





WIMBORNE CAST IRON BOILERS

INSTALLATION INSTRUCTIONS

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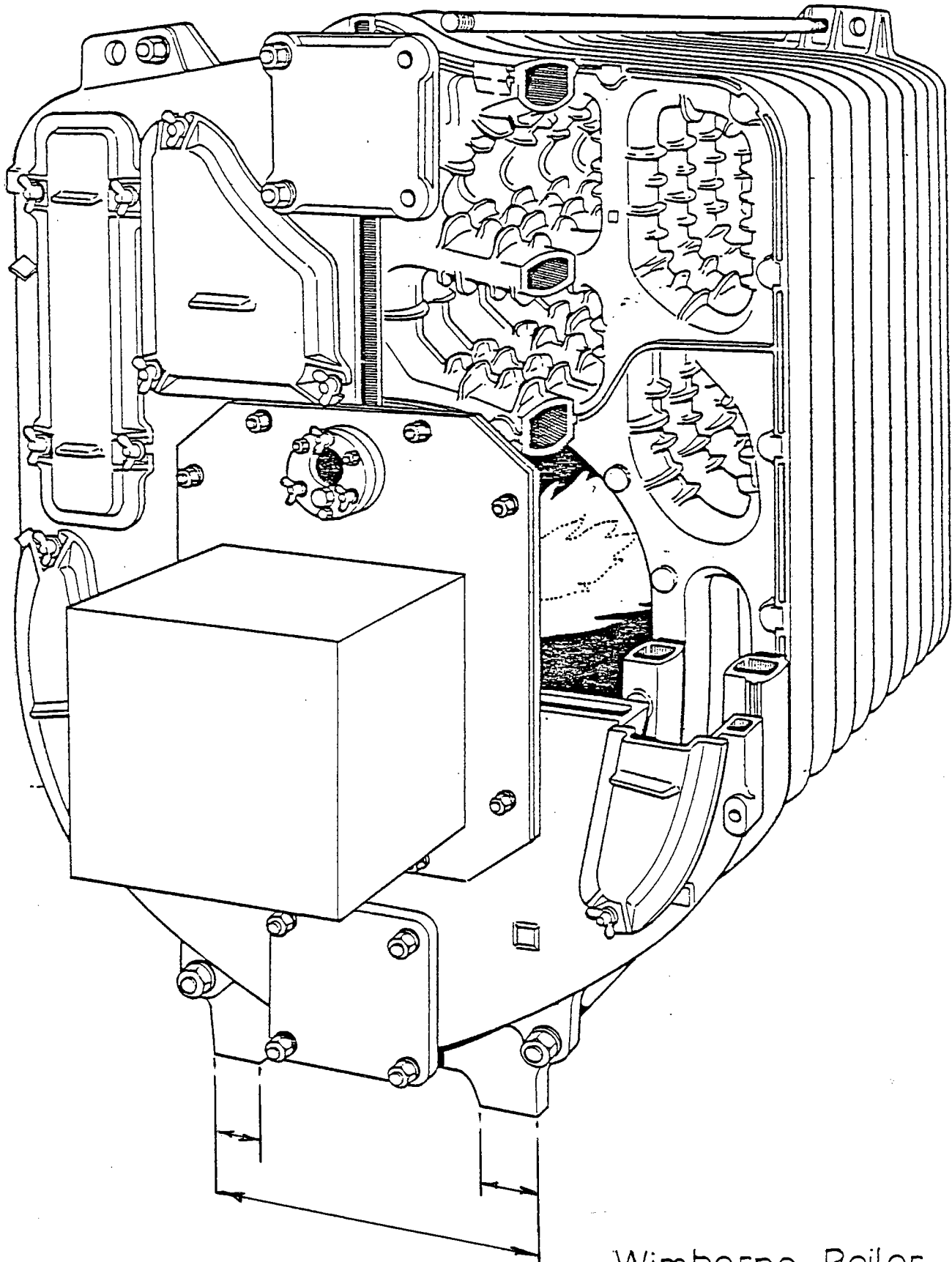
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Appendix I - Limit Thermostat Range Adjustment



Wimborne Boiler

FIG. 1

1. INTRODUCTION AND GENERAL DESCRIPTION

- i) The Hamworthy Wimborne Boiler has been introduced to complement the existing range of Hamworthy gas and oil fired modular boilers. The Wimborne boiler is designed to provide an input range between 226 and 835 kW. The boilers have a maximum water pressure rating of 7 bar .g. and are suitable for both open and pressurised systems.

The boilers are constructed from a number of cast iron sections mounted vertically. Connection between sections is made with steel nipples and the assembled boiler is held together with tie rods. The complete assembly forms a compact water cooled combustion chamber and heat exchanger.

The boilers are supplied with matched burners and are suitable for operating with a natural draught flue. Burners are available for firing fuel oil, natural gas or LPG. Two stage and dual fuel burners can also be supplied.

The boilers are delivered to site in kit form ready for site assembly. The cast iron sections are supplied on pallets. All other parts required for site assembly of the boilers are supplied as loose items or in carton packs.

ii) Delivery/Extent of Supply

The boiler is normally supplied as a set of equipment comprising:-

- a) Cast iron sections supplied loose for site assembly.
- b) All equipment and materials required for site assembly of the boiler (i.e rods, nipples, mastic and sealing compounds etc).
- c) Horizontal outlet rear flue hood other heat exchanger components. Flue access plates and fastenings.
- d) Burner mounting plate, drilled ready to accept burner.
- e) Flow and return manifolds and matching flanges.
- f) Casing panels and insulating blanket.
- g) Control panel containing the following:-
 - . Power on Light
 - . Burner On/Off Switch
 - . Thermostat Test Switch
 - . Hours Run Meter (TOTAL HOURS RUN)
 - . High Temperature Limit Thermostat
 - . Hours Run Meter (HIGH FIRE)
 - . Burner Lock Out Light
 - . High Temperature Lock Out Light
 - . High Temperature Reset Switch
 - . Water Flow Temperature Gauge (suitable for single boiler application only)
 - . Flue Gas Exit Temperature Gauge
- h) Matched burner. (Gas/Oil, Single/Dual Fuel, On/Off or High/Low Operation).
- i) Due to the many burner variables possible on the Wimborne range of boilers, the wiring between the burner and control panel is excluded. Ref. table 1 and section 10 of this manual for wiring recommendations.

1. GENERAL REQUIREMENTS

- i) The boiler should only be installed by a competent person in accordance with the relevant statutory requirements and codes of practice. It is in your own interest and the safety of all concerned that these requirements are complied with.

The installation of the boiler should be in accordance with the requirements of British Standards, Building Regulations, I.E.E. Regulations and the requirement of the local authority and local water undertaking.

If the boiler is gas fired the installation must comply with the requirements of the Gas Safety Regulations and the requirements of the local gas region.

The relevant sections of the following documents must be observed:-

British standards codes of practice:

- CP 341.300 - 307 Central heating by low pressure hot water.
- CP 342 Centralised hot water supply:
Part 1 - Individual dwellings.
Part 2 - Buildings other than individual dwellings.
- CIBS Guide Particular reference should be made to sections B7, B11 and B13, and the installation must be in accordance with our recommendations and good practice for our Warranty to apply.

ii) Oil Fired Boilers

The following standards apply to oil fired boilers.

- BS 5410 Parts 2 - Oil fired installations of 44 kW and above output capacity for space heating/hot water.

iii) Gas Fired Boilers

The installation should also be in accordance with any relevant requirements of the Local Gas Region and the relevant recommendations of the following documents:-

British Standard Codes of Practice.

- CP 331 Installation of pipes and meters for Town Gas.
Part 3 - Low pressure installation pipes.
- CP 332 Selection and installation of Town Gas space heating.
- BS6644 Specification for Installation Requirements for Gas Fired Hot Water Boilers or groups of Boilers with Rated Inputs above 60 kW but not greater than 2 MW.

/Continued.....

British Gas Publications.

Technical notes for the design of flues for non domestic gas boilers, combustion air and ventilation air, guidance notes for boiler installations in excess of 2,000,000 Btu/h (586 kW) output.

iv) Heating Controls

In order to ensure that the installation operates efficiently the following sections of the Building Regulations should be observed:-

The Building Regulations 1985. Part L Conservation of Fuel and Power

The Requirement Heating System Controls L4

'Space heating or hot water systems in building's shall be provided with automatic controls capable of controlling the operation and output of space heating systems and the temperature of stored water.'

Provisions meeting the performance - Boiler Control 1 - 3.

'Boiler Controls are required to achieve efficient operation where two or more gas or oil fired boilers with a total load of more than 100 kW, supply the same heat demands. Boilers run most efficiently at or near full output and control should be provided in a form which can detect variation in the need for heat in the building and so start, stop, or modulate the boiler as needed (sequence control). Care is needed in hydraulic design to ensure stable control.'

Hamworthy Engineering's Boiler Sequence Controller fully meets the provisions stated above and provision 1.1 (b) for weather compensating control.

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INPUT

TABLE 1
TECHNICAL DATA - WIMBORNE BOILERS

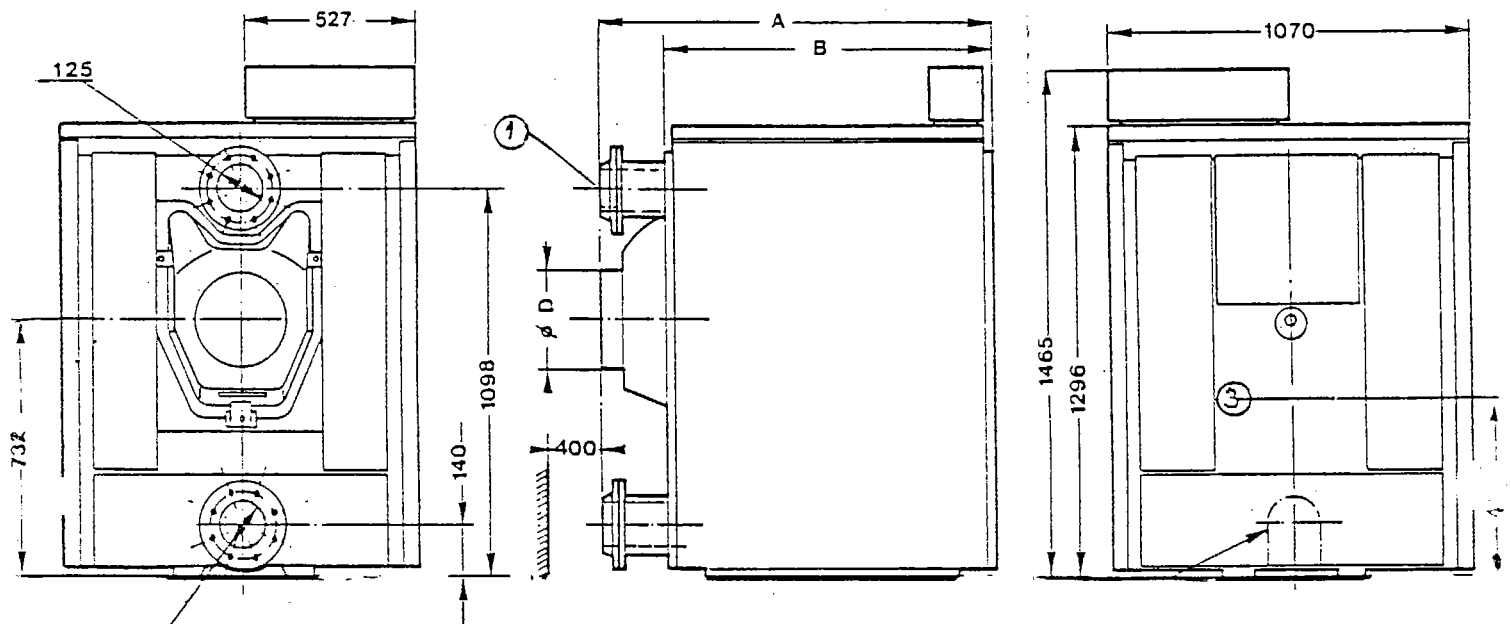
	KW 280.4 356.1 431.8 476.6 583.2 659.7 735.6 810.2 884.9 963.8 1037.3										
BOILER SIZE	6	7	8	9	10	11	12	13	14	15	16
HEAT INPUT TO WATER Kw	226	287	348	409	470	531	592	653	713	776	795-835
DESIGN WATER FLOW RATE AT 11°C l/min	294	374	454	533	613	693	772	852	930	1013	1038-1090
MINIMUM WATER FLOW RATE AT 22°C l/min	147	187	227	267	307	347	386	426	465	507	545
WATERSIDE PRESSURE DROP AT 11°C m bar	5	7	10	13	17	22	27	32	38	44	50
MINIMUM WATER PRESS. bar.g	7	7	7	7	7	7	7	7	7	7	7
WATER CONNECTIONS FLOW AND RETURN	5" BS4504 TABLE 16/3 FLANGE										
MAXIMUM WATER FLOW TEMPERATURE °C	110	110	110	110	110	110	110	110	110	110	110
WATER CONTENT l	206	238	270	302	334	366	398	430	462	494	526
INPUT RATE OIL 35 SR1 l/h	26.9	34.1	41.4	48.6	55.9	63.1	70.4	77.6	84.8	92.3	94.5-97.3
APPROX FLUE GAS VOLUMES (OIL FIRING) (VOLUMES REFERRED TO 0°C & 1013 m bar) m ³ /h	367	466	556	665	764	861	962	1060	1151	1257	1290-1350
APPROX FLUE GAS TEMP. (OIL FIRING) °C	240	240	240	240	240	240	240	240	240	240	240
INPUT RATE NAT. GAS m ³ /h	26.3	33.4	40.5	44.7	54.7	61.9	69.0	76.0	83.0	90.4	92.6-97.3
APPROX FLUE GAS VOLUMES (GAS FIRING) (VOLUMES REFERRED TO 0°C & 1013 m bar) m ³ /h	339	431	514	615	706	756	889	980	1071	1163	1254
APPROX FLUE GAS TEMP. (GAS FIRING) °C	210	210	210	210	210	210	210	210	210	210	210
MIN GAS PRESS. REQUIRED AT GAS TRAIN INLET * m bar	17.5	17.5	17.5	17.5	17.5	19.9	19.9	17.5	17.5	19.9	19.9
GAS CONNECTIONS BSPF	1½	1½	1½	2	2	2	2	2½	2½	2½	2½
BOILER GAS SIDE RESISTANCE m bar	0.88	1.34	1.56	1.58	1.85	2.25	2.36	3.5	3.9	4.25	4.5
DRAUGHT REQUIRED AT BOILER OUTLET (SUCTION) m bar	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3	0-0.3
FLUE CONNECTION mm	250	250	300	300	300	300	350	350	350	350	350
ELECTRICAL SUPPLY FUSED AND RATED AT	6 AMPS 240V 50 HZ 1 PHASE	6 AMPS 240V 50HZ	6 AMPS 415V 50 HZ 3 PHASE	6 AMPS 415V 50 HZ 3 PHASE	6 AMPS 415V 50 HZ 3 PHASE	10 AMPS 415V 50 HZ 3 PHASE	10 AMPS 415V 50 HZ 3 PHASE	10 AMPS 415V 50 HZ 3 PHASE	10 AMPS 415V 50 HZ 3 PHASE	10 AMPS 415V 50 HZ 3 PHASE	10 AMPS 415V 50 HZ 3 PHASE

* RIELLO GAS ONLY BURNERS

REFER TO H.E.L. FOR OTHER BURNERS

FIGURE 2.

WIMBORNE BOILER (OVERALL DIMENSIONS)

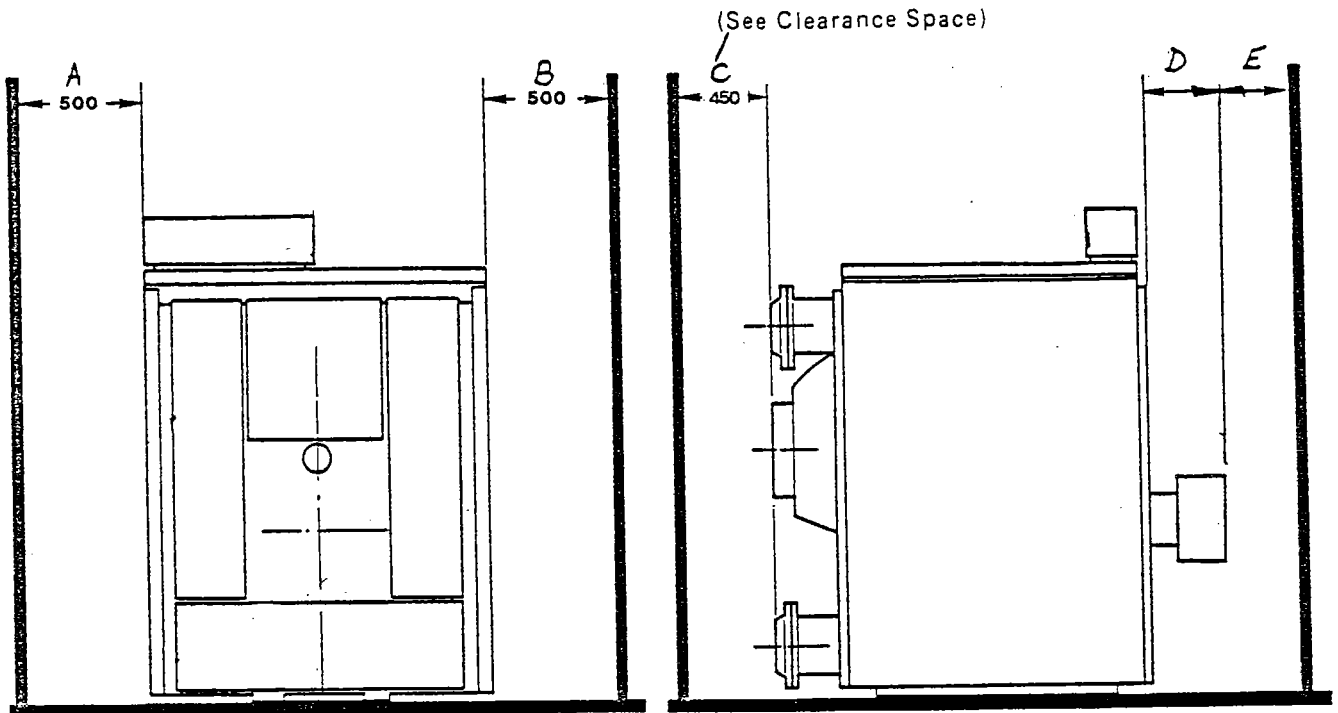


- (1) FLOW CONNECTION (FLANGED BS4504 TABLE 16/3)
- (2) RETURN CONNECTION (FLANGED BS4504 TABLE 16/3)
- (3) BURNER CENTRE LINE (FROM TOP OF PLINTH)

BOILER	NO. OF SECTIONS	DIMENSION			SHIPPING WEIGHT (KG)	WATER CAPACITY (LITRES)
		A	B	ØD		
6	6	1206	1021	250	1144	206
7	7	1342	1157	250	1288	238
8	8	1482	1297	300	1433	270
9	9	1622	1437	300	1585	302
10	10	1761	1576	300	1740	334
11	11	1901	1716	300	1878	366
12	12	2041	1856	350	2023	398
13	13	2180	1995	350	2161	430
14	14	2316	2131	350	2310	462
15	15	2455	2270	350	2440	494
16	16	2595	2410	350	2580	526

FIGURE 3.

BOILER CLEARANCE



WIMBORNE MODEL	DIMENSION			DIMENSION D		DIMENSION E	
	A	B	C	OIL FIRING	GAS FIRING	OIL FIRING	GAS FIRING
6	500	500	450	473	610	500	700
7	500	500	450	473	610	500	700
8	500	500	450	473	610	500	700
9	500	500	450	473	645	500	700
10	500	500	450	506	645	600	700
11	500	500	450	506	645	600	700
12	500	500	450	570	770	600	900
13	500	500	450	570	770	600	900
14	500	500	450	570	770	600	900
15	500	500	450	570	770	600	900
16	500	500	450	570	920	600	900

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BOILER ROOM LAYOUT

i) Base

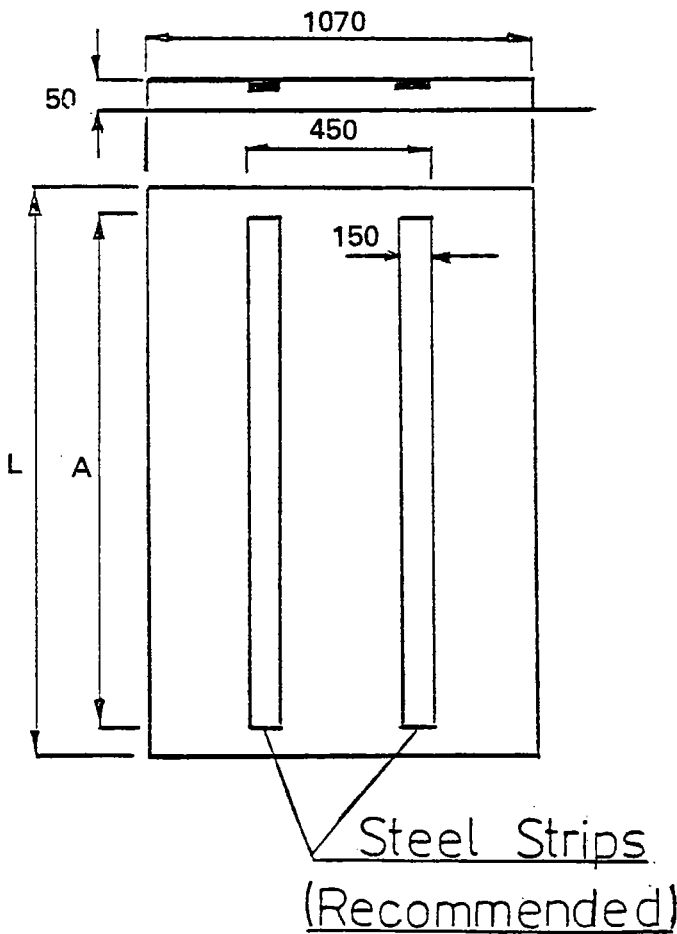
The boilers must be positioned on a level fire proof plinth of concrete or brick. Attention must be paid to the floor loadings (boiler weights are given in the table of dimensions). The plinth should be a minimum of 50 mm high and should end flush with the boiler casing front to prevent interference with the burner, oil pipework, or gas train. (See Figs 3 & 4).

ii) Clearance Space

Dimension C is a minimum recommendation permitting access to the rear of the boiler for maintenance.

It may not be sufficient in many instances for the fitting of flue bends "within" the boiler house and where necessary dimension C must be increased accordingly.

PLINTH DIMENSIONS (FIG. 4)



BOILER NO	A (mm)	L (mm)
6	900	1120
7	1040	1260
8	1180	1400
9	1320	1540
10	1460	1680
11	1600	1820
12	1740	1960
13	1880	2100
14	2020	2240
15	2160	2380
16	2300	2520

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5. AIR SUPPLY AND VENTILATION

- i) An adequate supply of air for combustion, dilution of combustion products and ventilation of the boiler house must be provided.

The supply of air for combustion dilution and ventilation must be supplied in accordance with B.S.6644.

The air supply to the boiler house shall be achieved by one of the following methods:-

- a) Air supply through a low level opening and discharged through a smaller sized high level opening.
- b) Air supplied by a fan to a low level opening and discharged naturally through a high level opening.
- c) Air supplied by a fan to a low level opening and discharged by means of a fan at a high level. The fans shall be selected so as not to cause a negative pressure in the boiler house relative to the outside pressure.

ii) Natural Ventilation

Where natural ventilation is used suitable permanent openings connected directly to the outside air shall be provided. The openings should be fitted with grilles that cannot easily be blocked or flooded. The free area of the grilles should be as follows:-

Low Level (Inlet) 540 cm² plus 4.5 cm² per kW in excess of 60 kW of total rated input.

High Level (Outlet) 270 cm² plus 2.25 cm² per kW in excess of 60 kW of total rated input.

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6. FLUE REQUIREMENTS AND DESIGN PRACTICES

The flue must be designed in accordance with local authority regulations and the recommendations of the Clean Air Act and BS.6644.

The flue system must be designed to suit the flue gas volume at the temperatures at which the gases leave the boiler exit. The flue system should provide a suction of between 0 - 0.3 mbar at the boiler exit.

To aid removal of the products of combustion and to prevent a "tamping effect" when the burner is started it is recommended that the following practices are followed.

Extract from I.H.V.E. Guide Section B13

- (a) Position the boilers as close as possible to the chimney to limit friction and heat losses in the connecting flue system.
- (b) Avoid all short radius 90° bends in flue systems.
- (c) Avoid abrupt section changes, and use transformation sections with 15° included angles.
- (d) Arrange the flue/chimney entry section to slope at 45° or more to the horizontal.
- (e) Avoid protrusion of the flues beyond the inner face of the chimney or main flue connection.
- (f) Make flues circular or square, and as a design limit avoid aspect ratios greater than 1.5 to 1, width to depth.
- (g) Where possible slope flues upwards towards the chimney.
- (h) Fit clean-out doors at each bend in the flues, at the chimney base, and adjacent to fans and dampers to aid in the maintenance of a clean flue system.
- (i) Avoid long "dead" chimney pockets under the flue entry points which are corrosion zones, and can cause harmonic pulsation problems.

A flue gas sampling point should be provided close to the boiler exit to enable CO₂, temperature, CO, and smoke number measurements to be made. A draught controller and stabilising device may be fitted if the flue dimensions or external conditions are likely to disturb the draught.

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7. FUEL SUPPLY

i) Gas Supply

a) Service Pipes

The local gas region must be consulted at the installation planning stage in order to establish the availability of an adequate supply of gas.

An existing service pipe must not be used without prior consultation with the local gas region.

b) Meters

A new gas meter will be connected to the service pipe by the local gas region, or a local gas region contractor.

An existing meter should be checked, preferably by the gas region, to ensure that it is adequate to deal with the rate of gas supply required.

c) Gas Supply Pipes

Supply pipes must be fitted in accordance with CP 331:3. Pipework from the meter to the boiler must be of adequate size. Do not use pipes of a smaller size than the boiler gas connection. The complete installation must be tested for soundness as described in the above Code.

If flexible connections are made between the gas supply and boiler the connections must comply with the following standards:-

B.S.5601 Part 1 and B.S.669 Part 2.

d) Boosted Supplies

Where it is necessary to employ a gas pressure booster, the controls must include a low pressure cut-off switch at the booster inlet. The local gas region must be consulted before a gas pressure booster is fitted.

ii) Oil Supply

a) Oil Supply Connections

The oil supply connections between the storage tank and the burner should be run in copper, steel or aluminium pipe. Galvanised pipes and fittings should not be used. All pipework and fittings must be oil tight and screwed joints should be made good with an oil resistant compound.

The supply should terminate close to the burner with a valve and filter, and approximately the last ½m should be run in flexible pipe to facilitate moving the burner away from the appliance during servicing.

The size and arrangement of pipework will depend on the distance and height of the storage tank in relation to the oil pump inlet on the burner.

b) Burner Fuel Pumps

The fuel pump supplied and fitted to each burner will vary between types and model numbers, refer to the supplement for burner details.

c) Gravity Feed Supply

Where the delivery connection on the tank is above the level of the pump inlet a single pipe may be used.

The burner oil pump is normally set for this supply arrangement.

d) Suction Lift Supply

Where the delivery connection on the tank is below the level of the pump inlet a two pipe system MUST BE USED.

Depending on the exact burner model supplied, it may be possible to convert the oil pump for use on this system. REFER to burner supplement for details.

If the suction pipe rises higher than the oil pump inlet at any point on the run it is recommended that a priming point should be provided so that if necessary it can be used to prime the line or check the effectiveness of the non-return valve at the tank end. Otherwise the vacuum gauge port on the pump can be used for this purpose.

/Continued.....

8. WATER SUPPLY AND SYSTEM DESIGN

- i) In order to ensure reliable operation of the boilers, the water system should be designed to comply with the following conditions:-
 - a) The minimum water flow rate as stated in Table 1 must be maintained at all times. This will limit the water temperature rise across the boiler to 22°C. The control system, pumps and valves should be designed to ensure this flow at all times.
 - b) Where boilers are switched on and off under time switch control, the system must be designed to overrun after the last boiler has ceased firing. This will prevent local overheating as a result of zero water flow through the boiler.
 - c) When firing the boilers with fuel oil, the return water temperature should not be less than 60°C (140°F). A return water temperature below this may result in acid condensation and corrosion of the boiler heating surfaces.

ii) Feed Water Quality

The use of hard water or the continual replenishment of the system will result in scaling of the boiler. In order to prevent this the following measures should be taken:-

- a) Ensure that system leaks are repaired quickly, and draining of the system is kept to an absolute minimum.
- b) If the water temporary hardness exceeds 250 ppm, the boiler must be filled with softened water. It is recommended that the water be treated to prevent precipitation of scale or sludge in the boiler water passageways.
- c) Old systems should be treated with deflocculating agents and flushed out at least twice. The system should then be filled with softened water. If any doubt still exists about the cleanliness of the system, consideration should be given to the fitting of a coarse filter in the return pipework to the boilers.

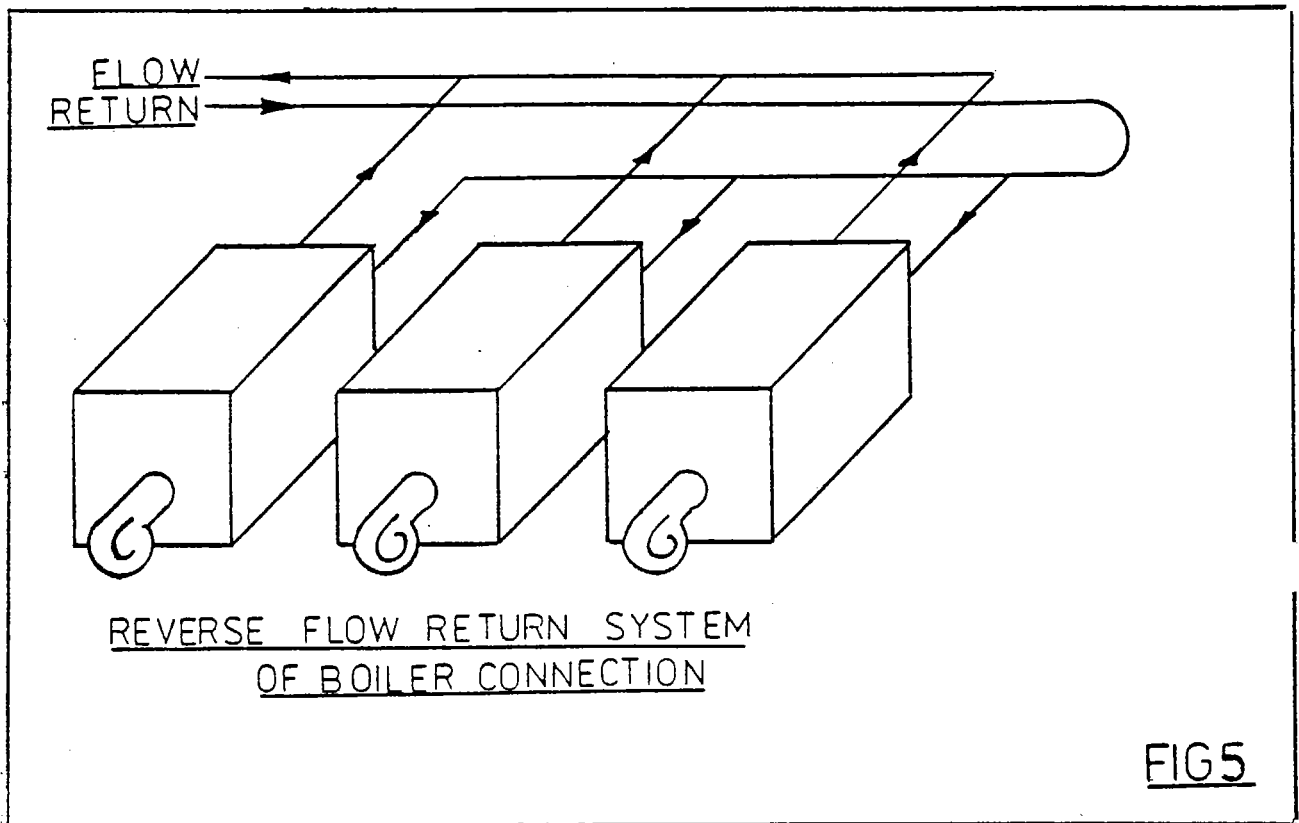
iii) Water Flow System

It is important that the system is designed to use the reverse return method of water connections. This is used to ensure an even flow of water through boilers connected in parallel. (See Fig. 5)

Using this method of connection the water pressure loss across any number of boilers will never be greater than that for a single module plus local pipework losses.

N.B. Where boilers are connected in parallel the boiler water temperature gauge will indicate the boiler flow temperature which may differ substantially to the temperature in the mixed flow header.

/Continued.....



iv) Boiler Operating Temperatures

a) Control Thermostats

The boilers are supplied with control thermostats which have a maximum setting of 110°C. Where the boilers are to be fitted on high temperature systems a "special to contract" thermostat can be supplied which has adjustment up to 130°C. The upper range of this thermostat can be limited as shown in Appendix I of this document.

b) Limit Thermostat (Overheat Cut-Off Device)

The limit thermostat has a range of 95°C to 130°C. The required limit temperature must be set to suit site requirements during initial commissioning. Adjustment is made by removing the limit thermostat from the control panel and by adjusting the range screw to the required setting.

The maximum operating temperature of the system is limited by the system static water pressure and the maximum temperature of the control and limit thermostats must be set accordingly (see below).

v) Minimum Water System Pressure

To comply with Guidance Note PM5 from the Health and Safety Executive the minimum static water pressure at the highest point in the circulating system must be calculated as follows:-

/Continued.....

If the boilers are to be installed as single units the minimum pressure must be equal to the gauge pressure equivalent to the saturated steam temperature obtained by adding 17°C to the required boiler flow temperature but never less than 2 m (6.5 ft).

e.g. 1. Required Flow Temperature	= 95°C
Safety Margin	= 17°C
Equivalent Saturated Steam Temperature	= <u>112°C</u>
From Steam Tables - corresponding Gauge Pressure	= 0.52 bar (7.5 psi)
	= 5.3 m (17.3 ft) head of water

If the boilers are to be installed in a modular formation the minimum pressure must be equal to the gauge pressure equivalent to the saturated steam temperature obtained by adding 17°C to the sum of the required mixed flow temperature and the temperature rise across the boilers.

e.g. 2. Required Mixed Flow Temperature	= 82°C
Temperature rise across boilers at minimum flow	= 11°C
Safety Margin	= 17°C
Equivalent Saturated Steam Temperature	= <u>110°C</u>
From Steam Tables - corresponding Gauge Pressure	= 0.41 bar (5.98 psi)
	= 4.18 m (13.7 ft) head of water

vi) SAFETY VALVES

The most important single safety device fitted to a boiler is its safety valve and each boiler, or in the case of modular installations, each bank of boilers, must be fitted with a pressure relief valve.

Clause 9 of BS6644 provides comprehensive information for the selection and location of safety valves and attention is drawn to the higher capacity requirements of safety valves for pressurised hot water systems (ref - clause 9.1.3.).

/Continued.....

vii) Pressure Gauge

The boiler system shall be fitted with a gauge that indicates the pressure in metres of water or bars. The gauge shall be fitted either on the boiler or on the adjacent flow pipe and sited so that it can be easily read and replaced without draining the boiler/system.

viii) Drain Valve

The boiler shall be fitted with a drain valve to B.S.2879 operated by means of a removable key. (Drain valve supplied).

/Continued.....

9. BOILER ASSEMBLY

- i) Boilers are normally supplied on several pallets containing all the components required to assemble the boiler on site. The components are supplied as follows:-
- a) Front and rear boiler sections plus a number of front, centre and rear intermediate sections.
 - b) Four tie rods of appropriate lengths complete with fasteners.
 - c) Set of nipples and mastic sufficient to join and seal the boiler.
 - d) Flue connecting spigot of appropriate diameter.
 - e) Water distribution tube. (Boiler sizes 12 - 16)
 - f) Burner mounting plate.
 - g) Box of accessories comprising flue access doors, flow and return manifolds, furnace backwall protection plate, rear flue hoods and all fastenings required to complete the boiler heat exchanger assembly.
 - h) Kits of casing supports (as required).
 - i) Front and rear casing kits (complete with fasteners).
 - j) Top and sides casing kit(s) of appropriate length.
 - k) Control panel.
 - l) Insulation blanket.
 - m) Burner (and gas train).
 - n) Flue cleaning brushes.

With the help of the packing list, make sure that all components and accessories are present.

Check the sections with great care, making sure that the orifices have not been damaged during handling operations, as such damage could lead to subsequent leakage. Remove all foreign bodies which may have found their way inside the sections.

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ii) INSTALLATION PROCEDURE

- a) Assemble boiler sections in required position.
- b) Fit flow and return manifolds, water distribution tube (if supplied) drain cock and plugs, rectangular flanges on front of boiler and thermostat pockets.
- c) Carry out hydraulic test.
- d) Fit flue access doors, rear flue hood, burner support plate and insulation.
- e) Fit insulation blanket, casing panels and control box.
- f) Fit burner and connect fuel and water supplies.
- g) Carry out electrical installation and wiring between control panel and burner.

iii) ASSEMBLY OF SECTIONS

These sections are connected with nipples which must be coated with special S.G.F. sealing compound (Supplied with the boiler) to ensure a leak-free assembly.

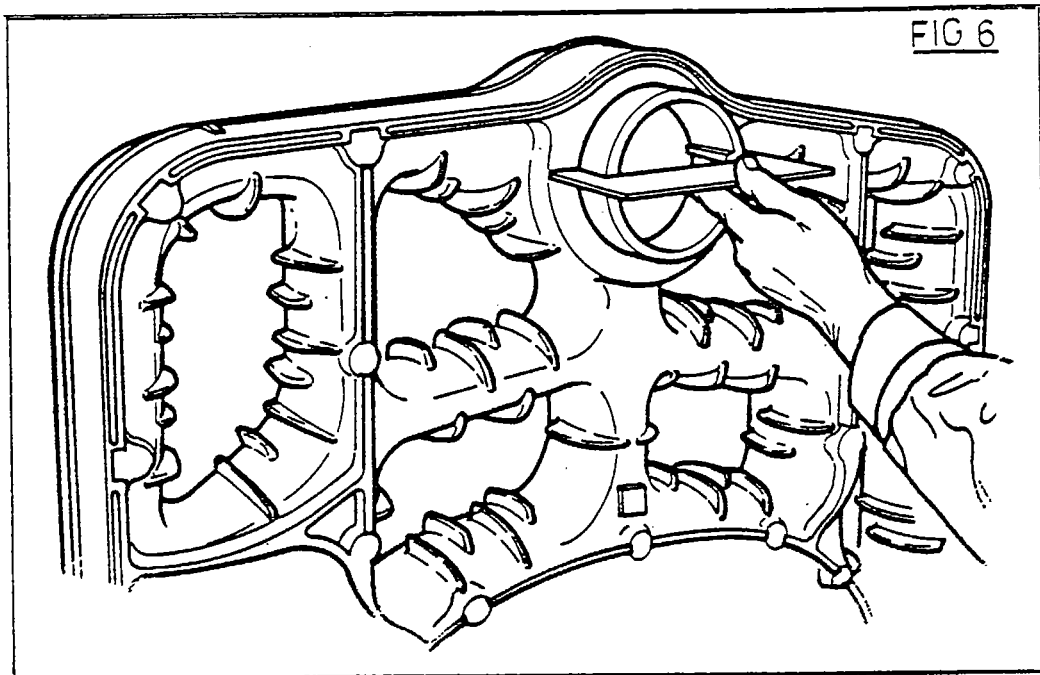
ALWAYS START WITH THE REAR SECTION

- a) Position the rear section vertically and prevent it from falling.
- b) Thoroughly clean the bores and nipples. Take the 2 nipples required and clean them with methylated spirit: if burrs or small patches of rust are present, remove them with very fine emery cloth. Never use old nipples. Clean the bores in the same way.
- c) Apply S.G.F. sealing compound inside the top and bottom bores, as well as on the nipples, with a clean brush or cloth.
- d) Insert the nipples into the bores by hand, ensuring that they are correctly positioned. (See Fig 6).

Using a piece of hard wood and hammer (or mallet), tap the nipples to make sure that they are secured in position.

Do not drive them in too far and make sure that they fit squarely (an incorrectly lined up nipple could cause the breakage of a section). Use the supplied template to ensure that the nipples are correctly inserted.

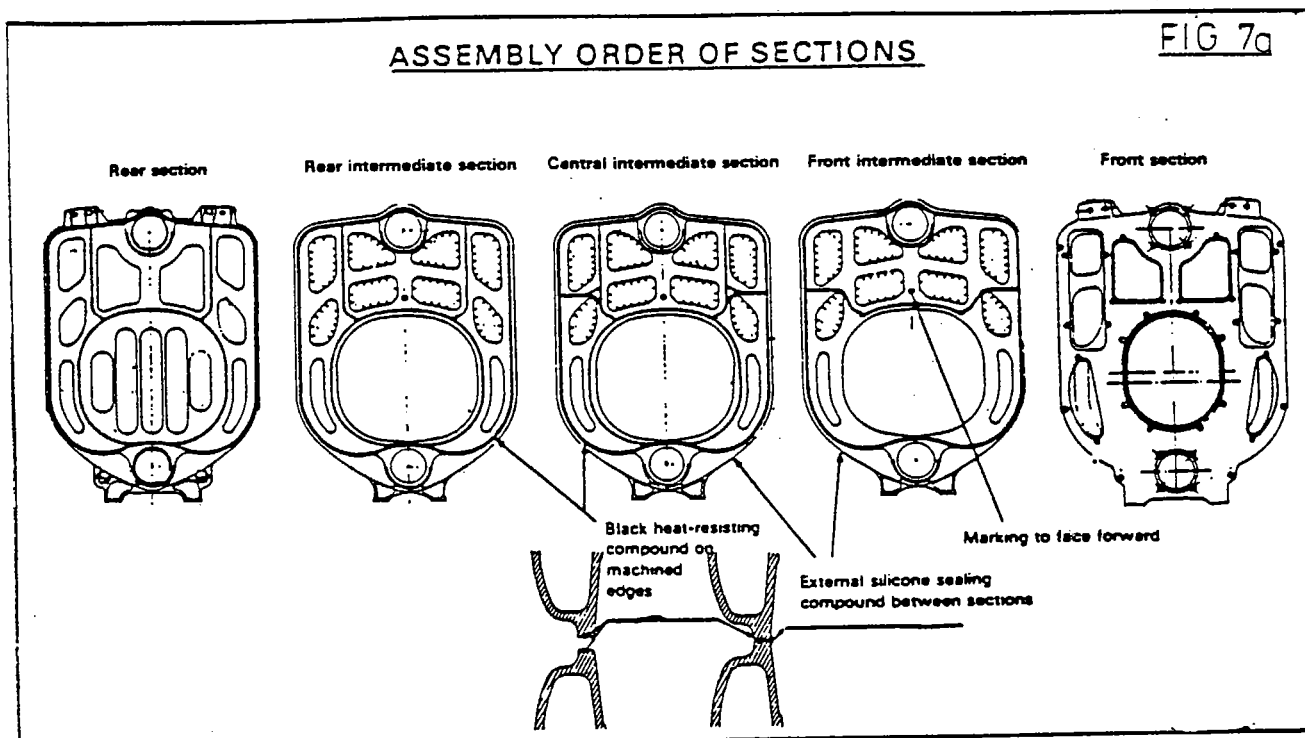
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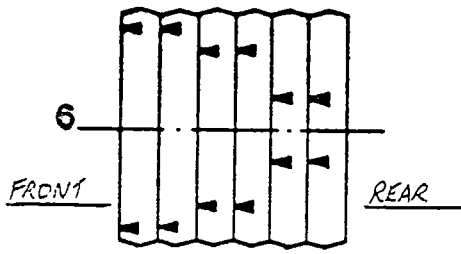


iv) INTERMEDIATE SECTIONS

When assembling the intermediate sections, from rear to front, the markings provided on the front, central and rear sections must always face the front end of the boiler. The intermediate sections must be assembled as shown on Figs 7a and 7b.

It is essential that the sections are assembled in exactly the order indicated in the above diagram.





PLAN VIEW

CENTRE INTERMEDIATE SECTION

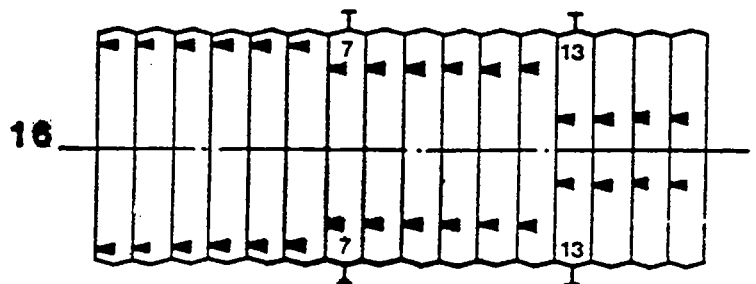
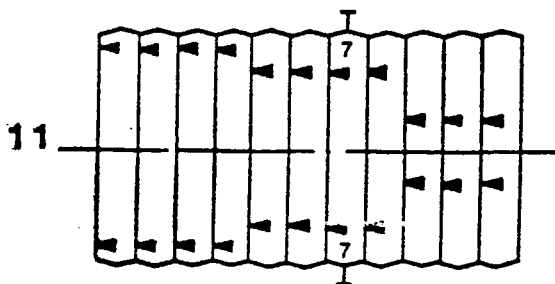
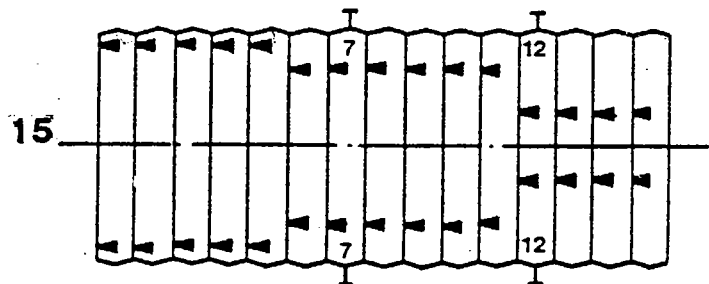
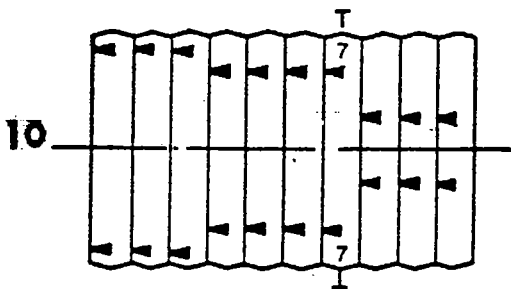
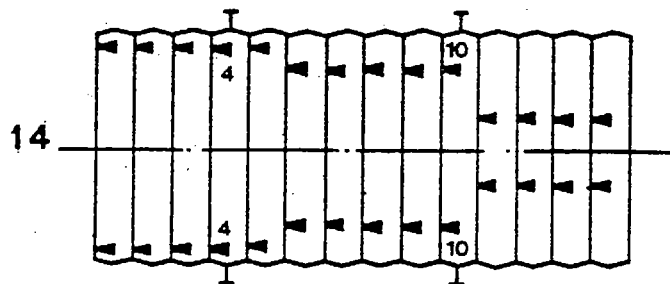
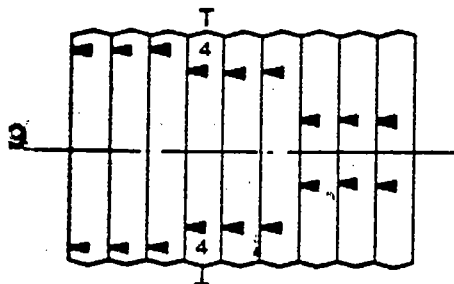
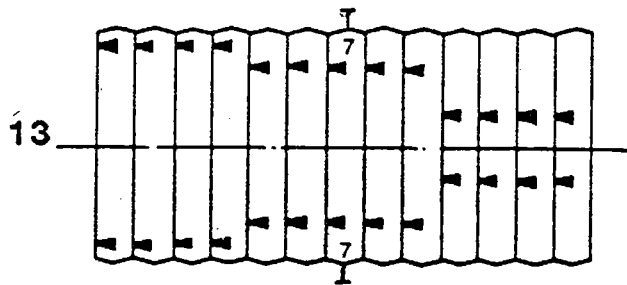
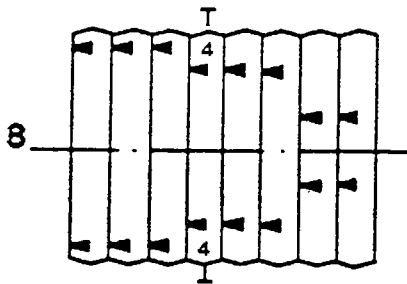
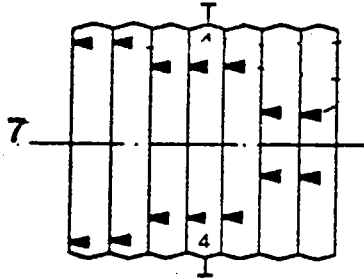
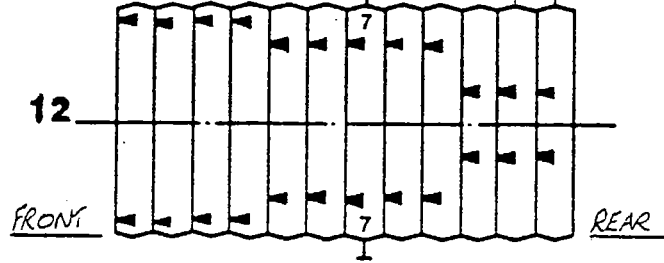
CASING SUPPORT BRACKET

FRONT INTERMEDIATE SECTION

REAR INTERMEDIATE SECTION

FRONT SECTION

REAR SECTION



BOILER CONSTRUCTION

FIG 7a

- a) Position a rear intermediate section in front of the rear section (letters AR facing forward), after cleaning the bores and applied sealing compound to the machined edges and in the external groove.

Slide this section into position, so that it slightly engages the corresponding nipples.

Using a mallet or a piece of hard wood, alternately tap the top and bottom nipples to ensure that the two sections are correctly engaged.

Make sure that both sections are perfectly aligned.

- b) Fit two more nipples in position and repeat the operation, with a second rear intermediate section.
- c) Insert an assembly bar (A) in each row of nipples.
- d) At the front end, fit a plain flange (F) and a nut (E) on each assembly bar, having thoroughly lubricated the threads of the nut. Fit a ratchet flange (G) on the opposite ends of the bars. (See Fig. 8)
- e) Lightly tighten nuts (E), ensuring that flanges F and G correctly engage the bores of the sections.
- f) Then, alternately tighten nuts (E) 1/2 turn at a time, on each assembly bar, taking care not to skew the assembly.

Continue tightening the sections until the sealing compound is squeezed out from between the machined faces. When tightening the section simultaneously tap the periphery of the section with a mallet, but NEVER hit flat parts. This will ease assembly.

Tighten fully and then remove the assembly flanges. Proceed in the same manner with each new section added, ensuring that the assembly order of the intermediate sections is observed.

- v) After assembling 3 or 4 sections, fit the rear hearth protection plate in position, against the rear section.
- vi) Complete the assembly with the front section, proceeding as before.
- a) Fit the tie rods and tighten as follows:-

Fit the special spring washers at the rear end of the rods. Tighten the nuts, leaving a gap of 1 mm between each turn of the spring washers (See Fig. 9). This operation must be carried out one rod at a time.

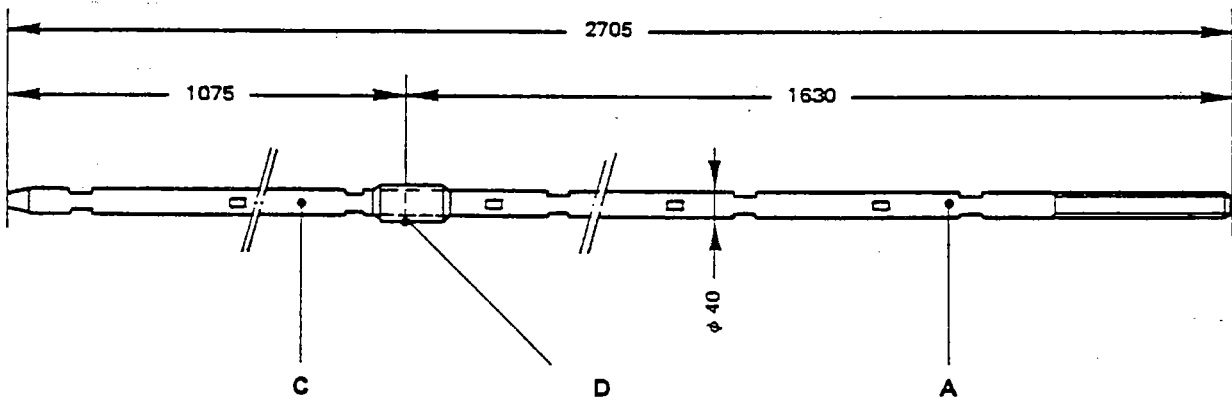
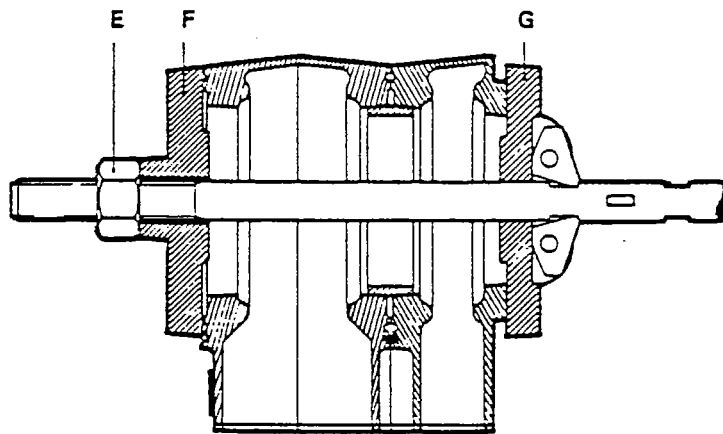
/Continued.....

ASSEMBLY TOOLS

To assemble the boiler body, it is necessary to use two tools comprising, each:

- 1 assembly bar (A)
- 1 end bar (C) (from WIMBORNE 11 onwards)

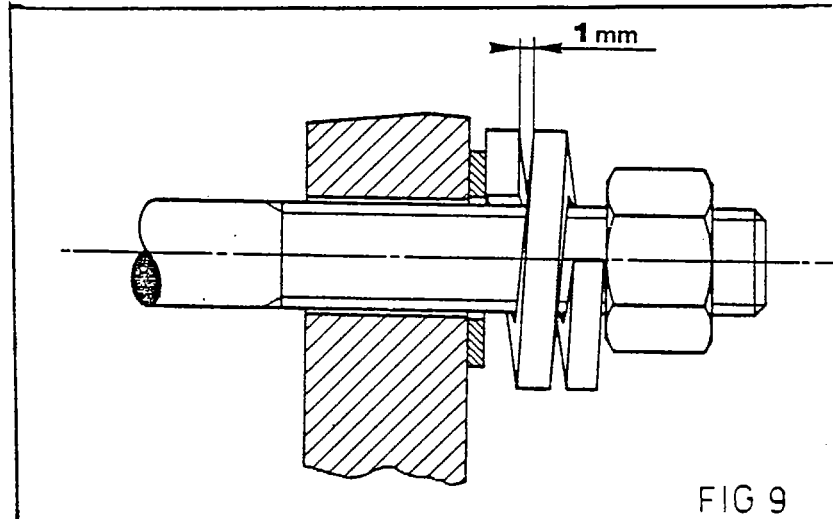
- 1 plain flange (F)
- 1 threaded sleeve (D) (from WIMBORNE 11 onwards)
- 1 ratchet flange (G)
- 1 assembly nut (E)
- 1 spanner



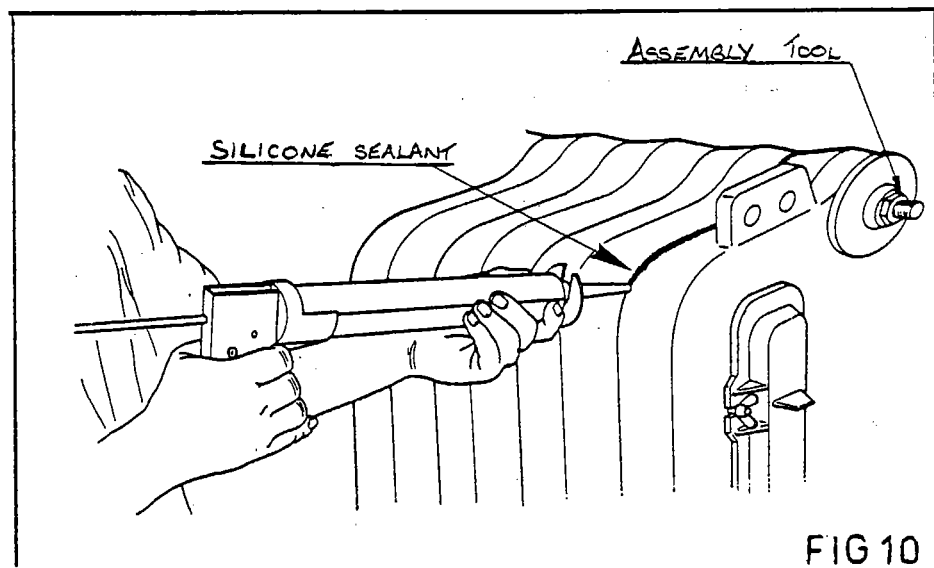
Boiler n°	Bar A	Bar C	Threaded sleeve D	Nut E	Plain flange F	Ratchet flange G
5 to 10	2	0	0	2	2	2
11 to 16	2	2	2	2	2	2

FIG 8

- c) If the boiler is supplied ready assembled remove the rear nuts and fit the special washers as described above.



- vii) Then externally seal the body proceeding as follows:- (See Fig. 10)
- a) Clean the V groove between each section and allow to dry.
 - b) Apply the sealing compound with the pressure gun supplied.
 - c) Smooth down the bead with a damp tool (a spatula for example).



/Continued.....

ACCESSORIES FITTED TO FRONT OF BOILER

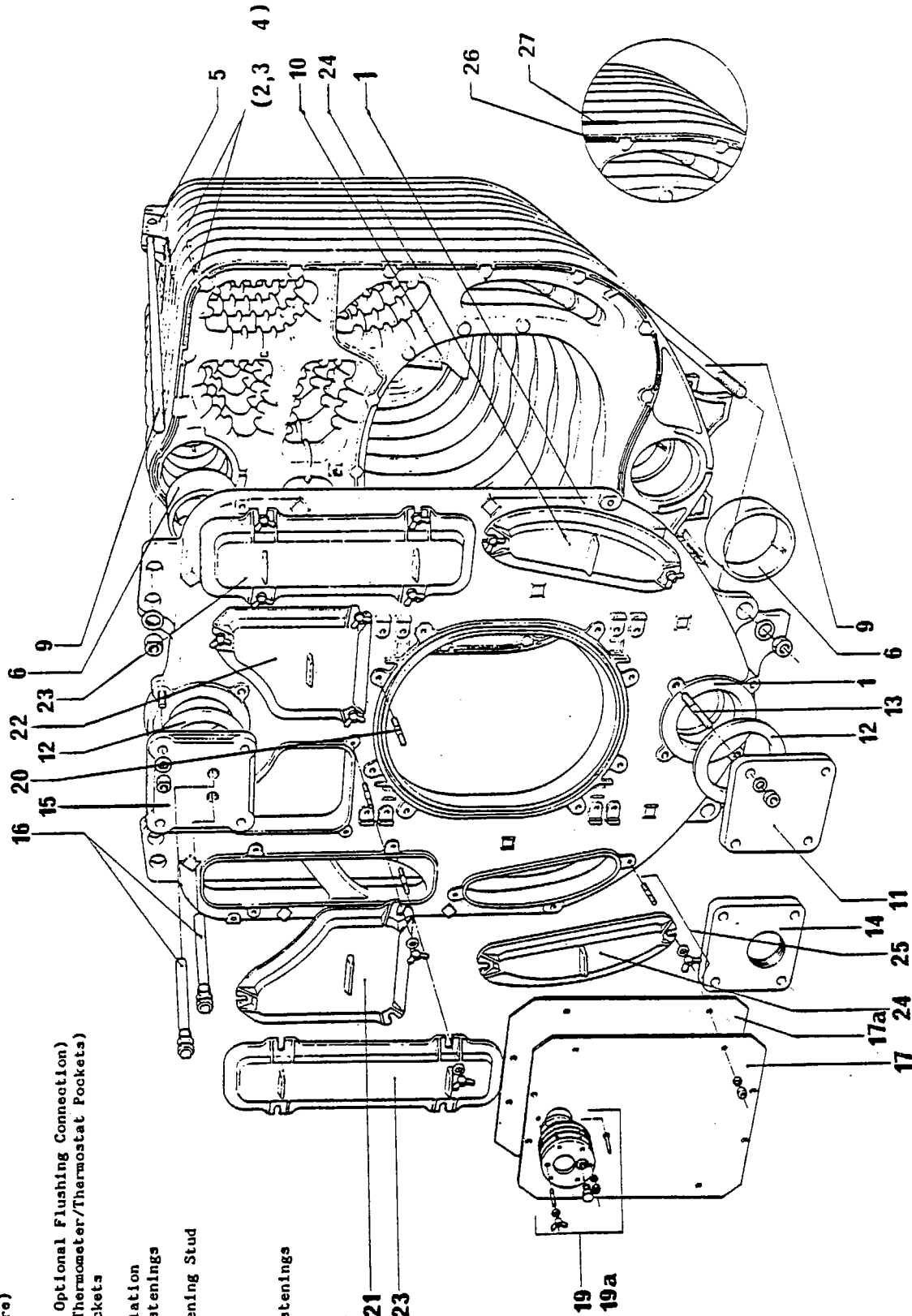
FIG 11a

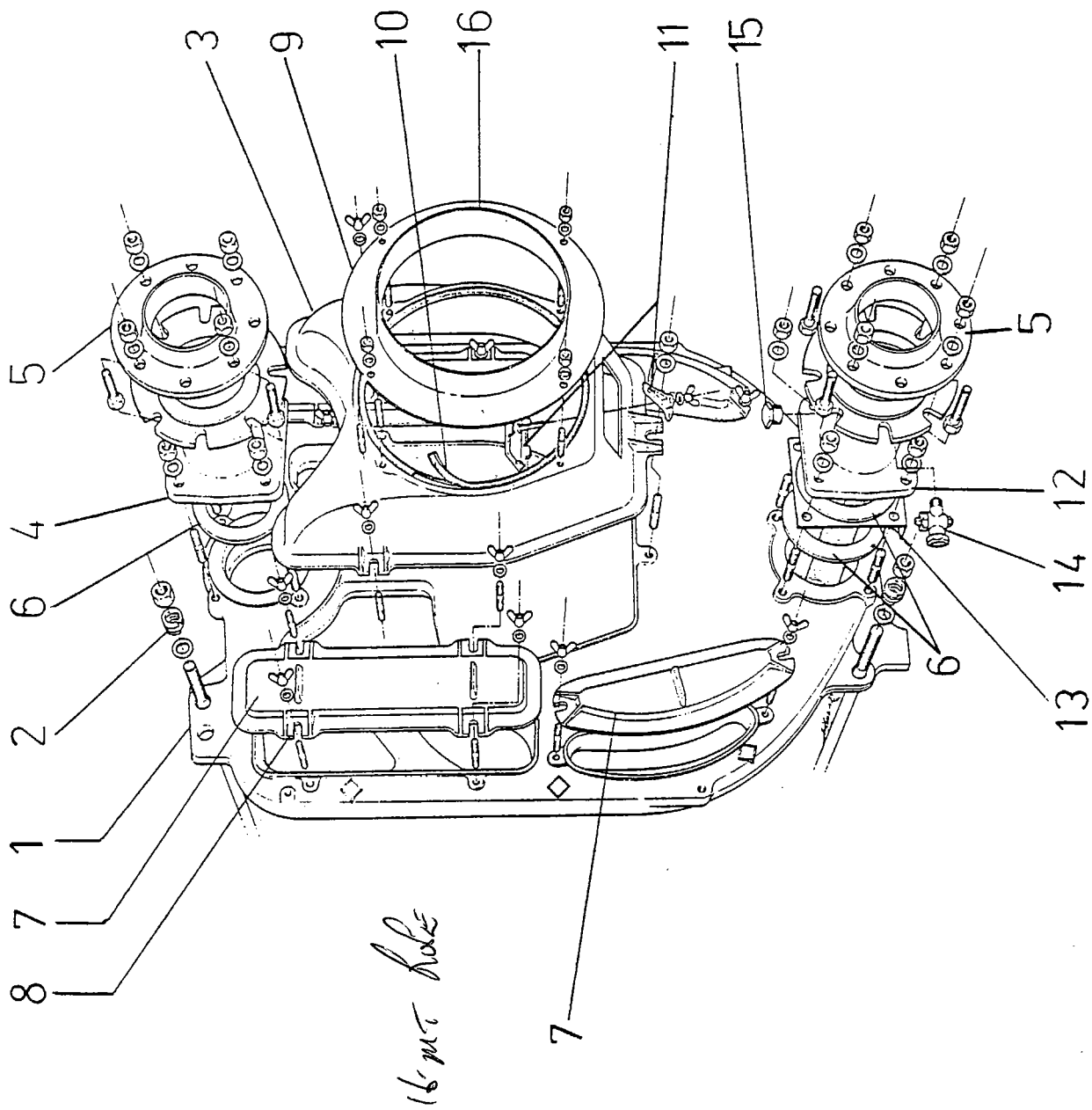
DESCRIPTION

- Front Section
- Intermediate Sections
- Rear Section
- Nipple
- Tie Rod
- Furnace Protection Plate
- Bottom Front Flange (Square)
- Neoprene Gasket
- Stud
- Bottom Front Flange (with Optional Flushing Connection)
- Top Flange (Threaded for Thermometer/Thermostat Pockets)
- Thermometer/Thermostat Pockets
- Burner Support Plate
- Burner Support Plate Insulation
- Flame Viewing Port and Fastenings
- Burner Support Plate Fastening Stud
- Front Flue Access Doors
- Front Flue Access Doors Fastenings
- Black Mastic
- Outer Sealant

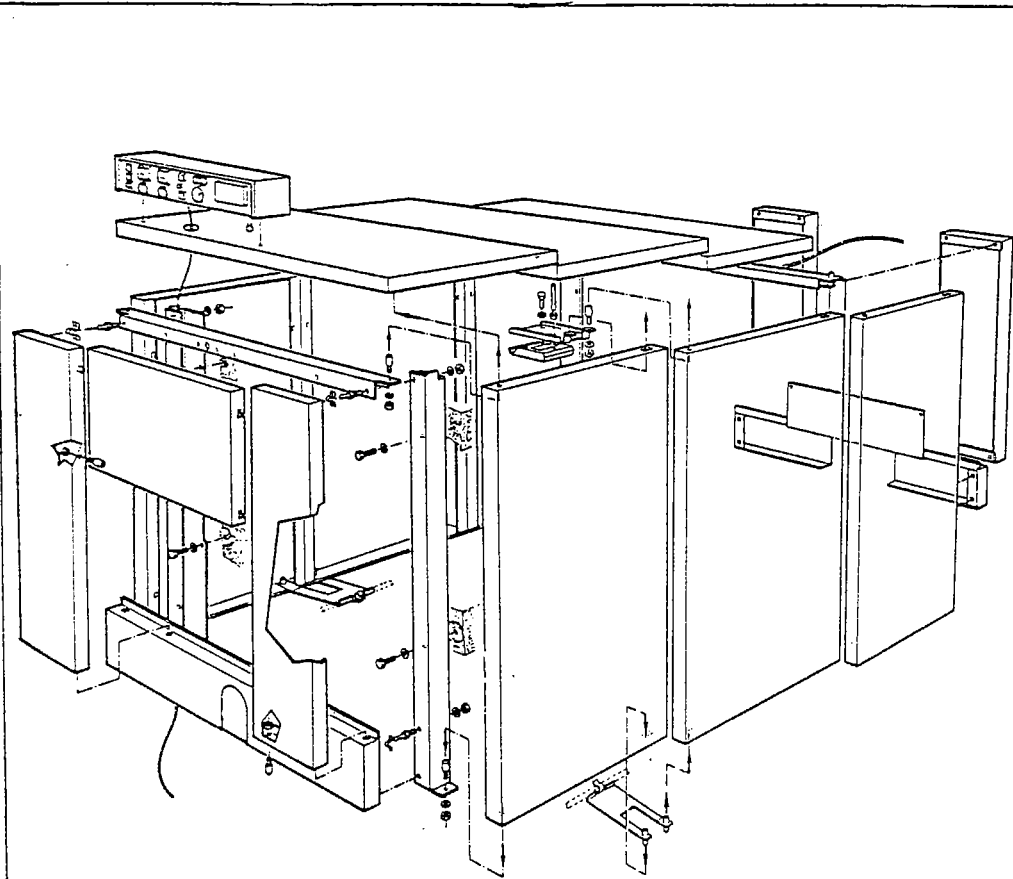
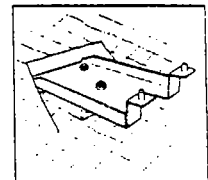
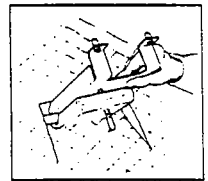
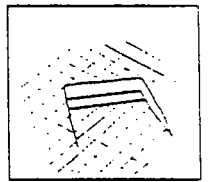
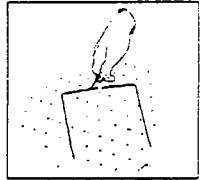
ITEM

- 1
- 2
- 3
- 4
- 5
- 6
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 17a
- 19
- 19a
- 20
- 21
- 22
- 23
- 24
- 25
- 26
- 27





- 1) Rear Boiler Section
- 2) Tie Rod Tensioning Spring
- 3) Rear Flue Hood
- 4) Top Outlet Manifold
- 5) Slip on Weld Flange
- 6) Neoprene Gasket
- 7) Rear Smoke Box Door
- 8) Rear Smoke Box Door Fastenings
- 9) Flue Connecting Spigot
- 10) Sealing Cord
- 11) Rear Smoke Box Access Hatch
- 12) Bottom Inlet Manifold
- 13) Flow Distributor
- 14) Drain Cock
- 15) Plug
- 16) Flue spigot



CASING ASSEMBLY

FIG 12

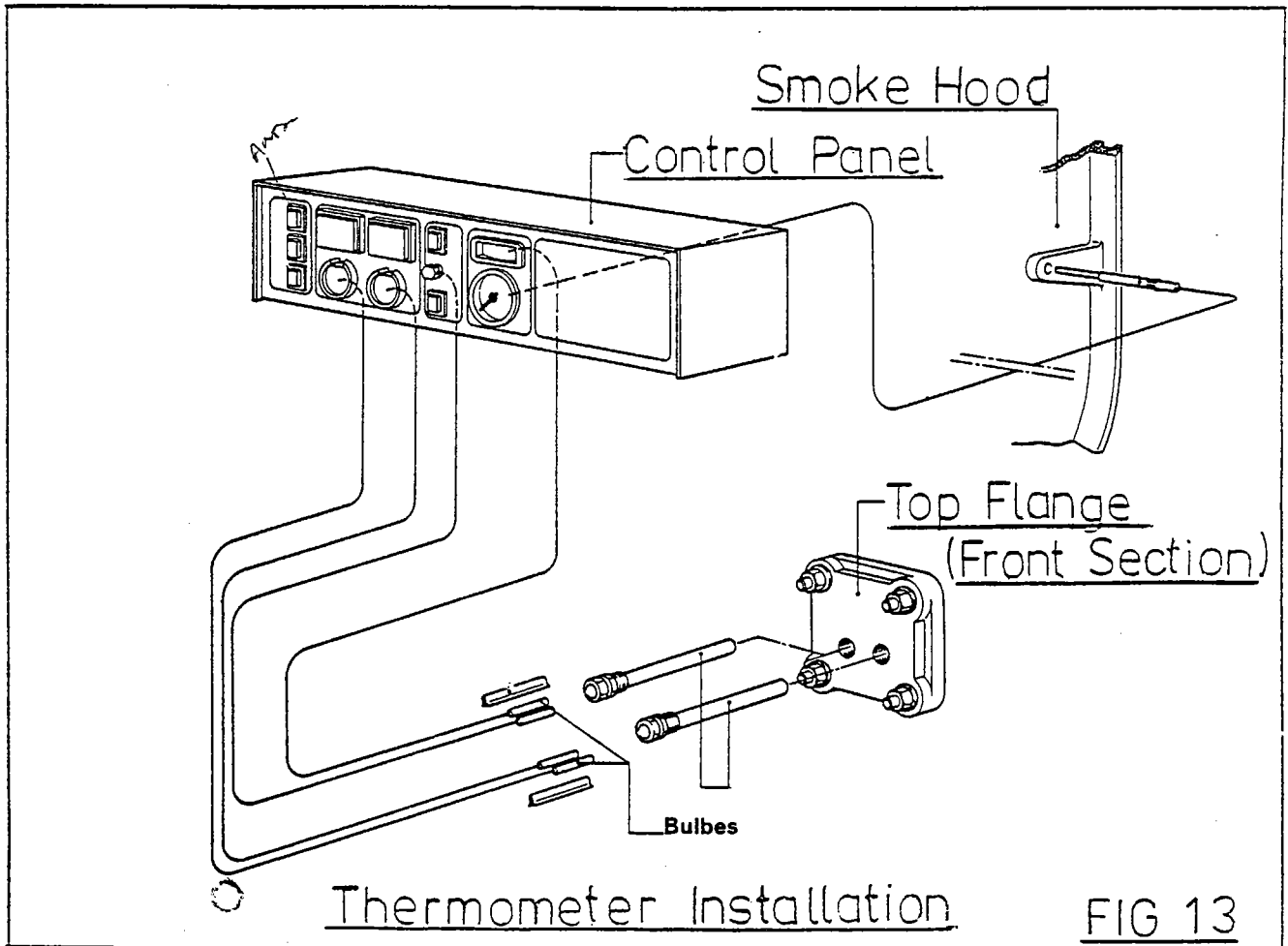


FIG 13

viii) FINAL POSITIONING OF BOILER

Set the boiler in its final location and level it. Ensure that each section is in contact with the base: if necessary, use metal shims to ensure this. (Shims not supplied).

ix) INSTALLATION OF ACCESSORIES (Fig. 11a and 11b)

The remaining components should be fitted in the following order:-

a) Water system accessories

At the front of the boiler:-

- i) Top cast iron flange, with two threaded holes to accommodate the thermostat and thermometer housings.
- ii) Bottom plain cast iron flange.
- iii) Optional: The bottom flange can be modified to enable a sludge flushing connection to be fitted.

At the rear of the boiler:-

- iv) Top outlet manifold and plug.
- v) S.S. water distributor and bottom return manifold (the water distributor is fitted on WIMBORNE 12 to 16 models only).

Position the water distributor between the boiler and the return manifold with the longitudinal slot facing up.
- vi) On the bottom return manifold fit the reducing adaptor and drain cock and plug.

b) Boiler Hydraulic Test

On completion of assembly boiler sections and water system accessories, a hydraulic test must be carried out.

In the case of open vented systems, the hydraulic pressure applied must be equal to one and a half times the *maximum operating pressure and be applied for 30 minutes.

In the case of pressurised systems, the hydraulic test pressure shall be twice the *maximum operating pressure and be applied for 30 minutes.

* The maximum operating pressure of the boiler shall be dependent on the system static head, pressurising equipment (where fitted) and the dynamic effects of circulating pumps.

It is the maximum pressure measured in the boiler under normal operating conditions.

/Continued.....

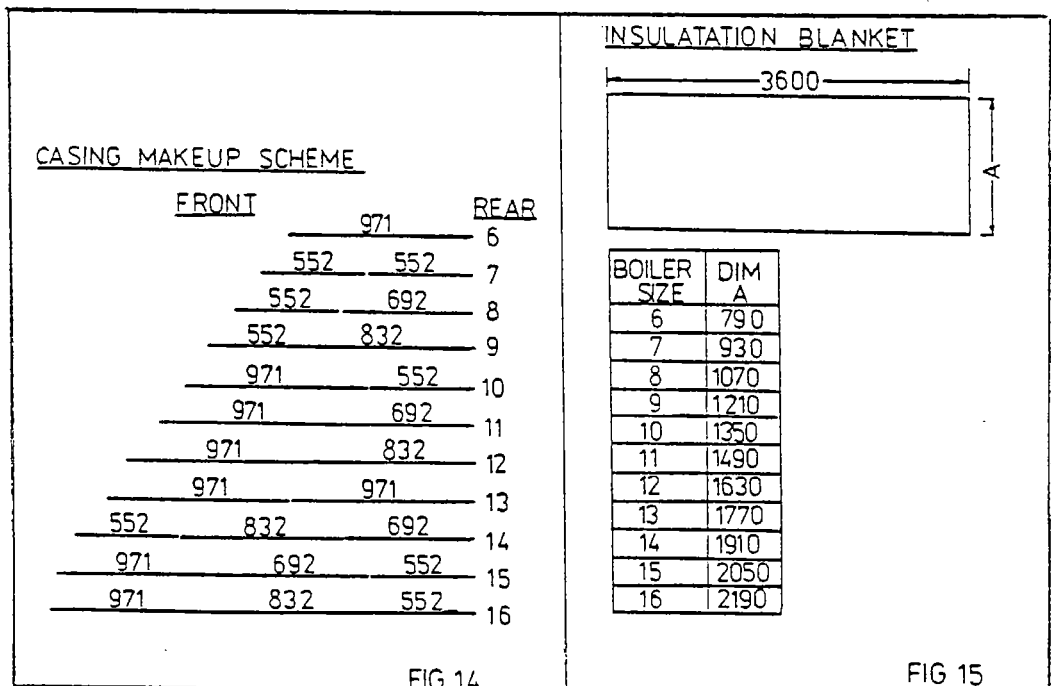
c) Flue system accessories

At the front of the boiler fit:-

- i) Pre-assembled flue access plates
- ii) Burner support plate and insulation
- iii) Pre-assembled sight port, to be secured to burner support plate with wing-nuts.

At the rear of the boiler fit:-

- i) Rear flue hood, complete with soot removal panel and flue spigot.
- ii) Fit and bond the ceramic cord supplied in the peripheral groove of the smoke-hood.
- iii) Fit pre-assembled rear flue access plates.
- iv) Fit the heating body lagging material and make required cuts to allow casing supports to be fitted. (See Fig. 15 for blanket dimensions).



xiv) ASSEMBLY OF CASING

The casing should then be assembled in the following sequence (See Fig. 12, 13 and 14).

- a) Secure the 4 front and rear uprights to the threaded bosses in the front and rear sections (do not tighten fully).
- b) Secure the 2 front and rear top cross members to the uprights, by means of "Rapid" studs.

/Continued.....

- c) Clip the front and rear bottom panels over the "Rapid" studs.

On the boiler body top and bottom tie rods, position the casing support brackets which support the side trim panels. Adjust the top bracket to ensure top and side panels are correctly aligned.
- d) Line up the side panels, by means of the height adjusting screw provided on the cast iron brackets. Lock the brackets onto the rods, by means of the screws.
- e) Fit the top panels.
- f) Fit and secure the control panel. (Fig. 13)
- g) Fit the front and rear detachable panels, starting with the side sections.
- h) Line up the uprights and tighten the 8 securing screws.
- j) Fit the side panels, hooking them onto the upper and lower casing support brackets.

xv) BURNER MOUNTING

The burner should be fitted to the studs fitted on the burner mounting plate. (For details see burner supplement).

Fuel and water connections can be made to the boiler.

/Continued.....

10. ELECTRICAL CONNECTIONS

Details and rating of the required electrical supply are given in Table 1. This should be supplied from a double pole fused switch box located in the boiler room.

All electric wiring should be in accordance with IEE Regulations, and be carried out in heat resistant PVC insulated cable. Care should be taken to ensure that the cables to the burner will allow it to be removed from the boiler for cleaning.

The wiring between the control panel and burner should be run through the flexible steel conduit supplied.

Consideration should be given to fitting an additional control thermostat for each module positioned in the common flow header, with a differential setting for simple sequence control. The Hamworthy Boiler Sequence Controller is recommended for full sequential control of a number of boilers. Full installation instructions will be supplied with the controller to suit individual applications.

THE APPLIANCE MUST BE EARTHED, AND THE SUPPLY PROTECTED.

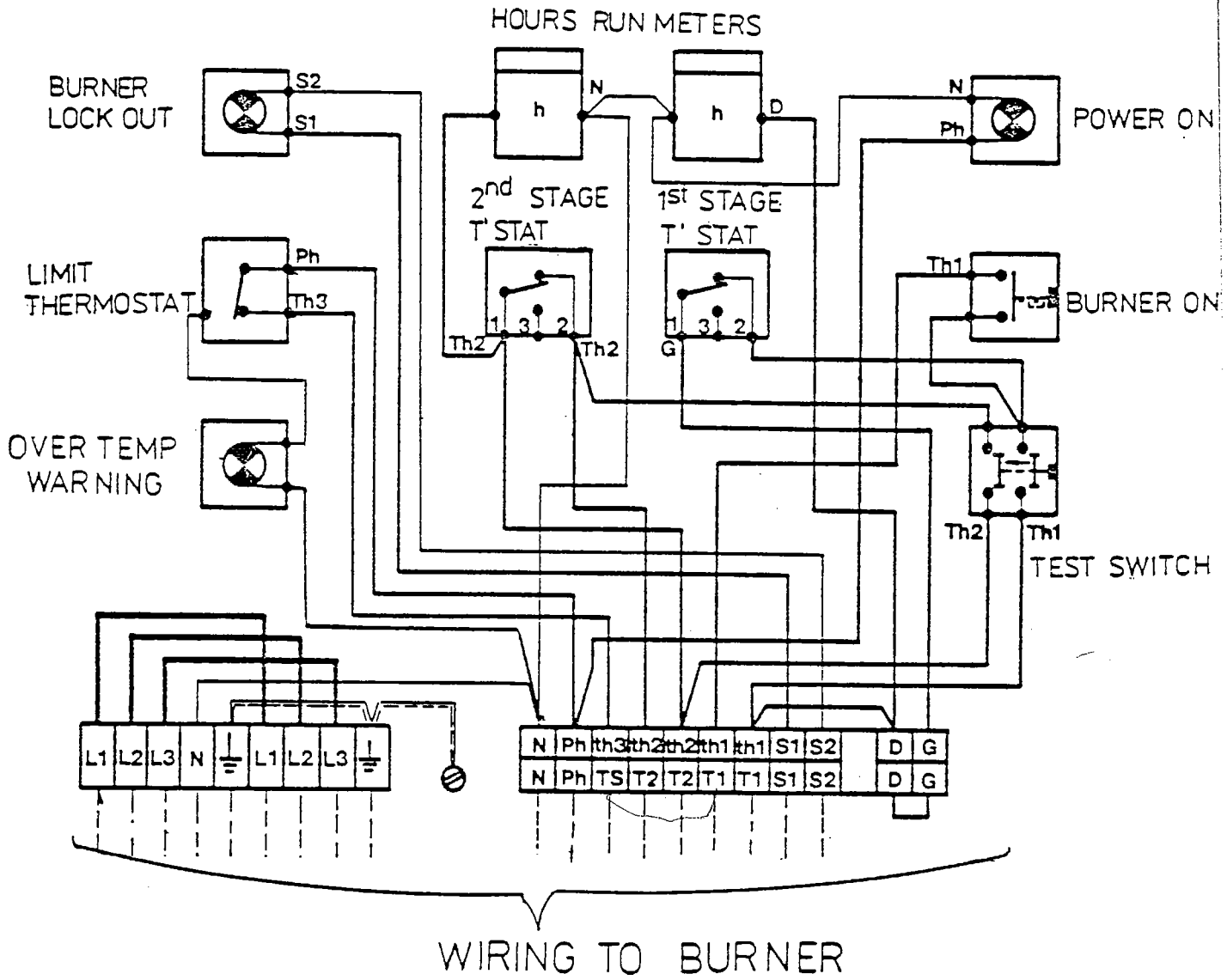
Typical wiring diagrams are shown in Figs. 16, 17, 18.

These must be read in conjunction with the electrical diagrams shown in the burner supplement.

/Continued.....

CONTROL PANEL WIRING

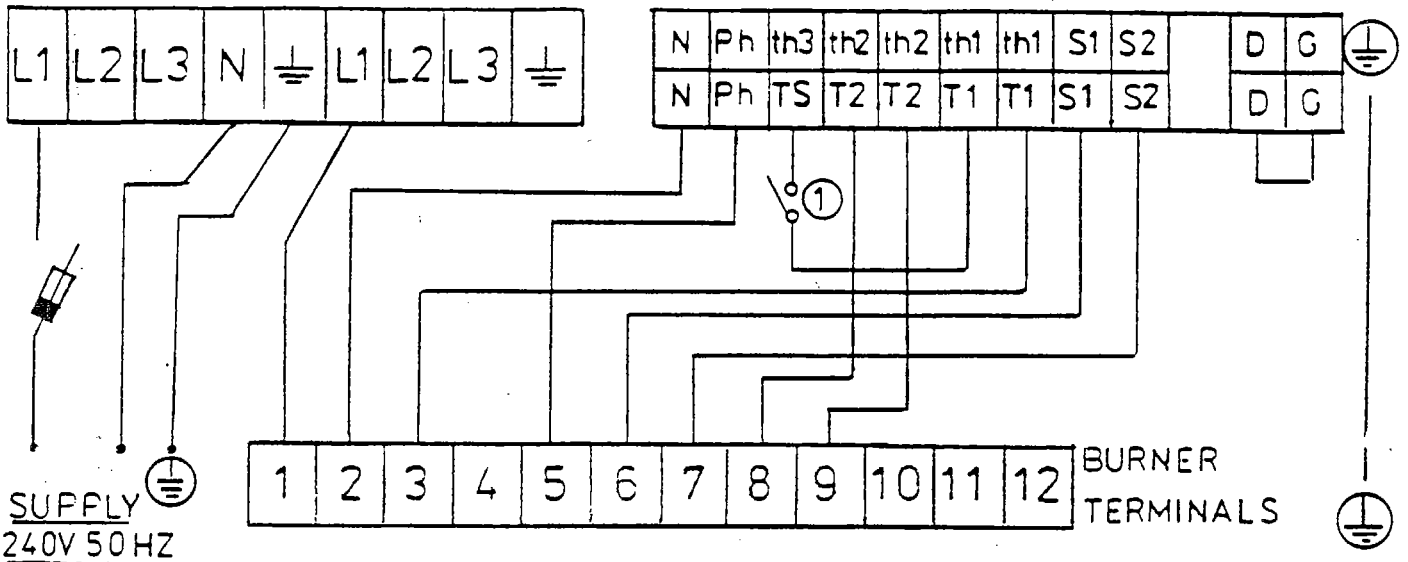
FIG 16



CONTROL PANEL TO BURNER WIRING

FIG17c

CONTROL PANEL TERMINALS



SUPPLY
240V 50HZ

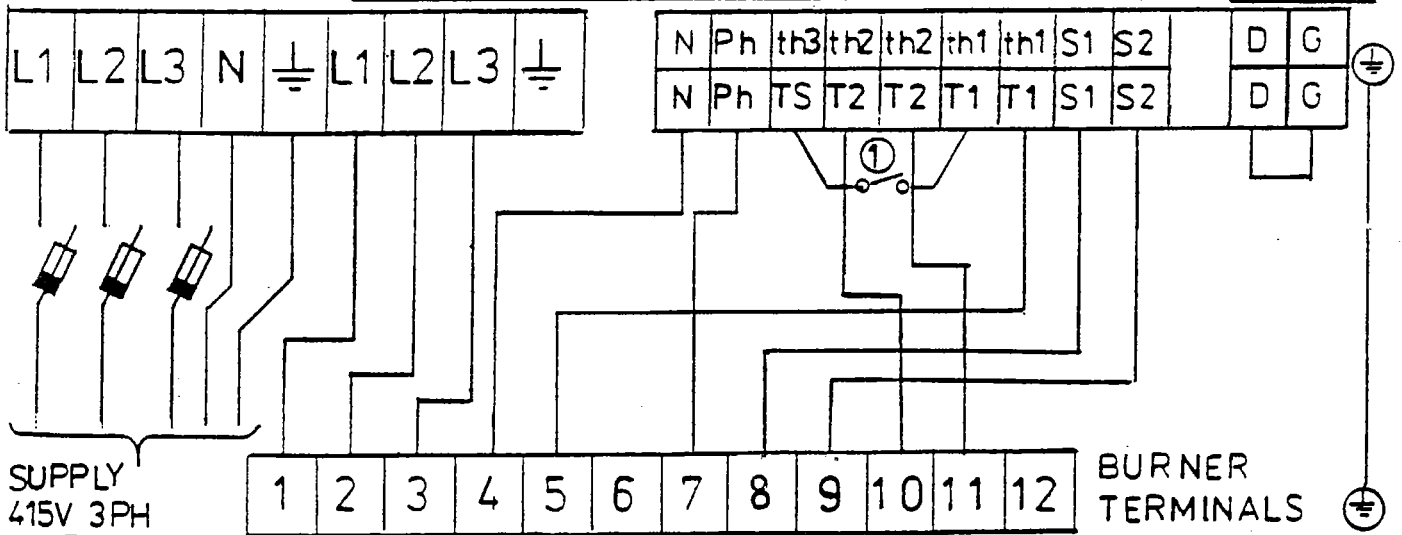
CONTROL PANEL TO BURNER WIRING

RIELLO GBW BURNER (HIGH, LOW, OFF OPERATION)

① LINK OR EXTERNAL THERMOSTAT

CONTROL PANEL TERMINALS

FIG17b



SUPPLY
415V 3PH
N+E

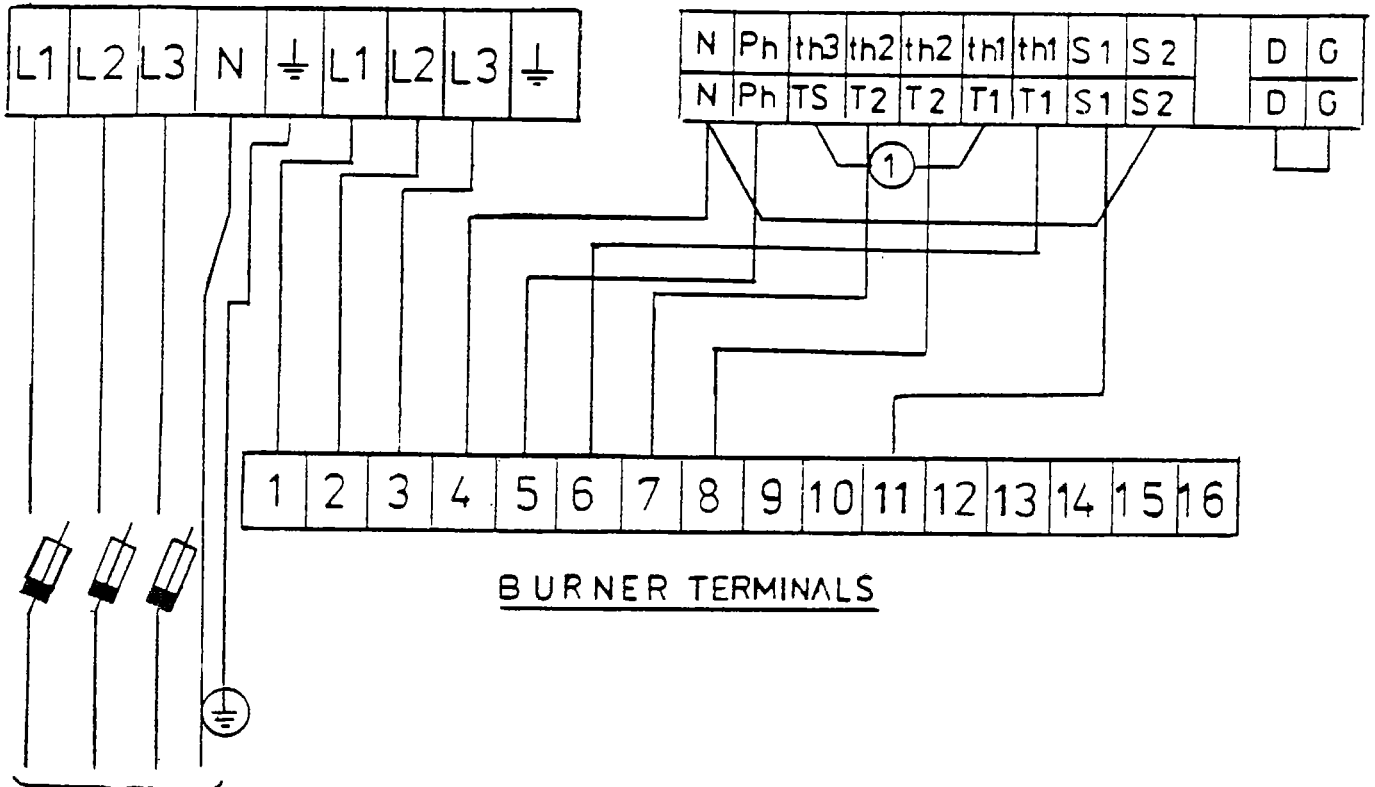
CONTROL PANEL TO BURNER WIRING

RIELLO PRESS 1 PRESS 2 PRESS 3 (HIGH, LOW, OFF OPERATION)

① LINK OR EXTERNAL THERMOSTAT

CONTROL PANEL TERMINALS

FIG 18



SUPPLY 415V
3PHASE N+EARTH

BURNER TO CONTROL PANEL WIRING NU WAY DUAL FUEL BURNERS

NDF 15-25 WITH SATRONIC TMG 740-2 CONTROL

FUSE RATINGS 10AMP

11. COMMISSIONING AND TESTING

i) Pre Commissioning Checks

The boiler should only be commissioned by a competent person.

Before attempting to commission the boiler ensure that any personnel involved are aware of the action to be taken.

The following checks should be made prior to commissioning:-

- a) The boiler should be turned off, the fuel and electricity supplies isolated.
- b) Ensure that the installation is complete.
- c) Check that the flueway passages to the chimney are clear. Check that the chimney is clear and all flue terminals or other fittings are correctly installed.
- d) Check that the boiler house is adequately ventilated and ventilation grilles are unobstructed.
- e) Check that the water circulation system is complete. Any leaks should be repaired prior to commissioning.
- f) Check that the water circulation system has been filled and the air vented from the system.
- g) Check that the fuel supply is available, if oil fired that oil tanks have been filled and the oil pipework between tank and burner has been primed.
- h) If the boiler is gas fired ensure that the gas supply is available and the gas pipework has been tested and is leak free.
- i) Ensure that the gas meter is operational and has been checked by the local gas region. Ensure that the gas pipework is fully purged.
- j) Check electrical earth continuity between boiler, gas pipework and mains supply.
- k) Check that all electrical components are correctly rated and connected.

With the electrical supply switched on the following checks can be made:

- l) The water circulating pumps can be checked to ensure the correct direction of rotation.
- m) Check that the water flows are the minimum stated in TABLE 1.
- n) Check that any boiler house ventilation fans have the correct direction of rotation and are operating.

The boiler can then be lit. This should be carried out in the following way and in accordance with the burner manufacturers lighting up instructions as described in the burner supplement.

/Continued.....

ii) Initial Commissioning Procedure

Oil Fired

- a) Set the burner to give the required fuel and air throughputs (See Burner Supplement).
- b) Set the control thermostat to its minimum setting. Check that the overheat thermostat is at its required setting.
- c) Switch the boiler on and start the burner.
- d) The burner controller will pre-purge the boiler, produce an ignition spark and then open the fuel solenoid valve. The flame should then ignite.
- e) If the flame fails to ignite it is essential that the boilers be fully purged prior to attempting to light the burner again.
- f) With the burner firing check the flue gas for CO₂, CO, flue gas temperature, smoke number and circulating water temperature rise.

The readings obtained should be as follows:-

CO ₂	11% - 12%
CO	Less than 100 ppm
Flue Gas Exit Temperature	230°C
Smoke No.	Less than 2
Circulating Water Temperature Rise	Less than 22°C

- g) The boiler should then be cycled on and off several times to check for reliable burner light up and satisfactory boiler operation.
- h) Set the boiler control thermostat to its required setting and check the operation of all safety cut out devices and heating system controls.

IMPORTANT:-

DOOR SEALS WILL SETTLE AFTER A PERIOD OF DRYING OUT AND IT IS THEREFORE ESSENTIAL THAT ALL DOOR FASTENERS ARE RETIGHTENED AFTER TWO OR THREE HOURS OF NORMAL FIRING.

FAILURE TO OBSERVE THIS RECOMMENDATION COULD RESULT IN BOILER DAMAGE.

iii) Gas Fired Boilers

- a) Set the burner to give the required gas and air throughput (See Burner Supplement).
- b) Open main boiler isolating gas valve and check for leaks through the gas train and pipework to burner. Measure the gas pressure at the gas train inlet.
- c) Set the control thermostat to its minimum setting and check that the overheat limit thermostat is at its required setting.
- d) Close the main boiler isolating gas valve and start the boiler. The boiler fan should start, pre purge the boiler and attempt to light the boiler. The flame should fail to ignite and the burner go to lockout.

/Continued.....

- e) Open the main boiler gas isolating valve, open the pilot gas manual isolating valve and check that main flame gas manual isolating valve is closed. Restart the burner. The burner should go through a post purge sequence, stop, pre purge the boiler and light the ignition flame. The main flame should fail to light. The burner will continue firing but only on the pilot (low) flame. The pilot gas rate can be checked and adjusted in this condition.
- f) Stop the burner. Open the main flame gas manual isolating valve and restart the burner. The burner should go through a start sequence, and pre purge the boiler. The ignition flame should start and then 7 seconds later the main flame should light.

g) With the burner firing the following checks should be made.

Flue Gas CO ₂	9% - 10%
Flue Gas CO ₂	Less than 100 ppm
Flue Gas Exit Temperature	220°C
Fuel Gas Throughput (This should be checked on the installations primary meter).	
Gas Pressure to Burner Head (This should match pressure derived from burner supplement)	

The air pressure proving switch should be set according to the burner manufacturers instructions.

- h) The boiler should then be cycled on and off several times to check for reliable burner light up and satisfactory boiler operation.
- i) Set the boiler control thermostat to its required setting and check the operation of all safety cut out devices and heating system controls.

SHOULD THE BURNER FAIL TO LIGHT THE BOILER MUST BE PRE PURGED PRIOR TO ANY ATTEMPT TO RESTART THE BURNER. IF THE BURNER REPEATEDLY FAILS TO IGNITE FULL INVESTIGATIONS SHOULD BE MADE TO FIND THE CAUSE OF FAILURE.

IMPORTANT:-

DOOR SEALS WILL SETTLE AFTER A PERIOD OF DRYING OUT AND IT IS THEREFORE ESSENTIAL THAT ALL DOOR FASTENERS ARE RETIGHTENED AFTER TWO OR THREE HOURS OF NORMAL FIRING.

FAILURE TO OBSERVE THIS RECOMMENDATION COULD RESULT IN BOILER DAMAGE.

/Continued.....

12. MAINTENANCE AND CLEANING

Ensure that the electrical supply and fuel supply are isolated from the boiler.

1. Ensure that the equipment is maintained dust free and all oil deposits removed promptly.
2. The boiler should be inspected for accumulation of soot or other deposits at least once every 3 months, or at shorter intervals if necessary.
4. The oil filter should be cleaned every 3 months and should immediately be checked if the oil tank has been allowed to reach a low level. Replace the element at the start of each heating season.
5. The photocell and electrodes should be cleaned every 2 weeks, and more if the boiler is in constant operation.

Boiler Cleaning

1. The boiler is supplied complete with bolted access doors item 29 on Fig. 11a.

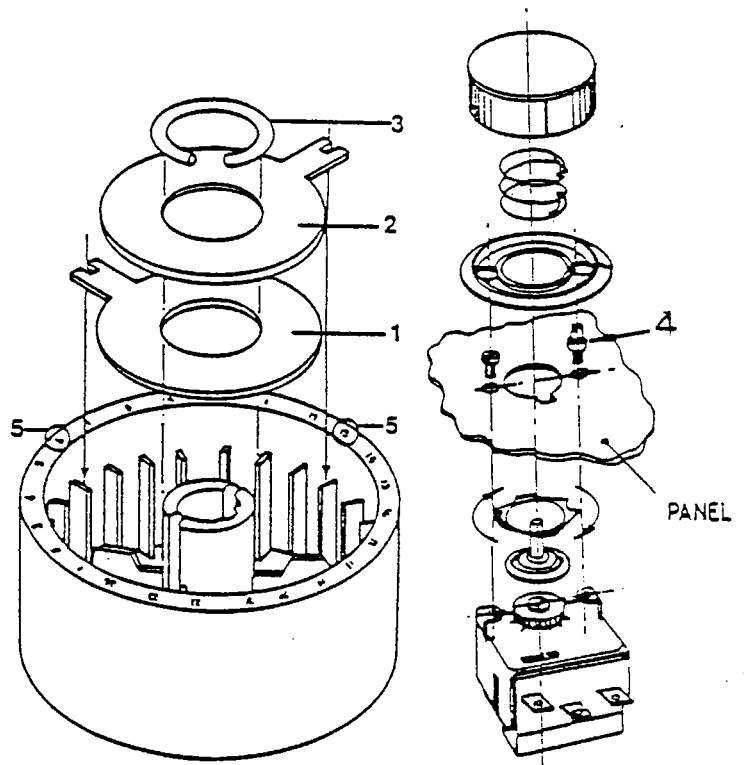
Remove the flue access doors this gives complete access to the flueways for vacuum or brush cleaning with approved chemical cleaner. Should it be necessary, access to the combustion chamber is also available by removing the burner mounting door.

Access to the rear of boiler flueways can be obtained by removing the rear flue access doors.

Flue cleaning brushes are supplied for cleaning the flueways.

Adjusting the limitation of angle of rotation
 Only for thermostats with drum type setting knobs

1. Pull the setting knob off the thermostat spindle.
2. Remove the spring clip (3) and limit stop discs (1) and (2) from inside the setting knob.
3. Insert limit stop disc (1) into the setting knob so that its stop arm locks onto that rib having the guide number (5) which corresponds to the start value of the desired setting range.
4. Insert limit stop disc (2) in the same manner, but this time choosing the rib and guide number which corresponds to the end value of the desired setting range.
5. Replace spring clip (3), thus securing the limit stop discs.
6. Push the setting knob back on to the thermostat spindle so that the stop screw (4) is located within the selected setting range.
7. Rotate the setting knob to the limit stops of both ends of the scale to check the adjusted range against the setting scale.



A. Desired start value of the new setting range in °C.
 Corresponding guide number for limit stop disc (1).

B. Desired end value of the new setting range in °C.
 Corresponding guide number for limit stop disc (2).

Setting range °C	Limit stop disc Nr.	Guide Nr. (5)														
		1	3	5	7	9	11	13	15	17	19	21	23	25	27	
50...110	1	A	50	55	60	65	70	75	80	85	90	95	100	105	110	—
	2	B	—	50	55	60	65	70	75	80	85	90	95	100	105	110
80...130	1	A	—	80	85	90	95	100	105	110	115	120	125	130	—	—
	2	B	—	—	80	85	90	95	100	105	110	115	120	125	130	—

Appendix 1. Control Thermostat Setting Procedure



