

PRICE - \$3.00

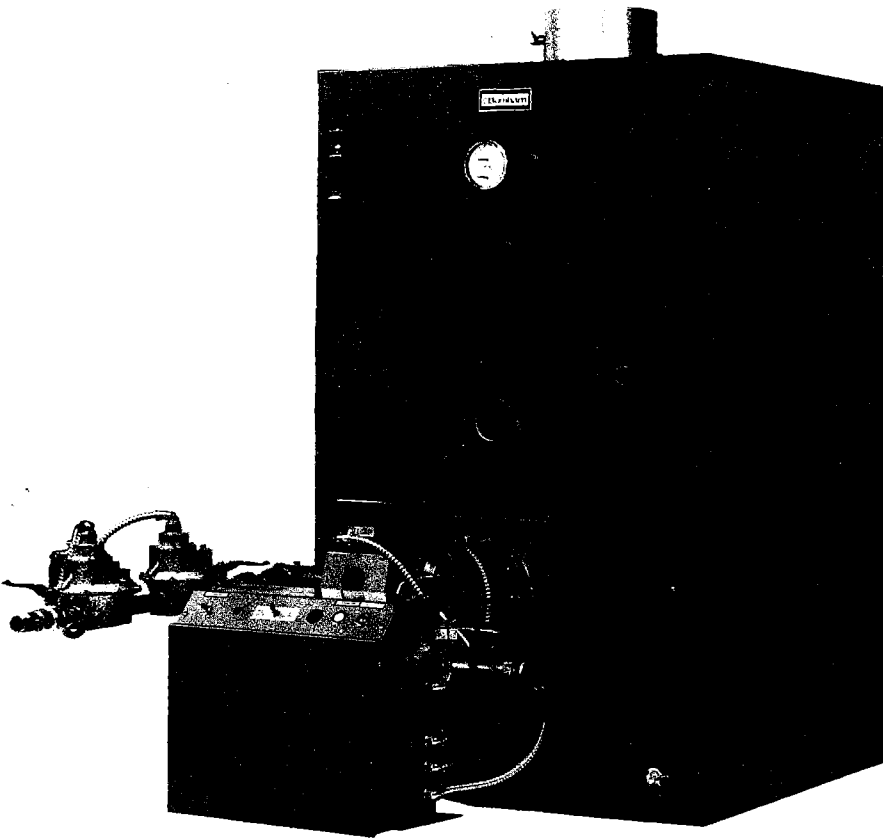
INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS PF-5 SERIES

CAST IRON HYDRONIC HEATING UNIT

FORCED DRAFT
FOR
LIGHT OIL,
GAS/LIGHT OIL,
OR GAS

HOT WATER OR STEAM

18 SIZES:
GROSS OUTPUT—
620,000 to
3,430,000 BTU/HR



For service & repairs to the heating plant, call your heating contractor. When seeking information on the boiler, provide series and size designation shown on the rating plate.

Boiler Number _____ Type Firing _____ Type System _____

Heating Contractor _____

Address _____ Phone No. _____

Burnham®

AMERICA'S BOILER COMPANY
Burnham Corporation
Lancaster, PA 17604-3079

SORT OUT ALL CARTONS, BUNDLES, AND SECTIONS and check against Shipping Schedule Chart below to be certain that you have all the material required to assemble the Boiler you ordered.

SHIPPING SCHEDULE CHART

BOILER NO.		Intermediate Section				TIE ROD BUNDL.				ASS'Y BOX				MISC. PARTS CARTON	JACKET CARTON	CANOPY CARTON	BURNER MTG PLATE CARTON	REAR PRESSURE RELIEF DOOR CARTON	FIRE WALL PLATES CARTON	FLUE THIMBLE AND DAMPER ASS'Y CARTON			STEAM TRIM CARTON OR WATER TRIM CARTON	BURNER CARTON	
		FX Front Section	C-No Supply Tap	CT-For Heater	CX-4" Supply Tap	BX-Back Section	TIE ROD BUNDL.				ASS'Y BOX									10"	14"	18"			
							① -26%	② -37%	③ -49 1/4	④ -67%	④ -504	⑤ -505	⑥ -506												⑦ -507
504	wo/heater	1	2			1				1				1	1	1	1	1	1		1	1			
	w/heater	1	1	1																					
505	wo/heater	1	3				1				1			1	1	1	1	1	1		1	1			
	w/heater	1	1	2																					
506	wo/heater	1	4				1				1			1	1	1	1	2	1		1	1			
	w/heater	1	2	2																					
507	wo/heater	1	5					1				1		1	1	1	1	2	1		1	1			
	w/heater	1	2	3																					
508	wo/heater	1	6					1		1			1	1	1	1	1	3	1		1	1			
	w/heater	1	3	3																					
509	wo/heater	1	7						1	1			1	1	1	1	1	3	1		1	1			
	w/heater	1	3	4																					
510	wo/heater	1	7		1	1			1			1	1	1	1	1	1	4	1		1	1			
	w/heater	1	3	4	1	1																			
511	wo/heater	1	8		1	1			1			1	1	1	1	1	1	4	1		1	1			
	w/heater	1	4	4	1	1																			
512	wo/heater	1	9		1	1	1			1			2	1	1	1	1	5	1		1	1			
	w/heater	1	4	5	1	1																			
513	wo/heater	1	10		1	1		1	1			2	1	1	1	1	1	5	1		1	1			
	w/heater	1	5	5	1	1																			
514	wo/heater	1	10		2	1		1	1		1		2	1	1	1	1	6	1		1	1			
	w/heater	1	5	5	2	1																			
515	wo/heater	1	11		2	1	1			1		1	2	1	1	1	1	6	1		1	1			
	w/heater	1	5	6	2	1																			
516	wo/heater	1	12		2	1		1	1	1			3	1	1	1	1	6		1	1	1			
	w/heater	1	6	6	2	1																			
517	wo/heater	1	13		2	1		1	1	1			3	1	1	1	1	6		1	1	1			
	w/heater	1	7	6	2	1																			
518	wo/heater	1	13		3	1			1	1		1	3	1	1	1	1	6		1	1	1			
	w/heater	1	6	7	3	1																			
519	wo/heater	1	14		3	1			1	1			3	1	1	1	1	6		1	1	1			
	w/heater	1	7	7	3	1																			
520	wo/heater	1	15		3	1			2	1			4	1	1	1	1	6		1	1	1			
	w/heater	1	7	8	3	1																			
521	wo/heater	1	16		3	1			2	1			4	1	1	1	1	6		1	1	1			
	w/heater	1	8	8	3	1																			

NOTES:●Not furnished with Gordon & Piatt R8 and R10 gas or gas/oil burners since these burners are furnished with steel mounting plates

▼Not required when sections are factory assembled

OPTIONAL EQUIPMENT

#548 Heater - Quantity as ordered

Heater opening cover plate-Quantity as ordered

Additional Controls-Type and quantity as ordered

IMPORTANT INFORMATION

PLEASE READ THIS PAGE CAREFULLY

1. READ THIS MANUAL AND BURNER INSTALLATION MANUAL CAREFULLY BEFORE INSTALLING, OPERATING, OR SERVICING THIS UNIT. IF YOU DO NOT HAVE A BURNER MANUAL, WRITE TO BURNHAM AND ASK FOR FORM NO. 52003 (Part #814502).
2. ALL BOILERS MUST BE INSTALLED IN ACCORDANCE WITH NATIONAL, STATE AND LOCAL PLUMBING, HEATING AND ELECTRICAL CODES AND THE REGULATIONS OF THE SERVING UTILITIES.
3. ALL HEATING SYSTEMS SHOULD BE DESIGNED BY COMPETENT CONTRACTORS AND ONLY PERSONS KNOWLEDGEABLE IN THE LAYOUT AND INSTALLATION OF HYDRONIC HEATING SYSTEMS SHOULD ATTEMPT INSTALLATION OF ANY BOILER.
4. THE BOILER MUST BE PROPERLY VENTED IN ACCORDANCE WITH NATIONAL FUEL GAS CODE AND LOCAL CODES. SERIOUS PROPERTY DAMAGE COULD RESULT IF THE BOILER IS NOT PROPERLY VENTED.
5. READ THE LITERATURE ENCLOSED BY THE MANUFACTURER WITH THE VARIOUS ACCESSORY DEVICES. THESE ACCESSORY DEVICES MUST BE INSTALLED AND USED ACCORDING TO THE RECOMMENDATIONS OF THE MANUFACTURER.
6. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO SEE THAT ALL CONTROLS ARE CORRECTLY INSTALLED AND ARE OPERATING PROPERLY WHEN THE INSTALLATION IS COMPLETED.
7. FOR OPTIMUM PERFORMANCE FROM THIS UNIT SERVICE AS SPECIFIED IN SECTION V OF THIS MANUAL.
8. IN ALL CASES, CLEARANCES BETWEEN BOILER AND/OR SMOKE PIPE SURFACES AND COMBUSTIBLE MATERIALS MUST COMPLY WITH NATIONAL FUEL GAS CODE ANSI Z223.1 (NFPA 54) DATED 1988 OR CURRENT EDITION AND, FOR OIL, NFPA 211.
9. ALL FLAMMABLE DEBRIS, RAGS, PAPER, WOOD SCRAPS, ETC., SHOULD BE KEPT CLEAR OF THE BOILER AT ALL TIMES. KEEP THE BOILER AREA CLEAN AND FREE OF FIRE HAZARDS.
10. PROBE AND FLOAT TYPE LOW WATER CUTOFF DEVICES REQUIRE ANNUAL INSPECTION AND MAINTENANCE. REFER TO SECTION V ITEM ④ FOR STEP BY STEP INSPECTION AND CLEANING INSTRUCTIONS.

WARNING

HIGH WATER TEMPERATURES INCREASE THE RISK OF BURNS OR SCALDING INJURY. INSTALL AN AUTOMATIC MIXING VALVE AT THE TANKLESS HEATER OUTLET TO AVOID EXCESSIVELY HOT WATER AT THE FIXTURES AS SHOWN IN FIGURE 26.

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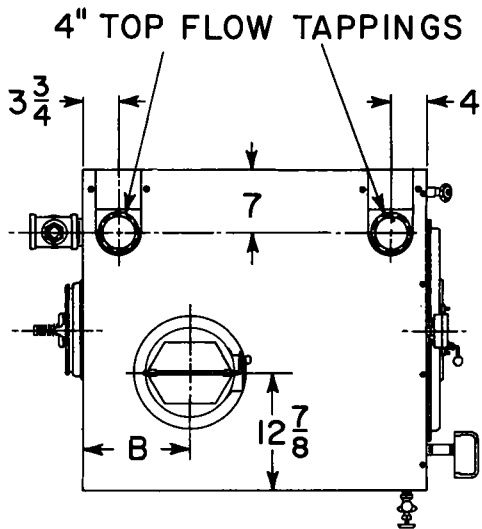


Fig. 1
Dimensional Information

NUMBER OF SECTIONS	DIMENSIONS				NUMBER OF SECTIONS	DIMENSIONS			
	L	A	B	C		L	A	B	C
4	25 3/4	10	12	19 1/2	13	79 3/4	14	33	73 1/2
5	31 3/4	10	12	25 1/2	14	85 3/4	14	39	79 1/2
6	37 3/4	10	12	31 1/2	15	91 3/4	14	45	85 1/2
7	43 3/4	10	12	37 1/2	16	97 3/4	18	51	91 1/2
8	49 3/4	10	12	43 1/2	17	103 3/4	18	57	97 1/2
9	55 3/4	14	12	49 1/2	18	109 3/4	18	63	103 1/2
10	61 3/4	14	12	55 1/2	19	115 3/4	18	69	109 1/2
11	67 3/4	14	12	61 1/2	20	121 3/4	18	75	115 1/2
12	73 3/4	14	27	67 1/2	21	127 3/4	18	81	121 1/2

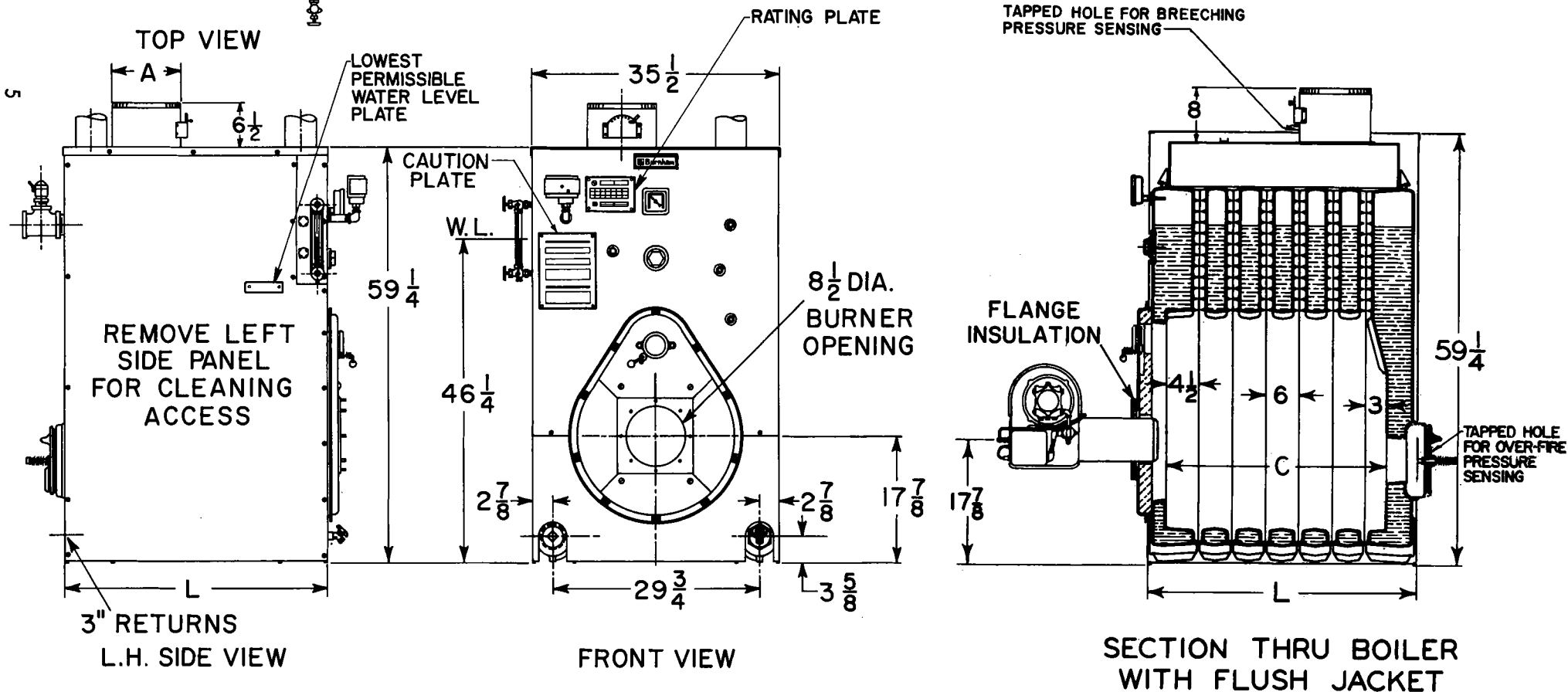




TABLE 1
RATINGS - - - DATA



Boiler(1) Number	Boiler H.P.	Gross Output MBh	NET I=B=R RATING ⁽²⁾			BURNER INPUT		Gas ⁽³⁾ Pressure Required (inches water column)	Heating Surface (ft. ²)	Net Firebox Volume (ft. ³)	Pressure ⁽⁴⁾ in Firebox (inches water column)	Water Content Full (lbs.)	Boiler Weight full of Water (lbs.)	I=B=R Vent Diameter (inches)
			Sq. Ft. Steam	MBh Steam	MBh Water	Oil gph	Gas (mbh)							
PF-504	18.5	620	1938	465	539	5.5	790	5.2	66	8.5	.244	581	2331	10
PF-505	23.5	785	2454	589	683	6.9	997	6.4	85	11.1	.244	700	2800	10
PF-506	28.4	951	2971	713	827	8.3	1204	6.6	104	13.7	.245	818	3218	10
PF-507	33.3	1116	3488	837	970	9.8	1412	6.9	123	16.3	.245	937	3687	10
PF-508	38.3	1281	4013	963	1114	11.2	1619	6.5	142	18.9	.246	1056	4106	10
PF-509	43.2	1446	4583	1100	1257	12.6	1826	6.5	161	21.5	.246	1174	4574	14
PF-510	48.2	1612	5158	1238	1402	14	2033	5.9	179	24.1	.247	1293	5043	14
PF-511	53.1	1777	5725	1374	1545	15.6	2240	5.7	198	26.8	.247	1412	5512	14
PF-512	58.0	1942	6283	1508	1689	17	2448	6.8	217	29.4	.248	1530	5980	14
PF-513	63.0	2108	6821	1637	1833	18.4	2655	6.3	236	32.0	.248	1649	6399	14
PF-514	67.9	2273	7354	1765	1977	19.8	2862	6.1	255	34.6	.249	1768	6858	14
PF-515	72.8	2438	7888	1893	2120	21.5	3069	6.2	274	37.2	.249	1886	7335	14
PF-516	77.8	2604	8425	2022	2264	22.5	3276	6.0	293	39.8	.250	2005	7755	18
PF-517	82.7	2769	8958	2150	2408	24	3484	5.5	312	42.4	.250	2123	8223	18
PF-518	87.7	2934	9492	2278	2551	25.5	3691	6.2	330	45.0	.251	2242	8742	18
PF-519	92.6	3099	10025	2406	2695	27	3898	6.2	349	47.6	.251	2361	9161	18
PF-520	97.5	3265	10563	2535	2839	28.5	4105	6.7	368	50.2	.252	2479	9629	18
PF-521	102.5	3430	11096	2663	2983	30	4312	7.4	387	52.8	.252	2598	10098	18

(1) Suffix "S" indicates steam boiler, "W" indicates water boiler. Suffix "G" indicates gas-fired, "O" indicates oil-fired, "GO" indicates combination gas-oil fired.

(2) I=B=R net ratings shown are based on piping and pickup allowances which vary from 1.333 to 1.288 for steam and 1.15 for water.

Consult manufacturer for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.

Net ratings for water, square feet, are based on 170°F average water temperature in system.

For higher water temperatures, select boiler on basis of I=B=R Net Ratings, MBH.

The I=B=R burner capacity in GPH is based on oil having a heat value of 140,000 BTU per gallon.

(3) Minimum gas pressure required at std. gas train inlet for maximum burner input based on 1000 Btu/cu. ft. 0.60 specific gravity gas.

(4) Boiler ratings are based on 12¼% CO₂, +.10" water column pressure at boiler flue outlet.

MAXIMUM ALLOWABLE WORKING PRESSURE

(USA)	(CANADA)
STEAM - 15 PSI	STEAM - 15 PSI
WATER - 50 PSI	WATER - 50 PSI
OPTIONAL SPECIAL ORDER - 70 PSI	

Ratings shown above apply at altitudes up to 1000 feet on oil and 2000 feet on gas. For altitudes above those indicated, the ratings should be reduced at the rate of 4% for each 1000 feet above sea level.

SECTION 1 - GENERAL INFORMATION (CONTINUED)

① INSPECT SHIPMENT carefully for any signs of damage.

- A. ALL EQUIPMENT is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of crated Boiler to the carrier in good condition.
- B. ANY CLAIMS for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances from, or shortage in orders, will be allowed by the manufacturer unless presented within sixty (60) days after receipt of goods.

② BOILER INSTALLATION — Must conform to the authority having jurisdiction, or in the absence of such requirements to:

USA —

Installation of oil burning equipment, ANSI/NFPA 31.

CANADA —

Oil Fired Steam and Hot Water Boilers for Commercial and Industrial use, CSA Standard B140.7.2 — 1967 (Re-affirmed 1991)

MINIMUM INSTALLATION CLEARANCES TO COMBUSTIBLE MATERIAL:

- | | |
|-------------------|---------------------------------|
| Front - 24 Inches | Above or Top - 6 Inches |
| Sides - 6 Inches | Vent Connector Pipe - 18 Inches |
| Rear - 6 Inches | |

NOTE:

1. Listed clearances comply with American National Standard ANSI/NFPA 31, Installation of oil burning equipment.
2. Listed clearances can not be reduced for alcove or closet installations.
3. For reduced clearances to combustible material, protection must be provided as described in the above ANSI/NFPA 31 standard.

A. **SERVICE CLEARANCE** - Locate the unit in the boiler room so as to provide ease of venting and adequate clearance for maintenance, serviceability, and installation of piping. Allow a minimum clearance of 3 feet at front and back of boiler for burner service and access to pressure relief door/flame observation port and on each side of the unit for cleaning of flues and for tankless water heater installation. Refer to Figure 1 for boiler dimensional data.

B. **PROVIDE ADEQUATE FOUNDATION** for the unit.

1. **CAUTION** DO NOT INSTALL BOILER ON CARPETING. Boiler is suitable for installation on combustible floors.
2. Floor construction should have adequate load bearing characteristics to bear the weight of the boiler filled with water (see Table 1). A boiler foundation similar to the one shown in Figure 2 is recommended if the boiler room floor is weak or uneven or if a water condition exists.

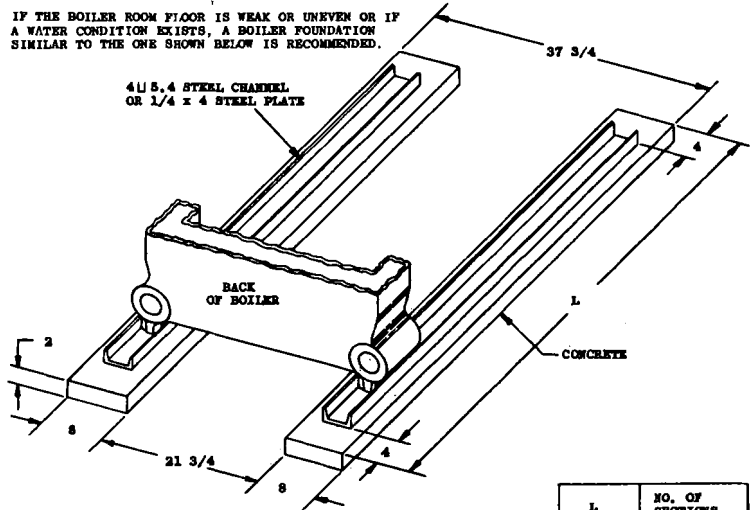
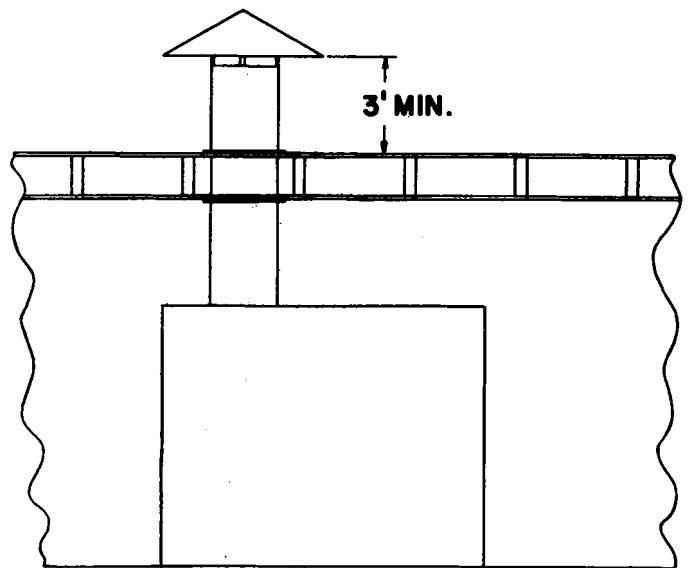


Fig. 2

L	NO. OF SECTIONS
33"	4
39"	5
45"	6
51"	7
57"	8
63"	9
69"	10
6'-3"	11
6'-9"	12
7'-3"	13
7'-9"	14
8'-3"	15
8'-9"	16
9'-3"	17
9'-9"	18
10'-3"	19
10'-9"	20
11'-3"	21



TYPICAL ARRANGEMENT FOR STUB VENT

Fig. 3

③ PROVIDE AIR SUPPLY AND VENTILATION to accommodate proper combustion.

A permanent opening or duct should be provided so that the boiler input will not exceed 4,000 Btuh/in² of free area.

④ CHIMNEY OR VENT

The PF-5 is designed for forced draft firing and may be used with a conventional natural draft stack or a stub

vent (see Figure 3). See Table I for the proper vent size. Draft controls are not normally required, although they may be used on installations where a natural draft stack is used or on multiple boiler installations with a common stack. The boiler is provided with a breeching damper which should be adjusted to maintain a slightly positive pressure in the vent connector box (up to 0.1" W.C.) during burner operation.

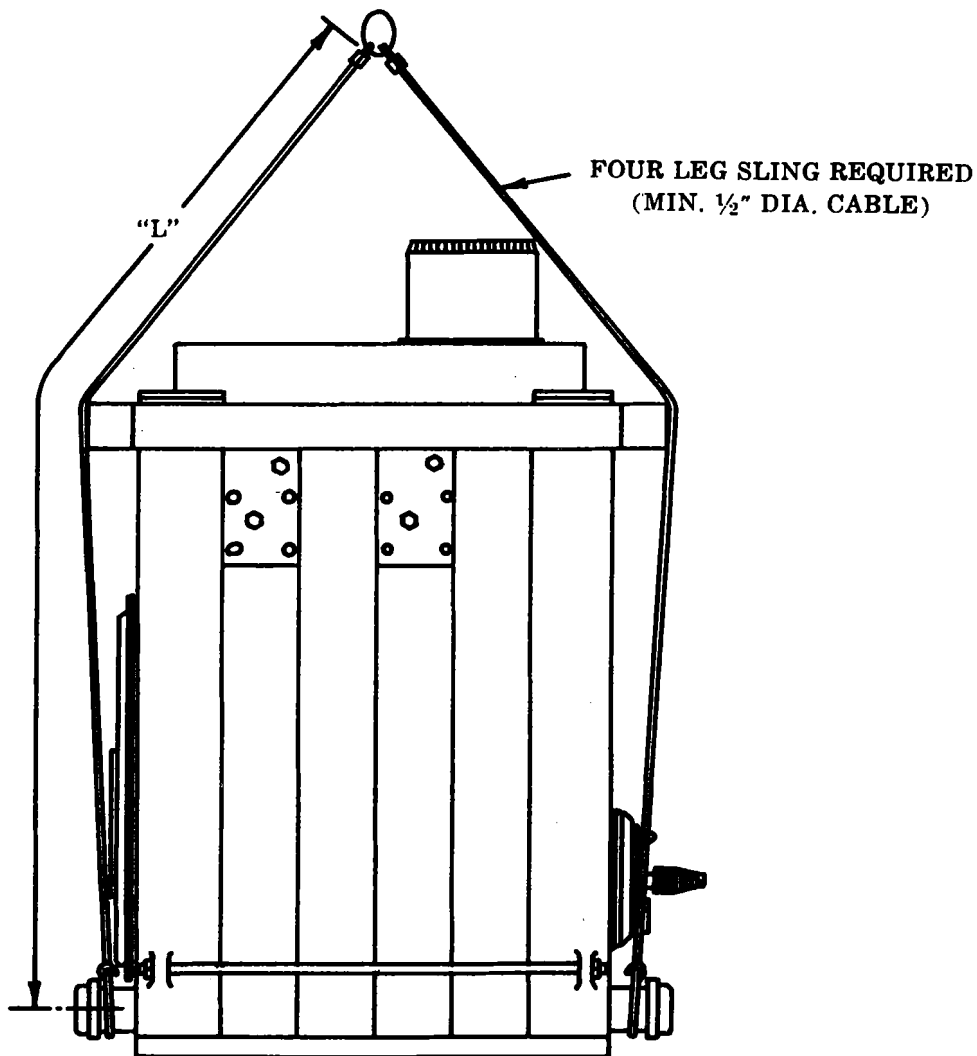
SECTION 11 - CAST IRON BLOCK ASSEMBLY

NO. OF SECTS.	LIFTING WEIGHT	MIN. SLING LENGTH "L"
4	1650	7'-6"
5	2000	7'-10"
6	2300	8'-2"
7	2650	8'-6"
8	2950	8'-10"
9	3300	9'-2"
10	3650	9'-6"
11	3950	9'-10"
12	4300	10'-2"

NO. OF SECTS.	LIFTING WEIGHT	MIN. SLING LENGTH "L"
13	4600	10'-6"
14	4950	10'-10"
15	5300	11'-2"
16	5600	11'-6"
17	5950	11'-10"
18	6300	12'-2"
19	6600	12'-6"
20	6950	12'-10"
21	7300	13'-2"

LIFTING INSTRUCTIONS

Fig. 4



- ① **FACTORY ASSEMBLED SECTIONS** - The assemblage should be set in the proper location as outlined in Section I. Lifting arrangement and weights are given in Figure 4.

The tie-rod nuts should then be loosened until finger tight. Now proceed to part ③ of this section "HYDROSTATIC TEST".

- ② **FIELD ASSEMBLED SECTIONS** - Follow the assembly procedure outlined on the following pages.

A. Assembly of Sections (Manual Draw-Up)

NOTICE

WHEN ASSEMBLING SECTIONS WITHOUT HYDRAULIC DRAW-UP EQUIPMENT, NEVER ASSEMBLE MORE THAN ONE SECTION AT A TIME.

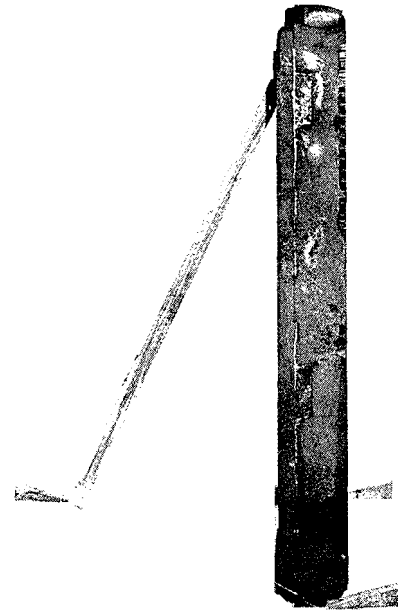
1. Place the rear section in its approximate final position, as outlined in Section I and support it with a suitable prop. See Figure 5.
2. Open the Boiler Assembly Carton(s).
3. Clean nipples and nipple ports thoroughly with a degreasing solvent and apply nipple lubricant provided.
4. Drive nipples squarely into section using block of wood and hammer, or preferably an aluminum headed hammer, if available.
5. A special nipple setting gauge is provided for the nipples. Gauge nipple in both directions to insure that it is driven to the proper depth into the nipple opening. Cut-out in gauge must rest on nipple, with legs of gauge touching finished face of section, when nipple is properly driven. See Figure 6.

NOTICE

NIPPLES MUST BE DRIVEN AS DIRECTED TO INSURE TIGHT JOINTS. MOST NIPPLE LEAKS ARE CAUSED BY TILTED OR COCKED NIPPLES.

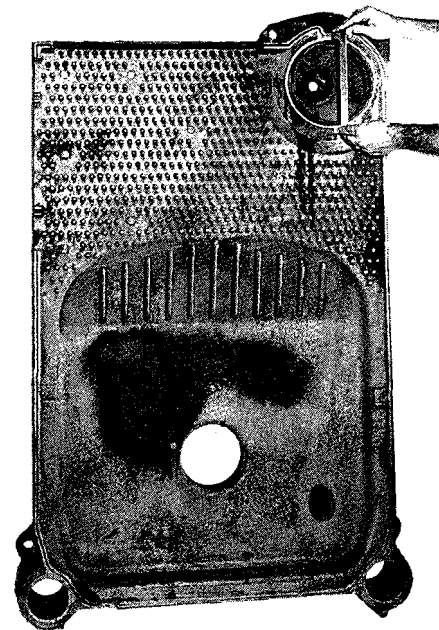
CAUTION

6. THIS IS A FORCED DRAFT FIRED BOILER & SEALANT MUST BE APPLIED WHERE SPECIFIED FOR PROPER AND SAFE PERFORMANCE. THE BURNHAM CORPORATION HAS APPROVED A SECTION JOINT SEALANT (SILASTIC) MANUFACTURED BY DOW-CORNING UNDER THE PRODUCT NUMBERS OF 732-RTV, 732-BL11 AND 781. ALL THREE NUMBERS ARE THE SAME MATERIAL.



POSITIONING OF BACK SECTION

Fig. 5



SETTING OF NIPPLES

Fig. 6

The grooves in the ground joint along the edge of the section should be cleaned with a wire brush. Then using a cartridge of sealant in a caulking gun, apply ¼" bead of Silastic to one side of each joint to be mated. Touch up any missed spots before draw-up. Touch-up after draw-up has no value. See Figure 7.

CAUTION

SECTIONS MUST BE DRAWN-UP TIGHT WITHIN FOUR HOURS OF THE TIME WHEN SILASTIC IS FIRST APPLIED. SILASTIC CURES IN FOUR HOURS AND WILL NOT FLOW INTO SEAL GROOVES AFTER FOUR HOURS FROM APPLICATION, REGARDLESS OF THE PRESSURE APPLIED.

7. From arrangement of sections chart (see Figure 8) select next section according to code letters on section.

NOTICE

SECTIONS MUST BE ASSEMBLED IN PROPER ORDER.

8. Clean nipple ports and place section on nipples in rear section. To facilitate assembly, it is advisable to enter the upper nipple first in its port, then enter the lower nipples in their respective ports.
9. Drive section in place with a heavy block of wood, striking blows as squarely as possible over nipples.
10. Insert the three ¾" draw-up rods through the nipple ports in the intermediate section extending them through the tapped holes in the rear section.

Place a 12" lg. steel channel on each end of the upper draw-up rod and an 8½" lg. steel channel on each end of the lower draw-up rods along with nuts and washers. These items are all located in the Draw-Up Kit. See Figures 9 and 10.

NOTICE

AVOID DAMAGE TO THE DRAW ROD THREADS WHILE DRAWING UP SECTIONS. APPLY OIL OR GREASE FREELY TO THE ROD THREADS WHILE ASSEMBLING SECTIONS TO PREVENT STRIPPING OF THREADS ON ROD.

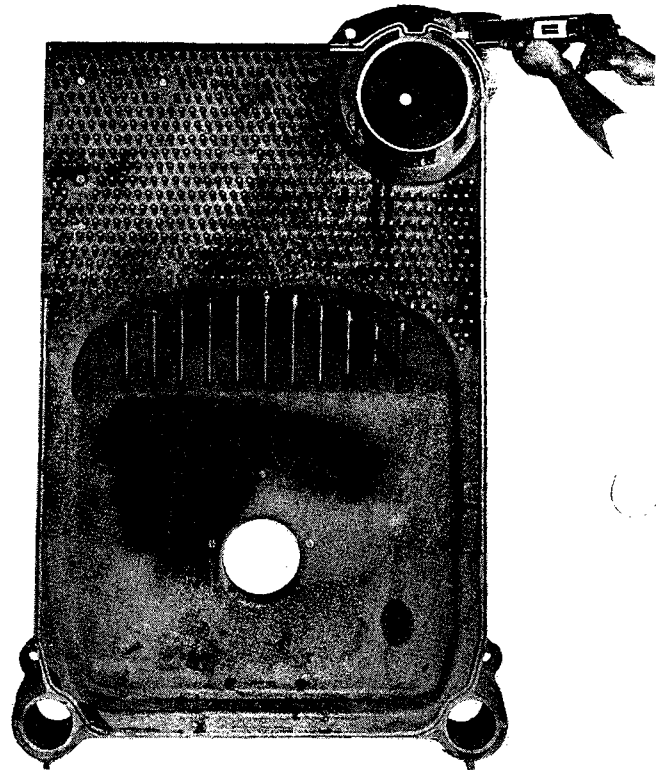
11. DRAW UP SECTION SLOWLY AND EVENLY, tightening each draw-up rod a little at a time so that sections are equally spaced, starting with lower draw-up rods.

KEEP NIPPLES ALIGNED WITH NIPPLE PORTS. If necessary, tap nipples lightly with a blunt tool or rod to keep nipples from cocking while sections are being drawn up. DO NOT DRAW UP SECTION WHEN NIPPLES ARE COCKED. Continue tightening draw-up rods equally, periodically bumping the section with the heavy block of wood to relieve tension on the draw-up rods, until sections meet iron-to-iron on the ground surfaces.

12. CONTINUE ASSEMBLING SECTIONS IN THEIR RESPECTIVE ORDER. Be certain that all sections are drawn up iron-to-iron at all three nipple ports.

CAUTION

Be sure to apply the sealant to the groove in the ground joints between adjacent sections as the boiler operates with a positive pressure in the firebox and products of combustion will escape between sections unless the sections are properly sealed. The sealant should be applied before each section is placed on the assemblage.



APPLICATION OF SEALANT

Fig. 7

NOTICE

On long boiler assemblies, it may be necessary to draw-up a partial block if the entire boiler is not ready to be drawn-up tight within four hours of the first application of Silastic. If the block assembly time extends overnight, the partial block completed must be drawn-up tight before leaving the boiler overnight. If a joint springs out, it must be re-drawn tight within four hours of first application of Silastic to the joint.

13. Tie rods must be installed in lugs immediately after draw-up is complete.
 - a. Insert tie rods through the lugs on the front & back sections. Place regular steel nuts & flat washers on both ends of rods and tighten finger tight.

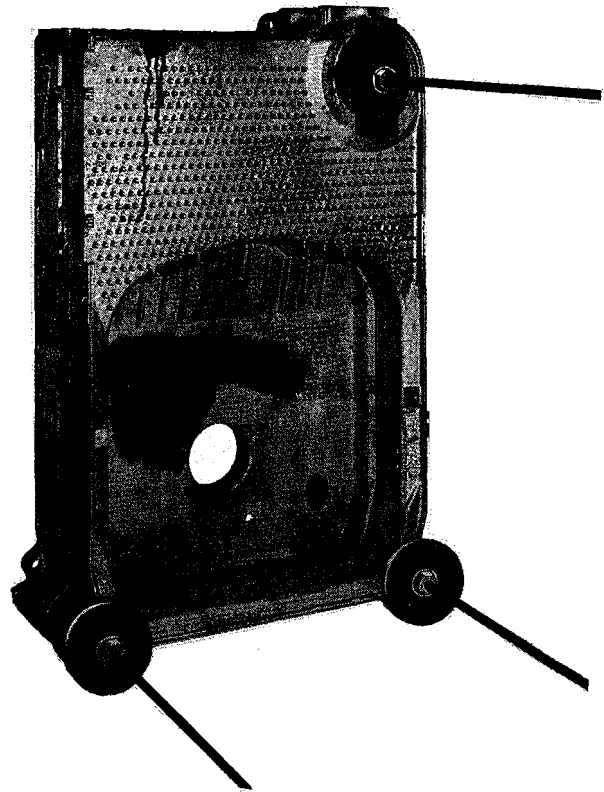
CAUTION

Do not overtighten tie rods. Steel nuts should be finger tight only to prevent section damage due to thermal expansion.

- b. Remove draw rod assembly from the sections and remove the draw rod couplings from the tie rods.

NOTICE

If a joint springs apart it must be re-drawn tight within four hours of the time of application of the silastic to that joint.



PULL - UP ASSEMBLY

Fig. 9

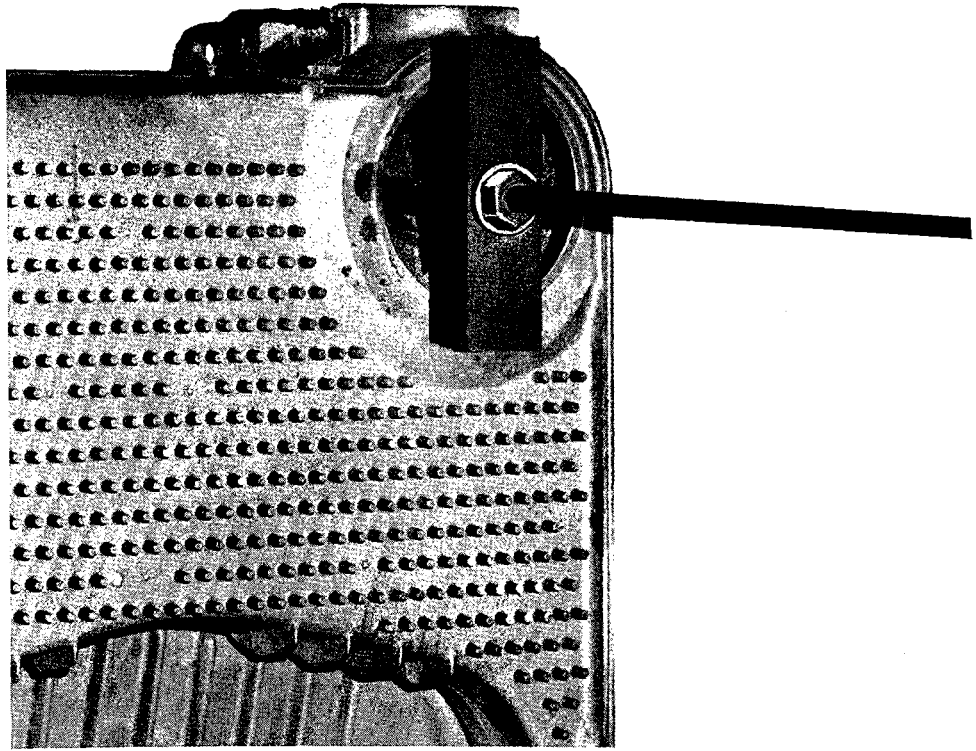
A. ARRANGEMENT OF SECTIONS

The sections must be assembled according to the arrangement listed in figure below to insure proper operation and proper alignment of piping with jacket knockouts.

SECTION ARRANGEMENT																					
FX - FRONT SECTION WITH 4" TOP TAPPING				C - CENTER SECTION				CX - CENTER SECTION W/4" TOP TAPPING													
CT - CENTER SECTION W/T.W.H. OPENING				BX - BACK SECTION WITH 4" TOP TAPPING																	
4	FX	CT	C	BX																	
5	FX	CT	C	CT	BX																
6	FX	CT	C	CT	C	BX															
7	FX	CT	C	CT	C	CT	BX														
8	FX	CT	C	CT	C	CT	C	BX													
9	FX	CT	C	CT	C	CT	C	CT	BX												
10	FX	CT	C	CT	CX	CT	C	CT	C	BX											
11	FX	CT	C	CT	C	CT	CX	CT	C	C	BX										
12	FX	CT	C	CT	C	CT	CX	CT	C	CT	C	BX									
13	FX	CT	C	CT	C	CT	CX	CT	C	CT	C	C	BX								
14	FX	C	C	CT	CX	CT	C	CT	CX	CT	C	CT	C	BX							
15	FX	C	C	CT	CX	CT	C	CT	CX	CT	C	CT	C	CT	BX						
16	FX	C	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	CT	C	BX					
17	FX	C	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	CT	C	C	BX				
18	FX	C	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	CT	CX	CT	C	BX			
19	FX	C	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	CT	CX	CT	C	C	BX		
20	FX	C	C	CT	C	CT	CX	CT	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	BX	
21	FX	C	C	CT	C	CT	CX	CT	C	CT	CX	CT	C	CT	C	CT	CX	CT	C	C	BX

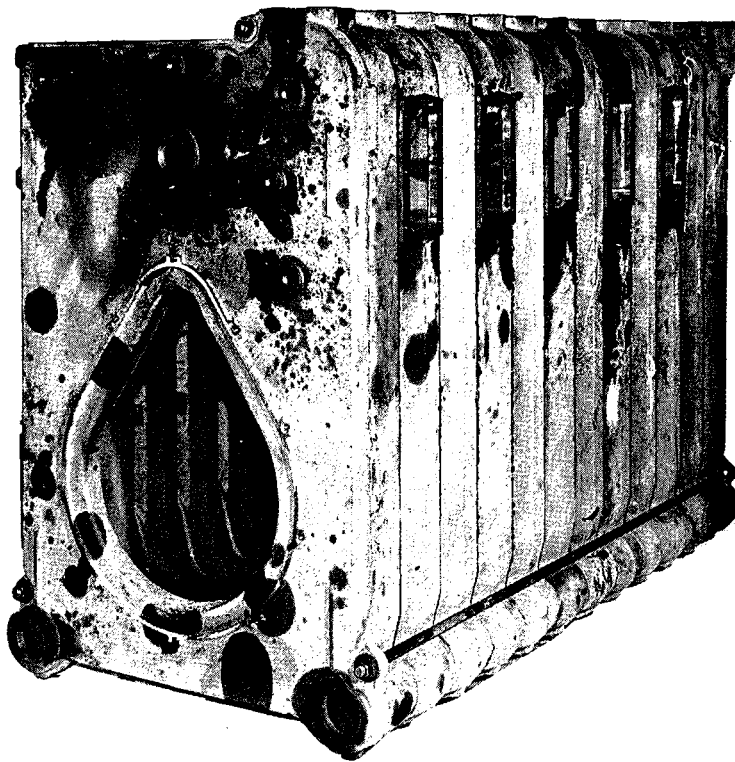
NOTE: For boilers less tankless water heaters replace the "CT" sections with "C" sections.

Fig. 8



CHANNEL BLOCK IN POSITION

Fig. 10



SECTION ASSEMBLEDGE

Fig. 11

14. Excess length of tie rods must be sawed off so they will not extend beyond end sections. Rods should project equally at each end to insure proper fit of the jacket.

See Figure 11 for complete boiler section assemblage. Illustration shows boiler equipped with sections for built-in water heater.

B. Assembly of Sections (Hydraulic Draw-Up)

The entire assemblage may be drawn up at one time using hydraulic draw-up equipment providing the operation is completed within four hours after application of the sealant.

"Hydraulic Draw-Up Equipment" is available through Burnham by ordering part number 6196008.

1. Repeat steps 1 through 9 under "Assembly of Sections (Manual Draw-Up)."
2. Continue driving sections in place (in their respective order) until all sections are in the assemblage. Ground surfaces between adjoining sections should be spaced $\frac{1}{4}$ " to $\frac{3}{8}$ " apart. Spacing of more than $\frac{3}{8}$ " will limit number of sections that can be drawn up in one unit and could indicate cocked nipples.

CAUTION

Be sure to apply the sealant to the groove in the ground joints between adjacent sections as the boiler operates with a positive pressure in the firebox and products of combustion will escape between sections unless the sections are properly sealed. The sealant should be applied before each section is placed on the assemblage.

On long boiler assemblies, it may be necessary to draw-up a partial block if the entire boiler is not ready to be drawn-up tight within four hours of the first application of Silastic. If the block assembly time extends overnight, the partial block completed must be drawn-up tight before leaving the boiler overnight. If a joint springs out, it must be re-drawn tight within four hours of first application of Silastic to the joint.

3. Insert the three $\frac{3}{4}$ " draw-up rods (and couplings if appropriate) through the tapped holes in the rear section extending them through the tapped holes in the front section. Be sure to screw draw-up rods into couplings far enough to prevent stripping threads.
4. Place a 12" lg. steel channel on each end of the upper draw-up rod and an 8 $\frac{1}{2}$ " lg. steel channel on each end of the lower draw-up rods. Install nuts and washers on one end of the draw-up rods and the hydraulic rams, washers and draw-up rod clamps on the other. See Figure 12.

NOTICE

Rods should be approximately centered in openings so that rods and couplings (when used) do not drag on pipe thread in end section tappings.

5. Draw-up Sections.

WARNING

READ THE STATEMENTS BELOW BEFORE ATTEMPTING TO USE HYDRAULIC EQUIPMENT.

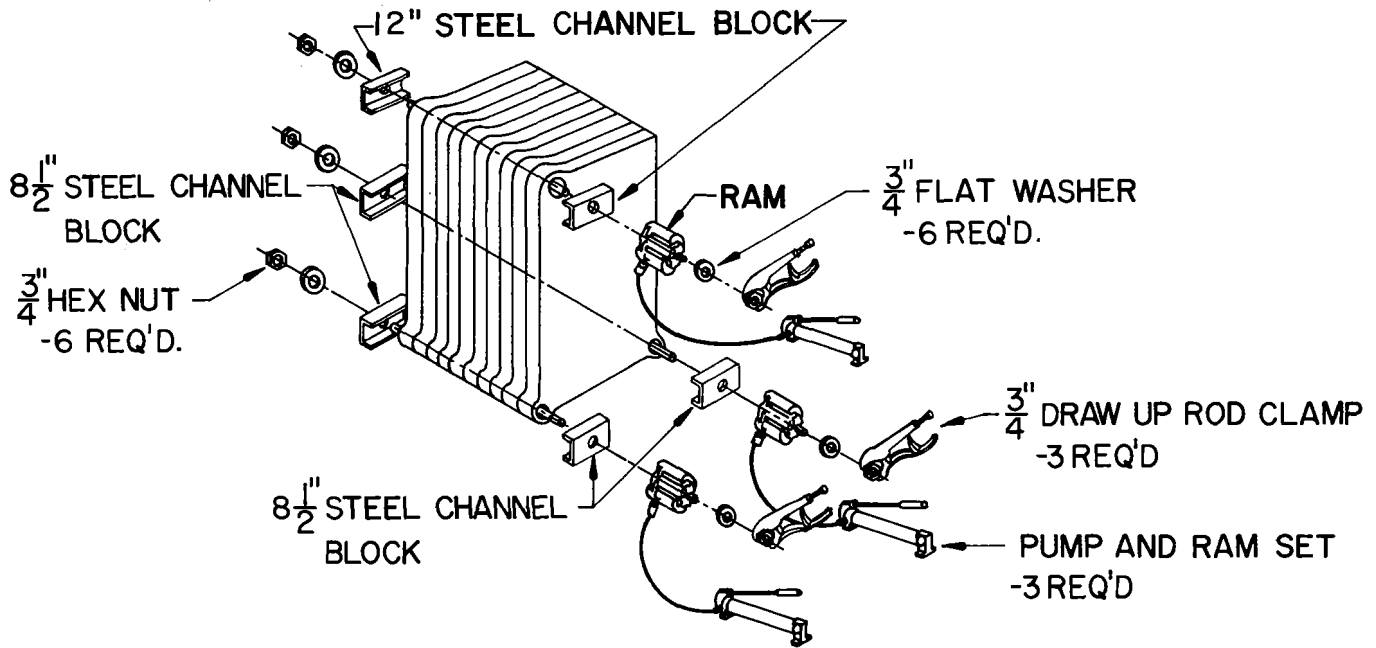
- RELEASE PRESSURE IN RAM PUMPS BEFORE ATTEMPTING TO REMOVE CLAMPS.
- DO NOT STAND IN LINE WITH DRAW-UP RODS AT EITHER END WHEN HYDRAULIC PRESSURE IS BEING APPLIED. AS A SAFETY MEASURE, ENDS OF DRAW-UP RODS SHOULD BE COVERED WHILE SECTIONS ARE BEING DRAWN IN CASE RODS SHOULD SNAP WHILE UNDER TENSION.
- DO NOT OPERATE RAM AGAINST DRAW-UP COUPLING.
- DO NOT OPERATE PUMP AFTER RAM HAS REACHED STROKE LIMIT.

Use hydraulic rams to draw up sections by applying pressure alternately on the draw-up rods. When rams reach stroke limit, release pressure in ram pumps and then move clamps to new position.

NOTICE

KEEP NIPPLES ALIGNED WITH NIPPLE PORTS. If necessary, tap nipples lightly with a blunt tool or rod to keep nipples from cocking while sections are being drawn up. DO NOT DRAW UP SECTION WHEN NIPPLES ARE COCKED. Continue tightening draw-up rods equally, periodically bumping the section with the heavy block of wood to relieve tension on the draw-up rods, until sections meet iron-to-iron on the ground surfaces.

6. Continue to draw-up until all sections make contact at the ground joints.
7. Repeat steps 13 and 14 under "Assembly of Sections (Manual Draw-Up)."



HYDRAULIC DRAW-UP OF SECTIONS

Fig. 12

- 3 HYDROSTATIC TEST — After the boiler sections have been assembled, it is essential that the boiler be hydrostatically tested before platework, jacket, or piping is installed.
- A. Tankless Heater Installation
If boiler is ordered with tankless heaters, install heaters with the gaskets provided. Table II on page 25 gives the maximum number of heater permissible per assemblage and the heater ratings.
 - B. Plug all boiler tappings and fill entirely with cold water. To protect and safeguard the accuracy of steam or water gauge supplied, DO NOT INSTALL GAUGE UNTIL AFTER TESTING OF BOILER.
 - C. Testing pressure should be at least 10 pounds but should not exceed 50 pounds.
 - D. EXAMINE BOILER CAREFULLY, INSIDE AND OUTSIDE, to insure against leaks from cocked nipples or through concealed breakage caused in shipping and handling. This precaution is for your protection and will simplify handling of necessary replacements and adjustment claims.
 - E. After making certain that there are no leaks, drain boiler and remove plugs for boiler trim and other connections.

SECTION III - INSTALLATION INSTRUCTIONS

① **INSTALL FLUE COVER PLATES** over cleanout openings on left side of boiler as shown in Figure 13.

- A. Locate the cover plates, carriage bolts, nuts and washers in the miscellaneous parts carton.
- B. Attach the carriage bolts to the top and bottom of the flue openings with washers and hex nuts to provide a fixed stud.
- C. Install flue cover plates & gaskets over studs and secure with washers and nuts.

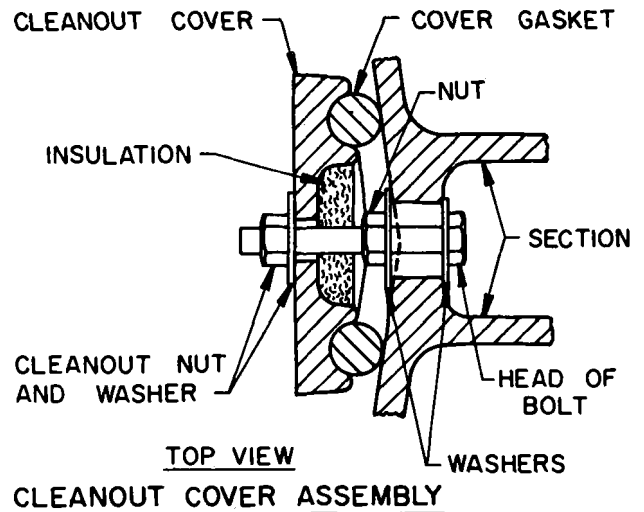


Fig. 13

② **MOUNT PRESSURE RELIEF DOOR**

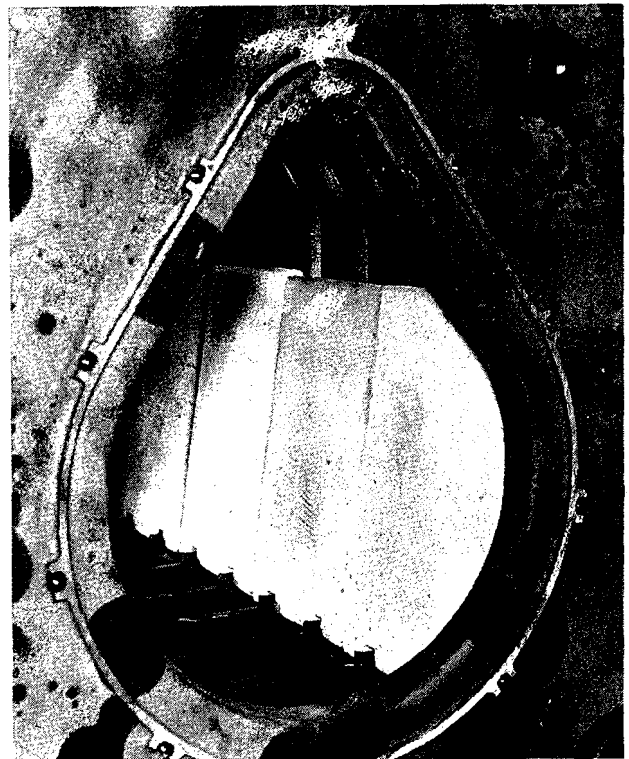
- A. Apply a $\frac{1}{4}$ " bead of Silastic along the groove on the inside face of the pressure relief door.
- B. Mount the pressure relief door onto the rear section (with the word "Top" in the upright position) using the (4) $\frac{5}{8}$ "-18 x 1" cap screws located in the miscellaneous parts carton.

③ Install the refractory firewall plates on the right side of the center sections. The plates should be installed toward the front of the boiler. See Figure 14.

IMPORTANT — THIS BOILER REQUIRES NO COMBUSTION CHAMBER.

④ **MOUNT BURNER MOUNTING PLATE**

- A. Cast iron burner mounting plate. Install (10) $\frac{5}{8}$ " x 2" long studs with the short length of threads into the boiler front section. Apply a bead of sealant around the periphery of the cast iron burner plate and secure to front section with $\frac{5}{8}$ " nuts and washers.
- B. Cast iron burner mounting plate with adapter plate (R-6 Burner Only). The adapter plate is furnished by Gordon-Piatt and is shipped with the burner. Mount the cast iron burner mounting plate as stated in (A) above. Mount the adapter plate to the mounting plate with (8) $\frac{3}{8}$ " x 1 $\frac{1}{4}$ " cap screws, $\frac{3}{8}$ "-16 hex nuts, washers and gasket provided. The R6 burner can now be secured to (4) studs on adapter plate using (4) $\frac{3}{8}$ "-16 hex nuts and washers.



FIREWALL PLATES

Fig. 14

- C. Steel burner mounting plate (see item D below for R-8 & R-10 mounting plate instructions). With the use of silastic, secure the rope gasket to the front section just inside the rib to which the burner plate seats. Using the (10) $\frac{5}{8}$ "-18 x 1" long hex head machine screws, mount burner plate to front section. With bolts provided mount burner to steel burner plate, see Figure 15 for view showing steel burner plate installed.
- D. Steel burner mounting plate with mounting lugs (R-8 and R-10 Burner Only). Mount the burner mounting plate as stated in (c) above. Locate the (6) $\frac{1}{2}$ " mounting lugs in the mounting plate carton. Attach the lugs to the weld studs on the burner mounting plate with the $\frac{1}{2}$ " hex nuts & washers. When the burner is installed, orient the lugs towards the center of the opening such that they hold the burner flange in place.

5 Canopy Assembly

- A. Attach the canopy brackets to the ends of the canopy with sheet metal screws. Two piece canopies should be joined together using the #10 x $\frac{1}{2}$ " sheet metal screws provided.
- B. Along the groove provided on top of the sections and across the top of the end sections, apply 2" wide strips of cerafelt and lap joint at corners. See Fig. 16.
- C. Place the canopy on the sections with the word "FRONT" positioned over the front section.
- D. Secure the canopy to the end sections by extending the $\frac{3}{8}$ " x $1\frac{1}{4}$ " carriage bolts from the end sections to the canopy brackets. Attach the canopy channels to the canopy and intermediate sections with the appropriate J-bolts.
- E. Check the seal between the canopy and the sections.
- F. Assemble the flue thimble to the top of the canopy with the bracket toward the front of the boiler using #10 x $\frac{1}{2}$ " screws.
- G. Figure 17 shows the canopy assembled to the sections with the flue thimble in place.
- H. Place canopy insulation over canopy foil side up, fold down sides and secure with wire.

6 Inspect Seal

- A. After the platerwork is in place, a visual inspection should be made of all sealed joints and repairs made if necessary. A darkened boiler room with a light source in the combustion space and canopy will aid this inspection.

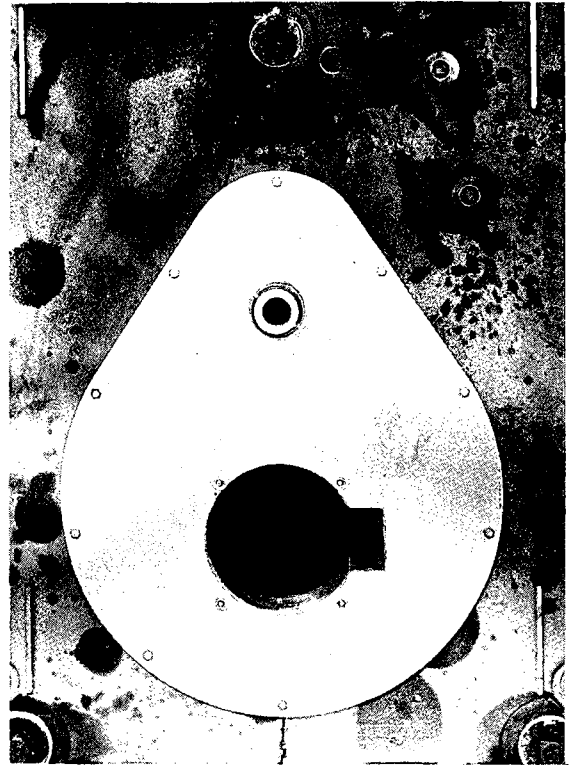


Fig. 15

7 BOILER PIPING

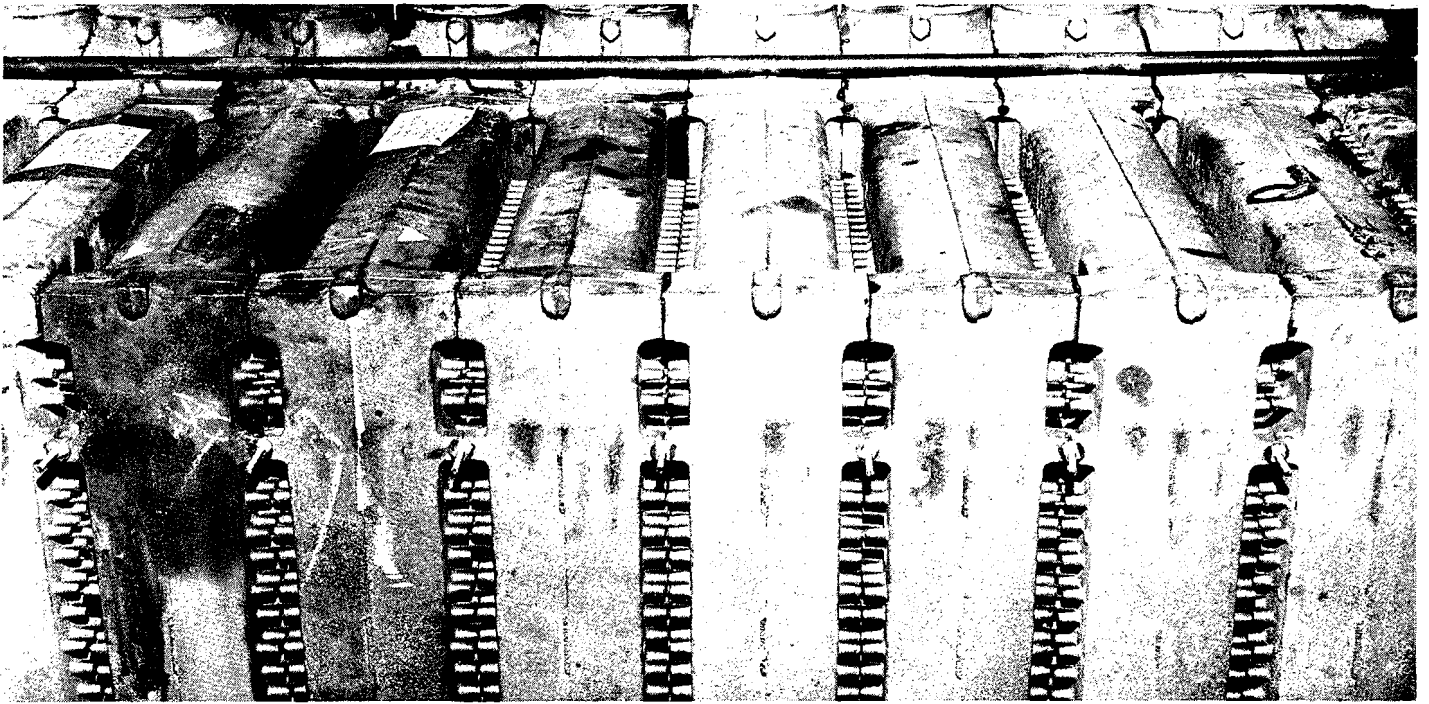
CONNECT SUPPLY AND RETURN PIPING TO HEATING SYSTEM.

NOTICE IT IS IMPORTANT THAT THE MINIMUM PIPING REQUIREMENTS AND ARRANGEMENTS BE COMPLIED WITH IN ORDER TO INSURE MAXIMUM RELIABILITY PERFORMANCE.

- A. CLEARANCES - All steam and hot water pipes shall have clearances of at least $\frac{1}{2}$ " from all combustible construction.
- B. With STEAM HEATING, see Figure 20, consult I=B=R Installation and Piping Guide No. 200.

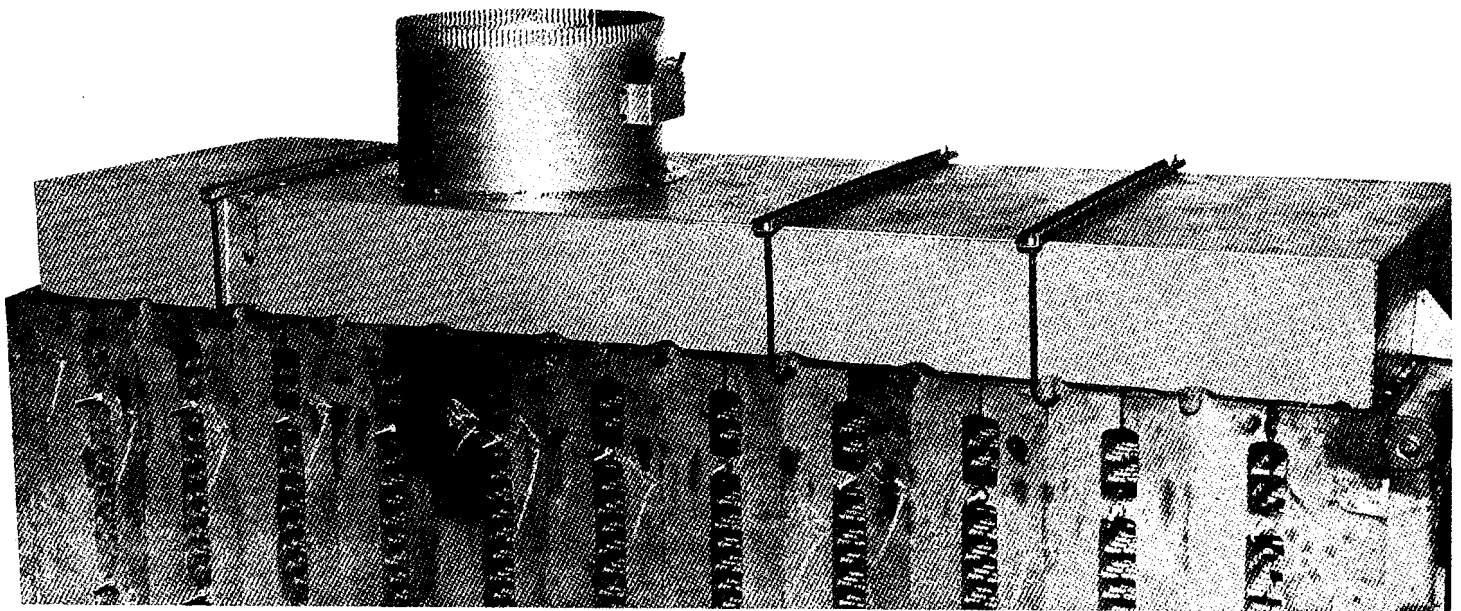
NOTICE PARTICULAR ATTENTION SHOULD BE GIVEN TO THE CONSTRUCTION OF THE HARTFORD LOOP ON STEAM BOILERS. FIGURE 22 ILLUSTRATES THE RIGHT AND WRONG WAY TO CONSTRUCT THE STEAM HEADER.

- C. With forced circulation HOT WATER HEATING, see Figure 21, consult I=B=R Installation and Piping Guide No. 200.
 - 1. If this boiler is used in connection with refrigeration systems, the boiler must be installed so that the chilled medium is piped in parallel with the heating boiler using appropriate valves to prevent the chilled medium from entering the boiler, see Figure 18. Also, consult I=B=R Installation and Piping Guides.



GROOVES AT TOP OF SECTION
FOR CANOPY SEALANT

Fig. 16



THIMBLE & CANOPY ASSEMBLY SECURED & SEALED TO SECTIONS

- If this boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air, the boiler piping must be equipped with flow control valves to prevent gravity circulation of boiler water during the operation of the cooling system.
- If the boiler will be operated where low boiler water temperatures may be encountered (i.e. converted gravity circulation systems, etc.) the use of a boiler water bypass is recommended to maintain optimum operation.

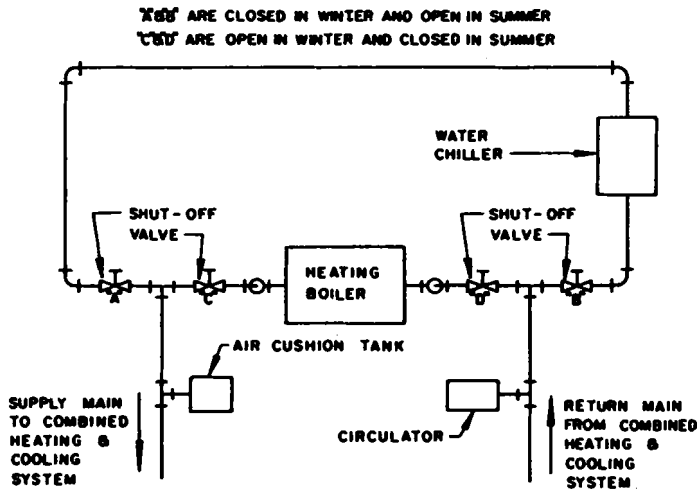
Remove the circulator and install a pipe tee between the circulator and boiler return along with a second tee in the supply piping as shown in Figure 19. The bypass should be the same size as the supply and return lines with valves located in the bypass and supply outlet as illustrated in Figure 19 order to regulate water flow for maintenance of higher boiler water temperature.

Set the by-pass and boiler supply valves to a half throttle position to start. Operate boiler until the system water temperature is at a normal operating range.

Adjust the valves to provide 180° to 200° F supply water temperature. Opening the boiler supply valve will raise the system temperature, while opening the by-pass valve will lower the system supply temperature.

WARNING

- A hot water boiler installed above radiation level must be provided with a low water cutoff device as part of the installation.



RECOMMENDED PIPING FOR COMBINATION HEATING & COOLING (REFRIGERATION) SYSTEMS WATER BOILERS

Fig. 18

OXYGEN CORROSION:

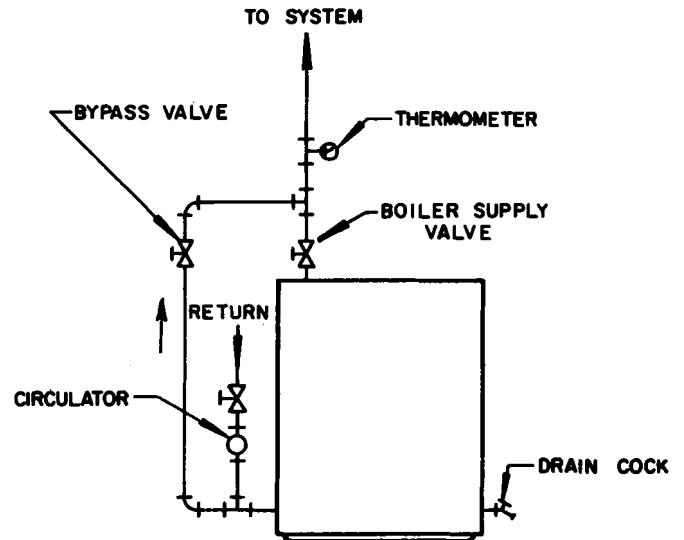
Oxygen contamination of the boiler water will cause corrosion of the iron and steel boiler components, which can lead to failure. As such, any system must be designed to prevent oxygen absorption in the first place or prevent it from reaching the boiler. Problems caused by oxygen contamination of boiler water are not covered by Burnham's standard warranty.

There are many possible causes of oxygen contamination such as:

- Addition of excessive make-up water as a result of system leaks.
- Absorption through open tanks and fittings.
- Oxygen permeable materials in the distribution system.

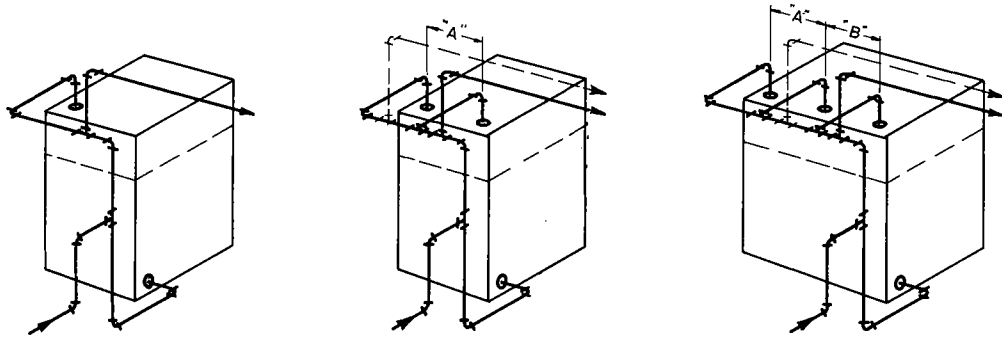
In order to insure long product life, oxygen sources should be eliminated. This can be accomplished by taking the following measures:

- Repairing system leaks to eliminate the need for addition of make-up water.
- Eliminating open tanks from the system.
- Eliminating and/or repairing fittings which allow oxygen absorption.
- Use of non-permeable materials in the distribution system.
- Isolating the boiler from the system water by installing a heat exchanger.



RECOMMENDED BYPASS PIPING - WATER BOILERS

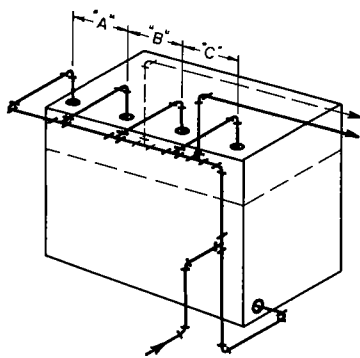
Fig. 19



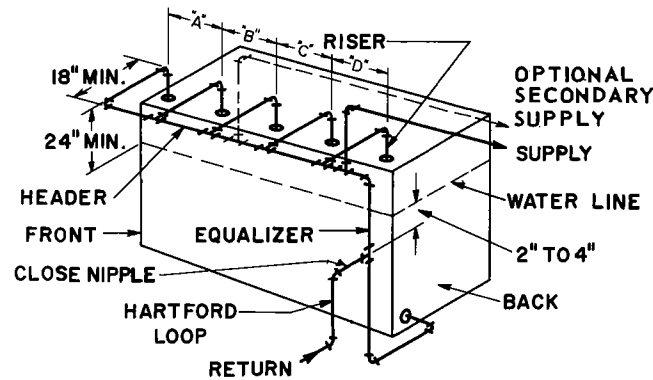
PF - 504 AND PF - 505

PF - 506 THRU PF - 509

PF - 510 THRU PF - 513



PF - 514 THRU PF - 517



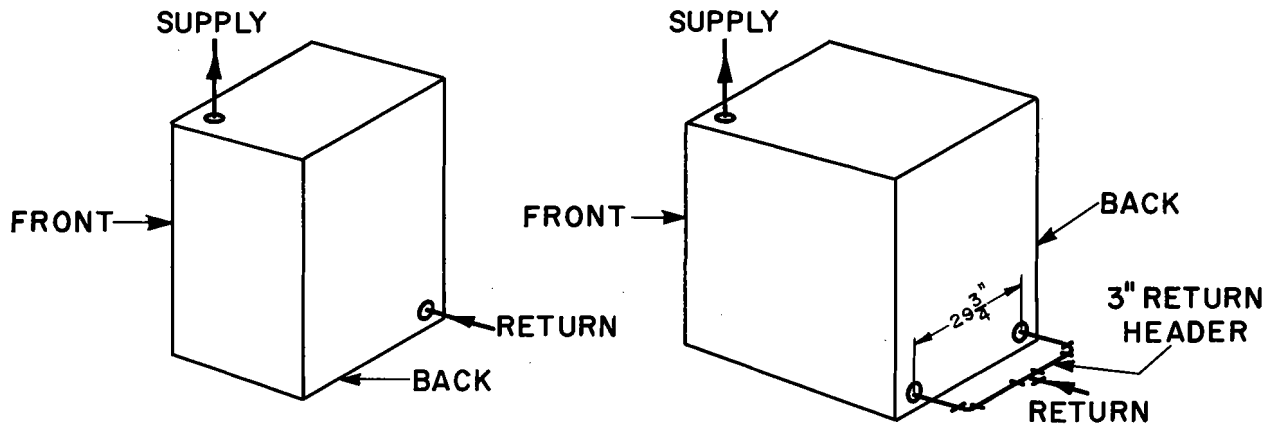
PF - 518 THRU PF - 521

BOILER NUMBER	PIPE SIZE (INCHES)				RISER SPACING (INCHES)			
	RISER	RETURN	HEADER	EQUALIZER	"A"	"B"	"C"	"D"
PF - 504	(1) 4	2	4	2 1/2	-	-	-	-
PF - 505	(1) 4	2	4	2 1/2	-	-	-	-
PF - 506	(2) 4	2 1/2	6	2 1/2	30 1/2	-	-	-
PF - 507	(2) 4	2 1/2	6	2 1/2	36 1/2	-	-	-
PF - 508	(2) 4	2 1/2	6	2 1/2	42 1/2	-	-	-
PF - 509	(2) 4	2 1/2	6	2 1/2	48 1/2	-	-	-
PF - 510	(3) 4	2 1/2	8	2 1/2	24 1/4	30 1/4	-	-
PF - 511	(3) 4	3	8	4	36 1/4	24 1/4	-	-
PF - 512	(3) 4	3	8	4	36 1/4	30 1/4	-	-
PF - 513	(3) 4	3	8	4	36 1/4	36 1/4	-	-
PF - 514	(4) 4	3	8	4	24 1/4	24 30 1/4	-	-
PF - 515	(4) 4	3	8	4	24 1/4	24 36 1/4	-	-
PF - 516	(4) 4	3	8	4	24 1/4	36 30 1/4	-	-
PF - 517	(4) 4	3	8	4	24 1/4	36 36 1/4	-	-
PF - 518	(5) 4	3	8	4	24 1/4	36	24	18 1/4
PF - 519	(5) 4	3	8	4	24 1/4	36	24	24 1/4
PF - 520	(5) 4	3	8	4	36 1/4	24	36	18 1/4
PF - 521	(5) 4	3	10	4	36 1/4	24	36	24 1/4

* Secondary Supply Connections illustrated in dotted lines are to be used only in addition to supply connections shown in solid lines, not in lieu of.

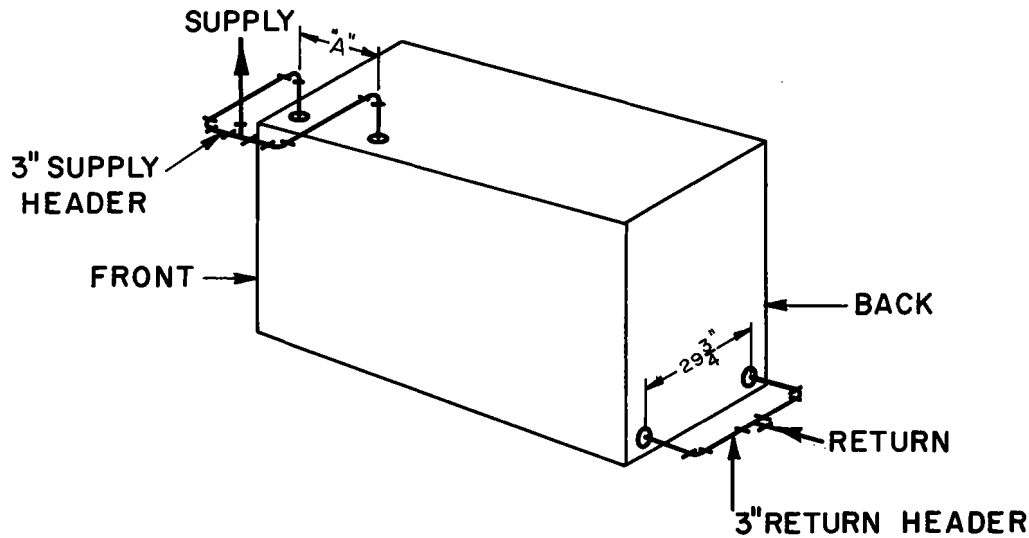
MINIMUM PIPING REQUIREMENTS STEAM BOILERS

Fig. 20



PF - 504 THRU PF - 507

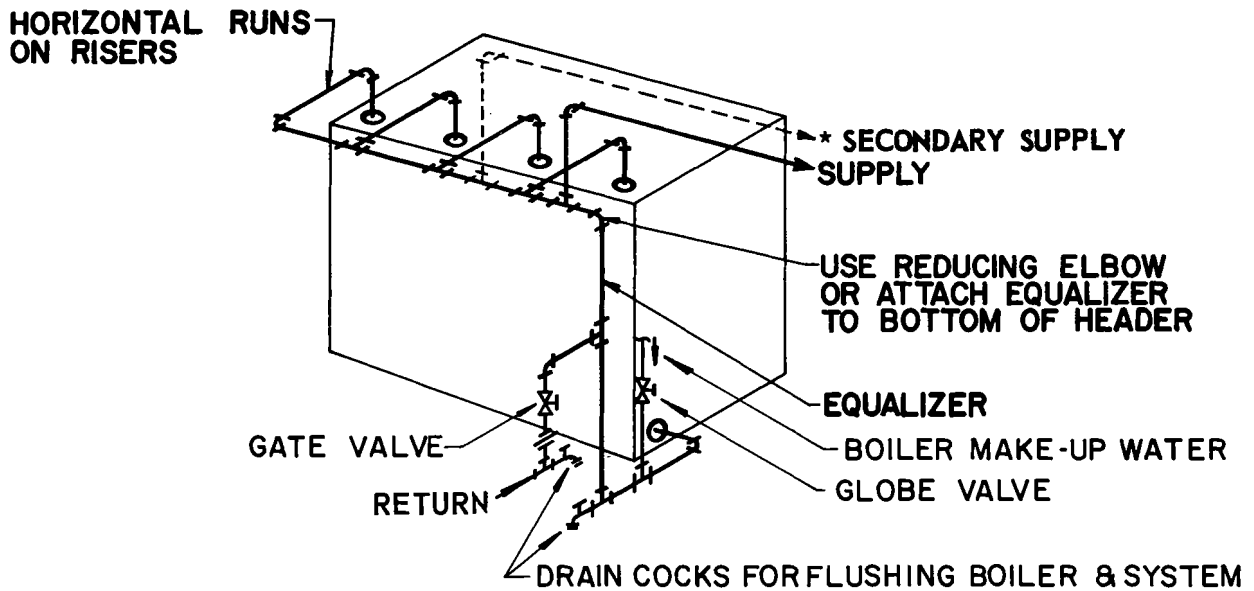
PF - 508 THRU PF - 513



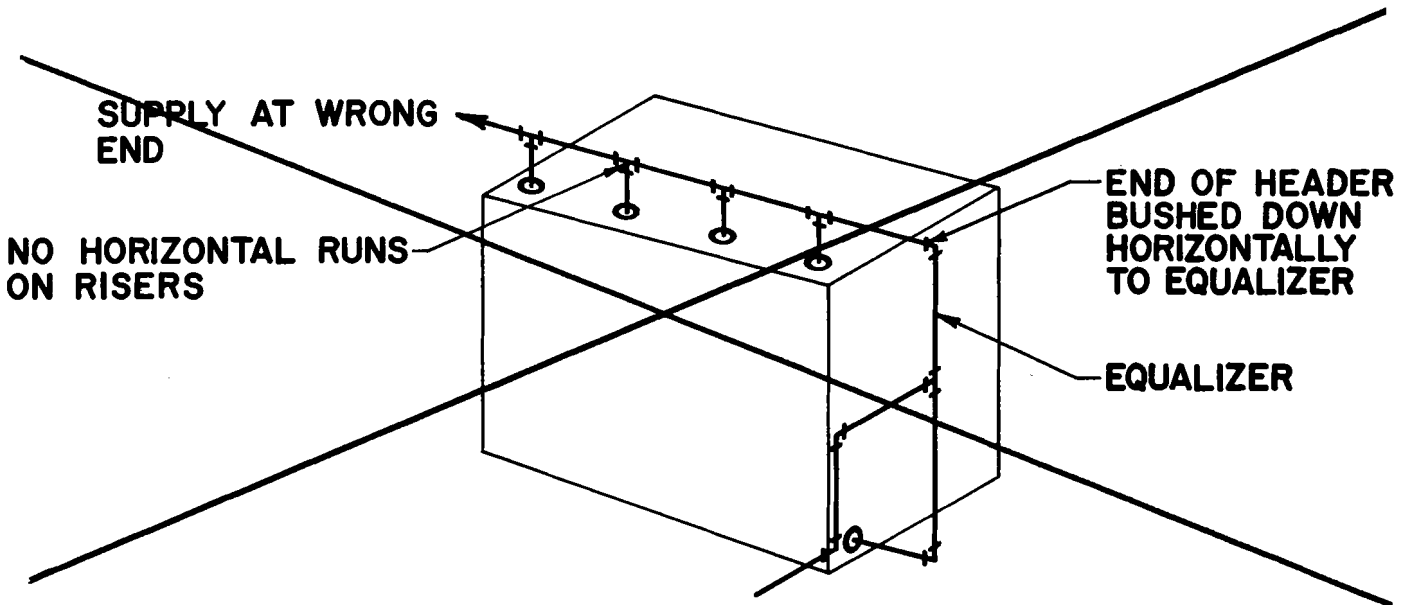
PF - 514 THRU PF - 521

BOILER NUMBER	SUPPLY AND RETURN (INCHES)	"A" (IN)
PF - 504	2 1/2	-
PF - 505	2 1/2	-
PF - 506	3	-
PF - 507	3	-
PF - 508	4	-
PF - 509	4	-
PF - 510	4	-
PF - 511	4	-
PF - 512	4	-
PF - 513	4	-
PF - 514	5	24 1/4
PF - 515	5	24 1/4
PF - 516	5	24 1/4
PF - 517	5	24 1/4
PF - 518	5	24 1/4
PF - 519	5	24 1/4
PF - 520	5	36 1/4
PF - 521	5	36 1/4

MINIMUM PIPING REQUIREMENTS WATER BOILERS



**CORRECT PHYSICAL ARRANGEMENT FOR STEAM HEADERS
INCLUDING RECOMMENDED VALVING FOR EFFECTIVE CLEANING**



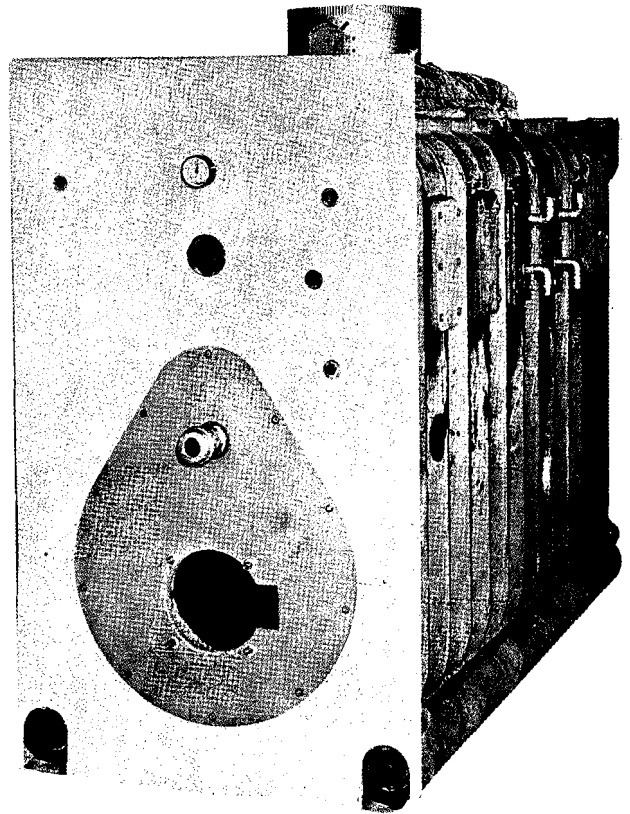
INCORRECT PHYSICAL ARRANGEMENT FOR STEAM HEADERS

*Secondary Supply connections illustrated in dotted lines are to be used only in addition to supply connections shown in solid lines not in lieu of.

Fig. 22

8 ASSEMBLY OF JACKET

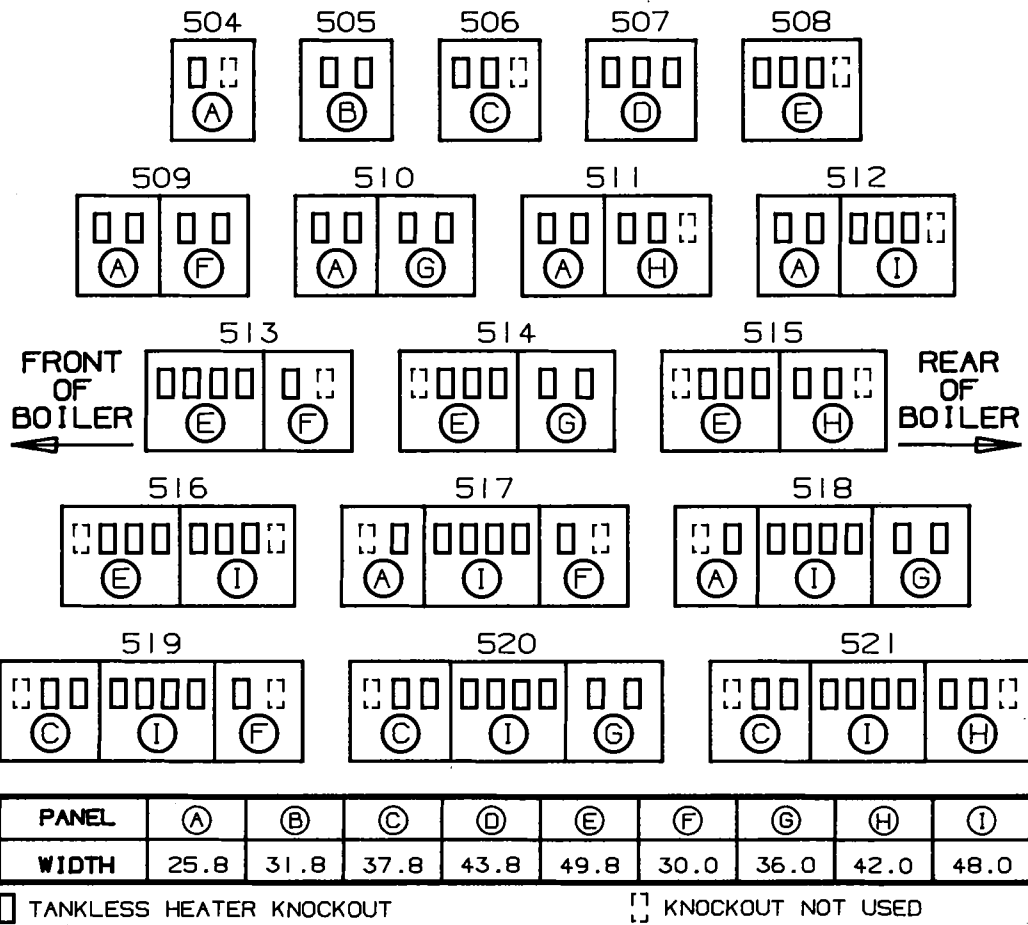
- A. Open jacket carton and jacket hardware package. Unless otherwise stated, all jacket components are fastened with #8 x 1/2" sheet metal screws. Do not drive sheet metal screws tight until jacket assembly is complete.
- B. Install threaded plastic leg spacers (2 per panel) into bottom of each jacket panel. See Figure 1.
- C. Place the lower front jacket panel in place below the burner plate. Install upper front panel by sliding it down behind the flanges of the front burner plate. Attach the lower panel to the upper panel with two sheet metal screws. Figure 23 shows the front panels assembled to the boiler.
- D. Assemble jacket side panels.
If the boiler has more than eight sections, the jacket side panels will consist of two pieces which should be assembled before application (in addition a small filler piece attaches to the left side panel). If the boiler has more than sixteen sections, the jacket side panels will consist of three pieces which should be assembled before application. See Figure 24 for proper arrangement of right side panels.
- E. Install jacket side panels.
In case of steam boilers, remove knockouts from the left side panel filler piece for gauge glass fittings. When tankless heaters are used, remove the appropriate knockouts from the right hand side panel.
- F. Install the back panel and then the top panel(s). If the boiler has more than 11 sections, the jacket top panels will consist of two pieces which should be assembled before application.
Knockouts in the top panel are provided for supply piping clearance. Filler pieces are to be assembled to panel where knockouts are removed.
- G. Tighten all jacket screws uniformly tight.



FRONT JACKET PANEL IN POSITION

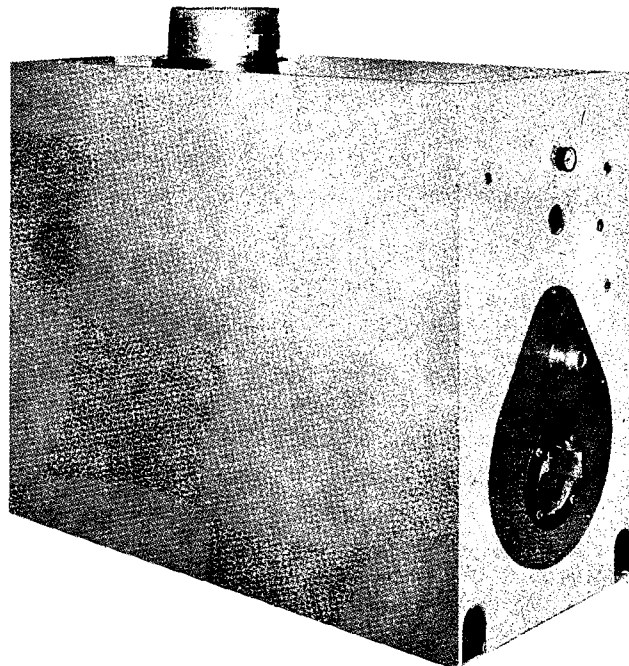
Fig. 23

- H. Locate the Rating Plate, Water Treatment Caution Plate, and Burnham Logo Plate in the Miscellaneous Parts Carton. Install the Rating Plate and Water Treatment Caution Plate on the jacket front panel using sheet metal screws. Attach the Burnham Logo Plate to the front panel by peeling off the paper backing and lining up the tabs with the jacket slots. Figure 1 shows correct placement of the plates.
- I. Install the Lowest Permissible Water Level Plate (located in the steam/water trim carton) on the jacket left panel using sheet metal screws. See Figure 1.



PF-5 JACKET RIGHT SIDE PANEL ARRANGEMENT

Fig. 24



COMPLETELY ASSEMBLED JACKET

Fig. 25

9 For boilers with no tankless heaters, proceed to Step 12 - Steam Trim or Step 13 - Water Trim.

10 Install the tankless heater manifolds according to Figure 27.

11 CONNECT TANKLESS HEATER PIPING AS SHOWN IN Fig. 26. See Table II for Tankless Heater Ratings.

THE FOLLOWING GUIDELINES SHOULD BE FOLLOWED WHEN PIPING THE TANKLESS HEATER:

A. Flow Regulation

If flow through the heater is greater than its rating, the supply of adequate hot water may not be able to keep up with the demand. For this reason a FLOW REGULATOR matching the heater rating should be installed in the cold waterline to the heater. Refer to Figure 26 for piping recommendations. The flow regulator should preferably be located below the inlet to the heater and a minimum of 12" away from the inlet so that the regulator is not subjected to excess temperatures that may occur during "off" periods when it is possible for heat to be conducted back through the supply line. The flow regulator also limits the flow of supply water regardless of inlet pressure variations in the range of 20 to 125 psi.

B. Tempering of Hot Water

WARNING

Install a mixing valve at the tankless heater outlet to avoid risk of burns or scalding due to excessively hot water at the fixture. Refer to Figure 26 for piping recommendations. Adjust and maintain the mixing valve in accordance with manufacturers instructions.

Installation of a tempering or mixing valve will also lengthen the delivery of the available hot water by mixing some cold water with the hot. In addition, savings of hot water will be achieved since the user will not waste as much hot water while seeking water temperatures to his liking. Higher temperature hot water required by dishwashers and automatic washers is possible by piping the hot water from the heater prior to entering the mixing valve. The mixing valve should be "trapped" by installing it below the cold water inlet to heater to prevent lime formation in the valve.

C. Flushing of Heater

All water contains some sediment which settles on the inside of the coil. Consequently, the heater should be periodically backwashed. This is accomplished by installing hose bibs as illustrated in Figure 26 and allowing water at city pressure to run into hose bib A, through the heater, and out hose bib B until the discharge is clear. The tees in which the hose bibs are located should be the same size as heater connections to minimize pressure drop.

D. Hard Water

This is applicable to some city water and particularly to well water. This should not be a deterrent but pre-

cautions are necessary. A water analysis is necessary and an appropriate water softener installed. This is not only beneficial to the heater but to piping and fixtures plus the many other benefits derived from soft water.

12 STEAM BOILERS - INSTALL STEAM TRIM

Items for steam trim are located in the steam trim carton (except for the separately ordered low cutoff and tankless heater control). Figure 30 shows the proper tappings for each item. Figure 28 shows front view of an assembled steam boiler.

- A. Install the gauge glass set into the extension fittings that were installed before the jacket was assembled.
- B. Install the low water cutoff.
- C. Install the Pressuretrol to the boiler using the 1/4" x 90° (2 1/2") syphon and the 3/4" NPT x 1/4" FPT hex bushing.
- D. Install the 3/4" drain cock using the 3" NPT x 3/4" FPT hex bushing.
- E. Install the steam gauge using the 1/2" NPT x 1/4" FPT hex bushing.
- F. Install the safety valve to the back section as shown in Figure 29. The safety valve is installed in the tee provided for blow-off piping.
- G. For boilers with tankless heaters, install the operating control in an unused tapping through one of the heater plates.
- H. Plug extra tappings.

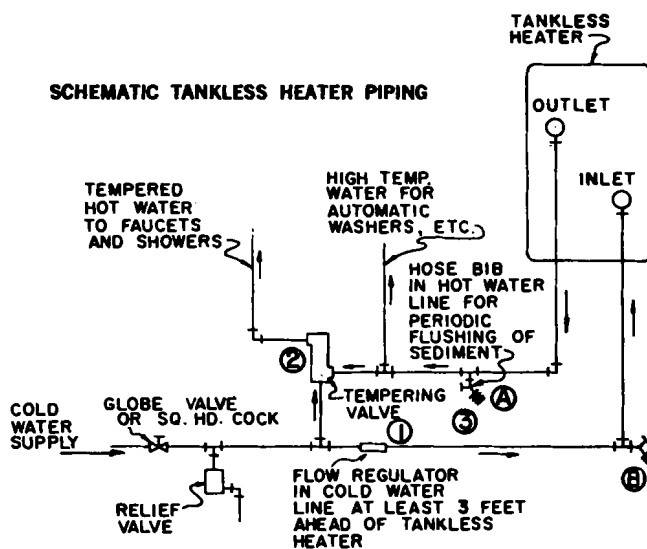
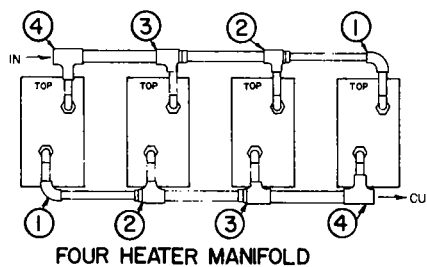
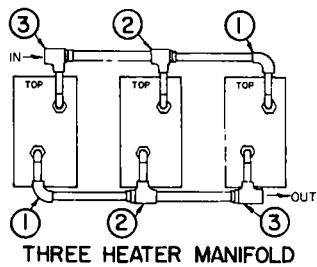
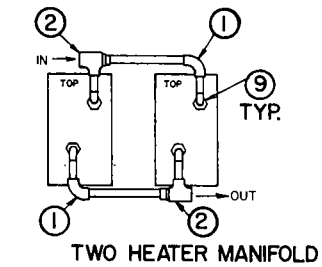
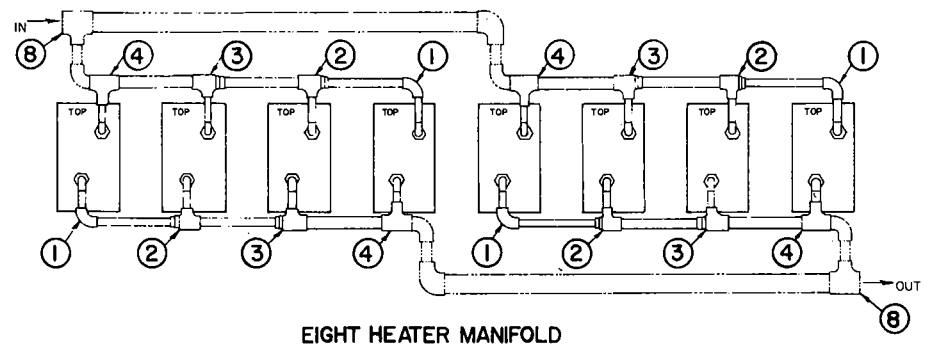
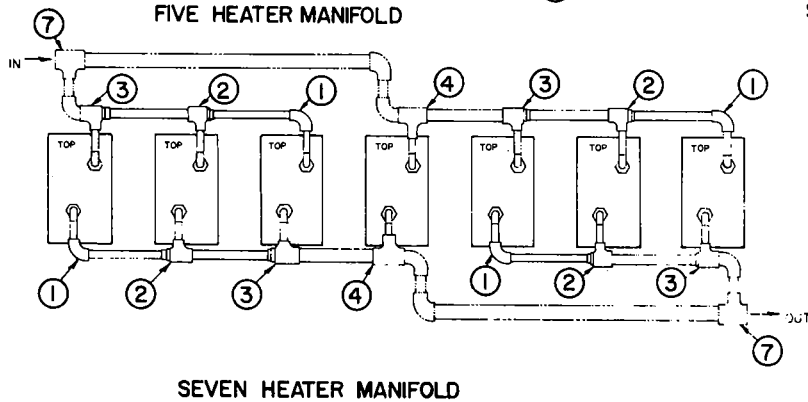
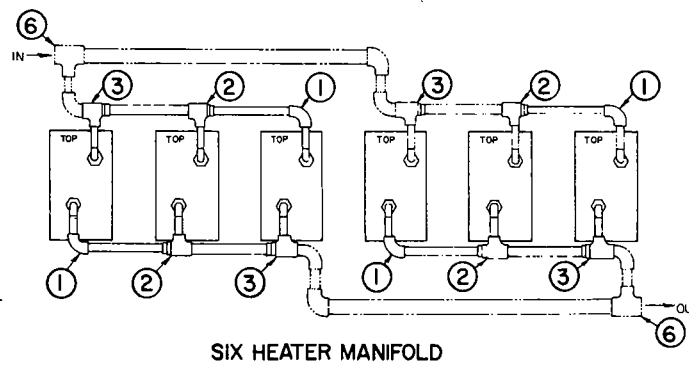
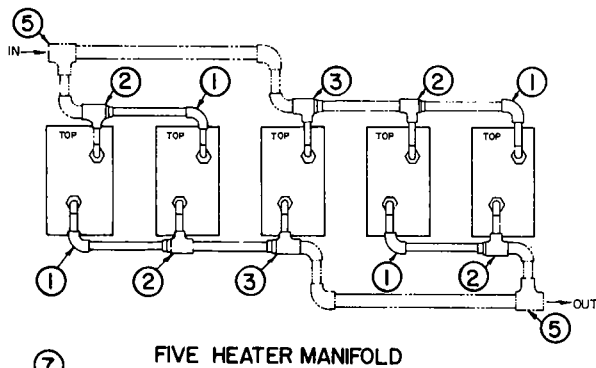


Fig. 26



NOTE:
IT IS IMPORTANT THAT WATER HEATERS
BE CENTRALLY LOCATED IN BOILER.



FITTINGS	
1	$\frac{3}{4}$ COPPER ELBOW
2	$1 \times \frac{3}{4} \times \frac{3}{4}$ COPPER TEE
3	$1\frac{1}{2} \times 1 \times \frac{3}{4}$ COPPER TEE
4	$1\frac{1}{2} \times 1\frac{1}{4} \times \frac{3}{4}$ COPPER TEE
5	$1\frac{1}{2} \times 1\frac{1}{4} \times 1$ COPPER TEE
6	$1\frac{1}{2} \times 1\frac{1}{4} \times 1\frac{1}{4}$ COPPER TEE
7	$2 \times 1\frac{1}{4} \times 1\frac{1}{4}$ COPPER TEE
8	$2 \times 1\frac{1}{2} \times 1\frac{1}{4}$ COPPER TEE
9	$\frac{3}{4}$ MALE ADAPTER

**MINIMUM PIPING RECOMMENDATION FOR PF-5
TANKLESS WATER HEATER MANIFOLDS**

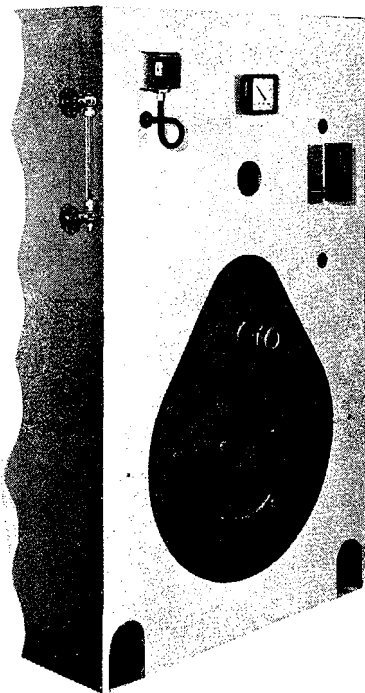
Fig. 27

TANKLESS WATER HEATER RATINGS *
(Steam and Water)

BOILER MODEL NUMBER	NUMBER OF #548 HEATERS INSTALLED							
	1	2	3	4	5	6	7	8
PF-504	8							
PF-505	8	16						
PF-506	8	16						
PF-507	8	16	24					
PF-508	8	16	24					
PF-509	8	16	24	32				
PF-510	8	16	24	32				
PF-511	8	16	24	32				
PF-512	8	16	24	32	40			
PF-513	8	16	24	32	40			
PF-514	8	16	24	32	40			
PF-515	8	16	24	32	40	48		
PF-516	8	16	24	32	40	48		
PF-517	8	16	24	32	40	48		
PF-518	8	16	24	32	40	48	56	
PF-519	8	16	24	32	40	48	56	
PF-520	8	16	24	32	40	48	56	64
PF-521	8	16	24	32	40	48	56	64

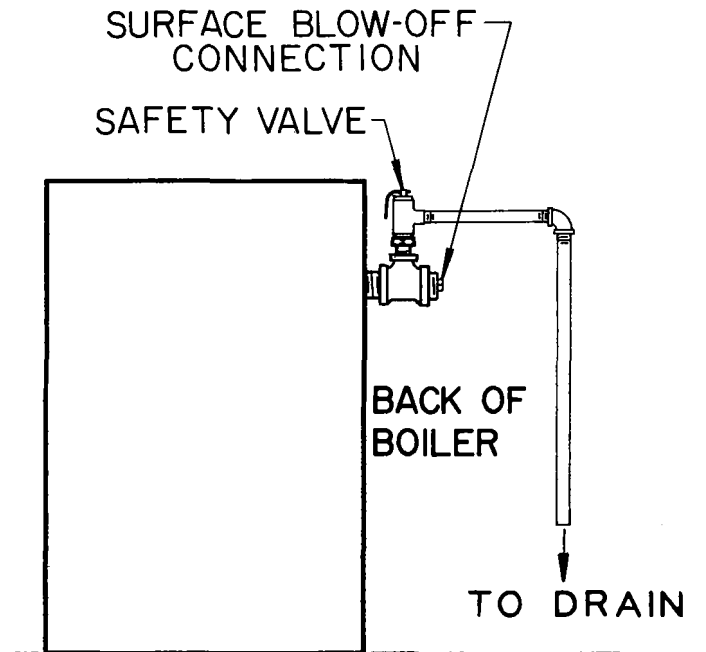
* Ratings are given in gallons per minute continuous flow of water heated from 40°F to 140°F with 200°F boiler water.

TABLE II



STEAM BOILER – FRONT VIEW

Fig. 28



STEAM BOILER - SAFETY VALVE HOOK-UP

Fig. 29

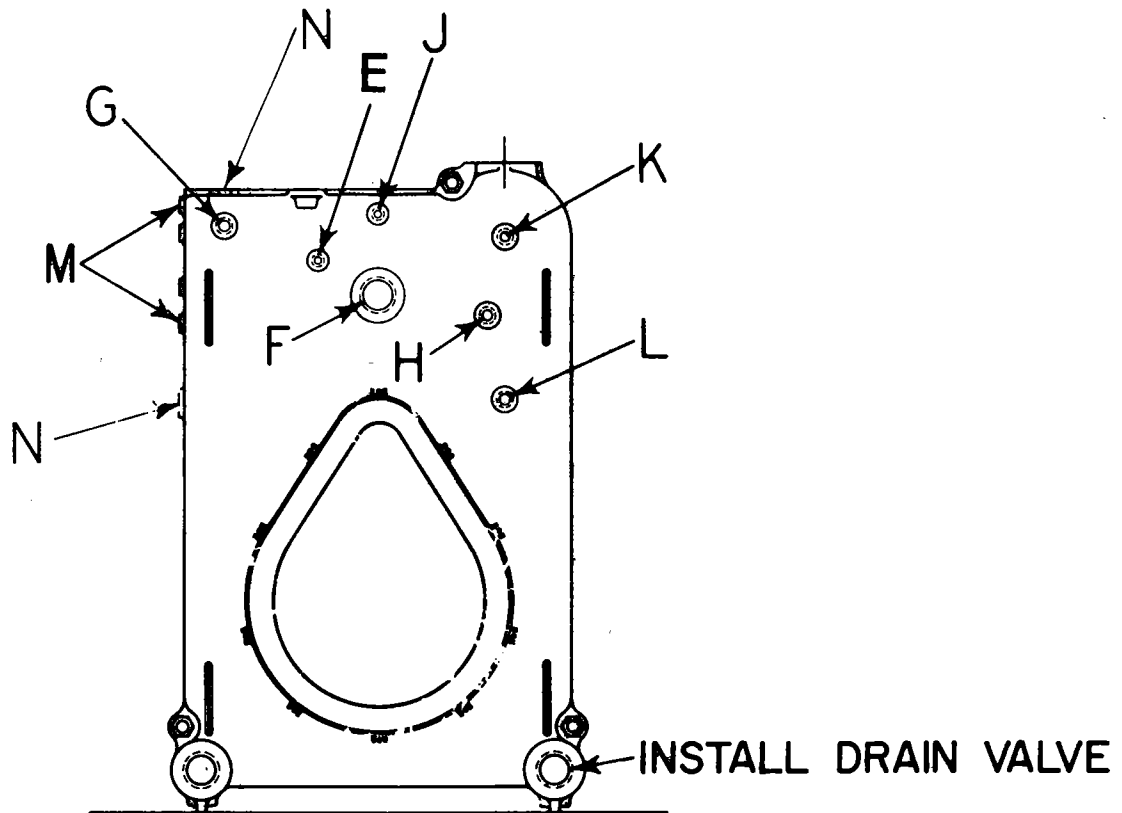


Fig. 30

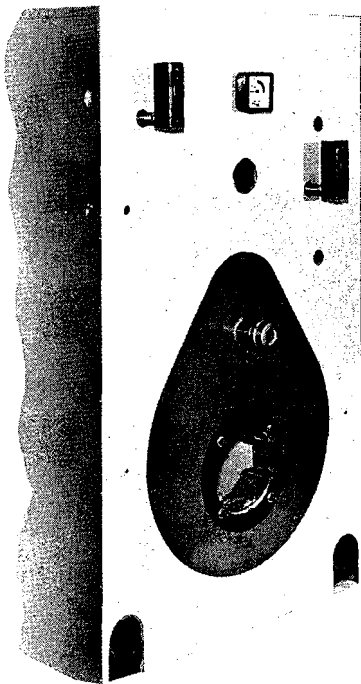
CONTROL APPLICATIONS			
LOCATION	SIZE OF TAPPINGS	STEAM	WATER
E	3/4	PROBE TYPE LOW WATER CUT-OFF	NOT USED
F	3	LOW WATER CUT-OFF	NOT USED
G	3/4	PRESSURE LIMIT CONTROL	TEMPERATURE LIMIT CONTROL
H	3/4	OPERATING CONT. TANKLESS HEATER	OPERATING CONT. TANKLESS HEATER
J	1/2	PRESSURE GAGE	COMB. ALTITUDE GAUGE & THERMOMETER
K	3/4	NOT USED	NOT USED
L	3/4	NOT USED	REVERSE ACTING CONTROL
M	1/2	GAGE GLASS	NOT USED
N	1	LOW WATER CUT - OFF	NOT USED

NOTE: — 3" TAPPING ON BACK SECTION. SAFETY VALVE PIPED IN CONNECTION WITH BLOW OFF ON STEAM BOILERS - SEE FIG. 29. TAPPING USED FOR CONNECTING SAFETY RELIEF VALVE ON WATER BOILERS - SEE FIG. 32.

13 WATER BOILERS - INSTALL WATER TRIM

Items for water trim are located in the water trim carton (except for the separately ordered low water cutoff.) Figure 30 shows the proper tappings for each item. Figure 31 shows front view of an assembled water boiler.

- A. Install the temperature pressure gauge.
- B. Install the low water cutoff.
- C. Install the immersion well and mount the aquastat onto the well.
- D. Install the $\frac{3}{4}$ " drain cock using the 3" NPT x $\frac{3}{4}$ " FPT hex bushing.
- E. Install the pressure relief valve as shown in Figure 32.
- F. Plug extra tappings.

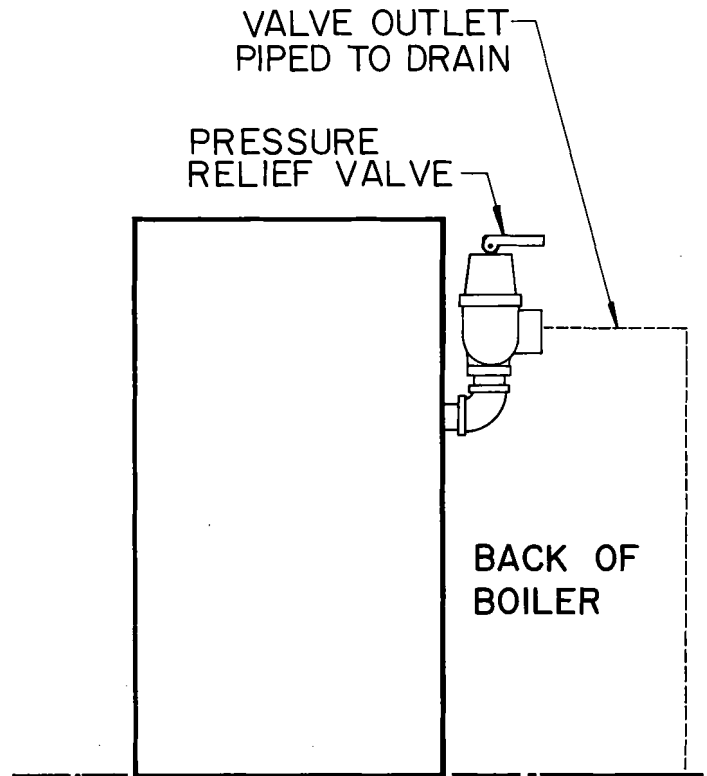


WATER BOILER - FRONT VIEW

Fig. 31

14 BURNER INSTALLATION

Refer to burner manufacturer's installation manual and, for Carlin burners, Burnham™ Form #52003 for proper installation, fuel piping, wiring, burner adjustment and service instructions. If necessary, use a hacksaw blade or knife to cut hole to the proper size in the burner plate insulation for receipt of burner air tube.



**WATER BOILER
PRESSURE SAFETY RELIEF VALVE HOOK-UP**

Fig. 32

SECTION IV - OPERATING INSTRUCTIONS

① ALWAYS INSPECT INSTALLATION BEFORE STARTING BURNER.

② FILL HEATING SYSTEM WITH WATER.

A. STEAM BOILERS - Fill boiler to normal water line. As shown in Figure 1, the normal water line is 46 $\frac{1}{4}$ " from the floor. At the start of each heating season and once or twice during the season try SAFETY VALVE to be sure it is in working condition. To do this, fasten wire or cord to lever of valve and pull lever -- standing safe distance away from valve.

B. HOT WATER BOILERS.

In a hot water heating system, the boiler and entire system (other than the expansion tank) must be full of water for satisfactory operation. Water should be added to the system until the boiler pressure gauge registers normal system design operating pressure. To insure that the system is full, water should come out of all air vents when opened.

WARNING

ON A HOT WATER SYSTEM THE PRESSURE MUST NOT EXCEED 50 POUNDS UNLESS THE BOILER IS EQUIPPED ESPECIALLY FOR 70 LBS. MAXIMUM WORKING PRESSURE. IF BOILER PRESSURE EXCEEDS PRESSURE SETTING OF SAFETY RELIEF VALVE, IT MUST BE RELIEVED IMMEDIATELY AND THE CAUSE OF RELIEF VALVE FAILURE INVESTIGATED AND CORRECTED. EXCESS PRESSURE IS DANGEROUS, IN ADDITION, COULD CAUSE DAMAGE TO HEATING SYSTEM.

DO NOT draw water from boiler while in use. When adding water while boiler is in operation, do not open supply valve fully but add water slowly.

③ SET CONTROLS with burner service switch turned "OFF".

④ ADJUST BURNER according to the burner manufacturer's specifications and, for Carlin Burners, according to Burnham™ Form #52003.

⑤ TEST CONTROLS

WARNING

Before Installation of the boiler is considered complete the operation of the boiler controls should be checked, particularly the low water cutoff and the high limit control.

A. CHECK OPERATING CONTROL OPERATION. Raise and lower operating control setting as required to start and stop burner.

B. WARNING — CHECK HIGH LIMIT CONTROL — Jumper Operating Control Terminals. Allow burner to operate until shutdown by limit. Installation is not considered complete until this check has been made. REMOVE JUMPER.

C. CHECK LOW WATER CUTOFF control with water level at normal water line (see Figure 1). Raise operating control setting to allow burner to operate. Open boiler drain to allow water level to drop to bottom of sight glass until burner operation is shut down by low water cutoff.

Close boiler drain and refill to normal water line. Burner should automatically restart during fill. Reset operating control.

IMPORTANT

PROBE AND FLOAT TYPE LOW WATER CUTOFF DEVICES REQUIRE ANNUAL INSPECTION AND MAINTENANCE. Refer to step ④ of Service Instructions for proper cleaning instructions.

D. CHECK OPERATING CONTROL on boiler equipped with tankless heaters. With burner off, draw hot water until burner starts, then turn off hot water and check burner shutdown.

⑥ CLEANING A NEW STEAM BOILER

Oil, greases & sediments which accumulate in a new boiler and piping must be removed from the system in order to prevent an unsteady water line and carry over of the water into the supply main above boiler. Operate the boiler with steam in the entire system for a few days allowing the condensate to return to the boiler. If the condensate can temporarily be wasted, operate boiler only for the length of time it takes for condensate to run clear. If the latter cannot be achieved or if the condensate is returned to the boiler, boil out the boiler using the SURFACE BLOWOFF connection. See Figure 29.

A. Drain boiler until water is just visible in gauge glass. Run temporarily 1 $\frac{1}{2}$ " pipe line from the surface blow-off connection to an open drain or some other location where hot water may be discharged safely. Do not install valve in this line.

B. NOTICE

Certain state and local codes may restrict the use of some of the chemicals listed for cleaning and maintaining the boiler. Check with local authorities before proceeding to use these chemicals.

Drain about 5 gallons of hot water from boiler into a container and dissolve into it 1 pound of caustic soda and 1 pound of trisodium phosphate for each 50 gallons of boiler water. See Table 3. Remove safety valve and add solution to boiler water thru exposed tapping.

CAUTION

Use extreme care in handling these chemicals. Caustic Soda is harmful to skin, clothing, and eyes. Do not permit the dry material or the concentrated solution to come into contact with skin or clothing.

QUANTITY CLEANING SOLUTION

BOILER NO.	WATER CAPACITY TO WATER LINE	CAUSTIC SODA	TRISODIUM PHOSPHATE
	GALS.	LBS.	LBS.
PF-504	58	1.2	1.2
PF-505	69	1.4	1.4
PF-506	81	1.6	1.6
PF-507	92	1.8	1.8
PF-508	104	2.1	2.1
PF-509	115	2.3	2.3
PF-510	126	2.5	2.5
PF-511	138	2.8	2.8
PF-512	149	3.0	3.0
PF-513	161	3.2	3.2
PF-514	172	3.4	3.4
PF-515	184	3.7	3.7
PF-516	195	3.9	3.9
PF-517	207	4.1	4.1
PF-518	218	4.4	4.4
PF-519	230	4.6	4.6
PF-520	241	4.8	4.8
PF-521	253	5.1	5.1

Maintain 95% Sodium Chromate and 5% Sodium Borate water treatment compound at the following concentration after boiler is cleaned:

Steam Boilers — 2 lb. per 100 gallons of boiler water

Hotwater Boilers — 1 lb. per 1400 gallons of heating system water

NOTE - THE USE OF THESE CHEMICALS MAY BE RESTRICTED IN SOME AREAS.

TABLE III

- C. Start burner and operate sufficiently to boil the water without producing steam pressure. Boil for about 5 hours. Open boiler feed pipe sufficiently to permit a steady trickle of water from the surface blowoff pipe. Continue this slow boiling and trickle of overflow for several hours until the water coming from the overflow is clear.
- D. Stop burner and drain boiler in a manner and to a location that hot water can be discharged with safety.
- E. Refill boiler to normal water line. If water in gauge glass does not appear to be clear, repeat steps A thru C, and boil out the boiler for a longer time.
- F. Remove temporary surface blowoff piping, plug tapping and reinstall safety valve. Boil or bring water temperature to 180°F promptly in order to drive off the dissolved gases in the fresh water.
- G. If unsteady water line, foaming or priming persist, install gate valve in Hartford Loop and drain valves in return main and at boiler and proceed as follows:
 - 1. Connect hoses from drain cocks to floor drain. Close gate valve in Hartford Loop and open drain cock in return main. Fill boiler to normal water level, turn on oil burner and operate boiler at this water level for at least 30 minutes after the condensate begins to run hot, then turn off burner. Close all radiator valves. Remove all supply main air valves and plug the openings in supply main.
 - 2. Draw about 5 gallons of hot water from boiler into a container and dissolve into it the quantities of caustic soda and trisodium phosphate shown in Table 3. Remove safety valve from boiler and pour this solution into boiler, then reinstall safety valve.
 - 3. Turn on burner and keep operating while feeding water to boiler slowly. This will raise water level in boiler slowly so that water will be boiling hot and will rise slowly into supply main and back through return main, flowing from drain hose at about 180°F. Continue until water runs clear from drain hose for at least 30 minutes.
 - 4. Stop feeding water to boiler but continue operating burner until excess water in boiler flows out through supply main and water lowers (by steaming) until it reaches normal level in boiler. Turn off burner. Drain boiler. Open all radiator valves. Reinstall all supply main air valves. Open gate valve in Hartford Loop.
 - 5. When boiler has cooled down sufficiently (crown-sheet of sections are not too hot to touch), close the drain cocks at boiler and in return main and feed water slowly up to normal level in boiler. Turn on burner and allow boiler to steam for 10 minutes then turn off burner. Draw off one quart of water from bottom gauge glass fitting and discard. Draw off another quart sample and if this sample is not clear, repeat the cycle of draining the boiler and return main and refilling the boiler until sample is clear.
 - 6. If the boiler water becomes dirty again at a later date due to additional sediment loosened up in the piping, close gate valve in Hartford Loop, open drain cock in return main, turn on burner and allow condensate to flow to drain until it has run clear for at least 30 minutes while feeding water to boiler so as to maintain normal water level. Turn off burner, drain boiler, open gate valve in Hartford Loop, then repeat step 1 above.

7 CLEANING A WATER BOILER

The oil and grease which accumulate in a new hot water boiler can be washed out in the following manner.

- A. Remove safety relief valve using extreme care to avoid damaging it.

B. NOTICE

Certain state and local codes may restrict the use of some of the chemicals listed for cleaning and maintaining the boiler. Check with local authorities before proceeding to use these chemicals.

Partially fill boiler and add caustic soda or trisodium phosphate to the boiler water at the rate of 1 lb. of either chemical per 50 gallons of total water in the system. See Table 3.

- C. Reinstall safety relief valve.
- D. Fill the entire system with water.
- E. Start firing the boiler.
- F. Circulate the water through the entire system.
- G. Vent the system, including the radiation.
- H. Allow boiler water to reach operating temperature, if possible.
- I. Continue to circulate the water for a few hours.
- J. Stop firing the boiler.
- K. Drain the system in a manner and to a location that hot water can be discharged with safety.
- L. Remove plugs from all available returns and wash the water side of the boiler as thoroughly as possible, using a high-pressure water stream.
- M. Refill the system with fresh water.

8 BOILER WATER TREATMENT

NOTICE

Certain state and local codes may restrict the use of some of the chemicals listed for cleaning and maintaining the boiler. Check with local authorities before proceeding to use these chemicals.

Add boiler water treatment compound as needed. A chromate boiler water treatment compound consisting of 95% sodium chromate and 5% sodium borate has been tested and found reliable. These tests have shown that the material, when used and maintained at the concentrations listed below, is effective in controlling and arresting corrosion. These chemicals may be purchased from any reliable chemical company.

- A. Low pressure steam boilers, such as the PF-5 Series should be maintained with a chromate concentration of 2 lb./100 gal. (see Table 3) of boiler water (2200 ppm). This concentration will be effective where all or practically all of the condensate is returned to the boilers.

B. Hot Water Boilers.

The use of chromate boiler water treatment compound in a water boiler involves considerations. Too high a concentration must be avoided as it may damage pump seals. Therefore, with a lower level of protection, it is necessary to take even greater precautions to keep free oxygen out of the system. Free oxygen can enter from system leaks, faulty vents, or vents improperly located with regard to pumps and from makeup water.

Hot water heating boilers should be maintained with a chromate concentration of 1 lb./1400 gal. of boiler water. See Table 3.

9 Make pH or Alkalinity Test.

After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done by drawing a small sample of boiler water and testing with hydrion paper which is used in the same manner as litmus paper, except it gives specific readings. A small color chart on the side of the small hydrion dispenser gives the reading in pH. Hydrion paper is inexpensive and obtainable from any chemical supply house or through your local druggist. The pH should be higher than 7, but lower than 11. Add some of the washout chemical (caustic soda), if necessary, to bring the pH within the specified range.

10 IMPORTANT

If, during normal operation, it is necessary to add water to this boiler more frequently than once a month consult a qualified service technician to check your system for leaks. A leaky system will increase the volume of make-up water supplied to the boiler which can significantly shorten the life of the boiler. Entrained in make-up water are dissolved minerals and oxygen. When the fresh, cool make-up water is heated in the boiler the minerals fall out as sediment and the oxygen escapes as a gas. Both can result in reduced boiler life. The accumulation of sediment can eventually isolate the water from contacting the cast iron. When this happens the cast iron in that area gets extremely hot and eventually cracks. The presence of free oxygen in the boiler creates a corrosive atmosphere which, if the concentration becomes high enough, can corrode the cast iron through from the inside. Since neither of these failure types are the result of a casting defect the warranty does not apply. Clearly it is in everyone's best interest to prevent this type of failure. The maintenance of system integrity is the best method to achieve this.

SECTION V - SERVICE INSTRUCTIONS

① **IMPORTANT** - See Item ⑩ under Operating Instructions if it becomes necessary to add water to the boiler more frequently than once a month.

② **GENERAL** - Inspection should be conducted annually. Service as frequently as specified in paragraphs below. While service or maintenance is being done, electrical power to the boiler must be "off".

③ **CLEAN THE BOILER HEATING SURFACES AND FLUE** at least once each year, preferably at the end of the heating season.

A. **CLEAN THE VENT SYSTEM** - Vent system should be checked annually for:

1. Obstructions.
2. Accumulations of soot.
3. Deterioration of vent pipe or vent accessories due to condensation or other reasons.
4. Proper support - no sags, particularly in horizontal runs.
5. Tightness of joints.

Remove all accumulations of soot with wire brush and vacuum. Remove all obstructions. Replace all deteriorated parts and support properly. Seal all joints.

B. **CLEAN THE BOILER FLUEWAYS**

1. Remove the smokepipe.
2. Remove the jacket top and left side panels.
3. Remove the canopy being careful not to damage the cerafelt gasket.
4. Loosen nuts securing the flue cleanout plates and remove the plates. The insulation should be removed with the plates taking care not to damage the insulation.
5. Using a 1¼" diameter wire or fibre bristle brush (36" handle) clean the flueways. Brush from the top and side using horizontal and diagonal strokes for best results.

C. **CLEAN TOP OF BOILER SECTIONS.**

Brush and vacuum the tops of the boiler sections.

D. **CLEAN THE FIREBOX**

1. Disconnect fuel line(s) and remove burner and burner mounting plate.
2. Using wire or fibre bristle brush clean crown of boiler and inside of water legs.

E. **REASSEMBLE BOILER**

1. Install the canopy taking care to align the cerafelt strips. If strips are damaged replace as needed.
2. Reinstall burner mounting plate to front section making sure Flextex rope gasket is in place and forms gas tight seal. If gasket is damaged, replace.
3. Bolt burner to burner mounting plate. Inspect gasket to assure adequate seal. Replace if damaged. Connect oil line(s) and/or gas line(s).
4. Reinstall flue plates making sure gasket on each plate is in place and forms gas tight seal. If damaged, all edges of the cleanout plates should be sealed with Silastic sealant when reinstalled until insulation can be replaced.

5. Reinstall jacket top and left side panels.
6. Reinstall smokepipe.

④ **MAINTENANCE OF LOW WATER CUTOFF DEVICES**

IMPORTANT

PROBE AND FLOAT TYPE LOW WATER CUTOFF DEVICES REQUIRE ANNUAL INSPECTION AND MAINTENANCE.

A. **PROBE TYPE LOW WATER CUTOFF**

Although these devices are solid state in the operation, the probe is exposed to possible contamination in the boiler water and subject to fouling.

It is important to physically remove the probe from the boiler tapping annually and inspect that probe for accumulation of scale or sediment.

Follow these steps to inspect, clean and/or replace the probe:

1. Turn off electric service to the boiler.
2. Drain boiler water to a level below the tapping for the probe.
3. Disconnect wiring connections between the low water cutoff control and the probe.
4. Dismount the low water cutoff control from the probe.
5. Unscrew the probe from the boiler tapping.
6. Inspect that portion of the probe that is exposed to the boiler water for a scale or sediment buildup.
7. Light deposits may be removed by wiping the probe with a damp cloth. Wiping the probe with a cloth soaked in vinegar will remove more tenacious lime deposits. The most stubborn deposits may be removed from the probe by using a diluted amount (3 part of water to 1 part) of phosphoric acid (H_2PO_4).

CAUTION

Exercise caution when handling phosphoric acid and follow the instruction label on its container.

8. Wire brushing of the probe is not recommended as the soft platinum guard ring sandwiched between the ceramic insulators may be damaged. Care must be taken not to damage this ring in any way or the useful life of the probe may be shortened.
9. Clean the pipe threads of the probe to remove old, hardened pipe dope and other foreign matter.
10. Apply a moderate amount of good quality pipe dope to the pipe threads on the probe, leaving the two end threads bare. Do not use PTFE (Teflon) tape.
11. Screw the probe into the boiler tapping.
12. Mount the low water cutoff control on the probe.
13. Reconnect the control to probe wiring.
14. Fill the boiler to its normal waterline.
15. Add boiler water treatment compound as needed (see Table 3).
16. Restore electric service to the boiler.
17. Fire burner to bring the water in the boiler to a boil to drive off free oxygen.

18. **WARNING - BEFORE RETURNING BOILER TO SERVICE:** Follow the low water cutoff check out procedure on page 29.

B. FLOAT TYPE LOW WATER CUTOFF

During the heating season, if an external low water cutoff is on the boiler, the blow off valve should be opened once a month (use greater frequency where conditions warrant), to flush out the sediment chamber so the device will be free to function properly.

Low water cutoffs and water feeders should be dismantled annually by qualified personnel, to the extent necessary to insure freedom from obstructions and proper functioning of the working parts. Inspect connecting lines to boiler for accumulation of mud, scale, etc., and clean as required. Examine all visible wiring for brittle or worn insulation and make sure electrical contacts are clean and that they function properly. Give special attention to solder joints on bellows and float when this type of control is used. Check float for evidence of collapse and check mercury bulb (where applicable) for mercury separation or discoloration. **DO NOT ATTEMPT TO REPAIR MECHANISMS IN THE FIELD.** Complete replacement mechanisms, including necessary gaskets and installation instructions, are available from the manufacturer.

5 Check burner and controls at least once a year. See Item **5** under Operating Instructions for control checks. See Burner Manual for burner tests and adjustments.

6 **LUBRICATE BOILER COMPONENTS** according to manufacturer's instructions. Generally, this involves the oil burner and circulator. This includes the type of lubricant to use, frequency of lubrication, and points to lubricate.

7 **GENERAL MAINTENANCE CONSIDERATIONS**

- A. Keep radiators and convectors clean.
- B. 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.
- C. 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.
- D. Where an expansion tank is used, make sure that neither the tank nor its drain pipe is exposed to freezing temperatures. Never place valves in piping leading to or from expansion tank.
- E. Boiler and system cleaning will help assure trouble free operation. See Item **6** under Operating Instructions for procedure.

8 **ATTENTION TO BOILER WHILE NOT IN OPERATION**

- A. **IMPORTANT**
IF BOILER IS NOT USED DURING WINTER TIME, IT MUST BE FULLY DRAINED TO PREVENT FREEZE DAMAGE.
- B. Spray inside surfaces with light lubricating or crankcase oil using gun with extended stem so as to reach all corners.
- C. With steam boilers, at end of season add sufficient water to fill boiler to top of water column and leave it that way until fall when water should be drained again to proper level. If at this time boiler water is dirty, drain water, flush out boiler, and refill with clean water to prescribed water level.

SECTION VI REPAIR PARTS

All Repair Parts can be ordered through the nearest Burnham Regional Sales Office or Manufacturer's Representative for delivery from Lancaster.

These offices can advise as to the availability of their products and repair parts from a more local source.

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- | | |
|--|---|
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California	A	Washington Counties	B
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Connecticut	B	All other Counties	C
Delaware	D	North Carolina	A
Florida	A	North Dakota	A
Georgia	A	Ohio	
Hawaii	A	Athens, Belmont, Gallia, Jefferson, Lawrence,	
Idaho	A	Meigs, Monroe, Washington Counties	D
Illinois	A	All other Counties	A
Indiana	A	Oklahoma	A
Iowa	A	Oregon	A
Kansas	A	Pennsylvania	D
Kentucky	A	Rhode Island	B
Louisiana	A	South Carolina	A
Maine	B	South Dakota	A
Maryland	D	Tennessee	A
Massachusetts	B	Texas	A
Michigan	A	Utah	A
Minnesota	A	Vermont	B
Mississippi	A	Virginia	
Missouri	A	Arlington, Accomack, Clarke, Fairfax,	
Montana	A	Frederick, Fauquier, Loudoun,	
Nebraska	A	Northampton, Prince William Counties	D
Nevada	A	All other Counties	A
New Hampshire	B	Washington	A
New Jersey		Washington, D.C.	D
Mercer County	D	West Virginia	D
All other Counties	C	Wisconsin	A
		Wyoming	A
		Canada	A

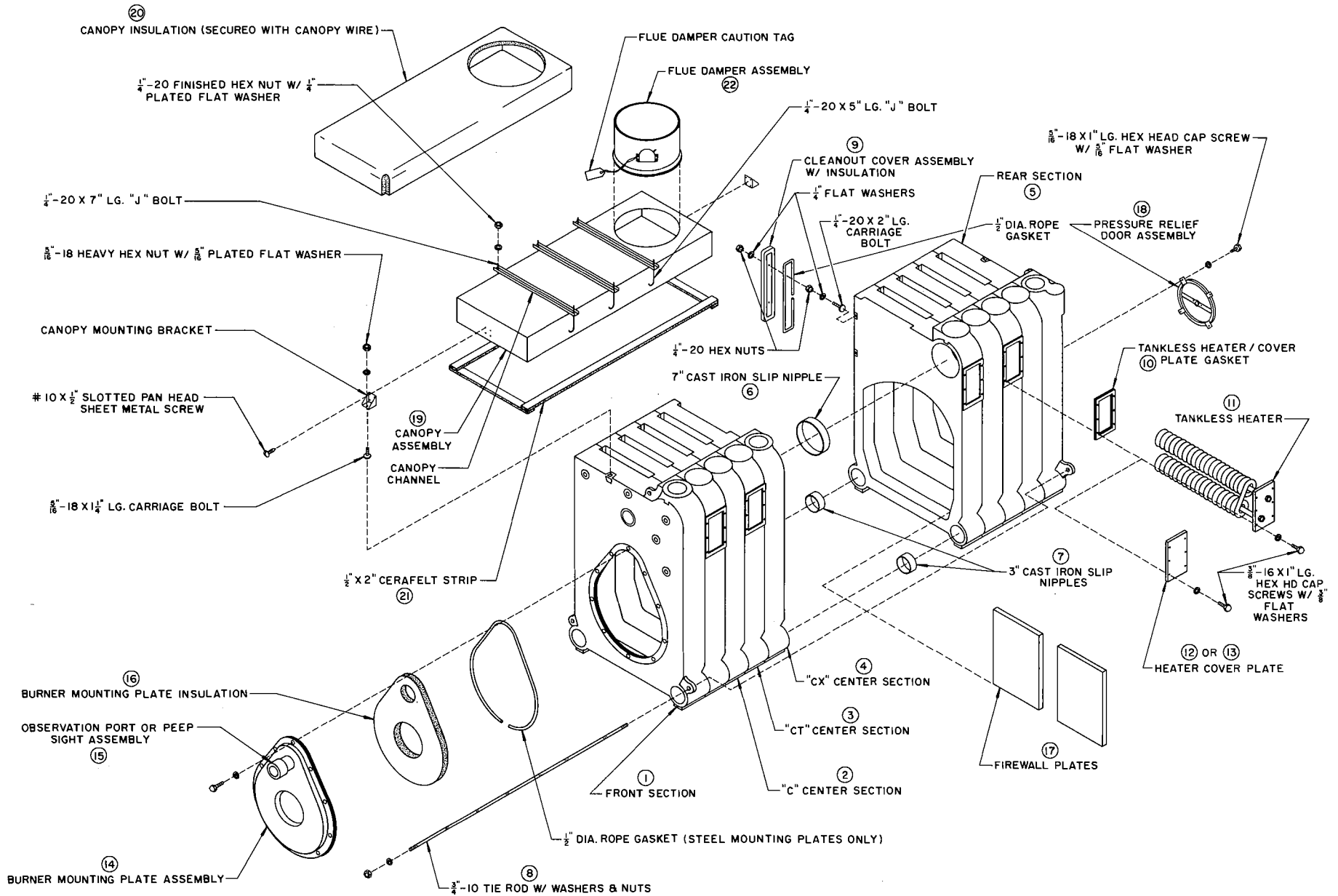


Fig. 33

REPAIR PARTS FOR BARE BOILER ASSEMBLY

ITEM NO.	DESCRIPTION	PART NO.	BOILER SIZE/QUANTITY																		
			504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	
1	Front Section	6172501	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	"C" Center Section	7172503	2	3	4	5	6	7	7	8	9	10	10	11	12	13	13	14	15	16	
3	Optional - "CT" Center, I.L.O. "C" - Max. # (Center Section with Tankless Heater)		1	2	2	3	3	4	4	4	5	5	5	6	6	6	7	7	8	8	
4	"CX" Center Section (with 3" Supply Tapping)	7172505	—	—	—	—	—	—	1	1	1	1	2	2	2	2	3	3	3	3	
5	Rear Section	7172502	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	7" Cast Iron Slip Nipple	7066004	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
7	3" Cast Iron Slip Nipple	7066002	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	
8	Tie Rod Sets																				
	Tie Rod Bundle, 26-3/4" LG	60861014	—	—	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	
	Tie Rod Bundle, 37-3/4" LG	60861011	1	1	—	—	—	—	—	—	1	1	—	1	1	—	—	—	—	—	
	Tie Rod Bundle, 49-3/4" LG	60861012	—	—	1	1	—	—	—	1	1	1	—	—	—	1	1	—	—	—	
	Tie Rod Bundle, 67-3/4" LG	60861013	—	—	—	—	1	1	1	—	—	—	1	1	1	1	1	2	2	2	
9	Cleanout Cover Assembly	6112524	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
10	Tankless Htr/Cover Plate Gskt. (1 each "CT" Section)	803250002																			
11	Tankless Htr (1 ea. "CT" Sctn.) OR	6032503																			
12	Blank Heater Cover Plate (1 each "CT" - Steam only) OR	7032501																			
13	Tapped Heater Cover Plate (1 each "CT" - Water only)	7032502																			
14	Burner Mounting Plate Assy. (w/Observation Port Assy. and Mtg. Plate Insulation)																				
	Cast Iron Burner Mounting Plate Assembly for:	60225011																			
	Carlin 301 Burner		1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Carlin 701 Burner		—	1	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Carlin 801 Burner		—	—	—	—	—	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Powerflame C1 Burner		1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	G&P R-6 Burner		1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Steel Mtg. Plate Assy. for:																				
	G&P R-8 Burner	60225021	—	—	—	1	1	1	1	1	1	—	—	—	—	—	—	—	—	—	
	G&P R-10 Burner	60225031	—	—	—	—	—	—	—	—	—	1	1	1	1	1	1	1	1	1	
	Powerflame C2 Burner	60225041	—	—	—	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Powerflame C3 Burner	60225051	—	—	—	—	—	—	—	—	—	—	1	1	1	1	1	1	1	1	
	Carlin 1050 FFD Burner	60225061	—	—	—	—	—	—	—	—	—	—	1	1	1	—	—	—	—	—	
	Carlin 1150 FFD Burner	60225071	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	1	1	
	Webster #JB1 Bur. PF504	6022540	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Webster #JB1 Bnr, PF505-13	6022541	—	1	1	1	1	1	1	1	1	1	—	—	—	—	—	—	—	—	
	Webster #JB2 Burner	6022542	—	—	—	—	—	—	—	—	—	—	1	1	1	1	1	1	1	1	
15A	Observation Port Assy. (Cast Iron Mtg. Plate)																				
	Cover (1 each)	7026004																			
	Shutter (1 each)	7026005																			
	Glass (1 each)	8026032																			
	Shutter Handle (1 each)	8026033																			
	Shutter Spring (1 each)	8026034																			
	Shutter Spring Pin (1 ea.)	8026035																			
	Shutter Handle Knob (1 ea.)	8026036																			
	Outer Gasket (1 each)	8206001																			
	Inner Gasket (1 each)	8206002																			
15B	Peep Sight Assembly (All Steel Mtg. Plates except Webster bnr.)																				
	Pyrex Sight Glass (1 each)	8026082																			
	Sight Glass Gasket (2 each)	8026083																			
	Conduit Bushing (Peep Sight Retainer, 1 each)	806600518																			
15C	Peep Sight, Webster Burner	806600050																			
16	Burner Mtg. Plate Insulation Cast Iron Burner Mtg. Plate Insulation (Carlin 301/ 601/801; Powerflame C1; G&P R-6 and ABC Bnrs.) Steel Mtg. Plate Insulation - Insulation depends on burner used. Contact sales office for repair parts.	8202502																			

BARE BOILER ASSEMBLY (Continued)

ITEM NO.	DESCRIPTION	PART NO.	BOILER SIZE/QUANTITY																	
			504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521
17	Firewall Plates	82025001	1	1	2	2	3	3	4	4	5	5	6	6	6	6	6	6	6	
18	Pressure Relief Door Assembly	6112525	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
19	Canopy Assembly																			
	Canopy Assembly, PF-504	61125042	1																	
	Canopy Assembly, PF-505	61125052		1																
	Canopy Assembly, PF-506	61125062			1															
	Canopy Assembly, PF-507	61125072				1														
	Canopy Assembly, PF-508	61125082					1													
	Canopy Assembly, PF-509	61125092						1												
	Canopy Assembly, PF-510	61125102							1											
	Canopy Assembly, PF-511	61125112								1										
	Canopy Assembly, PF-512	61125122									1									
	Canopy Assembly, PF-513	61125132										1								
	Canopy Assembly, PF-514	61125142											1							
	Canopy Assembly, PF-515	61125152												1						
	Canopy Assembly, PF-516	61125162													1					
	Canopy Assembly, PF-517	61125172														1				
	Canopy Assembly, PF-518	61125182															1			
	Canopy Assembly, PF-519	61125192																1		
	Canopy Assembly, PF-520	61125202																	1	
	Canopy Assembly, PF-521	61125212																		1
20	Canopy Insulation																			
	Canopy Insulation, PF-504	7202504	1																	
	Canopy Insulation, PF-505	7202505		1																
	Canopy Insulation, PF-506	7202506			1															
	Canopy Insulation, PF-507	7202507				1														
	Canopy Insulation, PF-508	7202508					1													
	Canopy Insulation, PF-509	7202509						1												
	Canopy Insulation, PF-510	72025010							1											
	Canopy Insulation, PF-511	72025011								1										
	Canopy Insulation, PF-512	72025012									1									
	Canopy Insulation, PF-513	72025013										1								
	Canopy Insulation, PF-514	72025014											1							
	Canopy Insulation, PF-515	72025015												1						
	Canopy Insulation, PF-516	72025016													1					
	Canopy Insulation, PF-517	72025017														1				
	Canopy Insulation, PF-518	72025018															1			
	Canopy Insulation, PF-519	72025019																1		
	Canopy Insulation, PF-520	72025020																	1	
	Canopy Insulation, PF-521	72025021																		1
21	Cerafelt Gasket																			
	10 Foot Roll	7206013	1	1																
	15 Foot Roll	7206014			1	1	1	1	1											
	25 Foot Roll	9206003								1	1	1	1	1	1	1	1	1	1	1
22	Flue Damper Assembly																			
	Flue Damper Assy., 10" Dia.	61125011	1	1	1	1	1													
	Flue Damper Assy., 14" Dia.	61125021						1	1	1	1	1	1							
	Flue Damper Assy., 18" Dia.	61125031												1	1	1	1	1	1	1

WATER TRIM REPAIR PARTS

Common Parts (Boiler Sizes 504 thru 521)	Quantity	PART NO.
Aquastat Controller, Honeywell L4006A2015	1	80160400
Immersion Well, Honeywell 123871A, 3/4" NPT	1	80160452
Temperature Pressure Gauge, Ametek 144840, 0-100 PSI	1	8056028
Pipe Plug, 1/2" NPT, Square Head, Black	2	806603507
(Gauge Glass Tappings)		
Pipe Plug, 3/4" NPT, Square Head, Black	2	806603512
(Reverse Acting Control Tappings)		
Pipe Plug, 1" NPT, Countersunk, Black	2	806603517
(Low Water Cut-Off Tappings)		
Pipe Plug, 3" NPT, Square Head, Black	2	806603514
(Bottom Washout Tapping and Low Water Cut-Off Tapping)		
Hex Bushing, 3" NPT x 3/4" FPT, Black	1	806600509
(Bottom Drain Tapping)		
Drain Cock, ConBraCo 31-606-01, 3/4" NPT	1	806603001

Specific Parts

	Boiler Size					
	504	506	509	512	519	
	and 505	to 508	to 511	to 518	to 521	
Relief Valves set at 50 PSI:						
ConBraCo 10-303-10, 3/4" NPT x 3/4" NPT	1	—	—	—	—	81660302
ConBraCo 10-214-10, 1" NPT x 1" NPT	—	1	—	—	—	81660330
Watts 740, 1" NPT x 1 1/4" NPT	—	—	1	—	—	81660305
Watts 740, 1 1/4" NPT x 1 1/2" NPT	—	—	—	1	—	81660308
Watts 740, 1 1/2" NPT x 2" NPT	—	—	—	—	1	81660309
Safety Valve Piping:						
Hex Bushing, 3" NPT x 3/4" FPT, Black	1	—	—	—	—	806600509
Hex Bushing, 3" NPT x 1" FPT, Black	—	1	1	—	—	806600559
Hex Bushing, 3" NPT x 1 1/4" FPT, Black	—	—	—	1	—	806600560
Hex Bushing, 3" NPT x 1 1/2" FPT, Black	—	—	—	—	1	806600542
Pipe Nipple, 3/4" NPT x Close, Black	1	—	—	—	—	806600022
Pipe Nipple, 1" NPT x Close, Black	—	1	1	—	—	806600004
Pipe Nipple, 1 1/4" NPT x Close, Black	—	—	—	1	—	806600018
Pipe Nipple, 1 1/2" NPT x Close, Black	—	—	—	—	1	806600008
Street Elbow, 3/4" NPT x 90°, Black	1	—	—	—	—	806601501
Street Elbow, 1" NPT x 90°, Black	—	1	1	—	—	806601514
Street Elbow, 1 1/4" NPT x 90°, Black	—	—	—	1	—	806601516
Street Elbow, 1 1/2" NPT x 90°, Black	—	—	—	—	1	806601517

STEAM TRIM REPAIR PARTS

Common Parts (Boiler Sizes 504 thru 521)	Quantity	PART NO.
Pressuretrol, Honeywell PA404A1009	1	80160300
Water Gauge Set, ConBraCo 20-104-10, w/8 1/2" Lg. glass	1	8056025
Steam Pressure Gauge, Ametek 144350, 3 1/2" Dia.	1	8056022
Syphon, 1/4" x 90° (4 1/2" leg)	1	806603006
(Pressuretrol)		
Extension Adapter, 1/2" NPT x 1/2" FPT	2	806604501
(Water Gauge Set)		
Pipe Nipple, 3" NPT x Close, Black	1	806600039
(Safety Valve)		
Hex Bushing, 3/4" NPT x 1/4" FPT, Black	1	806600508
(Syphon)		
Hex Bushing, 3" NPT x 3/4" FPT, Black	1	806603512
(Bottom Drain Tapping)		
Pipe Plug, 3/4" NPT, Square Head, Black	2	806603512
(Reverse Acting Control Tappings)		
Pipe Plug, 1" NPT, Countersunk, Black	2	806603517
(Low Water Cut-Off Tappings)		
Pipe Plug, 3" NPT, Square Head, Black	1	806603514
(Bottom Washout Tapping)		
Drain Cock, ConBraCo 31-606-01, 3/4" NPT	1	806603001
Lowest Permissible Water Level Plate, Form 1204	1	81460009
Sheet Metal Screw, #8 x 1/2" Lg., Phillips Truss Head, AB Plated	2	80860000

Specific Parts

	504	505 to 507	508 to 511	512 to 514	515 to 520	521	
	Safety Valves set at 15 PSI:						
ConBraCo 13-202-08, 1" NPT x 1" NPT	1	—	—	—	—	—	81660501
ConBraCo 13-213-08, 1 1/4" NPT x 1 1/2" NPT	—	1	—	—	—	—	81660505
ConBraCo 13-214-08, 1 1/2" NPT x 2" NPT	—	—	1	—	—	—	81660503
ConBraCo 12-205-08, 2" NPT x 2" NPT	—	—	—	1	—	—	81660507
ConBraCo 12-206-08, 2 1/2" NPT x 2 1/2" NPT	—	—	—	—	1	—	81660508
ConBraCo 12-208-08 3" NPT x 3" NPT	—	—	—	—	—	1	81660509
Black Tees (For Safety Valve)							
3" NPT x 3" NPT x 1" NPT	1	—	—	—	—	—	806601076
3" NPT x 3" NPT x 1 1/4" NPT	—	1	—	—	—	—	806601077
3" NPT x 3" NPT x 1 1/2" NPT	—	—	1	—	—	—	806601078
3" NPT x 3" NPT x 2" NPT	—	—	—	1	—	—	806601079
3" NPT x 3" NPT x 2 1/2" NPT	—	—	—	—	1	—	806601080
3" NPT	—	—	—	—	—	1	806601064

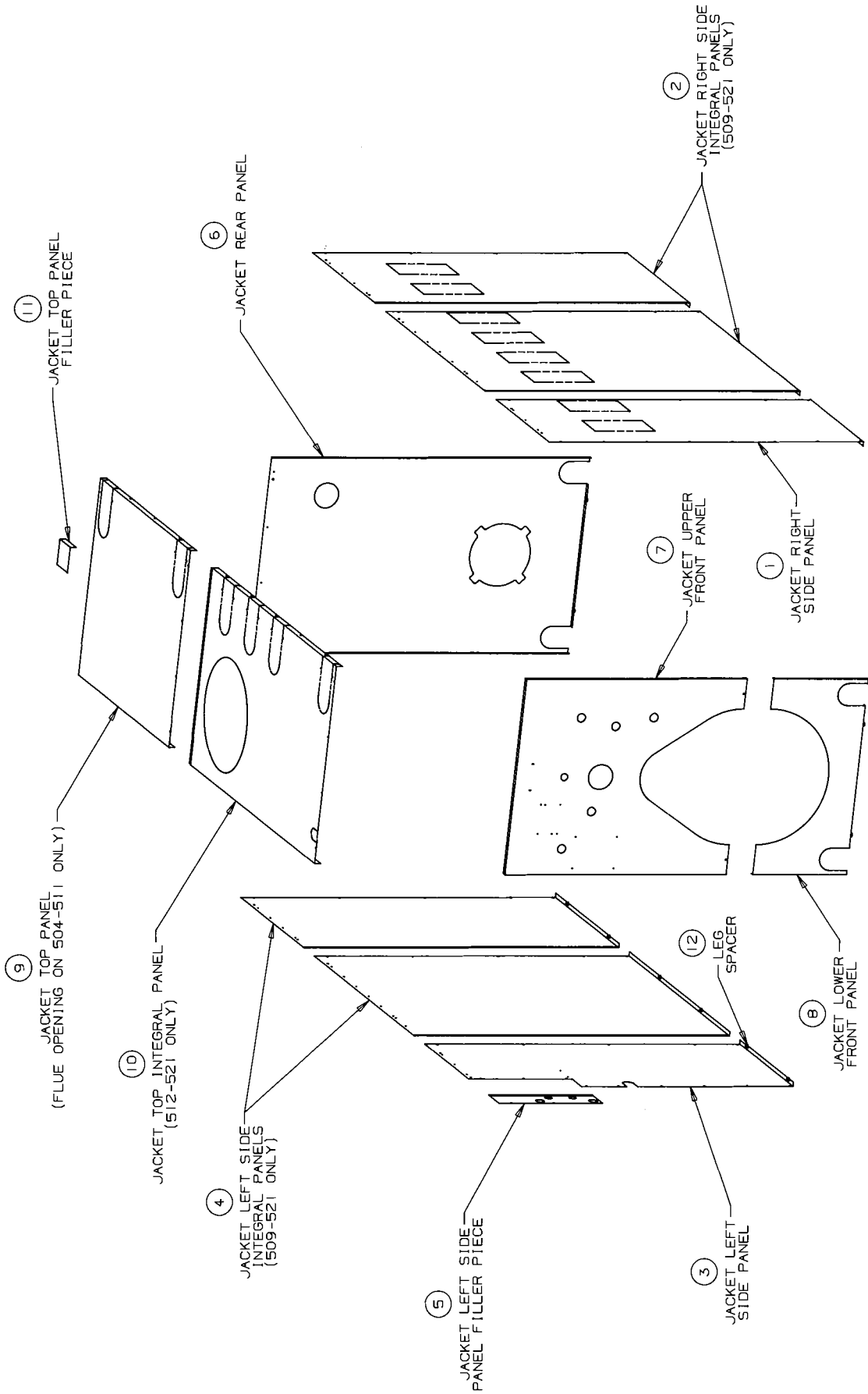


Fig. 34

JACKET REPAIR PARTS

ITEM NO.	DESCRIPTION	PART NO.	BOILER/QUANTITY																		
			504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	
1	Jacket Right Side Panel Sub-Assembly (504-521)																				
	504	60425042	1					1	1	1	1					1	1				
	505	60425052		1																	
	506	60425062			1													1	1	1	
	507	60425072				1															
	508	60425082					1					1	1	1	1						
2	Jacket R.S. Integral Panel Assembly (509-521)																				
	509	60425044						1				1				1		1			
	510	60425054							1				1				1		1		
	511	60425064								1				1						1	
	512	60425074									1				1	1	1	1	1	1	
3	Jacket L.S. Panel Sub-Assembly (504-521)																				
	504	60425043	1					1	1	1	1					1	1				
	505	60425053		1																	
	506	60425063			1													1	1	1	
	507	60425073				1															
	508	60425083					1					1	1	1	1						
4	Jacket L.S. Integral Panel Assembly (509-521)																				
	509	60425045						1				1				1		1			
	510	60425055							1				1				1		1		
	511	60425065								1				1						1	
	512	60425075									1				1	1	1	1	1	1	
5	Jacket L.S. Panel Filler Piece Assembly	6042501	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	Jacket Rear Panel Assembly	6042502	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	Jacket Upper Front Panel Assembly	6042503	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	Jacket Lower Front Panel Assembly	60425221	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	Jacket Top Panel Assembly																				
	504	604250461	1																		
	505	604250561		1																	
	506	604250661			1																
	507	604250761				1															
	508	604250861					1														
	509	604250961						1													
	510	604251061							1												
	511	604251161								1											
	512	604251261									1										
	513	604251361										1									
	514	604251461											1								
	515	604261561												1							
	516	604251661													1						
	517	604251761														1					
	518	604251861															1				
	519	604251961																1			
	520	604252061																	1		
	521	604252161																		1	
10	Jacket Top Integral Panel Assembly (512-521)																				
	512-515	60425231									1	1	1	1							
	516-521	60425241													1	1	1	1	1	1	
11	Jacket Top Panel Filler Piece Assembly	6042525	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	
	Paper Bag Containing:																				
	Sheet Metal Screws																				
	# 8 x 1/2" Lg. Phillips,																				
	Truss Hd, Type AB Plt'd.	80860000	46	46	52	52	52	62	72	72	72	72	78	78	78	78	84	84	84	84	
12	Leg Spacer	806603518	8	8	8	8	8	12	12	12	12	12	12	12	12	12	12	12	12	12	

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Limited Warranty

**SERIES 5B, SERIES 8B, PF-5 SERIES, V-9 SERIES,
FD SERIES, WOODLANDER, DUO-RAD™, AND CAST IRON RADIATION
SAHARA INDIRECT WATER HEATER***

LIMITED WARRANTY - Except as provided below with respect to products or parts not manufactured by Burnham Corporation, Burnham Corporation warrants to the original owner at the original installation site that products manufactured by Burnham, America's Boiler Company comply, at the time of manufacture, with recognized Hydronics industry regulatory agency standards and requirements then in effect and will be free from defects in materials and workmanship for a period of one year after the date of installation.

The remedy for breach of this warranty is expressly limited to the repair or replacement of any part found to be defective under conditions of normal use and does not extend to liability for incidental, special or consequential damages or losses such as loss of the use of the products, inconvenience, loss of time or labor expense involved in repairing or replacing alleged defective product. Burnham Corporation shall have no responsibility for the performance of any product sold by it under conditions varying materially from those under which such product is usually tested under existing industry standards, nor for any damage to the product from abrasion, erosion, corrosion, deterioration or the like due to abnormal temperatures or the influence of foreign matter or energy, nor for the design or operation of any system of which any such product may be made a part or for the suitability of any such product for any particular application.

For products or parts not manufactured by Burnham Corporation, the warranty obligations of Burnham Corporation shall, in all respects, conform and be limited to the warranty actually extended to Burnham Corporation by its vendors.

Warranty service can be obtained by contacting the original installer of the product and providing him with a detailed description of any apparent defect. If this procedure fails to result in satisfactory warranty service, the owner should notify Burnham Corporation, Burnham, America's Boiler Company, P.O. Box 3079, Lancaster, PA 17604. Transportation to a factory or other designated facility for repairs of any products or items alleged defective shall, in all events, be the responsibility and at the cost of the owner.

Notwithstanding any of the above provisions, (1) failures resulting from misuse, improper installation or lack of maintenance are not covered by this warranty, and (2) Burnham Corporation's liability under this warranty shall not exceed the selling price of the product found to be defective.

Equipment furnished by the Buyer, either mounted or unmounted, and when contracted for by the Buyer to be installed or handled is not covered by this warranty. Burnham Corporation does not assume any responsibility in connection with such equipment, operation, warranty, performance, or any other liability connected thereto.

The foregoing provisions of this **WARRANTY** shall be effective to the maximum extent permitted by applicable law, and, to the extent that any such provision would otherwise have an unconscionable result or would otherwise be inconsistent with applicable law, such provision shall be limited in effect to the minimum extent necessary to avoid such unconscionable result or inconsistency with applicable law.

Any implied warranties, including implied warranties of merchantability and fitness for a particular purpose shall, to the extent permitted by applicable law, be limited in duration to a period of one year after the date of installation. To the extent permitted by applicable law, the remedies for breach of any such implied warranty shall be limited to the remedies set forth above with respect to a breach of the express limited warranty provided. With respect to the limitations on implied warranties set forth above, Burnham Corporation hereby notifies each person to whom such warranty is made as follows: Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

 **Burnham**®

AMERICA'S BOILER COMPANY
Burnham Corporation

Lancaster, PA 17604