

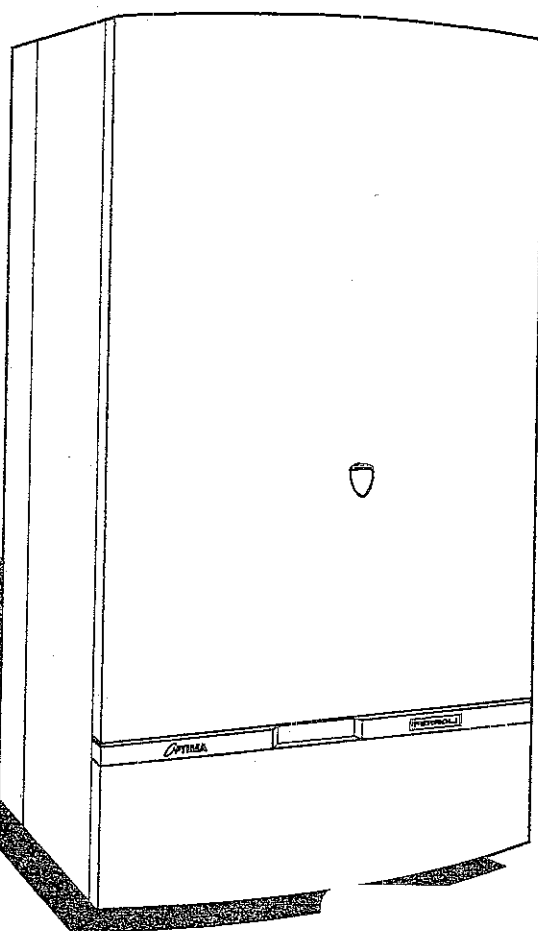
OPTIMA 900

06/94
VMF6.1

**WALL MOUNTED, ROOM SEALED,
FAN ASSISTED, GAS COMBINATION BOILER**

**TECHNICAL
INFORMATION
INSTALLATION
and
SERVICE
INSTRUCTIONS**

Read these Instructions thoroughly
before using the appliance



Phone numbers:

Installer _____

Service Engineer _____

Serial No. _____

**FOR SERVICE INFORMATION
OR HELP PLEASE TELEPHONE
08707 282 885**

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Burton Upon Trent, Staffordshire DE14 3HD



ALL SPECIFICATIONS SUBJECT TO CHANGE

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**page INDEX**

3	General Description	25	Electrical Functional Flow Wiring Diagram
3	Related Documents	28	Illustrated Wiring Diagram
4	Technical Data	29	Fault Finding
5	Appliance Dimensions	30	General Test + fault finding - Chart 1
6	Boiler Flow Diagram	31	General Test + fault finding - Chart 2
7	Key of boiler flow diagram	32	General Test + fault finding - Chart 3
8	Installation Details	33	General Test + fault finding - Chart 4
8	Location of Boiler	34	General Test + fault finding - Chart 5
8	Air Supply	35	General Test + Check of air flow through boiler - Chart 6
10	Flue System	36	Replacement of parts
10	Gas Supply	37	Pilot burner
10	Water System	37	Ignition electrode
12	Central Heating Pump	37	Thermocouple
12	Sizing of expansion vessel	40	Cold water flow switch and filter
13	Installation of Boiler	41	Honeywell gas valve
13	1. Unpacking	41	Printed circuit board (P.C.B.)
13	2. Mounting the Boiler Jig on the Wall (rear flue)	42	Thermostats
13	3. Mounting the Boiler Jig on the Wall (side flue)	42	Temperature sensors
14	Drilling template	42	Pressure relief valve
15	4. Preparing the Flue Assembly	42	Pump
16	5. Connecting the Boiler	43	Automatic air vent
18	6. Fitting the Flue Assembly	44	Pressure/temperature gauge
18	7. Electrical Installation	44	C.H. selector switch
19	8. Commissioning & Testing	45	Time clock
19	8.1 Filling the Central Heating System	46	Boiler thermostat
19	8.2 Filling the Domestic Hot Water System	46	Ignition generator
19	8.3 Electricity Supply	47	Air pressure switch
19	8.4 The Gas Installation	48	Expansion vessel
19	8.5 To Light the Boiler	49	Sealed chamber (parts)
21	8.6 To Range Rate the Boiler C.H.	50	Combustion chamber (parts)
23	8.7 D.H.W. Burner Pressure	51	Heat exchanger + C.H. and D.H.W. parts
23	9. System operation	52	Spare Parts List
23	10. Handing Over to the User	53	Domestic Hot Water Performance + Modureg
24	General Wiring Diagram	54	General Wiring Diagram
		55	Fast Fault Finding
		56	Special Installation Possibilities



OPTIMA 900



General Description

The **Ferroli OPTIMA 900** is a wall mounted, room sealed, fan assisted, combination boiler for Central Heating (C.H.) and domestic Hot Water (D.H.W.).

The boiler is of light weight construction and the heat exchanger provides Central Heating and Domestic Hot Water from an integrally designed unit. The boiler contains its own expansion vessel for sealed systems. The wall mounting jig contains all the isolating cocks for the water and gas supplies which can be fitted to the wall and provided with all the necessary gas and water connections prior to the boiler being attached. The flue can either be left hand, right hand or rear. There are three flue lengths available and they are 0.75 metres (for wall thickness up to 565 mm), 2 metres (for wall thickness up to 1815 mm) and 3 metres (for wall thickness up to 2815 mm). These wall thicknesses assume a rear flue outlet. For side flue outlet the effective wall thickness for each flue length is reduced by 91 mm plus the distance of the appliance from the side wall. The Central Heating and the Domestic Hot Water temperature is controlled by the Honeywell Modureg valve in conjunction with the P.C.B. There is a limit thermostat on the central heating circuit which operates at 88°C and a limit thermostat in the Domestic Hot Water circuit which operates at 70°C. There is also an overheat cut-off thermostat which will shut the boiler down completely and this thermostat operates at 100°C. The boiler is fitted with its own Central Heating pump. The pump is switched ON/OFF by the time clock and/or a 24 Volt room thermostat. The pump circuit also has a 6 minute over-run time. There is a Domestic Hot Water flow switch fitted and when there is a demand for Domestic Hot Water (flow of more than 0.5 gallon/minute, 2.5 litre/minute) the Central Heating pump is switched off making available the maximum output of the gas burner for Domestic Hot Water. On the P.C.B. the maximum output for Central Heating can be set. This does not influence the maximum output for domestic hot water. At the factory the central heating output is pre-set to maximum. The appliance is not suitable for external installation.

Related Documents

This appliance must be installed strictly in accordance with these instructions:

The Gas Safety Regulations (Installations & Use) 1984.

The Local Building Regulations

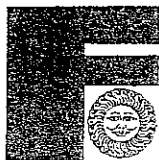
The Building Regulations.

The Buildings Standards (Scotland - Consolidated) Regulations.

British Standards Codes of Practice:

B.S.	7593	1993	TREATMENT OF WATER IN DOMESTIC HOT WATER CENTRAL HEATING SYSTEMS
B.S.	5546	1990	INSTALLATION OF HOT WATER SUPPLIES FOR DOMESTIC PURPOSES
B.S.	5440	PART 1	FLUES
B.S.	5440	PART 2	AIR SUPPLY
B.S.	5449	1990	FORCED CIRCULATION HOT WATER SYSTEMS
B.S.	6798	1987	INSTALLATION OF GAS FIRED HOT WATER BOILERS
B.S.	6891	1989	GAS INSTALLATIONS
B.S.	7671	1992	IEE WIRING REGULATIONS

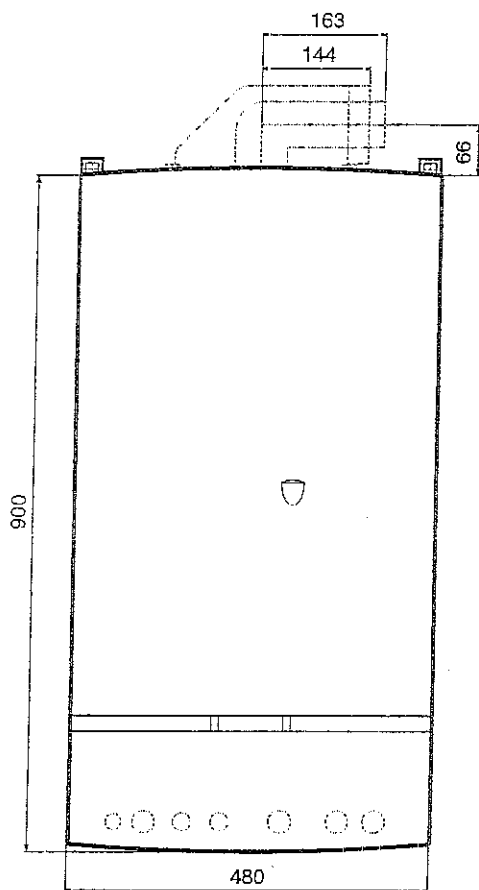
Model Water Bye Laws.



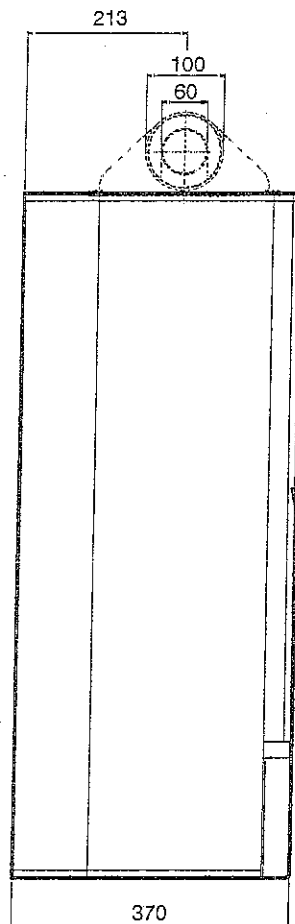
Technical data	NATURAL GAS	PROPANE LPG
	(G20)	(G31)
Nominal heat input (gross calorific value)	34.8 kW	34.8 kW
Nominal heat output	27.9 kW	27.9 kW
Minimum heat output	11.8 kW	11.8 kW
Gas rate	3.3 m ³ /h	2.39 kg/h
Burner setting pressure	14 mbar (max.)	36 mbar (max.)
Minimum burner pressure	2.5 mbar (min.)	5.0 mbar (min.)
Main injector Ø	1.15 mm	0.72 mm
Pilot injector Ø	0.27 mm	0.22 mm
Dimensions (o/all)		
Height	1020 mm	
Width	480 mm	
Depth	360 mm	
Weight (net)	51 kg	
Weight (gross)	53 kg	
Electricity supply:	240V - 50 Hz	
Fuse rating:		
Mains	3 Amp. (main fuse)	
on P.C.B. in boiler	F2 Amp (Fast)	
Electrical input	160 Watt	
Domestic Hot Water flow:		
(35°C rise)	11.4 l/min.	
Minimum Domestic Hot Water Flow	2.5 l/min	
Maximum domestic cold water		
Inlet pressure:	10,0 bar	
C.H. Safety valve pressure setting	3 bar	
C.H. Expansion vessel capacity	7 litre	
Min. heating circuit pressure	0,8 bar	
Max. heating circuit pressure	3.0 bar	
Boiler water capacity:		
Heating	1.5 litre	
Domestic hot water	0.5 litre	
Pipe connections:		
Gas	22 mm	
Domestic cold water inlet	15 mm	
Domestic cold water outlet	15 mm	
Central heating flow	22 mm	
Central heating return	22 mm	
Pressure relief valve drain	15 mm	
Min. installation clearances. Sides:		
Left hand	5 mm	
Right hand	5 mm	
Front	50 mm	
Min. height from worktop to base	(plus access for service) 200 mm	

Appliance Dimensions

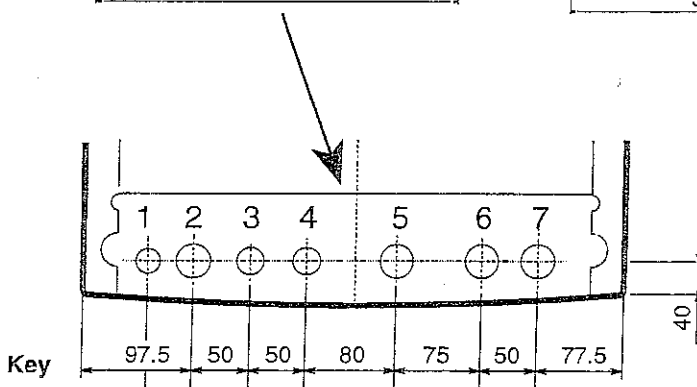
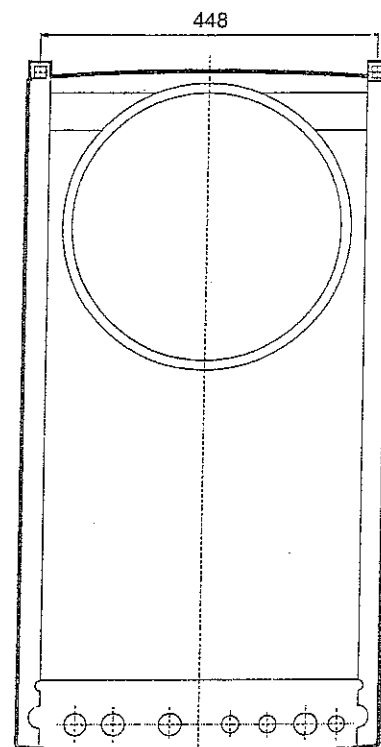
FRONT VIEW



LEFT SIDE VIEW

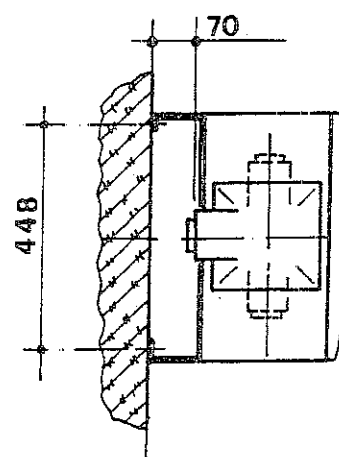


REAR VIEW

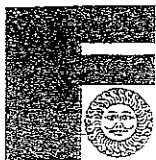


- Key
1. Electricity cable entry
 2. Gas supply
 3. Domestic Hot Water outlet
 4. Domestic Cold Water inlet
 5. Central Heating Pressure relief valve
 6. Central Heating Flow outlet
 7. Central Heating Return inlet

Fig. 1



TOP VIEW



OPTIMA 900

FERROLI

Boiler Flow Diagram

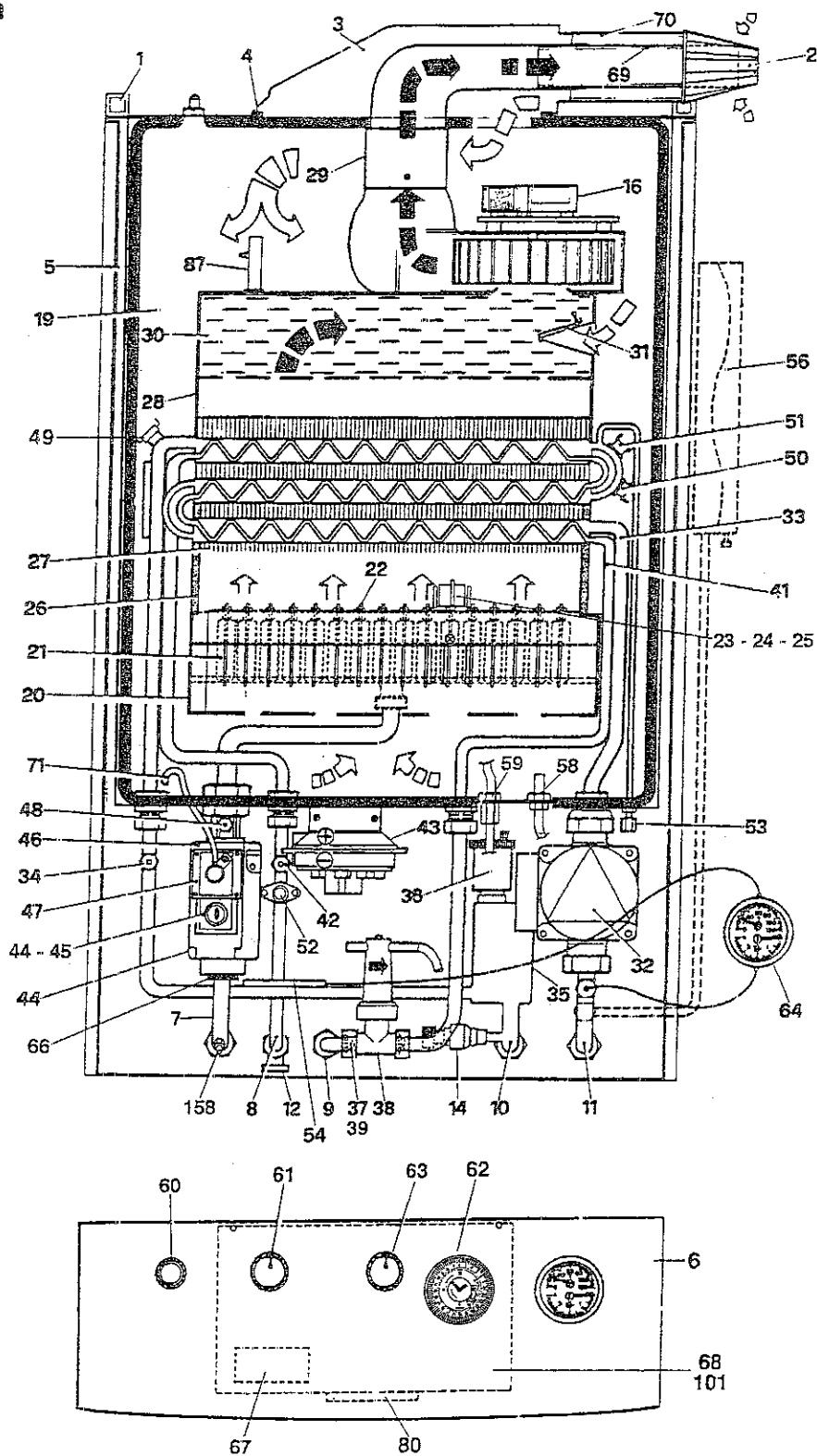


Fig 2

Key

1. Fixing point
2. Flue terminal
3. Flue/air intake hood
4. Sealing gasket
5. Room sealed compartment
6. Control panel
7. Gas inlet
8. Domestic hot water outlet
9. Cold water inlet
10. Central heating flow outlet
11. Central heating return inlet
12. D.H.W. draining point
14. Central heating safety valve
16. Fan
19. Combustion - heat exchanging compartment
20. Burner assembly
21. Main injector
22. Burner
23. Thermocouple
24. Spark electrode
25. Pilot
26. Combustion chamber insulation
27. Copper heat exchanger for C.H. + D.H.W.
28. Flue collector from heat exchanger
29. Internal flue exit
30. Flue/surplus air collector
31. Air pressure control damper
32. Central heating pump
33. C.H. waterway of the heat exchanger
34. C.H. flow temperature sensor
35. Air separator
36. Automatic air vent
37. Cold water inlet filter
38. Cold water flow switch
39. Cold water flow limiter
41. D.H.W. waterway of the heat exchanger
42. D.H.W. temperature sensor
43. Air pressure switch
44. Combination gas valve
45. Knob gas valve
46. Operator gas valve
47. Modulating regulator (Modureg) gas valve
48. Burner pressure test point
49. Overheat cut-off thermostat 100°C
50. Central heating limit thermostat 88°C
51. Central heating frost thermostat
52. D.H.W. limit thermostat
53. Heat exchanger venting point
54. Temperature sensing phial
56. Expansion vessel
58. Fan air outlet pressure test point
59. Flue outlet pressure test point
60. Extended control knob to gas valve
61. C.H. selector switch
62. Time clock
63. C.H. boiler thermostat
64. C.H. temperature/pressure gauges
66. Microswitch combination gas valve
67. Ignition transformer
68. Control box with P.C.B.
69. Inner flue duct
70. Outer air intake duct
71. Modulating balance tube
80. 240 V + 24 V roomstat terminal blocks
87. Venturi test point
101. P.C.B. (printed circuit board)
158. Gas inlet pressure test point



Installation Details

Gas Safety (Installation & Use) Regulations: 1984

In the interest of safety, it is the law that all gas appliances are installed by a competent person in accordance with the above Regulations, Building Regulations/Building Standards Scotland, Codes of Practice, current I.E.E. Regulations and the byelaws of the Local Water Undertaking. Failure to comply with the Regulations may lead to prosecution; it is in your interest and that of safety to ensure that the law is complied with.

Important - If the boiler is to be fitted in a timber framed building it should be fitted in accordance with the British Gas publication; Guide for Gas Installation in Timber Frame Housing; Reference DM2. If in doubt advice must be sought from the Local Gas Region of British Gas Plc.

Location of Boiler

The installation of the **OPTIMA 900** must be on a suitable non-combustible load bearing wall which will provide an adequate fixing for the boiler mounting bracket assembly. The location should be in an area where the water pipes will not be subjected to frost conditions. In siting the combination boiler the following limitations **must** be observed:

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. 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 so situated that it cannot be touched by a person using the bath or shower.

Terminal Position

POSITION	MINIMUM SPACING (fig. 3)	mm
A	Directly below an openable window, air vent, or any other ventilation opening	300
B	Below gutters, soil pipes or drainpipes	75
C	Below Eaves	100
D	Below a Balcony	100
E	From vertical drainpipes or soilpipes	75
F	From internal or external corners	100
G	Above adjacent ground or balcony level	100
H	From a surface facing the terminal	600
I	Facing another terminal	1,200
J	From opening (door/window) in carport into dwelling	1,200
K	Vertically from a terminal on the same wall	300
L	Horizontally from a terminal on the same wall	300
N	Below carport	600

A Quinnet Barrat and Quinnet guard (part No. C2) should be screwed to the wall centrally over the terminal, when the distance is less than 2 m from the outside floor.

Air Supply

The room in which the boiler is installed does not require a purpose provided vent. If the boiler is installed in a cupboard or compartment, permanent air vent are required in the cupboard or compartment, one at high level one at low level, either direct to the outside air to a room. Both high and low level air vents must communicate with the same space.

Minimum effective area requirements of compartment air vents (for cooling purposes only) (fig. 4).

Terminal Position

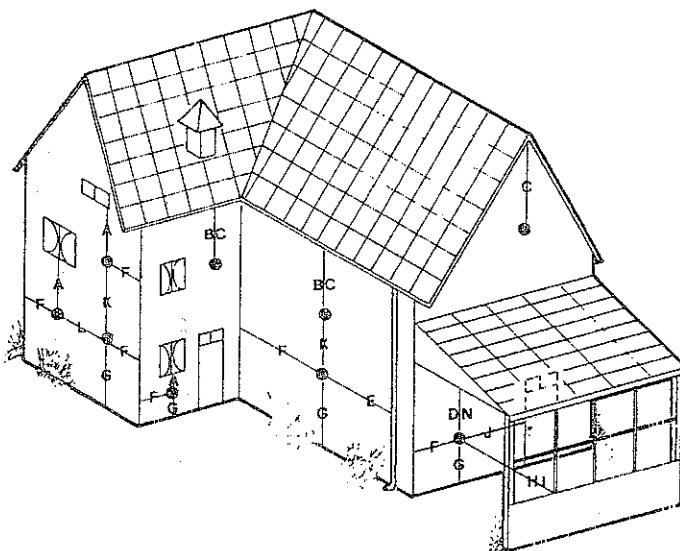


Fig. 3

Air supply

APPLIANCE FLUE SYSTEM APPLIANCE LOCATION	ROOM-SEALED	AIR VENT AREAS
IN ROOM		NIL
IN COMPARTMENT OPEN TO ROOM		HIGH LEVEL: 252 cm ² (38 in ²) LOW LEVEL: 252 cm ² (38 in ²)
IN COMPARTMENT OPEN TO OUTSIDE		HIGH LEVEL: 126 cm ² (19 in ²) LOW LEVEL: 126 cm ² (19 in ²)

Fig. 4

Minimum Clearance mm

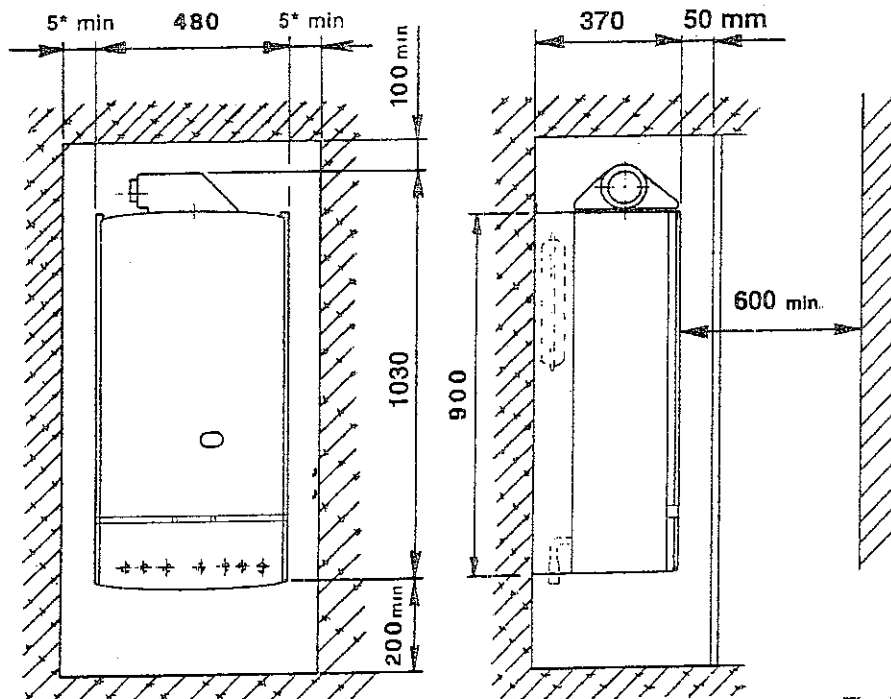


Fig. 5

NOTES

- * If a side outlet flue is to be used, a clearance of 75 mm will be needed on the flue outlet side of the boiler.
- ** Access to the front of the boiler must be available for maintenance (min 600 mm).

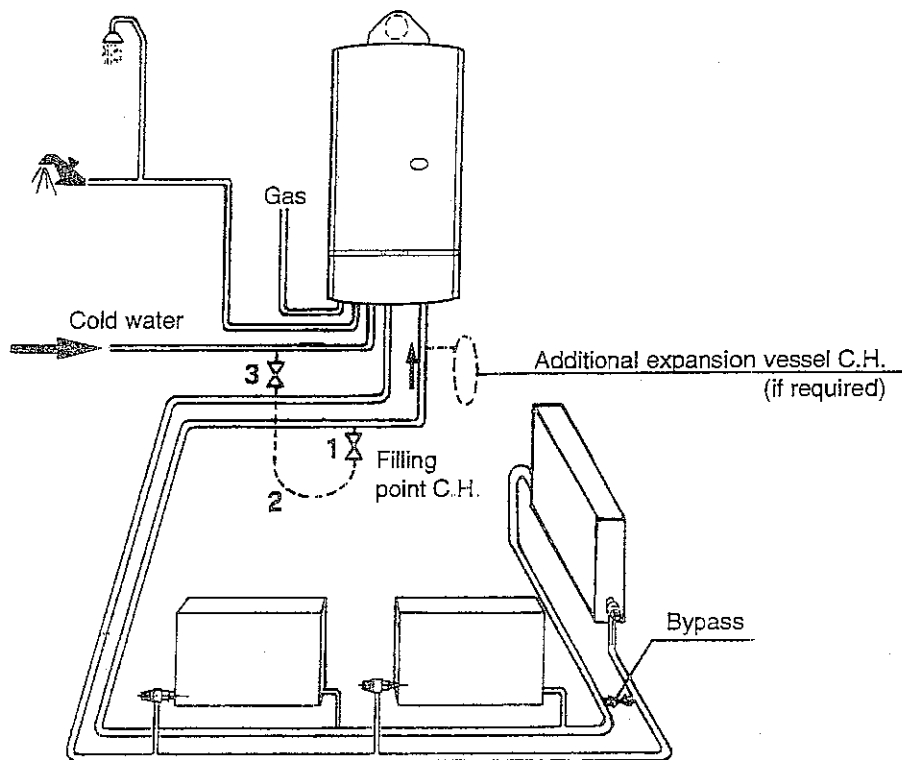
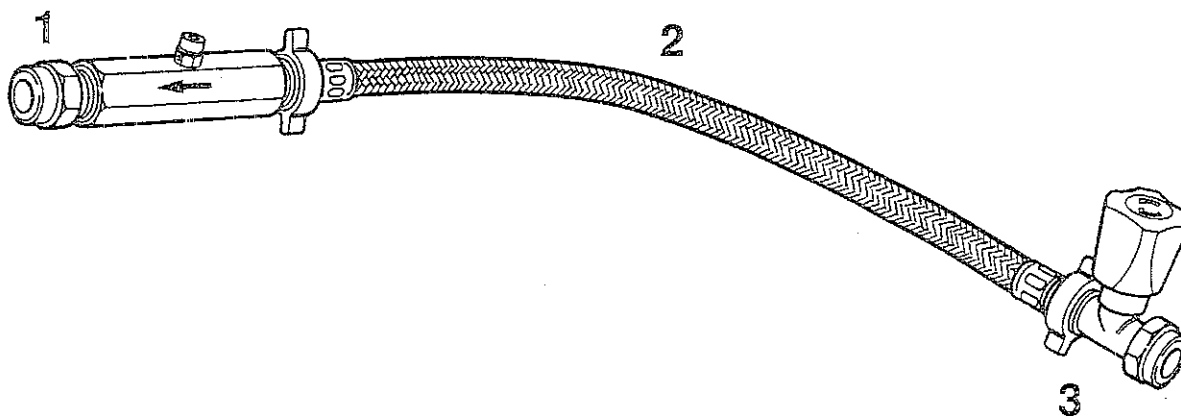


Fig. 6

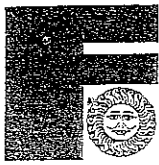
NOTE: A bypass must be fitted as far as possible from the boiler if thermostatic radiator valves are fitted throughout.



Key

- 1. Filling point C.H.
- 2. Temporary connection
- 3. Cold water supply

Fig. 7



Built-in Central Heating Water Circulating Pump

The pump head available for circulating the water is given in fig. 8.

N.B. - The pump is factory set at position 3. The pump is a Grundfos type 15-50 UPS series.

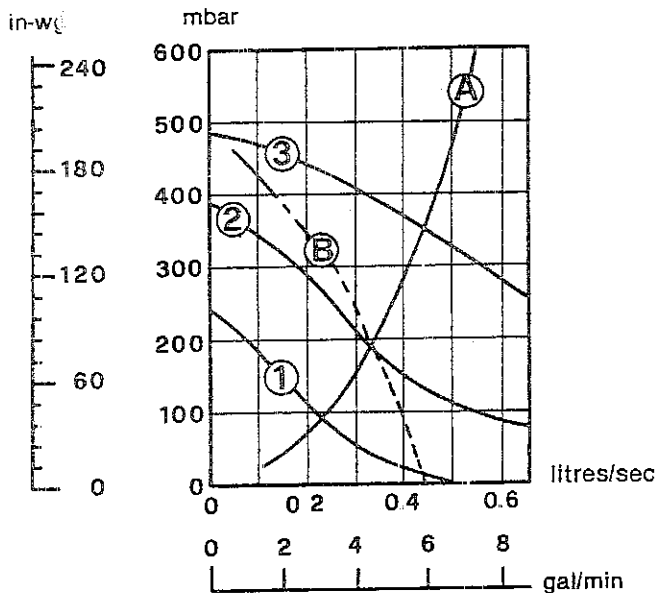
Grundfos Pump performance graph

Note - Minimum flow through boiler heat exchanger at any time should not fall below 6 litres per minute.

If required an additional expansion vessel may be fitted to the central heating return inlet.

If the total volume of water in the system exceeds 40 litres an additional expansion vessel must be fitted to the central heating return inlet.

Pump performance curve Grundfos UPS 15-50



- 1 2 3 Speed settings
A Boiler pressure drop
B Max. available pump head C.H.

Fig. 8

SIZING OF ADDITIONAL EXPANSION VESSELS:

Deduct from the value given in the table the 7 litre vessel supplied.

Note

1. Fill C.H. installation to min 1.5 bar.
2. Select by preference the expansion vessel for increased system pressure of 2.0 bar
3. Expansion vessel must be fitted to Central Heating Return Inlet
4. The standard 7 litres expansion vessel is charged to 1 bar

Fig. 9

SAFETY VALVE SETTING (bar)	3.0					
VESSEL CHARGE PRESSURE (bar)	0.5		1.0		1.5	
INITIAL SYSTEM PRESSURE (bar)	1.0	1.5	2.0	1.5	2.0	2.0
TOTAL WATER CONTENT of SYSTEM	EXPANSION VESSEL VOLUME (litres)					
LITRES						
25	3.5	6.5	13.7	4.7	10.3	8.3
50	7.0	12.9	27.5	9.5	20.6	16.5
75	10.5	19.4	41.3	14.2	30.9	24.8
100	14.0	25.9	55.1	19.0	41.2	33.1
125	17.5	32.4	68.9	23.7	51.5	41.3
150	21.0	38.8	82.6	28.5	61.8	49.6
175	24.5	45.3	96.4	33.2	72.1	57.9
200	28.0	51.8	110.2	38.0	82.4	66.2
For syst. volumes other than those given above, mult. the syst. volume by the factor across	0.140	0.259	0.551	0.190	0.412	0.33

Installation

Note - To mount the boiler on the wall, a two person lift will be needed.

1.0 UNPACKING

The appliance is delivered in 2 cartons.

- 1.1 The large carton contains the boiler, and the Installation/Service and Users Instructions.
- 1.2 The second carton contains the mounting jig assembly, complete with isolating valves, the assembly fixing screws and wall plugs (x4), the boiler mounting nuts and washers (x2), drilling template, flue assembly and turret

When the cartons are unpacked examine for any signs of damage in transit. All protective plastic should be left in place until installation is complete.

2.0 FIXING THE MOUNTING JIG ON THE WALL (Rear Wall Flue Applications)

- 2.1 Select the boiler location carefully ensure that all requirements given in previous text are satisfied. Fig. 10 will also give guidance to fixing dimensions.
- 2.2 Locate template on wall, mark the positions of the four jig bracket fixing holes and the flue opening.
- 2.3 Carefully cut the circular hole (118 mm minimum diameter) for the flue assembly.
- 2.4 Using a 10 mm drill, drill 70 mm deep holes to accept the wall plugs, and insert wall plugs.
- 2.5 Fit the mounting jig assembly using the four fixing screws provided (Ensure that all the service cocks are in the OFF position). Operate valves several times to ensure they are free.
- 2.6 With the exception of the connection to the pressure relief valve, make all the water and gas connections to the jig bracket valves. Fully tighten (fig. 11). Water connections can be made with compression or capillary fittings (before the gas inlet to the boiler there must be at least 100 mm of straight before any bends).

3.0 FIXING THE MOUNTING JIG ON THE WALL (Side Wall Flue Applications)

- 3.1 Select the boiler location carefully ensuring that all the requirements given in previous text are satisfied. Fig. 10 will also give guidance.
- 3.2 Locate the template on wall and mark the position of the four jig bracket fixing holes.
- 3.3 Using a 10 mm drill, drill 70 mm deep holes to accept the wall plugs, and insert wall plugs.
- 3.4 Fit the mounting jig assembly using the four fixing screws provided.
- 3.5 Extend a horizontal line from the centre of the rear flue outlet to the side wall.
- 3.6 Mark the centre line (vertically) for the flue assembly hole, and mark the centre of the hole.
- 3.7 Carefully cut the circular hole (118 mm minimum diameter) for the flue assembly.



Important Note - Always use two spanners to prevent twisting of soft copper pipework on the boiler.

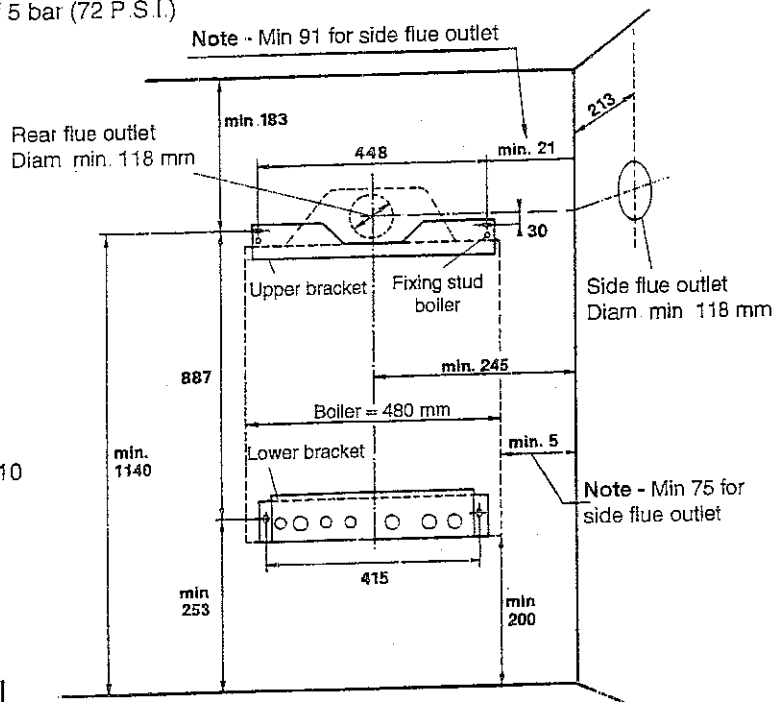
Flush out the water system.

Note - The maximum inlet cold water pressure must not exceed 10 bar (145 P.S.I.) and a water governor or a pressure reducing valve will be required if the pressure is in excess of 5 bar (72 P.S.I.)

Ensure all pipework is adequately supported.

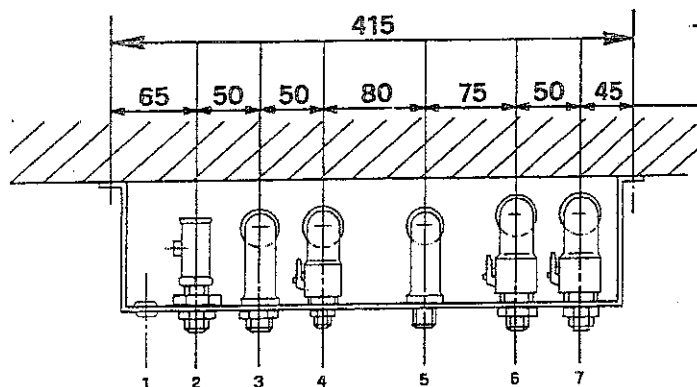
Drilling template

Fig 10



- 1 = Electrical cable entry
- 2 = Gas supply
- 3 = Domestic Hot Water outlet
- 4 = Domestic Cold Water Inlet
- 5 = Outlet Central Heating safety valve
- 6 = Central Heating flow outlet
- 7 = Central Heating return inlet

- 2 = 22 mm
- 3-4-5 = 15 mm
- 6-7 = 22 mm



2 Gas 22 mm

3 Domestic Hot Water outlet 15 mm

5 Outlet central heating safety valve 15 mm

4 Domestic Cold Water inlet 15 mm
6 Central Heating flow outlet 22 mm
7 Central Heating return inlet 22 mm

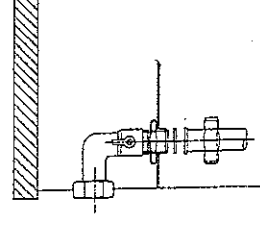
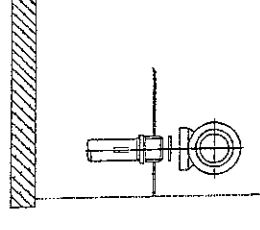
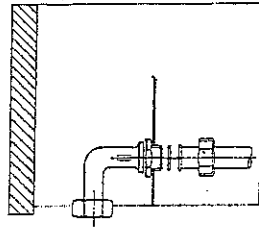
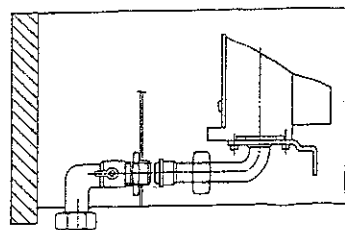


Fig 11

Important Note - Always use two spanners to prevent twisting of soft copper pipework.

Note - The central heating safety valve (5) should be piped 15 mm to discharge safely outside the property.

4.0 PREPARING THE FLUE ASSEMBLY

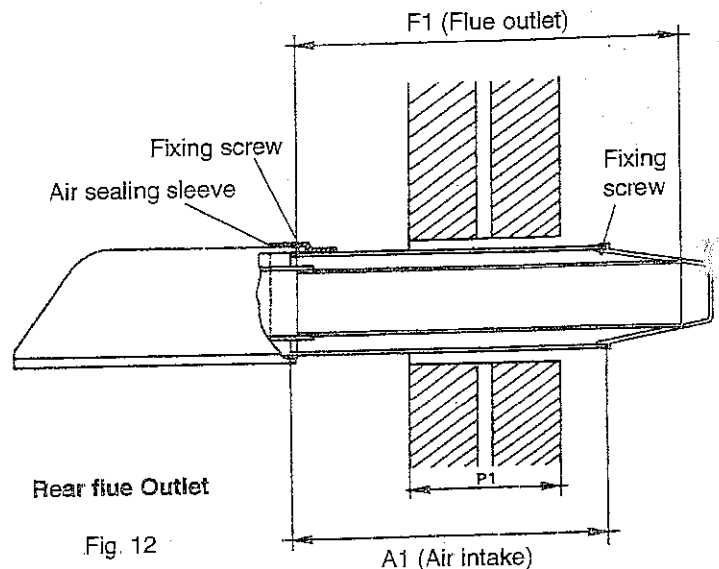
4.1 Rear Flue Outlet (fig. 12)

important - The aluminium flue pipe must protrude into the outside grill by 2 in (50 mm), never cut it to the same length as the plastic air pipe (aluminium flue pipe = plastic air inlet pipe + 50 mm!).

Aluminium flue pipe length = Plastic air inlet pipe length plus 50 mm (2") longer.

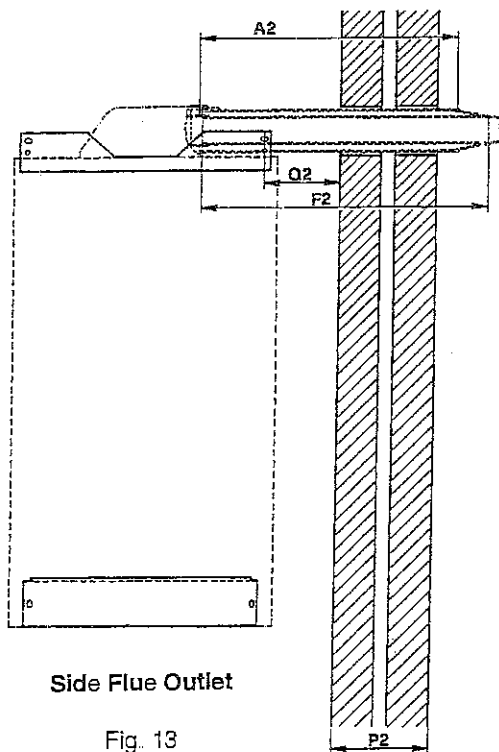
- 4.1.1 Accurately measure the Wall thickness (P1)
- 4.1.2 From the end opposite to the terminal, cut the plastic air duct (dimension A1) to length (P1 + 105 mm)
Note - That the terminal is **not** included in A1.
- 4.1.3 Cut the metal flue duct to length (P1 + 155 mm) (dimensions F1).
Note - The metal flue pipe must be 50 mm (2 inches) longer than the plastic air inlet pipe.
- 4.1.4 Drill a 3 mm hole 15 mm from the plain end of plastic air duct.
- 4.1.5 Place flue components to one side to be used later.
- 4.2 Side Flue Outlet (fig. 13).

important - The aluminium flue pipe must protrude into the outside grill by 2 in (50 mm), never cut it to the same length as the plastic air pipe.



Rear flue Outlet

Fig. 12

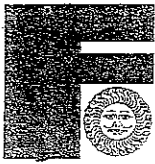


Side Flue Outlet

Fig. 13

Aluminium flue pipe length = Plastic air inlet pipe length plus 50 mm (2") longer.

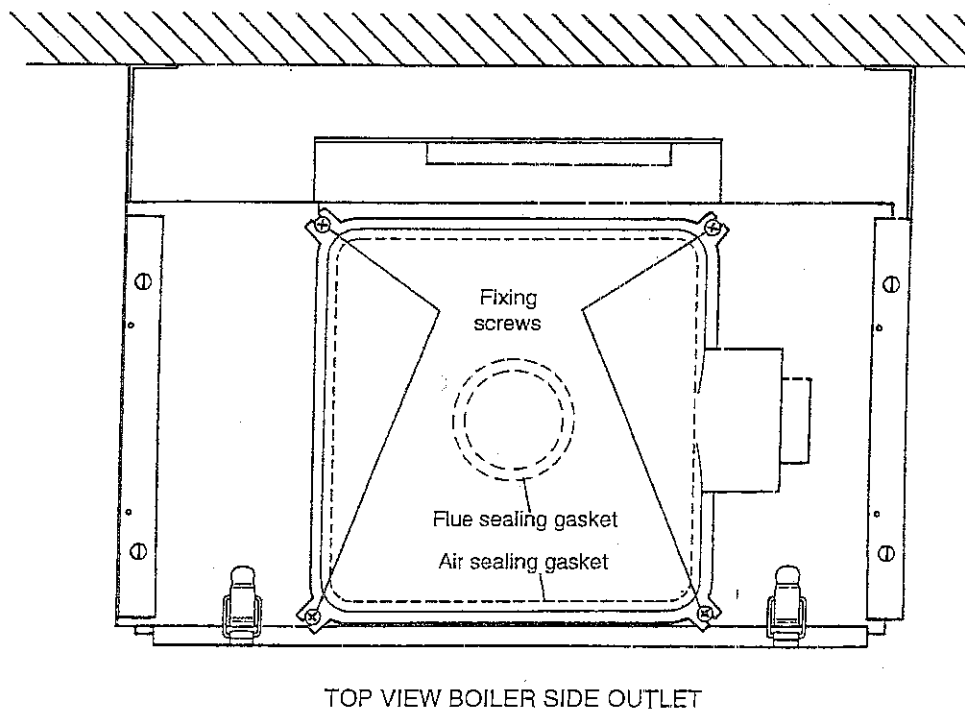
- 4.2.1 Accurately measure the Wall thickness (P2).
- 4.2.2 Accurately measure the distance from the centre of the stud fixing of the mounting jig assembly to the side wall (Q2)
- 4.2.3 From the end opposite to the terminal, cut the plastic air duct (dimension A2) to length (P2 + Q2 + 125 mm).
Note - That the terminal is **not** included in length A2.
- 4.2.4 Cut the metal flue duct to length (P2 + Q2 + 175 mm) (dimension F2).
Note - The metal flue pipe must be 50 mm (2 inches) longer than the plastic air inlet pipe.
- 4.2.5 Drill a 3 mm hole 15 mm from the plain end of plastic air duct.
- 4.2.6 Place flue components to one side to be used later.



5.0 CONNECTING THE BOILER

- 5.1 Place the boiler on its back.
- 5.2 Remove the boiler base plate, four screws (fig. 16). Remove the plugs fitted to the boiler water connections. Remove the bag of sealing washers from the boiler pipework. Remove the front panel by gripping on both sides and pulling away from the main boiler.
- 5.3 Lift boiler as shown in fig. 15 onto the top studs and fit supplied nuts and washers hand tight
- 5.4 Lift at bottom to engage the water and gas connections. Tighten central heating flow and return, and the domestic hot water inlet and outlet, using appropriate sealing washers. Tighten the gas union.
- 5.5 Screw the pressure relief valve adaptor provided, through the jig bracket into the valve, using the remaining washer (fig. 17).
- 5.6 Connect the pressure relief valve discharge pipe (15 mm) to the outside of the building, where possible over a drain. The discharge must be such that it will not be hazardous to occupants or passers-by cause damage to external electric components or wiring. The pipe should be directed towards the wall.

must not discharge above an entrance or window, or any type of public access. The installer must consider that the overflow could discharge boiling water.



TOP VIEW BOILER SIDE OUTLET

Fig. 14

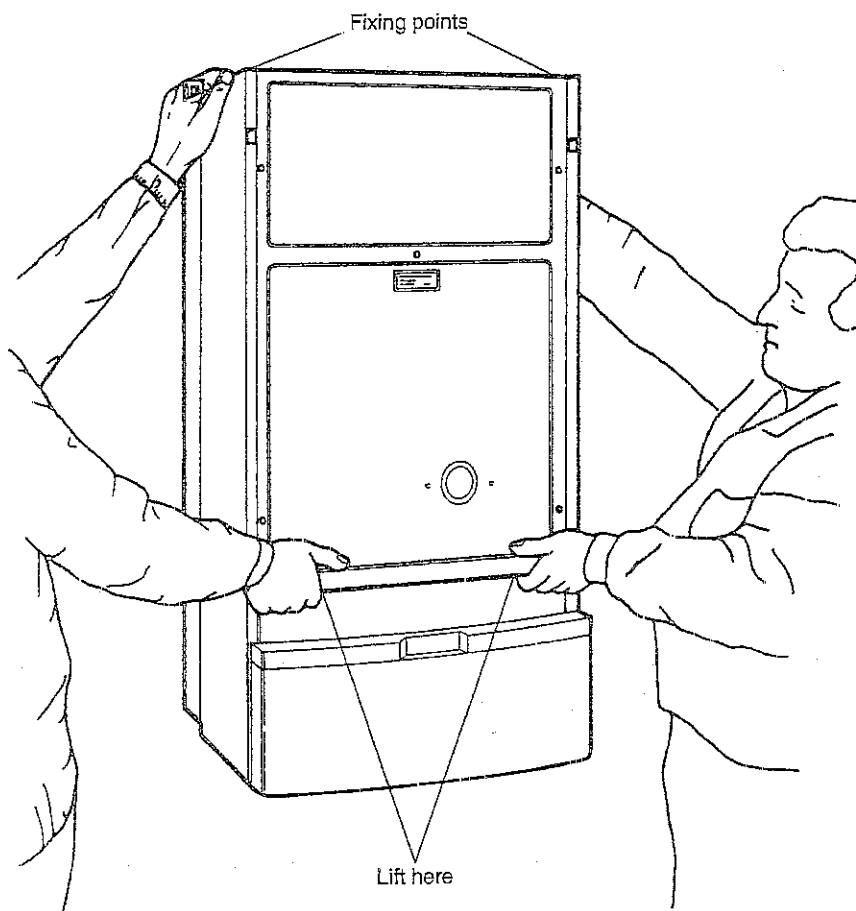


Fig. 15

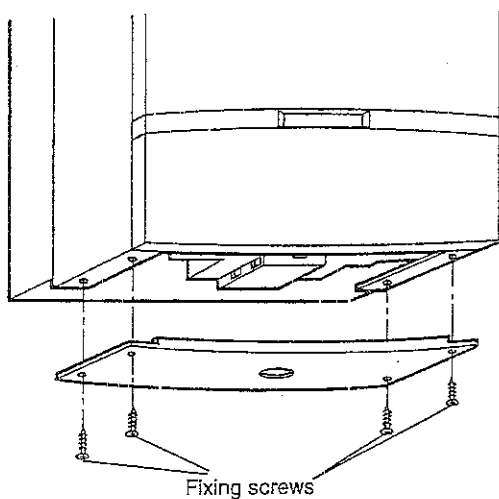


Fig. 16

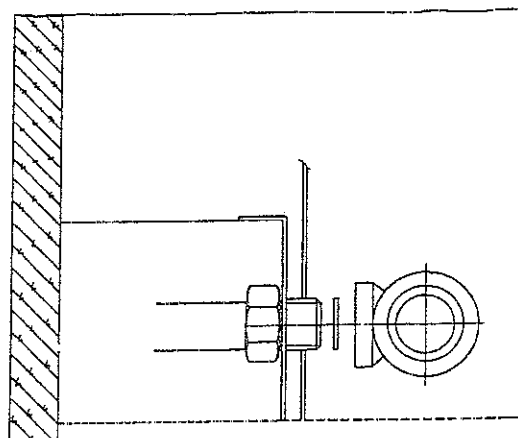
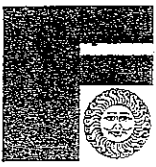


Fig. 17



6.0 FITTING THE FLUE ASSEMBLY

6.1 With Sufficient Clearance To Insert Assembly From Inside

- 6.1.1 Push the air duct seal onto the air duct at the cut end.
- 6.1.2 Insert the flue assembly into the wall.
- 6.1.3 Make good internal wall face.
- 6.1.4 Fully insert the flue assembly into the turret spigot. Insert the self tapping screw supplied. Fully tighten.
- 6.1.5 Secure the turret.
- 6.1.6 Slide the air duct seal over the joint.
- 6.1.7 Check the terminal relationship with the wall as shown in fig. 12.
- 6.1.8 Make good the outside wall face, re-weatherproof.

6.2 With insufficient Clearance To Insert Assembly From Inside

- 6.2.1 From outside, push flue duct, then the air duct through the wall.
- 6.2.2 Push the air duct seal over the air duct.
- 6.2.3 Fully insert the flue duct into the turret, then the air duct. Slide, back the seal and secure the air duct with the self tapping screw provided.
- 6.2.4 Slide the seal over the joint and secure the turret.
- 6.2.5 Continue as detailed in 6.1.8 above.

ELECTRICAL INSTALLATION

Electrical installation must be carried out by a competent electrician. The appliance is to be connected to a 240 V ~ 50 Hz supply (see fig. 18). The supply fuse rating is 3A. The terminals are accessible after removing the white base plate and single screw securing the terminal cover (see fig. 18).

7.1 Procedure

- 7.1.1 The supply cable must be no less than 0.75 mm (24x0.2 mm) to BS6500 table 16.
- 7.1.2 The earth conductor must be cut longer than the live and neutral (fig. 19).
Connect the Supply Cable to the terminal block marked 240 V ~ 50 Hz, L, N, the supply cable is to be connected as follows:
 - i) Connect the brown wire to the L (live) terminal).
 - ii) The blue wire to the N (neutral) terminal.
 - iii) The green/yellow wire to the (earth) terminal.
- 7.1.3 Secure the cable with the cable clamp. The supply cable can be connected to the mains supply by the use of an unswitched shuttered socket-outlet in conjunction with the 3A fused 3 pin plug both in accordance with BS 1363. This provides complete isolation. Alternatively, a fused double pole switch having a contact separation of at least 3 mm, in all poles and provided just for the boiler and its external controls can be used. A wiring diagram is provided on the appliance, attached to the rear of the front panel. In addition, there is one in this manual (fig. 25). Attention is drawn to the requirements of the current I.E.E. Regulation and in Scotland, the electrical provisions of the Building regulations.
- 7.2 Room Thermostat (fig. 18) (or remote time clock connection)
 - 7.2.1 Please note that the room thermostat, clock switch connection is 24 V. To connect mains voltage to these terminals will seriously damage the printed circuit board. The room thermostat and clock switch connector block is situated within the connector box. Twin core cable should be used for this connection (terminals 4 and 5).
 - 7.2.2 If using a remote 240 Volt time clock ensure that the motor and switch connections are totally separate in the clock and that the switch connections are independent for the 24 Volt terminals (4 and 5) on the boiler.

External controls: room stat or remote time clock in the place of loop terminals 4 and 5. Please note 24 V only, use only voltage free contacts.

IMPORTANT

If 240 V is connected to terminals 4 or 5, damage will be caused to the P.C.B.

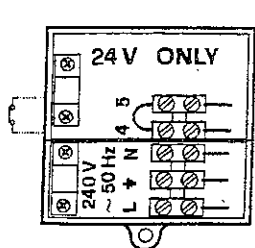
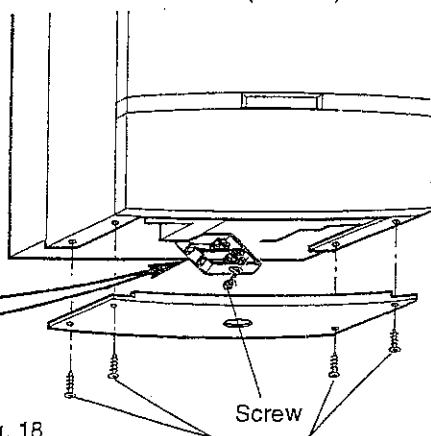


Fig. 18



Fixing screw front

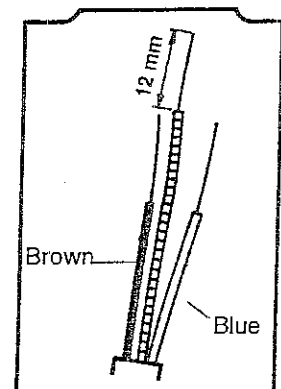


Fig. 19

IF IN DOUBT PHONE 021 313 1030

8.0 COMMISSIONING AND TESTING

8.1 Filling the Central Heating System

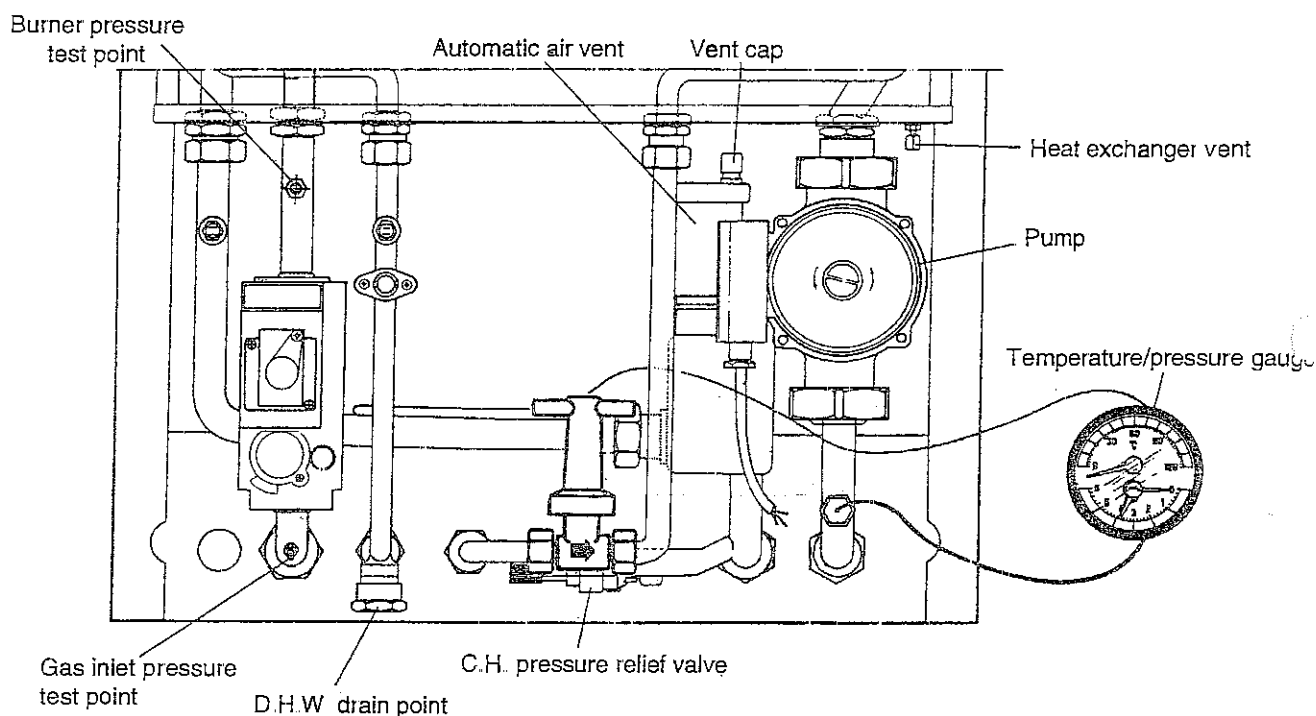


Fig. 20

Remove the top front panel by gripping both sides and pulling forward away from main boiler assembly.

Loosen the cap of the automatic air vent (fig. 20) and leave it loose.

Open the central heating flow and return cocks (fig. 11).

Gradually fill the system as detailed in Make up Water

While filling, vent the heat exchanger at venting point by loosening cap (fig. 20) and vent each radiator.

Tighten cap on heat exchanger air vent.

Ensure the working pressure, when filled, is between 1 to 1.5 bar on the pressure gauge (see technical data).

Check the system for leaks.

Flush system in accordance with B.S. 7593

8.2 Filling the Domestic Hot Water System

Close all hot water draw off points. Open main cold water stop cock and ensure the cold water inlet cock is open at the boiler jig bracket (fig. 11). Slowly open each hot tap in turn until clean water, free from air pockets, is seen.

Check system for leaks.

8.3 Electricity Supply

Carry out preliminary checks (i.e. earth continuity, polarity short circuit and resistance to earth using a suitable multimeter).

8.4 The Gas Installation

The whole of the gas installation including the meter, should be inspected and tested for soundness, and purged in accordance with the recommendations of BS6891-1988.

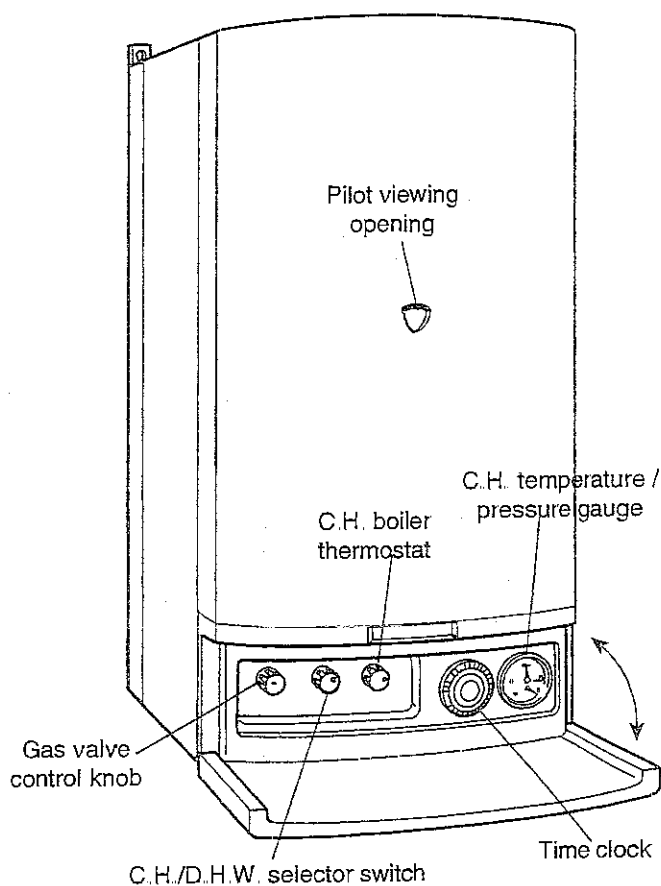
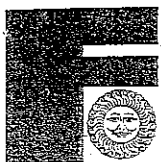


fig. 21

8.5 To Light the Boiler (fig. 21)

- Open controls panel door.
- Switch on electricity supply.
- Adjust room thermostat and all external controls to «ON». Check operation of pump.
- Turn the boiler thermostat to maximum. Fan will run (A waiting time of max 3 minutes before fan will run is possible!). Wait 20 seconds after fan starts to run at full speed.
- Depress the gas control knob fully (this should operate the electronic ignitor). When the pilot flame is seen to light through the pilot viewing window, keep the control knob fully depressed for a further 15 seconds, then release.
Should the pilot fail to remain alight (or goes out on any other occasion i.e. if electricity supply as been turned off) wait 3 minutes and repeat. Should the pilot still fail to remain alight, refer to the fault finding section.
- With the pilot burner established, observe that the main burners cross-light smoothly.
- Temporarily turn off by switching off electricity supply.

Important Note: If the burner stops for C.H. only after a waiting time of 3 minutes will the boiler will light again!

Burner Pressure C.H. and D.H.W.

8.6 To Range Rate the Boiler C.H. (not required for standard installations)

The boiler can be range rated for an output from 11.8 kW (40,000 Btu/h) up to 27.9 kW (95,000 Btu/h). When the boiler is supplied it is factory set at the maximum output 27.9 kW (95,000 Btu/h).

Procedure

- Release the control panel fixing screws (fig. 30) and lower panel.
- Loosen the screw in the burner pressure test point (fig. 22) and attach a gauge.
- Switch on the electricity supply to relight the main burner.

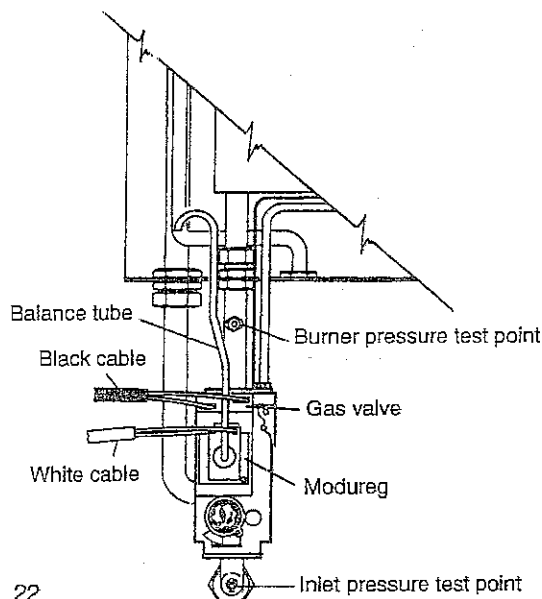


Fig. 22

Note 1 - Modulation is available on central heating, so the procedures must be carried out while the system is relatively cold. Recheck boiler thermostat is set to maximum.

d. Adjust the potentiometer P1 on the PCB (fig. 23) in the control panel until the required burner pressure is obtained (Anticlockwise to reduce the pressure).

Note 2 - Short circuit 04-05 only on connector X3 on the P.C.B.

- Boiler starts for C.H.
- Waiting time is excluded
- Max burner pressure C.H. can be checked/set with potentiometer P1

Note 3 - The range of inputs with corresponding burner pressure is given on the Data badge which is situated behind the top front panel. Further informations is on fig. 24a - fig. 24b.

e. With the pressure set, turn off the electrical supply and mark the set input on the Data badge (with sticker supplied).

Burner Pressure C.H. and D.H.W.

P1 = C.H. range rating to be set on site (if required)

P2 = Max output D.H.W. (factory set, not to be adjusted)

P3 = D.H.W. temperature (factory set, not to be adjusted)

P1 Adjust with screwdriver!

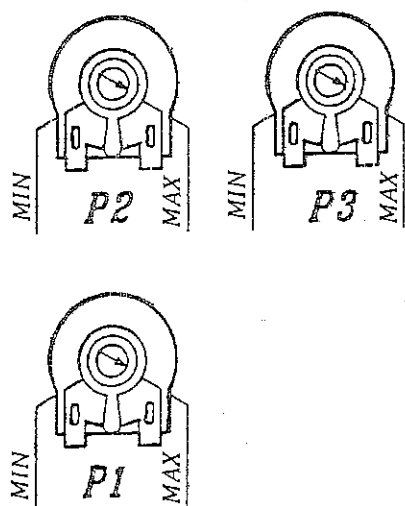
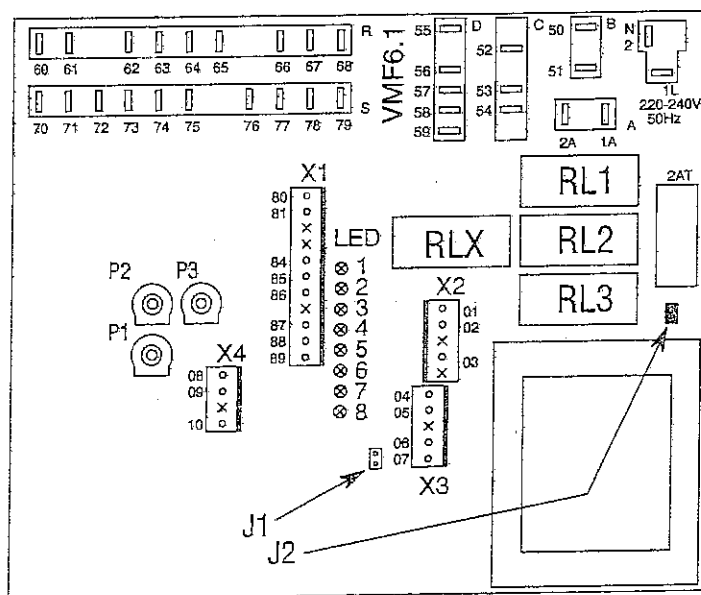
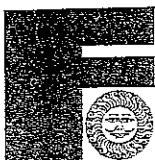


Fig. 23





Burner Pressure C.H.

- Natural gas
- L.P.G. (Propane)

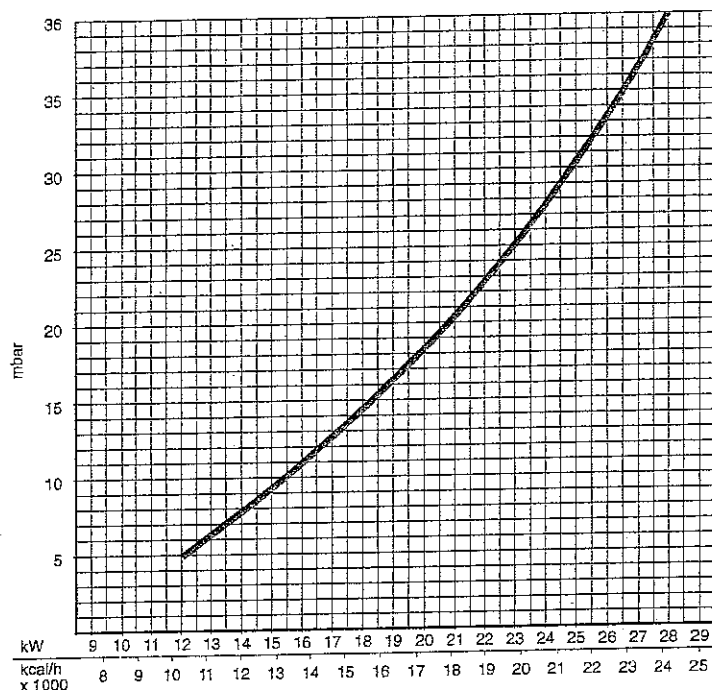


Fig. 24a - Burner pressure VS C.H. Load with L.P.G. (G31) (Propane)

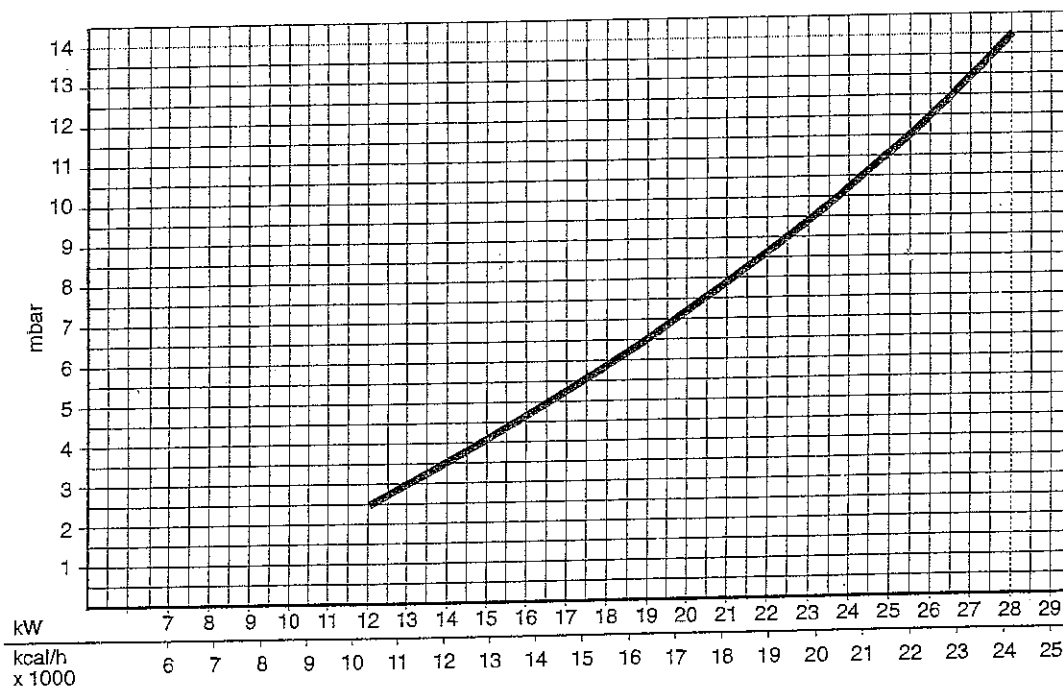


Fig. 24b - Burner pressure VS C.H. load with natural gas (G20)

**8.7 D.H.W. Burner Pressure**

The domestic hot water burner pressure is not range rateable and not adjustable but the maximum and minimum burner pressure should be checked as follows:

- a. Check electricity supply is still off.
- b. Open a D.H.W. tap at high flow until the water runs cool and leave running.
- c. Switch on the electricity supply.
- d. The pressure should be 14 mbar $\pm$ 0.5 mbar.
- e. Disconnect one of the wires from the «Modureg» (fig. 22), this will reduce the burner to minimum which should read 2.5 mbar $\pm$ 0.5 mbar. If the burner pressure is not as stated check the inlet working pressure (fig 22) which should be minimum 20 mbar. If that is correct, consult Ferrol. No attempt should be made to alter D.H.W. burner pressure.
- f. Switch off electrical supply and close hot tap.
- g. Reconnect the wire to the «Modureg». Remove pressure gauge, tighten the test screws.
- h. Replace control panel (2 screws).
- i. Turn on electricity supply, open a hot tap to full flow and when the burner lights, test for gas soundness with a leak detection fluid around the gas valve and connections including the pressure test point screws.

Note - The cutting of the electricity supply may result in the pilot being extinguished - re-light if need be, after waiting three minutes at least.

9.0 SYSTEM OPERATION

Let the boiler operate normally on central heating for about 30 minutes.

- I) Vent radiators.
- II) Vent heat exchanger.
- III) Examine all pipework for leakage.
- IV) Turn on a D.H.W. tap and check that the C.H. pump stops running.
- V) As the D.H.W. temperature reaches 60°C check the burner for modulation.
Turn the gas valve «off», (twist left hand white button 1/12th turn clockwise and release), and isolate electricity supply.
Drain down the central heating system fully, when hot.
Refill the system as previously instructed. Repeat the venting.
Examine the system's water pressure and top up as necessary.
Replace the casing front panel and close the control panel cover.

10.0 HANDING OVER TO THE USER

After completion of installation and commissioning of the system:

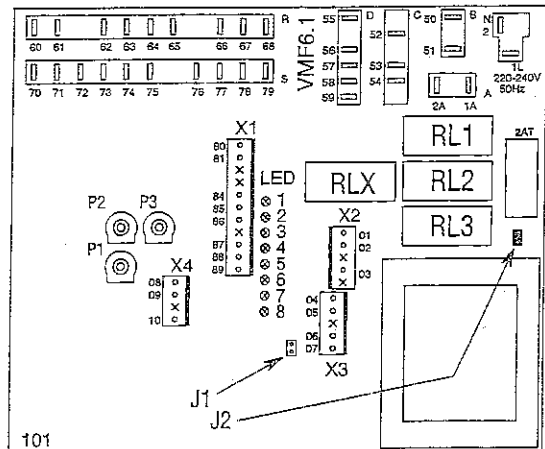
- a. Hand over the User's Instructions' to the Householder and explain His/Her responsibility under the Gas safety (Installation and Use) Regulations 1984.
- b. Explain and demonstrate the lighting and shutting down procedure.
- c. Explain the operation of the boiler including the use and adjustment of ALL system controls.
Advise the User of the precautions necessary to prevent damage to the system and to the building, in the event of the system remaining inoperative during frost conditions.
- d. Stress the importance of regular servicing by a qualified Heating Engineer and that a comprehensive service should be carried out at LEAST ONCE A YEAR.



General Wiring Diagram

Key

- 16 Fan
- 23 Thermocouple
- 24 spark electrode
- 31 Air pressure control damper
- 32 Central heating pump
- 34 C.H. flow temperature sensor
- 38 Cold water flow switch
- 42 D.H.W. temperature sensor
- 43 Air pressure switch
- 46 Operator gas valve
- 47 Modulating regulator (Modureg) gas valve
- 49 Overheat cut-off thermostat
- 50 Heat exch. limit thermostat
- 51 Heat exch. frost thermostat
- 52 D.H.W. limit thermostat
- 60 Extended control knob gas valve
- 61 C.H. selector switch
- 62 Time clock
- 63 C.H. boiler thermostat
- 64 C.H. temperature pressure gauges
- 66 Microswitch combination gas valve
- 67 ignition transformer
- 68 Control box with P.C.B.
- 72 Room thermostat (not fitted)
- 80 240V + 24V roomstat terminal blocks
- 101 P.C.B.



J1-J2 = Jumper links on P.C.B.

J1 = Is not required

J2 = Must be fitted!

P1 = C.H. max output
(to be set on site)

P2 = D.H.W. max output
(factory set)

P3 = D.H.W. temperature
(factory set)

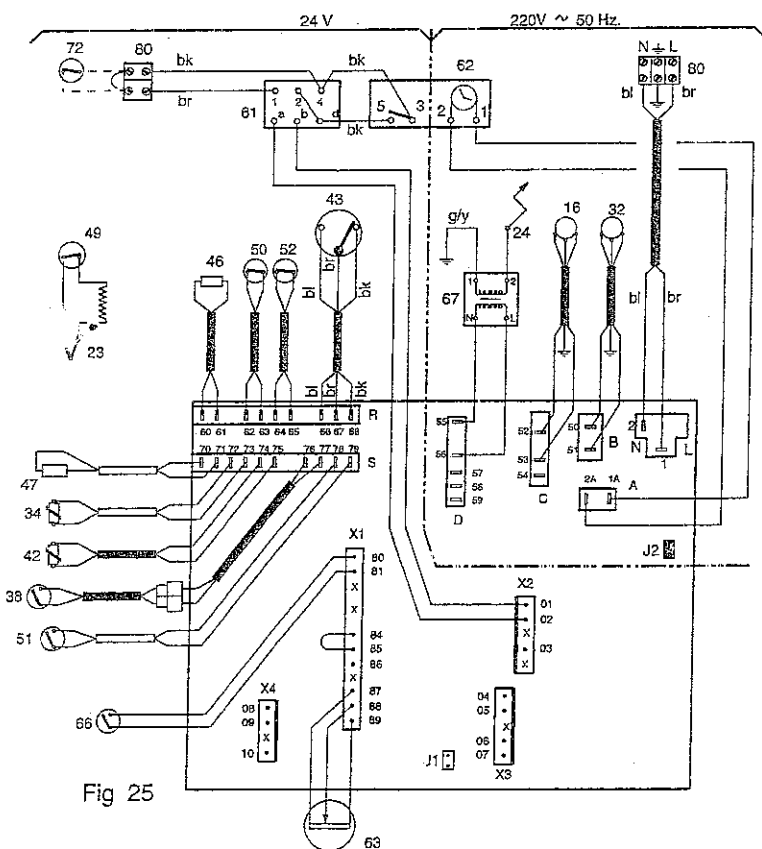
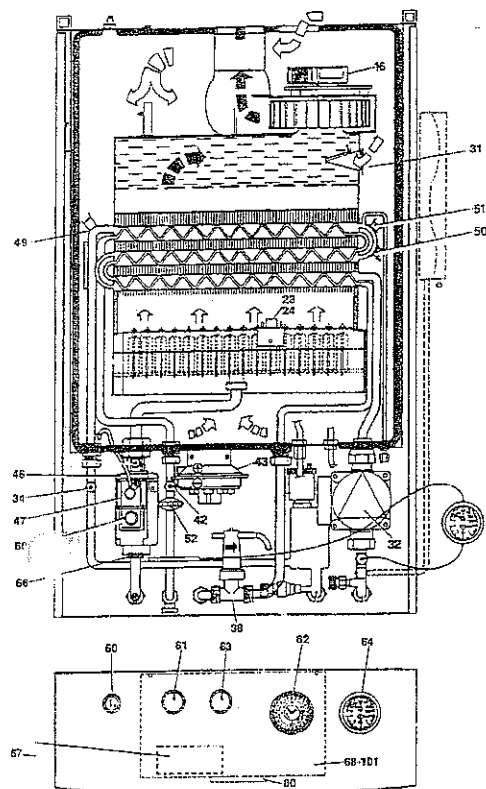
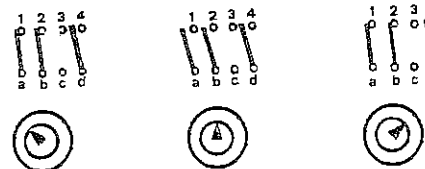


Fig 25

61. C.H. selector switch



Heating timed and Hot water only

Heating continuous and hot water

Electrical Functional Flow Wiring Diagram

Note

All Contact shown in following condition:

- No electrical mains
- No domestic hot water flow
- Temperature too low
(all mechanical thermostats closed)

Notes:

1. C.H. pump will be switched on if temperature of 50 (Heat exchanger limit thermostat) is too high.
2. C.H. pump will be switched on for 1 sec. after D.H.W. tap has been closed.

34 42 Temperature sensors

25°C = 1000 Ohm

60°C = 1300 Ohm

80°C = 1490 Ohm

Key

- 16. Fan
- 24. Spark electrode
- 32. Central heating pump
- 34. C.H. flow temperature sensor
- 38. Cold water flow switch
- 42. D.H.W. temperature sensor
- 43. Air pressure switch
- 46. Operator gas valve
- 47. Modulating regulator (Modureg) gas valve
- 50. Heat exchanger limit thermostat
- 51. Heat exchanger frost thermostat
- 52. D.H.W. limit thermostat
- 61. C.H. selector switch
- 62. Time clock
- 63. C.H. boiler thermostat
- 66. Microswitch combination gas valve
- 67. Ignition transformer
- 72. Room thermostat/remote time clock (not fitted)

LED n°	colour	signification:
1	green	Mains on/low voltage on
2	yellow	Domestic hot water flow switch (38) on
3	yellow	Central heating room thermostat (72) / clock (62) calling for heat
4	green	Sensor (34) or (42) calling for heat
5	red	Central Heating waiting time, a max. 3 minutes delay following shut off Boilerstat (63), Clock (62), Roomstat (72) or use of Hot Water
6	yellow	Demand for heat - fan relay (RL2) will be energised
7	green	Air pressure switch (43) on, air flow checked
8	yellow	Gas valve (46) energised

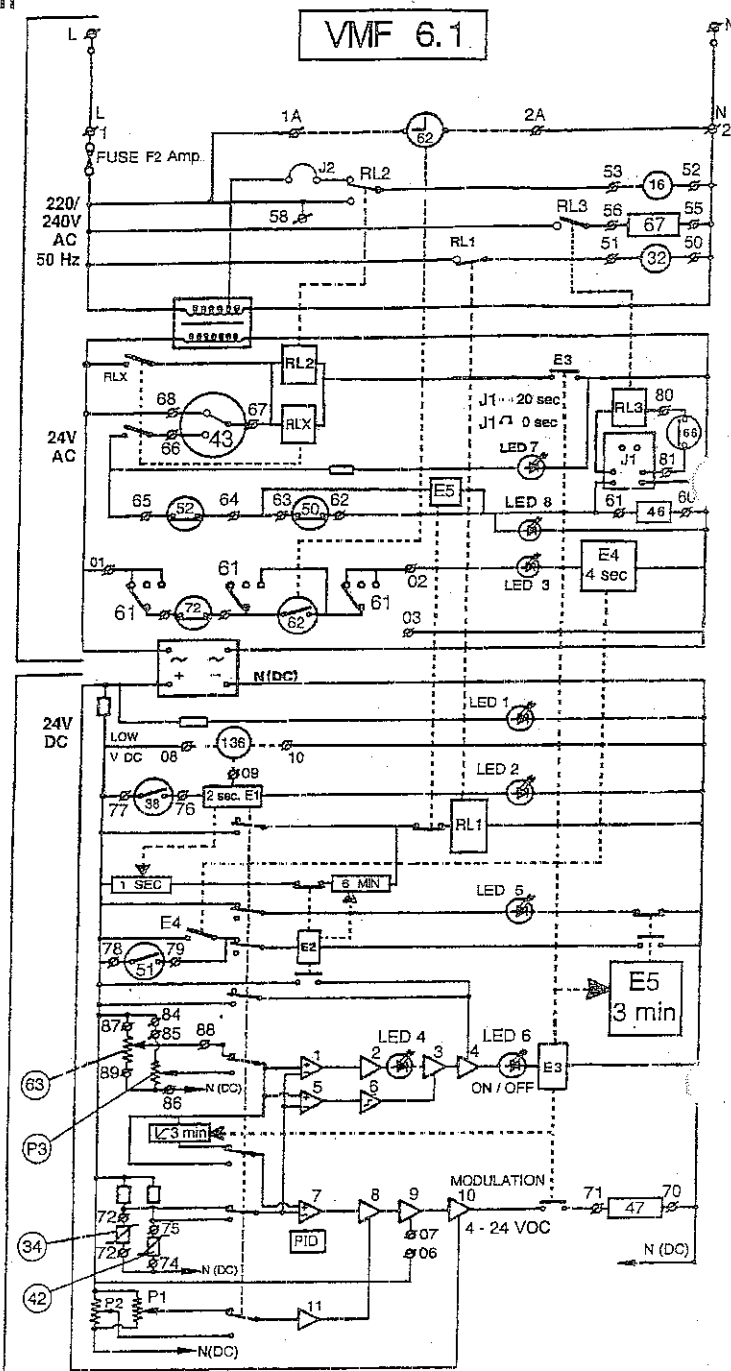


Fig. 26



Short explanation on electrical functional drawing VMF6.1

240 V AC - 24 V AC - 24 V DC

- 1.0 All contacts shown in following condition.
No electrical mains voltage - Temperature too low (all mechanical thermostats closed).
- 1.1 The electrical systems can be divided on 4 main areas.
- 1.2 240 V AC With fan, C.H. pump, spark igniter and fuses.
- 1.3 24 V AC With 4 relays, on/off operator of combination gas valve, 24 V AC is available from a 240V/24V transformer.
- 1.4 24 V DC For power supply to the modulating coil (Modureg) of combination gas valve.
- 1.5 Low V DC For electronic control system.
- 2.0 **240 V AC Fuses F 2 Amp. (Fast)**
- 2.1 RL2 contact of relay 2 controls directly the fan speed between low speed (low voltage from transformer) and full speed if coil of relay 2 is energised.
- 2.2 Pump controlled by Relay 1.
- 2.3 Spark igniter generates high voltage as soon as contact RL3 of relay 3 is energised by the microswitch on the combination gas valve (microswitch will close with control knob of combination gas control fully depressed).

Attention - Relay 3 has a 20 sec. electronic delay! (pre-purge time!).

3.0 24 V AC

- 3.1 Electronic Relay E3 on P.C.B. will be switched «on» as soon as there is any heat demand for heat from central heating.
- 3.2 In stand-by situation the air pressure switch should be in shown position (68-67 closed) and the fan should be at low speed.
- 3.3 If 68-67 is not closed, relays (RLX) and (RL2) cannot be activated. This is a safety check on the correct function of the air pressure switch (no air pressure with fan at low speed).
- 3.4 With 24 V AC between 68 and 60 and air pressure switch in the shown position, relay RLX will be activated.
- 3.5 The Relay RLX links the N.C. position of the air pressure switch, Relay RL2 will switch the fan to full speed.
- 3.6 The switch in the air pressure switch will change position if air flow is high enough for safe combustion and LED7 will be energised.
- 3.7 The on/off operator in the gas valve will be activated if the high limit thermostat (heat exchanger) demand heat.
- 3.9 If during a period of at least 20 seconds after starting the fan at full speed, the air pressure switch was switched in the safe position (67-66 closed) relay RL3 can be energised (20 sec. time delay relay RL3).
- 3.10 Depressing fully the knob of the combination gas valve, the microswitch will close and a spark will be generated (for ignition of the pilot)

4.0 24 V DC

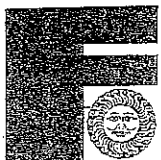
- 4.1 24 V DC is necessary for the power supply amplifier 9, which drives the modulating coil (Modureg) on the combination gas control. Operating voltage on the coil is between 4 Volt and 25 Volt DC.
- 4.2 **Attention** - Never link the modulating coil with a wire or amper tester. Part of the P.C.B. will be destroyed.
Testing can only be done with a voltage tester!

Short explanation on electrical functional drawing Low V DC

5.0 Low V DC Electronic Control System

- 5.1 On the Low V DC output is a Green LED (Light Emitting Diode - Mini Lamp.) to indicate if Low V DC is available, if not replace fuse.
- 5.2 Domestic water flow switch; contact closed if water is running (minimum 2.5 L/min)

- 5.3 Electronic relay E1 (if activated by the water flow switch) switches the control system from the central heating to domestic hot water and gives priority to Domestic Hot Water (Time delay of 2 seconds).
- 5.4 Central Heating Flow temperature sensor and Domestic Hot Water temperature sensor are electrical resistors with a positive temperature coefficient (P.T.C.).
1000 Ohm at 25 degr. C. - 1300 Ohm at 60 degr. C. - 1490 Ohm at 80 degr. C.
(These must not be looped for testing purposes at that will indicate «no heat required»).
- 5.5 **Function of Low V DC circuit**
- 5.5.1 **Domestic Hot Water Taps Closed: Contacts of electronic relay E1 as shown.** Central heating continuous (selector switch turned to the right, Time Clock contact will be linked).
- 5.5.1.1 Electronic relay E2 is activated and will switch off the Relay RL1. The pump will be switched on! After switching off E2 Relay RL1 will remain deenergised for 6 minutes.
- 5.5.1.2 **Attention** - The C.H. pump will be switched off immediately if Relay 2 is activated (for example on activation of relay E1 through the water flow switch).
- 5.5.1.3 Amplifier 1 compares the Set Point of the central heating boiler thermostat (potentiometer on front panel) with the actual temperature of the C.H. sensor. If set point is higher as actual value, amplifier 2 and 3 will be activated and if relay E3 is switched on, the fan starts at full speed through relay RL2.
- 5.5.1.4 Amplifier 2 is a differential on/off amplifier on the P.C.B. This amplifier controls electronically the on/off differential of the flow temperature C.H.
- 5.5.1.5 Amplifiers 5 and 6 are security amplifiers which check if there is not abnormal situation on the temperature sensors. For example with an abnormal low electrical resistance (sensor linked) the amplifier 5 will switch off amplifiers 6,3 and 4. So the fan will be switched to low speed and the burner will be closed down.
- 5.5.1.6 Amplifier 7 is the real modulating amplifier (PID) which controls the power amplifier 9 and so the voltage on the Modureg modulating coil of the combination gas valve. Amplifier 7 compares continuously the set value of the potentiometer 63 with the actual value of the sensor and will control the voltage on the Modureg coil to keep the flow temperature at the set value. If flow temperature is too high (min output burner higher than C.H. absorption) the burner will be on/off controlled by amplifier 1 (see 5.5.1.3). The Modureg can only control the gas flow to the burner within the preset minimum and maximum settings for safe ignition reasons. Min and max. pressure of Modureg is mechanically set.
- 5.5.1.7 With potentiometer P1 on the P.C.B. the max. output of the power amplifier 9 can be limited, through amplifier 8. On delivery from factory this potentiometer is set to max., giving max. C.H. output.
- 5.5.2 **Domestic Hot Water tap open**
Water flow minimum 0,5 Gallon/min. (2,5 L/min.). The contact in the water flow switch closes and relay E1 will be activated. Several contacts of E1 are switched over:
- 5.5.2.1 A contact breaks and the central heating pump will be switched off immediately.
- 5.5.2.2 A contact bypasses central heating (the contact of Relay E2 is bridged).
- 5.5.2.3 A contact switches from the central heating boiler thermostat 63 to the Hot Water temperature set point potentiometer P3 on the P.C.B.
- 5.5.2.4 A contact switches from the central heating temperature sensor to the domestic hot water temperature sensor.
- 5.5.2.5 A contact switches from max. output C.H. potentiometer P1 to max. output D.H.W. P2.
- 5.6 **Function of selector switch Central Heating.**
- 5.6.1 Heating continuous and Hot Water see 5.5.1 and 5.5.2.
- 5.6.2 Hot water Only.
- 5.6.2.1 Fan and burner will start on "call for Heat" from (domestic) water flow switch.
- 5.6.2.2 Fan and burner and C.H. pump will start on call for Heat from frost thermostat. C.H. pump will stop 6 min. after frost thermostat contact breaks.
- 5.6.3 Heating timed and Hot Water (position as shown in the electrical functional drawing).
- 5.6.3.1 See 5.6.2.1
- 5.6.3.2 See 5.6.2.2
- 5.6.3.3 Fan and burner and C.H. pump will start on call for heat from Time Clock and Room thermostat (if fitted) C.H. pump will stop 6 min. after Time Clock or Room thermostat (if fitted) contacts break.



OPTIMA 900



Illustrated Wiring Diagram

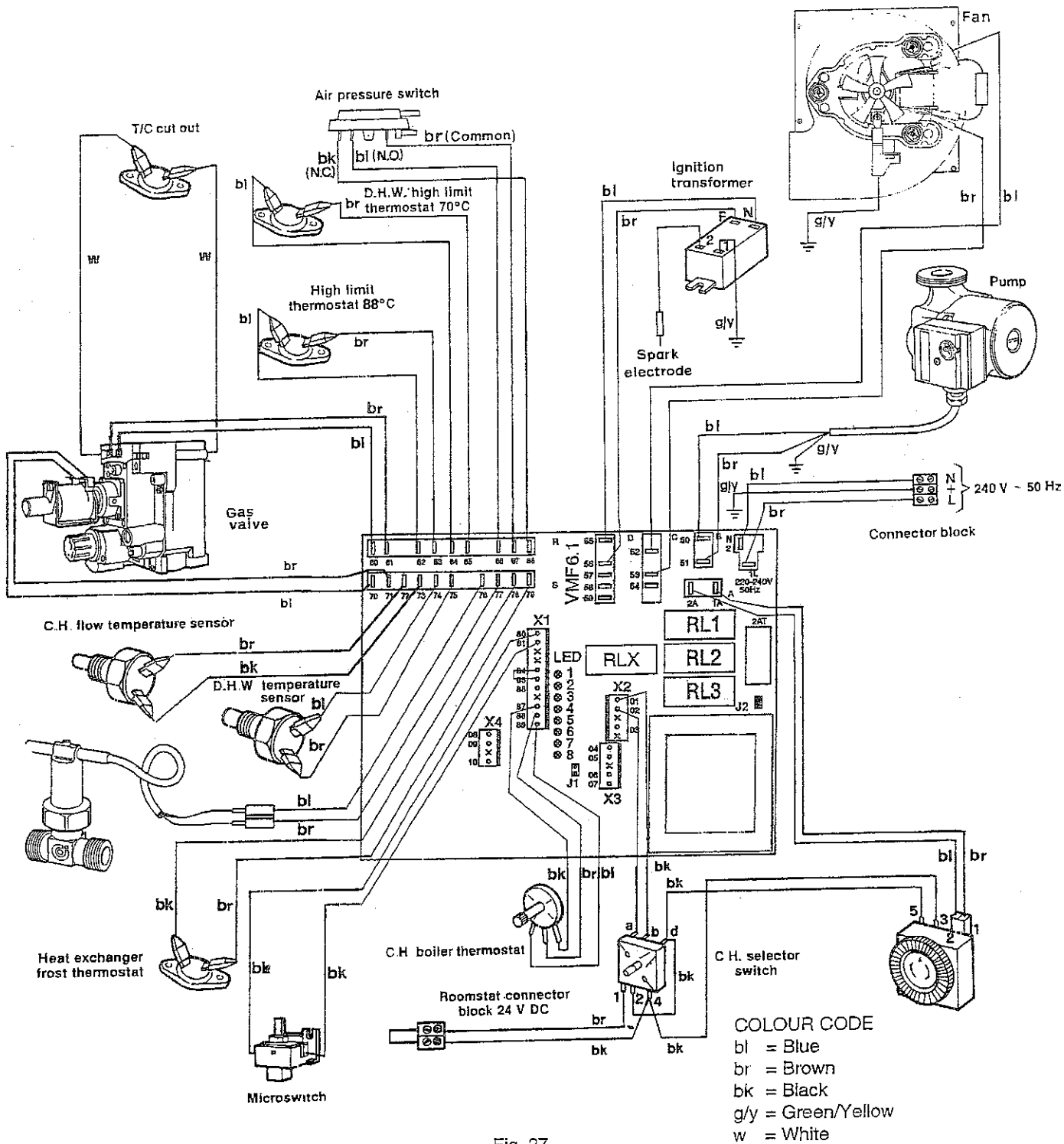


Fig 27

General fault finding

Engineer Please Check

1. Gas available (check kitchen and gascocks)
2. Electrical mains is on.
3. Water pressure Central Heating System (min. 1 bar on pressure gauge)
4. Water flow domestic hot water (min. 0.5 Gal/min - 2.5 L/min) (fills a 1 pint milk bottle max 15 seconds).
5. Is central heating pump running.
6. Air inlet/flue outlet free from obstacles.
7. Are all service cocks open?
8. Is at least one radiator valve or bypass in Central Heating system open?

For "FAST" fault finding see separate instructions inside the electrical control box or page 55

Always follow the complete General test Procedure to make sure that no fault remains unnoticed.

Never disconnect any wire without previous testing. It is possible that a fault disappears after disconnecting and rewiring the electrical connections, this fault will come back later.

Never pull on the wires in the terminals.

To disconnect the terminal pull on the insulation cover, keeping the terminal pushed back.

The relays on the P.C.B. can be checked. The relays have transparent covers and the position of the contacts can be verified (to see if a relay is energised or not see fig. 28)

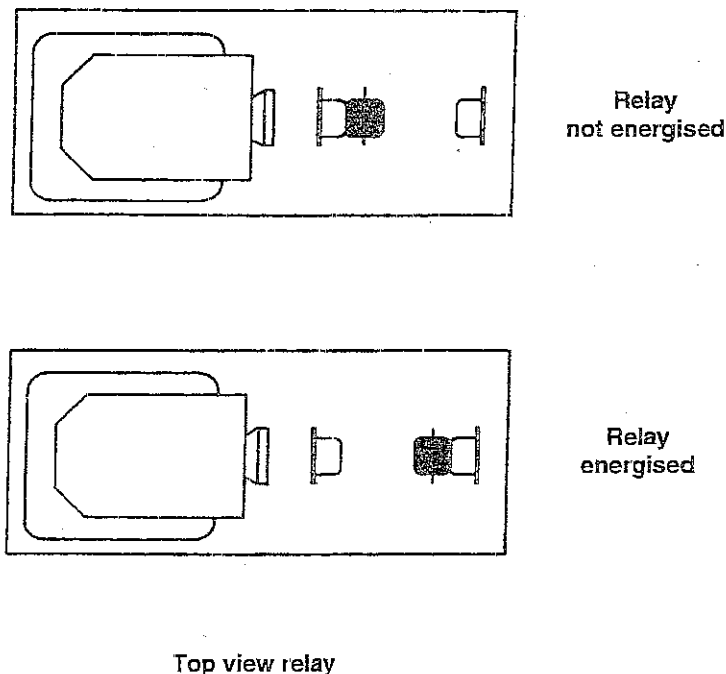
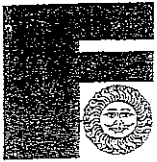


Fig. 28



General Test + Fault Finding - Chart 1

Check carefully before starting fault finding

- Gas
- Electric mains
- Central heating pressure min. 1 bar.
- Central heating pump spins free
- Heat exchanger air vented
- Green LED 1 on P.C.B. alight, if not check fuse F 2 Amp. on P.C.B. and external fuses
- Waterflow D.H.W. min. 0.5 Gallon/min. (2.5 Litres/min.)

Put selector switch on hot water only

Close Domestic Hot Water taps

Fan runs at full speed

YES

NO

C.H. pump runs

YES

NO

Temperature of heat exchanger very low
Frost protection thermostat closed

If temp high check wiring or replace
frost thermostat

If temp very low

Disconnect Frost Thermostat 51
Fan speed?

Low

Fan keeps running at full speed

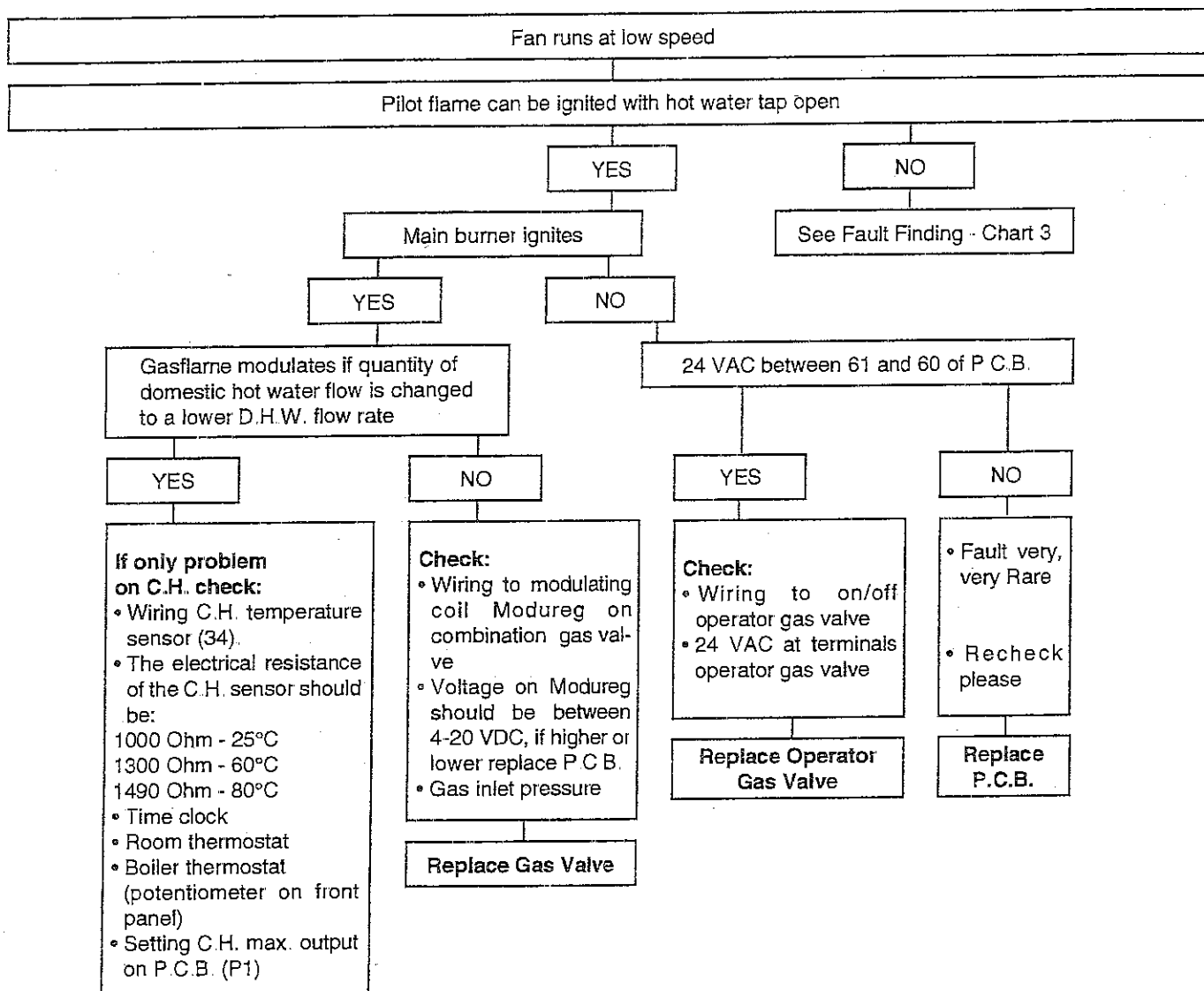
Low

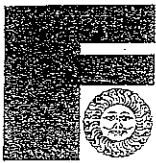
Relay 2 energised

Replace P.C.B.

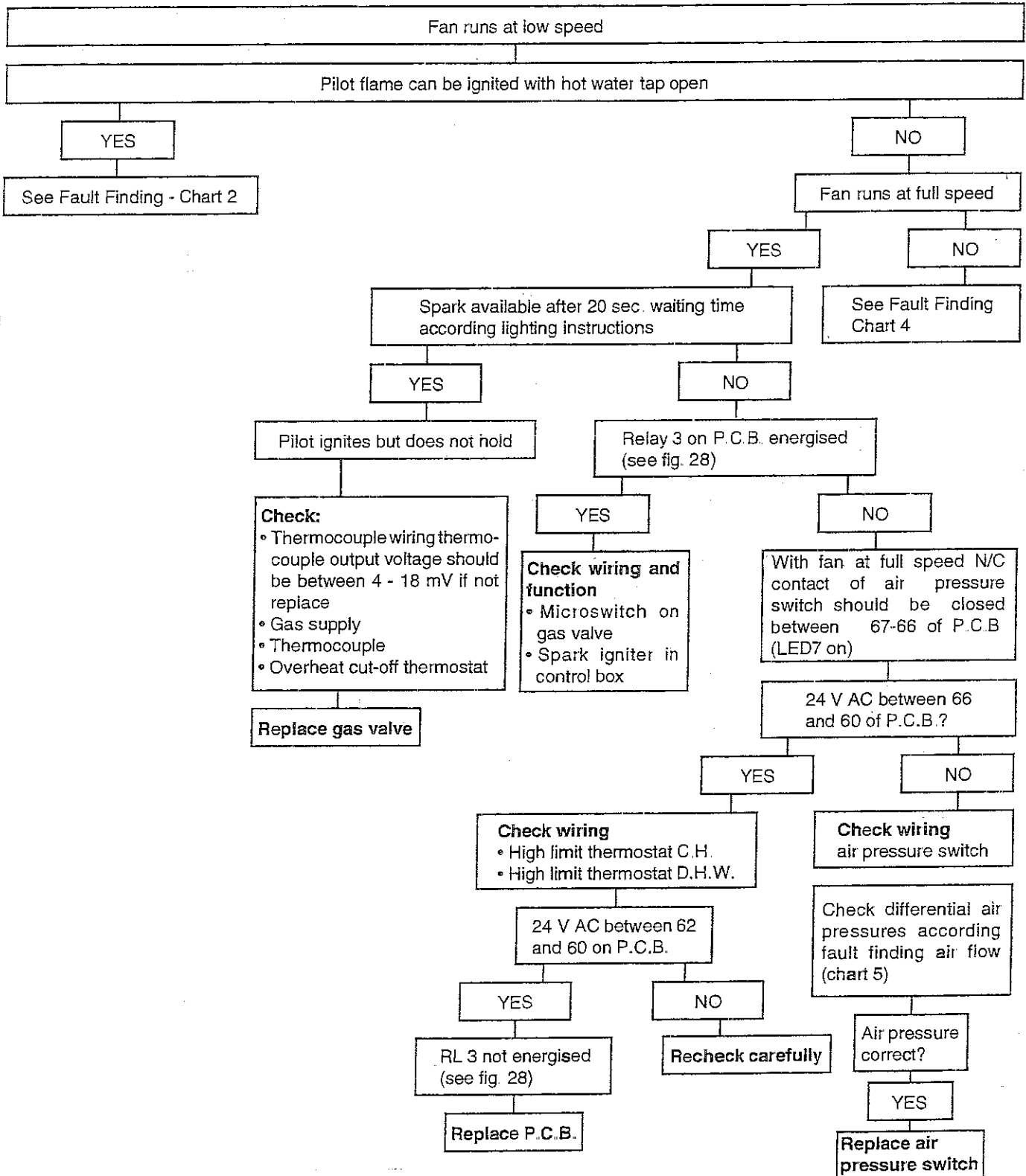
Fan runs at low speed. See fault finding chart 2.

General Test + Fault Finding - Chart 2

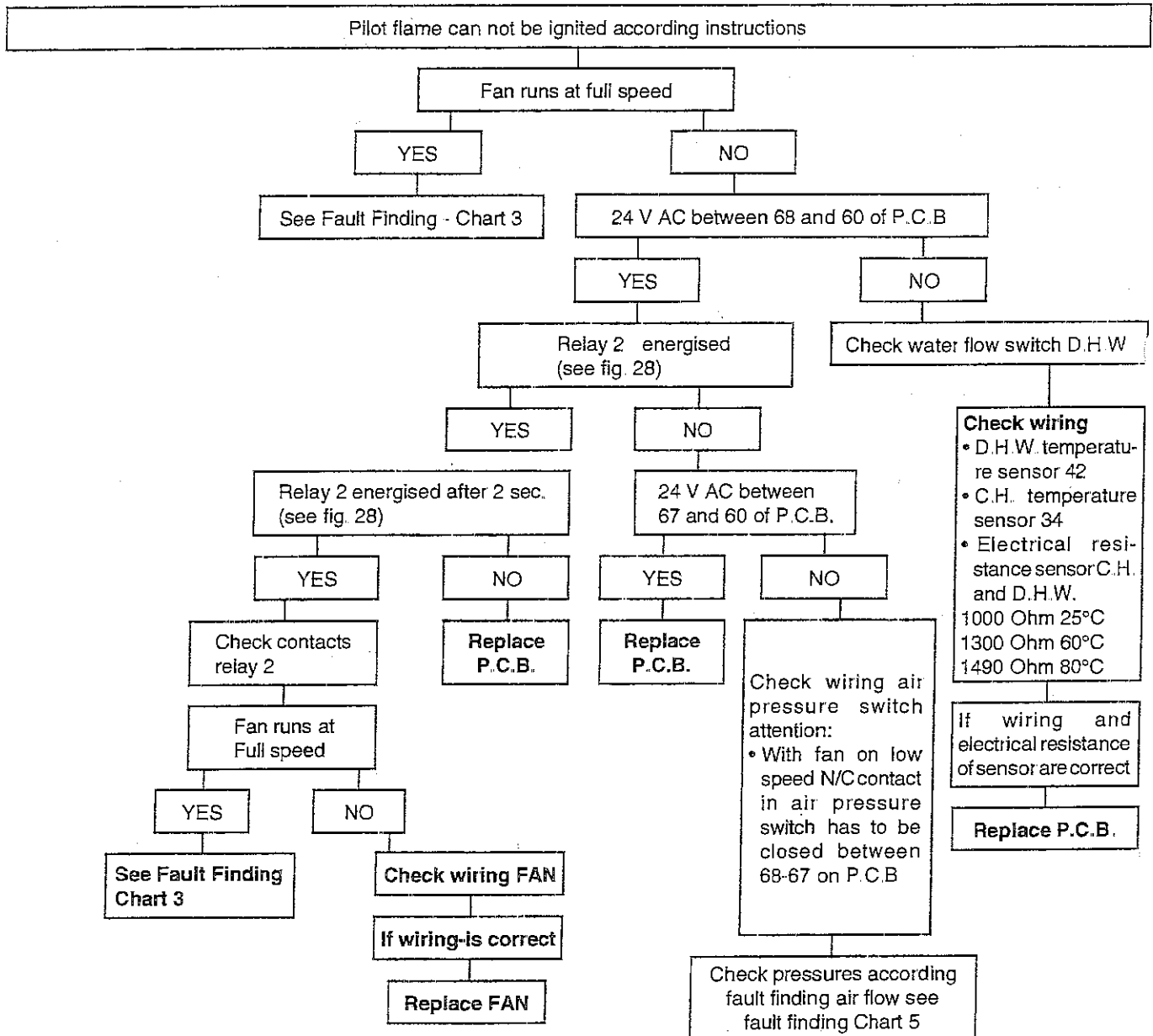


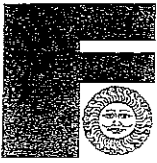


General Test + Fault Finding - Chart 3

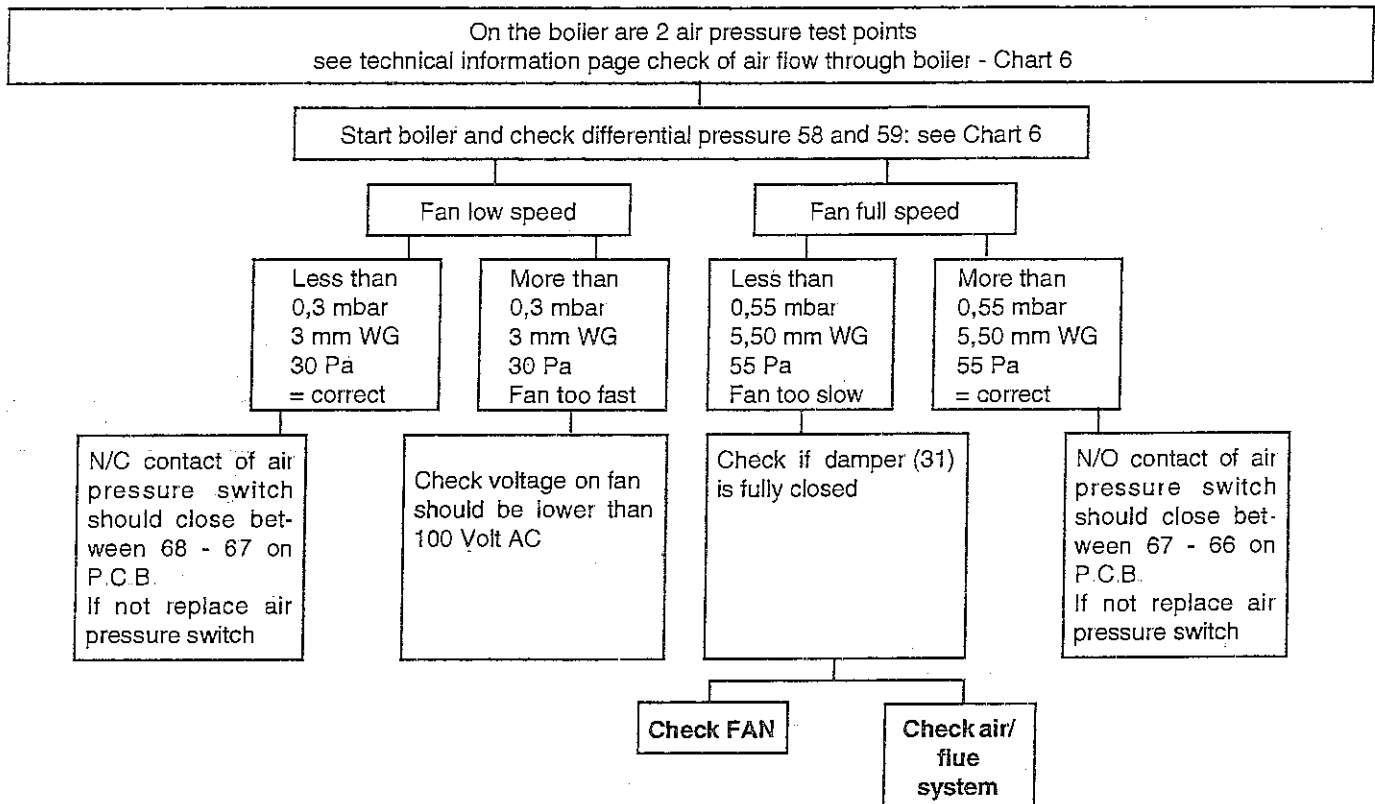


General Test + Fault Finding - Chart 4





General Test + Fault Finding - Chart 5



General Test + Check of Air Flow through boiler - Chart 6

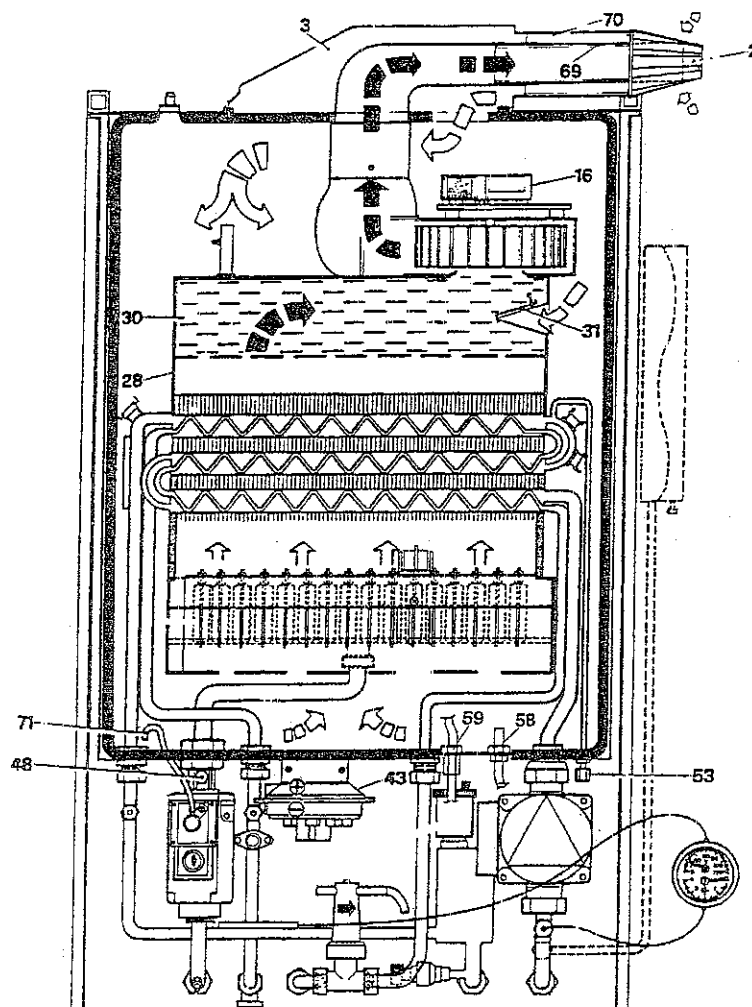


Fig. 29

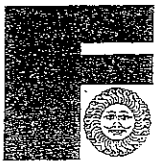
On the boiler are two pressure test points with which the correct pressure and air flow of the air can be checked.

Attention - It is always necessary to measure **differential** pressure because the boiler is a room sealed appliance.

58 - 59 Differential pressure on air pressure switch 43.

Checks:

1. On low speed the **differential pressure** between points 58 and 59 should be no more than 0.3 mbar - 3 mm WG - 30 Pa.
2. On full speed **differential pressure** between 58 and 59 should be no less than 0.55 mbar - 5.5 mm WG - 55 Pa.
3. If differential pressure 58 and 59 less than 0.55 mbar check air pressure damper 31 and fan 16.



Replacement of Parts

1.0 INITIAL PROCEDURE

Before work commences ensure that:

- a) The boiler is cold, electricity supply is isolated, and the gas supply is turned off at the inlet of the boiler (fig. 1).
- b) For replacement of parts where water connections are broken, it will be necessary to isolate and drain either or both the central heating or domestic hot water circuits of the boiler only. The cold water mains inlet is isolated at the inlet cock (fig. 1). The D.H.W. is drained via drain cap (fig. 37).
The C.H. flow and return cocks are turned off at the isolation cocks (fig. 1). The C.H. is drained via the pressure relief valve (twist about 1/2 of a turn).

Important

- c) Upon completion of the work the following (details of which are included in the commissioning section):
Should be checked:

- I) Gas soundness of all joints.
 - II) Water soundness of all joints.
 - III) The electricity supply.
 - IV) The pressure of the sealed system and top up where necessary.
- d) Replace all components in reverse order, observing any special notes given.

e) Removal of Outer Casing

Note - It may not be necessary to remove all the outer casing. Refer to individual sections for the extent to which the outer case needs to be removed.

- f) **Front Panel**
Grip on both sides and lift away from the main boiler assembly.

- g) **Base Plate**
Remove the four fixing screws (fig. 16).

Side Panels

For each panel, remove two fixing screws at base of appliance and single fixing screw at top of appliance (fig. 30).
Also remove hinged control panel cover.

Note - The panels are located in keyhole slots, push panels upwards and pull away.

- i) **Removal of Combustion Chamber Outer Cover**
Remove the five combustion chamber outer cover fixing screws and undo four buckle clips (fig. 30) to remove cover.
- j) **To Remove Control Panel**
Hinge control panel cover downwards.
The two control panel securing screws can now be removed (fig. 30), hinge control panel forwards and disengage from bottom lugs the control panel can now be removed.
- k) **To lower control box frame**
Remove screw securing gas control valve to frame.
Remove the base plate (g) above.
Remove the two screws securing the frame to the back panel.

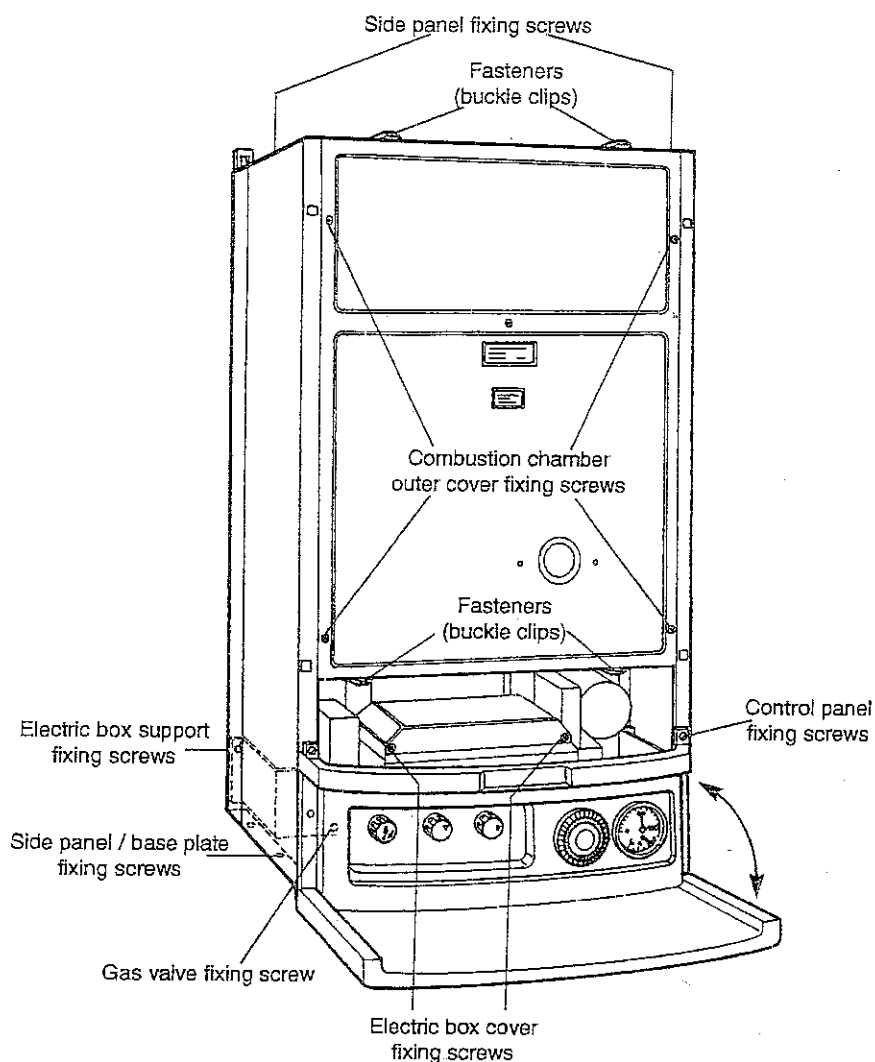


Fig. 30

2.0 PILOT BURNER, INJECTOR, SPARK ELECTRODE AND THERMOCOUPLE

- a) Refer to Section 1, items a, c, d, f and i.
- b) Disconnect the thermocouple from the Honeywell valve (use a 10 mm spanner) (fig. 31).

Note - The thermocouple interrupter is located in a slot below and must be in the correct position when re-connecting the thermocouple.

- c) Unscrew the pilot supply pipe compression nut from the Honeywell valve (fig. 31)
- d) Remove the pilot inspection cover 2 screws (fig. 32)
- e) Remove the pilot retaining plate, 1 screw (fig. 32).
- f) Pull pilot assembly downwards (fig. 34)
- g) Unscrew the electrode with cable.
- h) Unscrew the thermocouple from the pilot assembly (fig. 34).
- i) Re-assemble in reverse order and ensure ignition is satisfactory.
- j) Check the operation of the flame failure device. The boiler should operate satisfactorily with a thermocouple output of between 4 and 18 millivolts.

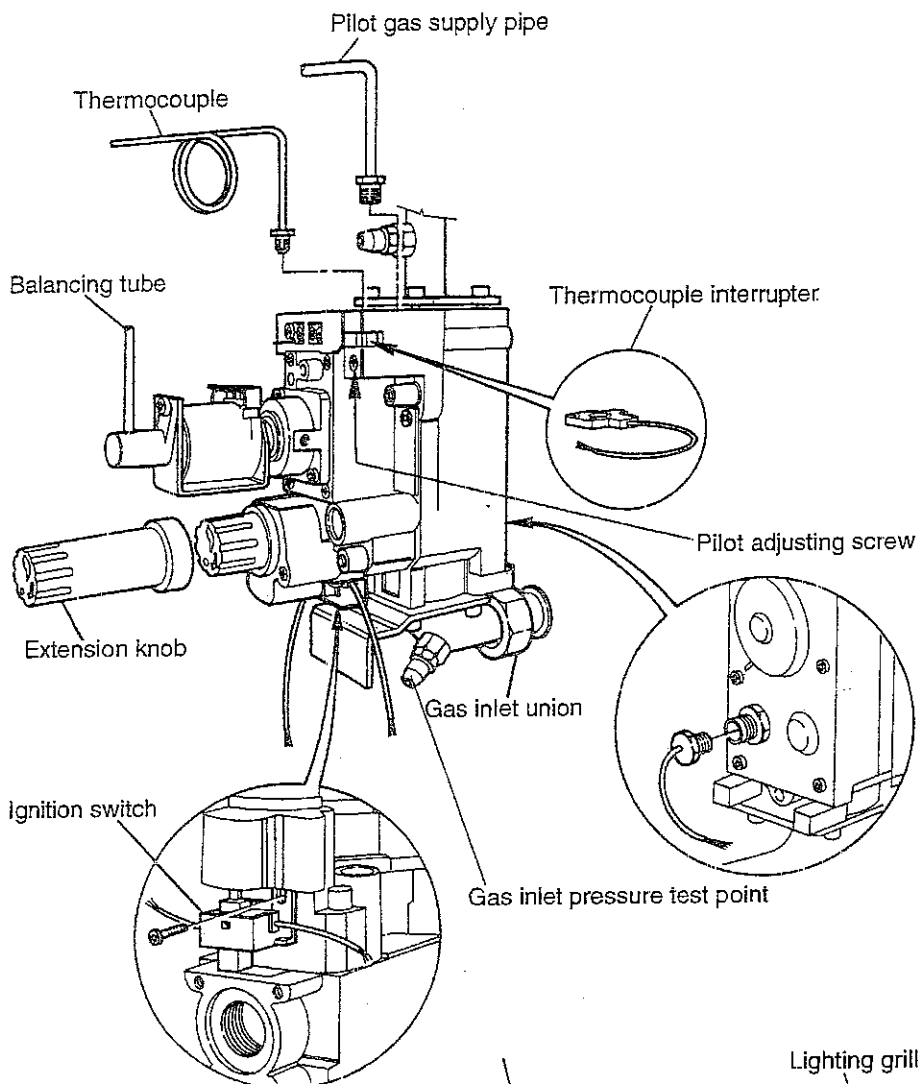
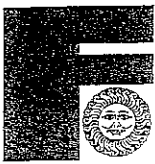


Fig. 31

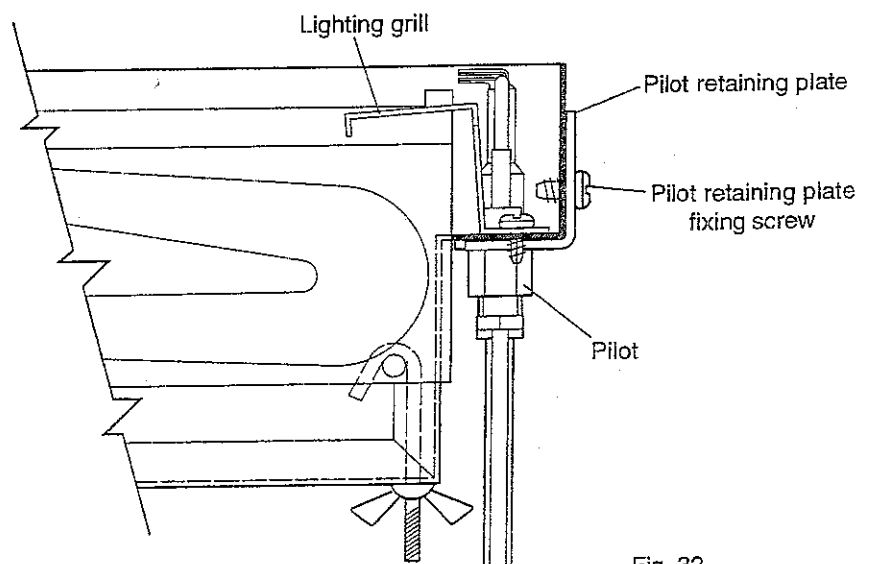


Fig. 32

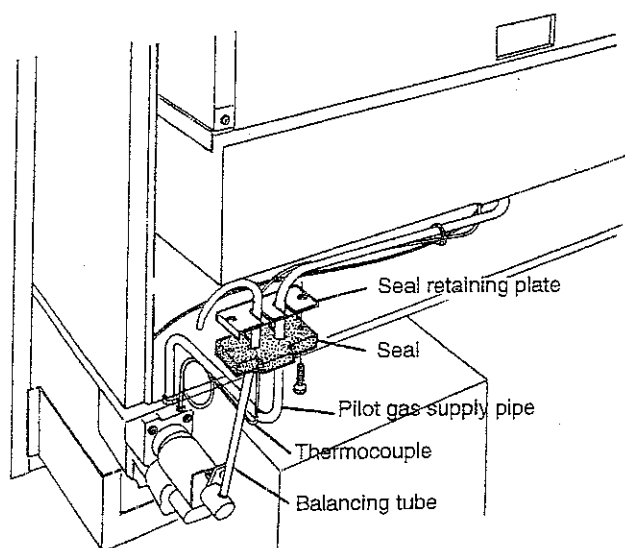


Fig. 33

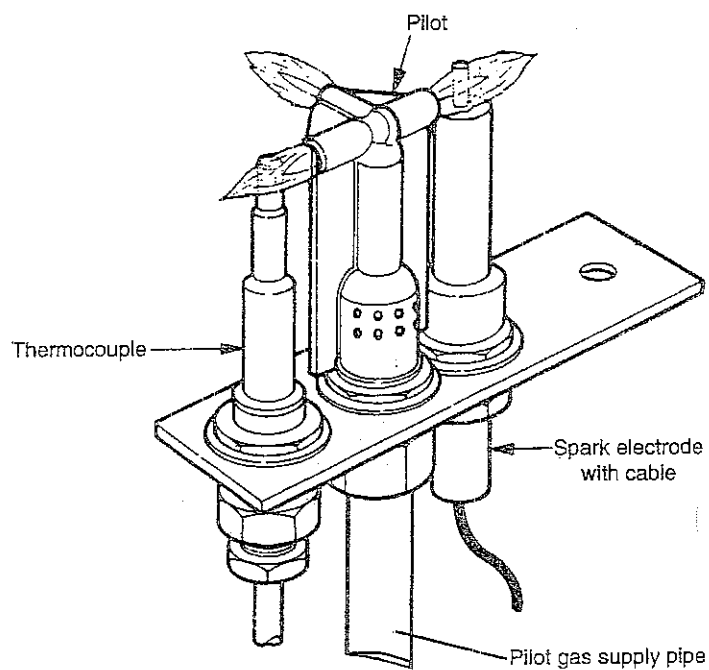


Fig. 34

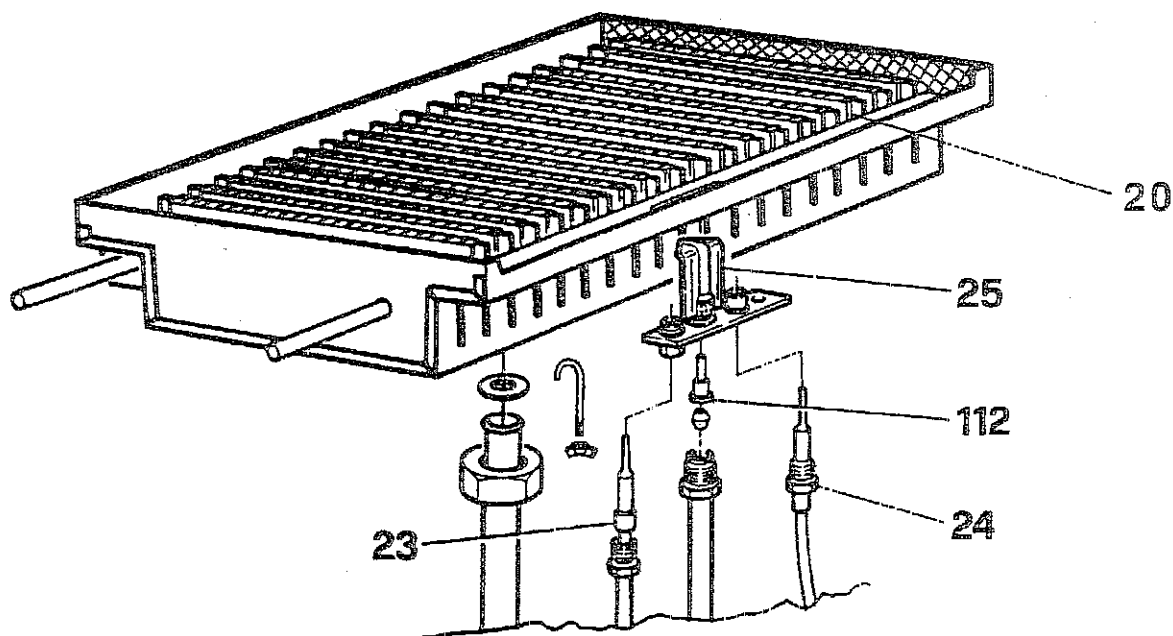
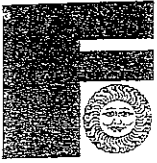


Fig. 35



3.0 COLD WATER FLOW SWITCH (Domestic Hot Water) AND FILTER

- Refer to section 1, items a, b, c, d, f and g (drain D.H.W. only fig. 37).
- Undo the flow switch unions and carefully lower the flow switch taking care not to lose either the (three) sealing washers, filter or flow restrictor.
- Disconnect the electrical connections to the flow switch.
- Re-assemble in reverse order, ensuring that the filter, flow restrictor and sealing washers are in the correct position (fig. 38). The polarity for the electrical wiring is immaterial.

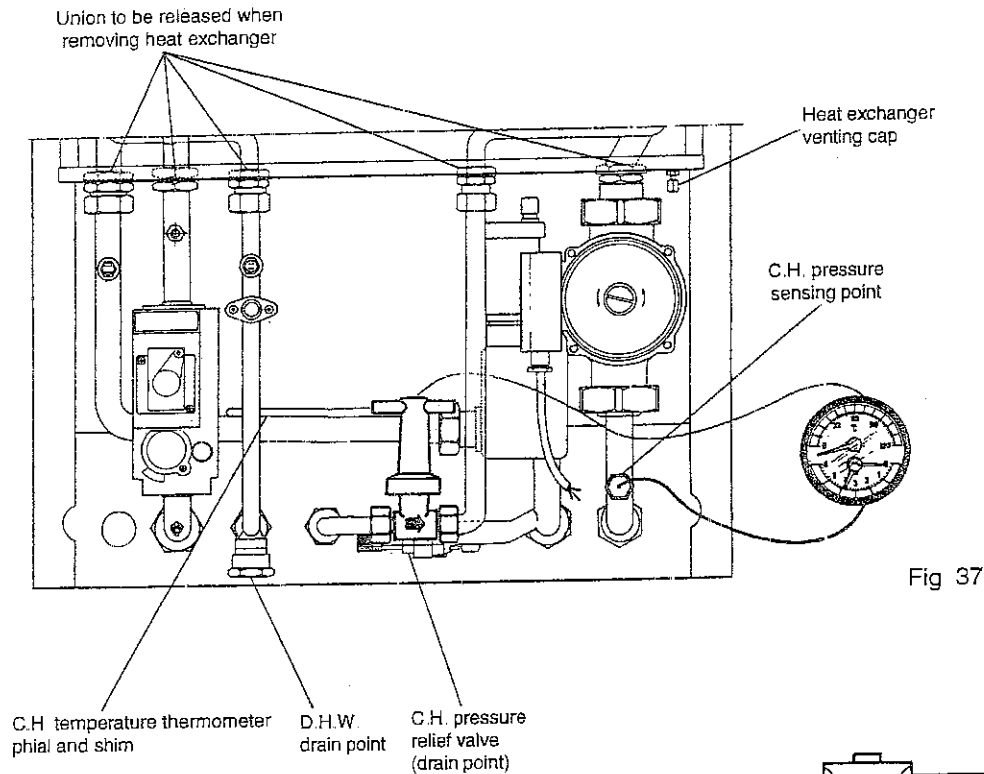


Fig 37

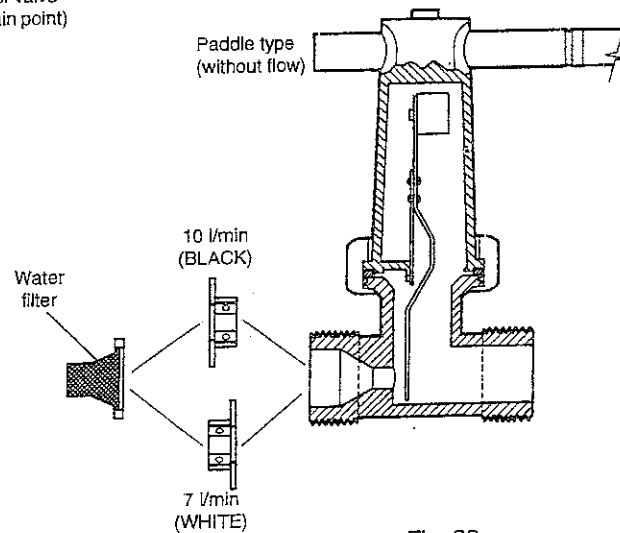


Fig 38

4.0 HONEYWELL GAS VALVE (fig. 31)

- a) Refer to Section 1, items a, c, d, f, g, h (left hand side panel) and j.
- b) Remove thermocouple and pilot gas supply from valve.
(Pull out thermocouple interrupter wire from below thermocouple).
- c) Disconnect the four electrical connections from the top of the valve.
- d) Disconnect modulating balance tube by removing the fixing screw, and gently pull off from the front of the valve.
- e) Disconnect the gas supply to the gas valve at the inlet union.
- f) Remove the screw securing the base of the gas valve to the control box frame of the appliance.
- g) Remove the four Allen screw which secure the inlet supply pipe to the gas valve
(Take care not to lose the sealing washer).
- h) Undo the union which is on the burner supply pipe and withdraw gas valve towards front

Note - Ignition wires and thermocouple interrupter wire is still attached.

- i) Remove single screw securing the ignition switch to be bottom of the valve.
- j) From the rear of the valve remove the thermocouple interrupter connection (10 mm spanner).
- k) Remove valve, pull off gas control knob extension.
- l) Re-assemble in reverse order Re-connect electrical connection in accordance with the wiring diagram (fig. 25).
- m) Fully test the operation of the new gas valve and reset burner pressures as prescribed (see commissioning).

5.0 P.C.B.

- a) Refer to section 1, items a, c, d, f and j.
- b) Unscrew two fixing screws on the P.C.B. top cover plate, lift and disconnect all connectors from P.C.B. (fig. 39)
- c) Unscrew upper fixing screws from P.C.B.
- d) Gently pull P.C.B. off mounting studs and remove.
- e) Re-assemble in reverse order (Refer to wiring diagram fig. 25).
- f) Range rate the boiler C.H. and check the operation of the controls (See commissioning).

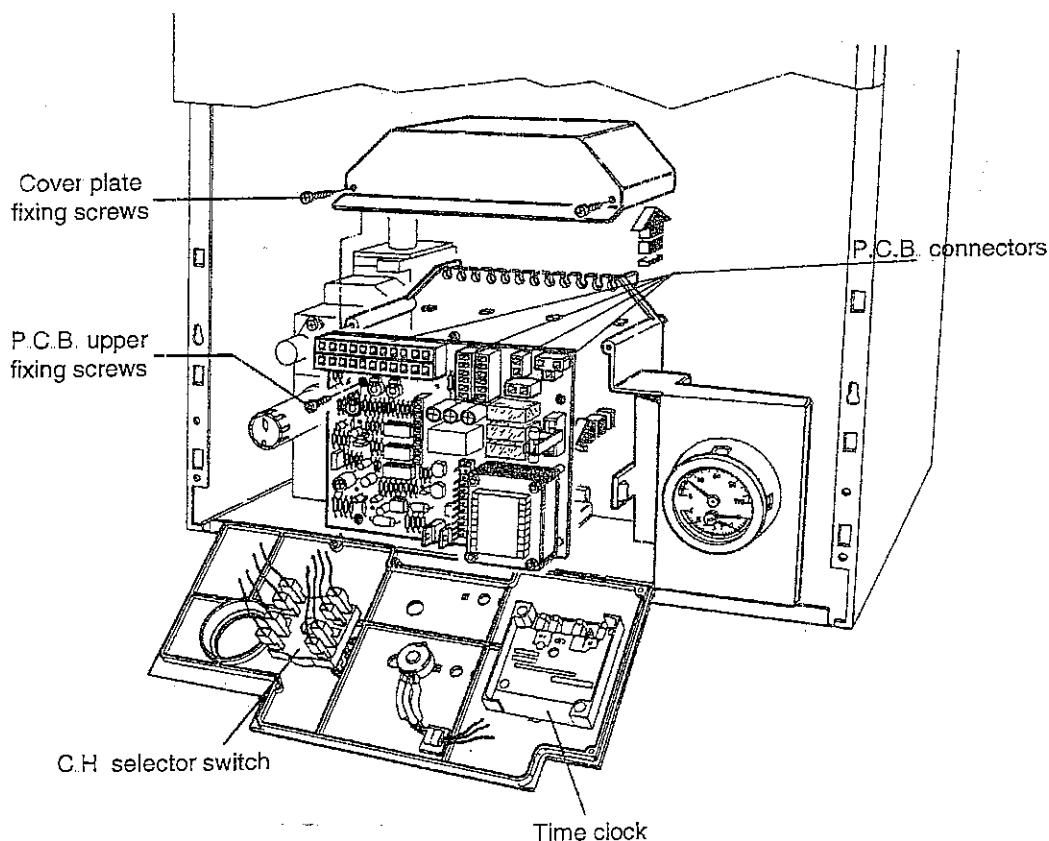
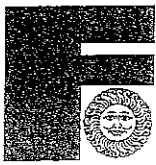


Fig. 39



6.0 CENTRAL HEATING LIMIT THERMOSTAT, OR FROST THERMOSTAT, OR OVERHEAT CUT OFF THERMOSTAT OR D.H.W. LIMIT THERMOSTAT

- a) Refer to Section 1, items a, d, f and i.
- b) Refer to fig. 2 to identify the location of respective thermostat.
- c) Remove two spring clips (with a pair of pliers).
- d) Disconnect electrical connections to the thermostat
- e) Re-assemble in reverse order (Polarity Immaterial) Heat sink compound, must be used.

7.0 D.H.W. TEMPERATURE SENSOR OR CENTRAL HEATING TEMPERATURE SENSOR

- a) Refer to section 1, items a, b, c, d, f, g, h (left hand side panel) and k
- Identify the sensor from fig. 2.
- Disconnect the electrical connections to the sensor.
- d) Unscrew the temperature sensor.
- e) Re-assemble in reverse order (Polarity Immaterial).

8.0 PRESSURE RELIEF VALVE

- a) Refer to section 1, items a, b, (central heating) c, d, and g.

Note - If this valve is not working correctly then the water can only be drained from the appliance by, removing the pressure relief valve.

- b) Release the outlet union to the valve and undo the valve union connection, taking care not to lose the sealing washers.
- c) Remove the pressure relief valve outlet fitting
- d) Re-assemble in reverse order, and check the operation of new valve.

9.0 PUMP

- a) Refer to section 1, items a, b (central heating), c, d, f, g, h (right hand side panel), j and k.
- b) Loosen the two pump union connections.
- c) Remove electrical cover on pump, one screw (fig. 40). (Rotate pump to remove cover).
- d) Disconnect the live, neutral and earth connection.
- e) Release the cable retaining gland and pull the cable clear.
- f) Disconnect the two pump union connections. Remove pump (Retain washers if not re-newing).
- g) Re-assemble in reverse order (fig. 40).

Note - Ensure the arrow indicating the direction of flow, on the pump housing is pointing upwards, and the speed setting is at 3.

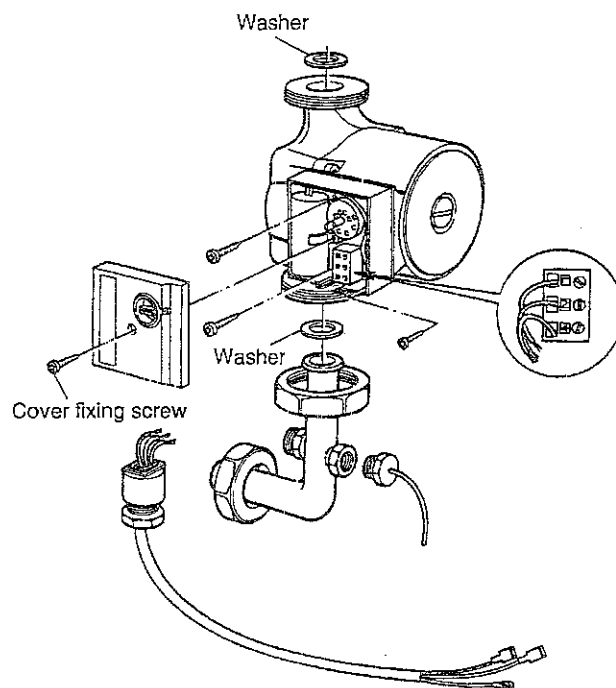


Fig. 40

10.0 AUTOMATIC AIR VENT

- a) Refer to Section 1, items a, b (central heating), c, d, f, g, h, (right hand side panel) and k.
- b) Loosen the pump union connections and swivel the pump to the right.
- c) Unscrew the automatic air vent (fig. 2, item 36).
- d) Re-assemble in reverse order ensuring the «O» ring is fitted (fig. 41) and that the venting cap is loose. Replace pump ensuring that the arrow indicating flow points upwards.

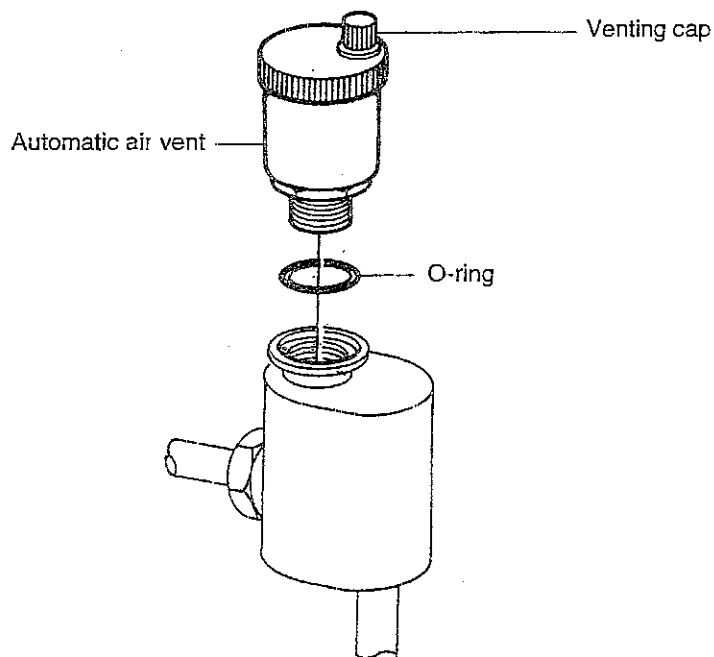
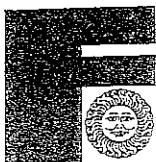


Fig. 41



11.0 PRESSURE/TEMPERATURE GAUGE

- Refer to Section 1, items a, b, (central heating), c, d, f, g and j
- Remove the shim then the temperature sensing phial from its pocket (fig. 37).
- Unscrew the pressure sensor from its housing (fig. 37) (Access from below).
- Unscrew the knurled nut from the rear of the gauge, and remove the gauge forwards.

12.0 REMOVAL OF C.H. SELECTOR SWITCH

- Refer to section 1, items a, c, d, f and j
- Disconnect the electrical connections to the selector switch (fig. 42)
- Pull off selector switch knob.
- Unscrew the two fixing screws exposed when the knob is removed
- Re-assemble in reverse order (refer to fig. 42 for wiring). Check the operation of the new switch.

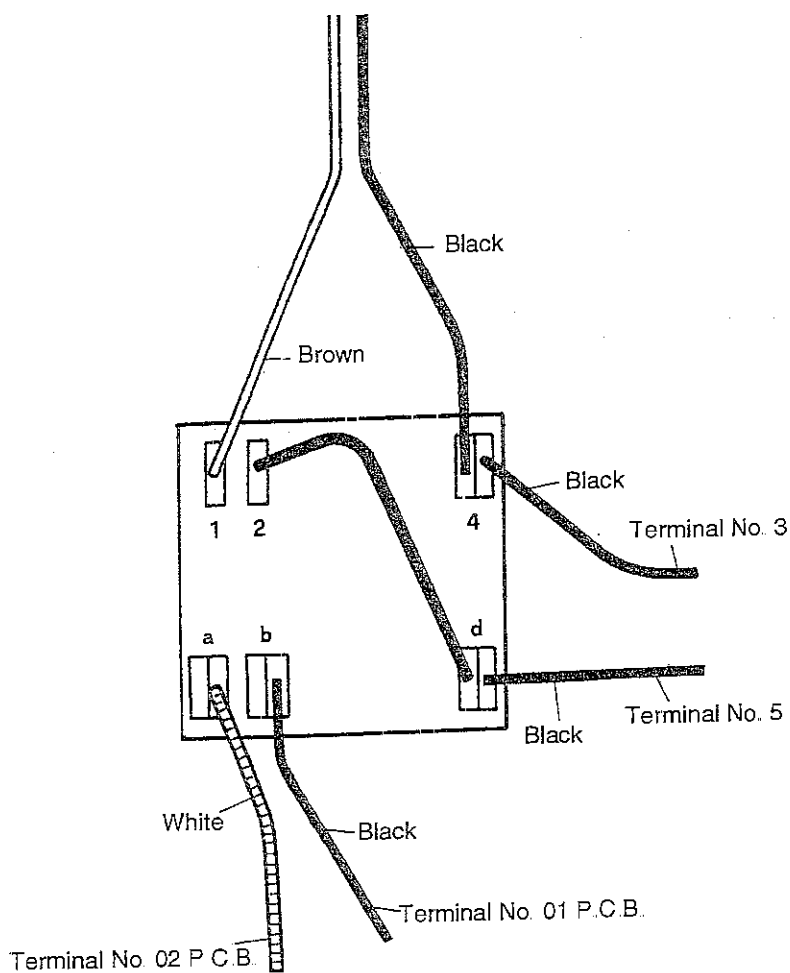


Fig 42

13.0 REMOVAL OF THE CLOCK

- a) Refer to section 1, items a, c, d, f and j
- b) Disconnect the electrical connections to the time clock.
- c) Remove the time clock from the control panel (fig. 43).
- d) Re-assemble in reverse order (refer to fig. 43 for replacement of the time clock)

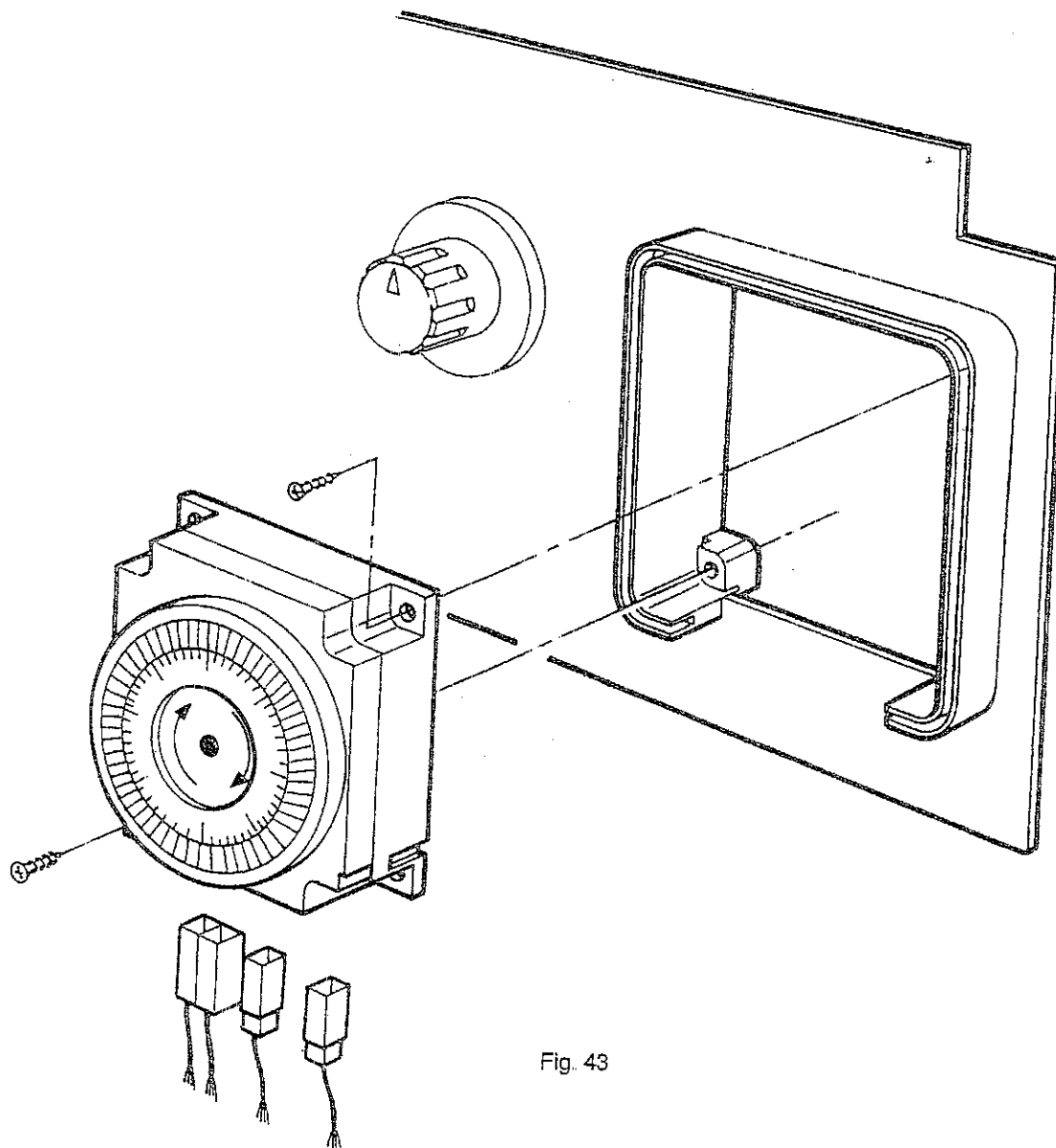


Fig. 43



14.0 REMOVAL OF BOILER THERMOSTAT

- Refer to Section 1, items a, c, d, f, and j.
- Remove P.C.B. top cover plate by unscrewing the two fixing screws and pulling away (fig. 39).
- Disconnect the connector from the P.C.B. (terminals 87 - 88 - 89).
- Pull off the thermostat knob and lever up the two securing tags revealed.
- Re-assemble in reverse order, ensure the wires are pointing downwards.
(Refer to fig. 25 for wiring).

15.0 REMOVAL OF IGNITION GENERATOR

- Refer to Section 1, items a, c, d, f and j.
- Disconnect electrical connection to the ignition generator.
- Release the two ignition generator fixing screws, situated at the base. (Refer to fig. 44 for wiring)
- Re-assemble in reverse order (Refer to fig. 44 for wiring) Check the ignition of the pilot.

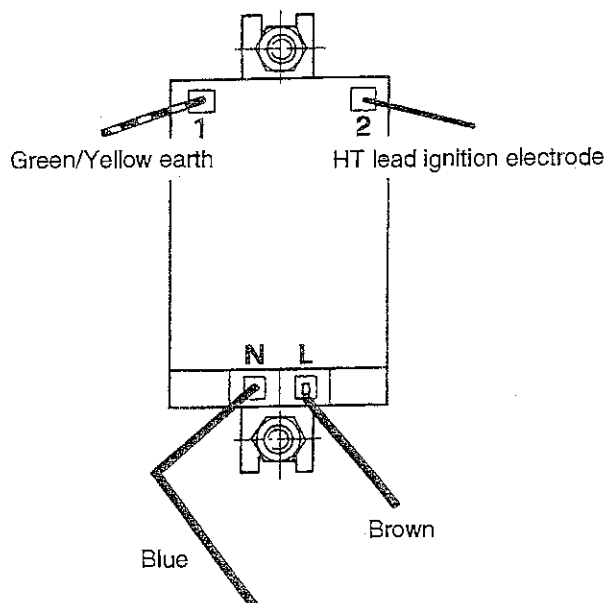


Fig. 44

16. AIR PRESSURE SWITCH

- a) Refer to Section 1, items a, c, d, and f.
- b) Identify the air pressure switch from fig. 2
- c) Remove the two screws securing the air collection plate (fig. 45), and withdraw the plate complete with the air pressure switch.
- d) Disconnect electrical leads to air pressure switch.
- e) Remove pressure sensing tubes.
- f) Remove the pressure switch, 2 screws.
- g) Re-assemble in reverse order (refer to fig. 46 for wiring).

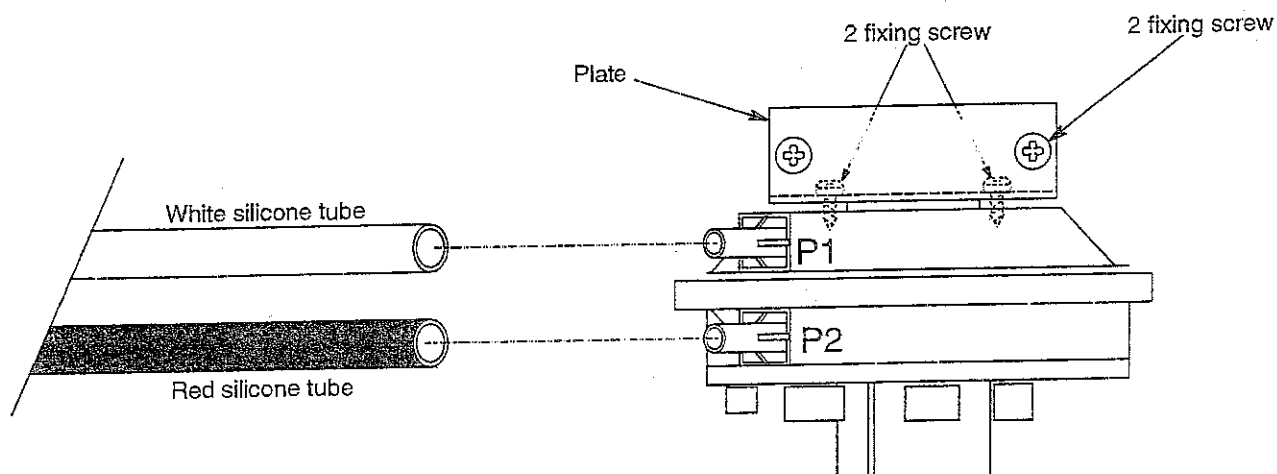


Fig. 45

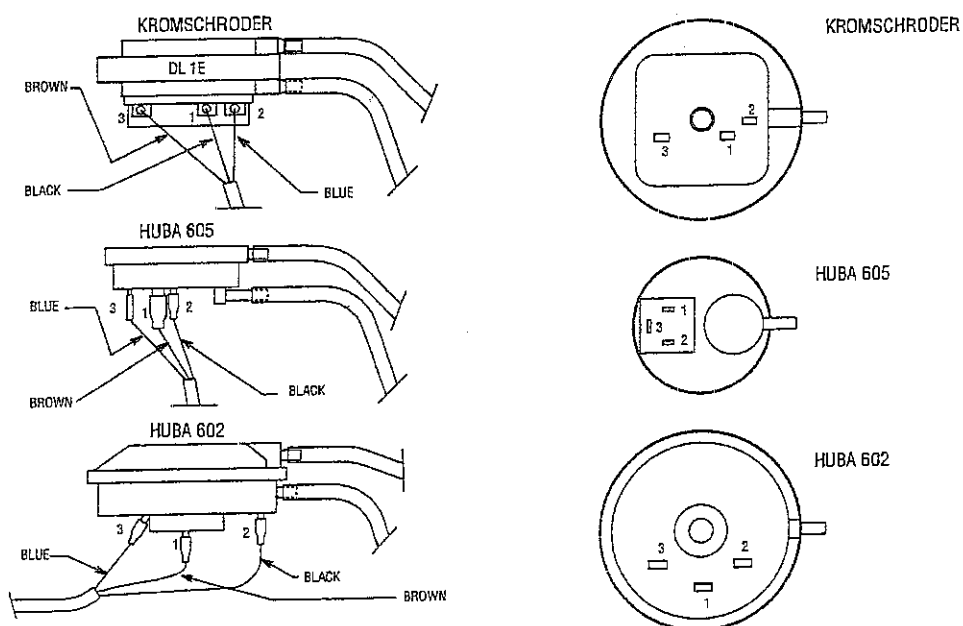
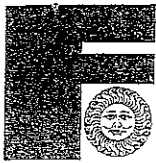


Fig. 46



17.0 REMOVAL AND RE-PRESSURISING OF C.H. EXPANSION VESSEL

Note - If there is less than 500 mm clearance above the boiler or if the boiler has a rear flue outlet then removal of the expansion vessel can only be achieved by first removing the boiler from the wall.

Note - For rear exit flues it is not recommended that the flue and air duct be removed from the wall. Either remove the boiler leaving the ducts in place or insert an equivalent vessel in the **central heating return** to the boiler.

- a) Removal of expansion vessel.
 - I) Refer to section 1, items a, b and c (Drain C.H. side of boiler).
 - II) Remove the two screws from the expansion vessel securing plate, (fig. 47) which can be found at the top back of the boiler.
 - III) Undo the compression fitting on the top of the expansion vessel (fig. 47).
 - IV) Remove the expansion vessel.
 - V) Re-assemble in reverse order.
- b) Re-pressuring of expansion vessel. (Charge pressure 0,8 - 1,0 bar).
 - I) Close the C.H. flow and return cocks on boiler and drain the boiler (fig. 20).
 - II) The schrader valve is positioned on the top right hand side of the expansion vessel, behind the inlet connection.
 - III) Re-open C.H. flow and return cocks and re-charge the system to between 1 & 1,5 bar and vent the boiler and radiators

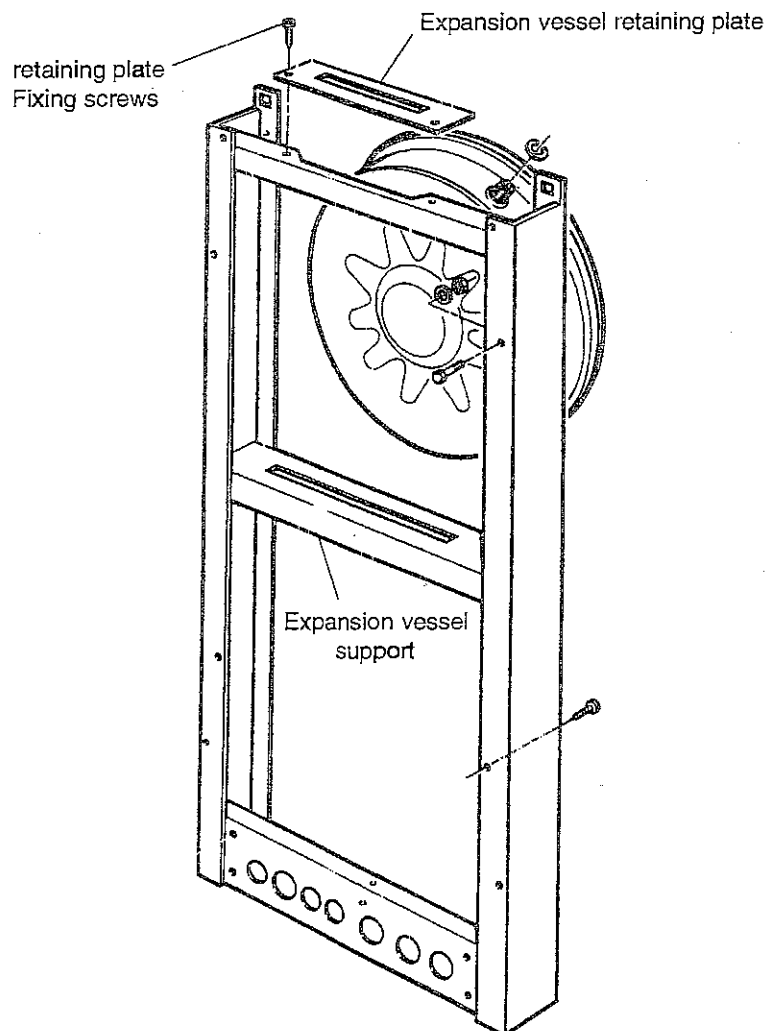


Fig. 47

Exploded view sealed chamber of the boiler

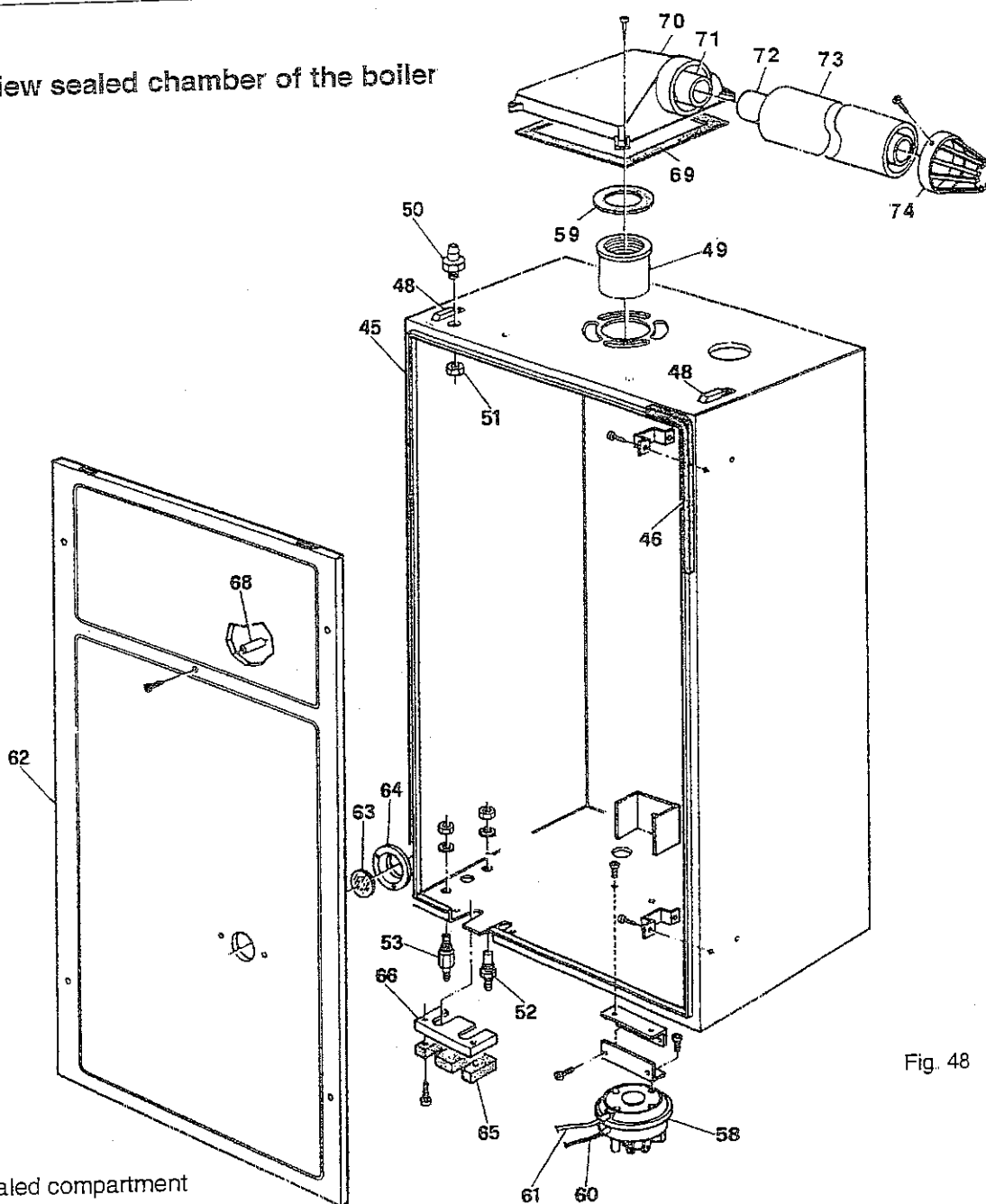
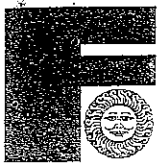


Fig. 48

Key

- 45 Room sealed compartment
- 46 Adhesive packing
- 48 Hinge
- 49 Collar flue exit
- 50 Pressure test point
- 51 Nut air pressure switch test point
- 52 Air pressure test point
- 53 Flue pressure test point
- 58 Air pressure switch
- 59 Seal for curve turret
- 60 Red silicone tube
- 61 White silicone tube

- 62 Closing panel for room sealed compartment
- 63 Looking glass
- 64 Plate for glass
- 66 Plate
- 67 Seal
- 70 Flue gas outlet bend
- 71 output smoke curve
- 72 Tube flue outlet
- 73 Tube air intake
- 74 terminal tube protection



Exploded view gas line, combustion chamber and draft diverter

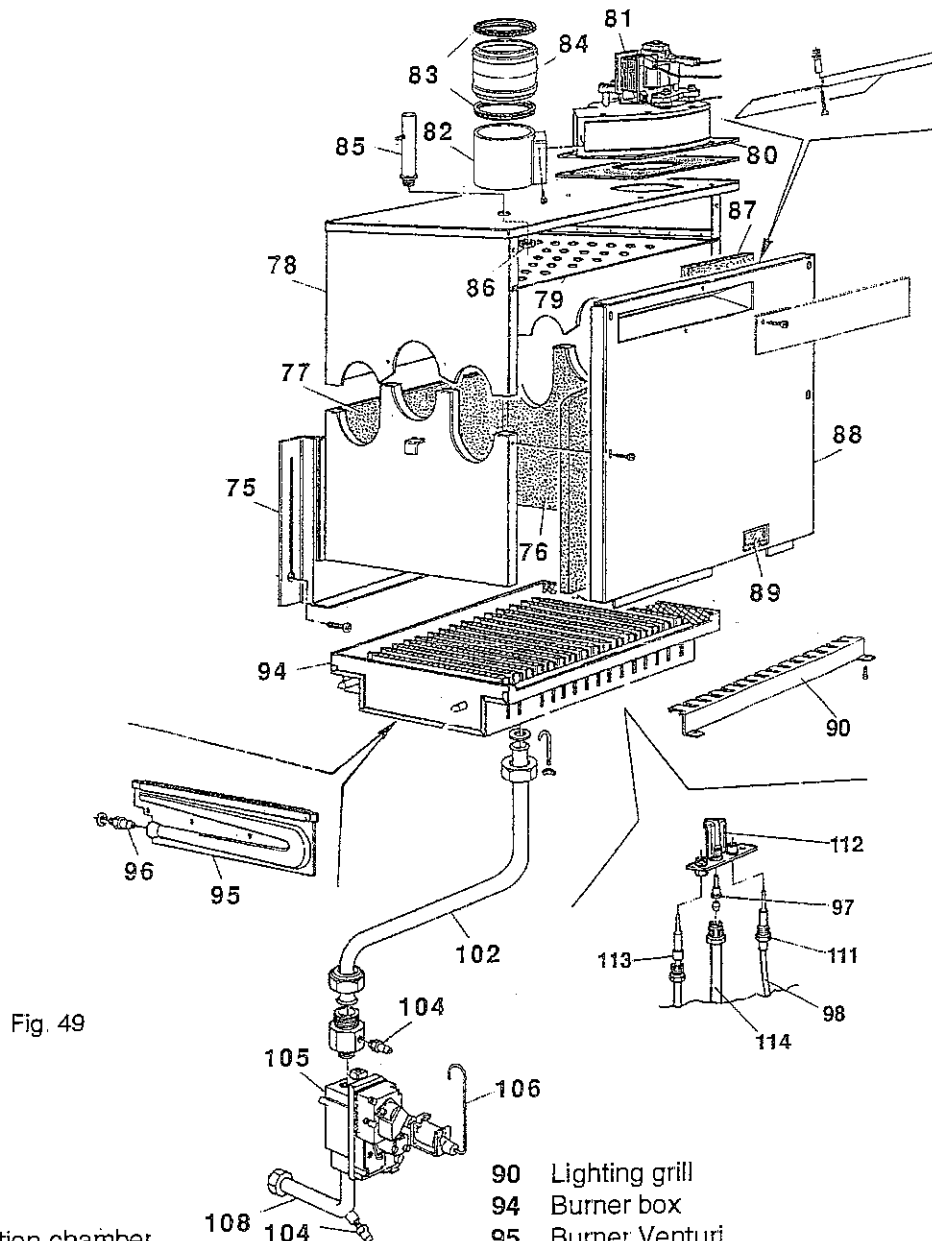


Fig. 49

Key

- | | | | |
|----|--|-----|-------------------------|
| 75 | Complete combustion chamber | 90 | Lighting grill |
| 76 | Combustion chamber insulation back panel | 94 | Burner box |
| 77 | Combustion chamber insulation side panel | 95 | Burner Venturi |
| 78 | Flue collector | 96 | Main Injector |
| 79 | Outlet flue deflector | 97 | Pilot injector |
| 81 | Fan | 98 | Ignition cable |
| 82 | Flue collector outlet from fan | 104 | pressure test point |
| 83 | Outlet flue junction collar | 105 | Gas valve |
| 85 | Venturi test point | 106 | Modulating balance tube |
| 87 | Panel isolation | 108 | Inlet tube gas valve |
| 88 | Combustion chamber panel | 111 | Spark electrode |
| 89 | Glass window | 112 | Pilot |
| | | 113 | Thermocouple |
| | | 114 | Pilot gas supply pipe |

Exploded view heat exchanger + C.H. and D.H.W. parts

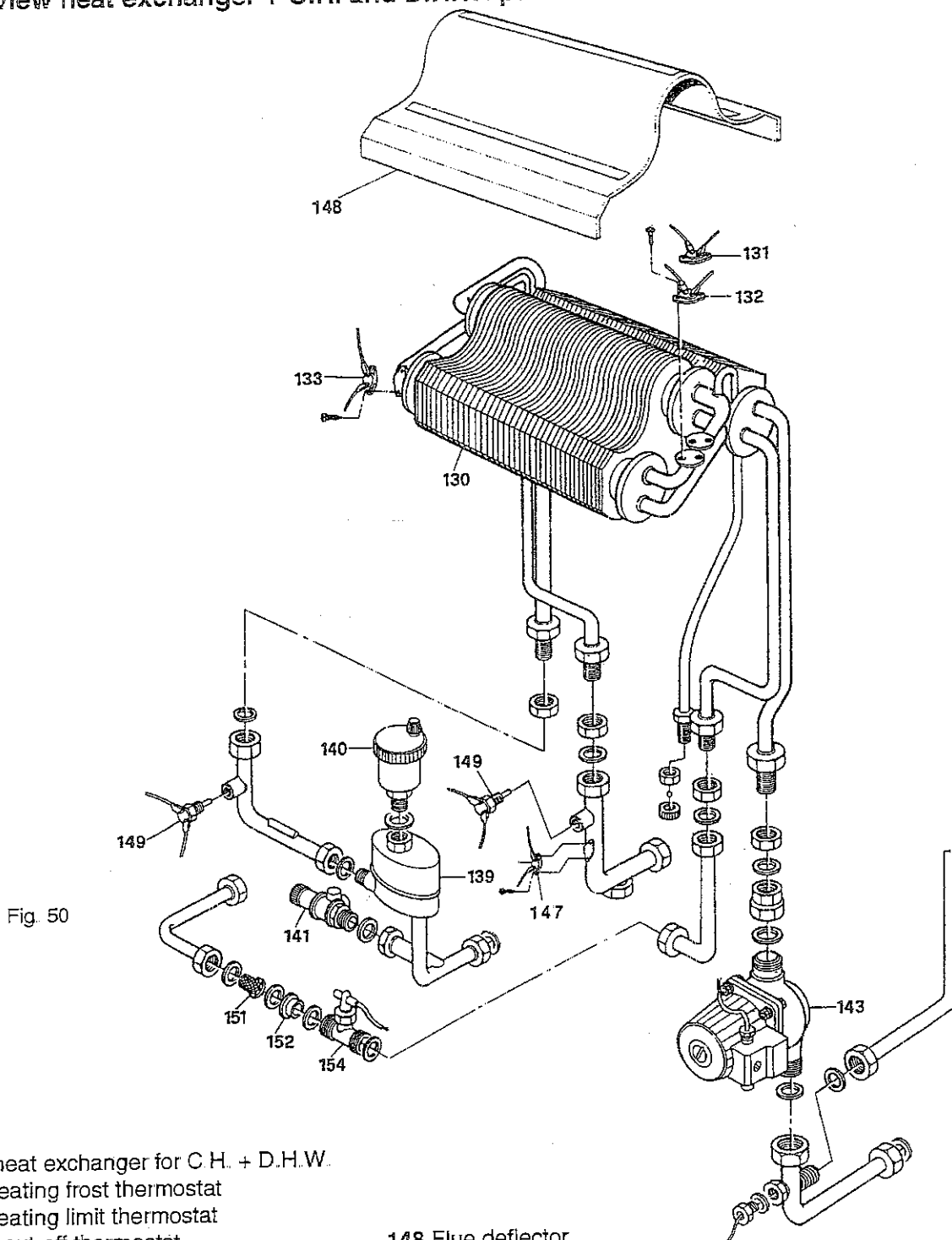


Fig. 50

Key

130 Copper heat exchanger for C.H. + D.H.W.

131 Central heating frost thermostat

132 Central heating limit thermostat

133 Overheat cut-off thermostat

140 Automatic air vent

141 Safety valve

143 Central heating pump

147 D.H.W. limit thermostat

148 Flue deflector

149 Temperature sensor

151 Cold water inlet filter

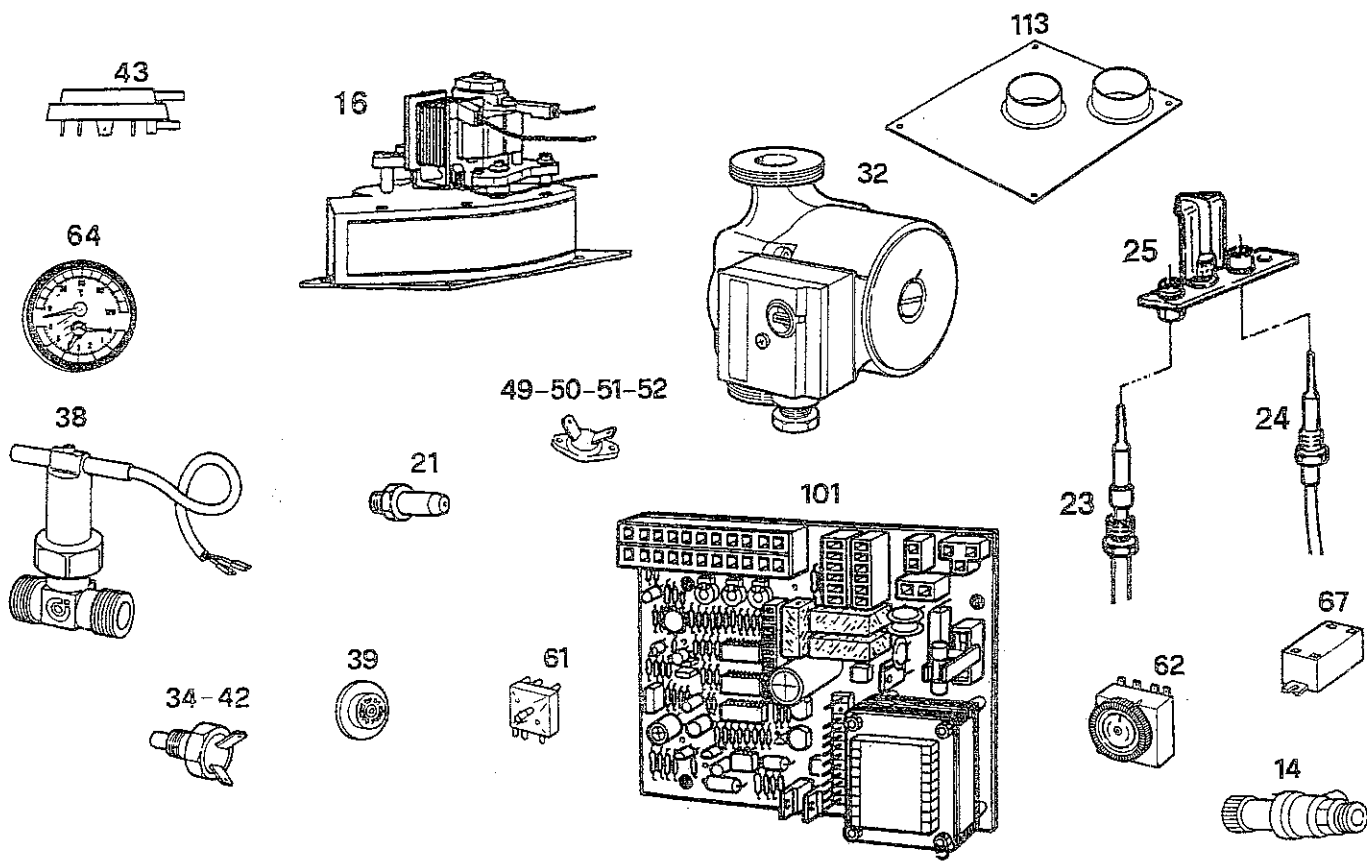
152 Cold water flow limiter

154 Cold water flow switch



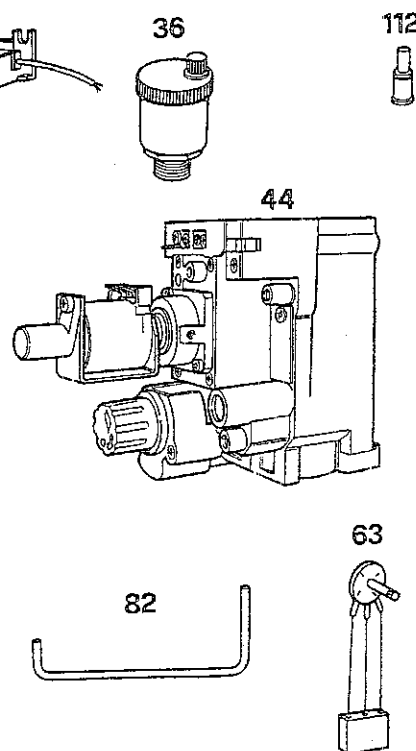
OPTIMA 900

FERROLI



Spare Parts List

Item No.	G.C. Part No.	Makers Part No	No. Off	DESCRIPTION
14	386816	800130	1	C.H. safety valve
16	-	803090	1	Fan
21	-	803080	20	Main injector (Natural Gas)
21	-	801850	20	Main injector (L.P.G.)
23	-	801490	1	Thermocouple
24	-	801640	1	Spark electrode
25	-	801510	1	Pilot
32	386814	800600	1	Central heating pump
34	386818	800310	2	Temperature sensor
36	394246	801160	1	Automatic air vent
38	379035	800120	1	Cold water flow switch (paddle type)
39	386829	801220	1	Cold water flow limiter (10 lt/min.)
42	386818	800310	2	Temperature sensor
43	381691	800140	1	Air pressure switch
44	386544	800540	1	Combination gas valve
49	386815	801240	1	Overheat cut-off thermostat
50	386577	800160	1	Heat exchanger limit thermostat
51	386828	800180	1	Heat exchanger frost thermostat
52	386576	801000	1	D.H.W. limit thermostat
61	372225	801230	1	C.H. selector switch
62	397811	812800	1	Time clock
63	372224	801260	1	C.H. boiler thermostat
64	386580	800300	1	C.H. temperature/pressure gauge
66	372320	801370	1	Microswitch combination gas valve
67	372309	801150	1	Ignition transformer
101	372306	802540	1	P.C.B. VMF6.1
112	-	801610	1	Pilot injector (Natural Gas)
112	-	801470	1	Pilot injector (L.P.G.)
113	-	825080	1	Special two pipe flue/air adapter



Domestic Hot Water Performance

Fig. 1 - D.H.W. Pressure Drop VS. flow
 A = Standard with cold water Flow Restrictor
 B = Cold Water Flow Restrictor Removed

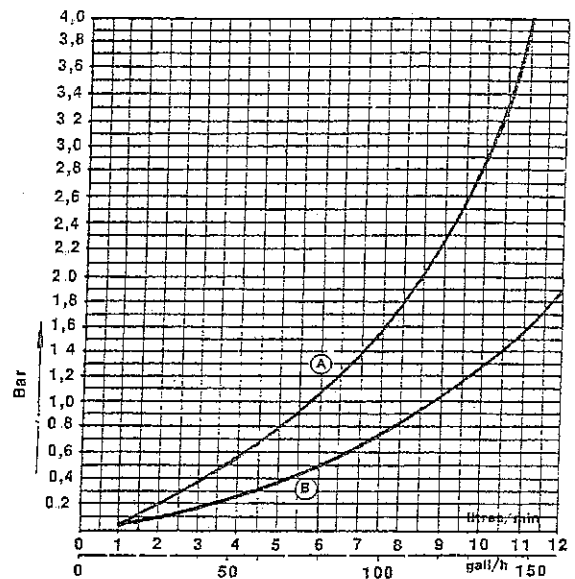


Fig 1

Fig. 2 - D.H.W. temperature VS. flow
 A = Cold Water 15°C
 B = Cold Water 5°C

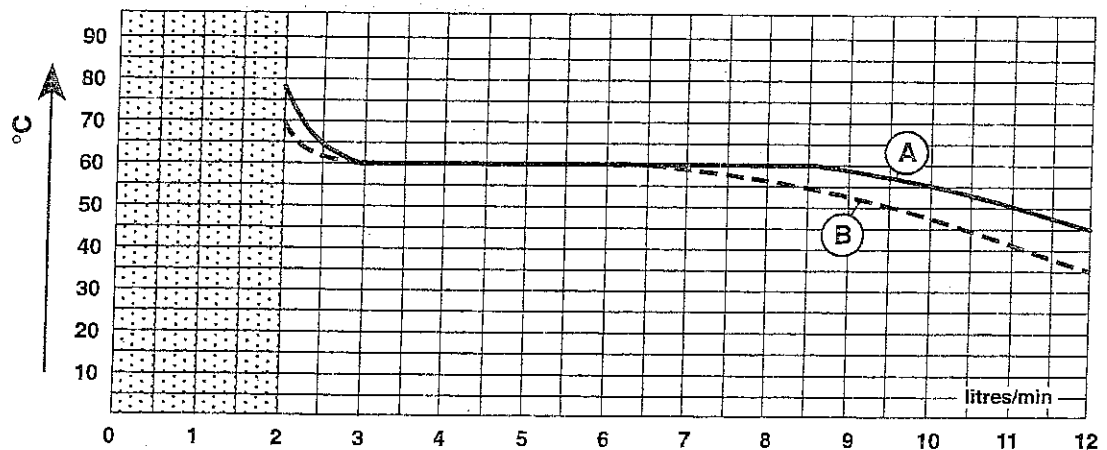
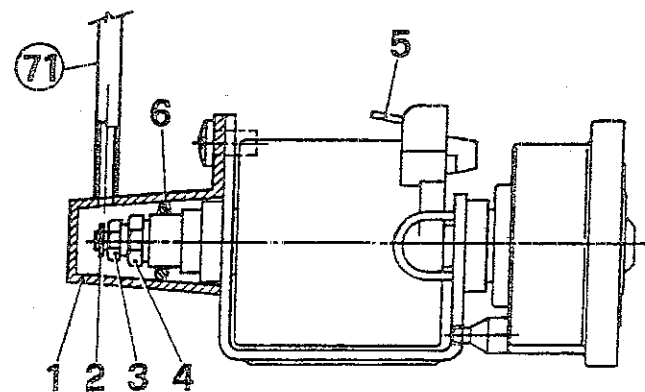


Fig. 2

Modulating regulator (Modureg) of gas valve

1. Cap (with tube 71)
2. Shaft
3. Adjustment screw for max. pressure setting
4. Adjustment screw for min. pressure setting
5. 6,3 mm AMP terminals
6. «O» ring
71. Modulating balance tube

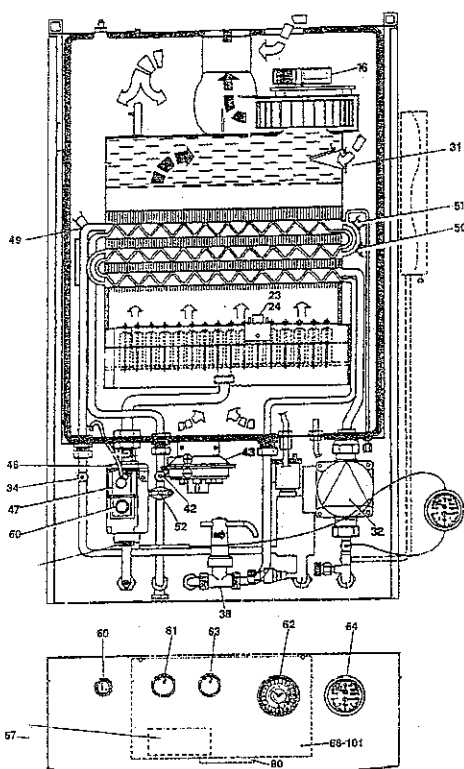


If necessary replace complete MODUREG

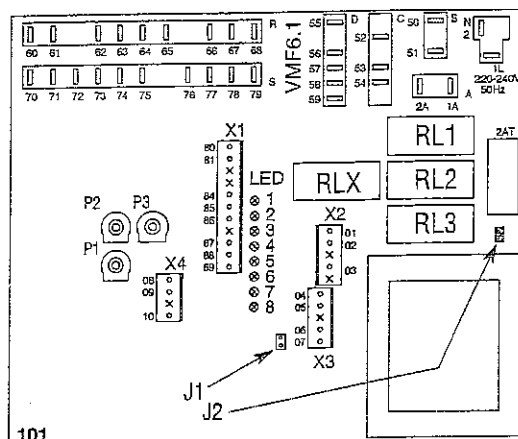
Pressure settings	Minimum		Maximum	
	mbar	inch WG	mbar	inch WG
Natural Gas	2.5	1.0	14.0	5.6
L.P.G.	5.0	2.0	36.0	14.4



OPTIMA 900



- Key**
- 15 Fan
 - 23 Thermocouple
 - 24 spark electrode
 - 31 Air pressure control damper
 - 32 Central heating pump
 - 34 C.H. flow temperature sensor
 - 38 Cold water flow switch
 - 42 D.H.W. temperature sensor
 - 43 Air pressure switch
 - 46 Operator gas valve
 - 47 Modulating regulator (Modureg) gas valve
 - 49 Overheat cut-off thermostat
 - 50 Heat exchan. limit thermostat
 - 51 Heat exchan. frost thermostat
 - 52 D.H.W. limit thermostat
 - 60 Extended control knob gas valve
 - 61 C.H. selector switch
 - 62 Time clock
 - 63 C.H. boiler thermostat
 - 64 C.H. temperature pressure gauges
 - 66 Microswitch combination gas valve
 - 67 Ignition transformer
 - 68 Control box with P.C.B.
 - 72 Room thermostat (not fitted)
 - 80 240V + 24V roomstat terminal blocks
 - 101 P.C.B.



J1 - J2 Jumper links on P.C.B.

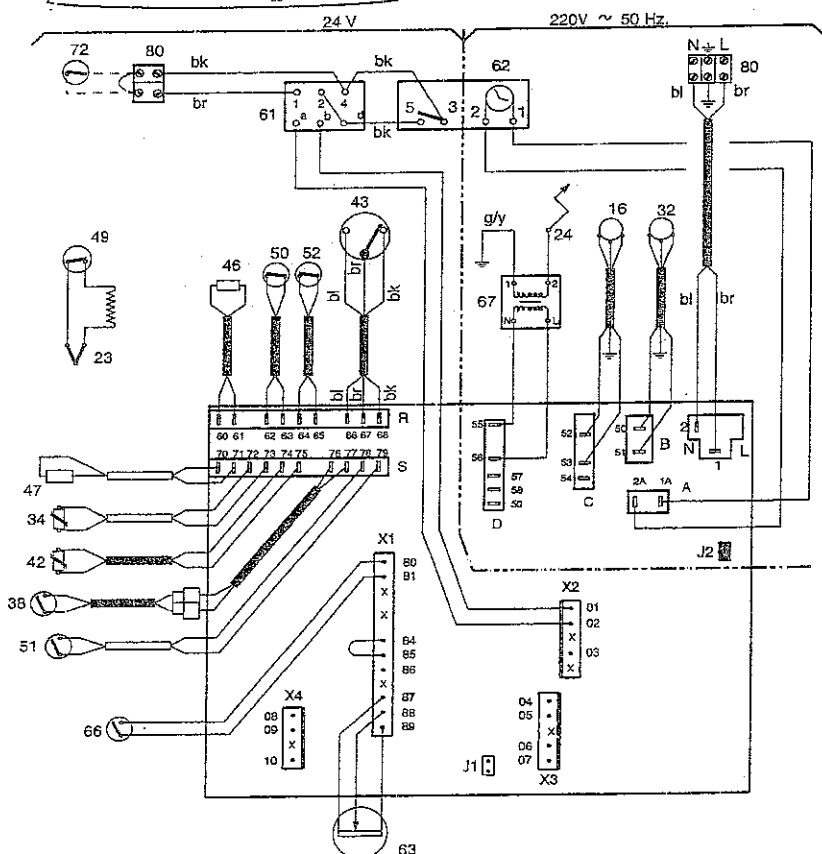
J1 Is not required

J2 Must be fitted

P1 = C.H. max. output (to be set on site)(if required)

P2 = D.H.W. max. output (factory set)

P3 = D.H.W. temperature (factory set)



61. C.H. selector switch



Heating timed and hot water



Hot water only



Heating continuous and hot water

NOTE:
THE TRANSFORMER ON THE P.C.B. HAS A BUILT-IN OVERHEAT PROTECTION.
IF THIS IS OPEN, ALL LED'S WILL BE OFF BUT THE C.H. PUMP (32) WILL RUN
SWITCH OFF THE BOILER FOR AT LEAST 20 MINUTES

CONNECTOR X2
01-03 = 24V~2VA

X4 a

DON'T CONNECT ANYTHING TO THIS CONNECTOR, THIS COULD DAMAGE THE P.C.B

X3 b

TEST CONNECTOR X3

04 TEST

05

06 MODUREG

07 MAX VOLTAGE

c

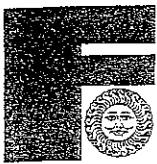
SHORT CIRCUIT 04-05 AND SHORT CIRCUIT 06-07:

- BOILER WILL START FOR C.H - WAITING TIME IS EXCLUDED
- P1 AND P2 OUT OF OPERATION -
- CHECK/SET MECHANICAL MAXIMUM ON MODUREG (47)

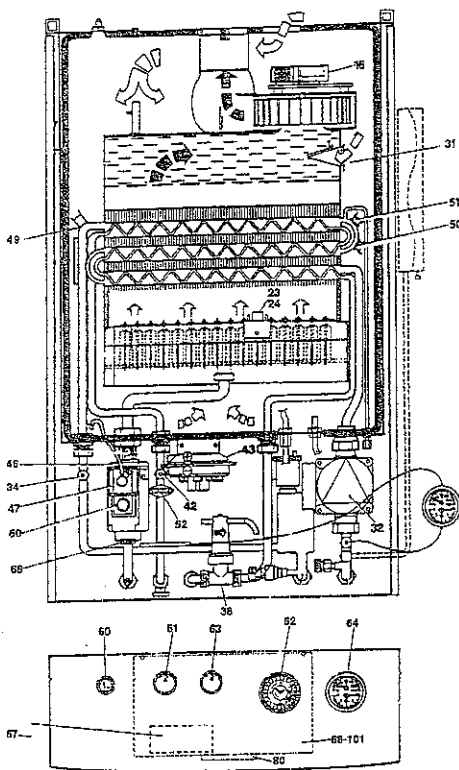
d

SHORT CIRCUIT 04-05 ONLY.

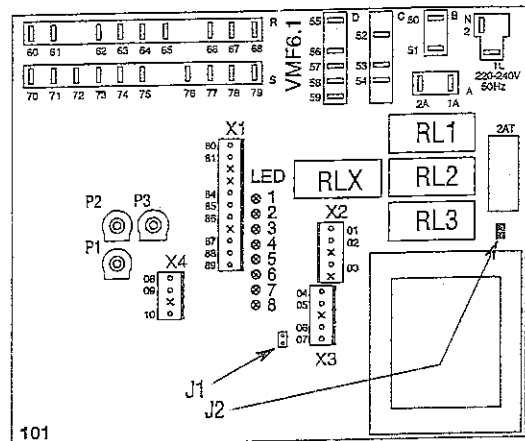
- BOILER STARTS FOR C.H.
- WAITING TIME IS EXCLUDED
- MAX BURNER PRESSION C H CAN BE CHECKED/SET WITH P1



OPTIMA 900



- Key**
- 16 Fan
 - 23 Thermocouple
 - 24 spark electrode
 - 31 Air pressure control damper
 - 32 Central heating pump
 - 34 C.H. flow temperature sensor
 - 38 Cold water flow switch
 - 42 D.H.W. temperature sensor
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 - 49 Overheat cut-off thermostat
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 - 51 Heat exch. frost thermostat
 - 52 D.H.W. limit thermostat
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 - 61 C.H. selector switch
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 - 63 C.H. boiler thermostat
 - 64 C.H. temperature pressure gauges
 - 66 Microswitch combination gas valve
 - 67 Ignition transformer
 - 68 Control box with P.C.B.
 - 72 Room thermostat (not fitted)
 - 80 240V + 24V roomstat terminal blocks
 - 101 P.C.B.



J1 - J2 Jumper links on P.C.B.

J1 is not required

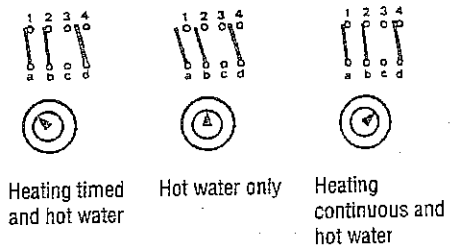
J2 Must be fitted

P1 = C.H. max. output (to be set on site) (if required)

P2 = D.H.W. max. output (factory set)

P3 = D.H.W. temperature (factory set)

61. C.H. selector switch



NOTE:

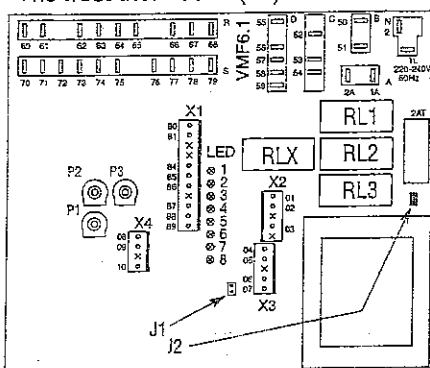
THE TRANSFORMER ON THE P.C.B. HAS A BUILT-IN OVERHEAT PROTECTION. IF THIS IS OPEN, ALL LED'S WILL BE OFF BUT THE C.H. PUMP (32) WILL RUN SWITCH OFF THE BOILER FOR AT LEAST 20 MINUTES

CONNECTOR X2
01-03 = 24V-2VA

X4	a	X3	b	c	d
DON'T CONNECT ANYTHING TO THIS CONNECTOR, THIS COULD DAMAGE THE P.C.B.		TEST CONNECTOR X3	SHORT CIRCUIT 04-05 AND SHORT CIRCUIT 06-07: - BOILER WILL START FOR C.H. - - WAITING TIME IS EXCLUDED - P1 AND P2 OUT OF OPERATION - - CHECK/SET MECHANICAL MAXIMUM ON MODUREG (47)	SHORT CIRCUIT 04-05 ONLY. - BOILER STARTS FOR C.H. - WAITING TIME IS EXCLUDED - MAX BURNER PRESSURE C.H. CAN BE CHECKED/SET WITH P1	

General Notes - For use on the OPTIMA 900 fitted with VMF6.1 Printed Circuit Board

- *The pilot light can only be ignited after the Fan (16) has run for at least 20 seconds on full speed.
- *The central heating pump (32) will run to disperse heat if the temperature at the heat exchanger limit thermostat (50) is too high
- *The frost thermostat (51) will switch on the boiler for central heating if the temperature is too low.



LED n°	colour	signification:
1	green	Mains on/low voltage on
2	yellow	Domestic hot water flow switch (38) on
3	yellow	Central heating room thermostat (72) / clock (62) calling for heat
4	green	Sensor (34) or (42) calling for heat
5	red	Central Heating waiting time, a max. 3 minutes delay following shut off Boilerstat (63), Clock (62), Roomstat (72) or use of Hot Water
6	yellow	Demand for heat - fan relay (RL2) will be energised
7	green	Air pressure switch (43) on, air flow checked
8	yellow	Gas valve (46) energised

Jumpers J1 - J2

	Fitted	Not Fitted
J1	Prepurge time before ignition = 0 second	Prepurge time before ignition = 20 seconds
J2	Fan control High & Low speed	Fan control High speed only/off

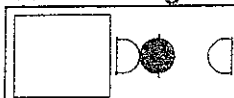
Resistance of Central Heating or Hot Water sensors (34) + (42)

10 °C	890 ohm
25 °C	1000 ohm
60 °C	1300 ohm
80 °C	1490 ohm

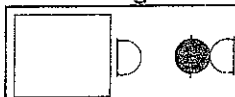
RELAYS

RL1	central heating pump
RL2	fan
RL3	ignition

RL not energised



RL energised



NOTE

If RL1 is not energised the Central Heating pump will run

Check operation using LED's as a fault finding guide. First check section A, then B, then C, then D.
0 = LED off 1 = LED on x = LED either on/off is not important

A	Domestic Hot water tap open (Flow rate greater than 2,5 l/min)			POSSIBLE CAUSE OF FAULT
	LED	OK	FAULT	
	1	1	0	No mains electricity/switches off/fuse blown.
	2	1	0	D.H.W. flow switch (38) not operating.
	3	X	X	Not required for D.H.W.
	4	1	0	- D.H.W. sensor (42) not connected or D.H.W. temperature too high
	5	0	1	- Waiting time operating: replace P.C.B.
	6	1	0	Short circuit on D.H.W. sensor (42) or resistance lower than 500 Ohm

B	CENTRAL HEATING ON Room stat (72) at Max, HW tap closed			POSSIBLE CAUSE OF FAULT
	LED	OK	FAULT	
	1	1	0	No main electricity/switches off, fuse blown.
	2	0	1	Hot water tap open - D.H.W. flow switch (38) contact closed
	3	1	0	Roomstat (72) or clock (62) not calling for heat
	4	1	0	- Central heating sensor (34) not connected or - boiler temperature too high or - boiler thermostat (63) below CH temperature
	5	0	1	Waiting time still operating (max. 3 minutes)
	6	1	0	- C.H. sensor (34) short circuit or resistance lower than 500 ohm

C	GENERAL TEST FOR D.H.W. AND CENTRAL HEATING (First check A and B above)			POSSIBLE CAUSE OF FAULT
	LED/REL	OK	FAULT	
	RL2/RLX	energised	not energised	Air pressure switch (43) not in NC position or miswired: check wiring
	7	1	0	- fan (16) runs too fast at low speed - fan (16) not running at full speed or - air flow too low: check e.g. air intake/flue outlet or - air pressure control damper (31) not fully closed with front cover off
	8	1	0	- air pressure switch (43) faulty - CH limit thermostat (50) open circuit (pump will run) - DHW limit thermostat (52) open circuit

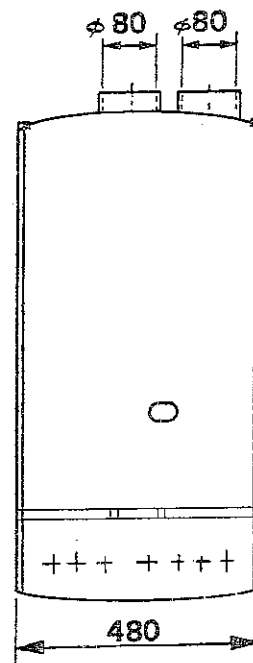
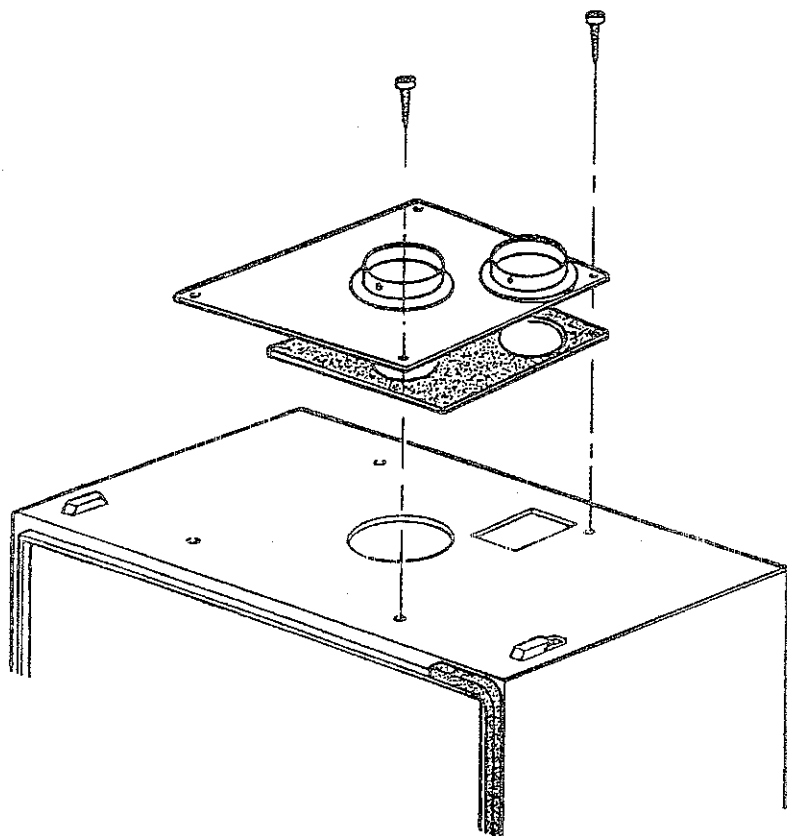
D	IGNITION OF PILOT		
1	Fan (16) should run at full speed for at least 20 seconds (open hot tap or set controls so boiler is calling for heat).	5	Relay RL3 will energise
2	Check first A, B and C above	6	Ignition transformer (67) will energise
3	Push ignition button (60) fully in	7	Check spark and position of spark electrode (24)
4	Microwitch (66) will close		



Special Installation Possibilities: Two-pipe air intake/flue outlet

Special Air Intake/Flue Outlet

The standard Flue/air intake hood on top of the boiler can be replaced by a special two pipe flue adapter.



For details see separate instructions;
«Optional flue systems»

