

SERIES HB 014

PLAINTIFF'S EXHIBIT

ASI-665

EMPIRE BOILER

by

AMERICAN-Standard

INSTALLATION—OPERATION AND MAINTENANCE MANUAL

FOR

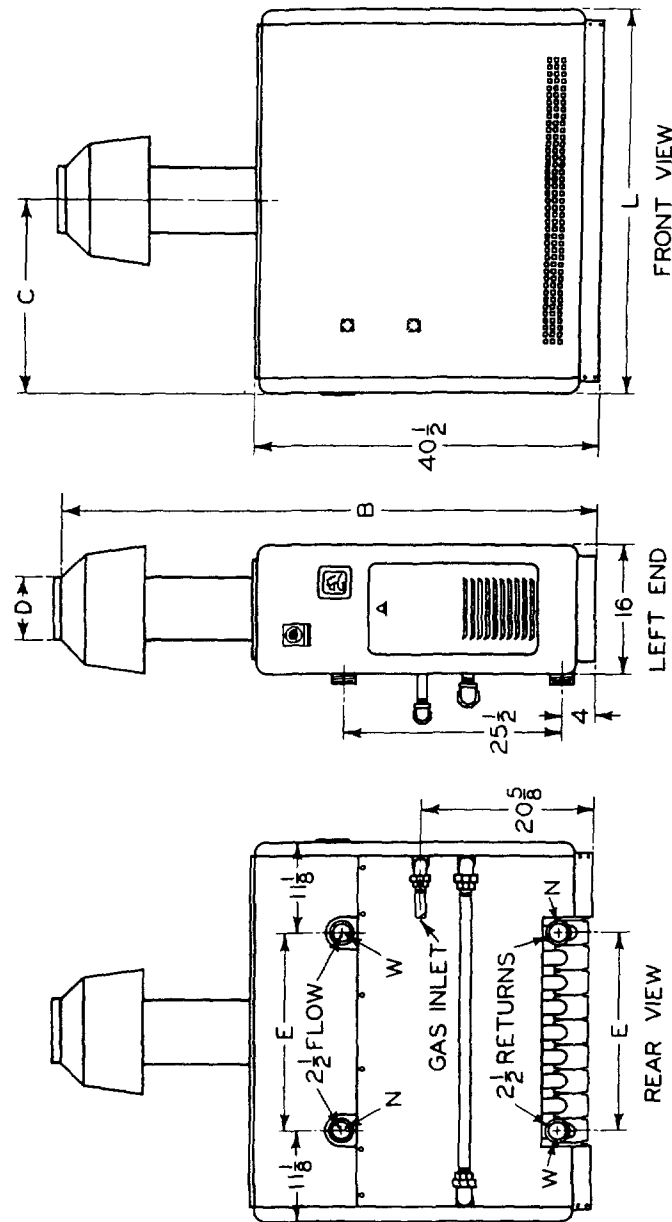
TYPE 4-GA GAS FIRED BOILERS

APPROVED BY AMERICAN GAS ASSOCIATION

*Notice to Installer and Operator
This Booklet Must Be Affixed to or Placed in
Suitable Pocket on the inside of the Access Panel*

AMERICAN-Standard
First in heating ... first in plumbing

2/57



FOR FORCED CIRCULATION USE W CONNECTIONS
(CAP N CONNECTIONS)
FOR GRAVITY CIRCULATION USE W AND N CONNECTIONS

BOILER NUMBER	NO. OF SECTIONS	NO. OF BURNERS	B	C	D	E	L
4-GA-8-E	8	4	55 $\frac{1}{4}$	18 $\frac{3}{4}$	7	15	37 $\frac{1}{4}$
4-GA-9-E	9	4	57 $\frac{1}{4}$	20 $\frac{1}{4}$	7	18	40 $\frac{1}{4}$
4-GA-11-E	11	4	63 $\frac{3}{4}$	23 $\frac{1}{4}$	8	24	46 $\frac{1}{4}$

ERECTING

Caution

On hot water systems, expansion tank should not be installed in cold or exposed place. No valve 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" above floor level.

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 gauge supplied with boiler do not install gauge 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. Note: When boiler is used for direct hot water supply, test pressure should be increased up to 120 lbs.

Assembly of Fittings

1. Position boiler section assemblage so that front and both ends are accessible. Loosen all tie rod nuts so that they are finger tight only.
2. Place rear jacket panel in position, then attach flow and return fittings to flow and return nipples projecting through panel. If only 2

nipples are used, connect to diagonally opposite nipples as marked (W and W) to insure proper circulation. Remaining nipples (N and N) should be capped. (See inside of front cover.)

It is recommended that a tee be provided in the piping near the flow outlet for installation of a relief valve.

3. Install bushing, street elbow, close nipple and drain cock in lower tapping on right end section.

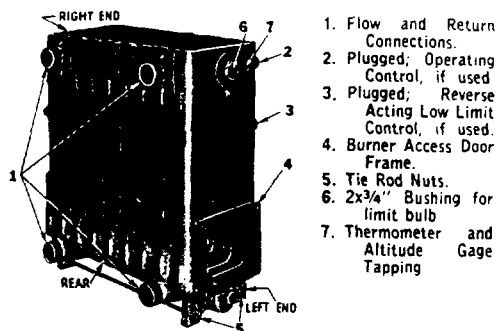


FIG. 1—Section Assemblage

For Electric Ignition, the pilot lighter assembly is furnished in separate container. It should be installed before the burner assembly is placed in the boiler. To install the lighter assembly, place it in position with the end of the thermocouple through the hole and push downward until the spring clip engages the bottom of the pilot body.

4. Burner access door frames are alike. Attach frames to right and left end sections using $\frac{1}{4}$ -20 x $1\frac{1}{8}$ " flat head brass screws at top.

5. Fill putty groove at top of sections with boiler putty and place canopy in position with flange firmly imbedded in putty to make gas seal. Smooth off excess putty. Place flue pipe on canopy.

6. Place burner supports for 9 and 11 section boilers on 3rd section from left and 3rd section from right ends. For 8 section boiler, place burner supports on 3rd section from left end and 2nd section from right end. On 8 section boiler the longer burners go in the left end.

Installing Burner and Control Sub-Assemblies

1. Each 4-GA boiler is supplied with four burners which must be installed as shown in Fig. 2. Burner Nos. 2 and 4 are plain without pilot attachments. Burner assemblies Nos. 1 and 3 vary according to type of installation. Identify them as shown on page 3.

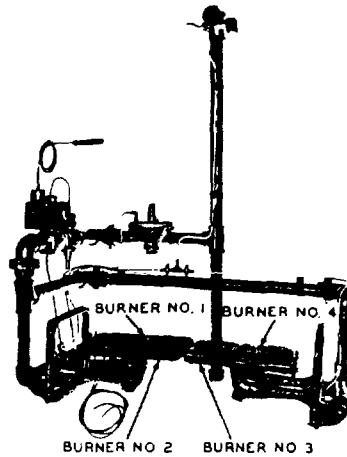


FIG. 2—Burner Arrangement

Electric Ignition

No. 1—Burner, pilot bracket, pilot burner, thermocouple, vent tube tip and electric ignition block.

No. 3—Burner, pilot bracket and pilot burner.

Manual Ignition

(Mfd., Nat. and Mixed Gases)

No. 1—Burner, pilot bracket, pilot burner, thermocouple and vent tube tip.

No. 3—Burner, pilot bracket and pilot burner.

Manual Ignition

(L.P. and L.P.-Air Gas)

No. 1—Burner, pilot bracket, pilot burner and thermocouple (also vent tube tip for L.P.-Air gas).

No. 3—Burner, pilot bracket, pilot burner and thermocouple (smaller diameter).

Fit burner assemblies to tapered ends of mixers. (Forked lugs on burner engage lug on mixer.) Place burner and mixer assemblies on burner supports in combustion chamber. Install L.H. burner first.

2. Check orifice spud with drill size specified on tag attached to manifold.

Push spud holders into tapered holes in mixers and attach the manifold (with automatic gas valve) and manifold brackets to left end burner access door frame with $\frac{1}{4}$ " x $\frac{3}{4}$ " round head brass screws in upper holes and $\frac{1}{4}$ " x $1\frac{1}{2}$ " round head brass screws in bottom holes.

Attach remaining manifold to right end similarly.

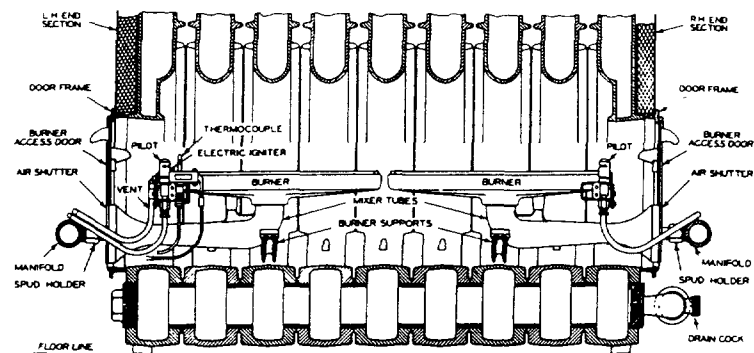


FIG. 3—Sectional View (Electric Ignition)

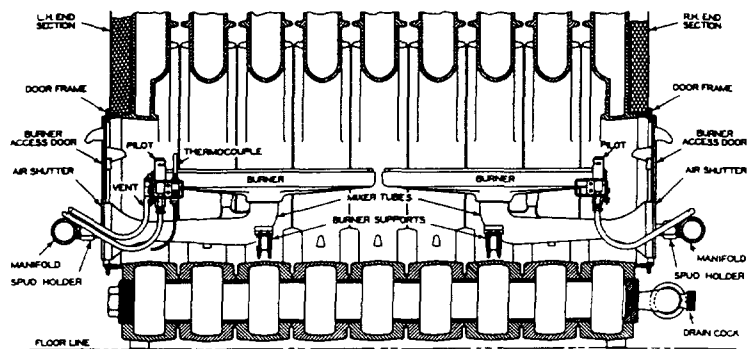


FIG. 4—Sectional View (Manual Ignition; Mfd., Nat. and Mixed Gases)

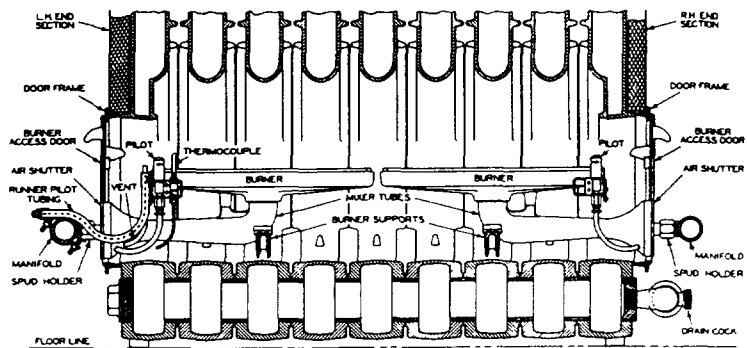


FIG. 4-A Sectional View (Runner Pilot Ignition)

3. Join lower union joint on left manifold to union joint on right manifold with connecting pipe across rear.

Attach control piping assembly with union elbow to left manifold at top union joint and to gas supply pipe with union. (See Fig. 2.) Be sure arrows on Automatic Gas Valve, BASO Valve and Gas Pressure Regulator point in direction of gas flow. Tighten manifold bracket attaching screws and set screws in manifold brackets.

4. Attach number and series plate to left end insulation plate also terminal block and pilot ignition transformer on boilers having electric ignition. Place left end insulation plate in position with bottom edge in back of burner access door frame and hold until temperature bulb is installed. Insert the temperature bulb element of the automatic gas valve in the upper center tapping on the left end using the split nut and gland fitting provided. For more sensitive operation, discard well before installing. Place right end insulation plate (plain) in position.

5. Install combination thermometer and altitude gage in upper tapping on face of left end of section assemblage (See Fig. 5).

Two $\frac{3}{4}$ " tapings for the application of a reverse acting aquastat and a limit control have been provided on the left end section (See Fig. 1).

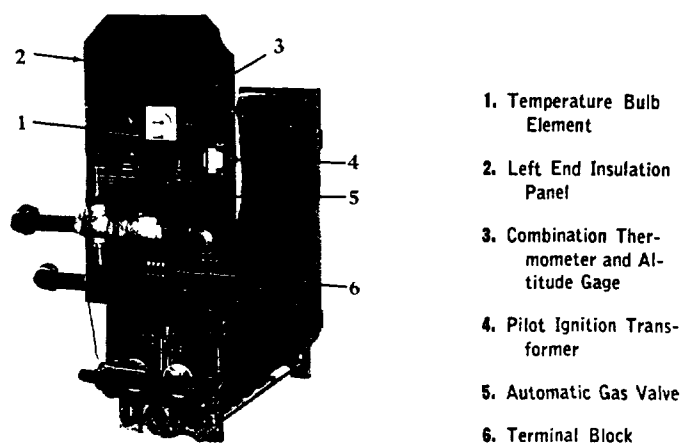


FIG. 5—Installing Gage and Temperature Bulb

Connecting Controls

1. For all gases, connect thermocouple from pilot burner to series 500 BASO automatic pilot valve at left end of unit. For liquefied petroleum and liquefied petroleum-air gases mount an 808 type BASO pilot valve and bracket with sheet metal screws in holes provided on right end insulation panel and connect thermocouple (smaller diameter) from pilot burner to pilot valve.

2. Connect pilot line from pilot burners to manual shut-off valve. See Figures 6 and 8 for Mfd. Nat. and Mixed gases, Manual Ignition, and Figures 6 and 7 for Mfd. Nat. and Mixed gases, Electric Ignition.

Connect pilot line to Baso Automatic Pilot Valve for L.P. and L.P. Air gases. See Figure 13.

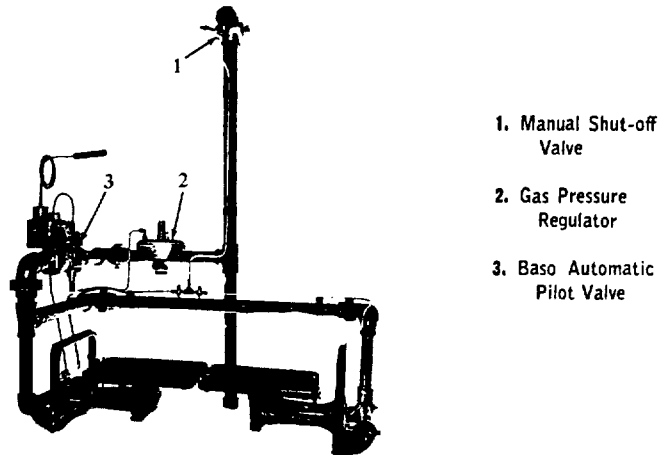
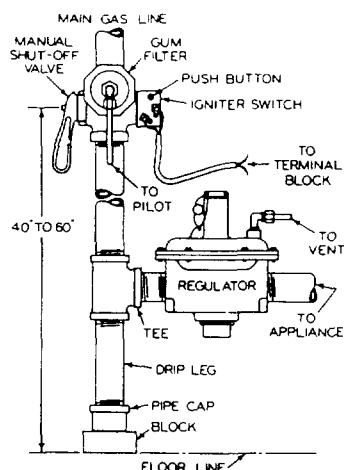


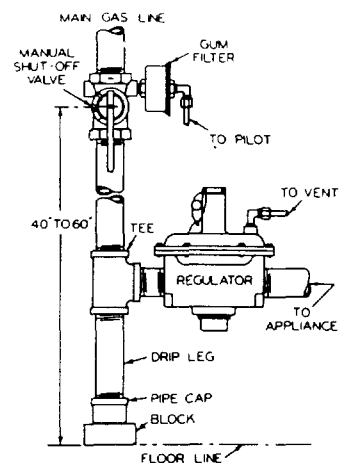
FIG. 6—Controls for Manual Ignition Mfd., Nat. and Mixed Gases

3. Connect vent tube from pilot burner bracket to gas pressure regulator. Be sure stainless steel tip is screwed in securely and that flame check is in place in vent tube connection on regulator (See Fig. 9).



NOTE
ALL PIPING SHOWN BELOW SHUT-OFF
VALVE NOT SUPPLIED BY AR & S.S. CORP

FIG. 7—Supply Piping Arrangement
(Electric Ignition)



NOTE
ALL PIPING SHOWN BELOW SHUT-OFF
VALVE NOT SUPPLIED BY AR & S.S. CORP

FIG. 8—Supply Piping Arrangement
(Manual Ignition; Mfd., Nat. and
Mixed Gases)

4. Make wiring connections according to wiring diagram applying to controls used. (See Fig. 10.) Install thermostat and connect as indicated.

5. Install burner access doors, one on left end frame and one on right end frame.

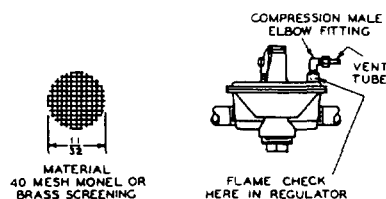


FIG. 9—Flame Check

Jacket Assembly

1. Place front jacket panel in position.

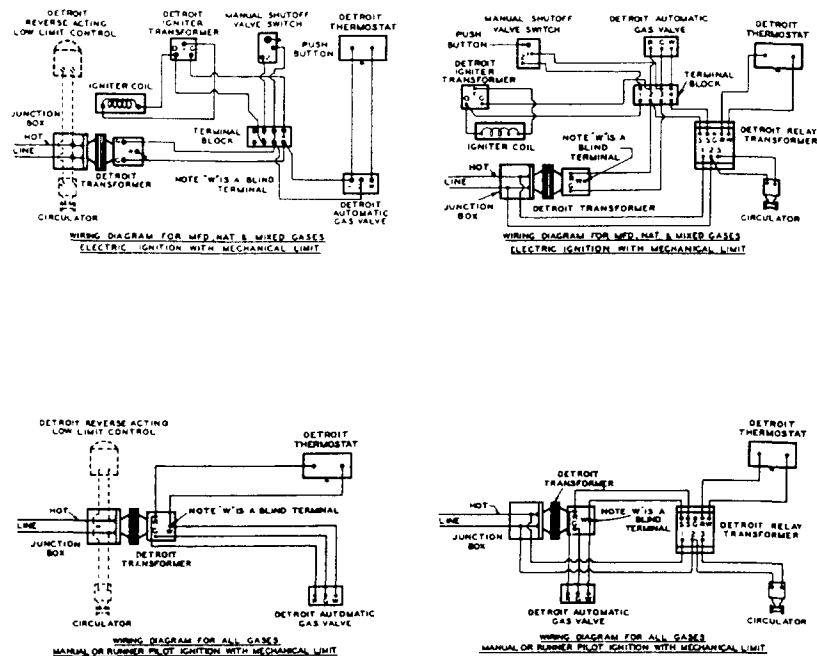


FIG. 10—Wiring Diagrams

2. Place left end jacket panel in position with flanges engaging slip joints of rear and front jacket panels and attach at top and bottom with jacket screws.
3. Place right end jacket panel in position with flanges engaging slip joints of rear and front jacket panels and attach at top and bottom with jacket screws.
4. Place top jacket panel in position with flue pipe projecting through flue opening and grille over left end.
5. Place draft hood on flue pipe.
6. Attach control access door (with louvers) to left end jacket panel and plain door to right end jacket panel.

Filling System

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

Fill open system to $\frac{1}{8}$ height of expansion tank, remove rim and glass from gage and set movable pointer under automatic pointer. Replace rim and glass.

Fill closed 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.

Pilot Adjustment

Light boiler as directed in operating instructions and check for gas leaks. Adjust pilot flame to extend just over the top of the burner. Pilot rate can be adjusted with the screw underneath the cap on the pilot cock or by adjusting throttling cock, if provided in pilot line.

Normal Pilot Input for BASO Pilot Burners

	Mfd.	Nat.	Mixed	L.P.	LP-Air
Input Per Burner	1000	1400	1200	1000	1000

Input Adjustment

After boiler is warmed up, shut off all other gas appliances connected to gas meter and time 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.

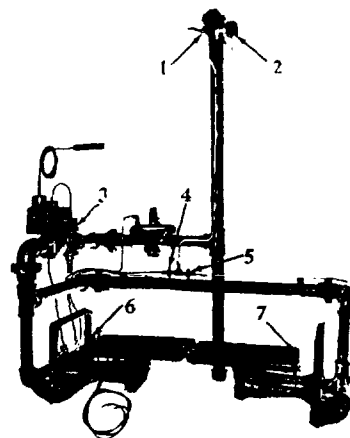
Main Burner Primary Air Adjustment

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.

OPERATING

Shutting Off (For All Gases)

1. Close manual shutoff valve and pilot cocks.
2. Turn off switch in electric line to appliance.

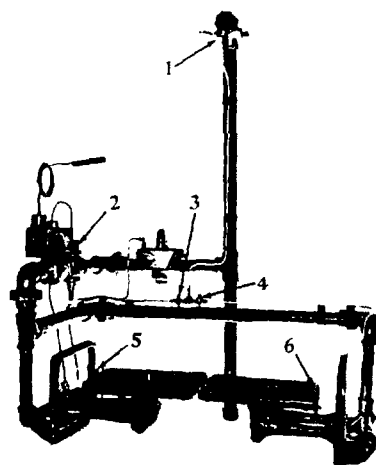


1. Manual Shutoff Valve
2. Push Button Lighter Switch
3. Baso Automatic Pilot Valve
4. Left End Pilot Cock
5. Right End Pilot Cock
6. Left End Pilot Burner
7. Right End Pilot Burner

FIG. 11—Controls for Electric Ignition

Re-Lighting (Electric Ignition)

1. Set thermostat at lowest temperature.
2. Close manual shutoff valve and pilot cocks.
3. Turn off switch in electric line to appliance.
4. Wait 5 minutes.
5. Turn on switch in electric line to appliance.
6. Open pilot cock to left end pilot burner.
7. Press button on lighter switch until left end pilot burner lights.
8. Wait 2 minutes.
9. Press plunger on automatic pilot valve.
10. Open manual shutoff valve.
11. Set thermostat above room temperature. (Main burners should light.)
12. Open pilot cock to right end pilot burner. (Pilot should light.)
13. Set thermostat at desired temperature.

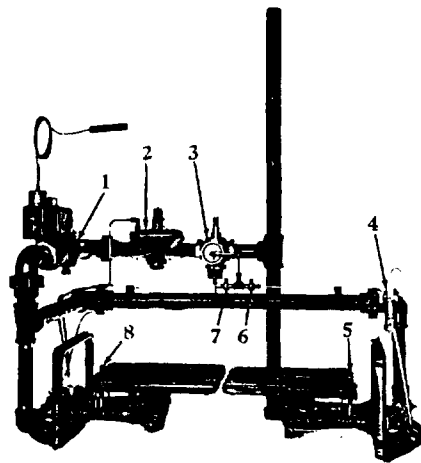


1. Manual Shut-off Valve
2. Gas Automatic Pilot Valve
3. Left End Pilot Cock
4. Right End Pilot Cock
5. Left End Pilot Burner
6. Right End Pilot Burner

FIG. 12—Controls for Manual Ignition; Mfd., Nat. and Mixed Gases

Re-Lighting (Manual Ignition; Mfd., Nat. & Mixed Gases)

1. Set thermostat at lowest temperature.
2. Close manual shut-off valve and pilot cocks.
3. Turn off switch in electric line to appliance.
4. Wait 5 minutes.
5. Open left end pilot cock and light left end pilot burner.
6. Open right end pilot cock and light right end pilot burner.
7. Wait 2 minutes.
8. Press plunger on automatic pilot valve.
9. Open manual shut-off valve.
10. Turn on switch in electric line to appliance.
11. Set thermostat at desired temperature.



1. Manual Shut-off Valve
2. Gas Pressure Regulator
(LP-Air Only)
3. Basis Automatic Pilot
Valve
4. Right End Basis Auto-
matic Pilot Valve
5. Right End Pilot Burner
6. Right End Pilot Cock
7. Left End Pilot Cock
8. Left End Pilot Burner

FIG. 13—Controls for Manual Ignition; Liquefied Petroleum and LP—Air Gases

Re-Lighting (Manual Ignition; Liquefied Petroleum Gases)

1. Set thermostat at lowest temperature.
2. Close manual shut-off valve and pilot cocks.
3. Turn off switch in electric line to appliance.
4. Wait 5 minutes.
5. Open left end pilot cock, press plunger on automatic pilot valve and light pilot. Hold plunger for 2 minutes.
6. Open right end pilot cock, press plunger on right end automatic pilot valve and light pilot. Hold plunger for 2 minutes.
7. Open manual shut-off valve.
8. Turn on switch in electric line to appliance.
9. Set thermostat at desired temperature.

Pilot Goes Out

If the pilot flame is extinguished, the automatic pilot will shut off the automatic gas valve, rendering the boiler inoperative. Relight according to applicable instructions. If boiler is not operating correctly, call Heating Contractor or Gas Company Service man.

Operation During Failure of Electric Power Supply

In case of failure of supply of electric current, boiler will automatically shut off. Boiler will not operate automatically while electric power is off; however, boilers equipped with Detroit V-574-FW automatic gas valve may be operated manually as follows:

1. If pilot is out, relight as directed for manual ignition.
2. Remove rectangular housing from top of valve.
3. Pull up knob located on top. (Burners should light)
4. Caution—Shut off boiler by pressing reset lever, located next to knob, before water temperature becomes excessive.

Bear in mind that operating the boiler manually is an emergency condition and that constant supervision is required to prevent the possibility of damage due to overheating. Never allow the boiler to operate under this emergency condition if it is to be left unsupervised for any length of time.

5. Valve is fully recycling and will return to automatic operation when electric power returns.

CARE AND ATTENTION

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.

While In Operation

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

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 jacket front and side panels so that cleanout coverplates are accessible. These may be removed from either side of the boiler for cleaning between the sections.

General Care of Heating System

1. Keep radiators and convectors clean.
2. Keep system in good repair. It is advisable to have it inspected by your heating contractor at least once a year.
3. If a hot water radiator is hot at the bottom, but not at the top, it indicates that air has accumulated inside and should be vented. To vent radiator: Hold small cup under air vent (located near top of radiator), open vent until water escapes and then close.

4. Fill hot water systems as follows:

Open all radiator valves, but keep vents at top of radiator closed. Fill open systems till hands on altitude 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.

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

6. Where an expansion tank is used, make sure that neither the tank nor its drain pipe is exposed to freezing temperatures. Never place valves in piping leading to or from expansion tank.

NOTE: All parts of this boiler have been carefully inspected and packed. See Packing and Parts List sheet for details.

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.

GIVE BOILER SIZE AND SERIES NUMBER WHEN ORDERING REPAIR PARTS.

Boiler Size

Series No. (See Series Plate on Boiler)

Date



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