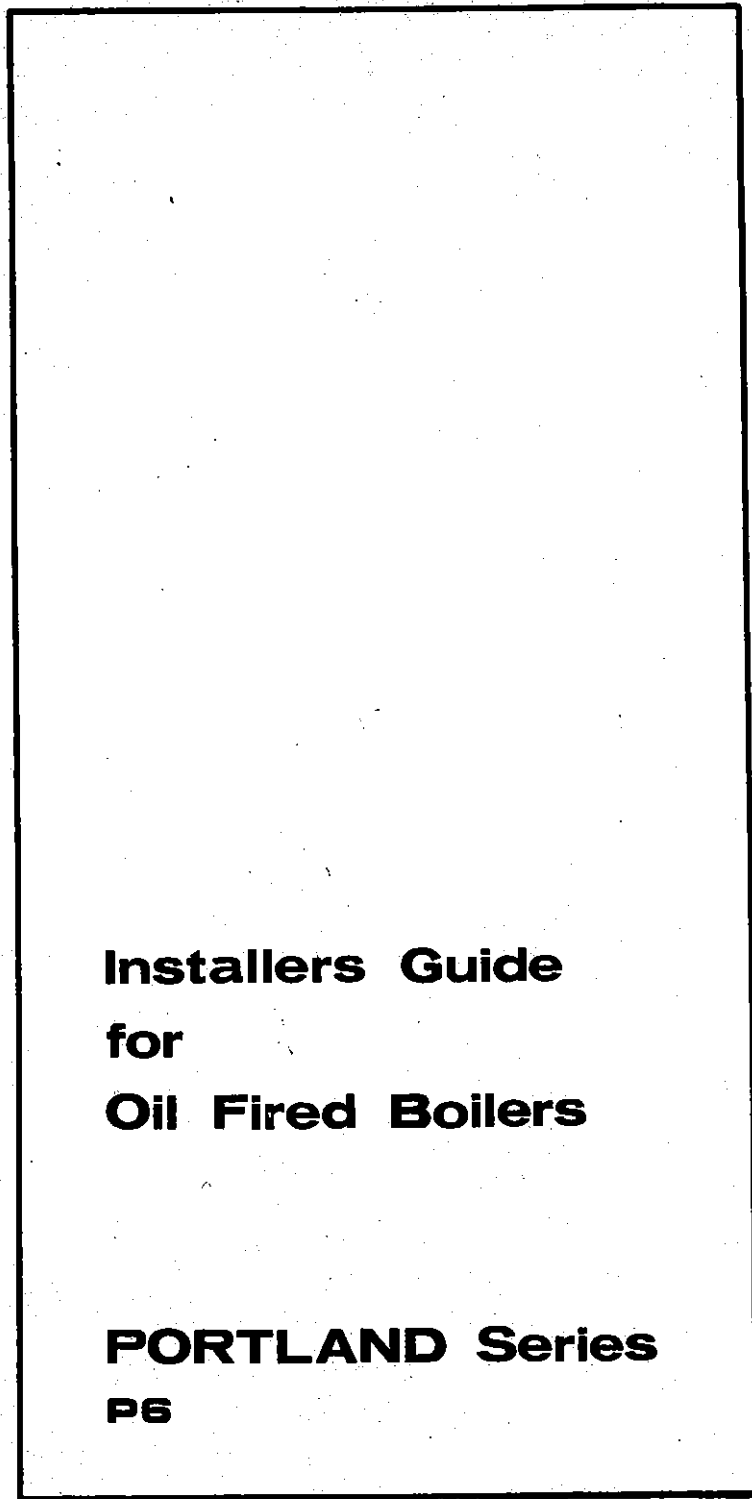


Hamworthy



**Installers Guide
for
Oil Fired Boilers**

**PORTLAND Series
P6**

GENERAL DESCRIPTION

The Hamworthy PORTLAND Boiler is a fully automatic Oil Fired Unit designed to give reliable and efficient service. It is suitable for Domestic, Commercial and Industrial Central Heating and Indirect Hot Water Systems.

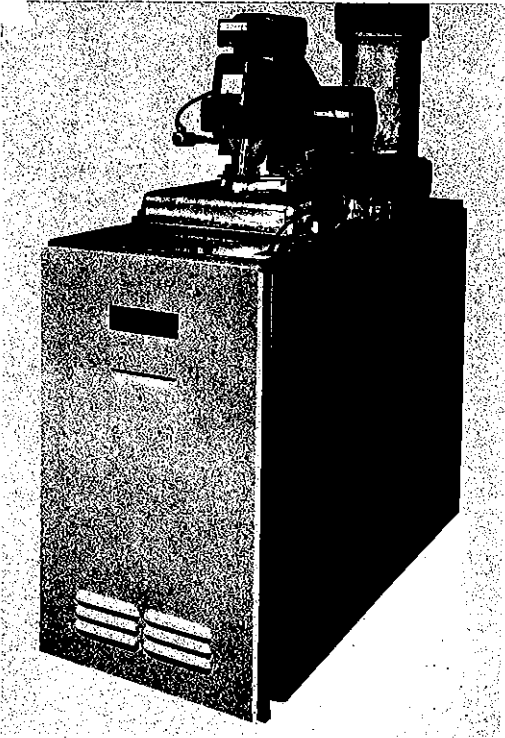


Fig. 1
PORTLAND Boiler
with casing fitted.

The Boiler is unique in that the cast iron sections are set above each other on the horizontal plane and by special arrangement of the connecting nipples, the water flows in series through each individual section. This method ensures that no hot spots are created in the boiler and gives a small unit with high output.

To further reduce the overall floor space occupied by the unit, each cast section is divided in two across its width by a water cooled wall, the front half forming a combustion chamber and the rear half, containing finned tubes, forming the convection section. The burner is mounted on a hinged door positioned over the top of the combustion chamber, and fires downwards, the combustion gases passing under the bottom divided section and up the convection bank to the flue.

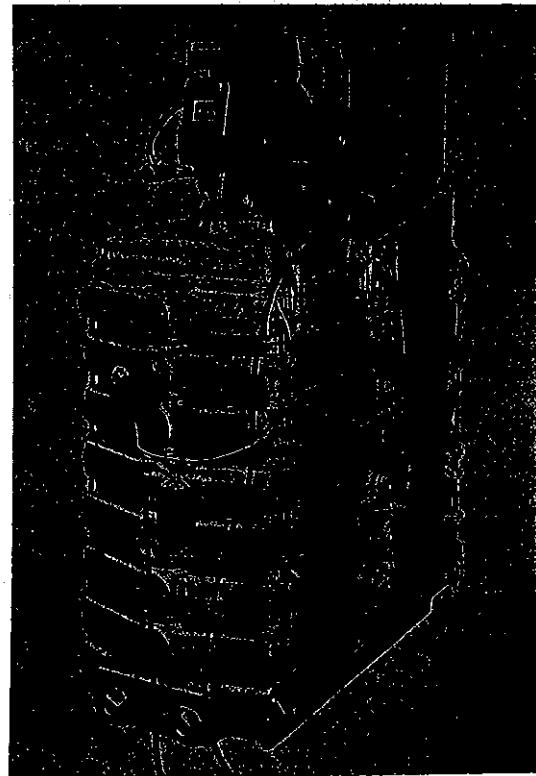


Fig. 2
PORTLAND
Boiler without
casing fitted

Each boiler is constructed from high grade cast iron and is factory assembled and hydraulically tested to 200 p.s.i.g. (1379 kPa).

The maximum working pressure of the unit is 100 p.s.i.g. (690 kPa).

Installation consists essentially of connecting electrical, oil and water services, and chimney.

The base of the boiler is fully water cooled and no special floor insulation is required. The hinged burner mounting door allows complete access to the combustion chamber for servicing and the flue hood, fitted to the top of the boiler, has a removable plate which gives access to the convection bank for cleaning.

Each unit is supplied with a matched Nu-Way ZL2D oil burner suitable for 35 seconds *Redwood No. 1* fuel oil. (Alternative burners may be considered if approved by Hamworthy Engineering Ltd. but they would be supplied direct from the burner manufacturer).

PORTLAND BOILERS & MODULAR SYSTEMS

Portland boilers are ideally suited to Modular application since the unique series water flow characteristic enables the boilers to be connected in parallel to give a modular unit. This system eliminates the need for large boiler rooms and special foundations other than suitable load bearing structures.

The unit has been designed to pass through 30 in. (762 mm.) doorways and narrow corridors and its weight kept to a minimum to enable installation in completed buildings, i.e. up and down stairways, to be accomplished with the minimum amount of lifting tackle.

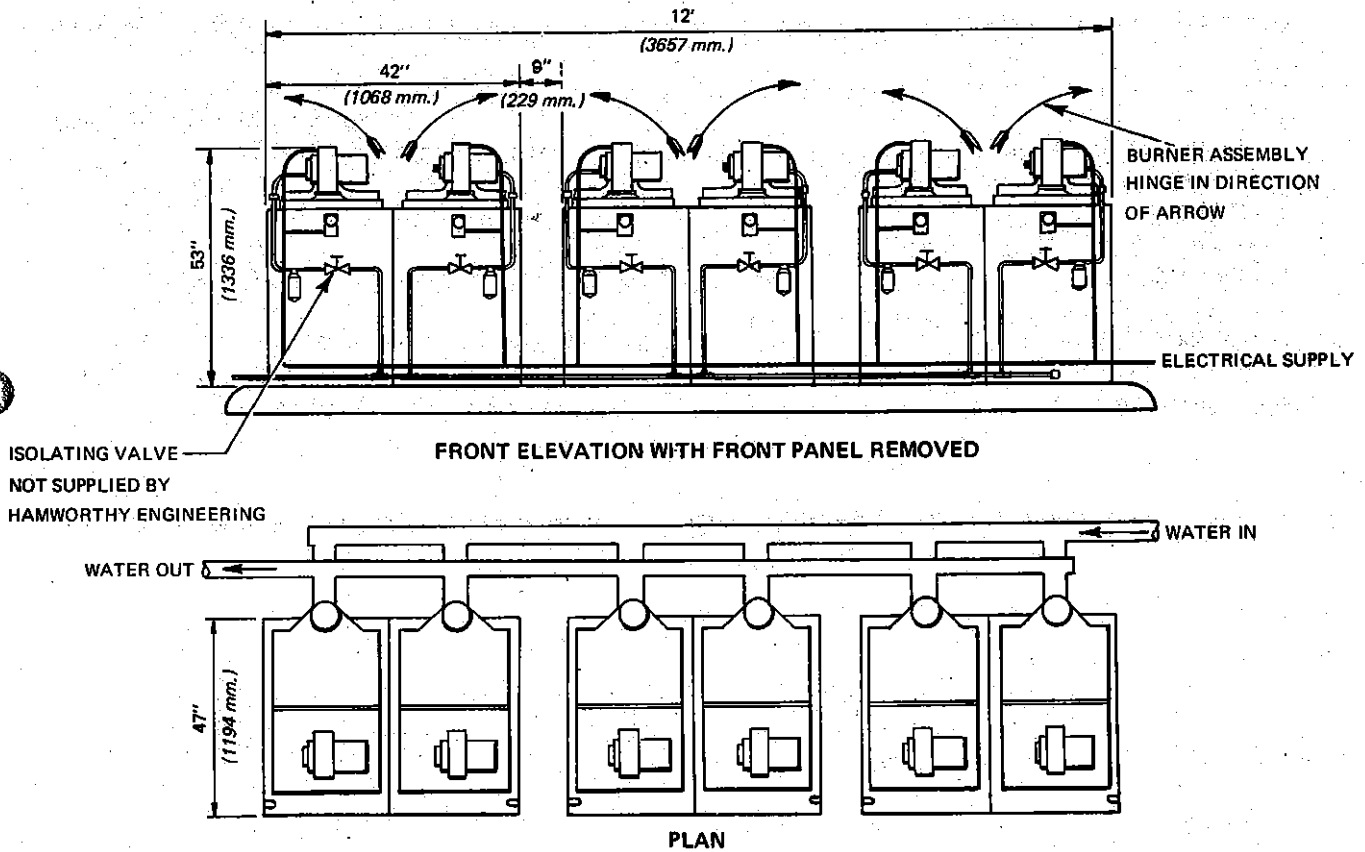


Fig. 3
Typical Modular System showing 6 - P6 Boilers in an ideal layout. Giving a Total Output of 3 million Btu/hr. (879 kW).

Where five or more boilers are coupled together, it is recommended that they should be Sequence Controlled. A suitable 8 or 10 step Control Panel can be supplied by Hamworthy Engineering for this purpose. Details of these control systems can be obtained by contacting the Heating Department of Hamworthy Engineering Ltd.

Each Single Boiler unit or module should be controlled by a thermostat positioned in the main flow pipework at a distance from the unit or units such that mixing of individual boiler outlets is complete. This thermostat is over and above that supplied as a high limit thermostat with the boiler and is not supplied by Hamworthy Engineering Ltd.

Fan	6 ⁵ / ₁₆ in. (160 mm.) Dia.
Photo Electric Cell	Landis & Gyr QRB-1
Control Box	Landis & Gyr LAB-1
Input Rating	625,000 Btu/hr. (183 kW)
Approx Weight	56 lb. (25 kg.)
Safety Controls	The oil burner is fully sequenced and automatically shuts down in event of flame failure. It fully complies with B.S. 799, Part 3.
CASING Type	Sheet Steel, Grey stove enamelled with removable white fascia and fully insulated with glass fibre.

TABLE 1

MODEL REF. PORTLAND	NO. OF MODULES	APPROX. OIL USAGE		OUTPUT		APPROX. INSTALLED WEIGHT		RECOMMENDED CHIMNEY DIAMETER	
		gph	lph	x 1000 Btu/hr.	kW	lb.	Kg.	in.	mm.
P6	1	3.9	17.5	500	146	1480	191	8	203
P2/6	2	7.8	35.1	1000	292	2960	383	12	304
P3/6	3	11.7	52.6	1500	438	4440	574	14	355
P4/6	4	15.6	70.2	2000	584	5920	766	16	406
P5/6	5	19.5	87.7	2500	730	7400	957	18	457
P6/6	6	23.4	105.3	3000	876	8880	1149	18	457

NOTE: Weight of single module as delivered in four packages is approx. 1410 lb. (640 kg.)

Hamworthy Engineering Ltd. reserve the right to alter the Specification without prior notice.

INSTALLATION RECOMMENDATIONS

1. All boilers should be installed to B.S. Code of Practice CP3002 Pt. 1, 1961.
2. Locate boilers so that the length of ducting to chimney is kept to a minimum. The following minimum clearance from combustible materials must be maintained:-

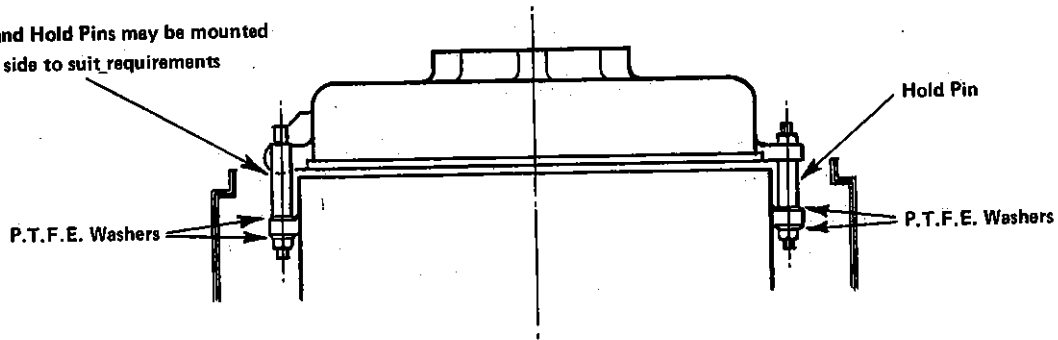
Front and Rear	—	6 in. (152 mm.)	
Sides	—	18 in. (457 mm.)	} for servicing
Top	—	24 in. (610 mm.)	
3. Provide a good level floor capable of bearing the weight of the boiler being installed (approx. 1480 lb. (671 kg.) per single module complete). The base of the boiler is water cooled and no further insulation is required other than specified by the Local Authority.
4. Adequate air for combustion must be provided by at least two openings in the boiler room structure, one located at low level and one at high level. Allow between 30 and 40 sq. in. (19355 — 25806 mm.²) free area per 100,000 Btu/hr. (29 kW) of boiler input.
5. Provide 220–240 volt single phase 50 Hz A.C. electrical supply preferably through a double pole fused switchbox installed in the boiler room. All electrical wiring to be in accordance with I.E.E. regulations.

The flue and horizontal ducting must be self supporting. Under no circumstances should the weight of these components be taken by the flue hood.

7. Boiler Assembly

- a) Mark floor area to show required position of boiler.
- b) Manoeuvre boiler on its wooden pallet to the required position.
- c) Remove pallet and set boiler onto floor.
- d) Fit flue hood and cover and clamp into position using the short tie rod provided and the rear boiler tie rod. Ensure that the asbestos rope seal is fitted between the top section and flue hood.
- e) Check that the burner mounting door and refractory target wall are fitted correctly. The burner mounting door can be set to hinge either to the left or right by adopting the following procedure:-
 - 1) Unscrew the locking nuts on top of the hold pins and remove with washers.
 - 2) Lift the mounting door and remove the hold pins by unscrewing the retaining nut at the bottom of the pin taking care not to lose the P.T.F.E. washers.
 - 3) Close the mounting door and free the hinge pins by unscrewing the retaining nut at the bottom of the pin taking care not to lose the P.T.F.E. washers.
 - 4) Lift the door with the hinge pins in place and relocate on the other side of the boiler ensuring that the P.T.F.E. washers are in position on top of the casting lugs.
 - 5) Bolt up the hinge pins ensuring that P.T.F.E. washers are in position between the casting lugs and the nuts.
 - 6) Replace the hold pins on the opposite side of the boiler ensuring that P.T.F.E. washers are in position above and below the casting lugs.
 - 7) Bolt the door firmly in position using the nuts and washers at the top of the hold pins whilst ensuring that the asbestos rope between door and top section forms a gas tight seal.

Hinge Pins and Hold Pins may be mounted either side to suit requirements



BURNER MOUNTING DOOR HINGING ARRANGEMENT

Fig. 5

- f). Connect water services and chimney ducting. If the boiler is to be installed with a connecting flue, where possible allow at least 24 in. (610 mm.) of vertical flue from the boiler outlet before joining with the horizontal section. Also ensure that the vertical section of flue fits around the outside of the spigot on top of the flue hood (8½ in. (216 mm.) O.D.) and not inside where it could penetrate into the hood and cause a restriction. A draught stabiliser should be supplied and fitted by the Installer into the chimney. On a multi-boiler installation only one stabiliser need be installed, provided it is of sufficient size, either at the base of the chimney or in the dead end on the horizontal section of duct.

The Installer should supply and fit in the system, control thermostats, pressure relief valves, gauges and thermometers as required.

- g) Fit oil burner to mounting door with bolts and gasket provided. The burner can be mounted in any of four positions though the most convenient position will probably be with the Lab 1 control box reset button pointing towards the front of the boiler.
- h) Position one side panel of the casing against the boiler to provide a location for the oil and electrical supply which should preferably be run along the floor and through the cut out provided at the front of the side panel.

The casing is provided with a false front which hides a small compartment approximately 6 in. (152 mm.) deep into which can be fitted the oil filter, oil isolating valve, electrical on-off switch if required and the boiler limit thermostat as illustrated in Figure 6. The oil supply and electrical supply to the burner can then be led out at the top of the casing via the knockouts in the front top casing panel. They should exit from the casing on the same side of the boiler as the hinges on the burner mounting door so that the door can be hinged aside without any disconnections being necessary.

The flexible hose provided should be used as the last connection between oil supply and burner to allow for movement when the door is opened. In all instances an isolating valve (not Hamworthy supply) should be fitted between the main oil supply and the filter.

The oil pump is supplied for connection to a single pipe system. When a two pipe system is required, the pump must be adjusted by the insertion of a small plug, details of which are attached to the oil burner.

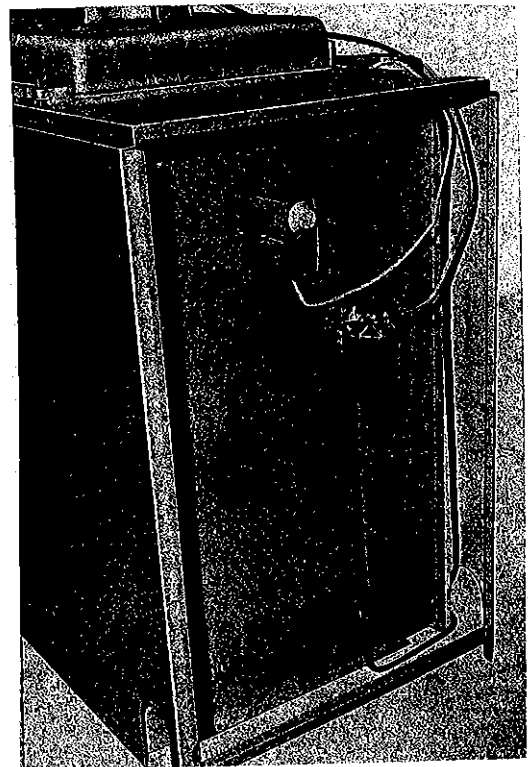
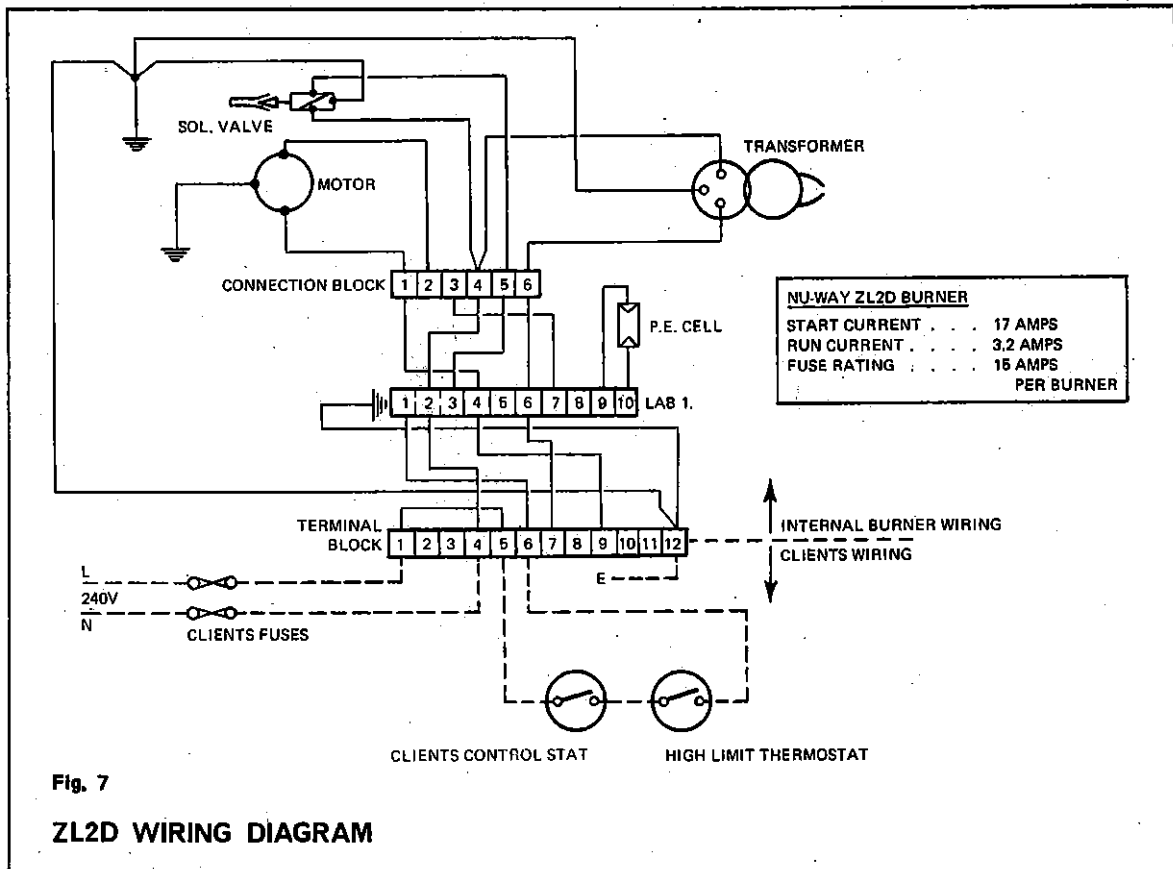


Fig. 6

- i) The burner should be electrically connected in accordance with the wiring diagram shown below. Care should be taken to ensure that the incoming cables will 'flex' as with the oil supply, thus allowing the door to open without disconnecting wires. All exposed wiring should be contained within electrical conduit to prevent any possible damage by heat.



- j) Fill the system with water in accordance with standard practice. Check for leaks. If the boiler feed water has a high degree of hardness, it is recommended that the water be treated to prevent precipitation of the hardness as scale or sludge in the boiler water passageways. Details of additives can be obtained from any reliable manufacturer of water treatment chemicals or from the local Water Board. However, it should be remembered that even if the boiler water is of average hardness, not requiring treatment, subsequent draining of a system for repair or constant make up water in the event of an undetected leak will cause fresh precipitation and gradual build-up of scale. It is essential therefore that leaks are attended to promptly.
- k) Assemble the casing around the boiler and fit the limit thermostat into the pocket on the boiler through the hole provided in the inner front casing panel. Should the boilers have the oil and electrical supplies permanently connected before assembly of the casing, it may prove necessary to fit the inner front casing panel prior to the rest of the casing to enable the correct positioning and supporting of the filter etc. to be carried out.

OIL SUPPLY

Wherever possible a single pipe gravity feed oil supply system should be installed.

In this case the base of the oil tank should not be below the centre line of the oil burner. Connecting oil pipework to the burner should be $\frac{3}{8}$ in. (9.5 mm.) minimum and the length of pipework as short as possible. Care should be taken to ensure that no air locks can form and the minimum amount of bends should be used.

When the bottom of the oil tank is below the centre line of the burner a two-pipe system should be used.

On most installations the fire valve will be actuated by fusible links which should be arranged across the top of the burners as low as possible without interfering with the hinging of the burner door.

COMMISSIONING & LIGHTING-UP INSTRUCTIONS

1. Check that the boiler and system are full of water by momentarily opening pressure relief valve and checking water flows from it.
2. If isolating valves are fitted to the boiler, ensure that they are open and if a pump is fitted to the circuit, ensure that it is running.
3. Ensure the burner is electrically isolated and remove the burner nozzle assembly (see Fig. 8). Check that the nozzle is fitted and that it is of the correct size, and check that the electrodes are positioned in accordance with Fig. 9.
4. Replace nozzle assembly and open the burner door (see Fig. 10).

Check that:

- a) The air cone is the correct diameter.
 - b) The position of the diffuser relative to the nozzle is in accordance with Fig. 11.
 - c) The target wall is in position.
5. Close and secure the burner mounting door.
 6. Turn on oil supply and bleed all air from the system. Air can be bled from the oil pump through the pressure gauge port. When air has been removed, fit a pressure gauge with range 0–300 p.s.i.g. (0–2069 kPa) to the pump (see Fig. 12).

7. Set air damper to approximately one-third open and ensure that there is no obstruction to the air inlet.
8. Turn high limit and control thermostats to their highest setting.
9. Switch on oil burner electrical supply and burner should pre-purge and then ignite.
10. Adjust oil pressure on burner pump by means of adjusting screw (see Fig. 12 and general data).
11. Adjust air damper (and draught stabiliser if fitted) to give a boiler exit draught of 0.08 in. (2 mm.) w.g. a smoke number of 0–1 on the Bacharach Scale and a CO₂ reading of 10%. It is important that the above smoke number is obtained and maintained throughout the life of the boiler. Lock the air damper in position when satisfactory figures have been obtained.
12. Switch off burner and remove pressure gauge, and refit plug.
13. Re-start burner and set control and limit thermostats to their required settings.
14. Check all controls to ensure they operate correctly.

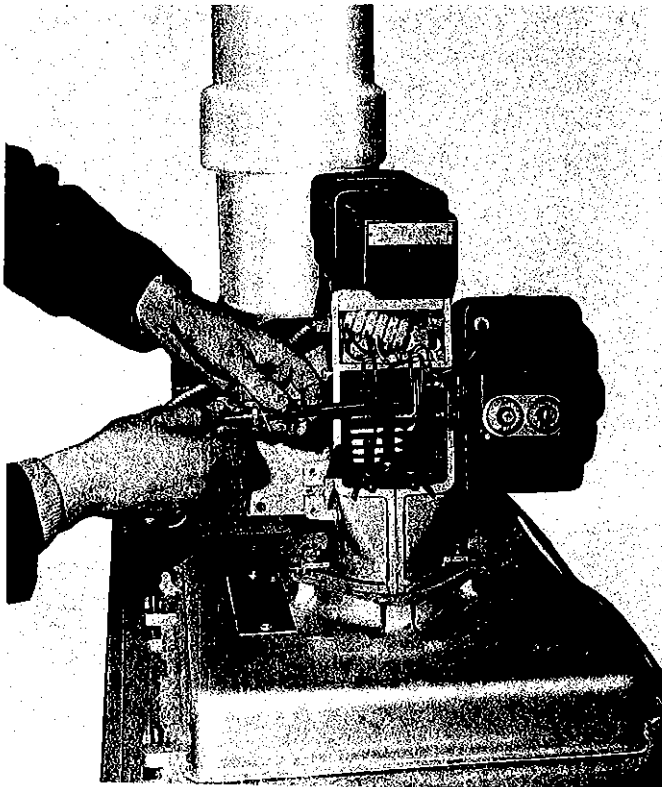
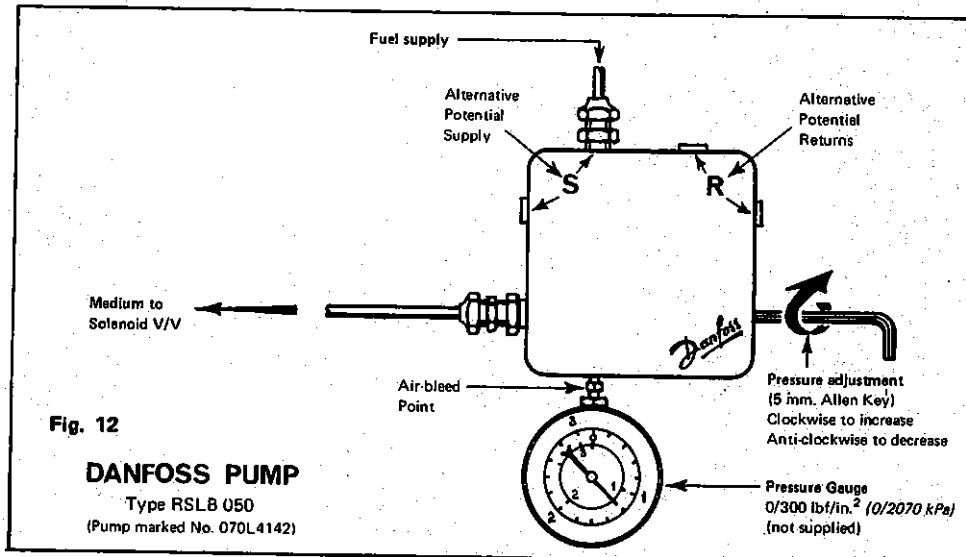
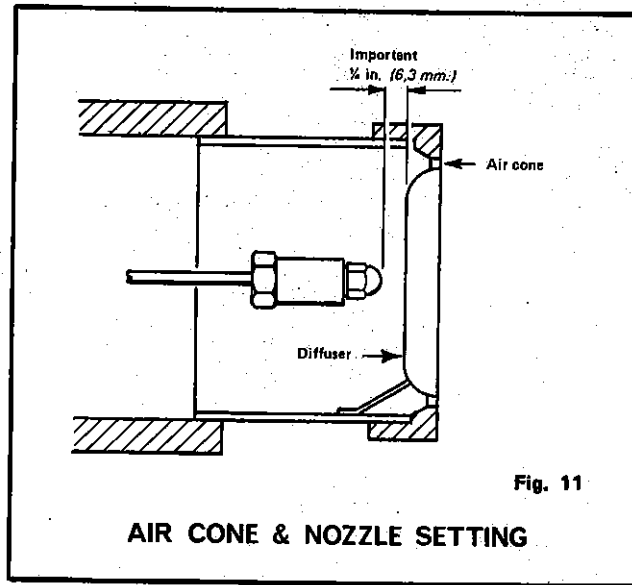
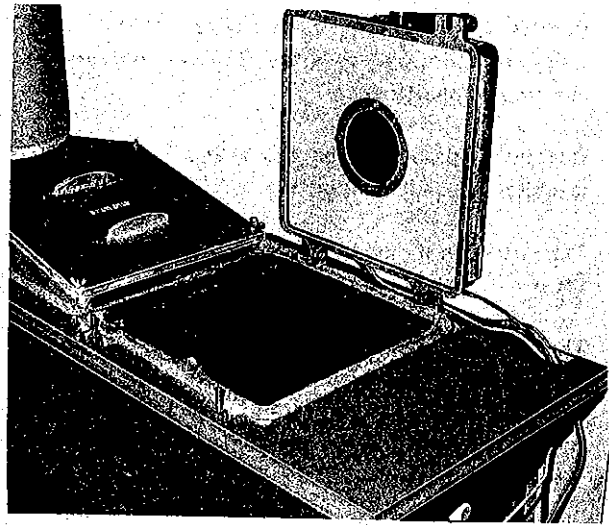
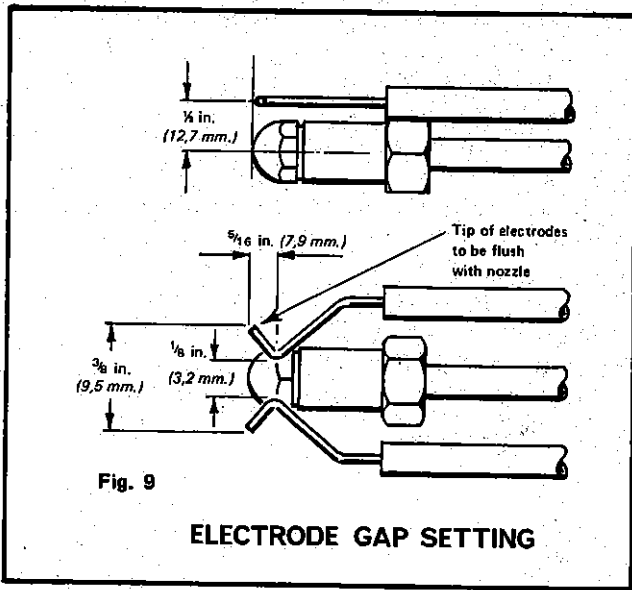


Fig. 8

Removing Burner Nozzle Assembly

To remove the nozzle assembly, slacken off the screw at the side of the transformer and swing the latter aside. Remove the small slide which grips the oil feed pipe and loosen the oil pipe connection to the solenoid valve. The nozzle assembly is then free to be lifted out as shown.



HAMWORTHY PORTLAND BOILER

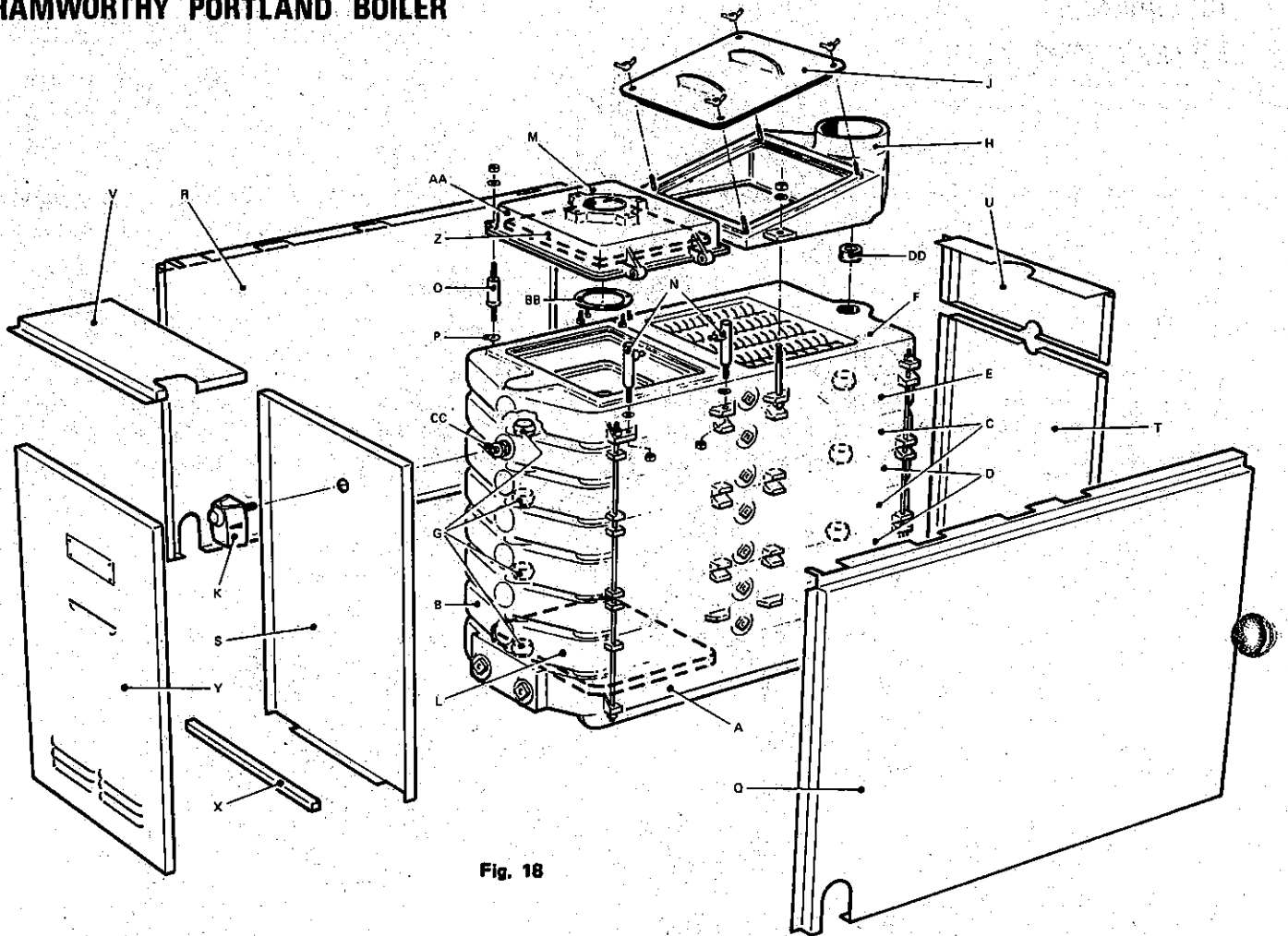


Fig. 18

HAMWORTHY PORTLAND PARTS LIST

Ref.	Name of Part	Part No.	No. Reqd.	Ref.	Name of Part	Part No.	No. Reqd.
A	Wet Base	330899645	1	P	P.T.F.E. Washer	331604515	8
B	Make Up Section	330899652	1	Q	R.H. Side Panel	330899710	1
C	Middle Section R.H.	330899678	2	R	L.H. Side Panel	330899694	1
D	Middle Section L.H.	330899660	2	S	Inner Front Panel	330899728	1
E	Middle Thermo Section	330899801	1	T	Rear Panel	330899702	1
F	Top Section	330899793	1	U	Top Rear Panel	330899876	1
G	Nipple	330502033	7	V	Top Front Panel	330860894	1
H	Flue Hood	333005158	1	X	Front Tie Bar	330170153	1
J	Flue Hood Cover	333005133	1	Y	Front Panel	330899686	1
K	High Limit Thermostat	747433156	1	Z	Millboard Shield	331205131	1
L	Target Wall	339903554	1	AA	Insulation	331205149	1
M	Burner Mounting Door	330860746	1	BB	Retaining Ring	330190078	1
N	Hinge Pin	332015638	2	CC	Thermostat Pocket	331050032	1
O	Hold Pin	332015646	2	DD	Countersunk Plug	742222083	1

All boiler component spares are obtainable from:-

Hamworthy Engineering Limited, Combustion Division, Heating Department,
 Fleets Corner, POOLE, Dorset BH17 7LA Telephone: Poole 5123