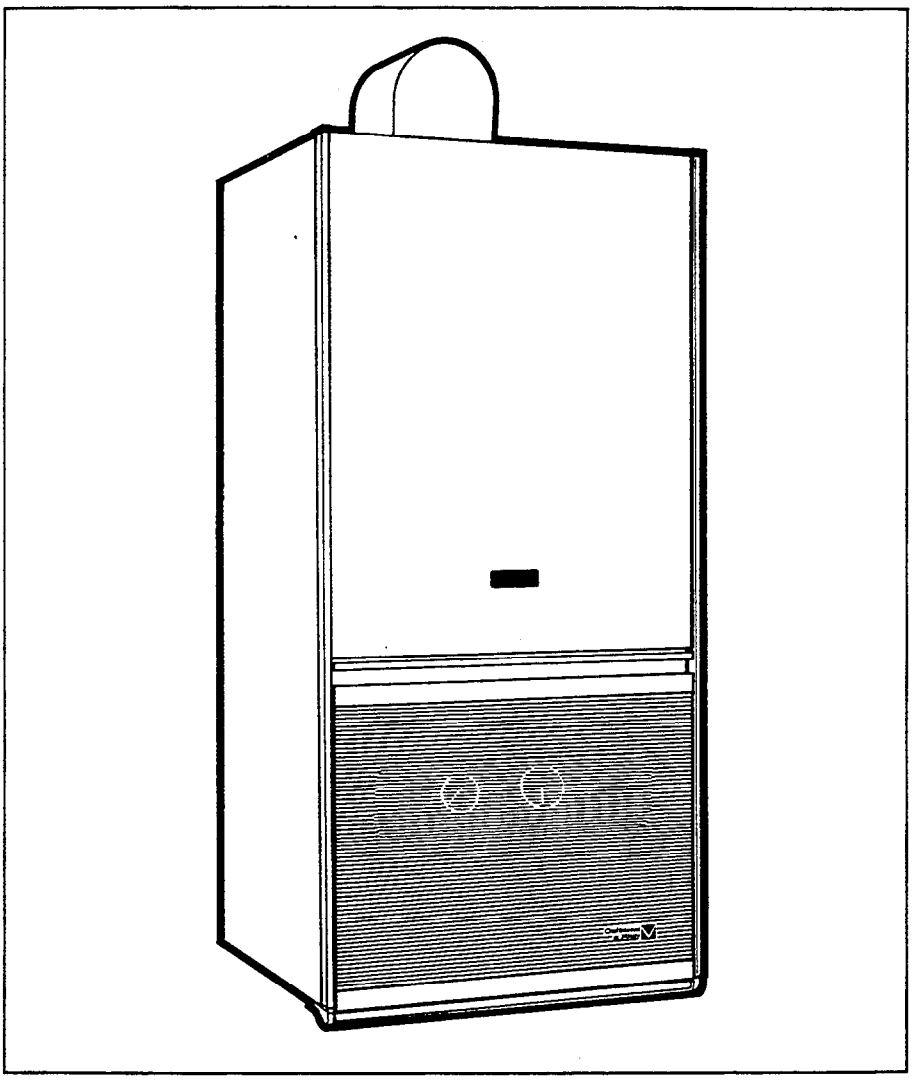
Celtic 2.20FF RSc

COMBINATION BOILER



installation instructions

(leave these instructions with the User or at the Gas Service meter)

Chaffoteaux et Maury

Looking Good. Heating Better

The CELTIC 2.20 FF is a wall mounted, low water content fanned balanced flue appliance suitable for central heating and instantaneous hot water. The output is 23.2 kW (79158 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 and electrical connection box.

The flue which is 100 mm (4 ins) round pipe can be directed to the rear or to the left or right and can be extended to a maximum length of 3 m thus facilitating installation remote from an external wall.

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 instantaneous hot water temperature.
- Fully adjustable central heating flow temperature regulation between 50° C and 82° C.
- High limit thermostat for both boiler and instantaneous hot water.
- Suitable for showers which themselves are compatible with multipoint water heaters.

Guarantee

The manufacturer's guarantee on this appliance is for 12 months from the date of installation. The guarantee is voidable if the appliance is not installed in accordance with the recommendations made herein or in a manner approved by the manufacturer.

1.1 DIMENSIONS

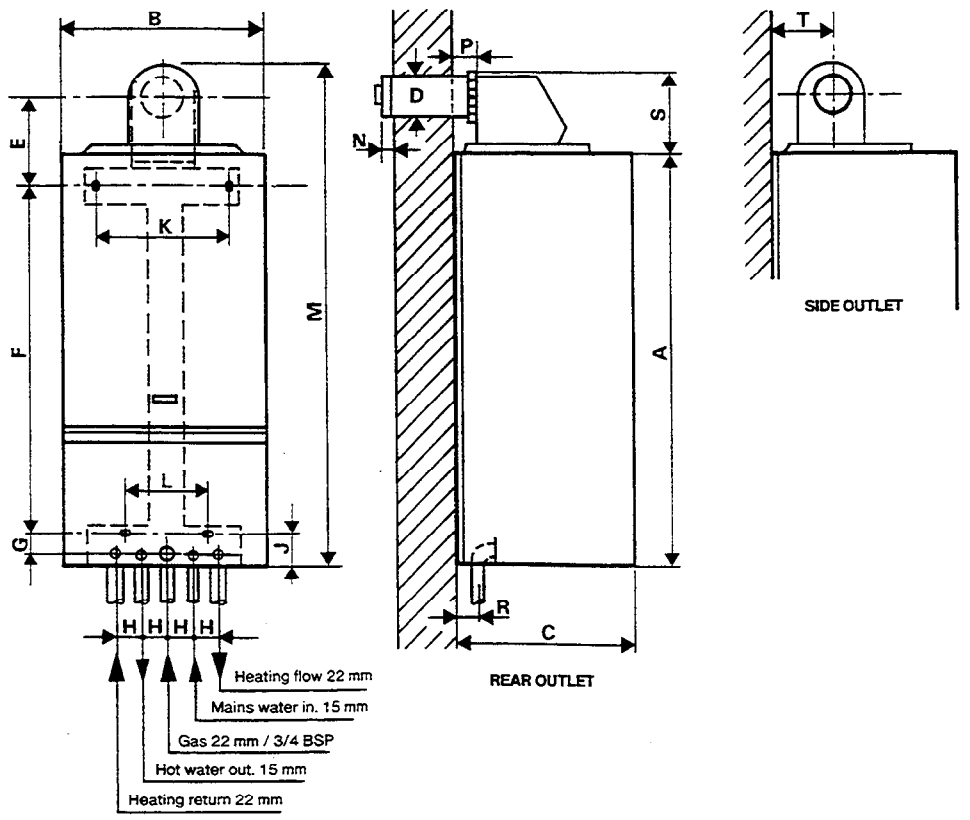


Fig. 1

CELTIC 2.20 FF RSc		
	mm	ins
A	820.5	32.3
B	391	15.4
C	365	14.4
D	100	4
E	165.5	6.5
F	654.5	25.7
G	43	1.
H	50	2
J	75	3
K	260	10.2
L	150	6
M	972.5	38.3
N	25	1
P	61	2.4
R	30	1.2
S	152	6
T	112	4.4

1.2 Technical data

Input	27.5 kW	93832 Btu/h
Output	23.2 kW	79158 Btu/h
Hot Water		
Water flow rate raised 50° C (90° F)	6.5 lit/min	1.4 gpm
Water flow rate raised 30° C (54° F)	11.1 lit/min	2.44 gpm
Maximum temperature	60° C	140° F
Maximum pressure	10 bar	150 psi
Minimum working pressure	1 bar	15 psi
Gas rate - hot water	2.58 m³/h	90.74 ft³/h
Burner pressure	10 mbar	3.9 ins/wg
Central heating		
Maximum output	23.2 kW	79158 Btu/h
burner pressure	10 mbar	3.9 ins/wg
gas rate	2.58 m³/h	90.74 ft³/h
Minimum output	9.1 kW	26300 Btu/h
burner pressure	1.25 mbar	0.5 ins/wg
gas rate	0.935 m³/h	33.65 ft³/h
Maximum pressure - heating	3.5 bar	51 psi
Minimum flow rate	300 lit/hr	1.1 gpm

Connections

Gas	3/4 ins BSP (male)
Heating flow	22 mm
Heating return	22 mm
Mains cold water	15 mm
Hot water draw off	15 mm

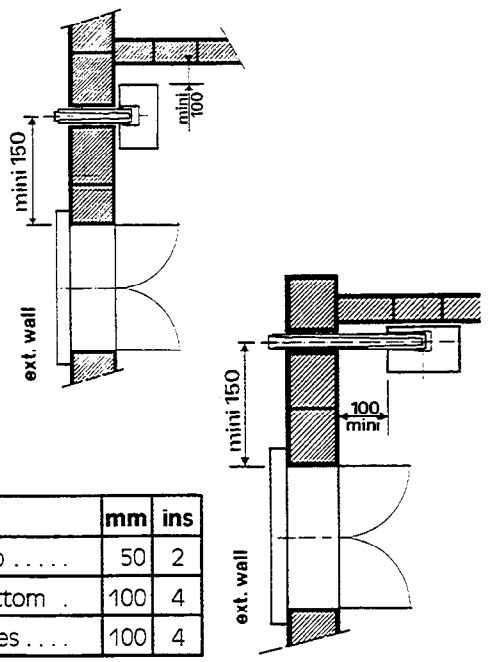
Electrical connection 240 V single phase 50 hz. Fuse 3 amp.

Weight	42 kg	92.4 lbs
Water capicity	7 pints	4 litres

Ignition - continuous spark generator ANSTOSS
Electrode - Chaffoteaux - spark gap 5 mm
Boiler thermostat - Sopac Jaeger 1070 00049
Boiler limit thermostat - Sopac Jaeger AV 1901 (85° C ±3° C)
Hot water limit thermostat - Sopac Jaeger 800 050 (57° C ±3° C)
Gas valves - AEMF
High limit thermostat - Tokoswitch (110° C ±5° C)
Thermocouple - thermoelectric valve - Chaffoteaux Ltd
Fan motor - AEG
Pressure switch - Dungs

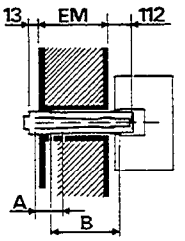
	LPG Propane - Supply pressure 37 mbar (14.6 ins wg)		Natural Gas	
Manifold injectors	0.72 mm		1.28 mm	0.05 ins
Pilot injector	0.20 mm		0.3 mm	0.01 ins
Manifold restrictors 2/3	6.0 mm		4.6 mm	0.18 ins
1/3	1.8 mm		2.4 mm	0.095 ins
Manifold gas pressure max. output	33 mbar	13 ins wg		
min. output	5.8 mbar	2.3 ins wg		

1.3 Clearances around boiler



	mm	ins
Top	50	2
Bottom	100	4
Sides	100	4

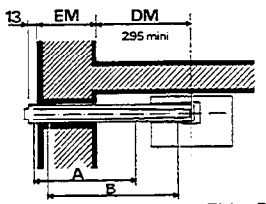
1.4 Flue length



FLUE ASSEMBLY - rear outlet

wall thickness	up to 588	589 & over
	Standard B 62601 supplied with appliance	Order an extention assembly B 62823

A = EM – 150
B = EM + 51



FLUE ASSEMBLY - side outlet

A = EM + DM – 262
B = EM + DM – 61

EM + DM	up to 700	from 701 to 1600	from 1601 to 2500	from 2501 to 2987*
	Standard B 62601 supplied with app.	Order 1 extention assembly B 62823	Order 2 ext. assemblies B 62823	Order 3 ext. assemblies B 62823

EM = Wall thickness
DM = Wall distance

1.5 Description

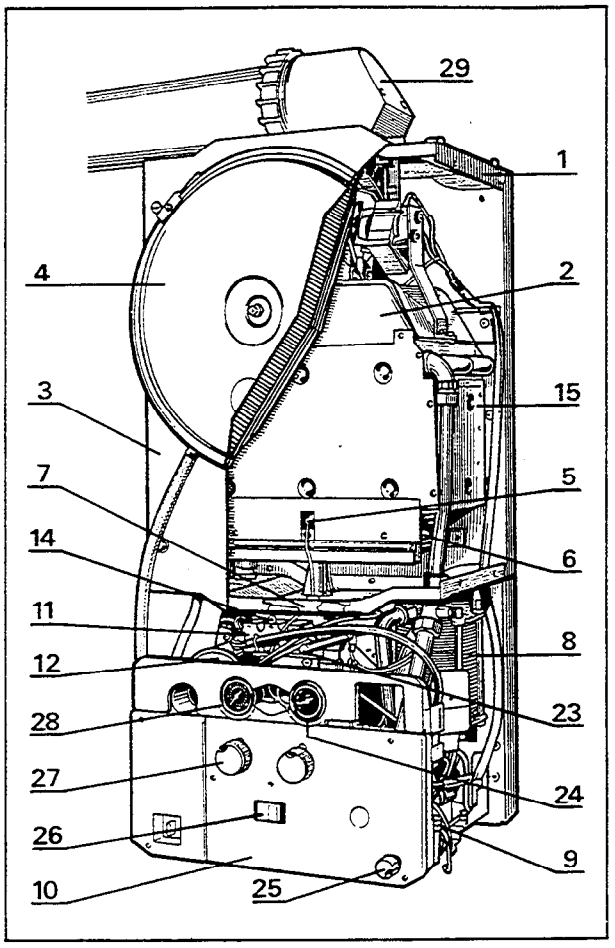


Fig. 2

The appliance is mounted in a galvanised steel case with a white epoxy resin finish.

1. Chassis :

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

2. Flue hood :

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

3. Combustion chamber :

This is assembled from a number of components mounted onto the chassis. The front panel is simply removed for servicing complete with the expansion vessel, hooks are 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 gals) and is sized for a normal system water content where the load is equivalent to the maximum output of the boiler. The charge pressure is 0.65 bar.

5. Pilot security is by thermocouple flame failure

6. Multigas burner comprising :

Stainless steel burner blades (14).
Manifold with injectors.

7. Gas section including thermoelectric valve and 2 stage gas valves.

8. Secondary heat exchanger :

The secondary heat exchanger is a plate type heat exchanger. A high limit thermostat is fitted on the pipework limiting the water temperature to a maximum of 60° C.

9. Change over valve :

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

10. Electrical box containing :

Mains connection
Fuses
Printed circuit board
Connections for external controls
Connections for fan and pressure switch
Connection for pump.

11. Solenoid valve :

Block on which 3 valves are mounted :
1/3 valve (blue) - 1st stage valve-heating and hot water.
2/3 valve - full output to hot water (black).
2/3 valve - (variable valve) central heating (orange).

12. Pump

Grundfos pump motor.

13. Air separator and air purger directly connected to the pump inlet.

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 - boiler.

17. Water service cock.

18. Flow isolating valve - heating.

19. Gas service cock.

20. Domestic hot water outlet.

21. Safety valve with drain cock.

22. Heating return isolating valve with filter.

23. Ignition button.

24. Thermometer indicating boiler flow temperature.

25. Temperature selector for domestic hot water.

26. Selector switch - hot water only/OFF/heating and hot water (Summer/Winter).

27. Thermostat to regulate heating flow temperature.

28. Pressure gauge.

29. Pressure switch.

1.6 Description of operation

1.6.1 The Celtic 2.20 is a dual purpose or combination boiler providing central heating and hot water. Hot water is provided on demand on an instantaneous basis. For the duration of the demand for hot water the central heating is interupted.

The appliance operates in two modes. A 'summer' setting where is operates only on hot water demand and a 'winter' setting providing central heating and switching to hot water on demand.

1.6.2 Central heating (See fig. 3) :

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 (fig. 3) and out via the flow valve (27) to the radiator circuits (34).

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

The limit thermostat (16) set to 90° C closes both solenoid valves in the event of its set temperature being reached as could occur under the low flow conditions.

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

1.6.3 Hot water (See fig. 4) :

When there is a demand water flows 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. See fig. 4 (20). The primary water heated by the boiler now passes through the water to water heat exchanger (18) where it flows through alternate plates indirectly heating the DHW.

The rising of the change over valve spindle causes :

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

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

3. The selection of the 1/3 valve and the fixed 2/3 valve.

The water temperature is under the control of the user and the opening of the regulator (25) increases the flow volume of the water and thus reduced the temperature.

When the regulator is closed - hottest setting, lowest flow - a limiting thermostat (32) prevents the secondary hot water temperature exceeding 60° C by cycling the solenoid valve without interupting the flow of water.

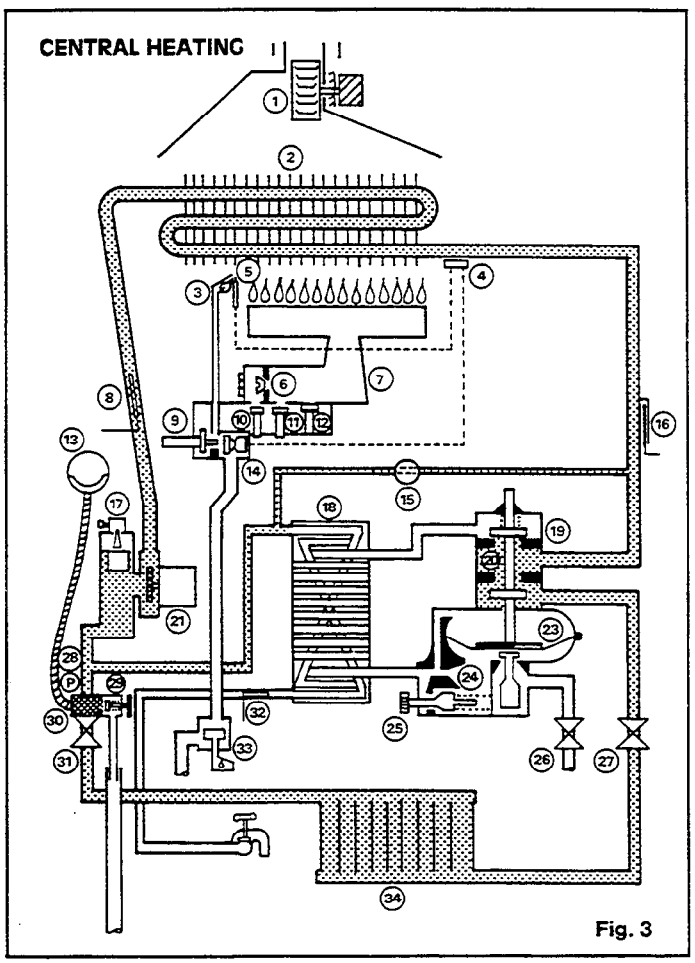


Fig. 3

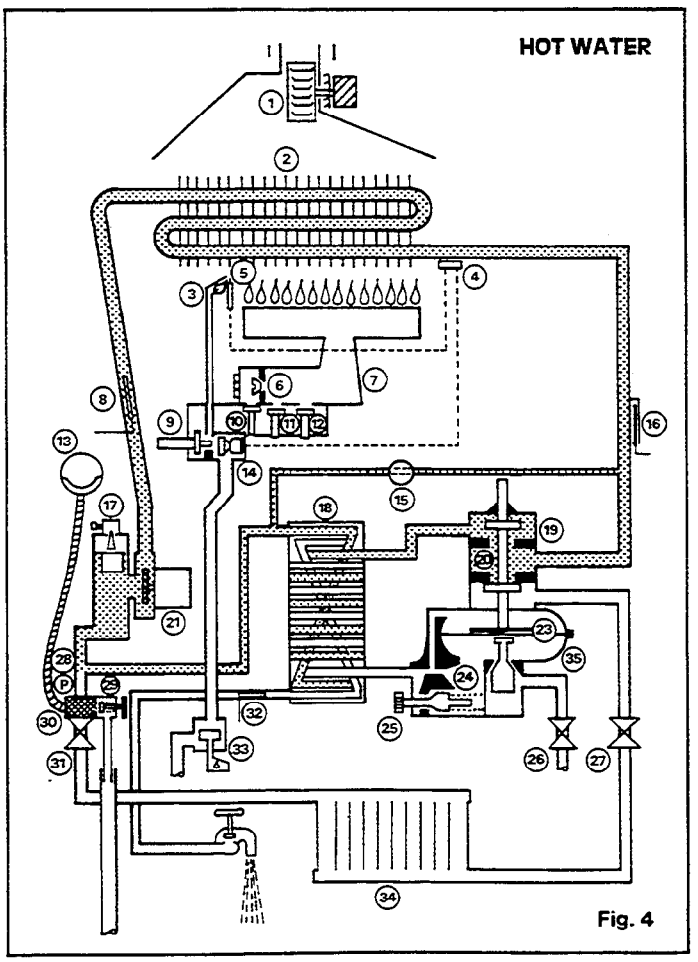


Fig. 4

1.6.4 Gas

When the main gas cock (33) is turned to the on position gas is admitted to the gas section (7). Pressing the ignitor button (9) operates a microswitch causing the commencement of a firing cycle. The fan changes from low to high speed and after a purge period of approx 15 seconds a continuous stream of sparks are delivered igniting the pilot gas (3). Simultaneously, the thermoelectric valve (14) is opened and after 10 seconds, sufficient energy is being produced by the thermocouple (5) for the thermoelectric valve to be retained in the open position.

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

There are 3 solenoid valves 1) the centre (blue) valve (10) fixed at 1/3 of max rated output. 2) the right hand hot water (black) valve (12) fixed at 2/3 of maximum rated output. 3) the left hand central heating (orange) valve (10) which is variable between 1/3 and maximum rated output.

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

1.6.5

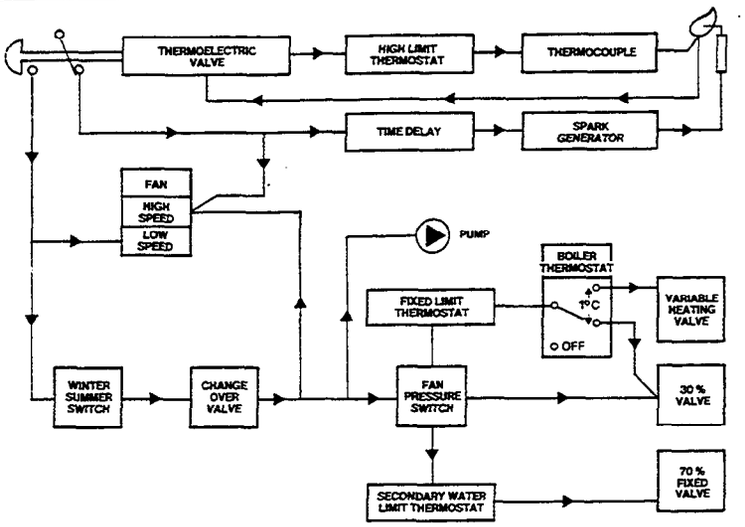
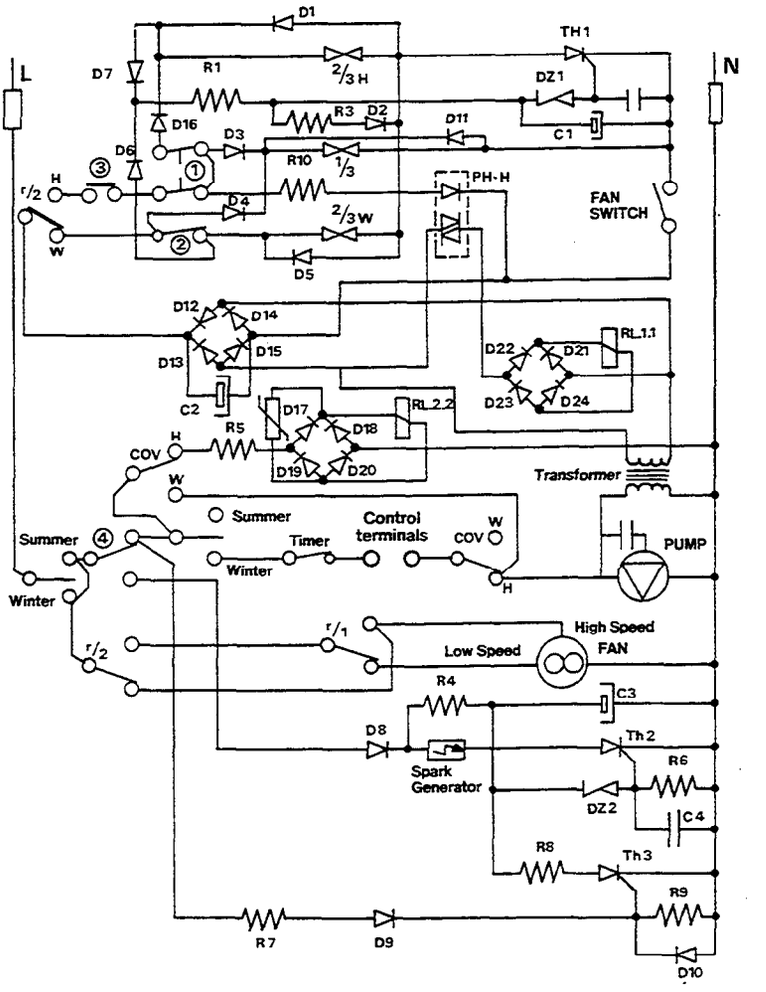


Fig. 5



Key

1. Boiler thermostat (central heating mode)
2. Secondary hot water limit thermostat
3. Limit thermostat
4. Ignition push rod

COV Change over valve
H Heating mode
W Water mode
RII Relay No and No of contacts
r/l contact for relay

Fig. 6

2. INSTALLATION REQUIREMENTS

2.1 General

The installation of the boiler must be in accordance with the Gas Safety Regulations, Building Regulations, I.E.E. Regulations and the Byelaws of the local water Undertaking. It should be in accordance also with the BS Codes of Practice and the British Gas Specifications for Central Heating Systems and any relevant requirements of the local Gas Region and Local Authority.

Details recommendations are stated in the following British Standard Codes of Practice : CP 331:3, BS 5365:2, BS 5546, BS 5440:1 and 2, BS 5449:1

Note : Gas Safety (Installation and Use) Regulations 1984.

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 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 a non combustible material.
The boiler may be installed in any room or internal space although particular attention is drawn to the requirements of the I.E.E. Wiring Regulations and, in Scotland, the electrical provisions of the Building Regulations applicable to Scotland, with respect to the installation of a heater 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 heater 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 5376:2.

2.3 Water Circulation Systems

The Celtic 2.20 FF is suitable for SEALED SYSTEMS only and should be in accordance with the relevant recommendations given in BS 5376:2, BS 5449:1 (for smallbore or microbore systems) and the British Gas Specifications for Central Heating Systems.

2.4 Siting the Flue Terminal

The standard flue set is suitable for walls having a thickness of 75 mm (3 ins) to 355 mm (14 ins). Other flue options are available to a maximum of 3 m (9 ft 8 ins) to special order. See 1.5.

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 such as an outhouse or lean-to. It is important that the position of the terminal allows a free passage of air across at all times. The minimum acceptable spacings from the terminal to obstructions and ventilation openings are specified below :

Terminal positions	Min spacings
A - Directly below an opening, windows etc.	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 a terminal on the same wall	1200 mm
K - Vertically from a terminal on the same wall	1500 mm
L - Horizontally from a terminal on the same wall	300 mm

Note : The flue can be extended to clear a projection. Where the terminal is fitted within 850 mm (34 ins) of a plastic or painted eaves, an aluminium shield of at least 750 mm (30 ins) long should be fitted to the underside of the gutter or painted surface.

Where the lowest part of the terminal is less than 2 m (6.5 ft) above the level of any ground balcony, flat roof or place to which any person has access and which adjoins the wall in which the terminal must be protected by a guard of durable material. (A terminal guard is available from Chaffoteaux Limited) or from Tower Flue Components. Tonbridge 35155.

The air inlet/products outlet duct and the terminal of the appliance must not be closer than 50 mm (2 ins) to any combustible material. Detailed recommendations on the protection of combustible material are given in BS 5440 Pt 1: 1978 (Sub-Clause 20.1).

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.

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.

Cupboard or compartment air supply

Position of Vents	Air from room	Air direct from outside
High level	248 cm² (38.5 in²)	124 cm² (19.25 in²)
Low level	248 cm² (38.5 in²)	124 cm² (19.25 in²)

2.6 Electrical Supply

This appliance must be earthed. All wiring must confirm to the I.E.E. Regulations. The CELTIC 2.20 FF requires a 240 V single phase, 50 Hz supply. A means of isolation must be provided adjacent to the boiler, this should preferably be an unswitched plug and socket. The fuse rating should be 3 amp. The supply cord must be 0.75 m^2 three core heat resisting cable.

2.7 Gas Supply

The Celtic 2.20 FF on Natural Gas requires :

The meter and supply pipes must 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 CP 331:3.

3. SYSTEM GUIDANCE

3.1 General

The Celtic 2.20 FF dual purpose boiler is a low water content boiler and is supplied for sealed systems only – all controls including the expansion vessel, high limit thermostat, temperature and pressure gauges and safety valve are built in to the appliance.

The thermostat is adjustable and on its maximum setting gives a nominal 82° C (180° F) flow temperature ± 4° C (7° F). Detailed recommendations for water circulation are given in BS 5376:2 1976, BS 5449:1 1977 and BS 5546: 1979. Whilst the boiler provides instantaneous hot water there may be occasions when a cylinder will be used, for instance, if the property has 2 bathrooms. Detailed recommendations of this application are given in 7.1 to 7.3. Thermostatic control should be fitted to the heating circuits and the cylinder if one is fitted.

3.2 System controls

The boiler is electrically controlled and is suitable for most control schemes currently available including thermostatic radiator valve and motorised valves. When using motorised valves the controls should be so arranged to switch off the boiler when circuits are satisfied. The boiler requires a minimum flow rate of 300 lit/hr (1.1 gpm) and consequently **if thermostatic radiator valves are used a by pass will be necessary.**

3.3 Pump

The boiler is fitted with a Grundfos pump equivalent to the Grundfos 18/60. The graph fig. 7 indicates the residual head available for the system.

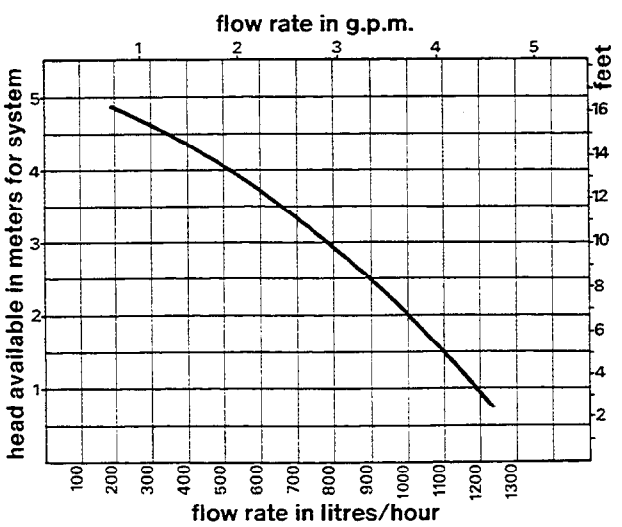


Fig. 7

3.4 Expansion vessel

The expansion vessel which is fitted on the front of the combustion chamber maintains pressure and accomodates 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.

The connection in the centre of the expansion vessel is not a vent point.

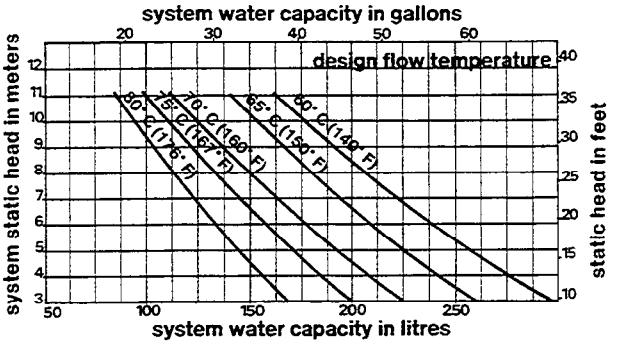


Fig. 8

The graph fig. 8 indicates the maximum system water volumes against system static head for different flow temps and should not be exceeded.

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	(0.44 gals)

3.5 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 3.7).

3.6 Mains connection

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

3.7 Filling point (See BS 5376:Pt2 Appendix A)

Filling and rechargeing can be done :

1) Through a temporary hose connection from a draw off tap supplied from a service pipe under mains pressure, provided that this is acceptable to the local Water Authority. See fig. 9.

2) Through self contained unit comprising a cistern, pressure booster pump if required and if necessary a pressure reducing valve or flow restrictor. Fig. 10.

3) Through a cistern, used for no other purpose permanently connected to a service pipe. The static head available should be sufficient to provide the designed initial system design pressure.

3.8 Pipework should be of copper, small bore or microbore with capillery or compression jointing to a high standard, leak sealant shall not be used in the system.

3.9.1 Boiler replacement (retrofit)

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

3.9.2 Existing systems

Valves and joints should be carefully checked for leaks and the appropriate action 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 may be 1.0 bar and the running pressure exceeding 1.5 bar. Consideration should be given to the replacement of radiator valves with a pattern capable of sealing at the higher pressures.

3.10 Cylinder

Where a domestic hot water cylinder is used with the Celtic 2.20 FF it **MUST** be of the indirect and high recovery type to BS 1566:Pt1. Single feed cylinders are not suitable for use with this appliance. Flow and return pipework to the cylinder should be in 22 mm copper pipe.

3.11 Inhibitors

Chaffoteaux Ltd do not generally recommend the use of inhibitors in system utilising the Celtic 2.20 FF boiler. It is however, appreciated that the use of a corrosion and limescale inhibitor may be desirable or specified.

The following are the appliance manufacturers recommendations :

1) Use only a British Gas or similar approved inhibitor from the Fernox range manufactured by Industrial (Anti Corrosion) Services Britannica Works, Arkesdon Road, Clabering, Nr Saffron Waldron.

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 refilling the system.

3.12 Add on Devices

It is important that no external control devices eg. 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 voidable and also infringe the Gas Safety (Installation and Use) Regulations 1984.

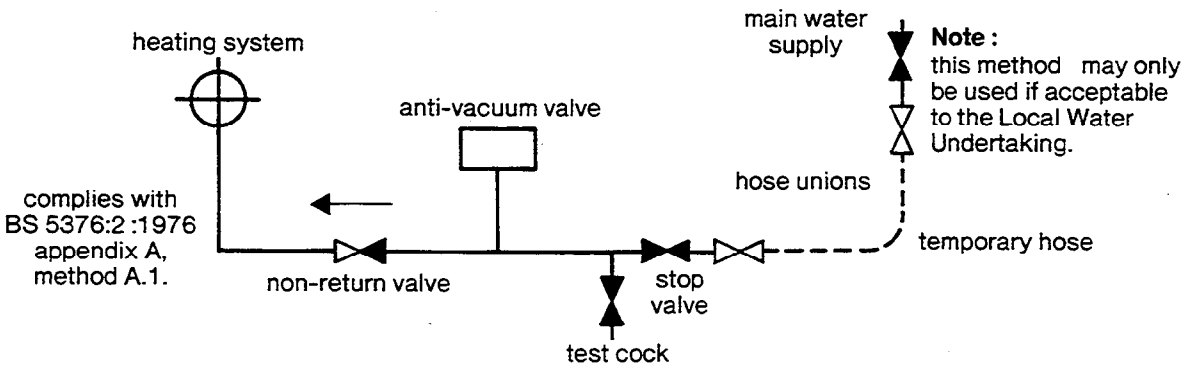


Fig. 9

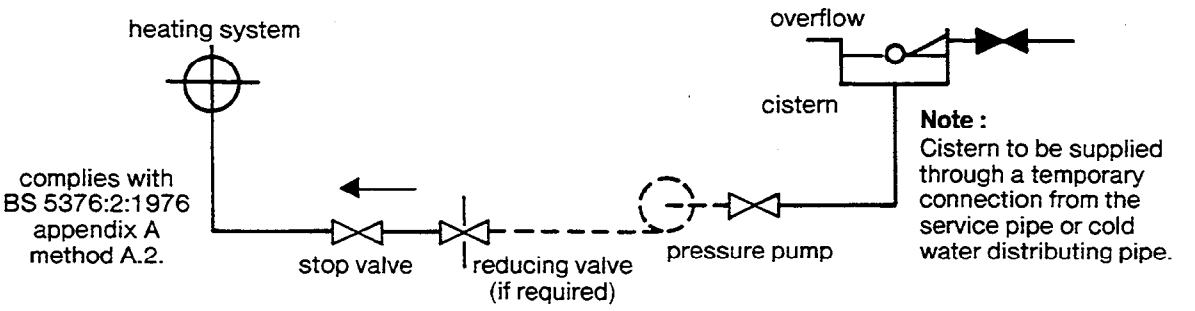


Fig. 10

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 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 top panel
1 screen
1 glass door complete with hinges.

3) Mounting bracket comprising : top bracket
spacing bracket
bottom bracket
flue guide
plastic connection jig plate.

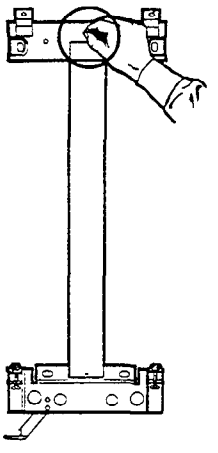
4) Plastic bag containing : gas and water connections and washers.

5) Box containing : control knobs
screws and fixings
safety valve.

6) Flue assembly : flue turret with pressure differential switch and 1st flue duct section
plastic wall liner with terminal, parrallel flue duct
flue duct plastic turret cover.

7) Plastic bag containing : flue locking ring
'O' ring
2 gaskets
4 mounting screws.

4.1



Positioning the boiler

a) Assemble the bracket made up of 4 pieces. The assembly screws are placed in the small recessed pockets.

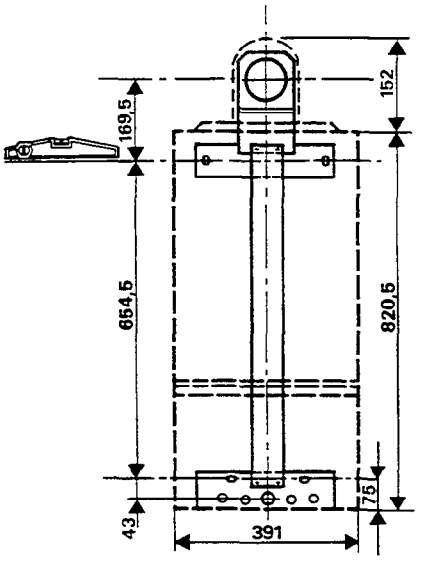
b) Select the location for the boiler, ensure clearances see 1.2

c) The bracket which also acts as a template can be temporarily attached using a nail.

d) Drill pilot hole where flue will breach external wall and check terminal position see table 2.4

e) Mark 4 fixing points, drill and plug wall.

4.2



Rear outlet flue

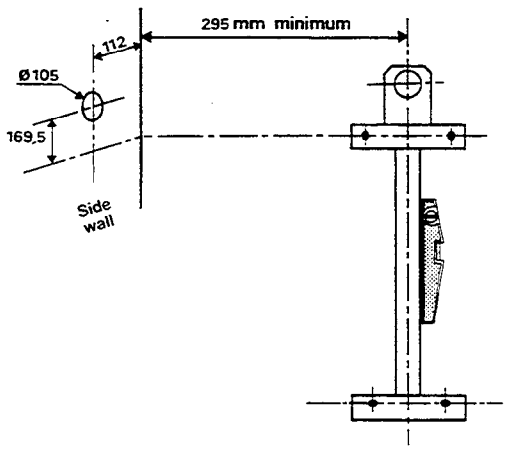
a) Mark centre line of the opening for the wall liner 169.5 mm above a horizontal line drawn through the top fixing holes.

b) Mark centre line of bracket.

c) Using a 4" core drill, drill hole for flue.

d) The flue pipe should be horizontal or slope slightly downwards to the outside.

4.3



Side outlet flue

a) Temporarily position mounting bracket using a single nail.

b) Mark centre of opening 4.2 a.

c) Mark vertical axis on wall to be drilled at 112 mm from angle of wall.

d) Using a 4" core drill, drill hole for flue.

e) The flue pipe should be horizontal or slope slightly downwards to the outside.

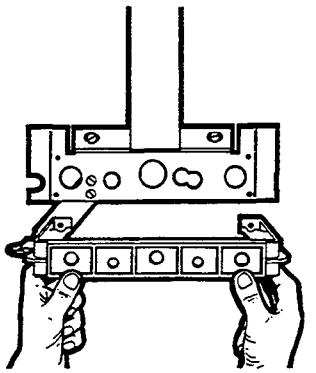
4.4

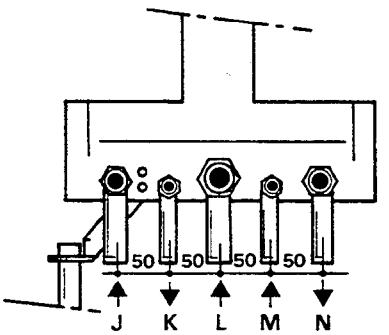
Mounting bracket

a) Using 6 mm x 50 wood screws and washers provide fix bracket to wall.

NB. Check level and plumb before tightening.

4.5





Jig plate

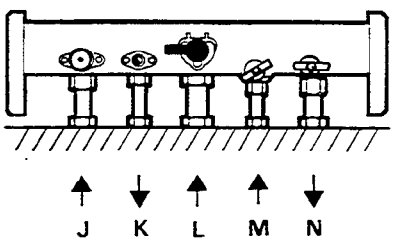
a) Attach plastic jig plate to bottom bracket using 4 thread forming screws provided.

b) Fit bends to jig plate – see diagram.

c) The water pipes can either come from above or below. The gas can only enter from below the appliance.

d) If the boiler is positionned on an internal wall it is possible to connect to the appliance from the rear. The connections on the appliance are BSP.

Gas & Water Connections	Tube Diameter	Thread Size
J Heating return	22 mm	1/4
K Domestic hot water outlet ..	15 mm	1/2
L Gas inlet	22 mm	3/4
M Main water inlet	15 mm	1/2
N Heating flow	22 mm	3/4



4.6

Water connections

a) Solder water connections.

NB. System can be completed before boiler is mounted.

4.7

Gas connection

a) The gas connection is 3/4" BSP male (tapered).

NB. The gas supply pipe must not be less than 22 mm.

4.8

Fitting the boiler

a) Remove the plastic jig plate.

b) Fit safety valve drain pipe and run 22 mm tube – falling all way to external drain.

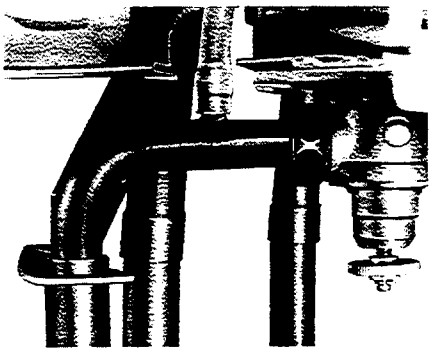
c) If side outlet flue is used remove top section of mounting bracket.

d) Hang boiler on bracket, ensure that it is properly located and plumb.

e) Using washers provided connect water connections – plain washers only.

f) Using **filter washer** connect gas.

4.9



Fit safety valve

The safety valve is mounted below the heating return isolating valve.

a) Ensure 'O' ring is in position.

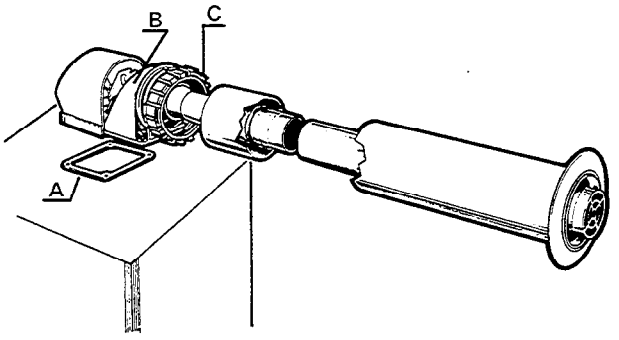
b) Fit safety valve and secure with grub screw provided.

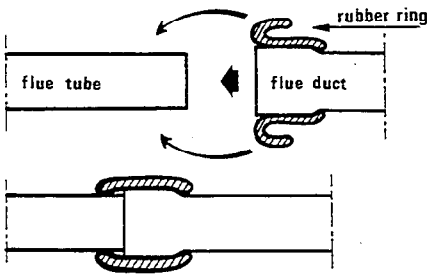
c) Fit 15 mm tail, which has nipple to receive plastic tube from air separator, using washer provided.

NB. The drain must be 22 mm and the 15 mm drain bend from the safety valve is entered into drain pipe. DO NOT SOLDER.

d) Connect plastic tube from air separator to nipple on safety valve drain bend.

4.10





Fitting the flue 600 mm long or less

a) Measure the wall thickness and cut the flue duct to length. See 1.5.

NB. In very cold weather, the air duct becomes brittle-warm before cutting.

b) Peel off protective paper from adhesive side of cork gasket and place on mating side of the flue turret, lining up screw holes and press down.

c) Assemble flue duct onto the 1st flue tube section which is fitted to the flue turret.

d) Fit locking ring and 'O' ring over plastic air duct – wall liner.

e) Fit flue duct and turret through the air duct/wall liner so that it engages into the terminal.

f) Engage locking ring over lugs on the flue turret by turning anti-clockwise direction viewed from behind the turret.

g) Ensure chanelled gasket is properly seated.

h) Pass the assembled flue through the wall so that the terminal extends 13 mm past the external wall surface. (Wall plate – is provided complete with mastic sealing ring to seal air duct to structure).

j) Seat turret onto the flue outlet and secure with 4 screws provided.

k) Do not fit the turret cover until electrical connections have been made and the boiler commissioned.

4.11

Fitting the flue – over 600 mm long

a) Remove the terminal from air duct supplied with boiler - retain the two screws.

b) Measure and cut flue duct and air duct extention sections to length.

c) Refit terminal in section which breaches external wall.

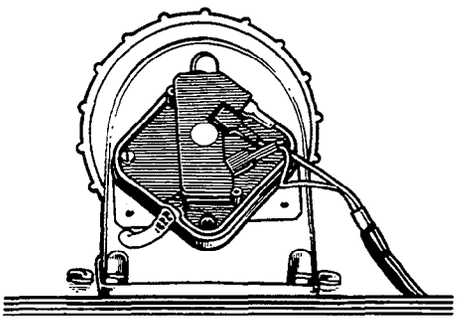
d) Fit air duct into position supporting from brackets as necessary and fit locking ring and 'O' ring.

e) Assemble flue duct making sure joints are secured with rubber gaiters.

f) Enter flue duct into air duct and locate into terminal.

Proceed as 4.10 f to k.

4.12



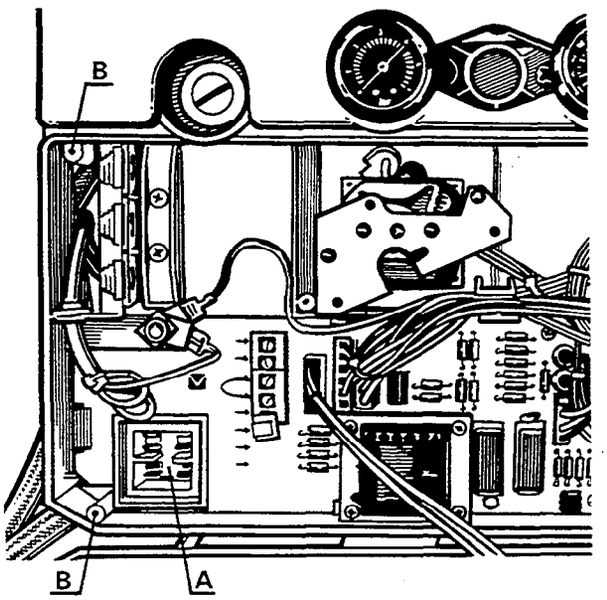
Connection to the pressure switch

a) The two wires in the harness must be connected.

b) Push spade terminals onto tags. Terminal COM (P) and NO (2) – the common and normally open contacts.

NB. Before plastic cover is fitted ensure cable route does not foul turet fixing screw.

4.13



Making the electrical connection

See sect. 2 for the electrical supply requirements.

THIS APPLIANCE MUST BE EARTHED.

a) Pull out fuses (A).

b) Remove two screws (B).

c) Open door on 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 m² and must be heat resisting.

e) Remove cable clamp.

f) Connect permanent live and neutral supply to terminal Ph & N.

g) Connect earth to earth pillar.

h) Connect external controls - time clock room stat etc across terminals 6 & 7. See 5.1-5.5.

j) Secure cables with cable clamp.

k) Close door and secure with two screws.

m) Replace fuses.

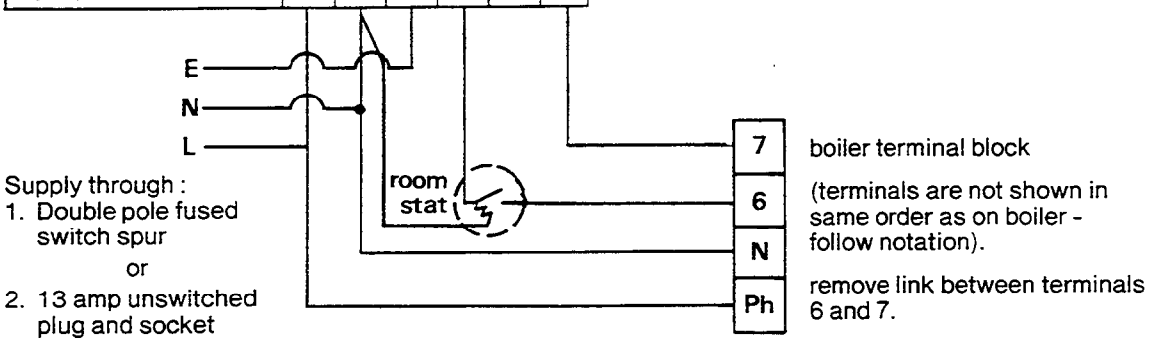
NB. The length of the earth wire between the cable clamp and the terminal must be such that the live and neutral wires become taut before the earth wire if the supply cord is pulled.

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

Use only voltage free external control switching. **No supply voltage should be connected to terminals 6 or 7.**

5. ELECTRICAL CONTROLS

Control	Terminals in control					
Horsman (Coronet) * .	L	N	E	4	2	5
Landis & Gyr RNB 30 .	L	N	X	4	1	2
Randall 103 *	6	5	4	1	2	3
Sangamo M6	6	4	X	1	7	3
Switchmaster 300 ...	L	N	X	1	2	4
Towerchron TC *	1	2	X	7	+	4
Towerchron T 2001 C	1	2	X	7	+	4
Venner T10	L	N	E	3	+	2



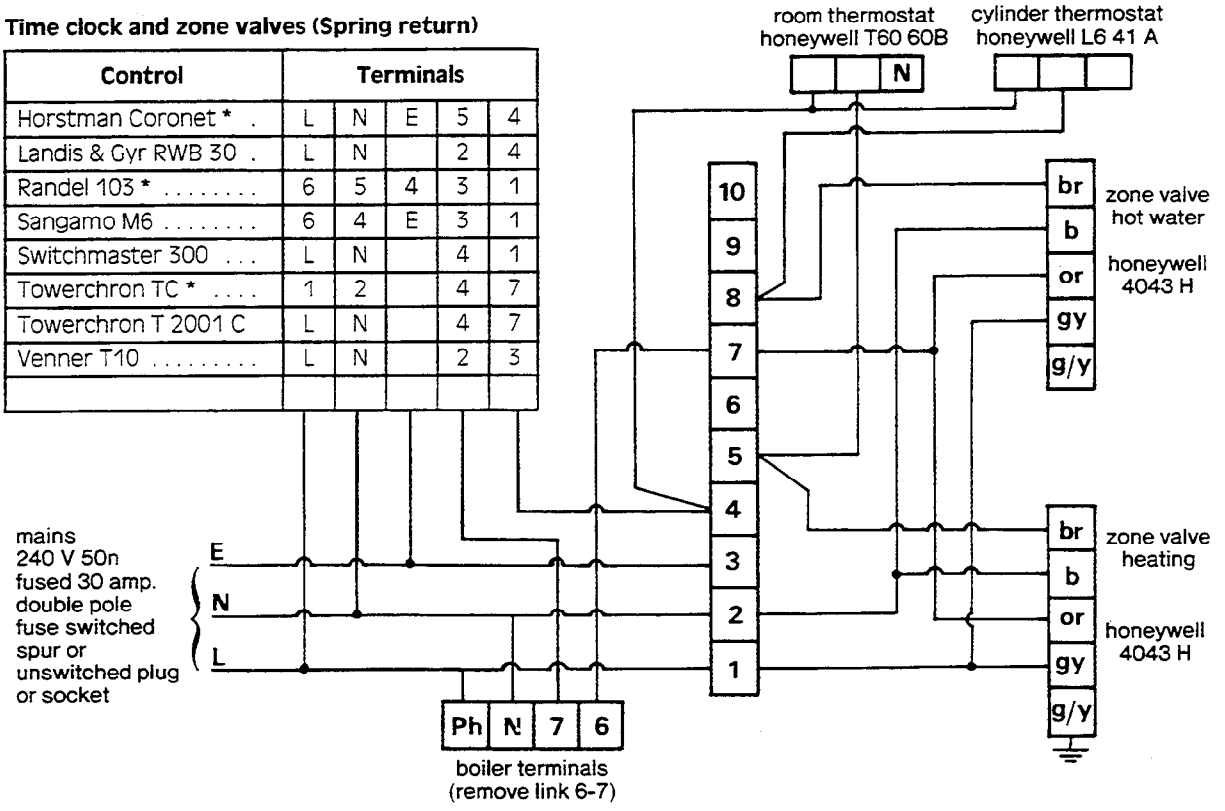
5.1 Time clock - Time clock and room stat

- The time clock contacts **must** be voltage free (remove external links).
- The room stat accellerator should be connected is fitted.
- Supply fuse valve 3 am.

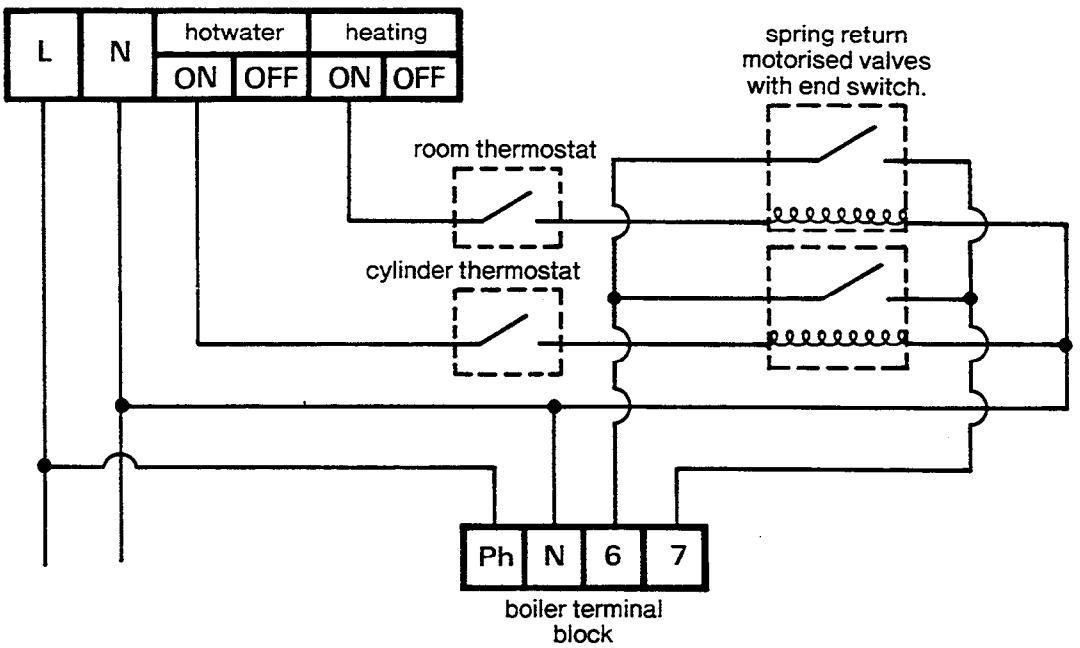
NB. 1) X in table indicates no earth connection in time clock.
2) * in table indicates that external links on time clock must be removed.
3) + in table indicates no 'spare' connection in time clock so a connector will be required.

5.2 Time clock and zone valves (Spring return)

Control	Terminals				
Horstman Coronet * .	L	N	E	5	4
Landis & Gyr RWB 30 .	L	N		2	4
Randel 103 *	6	5	4	3	1
Sangamo M6	6	4	E	3	1
Switchmaster 300 ...	L	N		4	1
Towerchron TC *	1	2		4	7
Towerchron T 2001 C	L	N		4	7
Venner T10	L	N		2	3

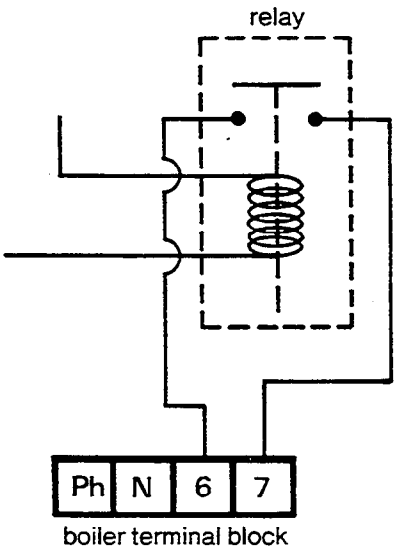


5.3 Programmer and zone valves



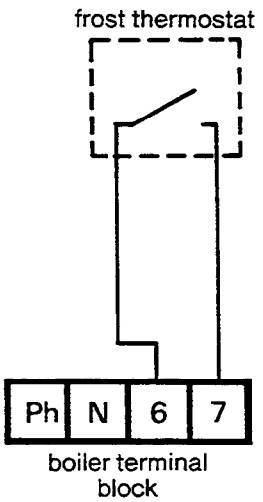
5.4 Honeywell Y plan, Satchwell flow share or Satchwell mini valves to control zones.

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



5.5 Frost thermostat.

If the appliance is installed in an unheated area in a garage a frost thermostat must be fitted in addition to any other controls.



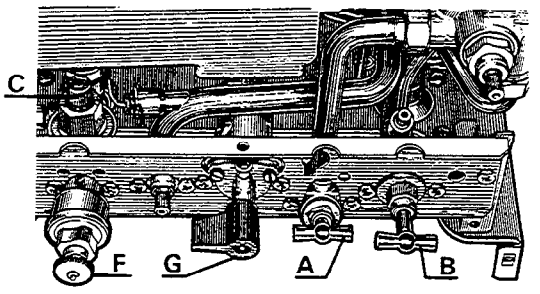
6. COMMISSIONING

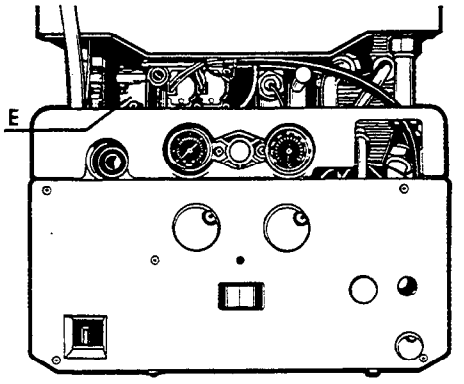
6.1

Hot water circuits - filling

1) Check that stop cocks down stream of appliance are of a fixed jumper type.
2) Open mains cold water inlet valve 6.2 (A).
3) Vent installation by opening taps and closing.
4) Check that 'dead legs' have been eliminated.
4) Check for water soundness and rectify if necessary.

6.2

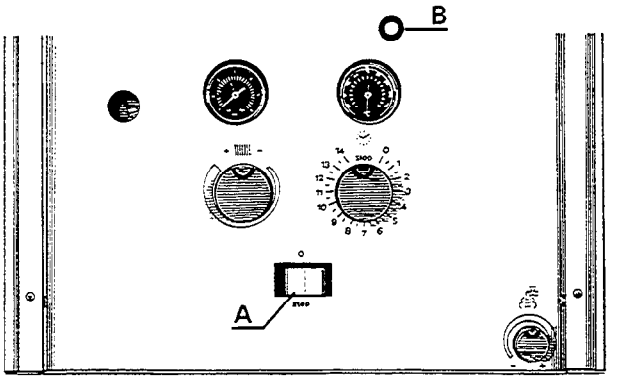




Central heating circuits - filling

1) Ensure that the isolating valves are open.
   NB. The return isolation valve (C) opens by unscrewing in an anti-clockwise direction. When the thread has disengaged the head springs out about 3/4 ins.
2) Set fill system to charge condition see sect. 3.
3) Vent the radiators and any high points.
4) Vent air separator E by loosening sealing screw.
5) Set system charge pressure to design cold pressure. New installation we suggest 1.0 bar. Old installation see sect. 3.9.2 set to system static head or 0.8 bar which ever is the greater.
6) Check for water soundness and rectify.
7) Switch on electrical supply.
8) Manually check pump rotation.
9) Switch to winter which will start pump.
10) Allow pump to run for further 10-15 minutes.
11) Drain system by disconnecting fill system and opening the emptying 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 return isolating valve see sect. 8.6 clean and replace.
13) Refill system as above.

6.3



Lighting the boiler

1) Purge gas supply.
2) Turn the lever on the gas service cock 6.2 (G) to the left. In the open position the ♦ sign is to the front.
3) Switch on the electrical supply.
4) Turn the selector (A) 6.3 to the winter position. The fan will run at low speed.
5) Press the ignitor button (B) and hold in.
   a) The fan will change from low to high speed to purge the combustion chamber - gas is admitted to the pilot.
   b) After approx. 15 secs the spark generator passes a continuous stream of sparks to light the pilot.
   c) When the pilot is alight - viewed through the sight glass wait a further 20 seconds before slowly releasing the button.
6) When the button is released if you have the selector set to winter and ancillary controls are in demand position, the boiler will fire.
7) Check for gas soundness using sense of smell and leak detection fluid.
8) Check and adjust gas pressure/gas rate. See 6.4

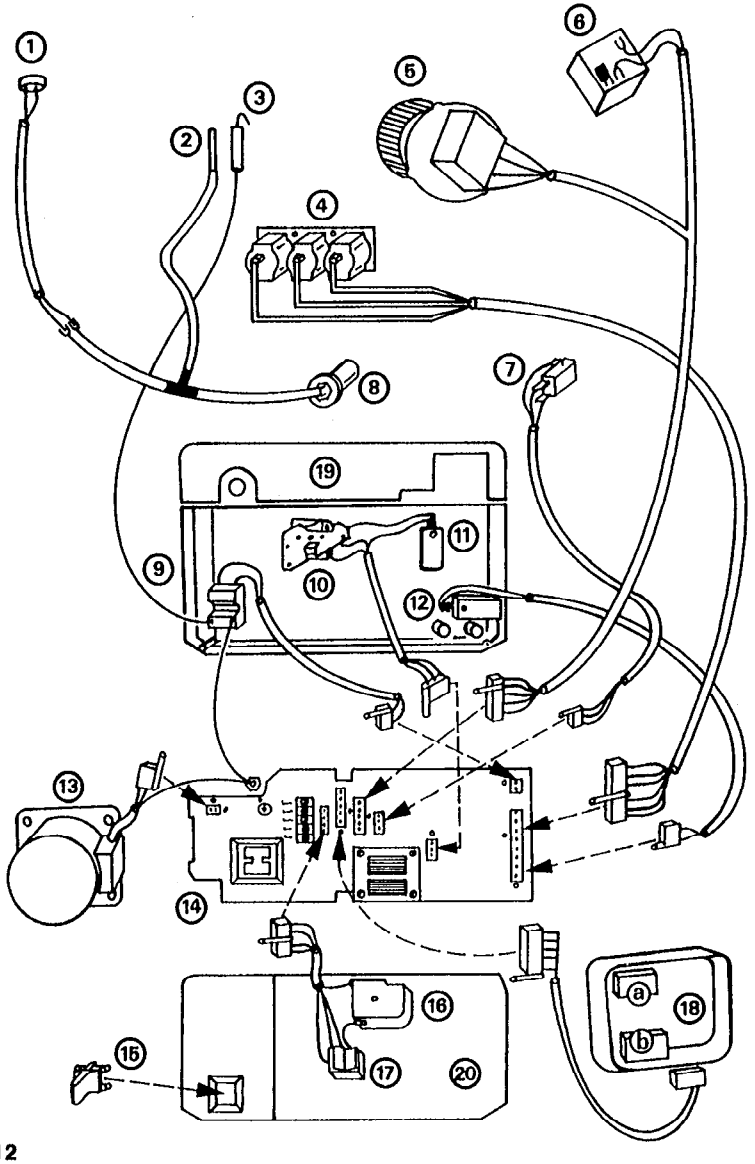


Fig. 12

1	Toko high limit thermostat	8	Thermoelectric valve	15	Fuses
2	Thermocouple	9	Spark generator	16	Delay timer
3	Ignition electrode	10	Boiler thermostat	17	Selector switch
4	Solenoid valves	11	Boiler limit thermostat	18a	Microswitch box on change over valve
5	Fan	12	Hot water limit thermostat	18b	C.H. microswitch
6	Pressure switch	13	Pump	19	Controls box base
7	Ignition microswitch	14	Printed circuit board	20	Controls box cover

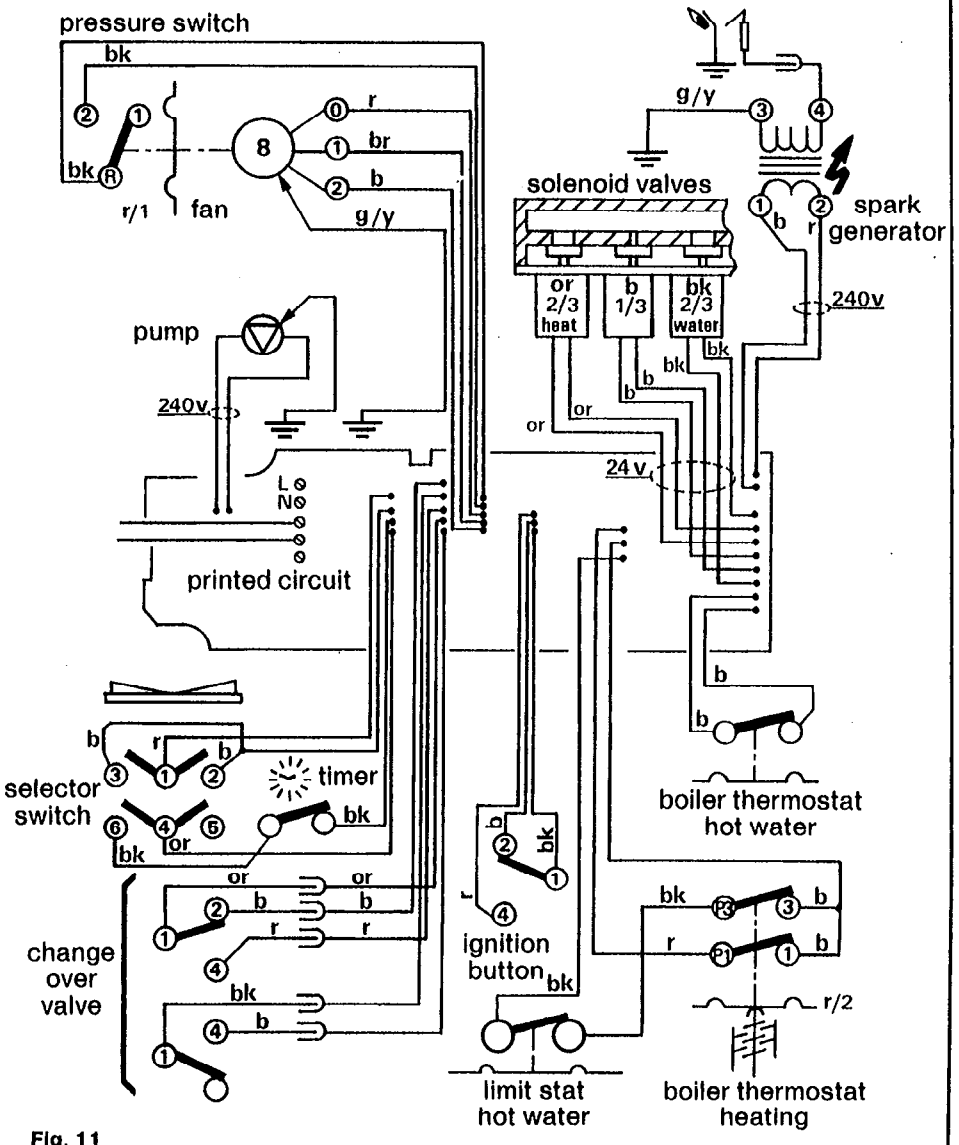
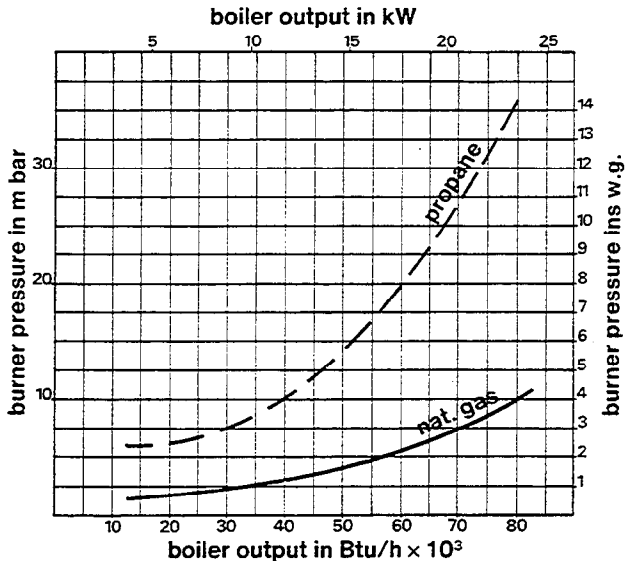
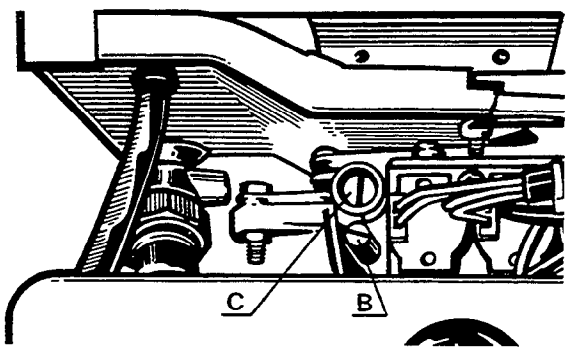


Fig. 11

KEY			
bk	BLACK	or	ORANGE
b	BLUE	r	RED
br	BROWN	w	WHITE
g/y	GREEN YELLOW	r/-	RELAY CONTACTS

6.4





Gas rate adjustment

The gas rate on hot water is fixed and is a function of the restrictor sizes. The central heating variable restrictor is set at 75 % ie. for an output of approx. 17.5 kW (60,000 Btu/h).

1) Switch the boiler to the off position - switch 6.3 (A) central position.
2) Remove the pressure test point screw - (B) and connect a suitable pressure gauge.
3) Remove hexagonal cap from the gas volume adjuster (C) exposing the adjustment screw.
4) Turn boiler to winter and check that controls are calling for heat.
5) Adjust pressure after boiler has been running for 10 minutes and then check the gas rate. The setting pressures are given in the graph relative to the required output. The pressure will be reduced by a clockwise movement of the screw and increased by an anticlockwise movement.
6) Turn to summer and open a draw off tap. The boiler will fire at 100 % check gas pressure. If pressure is not as stated, check the gas pressure on the inlet to the appliance with the appliance working - this should not be less than 8 ins wg (Nat Gas), 14.6 in (Propane).
7) Turn off boiler and refit pressure test point screw and volume regulator cap. Test for leakage around the pressure test points.

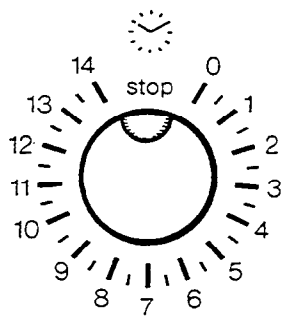
6.5

Adjusting the by pass

Where a by pass is fitted see 3.2 it is necessary to adjust it to obtain the boiler minimum requirement. See

1) Set boiler thermostat to maximum fire boiler on winter setting.
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 will normally be say one or two radiators operating.
4) Open by pass gradually until the boiler operates quietly and the Δt is maintained.

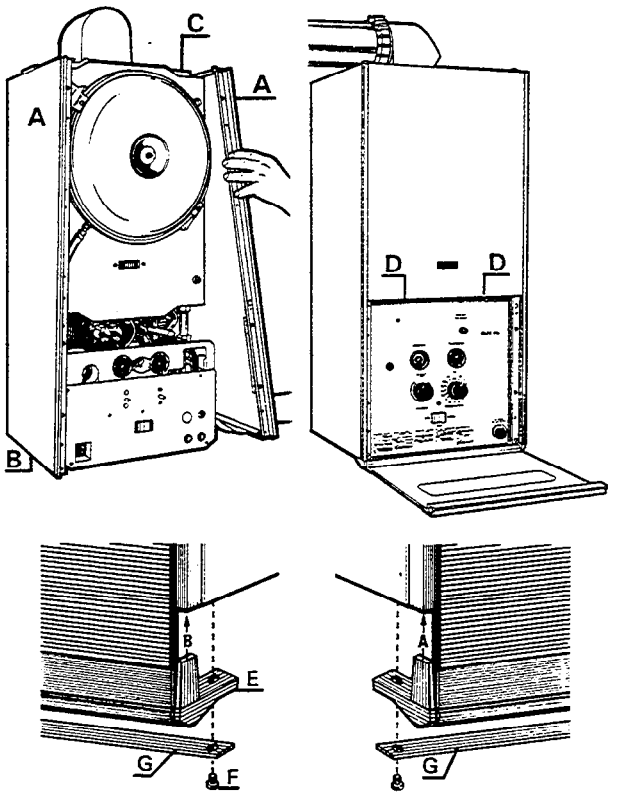
6.6



Timer

There is a delay timer fitted to the appliance as standard equipment. If auxillary time controls are fitted the timer can be set to stop and left. If the consumer wishes to utilise this control it operates the same as any other delay device. If you for instance set to 2 the appliance goes off immediately and will come on again after a delay of 2 hours.

6.7



Fitting the casing

1) Take from the carton the controls cover, the glass door, the top front panel and the side panels.
2) Remove control knobs used during testing and commissioning.
3) Fit side panels (A) and secure with screw at bottom rear (B).
4) Put the control cover 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 various control knobs, gas push button boiler thermostat delay timer and domestic hot water temperature selector.
7) To fit the glass door proceed as follows :

   NB. THE TIE ROD (G) MUST BE USED

   a) Take out the two screws securing hinges to the tie rod - Retain the screws.

   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 through 90° C and engage into profile of the left hand side panel. Fix assembly with screw from beneath.

7. HEATING AND HEATING AND HOT WATER SYSTEMS

It must be remebered 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 constraints associated with multipoints apply equally to combination boilers.

The appliance has two separate functions, to provide heating and instantaneous hot water. It can have a third, which is to supply hot water high demand through the use of an indirect cylinder.

Such a course would recommend itself if for instance there is more than one bathroom. 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.

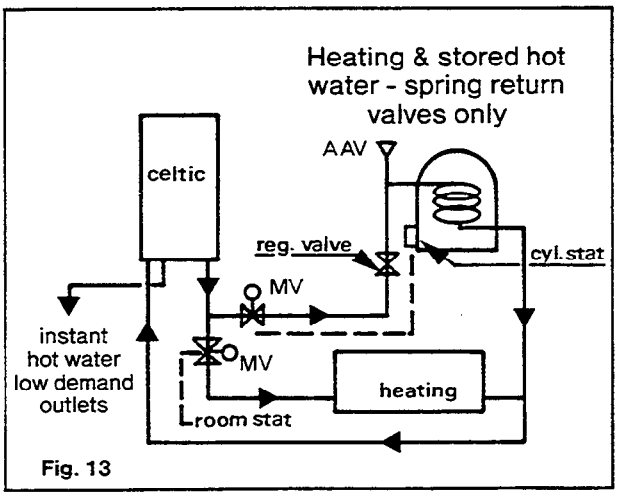


Fig. 13

7.1

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

Figs. 13, 14 & 15 indicate various layouts for the production of hot water. It is recommended that only a high recovery cylinder is used and circumstances may from time to time dictate that a special saturated heat exchanger in an indirect cylinder may be desireable.

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. (See notes on drawing).

It is also possible where the occupation of the house is variable to provide either for small or large load. This is best achieved with a tall, small diameter cylinder. Fig. 16. See sec. 5 for possible wiring arrangements.

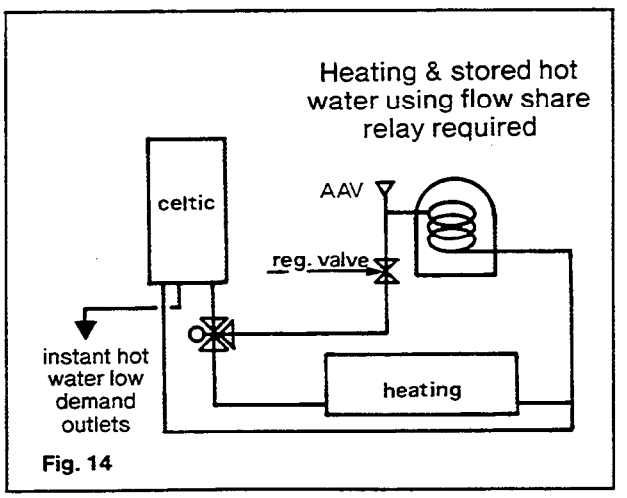


Fig. 14

7.2 When using the instantaneous side of the appliance the use of non return valves and/or loose jumpered stop cocks is just as critical as with the conventional multi-point and should be avoided. If a non-return valve is fitted in the incoming water supply then an expansion vessel MUST be fitted in the domestic hot water circuit with a capacity of at least 0.16 litres.

When replacing an existing cylinder storeage system with an instantaneous type system 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 3 ft - 1 metre above the top of the appliance and ideally should be as close as possible to the terminal fitting.

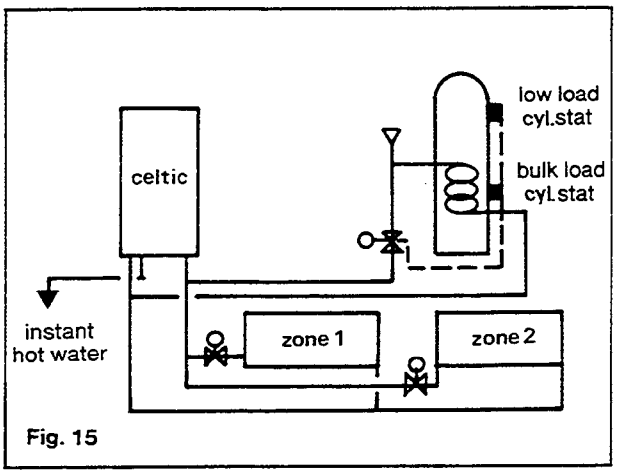


Fig. 15

7.3 The consideration of heating systems using thermostatic valves should ensure that the minimum flow rate through the appliance is maintained and in this connection the remote by pass is preferred.

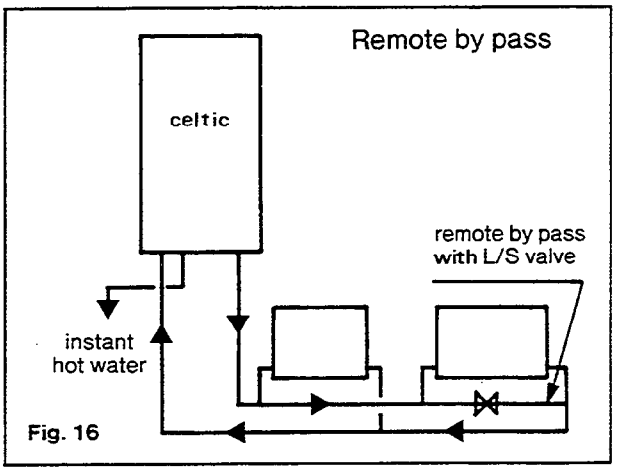


Fig. 16

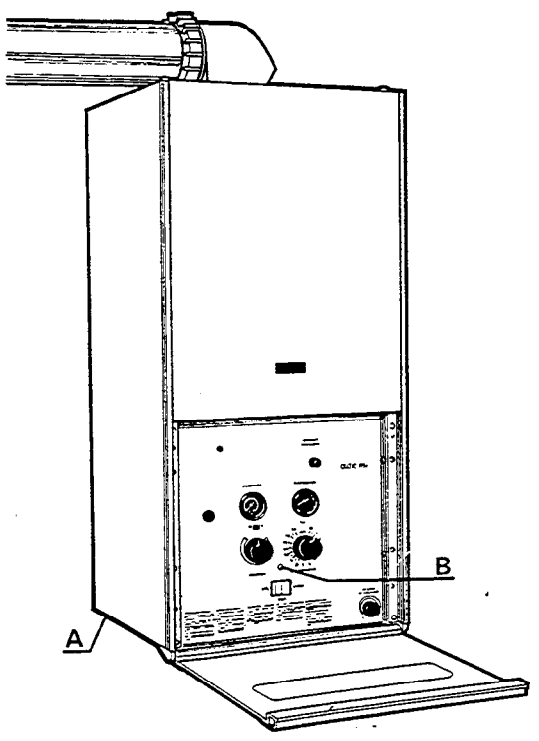
8. Servicing

For efficient and trouble free operation it is important that the Celtic receives regular maintenance.

Before commencing any work turn off the gas at the gas inlet cock 6.2.9.

Ensure that the electricity supply is disconnected.

8.1



Remove front casing

a) Remove two screws (A) bottom rear of boiler.

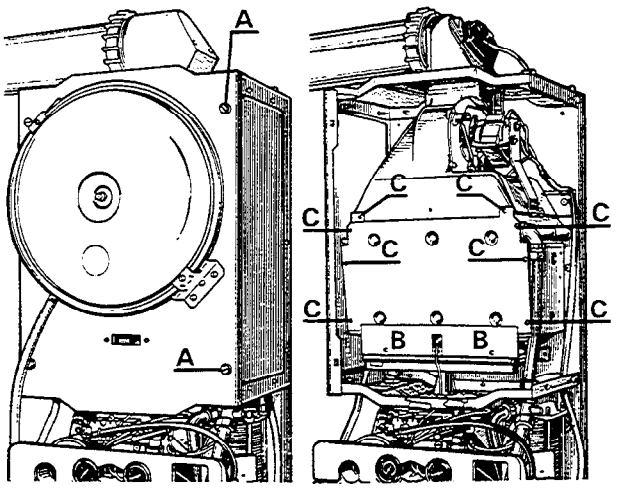
b) Remove screw (B) centre of lower front panel.

c) Remove control knobs.

d) Remove case by easing forward at bottom and lifting off lugs at top.

e) Replace in reverse order.

8.2



Remove combustion chamber front panel

a) Remove 4 screws securing front panel (A).

b) Lift off front panel complete with expansion vessel and hang on hooks below boiler.

c) Remove two screws (B) at ends of burner and remove closure plate.

d) Remove 8 screws, retain combustion chamber front panel.

e) Replace in reverse order.

8.3

Remove burner assembly

a) Remove 2 screws and remove burner manifolds

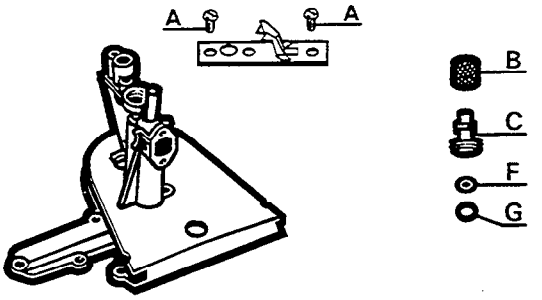
b) Remove gasket and retain in a safe place.

c) Remove 2 screws securing burner to chassis.

d) Lift at front and slide out taking care not to trap the ignition electrode lead.

e) Replace in reverse order.

8.4



To remove pilot

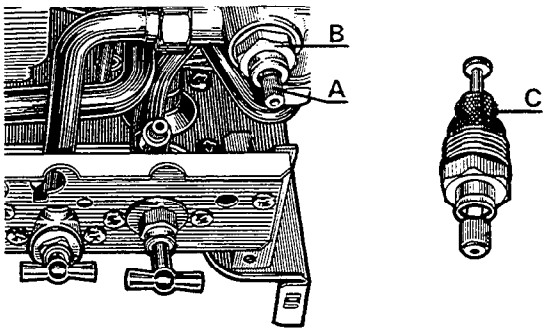
a) Remove 2 screws (A) securing deflector plate and pilot head taking care not to loose the front spacer.

b) Remove pilot air filter (B).

c) Using a spanner remove pilot body from burner base (C).

NB. The pilot injector (F) is retained in the base of the body with an 'O' ring (G). If the injector is replaced it is fitted bright side uppermost. Replace in reverse order.

8.5



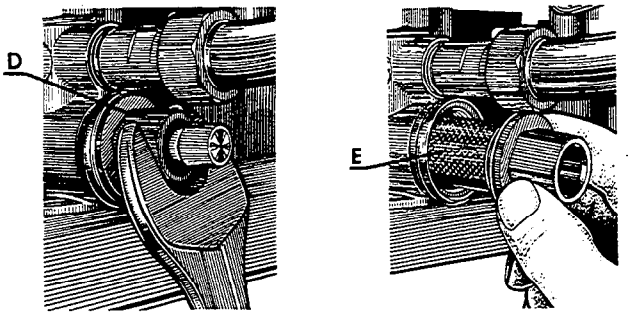
Service the change over valve

a) Isolate from mains water and drain from drain valve beneath the change over valve (A).

b) Remove governor and filter (B).

c) Clean filter (C) - grease governor using a high temperature silicone grease.

8.6



To clean heating return filter

a) Ease flexible tube to one side.

b) Ease capillary to one side.

c) Isolate heating flow and return valves (B & C) and drain through safety valve (F) (6.2).

d) Using spanner remove return valve spindle guide assembly (D).

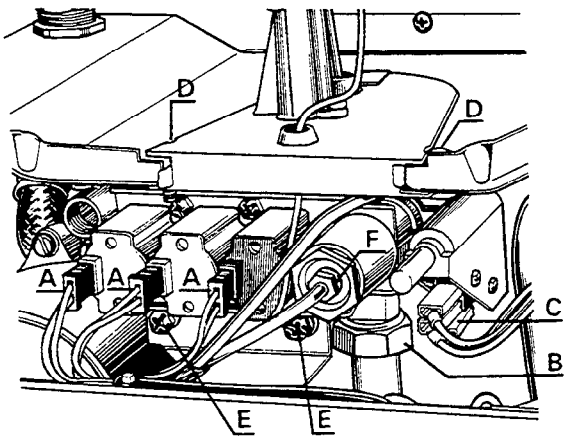
e) Lift filter off assembly (E).

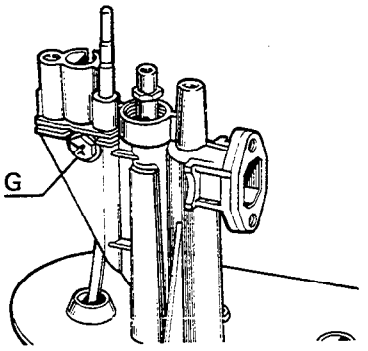
f) Clean in warm water.

g) Replace in reverse order.

9 REPLACEMENT OF PARTS

9.1





To replace thermocouple

a) Remove front case - 8.1

b) Remove combustion chamber front cover, closure plate and front panel 8.2

c) Remove burner manifold and burner 8.3

d) Remove deflector plate and pilot burner head 8.4 a) and b).

e) Unplug ignitor lead from rear of contro box.

f) Remove plugs from solenoid valves (A).

g) Release the gas union (B).

h) Part the thermocouple where it connects to the high limit stat (round pin push in connectors).

j) Pull off 3 tab connectors (C) from microswitch noting their position.

k) Remove the two screws retaining gas section to bracket (E).

l) Remove 2 screws from combustion chamber to gas section (D).

m) Slide out gas section by sliding forwards.

n) Take care to retain gas union washer.

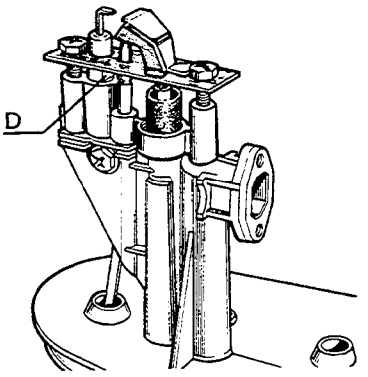
o) Remove thermocouple from thermoelectric valve connection (F).

p) Remove screw (G) which locates into the lower groove on the thermocouple.

q) Remove thermocouple by sliding down through gas section.

r) Replace in reverse order.

9.2



Replace electrode and lead assembly

a) Remove case 8.1.

b) Remove combustion chamber front cover, closure plate and combustion chamber front panel 8.2

c) Remove manifold and burner 8.3

d) Remove pilot head and deflector plate 8.4

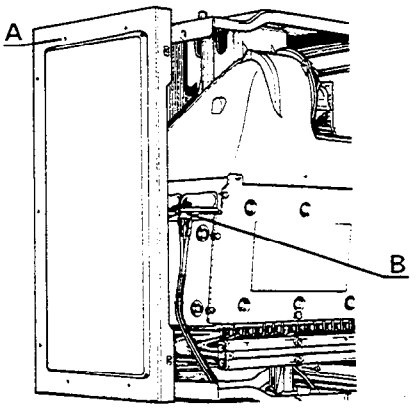
e) Disconnect electrode lead at rear of electrical box.

f) Feed cable up through gas section.

g) Remove electrode by pulling upward.

h) Replace in reverse order locating electrode in (D) spark gap 5 mm.

9.3



To replace high limit thermostat

a) Remove case 8.1

b) Remove combustion chamber front cover 8.2

c) Remove left hand side panel by removing 7 screws (A).

d) Remove 2 screws securing high limit thermostat to bracket (B).

e) Part the thermocouple at the connection.

f) Feed the wiring loom up into the combustion chamber.

g) Replace in reverse order.

NB. Use heat sink grease between high limit stat and plate.

9.4

To replace microswitch

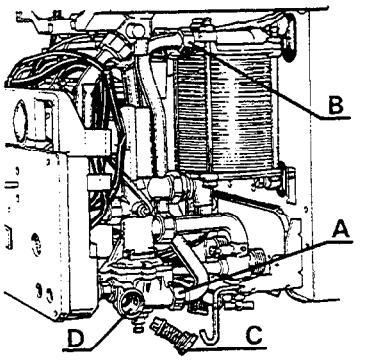
a) Remove gas section see 9.1 a-m.

b) Remove 2 screws retaining microswitch.

c) Remove microswitch.

d) Replace in reverse order.

9.5



To replace venturi

a) Isolate from mains water and drain down 8.5

b) Undo union at rear of change over valve (A).

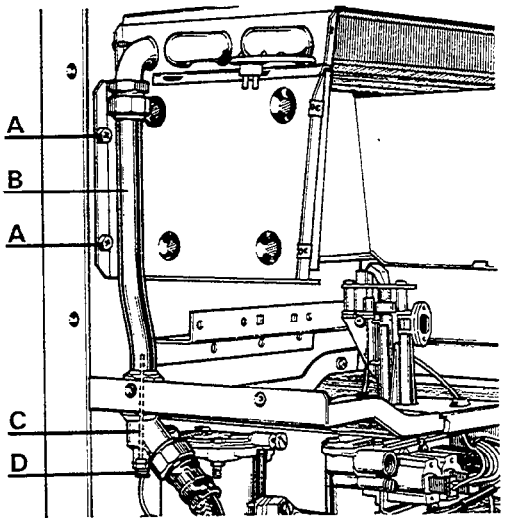
c) Loosen union on secondary heat exchanger and move pipe to one side (B).

d) Remove plug from right hand side of change over valve (C) (take care not to loose spring and pressure relief valve).

e) Use small screwdriver to gently push out venturi (D) - Ensure screw driver does not enter throat of venturi.

f) Replace in reverse order.

9.6



To replace primary heat exchanger

a) Remove front case 8.1

b) Remove combustion chamber front cover, combustion chamber front panel, manifold and burner 8.2, 8.3. Remove right hand and left hand side panels.

c) Disconnect high limit stat 9.3

d) Remove flow pipe - right hand side, by undoing unions and take out.

e) Remove return pipe (B) by undoing unions, ease out at top and lift out over boiler thermostat sensing phial (C).

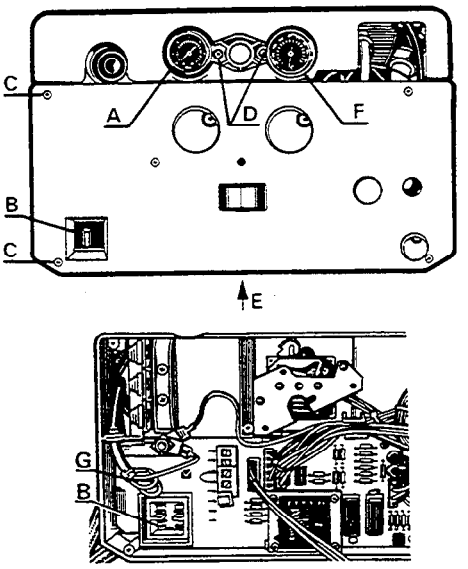
f) Remove four screws (A) securing combustion chamber to chassis.

g) Remove heat exchanger and combustion chamber together by dropping down and pulling forward.

h) Remove 2 screws securing heat exchanger to combustion chamber at rear.

j) Replace in reverse order.

9.7



To remove electrical box

a) Isolate electrical supply. Drain down.

b) Remove fuses (B).

c) Remove 2 screws (C) and open door on left hand side of electrical box.

d) Pull off plugs on solenoid valves.

e) Pull off pump plug (G) and earth tag from earth pillar, feed out through rear of box.

f) Disconnect the pressure gauge (A) by undoing union at rear. Take care to retain washer.

g) Remove two screws (D) in front of box.

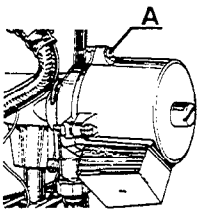
h) Remove two screws from base of box (E) where brackets meets jig plate.

j) Ease forward gently - thermostat (F) will disengage from by-pass pipe.

k) Box can be hung on hook beneath boiler - take care with capillaries.

l) Replace in reverse order.

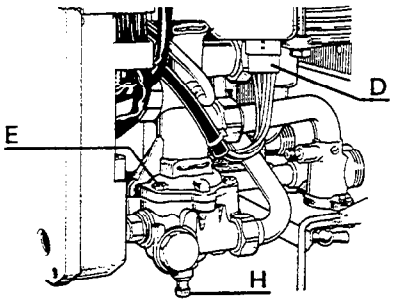
9.8

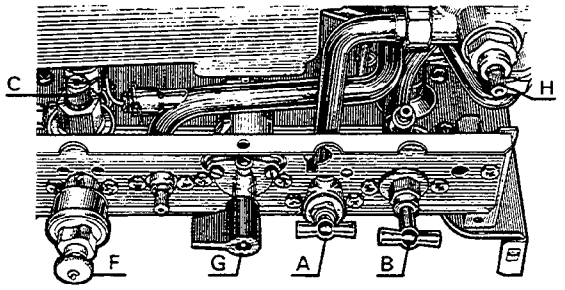


To replace pump head

a) Remove front case 8.1
b) Remove electrical box 9.7
c) Remove four nuts (A) and bolts retaining pump head.
d) Remove pump head.
e) Take off electrical connection cover by removing screw.
f) Disconnect connections and transfer lead to new pump.
g) Replace in reverse order.

9.9





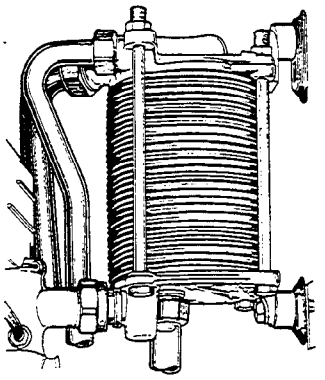
To replace change over valve assembly

a) Turn off mains water valve (A).
b) Turn off central heating flow and return valves (B & C).
c) Drain secondary side by opening drain plug on bottom of change over valve (H).
d) Drain primary side through safety valve (F).
e) Remove plug (D) from microswitch assembly.
f) Slacken 5 unions on change over valve and drain any residual water into a bowl.
g) Undo union nuts.
h) Remove valve.
j) To inspect diaphragm remove four screws (E) securing top section to bottom section.

NB. DO NOT REMOVE SPRING CLIPS.

k) Clean or replace diaphragm.
l) Flush out water section.
m) Replace in reverse order.

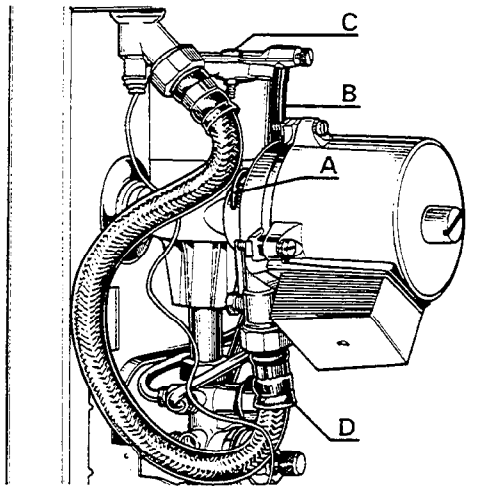
9.10



To replace the secondary heat exchanger

a) Remove change over valve assembly 9.9
b) Slacken the four connections.
c) Drain residual water into bowl.
d) Remove connections.
e) Remove nuts top and bottom securing heat exchanger to chassis.
f) Replace in reverse order.

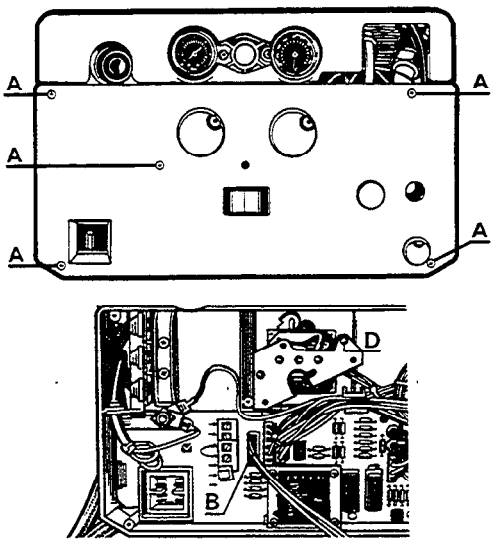
9.11



Replace air separator

a) Remove front case 8.1
b) Remove electrical box 9.7
c) Isolate flow and return valves 9.9 (B & C).
d) Drain down through safety valve.
e) Remove spring clip (A) by gripping with plier and pulling out.
f) Disconnect flexible pipe (D) at return valve.
g) Remove pump and volute.
h) Ease air separator forward and disengage peg which secures air separator to rear chassis.
j) To remove float disconnect plastic drain tube (B).
k) Remove four screws (C) securing float.
l) Lift out float.
m) Clean and replace as necessary.
n) Replace in reverse order.

9.12



To replace boiler thermostat

a) Remove case 8.1

b) Remove 5 screws (A) and remove electrical box cover. Unplug from the PCB the single connector for the switch and timer.

c) Close flow and return valves 9.9 (B & C).

d) Drain down boiler.

e) Remove (D) clip retaining thermostat phial in wet pocket - remove phial 9.6 (C).

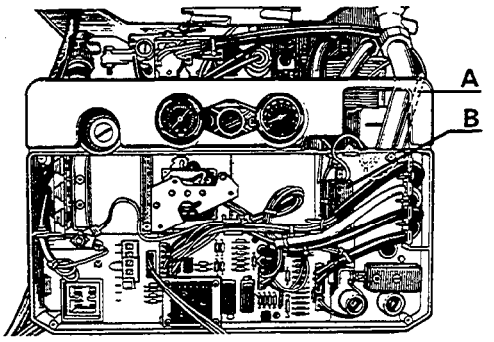
f) Remove 2 screws (D) which secure boiler thermostat onto moulded pegs in electrical box.

g) Remove connections from thermostat noting position of spade connectors see fig. 11.

h) Feed out capillery through to electrical box.

j) Replace in reverse order.

9.13



To replace security thermostat

a) Remove case 8.1

b) Remove electrical box front cover 9.12 b

NB. Thermostat is situated to right hand corner of electrical box (B).

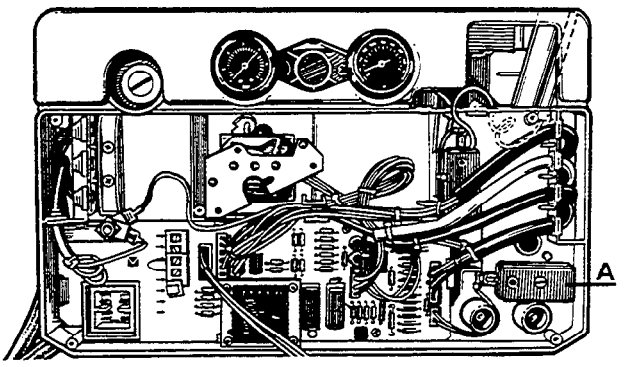
c) Remove split pin from dry pocket on flow pipe (A).

d) Thermostat located on moulded pins - ease forward and remove spade connectors.

e) Feed capillary through the control box.

f) Replace in reverse order.

9.14



To replace domestic hot water thermostat

a) Remove case 8.1

b) Remove electrical box cover 9.12 b.

c) Isolate mains water supply - drain through drain plug on base of change over valve 8.5

d) Remove (D) clip which retains phial in wet pocket.

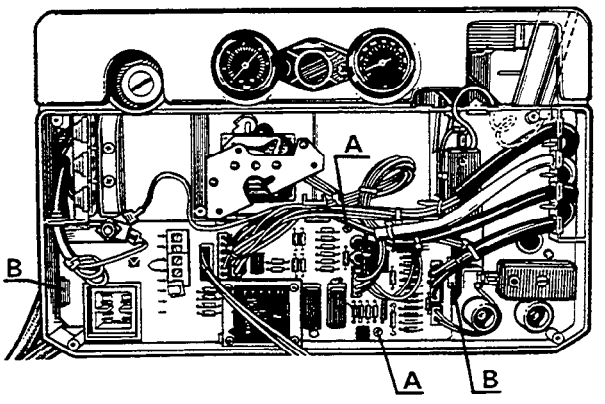
e) Remove phial from pocket.

f) Pull thermostat off moulded pegs and pull off spade connections.

g) Feed capillary through the control box.

h) Replace in reverse order.

9.15



To replace PCB

a) Remove casing 8.1

b) Remove electrical box front cover 9.12

c) Remove all plug in connections.

d) Disconnect mains input cable.

e) Disconnect external controls if fitted from terminals 6 and 7.

f) Remove two Philips screws (A).

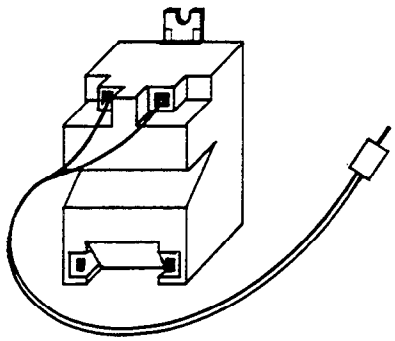
g) Pull back plastic catches (B) at each end of PCB.

h) Remove by pulling to the left and forward disengage from guide - centre bottom.

j) Pull PCB forward.

k) Replace in reverse order.

9.16



To replace the spark generator

a) **Remove case 8.1**

b) Remove electrical box cover 9.12 b

c) Remove PCB 9.15

d) Remove insulating separator board.

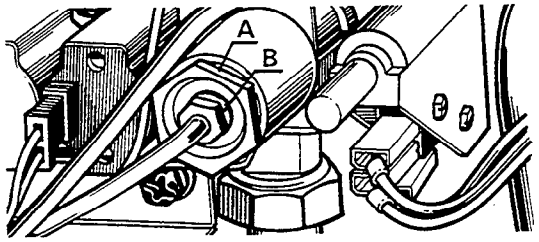
e) Unplug electrode and lead from rear of control box.

f) Pull tab connections from spark generator noting position.

g) Replace in reverse order.

NB. Ensure earth connected and when positioning insulated separator wires must pass through cut outs.

9.17



To replace thermoelectric valve

a) Remove case 8.1

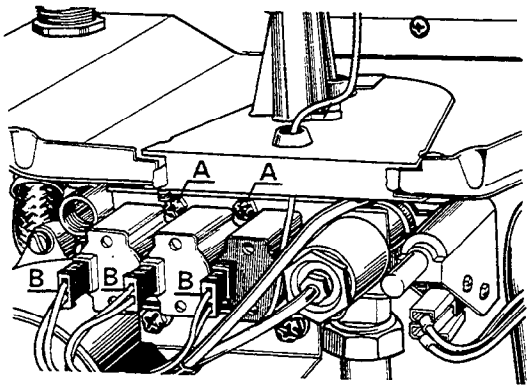
b) Remove thermocouple connection (B).

c) Remove nut (A) securing thermoelectric valve (25 mm AF).

d) Withdraw thermoelectric valve.

e) Replace in reverse order.

9.18



To replace solenoid valves

a) Remove case 8.1

b) Withdraw plugs - colour coded - from solenoids (B).

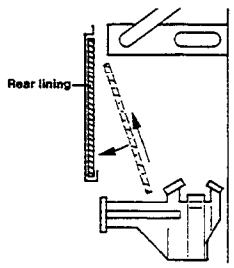
c) Remove 6 screws (A) securing valve mounting plate.

d) Remove plate and solenoids - take care not to misplace springs.

e) Replace in reverse order.

NB. If solenoids are removed for any reason the gasket - solenoid valve plate to gas section - **must** be replaced.

9.19



To replace combustion chamber linings

a) Remove front case 8.1

b) Remove combustion chamber cover, remove closure plate and front panel 8.2

c) Remove burner 8.3

d) Slide out side linings first followed by rear which is removed by easing upwards and sliding out from bottom.

e) Replace in reverse order.

9.20

To replace fan

a) Remove front case 8.1

b) Remove combustion chamber front panel 8.2

c) Remove 4 screws - two on flue hood (A) and two on support bracket (B).

d) Turn anti-clockwise 10° and withdraw.

e) Note position of electrical connections and pull off spade connectors.

f) Replace in reverse order.

NB. Ensure bracket to rear of fan locates in slot in flue hood.

9.21

To replace pressure switch

a) Remove 2 screws retaining plastic cover.

b) Remove spade connectors noting positon (COM-P and NO-2).

c) Disconnect pressure sampling tube by removing from nipple.

d) Remove two screws securing pressure switch.

e) Replace in reverse order.

NB. Ensure 'O' ring in position on rear of pressure switch to seal joint - pressure switch - high pressure sample joint.

9.22

To repressurise expansion vessel

1) Remove casing 8.1.

2) Isolate and drain system.

3) Using valve gauge check pressure on schrœder valve.

4) Repressurise using hand pump (bycycle pump) (0,65 bar).

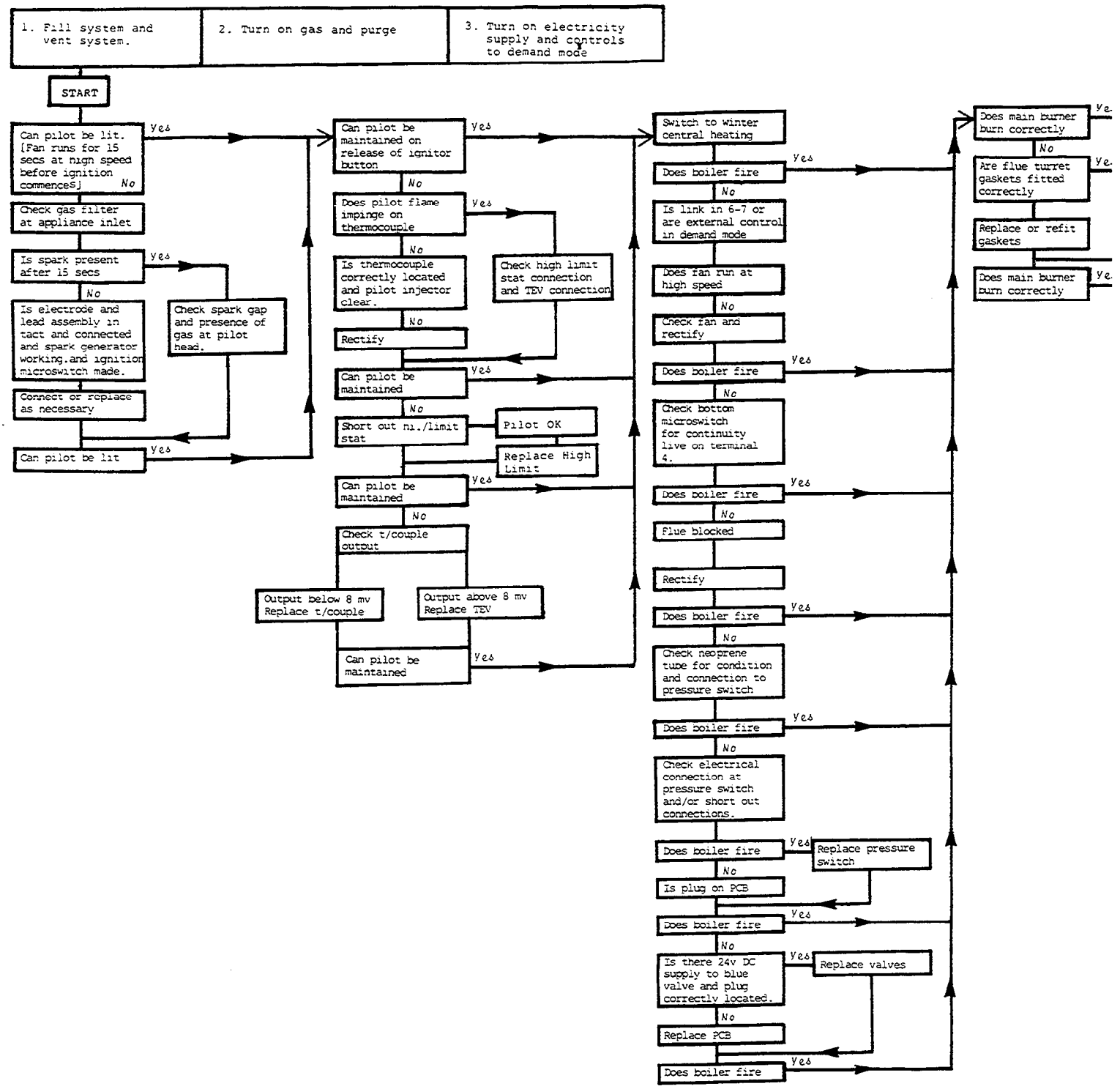
5) Refill and recommission boiler.

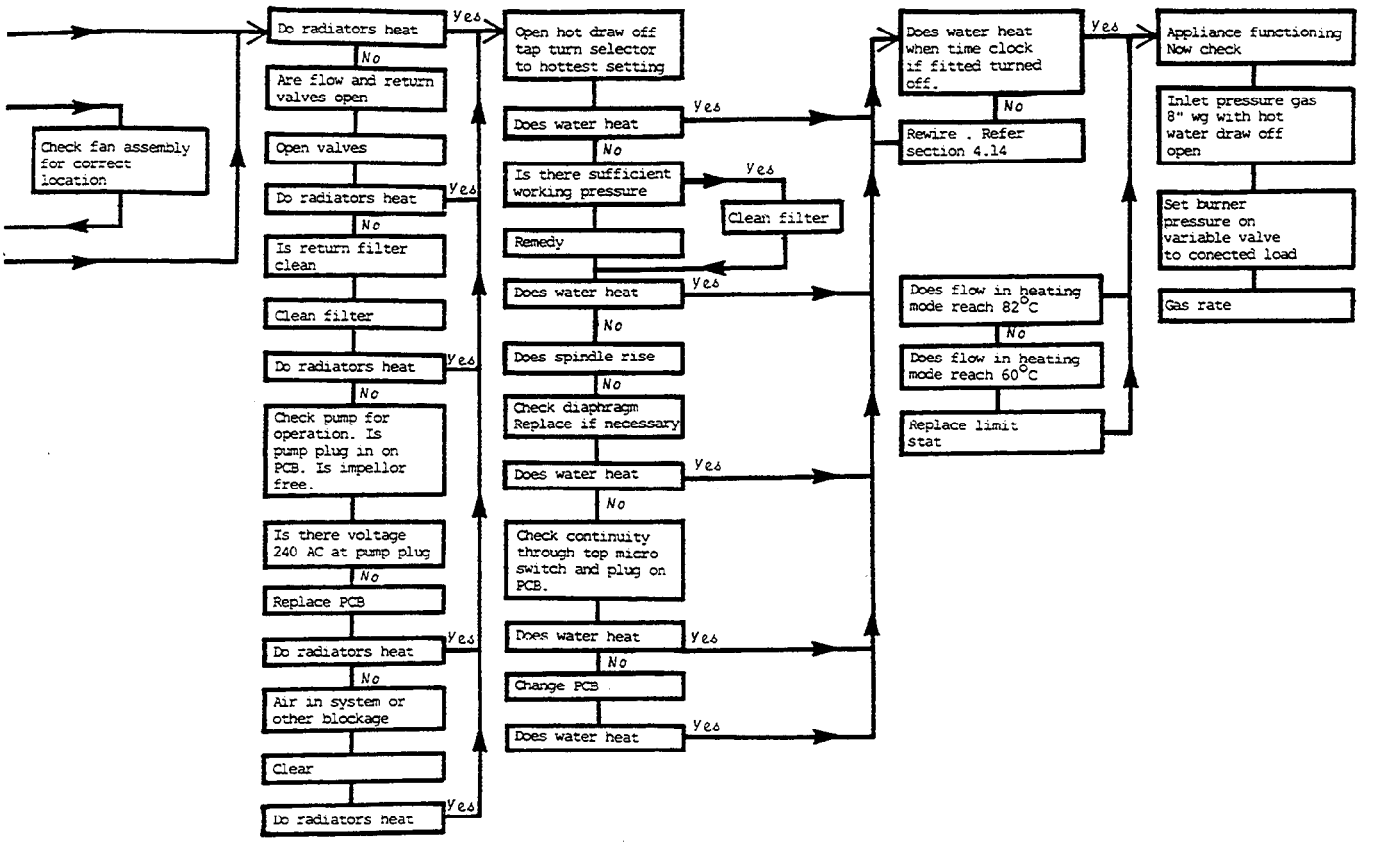
FAULT FINDING

DEFECT	CAUSE	REMEDY
1) Explosive ignition	**1)** Poor pilot flame **a)** Inlet pressure low - should be 8" wg **b)** Obscurred gas filter **c)** Pilot injector	 **1a)** Check meter and pipe sizing **1b)** Clean **1c)** Replace.
	2) 1/3 valve not operating **a)** 24 volt supply to valve **b)** No voltage at solenoid	 **2a)** Replace solenoids **2b)** Replace PCB
	3) Crossiighting strip - missing/incorrectly positioned	**3a)** Replace or reposition.
2) Unstable burner	**1)** Incorrect injectors	**1)** Replace
	2) Gas pressure at manifold **a)** Too high **b)** Too low	 **2a)** Adjust **2b)** Check restrictors
	3) Neoprene gasket not correctly fitted or missing	**3)** Fit or refit.
	4) Incorrectly assembled flue duct	**4)** Check and reassemble
	5) Combustion chamber front cover not sealing	**5a)** Tighten **5b)** Replace sealing strip
	6) Fan incorrectly located	**6)** Remove and refit correctly.
	7) Heat exchanger fins obscurred	**7)** Clean.
3) Central heating - low flame temperature	**1)** Boiler thermostat out of calibration	**1)** Replace
	2) Limit stat out of calibration	**2)** Replace
	3) Insufficient gas pressure at burner	**3)** Check pressure at meter and pipe sizing
	4) 1/3 blue or 2/3 orange gas valve not opening **a)** 24 volts at solenoid. **b)** No voltage at solenoid	 **4a)** Replace solenoid **4a)** Replace PCB.
	5) Hot water valve in change over valve assembly sticking **a)** Dead leg on hot water system **b)** Bent spindle in valve	 **5a)** Eliminate **5b)** Replace.
	6) Bypass, if fitted, incorrectly adjusted	**6)** Adjust
	7) Pressure switch hunting	**7)** Replace.
4) Boiler noisy	**1)** On heating only **a)** Low flow rate as result of system resistance **b)** Air	 **1a)** Check and if omitted fit bypass **1b)** Purge
	2) On hot water and central heating **a)** Low pressure in sealed system **b)** Pump running slow	 **2a)** Repressurise **2b)** Replace pump
	3) Blocked filter on heating return	**3)** Clean and replace
	4) Gas filter fitted to central heating or return pipes	**4)** Remove
	5) Blocked heat exchanger	**5)** Replace
5) Hot water only does not operate over temperature range	**1)** Govenor sticking	**1)** Lubricate and replace
	2) Low inlet pressure	**2)** Ensure all down stream stop cocks open
	3) Inlet filter blocked	**3)** Clean and replace
	4) Incorrect venturi	**4)** Replace

DEFECT	CAUSE	REMEDY
	5) Pressure relief valve in change over valve stuck open or defective	**5)** Clean or replace
	6) Hot water limit stat out of calibration	**6)** Replace
	7) Solenoids not operating	**7)** See 1.2 above
	8) Pressure switch hunting	**8)** Replace
	9) Low inlet gas pressure	**9)** See 1.1a above
6) Safety valve blows	**1)** Charge pressure too high	**1)** Adjust
	2) System water volume too high	**2)** Check and if necessary use additional vessel on system
	3) Vessel lost air charge	**3)** Recharge
	4) Water to water heat exchanger letting by	**4)** Replace
7) Pump noisy	**1)** Air in system	**1)** Vent or purge and leave screw open 1/2 turn.
	2) Air seperator not venting	
	a) Needle stuck	**2a)** Release and lubricate
	b) Float stuck	**2b)** Release and lubricate
	3) Debris in pump	**3)** Clean and replace
8) High system Δt	**1)** Return filter obscurred	**1)** Clean and replace
	2) Low flow rate	
	a) Pump defective	**2a)** Replace
	b) High system resistance	**2b)** See 4.1a above
	c) Gas filter inadvertantly fitted flow or return connection	**2c)** Remove
	d) Return filter blocked	**2d)** Clean and replace
	3) Low gas rate with high water flow	**3)** Adjust
9) Rapid cycling High/low or High/low/off	**1)** Low flow rate	**1)** See 8.2 above
	2) Limit stat out of calibration	**2)** Replace
	3) Bypass if fitted not regulated	**3)** Adjust
	4) Pressure switch hunting	**4)** Replace
	5) Blocked heat exchanger	**5)** Replace
10) Fan on high speed continuously	**1)** Defective PCB	**1)** Replace
11) Pilot outage	**1)** Low inlet gas pressure	**1)** Check at meter and supply pipe sizing
	2) Blocked filter	**2)** Clean or replace
	3) Defective thermocouple	
	a) Check output below 12 mv	**3a)** Replace
	b) Over 12 mv	**3b)** Check high limit connection
	4) Defective thermoelectric valve	**4)** Replace
	5) High limit stat operating	**5)** Replace
	6) Front combustion panel not sealed	**6)** Refit or replace sealing strip

FAULT FINDING CHART




Check fan assembly for correct location
Do radiators heat
Yes
No
Are flow and return valves open
Open valves
Do radiators heat
Yes
No
Is return filter clean
Clean filter
Do radiators heat
Yes
No
Check pump for operation. Is pump plug in on PCB. Is impellor free.
Is there voltage 240 AC at pump plug
No
Replace PCB
Do radiators heat
Yes
No
Air in system or other blockage
Clear
Do radiators heat
Yes
Open hot draw off tap turn selector to hottest setting
Does water heat
Yes
No
Is there sufficient working pressure
Yes
Clean filter
Remedy
Does water heat
Yes
No
Does spindle rise
No
Check diaphragm Replace if necessary
Does water heat
Yes
No
Check continuity through top micro switch and plug on PCB.
Does water heat
Yes
No
Change PCB
Does water heat
Yes
Does water heat when time clock if fitted turned off.
Yes
No
Rewire . Refer section 4.14
Does flow in heating mode reach 82°C
No
Does flow in heating mode reach 60°C
Replace limit stat
Appliance functioning Now check
Inlet pressure gas 8" wg with hot water draw off open
Set burner pressure on variable valve to conected load
Gas rate

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