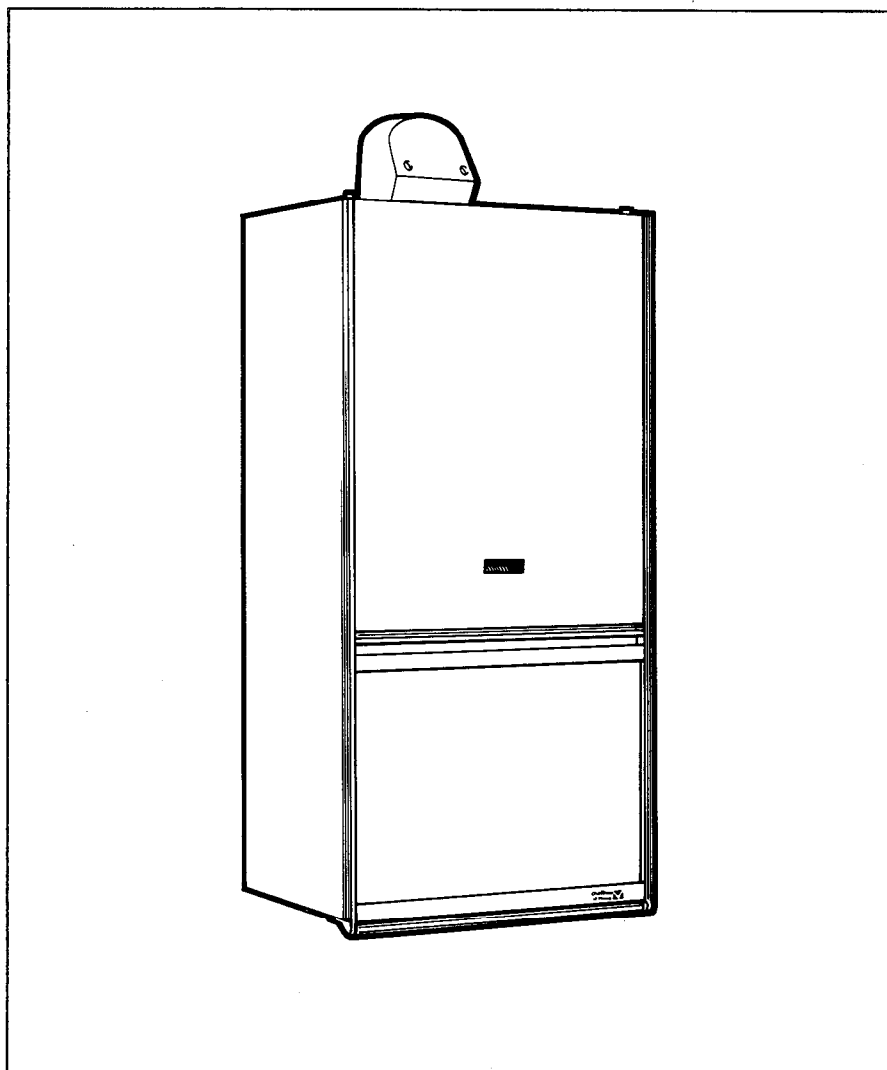


STERLING FF

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 04
from serial number



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 STERLING FF 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 are the expansion vessel, circulating pump, temperature and pressure gauges, safety valve, electric connection box, domestic expansion vessel and time clock.

1) 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).

2) Vertical flue option (see section 1.4.4).

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 40° 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.
- 7 day programme time clock.

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

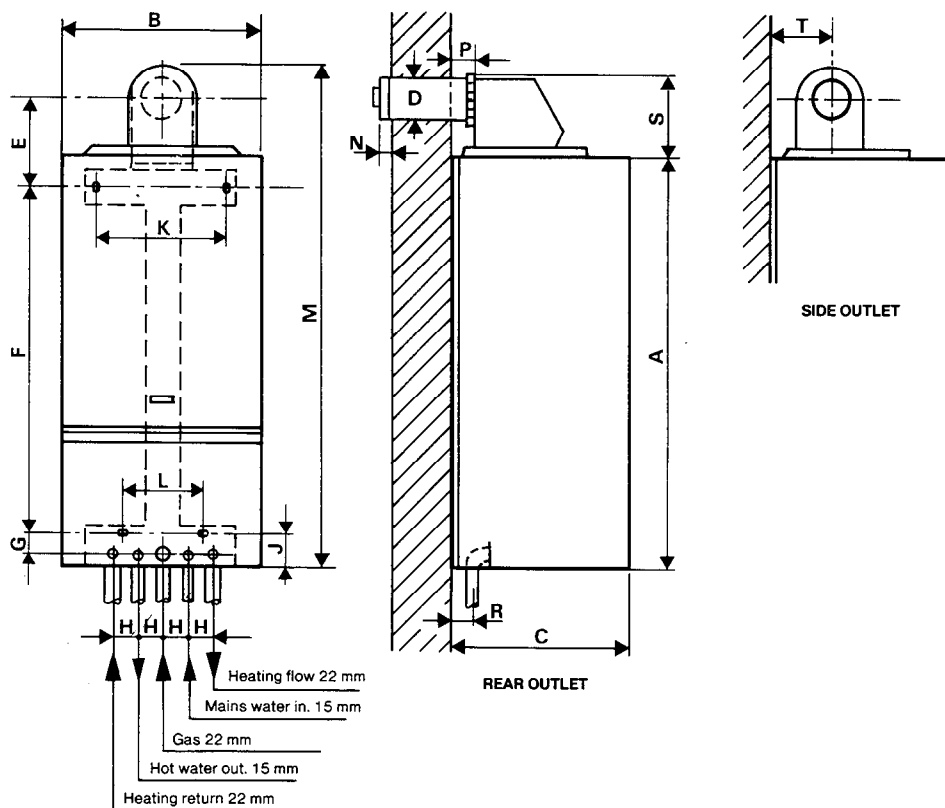


Fig. 1

	mm	in
A	820.5	32.3
B	391.0	15.4
C	365.0	14.4
D	100.0	4
E	169.5	6.7
F	654.5	25.7
G	43.0	1.7
H	50.0	2.0
J	75.0	3.0
K	260.0	10.2
L	150.0	6.0
M	972.5	38.3
N	13.0	0.5
P	61.0	2.4
R	30.0	1.2
S	152.0	6.0
T	112.0	4.4

1.2 Technical Data

Hot water			Connections		
Input.....	28.90 kW	98612 Btu/h	Gas.....	22 mm copper	
Output.....	23.00 kW	78480 Btu/h	Heating flow.....	22 mm copper	
Water flow raised 45 °C (81 °F).....	7.4 l/min	1.7 gal/min	Heating return.....	22 mm copper	
Water flow raised 35 °C (63 °F).....	9.5 l/min	2.1 gal/min	Mains cold water inlet.....	15 mm copper	
Water flow raised 30 °C (54 °F).....	11.1 l/min	2.5 gal/min	Hot water outlet.....	15 mm copper	
Maximum temperature.....	60 °C	140 °F	Electrical supply 240 V ~ 50 Hz, fused at 3A.		
Maximum pressure.....	10 bar	150 psi	Electrical consumption.....	195 watts	
Minimum working pressure.....	.6 bar	9 psi	Internally fused, two at 2A (BS 4265)		
Gas rate.....	2.743 m ³ /h	96.87 ft ³ /h	Weight.....	42 kg	92.4 lb
Burner pressure.....	11.8 mbar	4.7 in wg	Water capacity.....	4 litres	7 pints
Central heating			Ignition - ANSTOSS continuous spark generator		
Maximum input.....	27.64 kW	94313 Btu/h	Ignition electrode - SAPCO		
Maximum output.....	22.00 kW	75068 Btu/h	Ignition probe - SAPCO		
Gas rate (maximum).....	2.63 m ³ /h	92.98 ft ³ /h	Thermistor - SIEMENS		
Burner pressure.....	11.2 mbar	4.5 in wg	Boiler limit thermostat - SOPAC / JAEGER (85°C)		
Minimum input.....	10.85 kW	37020 Btu/h	Hot water limit thermostat - SOPAC / JAEGER (57°C ± 3°C)		
Minimum output.....	7.64 kW	26062 Btu/h	Safety overheat thermostat (TOKOSWITCH - (105°C)		
Gas rate (minimum).....	1.0 m ³ /h	35.31 ft ³ /h	(manual reset) (ELMWOOD)		
Burner pressure.....	1.5 mbar	0.6 in wg	Overheat high- limit thermostat (TOKOSWITCH - (110°C)		
Minimum flow rate.....	300 l/h	1.1 gal/min	(automatic reset) (ELMWOOD - (105°C)		
Maximum pressure.....	2.5 bar	36.5 psi	Gas valve - AEMF		
At the maximum pressure loss of the flue			Fan motor - SEL		
Temperature of the products of combustion :	98 °C	208 °F	Pressure switch - DUNGS 88 Pa / 49 Pa		
The CO content of the dry free air products of combustion :	0.0136%		Pump head - GRUNDFOS UP 15/60		
Natural gas			C.H. expansion vessel initial charge pressure - 0.65 bar (9.6 psi)		
Manifold injectors 14 of.....	1.28 mm	0.05 in	Domestic expansion vessel initial charge pressure - 2 bar (30 psi)		
Gas section restrictors 2/3 valves	4.4 mm	0.17 in			
1/3 valve	2.3 mm	0.09 in			
security valve.....	no restrictor fitted				

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

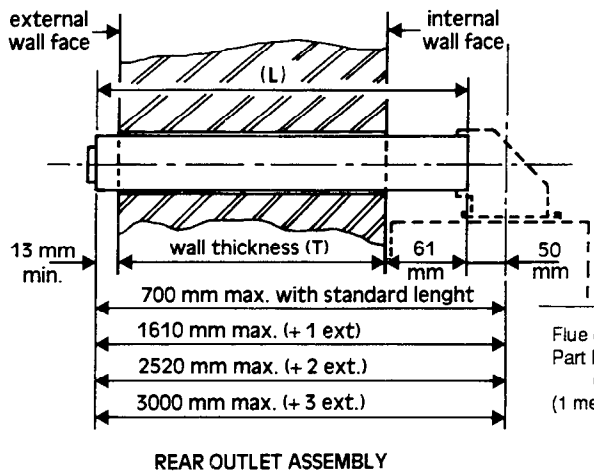
Side : from 393 mm to 2692 mm

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).

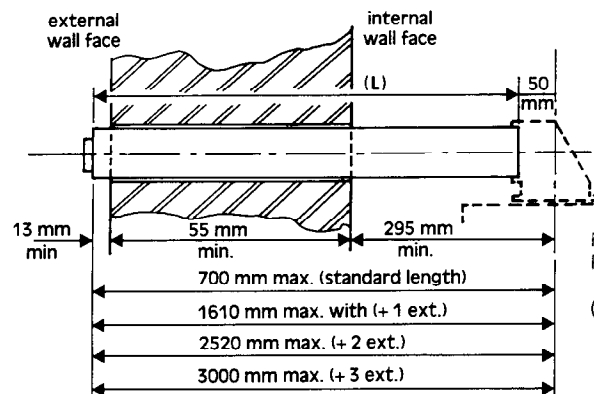
- Cut off same amount from aluminium flue duct (plain end).

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 STERLING FF 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

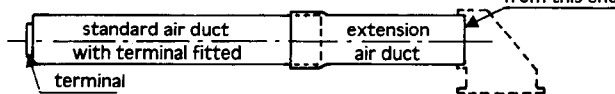
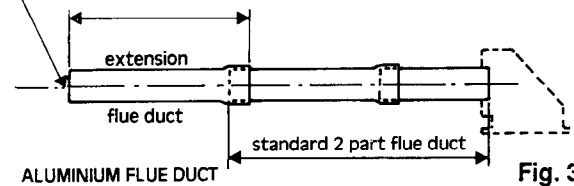


Fig. 3a PLASTIC AIR DUCT

cut off from this end



ALUMINIUM FLUE DUCT

Fig. 3b

1.4.3 Other Flue Arrangements Horizontal

Other Flue Arrangements Horizontal

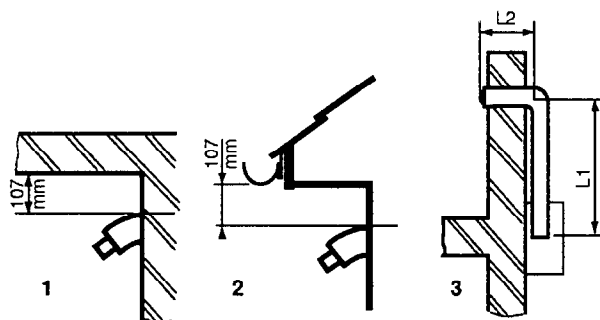


Fig. 3c

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.

1.4.4

Vertical Flue Arrangements

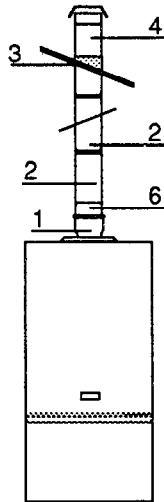


Fig. 3 d

a) Straight flue (fig. 3 d)

- 1) Adaptor.
- 2) Extensions (9.5 m maximum).
- 3) Roof flashing.
- 4) Terminal.
- 6) Reducer.

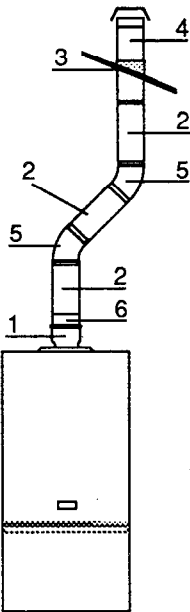


Fig. 3 e

b) Flue with two 45° bends (fig. 3 e)

- 1) Boiler adaptor.
- 2) Extensions (8 m maximum).
- 3) Roof flashing.
- 4) Terminal.
- 5) 45° bend.
- 6) Reducer.

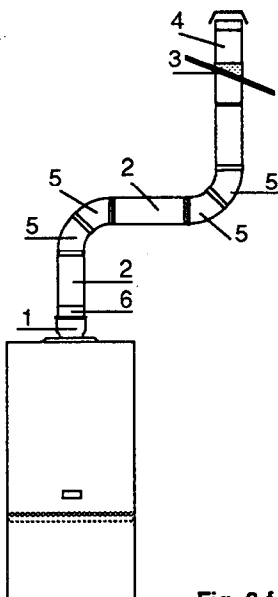


Fig. 3 f

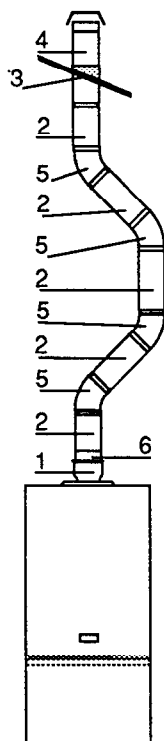


Fig. 3 g

c) Flue with four 45° bends (fig. 3 f and 3 g)

- 1) Adaptor.
- 2) Extensions (6 m maximum) fig. 3 f and 3 g including horizontal (2 m maximum) fig. 3 f.
- 3) Roof flashing.
- 4) Terminal.
- 5) 45° bends (x 4 maximum) fig. 3 f and 3 g.
- 6) Reducer.

With the exception of (3) roof flashing and (4) terminal, all other fittings are designed for internal installation only.

N.B. In these two arrangements figs. 3 f and 3 g, the total length of straight extensions must not exceed 6 meters with a maximum of 4 x 45° bends.

Horizontal run must not exceed 2 meters.

1.5 Description of Components and Location

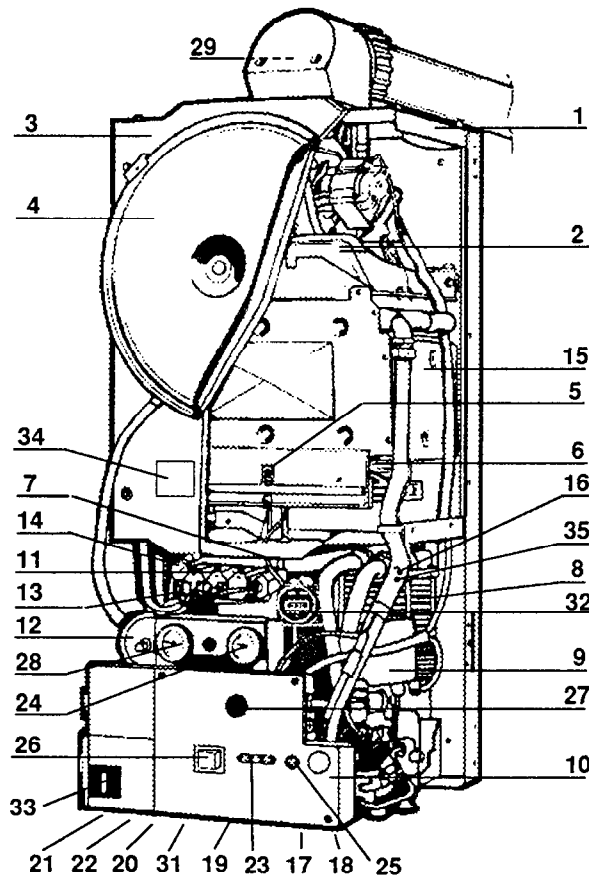


Fig. 4

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 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. Flame supervision device (not illustrated).

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

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

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 boards

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

Indicator LEDs.

11. Solenoid valve :

Block on which 4 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)

Security valve (grey).

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. Indicator LEDs.

24. Thermometer indicating boiler flow temperature.

25. Manual lock out reset.

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

27. Adjustment 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. Time clock.

33. Fuses.

34. Data badge position.

35. Control thermistor.

1.6 Description of Operation

The STERLING FF a 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). An expansion vessel (13) is fitted in the primary circuit. Temperature control is by means of a temperature sensing thermistor and potentiometer. These signals are fed to a comparator.

When the flow approaches the set temperature, the variable gas valve is closed and the boiler continues to fire on 1/3 solenoid valve (11). When the set temperature is reached, the boiler switches off. If flow temperature reduces, the 1/3 solenoid valve opens followed by the variable solenoid valve (10).

Temperature adjustment is between a minimum of 40°C approx. and a nominal maximum of 82°C.

The boiler is protected by high limit thermostats (4) and

(38) the operation of which interrupts the electrical supply to the security solenoid valve and extinguishes the burner.

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 thermistor 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).

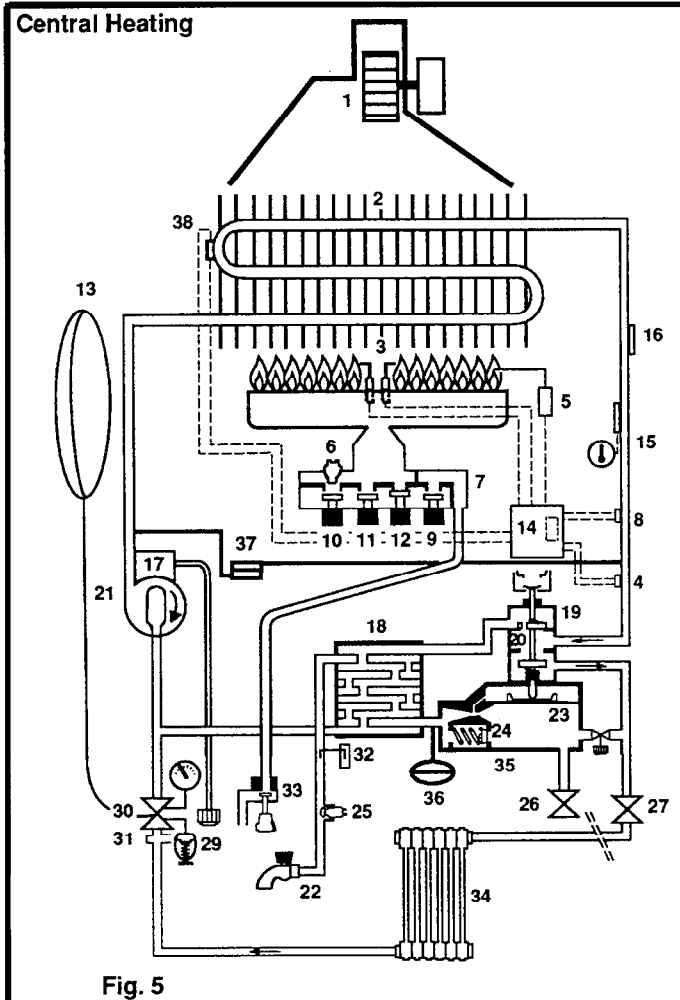


Fig. 5

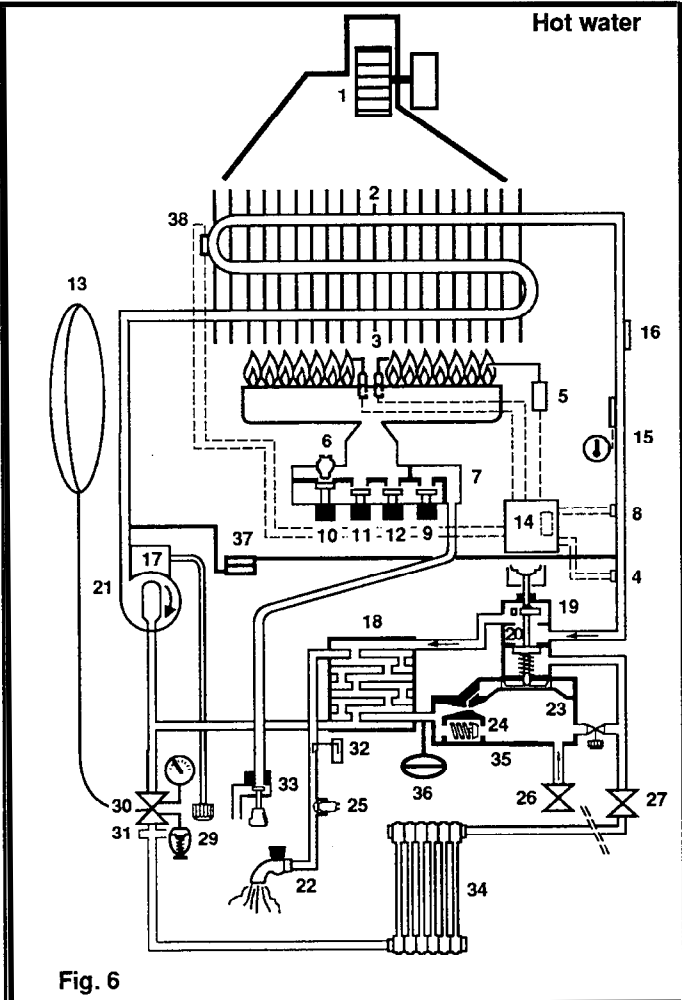


Fig. 6

1.6.4 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).

When there is a demand for heating or hot water, the security solenoid valve (9) and the 1/3 solenoid valve open together, which allows gas to pass to the burner. Simultaneously the high tension transformer is energised and produces a stream of sparks from the ignition electrodes (3) which light the main burner.

The flame supervision (5) is controlled by ionisation circuit.

If the main burner is not established after 5 seconds, the boiler fails safe to lock out and has to be reset manually.

There are 4 solenoid valves : the right hand (grey) valve (9) is the security valve, the blue valve (11) fixed at 1/3 of max rated output, the 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 top 2/3 maximum rated output.

The gas admitted by the orange valve is varied by adjuster (6) (see section 6.4).

1.6.5 FUNCTIONAL FLOW DIAGRAM

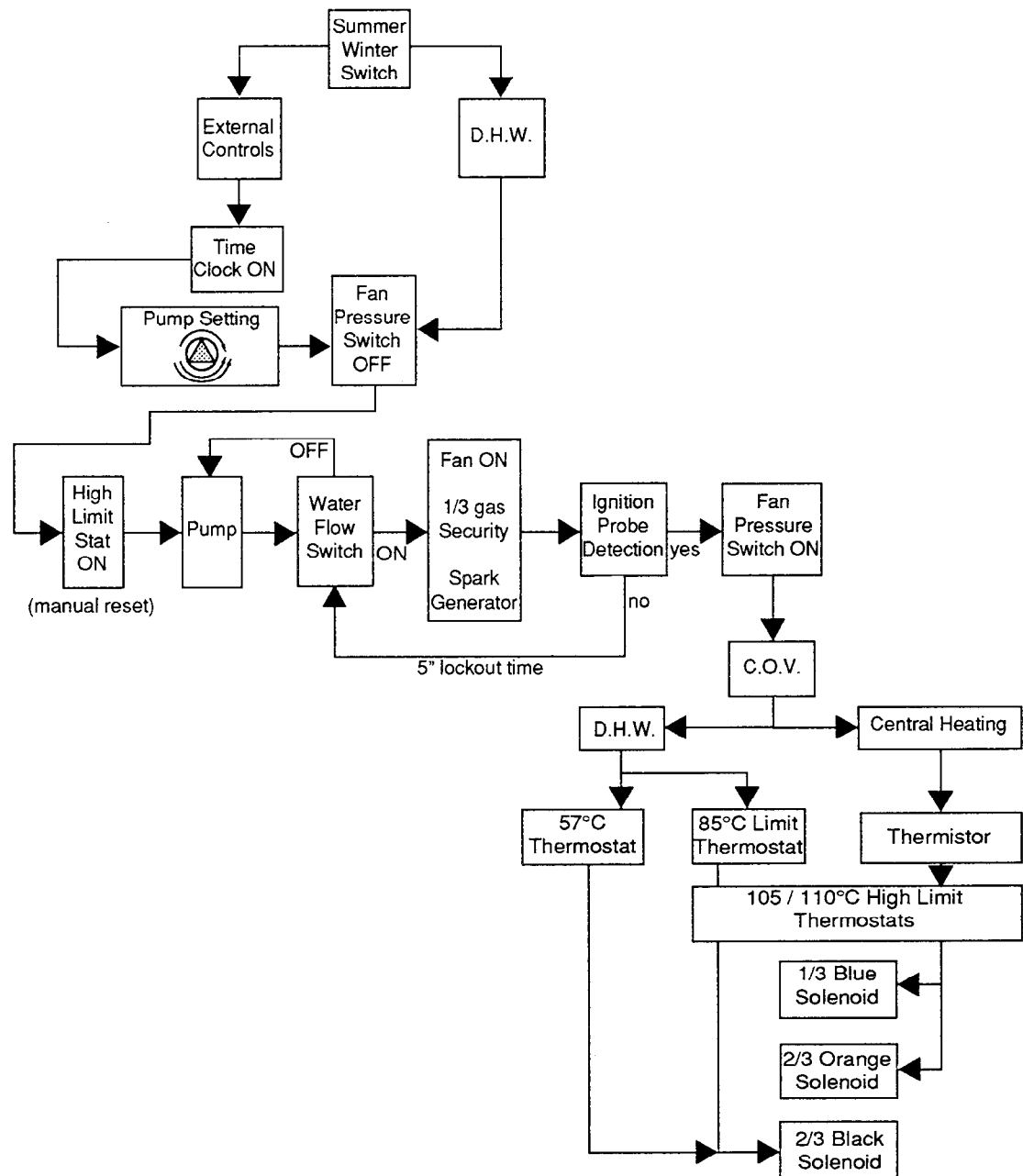


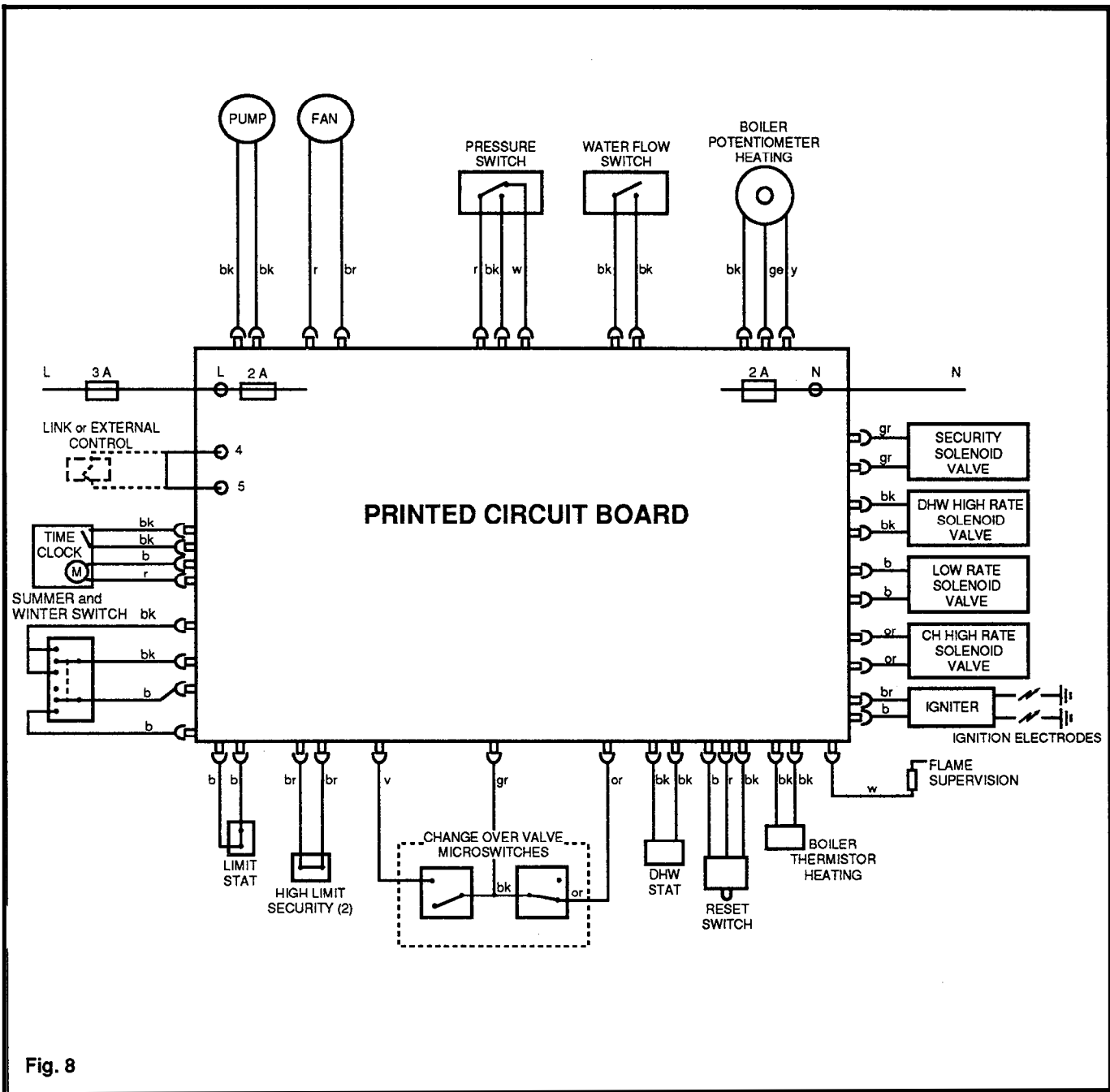
Fig. 7

1.6.6 Safety Controls

In addition to the normal safety controls the STERLING FF 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 on via the flow switch (No.31 - page 6), see figs 5 & 6 (37).

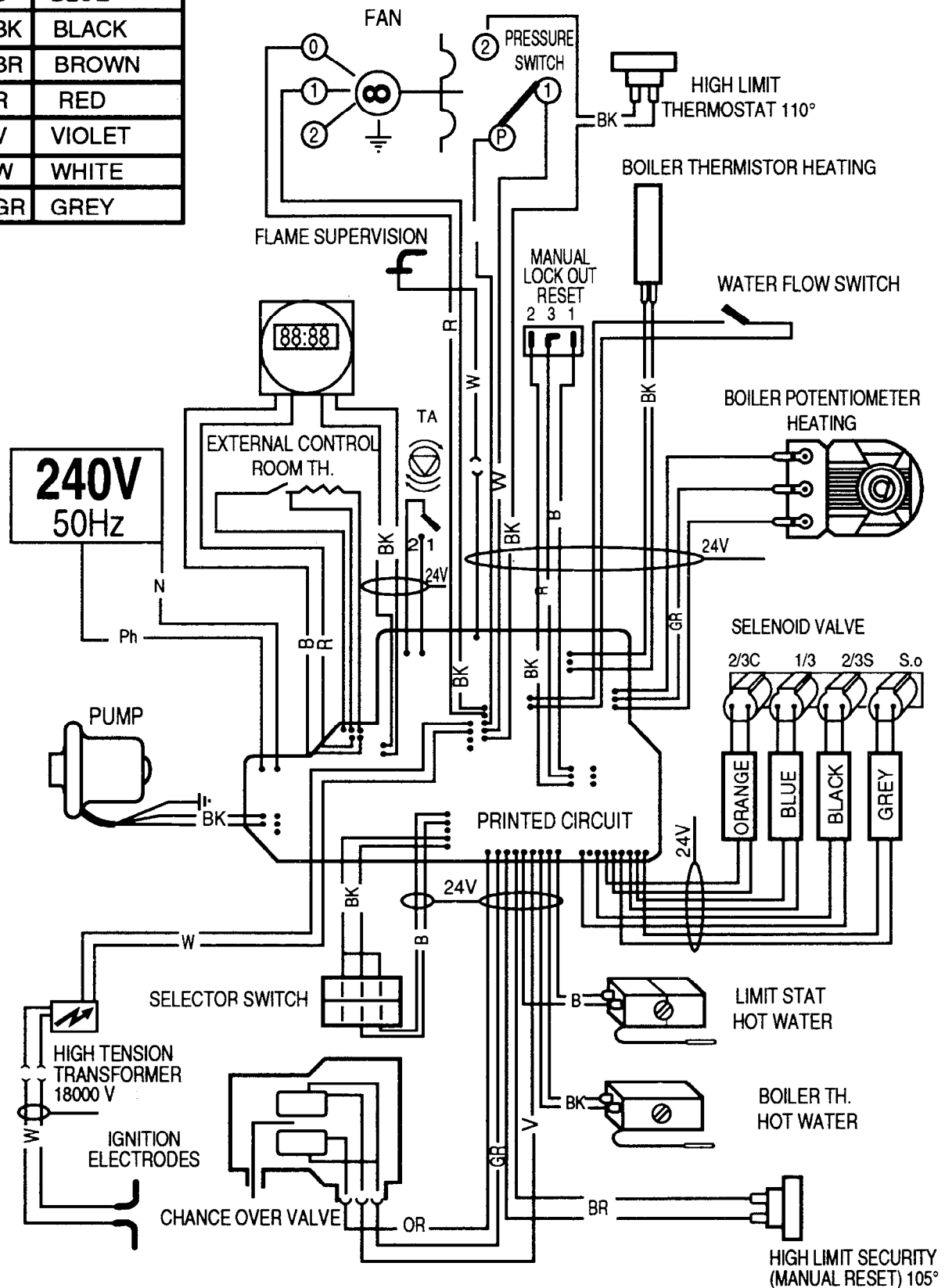
1.6.7 FUNCTIONAL FLOW WIRING DIAGRAM



- b = blue
- bk = black
- br = brown
- ge = green
- gr = grey
- or = orange
- r = red
- v = violet
- w = white
- y = yellow

1.6.8 ILLUSTRATED WIRING DIAGRAM

OR	ORANGE
B	BLUE
BK	BLACK
BR	BROWN
R	RED
V	VIOLET
W	WHITE
GR	GREY



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 BS Codes of Practice and the British Gas Specifications for Domestic Wet Central Heating Systems and any relevant requirements of the local Gas Region and 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 STERLING FF 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, windowsetc 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)(see section 14.3, fig. 3c)

Vertical Flue

Terminal positions	Min clearances
M - Above intersection with Roof.....	150 mm

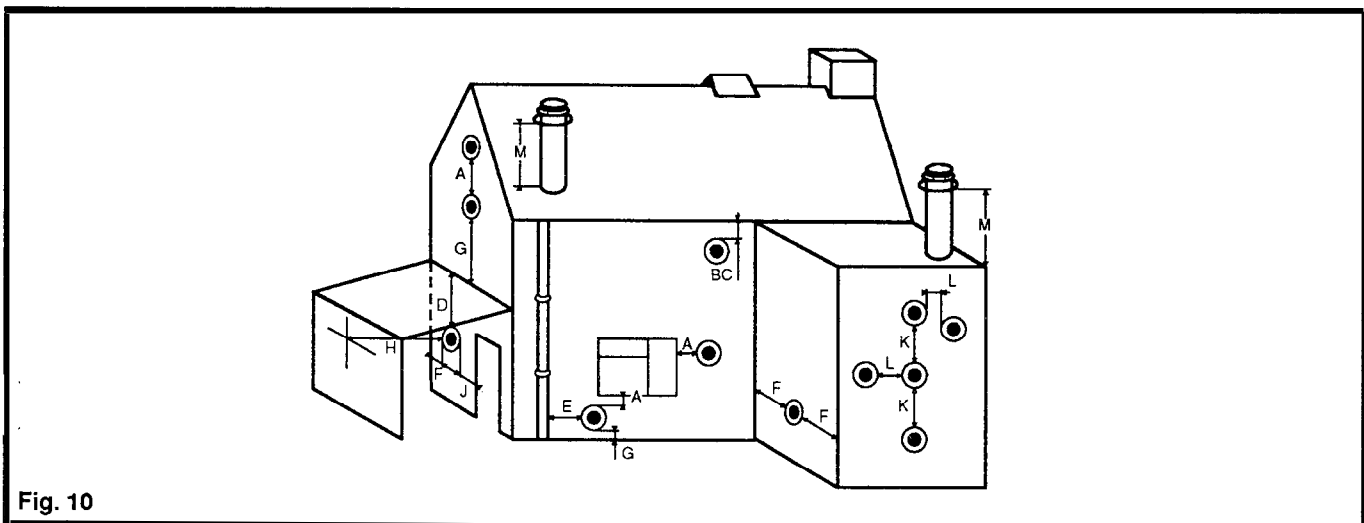


Fig. 10

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

C) Protect with a terminal guard fitted centrally over the terminal 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. 071-639-1357

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 ² (40 in ²)	130 cm ² (20 in ²)
Low level	261 cm ² (40 in ²)	130 cm ² (20 in ²)

2.6 Electrical Supply

- This appliance must be earthed.
- All wiring external to the appliance must conform to the current B.S. 7671.
- The STERLING FF 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 mm² (24 x 0.2 mm) three core to BS 6500 Table 16.

2.7 Gas Supply

The STERLING FF requires:
2.743 m³/h (96.87 ft³/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 STERLING FF 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.

When the appliance is connected to a vertical flue, the temperature adjustment must not be set below the midway position.

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 are given in sections 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 STERLING FF 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 bypass 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.

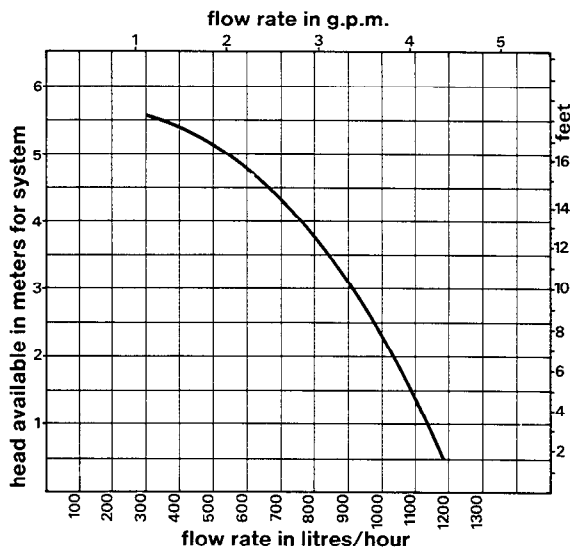


Fig. 11

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 BS 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

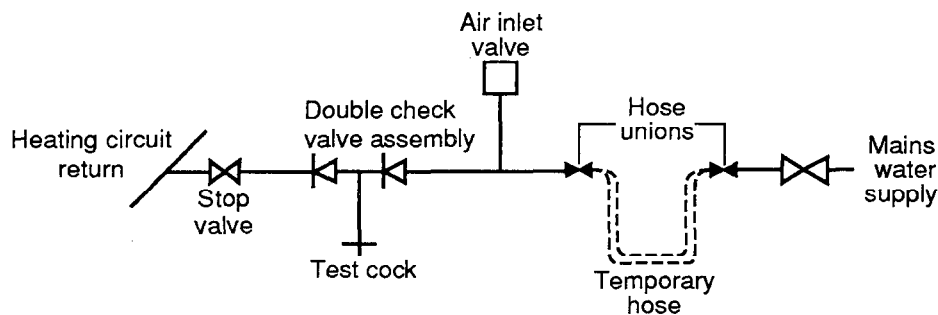
Pipework

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

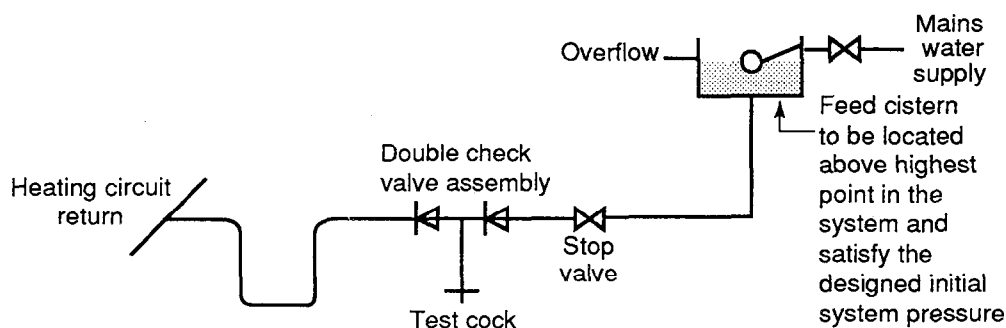
Domestic expansion vessel

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 STERLING FF 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 STERLING FF 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 STERLING FF.

3.12 Add-on devices

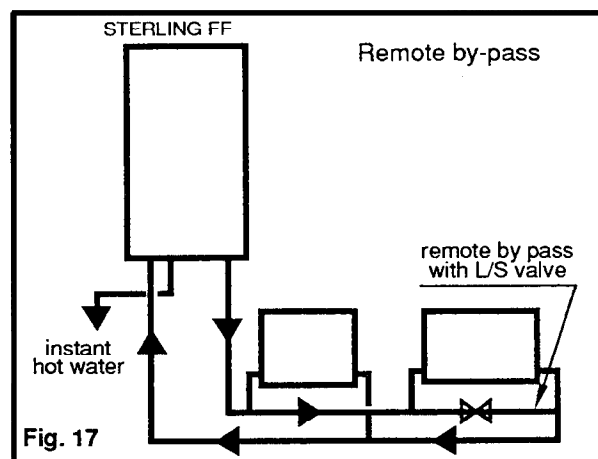
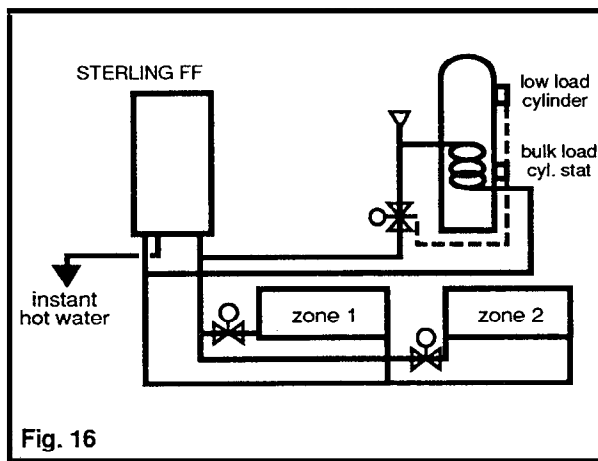
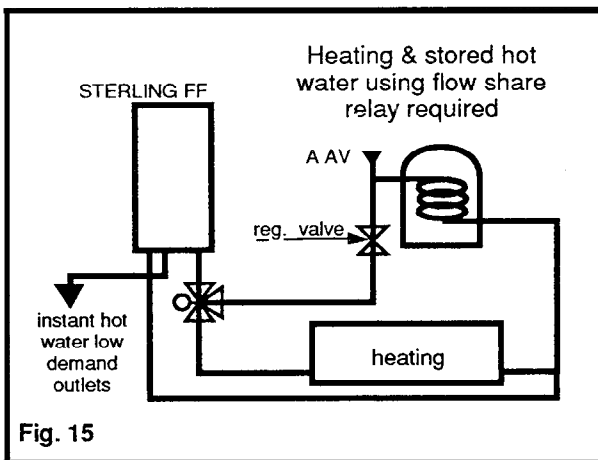
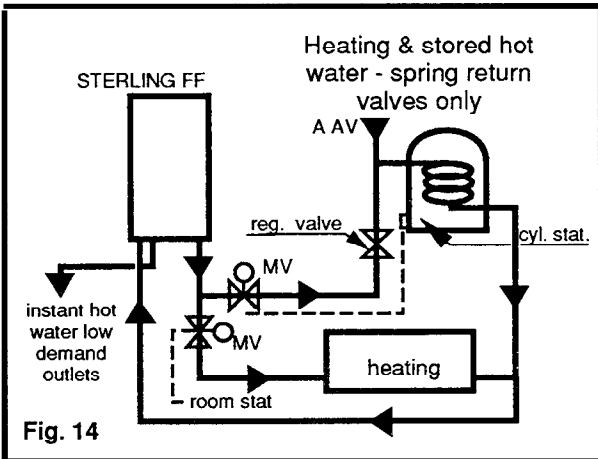
It is important that no external control devices e.g. economisers be directly fitted to this appliance unless covered by these installation instructions or agreed with the manufacturer in writing. Any direct connection of a control device not approved by the manufacturer could make the guarantee void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



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.

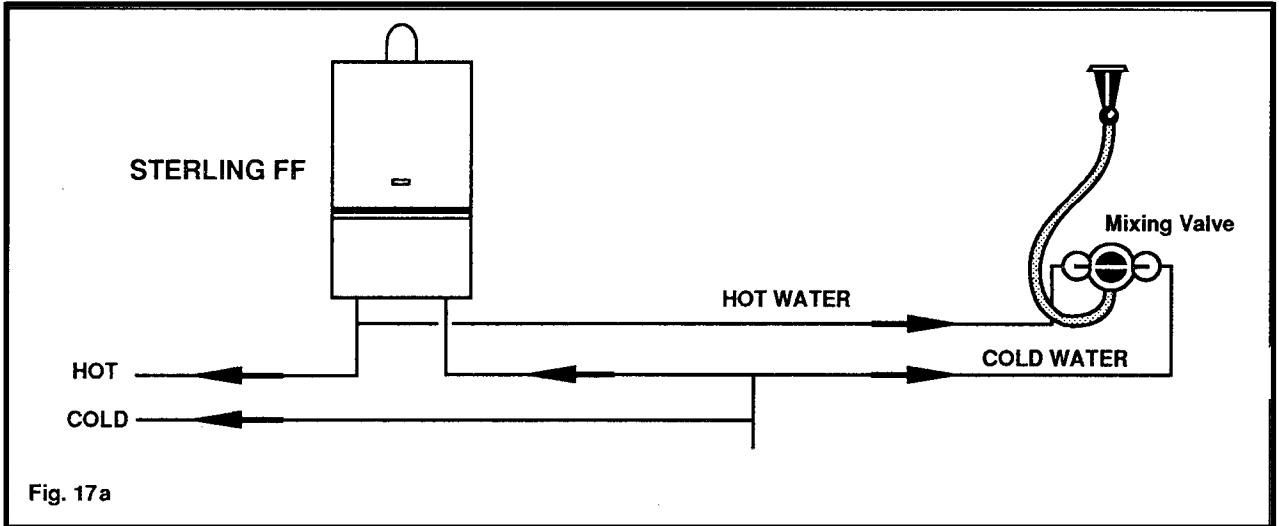


Fig. 17a

It is important to select a compatible shower for the STERLING FF. 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

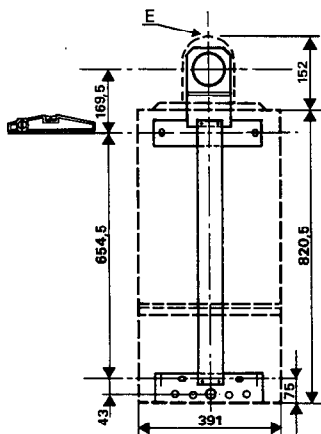


Fig. 18

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

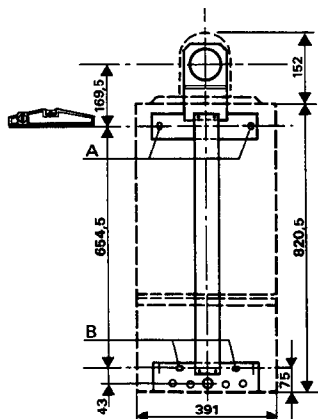


Fig. 19

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

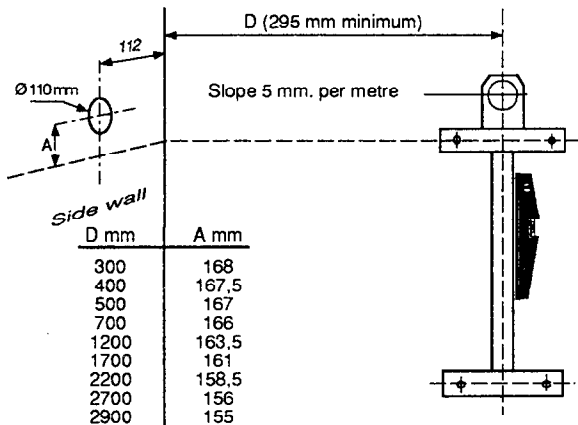


Fig. 20

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

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

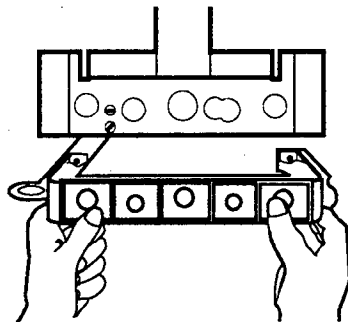


Fig. 21

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

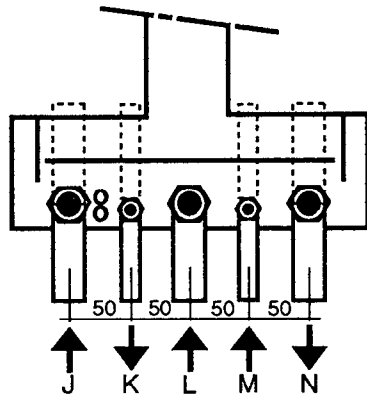


Fig. 22

Gas and water connections

Connection	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 staight 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

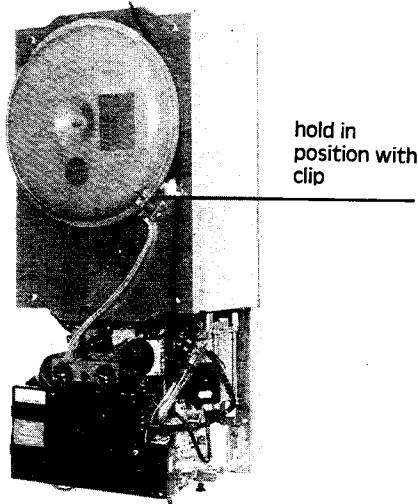


Fig. 23

Fitting the boiler

- a) Remove plastic jig plate from bracket and retain screws.
- b) Hang boiler on mounting bracket, ensure that it is properly located.
- c) Fit two screws through the lower part of the support bracket and into the rear spacers on the boiler.

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

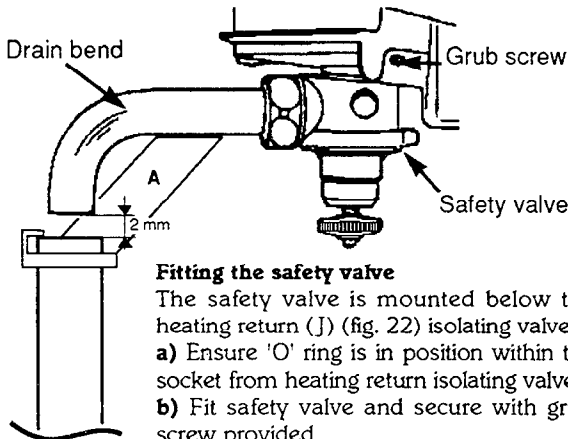


Fig. 24

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
- 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 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 an 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

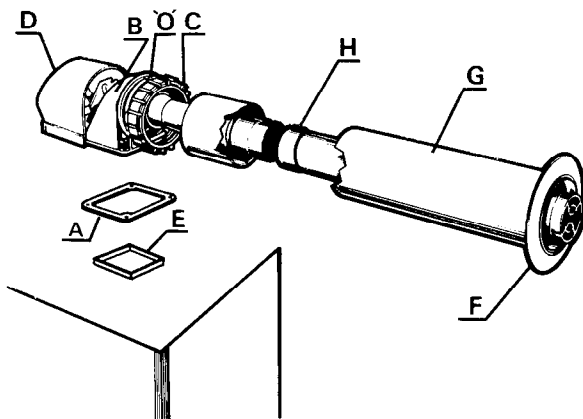


Fig. 25

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 (see figs 2 and 3).

- 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.
- n) Do not fit plastic turret cover 'D' until electrical connections to the pressure switch have been made (see fig.26).

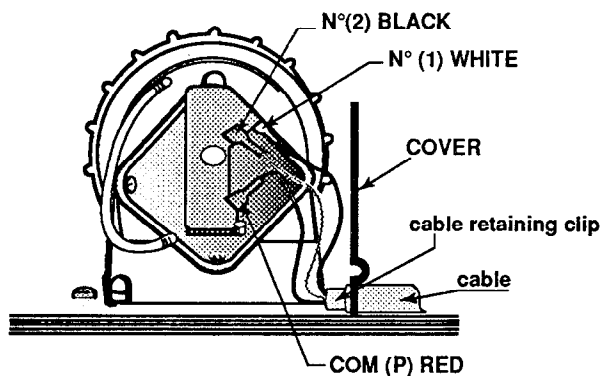
4.11

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

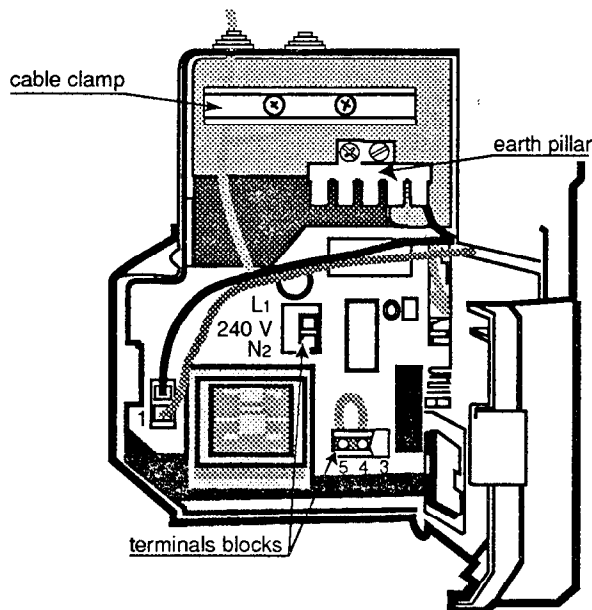


Connection to the pressure switch

- 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).

Fig. 26

4.13



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 mm²
- e) Remove cable clamp.
- f) Connect permanent live to L terminal (1) and neutral to N terminal (2).
- g) Connect earth to earth tag with the spade connector provided.
- h) Connect external controls - room thermostat etc. across terminals 3, 4 and 5, (see section 5.).
- 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.

Fig. 27

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.

4.14 VERTICAL FLUE

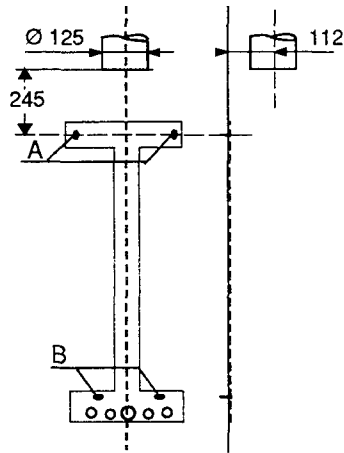


Fig. 28

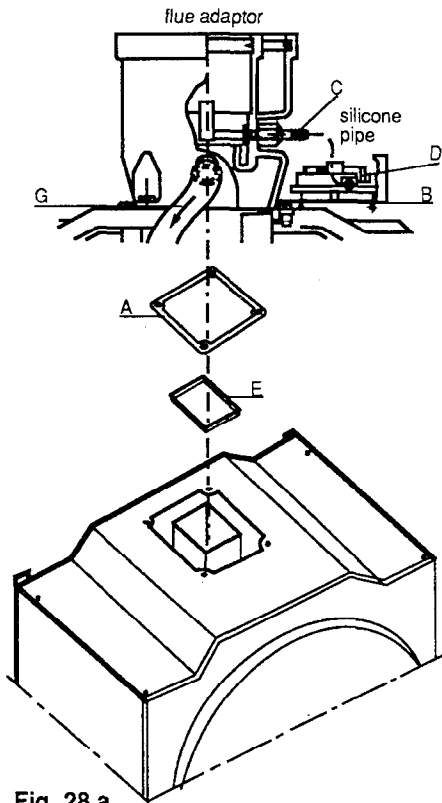


Fig. 28 a

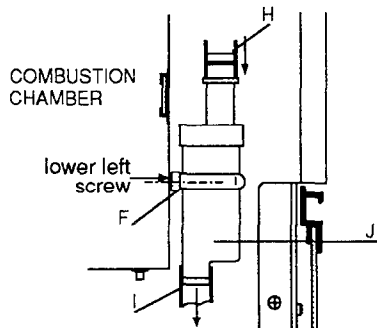


Fig. 29

Positioning the boiler

- Select the location for the boiler referring to the dimensions shown in 1.1 and 1.3.
- Select the flue configuration (see section 1.44).
- Assemble the mounting bracket made up from 4 pieces using 4 thread forming screws (do not fit rear outlet guide plate).
- Mark vertical centre line for boiler on wall.
- Mark horizontal line for upper bracket fixing screws.
- Using bracket as template mark 4 fixing points (A) and (B).
- Drill 4 fixing holes (A) and (B) and plug.
- Fix bracket to wall using 6 mm x 50 mm wood screws provided (see fig. 28).

Fitting the flue adaptor to the boiler

- Peel off protective paper from the adhesive side of the cork gasket (A) and place on the mating side of the flue adaptor.
- Position the square channelled rubber gasket (E) on the flue hood outlet of the boiler channel facing downwards into the boiler.
- Seat the flue adaptor on top of the boiler making sure that both gaskets are in place and secure the adaptor to the boiler by the 4 screws provided, utilizing the 2 right hand screws to fix the pressure switch support (D).
- Connect the small silicon tube between the adaptor connection (C) and the low pressure connection on the pressure switch (D) (see fig. 28 a).
- Connect the 3 wires to the pressure switch (see section 4.11 fig. 26).
 - Corn P (red)
 - No. 1 (white)
 - No. 2 (black)

Installing the boiler

The connection are made in the usual manner, see sections 4.4 and 4.5 and the boiler can now be fitted, see section 4.8.

Fitting the condensation drain

Fit the retaining clip by removing the bottom left hand screw from the combustion chamber, placing it through the fixing hole in the bracket and replacing the screw with the bracket located (F).

Place the condensation trap (J) into the bracket and connect the large silicon tube between the adaptor connection (G) and the trap connection (H).

The remaining silicon tube is connected to the condensation trap bottom connection (I) and must be fitted to suitable plastic pipework to ensure that the discharge is over a drain (see fig. 29). Fill condensation trap with water prior to use.

Fitting the flue

The flue can now be fitted into the adaptor via the reducer, making sure that all sections are tightly secured by pushing them firmly into position. All sections must be supported to ensure stability and no excessive weight put on the boiler (see section 1.4.4).

Important

The flue must rise vertically a minimum of .5 meters before a bend is fitted. It must only be installed in the manner shown in section 1.44.

Ensure that all joints are fitted with "O" ring and lightly lubricated with silicone grease.

It is appreciated that in some instances it may be necessary to install the flue prior to the fitting of the boiler. If this is the case, it is important to remember that the measurement between the horizontal fixing line for the template to the start of the flue is 245 mm.

5. EXTERNAL CONTROLS

5.1 Programmer and zone valves

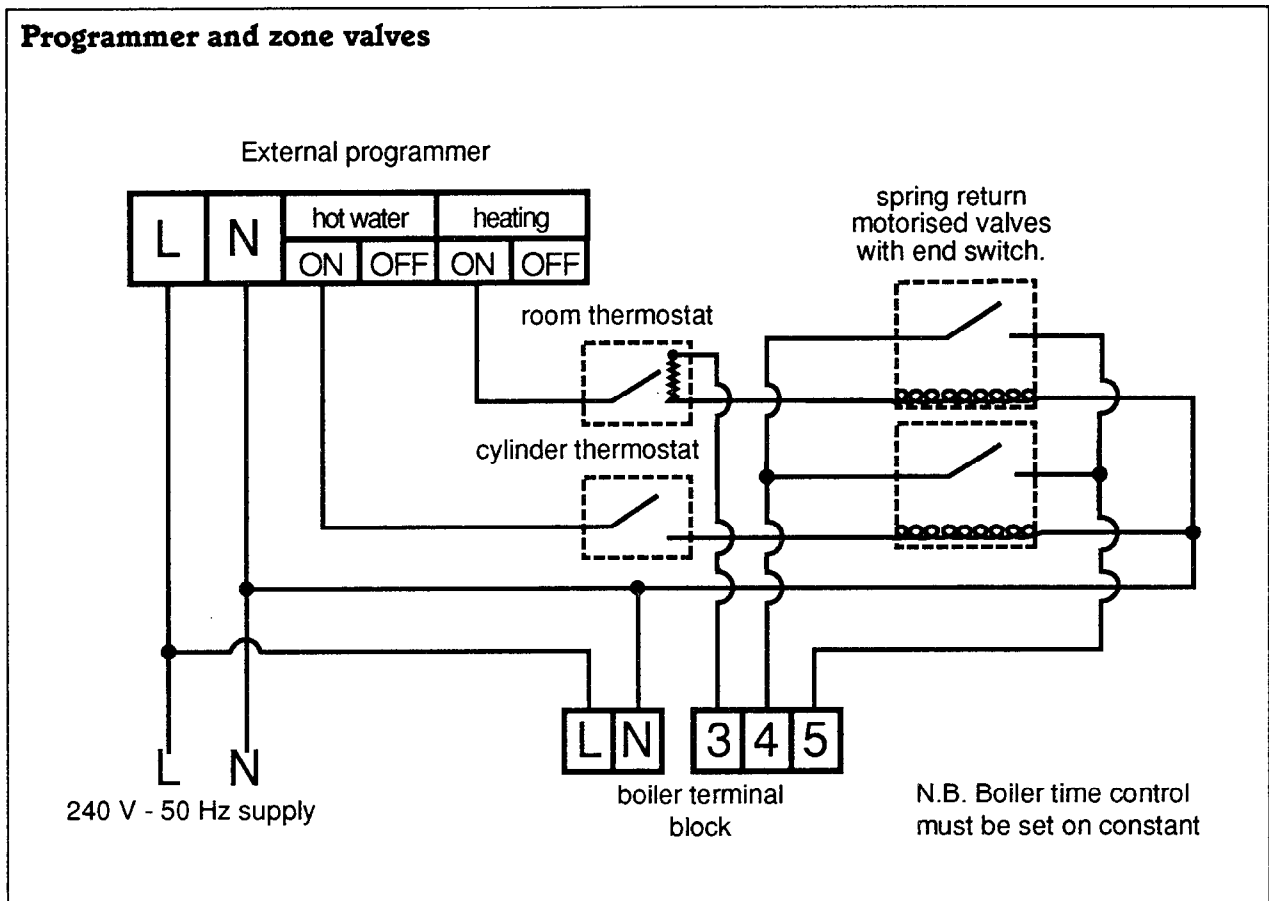


Fig. 30

5.2. 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.

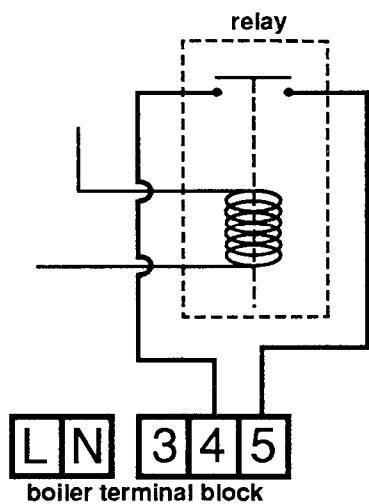


Fig. 31

5.3 Frost thermostat

Fig. 32

5.4 Room thermostat

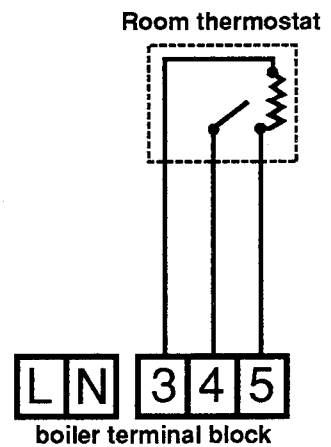


Fig. 32 a

6. COMMISSIONING

6.1

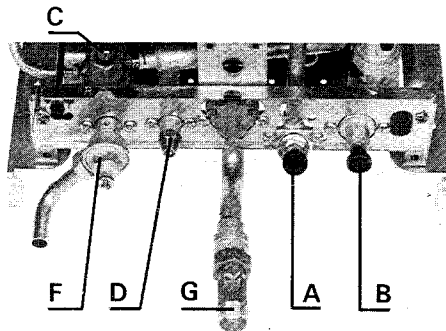


Fig. 33

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

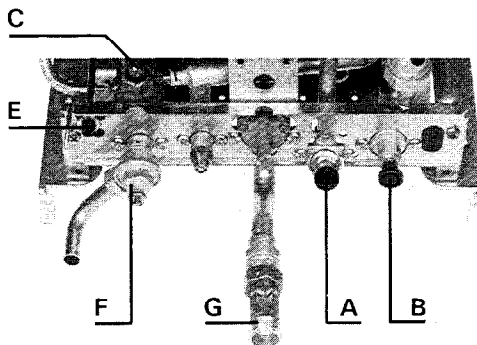



Fig. 34

Central heating circuits - filling

- 1) Ensure that the isolating valves are open (B and C) (fig. 34).
- 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 (E) (fig. 34) 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 (D) (fig. 35).
Insert small electrical screwdriver (3 mm blade), locate in slot in pump shaft, rotate clockwise to ensure that pump is free replace cap (D).
 - 9) Switch to HOT WATER + CENTRAL HEATING on selector switch (A) (fig. 35) switch position «».
 - 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 (7.4) 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

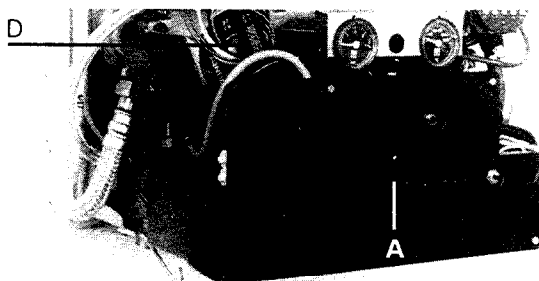



Fig. 35

Remove protective film from case.

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.
- 3) Temporarily locate the temperature control 'knob' - and turn to maximum setting.
- 4) Switch to HOT WATER + CENTRAL HEATING «» on the selector switch (A).
Ensure that any ancillary controls are in the demand position the boiler will now fire automatically.
- 5) Check for gas soundness using leak detection fluid or gas detector.
- 6) Check and adjust gas pressure/gas rate, see Section 6.4.
- 7) L.E.D. display sequence.
Green : electrical supply on
Yellow : run
Red : lock-out
and if boiler locks out, reset and repeat.

6.4

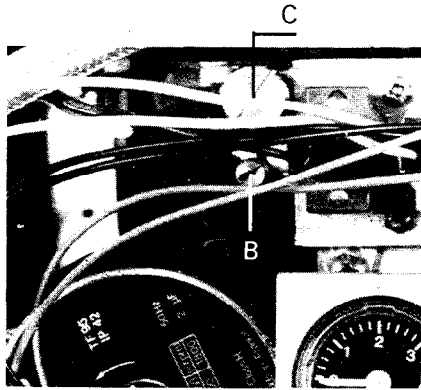


Fig. 36

Gas rate adjustment

N.B. Before adjustment check gas pressure on the inlet to the appliance, with the appliance working - this should be 20 mbar (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 «☒» 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 «0». 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.

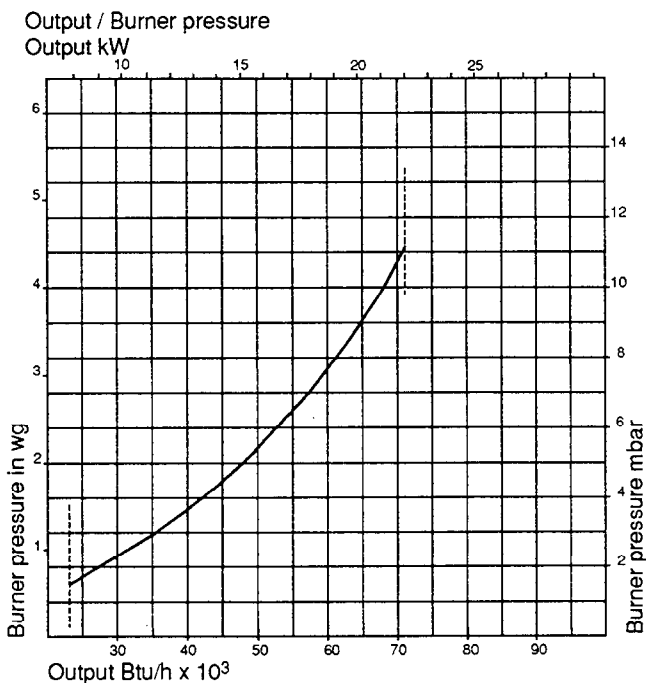


Fig. 37

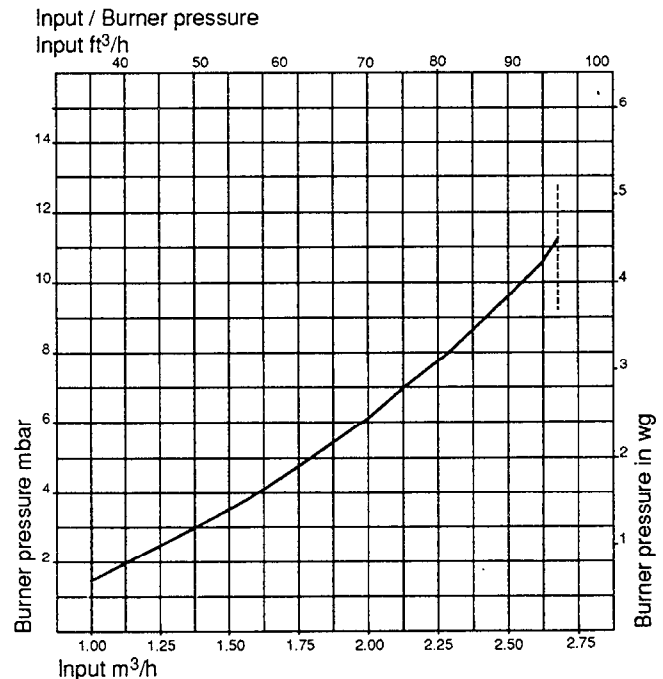


Fig. 38

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

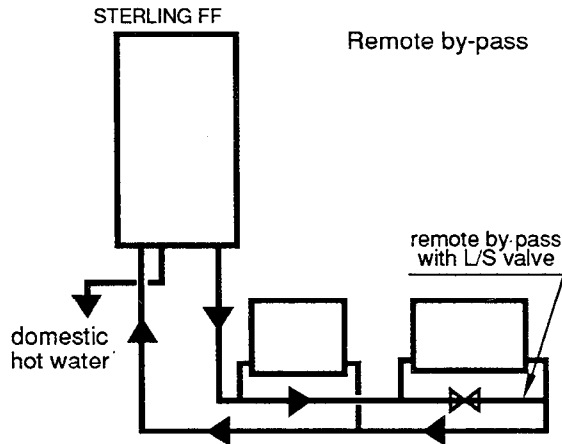


Fig. 39

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 «☒».
- 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

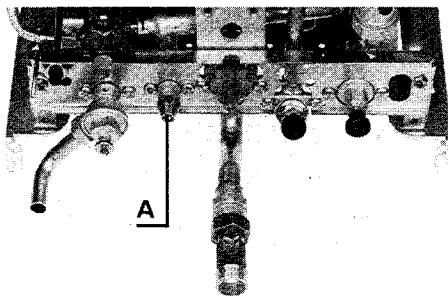


Fig. 39 a

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

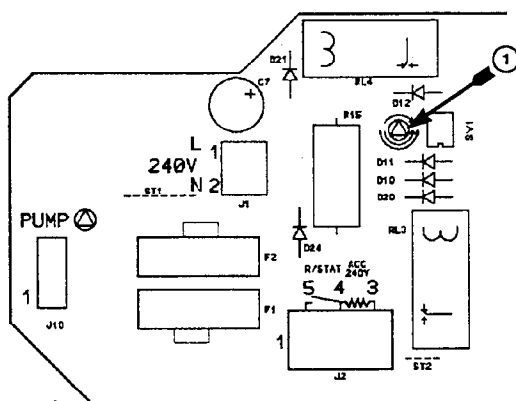


Fig. 39 b

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. 39b), the room thermostat then only switching the burner on and off.



6.9

Central heating temperature differential setting adjustment (1)

The appliance is set to give a temperature of differential setting of 12°C on the termistor control ($\Delta T 2$ position). For largers systems, to increase the mean temperature, it is possible to decrease the temperature differential to 7°C by removing the plug $\text{\textcircled{2}}$ from $\Delta T 2$ position and inserting it into $\Delta T 1$ position. For smaller systems, to minimise cycling a temperature differential of 20 °C be achieved by removing the plug from $\Delta T 2$ position and inserting it into $\Delta T 3$ position, see fig. 39 c

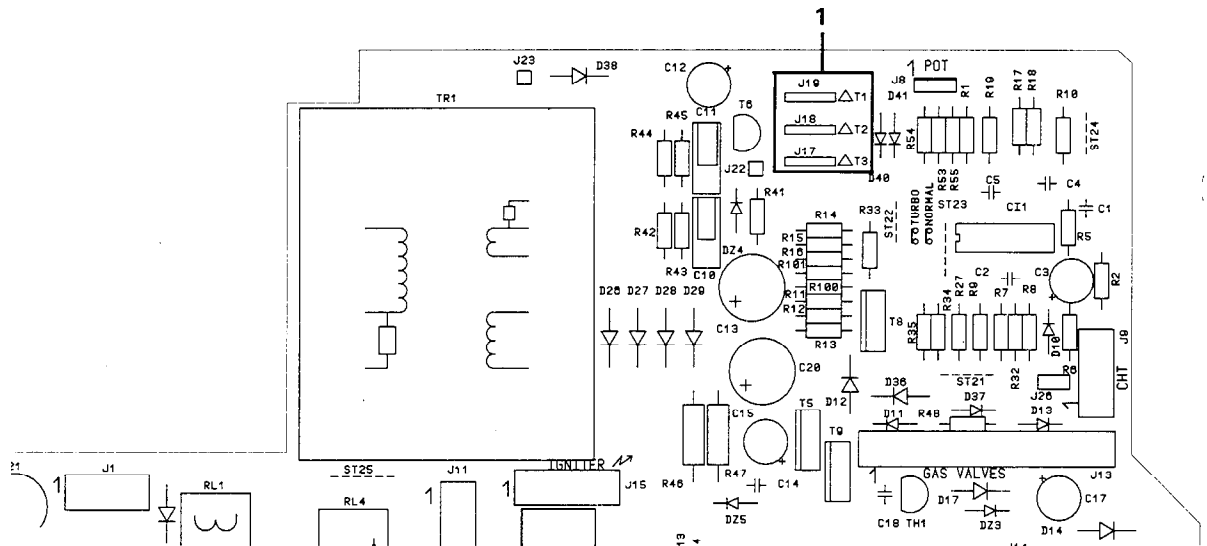


Fig. 39 c

6.10

Fitting the casing

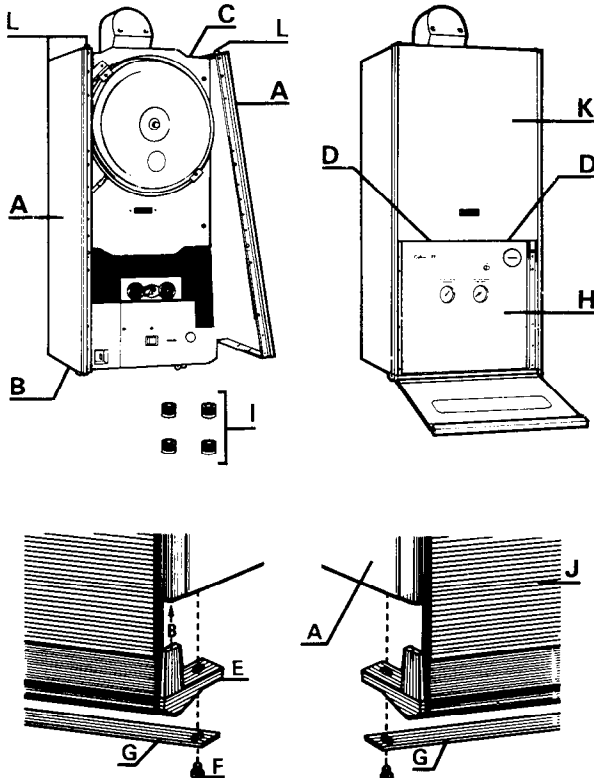


Fig. 40

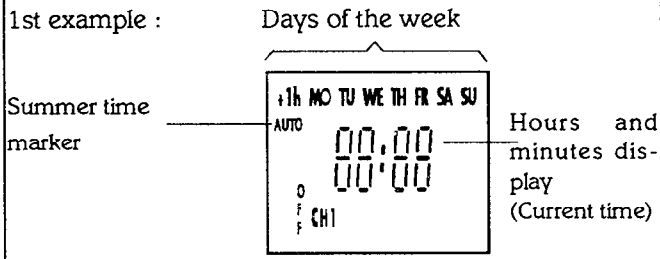
- 1) Take from the carton the controls cover (H), the glass door (J) the top front panel (K) the side panels (A) and the rubber grommets (I).
- 2) Remove control knobs used during testing and commissioning and fit the four grommets into the holes at the top of each side panel (I).
- 3) Fit side panels (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.

6.11 Time Clock Operating Instructions

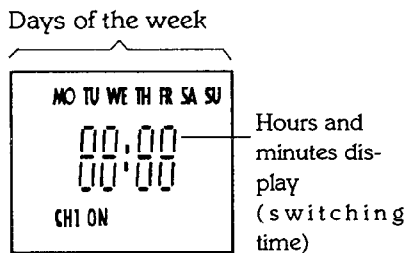
LCD display-unit

The display contains a large number of elements to clearly show the various data and information.

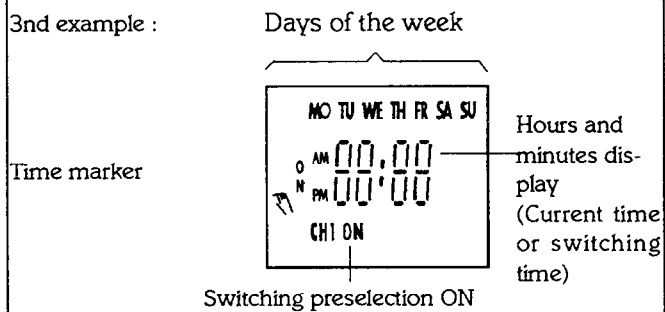
1st example :



2nd example :



3rd example :



Data administration inside the time switch

a) Blocks

The time switch is designed as a 7-day clock but can, of course, also be used in 24-hour mode if, for example, all seven days of the week are allocated to particular switching times.

If you wish switching to take place at the same time on various days, this can be done with the following weekday blocks :

Monday - Sunday (MO SU)

Monday- Friday (MO FR)

Saturday+ Sunday (SA + SU)

Single-day programming is, of course, possible.

b) Memory locations

The memory capacity is designed for 16 locations, 8 switching pairs being available (8 ON and 8 OFF).

c) Implementation of the switching commands

Whenever the program or time is changed (e. g. summer time/winter time switchover), all memory locations are "interrogated" and the processor creates the switching state which corresponds to the "current status" according to the program.

Keypad description - functions

The relevant keys must be pressed in combination with the key

⊖ in order to enter the current time of day.

⊖ + Day to enter the current day of the week

⊖ + h+0 to enter the time (hours)

⊖ + m+ to enter the time (minutes)

The relevant keys are only pressed individually for all further entries or to check the programmed switching time.

CH 1 To select the standard display (current status)

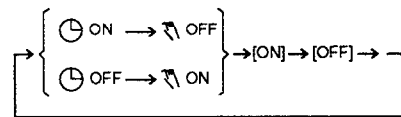
To select the relevant memory locations for ON or OFF when programming and entering in the memory.

Day For selecting the relevant day of the week for switching times.

h+ For entering the hours for switching times.

m+ For entering the minutes for switching times.

↻ 1 For manually advancing the switching state



[] Means constant operation (fix)

+ 1 h To select summer time or winter time

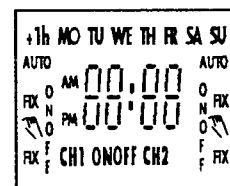
Res. To delete all stored switching times in the memory and the current time in the display.

Entering the current time

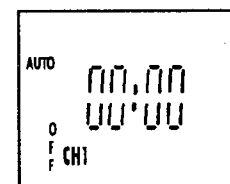
It must be assumed that the battery of the time switch is discharged until the appliance is put into operation. It can take up to 2 minutes until the various segments in the display light up (battery charging procedure).

Use a pencil or a similar object to press the "Res" key. This sets the electronics to "neutral". All segments in the display are visible for approximately 5 seconds.

On pressing the re-set button the display will show thus :



After 5 seconds, the following appears :



Routine start :

Press the ⊖ button once. MO (Monday) appears in the display and the clock starts at 20:00.

The ⊖ key **must** be constantly pressed in order to enter the current time.

Any sequence of entry is possible.

If the current time is entered during the summer time periode, the time may be advanced by one hour with the "+1h" key. The additional "+1h" identifier appears in the display.

Example :	Keys :	Display :
16:20	Keep \ominus pressed	
Thursday	Day	
	h+, m+	

If the h+ and m+ keys are pressed for longer than 2 seconds, roll mode occurs.

Release the key. Make a time check, e.g. radio/television/telephone speaking clock. A colon flashes between the hours and minutes display in the display.

Programming switching times

Entering switch-on and switch-off times is started and completed (stored) with thr CH 1 key.

When this key is pressed, the memory locations for an ON command and then for an OFF command are alternately called up.

After the individual switching times have been entered, they are also entered into the memory with the CH 1 or \ominus key.

Example :	Keys :	Display :
Mo, Tu, We, Th, Fr 6:00 ON	CH 1 - call up memory location for ON command, then press day until M.T.W.T.F. appear, then press h+, m+ until correct switch/off time is display	

This switching command is then stored by pressing CH 1 again.

The time switch is now ready to accept the first switch/off time. Corresponding switch-off times are programmed in the same way.

If the relevant programming procedure is interrupted for longer than approximately 1 - 2 minutes, the display contents change back to the current time.

Partial entries, e.g. only hours, are recorded in the memory but are not effective as a switching command. See point 10 c.

To return the clock to its normal mode press the \ominus key.

Read - change - delete

a) Read

The programmed switching times are "read" step-by-step with the "CH 1" key. Every display content corresponds to a memory location.

b) Change

A command called up with key CH 1 key can be changed (corrected) in the display - simply overwrite displayed data - but is not recorded in the memory until "CH 1" key is pressed.

The \ominus key is also used to transfer the new value into the memory.

The time switch is now in the current mode of operation.

c) Delete

If you want to cancel one of the entered switching times, it is sufficient to "deleted" part of the entry. E.g. 06:-- ; or --:30 ; or --:--.

The entire contents of the memory, including the time, are deleted with the "Res" key.

Manual actuation of the switching output

The switching output can be influenced as follows with the key 1.

Starting position

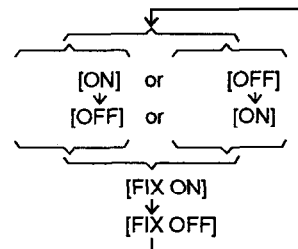
\uparrow Press once

\uparrow Press again

\uparrow Press again

\uparrow Press again

(back to automatic mode)



Notes :

A manually changed switching state \uparrow ON or \uparrow OFF is cancelled again by the next automatic switching time, i.e. the next programming step is carried out again automatically.

It is only possible to return to automatic mode from the functions FIX ON and FIX OFF by pressing the \uparrow keys.

HAND OVER THE USERS INSTRUCTIONS AND EXPLAIN THE BASIC FUNCTIONS OF OPERATING THE APPLIANCE. LEAVE THE INSTALLATION AND SERVICING INSTRUCTIONS WITH THE USER.

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 and pressure in heating system.

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

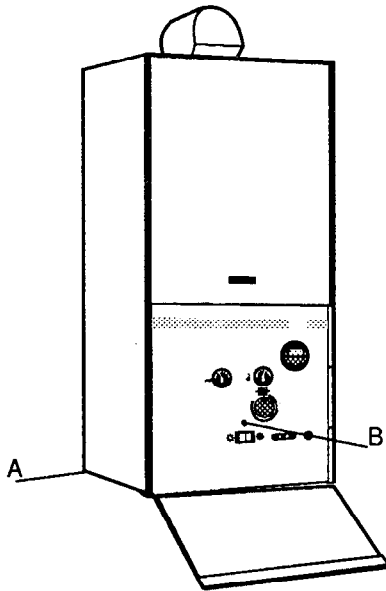


Fig. 41

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.
- 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

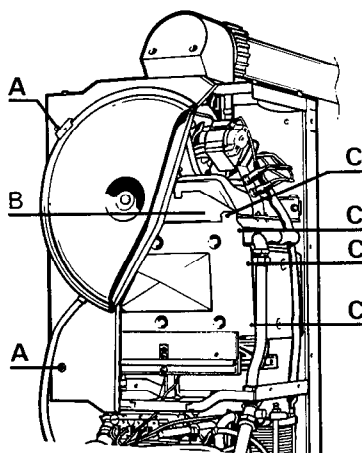


Fig. 42

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, and unclip wiring harness to pressure switch.
 - 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 8 screws (C) and lift off heating body front panel with access panel (B).
 - d) Clean the heat exchanger after removing the burner, (see section 7.5).
- Replace in reverse order.

7.3

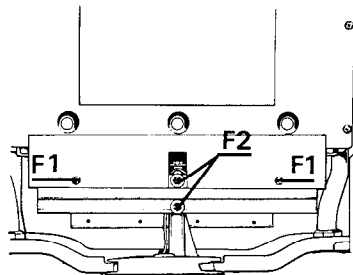


Fig. 43

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 7.5).

7.4

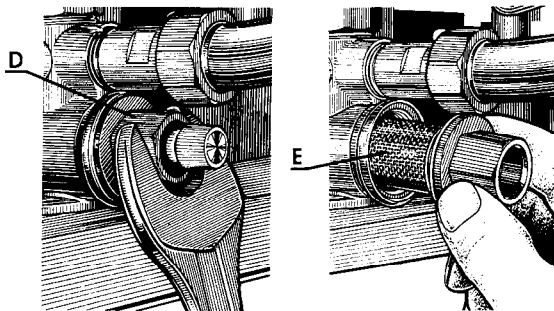


Fig. 44

To clean heating return filter

- a) Close heating flow and return valves (B and C) and drain through safety valve (F) (see section 6.2).
- b) Using spanner remove return valve spindle guide assembly (D).
- c) Lift filter (E) off assembly.
- d) Clean in warm water.
- e) Replace in reverse order. Replace all components removed in reverse order.

7.5

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.
- c) Examine electrode and clean, the tip. If the tip appears damaged replace electrode and lead assembly - (see section 8.1).
- d) Replace all components in reverse order ensuring that the gasket between the gas section and the manifold is correctly positioned upon reassembly.
- e) Open all isolation valves and repressurise system if necessary.
- f) Recommission and check controls.
- g) After the boiler is lit, check all gas connections for soundness.
- h) 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).
- i) Restore any system controls and clocks to their original setting.

7.6

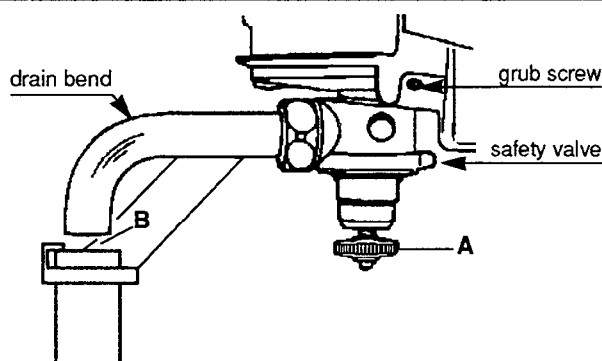


Fig. 45

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 8.33).

8. REPLACEMENT OF PARTS

N.B. Before commencing ensure gas and electricity supplies are isolated, and drain appliance if necessary.

8.1

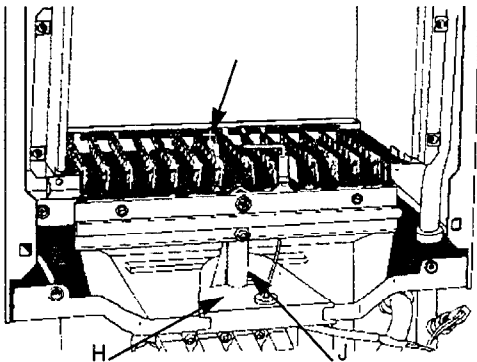


Fig. 46

To replace electrodes

- a) Remove front case (see section 7.1),
- b) Remove outer front panel and combustion chamber front panel (see section 7.2),
- c) Disconnect from electrical box by pulling off electrode lead from the high voltage transformer.
- d) Feed cable up through gas section (H) removing grommet (J) (see fig. 46),
- e) Disconnect probe (see section 8.2).
- f) Remove burner (see section 7.3),
- g) Remove screws securing electrodes,
- h) Replace in reverse order.

8.2

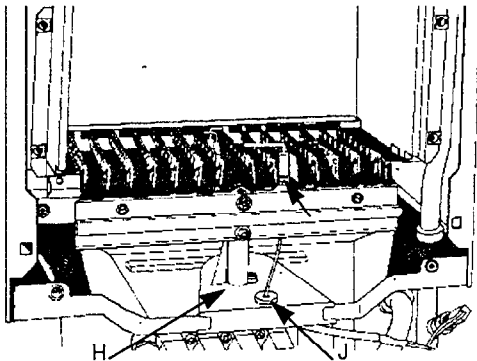


Fig. 46 a

To replace probe

- a) Remove front case (see section 7.1),
- b) Remove outer front panel and combustion chamber front panel (see section 7.2),
- c) Disconnect from electrical box by pulling off probe lead at lower left hand rear.
- d) Feed cable up through gas section (H) removing grommet (J) (see fig. 46 a),
- e) Disconnect electrodes (see section 8.1).
- f) Remove burner (see section 7.3),
- g) Remove screw securing probe
- h) Replace in reverse order.

8.3

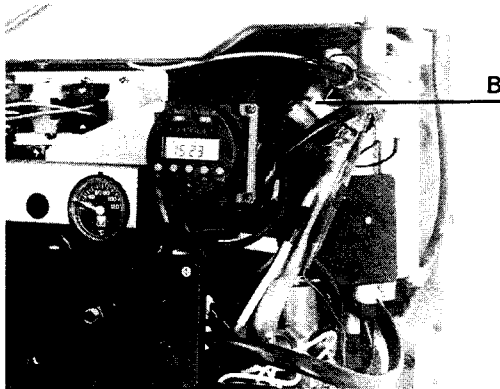


Fig. 47

To replace safety overheat thermostat 105°C

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

8.4

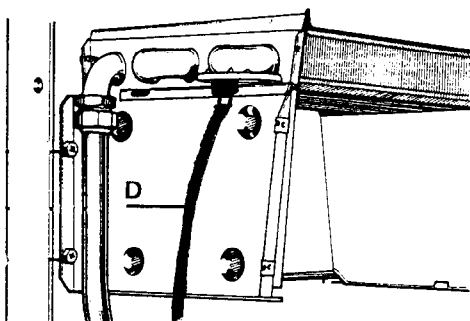


Fig. 48

To replace overheat thermostat 110°C

- a) Remove front case (see section 7.1),
- b) Remove outer front panel.
- c) Remove left side panel.
- d) Remove two screws securing high limit thermostat to bracket.
- e) Remove high limit stat.
- f) Replace in reverse order. Use heat sink grease between high limit stat and bracket.

8.5

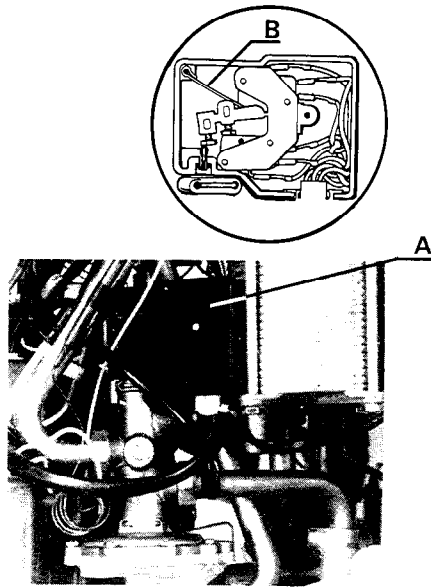


Fig. 49

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

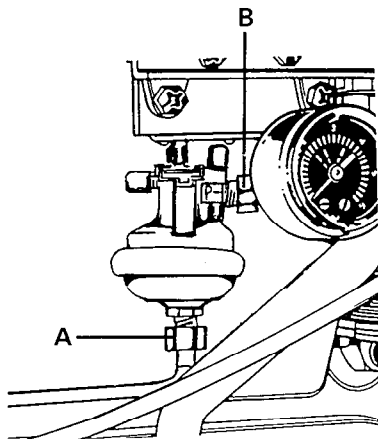


Fig. 50

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

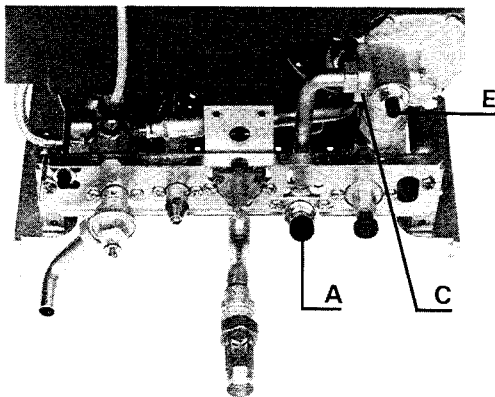


Fig. 51

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

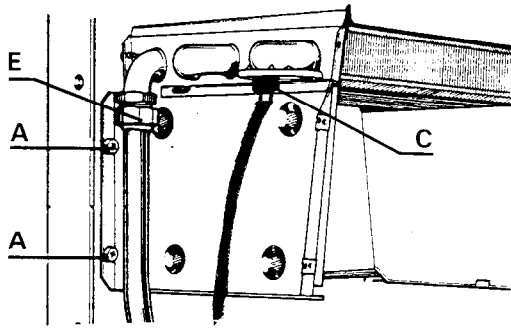


Fig. 52

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 overheat thermostat (C).
- i) Remove four screws (A) securing heating body panels to chassis.
- j) Undo flow and return pipe unions (E), remove pipes and slide primary heat exchanger forwards.
- k) Replace in reverse order.

8.9

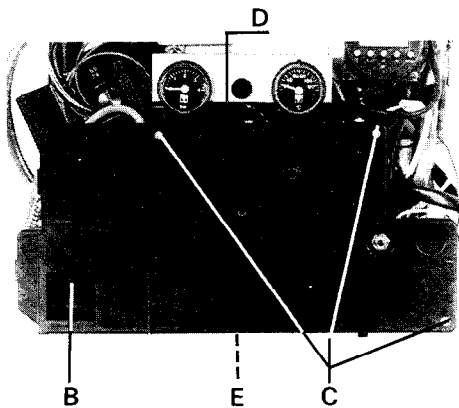


Fig. 53

To remove electrical control box

- a) Remove front casing (see section 7.1).
 - b) Remove fuses by pulling fuse carrier (B) from electrical box (see fig. 54).
 - 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) (see fig. 53).
 - 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 at connector.
 - k) Disconnect electrode from rear of electrical box.
 - l) Disconnect the two time clock plugs from the electrical box.
 - m) 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.
 - n) Continue moving electrical box until bottom support bracket can be positioned on hook at bottom of appliance. To remove the electrical box completely, continue in the following manner.
 - o) Isolate appliance from the system by closing valve A (see Section 6.2) (Fig. 34).
 - p) Drain secondary side by opening drain plug (H) (fig. 34).
 - q) Remove clip and phial from DHW thermostat pocket.
 - r) Unclip and remove limit boiler thermostat phial.
 - s) Remove box completely.
- To replace electrical box in reverse order note :
- a) Hang box on hook.
 - b) Capillaries must be routed behind any pipework .

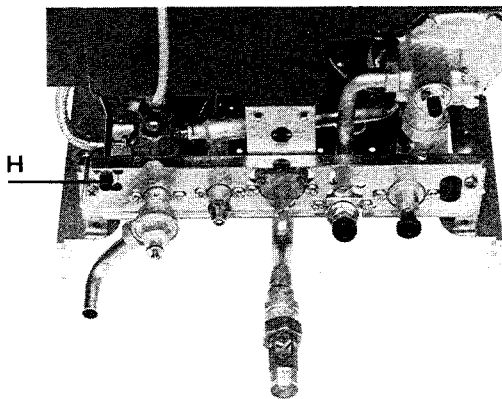


Fig. 54

8.10

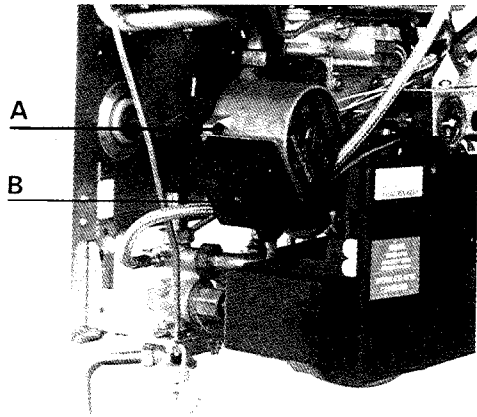


Fig. 55

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 8.11 (B and C, fig. 57).
- c) Drain boiler (primary side) through safety valve (see section 8.11 (F, fig. 57)).
- d) Remove four hexagon headed screws (A).
- e) Remove pump head noting orientation.
- f) Take off electrical connection cover by removing screw (B).
- 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 STERLING FF the pump is a Grundfos UP 15-60

8.11

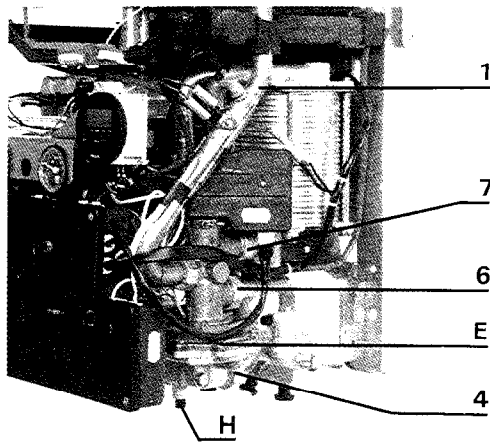


Fig. 56

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

- a) Remove front case (see section 7.1).
- b) Remove the 3 electrical box fixing screws (D) and (E) (see fig. 53) and carefully pull the electrical box towards you, taking care not to damage any capillaries or disconnect wiring.
- 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 flow 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 height 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

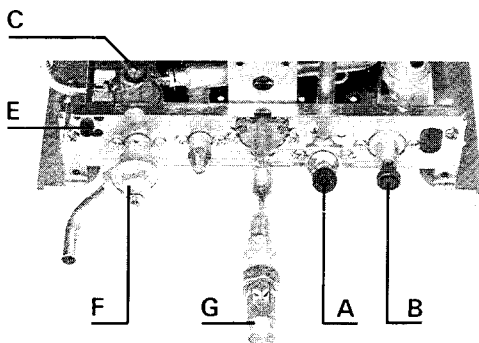


Fig. 57

8.12

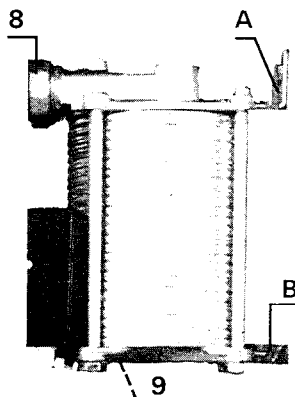


Fig. 58

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.

8.13

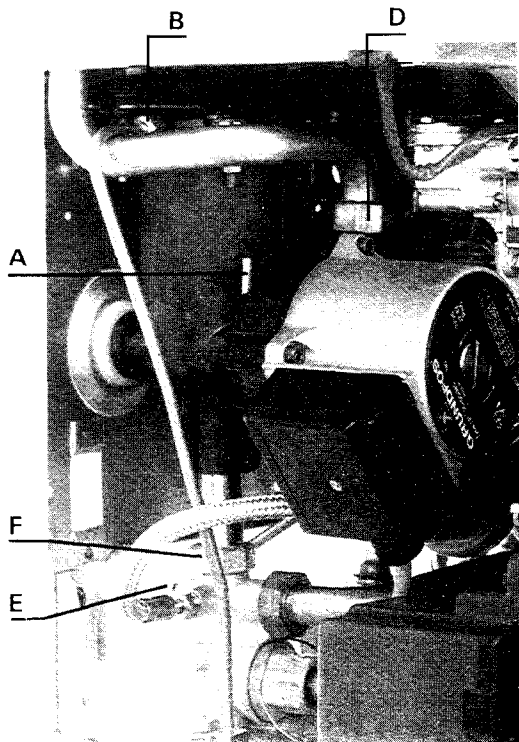


Fig. 59

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. 57))
- d) Drain boiler down through safety valve (F) (see section 7.6 (fig. 45)).
Remove electrical box (see 8.11) and disconnect pump.
- e) Disconnect flow switch pipe union from pump volute (E).
- f) Disconnect manual vent tube (B) be carefull not to loose black washer.
- g) Pull out spring clip (A) with pliers.
- h) Disconnect pump connection at union (D) at pump outlet.
- j) Pull pump complete with volute forwards and remove.
- k) Disconnect union nut at base of air separator (F).
- m) Ease air separator forward and disengage integral peg from chassis bracket,
- 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.

8.14

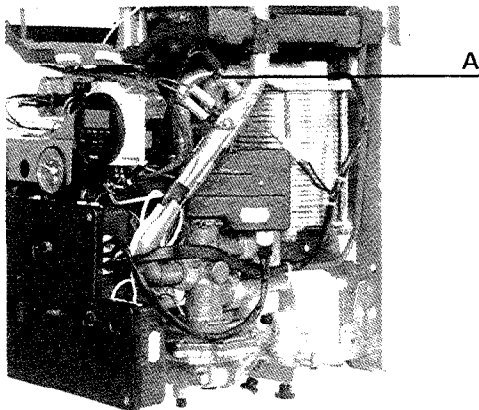
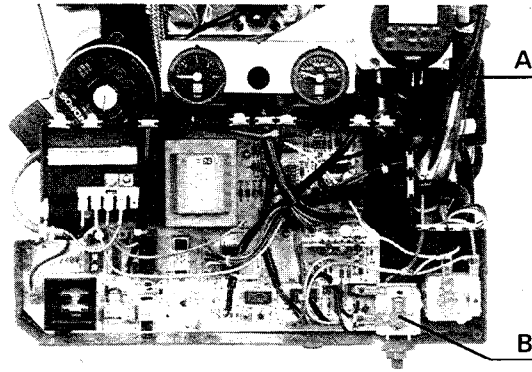


Fig. 60

To replace thermistor

- a) Remove front case (see section 7.1).
- b) Disconnect the spade connectors.
- c) Unscrew the knurled ring (A) (fig. 60) retaining thermistor.
- d) Remove the thermistor by gently pulling.
- e) Replace in reverse order using heat sink grease on thermistor.

8.15

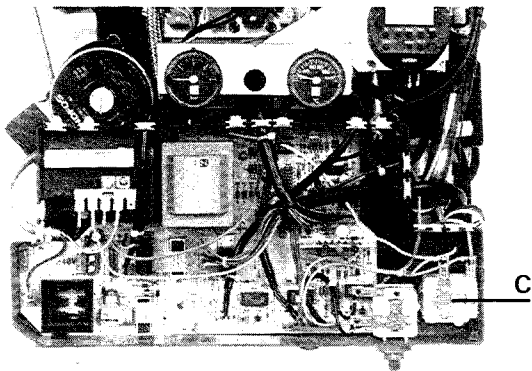


To replace boiler limit thermostat

- a) Remove front case (see section 7.1).
- b) Remove electrical box (see section 8.11).
- N.B.** Thermostat (B) is situated to right bottom of electrical box, sensor on flow pipe, on right hand lower side.
- c) Remove from 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).

Fig. 61

8.16

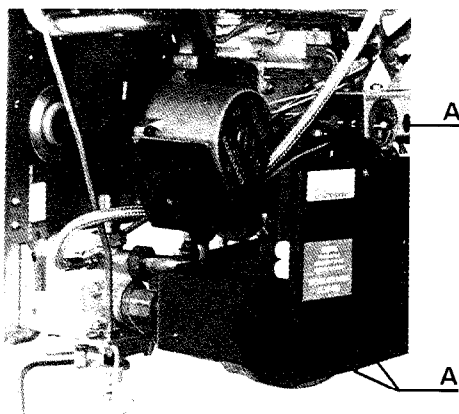


To replace domestic hot water thermostat

- a) Remove front case (see section 7.1).
- b) Isolate mains water supply - drain from valve beneath the change over valve (see section 8.11 fig. 56 (H)).
- c) Remove clip which retains phial in wet pocket.
- d) Remove phial from pocket.
- e) Remove electrical box front cover (see section 8.11, c).
- f) Ease thermostat (C) off moulded pegs and pull off spade connections.
- g) Feed capillary through the control box, having removed the split grommet.
- h) Replace in reverse order. Polarity immaterial.

Fig. 62

8.17



To replace high tension transformer (spark generator)

- a) Remove front case (see section 7.1).
- b) Remove the 3 screws (A).
- c) Unplug electrical connection to the pump.
- d) Carefully pull the control box forward and angle to give access to the transformer (see section 8.9.).
- e) Remove screw from transformer and disconnect from amp tags.
- f) Replace in reverse order.

Fig. 63

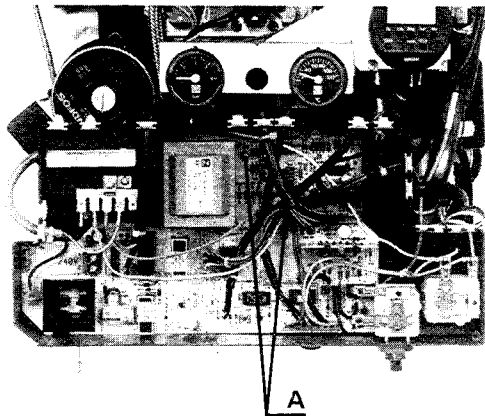
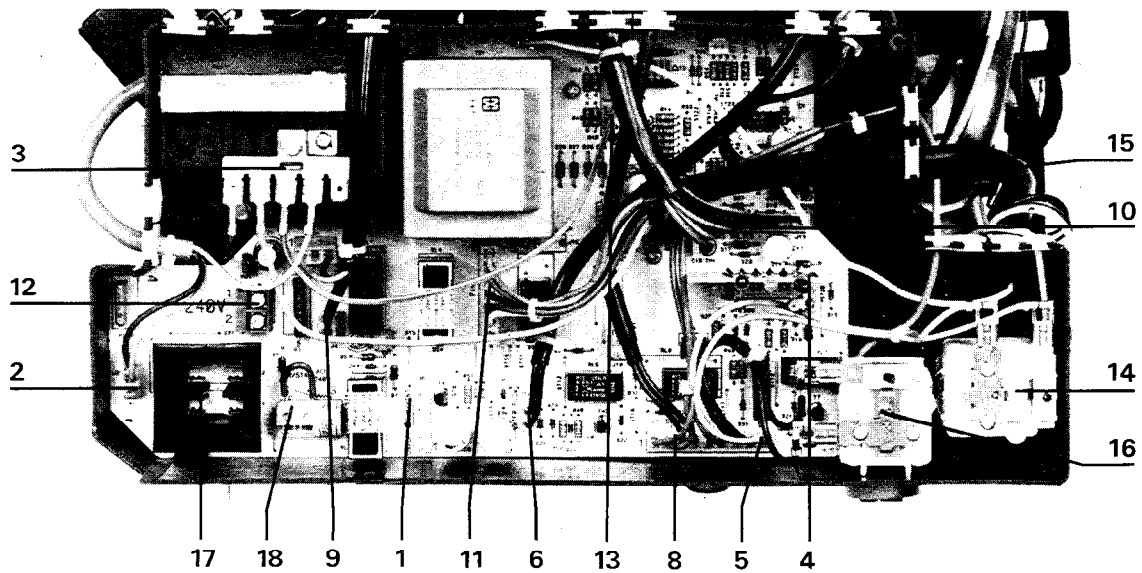


Fig. 64

To replace printed circuit boards (PCBs)

- a) Remove front case (see section 7.1).
- b) Remove electrical box front cover (see section 8.9 (C)).
- c) Unplug LED printed circuit board to replace new LED printed circuit board.
Remove all plug in connectors.
- d) Disconnect mains input cable at terminals 1 and 2 but not the earth.
- e) Disconnect external controls, if fitted, from terminals 3, 4 and 5.
- f) Remove two screws (A).
- g) Slide PCB slightly upwards to disengage guide.
- h) Pull PC B forward.
- i) Replace in reverse order.

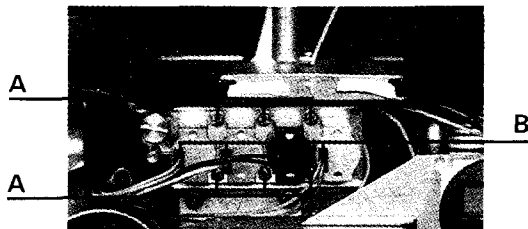


- | | | |
|-------------------------|----------------------------------|----------------------------------|
| 1 Summer/winter Switch | 7 D.H.W. Thermostat
Capillary | 13 Igniter |
| 2 Pump | 8 Change Over Valve | 14 D.H.W. Thermostat |
| 3 Earth | 9 Time clock | 15 Boiler Thermistor |
| 4 LEDs | 10 Solenoid Gas Valve | 16 Limit Thermostat |
| 5 C.H. Limit Thermostat | 11 Fan connection | 17 Fuse |
| 6 Water Flow Switch | 12 240 V-50 Hz connection | 18 Room thermostat
connection |

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

Fig. 65

8.19

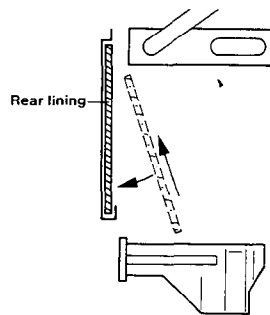


To replace solenoid valves

- a) Remove front case (see section 7.1).
- b) Withdraw plugs - colour coded - from solenoids (B).
- c) Remove six 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 GASKET.

Fig. 66

8.20

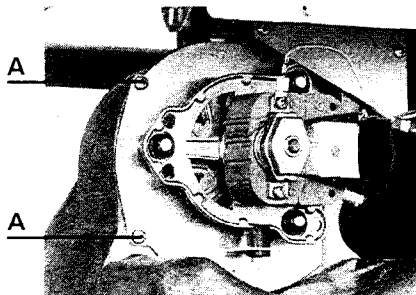


To replace heating body linings

- 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.

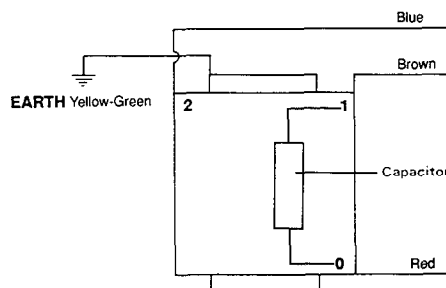
Fig. 67

8.21



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 sealed chamber panel (see section 8.8).
- e) Pull off 3 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 connections and that the lug at the rear is located correctly.



- (0) : Red
- (1) : Brown
- (E) : Yellow/Green
- (2) : Not used.

Fig. 68

8.22

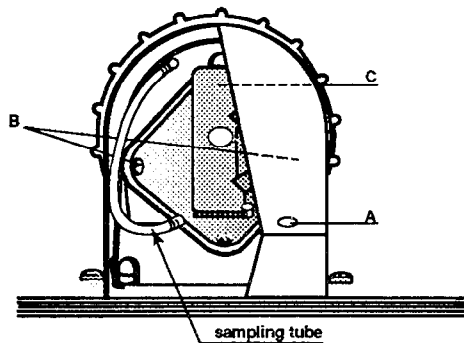


Fig. 69

To replace pressure switch (Horizontal Flue)

- 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.

8.23

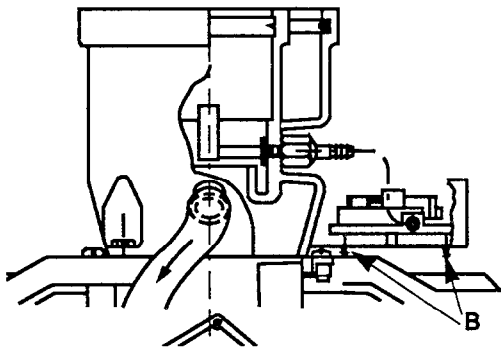


Fig. 69a

To replace pressure switch (Vertical Flue)

- a) Note position of spade connectors and remove (COMP, No 1 and No 2).
- b) Disconnect pressure sampling tube by pulling off nipple.
- c) Remove two screws retaining pressure switch (B).
- d) Replace in reverse order.

8.24

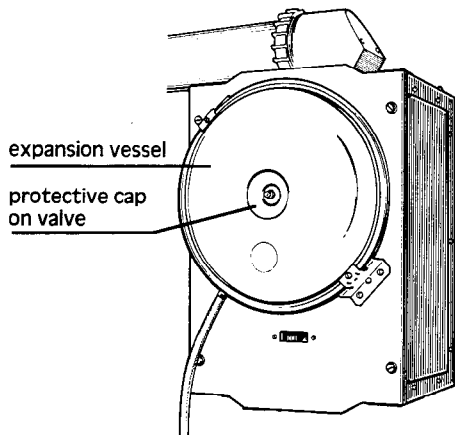


Fig. 70

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

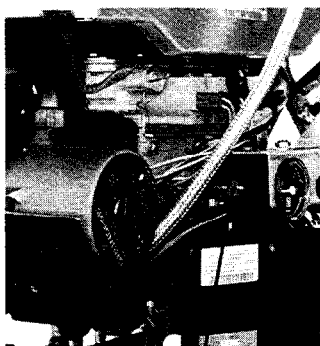
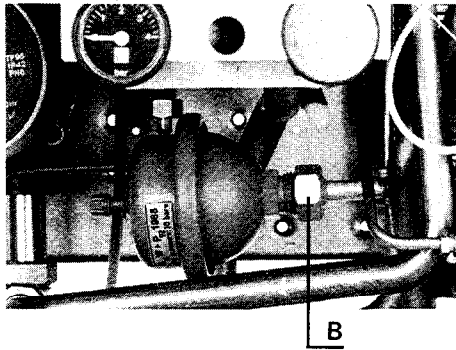


Fig. 71

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



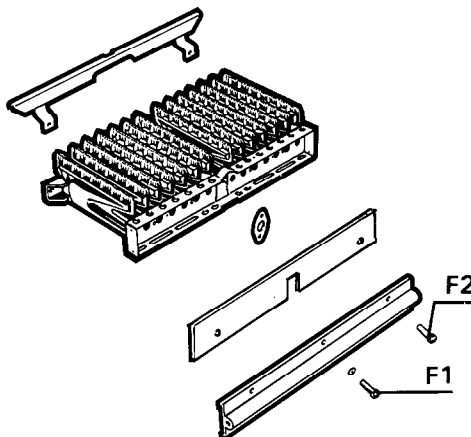
To replace the domestic expansion vessel

- a) Isolate cold water mains supply (see section 6.2).
- b) Drain from valve (E) beneath the change over valve (see section 8.7) (fig. 51).
- c) Remove electrical control box (see section 8.11, b).
- d) Undo connection +- and remove domestic expansion vessel.

Replace in reverse order.
Check for leaks.

Fig. 72

8.27

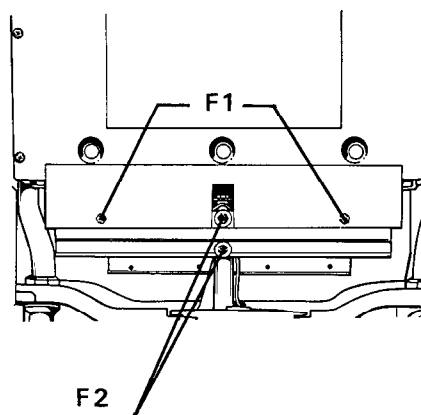


To replace main burner

- 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. 73

8.28

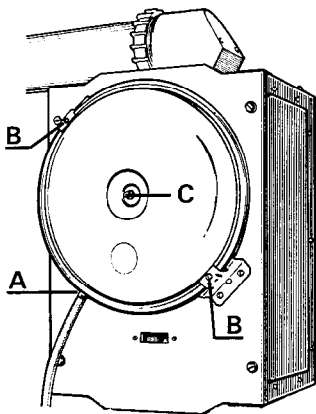


To replace the burner manifold assembly

- 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 Bumer base.
- e) Replace in reverse order.

Fig. 74

8.29

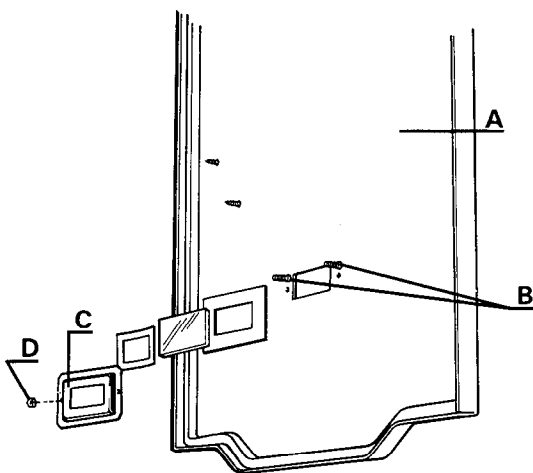


To replace expansion vessel

- 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 8.23).
 - h) Open flow and return valves. If necessary, repressurise system.
- (See section 6.2).

Fig. 75

8.30

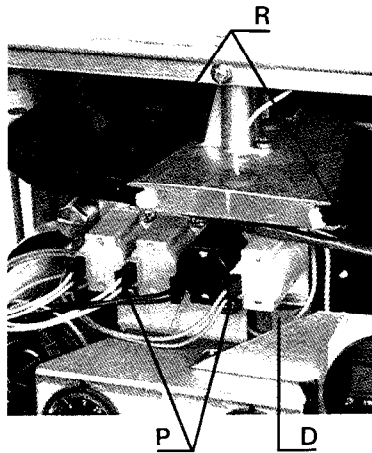


To replace viewing window

- 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. 76

8.31

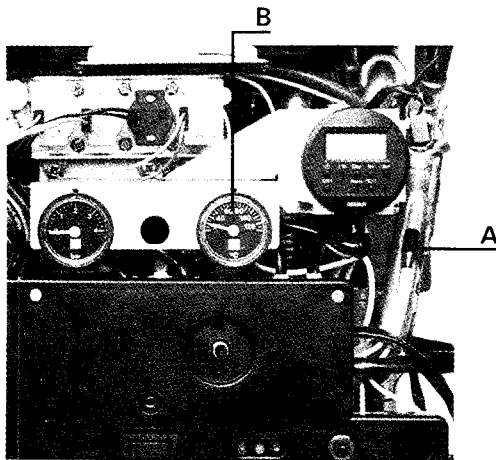


To replace the main gas valve body

- a) Remove front case (see section 7.1).
- b) Remove sealed chamber front panel (see section 7.2).
- c) Remove burner assembly (see section 7.3).
- d) Remove electrical control box (see section 8.11, b).
- e) Disconnect electrodes probe and solenoids.
- f) Remove two screws (P) retaining bracket to gas section and ease bracket down to clear gas section.
- g) Slacken and undo the gas supply union (D) beneath gas section.
- h) Remove two screws (R) retaining gas section to combustion chamber base.
- i) Remove gas section by pulling forward.
- j) Reassemble in reverse order and check for gas soundness.

Fig. 77

8.32

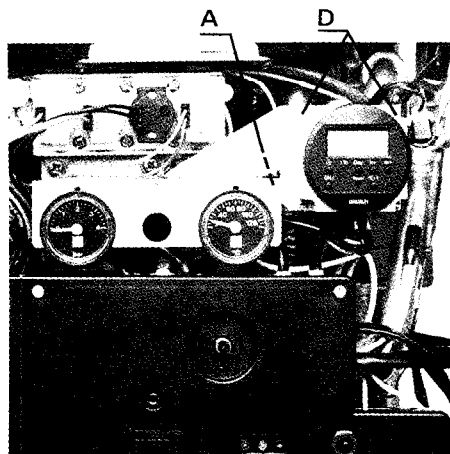


To replace the thermometer

- a) Remove the front case (see section 7.1).
- b) Unclip and remove thermometer sensor from flow pipe (A) (see fig. 78).
- c) Withdraw gauge (B).
- d) Replace in reverse order.

Fig. 78

8.33



To replace time clock

- a) Remove front case (see section 7.1).
- b) Remove 2 screws fixing the time clock support (A) (see fig. 79).
- c) Withdraw "amp tags" noting position.
- d) Remove 4 screws (D) fixing the time clock to the support.
- e) Replace in reverse order.

Fig. 79

8.34

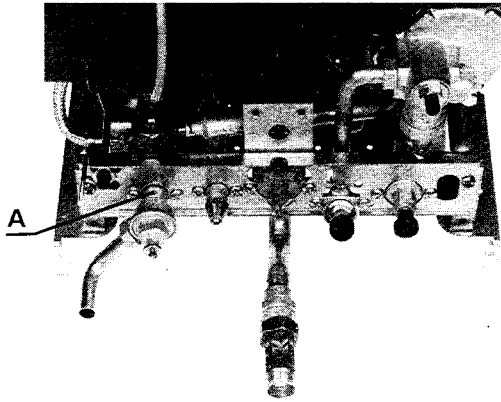


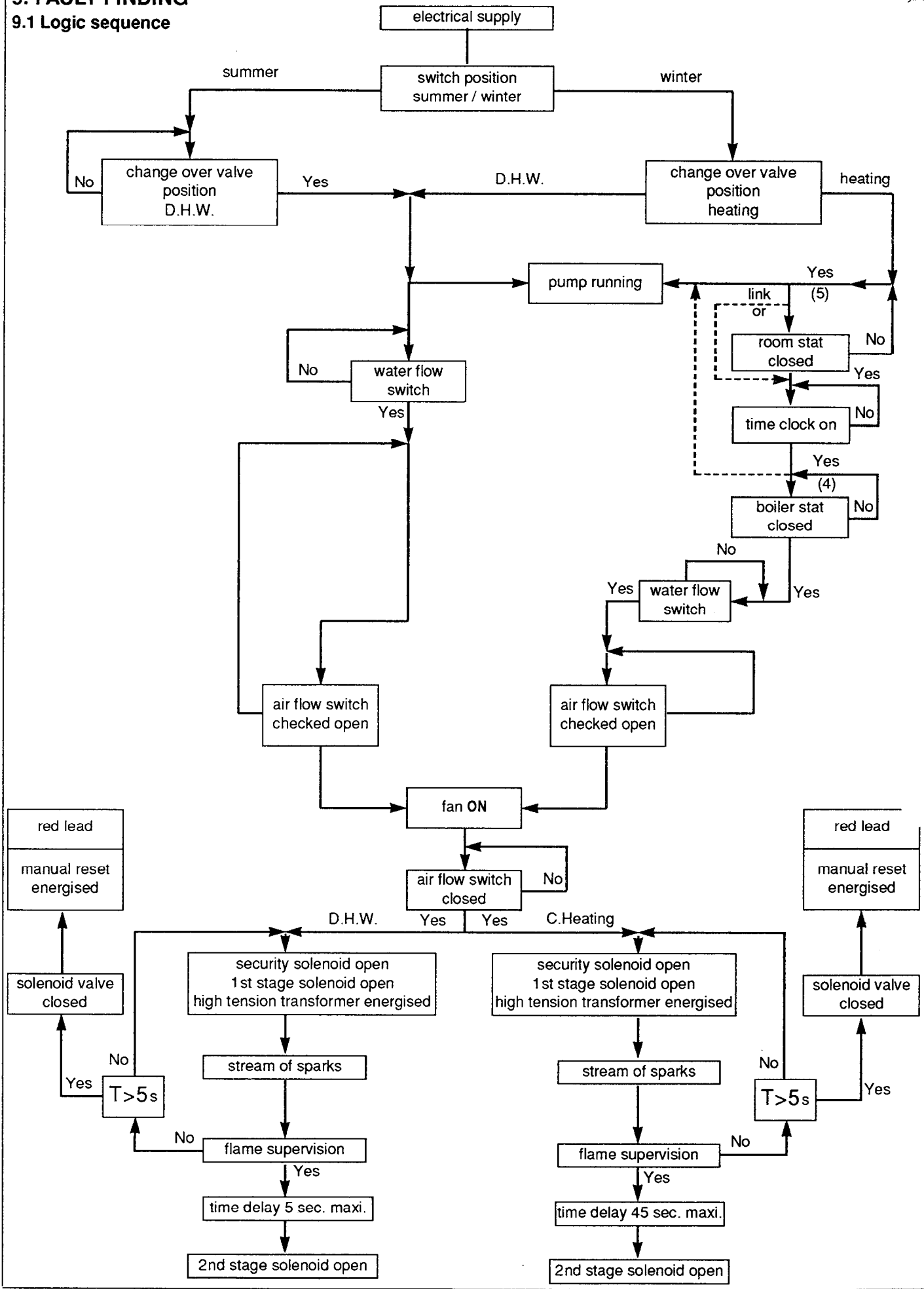
Fig. 80

To replace safety valve

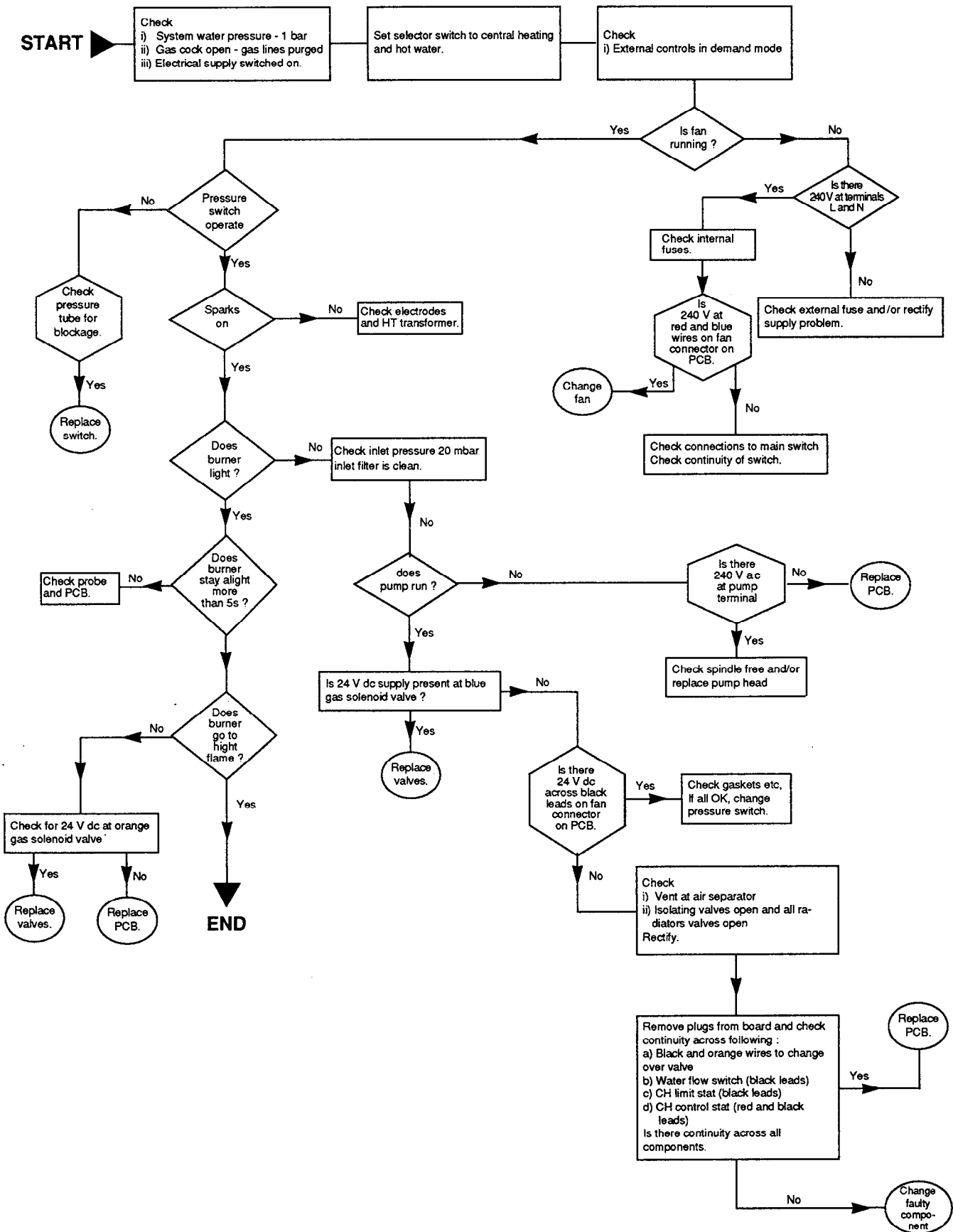
- a) Remove case (see section 7.1).
- b) Close heating flow and return valves and drain the appliance through safety valve (see section 6.2 fig. 34 (f) and section 7.6).
- c) Ensure that the boiler is completely drained and the pressure gauge is reading zero (0).
- d) Undo the grub screw (A) and remove 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

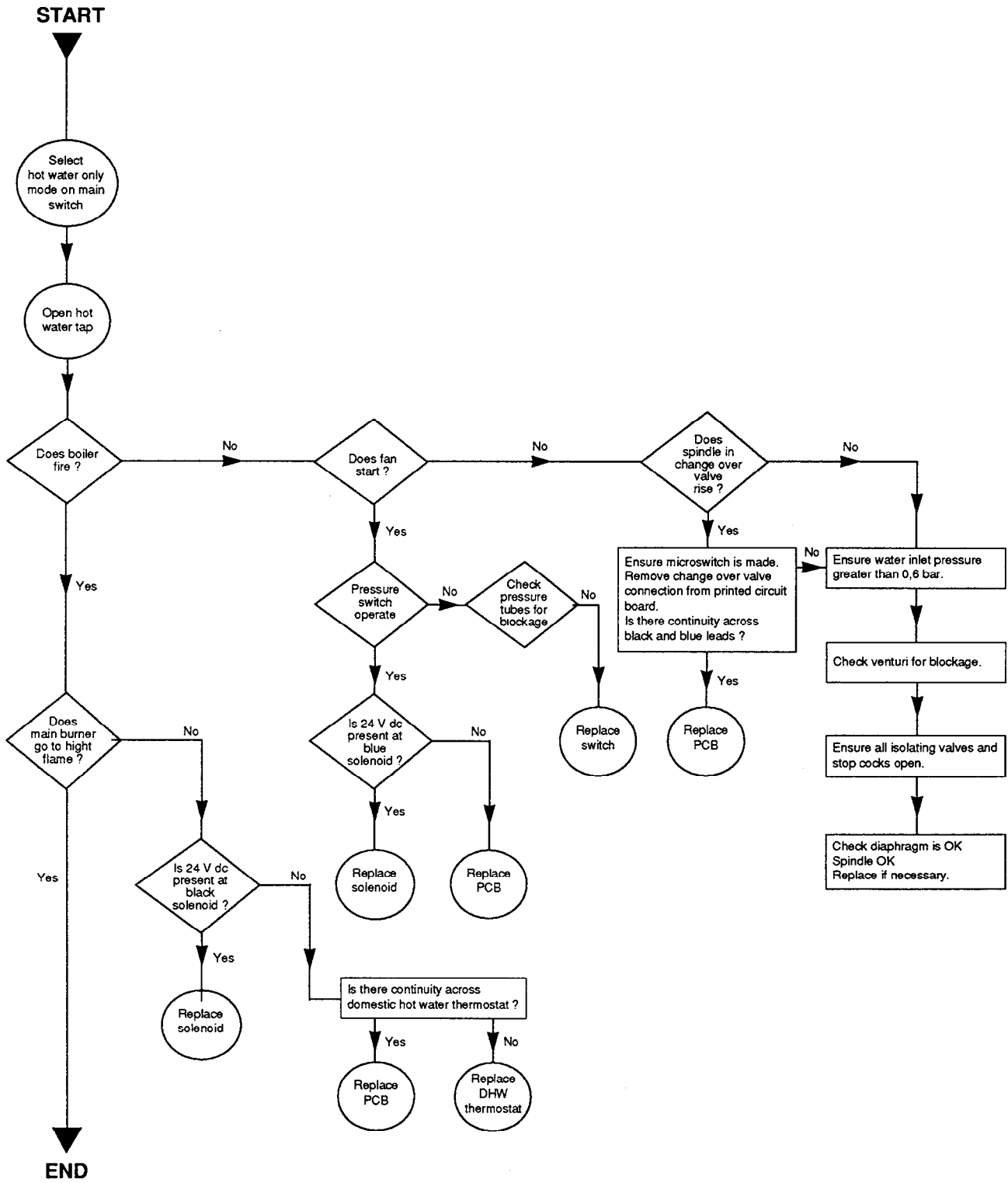
9.1 Logic sequence



**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"> i) Poor sparks ii) Blocked gas filter iii) 1/3 valve not operating <ul style="list-style-type: none"> a) 24 volts supply to valve b) No voltage at solenoid iv) Crosslighting strip - missing/incorrectly positioned 	<ul style="list-style-type: none"> 1) Check electrodes and HT transformer replace if necessary see sections 8.17 and 8.1 2) Clean 3a) Replace solenoids, see section 8.19 3b) Check plugs on printed circuit board, see section 8.18 3c) Replace printed circuit board, see section 8.18 4) Replace or reposition, see section 8.26
2) Unstable burner	<ul style="list-style-type: none"> i) Incorrect injectors ii) Gas pressure at manifold <ul style="list-style-type: none"> a) Too high a) Too low iii) Terminal incorrectly positioned iv) Incorrectly assembled flue duct v) Fan incorrectly located vi) Combustion chamber front cover not sealing vii) Heat exchanger fins blocked viii) Neoprene gasket in turret not correctly fitted or missing 	<ul style="list-style-type: none"> 1) Replace manifold 1.28 mm injectors for natural gas, see section 8.27 2a) Adjust, see section 6.4 2b) Check restrictors and inlet pressure, see section 1.2 3) See section 2.4 4) Check and reassemble, see section 4.10, 1.4.4 5) Remove and refit correctly, see section 8.21 6a) Tighten 6b) Replace sealing strip 7) Clean, see section 7.5 8) Fit or refit, see section 4.10
3) Central heating low flow temperature	<ul style="list-style-type: none"> i) Boiler thermistor out of calibration ii) Insufficient gas pressure iii) 1/3 blue or 2/3 orange gas valve not opening <ul style="list-style-type: none"> a) 24 volts at solenoid b) No voltage at solenoid iv) Hot water valve in change over valve assembly sticking <ul style="list-style-type: none"> a) Dead leg on hot water system b) Bent spindle in valve v) By-pass, if fitted, incorrectly adjusted vi) Pressure switch hunting 	<ul style="list-style-type: none"> 1) Replace, see section 8.14 2) Check pressure at meter and pipe sizing, see sections 1.2, 2.1 and 2.7 3a) Replace solenoid, see section 8.19 3b) Replace print circuit board, see section 8.18 4a) Eliminate 4b) Replace, see section 8.11 5) Adjust, see section 6.6 6) Replace, see section 8.22

PROBLEM	CAUSE	REMEDY
4) Boiler noisy	<ul style="list-style-type: none"> i) On heating only <ul style="list-style-type: none"> a) Low flow rate as result of system resistance b) Air in system ii) On hot water and central heating <ul style="list-style-type: none"> a) Low pressure in sealed system b) Pump not running iii) Blocked filter on heating return or blocked pump hose iv) Gas filter fitted to heating flow or return pipes v) Heat exchanger scaled vi) Overgassed (vii) isolating valves not fully open 	<ul style="list-style-type: none"> 1a) Check and if omitted fit by-pass see section 6.6 1b) Purge by venting radiators 2a) Repressurise to 1 bar cold see section 3.6 2b) Replace pump head, see section 8.10 3) Clean and replace see section 7.5 4) Remove and reposition see section 4.5 5a) Descale 5b) Replace, see section 8.8 6a) Check gas pressure and adjust, see section 6.4 6b) Check restrictors, see section 1.2 7) Open fully see section 6.2
5) Hot water does not operate over temperature range	<ul style="list-style-type: none"> i) Change-over valve sticking ii) Low inlet water pressure iii) Incorrect venturi fitted iv) Hot water limit stat out of calibration v) Solenoids not operating vi) Pressure switch hunting vii) Low inlet gas pressure 	<ul style="list-style-type: none"> 1) Lubricate or replace see section 8.11 2) Ensure all down stream stop cocks open 3) Replace with 5.4 mm diameter, see section 4) Replace, see section 8.7 5) See section 8.19 6) Replace, see section 8.22 7) See section 1.2
6) No main burner	<ul style="list-style-type: none"> i) Lack of water flow ii) Pump jammed iii) No water iv) Flow switch not operating v) Fan pressure switch not operating 	<ul style="list-style-type: none"> 1) Checks valves are open see section 6.2 2) Manually check, see section 3.3 3) Fill system, see section 6.2 4) Replace switch, see section 8.6 5) Replace, see section 8.21
7) Safety valve discharges	<ul style="list-style-type: none"> i) System pressure too high ii) Not isolated from mains iii) Vessel lost air charge iv) Secondary heat exchanger (water to water) internal water leak 	<ul style="list-style-type: none"> 1) Adjust 1 bar cold 2) Remove filling loop 3) Recharge 0.65 bar, see section 8.23 4) Replace, see section 8.12
8) Pump noisy	<ul style="list-style-type: none"> i) Air in system ii) Air in separator iii) Debris in pump iv) Water filter blocked 	<ul style="list-style-type: none"> 1) Vent radiators 2) Open vent on air separator and purge, see section 6.2 3) Clean and replace, see section 8.10 4) Clean and replace, see section 7.5

PROBLEM	CAUSE	REMEDY
9) Excessive temperature rise across boiler	<ul style="list-style-type: none"> i) Return filter blocked ii) Low water flow rate <ul style="list-style-type: none"> a) Pump defective b) High system resistance c) Gas filter inadvertently fitted in flow or return connection iii) Gas rate too high 	<ul style="list-style-type: none"> 1) Clean and replace, see section 7.5 2a) Replace, see section 8.10 2b) Fit by-pass, see section 6.6 2c) Remove and refit, see section 4.4 3) Adjust, see section 1.2
10) Rapid cycling high/low or high/low/off	<ul style="list-style-type: none"> i) Low water flow rate ii) Thermistor out of calibration iii) By-pass, if fitted, not regulated iv) Blocked heat exchanger v) Temperature differential setting incorrect 	<ul style="list-style-type: none"> 1) See 'System guidance' section 3.13 2) Replace, see section 8.14 3) Adjust, see section 6.6 4) Clean or replace, see section 8.8 5) Adjust, see section 6.9
11) Fan on continuously	<ul style="list-style-type: none"> i) Defective printed circuit board 	<ul style="list-style-type: none"> 1) Replace, see section 8.18
12) Loss of pressure	<ul style="list-style-type: none"> i) Leak on system ii) Leak on appliance 	<ul style="list-style-type: none"> 1) Locate and rectify 2) Locate and rectify
13) Gain in pressure shown on gauge	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 1) Close stop cocks and remove 2) Clear blockage 3) Replace, see section 8.12

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