



GWM GAS BOILER

INSTRUCTION MANUAL

MODULAR BOILERS

DESIGN CERTIFIED BY AMERICAN GAS ASSOCIATION

**NOTICE TO INSTALLER AND OPERATOR
THIS BOOKLET MUST BE AFFIXED ON OR
ADJACENT TO THE HEATING EQUIPMENT.**

FORM NO. BP-31409-05

SERIES NO. 1B-J1

06522

PLAINTIFF'S EXHIBIT

ASI-422

TABLE OF CONTENTS

<u>ITEM</u>	<u>PAGE NO.</u>
GENERAL INFORMATION	1
SETTING THE UNIT	1
AIR SUPPLY	2
CHIMNEY	2
RATINGS DATA	3-7
GAS PIPE SIZE AND DELIVERY SCHEDULE	8
CONTROL TAPPINGS	9
PIPING RECOMMENDATIONS	10
DIMENSIONS FOR INLETS AND OUTLETS	11
UNPACKING	14
WATER HEADER INSTALLATION	15-21
JACKET INSTALLATION	15,22
INSTALLATION OF CONTROLS & PIPING	25
WIRING DIAGRAMS	26-28
FILLING SYSTEM	29
LIGHTING INSTRUCTIONS	30-31
MANIFOLD PRESSURE ADJUSTMENT	33
PILOT ADJUSTMENT	33
MAIN BURNER AIR ADJUSTMENT	33 & 34
GENERAL MAINTENANCE	35
INSPECTION AND CLEANING OF BOILER	36
SERVICE WATER PACKAGE	37 - 42

GENERAL INFORMATION

The GWM boilers, designed for maximum comfort and efficiency, are the latest development in cast iron boiler technology. Developed specifically for forced water circulation, the boilers are available for use with natural and propane gases. The boilers are designed to be manifolded together to give inputs up through 8,000 Mbh.

The boiler design is A.G.A. certified, and is constructed and tested in accordance with A.S.M.E. regulations for up to 50 psig working pressure (100 psig working pressure available on special order). The cast iron surfaces will afford long trouble-free service while providing optimum compactness for an atmospheric gas-fired Hydronic system.

Relatively small water content, and specially designed burners and controls permit close temperature control of the boiler water. Consequently, the boilers are not equipped with internal tankless water heaters. Recommendations are available for the installation of an external heat exchanger with the boilers which will give domestic hot water supply.

The GWM features: compact, light weight design; no separate base or combustion chamber; 5 thru 7 sections ranging from 264 Mbh to 396 Mbh input (see Table 1). The boilers are manifolded together to give input combinations as listed in Table 2. Other installation data are also given in Tables 2 and 3.

This manual gives the necessary information for the proper assembly, installation, operation, maintenance, and service of the units. For special problems contact American-Standard, Hydronics Department, 25 Rano Street, Buffalo, New York.

INSTALLATION REQUIREMENTS

The boilers should be installed in accordance with the latest American National Standards "Installation of Gas Appliances and Gas Piping" obtainable from the American Gas Association 1515 Wilson Blvd., Arlington, Virginia 22209. Installation should also conform with requirements of local gas company and all state and city building codes.

The boilers are approved for installation on non-combustible flooring only. On hot water systems, the expansion tank should not be installed in cold or exposed place. If pipe leading to or from the tank freezes, serious damage may result. If valve of any description is installed in the piping leading to or from the expansion tank BE SURE THAT IT IS OPEN WHILE THE BOILERS ARE IN OPERATION.

LOCATION

Locate the boilers near the chimney or flue and as centralized with respect to the heat distribution system as practicable. Provide the necessary service accessibility clearance.

For locations where the floor is not level or if water conditions exist, the boilers should be mounted on a concrete base, preferably to a height of 3".

SERVICE ACCESSIBILITY CLEARANCES

From combustible material to boilers or vent collector - 6 inches. Front and rear for servicing, cleaning or removal of controls, burners and circulator - 24 inches.

In utility room installations, the door shall be wide enough to allow the largest part to enter or to permit the replacement of another appliance such as a water heater.

COMBUSTION AIR AND VENTILATION

Adequate facilities must be available for providing air for combustion and ventilation. Except for installations in large spaces (such as full basements) where infiltration can normally be assumed to provide sufficient air, this will usually necessitate:

- (a) Two openings to interior space having adequate infiltration from the outside, one near the floor, the other near the ceiling, installed in the door or a single wall of the boiler room. Each opening must have a minimum free area of one (1) square inch per 1000 Btu per hour of input rating of all appliances in the room.
- (b) Additional opening to exterior space when combustion air must be obtained from outside, minimum free area of 1 square inch per 5000 Btu per hour of input rating, or in accordance with the methods outlined in the latest issue of A.N.S. Z21.30 entitled "Installation of Gas Appliances and Gas Piping".

CHIMNEY

- 1. Where two or more boilers vent into a common flue, the area of the common flue should at least equal the area of the largest flue or vent connector plus 50% of the areas of the additional flue or vent connectors.
- 2. Flue or vent connector must be inserted into, but not beyond, the inside of the chimney flue.
- 3. Horizontal runs of flue pipe should be kept at a minimum and should pitch upward from the boiler at least 1/4" per foot.

TESTING

Before connecting boilers to system, plug openings, fill boilers with water and subject to not less than 10 lbs. nor more than 50 lbs. pressure. Inspect boilers inside and outside for leakage as a result of breakage from handling and shipping. To safeguard accuracy of gauge and controls supplied with boilers, do not install until after test. This precaution of testing the boilers will simplify handling of any necessary replacements or adjustments and assist in treating claims against transportation companies. After test, drain and remove plugs where required.

TABLE 1 - RATINGS FOR NATURAL AND PROPANE			
Boiler Number	A.G.A. Input Btu/Hr.	A.G.A. Output Btu/Hr.	Net Installed Radiation Mbh Water
GWM-5	264,000	211,200	183.5
GWM-6	330,000	264,000	229.6
GWM-7	396,000	316,800	275.7

I=B=R APPROVED



A.G.A. DESIGN CERTIFIED



Modular Model Number	Number of Individual Boilers			Input (Mbh)	Output (Mbh)	Net Rating (Mbh)	System Supply & * Return Size (In.)	Chimney Diameter (In.)	Chimney Height (ft.)
WM-528	2	0	0	528	422.4	367.0	2	9	20
WM-594	1	1	0	594	475.2	413.9	2	9	20
WM-660	0	2	0	660	528.0	459.1	2	9	20
WM-726	0	1	1	726	580.8	504.3	2	10	20
WM-792	0	0	2	782	633.6	551.3	2	10	20
WM-858	2	1	0	858	686.4	596.5	2-1/2	11	20
WM-924	1	2	0	924	739.2	643.5	2-1/2	11	20
WM-990	0	3	0	990	792.0	688.7	2-1/2	12	20
WM-1056	0	2	1	1056	844.8	733.9	2-1/2	12	20
WM-1122	0	1	2	1122	897.6	780.9	2-1/2	12	20
WM-1188	0	0	3	1188	950.4	826.1	2-1/2	12	20
WM-1254	1	3	0	1254	1,003.2	873.0	3	14	20
WM-1320	0	4	0	1320	1,056.0	918.3	3	14	20
WM-1386	0	3	1	1386	1,108.8	963.5	3	14	20
WM-1452	0	2	2	1452	1,161.6	1010.4	3	14	20
WM-1518	0	1	3	1518	1,214.4	1055.7	3	14	20
WM-1584	0	0	4	1584	1,267.2	1102.6	3	14	20
WM-1650	0	5	0	1650	1,320.0	1147.8	3	14	20
WM-1716	0	4	1	1716	1,372.8	1193.0	3	15	20
WM-1782	0	3	2	1782	1,425.6	1240.0	3	15	20
WM-1848	0	2	3	1848	1,478.4	1285.2	3	15	20
WM-1914	0	1	4	1914	1,531.2	1332.2	4	15	20
WM-1980	0	0	5	1980	1,584.0	1376.4	4	16	20
WM-2046	0	5	1	2046	1,636.8	1422.6	4	16	20
WM-2112	0	4	2	2112	1,689.6	1467.8	4	16	20
WM-2178	0	3	3	2178	1,742.4	1516.5	4	16	20
WM-2244	0	2	4	2244	1,795.2	1561.7	4	16	20
WM-2310	0	1	5	2310	1,848.0	1607.0	4	18	20
WM-2376	0	0	6	2376	1,900.8	1652.2	4	18	20
WM-2442	0	5	2	2442	1,953.6	1697.4	4	18	20
WM-2508	0	4	3	2508	2,006.4	1746.1	4	18	20
WM-2574	0	3	4	2574	2,059.2	1791.3	4	18	20
WM-2640	0	2	5	2640	2,112.0	1836.5	4	18	20

Based on Δt system = 20F.

TABLE 2 -GWM MODULAR BOILER RATINGS AND DATA - (cont'd.)

Modular Model Number	Number of Individual Boilers			Input (Mbh)	Output (Mbh)	Net Rating (Mbh)	System Supply & * Return Size (in.)	Chimney Diameter (in.)	Chimney Height (ft.)
	GWM-5's	GWM-6's	GWM-7's						
GWM-2706	0	1	6	2706	2,164.8	1881.7	4	18	20
GWM-2772	0	0	7	2772	2,217.6	1927.0	4	18	20
GWM-2838	0	5	3	2838	2,270.4	1975.7	4	20	20
GWM-2904	0	4	4	2904	2,323.2	2020.9	4	20	20
GWM-2970	0	3	5	2970	2,376.0	2066.1	4	20	20
GWM-3036	0	2	6	3036	2,428.8	2111.3	4	20	20
GWM-3102	0	1	7	3102	2,481.6	2156.5	4	20	20
GWM-3168	0	0	8	3168	2,534.4	2205.2	4	20	20
GWM-3234	0	5	4	3234	2,587.2	2250.4	5	20	20
GWM-3300	0	4	5	3300	2,640.0	2295.7	5	20	20
GWM-3366	0	3	6	3366	2,692.8	2340.9	5	20	20
GWM-3432	0	2	7	3432	2,745.6	2386.1	5	20	20
GWM-3498	0	1	8	3498	2,798.4	2434.8	5	20	20
GWM-3564	0	0	9	3564	2,851.2	2480.0	5	22	20
GWM-3630	0	5	5	3630	2,904.0	2525.2	5	22	20
GWM-3696	0	4	6	3696	2,956.8	2570.4	5	22	20
GWM-3762	0	3	7	3762	3,009.6	2615.7	5	22	20
GWM-3828	0	2	8	3828	3,062.4	2664.3	5	22	20
GWM-3894	0	1	9	3894	3,115.2	2713.0	5	22	20
GWM-3960	0	0	10	3960	3,168.0	2756.5	5	22	20
GWM-4026	0	5	6	4026	3,220.8	2800.0	5	22	20
GWM-4092	0	4	7	4092	3,273.6	2843.5	5	22	20
GWM-4158	0	3	8	4158	3,326.4	2895.7	5	22	20
GWM-4224	0	2	9	4224	3,379.2	2939.1	5	22	20
GWM-4290	0	1	10	4290	3,432.0	2982.6	5	24	20
GWM-4356	0	0	11	4356	3,484.8	3026.1	5	24	20
GWM-4422	0	5	7	4422	3,537.6	3078.3	5	24	20
GWM-4488	0	4	8	4488	3,590.4	3121.7	5	24	20
GWM-4554	0	3	9	4554	3,643.2	3165.2	5	24	20
GWM-4620	0	2	10	4620	3,696.0	3217.4	5	24	20
GWM-4686	0	1	11	4686	3,748.8	3260.9	5	24	20

* Based on Δt System=20F.

Modular boiler number	Number of Individual Boilers			Input (Mbt/h)	Output (Mbt/h)	Net Rating (Mbt/h)	System Supply & * Return Size (in.)	Chimney Diameter (in.)	Chimney Height (ft.)
M-4752	0	0	12	4752	3,801.6	3304.3	5	24	20
M-4818	0	5	8	4818	3,854.4	3347.8	5	24	20
M-4884	0	4	9	4884	3,907.2	3400.0	5	24	20
M-4950	0	3	10	4950	3,960.0	3443.5	5	24	20
M-5016	0	2	11	5016	4,012.8	3487.0	6	26	20
M-5082	0	1	12	5082	4,065.6	3539.1	6	26	20
M-5148	0	0	13	5148	4,118.4	3582.6	6	26	20
M-5214	0	5	9	5214	4,171.2	3626.1	6	26	20
M-5280	0	4	10	5280	4,224.0	3669.6	6	26	20
M-5346	0	3	11	5346	4,276.8	3721.7	6	26	20
M-5412	0	2	12	5412	4,329.6	3765.2	6	26	20
M-5478	0	1	13	5478	4,382.4	3808.7	6	26	20
M-5544	0	0	14	5544	4,435.2	3860.9	6	26	20
M-5610	0	5	10	5610	4,488.0	3904.3	6	26	20
M-5676	0	4	11	5676	4,540.8	3947.8	6	26	20
M-5742	0	3	12	5742	4,593.6	3991.3	6	26	20
M-5808	0	2	13	5808	4,646.4	4043.5	6	26	20
M-5874	0	1	14	5874	4,699.2	4087.0	6	26	20
M-5940	0	0	15	5940	4,752.0	4130.4	6	26	20
M-6006	0	5	11	6006	4,804.8	4133.9	6	26	20
M-6072	0	4	12	6072	4,857.6	4226.1	6	30	20
M-6138	0	3	13	6138	4,910.4	4269.6	6	30	20
M-6204	0	2	14	6204	4,963.2	4313.0	6	30	20
M-6270	0	1	15	6270	5,016.0	4365.2	6	30	20
M-6336	0	0	16	6336	5,068.8	4408.7	6	30	20
M-6402	0	5	12	6402	5,121.6	4452.2	6	30	20
M-6468	0	4	13	6468	5,174.4	4495.7	6	30	20
M-6534	0	3	14	6534	5,227.2	4542.8	6	30	20
M-6600	0	2	15	6600	5,280.0	4591.3	6	30	20
M-6666	0	1	16	6666	5,332.8	4634.8	6	30	20
M-6732	0	0	17	6732	5,385.6	4687.0	6	30	20

* Based on Δt system = 20°F.

GWMM MODULAR BOILER RATINGS AND DATA - (cont'd.)

Modular Model Number	Number of Individual Boilers		Input (Mbh)	Output (Mbh)	Net Rating (Mbh)	System Supply & * Return Size (in.)	Chimney Diameter (in.)	Chimney Height (ft.)
	GWMM-5's	GWMM-6's	GWMM-7's					
GWMM-6798	0	5	13	5,439.2	4730.4	6	30	20
GWMM-6864	0	4	14	5,491.2	4773.9	6	30	20
GWMM-6930	0	3	15	5,544.0	4817.4	6	30	20
GWMM-6996	0	2	16	5,596.8	4870.0	6	30	20
GWMM-7062	0	1	17	5,649.6	4913.0	6	30	20
GWMM-7128	0	0	18	5,702.4	4956.5	6	30	20
GWMM-7194	0	5	14	5,755.2	5008.7	8	30	20
GWMM-7260	0	4	15	5,808.0	5043.5	8	30	20
GWMM-7326	0	3	16	5,860.8	5095.7	8	30	20
GWMM-7392	0	2	17	5,913.6	5139.1	8	30	20
GWMM-7458	0	1	18	5,966.4	5191.3	8	30	20
GWMM-7524	0	0	19	6,019.2	5234.8	8	36	20
GWMM-7590	0	5	15	6,072.0	5278.3	8	36	20
GWMM-7656	0	4	16	6,124.8	5321.7	8	36	20
GWMM-7722	0	3	17	6,177.6	5373.9	8	36	20
GWMM-7788	0	2	18	6,230.4	5417.4	8	36	20
GWMM-7854	0	1	19	6,283.2	5460.9	8	36	20
GWMM-7920	0	0	20	6,336.0	5513.0	8	36	20
GWMM-7986	0	5	16	6,388.8	5556.5	8	36	20
GWMM-8052	0	4	17	6,441.6	5600.0	8	36	20

* Based on Δt system=20F.

TABLE 3 - GAS PIPE DELIVERY SCHEDULE AND CONNECTIONS

Maximum Capacity of Pipe in Cubic Feet of Gas per Hour for Gas Pressure of 0.5 Psig or Less and a Pressure Drop of 0.3 Inch Water Column (Based on a 0.60 Specific Gravity Gas)

Nominal Iron Pipe Size, Inches	Length of Pipe, Feet													
	10	20	30	40	50	60	70	80	90	100	125	150	175	200
.250	32	22	18	15	14	12	11	11	10	9	8	8	7	6
.375	72	49	40	34	30	27	25	23	22	21	18	17	15	14
.500	132	92	73	63	56	50	46	43	40	38	34	31	28	26
.750	278	190	152	130	115	105	96	90	84	79	72	64	59	55
1.000	520	350	285	245	215	195	180	170	160	150	130	120	110	100
1.250	1,050	730	590	500	440	400	370	350	320	305	275	250	225	210
1.500	1,600	1,100	890	760	670	610	560	530	490	460	410	380	350	320
2.000	3,050	2,100	1,650	1,450	1,270	1,150	1,050	990	930	870	780	710	650	610
2.500	4,800	3,300	2,700	2,300	2,000	1,850	1,700	1,600	1,500	1,400	1,250	1,130	1,050	980
3.000	8,500	5,900	4,700	4,100	3,600	3,250	3,000	2,800	2,600	2,500	2,200	2,000	1,850	1,700
4.000	17,500	12,000	9,700	8,300	7,400	6,800	6,200	5,800	5,400	5,100	4,500	4,100	3,800	3,500

Boiler Number	SIZE OF GAS CONNECTION ON BOILERS	
	Natural Gas	Propane
GWM-5	3/4	1/2
GWM-6	3/4	1/2
GWM-7	3/4	3/4

RECOMMENDED PIPING WHEN AUX. MANUAL SHUTOFF VALVE OR SEPARATE
MANUAL SHUTOFF VALVE AND AUTOMATIC GAS VALVE ARE SUPPLIED

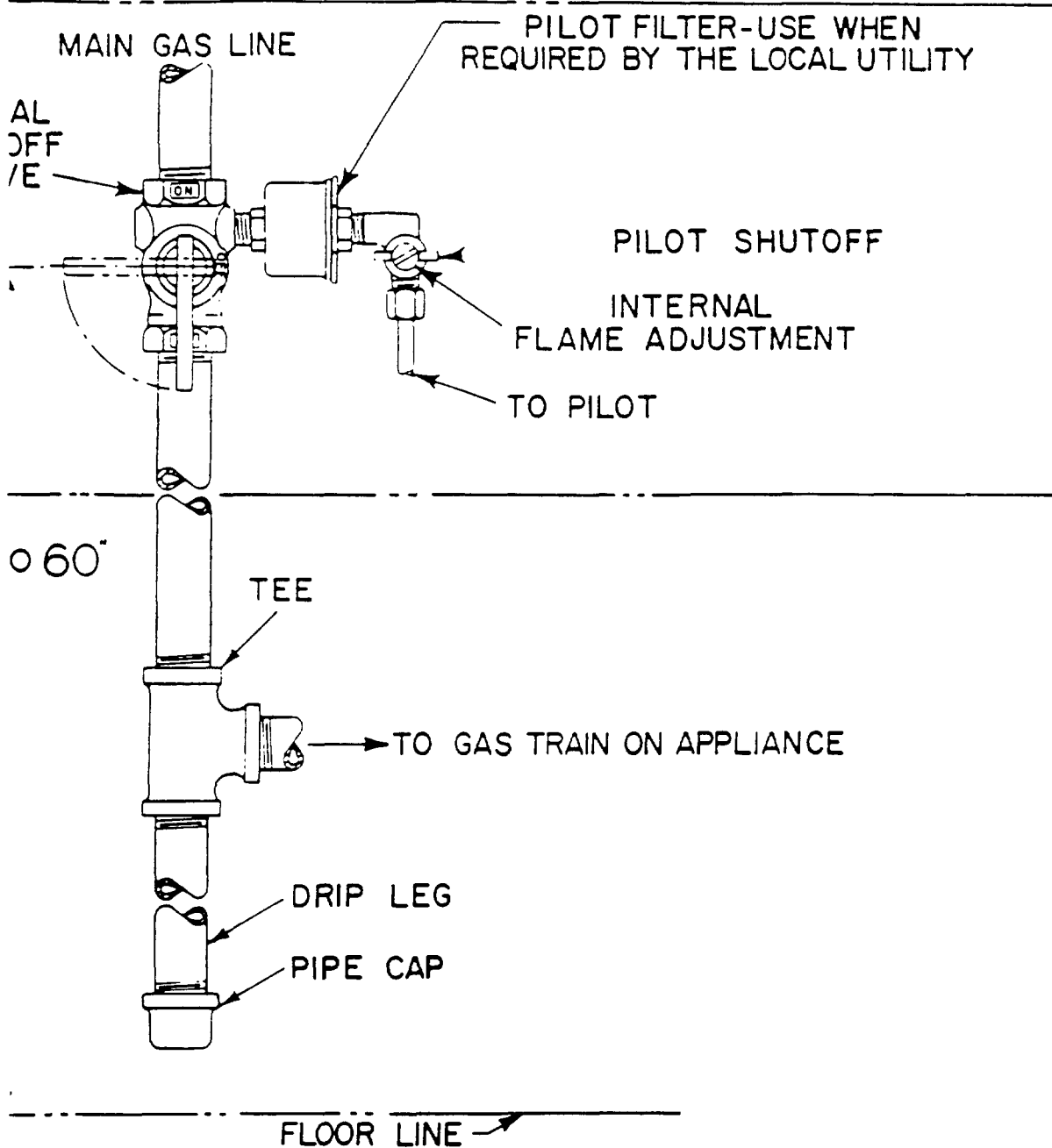
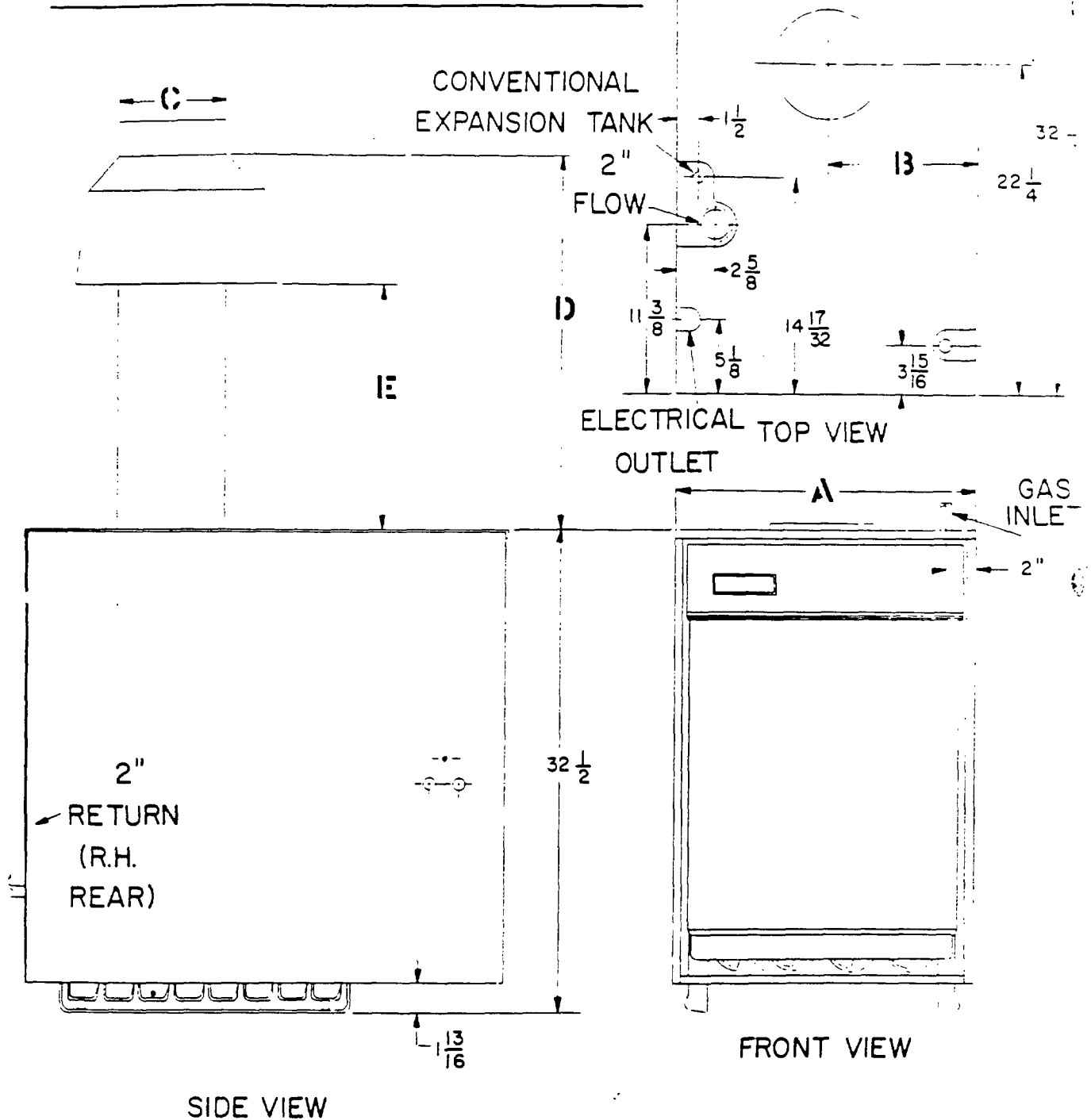


FIG. 2

FIG. 3 - DIMENSIONS FOR INLETS AND OUTLETS



BOILER NO.	NO. OF SECTIONS	NO. OF BURNERS	DIMENSIONS					WATER CONTENT (GALLONS)	FLUE		GAS CONNECTIONS	
			A	B	C	D	E		DIAMETER (INCHES)	HEIGHT ABOVE DRAFT HOOD (FT)	NAT	LP
GWM-5	5	4	20"	10"	7"	24 13/16	16 1/8	11.9	7	15	3/4	1/2
GWM-6	6	5	23 3/4	11 7/8	8"	27 3/4	18	13.9	8	15	3/4	1/2
GWM-7	7	6	27 1/2	13 3/4	8"	27 3/4	18	15.9	8	15	3/4	3/4

BOILER WITH ELIMINAIRE

The ELIMINAIRE is a unique built-in air separator which prevents air from being transmitted to the system and directs the air to the compression tank. External air separators such as dip tube or inlined accessories are not required. This important feature on the L. H. END SECTION also allows for considerable simplification of the near boiler piping (See Figure Below) and assures positive air separation essential to proper system performance. The ELIMINAIRE plus the recommended piping provides for a substantial saving in material and installation cost.

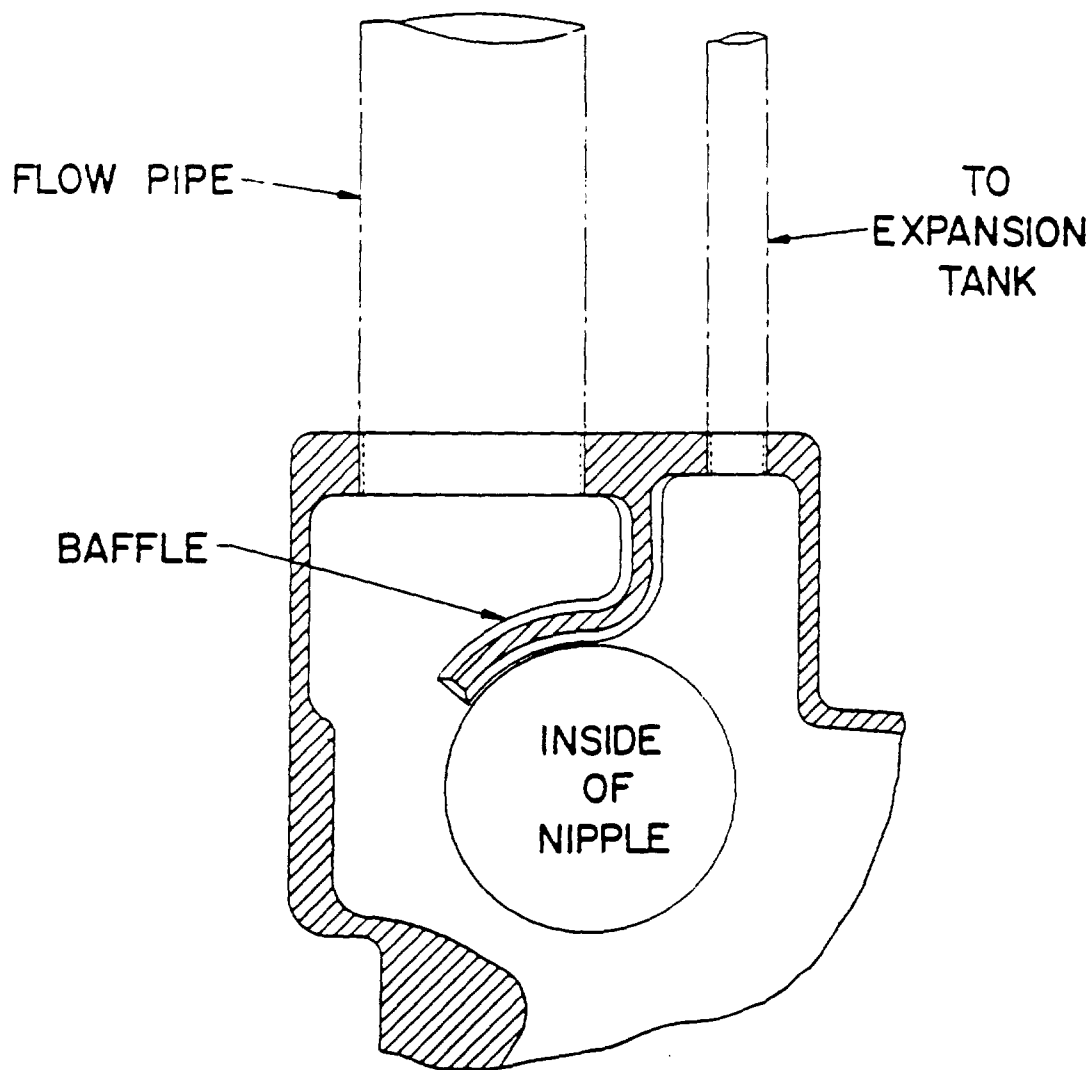
PIPING FOR FLOW PIPE & EXPANSION TANK

FIG. 4

CAUTION

If and when boilers are used in connection with refrigeration systems, boilers should be so installed that chilled medium is piped parallel with the heating boilers using appropriate valves to prevent the chilled medium from entering the heating boiler.

When hot water heating boilers are connected to heating coils located in air handling units, where they may be exposed to refrigerated air circulation, such boiler 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.

The expansion tank should not be set in a cold or an exposed place. If the pipe leading to or from the tank freezes, serious damage may result. If valve of any description is installed in the piping leading to or from the expansion tank BE SURE THAT IT IS OPEN WHILE THE BOILERS ARE IN OPERATION.

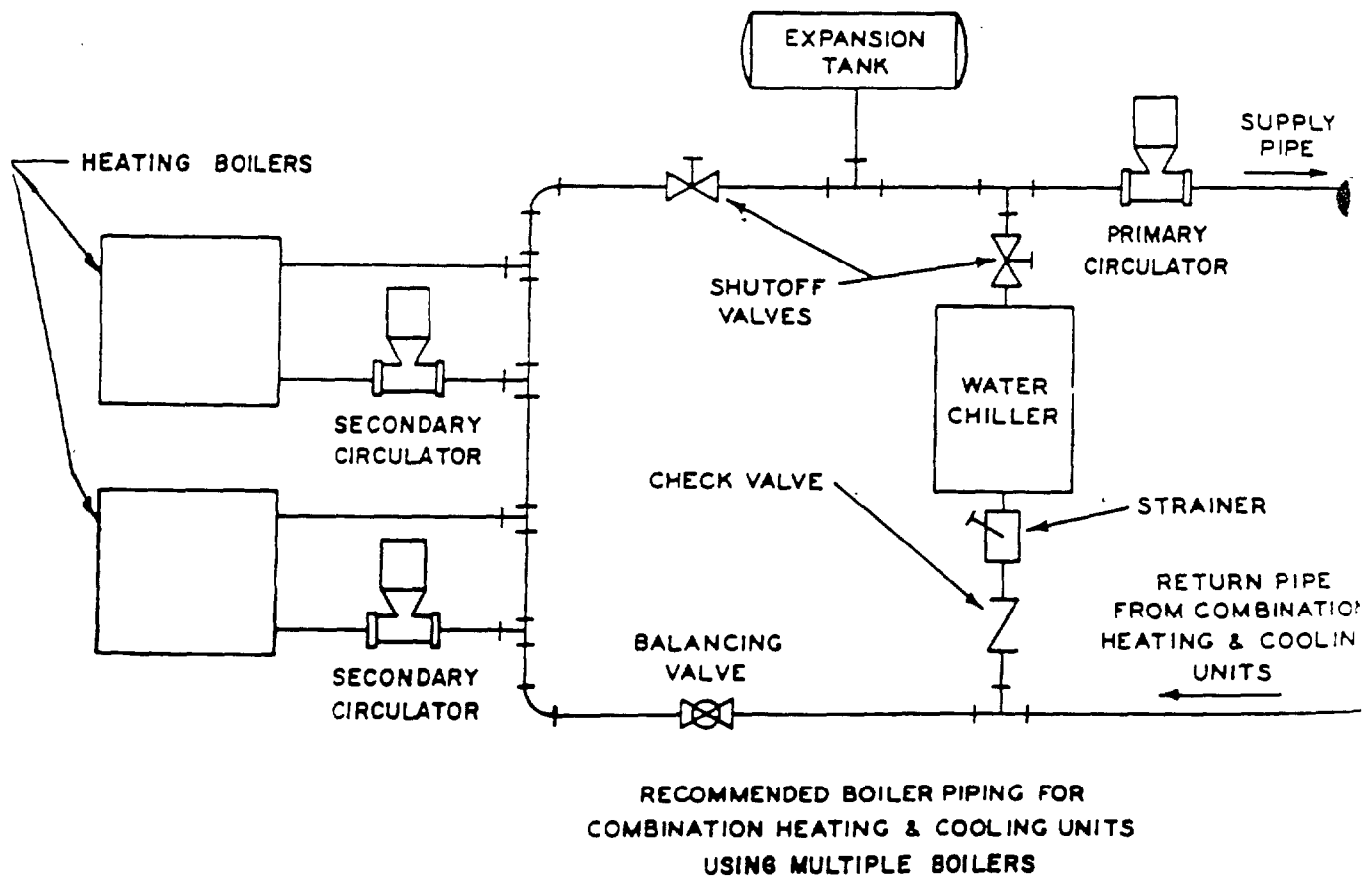


FIG. 5

BOILER INSTALLATION

GWM boilers are shipped with sections and burners factory assembled and crated. Installation should be accomplished as follows:

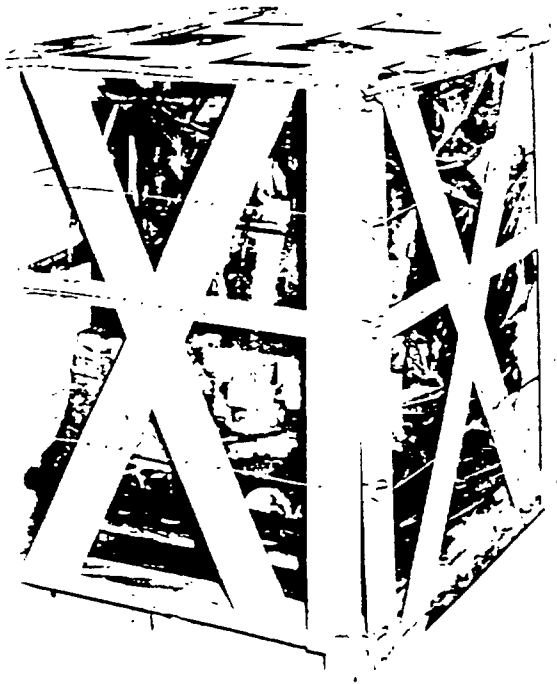


FIG. 6 - Crated Boiler

1. Nails
2. Side Fasteners

UNPACKING BOILERS (See Fig. 6)

Place the boilers close to final location, if possible, before removing the shipping crates. (See Fig. for spacing of boilers).

If American-Standard cast iron headers are used (optional equipment), up to 8 boilers may be placed in a row. If more than 8 boilers are used with these headers, the boilers should be split into two rows (9 thru 16 boilers) or into three rows (17 thru 21 boilers). The rows should be piped in parallel.

Each crate should be removed as follows:

1. Unfasten all crating wire at the corner of the crate.
2. Remove nails fastening crate sides to top and bottom of crate. Lift off the crate top and unwrap crate side from crate base. Remove the plastic bag.
3. Remove blocking which holds burners in place and which supports burners.
4. Loosen four cap screws that hold boiler to the crate base, one at either side of end sections. Remove both screws at one end section so that the two remaining screws can be slid out of the slots in the other end section. Move the boiler off the crate base to the final location.

Floor should be level where the boilers are installed.

WATER HEADER INSTALLATION

Install water headers. If primary-secondary pumping arrangement is used, refer to Figures 8, 9, and 10. If supply-return manifold arrangement is used to give parallel flow, refer to Figures 11 and 12. Secondary circulators should be installed in accordance with these figures after the jacket is installed.

If American-Standard cast iron headers are not used, then headers should be fabricated giving comparable locations for supply and return piping, relief valves, temp-pressure gauges and operating controls. The header diameter(s) should conform to the system supply and return size given in Table 2.

INSTALLATION OF JACKET

Each jacket should be installed as follows:

1. Install the four jacket angle clips to the front and rear plates with #8 x 3/8" sheet metal screws (See Fig. 7).
2. Hang the L. H. side panel and the R. H. side panel onto the jacket angle clips.

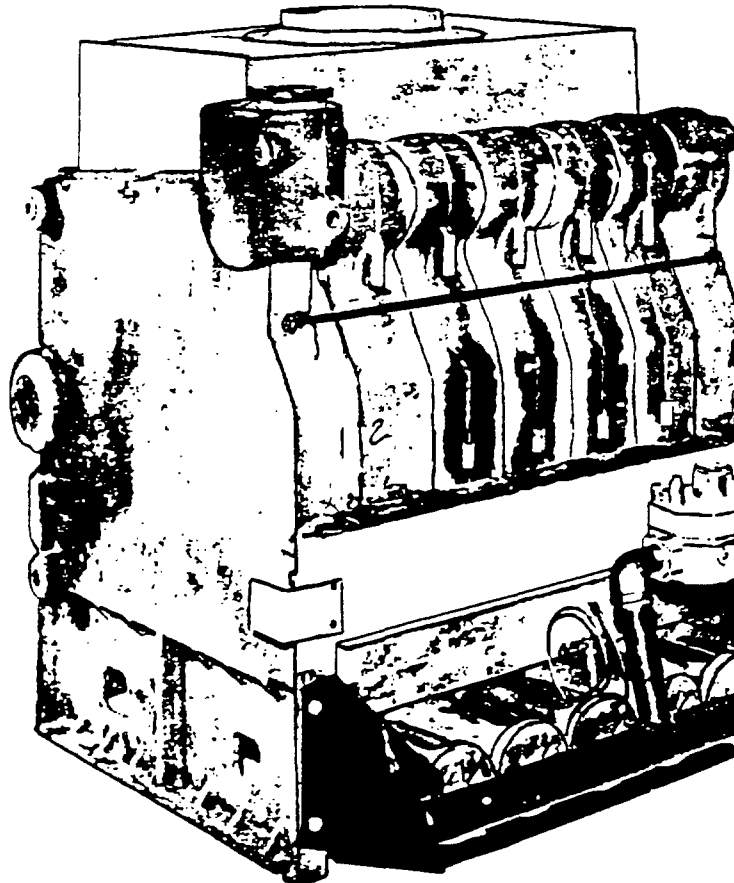


FIG. 7

1. IDENTIFYING THE PROBLEM



UP TO 6 BOLLERS MAY BE PLACED IN A ROW LEAVING THE REMAINDER SUPPLIED ON SPECIAL ORDER
IF MORE THAN 6 BOLLERS ARE ORDERED THEY SHOULD BE SHIPPED INTO TWO
BOXES (10 ROWS OF BOLLERS) OR INTO THREE BOXES (11 ROWS IN BOLLERS)
THE BOLLERS SHOULD BE PACKED IN PALLETS

 INSTALL TEMPERATURE & PRESSURE GAGE IN OUTLET END OF HEATER

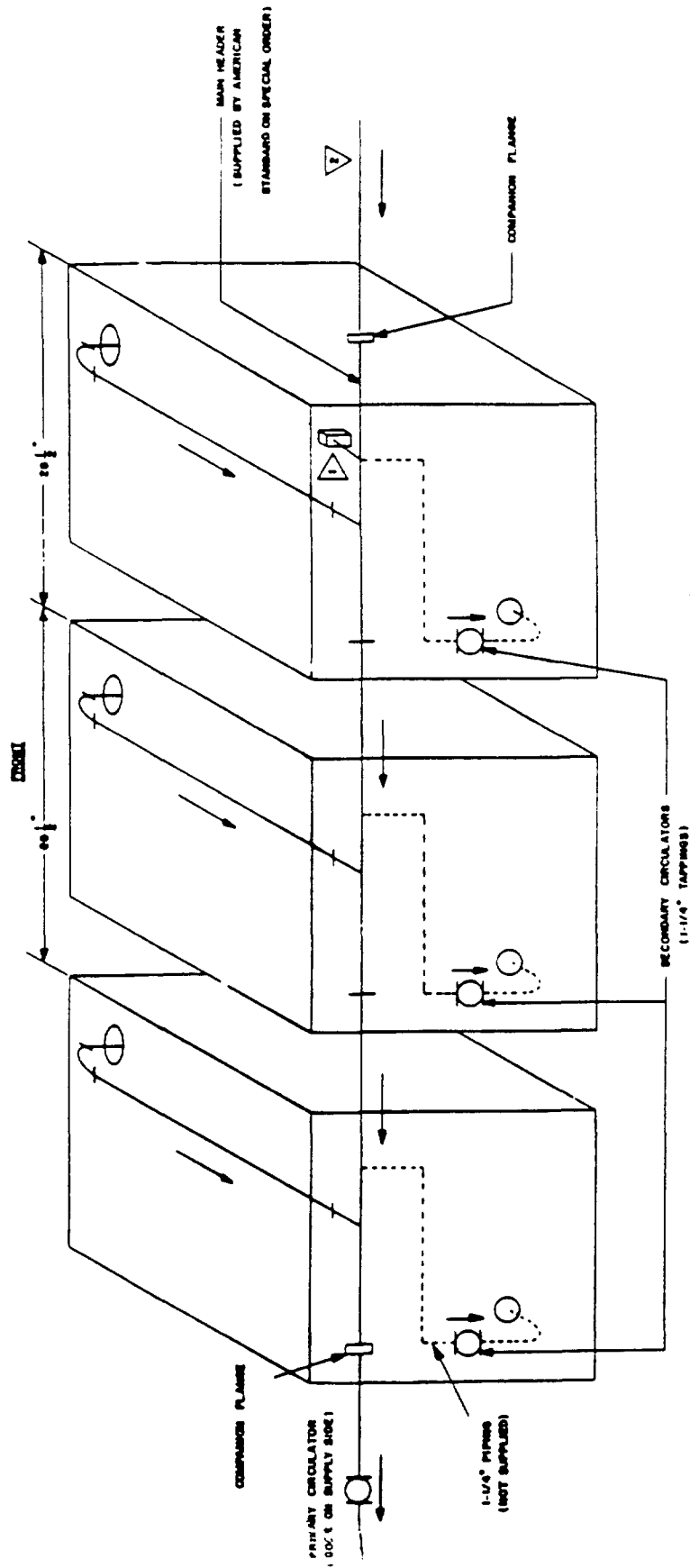
 CALCULATOR PERMITTED FOR LEFT TO RIGHT FLUENCY IN READING (USE ANSWER FROM BACK)

3 CIRCULATION RETURN FOR ENTRY TO LEFT FLOW IN READER'S (VIEWING FROM BACK)

4 DISCUSSION (PAGE 110 ON 0 0 0 12B)

FIG. 8

OWN BOILER MANIFOLD ARRANGEMENT
FOR PRIMARY-SECONDARY CIRCULATOR SYSTEM
(PIPING AND CONTROL ARRANGEMENT FOR
FLOW FROM RIGHT TO LEFT VIEWING BACK)



- 2 WHEN INDIVIDUAL L400SA IMMERSION CONTROLS OR INDIVIDUAL A187PC-8 INDOOR/OUTDOOR CONTROLS ARE USED FOR CONTROLLING THE BOILERS, THEY ALL MUST BE LOCATED ON THE RETURN END OF THE HEADER.
- 1 A187SA FOUR-STAGE IMMERSION CONTROL LOCATION -OR- A187AA-11 CONTROL LOCATION WHEN 8-STAGE BOILER RESENDER IS USED.

FIG. 10

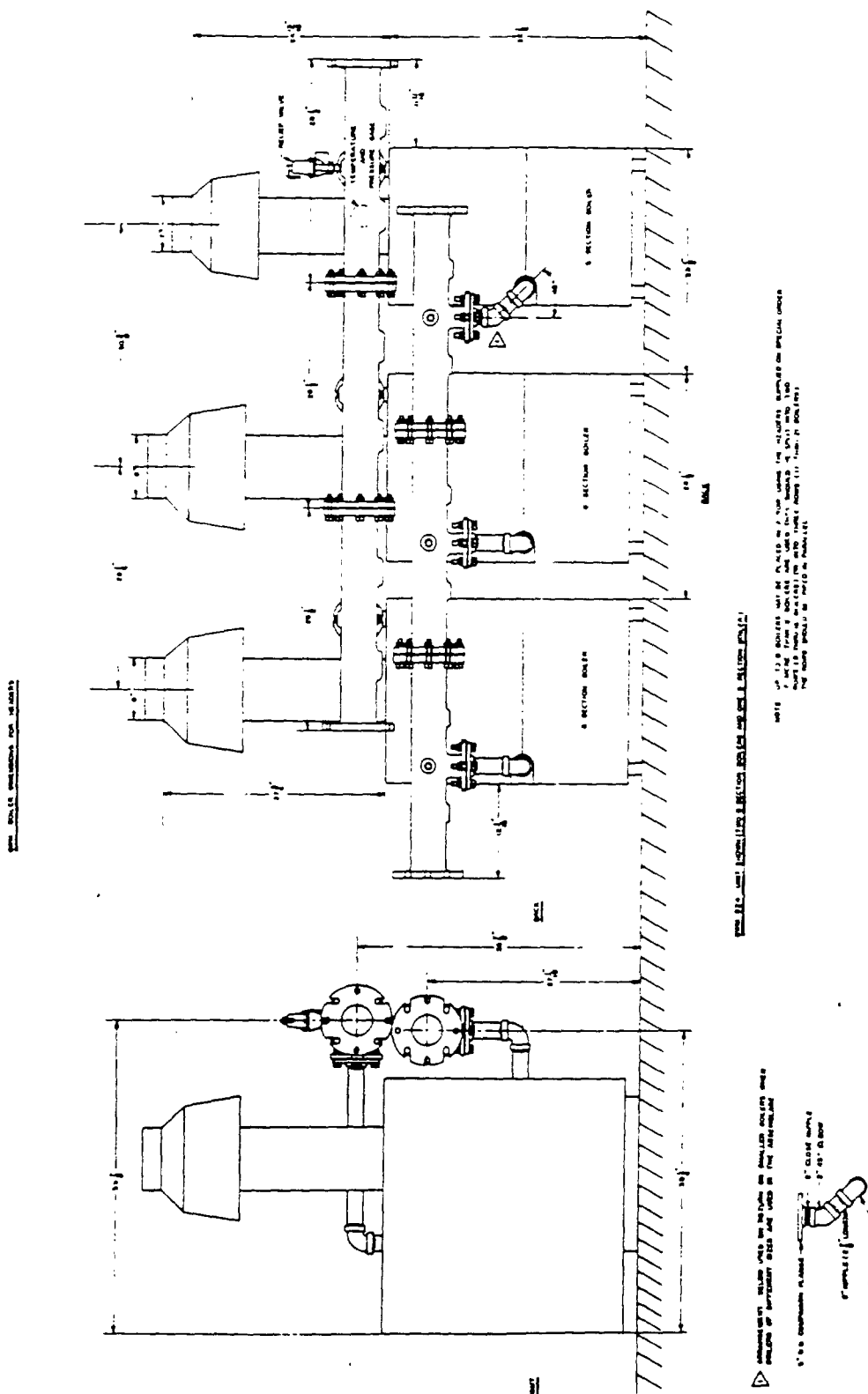
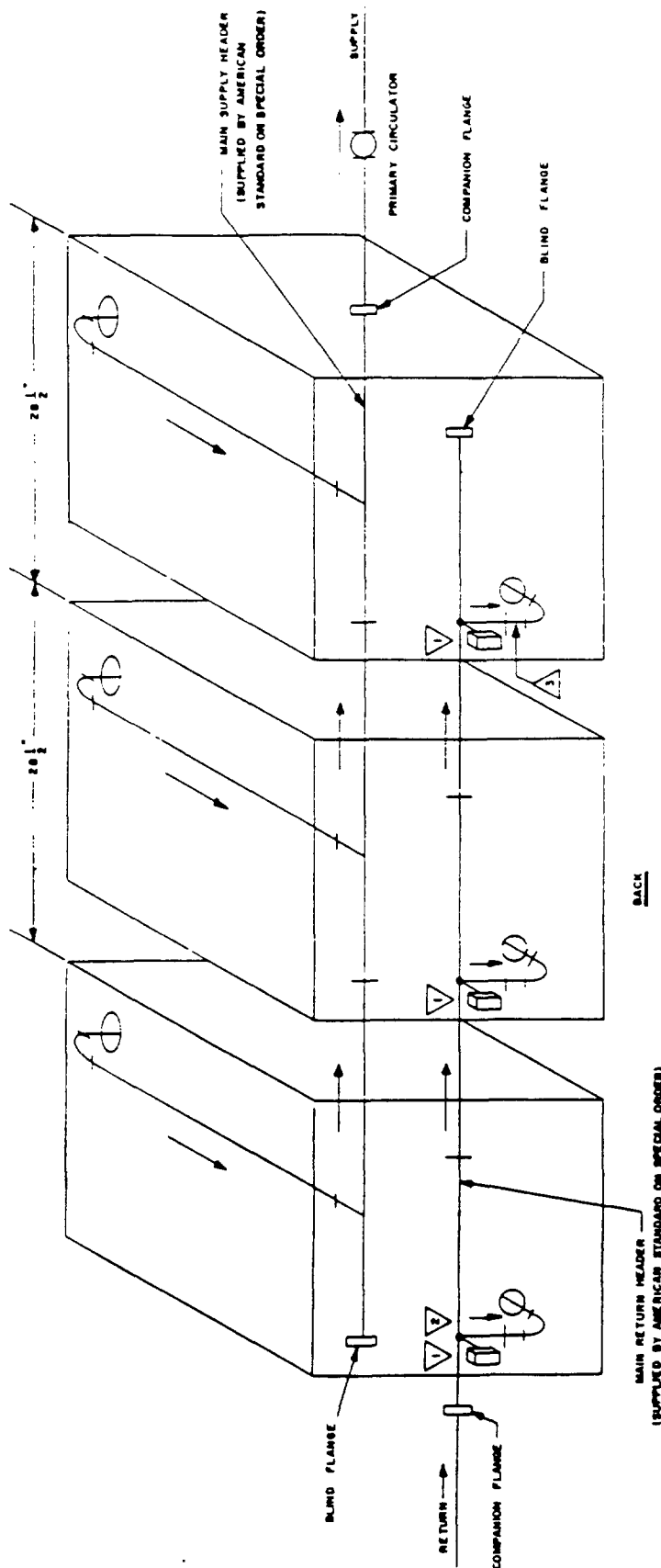


FIG. 11

FROM



NOTE - FOR FLOW FROM RIGHT TO LEFT VIEWING BACK
THE HEADER PIPING CONNECTIONS SHOULD
BE REVERSED

7. SECTION BOILERS

- 3 EXTRA WIPPLE AND 45° ELBOW USED ON RETURN OF SMALLER BOILERS WHEN BOILERS OF DIFFERENT SIZE ARE USED IN THE ASSEMBLAGE
- 2 A18AAA-11 CONTROL LOCATION WHEN 8-STAGE BOILER SEQUENCER IS USED
- ON-A38AAA FOUR-STAGE IMMERSION CONTROL LOCATION
- 1 LOCATION FOR L4008A CONTROLS ON A197C-6 INDOOR/OUTDOOR CONTROLS WHEN USED.

FIG. 12

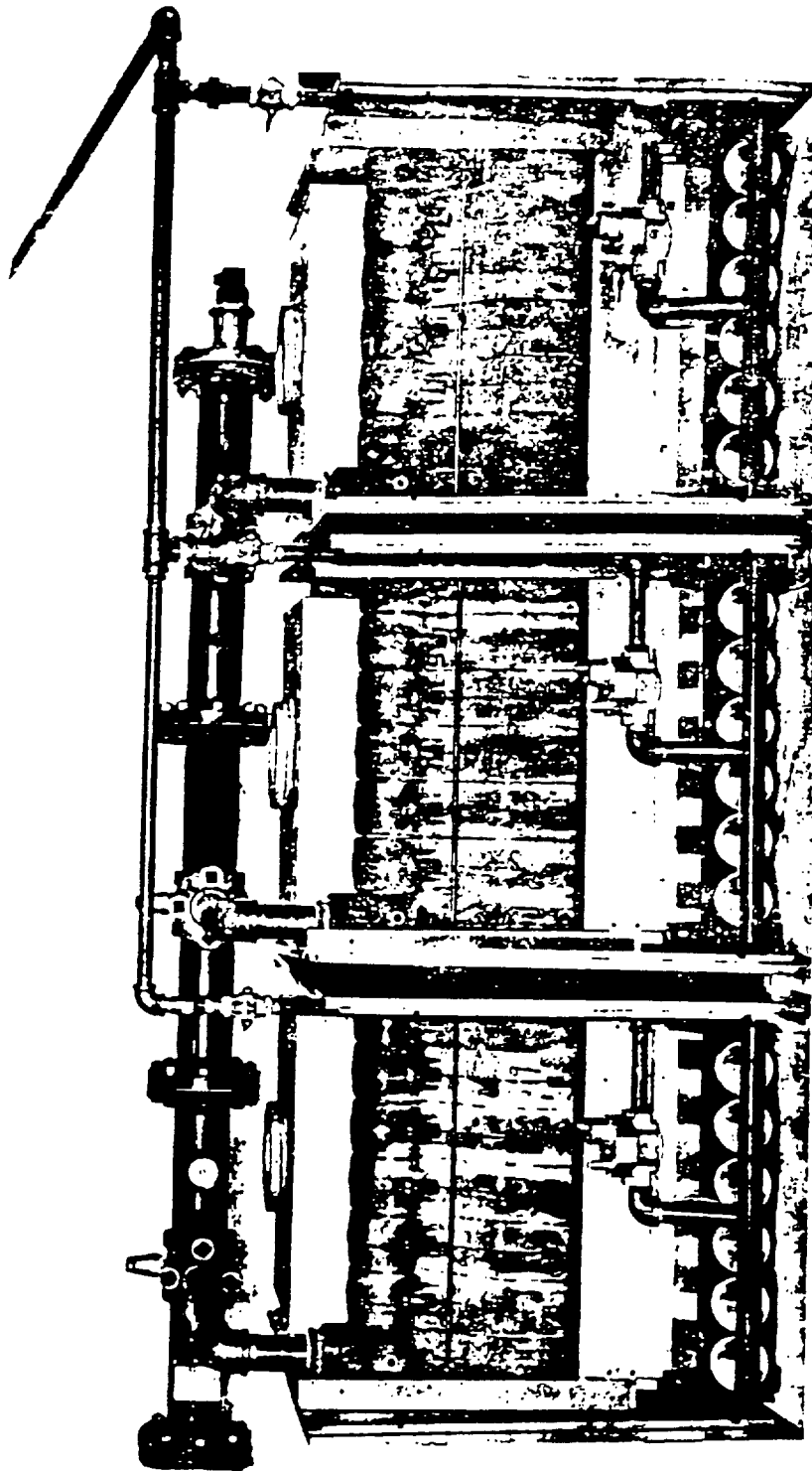


FIG. 13

(Jacket Installation continued from page 15)

3. Attach the jacket liner to the side panels with #8 x 3/8" sheet metal screws. LEAVE ALL JACKET SCREWS SLIGHTLY LOOSE UNTIL ENTIRE JACKET IS ASSEMBLED. Drape the loose end of the jacket liner insulation over the canopy (See Figure 14).
4. Attach the back panel to the side panels with #8 x 3/8" sheet metal screws.
5. Attach the tie bar to the side panels at the lower front portion of the boiler with #8 x 3/8" sheet metal screws (See Figure 15).
6. Place the black upper front panel so that it engages the slots in the side panels and attach the top panel with #8 x 3/8" sheet metal screws.
7. Attach the number and series plate and the lighting instructions plate to the jacket liner with #6 x 1/4" sheet metal screws. (See Figure 15)
8. After installation of controls and wiring, the beige lower front panel should be installed (See Figure 16).

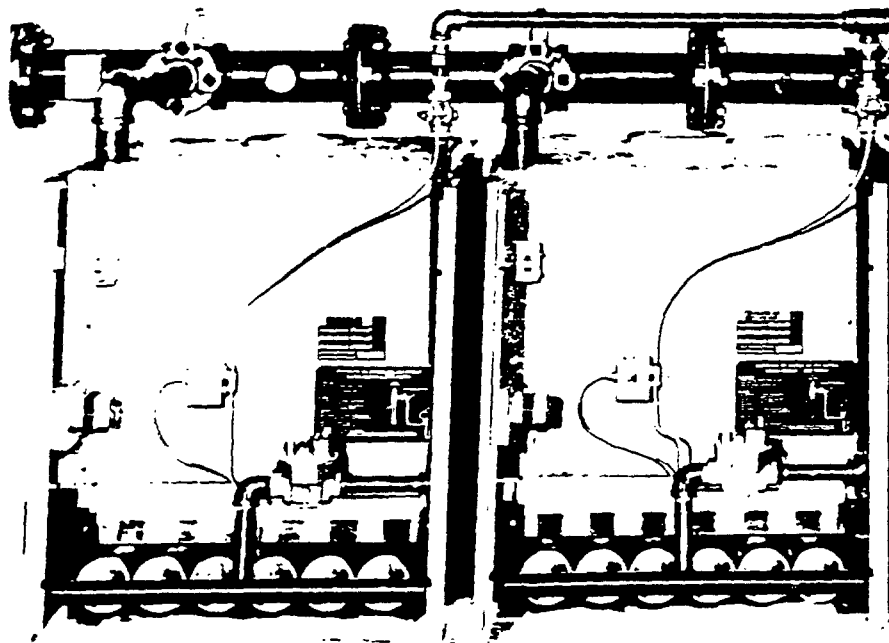


FIG. 14

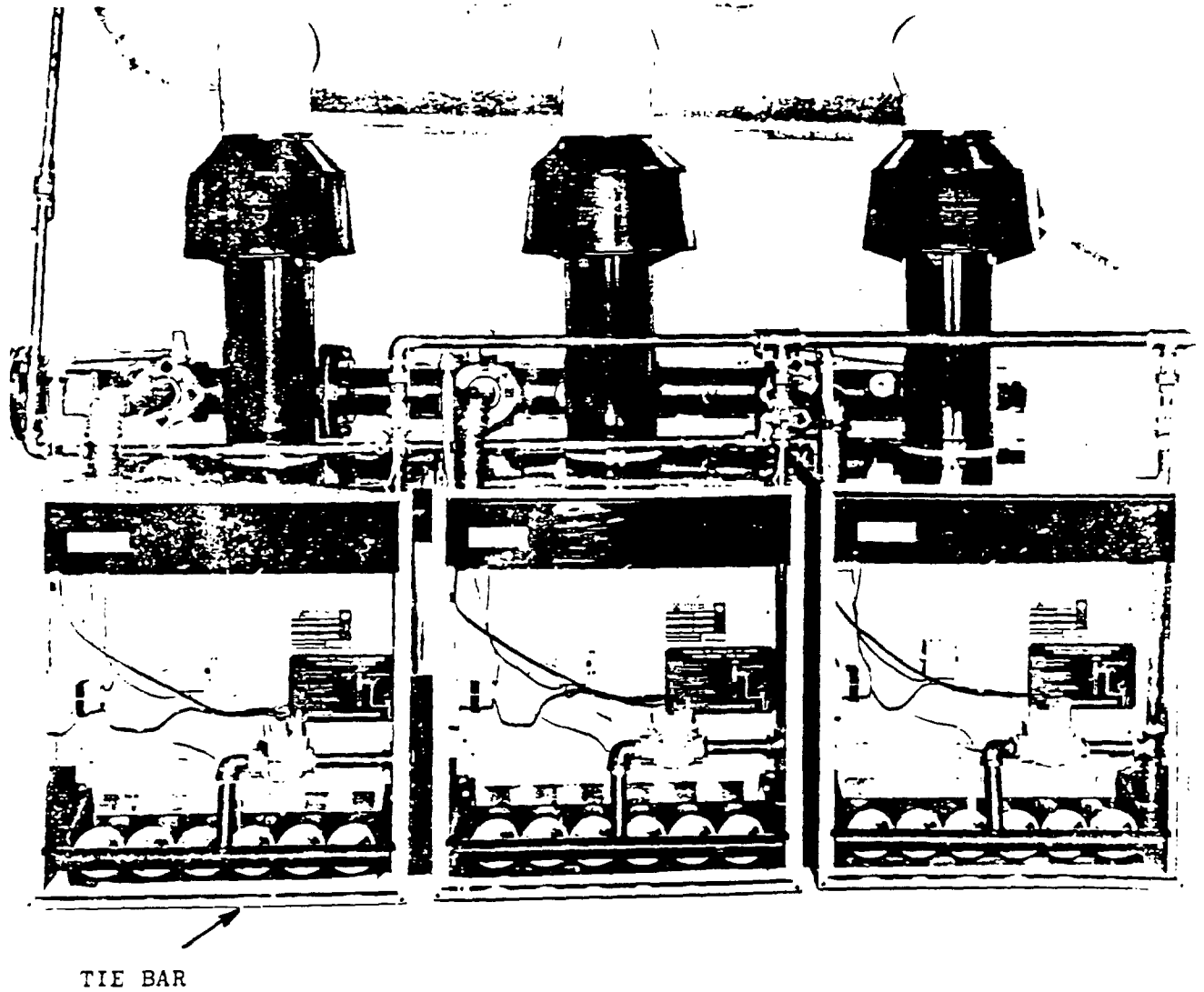


FIG. 15

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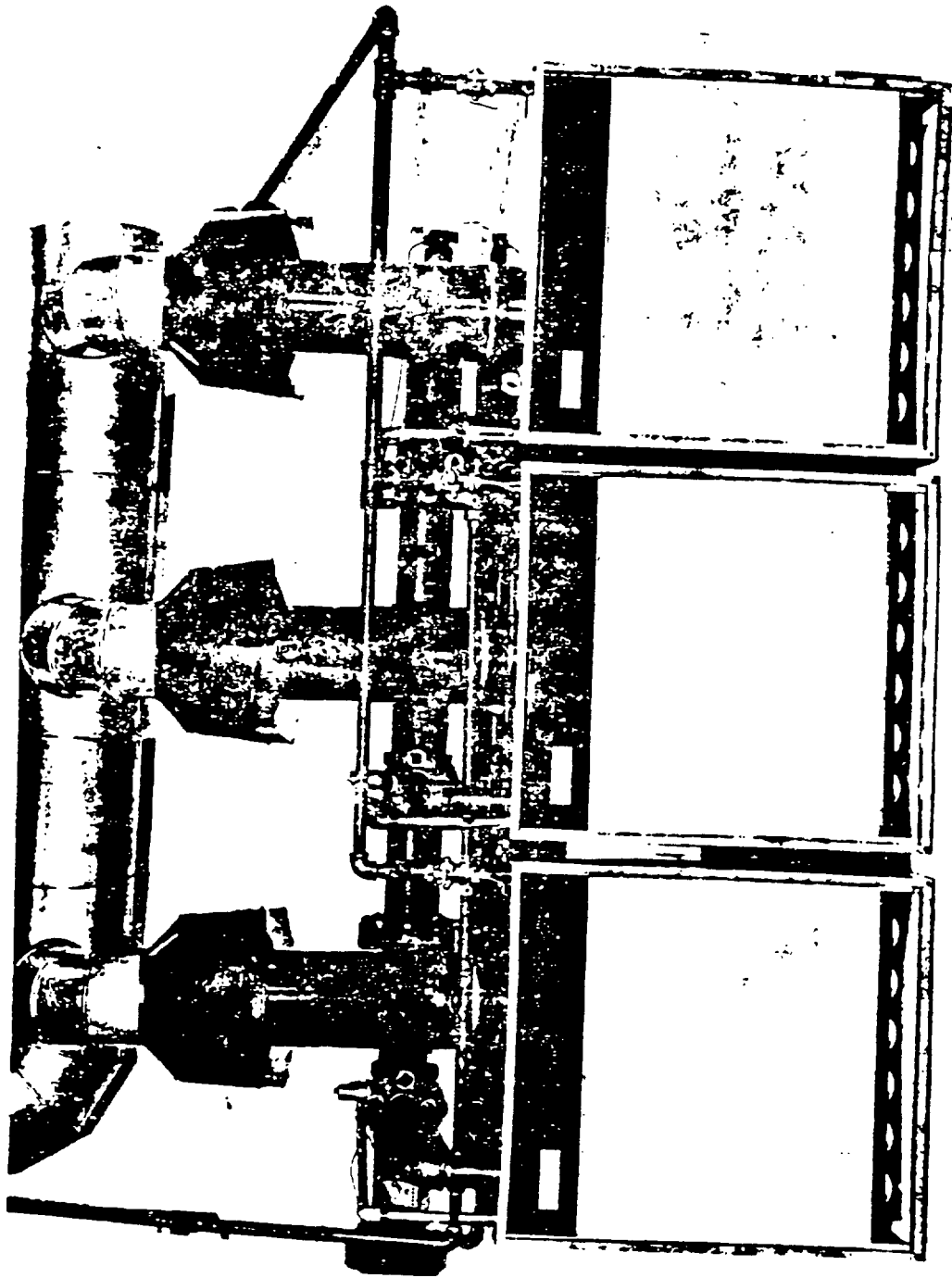
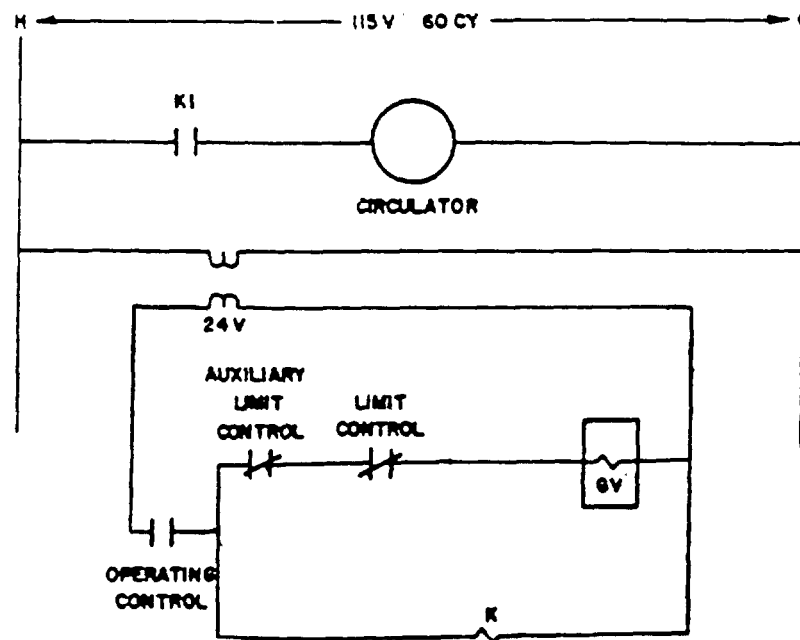
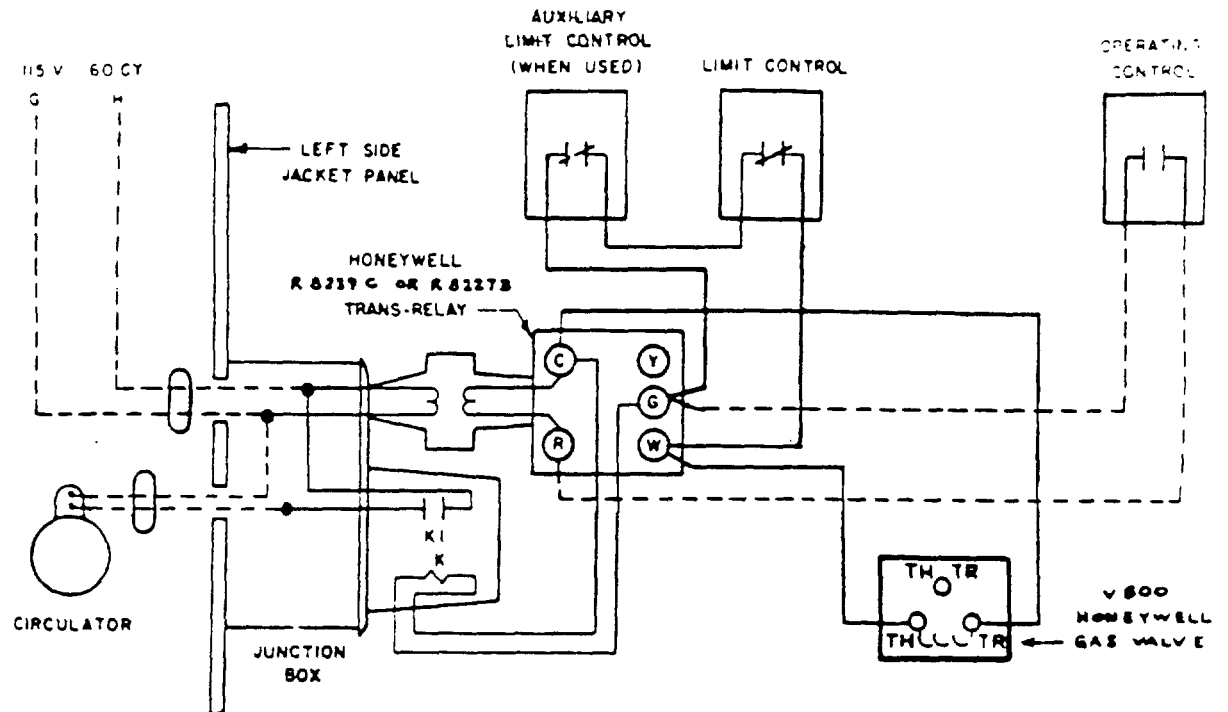


FIG. 16

INSTALLATION OF CONTROLS AND PIPING

1. Install the temperature-pressure gauges and the relief valves (with 3/4" nipple) in the water header (See Figure 14). A full sized discharge pipe from the relief valves to drain is recommended.
2. Install the gas piping (refer to Table 2 for sizing information). All pipe joints must be made using compound resistant to propane gas.
3. Attach the safety pilot switches (when used) to jacket liners with #8 x 1/2" sheet metal screws.
4. Connect the pilot gas lines from the combination controls or safety pilot switches to the pilot burners. When safety pilot switches are supplied, install pilot gas supply lines from switches to pilot shutoff valves on manual shutoff valves.
5. Electrical service should be brought to the boilers and connections made to accord with the wiring diagram furnished on the inside of each jacket liner. (If the supply-return manifold arrangement is used, the wiring diagram is packed separately and is to be placed over the wiring diagram on the inside of each jacket liner. Install and connect transformers and operating controls according to applicable wiring diagram. If the 8-stage boiler sequencing control is used, it should be wired in accordance with Figure 19 . If electronic controls are used refer to the instructions contained in the electronic controls installation manual.
6. Install drain cocks in 1/2" tappings at rear of boilers using 1/2" nipples and couplings provided therefore.
7. Place drafthoods firmly on the flue outlet collars of the canopys which project above the jackets and connect to chimney.
8. Fill system (refer to page 29).
9. Test water system for tightness. Check all gas piping joints for leakage by using a soapsuds solution before operating unit.
10. Light boilers (refer to pages 30 and 31).
11. Make final burner adjustment and check out controls (refer to pages 33 and 34).

WIRING DIAGRAM FOR
PRIMARY-SECONDARY PUMPING ARRANGEMENT



GWM BOILER WIRING DIAGRAM
INTERMITTENT CIRCULATOR OPERATION
24 VOLT CONTROLS

FIG. 17

WIRING DIAGRAM FOR PRIMARY-SECONDARY PUMPING ARRANGEMENT

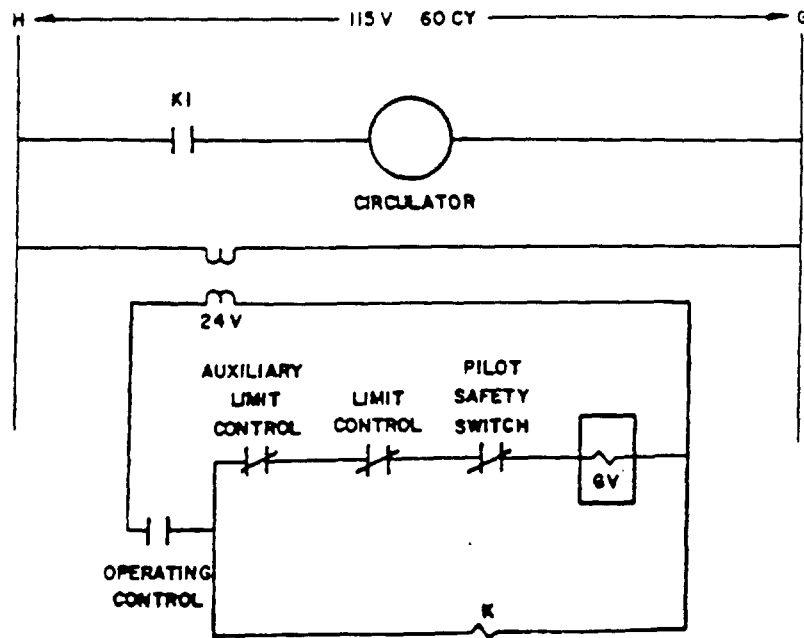
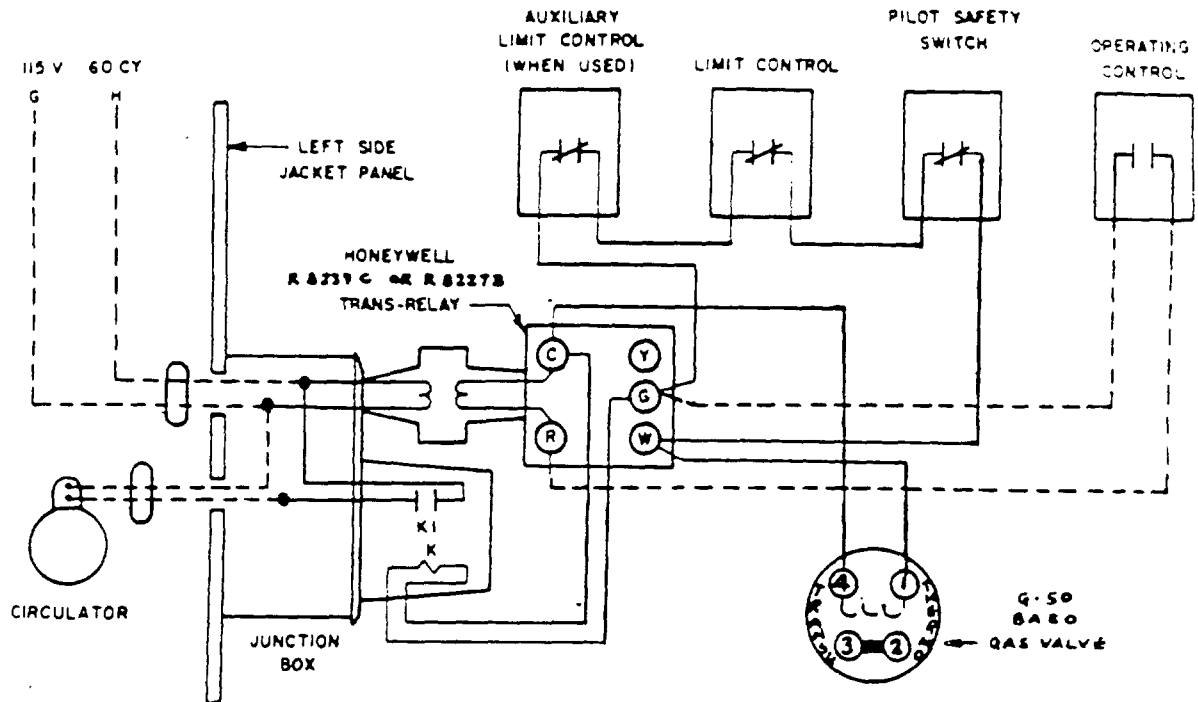


FIG 17a

GWM BOILER WIRING DIAGRAM
INTERMITTENT CIRCULATOR OPERATION
24 VOLT CONTROLS

WIRING DIAGRAM FOR SUPPLY-RETURN MANIFOLD ARRANGEMENT

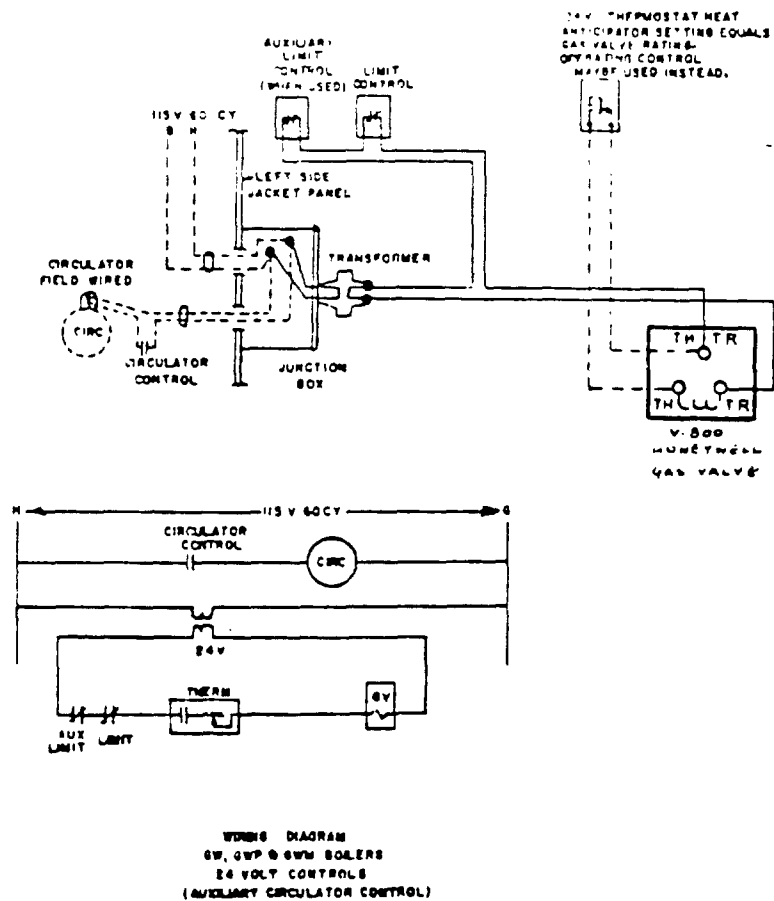
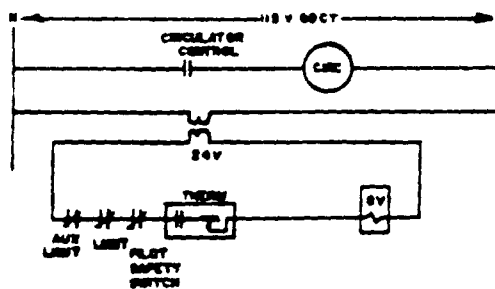
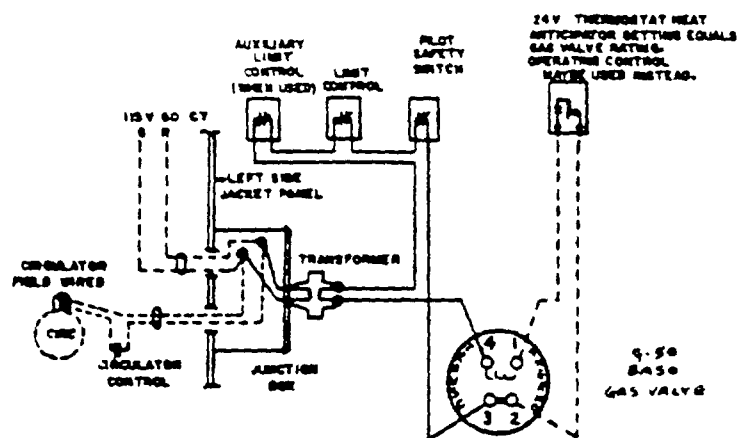


FIG 18

WIRING DIAGRAM FOR SUPPLY-RETURN MANIFOLD ARRANGEMENT



WIRING DIAGRAM
6W, 6VP & 6VM BOILERS
24 VOLT CONTROLS
(AUXILIARY CIRCULATOR CONTROL)

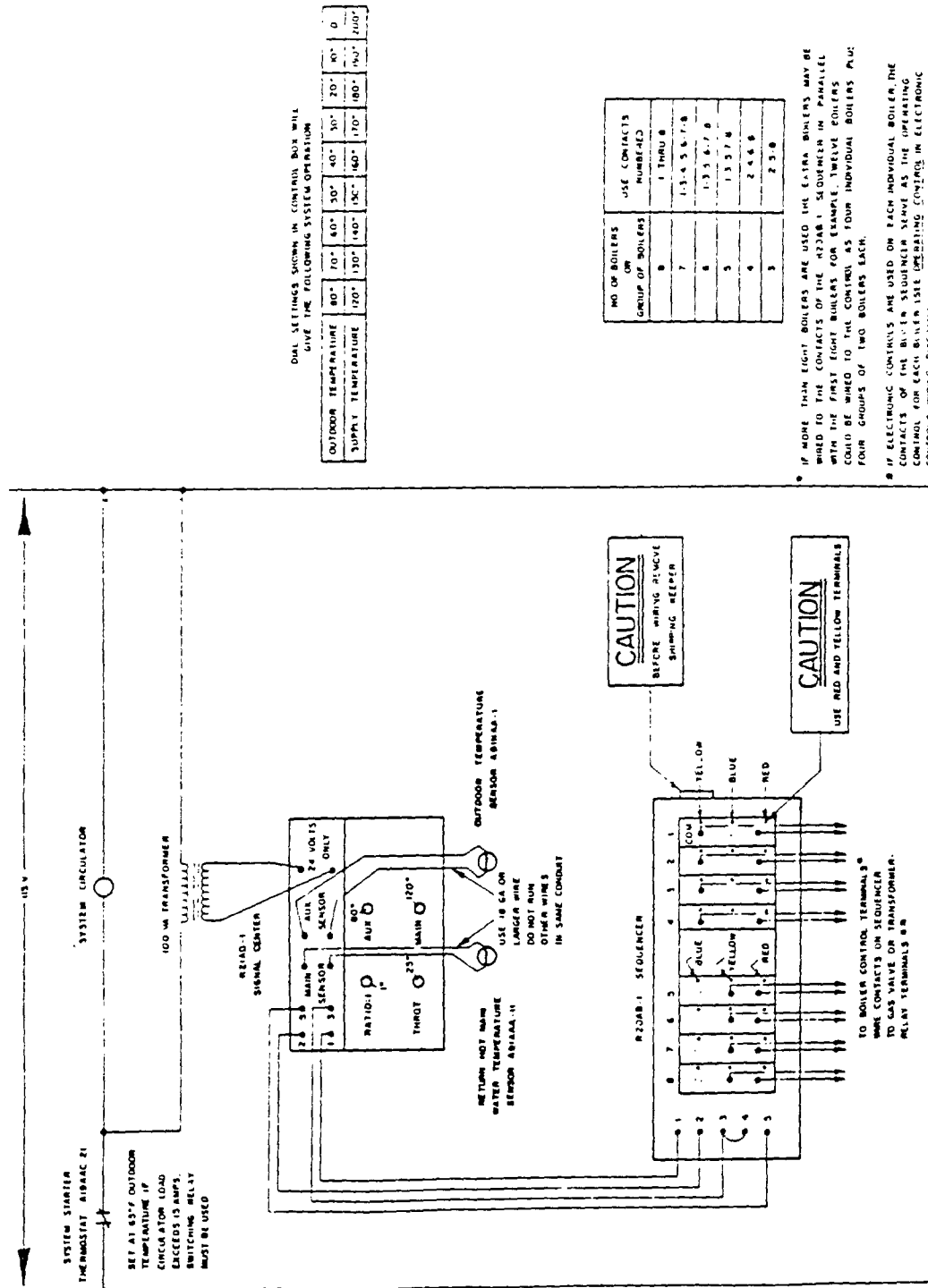
FIG 18a

06550

GWM GAS BOILER

EIGHT STAGE BOILER SEQUENCER

WIRING DIAGRAM



FILLING SYSTEM (GENERAL INFORMATION)

CAUTION: Never start boilers unless they are properly filled. Following filling, the piping elsewhere in the system should be checked for leaks. After boilers are in operation make-up water should be added slowly.

When filling a system, the pressure must not exceed 50 lbs. (100 lbs. with 100 lb. relief valve). If it does, it must be relieved immediately and the relief valve failure investigated and corrected, otherwise pressure may build up and cause damage to heating system.

The owner should occasionally check the readings on the press-temp gauges. The higher range scale indicates the water temperature within the boiler header; and, should the water exceed 250°F, operation must be discontinued until the system is checked and the fault corrected. The lower range scale indicates the pressure within the system and should not exceed 50 lbs. (100 lbs. with 100 lb. relief valve).

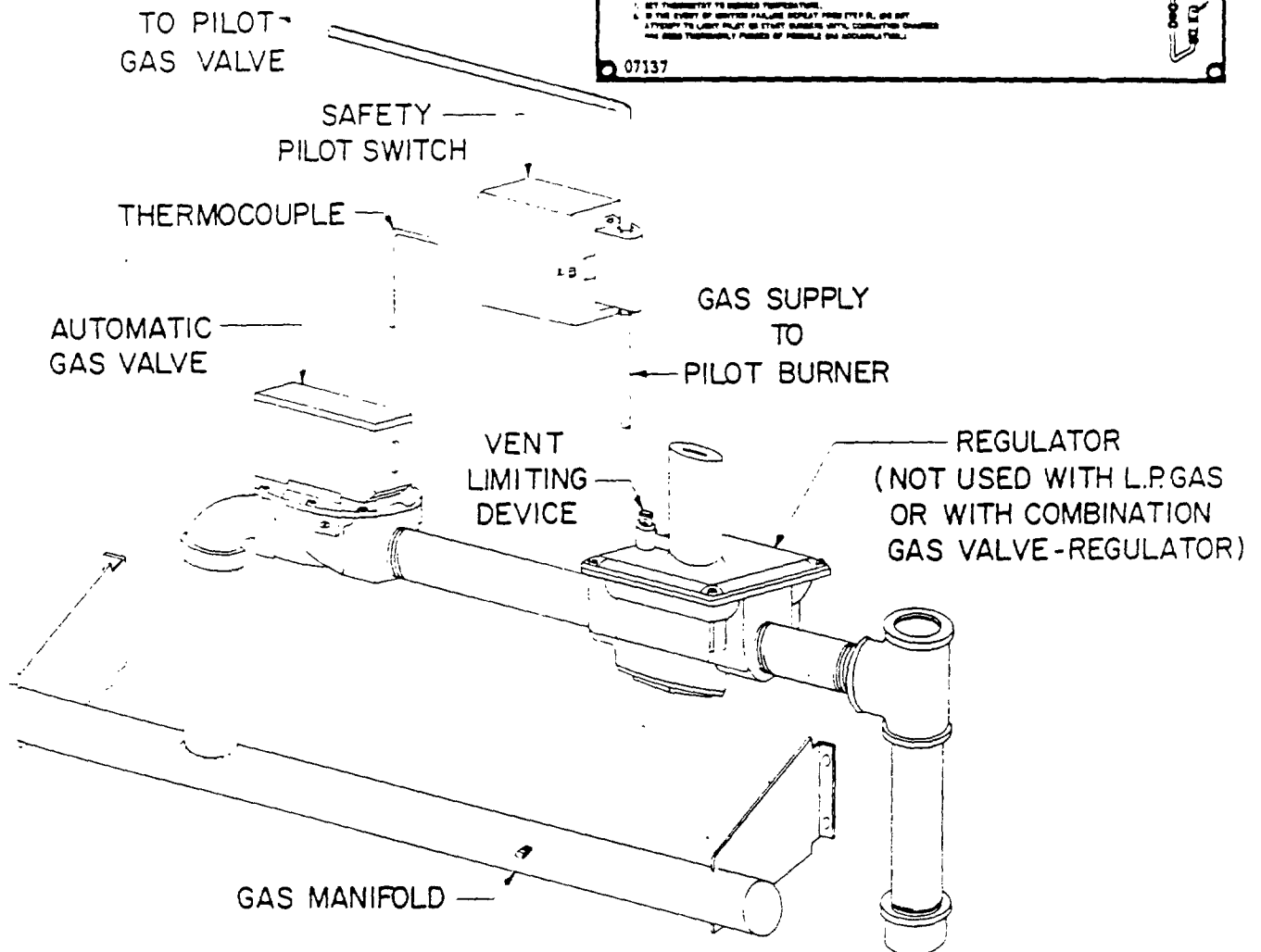
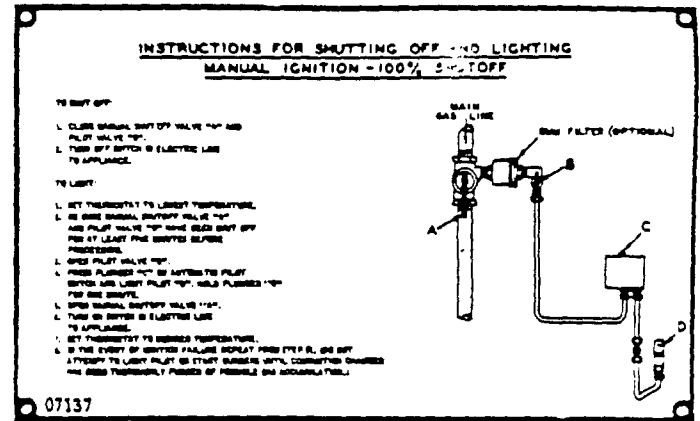
In a closed system the boilers and piping are entirely filled with water except for a cushion of air in the upper portion of the expansion tank. When the water is heated, it expands, compressing the air. If, for any reason, this air were completely displaced from the tank, there would no longer be a cushion. In that event an increase in water temperatures would cause a corresponding increase in volume and pressure would force the relief valve open to discharge the excess volume. To correct such a condition, the expansion tank must be drained enough to permit the tank to fill with air.

PIPING ARRANGEMENT AND LIGHTING INSTRUCTIONS

24 VOLT SYSTEM

6 and 7 Section - Natural Gas

FIG. 20



ASSEMBLY OF GAS VALVE AND MANIFOLD - 24 VOLT SYSTEM

PIPING ARRANGEMENT AND LIGHTING INSTRUCTIONS

24 VOLT SYSTEM

5 Section - Natural Gas

5, 6, and 7 Section - Propane Gas

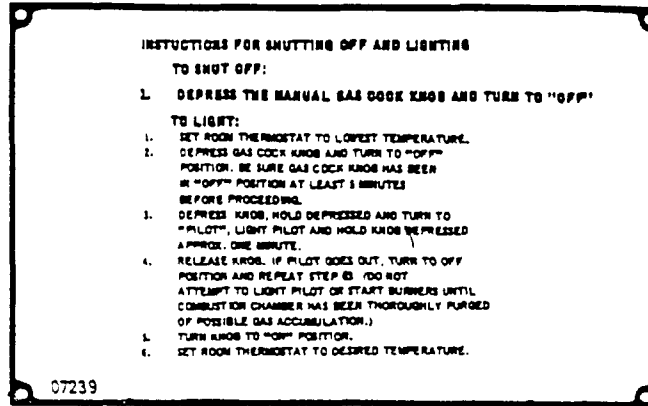
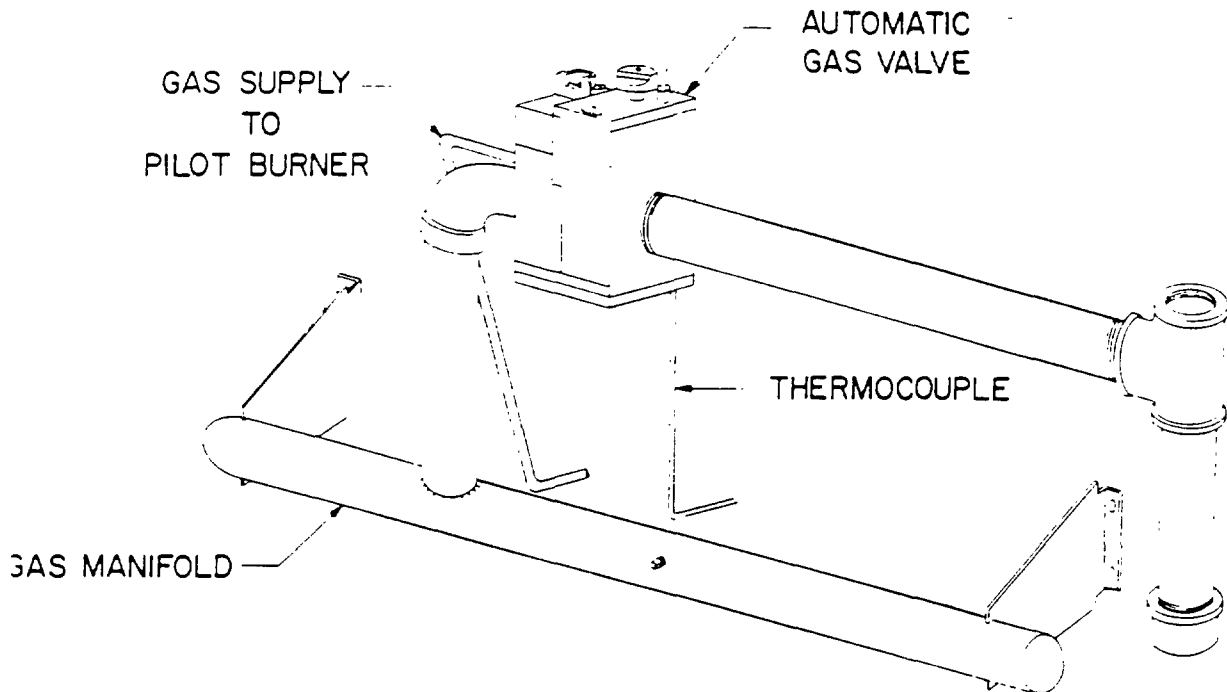


FIG. 22



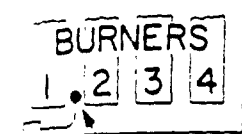
ASSEMBLY OF COMBINATION CONTROL
AND MANIFOLD 24 VOLT SYSTEM

FIG. 23

COMBINATION CONTROL

COMBINATION AUTOMATIC PILOT,
PRESSURE REGULATOR,
AUTOMATIC GAS VALVE, AND
MANUAL SHUTOFF VALVE.

5 SECTION BOILER



PILOT BURNER
WITH
THERMOCOUPLE

6 SECTION BOILER



PILOT BURNER
WITH
THERMOCOUPLE

7 SECTION BOILER

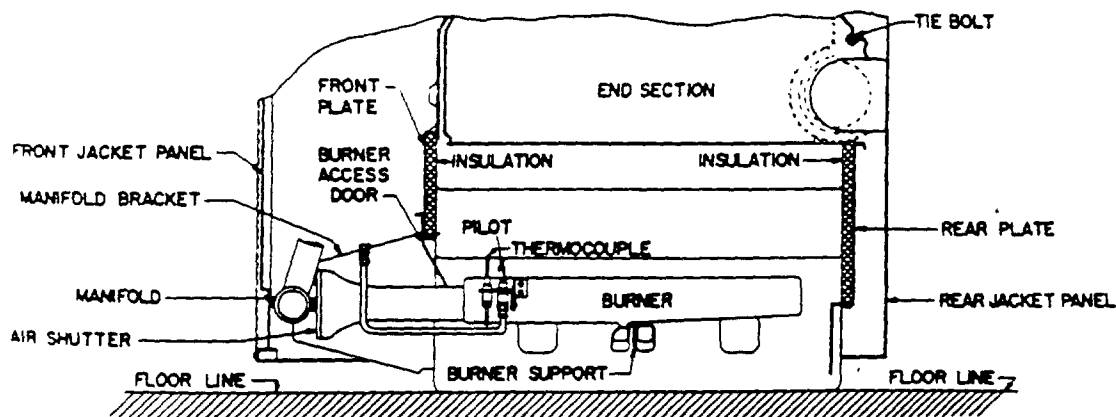


PILOT BURNER
WITH
THERMOCOUPLE

NOTE: TO REMOVE PILOT BURNER NO. 1 ON 5 SECTION
BOILER, FIRST REMOVE BURNERS NO. 2 AND 3.

PILOT LOCATION FOR ALL GASES

FIG. 24



BURNER AND PILOT ASSEMBLY
FOR MANUAL IGNITION

FIG. 25

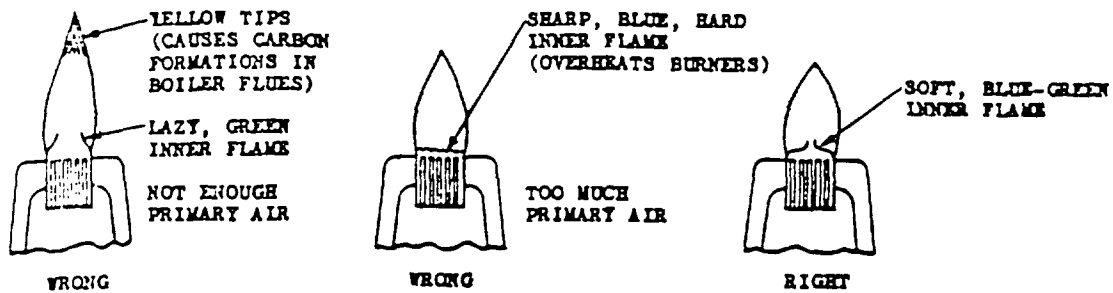


FIG. 26

Ribbon burners - Natural gas

Adjust air shutter to give sharp blue flame with no yellow. For natural gas, good performance is usually obtained with air shutter set to maximum open position.

TEMPERATURE LIMIT CONTROL

The temperature limit control is located in the upper left corner of the control vestibule. The limit control can be checked and adjusted by removing the front door. If replacement is necessary, more ready access is obtained by:

1. Removing jacket top panel screws on each side.
2. Lifting top panel in front only until side panels can be moved outward approximately 1/4 inch allowing upper front panel to be removed.
3. Limit control is now completely exposed for service.
4. Replace panels and screws in reverse order.
5. Set limit control to 220° F or lower, if desired.

MAINTENANCE

GENERAL

IT IS IMPORTANT THAT THIS BOILER BE INSPECTED ONCE A YEAR BY A COMPETENT SERVICEMAN TO INSURE CONTINUED RELIABLE, SAFE OPERATION.

This inspection should include checking of all boiler safety controls, pilot, section flueways and burners. See next page for instructions on burner and section inspection and cleaning.

IN FALL BEFORE STARTING BOILER

Drain system sufficiently to remove sludge in bottom of boiler. Do not drain more water than necessary to remove sludge, then refill to proper level as directed in this manual.

MAINTENANCE OF BOILER WHILE IN OPERATION

Check water level regularly and add water slowly when needed. If water must be added frequently, check system for leaks. This boiler is fired automatically.

IN WINTER WHILE NOT IN OPERATION

Drain entire system to prevent damage from freezing. Drain through drain cocks located at lowest point in system. Be sure boiler is completely drained.

IN SUMMER WHILE NOT IN OPERATION

Keep the system filled as during the heating season. This is the recommended time to have a periodic check up of all safety controls and a close inspection of the burners, flue passage-ways, and flue pipe. It is also good practice to recheck the input firing rate and the gas air mixture on the burners to see that the boiler is operating at normal efficiency.

GENERAL MAINTENANCE OF HEATING SYSTEM

Keep radiators and convectors clean.

If a hot water radiator is hot at the bottom but not at the top, it indicates that air has accumulated inside and should be vented. To vent radiator hold small cup under air vent (located near top of radiator), open vent until water escapes and then close. Fill hot water systems only as directed in this manual.

If much water is added to system, it is advisable to heat system to a high temperature and vent again. This will make less venting necessary during the winter.

INSPECTION AND CLEANING OF BOILER BURNERS AND FLUEWAYS

For maximum efficiency and safe operation, burners and boiler flue passages should be inspected and cleaned, if necessary, once a year.

Inspection Procedure:

1. Turn manual shutoff valve and pilot shutoff valve to off positions.
2. Remove lower front panel from boiler by lifting upward and pulling out.
3. Remove pilot line, vent line, and thermocouple.
4. Remove the burner access door (See Figure 25).
5. Remove burners by lifting at the rear, sliding them toward the back of the boiler until free of the spuds, and lifting them out over the manifold.
6. Check burner gas ports or ribbons for lint and dirt.
7. Section cleanliness can be checked with a mirror and light inserted in the opening where the burners have been removed.

BURNER CLEANING

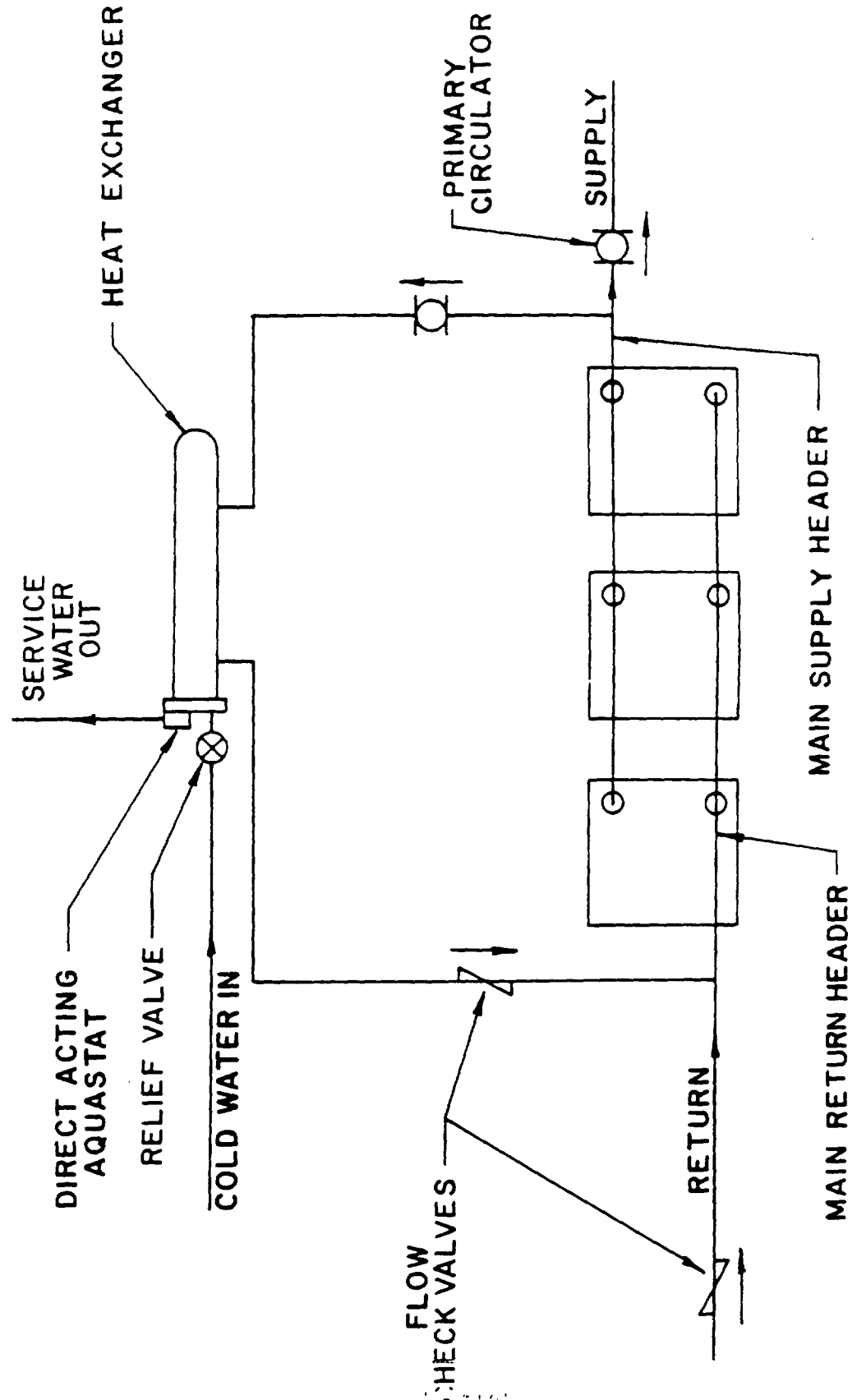
If burner inspection reveals rust, scale or lint present, clean as follows:

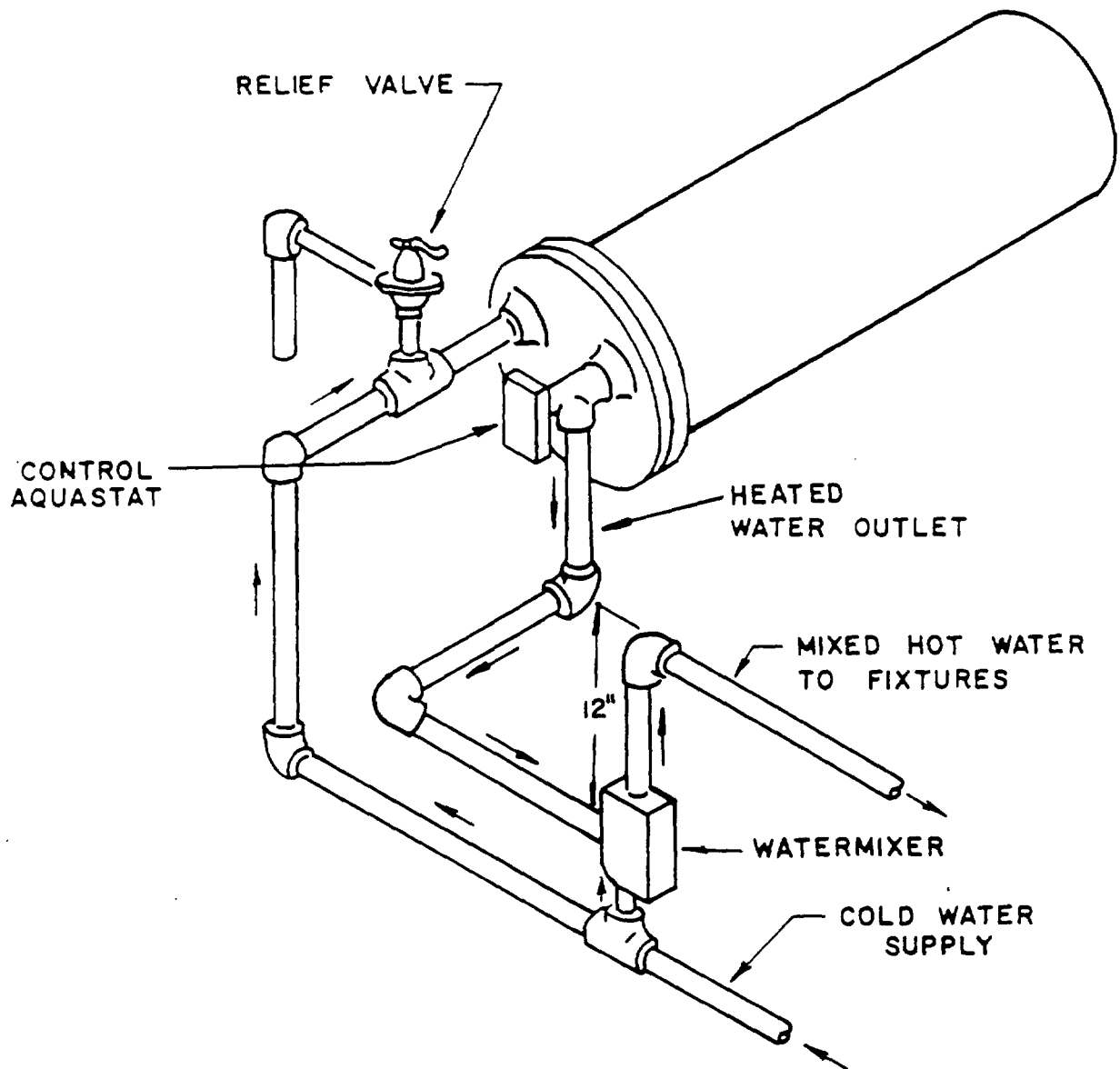
1. Drilled Port Burner - Pass a #30 or #31 drill through the ports and shake any dislodged material out through the mixing tube.
2. Ribbon Burners - Remove ribbon, hold down clamps, and then remove ribbons. Separate ribbons by fanning out and clean with wire brush. Reassemble to burner.

SECTION CLEANING

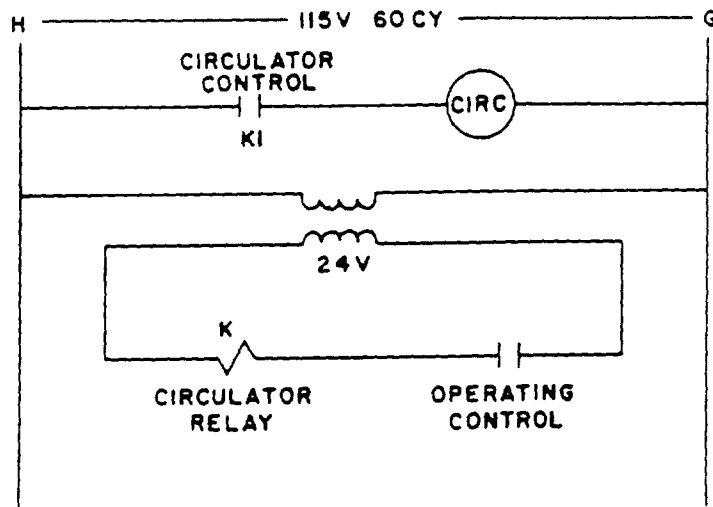
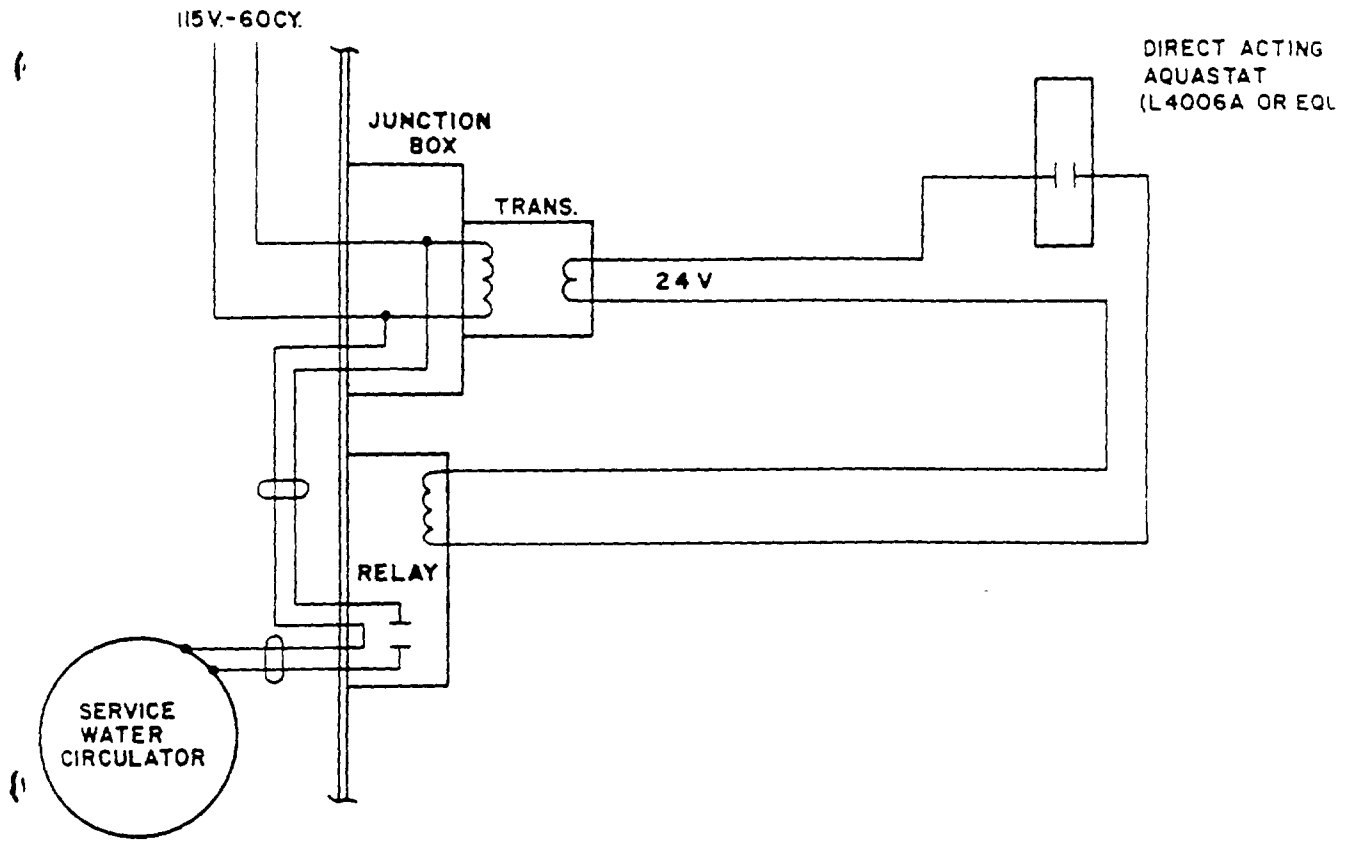
If section inspection reveals soot or scale, clean as follows:

1. IMPORTANT - BE SURE TO REMOVE BURNERS BEFORE PROCEEDING.
2. Remove flue pipe, jacket top, and canopy-draft hood assembly.
3. Clean sections with a wire flue brush.
4. Reassemble, carefully locating all parts.
5. Install burners and light pilot.
6. Check burner air adjustment as directed in this manual.

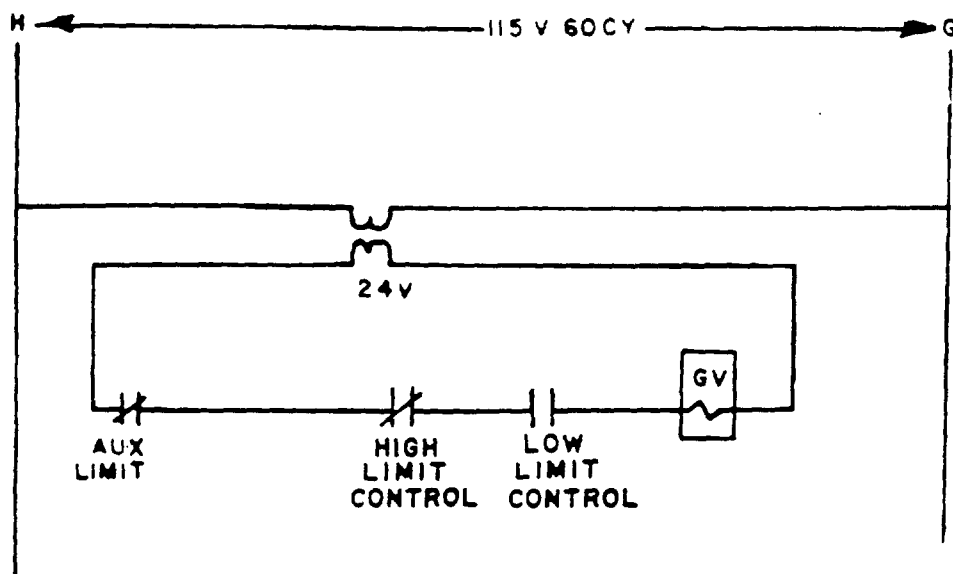
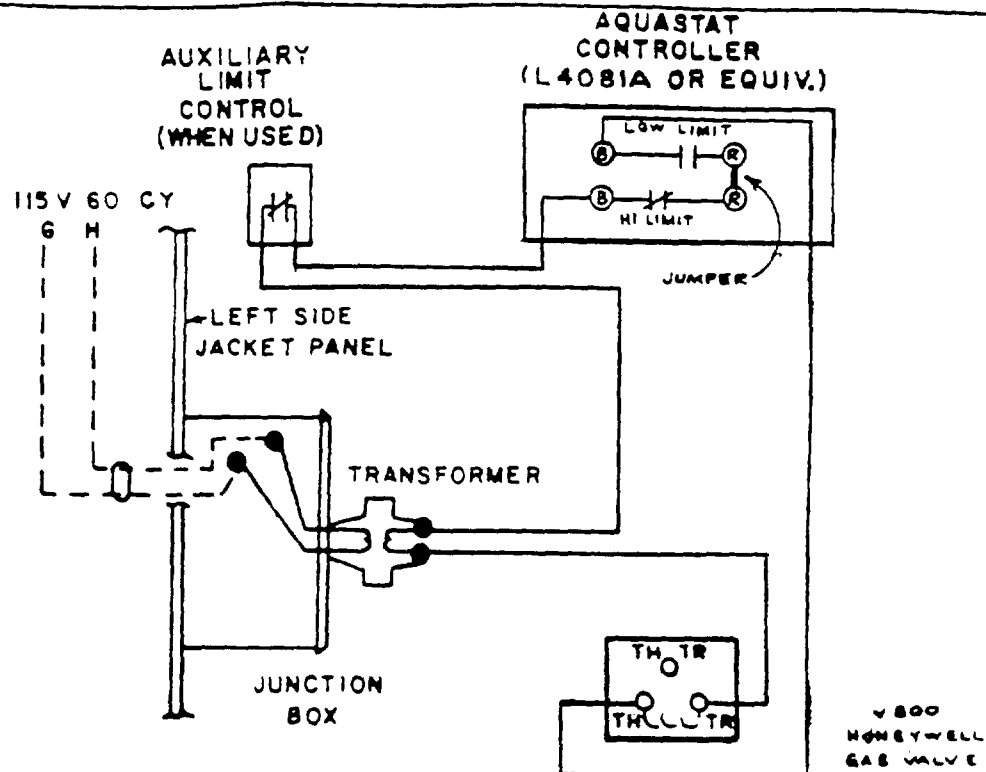




WATERMIXER ARRANGEMENT

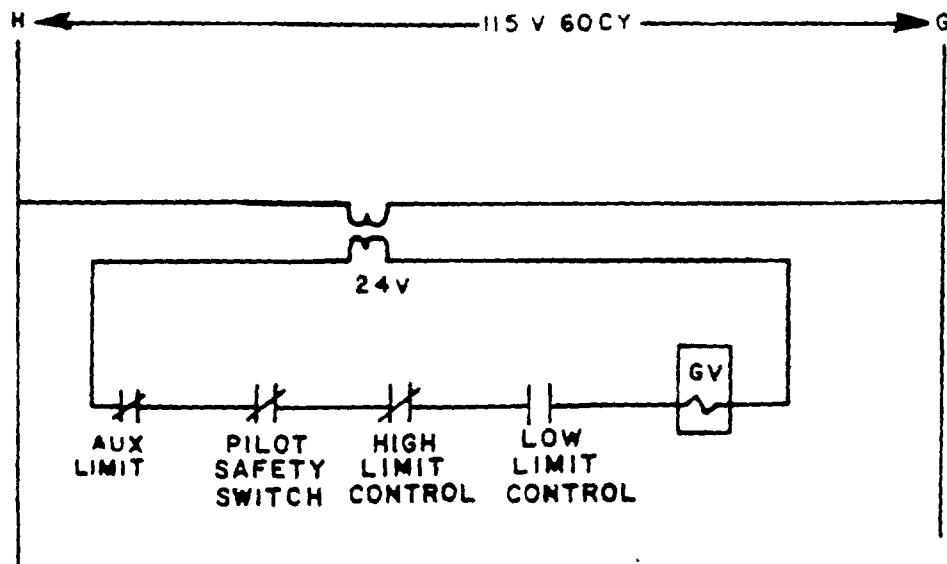
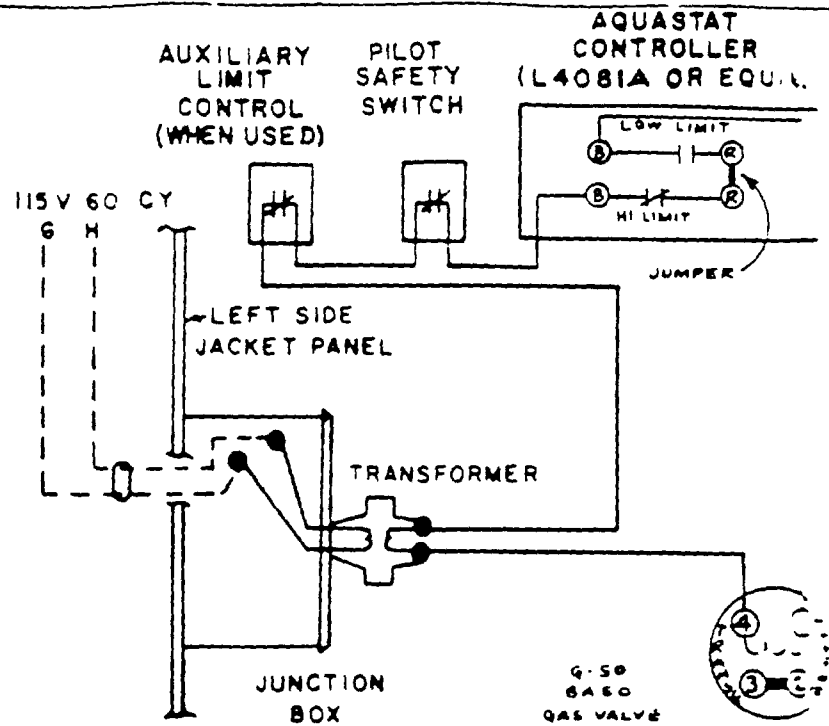


WIRING DIAGRAM
FOR CIRCULATOR CONTROL
SERVICE WATER PACKAGE

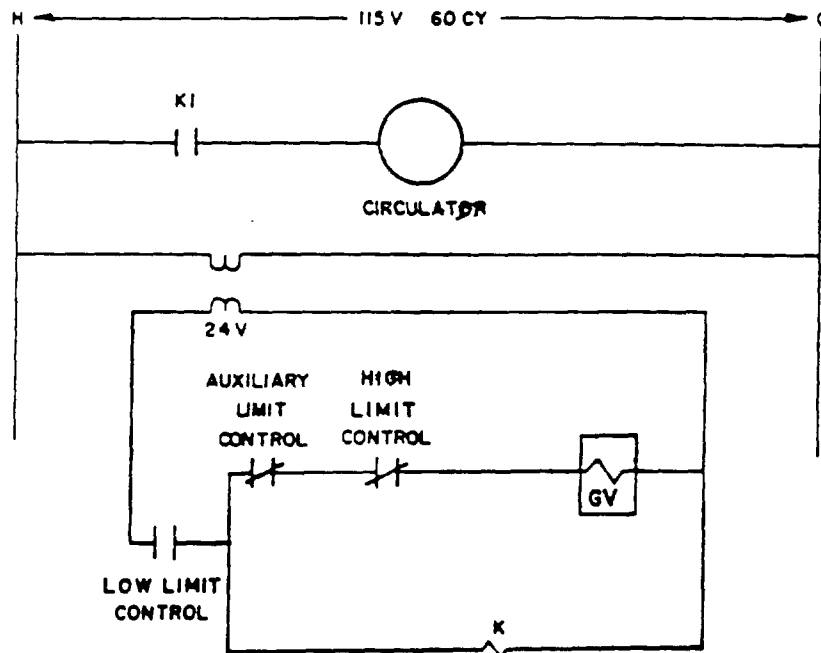
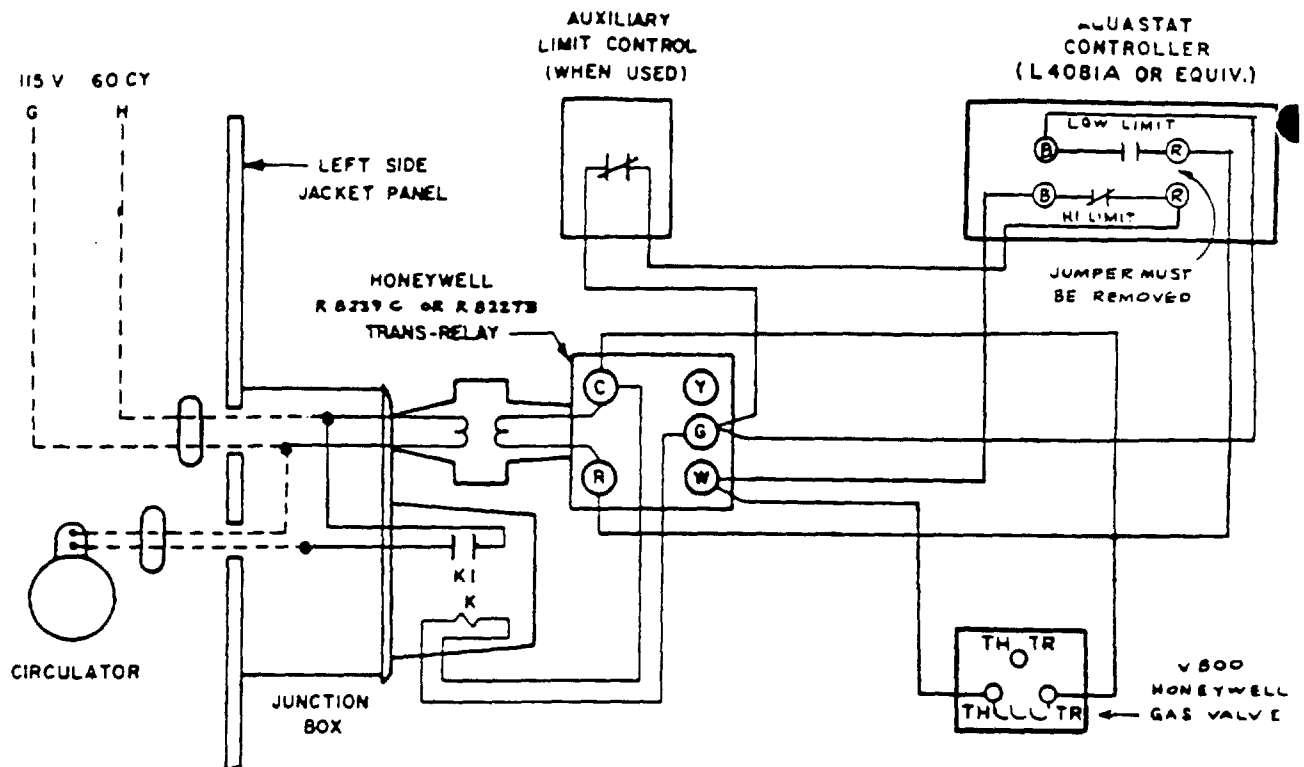


WIRING DIAGRAM
GWM BOILERS
24 VOLT CONTROLS
PARALLEL FLOW ARRANGEMENT
FOR SERVICE WATER PACKAGE

GWM GAS BOILER



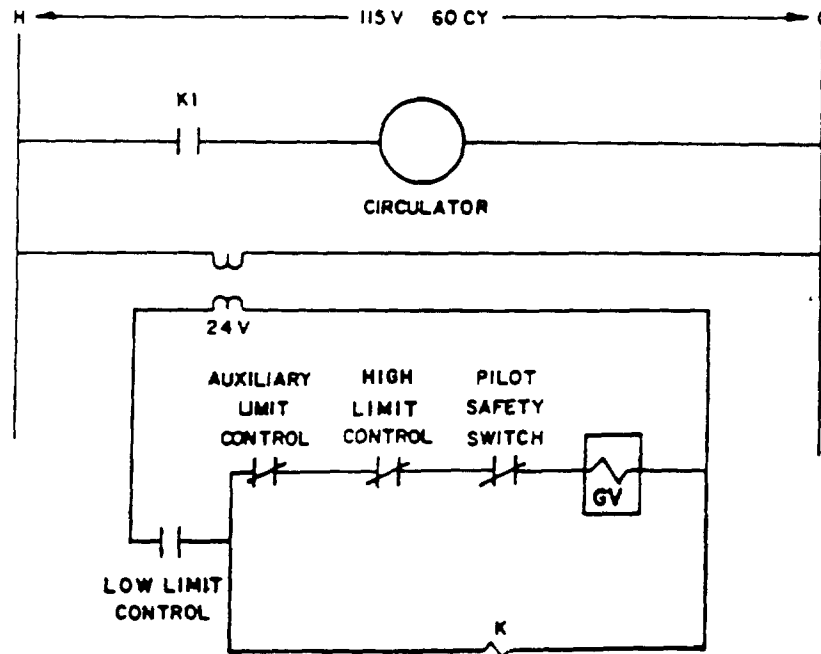
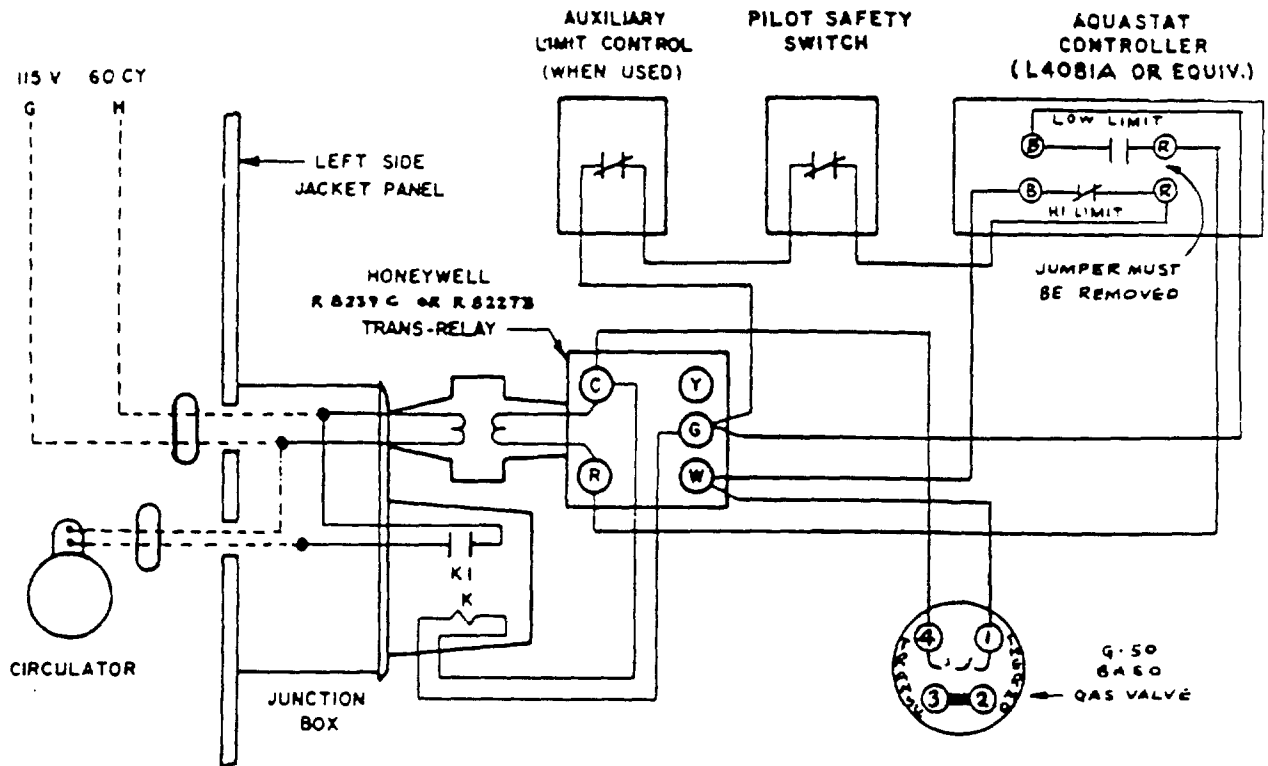
WIRING DIAGRAM
GWM BOILERS
24 VOLT CONTROLS
PARALLEL FLOW ARRANGEMENT
FOR SERVICE WATER PACKAGE



32407

GWM BOILER WIRING DIAGRAM
INTERMITTENT CIRCULATOR OPERATION
24 VOLT CONTROLS
PRIMARY-SECONDARY ARRANGEMENT
FOR SERVICE WATER PACKAGE

06564



32407

GWM BOILER WIRING DIAGRAM
 INTERMITTENT CIRCULATOR OPERATION
 24 VOLT CONTROLS
 PRIMARY-SECONDARY ARRANGEMENT
 FOR SERVICE WATER PACKAGE

06565

CAUTION TO INSTALLER AND OWNER

This hydronic heating boiler incorporates the best in engineering and manufacturing techniques and will give years of good service and trouble-free operation if properly treated.

The heat transfer surface has been carefully designed to give optimum performance and reliability. However, the presence of contaminants such as scale, sediment and boiler sealing compounds in the section waterways may serve to insulate the heat transfer surface and cause premature failure of the sections.

Scale build-up can be prevented by good installation practices which eliminate addition of makeup water to the system.

Sediment which may accumulate in the boiler should be flushed out on a regular basis in accordance with recommended maintenance practices.

Occasionally, leaks will be detected in the system. These leaks are usually of such a nature that they may be prevented or corrected by good workmanship. Every effort should be made to correct them without the use of boiler sealing compounds. If sealing compounds are used, they should be used as sparingly as possible and never in excess of the manufacturer's recommendations. Following their use the boiler must be thoroughly flushed out. Otherwise, serious damage may result.

In some special installations, glycol anti-freeze is added to the water in the system to protect against freezing during cold weather when the boiler is not being fired and the system is not drained. Although American Standard cannot recommend this practice, we recognize that glycol anti-freeze will occasionally be used. Heat transfer is poorer with glycol than with water. Therefore, glycol should never be used in greater quantity than 50% in the system; with any quantity, radiator output will be lower than with plain water. It is always better, when possible, to drain the entire system, rather than use anti-freeze; the heating system and house plumbing will not freeze while the heating system is operating; and plumbing is not protected if the heating system is not operating, whether or not anti-freeze is used.

Cast iron is highly resistant to corrosion. However, some propellants used in aerosol cans break down into poison gas and corrosive gas at high temperature; if aerosol mixtures are used near boilers, the aerosol will enter the boiler flame and be heated. Continued use of aerosol cans near heating systems may result in severe boiler heating surface corrosion and possible danger to health.

CONSUMER PROTECTION - WARRANTY

American-Standard products normally reach owners or consumer-users through an industry channel of distributors and plumbing and heating contractors. Experience has shown that claims of defects in our products generally relate to abuse or to other damage which occur after our sale and are not our responsibility. Since determining proper responsibility requires local inspection, our warranty (set forth below) extends only to our direct buyers; distributors are best equipped to obtain the facts underlying claims, to place responsibility where it belongs and to recommend/handle repair or replacement.

American-Standard warrants only to its distributors and other direct Buyers that it will furnish by freight a replacement for, or at its option repair, any product of its manufacture or part or portion thereof, proved to its satisfaction to be defective in material or workmanship under normal use and service within one year after installation.

THERE IS NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING NO IMPLIED WARRANTY OF MERCHANTABILITY OR IMPLIED WARRANTY FOR FITNESS FOR A PARTICULAR PURPOSE AND AMERICAN-STANDARD WILL NOT BE RESPONSIBLE FOR ANY DAMAGES WHATSOEVER NOR FOR LABOR OR TRANSPORTATION EXPENSES RELATING TO SUCH REPLACEMENT OR SUCH REPAIR. NOR WILL IT BE HELD RESPONSIBLE FOR WARRANTY ADJUSTMENTS COSTING MORE THAN THE PRICE OF THE PRODUCT TO ITS DISTRIBUTORS AND OTHER DIRECT BUYERS.

Goods of other manufacturers sold by American-Standard are not warranted unless accompanied by an express written warranty, but the Seller will endeavor to secure for its direct Buyers the benefits of warranties extended by such other manufacturers for such goods.

American-Standard is proud of its record for product quality and for fairness in handling warranty matters; and, if an ultimate user of our products should feel our warranty system described above does not work fairly in his case, he should write the Office of the President, Director of Consumer Affairs, U. S. Plumbing/Heating, American-Standard, 40 West 40th Street, New York, N. Y. 10018.

DEALER'S NAME: _____

ADDRESS: _____

TELEPHONE NO.: _____

DATE OF INSTALLATION: _____



PLUMBING & HEATING

P. O. BOX 2003

NEW BRUNSWICK, N.J. 08903