FLUSH DELUXE PACKAGED BOILER W/ EXPOSED CONTROLS

G-2 FPB

PACKAGED GAS BOILER

PLAINTIFF'S EXHIBIT

ASI-673

by

AMERICAN-Standard

INSTALLATION–OPERATION AND MAINTENANCE MANUAL

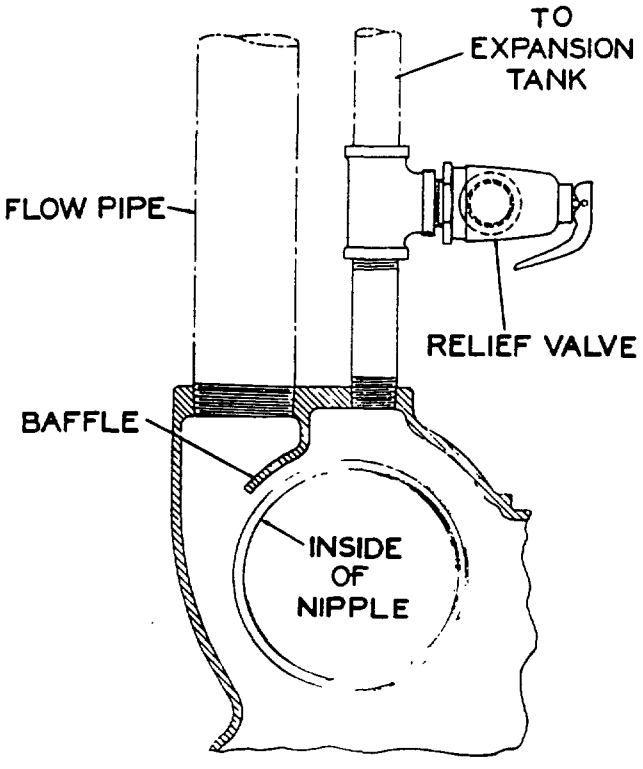
APPROVED BY AMERICAN GAS ASSOCIATION

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

AMERICAN-Standard

First in heating . . . first in plumbing

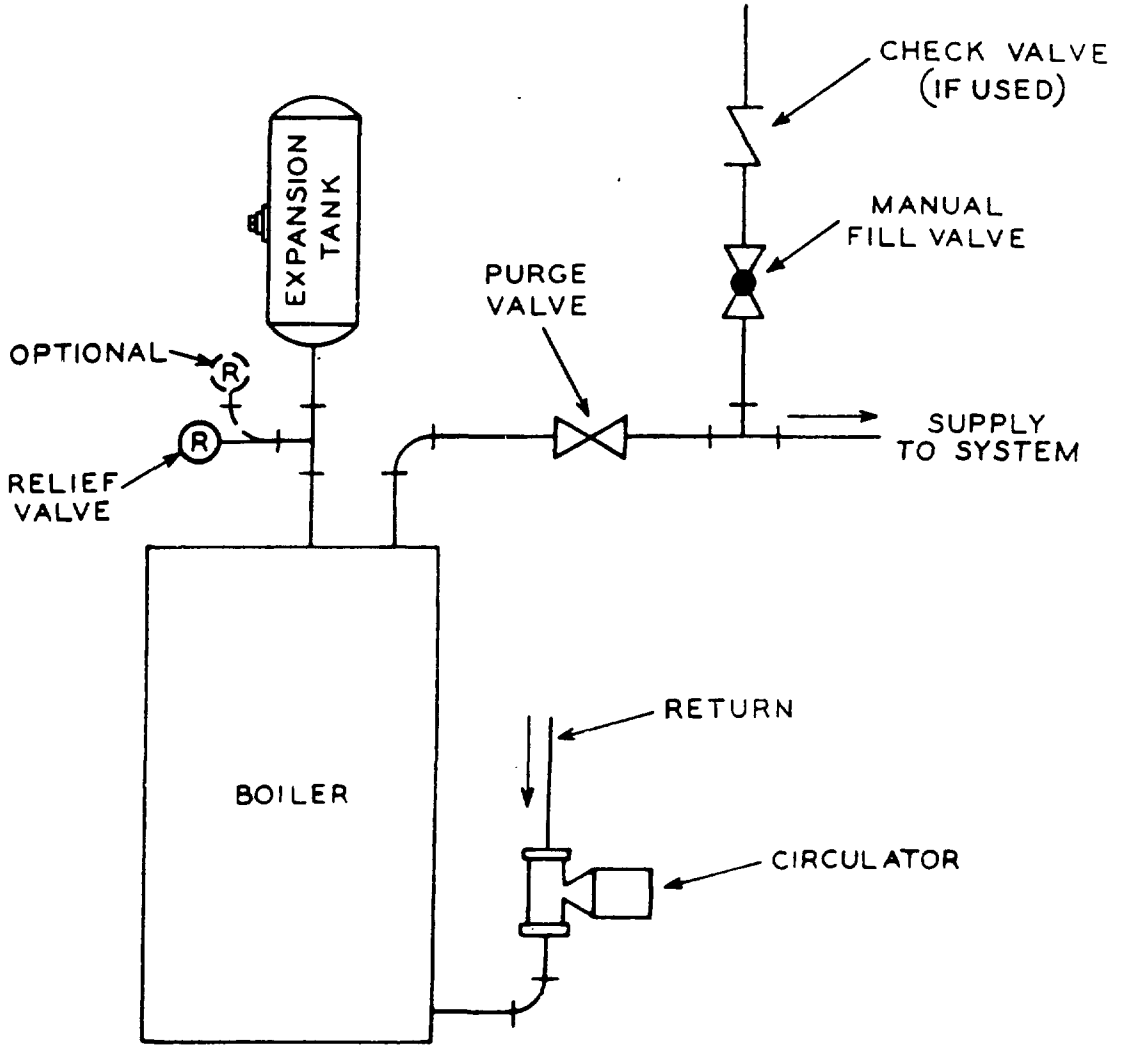
BP-G-2 FPB REV. 2-62



PIPING FOR FLOW PIPE & RELIEF VALVE

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 boiler also allows for considerable simplification of the near boiler piping (See Figure) and assures positive air separation essential to proper system performanc The Eliminaire plus the recommended piping provides for a substantial saving in material and installation cost.

BOILER PIPING RECOMMENDATIONS WITH THE ELIMINAIRE



PROCEDURE FOR FILLING SERIES LOOP HEATRIM SYSTEM

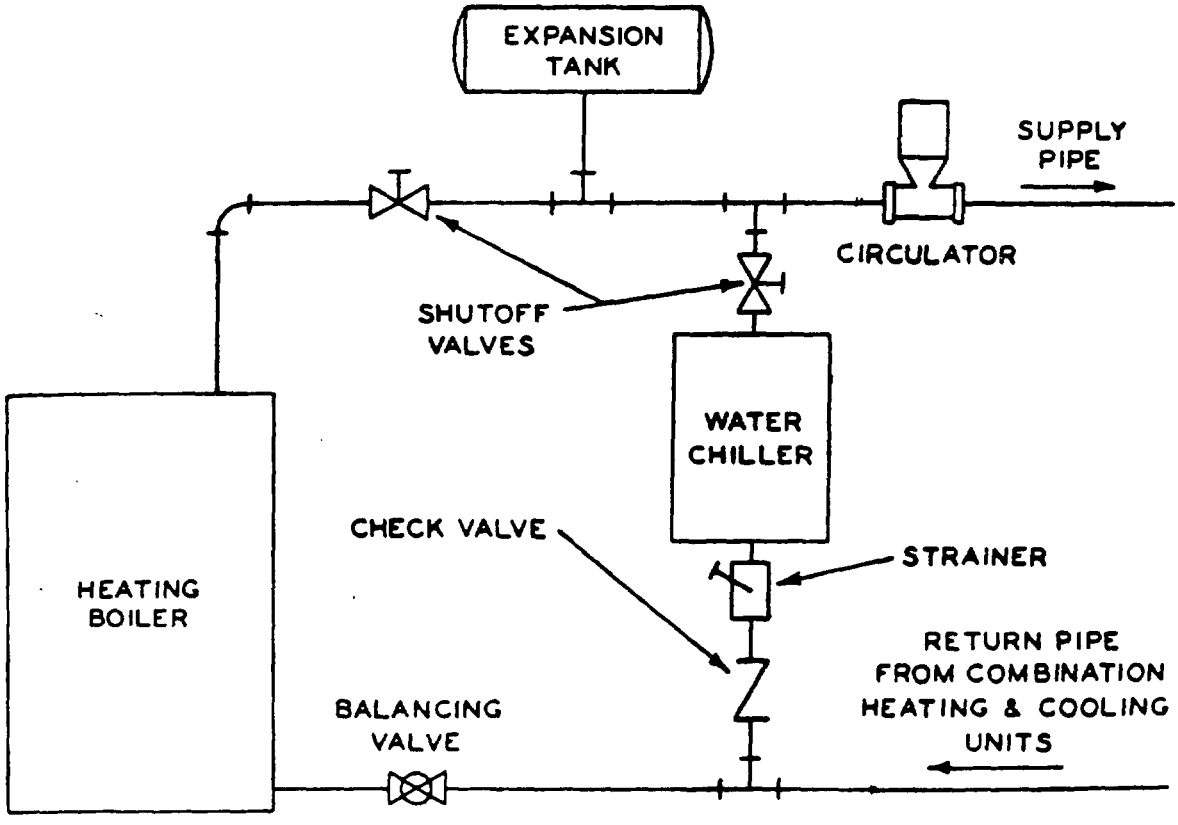
1. Open fill valve.
2. Close purge valve.
3. Vent air from boiler by manually opening relief valve.
4. When water appears at relief valve, release lever and allow to close.
5. Continue filling until pressure gauge reads approximately 12 pounds. (Close fill valve)
6. Open purge valve.

Note:- For a single loop heatrim system no additional vents, cocks, valves, drains, or other accessories are required except: When tankless heater is used and heatrim is above the boiler outlet. install a flow check valve to prevent gravity circulation.

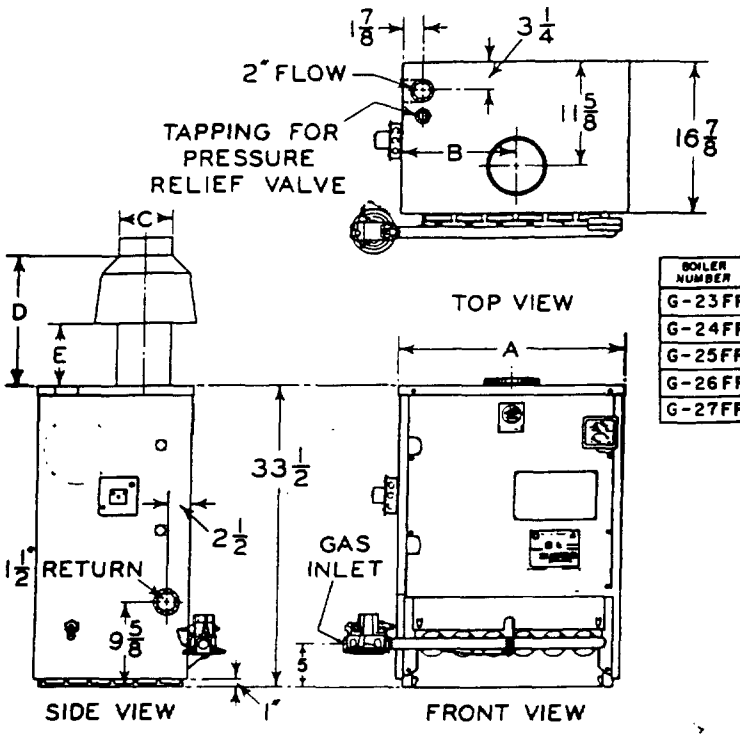
CAUTION

If and when this boiler is used in connection with refrigeration systems, boiler should be so installed that chilled medium is piped parallel with the heating boiler 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.

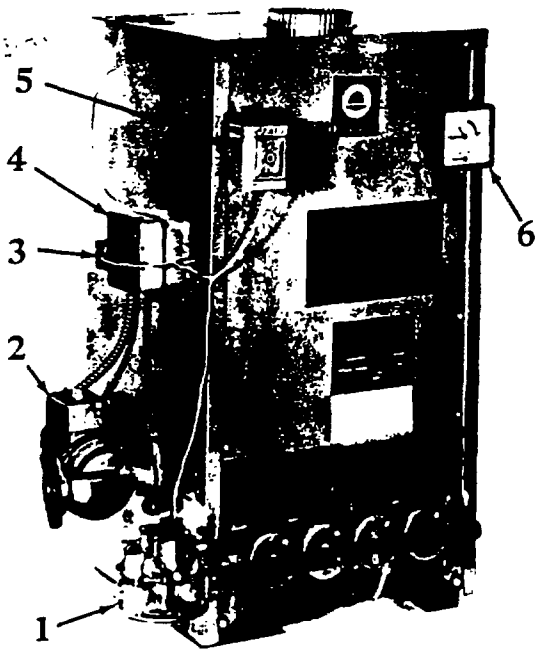


RECOMMENDED BOILER PIPING FOR COMBINATION HEATING & COOLING UNITS



BOILER NUMBER	No. OF SECTIONS	No. OF BURNERS	A	B	C	D	E
G-23FPB	3	2	11	5 1/2	4	13	7
G-24FPB	4	3	14 1/4	7 1/8	5	13 3/4	7
G-25FPB	5	4	17 1/2	8 3/4	5	13 3/4	7
G-26FPB	6	5	20 3/8	10 3/8	6	16 1/2	9
G-27FPB	7	6	24	12	6	16 1/2	9

Crated Boiler
1. Nails - Top & Sides
2. Side Fasteners



1. Automatic Gas Valve
2. Circulator Pump
3. Transformer
4. Junction Box
5. Immersion Limit Control
6. Altitude & Temperature Gauge

14-10

PIPE DELIVERY SCHEDULE

Capacity of Pipes in Cubic Feet of Gas per Hour.

Length of Pipe in Feet	Pipe Size 3/4"	1"	1-1/4"
10	212	425	725
20	150	300	510
30	122	252	425
40	105	218	370
50	95	195	330
75	77	160	270
100	66	134	232

Boilers are shipped assembled as completely packaged units except for the drafthood which is shipped as a separate unit.

NOTE: Gas connection is 1/2" pipe size at the automatic gas valve.

LOCATION

Locate the boiler near the chimney or flue and as centralized with respect to the heat distribution system as practicable.

If water condition exists in the basement, or if it has been necessary to waterproof the basement floor, the boiler should be mounted on a concrete or hollow tile base, preferably to a height of at least three inches.

SERVICE ACCESSIBILITY CLEARANCES

Boilers, when equipped with floor pan and radiation shield are approved for installation with minimum permissible clearance to combustible material as shown on the label attached to the boiler jacket. Necessary service accessibility clearances take precedence over these clearances.

Minimum clearance of 6" must be maintained between the boiler, including projecting drafthood and vent connector, and any combustible material. A minimum front clearance of 24" must be provided for servicing burners and controls. Allow 18" for renoval of circulator.

IMPORTANT: Refer to label on the boiler jacket for the minimum permissible clearance to combustible material as approved by A.G.A. (American Gas Association)

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

AIR FOR COMBUSTION 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, one near the floor, the other near the ceiling installed in the door or a single wall of the heater room.

(b) Openings to interior spaces, minimum free area of one (1) square inch per 1000 Btu per hour of input rating, with a minimum of 100 square inches. (This method should only be used where more practicable).

(c) Openings to outdoors - minimum free area of 1 square inch per 4000 Btu per hour of input rating, or in accordance with the methods outlined in the latest issue of A.S.A. Z21.30 entitled "Installation of Gas Appliances and Gas Piping". (This method should only be used where openings to interior spaces are impracticable).

CHIMNEY

Flue or vent connector to chimney shall not be smaller than the size of the outlet of the draft diverter.

Where two or more appliances 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 fifty percent of the areas of the additional flue or vent connectors.

Flue or vent connector must be inserted into but not beyond the inside wall of the chimney flue. Horizontal runs of flue pipe should be kept at a minimum and should be installed with a 1/4" pitch per foot maintained.

CAUTION

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 BOILER IS IN OPERATION.

This appliance should be installed in accordance with the latest A.G.A. instructions "For Installation of Gas Piping and Gas Appliances in Building." Reference should also be made to gas company regulations and local building, plumbing or other codes in effect in the area in which the installation is made.

Bottom pan (Floor Shield) and radiation shield are provided (on special order) for use if boiler is to be installed on combustible floor or in a closet type enclosure.

The bottom pan should be inserted from the front and rest on supports near the bottom of each end section. The radiation shield should be installed in front of the main burners and rest on projecting rib of each end section. Turned down flanges on shield should point down as shown in cuts on page 5.

Place boiler in approximate final location, if possible before removing the shipping crate. Floor should be level where boiler is installed.

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 crate top and unwrap crate side from crate base.

3. Loosen four cap screws that hold boiler to the crate base, one at either side of end sections, just under the jacket. 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.

4. Remove blocking which holds burners in place.

5. Make up drip leg piping (not supplied by AR & SS Corp.) of suitable height and install the manual shut-off valve assembly. See page 6.

6. Make suitable connection between tee in the drip leg piping and the Gas Valve. It is advisable to install a union fitting when making this connection.

7. For boilers with non-100% shutoff, install the pilot line from the manual shutoff valve to the pilot tube connection.

8. Connect return piping to the circulator. Be sure that the flange gasket is not damaged and that the bolts are properly tightened.

9. Install the safety relief valve in the 3/4" tapping on top of the boiler at left side.

Place the drafthood firmly on the flue outlet collar of the canopy which projects above the jacket and connect to chimney.

CLEANING BOILER - To clean boiler remove parts in the following order: Flue Pipe, Drafthood, Top Jacket Panel and Canopy.

IMPORTANT - After cleaning, carefully seal all around the canopy with asbestos packing also remove all dirt from main burners and pilot to insure proper operation when service is resumed.

CANOPY INSTALLATION - Lay the asbestos packing provided against the front edge and across the left end of the recess on top of the sections. Carefully place the canopy so that it holds the packing against the front and end of the recess. Do not PLACE THE CANOPY ON TOP OF THE PACKING.

Hold the canopy firmly in place and lay the remainder of the packing along the rear and right end under the hold-down clip. Insert the canopy screws and tighten to hold the canopy in final position. Tuck the packing in place around the canopy using a putty knife or piece of material about 1/16" thick and 1" wide. Be careful not to push the packing under the canopy into the flue ways.

CANOPY INSTALLATION

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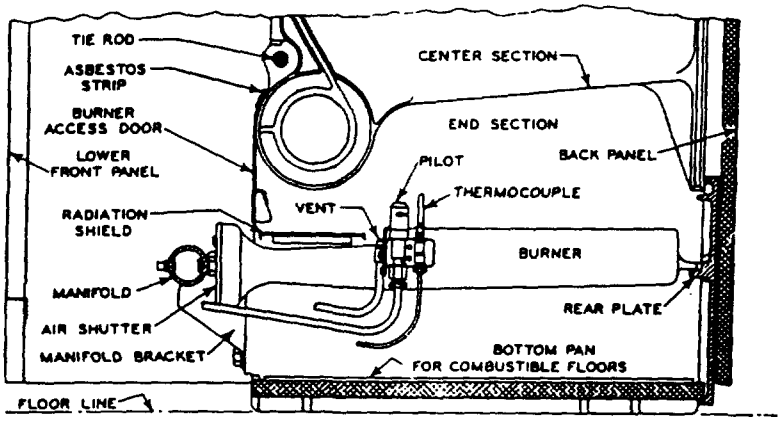
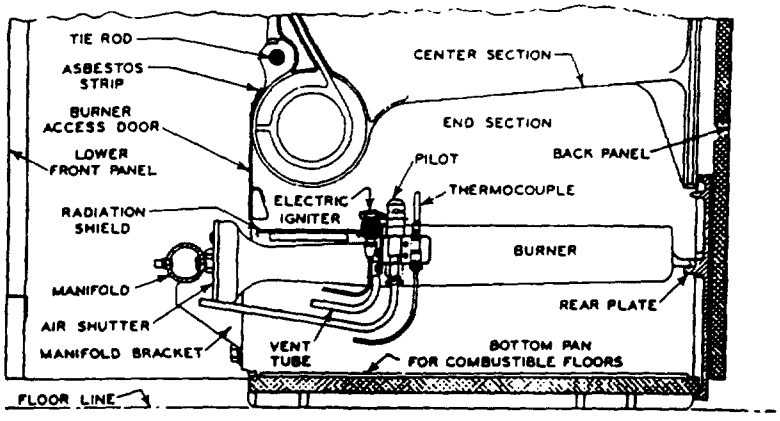
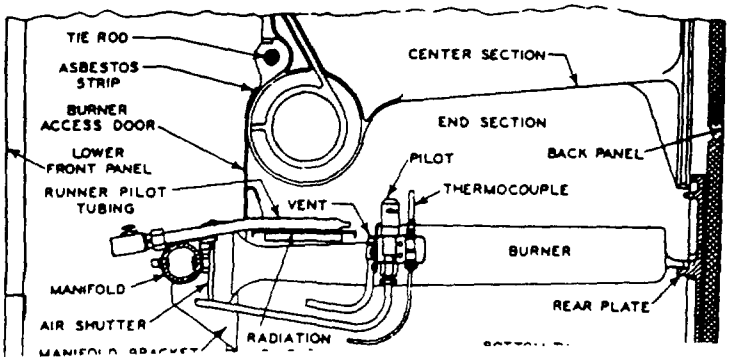


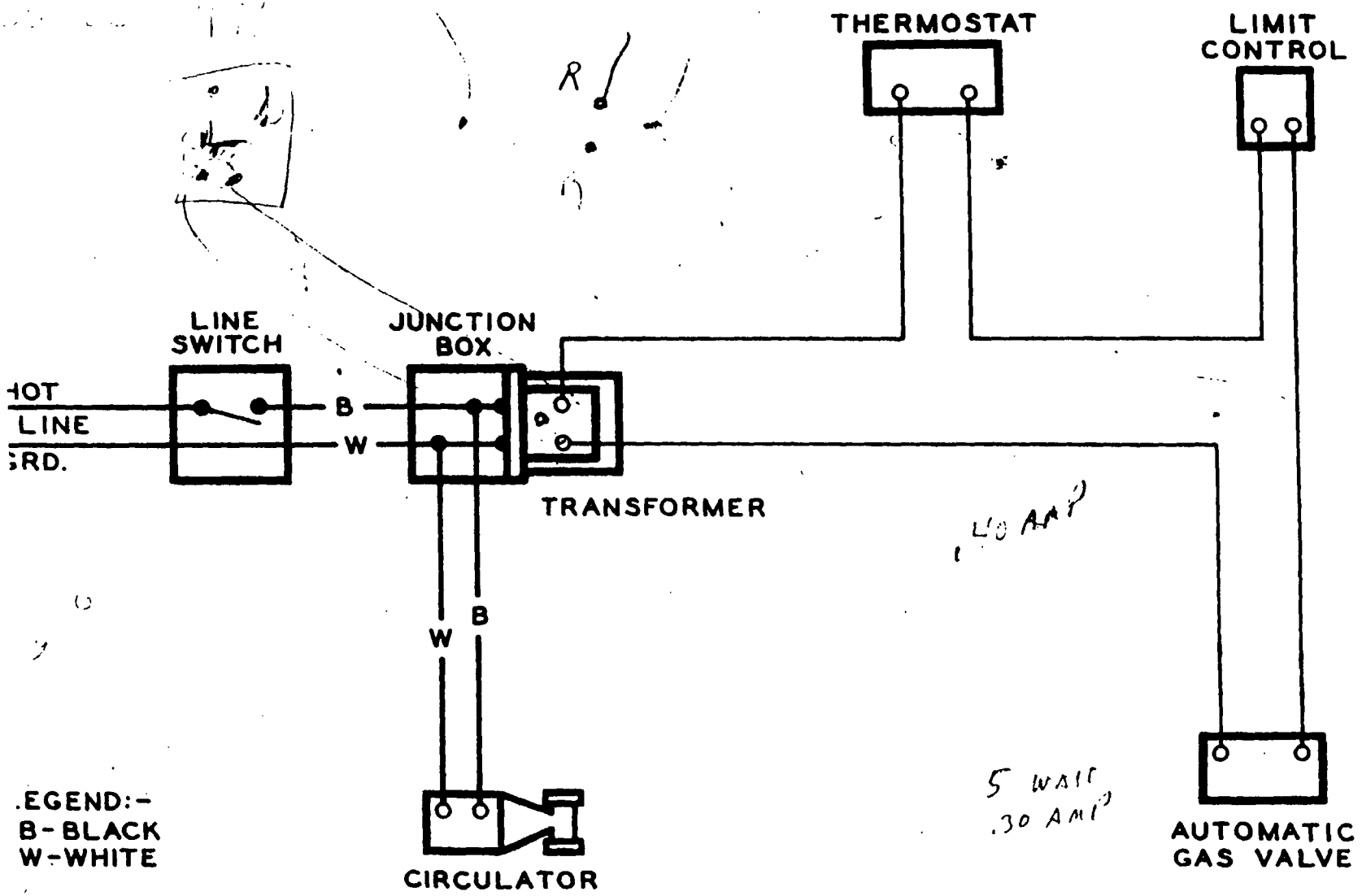
Manual Ignition



Electric Ignition



Runner Pilot Ignition



WIRING DIAGRAM FOR FORCED HOT WATER SYSTEM
GAS VALVE CONTROLLED BY THERMOSTAT
CIRCULATOR CONTROLLED BY LINE SWITCH

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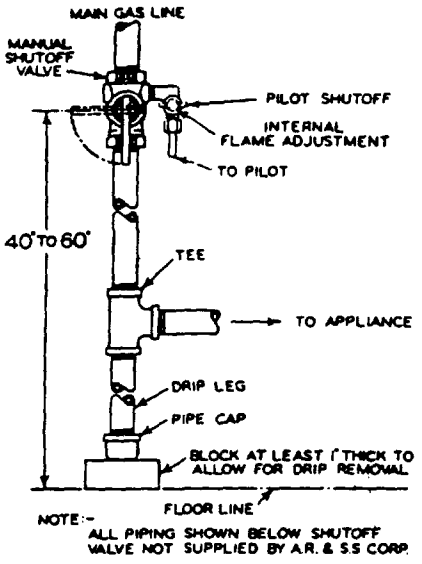
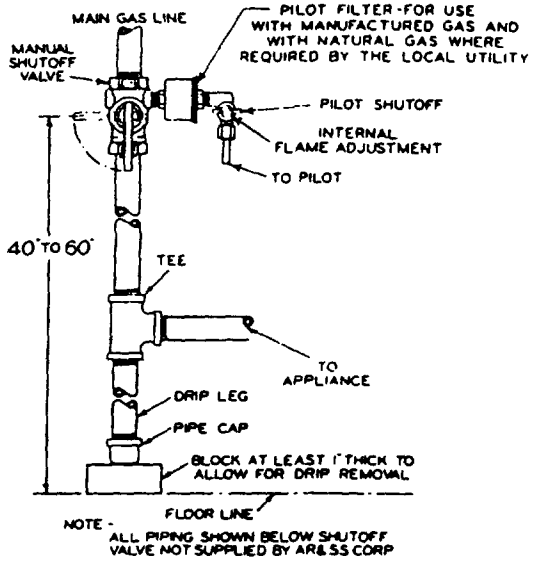
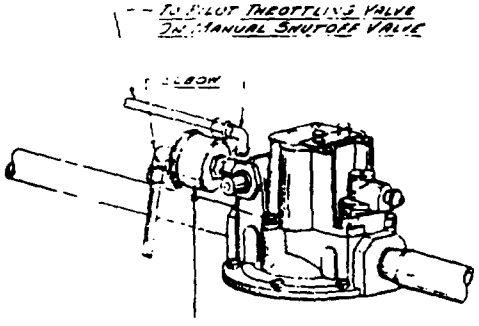
8G-14198



Supply Piping for Boiler
With 100% and Non-100% Shutoff.



Supply Piping for use on Boiler
With Manufactured Gas, Non-100% Shutoff



INSTALLATION OF PILOT FILTER
FOR 100% SHUTOFF WHEN REQUIRED

Electrical service should be brought to the boiler and connections made to accord with the wiring diagram furnished. Install and connect the room thermostat according to the wiring diagram.

TESTING

Before any system of gas piping is finally put into service, it shall be carefully tested to assure that it is gas tight. Soap and water solution, or other material acceptable for the purpose, shall be used in locating gas leaks.

FILLING SYSTEM

CAUTION: Never start boiler unless it is properly filled. After boiler is in operation, makeup water should be added slowly.

Fill open system to 1/3 height of expansion tank, remove rim and glass from gauge and set movable point under automatic pointer. Replace rim and glass.

Fill closed system until relief valve relieves. This must be less than 30 lbs. pressure. Remove rim and glass from gauge and set movable pointer under automatic pointer. Replace rim and glass.

Keep system filled. Pointers on gauge should be even. If pressure exceeds 30 Lbs., relieve at once by opening relief valve or drain cock.

NORMAL PILOT INPUT FOR BASO PILOT BURNERS

	MFD.	NAT.	MIXED	LP	LP-AIR
Input per Burner Btu/Hr.	1000	1100	1200	1000	1000

MANIFOLD PRESSURE ADJUSTMENT FOR MAIN BURNER INPUT

Light the boiler according to the directions on the Lighting Instruction plate (on front of boiler) and operate for a short period. Then, shut off all other gas appliances connected to gas meter and time consumption. Boiler input should be adjusted at rated input as indicated on nameplate in accordance with procedure outlined below.

$$\text{Gas Consumption (Cubic Feet per Hr.)} = \frac{\text{INPUT RATING (Btu per Hr.)}}{\text{Heating Value of Gas (BTU per Cu. Ft.)}}$$

1/8" pipe plug is placed in the manifold to provide for checking the gas pressure in the manifold with a manometer or small pressure gauge. The manifold pressure should be set at 3.5 inches of water for natural and mixed gases or 2.5 inches of water for manufactured gas. To adjust the pressure, remove the cap on the gas pressure regulator and screw in the adjusting screw to raise pressure or screw out the adjusting screw to lower pressure. Refer to V-600 valve instruction sheet for making regulator adjustments. Only small variations in gas flow should be made by means of the gas pressure regulator adjustment. In no case should the final manifold pressure vary more than plus or minus 0.3 inches water column from the above specified pressures. Any necessary major changes in the flow should be made by changing the size of the burner orifice.

MAIN BURNER PRIMARY AIR ADJUSTMENT

Adjust burner flame by opening or closing primary shutter. Flame should burn quietly, show no yellow and should have a noticeable inner blue cone. After adjustment, tighten screw to lock shutter in position.

PILOT GOES OUT

If the pilot flame is extinguished the automatic gas valve will shutoff the gas. If boiler is operating correctly, relight as directed on the lighting instruction plate. If boiler is not operating correctly, call heating contractor or gas company service man.

GENERAL CARE OF HEATING SYSTEM

1. Keep radiators and convectors clean.

2. Keep system in good repair. It is advisable to have it inspected by your heating contractor at least once a year.

3. 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.

4. Fill hot water systems as follows:

   Open all radiator valves, but keep vents at top of radiator closed. Fill open systems till hands on altitude gauge are even. If it is a closed system the water filling will stop automatically when proper pressure is reached. (Pressure should not exceed 30 pounds). Then beginning with ground floor, vent each radiator as directed above. It may be necessary to add water during this operation to expel air from higher radiators.

5. 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.

6. Where an expansion tank is used, make sure that neither the tank nor its drain pipe is exposed to freezing temperature. If valve of any description is installed in piping leading to or from the expansion tank, BE SURE THAT IT IS OPEN WHILE THE BOILER IS IN OPERATION.

CARE OF BOILER WHILE IN OPERATION

Check water level regularly and add water slowly when needed.

This boiler is fired automatically.

IN WINTER WHILE NOT IN OPERATION

Drain entire system to prevent damage from freezing. Drain boiler through drain cock, located at left side. Also remove drain plug located on front edge of right end section. Be sure boiler is completely drained.

IN SUMMER WHILE NOT IN OPERATION

Fill system as during heating season. Have boiler inspected by service man before the start of the heating season. The surface between the boiler sections can be cleaned from the top of the boiler. If the top jacket panel is to be removed, it is advisable to place blocks or strips under the sides of the jacket to facilitate re-assembly of the panel.

FOR BOILER EQUIPPED WITH V-531 or V-603 VALVE.

EMERGENCY INSTRUCTIONS FOR OPERATION DURING FAILURE OF ELECTRIC POWER SUPPLY

In the event of failure of electric power supply the gas burner operating this boiler will automatically shut off. It is possible to operate this burner manually by following the directions given below.

CAUTION -- THE BURNER SHOULD BE OPERATED MANUALLY ONLY AS AN EMERGENCY MEASURE. THE AUTOMATIC SAFETY CONTROLS WHICH PROTECT THE BOILER DURING NORMAL OPERATION ARE NOT OPERATIVE. CONSTANT SUPERVISION IS REQUIRED TO PREVENT THE POSSIBILITY OF DAMAGE TO THE BOILER BECAUSE OF LOW WATER OR OVERHEATING. NEVER LEAVE THE BURNER OPERATING MANUALLY IF IT IS TO BE UNSUPERVISED FOR ANY LENGTH OF TIME.

IN SUPPLYING THESE BRIEF DIRECTIONS FOR MANUAL OPERATION OF THE BURNER, THE MANUFACTURER CAN ASSUME NO RESPONSIBILITY FOR THE SAFE OPERATION OF THE BURNER, BOILER AND OTHER EQUIPMENT. SAFETY DEPENDS UPON THE CARE AND JUDGMENT EXERCISED BY THE OPERATOR. ALL POSSIBILITIES CANNOT BE COVERED IN THESE BRIEF DIRECTIONS.

BASIC STEPS IN MANUAL OPERATION

1. Be sure the burner pilot is burning properly. If so, then: -
2. Turn off electric power switch controlling the burner. LEAVE THIS SWITCH OFF UNTIL POWER HAS BEEN RESTORED.
3. Burner may now be operated manually by opening the automatic gas control valve in accordance with instructions printed on the valve cover.
4. If the boiler operated by the gas burner is installed on a forced circulation hot water heating system (incorporating electric circulating pump) OPEN FLOW CONTROL VALVE OR VALVES IF PROVIDED IN THE WATER LINES. ***(Note:*** - It is suggested that the original position of these valves be carefully observed and these observations recorded, to permit restoring these valves to their original position when automatic operation is resumed.)

   Also, REDUCE THE MAIN BURNER FLAME TO A MINIMUM ADJUSTMENT (approximately 1/3 or 1/4 normal size) BY PARTIALLY CLOSING THE MANUAL GAS SHUT OFF VALVE.

TO RESTORE BURNER TO AUTOMATIC OPERATION UPON RESUMPTION OF SUPPLY OF ELECTRIC CURRENT

1. Return automatic gas control valve to its original "automatic" setting, in accordance with instructions on valve cover.
2. Turn on electric power supply switch.
3. On forced circulation hot water heating systems, return flow control valves, if provided, to their normal operating positions.
4. Turn manual gas shut off valve to its wide open position.