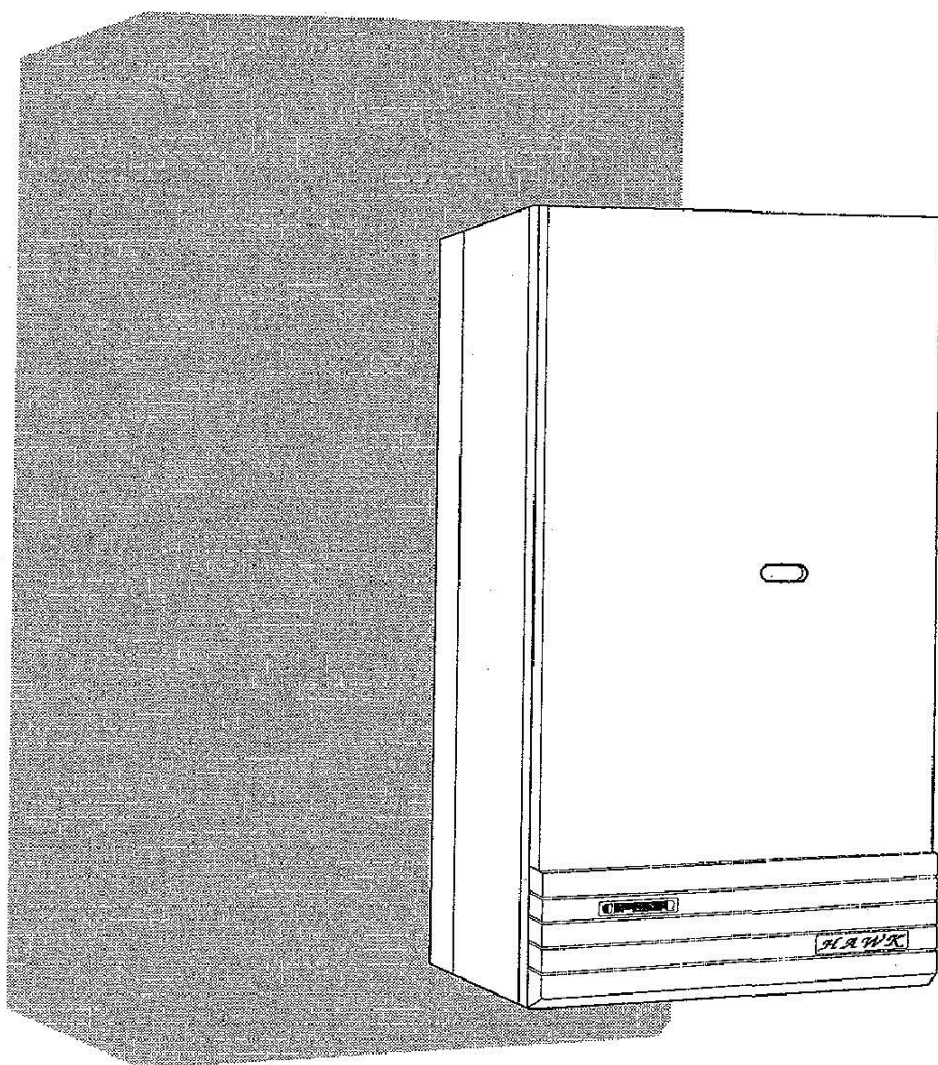


INSTALLATION & SERVICING INSTRUCTIONS

HAWK

**WALL MOUNTED, FANNED,
ROOM SEALED, COMBINATION BOILER**



SERVICE HELPLINE

FOR SERVICE OR TECHNICAL ASSISTANCE
PHONE: 021-313 0989
PLEASE QUOTE BOILER SERIAL NUMBER

This Appliance has been Tested
and Certified by British Gas Plc G.C.
Appliance No. 4738101
W.R.C. No. 9207076

Important:

Please read this book
before installing this appliance

Leave these instructions with the user

CONTENTS

PAGE	INDEX
3	Introduction
4	Technical Data
5	Appliance Dimensions
6	Boiler Flow Diagram
7	Key of Boiler Flow Diagram
8	Installation Details
9	Location of Boiler
9	Air Supply
10	Flue System
10	Gas Supply
10	Water System
11	Temporarily filling loop
12	Central Heating Pump
12	Sizing of expansion vessel
13	Installation of Boiler
13	1. Unpacking
13	2. Preparing Appliance Fixing (Rear Flue)
13	3. Preparing Appliance Fixing (Side Flue)
13	4a. Preparing Boiler (standard carton)
14	Installation dimensions
15	4. Preparing the Flue Assembly
16	5. Connecting the Boiler
17	6. Fitting the Flue Assembly
17	7. Electrical Installation
18	8. Commissioning & Testing
18	8.1 Filling the Central Heating System
18	8.2 Filling the Domestic Hot Water System
18	8.3 Electricity Supply
18	8.4 The Gas Installation
19	8.5 To Light the Boiler
20	8.6 To Range Rate the Boiler C.H.
21	8.7 D.H.W. Burner Pressure
21	9. System operation
21	10. Handing Over to the User
22	General Wiring Diagram
23	Electrical Functional Flow Wiring Diagram
26	Illustrated Wiring Diagram
27	Fault Finding
28	General Test + Fault Finding - Chart 1
29	General Test + Fault Finding - Chart 2
30	General Test + Fault Finding - Chart 3
31	General Test + Fault Finding - Chart 4
32	General Test + Fault Finding - Chart 5
33	General Test + Test of Air Flow through boiler - Chart 6
34	Replacement of Parts
35	Pilot burner and injector
38	Ignition electrode
38	Thermocouple
38	Cold water flow switch and filter
39	Honeywell gas valve
39	Printed circuit board (P.C.B.)
40	Thermostats
40	Temperature sensors
40	Pressure relief valve
40	Pump
41	Automatic air vent
42	Pressure/temperature gauge
42	D.H.W. expansion vessel
44	Boiler thermostat
44	Spark igniter
44	Air pressure switch
45	Fan
46	Main burner
47	Heat exchanger
48	Combustion chamber insulation panels
49	C.H. expansion vessel
50	Annual Servicing Instructions
51	Spare Parts List
52	Domestic Hot Water Performance + Modureg
53	General Wiring Diagram
54	Fast Fault Finding

INTRODUCTION

Gas Safety (Installation and Use) Regulations 1984 (As Amended)

This appliance must be installed and serviced by a competent person, in accordance with the above regulations.

Failure to install appliances correctly could lead to prosecution

It is in your own interest and that of safety, to ensure that these regulations are complied with.

Boiler Description

The FER Hawk is a room sealed combination boiler using a fan assisted balanced flue.

The boiler, providing both central heating and instantaneous hot water at mains pressure, has been designed for use with a sealed central heating system.

The pump, expansion vessel and all safety devices are fitted within the boiler.

The boiler will suit central heating systems requiring 8.1 to 22.3 kW (27,600 to 76,000 Btu/h).

The boiler will automatically modulate to provide the correct amount of heat required for the system, no range rating is needed.

The maximum domestic hot water temperature is set at 55 °C and will provide 9.2 litres/min. of water at 35 °C temperature rise.

The central heating water temperature is controllable by the boiler thermostat which can be adjusted by the user.

A six minute pump over run is incorporated to dissipate heat following shut down of the central heating.

The pump is not required to operate during use of the domestic hot water, although a one second pump spin will automatically cut in when the domestic hot water is shut off thus preventing failure of the pump (due to sticking) in the summer months.

A permanent pilot is used to provide ignition for the main burner, this is lit by the use of a piezo igniter.

The boiler is designed to be used with an external time switch/room thermostat of voltage free contacts.

The following automatic safety features are included:-

- Overheat safety thermostat to shut off the boiler and pilot if the heat exchanger exceeds a preset temperature.

- Limit thermostats on the central heating and hot water to prevent overheating on each of these circuits.

- A pressure safety valve which will open and relieve excess water pressure from the central heating system.

Related Documents

It is the Law that all gas appliances are installed by competent persons in accordance with the following regulations:-

Gas Safety (Installation & Use) Regulations 1984. (As amended).

- All relevant Building Regulations.

- Model and Local Water undertaking Byelaws.

- Health & Safety document 635 "The Electrician at Work Regulations 1989".

- Current I.E.E. Regulations. (BS 7671).

British Standard Codes of Practice:-

BS5440: 1 1990 Flues

BS5440: 2: 1989 Air supply

BS5449: 1990 Forced Circulation Hot Water Systems

BS5546: 1990 Installation of Hot Water supplies for Domestic Purposes.

BS6798: 1987 Installation of Gas Fired hot Water Boilers.

BS6891: 1989 Gas Installations.

BS7593: 1993 Treatment of Water in Domestic Hot Water Central Heating Systems.

Technical Data

	Metric	Imperial
Nominal Heat Input D.H.W. & C.H.	27.8 kW	94,800 Btu/h
Minimum Heat Input D.H.W. & C.H.	11.0 kW	37,500 Btu/h
Nominal Heat Output D.H.W. & C.H.	22.3 kW	76,000 Btu/h
Minimum Heat Output D.H.W. & C.H.	8.1 kW	27,600 Btu/h
Maximum Gas Rate	2.65 m ³ /h	93.6 ft ³ /h
Burner Pressure (max.)	15.3 mbar	6.1 in wg
Burner Pressure (min.)	2.5 mbar	1.0 in wg
Injector Marking (Main Burners)	210	
Injector Size (4 off)	2.10 mm	• 0.082 in
Pilot Injector Marking	38/33A	
Dimensions (overall):		
Height	1020 mm	40.16 in
Width	480 mm	18.90 in
Depth	360 mm	14.16 in
Weight (nett)	51 kg	112 lb
Weight (gross)	53 kg	117 lb
Electricity supply:	240 V ~ 50 Hz	
External fuse	3 A	
Electrical Input	150 W	
Central Heating:		
Max. Flow Temperature	85 °C	153 °F
Temperature Rise Across Boiler	20 °C	36 °F
Domestic Hot Water Flow:		
35°C Rise	9.2 litres/min	2.03 gal/min
Minimum Domestic Hot Water Flow	2.5 litres/min	0.42 gal/min
Maximum Domestic Cold Water Inlet press	10 bar	145.14 lbf/in ² (P.S.I.)
Minimum Heating Circuit Pressure	0.8 bar	11.61 lbf/in ² (P.S.I.)
Maximum Heating Circuit Pressure	3.0 bar	43.5 lbf/in ² (P.S.I.)
Boiler Water Capacity: Heating	1.5 litres	0.3 gal
Domestic Hot Water	0.5 litres	0.1 gal
Connections:		
Gas	22 mm	
Domestic Hot Water Outlet	15 mm	
Domestic Cold Water Inlet	15 mm	
Pressure Relief Valve Drain	15 mm	
Central Heating Flow	22 mm	
Central Heating Return	22 mm	
Minimum Installation Clearances:		
Sides - Left hand	5 mm*	1/4 in
Right hand	5 mm*	1/4 in
Front	50 mm**	2 in
Minimum Clearance below	200 mm	8 in
Minimum Clearance above	100 mm	4 in

Notes:

- * If using a side outlet flue then the minimum clearance on the flue outlet side of the appliance must be increased to 75 mm (3 in).
- ** Access to the front of the boiler must be available for maintenance (min. 600 mm)

Appliance Dimensions

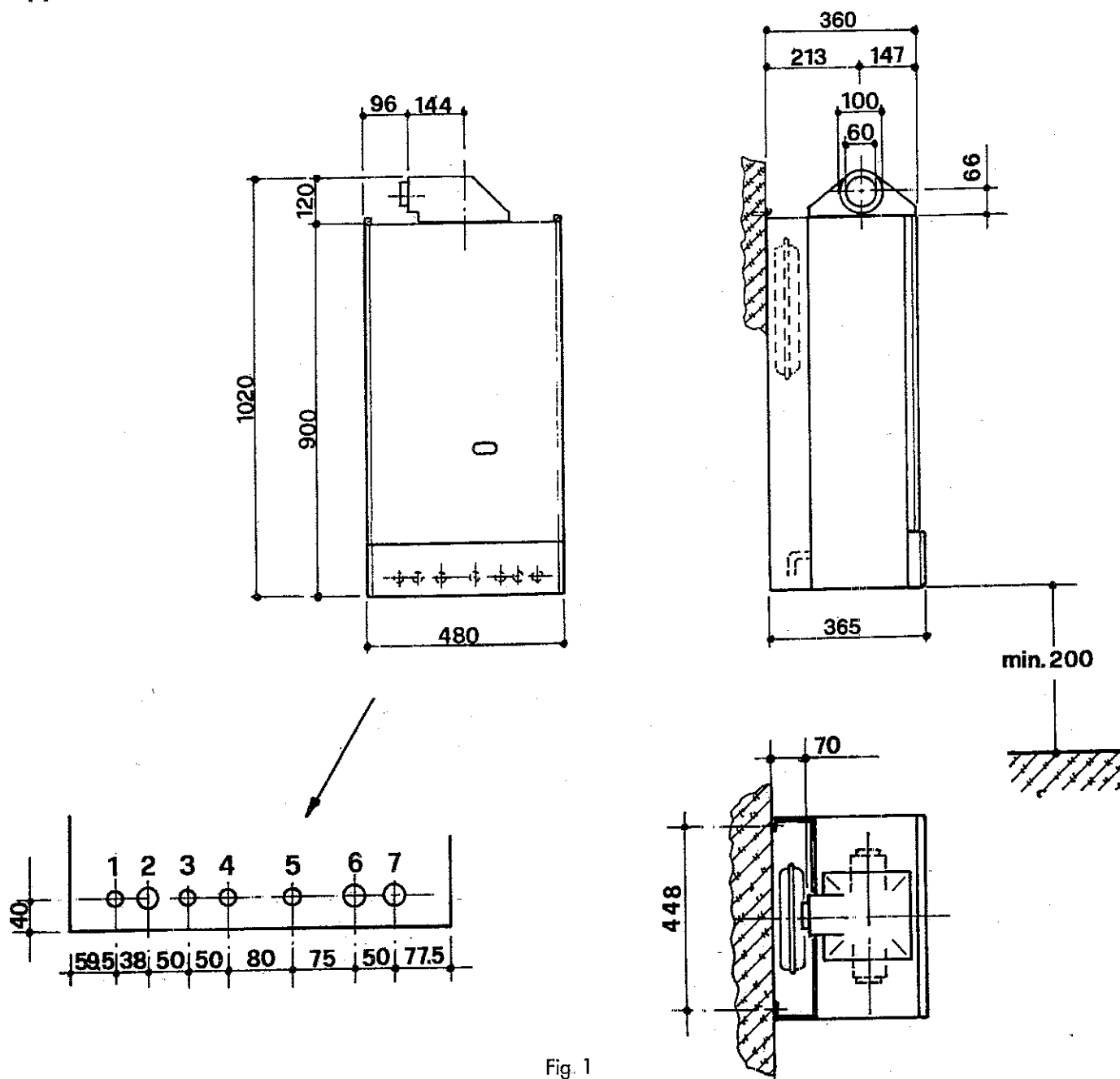


Fig. 1

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

Boiler Flow Diagram

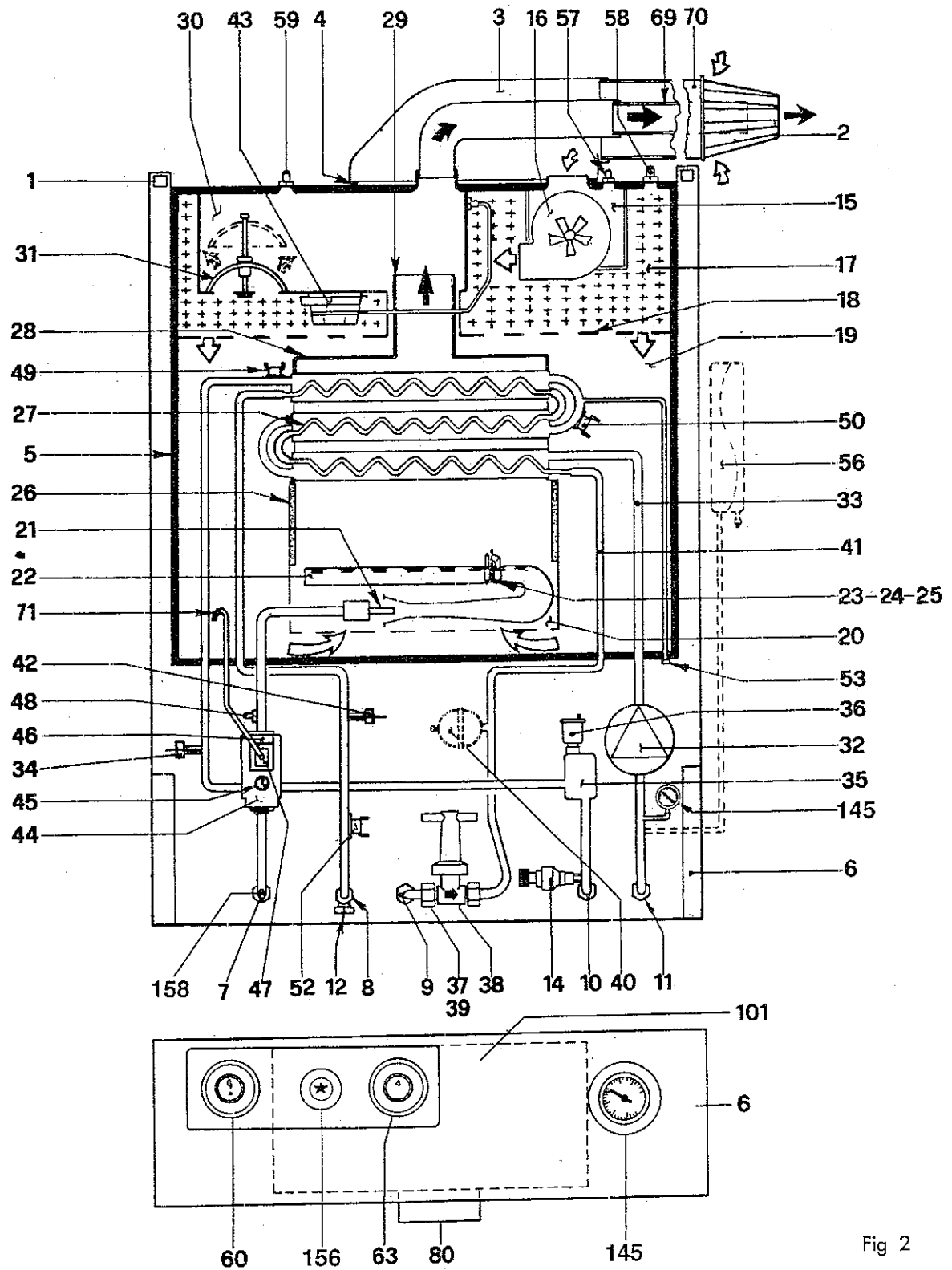


Fig 2

Key

- | | | | |
|------|--|-------|--|
| 1.. | Fixing point | 36.. | Automatic air vent |
| 2.. | Flue terminal | 37.. | Cold water inlet filter |
| 3.. | Flue/air intake hood | 38.. | Cold water flow switch |
| 4.. | Sealing gasket | 39.. | Cold water flow limiter |
| 5.. | Room sealed compartment | 40.. | Domestic hot water expansion vessel (optional) |
| 6.. | Control panel | 41.. | D.H.W. waterway of the heat exchanger |
| 7.. | Gas inlet | 42.. | D.H.W. temperature sensor |
| 8.. | Domestic hot water outlet | 43.. | Air pressure switch |
| 9.. | Cold water inlet | 44.. | Combination gas valve |
| 10.. | Central heating flow outlet | 45.. | Knob gas valve |
| 11.. | Central heating return inlet | 46.. | Operator gas valve |
| 12.. | D.H.W. draining point | 47.. | Modulating regulator (Modureg) gas valve |
| 14.. | Central heating safety valve | 48.. | Burner pressure test point |
| 15.. | Air inlet to fan | 49.. | Overheat cut-off thermostat |
| 16.. | Fan | 50.. | Central heating limit thermostat |
| 17.. | Air outlet from fan | 52.. | D.H.W. limit thermostat |
| 18.. | Air distribution screen | 53.. | Heat exchanger venting point |
| 19.. | Combustion - heat exchanging compartment | 56.. | Expansion vessel |
| 20.. | Burner assembly | 57.. | Fan air inlet pressure test point |
| 21.. | Main injector (4) | 58.. | Fan air outlet pressure test point |
| 22.. | Burner (4) | 59.. | Flue outlet pressure test point |
| 23.. | Thermocouple | 60.. | Extended control knob to gas valve |
| 24.. | Spark electrode | 63.. | C.H. boiler thermostat |
| 25.. | Pilot | 68.. | Control box with P.C.B. |
| 26.. | Combustion chamber insulation | 69.. | Inner flue duct |
| 27.. | Copper heat exchanger for C.H. + D.H.W. | 70.. | Outer air intake duct |
| 28.. | Flue collector from heat exchanger | 71.. | Modulating balance tube |
| 29.. | Internal flue exit | 80.. | 240 V + 24 V roomstat terminal blocks |
| 30.. | Flue/surplus air collector | 101.. | P.C.B. (printed circuit board) |
| 31.. | Air pressure control damper | 145.. | C.H. pressure gauge |
| 32.. | Central heating pump | 156.. | Piezo-igniter |
| 33.. | C.H. waterway of the heat exchanger | 158.. | Gas inlet pressure test point |
| 34.. | C.H. flow temperature sensor | | |
| 35.. | Air separator | | |

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 FER *HAWK* 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
M	Adjacent to an opening (door or window)	300
N	Below carport	600

A Quinell Barrat and Quinell 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 vents 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

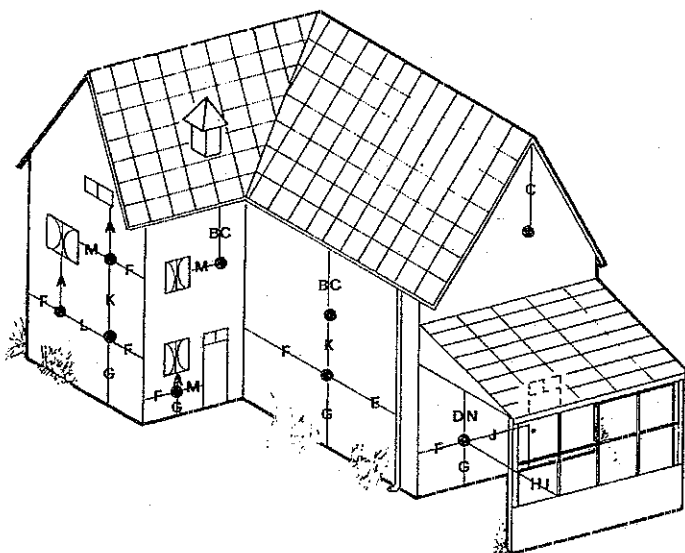


Fig 3

Minimum Clearance mm

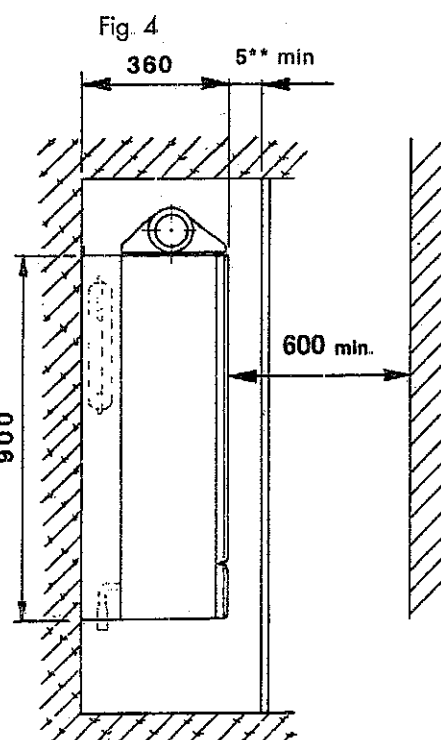
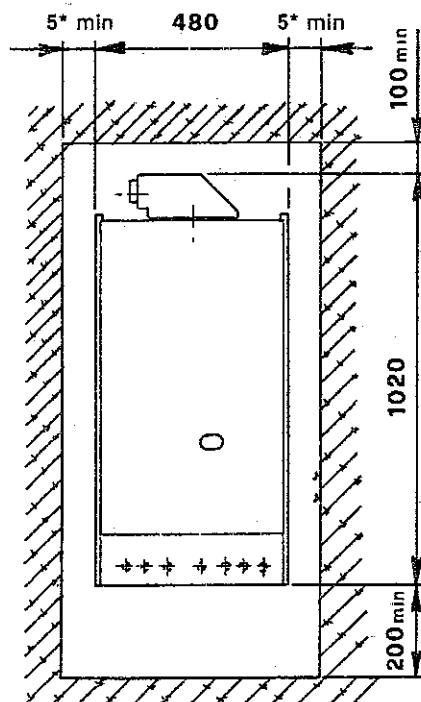


Fig. 5

Air supply

APPLIANCE LOCATION \ APPLIANCE FLUE SYSTEM	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)

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).

Flue system

The boiler allows the flue outlet to be taken from the rear of the boiler or from either side.

A standard flue length of 0.75 metres is provided.

It is absolutely **essential**, to ensure that products of combustion discharging from the terminal cannot re-enter the building, or enter any adjacent building, through ventilators, windows, doors, natural air infiltration, or forced ventilation/air conditioning.

Gas Supply

If necessary the local Gas Region should be consulted, at the installation planning stage, in order to establish the availability of an adequate supply of gas.

An existing service pipe must **not** be used without prior consultation with the Local Gas Region.

A gas meter can only be connected by the Local Gas Region, or by a Local Gas Region's Contractor.

Installation pipes should be fitted in accordance with BS6891-1988.

Appliance inlet working pressure must be 20 mbar **MINIMUM**.

Pipework from the meter to the combination boiler must be of an adequate size, minimum 22 mm.

The boiler requires 2.65 m³/h (93.6 ft³/h) of natural gas.

The complete installation must be tested for gas soundness and purged as described in BS6981-1988. All pipework must be adequately supported. An isolating gas valve is provided and should be fitted on the manifold assembly.

Water System

Central Heating

It must be a sealed system. Detailed recommendations are given in BS6798, BS5449, BS6700 and CP342 Part. 2. Pipework not forming part of the useful heating surface should be insulated to prevent any heat losses or possible freezing (i.e. in roof spaces or ventilated underfloor spaces). Drain taps should be positioned at the lowest point of the system in accessible locations to permit the whole system to be drained down. The drain taps should be in accordance with BS2879. Copper tubing to BS2871, Part. 1 is recommended for water carrying pipework. Pipework in horizontal runs should have a gradient where possible to facilitate the removal of air. It should be ensured that the boiler heat exchanger is not a natural point for collecting air. A typical heating system with domestic hot water circuit is illustrated in fig. 6.

Important - A minimum flow rate through the boiler of 6 l/min must be maintained. A bypass should be fitted as far as possible from the boiler if thermostatic radiator valves are fitted throughout.

Make up Water

Provision must be made for replacing water lost from sealed system. Reference should be made to BS6798, for methods of filling and making up sealed systems. There must be no direct connection between the boiler's central heating system and the mains water supply. The use of mains water to charge and pressurise the system directly, is conditional upon the Local Water Byelaw. Again any such connection must be disconnected after use.

Domestic Hot Water

Always fit a water softener or scale reducer in "hard water areas". The maximum Domestic Water pressure for the inlet supply is 10 bar (145 P.S.I.). If the cold mains supply exceeds 5 bar (72 P.S.I.), a water governor or pressure reducing valve must be fitted by the installer onto the mains supply in an accessible position preferably between 3 and 5 metre (10 - 16 ft) before the Appliance. Such a valve must be Approved by the Water Research Council.

Domestic Hot Water Expansion Vessel

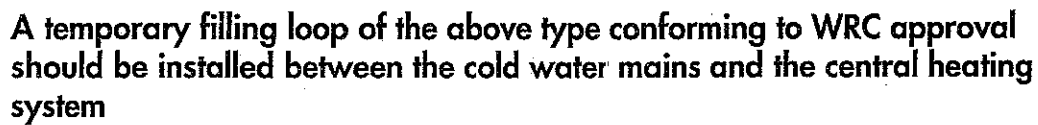
Where problems with "water hammer" are experienced a Domestic Hot Water expansion vessel can be fitted within the Appliance on the supplied connection point (see Fig. 20, page 24).

Attention - Is drawn to the Model Water Byelaws.

Fittings manufactured from duplex (alpha-beta) brass are not acceptable for underground use and certain water undertakings will not accept their use above ground.



TEMPORARY FILLING LOOP



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

Fig 7

Built-in Central Heating Water Circulating Pump

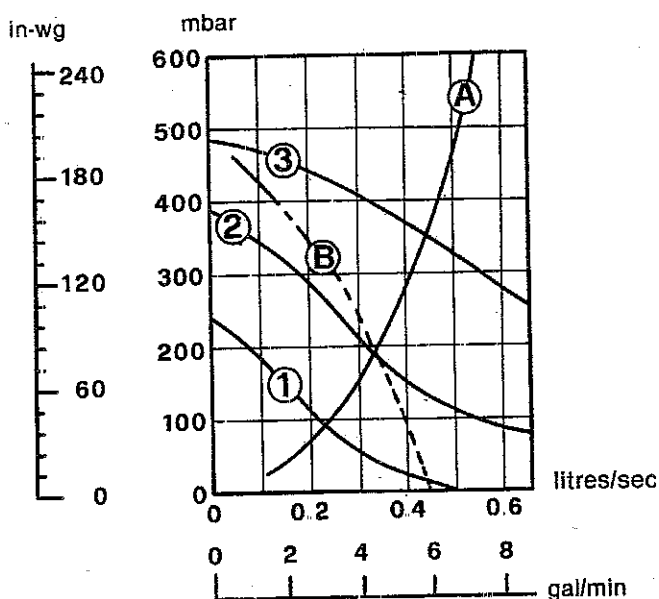
The pump head available for circulating the water is given in fig. 8.

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

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

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

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

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

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

1.0 UNPACKING

The appliance is delivered in two cartons.

- 1.1 The large carton contains the boiler, and the Installation/Servicing and Users Instructions.
- 1.2 The second carton contains the flue assembly, valves, fixing screws and flue 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 PREPARING APPLIANCE FIXING (Rear Flue Applications)

- 2.1 Select the boiler location carefully ensuring that all requirements given in previous text are satisfied. Fig. 10 will give guidance to fixing dimensions.
- 2.2 Mark position of flue centre and boiler fixing holes as shown in figure 10.
- 2.3 Carefully cut the circular flue hole. (118 mm minimum diameter).
- 2.4 Using a 8 mm drill, drill 60 mm deep holes to accept fixing wall bolts and insert these.
- 2.5 Tighten fixings until secure then remove nuts leaving fixing bolts protruding from wall.

N.B.- If the wall to be used is off a material or construction that a firm fixing cannot be obtained with the fixing bolts supplied use alternative fixings.

3.0 PREPARING APPLIANCE FIXING (Side Flue Applications)

- 3.1 Select the boiler location carefully ensuring that all the requirements given in previous text are satisfied. Fig. 10 will give guidance.
- 3.2 Mark position of flue centre and fixing bolts as shown in figure 10.
- 3.3 Carefully cut the circular flue hole (118 mm minimum diameter).
- 3.4 Fit fixing wall bolts for boiler as explained in 2.4 and 2.5.

N.B.- If the wall to be used is of a material or construction that a firm fixing cannot be obtained with the fixing bolts supplied use alternative fixings.

4.0 PREPARING BOILER (standard carton)

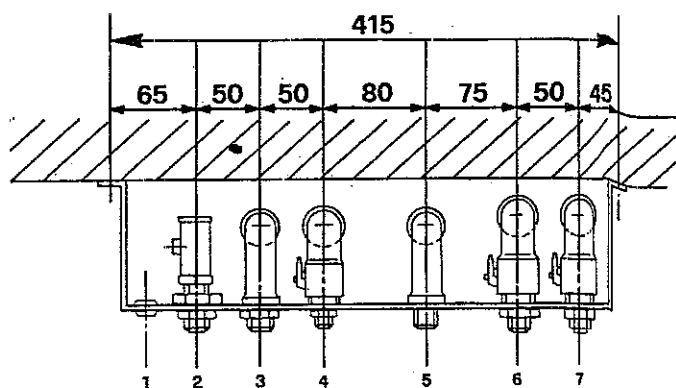
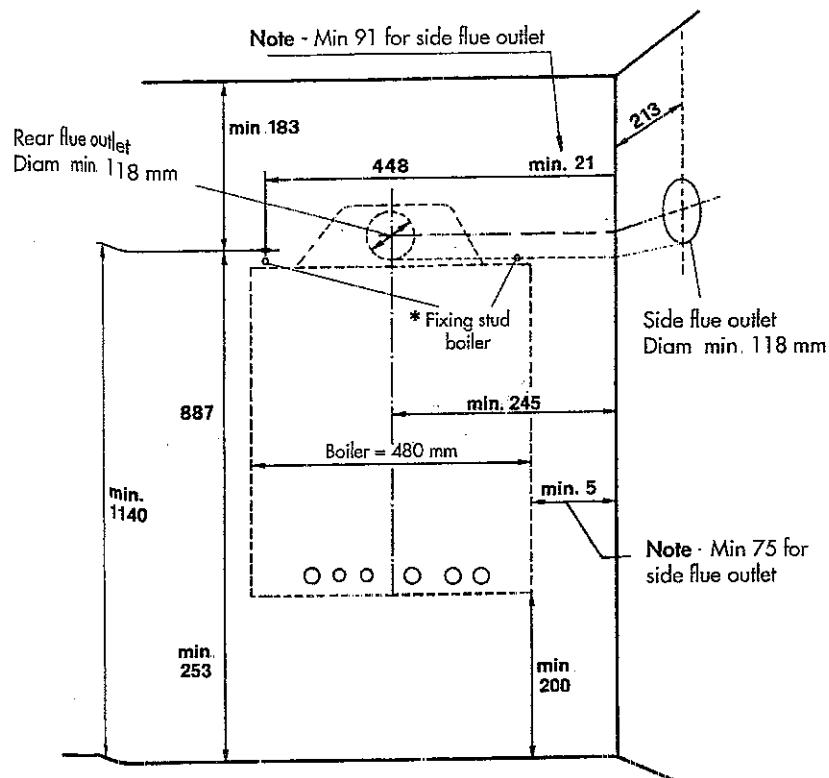
- 4.1 Place the boiler on its back.
- 4.2 Remove the boiler base plate, four screws (fig. 16). Remove the plugs fitted to the boiler water connections. Remove the bag of sealing washers from the boiler pipe work.
- 4.3 From left to right fit gas cock and water valves as follows (fig. 11) using appropriate washer.
 - 22 mm Gas Cock (Yellow handle) Position 2
 - 15 mm Domestic Hot Water Outlet Position 3
 - 15 mm Domestic Cold Water Inlet (Blue handle) Position 4
 - 22 mm Central Heating flow (Blue handle) Position 6
 - 22 mm Central Heating Return (Blue handle) Position 7
 - for 15 mm Safety Valve connection (see 5.0)

N.B.: Before the gas inlet to the boiler there must be at least 100 mm of straight before any bends.

INSTALLATION DIMENSIONS

* Boiler fixing studs level with the bottom of the flue hole

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

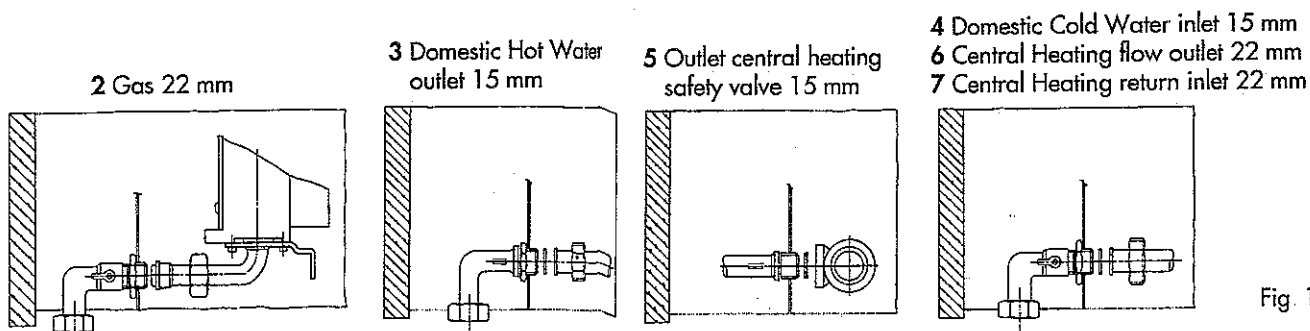


Fig. 11

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.

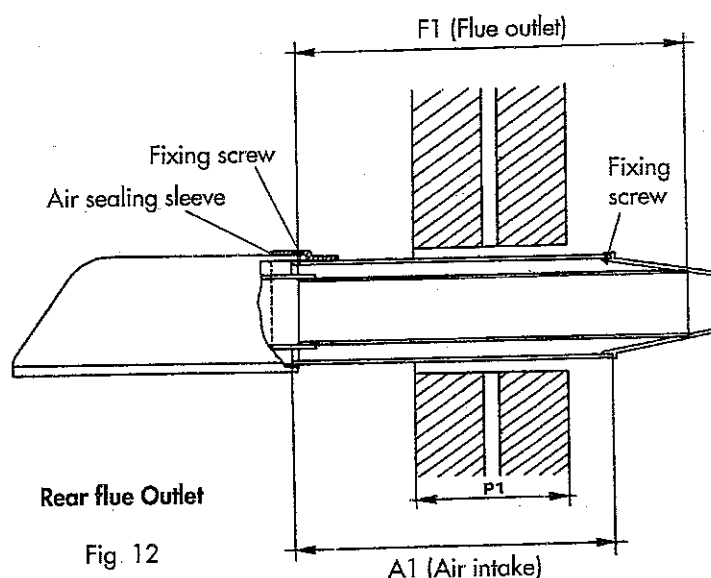


Fig. 12

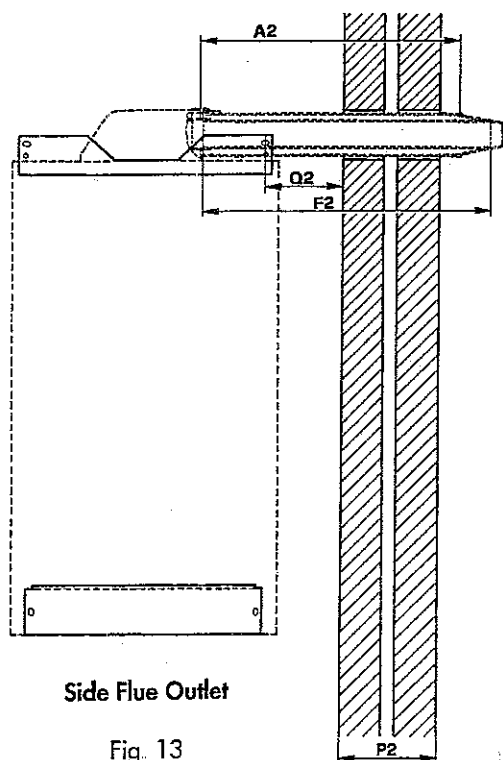


Fig. 13

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.

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 fixing bolts and fit supplied nuts and washers
- 5.4 Connect installation pipe work to boiler valves in the order shown in fig. 11.
- 5.5 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.

It 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..

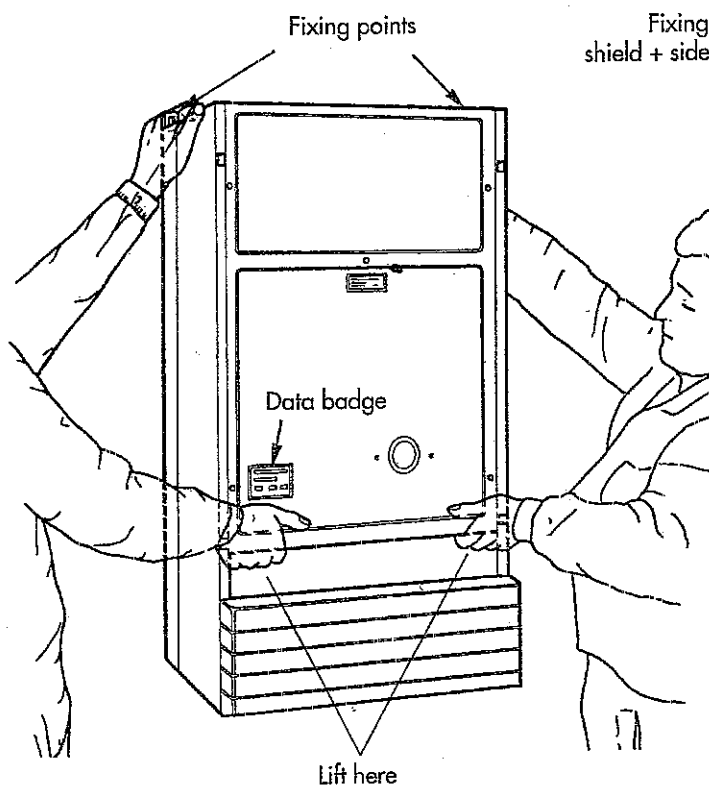
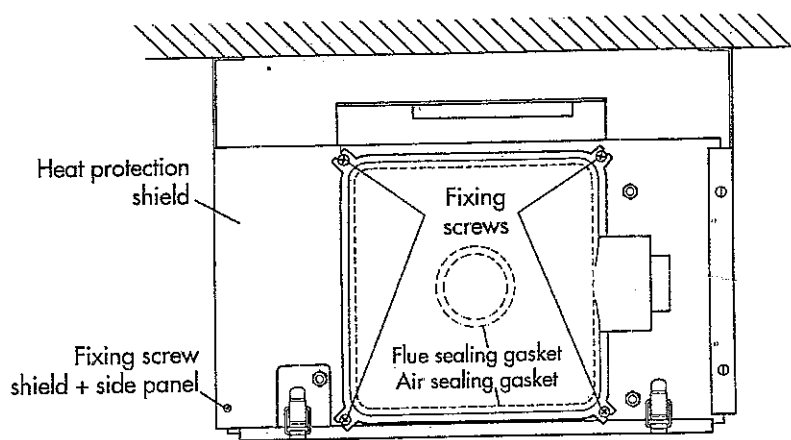


Fig. 15



TOP VIEW BOILER SIDE OUTLET Fig. 14

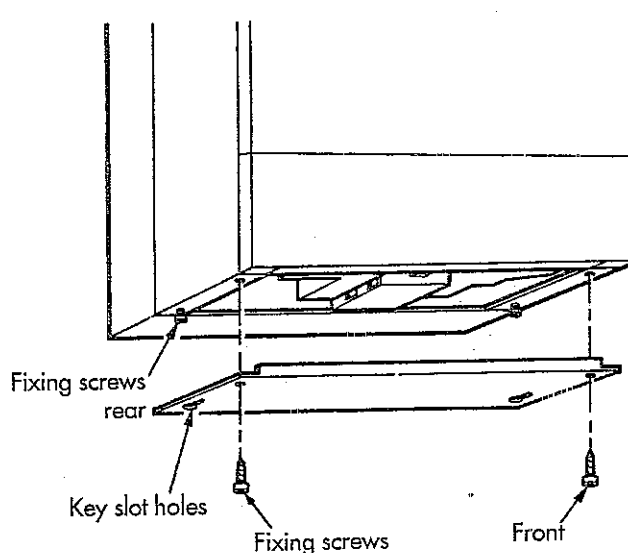


Fig. 16

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 (fig. 14).
- 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 (fig. 14).
- 6.2.5 Continue as detailed in 6.1.8 above

7.0 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 not be 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.

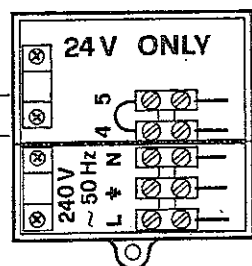


Fig. 18

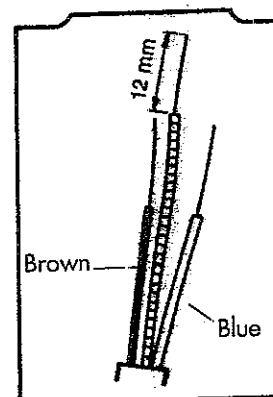
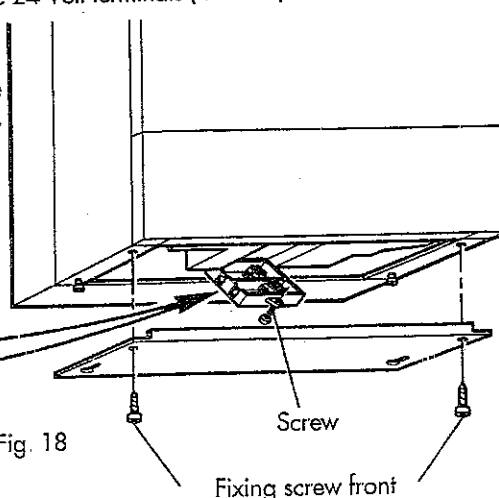


Fig. 19

8.0 COMMISSIONING AND TESTING

8.1 Filling the Central Heating System

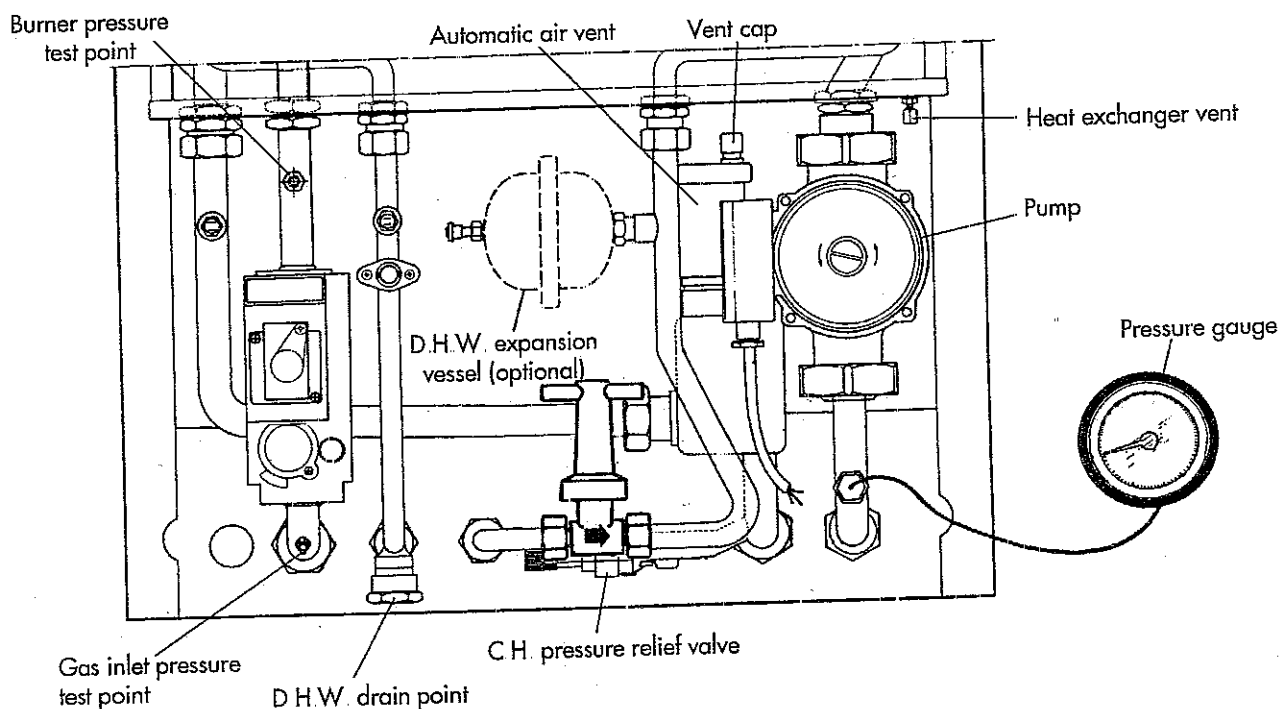


Fig. 20

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.

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.

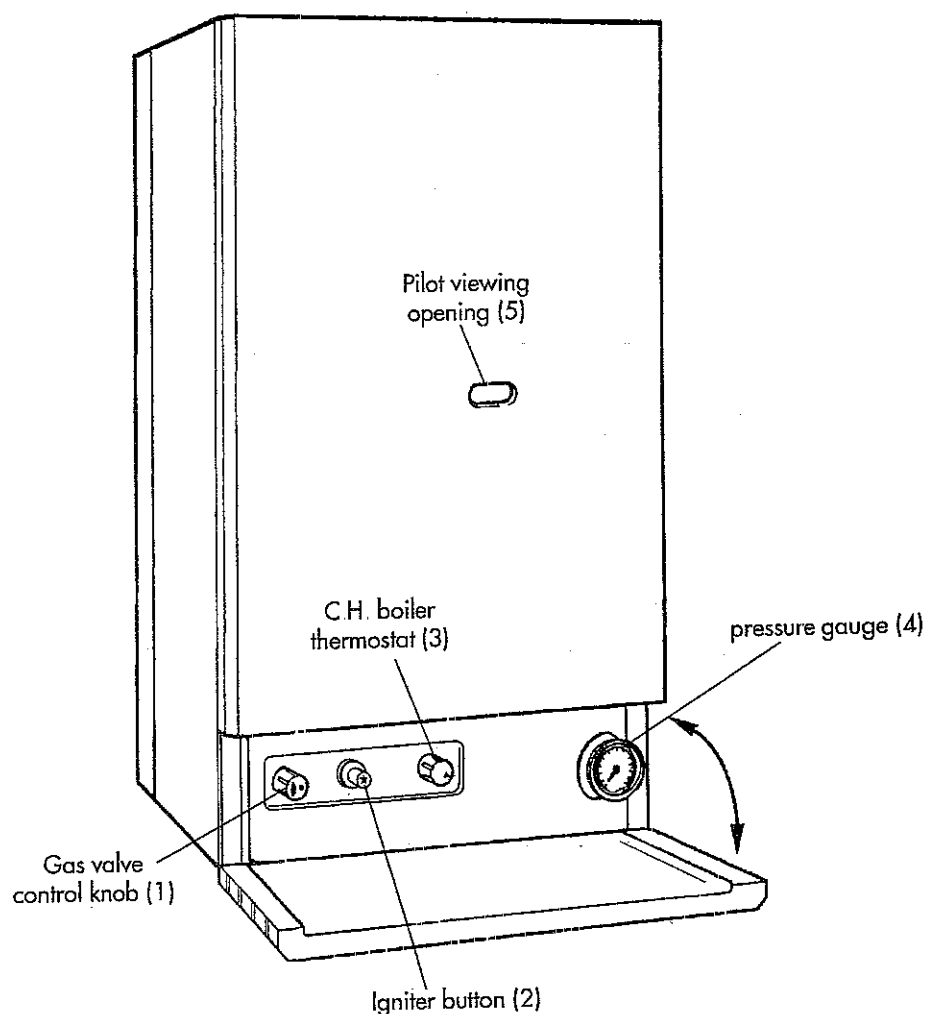


fig. 21

8.5 To Light the Boiler (fig. 21)

1. Before lighting check central heating system pressure is at 1 bar. (4).
2. Ensure electric, gas and water mains are on valves on the boiler are open.
3. Set any room thermostat/external controls to "ON" position.
4. Set boiler thermostat (3) to maximum.
5. Fan in the boiler will increase in speed. (Wait 30 seconds).
6. Depress gas control knob (1) fully and keep depressed.
7. Press igniter button (2) repeatedly until pilot flame lights. (View through pilot inspection window (5)).
8. Once pilot flame is lit keep gas control knob fully depressed for 20 seconds.
9. Release gas control knob (1) and main burner will light.

Notes: After using hot water the central heating will not light for at least two minutes.
Domestic hot water is available at any time, once the boiler is lit

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

8.6 To Range Rate the Boiler C.H.

The boiler can be range rated for an output from 8,1 kW (27.645 Btu/h) up to 22,3 kW (76.000 Btu/h). When the boiler is supplied it is factory set at the maximum output 22,3 kW (76.000 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.

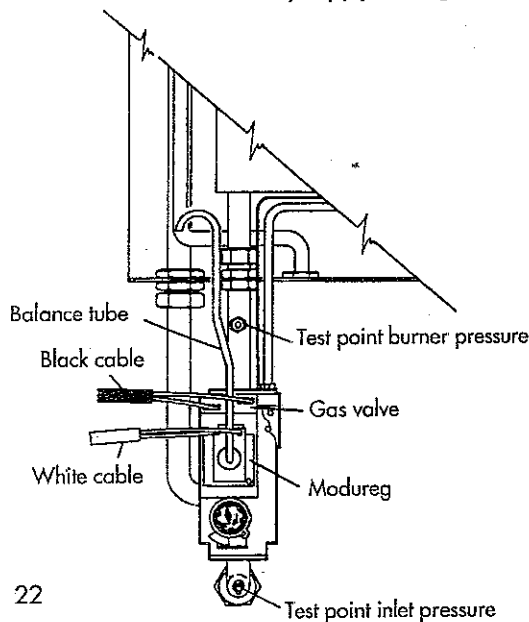


Fig. 22

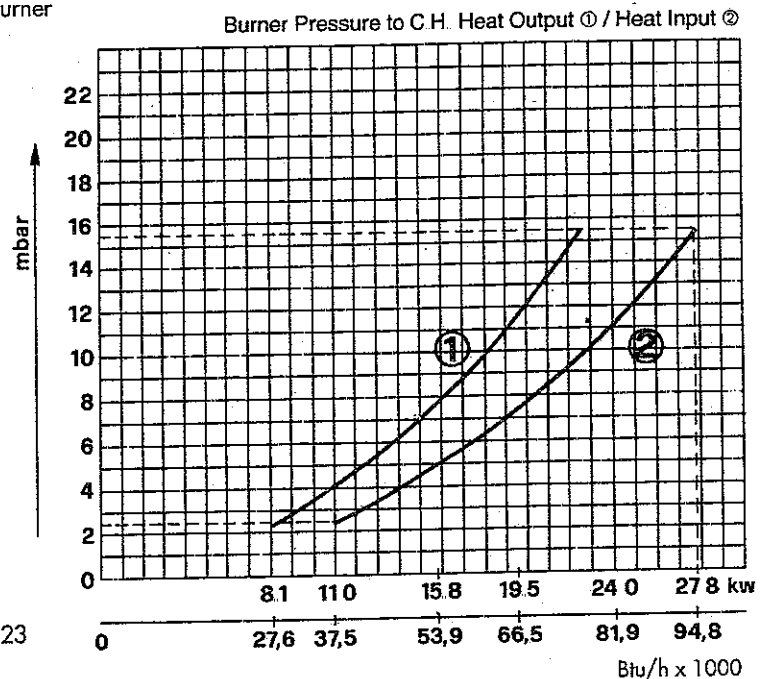


Fig. 23

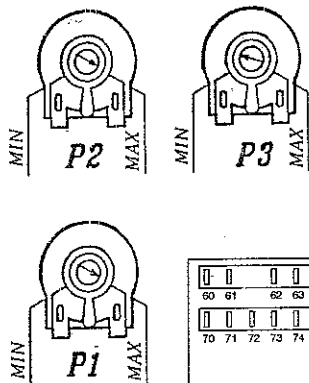
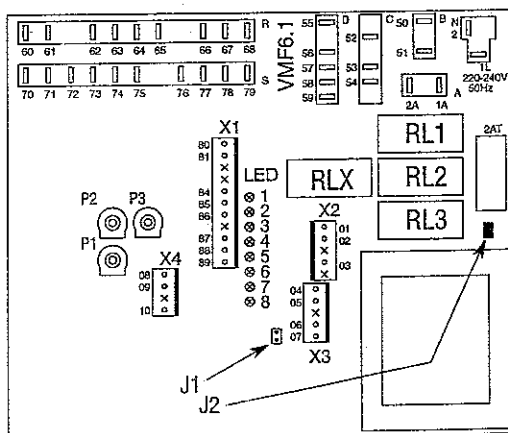


Fig. 24



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. 24) 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. 23).

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
- 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!

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 15.3 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 pressure (fig. 22) which should be minimum 20 mbar. If that is correct, consult Ferroli. 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.

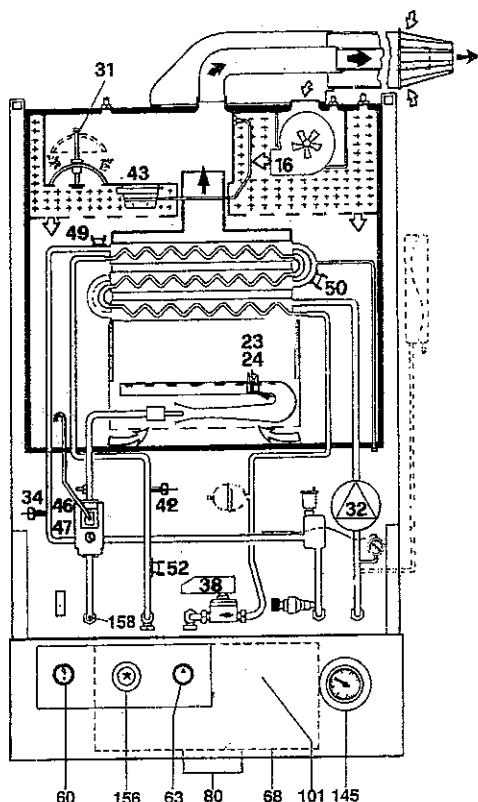
- I) Vent radiators.
- II) Vent heat exchanger.
- III) Examine all pipework for leakage.
- IV) Turn on a D.H.W. tap and check that the C.H. pump stops running.
- V) As the D.H.W. temperature reaches 60°C check the burner for modulation.
Turn the gas valve «off», (twist left hand white button 1/12th turn clockwise and release), and isolate electricity supply.
Drain down the central heating system fully, when hot. Following BS 1593 1993.
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

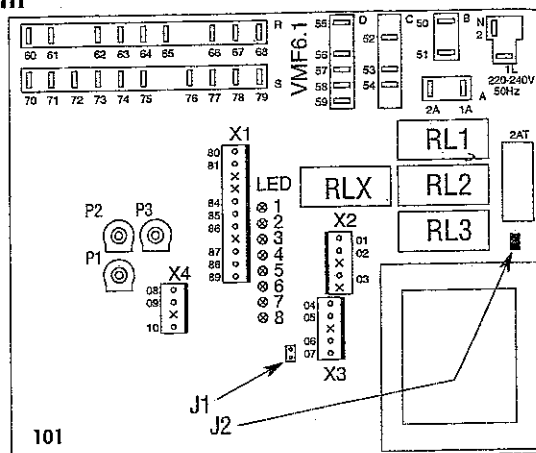
After completion of installation and commissioning of the system:

- 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
 - 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 Operatore gas valve
 - 47 Modulating regulator (Modureg) gas valve
 - 49 Overheat cut-off thermostat
 - 50 Heat exchan limit thermostat
 - 52 D.H.W. limit thermostat
 - 60 Extended control knob to gas valve
 - 63 C.H. boiler thermostat
 - 68 Control box with P.C.B.
 - 72 Room thermostat (not fitted)
 - 80 240V - 24V roomstat/time switch terminal blocks
 - 101 P.C.B.
 - 145 C.H. pressure gauge
 - 156 Piezo -igniter
 - 158 Gas inlet pressure Test point



- 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)

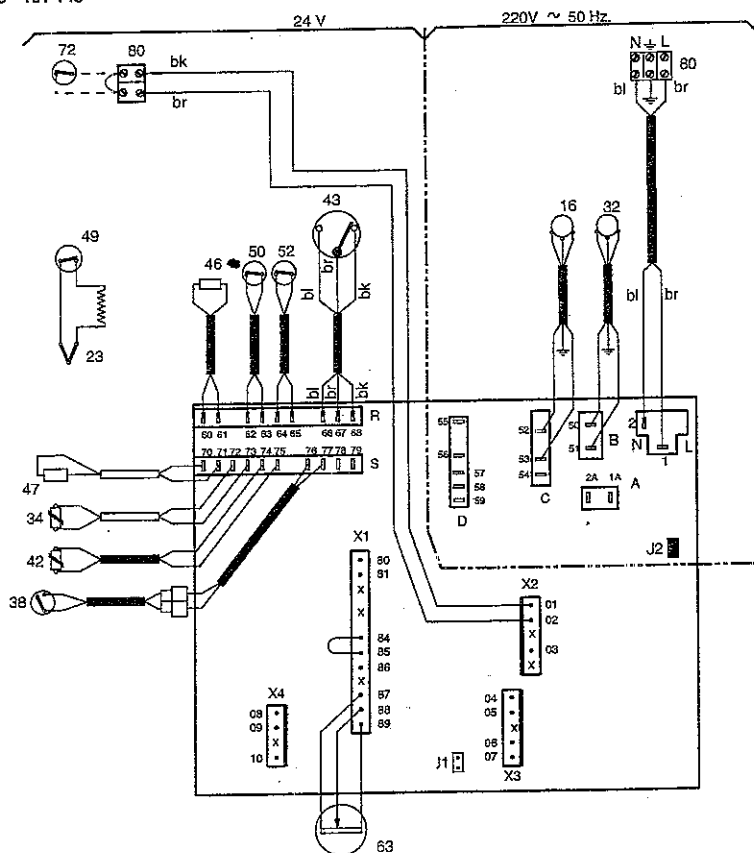


Fig. 25

23

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 into 4 main areas.
- 1.2 240 V AC With fan, C.H. pump, 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.
- 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
- 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.** All external C.H. controls "ON".
- 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 then 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.

Illustrated Wiring Diagram

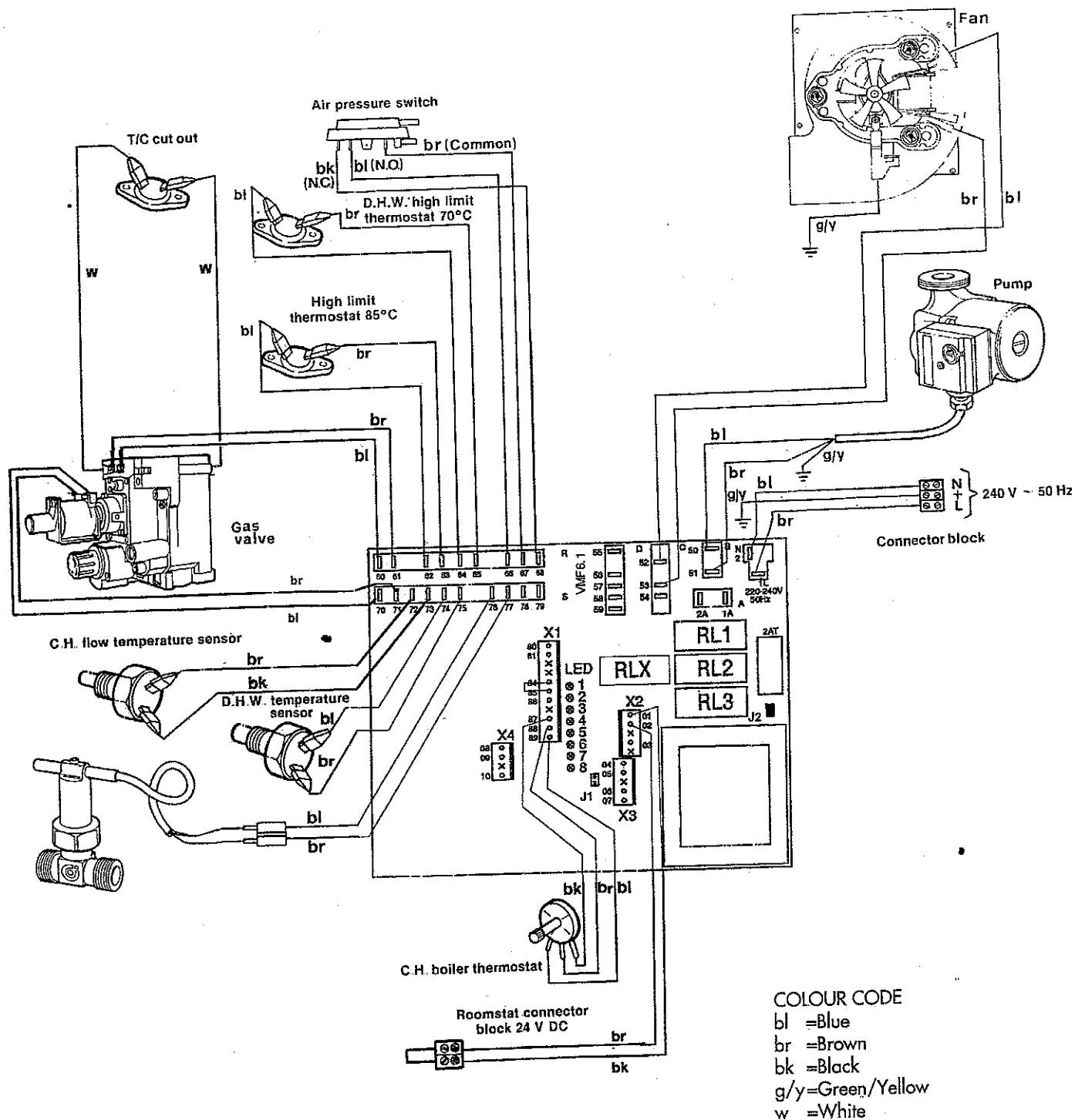


Fig 27

General fault finding

For "Fast" Fault Finding see separate instructions inside the electrical control box or page 53-54

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?

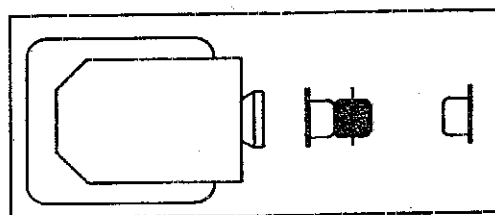
Always follow the complete General test Procedure to make sure that no fault remains unnoticed.

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.

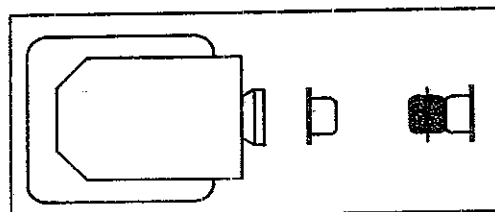
Never pull on the wires in the terminals.

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).



Relay
not energised



Relay
energised

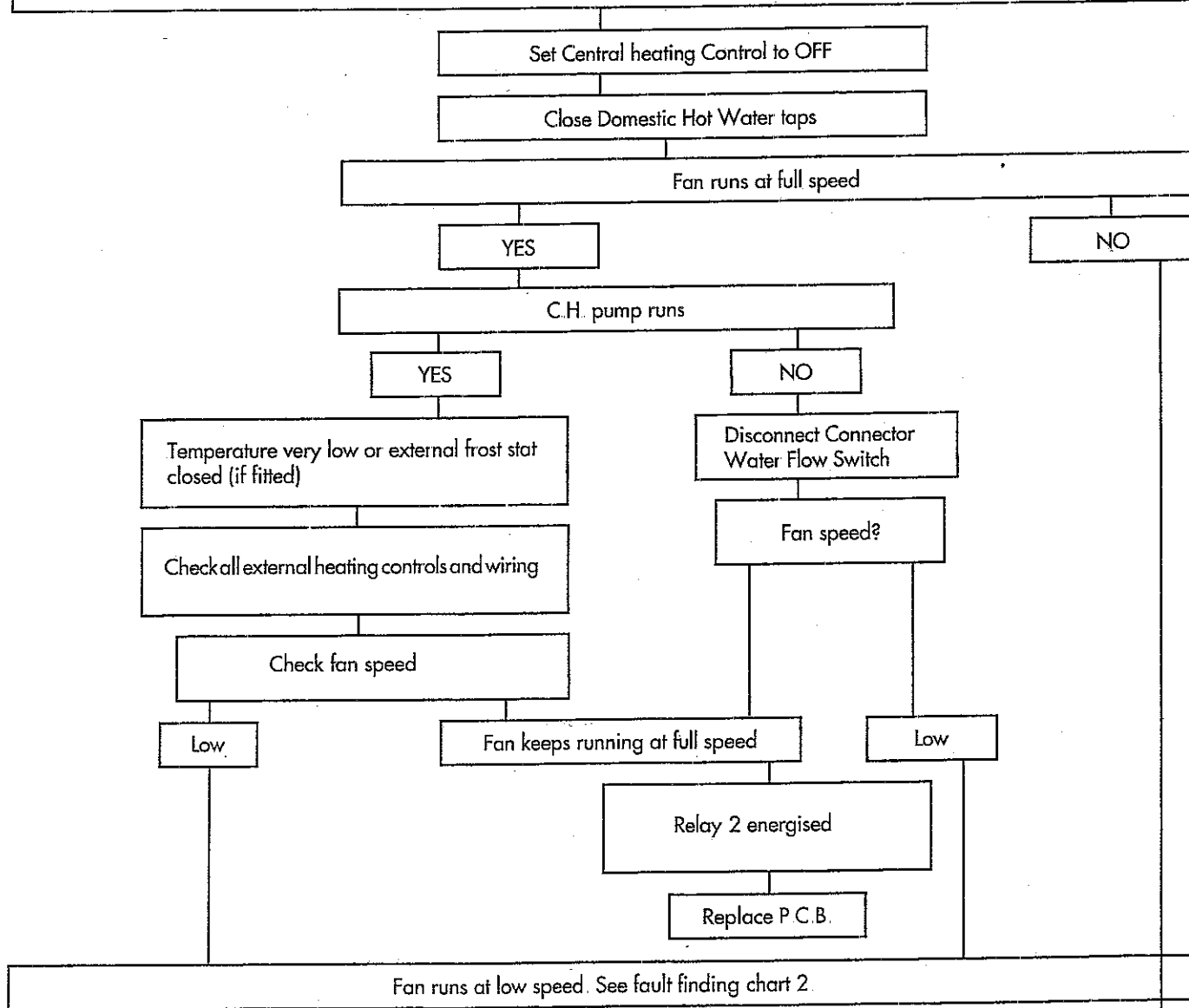
Top view relay

Fig. 28

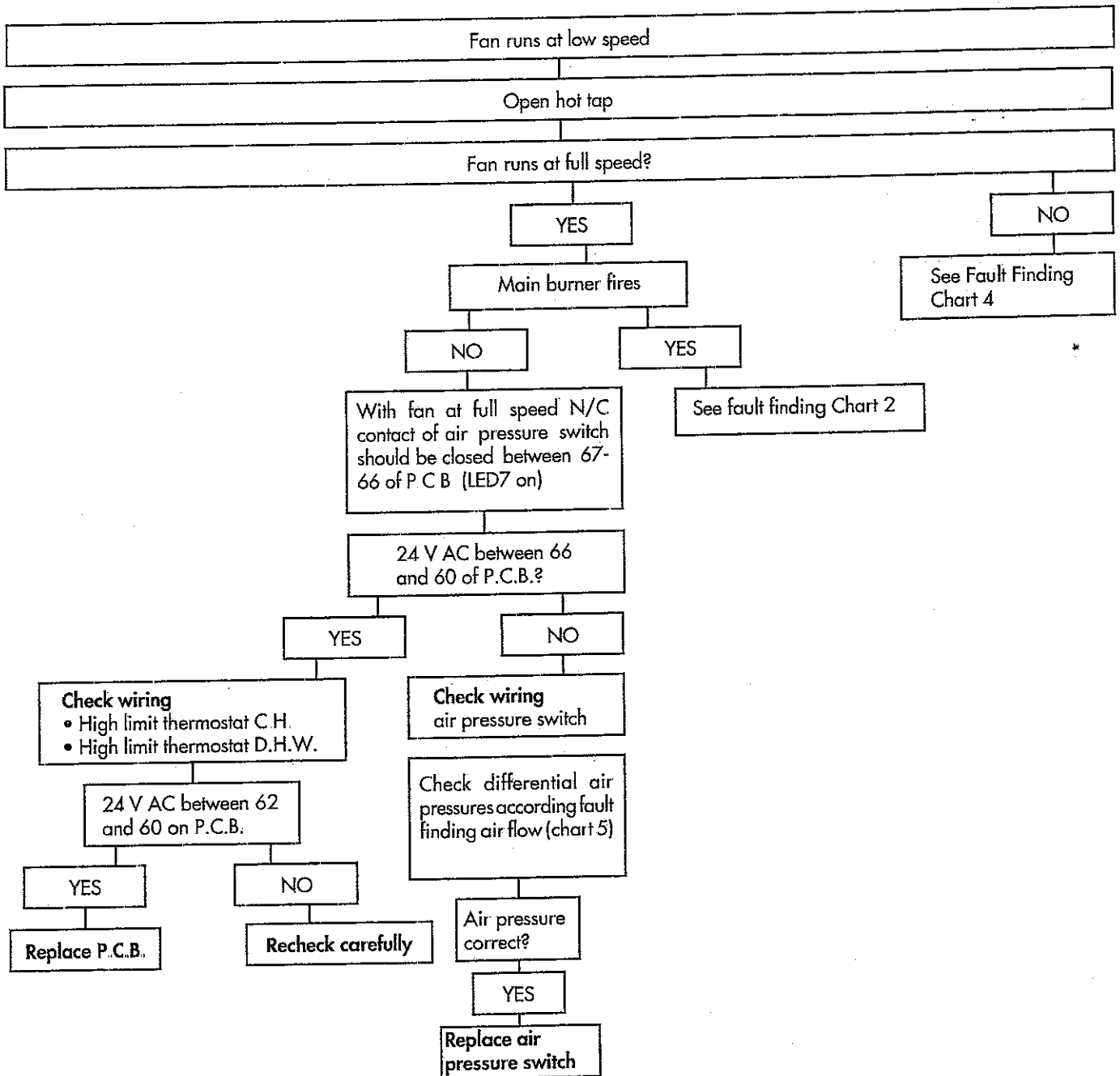
General Test + Fault Finding - Chart 1

Check carefully before starting fault finding

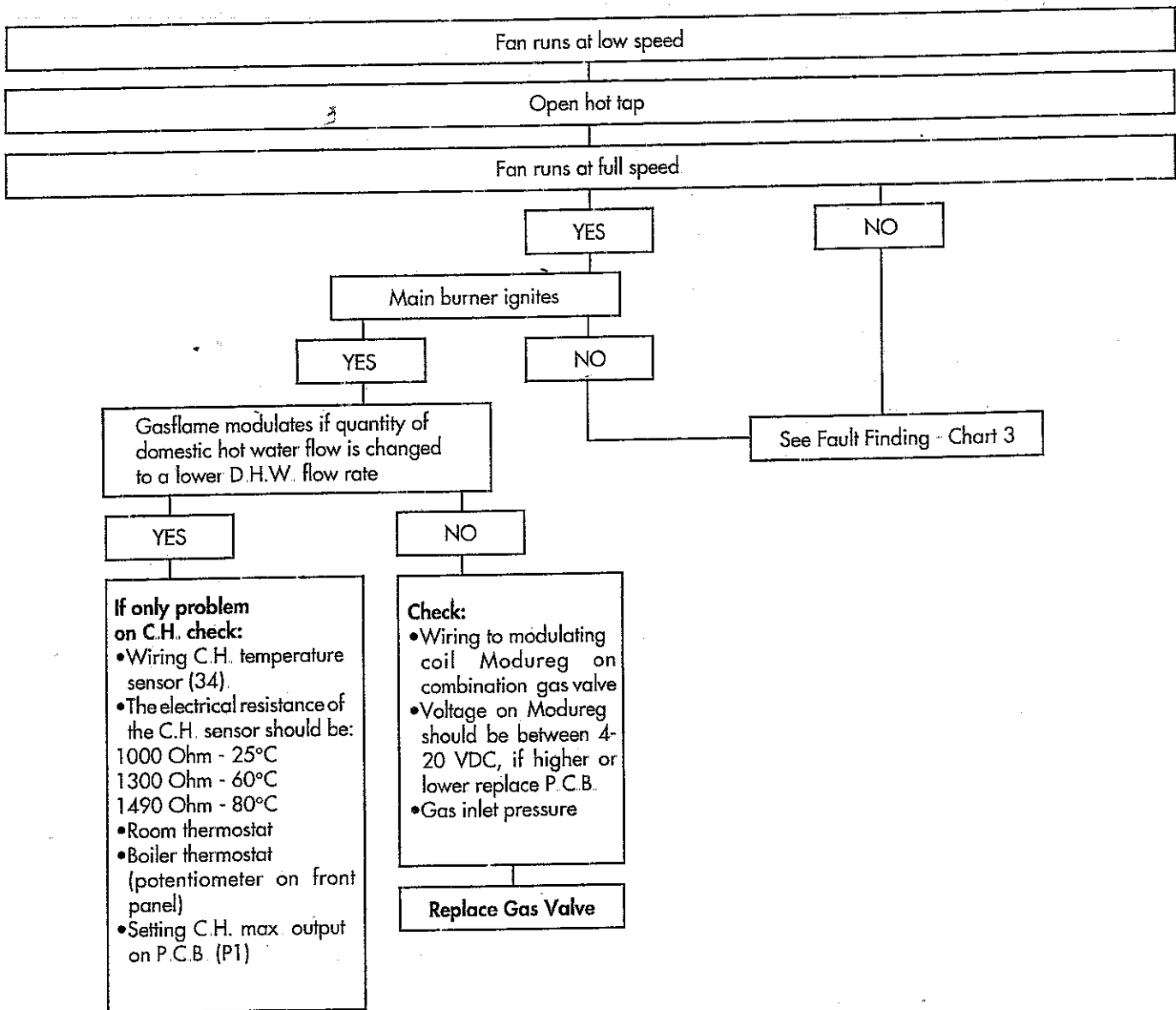
- Gas
- Electric mains
- Central heating pressure min. 1 bar
- Central heating pump spins free
- Heat exchanger air vented
- Green LED 1 on P.C.B. alight, if not check fuse F 2 Amp on P.C.B. and external fuses
- Waterflow D.H.W. min. 0.5 Gallon/min (2.5 Litres/min.)



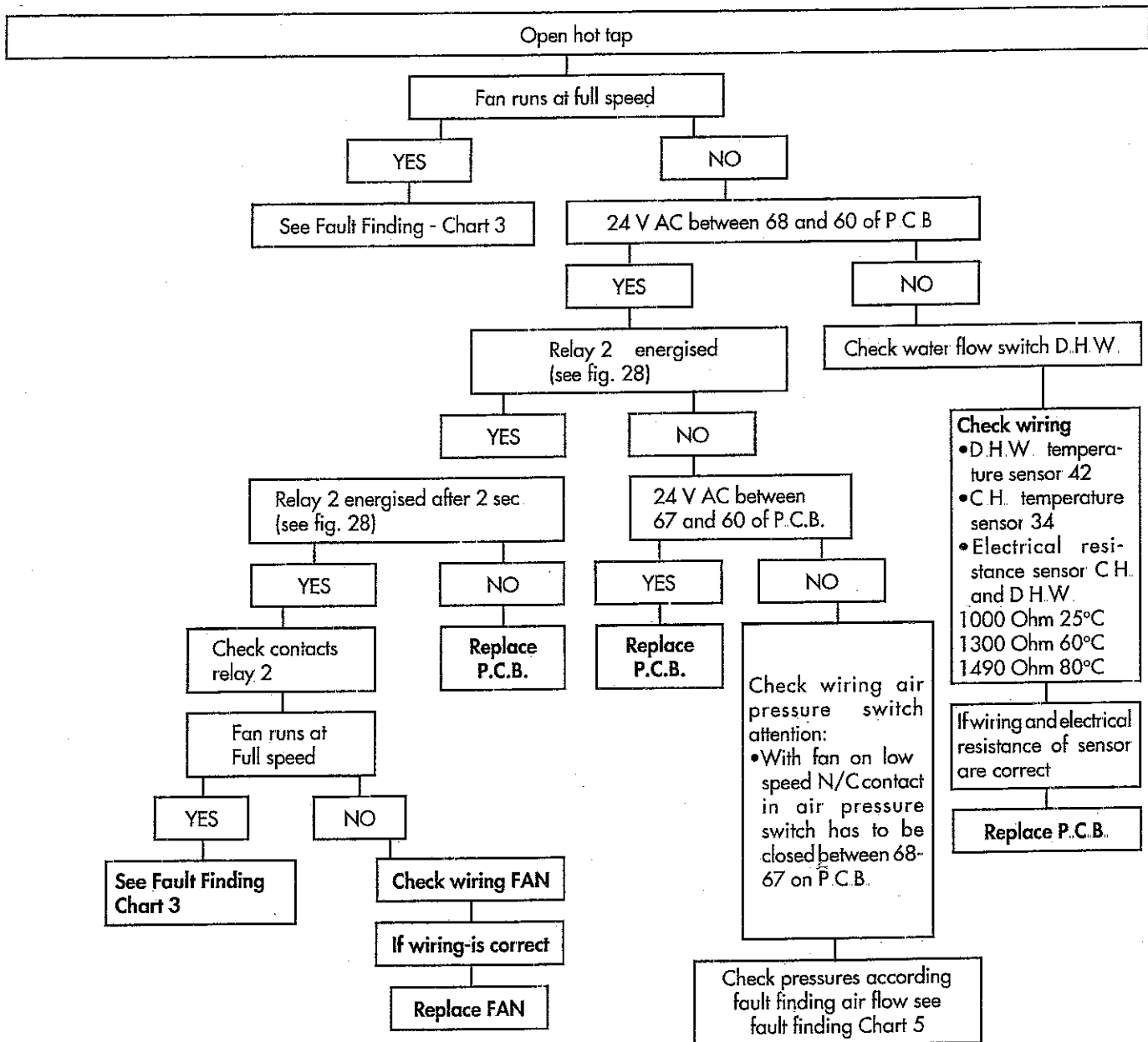
General Test + Fault Finding - Chart 3



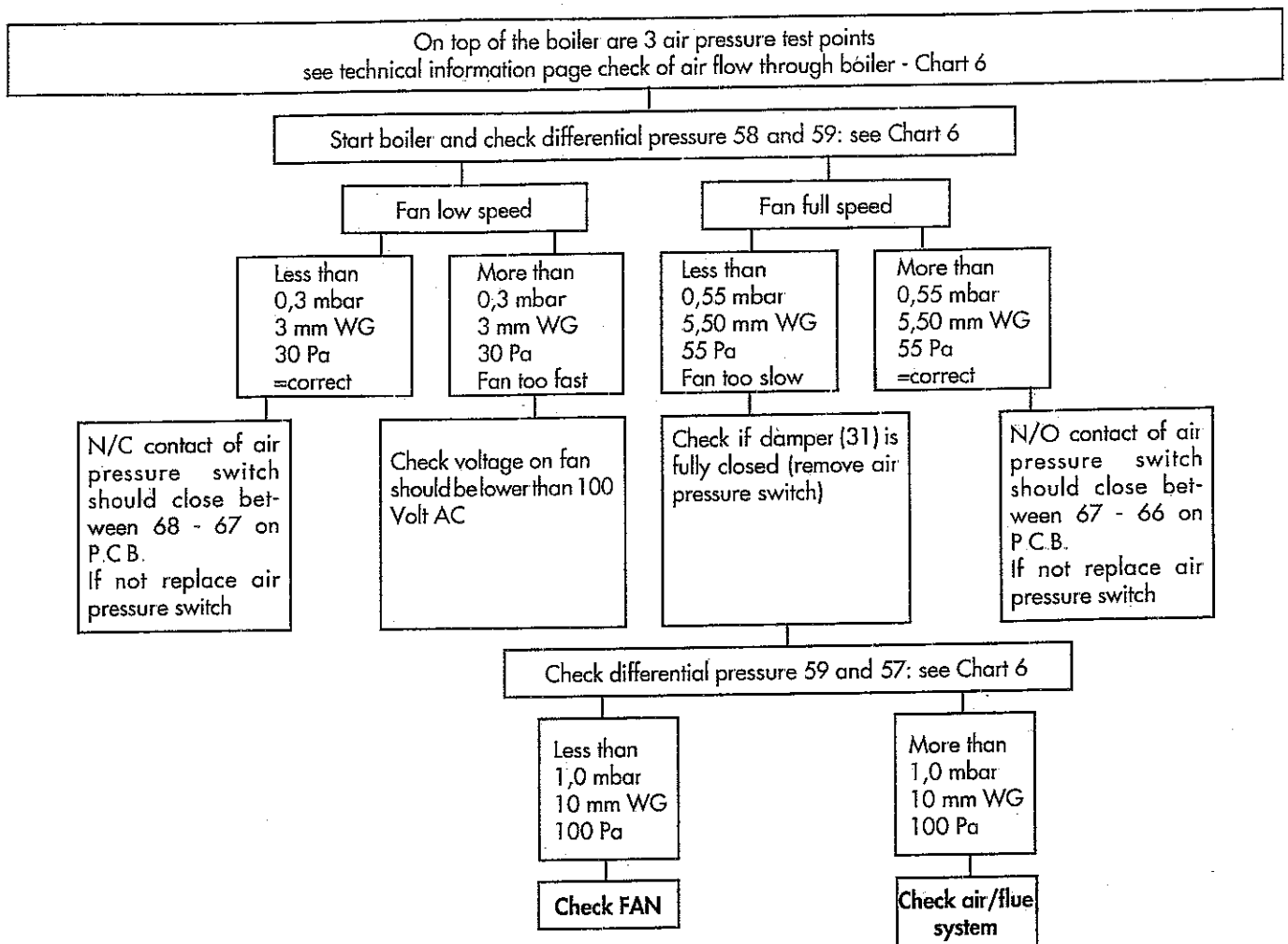
General Test + Fault Finding - Chart 2



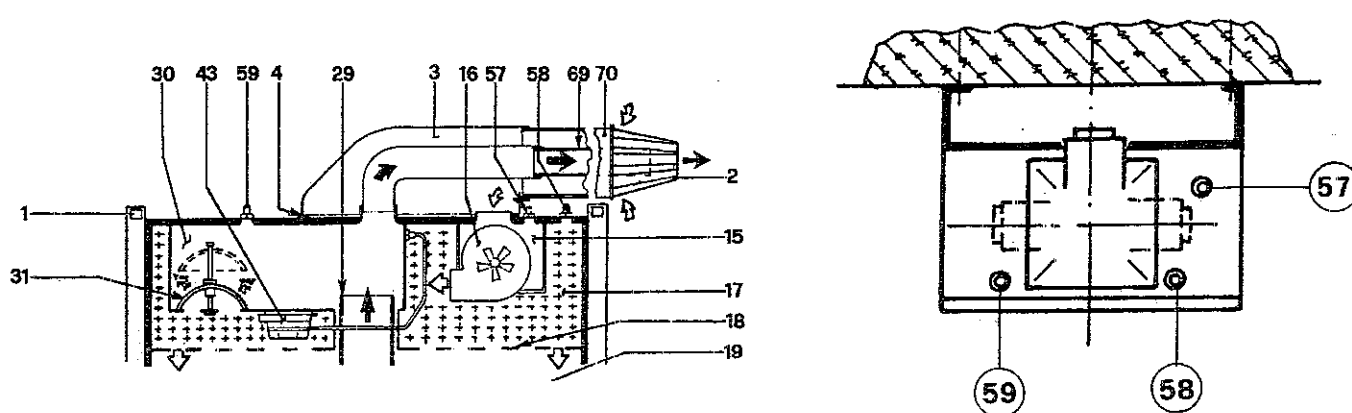
General Test + Fault Finding - Chart 4



General Test + Fault Finding - Chart 5



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



Top view of boiler

Pressure Test Points

- 57- Fan air inlet pressure test point
- 58- Fan air outlet pressure test point
- 59- Flue outlet pressure test point

Fig. 29

Top View Boiler

On top of the boiler are three 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 damper 31 and air pressure switch 43.
- 59-57 Differential pressure on external air/flue duct.
- 58-57 Differential pressure fan 16.

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 less than 0.55 mbar: check differential pressure between 59 and 57. ON full speed **differential pressure** between 59 and 57 should be to no more than 1.0 mbar - 10 mm WG - 100 Pa. If more check flue ducting.
4. If differential pressure 58 and 59 less than 0.55 mbar and differential pressure 59 and 57 less than 1.0 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 pull it forward away from the main boiler assembly.
- g) **Base Plate**
Remove the four fixing screws (fig. 16).
- h) **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. The left hand panel also has the heat protection shield secured by the fixing screw (fig. 14)

- 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 Release Control Panel**
Hinge control panel cover downwards.
The two control panel securing screws can now be removed (fig. 30), hinge control panel forwards.
- 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.

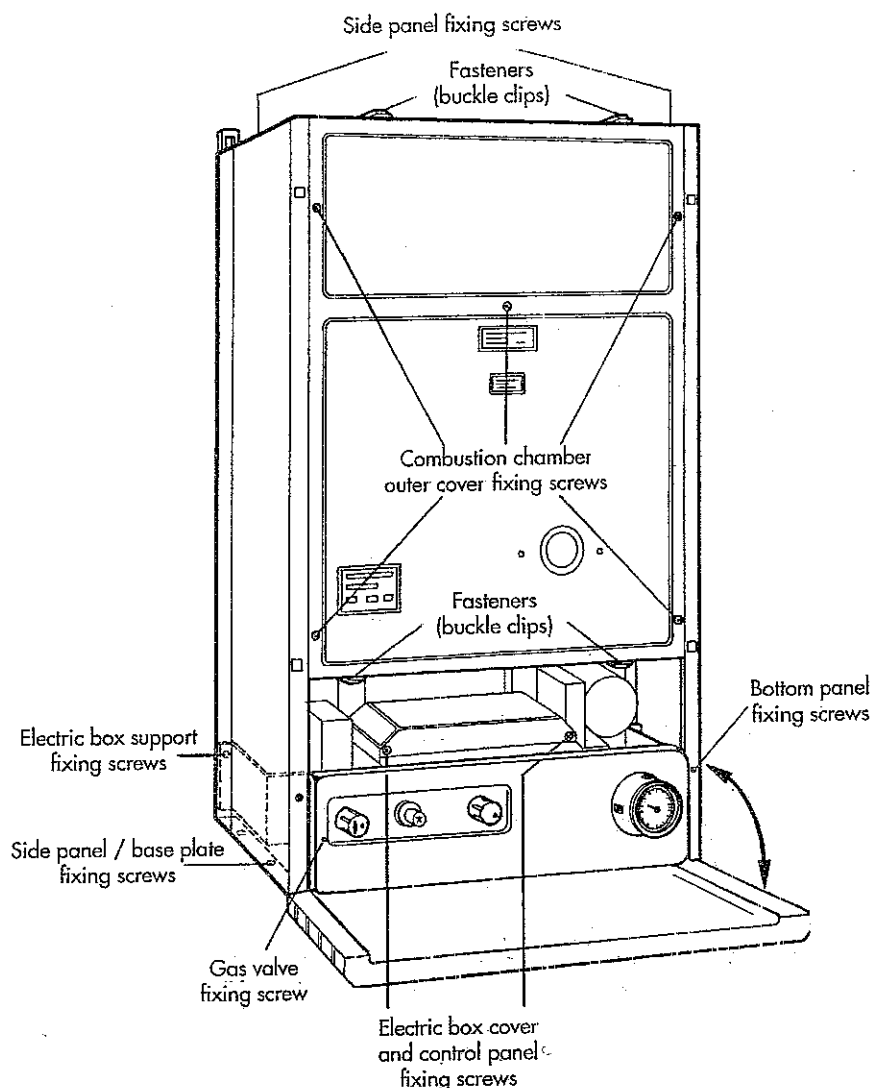


Fig 30

2.0 PILOT BURNER AND INJECTOR

- 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 interrupteur 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 pipe/thermocouple retaining plate, 2 screws (fig. 32).
- f) Remove the single pilot assembly fixing screw (fig. 34) Pull pilot assembly downwards.
- g) Disconnect the H.T. lead from the electrode, and withdraw the electrode.
- h) Remove pilot burner assembly complete (take care not to lose the seal on the pilot burner supply pipe and thermocouple).
- i) Unscrew the pilot burner supply compression nut, and remove the supply pipe and injector. (Injector is a sliding fit to supply pipe) (fig. 36).
- j) Re-assemble in reverse order. Ensure that the pilot works correctly and that the pilot flame envelopes the thermocouple tip (fig. 36).

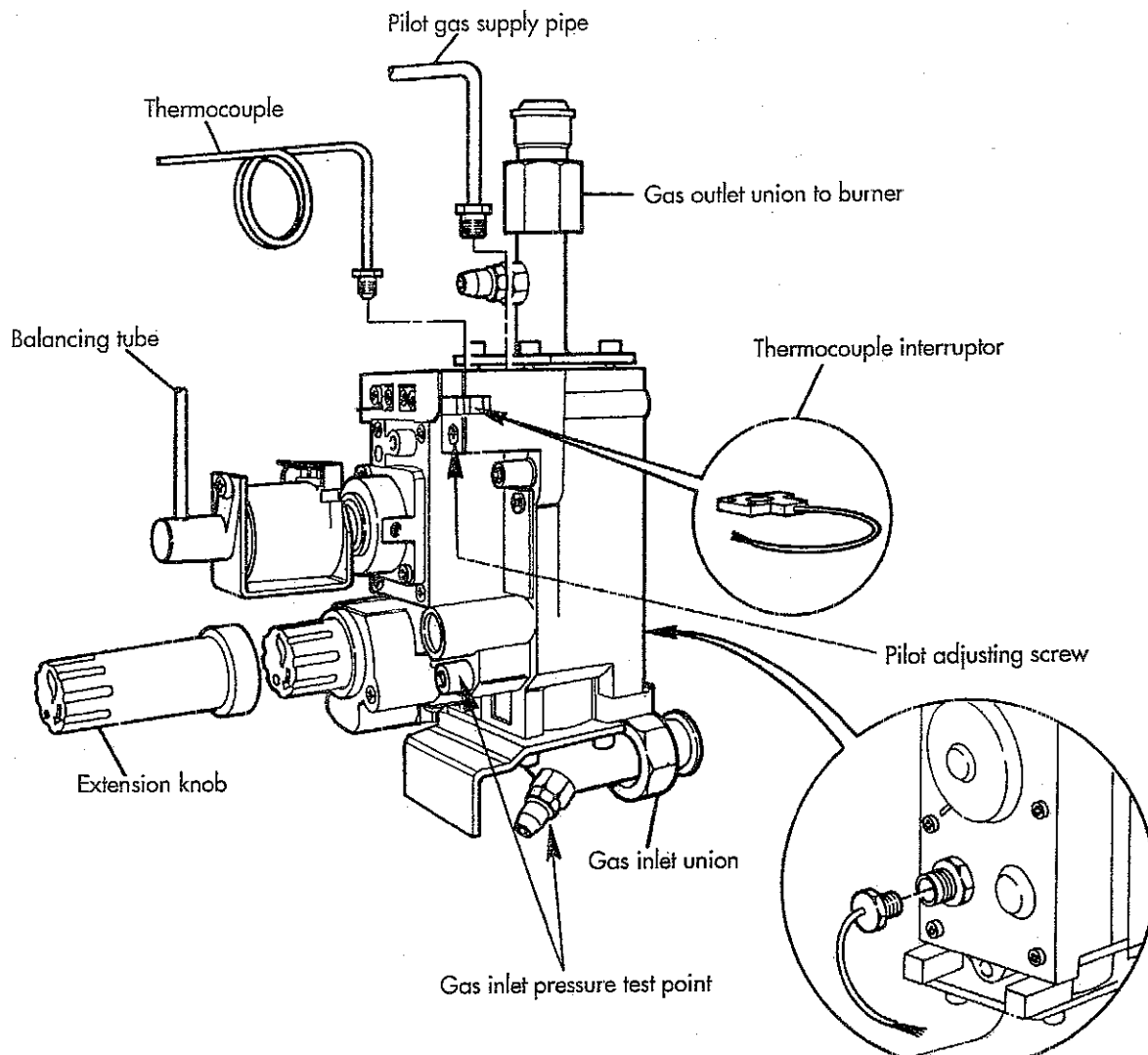


Fig 31

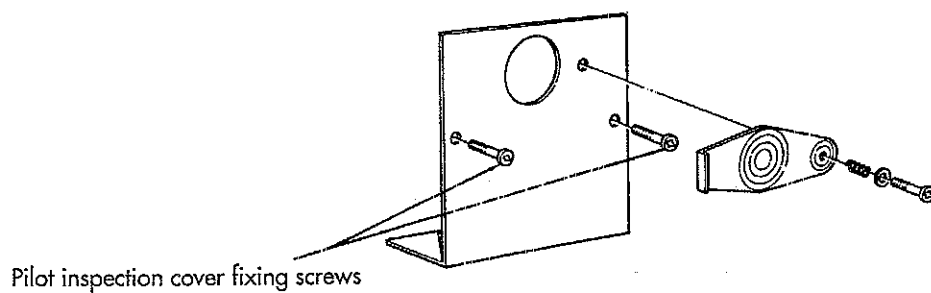


Fig. 32

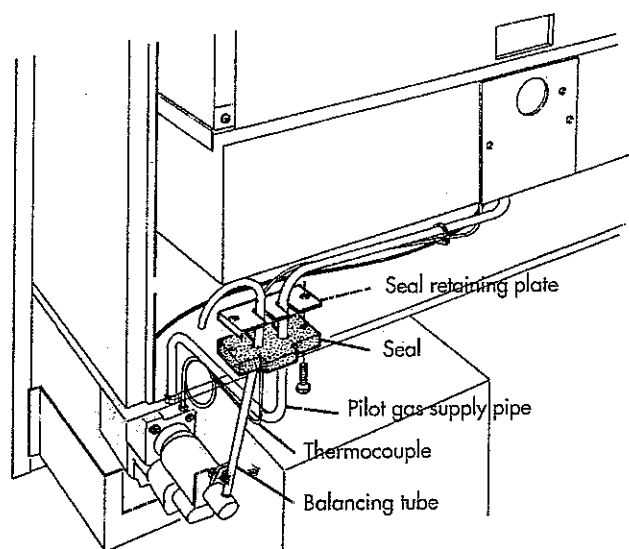


Fig. 33

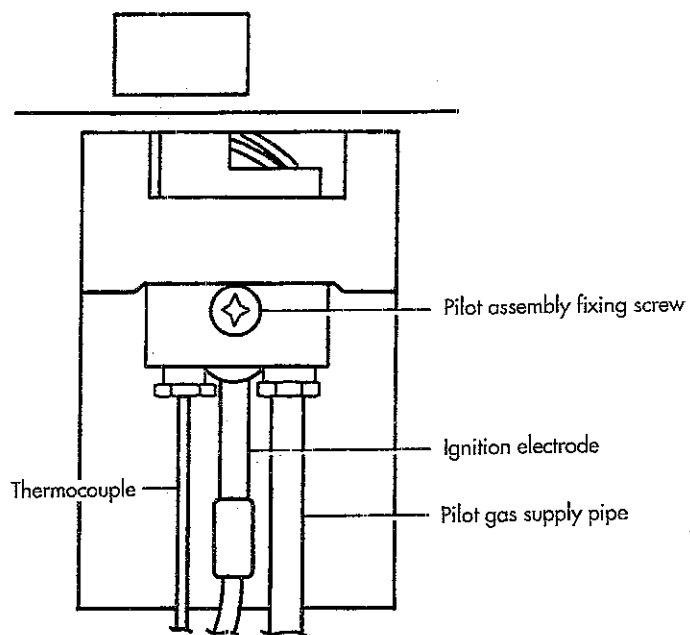


Fig. 34

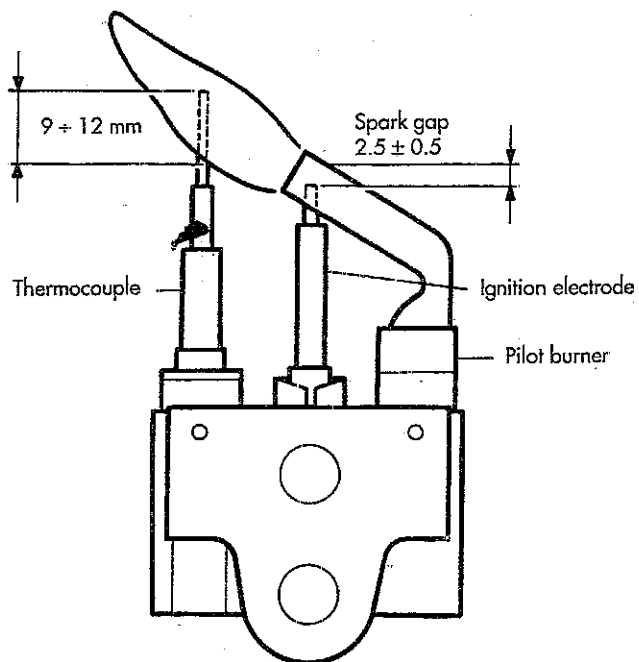


Fig. 35

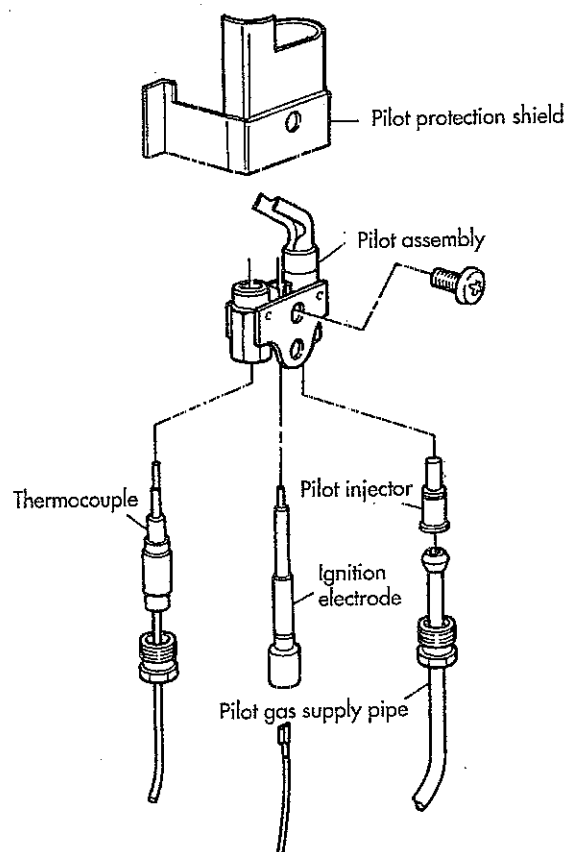


Fig. 36

35).

3.0 IGNITION ELECTRODE

- Refer to Section 1, items a, d, f, and i.
- Remove pilot inspection cover, 2 screws (fig 32).
- Push the electrode downwards to clear spring clip location and remove the lead
- Re-assemble in reverse order and ensure ignition is satisfactory. Spark gap should be 2.5 mm $\pm$ 0.5 mm.

4.0 THERMOCOUPLE

- Refer to section, items a, c, d, f, and i.
- Remove pilot burner assembly. Refer to section 2, items b, c, d, e, f, g and h.
- Unscrew the thermocouple from the pilot assembly.
- Check the operation of the flame failure device. The boiler should operate satisfactorily with a thermocouple output of between 4 and 18 millivolts.

5.0 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.

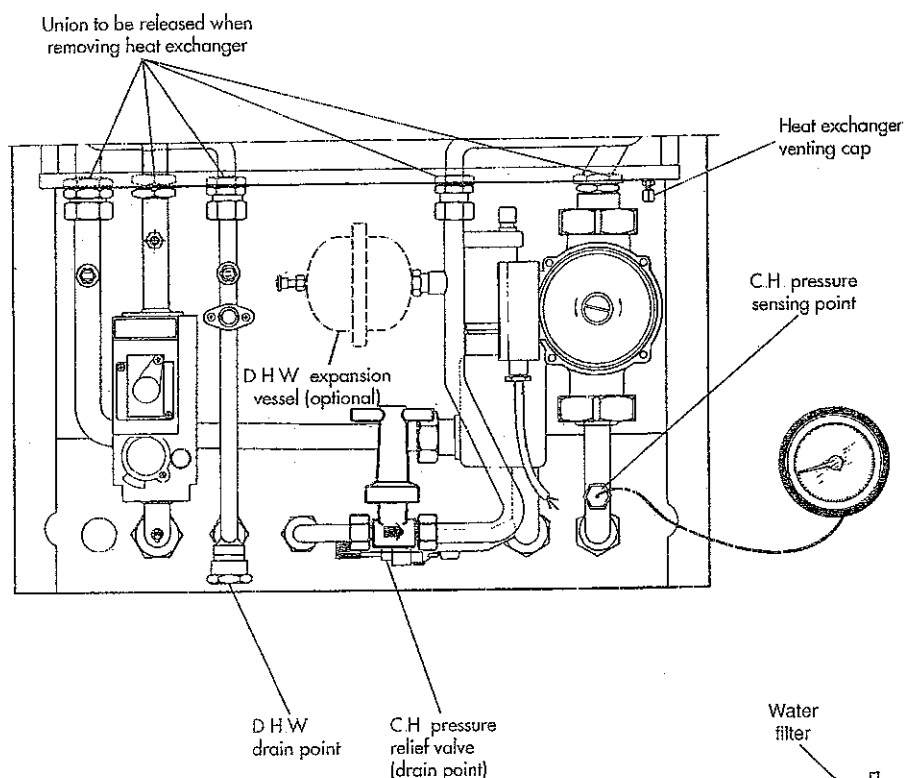


Fig. 37

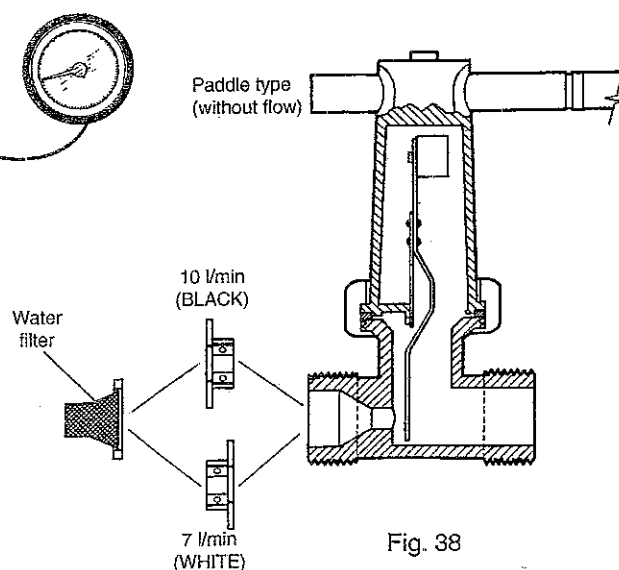


Fig. 38

6.0 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 interrupteur 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 withdrawn gas valve towards front

Note - Thermocouple interrupteur wire is still attached.

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

7.0 P.C.B.

- a) Refer to section 2, 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).

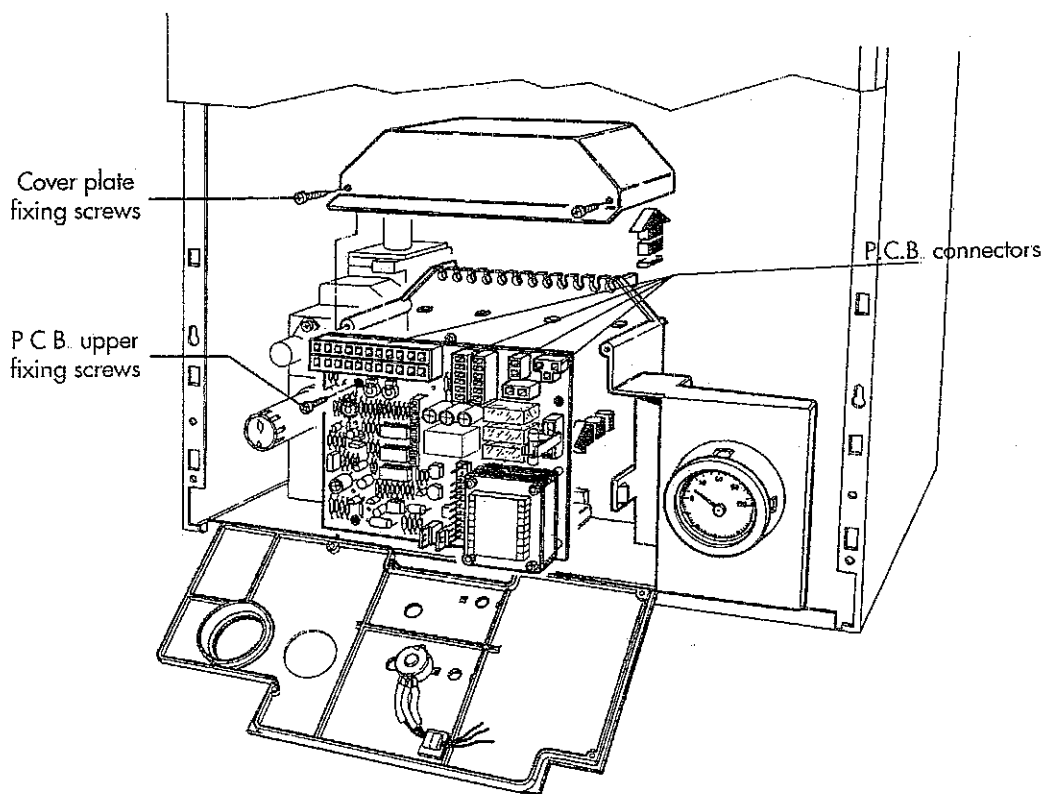


Fig 39

8.0 CENTRAL HEATING LIMIT 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.

9.0 D.H.W. TEMPERATURE SENSOR OR CENTRAL HEATING TEMPERATURE SENSOR (Control Thermostat)

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

10.0 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.

11.0 PUMP

- a) Refer to section 2, 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.

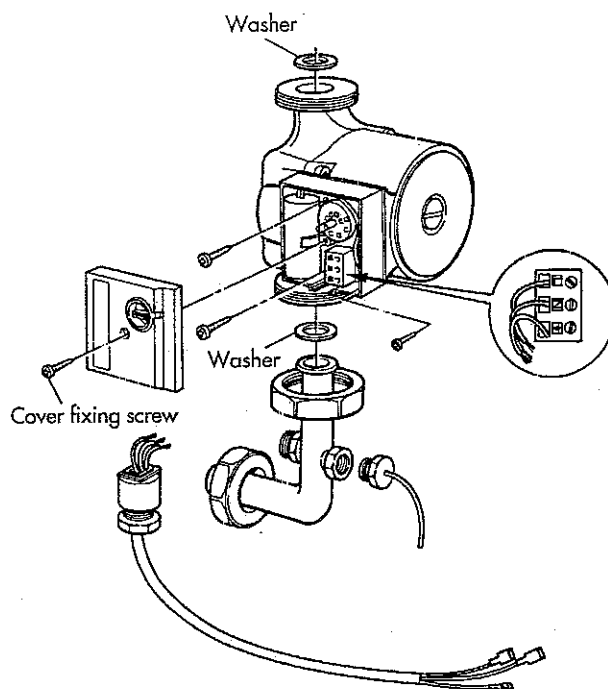


Fig. 40

12.0 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

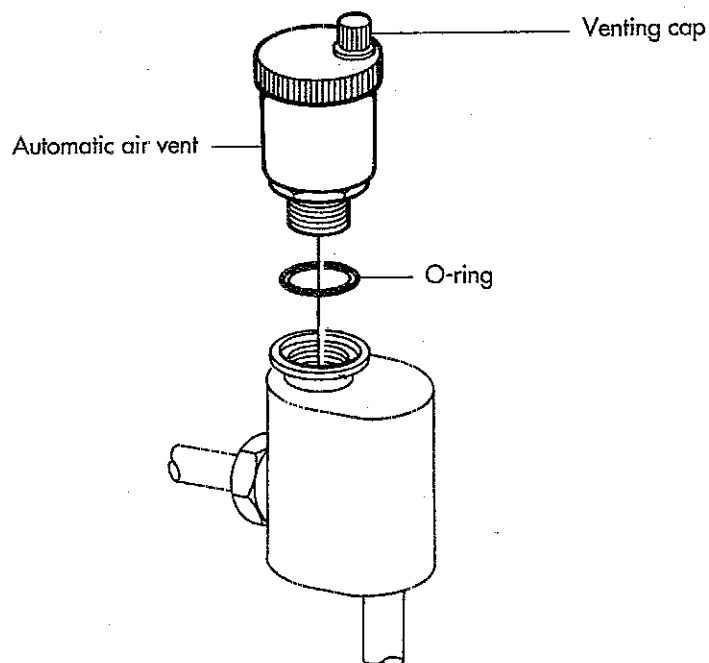


Fig. 41

13.0 PRESSURE GAUGE

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

14.0 D.H.W. EXPANSION VESSEL (OPTIONAL)

- Refer to section 1, items a, b (D.H.W.), c, d, f and g
- Unscrew the expansion vessel (fig. 37). (Take care not to loose the sealing washer)
- Re-assemble in reverse order, ensure the sealing washer is in place.

Note

15.0 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.
- 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 (Take care not to lose insulation pad).
- Re-assemble in reverse order, ensure insulation pad is in place and the wires are pointing downwards.
(Refer to fig 25 for wiring).

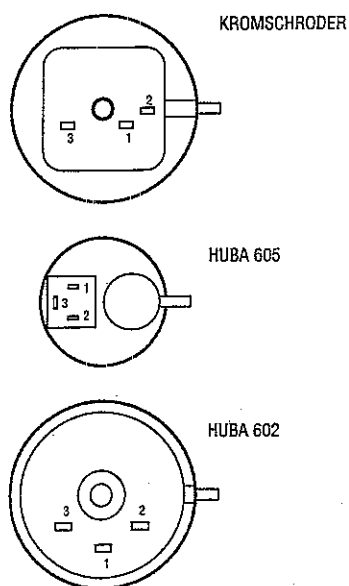
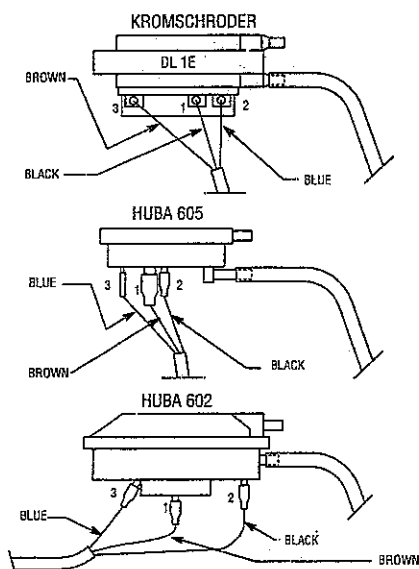
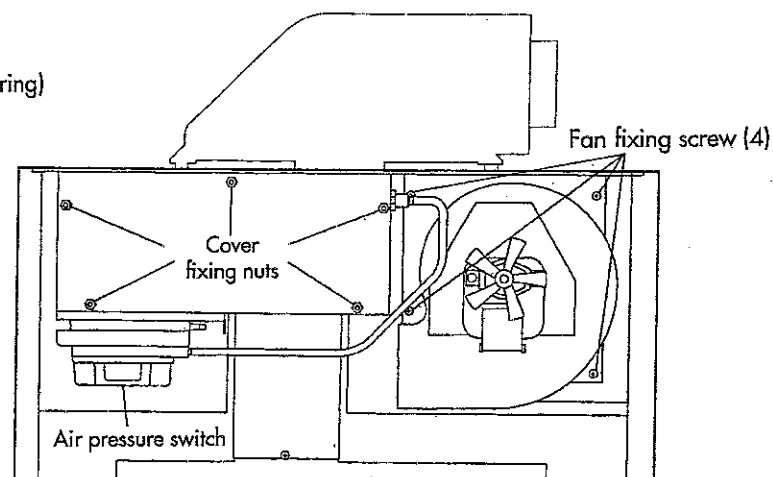
16.0 REMOVAL OF SPARK IGNITER

- Refer to Section 1, items a, c, d, f and j.
- Disconnect High-Voltage and Earth connection to the piezo-igniter.
- Remove the piezo-igniter.
- Re-assemble in reverse order. **Note:** don't forget the earth wire.

17.0 AIR PRESSURE SWITCH

- Refer to Section 1, items a, c, d, f, and i.
- Remove the five screw securing the air collection plate (fig 45), and withdraw the plate complete with the air pressure switch (Take care not to lose «P» clip).
- Disconnect electrical leads to air pressure switch.
- Remove pressure sensing tube.
- Remove the pressure switch, 2 screw.
- Re-assemble in reverse order (refer to fig 45 for wiring).

Fig 45

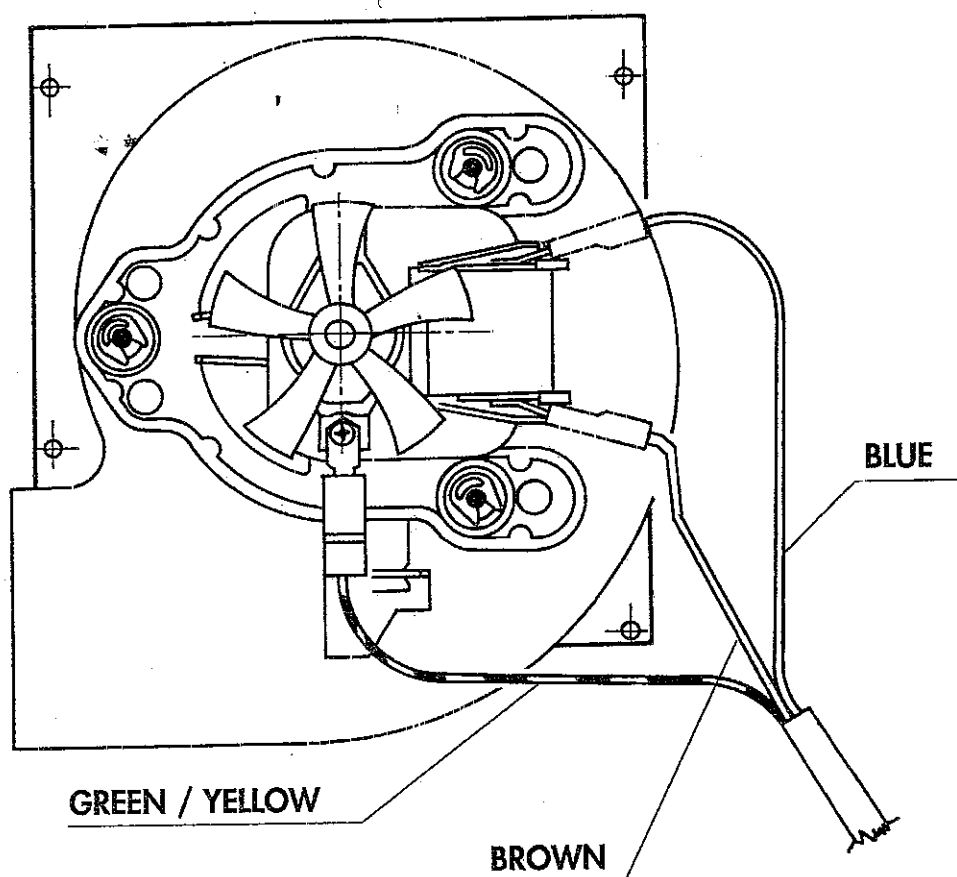


Brown - Common
Black = N.C.
Blue = N.O.

Fig. 46

18.0 REMOVAL OF FAN

- a) Refer to Section 1, items a, c, d, f, and i.
- b) Disconnect electrical connections (fig. 47).
- c) Unscrew the four fixing screws securing the fan remove air sensor tubes and withdraw fan (fig. 45).
- d) Re-assemble in reverse order (refer to fig. 47) for wiring.



Note - Remove Blue, Brown and Green/Yellow wires before removing fan.

Fig. 47

19.0 REMOVAL OF MAIN BURNER INJECTORS (x4)

- a) Refer to Section 1, items a, c, d, f, and i.
- b) Remove pilot burner assembly. Refer to section 2 items b, c, d, e, f, g, and h.
- c) Unscrew burner inlet union connection (fig. 48).
- d) Remove combustion chamber front panel by unscrewing the two fixing screws (fig. 49).
- e) Unscrew the burner assembly fixing screws (fig. 49) and remove complete burner assembly (take care not to lose sealing cap on gas supply pipe).
- f) Remove the three screws securing the burner air guide plate (see fig. 48).
- g) Remove the two screws securing the injector rail (fig. 48) and remove the injector rail complete with burners.
- h) Pull burners off injectors.
- i) Remove injectors (Take care not to lose the copper sealing washers).
- j) Re-assemble in reverse order (check operation on boiler).
- k) Check tightness of sealing cap.
- l) Check operation of boiler.

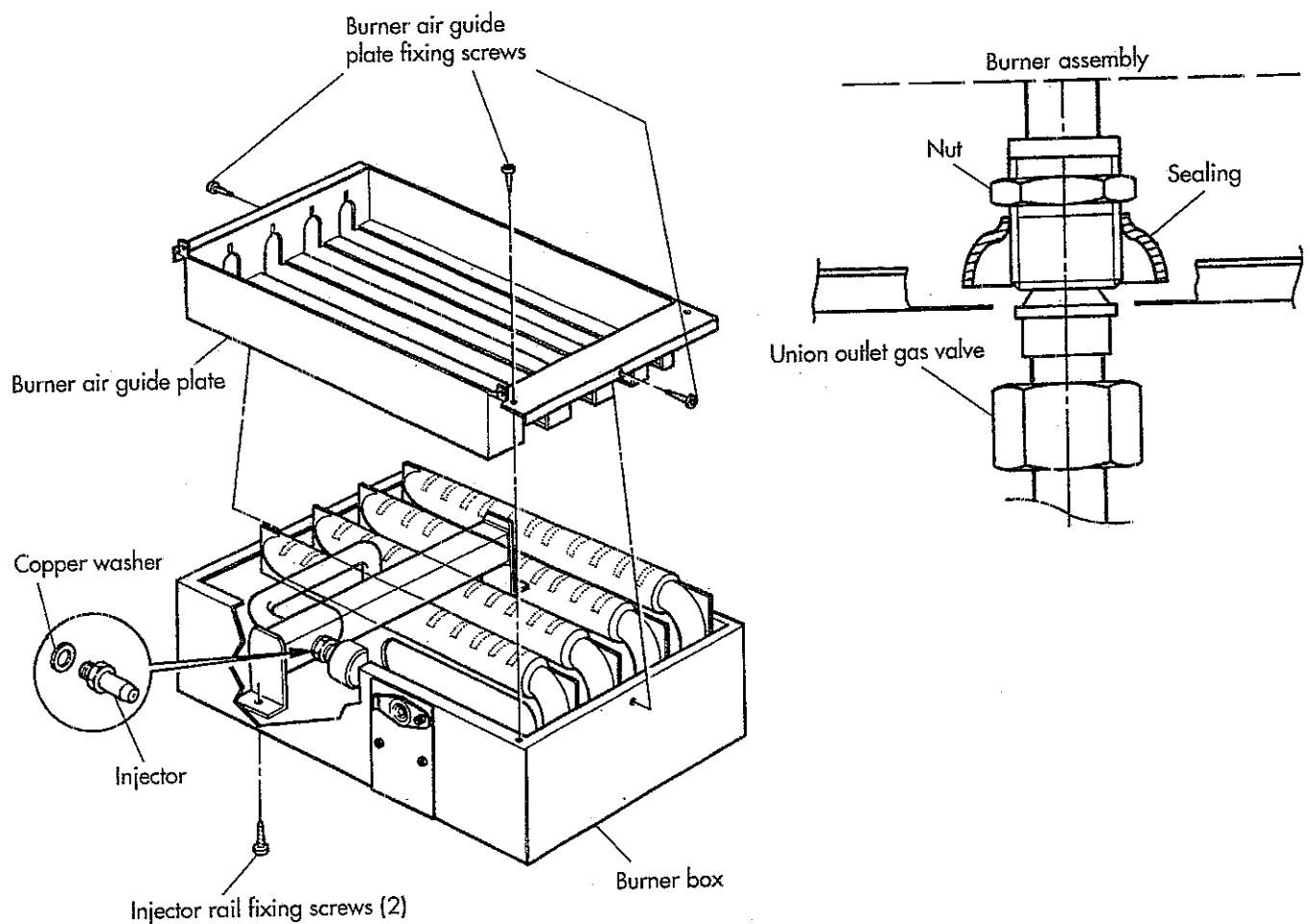


Fig. 48

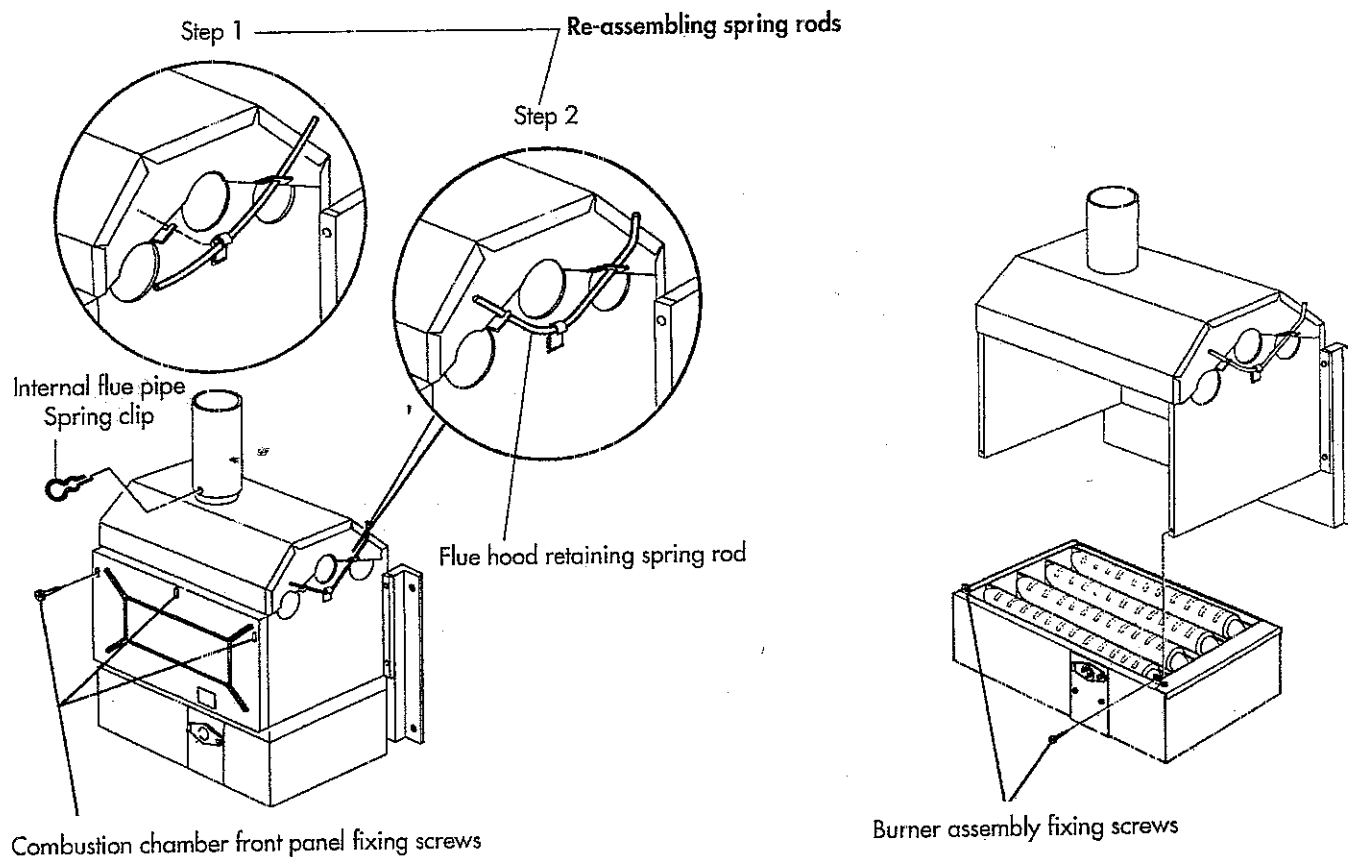


Fig. 49

20.0 REMOVAL OF HEAT EXCHANGER

- a) Refer to Section 1, items a, c, d, f, g, h, i and j.
- b) Remove pilot burner assembly. Refer to section 2, items b, c, d, e, f, g, h, and k
- c) Remove main burner. Refer to section 21, items c, d, and e
- d) Disconnect the two pump union connections, remove pump and rest in the control panel cover.
(Do not lose the pump washers).
- e) Remove the other half of the top union pump connection and then remove locking nut (fig. 37).
- f) Disconnect the remaining three unions at the base of the combustion chamber (take care not to lose sealing washer and remove locking nuts) (fig. 37).
- g) Remove heat exchanger venting cap and locking nut, (take care not to lose ball bearing) (fig. 37).
- h) Disconnect the electrical connection from C.H. limit thermostats, and overheat cut-off thermostat, (identify these components from fig. 2).
- i) Remove flue hood retaining spring rods by pushing up and outwards (fig. 49).
- j) Remove the spring clip securing the flue hood to the internal flue pipe and push the flue pipe upwards (fig. 49) and latch it in the flue to keep it out of the way.
Carefully lift the flue hood out.
- k) Remove the single screw from the «U» bracket below the combustion chamber (fig. 50) and remove bracket.
- m) Slide combustion chamber downwards.
- n) Lift the heat exchanger upwards and pull away.
- o) Re-assemble in reverse order. Refer to fig. 48 for replacement of spring rods and refer to wiring diagram fig. 25 for re-connection.
- p) Fully check the operation of the boiler. (Refer to commissioning).

21.0 REMOVAL OF COMBUSTION CHAMBER INSULATION PANELS

- a) Refer to section 1, items a, c, d, f and i
- b) Remove the pilot burner assembly refer to section 2, items b, c, d, e, f, g and h
- c) Remove the main burner refer to section 21, items c, d and e.
- d) Remove the single screw from the «U» bracket below the combustion chamber (fig 50) and remove bracket.
- e) Slide combustion chamber downwards.
- f) Gently lift out the two side insulation panels and the back insulation panel.
- g) Removal of the combustion chamber front insulation panel.
- l) Pull up the four metal tags which secure the insulation to the front panel (fig 51).
- II) Gently lift out the insulation, take care not to lose the glass viewing window.
- III) Refit the insulation panel and push the metal securing tags back down.
(Take care that the viewing window is in place)
- h) Re-assemble in reverse order (refer to fig. 48 for replacement of spring clip and refer to fig. 25 for wiring).
Ensure that the internal flue pipe is fixed to the top of the flue hood.
- i) Fully check operation of the boiler (refer to commissioning)

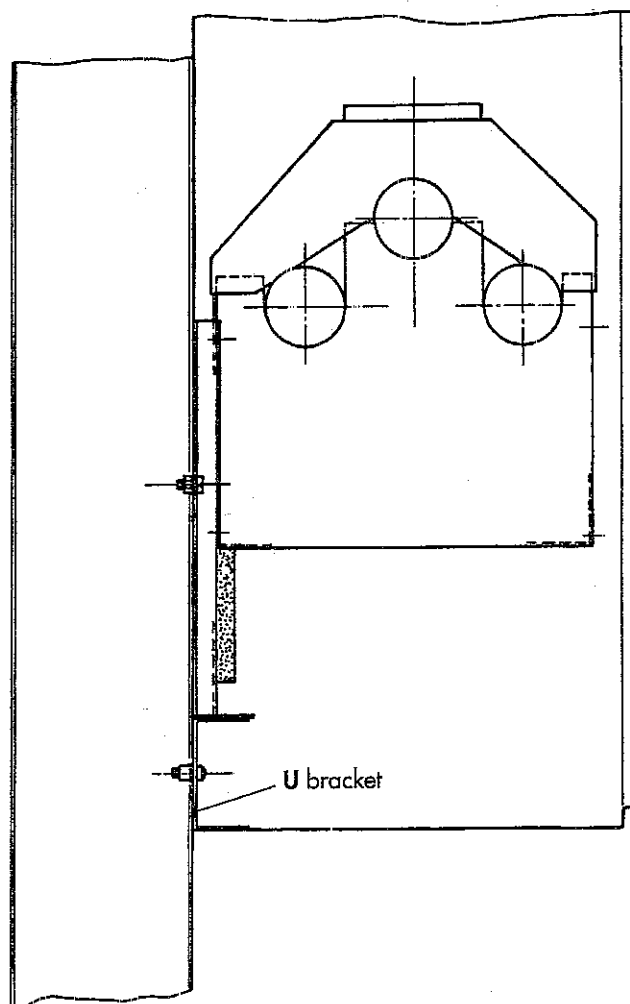


Fig. 50

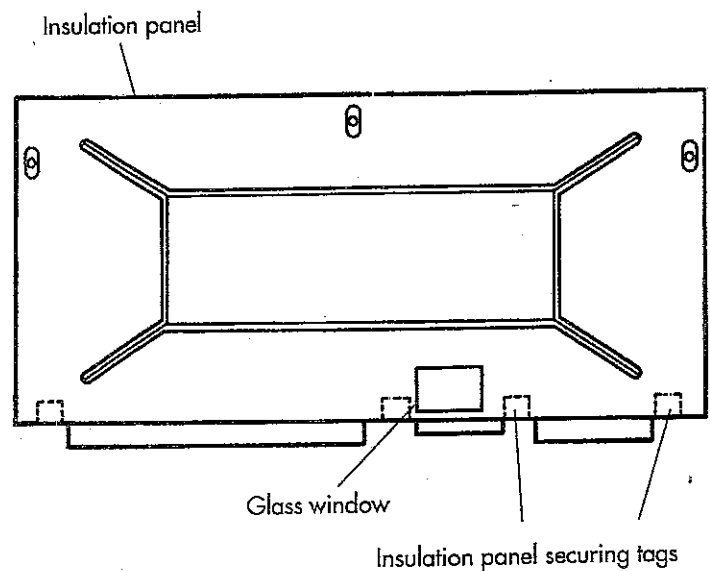


Fig. 51

22.0 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 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. 52) which can be found at the top back of the boiler.
 - III) Undo the compression fitting on the top of the expansion vessel (fig. 52).
 - 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.

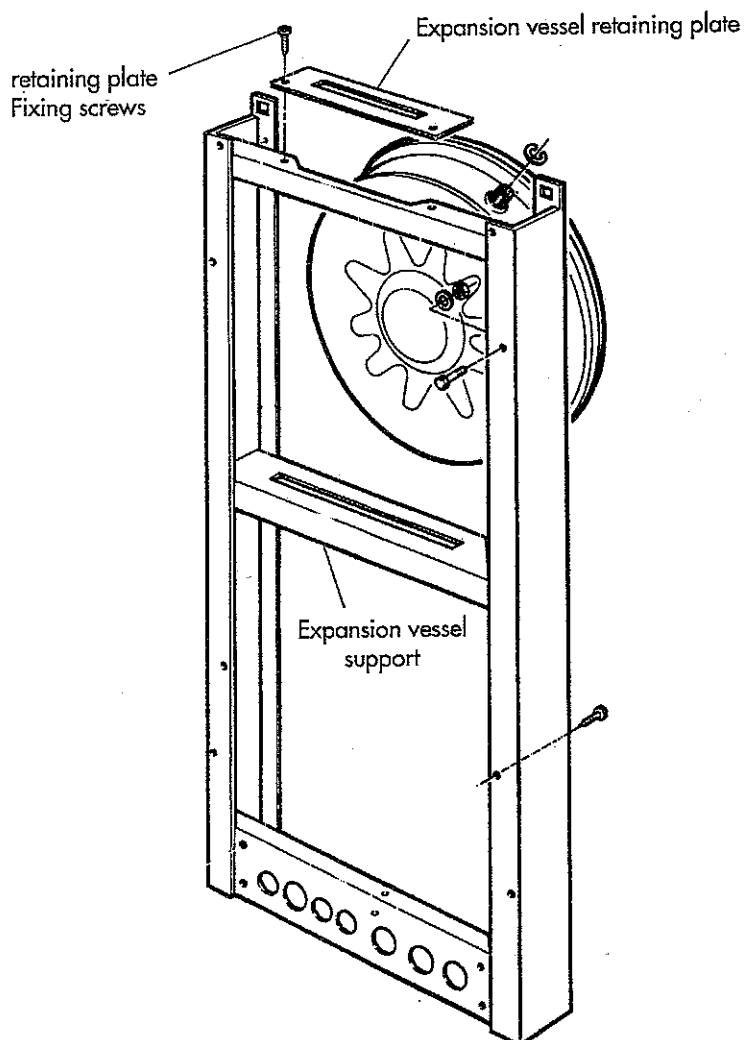


Fig. 52

Annual Servicing Instructions

Certain procedures may not be necessary - check the operation of the pilot, thermostat and main burner before servicing, as well as the domestic hot water flow rates. Note that the heat exchanger must always be cleaned

Before work commences ensure that:

- a) Boiler is cold
- b) Electricity supply to the boiler is isolated
- c) Gas supply to the boiler is isolated, at the cock on the inlet manifold

1.0 TO REMOVE THE BOILER OUTER CASING

1.1 **Front panel** - Grip firmly on both sides and pull it forward away from the main boiler assembly.

1.2 **Base Plate** - Unscrew the four screws which secure the base plate (fig. 30).

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

1.3 **Combustion Chamber Outer Cover** - Remove the five combustion chamber outer cover screws (fig. 30) and unlatch the four buckle clips and remove cover.

2.0 REMOVAL OF PARTS FOR SERVICING

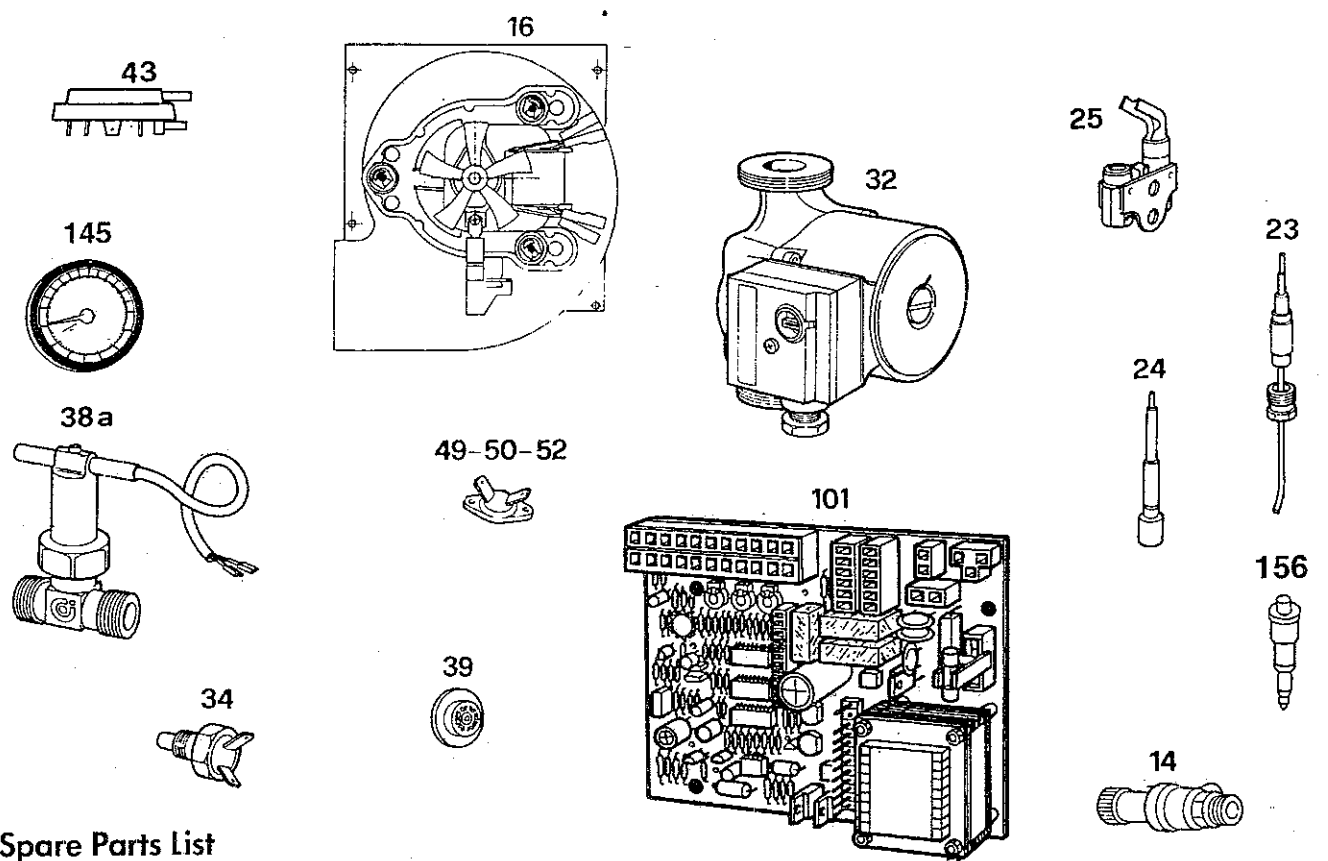
- 2.1 Remove thermocouple from Honeywell valve (10 mm spanner). Note that the thermocouple interrupter is located in a slot below and must be in this position before reconnecting the thermocouple (fig. 31).
- 2.2 Unscrew the pilot gas compression nut from the Honeywell valve (fig. 31)
- 2.3 Remove the pilot inspection cover 2 screws (fig. 32)
- 2.4 Pull electrode H T lead from electrode.
- 2.5 Unscrew burner inlet union connection.
- 2.6 Remove the combustion chamber front panel by unscrewing the two fixing screws (fig. 48).
- 2.7 Remove the two screws securing the burner assembly box (fig. 48).
- 2.8 Remove the pilot pipe/thermocouple seal retaining plate 2 screws (fig. 33)
- 2.9 Remove the main burner assembly box and pilot assembly complete.
- 2.10 Remove the single pilot assembly fixing screw (fig. 34). Pull pilot assembly downwards to withdraw
- 2.11 If required pull electrode from location and inspect electrode. Replace if deteriorated or ceramic cracked.
- 2.12 Inspect the thermocouple tip for signs of deterioration. Replace if necessary.
- 2.13 If required unscrew the pilot burner supply compression nut and remove supply pipe and injector (injector is a sliding fit in the housing). Examine injector for any blockage. Blow out any deposits (do not use a sharp implement to unblock).
- 2.14 Remove the three screws securing the burner air guide plate (fig. 49)
- 2.15 Remove the two fixing screws securing the injector rail (fig. 49) and remove the injector rail complete with burners
- 2.16 Pull burners off injectors
- 2.17 Clean the burners with a brush.
- 2.18 Inspect the main injector and clean if necessary.
- 2.19 Remove the spring clip securing the flue hood to the flue and push the flue pipe upwards (fig. 48) and latch it in the flue to keep it out of the way.
- 2.20 Pull out the two fixing rods from the side of the flue hood (fig. 48). Gently lift the flue hood out.
- 2.21 Clean the heat exchanger with a suitable brush and the bar provided (the bar is located on the small heat exchanger air vent pipe, which is situated on the right hand side of the boiler, and is accessible when the combustion chamber outer cover has been removed).
- 2.22 If the domestic hot water rate is low, from underneath the appliance turn off the domestic water cocks and drain the domestic hot water by opening the drain plug (fig. 37).
From underneath the appliance undo the two unions and remove the flow switch valve (fig. 38) far enough to gain access to the filter which is on the inlet to the valve and the flow restrictor which is on the outlet (Take care not to lose the sealing washer at either connection of the flow control valve).
Clean or replace the filter if necessary.

3.0

3.1 Re-assemble the appliance in reverse order. Take care that:

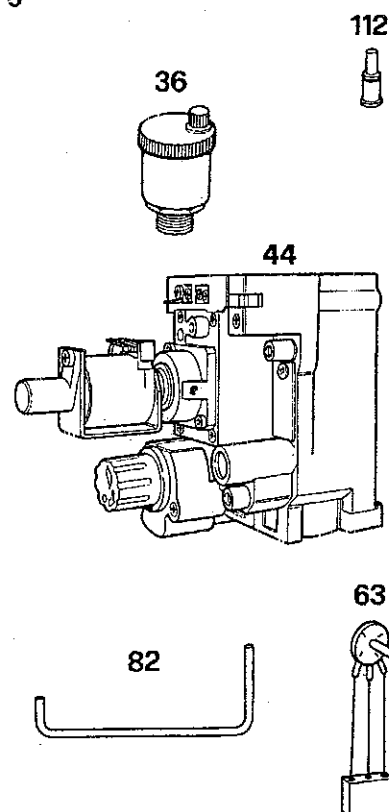
- a) Flow switch valve filter and restrictor are fitted correctly (fig. 38).
- b) Pilot injector is in position (fig. 35)
- c) Electrode is fully located (spark gap 2.5 mm +/- 0.5 mm).
- d) Thermocouple interrupter is correctly located in Honeywell valve (fig. 31).

Note - Always check for gas and water soundness of any joints broken during servicing.



Spare Parts List

Item No.	G.C. Part No.	Makers Part No	No. Off	DESCRIPTION
14	386816	800130	1	C.H. safety valve
16	372310	802180	1	Complete fan
21	372176	815850	4	Main injector (Natural Gas)
21		815870	4	Main injector (L.P.G.)
23	390210	801170	1	Thermocouple
24	386575	800280	1	Spark electrode
25	386586	800270	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
39	386829	801220	1	Cold water flow limiter
43	379351	800140	1	Air pressure switch
44	372544	800540	1	Combination gas valve
49	386815	801240	1	Overheat cut-off thermostat
50	386577	800160	1	Heat exchanger limit thermostat
52	386576	801000	1	D.H.W. limit thermostat
63	372224	801260	1	C.H. boiler thermostat
101	372306	802540	1	P.C.B. VMF6.1
112	386573	810570	1	Pilot injector (Natural Gas)
112	-	810660	1	Pilot injector (L.P.G.)
145	-	-	1	Pressure gauge
156	-	-	1	Piezo igniter



Domestic Hot Water Performance

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

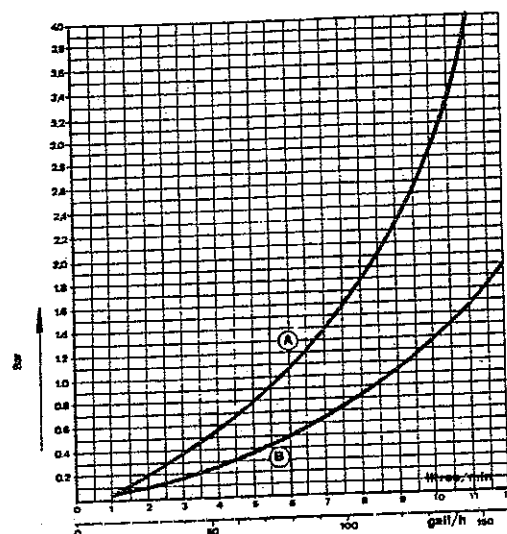


Fig. 1

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

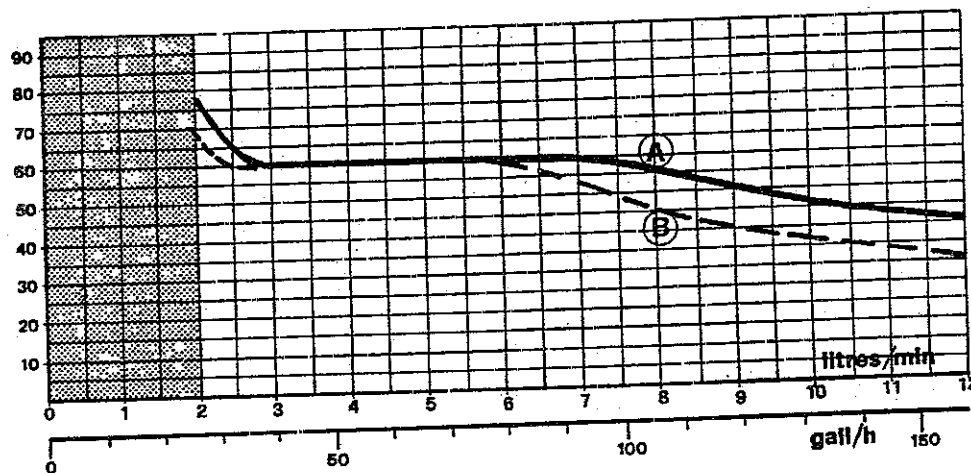


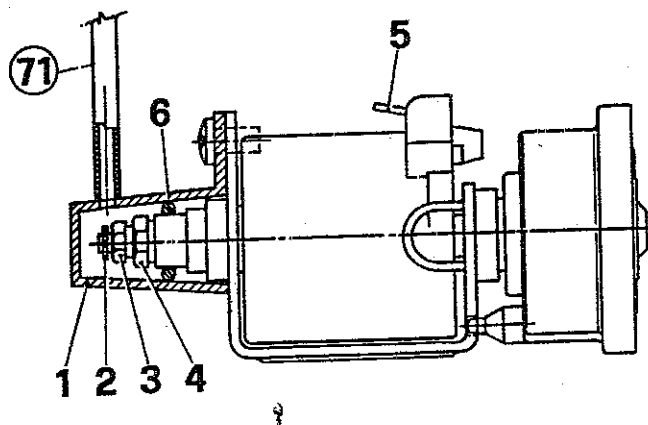
Fig. 2

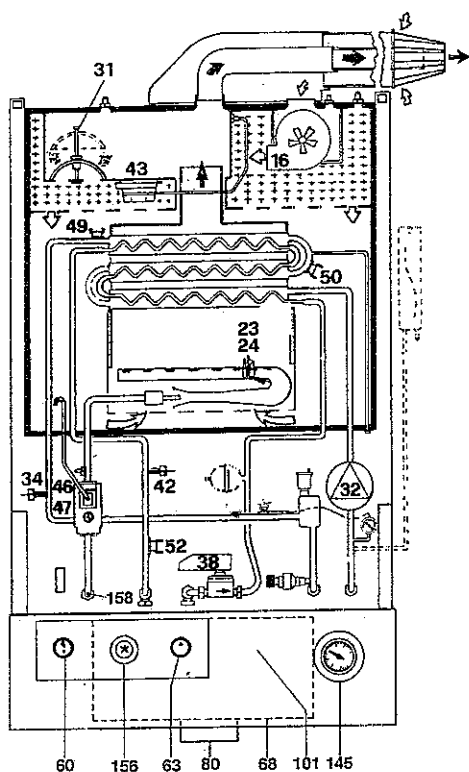
Modulating regulator (Modureg) of gas valve

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

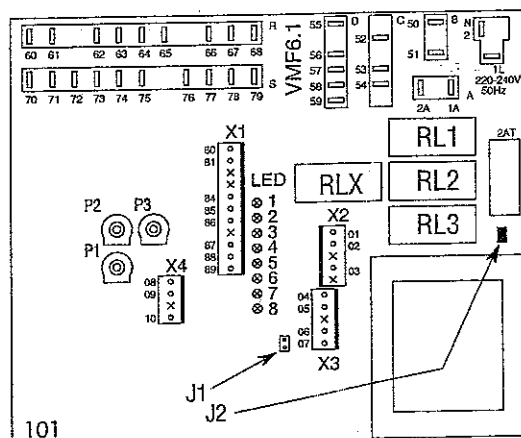
If necessary replace complete MODUREG

Pressure settings	Minimum		Maximum	
	mbar	inch WG	mbar	WG
Natural Gas	2.5	1.0	15.3	6.1
L.P.G.	7.5	3.0	30.0	12.0





- 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 C.H. limit thermostat
 - 52 D.H.W. limit thermostat
 - 60 Extended control knob gas valve
 - 63 C.H. boiler thermostat
 - 68 Control box with P.C.B.
 - 72 Room thermostat (not fitted)
 - 80 240V + 24V roomstat terminal blocks
 - 101 P.C.B.
 - 145 C.H. pressure gauge
 - 156 Piezo-igniter



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

J1 Is not required

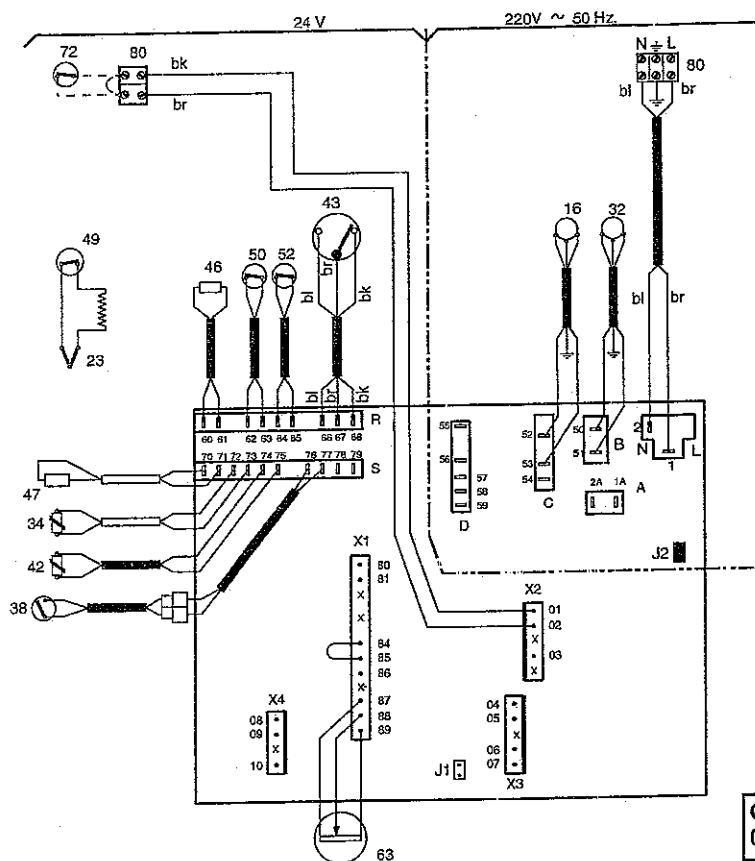
J2 Must be fitted

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)

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

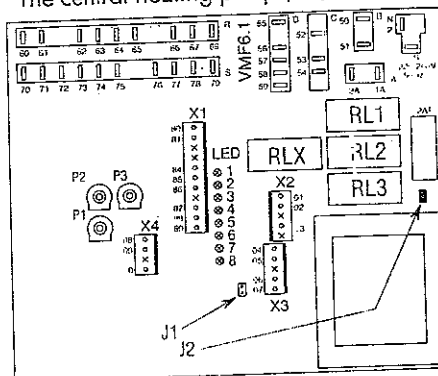
X4	a
DON'T CONNECT ANYTHING TO THIS CONNECTOR, THIS COULD DAMAGE THE P.C.B.	

X3	b	c	d
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 PRESSION C.H. CAN BE CHECKED/SET WITH P1

General Notes - For use on the *HAWK* fitted with VMF6.1 Printed Circuit Board

*The pilot light should 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



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

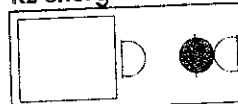
RELAYS

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.
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	
	RLX/RL2	energised	not energised	Air pressure switch (43) not in NC position or miswired: check wiring
				- fan (16) runs too fast at low speed
	7	1	0	- 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
				- air pressure switch (43) faulty
	8	1	0	- CH limit thermostat (50) open circuit (pump will run)
				- DHW limit thermostat (52) open circuit



ALL SPECIFICATIONS SUBJECT TO CHANGE

FÉRROLI HELPLINE
FOR SERVICE INFORMATION
OR HELP PLEASE TELEPHONE
08707 282 885
