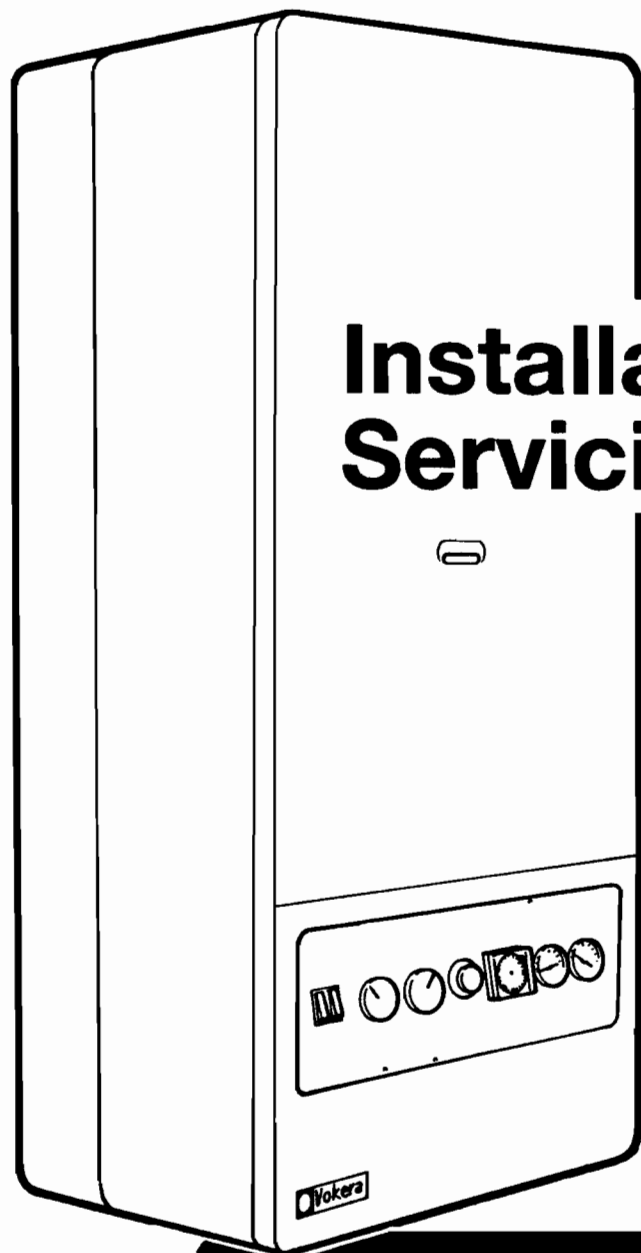




Vokèra

**18-72 D.M.C.F.
AND
21-84 D.M.C.F.**

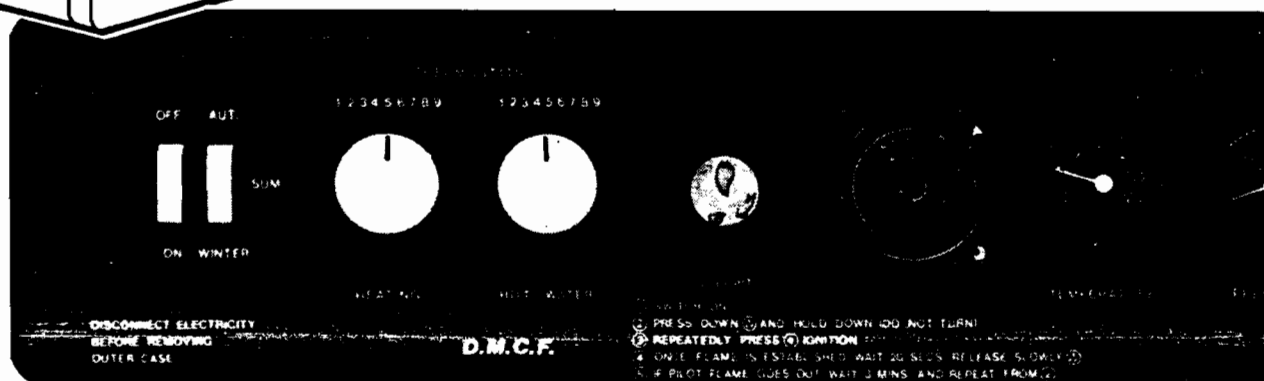
Installation and Servicing Instructions



BRITISH GAS TESTED AND CERTIFIED
18-72 DMCF – G.C. No. 47 094 04
21.84 DMCF – G.C. No. 47 094 05
N.W.C. 8608012

Leave these instructions
adjacent to the
Gas Meter

These Appliances are for use
with Natural Gas only



1.1 Introduction

The Vokera 18/72 and 21/84 D.M.C.F. are a combined central heating and domestic hot water appliance. By design, they incorporate a circulating pump, 3 port valve, expansion vessel, safety valve temperature gauge, pressure gauge and automatic by-pass.

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

The appliances are designed for use with a sealed heating system requiring pumped

circulation, and are not intended for installation on an open vented system.

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

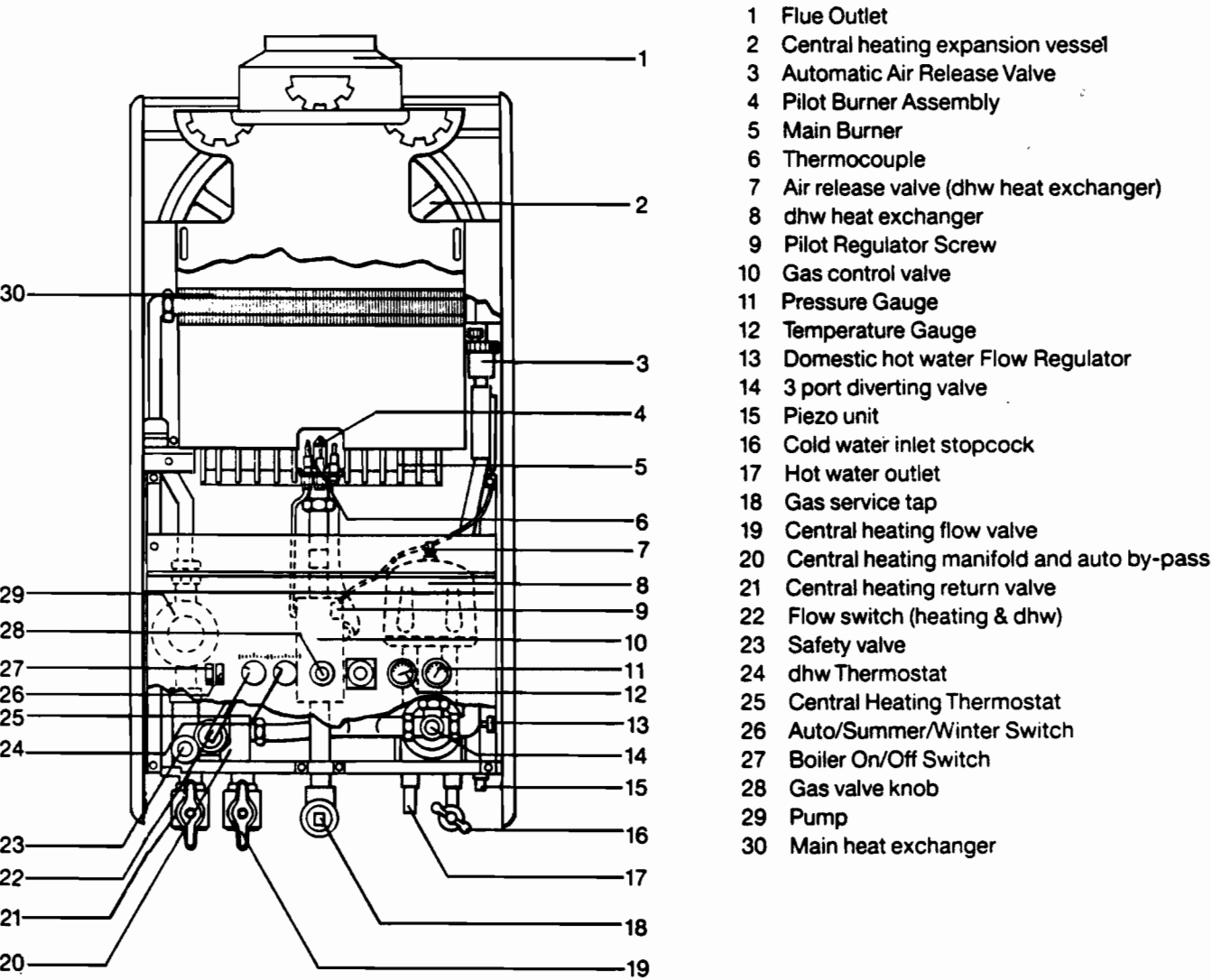
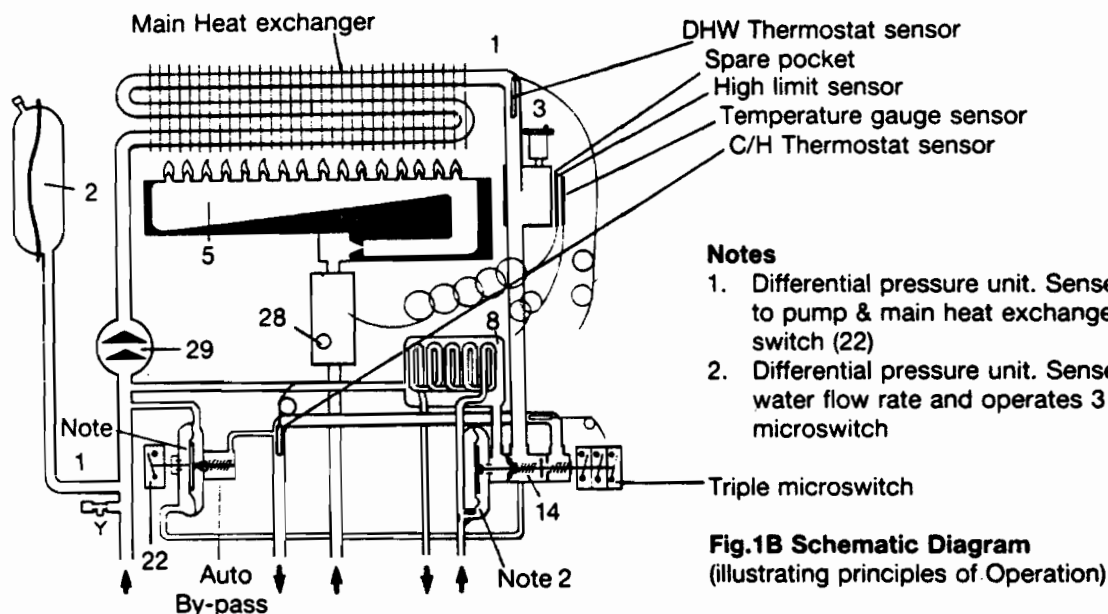


Fig.1A General Layout



SECTION 2 DESIGN AND OPERATING PRINCIPLES

2.1 Design and Operating Principles

2.1.1 Fig.1A illustrates the general layout of components. Fig. 1B illustrates the operating principles described below.

2.2 Ignition

- 2.2.1 The main electricity supply is switched off.
- 2.2.2 Ensure main gas supply is on.
- 2.2.3 Turn on the appliance gas service tap (18)
- 2.2.4 With the appliance switched off, press the gas control valve knob (28) and hold it in. At the same time press the Piezo button (15) repeatedly to light the pilot burner. Stop pressing the Piezo button once a flame is established but hold in the gas knob for a further 15 seconds, then release the knob.
- 2.2.5 The pilot flame should remain alight and envelop the thermocouple.

2.3 Central Heating Mode

- 2.3.1 When the various switches and controls impose a demand for heat the pump is switched on and the 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 (25) 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 main switch is on and the pilot lit, regardless of Summer/Winter 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 (14) 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 (24) 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.
- 2.5.2 A safety valve is provided to relieve excess pressure.

SECTION 3 TECHNICAL DATA

3.1 Units

- 3.1.1 Dimensions and values are given in the preferred S.I Units with Imperial equivalents in brackets where applicable.

3.2 Dimensions and Contents

- 3.2.1 Height: 900mm (35.5ins) overall
Width: 480mm (18.9ins)
Depth: 360mm (14.2ins)
Weight: 18-72 39kg (86lbs)
 21-84 44kg (97lbs)

3.3 Connection sizes

- 3.3.1 Heating flow and return: Nut & olive for 22mm o.d. tube
Cold water inlet: Nut & olive for 15mm o.d. tube
Hot water outlet: Nut & tail for 15mm o.d. tube
Gas Service: Rc ½ (½in BSP int)
Safety valve: Rc ½ (½in BSP int)
Flue outlet: 125mm nominal size (The outlet accepts either flue pipes to BS567 or *twin* wall flue pipes to BS715) (Single wall metal pipes can be used with an adaptor, but are not to be used externally of the building.)

3.4 Installation Requirements

- 3.4.1 Minimum clearances
above 600mm (24in) (To give minimum straight length of vertical pipe and to allow removal of sealed expansion tank.)
Below 460mm (18in)
In front 600mm (24in)
Left hand side 25mm (1in)
Right hand side 100mm (4in)
- 3.4.2 Maximum heating system contents 170 litres (38 gals)
Water content of boiler 3 litres (.66 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 BS5376.2.1976 Appendix A and/or to local water Authority approval

3.5 Electrical Details

- 3.5.1 Mains supply 240v~50Hz Fused 3 amp
Power consumption: 120 watts max.

3.6 Performance and Limitations 21-84 DMCF

- 3.6.1 Max. input 30.5 kW (104,100 Btu/h)
Min. input 12.2 kW (41,600 Btu/h)
Max. output 23.5 kW (80,200 Btu/h)
Min. output 8.8 kW (30,000 Btu/h)
Central Heating output range
Max. 23.5 kW (80,200 Btu/h)
Min. 8.8 kW (30,000 Btu/h)
(fig.21 shows the relation between burner pressure and output)
Nominal hot water production
11.2 litres/min. raised through 30°C (2.4 gallons/min raised through 54°F)
Central Heating Pump Duty
fig.2 indicates the flow rate available plotted against system pressure drop.
N.B. When using this graph apply only the pressure drop of the system. The curve has been modified to allow for the pressure drop through the appliance.
Fig.3 shows the pressure drop through the appliance only in the central heating mode.

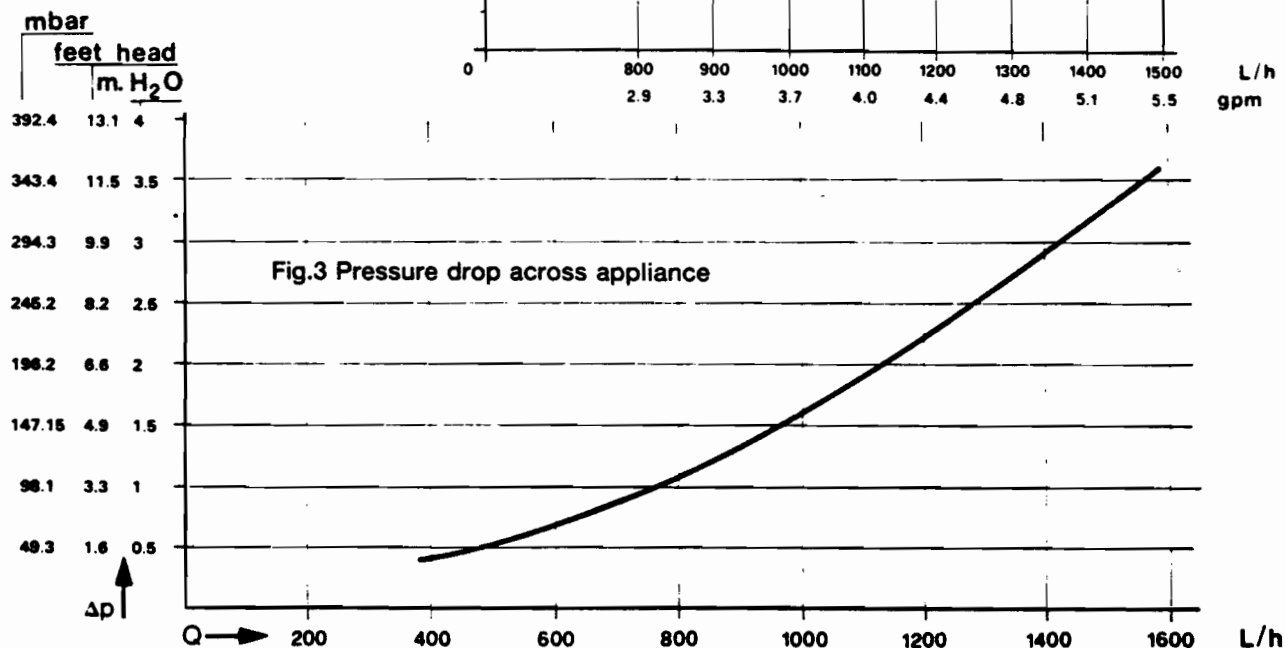
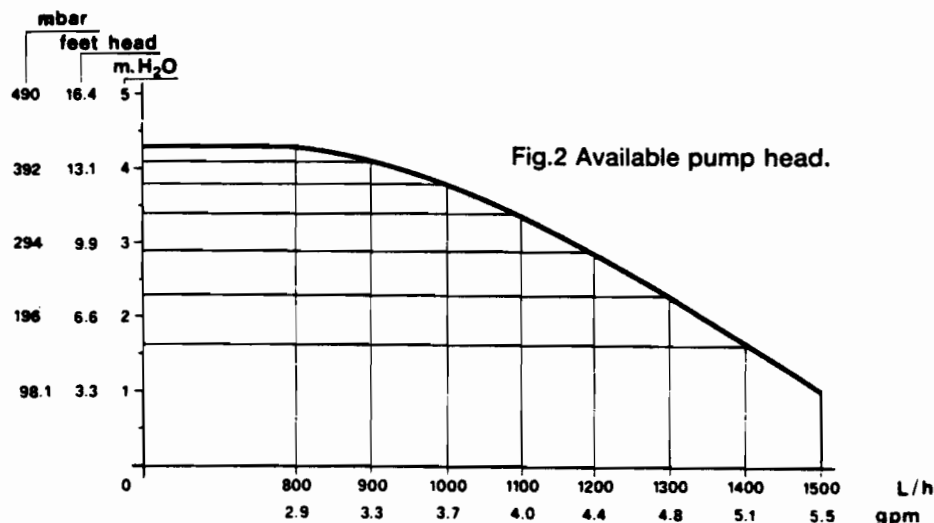
3.7 Performance and Limitations 18-72 DMCF

- 3.7.1 Max. input 26.0 kW (88,800 Btu/h)
Min. input 10.5 kW (35,800 Btu/h)
Max. output 20.2 kW (69,000 Btu/h)
Min. output 7.6 kW (26,000 Btu/h)
Central Heating output range
Max. 20.2 kW (69,000 Btu/h)
Min. 7.6 kW (26,000 Btu/h)
(fig.21 shows the relation between burner pressure and output)
Nominal hot water production
9.6 litres/min. raised through 30°C (2.1 gallons/min raised through 54°F)
Central Heating Pump Duty
fig.2 indicates the flow rate available plotted against system, pressure drop.
N.B. When using this graph apply only the pressure drop of the system. The curve has been modified to allow for the pressure drop through the appliance.
Fig.3 shows the pressure drop through the appliance only in the central heating mode.

Fig.2 shows the residual pump head available for the central heating system after allowing for the pressure loss through the Appliance.

Fig.3 shows the actual pressure loss through the Appliance.

Fig.21 shows the relation between burner pressure and central heating output.



Working Pressures	Heating System	Hot Water System
Maximum	1.5 bar/15m.wg/50ft wg.	6.0bar/90psig
Minimum	0.5 bar/5m.wg/16ft wg.	0.5bar/7psig
Safety valve setting	3 bar/30m/102ft	-

Flow Rates

Min. Water Flow (dhw) 2.8 litres/min (0.6 gpm)

Minimum central heating flow rate through appliance 350 litres/hour (1.28 gals/min)

	18-72	21-84
Min. Gas Rate m ³ /h	0.94	1.10
Max. Gas Rate m ³ /h	2.34	2.75

3.8 Burner Details

	18-72	21-84
Main Burner	Polidoro NP13	Polidoro NP15
Main Burner Injectors	13 x 1.25	15 x 1.25
Burner Pressure Max Rate	8.9 mbar	9.8 mbar
Burner Pressure Min Rate	1.6 mbar	1.6 mbar
Central Heating and d.h.w.		

Pilot Burner: Polidoro

Pilot Injector: 25 (marking) 2 holes

Gas Control Valve Basic: Honeywell V4600C 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.

6.6 Lighting the boiler

6.6.1 Before lighting open flow and return valves (cl. 6.3.3.2)

If external controls are fitted (e.g. timeclock and thermostat) ensure they 'call for heat'. The commissioning of the appliance may be easier if the external controls are temporarily disconnected and terminals 3 & 4 linked. (For access procedure refer to clauses 5.7.2 for instructions).

6.6.2 Turn on electricity supply. Put the Auto/Summer/Winter switch (26) in the winter position.

6.6.3 Set the heating control thermostat at its highest setting.

6.6.4 The main burner should now light.

6.6.5 N.B. The most common cause of failure to light is insufficient water flow see cl. 4.7.2 & 6.11

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 20) and slacken the screw half a turn in an anti clockwise direction. Attach a suitable pressure gauge. Turn on electricity supply, turn on a domestic hot water tap to operate boiler in dhw mode.

6.7.5 The pressure reading for maximum rate should be:

18-72

8.9 mbar/3.57in wg (plus or minus 0.89 mbar/0.35in wg)

21-84

9.8 mbar/3.93in wg (plus or minus 0.98 mbar/0.39in wg).

If the pressure is wrong it should be adjusted as instructed in clause 8.21. (N.B. Whenever the maximum rate is adjusted check and adjust the minimum rate too).

6.7.6 If the boiler temperature is above 60°C turn the dhw thermostat down until the low flame is established. If low fire cannot be established in this way, turn off the mains and transfer the cable on terminal 2 of the dhw thermostat to terminal 1 (Fig 17 shows location). Switch on electricity.

6.7.7 When low flame is established, the pressure gauge should read 1.6 mbar (0.64in wg) plus or minus 0.16mbar/0.06in wg. If it is different,

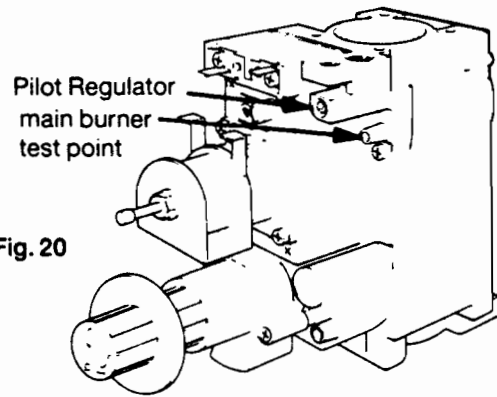


Fig. 20

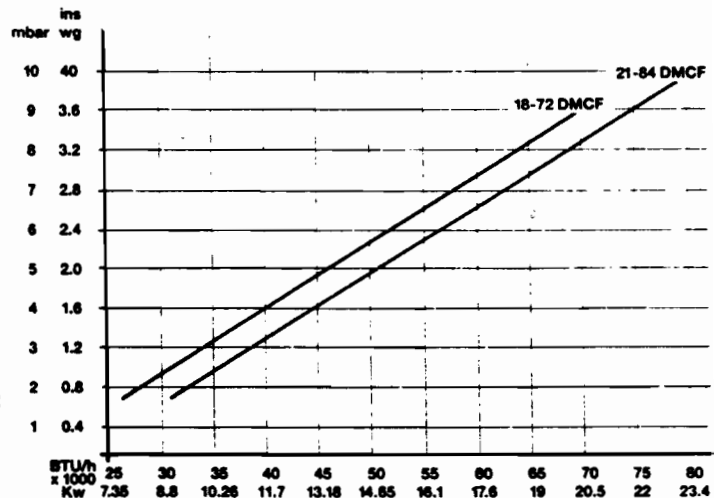


Fig. 21

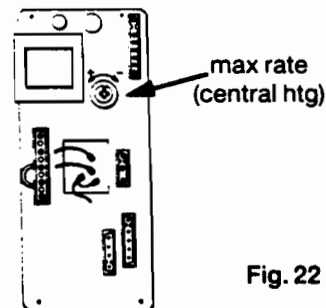


Fig. 22

adjustment should be made in accordance with the instructions in clause 8.21.

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 21 to determine pressure for the heating output you need (e.g. for 17.6kW a pressure of 6.5mbar is needed). Use a screwdriver to adjust the potentiometer (fig 22) until the required pressure is indicated on the gauge. Once this pressure has been fixed it should be indelibly recorded on the data badge. This is to ensure that the burner can be reset when any service operation involves alteration of burner settings.

8.21 Setting Gas Pressures

ALL SETTINGS DONE WITH 'U' GAUGE
FITTED TO BURNER TEST NIPPLE AS
INSTRUCTED IN CLAUSE 6.7.4

8.21.1 Setting Maximum Rate

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

Refer to Figs 37 & 52

Loosen fine locknut (7BA). Unscrew completely
the fine adjusting screw.

If not already on, turn on H/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 as follows:
18-72 – 8.9 mbar (3.57 ins wg) plus or minus
0.89 mbar (0.36 ins wg).
21-84 – 9.8 mbar (3.93 ins wg) plus or minus
0.98 mbar (0.39 ins wg).

Carefully tighten lock nut without altering
setting

Turn off tap and electrical supply.

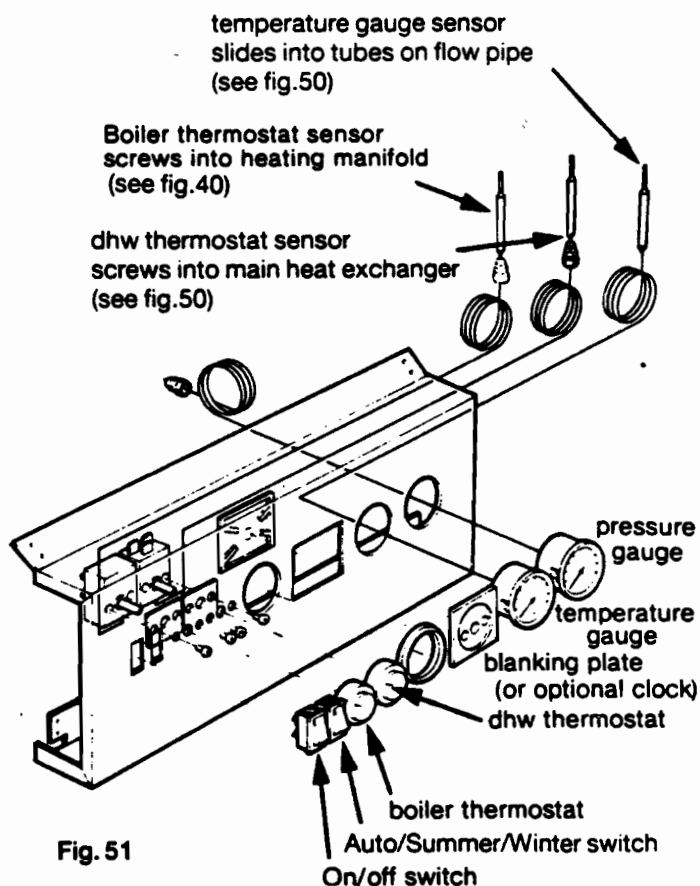


Fig. 51

9.1 Preliminary electrical system checks as contained in the B.G.C. Multimeter Instruction Book are the first electrical checks to be carried out during a fault finding procedure. On completion of any service/fault finding task which has required the breaking and remaking of electrical connections the checks A2, Earth Continuity, C, Polarity and D, 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 a 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 Fig.1B & Figs. 56-58. It is assumed that the on/off switch is ON and the pilot flame is alight.

9.2.1 At rest

No call for either Heating or Domestic Hot Water.

Pilot alight.

9.2.2 Domestic Hot Water Mode Fig. 57

When a hot water draw-off tap is turned on the differential pressure unit exerts thrust to change over the 3 way valve and operate the DHW flow switch.

- (a) The pump is energised.
- (i) The Boiler circuit flow switch is closed.
- (b) The gas valve operator is energised via the boiler circuit flow switch.
- (c) The operation of the DHW Flow Switch also completes the low voltage control circuit for the modulating coil on the Gas Valve.
- (i) 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.
- (d) Successive operations of the thermostat alternates the boiler between high and low fire to regulate the average heat input.
- (e) 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.

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

9.2.3 Central Heating Mode Fig. 58

In this mode the Summer/Winter switch must be closed i.e. in the Winter position, fig 1A.

With all controls calling for heat

- (a)(i) The pump is energised
- (ii) The boiler circuit flow switch closes, permitting a supply through the boiler 2nd stage thermostat to energise the Gas Valve operator. the 2nd stage thermostat also provides a supply to the Transformer energising the control circuit.
- (iii) The control circuit is via the 1st stage of the Boiler thermostat when the thermostat calls for heat it is open circuit (i.e. make on rise).

Control current to the Gas Valve modulating coil is subject to the resistance of the potentiometer. The resulting low voltage to the coil positions the Gas Valve for the Maximum Central Heating Rate.

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

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

- (iv) 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. But the pump keeps running to circulate to the radiators.
- (v) If the supply to P2 of the thermostat is broken (e.g. by a room thermostat both the burner and pump are switched 'off'.
- (vi) Should there be a restriction in the heating circuit reducing the flow rate through the boiler to below 350 litres/ hour (1.28 g.p.m.) the boiler circuit flow switch will open and close the gas valve.

8.21.2 Setting Minimum Rate

Replace fine adjusting screw.

Remove wire on No.2 terminal of Hot water stat replace on no.1 terminal (see fig.47)

Turn on electrical supply. Turn on tap.

Boiler will light up in Hot Water mode at low fire. Adjust pressure using fine adjusting screw turn clockwise to increase anti-clockwise to decrease (set pressures as follows:

18-72 – 1.6 mbar/0.64 ins wg

21-84 – 1.6 mbar/0.64 ins wg)

plus or minus 0.16 mbar (0.06 in 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.

8.21.3 Central Heating (Range Rating) To set maximum rate in central heating mode

See clauses 6.7.9 for necessary adjustments. Refer to the commissioning rate recorded by the commissioning engineer on the boiler badge.

8.22 End of Servicing

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

Refit casings and clean up.

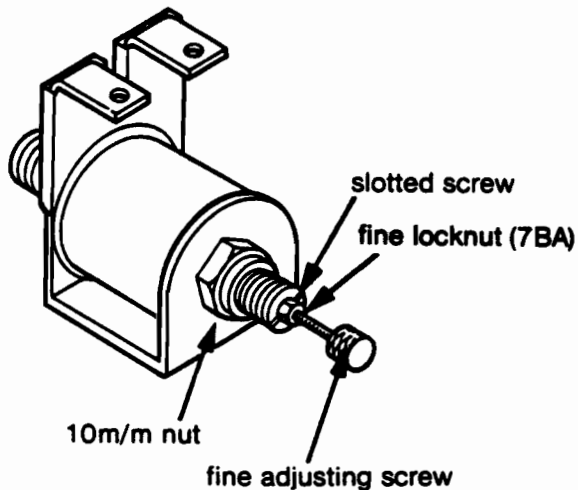
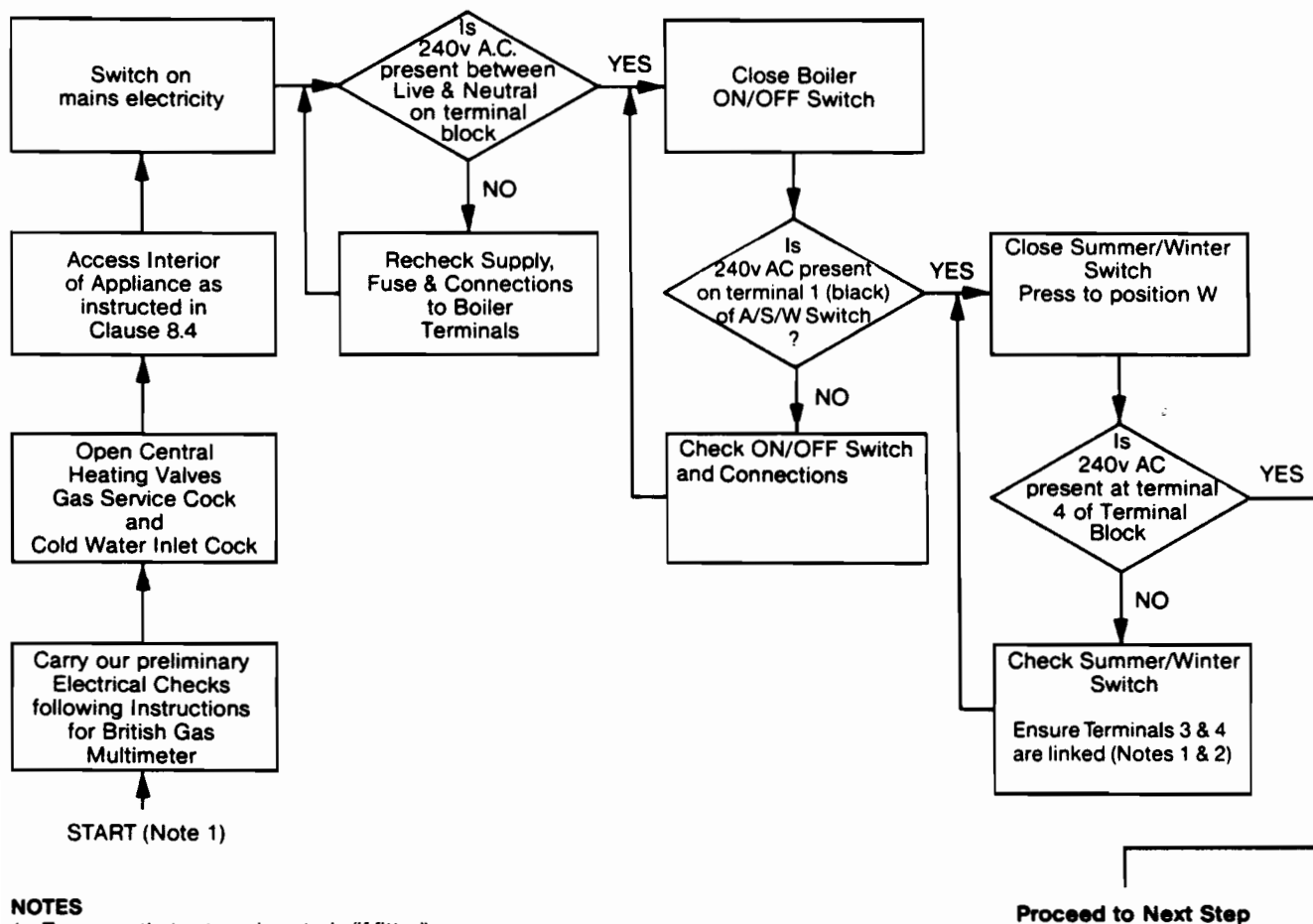


Fig. 52

FAULT FINDING STEP 1

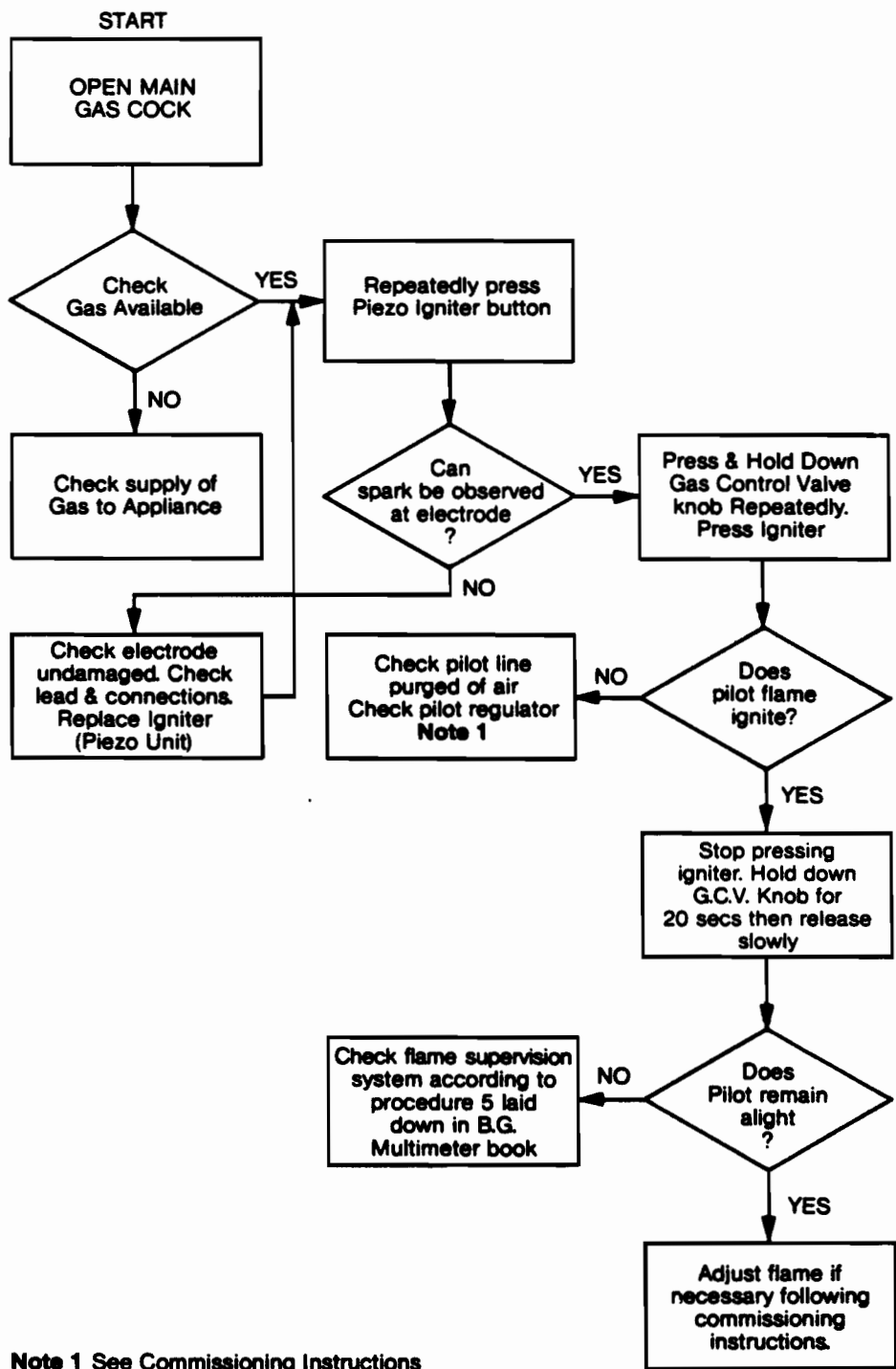
CHECK ELECTRICAL SUPPLIES, SWITCHES & CONNECTIONS



NOTES

1. To ensure that external controls (if fitted) do not interfere disconnect from terminals 3 & 4 (labelling to ensure correct reconnection) & provide a solid link from 3 to 4.
2. Check terminal 3 (white) of S/W switch, if no supply present, change switch.

FAULT FINDING STEP 2
CHECK GAS CONTROL PILOT BURNER FLAME SUPERVISING SYSTEM



Note 1 See Commissioning Instructions

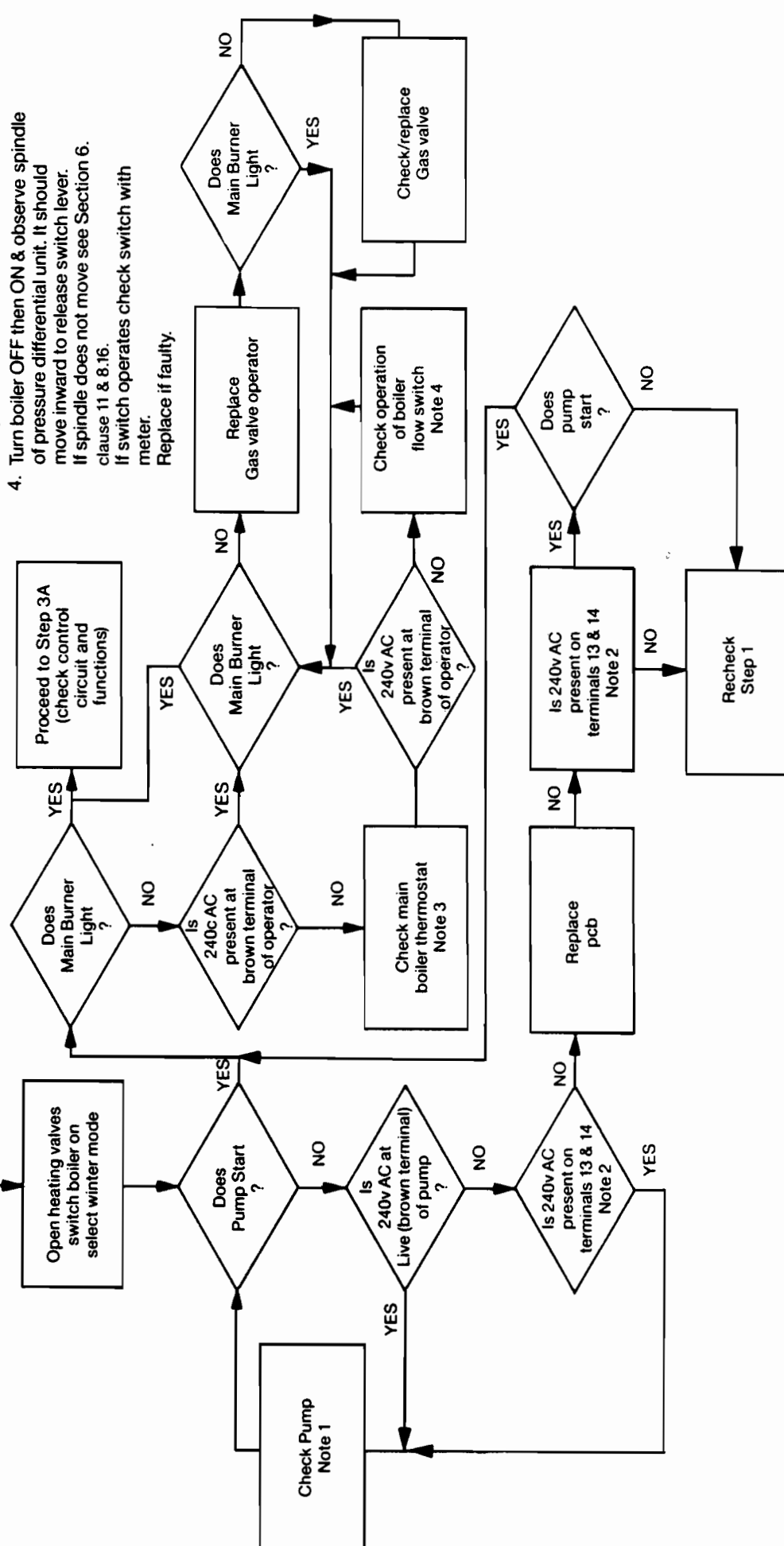
CHECK OPERATION IN CENTRAL HEATING MODE

Check system is filled with water and properly commissioned.
Conclude steps 1 & 2. Start with cold system and do not draw off hot water during this check

Check system is filled with water and properly commissioned.

Conclude steps 1 & 2. Start with cold system and do not draw off hot water on this check

**Open heating valves
switch boiler on
select winter mode**



1. If necessary wire pump to independent electricity supply. Check capacitor. Check rotor is free. Replace pump or pump head. Set new pump regulator to position 3.

2. Terminal 13 – neutral
Terminal 14 – live

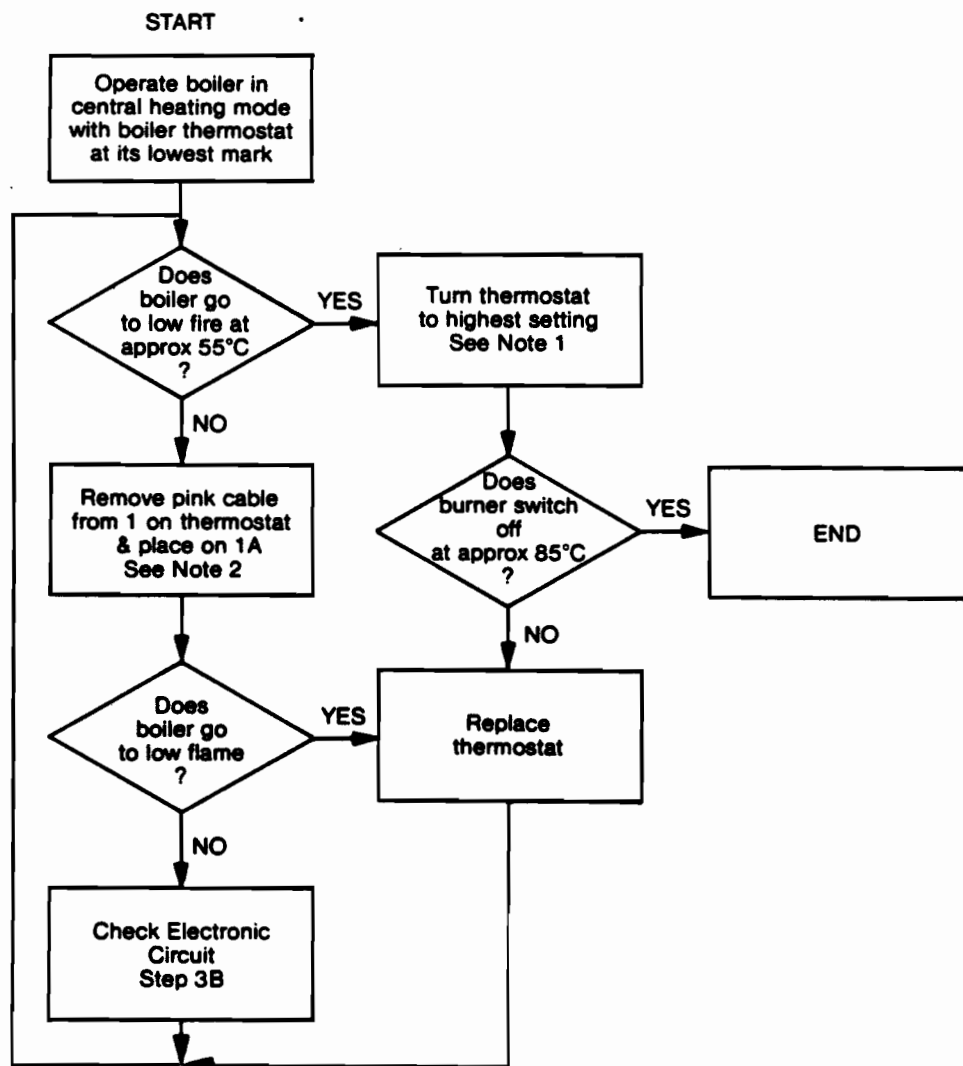
3. If 240V not present on terminal 2A (black lead) and boiler temperature not above thermostat setting then thermostat is faulty.

1. Turn boiler OFF then ON & observe spindle of pressure differential unit. It should move inward to release switch lever. If spindle does not move see Section 6. clause 11 & 8.16.

Replace if faulty.

FAULT FINDING STEP 3A

CHECKING C/H THERMOSTAT CIRCUITS

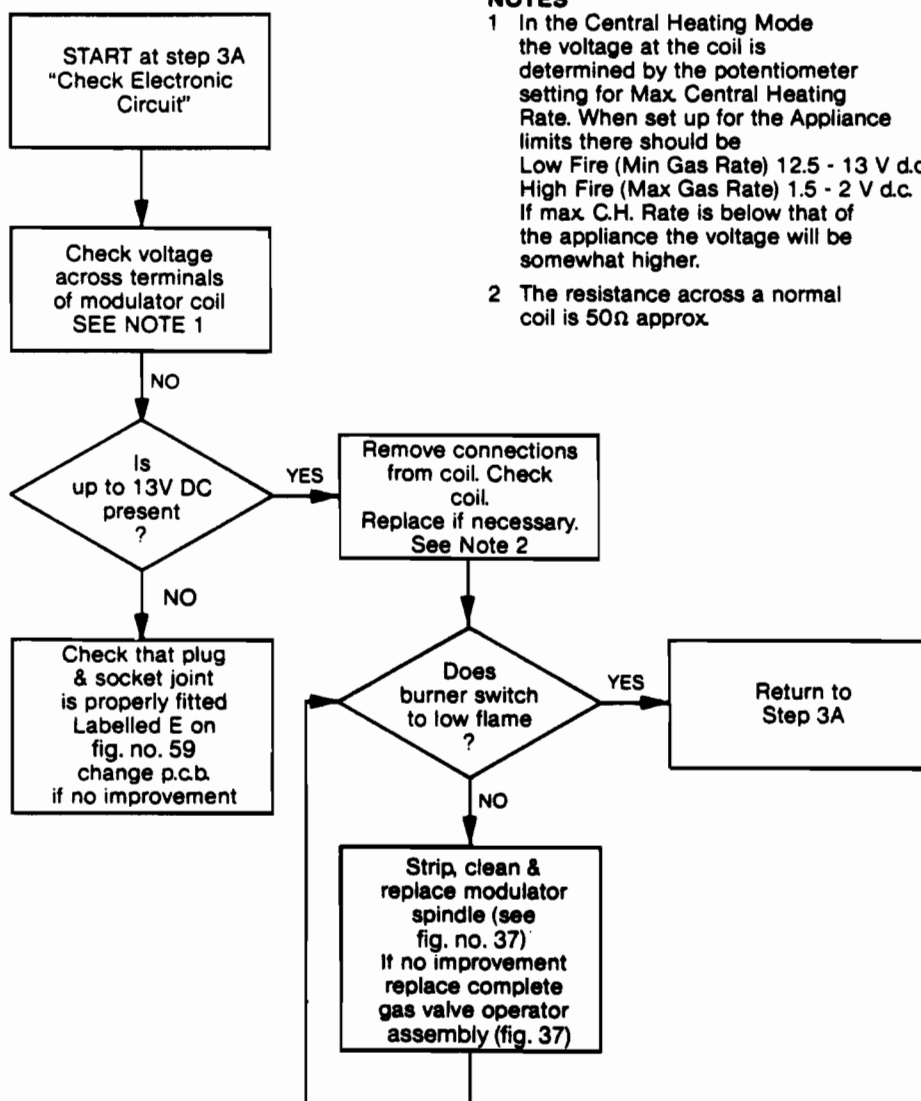


NOTES

- 1 Reduce number of radiators 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 black leads are 240VAC. The pink leads are 12.5V DC. Do not confuse.

FAULT FINDING STEP 3B

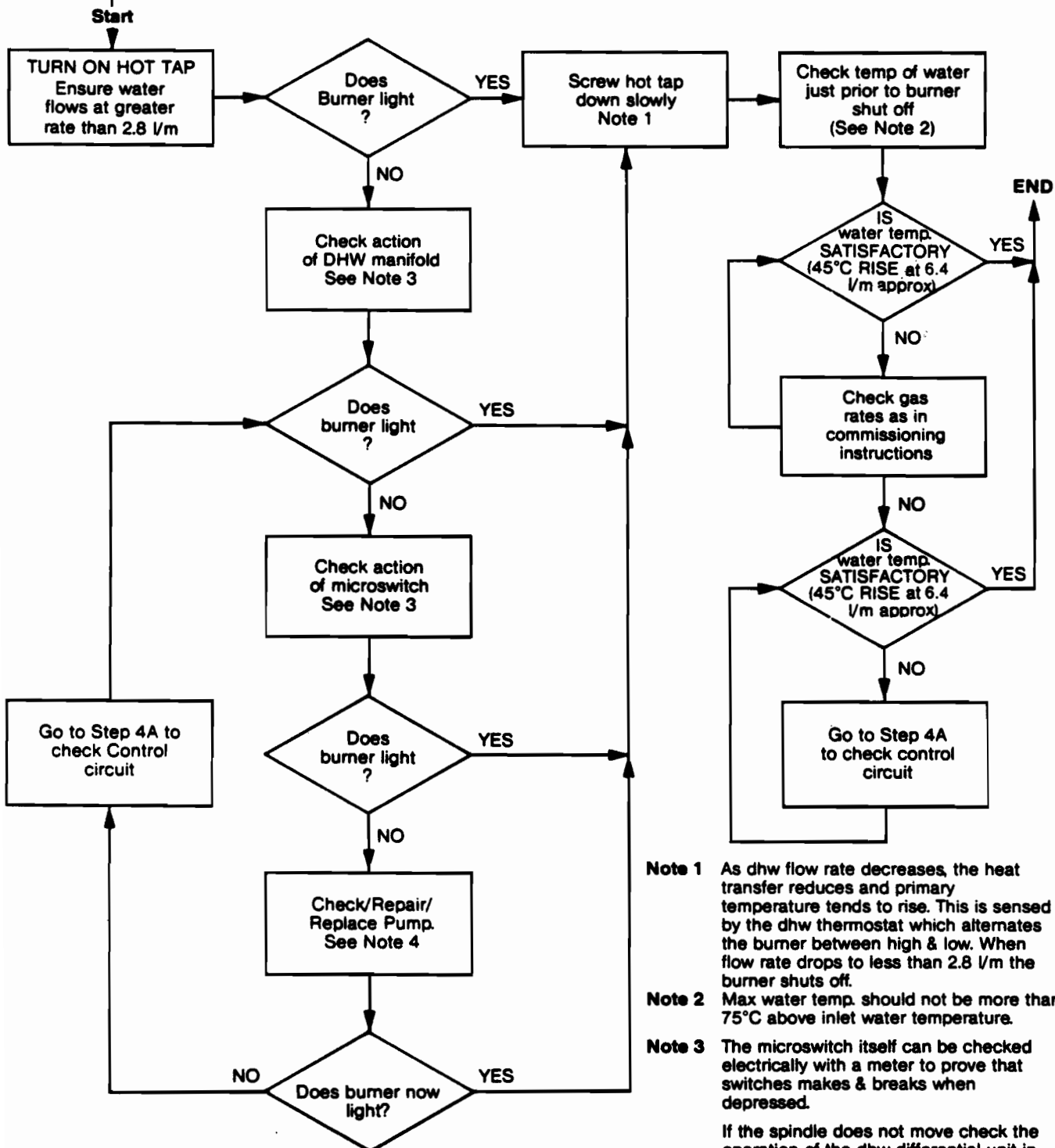
CHECK ELECTRONIC CIRCUIT IN C/H MODE



FAULT FINDING STEP 4

CHECKING DOMESTIC HOT WATER FUNCTION

Basic wiring & functions have been checked by procedures in step 3.
Open air release tap (to ensure DHW heat exchanger is fully cleared of air). Light pilot, switch boiler on select Summer position. DHW thermostat at 9



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

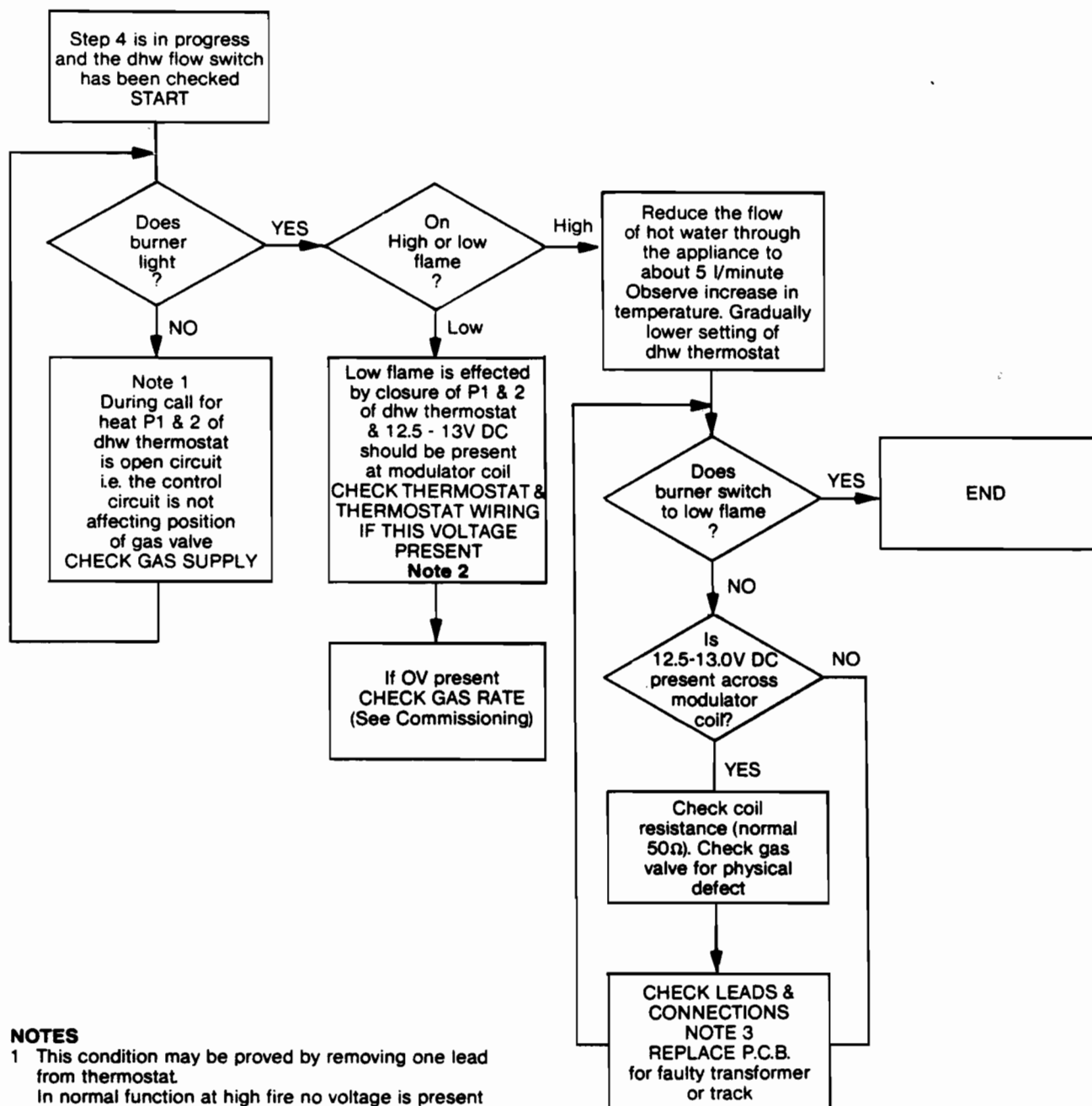
Note 2 Max water temp. should not be more than 75°C above inlet water temperature.

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

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

Note 4 The sequence has assumed that Step 3 has been concluded (see box top left). If the pump is not faulty double check Step 3. Look additionally for a blockage in pump or pipework.

FAULT FINDING STEP 4A **CHECK CONTROLS IN DHW MODE**



NOTES

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

2 If tab connector is on terminal 1 instead of 2 fault will occur.

3 To establish low flame 12.5 to 13.0 V d.c. must be present across the modulator coil. Absence due either to transformer or faulty circuit.

CHECK FOR CORRECT WIRING & CONTINUITY.

GREY lead from coil to T.7 on pcb

PURPLE lead from 8 to common of flow switch

RED from Normally Open of flow switch to 2 on dhw stat

RED from P1 on stat to 9 on pcb

Instructions for (A) Fitting Vokera Time Switch to Appliance

(B) Wiring to external Time Switches, Room Thermostats and Frost Thermostats

A. Fitting Vokera Time Switch

- 10.1 Switch OFF electricity supply to the appliance.
- 10.2 Gain access following instructions in Clauses 8.4.1 & 8.4.2
- 10.3 Remove blank panel marked ENERGY SAVING from the control panel by releasing 2 nuts at the back.
- 10.4 Remove clock from box. Twist clear plastic front cover clockwise and lift off exposing screw on corner.
- 10.5 Remove screw. Grip the backplate firmly by the corners nearest the terminal block and pull off the back plate (fig 1).
- 10.6 Detach the grey plastic fixing strap from the clock by pulling the side lugs clear of the serrated surface of the clock and sliding the strap clear.
- 10.7 Push the clock through the aperture in the panel and slide the fixing strap over the body pushing it home against the rear of the panel to hold the clock firm. Figs 3 & 4.
- 10.8 Using the wiring loom provided with the clock, wire as follows. (Fig. 4)
- 10.9 Wire the back plate and press it on to the rear of the clock. Tighten fixing screw.
- 10.10 Close up boiler. Refit plastic clockface cover.

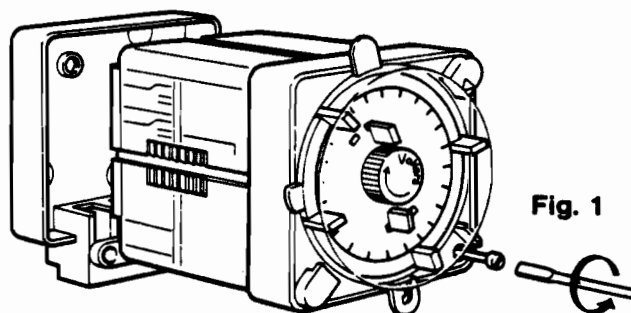


Fig. 1

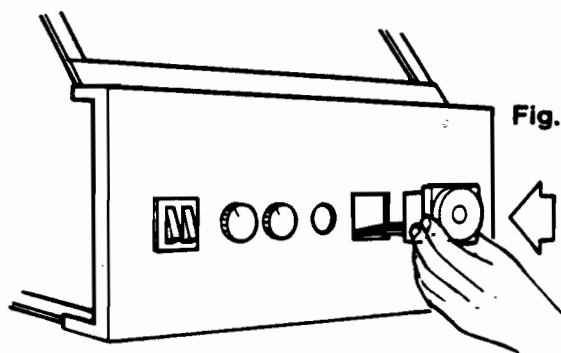


Fig. 2

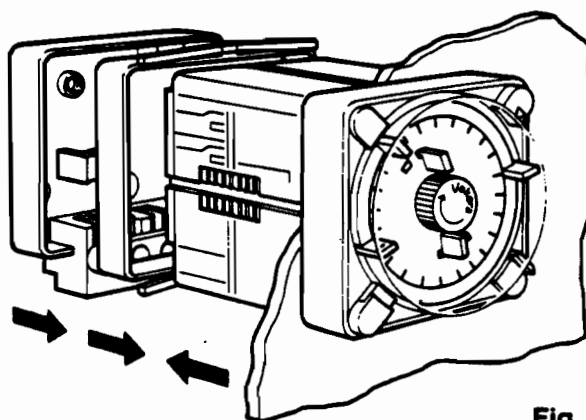


Fig. 3

Black wire: Remove existing black wire on boiler AUTO/SUMMER/WINTER switch, fit double connector on to terminal and refit existing wire.

Brown wire: Connects to spare terminal on AUTO/SUMMER/WINTER switch.

White wire: Connects to terminal 3 on main terminal strip.

Blue wire: Connects to terminal 5 on main terminal strip.

Remove the loop between terminals 3 & 4 on the boiler terminal strip if a room stat is also fitted.

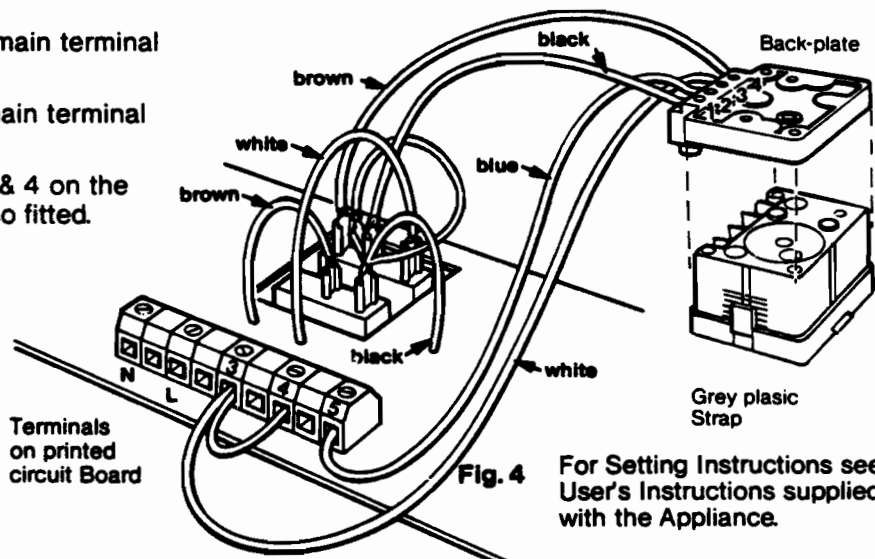
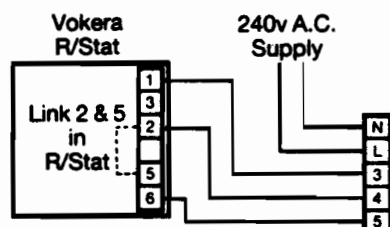
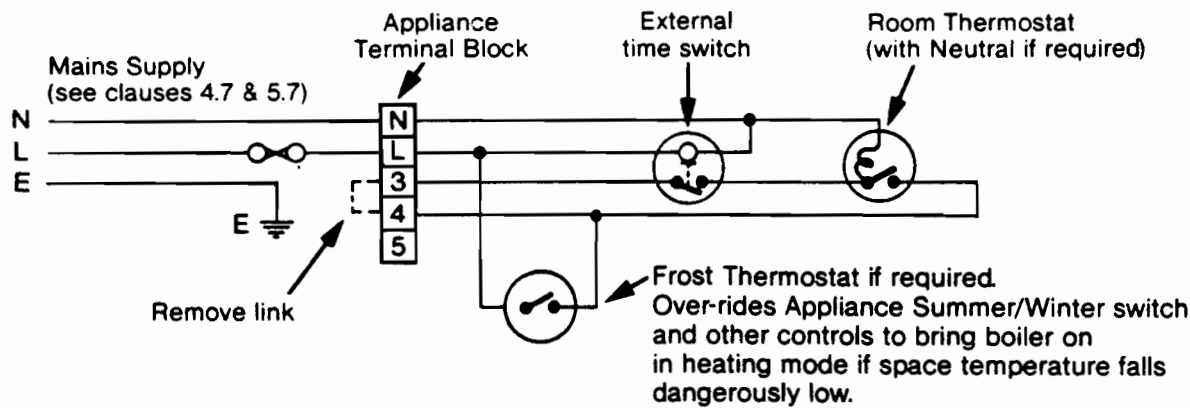


Fig. 4

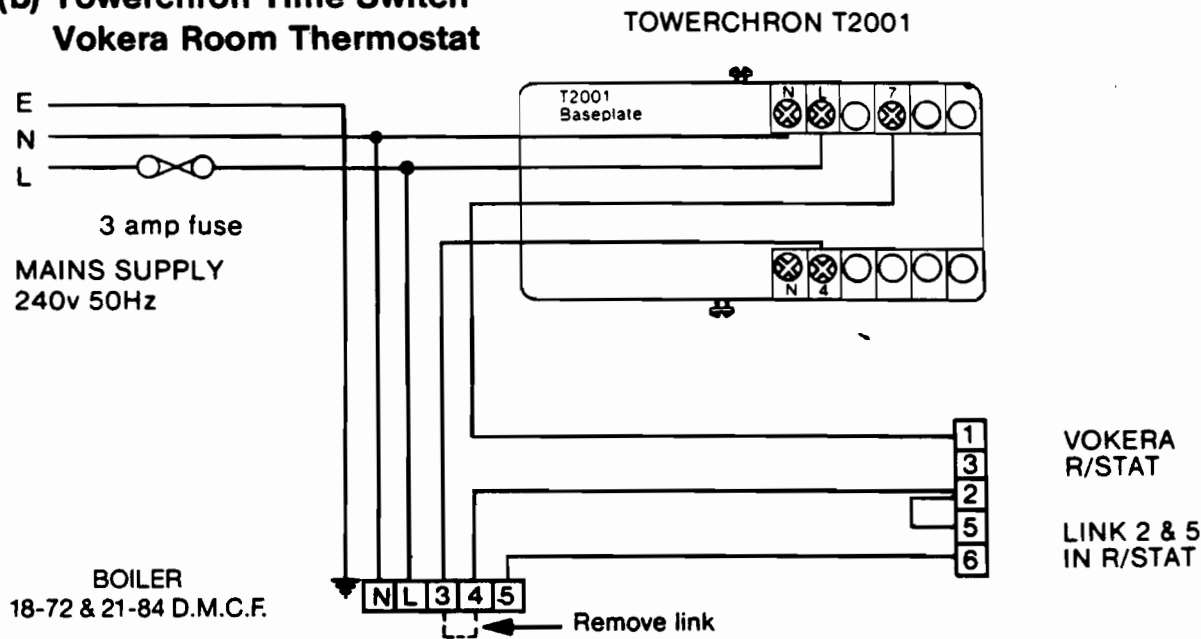
For Setting Instructions see User's Instructions supplied with the Appliance.

B. Wiring to External Time Switches and Thermostats.

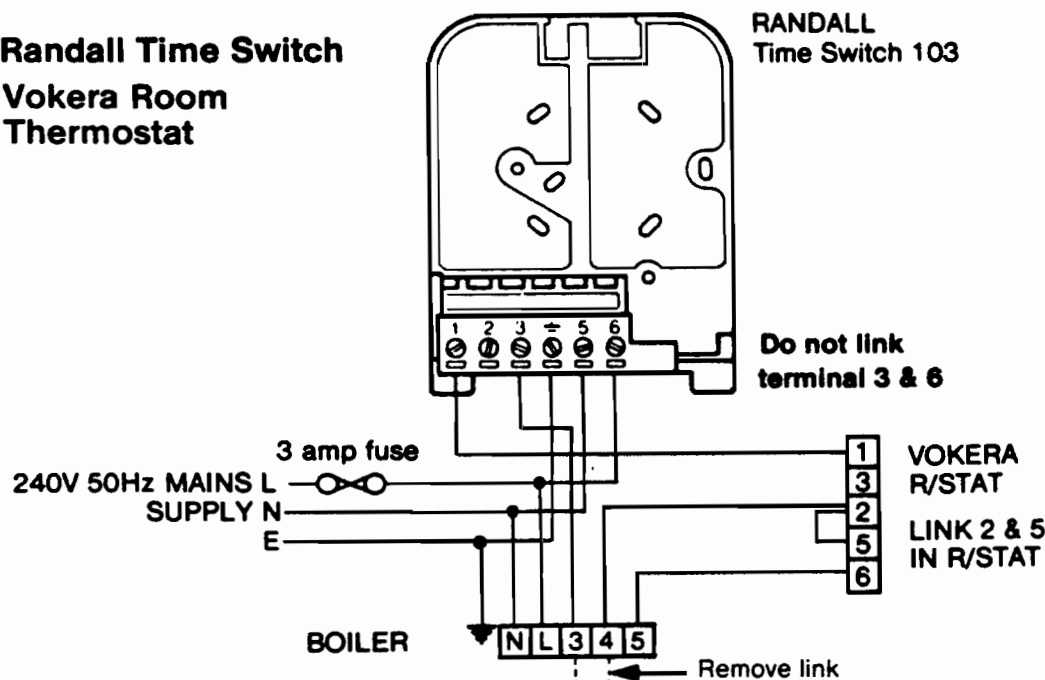
(a) General Schematic Diagram.



**(b) Towerchron Time Switch
Vokera Room Thermostat**



**(c) Randall Time Switch
Vokera Room Thermostat**



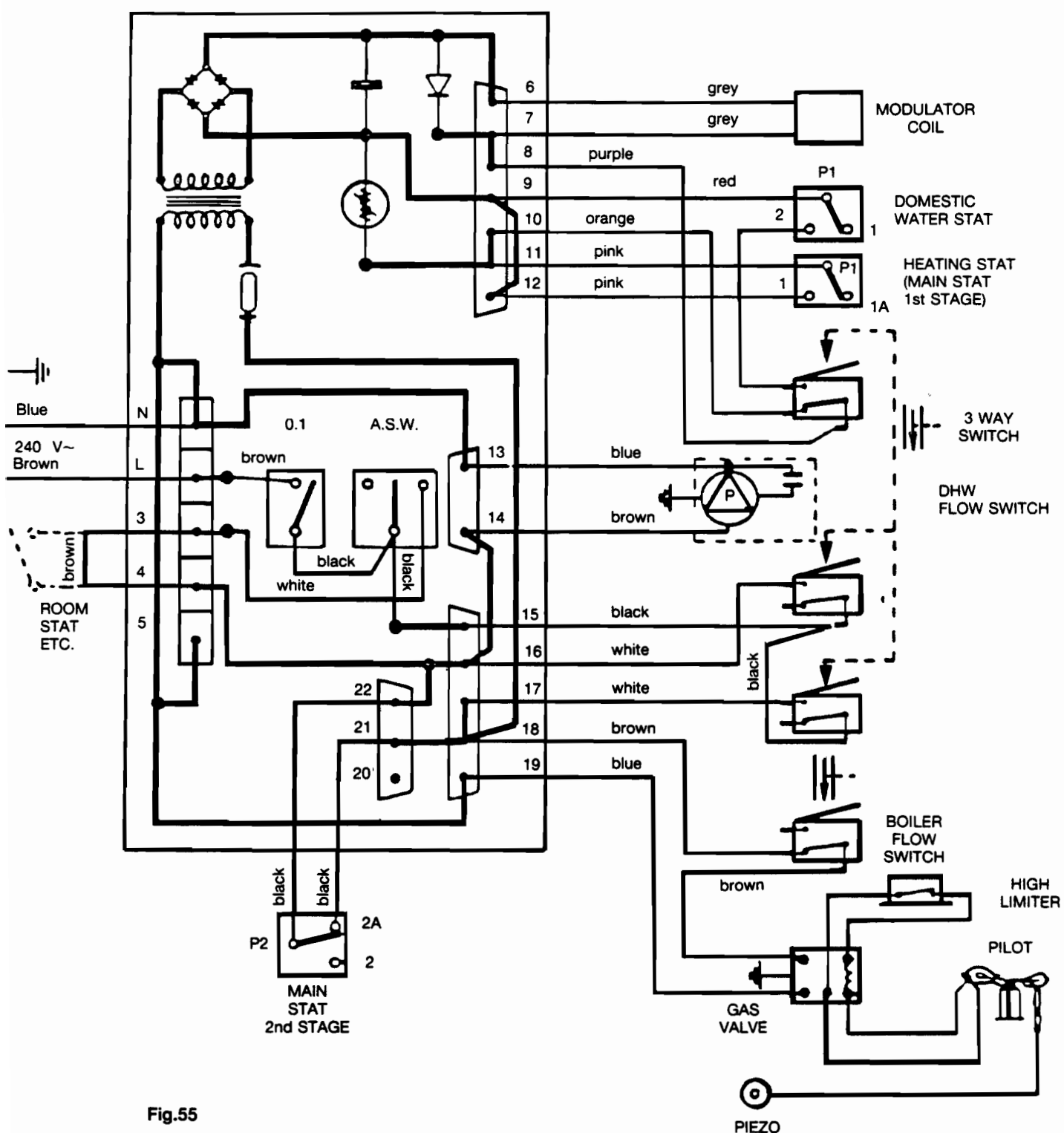


Fig.55

GENERAL LAYOUT OF WIRING FROM PRINTER CIRCUIT BOARD

FUNCTIONAL FLOW DIAGRAM General Layout

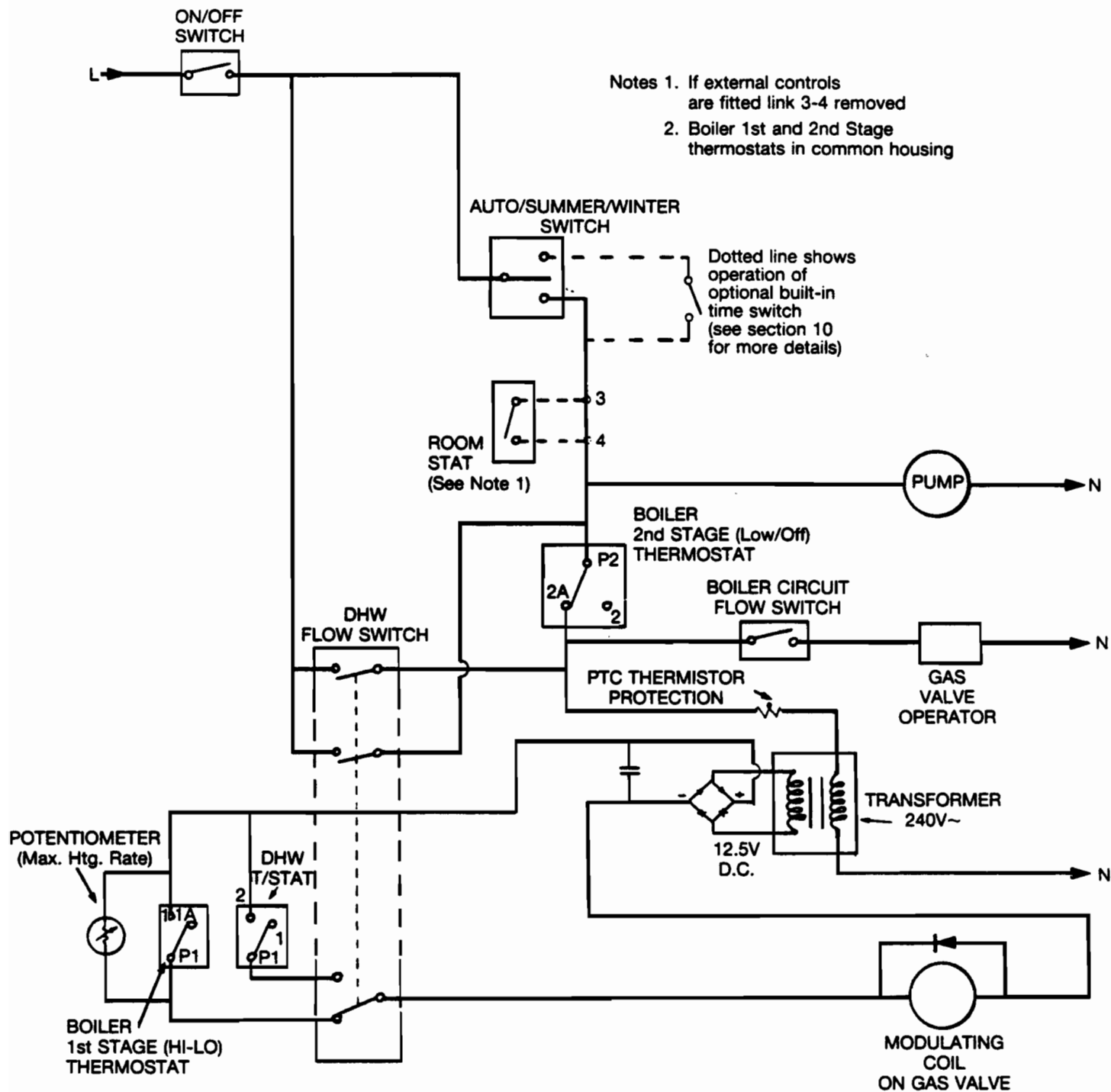


Fig.56

FUNCTIONAL FLOW DIAGRAM In d.h.w. mode

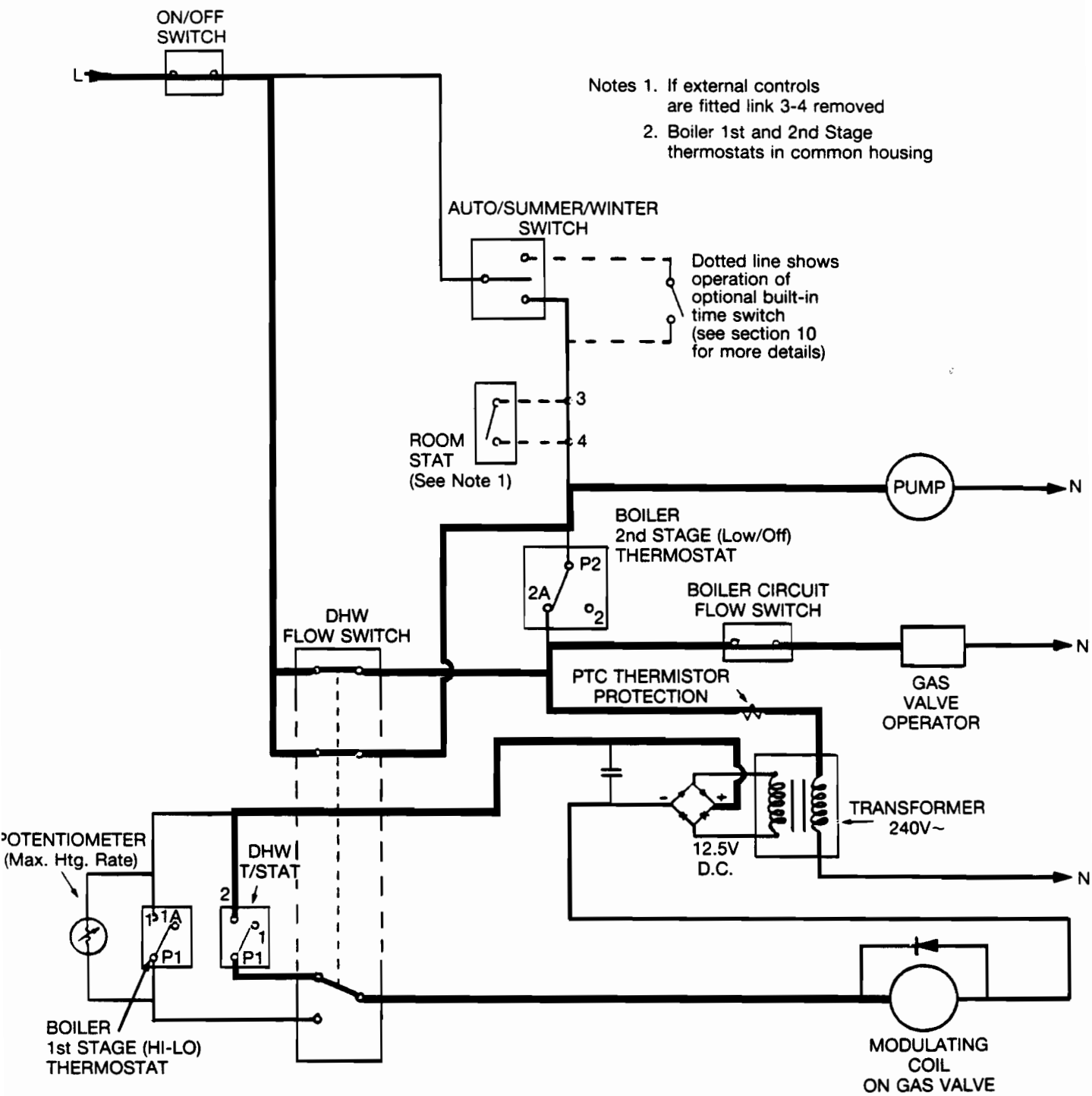


Fig.57

FUNCTIONAL FLOW DIAGRAM In central heating mode

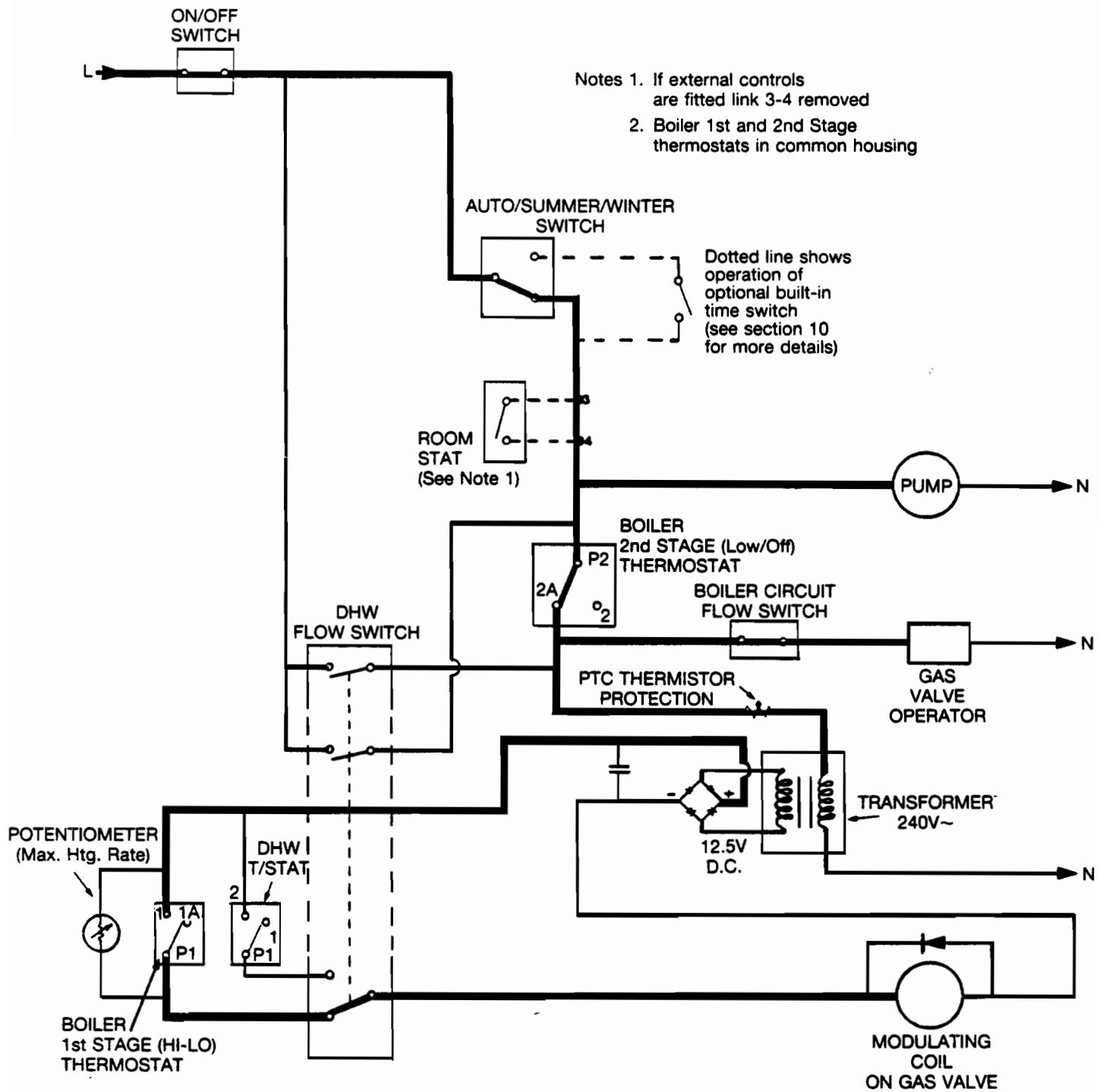


Fig.58

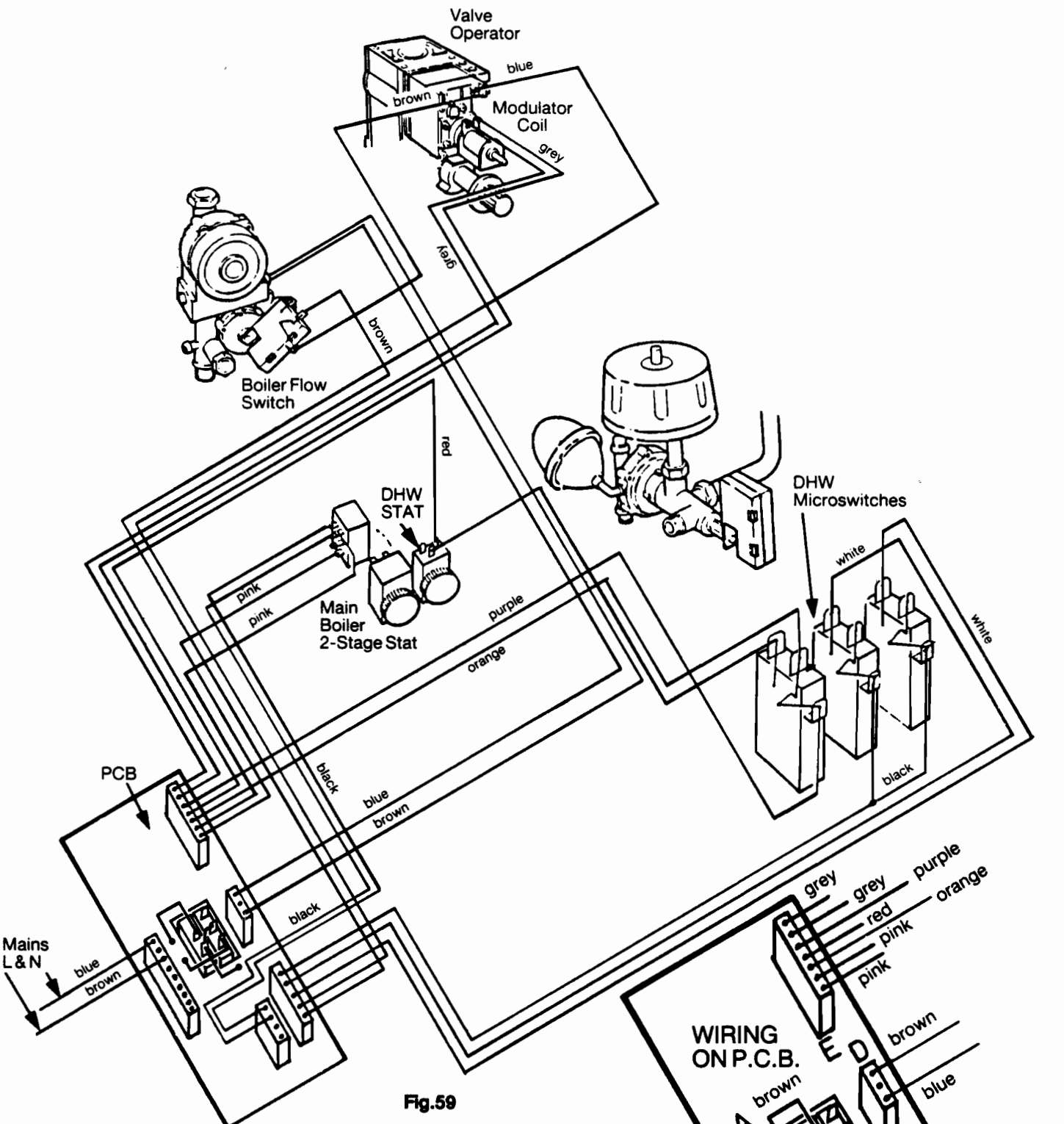
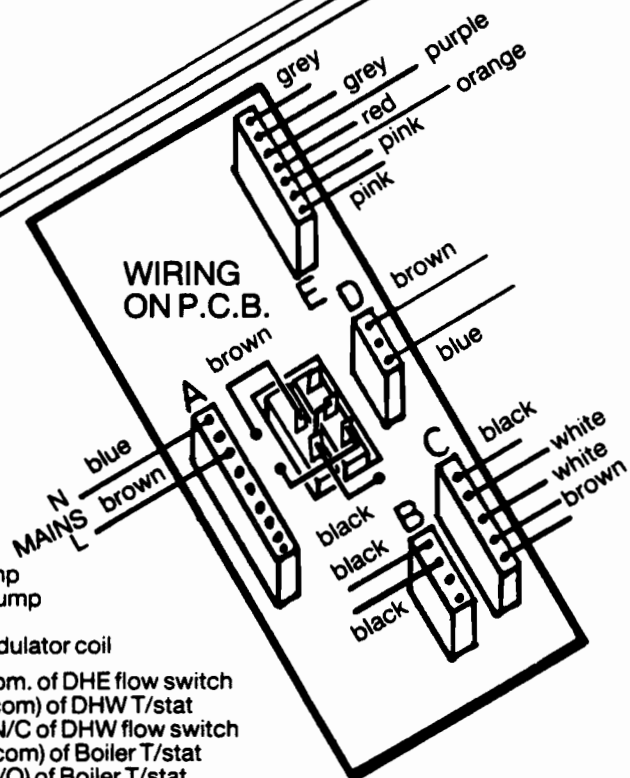


Fig.59

KEY TO WIRING ON PCB

A	N	Blue for Mains Neutral
	L	Brown for Mains Live
	3	White to Timed/constant Switch (via P)
	4	Brown link (removed if terminals used for external control)
	5	
B	22	Black to P2(Com) of Main Thermostat
	21	Black to 2A(N/C) of Main thermostat
C	15	Black to Com of DHW flow switch
	16	White to N/O of DHW flow switch
	17	White to N/O of DHW flow switch
	18	Brown to N/C of Boiler flow switch
	19	Blue to Gas valve operator

D	13	Blue to pump
	14	Brown to pump
E	6	Grey to Modulator coil
	7	
	8	Purple to com. of DHE flow switch
	9	Red to P1(com) of DHW T/stat
	10	Orange to N/C of DHW flow switch
	11	Pink to P1(com) of Boiler T/stat
	12	Pink to 1 (N/O) of Boiler T/stat



8.1 General

8.1.1 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.

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

8.2.1 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.

Always after any service work and after exchanging any electrical component follow the instructions in the British Gas Multi Meter Book for preliminary electrical system checks, particularly the checks,

A Earth continuity
C Polarity, and
D Resistance to earth

8.3 Recommended Routine Servicing

8.3.1 Annual Servicing

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

1. Inspect exterior for signs of damage and deterioration particularly of flue pipework and electrical connections.
2. Inspect air supply and ventilation arrangements comparing them with the requirements laid down in clauses 4.6.1 & 2 to ensure no alterations have been made since installation.
3. Turn off mains electricity and remove front casing (see clauses 8.4.1 - 8.4.2)
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 a preliminary inspection of its operation. This is accomplished by opening a domestic hot water draw off tap, e.g. yellowing of flame tip, flame lift off or sooting.

5. Ensure central heating valves (fig 1A) are open. Note these are 1/4 turn valves, red handles vertical indicate open.

Observe pressure gauge reading (fig 1A) which should be approximately 10m.w.g. 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 and 8.5
8. Remove pilot burner assembly and brush clean. Inspect pilot injector and blow clean (see clause 8.5)
9. Remove main burner. 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 8.6 and 8.7)
10. Place cloth below combustion chamber to catch debris.

Remove the front cover of flue hood to gain access to the main heat exchanger and lightly clean with stiff long bristle brush.
11. Inspect combustion chamber lining. The insulating material is easily damaged. Do not scrape, but clean off lightly.

If any panels are damaged these should be replaced (see Clause 8.10)
12. Replace all parts but leave the controls fascia open and outer casing off.
13. Undertake a complete commissioning check as detailed in section 6.
14. With the appliance operating at maximum input (DHW) carry out spillage test at the draught diverter in accordance with BS5440:1:1978.
15. Close up control fascia and refix front casing.
16. Clean off casing using soft cloth and diluted detergent.

8.3.2 Occasional Servicing

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

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

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

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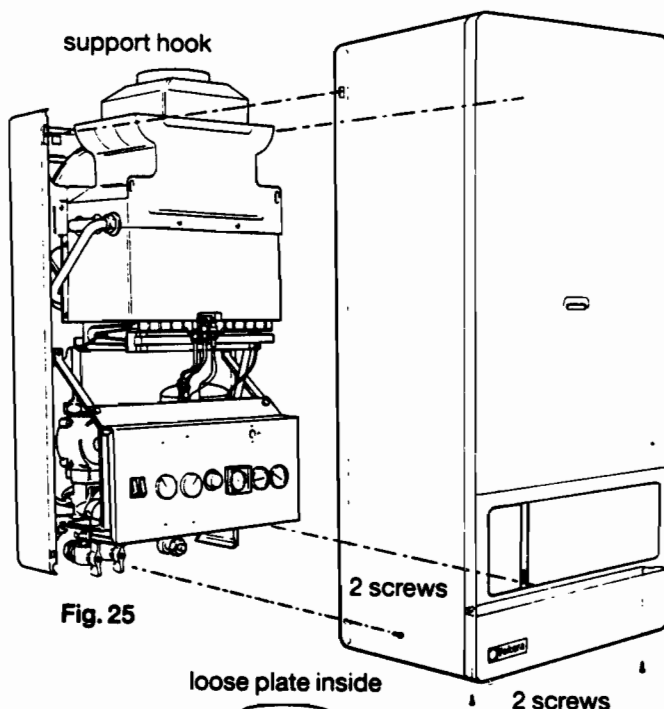


Fig. 25

8.4 To Gain general Access

To remove components access to the interior is essential. Refer to figs 25-27

8.4.1 To remove front casing

Release 4 screws at the base. 2 vertical towards front and 2 horizontal towards rear.

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

Slightly spring sides of case outwards and withdraw from the appliance.

8.4.2 To open controls fascia (fig 26 & 27)

Release 2 screws at the top of the fascia.

Swing fascia forwards and down depressing the gas control knob which otherwise would impede free movement.

8.4.3 Servicing may be easier if lower plastic grille is removed.

Release 2 vertical screws and pull grille downwards.

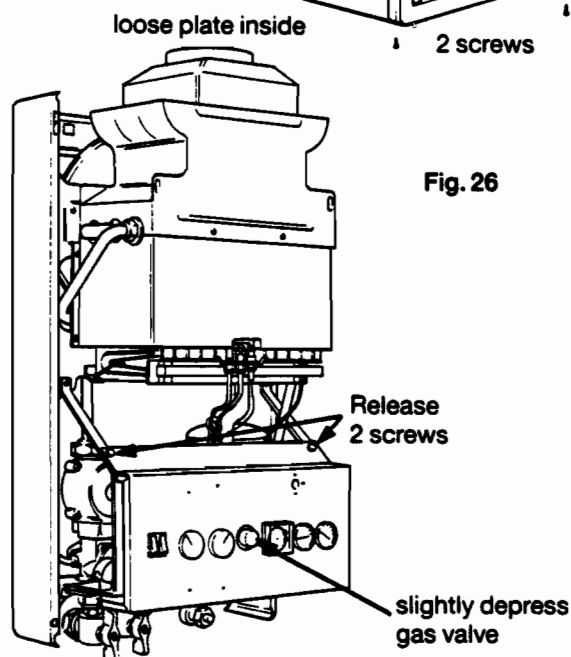


Fig. 26

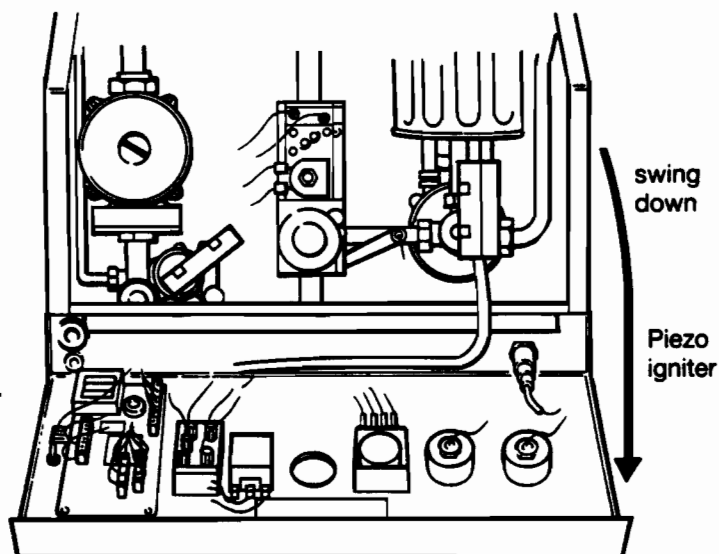


Fig. 27

8.5 To remove/replace electrode, thermocouple and pilot burner

Refer to fig no. 28 & 29

For part no reference see figs 53 & 54

8.5.1 Gain general access as (8.4)

8.5.2 To Remove Electrode

8.5.2.1 Pull off electrode lead.

8.5.2.2 Unscrew electrode retaining nut.

8.5.2.3 Remove electrode.

8.5.2.4 Replace in reverse order.

8.5.3 To remove/replace thermocouple

8.5.3.1 Unscrew retaining nut at burner end and pull out probe.

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

8.5.3.2 Disconnect thermocouple at gas valve end.

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

8.5.4 To remove/replace pilot burner and/or injector

8.5.4.1 Remove electrode and thermocouple (8.5.2-8.5.3).

8.5.4.2 Unscrew pilot supply pipe union, and withdraw pipe

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

8.5.4.3 Release 2 screws securing pilot burner assembly.

8.5.4.4 Reassemble in reverse order.

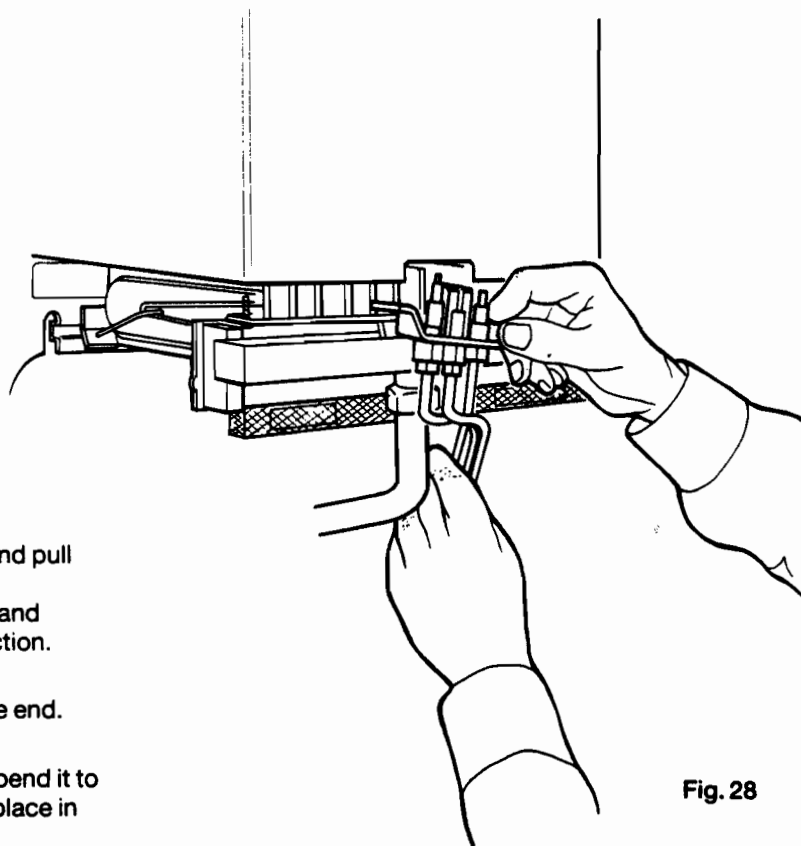


Fig. 28

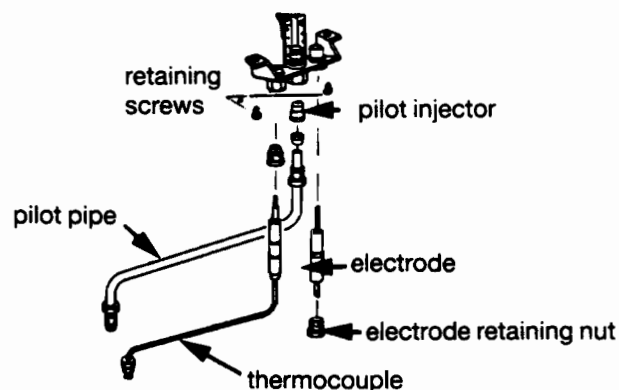


Fig. 29

8.6 To remove burner bar & main injectors (figs 30 & 31)

8.6.1 Gain general access (8.4)

8.6.2 Remove pilot burner (8.5.3)

8.6.3 Unscrew gas supply union.

8.6.4 Release 4 burner bar securing screws, tilt bar backwards and pull forwards, then slide out carefully. If difficulty is found in disengaging the supply pipe, undo the union at the appliance service tap to permit greater flexibility of the supply pipe. Ensure the rubber seal on the supply pipe is intact, if damaged, replace during re-assembly.

8.6.5 If necessary remove lint guard and unscrew injectors (13 for 18-72. 15 for 21-84.)

8.6.6 Reassemble in reverse order.

8.7 To remove main burner (figs 32 - 33)

8.7.1 Carry out operations 8.6.1 - 8.6.5

8.7.2 Release two vertical screws securing front of burner.

Ease burner downwards and forwards. It will disengage from rear support pegs.

8.7.3 Reassemble in reverse order.

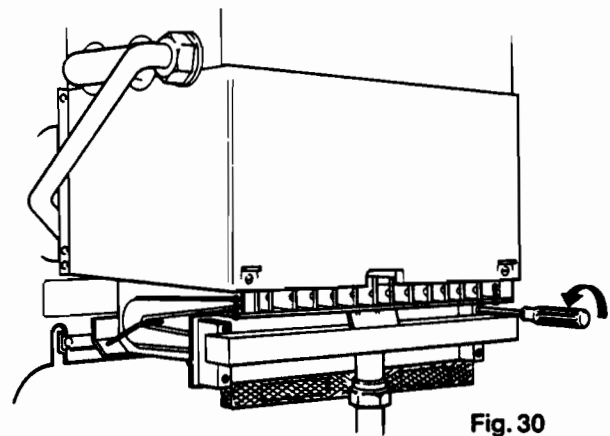


Fig. 30

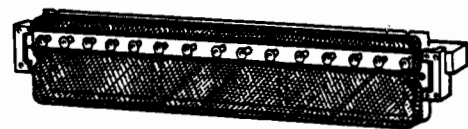


Fig. 31

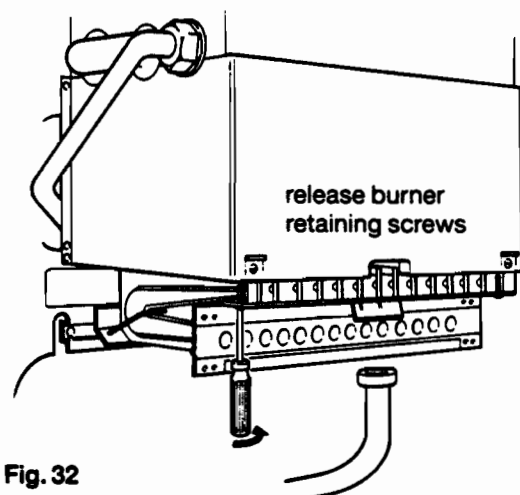


Fig. 32

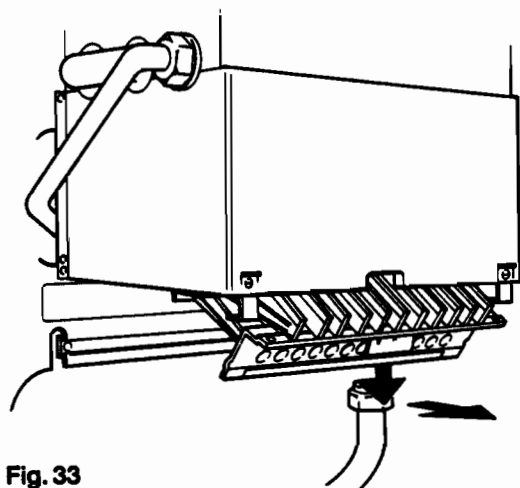


Fig. 33

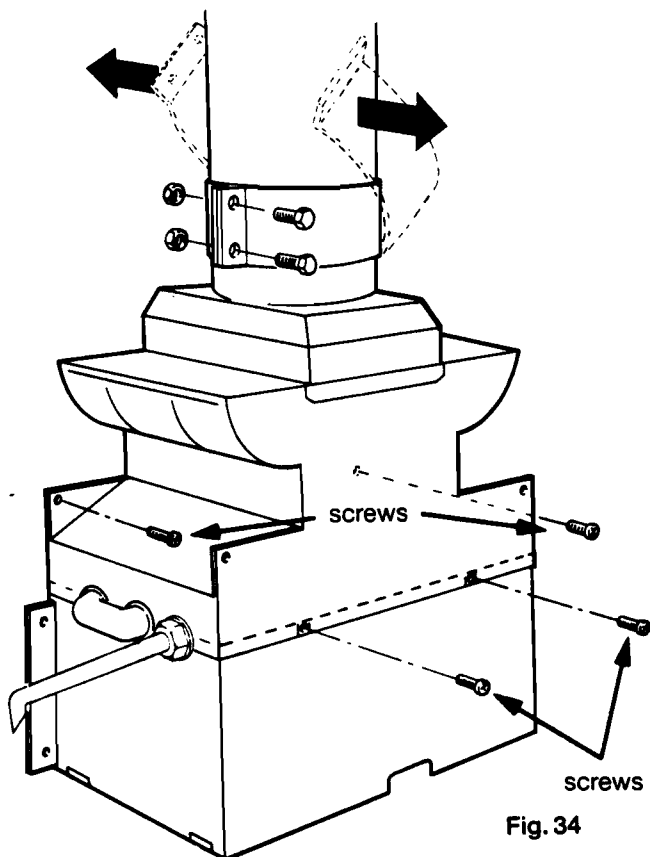


Fig. 34

8.8 To remove flue hood
Part No. 4344 Fig 53 (18-72)
Part No. 4343 Fig 54 (21-84)
Refer to figs 34 & 35

- 8.8.1 Gain general access (8.4)
- 8.8.2 Remove split collar from flue connection
- 8.8.3 Release 4 screws (2 on face, 2 on back frame) and ease flue hood up.
- 8.8.4 Reassemble in reverse order.

8.9 To remove heat exchanger
Part No. 4755 Fig 53 (18-72)
Part No. 4333 Fig 54 (21-84)
Refer to fig 35

- 8.9.1 Carry out operations 8.8.1 - 8.8.4
- 8.9.2 Close heating valves ($\frac{1}{4}$ turn until red handle is horizontal). Turn safety valve $\frac{1}{4}$ turn to drain appliance.
- 8.9.3 Place cloth under heat exchanger to catch surplus water. Unscrew unions at each end. Unscrew domestic thermostat retaining nut and withdraw sensor. Lift heat exchanger to clear casing and pull forward. Avoid spillage of water on boiler electrics.
- 8.9.4 Reassemble in reverse order.

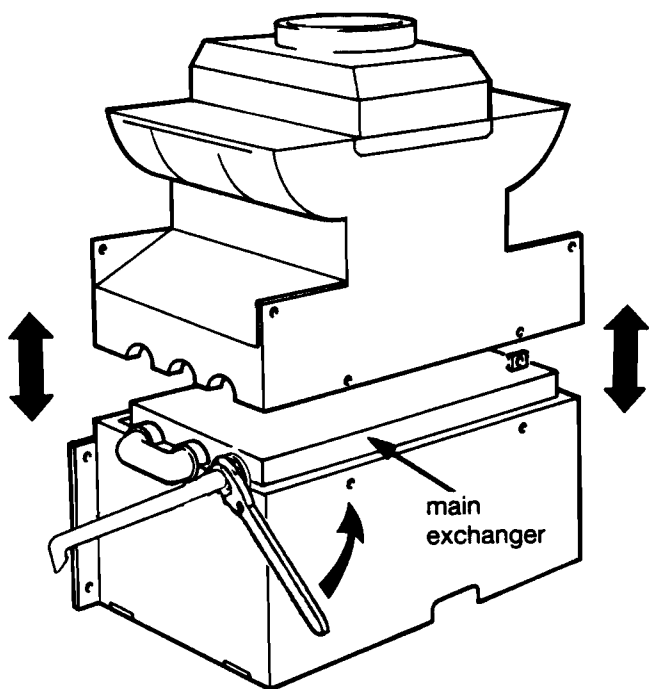


Fig. 35

8.10 To remove Combustion Chamber Insulation Panels
Part No. 0363 Fig 53 (18-72)
Part No. 0361 Fig 54 (21-84)
Refer to fig 36

- 8.10.1 Carry out operations 8.8.1 to 8.8.4 and 8.9.2 to 8.9.3
- 8.10.2 Gently prise panels inwards in order shown and lift out.
- 8.10.3 Reassemble (N.B. very brittle) in reverse order.

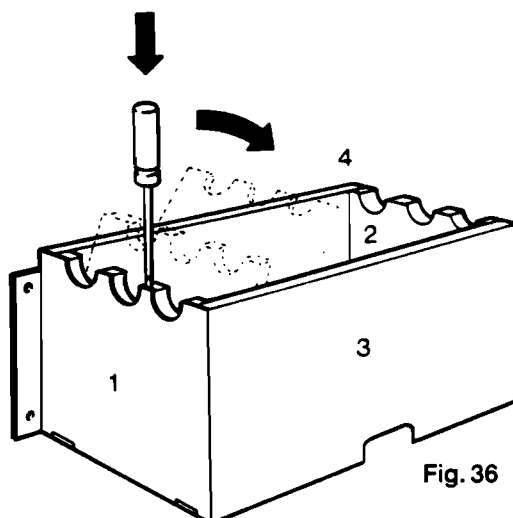


Fig. 36

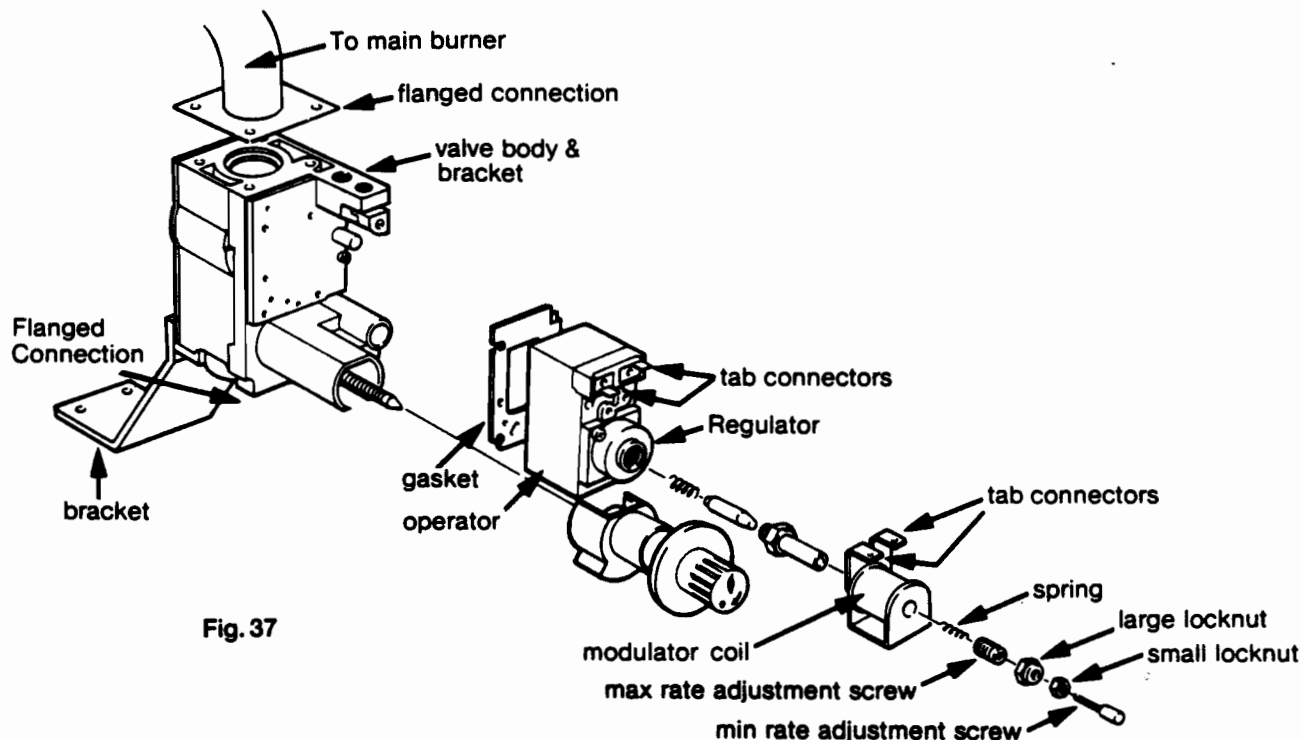


Fig. 37

8.11 To remove/replace gas control valve modulator and operator (Refer to fig 37)
For part nos see figs 53 & 54

8.11.1 Gain general access (8.4)

8.11.2 Modulator Coil (fig 37)

8.11.2.1 Pull off electrical leads from tab connectors.

8.11.2.2 Slacken large locknut, unscrew max. rate adjustment screw and remove (N.B. take care of spring)

8.11.2.3 Remove modulator coil.

8.11.2.4 Replace in reverse order (see fig 59 for electrical connections)

8.11.2.5 Check burner pressures (cl. 6.7)

8.11.3 Operator (fig 37)

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

8.11.3.2 Remove modulator coil (8.11.2).

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

8.11.3.4 Remove operator, exposing gasket.

8.11.3.5 Replace in reverse order using new gasket (see fig 59 for electrical connections)

8.11.3.6 Check burner pressures (cl. 6.7)

8.11.4 Gas Control Valve (fig 37)

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

8.11.4.2 Disconnect leads from high limit thermostat, and disconnect thermocouple and pilot supply pipe connections.

8.11.4.3 Remove screws securing bracket to base frame

8.11.4.4 Remove 4 flange securing screws at each end, and withdraw valve (This may be easier with gas pipe disconnected from main burner)

8.11.4.5 Replace in reverse order using new gaskets

8.11.4.6 Test all disturbed joints for gas soundness. Check burner pressures (cl. 6.7). If incorrect, adjust as instructed in cl. 8.21.

8.12 To remove pump (figs 38 & 39)

8.12.1 Gain general access (8.4)

8.12.2 Close heating flow and return valves (fig 1A (19 & 21) ¼ turn until red handle is horizontal.

8.12.3 Drain appliance via safety valve by ¼ turn of safety valve knob

8.12.4 Disconnect pipe union connection at heat exchanger and pull pipe upwards with a slight twisting movement to remove from pump union.

8.12.5 Grasp pump and pull upwards with a slight twisting movement to disconnect at inlet.

8.12.6 Disconnect electrical leads from pump.

8.12.7 Reassemble in reverse order. Reconnect electrical leads. Brown to L, Blue to N, Yellow/Green to E.

8.13 To remove heating manifold

Part No. 3208 figs 53 or 54
Refer to fig 39

8.13.1 Remove pump (8.12)

8.13.2 Disconnect safety valve discharge, and heating valve unions.

8.13.3 Remove retaining screw (securing manifold to frame)

8.13.4 Disconnect unions including expansion pipe union, connecting pipe from 3 port valve and pressure gauge connection.

8.13.5 Unscrew and remove retaining nut and remove micro switch.

8.13.6 Remove manifold.

Manifold Assembly

Release cover retaining screws and ease off with a screwdriver.

Refer to figs 39 and 53 or 54 for location of components.

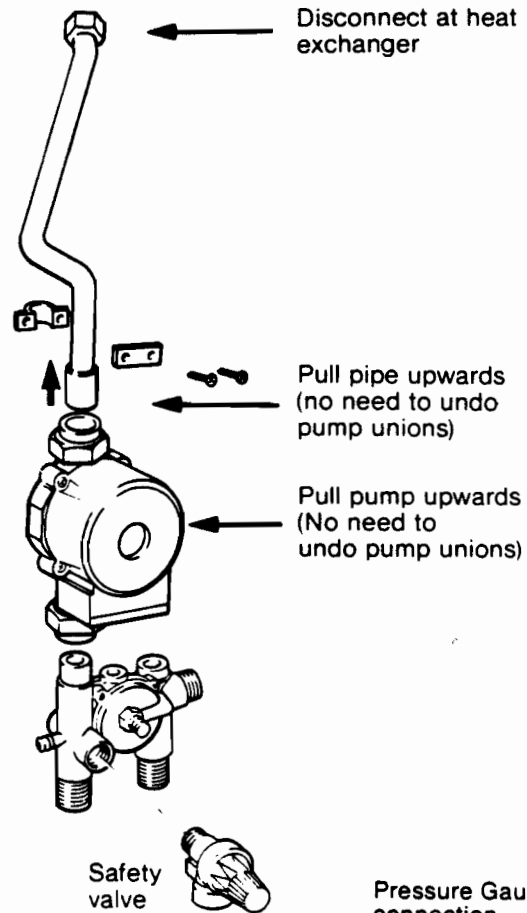


Fig. 38

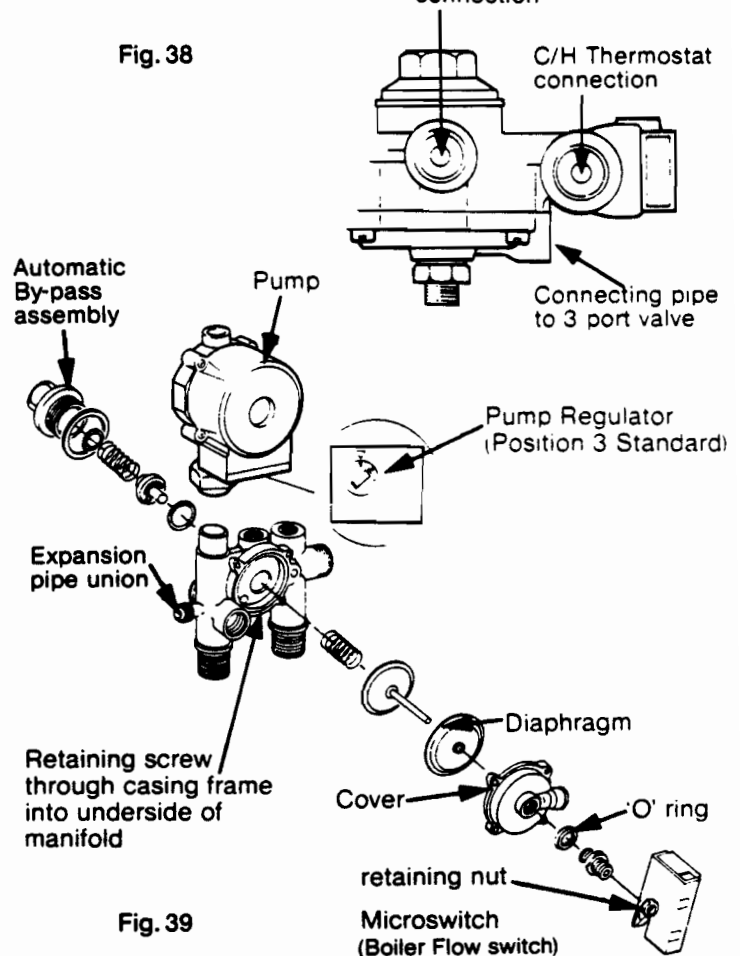


Fig. 39

8.14 Removal of Domestic Hot Water Heat Exchanger

Refer to fig 40 & 41

- 8.14.1 Gain general access (8.4)
- 8.14.2 Close cold water inlet stopcock and central heating valves
- 8.14.3 Open lowest draw-off or drain tap on hot water system.
- 8.14.4 Turn safety valve ¼ turn to drain primary side (and unscrew air vent on top of heat exchanger).
- 8.14.5 Place receptacle or an absorbent pad below appliance to catch trapped water.
- 8.14.6 Remove retaining nut and remove micro switch (8.19.3)
- 8.14.7 Disconnect 3 union nuts leaving nut A and disconnect the union on the heating manifold at the opposite end of the pipe secured by nut A.
- 8.14.8 Remove DHW thermostat sensor. Disconnect main flow pipe unions from heat exchanger and 3 port valve and carefully move aside.
- 8.14.9 Ease the unit and pipe out of the appliance. Disconnect nut A.
- 8.14.10 Reassemble by connecting pipe with nut A hand tight and ease into appliance connecting pipe at manifold and tighten all nuts.
- 8.14.11 Reassemble in reverse order

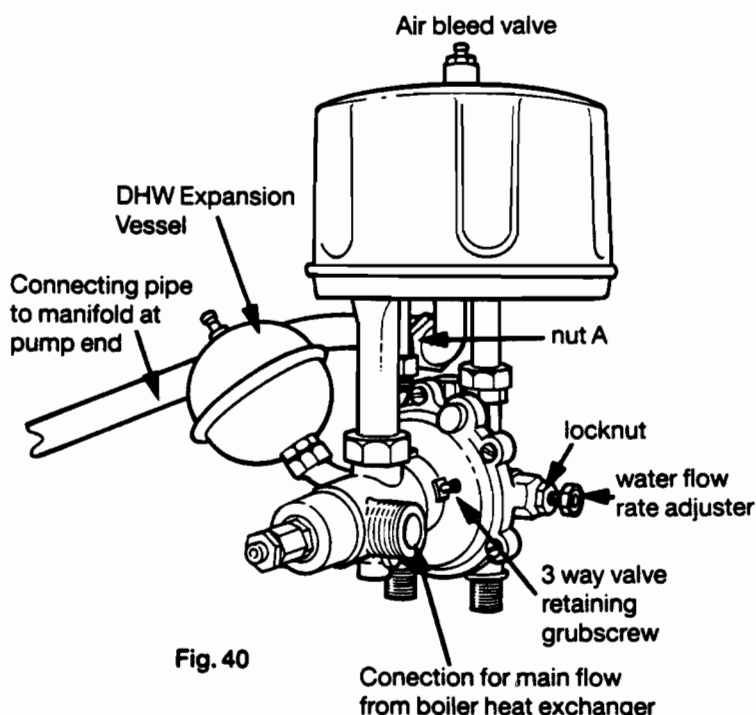


Fig. 40

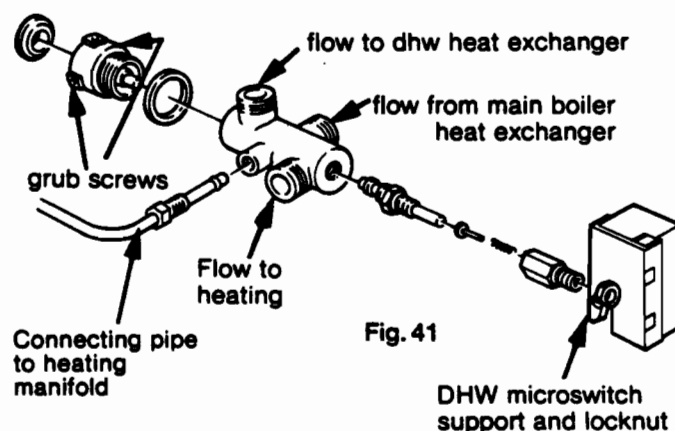


Fig. 41

8.15 Removal of 3-way diverting valve

Refer to figs 40 & 41

- 8.15.1 Gain general access (8.4)
- 8.15.2 Close central heating valves (¼ turn until red handle is horizontal)
- 8.15.3 Drain appliance via safety valve by ¼ turn of knob.
- 8.15.4 Unscrew retaining nut and remove micro switch
- 8.15.5 Disconnect 3 pipe unions. (Prepare to catch a small quantity of water.)
- 8.15.6 Unscrew connecting pipe to heating manifold.
- 8.15.7 Slacken retaining grub screws securing valve to manifold and withdraw valve. (if necessary slacken unions at opposite ends of connecting pipes to facilitate removal).
- 8.15.8 Reassemble in reverse order.

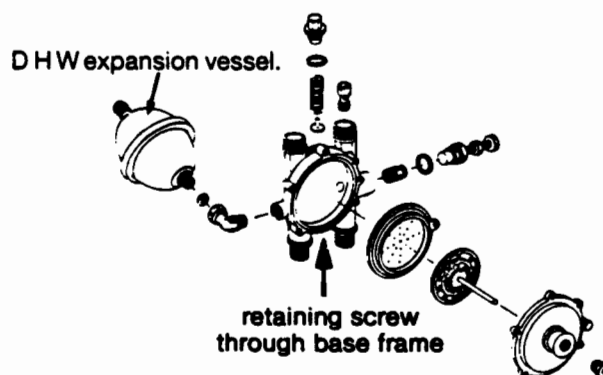


Fig. 42

8.16 Removal of Domestic Hot Water Manifold

see fig 42

- 8.16.1 Remove 3 way diverting valve (8.15)
- 8.16.2 Close cold water inlet stopcock and drain secondary side by opening draw-off or drain tap.
- 8.16.3 Remove dhw heat exchanger (8.14)

- 8.16.4 Disconnect unions at cold water inlet and hot water outlet and remove manifold retaining screw (through base frame).
Remove manifold (figs 42 & 53 or 54 give details of further disassembly).
- 8.16.5 Reassemble in reverse order.

8.17 Removal of Heating Expansion Vessel

Part No 4492 Fig 53 or 54
Refer to fig 43

- 8.17.1 Gain access (8.4)
- 8.17.2 Close central heating valves (¼ turn until red handle is horizontal)
- 8.17.3 Drain appliance via safety valve by ¼ turn of knob.
- 8.17.4 Remove top clip and unscrew union at lower end of connecting pipe.
Lift vessel and pipe together.
- 8.17.5 Remove pipe from vessel and transfer to new vessel.
- 8.17.6 Re-assemble in reverse order.

8.18 Removal of DHW Expansion Vessel (fig 42)

- 8.18.1 Gain access and drain off water (8.14.1-3)
- 8.18.2 Unscrew vessel from 135° support elbow.
- 8.18.3 Re-assemble in reverse order.

8.19 Removal of Electrical Components

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

8.19.2 Heating micro switch

Part No 4302 fig 53 or 54
Refer to fig 39

Hold switch and unscrew retaining nut
Remove switch and remove cover
Pull off electrical tab connections
Reassemble in reverse order, reconnecting electrical tab connectors following figure 59

8.19.3 DHW Microswitch

Part No 4148 fig no. 53 or 54
Refer to fig no 41

Hold switch and remove locking nut securing it to the 3 way valve
Remove switch and remove cover.
Pull off electrical tab connections.
Reassemble in reverse order reconnecting electrical tab connectors following figure 59.

8.19.4 High Limit Thermostat (Thermocouple Interruptor)

Part No. 4978 Fig No. 53 or 54
Refer to fig 44

Disconnect 2 electrical connections at Gas Control Valve. Remove split pin from carrier tube and withdraw sensor probe. Reassemble in reverse order.

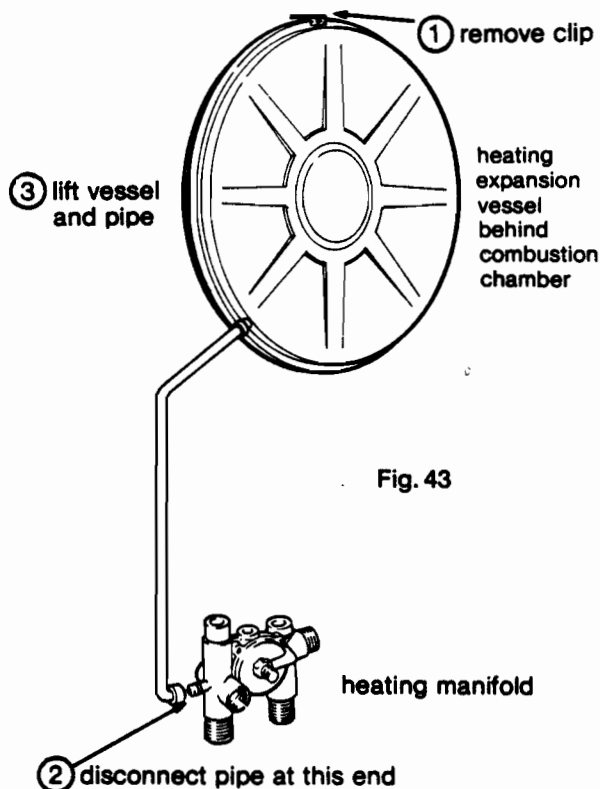


Fig. 43

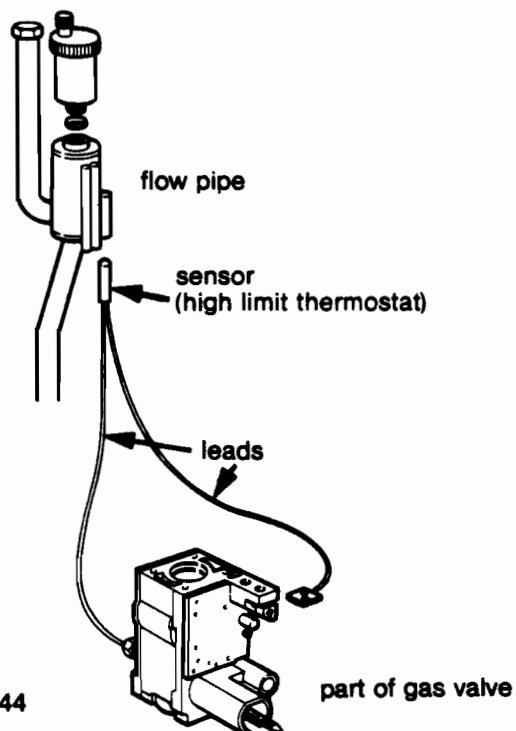


Fig. 44

8.19.5 Boiler Thermostat
Part No. 3212 Fig. No. 53 or 54
Refer to fig 45 & 46

Drain down boiler.

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

Pull electrical tabs off back of thermostat

Pull knob off front revealing 2 retaining
 screws

Remove screws to release thermostat
 and remove.

Reassemble in reverse order using a new
 fibre washer.

Refer to figs 45 & 46 to ensure correct
 location of thermostat and push-on
 wiring tabs

Refer to electrical drawing figs 46 & 59.

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

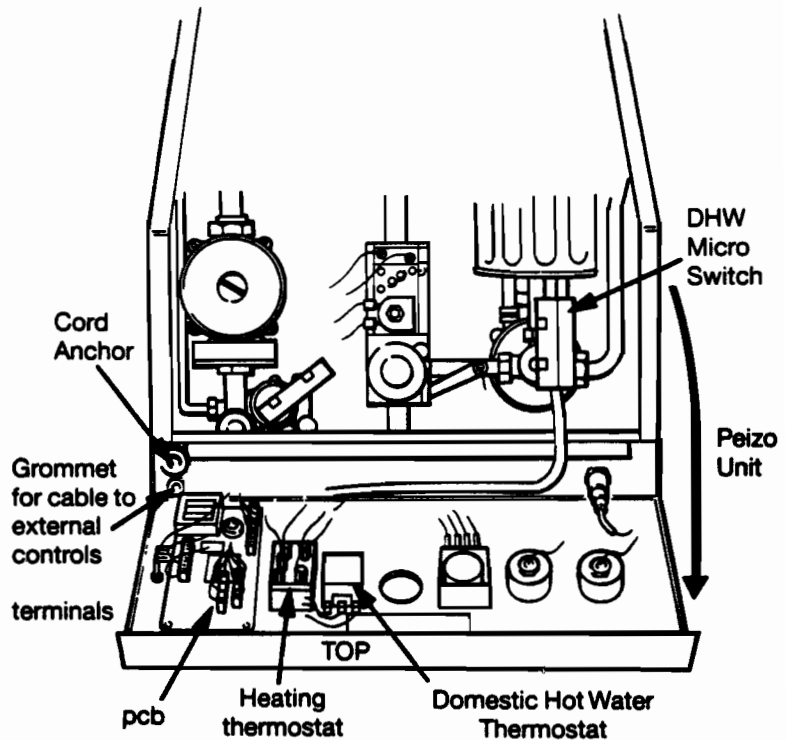


Fig. 45

8.19.6 Hot water Thermostat
Part No. 4885 Fig 53 or 54
Refer to figs 47, 50 & 51

Drain down boiler

Unscrew sensing probe from top right hand
 side of main heat exchanger.

Pull electrical tabs off back of thermostat

Pull knob off front revealing 2 retaining screws

Remove screws to release thermostat and
 remove

Reassemble in reverse order.

Refer to fig 45 to ensure correct location of
 thermostat and push on wiring tabs
 Refer to electrical drawing figs 47 & 59

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

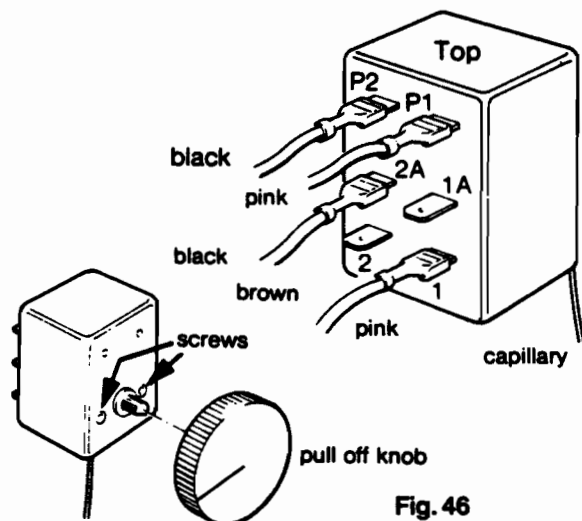


Fig. 46

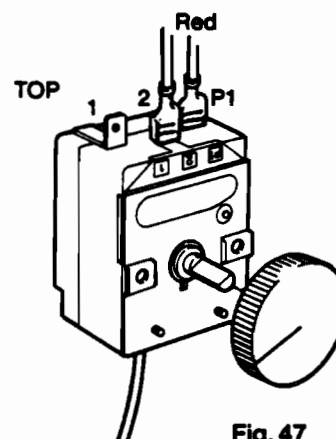


Fig. 47

8.19.7 Removal of Printed Circuit Board

Part No. 4546 Fig 53 or 54

Refer to figs 17, 18 & 48

Disconnect external wiring from terminal strip.

Remove 4 plugs from p.c.b.

Pull tab connectors off both rocker switches

Where the nylon support posts protrude through the front of the control fascia squeeze the spring tabs with pliers and push the posts inward to free the p.c.b.

Refix by pressing the support posts into the holes in the fascia.

Replace electric connections. Refer to fig 59 to ensure correct locations..

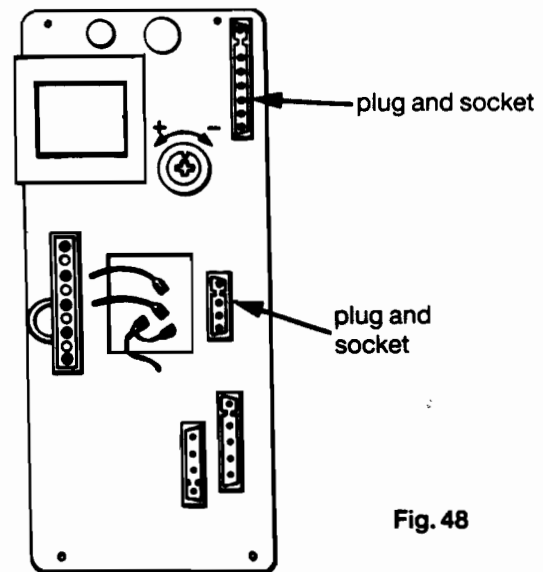


Fig. 48

8.19.8 Removal of Switches (On/Off and Auto/Summer/winter

Part no. 4980 & 4981 fig 53 or 54

Refer to figs 49 & 51

(Removal of the "on/off" and "Auto/Summer/Winter" switches may best be accomplished by first removing the p.c.b.)

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

To replace refer to fig 49 to ensure switch is in correct attitude and press into hole from the front until spring tabs latch. Refer to fig 49 for correct wiring details.

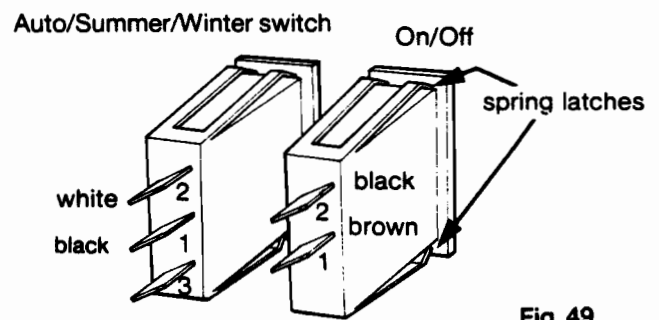


Fig. 49

8.20 Removal of Mechanical Instruments and Components

8.20.1 Pressure gauge

Part No. 4472 Fig 53 or 54

Refer to figs 39 & 51

Close central heating flow and return valves, $\frac{1}{4}$ turn until red handle is horizontal, drain appliance through the safety valve by $\frac{1}{4}$ turn of the knob.

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

Unscrew union on manifold.

Remove and clean off washer remnants.

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

Refix in reverse order following original route for capillary.

8.20.2 Temperature gauge

Part No. 4441 Fig 53 or 54

refer to fig 51

Trace capillary to sensor. Remove split pin from carrier tube and withdraw sensor. Remove clip from capillary tube.

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

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

8.21 Setting Gas Pressures

ALL SETTINGS DONE WITH 'U' GAUGE FITTED TO BURNER TEST NIPPLE AS INSTRUCTED IN CLAUSE 6.7.4

8.21.1 Setting Maximum Rate

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

Refer to Figs 37 & 52

Loosen fine locknut (7BA). Unscrew completely the fine adjusting screw.

If not already on, turn on H/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 as follows:
18-72 – 8.9 mbar (3.57 ins wg) plus or minus 0.89 mbar (0.36 ins wg).
21-84 – 9.8 mbar (3.93 ins wg) plus or minus 0.98 mbar (0.39 ins wg).

Carefully tighten lock nut without altering setting

Turn off tap and electrical supply.

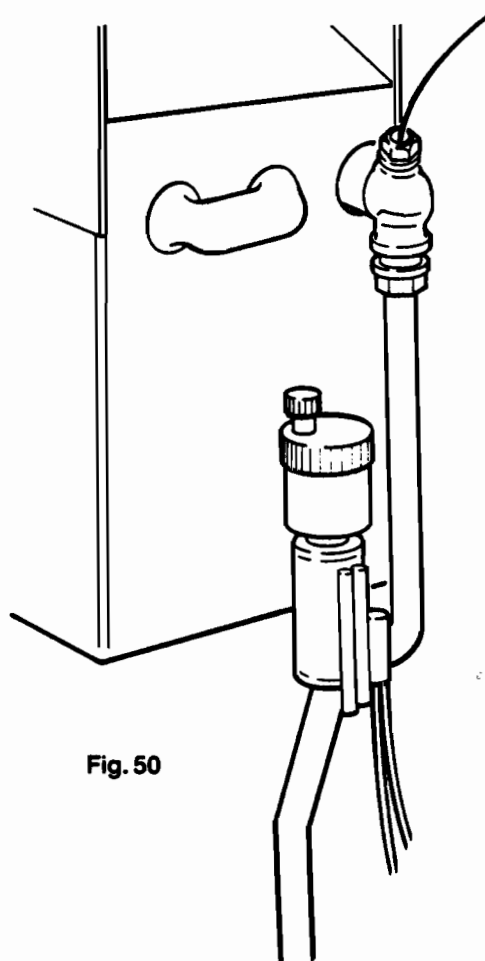


Fig. 50

temperature gauge sensor slides into tubes on flow pipe (see fig.50)

Boiler thermostat sensor screws into heating manifold (see fig.40)

dhw thermostat sensor screws into main heat exchanger (see fig.50)

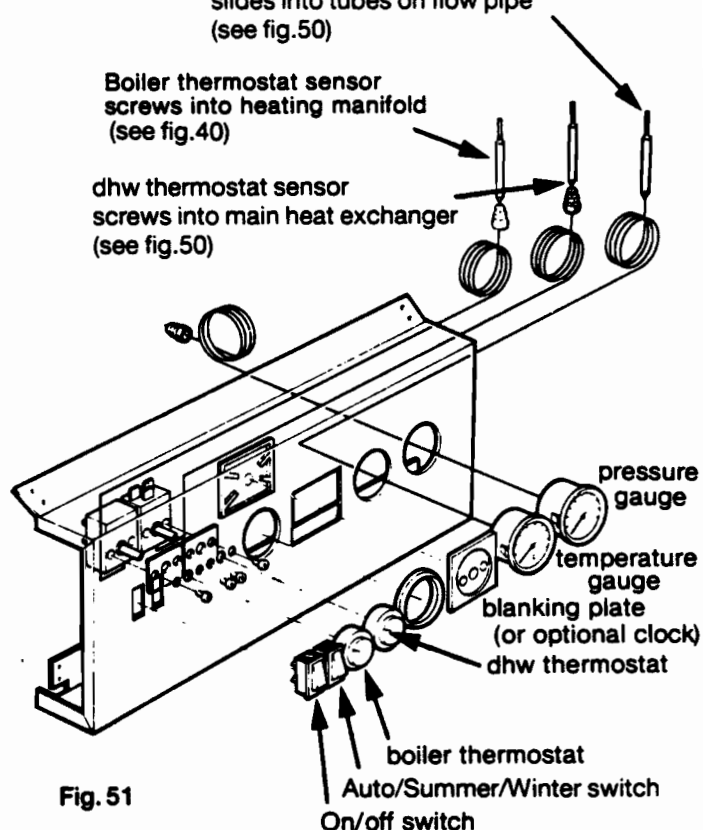
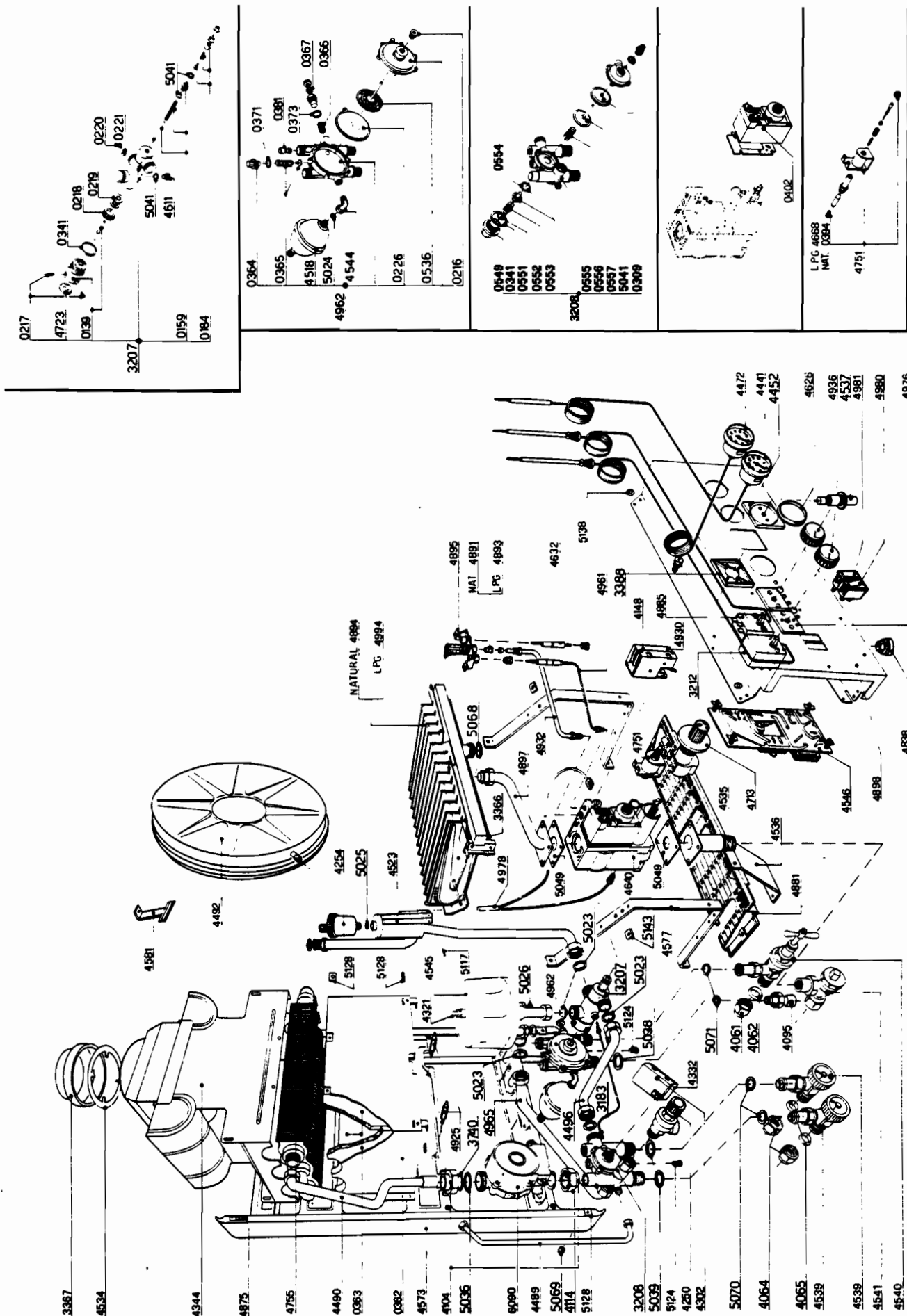
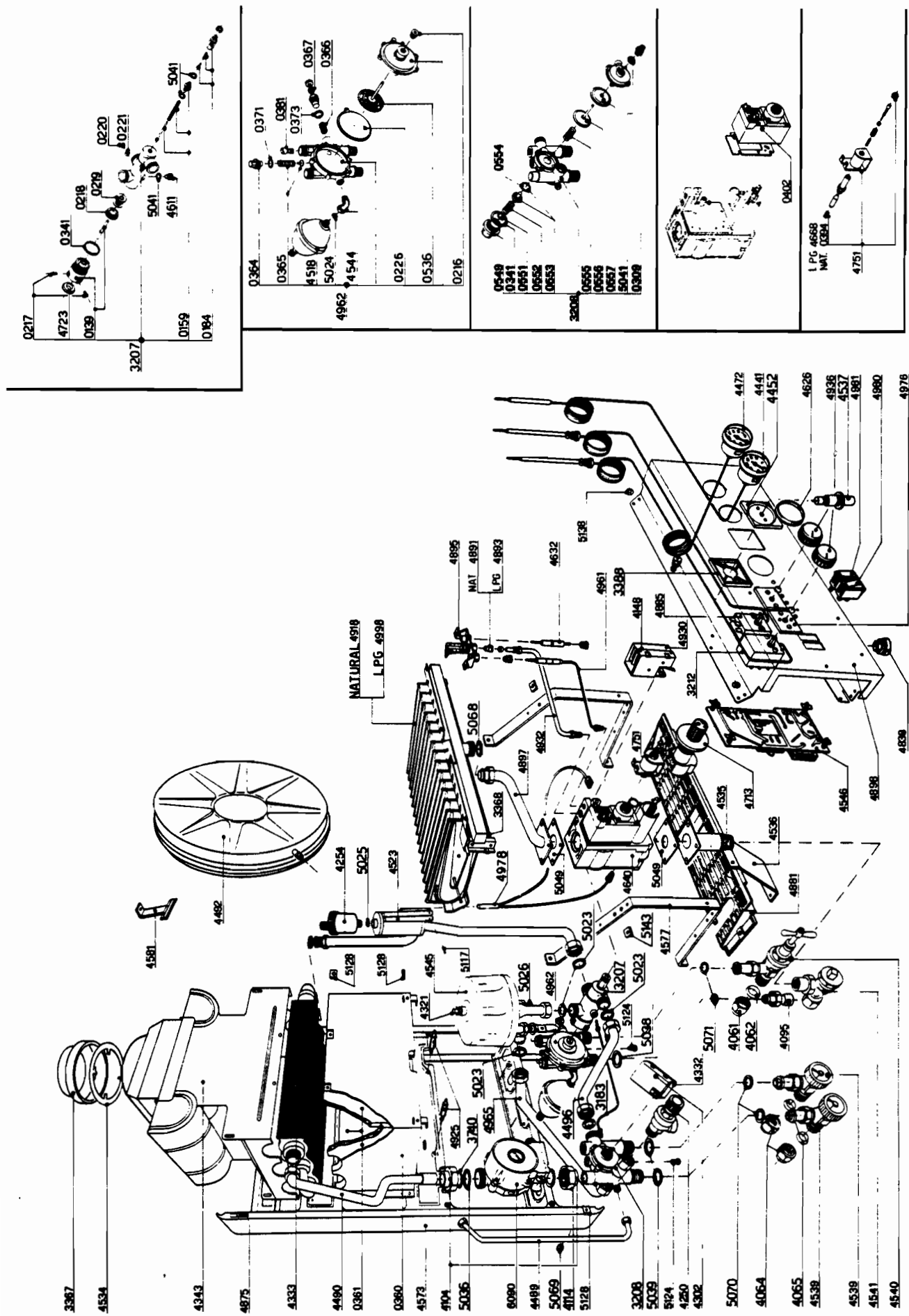


Fig. 51



VOKERA 18-72 D.M.C.F.



VOKERA 21-84 D.M.C.F.

SHORT SPARE PARTS LIST

VOKERA 18-72 D.M.C.F. & 21-84 D.M.C.F.

Code G.C. No. Description

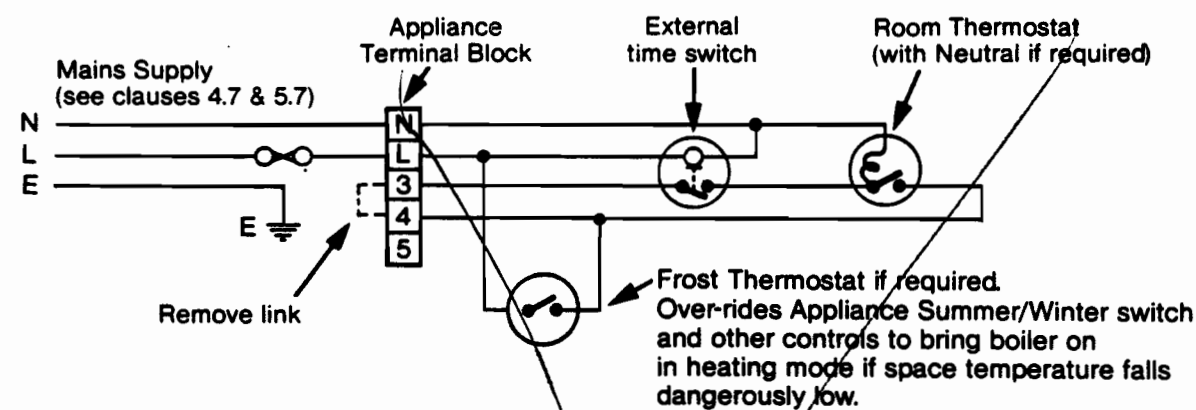
0226	333 929	Domestic Diaphragm
0357	333 928	Main Jets 1.25 Diameter
0361	333 931	Heat exchanger Insulation panels (21-84)
0363	333 828	Heat exchanger Insulation panels (18-72)
0402	333 837	Gas Valve Solenoid 220/240v
0554	333 938	'O' Ring Seal
0557	333 941	Flow switch rubber diaphragm
3207	333 943	3-way diverting valve
3208	333 944	Heating Manifold
4095	333 720	Hot Water Outlet
4104	333 721	Push fit pump union
4148	333 951	Triple Micro Switch
4250	333 772	Safety valve
4254	333 722	Automatic Air Venting Bottle (3/8)
4302	333 773	Single micro switch (Heating micro switch)
4333	333 727	Main Heat Exchanger (21-84)
4343	333 728	Flue Draught Diverter (21-84)
4344	333 952	Flue Draught Diverter (18-72)
4441	333 774	Temperature Gauge
4472	333 776	Pressure gauge
4489	333 731	Expansion Pipe
4492	333 733	Expansion Vessel
4518	333 885	Domestic Expansion Vessel
4523	333 953	Main Flow Pipe with Air Separator
4535	333 740	Gas Connecting Barrel
4536	333 741	Gas Valve mounting bracket
4537	333 777	Piezo unit
4539	333 778	Heating Flow or Return valve

Code G.C. No. Description

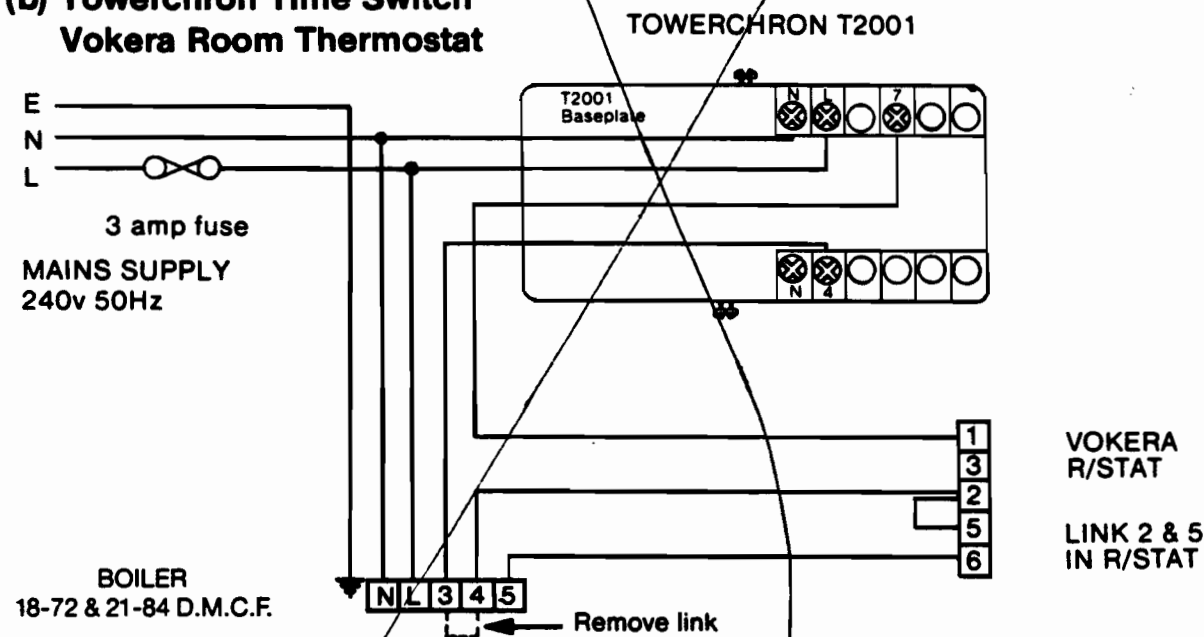
4540	333 779	Mains stop cock
4541	333 780	Gas Service tap
4545	333 887	Domestic Heat Exchanger (18-72)
4546	333 954	Printed Circuit Board
4549	333 955	Domestic Heat Exchanger (21-84)
4632	333 786	Electrode
4640	333 888	Gas Control Valve (complete)
4713	333 761	Gas Valve Operating Knob
4751	333 890	Electric Magnetic Modulator Coil
4755	333 956	Main Heat Exchanger (18-72)
4838	333 763	Electric Wire Locking Sleeve
4885	333 893	Domestic Thermostat
4891	333 789	Pilot Injector Natural Gas
4894	333 896	Main Burner (18-72)
4895	333 957	Pilot Burner
4897	333 965	Gas Valve to burner connecting pipe
4918	333 959	Main Burner (21-84)
4932	333 960	Pilot Pipe
4936	333 900	Thermostat Knob
4961	333 902	Thermocouple
4962	333 903	Domestic Hot Water Manifold
4978	333 768	High Limit thermostat
4980	333 906	On/Off Switch
4981	333 961	Auto/Summer/winter Switch
5023	333 790	Fibre Washer (3/4)
5025	333 792	Fibre Washer
5026	333 793	Fibre Washer (1/2)
5049	333 798	Gas Valve Inlet/Outlet Gasket
5068	333 912	Gas pipe to burner seal
6090	389 374	Circulating Pump Grundfos

B. Wiring to External Time Switches and Thermostats.

(a) General Schematic Diagram.



**(b) Towerchron Time Switch
Vokera Room Thermostat**



**(c) Randall Time Switch
Vokera Room Thermostat**

