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**IDEAL**

**Concord  
C.140-330  
Series 2A**



April, 1978

## Installation & Servicing

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### B.G.C. Appliance Nos.

Concord C. 140	41. 409. 42	Concord C. 230	41. 409. 44
Concord C. 170	41. 409. 43	Concord C. 260	41. 409. 45
Concord C. 200	41. 409. 66	Concord C. 290	41. 409. 46
		Concord C. 330	41. 409. 47

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## GAS DATA

TABLE 1

Boiler Size No. of Sections		C.140 4	C.170 5	C.200 5	C.230 6	C.260 7	C.290 8	C.330 10
Input	kW	53.0	60.4	75.6	88.2	100.2	112.5	124.8
	MJ/h	191	218	272	316	361	404	449
	Btu/h x 1000	181	206	258	301	342	384	426
Rated Output	kW	41.0	48.4	58.6	67.4	76.2	86.5	96.7
	MJ/h	148	174	211	242	274	311	348
	Btu/h x 1000	140	165	200	230	260	295	330
Gas Rate *	m <sup>3</sup> /h	4.93	5.62	7.02	8.15	9.30	10.40	11.60
	ft <sup>3</sup> /h	174	198	248	290	329	369	410
Approximate flue Gas Volume + in Primary Flue	m <sup>3</sup> /h	116	132	165	193	219	246	273
	ft <sup>3</sup> /h	4090	4650	5830	6820	7730	8670	9640
Approximate Flue Gas Volume + in Secondary Flue	m <sup>3</sup> /h	205	233	292	342	388	434	483
	ft <sup>3</sup> /h	7240	8240	10320	12070	13690	15360	17070
Main Burner Injector size	mm	3.4	3.6	4.0	4.4	4.7	4.9	5.2
Manifold Pressure NATURAL GAS ONLY	mbar	13.0	13.5	13.3	←————— 13.5 —————→			
	in.w.g.	5.2	5.4	5.3	←————— 5.4 —————→			

\* The gas rates quoted are for NATURAL GAS only and assume a C.V. of 38.3 MJ/m<sup>3</sup> (1040 Btu/ft<sup>3</sup>). The gas rate at calorific values differing from that figure may be calculated by dividing the calorific value of the gas into the figure given in the 'INPUT' column above.

+ Primary flue volumes assume 8.5% CO<sub>2</sub> and 220°C (428°F) temperature.

Secondary flue volumes assume 3.5% CO<sub>2</sub> and 120°C (248°F) temperature.

# BOILER DATA

## TABLE 2

Boiler Size No. of Sections		C.140 4	C.170 5	C.200 5	C.230 6	C.260 7	C.290 8	C.330 10
Tappings		1 x Rc2½ at rear						
Flow	in.BSP	1 x 2½ at rear						
Return **		1 x Rc2½ at rear and 2 x Rc2 at sides						
	in. BSP	1 x 2½ at rear and 2 x 2 at sides						
Maximum Static Water Head	metres	36.5						
	feet	120						
Gas Inlet Connection		Rc¾						
	in.BSP	¾						
Minimum Dynamic Gas Pressure Required at Boiler Inlet	mbar (gauge)	19.9						
	in.w.g	8						
Electricity Supply		220/250 volts, AC, single phase 50Hz. Fuse Value 3 amps						
Flue Size	mm	152		203				
	in	6		8				
Diverter Outlet Socket Internal Diameter	mm	174		237				
	in	6.13/16		9.5/16				
Length of Burner Bars (overall including air-mix tube)	mm	425	521	617	713	785	977	
	in	16¾	20½	24.9/32	28.1/16	30.29/32	38.15/32	
Main Burner Injectors No.		3						
Boiler Thermostat		Ranco C 26—P.0616 (Range approx.54—82°C (130—180°F)						
Gas Control		Robertshaw U.7000 BER 240 S7 CLT ¾in.						Robertshaw U.7000HCER 240S7 ALT ¾in.
Pilot Burner		Robertshaw 2CH7 (with 0.018 Injector)						
Thermocouple		Robertshaw T46 (24in)						
OPTIONAL EXTRAS								
Limit Thermostat		Ranco L5P 1029						
Thermocouple Connector		Robertshaw 21899						
Approximate Dry Weight	Kg	241	304	305	366	426	487	610
	lb	532	670	673	807	941	1074	1344
Water Content	litre	26.3	32.7	39.0	46.0	52.7	66.3	
	gal	5.8	7.2	8.6	10.1	11.6	14.6	

### Note:

\*\* Side tapings MUST ONLY BE USED for gravity circulation.

### GENERAL DESCRIPTION

Tables 1 and 2 and the descriptive notes which follow contain all the essential data likely to be required by the installer.

### CONSTRUCTION

**Boiler Body:** Cast iron sectional, supplied assembled. Loose sections and platework for site assembly can be supplied to special order.

**Casing:** Stove enamelled sheet steel, easily assembled at site.

**Diverter:** External type, polished stainless steel.

### GAS CONTROLS

Control is by a slow opening combination gas control incorporating a thermocouple flame failure device and mains voltage gas valve. The control box has a terminal strip with

connections for the mains input, circulating pump and mains voltage room thermostat controlling the circulating pump. Also included in the control box is a mains voltage boiler control thermostat. A boiler limitstat, operating in the thermocouple circuit, is available as an optional extra.

## DUTY

The range of boilers is suitable for central heating and indirect hot water supply (gravity or pumped circulation) at static head up to 36.5 metres (120 feet). It is not suitable for direct hot water supply.

## GRAVITY CIRCULATION CONSIDERATIONS

All boilers in the Concord C series have a single 2½in. BSP flow tapping and consideration must be given by the heating engineer to any possible pump effect on the gravity circulation to a D.H.W. cylinder when a common flow is employed in a combined system. In such applications, it is strongly recommended that 2½in. BSP pipework, swept elbows and swept tees be used between the boiler flow tapping and the point where the common flow is divided. This junction must be as near to the boiler as possible. Pipe sizes affecting water velocity at entry to the pumped heating circuit and gravity circulating head available should ensure that reverse circulation down the primary flow pipe to the D.H.W. cylinder does not take place when the heating pump is in operation.

Should the initial evaluation of a proposed or existing combined gravity D.H.W. and pumped heating system leave any doubt as to its efficient operation, it is recommended that a full pumped primary system be considered.

## MINIMUM FLOW OF WATER

The system design must provide for an adequate flow rate through the boiler at all times when the boiler is firing. The minimum flow rate should correspond to a temperature difference across the boiler flow and return of 25°C (77°F) assessed at catalogue rating.

## DIMENSIONS

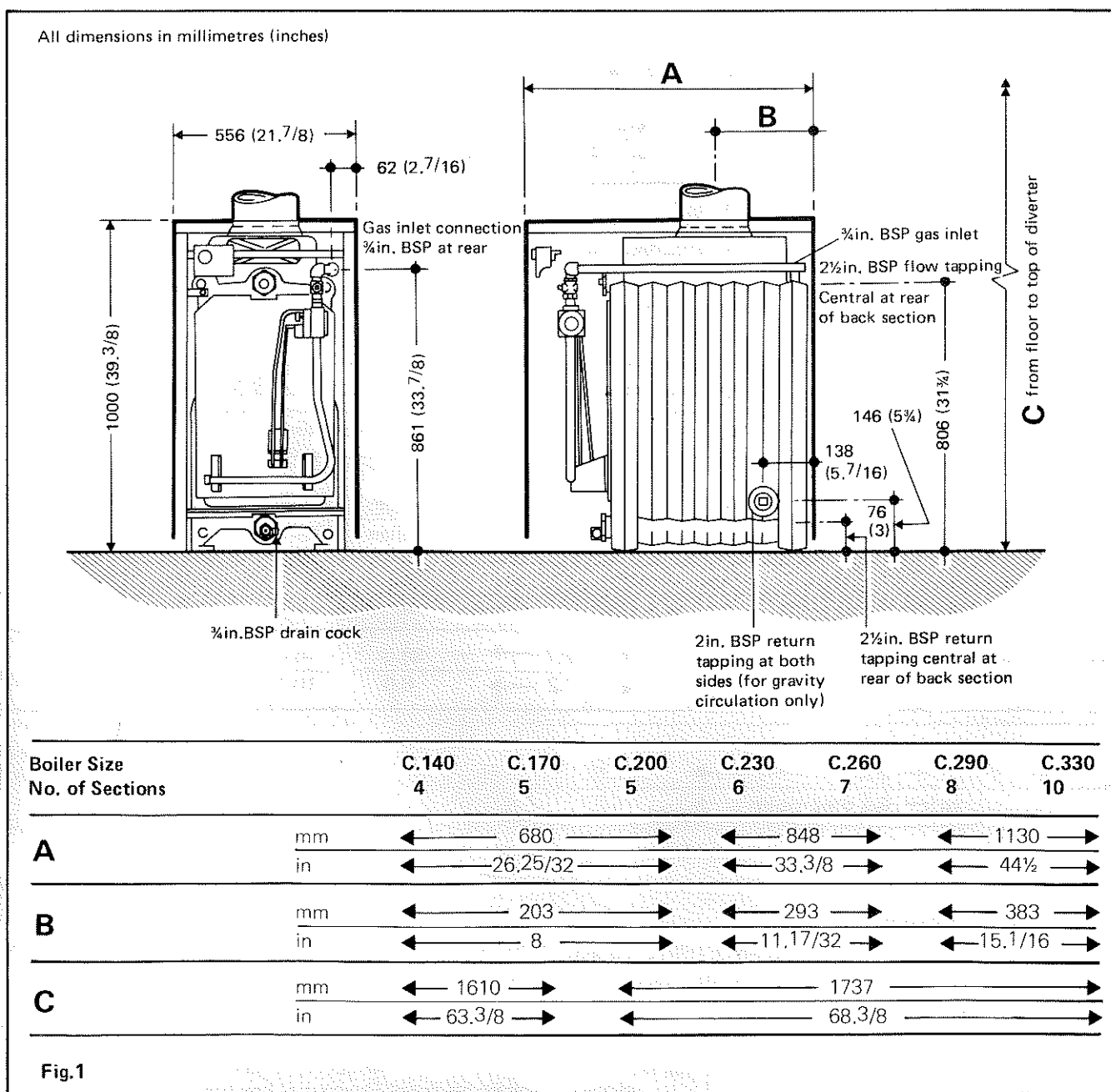
Overall dimensions and the positions of the tappings, gas inlet connection and flue outlet are shown in Fig.1.


## SITE REQUIREMENTS

The installation should comply with relevant British Standard Specifications, Codes of Practice and current Building Regulations, together with any special regional requirements of the Local Authorities, Gas Region, and Insurance Company. All electrical wiring must comply with I.E.E. Regulations for the electrical equipment of buildings.

## INSTALLATION

For safety use a competent installer to fit this appliance, e.g. CORGI (the Confederation for the Registration of Gas



Installers) requires its members to work to satisfactory standards. They are identified by this symbol 

### POSITION OF BOILER

Minimum clearances required from walls or other fixed objects to allow for installation, maintenance, the free access of combustion air and correct functioning of the draught diverter are as follows:—

spillage of products from the draught diverter when the extractor fan is running and all doors and windows are shut should be carried out after installation. If spillage be detected, the area of permanent ventilation must be increased.

### SECONDARY FLUE

To ensure safe and satisfactory operation, the boiler must be

Boiler Size No. of Sections		C.140 4	C.170 5	C.200 5	C.230 6	C.260 7	C.290 8	C.330 10
At Front	mm	450	← 500 →	750	840	650	830	
	in	17¾	← 19¾ →	29½	33	25½	32¾	
At Rear	← Allow sufficient space for access and pipework →							
At Sides	← Can be zero, but space will be required for water connections when side returns are used →							

### FOUNDATION

As these boilers have a wet base, it is not necessary to provide an insulated foundation and they may be installed directly on any level floor. However, in the case of a floor made of combustible material (e.g. wood, thermoplastic tiles, etc.) the boiler must be stood on a plate of adequate strength of non-combustible material. Always check, of course, that the load carrying capacity of the floor is adequate to safely support the weight of the boiler.

### VENTILATION

Safe, efficient and trouble-free operation of conventionally flued gas boilers is vitally dependent on the provision of an adequate supply of fresh air to the room in which the appliance is installed. Ventilation, by grilles communicating directly with the outside air, is required at both high and low levels. The minimum free areas of these grilles must be according to the following scale:—

- |               |   |
|---------------|---|
| At low level  | 11 cm <sup>2</sup> per 1.0 kW of boiler output<br>(1 in <sup>2</sup> per 2000 Btu/h output) |
| At high level | One half of the low level requirement   |

Site ventilation grilles to avoid the risk of accidental obstruction. If further guidance on ventilation is required, consult CP.332 Part 3.

### IMPORTANT

The use of an extractor fan in the same room as the boiler (or in an adjacent room in communication) can, in certain conditions, adversely affect the safe operation of the boiler. Where such a fan is already fitted (or if it is intended to fit an extractor fan after installation of the appliance) the advice of the Gas Region should be obtained. Tests for

connected to a secondary flue capable at all times of adequately evacuating the combustion products, the approximate volumes of which are given in Table 1.

The flue design recommendations contained in CP.332 Part 3, should be strictly observed. The draught diverter supplied with the boiler must never be omitted.

### GAS

A dynamic gas pressure of at least 20.0 mbar (gauge) (8in. w.g) must at all times be available at the boiler inlet when firing at the rated heat input. If there be any doubt regarding the capacity of the gas meter, the available gas pressure, the adequacy of existing service pipes or the size required for new service pipes, the advice of the Gas Region should be requested.

### ELECTRICITY

A 200/250v 50Hz AC mains supply is required. A 3-pin socket outlet, fused at 3amps, should be provided near to the boiler. If a switched outlet be used, the switch MUST be of the double-pole type. **D.C. current is not suitable.**

### WATER CONNECTIONS

The positions and sizes of the flow and return tappings provided are shown in Fig.1. The return tappings on the sides of the boiler must only be used for the gravity returns of combined pumped and gravity systems; pumped circuits must never be connected to these tappings. Bushing down the pumped rear return to 1½in. BSP is recommended; this gives the most satisfactory temperature distribution within the boiler.

## INSTALLATION

### PACKAGING

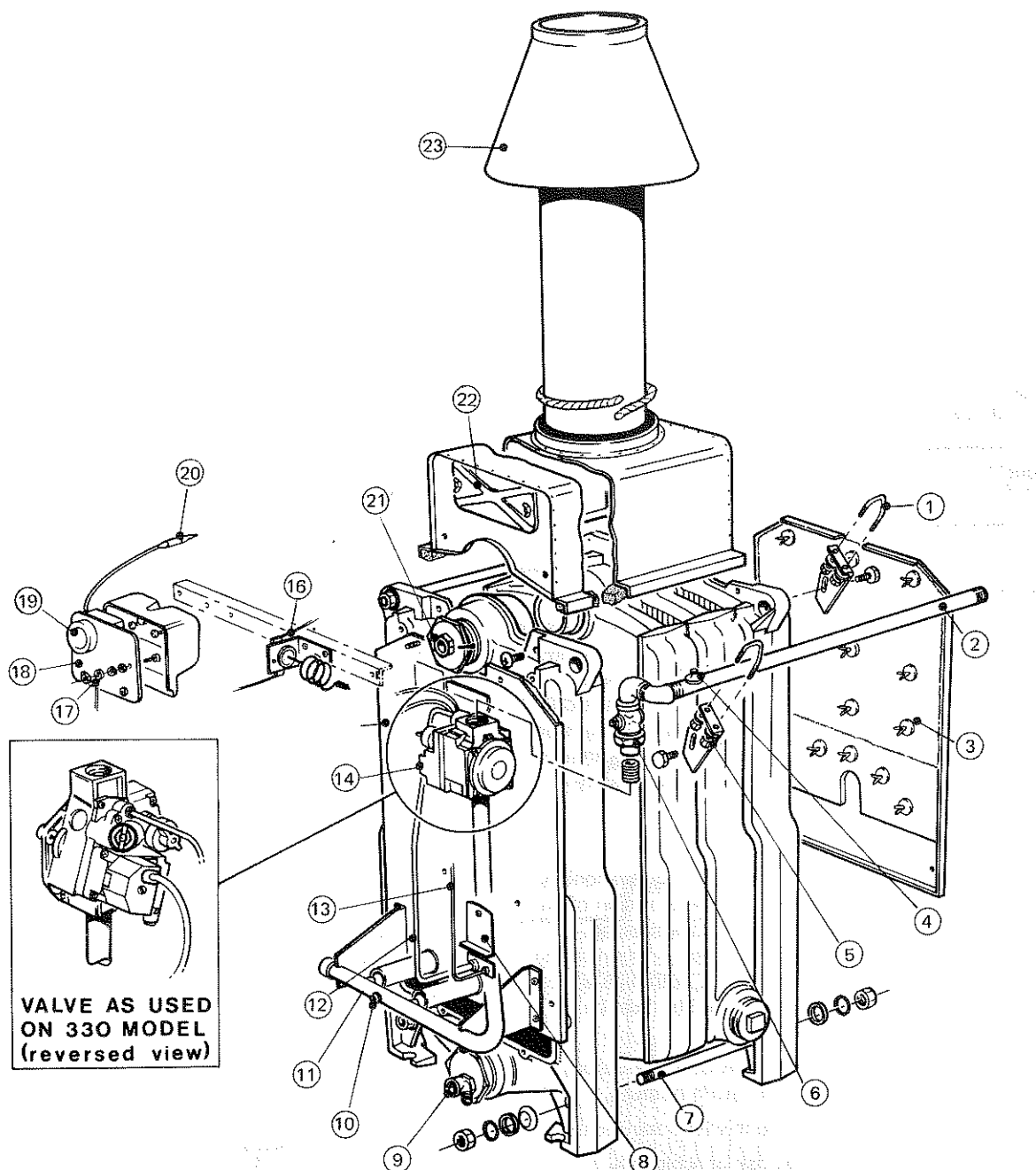
Factory assembled boilers are despatched from works in three packages:—

1. Assembled boiler body on wooden pallet base. The boiler limitstat (optional extra) when ordered is supplied in a pack taped to the boiler gas pipe.
2. Carton containing the casing, fastenings, flue brush, control box and instruction book.
3. Carton containing the draught diverter.

Check that all these packages have been correctly received at the site.

### WARNING:

Never attempt to lift or move the boiler by the gas pipework or burner manifold as damage by straining will result. The burner and control line assembly must be removed before lifting the boiler from the wooden pallet base for installation. To remove the assembly, take off the nuts and washers on the six studs securing the front cover to the boiler body and



**Legend:**

- |                                   |                                       |   |
|-----------------------------------|---------------------------------------|---|
| 1. Gas Pipe Clamp                 | 10. Manifold Gas Pressure Test Nipple | 17. Earth Bond  |
| 2. Gas Inlet Connection           | 11. Gas Manifold                      | 18. Control Box                                       |
| 3. Rear Cover                     | 12. Pilot Gas Pipe                    | 19. Boiler Control Thermostat Knob                    |
| 4. Inlet Gas Pressure Test Nipple | 13. Thermocouple Lead                 | 20. Boiler Thermostat Phial                           |
| 5. Gas Pipe Clamp                 | 14. Gas Control                       | 21. Pocket for Boiler Thermostat and Boiler Limitstat |
| 6. Union Gas Cock                 | 15. Front cover                       | 22. Collector Hood Cleanout Cover                     |
| 7. Tie Bar                        | 16. Boiler Limitstat (Optional Extra) | 23. Diverter  |
| 8. Lighting Door                  |                                       |   |
| 9. Drain Cock                     |                                       |   |

**Fig.2**

**CONCORD C140 ILLUSTRATED**

slacken the nuts on the front gas pipe clamp. The assembly can then be slid forward from the boiler body and put to one side in a safe place; it should not be replaced until the boiler body has been taken off the wooden base and removed to its final installed position. Manoeuvre the boiler body into the chosen position (note the warning above before doing so). Replace the burner and control line assembly. Replace tightly on the six studs the washers and brass nuts securing the front cover to the boiler body, (note that seven nuts are provided; the extra nut should be screwed onto the upper left hand stud. This is used later for making an earth bonding connection when fitting the control box to the boiler), and tighten the front gas pipe clamp nuts.

**Secondary Flue Connection**

Place the draught diverter centrally in position over the boiler flue outlet and complete the secondary flue connection. Seal with approved boiler putty between the boiler outlet socket and the diverter, and between the diverter outlet socket and the flue pipe to ensure gas-tight joints at these points.

**Note:**

The maximum unsupported weight of the flue pipe should not exceed 45kg (100 lb).

THE DRAUGHT DIVERTER MUST NEVER BE OMITTED, OR MODIFIED IN ANY WAY. IT MUST BE MOUNTED IN

THE VERTICAL PLANE DIRECTLY ON TOP OF THE BOILER SMOKEHOOD OUTLET.

### GAS CONNECTION

Connect the gas supply to the gas inlet pipe. The use of an approved union is recommended here.

### COMPLETING WATER CONNECTIONS

The flow and return connections to the rear tappings may conveniently be completed at this stage. Note however that connections to the side return tappings (which are for use only with the gravity circuit of combined pumped and gravity systems) cannot be made before the jacket has been fitted. Check that all tappings not used have been tightly plugged.

### CASING

The casing may now be fitted, the assembly method being clearly shown in Fig.3. When using the side return tappings, the knockout opening in the appropriate side panel should be removed before assembly.

Note that three sizes of casing are used for the range of seven sizes of boiler. To achieve correct assembly, always align the rear of the casing side panels with the rear of the boiler body

#### Casing Assembly (see Fig.3)

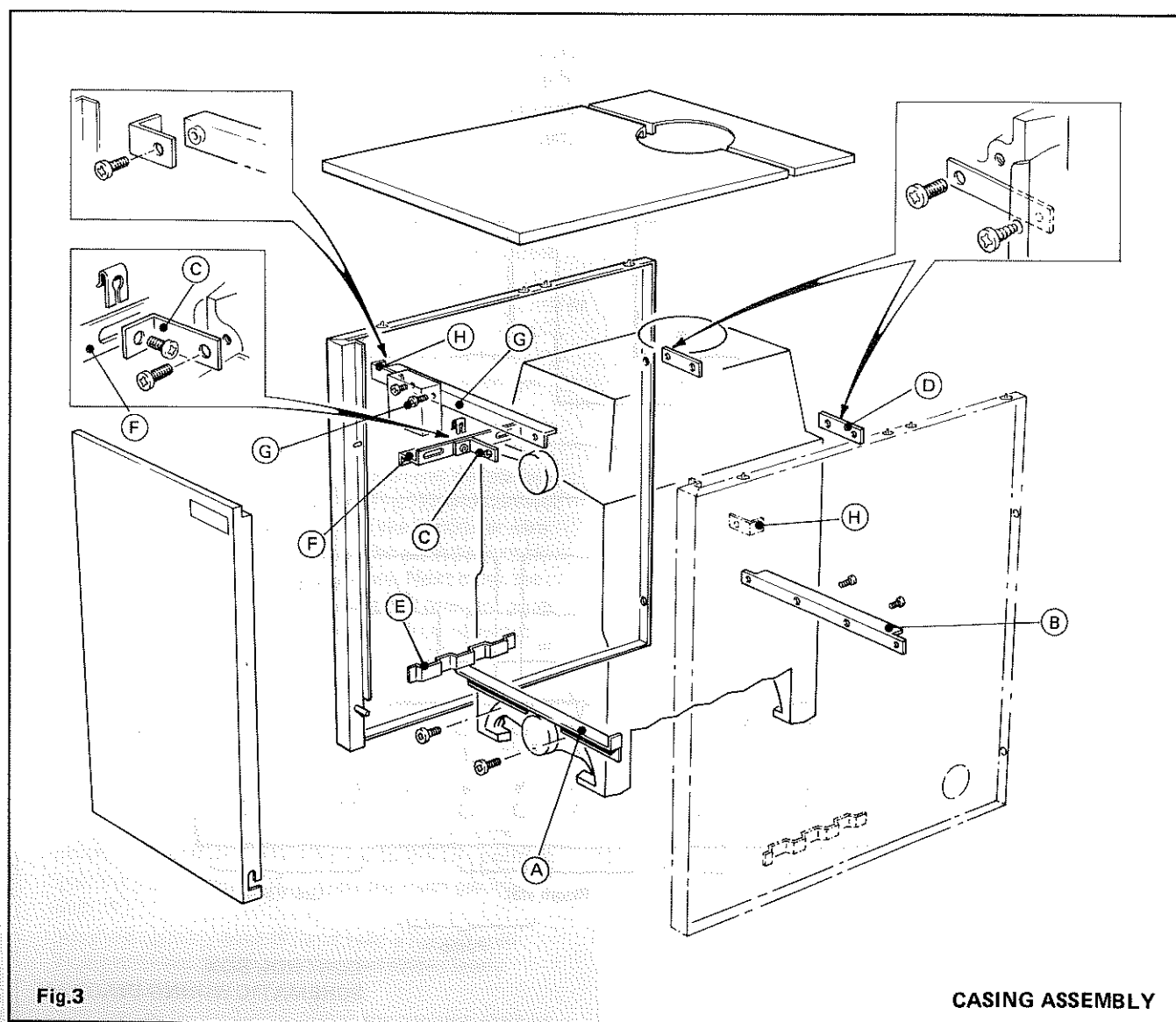
1. Fasten the lower front (A) and rear (B) channels to the boiler body (M8 x 12 lg. hex head screws into tapped holes in front and rear boiler sections).
2. Fit front fixing bracket (C) (one only, positioned at the left hand side) and rear fixing brackets (D) (two, one at each side) to the boiler body. (M8 x 12 lg. hex head screws into tapped holes in front and rear boiler sections).

3. Position the left hand side panel return behind the rear lower angle (B) and allow the aligned slot in the locating front bracket (E) to engage with the lug on the lower front channel (A). Fasten the panel with No. 10 x 10 long self-tapping screws to the rear fixing bracket (D) and rear angle (B).
4. Fasten front fixing bracket (C) to the upper locating bracket (F) with M5 x 10 lg. Pozi pan screw (locate spine nut over aligned slot in bracket).
5. Similarly fit the right hand side panel. Note however that at this side there is no front fixing bracket and upper locating bracket.
6. Fit the control box upper support angle (G) to the brackets (H) on the side panels, using M5 x 10 lg. Pozi pan screws.
7. Fasten the control box to the support angle (G), using M5 x 10 lg. Pozi pan screws.
8. Fit the front and rear top panels (held by nylon studs).
9. Fit front panel (positioned on pins at the bottom and held vertical by spring studs at the top).

### ELECTRICAL CONNECTIONS

The internal wiring of the boiler control box is shown in Fig.4. The terminal strip in the box provides for the connection of:—

1. The electricity mains supply.
2. A mains voltage (three or four terminal type) room thermostat switching the circulating pump.
3. The circulating pump.



Systems controls, other than a room thermostat, must be wired externally into the live mains lead to the boiler. If a frost-stat be fitted it should, of course, be wired in parallel with any other controls to ensure that the action of these is over-riden. Any clock control used should be of the four terminal type, giving a separate supply for the clock motor. If a programmer be used, study of the manufacturer's wiring instructions in conjunction with Fig.4 will enable the wiring to be completed.

## WIRING UP

**Mains:** Undo the screws securing the control box cover and to assist wiring up, turn the cover round and loosely screw to control box lower tapping with the long screw. Enter the mains lead at the rear of the boiler, pass it through the control box cable entry and connect as follows to the terminal strip:—

Brown (live lead)	to Terminal 3
Blue (neutral lead)	to Terminal 1
Green/Yellow (earth lead)	to Terminal 2

THE EARTH CONNECTION MUST **NEVER** BE OMITTED.

### Room Thermostat:

Connect as shown in Fig.5. The link fitted in the control box between terminals 5 and 6 must be removed.

**Circulating Pump:** Connect as follows to the terminal strip:—

Brown (Live lead)	to Terminal 9
Blue (Neutral lead)	to Terminal 7
Green/Yellow (Earth lead)	to Terminal 8

All wiring between entry at the rear of the boiler and the control box must be secured neatly under the cable clips provided on the casing. Wiring must never be allowed to contact the hot boiler body.

### Earth Bonding

The control box is provided with an earth bond. This earth bond must be fitted to the upper left hand stud on the front

of the boiler body. Remove the extra brass nut on this stud, place the earth lead terminal over the stud and secure with the extra brass nut.

THIS CONNECTION MUST **NEVER** BE OMITTED.

The gas control lead, pre-wired to the control box, terminates with two push-on spade terminals and one ring terminal. Fit the spade terminals onto the two connector tags on the Robertshaw gas control and the earth connection to the screwed terminal on the gas control.

### Limitstat

This control is supplied on request as an optional extra.

This operates to shut down the boiler completely in the event of failure of the boiler control thermostat or gas control. It is connected in series with the thermocouple flame failure circuit which is interrupted by the operation of the limitstat, thus immediately shutting off the supply of gas to the pilot and main burner.

On cooling, the boiler must be manually relit before operation can be resumed.

To fit the limitstat remove the boiler thermostat phial and pocket. Replace the pocket with the new one provided with the limitstat kit.

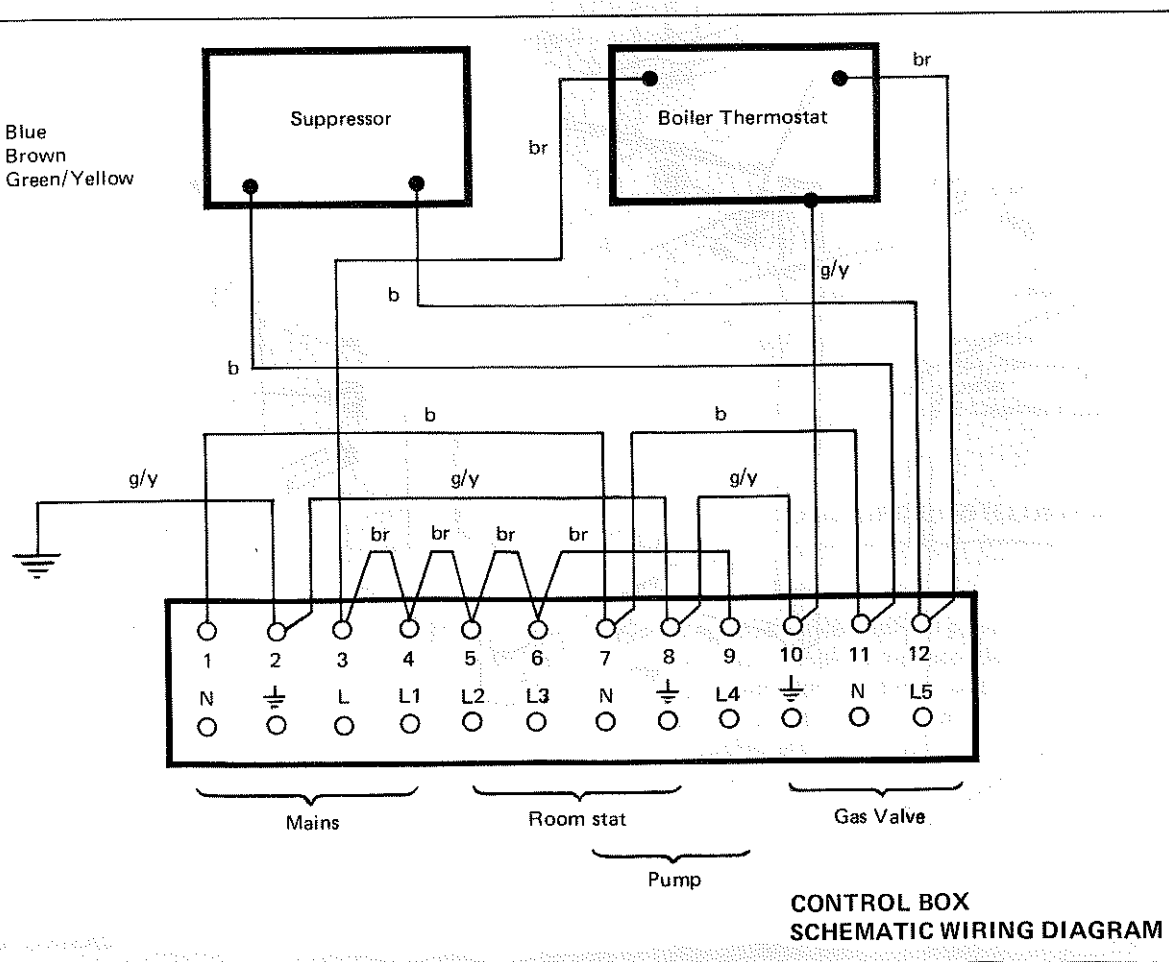
Disconnect the thermocouple capillary from the gas control and fit the limitstat connector (refer Fig.6). Replace the thermocouple capillary. Fit the limitstat to the bracket and secure the bracket to the top cross member (refer Fig.2). Secure leads with push-on connectors to spade terminals on the limitstat.

Fit the limitstat phial coil over the end of the boiler thermostat phial, ensuring that the capillary lays along the groove in this phial (refer Fig.6). Insert into the thermostat pocket and secure with the split pin provided.

## COMMISSIONING AND INITIAL LIGHTING (Fig.7)

### General

Check that the system has been filled and properly vented,





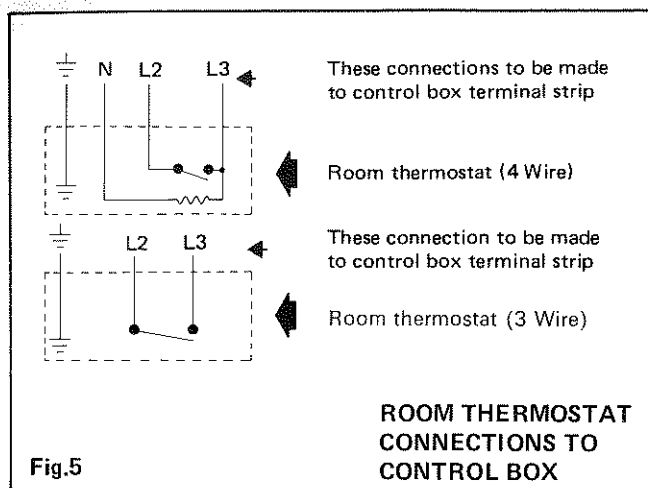


Fig.5

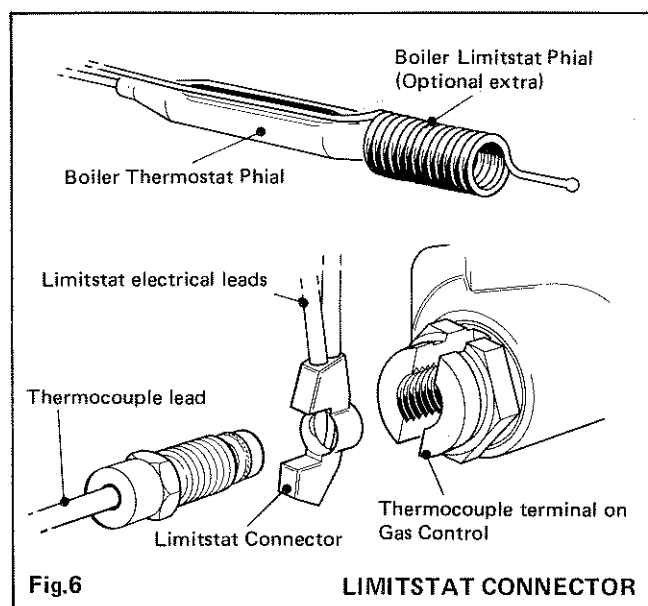


Fig.6

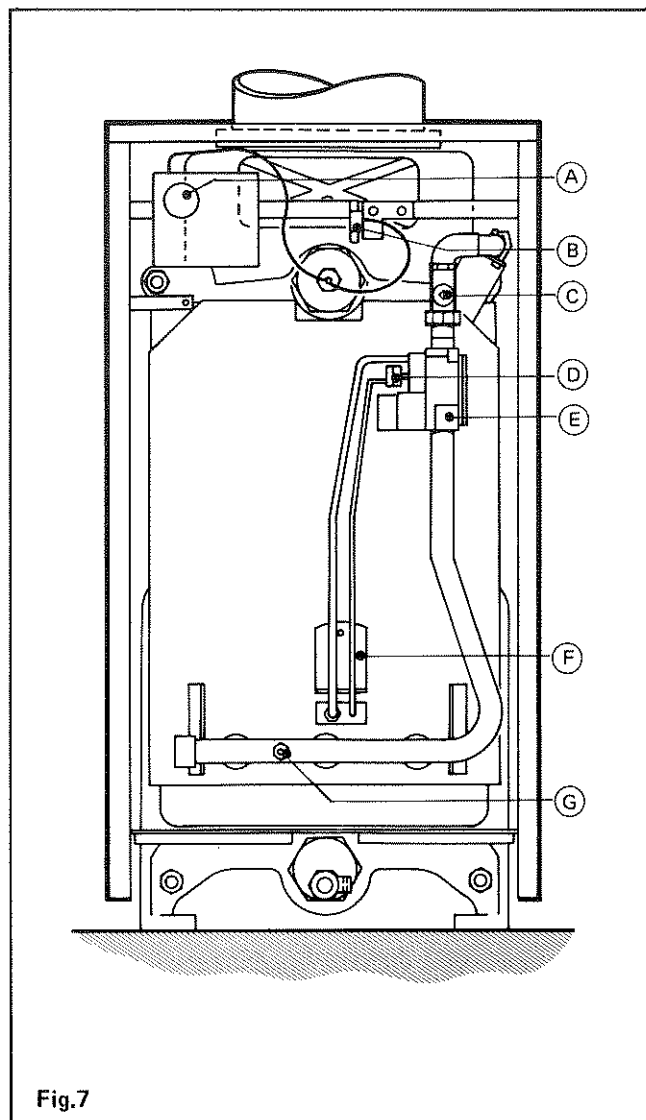


Fig.7

all drain cocks closed and that any stop valves fitted in the flow and return mains are open.

### Purging

Check that the electricity supply is switched OFF. Remove jacket front panel. Extinguish all naked lights and open all doors and windows. Do not smoke. Check that the gas supply is turned ON at the meter. Open the main gas inlet cock (C). Loosen the union nut on the cock outlet and carefully purge air from the pipework. Re-tighten the union nut when gas is smelled.

### TESTING FOR GAS TIGHTNESS

Close the gas supply cock at the meter. Remove the screw in the gas inlet pressure test nipple (4) (Fig.12) and connect a gas pressure gauge to the test nipple. Take particular care to ensure a gas-tight connection. Open the gas supply cock at the meter and record the static pressure. Next close the gas supply cock at the meter and observe the pressure gauge over a period of one minute. Any pressure drop recorded over this period must not exceed 0.5 mbar (0.2in. w.g).

### INITIAL LIGHTING

1. Turn the gas control knob (D) to the position marked with a circle (i.e. OFF).
2. Turn the boiler thermostat knob (A) to OFF.
3. Ensure that all external system controls (e.g. time switch, roomstat etc.) are adjusted to the ON position.
4. Wait for three minutes then open the main gas inlet cock (C).
5. Open the lighting door (F) and hold a lighted spill adjacent to the pilot burner located immediately behind the door.
6. Turn the gas control knob (D) to the position marked

with a stylised spark (\*) and hold down. This action allows gas to pass to the pilot burner which should now light.

7. When the pilot burner has lit and is burning with a stable flame, withdraw the spill but retain pressure on the gas control knob (D) for a further 20 seconds. If the pilot flame goes out when the gas control knob is released, turn the gas control knob to OFF, wait for three minutes, then repeat the instructions in paragraphs 5 and 6 above.
8. If the pilot cannot be established check that the pilot flame correctly envelops the thermocouple tip by 10–13mm (3/8in. – 1/2in.). If not, adjust the pilot burner pressure as necessary. Instructions for this adjustment are given under 'Pilot Burner Pressure' below. Check that the thermocouple lead connections at the gas control and, if fitted, boiler limitstat, are clean and secure. When the pilot flame is properly established, close the lighting door.
9. Turn the gas control knob (D) to the position marked with a flame.
10. Switch on the electricity supply.
11. Turn the boiler thermostat knob (A) to the required setting. This action will light the boiler.
12. When the boiler has lit, check all gas connections for tightness with soap solution.
13. Note that the gas control opens progressively, giving a low opening pressure which is progressively increased over a period of approximately 10 seconds to the full operating pressure. This feature ensures smooth, quiet ignition.

## MANIFOLD GAS PRESSURE

The manifold gas pressure must now be checked and adjusted as necessary. Commence the adjustment procedure with the system cold, on full load and with all temperature controls set at maximum. This will ensure, as far as possible, that thermostatic shutdown does not interfere whilst the pressure is being checked and adjusted. Remove the screw in the manifold pressure test nipple (G) and securely connect a suitable gas pressure gauge. Light the boiler and allow it to operate for about fifteen minutes to stabilise the burners. Check the pressure and adjust it to the figure shown in Table 2 for the appropriate boiler size. The location on the gas control of the manifold gas pressure adjuster is shown in Fig.8. Remove the dust cover over the adjuster and, using a small screwdriver, turn the screw beneath clockwise to increase or anti-clockwise to decrease pressure. The pressures quoted in Table 2 are given to facilitate speedy approximate adjustment of the gas rate. After setting to the pressure indicated allow the boiler to operate for about fifteen minutes to stabilise and then check the gas rate by reference to a watch and the gas meter. (Before doing so make certain that any other gas appliances connected to the same meter are turned off). The gas rate for each size of boiler is given in Table 1. A deviation of  $\pm 2\%$  of the quoted figure in the observed gas rate is of no practical importance but any greater variation must be adjusted by increasing or decreasing pressure as required by small steps until the correct rate is obtained. Replace the dust cover when finished, disconnect the gas pressure gauge and replace the blanking-off screw in the manifold pressure test nipple.

## PILOT BURNER PRESSURE

The pilot burner flame should envelop the thermocouple head by 10–13mm ( $3/8$ – $1/2$ in.). The position of the pilot burner pressure adjuster on the gas control is shown in Fig.8. Turn the adjustment screw beneath the dust cover clockwise to decrease or anti-clockwise to increase the flame length. Replace the dust cover and fibre washer.

## TESTING

Check that the main burner responds correctly to the manual ON/OFF operations of the boiler control thermostat and any other controls fitted in the gas control circuit.

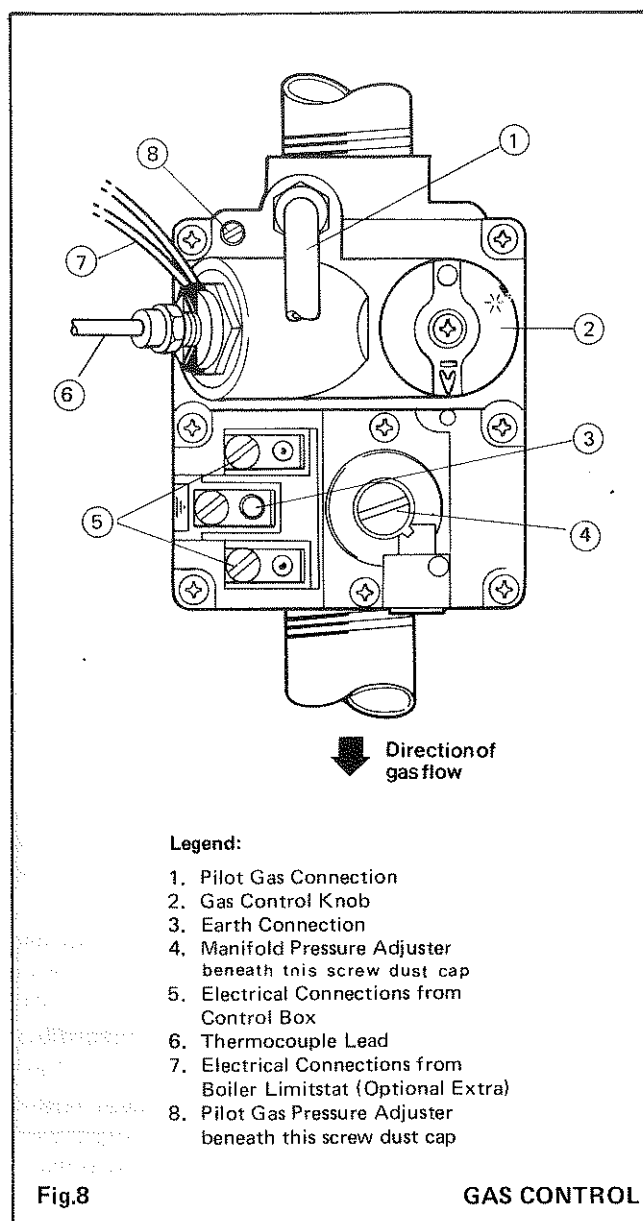
Check in the following manner the operation of the flame failure safety device:—

1. Extinguish the main burner and pilot burner by turning off the main gas inlet cock (Fig.7) (C).
2. Wait for  $1\frac{1}{2}$  minutes, during the course of which the thermocouple-operated solenoid valve in the gas control, which controls the main and pilot gas flow, will be heard to close.
3. Open the lighting door (Fig.7) (F) and hold a lighted taper adjacent to the pilot burner and then open the main gas inlet cock. Neither the pilot burner nor the main burner should ignite.

## WARNING

The lighted spill must always be positioned at the pilot burner **before** opening the gas inlet cock.

If this test cannot be satisfactorily made, the gas control is faulty, and should be examined and repaired or replaced by a competent engineer. The boiler must not be used until this has been done.



## ROUTINE OPERATION

Full instructions covering routine lighting and operation of the boiler are given on the Instruction Plate located on the inside of the casing door.

## HANDING OVER

Draw the attention of the boiler owner or his representative to the Lighting and Operating Instruction Plate on the inside of the jacket door. Give a practical demonstration of lighting and shutting down. Describe the function of the boiler and system controls and show how they are adjusted and used. Hand over this booklet to the customer and request him to keep it in a safe place for ready reference.

## IMPORTANT

Point out to the owner that the boiler must have regular maintenance and cleaning at least annually to ensure reliable and efficient operation. Regular attention will also prolong the life of the boiler and should preferably be performed at the end of the heating season. Recommend that a contract for this work should be made with the Regional Gas Authority or a firm of Heating Engineers.

# MAINTENANCE

## WARNING:

Before working on the boiler always disconnect the electricity supply (remove plug from socket or switch off at a double-pole isolating switch) and shut off the main gas inlet cock.

## CLEANING THE BOILER

1. Disconnect the electricity supply and turn off the main gas inlet cock (see note above).
2. Remove the casing front panel by pulling forward from the top to release the spring stud fasteners and then lifting off.
3. Lift off the casing top panels.
4. Remove electric leads at the gas control (white three-core cable; if the boiler be fitted with the optional limitstat there will also be two white leads to the thermocouple connector).
5. Unscrew the union nut beneath the main gas inlet cock.
6. Remove the hexagon nuts and washers securing the combustion chamber front panel. Note that the upper left-hand stud has two nuts, the upper nut securing a green/yellow earth bond lead. After removing the upper nut this bond can now be released. Slacken off the nuts on the front gas pipe clamp. The complete front plate/burner assembly is now free to be withdrawn from the combustion chamber. Put it to one side in a safe place. Similarly remove the combustion chamber cover at the rear of the boiler.
7. Remove the wing nuts securing the collector hood front and rear clean-out covers. Remove the covers.
8. Cover the floor of the combustion chamber with newspaper or strong brown paper to collect, and facilitate removal of, debris dislodged during cleaning.
9. Pass the flue brush through the collector hood clean-out cover opening(s) and thoroughly clean the interior of the hood, brushing dislodged debris through the flue openings between the boiler sections. Continue by using the brush from the front and rear of the boiler to thoroughly clean the boiler flueways. Next, using the brush from inside the combustion chamber, brush upward between the sections. Finally brush down the walls of the combustion chamber. Perform all these operations with great care to ensure all deposits are completely removed.
10. Remove the paper with the dislodged deposits from the floor of the combustion chamber.
11. Examine the burner assembly. Clean the burner bars by brushing them down with a stiff bristle (**not wire**) brush. Check each bar carefully to ensure that all the flame ports are clear and that all surfaces are free from accumulated deposits. If available, an industrial vacuum cleaner may be useful to assist in this work. When cleaning the burner bars, take care to avoid damage, from rough handling, to the pilot burner and thermocouple assembly.
12. Examine the pilot burner and thermocouple. Clean them by wiping gently with a soft rag. Ensure that the flame ports and pilot injector are unobstructed. If the injector is damaged, a new injector should be fitted. If the thermocouple tip shows signs of deterioration (e.g. burning, splitting or cracking) a new thermocouple should be fitted. Check that all thermocouple lead connections are clean and tight. Do not tighten these connections more than one-quarter turn beyond finger-tight. If fitting a new thermocouple do not kink the lead; any bends should have a minimum radius of 25mm (1in.). If refitting the pilot burner assembly ensure that the thermocouple is to the right hand side.

13. Examine the gas injectors (located in the gas manifold), and check that the orifices are unobstructed.
14. Brush out any dirt which may have accumulated on the floor beneath the boiler.
15. Re-assemble the boiler in reverse order.

## IMPORTANT

Ensure that the green/yellow earth bond from the control box is correctly replaced under the second nut on the upper left-hand front cover stud and that the gas union nut is securely tightened.

## TESTING AFTER SERVICING

After re-assembly, restore the electricity and gas supplies. Light the boiler (see Lighting Instructions on inside of casing front panel) and check gas connections for tightness as detailed under 'Testing for Gas Tightness' on page 9. Check gas pressures and the gas rate and test as instructed on page 10 under headings 'Manifold Gas Pressure', 'Pilot Gas Pressure' and 'Testing'. Adjust time and temperature controls to the user's requirement and remember to reset any time control, which may have been switched off, to the correct time of day.

## REPLACING COMPONENTS

The boiler has been designed to facilitate the replacement of all components which may require renewal during the service life of the appliance.

### Gas Control

Follow instructions under 'Cleaning the Boiler', in preceding paragraphs 1–6. Undo the thermocouple lead and pilot pipe connections at the gas valve. The valve may now be unscrewed, re-assembly being in reverse order.

### Thermocouple

Undo the thermocouple connections and withdraw. Follow the instructions under 'Cleaning the Boiler', para 12 for re-assembly.

### Pilot Burner

Undo the pilot pipe and thermocouple connections and withdraw both the pipe and thermocouple. Unscrew the two pozidrive screws holding the burner to the front plate and withdraw the burner complete. Replace in reverse order ensuring that the pilot injector is in position and the thermocouple is to the right hand side.

### Control Thermostat

Switch off the electricity supply and turn off the main gas inlet cock. Remove the thermostat retaining bush and withdraw the phial from the pocket. Remove the thermostat knob and the three screws securing the control box cover. Unplug the two wires from the thermostat. Undo the two screws holding the thermostat to the control box cover and remove the thermostat. Re-assemble in reverse order ensuring that the thermostat earth wire is re-connected over the fixing screw next to the thermostat body.

### Limitstat

Change the limitstat in the reverse order of the fitting operations given on page 8.

## BURNERS

Follow the instructions given under 'Cleaning the Boiler', (in preceding paras 1–6). The burners may now be unscrewed from the front plate. Re-assemble in reverse order.

## BOILER LIMITSTAT (Optional Extra)

This optionally extra control operates to shut down the boiler completely in the event of the failure of the boiler control thermostat or gas control. The development of excessively high water temperature of boiling is thus

prevented. It is connected in series with the thermocouple flame failure circuit which is interrupted by the operation of the limitstat, thus immediately shutting off the supply of gas to the pilot and main burners. On cooling, the limitstat automatically returns to the operating position but the boiler must be manually re-lit before operation can be resumed, having first depressed the reset button on the limitstat. The temperature at which the limitstat operates is not adjustable. If persistent operation of this control is

experienced, first check that all electrical connections in the thermocouple circuit are clean and tight (but not more than one-quarter turn beyond finger-tight). If this action does not affect a cure, a fault has most probably developed in the boiler control thermostat and it should be replaced with a new instrument unless of course, shut down is occurring at a low flow temperature, indicating that the limitstat itself is faulty and requires replacement.

## ASSEMBLY INSTRUCTIONS FOR SITE ASSEMBLED BOILERS

### SITE ASSEMBLY PROCEDURE

#### GENERAL

The installation of the boiler must be in accordance with the Gas Safety Regulations; Building Regulations; I. of E.E. Regulations, and the byelaws of the local Water Undertaking. It should also be in accordance with the relevant British Standards and Codes of Practice, together with any relevant requirements of the local Gas Region and Local Authority.

#### Tools and Materials Required:

Machine Oil  
Pipe Fitting Tools  
Pozidrive Screwdriver  
M5 and M8 Spanners  
Arbormast sealing Strip

#### PREPARATION OF SECTIONS

Each section should be brushed clean on all external surfaces and any debris which may have accumulated within the

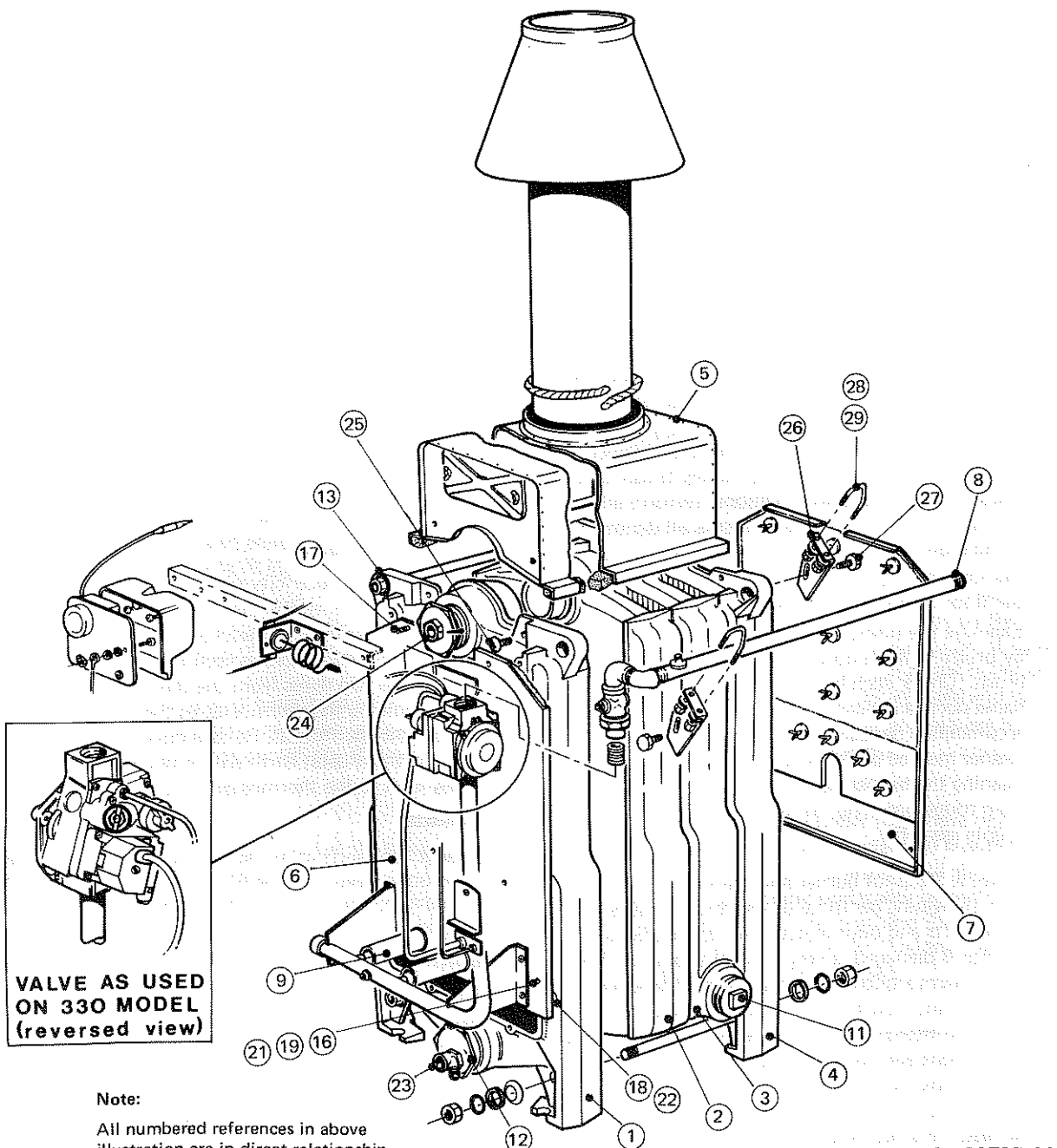
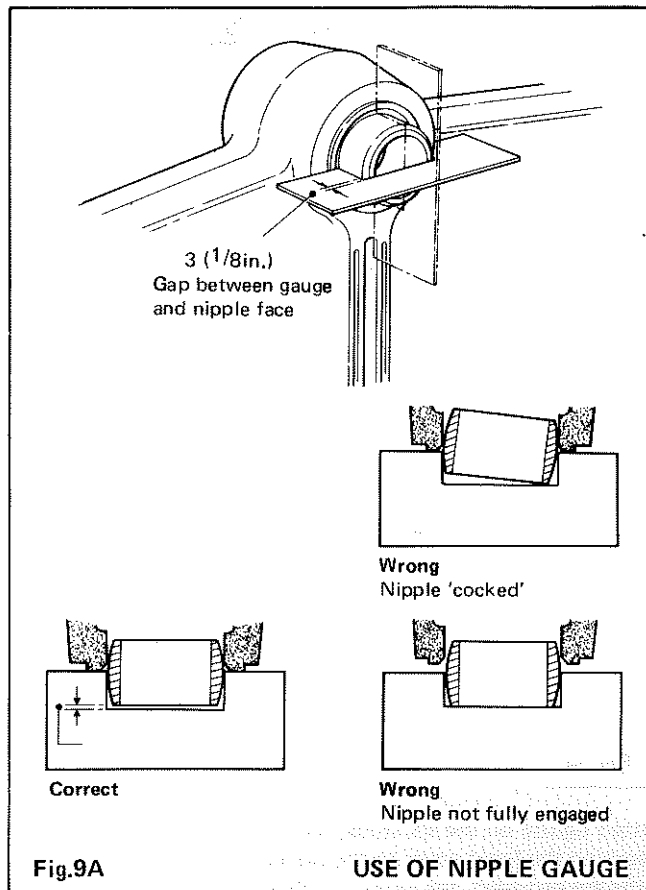


Fig.9

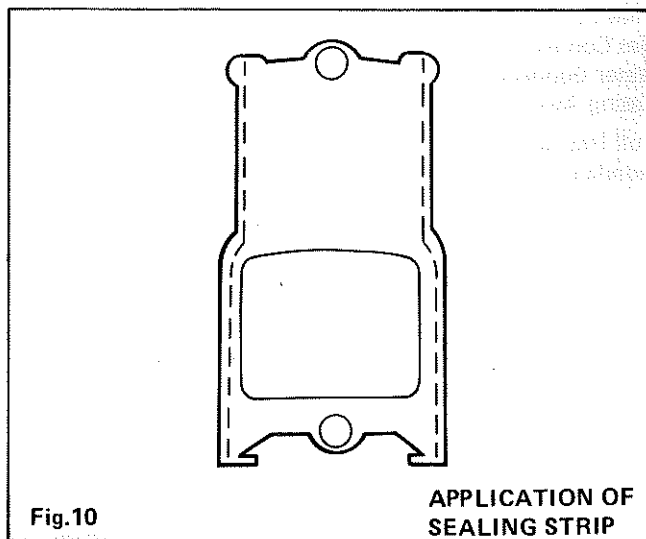
sections should be removed via the bottom nipple ports. The nipple ports and nipples should be thoroughly cleaned of protective grease and light oil applied.

### SECTION ASSEMBLY (Refer Fig.11)

Place the back section in position, supporting it with a wooden prop. Locate nipples in the top and bottom nipple ports and carefully drive them home, using a mallet and a hardwood block. Ensure that the nipples are entered correctly as incorrectly entered nipples will almost certainly lead to leaks and fractures. Try the nipple gauge across the face of each homed nipple, in two positions, at right angles. A correctly entered nipple should provide a parallel gap of up to 2mm (1/16in.) under the gauge. (Refer to Fig.9A).



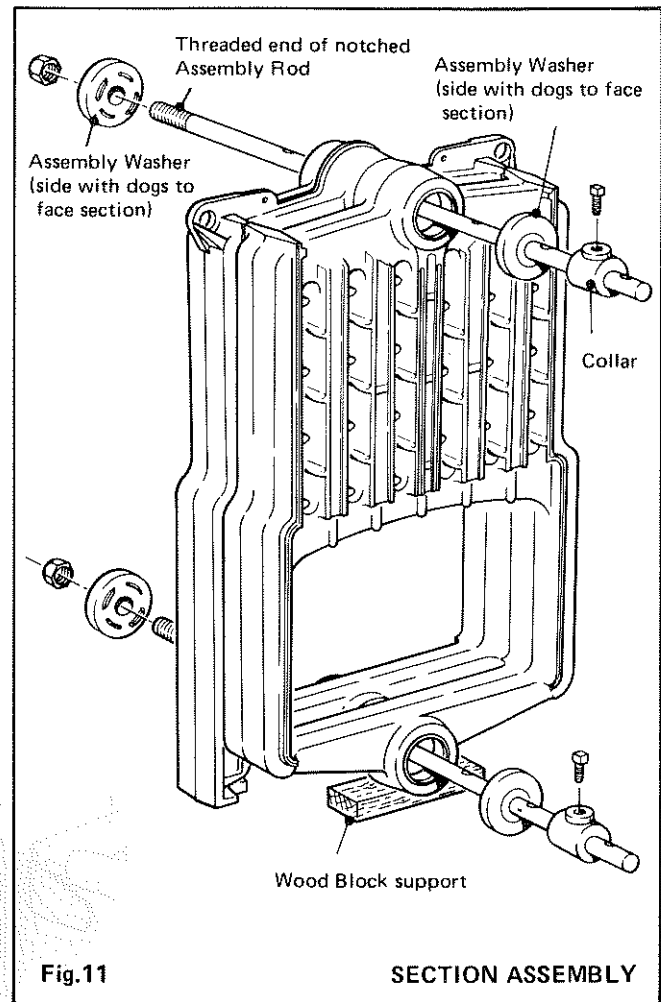
Apply 2 lengths of arbormast sealing strip to the front face of the back section, in the position shown by the dotted line in Fig.10.



Manoeuvre the connector section (with side return tapping) into position, carefully supporting it in a suitable manner until it engages the nipples projecting from the back section. Pass a notched assembly rod through each of the upper and

lower nipple ports with the longer threaded ends protruding through the nipple ports to the rear of the boiler. Pass the cast iron assembly washers along the assembly rods (see Fig. 11) ensuring that the locating lugs on the washers are correctly engaged in the nipple ports on the front of the connector section and the rear of the back section, thus centralising the assembly rods. Place an assembly collar on the notched end of each assembly rod and engage the round-nosed setscrews in the appropriate notches.

Fit flat steel washers and nuts on the longer threaded ends of the assembly rods. Liberally lubricate the threads and screw up the nuts equally in turn until the sections are fully engaged.



When the connector section is correctly in position, release the setscrews, remove the collars and washers and withdraw the assembly rods sufficiently to permit placing nipples and the next section (middle section) in position. After the nipples have been correctly entered in the nipple ports, (see Fig.9A) apply 2 lengths of arbormast sealing strip to the face of the connector section as shown in Fig.10. The first middle section can then be manoeuvred into position, being suitably supported, until it engages the nipples projecting from the connector section.

Replace the assembly rods, relocate nuts on the long threads and reset the collars and washers one notch further along. Draw the sections together as previously described.

Repeat the assembling process for the remaining middle sections, ensuring that the 2 lengths of arbormast sealing strip are applied to the front face of each section after assembly. Finally, fit the front section, following the same assembly procedure.

On completion of the assembly of the boiler body, the two notched assembly rods and collars and washers should be removed and the four boiler tie rods fitted. These tie rods pass through the large holes in the assembly lugs located on

the top shoulders and inside the feet of the front and rear sections. (See Fig.2)

Fit a flat steel washer, a shakeproof washer and a nut on the threaded ends of the tie rods at the rear of the boiler.

Fit a cup washer, a flat steel washer, a shakeproof washer and a nut on the threaded ends of the tie rods at the front of the boiler. Screw up all the nuts equally in turn until all are secure, but do not overtighten and distort cup washer. At this stage, if one or both of the side return tappings on the connector section are not required, the 2in. BSP sq. hd. plugs should be made watertight. The 2½in. x ½in. bush should be screwed into the top tapping on the face of the front section, followed by the fitting of the thermostat pocket to the tapping in the bush. The 2½in. x ½in. eccentric bush is fitted into the bottom tapping on the front section and the drain cock fitted into the bush. All connections should be made watertight using an approved jointing compound.

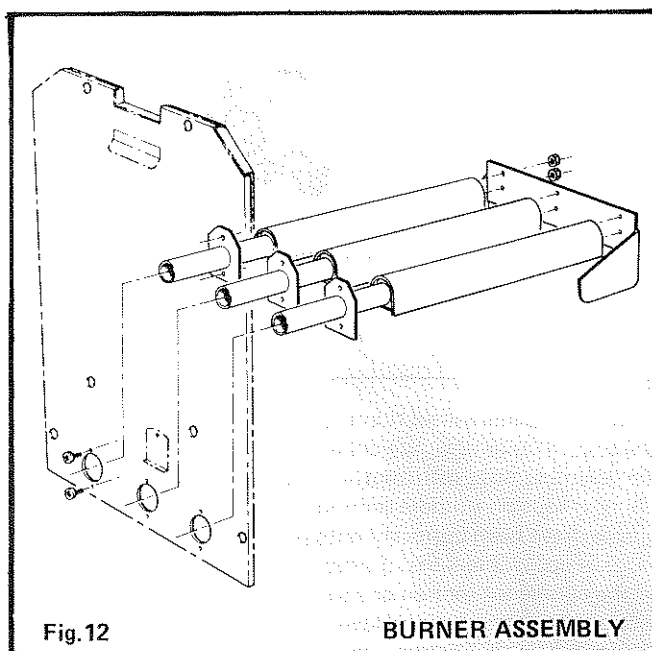
#### FITTING COLLECTOR HOOD (See Fig.1).

Apply 2 lengths of arbormast sealing strip to the front and rear seating edges of the collector hood before fitting on top of the boiler body. (Glass fibre sealing rope is affixed to the side seating edges at works prior to despatch).

Place the hood in position on top of the boiler body assembly and secure with the four Hex Hd. Bolts provided. These bolts pass through the small holes in the top tie rod fixing lugs and screw into the nutserts fitted in the ends of the collector hood.

#### FITTING MAIN BURNERS (See Fig.12)

Attach the burners to the rear support by means of M5 Hex nuts. The burners should then be slotted through the front plate and then attached using the M5 x 6mm pozi head screws.

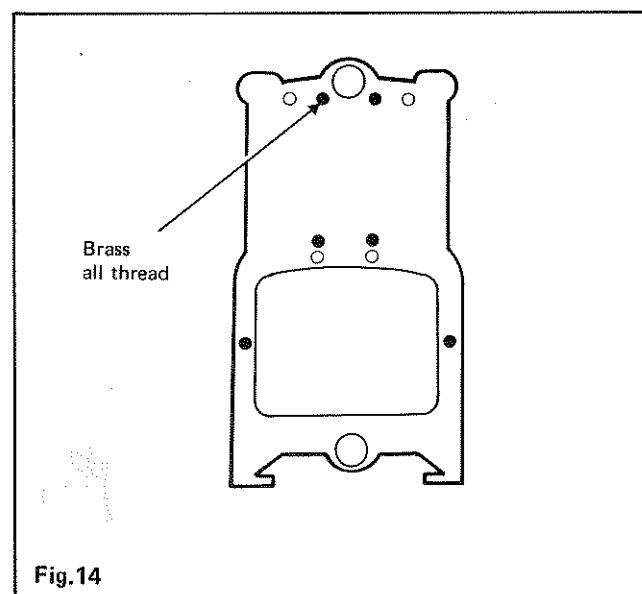
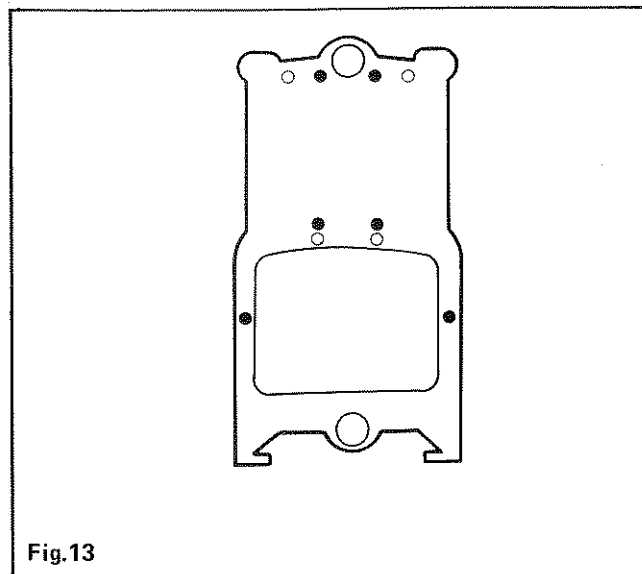


#### FITTING REAR PLATE ASSEMBLY

Insert the six M8 x 32mm lg. all-thread studs and M8 steel nuts into the tappings on the back section (see Fig.13). The two lower centre tappings are not used. A washer should be fitted to the bottom side stud fixings. Care should be taken to ensure that the studs are level. The rear plate assembly can now be fitted and tightly secured to the back section with M8 Hex nuts (brass) and washers.

#### FITTING FRONT PLATE/MANIFOLD/BURNER ASSEMBLY

Fit the six studs, fixings etc. into the front section as shown in Fig.14. The front plate/manifold assembly should now be



fitted tightly on the six studs, the washer and brass nuts securing the front cover to the boiler body. (Note that seven nuts are provided, the extra nut should be screwed onto the brass all-thread. This is used later for making an earth connection when fitting the control box to the boiler).

The boiler is now ready for the following:—

- Flue Connection
- Gas Connection
- Water Connection
- Casing Assembly

Full instructions for making the above connections are as detailed in the standard Installation Instructions.

**STELRAD GROUP** pursues a policy of continuing improvement in design and performance of its products. The right is therefore, reserved to vary specification without notice.

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