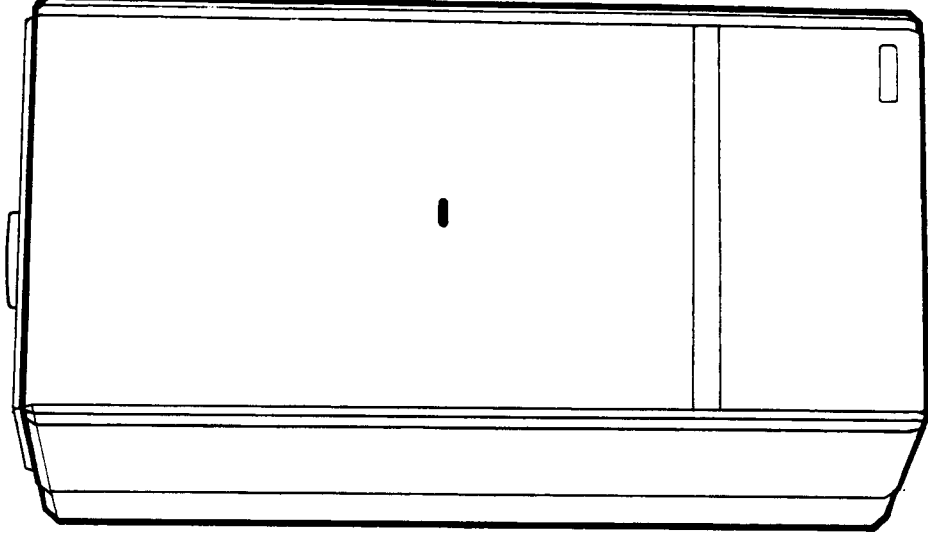


# Vokèra

## 20/80 R.S. Flowmatic

### Installation and Servicing Instructions



G C No. 47 094 07  
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**

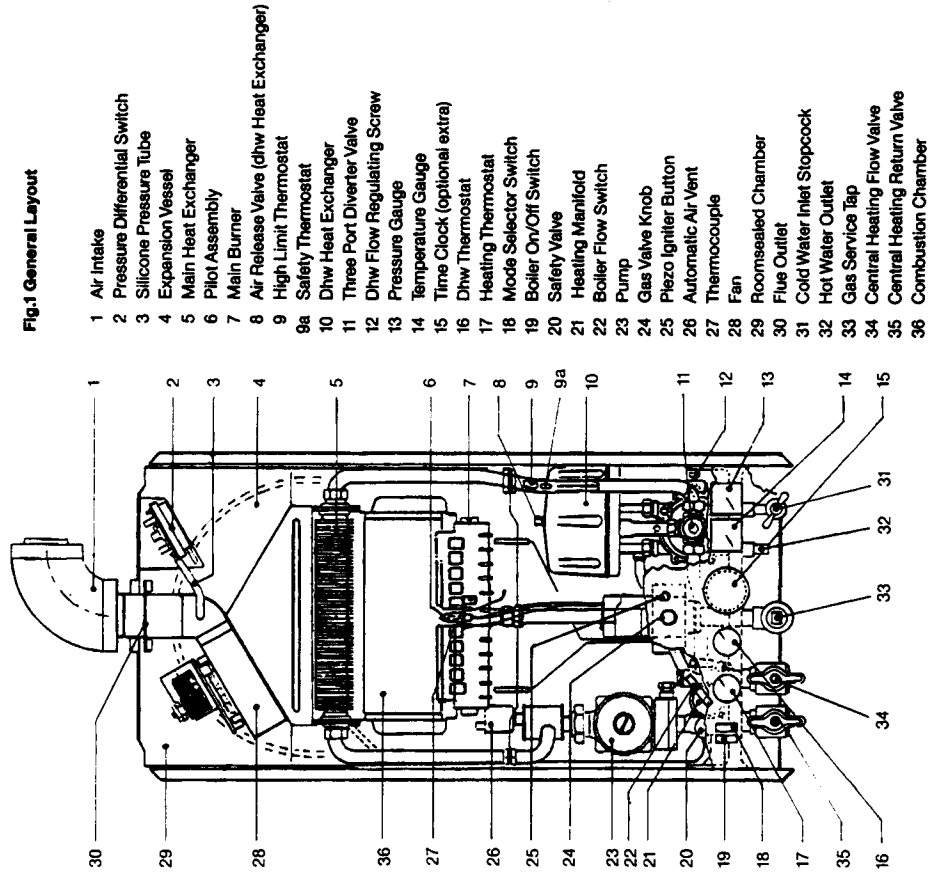
The Vokera 20/80 Flowmatic is a combined central heating and domestic hot water appliance. By design it incorporates a circulating pump, 3 port valve, expansion vessel, safety valve, temperature gauge and automatic by-pass.

It is produced as a room sealed category 1N appliance suitable for wall mounting applications only. It is provided with a fan powered flue outlet with an annular co-axial combustion air intake which can be rotated through 360 degrees.

The appliance is designed for use with a sealed heating system only and is 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.

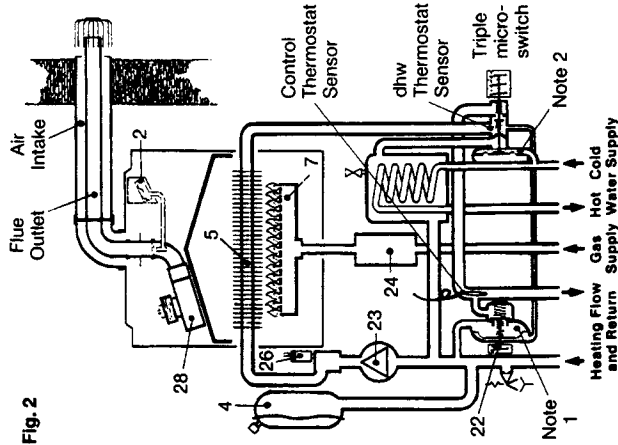
**Fig.1 General Layout**



- 1 Air Intake
- 2 Pressure Differential Switch
- 3 Silicone Pressure Tube
- 4 Expansion Vessel
- 5 Main Heat Exchanger
- 6 Pilot Assembly
- 7 Main Burner
- 8 Air Release Valve (dhw Heat Exchanger)
- 9 High Limit Thermostat
- 9a Safety Thermostat
- 10 Dhw Heat Exchanger
- 11 Three Port Diverter Valve
- 12 Dhw Flow Regulating Screw
- 13 Pressure Gauge
- 14 Temperature Gauge
- 15 Time Clock (optional extra)
- 16 Dhw Thermostat
- 17 Heating Thermostat
- 18 Mode Selector Switch
- 19 Boiler On/Off Switch
- 20 Safety Valve
- 21 Heating Manifold
- 22 Boiler Flow Switch
- 23 Pump
- 24 Gas Valve Knob
- 25 Piezo Igniter Button
- 26 Automatic Air Vent
- 27 Thermocouple
- 28 Fan
- 29 Roomsealed Chamber
- 30 Flue Outlet
- 31 Cold Water Inlet Stopcock
- 32 Hot Water Outlet
- 33 Gas Service Tap
- 34 Central Heating Flow Valve
- 35 Central Heating Return Valve
- 36 Combustion Chamber

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**Notes**

1. Differential pressure unit. Senses water flow rate to pump & main heat exchanger and operated flow switch (22)
2. Differential pressure unit. Senses domestic hot water flow rate and operates 3 port valve/triple microswitch

**SECTION 2 DESIGN PRINCIPLES AND OPERATING SEQUENCE**

- 2.1 Fig.1 illustrates the general layout of components. Fig.2 illustrates the operating principles described below
- 2.2 **Ignition and Rest Mode**
  - 2.2.1 With the appliance on/off switch (19) in the 'off' position, the pilot is ignited by depressing the gas valve knob (24) and pressing the Piezo button (25).
  - 2.2.2 As soon as a pilot flame is established and the gas valve knob released, the on/off switch (19) must be switched 'on'. This allows the flue fan to run at slow speed to scavenge the combustion chamber and provide air for the pilot burner.
  - 2.2.3 In this mode, the appliance remains 'ticking over' until there is a call for heat.
- 2.3 **Central Heating Mode**
  - 2.3.1 When the various switches and controls impose a demand for heat, the fan is switched to full speed. 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.
- 2.3.2 As water temperature increases this is sensed by the thermostat which eventually operates at its first stage to switch the burner to low flame.
  - 2.3.3 Depending on the load, either the water temperature will continue to rise when the second stage of the thermostat (17) will operate to switch the burner off, or the water temperature will fall and re-establish high flame.
- 2.4 **Domestic Hot Water Mode**
  - 2.4.1 The appliance will operate in domestic hot water mode whenever the on/off switch is 'on' and the pilot lit, regardless of the mode selector switch position and any demand for central heating.
  - 2.4.2 Opening a draw off tap will operate the dhw differential pressure device which in turn operates the 3-port valve (11) and the dhw flow switch. The three port valve diverts boiler water to the dhw heat exchanger. 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.

**2.5 Safety Devices**

- 2.5.1 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 flame supervision circuit.
  - (c) At the same time the fan will still operate.
- 2.5.2 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 1065mm (42in) overall (890 casing)  
Width: 450mm (17.7in)  
Depth: 360mm (14.2in)  
Weight (empty) 53kg (117lb) (full 56kg (123lb))  
Water content : 2.5 litres (.55 gals) for further dimensions see figs 13 - 16
  - 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: nominal dia 100mm specially supplied with boiler.
  - 3.4 **Installation Requirements**
    - 3.4.1 **Clearances**  
Minimum - above 50mm (2in) (above flue)  
Minimum - below 300mm (12in) (from casing)  
Minimum - in front 600mm (24in) (from casing)  
Minimum - At sides 75mm (3in) (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 1976
    - 3.4.4 Means of filling sealed system: To accord with BS and/or local Water Authority requirements.
  - 3.4.5 **Electrical Details**  
Mains supply 240/250v ~ 50Hz Fused 3A  
Power consumption: 200w.
    - 3.6 **Performance and Limitations**  
Max. input 28.6 kW (97,600 Btu/h)  
Min. input 11.9 kW (40,600 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
- The standard flue duct assembly allows a maximum length of duct as follows:  
Rear flue: 693mm (wall thickness)  
Side flue: 890mm (to centre line of boiler).  
Using extension tubes, the flue may be extended to a maximum of 4.5 metres in a straight line.  
A maximum of two extra 90 degree bends (Section 5.3.20) may be used but for each bend used the maximum length of straight flue is reduced by 0.75 metres.  
e.g. 1 extra bend plus 3.75 metres of straight flue.
- Central Heating output range**  
Max. 23.3 kW (79,500 Btu/h)  
Min. 8.7 kW (31,700 Btu/h)  
(fig.24 shows the relation between burner pressure and input/output btu/s)
- 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)
- Central Heating Pump Duty**  
Fig.3 shows the residual pump head available for the central heating system after allowing for the pressure loss through the appliance.  
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.

## SECTION 4 GENERAL REQUIREMENTS

### 4.0

#### General Requirements

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

### 4.1

#### Related Documents

The installation of this boiler 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	Part 1	Forced circulation hot water systems
BS 5546	1979	Installation of gas hot water supplies for domestic purposes (2nd family gases).
BS 5440	Part 1	Flues
BS 5440	Part 2	Air supply.

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

### 4.2

#### Location of Appliance

The combination boiler may be installed in any room or internal space, although particular attention is drawn to the requirements of the current I.E.E. Wiring Regulations, and in Scotland, the electrical provisions of the Building Regulations applicable in Scotland, with respect to the installation of the combination boiler in a room or internal space containing a bath or shower.

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

The location chosen for the boiler 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 boiler.

Where the installation of the boiler will be in an unusual location special procedures may be necessary and BS 6798:1987 gives detailed guidance on this aspect.

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

Pipework from the meter to the boiler must be of adequate size. Pipes of a smaller size than the boiler 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 boiler serves other appliances ensure that an adequate supply is available both to the boiler and the other appliance when they are in use at the same time.

### 4.4

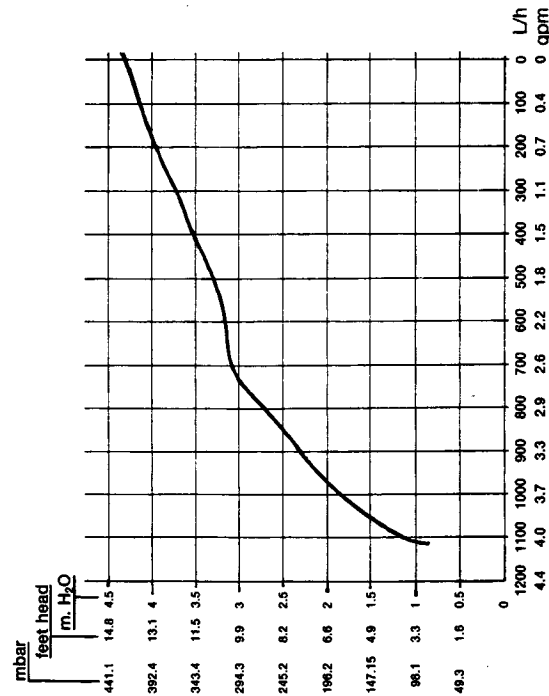
#### Flue System

The terminal should be located where dispersal of combustion products is not impeded and with due regard for the damage or discolouration that might occur to building products in the vicinity (see fig 4).

In cold and/or humid weather water vapour may condense on leaving the flue terminal. The effect of such 'steaming' must be considered.

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

Maximum 1.5bar/15m.wg/50ft wg  
Minimum 0.5bar/5m.wg/16ft wg  
Safety valve setting 3bar/30m/102ft

#### Heating System

1.5bar/15m.wg/50ft wg  
0.5bar/5m.wg/16ft wg  
3bar/30m/102ft

#### Hot Water System

6.0bar/90psig  
0.5bar/7psig

#### 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

Min. Gas Rate m<sup>3</sup>/h 1.13  
ft<sup>3</sup>/h 39.9  
Max. Gas Rate m<sup>3</sup>/h 2.68  
ft<sup>3</sup>/h 94.7

### 3.7

#### Burner Details

Main Burner Polidoro NP 12  
Main Burner Injectors 12 x 1.35  
Burner Pressure Max. 9.5 mbar  
Burner Pressure Min. 1.2 mbar C/H and DHW

#### 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.

The terminal must not be closer than 50mm (2in) to any combustible material. For protection of combustibles, refer to BS 5440:1 where the terminal is less than 2m (6.6ft) above a pavement or platform to which people have access (including any balcony or flat roof) the terminal must be protected by a guard of durable material.

A suitable guard is available from G.R.Claudio (Vokera) Ltd, Part No 018, G.C. No. 301 106.

This guard must be fitted centrally over the terminal.

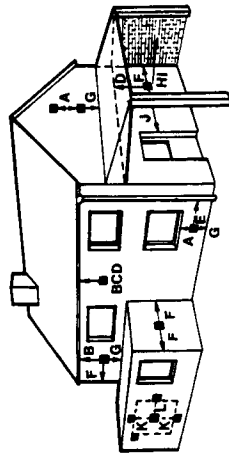


Fig. 4

Terminal position for fan assisted boiler (minimum distance)	mm
A — Directly below an open window or other opening (e.g. air brick)	300
B — Below gutters, soil pipes or drain pipes	75
C — Below eaves	200
D — Below balconies or cat port roof	200
E — From vertical drain pipes and soil pipes from internal or external corners	75
F — Above ground or below balcony level	300
G — From a surface facing a terminal	600
H — From a terminal facing a terminal	1200
I — From an opening in the car port (e.g. door window) into dwelling	1200
J — Vertically from a terminal on the same wall	1500
K — Horizontally from a terminal on the same wall	300

**4.5 Air Supply**  
Recommendations for air supply are detailed in BS5440:2:1976. The following notes are intended for general guidance.

The roomsealed fan flued boiler does not require a permanent air vent for combustion air supply.

Where installed in a cupboard or compartment ventilation is required for cooling.

The table below gives the recommended minimum effective areas of such air vents

POSITION OF AIRVENTS	AIR VENT AREAS	
	AIR FROM ROOM OR INTERNAL SPACE	AIR DIRECT FROM OUTSIDE
high level	257cm <sup>2</sup> (39.0in <sup>2</sup> )	128cm <sup>2</sup> (19.5in <sup>2</sup> )
low level	257cm <sup>2</sup> (39.0in <sup>2</sup> )	128cm <sup>2</sup> (19.5in <sup>2</sup> )

N.B. 1. Both vents must either communicate with the same room or space or be on the same outside wall.

2. Where vents communicate with an adjacent internal space, it is suggested that the space is adequately ventilated.

**4.6 Water Circulation (Central Heating)**  
Detailed recommendations are given in BS 6798:1987 and BS 5449:1:1977 (for smallbore and microbore central heating systems).

The following notes are given for general guidance.

**4.6.1 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.

**4.6.2** 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 boiler 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 5 & 6 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 at least 15mm nominal size and manufactured in accordance with BS 2879:1980.

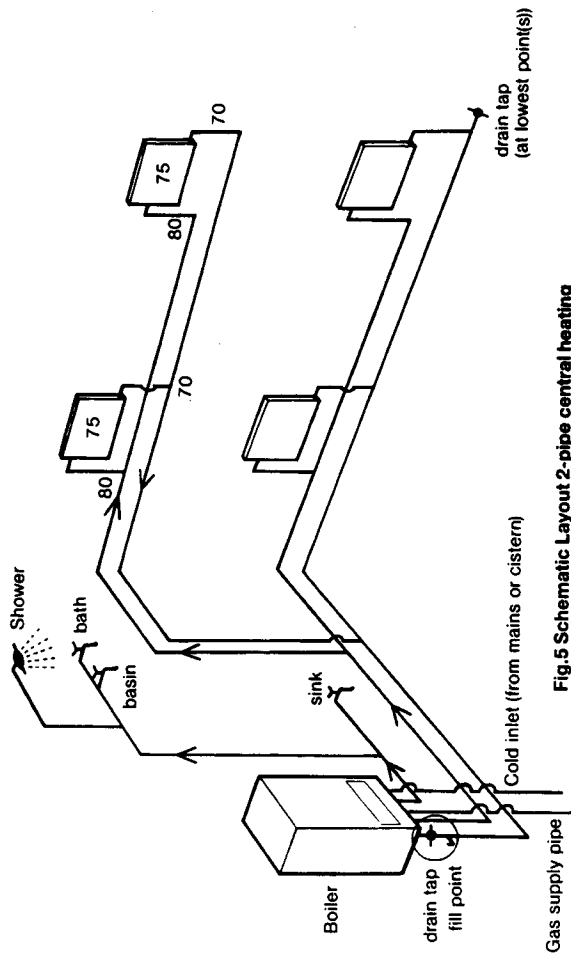


Fig. 5 Schematic Layout 2-pipe central heating

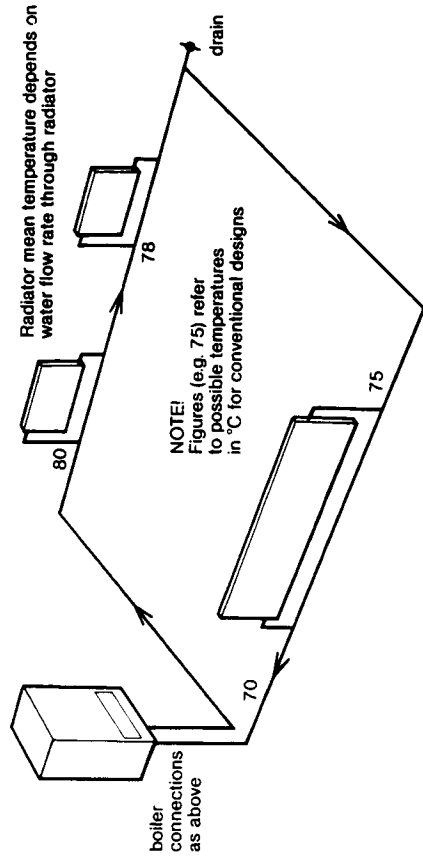


Fig. 6 Schematic single pipe central heating

**Salient features of each system**

**2 Pipe**

- Radiators connected in parallel
- Water flow to each directly affected pump
- Shutting off radiators affects total flow in system
- Radiators have approx. same mean temperature
- Low flow rate affects all radiators equally

**1 Pipe**

- Each radiator is on individual circuit off main pipe
- Water flow not directly affected by pump. Flow in each radiator depends on thermosiphon + 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.



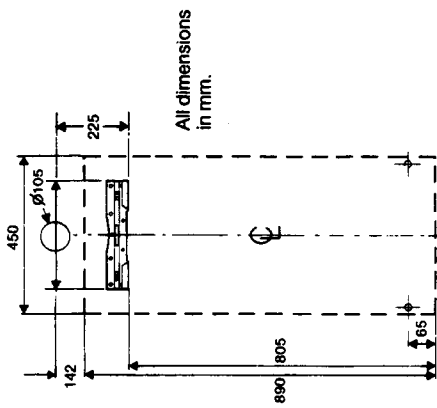


Fig. 13

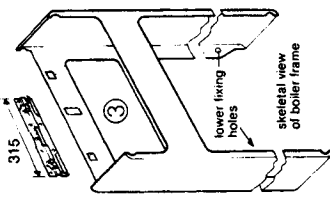


Fig. 14

**5.4 Mounting the Appliance (Fig 13)**

Place the template on a smooth, vertical incombustible surface and use it to locate the upper bracket, bottom fixing and flue pipe holes.

Alternatively, position bracket and holes to dimensions in fig 13.

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

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

Remove boiler and drill and plug wall for 1½" No 10 screws.

Drill a 105mm hole through the wall to allow passage of the flue pipe.

Refer to fig. 13 and figs. 14-18 for relevant dimensions for locating the hole. Where it is remote from the boiler take special care to ensure hole is at the correct level so that the finished flue is horizontal.

**5.5 Fitting the Flue**

Refer to figures 14 - 18

The flue outlet elbow may be rotated 360 degrees on its vertical axis. The flue may be extended from this in the horizontal plane.

The standard flue pipe supplied may be used for extension up to 890mm - from outside of wall to centre of the flue elbow. Extension kits (Part No. 026, G.C. No. 370 346) are available to order for flue extensions of up to 4.5 metres total length.

Hang the boiler on the bracket. Adjust the boiler sideways to its correct position. Measure carefully from the actual face of the outside wall to the centre of the flue bend. (Dimension X on Figs. 14 & 15). Locate the small maintenance clip on to the flue elbow (fig. 14) and assemble onto the flue outlet on the top of the boiler. Twist the flue bend to the outlet direction required, and tighten the maintenance clip to secure the flue bend in place. Carefully level across to check that the hole through the wall is at the same level as the flue bend.

The flue kit supplied is suitable for an exact dimension of 890mm.

Extension tubes will increase X to the following:

- 1 extension = 1740mm
- 2 extensions = 2590mm
- 3 extensions = 3440mm
- 4 extensions = 4290mm

Cut 5th extension for a Maximum length of 4.5 metres.

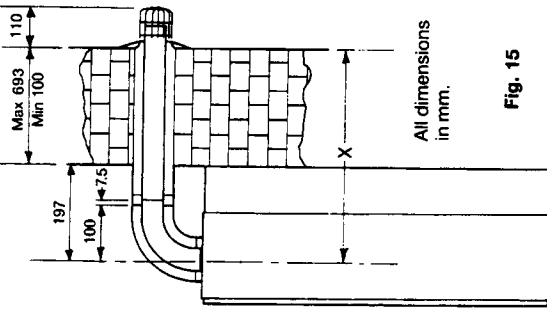


Fig. 15

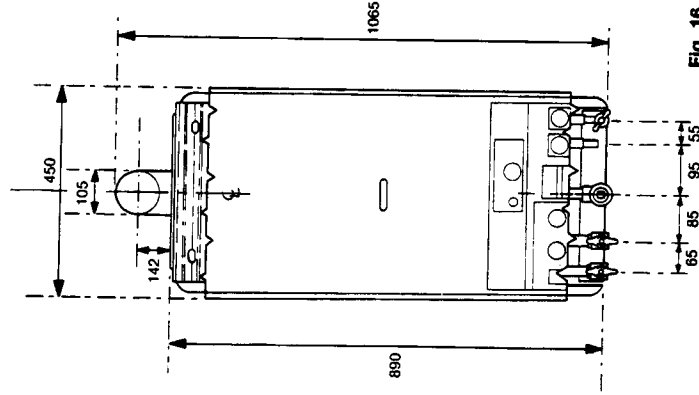


Fig. 16

**5.5.5**

Where X is less than 890mm, the supplied flue must be shortened as follows:-

Separate the two tubes by removing screw G (fig. 17).

Subtract the measured length from 890mm. The difference is the precise length to be removed from both tubes (890 - X = length to be cut off from the plain ends.)

**Example**

X is measured as 630mm

Amount to be cut off both tubes is 890 - 630 = 260.

**5.5.6**

Where X is more than 890mm an extension kit (or kits) is needed. The standard uncut lengths with extension(s) is shown in section 5.5.4

Always cut the extension tubes, not the standard tube.

**1. Measure X**

2a. If using 1 extension piece, cut (1770 - X)mm from the inner flue tube but (1750 - X)mm from the outer air tube.

2b. If using 2 extension pieces, cut (2600 - X)mm from the inner flue tube but (2560 - X)mm from the outer air tube.

Shorten inner and outer tubes of last extension piece.

**EXAMPLE**

X = 1295

Cut 1770 - 1295 = 465mm from air tube

Cut 1750 - 1295 = 445mm from flue tube

**CUT CLEAN AND SQUARE WITH FINE TOOTH SAW AND REMOVE BURRS.**

Loosen the small maintenance clip and lift the flue bend off the boiler flue outlet.

Ensure inner and outer terminal tubes are firmly fitted together with screw G (fig. 17).

Push the terminal tubes through the wall until the face of the outer tube protrudes 18mm from the face of the wall (fig. 17). The terminal grill (D) will then protrude 110mm from the wall face.

If extension pieces are used assemble these using the maintenance clips provided.

Always fully butt the joints before securing the clips.

Make sure the entire length of the flue is truly horizontal and adequately supported. Use at least one bracket for each extension.

(Conventional adjustable strap supports, Part No. 03, G.C. No. 307 105, suffice. Vokera stockist can supply if necessary)

Assemble the second small maintenance clip on the end of the inner flue tube.

Refit the flue elbow onto the boiler. Align the flue elbow with the flue pipe and tighten the maintenance clip between the flue elbow and the boiler. Ensure pipe sections butt together.

**5.5.7**

Where X is less than 890mm, the supplied flue must be shortened as follows:-

Separate the two tubes by removing screw G (fig. 17).

Subtract the measured length from 890mm. The difference is the precise length to be removed from both tubes (890 - X = length to be cut off from the plain ends.)

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**CUT CLEAN AND SQUARE WITH FINE TOOTH SAW AND REMOVE BURRS.**

Loosen the small maintenance clip and lift the flue bend off the boiler flue outlet.

Ensure inner and outer terminal tubes are firmly fitted together with screw G (fig. 17).

Push the terminal tubes through the wall until the face of the outer tube protrudes 18mm from the face of the wall (fig. 17). The terminal grill (D) will then protrude 110mm from the wall face.

If extension pieces are used assemble these using the maintenance clips provided.

Always fully butt the joints before securing the clips.

Make sure the entire length of the flue is truly horizontal and adequately supported. Use at least one bracket for each extension.

(Conventional adjustable strap supports, Part No. 03, G.C. No. 307 105, suffice. Vokera stockist can supply if necessary)

Assemble the second small maintenance clip on the end of the inner flue tube.

Refit the flue elbow onto the boiler. Align the flue elbow with the flue pipe and tighten the maintenance clip between the flue elbow and the boiler. Ensure pipe sections butt together.

**5.5.5**

Where X is less than 890mm, the supplied flue must be shortened as follows:-

Separate the two tubes by removing screw G (fig. 17).

Subtract the measured length from 890mm. The difference is the precise length to be removed from both tubes (890 - X = length to be cut off from the plain ends.)

**Example**

X is measured as 630mm

Amount to be cut off both tubes is 890 - 630 = 260.

**5.5.6**

Where X is more than 890mm an extension kit (or kits) is needed. The standard uncut lengths with extension(s) is shown in section 5.5.4

Always cut the extension tubes, not the standard tube.

**1. Measure X**

2a. If using 1 extension piece, cut (1770 - X)mm from the inner flue tube but (1750 - X)mm from the outer air tube.

2b. If using 2 extension pieces, cut (2600 - X)mm from the inner flue tube but (2560 - X)mm from the outer air tube.

Shorten inner and outer tubes of last extension piece.

**EXAMPLE**

X = 1295

Cut 1770 - 1295 = 465mm from air tube

Cut 1750 - 1295 = 445mm from flue tube

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Shorten inner and outer tubes of last extension piece.

**EXAMPLE**

X = 1295

Cut

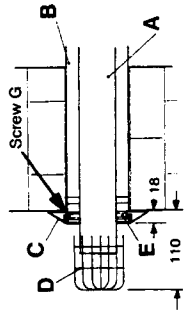


Fig. 17

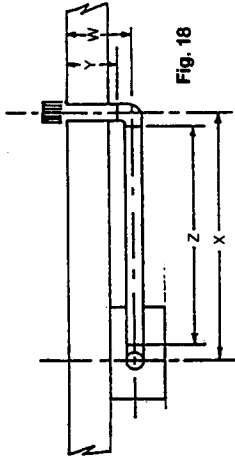


Fig. 18

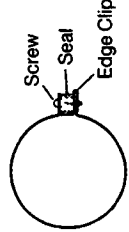


Fig. 18a

- 5.5.22 Carry out steps 5.5.2-5.5.3
- 5.5.23 Ensure when siting the flue hole position that the combined distances (Y&Z on fig 18) between the flue elbow on the boiler to the extra bend and from the face of the outside wall to the extra bend do not total more than 3.75 metres.
- 5.5.24 Measure carefully the distance between the centre of the flue bend on the boiler to the centre of the hole through the wall (dimension X fig. 18).  
NOTE: Extension kit/s part no 026 will be required if the distance measured is greater than 780mm
- 5.5.25 Subtract 230mm from the measured dimension, separate the two tubes and cut the outer tube to this dimension.
- 5.5.26 Cut the inner tube 15mm longer than the outer tube.
- 5.5.27 Referring to fig. 14 assemble a small maintenance clip on the outlet of the boiler flue bend. Push the inner flue tube into clip and tighten clip screws.
- 5.5.28 Slide the outer flue tube into place leaving approx. 15mm between the bend and the flue tube.
- 5.5.29 Referring to fig. 14 fit the large maintenance clip into position and tighten clip screws.
- 5.5.30 Connect the flue tube to the extra bend using the same method ensuring that the bend outlet is in line with the hole through the wall
- 5.5.31 Ensure that the flue pipe runs parallel to the wall then carefully measure the distance from the outside face of the wall to the centre of the extra bend (dimension W fig. 18).
- 5.5.32 Subtract 97mm from the dimension and cut the outer tube to this length.  
NOTE: The two tubes must be separated by removing screw G fig 17 before cutting.
- 5.5.33 Ensure that any shortening of the tube is done from the plain end.
- 5.5.34 Reassemble the inner and outer flue tubes and refix screw G.
- 5.5.35 Mark the inner tube 7mm longer than the outer and cut off the inner tube at this point.
- 5.5.36 Remove the large maintenance clip, loosen the small clip and remove the bend.
- 5.5.37 Push the flue tubes through the wall, loosely refit the extra flue bend.
- 5.5.38 Assemble a small maintenance clip onto the inner flue tube, draw the flue tube towards the flue bend until the inner tubes butt. Tighten the screws on the small clip.
- 5.5.39 Referring to fig. 14 fit the large maintenance clip into position and secure clip screws.

- 5.5.40 Check and adjust if necessary so that the outer flue tube protrudes 18mm from the outside face of the wall.
- 5.5.41 Tighten all maintenance clips, make sure that the entire flue is horizontal and adequately supported. Use at least one bracket (Part No. 03, G.C. No. 301 105) for each extension.
- 5.6 **Connecting the Gas and Water**
- 5.6.1 Figs. 12 and 16 show the locations of the fittings.
- 5.6.2 Do not over tighten nuts and use another spanner to apply counter force to avoid damaging the appliance
- 5.6.3 **Gas Supply**  
Connecting the gas supply.  
Connect a 15mm gas pipe to the gas service tap and tighten the union nut securing the tap to the appliance.
- 5.6.4 **Central Heating**  
Connect the central heating pipework (22mm o.d) to the respective valves, right hand = flow, left hand = return, and tighten the nuts.
- 5.6.5 **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.
- 5.6.6 **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.
- 5.6.7 **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.
- 5.7 **Electrical Connections**  
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.  
To gain access to the electrical terminals hinge down the spring loaded control fascia. (ref to fig. 19) until it rests in an approximately horizontal position.  
Press in the sides of the printed circuit board cover (fig. 20) to release retaining clips, and lift cover off.  
The terminal block is easily visible on the left of the printed circuit board (fig. 21)  
The electricity supply cable from the isolator and the appliance terminal block must be 3 core flexible sized 0.75mm<sup>2</sup> (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
- 5.7.1
- 5.7.2
- 5.7.3

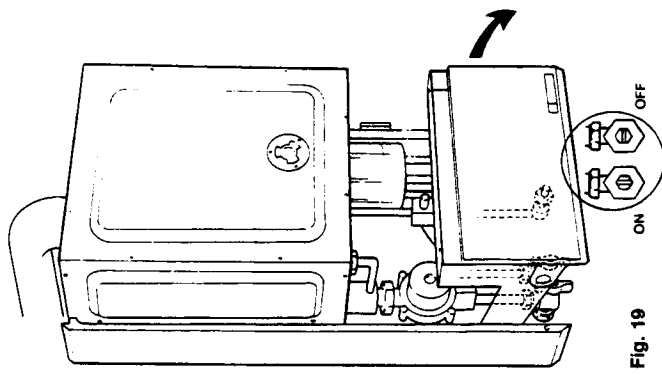


Fig. 19



## 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 (18 and 20, Fig. 1).
- 6.4** 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).
- 6.4.1** 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.
- 6.4.2** Initial filling of the System  
See Clause 3.4.4 and 4.6.8
- 6.5.1** Open central heating flow and return valves (red handle vertical indicates open, horizontal indicates closed). Unscrew black cap on automatic air release valve (26) one full turn (leave open permanently).
- 6.5.2** Close all air release taps on the central heating system.
- 6.5.3** Gradually open stopcock at the filling point connection to the central heating system until water is heard to flow. Do not open fully.
- 6.5.4** 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.
- 6.5.5** Open the primary vent screw on the top of the dhw heat exchanger (8) until clear water is discharged.  
Continue filling the system until at least 1.5 bar registers on the gauge (13) then turn off the filling point stopcocks.  
Inspect the system for water soundness and remedy any leaks discovered.
- 6.3.3** Where the text bears identifying numbers in brackets, refer to figs. 1 and 2 unless otherwise instructed. Close control panel, open controls cover.
- 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 (20) a quarter turn to release water until the required figure registers on the gauge (13).
- 6.3.5 Filling the Hot Water System**  
Close all hot water draw-off taps.  
Open cold water inlet stopcock (15)  
Slowly open each draw-off until clear water is discharged.
- 6.4 Checking Electricity Supply**  
Carry out preliminary checks for continuity, polarity, and resistance to earth, gaining access as required according to clause 5.7.2 in this manual.  
Leave the appliance with the control fascia closed and with the mains electricity switched OFF
- 6.5 Establishing the Pilot flame**  
The main electricity supply is switched OFF (6.4.2).  
Ensure main gas supply is ON.  
Turn on the appliance gas service tap.  
Press the gas control knob (24) and hold it in. At the same time, repeatedly press the Piezo button (25) 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.  
The pilot flame should remain alight, and envelope the thermocouple (see fig. 22). If it goes out, wait 3 minutes and repeat from 6.5.4

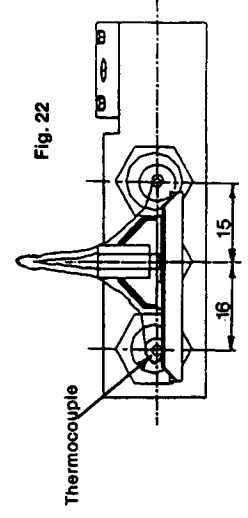


Fig. 22

Thermocouple

- 5.7.4** Pass the cable through the cord anchorage and connect it so that should the cable slip the anchorage the current carrying conductors become taut before the earthing conductor. (fig. 21)
- 5.7.5** 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.
- 5.7.6** Neatly arrange the external cable in such a way that unrestricted opening of the controls fascia is possible without strain on the cable. External controls may be wired from terminals 1 & 3 (after removing a factory fitted link). If a neutral is needed use the terminal mark 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.

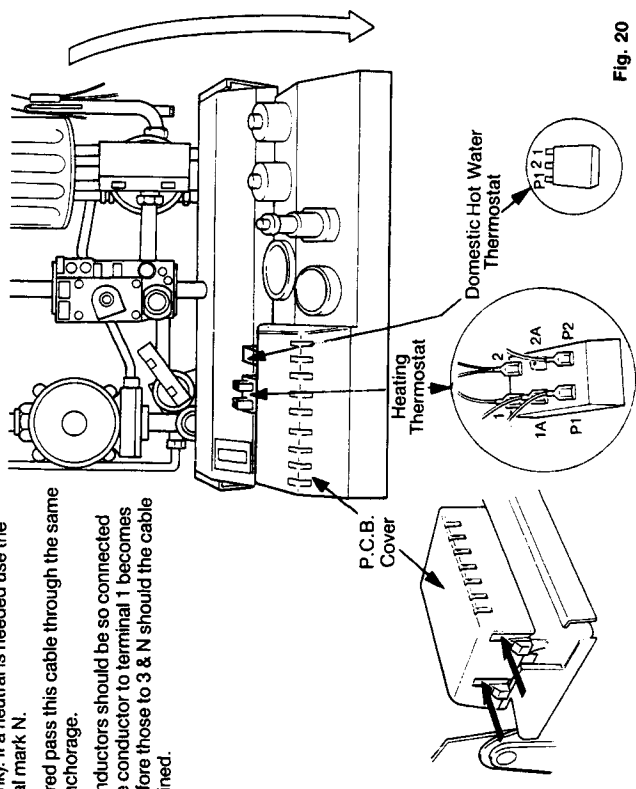


Fig. 20

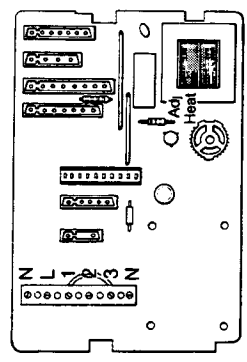


Fig. 21

**6.5.6** When the pilot flame is established, turn on the mains electricity and switch on the appliance on/off switch. This permits slow speed operation of the flue fan to maintain the pilot.

**6.5.7** Refer to fig. 22 and check that the pilot flame is correct. If it is necessary to adjust the flame refer to cl. 5.7.2 for access instructions. Fig. 23 shows the location of the adjustment screw. Turning clockwise decreases flame and vice versa.

**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 side 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 Boiler**

**6.6.1** Before lighting, open flow and return valves (Cl 6.3.2)

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 5.7.2 for instructions).

**6.6.2** Ensure that the mains electricity and the appliance 'on/off' switch (19) are turned on.

**6.6.3** Set the control thermostat (17) to its highest setting.

**6.6.4** Set the Mode Selector switch (18) 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 5.7.2.

**6.7.4** Locate the main burner pressure test point (Fig. 23) 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 boiler in dhw mode. Adjust the hot water thermostat to maximum setting.

**6.7.5** The pressure reading for maximum rate should be 9.5mbar/3.8in wg (plus or minus 0.9mbar/0.4in wg)

If the pressure is wrong it should be adjusted as instructed in clause 8.23 (N.B. Whenever the maximum rate is adjusted check and adjust the minimum rate too)

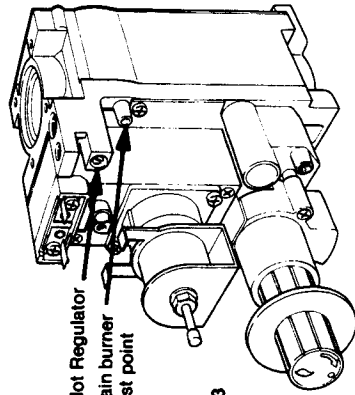


Fig. 23

**6.7.6** If the boiler 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. 20 shows location). Switch on electricity.

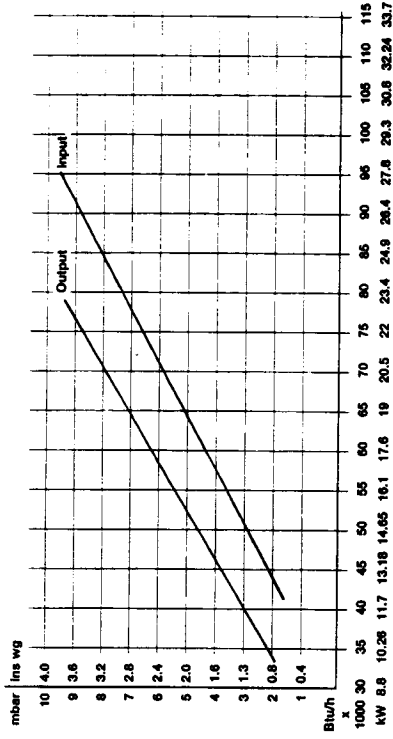
**6.7.7** When low flame is established, the pressure gauge should read 1.2mbar/0.5in wg (plus or minus 0.1mbar/0.05in wg). If it is different, adjustment should be made in accordance with the instructions in clause 8.24.

**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.

**6.7.9 Setting the Maximum Rate for Central Heating (Range Rating)**

Refer to fig. 24 to determine pressure for the heating output you need. Use a screwdriver to adjust the potentiometer (fig. 21) 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.

Fig. 24



**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.

**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). Fig. 23

**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 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. 19).

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 (11) to its other position thus heating the domestic water flowing through the coil of the dhw heat exchanger.

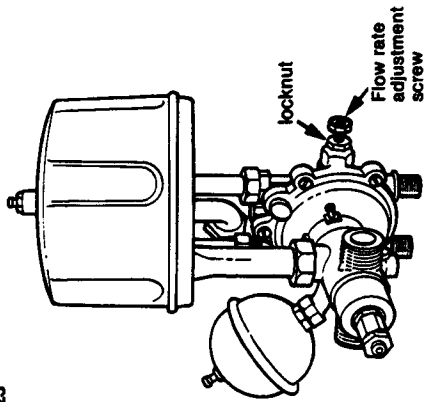
The operation of the 3-port valve will close the burner control micro-switch (22) and light the burner on maximum rate.

**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.

Fig. 25



6.13.6 To adjust the flow rate ref to fig. 25 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.

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 (18) 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 chw 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, relighten 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.

6.15.3 Refixing the Front Cover (fig. 26)

6.15.4 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.

6.15.5 Slide the casing downwards to fully engage the hooks and to align the bottom fixing holes. Replace the four case retaining screws. (fig. 26).

6.17 Supplementary Instructions for Fitting & Removing Optional Time Clock and for Wiring to External Controls.

Section 10 Appendices A,B and C 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.

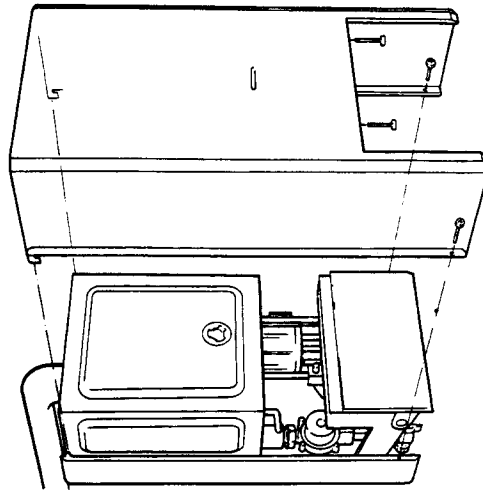


Fig. 26

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 boiler 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 boiler 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

**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 4.5.1 & 2 to ensure no alterations have been made since installation.
3. Turn off mains electricity and remove front casing (see clause 8.4).
4. Replace fuse if previously removed (8.2 above) and turn on electricity, run the boiler 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) 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) which should be approximately 1 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).

9. Remove main burner. cl 8.7.1 to 8.7.6. 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 clauses 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 8.12).

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.

#### 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.

#### 8.3.2

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 the instructions without dismantling the appliance by circulating a fluid through the hot and cold services. To do this, disconnect from hot and cold services is necessary. Reconnect only after thorough flushing with clean water.

#### TO GAIN GENERAL ACCESS

To remove components access to the interior is essential. Refer to figs. 27 & 28

Ensure electricity supply is isolated before carrying out any servicing.

To remove front casing

Release 4 retaining screws (fig. 27).

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

The control panel can now be hinged down for access.

Remove 4 vertical screws and pull lower plastic grill downwards.

**ROOM SEALED CHAMBER FRONT COVER** (including viewing window)  
Part No 5904

Refer to fig 29

Gain general access as 8.4

Remove roomsealed front cover plate by releasing eight screws (fig. 29) and easing cover off. The screws are not captive. Inspect gasket for damage. If damaged, replace.

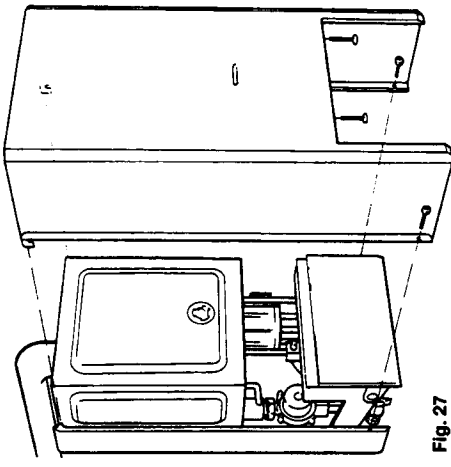


Fig. 27

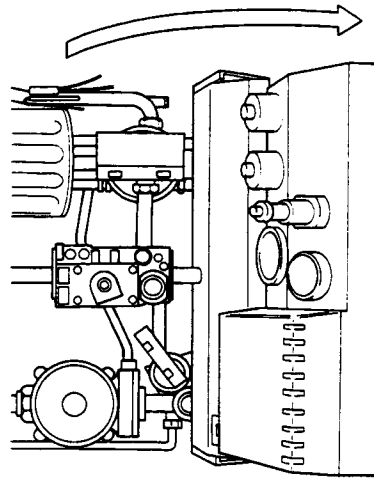


Fig. 28

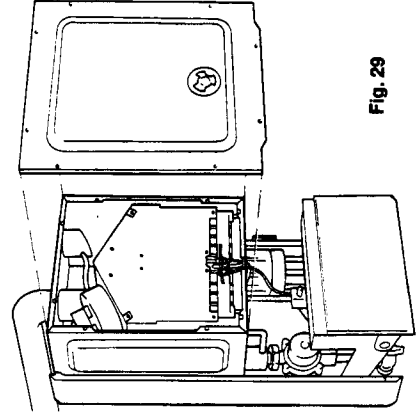


Fig. 29

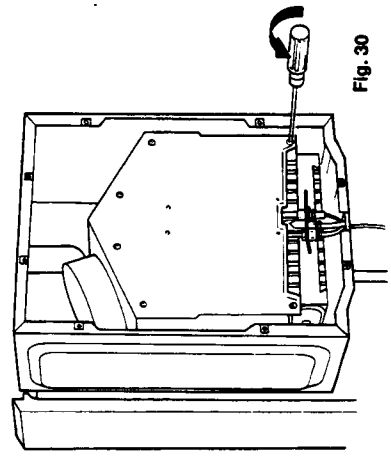
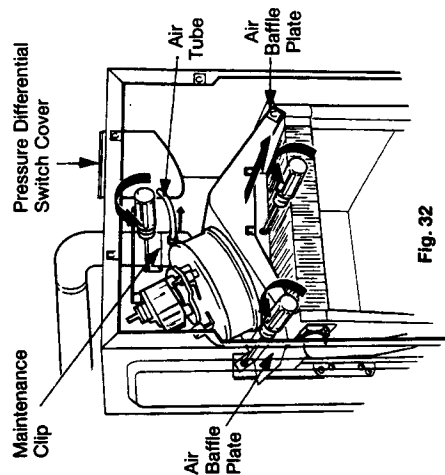
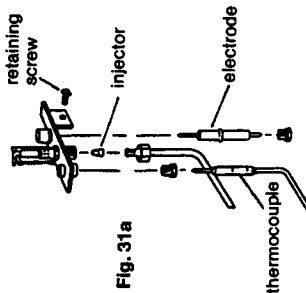
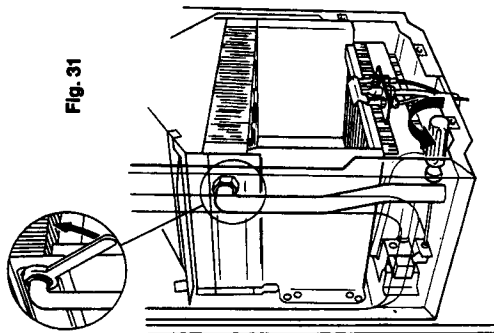


Fig. 30

- 8.6 TO REMOVE/REPLACE ELECTRODE, THERMOCOUPLE AND PILOT BURNER**  
Refer to fig. 31A
- 8.6.1** Gain general access as 8.4
- 8.6.2** Remove room-sealed chamber front cover plate as 8.5.2
- 8.6.3 TO REMOVE PILOT BURNER ASSEMBLY**
- 8.6.3.1** Pull off 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. 31A).
- Ease pilot burner assembly and pipe forward, sliding rubber gasket from frame. Remove electrode, Thermocouple and pilot pipe.
- 8.6.4 REMOVE ELECTRODE**
- 8.6.4.1** Pull off electrode lead.
- 8.6.4.2** Unscrew electrode retaining nut.
- 8.6.4.3** Remove electrode.  
Reassemble in reverse order.
- 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. Ease it through the rubber gasket. (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.  
N.B. Make sure rubber gasket is intact and properly fitted to boiler case so as to be air tight.
- 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.  
Reassemble in reverse order.
- 8.7 MAIN BURNER**  
Part No 5295  
Refer to fig 31
- 8.7.1** Gain general access as 8.4
- 8.7.2** Remove room-sealed front cover as 8.5.2.
- 8.7.3** Remove front of combustion chamber by releasing six screws (fig 30)
- 8.7.4** Remove pilot burner assembly as 8.6.3



- 8.8 MAIN BURNER INJECTORS**
- 8.8.1** Gain general access as 8.4
- 8.8.2** Remove room-sealed front cover plate and combustion chamber front (8.5.2 & 8.7.3).
- 8.8.3** Remove main burner (8.7.4 to 8.7.6).
- 8.8.4** Unscrew injector(s).  
Reassemble in reverse order.
- 8.9 MAIN HEAT EXCHANGER**  
Part no. 5351  
Refer to fig. 31
- 8.9.1** Gain general access as 8.4.
- 8.9.2** Remove roomsealed front cover plate (8.5.2).
- 8.9.3** Remove front of combustion chamber. (8.7.3)
- 8.9.4** Close heating valves (1/4 turn until handle is horizontal). Turn safety valve 1/4 turn to drain primary circuit of boiler.
- 8.9.5** Place cloth under heat exchanger to catch surplus water.
- 8.9.6** Unscrew unions on either side of main heat exchanger. fig. 31.
- 8.9.7** Slide out main heat exchanger, taking care not to damage insulation panels. Avoid spillage of water on boiler electrics.
- 8.9.8** Reassemble in reverse order using new fibre washers on unions.
- 8.10 FLUE FAN**  
Part No 5910
- 8.10.1** Gain general access as 8.4  
Remove room-sealed front cover plate (8.5.2) and front of combustion chamber (8.7.3).
- 8.10.2** Loosen maintenance clip securing screws (see fig. 32) and slide upwards to clear joint.
- 8.10.3** Remove silicone pipe from nozzle on inner flue bend.
- 8.10.4** Remove 3 flue hood retaining screws (see fig. 32)  
**NOTE:** When removing the two side screws the two air baffle plates can be removed.
- 8.10.5** Carefully slide flue hood forward disconnecting electrical leads on fan in the process.
- 8.10.6** Unscrew 4 screws securing fan to flue hood and remove fan.
- 8.10.7** Reassemble in reverse order, replacing centre hood screw first.
- 8.11 FLUE PRESSURE DIFFERENTIAL SWITCH**  
Part No 5926  
Refer to fig 32
- 8.11.1** Remove front casing (8.4.1).
- 8.11.2** Remove room sealed cover (8.5.2).

- 8.11.2** Remove 3 screws holding pressure differential switch cover (fig. 32) and remove cover.
- 8.11.3** Pull air tube from nozzle on inner flue bend.
- 8.11.4** Pull off tab connectors and ease pressure switch upwards. Disconnecting air pressure pipe in the process.
- 8.11.5** Reassemble in reverse order.  
See fig 50 for correct fitting of electrical connections. The air pipe must be reconnected to the upper nozzle on the pressure switch.
- 8.12 COMBUSTION CHAMBER INSULATION BOARDS**
- 8.12.1** Gain general access as 8.4
- 8.12.2** Remove room-sealed front cover 8.5.2  
Remove front of combustion chamber 8.7.3  
Close Heating Valves 8.9.4  
Remove Main Heat Exchanger 8.9
- 8.12.3** To remove side combustion chamber insulation boards. Gently prise upwards and pull out.
- 8.12.4** To remove rear board. Gently prise upwards and pull out.
- 8.12.5** Fourth panel (front) is replaced complete with combustion chamber front panel.
- 8.13 TO REMOVE/REPLACE GAS CONTROL VALVE MODULATOR AND OPERATOR**  
Refer to fig. 33
- 8.13.1** Gain general access (8.4)
- 8.13.2 MODULATOR COIL**
- 8.13.2.1** Pull of electrical leads from tab connectors.
- 8.13.2.2** Slacken locknut, unscrew max. rate adjustment screw and remove (NB take care of spring).
- 8.13.2.3** Remove modulator coil.
- 8.13.2.4** Replace in reverse order (see fig. 50 for electrical connections).
- 8.13.2.5** Check burner pressures (cl 6.7).
- 8.13.3 OPERATOR**
- 8.13.3.1** Pull off all electrical leads from modulator and operator tab connectors.  
Disconnect earth lead.
- 8.13.3.2** Remove modulator coil (8.13.2)
- 8.13.3.3** Release 4 screws securing operator to gas valve body (2 at top below tab connectors 2 at bottom extreme corners).
- 8.13.3.4** Remove operator, exposing gasket.
- 8.13.3.5** Replace in reverse order using new gasket (see fig. 50 for electrical connections).
- 8.13.3.6** Check burner pressures (cl. 6.7).

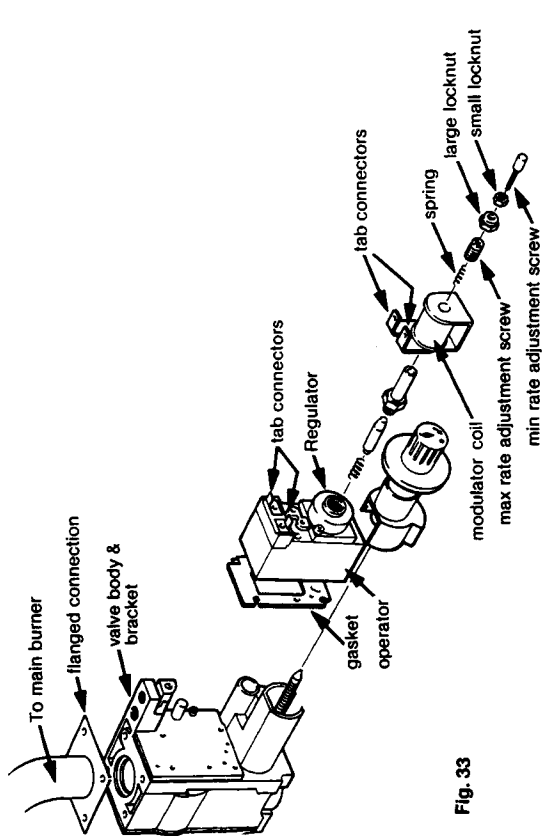


Fig. 33

- 8.13.4 **GAS CONTROL VALVE**
- 8.13.4.1 Remove modulator coil and operator as detailed above. The operator etc. can be transferred to any new valve to retain regulation settings.
- 8.13.4.2 Disconnect thermocouple and pilot supply pipe connections. Pull interruptor lead from valve.
- 8.13.4.3 Remove screws securing bracket to base frame.
- 8.13.4.4 Remove 4 flange securing screws at each end, and withdraw valve (this may be easier with gas pipe disconnected from main burner), disconnecting second interruptor lead in the process.
- 8.13.4.5 Replace in reverse order using new gaskets.
- 8.13.4.6 Test all disturbed joints for gas soundness. Check burner pressures (cl 6.7). If incorrect, adjust as instructed in cl 8.24).

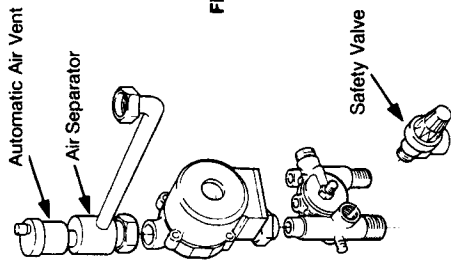


Fig. 34

- 8.14 **PUMP**  
Part No 6090  
Refer fig 34
- 8.14.1 Gain general access as 8.4
- 8.14.2 Close heating valves and return valves (fig. 1, 18 & 20) by turning 1/4 turn until handles are horizontal.
- 8.14.3 Drain appliance via safety valve by 1/4 turn of safety valve knob.
- 8.14.4 Disconnect pipe union connection at front left corner of combustion chamber.
- 8.14.5 Disconnect top union on pump and remove pipe and air separator assembly from the pump.

- 8.15 **HEATING MANIFOLD**  
Part No 3208  
Refer to fig. 35
- 8.15.1 Remove pump as 8.14.
- 8.15.2 Disconnect safety valve discharge pipe and heating valve unions.
- 8.15.3 Remove retaining screw (securing manifold to frame).
- 8.15.4 Disconnect expansion vessel pipe union, pressure gauge connection, domestic hot water heat exchanger union, heating flow union, connecting pipe to 3 port valve union and heating thermostat sensor.
- 8.15.5 Unscrew and remove retaining nut and remove micro switch.
- 8.15.6 Remove manifold

**MANIFOLD ASSEMBLY**

- Release cover retaining screws and ease off with a screwdriver.
- Refer to fig. 35 for location of components.
- Replace in reverse order, ensuring that washers are replaced in all union connections.

**REMOVAL OF DOMESTIC HOT WATER HEAT EXCHANGER**

- 8.16 Refer to figs 36, 37, 38 and 41
- 8.16.1 Gain General access (8.4)
- 8.16.2 Close cold water inlet stopcock and central heating valves.
- 8.16.3 Open lowest draw-off or drain tap on hot water system.
- 8.16.4 Turn safety valve 1/4 turn to drain primary side.
- 8.16.5 Place receptacle or an absorbent pad below appliance to catch trapped water.
- 8.16.6 Remove retaining nut (fig 37) and remove micro switch, disconnecting plug to fan slow speed resistor, in the process.
- 8.16.7 Disconnect main flow pipe unions from heat exchanger and 3-port valve and carefully move aside.
- 8.16.8 Disconnect 4 union nuts (fig 36).
- 8.16.9 Ease the unit out of the appliance.
- 8.16.10 Reassemble in reverse order, using new fibre washers.

**NB.** When refitting main flow tube ensure sensors for temperature gauge in high limit thermostat are fully located in their relevant pockets.

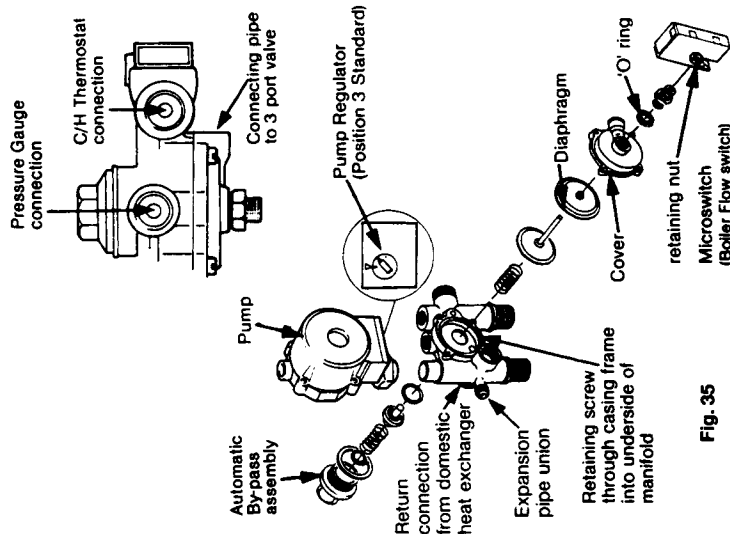


Fig. 35

Fig. 36

### 8.17 3-WAY DIVERTING VALVE

Refer to figs. 36 & 37

8.17.1 Gain General Access as 8.4.

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

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

8.17.4 Unscrew retaining nut and remove micro switch (fig. 37).

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

8.17.6 Unscrew connecting pipe to heating manifold.

8.17.7 Slacken retaining grub screws securing valve top manifold and withdraw valve. (If necessary slacken unions at opposite ends of connecting pipes to facilitate removal).

8.17.8 Reassemble in reverse order.

### 8.18 REMOVAL OF DOMESTIC HOT WATER MANIFOLD

See fig. 38

Gain general access as 8.4

8.18.1 Remove 3 way diverting valve 8.17.

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

8.18.3 Remove dhw heat exchanger 8.16.

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

8.18.5 Remove manifold (fig. 38) gives details of further disassembly.

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

### 8.19 CHECKING/REPLACING MAIN EXPANSION VESSEL

8.19.1 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 (14.7 psi) and remove the pump.  
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.

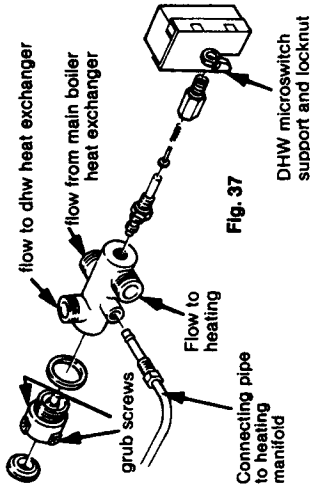


Fig. 37

DHW microswitch support and locknut

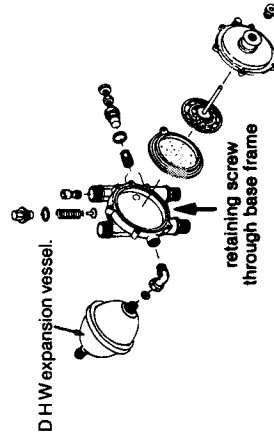


Fig. 38

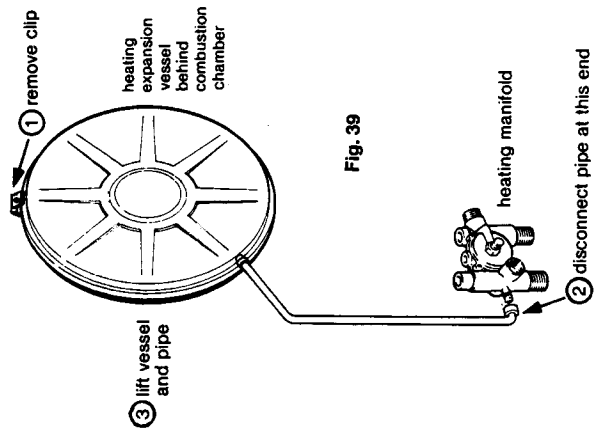


Fig. 39

N.B. If the boiler is installed with a clearance above of 343mm (13.5in) or more and with a side exit flue it is possible to remove the expansion vessel in situ, follow steps 8.19.10 - 8.19.11

If the clearance above is less than 343mm (13.5in) or, with a back exit flue, it is not possible to remove the expansion vessel in situ, follow steps 8.19.2 - 8.19.11

8.19.2 Gain access as 8.4

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

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

8.19.5 Remove screws on large maintenance clips (fig 40) and remove clips, loosen screws on the small clips and remove flue elbow.

8.19.6 Disconnect all pipe unions at the appliance base.

8.19.7 Switch OFF mains electricity and gain general access. Disconnect electricity supply at p.c.b. (read cl.5.7)

8.19.8 Remove lower fixings (fig 13) and lift appliance off upper bracket.

8.19.9 Refer to fig 39

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

8.19.11 Reassemble and remount all in reverse order.

### 8.20 DHW EXPANSION VESSEL

Refer to fig 36

8.20.1 Gain access 8.4

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

8.20.3 Unscrew vessel from 135 degrees support elbow.

8.20.4 Reassemble in reverse order.

### 8.21 SAFETY VALVE

Gain General Access 8.4.

8.21.2 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.

8.21.3 Remove Heating Microswitch as 8.22.2.

8.21.4 Unscrew safety valve discharge pipe.

8.21.5 Unscrew complete valve from Heating Manifold.  
Replace in reverse order.

### 8.22 REMOVAL OF ELECTRICAL COMPONENTS

8.22.1 Ensure electricity is switched off at main isolator and gain general access (8.4)

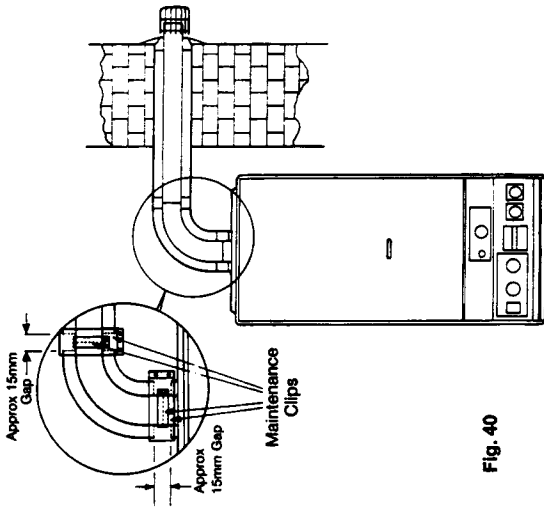


Fig. 40

### 8.22.2 HEATING MICRO SWITCH

Part No 4302

Refer to fig. 35

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 Reassemble in reverse order.

### 8.22.7 DHW MICROSWITCH

Part No 4148

Refer to fig. 41

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

8.22.9 Remove switch and remove cover.

8.22.10 Pull off electrical tab connections.

8.22.11 Reassemble in reverse order.

### 8.22.12 HIGH LIMIT THERMOSTAT (THERMOCOUPLE INTERRUPTOR)

Part No 4888

Refer to fig. 41

8.22.13 Disconnect 2 electrical connections at Gas Control Valve.

8.22.14 Ease off Thermostat retaining clip on flow tube.

8.22.15 Reassemble in reverse order.

**8.22.17 HEATING THERMOSTAT**

Part No 3212  
Refer to figs 42 & 43

**8.22.18** 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.

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

**8.22.20** Pull electrical tabs off back of thermostat.

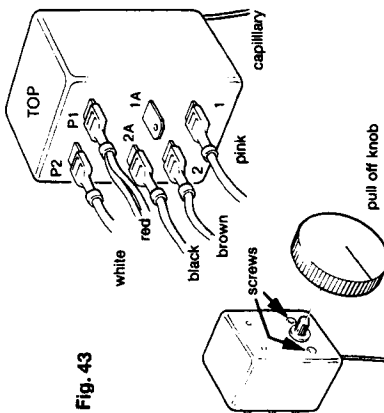
**8.22.21** Pull knob off front revealing 2 retaining screws.

**8.22.22** Remove screws to release thermostat and remove.

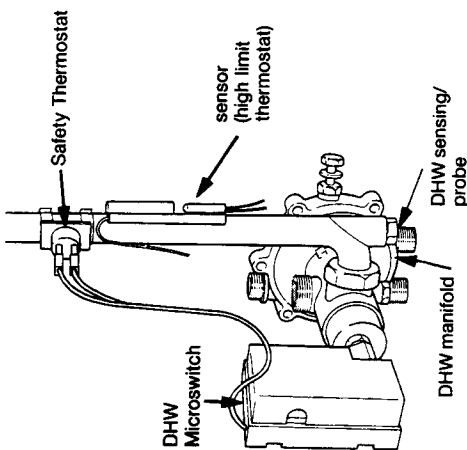
**8.22.23** Reassemble in reverse order using a new fibre washer.

**8.22.24** Refer to figs 42 & 43 to ensure correct location of thermostat and push-on wiring tabs.

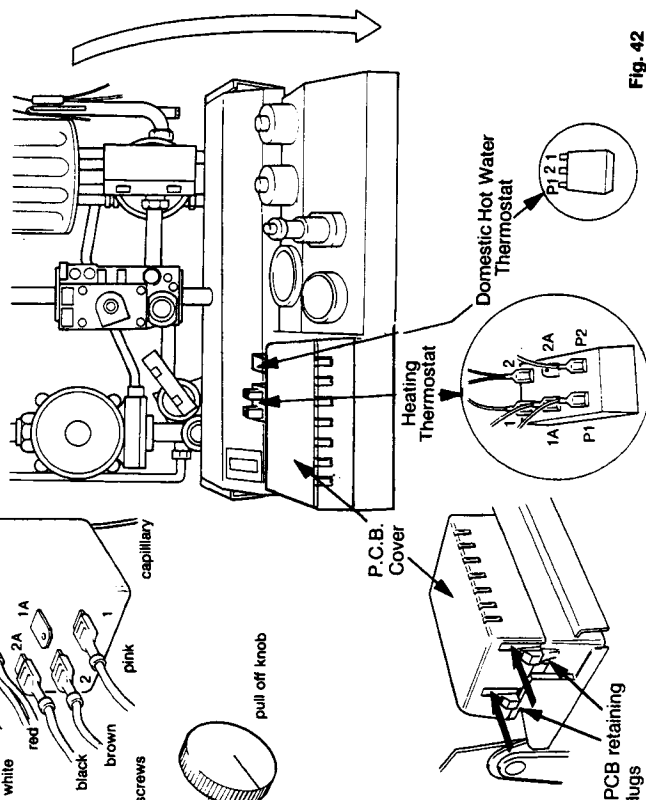
**NB** When changing this thermostat it may be necessary to repressurise the system (section 6.3.3 gives details).



**Fig. 43**



**Fig. 41**



**Fig. 42**

**8.22.25 HOT WATER THERMOSTAT**

Part No 5394

Refer to figs. 42 & 43

**8.22.26** 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.

**8.22.27** Unscrew sensing probe from bottom of main flow tube, (fig. 41)

**8.22.28** Pull electrical tabs off back of thermostat.

**8.22.29** Pull knob off front revealing 2 retaining screws.

**8.22.30** Remove screws, release pulse clip and release thermostat and remove.

**8.22.31** Reassemble in reverse order.

**8.22.32** Refer to fig. 42 to ensure correct location of thermostat and push on wiring tabs.

Orange wire to terminal P1

Red wire to terminal 2

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

**8.22.38 REMOVAL OF PRINTED CIRCUIT BOARD**

Part No 5797

Refer to fig. 42

**8.22.39** Press in the sides of the printed circuit board cover (fig. 42) to release retaining clips and lift cover off.

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

**8.22.41** Remove 6 plugs from p.c.b

**8.22.42** Pull tab connectors off both rocker switches.

**8.22.43** Pull back p.c.b retaining lugs and remove p.c.b.

**8.22.44** Replace in reverse order

**8.22.45** Replace electrical connections. Refer to fig. 44 to ensure correct locations of switch wires.

**8.22.46 SWITCHES (ON/OFF and TIMED/ SUMMER/CONSTANT or MODE SELECTOR**

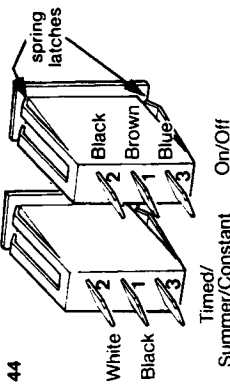
Part No's 5284 & 4981

Refer to fig. 44

**8.22.47** Pull of tab connectors, squeeze spring latching tabs at the back of the panel and push switch outwards.

**8.22.48** To replace refer to fig 44 to ensure switch is in correct attitude and press into hole from the front until spring tabs latch. Refer to fig 44. for correct wiring details.

**Fig. 44**



White  
Black  
Brown  
Blue

Spring latches

Timed/  
Summer/Constant On/Off

**8.22.49 SAFETY THERMOSTAT**

Part number 5441

Refer to fig. 41

**8.22.50** Pull off tab connectors and ease off thermostat retaining clip.

**8.22.51** Reassemble in reverse order.

**8.22.52 FAN SLOW SPEED RESISTOR**

**8.22.53** Unplug inline connector below fan resistor.

**8.22.54** Remove 2 retaining screws from resistor.

**8.22.55** Replace in reverse order.

**8.23 REMOVAL OF MECHANICAL INSTRUMENTS AND COMPONENTS.**

**8.23.1 PRESSURE GAUGE**

Part no 5263

Refer to figs. 35 & 45

**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.

**8.23.7** Refix in reverse order following original route for capillary.

**8.23.8 TEMPERATURE GAUGE**

Part no 5262

Refer to fig. 45

**8.23.9** Trace capillary to sensor. Remove pulse clip and capillary tube retaining clip from flow tube and withdraw sensor.

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

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



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. 48 & 50. It is assumed that the on/off switch is ON and the pilot flame is alight.

**9.2.1 At Rest**

No call for Heating or Domestic Hot Water. Current flows via the normally closed contacts of R1, through the 560Ω resistor then through the normally closed contacts of the boiler flow switch to the fan which runs at low speed to scavenge the combustion chamber and provide air for the pilot flame.

N.B. If the electricity supply is switched off or fails the fan will cease to operate and there may be insufficient air to maintain the pilot. A relighting of the pilot would be necessary.

**9.2.2 Domestic Hot Water Mode**

Turning on a tap will operate the hot water flow switches, which will energise terminal 1 (normally closed) on the fan pressure differential switch and the pump. The pump activates the boiler flow switch.

The transformer is energised causing the contacts of R1 to be made. The fan will start and the pressure differential switch will change over 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.

**Central Heat Mode**

In this mode the timed/summer/constant switch must be in the closed i.e. constant position fig. 1.

With all controls calling for heat the pump will run and a supply through the boiler 2nd stage thermostat which will energise terminal 1 (normally closed) on the fan pressure differential switch.

The transformer is energised causing the contacts of R1 to be made. The fan will start and the pressure differential switch will change over energising the gas valve. 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 regulate 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.

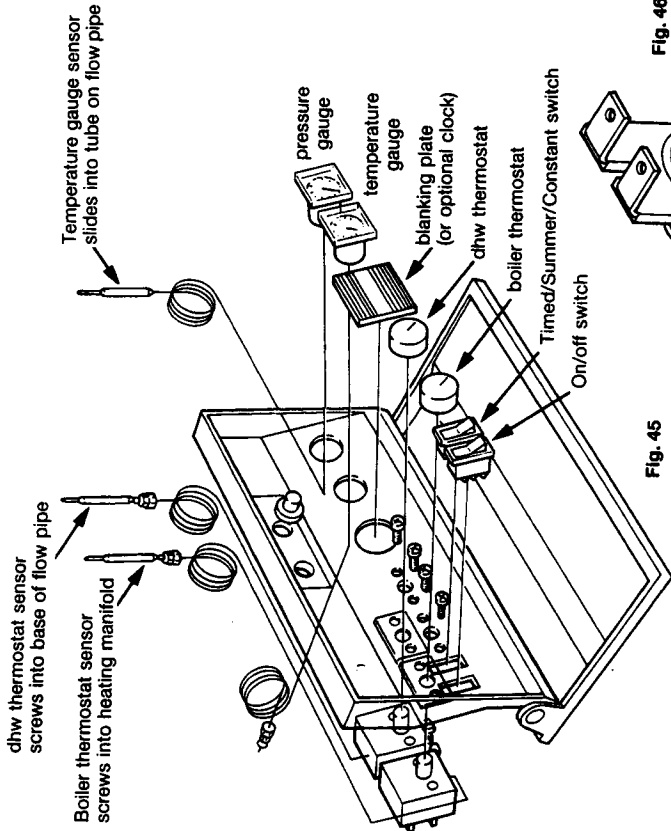


Fig. 45

**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. 46

Loosen small locknut. Unscrew completely the fine adjusting screw. If not already on, turn on hot water tap and electrical supply.

Adjust main gas pressure by loosening 10mm nut and turning slotted screw clockwise to increase pressure. Anti-clockwise to decrease (set pressure to 9.5 mbar/3.8in wg) plus or minus 0.95mbar/0.4in 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. 46).

Turn on electrical supply. Turn on tap. The boiler will light up in Hot Water mode at low

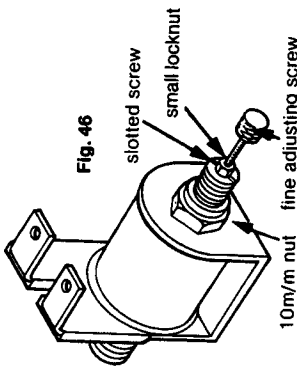


Fig. 46

flame. Adjust pressure using fine adjusting screw turn clockwise to increase anti-clockwise to decrease (set pressure at 1.2mbar/0.48in wg) plus or minus 0.12mbar/0.05in wg.

Tighten locknut.

Turn off tap. Turn off electrical supply.

Remove wire on No 1 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.**

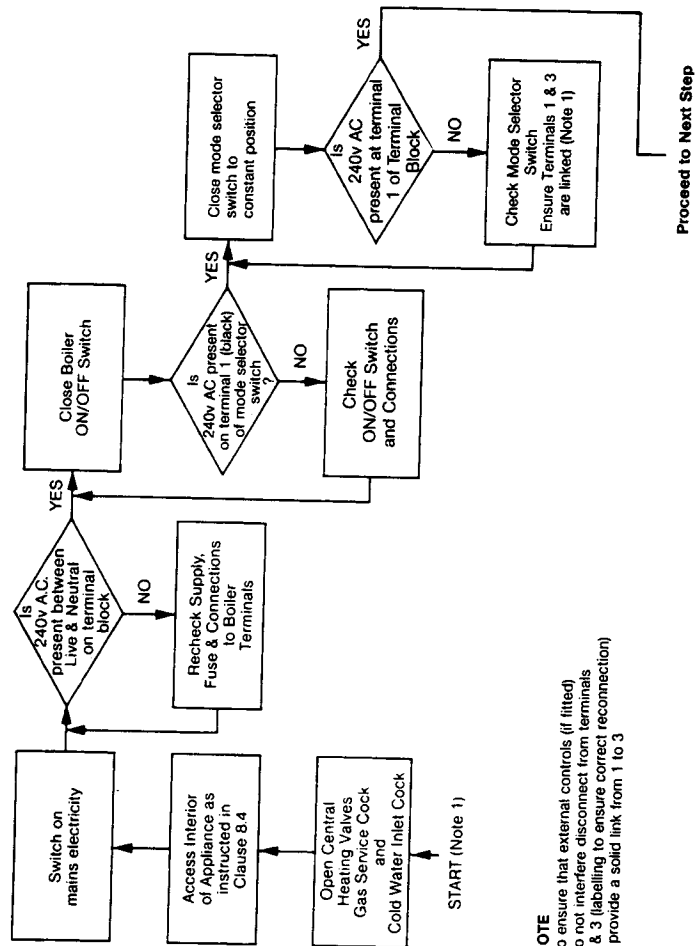
See clauses 6.6:16 for necessary adjustments. Refer to the commissioning engineer on the boiler badge.

**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.

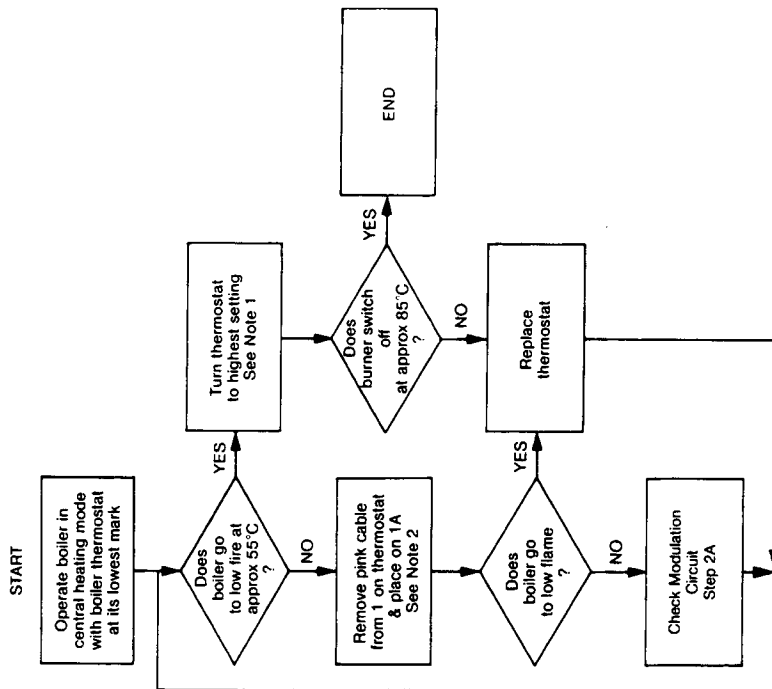
If the supply to P2 of the thermostat is broken (e.g. by a room thermostat) both the burner and pump are switched off.  
Should there be a restriction in the heating circuit reducing the flow rate through the boiler to below 350 litres/hour (1.28gpm), the boiler circuit flow switch will open and de-energise the gas valve.

### FAULT FINDING STEP 1 CHECK ELECTRICAL SUPPLIES, SWITCHES & CONNECTIONS



**NOTE**  
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

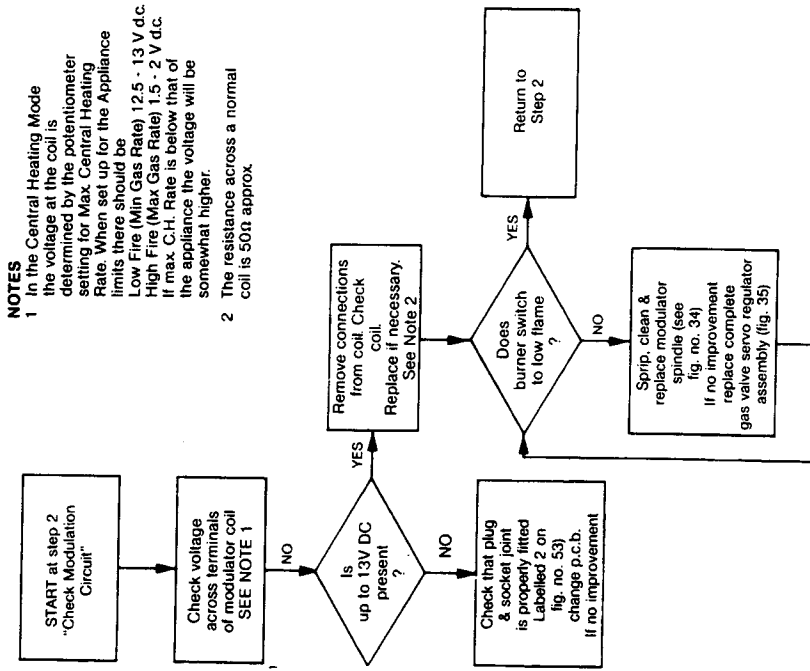
### FAULT FINDING STEP 2 CHECKING C/H THERMOSTAT CIRCUITS



**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.

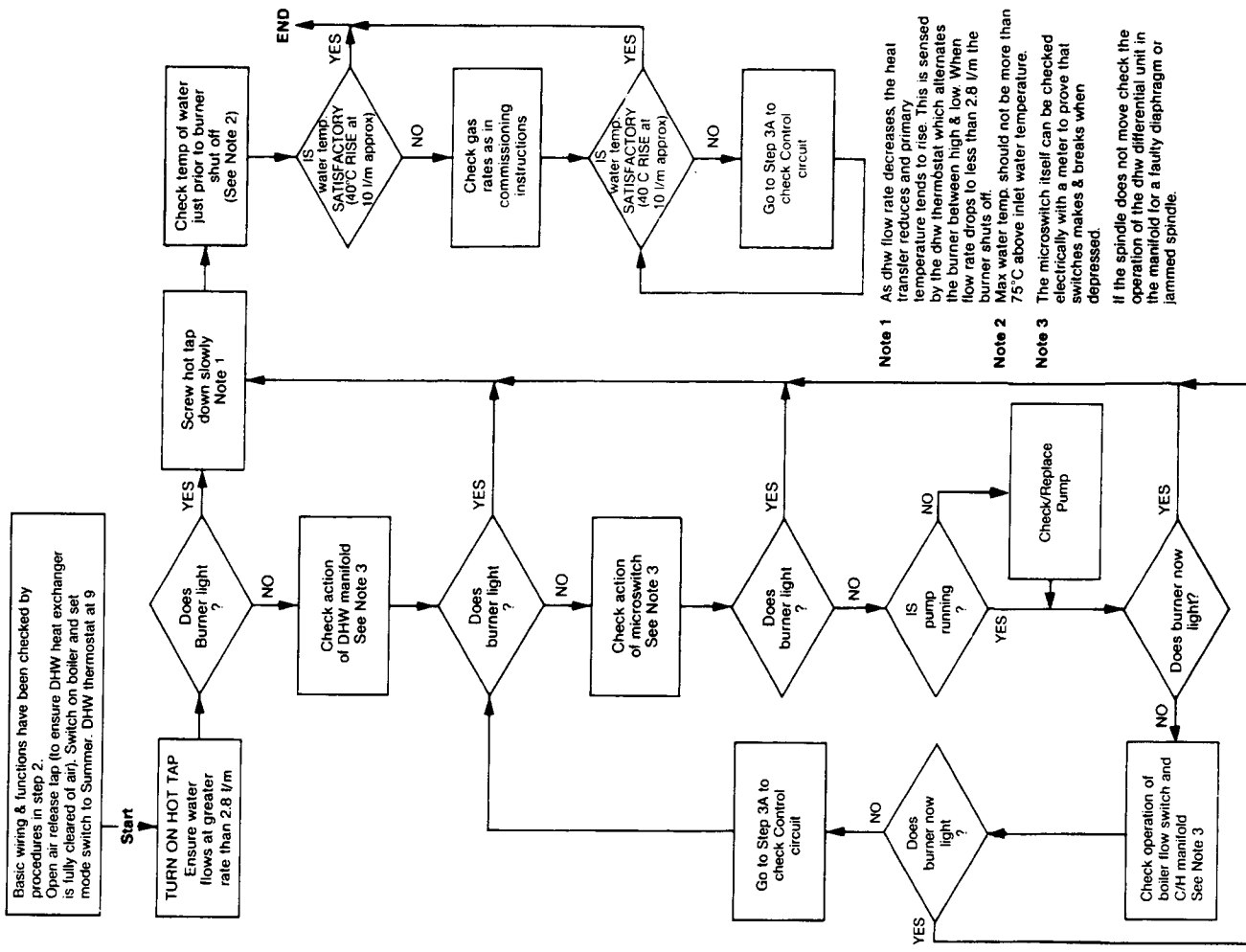
### FAULT FINDING STEP 2A

#### CHECK MODULATION CIRCUIT IN C/H MODE



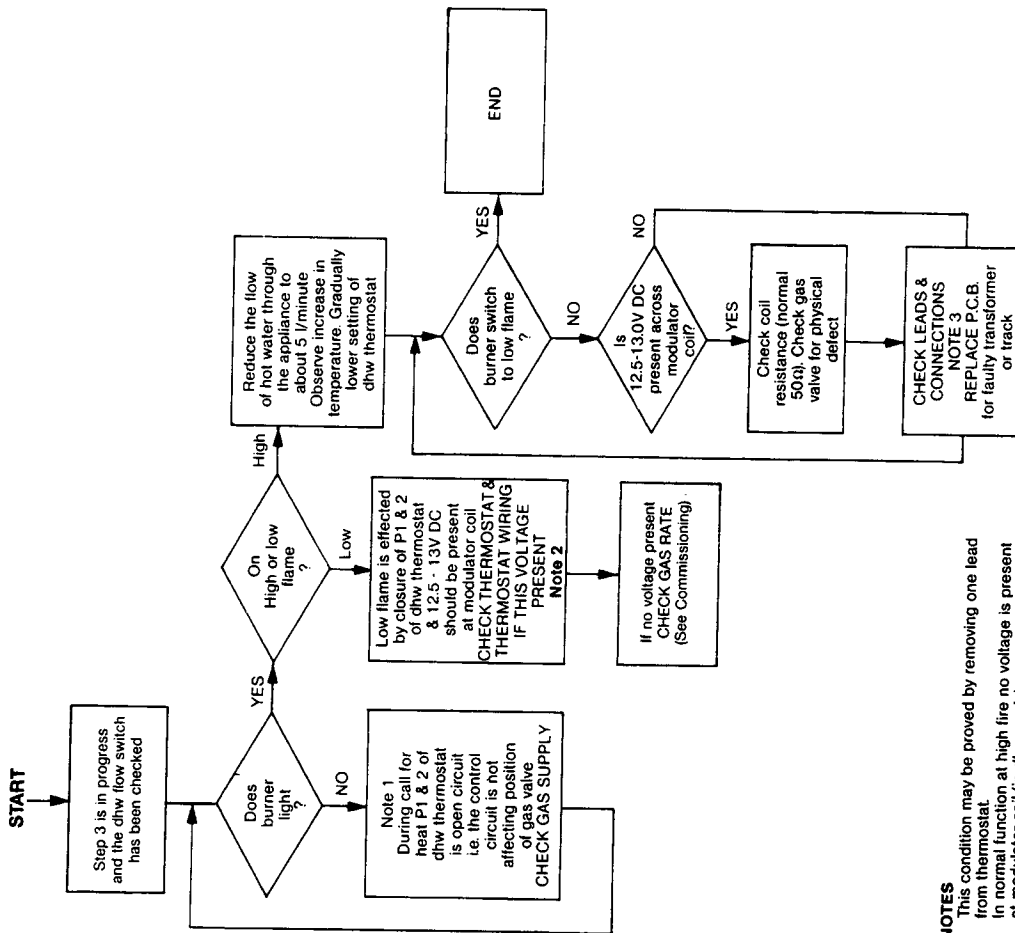
### FAULT FINDING STEP 3

#### CHECKING DOMESTIC HOT WATER FUNCTION



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

**FAULT FINDING STEP 3A  
CHECK CONTROLS IN DHW MODE**



- NOTES**
- 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).
  - If tab connector is on terminal 1 instead of 2 fault will occur.
  - 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:10 on pcb. PURPLE lead from coil to T:9 on pcb. PINK from Normally Open or flow switch to 2 on dhw stat. RED from P1 on stat to T:30 on pcb.

### A. Installation of the Vokera time switches (24 Hr and 7 day)

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. (See 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.

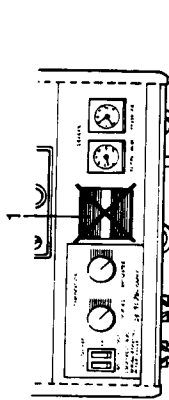
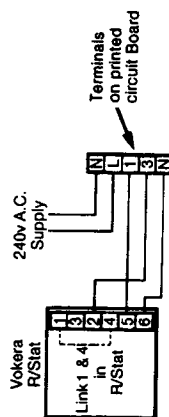


Fig. 1

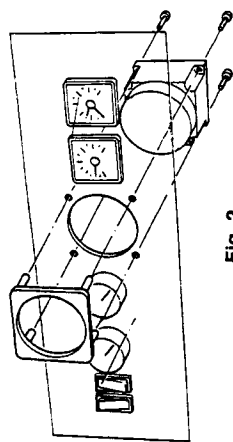


Fig. 2

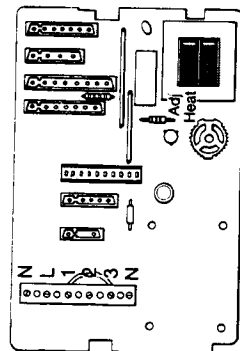


Fig. 3

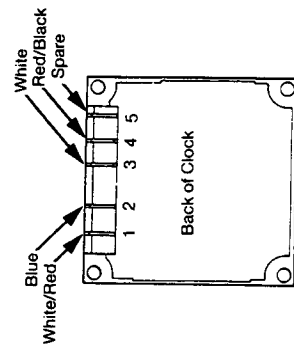
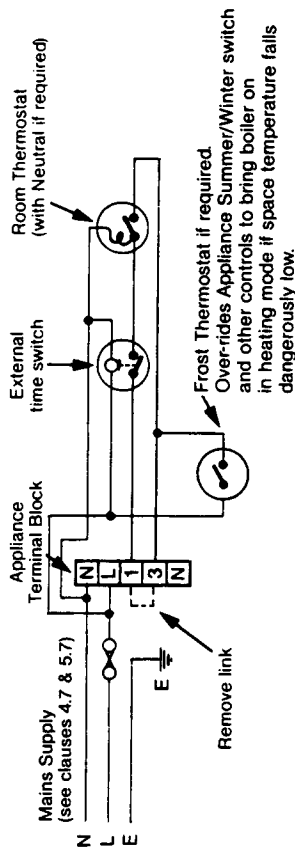


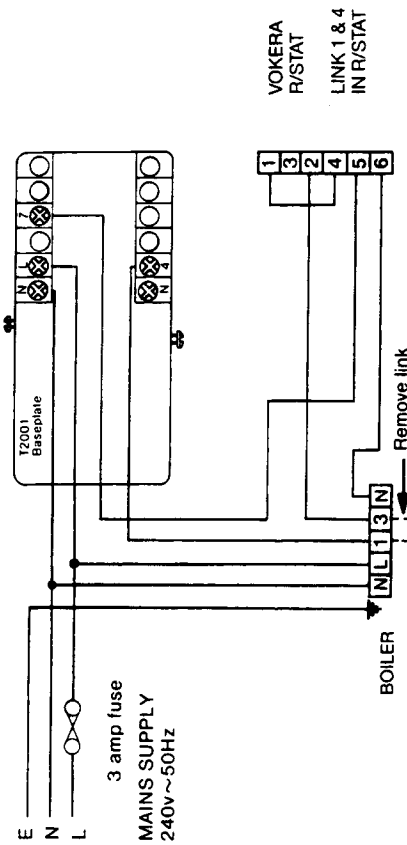
Fig. 4

### B. Wiring to External Time Switches and Thermostats

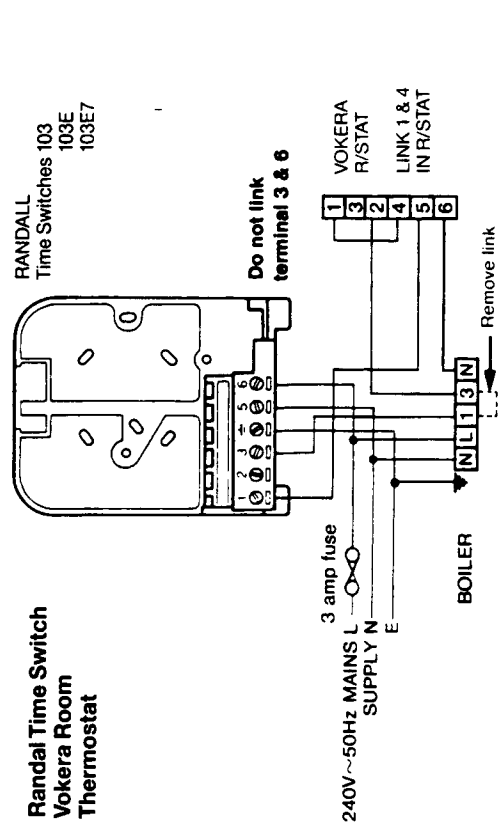
#### (i) General Schematic Diagram.



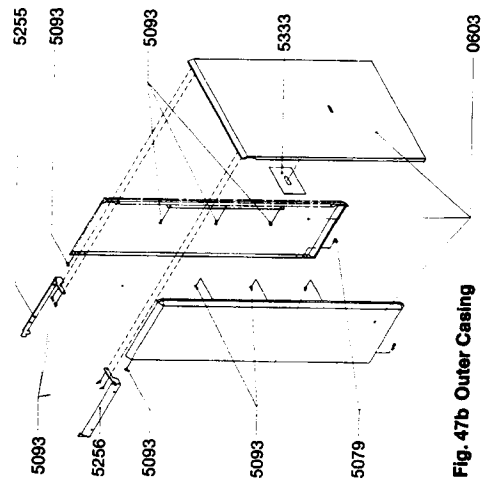
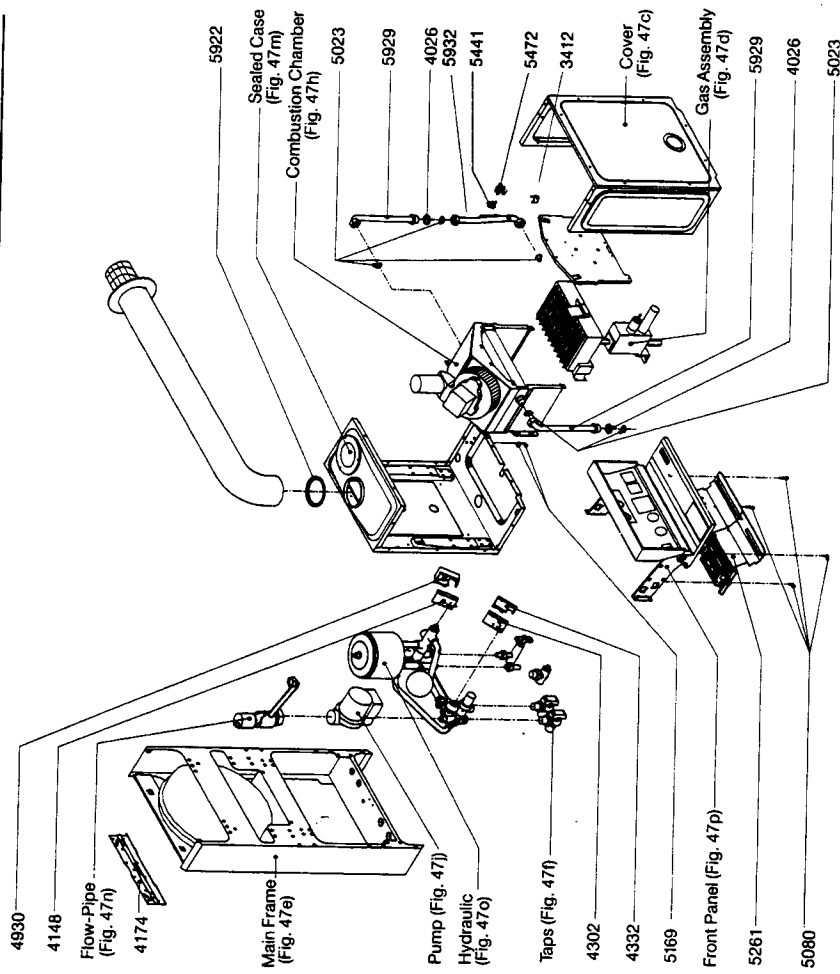
#### (ii) Towerchron Time Switch Vokera Room Thermostat



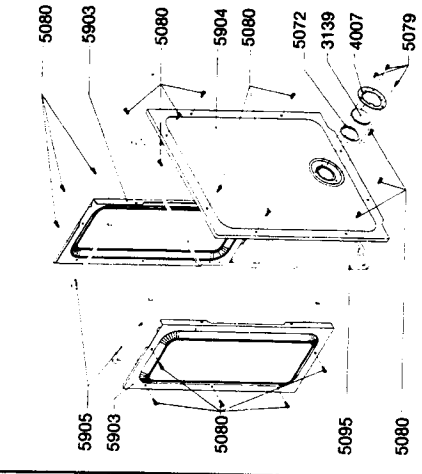
#### (iii) Randall Time Switch Vokera Room Thermostat



**EXPLODED DIAGRAMS Fig. 47**

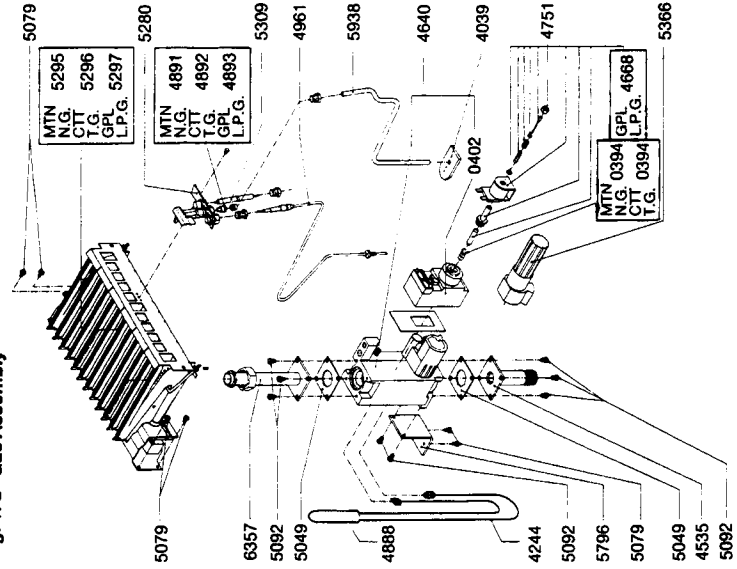


**Fig. 47b Outer Casing**

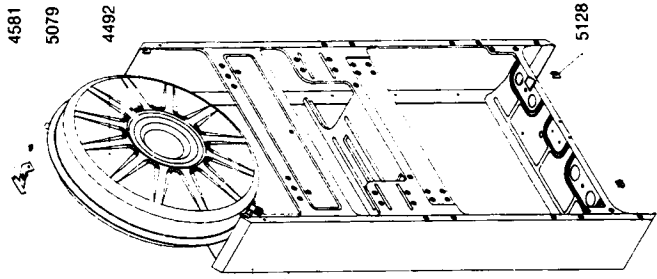


**Fig. 47c Cover and Left-Right Sides**

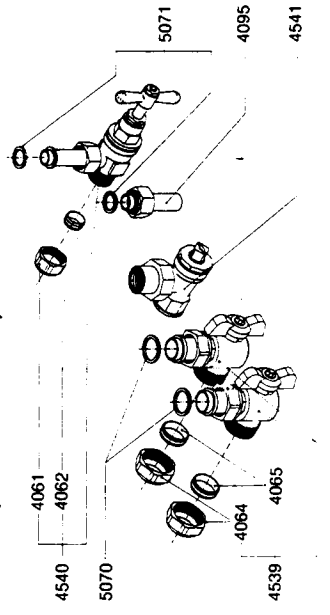
**Fig. 47d Gas Assembly**



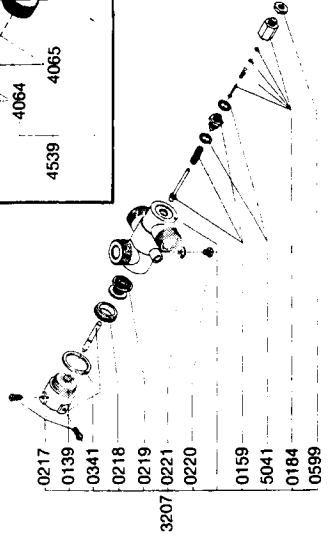
**Fig. 47e Expansion Vessel 10 lt.**



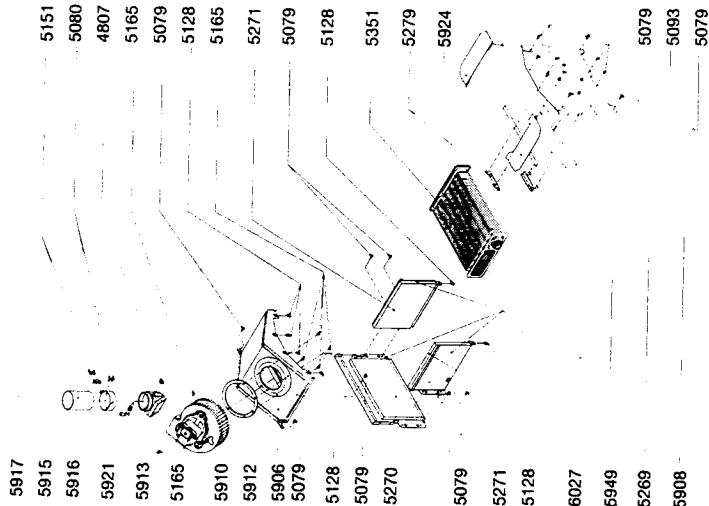
**Fig. 47f Taps and Connection Pipes**



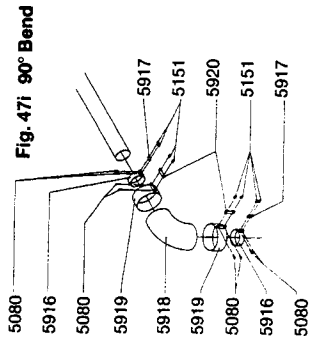
**Fig. 47g Three Port Diverter Valve**



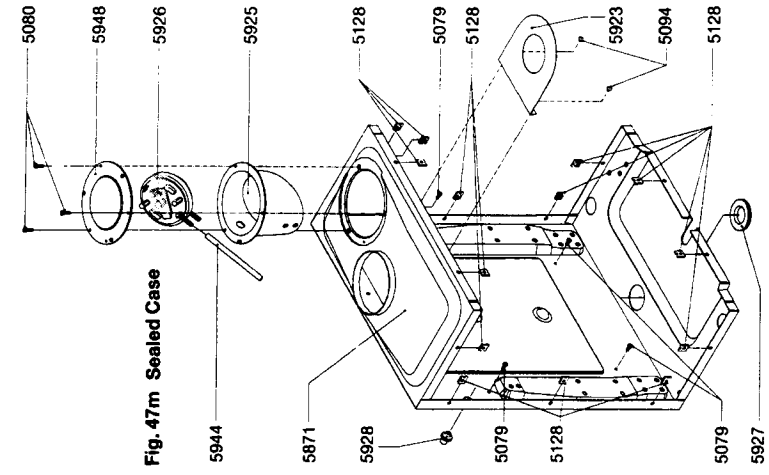
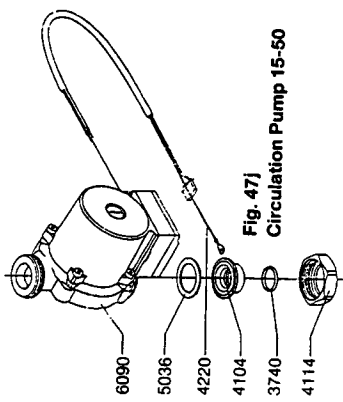
**Fig. 47h Combustion Chamber**



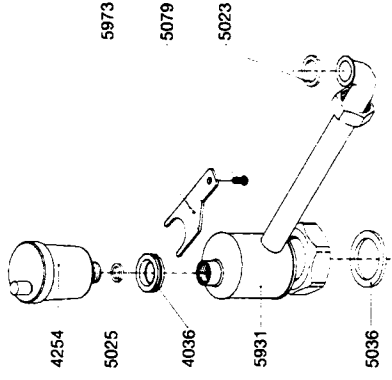
**Fig. 47i 90° Bend**



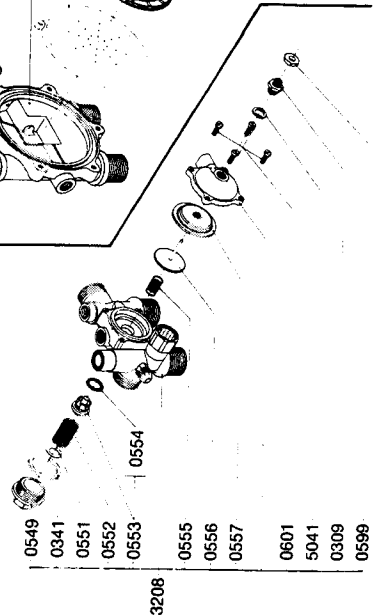
**Fig. 47j  
Circulation Pump 15-60**



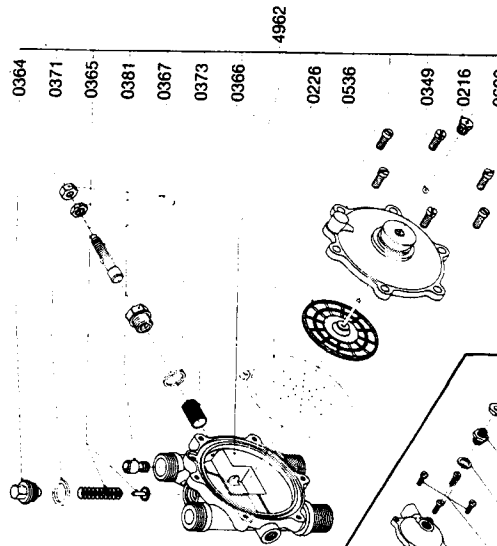
**Fig. 47n Flow-Pipe with Air Separator**



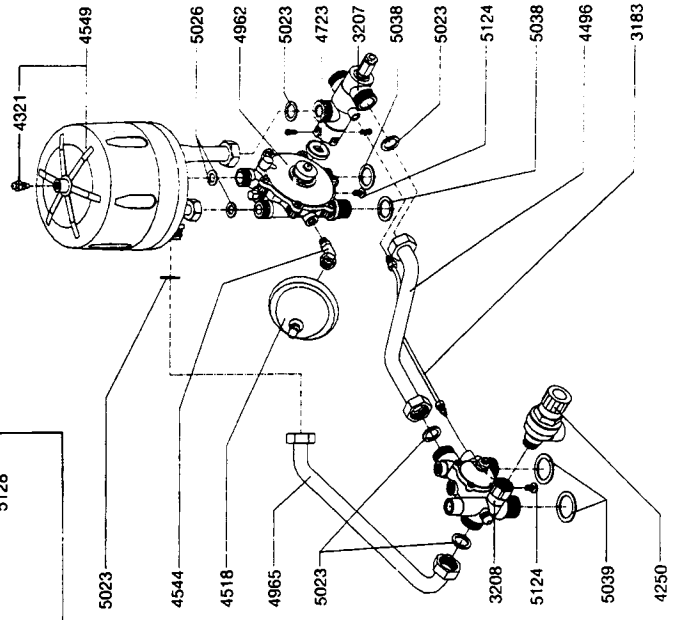
**Fig. 47k Central Heating Manifold with Automatic By-Pass**



**Fig. 47l Domestic Hot Water Manifold**



**Fig. 47o Hydraulic**



**SHORT SPARE PARTS LIST**

Refer to Fig. 47

Code	G.C. No.	Description
0226	333 929	Domestic Diaphragm
0367	333 832	Domestic Water Flow regulating screw
0402	333 837	Gas Valve Solenoid 220/240v
0557	333 941	Flow switch diaphragm
3207	333 943	3-way diverting valve
3208	333 944	Heating Manifold
3212	333 945	Boiler thermostat
4095	333 720	Hot Water Outlet
4148	333 951	Triple Microswitch
4250	333 772	Safety valve
4254	333 722	Automatic Air Vent
4302	333 773	Single micro switch (flow switch)
4492	333 733	Expansion Vessel
4518	333 885	Domestic Expansion Vessel
4540	333 779	Mains stop cock
4541	333 780	Gas Service tap
4549	333 955	Domestic Heat Exchanger
4640	333 888	Gas Valve complete 220/240v
4751	333 890	Modulator Coil Assembly
4888	333 894	High Limit Thermostat
4962	333 903	Domestic Distribution Manifold
4981	333 961	Timed/Summer/Constant Switch
5262	301 003	Temperature Gauge
5263	301 004	Pressure Gauge
5264	301 005	Thermostat knob
5284	301 009	On/Off switch
5295	301 081	Burner
5309	301 083	Spark Electrode
5351	301 085	Main Heat Exchanger
5394	301 025	Domestic Thermostat
5797	301 089	Printed Circuit
5800	301 090	Piezo Igniter
5910	394 754	Fan RL 97
5926	301 063	Pressure Differential switch
6090	384 288	Grundfos circulating pump UPS 15-50

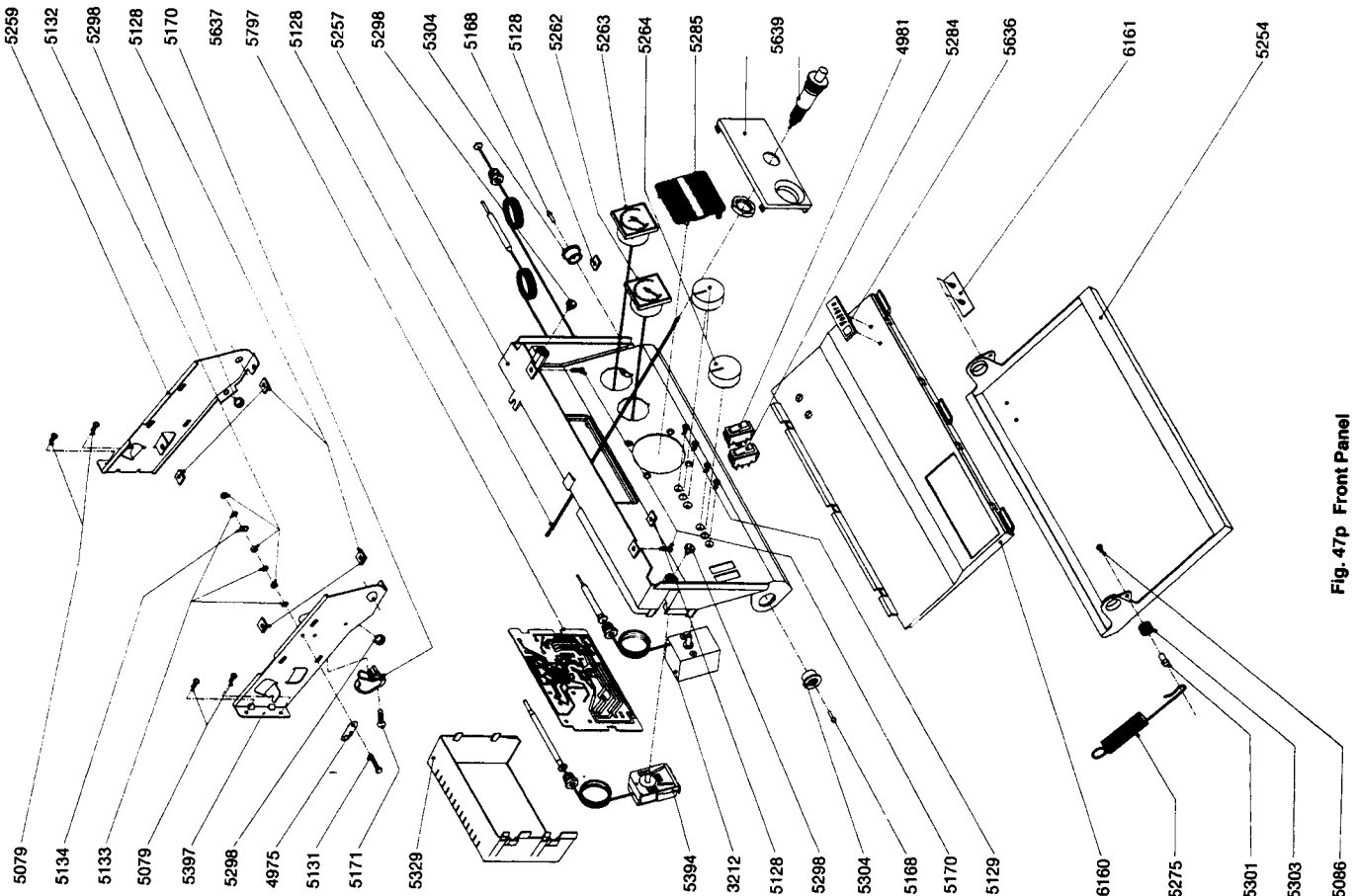


Fig. 47p Front Panel



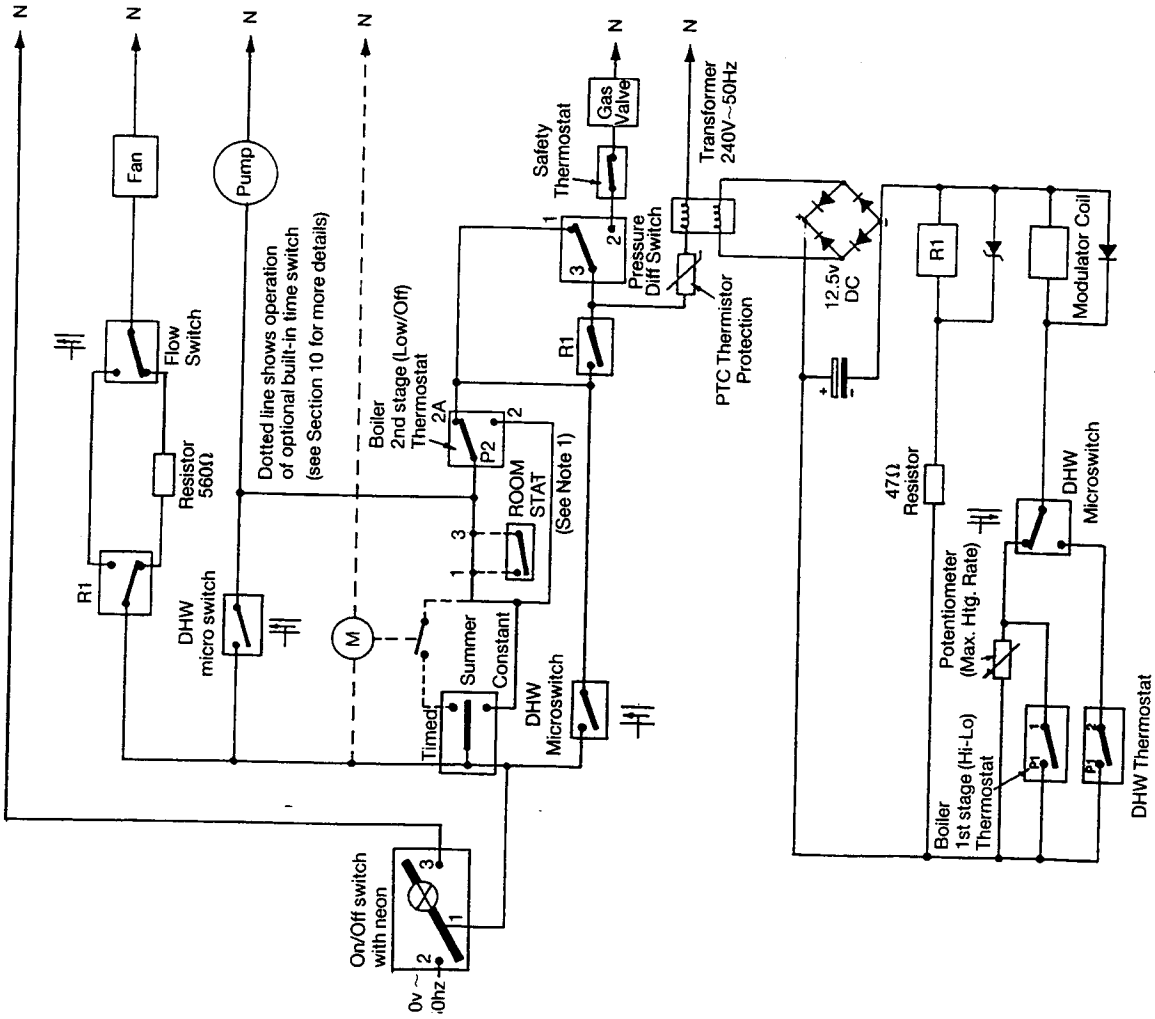


Fig. 48

- Notes
1. If external controls are fitted link 1-3 removed
  2. Boiler 1st and 2nd Stage thermostats in common housing

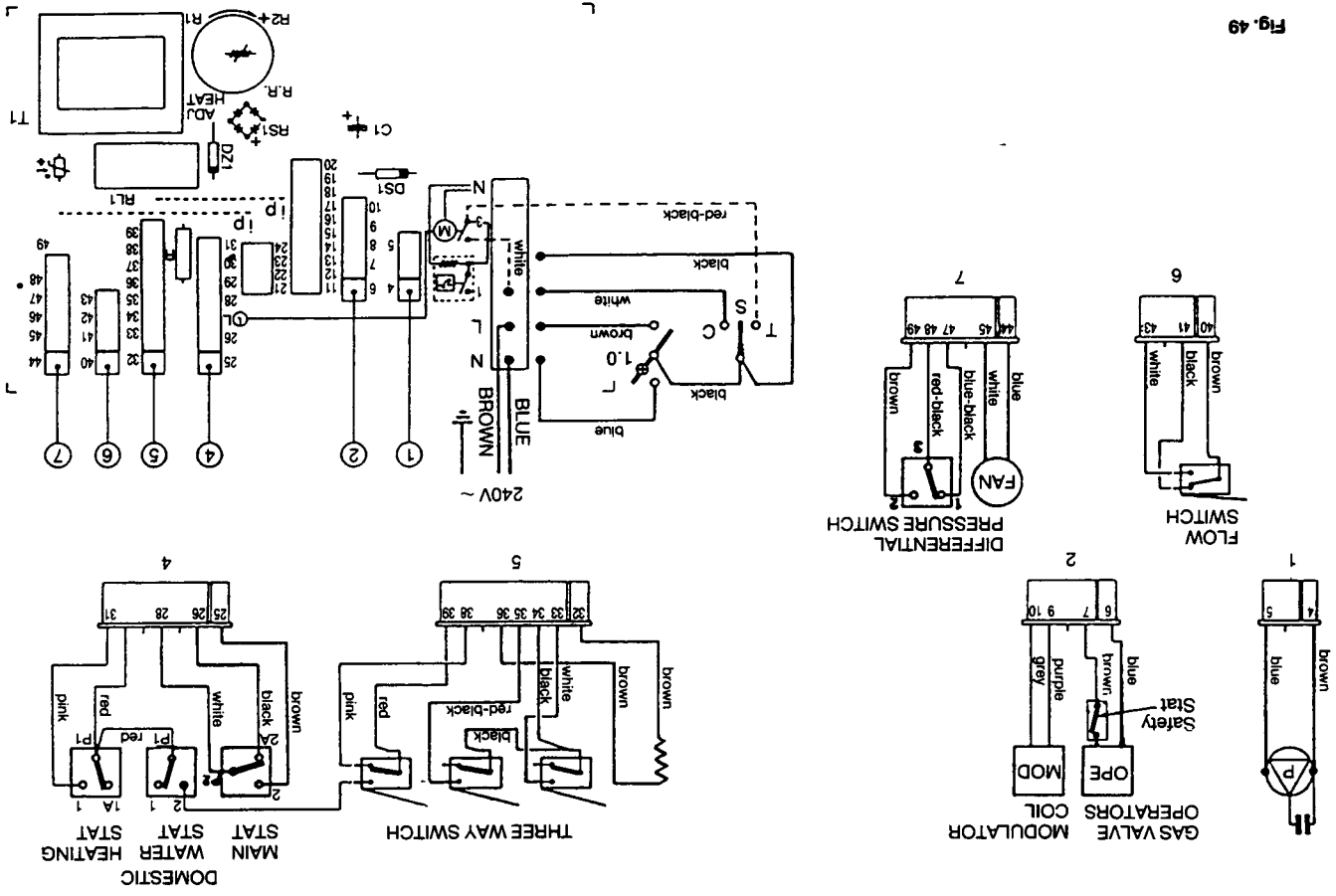


Fig. 49

ILLUSTRATED WIRING DIAGRAM

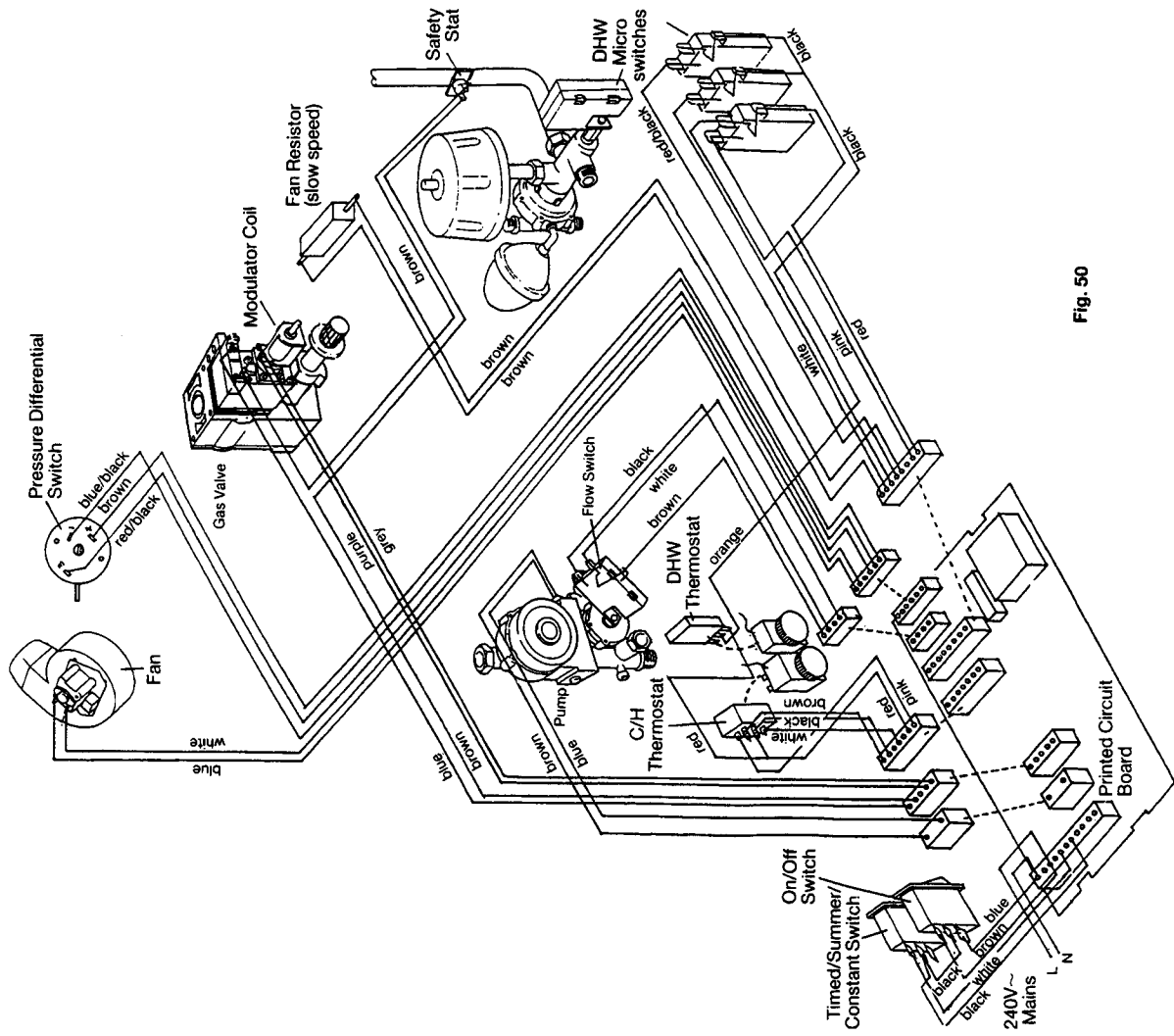


Fig. 50



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