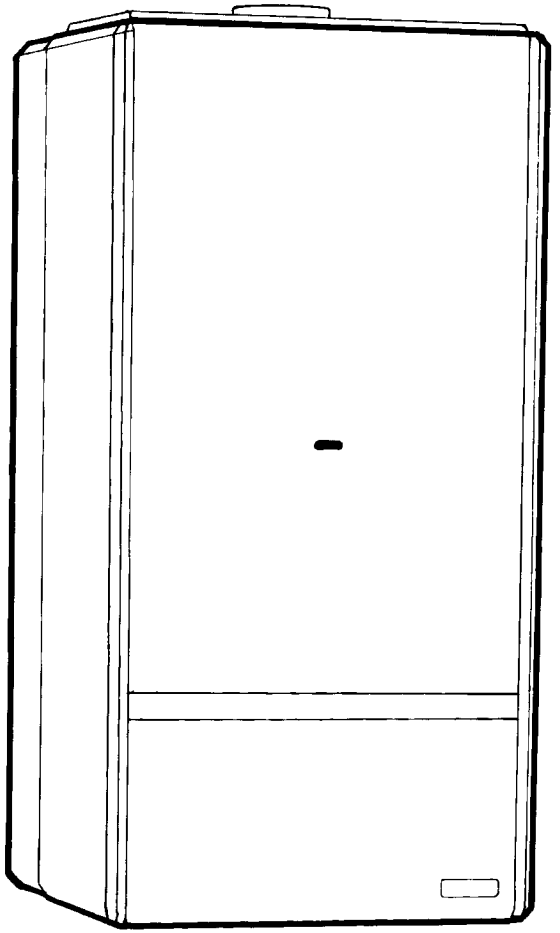
Vokèra

20/80 CF and 24/96 CF Flowmatic



Installation and Servicing Instructions

20-80 CF G.C. No. 47 094 10
24-96 CF G.C. No. 47 094 09

British Gas Tested and Certified
NWC No. 89 11 061

HAND THESE INSTRUCTIONS TO THE USER.

This Appliance is for use with Natural Gas only.

SECTION 1 INTRODUCTION

The Vokera 20/80 and 24/96 CF Flowmatic are combined central heating and domestic hot water appliances. By design they incorporate a circulating pump, expansion vessel, safety valve, temperature gauge, pressure gauge and 3 port diverter valve.

They are produced as open flued, category 1N appliances suitable for wall mounting applications only.

These appliances are designed for use with a sealed heating system only and are not intended for use on an open vented system.

A range-rating facility is incorporated in the boiler for the central heating system in conjunction with the high/low burner control. The domestic hot water (dhw) service utilises a differential water pressure control combined with a 3 port diverter valve to give hot water priority.

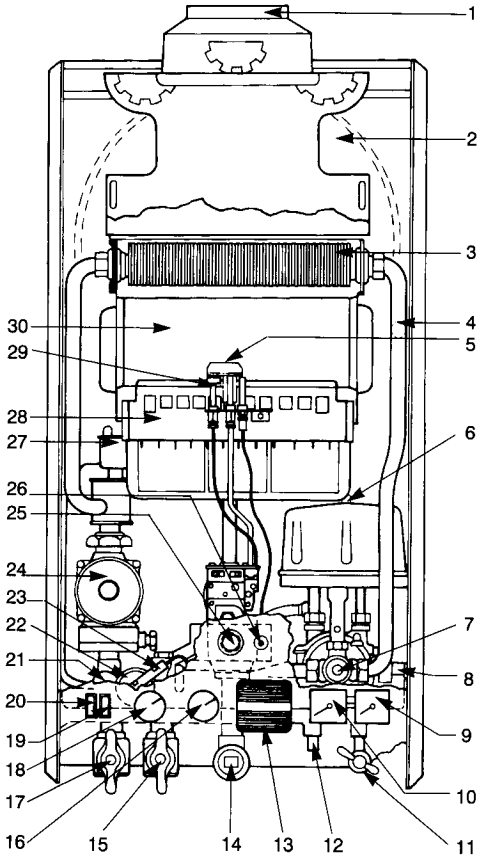
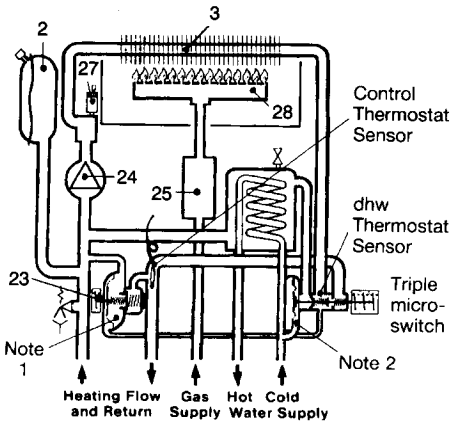


Fig.1 General Layout

1 Flue Outlet
2 Expansion Vessel
3 Main Heat Exchanger
4 Safety Thermostat
5 Pilot Assembly
6 Air Release Valve (dhw Heat Exchanger)
7 Three Port Diverter Valve (behind dhw microswitch)
8 Dhw Flow Regulator
9 Pressure Gauge
10 Temperature Gauge
11 Cold Water Inlet Stopcock
12 Hot Water Outlet
13 Time Clock (optional)
14 Gas Service Tap
15 Central Heating Flow Valve
16 Dhw Thermostat
17 Central Heating Return Valve
18 Central Heating Thermostat
19 Mode Selector Switch
20 Boiler On/Off Switch
21 Safety Valve
22 Central Heating Manifold and Auto By-pass
23 Flow Switch (Boiler)
24 Pump
25 Gas Valve Knob
26 Piezo Igniter Button
27 Automatic Air Release Valve
28 Main Burner
29 Thermocouple
30 Combustion Chamber

Fig. 2



Notes

1. Differential pressure unit. Senses water flow rate to pump & main heat exchanger and operates flow switch (23)
2. Differential pressure unit. Senses domestic hot water flow rate and operates 3 port valve/triple microswitch

SECTION 2 DESIGN AND OPERATING SEQUENCE

2.1 Fig.1 illustrates the general layout of components. Fig.2 illustrates the operating principles described below

2.2 Central Heating Mode

2.2.1 With the pilot lit and the various switches and controls imposing a demand for heat, the pump is switched on and flow of water operates a flow switch. This in turn energises the gas valve operator permitting gas flow through the main burner to be ignited by the permanent pilot flame.

2.2.2 As water temperature increases this is sensed by the thermostat which eventually operates at its first stage to switch the burner to low flame.

2.2.3 Depending on the load, either the water temperature will continue to rise when the second stage of the thermostat (18) will operate to switch the burner off, or the water temperature will fall and re-establish high flame.

2.3 Domestic Hot Water Mode

2.3.1 The appliance will operate in domestic hot water mode whenever the on/off switch is 'on' regardless of the mode selector switch position and any demand for central heating.

2.3.2 Opening a draw off tap will operate the dhw differential pressure device which in turn operates the 3-port valve (7) and the dhw flow switch.

The three port valve diverts boiler water to the dhw heat exchanger.

2.3.3 The dhw flow switch transfers control of the burner to the dhw thermostat (16) which switches successively from high to low flame to maintain an average heat input to suit the dhw output required.

2.4 Safety Devices

2.4.1 In both central heating and hot water modes safe operating is ensured by

A. Differential pressure units in both primary and dhw circuits which prevent burner operation if water flow rates are too low.

B. A high limit thermostat, which interrupts the control circuit shutting off the gas valve.

2.4.2 A safety valve is provided to relieve excess pressure from the primary circuit.

SECTION 3 TECHNICAL DATA

3.1 Units

Dimensions and values are given in the preferred SI Units with Imperial units in brackets where applicable.

3.2 Dimensions and Contents

Height 925mm (36.5in) overall (890 casing)
Width: 450mm (17.7in)
Depth: 360mm (14.2in)
Weight (empty 42kg (93lb))
Weight (full 45kg (99lb))
Water content : 3 litres (.66 gals)
for further dimensions see figs 10 - 11

3.3 Connection sizes

Heating flow and return: Nut and olive for 22mm o.d.
Cold water inlet: Nut and olive for 15mm o.d
Hot water outlet: Nut and tail for 15mm compression or capillary.
Gas Service: Rc 1/2 (1/2in BSP int)
Safety valve outlet: Rc 1/2 (1/2in BSP int)
Flue outlet: nom dia 143mm (see section 4.4)

3.4 Installation Requirements

3.4.1 Clearances

Minimum - above 300mm (12in) (from casing)
Minimum - below 300mm (12in) (from casing)
Minimum - In front 600mm (24in) (from casing)
Minimum - At sides 25mm (1in) (from casing)

3.4.2 Maximum heating system contents approx. 96 litres (21 gals)
Acceptance capacity of expansion vessel 10 litres (2.2 gals).

3.4.3 Air supply/Ventilation: To requirements of BS 5440 Part 2 1989

3.4.4 Means of filling sealed system: To accord with BS and/or local Water Authority requirements.

3.5 Electrical Details

Mains supply 240/250v ~ 50Hz Fused 3A
Power consumption: 100w.

3.6 Performance and Limitations 20/80 CF

Max. input 29.5 kW (100,600 Btu/h)
Min. input 11.8 kW (40,200 Btu/h)
Designed water temperature rise 20°C

Max. output 23.3 kW (79,500 Btu/h)
Min. output 8.7 kW (29,700 Btu/h)
Max flow temperature 85°C

Central Heating output range

Max. 23.3 kW (79,500 Btu/h)
Min. 8.7 kW (29,700 Btu/h)
(fig.17 shows the relation between burner pressure and input/output Btu/h)

Nominal hot water production

9.5 litres/min. raised through 35°C
11.1 litres/min. raised through 30°C
(2.1 gallons/min. raised through 63°F)
(2.44 gallons/min. raised through 54°F)

Performance and Limitations 24/96 CF

Max. input 35.0 kW (119,400 Btu/h)
Min. input 12.0 kW (40,900 Btu/h)
Designed water temperature rise 20°C

Max. output 28.0 kW (95,500 Btu/h)
Min. output 8.7 kW (29,700 Btu/h)
Max flow temperature 85°C

Central Heating output range

Max. 28.0 kW (95,500 Btu/h)
Min. 8.7 kW (29,700 Btu/h)
(fig.17 shows the relation between burner pressure and input/output Btu/h)

Nominal hot water production

11.4 litres/min. raised through 35°C
13.3 litres/min. raised through 30°C
(2.53 gal/min. raised through 63°F)
(2.9 gal/min. raised through 54°F)

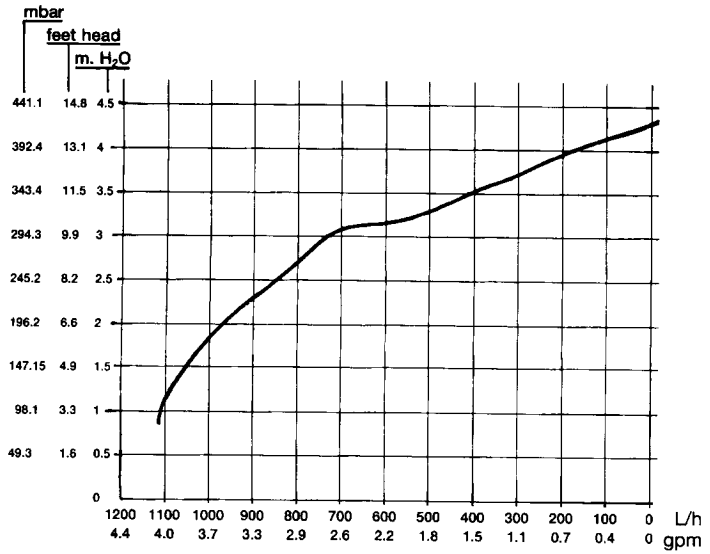
Central Heating Pump Duty

Fig.2 indicates the flow rate available plotted against system pressure drop.

N.B. When using this graph apply only the pressure drop of the system. The curve has been modified to allow for the pressure drop through the appliance.

Fig. 3 Available pump head

Fig. 3 shows the residual pump head available for the central heating system after allowing for the pressure loss through the appliance.



Working Pressures	**Heating System**	**Hot Water System**
Maximum	1.5bar/15m.wg/50ft wg	6.0bar/90psig
Minimum	0.5bar/5m.wg/16ft wg	1.0bar/15psig
Safety valve setting	3bar/30m/102ft	

Flow Rates

Min. water flow (dhw) 2.8 litres/min (0.6 gal/min)

Min. central heating flow rate through appliance 350 litres/h (1.28 gal/min).

Gas Rates

	20-80	24-96
Min. Gas Rate	1.12 m³/h (39.6 ft³/h)	1.14 m³/h (40.3 ft³/h)
Max. Gas Rate	2.8 m³/h (98.9 ft³/h)	3.33 m³/h (117.7 ft³/h)

3.8 Burner Details

	20-80	24-96
Main Burner	Polidoro NP12	Polidoro NP14
Main Burner Injectors	12 x 1.30	14 x 1.30
Burner Pressure Max Rate	10.6mbar	11.5mbar
Burner Pressure Min Rate Central Heating and d.h.w.	1.9mbar	1.6mbar

Pilot Burner: Polidoro

Pilot Injector: 27 (marking) 2 holes

Gas Control Valve: Basic Honeywell VR4600 1128 2 220/240v This unit is modified.

The modification comprises a coil carried by the main burner regulation screw. For low flame a voltage of approx. 12.5v dc is applied to the coil to hold the valve spindle against the mechanical stop. For central heating max. rate the valve is restricted in its max. opening by application of a site adjustable voltage.

SECTION 4 GENERAL REQUIREMENTS

4.0 General Requirements

This appliance must be installed by a competent person in acordance with the Gas Safety (Installation and Use) Regulations 1984.

4.1 Regulated Documents

The Installation of this apliance must be in accordance with the relevant requirements of the Gas Safety (Installation & Use) Regulations 1984, the Local Building Regulations, the current I.E.E. Wiring Regulations, the by-laws of the local water undertaking, and in Scotland, in accordance with the Building Standards (Scotland) Regulation.

It should be in accordance also with any relevant requirements of the local gas region and local authority and the relevant recommendations of the following British Standard Codes of Practice:

BS 6891		1988	Low pressure installation pipes
BS 6798		1987	Boilers of rated input not exceeding 60kW.
BS 5449		1990	Forced circulation hot water systems
BS 5546		1990	Installation of gas hot water supplies for domestic purposes (2nd family gases).
BS 5440	Part 1	1990	Flues
BS 5440	Part 2	1989	Ventilation.

4.2 Location of Appliance

The location chosen for the appliance must permit the provision of a satisfactory flue and termination. The location must also permit an adequate air supply for combustion purposes and an adequate space for servicing and air circulation around the appliance.

This appliance MUST NOT be installed in a bedroom, bedsitting room or any room, or space containing a bath or shower.

Where the installation of the appliance will be in an unusual location special procedures may be necessary and BS 6798 gives detailed guidance on this aspect.

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

Details of essential features of cupboard /compartment design including airing cupboard installations are given in BS 6798:1987. This appliance is not suitable for external installation.

4.3 Gas Supply

A gas meter is connected to the service pipe by the local gas region or a local gas region contractor.

An existing meter should be checked, preferably by the gas region to ensure that the meter is adequate to deal with the rate of gas supply required for all appliances it serves.

Installation pipes should be fitted in accordance with BS 6891:1988.

Pipework from the meter to the appliance must be of adequate size. Pipes of a smaller size than the appliance inlet connection should not be used.

The complete installation must be tested for soundness as described in the above code.

N.B. If the gas supply for the appliance serves other appliances ensure that an adequate supply is available both to the combination boiler and the other appliance when they are in use at the same time.

4.4 Flue System

4.4.1 Detailed recommendations for flueing are given in BS5440:1:1990.

The following notes are intended to give general guidance.

The cross-sectional area of the flue serving the appliance must be not less than the area of the flue outlet of the appliance.

Min flue height 1.5 metres

The flue should terminate in accordance with the relevant recommendations given in BS5440:1:1990, table 14.

A terminal of a type that has been tested and found satisfactory by British Gas should be fitted at the flue outlet.

The point of termination must not be within 60mm (2ft) of an openable window, air vent or any other ventilation opening.

4.4.2 Single wall flue pipes are not to be used.

Vokera recommend twin walled flue pipes to BS 715 be used in conjunction with a flue draft diverter connector of the same make.

To avoid condensation the flue should have a length not exceeding that given in BS5440:1:1990 figure 13.

The flue pipe must be not closer than 25mm (1in) to combustible material. For twin walled flue pipe the 25mm (1in) distance should be measured from the internal pipe. (For further details on the protection of combustible material adjacent to the flue pipe see BS5440:1:1990, sub-clause 3.3).

Flue pipe should be secured by support brackets fitted throughout its length at intervals of not more than 1.8m (6ft). For flue pipes of the spigot and socket type the socket of each section must be at the outlet (the topmost section will not have a socket) and supporting brackets, preferably should be fitted immediately beneath a socket. The brackets should be rigidly fixed to the pipe and to the adjacent wall.

4.4.3 Brick Chimney/Flue Liner Installations
If the appliance is to be flued into a brick chimney or a flue-liner - refer to BS5440:1:1990 for further details.

IMPORTANT: Before installing the appliance to any existing brick chimney installation, the flue system efficiency must be checked as detailed in 4.4.4.

4.4.4 Flue System Efficiency
Apply to the opening at the base of the flue system a lighted smoke match or paper torch and observe whether all the smoke is pulled up the flue.
In certain conditions, there may be spillage of smoke due to inversion caused by the flue being colder than the outside air. In such cases, heat should be introduced into the flue e.g. by using a blow lamp, and the smoke test repeated.
If either down draught or no definite upflow is indicated, this must be investigated and if possible corrected. If the fault cannot be corrected, do not install the appliance but consult the local gas Region.

4.5 Air Supply

Detailed recommendations for air supply are given in BS5440:2:1990. The following notes are intended to give general guidance.

4.5.1 Room or Internal Space Air Supply

Where the appliance is to be installed in a room or internal space, the appliance requires the room or internal space containing it to have a permanent air vent. This vent must be either direct to outside air or to an adjacent room or internal space which must itself have a permanent air vent of at least the same size direct to outside air.
The minimum effective area of the permanent air vent(s) is specified below and is related to the maximum rated heat input of the appliance

20-80	24-96
101.25cm² (15.7in²)	126cm² (19.5in²)

By 'effective' is meant the free area of the airways between the louvres or lattice of any grille used to cover the hole.

4.5.2 Cupboard or Compartment Air Supply
Where the appliance is to be installed in a cupboard or compartment permanent air vents are required (for combustion, flue dilution and cooling purposes) in the cupboard or compartment at high and low level. These air vents must either communicate with a room or internal space or be direct to outside air.

The minimum effective area of the permanent air vents required in the cupboard or compartment are specifired below and are related to the maximum rated heat input of the appliance.

POSITION OF AIR VENTS	EFFECTIVE AIR VENT AREAS			
	AIR FROM ROOM OR INTERNAL SPACE		AIR DIRECT FROM OUTSIDE	
	20-80	24-96	20-80	24-96
high level	266cm² (41.5in²)	315cm² (49in²)	133cm² (20.5in²)	158cm² (24.5in²)
Low Level	531cm² (82.3in²)	630cm² (98in²)	266cm² (41.5in²)	315cm² (49in²)

Note– both air vents must communicate with the same room or internal space or must both be on the same wall to outside air.
Where cupboard or compartment air vents communicate with a room or internal space, the room or internal space must itself have a permanent air vent(s) as specified in 4.5.1

4.5.3 Effect of an Extract Fan
If there is a fan* in any room or internal space in the premises, there is a possibility that if adequate air inlet area from outside is not provided, spillage of the products from the boiler flue could occur when the extract fan is in operation. Where such installations occur, a spillage test as detailed in BS 5440:1:1990 Section 4.3 must be carried out and any necessary action taken.
* 'Fan' includes extract fans, fans in open-flued appliances, fans in cooker heads and circulating fans of warm-air heating systems (whether or not gas-fired).

4.6 Water Circulation (Central Heating)

Detailed recommendations are given in BS 6798:1987 and BS 5449:1990 (for smallbore and microbore central heating systems).

4.6.1 The following notes are given for general guidance.

4.6.2 Pipework
Copper tubing to BS 2871:1:1971 is recommended for water pipe. Jointing should be either by capillary soldered or with compression fittings.

Where possible, pipes should have a gradient to ensure air is carried naturally to air release points and water flows naturally to drain taps.

It should be ensured as far as possible that the appliance heat exchanger is not a natural collecting point for air.

Except where providing useful heat, pipes should be insulated to prevent heat loss and to avoid freezing. Particular attention should be paid to pipes passing through ventilated spaces in roofs and under floors.

4.6.3 By-Pass
An automatic by-pass is incorporated in the appliance and systems should be designed to ensure that with only one radiator turned on a flow rate of at least 350 litres/hour (1.28 gals/min) is achieved through the boiler.

4.6.4 System Design
Figs 4 & 5 illustrate typical layouts.

4.6.5 Draining Taps
These must be located in accessible positions to permit the draining of the whole system. The taps must be least 15mm nominal size and manufactured in accordance with BS 2879:1980.

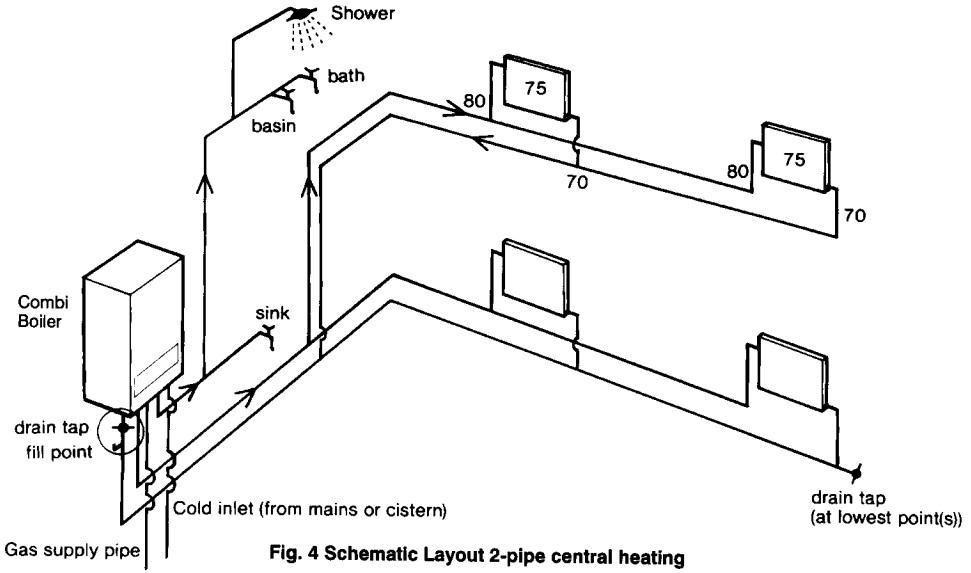


Fig. 4 Schematic Layout 2-pipe central heating

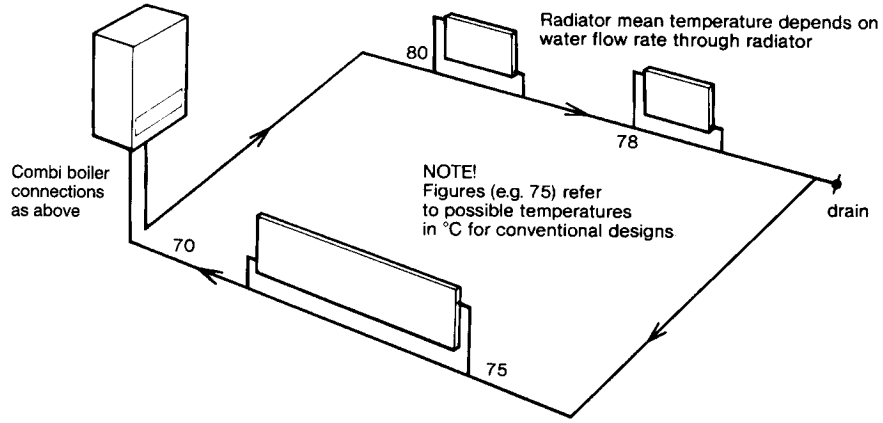


Fig. 5 Schematic single pipe central heating

Salient features of each system

2 Pipe	1 Pipe
- Radiators connected in parallel - Water flow to each directly affected by pump - Shutting off radiators affects total flow in system - Radiators have approx. same mean temperature - Low flow rate affects all radiators equally	- Each radiator is on individual circuit off main pipe - Water flow not directly affected by pump. Flow in each radiator depends on thermosyphon + pressure differential between connection to main circuit. - Shutting off individual radiators hardly affect total flow in system. - Radiator mean temperature progressively drops around systems. - Low flow rate seriously affects last radiators on circuit.

N.B. Vokera Ltd recommend a 2-pipe system. Single pipe systems are more liable to be troublesome unless carefully designed and installed.

4.6.6 Air Release Points
These must be fitted at all high points where air will naturally collect, and must be sited to facilitate complete filling of the system.

4.6.7 The appliance has an integral sealed expansion vessel to accommodate the increase of water volume when the system is heated. It can accept up to 10 litres (2.2gals) of expansion water. If the appliance is connected to a system with an unusually high water content. Calculate the total expansion and add additional sealed expansion capacity as appropriate.

In general, modern systems will present no problem.

4.6.8 Filling Point
A method for initially filling the system and replacing water lost during servicing must be provided, and it must comply with local water authority regulations.

A method is shown in fig. 6 using the Vokera filling loop which is acceptable in most areas. In the event that this method is not suitable in a particular area, contact the local authority for preferred methods.

N.B. The installer should ensure that no leaks exist as frequent filling of the system could cause premature scaling of the main heat exchanger.

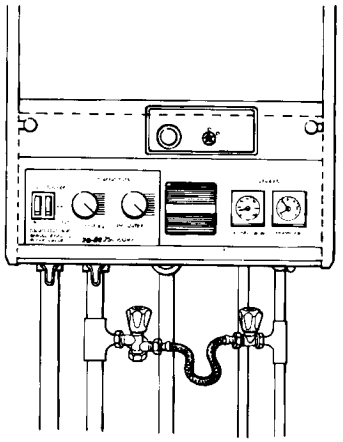


Fig. 6

4.7 Electrical Supply

The appliance is supplied for operation on 240/250V ~ 50Hz electricity supply. It should be protected with a 3-amp fuse.

THIS APPLIANCE MUST BE EARTHED.

The method of connection to the mains electricity must allow complete isolation from the supply.

The preferred method is by using a fused double pole switch with a contact separation of at least 3mm.

The switch must supply ONLY the appliance and immediate electrical control circuits (e.g. programmer/room thermostat)

Alternatively, use an unswitched shuttered socket outlet with a fused 3-pin plug both complying with BS 1363.

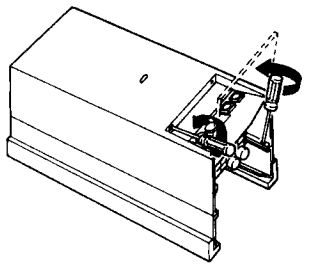


Fig. 7

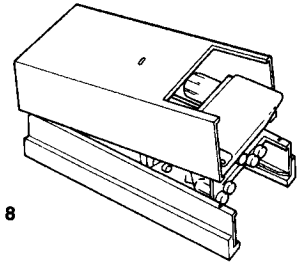


Fig. 8

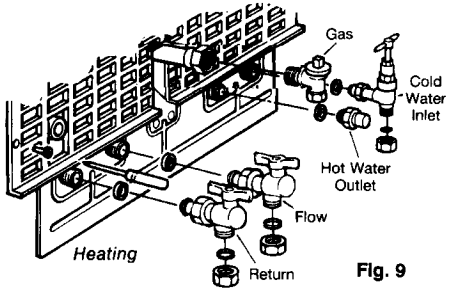


Fig. 9

5.1 Delivery (fig 8)

The appliance is delivered in a heavy duty cardboard carton.

Lay the carton on the floor with the writing the correct way up, and pull both sides of the carton open. DO NOT USE A KNIFE. Unfold the rest of the carton from around the appliance.

Lay the appliance with the black frame on the floor.

Remove the polystyrene block at the top of the boiler.

Remove the polystyrene block at the base of the appliance containing the boiler fixing fit and hanging bracket.

The Fixing Kit contains:
1 - Hanging bracket
1 - Fittings pack containing:
central heating valves (2)
gas service tap (1)
cold water stopcock (1)
hot water outlet (1 nut & tail)
Various washers
Data badge sticker
Guarantee card, fixing template and 3 amp fuse are behind the lower hinge down cover.

5.2 Preparing for Mounting

5.2.1 Remove 4 screws securing the lower part of the casing to the case frame. (Fig 7)

Open lower cover for upper pair.

5.2.2 Slightly lift the casing and slide it gently towards the top of the appliance to disengage the case from the top suspension hooks. (Fig 8)

5.2.3 Ensure the casing and screws are put to one side in a safe place.

5.2.4 Remove plastic plugs from boiler connections.

5.2.5 Loosely fit (hand tight) the valves and fittings using the washers supplied (Fig 9)

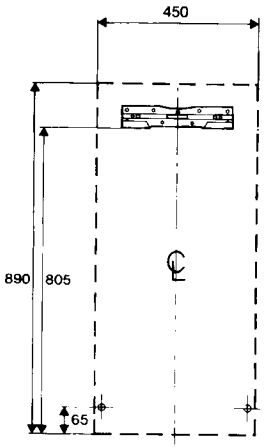
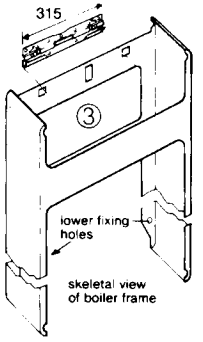


Fig. 10



All dimensions in mm.

5.3 Mounting the Appliance

5.3.1 Place the template on a smooth, vertical incombustible surface and use it to locate the hanging bracket and mark fixing holes.

Alternatively, position bracket and holes to dimensions in fig 10 and mark fixing holes.

5.3.2 Drill and plug the wall for 2 x 2" No 10 screws for upper bracket and screw the bracket firmly into position using rust proof countersunk screws.

5.3.3 Hang the appliance on the bracket and adjust to final position. Mark the lower fixing holes.

5.3.4 Remove appliance and drill and plug wall for 1 1/2" No 10 screws.

Fitting the Flue

Detailed recommendations for flue installations are given in BS 5440 part 1 1990.

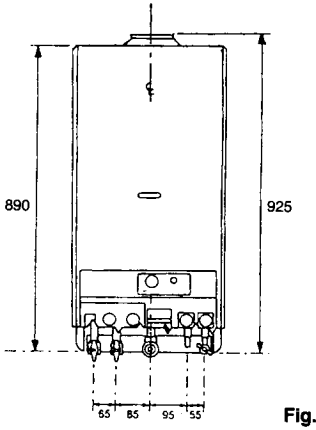
Prepare the hole to the exterior of the building or into the chimney. (Where an existing brick chimney is to be used it must be swept thoroughly and lined before fitting the appliance).

Insert a vertical flue pipe into the appliance outlet spigot and make good the joint with fireclay cement.

N.B. The minimum height of this vertical section must be 600mm (24in) before any bend.

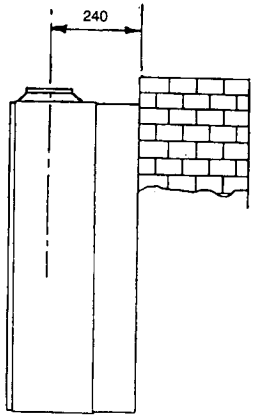
Assemble the remaining flue pipe and fittings in accordance with the manufacturers instructions ensuring all joints are properly sealed.

All flue pipes must be independently supported so that no weight rests on the appliance and that no flue joints are strained.



All dimensions in mm.

Fig. 11



5.4 Connecting the Gas and Water

5.4.1 Figs. 9 and 11 show the locations of the fittings.

5.4.2 Do not over tighten nuts and use another spanner to apply counter force to avoid damaging the appliance.

Access to the nuts is improved by first removing lower plastic grill by removing 4 screws.

5.4.3 Gas Supply

Connecting the gas supply.

Connect a 15mm gas pipe to the gas service tap using a 1/2" BSP x 15mm male connector, then tighten the union nut securing the tap to the appliance.

5.4.4 Central Heating

Connect the central heating pipework (22mm o.d) to the respective valves, right hand = flow, left hand = return, and tighten the nuts.

5.4.5 Hot Water

Provide a suitable coupling and connect the hot water draw-off pipe to the 15mm o.d tail. Tighten the nut.

If the hot water system does not include a tap below the hot water outlet connection provide a suitable drain tap to permit draining of the appliance hot water side during servicing.

5.4.6 Cold Water

Connect a 15mm cold water service pipe to the inlet stopcock of the appliance. Tighten the nut.

If the cold water supply is liable to large pressure fluctuations, some form of flow/pressure regulator should be fitted in the supply pipe.

5.4.7 Safety Valve Discharge

The safety valve is located beneath the pump. It has a threaded outlet Rc 1/2 (1/2in BSP Int) to permit a discharge pipe to be connected.

When connecting, ensure the discharge pipe does not restrict access to or operation of the central heating valves. The discharge should terminate facing downwards exterior to the building in a position where discharging (possible boiling) water will not create danger or nuisance, but in an easily visible position.

5.5 Electrical Connections

5.5.1 The electricity supply must be as specified in clause 4.7. If controls external to the appliance are required, design of the external electrical circuits should be undertaken by a competent person.

See Section 10 for further advice.

N.B. IT IS ESSENTIAL THAT ALL EXTERNAL CONTROL CIRCUITS AND WIRING IS WIRED FROM THE SAME ELECTRICAL ISOLATOR AS SERVES THE APPLIANCE.

Factory fitted internal wiring must not be disturbed when wiring external controls.

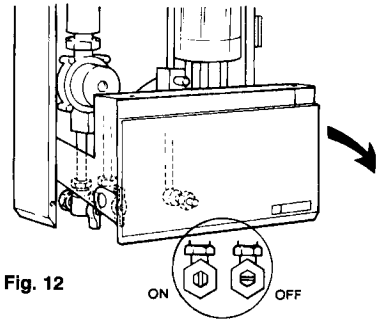


Fig. 12

5.5.2 To gain access to the electrical terminals hinge down the spring loaded control fascia. (ref to fig. 12) until it rests in an approximately horizontal position.

Press in the sides of the printed circuit board cover (fig. 13) to release retaining clips, and lift cover off.

The terminal block is easily visible on the left of the printed circuit board (fig. 14)

5.5.3 The electricity supply cable from the isolator and the appliance terminal block must be 3 core flexible sized 0.75mm² (24 x 0.2mm) to table 15-16, BS6500.

Wiring to the appliance should be rated for operation in contact with surface up to 90°C

5.5.4 Pass the cable through the cord anchorage and connect the wires Brown to L Blue to N and Green/Yellow to the earth screw ⏚ arrange the wires so that should the cable slip the anchorage the current carrying conductors become taut before the earthing conductor.

5.5.5 Securely tighten all terminal screws and arrange the cable with slack between the anchor and the terminal block. Tighten the cord anchorage screw until the cable is secure.

5.5.6 Neatly arrange the external cable in such a way that unrestricted opening of the controls fascia is possible without strain on the cable.

5.5.7 External controls may be wired from terminals 1 & 3 (after removing a factory fitted link). If a neutral is needed use the terminal marked N.

If required pass this cable through the same cord anchorage.

The conductors should be so connected that the conductor to terminal 1 becomes taut before those to 3 & N should the cable be strained.

Close the control fascia.

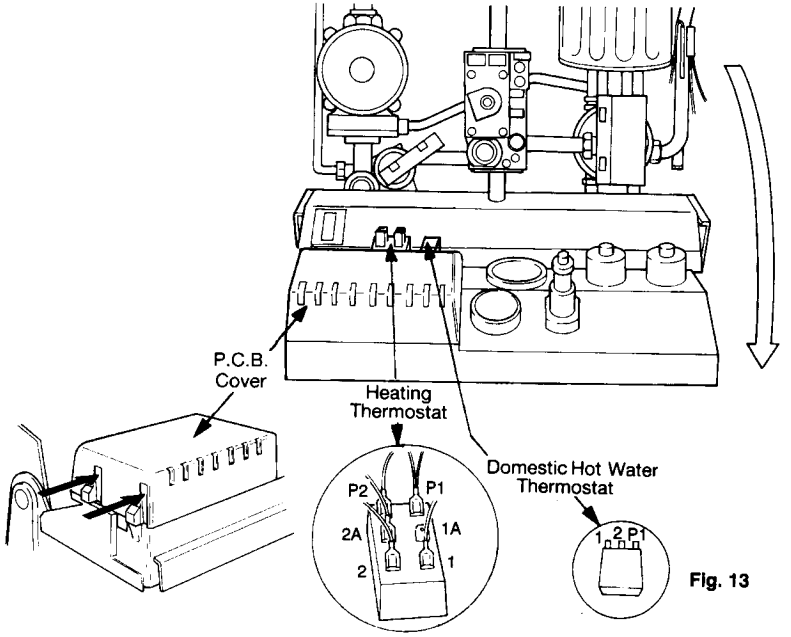


Fig. 13

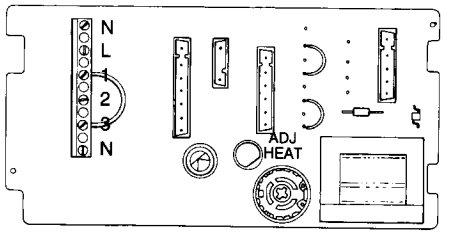


Fig. 14

SECTION 6 COMMISSIONING

6.1 Where the text bears identifying numbers in brackets, refer to figs. 1 and 2 unless otherwise instructed. Close control panel, open controls cover.

6.2 Gas Supply Installation
Inspect the entire installation including the meter, test for soundness and purge, all as described in BS6891:1988.

6.3 Central Heating Systems

6.3.1 IMPORTANT
DO NOT RELEASE AIR FROM THE RED SEALED EXPANSION TANK. It is charged with air at the factory to 1bar (15psig)

6.3.2 Initial Flushing of the Pipework
The appliance contains components likely to be damaged or blocked by grease and dirt from the system. It is recommended therefore that the appliance be disconnected from the system for the initial flush.

6.3.2.1 Close the appliance central heating valves and disconnect from the appliance (15 and 17, Fig. 1).

Connect a temporary water supply to the return and a drain pipe to the flow and flush the entire system until the drain discharges clean water (for at least five minutes).

Drain the system by opening the drain taps at all low points. Close the drain taps and reconnect the flow and return valves to the appliance.

6.3.3 Initial filling of the System

6.3.3.1 See Clause 3.4.4 and 4.6.8

6.3.3.2 Open central heating flow and return valves (red handle vertical indicates open). Unscrew black cap on automatic air release valve (27) one full turn (leave open permanently).

6.3.3.3 Close all air release taps on the central heating system.

6.3.3.4 Gradually open stopcock at the filling point connection to the central heating system until water is heard to flow. Do not open fully.

6.3.3.5 Starting with the lowest radiator open each air release tap in turn closing it only when clear water, free of bubbles, flows out. In the same way release air from any high points in the pipework.

6.3.3.6 Open the primary vent screw on the top of the dhw heat exchanger (6) until clear water is discharged.

6.3.3.7 Continue filling the system until at least 2.0 bar registers on the gauge (9) then turn off the filling point stopcocks.

6.3.3.8 Inspect the system for water soundness and remedy any leaks discovered.

6.3.4 Setting the System Design Pressure

6.3.4.1 The design pressure must be a minimum of 1bar and maximum 1.5bar.

6.3.4.2 The actual reading should ideally be 1bar plus the equivalent height in meters to the highest point of the system above the base of the appliance (up to the maximum of 1.5bar total).

N.B. The safety valve is set to lift at 3bar /30m /45psig.

6.3.4.3 To lower the system pressure to the required value turn the red knob of the safety valve (21) a quarter turn to release water until the required figure registers on the gauge (9).

6.3.5 Filling the Hot Water System

6.3.5.1 Close all hot water draw-off taps.

6.3.5.2 Open cold water inlet stopcock (11)

6.3.5.3 Slowly open each draw-off until clear water is discharged.

6.4 Checking Electricity Supply

6.4.1 Carry out preliminary checks for continuity, polarity, and resistance to earth, gaining access as required according to clause 5.5.2 in this manual.

6.4.2 Leave the appliance with the control fascia closed and with the mains electricity switched OFF

6.5 Establishing the Pilot flame

6.5.1 The main electricity supply is switched OFF (6.4.2).

6.5.2 Ensure main gas supply is ON.

6.5.3 Turn on the appliance gas service tap.

6.5.4 Press the gas control knob (25) and hold it in. At the same time, repeatedly press the Piezo button (26) to light the pilot burner. Once a flame is seen through the viewing window, hold in the gas control knob for a further 15 seconds then release the knob slowly.

6.5.5 The pilot flame should remain alight and envelope the thermocouple (see fig. 15). If it goes out, wait 3 minutes and repeat from 6.5.4

6.5.6 When the pilot flame is established, turn on the mains electricity and switch on the appliance on/off switch.

6.5.7 Refer to fig. 15 and check that the pilot flame is correct. If it is necessary to adjust the flame refer to cl. 5.5.2 for access instructions. Fig. 16 shows the location of the adjustment screw. Turning clockwise decreases flame and vice versa.

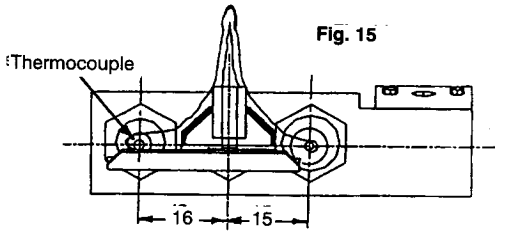


Fig. 15

6.5.8 Before completion of this section, check the output of the thermocouple. Start at 6.5.1 but first remove the thermocouple leads from their connections at the top and rear of the gas valve and attach a multimeter to the leads. Proceed through 6.5.4. When the pilot is lit, hold the gas valve in to permit a reading of the meter. An output in the range of 7 to 10mV is satisfactory. Reconnect the leads to the gas valve.

6.6 Lighting the Appliance

6.6.1 Before lighting, open flow and return valves (Cl 6.3.3.2)

If external controls are fitted (e.g timeclock and thermostat) ensure they 'call for heat'. The commissioning of the appliance may be easier if the external controls are temporarily disconnected and terminals 1 & 3 linked. (For access procedure turn off electricity and refer to clause 5.5.2 for instructions).

6.6.2 Ensure that the mains electricity and the appliance 'on/off' switch (20) are turned on.

6.6.3 Set the control thermostat (18) to its highest setting.

6.6.4 Set the Mode Selector switch (19) to constant.

6.6.5 The main burner should now light.

6.6.6 N.B. The most common cause of failure to light is insufficient water flow. See cl. 4.6.3 and 6.11.2.

6.7 Check Burner Pressures

6.7.1 The heat inputs for high and low gas rates are factory set to the maximum values given in section 3.6 for domestic hot water and central heating but it is necessary to check them when commissioning.

6.7.2 The maximum heat input for the central heating mode may be reduced by a simple adjustment to suit the system load. This in no way affects the appliance maximum which is always obtained in the domestic hot water mode.

6.7.3 Turn off the main electricity supply. Gain access to the interior as instructed in clause 5.5.2.

6.7.4 Locate the main burner pressure test point (Fig. 16) and slacken the screw half a turn in an anti clockwise direction. Attach a suitable pressure gauge. Turn on the main electricity supply, turn on a domestic hot water tap to operate the appliance in dhw mode. Adjust the hot water thermostat to maximum setting.

6.7.5 The pressure reading for maximum rate should be:

20/80
10.6mbar/4.2in wg (plus or minus 1.0mbar/0.42in wg)

24/96
11.5mbar/4.6in wg (plus or minus 1.1mbar/0.46in wg)

If the pressure is wrong it should be adjusted as instructed in clause 8.24 (N.B. Whenever the maximum rate is adjusted check and adjust the minimum rate too)

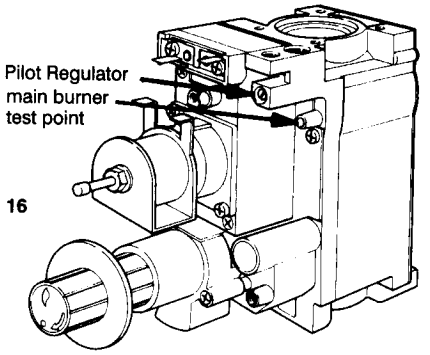


Fig. 16

6.7.6 If the flow temperature is above 60°C turn the dhw thermostat down until the low flame is established. If low flame cannot be established in this way, turn off the electricity supply and transfer the cable on terminal 2 of the dhw thermostat to terminal 1 (Fig. 13 shows location). Switch on electricity.

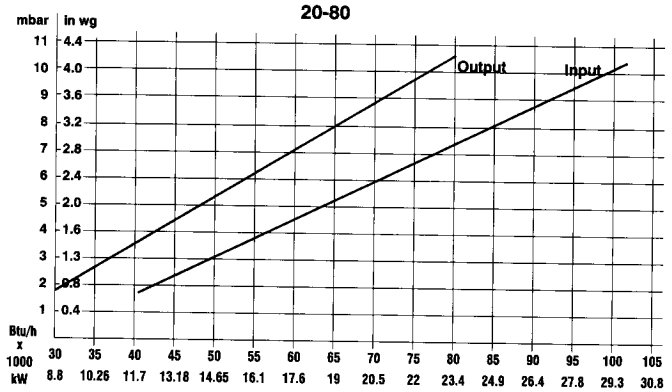
6.7.7 When low flame is established, the pressure gauge should read

20/80
1.9mbar (0.76in wg) plus or minus 0.19mbar (0.08in wg)

24/96
1.6mbar (0.6in wg) plus or minus 0.2mbar (0.06in wg)

6.7.8 If the thermostat connection has been transposed to obtain low flame (cl 6.7.6), turn off the mains electricity and replace the cable on terminal 2.

Fig. 17



6.7.9 **Setting the Maximum Rate for Central Heating (Range Rating)**
Refer to fig. 17 to determine pressure for the heating output you need. Use a screwdriver to adjust the potentiometer (fig. 14) until the required pressure is indicated on the gauge. Once this pressure has been fixed it should be indelibly recorded on the label provided and affixed next to the data badge. This is to ensure that the burner can be reset when any service operation involves alteration of burner settings.

6.8 **Checking the Flue System**

6.8.1 The flue system should be visually checked for soundness. Check all clamps and fixings are secure and tight.

Carry out spillage test as BS 5440:1990 Clause 4.3.2.

6.9 **Checking the Heating Thermostat**

6.9.1 Allow the system to warm up and manipulate the c/h thermostat to ensure the burner switches from 'high' to 'low' and 'low' to 'off' and vice versa (scale range covers approx. 45°C - 85°C).

6.10 **Checking the operation of the Flame Failure Device**

6.10.1 With the burner on high flame, turn the gas knob in a clockwise direction and confirm that a definite `click' is heard. Relight pilot (6.5.4).

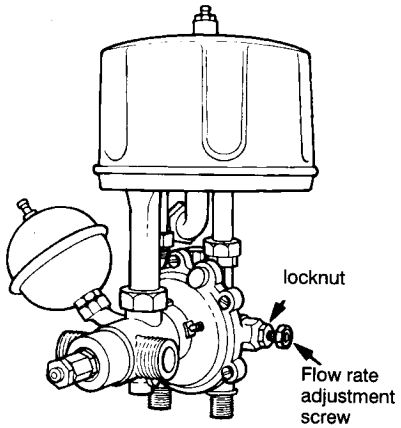
6.11 **Regulating the Central Heating System**

6.11.1 Fully open all radiator and circuit valves and run the appliance in the central heating mode until heated water is circulating. If conditions are warm, remove any thermostatic valve heads.

6.11.2 If the burner will not light, ensure that water is in fact circulating. See cl. 4.6.3

6.11.3 Adjust radiator return valves and any branch circuit return valves until the individual return temperatures are correct

Fig. 18



and are approximately equal.

6.11.4 When all is adjusted, progressively close all radiator valves to ensure that the appliance still operates when flow through the system is limited.

If the burner cuts out prematurely due to lack of water flow through the appliance, the system should be regulated to ensure a flow rate of at least 350 litres/hour (1.28 gals/min).

6.12 **Final Flushing of the Heating System**

6.12.1 After the system has been thoroughly heated to about 60°C (140°F) or above, and hot water has circulated to all parts, any residual grease, flux and other foreign material will have been dislodged.

6.12.2 Inspect the system for soundness. Turn the appliance off and turn off the on/off switch (fig 1 No. 20).

Open all drain taps and quickly drain the system whilst still hot to remove offending substances. Refill as instructed in clause 6.3.3.

6.13 **Filling, Testing and Regulating the Domestic Hot Water System**

6.13.1 Start with the appliance switched ON, having completed the procedures described in clause 6.4 to 6.10.

6.13.2 Open a domestic hot water tap (preferably the bath tap).

Ensure cold water inlet stopcock is open and the dhw thermostat (16) is set at maximum.

6.13.3 The flow of water should activate the differential pressure device and drive the diverting valve (7) to its other position thus heating the domestic water flowing through the coil of the dhw heat exchanger.

The operation of the 3-port valve will close the burner control micro-switch (23) and light the burner on maximum rate.

6.13.4 If the burner does not light, check that the water flow rate is above the minimum required to operate the differential pressure device 2.8 litres/min (0.61 gals/min).

6.13.5 The temperature of the water will depend on the rate at which it flows.

If, due to high water pressure the flow rate is unacceptably high (and thus the temperature too low for practical use) the flow rate should be adjusted.

6.13.6 To adjust the flow rate ref to fig. 18 and locate the adjustment screw.

Slacken the locknut and turn the screw clockwise until the required temperature is reached. Tighten locknut. It is best to set for the lowest acceptable temperature since the user can gain higher temperatures by restricting flow at the tap.

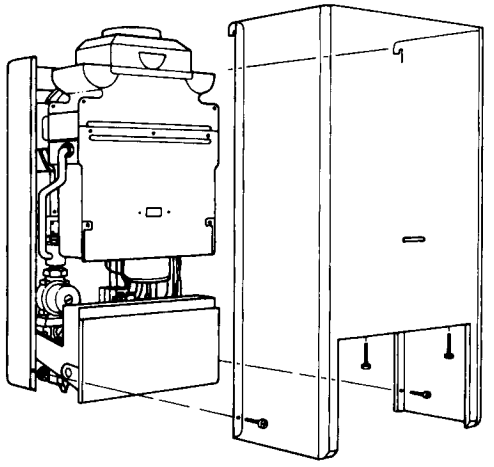


Fig. 19

N.B. If the cold supply is subject to large fluctuations or is above the permitted maximum a suitable pressure/flow regulator should be fitted in the cold water supply to the appliance.

6.13.7 Turn the appliance mode selector switch (19) to the summer position.

Slowly close the tap to reduce the draw of rate to above the minimum approx. 2.8 litres/min (0.61 gal/min). Rotate the dhw control thermostat to ensure it operates at its various settings.

6.13.8 Close the draw-off tap still further. The burner should stop when the rate falls below approximately 2.8 litres/min (0.61 gal/min).

6.14 Final Check for Operations
Turn off at the ON/OFF switch, disconnect pressure gauge, retighten screw. Relight boiler.

6.14.1 Re-check for gas soundness

6.14.2 Re examine heating and hot water systems and cold water supply for water soundness.

6.14.3 Check the appearance of the pilot and gas flame to assess adequacy of combustion air supply.

6.14.4 Re-check the flue system for soundness and adequacy of supports.

6.15 Concluding Operations

6.15.1 If external controls have been disconnected and terminals 1 & 3 temporarily linked, remove the link and reconnect the external control circuit, check the operation of the external controls.

6.15.2 Hinge up the control fascia.

6.16 Refixing the Front Cover (fig. 19)

6.16.1 Offer up the front casing to the back frame in a near vertical attitude and locate the hooks on the casing over the hooks on the frame.

Slide the casing downwards to fully engage the hooks and to align the bottom fixing holes. Replace the four case retaining screws. (fig. 19).

6.17 Supplementary Instructions for Fitting & Removing Optional Time Clock and for Wiring to External Controls.
Section 10 Appendices A and B at the rear of this manual provides full instructions for fitting and wiring the optional built-in time switches and for wiring to external controls.

SECTION 7 INSTRUCTING THE USER

7.1 Hand over the copy of the Users Instructions supplied with the appliance, together with these Instructions, and explain how to operate the appliance correctly and explain how to use the timeclock and room thermostat if fitted.

7.2 Show the user how to switch off the appliance quickly and indicate the position of the electric supply isolator.

7.3 Explain that air supply grilles must not be blocked in any way.

7.4 Inform the user of the location of all drain cocks and air vents.

7.5 Explain how to turn the appliance off for both short and long periods and advise on the precautions necessary to prevent damage should the appliance be inoperative when freezing conditions may occur.

7.6 Finally, advise the User that, for continued safe and efficient operation, the appliance must be serviced by a competent person a least once a year.

SECTION 8 SERVICING INSTRUCTIONS

8.1 General

To ensure efficient safe operation of the appliance it is necessary to carry out routine servicing at regular intervals.

The frequency of servicing will depend upon the particular installation conditions and the use to which the appliance is put; but, in general, once per year should be adequate.It is the law that any service work must be carried out by a competent person such as British Gas or other recognised companies.

The following instructions apply to the boiler and its controls, but it should be remembered that the central heating and domestic hot water systems will also require attention from time to time.

8.2 Important Notes

WARNING: Having carried out a preliminary flame check and before starting any servicing work, switch OFF the mains electricity supply and disconnect the plug at the main isolating switch and socket. (If a switch is used remove the fuse.)

Turn off gas supply at the gas service tap fitted to the appliance.

Always test for gas soundness after any service work and after exchanging any gas carrying component.

8.3 Recommended Routine Servicing

8.3.1 Annual Servicing

The following procedures should be carried out at least once per year.

1. Inspect exterior for signs of damage and deterioration particularly of flue pipework and electrical connections.

2. Inspect air supply and ventilation arrangements comparing them with the requirements laid down in clauses 4.5 to ensure no alterations have been made since installation.

3. Turn off mains electricity and remove front casing (see clause 8.4.1).

4. Replace fuse if previously removed (8.2 above) and turn on electricity, run the appliance for a few minutes in the domestic hot water mode to permit inspection of its operation. This is accomplished by opening a domestic hot water draw off tap and inspect the burner for yellowing of flame tip, flame lift off or sooting.

5. Ensure central heating valves (fig.1 15 & 17) are open. Note these are 1/4 turn valves which are open when handle is vertical, closed when handle is horizontal.

Observe pressure gauge reading (fig. 1 No.9) which should be between 1-1.5 bar when the system is cold (see clause 6.3.4)

6. Turn off mains electricity and turn off gas service tap on the appliance.

7. Gain general access as described below in clause 8.4.

8. Remove pilot burner assembly and brush clean. Inspect pilot injector and blow clean (see clause 8.6.3 - 8.6.6).

9. Remove main burner. cl 8.7.2 to 8.7.4. Lightly clean with a soft brush and inspect for damage. If during initial inspection, any combustion irregularity was suspected, remove injectors and clean or replace (see clause 8.8).

10. Place cloth below combustion chamber to catch debris. Clean heat exchanger using suitable brushes and rods if necessary.

11. Inspect combustion chamber lining. The insulating material is easily damaged. Do not scrape, but clean off lightly.

If any panels are damaged these should be replaced (see Clause 8.10).

12. Replace all parts in reverse order but leave the controls fascia open and outer casing off.

13. Undertake a complete commissioning check as detailed in section 6.

14. Close up control fascia and refix front casing.

15. Clean off casing using soft cloth and dilute detergent.

8.3.2 Replacement of Parts

1. The life of individual components varies and they will need servicing as and when faults develop. The fault finding sequence charts in section 9 will serve to locate which component is the cause of any malfunction, and instructions for removal, inspection and replacement of the individual parts are given in the following pages.

2. The domestic hot water heat exchanger may in certain conditions become partially blocked by scale deposits. Evidence of this will be deterioration in performance.

This condition could well be treated using proprietary descalants following makers instructions without dismantling the appliance by circulating a fluid through the dhw coil. To do this, disconnection from hot and cold services is necessary. Reconnect only after thorough flushing with clean water.

8.4 To Gain General Access/Assembly

To remove components access to the interior is essential. Refer to figs 20 & 21.

Ensure gas and electricity supplies are isolated before carrying out any servicing.

8.4.1 To remove front casing

Release 4 retaining screws fig 20

Pull bottom of case slightly forward and push upwards to disengage from top support hooks and withdraw case from the appliance.

The control panel can now be hinged down for access.

8.4.2 Reassembly is always carried out in reverse order to dismantling, unless otherwise stated. Electrical connections must be remade in accordance with the wiring diagram fig 42.

8.4.3 Wherever gas control components are replaced, check the burner pressures and adjust if necessary (Section 8.24)

8.4.4 If required remove lower plastic grill by removing 4 vertical screws and pull grill downwards.

8.5 Combustion Chamber Baffle and Front Cover

8.5.1 Release 2 screws (fig 20) ease baffle forwards and down to release from back retaining lugs.

8.5.2 Remove front cover by releasing 3 screws (fig 22) and ease cover off.

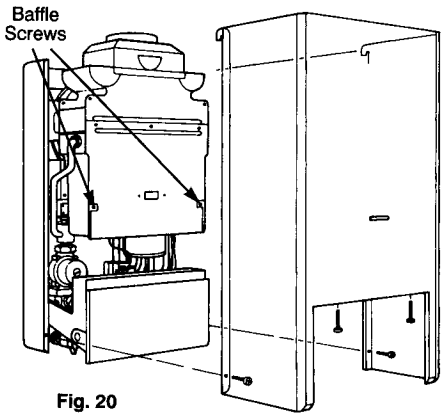


Fig. 20

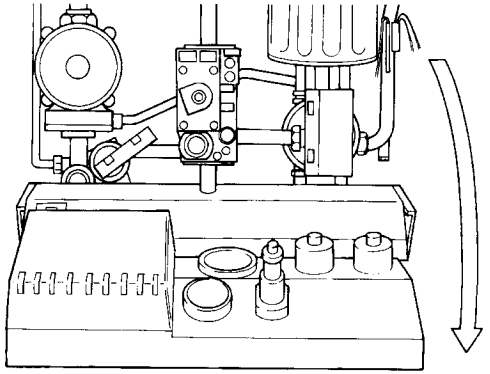


Fig. 21

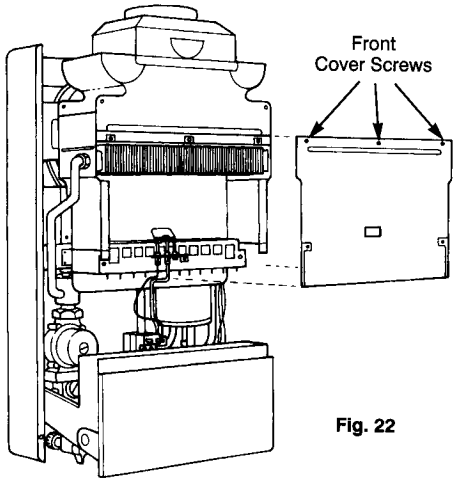


Fig. 22

8.6 To Remove/Replace Electrode, Thermocouple and Pilot Burner

Refer to fig. 24

8.6.1 Refer to 8.4

8.6.2 Remove combustion chamber baffle plate anbd combustion chamber front cover (8.5.1 & 8.5.2)

8.6.3 To Remove Pilot Burner Assembly

8.6.3.1 Pull of electrode lead.

8.6.3.2 Disconnect pilot pipe and thermocouple at gas valve end.

8.6.3.3 Release screw securing pilot burner assembly. (fig. 24).

8.6.3.4 Ease pilot burner assembly and pipe forward.

8.6.3.5 Remove electrode, Thermocouple and pilot pipe.

8.6.4 To Remove Electrode

8.6.4.1 Pull off electrode lead.

8.6.4.2 Unscrew electrode retaining nut.

8.6.4.3 Remove electrode.

8.6.5 To Remove/Replace Thermocouple

8.6.5.1 Remove pilot burner assembly (8.6.3). Unscrew retaining nut at burner end and pull out probe.

(**N.B.** Retaining nut is compression fit and slides off the probe in an upward direction.)

8.6.5.2 If a new thermocouple is to be fitted, bend it to approximate shape of old one and replace in reverse order.

8.6.6 To Remove/Replace Pilot Burner and/or Injector

8.6.6.1 Remove pilot assembly (8.6.3).

8.6.6.2 Remove electrode and thermocouple.

8.6.6.3 Unscrew pilot supply pipe union, and withdraw pipe.

N.B. Pilot injector is held captive by bush on the end of the connecting pipe. It will drop out as pipe is removed.

8.7 Main Burner

8.7.1 Refer to 8.4

8.7.2 Remove combustion chamber baffle plate and combustion chamber front cover (8.5)

8.7.3 Remove pilot burner assembly as 8.6.3

8.7.4 Remove four burner retaining screws (fig 23) ease burner forward removing lint guard in the process.

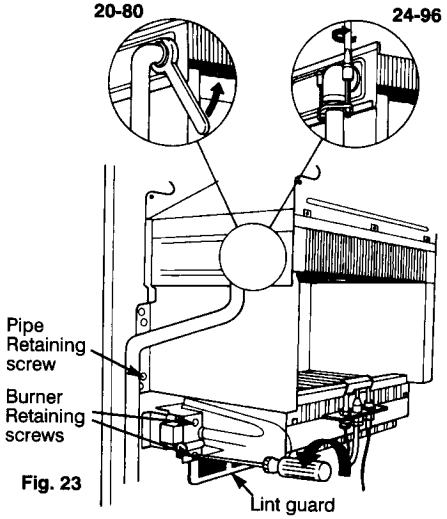


Fig. 23

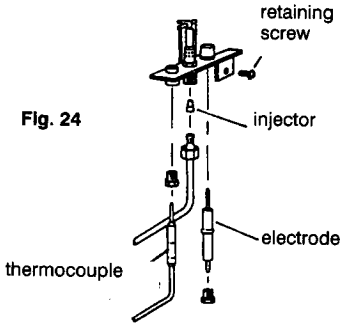


Fig. 24

8.8 Main Burner Injectors (marked 130)

8.8.1 Refer to 8.4

8.8.2 Remove combustion chamber baffle plate and chamber front cover (8.5).

8.8.3 Remove main burner (8.7.3 to 8.7.4).

8.8.4 Unscrew injector(s) and washer(s).

8.9 MAIN HEAT EXCHANGER
Part No 5351(20-80) 5356(24-96)
Refer to Fig 23

8.9.1 Refer to 8.4.

8.9.2 Remove combustion chamber baffle plate and combustion chamber front cover (8.5).

8.9.3 Close heating valves (Fig.1, 15 & 17 1/4 turn until handle is horizontal). Turn safety valve 1/4 turn to drain primary circuit of boiler.

8.9.4 Place cloth under heat exchanger to catch drips of surplus water.

8.9.5 **20-80**
Unscrew unions on either side of main heat exchanger. (fig. 23)

24-96
Disconnect upper flanges by removing 2 screws on each flange (fig 23)

8.9.6 Slide out main heat exchanger, taking care not to damage insulation panels. Avoid spillage of water on boiler electrics.

8.9.7 Reassemble in reverse order using new fibre washers on unions.

8.10 **Combustion Chamber Insulation Boards**

8.10.1 Remove Main Heat Exchanger 8.9

8.10.2 Fourth panel (front) is replaced complete with combustion chamber front panel.

8.10.3 To remove side and rear combustion chamber insulation boards, gently prise upwards and pull out.

8.11 **Gas Control Valve, Modulator and Operator**
Refer to fig. 25

8.11.1 Refer to 8.4

8.11.2 **Modulator Coil**

8.11.3 Pull of electrical leads from tab connectors.

8.11.4 Slacken large locknut, unscrew max. rate adjustment screw and remove (NB take care of spring and washer).

8.11.5 Remove modulator coil.

8.11.6 **Operator**

8.11.7 Pull off all electrical leads from modulator and operator tab connectors.

Disconnect earth lead.

8.11.8 Remove modulator coil (8.11.4)

8.11.9 Release 4 screws securing operator to gas valve body (2 at top below tab connectors 2 at bottom extreme corners).

8.11.10 Remove operator, exposing gasket.

8.11.11 Replace in reverse order using new gasket.

8.12 **Gas Control Valve**

8.12.1 Remove modulator coil and operator as detailed above. The operator etc. can be transferred to any new valve to retain regulation settings.

8.12.2 Disconnect thermocouple and pilot supply pipe connections. Pull interruptor lead from valve.

8.12.3 Remove screws securing bracket to base frame.

8.12.4 Remove 4 flange securing screws at each end, and withdraw valve disconnecting second interruptor lead in the process.

8.12.5 Replace in reverse order using new gaskets.

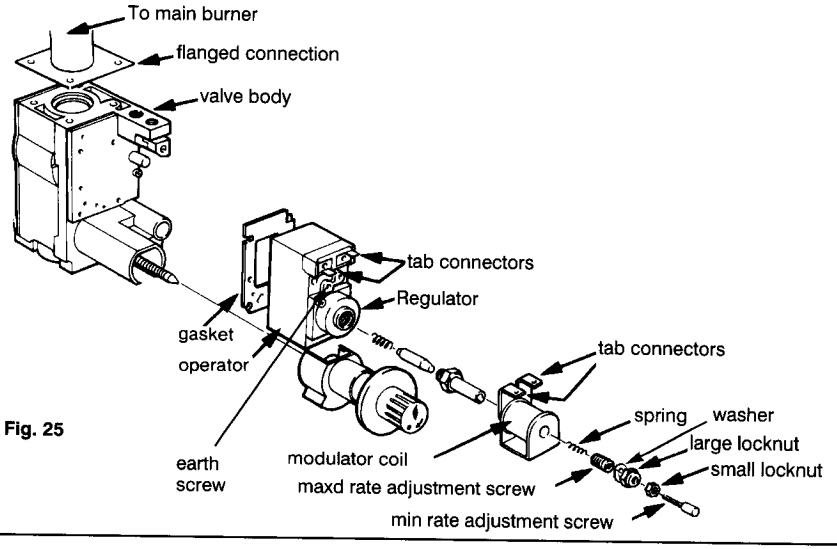


Fig. 25

8.13 **Pump**
Part No 6090
Refer fig 26

8.13.1 Refer to 8.4

8.13.2 Close heating valves and return valves (fig. 1, 15 & 17) by turning 1/4 turn until handles are horizontal.

8.13.3 Drain appliance via safety valve by 1/4 turn of safety valve knob.

8.13.4 Disconnect pipe connection at front left corner of main heat exchanger (fig 23)

8.13.5 Disconnect top union on pump and remove screw securing pipe to main frame. Remove pipe and air separator assembly from the pump.

8.13.6 Grasp pump and pull upwards with a slight twisting movement to release pump from manifold.

8.13.7 Disconnect electrical leads from pump.

Reconnect electrical leads. Brown to L, Blue to N and Green to E.

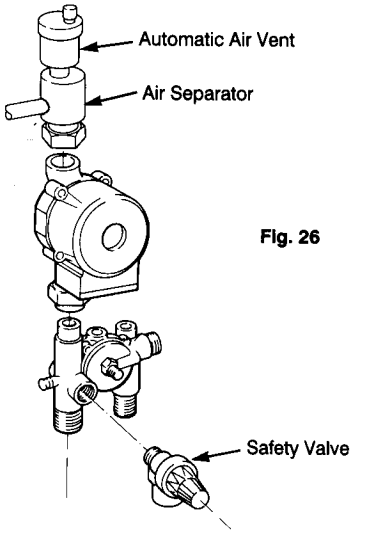


Fig. 26

8.14 **Heating Manifold** *Part No 3208*
Refer to fig. 27

8.14.1 Remove pump as 8.13.

8.14.2 Disconnect safety valve discharge pipe and two heating valve unions.

8.14.3 Remove retaining screw (securing manifold to frame).

8.14.4 Disconnect pressure gauge connection, domestic hot water heat exchanger union, heating flow union, connecting pipe to 3 port valve union and heating thermostat sensor.

8.14.5 Disconnect expansion vessel pipe union.

8.14.6 Unscrew and remove retaining nut and remove micro switch.

8.14.7 Remove manifold

8.14.8 Transfer safety valve to new manifold.

Manifold Assembly

Release cover retaining screws and ease off with a screwdriver.

Refer to fig. 27 for location of components.

Replace in reverse order, ensuring that washers are replaced in all union connections. Check for water soundness.

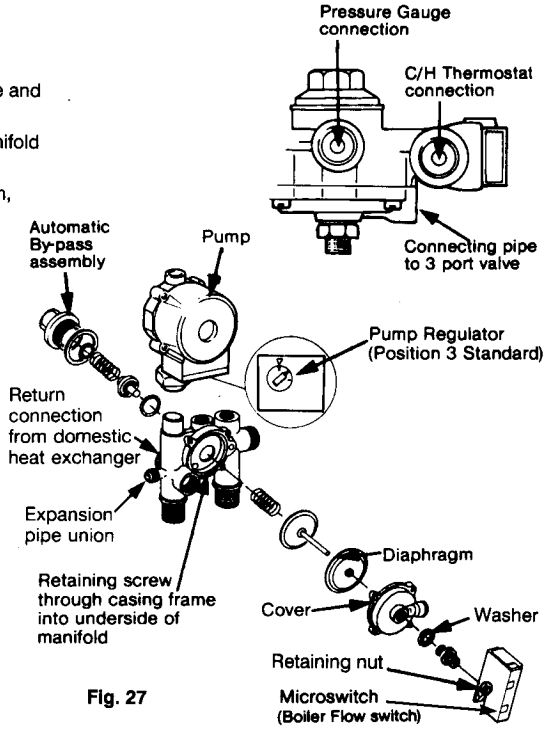


Fig. 27

8.15 Removal of Domestic Hot Water Heat Exchanger

Refer to figs 28, 29 and 30

8.15.1 Refer to 8.4

8.15.2 Close cold water inlet stopcock and central heating valves.

8.15.3 Open lowest draw-off or drain tap on hot water system.

8.15.4 Turn safety valve 1/4 turn to drain primary side.

8.15.5 Place receptacle or an absorbent pad below appliance to catch trapped water.

8.15.6 Remove DHW expansion vessel (unscrew) as 8.19

8.15.7 Disconnect main flow pipe from heat exchanger and 3-port valve and carefully move aside.

8.15.8 Disconnect 4 union nuts (fig 28).

8.15.9 Ease the unit out of the appliance.

8.15.10 Reassemble in reverse order, using new fibre washers. NB. When refitting main flow tube ensure sensors for temperature gauge and high limit thermostat are fully located in their relevant pockets.

8.16 3-way Diverting Valve

Refer to figs 28 & 29

8.16.1 Refer to 8.4

8.16.2 Close central heating valves (valve head is horizontal when closed).

8.16.3 Drain appliance via safety valve by 1/4 turn of knob.

8.16.4 Unscrew locknut and remove micro switch (fig. 29).

8.16.5 Disconnect 3 pipe unions (prepare to catch a small quantity of water).

8.16.6 Unscrew connecting pipe to heating manifold.

8.16.7 Slacken retaining grubscrews securing valve to manifold and withdraw valve. (If necessary slacken unions at opposite ends of connecting pipes to facilitate removal).

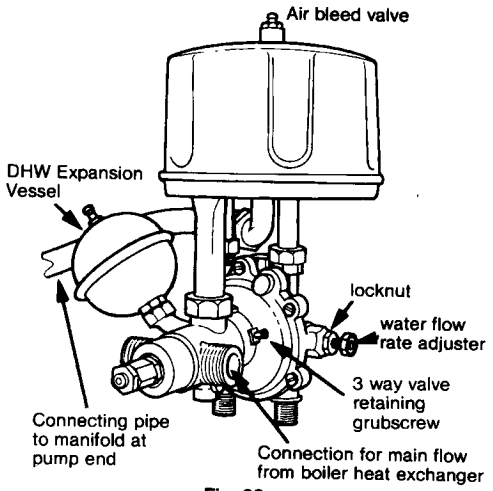


Fig. 28

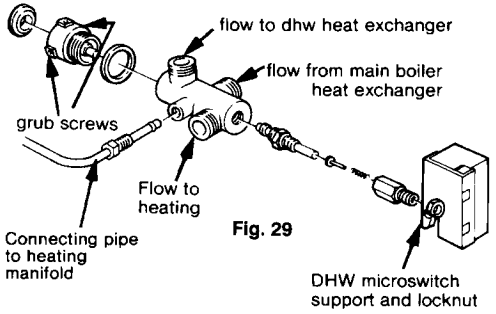


Fig. 29

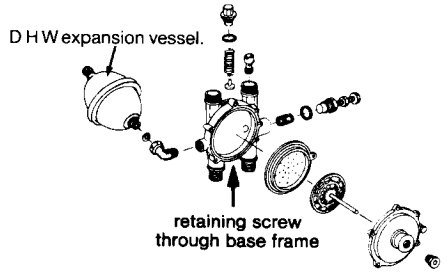


Fig. 30

8.17 Removal of Domestic Hot Water Manifold

Refer to figs 28 & 30

Refer to 8.4

8.17.1 Remove 3 way diverting valve 8.16.

8.17.2 Close cold water inlet stopcock and drain secondary side by opening draw-off or drain tap.

8.17.3 Remove dhw heat exchanger 8.15.

8.17.4 Disconnect unions at cold water inlet and hot water outlet and remove manifold retaining screw (through base frame).

8.17.5 Remove manifold (fig. 30) gives details of further disassembly.

8.17.6 Reassemble in reverse order.

N.B. Ensure sensors for temperature gauge and high limit thermostat are fully located in their relevant pockets.

8.18 Checking/Replacing Main Expansion Vessel

8.18.1 The expansion vessel is factory pressurised to 1bar (14.7psi) and should be checked during servicing. Should it have lost pressure it can be repressurised in situ. Drain the boiler. Fit a suitable pump and gauge (ie car foot pump and gauge) to the nipple at the top right-hand side of the expansion vessel, and pressurise to 1bar (14.7psi) and remove the pump.

NOTE: Access to the nipple can be improved by loosening the upper vessel retaining screw and rocking the vessel forwards.

If the vessel cannot be repressurised or if pressure loss is very frequent the expansion vessel will require changing. Alternatively, a new vessel can be fitted in the return to the appliance, and the old vessel isolated in situ.

N.B. If the boiler is installed with a clearance above of 343mm (13.5in) or more it is possible to remove the expansion vessel in situ, follow steps 8.18.10 - 18.18.11

8.18.2 Refer to 8.4

8.18.3 Close central heating valves (valve head is horizontal when closed).

8.18.4 Drain appliance via safety valve by 1/4 turn of knob.

8.18.5 Disconnect flue from appliance.

8.18.6 Disconnect all pipe unions at the appliance base.

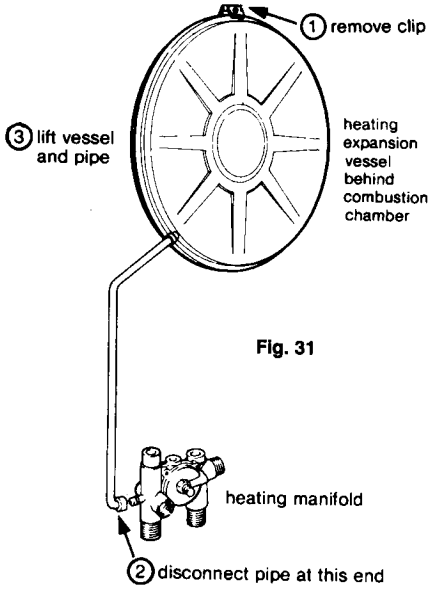


Fig. 31

8.18.7 Switch OFF mains electricity and gain general access. Disconnect electricity supply at p.c.b. (read cl.5.5)

8.18.8 Remove lower fixings (fig 10) and lift appliance off upper bracket.

8.18.9 Refer to fig 31

8.18.10 Remove clip securing vssel at top. Disconnect expansion pipe at heating manifold, lift vessel & pipe out of appliance.

8.19 DHW Expansion Vessel

Refer to fig. 28

8.19.1 Refer to 8.4

8.19.2 Close cold water inlet stopcock. Open lowest draw off or drain tap on system.

8.19.3 Unscrew vessel from 135 degrees support elbow.

8.20 Safety Valve

8.20.1 Refer to 8.4.

8.20.2 Drain down primary side of boiler by closing heating valves (1/4 turn until handle is horizontal). Turn safety valve 1/4 turn to drain appliance. Remove Heating Microswitch as 8.22.2.

Unscrew safety valve discharge pipe.

Unscrew complete valve from Heating Manifold.

8.21 Auto Air Vent

Refer to fig. 26

8.21.1 Refer to 8.4

8.21.2 Follow steps 8.13.2 - 8.13.5

8.21.3 Unscrew auto air vent

8.21.4 Reassemble in reverse order using new fibre washer.

8.22 Removal of Electrical Components

8.22.1 Refer to 8.4

8.22.2 **Heating Micro Switch** *Part No 4302*

Refer to fig. 27

8.22.3 Hold switch and unscrew retaining nut

8.22.4 Remove switch and remove cover

8.22.5 Pull off electrical tab connections.

8.22.6 **DHW Microswitch** *Part No 4148*

Refer to fig. 32

8.22.7 Hold switch and remove locking nut securing it to the 3 way valve.

8.22.8 Remove switch and remove cover.

8.22.9 Pull off electrical tab connections.

8.22.10 **High Limit Thermostat (Thermocouple Interruptor)**

Part No 4888

Refer to fig. 32

8.22.11 Disconnect 2 electrical connections at Gas Control Valve.

8.22.12 Ease off Thermostat retaining clip on flow tube and withdraw sensor probe.

8.22.13 **Safety Thermostat** *Part No 5441*

Refer to fig. 32

8.22.14 Disconnect two electrical connections.

8.22.15 Ease off thermostat retaining clip.

8.22.16 **Heating Thermostat** *Part No 3212*

8.22.17 Drain down primary side of boiler by closing heating valves (1/4 turn until handle is horizontal). Turn safety valve 1/4 turn to drain appliance.

8.22.18 Trace capillary tube to heating manifold unscrew sensing probe retaining nut and withdraw probe.

8.22.19 Pull electrical tabs off back of thermostat.

8.22.20 Pull knob off front revealing 2 retaining screws.

8.22.21 Remove screws to release thermostat and remove.

8.22.22 Reassemble in reverse order using a new fibre washer.

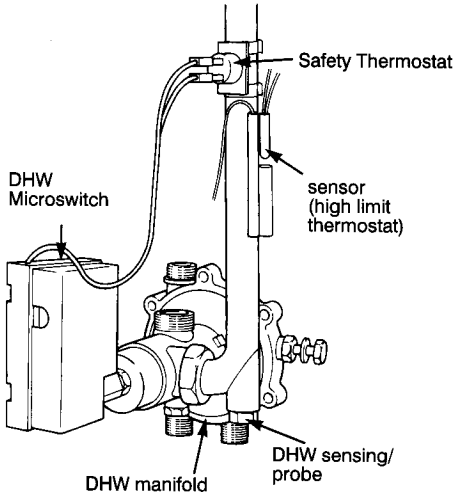


Fig. 32

8.22.23 Refer to figs 33 & 34 to ensure correction location of thermstat and push-on wiring tabs.

NB When changing this thermostat it may be necessary to repressurise the system (section 6.3.3 gives details).

8.22.24 **Hot Water Thermostat**
Part No 5394
Refer to fig 33

8.22.25 Drain down primary side of boiler by closing heating valves (1/4 turn until handle is horizontal). Turn safety valve 1/4 turn to drain appliance.

8.22.26 Unscrew sensing probe from bottom of main flow tube. (fig. 32) N.B. If the plastic grill has not been removed (8.4.2) it will need to be done now.

8.22.27 Pull electrical tabs off back of thermostat.

8.22.28 Pull knob off front revealing 2 retaining screws.

8.22.29 Remove screws, release purse clip and remove thermostat.

8.22.30 Refer to fig. 33 to ensure correct location of thermostat and push on wiring tabs. Orange wire to terminal 2. Red wire to terminal P1

NB When changing this thermostat it may be necessary to repressurise the system (section 6.3.3 gives details).

8.22.31 **Removal of Printed Circuit Board**

Part No

Refer to fig. 33

8.22.32 Press in the sides of the printed circuit board cover (fig. 33) to release retaining clips and lift cover off.

8.22.33 Disconnect external incoming live and neutral and any control wiring from terminal strip.

8.22.34 Remove 4 plugs from p.c.b

8.22.35 Pull tab connectors off both rocker switches.

8.22.36 Pull back p.c.b retaining lugs and remove p.c.b.

8.22.37 Replace electrical connections. Refer to fig. 41 to ensure correct locations.

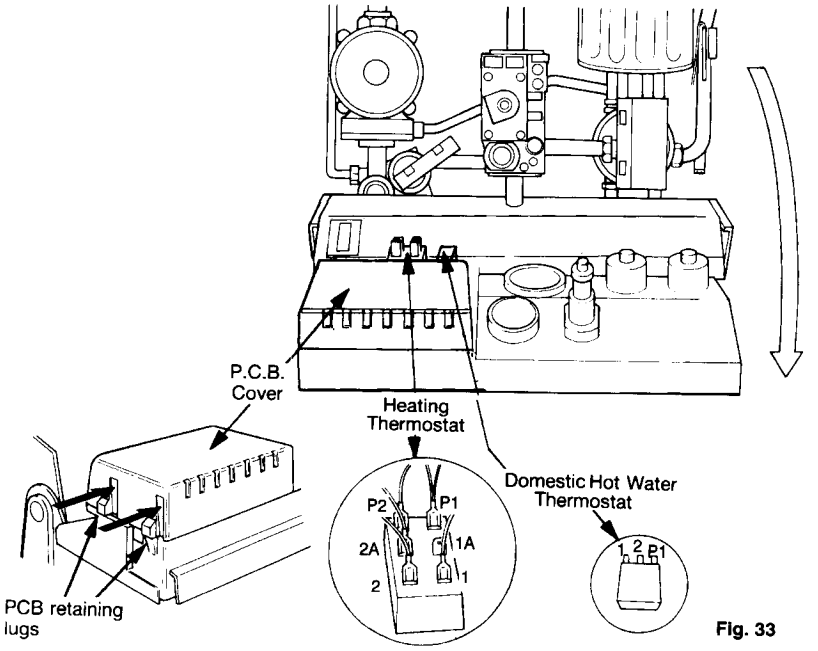


Fig. 33

8.22.38 **Switches (On/Off and Timed/Summer/ Constant or Mode Selector)**

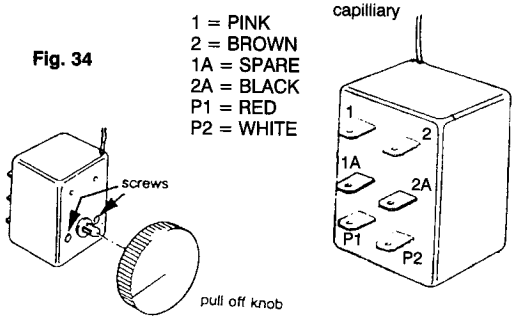
Part No 5284 & 4981

Refer to fig. 35

8.22.39 Pull of tab connectors. Squeeze spring latching tabs at the back of the panel and push switch outwards.

8.22.40 To replace refer to fig 35 to ensure switch is in correct attitude and press into hole from the front until spring tabs latch. Refer to fig 35 for correct wiring details.

Fig. 34



8.23 **Removal of Mechanical Instruments and Components**

Refer to 8.4

8.23.1 **Pressure Gauge**

Part No 5263

Refer to figs. 27 & 36

8.23.2 Close central heating flow and return valves, by 1/4 turn to horizontal position, drain appliance through the safety valve by 1/4 turn of the knob.

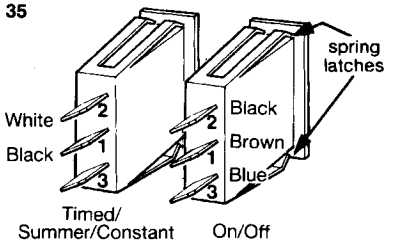
8.23.3 Trace capillary from back of gauge to connecting point on heating manifold.

8.23.4 Unscrew union on manifold.

8.23.5 Remove and clean off washer remnants.

8.23.6 Squeeze plastic locking lugs behind fascia and press gauge from aperture.

Fig. 35



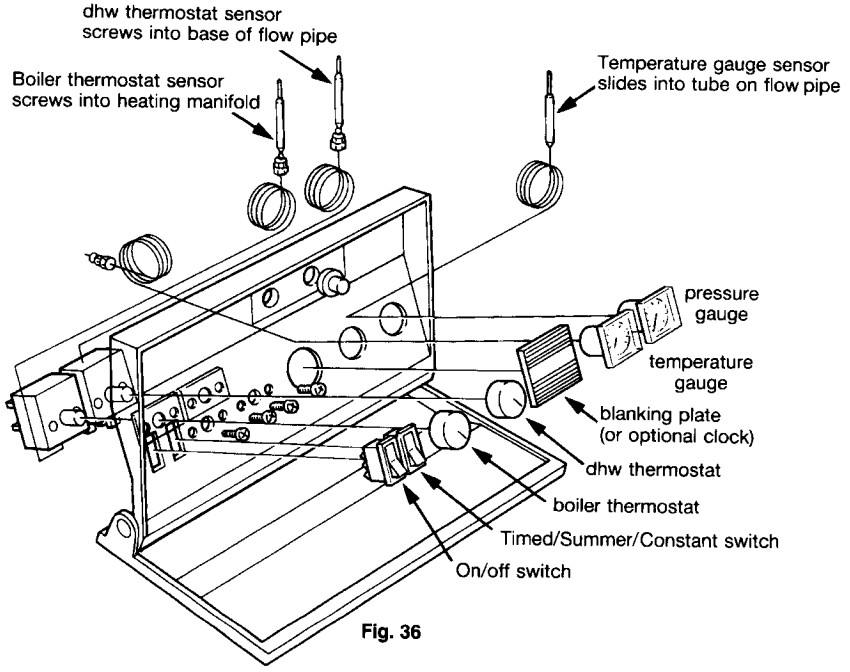


Fig. 36

8.23.7 **Temperature Gauge**

Part No 5262

Refer to fig. 36

8.23.8 Trace capillary to sensor. Remove purse clip and capillary tube retaining clip from flow tube and withdraw sensor.

8.23.9 Squeeze plastic locking lugs behind fascia and press gauge from aperture.

8.23.10 Re-assemble in reverse order ensuring locking lugs are located in the grooves, and capillary clip is refixed.

8.24 **Setting Gas Pressures**

ALL SETTINGS DONE WITH "U" GAUGE FITTED TO BURNER TEST NIPPLE AS INSTRUCTED IN CLAUSE 6.6

8.24.1 **Setting Maximum Rate**

Turn off electrical supply to boiler and follow instructions in section 8.4 to gain access.

Refer to Fig. 37

Loosen small locknut. Unscrew completely the fine adjusting screw.

Turn on hot water tap.

Adjust main gas pressure by loosening 10mm nut and turning slotted screw clock-wise to increase pressure. Anti-clockwise to decrease set pressure to

20-80
10.6 mbar (4.25 in wg) plus or minus 1.0 mbar 0.42 in wg

24-96
11.5 mbar (4.6 in wg) plus or minus 1.1 mbar 0.46 in wg

Carefully tighten lock nut without altering setting.

Turn off tap and electrical supply.

Replace fine adjusting screw.

8.24.2 **SETTING MINIMUM RATE**
Remove wire on No. 2 terminal of Hot water stat and replace on No 1 terminal (see fig. 33).

Turn on electrical supply. Turn on tap. The boiler will light up in Hot Water mode at low flame. Adjust pressure using fine adjusting screw turn clockwise to increase anti-clockwise to decrease set pressure

20.80
1.9 mbar (0.76 in wg) plus or minus 0.19 mbar 0.08 in wg

24-96
1.6 mbar (0.6 in wg) plus or minus 0.2 mbar 0.06 in wg

Tighten locknut.

Turn off tap. Turn off electrical supply.

Remove wire on No I terminal on Hot water stat and replace on No 2.

8.24.4 **Central Heating (Range Rating) to Set Maximum Rate in Central Heating Mode.**

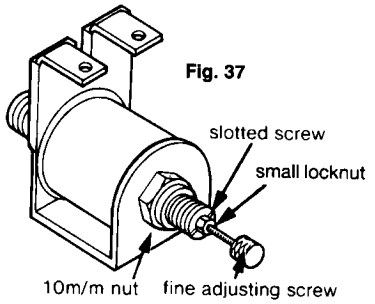
See clauses 6.6.16 for necessary adjustments. Refer to the commissioning rate recorded by the commissioning engineer on the label situated beside the appliance data badge on front panel.

8.25 **END OF SERVICING**

Run through the general commissioning as described in Section 6 as far as they apply.

Refit casings and clean up.

Fig. 37



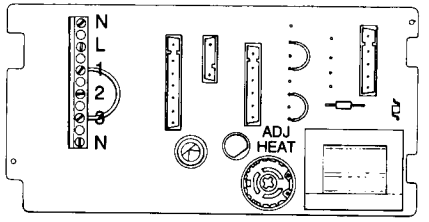


Fig. 38

9.1 On completion of any service/fault finding task which has required the breaking and remaking of electrical connections, the checks Earth Continuity, polarity and Resistance to Earth must be repeated.

The following flow diagrams suggest the logical sequence of steps for fault finding.

They are not exhaustive but cover all that can reasonably be carried out on site by the installer.

Acquaintance with the functional sequence will prove helpful for some, and this is included for reference. As further help, the role of each part is briefly described.

Also included in this section are wiring diagrams and schematics to assist in fault location and servicing as described in the text.

9.2 Sequence of Functions
When following this sequence, refer to figs. 40 & 42. It is assumed that the on/off switch is ON and the pilot flame is alight.

9.2.1 Domestic Hot Water Mode
Turning on a tap will operate the hot water flow switches, which will energise the pump. The pump activates the boiler flow switch energising the gas valve via the safety thermostat, and the boiler will produce hot water as described below.

The operation of the DHW Flow Switch also completes the low voltage control circuit for the modulating coil on the Gas Valve.

The normally open (make on rise) DHW Thermostat remains open circuit when calling for heat. Zero voltage on the coil permits maximum gas rate.

Closure of the thermostat provides full voltage at the coil which closes the operator to give the set minimum gas rate.

Successive operation of the thermostat alternates the boiler between high and low fire to regulate the average heat input.

Note that the sensor of the DHW thermostat senses the temperature of primary water leaving the main heat exchanger. The amount of heat transferred from the primary water to the dhw tap water depends on the temperature difference between them.

Therefore as the dhw temperature rises the primary water temperature will tend to rise also.

The dhw thermostat senses this and controls the gas rate accordingly.

When the domestic water draw off rate drops below the permitted minimum (2.8 l/min) the DHW flow switch reverses and the boiler reverts either to the "rest" mode or, if there is a heating call, to the mode described below.

9.2.2 Central Heat Mode
In this mode the timed/summer/constant switch must be in the closed ie. constant position fig. 1. (19)

With all controls calling for heat the pump will run and a supply through the boiler 2nd stage thermostat which will energise the gas valve via the safety thermostat, and the boiler will operate for central heating as described below.

The control circuit is via the 1st stage of the boiler thermostat when the thermostat calls for heat it is open circuit (i.e. make on rise).

Control current to the gas valve modulating coil is subject to the resistance of the potentiometer. The resulting low voltage to the coil positions the gas valve for the maximum central heating rate.

On reaching the set temperature the thermostat closes, by-passing the potentiometer and imposing maximum voltage on the modulating coil. The boiler then operates at the set minimum rate.

Successive operations of the thermostat regulates the average heat input to that required.

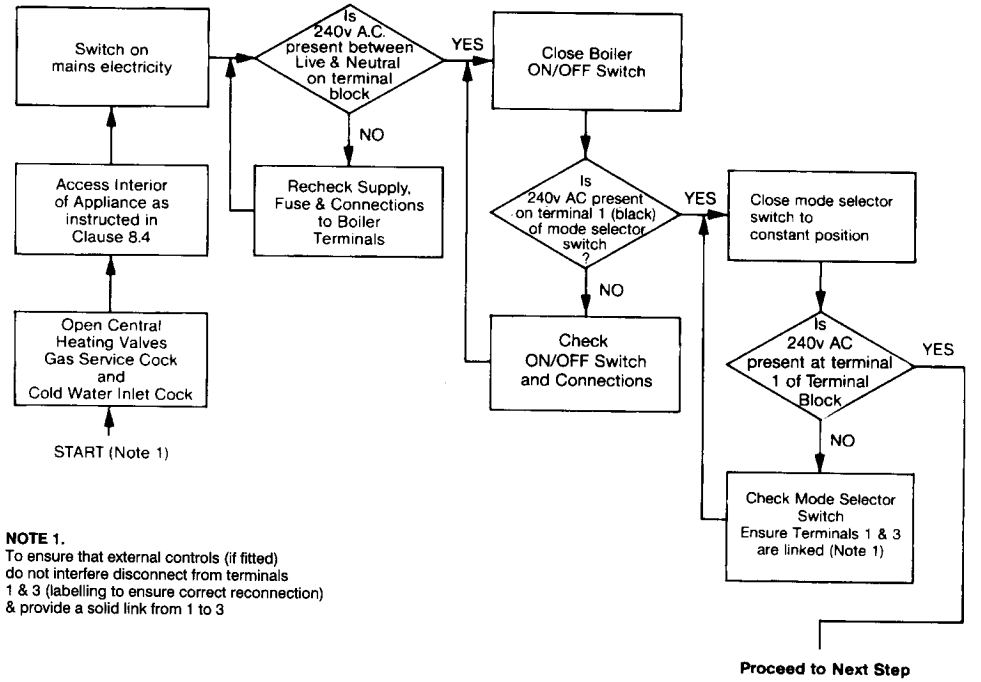
If, on low fire, the boiler temperature continues to rise the 2nd stage thermostat breaks P2-2A putting the burner circuitry back into the `rest' mode.

P2-2 is made and so keeps the pump running to circulate to the radiators.

If the supply to P2 of the thermostat is broken (e.g. by a room thermostat) both the burner and pump are switched off.

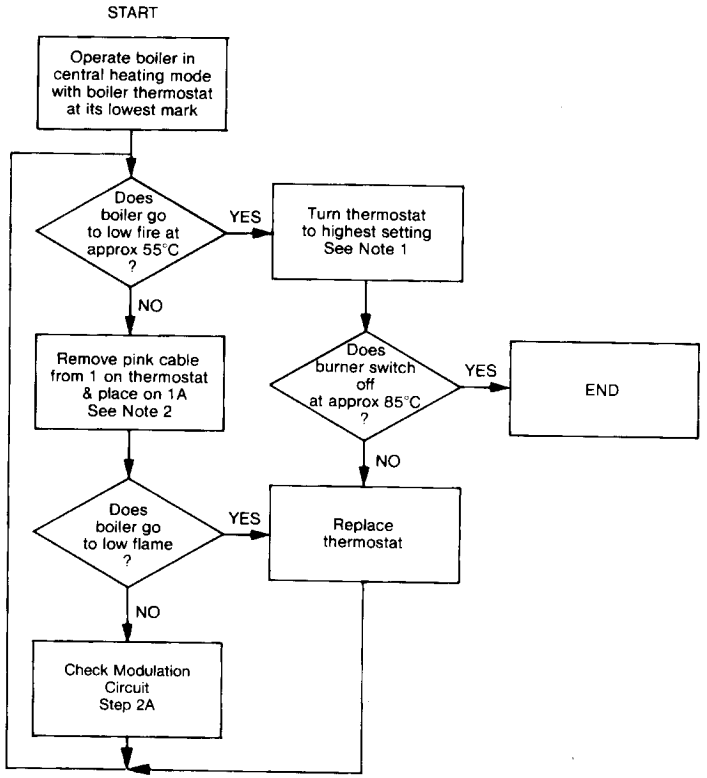
Should there be a restriction in the heating circuit reducing the flow rate through the boiler to below 350 litres/hour (1.28 gpm) the boiler circuit flow switch will open and de-energise the gas valve.

FAULT FINDING STEP 1
CHECK ELECTRICAL SUPPLIES, SWITCHES & CONNECTIONS



NOTE 1.
To ensure that external controls (if fitted) do not interfere disconnect from terminals 1 & 3 (labelling to ensure correct reconnection) & provide a solid link from 1 to 3

FAULT FINDING STEP 2
CHECKING C/H THERMOSTAT CIRCUITS

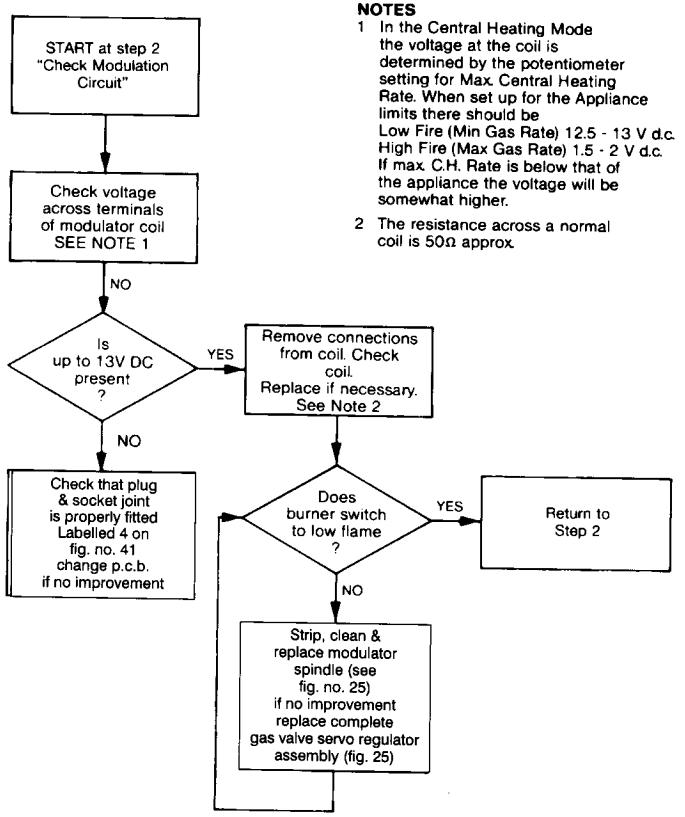


NOTES

1 Reduce number of radiators turned on to give quick response. Observe controls switch 1st to LOW and then OFF

2 IMPORTANT. Turn off electricity to make change. N.B. The white/black/brown leads are 240V AC. The pink and red leads are 12.5V DC. Do not confuse.

FAULT FINDING STEP 2A
CHECK MODULATION CIRCUIT IN C/H MODE

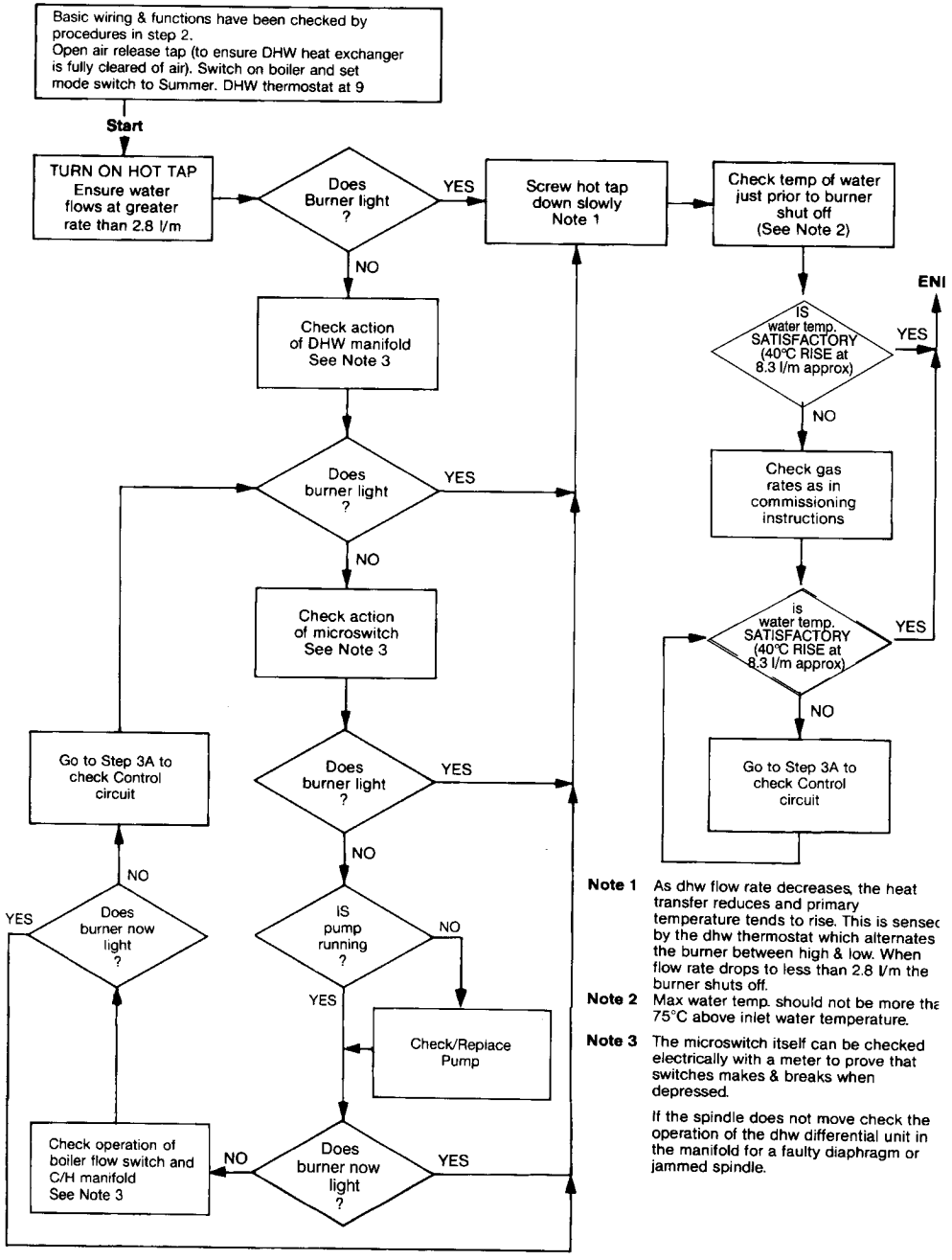


NOTES

1 In the Central Heating Mode the voltage at the coil is determined by the potentiometer setting for Max. Central Heating Rate. When set up for the Appliance limits there should be
Low Fire (Min Gas Rate) 12.5 - 13 V d.c.
High Fire (Max Gas Rate) 1.5 - 2 V d.c.
If max. C.H. Rate is below that of the appliance the voltage will be somewhat higher.

2 The resistance across a normal coil is 50Ω approx.

FAULT FINDING STEP 3
CHECKING DOMESTIC HOT WATER FUNCTION



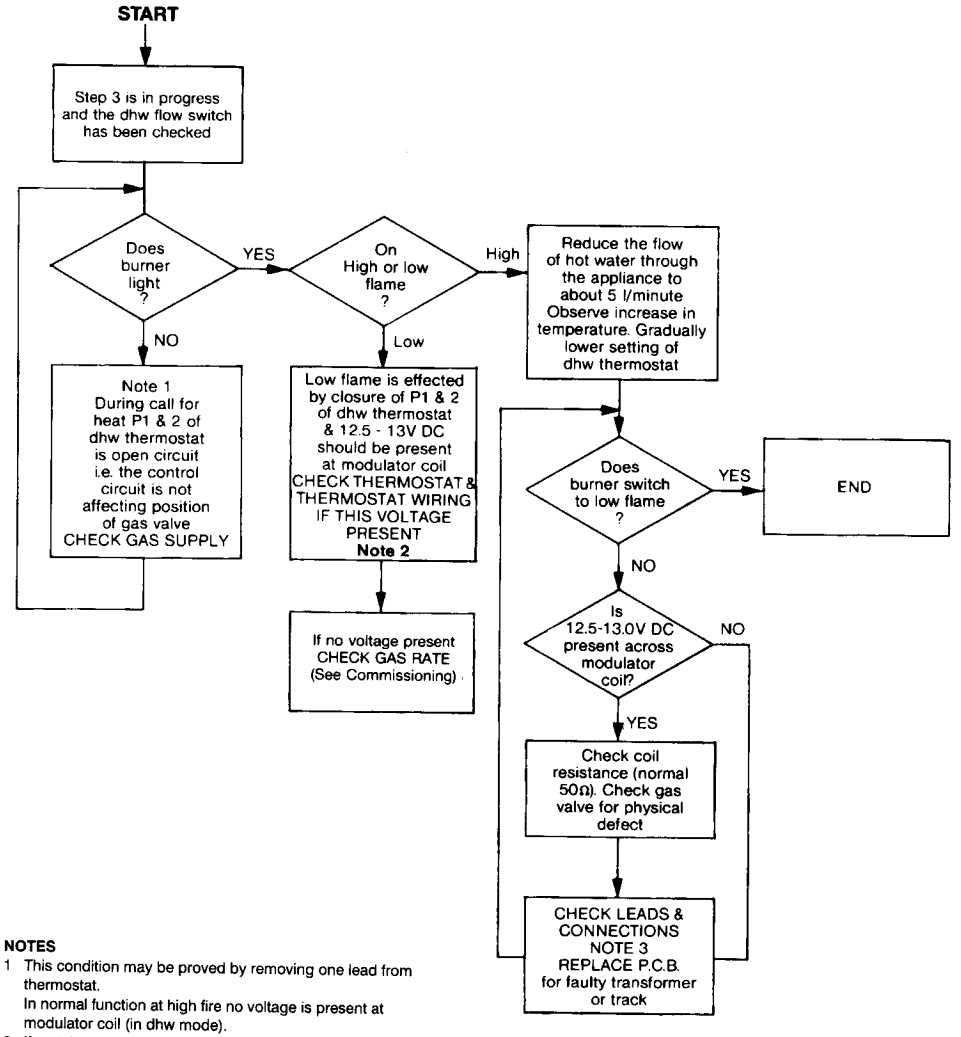
Note 1 As dhw flow rate decreases, the heat transfer reduces and primary temperature tends to rise. This is sensed by the dhw thermostat which alternates the burner between high & low. When flow rate drops to less than 2.8 l/m the burner shuts off.

Note 2 Max water temp. should not be more than 75°C above inlet water temperature.

Note 3 The microswitch itself can be checked electrically with a meter to prove that switches makes & breaks when depressed.

If the spindle does not move check the operation of the dhw differential unit in the manifold for a faulty diaphragm or jammed spindle.

FAULT FINDING STEP 3A
CHECK CONTROLS IN DHW MODE



NOTES

1 This condition may be proved by removing one lead from thermostat.
In normal function at high fire no voltage is present at modulator coil (in dhw mode).

2 If no tab connector is on terminal 1 instead of 2 fault will occur.

3 To establish low flame 12.5 to 13.0 V d.c. must be present across the modulator coil. Absence due either to transformer or faulty circuit.
CHECK FOR CORRECT WIRING & CONTINUITY.
GREY lead from coil to T.35 on pcb
PURPLE lead from coil to T.34 on pcb
ORANGE from Normally Open of micro switch to 2 on dhw stat
RED from P1 on stat to T.10 on pcb

Instructions for (A) Fitting Vokera 24 Hour Time Switch *(Part No. 032 GC No. 301 110)* and Fitting Vokera Digital 7 Day Time Switch *(Part No. 05 G.C. No. 301 109)* (B) Wiring to external Time Switches, Room Thermostats and Frost Thermostats

A.

Remove the clock aperture blanking plate (1) (fig 1) by squeezing the two lugs on the rear of the plate together and push the plate out.

Remove the clock from its box.

Wire the clock as shown in fig 4.

Insert the clock into the aperture from the back of the control panel. Push the mounting bezel (2) through the front panel and secure to the clock using the four screws provided. (fig 2)

Connect the other ends of the wires as detailed below. (fig 3)

White/Red: Connects to double connector on black wire on top terminal of ON/OFF switch.

Blue: connect to bottom terminal marked N on main terminal strip.

White: Connect to terminal 1 on main terminal strip, (leave link 1-3 connected if no room thermostat is used).

Red/Black: Connect to spare terminal on rear of timed/summer/constant switch.

Remove the loop between terminals 1 & 3 on the boiler terminal strip if a room stat is also fitted.

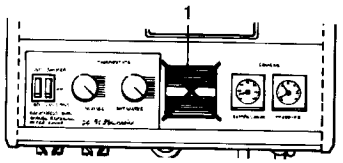


Fig. 1

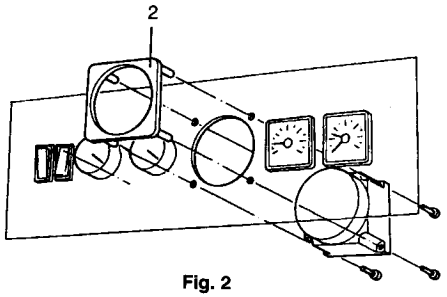


Fig. 2

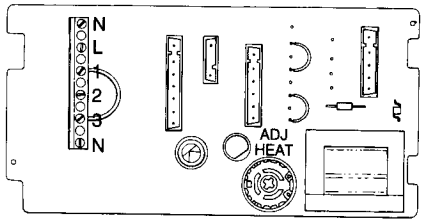
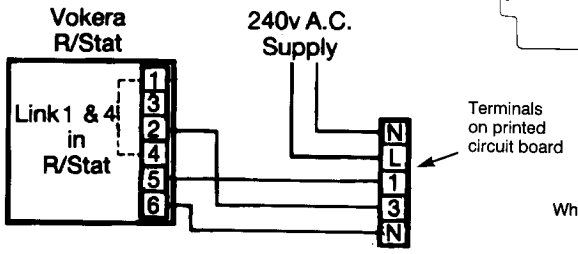


Fig. 3



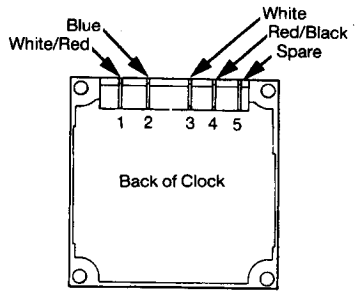
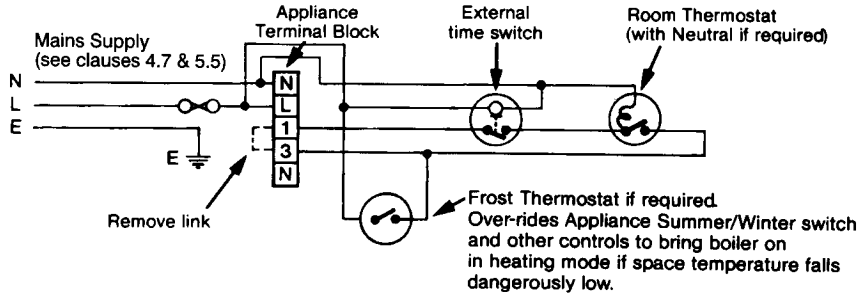


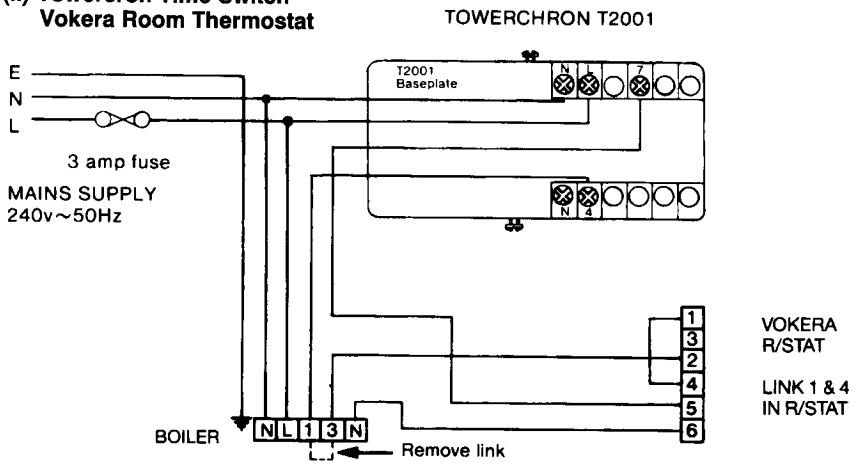
Fig. 4

B. Wiring to External Time Switches and Thermostats

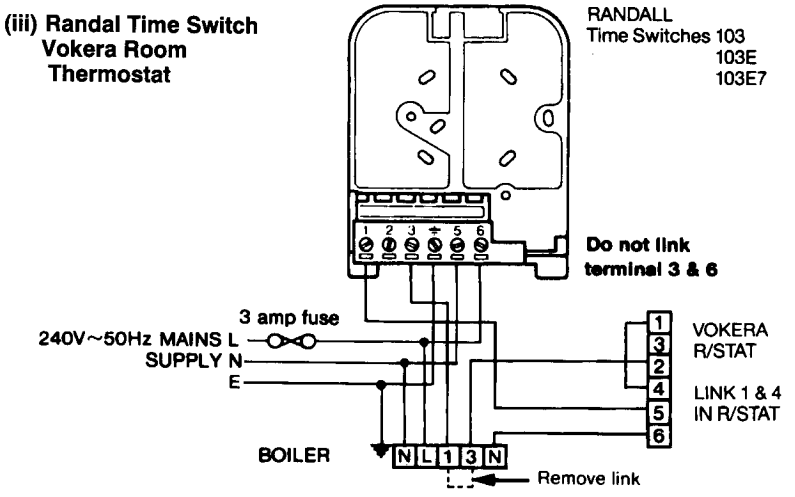
(i) General Schematic Diagram



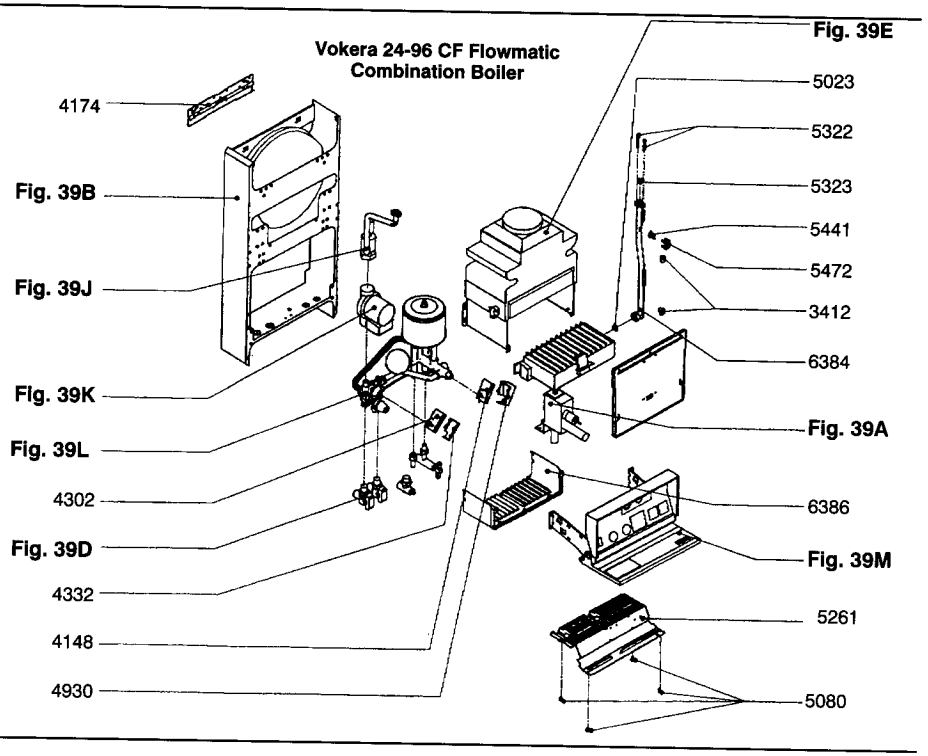
(ii) Towercron Time Switch Vokera Room Thermostat



(iii) Randal Time Switch Vokera Room Thermostat



EXPLODED DIAGRAMS Fig. 39



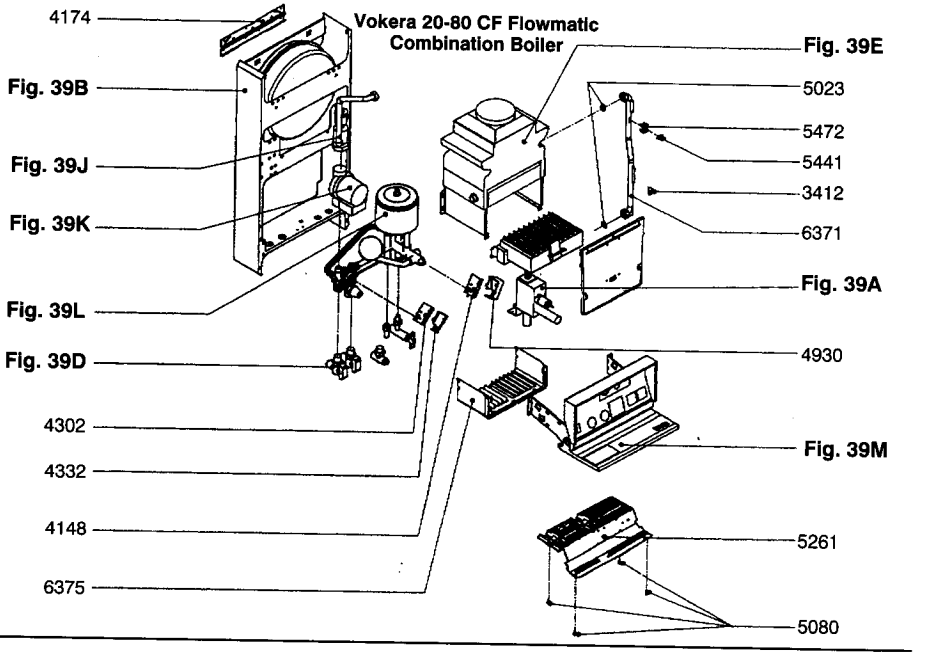
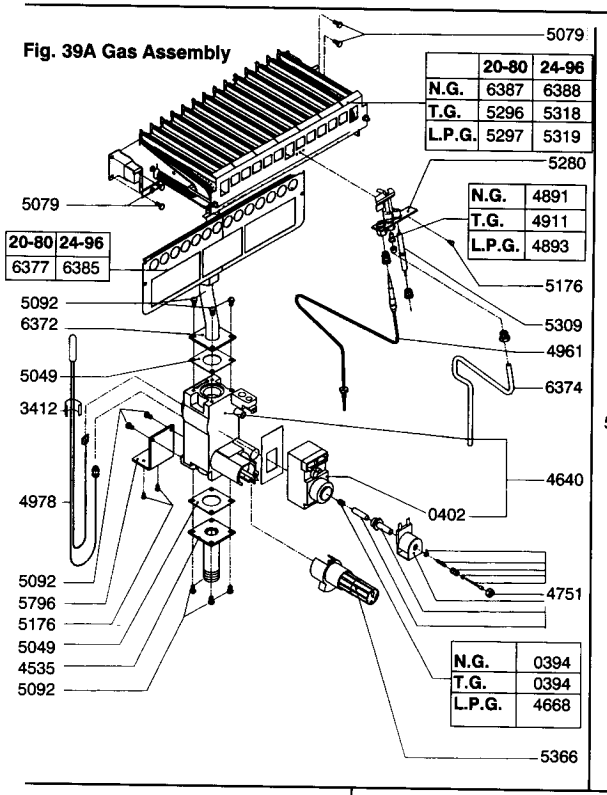


Fig. 39A Gas Assembly



	20-80	24-96
N.G.	6387	6388
T.G.	5296	5318
L.P.G.	5297	5319

N.G.	4891
T.G.	4911
L.P.G.	4893

20-80	24-96
6377	6385

N.G.	0394
T.G.	0394
L.P.G.	4668

Fig. 39B Expansion Vessel 10 lt.

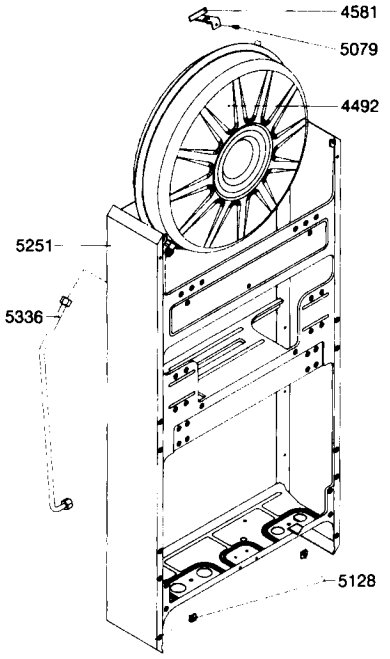


Fig. 39C Three Port Diverter Valve

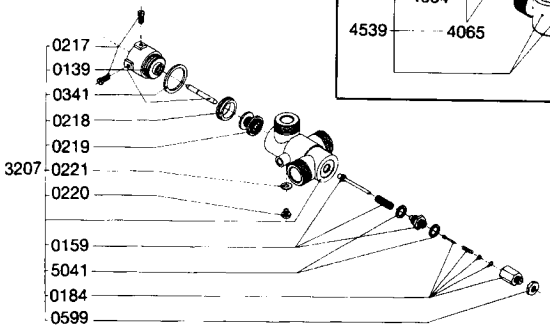
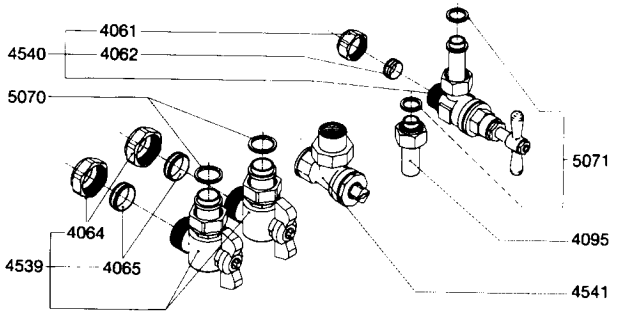


Fig. 39D Taps and Connection Pipes



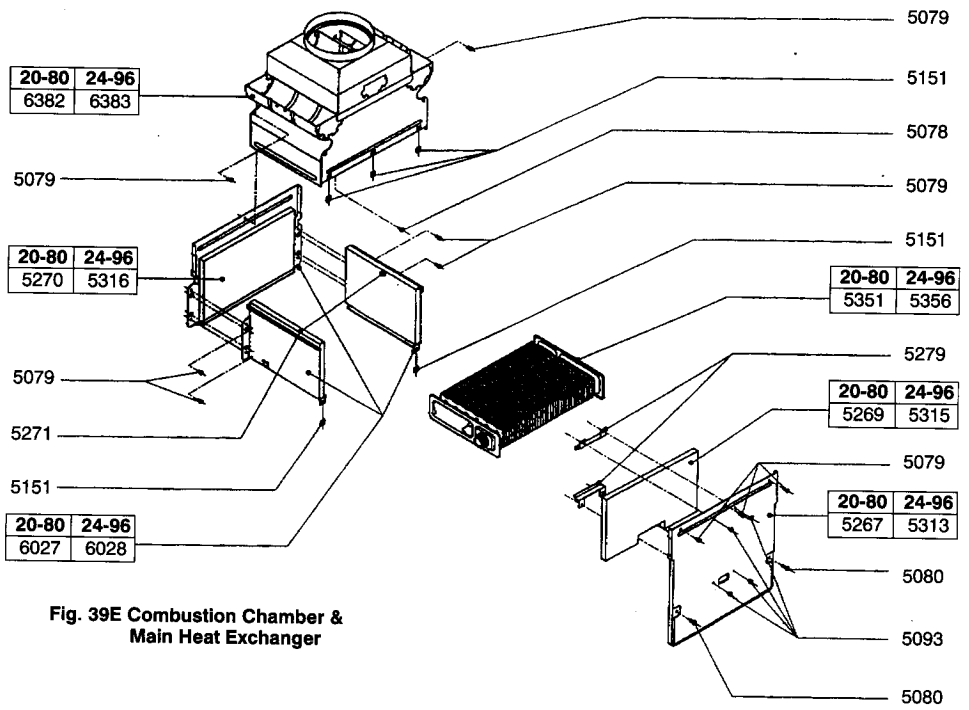


Fig. 39E Combustion Chamber & Main Heat Exchanger

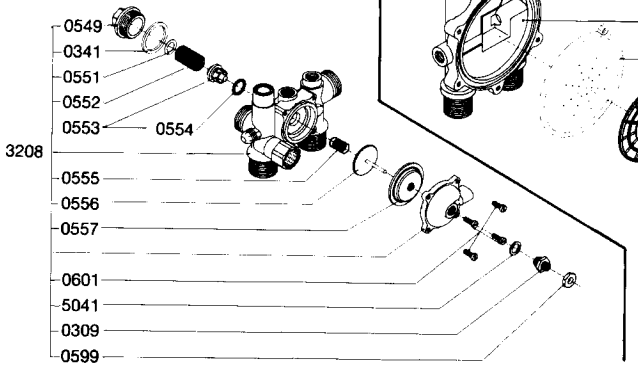


Fig. 39F Central Heating Manifold with Automatic By-Pass

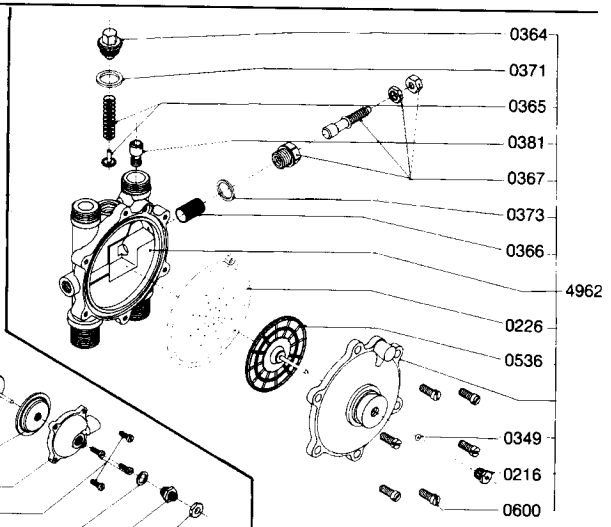
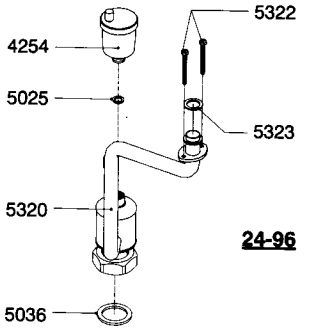


Fig. 39G Domestic Hot Water Manifold

Fig. 39J Flow-Pipe with Air Separator



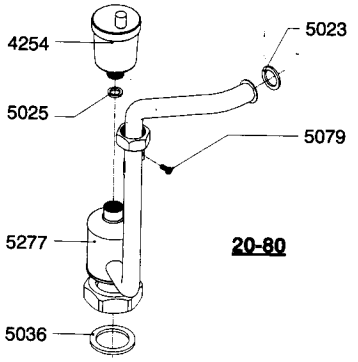
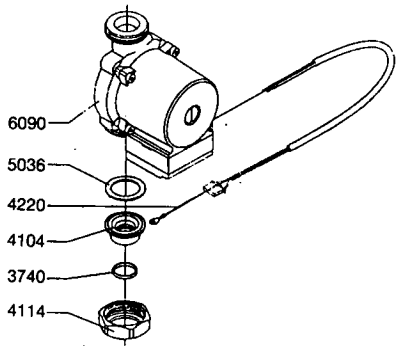


Fig. 39K Circulation Pump 15-50



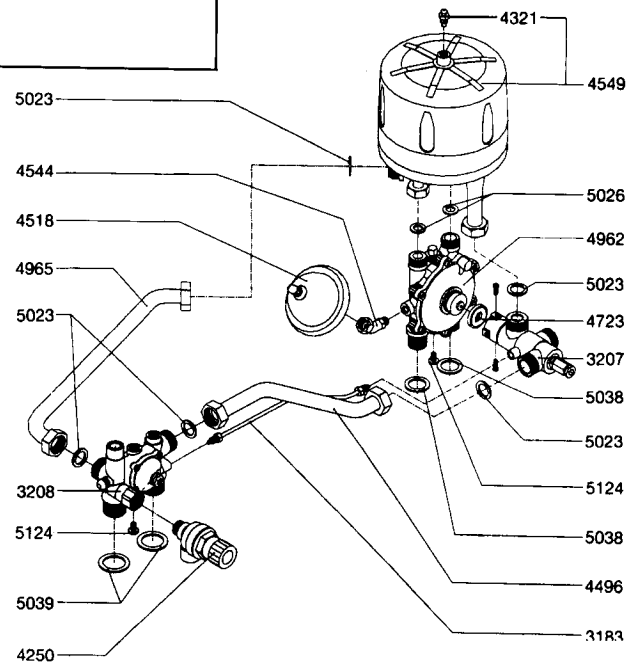


Fig. 39L Hydraulic

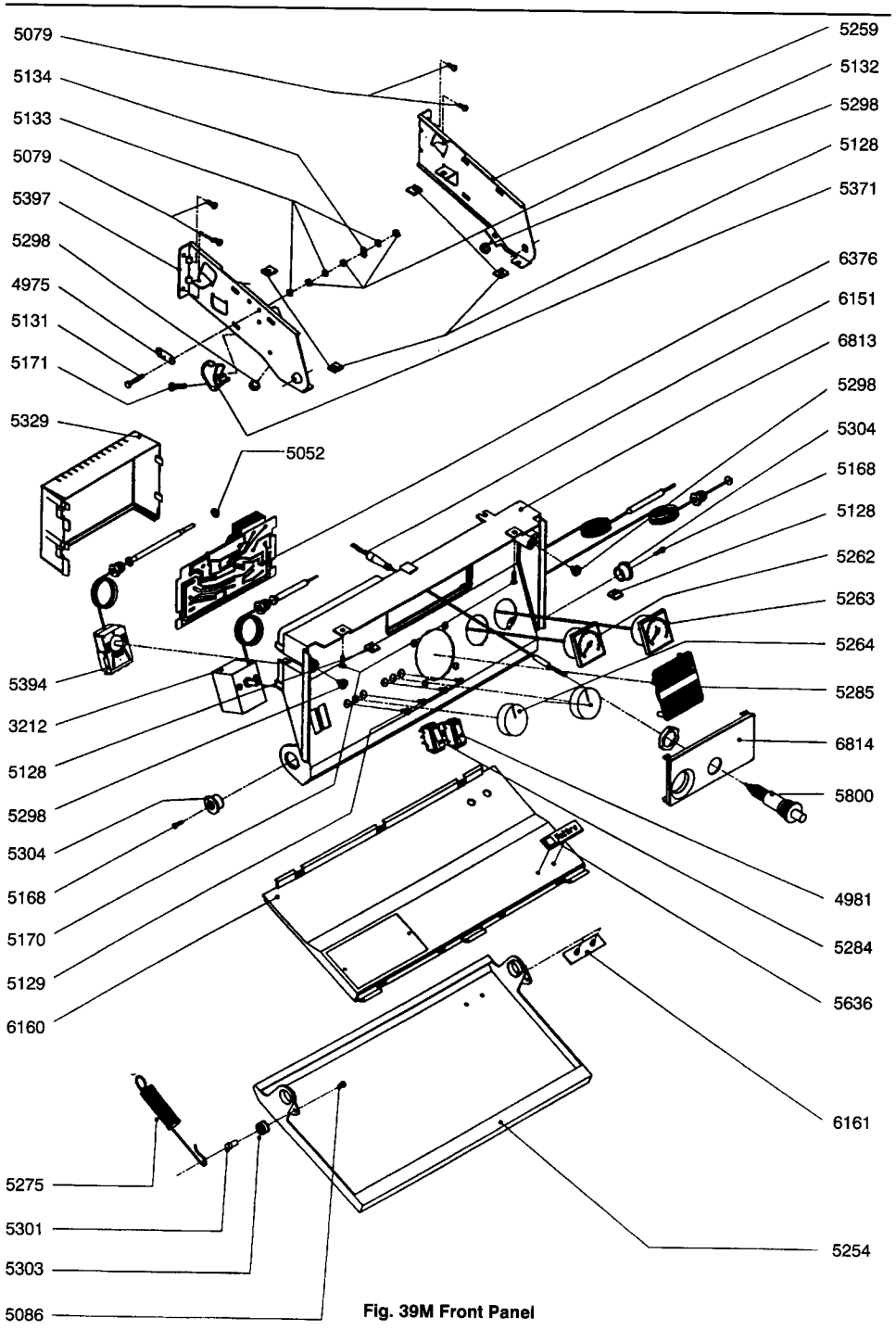


Fig. 39M Front Panel

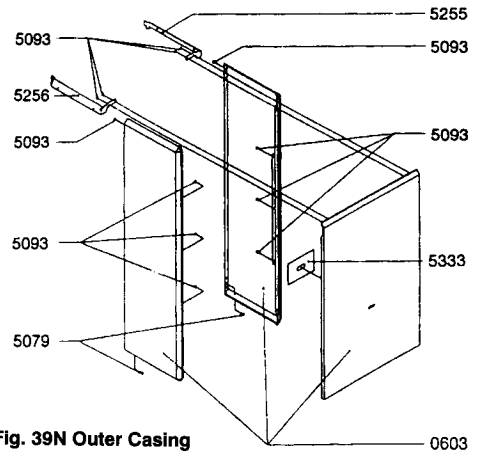


Fig. 39N Outer Casing

SHORT SPARE PARTS LIST

Code	G.C. No.	Description	Code	G.C. No.	Description
0226	333 929	Domestic Diaphragm	4540	333 779	Mains stop cock
0367	333 832	Domestic Water Flow regulating screw	4541	333 780	Gas Service tap
0557	333 941	Flow switch diaphragm	4549	333 955	Domestic Heat Exchanger
0598	333 972	Servo pressure regulator	4961	333 902	Thermocouple
0602	333 976	Solenoid	4962	333 903	Domestic Distribution Manifold
3207	333 943	3-way diverting valve	4981	333 961	Timed/Summer/Constant Switch
3208	333 944	Heating Manifold	5262	301 003	Temperature Gauge
3212	333 945	Boiler thermostat	5263	301 004	Pressure Gauge
3409	333 978	High Limit thermostat	5264	301 005	Thermostat knob
4095	333 720	Hot Water Outlet	5284	301 009	On/Off switch
4148	333 951	Triple Microswitch	5317	301 017	Main Burner
4250	333 772	Safety valve	5394	301 025	Domestic Thermostat
4254	333 722	Automatic Air Vent	5634	301 029	Gas valve
4302	333 773	Single micro switch (flow switch)	5800	301 090	Piezo Igniter
4492	333 733	Expansion Vessel	5868	301 041	Modulator coil
4518	333 885	Domestic Expansion Vessel	6090	384 288	Grundfos circulating pump UPS 15-50

FUNCTIONAL FLOW DIAGRAM General Layout

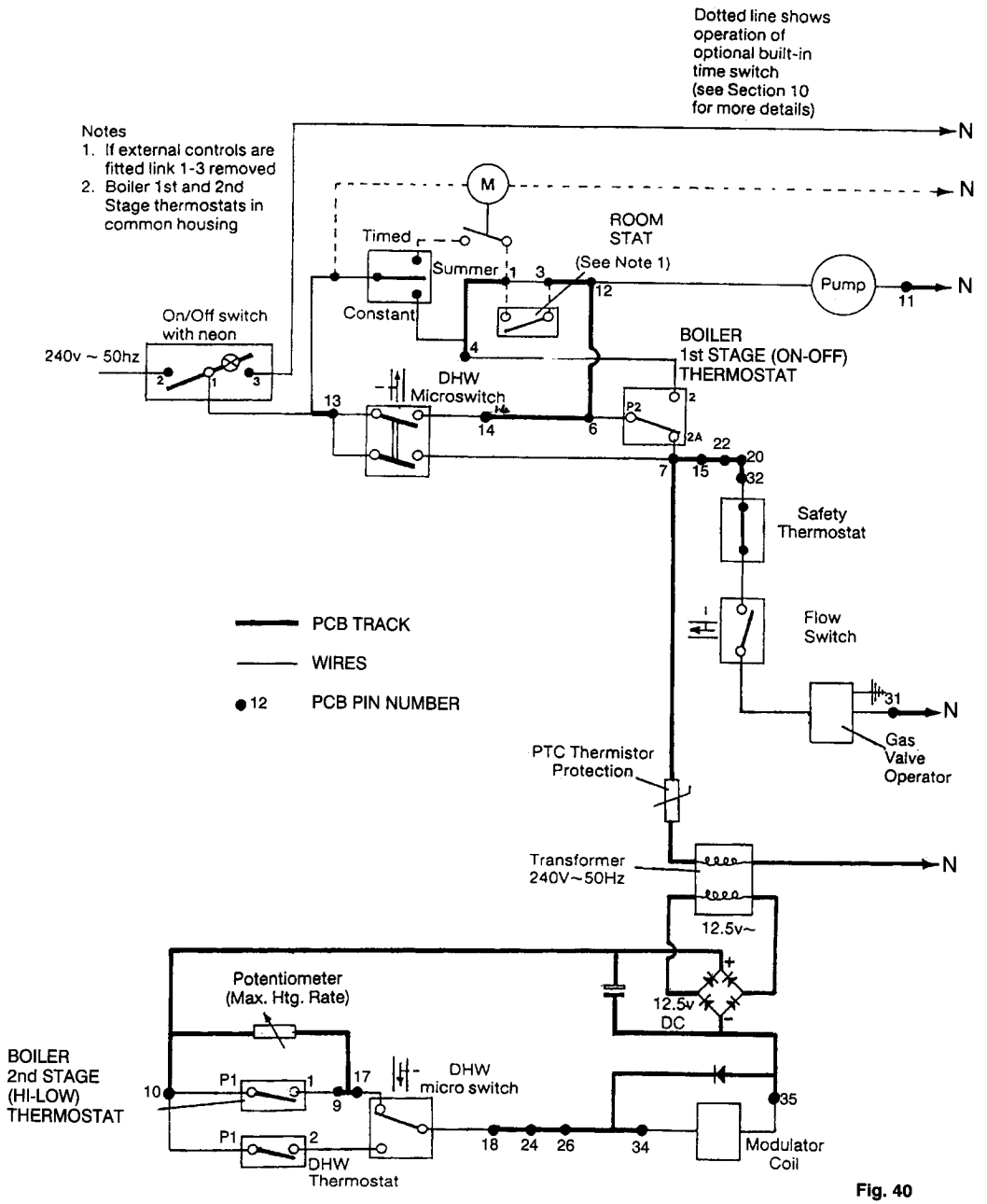
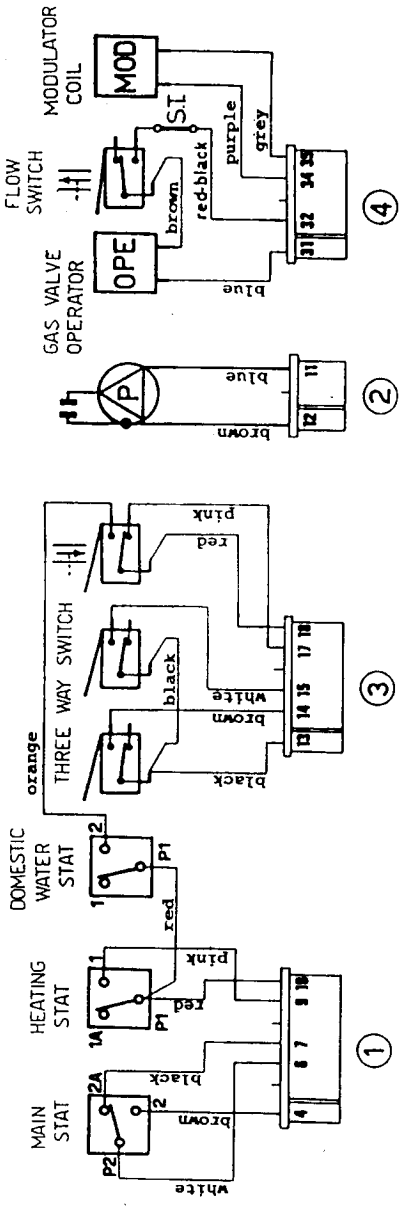


Fig. 40

GENERAL LAYOUT OF WIRING FROM PRINTED CIRCUIT BOARD

Code G.C. No.



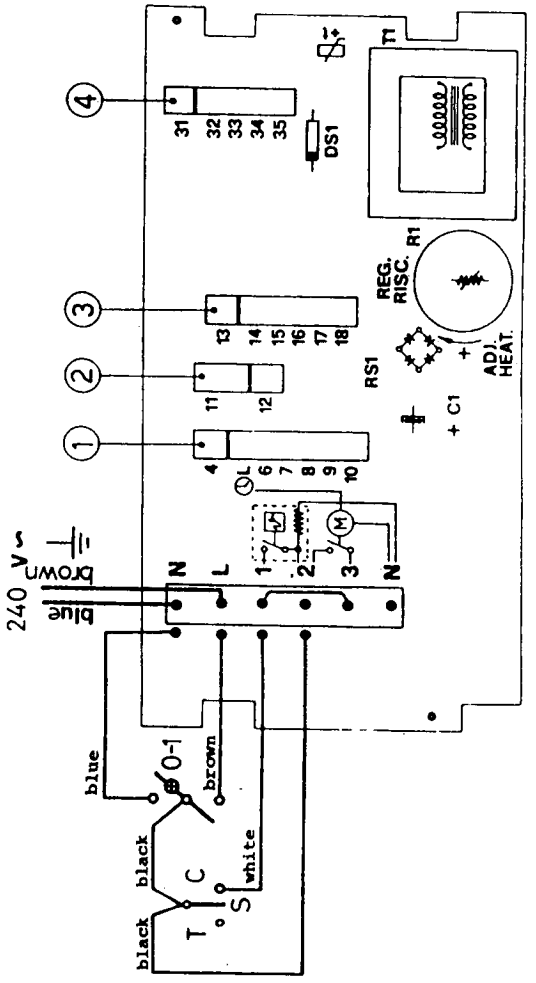


Fig. 41

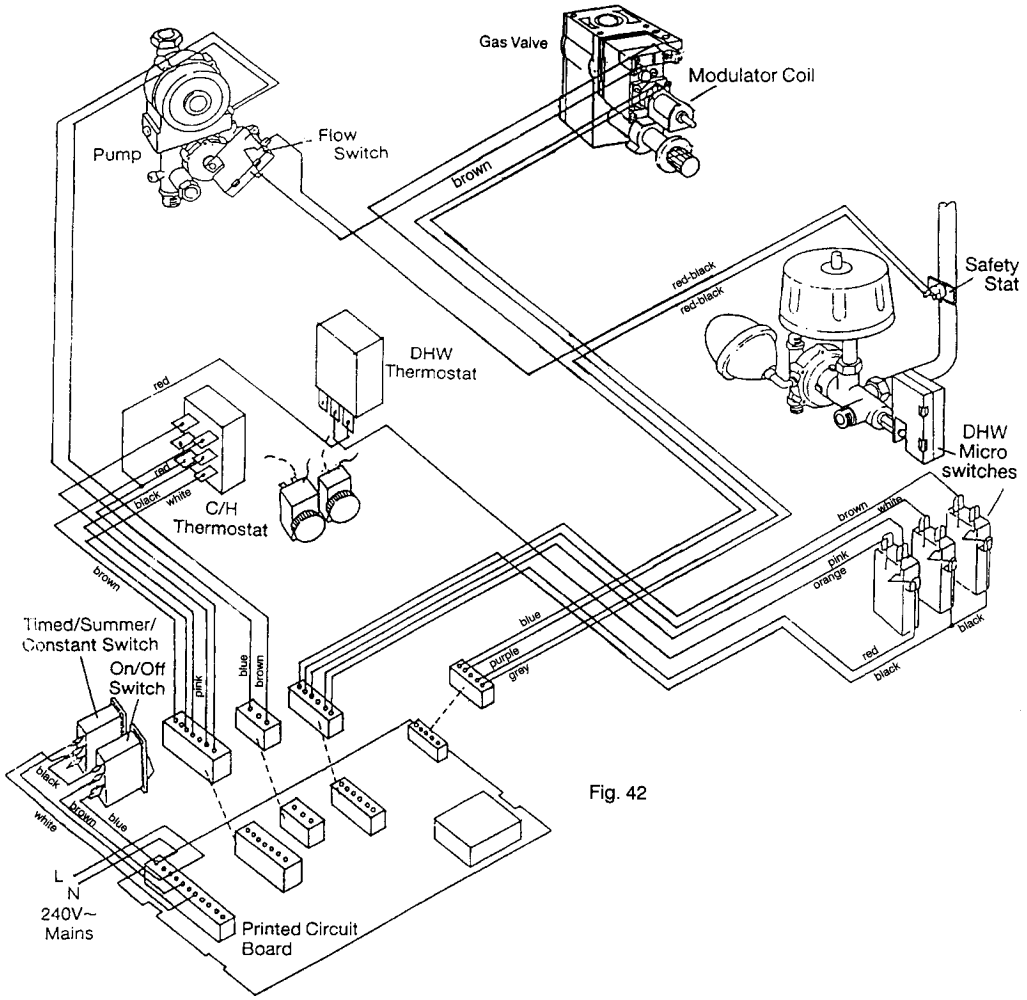

Gas Valve
Modulator Coil
Pump
Flow Switch
brown
red-black
red-black
Safety Stat
DHW Thermostat
red
red
black
white
C/H Thermostat
DHW Micro switches
brown
white
pink
orange
brown
blue
purple
grey
red
black
Timed/Summer/ Constant Switch
On/Off Switch
pink
blue
brown
black
white
brown
blue
L
N
240V~ Mains
Printed Circuit Board

Fig. 42

GR Claudio (Vokèra) Limited
Head Office and Accounts: Morson Road, Enfield, Middlesex, EN3 4NQ Tel: 081 - 804 7202 (5 lines) Fax: 081 - 804 8163 Telex 23309 Vokèra G
Northern Region: 360 Bowling Back Lane, Bradford, West Yorkshire BD4 8TS Tel: Bradford 0274 660314 (3 lines) Fax: 0274 660446
Scottish Region: Shuna Street Mary Hill, Glasgow G20 9NW Tel: 041 - 945 4944 Fax 041 - 945 5136

PRINTED ON **TOTALLY CHLORINE FREE** PAPER

Cod. 628.16392 - 1.000 - 1/94