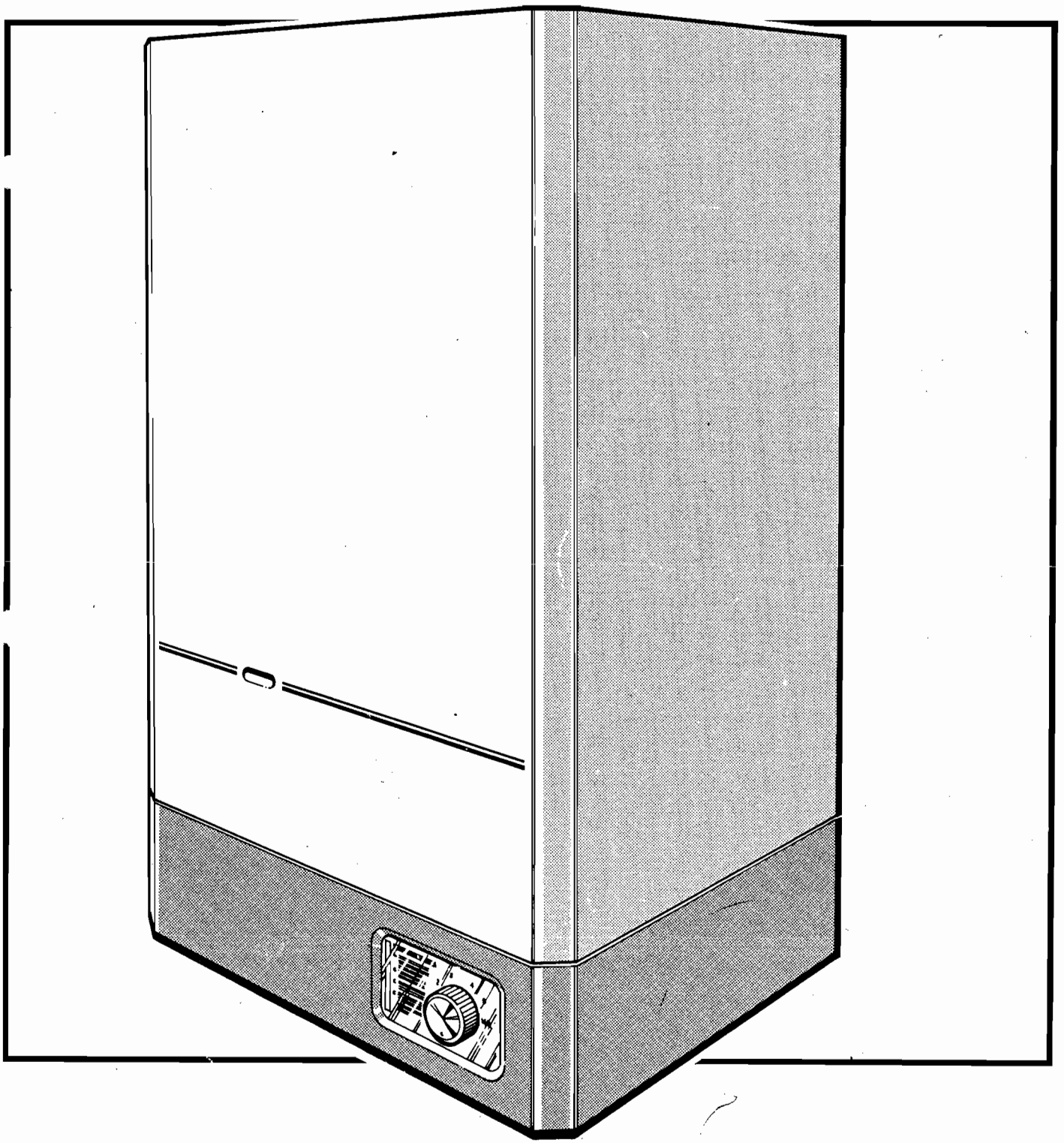
INSTALLATION AND SERVICING INSTRUCTIONS

HALSTEAD BENTLEY 30F, 40F, 50F & 60F WALL MOUNTED FAN ASSISTED CAST IRON BALANCED FLUE BOILER



To be left with the user - adjacent to the gas meter.

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1 INSTALLATION

1.1 INTRODUCTION

The Halstead Bentley 30F, 40F, 50F & 60F, are wall mounted, fan assisted balanced flue natural gas boilers incorporating a cast iron heat exhanger.

These appliances may be used either on fully pumped systems or systems utilising gravity DHW and pumped CH.

The flue outlet may be from the rear or either side to the boiler, and with the appropriate extension duct kits can be used for wall thicknesses up to **2.2 metres.**

Note: *Due to the limited size of the opening in the top of the boiler casing it is not possible to run both gravity and pumped pipes in the more restricted RH flue installation. However, gravity DHW can be installed with either LH or rear flue applications.*

Each model is range rated and may therefore be adjusted to suit system requirements. (Refer to section 1.2 for performance data). Upon leaving the factory each appliance is set to its middle rating.

1.2 TECHNICAL DATA

PERFORMANCE DATA

HEAT OUTPUT	**30F**	**40F**	**50F**	**60F**
MAX KW	8.79	11.72	14.65	17.58
BTU/HR	30000	40000	50000	60000
MID KW	7.33	10.26	13.19	16.12
BTU/HR	25000	35000	45000	55000
MIN KW	5.86	8.79	11.72	14.65
BUT/HR	20000	30000	40000	50000
HEAT INPUT				
MAX KW	11.34	15.12	18.78	22.40
BTU/HR	38692	51930	64080	76433
MID KW	9.58	13.41	17.06	20.94
BTU/HR	32687	45754	58220	71430
MIN KW	7.76	11.72	15.32	19.03
BTU/HR	26477	39988	52270	64940
BURNER SETTING PRESSURE				
MAX mbar	15.0	14.5	13.9	13.4
in.wg	6.0	5.8	5.6	5.4
MID mbar	10.3	11.6	11.6	11.7
in.wg	4.14	4.6	4.6	4.7
MIN mbar	7.0	8.7	9.3	9.8
in.wg	2.8	3.5	3.7	3.9

GENERAL DATA	**30F**	**40F**	**50F**	**60F**
Burner injector	2.6mm	3.0mm	3.4mm	3.8mm
Water capacity (litres)	2.2	2.2	2.7	2.7
Minimum water flow	0.19 l/s	0.25 l/s	0.32 l/s	0.38 l/s
Minimum static head	1 metre (3.3ft) all models			
Maximum static head	30 metre (100ft) all models			
Thermostat setting	60-82°C all models			
Empty weight kg (lb)	52.8 (118)	52.8 (118)	64 (144)	64 (144)
Flue size	100mm diameter all models			
Electrical supply	240 V at 50 Hz, fused at 3 amps all models			
Power consumption	35 Watts all models			
Gas consumption M^3/hr (ft^3/hr)	1.05 (37)	1.41 (50)	1.73 (61)	2.08 (73)
Gas connection	Rc ½ (½ inch BSP internal)			
Water connections	3* RC1 (1 inch BSP internal) with adaptors for 22mm copper connections			

1.3 GENERAL NOTES

IMPORTANT: These appliances are for use on NATURAL GAS ONLY.
It is important that the boiler should be installed strictly in accordance with these instructions, the installer must pay particular attention to the following points:

a) The boiler is not suitable for external installation.

b) An indirect cylinder, not of the self priming type must be used for the provision of hot water.

c) The system must be thoroughly flushed.

d) The system must be vented before firing the boiler.

e) Correct balancing of the system is important.

The boiler must be installed by a competent person and the installation must be in accordance with the relevant requirements of the current Gas Safety (installation and use) Regulations, 1984, al building regulations including the building Standards (Scotland) Regulations and by-laws of the local water undertaking. The electrical wiring must be in accordance with current IEE regulations.

The method of connection to the mains electrical supply must facilitate complete isolation of the boiler, preferably by the use of a fused 3 pin plug and shuttered socket outlet. Alternatively a fused double pole switch, having a 3mm contact separation in both poles, and serving only the boiler may be used.
Detailed recommendations are in the following British Standards codes of practice and British Gas publications: BS 6891: 1988, BS 6798: 1987, BS 5449: 1990, BS 5446: 1990, BS 5440: Pt. 1 1990, BS 5440: Pt. 2 1989. Guide to gas installation in timber framed housing, British Gas Publication DM2.

The gas pipework to the boiler must be of adequate size and no smaller than the boiler inlet connection.

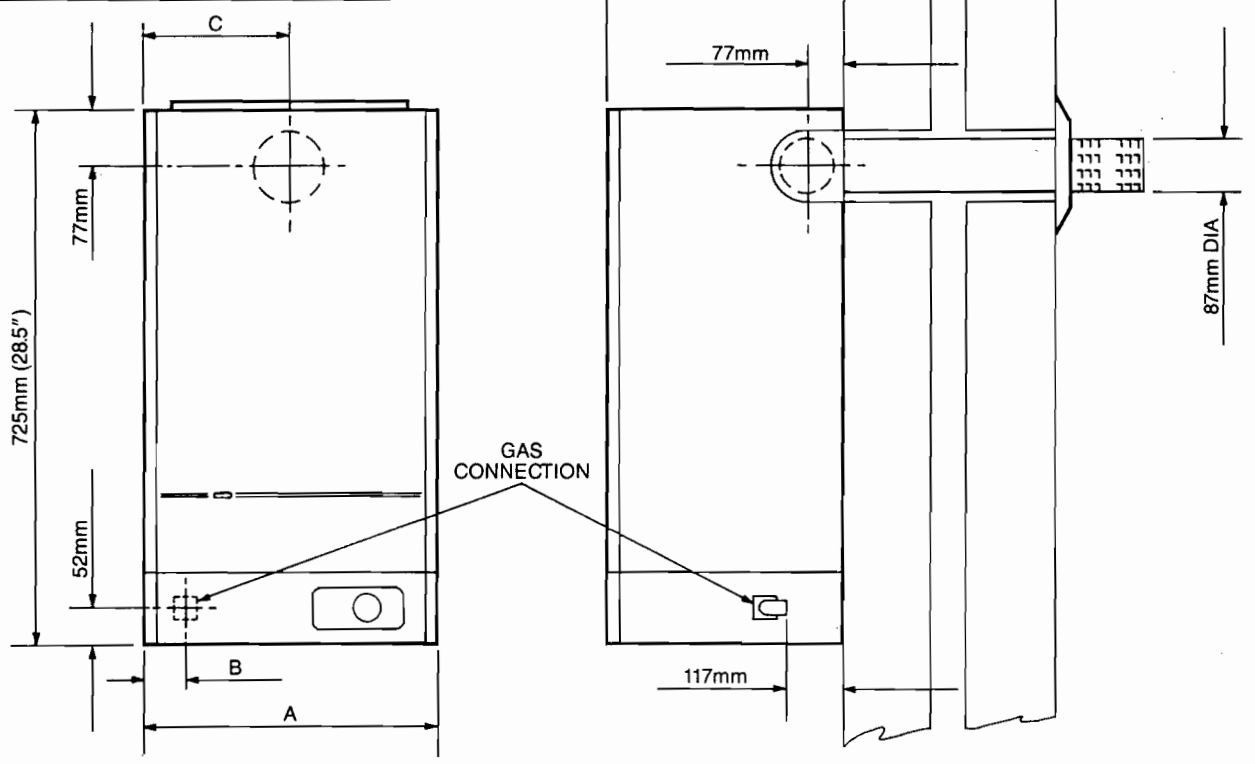
The installation must be tested for gas soundness as described in the above codes.

1.4 CLEARANCES REQUIRED

The boiler should be positioned giving the minimum clearances shown in Fig 2. If the boiler is to be positioned in an unusual location, attention should be paid to BS 5376: Pt. 2 1976 which gives guidance, and British Gas Publication Guide to Gas Installation in timber framed housing, reference DM2. The boiler can be installed onto a combustible wall.

OVERALL APPLIANCE DIMENSIONS

	30F/40F	50F/60F
Dimension A	400mm (15.75")	500mm (19.75")
Dimension B	30mm (1.18")	80mm (3.15")
Dimension C	205mm (8.10")	255mm (10.04")



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MAXIMUM WALL THICKNESS 30F/40F

Standard flue kit:	
Rear Outlet	670mm (26.35")
LHS Outlet	640mm(25.20")
RHS Outlet	600mm (23.62")

Standard flue plus one extension duct kit:	
Rear Outlet	1490mm (58.66")
LHS Outlet	1460mm (57.50")
RHS Outlet	1420mm (55.90")

Standard flue plus two extension duct kits:	
Rear Outlet	2200mm (86.61")
LHS Outlet	2150mm (84.65")
RHS Outlet	2100mm (82.68")

MAXIMUM WALL THICKNESS 50F/60F

Standard flue kit:	
Rear Outlet	670mm (26.35")
LHS Outlet	590mm(23.23")
RHS Outlet	550mm (21.65")

Standard flue plus one extension duct kit:	
Rear Outlet	1490mm (58.66")
LHS Outlet	1410mm (55.50")
RHS Outlet	1570mm (61.81")

Standard flue plus two extension duct kits:	
Rear Outlet	2200mm (86.61")
LHS Outlet	2150mm (84.65")
RHS Outlet	2100mm (82.68")

MINIMUM AREA REQUIREMENTS CM^2 (in^2) FOR COMPARTMENT AIR VENTS

	Air from another room		Air direct from outside	
	High level	Low level	High level	Low level
30F	99 (16)	99 (16)	50 (8)	50 (8)
40F	148 (23)	148 (23)	72 (11.5)	72 (11.5)
50F	184 (28)	184 (28)	92 (14)	92 (14)
60F	195 (30)	195 (30)	97 (15)	97 (14)

1.5 VENTILATION REQUIREMENTS

If the boiler is to be installed in a compartment or cupboard the following requirements must be satisfied:

1 The inside lining should be non combustible and the door must have a fire resistance at least equal to that of the compartment walls.

2 The compartment must be large enough to allow the boiler to be inspected and serviced, however, it should not be made too large to discourage the possibility of it being used for storage. The door should be made large enough to allow any ancillary equipment to be removed from compartment.

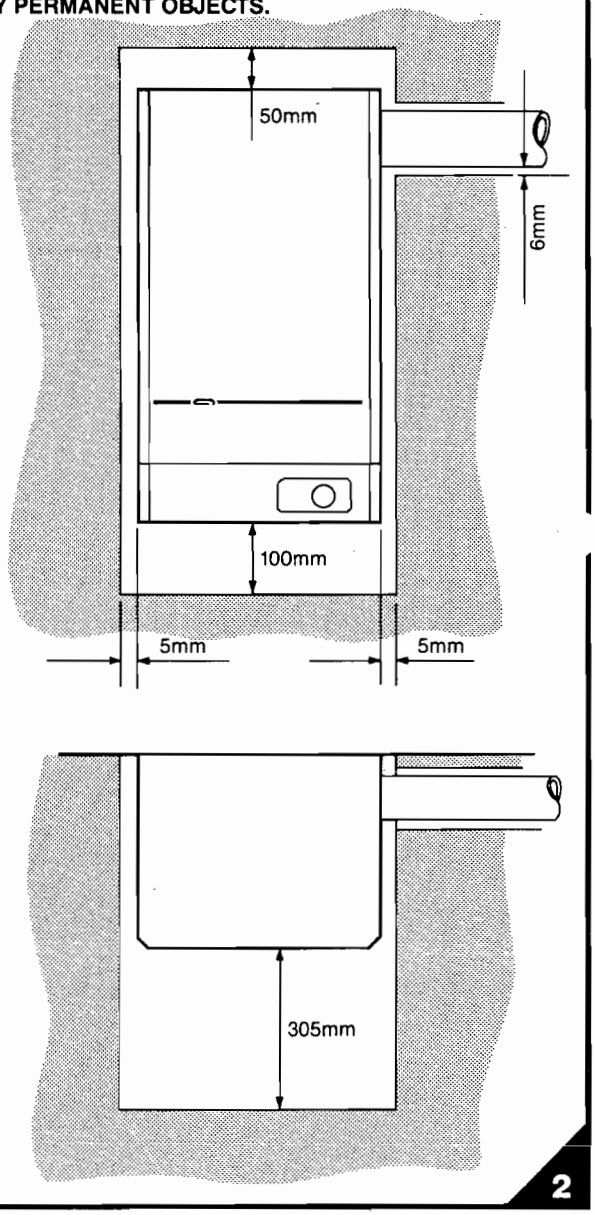
3 Permanent openings at high and low level must be provided in the compartment to allow adequate air for ventilation. See table, areas given in sq. cm and sq. in. (brackets).

4 Fire Precaution:
The air inlet and products outlet duct and the terminal of this boiler must not be closer than 25mm (1") to combustible material. Detailed recommendations on protection of combustible materials are given in BS 5440: Pt. 1 1990.

1.6 BOILER POSITION

The boiler can be installed on a party wall or external wall, using either a side or rear flue position as appropriate. Up to two extension duct kits may be used to accommodate wall thicknesses not exceeding **2.2 metres.**

MINIMUM BUILT-IN DISTANCES FROM WALLS, FLOORS, CEILINGS, WORKTOPS, CUPBOARDS AND ANY PERMANENT OBJECTS.



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1.7 SITING OF THE TERMINAL

The boiler must be installed so that the terminal is exposed to the outside air and its position allows air to pass freely across the terminal at all times.

Avoid positions where the terminal is adjacent to projections, particularly under a balcony, immediately adjacent to a drainpipe or immediately inside a re-entrant position. Fig 3 gives minimum dimensions from the terminal.

If the boiler is fitted under a window (or under a ventilator) and this window is openable, no part of the opening shall be within 0.3m (1ft) of the nearest part of the terminal.

It is normal for the flue gases to be seen as a white vapour particularly when the external temperature is low. Consideration should be given to the siting of the terminal where this may cause a nuisance.

It the flue terminal is to be installed so that it is 2m (6.6ft) or less from any ground, balcony or flat roof or place to which any person has access and which adjoins the walls in which the outlet is situated, a terminal guard must be fitted to the outside wall. Guards are available from Tower Flue Components Ltd. (Tel: 0732 351555). A type K2 is suitable for this boiler.

The terminal guard should be fixed to the wall with 4, 1" No. 10 screws. Ensure that the guard is placed asymmetrically over the terminal.

If the terminal is fitted within 850mm (34") of a plastic or painted gutter or 450mm (18") of painted eaves an aluminium shield of at least 750mm (30") long should be fitted to the underside of the gutter or painted surface.

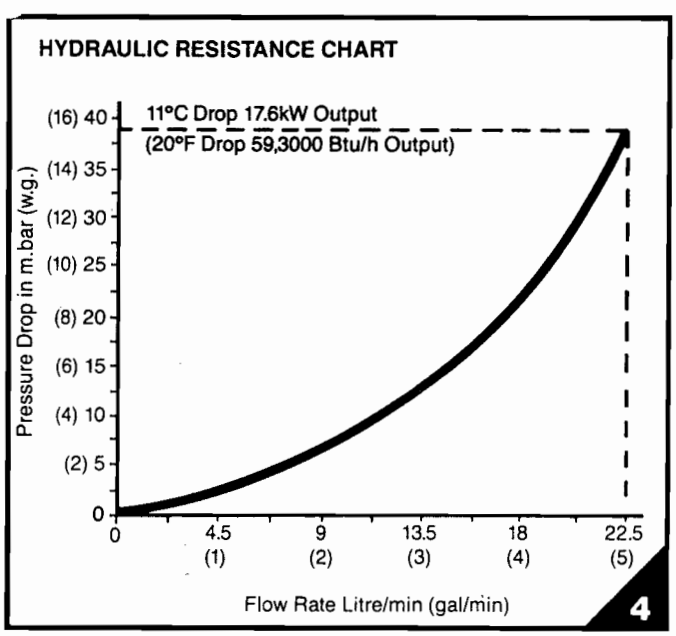
Detailed recommendations on protection of combustible materials will be found in BS 5440 Pt. 1 1990.

1.8 WATER SYSTEMS

The boiler must NOT be used for direct hot water supply. The hot water cylinder must be of the fully indirect (double feed) type. Self priming (single feed) cylinders MUST NOT BE USED.

The boiler is supplied complete with all fittings necessary for use with copper tubing to BS 2871 on fully pumped systems. It is important that the appropriate fittings are correctly used. Refer to section 2.6 for details.

Drain off cocks must be fitted at the lowest points of the system.



1.8.1 FULLY PUMPED SYSTEMS

An open vent pipe of 22mm diameter must be fitted in the boiler flow and terminated above the cold feed, discharging into the expansion cistern. The open vent must rise continuously from its connection with the system.

The expansion cistern should not have a smaller capacity than 22 litres (5 gallons).

The cold feed should be of 15mm minimum diameter.

The expansion cistern should have a lid to prevent evaporation loss.

The cistern must not be higher than 30m (100ft) above the boiler, or less than 1m (39").

1.8.2 COMBINED PUMPED CH & GRAVITY DHW SYSTEMS

The injector tee must be used for gravity DHW systems.

Note: *Due to the limited size of the opening in the top of the boiler casing it is not possible to run both gravity and pumped pipes in the more restricted RH flue installation. However, gravity DHW can be installed with either LH or rear flue applications.*

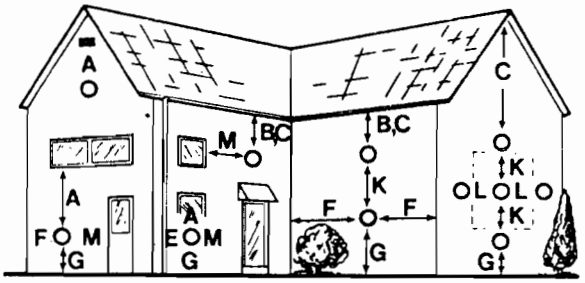
1.8.3 SEALED SYSTEMS

An optional sealed system kit is available to allow the use of this appliance on sealed systems.

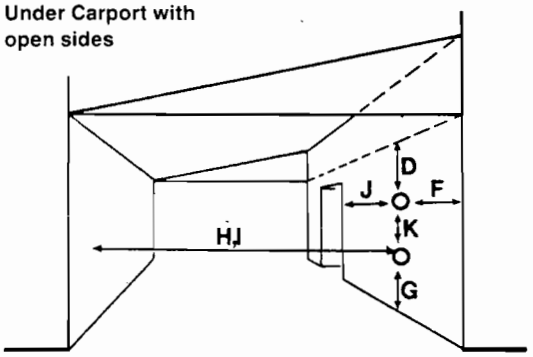
Full details of sealed system requirements and instructions are contained within the option kit.

The boiler must not be used on sealed systems unless the sealed system kit is fitted.

POSITION OF FLUE TERMINAL



Under Carport with open sides



	Terminal Position	Minimum Spacing	
A	Directly below an openable window, air vent or any other ventilation opening	300mm	(12in)
B	Below guttering, drain pipes or soil pipes	25mm	(1in)
C/D	Below eaves, balconies or carport roof	25mm	(1in)
E	From vertical drain pipes or soil pipes	25mm	(1in)
F	From internal or external corners	25mm	(1in)
G	Above adjacent ground, roof or balcony level	300mm	(12in)
H	From a surface facing the terminal	600mm	(24in)
I	From a terminal facing the terminal	1200mm	(48in)
J	From an opening in the car-port (eg door, window) into dwelling)	1200mm	(48in)
K	Vertically from a terminal on the same wall	1500mm	(60in)
L	Horizontally from a terminal on the same wall	300mm	(12in)
M	Adjacent to opening	150mm	(6in)

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2 INSTALLING THE

The appliance can be installed from inside the room. It is not necessary to access the terminal except to fit a terminal guard, where necessary (Section 1.7).

2.1 UNPACKING THE BOILER

The boiler is supplied attached to the wall hanging bracket which in turn is attached to the pallet by four securing bolts. Remove the boiler carton and top cap by cutting both packing straps. Inside the packing are a wall mounting template and a hardware pack.

The hardware pack consists of the following items:
a) 4 10mm rawplugs
b) 4 Hexagon headed screws
c) 1 Water spreader/1"-22m compression fitting
d) 1 1"-22mm compression adaptor
e) 1 1" black iron plug
f) 1 Flue spigot
g) 1 Air spigot
h) 4 Self tapping screws

1 To remove the boiler casing the lower plinth cover must first be removed by unscrewing the single M5 fixing screw on the underside and sliding the cover forwards clear of the casin

2 Unscrew the four case retaining screws (M5), two situated on the boiler top panel and two on the underside at the rear. Lift the casing clear of the boiler.

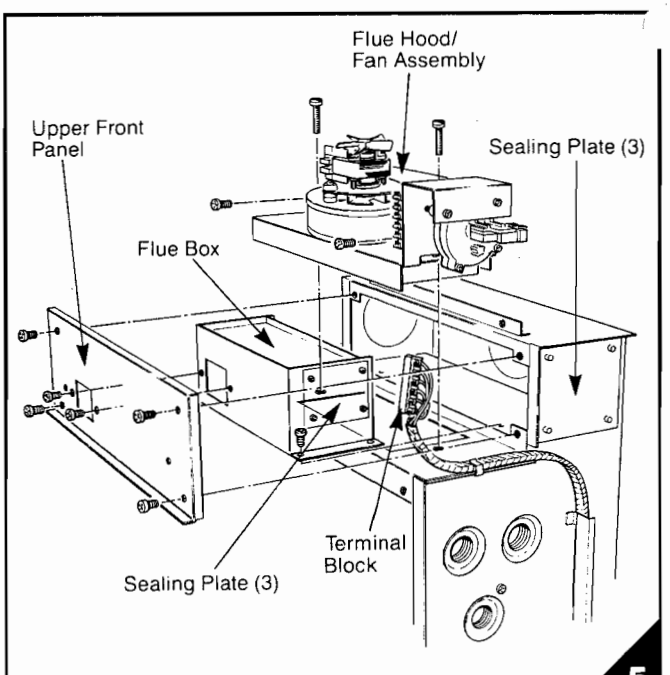
3 Remove the boiler from the mounting bracket by unscrewing the two M8 securing bolts situated on either side of the main boiler housing.

4 Remove the mounting bracket from the pallet by unscrewing the four securing bolts.

2.2 FIXING THE WALL MOUNTING BRACKET

1 Determine the position of the boiler with reference to section 1.6 & 1.7.

2 Open the paper wall mounting template and fold along the dotted lines.



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3 Secure the template in the desired position and mark the position of the fixings and the flue/air duct as appropriate for LH, RH, or rear flue application.

Note: *The minimum clearances are included on the wall template and the sides of the template (once folded) may be pushed fully up to any side wall.*

4 Remove the template and drill 4 holes with a 10mm masonry bit and insert the plastic plugs provided. (Alternate fixings should be used if the drilled holes are not sound.)

5 Cut the hole in the wall for the flue/air duct, using a 130mm (5") core drill.

Note: *If access is available to the outside of the terminal a 100mm (4") core drill may be used provided a wall liner is not necessary for timber framed building installation.*

6 Fix the wall mounting bracket in position using the rawbolts provided.

2.3 PREPARING THE APPLIANCE FOR INSTALLATION

1 Disconnect the terminal block situated behind the pressure switch by pulling the rear half towards the wall. (Fig 5).

2 Unscrew and remove the 4 screws retaining the collector hood and fan assembly. (Fig 5) Remove the collector hood assembly by sliding forwards to disengage the fan.

3 Unscrew and remove the 6 screws retaining the upper front panel. Remove the upper front panel.

4 Unscrew and remove the two M5 screws retaining the flue box and remove the flue box.

2.4 FLUE & AIR BOX PREPARATION

The air and flue boxes are each fitted with 3 sealing plates and gaskets. Depending on the direction of the flue, remove the appropriate sealing plates from both air and flue boxes taking care not to damage the gaskets which will be used for sealing the spigots in place later in the installation. Discard the two sealing plates which have no further use. The flue and air spigots are supplied seperately in the hardware pack. Do not fit these yet.

Note: *The flue spigots incorporate a restrictor plate which is different for all 4 models. The model no. is stamped on the corner of the spigot assembly. Under no circumstances should an incorrect restrictor be used.*

SPIGOT RESTRICTOR SIZES				
Model	30F	40F	50F	60F
Stamped	30	40	50	60
Diameter (mm)	30	38	42	58.5

REAR FLUE OUTLET

2.4.1 FLUE AND AIR DUCT PREPARATION

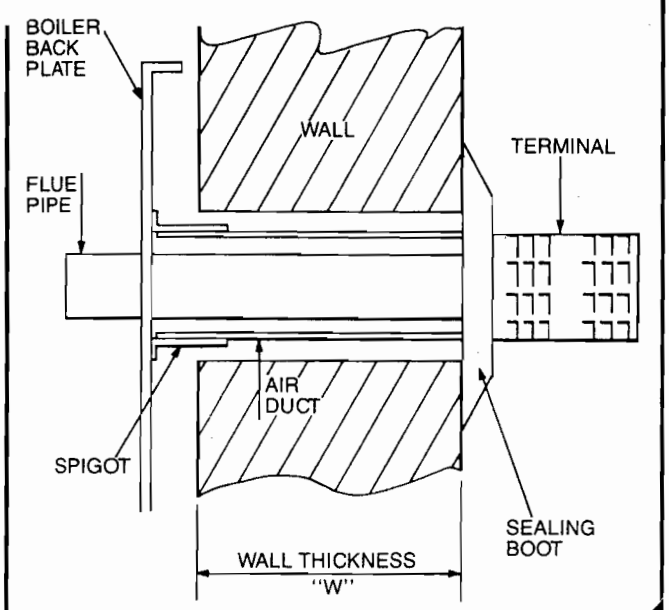
1 With reference to Fig 6 which shows a sectional view of the flue/air duct assembly, accurately measure the wall thickness "W".

2 **SIZING THE AIR DUCT:**
Measuring the total length of the air duct (the larger dia tube) as shown in Fig 7, cut the duct down from the plain end to length "A" where:

Length "A" = "W" + 29mm (1.2")

This ensures that the air duct will protrude correctly through the wall as shown in Fig 6.

SECTIONAL VIEW OF FLUE/AIR DUCT ASSEMBLY



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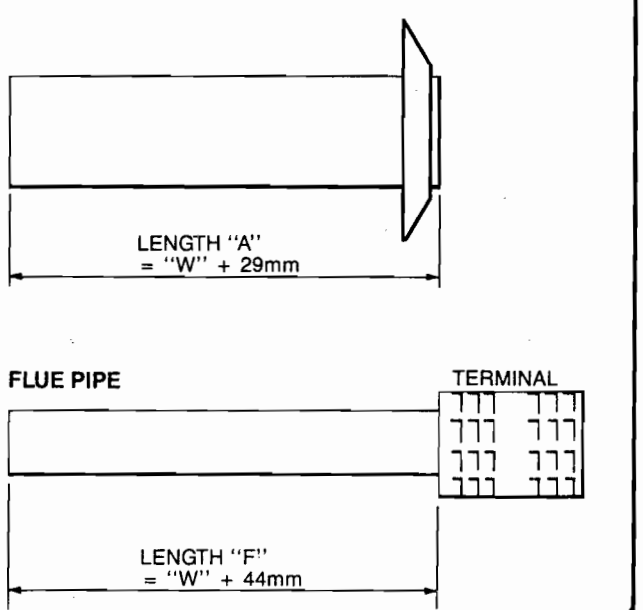
AIR DUCT



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3 **SIZING THE FLUE DUCT:**
Measuring from the end of the terminal as shown in Fig 7 cut the flue pipe to length "F" where:

Length "F" = "W" + 44mm (1.7")

4 Slide the air and flue tubes fully home onto the two spigots provided in the hardware pack. Drill two 3mm fixing holes in each tube using the spigots as templates. Fix the spigots to the tubes using the 4 self tapping screws supplied in the hardware pack.

2.4.2 INSTALLING THE APPLIANCE

Note: *If an extension duct is to be fitted, follow the following instructions in conjunction with the extension duct installation instructions contained within the kit.*

1 Fit the external rubber wall seal flange over the air duct at the swaged end, ensuring that it is the correct way around. See Fig 8.

2 Push the air duct complete with seal into the wall from the inside the building (Boot end first!) until the rubber sealing flange passes outside the wall and is felt to open. (Fig 8)

Note: *If a 4" core drill has been used then the sealing boot is assembled onto the air tube from outside the building.*

3 Pull the air duct assembly back towards the room until resistance is felt, when the spigot is approximately flush with the inside of the wall.

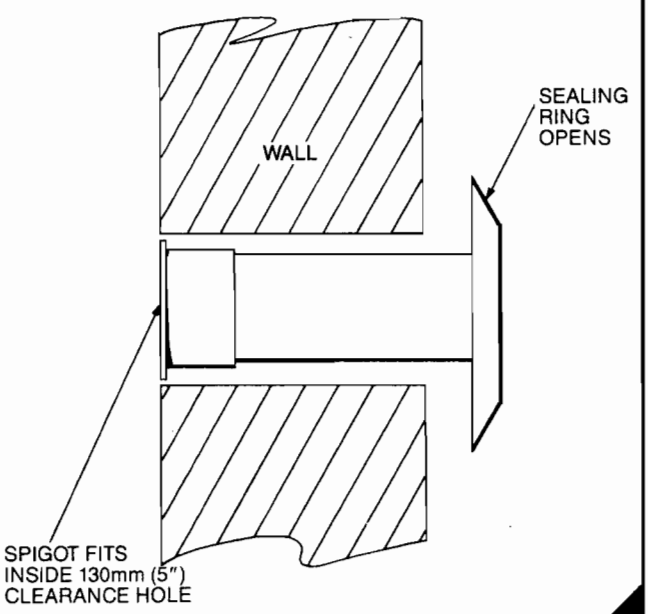
4 Lift boiler into position. Ensure that the boiler chassis is correctly fixed onto the mounting bracket with the two M8 bolts located at the top and the lower edge resting on the bracket at the bottom.

Note: *If no assistance is avaialbe it is advisable to remove the heat exchanger which will half the lift weight. See "Repalcement of Parts" Section 7.*

5 Secure the boiler to the mounting bracket by screwing up the two M8 bolts.

6 Working from inside the air box, align and attach the air duct spigot to the boiler back panel using the gasket and screws obtained by the previous removal of the sealing plate. Pull the spigot back to the boiler back ensuring a good seal. The rubber sealing boot will simultaneously form a seal to the outside wall.

DIAGRAM SHOWING AIR DUCT INSIDE WALL



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7 Attach the flue duct complete with spigot onto the flue box using the 4 screws and gasket obtained by the previous removal of the sealing plate.

8 Slide the flue and flue box into the air duct. Secure the flue box to the boiler body using the 2 M5 fixing screws shown in fig 5.

2.5 SIDE FLUE OUTLET

2.5.1 FLUE AND AIR DUCT PREPARATION

Note: *If an extension duct is to be fitted, follow the following instructions in conjunction with the extension duct installation instructions contained within the kit.*

1 With reference to fig 9 accurately measure the wall thickness "W", and the clearance "C" between the outside of the boiler casing and the inner wall face. The position of the outer casing can be found directly from the handed template.

2 **SIZING THE AIR DUCT:**
Measuring the total length of the air duct (the larger dia tube) shown in fig 10, cut the air duct down (from the plain end) to length "A" where:

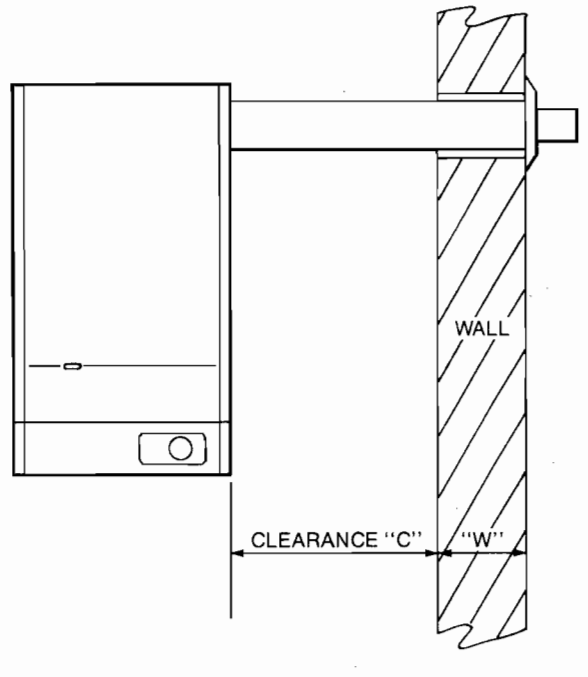
Length "A" = "W" + "C" + "E"

Dimension "E" is found from the table below.

AIR DUCT DIMENSION "E"		
Model	**30F/40F**	**50F/60F**
RH Flue	91mm (3.6")	91mm (3.6")
LH Flue	51mm (2")	51mm (2")

This ensures that the air duct will protrude correctly through the wall.

R.H. FLUE OUTLET SHOWN



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3 **SIZING THE FLUE DUCT:**
Measuring from the end of the terminal as shown in fig 10 cut the flue pipe to lenght "F" where:

Lenght "F" = "W" + "C" + "E"

Dimension "E" is found from the tabel below.

FLUE DUCT DIMENSION "E"		
Model	**30F/40F**	**50F/60F**
RH Flue	116mm (4.6")	166mm (6.5")
LH Flue	76mm (3")	126mm (5")

4 Slide the air tube fully home into the spigot provided in the hardware pack. Drill two 3mm fixing holes in the air duct tube using the spigot as a template. Fix the spigot to the tube using two self tapping screws supplied in the hardware pack.

5 Slide the flue tube fully home onto the spigot provided in the hardware pack. Drill one 3mm fixing hole in the flue tube using the spigot as a template. Do not fix the tube to the spigot.

2.5.2 INSTALLING THE APPLIANCE

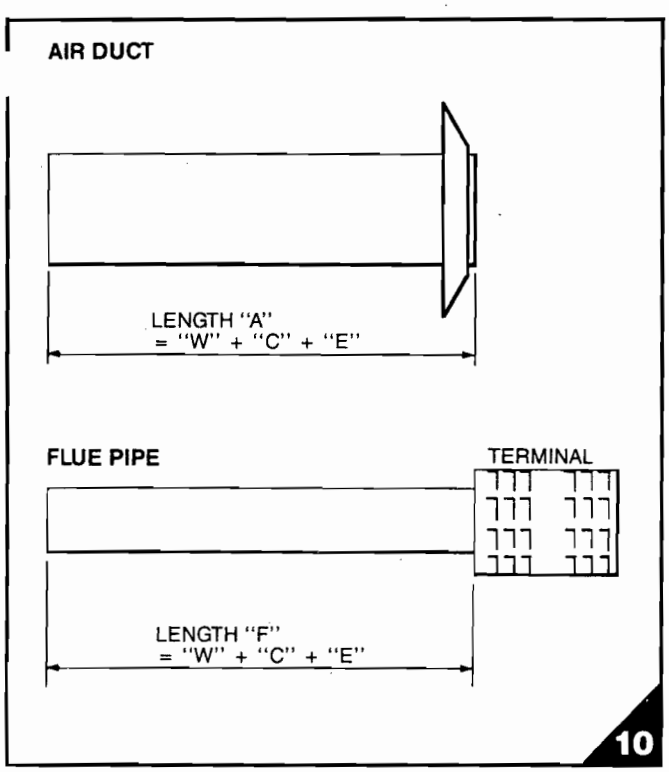
1 Fit the rubber wall sealing flange over the air duct at the swaged end, ensuring that it is the correct way round. See fig 8.

2 Push the air duct complete with sealing flange into the wall from the inside the building (boot end first!) until the rubber sealing flange passes outside the wall and is felt to open. (Fig 8).

Note: *If a 4" core drill has been used then the sealing boot is assembled onto the air tube from outside the building.*

3 Attach the flue spigot to the flue box using the gasket and screws obtained by the previous removal of the sealing plate.

4 Push the flue duct into the air duct and leave both ducts positioned protruding through the wall where they will not interfer with lifting the boiler onto the wall.



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5 Lift the boiler into position. Ensure that the boiler chassis is correctly positioned onto the mounting bracket with the two M8 bolts located at the top and the lower edge resting on the bracket at the bottom.

Note: *If no assistance is available it is advisable to remove the heat exchanger which will half the lift weight See "Replacement of parts" Section 7.*

6 Secure the boiler to the mounting bracket by screwing up the two M8 bolts.

7 Working from inside the air box align and attach the air duct spigot to the air box using the gasket and screws obtained by the previous removal of the sealing plate. Ensure a good seal is obtained. The rubber sealing boot will simultaneously form a seal on the outside wall.

8 Fit the flue box (fig 5) into the air box at the side of the flue pipe, and slide the flue box spigot over the protruding flue pipe. Use a single self tapping screw to attach the flue pipe to the spigot.

9 Secure the flue box to the boiler body using the two M5 fixing screws shown in fig 5.

10 Reassemble the items removed in steps 2, 3, and 4 (Section 2.3) in reverse order, ensuring a good seal at all joints.

11 Prepare the white casing for fitting by removing the "knockout" on the appropriate side with tin snips. Take great care not to damage the casing. Do not fit the casing until installation is complete.

2.6 CONNECTING TO THE GAS SUPPLY

The gas inlet connection is situated at the bottom left hand rear of the appliance (fig 1) and is Rc ½ (½" BSP). The gas supply pipe should be brought vertically upwards, close to the wall, with 90° elbow and pipe stub to make the connection.

The meter and installation pipe should be of sufficient size to carry the maximum boiler input plus the demand of any other installed appliance. BS 6891: 1988.

The gas required for the boiler is as follows:

30F	1.05 M^3/hr	(37 FT^3/hr)
40F	1.41 M^3/hr	(50 FT^3/hr)
50F	1.73 M^3/hr	(61 FT^3/hr)
60F	2.08 M^3/hr	(73 FT^3/hr)

The govenor at the meter must give a constant outlet pressure of 20 mbar (8.0" wg).

The gas supply line should be purged.
Warning: *Before lighting open all doors and windows, also extinguish any cigarettes, pipes, and any other naked lights.*

The complete installation must be tested for gas soundness.

2.7 WATER CONNECTIONS

The boiler has 3 Rc1 (1" BSPT) tappings situated on the right hand side of the sealed boiler body.

FULLY PUMPED CH & DHW SYSTEMS
Fittings are supplied in the hardware pack and should be used as follows: (With suitable jointing compound where appropriate) (Fig 11).

1 Fit the 1"-22mm compression adaptor with the water spreader into the bottom tapping, taking care not to use excessive jointing compound which may obstruct the holes in the spreader.

2 Fit the straight 1"-22mm compression adaptor into either of the top two tappings and plug the other tapping with the 1" black iron plug. Fit 22mm "street" elbows into the adaptors in preparation for the pipework.

3 If the appliance is to be used on a sealed system, the optional "sealed system kit" is necessary, and should be fitted at this stage. Refer to the separate instructions contained within the kit.

4 Install the pipework ensuring that it will pass through the openings in the casing. Note that for a RH flue, vertical rising pipes must pass in front of the flue. Pipework should be of an adequate size for the boiler and system. 22mm for all models.

PUMPED CH & GRAVITY DHW SYSTEMS

Note: *For gravity hot water circulaton, a minimum size of 28mm pipe should be used to supply the indirect cylinder.*

A DHW gravity injector tee is supplied. The boiler cannot be used on gravity DHW systems unless the tee is fitted.

The injector tee should be used in conjunction with the items supplied in the hardware pack.

1 Fit the 1"-22mm compression adaptor complete with water spreader into the bottom tapping, taking care not to use excessive jointing compound which may obstruct the holes in the spreader.

2 Fit the 22mm street elbow and special 22/28mm "T" adaptor into the compression adaptor. See fig 12.

3 Fit the1" x 22mm and a 1" x 28mm straight compression adaptors to the top two tappings.

4 Install the pipework ensuring that it will pass through the opening in the casing.

Note: *It is not possible to install a gravity circulated hot water system if the boiler is installed with a right hand side flue.*

2.8 WIRING INSTRUCTIONS

THIS APPLIANCE MUST BE EARTHED.
(Failure to do so may result in appliance malfunction).

The mains cable must be at least 0.75mm (20/.2mm to BS 6500 table 16.)

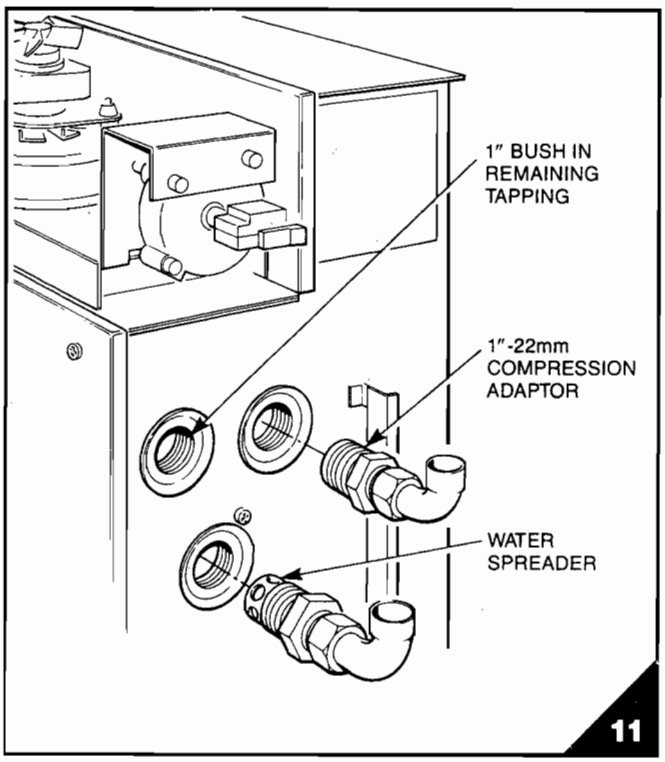
1 Remove the single screw retaining the control box and slide the box forwards to reveal the terminal block. (fig 15)

2 Pass the mains cable from the external controls or wiring centre through one of the spare grommets on the rear of the control box and the cable clamp. Connect the wires to L (terminal 12), N (terminal 11), and E (terminal 10). Ensure that the earth wire (G/Y) is longer than the live and neutral wires.

3 If desired, the pump may be also wired directly to terminals 12, 11, and 10, and the wire secrued in the cable clamp. This facility is optional and should only be used where this is more convenient than wiring the pump to another point in the system.

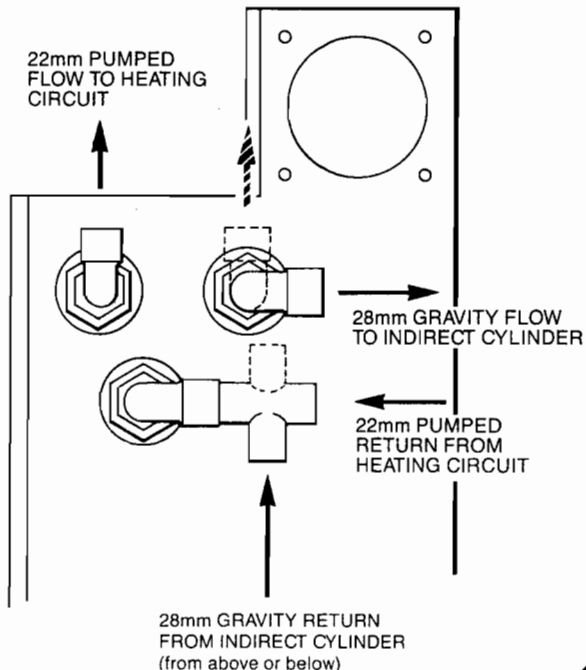
4 Slide and secure the control box back into position and neatly coil the excess wire behind the box. It is important to leave sufficient cable to ensure the control draw opens fully.

See wiring diagrams for typical installations. Figs 13, 14 & 14



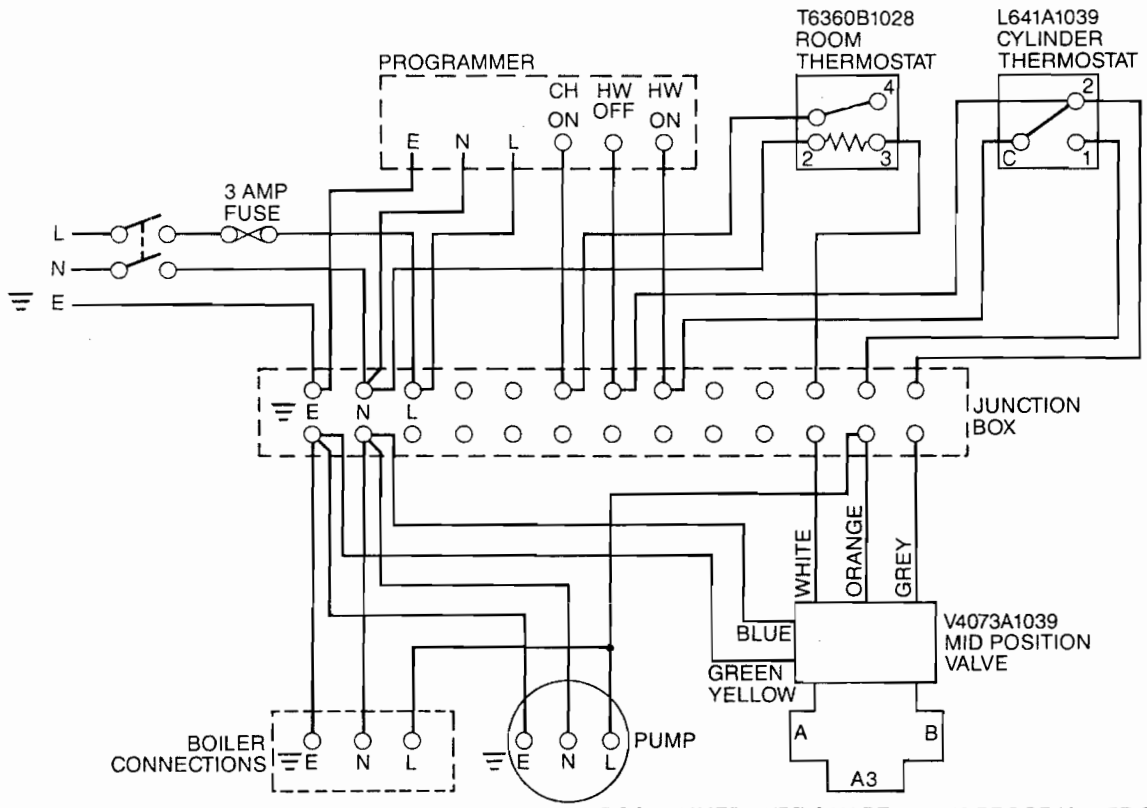
11

PUMPED CH AND GRAVITY DHW CONNECTIONS



12

TYPICAL WIRING LAYOUT FOR A FULLY PUMPED SYSTEM USING A MID POSITION VALVE HONEYWELL 'Y' PLAN

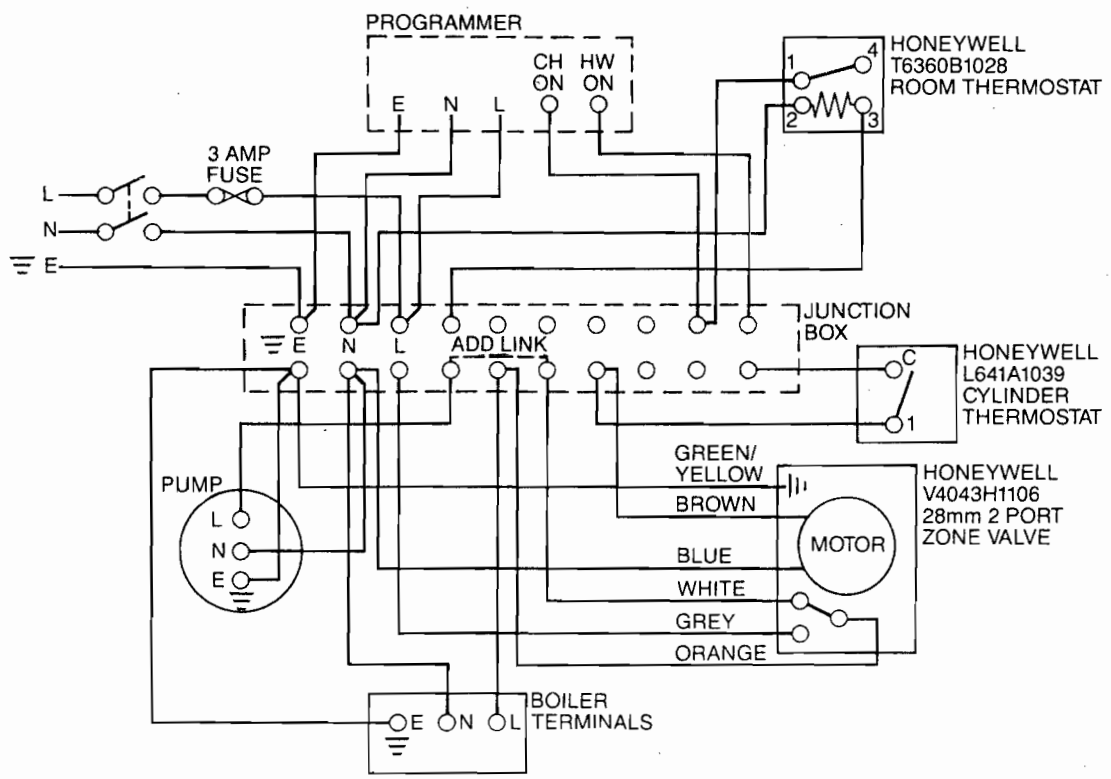


PROGRAMMER TYPE CAN BE 10 or 16 PROGRAMMER STYLE
EG ST6200 MINI PROGRAMMER
ST6300 FULL PROGRAMMER
ST6400 7 DAY PROGRAMMER
ST6450 5-2 DAY PROGRAMMER

Note: Honeywell room thermostat T6360 and L641A cylinder thermostats are double insulated.

13

TYPICAL WIRING LAYOUT FOR A CONTROLLED GRAVITY HOT WATER PUMPED CENTRAL HEATING SYSTEM HONEYWELL 'C' PLAN

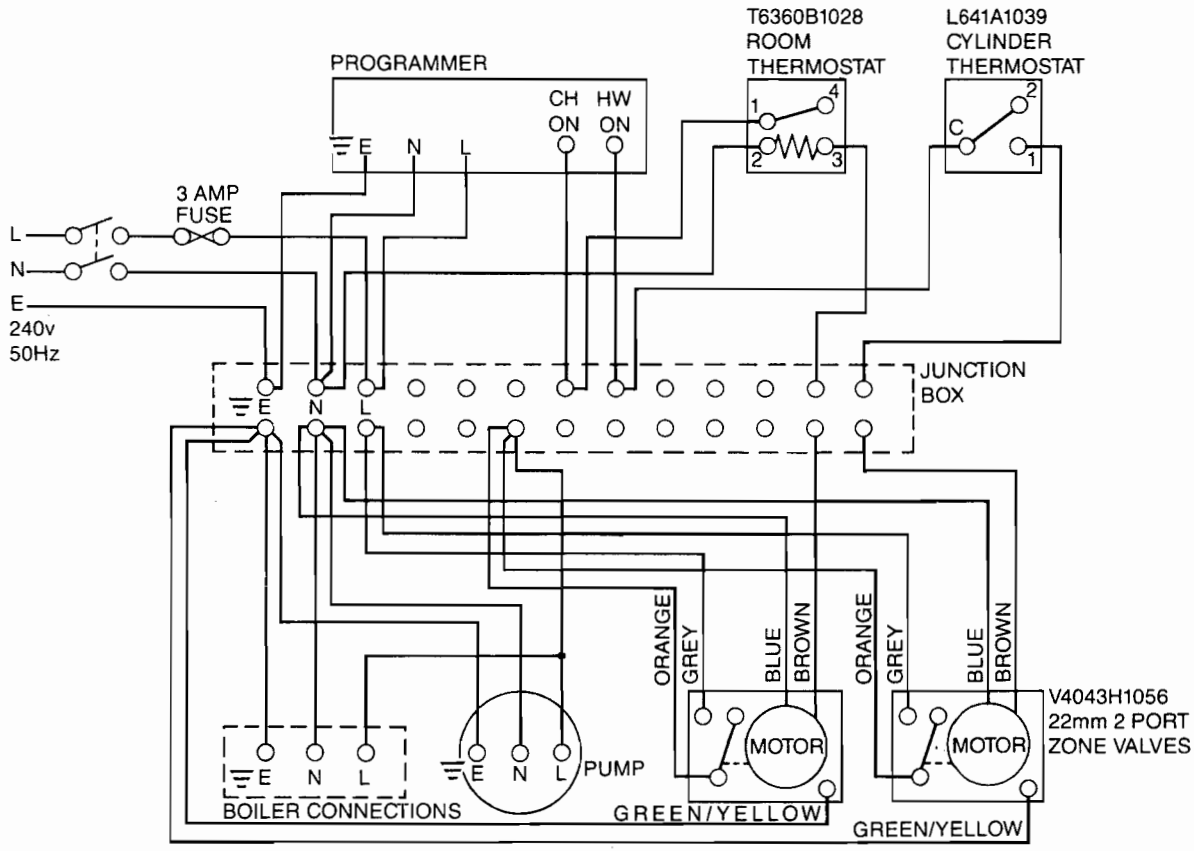


PROGRAMMER TYPE CAN BE 10 or 16 PROGRAMMER STYLE
EG ST6200 MINI PROGRAMMER
ST6300 FULL PROGRAMMER
ST6400 7 DAY PROGRAMMER
ST6450 5-2 DAY PROGRAMMER

Note: Honeywell room thermostat T6360 and L641A cylinder thermostats are double insulated.

14

TYPICAL WIRING LAYOUT FOR A FULLY PUMPED SYSTEM USING 2 x 2 PORT ZONE VALVES HONEYWELL 'S' PLAN



PROGRAMMER TYPE CAN BE 10 or 16 PROGRAMMER STYLE
EG ST6200 MINI PROGRAMMER
ST6300 FULL PROGRAMMER
ST6400 7 DAY PROGRAMMER
ST6450 5-2 DAY PROGRAMMER

Note: Honeywell room thermostat T6360 and L641A cylinder thermostats are double insulated.

14a

3 COMMISSIONING & TESTING

CHECKS TO ENSURE ELECTRICAL SAFETY SHOULD BE CARRIED OUT BY A REGISTERED PERSON. DO NOT USE THE BOILER WITHOUT THE OUTER CASE FITTED CORRECTLY.

3.1 VENTED WATER SYSTEMS

1 Commissioning is carried out before the boiler casing is fitted.

2 Check that the boiler front panel is correctly fitted and that all fixing screws are tight. (fig 7).

3 Fill and flush the water system with all valves open. Refil the system and check for leakage. Vent the system (including radiators) and make sure that the pump isolating valves (and any motorised valves if fitted) are fully open.

4 Turn on the gas supply and check for gas soundness around all gas pipework and gas carrying components within the boiler using leak detection fluid. **DO NOT USE A NAKED FLAME.**

5 Loosen the burner pressure test screw which can be found immediately above the burner supply tube connection on the RHS of the control (fig 16) and fit a pressure gauge.

Note: Access to the pressure test point is made easier by undoing the screw securing the control box and sliding it forward approximately 2".

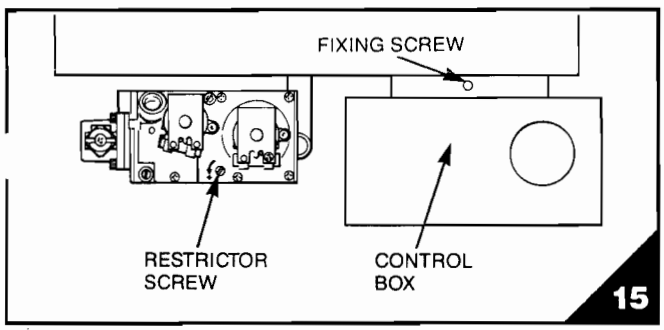
6 Ensure that all secondary controls (timer, room thermostat, and cylinder thermostat where fitted) are turned to maximum.

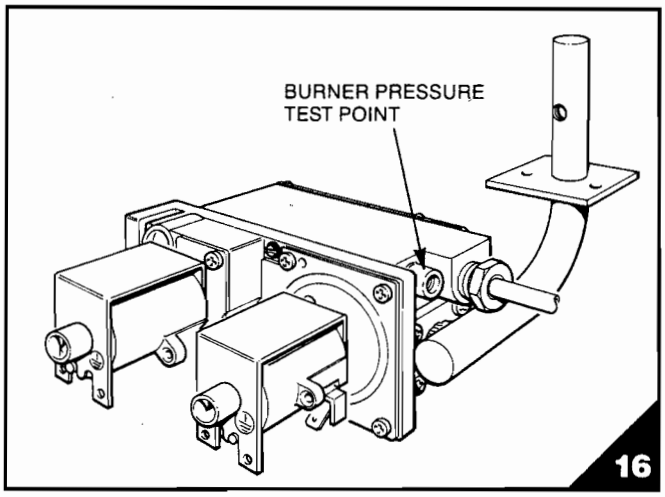
7 Turn the boiler thermostat knob to the off position.

8 Turn on electrical supply and check that the pump is working and is circulating water through the system.

9 Turn the boiler thermostat fully clockwise to its maximum setting. After a few seconds the burner will light. The burner flames can be seen through the viewing window in the front panel.

10 If the boiler fails to light, a check should be carried out on all electrical connections, then refer to section 5, fault finding.





11 Allow the burner to run for at least 10 minutes and check that the burner pressure is set as required. (Refer to Section 1.2 or the data badge.) If necessary adjust the restrictor screw (Fig 15) turning clockwise to decrease and anti-clockwise to increase the burner pressure.

12 Turn the thermostat knob fully anti-clockwise to the off position.

13 Remove the pressure gauge and tighten the pressure test screw. Relight the burner and check for gas soundness using leak detection fluid.

14 Fit the casing and secure using the four M5 fixing screws.

15 Fit the lower plinth cover and secure using the single M5 fixing screw.

16 Check that the operation of all external controls is satisfactory.

17 If an electrical fault is apparent after installation of the boiler, preliminary electrical checks should be performed. (Section 5) For any other problem consult the fault finding charts.

18 Balance the heating system and adjust the pump to give the required flow rate.

19 The boiler and system should now be allowed to reach its maximum working temperature and the operation of the boiler thermostat checked. Examine the system for leaks.

20 Turn off the system and drain rapidly whilst still hot.

21 Refill and vent ensuring all air is removed from the system.

22 Turn the boiler thermostat and all external controls to their required settings.

3.2 SEALED WATER SYSTEMS

Additional commissioning instructions for sealed systems are contained within the sealed system kit.

3.3 USER INSTRUCTIONS

Hand the users instructions to the user or purchaser for retention and instruct in the efficient and safe operation of the boiler and heating/DHW system.

Advise the user or purchaser of the precautions necessary to prevent damage to the heating/DWH system and to building in the event of the system remaining inoperative during frost conditions.

Finally advise the user or purchaser that for continued efficient and safe operation of the boiler it is important that adequate servicing is carried out at the intervals recommeded.

4 SERVICE INSTRUCTIONS

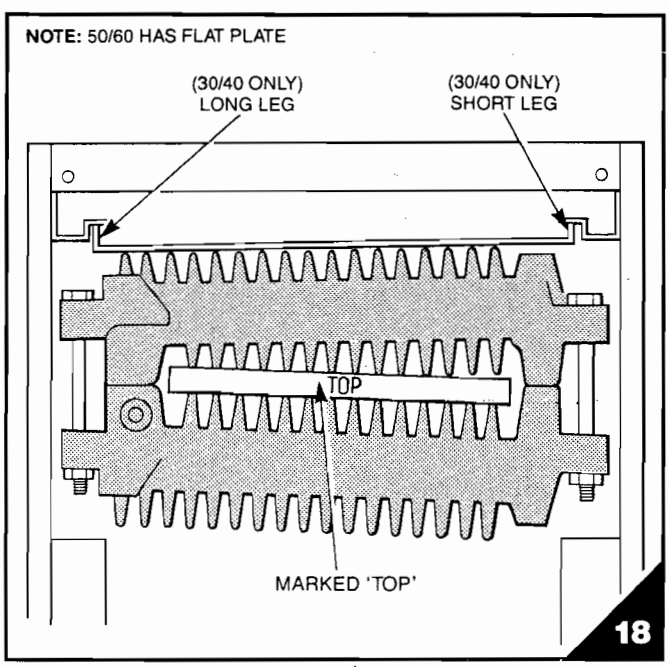
Before attempting any service to the boiler, ***isolate from the electrical supply and turn off the gas supply at the mains service cock.***
After completing any service operation or replacement of gas carrying components, always test for gas soundness using leak detection fluid.

4.1 HEAT EXCHANGER

Inspect the heat exhanger and clean the cast iron fins.

To gain access:

1 Remove the boiler casing by first removing the lower plinth cover (single screw) and then unscrewing the four fixing screws attaching the case to the boiler. Lift the case clear. See section 2.1.
2 Withdraw the thermostat phial from the heat exchanger pocket by pulling it through the rubber seal in the front panel.
3 Remove the sealed casing front panel by unscrewing the 4 M5 screws in each corner of the panel. (fig 17).
4 Remove the heatshield (fig 17) by unscrewing the two retaining screws.
5 Remove the insulated front panel by first supporting the panel, then unscrew the 2 fixing screws and carefully lower the panel before lifting clear taking care not to damage the insulation which is attached to the inside of this panel.
6 Disconnect the electrical terminal block situated adjacent to the pressure switch by supporting the pressure switch bracket and pulling the other half clear by sliding the rear half towards the wall.
7 Unscrew both fixing screws retaining the fan assembly to the flue box and the two M5*35mm screws securing the assembly to the collector hood.
8 Carefully remove the fan assembly by sliding it forwards away from the flue box and lifting clear. Take care not to damage the gasket on the bottom of the fan assembly.
9 Slide the 2 flue baffles forwards out of the heat exchanger making particular note of the correct orientation for future replacement. Fig 18
10 Unscrew the pilot pipe connection from the pilot burner, and disconnect the electrode lead from the electrode.
11 Unscrew the single fixing screw securing the burner support bracket to the base and remove the burner (complete with pilot burner) by sliding forwards.
12 Inspect the heat exchanger from both above and below. if necessary clean using a suitable flue brush after first placing a cloth over the pilot pipe and base to prevent the ingress of dirt. Remove all debris.



4.2 MAIN BURNER

13 Examine the main burner for any signs of deterioration or damage. Replace if necessary.
14 Clean the burner body and ports using a soft brush. Ensure all ports are clear.

4.3 PILOT ASSEMBLY

15 Remove the two screws securing the pilot bracket to the main burner.
16 Inspect the electrode for damage. Replace if necessary.
17 Unscrew and remove the pilot injector. Clean and inspect for damage or debris.
18 Clean the pilot burner and bracket. Ensure that it is free from debris.

4.4 MAIN INJECTOR

19 Ensure that the main injector is free from debris. if necessary remove the injector from the manifold. When refitting use a suitable sealing compound and check for gas soundness.

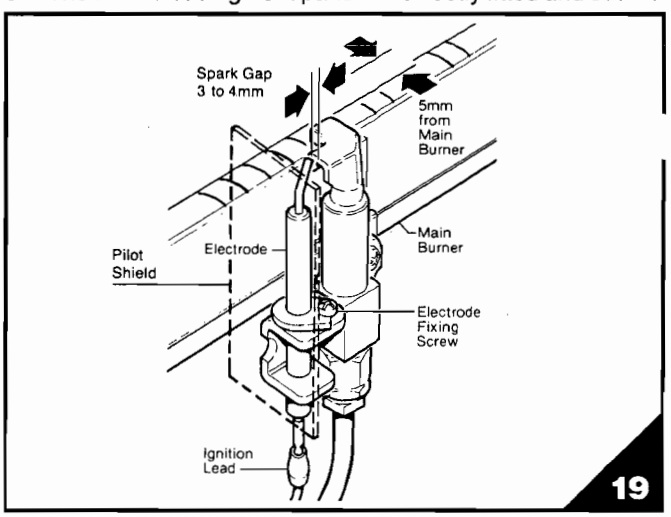
4.5 FAN ASSEMBLY

20 It is not necessary to remove any components on the f assembly for routine servicing however the assembly m be cleaned.
21 Examine the fan impeller (viewed from inside the flue hood and through the outlet) and check that there is no damage or debris.
22 Inspect fan outlet gasket. Replace if necessary.

4.6 REASSEMBLY

Reassemble all parts removed during the service in reverse order, ensuring:

1 The electrode gap is as shown in fig 19.
2 The main burner sits correctly on the main injector.
3 Care is taken not to damage any of the insulation boards or sealing gaskets.
4 A good seal between the fan assembly, the back panel, and the boiler body.
5 The two heat exchanger baffles are fitted correctly.
6 The sealed casing front panel is correctly fitted and sealed.



4.7 RE-COMMISSIONING

Follow the procedure in section 3 "commissioning and testing" to ensure the correct performance of the appliance, and ensure that the burner pressure is correctly set according to the desired output as marked on the data badge (situated on the RH side panel).

4.8 AFTER SERVICING

Test all points for gas soundness using a suitable soap solution, and check that all the external controls are set as required.

5 FAULT FINDING

IMPORTANT NOTICE

If an electrical fault occurs on the appliance the preliminary electrical system checks contained in the British Gas Multimeter Instruction Booklet must be carried out first.

When any service or replacement of electrical components which has required the breaking and re-making of electrical connections has taken place, the following tests must be repeated:

1 Earth Continuity

2 Polarity

3 Resistance to Earth

5.1 EARTH CONTINUITY CHECK

Appliances must be electrically disconnected, meter set on Ω (ohms) x 1 scale and adjust zero if necessary.

Test leads from any appliance earth point (e.g. inside control box) see wiring diagrams (Section 6) to earth pin on plug. Resistance should be less than 1 Ω (ohm). If the resistance is greater the 1 Ω (ohm) check all earth wires for continuity and all contacts are clean and tight.

If the resistance to earth is still greater than 1 Ω (ohm) then this should be reported to your supervisor.

5.2 SHORT CIRCUIT CHECK

Switches turned FULL ON—meter set on Ω (ohm) x 1 scale. Test leads from L to N on appliance terminal block, if meter reads 0 then their is a short circuit. Meter set on Ω (ohms) x 100 scale.

Repeat test with leads from L to E. If meter reads less than infinity (∞) there is a fault.

Note: *Should it be found that the fuse has failed but no fault is indicated a detailed continuity check (i.e. by disconnecting and checking each component) is required to trace the faulty component. It is possible that a fault could occur as a result of local burning/arcing but no fault could be found under test. However, a detailed visual inspection should reveal evidence of burning around the fault.*

5.3 POLARITY CHECK

Appliance reconnected to mains supply and meter set on 300 V ac scale. Test at appliance terminal block.

a) Test leads from L to N meter reads approx. 240 V ac.

b) Test leads from L to E (⏚) meter reads approx. 240 V ac.

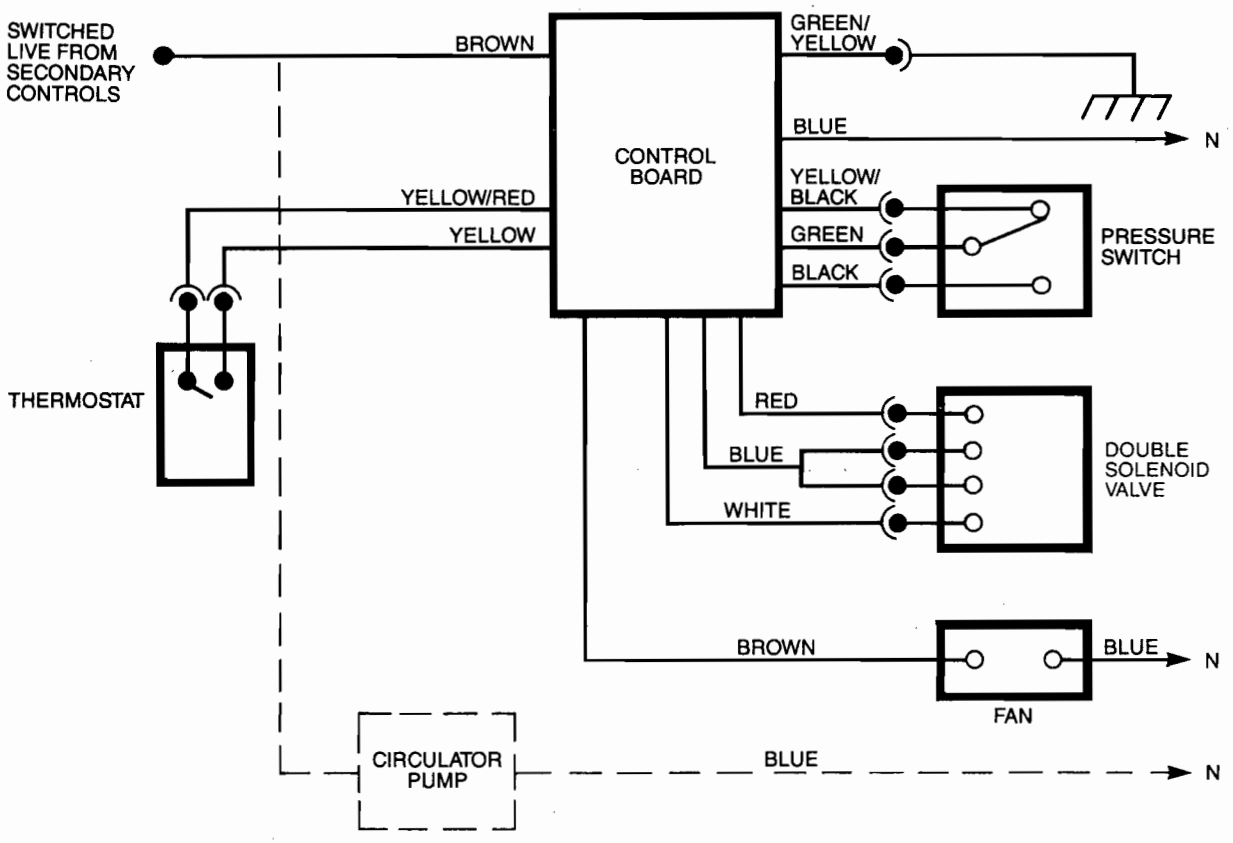
c) Test leads from N to E (⏚) meter reads from 0 to 15 V ac.

5.4 RESISTANCE TO EARTH CHECK

Appliance must be disconnected from main supply and meter on Ω (ohms) x 100 scale. All switches including thermostat on—test leads from L to E—if meter reads other than infinity (∞) their is a fault which should be isolated. A detailed continuity check is required to trace the faulty component.

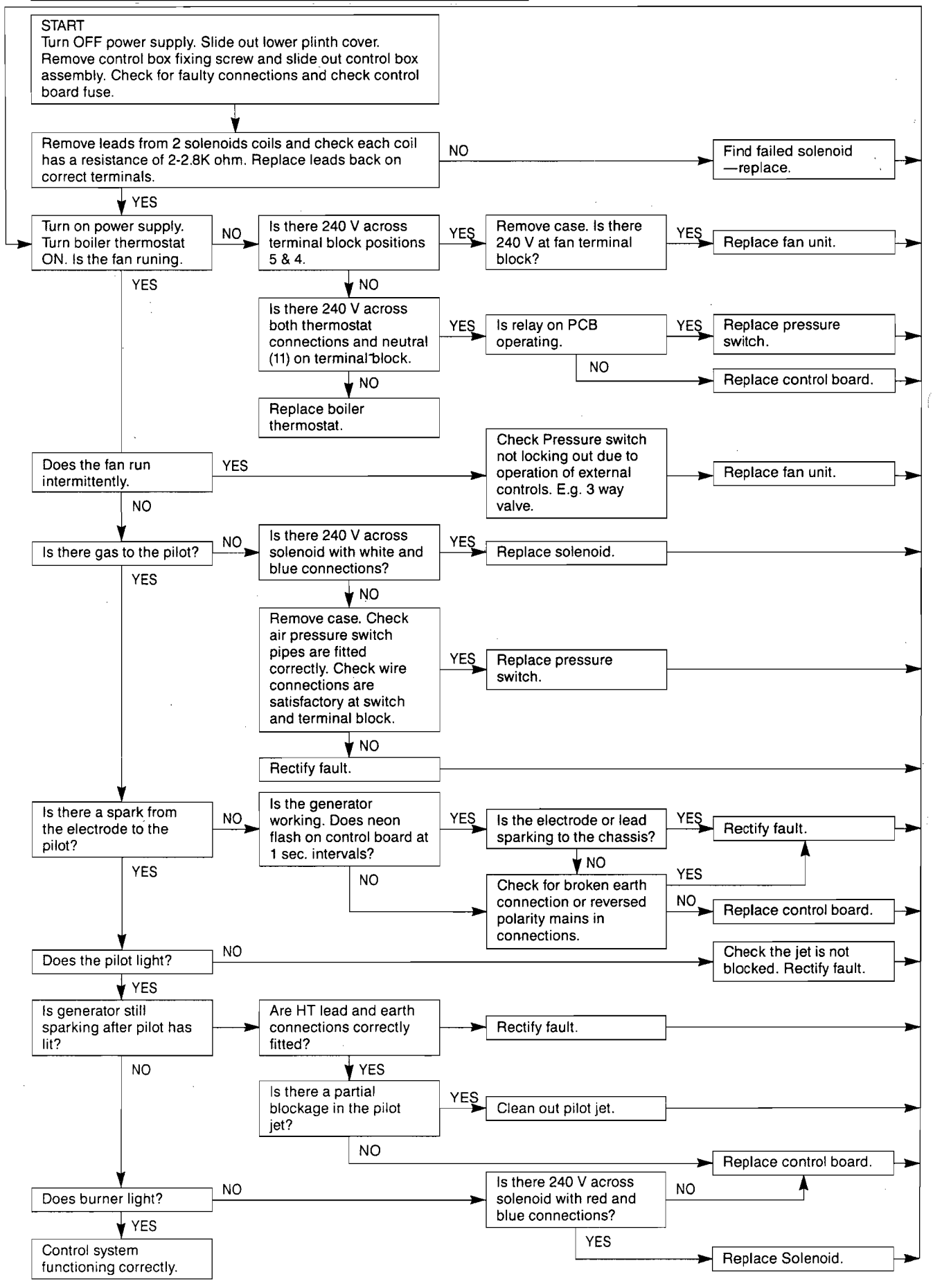
IMPORTANT: These series of checks are the first electrical checks to be carried out during a fault finding procedure. On completion to the service/fault finding task which has required the breaking and remaking of electrical connections then the checks 5.1 Earth Continuity, 5.3 Polarity and 5.4 Resistance to Earth must be repeated.

FUNCTIONAL FLOW WIRING DIAGRAM



5.5 FAULT FINDING CHART

To check electrical components, turn all external controls to boiler (secondary) e.g. cylinder and room thermostats ON. Ensure gas supply is turned ON at all cocks, check for blockages and purge out any air in line. Turn boiler thermostat to MAX. Check overheat thermostat (if fitted) has not operated.



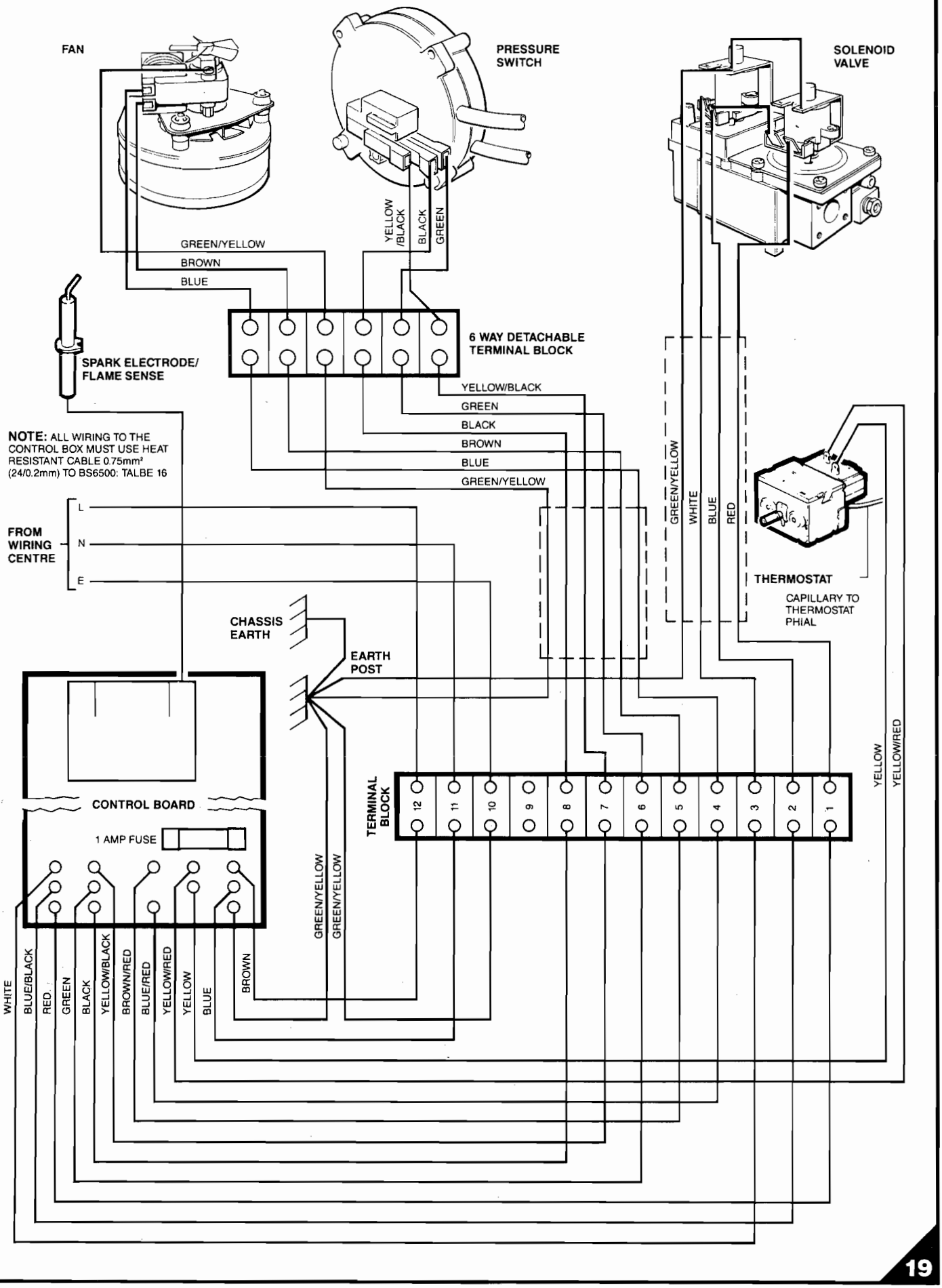
FAULT FINDING GUIDE BENTLEY

FAULT	POSSIBLE CAUSE	REMEDY
1 Boiler will not start- Fan fails to run- Pump fails to run	a) Electricity supply or controls not turned on. b) Wiring connections to boiler incorrect c) Boiler thermostat set too low. d) Boiler thermostat defective	a) Turn on. Check live power supply to terminal 12. Check 240v across 12 and 11. b) Check and correct as necessary c) Turn up d) Replace defective thermostat
2 Boiler will not start- Fan fails to run- Pump running	a) Overheat thermostat tripped (if fitted) b) Fuse blown on PCB c) Boiler thermostat defective d) Pressure switch rubber connection tubes kinked or disconnected e) Pressure switch defective f) Fan motor defective g) PCB defective h) Internal wiring fault in boiler	a) Reset overheat thermostat b) Replace fuse and investigate reason for fuse failure c) Replace boiler thermostat d) Check and rectify e) Replace pressure switch f) Replace fan assembly g) Replace PCB h) Trace and rectify. Check 12 and 6 way terminal blocks
3 Boiler will not ignite Fan running No spark	a) Pressure switch defective b) Spark electrode lead detached from PCB c) Electrode or lead assembly damaged d) Boiler case not sealed e) PCB defective f) Blockage in flue	a) Replace pressure switch b) Reconnect lead c) Replace electrode or lead assembly d) Reseal case e) Replace PCB f) Check and clear
4 Boiler will not ignite- Spark present	a) Gas supply not turned on b) Blocked pilot injector c) Spark gap too large d) Internal wiring fault-No supply to pilot solenoid e) Pilot solenoid defective f) Defective PCB	a) Turn on and purge if necessary b) Clean and clear injector c) Adjust gap to 3-4mm d) Trace and rectify e) Replace solenoid coil f) Replace PCB
5 Pilot ignites- No main burner	a) Pilot flame too small b) Electrode lead damaged c) PCB defective d) Internal wiring fault No supply to main solenoid e) Main solenoid defective f) Broken earth connection or reversed polarity	a) Clean and clear pilot injector b) Replace electrode and lead assembly c) Replace PCB d) Trace and rectify e) Replace solenoid coil f) Check and rectify

FAULT FINDING GUIDE BENTLEY

6 Boiler fails safe Main burner and pilot extinguished together and then repeats ignition sequence and fail safe	a) Insufficient working gas pressure at appliance inlet b) Partially blocked pilot c) Incorrect flue installation	a) Should be 8″ wg. Check working pressure at meter, should be 8.3″ wg. if low contact local gas region for service. If pressure at meter O.K. check for incorrect pipe size or partial blockage in pipe supply to boiler. b) Clean and clear pilot c) check instructions for correct flue assembly
7 Lack of heat (Low flow temperature)	a) Burner pressure too low b) Boiler thermostat set too low c) Boiler thermostat defective d) Pump speed too high	a) Check and adjust (see also "6") b) Turn up boiler thermostat c) Replace boiler thermostat d) Adjust pump speed to acheive 11°C rise across boiler
8 Boiler noisy (Kettling)	a) Burner pressure too high b) Pump speed too low or pump performance inadequate c) Partial blockage in heat exchanger d) System water highly aerated	a) check and adjust to system requirement b) Adjust pump speed to acheive 11°C temperature rise across the boiler. Change pump for high head model c) Descale and/or flush heat exchanger d) Inspect system design for pumping over, ineffective vent, air entrainment etc. and rectify as necessary
9 Boiler noise (Whistling)	Swarf or burr in main injector	Clear injector
10 Boiler overheats (Very high flow temperature)	a) Thermostat sensing bulb not located in thermostat pocket b) Boiler thermostat defective c) Solenoid defective-fails to close when de-energised d) Boiler connected back to front i.e. incorrect direction of flow through the boiler	a) Replace thermostat sensing bulb into pocket. b) Replace boiler thermostat. c) Replace gas valve assembly. d) Check and remedy.
11 Overheat thermostat prematurely trips out (if fitted)	a) Low water flow through boiler b) Defective overheat thermostat c) Pump problem	a) Check pump setting and systems for air-locks b) Replace overheat thermostat c) See 12 a and b.
12 Pump fails to run	a) Pump seized b) Pump incorrectly wired to boiler	a) Clean or replace pump b) Check and rectify wiring
13 Pilot remains alight when boiler turned off- Main burner fails to relight	Dirt on valve seating at pilot solenoid	Clean or replace gas valve assembly.

6 INTERNAL WIRING DIAGRAM



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7 REPLACEMENT OF PARTS

Replacement of parts must always be carried out by a competent person. Always disconnect from the electrical supply and isolate the gas at the service cock.

7.1 HEAT EXCHANGER

1 Remove the boiler casing by first removing the lower plinth cover (single screw) and then unscrewing the four fixing screws attaching the case to the boiler. Lift the case clear. See section 2.1.

2 Withdraw the thermostat sensing bulb from the heat exchanger by pulling it through the rubber seal in the front panel.

3 Remove the sealed casing front panel by unscrewing the 4 M5 screws in each corner of the panel. (drawing p13)

4 Remove the heatshield (drawing p13) by unscrewing the two retaining screws.

5 Remove the insulated front panel by first supporting the panel, then unscrewing the 2 fixing screws and carefully lowering the panel before lifting clear taking care not to damage the insulation which is attached to the inside of this panel.

6 Slide the two flue baffles forwards out of the heat exchanger taking care to note the correct orientation for subsequent refitting. (fig 18).

7 Drain the system at a point lower than the boiler.

8 Disconnect the compression pipe joints at the elbows entering the heat exchanger, and remove the heat exchanger connections.

9 Unscrew and remove the heat exchanger retention clamp.

10 Remove the sealing gaskets from around the heat exchanger tappings.

Note: *to prevent damage to the seals it is recommended that the side of the heat exchanger housing be supported away from the heat exchanger with a large bladed screwdriver or similar implement. This will also assist reassembly.*

11 Remove the heat exchanger by sliding forwards.

12 Replace the heat exchanger and re-assemble in reverse order ensuring that all joints and sealing materials are correctly located and sealed.

Check for correct location and positioning of the two flue distribution baffles. The water connections should be tested prior to refitting the casing. Refer to section 3 for notes on filling the system.

7.2 COMBUSTION CHAMBER INSULATION

1 Remove the heat exchanger as described in section 7.1 steps 1 to 11.

2 Remove the combustion chamber air distribution plate assemblies by removing the fixing screw in each and sliding forwards.

3 Replace the insulation boards (with the smooth side on view) and re-assemble in reverse order. See notes in Section 4.6 "Re-assembly".

Notes: *Take care not to damage the front and rear insulating pads during this operaton.*

7.3 MAIN BURNER

1 Follow steps 1 to 5 in Section 7.1.

2 Unscrew the pilot pipe connection from the pilot burner, and disconnect the electrode lead from the electrode.

3 Unscrew the single fixing screw securing the burner support bracket to the base and remove the burner (complete with pilot burner) by sliding forwards.

4 Remove the two screws securing the pilot burner to the main burner.

5 Replace the main burner and reassemble in reverse order. See notes in Section 4.6 "Reassembly".

7.4 MAIN INJECTOR

1 Follow steps 1 to 3 in Section 7.3.

2 Replace the main injector using a suitable sealing compound and reassemble in reverse order. See notes in section 4.6 "Reassembly".

7.5 PILOT ASSEMBLY & ELECTRODE

1 Follow steps 1 to 4 in Section 7.3.

2 Remove the electrode and pilot injector.

3 Replace and reassemble in reverse order. See notes in Section 4.6 "Reassembly".

7.6 DOUBLE SOLENOID VALVE

1 Remove the lower plinth cover by first unscrewing the single M5 fixing screw on the underside and then sliding it forwards clear of the main boiler casing.

2 Unscrew the single control box fixing screw (fig 15), and slide the control box forwards approximately 2" to make easier access to the flange fixing screws.

3 Unscrew the pilot pipe union and remove the pilot pipe from the main valve.

4 Remove push-on terminations and earth link from both coils.

5 Unscrew the four fixing screws in each flange.

6 Replace the double solenoid valve and reassemble in reverse order.

7.7 PRINTED CIRCUIT BOARD

1 Gain access to the control box by following steps 1 & 2 Section 7.6.

2 Pull off each connector block in turn from the PCB and release the clips securing the board.

3 Replace the printed circuit board and reassemble in reverse order.

7.8 AIR PRESSURE SWITCH

1 Remove the casing as described in step 1, section 7.1.

2 Pull off the three electrical connections.

3 Disconnect both pressure sensing tubes.

4 Unscrew the two screws attaching the pressure switch to the support bracket and remove the switch.

5 Replace air pressure switch and reassemble in reverse order. Refer to the wiring diagram (Section 6) to ensure that the connections are correctly re-made.

Note: *Ensure that the air sensing tubes are correctly refitted i.e. grey tube to the lower stub.*

7.9 THERMOSTAT

1 Remove the casing as described in step 1, Section 7.1.

2 Unscrew the single control box fixing screw (fig 15), and slide the control box forwards.

3 Pull off both electrical connections to the thermostat.

4 Pull off the thermostat knob.

5 Unscrew the hexagon nut securing the thermostat body to the control box and remove.

6 Withdraw the thermostat sensing bulb from the heat exchanger by pulling it through the rubber seal in the front panel.

7 Replace the thermostat and reassemble in the reverse order.

7.10 FAN ASSEMBLY

1 Remove the casing as described in step 1, Section 7.1.

2 Disconnect the electrical terminal block situated behind the pressure switch by supporting the pressure switch bracket and pulling the other half clear by sliding the rear half towards the wall.

3 Unscrew both fixing screws retaining the fan assembly to the flue box and the two screws securing the assembly to the collector hood.

4 Carefully remove the fan assembly by sliding forwards away from the flue box and lifting clear. Take care not to damage the gasket on the bottom of the fan assembly.

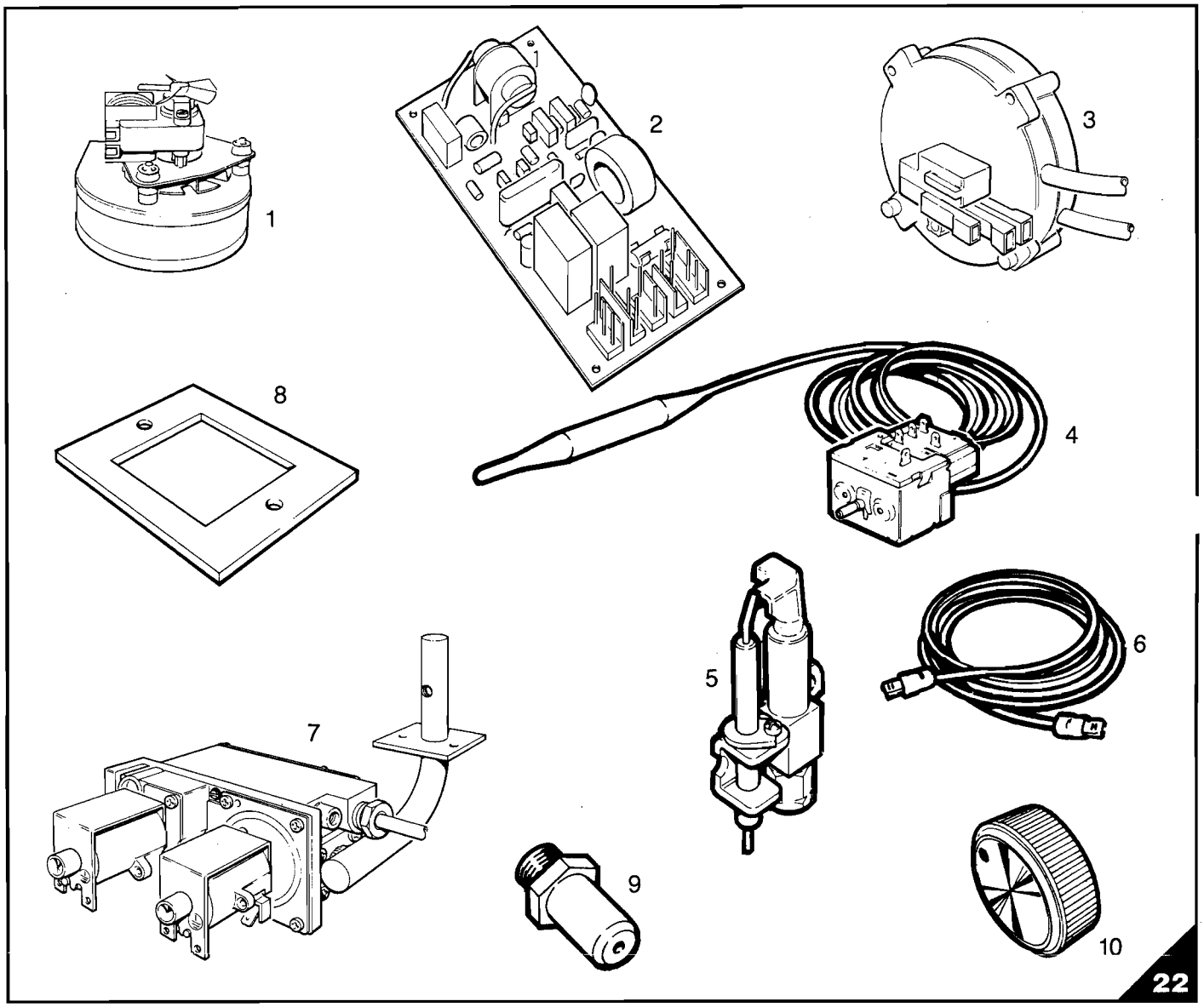
5 Disconnect the 3 wires from the detachable terminal block.

6 Remove the pitot tube from the fan scroll by undoing the two self tapping screws.

7 Remove the fan from the flue hood by unscrewing the four fixing screws inside the flue hood.

8 Replace the fan and reassemble in reverse order. See notes in Section 4.6 "Reassembly". Ensure that the pitot tube assembly is sealed into the fan scroll using a suitable sealing compound (silicone) taking care not to block the end of the tube.

8 REPLACEMENT PARTS



Item No.	Part No.	Description	Maker	Makers Part Ref.
1	601002	Fan assembly	Sifan	WFFB2801-002
2	6000503	Control board	Pactrol	408800V01
3	550510	Pressure switch	EAC	PS700-111
4	550511	Thermostat	Ranco	K36P 130900
5	500508	Electrode/Pilot	Johnson	27T1D1M421
6	401511	Electrode lead	Silicone Engineering	
7	500558	Double solenoid	Honeywell	VR4700E-1034
8	352522	Silicone fan outlet gasket	Whitby & Chandler	
9	701511	2.6mm injector	Steromatic	190260
	701509	3.0mm injector	Steromatic	190300
	701004	3.4mm injector	Steromatic	1903340
	701016	3.8mm injector	Steromatic	190380
10	300520	Control knob	Ray Engineering	

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