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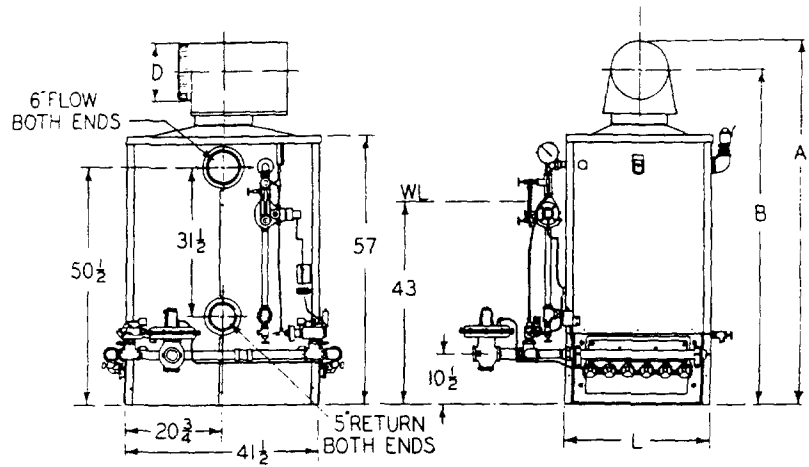
STANDARD BOILERS
by
AMERICAN-Standard
INSTALLATION-OPERATION
AND
MAINTENANCE MANUAL
FOR
TYPE 4G GAS FIRED BOILERS
APPROVED BY AMERICAN GAS ASSOCIATION

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

AMERICAN-Standard
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GENERAL DIMENSIONS

FOR 6 TO 11 SECTION BOILERS

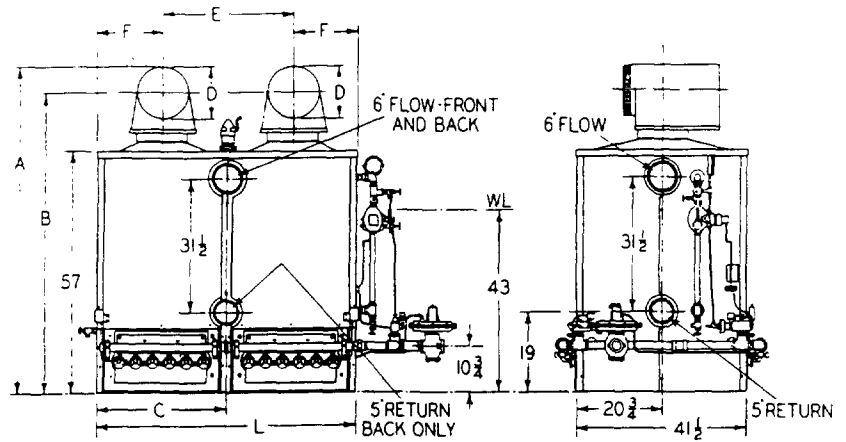


NO. OF BOILER	NO. OF SECTIONS	NO. OF BURNERS	A	B	D	L
4-G-6	6	10	74 7/8	69 3/8	11	27
4-G-7	7	12	76 5/8	70 5/8	12	31
4-G-8	8	14	78 1/8	71 5/8	13	35
4-G-9	9	16	79 7/8	72 7/8	14	39
4-G-10	10	18	81 1/2	74	15	43
4-G-11	11	20	83	75	16	47

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders shown in cut.

GENERAL DIMENSIONS

FOR 13 TO 41 SECTION BOILERS



NO. OF BOILER	NO. OF SECTIONS	NO. OF BURNERS	A	B	C	D	E	F	L
4-G-13	13	24	76 ⁵ / ₈	70 ⁵ / ₈	30 ⁵ / ₈	12	30 ³ / ₄	15 ³ / ₈	81 ¹ / ₄
4-G-15	15	28	78 ¹ / ₈	71 ⁵ / ₈	34 ⁵ / ₈	13	34 ³ / ₄	17 ³ / ₈	89 ¹ / ₄
4-G-17	17	32	79 ¹ / ₈	72 ¹ / ₈	38 ⁵ / ₈	14	38 ³ / ₄	19 ³ / ₈	77 ¹ / ₄
4-G-19	19	36	81 ¹ / ₂	74	42 ⁵ / ₈	15	42 ³ / ₄	21 ³ / ₈	85 ¹ / ₄
4-G-21	21	40	83	75	46 ⁵ / ₈	16	46 ³ / ₄	23 ³ / ₈	93 ¹ / ₄
4-G-22	22	42	78 ¹ / ₈	71 ⁵ / ₈	34 ⁵ / ₈	13	34 ³ / ₄	17 ³ / ₈	103 ¹ / ₂
4-G-25	25	48	79 ¹ / ₈	72 ¹ / ₈	38 ⁵ / ₈	14	38 ³ / ₄	19 ³ / ₈	115 ¹ / ₂
4-G-28	28	54	81 ¹ / ₂	74	42 ⁵ / ₈	15	42 ³ / ₄	21 ³ / ₈	127 ¹ / ₂
4-G-31	31	60	83	75	46 ⁵ / ₈	16	46 ³ / ₄	23 ³ / ₈	139 ¹ / ₂
4-G-33	33	64	79 ¹ / ₈	72 ¹ / ₈	38 ⁵ / ₈	14	38 ³ / ₄	19 ³ / ₈	153 ³ / ₄
4-G-37	37	72	81 ¹ / ₂	74	42 ⁵ / ₈	15	42 ³ / ₄	21 ³ / ₈	169 ³ / ₄
4-G-41	41	80	83	75	46 ⁵ / ₈	16	46 ³ / ₄	23 ³ / ₈	185 ³ / ₄

NOTE Straight Type Spud Holders replace the Angle
Type Spud Holders shown in cut.

ERECTING

CAUTION

On hot water systems, expansion tank should not be installed in cold or exposed place. No valves of any type should be installed in piping between boiler and expansion tank. Sealing system at any time during operation may cause breakage of boiler or radiators.

LOCATION

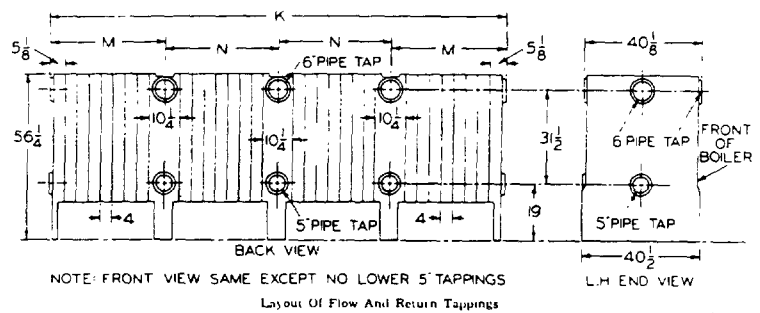
If water condition is encountered in basement, or if it has been necessary to water-proof the basement floor, boiler should be mounted on concrete or hollow tile base at least 3 inches above floor level.

NOTE

All references to Right or Left parts refer to observer's right or left when facing front of boiler. All sections are stenciled with word "Front" and individual numbers "1", "2", "3", etc. indicating the position which each section is to occupy in the boiler.

ASSEMBLY OF SECTIONS

1. Select right end section (less two 1" trim tappings; stenciled No. 1) and place in approximate final position with front of section facing correctly. Support with wood prop. Clean nipples and nipple openings with kerosene or gasoline and apply good lubricating oil. Do not use paint or red lead.



BOILER	K	M	N	NO. OF SECTIONS		
				ENDS	INTER-MEDIATES	CENTERS
A-G-6	28 1/4	—	—	2	0	4
A-G-7	30 1/4	—	—	2	0	5
A-G-8	34 1/4	—	—	2	0	6
A-G-9	38 1/4	—	—	2	0	7
A-G-10	42 1/4	—	—	2	0	8
A-G-11	46 1/4	—	—	2	0	9
A-G-13	60 1/4	30 1/4	—	2	1	10
A-G-15	68 1/4	34 1/4	—	2	1	12
A-G-17	76 1/4	38 1/4	—	2	1	14

BOILER	K	M	N	NO. OF SECTIONS		
				ENDS	INTER-MEDIATES	CENTERS
A-G-19	84 1/4	42 1/4	—	2	1	16
A-G-21	92 1/4	46 1/4	—	2	1	18
A-G-22	102 1/4	38 1/4	34 1/4	2	2	18
A-G-23	114 1/4	38 1/4	38 1/4	2	2	21
A-G-28	128 1/4	42 1/4	42 1/4	2	2	24
A-G-31	138 1/4	46 1/4	46 1/4	2	2	27
A-G-33	150 1/4	38 1/4	38 1/4	2	3	28
A-G-37	168 1/4	42 1/4	42 1/4	2	3	32
A-G-41	185 1/4	46 1/4	46 1/4	2	3	35

2 Drive nipples squarely into end section using block of wood and hammer. Gage nipples in both directions to insure that they are driven squarely and to proper depth in nipple openings. nipple setting gage is provided for this purpose. Cutout in gage should rest on both sides of nipple when legs of gage are touching finished pads on section. Most nipple leaks are caused by tilted or cocked nipples. See Fig 1.

3 Paint ground ribs around outside edge of section only, with red lead.

4 Place center section in position on nipples in end section. Drive sections together with heavy block of wood, striking sections squarely as possible over nipple ports. Assemble sections in numerical order with fronts (stenciled with position number) facing in same direction.

5. For 6 to 11 Section Boilers—Insert one tie rod through each bolt hole above lower nipple ports and one tie rod through upper nipple port. Place assembling block on upper rod and assembling washers on lower rods as shown and place nuts and washers on all rods. See Fig. 2.

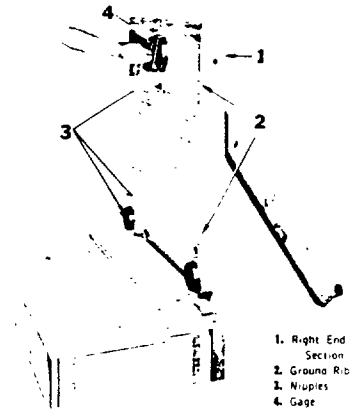


FIG. 1—Gaging Nipple

For 13 to 41 Section Boilers—Use assembling clamps with loose jaws against end section in place of nuts and washers. Place clamps on rods with flat side against section. Insert jaws in blocks with serrated end against rod and draw up on rod from opposite end. Tap jaw lightly to tighten grip on rod. Do not permit jaws to clamp on threads. Place nuts and washers on other end. See Fig 3.

All Sizes—Draw up evenly on nuts until sections make contact at ground joints. Bumping sections with heavy block of wood alternately at nipple ports during drawing up operation will facilitate assembly. Apply oil or grease freely to tie rod threads while assembling sections to prevent stripping of threads on rods.

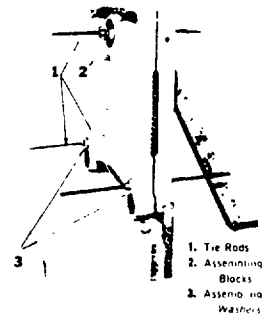


FIG. 2—Assembling Sections

Arrange for suitable blocking under center section. Paint ground rib of each section with red lead and continue assembling center sections ONE AT A TIME. Shift blocking each time so that support is under the last section assembled. See Figs. 1 and 2.

6. For 13 to 41 Section Boilers—Continue to assemble sections until ready for intermediate (thick) section. Bolt two burner support brackets to each side of intermediate base and lengthen tie rods with couplings. Repeat this operation as each intermediate section is assembled. See Fig. 4.

7. All Sizes—Remove upper tie rod and assembling blocks. Remove nuts and washers from lower rods. Place left end section in position and insert tie rods through bolt holes in sections. Draw sections together as in previous operations until all ground joints are tight. Back off all tie rod nuts until they are finger tight only.

TESTING

Before connecting boiler, plug openings, fill boiler with water and subject to not less than 10 lbs. nor more than 30 lbs. pressure. Inspect boiler inside and outside for leakage to insure against breakage from handling and shipping. To safeguard accuracy of gage supplied with boiler do not install gage until after test of boiler. This precaution of testing the boiler will simplify handling of any necessary replacements or adjustments and assist in treating with claims against transportation companies. After test, drain and remove plugs where required.

ASSEMBLY OF PLATEWORK

1. Screw short threaded end of brass studs into tapped bosses in recesses between sections and attach cleanout cover plates to front of boiler. See that asbestos gasket is on each plate and makes gas seal when drawn up tight. See Fig. 5.

Attach filler plates in like manner to back of boiler. Putty openings between plates and sections. Putty outside of sections at joints with boiler putty.

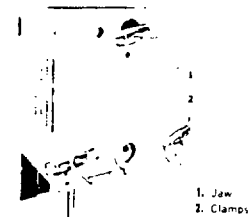


FIG 3—Assembling Clamps

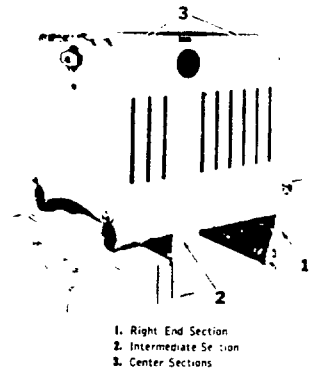


FIG 4—Assembling Larger Boiler

2 Place burner supports in pockets provided on end sections, and in bolted-on supports of intermediate sections on 13 to 41 section boilers. See Fig. 5.

3 Fill grooves on back of burner access door frames with putty and attach frames to sections with hex head screws using washers under heads. Attach manifold brackets to front and back burner access door frames with hex head screws. See Fig. 6.

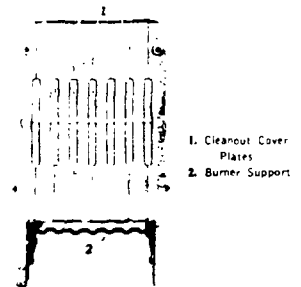
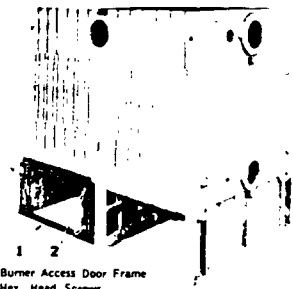


Fig. 5—Section Assemblage

ASSEMBLY OF BURNERS AND CONTROL PIPING

1. Assemble sub-assemblies of manifold, manifold piping, automatic gas valve and gas pressure regulator or automatic pilot valve and attach to boiler. See that orifice spuds in ends of spud holders are screwed in tight and that orifices are drilled to size specified on tag attached to manifold. (See Figs. 7, 8, 9, 10 and 11.)



1. Burner Access Door Frame
2. Hex Head Screws

Fig. 6—Assembling Burner Access Door Frame

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders shown in cut.

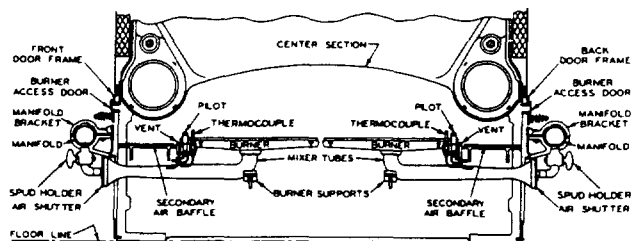


Fig. 7—Burner Installation—Pilot Burner, Thermocouple and Vent Tube

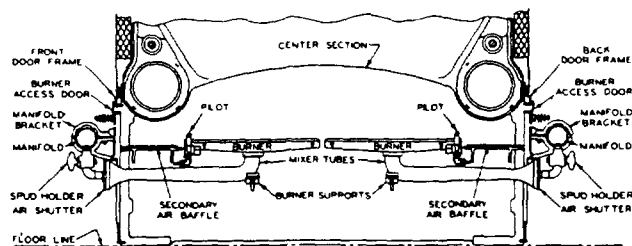
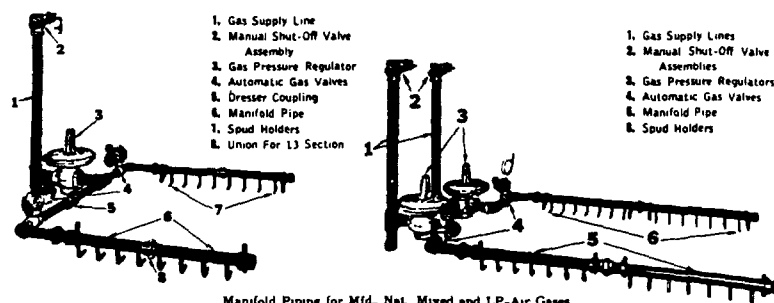


FIG. 8—Burner Installation—Auxiliary Pilot Burner

2. See that air shutter is assembled on each mixer tube, then place mixer tubes firmly on spud holders and burner support. Assemble main burners on tapered ends of mixer tubes so they are straight and level. (See Figs. 7, 8, 12, 13, 14 and 15 for proper burner locations).

3. Place front and back secondary air baffles on lugs on end and intermediate sections. The baffle flanges should be away from burners and turned downward. See Figs. 7 and 8.

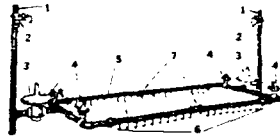


Manifold Piping for Mfd., Nat., Mixed and LP-Air Gases

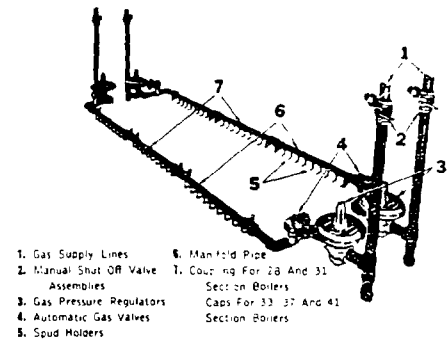
FIG. 9-A—Mfd. and LP-Air (6 through 13 sections) Nat. and Mixed (6 through 11 sections) FIG. 9-B—Mfd. and LP-Air (15 through 17 sections) Nat. and Mixed (13 through 21 sections)

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustrations on this page

- | | |
|-----------------------------------|--|
| 1. Gas Supply Lines | 6. Spud Holders |
| 2. Manual Shut Off Valve Assembly | 7. Caps For 19 And 21 Section Boilers |
| 3. Gas Pressure Regulators | Coupling For 22 And 25 Section Boilers |
| 4. Automatic Gas Valves | |
| 5. Manifold Pipe | |

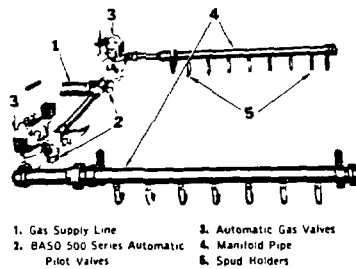


Manifold Piping for Mid, Nat, Mixed and LP-Air Gases
 FIG. 10-A—Mid and LP-Air (19 through 25 sections)



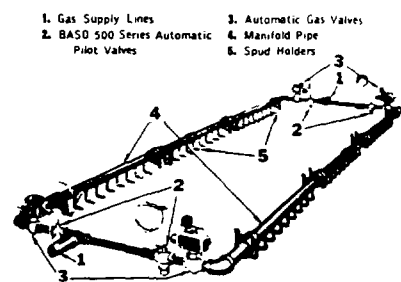
- | | |
|-----------------------------------|---|
| 1. Gas Supply Lines | 6. Manifold Pipe |
| 2. Manual Shut Off Valve Assembly | 7. Coupling For 28 And 31 Section Boilers |
| 3. Gas Pressure Regulators | Caps For 33, 37 And 41 Section Boilers |
| 4. Automatic Gas Valves | |
| 5. Spud Holders | |

FIG. 10-B—Mid and LP-Air (28 through 41 sections)
 Nat and Mixed (22 through 41 sections)



- | | |
|---|-------------------------|
| 1. Gas Supply Line | 3. Automatic Gas Valves |
| 2. BASO 500 Series Automatic Pilot Valves | 4. Manifold Pipe |
| | 5. Spud Holders |

Manifold Piping for Liquefied Petroleum Gases
 (Install Manual Shutoff Valve in Gas Supply Line Upstream From Item 1).
 FIG. 11-A—6 Through 19 Section Boilers



- | | |
|---|-------------------------|
| 1. Gas Supply Lines | 3. Automatic Gas Valves |
| 2. BASO 500 Series Automatic Pilot Valves | 4. Manifold Pipe |
| | 5. Spud Holders |

FIG. 11-B—21 Through 41 Section Boilers

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustrations on this page.

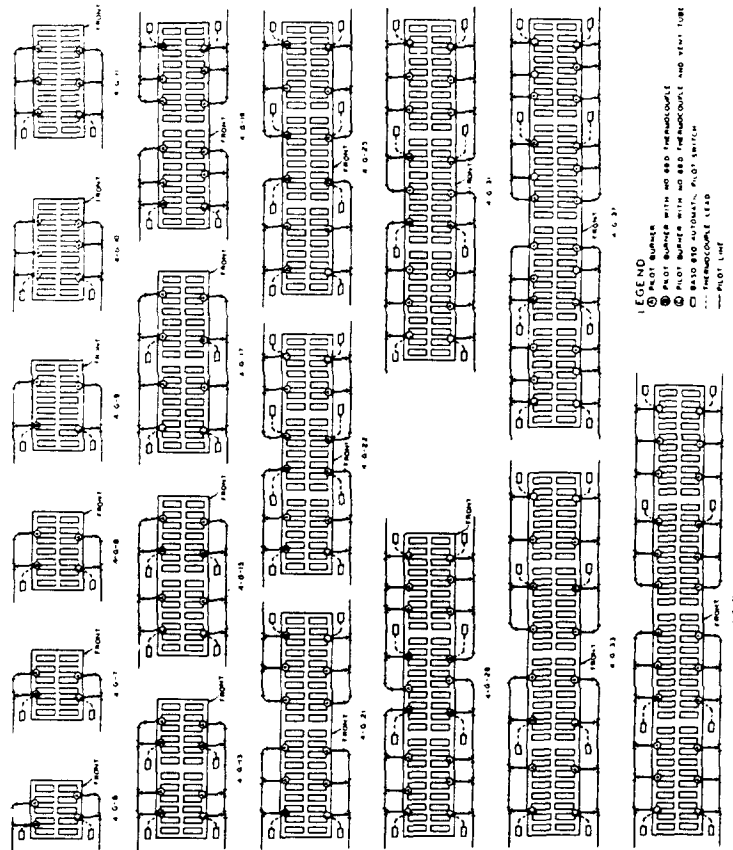
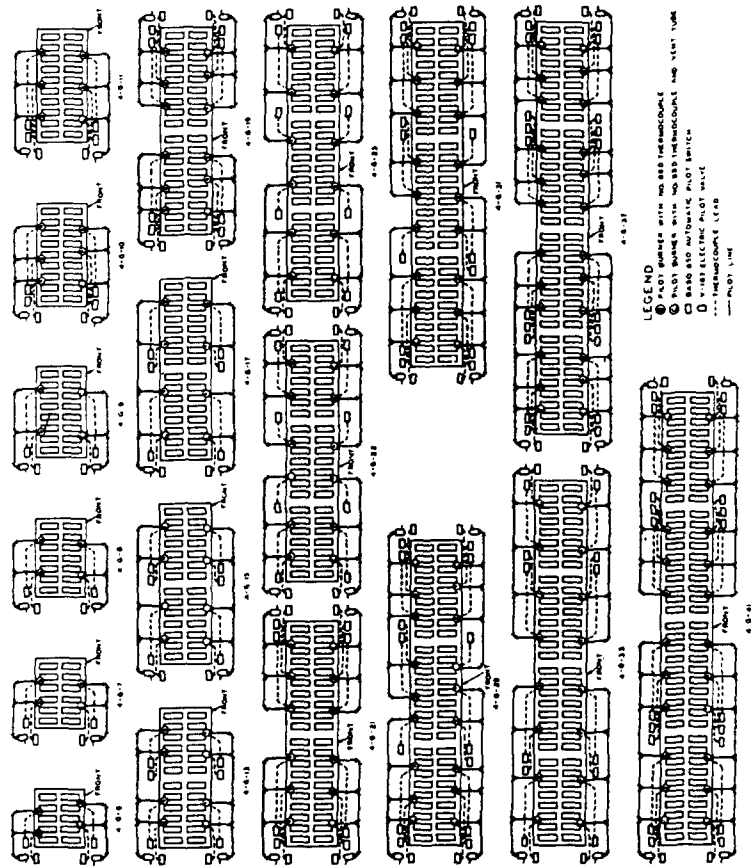


Fig. 12—Burner and Pilot Installation For Mid Gas







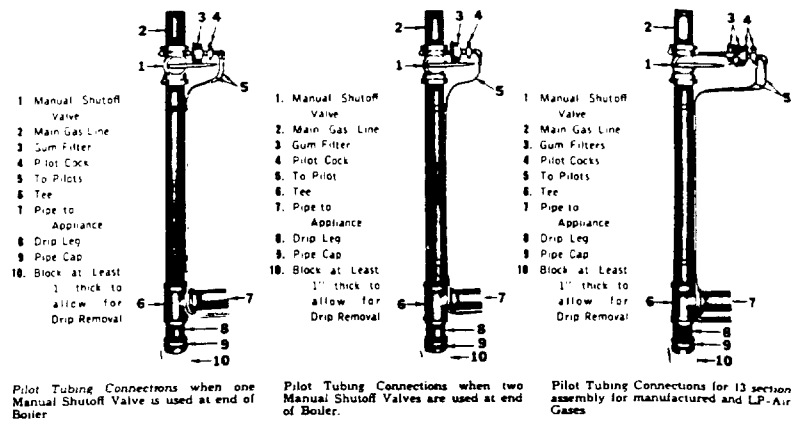


FIG. 16—Supply Piping Arrangements

NOTE. All Piping Shown Below Manual Shutoff Valve Not supplied by AR & SS Corp

4 Install manual shutoff valve assembly as shown in Fig. 16.

ASSEMBLY OF JACKET

1. Fill putty grooves at top of sections with boiler putty and place canopy or canopies in position so that turned down edges are firmly imbedded in the putty to make gas seal. Smooth off excess putty.

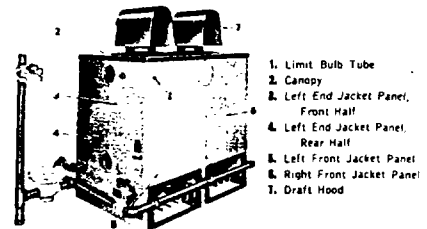


FIG. 17—Jacket Assembly; 13 through 21 section water boiler shown

NOTE Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustration on this page.

2 Place rear half of left end jacket panel in position, then place front half in position. Fasten two halves together having washer head screws pass through front half of panel into caged nuts attached to rear half of panel, attach panels to boiler section with washer head screws. On Water Boilers put temperature bulb tubing under jacket panel corner.

3 In similar manner attach two halves of right end jacket panel to boiler section.

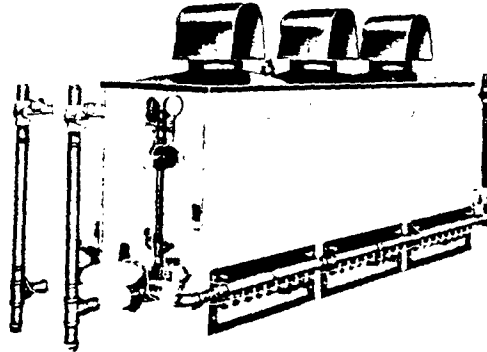


FIG. 18—Jacket Assembly, 3 combustion chamber boiler shown. 4 combustion chamber boiler jacket includes 2 center panel installations.

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustrations on this page.

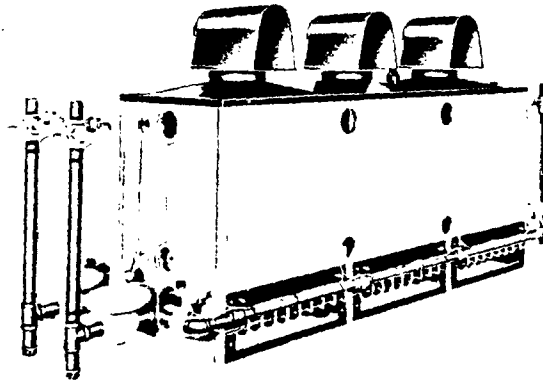


FIG. 19—Jacket Assembly; Right Rear View

4 Place front jacket panel in position. Flanges of front jacket panel to lap over end jacket panels and bottom to lap over cast iron burner access door frame. Attach jacket panel to burner access door frame with washer head screws.

5 For 13 to 41 Sections—Attach individual panels together with washer head screws for making up complete front or rear panels. Refer to Figs. 18 and 19. Place key strips between front and rear burner access door frames and attach with washer head screws.

6. Attach rear jacket panel in similar manner.

7 Place four short vertical keys in position at ends of front and rear burner access door frames, inserting top of keys under flanges of front and rear jacket panels. Attach keys to cast iron burner access door frame with washer head jacket screws. See Fig. 20.

8. Place canopy frame in position. See that frame is down tight over top edges of jacket panels.

9. Place draft hood on flue outlet of canopy.

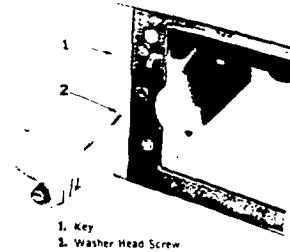


FIG. 20—Attaching Corner Keys

STEAM BOILERS

1 Assemble low water cutoff and water column piping as shown in Fig. 21 and attach to boiler as shown in Fig. 22. Assemble the working mechanism to the low water cutoff with gasket and screws (furnished in separate package). Make steam gage connection with nipple and tee to $\frac{1}{4}$ inch tapping on upper part of low water cutoff. Connect steam control element on automatic gas valve with steam gage tee using copper tubing and connectors. Fill tubing with water and screw steam gage into tee.

Check operation of Low Water Cutoff as shown on Page 23.

2. For 6 to 11 section boilers, connect safety valve to upper tapping on right end section using nipple and elbow provided.

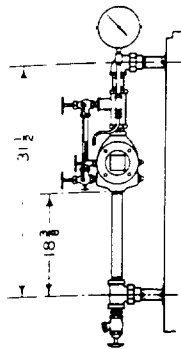


FIG. 21—Steam Trim

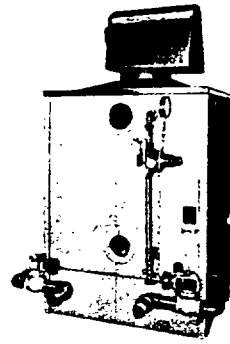


FIG. 22—Steam Trim Assembled



FIG. 23—Right End Connections for
Steam Boilers having 4 Automatic
Gas Valves

For 13 to 41 section boilers, insert bushings and connect safety valves into 3 inch tappings on intermediate sections. Plug unused tappings with plug (or on right end, install pressure limit control assembly when 4 automatic gas valves are supplied). Limit controls of right end gas valves should be connected to pressure limit control assembly with $\frac{3}{16}$ inch copper tubing. See Fig. 23.

WATER BOILERS

1. Insert temperature bulbs in upper tappings under jacket knockouts on left end section, see Fig. 17. For more sensitive operation, discard well before installing split nut and gland. Tube leading to bulb should be installed under jacket at corners.
2. Connect combination thermometer and altitude gage to upper one inch tapping on left end section with nipple and reducing coupling.
3. Plug upper tapping in right end near top unless relief valve is installed.
4. For boilers having 4 automatic gas valves, the bulbs from the valves on the right end should be installed similarly in the upper tappings under jacket knockouts on right end section.
5. If reverse acting low limit control is to be used, install it in lower $\frac{3}{4}$ inch tapping on rear of left end section.

ALL BOILERS

1. Install drain cock in lower $\frac{3}{4}$ inch tapping on right end section
2. Plug all tappings not used.
3. Be sure flame check is in gas pressure regulator as shown in Fig 24.

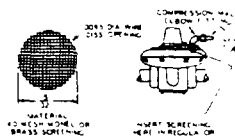


FIG. 24—Flame Check

CONNECTING CONTROLS (MFD., NAT. AND MIXED GASES)

A—For 6 through 17 sections for Mfd. gas and for 6 through 21 sections for Nat. and Mixed Gases

1. Connect pilot line from manual shutoff valve assembly (See Fig 16) to front pilot burner tubings. Install on top of spud holders. Connect a similar line to the rear pilot burners.

2. Connect thermocouple leads, attached to pilot burners, to BASO 850 automatic pilot switches and attach these switches to bracket with two 10-24 x $\frac{1}{2}$ inch screws and nuts which are then attached to the lower left corner of the front and rear jacket panels with two No. 10 sheet metal screws each. See Figs 12 and 13 for location of BASO switches. There should be a thermocouple attached to the left pilot burner in each combustion chamber in front and in back.

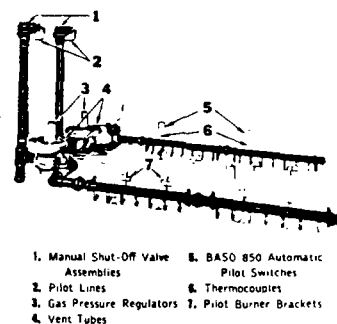


FIG. 25—Connecting Controls

3. Connect vent tube from gas pressure regulator to union leading to vent tube tip on pilot burner bracket. When one gas pressure regulator is supplied, vent tube tip should be attached to left front pilot burner bracket. If two gas pressure regulators are supplied at the same end, one vent tube should be connected to the left front pilot burner bracket and the other vent tube to the left rear pilot burner bracket. See Fig. 7, 12, 13 and 25.

4. Wire according to wiring diagram supplied.

5. Install burner access doors.

NOTE. Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustration on this page

B—For 19 through 41 sections for Mfd gas and for 22 through 41 sections for Nat and Mixed Gases

1. Connect pilot line from manual shutoff valve assembly (Fig. 16) to left front pilot burner tubings. Install on top of spud holders. Connect a similar line to left rear pilot burners. Connect similar pilot lines to right front and right rear pilot burners.

2. Connect thermocouple leads (attached to pilot burners) to BASO 850 automatic pilot switches and attach these switches to bracket with two 10-24 x 1/2 inch screws and nuts which are then attached to the front jacket panel with two sheet metal screws each. The location of the BASO switches and the pilot burners having thermocouples is indicated on Figs. 12 and 13.

3. Connect vent tube from gas pressure regulator to union leading to nearest vent tube tip on pilot burner bracket. The locations of pilot burner brackets having vent tube tips are shown on Figs. 7, 12, 13 and 26.

4. Wire according to wiring diagram supplied.

5. Install burner access doors.

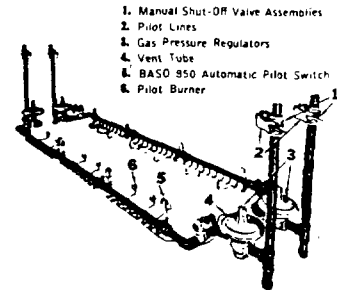


FIG. 26—Connecting Controls

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustration on this page.

CONNECTING CONTROLS (LIQUEFIED PETROLEUM GASES)

A—For 6 through 19 sections:

1. Connect pilot line from the pilot cock on front BASO 500 Series automatic pilot valve in main gas line to BASO 818 series automatic pilot valve (See Figs. 14 and 27). Connect line from 1/8 inch tee at outlet of BASO 818 series valve to front pilot burners. If more than 2 front pilot burners are installed, there should be an additional BASO 818 series valve attached in series with the first, (use 1/8 inch close nipple) one for each additional pilot burner. The outlet tee is taken from the outlet of the last BASO valve in the series. Connect a bypass line from the tee in the main gas line to the push button valve which is attached to the outlet of the last BASO 818. Attach BASO 818 valve to bracket with two 10-24 screws and attach brackets to jacket with two sheet metal screws each. See Fig. 14 for the location. Connect a similar pilot line to the rear pilot burners.

2. Connect a thermocouple with female connection from the left front pilot burner to the BASO 500 series valve in the main gas line. Connect a thermocouple with male connection (has smaller diameter tube) from each remaining front pilot burner to a BASO 818 series automatic pilot valve. Connect rear thermocouples similarly.

When finished, there should be a thermocouple from each pilot burner to one of the automatic pilot valves in the pilot line leading to that particular pilot burner. See Figs. 7 and 14.

3. Wire according to wiring diagrams supplied.

4. Install burner access doors.



- 1. BASO 500 Series Automatic Pilot Valves
- 2. BASO 818 Series Automatic Pilot Valves
- 3. Pilot Line
- 4. Bypass Line
- 5. Thermocouples
- 6. Brackets
- 7. Tee in Main Gas Line

FIG. 27—Connecting BASO Automatic Pilot Valves

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustration on this page.

B—For 21 through 41 sections:

1. Connect pilot line from the pilot cock on the left front BASO 500 series automatic pilot valve in main gas line to inlet of BASO 818 series automatic pilot valves which should be connected in series with $\frac{1}{8}$ inch close nipples (See Fig. 14). Attach to the lower right corner of the left front jacket panel with two No. 10 sheet metal screws. Connect pilot line from $\frac{1}{8}$ inch tee at outlet of BASO 818 valves to left half of front pilot burners. Connect a bypass line from the tee in the main gas line to the push button valve attached to the $\frac{1}{4}$ inch tee at the outlet of the BASO 818 valves (See Fig. 27). Connect a similar pilot line to the left rear pilot burners. Connect similar pilot lines to the right (front and rear) pilot burners from the right end BASO 500 series automatic pilot valves. The brackets containing the BASO 818 valves should be attached to the jacket as indicated in Fig. 27 with two No. 10 sheet metal screws each.

2. Connect a thermocouple with female connection from the left front pilot burner to the BASO 500 series automatic pilot valve in the main gas line. Connect a thermocouple with male connection (has smaller diameter tube) from each remaining pilot burner of the left front pilot burners (See Fig. 28), to one of the BASO 818 series automatic pilot valves.

Connect left rear and right (front and rear) thermocouples similarly.

When finished, there should be a thermocouple from each pilot burner to one of the automatic pilot valves in the pilot line leading to that particular pilot burner. See Figs. 7 and 14.

3. Wire according to wiring diagram supplied.

4. Install burner access doors.

5. The use of two stage regulation is recommended in all cases for Liquefied Petroleum gas installations. Two stage pressure regulators listed by Underwriters' Laboratories are available for this purpose.

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustration on this page.

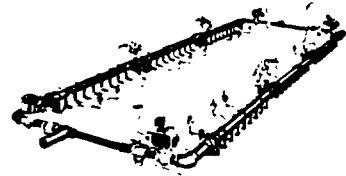


FIG. 28—Pilot Connections

CONNECTING CONTROLS (FOR LIQUEFIED PETROLEUM-AIR GASES)

A—For 6 through 17 sections:

1. Connect a pilot line from the left front manual shutoff valve assembly (for the 6 through the 13 section boilers, the pilot line will come from the left manual shutoff valve assembly) to the inlet of an MH V-167 electric pilot valve, which should be attached to a bracket as shown in Fig. 29. This bracket should then be attached to the lower left corner of the front jacket panel with three No. 10 sheet metal screws. Two BASO 850 automatic pilot switches should be attached to this bracket and for the 10 and 11 section boilers a second bracket containing a third BASO 850 switch should be attached with two of the same screws.



1. Bracket (S)
2. BASO 850 Automatic Pilot Switches
3. M-H V-167 Electric Pilot Valve
4. Three Sheet Metal Screws

FIG. 29—BASO Automatic Pilot Switches M-H Electric Pilot Valve

Connect the pilot line from the outlet of the MH V-167 electric pilot valve to the front pilot burners (See Fig. 15).

Attach a similar bracket to the rear corner of the jacket and connect a similar pilot line to the rear pilot burners.

2. On the 13, 15 and 17 section boilers, attach another bracket containing two BASO 850 automatic pilot switches to the lower left corner of the right front jacket panel. Attach a similar bracket to the rear of the boiler.

Connect a thermocouple from each front pilot burner to a nearby BASO 850 automatic pilot switch. When finished, there should be a thermocouple from each front pilot burner to a front BASO 850 switch which will be wired to the front automatic gas valve supplying gas to the main front burners that are lighted by that particular pilot. Connect rear thermocouples similarly (See Fig. 30).

3. Connect vent tube from gas pressure regulator to union leading to vent tube tip on pilot burner bracket. When one gas pressure regulator is supplied, vent tube tip should be attached to left front pilot burner bracket. If two gas pressure regulators are supplied, one should be connected to the left front pilot burner bracket and one to the left rear pilot burner bracket. See Figs. 7 and 15.

4. Wire according to wiring diagram supplied.

5. Install burner access doors.

B—For 19 through 41 sections:

1. Connect a pilot line from the left front manual shutoff valve assembly (for the 19 through 25 section boilers, the pilot line will come from the left manual shutoff valve assembly) to the inlet of an MH V-167 electric pilot valve which is attached to a bracket as shown in Fig. 29. This bracket should then be attached to the lower left corner of the left front jacket panel with three No. 10 sheet metal screws. Two BASO 850 automatic pilot switches should be attached to this bracket and for the 19, 21, 28, 31, 37 and 41 section boilers a second bracket containing a third BASO 850 switch should be attached with two of the same screws.

1. BASO 850 Automatic Pilot Switches
2. Thermocouples
3. Pilot Lines
4. M-H V-167 Electric Pilot Valve
5. Vent Tube
6. Gas Pressure Regulator
7. Manual Shut-Off Valve Assembly

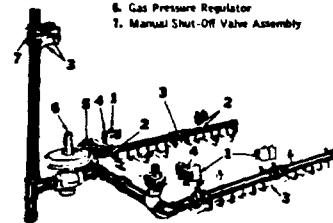


FIG. 30—Connecting Pilot Lines. For larger boilers there are similar connections on the right end.

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustration on this page.

Connect the pilot line from the outlet of the MH V-167 electric pilot valve to the left front pilot burners (See Fig. 15).

Attach a similar bracket to the left rear corner of the jacket and connect a similar pilot line to the left rear pilot burners.

2. On the 22 to 41 section boilers, attach (to the lower right corner of the left front jacket panel) another bracket for the 22 and 25 section boilers containing one BASO 850 switch; for the 28, 31, and 33, two BASO 850 switches; for the 37 and 41, three BASO 850 switches.

Connect a thermocouple from each pilot burner of the left front pilot burners to a nearby BASO 850 switch. Connect similar switches and pilot lines to the left rear and right front and rear quarters of the boiler.

When finished, there should be a thermocouple from each pilot burner to a BASO 850 switch which will be wired to the automatic gas valve supplying gas to the main burners which are lighted by that particular pilot burner. (See Fig. 30)

3. Connect vent tube from gas pressure regulator to union leading to nearest vent tube tip on pilot burner bracket. The location of pilot burner brackets having vent tube tips are shown on Figs. 7 and 15.

4. Wire according to wiring diagram supplied.

5. Install burner access doors.

FILLING SYSTEM

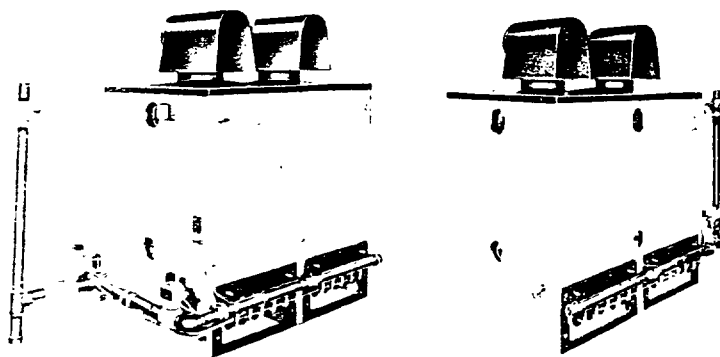
Caution: Never start boiler unless it is properly filled. (After boiler is in operation make up water should be added slowly).

Steam boilers should be filled until water is visible midway up gage glass between try cocks.

Fill open hot water system to $\frac{1}{2}$ height of expansion tank, remove rim and glass from gage and set movable pointer under automatic pointer. Replace rim and glass.

Fill closed hot water system until relief valve relieves. This must be less than 30 pounds pressure. If necessary, adjust relief valve setting. Remove rim and glass from gage and set movable pointer under automatic pointer. Replace rim and glass.

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



13 Section Boiler Completely Assembled

FIG 31-A—Left Front View

FIG 31-B—Left Rear View

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustrations on this page.

PILOT ADJUSTMENT

Light boiler as directed in operating instructions and check for gas leaks. Adjust pilot flame to extend over top of burner. Pilot rate can be adjusted with screw underneath cap on pilot throttling cock.

NORMAL PILOT INPUT FOR BASO PILOT BURNERS

	Mfd.	Nat.	Gas Mixed	L.P.	LP-Air
Input Per Pilot Burner Btu. Hr.	1000	1400	1200	1000	1000

MAIN BURNERS INPUT ADJUSTMENT

After boiler is warmed up, shut off all other gas appliances connected to gas meter and tune gas consumption. Adjust gas pressure regulator to give rated input indicated on nameplate.

$$\text{Gas Consumption (Cubic Feet Per Hr.)} = \frac{\text{Input Rating (Btu Per Hr.)}}{\text{Heating Value of Gas (Btu Per Cu. Ft.)}}$$

To increase consumption, turn adjustment screw (beneath cap on pressure regulator) clockwise; to decrease, turn screw counter-clockwise.

MAIN BURNER PRIMARY AIR ADJUSTMENT

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

CHECKUP OF LOW WATER CUTOFF

1. Light pilots as indicated in Operating Instructions. Turn thermostat to highest temperature. Automatic Gas Valves should open in approximately two minutes.
2. Open drain cock and drain water until water level is about an inch below center line of Low Water Cutoff. Automatic Gas Valves should close in approximately one minute.
3. Refill until water level is above center line of Low Water Cutoff. Automatic Gas Valves should open in approximately two minutes.

OPERATING**SHUTTING OFF: (MANUAL IGNITION; MFD., NAT. AND MIXED GASES)**

1. Close manual shutoff valve(s) and pilot cock(s).
2. Turn off switch in electric line to appliance.

RELIGHTING: (MANUAL IGNITION; MFD., NAT. AND MIXED GASES)

1. Set thermostat (or operating control) at lowest temperature.
2. Close manual shutoff valve(s) and pilot cock(s).
3. Turn off switch in electric line to appliance.
4. Wait 5 minutes.
5. Open burner access doors.
6. Open pilot cock(s) and light all pilot burners (front and back).
7. Close burner access doors.
8. Wait 2 minutes.
9. Press reset buttons on all BASO automatic pilot switches.
10. Open manual shutoff valve(s).
11. Turn on switch in electric line to appliance.
12. Set thermostat (or operating control) at desired temperature.

1. Manual Shut-Off Valve
2. Pilot Cock
3. Pilot Burners
4. BASO 850 Automatic Pilot Switches
5. Reset Button (On 850 Switch)
6. Automatic Gas Valves
7. Manual Control Lever
8. Hand Resetting Button

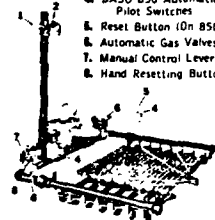


FIG. 32—Operating Controls Mfd., Nat. and Mixed Gases

NOTE Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustration on this page.

SHUTTING OFF (MANUAL IGNITION; LIQUEFIED PETROLEUM GASES)

1. Close pilot cock(s) and hand shutoff wheels on top of automatic gas valves.
2. Turn off switch in electric line to appliance.

RELIGHTING (MANUAL IGNITION; LIQUEFIED PETROLEUM GASES)

1. Set thermostat (or operating control) at lowest temperature.

2. Close pilot cock(s) and hand shutoff wheels on top of automatic gas valves.

3. Turn off switch in electric line to appliance.

4. Wait 5 minutes.

5. Open burner access doors.

6. Open pilot cock(s).

7. Light match and insert in lighting rod.

8. Press left front push button valve, hold and light all pilot burners on this pilot line.

9. Hold 2 minutes.

10. Press reset buttons on all left front BASO automatic pilot valves, then release push button valve.

11. Repeat steps 8, 9 and 10 for left rear of boiler. Repeat for right (front and rear) pilot burners on boilers having 4 automatic gas valves.

12. Close burner access doors.

13. Open hand shutoff wheels on top of automatic gas valves.

14. Turn on switch in electric line to appliance.

15. Set thermostat (or operating control) at desired temperature.

- | | |
|-------------------------|---|
| 1. Pilot Cocks | 8. Hand Resetting Button |
| 2. Automatic Gas Valves | 9. Push Button Valves |
| 3. Hand Shut-Off Wheels | 1. BASO 500 Series Automatic Pilot Valves |
| 4. Manual Control Lever | 2. BASO 818 Series Automatic Pilot Valves |

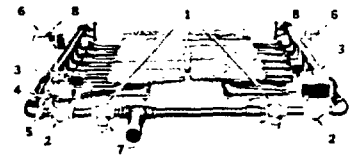


FIG. 33—Operating Controls Liquefied Petroleum Gases

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustration on this page.

SHUTTING OFF (MANUAL IGNITION; LIQUEFIED PETROLEUM-AIR GASES)

- 1 Close manual shutoff valve(s) and pilot cock(s).
- 2 Turn off switch in electric line to appliance.

RELIGHTING (MANUAL IGNITION; LIQUEFIED PETROLEUM—AIR GASES)

1 Set thermostat (or operating control) at lowest temperature

2. Close manual shutoff valve(s) and pilot cock(s).
3. Turn off switch in electric line to appliance.
- 4 Wait 5 minutes.
- 5 Open burner access doors.
- 6 Open pilot cock(s).

7. Turn knob on left front electric pilot valve to "Manual" and light all pilot burners in this pilot line.

8. Repeat for left rear of boiler. Repeat for right (front and rear) pilot burners on boilers having 4 automatic gas valves.

9. Close burner access doors.

10. Wait 2 minutes.

11. Press reset buttons on all BASO automatic pilot switches.

12 Open manual shutoff valve(s).

13. Turn on switch in electric line to appliance.

14. Set thermostat (or operating control) at desired temperature.

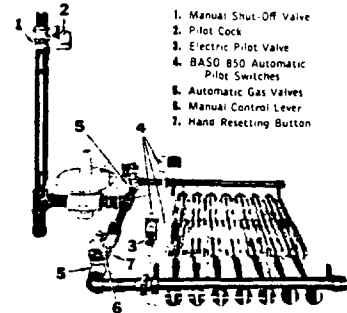


FIG. 34—Operating Controls Liquefied Petroleum-Air Gases

NOTE: Straight Type Spud Holders replace the Angle Type Spud Holders which are shown in illustration on this page.

PILOT GOES OUT

If the pilot flame is extinguished, the automatic pilot will shut off the automatic gas valve. If boiler is not operating correctly, call Heating Contractor or Gas Company service man. If boiler is operating correctly, relight as directed on pages 23, 24 and 25, whichever is applicable.

ELECTRIC POWER FAILURE

Boilers equipped with "Detroit" 569 VS (or VW) valves may be operated manually during electric power failure. Proceed as follows:

1. If pilot burners are out, relight as directed for "Re-Lighting (Manual Ignition)" for the appropriate gas. Follow instructions completely so boiler will resume automatic operation when power returns.

2. When pilot burners are lighted, press down on manual control lever on automatic gas valve; main burners should light; press in hand resetting button to hold lever down, burners will remain lighted.

The 569 automatic gas valve has a mechanical limit control which protects the boiler from excessive temperature or pressure.

3. Valve is 100% recycling and will resume automatic operation when electric power returns.

MAINTENANCE**IN FALL BEFORE STARTING BOILER**

Drain system sufficiently to remove sludge in bottom of boiler. Do not drain more water than necessary to remove sludge. Then refill to proper level as directed above.

MAINTENANCE OF BOILER WHILE IN OPERATION

1. Check water level regularly and add water slowly when needed.
2. This boiler is fired automatically.

- 3 Test safety valve on steam boiler at beginning of season and once a month thereafter:
 - a) Fasten cord or wire to valve lever.
 - b) When pressure is up, stand safe distance away and pull cord. (Steam should be released)

IN WINTER WHILE NOT IN OPERATION

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

IN SUMMER WHILE NOT IN OPERATION

Fill system as during heating season. Have boiler inspected by service man before the start of the heating season. If necessary, remove front jacket and cleanout cover plates and clean heating element.

GENERAL MAINTENANCE OF HEATING SYSTEM

- 1 Keep radiators and convectors clean.
2. Keep system in good repair. It is advisable to have it inspected by your heating contractor at least once a year.
3. If a hot water radiator is hot at the bottom but not at the top, it indicates that air has accumulated inside and should be vented. To vent radiator: Hold small cup under air vent (Located near top of radiator), open vent until water escapes and then close.
- 4 Fill steam boilers only as directed (on page 21.) See CAUTION Note.
- 5 Fill hot water systems as follows:

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

6. 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.

7. 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.

BLOWING OFF STEAM BOILERS

In the process of installation, oil, grease or grit works into new systems causing steam boilers to foam. Therefore, it is frequently necessary to blow off boiler under pressure, and to sometimes repeat the operation until boiler water and water column glass are clean.

To blow off, remove the safety valve and fittings from the boiler and connect a 2" pipe with valve to the tapping and run pipe to a suitable drain. Close flow and return valves if available or all radiator valves. Fill boiler with water to top of gauge glass. Light burners as directed in Operating Instructions and when steam pressure is over 10 lbs. but below 15 lbs. open blow off valve and regulate valve to maintain pressure in boiler. Add water as required to maintain full gauge level in boiler. Continue for about 2 hours. Then drain water to proper level, remove blow off piping and replace safety valve.

If water supply has not sufficient pressure proceed as above but open blow off valve fully and let pressure drop to zero. Then close valve, replenish water and repeat several times. At end of blow off build up 10 lb. pressure, shutoff burners as directed in operating instructions and blow water out through drain opening. Refill to proper level, AFTER BOILER HAS COOLED. Do not use soda, alkali, vinegar or any acid for cleansing the boiler. In severe cases, the use of "Vinco" is recommended. Use 3 lbs. of Vinco for 350 Sq.Ft. radiation or less and 1 lb. for each additional 150 Sq. Ft.

CAUTION

After the blow off operation, a checkup should be made of the Low Water Cutoff as directed on Page 17.

NOTE: All parts of this boiler have been carefully inspected and packed. In case of shortage, make sure that all parts have been removed from shipping container and examine packing material thoroughly. If part cannot be found, report shortage to your dealer, giving boiler size, series number, date, inspector's number and packer's number. (See Parts List and Packer's Check Tickets).

Give boiler size and series number when ordering repair parts.

BOILER SIZE

SERIES NO. (SEE SERIES PLATE ON BOILER)

DATE



AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
PITTSBURGH 22, PA.

ARSS 4884 REV. 14-64