



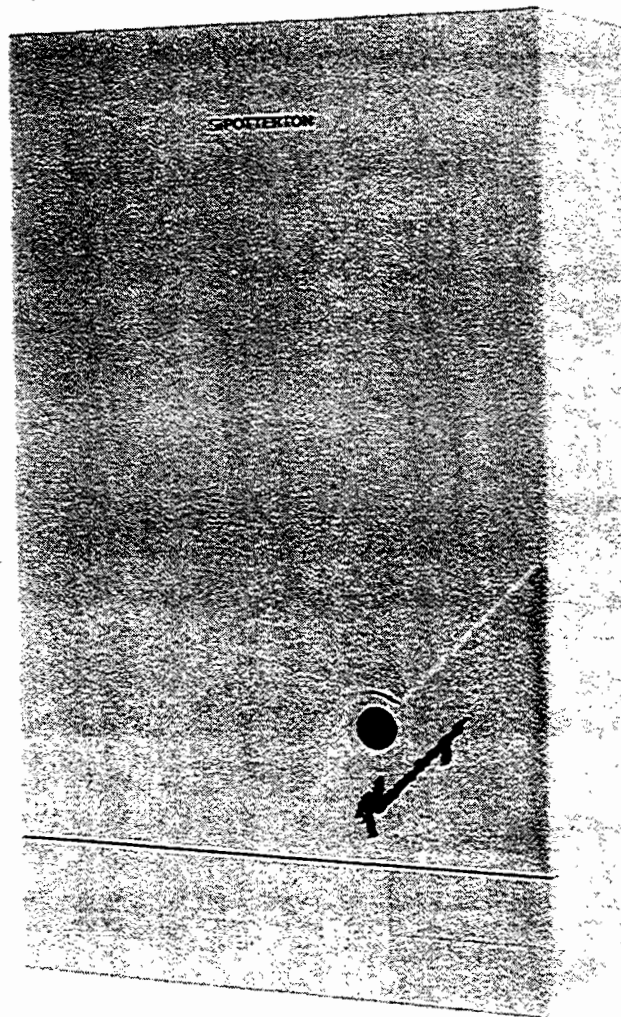
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# RS 20/35 RS 35/50

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## Balanced Flue Gas Fired Boiler

THIS APPLIANCE IS FOR USE WITH NATURAL GAS ONLY.



## Installation and Servicing Instructions

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LEAVE THESE INSTRUCTIONS ADJACENT TO THE GAS METER.

# **FLAMINGO RS 20/35 G.C. No. 41.605.57** **35/50 G.C. No. 41.605.58**

## **IMPORTANT**

This appliance must be installed and serviced by a competent person as stated in Gas Safety (Installation and Use) Regulations 1984.

Flamingo boilers are certified by BSI for safety. It is therefore important that no external devices (e.g., flue dampers, economisers etc.) be directly connected to these appliances unless covered by these installation instructions or otherwise recommended in writing.

Any direct connection of a control device not approved by Potterton could invalidate the BSI certificate and the normal warranty.

## **LIST OF CONTENTS**

	<b>Page No.</b>
General . . . . .	3
Optional Extras . . . . .	3
Accessories . . . . .	3
Installation Data . . . . .	3
Boiler Dimensions . . . . .	4
Site Requirements . . . . .	6
Technical Data . . . . .	7
Installation Instructions . . . . .	12
Commissioning . . . . .	18
Servicing Instructions . . . . .	21
Health and Safety Information . . . . .	Back page
Control Systems, Pipework and Wiring Guide . . . . .	Supplied in
User's Instructions . . . . .	Literature Pack

## GENERAL

Potterton Flamingo Balanced Flue boilers are automatically controlled, wall-mounted appliances, using a cast iron heat exchanger and are available in two outputs ranging from 5.86-14.65 kW (20,000-50,000 Btu/h). Refer to TECHNICAL DATA page 8. The boilers which are designed to provide domestic hot water and/or central heating must be used on INDIRECT hot water systems only. The cast iron heat exchangers are suitable for use on sealed or open vented gravity hot

water/pumped central heating systems or fully pumped systems.

The balanced flue system provided can be adjusted telescopically for wall thicknesses of 230 mm-380 mm (9 in-15 in). Further adjustment can be made down to a minimum wall thickness of 76 mm (3 in) by cutting the ducts.

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## OPTIONAL EXTRAS

The following are available as optional extras:—

FLUE EXTENSION KIT, suitable for a maximum wall thickness of 610 mm (24 in) Part No. 214214.

TERMINAL GUARD (Part No. 903765.), to be used

when the terminal is fitted less than 2m above a balcony, above ground or above a flat roof to which people have access.

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## ACCESSORIES

The following range of Potterton system controls are also available and further information will be provided upon request.

Electronic Programmer E.P. 2001, E.P. 3001,  
E.P. 4001 and E.P. 6000

Programmable Electronic Thermostat PET 1  
Thermostatic Radiator Valve PV456 and PH456  
Electronic Cylinder Thermostat PTT 2  
Electronic Room Thermostat PRT 2  
Spring Return Zone Valve PMV2  
Spring Return Diverter Valve PMV3

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## INSTALLATION DATA

The installation of the boiler must be in accordance with the latest relevant requirements of the Gas Safety (Installation and Use) Regulations 1984, local building regulations, current IEE Wiring Regulations and the by-laws of the local Water Undertaking.

Detailed recommendations are contained in the following British Standards and Codes of Practice.

BS. 6798 1987, BS. 5440 Part 1 1978  
BS. 5440 Part 2 1976, BS. 5449 Part 1 1977  
BS. 5546 1979, BS. 4814 1979, BS. 6891  
BUILDING REGULATIONS  
MODEL WATER BYE-LAWS  
BRITISH GAS PUBLICATION DM2  
GAS SAFETY (INSTALLATION AND USE)  
REGULATIONS 1984  
BUILDING STANDARDS (SCOTLAND)  
REGULATIONS.

FIG. 1. BOILER DIMENSIONS (mm)

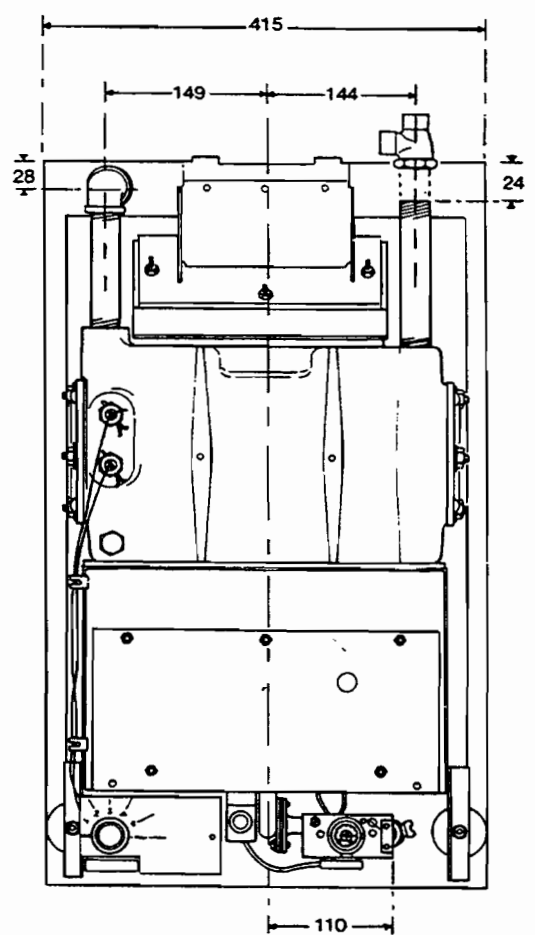
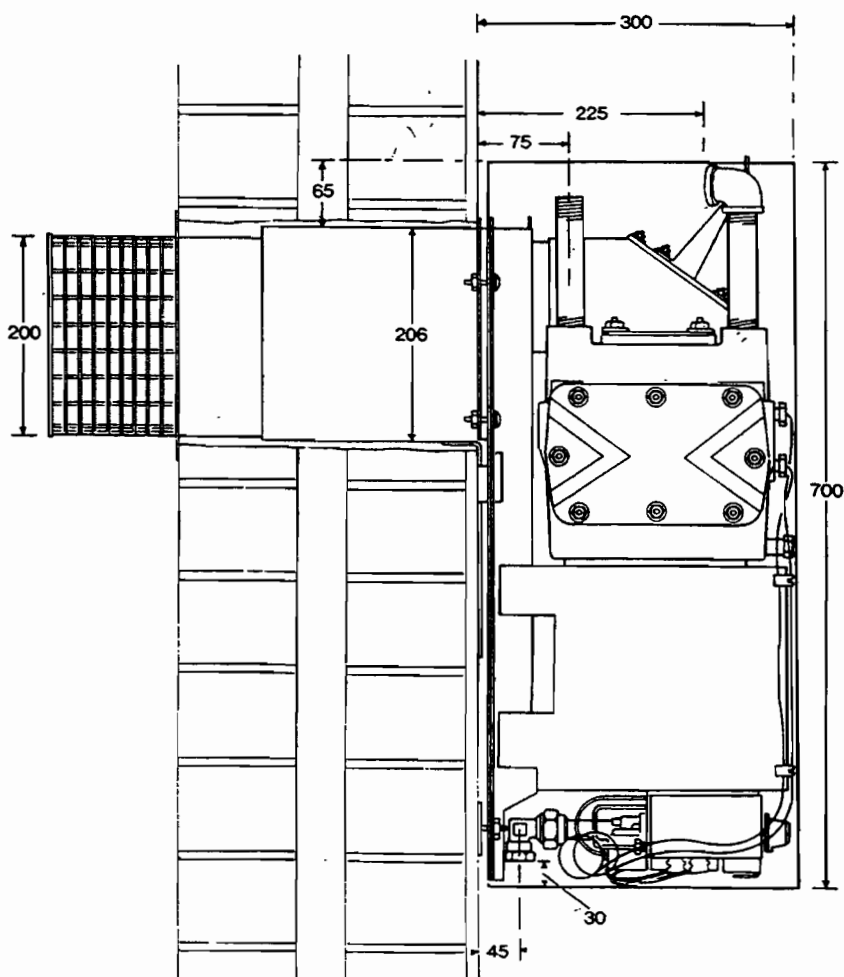
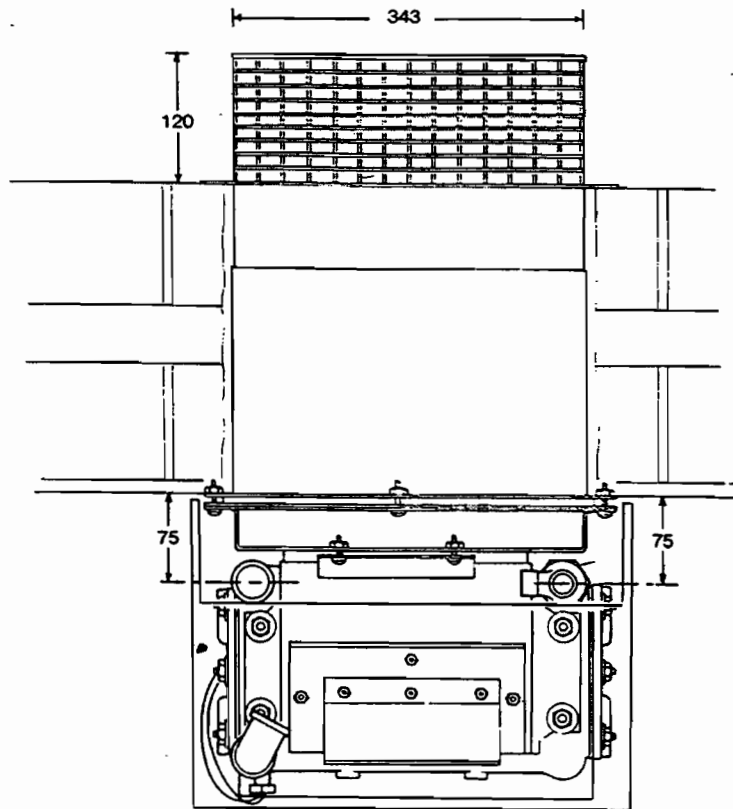
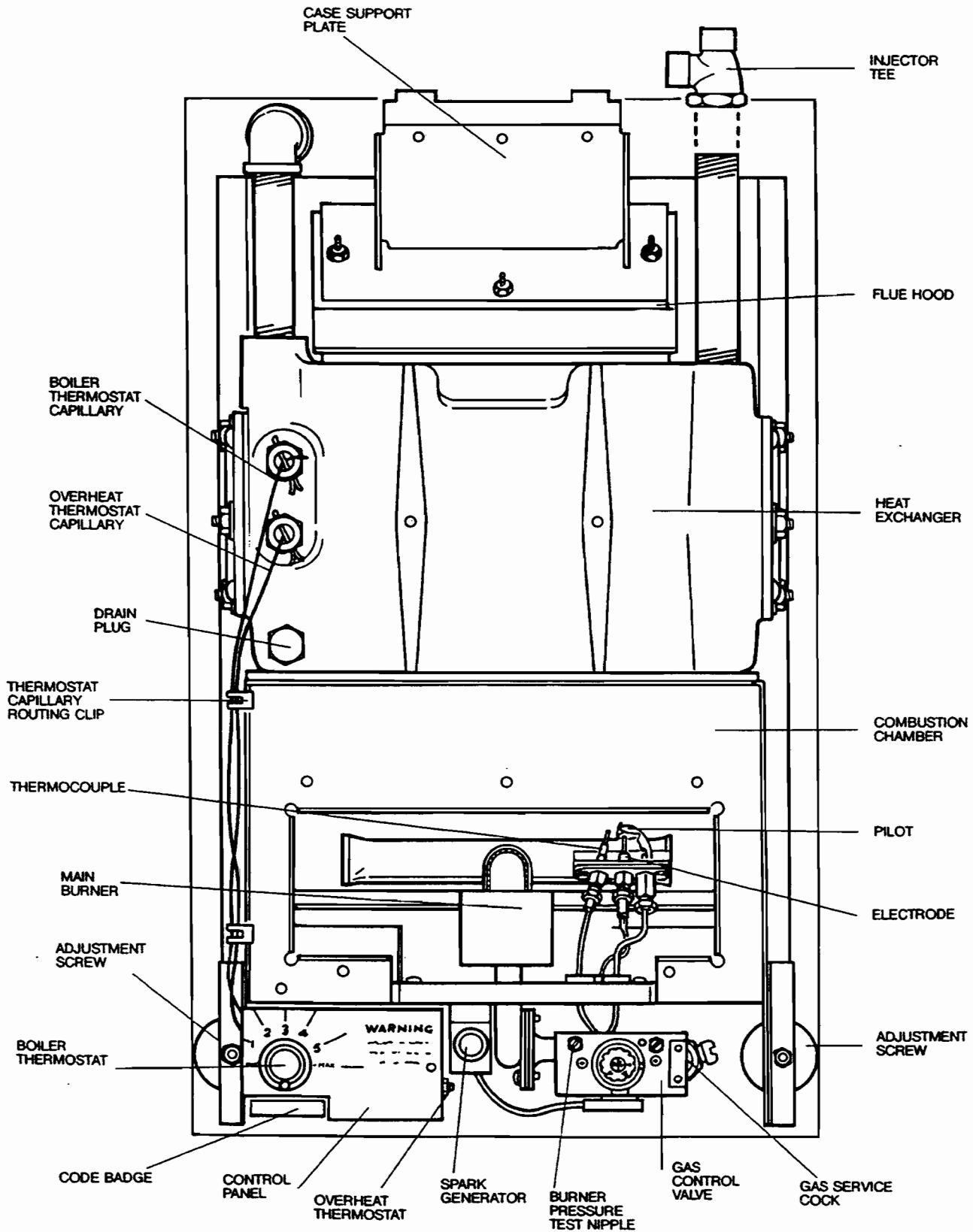


FIG. 2. GENERAL ARRANGEMENT



## SITE REQUIREMENTS

These boilers are not suitable for external installation. The appliance may be installed in any room, although particular attention is drawn to the requirements of the current I.E.E. wiring regulations and, in Scotland, the electrical provisions of the Building Standards applicable in Scotland with respect to the installation of the appliance in a room containing a bath or shower.

Where a room-sealed appliance is installed in a room containing a bath or shower, any electrical switch or appliance control, utilising mains electricity should be so situated that it cannot be touched by a person using the bath or shower.

If installed in a bathroom, the point of connection to the external electricity supply **MUST** be outside the room. Where the installation of the boiler will be in an unusual location special procedures may be necessary and BS. 6798 1987 gives detailed guidance on this aspect.

Ensure that the gas supply pipe and meter are large enough for this appliance and any others that may be run off the same meter. Reference should be made to BS. 6891.

### Boiler Mounting Surface

The boiler must be mounted on a flat wall, which may be of combustible material and must be sufficiently robust to take the weight of the boiler. The requirements of the local authorities and the Building Regulations must be adhered to.

### IMPORTANT NOTICE: TIMBER FRAMED HOUSES

If the appliance is to be fitted in a timber framed building it should be fitted in accordance with British Gas Publication. 'Guide for Gas Installations in Timber Framed Housing'. If in doubt, advice must be sought from the local Gas Region of British Gas.

### Clearances Around The Boiler

The following minimum clearances must be maintained after installation for correct operation and servicing of the boiler—

- 610 mm (2 ft) at the front of the boiler
- 5 mm (0.2 in) each side of the boiler
- 50 mm (2 in) at the top (measured from the top of boiler case)
- 100 mm (4 in) at the bottom of boiler

Additional clearances may be required to lift the boiler on to the wall.

### Ventilation

If the boiler is to be installed in a confined space such as a cupboard, the space will need ventilating. Openings must be provided at the top and bottom of the cupboard each of which should have a free area as shown in TABLE 1. Further details for installation of a boiler within a compartment are given in BS. 6798 1987.

TABLE 1

	Area for Air from Room		Area for Air from Outside	
	cm <sup>2</sup>	in <sup>2</sup>	cm <sup>2</sup>	in <sup>2</sup>
RS 35/50	174	27	87	14
RS 20/35	122	19	61	10

### Siting Of Balanced Flue Terminal

If a terminal is fitted less than 2 m above a balcony, above ground or above a flat roof to which people have access then a suitable terminal guard should be fitted (P.I.L. No. 903765)

Refer to BS. 5440 Part 1 1976 for further guidance.

The minimum spacings from the terminal to obstructions and ventilation openings are shown in FIG. 3

### Note:

Where a flue is fitted less than 1000 mm from a plastic or painted gutter or 500 mm from painted eaves, an aluminium shield of 1000 mm length should be fitted to underside of gutter or eave.

Any car port or other add-on extension should consist of a roof or a roof and one other wall. If it consists of a roof and two other walls the installation shall be treated as suspect and further advice sought.

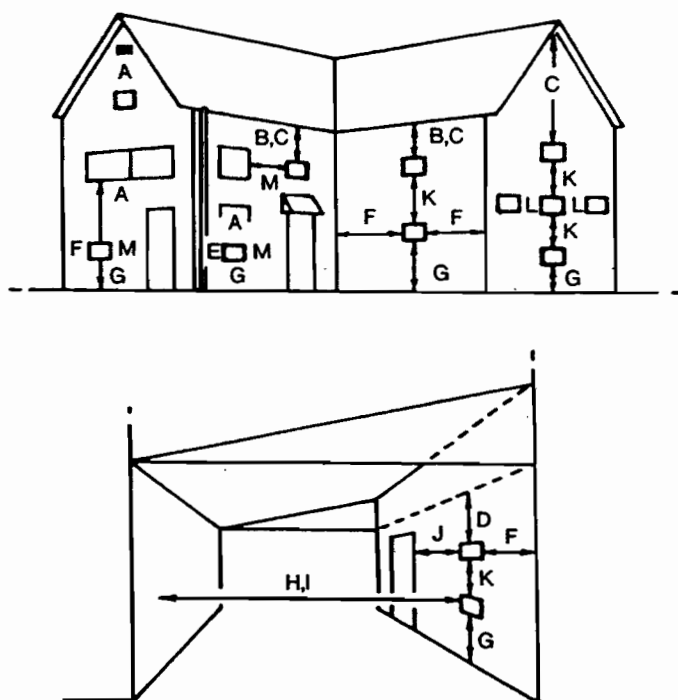


FIG. 3. THE SITING OF BALANCED FLUE TERMINAL

POSITION	MINIMUM DISTANCE
A. DIRECTLY BELOW AN OPENABLE WINDOW, AIR VENT, OR ANY OTHER VENTILATION OPENING.	mm 300
B. BELOW GUTTER, DRAIN/SOIL PIPE	300
C. BELOW EAVES	300
D. BELOW A BALCONY OR CAR PORT ROOF	600
E. FROM VERTICAL DRAIN PIPES AND SOIL PIPES	75
F. FROM INTERNAL OR EXTERNAL CORNERS	600
G. ABOVE ADJACENT GROUND OR BALCONY LEVEL	300
H. FROM A SURFACE FACING THE TERMINAL	600
I. FACING TERMINALS	600
J. FROM OPENING (DOOR/WINDOW) IN CARPORT INTO DWELLING	1200
K. VERTICALLY FROM A TERMINAL ON THE SAME WALL	1500
L. HORIZONTALLY FROM A TERMINAL ON THE SAME WALL	300
M. ADJACENT TO OPENING	300

## ELECTRICITY SUPPLY

A 240V~50 Hz., single phase electricity supply fused at 3A must be provided in accordance with the latest edition of the I.E.E. wiring regulations and any other local regulations that may apply. The current rating of the wiring to the boiler must exceed 3 amperes and have a cross sectional area of at least 0.75 mm<sup>2</sup> in accordance with BS. 6500 1984 Table 16. The method of connection to the electricity supply MUST facilitate complete isolation of the appliance, preferably by the use of a fused three-pin plug and unswitched, shuttered socket outlet, both complying with the requirements of BS. 1363. Alternatively, connection may be made via a fused double-pole isolator having a contact separation of at least 3 mm in all poles and serving the appliance and system controls only.

tion of the appliance, preferably by the use of a fused three-pin plug and unswitched, shuttered socket outlet, both complying with the requirements of BS. 1363. Alternatively, connection may be made via a fused double-pole isolator having a contact separation of at least 3 mm in all poles and serving the appliance and system controls only.

## TECHNICAL DATA

Maximum working head	— 30.5m (100 ft)
Minimum Working Head (Fully Pumped systems)	— 305mm (1 ft)
Minimum Circulating Head (Gravity systems)	— 1.2m (4 ft)
Gas supply pressure	— 20 mbar
Maximum Flow Temperature	— 82°C
Electricity Supply	— 240V~50Hz fused at 3A
Water Connections	
Gravity Flow	— R ¾ (¾ in BSP Male)
Gravity Return to injector 'Tee'	— To accept 28mm copper
Pumped Flow	— R.c. ¾ (¾ in BSP Female)
Pumped Return using injector 'Tee'	— To accept 22mm copper
Pumped Return without injector 'Tee'	— R. ¾ (¾ in BSP Male)
Gas supply Connection	— R.c. ½ (½ in BSP Female)
Water Content	— 6.5 litres — 1.43 gal
Appliance weight installed	— 62 kg — 137 lbs
Appliance weight lift	— 52 kg — 115 lbs

BOILER SIZE	INJECTOR SIZE	GAS RATE m <sup>3</sup> /h(ft <sup>3</sup> /h)	INPUT kW (Btu/h)	OUTPUT kW (Btu/h)	BURNER PRESSURE	
					mbar	in wg
Min	2.9mm	0.75 (26.57)	8.06 (27500)	5.86 (20000)	5.1	2.0
20/35		1.02 (35.94)	10.9 (37200)	8.06 (27500)	9.5	3.8
Max		1.26 (44.44)	13.48 (46000)	10.26 (35000)	13.8	5.5
Min	3.5mm	1.31 (46.37)	14.07 (48000)	10.26 (35000)	7.2	2.9
35/50		1.56 (55.00)	16.70 (57000)	12.46 (42500)	10.1	4.0
Max		1.79 (63.29)	19.20 (65500)	14.65 (50000)	13.0	5.2

## CIRCULATION PUMP SELECTION

The resistance through the heat exchanger when operating with a water flow rate producing an 11°C temperature rise at maximum boiler output is shown in TABLE 2. If other controls, such as three position valves are used in the system, the resistance through them, quoted in their manufacturer's literature must be taken

into account. The pump may be fitted on either the flow or return and **MUST** be wired directly to the boiler terminal block when fitted to a fully pumped system. It must be fitted with two isolating valves which are positioned as close to the pump as possible. Isolation of the valves must always leave the open vent unobstructed.

TABLE 2

	WATER FLOW RATE		BOILER RESISTANCE			
			With Injector Tee		Without Injector Tee	
	litres/sec	gal/min	kN/m <sup>2</sup>	in. wg	kN/m <sup>2</sup>	in. wg
20/35	.22	2.92	2.25	9.0	.30	1.2
35/50	.32	4.17	4.73	18.9	.55	2.2

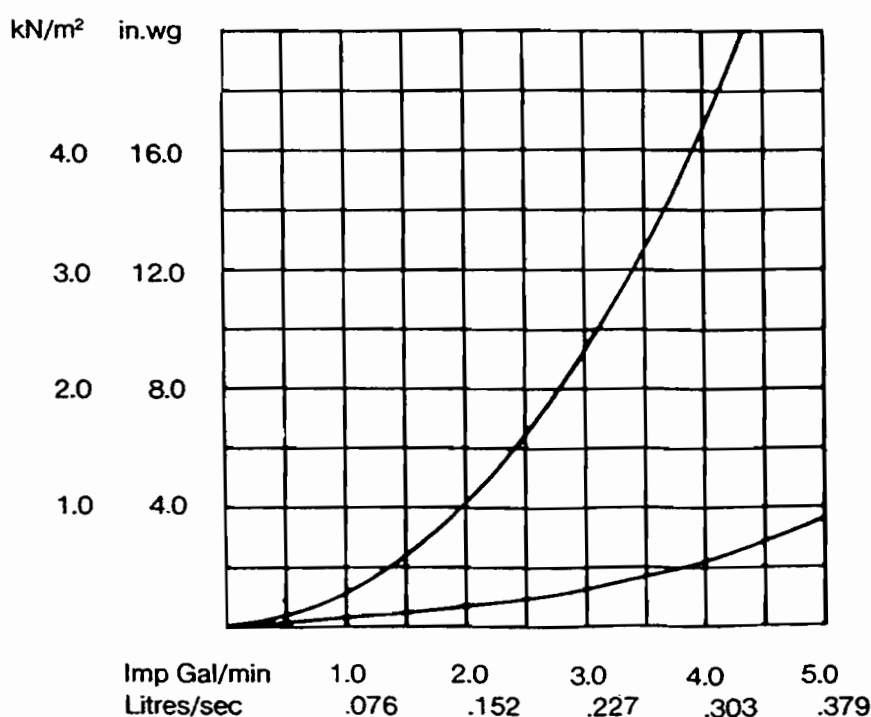


FIG. 4 PRESSURE LOSS ACROSS BOILER



## THE SYSTEM

The boiler must be used on Indirect hot water systems only. It is suitable for use on sealed or open vented gravity domestic hot water/pumped central heating systems or fully pumped systems.

The system should be designed so that the maximum static head does not exceed 30.5 m (100 ft) and a minimum on fully pumped systems of 305 mm (1 ft). See FIG. 5.

If a minimum 305 mm (1 ft) head is used extra care should be taken when designing the system to ensure that pumping over or sucking down at the vent pipe cannot occur.

Gravity domestic hot water circuits should have a minimum circulating head of 1.2 m (4 ft). SEE FIG. 7. To prevent reverse circulation in the gravity circuit when the pump is running, an injector tee is provided. This must be installed as shown in FIG 16a.

To prevent nuisance operation of the overheat thermostat, it is important that where electrically operated zone valves are used the boiler is wired so that it does not cycle when the zone valves are closed. Also systems fitted with controls that close both hot water and central heating circuits while the boiler is still hot must be fitted with a by-pass circuit to dissipate the residual heat within the boiler.

Further information on by-pass arrangements is provided in later notes and illustrations.

Drain-off taps should be fitted in the pipework close to the boiler if it is in a low point of the system.

### Note:

Although the system can be emptied using the drain-off taps installed in the pipework around the system, to empty the boiler it is necessary to remove the drain-off plug in the front lower left of the casing. SEE FIG. 2.

### Combined Gravity Hot Water and Pumped Central Heating systems.

Where a cylinder thermostat and zone valve are fitted to control the temperature of the domestic hot water it is recommended that a by-pass be installed in the gravity circuit. A suggested method of doing this is shown in FIG. 7 where the bathroom radiator is connected into the gravity circuit and is fitted with two lockshield valves. Mechanically operated thermostatic domestic hot water temperature control valves which allow the boiler to operate when the valve is closed or partially closed **MUST NOT BE FITTED.**

### Fully Pumped Systems

The pump must always be wired directly to the boiler terminal block as shown in FIG. 18.

If a three port diverter valve is used as shown in FIG. 5, a by-pass is not necessary since one circuit is always open.

Where a pair of two port valves are used, a by-pass is necessary. The total length of the by-pass circuit taken from the boiler connections should be greater than 4 metres of 22 mm pipe. It should be fitted with a lockshield valve and adjusted to maintain a minimum flow through the boiler of 4.5 litres/min (1 gal/min). Alternatively, the by-pass can be provided using the bathroom radiator as shown in FIGS. 5 & 6.

Systems fitted with controls which allow the boiler to operate when both the hot water circuit and the central heating circuits are closed i.e. mechanically operated thermostatic control valves, must be fitted with a by-pass circuit capable of:—

1. Dissipating a minimum of 1 kW (3400 Btu/h).
2. Maintaining a water flow through the boiler of 9 litres/min (2 gal/min).

A suggested method of meeting these requirements by using the bathroom radiator fitted with two lockshield valves is shown in FIGS. 5 & 6.

## SEALED SYSTEMS

### Installation

The installation must comply with the requirements of BS. 6798 1987 and BS. 5449 Part 1. The B.G. Publication "British Gas Specification for Domestic Wet Central Heating Systems" should also be consulted.

### Safety Valve

A non adjustable spring-loaded safety valve pre-set to operate at 3 bar (45 lbf/in<sup>2</sup>) shall be used. It must comply with BS. 6759 Part 1 and include a manual testing device. It shall be positioned in the flow pipe either horizontally or vertically upwards and close to the boiler. No shut-off valves are to be placed between the boiler and the safety valve. The valve should be installed into a discharge pipe which permits the safe discharge of steam and hot water such that no hazard to persons or damage to electrical components is caused.

### Pressure Gauge

A pressure gauge incorporating a fill pressure indicator, covering the range 0-4 bar (60 lbf/in<sup>2</sup>) shall be fitted to the system. It should be connected to the system, preferably at the same point as the expansion vessel. Its location should be visible from the filling point.

### Expansion Vessel

A diaphragm type vessel to BS. 4814 Part 1 shall be fitted close to the inlet side of the pump. The connecting pipework should not be less than 15 mm (½ in nominal). Pipework connecting the expansion vessel should not incorporate valves of any sort. Methods of supporting the vessel are supplied by the manufacturer. The nitrogen or air charge pressure of the expansion vessel shall not be less than the hydrostatic head, (height of the top point of the system above the expansion vessel). To size the expansion vessel it is first necessary to calculate the volume of water in the system in litres. The following volumes may be used as a conservative guide to calculating the system volume.

Boiler Heat Exchanger	6.5 litres
Small Bore Pipework	1 litre per kW of system output
Micro Bore Pipework	7 litres
Steel Panel Radiators	8 litres per kW of system output
Low Water Capacity Radiators	2 litres per kW of system output
Hot water Cylinder	2 litres

If the system is extended the expansion vessel volume may have to be increased unless previous provision has been made for the extension. Where a vessel of the calculated size is not available, the next available larger size should be used.

The boiler flow temperature is controlled at approximately 82°C. The vessel size can now be determined from the following table where V=system volume in litres.

Vessel Charge Pressure (bar)	0.5	1.0
Initial System Pressure (bar)	1.0	1.0
Expansion Vessel Volume (litres)	$V \times 0.11$	$V \times 0.087$

### Cylinder

The hot water cylinder must be an indirect coil type or a direct cylinder fitted with an immersion calorifier suitable for operating at a gauge pressure of 0.3 bar (5 lbf/in<sup>2</sup>) in excess of safety valve setting. Single feed indirect cylinders are not suitable for sealed systems.

### Method of Make-Up

Provision shall be made for replacing water loss from the system either:

- i) from a make-up vessel or tank mounted in a position higher than the top point of the system, and connected through a non-return valve either to the system

on the return side of hot water cylinder or the return side of all heat emitters.

or

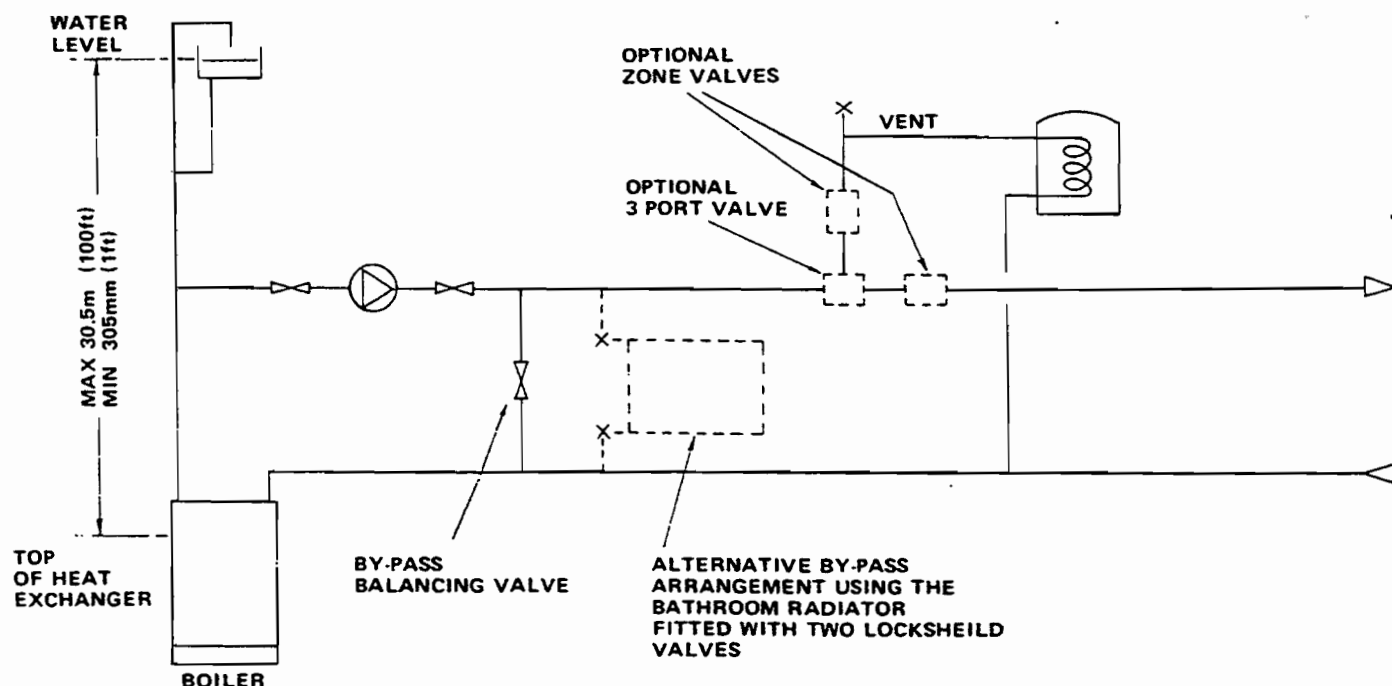
- ii) where access to a make-up vessel would be difficult, by using the mains top up method or a remote automatic pressurisation and make up unit as illustrated in FIG. 6 METHODS 1 and 2.

### Mains Connection

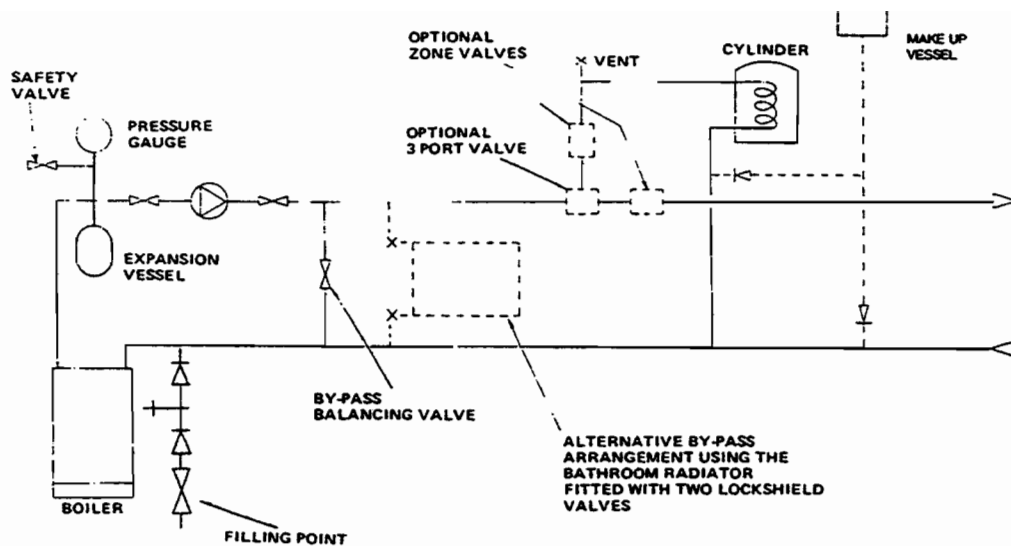
There shall be no connection to the mains water supply or to the water storage tank which supplies domestic water even through a non-return valve, without the approval of the local Water Authority.

### Filling Point

The system shall be fitted with a filling point at low level which incorporates a stop valve to BS.1010 and a double check valve (approved by the National Water Council) to be fitted in this order from the system mains. Refer to FIG. 6 METHOD 1.



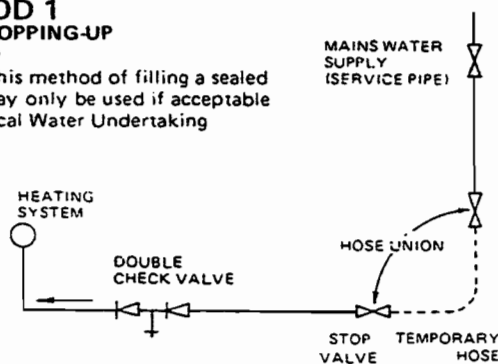
**FIG. 5 OPEN VENTED FULLY PUMPED SYSTEM  
FITTED WITH A COMBINED FEED AND VENT**



### Two methods of filling a sealed water system

#### METHOD 1 MAINS TOPPING-UP METHOD

NOTE: This method of filling a sealed system may only be used if acceptable to the Local Water Undertaking



#### METHOD 2 CISTERN FILLING METHOD

NOTE: Cistern to be supplied through a temporary connection from a service pipe or cold water distributing pipe

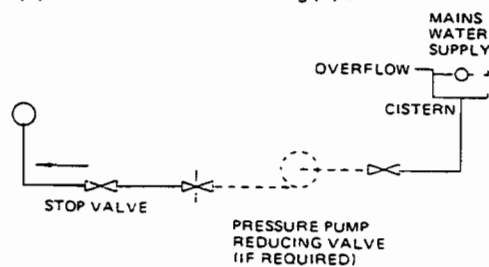


FIG. 6. FULLY PUMPED SEALED SYSTEM

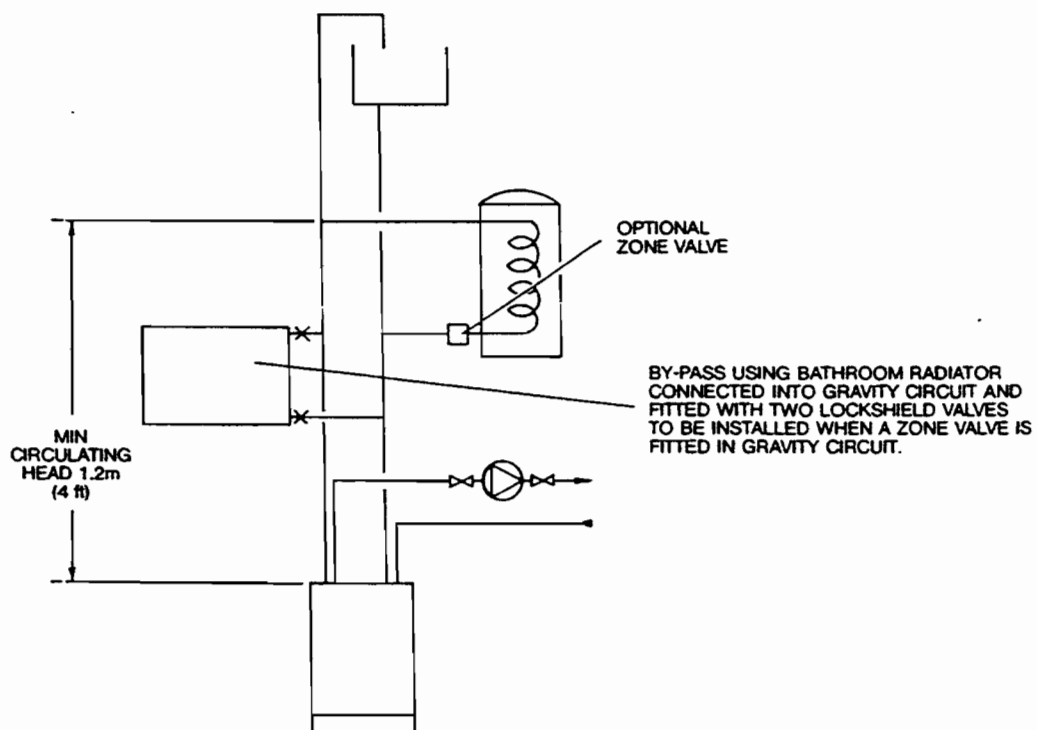


FIG. 7 OPEN VENTED GRAVITY DOMESTIC HOT WATER AND PUMPED CENTRAL HEATING SYSTEM

# INSTALLATION INSTRUCTIONS

It is the law that all gas appliances are installed and serviced by competent persons as stated in Gas Safety (Installation & Use) Regulations 1984. For Health and Safety information see back page.

The boiler and its associated equipment will arrive on site in two cardboard cartons. The contents of each carton is as follows.

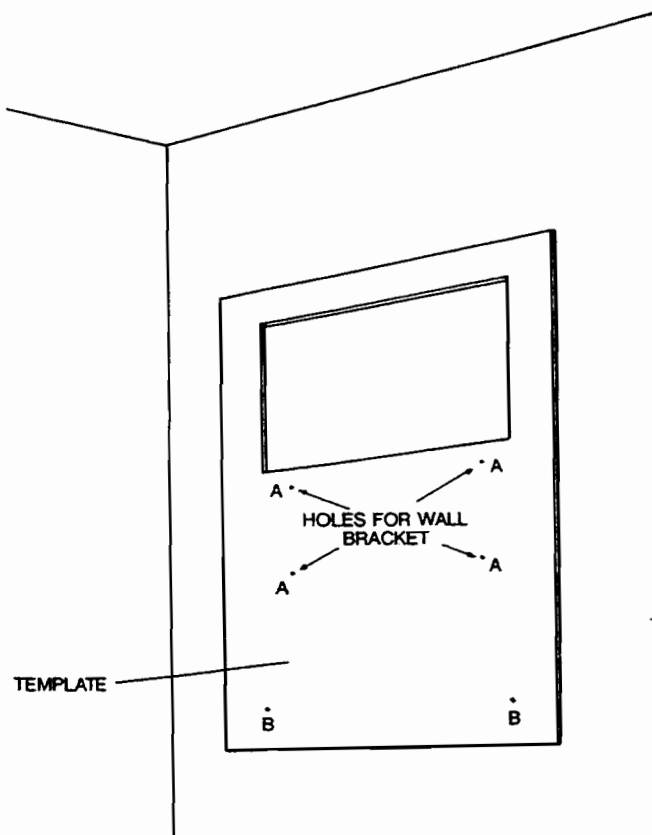
## CARTON 1

Boiler  
Case Support Plate  
Polythene Bag Containing:  
Injector Tee  
Adjustment Screws—2 off  
Gas Service Cock

## CARTON 2

Literature Pack Containing:  
Installation and Servicing Instructions  
User's Instructions  
Control Systems Pipework and Wiring Guide

Template  
Inner Flue Product Tube  
Outer Flue Product Tube  
Air Box  
Air Tube  
Terminal  
Accessory Packs  
Boiler Mounting Bracket  
Boiler Casing



**FIG. 8. TEMPLATE**

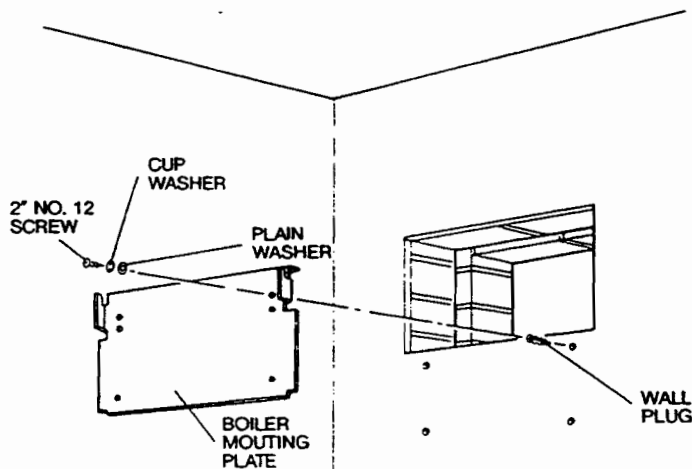
Place template in proposed boiler position, (the minimum side clearances are automatically allowed for). Refer to page 6 for top and bottom clearances which can be measured from the template.

Ensure that the template is level, mark hole positions 'A', 'B' and large flue outlet hole.

Remove template and carefully cut flue outlet hole through wall.

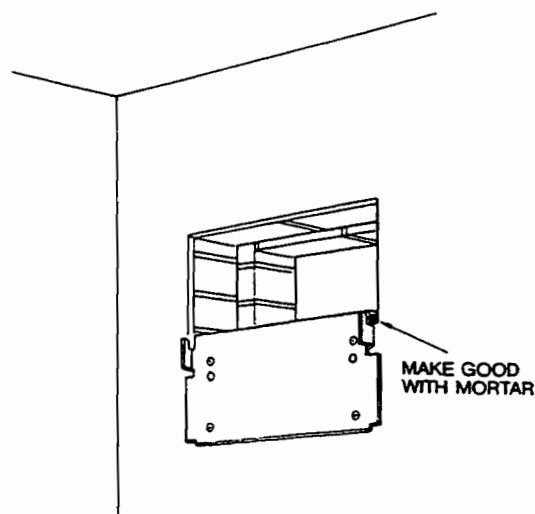
Drill holes 'A' using a 7mm drill.

Drill holes 'B' using a 5mm drill and insert the wall plugs from accessory pack B into holes.



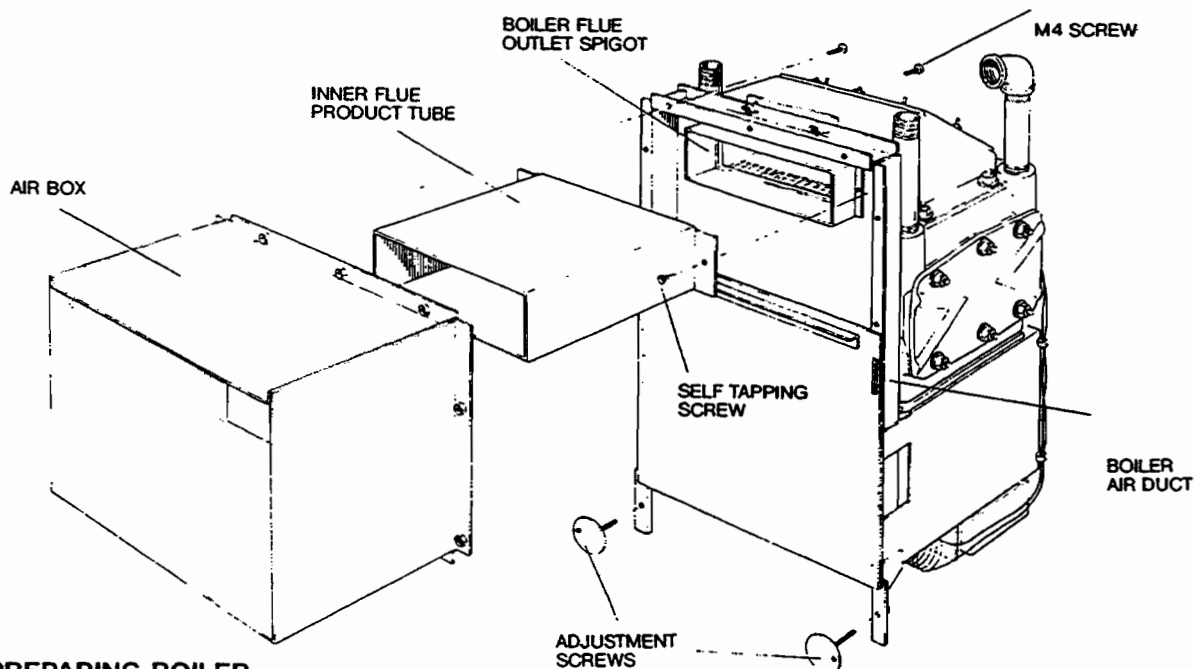
**FIG. 9. BOILER MOUNTING PLATE**

Using wall plugs, screws and washers (accessory pack A) attach boiler mounting plate to wall ensuring that it is level.



**FIG. 10. SEALING BOILER MOUNTING PLATE TO WALL**

Make good the bottom of the flue outlet hole on the inside wall face, up to the lip on the boiler mounting plate.



**FIG. 11. PREPARING BOILER**

The flue system provided with the boiler is telescopic and can be adjusted to suit a wall thickness of 230mm-360mm (9 in-15 in). Wall thicknesses down to 76mm (3 in) are catered for by shortening the Air Box, Inner Flue Product Tube (see FIG. 11) the Air Tube and Outer Flue Product Tube, see FIGS. 13 and 14. Each tube is to be shortened at its plain end by the amount shown in the following table.

WALL THICKNESS	TO BE CUT FROM EACH TUBE AND THE AIR BOX
76mm (3 in)	146mm (5.75 in)
102mm (4 in)	133mm (5.25 in)
127mm (5 in)	127mm (5.0 in)
152mm (6 in)	114mm (4.5 in)
178mm (7 in)	102mm (4.0 in)
203mm (8 in)	89mm (3.5 in)

Engage the Inner Flue Product Tube on to the boiler flue outlet spigot and secure using the two self-tapping screws from accessory pack C.

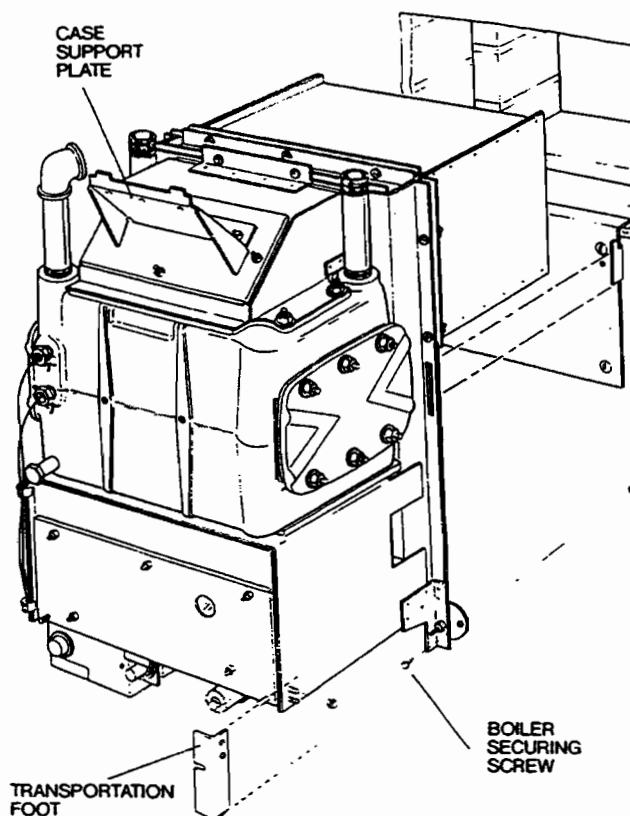
Secure the Air Box to the boiler air duct using the seven M4 screws from accessory pack C.

Remove the adjustment screws from the polythene bag in the boiler carton and screw them into the boiler legs as illustrated in FIG. 11.

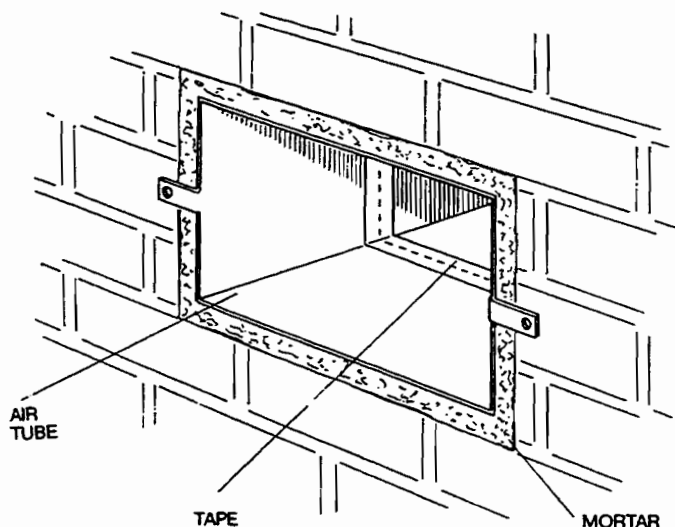
Lift boiler on to its mounting bracket.

Correct vertical alignment with the rear wall as necessary using the adjustment screws fitted to the boiler legs. When adjustment is complete, rotate the adjustment screws sufficiently to align the hole in the base plate with hole 'B' in the wall. Secure boiler to wall using the screws from accessory pack B.

Undo the two nuts securing the front transportation foot. Discard foot and nuts. Remove the case support plate from its transportation position on the fluehood and reposition it as shown in FIG. 12.



**FIG. 12. LIFTING BOILER**



Working from outside the building, slide the plain end of the Air Tube into Air Box leaving the tabs on the Air Tube flush with outside wall face. Using the adhesive tape from accessory pack D seal the joint between Air Tube and Air Box.

Make good the inside and outside wall surfaces.

FIG. 13. SEALING AIR TUBE TO AIR BOX

Engage the four self-tapping screws from accessory pack E into the pre-drilled holes in the end of the Outer Flue Product Tube but do not fully tighten. **Note, these screw positions are not symmetrical to ensure correct assembly with the Terminal.**

Slide the Terminal on to the Outer Flue Product Tube, engaging fully, the slots in the Terminal under the heads of the four screws in the Outer Flue Product Tube. Secure Terminal by tightening the four screws.

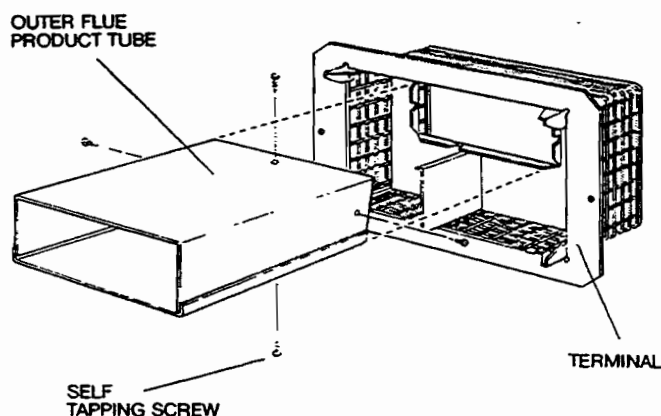


FIG. 14. ASSEMBLING TERMINAL

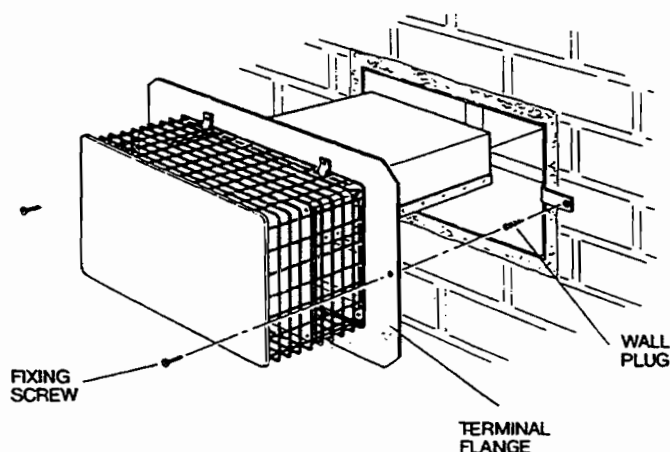


FIG. 15. SECURING TERMINAL

Slide the Terminal assembly into the Air Duct engaging the Outer Flue Product Tube over the Inner Flue Product Tube. Carefully push Terminal back until the Terminal flange touches the wall. Mark the position of the two Terminal fixing holes (which also pass through the holes in the Air Tube tabs) on the wall.

Temporarily remove Terminal assembly. Drill Terminal fixing holes using a 5mm drill and insert the wall plugs from accessory pack F into holes.

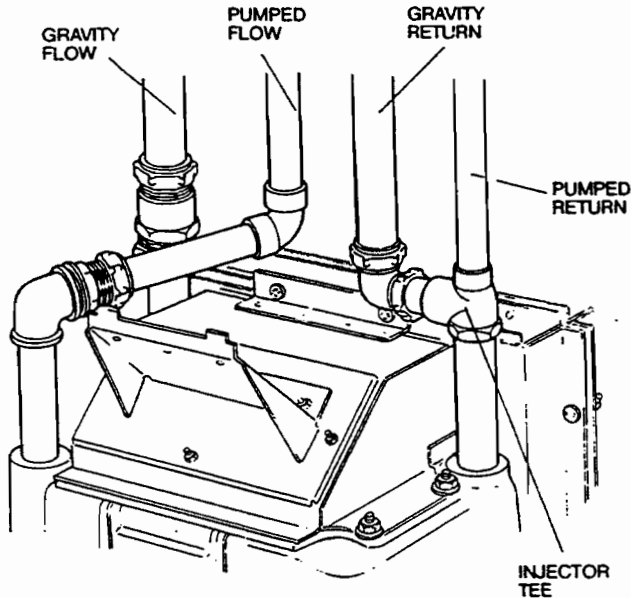
Re-fit Terminal assembly and secure using two screws from accessory pack F. Centrally fit terminal guard over terminal if applicable.

## CONNECTING SYSTEM PIPEWORK

The threaded steel tubes and elbow attached to the boiler when supplied have been factory sealed and water tested.

To ensure that the flow and return pipes will pass through the cut-outs provided in the top and bottom of the case all pipes should be routed as shown in FIGS. 16a, b. If required a 22mm copper pipe can be routed down each side of the boiler within the casing.

Install a drain-off tap close to the boiler if it is in a low point of the system.

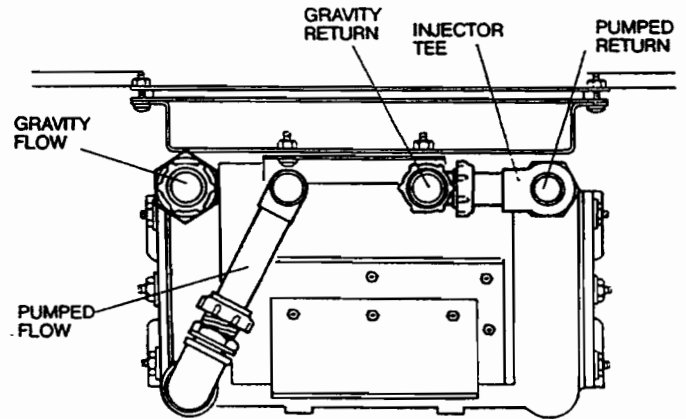


**FIG. 16a. COMBINED GRAVITY DHW PUMPED CH SYSTEM**

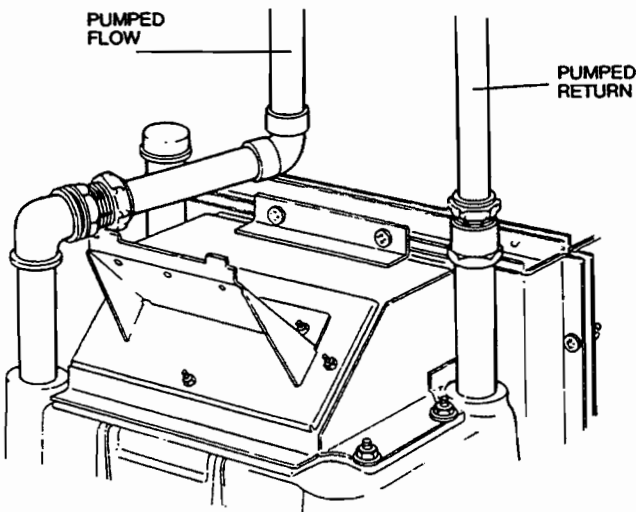
For combined gravity DHW and pumped CH systems an injector tee has been provided to ensure correct circulation in the gravity circuit. This must be connected to the boiler as shown in FIG. 16a. The gravity circuit should be installed using 28mm copper pipe with the flow increased to 28mm as close to the boiler connection as possible.

On fully pumped systems the injector tee is not required and should be discarded. The flow and return must be connected to the pumped tapings on the boiler and the gravity flow tapping should be capped off, or may be used as an open vent connection.

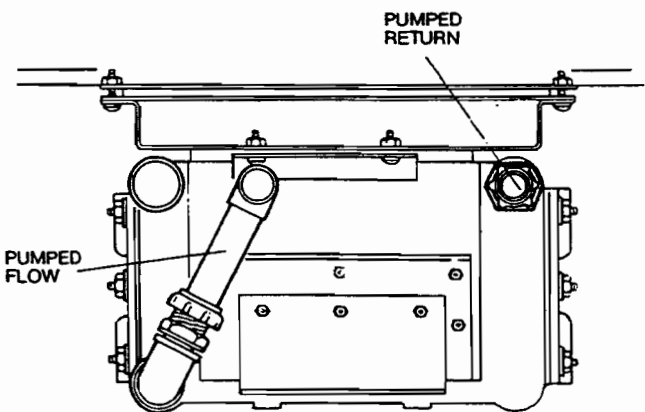
Route the gas supply pipe from below the boiler and connect it to the inlet connection of the gas cock.



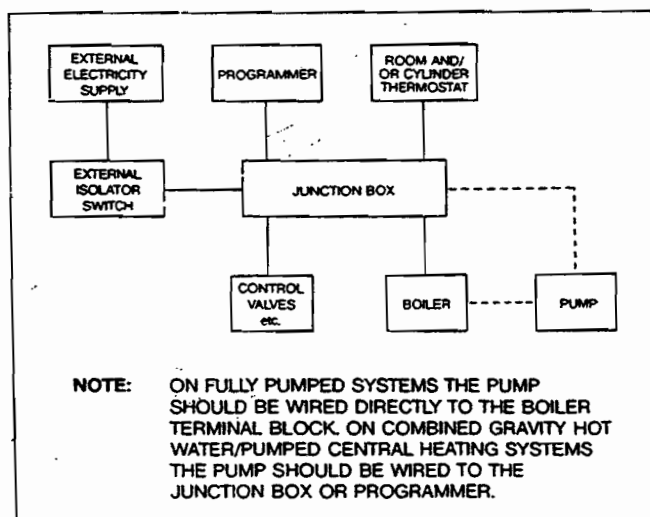
**FRONT OF BOILER VIEWED FROM TOP**



**FIG. 16b. FULLY PUMPED SYSTEM**



**FRONT OF BOILER VIEWED FROM TOP**



**FIG. 17. PRINCIPLE OF WIRING**

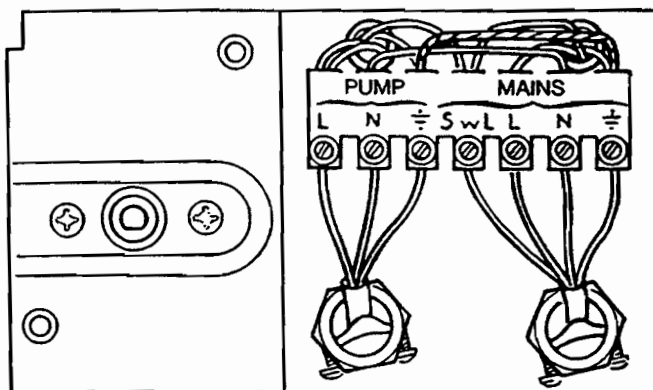
**WARNING:** This appliance must be earthed.

The boiler and all external control circuit wiring must be supplied from the same single isolating switch or plug and socket.

Care must be taken to ensure that all wiring to the boiler is kept clear of sharp edges and hot surfaces.

Ensure that the earth conductor is longer than the L, N, and SwL from the point of anchorage, so that the current carrying conductors become taut before the earth conductor, if the cable is pulled out of the cable clamp. The boiler terminal block which is situated in the control panel, (FIG. 2) is not designed to accept wiring from all the on-site controls and therefore the installer will usually need to incorporate a suitable junction box or Potterton Electronic Programmer.

The principle of wiring is shown in FIG. 17. It should be noted that the pump must be wired directly to the boiler terminal block on FULLY PUMPED systems and to the junction box or programmer on combined GRAVITY HOT WATER/PUMPED CENTRAL HEATING systems.



**FIG. 18. WIRING THE BOILER FOR A FULLY PUMPED SYSTEM**

Pull off the boiler thermostat knob. See FIG. 2.


Remove two screws securing control panel cover and remove cover.

Route a four core cable through the plastic bush in the rear of the control panel and the cable clamp as illustrated FIG. 18. Connect the cable to the boiler input terminals as follows:

- Permanent live to terminal marked MAINS 'L'  
Neutral to terminal marked MAINS 'N'  
Earth to terminal marked MAINS '⏏'  
Switched live from external controls to terminal marked MAINS 'SwL'

If there are no external controls fitted connect the SwL terminal to permanent live in the junction box.

Secure the cable within the cable clamp by tightening the two securing screws.

Following the pump manufacturer's instructions connect the pump supply wires to terminals marked PUMP L, N and  on the boiler terminal block. Route the cable through the plastic bush in the rear of the control panel and the cable clamp as illustrated FIG. 18. Secure the cable within the clamp by tightening the two securing screws.

Refit control panel cover and thermostat knob.

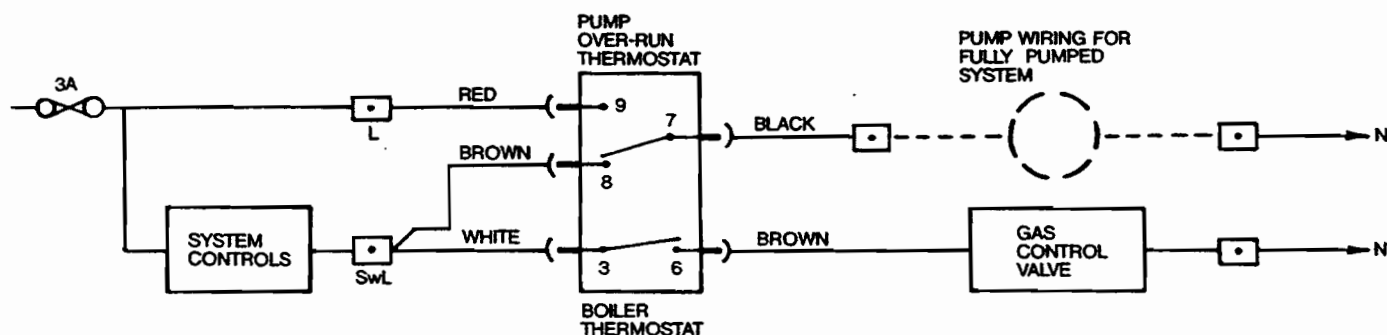




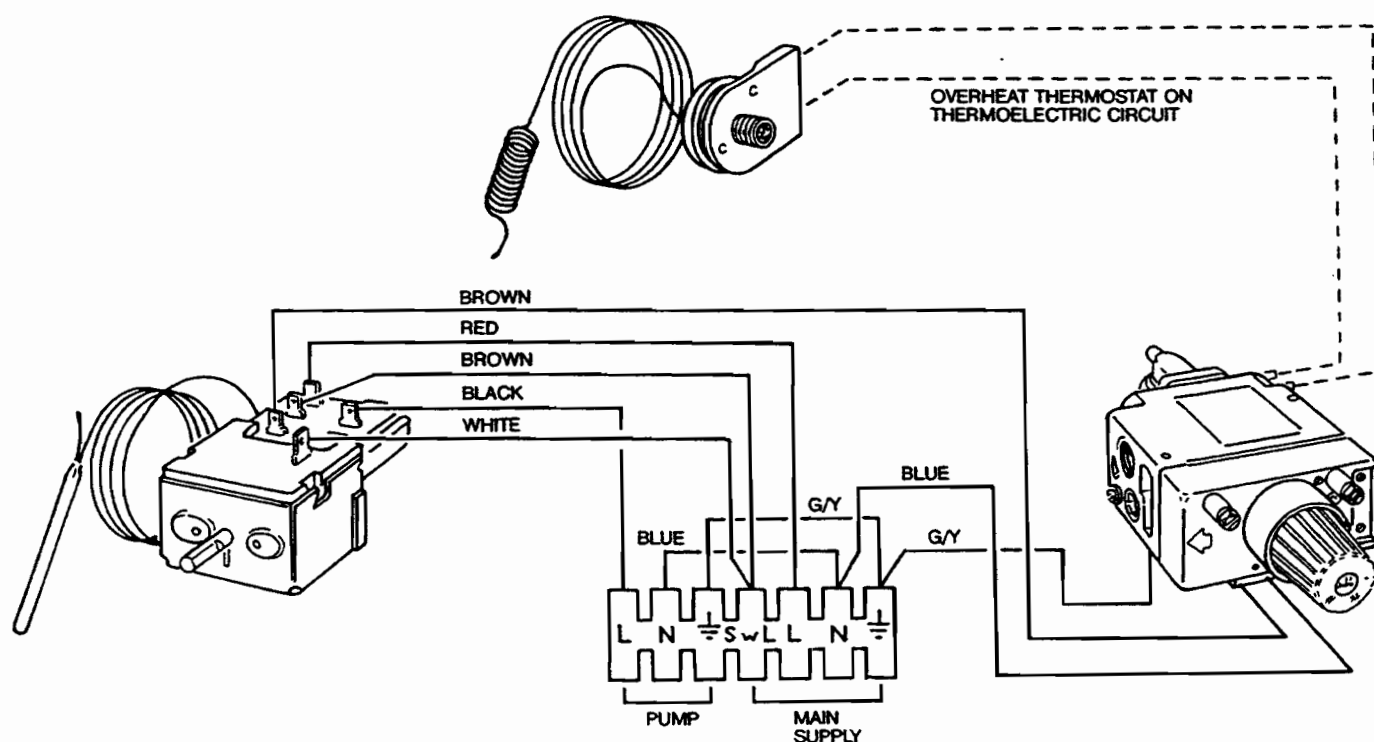
Remove two screws securing control panel cover and remove cover.

**Secure the cable within the clamp by tightening the two securing screws.**

**Refit control panel cover and thermostat knob.**



**FIG. 20. FUNCTIONAL FLOW DIAGRAM**



**FIG. 21. BOILER WIRING DIAGRAM**

# COMMISSIONING

## Open Vented Systems

Remove the pump and flush out the system thoroughly with cold water. Refit the pump, fill and vent the system and examine for leaks.



## Sealed Systems

The system can be filled using a sealed system filler pump with a break tank or by any other method approved by the Local Water Authority. Refer to FIG. 6 and BS. 6798 1987. Remove pump and flush out the system thoroughly with cold water. Re-fit the pump. Fill and vent the system until the pressure gauge registers 1.5 bar (21.5 lbf/in<sup>2</sup>), examine for leaks. Raise the pressure until the safety valve lifts. This should occur within  $\pm 0.3$  bar of the pre-set lift pressure of 3 bar. Release water to attain the correct cold fill pressure.


## All Systems

The whole of the gas installation including the meter should be inspected and tested for soundness and purged in accordance with the recommendations of BS. 6891.

## FIRST LIGHTING

- A Ensure that the pump and radiator isolating valves are open.
- B Turn the boiler thermostat to the 'O' position.
- C Turn on the main gas supply and the gas service cock on boiler.
- D Ensure that the time control, if fitted is in an 'ON' condition, and that the room and/or cylinder thermostats, where fitted are set to high temperatures.
- E Switch on the external electricity supply to the boiler. In the event of an electrical fault after installation of the appliance, preliminary electrical system checks must be carried out as described in the BG multimeter instruction book. The checks to be carried out are: A - Earth Continuity, B - Short Circuit, C - Polarity, D - Resistance to Earth.
- F Partly depress and turn the gas control knob clockwise ensuring the symbol  lines up with the datum mark on the gas valve body. See FIG. 22. This ensures that the valve is in the 'OFF' condition.
- G Partly depress and turn the control knob anticlockwise until the symbol  lines up with the datum mark on the gas valve body. Press and hold in the control knob and press the spark generator button until a click is heard. Release the spark generator button and repeat operation until the pilot ignites. See FIGS. 2 and 22.

Hold in the control knob for a further 15 seconds. On release the pilot should remain alight.

Partly depress and turn the control knob anticlockwise until the symbol  lines up with the datum mark on the gas valve body.

## NOTE:

On first lighting, establishment of the pilot flame may be slightly delayed due to the presence of air in the pipework. If the pilot fails to light or goes out at any time, immediately turn the control knob clockwise as far as possible, then release it and wait three minutes before repeating the lighting procedure. The control knob should not be touched during this period.

- H Turn the boiler thermostat on and to a high setting and the main burner will light.
- I Set the boiler thermostat and the room and/or cylinder thermostat(s) and time control, where fitted, to their required operating conditions.
- J Check soundness of all appliance gas carrying components and joints using leak detection fluid and a mirror where necessary.
- K Switch off the boiler, using the thermostat knob.

## FINAL ADJUSTMENT

- A Remove the screw from the burner pressure test nipple on the gas control valve and fit a pressure gauge to the test nipple. See FIG. 22.
- B Turn on the boiler thermostat, then check that the pressure is in accordance with the values stated under TECHNICAL DATA.

The burner is factory set to the maximum stated.

- C If burner pressure adjustment is necessary, turn the small slotted head screw, located on the front of the control valve between the control knob and the inlet pressure tapping (clockwise to decrease pressure, anti-clockwise to increase pressure). See FIG. 22.
- D With the burner set to its correct pressure, the firing rate given in TECHNICAL DATA should also be obtained and this should be checked by meter reading 10 minutes after the main burner has been lit.
- E Shut down the boiler, remove the pressure gauge and refit the screw in the test nipple. Re-light and test for gas soundness at the screw.
- F Remove the self-adhesive arrow from the inspection ticket tied to the burner supply pipe and stick it to the Data Plate attached to the inside of the casing bottom panel to indicate the appropriate burner setting pressure.
- G Heat the system to maximum. Check for water leaks, turn the boiler off, drain the system whilst hot.
- H Refill the system and on sealed systems adjust to the correct cold fill pressure. Set the pressure gauge pointer to the system design pressure.
- I If a by-pass circuit is fitted, the by-pass valve should be adjusted with the boiler operating under minimum load conditions to maintain sufficient water flow through the boiler to ensure that the overheat thermostat does not operate under normal operating conditions.

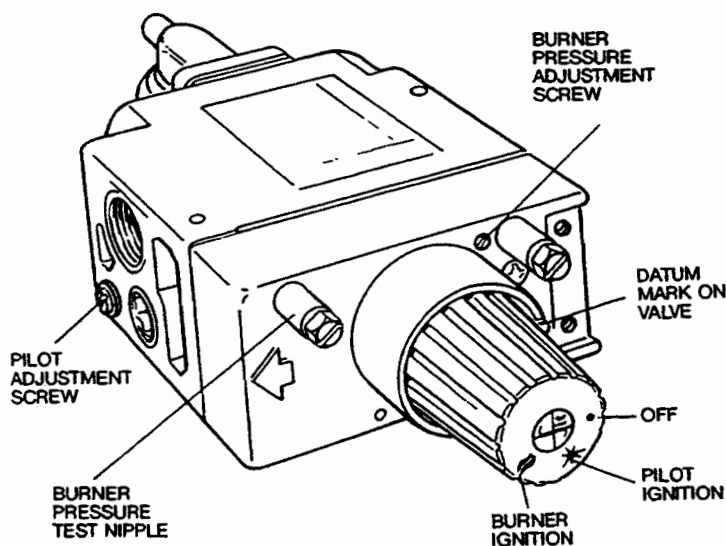


FIG. 22. GAS CONTROL VALVE

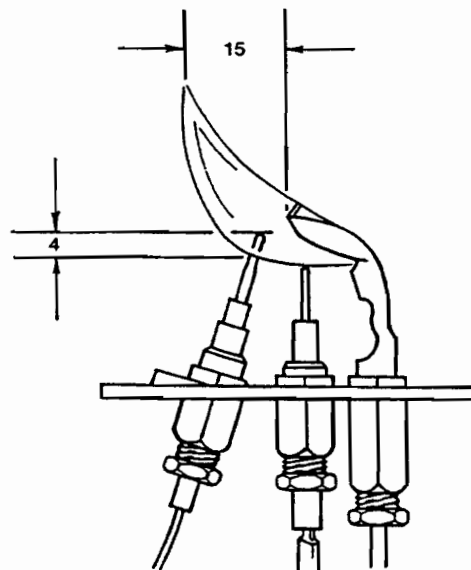


FIG. 23. PILOT BURNER

### Pilot Burner

The pilot burner pressure is factory set and should not need further adjustment. When correctly set, the pilot flame should heat the thermocouple so that the pilot safety device is "held in" but must not cause the thermocouple to glow bright red. FIG. 23 illustrates the approximate size of a correctly adjusted flame. The E.M.F. generated by the thermocouple should be of the order of 20-30 mV open circuit, 10-14 mV closed circuit. Due to the voltage drop in the overheat thermostat circuit there should be 6.5-8.5 mV closed circuit at the connection to the gas control valve. Drop out should occur between 1-3 mV closed circuit. If the pilot needs adjustment, rotate the pilot adjustment screw clockwise to reduce or anti-clockwise to increase the flame. See FIG. 22.

### Boiler Thermostat

At its minimum and maximum settings, the thermostat should control the water flow temperature at approximately 55°C-82°C (130°F-180°F). The thermostat has been calibrated by the makers and no attempt should be made to re-calibrate it on site. Turn the thermostat to the 'O' position and check that the main burner shuts down.

### Pump Over-Run Thermostat (Applicable on fully pumped systems only)

The over-run thermostat will keep the pump running when the boiler has shut down, as long as the water temperature within the boiler is above approximately 79°C (174°F). A drop of approximately 11°C (20°F) will occur before the thermostat will switch off the pump.

### Overheat Thermostat

The overheat thermostat is pre-set and no adjustment is possible. It will require manually re-setting and the pilot re-lighting if an overheat condition occurs. The re-set button can be found on the right hand side of the control panel. See FIG. 2.

### Gas Control Valve

- 1) **Main Solenoid**  
Check the operation of the valve by turning off the electricity supply, either by the isolating switch or time control, where installed. The main burner must shut down immediately.
- 2) **Flame Safety Valve**  
Turn the gas control knob to the 'off' position. The pilot must shut down, and a "click" indicating thermocouple drop out, should be heard within 60 seconds.

### External Controls

Check that any other external controls connected in the system such as time clocks and thermostats, control the boiler as required.

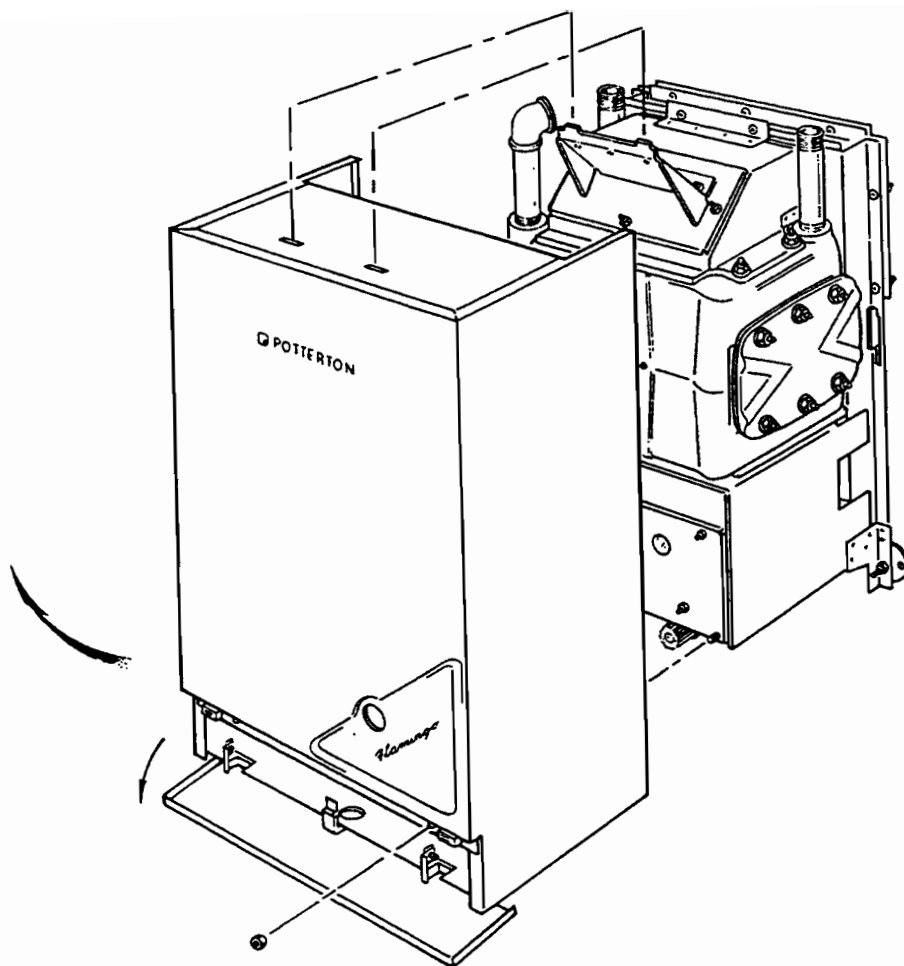
Ensure that the electrical supply to the boiler is switched 'off'.

### Fitting Boiler Case

Fit the boiler case by engaging the holes in the case top panel over the lugs on the support plate which is attached to the fluehood. See FIG. 24.

Expose the lower case fixings by lowering the door in the front of case. This is done by pressing the release lever through the hole in the underside of the case.

Locate the holes in the case over the threaded studs attached to the combustion chamber front panel and secure using two M5 nuts from accessory pack G.



**FIG. 24. FITTING BOILER CASE**

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### **User's Instructions**

A user's instruction leaflet is provided with this boiler but the householder must have the operation of the boiler and system explained by the installer. The householder must also be advised of the importance of annual service-

ing, and of the precautions necessary to prevent damage to the system and building, in the event of the system remaining out of commission in frost conditions.

# SERVICING INSTRUCTIONS

Regular skilled servicing and cleaning of the appliance is essential to ensure continued safe and efficient operation. The frequency of cleaning will depend upon the particular installation conditions, and the use to which the appliance is put, but in general, once per year should be adequate.

It is the law that all gas appliances are installed and serviced by competent persons as stated in Gas Safety (Installation and Use) Regulations 1984.

For Health and Safety Information see back page.

Servicing is best arranged by a contract placed with Potterton International Limited and further details are available from the local Potterton Regional Service Office.

The boiler DATA PLATE and WIRING DIAGRAM are attached to the inside of the casing bottom panel. The boiler CODE NUMBER which should be quoted when ordering spares or requesting information is on the front of the control panel below the boiler thermostat knob.

The following notes apply to the boiler and its controls but it should be remembered that attention must also be paid to the heating circuit itself including radiator valves, thermostats, the time control and the expansion and feed water system. It is advisable to clean the boiler immediately after the end of the heating season.

In all cases prior to servicing, light up the boiler and check that the pilot and main burners have a clean, even flame and that the gas rate and main burner pressure is correctly set.

Before the start of any servicing work, switch off at the external electricity supply by disconnecting the plug at the socket or switching off external isolating switch. Turn off the gas service cock.

## NOTE:

After completing any servicing or replacement of components check for gas soundness and carry out functional checks.

## 1. PREPARING THE BOILER FOR SERVICING

- A Expose the lower case securing nuts by lowering the door in the front of casing. Remove the two securing nuts. See FIG. 24. Remove case by lifting it from the locating lugs at the top of the boiler.
- B Remove the 5 nuts securing the combustion chamber front panel and remove panel. See FIG. 25. Inspect the rope seal on the front panel and replace if damaged.

## 2. MAIN BURNER ASSEMBLY — REMOVAL AND CLEANING

Refer to FIG. 25 and carry out the following:

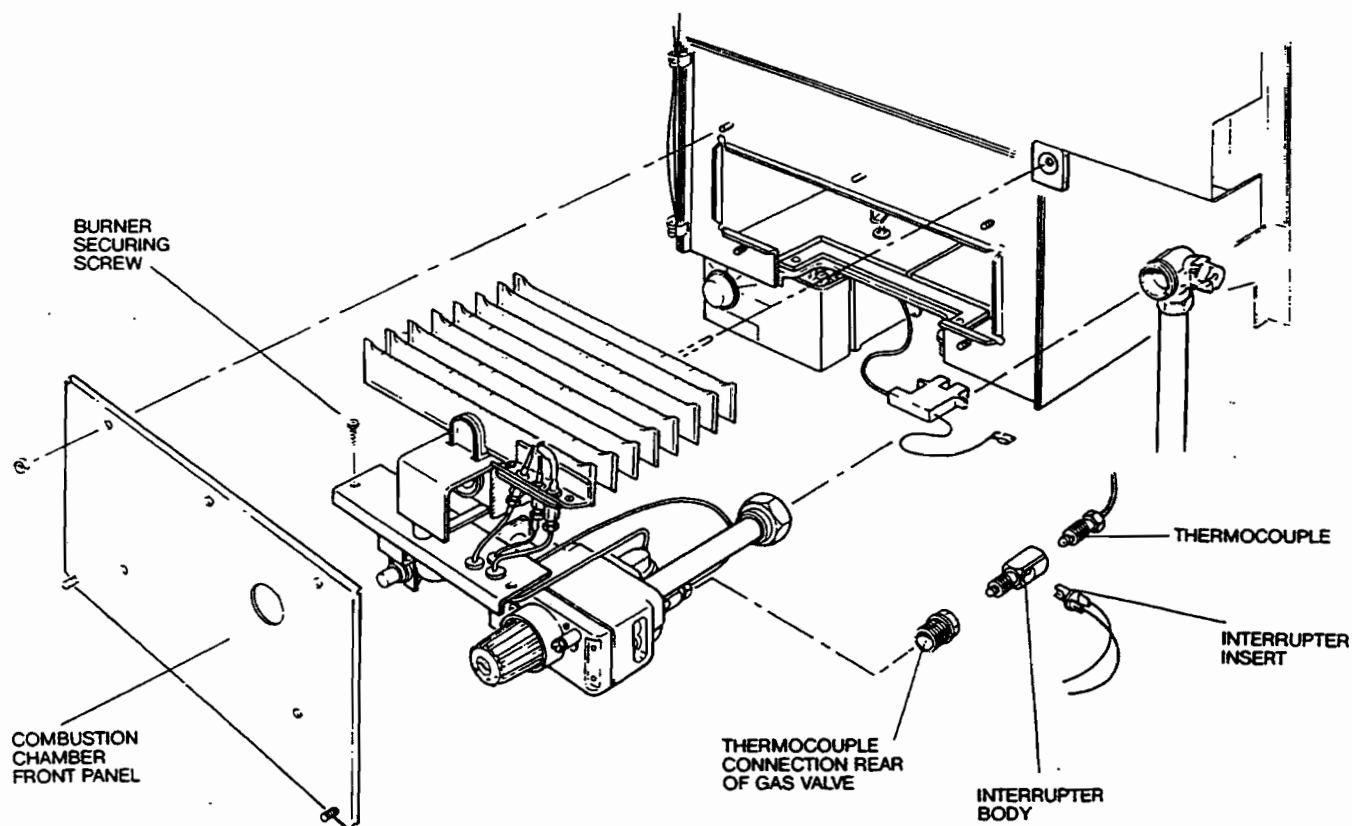
- A Undo the union of the gas service cock outlet.
- B Disconnect the two blue wires from the overheat thermostat. Release the wires from rear of control box by sliding the retaining grommet from slotted hole.
- C Unplug the electrical lead from the gas valve.
- D Remove the two main burner securing screws, lift out the main burner and gas control assembly.
- E Clean all deposits from the surface of the burner flame strip with a soft brush or vacuum cleaner and ensure there is no fluff in the entry of the burner venturi.
- F Remove the main burner injector and ensure the orifice is clean.

## G. PILOT BURNER

The following operations are only necessary if the pilot flame is distorted or the wrong size, and cannot be corrected using the pilot adjusting screw in the gas control valve, see FIGS. 22, 23.

Remove the pilot assembly from the burner by unscrewing the two pilot mounting screws and nuts, disconnect the electrode lead from electrode, uncouple the thermocouple and pilot gas tube nuts at the base of the pilot assembly. Flex pilot assembly forward to clear bracket, and withdraw assembly upwards. The pilot injector sits loosely on top of the pilot tube, or may be retained in the pilot head itself. Remove and inspect the pilot injector for dirt deposits and clean if necessary. Likewise inspect and clean the electrode and thermocouple using a soft brush.

- H. Re-assemble the injector and pilot to the burner but do not re-fit the main burner assembly to the boiler at this stage as the flue ways in the heat exchanger have first to be cleaned.



**FIG. 25. BURNER AND GAS CONTROL ASSEMBLY**

### 3. HEAT EXCHANGER

- A Remove the four nuts securing the access cover on flue hood. Lift off access cover.
- B Working from above and below the heat exchanger, use a suitable flue brush and remove all of the deposits from between the fins.
- C Refit the access cover, ensuring that the rope seal is undamaged and that a **GOOD SEAL** is made with the flue hood. Fully tighten the four nuts.

### 4. COMBUSTION CHAMBER INSULATION

Check the combustion chamber insulation for damage. If damaged replace as described under replacement.

### 5. MAIN BURNER ASSEMBLY — REPLACEMENT

- A Refit the burner and gas control valve assembly into the boiler ensuring that the locating pin on the rear of the burner engages correctly into the rear support bracket. Ensure also that the sealing gasket beneath the burner mounting flange is correctly positioned and a good seal obtained. Secure the assembly with two screws. See FIG. 25.
- B Reconnect the two blue wires to the overheat thermostat. Polarity is not important. Secure wires into rear of control panel by sliding retaining grommet into slot.
- C Reconnect the electrical leads to the gas valve terminals.

- D Reconnect the gas supply at gas service cock and turn on gas.

- E Refit the combustion chamber front panel.

- 6. Follow the full commissioning procedure as detailed in the **COMMISSIONING** section of these instructions.

- 7. No further servicing is required on any other boiler mounted units. Repair is by replacement.

### 8. FAULT FINDING

Refer to fault finding chart FIG. 26 and wiring diagram FIGS. 20, 21.

### 9. REMOVAL/REPLACEMENT OF BOILER MOUNTED UNITS

#### MAIN BURNER

Refer to FIG. 25 and carry out the following:

- a) Switch off the external electricity supply by disconnecting the plug at the socket or switching off external isolating switch.
- b) Carry out operations A and B as described in section 1 **PREPARING THE BOILER FOR SERVICING**.
- c) Turn off the gas service cock and remove burner and gas control assembly as described in section 2 **MAIN BURNER ASSEMBLY — REMOVAL AND CLEANING**, operations A, B, C, D, F. Separate the pilot from the main burner as described in the same section, operation G.

- d) Remove split grommets sealing the thermocouple lead, pilot tube and electrode lead to the burner mounting flange.
- e) Remove the four screws securing the burner manifold flange to the flange on the gas control valve outlet pipe.
- f) Lift burner away from the gas control valve while feeding the thermocouple lead, electrode lead and pilot tube through the holes in the burner mounting flange.
- g) Remove the rear locking nut securing the spark generator to the mounting bracket on the burner and withdraw the spark generator.
- h) Replacement is the reverse of removal. Use new sealing gaskets on reassembly. Ensure that the thermocouple lead, electrode lead and pilot tube are correctly replaced in the split grommets. Ensure also that the sealing gasket beneath the burner mounting flange is correctly positioned and a good seal is obtained.
- i) Follow the full commissioning procedure as detailed in the COMMISSIONING section of these instructions.

### **GAS CONTROL VALVE**

This operation is most easily carried out by first removing the burner and gas control valve assembly as follows:—

- a) Switch off the external electricity supply by disconnecting the plug at the socket or switching off external isolating switch.
- b) Remove boiler case and combustion chamber front panel as described in 1. PREPARING THE BOILER FOR SERVICING operations A and B.
- c) Turn off the gas service cock and remove main burner assembly as described in 2. MAIN BURNER ASSEMBLY — REMOVAL AND CLEANING, operations A, B, C, D.
- d) Disconnect the pilot supply tube at the gas valve.
- e) Disconnect the thermocouple from the interrupter at the rear of the gas control valve.
- f) Remove insert from interrupter and unscrew interrupter from gas control valve.
- g) Remove the four screws securing the burner manifold flange to the flange on the gas control valve outlet pipe.
- h) Remove inlet pipe from valve and fit to new valve. Replacement is the reverse of removal. Use new sealing gaskets on reassembly. Do not overtighten the rear thermocouple connection.
- i) Follow the full commissioning procedure as detailed in the COMMISSIONING section of these instructions.

### **PILOT ASSEMBLY and INJECTOR**

Refer to section 2G in SERVICING INSTRUCTIONS.

### **PILOT FILTER**

The pilot burner is protected from blockage by a pilot filter situated within the gas control valve. The filter is large and designed to last the life of the gas control valve under normal operating conditions. It is therefore unlikely to need replacing. However in the event of pilot filter blockage being suspected the complete control valve will need to be replaced.

### **THERMOCOUPLE**

- a) Switch off the external electricity supply by disconnecting the plug at the socket or switching off external isolating switch.
- b) Remove boiler case and combustion chamber front panel as described in 1. PREPARING THE BOILER FOR SERVICING (operations A and B).
- c) Disconnect the thermocouple lead from the gas control valve and pilot. Withdraw thermocouple lead through grommet in burner mounting flange, noting the route the lead takes so that the replacement can be routed in a similar manner to eliminate sharp bends.
- d) Replacement is the reverse of removal. Ensure that the thermocouple capillary is correctly replaced in the split grommet.

Do not overtighten the thermocouple nut.

### **ELECTRODE**

- a) Switch off the external electricity supply by disconnecting the plug at the socket or switching off external isolating switch.
- b) Remove boiler case and combustion chamber front panel as described in 1. PREPARING THE BOILER FOR SERVICING (operations A and B).
- c) Pull off the electrode lead from electrode.
- d) Unscrew the nut securing the electrode to the pilot and withdraw the electrode.
- e) Replacement is the reverse of removal.

### **COMBUSTION CHAMBER INSULATION**

- a) Switch off the external electricity supply by disconnecting the plug at the socket or switching off the external isolating switch.
- b) Remove boiler case and combustion chamber front panel as described in section 1. PREPARING THE BOILER FOR SERVICING operations A and B.
- c) Remove the burner assembly as described in section 2. MAIN BURNER ASSEMBLY — REMOVAL AND CLEANING operations A, B, C, D.
- d) To remove the insulation from the front, rear and door, bend back the retaining tabs and lift out.



To replace the side insulation it is necessary to first remove the front and rear insulation as previously described. Then remove the clips securing heat reflector plates to the locating studs on the base of the combustion chamber and lift out reflector plates. Bend back retaining tabs and lift out insulation.

- e) Replacement is the reverse of removal.
- f) Follow the full commissioning procedure as detailed in the COMMISSIONING section of these instructions.

#### **PILOT VIEWING WINDOW**

- a) Switch off the external electricity supply by disconnecting the plug at the socket or switching off external isolating switch.
- b) Remove boiler case and combustion chamber front panel as described in 1. PREPARING THE BOILER FOR SERVICING (operations A and B).
- c) Release the viewing window retaining frame by straightening the tabs which pass through the combustion chamber front panel. Remove the frame and lift out the glass. Take care not to damage the sealing gaskets when dismantling.
- d) Replacement is the reverse of removal.

#### **ELECTRODE LEAD**

- a) Switch off the external electricity supply by disconnecting the plug at the socket or switching off external isolating switch.
- b) Remove boiler case and combustion chamber front panel as described in 1. PREPARING THE BOILER FOR SERVICING (operations A and B).
- c) Pull off electrode lead from spark generator and electrode. Remove the split grommet and withdraw the electrode lead through the hole in burner mounting flange.
- d) Replacement is the reverse of removal. Ensure that the end of the electrode lead covered with black sleeving is attached to the spark generator and that the lead is correctly replaced in the split grommet.

#### **SPARK GENERATOR**

- a) Switch off the external electricity supply by disconnecting the plug at the socket or switching off external isolating switch.
- b) Remove boiler case as described in section 1. PREPARING THE BOILER FOR SERVICING operation A.

- c) Pull off electrode lead from spark generator, remove rear locking nut securing spark generator to its mounting bracket and withdraw spark generator.
- d) Replacement is the reverse of removal.

#### **BOILER THERMOSTAT**

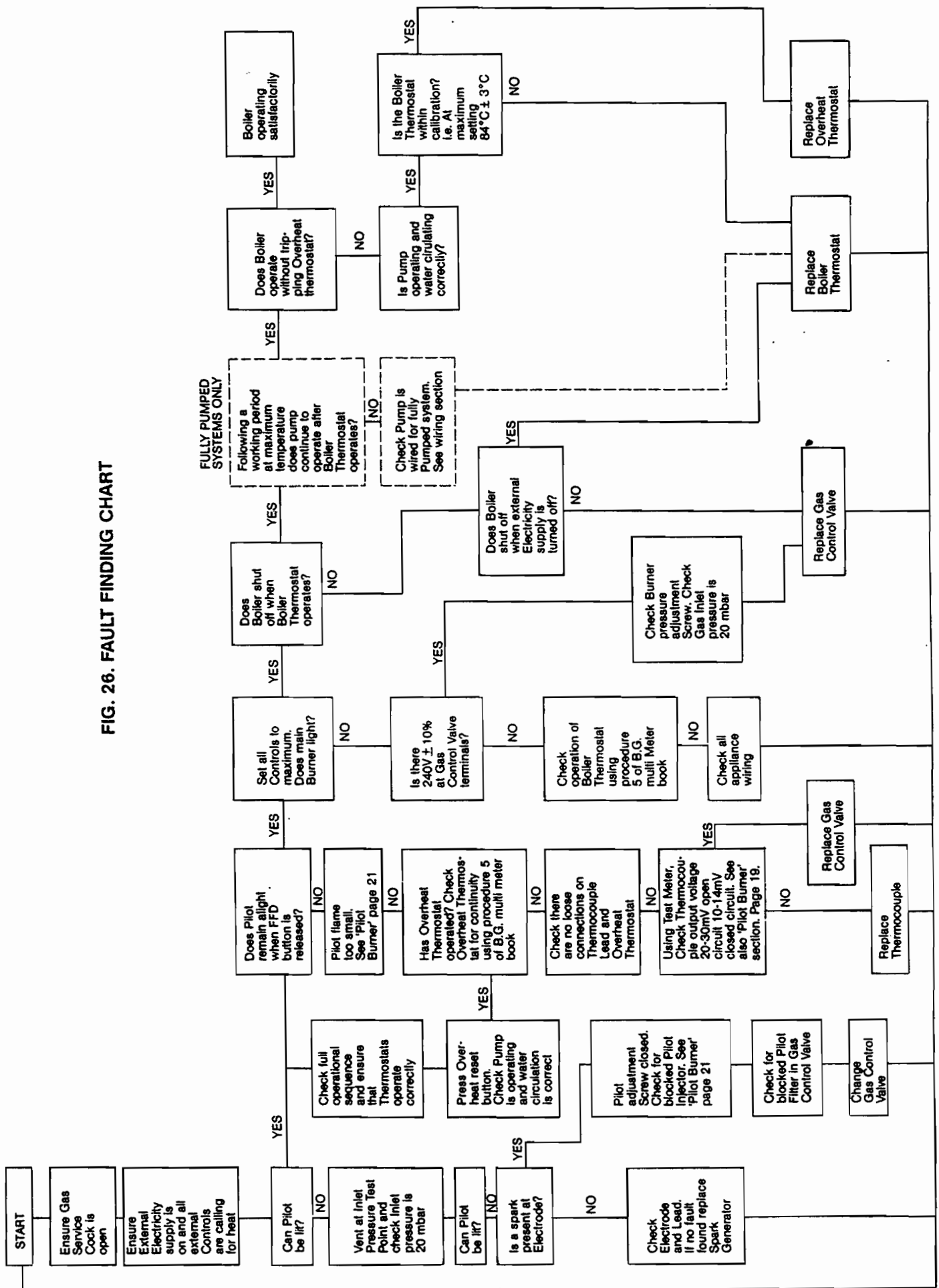
- a) Switch off the external electricity supply by disconnecting the plug at the socket or switching off external isolating switch.
- b) Remove boiler case as described in section 1. PREPARING THE BOILER FOR SERVICING operation A.
- c) Pull off the thermostat knob and remove the two screws securing the control panel cover and remove cover. Remove the two screws securing the thermostat to the control panel.
- d) Disconnect the electrical connections as follows:—  
White from terminal No. 3, Brown from 6, Black from 7, Brown from 8, Red from 9.
- e) Remove the split pin retaining the thermostat bulb and withdraw bulb from its pocket. Remove capillary from its routing clips. See FIG. 2.
- f) Replacement is the reverse of removal. The bulb of the new thermostat should be coated in heat conducting paste.

#### **OVERHEAT THERMOSTAT**

- a) Switch off the external electricity supply by disconnecting the plug at the socket or switching off external isolating switch.
- b) Remove boiler case as described in section 1. PREPARING THE BOILER FOR SERVICING operation A
- c) Remove locking nut securing thermostat to control panel.
- d) Disconnect the two blue wires from the thermostat terminals.
- f) Remove the split pin retaining the thermostat bulb and withdraw the bulb with its spacer from the pocket. Remove capillary from its routing clips. See FIG. 2.
- g) Replacement is the reverse of removal. Ensure that the spacer is correctly positioned to retain the thermostat bulb in the bottom of pocket.

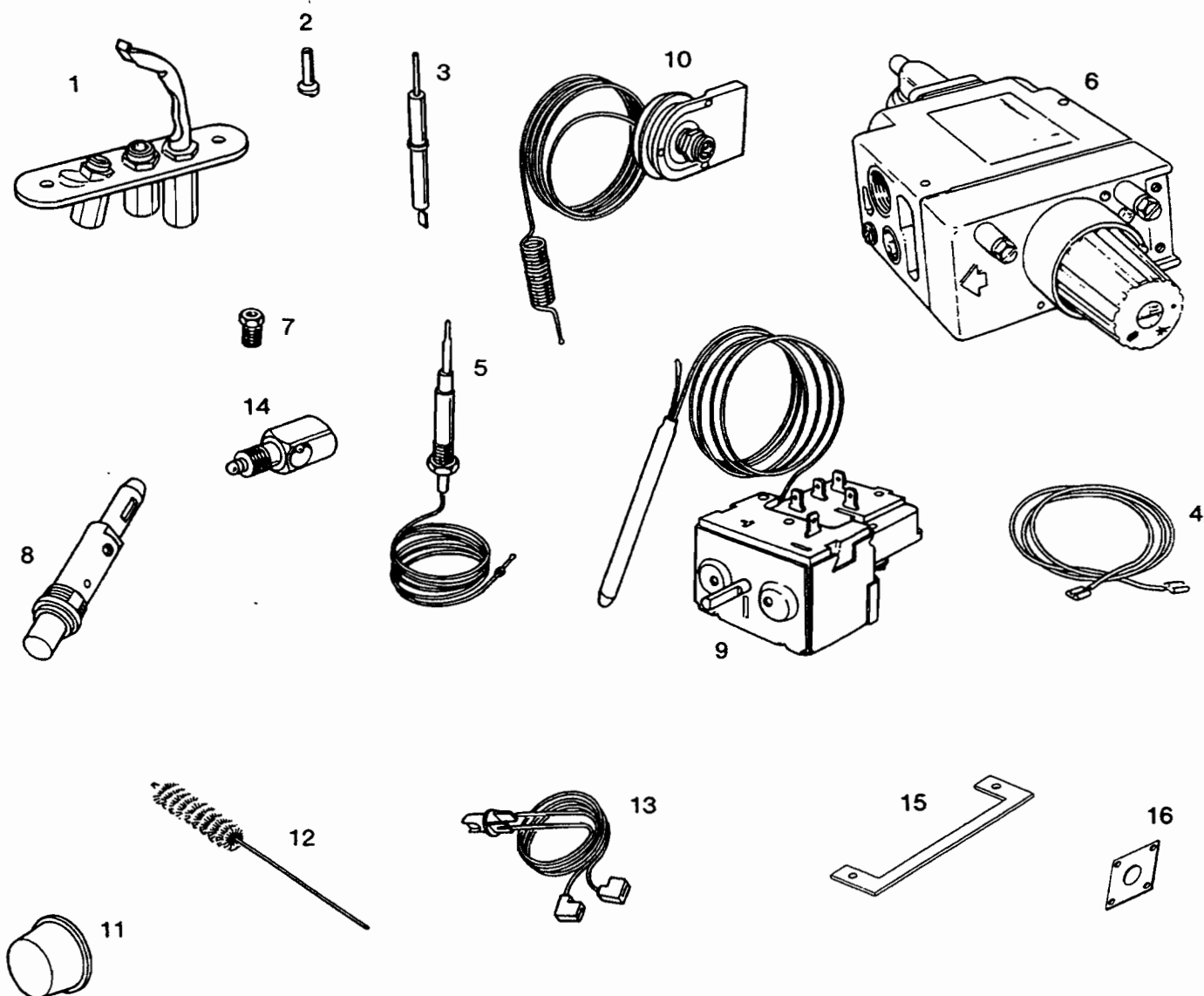


**FIG. 26. FAULT FINDING CHART**



# SHORT PARTS LIST

Key No.		P.I.L. Part No.	G.C. Part No.
1	Pilot and electrode assembly S.I.T. (inc. items 2 & 3)	214185	337 685
2	Pilot injector, 0.27mm S.I.T.	402892	395 674
3	Electrode, S.I.T.	402885	395 720
4	Electrode lead	407696	337 628
5	Thermocouple, S.I.T.	402905	381 626
6	Gas Control valve, S.I.T. COMPOSIT	402923	381 749
7	Burner Injector, 2.9mm	410965	337 374
	Burner injector, 3.5mm	410967	337 376
8	Spark generator, VERNITRON	407693	382 887
9	Boiler thermostat, RANCO	404496	381 839
10	Overheat thermostat, RANCO	404492	381 753
11	Boiler thermostat knob	214239	337 629
12	Flue brush (optional extra)	212514	337 526
13	Thermocouple interrupter assembly	214172	337 630
14	Thermocouple interrupter body	640845	394 215
15	Main Burner Gasket	214006	337 682
16	Gas Manifold Gasket	301461	357 465



**HEALTH AND SAFETY INFORMATION FOR THE  
INSTALLER AND SERVICE ENGINEER**

Under the Consumer Protection Act 1987 and section 6 of the Health and Safety at Work Act 1974, we are required to provide information on substances hazardous to health.

Small quantities of adhesives and sealants used in the product are cured and present no known hazards.

The following substances are also present.

**Insulation & Seals**

Material	— Ceramic Fibre; Alumino — Silicone Fibre
Description	— Boards, Ropes, Gaskets
Known Hazards	— Some people can suffer reddening and itching of the skin. Fibre entry into the eye will cause foreign body irritation. Irritation to respiratory tract.
Precautions	— People with a history of skin complaints may be particularly susceptible to irritation. High dust levels are only likely to arise following <b>harsh</b> abrasion. In general, normal handling and use will not present discomfort, follow good hygiene practices, wash hands before consuming food, drinking or using the toilet.
First Aid	— Medical attention must be sought following eye contact or prolonged reddening of the skin.

**Thermostat**

Material	— Contains very small quantity of xylene.
Description	— Sealed phial and capillary containing liquid.
Known Hazards	— Irritating to skin, eyes and throat. Vapour is harmful. Inflammable — do not extinguish with water.
Precautions	— Do not incinerate. Avoid contact with broken/leaking phials. Do not purposely puncture.
First Aid	— Eye/skin contact, wash with clean water, seek medical attention.

**SALES INQUIRIES:**

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