

# **Celtic plus**

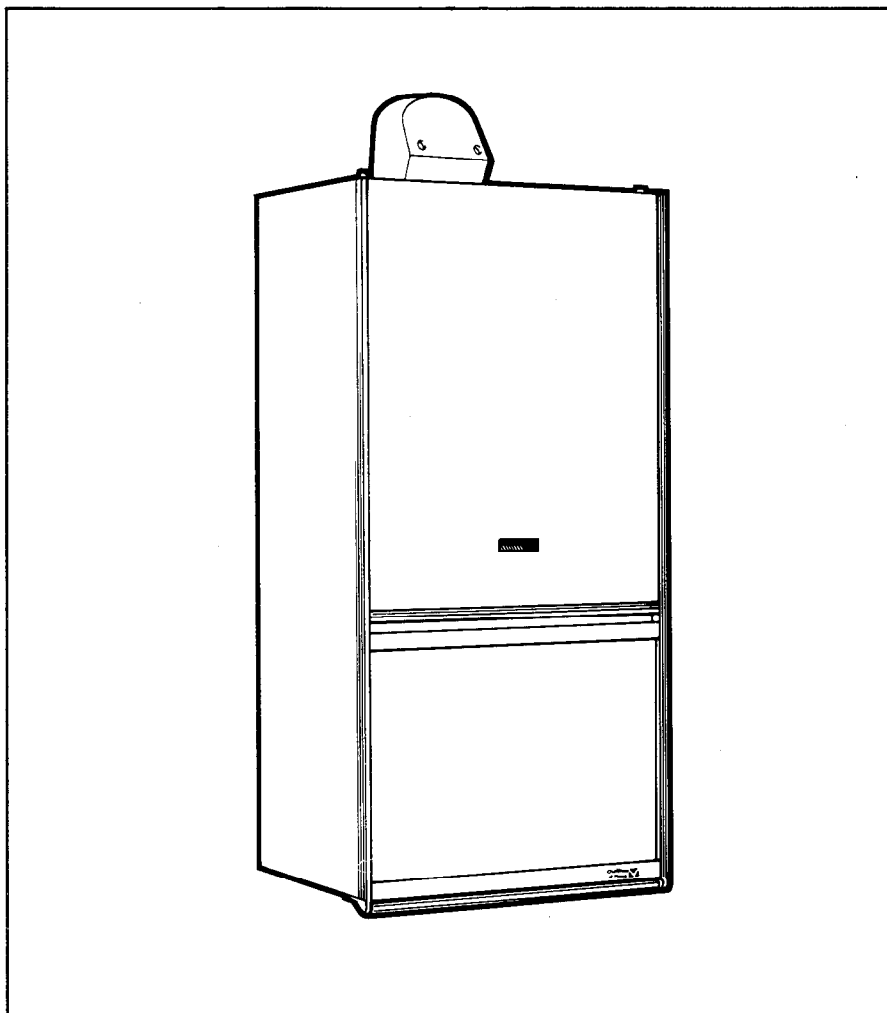
**Room Sealed Fanned Balanced Flue  
Combination Boiler**

## **GAS SAFETY (INSTALLATION AND USE) REGULATIONS.**

**It is the law that all gas appliances are installed by a competent person  
in accordance with the above regulations  
(For use on natural gas only. G20)**

G.C. No 47 980 07

from serial number 994 225 395 - 31



## **Installation and Servicing Instructions**

(leave these instructions with the user)

**Chaffoteaux  
et Maury**



**Looking Good.Heating Better**



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### SHORT SPARE PARTS LIST

Rear cover

## **CONTROL OF SUBSTANCES HARMFUL TO HEALTH**

### **IMPORTANT**

To comply with the Control of Substances Harmful to Health Regulation 1988 we are required to provide information on the following substance that is contained in this appliance.

**Description**                      Combustion Chamber Lining

**Material**                              Alumino Silicone Fibre

**Precautions**                      During servicing, keep the dust generation to a minimum and avoid inhaling any dust and contact with the skin and eyes. Normal handling and use will not present any discomfort, although some people with a history of skin complaints may be susceptible to irritation.

When disposing of the lining ensure that it is securely wrapped and wash hands after contact.

# 1. INTRODUCTION

The **Celtic plus** is a wall mounted, low water content fanned balanced flue appliance suitable for central heating and hot water via a non storage water to water heat exchanger. The maximum output is 23 kW (78480 Btu/h). The boiler is designed for sealed systems only and included in the appliance is the expansion vessel, circulating pump, temperature and pressure gauges, safety valve, electric connection box, and domestic expansion vessel.

The standard flue assembly supplied with the boiler is 100 mm (4 in) dia pipe, can be directed to the rear or to the left or right and can be extended to a maximum length of 3 m, or 1,6 metres horizontally using the available 90° bend (see sections 1.4.1, 1.4.2 and 1.4.3 figures 2, 3, 3a, 3b, 3c).

**Special features include :**

- Output to central heating fully range rated between

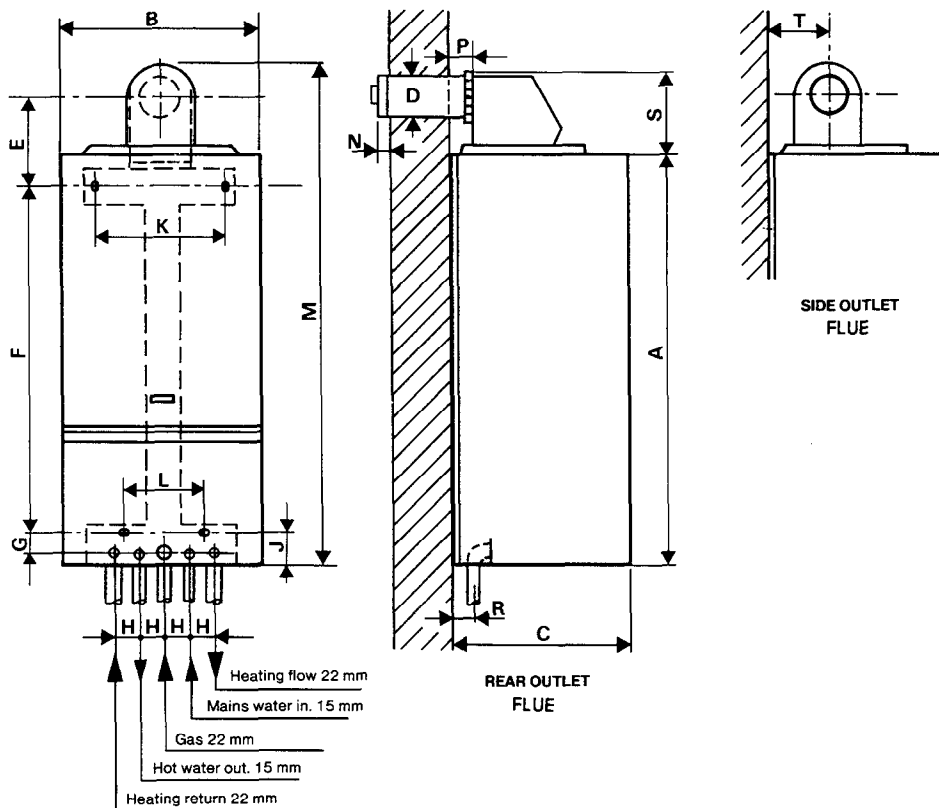
1/3 and full output.

- High efficiency.
- Special jig plate enabling all pipework to be installed before installing appliance.
- Independent control over central heating flow temperature and hot water.
- Fully adjustable central heating flow temperature.
- Regulation between 50° C and 82° C.
- High limit thermostat for both boiler and hot water.
- Water flow switch to protect appliance.
- Suitable for showers with compatible mixer valves.

**Guarantee**

The manufacturer's guarantee on this appliance is for 12 months from the date of purchase. The guarantee is void, if the appliance is not installed in accordance with the recommendations made herein.

**1.1 DIMENSIONS**



	mm	in
<b>A</b>	820.5	32.3
<b>B</b>	391.0	15.4
<b>C</b>	365.0	14.4
<b>D</b>	100.0	4.0
<b>E</b>	169.5	6.7
<b>F</b>	654.5	25.7
<b>G</b>	43.0	1.7
<b>H</b>	50.0	2.0
<b>J</b>	75.0	3.0
<b>K</b>	260.0	10.2
<b>L</b>	150.0	6.0
<b>M</b>	972.5	38.3
<b>N</b>	13.0	0.5
<b>P</b>	61.0	2.4
<b>R</b>	30.0	1.2
<b>S</b>	152.0	6.0
<b>T</b>	112.0	4.4

Fig. 1

## 1.2 Technical Data

<b>Hot water</b> Input..... 28.90 kW 98612 Btu/h Output..... 23.00 kW 78480 Btu/h Water flow raised 45 °C (81 °F)..... 7.4 l/min 1.7 gal/min Water flow raised 35 °C (63 °F)..... 9.5 l/min 2.1 gal/min Water flow raised 30 °C (54 °F)..... 11.1 l/min 2.5 gal/min Maximum temperature..... 60 °C 140 °F Maximum pressure..... 10 bar 150 psi Minimum working pressure..... .6 bar 9 psi Gas rate..... 2.743 m <sup>3</sup> /h 96.87 ft <sup>3</sup> /h Burner pressure..... 11.8 mbar 4.7 in wg			<b>Connections</b> Gas..... 22 mm copper Heating flow..... 22 mm copper Heating return..... 22 mm copper Mains cold water inlet..... 15 mm copper Hot water outlet..... 15 mm copper		
			Electrical supply 240 V ~ 50 Hz, fused at 3A. Electrical consumption..... 195 watts Internally fused, two at 2A (BS 4265) Weight..... 42 kg 92.4 lb Water capacity..... 4 litres 7 pints		
<b>Central heating</b> Maximum input..... 27.64 kW 94313 Btu/h Maximum output..... 22.00 kW 75068 Btu/h Gas rate (maximum)..... 2.63 m <sup>3</sup> /h 92.98 ft <sup>3</sup> /h Burner pressure..... 11.2 mbar 4.5 in wg Minimum input..... 10.85 kW 37020 Btu/h Minimum output..... 7.64 kW 26062 Btu/h Gas rate (minimum)..... 1.0 m <sup>3</sup> /h 35.31 ft <sup>3</sup> /h Burner pressure..... 1.5 mbar 0.6 in wg Minimum flow rate..... 300 l/h 1.1 gal/min Maximum pressure..... 2.5 bar 36.5 psi			<b>Ignition</b> - Anstoss continuous spark generator <b>Electrode</b> - Chaffoteaux et Maury Ltd, spark gap 5 mm <b>Boiler thermostat</b> - EGO (82°C) <b>Boiler limit thermostat</b> - SOPAC / JAEGER (85°C) <b>Hot water limit thermostat</b> - SOPAC / JAEGER (57°C ± 3°C) <b>Safety overheat thermostat</b> (Tokoswitch - (105°C) (Elmwood - (105°C)		
			<b>Gas valve</b> - AEMF <b>Fan motor</b> - SEL <b>Pressure switch</b> - DUNGS 102 Pa / 55 Pa <b>Pump head</b> - GRUNDFOS UP 15/60 <b>C.H. expansion vessel initial charge pressure</b> - 0.65 bar (9.6 psi) <b>Domestic expansion vessel initial charge pressure</b> - 2 bar (30 psi)		
<b>Natural gas</b> Manifold injectors 14 of..... 1.28 mm 0.05 in Pilot injector..... 0.3 mm 0.01 in Gas section restrictors 2/3 valves 4.4 mm 0.17 in 1/3 valve .. 2.3 mm 0.09 in					

## 1.3

### Minimum Clearances around Boiler

Top above air duct.....	50 mm (2 in)
Bottom below case.....	150 mm (6 in)
Sides.....	100 mm (4 in)
Front.....	600 mm (24 in)

## 1.4

### Wall Thicknesses

The standard flue assembly can accommodate the following thicknesses.

Rear : from 55 mm to 576 mm

Side : from 55 mm to 392 mm

(this allows for a minimum clearance of 100 mm between the appliance and the side wall. As this dimension increases, so the maximum side wall thickness available decreases).

Extension flue assemblies are available to accommodate wall thicknesses of :

Rear : from 577 mm to 2876 mm

Side : from 393 mm to 2692 mm

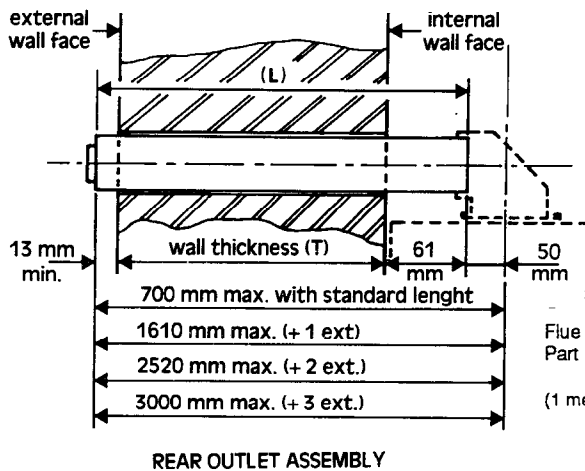
See figs. 2 and 3 for details of number of extensions required.

**IMPORTANT NOTE** : The extension ducts supplied, up to a maximum of 3, will in fact permit a greater length than indicated to be covered. The ducts **MUST** be cut so that the maximum length from the centre line of the flue turret to the outermost point of the air duct **DOES NOT EXCEED** 3 metres horizontal. Greater length must not be used.

See sections 1.4.1. 1.4.2. 1.4.3.



### 1.4.1 Rear Flue Outlet Horizontal



#### To cut flue assembly to length

- Measure wall thickness (T).
- Add 74 mm, this will give required length (L).
- Mark plastic air duct for length (L) and cut off surplus (from plain end).

**N.B.** If extension sections are used ensure these are firmly pushed together, see figs. 3b and 3c and a fall of 5 mm per metre length should be provided (see section 4.3).

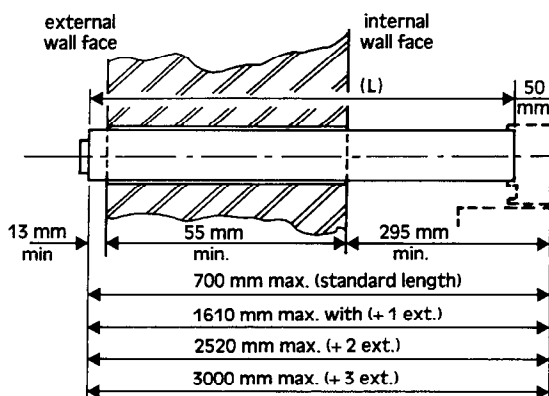
- Cut off same amount from aluminium flue duct (plain end).

Flue extension accessory  
Part No. 62823.00  
(G.C. 264459)  
(1 metre length)

REAR OUTLET ASSEMBLY

Fig. 2

### 1.4.2 Side Flue Outlet Horizontal



#### To cut flue assembly to length

- Measure from external wall face to centre line of **Celtic plus** and subtract 37 mm (this will give required length "L").
- Cut off surplus from plastic air duct (plain end).

**N.B.** If extension sections are used ensure these are firmly pushed together, see figs. 3b and 3c and a fall of 5 mm per metre length should be provided (see section 4.3).

- Cut off same amount from aluminium flue duct (plain end).

Flue extension accessory  
Part No. 62823.00  
(G.C. 264459)  
(1 metre length)

Fig. 3

SIDE OUTLET ASSEMBLY

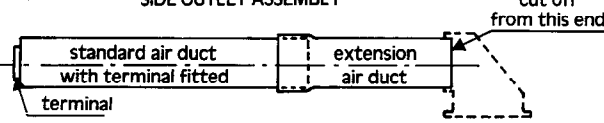
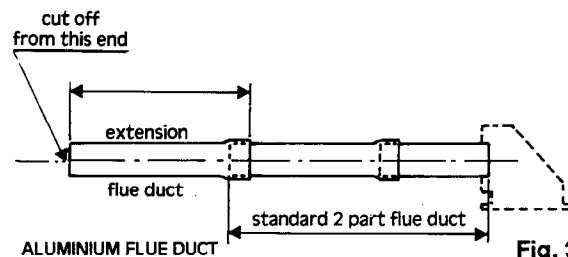


Fig. 3a

PLASTIC AIR DUCT



ALUMINIUM FLUE DUCT

Fig. 3b

### 1.4.3 Other flue Arrangements Horizontal

#### Other flue Arrangements Horizontal

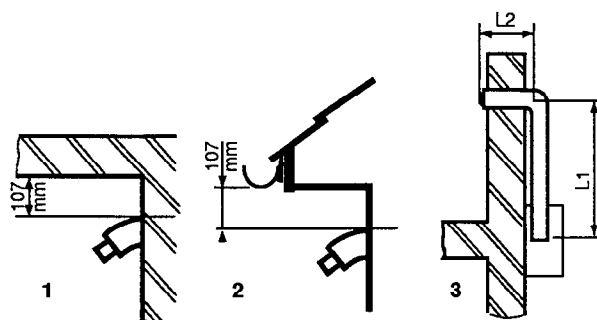


Fig. 3c

1. Distance from internal corner 300 mm without kit, 107 mm with kit No 76216 (GC No 264 833).
2. Distance below balconies or eaves 200 mm without kit, 107 mm with kit No 76216 (GC No 264 833).
3. Appliance is normally supplied packed with standard 650 mm straight flue section. Additional straight extension lengths of 1 metre, part No 62823 (GC No 264 459), can be use up to a total straight length of 3 metres. It is also possible to incorporate one bend in the flue using part No 65572 (GC No 264 835). In this case the length L1 + L2 should not exceed 1.6 metres horizontally.

## 1.5 Description of Components and Location

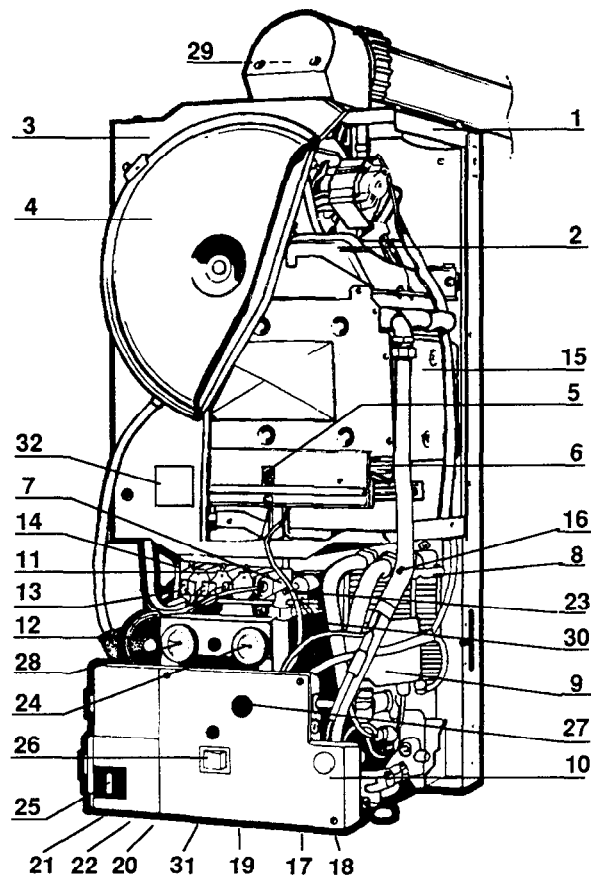


Fig. 4

The appliance is mounted in a steel case which has a white epoxy resin paint finish.

### 1. Chassis:

The chassis is a rigid plated mild steel pressing on which all components are mounted.

### 2. Flue hood:

Is an aluminium alloy casting onto which the two speed fan is mounted.

### 3. Combustion chamber:

This is assembled from a number of components mounted onto the chassis. The front panel is simply removed for servicing complete with the expansion vessel, a hook is fitted below the appliance to accept and retain the panel during servicing.

### 4. Expansion vessel:

The expansion vessel has a capacity of 5,4 litres (1.19 gal) and is sized for a normal system water content where the load is equivalent to the maximum output of the boiler. The charge pressure is 0.65 bar.

5. Pilot security is by thermocouple flame failure.

6. Multigas burner comprising: stainless steel blades (14) and a manifold with injectors (14).

7. Gas section including thermoelectric valve and two stage solenoid valves.

### 8. Secondary heat exchanger :

The secondary heat exchanger is a plate type heat exchanger. A thermostat is fitted on the pipework limiting the domestic hot water temperature to a maximum of  $57 \pm 3^\circ \text{C}$ .

### 9. Change over valve :

The valve is activated by a demand for domestic hot water, closes the heating circuits, and directs water to the secondary heat exchanger.

### 10. Electrical box containing :

Mains connection

Fuses

Printed circuit board

Connections for external controls

Connections for fan, pressure switch and flow switch

Connections for pump

Connections for change over valve and for gas solenoid valve

### 11. Solenoid valve :

Block on which 3 valves are mounted :

1/3 valve - 1st stage valve-heating and hot water (blue)

2/3 valve - full output to hot water (black)

2/3 valve - (variable valve) central heating (orange)

### 12. Grundfos pump motor

13. Air separator and vent directly connected to the pump inlet (not illustrated).

14. Regulation screw to adjust output to heating (2/3 valve).

### 15. Heating body comprising :

Copper finned tube heat exchanger protected with silicone resin paint. Combustion chamber in aluminium coated steel. Combustion chamber lining - ceramic fibre panels.

16. High limit thermostat (manual reset).

17. Water service tap (not illustrated).

18. Flow isolating valve - heating (not illustrated).

19. Gas service tap (not illustrated).

20. Domestic hot water outlet with regulator (not illustrated).

21. Safety valve with drain tap (not illustrated).

22. Heating return isolating valve with filter (not illustrated).

23. Ignition button.

24. Thermometer indicating boiler flow temperature.

25. Fuses.

26. Selector switch - hot water only/OFF/heating and hot water.

27. Thermostat to regulate heating flow temperature.

28. Pressure gauge.

29. Pressure switch (not illustrated).

30. Domestic expansion vessel (not illustrated).

31. Water flow switch (not illustrated).

32. Data badge position.

## 1.6 Description of Operation

The **Celtic plus** is combination boiler providing central heating and hot water. Hot water is provided on a demand basis. For the duration of the demand for hot water the central heating is interrupted.

The appliance operates in two modes. A hot water only setting where it operates only on hot water demand and a hot water + central heating setting providing central heating and switching to hot water on demand.

### 1.6.1 Central Heating (see fig. 5)

The pump (21) circulates water which returns to the boiler via the return valve (31) which incorporates a filter (30). Before reaching the pump it passes through an air separator and air purger (17). The return water passes through the heat exchanger (2) where it is heated. It then passes through the change over valve (19) which in heating mode is in its rest position and out via the flow valve (27) to the radiator circuits (34).

The boiler thermostat (8) controls the temperature of the circulation water between a minimum of 50° C approx and a nominal maximum of 82° C. The boiler thermostat also controls the opening of the 1/3 (11) and variable solenoid valve (10).

The limit thermostat (16) set to 85° C closes both solenoids valves in the event of its set temperature being reached as could occur under the low flow conditions.

The boiler is protected by a high limit thermostat (4) the operation of which interrupts the thermocouple and extinguishes the pilot. If the high limit thermostat operates it is necessary to manually re-establish the pilot.

An expansion vessel (13) is fitted in the primary circuit.

### 1.6.2 Hot Water (see fig. 6)

When there is a demand water flows in from the cold mains supply (26) through the water section part (35) of the change over valve (19). The inclusion of a venturi (24) produces high pressure under the diaphragm (23) causing it to rise. This movement is transmitted to the change over valve closing the heating port and opening the hot water port, as shown (20). The primary water heated by the boiler now passes through the water to water heat exchanger (18) where it flows through alternate plates indirectly heating the DHW.

The rising of the change over valve spindle causes :

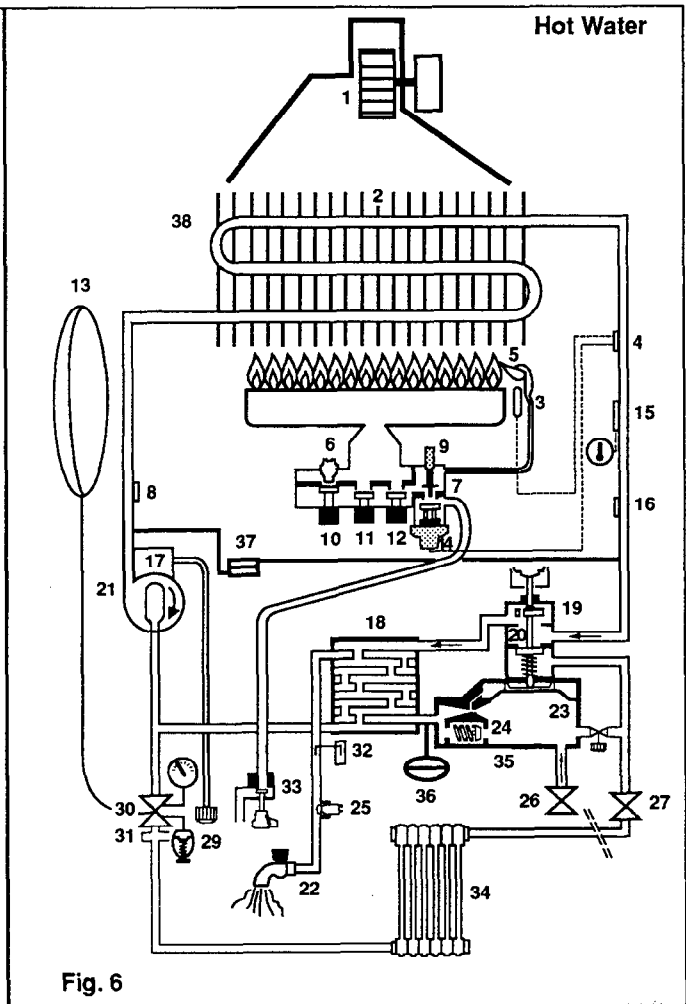
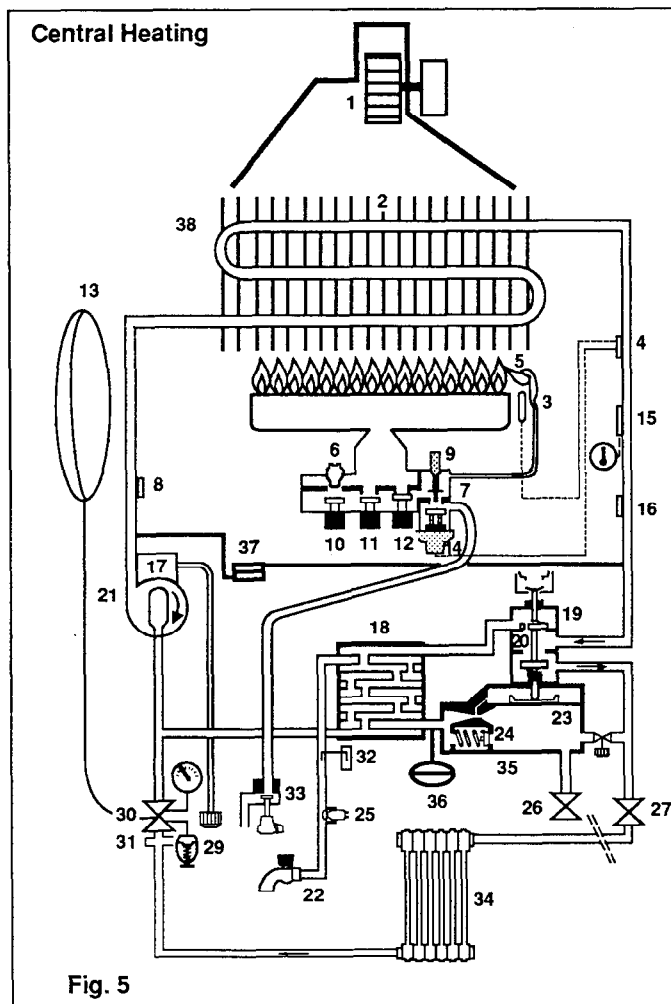
1. The opening of a microswitch stopping the pump. This circuit is remade by a second microswitch making when the hot water port is fully open.

2. The by-passing of the boiler thermostat brings the boiler under control of a fixed temperature thermostat (32) which operates on the 2/3 fixed solenoid (12).

The D.H.W. flow rate is adjustable by a restrictor (25) and a limiting thermostat (32) reduces the gas rate when the domestic hot water reaches 57° C by interrupting the electrical supply to the hot water solenoid (12).

If the primary circuit reaches 85° C the limit thermostat (16) closes both solenoids valves.

A domestic expansion vessel is fitted in the D.H.W. circuit (36).



### 1.6.3 Gas (see figs. 5 and 6)

When the main gas tap (33) is turned to the on position gas is admitted to the gas section (7). Pressing the ignitor button (9) operates a microswitch causing the commencement of a firing cycle. The fan changes from low to high speed and after a purge period of approx 14 seconds a continuous stream of sparks are delivered lighting the pilot gas (3). Simultaneously the thermoelectric valve (14) is opened and after a further 5 seconds sufficient energy is being produced by the thermocouple (5) for the thermoelectric valve to be retained in the open position.

When the ignitor button is slowly released gas is admitted to the underside of the solenoid valves (10,11 and 12).

There are 3 solenoid valves: the centre (blue) valve (11) fixed at 1/3 of max rated output the right hand hot water (black) valve (12) fixed at 2/3 of maximum rated output, the left hand central heating (orange) valve (10) which is variable up to top 2/3 maximum rated output. The gas admitted by the orange valve is varied by adjuster (6) (see section 6.4).

### 1.6.4 FUNCTIONAL FLOW DIAGRAM

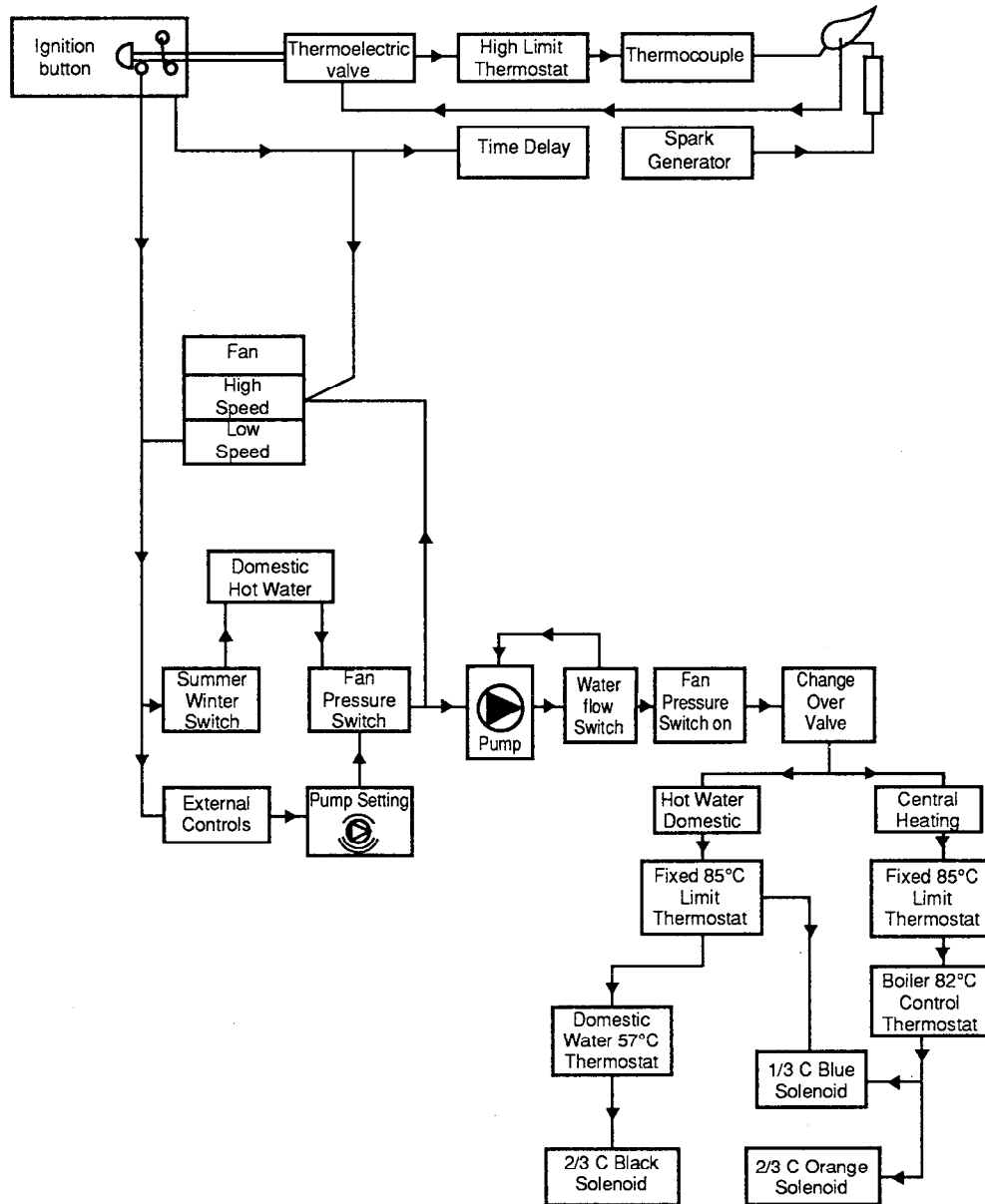


Fig. 7

### 1.6.5 Safety Controls

In addition to the normal safety controls the **Celtic plus** incorporates the following feature.

Should the central heating water flow reduce to below 300 l/h (1.1 gal/min) the gas supply to the burner is turned off, see fig. 4 (31) and figs. 5 & 6 (37).

**1.6.6 FUNCTIONAL FLOW WIRING DIAGRAM**

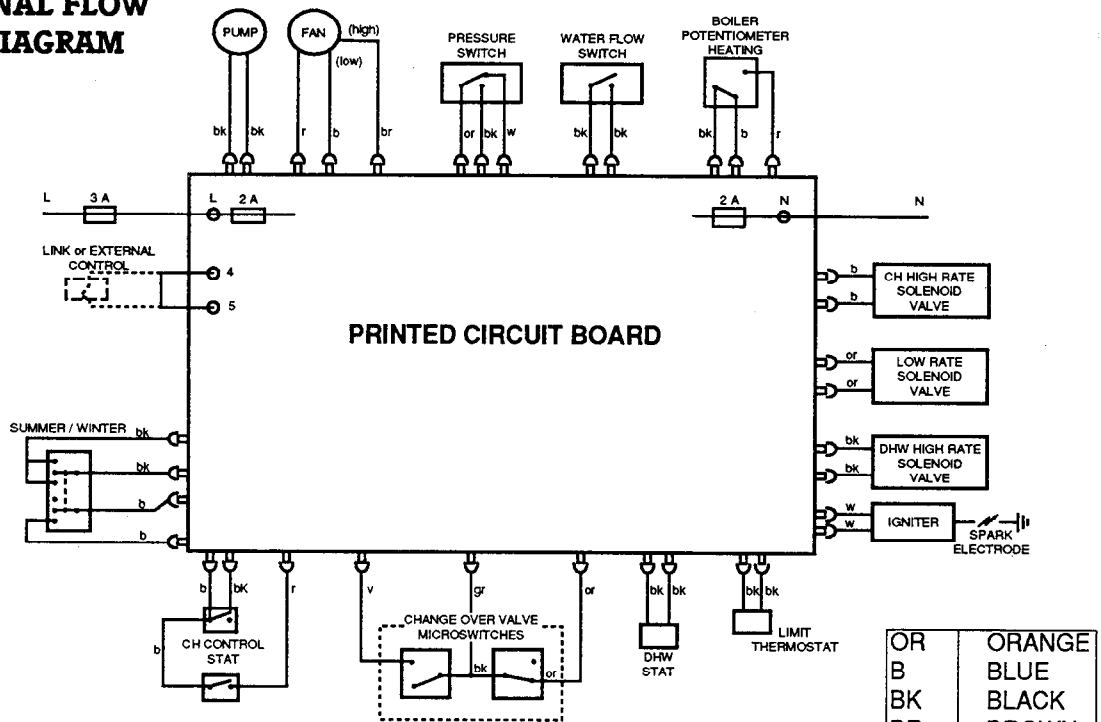


Fig. 8

**1.6.7 ILLUSTRATED WIRING DIAGRAM**

ALL CABLES ARE 240V EXCEPT WHERE THEY ARE INDICATED 24V

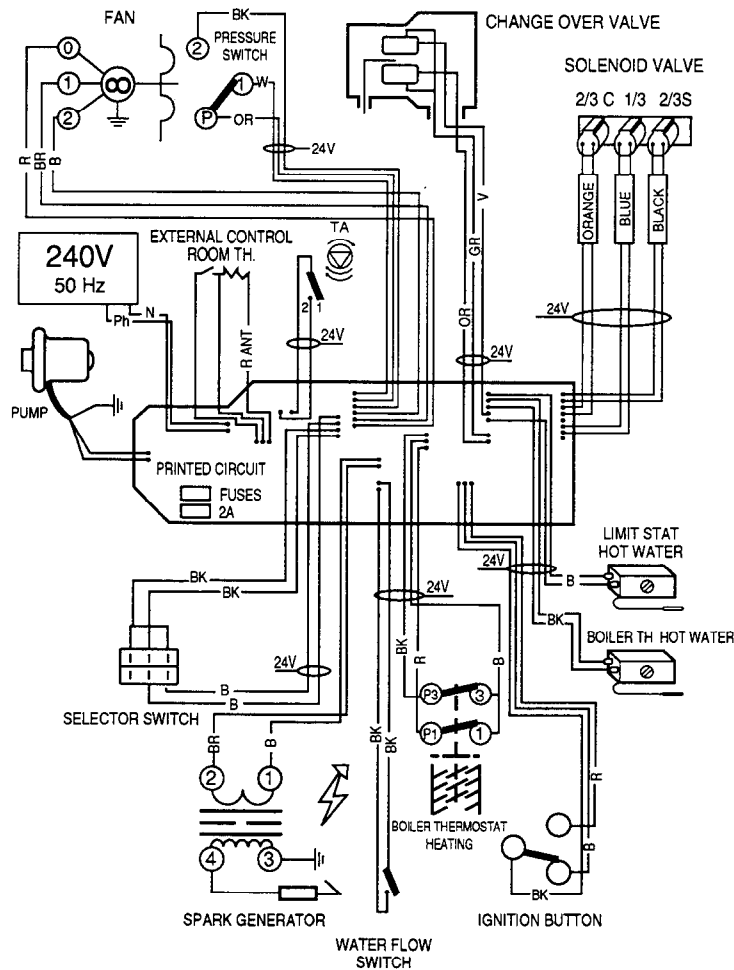


Fig. 9

## 2 INSTALLATION REQUIREMENTS

### 2.1 General

The installation of the boiler must be in accordance with Gas Safety (Installation and Use) Regulations, Building Regulations and current Byelaws of the Local Water Undertaking. It should be in accordance also with the current B.S. Codes of Practice and the British Gas Specifications for Domestic Wet Central Heating Systems and any relevant requirements of the local Gas Region, Local Authority Building Standards (Scotland) Regulations, and the Safety Document 635, The Electricity at work Regulation.

Detailed recommendations are stated in the following British Standard Codes of Practice:

B.S. 6891, B.S. 6798, B.S. 5440 : 1 and 2, B.S. 5449: 1, B.S. 7593, BS 5546 B.G.DM2, B.S. 4814, B.S. 7074 1 e 2, B.S. 7671.

**Note :** Gas Safety Installation and Use Reg. It is the law that all gas appliances are installed by competent persons in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution. It is in your own interest and that of safety to ensure compliance with the law.

### 2.2 Location

The boiler is not suitable for external installation. The position chosen for the boiler must permit the provision of a satisfactory flue termination. The location must also permit adequate space for servicing and air circulation around the boiler. The surface on which the boiler is mounted must be of non combustible material.

The boiler may be installed in any room or internal space although particular attention is drawn to the requirements of the current B.S. 7671 and, in Scotland, the electrical provisions of the Building Regulations applicable to Scotland, with respect to the installation of a heater utilising mains electricity in a room or internal space containing a bath or shower.

Where the installation of the boiler will be in an unusual location special procedures may be necessary and BS 5546 gives detailed guidance on this aspect.

A compartment used to enclose the boiler must be designed and constructed specifically for this purpose. An existing cupboard or compartment may be used provided that it is modified for the purpose.

Details of essential features of cupboard/compartment design are given in BS 6798.

### 2.3 Water Circulation System

The **Celtic plus** is suitable for SEALED SYSTEMS **ONLY** and should be installed in accordance with the relevant recommendations given in BS 6798, BS 5449:1 (for the smallbore or/and microbore systems) and the British Gas Specifications for Central Heating Systems.

### 2.4 Siting the Flue Terminal

Refer to section 1.4 for details of wall thicknesses which can be covered.

Detailed recommendations for flueing are given in BS 5440 Pt 1. The following notes are intended to give general guidance.

The boiler must be installed so that the flue terminal is exposed to external air. The boiler must NOT be installed so that the terminal discharges into another room or space e.g. outhouse or closed in lean-to. It is important that the position of the terminal allows a free passage of air across at all times. The minimum acceptable clearances from the terminal to obstructions and ventilation openings are specified below (fig. 10).

#### Horizontal Flue

Terminal positions	Min clearances
A - Directly below an opening, windows etc or adjacent to an opening.....	300 mm
B - Below gutters soil pipes or drain pipes ...	75 mm
C - Below eaves .....	200 mm*
D - Below balconies or car port roof .....	200 mm*
E - From a vertical drain pipe or soil pipe ....	75 mm
F - From an internal or external corner .....	300 mm*
G - Above ground roof or balcony level .....	300 mm
H - From a surface facing the terminal.....	600 mm
J - From an opening in the car port (e.g. door or window) into dwelling.....	1200 mm
K - Vertically from a terminal on the same wall.....	1500 mm
L - Horizontally from a terminal on the same wall .....	300 mm

\* (107 mm) minimum clearance using kit No. 76216.00 (G.C. 264 833).

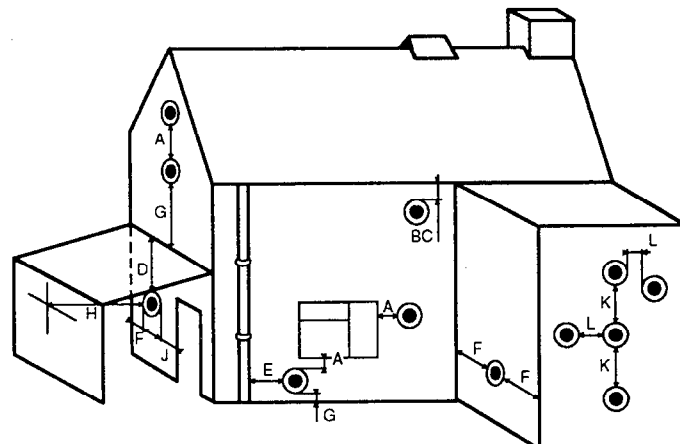


Fig. 10

BUILDING REGULATIONS excerpt.  
Approved document J Part B 1.4 (C) (D).

C) Protect with a terminal guard if it could come in contact with people near the building or be subjected to damage.

D) Designed so as to prevent the entry of any matter which might restrict the flue.

(A terminal guard G.C. No 381 782 is available from).

Quinnel Barret & Quinnel Wireworks  
Old Kent Road  
London SE15 1NL Tel. 081-639-1357

The air inlet/outlet duct and the terminal of the appliance must not be closer than 25 mm (1 in) to any combustible material. Detailed recommendations on the protection of combustible material are given in BS 5440 Pt 1.

#### IMPORTANT NOTICE : TIMBER FRAMED HOUSES

IF THE APPLIANCE IS TO BE FITTED IN A TIMBER FRAMED BUILDING IT SHOULD BE FITTED IN ACCORDANCE WITH THE BRITISH GAS PUBLICATION - "GUIDE FOR GAS INSTALLATIONS IN TIMBER FRAMED HOUSING" reference DM2. IF IN DOUBT, ADVICE MUST BE SOUGHT FROM THE LOCAL REGION OF BRITISH GAS OR C.O.R.G.I.

## 2.5 Air Supply

The room in which the boiler is installed does not require a purpose provided air vent.

If the boiler is installed in a cupboard or compartment permanent air vents are required in the cupboard or compartment, one at high level and one at low level either direct to the outside air or to a room. Both high and low level air vents must communicate with the same space.

Position of vents	Air from room	Air direct from outside
High level	261 cm <sup>2</sup> (40 in <sup>2</sup> )	130 cm <sup>2</sup> (20 in <sup>2</sup> )
Low level	261 cm <sup>2</sup> (40 in <sup>2</sup> )	130 cm <sup>2</sup> (20 in <sup>2</sup> )

## 2.6 Electrical Supply

- This appliance must be earthed.
- All wiring external to the appliance must conform to the current B.S. 7671.
- The **Celtic plus** requires a 240 V - 50 Hz supply.
- Connection of the appliance and any system controls to the mains supply must be through a common isolator and must be fused at 3A maximum.

This should preferably be an unswitched shuttered socket outlet and 3 pin plug to BS 1363. Alternatively, a double pole isolating switch may be used, provided it has a minimum contact separation of 3 mm in both poles. The isolator should be clearly marked showing its purpose, preferably positioned close to the appliance.

-Fuse the supply at 3A.

-The supply cord must be 0.75 mm<sup>2</sup> (24 x 0.2 mm) three core to BS 6500 Table 16.

## 2.7 Gas Supply

The **Celtic plus** requires:

2.743 m<sup>3</sup>/h (96.87 ft<sup>3</sup>/h) gas flow.

The meter and supply pipes should be capable of delivering this quantity of gas in addition to the demand from any other appliances in the house.

The complete Installation must be tested for soundness as described in BS 6891.

## 3 SYSTEM GUIDANCE

### 3.1 General

The low water content **Celtic plus** boiler includes the expansion vessels, safety overheat thermostat, temperature and pressure gauges, and safety valve.

The flow temperature is adjustable and gives a nominal 82 °C (180° F) on its maximum setting.

Detailed recommendations for water circulation are given in BS 5546. Whilst the boiler provides hot water, there may be occasions when a cylinder will be used, for instance, if the property has two bathrooms. Detailed recommendations of this application is given in section 3.13. Thermostatic control should be used in the heating circuits and the cylinder if one is fitted.

It must be remembered that a combination appliance has a limited volume of hot water that can be supplied at any one time for a given temperature. Indeed in most respects it is equivalent to a multipoint water heater and many of the constraints associated with multipoints apply equally to combination boilers.

The appliance has two separate functions, to provide heating and hot water on demand. It can have a third which is to supply hot water high demand through the use of an indirect cylinder, where there is more than one bathroom or if the standard and appointments of the property, such as basins in all bedrooms and a large kitchen indicate a high usage of hot water.

Hot water produced indirectly through a cylinder can be used to satisfy high simultaneous demand outlets - bathrooms etc, whilst the benefits of high efficiency in generally small quantities of hot water, can be fully utilised in kitchens, cloakrooms and so on.

Separate time and temperature control over hot water generated in this way can be achieved by the use either of two port valves or three port valves of a flow share or priority pattern.

It is also possible, where the occupation of the house is variable, to provide either for a small or large load. This is best achieved with a tall, small diameter cylinder. See section 5 for possible wiring arrangements.

A domestic expansion vessel is fitted to the boiler with a capacity of 0.16 litres, prior to the secondary heat exchanger which enables the boiler to be connected to a cold main water supply containing a non-return valve or any device containing a non-return valve.

**IF THE MAINS COLD WATER SUPPLY IS IN EXCESS OF 10 BAR (150 PSI) A PRESSURE LIMITER MUST BE FITTED TO AVOID EXCESSIVE PRESSURE BEING APPLIED TO THE BOILER.**

When replacing an existing cylinder storage system with **Celtic plus** it is essential that all redundant pipework is removed and dead legs eliminated,

In properties where there are multiple draw-off Points on different levels consideration should be given to the use of non-return valves in the secondary hot water system to avoid "active dead legs". No non-return valve should be less than 1 m (3 ft) above the top of the appliance and ideally should be as close as possible to the hot water outlet.

### 3.2 System controls

The boiler is electrically controlled and is suitable for most control schemes currently available including thermostatic radiator valves and motorised valves.

When using motorised valves the controls should be arranged to switch off the boiler when circuits are satisfied. The boiler requires a minimum flow rate of 300 L/h (1.1 gal/min) and consequently, if thermostatic radiator valves are fitted to all radiators, a by pass will be necessary. This will ensure that the boiler will operate correctly when all TRVs are closed. (see fig. 17).

### 3.3 Pump

The boiler is fitted with a Grundfos UP.15/60 pump head. The graph (fig. 11) indicates the residual head available for the system.

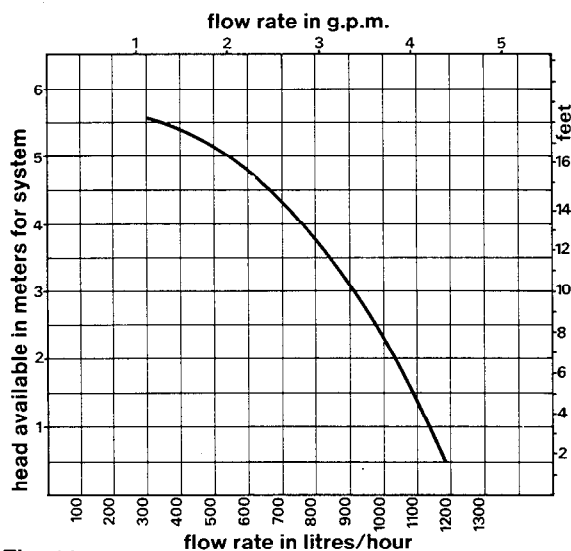


Fig. 11

### 3.4 Expansion vessel

The expansion vessel which is fitted on the front of the combustion chamber accommodates system water expansion. The vessel has a capacity of 5.4 litres (1.19 gals) and is charged to a pressure of 0.65 bar (9.7 p.s.i.).

**THE CONNECTION IN THE CENTRE OF THE EXPANSION VESSEL IS A CHARGING AND NOT A VENT POINT.**

At the design flow temperature and the initial system pressures quoted the maximum allowable system volume is 75 litres. If the water volume is not known and cannot be accurately assessed from manufacturers data the following volumes may be used to give a conservative estimate of the system volume.

Boiler.....	4 litres (0.8 gals)
Small bore pipework.....	0.3 litres (0.07 gals)
	per 0.292 kW
Microbore pipework.....	7 litres (1.5 gals)
Steel panel radiators .....	2.3 litres (0.5 gals)
	per 0.292 kW (1000 Btu/h) of system output
Hot water cylinder .....	2 litres (0.44 gals)

If the volume exceeds 75 litres an additional vessel will be required fitted in the flow from the appliances. Refer to BS 7074 Pt. 1 or BS 5449 for details of sizing.

### 3.5 Mains water connection

There shall be no permanent connection to the Heating System Pipework for filling or replenishing without the approval of the Local Water Authority (see Byelaw No.14 and figs. 12 and 13).

### 3.6 Filling point (see B.S. 5449)

Filling and recharging can be done :

1) Through a temporary hose connection to mains water.

A stop-valve should be fitted to the service main outlet and a double check valve assembly and stop-valve should be fitted to the system side of the temporary hose (see fig. 12).

2) A cistern used for no other purpose connected to the mains water.

The static head provided by the cistern must be sufficient to satisfy the designed initial system pressure. The supply pipe from the cistern should include the double check valve assembly and stopcock (see fig. 13).

### 3.7

#### Make up system

Provision must be made for replacing water lost from the system indicated by a reduction in pressure shown on the pressure gauge. Recharge through the filling point (see section 3.6).

### 3.8

#### Pipework

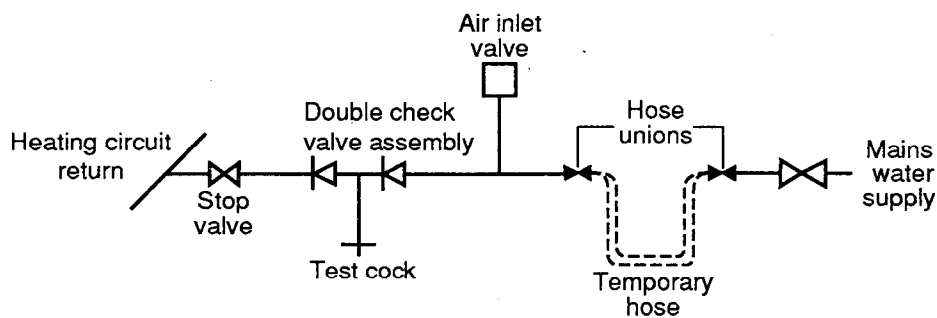
Pipework can be of copper or suitable plastic, small bore or microbore with capillary or compression jointing to a high standard, leak sealant must not be used in the system.

### 3.9

#### Domestic expansion vessel

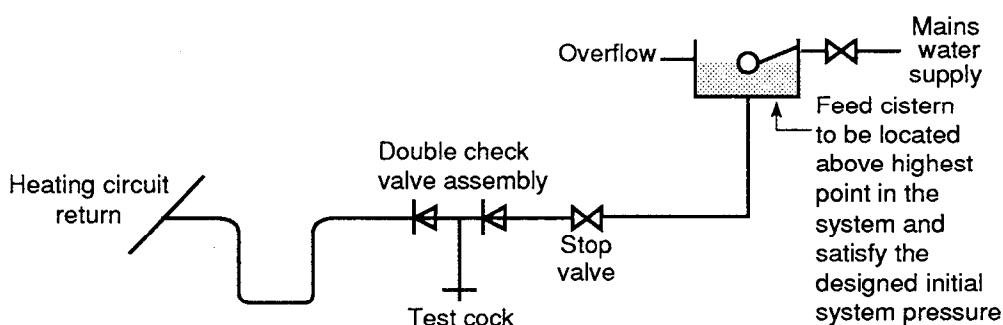
The expansion vessel which is fitted on the cold water supply to the secondary heat exchanger accommodates domestic hot water expansion. The vessel has a capacity of 0.16 litres (0.035 gals) and is charged to a pressure of 2 bars (30 p.s.i.); it has a maximum working pressure of 10 bars with an allowable pressure peak of 14 bars.





(a) Non-automatic filling and make-up. Temporary hose filling loop available, Pt.No.CHL.112

Fig. 12



(b) Automatic filling and make-up.

Fig. 13

### 3.9.1 Boiler replacement (retrofit)

In an old system where the boiler is being replaced, we recommend the use of a strainer, fitted with a drain tap on the heating return, designed to retain scale particles and other solid debris. It is good practice to use a chemical cleaner with a flocculating agent, used as recommended by the cleanser manufacturer, to clean the system before the old boiler is removed. (see BS 7593).

### 3.9.2 Existing systems

Valves and joints should be carefully checked for leaks and the appropriate action should be taken either as a repair or replacement. The old open system has probably only been subjected to a pressure of 0.4 bar or less. When you change to a sealed system where the charge pressure will be 1.0 bar and the running pressure exceeding 1.5 bar, consideration should be given to the replacement of radiator valves with a pattern capable of sealing at the higher pressures.

### 3.10 Cylinder

Where a domestic hot water cylinder is used with the **Celtic plus** it MUST be of the indirect and high recovery type to BS 1566 Pt 1 Single feed cylinders are not suitable for use with this appliance. Flow and return pipework to the cylinder should be in 22 mm pipe.

### 3.11 Inhibitors and water conditioners

(see BS 7593)

Chaffoteaux et Maury generally recommend the use

of inhibitors in systems using the **Celtic plus** boiler.

The following are the appliance manufacturer's recommendations :

1) Use only a British Gas or similar approved inhibitor. These manufacturers can assist with the selection.

Grace Dearbon Ltd - Widnes - Cheshire WA8 8 UD  
Tel: 051 424 5351.

Fernox Manufacturing Company Limited Britannica Works, Clavering, Essex CB11 4QZ

Tel: 0799 085811.

2) Use only the quantities specified by the inhibitor manufacturer.

3) Cleanse the system as required by the inhibitor manufacturer.

4) Add inhibitor only after flushing when finally re-filling the system.

5) In-line water conditioners both of chemical and magnetic type are suitable for use with the **Celtic plus**.

### 3.12 Add-on devices

It is important that no external control devices e.g. economisers be directly fitted to this appliance unless covered by these installation instructions or agreed with the manufacturer in writing. Any direct connection of a control device not approved by the manufacturer could make the guarantee void and also infringe the Gas Safety (Installation & Use) Regulations.

### 3.13 Heating and hot water systems

Figs. 14, 15, 16 and 17 indicate various layouts for the production of hot water. It is recommended that only a high recovery indirect cylinder is used and circumstances may from time to time dictate that a special saturated heat exchanger in an indirect cylinder may be desirable.

When replacing an existing cylinder storage system with an instantaneous type system it is essential that all redundant pipework is removed and dead legs eliminated.

The consideration of heating systems using thermostatic valves should ensure that the minimum flow rate through the appliance is maintained at all times and in this connection the remote by-pass is preferred (see fig. 17).

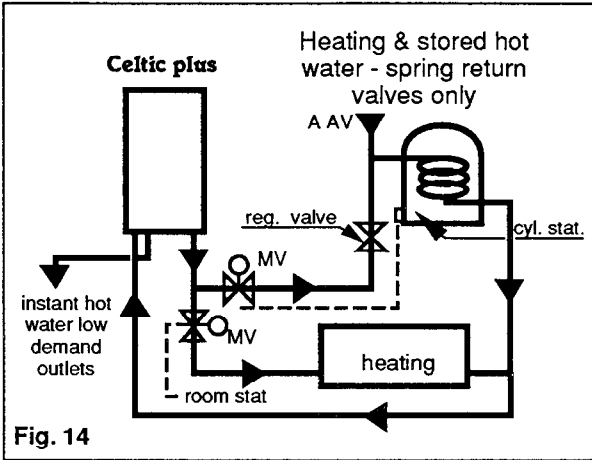


Fig. 14

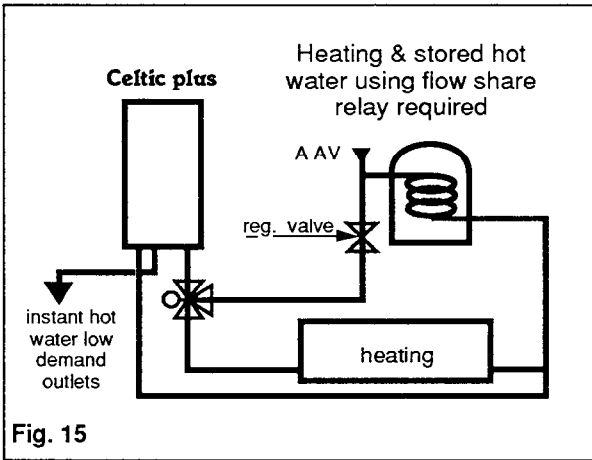


Fig. 15

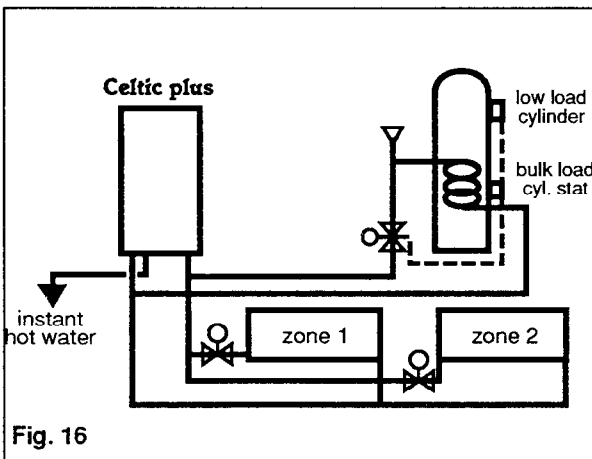


Fig. 16

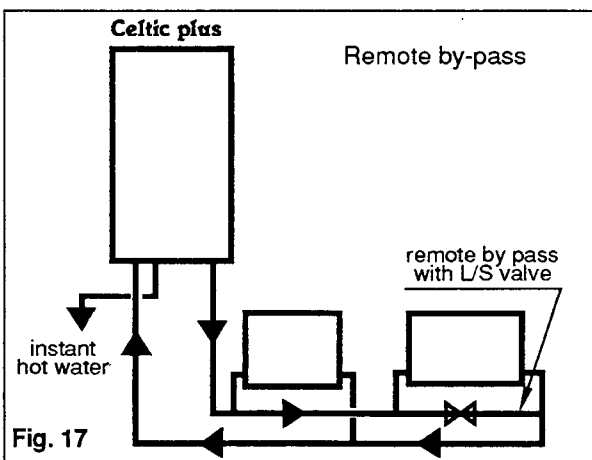
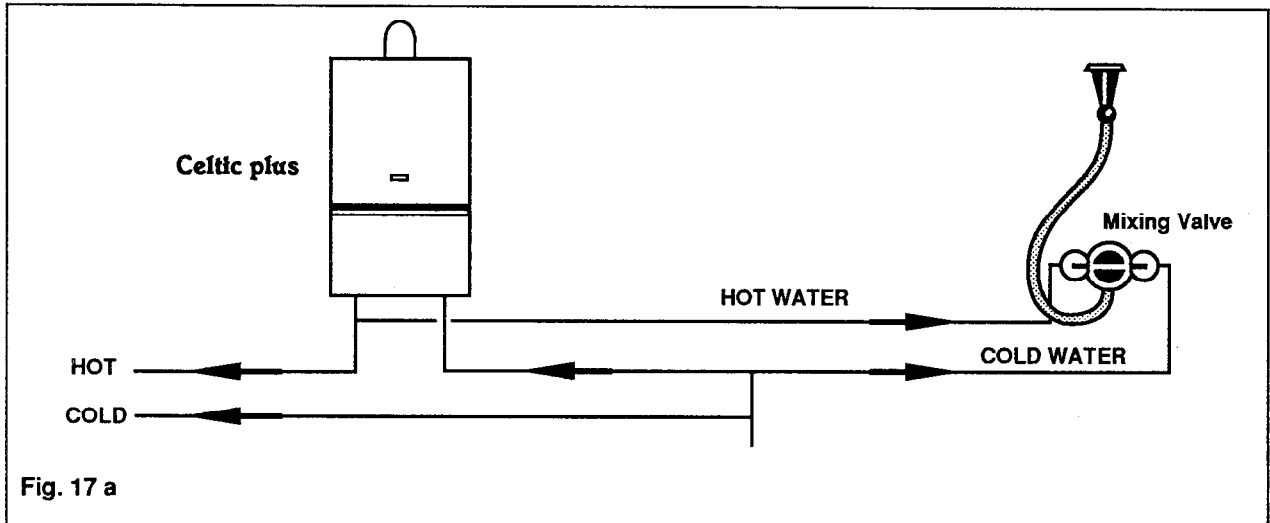


Fig. 17

### 3.14 Shower Application

The appliance can be used to supply hot water to separate shower draw-off. It must not be used to supply more than one shower mixing valve.

The recommended pipework arrangement for a shower is shown below and the hot supply to the mixing valve should be the first draw off.



It is important to select a compatible shower for the Celtic plus. The following manufacturers can assist with the selection.

**New Team Ltd**  
Brunell Road  
Earlstree Industrial Estate  
Corby  
Northants NN17 2LF

Tel.No.0536-62822

**Meynell Valves Ltd**  
Shaw Road  
Bushbury  
Wolverhampton  
West Midlands WV10 9LB

Tel.No.0902-28621

**Aqualisa Products Ltd**  
Hortons Way  
London Road  
Westerham  
Kent TN16 1BT

Tel.No.0959-63240

**Barking Grohe**  
1 River Road  
Barking  
Essex IG11 0HD

Tel.No.081-594-8898

Do not use the appliance with push on hand showers that fit over hot and cold taps.

## 4 INSTALLING THE BOILER

A vertical flat area is required for the boiler: 1122 mm high x 591 mm wide (44 in x 23.25 in). The surface on which the boiler is mounted must be of a non reverberating and of a non combustible material. The appliance is supplied in a single carton which contains :

- 1) The **chassis** with all functional parts attached.
- 2) **Casing comprising** : 2 side panels  
1 front panel  
1 controls fascia cover  
1 glass door complete with hinges
- 3) **Mounting bracket comprising** : flueguide  
top support plate  
spacing strip  
bottom support plate  
plastic jig plate connection
- 4) **Plastic bag containing** : gas filter/washer
- 5) **Box containing** : gas and water connections inc. 4 above.
- 6) **Box containing** : control knobs  
safety valve  
wall plugs  
screws and fixings.
- 7) **Flue assembly** : flue turret with pressure differential switch and 1st flue duct section  
plastic wall liner with terminal  
flue duct  
plastic turret cover  
2nd flue section
- 8) **Plastic bag containing** : flue locking ring  
'O' ring  
2 gaskets - one cork and one rubber  
4 mounting screws with washers for flue turret

N.B. (i) Flue accessories are not supplied as standard, and must be ordered to suit (see section 1.4)

### 4.1

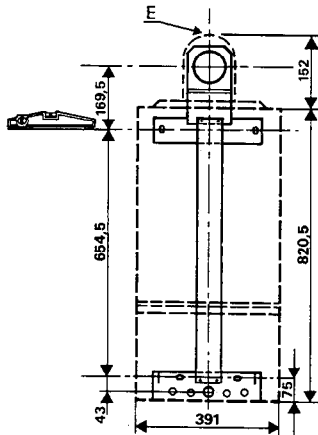


Fig. 18

#### Positioning the boiler

- a) Select the location for the boiler referring to the dimensions shown in 1.1 and 1.3 terminal location positions (2.4 - fig. 10). b) Check flue length (see 1.4 - figs. 2 and 3).
- c) Check clearance on external wall for flue terminal position (see table 2.4 - fig. 10)
- d) Assemble the mounting bracket made up from 4 pieces (fig. 18) using 4 thread forming screws.
- e) If for rear flue installation, remember to include the flue guide plate E, using 2 thread forming screws.

### 4.2

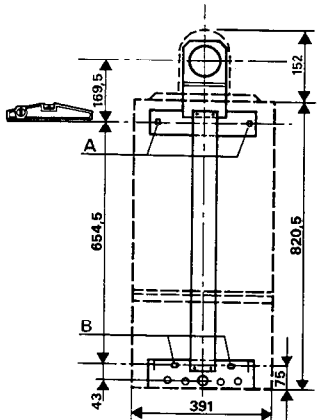
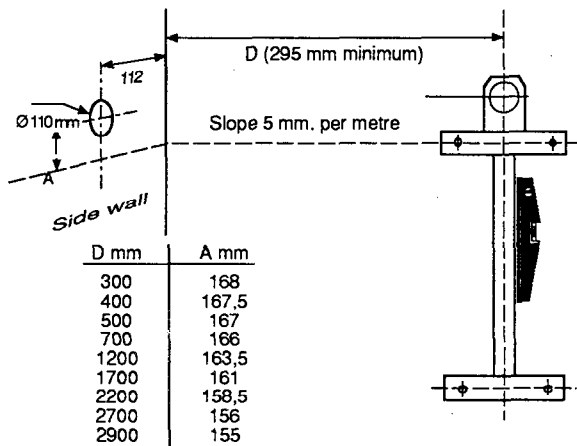


Fig. 19

#### Rear outlet flue

- a) Mark vertical centre line for boiler on wall.
  - b) Mark horizontal centre line for 107 mm (4.2 in) dia wall opening and one for upper bracket fixing screws (A).
  - c) Using bracket as template mark 4 fixing points (A) and (B).
  - d) Mark wall for flue opening using flue guide plate.
  - e) Drill the wall for the flue opening using a 107 mm (4.2 in) core drill.
  - f) Drill 4 fixing holes (A) and (B) 7.9 mm (5/16 in) and Plug.
  - g) Fix bracket to wall using 6 mm x 50 mm wood screws provided.
- N.B.** Ensure bracket is square and plumb to vertical centre line before tightening.

### 4.3



N.B. Dimension (A) decreases as dimension (D) increases due to the required decline of flue of 5 mm per metre.

Fig. 20

### Side outlet flue

- Mark vertical centre line for boiler on wall (see fig. 20).
  - Using bracket as a template mark 4 fixing slots (A) and (B).
  - Mark horizontal line through the fixing slots (A) and project to side wall.
  - Mark vertical axis of flue opening 112 mm (4.4 in) from corner of wall.
  - Mark wall for centre of flue opening 169.5 mm above the horizontal on side wall.
  - Drill the wall for the flue opening using a 110 mm (4.3 in) core drill.
  - Drill 4 fixing holes (for (A) top of slot) and (for (B) bottom of slot).
  - Fix bracket to wall using 6 mm x 50 mm wood screws provided.
- N.B. Ensure bracket is square and plumb to vertical centre line before tightening.

### 4.4

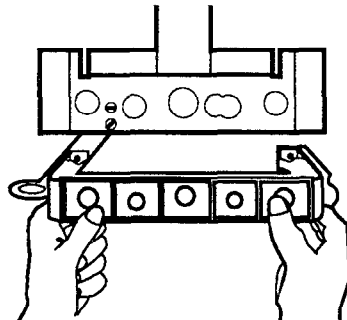


Fig. 21

### Jig plate

- N.B. By using the plastic jig plate the piping system can be completed before the boiler is mounted.
- Attach plastic jig plate to bottom bracket using 4.6 mm x 10 hexagonal screws provided (fig. 21).
  - Fit copper tails and washers to jig plate, the mains water inlet tail (M) is the shorter of the two 15 mm tails
  - All connections can either come from above or below using the standard tails provided.
- N.B. IF THE GAS CONNECTION IS FROM ABOVE THE PIPE WILL HAVE TO BE SET AROUND THE FLUE OUTLET, IF THE OUTLET IS TO THE REAR.

### 4.5

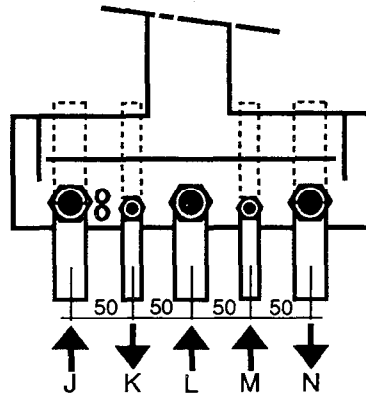


Fig. 22

### Gas and water connections

### Tube diameter

J) Heating return	22 mm
K) Hot water outlet domestic	15 mm
L) Gas inlet	22 mm
M) Mains water inlet domestic	15 mm
N) Heating flow	22 mm

### Pipework

- Copper tails are 22 mm and 15 mm to accept straight connectors.

### 4.6

### Water connections

- Make connections to copper tails using either solder capillary fittings or compression type.

### 4.7

### Gas connection

- The gas connection is 22 mm diameter.
  - Make the gas connection using solder capillary fittings.
- N.B. The gas supply pipe must not be less than 22 mm diameter

### IMPORTANT NOTE :

At this stage the pipework can be completed and tested before the boiler is positioned. Having completed a satisfactory test on the pipework the boiler can now be fitted or retained for fitting at a later date.

4.8

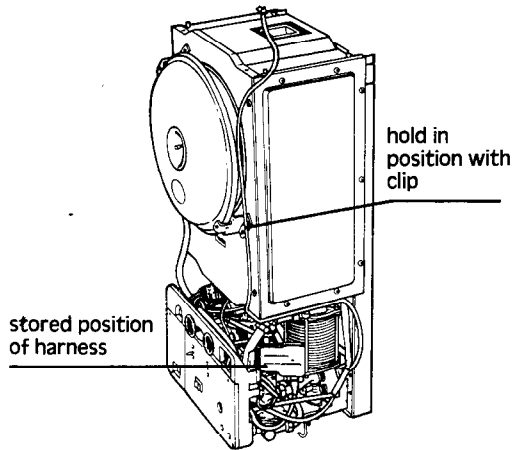


Fig. 23

**Fitting the boiler**

- a) Before hanging the boiler, uncoil wiring harness (connections to pressure switch) stored by changeover valve, route through front of chassis and up front of boiler, place into clips.
- b) Remove plastic jig plate from bracket and retain screws.
- c) Hang boiler on mounting bracket, ensure that it is properly located.

**N.B.** Insert washer into union nut and offer assembly to boiler. Use the plain black 3/4 and 1/2 diameter graphited fibre washers for water unions, and the white 3/4 filter/washer for the gas union.

- d) Connect water union using plain washers, working from left to right.
- e) Connect the gas union using the filter/washer packed separately either way round.

**N.B.** As an alternative to using the plastic jig plate the tails can be fitted to the boiler before mounting, then connected to the services.

4.9

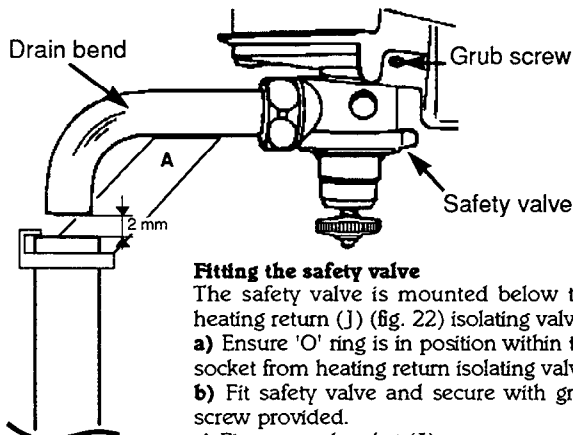


Fig. 24

**Fitting the safety valve**

The safety valve is mounted below the heating return (J) (fig. 22) isolating valve.

- a) Ensure 'O' ring is in position within the socket from heating return isolating valve
- b) Fit safety valve and secure with grub screw provided.
- c) Fit support bracket (A).
- d) Fit 14 mm tail drain bend using washer

provided.

**N.B.** The drain must be 22 mm and the 14 mm drain bend from the safety valve must be installed so that discharge of water is directly over the 22 mm drain and readily visible. A tundish arrangement is acceptable. The connection must NOT be made by a capillary or compression fitting directly between the 14 mm drain bend and the 22 mm discharge pipe without a 2 mm air gap (see fig. 24).

**THE 22 MM DISCHARGE PIPE MUST DISCHARGE TO THE OUTSIDE OF THE BUILDING WHERE POSSIBLE OVER A DRAIN. THE DISCHARGE MUST BE SUCH THAT IT WILL NOT BE HAZARDOUS TO OCCUPANTS OR CAUSE DAMAGE TO EXTERNAL ELECTRICAL COMPONENTS OR WIRING. THE PIPE SHOULD BE DIRECTED DOWNWARDS. IT MUST NOT DISCHARGE ABOVE AN ENTRANCE OR WINDOW OR ANY TYPE OF PUBLIC ACCESS AS THE TEMPERATURE OF THE WATER BEING DISCHARGED MAY REACH 100° C.**

4.10

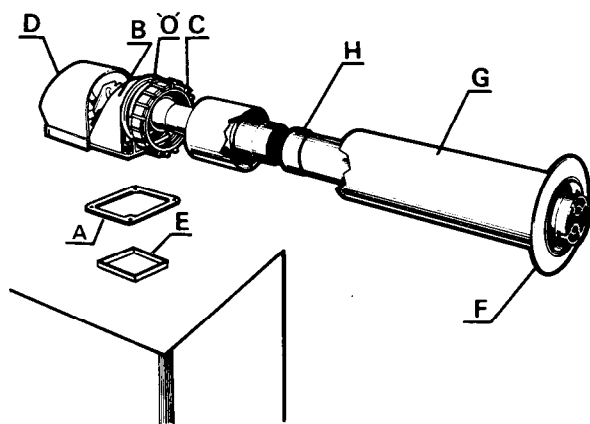


Fig. 25

**Fitting the flue up to 700 mm long**

- a) Cut plastic duct (G) to length required (see fig. 2 or 3 dimension (L)).
  - b) Cut same amount from aluminium flue duct (H).
- N.B.** In very cold weather the plastic air duct becomes brittle, warm before cutting.
- c) Remove plastic turret cover (D) from flue turret (B)

held by two screws.

- d) Peel off protective paper from adhesive side of cork gasket (A) place on mating side of flue turret (B) lining up with four clearance holes, press together.
- e) Assemble second part of flue duct (H), push fit.
- f) Slide locking ring (C) and 'O' ring over plastic air duct.
- g) Slide air duct over flue duct, engage end of flue duct into terminal and locate air duct into turret (B).
- h) Slide 'O' ring along air duct (C), to contact with the face of the turret (B). Locate lugs on locking ring (C) between lugs on flue turret (B). Push together and turn to lock.
- j) Position square channelled rubber gasket (E) on the flue hood outlet of the boiler, channel facing downwards.
- k) Pass the flue assembly through the wall and seat turret (B), onto the flue outlet, secure with 4 screws provided.

**N.B.** The terminal must extend 13 mm (0.5 in) past the surface of the external wall.

- l) Fit wall plate (F) provided with mastic sealing ring over air duct to structure.
- m) Make good internal wall face where the air/flue duct assemblies exit the room.
- a) Do not fit plastic turret cover 'D' until electrical connections to the pressure switch have been made (see fig.26).

#### 4.11

##### Fitting the flue over 700 mm long

- a) Assembly is precisely as detailed in section 4.10 using the requisite number of extension flue and air ducts. In particular note the following.
- b) The standard flue duct is always used (both sections) at the appliance end (uncut).
- c) The standard air duct is always used at the terminal end (uncut).
- d) When cutting, always cut one extension flue duct and the same amount from one extension air duct Always cut the plain end NOT the socket end.
- e) Full details of dimensions and assembly are given in figs. 2 or 3 as applicable.
- f) If internal fixtures prevent the assembled ducts being passed through the wall from the inside, the ducts may be pushed through from outside (remove the locking ring (C) and O ring first).

**N.B.** see also section 4.3

#### 4.12

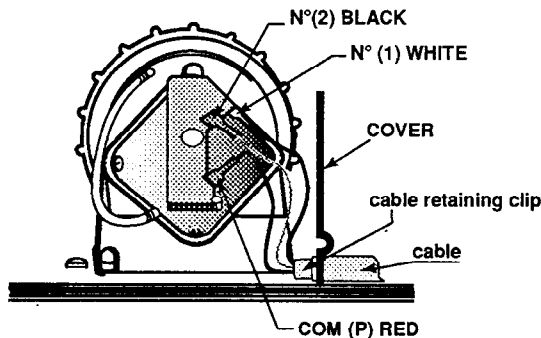


Fig. 26

##### Connection to the pressure switch

- a) The 3 wires on the harness must be connected.
- b) Push spade terminals onto tags COM (P) No (1) and No (2)
- c) Fit turret cover (D) (fig.25) ensuring that both the air tube and cables are not trapped. Ensure that the cable retaining clip is positioned inside of the cover as shown. (see fig. 26).

#### 4.13

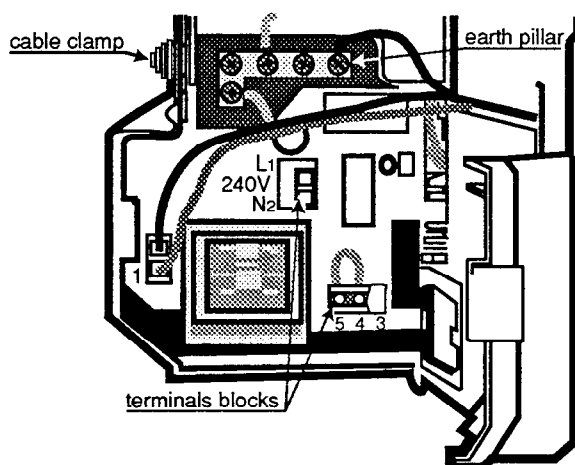


Fig. 27

##### Making the electrical connection

**N.B.** See Section 2.6 for electrical supply requirements THIS APPLIANCE MUST BE EARTHED.

- a) Pull out fuses (A).
- c) Open door to left hand side of electrical box.
- d) Cut the cable entries to the size of the cable being used which should not be less than 0.75 mm<sup>2</sup>
- e) Remove cable clamp.
- f) Connect permanent live to L terminal (1) and neutral to N terminal (2).
- g) Connect earth to earth screw on the spade connector block.
- h) Connect external controls - room thermostat etc. across terminals 3, 4 and 5, (see section 5, fig. 28).
- j) Secure cables with cable clamp and locate flex into clip on boiler chassis.
- k) Close door
- l) Replace fuses.

**N.B.** The length of the earth wire between the cable clamp and the terminal must be such that the live and neutral wires become taut before the earth wire if the supply cord is pulled.

In the event of an electrical fault after installation preliminary electrical system checks must be carried out. Checks to ensure electrical safety should be carried out by a competent Person i.e earth continuity, polarity and resistance to earth .

**USE ONLY VOLTAGE FREE EXTERNAL CONTROL SWITCHING. NO SUPPLY VOLTAGE SHOULD BE CONNECTED TO TERMINALS 3, 4 OR 5.**

## 5. EXTERNAL CONTROLS

### 5.1 Time clock - Time clock and room stat

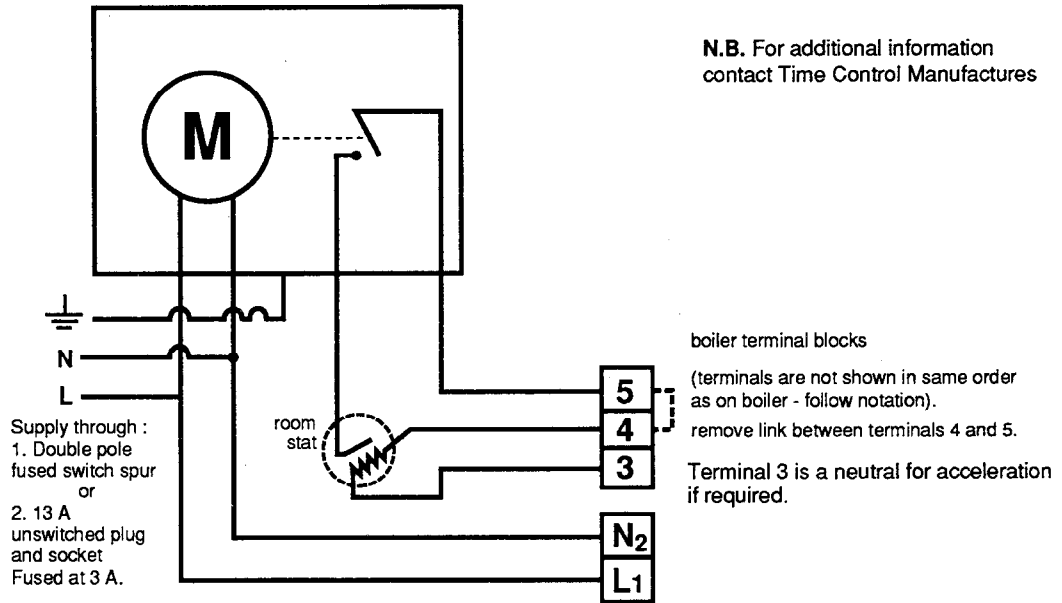
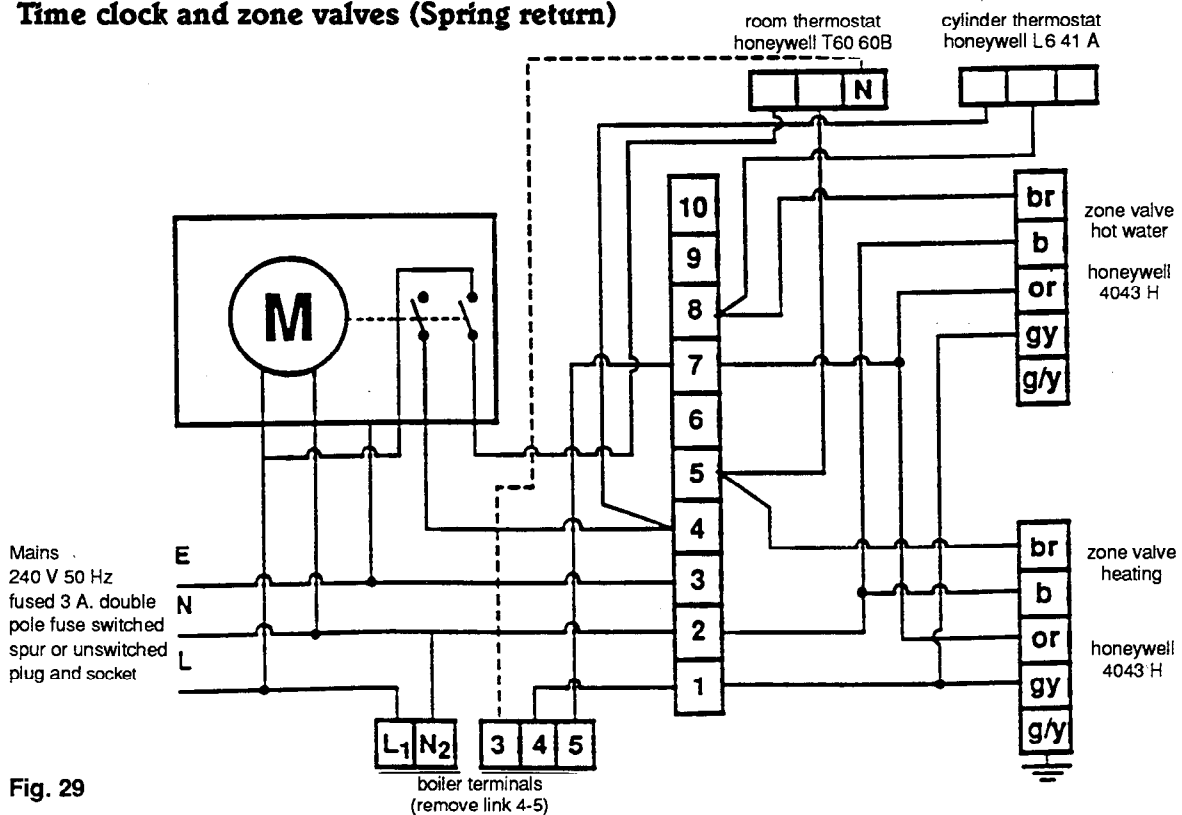


Fig. 28

- The time clock contact **must** be voltage free (remove external links) and connection between terminals 4 and 5. the room stat accelerator should be connected if fitted to terminal 3.

### 5.2 Time clock and zone valves (Spring return)





5.3

**Programmer and zone valves**

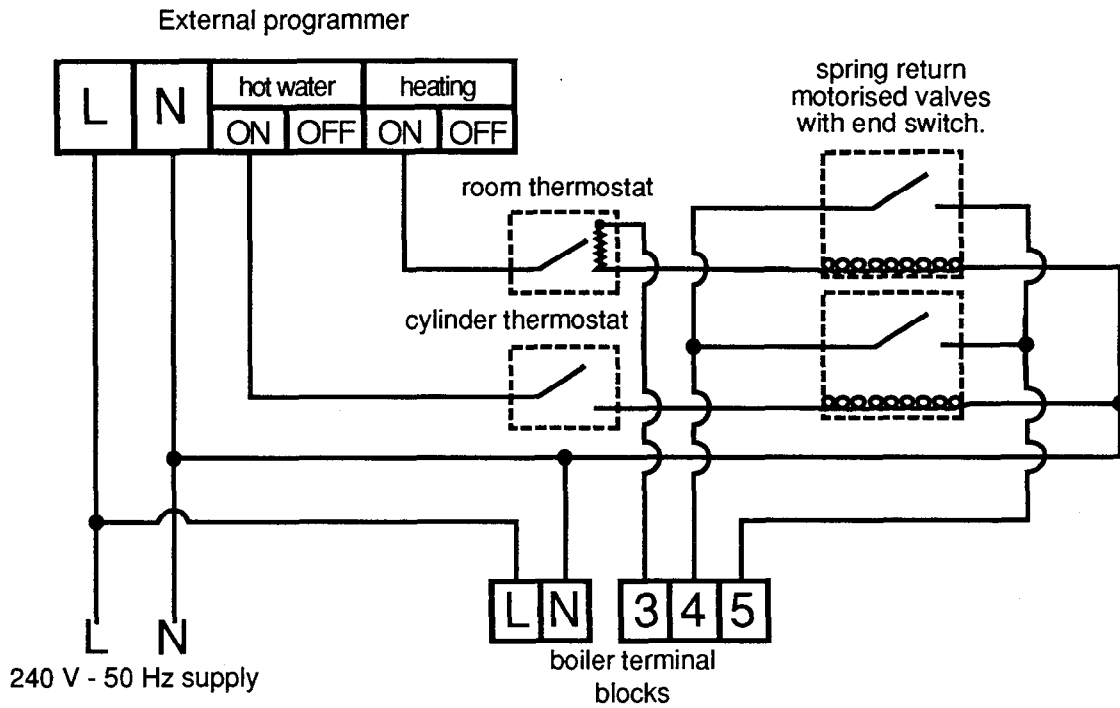


Fig. 30

5.4

**Honeywell Y plan, Satchwell flow chart or Satchwell mini valves to control zones.**

Refer to controls manufacturers literature. Live to relay coil is the wire in their literature which carries the signal to the boiler.

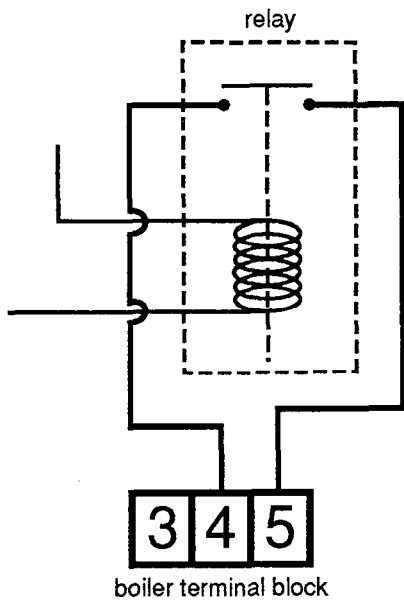


Fig. 31

5.5 Frost thermostat

It is advisable, if the appliance is fitted in a location subject to adverse weather conditions, to protect the system from frost damage by fitting an additional remote frost thermostat which will override the controls whilst the selector switch is set to hot water + central heating.

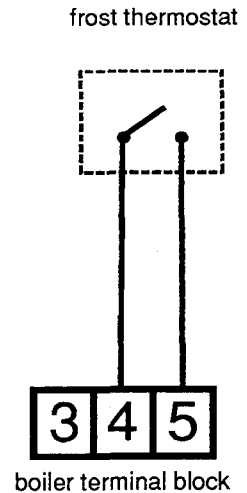


Fig. 32

## 6. COMMISSIONING

### 6.1

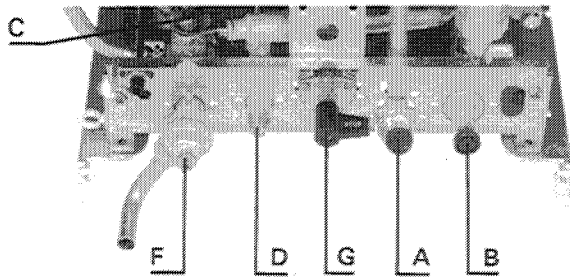


Fig. 33

#### Hot water circuits - filling

- 1) Check that stop cocks up stream of appliance are of a fixed jumper type.
- 2) Open mains cold water inlet valve (fig. 33) (A).
- 3) Vent installation by opening taps and closing.
- 4) Check that 'dead legs' have been eliminated.
- 5) Check for water soundness and rectify if necessary.
- 6) Set D.H.W. flow rate as required by adjusting screw (D) increase (anticlockwise) decrease (clockwise), see section 6.7.

### 6.2

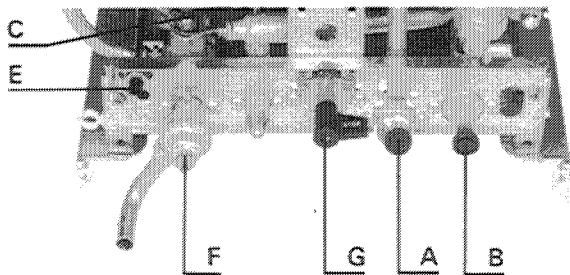


Fig. 34

#### Central heating circuits - filling

- 1) Ensure that the isolating valves are open (fig. 34 B and C). **N.B. Valve (C) must be turned anti-clockwise by the knurled shaft until it dislocates from the thread and then pulled out horizontally to its extremity (approximately 30 mm (1 1/4 ins)).**
  - 2) Fill system to charge condition, see section 3.
  - 3) Vent radiators and any high points.
  - 4) Vent air separator by loosening screw (fig. 34) (E) and purging until no air is apparent **N.B. :** ensure screw E is tightened.
  - 5) Set system charge Pressure to design cold pressure. For a new installation we suggest 1.0 bar. For an old system see section (3, 9, 2) set to system static head or 0.8 bar which ever is the greater.
  - 6) Check for water soundness and rectify any leaks.
  - 7) Switch on electrical supply.
  - 8) Manually check pump is free to rotate. Remove cap (fig. 35 D).
  - 9) Switch to HOT WATER + CENTRAL HEATING on selector switch (A) (fig. 35) switch position (II).
  - 10) Allow pump to run for further 10-15 minutes. Switch OFF.
  - 11) Isolate water supply and drain boiler by disconnecting fill system and opening the drain valve (F). This is incorporated in the safety valve and is achieved by screwing down the head until the valve lifts. Open all low level drain cocks.
  - 12) Remove filter in the return isolating valve (C) and inspect for any installation debris (see section 7.5), to clean and replace.
  - 13) Refill system as above.
- N.B.** It is recommended that this is repeated after the system has been operated up to temperature to 'hot flush' to remove fluxes and remaining debris.

### 6.3

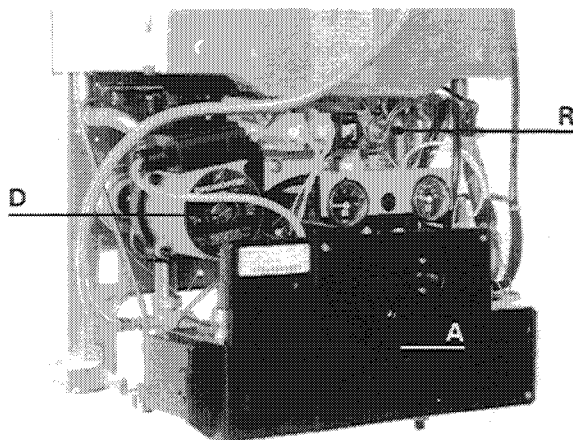


Fig. 35

#### Lighting the boiler

- 1) Purge gas supply. Switch on electrical supply
  - 2) Turn the lever on the gas service tap (fig. 34) (G) to the left. In the open position the flame sign is to the front.
  - 3) Temporarily locate the two control 'knobs' one thermostat knob, one ignition button extension.
  - 4) Switch to HOT WATER + CENTRAL HEATING (II) on the selector switch (A). The fan will run at low speed.
  - 5) Press the ignition button (R) and hold in.
    - a) The fan will change to high speed to purge the combustion chamber. Gas is admitted to the pilot.
    - b) After approx 14 seconds the spark generator passes a continuous stream of sparks to light the pilot.
    - c) When the pilot is alight - viewed through the sight glass wait for a further 5 seconds before slowly releasing the button.
  - 6) When the button is released, while the boiler is set to heating and any ancillary controls are in demand position, the boiler will fire.
  - 7) Check for gas soundness using leak detection fluid or gas detector.
  - 8) Check and adjust gas pressure/gas rate, see Section 6.4
- N.B.** The thermocouple output should be checked at this stage, should be greater than 12 mv.

6.4

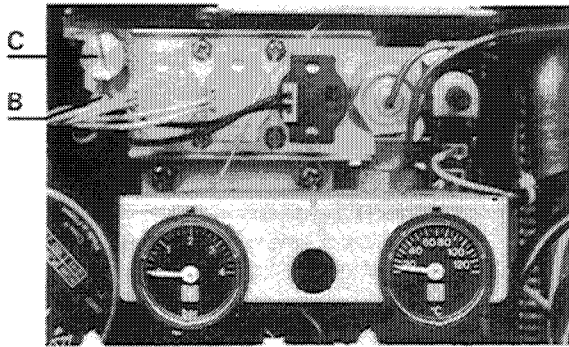


Fig. 36

**Gas rate adjustment**

**N.B.** Before adjustment check gas pressure on the inlet to the appliance, with the appliance working - this should be 20 m bar (8 in wg) for natural gas (G 20).

The maximum gas rate on hot water is fixed and is a function of the restrictor size. The central heating variable adjuster is factory set at 75 % i.e for an output of approx 16.5 kW (56248 Btu/h).

- 1) Switch boiler to the off (O) central position, see section 6.3 (fig. 35).
- 2) Remove the pressure test point screw - (B) and connect a suitable pressure gauge.
- 3) Remove the hexagonal cap from gas rate adjuster exposing the adjusting screw (C).
- 4) Switch the boiler to hot water and central heating (II) and check that any fitted external controls are calling for heat.
- 5) Adjust. Setting pressures are given in graph figs. 37 and 38. The pressure will be reduced by clockwise movement of screw, increased by anticlockwise movement. Now select hot water only, adjust hot water regulator, see fig. 4 (20), to minimum and open the largest volume draw-off tap. The gas pressure should now be the maximum as indicated in Technical Data.
- 6) Switch boiler off (O). Remove pressure gauge and replace test point screw and gas rate adjuster hexagon cap. Check for gas soundness around screw.
- 7) Mark the data badge, located on the front of the combustion chamber below the sight glass to indicate output to heating system.

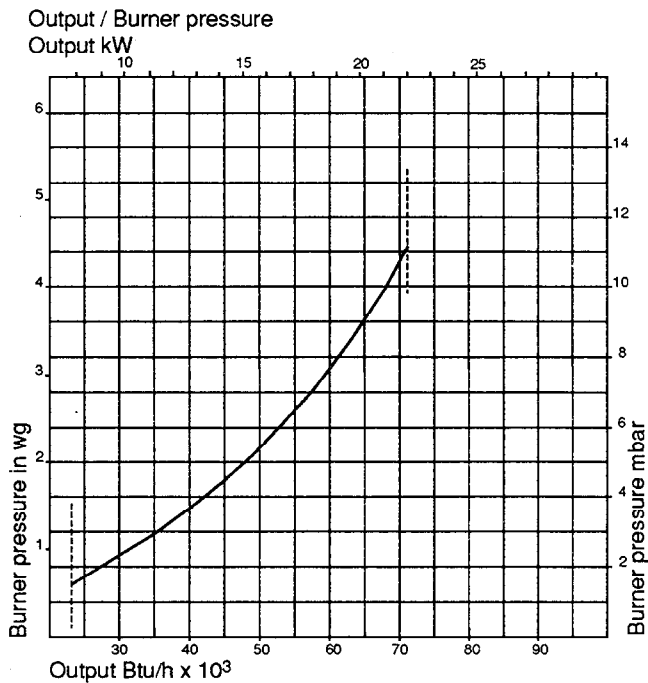


Fig. 37

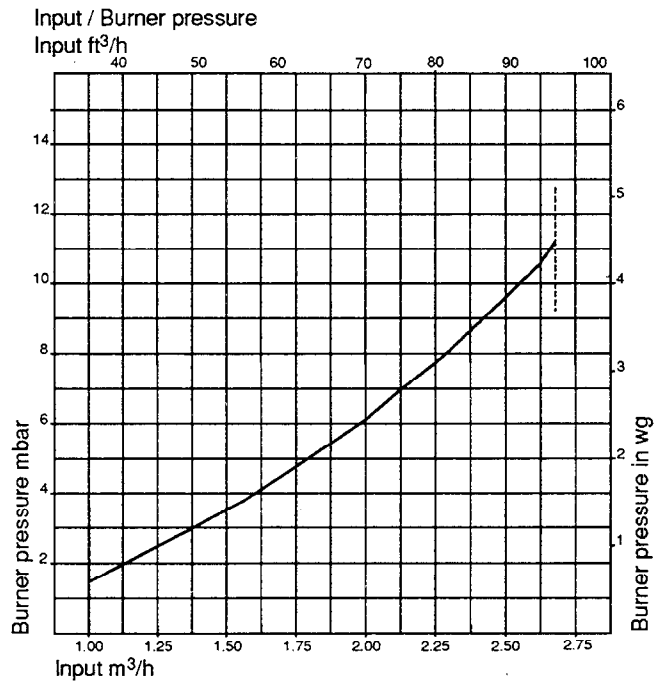


Fig. 38

6.5

**D.H.W flow rate adjustment**

This is set by the installer during commissioning.  
See section 6.1 and 6.7.

6.6

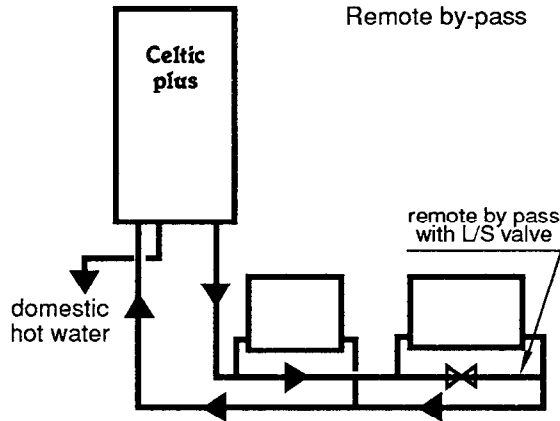


Fig. 39

**Adjusting the heating system by-pass**

Where a by-pass is fitted, see section 3.2, it is necessary to adjust to obtain the boiler minimum flow requirement of 300 l/h (1.1 gal/min).

- 1) Set boiler thermostat to maximum, switch boiler to HOT WATER + CENTRAL HEATING (II).
- 2) Open all radiators and close the by-pass. Check the temperature rise across the boiler which should not be greater than 20° C (36 °F).
- 3) Adjust system to minimum load. This is normally done by closing valves on all but two radiators.
- 4) Open by-pass gradually until the boiler operates quietly and the temperature rise is maintained.

**N.B.** The by-pass valve should be of the lock shield pattern. The flow switch operates at approx 300 l/h (1.1 gal/min).

6.7

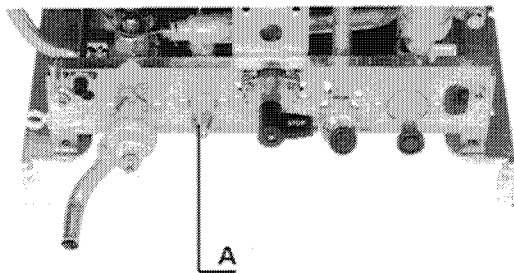


Fig. 39 a

**Hot water adjustment**

A flow restrictor (A) is fitted on the domestic hot water outlet. Adjustment of this restrictor enables regulation of the flow rate of the D.H.W. to suit individual installation conditions and requirements.

Adjustment is made by either turning the screw in a clockwise direction to reduce the flow rate and increase the temperature or by turning the screw anti-clockwise to increase the flow rate and decrease the temperature.

6.8

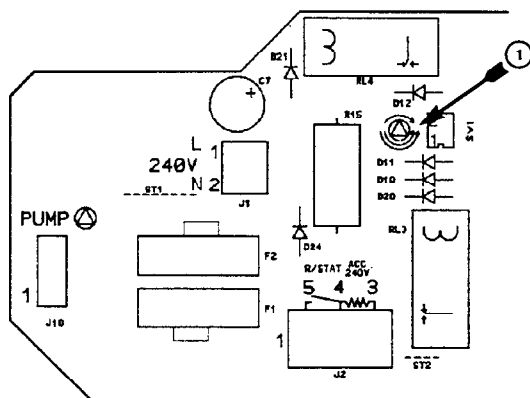


Fig. 39 b

**Pump switching adjustment**

The pump is set to turn ON/OFF via the room thermostat along with the burner, when the central heating mode is selected.

It is possible if required, to have the pump running continuously by turning the switch ① anti-clockwise, see fig. 39 b. The room thermostat then only switching the burner on and off.



Pump and burner switched



Burner only switched

6.9

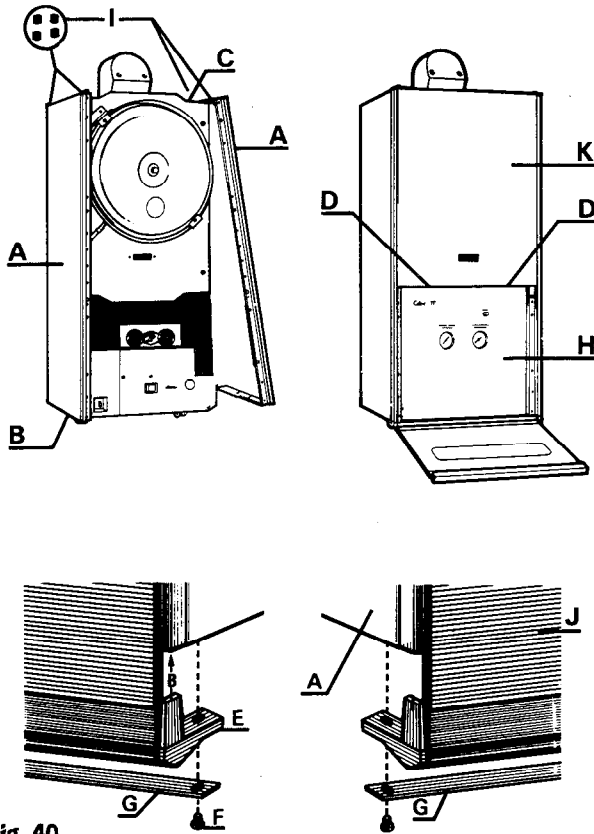


Fig. 40

**Fitting the casing**

- 1) Take from the carton the controls cover (H), the glass door (J) the top front panel (K) the side panels (A) and the rubber grommets (I).
- 2) Remove control knobs used during testing and commissioning and fit the four grommets into the holes at the top of each side panel (I).
- 3) Fit side panels (A) and secure with screws at bottom rear (B).
- 4) Put the control cover (H) in position and secure with five screws.
- 5) Fit the front top panel over the pins at the top of the boiler (C) and secure with two screws at the bottom (D)
- 6) Fit the central heating control knob.
- 7) To fit the glass door proceed as follows :
  - N.B. THE TIE ROD (G) MUST BE USED**
  - a) Remove the nuts from the machine screws securing the tie rod to the hinges.
  - b) Offer the door up vertically. Engage part (E) in the profile of the right hand side panel . Fix assembly with screw from beneath (F).
  - c) Pivot the left hand hinge and engage into profile of the left hand side panel. Fix assembly with screw from beneath.

HAND OVER THE USERS INSTRUCTIONS AND EXPLAIN THE BASIC FUNCTIONS OF OPERATING THE APPLIANCE. LEAVE THE INSTALLATION AND SERVICING INSTRUCTIONS WITH THE USER.  
 IF THE ELECTRICITY SUPPLY IS INTERRUPTED THE PILOT MAY HAVE ESTINGUISHED. WHEN THE SUPPLY IS RESTORED RELIGHT THE PILOT SEE SECTION 6.3.

## 7. ROUTINE SERVICING

To ensure continued efficient and safe operation of the appliance it is recommended that it is checked and serviced as necessary at regular intervals. The frequency of servicing will depend upon the particular installation condition and usage, but in general once a year should be adequate.

It is the law that any service work must be carried out by a competent person, such as British Gas, other C.O.R.G.I. registered personnel or your local Chaffoteaux Service Centre, in accordance with the Gas Safety (Installation and Use) Regulations. This routine service will normally be confined to :

- 1) Cleaning the burner.
- 2) Cleaning the heat exchanger.
- 3) Checking the gas controls.
- 4) Cleaning water filter, hoses and heating filter.
- 5) Check operation of safety valve.

The following schedules are recommended :

- a) Check the function of appliance, burner pressure, gas flow rate and soundness.
- b) Observe flame picture and undertake combustion test.
- c) Check, clean or replace components as necessary.

**N.B.** Before commencing any work turn off gas at the gas inlet tap (fig. 34) item (G) and ensure that the electricity supply is disconnected. Isolate water supply and drain appliance if required.

### 7.1

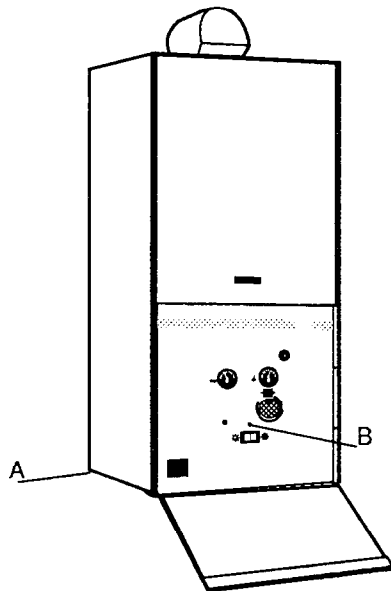


Fig. 41

#### To remove front casing

- a) Remove two screws (A) bottom rear of boiler.
- b) Remove screw (B) centre of lower front panel.
- c) Remove thermostat knob and ignition push button.
- d) Remove case by easing forward at bottom and lifting off lugs at top. If necessary, remove the lower control cover (4 screws) and lift off the upper front panel before removing case.

### 7.2

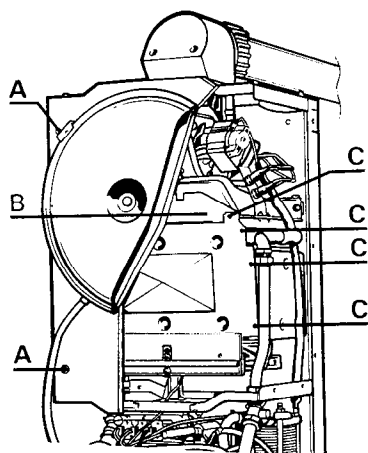


Fig. 42

#### To remove sealed chamber front panel and combustion chamber front panel to expose heat exchanger (primary)

- a) Remove four screws (A) securing the combustion chamber front panel.
  - b) Lift off front panel complete with expansion vessel and hang on hooks provided below boiler through matching holes on top folded edge.
- N.B.** Alternatively support on worktop or floor to avoid damage to flexible tube.
- Remove 2 screws (F1) and remove closure plate (see section 7.3).
- c) Remove 6 screws (C) and lift off heating body front panel with access panel (B).
  - d) Clean the heat exchanger after removing the burner, see section 7.6.
- Replace in reverse order.

### 7.3

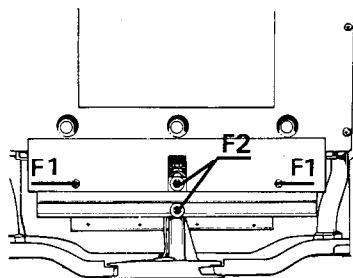


Fig. 43

#### To remove burner assembly

- a) Remove two screws (F1) and remove closure plate by withdrawing forward.
- b) Remove two screws (F2) and remove burner by withdrawing forwards, taking care not to trap ignition electrode lead.
- c) Remove gasket and retain in safe place, or if adhered to one surface, leave alone as removal may damage the gasket. Replace gasket if necessary.
- d) To clean burner (see section 7.6).

### 7.4

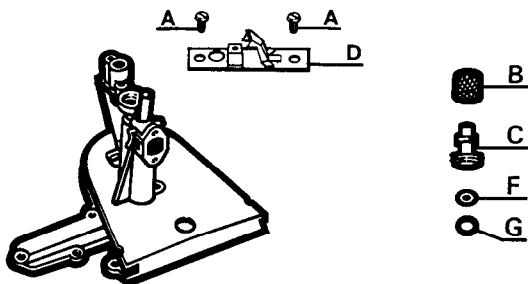


Fig. 44

#### To remove pilot

- a) Remove two screws (A) securing deflector plate and pilot head. Lift off deflector plate (D) taking care not to damage the electrode tip.
- b) Remove pilot air filter (B).
- c) Using a 7 mm spanner, remove pilot body (C) from pilot burner base.
- d) Check injector and clean the filter. N.B. The pilot injector (F) is retained in the base of the body with an 'O' ring (G). If the injector is replaced it is fitted bright side uppermost.
- e) Ensure deflector plate (D) is correctly located on the pilot.

### 7.5

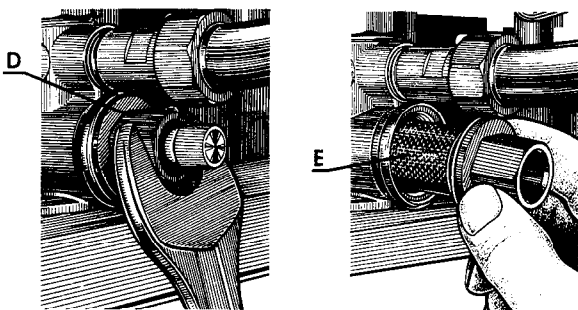


Fig. 45

#### To clean heating return filter

- a) Close heating flow and return valves (B and C) and drain through safety valve (F) »section 6.2).
- b) Using spanner remove return valve spindle guide assembly (D). N.B. Take care not to damage the capillary tube right hand side.
- c) Lift filter (E) off assembly.
- d) Clean in warm water.
- e) Replace in reverse order. Replace all components removed in reverse order.

## 7.6

### Cleaning and replacement of parts

- a) The burner can be cleaned by inverting and brushing with a soft brush, inspect injectors, ensure they are clear.
- b) The heat exchanger flueways can be cleaned by thoroughly brushing the finned surface. After brushing inspect to ensure that the flueways are completely clear.
- d) The thermocouple can be wiped with a lint free cloth to remove any deposits. If the thermocouple tip appears burnt or cracked, exchange to avoid a possible break at a later date - (see section 8.1).
- d) Examine electrode and clean, the tip. If the tip appears damaged replace electrode and lead assembly - see section 8.2.
- e) Replace all components in reverse order ensuring that the gasket between the gas section and the manifold is correctly positioned upon reassembly.
- f) Open all isolation valves and repressurise system if necessary.
- g) Recommission and check controls.
- h) After the boiler is lit, check all gas connections for soundness.
- i) Allow the boiler to warm up thoroughly, then check the burner pressure and adjust as necessary to that given in the table for required output (see section 6.4).
- j) Restore any system controls and clocks to their original setting.

## 7.7

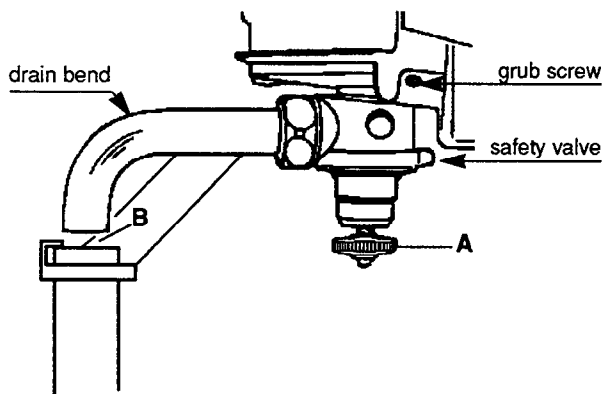


Fig. 46

### To check operation of safety valve

Turn off the appliance by selecting the 0 position on the Summer and Winter switch.

Engage the knurled ring (A) to the thread and turn it clockwise until water can be seen to discharge from the outlet (B). Turn the knurled ring (A) anti-clockwise until it disengage from the thread.

Ensure that the pressure has not decreased below 1 bar and repressurise if necessary (see section 6.2).

**N.B.** If the water does not discharge, replace valve (see section 8.34).



## 8. REPLACEMENT OF PARTS

**N.B.** Before commencing ensure gas and electricity supplies are isolated.

### 8.1

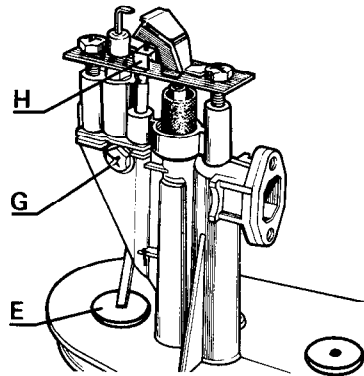


Fig. 47

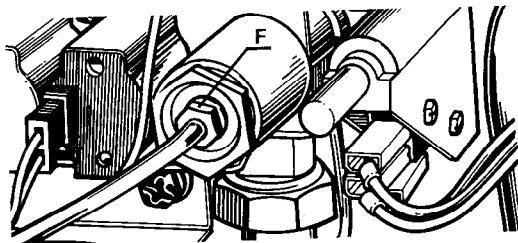


Fig. 48

#### To remove thermocouple

- a) Remove front case, see section 7.1.
- b) Remove outer front panel, see section 7.2.
- c) Remove burner, see section 7.3.
- d) Remove high limit stat see section 8.3.
- e) Remove thermocouple from thermoelectric valve connection (F).
- f) Loosen securing screw (G) two full turns to relieve tension from locking spring.
- g) Remove thermocouple by sliding down through gas section.
- h) Remove grommet (E) from base of gas section.
- j) Carefully form a 4 inch radius to thermocouple and insert thermocouple through gas section.
- k) Slide grommet (E) over the thermocouple.
- l) Continue feeding the thermocouple into its location until it is hard against the thermocouple stop H in the pilot head.
- m) Tighten fixing screw (G), previously loosened.
- n) Reposition grommet in base of gas section.
- o) Form the new thermocouple and connect to thermoelectric valve (F).
- p) Replace, high limit thermostat.

**NOTE :** When replacing the thermocouple the conductor may need manipulating - avoiding bending at acute angles

### 8.2

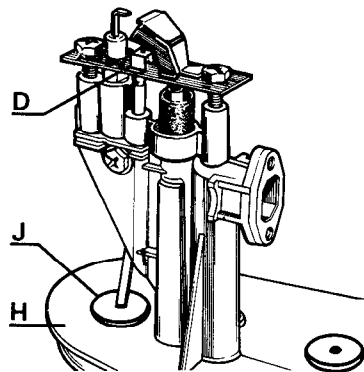


Fig. 49

#### To replace electrode and lead assembly

- a) Remove front case, see section 7.1
- b) Remove outer front panel and combustion chamber front panel, see section 7.2
- c) Remove burner, see section 7.3
- d) Remove deflector plate (D), see section 7.4
- e) Disconnect from electrical box by pulling off electrode lead at lower left hand rear.
- f) Feed cable up through gas section (H) removing grommet (J).
- g) Remove electrode by pulling upward from location groove.
- h) Replace in reverse order locating electrode in deflector plate (D), spark gap 5 mm.

### 8.3

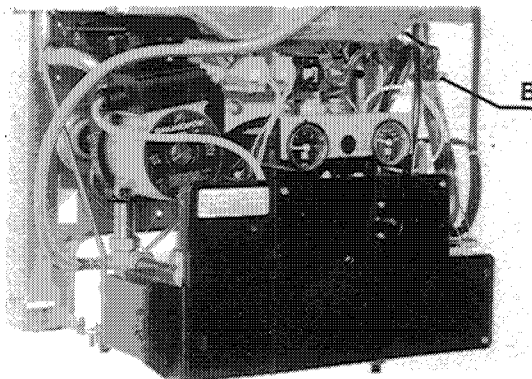


Fig. 50

#### To replace safety overhear thermostat

- a) Remove front case, see section 7.1
- b) Remove two screws securing high limit thermostat to bracket (B).
- c) Remove high limit stat and thermocouple see 8. 1.
- d) Withdraw noting route.
- e) Replace in reverse order. Use heat sink grease between high limit stat and bracket (B).

## 8.4

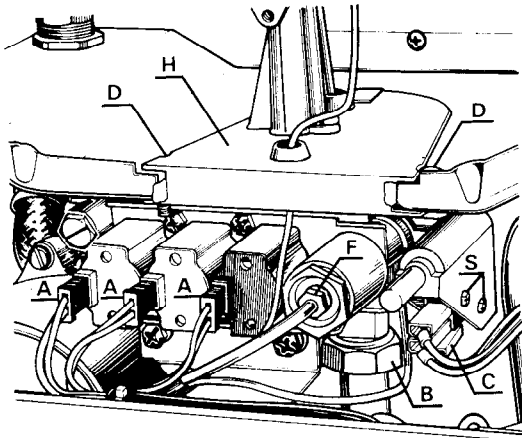


Fig. 51

### To replace ignition microswitch

- a) Remove front case, see section 7.1.
- b) Remove outer front panel and combustion chamber front cover, see section 7.2.
- c) Remove burner see section 7.3.
- d) Remove electrical control box, see section 8.9.
- e) Remove plugs from solenoid valves (A), noting colours.
- f) Pull off three tab connectors (C) from microswitch noting their position (blue top, red centre, black bottom) . **Note** : Microswitch connections must be made in accordance with wiring diagram. (fig. 9).
- g) Release gas union (B).
- h) Remove the two screws (D) retaining gas section.
- j) Slide out gas section (H) by pulling forwards (comprises solenoid valves, gas valve, pilot assembly electrode, etc).
- k) Remove two screws (S) retaining microswitch.
- m) Remove microswitch.
- n) Replace in reverse order.

## 8.5

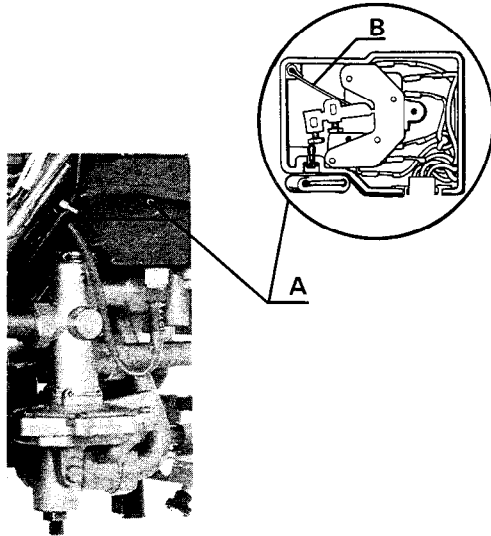


Fig. 52

### To replace change over valve microswitch

- a) Remove front case see section 7.1
  - b) Undo screw (A) and remove microswitch box cover. **N.B.** Upper microswitch operates for D, H, W mode. Lower microswitch operates for C H mode.
  - c) Lift spring (B) and pull operating lever off mounting pins.
  - d) Remove respective microswitch from mounting pins.
  - e) Note colour code and pull off electrical tags.
  - f) Replace in reverse order. When replacing box cover, ensure that the lugs on the connector block are clamped **inside** the box.
- N.B.** Refer to fig. 9 for colour codes.

## 8.6

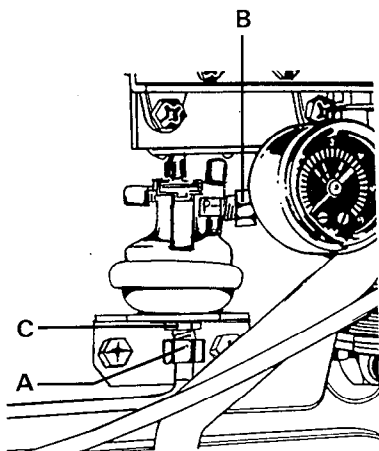


Fig. 53

### To replace the flow switch assy.

- a) Remove air separator see section 8.13.
- b) Disconnect high pressure tube at union A.
- c) Disconnect low pressure tube at union B.
- d) Replace reverse order.
- e) Check for leaks

## 8.7

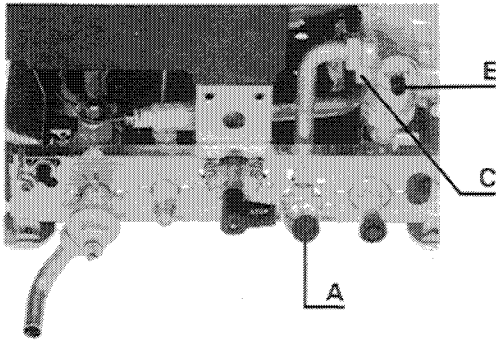


Fig. 54

### To replace venturi

- a) Remove front case see section 7.1.
- b) Isolate from cold mains water supply (A), open an hot water outlet and drain down from valve (E).
- c) Remove plug (C) from left hand side of change over valve.
- d) Use small screw driver to gently push out venturi ensure screw driver does not enter throat of venturi.
- e) Replace in reverse order.
- f) Ensure that valve E is closed, restore cold mains water supply, check for leaks.

## 8.8

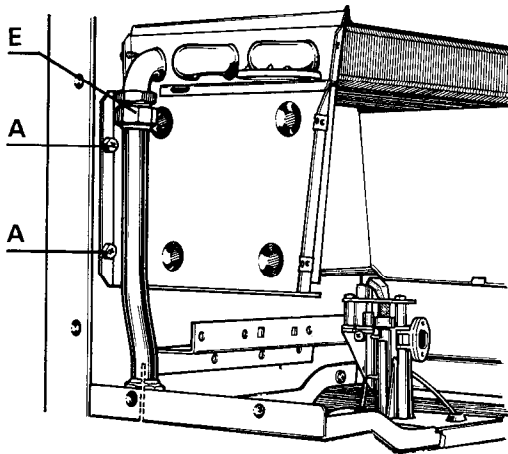


Fig. 55

### To replace primary heat exchanger

- a) Remove front case, see section 7.1.
- b) Isolate appliance from system by closing heating flow and return valves (B and C), see fig. 34.
- c) Drain boiler (primary side) through safety valve (F) (fig. 34).
- d) Remove four screws securing the sealed chamber front panel and remove (see section 7.2).
- e) Remove left and right hand side on chamber Panels by pulling them carefully towards you.
- f) Remove combustion chamber front panel, see section 7.2.
- g) Remove burner, see section 7.3.
- h) Remove four screws (A) securing heating body panels to chassis.
- i) Undo flow and return pipe unions (E), remove pipes and slide primary heat exchanger forwards.
- j) Replace in reverse order.

## 8.9

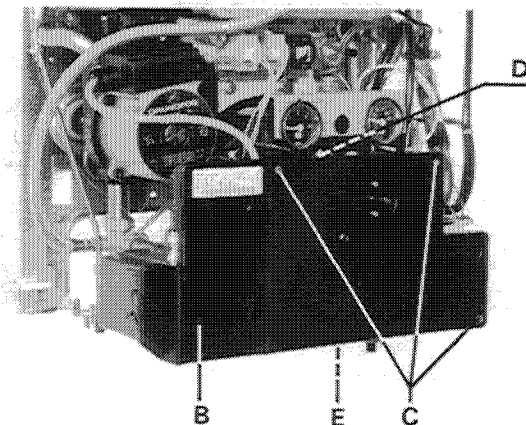


Fig. 56

### To remove electrical control box

- a) Remove front casing, see section 7.1.
- b) Remove fuses by pulling fuse carrier (B) from electrical box.
- c) Remove 3 screws (C) lift electrical box cover away and unplug from PCB.
- d) Pull off plug from solenoid valves at PCB.
- e) Unplug pump connector at PCB and earth wire.
- f) Unplug connector to change over valve at PCB.
- g) Unplug connector from fan at PCB.
- h) Remove one screw (D) and two screws (E). (Electrical box support bracket to lower chassis).
- i) Carefully ease electrical box forward to allow access to flow switch lead, also to electrode at bottom rear of box.
- j) Disconnect lead from flow switch.
- k) Disconnect electrode from rear of electrical box.
- l) Carefully move the electrical box away from the appliance and to the right whilst straightening the capillary tube from boiler limit thermostat and domestic hot water thermostat.

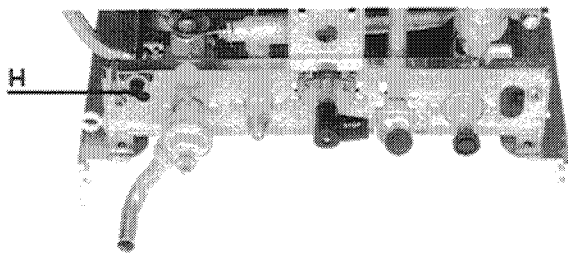


Fig. 56a

- q) Continue moving electrical box until bottom support bracket can be positioned on hook at bottom of appliance (see fig. 56 a). To remove the electrical box completely, continue in the following manner.
  - r) Isolate appliance from the system by closing valve A, (see section 6.2 (Fig. 34)).
  - s) Drain secondary side by opening drain plug (H) (fig. 34).
  - u) Remove clip and phial from DHW thermostat pocket.
  - w) Unclip and remove limit boiler thermostat phial.
  - x) Remove box completely.
- To replace electrical box in reverse order note :
- a) Hang box on hook.
  - b) Capillaries must be routed behind any pipework .

8.10

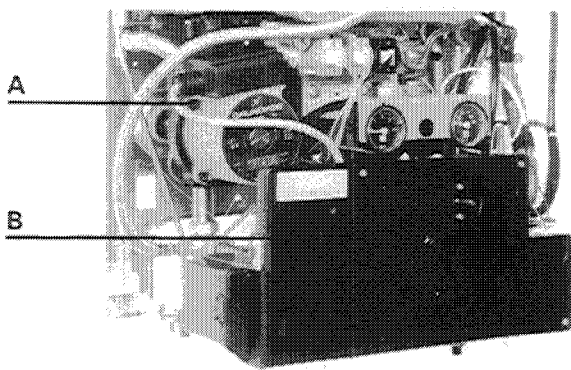


Fig. 57

**To replace pump head**

- a) Remove front case, see section 7.1.
- b) Isolate boiler from system by closing flow and return valves (see section 6.2 (B and C)).
- c) Drain boiler (primary side) through safety valve (see section 6.2 (F)).
- d) Open electrical box cover (B) and unplug pump connection.
- e) Remove four screws (A).
- f) Remove pump head noting orientation.
- g) Remove lead and transfer to new pump head.
- h) Replace in reverse order.
- j) Open flow and return valves Top up system if necessary.

**N.B.**

For the **Celtic plus** the pump is a Grundfos UP 15-60

8.11

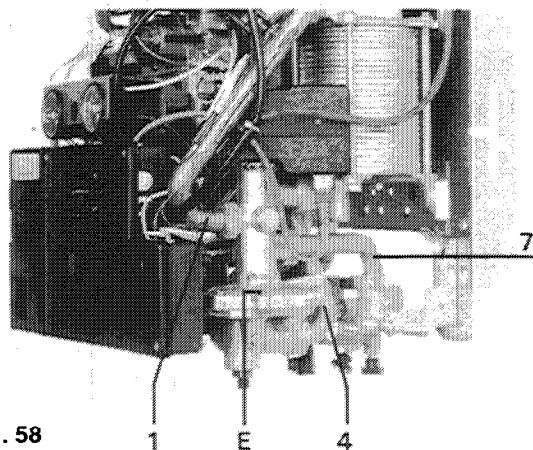
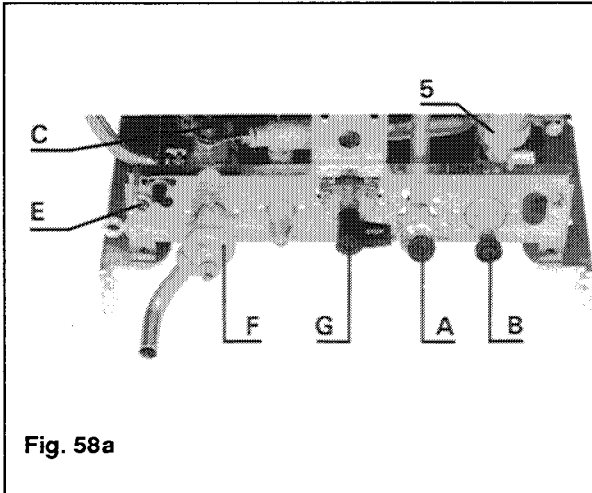


Fig. 58

**To replace change over valve (C, O, V)**

- a) Remove front case, see section 7.1.
- b) Disconnect and remove electrical box, see section 8.9.
- c) Turn off main water at valve see section 6.2 (A).
- d) Turn off central heating flow and return valves see section 6 (B).
- e) Drain secondary side by opening drain plug on bottom of change over valve (H).
- f) Remove safety overheat thermostat from tube and carefully position to one side.
- g) Remove front tube (1) from change over valve unclip thermometer sensor, unclip high limit thermostat.
- h) Remove flow pressure tube (2) from C, O, V, to flow switch.

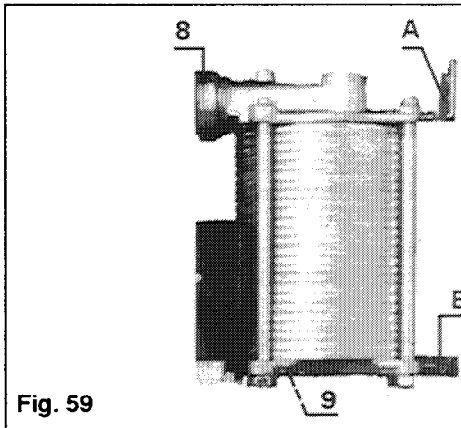
**N.B.** Swing microswitch box to give access to union nuts.



- j) Remove rear tube (4) from C, O, V, to secondary heat exchanger.
- k) Unscrew union nut (5) of mains water inlet to C, O, V.
- l) Unscrew heating return tube nut (6) from C, O, V.
- m) Unscrew union nut (7) of C, O, V, to secondary heat exchanger.
- n) Remove C, O, V.
- o) To inspect diaphragm remove eight screws (E) securing valve to water section.
- N.B.** To service the C, O, V, piston remove spring clips, remove piston clean and grease.
- p) Clean or replace diaphragm.
- q) Flush out water section.
- r) Replace in reverse order.
- s) Open flow and return valves. Top up system if necessary

Fig. 58a

## 8.12

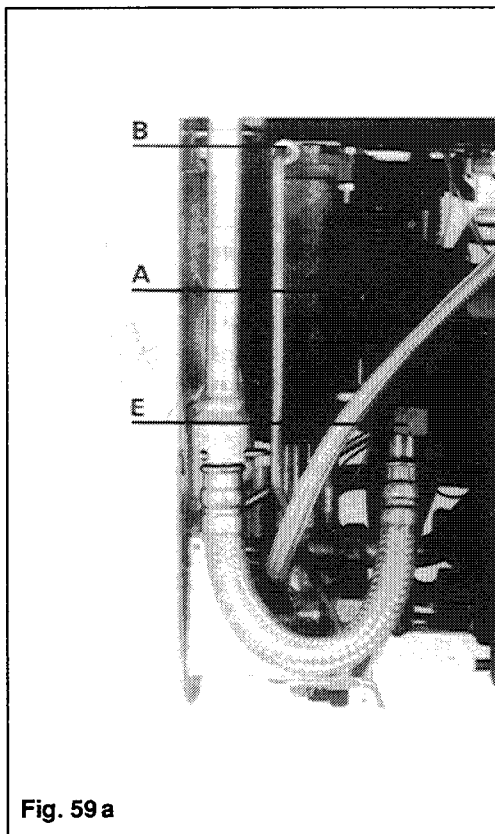


### To replace secondary heat exchanger

- a) Remove front case, see section 7.1.
- b) Disconnect and remove electrical box (see section 8.9).
- c) Remove change over valve (see section 8.11).
- d) Unscrew union nut (8) at top of secondary heat exchanger.
- e) Unscrew bottom left hand union nut (9) of secondary heat exchanger.
- f) Slacken top screw (A) of heat exchanger to chassis.
- g) Remove bottom screw (B) and spacer.
- h) Remove secondary heat exchanger.
- i) Replace in reverse order.
- N.B.** Do not unscrew the four tie rods in the secondary heat exchanger.

Fig. 59

## 8.13



### To replace air separator

- a) Remove front case (see section 7.1),
- c) Close heating flow and return valves (B & C) (see section 8.11 (fig. 58 A)).
- d) Drain boiler down through safety valve (F) (see section 8.11 (fig. 56)).
- e) Disconnect bleed pipe union from pump volute (E).
- f) Disconnect drain tube (B).
- g) Pull out spring clip (A) with pliers.
- h) Disconnect flexible pipe union (D) at pump outlet.
- j) Pull pump complete with volute forwards and remove.
- k) Disconnect union nut at base of air separator.
- m) Ease air separator forward and disengage integral peg from chassis,
- q) Replace in reverse order. Ensure that washer is replaced in lower union of separator.
- r) Open flow and return valves. Re-pressurise system if necessary.

Fig. 59a

### 8.14

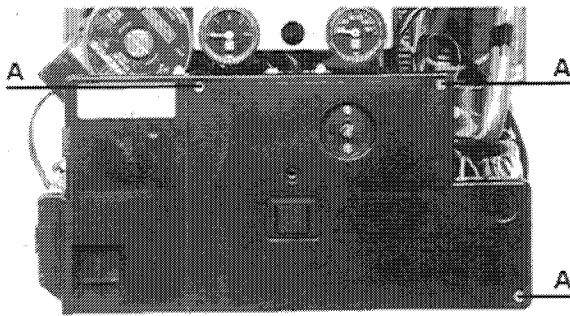


Fig. 60

#### To replace boiler thermostat

- a) Remove front case (see section 7.1).
- b) Remove five screws (A) and remove electrical box cover. Unplug from the PCB the single connector for the switch.
- c) Remove clip retaining thermostat phial .
- d) Remove two screws (D) which secure boiler thermostat to the electrical box cover.
- e) Remove the spade connectors noting position, see illustrated wiring diagram fig. 9.
- f) Feed out capillary through electrical box having removed the split grommet.
- g) Replace in reverse order.

### 8.15

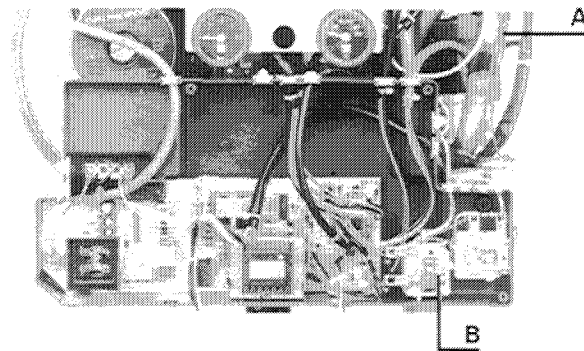


Fig. 61

#### To replace boiler limit thermostat

- a) Remove front case (see section 7.1).
- b) Remove electrical box, see section 8.9.
- N.B.** Thermostat is situated to right top of electrical box, sensor in pocket on flow pipe on right hand lower side.
- c) Remove split pin from dry pocket on flow pipe (A).
- d) This thermostat is located on moulded pins - ease forward and remove spade connectors.
- e) Feed capillary through the control box having removed the split grommet.
- f) Replace in reverse order (polarity immaterial).

### 8.16

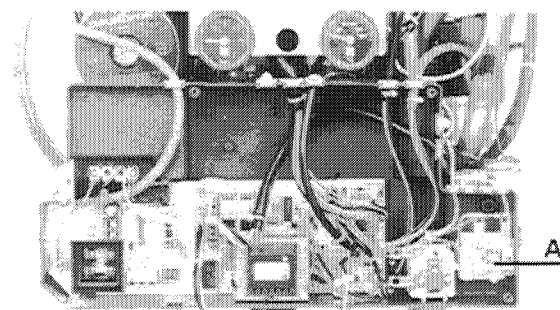
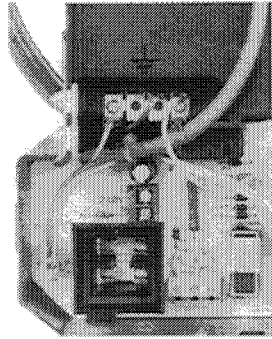


Fig. 62

#### To replace domestic hot water thermostat

- a) Remove front case (see section 7.1).
- b) Remove electrical box front cover (see section 8.9.(c)).
- c) Isolate mains water supply - drain from valve beneath the change over valve (see section 8.11 fig. 58 (H)).
- d) Remove clip which retains phial in wet pocket.
- e) Remove phial from pocket.
- f) Ease thermostat off moulded pegs and pull of spade connections.
- g) Feed capillary through the control box, having removed the split grommet.
- h) Replace in reverse order. Polarity immaterial.

**8.17**

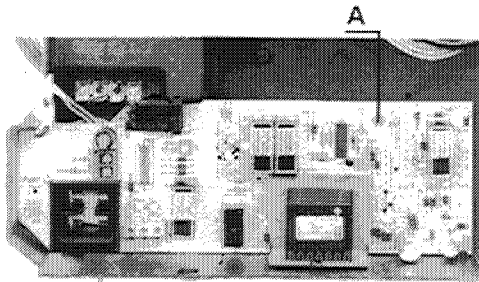


**To replace spark generator**

- a) Remove front case (see section 7.1).
- b) Remove electrical box cover (see section 8.9 (C)).
- c) Remove PCB (see section 8.18).
- d) Pull tab connections from spark generator noting position.
- e) Slacken bottom fixing screw and remove top screw from generator.
- f) Lift up off bottom screw and pull forwards.
- g) Replace in reverse order. (Connect leads before locating generator).

**Fig. 63**

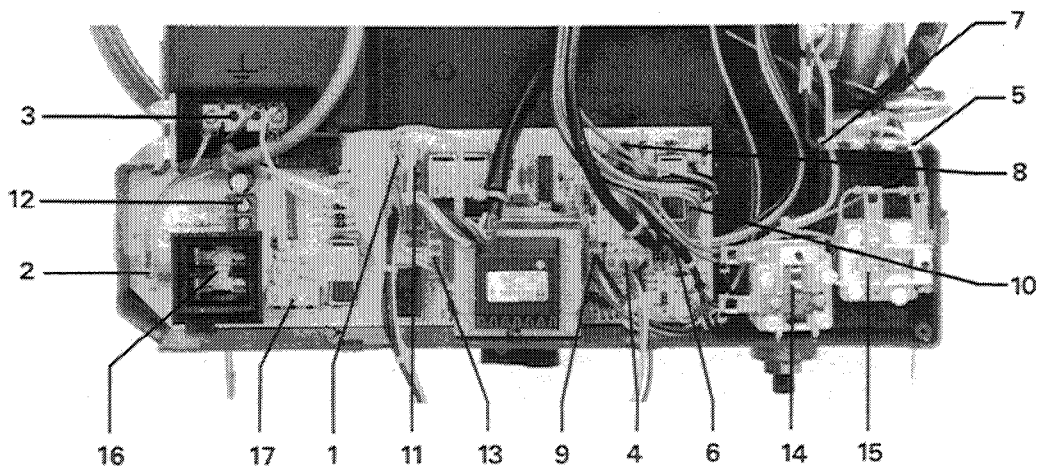
**8.18**



**To replace printed circuit board (PCB)**

- a) Remove front case (see section 7.1).
- b) Remove electrical box front cover (see section 8.9(C)).
- c) Remove all plug-in connections (10).
- d) Disconnect mains input cable at terminals 1 and 2 but not the earth.
- e) Disconnect external controls, if fitted, from terminals 4 and 5.
- f) Remove one screw (A).
- g) Slide PCB slightly upwards to disengage guide.
- h) Pull PCB forward.
- j) Replace in reverse order.

**Fig. 64**



- |                        |                     |                         |                               |
|------------------------|---------------------|-------------------------|-------------------------------|
| 1 Summer/Winter Switch | capillary           | 9 Push Button Ignition  | 14 D.H.W. Thermostat          |
| 2 Pump                 | 6 Water Flow Switch | 10 Solenoid Gas Valve   | 15 Limit Thermostat           |
| 3 Earth                | 7 D.H.W. Thermostat | 11 Fan connection       | 16 Fuse                       |
| 4 Boiler Thermostat    | Capillary           | 12 240V-50Hz connection | 17 Room thermostat connection |
| 5 Limit Thermostat     | 8 Change Over Valve | 13 Igniter              |                               |

**Fig. 65 ELECTRICAL BOX SHOWING POSITION OF COMPONENTS WITH LAYOUT OF PLUGS AND WIRING.**

8.19

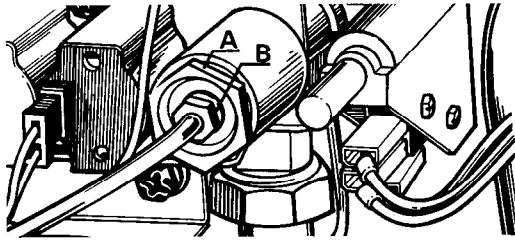


Fig. 66

**To replace thermoelectric valve**

- a) Remove front case (see section 7.1).
- b) Remove thermocouple connection (B).
- c) Remove nut (A) securing thermoelectric valve.
- d) Withdraw thermoelectric valve.
- e) Replace in reverse order.

**N.B.** Care should be taken when replacing the nut securing the thermoelectric valve - fine threads.

8.20

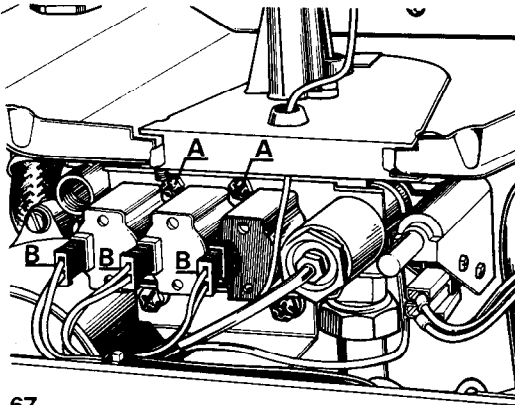


Fig. 67

**To replace solenoid valves**

- a) Remove front case (see section 7.1).
- b) Withdraw plugs - colour coded - from solenoids (B).
- c) Remove four screws (A) securing valve mounting plate.
- d) Remove mounting plate and solenoids - take care not to misplace valve springs and plungers.
- e) Replace in reverse order using a NEW CASSET.

8.21

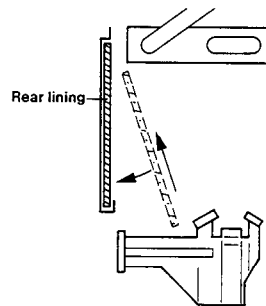


Fig. 68

**To replace heating body linings**

- a) Remove case (see section 7.1).
- b) Remove combustion chamber front panel with expansion vessel (see section 7.2 (A, B, C and D)).
- c) Remove burner (see section 7.3 (d)) First slide out side linings followed by rear which is removed by easing upwards and sliding out from bottom.
- e) Replace in reverse order.

8.22

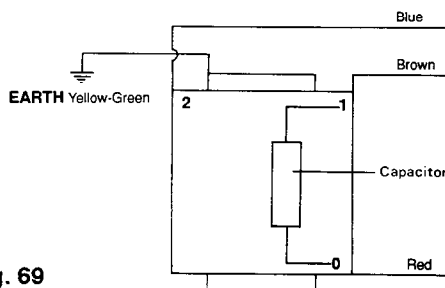
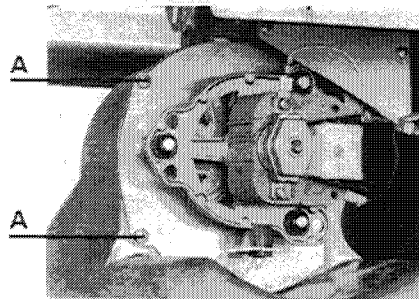


Fig. 69

**To replace fan assembly**

- a) Remove case (see section 7.1).
  - b) Remove outer front panel (see section 7.2).
  - c) Remove right hand side combustion chamber panel (see section 8.8).
  - e) Pull off 4 spade connections from fan.
  - f) Remove 2 screws - on flue hood (A).
  - g) Turn anti-clockwise 10° to disengage lug from rear and withdraw assembly.
  - h) Replace in reverse order using new gasket.
- N.B.** Ensure correct location of fan connectors and that the lug at the rear is located correctly.

- (0) : Red.
- (1) : Brown.
- (2) : Blue.
- (E) : Yellow/Green.



8.23

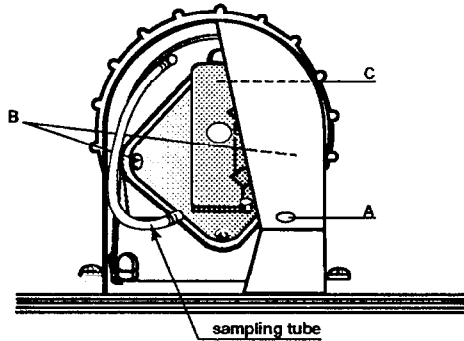


Fig. 70

**To replace pressure switch**

- a) Remove two screws (A) retaining plastic turret cover and remove terminal cover.
  - b) Note position of spade connectors and remove (COMP, No 1 and No 2).
  - c) Disconnect pressure sampling tube by pulling off nipple.
  - d) Remove two screws retaining pressure switch (B).
  - e) Replace in reverse order.
- N.B. Ensure 'O' ring is position on rear of pressure switch to seal pressure switch - high pressure sample joint. Transfer 4 mm support screw (C) and nut onto the new switch if not supplied.

8.24

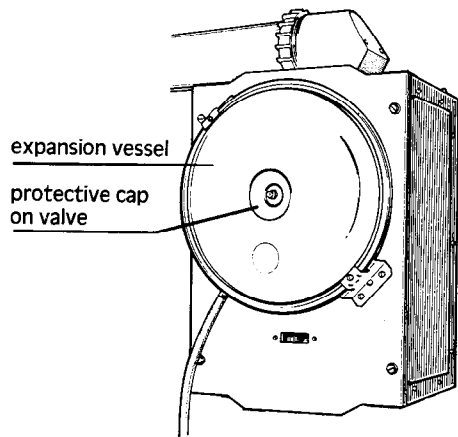


Fig. 71

**To re-pressurise expansion vessel**

- a) Remove case (see section 7.1).
  - b) Close heating flow and return valves and drain boiler through safety valve (see section 6.2 fig. 34 (F)).
  - c) Remove protective cap and check pressure on schroeder valve with gauge.
- N.B. The setting pressure is 0.65 bar (9.5 psi).
- d) To re-pressurise use car foot pump or bicycle pump with adaptor.
  - e) Close safety valve.
  - f) Open heating flow and return valves.
  - g) Refill and commission boiler.
- N.B. Do not use a high pressure air line.

8.25

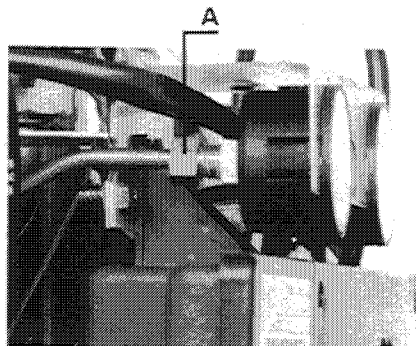
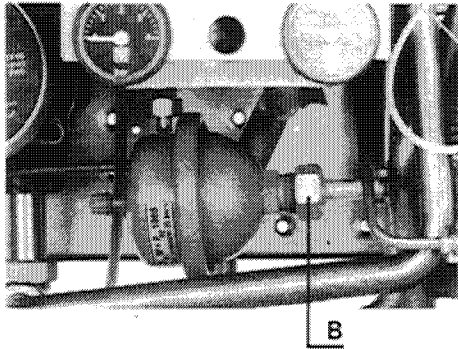


Fig. 72

**To replace pressure gauge**

- a) Remove case (see section 7.1).
- b) Close heating flow and return valves and drain boiler through safety valve (see section 6.2 fig. 34 (F)).
- d) Undo union nut (A) on pressure tube at rear of gauge.
- e) Withdraw gauge.
- f) Replace in reverse order.
- g) Open flow and return valves. Re-pressurise system if necessary.

8.26

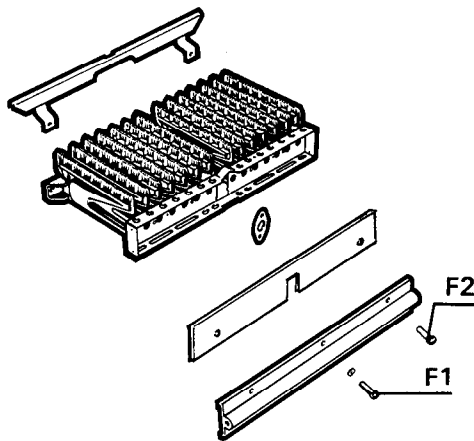


**To replace the domestic expansion vessel**

- a) Isolate cold water mains supply (see section 6.2).
  - b) Drain from valve beneath the change over valve see section 8.11 (see fig. 58H).
  - c) Remove electrical control box (see section 8.9).
  - d) Undo connection (B) and remove domestic expansion vessel.
- Replace in reverse order.  
Check for leaks.

Fig. 73

8.27

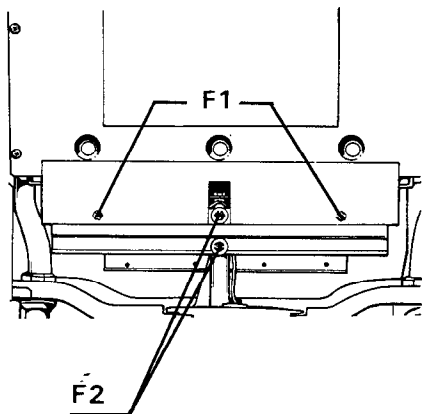


**To replace main burner**

- a) Remove case (see section 7.1).
- b) Remove outer front panel (see section 7.2).
- c) Remove burner (see section 7.3).
- d) Replace in reverse order ensuring that the gasket is correctly positioned between the injector cover plate and the manifold.

Fig. 74

8.28

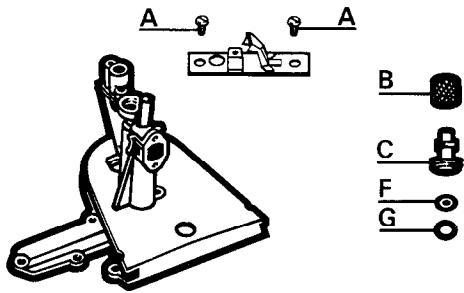


**To replace the burner manifold assembly**

- a) Remove the front case (see section 7.1).
  - b) Remove the combustion chamber front panel to expose the burner manifold (see section 7.2 (a to c)).
  - c) Remove the two screws F1 and remove the closure plate.
- N.B.** When replacing the manifold it is advisable to replace the gasket at the same time.
- d) Remove the two screws F2 and lift off from Burner base.
  - e) Replace in reverse order.

Fig. 75

8.29

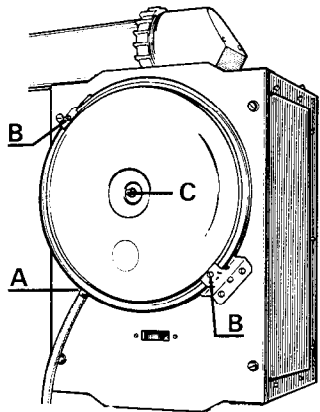


**To replace pilot injector, air filter, deflector plate/burner head**

- a) Remove as detailed in section 7.4.
  - b) Replace in reverse order.
- N.B.** Pilot injector fitted bright side uppermost.

Fig. 76

8.30

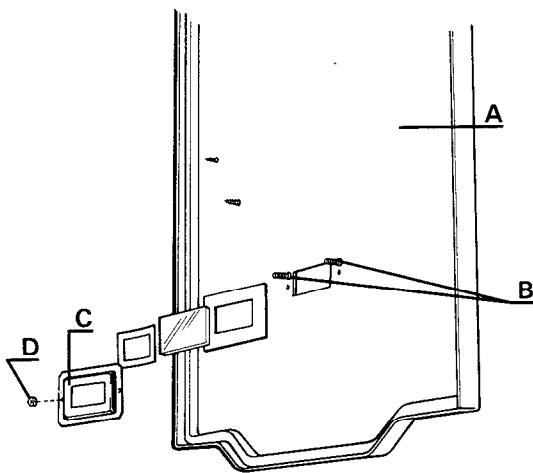


**To replace expansion vessel**

- a) Remove front case (see section 7.1).
- b) Isolate appliance from system by closing flow and return valves (see section 6.2 fig. 34 (B et C)).
- c) Drain boiler (primary side) through safety valve fig. 34 (F) and vent expansion vessel at (C).
- d) Remove flexible pipe from expansion vessel, at (A).
- e) Loosen upper securing screw (B) support and loosen lower screw. Slide out expansion vessel.
- f) Replace in reverse order, engaging the thread of the flexible pipe before screwing fully home screws (B). The vessel must be central on the front panel.
- g) Re-pressurise expansion vessel (see section 8.24).
- h) Open flow and return valves. If necessary, repressurise system. (see section 6.2).

Fig. 77

8.31



**To replace viewing window**

- a) Remove front case (see section 7.1).
- b) Remove combustion chamber front panel (A) (see section 7.2).
- c) Remove the screws (B) securing the sight glass bracket (C). Take care not to loose the two nuts (D).
- d) Replace in reverse order referring to diagram opposite.

Fig. 78

8.32

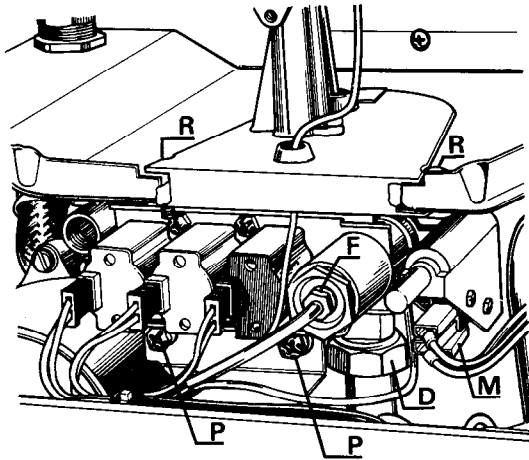


Fig. 79

**To replace the main gas valve body**

- a) Remove front case (see section 7.1).
- b) Remove combustion chamber front panel (see section 7.2).
- c) Remove burner assembly (see section 7.3).
- d) Remove electrical control box (see section 8.9).
- e) Part thermocouple connections to high limit thermostat.
- f) Pull connectors off microswitch (M) noting colours.
- g) Remove two screws (P) retaining bracket to gas section and ease bracket down to clear gas section.
- h) Slacken and undo the gas supply union (D) beneath gas section.
- j) Remove two screws (R) retaining gas section to combustion chamber base.
- k) Remove gas section by pulling forward.
- m) Reassemble in reverse order and check for gas soundness.

8.33

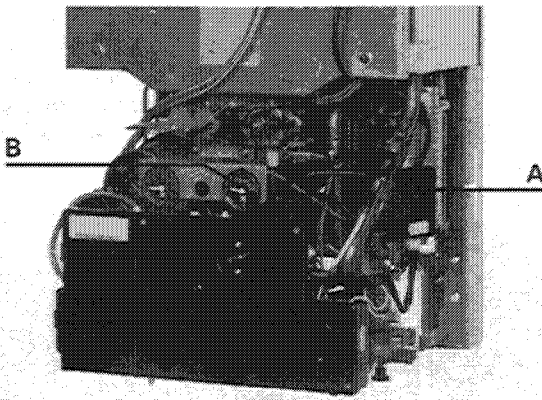


Fig. 80

**To replace the thermometer**

- a) Remove the front case (see section 7.1).
- b) Unclip and remove thermometer sensor from flow pipe (A).
- c) Withdraw gauge (B) by compressing the two fixing lugs and pushing the gauge towards you. Feed the sensor through the bracket.
- d) Replace in reverse order.

8.34

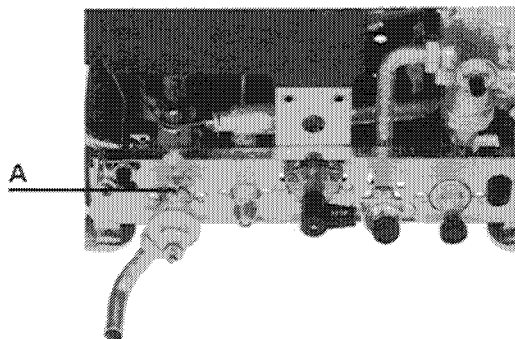
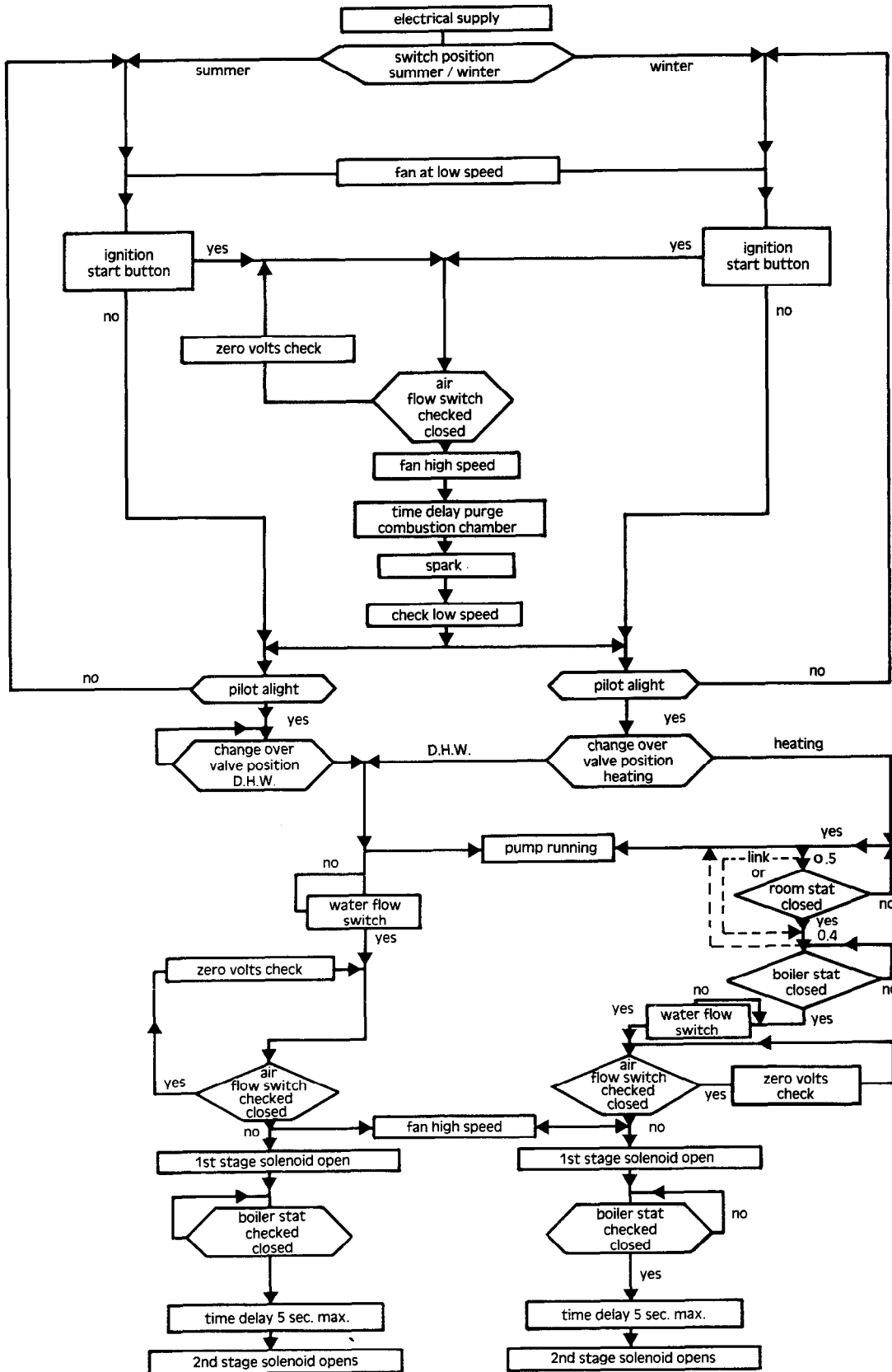


Fig. 81

**To replace safety valve**

- a) Remove case (see section 7.1).
- b) Close heating flow and return valves and drain the appliance through safety valve (see section 6.2 fig. 34 (f) and section 7.8).
- c) Ensure that the boiler is completely drained and the pressure gauge is reading zero (0).
- d) Undo the grub screw (A) and remove the complete assembly by carefully pulling it in a downwards direction.
- e) Replace in reverse order.
- f) Ensure that the valve is in the close position and repressurise system (see section 6.2).
- g) Open heating flow and return valves.
- h) Check for leaks.

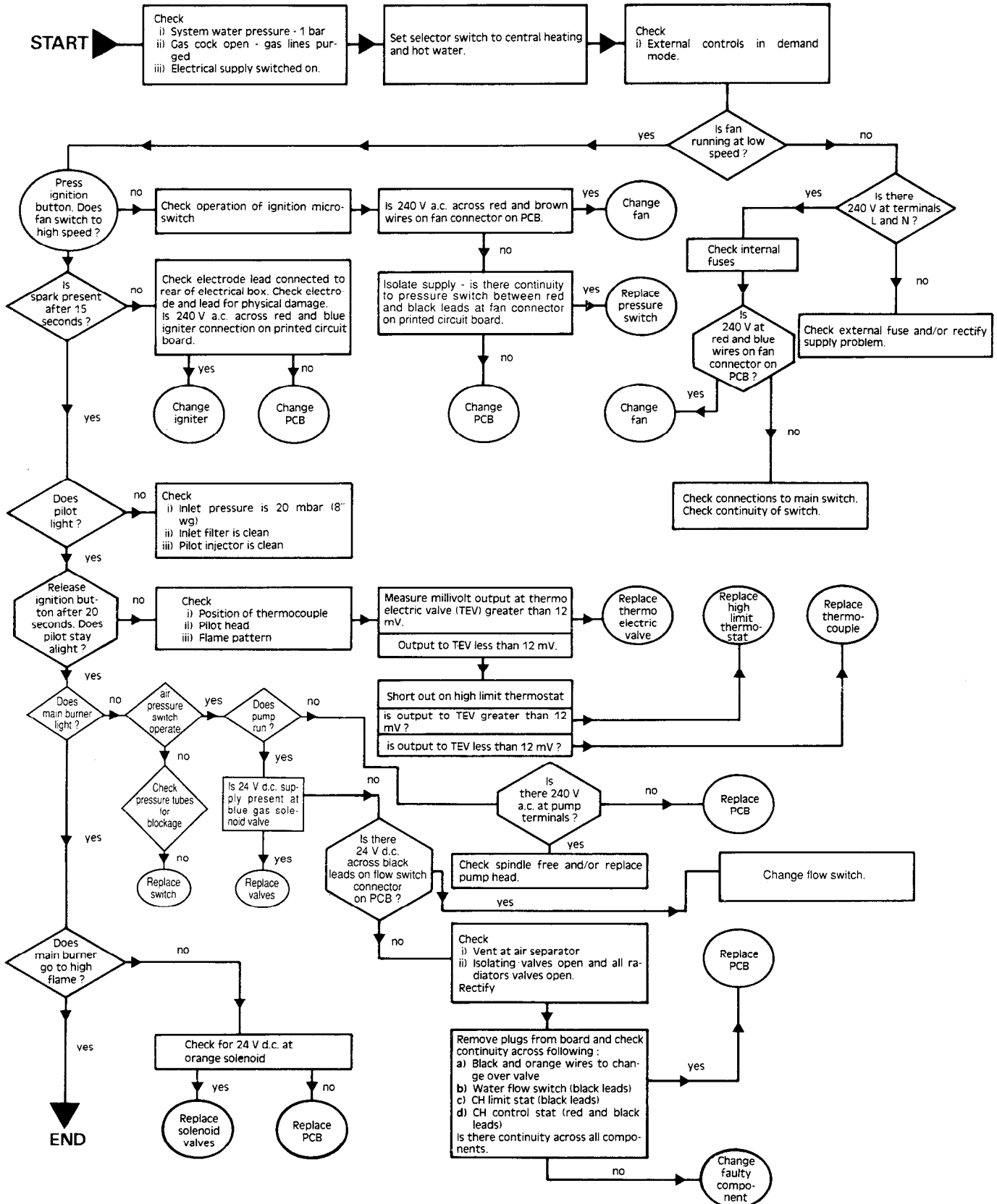
9. FAULT FINDING  
9.1 Logic sequence



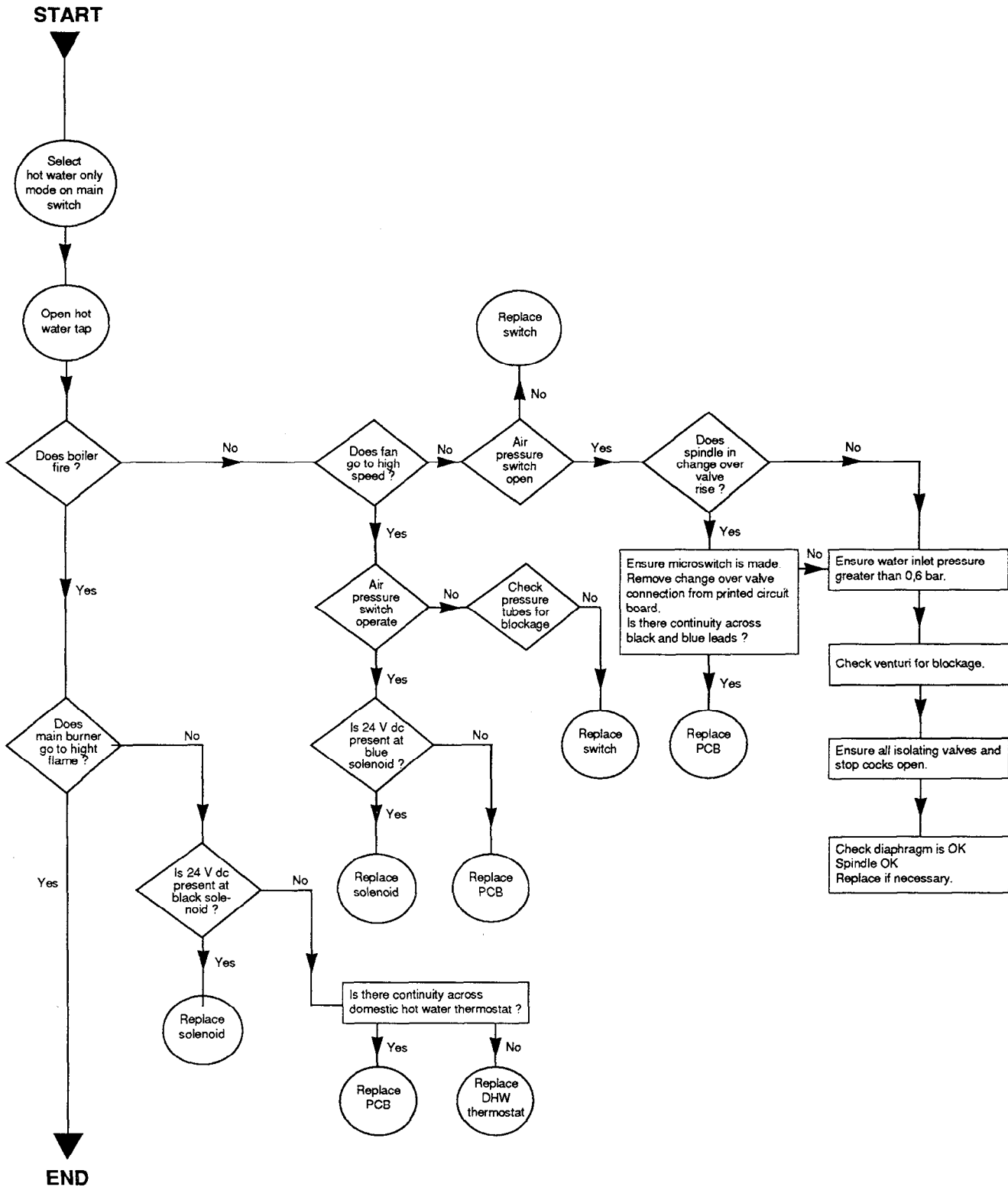
9.2

# FAULT FINDING CENTRAL HEATING OPERATION SEQUENTIAL FLOW CHART 1

READ IN CONJUNCTION WITH SECTIONS (9.1 & 9.3)



**FAULT FINDING  
DOMESTIC HOT WATER OPERATION  
SEQUENTIAL FLOW CHART 2  
READ IN CONJUNCTION WITH SECTIONS (9.1 & 9.2)**



## 9.4 FAULT FINDING TABULAR CHART

PROBLEM	CAUSE	REMEDY
1) Explosive ignition	<ul style="list-style-type: none"> <li>i) Poor pilot flame                             <ul style="list-style-type: none"> <li>a) Inlet pressure low - should be 8" wg (20 mbar) working pressure</li> <li>b) Blocked gas filter</li> <li>c) Pilot injector dirty</li> </ul> </li> <li>ii) 1/3 valve not operating                             <ul style="list-style-type: none"> <li>a) 24 volts supply to valve</li> <li>b) No voltage at solenoid</li> </ul> </li> <li>iii) Crosslighting strip - missing/incorrectly positioned</li> </ul>	<ul style="list-style-type: none"> <li>1a) Check meter and pipe sizing see sections 2.7 and 4.7</li> <li>1b) Clean</li> <li>1c) Clean replace, see section 8.29</li> <li>2a) Replace solenoids, see section 8.20</li> <li>2b) Check plugs on printed circuit board</li> <li>2c) Replace printed circuit board, see sections 8.18</li> <li>3) Replace or reposition</li> </ul>
2) Unstable burner	<ul style="list-style-type: none"> <li>i) Incorrect injectors</li> <li>ii) Gas pressure at manifold                             <ul style="list-style-type: none"> <li>a) Too high</li> <li>a) Too low</li> </ul> </li> <li>iii) Terminal incorrectly positioned</li> <li>iv) Incorrectly assembled flue duct</li> <li>v) Fan incorrectly located</li> <li>vi) Combustion chamber front cover not sealing</li> <li>vii) Heat exchanger fins blocked</li> <li>viii) Neoprene gasket in turret not correctly fitted or missing</li> </ul>	<ul style="list-style-type: none"> <li>1) Replace manifold 1.28 mm injectors for natural gas, see section 8.28</li> <li>2a) Adjust, see section 6.4</li> <li>2b) Check restrictors and inlet pressure, see section 1.2</li> <li>3) See section 2.4</li> <li>4) Check and reassemble, see section 4.10</li> <li>5) Remove and refit correctly, see section 8.22</li> <li>6a) Tighten</li> <li>6b) Replace sealing strip</li> <li>3) Clean, see section 7.2 and 7.7</li> <li>3) Fit or refit, see section 4.10</li> </ul>
3) Central heating low flow temperature	<ul style="list-style-type: none"> <li>i) Boiler thermostat out of calibration</li> <li>ii) Limit stat out of calibration</li> <li>iii) Insufficient gas pressure</li> <li>iv) 1/3 blue or 2/3 orange gas valve not opening                             <ul style="list-style-type: none"> <li>a) 24 volts at solenoid</li> <li>b) No voltage at solenoid</li> </ul> </li> <li>v) Hot water valve in change over valve assembly sticking                             <ul style="list-style-type: none"> <li>a) Dead leg on hot water system</li> <li>b) Bent spindle in valve</li> </ul> </li> <li>vi) By-pass, if fitted, incorrectly adjusted</li> <li>vii) Pressure switch hunting</li> <li>viii) System incorrectly balanced</li> </ul>	<ul style="list-style-type: none"> <li>1) Replace, see section 8.14</li> <li>2) Replace, see section 8.15</li> <li>3) Check pressure at meter and pipe sizing, see sections 2.7 and 4.7</li> <li>4a) Replace solenoid, see section 8.20</li> <li>4b) Replace print circuit board, see section 8.18</li> <li>5a) Eliminate</li> <li>5b) Replace, see section 8.11</li> <li>6) Adjust, see section 3.16</li> <li>7) Replace, see section 8.23</li> <li>8) Balance system.</li> </ul>



PROBLEM	CAUSE	REMEDY
4) Boiler noisy	<ul style="list-style-type: none"> <li>i) On heating only               <ul style="list-style-type: none"> <li>a) Low flow rate as result of system resistance</li> <li>b) Air in system</li> </ul> </li> <li>ii) On hot water and central heating               <ul style="list-style-type: none"> <li>a) Low pressure in sealed system</li> <li>b) Pump not running</li> </ul> </li> <li>iii) Blocked filter on heating return</li> <li>iv) Gaz filter fitted to heating flow or return pipes</li> <li>v) Heat exchanger scaled</li> <li>vi) Overgassed</li> <li>(vii) isolating valves not fully open</li> </ul>	<ul style="list-style-type: none"> <li>1a) Check and if omitted fit by-pass see section 3.16</li> <li>1b) Purge by venting radiators</li> <li>2a) Repressurise to 1 bar cold see section 6.2 (5)</li> <li>2b) Replace pump head, see section 8.10</li> <li>3) Clean and replace see section 7.6</li> <li>4) Remove and reposition see section 4.5</li> <li>5a) Descale</li> <li>5b) Replace, see section 8.8</li> <li>6a) Check gas pressure and adjust, see section 6.4</li> <li>6b) Check restrictors. see section 1.2</li> <li>7) Open fully see section 6.2</li> </ul>
5) Hot water does not operate over temperature range	<ul style="list-style-type: none"> <li>i) Low inlet water pressure</li> <li>ii) Incorrect venturi fitted</li> <li>iii) Hot water limit stat out of calibration</li> <li>iv) Solenoids not operating</li> <li>v) Pressure switch hunting</li> <li>vi) Low inlet gas pressure</li> </ul>	<ul style="list-style-type: none"> <li>1) Ensure all down stream stop cocks open</li> <li>2) Replace with 5.4 mm diameter, see section 8.7</li> <li>3) Replace, see section 8.16</li> <li>4) See section 9.2. Flow chart 1</li> <li>5) Replace, see section 8.23</li> <li>6) See section 6.4</li> </ul>
6) No main burner	<ul style="list-style-type: none"> <li>i) Lack of water flow</li> <li>ii) Pump jammed</li> <li>iii) No water</li> <li>iv) Flow switch not operating</li> <li>v) Heating thermostat faulty (CH only)</li> <li>vi) Pressure switch not operating</li> </ul>	<ul style="list-style-type: none"> <li>1) Checks valves are open see sections 6.1 and 6.2</li> <li>2) Manually check, see section 6.2 (8)</li> <li>3) Fill system, see section 6.2</li> <li>4) Replace switch, see section 8.34</li> <li>5) Replace, see section 8.14</li> <li>6) Replace, see section 8.23</li> </ul>
7) Safety valve discharges	<ul style="list-style-type: none"> <li>i) System pressure too high</li> <li>ii) Not isolated from mains</li> <li>iii) Vessel lost air charge</li> <li>iv) Secondary heat exchanger (water to water) internal water leak</li> </ul>	<ul style="list-style-type: none"> <li>1) Adjust 1 bar cold</li> <li>2) Remove filling loop</li> <li>3) Recharge 0.65 bar, see section 8.24</li> <li>4) Replace, see section 8.12</li> </ul>
8) Pump noisy	<ul style="list-style-type: none"> <li>i) Air in system</li> <li>ii) Air separator</li> <li>iii) Debris in pump</li> <li>iv) Water filter blocked</li> </ul>	<ul style="list-style-type: none"> <li>1) Vent radiators</li> <li>2) Open vent on air separator, see section 6.2 (4)</li> <li>3) Clean and replace, see section 8.10</li> <li>4) Clean and replace, see section 7.6</li> </ul>

PROBLEM	CAUSE	REMEDY
9) Excessive temperature rise across boiler	i) Return filter blocked ii) Low water flow rate a) Pump defective b) High system resistance c) Gas filter inadvertently fitted in flow or return connection iii) Gas rate too high	1) Clean and replace, see section 7.6  2a) Replace, see section 8.10 2b) Fit by-pass, see section 3.16 2c) Remove and refit, see sections 4.5 3) Adjust, see section 6.4
10) Rapid cycling high/low or high/low/off	i) Low water flow rate ii) Limit stat out of calibration iii) By-pass, if fitted, not regulated iv) Blocked heat exchanger	1) See 'System guidance' section 3.3 2) Replace, see section 8.15 3) Adjust, see section 6.5 4) Clean or replace, see section 8.8
11) Fan on high speed continuously	i) Defective printed circuit board	1) Replace, see section 8.18
12) Loss of pressure	i) Leak on system ii) Leak on appliance	1) Locate and rectify 2) Locate and rectify
13) Gain in pressure shown on gauge	i) Filling loop still fitted and letting by ii) Blockage in expansion chamber flexible hose iii) Secondary heat exchanger (water to water) internal water leak	1) Close stop cocks and remove 2) Clear blockage 3) Replace, see section 8.12

# Notes

Chaffoteaux et Maury Limited,  
Trench Lock, Trench, Telford, Shropshire TF1 4SZ  
Telephone: (01952) 222727 Fax: (01952) 243493

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