

# HEATMAKER™

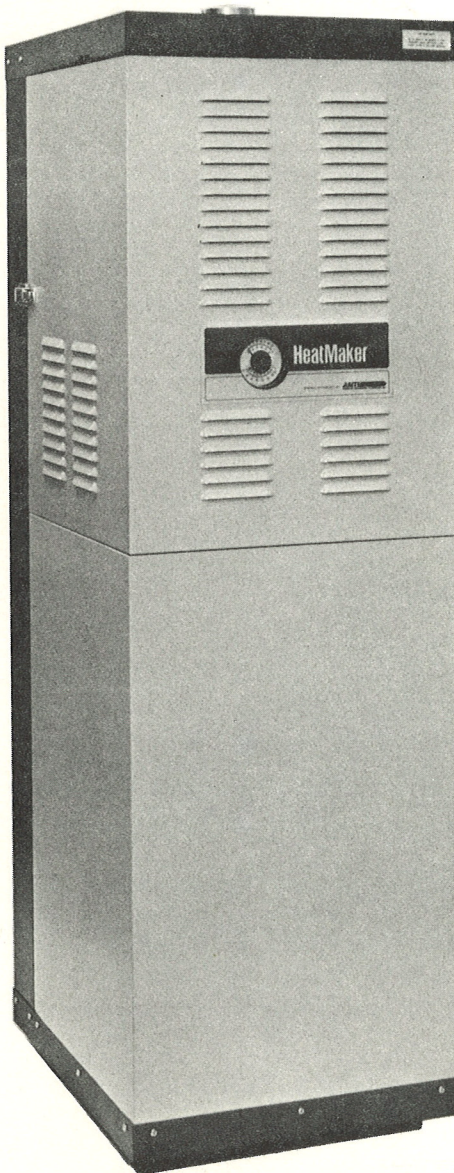
*Versatility under fire.*

BULLETIN I88-1

## INSTALLATION & OPERATING INSTRUCTIONS

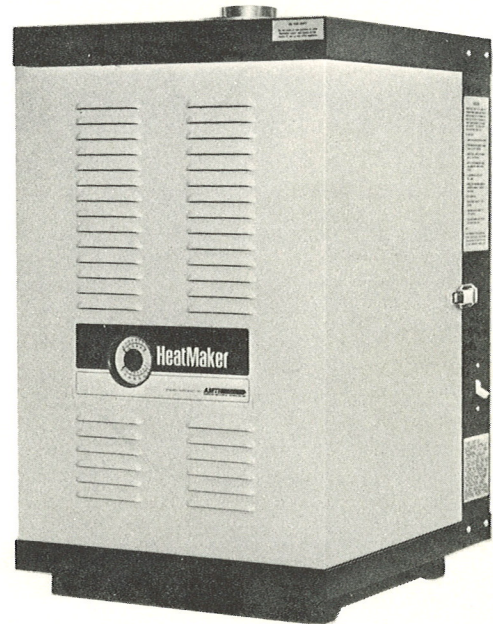
### HW-SERIES

Model 130HW, 100HW, 60HW  
Integrated Hydronic Heating  
and Domestic Hot Water Appliance  
for Natural or Propane Gas



### H-SERIES

Model 130H, 100H, 60H  
Hydronic Heating Only  
For Natural or Propane Gas



#### FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

**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.

#### FOR YOUR SAFETY

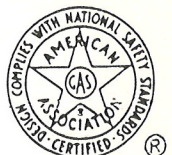
##### WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical 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.

**To the Installer:** After installation these instructions must be given to the homeowner or left on or near the boiler.

**To the Homeowner:** This booklet contains important information that will help you in maintaining and operating this boiler. Please retain it for future reference.

**Note:** In the interest of product improvement, specifications are subject to change without notice.



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## INTRODUCTION

**HW-SERIES—Integrated Appliance,  
Heating and Domestic Hot Water  
Model 130HW, 100HW, and 60HW**

**H-SERIES—Heating Only  
Model 130H, 100H, and 60H**

The HeatMaker is a direct vent, low pressure, hot water boiler. It has a force draft, pre-mixed combustion system. All the air for combustion and about 30% excess air is supplied with the gas to the burner (flameholder). The air is drawn into the system through the intake duct which surrounds the vent pipe. The intake air is metered through an air orifice and then mixed with gas before entering the combustion air blower. The blower is mounted directly below the burner (flameholder) and forces the air/fuel mixture through the flameholder and into the combustion chamber. The mixture is ignited and burns on the flameholder. The hot gases are forced out through the heat exchanger and into the flue collector. From the flue collector they enter the vent pipe and are discharged to the outside atmosphere through the vent terminal.



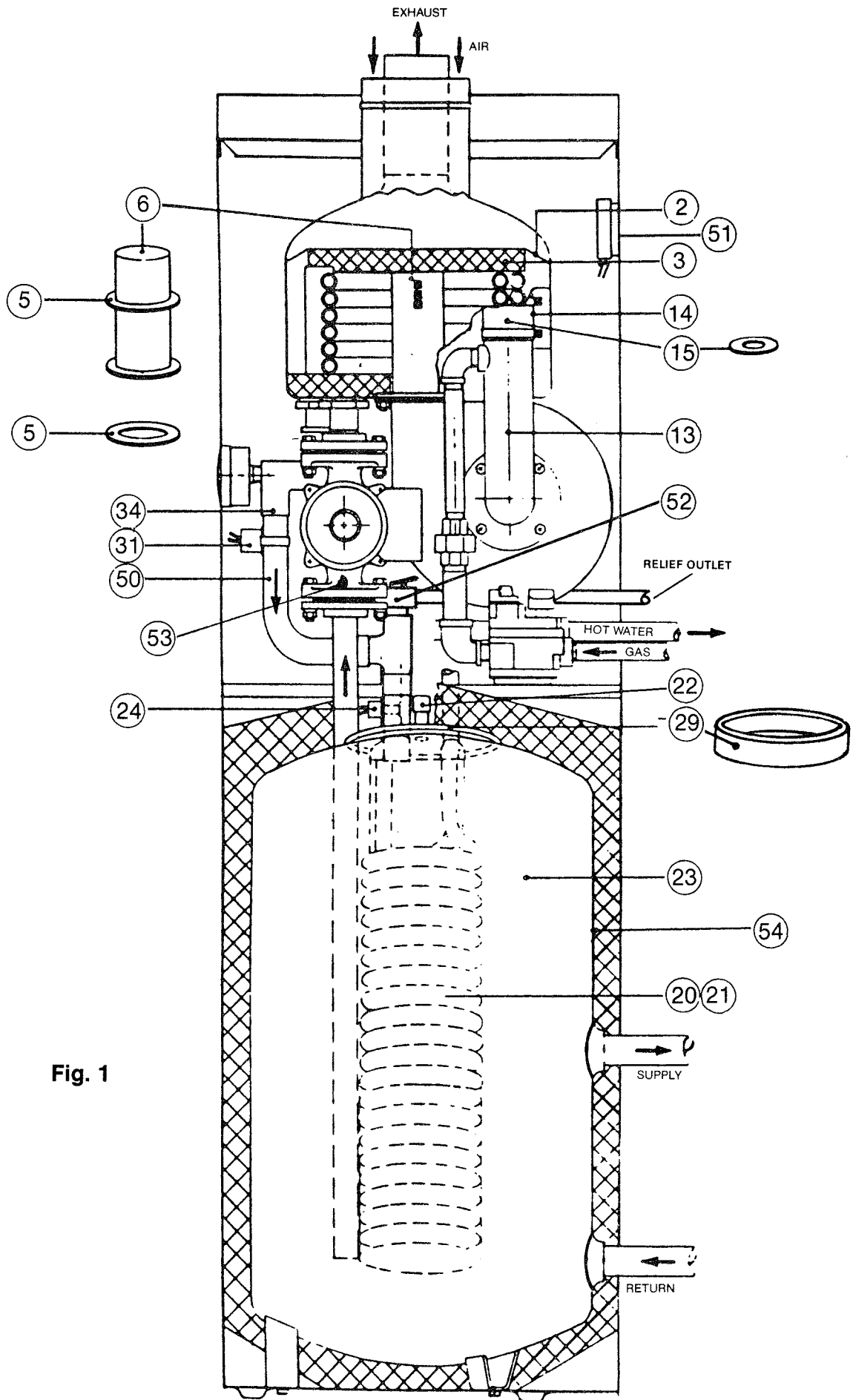
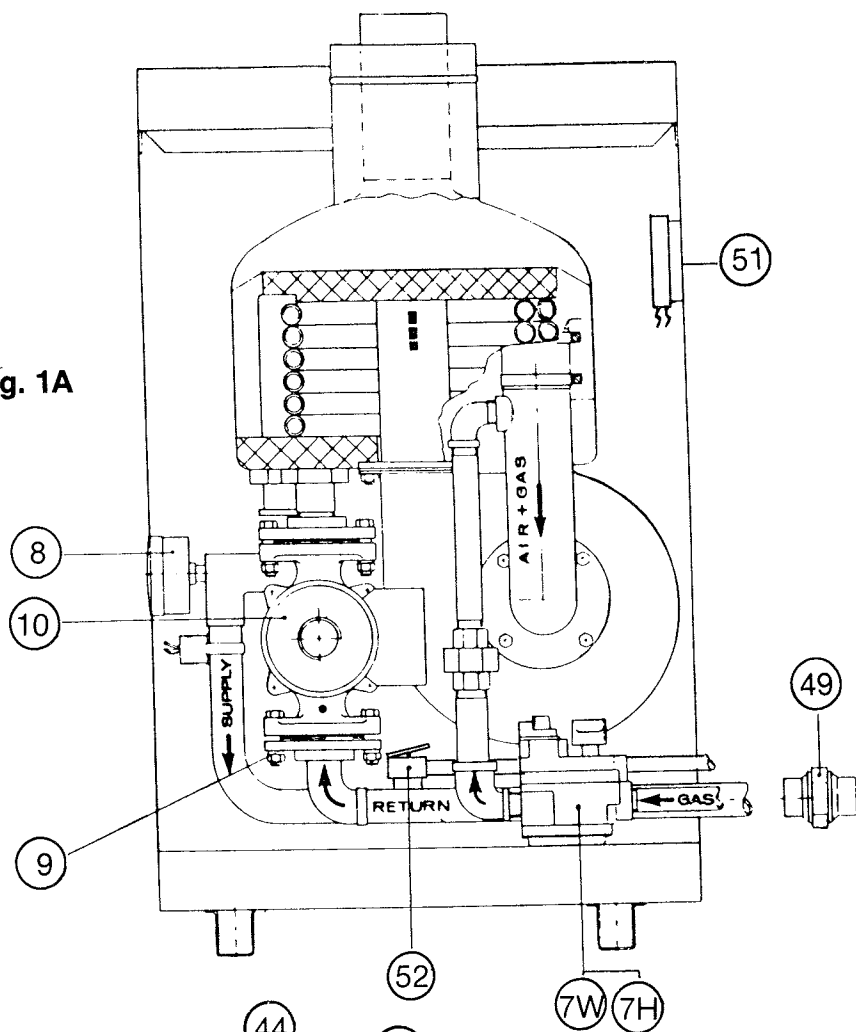
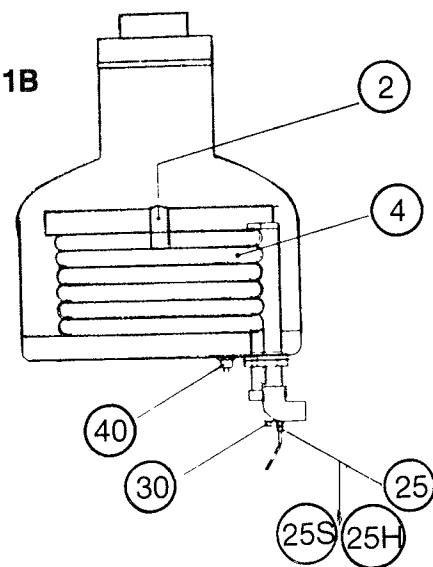


Fig. 1

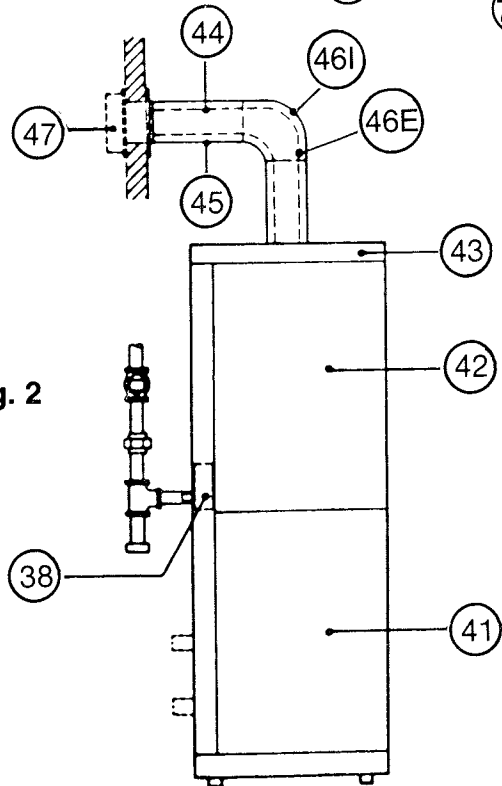
**Fig. 1A**



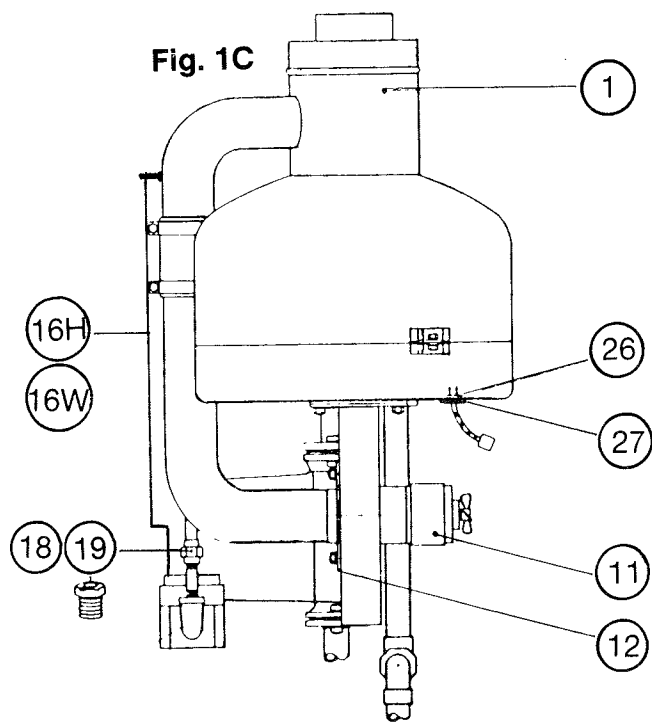
**Fig. 1B**



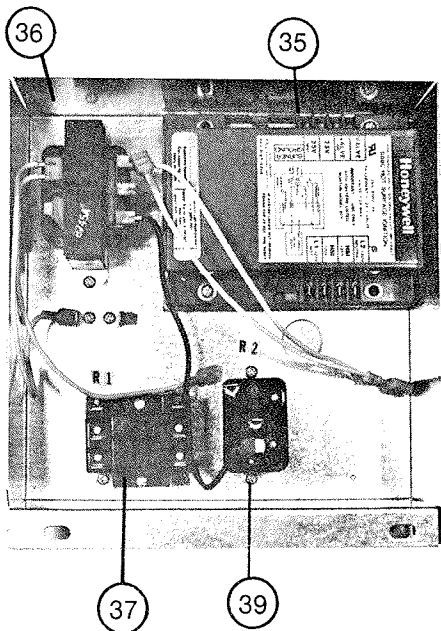
**Fig. 2**



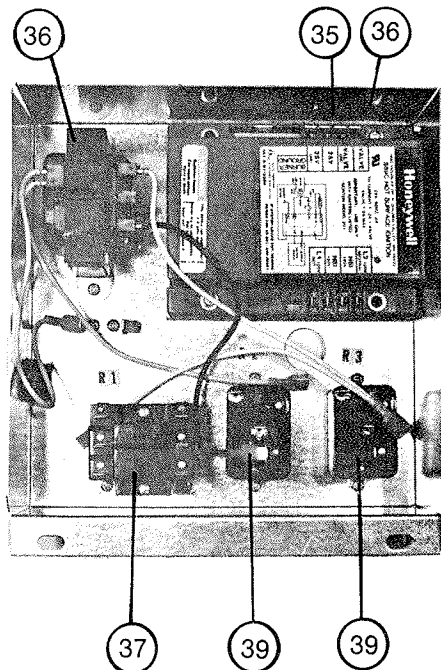
**Fig. 1C**



**H-unit Control Box**



**HW Unit Control Box**



**PARTS LISTING**

NUMBER	PART NUMBER	PART NAME
1	2601-001	Assembly, combustion chamber top
2	2600-402	Retainer, insulation
3	2600-026	Insulation, coil cover
4	2601-002	Assembly, combustion chamber coil
5	2600-055	Gasket, flameholder/blower
6	2601-003	Flameholder with gasket
7H	2600-264-1	Gas valve, Honeywell
7W	2600-264	Gas valve, White Rogers
8	2600-463	Gauge, press/temp back mount
8	2600-042	Gauge, press/temp bottom mount
9	2600-057	Gasket, pump two
10	2601-753	Pump, unit 15-42F (86-001 onward)
11	2601-049	Blower (with gasket)
12	2600-056	Gasket, blower intake
13	2600-220	Assembly, blower intake duct
14	2600-495	Coupling, air duct
* 15	Specify input	Orifice, air
16H	2600-066-1	Balance line for Honeywell
16W	2600-066	Balance line for White Rogers
17	2600-046	Nut and ferrule
18	2600-044	Union, orifice
* 19	Specify input	Orifice, gas
20	2601-353	Coil, single wall D.W.H.
21	2601-283	Coil, double wall D.W.H.
22	2600-493	Air vent
23	2600-001	Assembly, transfer tank & coil
24	2601-041	Control, low limit
25H	2601-040	High limit (before 84-001)
25S	2601-458	Safety limit (S/N 84-001-onward)
26	2601-004	Igniter with gasket
27	2600-355	Gasket, igniter
28	2600-279	Gasket, D.W.H. coil (flat type)
29	2600-491	Gasket, D.W.H. coil (w/o holes)
30	2600-020	Pet cock and tube assembly
31	2601-457	Control, operating
32	2600-507	Harness, wiring (load)
33	2600-084	Harness, wiring (line)
34	2600-444	Fitting, boiler discharge
35F	2601-263	Fenwal control board
35H	2601-263-1	Honeywell control board
36	2601-260	Transformer, 120/24 VAC, 30 VA
37	2601-261	Relay (R1)
38	2600-111	Switch, 120 volt
39	2601-262	Relay (R2 and R3)
40	2600-361	Thermal Cut-Off (TCO)
41	2600-126	Lower panel, jacket
42	2501-452	Access panel, jacket
43	2600-094	Top panel, jacket
44	2600-316	Pipe, 3" vent (SS)
45	2600-315	Pipe, 5" air
46E	2600-386	Elbow, 3" vent
46I	2600-387	Elbow, 5" vent
47	2600-102	Termination, vent S/S
48	2600-313	Extended Termination, vent
49	2600-129	Thermostat, supply water H and HC only
50	2600-473	Tube, boiler discharge
51	2600-598	Stack switch (86-001 onward)
52	2600-168	Pressure relief valve
53	2601-269	Pressure switch (before 84-001)
54	2602-287	Tank (no coil)

When ordering parts, be sure to include the following information:

Unit Model Number	Part Number
Unit Serial Number	Part Description

\*NOT SOLD SEPARATELY - ORDER ORIFICE KIT  
FOR DESIRED INPUT AND TYPE OF GAS

## HEAT AND HOT WATER HW-SERIES

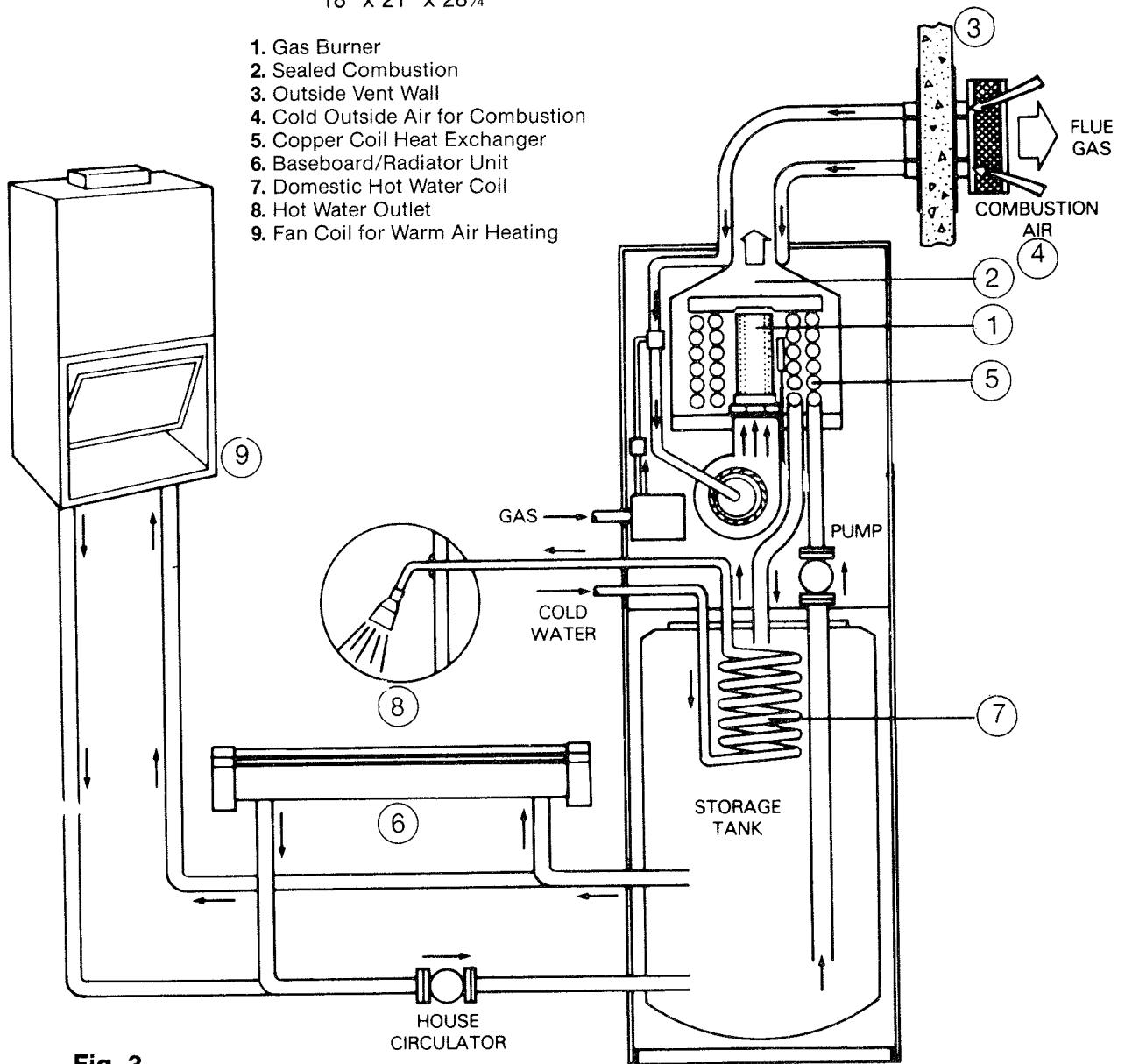
### Space Saving Dimensions

#### HW-Series

18" x 21" x 57¼"

#### H-Series

18" x 21" x 28¼"

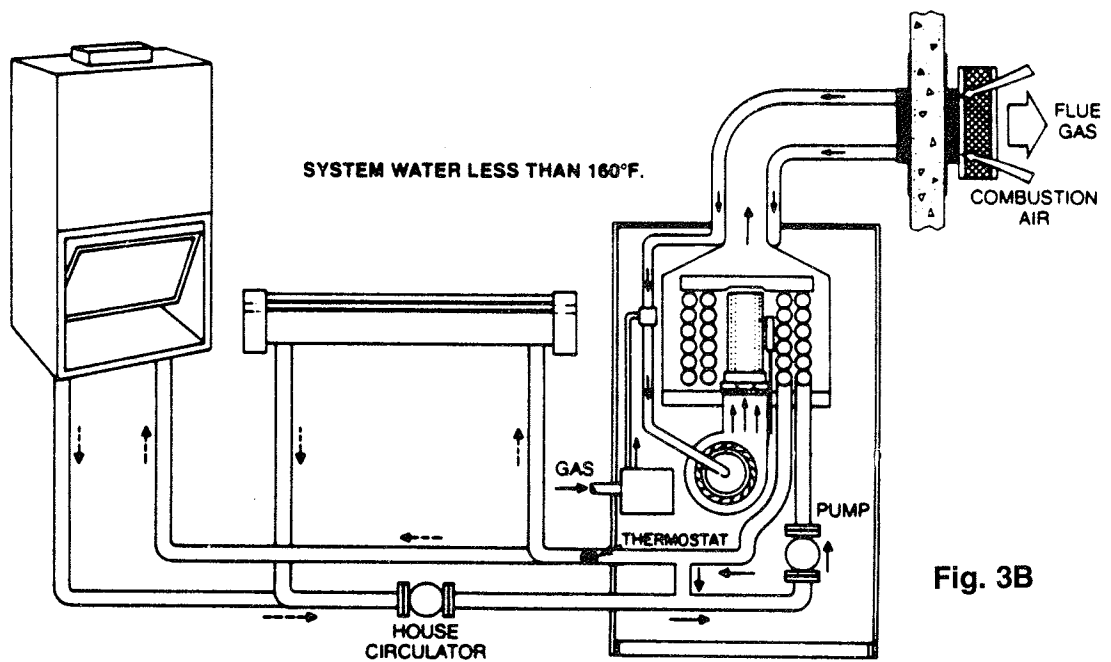
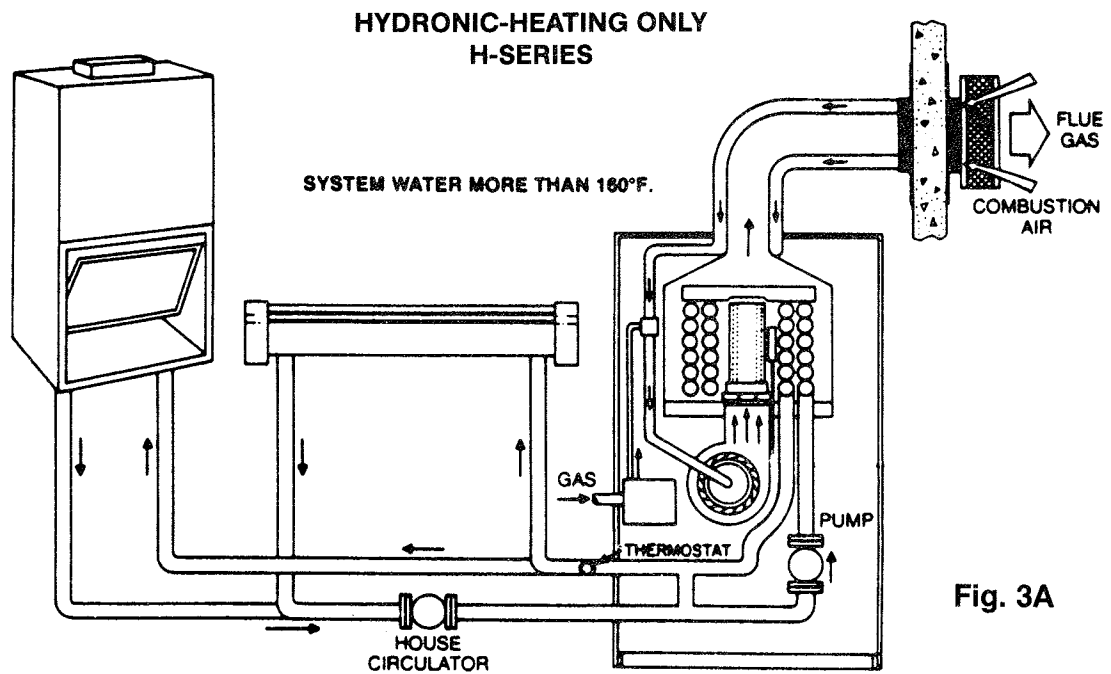


**Fig. 3**

### SIMPLIFIED SCHEMATIC DIAGRAM

#### HW-SERIES

The HW-Series has domestic hot water heating as well as hydronic space heating. To do this it has a storage tank through which boiler water is circulated. A heat exchanger within the tank absorbs heat from the boiler water and transfers it to the domestic hot water. The domestic hot water is circulated through the heat exchanger and the boiler water is circulated around it.



**SCHEMATIC DIAGRAM SIMPLIFIED**

### H-SERIES

The H-Series is designed to supply only hot water for space heating. It has a unique system to prevent cold water from entering the boiler and causing the condensation of water vapor from the products of combustion. In this system a thermostat prevents the water from leaving the unit at less than 160° F and forces the cooler water through the bypass back into the boiler.

## TO THE INSTALLER:

### BEFORE YOU BEGIN

The HeatMaker is uniquely different than any heating boiler you have installed in the past.

It is important for you to take a few minutes to review the contents of this installation and operating manual **before you begin installation**. This will avoid making mistakes and causing confusion when installing and operating the unit.

Here are some of the unique features of the HeatMaker you should be aware of before you start the installation steps:

#### Direct Vent — Sealed Combustion

The HeatMaker does not take combustion air (primary air) from the installation location. All of its air is drawn in from outside through the 5" outer pipe. Exhaust gases are vented through the 3" vent pipe positioned inside the 5" intake pipe. As you can see in Figure 2, the hot exhaust gases are surrounded by the intake flow of cool supply air. This means that the vent can be installed through combustible materials.

#### No Chimney ... Flue ... or Draft Inducer Required

Because this is a designed sealed combustion, forced-draft unit, it does not need, and **must not** be connected to, a chimney, existing venting system, or draft inducer.

The supplied venting system can be installed through the nearest outside wall. (See vent installation steps, page 8).

**CAUTION:** Connection of this vent to a chimney, existing venting system, or draft inducer will cause insufficient combustion and the unit will not operate.

It is designed to efficiently and instantaneously heat system water for distribution through the hydronic heating system.

The HeatMaker must be protected against overpressurization. 30 PSI pressure relief valve is provided in the supply line of the boiler.

**IMPORTANT:** The relief valve supplied is A.S.M.E. approved and can only be substituted or replaced with 30 PSI, A.S.M.E. approved ¾" relief valve of the proper size.

### TWO MODELS

The HeatMaker is supplied in two different series.

H-Series is for hydronic heating only.

HW-Series is an integrated appliance that supplies hydronic heating as well as domestic hot water.

**CAUTION:** HW-Series (Integrated) contains two separate water circuits. One is connected to the hydronic piping system and the other to the domestic hot water piping.

Both circuit connections are made at the storage tank. Referring to Figure 2, you can see that should domestic system piping be inadvertently connected to heating system connections, heating system water would enter the potable water piping. Be sure that connections are made to the storage tank correctly.

### CODE STANDARDS

All installations must be made in accordance with the American National Standard Z223.1 "National Fuel Gas Code,"

latest edition and with the requirements of the local utility or other authorities having jurisdiction. Such applicable requirements take precedence over the general instructions contained herein.

All electrical wiring is to be done in accordance with the National Electrical Code ANSI/NFPA No. 70-1984.

When required by the jurisdiction authority, the installations must conform to the American Society of Mechanical Engineers' Safety Code for controls and safety devices for automatically fired boilers, No. CSD-1.

### H-SERIES APPLICATION NOTE:

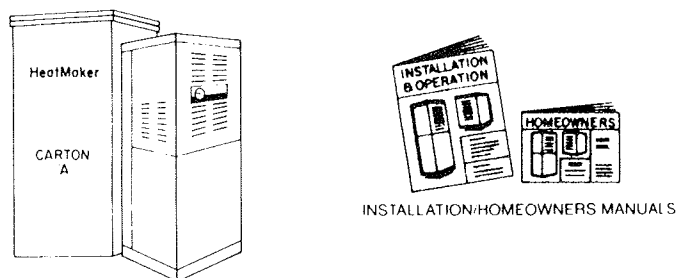
A common installation error is to fail to provide adequate circulation through the heating system and boiler. Besides causing uneven heating, this can result in short-cycling of the boiler. Recommended minimum circulation rates for H-series boilers are as follows:

Model 60-H .....	4 GPM
Model 100-H .....	6 GPM
Model 130-H .....	7.5 GPM

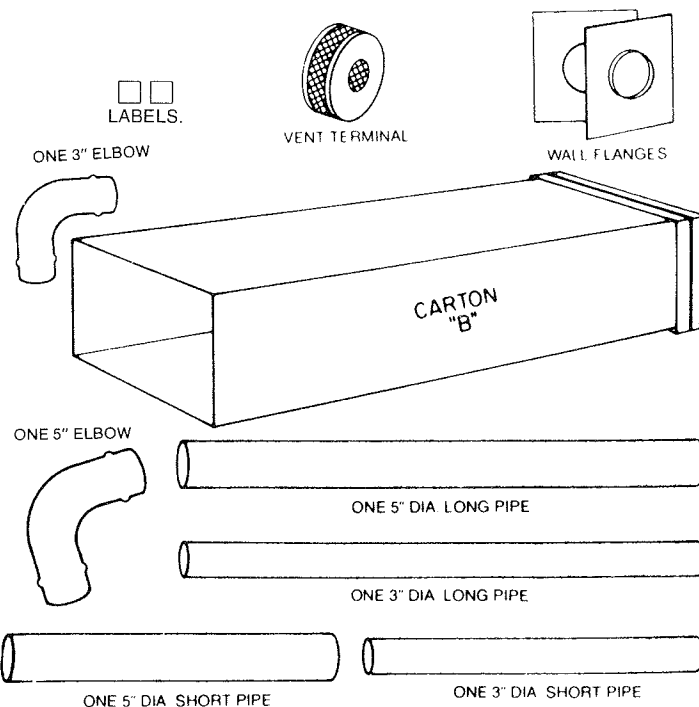
### STEP 1 — UNPACKING

Two cartons are required for the HeatMaker.

#### CARTON "A" CONTENTS Fig. 4



#### CARTON "B" CONTENTS Fig. 4A





- 1A. Remove all packing and tie-down materials.
- 1B. Check contents of two cartons against list shown above.
- 1C. Make immediate claims for damage or shortage.

## STEP 2 — LOCATING THE HEATMAKER

The HeatMaker design is certified by the A.G.A. for installation on combustible flooring; in alcoves; basements; closets or utility rooms. It must not be installed on carpeting. If installed in a finished area, provision should be made for drainage of any accidental spillage or leakage.

The location for the unit should be chosen with regard to venting dimensions, convenient access to piping, ventilation of operating components and accessibility for service and cleaning.

Information on where the vent terminal should and should not terminate, including:

- (a) Distance from adjacent public walkways, adjacent buildings, openable windows and building openings, consistent with the National Fuel Gas Code, Z223.1;
- (b) Information on preventing blockage by snow;
- (c) Information on protecting building materials from degradation by flue gases; and
- (d) Minimum clearance of 4 feet (1.22 m) horizontally from, and in no case above or below, unless a 4-foot (1.22 m) horizontal distance is maintained, from electric meters, gas meters, regulators and relief equipment.

The following dimensions and criteria should be followed when choosing the location for the unit:

### A. MINIMUM CLEARANCE FROM COMBUSTIBLE CONSTRUCTION

To meet A.G.A. requirements for clearance from combustible materials, locate unit to provide the following minimum clearance dimensions:

Sides .....	1"
Top .....	1"
Back .....	1"
Front .....	1"
Vent .....	0"

### Recommended Clearance for Accessibility and Venting

To provide reasonable accessibility and for vent installation, the following minimum clearances are recommended:

Left Side .....	6"
Right Side (controls) .....	12"
Top (vent) .....	14"
Back .....	9"
Front .....	24"

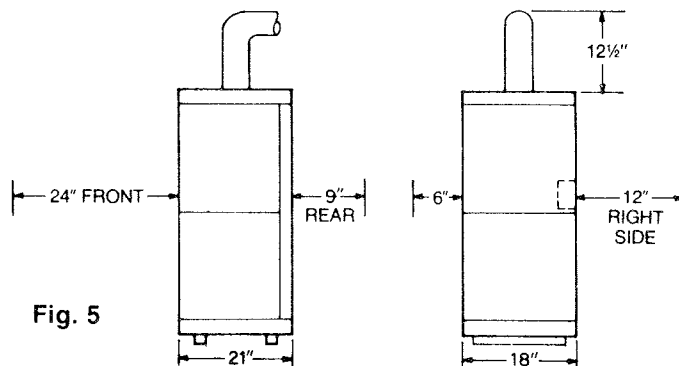


Fig. 5

**Minimum Head Room** (measured from base of unit to top of vent).

HW-Series .....	6'3"
H-Series .....	3'10"

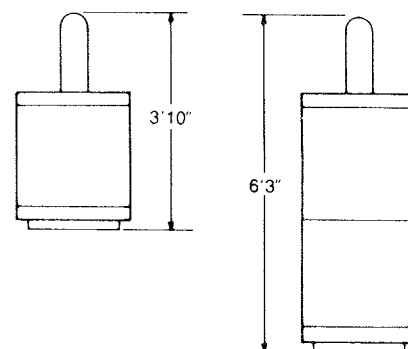


Fig. 5A

**\* NOTE:** Maximum horizontal length with the standard vent kit supplied with the unit is 46". Longer lengths of vent pipe are available from your supplier.

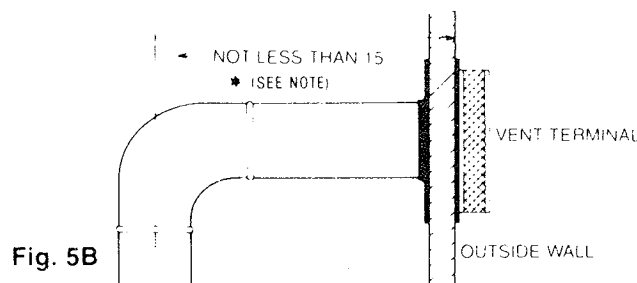


Fig. 5B

### B. VENTING UNIT FOR PROPER VENTING\* (See note)

#### 1. Venting Distance From Outside Wall

The maximum distance from the vent connector on the unit to the vent termination on the outside of the building is determined by the combined length of both the horizontal and vertical runs. That length may not exceed 12 FT. (e.g., if a 3 FT. vertical section is required then only 9 FT. is available for the horizontal run—3 + 9 = 12 FT.)

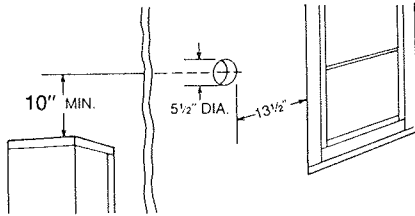


Fig. 5C

## 2. Locating Vent Opening in Outside Wall

The center line of the vent opening must be at least 10" above the top of the HeatMaker, 16½" above grade, outside, and at least 13½" from any other building openings, such as doors, windows, etc.

Vent opening should be well away from shrubbery or other obstructions that would prevent free air flow to and from vent terminal.

Whenever possible, locations under windows should be avoided.

**NOTE:** Should it be impossible to locate opening center line 16½" above grade, use optional vent terminal #2600-313.

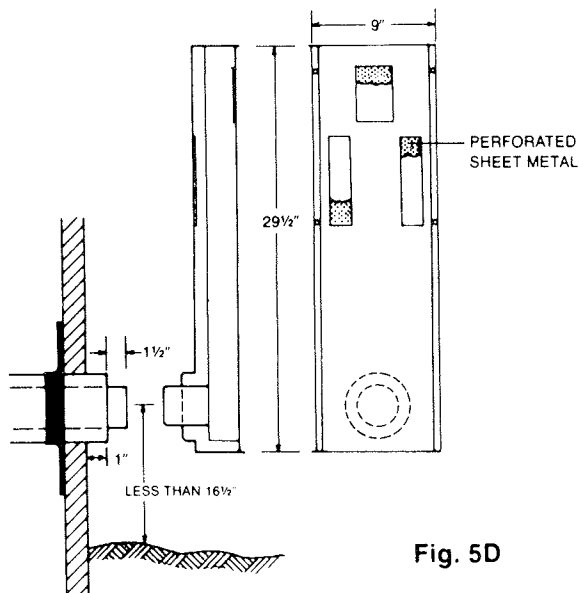


Fig. 5D

## OPTIONAL VENT TERMINATION — PART #2600-313

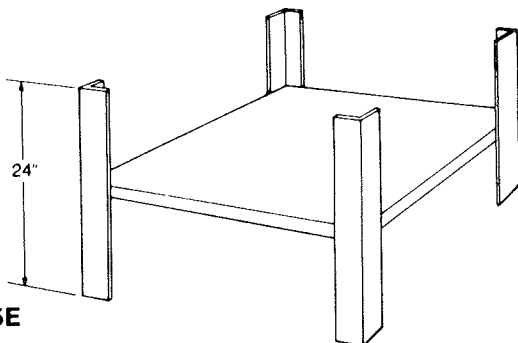


Fig. 5E

## OPTIONAL UNIT STAND, #2600-314

Should it be impossible to locate vent opening center line within 48" of the top of the unit, use optional unit stand #2600-314.

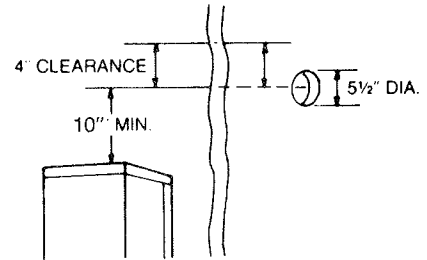


Fig. 5F

## 3. Locating Unit for Vent Pipe Height

The location of the HeatMaker must have at least 4" of head room above the center line of the vent opening in the exterior wall.

## C. LOCATING UNIT WITH RESPECT TO VENTILATION

While the HeatMaker requires no interior air for combustion, adequate air flow around the unit must be provided for proper cooling of electrical components.

## STEP 3 — INSTALLING VENT PIPING AND TERMINAL

All materials for a vent installation with a total vent length of seven (7) feet, and two elbows are provided. The maximum allowable vent length is twelve (12) feet and it may also have two (2) elbows. Use only venting materials supplied by the manufacturer or those which meet or exceed the requirements of the manufacturer. Do not join pieces of vent pipe to obtain the longer lengths. When required, purchase longer lengths from your supplier. If elevation of the vent terminal is necessary, use optional terminal (part number 2600-313). If elevation of the unit is necessary (H-series), use optional unit stand (part number 2600-314). Both of these accessories are available from your distributor.

- 1 - Elbow (3" inner)
- 1 - Elbow (5" outer)
- 1 - 5" diameter x 43½" long pipe
- 1 - 3" diameter x 43½" long pipe
- 1 - 5" diameter x 31½" short pipe
- 1 - 3" diameter x 31½" short pipe
- 2 - Wall flanges
- 1 - Vent terminal
- 1 - Literature and label package

If dimensions A or B cannot be obtained with the parts supplied, longer lengths may be purchased from your supplier (you may not, however, exceed the maximum allowable length mentioned above).

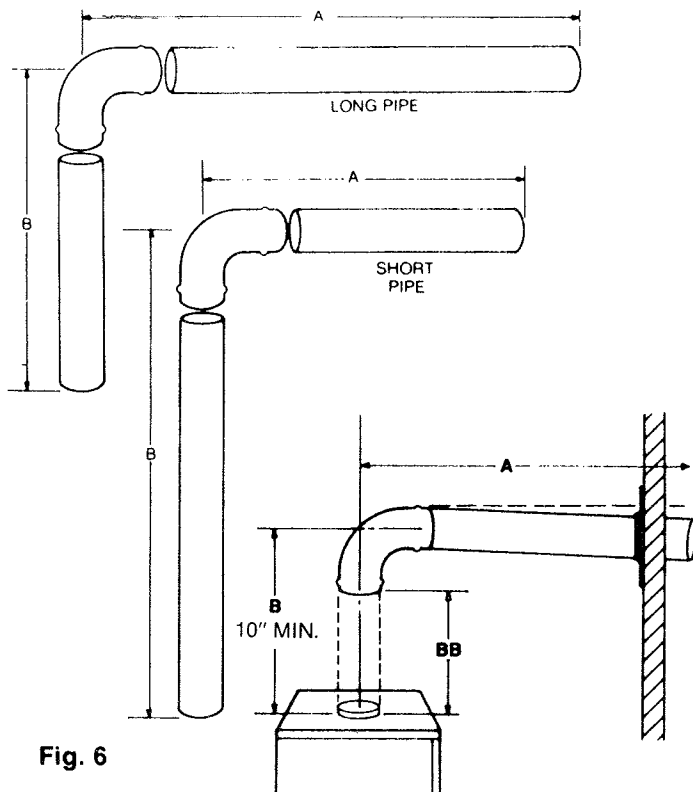


Fig. 6

Assemble without screws the elbow and two 5" diameter lengths of pipe. Rough measure distances A and B to determine vent arrangement and to insure that the location selected is within the venting limitations. **Do not cut pipes during this step.**

- C. Check to be sure center line of the vent opening in the exterior wall is at least 10" from the top of the unit jacket. Check to be sure there is at least 4" of clearance above the center line of the vent opening in the exterior wall at the unit location (Figure 5F).
- D. Cut 5½" diameter hole in exterior wall at vent opening.

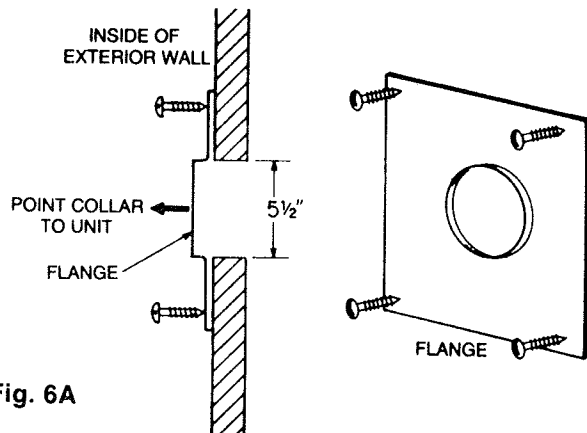


Fig. 6A

- E. Center wall flange over hole on the inside of the exterior wall with the collar pointing to the unit. Secure the wall flange to the wall.

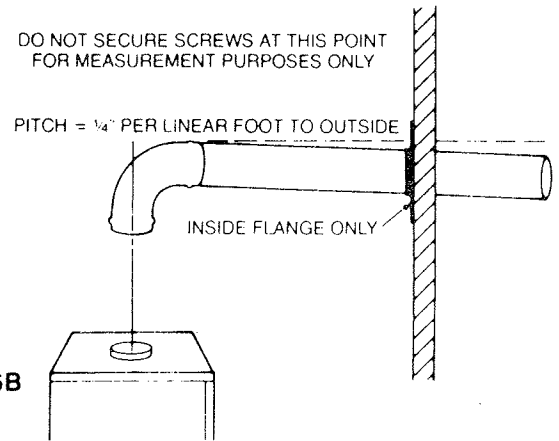


Fig. 6B

- F. With the elbow engaged, slide the horizontal run (A) of the 5" pipe through the wall flange until the elbow centers over the vent outlet on the unit. Temporarily support this section so that the pipe is pitched **down** from the unit toward the outside wall ¼" per foot. This will prevent water or melted snow from running into the unit.
- G. Measure vertical distance (BB) (base of collar or unit to shoulder on elbow) allowing for full engagement of collar and elbow. Cut vertical 5" and 3" pieces the same length (Figure 6).

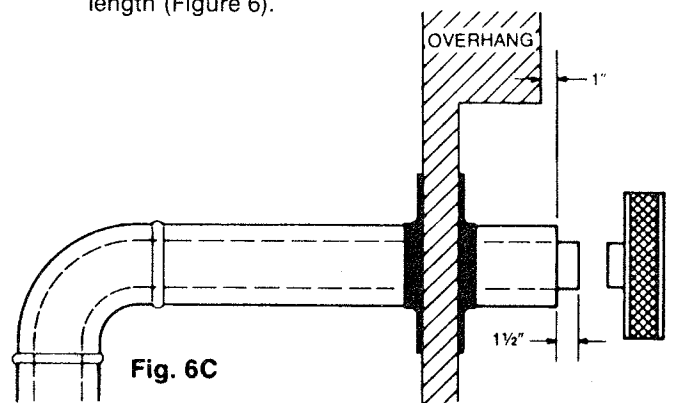


Fig. 6C

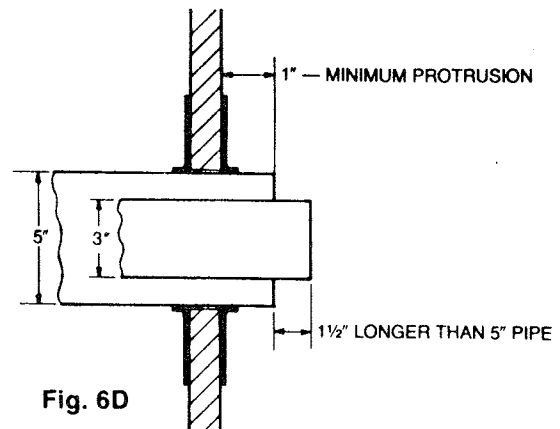
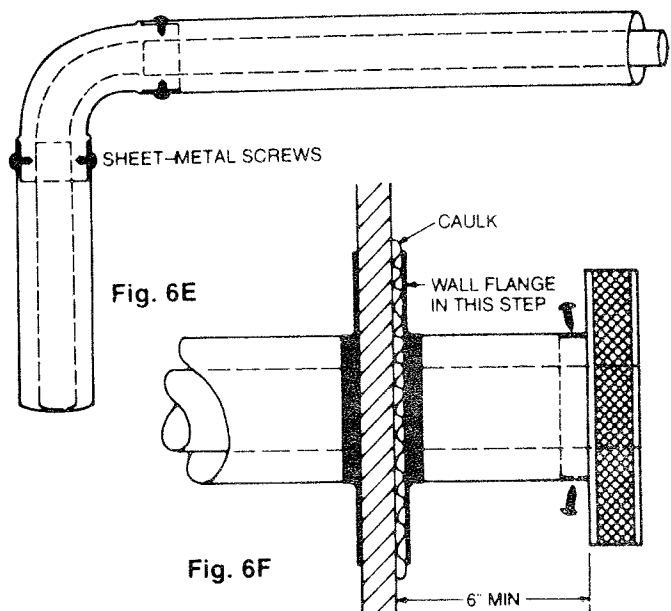
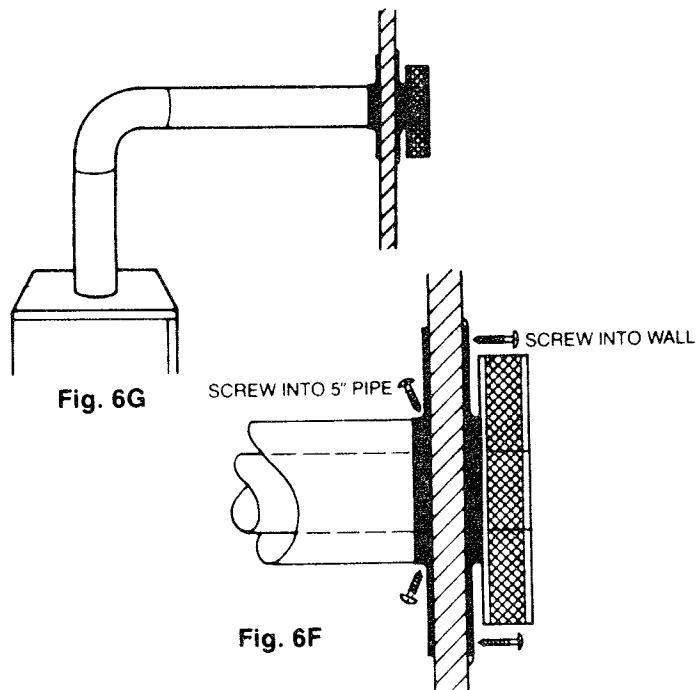


Fig. 6D

- H. On the outside of the house, mark the 5" horizontal piece for the correct protrusion (Figures 6C and 6D). The minimum protrusion is 1" (for the outside wall flange). Cut the 5" pipe on the mark. **Cut the 3" horizontal piece 1½" longer than the 5" piece.** If optional vent terminal is being used, see Figure 5D.



- I. Assemble the elbow and both horizontal and vertical runs of inner 3" and outer 5" vent pipes. **Pipes must be fully engaged over fittings all the way to the stops.** Tape 3" pipe joints. Secure the 5" pieces to the elbow with sheet metal screws (Figure 6E).
- J. Push assembly through wall so that the pipe extends at least 6" outside. Slide the outside wall flange over the pipe with the collar facing out. Fully engage the vent terminal and secure with two sheet metal screws. Caulk behind the outside wall flange (Figure 6F).



- K. Push assembly back in and fully engage assembly over the unit collar (Figure 6G).
- L. Secure outside wall flange to the house and install a sheet metal screw through either the inner or outer wall flange collar to prevent movement of the horizontal run (Figure 6F).

#### STEP 4 — CONNECTING GAS TO HEATMAKER

- A. The HeatMaker requires an inlet gas pressure of at least 4" W.C. and no greater than 14" W.C. Check with your local gas utility or supplier for availability of this pressure range.
- B. Referring to Table 1, size supply piping to keep pressure drop between meter and unit to below 0.3" W.C.
- C. Run gas supply line in accordance with all applicable codes. **If unit is installed above gas supply, run piping up to a point above vent center line and back down to unit.** This will prevent water from entering gas supply should a leak develop in the boiler section.
- D. Locate and install manual shutoff valves in accordance with state and local requirements.
- E. Install drip leg and ground joint union (Figure 7).
- F. Support all piping with proper hangers.
- G. All threaded joints should be coated with piping compound resistant to action of liquified petroleum gas regardless if LPG is used or not.
- H. 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).
- I. The boiler and its gas connection must be leak tested before placing the boiler in operation.
- J. Purge all air from gas lines.
- K. Note HeatMakers are certified for 4" to 14" W.C. We find on L/P the unit performs better when the high pressure regulator is not set over 10" W.C.

**CAUTION: DO NOT USE OPEN FLAME TO CHECK FOR LEAKS**

#### STEP 5 — CONNECT AND INSTALL HEATING SYSTEM PIPING, FITTINGS, AND ACCESSORIES

**HW-Series — Integrated Appliance**  
**H-Series — Hydronic Heating Unit**

Typical piping diagram is shown in Figures 9, 9A and 9B. Water connections on unit are located in Figures 3, 3A and 3B.

##### A. Install Thermal Leg (HW-Series only)

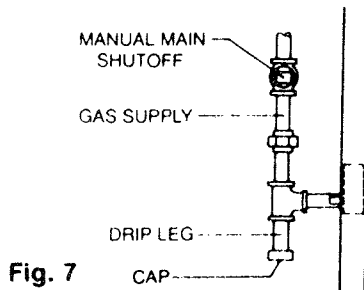
To minimize heat losses from the storage tank during standby periods, it is recommended that all heating and domestic hot water piping to the HeatMaker be made with a vertical leg extending at least 6" down from the point of connection. This will minimize thermal convection between the transfer tank and the external piping. For further heat loss reduction, the piping between the HeatMaker up to and including the vertical leg can be insulated with ½-¾" of insulation.

**B. Hot Water Supply Connections, Fittings and Accessories**  
(Refer to Figures 9, 9A and 9B).\*

1. Connect system supply to 1" supply connection (A).
2. Pipe the discharge of the relief valve, full size, to a drain or in a manner to prevent injury in the event of pressure relief.
3. Install an air purger (2) in supply line downstream of relief valve.
4. Install an automatic float type air vent (3) on air purger.
5. Connect automatic fill valve on return (4) and diaphragm type expansion tank (5) (AMTROL FillTrol or equivalent) to air purger as shown. Minimum fill pressure must be 12 psig.
6. Install **hydraulic** flow check (6) in supply line downstream of air purger. (For HW-Series only.)
7. Install gate or shutoff valve (Optional) (7) downstream of flow check.

**TABLE 1: PIPE DELIVERY SCHEDULE**

Length of Pipe	Capacity of pipe in Cubic Feet Per Hour (.6 Specific Gravity)			
	1/2"	3/4"	1"	1 1/4"
10'	132	278	520	1,050
20'	92	190	350	730
30'	73	152	285	590
40'	63	130	245	500
50'	56	115	215	440
75'	45	93	175	360
100'	38	79	150	305
150'	31	64	120	250
<b>Additional length to be added for each tee or bend</b>	1.3'	1.7'	2.2'	2.7'



**C. Return Connection, Fittings, and Accessories**

1. Connect system return to 1" return connection (B) located below supply connection on unit.
2. Install a boiler drain valve (8) adjacent to unit in return line.
3. Install a properly sized circulator (9) with isolation valves (Optional) (10).

**CAUTION:** All hot water pipes must be installed with a minimum of 1" clearance from combustible material.

**D. Cold Water Make-Up**

1. Connect cold water supply to inlet connection of automatic fill valve (4).
2. If codes require, install suitable backflow preventer (11) between automatic fill valve and city main.
3. Install gate or shutoff valve upstream of fill valve. (Upstream of backflow preventer if required.)

\*A hot water boiler installed above radiation level must be provided with a low water cutoff device.

**STEP 6 — CONNECT AND INSTALL DOMESTIC WATER SYSTEM PIPING, FITTINGS, AND ACCESSORIES, HW-SERIES ONLY**

(Refer to Figures 9, 9A and 9B for Proper Locations)

**A. Domestic Hot Water Supply Piping, Fittings, and Accessories**

1. Connect hot water tempering valve (12) ("HOT" port) to hot water outlet from unit (C). This valve should be mounted 8" to 12" below the outlet (C) and set for 140°F mixed delivery temperature or as local codes dictate.
2. Connect gate or shutoff valve (13) to tempering valve (12) "MIX" port.
3. Connect domestic hot water supply to gate or shutoff valve (13).

**B. Domestic Cold Water Supply Piping, Fittings, and Accessories**

1. Connect pressure relief valve (17) if required by codes, maximum 150 PSI as close to the unit as possible. No other valves or restrictions must be installed between the HeatMaker and the relief valve (DO NOT USE A TEMPERATURE/PRESSURE RELIEF VALVE AS THIS IS NOT A STORAGE HOT WATER HEATER).
2. Install tee (15), "run" to relief (17), if installed, or to cold water inlet connection (D) on unit, "branch" to "COLD" port of mixing valve.
3. Install flow restrictor (14) to tee (15) "run". (See Table 2, page 15 for recommended sizes.)
4. Connect gate or shutoff valve (16) to flow restrictor (14) and domestic cold water inlet.



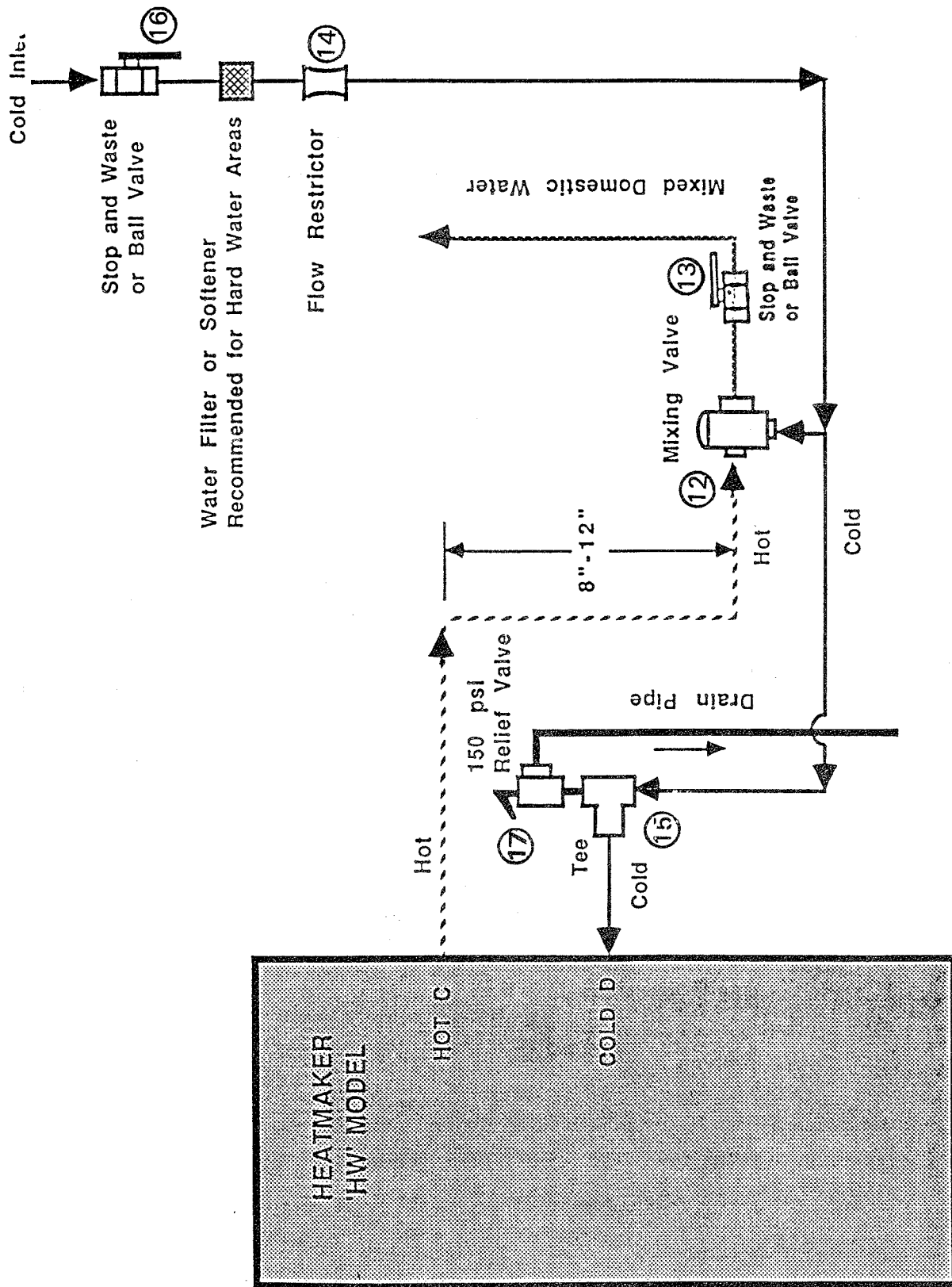
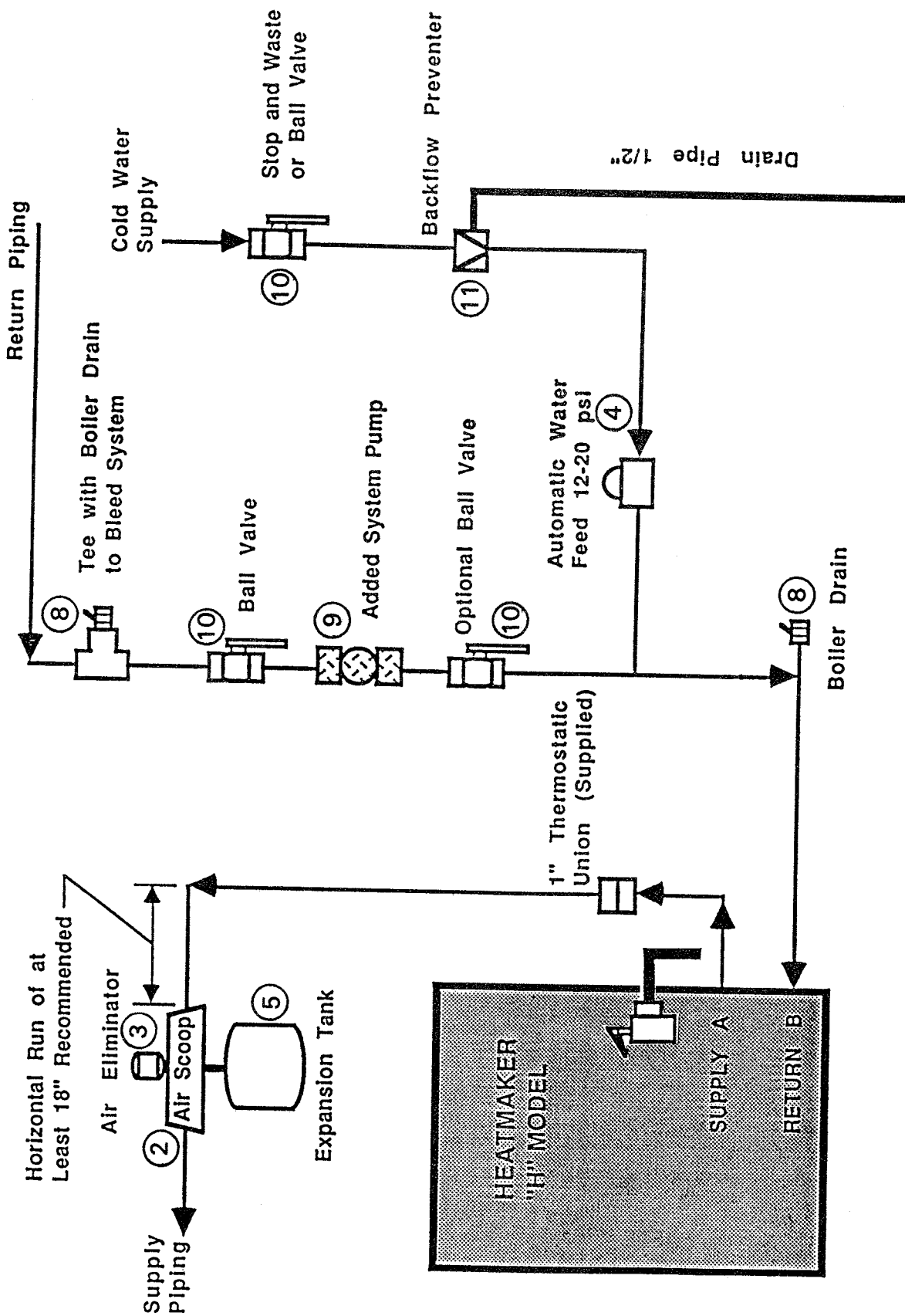


FIG. 8 - DOMESTIC WATER PIPING



**FIG 9 - HYDRONIC PIPING**

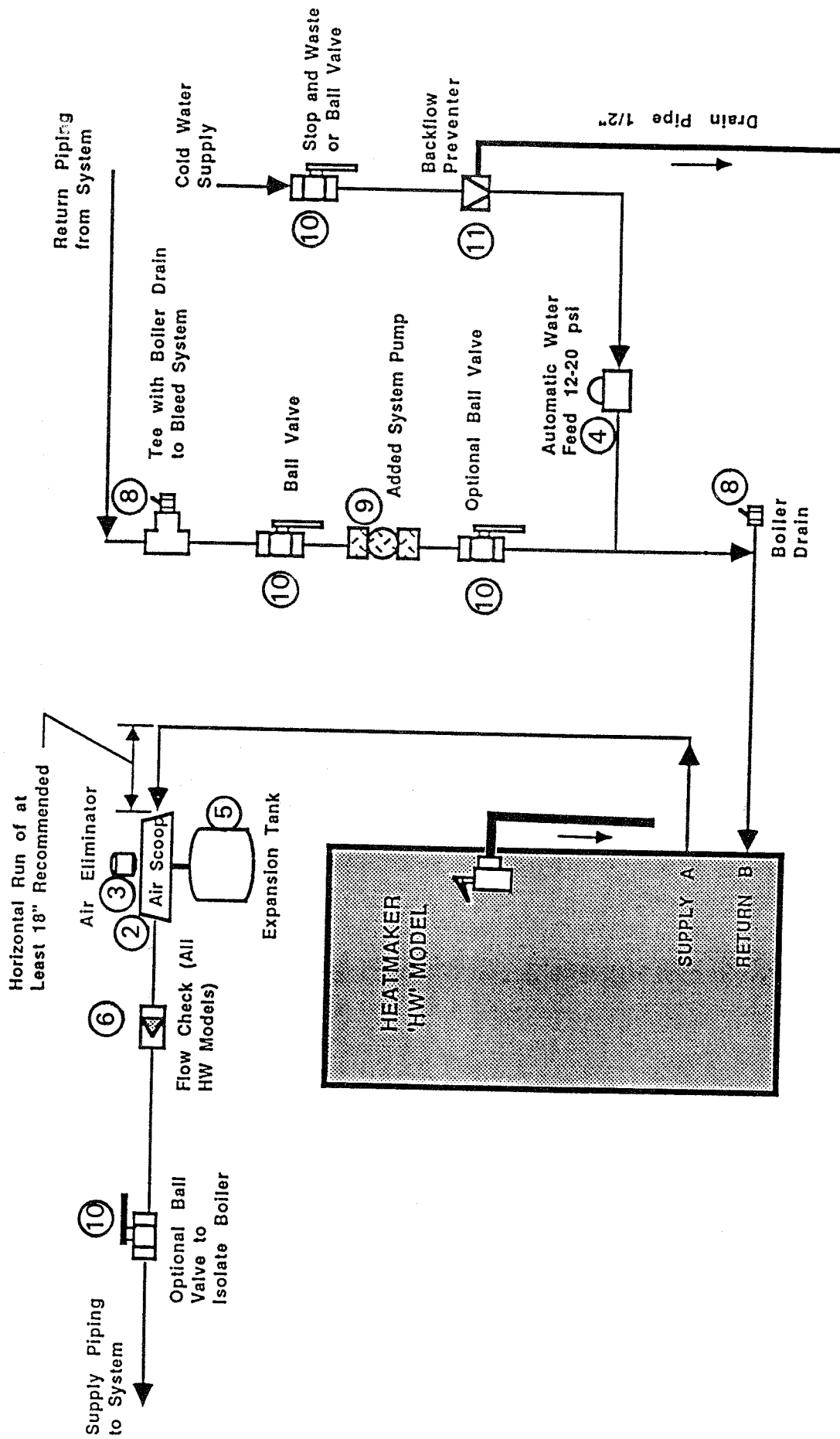


FIG. 9A - SINGLE ZONE HYDRONIC PIPING

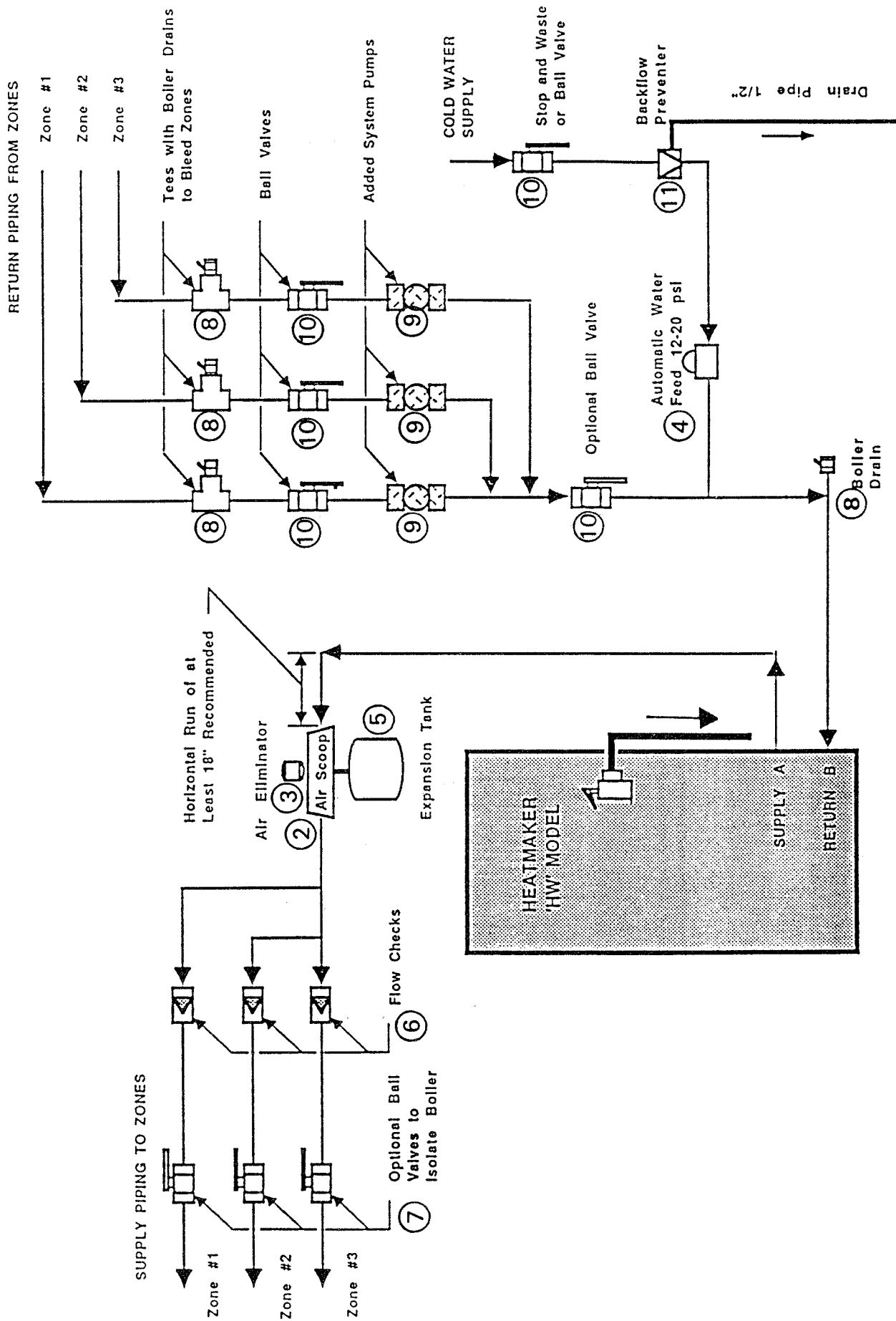


FIG. 9B - MULTI ZONE HYDRONIC PIPING

## **Using the HeatMaker in a Combined Hot Water Heating and Chilled Water Cooling System**

The boiler, when used in connection with a refrigeration system, must be installed so that the chilled medium is piped in parallel with a heating boiler with appropriate valves to prevent the chilled medium from entering the heating boiler.

The boiler piping system of a hot water heating boiler connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation must be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

### **STEP 7 — ELECTRICAL CONNECTIONS**

All electrical wiring must conform to local codes and/or the National Electric Code. The unit 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 No. 70-1984 or latest edition.

Single pole switches, including those of safety controls and protective devices must not be wired in a grounded line.

All electrical connections are made in the field wiring box which is located on the right side of the unit.

**NOTE:** All internal electric components have been pre-wired. No attempt should be made to connect electric wires to any other location except the wiring box designated above.

Wiring connections are indicated on the following wiring diagram.

#### **1. Main Power**

Connect a 120 volt supply to the main power switch illustrated - hot leg is connected directly to switch; neutral leg to large white wire. Ground wire to the grounding screw in the box.

#### **2. Single Zone Installations**

For single zone installations, not using a zone valve, connect room thermostat wires to the small red and white wires. Connect circulator (120 volt, ½ hp maximum) between the blue wire and the large white wire (neutral).

#### **3. Zone Valves and Thermostats**

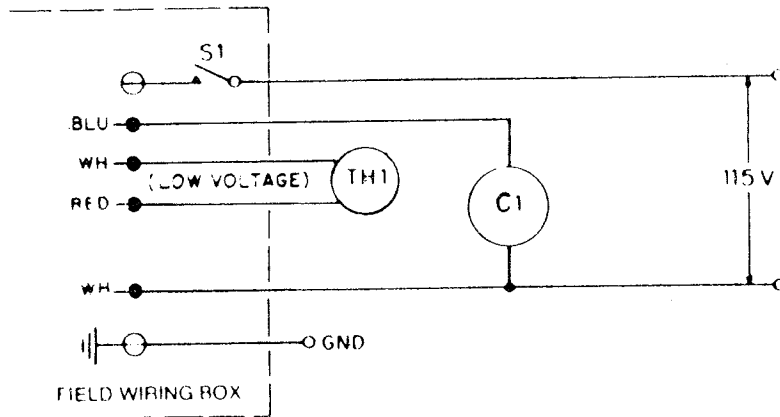
Install external 24 volt transformer of sufficient V.A. to power combined load of zone valves. Consult zone valve manufacturer's instructions. Connect circulator (120 volt, ½ hp maximum) between the blue wire and the large white wire (neutral).

#### **4. Multi-Zone/Multi-Relay-Circulator Installations**

Consult relay manufacturer's instructions.



# WIRING DIAGRAM FOR SINGLE ZONE

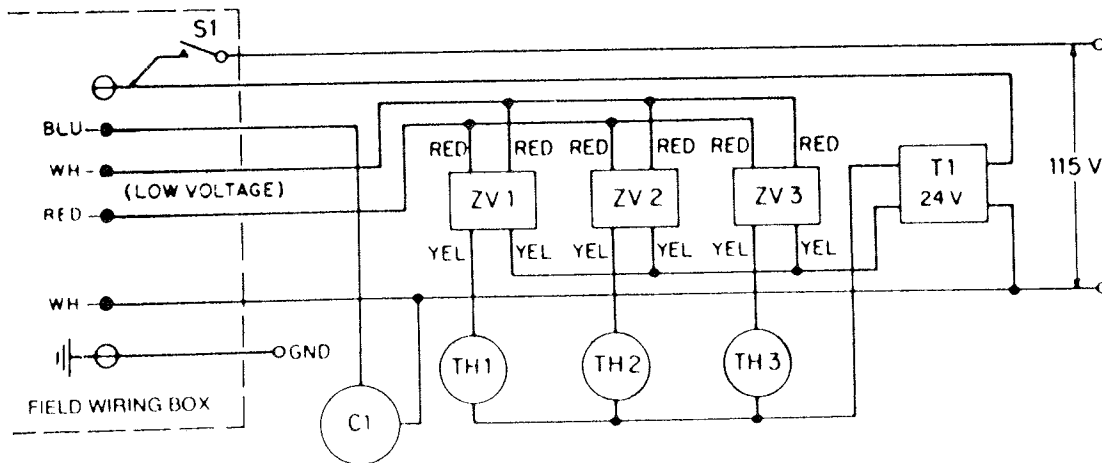


## Legend:

- S1 Disconnect Switch
- TH 1 24-Volt Thermostat
- C1 System Circulator

Fig. 10

# WIRING DIAGRAM — ZONING WITH ZONE VALVES



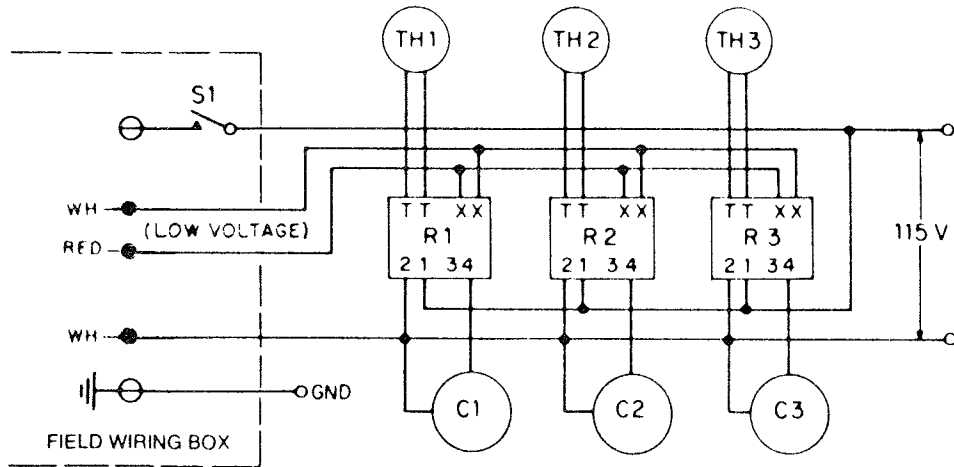
## LEGEND:

- S 1 . . . Disconnect Switch
- TH 1 } 24-Volt Thermostat
- TH 2 }
- TH 3 }
- C 1 . . . Circulator
- ZV 1 } Zone Valves
- ZV 2 } Honeywell V804
- ZV 3 } or equivalent
- T 1 . . . 24-Volt Transformer
- Sufficient VA for
- All zone valves.

Fig. 10A

All components supplied by others,

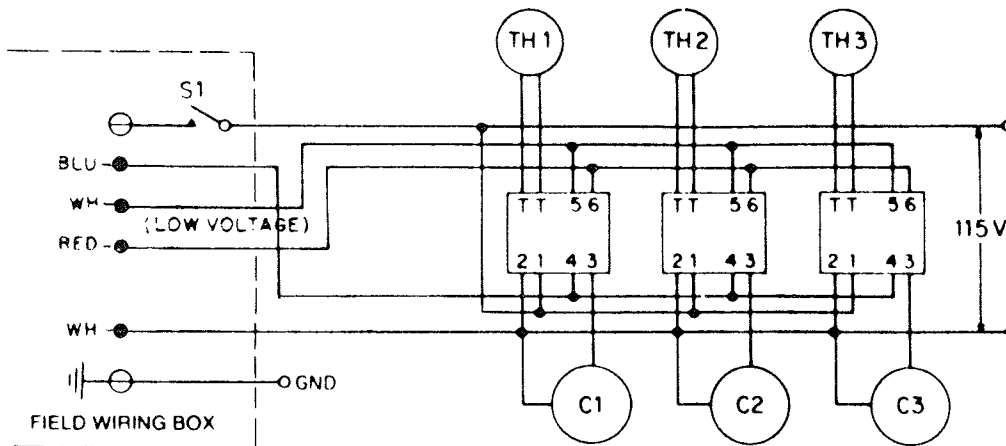
## WIRING DIAGRAM — ZONING WITH CIRCULATORS H-Series



**LEGEND:**  
 S 1 ... Disconnect Switch  
 TH 1 }  
 TH 2 } 24-Volt Thermostats  
 TH 3 }  
 C 1 }  
 C 2 } Zone Circulators  
 C 3 }  
 R 1 }  
 R 2 } Zone Relays  
 R 3 } Honeywell RA832A  
 or equivalent

Fig. 10B

## WIRING DIAGRAM — ZONING WITH CIRCULATORS HW-Series



**LEGEND:**  
 S 1 ... Disconnect Switch  
 TH 1 }  
 TH 2 } 24-Volt Thermostats  
 TH 3 }  
 C 1 }  
 C 2 } Zone Circulators  
 C 3 }  
 R 1 }  
 R 2 } Zone Relays  
 R 3 } Honeywell R845A  
 or equivalent

Fig. 10C

All components supplied by others,

### STEP 8 — STARTUP

#### FILLING SYSTEM

1. Open all supply and return valves.
2. Fill heating system to **minimum operating pressure - 12 psig.**
3. Purge all lines by opening vents.
4. For HW-Series open vent on top of tank until air venting stops. Close vent.
5. Open bleed pet cock and bleed air from boiler coil until a good stream of water comes out. (Figure 11)
6. Turn on 120 volt power for 15 seconds and then turn off.
7. Open all vents again to discharge any additional air and close off after air is eliminated.
8. System is now ready for operation.

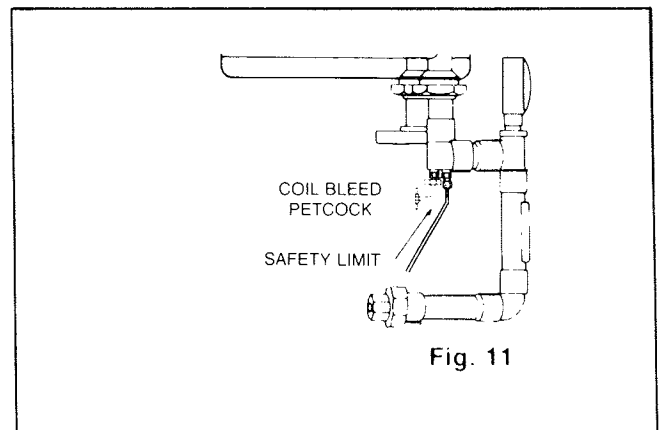
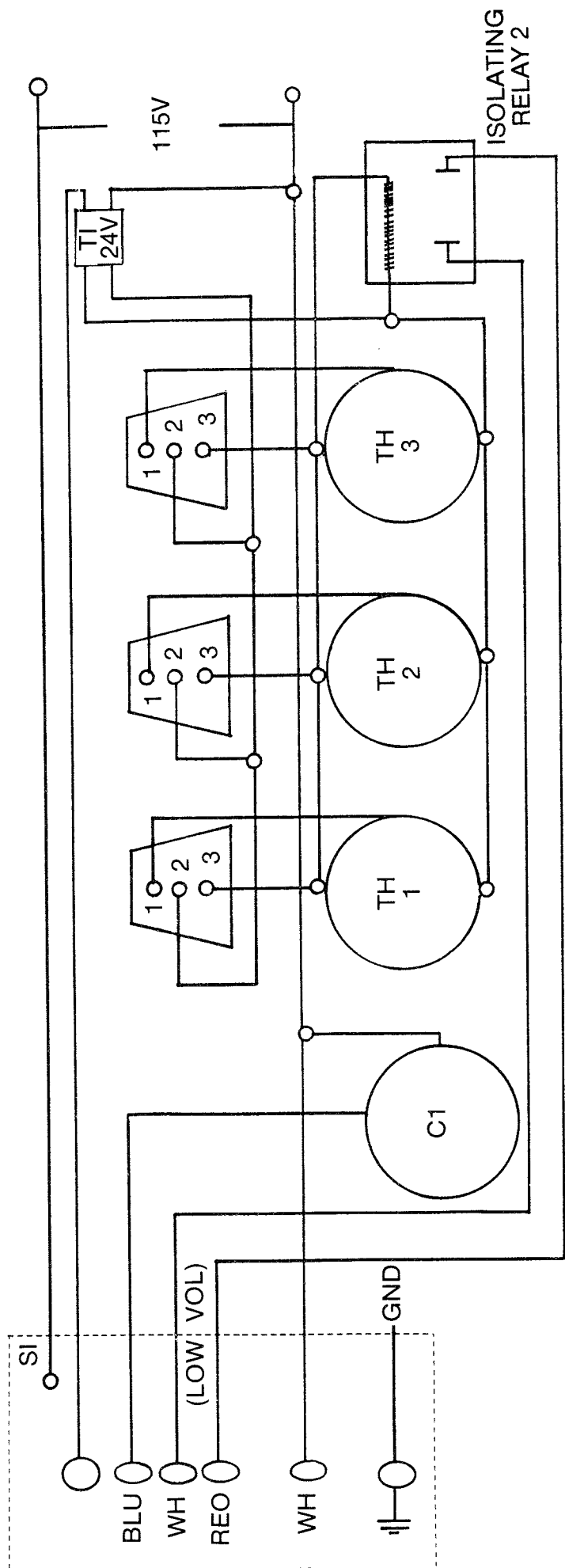


Fig. 11

WIRING DIAGRAM — ZONING WITH TACO ZONE VALVES



## FIRING BURNER

1. Be sure that system has been filled properly (see above) and is leak-tight.
2. Open gas cock(s).
3. Open manual gas shutoff valve by turning to "on" position.
4. Turn on main switch, and set thermostat to call for heat.
5. In approximately 45 seconds, blower will come on.
6. **NOTE: Burner may not ignite on first attempt because of air in gas lines.**
7. In this case, blower will stop after 15 seconds.
8. Should this happen, turn off main switch. Wait 5 minutes and turn on main switch again.
9. If burner fails to ignite after three attempts, refer to Service Manual or call service for troubleshooting.

### CAUTION

SHOULD ANY PRONOUNCED ODOR OF GAS BE DETECTED OR IF THE GAS BURNER DOES NOT APPEAR TO BE FUNCTIONING IN A NORMAL MANNER, CLOSE MAIN SHUTOFF VALVE, DO NOT SHUT OFF SWITCH, AND CONTACT YOUR HEATING CONTRACTOR, GAS COMPANY, OR FACTORY REPRESENTATIVE.

## 10. Check Burner Input (HW-Series and H-Series)

Unit should be in operation 15 minutes before checking input. All other appliances served by the gas meter should be shut off.

- a. Measure the time, in seconds, it takes to use one cubic foot of gas.
- b. Divide the number of seconds into 3,600.
- c. Multiply the result by the heating value of the gas to obtain BTU/HR input.

### Example:

If it takes 36 seconds to use one cubic foot of gas and the heating value of the gas is 1,000 BTU/CU FT,

$$\text{INPUT} = \frac{3,600}{36} \times 1,000 = 100,000 \text{ BTU/HR}$$

### Input Ranges

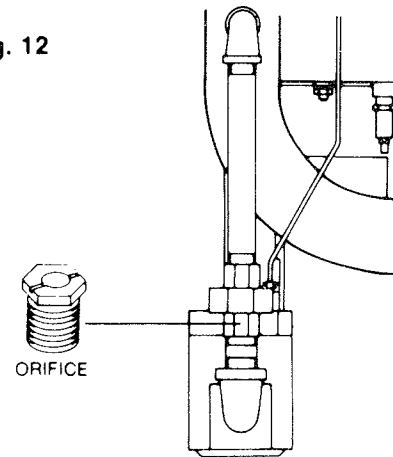
130H and HW  
127,400 BTU/hr. to 132,600 BTU/hr.  
100H and HW  
98,000 BTU/hr. to 102,000 BTU/hr.  
58,800 BTU/hr. to 61,200 BTU/hr.

If the firing rate is in this range, proceed to Step 12. Because of the altitude and other minor variations, it is possible the input will not fall within this range and the gas orifice must be replaced.

## 11. Changing Gas Orifice

A HeatMaker tune-up kit is available from your supplier. It contains a larger and a smaller diameter gas orifice. If the unit firing rate is low, install the larger

Fig. 12



diameter orifice. To install, shut off electricity and gas to unit. Loosen the gas orifice union (Figure 12) and move the lower half of the union to the side far enough to remove the orifice. Change orifice. Tighten union, turn on the gas and electricity, start unit and recheck input (see Step 10).

12. It is recommended that the unit be checked with a standard CO<sub>2</sub> or O<sub>2</sub> tester. Insert tester probe at least 6" into exhaust pipe through outside vent terminal. Readings should be:

CO<sub>2</sub> — 8% to 9¼% (natural gas)  
9.2% to 10.8% (propane gas)

O<sub>2</sub> — 6¾% to 4½%

**NOTE:** This is a sealed combustion unit with the air orifice and gas valve factory set. They must not be altered or adjusted. If the firing rate cannot be obtained with the orifices supplied or if CO<sub>2</sub> or O<sub>2</sub> readings do not fall within the above ranges, contact your factory representative.

## 13. Check Limit Control Operation

### A. HW-Series — Operating and Low Limit Control

1. When water temperature reaches low limit set point (~180°F) with no call for heat, HeatMaker will shut down.
2. Turn up the room thermostat. Boiler pump (inside jacket) will now run.
3. If water temperature is below operating control cut-out temperature (~210°F) burner will fire.
4. When operating control cut-out temperature is reached (~210°F) burner will go off, but boiler pump and system circulator will continue to operate.
5. When water temperature drops below low limit cut-in temperature (~150°F) and there is a continued call for heat, the system circulator will go off, the boiler pump will continue to operate and the burner will remain on. When low limit cut-out temperature is reached (~180°F), the system circulator will come on.

**B. H-Series — Operating Control**

1. Burner will run until operating control cut-out temperature (~210° F) is reached.
2. When operating control cut-out temperature is reached, burner will go off and system pump will continue to run.
3. When temperature reaches operating control cut-in temperature (~170° F), burner will start and continue to run until a call for heat is satisfied or operating control cut-out temperature is reached again.

**C. H- and HW-Series — Safety Limit Operation**

If boiler water temperature exceeds operating control cut-out temperature for any reason, the safety limit will interrupt power to the gas valve at approximately 240° F. Unit will make an attempt to restart in 45 seconds but ignition will not occur and burner lockout will occur unless temperature has returned to reset temperature (~195° F).

**D. H- and HW-Series Series — Thermal Cut-Off (TCO) Operation**

If, for any reason, the burner is operated without sufficient water in the boiler, the TCO will interrupt power to the gas valve before temperatures harmful to the boiler are reached. After 45 seconds the burner will go through a trial for ignition but ignition will not occur and burner lockout will occur unless the overheating condition has been corrected. **DO NOT RESET BURNER CONTROL UNTIL IT HAS BEEN DETERMINED THAT THERE IS NO AIR IN BOILER COIL AND THAT THE UNIT PUMP IS OPERATING PROPERLY.**

**NOTE:** Operation of the safety limit, stack switch or the TCO will initiate burner lockout. Reset is accomplished by switching power switch to "OFF" position and then returning it to "ON" position.

**E. H- and HW-Series — Stack Switch Operation**

If, for any reason, the combustion air blower fails to provide adequate air flow, or if the flue is blocked so as to prevent sufficient air flow for proper combustion, the contacts of the stack switch will open and interrupt power to the gas valve. After 45 seconds the burner will go through a trial for ignition but ignition will not occur unless the cause of the reduced air flow has been rectified. If the condition still exists, lockout will follow.

**14. You **MUST** Check Flame Monitoring Control (ignition system safety shutoff device).**

- A. Close gas cock with burner operating.
- B. In 3 seconds, blower should stop.
- C. After 45 seconds, the unit will attempt another start, but it should not fire.
- D. Open gas cock. Switch unit "OFF" and then "ON" again. Burner should start after about 45 seconds.

**15. Close all covers. Reset room thermostats and place these instructions in a place convenient to the Heat-Maker.**

**16. Please be sure that the warranty card is mailed to AMTI by either you or the property owner.**

**LIGHTING AND SHUTDOWN INSTRUCTIONS**

**A. LIGHTING**

1. Ensure that boiler is filled with water, air is bled from boiler coil and that boiler water pressure is at a minimum of 12 psi.
2. Open main gas cock.
3. Open gas cock on gas valve.
4. Turn "ON" disconnect switch (on right side of unit).
5. After 45 seconds, ignition will occur (if there is a call for heat).

**B. SHUTDOWN**

1. Turn "OFF" disconnect switch.
2. Close gas cock on gas valve.
3. Close main gas cock.



# MAINTENANCE

## A. Owner Care and Maintenance

1. **Inspect venting system** — Annually remove screws on vent terminal and remove terminal. Inspect interior with flashlight.
2. **General Housekeeping** — Keep boiler area clear and free from combustible materials, gasoline and other flammable vapors and liquids.

Keep boiler jacket louvers clear for proper cooling of internal components.

Do not obstruct boiler room ventilation screens or grills.

## B. Service Maintenance — Cleaning Heat Exchanger to be Done by Qualified Service Person\*

1. Turn off electric and gas supplies and remove the jacket.
2. Remove the vent assembly and top cover.
3. Remove the top half of the combustion chamber by removing the three screws and nuts that clamp the top half to the bottom half, the clamp on the induction tube and the 1/8" diameter balance line.

4. Remove the top insulator cap by spreading the retainer.
5. Remove the igniter.
6. Clean the finned tubing with a wire brush and vacuum all loose material from the combustion chamber. Use care to avoid contacting the igniter assembly. Wipe flameholder (burner) with a clean dry rag.
7. Replace all parts in the reverse order in which they were removed.
8. Restart the unit as indicated by the operating instructions plate.

## C. Replacements Parts

(Refer to Figures 1, 1A, 1B, 1C).

**\* The HeatMaker should never require this service under normal use.**

### NOTES:

Flow restrictor recommendations are based upon heating water from 50°F to a minimum of 120°F. Use of the minimum-sized restrictor will provide rated hot water for approximately 30 minutes. Use of the maximum-sized restrictor will provide rated hot water for approximately 5 minutes.

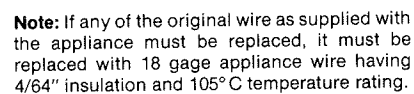
The gas control assembly supplied with the HeatMaker meets the safe lighting and other performance criteria specified under ANSI Z21.13-1987.

TABLE 2: RECOMMENDED FLOW RESTRICTOR SIZES

HW-SERIES MODEL NO.	FLOW RESTRICTOR SIZE — GPM	
	MINIMUM	MAXIMUM
60*	2	4
100	3	5
130	3.5	5

\* Model 60-HW is not recommended for large hot water demands.

## WIRING DIAGRAM

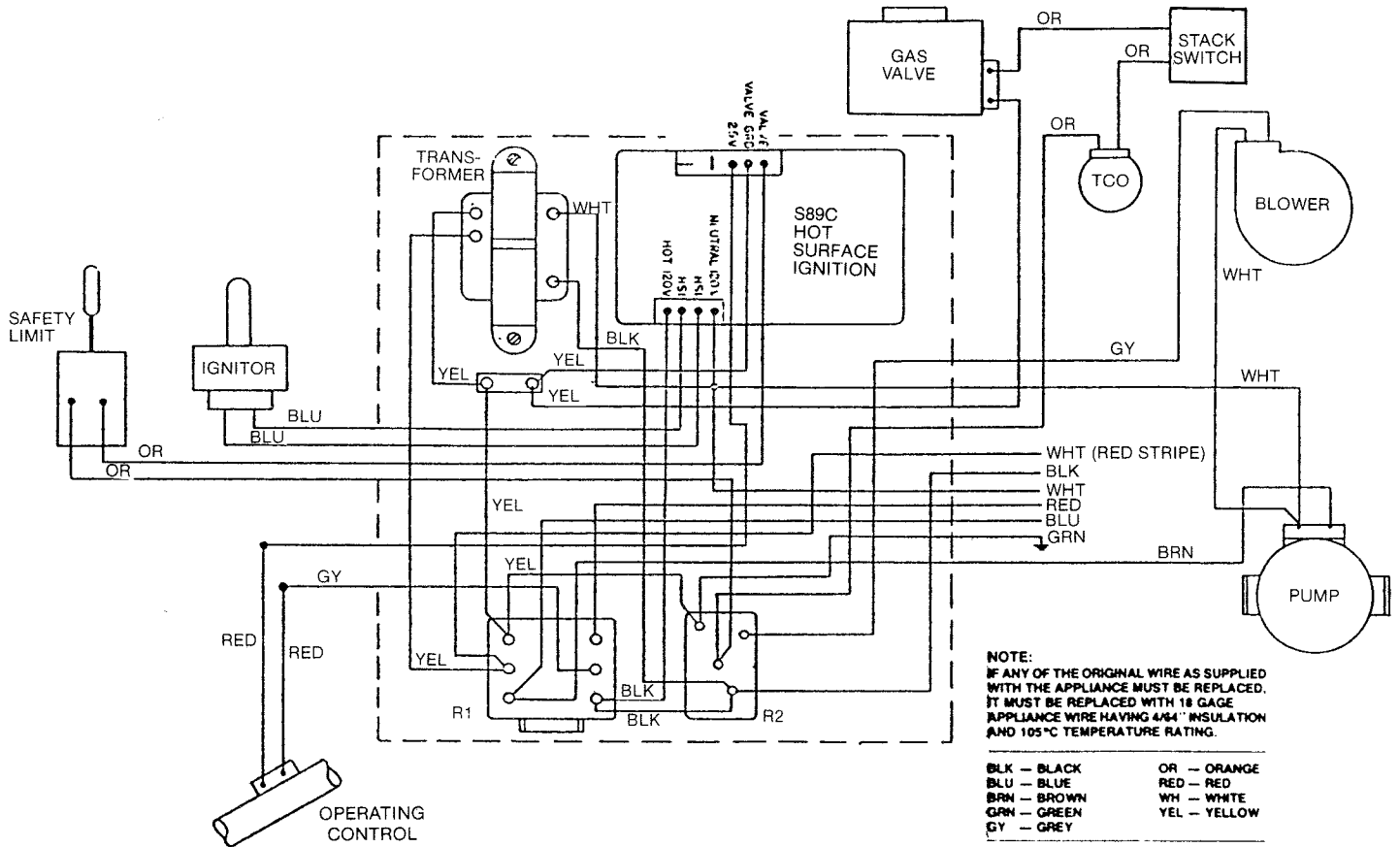


BLK-Black	OR-Orange
BLU-Blue	RED-Red
BRN-Brown	WH-White
GRN-Green	YEL-Yellow
GY-Gray	

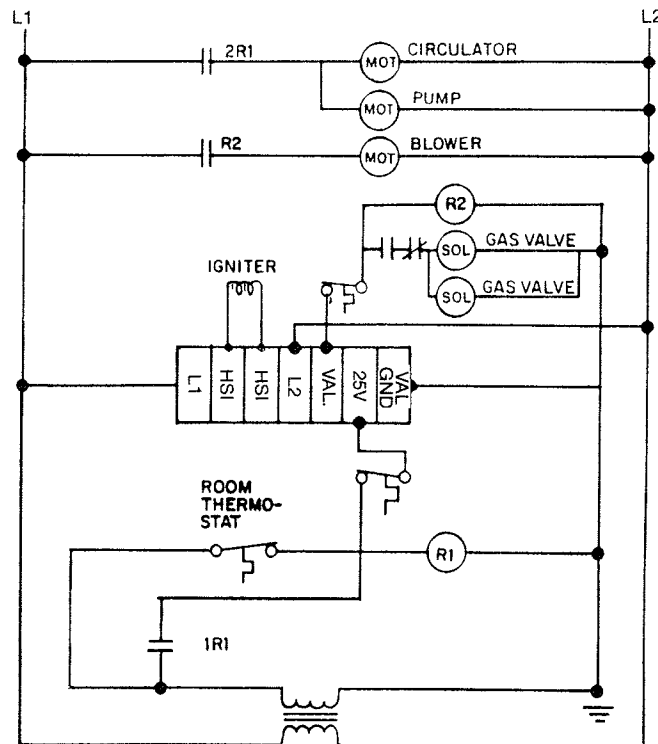
**NOTE:**  
THIS UNIT MAY HAVE A FENWAL CONTROL (052-21) OR HONEYWELL CONTROL (S89C). THE TROUBLESHOOTING IS THE SAME.

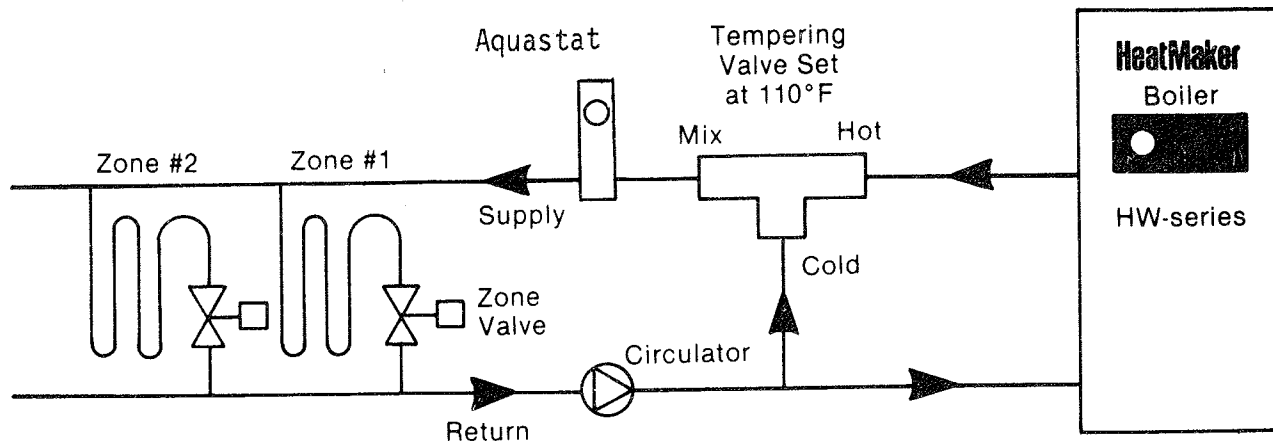
# H SERIES

## WIRING DIAGRAM



## ELECTRICAL SCHEMATIC H SERIES





### Radiant (Low Temperature) Heating Systems: Suggested Installation for HeatMaker Boilers

Radiant heating systems require a steady supply at a fairly low temperature, typically about 110° F. The HeatMaker HW-series boiler ideally satisfies this requirement as its built-in storage tank serves as a thermal "fly-wheel" to prevent short-cycling of the boiler at all loads. Boilers without built-in thermal storage should be avoided since they cannot maintain a constant supply temperature without excessive short-cycling.

To obtain control over supply temperature, install a low-temperature tempering valve (such as a Watts N170L) at the boiler outlet to mix hot water from the boiler with the cooler return water from the system. (If the tempering valve is unable to temper the water even at its lowest setting, it may be necessary to throttle the hot water from the boiler slightly.) Radiant systems require high water flow, so be sure to use a large enough tempering valve - at least 1" size.

To protect against damage to the radiant system in the event the tempering valve should fail, an aquastat set at least 10° F above the tempering valve setting and wired in series with the operating thermostat should be installed as shown.

Install remainder of piping and wire the zone valves and circulator in accordance with the instructions in this manual. The HeatMaker circulator delay will inhibit circulator operation until the internal storage tank is hot enough for domestic hot water purposes, while the tempering valve will assure that the supply temperature is correct.

Install in accordance with local codes.

**Important Note:** Plastic piping is permeable to oxygen which can corrode metal parts (pump, boiler tank) of the system. To prevent corrosion, a suitable **CORROSION INHIBITOR MUST BE USED**. AMTI can supply a corrosion inhibitor suitable for use with polybutylene tubing if none is available from your wholesaler.

### 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. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do **not** try to light the burner by hand.
- 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
  1. Do not try to light any appliance.
  2. Do not touch any electric switch; do not use any phone in your building.
  3. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
  4. 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.

### OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do **not** try to light the burner by hand.
5. Remove control access panel.
6. Push in gas control knob slightly and turn clockwise  to "OFF".

**NOTE:** Knob cannot be turned to "OFF" unless knob is pushed in slightly. Do not force.

7. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
8. Turn gas control knob counterclockwise ↶ to "ON".
9. Replace control access panel.
10. Turn on all electric power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

#### 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. Remove control access panel.
4. Push in gas control knob slightly and turn clockwise ↷ to "OFF". Do not force.
5. Replace control access panel.

#### SPECIFICATIONS

	MODEL NUMBER	FUEL TYPE	AGA INPUT	DOE HEATING OUTPUT <sup>(1)</sup>	SQ-FT HOT WATER	LINEAL FEET BASEBOARD	DOMESTIC HOT WATER GPM AT 100°F RISE <sup>(3)</sup>		DOE ANNUAL FUEL UTIL. EFFICIENCY	APPROX. SHIPPING WEIGHT <sup>(4)</sup>
			BTU/Hr	BTU/hr	(2)	(2)	CONTINUOUS	INTERMITTENT	(AFUE) <sup>(1)</sup>	lb
HW-SERIES*	130HW	Natural	130,000	107,000	620	195	2.4	4.1	82	215
		LPG	130,000	107,000	620	195	2.4	4.1	82	215
	100HW	Natural	100,000	84,000	485	150	2.0	3.8	84	215
		LPG	100,000	84,000	485	150	2.0	3.8	84	215
	60HW	Natural	60,000	52,000	300	95	1.4	3.4	87	215
		LPG	60,000	52,000	300	95	1.4	3.4	87	215
H-SERIES**	130H	Natural	130,000	107,000	620	195	---	---	82	115
		LPG	130,000	107,000	620	195	---	---	82	115
	100H	Natural	100,000	84,000	485	150	---	---	84	115
		LPG	100,000	84,000	485	150	---	---	84	115
	60H	Natural	60,000	52,000	300	95	---	---	87	115
		LPG	60,000	52,000	300	95	---	---	87	115

\* Heating and Domestic Hot Water

\*\* Heating Only

- (1) Measured in accordance with procedures specified by the U.S. Department of Energy.
- (2) Based upon average water temperature of 170°F in heat distribution system.
- (3) Continuous rating based upon 100°F average temperature rise over 30-minute continuous draw. Intermittent rating based upon 100°F average temperature rise over three 5-minute draws with two 10-minute recovery periods.
- (4) Shipping weights include all standard equipment.



## NOTES

**DOMESTIC HOT WATER DELIVERY IN GPM  
FOR HEATMAKER BOILERS  
\*\*\* 60 DEGREE RISE \*\*\***

	5 MIN DRAW	10 MIN DRAW	20 MIN DRAW	30 MIN DRAW	60 MIN DRAW
<b>HW-SERIES BOILERS:</b>					
130-HW	6.8	5.2	4.4	4.1	3.9
100-HW	6.1	4.4	3.6	3.4	3.1
60-HW	5.0	3.4	2.6	2.3	2.0
<b>H-SERIES BOILERS PLUS 40 GALLON EXTERNAL TANK:</b>					
130-H	10.0	7.2	5.4	4.8	4.2
100-H	10.0	6.4	4.6	4.0	3.4
60-H	9.0	5.4	3.6	3.0	2.4
<b>HW-SERIES BOILERS PLUS 40 GALLON EXTERNAL TANK:</b>					
130-HW	10.0	8.8	6.2	5.3	4.5
100-HW	10.0	8.0	5.4	4.6	3.7
60-HW	10.0	7.0	4.4	3.5	2.6

**DOMESTIC HOT WATER DELIVERY IN GPM  
FOR HEATMAKER BOILERS  
\*\*\* 80 DEGREE RISE \*\*\***

	5 MIN DRAW	10 MIN DRAW	20 MIN DRAW	30 MIN DRAW	60 MIN DRAW
<b>HW-SERIES BOILERS:</b>					
130-HW	5.1	3.9	3.3	3.1	2.9
100-HW	4.5	3.3	2.7	2.5	2.3
60-HW	3.7	2.5	1.9	1.7	1.5
<b>H-SERIES BOILERS PLUS 40 GALLON EXTERNAL TANK:</b>					
130-H	9.9	6.3	4.5	3.9	3.3
100-H	9.3	5.7	3.9	3.3	2.7
60-H	8.5	4.9	3.1	2.5	1.9
<b>HW-SERIES BOILERS PLUS 40 GALLON EXTERNAL TANK:</b>					
130-HW	10.0	7.5	5.1	4.3	3.5
100-HW	10.0	6.9	4.5	3.7	2.9
60-HW	10.0	6.1	3.7	2.9	2.1

**DOMESTIC HOT WATER DELIVERY IN GPM  
FOR HEATMAKER BOILERS  
\*\*\* 100 DEGREE RISE \*\*\***

<b>HW-SERIES BOILERS:</b>					
130-HW	4.1	3.1	2.6	2.5	2.3
100-HW	3.6	2.7	2.2	2.0	1.9
60-HW	3.0	2.0	1.5	1.4	1.2
<b>H-SERIES BOILERS PLUS 40 GALLON EXTERNAL TANK:</b>					
130-H	9.4	5.8	4.0	3.4	2.8
100-H	8.9	5.3	3.5	2.9	2.3
60-H	8.3	4.7	2.9	2.3	1.7
<b>HW-SERIES BOILERS PLUS 40 GALLON EXTERNAL TANK:</b>					
130-HW	10.0	6.7	4.4	3.7	2.9
100-HW	10.0	6.3	4.0	3.2	2.5
60-HW	10.0	5.6	3.3	2.6	1.8

ORIG

**HEATMAKER**  
*Versatility under fire.*

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