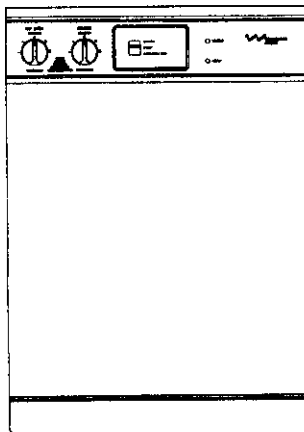


**WORCESTER
BOSCH**

Highflow 400 RSF

FLOOR STANDING COMBINATION APPLIANCE FOR CENTRAL
HEATING AND MAINS FED DOMESTIC HOT WATER

INSTALLATION AND SERVICING INSTRUCTIONS



APPLIES TO
APPLIANCES
PRE MAY 1997

GC NUMBER 47 311 18

BOILER OUTPUT

To Hot Water On/Off Control
Maximum 24.0 kW (82,000 Btu/h)

To Central Heating On/Off Control Range Rated
Minimum 8.8 kW (30,000 Btu/h)
Maximum 24.0 kW (82,000 Btu/h)

IMPORTANT: THIS APPLIANCE IS FOR USE WITH NATURAL GAS ONLY

THESE INSTRUCTIONS APPLY IN THE UK ONLY

THESE INSTRUCTIONS ARE TO BE LEFT WITH THE USER OR AT THE GAS METER

This appliance must be installed by a competent person in accordance
with the Gas Safety (Installation and Use) Regulations 1994

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1. Installation Requirements

1.1 Gas Safety (Installation and Use) Regulations 1994: All gas appliances must be installed by a competent person in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.

1.2 The manufacturers notes must not be taken, in any way, as overriding statutory obligations.

1.3 The compliance with a British Standard does not, of itself, confer immunity from legal obligations. In particular the installation of this appliance must be in accordance with the relevant requirements of the following: Gas Safety (Installation and Use) Regulations 1984 (as amended), current IEE Wiring Regulations, local Building Regulations, Building Standards (Scotland) (Consolidation), byelaws of the local Water Company and Health and Safety Document No. 635 (Electricity at Work Regulations 1989). The British Gas Material and Installation Specification for central heating and hot water. It should be in accordance with the relevant recommendations of the following British Standards:

BS 6798:1987 Specification for Installation of gas fired hot water boilers of rated input not exceeding 60 kW

BS 5449:1990 Central Heating for Domestic Premises

BS 5546:1990 Installation of gas hot water supplies for domestic purposes.

BS 5440:1:1990 Flues and Ventilation for gas appliances of rated input not exceeding 60kW: Flues.

BS 5440:2:1989 Flues and ventilation for gas appliances of rated input not exceeding 60kW: Air Supply.

BS 6891:1988 Installation of low pressure gas pipework installations up to 28mm (R1)

1.4 To ensure that the installation will perform to the highest standards, the system and components should conform to any other relevant British Standards in addition to those mentioned in the instructions.

1.5 The appliance complies with the Essential Requirements of the Gas Appliance Directive and other Directives currently applicable.

1.6 This appliance contains no asbestos products. There is no potential hazard due to the appliance being electrically unsafe. There are no substances used that are a potential hazard in relation to the COSHH Regulations 1988.

2. General Information

2.1 This appliance is not suitable for external installation.

2.2 The appliance controls are set to provide a maximum output of 24 kW for the domestic hot water and a central heating load of up to 24 kW.

2.3 The control circuit provides automatic ignition. A permanent pilot is not used.

2.4 PRINCIPLE APPLIANCE COMPONENTS.

A low thermal capacity Gas to Water heat exchanger

A water to water heat exchanger to provide domestic hot water.

A heatbank having a nominal capacity of 60 litres of circulating primary hot water positioned in the lower half of the appliance

A water diverter valve to direct the boiler output either to domestic hot water or central heating as required.

Multifunctional gas valve and electrical control system to individually control the domestic hot water and central heating.

An integral circulating pump.

Boiler and hot water temperature control thermostats providing control for central heating and domestic hot water.

A User's Operating Switch for selection of water only or heating and water.

A by-pass for central heating system.

A pump overrun thermostat which enables the pump to run on for a short period to allow the boiler section to cool to a preset temperature after each operating cycle.

An expansion vessel, pressure gauge and pressure relief valve.

Temperature safety cut-out controls.

An optional extra facia mounted programmer.

A water flow regulator and flow switch in the domestic supply.

A standard horizontal rear flue kit to accommodate a flue length* of 100 mm to 500 mm

Alternatively, a standard horizontal side flue kit to accommodate a flue length of 100 mm to 1000 mm.

Optional extra flue kits to provide for flue lengths up to a maximum of 3000 mm.

Optional extra 90° flue bends to redirect the flue to the right, left or upwards.

N.B. Maximum flue length reduces when a flue bend or bends are fitted .

An optional vertical balanced flue system.

2.5 ELECTRICAL SUPPLY.

Mains supply: 230V ~ 50Hz, 270watts. External fuse 3A. Internal fuse 3.15A (20mm) fast blow.

2.6 GAS SUPPLY.

The boiler requires 2.8 m³/h (98.5 ft³/hr) of gas with a calorific value of 38.7 MJ/m³. (1038 Btu/h.) The gas meter and supply pipes must be capable of supplying this quantity of gas in addition to the demand from any other appliances being served. The following table gives an indication of limiting gas pipe lengths and the allowance to be made for fittings. Refer * - BS6891 for further information.

The meter governor should deliver a dynamic pressure of 20mbar (8in wg.) at the appliance.

The complete installation including the gas meter must be tested for soundness and purged. See BS 6891.

	Total Length of Gas Supply Pipe (metres)			Pipe Diameter (mm)
	3	6	9	
Gas Discharge Rate (m ³ /hr)	8.7	5.8	4.6	22
	18.0	12.0	9.4	28

2.7 PACKING.

The appliance and flue components are packed in separate cartons.

2.8 GENERAL INSTALLATION.

The appliance is supplied for connection to a sealed system but is suitable for use with an open system.

The specified ventilation openings made into a wall or compartment door must not be obstructed.

If the appliance is to be fitted into a compartment then the compartment must conform to the requirements of BS 6798:1987: Section 6.

The clearances specified for installation and servicing must be maintained.

2.9 FLUE.

The appliance has a multi-directional balanced fanned flue system: rear, right or left. *11" x 6 1/2" (219 x 204)*

A terminal guard, Type K2, GC 393 553, is available from Tower Flue Components, Vale Rise, Tonbridge, TN9 1TB.

The standard horizontal flue assembly length is from 100 mm to 500 mm when the appliance is flued to the rear. When flued to the side the standard flue length is from 100 mm to 1000 mm.

Extended flue lengths up to 3000 mm are available in 1000 mm lengths as optional extras.

To flue the appliance right, left or upwards 90° flue bends are available as optional extras.

A maximum of three 90° flue bends are available for the flue system.

N.B. When using an extra 90° flue bend or bends the maximum flue length is reduced. See Section 5b.

Do not allow the flue terminal fitted to the outside wall to become obstructed or damaged.

An internal flue fixing kit is packed with the standard flue kit. For fitting instructions refer to Section 11.7.

A vertical balanced flue is available with a flue length from 100 mm to 4500 mm

2.10 CONTROLS.

The electronic control system via the gas valve operates the heat input in response to the central heating and domestic hot water temperature settings.

The Operating switch provides for the selection of domestic hot water (**WATER**) only or central heating and domestic hot water (**HEATING and WATER**) or **Off**.

A fascia mounted programmer is available as an optional extra. A remote mounted programmer may be connected to the appliance.

The control thermostats for central heating and domestic hot water are mounted on the integral fascia.

There is provision for the connection of a mains voltage room thermostat. Refer to Section 10.

Frost Protection.

When the appliance and heating system are exposed to low temperatures it is advised to fit a frost thermostat Refer to Section 10.

Thermostatic radiator valves can be used in the system. The appliance incorporates an adjustable by-pass between the central heating flow and return.

2.11 SYSTEM NOTES.

WARNING:

CHECK THAT NO DIRT IS LEFT IN EITHER THE GAS OR WATER PIPEWORK AS THIS COULD CAUSE DAMAGE TO THE APPLIANCE. THOROUGHLY FLUSH THE HEATING SYSTEM, AND THE WATER SUPPLY IN ACCORDANCE WITH THE RECOMMENDATIONS OF BS 7593:1992.

PURGE THE GAS SUPPLY BEFORE FINALLY CONNECTING THE APPLIANCE.

The water pipe connections throughout a sealed system must be capable of sustaining a pressure of up to 3 bar.

Radiator valves must conform to the requirements of BS2767(10):1972.

The relief valve drain outlet must be directed away from any electrical components or where it would cause a hazard to the user.

A drain cock to BS 2879 must be fitted to the lowest point of the system.

For circuit design purposes it is important that due note is taken of the information given in Table 4 relating to the available pump head.

2.12 SHOWERS, BIDETS, TAPS AND MIXING VALVES.

Hot and cold taps and mixing valves used in the system must be suitable for operating at a mains pressure of up to 10 bar.

Thermostatically controlled or pressure equalising shower valves will guard against the flow of water at too high a temperature.

Hot and cold mains fed water can be supplied direct to an over-rim flushing bidet subject to local water company requirements.

With all mains fed systems the flow of water from the individual taps will vary with the number of outlets operated simultaneously and the cold water mains supply pressure to the property. Flow balancing using 'Ball-o-Fix' type valves is recommended to avoid an excessive reduction in flow to individual outlets. For further information contact Worcester Heat Systems Ltd.

2.13 SAFETY CONSIDERATIONS.

The appliance must not be operated in a waterless condition.

The appliance must not be operated with the boiler inner casing cover removed.

Work must not be carried out on the appliance without the gas and electricity supplies being turned off.

Checks must be made to ensure that the ventilation openings made into walls and partitions are of the correct size and are not obstructed.

2.14 OPERATION. See Fig. 1.

HOT WATER MODE:

With the appliance in a standby condition, i.e. heatbank at the temperature set by the hot water control thermostat, burner off, fan off, pump off and a demand is made for hot water:

The flow switch will energise the pump and circulate primary hot water around the boiler and water to water heat exchanger. The burner will light at its maximum setting, to maintain the temperature of the heatbank and the fan will operate.

When hot water is no longer required the appliance will continue to operate, the burner will cycle a number of times, until the heatbank has returned to temperature. The pump will continue to run for a few minutes to dissipate the residual heat from the appliance around the central heating circuit.

NOTE: If it is required to use the appliance for Hot Water only or before the Central Heating circuit is connected a 22 mm copper by-pass pipe must be connected between the Central Heating Flow and Central Heating Return. The minimum length of the by-pass pipe to be 2 metres.

CENTRAL HEATING MODE:

With the appliance in a standby condition and a demand is made for heating:

The water diverter valve will open, pump will energise and circulate primary water around the heating system, burner will light to the nominal setting pressure and the fan will operate.

With the system at the temperature set by the Temperature Control Knob, on the fascia, the burner will cycle to maintain output to the system.

If the system no longer requires output to maintain the desired room temperature, the burner will extinguish. The pump will continue to run for a short period to dissipate the residual heat from the appliance and then switch off.

When the primary water has cooled sufficiently below the temperature set by the Temperature Control Knob, the burner will light, pump will energise and process repeated.

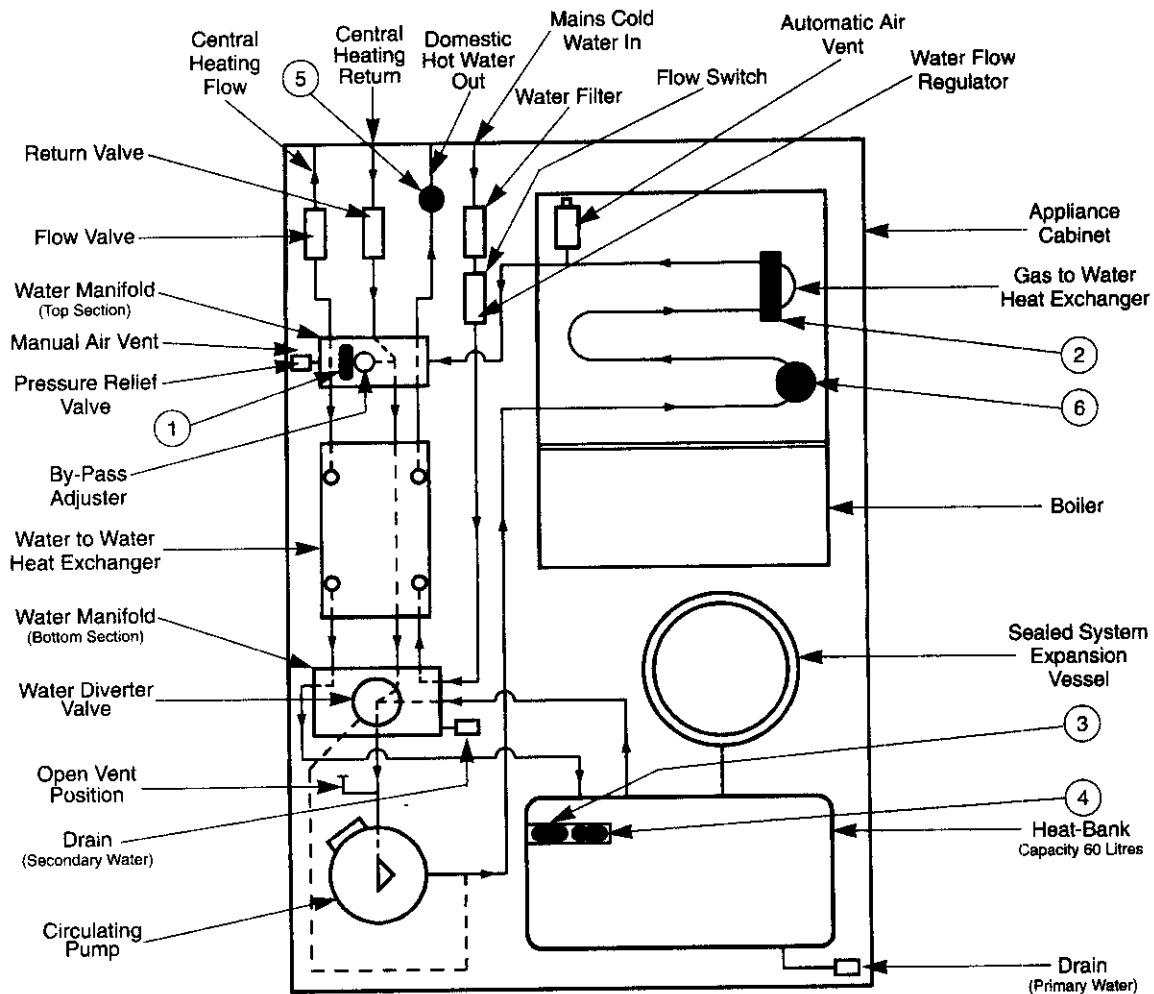
HOT WATER AND CENTRAL HEATING MODE:

The appliance will supply heat to the central heating system as required. A demand for hot water at a tap or shower will override the central heating function for the period of the hot water demand.

When hot water is no longer required the burner and pump will continue to operate until the heatbank is back to the required temperature.

The appliance will return to the central heating state and its normal mode of operation.

Fig. 1. Appliance water flow diagram.



- ① C.H. Thermostat ZAGAS041
- ② Safety Temperature Limiter ZAGAS043
- ③ H.W. Thermostat ZAGAS042

- ④ Heatbank Overheat Thermostat ZAGAS044
- ⑤ H.W. Limit High Thermostat ZAMAJ 223
- ⑥ Pump Over-run Thermostat ZAMAJ165

3. Technical Data

see Fig. 2 and 3.

The Data Plate is fixed to the top of the control box casing.

Table 1

NOMINAL BOILER RATINGS (10 minutes after lighting the appliance)								
MODE	OUTPUT		INPUT		BURNER SETTING PRESSURE		GAS RATE	
	kW	Btu/h	kW	Btu/h	m bar.	in. wg.	m ³ /h	ft ³ /h
HEATING RANGE	8.8	(30,000)	12.1	(41,300)	1.0	0.4	1.11	40.0
	11.0	(37,000)	15.0	(51,000)	3.5	1.4	1.45	51.0
	13.0	(44,350)	17.4	(59,400)	5.2	2.1	1.55	54.5
	15.0	(51,200)	19.7	(67,000)	5.5	2.2	1.90	67.5
	17.0	(58,000)	22.2	(75,700)	7.5	3.0	2.15	76.0
	19.0	(64,800)	24.5	(83,500)	9.5	3.8	2.40	84.0
	21.0	(71,500)	27.0	(92,000)	11.0	4.4	2.60	92.5
	23.0	(78,500)	29.2	(99,500)	14.0	5.6	2.80	100.0
	24.0	(82,000)	30.0	(102,000)	14.5	5.8	2.90	102.0
HOT WATER	24.0	(82,000)	30.0	(102,000)	14.5	5.8	2.90	102.2

NOTE: The appliance is factory pre-set to satisfy a central heating requirement of 15 kW (51,200 Btu/h). The output must be adjusted to suit the heating system when commissioning the appliance.

Table 2: Multi-Directional Flue System.

FLUE DETAILS		
	mm	inches
WALL HOLE DIAMETER	120	4.5
WALL HOLE DIAMETER FOR INTERNAL FLUE FIXING KIT	150	6.0
STANDARD HORIZONTAL FLUE MINIMUM LENGTH SIDE AND REAR	100	4.0
STANDARD HORIZONTAL FLUE MAXIMUM LENGTHS – REAR	500	19.6
– SIDE	1000	39.3
EXTENDED HORIZONTAL FLUE MAXIMUM LENGTH – SIDE AND REAR	3000	118

NOTE: 1. THE STANDARD HORIZONTAL REAR FLUE KIT IS SUITABLE FOR REAR FLUE APPLICATION ONLY. A FLUE ADAPTOR IS INCLUDED IN THE KIT.

NOTE: 2. THE STANDARD HORIZONTAL SIDE FLUE KIT IS SUITABLE FOR SIDE FLUE APPLICATIONS ONLY. A 90° FLUE BEND IS INCLUDED IN THE KIT.

NOTE: 3. OPTIONAL EXTRA FLUE BENDS ARE AVAILABLE. THE MAXIMUM FLUE LENGTH IS REDUCED WHEN AN EXTRA FLUE BEND OR BENDS ARE USED. Refer to Note 4 and 5.

NOTE: 4. WHEN USING TWO FLUE BENDS THE MAXIMUM EXTENDED STRAIGHT FLUE LENGTH MUST NOT EXCEED 2300 mm.

NOTE: 5. WHEN USING THREE FLUE BENDS THE MAXIMUM EXTENDED STRAIGHT FLUE LENGTH MUST EXCEED 1000 MM .

NOTE: 6. SEE SECTION 5b "FLUE OPTIONS" FOR FURTHER INFORMATION.

NOTE: 7. NO MORE THAN THREE 90° FLUE BENDS CAN BE USED.

VERTICAL BALANCED FLUE.

Instructions describing the fitting of the vertical balanced flue system are sent with the vertical flue kit.

IMPORTANT: It will be necessary to purchase at least one 90° flue bend when installing the vertical balanced flue system. See Section 5b "Flue Options" for further information.

NOTE: The maximum overall height of the vertical balanced flue measured from the top of the appliance casing to the top of the vertical balanced flue terminal is 5500 mm.

Table 3

VERTICAL BALANCED FLUE DETAILS		
	mm	inches
CEILING HOLE DIAMETER	130	5.0
MINIMUM AIR DUCT LENGTH	100	4.0
MAXIMUM AIR DUCT LENGTH	4500	177.0

Table 4

AVAILABLE PUMP HEAD							
	BOILER OUTPUT		HEAD		MIN. FLOW RATE		TEMPERATURE RISE ACROSS HEATING FLOW AND RETURN
	kW	Btu/h	Metres	Feet	L/min.	Gal/Min.	
HEATING RANGE	8.8	(30,000)	6.1	20.0	11.5	2.5	11°C (20°F)
	11.0	(37,000)	5.4	17.5	14.0	3.1	
	13.0	(44,350)	4.9	16.0	17.0	3.7	
	15.0	(51,200)	4.2	13.5	19.5	4.3	
	17.0	(58,000)	5.3	17.0	15.0	3.3	16°C (24°F)
	19.0	(64,800)	4.85	16.0	17.0	3.7	
	21.0	(71,500)	4.4	14.5	19.0	4.2	
	23.0	(78,500)	5.2	17.0	16.0	3.5	21°C (38°F)
	24.0	(82,000)	5.0	16.5	16.5	3.6	

Table 5: Nominal Weight of Appliance

DRY WEIGHT OF APPLIANCE	96kg	(212lb)
PACKAGED WEIGHT OF APPLIANCE	98kg	(216lb)
MAXIMUM INSTALLATION WEIGHT	156kg	(344lb)

Table 6:

SPECIFICATIONS	
CENTRAL HEATING FLOW	22 mm Copper Tube
CENTRAL HEATING RETURN	22 mm Copper Tube
COLD WATER MAINS INLET	15 mm Copper Tube
DOMESTIC HOT WATER OUTLET	22 mm Copper Tube
GAS INLET	22 mm Copper Tube
PRESSURE RELIEF VALVE DRAIN CONNECTION	22 mm Copper Tube
OVERALL CASING HEIGHT	860 mm (33.8 in.)
OVERALL CASING WIDTH	600 mm (23.6 in.)
OVERALL CASING DEPTH	600 mm (23.6 in.)

Table 7

SPECIFICATIONS	
PRIMARY CAPACITY INCLUDING HEATBANK	60 Litres (13.2 galls.)
MAXIMUM INLET DOMESTIC WATER PRESSURE	10 Bar (150 psi)
MINIMUM INLET DOMESTIC WATER PRESSURE (WORKING) FOR MAXIMUM HOT WATER FLOW	1.0 Bar (15.0 psi)
MINIMUM INLET DOMESTIC WATER PRESSURE (WORKING) TO OPERATE THE APPLIANCE	0.1 Bar (1.5 psi)
MAXIMUM CENTRAL HEATING FLOW TEMPERATURE	Nominally 82°C (180°F)
MAXIMUM STATIC HEAD – PRIMARY	30m (97ft.)
MINIMUM STATIC HEAD – PRIMARY	1.0m (3.3ft.)
OUTPUT TO DOMESTIC HOT WATER	24.0kW (82,000 Btu/h)
OUTPUT TO CENTRAL HEATING	8.8 to 24.0kW (Adjustable) (30,000 to 82,000 Btu/h)
MAXIMUM DOMESTIC HOT WATER FLOW RATE FROM THE APPLIANCE	Nominally 18.0 l/min. ± 15% (3.96 gall/m)
EQUIVALENT HOT WATER FLOW RATE FROM THIS APPLIANCE TO GIVE 30°C RISE (SPECIFIC RATE)	20 l/min. (4 gall/m)

Fig. 2. Appliance cabinet dimensions and minimum clearances required.

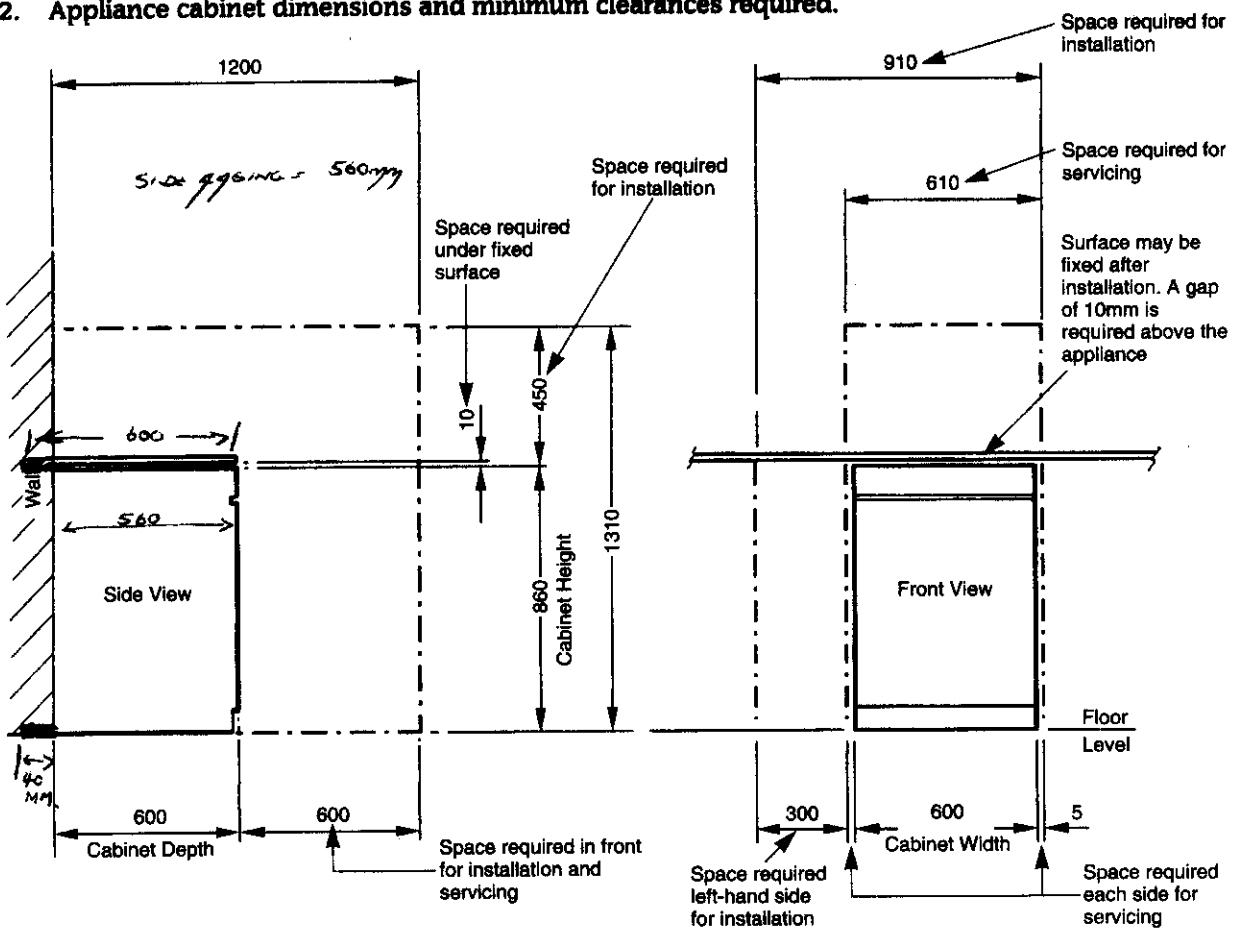
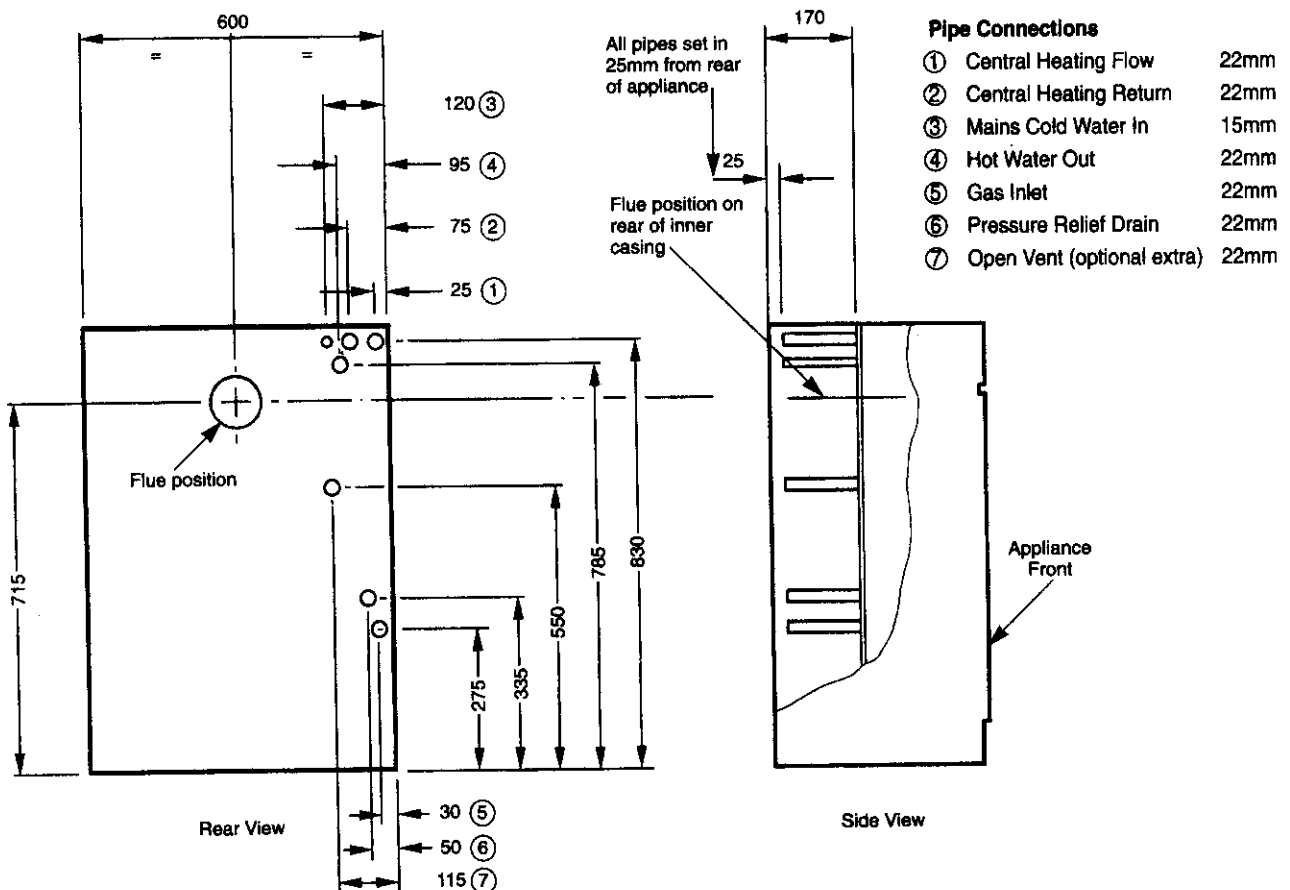


Fig. 3. Appliance pipework connections and flue position.



4. Siting The Appliance

4.1 THE APPLIANCE MAY BE INSTALLED IN ANY ROOM ALTHOUGH PARTICULAR ATTENTION IS DRAWN TO THE REQUIREMENTS OF THE CURRENT I.E.E. WIRING REGULATIONS AND, IN SCOTLAND, THE ELECTRICAL PROVISIONS OF THE BUILDING REGULATIONS APPLICABLE IN SCOTLAND, WITH RESPECT TO THE INSTALLATION OF APPLIANCES IN ROOMS CONTAINING BATHS OR SHOWERS.

WHERE A ROOM SEALED APPLIANCE IS INSTALLED IN A ROOM CONTAINING A BATH OR SHOWER, ANY ELECTRICAL SWITCH OR APPLIANCE CONTROL USING MAINS ELECTRICITY MUST NOT BE ABLE TO BE TOUCHED BY A PERSON USING THE BATH OR SHOWER.

4.2 The appliance is not suitable for external installation.

4.3 The appliance is floor standing, the floor must be firm and level. Special floor protection is not required.

4.4 The floor must be capable of supporting the weight of the appliance. Refer to Section 3 Table 5.

4.5 If the appliance is to be fitted in a timber framed building refer to the British Gas publication "Guide for Gas Installations in Timber Framed Housing".

4.6 The following clearances must be available for installation and for servicing, (See Fig. 2).

	Installation	Service
Above the appliance	450 mm	10 mm
In front	600 mm	600 mm
Right side	5 mm	5 mm
Left side	300 mm	5 mm

4.7 The appliance can be installed in a cupboard to be used for airing clothes provided that the requirements of BS 6798 and BS 5440:2 are strictly followed.

4.8 The airing space must be separated from the boiler space by a perforated non-combustible partition. Expanded metal or rigid wire mesh are acceptable provided that the major dimension is less than 13mm. See BS 6798:1987.

4.9 No combustible surface must be within 75mm of the casing. See BS476:4.

4.10 The distance between the inner face of a cupboard door and the cabinet front should not be less than 75mm.

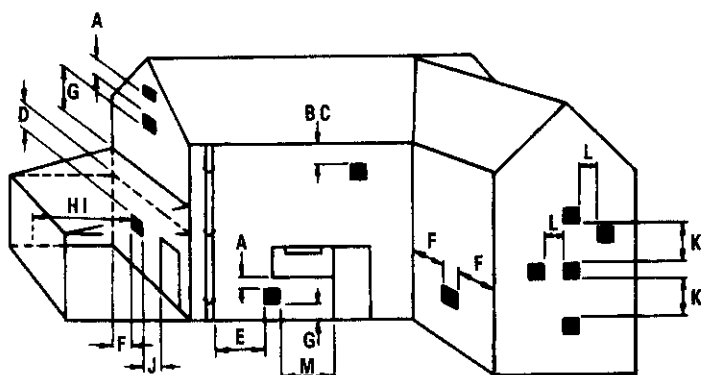
4.11 Always consider the possible need to disconnect the pipes from the appliance after installation.

4.12 The appliance has a vertical flue option. Refer to Section 5c.

4.13 L.P.G. Installation: The appliance shall not be installed in a room or internal space below ground level when it is intended for use with L.P.G. This does not preclude the installation into room, which are basements with respect to one side of the building but open to ground level on the opposite side.

Fig. 4. Siting of the flue terminal.

MINIMUM SITING DIMENSIONS FOR POSITIONING THE BALANCED FLUE TERMINAL



TERMINAL POSITION	MIN. DISTANCE
A- directly below an openable window or other opening e.g. air brick.	300 mm (12 in.)
B- Below gutters, soil pipes or drain pipes.	75 mm (3 in.)
C- Below eaves.	25 mm (1 in.)
D- Below balconies or car port roof.	25 mm (1 in.)
E- From vertical drain pipes and soil pipes.	25 mm (1 in.)
F- From internal or external corners.	25 mm (1 in.)
G- Above ground, roof or balcony level.	300 mm (12 in.)
H- From a surface facing a terminal.	600 mm (24 in.)
I- From a terminal facing a terminal	1200 mm (47 in.)
J- From an opening in a car port (e.g. door window) into dwelling.	1200 mm (47 in.)
K- Vertically from a terminal on the same wall.	150 mm (6 in.)
L- Horizontally from a terminal on the same wall.	300 mm (12 in.)
M- From door, window or air vent (achieve where possible).	150 mm (6 in.)

5a. Flue Terminal Position

Note: Some flue options must have fitted a flue restrictor ring of the correct size. For more information refer to Section 11.3 page 20 and Fig. 24.

5a.1 The flue must be installed as specified by BS 5440:Part 1.

5a.2 TERMINAL POSITION. See Fig. 4.

5a.3 The terminal must not cause an obstruction nor the discharge a nuisance.

5a.4 If the terminal is fitted within 850mm of a plastic or painted gutter or within 450mm of painted eaves then an aluminium shield at least 750mm long should be fitted to the underside of the gutter or painted surface.

5a.5 If a terminal is fitted less than 2 metres above a surface to which people have access then a guard must be fitted. Refer to Section 2, Item 2.9.

5a.6 The terminal guard must be evenly spaced about the flue terminal and fixed to the wall using plated screws

5a.7 In certain weather conditions a terminal may steam and siting where this could cause a nuisance should be avoided.

5a.8 Take care to ensure that combustion products do not enter ventilated roof voids.

NB. For siting the Vertical Balanced Flue Terminal refer to the Installation and Servicing Instructions packed with the vertical flue kit.

5b. Flue Options

See Fig. 5.

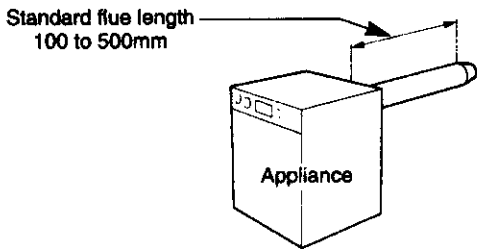
Two standard flue kits are available for the appliance:

5b.1 STANDARD HORIZONTAL REAR FLUE KIT.

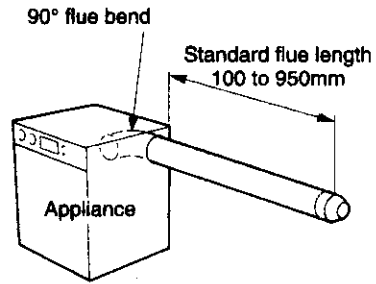
See Fig. 5 Frame 1.

The maximum flue length when measured from the REAR of the appliance casing is 500 mm. The flue will project horizontally only from the rear of the appliance.

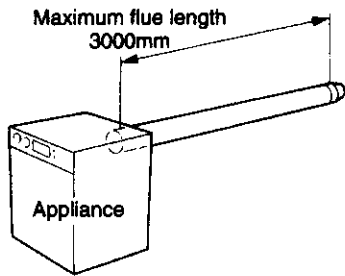
Fig. 5. Flue options.



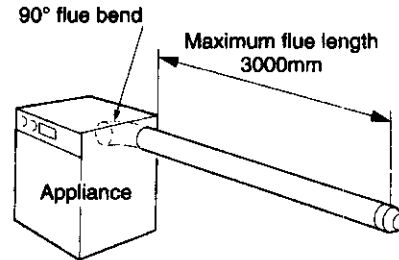
Frame 1: Flue Option 1. Standard Horizontal Rear Flue.



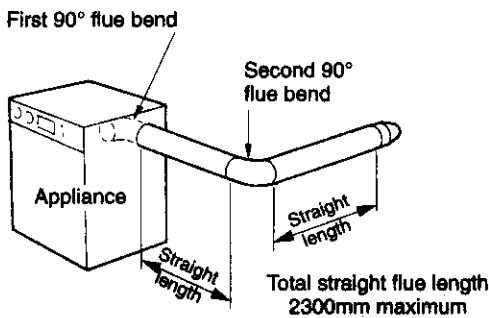
Frame 2: Flue Option 2. Standard Horizontal Side Flue.



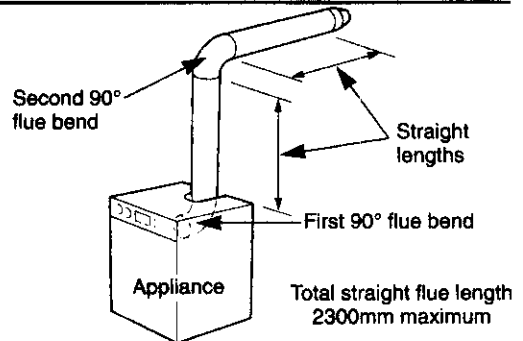
Frame 3: Flue Option 3. Extension Horizontal Rear Flue.



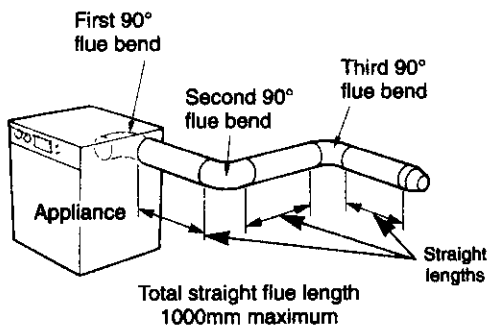
Frame 4: Flue Option 4. Extension Horizontal Side Flue.



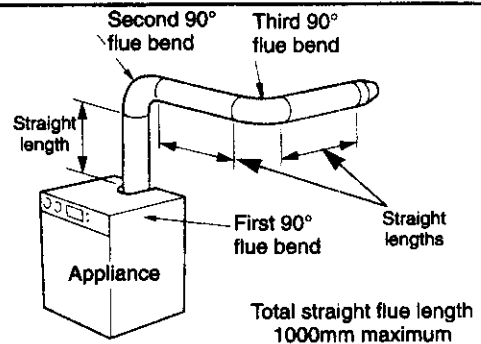
Frame 5: Flue Option 5. Extension Horizontal Flue using a second 90° Flue Bend.



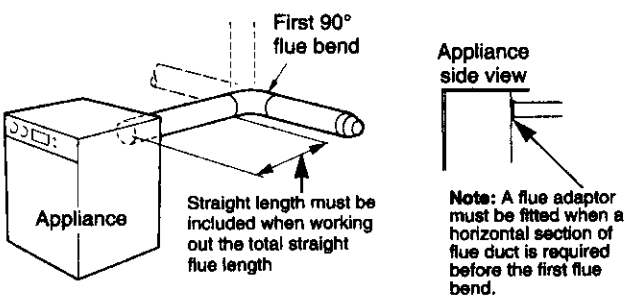
Frame 6: Flue Option 6. Extension upwards and Horizontal Flue using a second 90° Flue Bend.



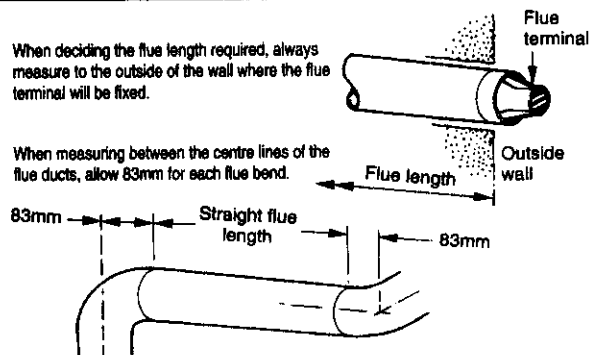
Frame 7: Flue Option 7. Extension Horizontal Flue using a second and third 90° Flue Bend.



Frame 8: Flue Option 8. Extension upward and Horizontal Flue using a second and third 90° Flue Bend.



Frame 9: Flue Option 9. To fit a horizontal section of flue duct before the first 90° Flue Bend for Flue Options 2, 4, 5, 6, 7 and 8.



Frame 10

The following items are included in this flue kit:

- 1 – Air duct 700 mm long (including fixing length inside appliance cabinet).
- 1 – Flue duct 700 mm long (including fixing length inside appliance cabinet).
- 1 – Balanced Flue Terminal.
- 1 – Flue Adaptor.
- 2 – Fixing screws.
- 1 – Tube of silicone sealant.

5b.2 Standard Horizontal Side Flue Kit. See Fig. 5 Frame 2. The maximum flue length when measured from the **RIGHT** or **LEFT-HAND** side of the appliance cabinet is 950 mm. The flue will project horizontally from the right or left-hand side of the appliance.

The following items are included in this flue kit:

- 1 – Air duct 1170 mm long (including fixing length inside appliance casing.)
- 1 – Flue duct 1170 mm long (including fixing length inside appliance casing.)
- 1 – Balanced Flue Terminal.
- 1 – 90° Flue Bend.
- 4 – Fixing screws.
- 1 – Tube of silicone sealant.

Notes:

a). The following items referred to in this section are supplied as optional extras. The site must be surveyed and the items made available before the installation is commenced. When ordering extras the relevant part numbers must be quoted:

Optional Extra	Part Number
Extension Flue kit 1000 mm long	ZKGAS177X
Flue Adaptor.	SSA5707/2
90° Flue Bend	SSA5870/2
Flue Spacer	ZGCLP054X
Air Duct Support Bracket	SSA6854/2

b). When determining the flue length required, always measure to the outside of the wall where the flue terminal will be fixed. See Fig. 5. Frame 10.

c). When measuring between the centre lines of flue ducts, allow 83 mm for each flue bend. See Fig. 5. Frame 10.

5b.3 EXTENSION HORIZONTAL REAR FLUE.

Extension flue lengths may be added to the rear of the appliance. The flue must be assembled from the Standard Horizontal Rear Flue Kit and extension flue kits. The flue may be any length providing it does not exceed 3000 mm measured from the rear of the appliance cabinet. See Fig. 5. Frame 3.

The flue assembly must remain horizontal when installed.

5b.4 EXTENSION HORIZONTAL SIDE FLUE.

Extension flue lengths may be added horizontally to the right or left hand side of the appliance. The flue must be assembled from the standard flue supplied, one 90° flue bend and extension flue kits. The flue may be any length providing the total straight length does not exceed 3000 mm. See Fig. 5. Frame 4.

The flue assembly must remain horizontal when installed.

5b.5 EXTENSION HORIZONTAL FLUE USING A SECOND 90° FLUE BEND.

Extension flue lengths may be added horizontally and include a second 90° flue bend. The flue system must be assembled from the Standard Horizontal Side Flue Kit, extension flue kits and a second 90° flue bend. The flue may be any length providing the total straight length does not exceed 2300 mm when measured from the side of the appliance cabinet. See Fig. 5. Frame 5.

The flue including the second 90° flue bend may be positioned in any horizontal direction to suit the installation.

5b.6 EXTENSION UPWARDS AND HORIZONTAL FLUE USING A SECOND 90° FLUE BEND.

Extension flue lengths may be added upwards and horizontally and include a second 90° flue bend. The flue system must be assembled from the Standard Horizontal Side Flue Kit, extension flue kits and a second 90° flue bend. The flue may be any length

providing the total straight length does not exceed 2300 mm when measured from the appliance cabinet. See Fig. 5. Frame 6.

The horizontal section of flue and second 90° flue bend may be positioned in any horizontal direction to suit the installation.

5b.7 EXTENSION HORIZONTAL FLUE USING A SECOND AND THIRD 90° FLUE BEND.

Extension flue lengths may be added horizontally and include a second and third 90° flue bend. The flue system must be assembled from the Standard Horizontal Side Flue Kit, extension flue kits, second and third 90° flue bends. The flue may be any length providing the total straight length does not exceed 1000 mm when measured from the appliance cabinet. See Fig. 5. Frame 7.

The flue including the second and third 90° flue bends may be positioned in any horizontal direction to suit the installation.

5b.8 EXTENSION UPWARDS AND HORIZONTAL FLUE USING A SECOND AND THIRD 90° FLUE BEND.

Extension flue lengths may be added upwards and horizontally and include a second and third 90° flue bend. The flue system must be assembled from the Standard Horizontal Side Flue Kit, extension flue kits, a second and third 90° flue bend. The flue may be any length providing the total straight length does not exceed 1000 mm when measured from the appliance cabinet. See Fig. 5. Frame 8.

The horizontal section of flue, second and third 90° flue bend may be positioned in any horizontal direction to suit the installation.

5b.9 EXTENSION HORIZONTAL FLUE FITTED BEFORE THE FIRST 90° FLUE BEND.

For Flue Options 2, 4, 5, 6, 7 and 8.

It may be required, because of site conditions, to fit a straight section of flue duct before the first 90° flue bend. A flue adaptor is required.

IMPORTANT: This section of flue duct must be included when working out the total straight flue length for each Flue Option. See Fig. 5. Frame 9.

5c. Vertical Flue System

5c.1. A vertical balanced flue system with a length of between 100 mm and 4500 mm can be fitted to the appliance.

5c.2. Instructions describing the fitting of the vertical balanced flue system are packed with the vertical flue terminal assembly.

5c.3. The maximum overall height of the vertical balanced flue measured from the top of the appliance cabinet to the top of the vertical balanced flue terminal is 5500 mm.

6. Air Supply

6.1 The appliance does not require a separate vent for combustion air.

6.2 Installations in cupboards or compartments require permanent vents for cooling purposes, one at high level and one at low level, either direct to outside air or to a room. Both vents must pass to the same room or be on the same wall to the outside air.

6.3 There must be sufficient clearance around the appliance to allow proper circulation of ventilation air. Refer to Section 4. Item 4.6.

6.4 The minimum free areas required are given below:

POSITION OF VENTS	AIR FROM THE ROOM	AIR DIRECT FROM OUTSIDE
HIGH LEVEL	264 cm ² (41 in ²)	132 cm ² (20.5 in ²)
LOW LEVEL	264 cm ² (41 in ²)	132 cm ² (20.5 in ²)

6.5 Refer to BS 6798 and BS 5440:2 for additional information.

7. Sealed System

See Fig. 6 and 7.

7.1 The system must comply with the requirements of BS 6798 and BS 5449:1.

7.2 The appliance must not be operated without the system being full of water, properly vented and pressurised.

7.3 The safety valve operates at 3bar (45lb/in²). The discharge must be directed away from electrical items or where it might be a hazard to the user.

7.4 The pressure gauge indicates the system pressure which must be maintained.

7.5 The 12 litre expansion vessel is charged to 0.5 bar and is suitable for a static head of 5m (17.5ft). The pressure can be increased if the static head is greater than 5m (17.5ft).

7.6 With an initial system pressure of 0.5 bar, a system capacity of about 104 litres can be accommodated. Refer to BS 7074 Part 1 for more information.

7.7 The filling point must be at low level. See Fig 6.

7.8 Water loss must be replaced. See Fig 7. The connection

should be made in the central heating return as close to the appliance as possible.

7.9 The make-up vessel must be fitted with a non-return valve.

7.10 Repeated venting loses water from the system. It is essential that this water is replaced and the system pressure maintained.

7.11 There must be no connection to the mains water without the authority of the local Water Company.

7.12 The pump is set at maximum and must not be adjusted.

7.13 Connections in the system must resist a pressure of up to 3 bar.

7.14 Radiator valves must conform to BS 2767(10): 1972.

7.15 Other valves used should conform to the requirements of BS 1010.

7.16 To make use of the extra heat available from the appliance at the end of any demand, it is recommended that a single small radiator be left permanently open.

7.17 If it is required to use the appliance for Domestic Hot Water before the Central Heating Circuit is connected a 22 mm copper by-pass must be connected between the Central Heating Flow and Central Heating Return. Refer to Section 11.

Fig. 6. Sealed primary water system.

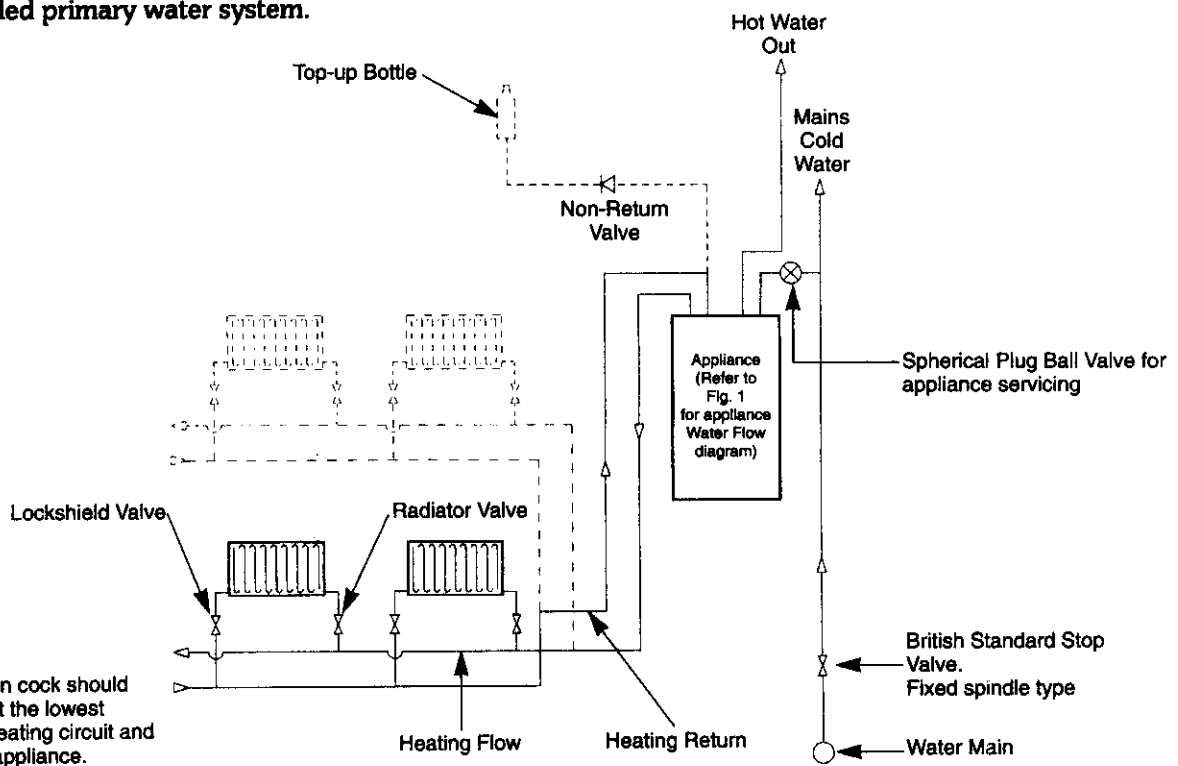
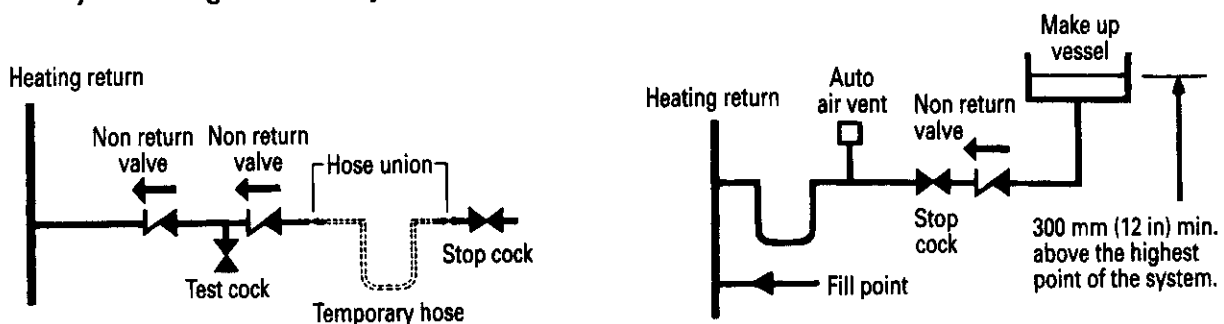


Fig. 7. System filling and make-up.



8. Open Vent Primary System

See Fig. 8.

8.1 The appliance is supplied suitable for connection to a sealed system. If it is to be used with an open vent system then the instructions given below must be followed.

8.2 A 22 mm preformed combined feed and vent pipe available as an optional extra must be connected to the appliance. See Section 11.3 and Fig. 18.

Note: Refer to Section 2 – Table 4, for the sizes of the flow and return pipework.

8.3 The feed and expansion cistern should be arranged so that a minimum static head of 1.0m (39 in) above the top of the appliance or above the highest point in the heating circuit, whichever is the highest, is achieved. See Fig. 8.

8.4 The feed and vent pipe must rise continuously from the appliance to the feed and expansion cistern.

8.5 A safety valve is not required on an open vented system. With the safety valve left in position a pipe must be fitted which terminates such that any discharge does not cause a hazard to the occupants or damage to electrical components.

8.6 Air within the appliance will be expelled via the feed and vent connection or dissipated into the rest of the system which must be fitted with manual air vents at any high point.

8.7 The pump is set to maximum and must not be reset.

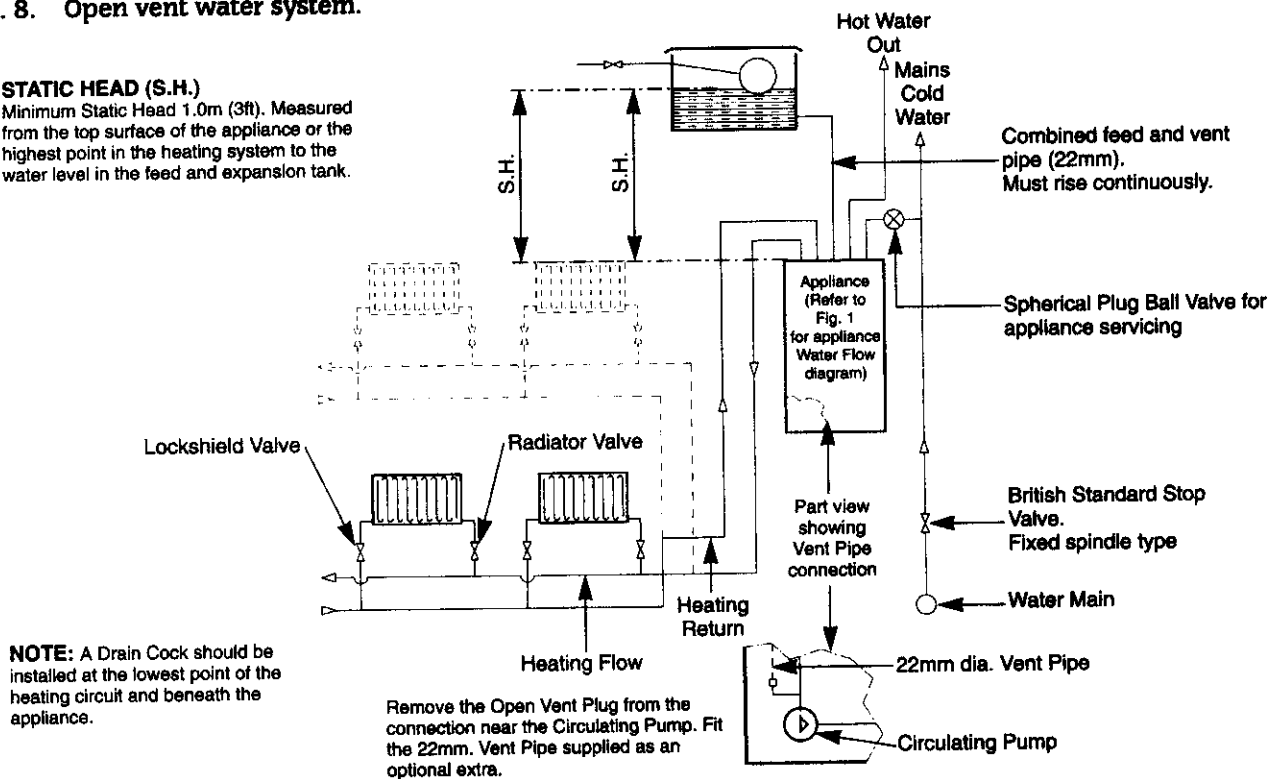
8.8 To make use of the extra heat available from the appliance at the end of any demand, it is recommended that a single small radiator be left permanently open.

8.9 If it is required to use the appliance for Hot Water before the Central Heating Circuit is connected a 22 mm copper by-pass must be connected between the Central Heating Flow and Central Heating Return. Refer to Section 11.

Fig. 8. Open vent water system.

STATIC HEAD (S.H.)

Minimum Static Head 1.0m (3ft). Measured from the top surface of the appliance or the highest point in the heating system to the water level in the feed and expansion tank.



9. Domestic Water Supply

9.1 The final 600mm of the mains cold water connection to the appliance should be made in copper tube only.

9.2 The appliance is suitable for a mains pressure of up to 10 bar (150 lb/in²).

9.3 The appliance is fitted with a mains supply isolating valve.

9.4 The maximum hot water flow rate is 18 l/m ± 15% (3.9 gall/min).

9.5 In winter, when the mains inlet water temperature is lower a reduced flow rate, achieved at the tap, will increase the required delivery temperature.

9.6 It is suggested that long pipe runs to the taps or shower should be insulated to prevent the rapid cooling of hot water after the tap or shower has been turned off.

9.7 Hot and cold taps and mixing valves used with this appliance must be suitable for operating at a pressure of up to 10 bar (150 lb/in²).

9.8 Anti-syphonage arrangements are normally not necessary. See paragraph 9.10 following.

9.9 Thermostatically controlled or pressure equalising shower valves will guard against the flow of water at too high a temperature.

9.10 The head of a loose head shower must not fall closer than 25mm (1in) above the top edge of the bath to prevent its immersion in bath water. Alternatively the shower must be fitted with an anti-syphonage device at the point of the flexible hose connections.

9.11 The supply of hot and cold mains water direct to a bidet is permitted, subject to local Water Company requirements, provided that the bidet is of the over-rim flushing type. The outlet(s) should be shrouded and unable to have any temporary hand held spray attached. No anti-syphonage arrangements are necessary.

9.12 As the maximum temperature of the hot water heat exchanger is limited by the control circuit, there is normally no need for water treatment to prevent scale accumulation. In exceptional circumstances a device to prevent scale formation can be fitted.

9.13 Installation of a scale inhibitor assembly should be in accordance with the requirements of the local Water Company. An isolating valve to allow servicing should be fitted.

9.14 The water hardness can be determined using a standard test paper or by reference to the local water company.

9.15 A miniature expansion vessel (Zilmet R¹/₂, 160ml, 15bar), available as an optional extra, may be fitted into the domestic water supply circuit if there is evidence of water hammer.

To fit the expansion vessel :

- (i) Remove the front cover. Refer to Section 14 paragraph 14.2a, and Fig. 14.
- (ii) Unscrew the hexagon headed screw located below the flow switch. See Fig. 16.
- (iv) Screw the expansion vessel into the connection using thread sealant compatible with potable water.

9.17 **NOTE:** If it is required to use the appliance for Hot Water before the Central Heating Circuit is connected a 22 mm copper by-pass must be connected between the Central Heating Flow and Return. Refer to Section 11.

10. Electrical

Refer to Figs. 9, 10, 11 and 12.

10.1 Mains Supply 230V ~ 50Hz 270 watts. External Fuse 3A. Internal Fuse 3.15A fast blow 20mm long.

10.2 The electrical supply must be connected by a qualified electrician.

10.3 A fused double pole isolator with a contact separation of 3mm in all poles MUST be used to supply the appliance and controls.

10.4 The appliance must be earthed.

10.5 Mains Cable: PVC insulated 0.75mm² (24x0.20mm) to BS 6500 Table 16. If a new cable is needed it must be connected into the terminals marked L (Brown or Red lead), N (Blue or Black lead) and \oplus (Green/Yellow or Green) and be held securely in the cable clamp. Ensure the Earth conductor is longer than the current carrying conductor, so that if the cable slips in its

anchorage, the current carrying conductors become taut before the Earth conductor. For access refer to Section 14.

10.6 The wiring between the appliance and the electrical supply shall comply with current IEE Wiring Regulations, and any local regulations which apply.

10.7 If a room and/or frost thermostat is to be fitted refer to Fig. 11.

10.8 The thermostats must be suitable for use on mains voltage.

10.9 A fascia mounted programmer is available as an optional extra. Instructions are supplied with the programmer kit. See Fig. 12.

10.10 A timeswitch or programmer can be fitted externally to the appliance.

10.11 SAFETY CHECK.

After installation or in the event of an electrical fault the electrical system shall be checked for short circuits, fuse failure, incorrect polarity of connections, earth continuity and resistance to earth.

Fig. 9. Wiring diagram.

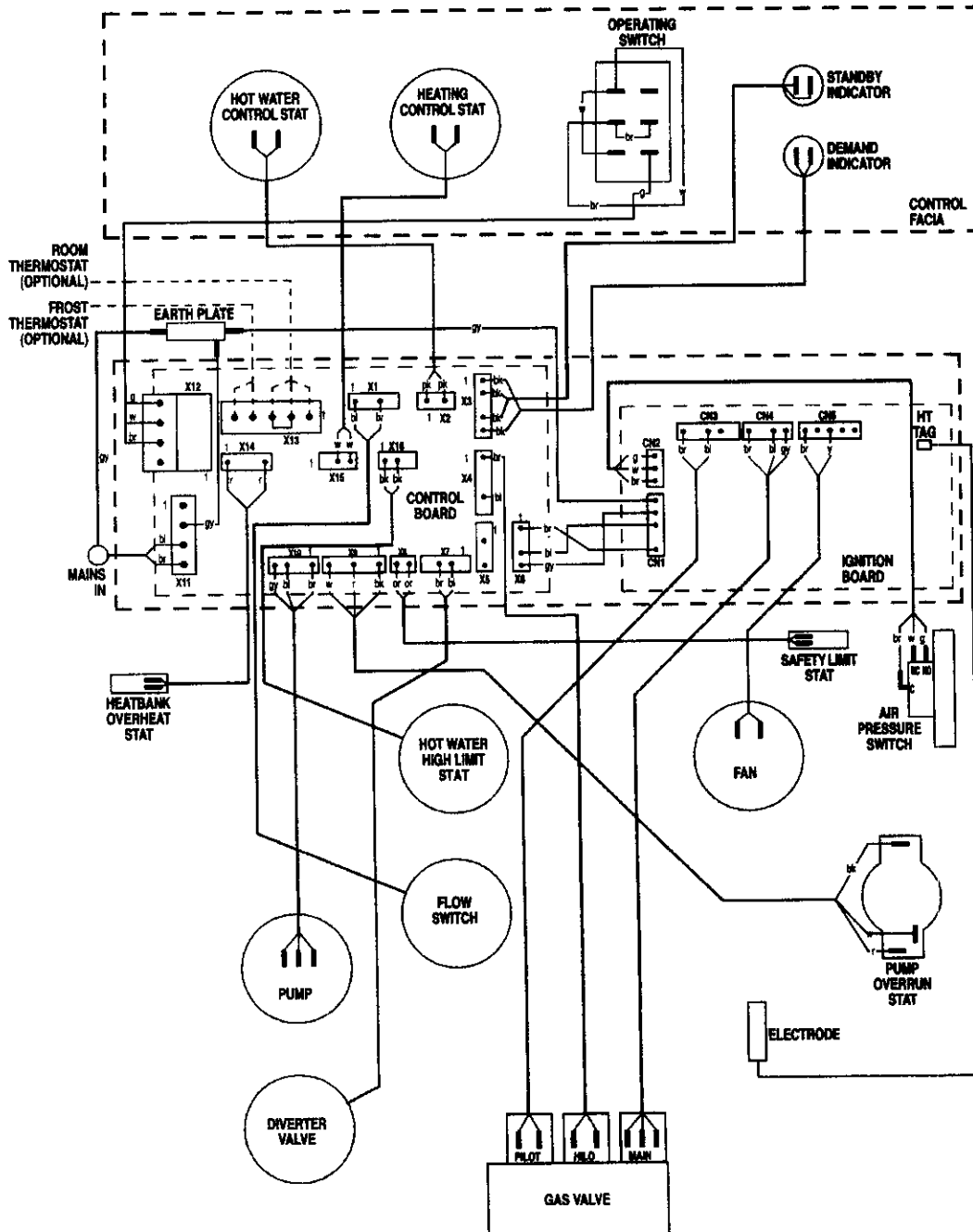


Fig. 10. Functional flow diagram.

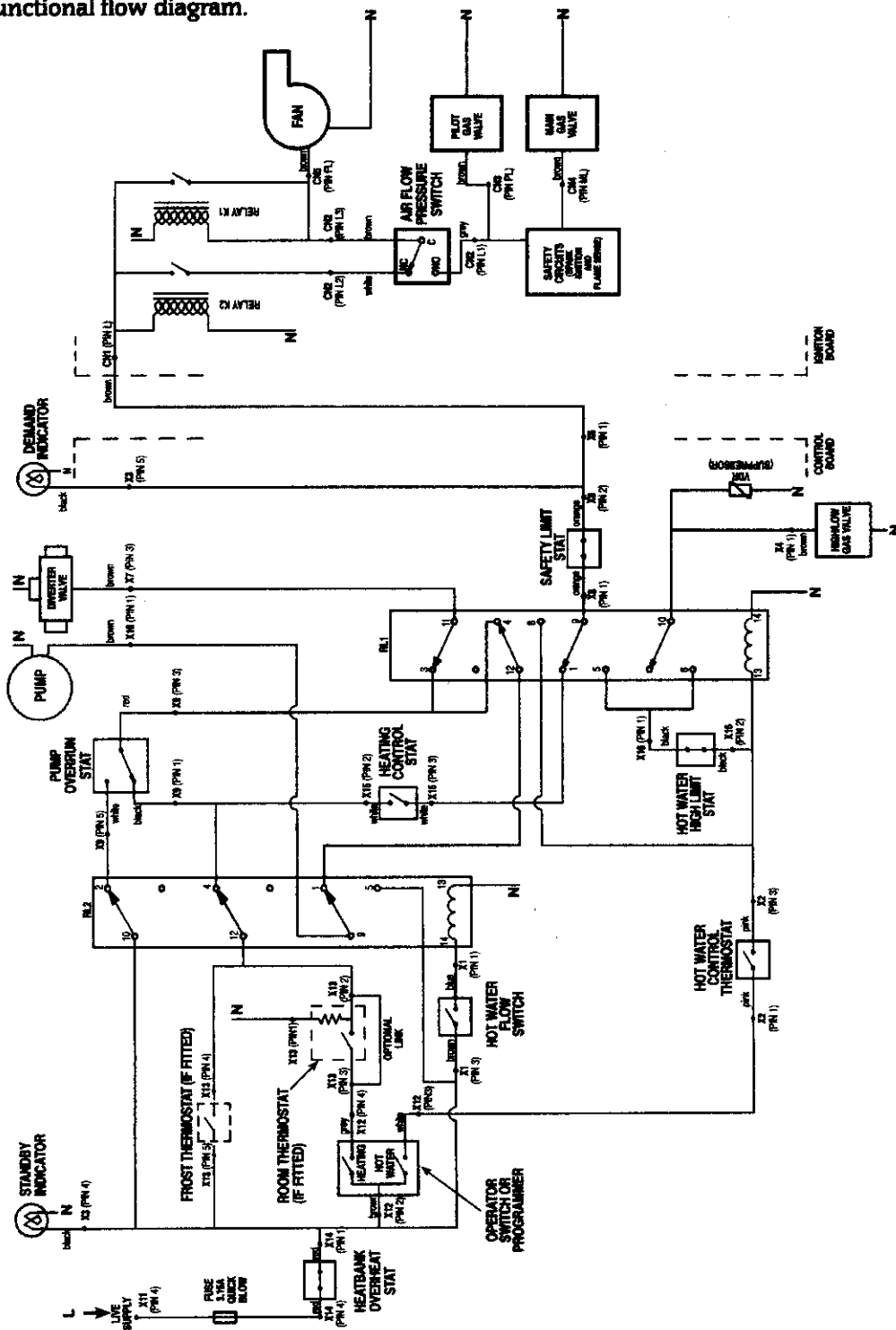


Fig. 11. Room/frost thermostats and programmer.

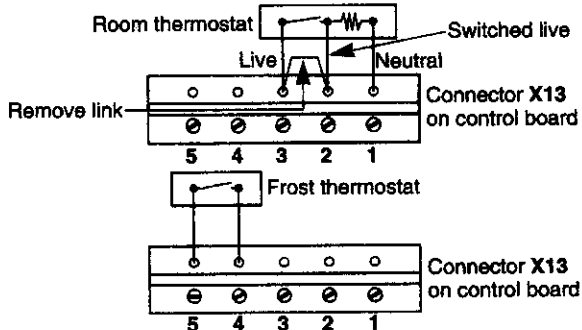
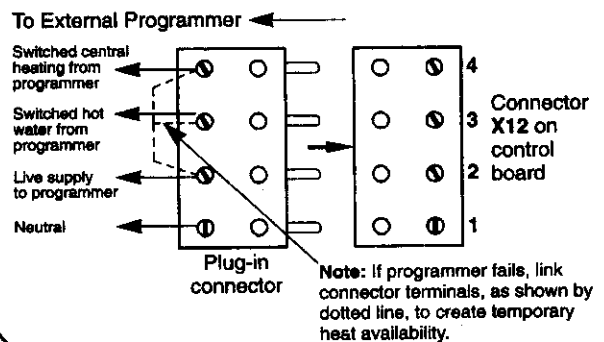


Fig. 12. External programmer connections.



11. Installing The Appliance

The appliance is supplied suitable for fitting to a sealed system. If it is to be fitted to an open vent system refer to paragraph 11.3 and Section 8.

11.1 FLUE OPTIONS: Refer to Section 5b and Fig. 5.

IMPORTANT: Two standard flue kits are available for the appliance:

1) Standard Horizontal Rear Flue Kit.

The maximum flue length when measured from the **REAR** of the appliance casing is 500 mm. See Fig. 5 Frame 1.

2) Standard Horizontal Side Flue Kit.

The maximum flue length when measured from the **SIDE** of the appliance casing is 950 mm. See Fig. 5 Frame 2.

EXTENSION FLUE KITS.

Extension flue kits and 90° flue bends are available to increase the length and redirect the flue as follows:

- From the standard flue length up to 3000 mm straight flue.
- From the standard flue length to up 2300 mm when a second 90° flue bend is required.
- From the standard flue length up to 1000 mm when a second and third 90° flue bend is required.

Refer to Section 3, Table 2 and Section 5b, Flue Options, to determine whether an extension flue kit or kits and an extra 90° flue bend or bends are required.

IMPORTANT: Extension flue kits, extra 90° flue bends, flue adaptor, flue spacer and air duct supports are all optional extras. All the extras required for the installation must be available before continuing. Refer to Section 5b.

VERTICAL BALANCED FLUE OPTION.

A vertical balanced flue option is available. Instructions describing the fitting of the vertical balanced flue system are sent with the vertical flue terminal assembly.

The flue must be installed as specified in BS 5440 Part 1.

11.2 GENERAL FITTING.

The following description covers one method of installation. Extra space may be required for installation if connections are made in a different way.

Compression fittings may be used on all water connections to allow for the fitting of the appliance and servicing.

Pipework must be routed so as not to obstruct access to the circulating pump, diverting valve, gas valve, water to water heat exchanger or heat bank.

Removable sections are provided in the cabinet top panel to facilitate vertical pipe connections and the flue system, if required.

Alternatively, removable sections are provided in the side panels to accommodate the side flue system.

Check the appliance carton contains:

Installer's Instruction Pack.

User's Information Pack.

Hardware Pack with flue restrictor rings.

Appliance.

Carefully remove the appliance from the cardboard package and plinth.

Check the position chosen for the appliance is in accordance with the instructions given in Sections 4 and 5a. Also refer to Fig. 2.

Do not place the appliance in its final position at this stage.

For all flue options from the dimensions given in Fig. 13 carefully mark out:

- the wall with the centre-lines for the Rear Flue centre point position.
- the floor with the base outline of the appliance.

Before continuing with the installation it will be necessary to decide which flue option is suitable. Refer to Section 5b and Fig. 5.

Having decided upon the most suitable flue option for the installation, the position of the hole for the flue must now be marked on the wall/walls.

FLUE OPTION 1. See Fig. 5.

The location of the centre point position for the Rear Flue is obtained from the flue centre-lines previously marked.

This is the Rear Flue centre point position. See Fig. 13.

FLUE OPTION 2. See Fig. 5.

Draw a horizontal line from the Rear Flue centre point position in the appropriate direction along the wall. Check that it remains horizontal. Measure 94 mm from the junction of the walls and make a short vertical line. Extend the horizontal line to intersect the vertical line and mark the position.

This is the Side Flue centre point position. See Fig. 13.

FLUE OPTION 3. See Fig. 5.

The location of the centre point position for the Rear Flue is obtained from the flue centre-lines previously marked.

If the flue duct extends through other walls ensure it remains horizontal.

Measure the rear flue centre point position from the floor and transfer this dimension to the appropriate wall where the flue will terminate. Mark the wall to suit the installation.

This is the Rear Flue Extension centre point position. See Fig. 13.

FLUE OPTION 4. See Fig. 5.

Draw a horizontal line from the Rear Flue centre point position, previously marked, in the appropriate direction along the wall/walls. Ensure it remains horizontal.

If the flue system extends through other walls or the appliance is not installed close to a wall, ensure it remains horizontal. Measure the rear flue centre point position from the floor and transfer this dimension to the appropriate wall where the flue will terminate.

Measure 94 mm from the junction of the walls if the appliance is installed against a wall and make a short vertical line.

If the appliance is **NOT** installed against a wall, measure the distance from the junction of the walls, make a short vertical line to suit the installation. Extend the horizontal line to intersect the vertical line and mark the position.

This is the Side Flue Extension centre point position. See Fig. 13.

FLUE OPTION 5. See Fig. 5.

Draw a horizontal line from the Rear Flue centre point position, previously marked, in the appropriate direction along the wall/walls. Check that it remains horizontal.

If the flue system extends through other walls or the appliance is not installed close to a wall, ensure it remains horizontal. Measure the rear flue centre point position from the floor and transfer this dimension to the appropriate wall as necessary.

Mark the wall where the flue will terminate to suit the installation.

This is the Side Flue Extension centre point position. See Fig. 13.

FLUE OPTION 6. See Fig. 5.

Draw a vertical line upwards from the Rear Flue centre point position previously marked. Extend the line, approximately 250 mm, above the position required for the centre-line of the horizontal flue duct. See Fig. 13.

Mark the position on the vertical line to coincide with the centre-line position of the horizontal duct.

This is the Rear Flue Upwards Extension centre point position. See Fig. 13.

FLUE OPTION 7. See Fig. 5.

Follow the procedure as described in Flue Option 5 ensure the flue system remains horizontal.

Mark the wall where the flue will terminate to suit the installation.

This is the Side Flue Extension centre point position. See Fig. 13.

FLUE OPTION 8. See Fig. 5.

Follow the procedure as described in Flue Option 6 ensure the flue system remains vertical and horizontal.

Mark the wall where the flue will terminate to suit the installation.

This is the Rear Flue Upwards Extension centre point position. See Fig. 13.

FLUE OPTION 9. See Fig. 5.

NOTE: A flue adaptor is required for these flue options.

Refer to Flue Options: 2, 4, 5, 6, 7 and 8.

For installations that require a straight section of flue duct before the first 90° flue bend, follow the procedure as described in the appropriate Flue Option. Mark the flue centre point position.

The position for the hole/holes for the flue should be marked on the wall/walls.

Drill the flue hole/holes 120 mm (4.5in.) diameter, ensure it is horizontal, through the wall/walls.

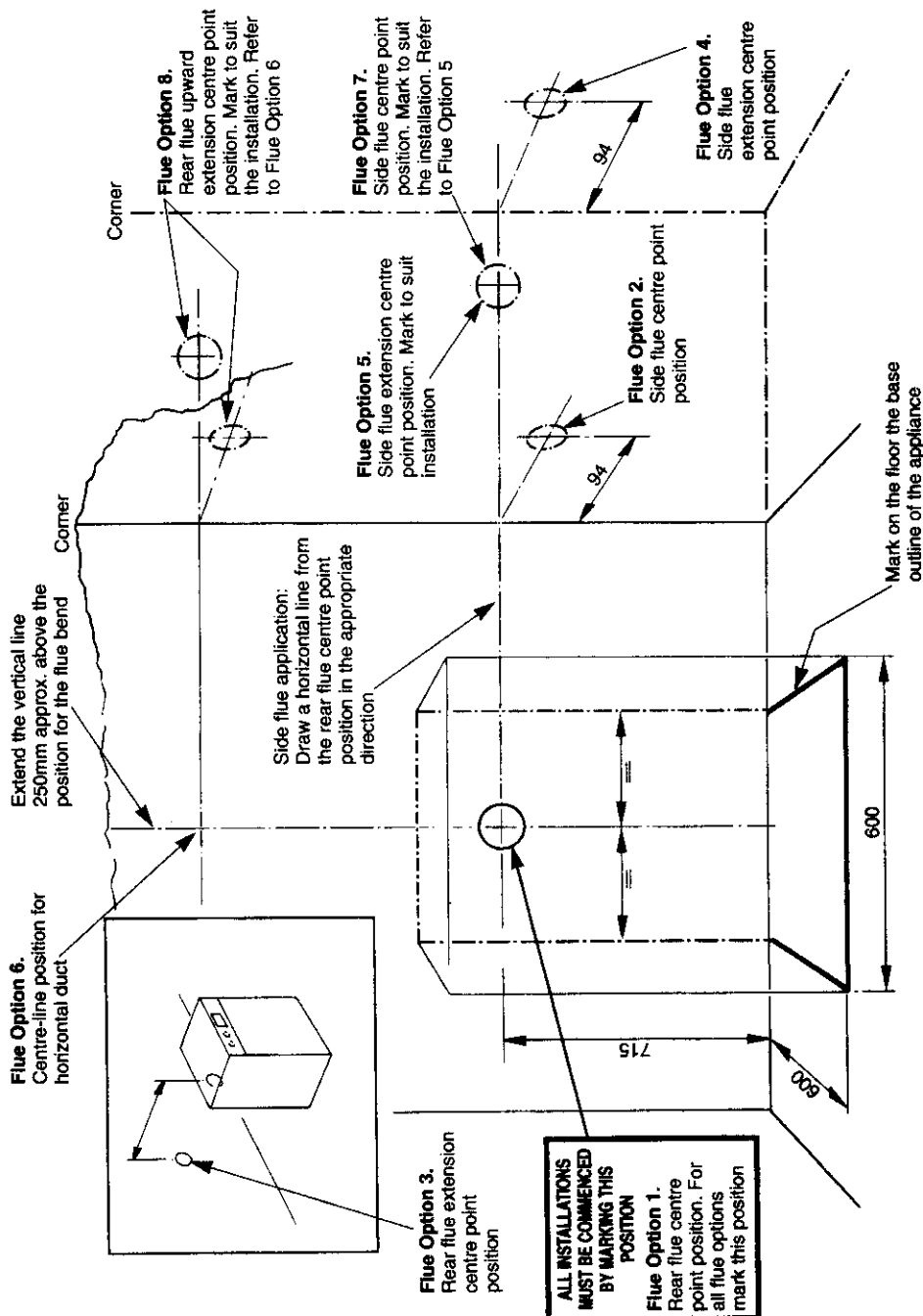
If the internal flue fitting kit is used the hole must be 150 mm (6 in.) diameter.

Depending on site conditions it may be helpful to pre-plumb the appliance before moving it into position. Fitting unions or stub pipes to the appliance pipework should be done at this stage. Refer to Section 3 and Fig. 3.

Pipework must be arranged to clear the flue system. See Section 5b and Fig. 5.

Before the appliance is fitted to the central heating system, thoroughly flush the heating system and the mains cold water supply pipe.

Fig. 13. Marking the flue positions for all flue options.



11.3 FIXING THE APPLIANCE FOR ALL FLUE OPTIONS.

To gain access to the appliance remove the cabinet front and top panel and place the fascia and control box in the Service Position :

- i) Lift the cabinet front panel off the top location and clear the lower return over the kick strip. See Fig. 14.
- ii) Unscrew the two screws securing the fascia to the outer edges of the cabinet accessible under the fascia. Ease the fascia and control box forwards on the slide rails until fully extended. See Fig. 14.
- iii) Lift the assembly upwards through 90° into Service Position. Lodge in the Service Position on the outer locations. See Fig. 14.
- iv) Unscrew the two screws securing the control panel securing the cabinet top panel. See Fig. 14.
- v) Lower the fascia and control box to the fully extended position. Ease the cabinet top panel forwards approximately 20 mm and lift clear of the appliance. See Fig. 14. Return the fascia and control box to the Service Position.

NOTE: The weight of the appliance empty is 96 Kg (212 lb), more than one person will be required when moving the appliance.

When the appliance is flued to the rear ensure the flue position, located on the rear of the appliance, is directly in line with the hole in the wall.

For all other flue applications, the centre of the flue position must be in line with the centre-lines for the Rear Flue position, previously marked. See Fig. 13.

Always support the appliance pipework when tightening.

SEALED SYSTEM.

Connect a 22 mm copper drain pipe to the discharge connection at the rear of the appliance.

Ensure: i) any discharge does **not** fall onto electrical components or where it might be a hazard to the user. See Fig. 15.

ii) the drain pipe must fall throughout its length.

OPEN VENT SYSTEM.

If the appliance is to be used on an open vent system remove the open vent plug from the bottom manifold connection. Fit the 22 mm copper vent pipe, supplied as an optional extra, to this connection. See Fig. 18.

To access the open vent connection remove the pump head.

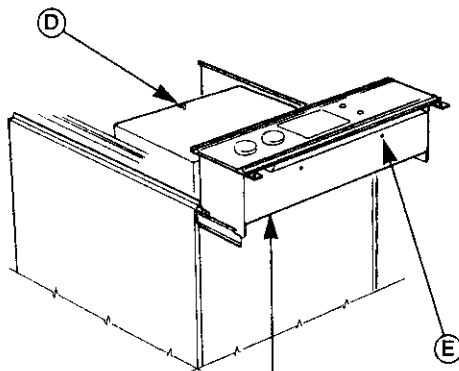
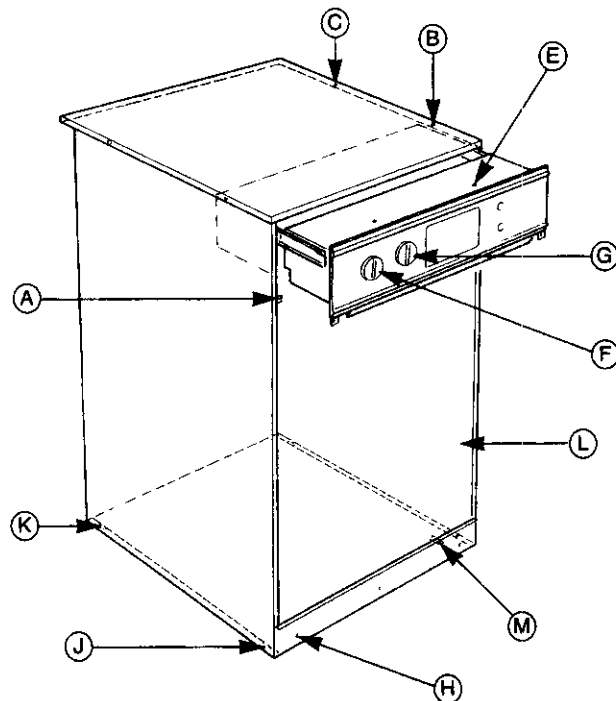
Fig. 14. Cabinet, fascia, control box and flue assembly fixing screws.

To gain access to the appliance:

1. Lift cabinet front panel L off top location and clear the return edge over the kick strip.
2. Remove screws A and ease fascia and control box forwards on the slide rails.
3. Remove screws B, accessible under cabinet top panel. Ease panel forwards clear of location C and remove.
4. Lift fascia and control box through 90° into the service position. Lodge in position on the outer locations.

To gain access to the control box from the service position:

1. Pull the thermostat knobs F and G clear of the fascia.
2. Remove screws E.
3. Ease fascia out of control box. Take care not to over stretch the capillary tubes or wiring.
4. Support the fascia out of the control box when carrying out installation or service operations.



Lift fascia and control box into the service position

- (A) Fascia and control box fixing screws
- (B) Cabinet top panel fixing screws
- (C) Cabinet to panel fixing lugs
- (D) Flue assembly clamping screw
- (E) Fascia fixing screws
- (F) Hot water control thermostat knob
- (G) Heating control thermostat knob
- (H) Kick strip fixing screws
- (J) Cabinet side panel front location
- (K) Cabinet side panel fixing lugs
- (L) Cabinet front panel (no fastenings)
- (M) Primary system drain. Remove kick strip for access

Fig. 15. Discharge pipe connection for sealed system.

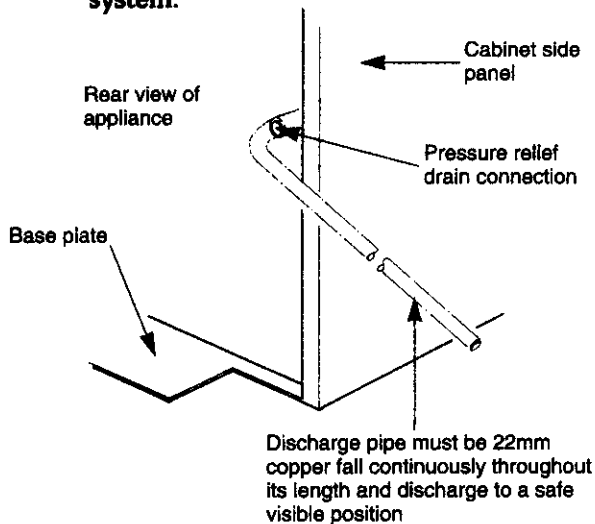


Fig. 17. Central heating flow and return valves, by-pass adjustment, pressure relief and manual air vent.

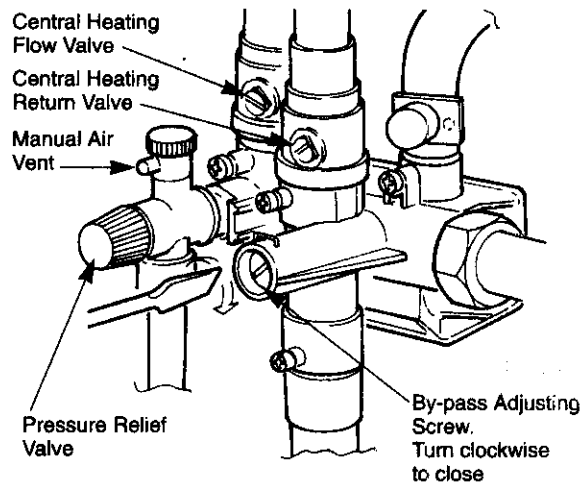


Fig. 16. Layout of components with expansion vessel in service position.

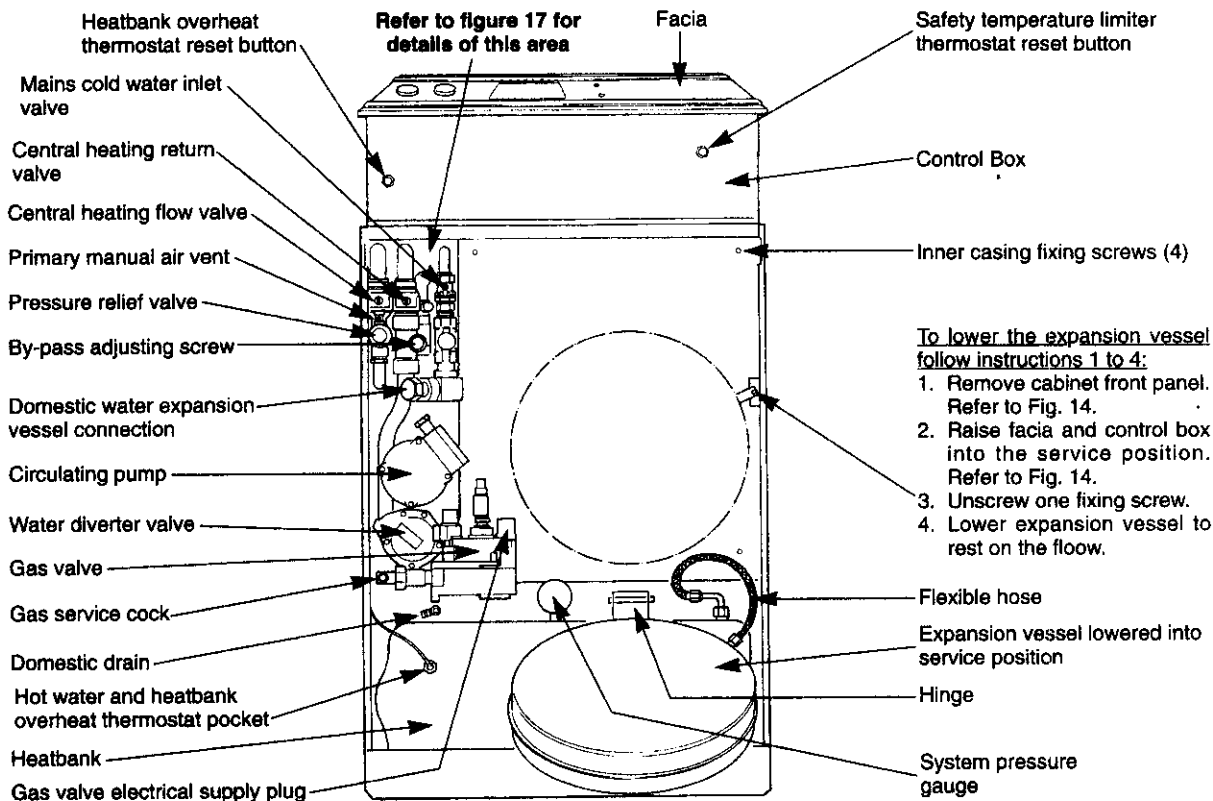
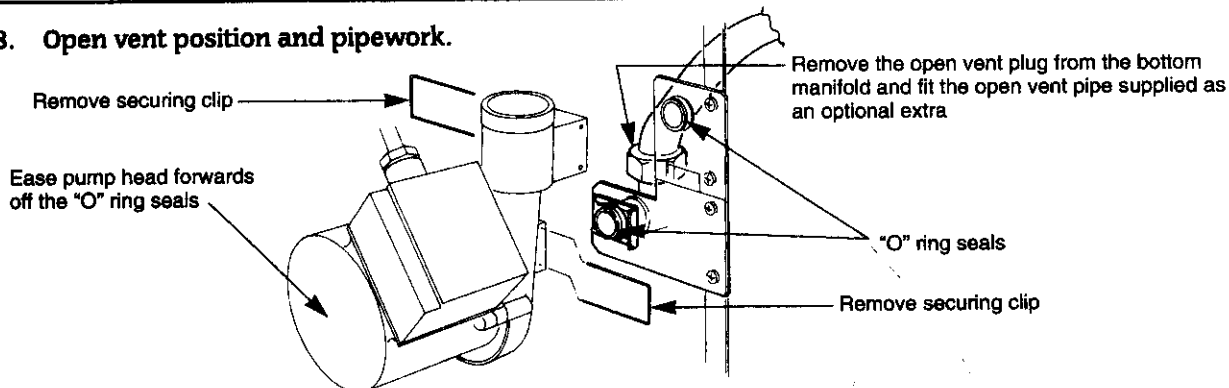


Fig. 18. Open vent position and pipework.



Withdraw the two securing clips from the pump body.

East the pump forwards about 10mm off the "O" ring seals. It is not necessary to disconnect the electrical cable. The cable is sufficient to allow the pump head to rest on top of the appliance. Do not allow the pump head to be suspended by the cable. Secure the pump head. See Figs. 18 and 45.

NOTE: HOT WATER ONLY.

If required the appliance may be used for Hot Water only before the Central Heating is connected. A 22 mm copper by-pass pipe at least 2 metres long must be connected between the Central Heating Flow and Central Heating Return.

NOTE: INTERNAL FLUE FITTING KIT.

If the Internal Flue Fitting Kit is to be used refer to Section 11.7 following describing the assembly of the flue components and fitting the Internal Flue Kit.

GENERAL INFORMATION AND GUIDE LINES FOR ALL FLUE OPTIONS.

Check the contents of the standard flue kit and extension flue kit or kits against the respective packing list.

Remove ALL packaging from the ducts, flue bend or bends and flue terminal assemble.

N.B. The size of the Air Duct is 100 mm diameter and Flue Duct 60 mm diameter.

IMPORTANT: The air duct, flue duct and flue bend/bends are manufactured from aluminium and must be handled with care.

Measure and cut the air and flue ducts to length ensure the cuts are square and free from burrs. Always check the dimensions before cutting the duct.

Do not cut the expanded end of the extension air or flue ducts unless instructed otherwise.

The air and flue ducts supplied with the standard flue kits must be adjacent to the flue adaptor or first flue bend. See Fig. 22 or 23.

The flue adaptor, supplied with the Standard Horizontal Rear Flue Kit, must be fitted for Flue Option 1 and 3. See Fig. 5.

Other flue options, that require a horizontal section of flue duct fitted directly to the rear of the appliance, must be fitted with a flue adaptor. See Fig. 5 Frame 9.

The flue adaptor is also available as an optional extra. See Fig. 5 Frame 9 and refer to Section 5b Option 9.

Fit the flue adaptor into the flue sealing grommet located on the rear of the inner casing. Ensure it is located correctly against the stop. Tighten the clamping screw located on top of the inner casing. See Fig. 14.

When assembling extension air and flue ducts ensure the ducts are correctly located in the socketed joints. See Fig. 23.

Measure the length of the air and flue ducts from the end that will be fixed into the adaptor or flue bend fitted to the appliance.

Before cutting the air or flue ducts ensure the final expanded section is at least 100 mm clear of the flue terminal end or flue bends. If it is not reduce the length of the adjacent air and flue ducts by cutting off from the non-expanded end the amount necessary to give the minimum clearance. See Fig. 23.

Take care to seal all the flue joints where indicated. See Fig. 23.

To seal the flue joints disengage the joint and apply a smear of silicone sealant around the duct. See Fig. 23.

If the flue assembly is longer than 1500 mm the flue duct must be supported within the air duct with a flue spacer available as an optional extra. See Fig. 23.

On final assembly the air duct must be adequately supported. Air duct support brackets are available as an optional extra.

See Section 5b for flue spacer and air duct support bracket part number.

Flue Restrictor Rings are supplied with the hardware pack. A restrictor ring must be fitted into the flue terminal the size will depend on the Flue Option chosen. Refer to the following table for restrictor size. When fixing the flue restrictor ring refer to Fig. 24.

NOTE: For flue options using two or three flue bends the restrictor rings are **NOT** required and **MUST** be discarded.

Flue Option	Flue Length or Total Straight Flue Length (mm)	Flue Restrictor Size mm (dia.)
1	100 to 1000	70
2	100 to 1000	75
3	1000 to 3000	75
4	1000 to 3000	77
5	100 to 2300	Not required
6	100 to 2300	Not required
7	100 to 1000	Not required
8	100 to 1000	Not required

The optimum route for the flue must be measured and sufficient extension flue/flues and other components ordered to install the flue satisfactory.

See Section 5b for parts identification and part numbers.

Because of site conditions it may be necessary to deviate from the following method of installation. Joints must be sealed and fixed where applicable.

Now turn to the appropriate section to install the flue system:

Section 11.4 Standard Horizontal Rear Flue Assembly.

Section 11.5 Standard Horizontal Side Flue Assembly including one 90° Flue Bend.

Section 11.6 Fitting Extension Flues and Extra 90° Flue Bend or Bends.

11.4 STANDARD HORIZONTAL REAR FLUE.

(FLUE OPTION 1). See Fig. 19.

IMPORTANT: (i) A flue restrictor ring **MUST** be fitted in the flue terminal. Refer to Section 11.3 for the correct size and the following instructions for fixing.

See Fig. 24.

(ii) The flue adaptor **MUST** be fitted to connect the flue system to the appliance. See Fig. 21. Refer to Section 11.3 and the following instructions for fixing.

AIR AND FLUE DUCT PREPARATION.

The standard flue assembly, supplied with the appliance, accommodates a maximum flue length of 500 mm measured from the **REAR** of the appliance casing. See Fig. 19.

HORIZONTAL REAR FLUE ASSEMBLY.

Measure accurately the distance from the rear of the appliance, previously marked on the floor, to the outside surface of the wall. Dimension A. See Fig. 19.

$$\text{Air duct length} = A + 188 \text{ mm}$$

$$\text{Flue duct length} = A + 228 \text{ mm.}$$

Cut air and flue ducts to length. Do not cut the drilled end of the air duct.

IMPORTANT: Fit the flue restrictor ring marked **70** into the flue terminal. See Fig. 24.

Assemble the air duct to the flue terminal. Ensure it fits fully into the flue terminal and the restrictor ring is located firmly between the end of the air duct and flue terminal. See Fig. 24.

Drill through the holes in the flue terminal into the air duct with the drill provided. Apply a smear of silicone sealant to the end of the air duct and fix into the flue terminal using the screws provided. See Fig. 21.

Fit the flue duct into the extended end of the flue adaptor, ensure it is located correctly against the stop. Drill two holes through the holes in the flue adaptor. See Fig. 21.

Fit the air duct over the outside of the flue duct and onto the flue adaptor.

Ensure it is located correctly against the stop and the flue duct fits into the flue terminal. Drill two holes through the holes in the air duct. See Fig. 21.

Disconnect the air and flue ducts from the flue adaptor.

Apply a smear of silicone sealant around the outside of the flue duct. Fit the flue duct into the flue adaptor and fix with the screws provided. See Fig. 21.

Apply a smear silicone sealant around the inside of the air duct.

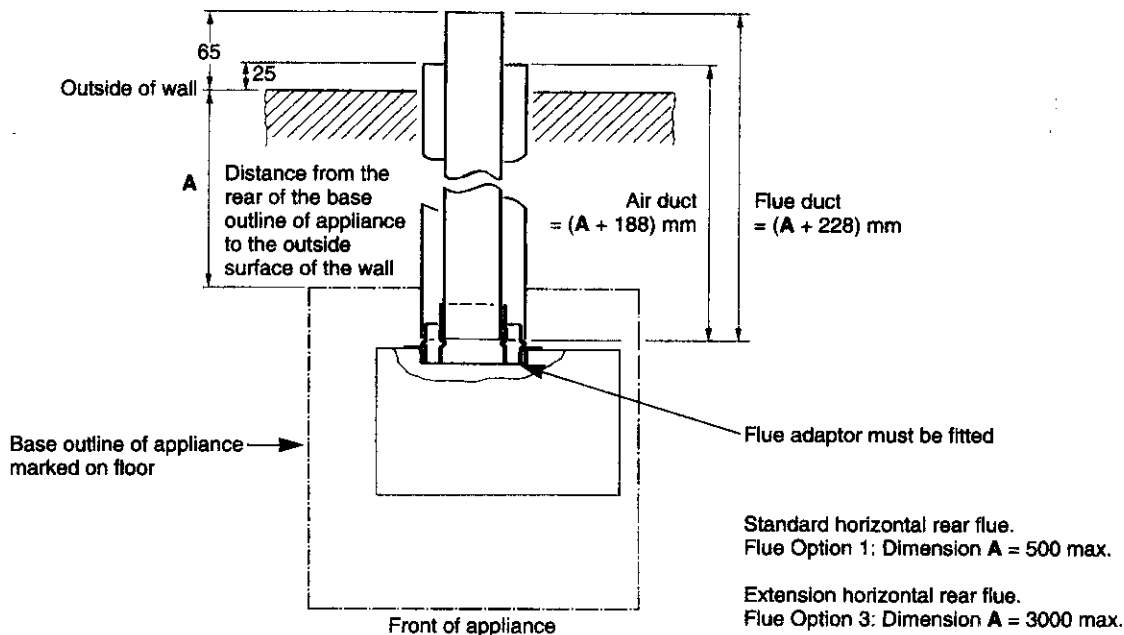
Re-assemble the air duct over the flue duct, ensure the flue duct fits into the flue terminal and the air duct fits over the flue adaptor. Fix with the screws provided.

IMPORTANT: Fit the flue restrictor ring marked 75 into the flue terminal. See Fig. 24.

Assemble the air duct to the flue terminal. Ensure it fits fully into the flue terminal and the restrictor ring is located firmly between the end of the air duct and flue terminal. See Fig. 24.

Drill through the holes in the flue terminal into the air duct with the drill provided. Apply a smear of silicone sealant to the end of the air duct and fix into the flue terminal using the screws provided. See Fig. 22.

**Fig. 19. Flue Option 1: Standard horizontal rear flue.
Flue Option 2: Extension horizontal rear flue.**



The flue system is now assembled. See Fig. 21.

From inside or outside the dwelling pass the flue assembly through the hole in the wall.

Temporarily support the flue system, ensure it is horizontal and will align with the flue position on the rear of the inner casing.

Carefully ease the appliance into the position previously marked. Ensure the flue position located on the rear of the appliance is correctly aligned with the centre-lines of the flue.

Fit the flue adaptor into the flue grommet located on the rear of the inner casing. See Fig. 21.

Ensure it is located correctly against the stop. Fully tighten the clamping screw accessible on top of the inner casing. See Fig. 14.

Note: Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.

Make good the internal and external brickwork or rendering.

11.5 STANDARD HORIZONTAL SIDE FLUE ASSEMBLY INCLUDING ONE 90° FLUE BEND. (FLUE OPTION 2). See Fig. 20.

IMPORTANT: A flue restrictor ring **MUST** be fitted in the flue terminal. Refer to Section 11.3 for the correct size and the following instructions for fixing. See Fig. 24.

HORIZONTAL SIDE FLUE ASSEMBLY.

Measure accurately, the distance from the side of the appliance cabinet, previously marked on the floor, to the outside surface of the wall. Dimension A. See Fig. 20.

Air duct length = $A + 244$ mm.

Flue duct length = $A + 284$ mm.

Cut the air and flue ducts to length. Do not cut the drilled end of the air duct.

Fit the flue duct into the flue bend. Ensure it is located correctly against the stop. Drill two holes through the holes in the flue bend. See Fig. 22.

Fit the air duct over the outside of the flue duct. Ensure it is located correctly against the stop. Drill two holes through the holes in the air duct.

Disconnect the air and flue ducts from the flue bend.

Loosely assemble the flue duct into the air duct and engage in the flue terminal. From outside the dwelling pass the assembly through the hole in the wall.

From inside ease the flue duct sufficiently clear of the air duct to fit the flue bend.

Apply a smear of silicone sealant around the outside of the flue duct. Fit the flue duct into the flue bend and fix with the screws provided. See Fig. 22.

Apply a smear of silicone sealant around the outside of the flue bend.

Assemble the flue bend into the air duct and fix with the two screws provided. Ensure the flue duct is correctly engaged in the flue terminal. See Fig. 22.

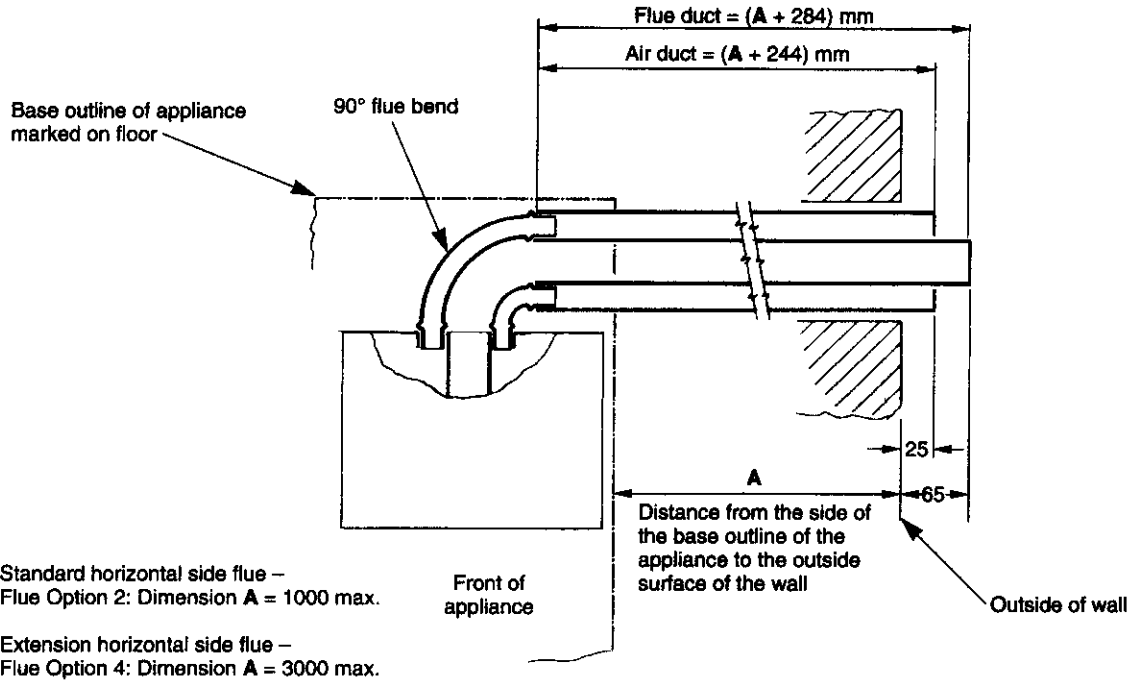
Note: Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.

The flue system is now assembled. See Fig. 22.

Support the flue system temporarily so that it lines up with the flue centre-lines previously marked.

Carefully ease the appliance into the position previously marked. Ensure the flue position, located on the rear of the appliance, is correctly aligned with the flue centre-lines previously marked.

**Fig. 20. Flue Option 3. Standard horizontal side flue.
Flue Option 4. Extension horizontal side flue.**



Fit the flue bend into the flue grommet located on the rear of the inner casing.

Ensure it is correctly located against the stop. Fully tighten the clamping screw accessible on top of the inner casing. See Fig. 14.

Make good the internal and external brickwork or rendering.

11.6 Fitting Extension Flues and Extra 90° Flue Bend or Bends.

The installation can now be continued by following the appropriate instructions for the Flue Option listed in the following table. See also Fig. 5.

Option No.	Flue Option	Section
3	Extension horizontal rear flue	11.6.1
4	Extension horizontal side flue	11.6.2
5	Extension horizontal flue using a second 90° flue bend	11.6.3
6	Extension upwards and horizontal flue using a second 90° flue bend	11.6.4
7	Extension horizontal flue using a second and third 90° flue bend	11.6.5
8	Extension upwards and horizontal flue using a second and third 90° flue bend	11.6.6
9	To fit a horizontal section of flue duct before the first 90° flue bend for flue options 2, 4, 5, 6, 7 and 8.	11.6.7

**11.6.1. EXTENSION HORIZONTAL REAR FLUE.
(FLUE OPTION 3). See Fig. 19.**

- IMPORTANT:**
- i) Length of flue when measured from the rear of the appliance casing must not exceed 3000 mm.
 - ii) A flue restrictor ring **MUST** be fitted into the flue terminal. Refer to Section 11.3 for the correct size and the following instructions for fixing. See Fig. 24.
 - iii) The flue adaptor **MUST** be fitted to connect the flue system to the appliance. See Fig. 21. Refer to Section 11.3 and the following instructions for fixing.

HORIZONTAL REAR FLUE ASSEMBLY.

Measure accurately the distance from the rear of the appliance, previously marked on the floor, to the outside surface of the wall. Dimension A mm. See Fig. 19.

Air duct length = $A + 188$ mm,
Flue duct length = $A + 288$ mm,

Cut the air and flue ducts to length. Do not cut the drilled end of the air duct that will fit adjacent to the appliance.

IMPORTANT: Fit the flue restrictor marked 75 into the flue terminal. See Fig. 24.

ASSEMBLE THE AIR DUCTS.

Continue the installation by following the procedure as described in Section 11.3.

If necessary, assemble and check the air duct length. Drill two holes through the holes, in the expanded end of each air duct with the drill provided. Disengage each air duct and apply a smear of silicone sealant around of the air duct to seal the joint. See Fig. 23.

Reassemble and fix the air ducts together with the screws provided.

ASSEMBLE THE FLUE DUCTS.

Follow the procedure for measuring, cutting, sealing and fixing as described in Section 11.3.

Note: If the extension is longer than 1500 mm a flue duct support must be fitted before the ducts are finally assembled. The flue duct support must be fitted half-way along the flue duct for effective support. See Fig. 23.

ASSEMBLE THE FLUE DUCT INTO THE AIR DUCT.

Assemble the air and flue ducts into the flue terminal. Ensure the air duct fits fully into the flue terminal and the restrictor ring is located firmly between the end of the air duct and flue terminal. See Fig. 24. Drill through the holes in the flue terminal into the air duct with the drill provided.

Apply a smear of silicone sealant to the end of the air duct and fix into the flue terminal using the screws provided. See Fig. 23.

Note: Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.

Fit the flue adaptor to the air and flue ducts and assemble the flue system. Follow the procedure as described in Section 11.3 and 11.4 to fit the flue adaptor and assemble the flue system.

The flue system is now assembled.

From inside or outside the dwelling pass the flue assembly through the hole/holes in the wall/walls.

Temporarily support the flue system, ensure it is horizontal and will align with the flue position, located on the rear of the appliance.

Carefully ease the appliance into the position previously marked. Ensure the flue location is correctly aligned with the centre-lines of the flue.

Fit the flue adaptor into the flue grommet located on the rear of the inner casing. See Fig. 23.

Ensure it is located correctly against the stop. Fully tighten the clamping screw accessible on top of the inner casing. See Fig. 14.

- NOTE:**
- Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.
 - Flues longer than 1500 mm must be adequately supported. Air duct support brackets are available as an optional extra. See Section 5b.
 - Make good the internal and external brickwork or rendering.

11.6.2. EXTENSION HORIZONTAL SIDE FLUE. (FLUE OPTION 4). See Fig. 20.

- IMPORTANT:**
- Length of flue when measured from the side of the appliance casing must not exceed 3000 mm.
 - A flue restrictor ring **MUST** be fitted into the flue terminal. Refer to Section 11.3 for the correct size and the following instructions for fixing. See Fig. 24.
 - A flue adaptor is not required.

HORIZONTAL SIDE FLUE ASSEMBLY.

Measure accurately the distance from the side of the appliance, previously marked on the floor, to the outside surface of the wall. Dimension A mm. See Fig. 20.

$$\text{Air duct length} = A + 244 \text{ mm,}$$

$$\text{Flue duct length} = A + 284 \text{ mm,}$$

Cut the air and flue ducts to length. Do not cut the drilled end of the air duct that will fit adjacent to the appliance.

IMPORTANT: Fit the flue restrictor ring marked 77 into the flue terminal. See Fig. 24.

Assemble the air ducts.

Continue the installation by following the procedure as described in Section 11.3.

If necessary assemble and check the air duct length. Drill two holes through the holes in the expanded end of each air duct with the drill provided. Disengage each air duct and apply a smear of silicone sealant around of the air duct to seal the joint. See Fig. 23.

Reassemble and fix the air ducts together with the screws provided.

Assemble the flue ducts.

Follow the procedure for measuring, cutting, sealing and fixing as described in Section 11.3.

Note: If the extension is longer than 1500 mm a flue duct support must be fitted before the ducts are finally assembled. The flue duct support must be fitted half-way along the flue duct for effective support. See Fig. 23

Assemble the flue duct into the air duct.

Fit the air and flue ducts into the flue terminal. Ensure the air duct fits fully into the flue terminal and the restrictor ring is located firmly between the end of the air duct and flue terminal. See Fig. 24. Drill through the holes in the flue terminal into the air duct with the drill provided.

Apply a smear of silicone sealant to the end of the air duct and fix into the flue terminal using the screws provided.

Note: Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.

Fit the flue duct into the flue bend. Ensure it is located correctly against the stop. Drill two holes through the holes in the bend. See Fig. 23.

Fit the air duct over the outside of the flue bend. Ensure it is located correctly against the stop. Drill two holes through the holes in the air duct.

Disconnect the air and flue ducts from the flue bend.

Loosely assemble the flue duct into the air duct and engage in the flue terminal.

From outside the dwelling pass the assembly through the hole in the wall.

From inside ease the flue duct sufficiently clear of the air duct to fit the flue bend.

Apply a smear of silicone sealant around the outside of the flue duct. Fit the flue duct into the flue bend and fix with the screws provided. See Fig. 23.

Apply a smear of silicone sealant around the outside of the flue bend.

Assemble the flue bend into the air duct and fix with the two screws provided.

Ensure the flue duct is correctly engaged in the flue terminal. See Fig. 23.

Note: Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.

The flue system is now assembled.

Temporarily support the flue system, ensure it is horizontal and the flue bend will align with the flue position, located on the rear of the inner casing. See Fig. 23.

Carefully ease the appliance into the position previously marked. Ensure the flue position is correctly aligned with the flue centre-lines previously marked

Fit the flue bend into the flue grommet located on the rear of the inner casing See Fig. 23.

Ensure it is located correctly against the stop. Fully tighten the clamping screw accessible on top of the inner casing. See Fig. 14.

- NOTE:**
- Do not apply a smear of silicone sealant around the end of the flue duct that fits into the flue terminal.
 - Flues longer than 1500 mm must be adequately supported. Air duct support brackets are available as an optional extra. See Section 5b.
 - Make good the internal and external brickwork or rendering.

11.6.3. EXTENSION HORIZONTAL FLUE USING A SECOND 90° FLUE BEND. (FLUE OPTION 5). See Fig. 25.

IMPORTANT: i) The two lengths of straight air duct when added together must not exceed 2300 mm.

- A flue restrictor ring is not required.
- A flue adaptor is not required.

Refer to the instructions in Section 11.3.

First flue length from the appliance to the second flue bend.

The first flue bend will fit into the flue position located on the rear of the inner casing. See Fig. 25.

Measure the horizontal distance between the centre of the flue position located on the rear of the inner casing and the centre of the second flue bend.

Dimension B. See Fig. 25.

Dimension B must not be less than 210 mm.

$$\text{Air duct length} = B - 166 \text{ mm}$$

$$\text{Flue duct length} = B - 152 \text{ mm}$$

The section of horizontal air and flue duct fitted adjacent to the first flue bend will not require expanded ends. Cut off the expanded ends from this section.

SECOND FLUE LENGTH.

Measure the distance between the centre of the second flue bend and the outside surface of the wall. Dimension C. See Fig. 25.

$$\text{Air duct length} = C - 50 \text{ mm.}$$

$$\text{Flue duct length} = C - 13 \text{ mm.}$$

Assemble the air and flue ducts as described in Sections 11.3, 11.4 and 11.5 with attention to the following:

Fit the flue terminal and second flue bend to the second flue length.

Ensure the air duct is fixed at both ends and the flue duct fixed to the flue bend only. Fix with the screws provided. See Figs. 25 and 26.

Fit the first flue length to this flue bend followed by the first flue bend.

Ensure the first flue bend is aligned correctly with the appliance.

Fix each end of the air duct to the bends with the screws provided.

The flue duct must fit correctly between the flue bends. The flue duct is trapped between the flue bends and does not require fixing screws. See Fig. 26.

Follow the procedure for fixing the assembly to the appliance as described in Section 11.6.2.

11.6.4. EXTENSION FLUE UPWARDS AND HORIZONTAL USING A SECOND 90° FLUE BEND.

(FLUE OPTION 6). See Fig. 27.

IMPORTANT: i) The two lengths of straight air duct when added together must not exceed 2300 mm.

ii) A flue restrictor ring is not required.

iii) The flue adaptor is not required.

Refer to the instructions in Section 11.3

First flue length from the appliance to the second flue bend.

The first flue bend will fit into the flue position located on the rear of the inner casing.

Measure the distance upwards between the centre of the flue position located on the rear of the inner casing and the centre of the second flue bend.

Dimension B See Fig. 27.

Dimension B must not be less than 210 mm.

$$\text{Air duct length} = B - 166$$

$$\text{Flue duct length} = B - 152$$

The upward section of air and flue duct fitted adjacent to the first flue bend will not require expanded ends. Cut off the expanded ends from this section.

Second flue length.

Measure the distance between the centre of the second flue bend and the outside surface of the wall. Dimension C.

$$\text{Air duct length} = C - 58 \text{ mm.}$$

$$\text{Flue duct length} = C - 13 \text{ mm.}$$

Assemble the air and flue ducts as described in Sections 11.3, 11.4 and 11.5 with attention to the following:

Fit the flue terminal and second flue bend to the second flue length.

Ensure the air duct is fixed at both ends and the flue duct fixed to the flue bend only. Fix with the screws provided. See Figs. 26 and 27.

Fit the first flue length to this flue bend followed by the first flue bend.

Ensure the first flue bend is aligned correctly with the appliance.

Fix each end of the air duct to the flue bends with the screws provided.

The flue duct must fit correctly between the flue bends. The duct is trapped between the flue bends and does not require fixing screws. See Fig. 26.

Follow the procedure for fixing the assembly to the appliance as described in Section 11.6.2.

11.6.5. EXTENSION FLUE HORIZONTAL USING A SECOND AND THIRD 90° FLUE BEND.

(FLUE OPTION 7). See Fig. 28.

IMPORTANT: i) The three lengths of straight air duct when added together must not exceed 1000 mm.

ii) A flue restrictor is not required.

iii) A flue adaptor is not required.

Refer to the instructions in Section 11.3.

Refer to Section 11.6.3 and measure Dimension B and C. See Fig. 28.

For this flue option Dimension B is the centre distance between each flue bend. The dimension may vary between each bend. The minimum dimension must not be less than 210 mm.

First and second flue lengths:

$$\text{Air duct length} = B - 166 \text{ mm.}$$

$$\text{Flue duct length} = B - 152 \text{ mm.}$$

Third flue length:

$$\text{Air duct length} = C - 58 \text{ mm.}$$

$$\text{Flue duct length} = C - 13 \text{ mm.}$$

Assemble the air and flue ducts as described in Section 11.3 and 11.5.

Before fixing each section of duct, ensure each flue bend is aligned correctly.

Follow the procedure for fixing the assembly to the appliance as described in Section 11.6.2. See Figs. 26 and 28.

11.6.6. EXTENSION FLUE UPWARDS AND HORIZONTAL USING A SECOND AND THIRD 90° FLUE BEND.

(FLUE OPTION 8). See Fig. 29.

IMPORTANT: i) The three lengths of straight air duct when added together must not exceed 1000 mm.

ii) A flue restrictor is not required

iii) A flue adaptor is not required.

Refer to the instructions in Section 11.3.

Follow the instructions in Section 11.6.5.

Refer to Section 11.6.4 and measure Dimension B and C. See Fig. 29.

For this flue option Dimension B is the centre distance between each flue bend. The dimension may vary between each bend. The minimum dimension must not be less than 210 mm.

Upwards Section:

$$\text{Air duct length} = B - 166 \text{ mm.}$$

$$\text{Flue duct length} = B - 152 \text{ mm.}$$

Horizontal Section:

First Section:

$$\text{Air duct length} = B - 166 \text{ mm.}$$

$$\text{Flue duct length} = B - 152 \text{ mm.}$$

Second Section:

$$\text{Air duct length} = C - 58 \text{ mm.}$$

$$\text{Flue duct length} = C - 13 \text{ mm.}$$

Assemble the air and flue ducts as described in Section 11.3 and 11.5.

Before fixing each section of duct, ensure each flue bend is aligned correctly.

Follow the procedure for fixing the assembly to the appliance as described in Section 11.6.2. See Figs. 26 and 29.

11.6.7. TO FIT A HORIZONTAL SECTION OF FLUE DUCT BEFORE THE FIRST 90° FLUE BEND FOR FLUE OPTIONS 2, 4, 5, 6, 7 AND 8.

(FLUE OPTION 9). See Fig. 30.

IMPORTANT: i) The total length of straight flue including this section **MUST** not exceed the length stated in the Flue Option chosen.

- ii) A flue restrictor ring may be required. Refer to Section 11.3 to determine the size or whether the restrictor is necessary.
- iii) A flue adaptor **MUST** be fitted to connect the flue system to the appliance. Refer to the instructions in Section 11.4.

Measure accurately the distance from the rear of the appliance, previously marked on the floor, to the centre of the first 90° flue bend. Dimension D. See Fig. 30.

The minimum dimension must not be less than 105 mm.

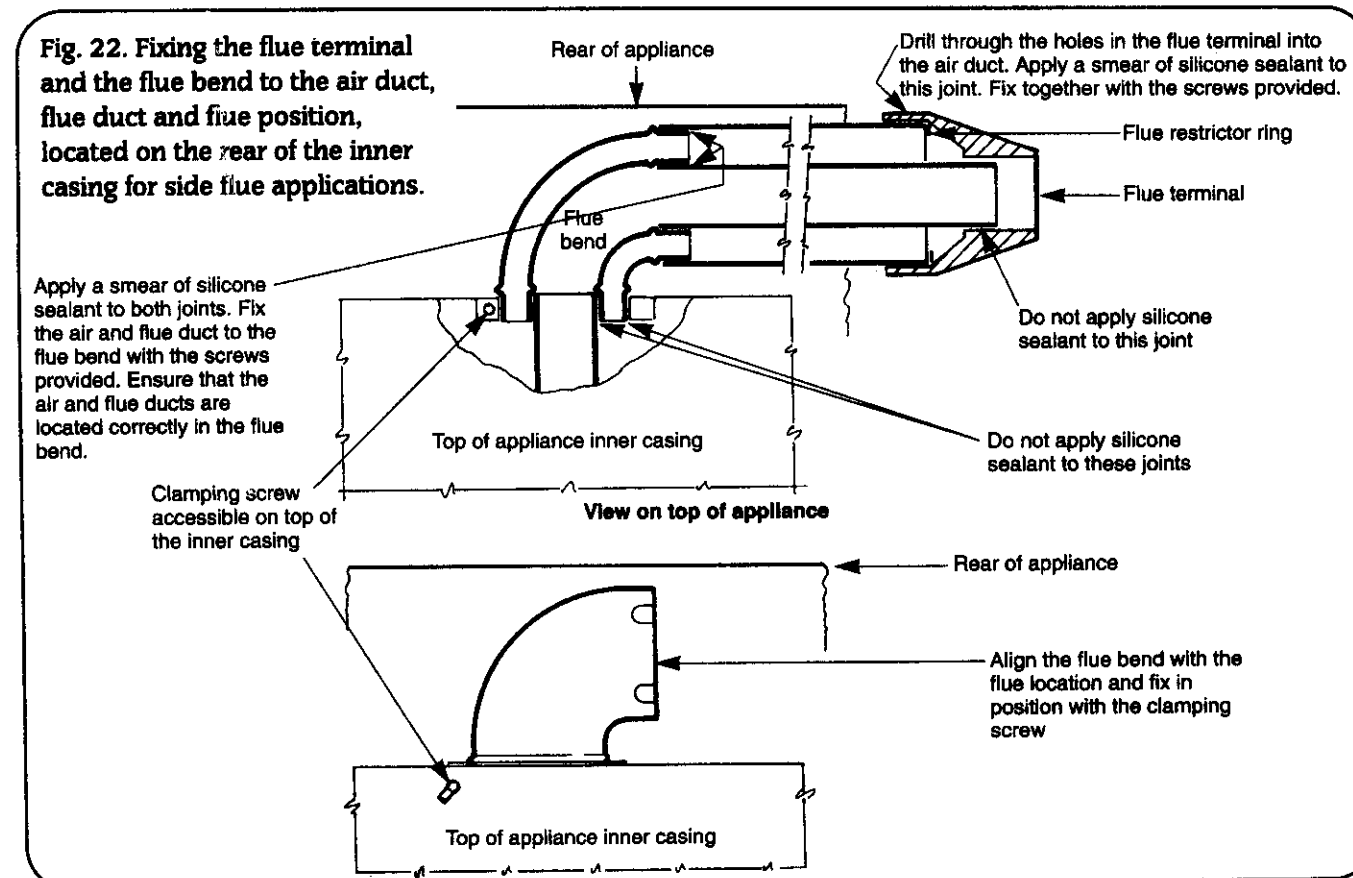
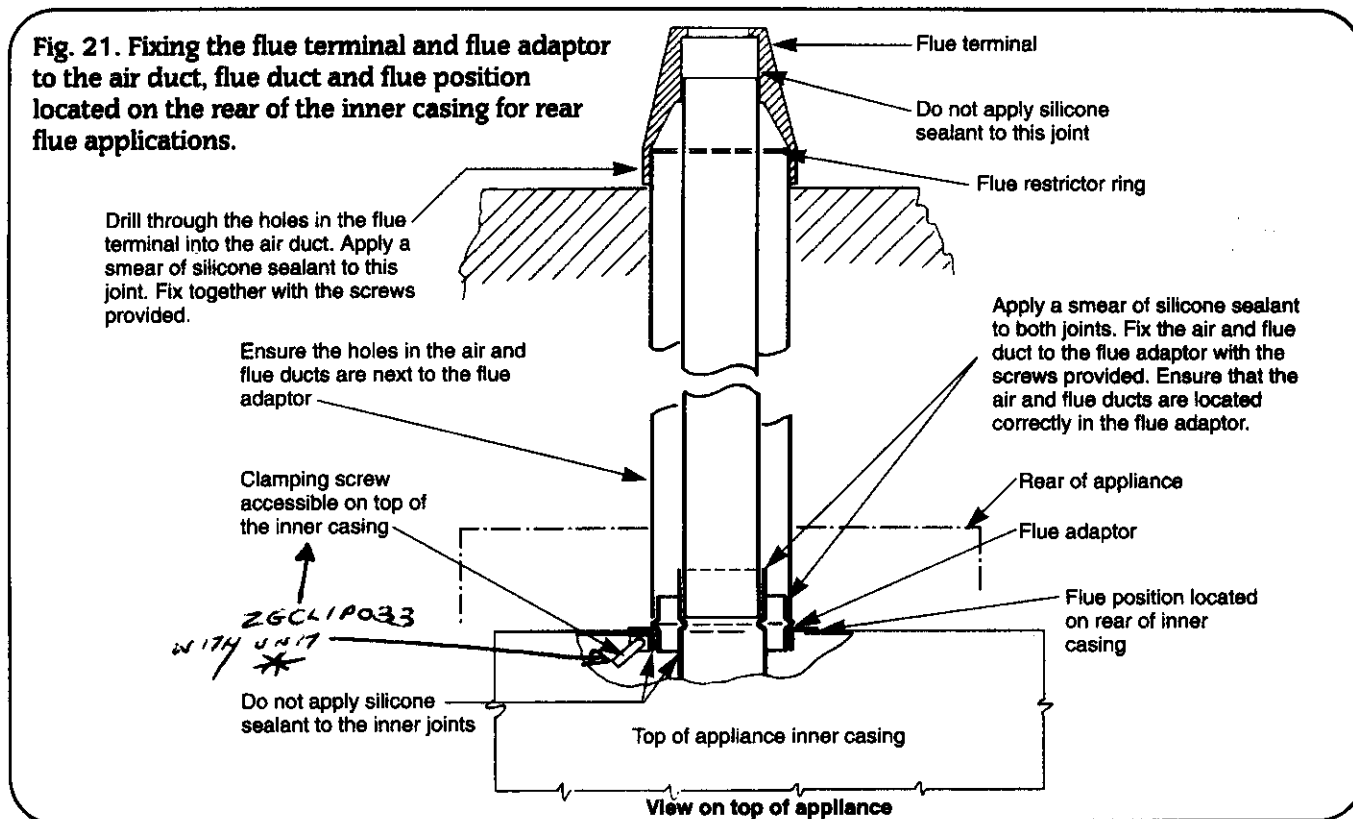
Air duct length = D +

Flue duct length = D +

BOTH 95 PER 0.95997

Cut air and flue ducts to length. Do not cut the drilled end of the air duct.

Horizontal section of flue duct from the rear of the appliance casing to the first 90° flue bend.



Continue the installation by following the procedure for the flue option chosen. Refer to Section 11.5, 11.6.2, 11.6.3, 11.6.4, 11.6.5, or 11.6.6.

11.7 INTERNAL FLUE FITTING.

If it is required to install the flue system from inside the building the hole in the wall must be 150 mm (6 in) diameter.

Measure and cut the ducts as previously described. See Section 11.3.

Assemble the air and flue ducts to the flue terminal and flue bend as previously described. See Section 11.4 and 11.5.

Fit the rubber sealing gasket to the flue terminal. Centralise the gasket and tighten the clamping ring. See Fig. 31.

Pass the assembly through the wall from inside the building so that the gasket flange is against the outside face of the wall. See Fig. 32.

Align the flue outlet or flue bend with the flue position on rear of the appliance. Ensure the flue outlet or flue bend is correctly located against the stop. See Fig. 23.

Tighten the clamping screw accessible on top of the inner casing. See Fig. 14.

Make good the internal brickwork.

11.8 FINAL INSTALLATION.

Check that all the water connections and the gas connection have been tightened.

Facia Mounted Programmer (where applicable).

Remove the facia panel as described in Section 11.3. Refer to Fig. 14.

Unplug the Operating Switch connection at the control board. Unscrew and retain the four nuts and washers securing the switch mounting plate to the facia. See Fig. 9. Remove the plate. Fit the programmer to the facia and fix using the four nuts and washers. Plug the lead into the connection on the control board. See Fig. 12. The programmer can be set when the electricity supply has been turned on at the commissioning stage.

Connect the mains electricity supply to the appliance and connect any room and/or frost thermostats. Refer to Section 10, Fig. 9 and 12. The leads from the thermostats must pass through holes provided in the control box at the right hand side and be clamped using the strain relief bushes provided in the pack. Check that the control box and facia can be withdrawn into the Service Position before fixing any leads outside the appliance.

Refit the control box and facia in the reverse order.

Test the gas supply for soundness as indicated in BS 6891.

If the appliance is not to be commissioned immediately, replace the cabinet top and front panel. See Fig. 14.

Check that the gas supply, the electricity supply and the water connections are all turned off.

Fig. 23. Typical extension horizontal side and rear flue assemblies.

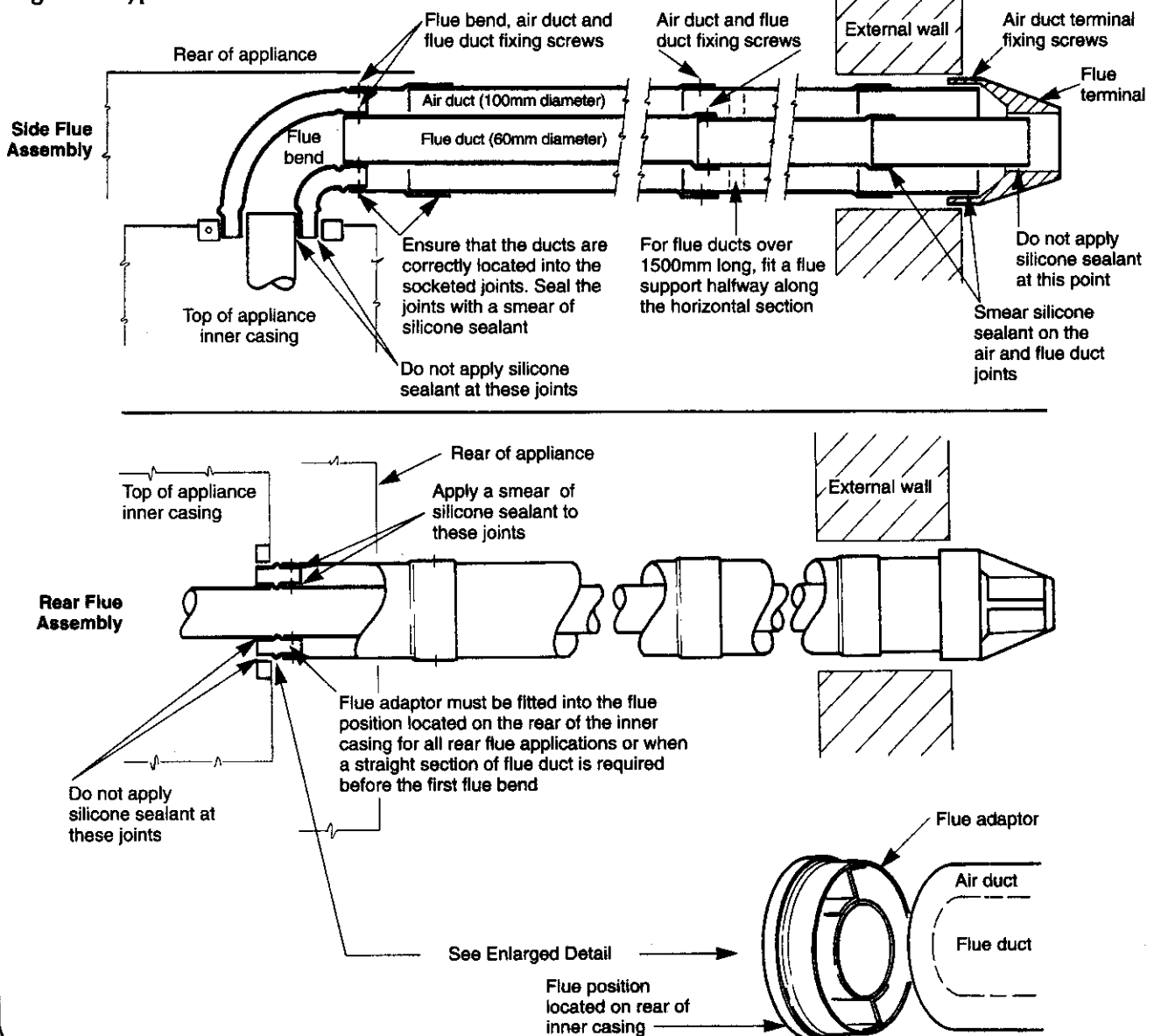
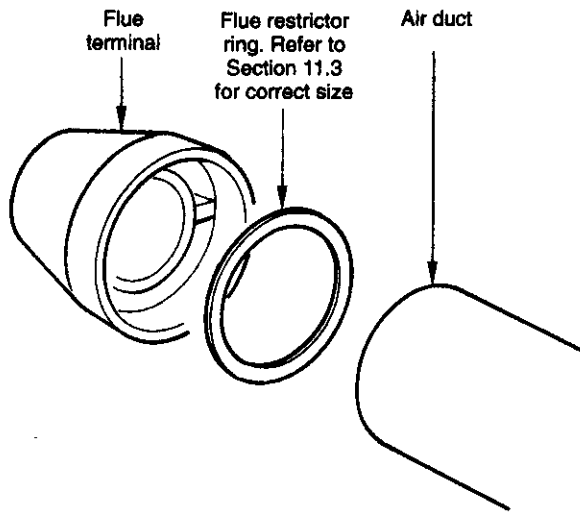


Fig. 24. Fixing the flue restrictor ring into the flue terminal.



Fit the flue restrictor ring into the flue terminal. Ensure the air duct is fully engaged in the flue terminal and the restrictor ring is located firmly between the end of the air duct and flue terminal. Drill through the holes in the flue terminal into the air duct with the drill provided. Apply a smear of silicone sealant to the outside end of the air duct and fit into the flue terminal using the screws provided.

Fig. 25. Flue Option 5. Extension horizontal flue using a second 90° flue bend.

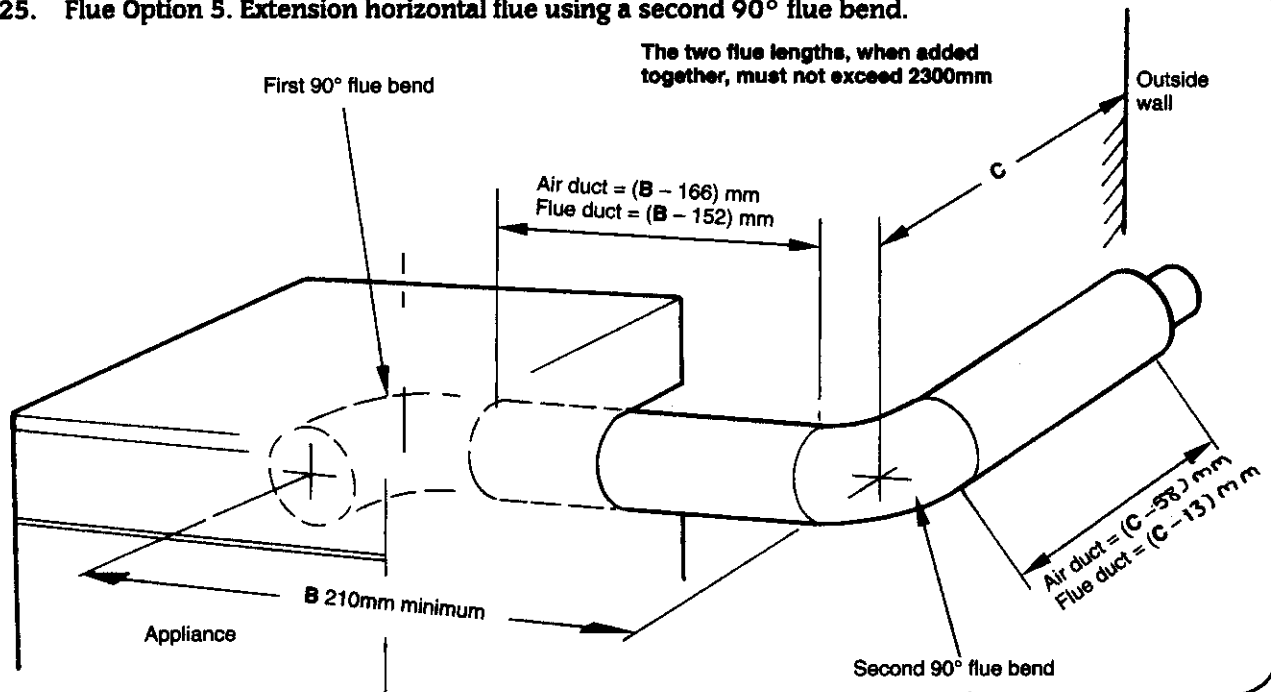


Fig. 26. Fitting the flue bends to the intermediate sections of the flue duct.

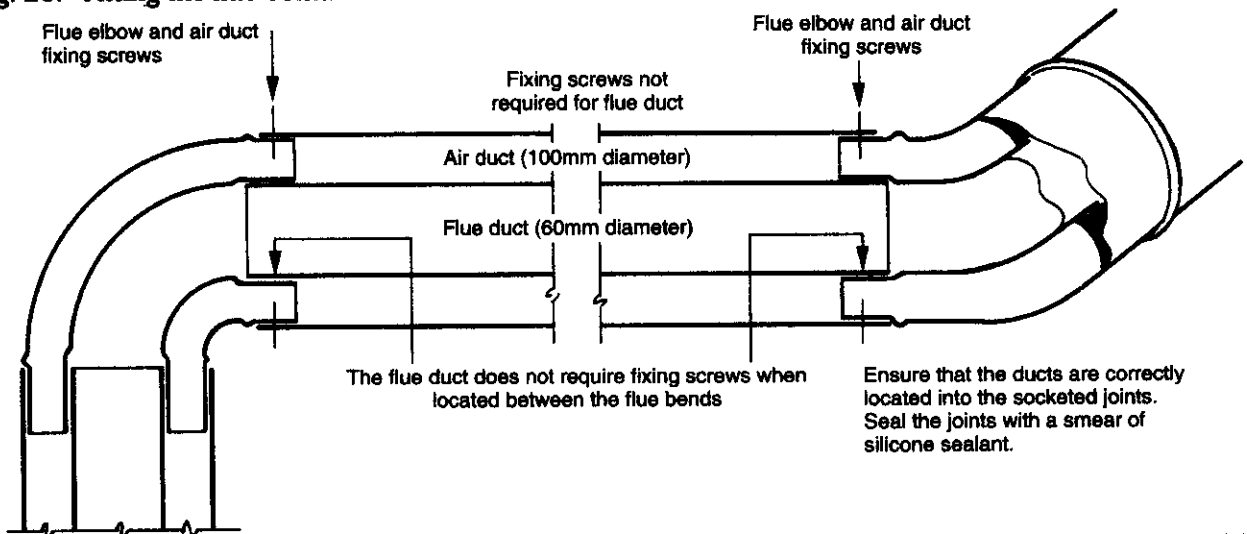


Fig. 27. Flue Option 6. Extension flue upwards and horizontal using a second 90° flue bend.

The two flue lengths, when added together, must not exceed 2300mm

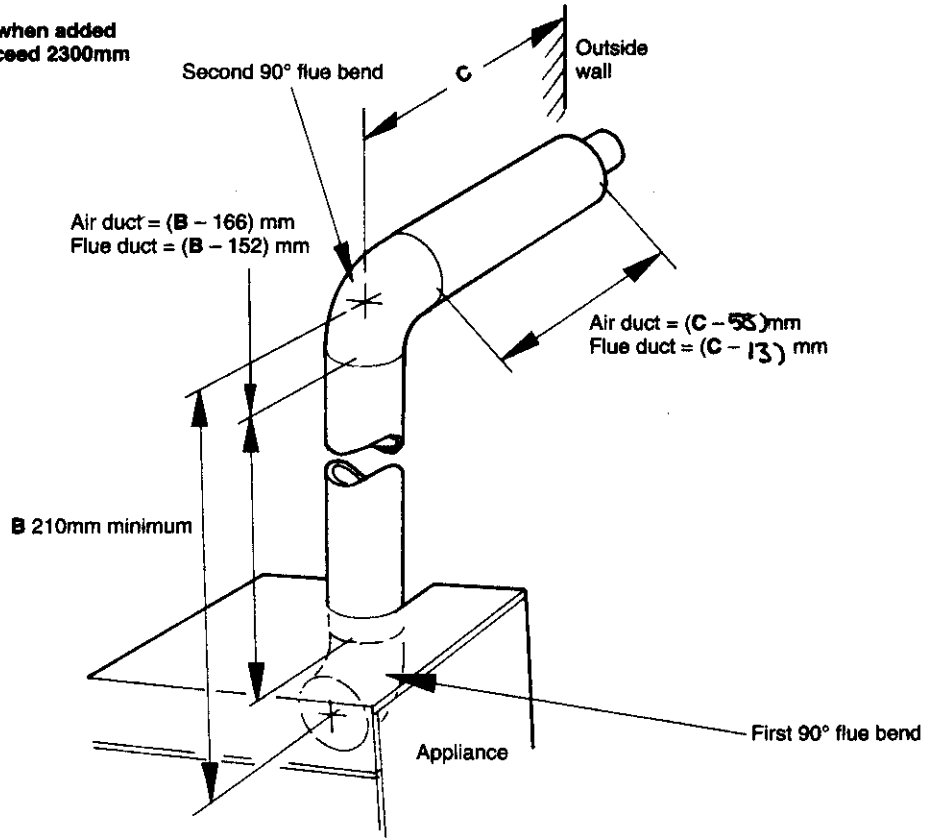


Fig. 28. Flue Option 7. Extension flue horizontal using a second and third 90° flue bend.

The three lengths, when added together, must not exceed 1000mm,

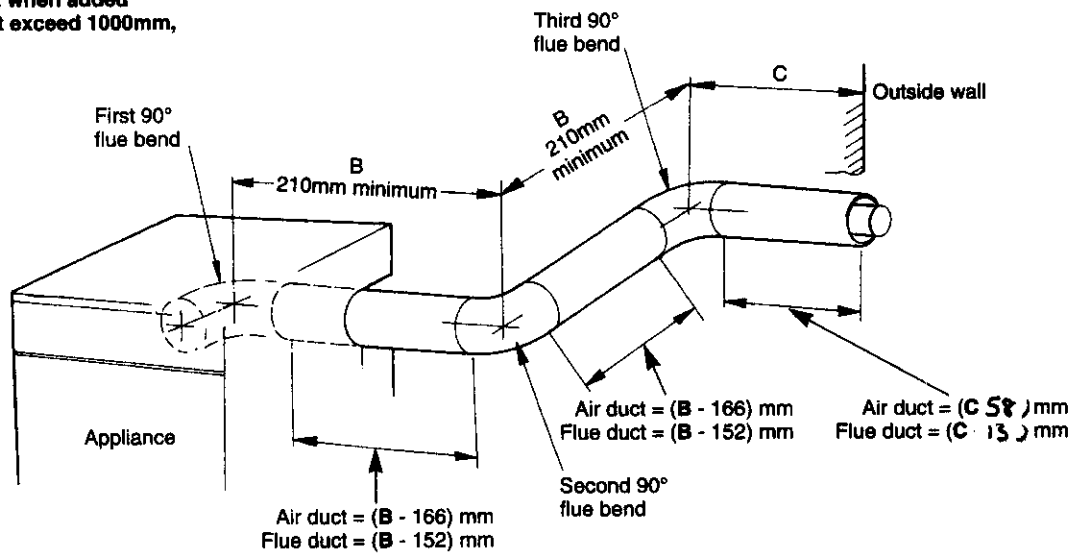


Fig. 29. Flue Option 8. Extension flue upwards and horizontal using a second and third 90° flue bend.

The three lengths, when added together, must not exceed 1000mm

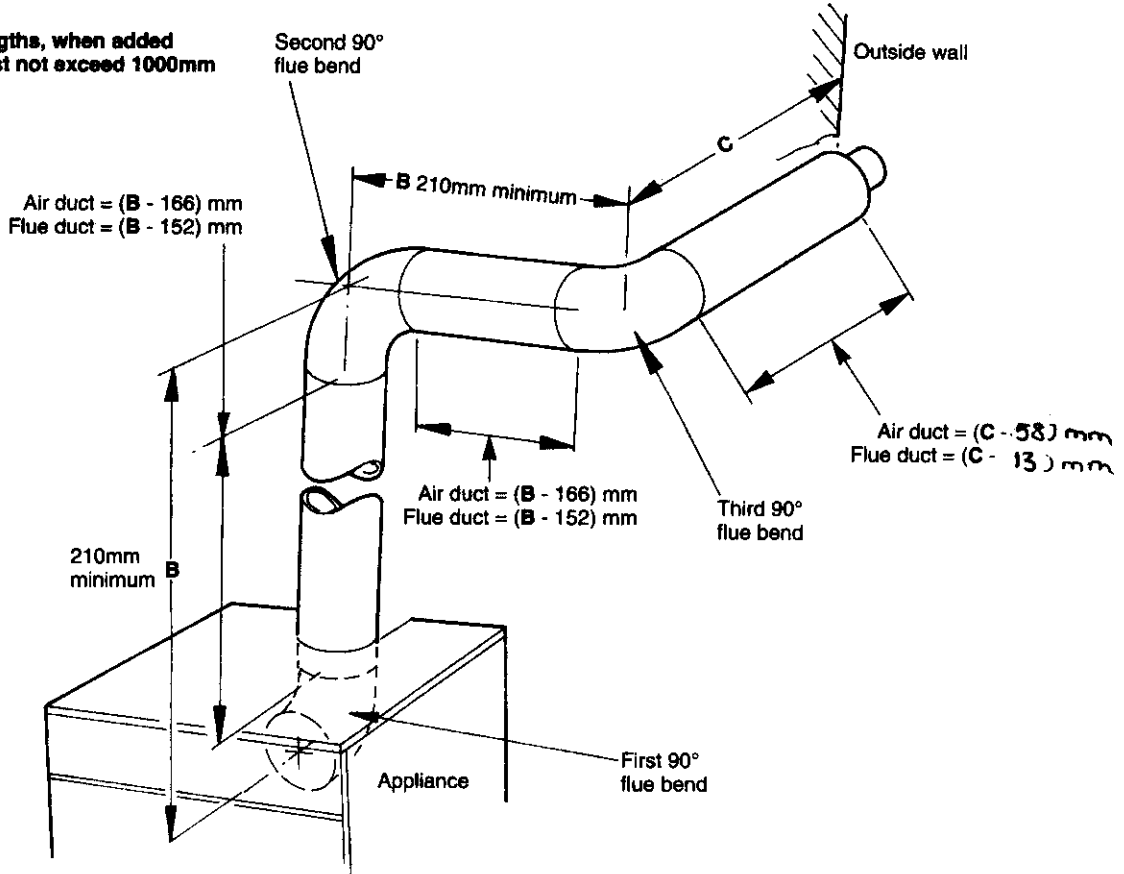


Fig. 30. Flue Option 9. Horizontal section of flue duct before the first 90° flue bend.
For Flue Options 2, 4, 5, 6, 7 and 8.

Total length of straight flue including this section must not exceed the length stated in the flue option chosen.

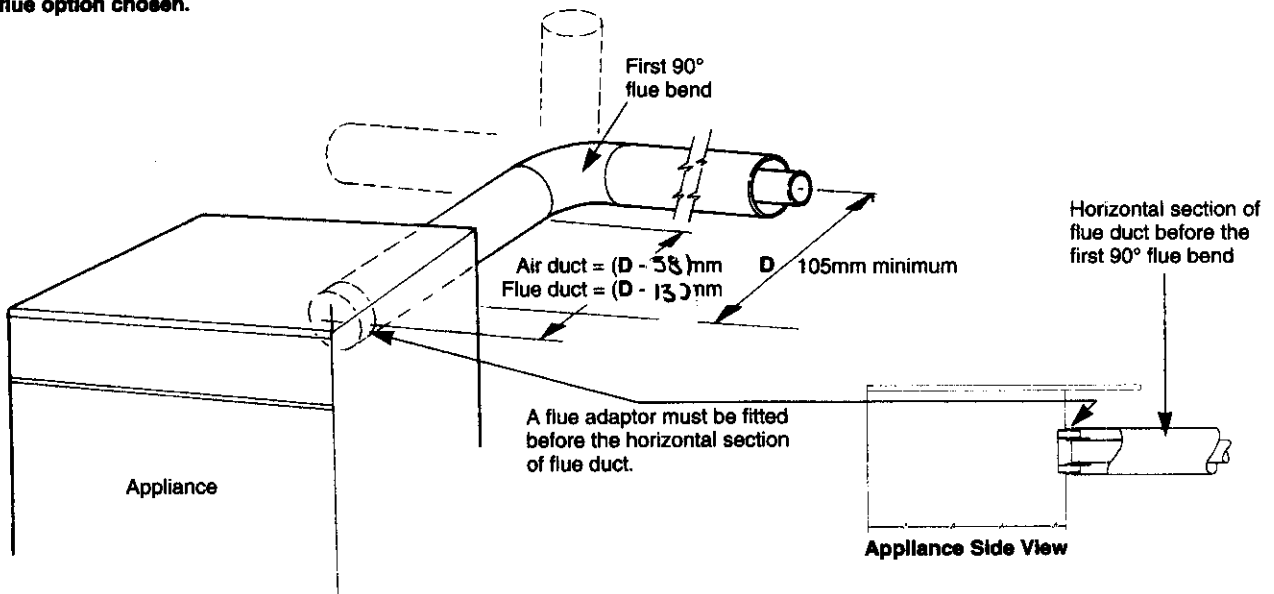


Fig. 31. Terminal assembly for internal fitting of the flue.

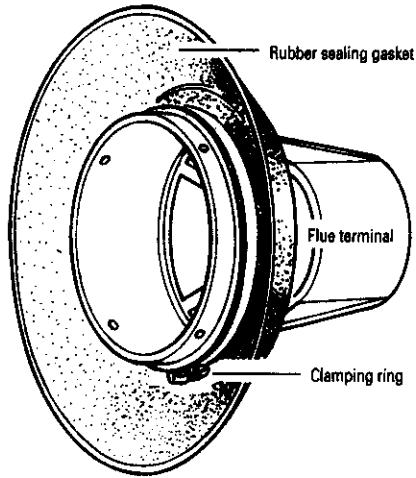


Fig. 32. Duct and terminal assembly for internal fitting of the flue.

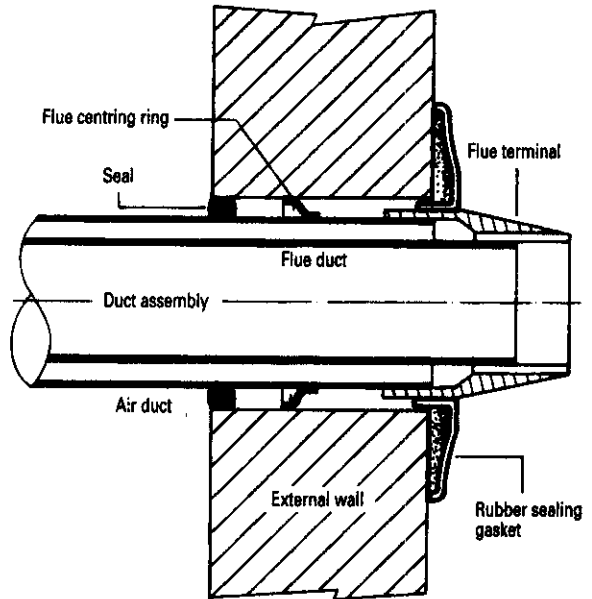


Fig. 33. Gas control valve adjustment.

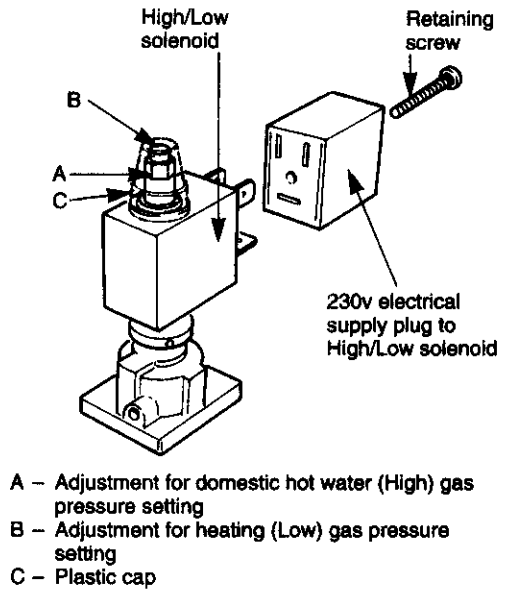
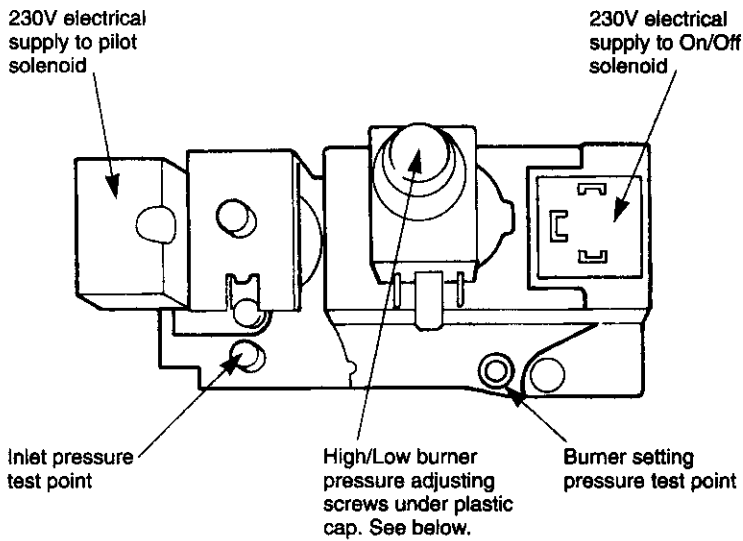
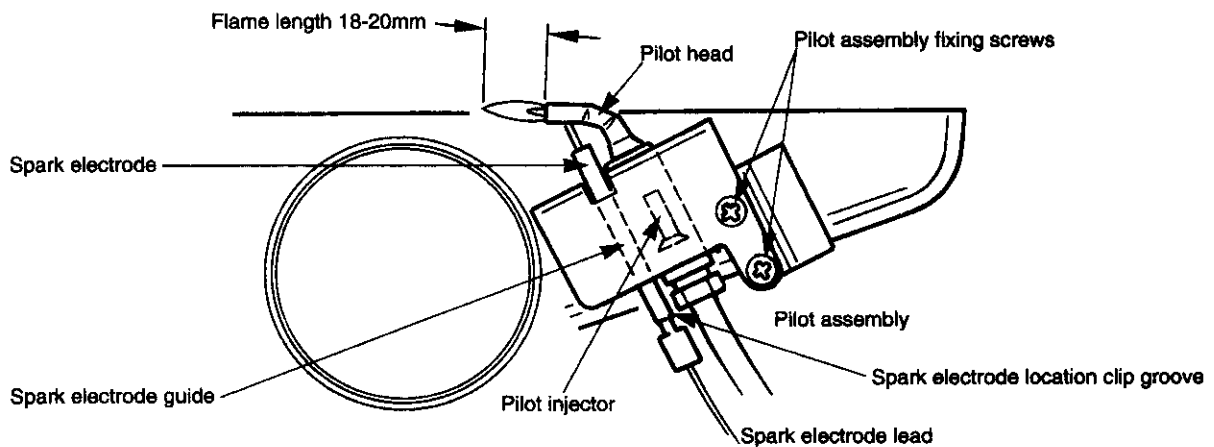


Fig. 34. Pilot burner assembly.



12. Commissioning The Appliance

12.1 The appliance is despatched with the controls set to provide a maximum output for domestic hot water of 24 kW (82,000 Btu/h) and satisfy a central heating load of 15 kW (51,000 Btu/h).

The controls can be reset to increase or decrease the heat load capability from 8.8 kW (30,000 Btu/h) to 24 kW (82,000 Btu/h). Refer to Section 12.4 – Appliance Operation (Central Heating Mode).

HOT WATER SYSTEM

Check that the mains water supply has been fully flushed out at installation.

CENTRAL HEATING SYSTEM

Check that the central heating system has been fully flushed out at installation.

GAS SERVICE

The complete system, including the meter, shall be inspected and tested for soundness and purged as indicated in BS 6891.

12.2 APPLIANCE AND CENTRAL HEATING SYSTEM PREPARATION.

If the cabinet front panel was replaced on final installation (Refer to Section 11.8) remove the panel before starting the commissioning procedure. See Fig. 14.

Check that the gas service and the electrical supply to the appliance are turned off. See Fig. 3 and 17.

Raise the fascia and control box into the Service Position. Refer to Section 11.3 and Fig. 14.

Lower the expansion vessel into the Service Position and remove the inner casing front cover. See Fig. 16.

Check that all the water connections throughout the system are tight.

Open the system valves at the appliance. See Figs. 3 and 17.

Open all the radiator valves, fill the system and vent each radiator in turn.

Vent the heatbank from the manual air vent. See Figs. 16 and 17. The automatic air vent (fixed to the flow manifold) will vent the boiler section for sealed systems. Do not replace the inner casing front cover until instructed in Section 12.4 Appliance Operation.

Check the pressure relief valve operates by turning the knob anti-clockwise until it releases. Water should be expelled from the discharge pipe. See Fig. 15.

SEALED SYSTEMS ONLY.

SET THE EXPANSION VESSEL PRESSURE

The charge pressure of the expansion vessel (as supplied) is 0.5 bar, which is equivalent to a static head of 5 metres (17 ft). The charge pressure must not be less than the static head at the point of connection. See Fig 6. A Schraider type tyre valve is fitted to the expansion vessel to allow the charge pressure to be increased if necessary.

SET THE SYSTEM PRESSURE

Fill the system until the pressure gauge shows 2.5 bar (37 lb/in²) and check for water soundness. Release water from the system using the pressure relief valve test knob until the System Design Pressure is obtained up to a maximum of 1.5 bar.

System Design Pressure in bar = Static Head of the System in bar + 0.3

Note: 1 bar is equivalent 10.2 metres (33.5 ft) of water

Set the movable pointer on the pressure gauge to coincide with the indicating pointer, giving a permanent record of the set system pressure. See Fig. 16.

If the pressure indicated on the pressure gauge is greater than 2.5 bar when operating at the maximum central heating temperature, an extra expansion vessel must be fitted to the system as close to the appliance central heating return connection as possible.

The appliance (as despatched) can accommodate a system volume of about 104 litres. Refer to BS 7074 Part 1. If the system volume is in excess of that accommodated by the expansion vessel fitted to the appliance then an extra vessel must be fitted as close as possible to the central heating return connection of the appliance.

Any extra vessel fitted must be pressurised to the same figure as the integral vessel. If the expansion vessel fails then the specified replacement must be fitted.

12.3 PROGRAMMER.

Any programmer fitted to the appliance should be set up at this stage following the instructions sent with the programmer.

12.4 APPLIANCE OPERATION.

Check that the electrical supply to the appliance is off.

Turn the room thermostat (if fitted) to maximum.

Set the Operating Switch (or Programmer) to OFF.

In order to thoroughly vent the appliance and system the appliance may be operated without gas turned on as follows:

Switch on the electricity supply.

Set the Operating switch (or Programmer) to Heating and Water and the Hot Water thermostat to maximum. The pump and fan will run, a continuous spark will occur at the pilot electrode, but the pilot and main burner will not light.

Primary water will circulate around the appliance.

Allow the appliance to operate in this condition for a few minutes before setting the Hot Water thermostat to the Off position.

Set the Heating thermostat to maximum and room thermostat (if fitted) to maximum. The water diverter will open to central heating and the appliance will operate as previous. See Fig. 16.

Primary water will now circulate around the central heating system. Allow the appliance to operate in this condition for a few minutes. Vent all radiators during this period until air is cleared from the system.

When the system has been vented sufficiently set the Heating thermostat to the Off position.

Note: The water diverter valve, in the de-energised condition, is always open to Hot Water. The controls give priority to reheating the heatbank following a demand for hot water. If the valve fails to open when energised to the central heating system, hot water will still be available.

The valve does not have a manually open position.

Set the Operating Switch (or Programmer) to OFF.

Switch off the electrical supply.

The appliance and central heating system should now be vented.

Continue the appliance operation:

Disconnect the electrical supply plug from the solenoid operator on the gas valve adjacent to the Modureg actuator by unscrewing the retaining screw. See Fig. 33.

Turn on the gas supply and reconnect the electricity supply.

Put the Operating Switch (or Programmer) to Heating and Water and turn the Heating thermostat to Max.

A continuous spark will occur until the pilot is alight and sensed by the control circuit. The fan and pump will run but the main burner will not light. Test for gas soundness at the joint between the pilot pipe and the burner with leak detection fluid. See Fig. 34.

Observe the pilot flame. It should be about 20mm (3/4in) long and envelope the spark electrode tip. See Fig. 34.

Put the Operating Switch (or Programmer) to OFF and disconnect the electrical supply at the mains.

IMPORTANT: Replace the inner casing cover and reposition the pressure vessel. See Fig. 16.

Reconnect the electrical supply plug to the gas valve. See Fig. 33.

Loosen the burner pressure test point screw and connect a pressure gauge. See Fig. 33.

HOT WATER MODE.

Set the Operating Switch (or Programmer) to Water. Turn the Hot Water thermostat to maximum. Turn the Heating thermostat to Off.

The boiler should light at a burner pressure of between 14 and 14.5 mbar (5.6-5.8in wg). Allow the boiler to fire for at least 10 minutes before checking the gas pressure.

Note: It may be necessary to open a hot tap to maintain the boiler firing.

If the burner pressure is low check that the supply pressure at the gas valve is at least 19 mbar (7.6in wg). See Fig. 33.

HOT WATER (HIGH) GAS PRESSURE.

The burner (High) pressure is factory set and should **NOT** be adjusted in the Hot Water mode. If the gas supply pressure is correct but the correct burner pressure is not achieved, contact Worcester Heat Systems Service Department.

Should the appliance not light, check it is not in the overheat lock-out state, by pressing the re-set button on bottom right hand side of the control box. See Fig. 16.

Check several times the main burner lights smoothly and goes out, by operating the Hot Water thermostat, before proceeding to check the Heating (Low) gas pressure.

Close the hot water tap (if necessary). The fan will stop and the pump will continue running until the appliance has cooled to a preset temperature.

Set the Operating Switch (or Programmer) to Off.

CENTRAL HEATING MODE.

Check that all the radiator valves are open. Set the room thermostat, if fitted, to maximum and the Heating thermostat to maximum. Turn the Hot Water thermostat to Off.

Sealed Systems: Check the system is pressurised and set to the required pressure as indicated on the gauge. See Fig. 16.

Set the Operating Switch (or Programmer) to Heating and Water.

The boiler should light at a burner pressure of 1.0 mbar. (0.4 in wg).

HEATING (LOW) GAS PRESSURE.

The burner (Low) pressure is factory pre-set to satisfy a central heating demand of up to 15 kW (51,000 Btu/hr). For different heating requirements the (Low) gas pressure must be adjusted to suit the installation.

The output to central heating is adjustable from a minimum of 8.8 kw (30,000 Btu/hr) to a maximum of 24 kW (82,000 Btu/hr). Refer to Section 3, Table 1, for Nominal Boiler Rating.

Allow the boiler to fire for at least 10 minutes before checking the (Low) gas pressure.

Ensure all the radiators are heating up evenly.

To adjust the Heating (Low) Gas Pressure:

- Remove the grey plastic cover over the pressure adjustment screws on the gas valve. Place a small screwdriver in one of the slots and carefully lift the cap. See Fig. 33.
- Using a small blade width screwdriver, turn the screw 'B' clockwise to increase and counter-clockwise to decrease pressure until the desired setting is achieved.
- Operate the Heating thermostat several times to ensure the main burner ignites smoothly before checking that the gas valve switches from High to Low pressure correctly.
- Using the Hot Water and Heating control thermostats, switch the appliance, from High to Low and back several times to ensure correct gas pressures. Replace the plastic cap 'C'.
- If the Heating (Low) Gas Pressure has been changed set the indicator arrow on the data plate to the new setting.

Balance the system so that the required temperature difference across the heating flow and return pipes is obtained. See Section 3, Table 4.

Adjust the by-pass valve until the same temperature difference is obtained. See Fig. 16 and 17. This should be carried out with only a single radiator operating.

If thermostatic radiator valves are fitted then one radiator should be left uncontrolled. The bypass valve should never be fully closed.

Set the room thermostat to minimum and check that the burner goes out.

Reset the room thermostat to maximum and the burner will re-light and follow the normal operating procedure.

Check for the proper ignition of the burner after a break in the gas supply.

Turn off the gas service cock and wait for 60 seconds. The main burner and pilot will go out but sparking from the electrode will continue. Carefully open the gas service cock and observe the burner re-light and follow the normal sequence of operation.

Put the Operating switch (or Programmer) to OFF. Switch off the gas service cock and the electrical supply to the appliance.

Drain the heating system whilst the appliance is still hot. Refer to Fig. 14 for the position of the appliance drain point.

Refill, vent and re-pressurise (sealed systems) as described previously.

HOT WATER AND CENTRAL HEATING MODE.

Turn on the electricity supply and open the gas supply cock to the appliance.

Set the Operating Switch (or Programmer) to Heating and Water. If a programmer is fitted set the Hot Water to Continuous or 24Hrs and the Heating to On.

Set the Hot Water thermostat to **MAXIMUM**. The pilot will ignite the main burner smoothly and the boiler will heat the water stored in the heatbank. Once the heatbank has been satisfied the appliance will switch off.

Turn on any hot water tap to maximum. After a short period the burner will re-ignite. If hot water has not yet reached the tap, wait until it does, then turn the tap off. The boiler will fire until the heatbank has reheated and switch off.

Set the Operating Switch to Hot Water. If a programmer is fitted set the Hot Water to Continuous and the Heating Off. Repeat the previous hot water draw off

Set the Operating Switch to Heating and Hot Water. If a programmer is fitted set to Continuous or 24 Hrs and the Heating to ON. Set both appliance thermostats to maximum. The boiler will fire and commence to heat up the radiators. Allow to operate for 45 minutes, venting as necessary. Check for water soundness.

Note: From cold it will take about 12 minutes for the heatbank to be satisfied before the central heating system will receive heat.

IMPORTANT: The complete appliance must be checked for water leaks. Should any leaks be found they must be rectified before proceeding further.

Set the Operating Switch to OFF, or if a programmer is fitted, switch to OFF. Switch electrical supply off at the mains. Set both appliance thermostats to OFF.

Drain water from the appliance and the system from the drain points while the water is still hot.

Refill the appliance and system. Repeat commissioning operation under "Hot Water and Central Heating mode."

Check for correct operation of User's Controls including the room thermostat (if fitted) and leave set to customer's requirements.

12.5 COMPLETION OF COMMISSIONING.

Dis-connect the pressure gauge and tighten the test point screw.

Re-start the appliance and check for gas soundness around the test point screw.

Refit the expansion vessel and cabinet front panel. See Fig. 16.

If the appliance is being passed over to the User immediately refer to Section 13, Users Instructions and set the controls to the user's requirements.

If the appliance is to be left inoperative check that the Operating Switch or programmer is set to OFF. Turn the gas service cock to off and switch off the electricity supply.

If there is any possibility of the appliance and system being left inoperative during frosty conditions then drain the appliance and system.

For short inoperative periods leave the appliance under the control of a frost thermostat, if fitted, or operating continuously under the control of a room thermostat set at 6°C.

13. Instructions to the User

13.1 Tell the user how to operate the appliance and hand over the Users Instructions leaflet.

13.2 Tell the user what to do if the heating system is not to be used in frosty weather. Also tell the user that if the appliance is not to be used for long periods during frosty weather, the system must be drained and the gas and electricity supplies turned off.

13.3 Tell the user the Sealed System set pressure if applicable.

13.4 Tell the user of the importance of regular servicing. Worcester Heat Systems Ltd offer a comprehensive maintenance contract.

13.5 Set the system controls to the users requirements.

13.6 If an external programmer has been fitted which has a programmable hot water facility then instruct the user how to set up the programme.

14. Inspection and Servicing

To ensure continued efficient operation of the appliance it must be checked and serviced as necessary at regular intervals. The frequency of servicing will depend upon the particular installation conditions and usage, but once per year should generally be adequate. The extent of the service required by the appliance is determined by the operating condition of the appliance when tested by fully qualified engineers.

It is the law that any service work must be carried out by competent engineers such as British Gas or Corgi registered personnel.

14.1 PRE-SERVICE INSPECTION.

Check that the flue terminal and the terminal guard, if fitted, are clear.

If the appliance is in a compartment check that the ventilation openings in the compartment door or walls are clear. Refer to Section 6, Air Supply.

Check the system and remake any joints or fittings which show signs of leakage. Refill, vent and re-pressurise sealed systems as described in Section 12, Commissioning.

Operate the appliance and the system taking note of any faults.

WARNING:

Disconnect the electrical supply at the mains and turn off the gas supply at the gas service cock on the appliance before servicing the appliance. See Fig.16.

After completing the service always test for gas soundness as indicated in BS 6891.

14.2 DISMANTLE THE APPLIANCE.

To carry out a full and comprehensive service of the appliance remove the following parts to gain access to the components which need to be checked or serviced.

(a) Cabinet Front Panel.

Lift off the top location and clear the lower return over the kick strip. See Fig. 14.

(b) Facia and Control Box.

Remove the cabinet front panel. Unscrew the two screws securing the facia to the outer edges of the cabinet, accessible under the facia. Ease the facia forwards on the slide rails until fully extended. Lift the facia and control box upwards through 90° into the Service Position. Lodge in the Service Position on the outer locations. See Fig. 14.

(c) Expansion Vessel.

Unscrew one screw securing the expansion vessel support bracket to the right hand side panel. Lower the vessel gently until resting on the floor. See Fig. 16.

(d) Inner Casing Cover.

Repeat operations a, b and c. Unscrew the four screws securing the cover to the inner casing and lift off. See Fig. 16.

(e) Fan.

Repeat operations a,b,c and d. Ease the two electrical connections from the fan motor and the two flexible pipes from the venturi housing. Unscrew the two screws securing the front of the fan mounting plate to the flue hood. Ease the fan assembly out of the flue bend or flue adaptor by gently pulling the mounting plate forwards about 20 mm to clear the flue bend or flue adaptor. Remove the fan and mounting plate assembly from the inner casing. Ensure the short leg of the venturi faces into the fan. See Fig. 35.

(f) Flue Hood.

Repeat operations a,b,c,d and e. Unscrew the two screws locating the front of the flue hood to the combustion chamber cover. Ease the flue hood forwards about 15 mm to clear the rear location. Remove the flue hood off the heat exchanger and clear of the inner casing. See Fig. 35.

(g) Combustion Chamber Cover.

Repeat operations a,b,c,d,e, and f. Unscrew the four screws securing the combustion chamber cover and remove the cover. See Fig. 35.

(h) Burner.

Repeat operations a,b,c,d,e,f and g. Unscrew the two screws securing the pilot bracket to the burner. Unscrew the two screws securing the front of the burner to the burner bracket located inside the inner casing. Remove the burner by easing upwards and forwards off the main burner injector and clear of the pilot bracket. See Fig. 35.

(i) Pilot Bracket.

Repeat operations a,b,c,d,e,f and g. Unscrew the two screws securing the pilot bracket to the burner bracket. Unclip the spark igniter and remove.

Support the pilot bracket with a suitable tool. Unscrew the pilot pipe union nut and ease the pipe clear of the bracket. Remove the pilot injector from the pilot bracket. See Figs. 34 and 35.

14.3 Servicing of Components.

Clean the Fan.

Unscrew the three screws securing the fan mounting plate to the fan. Unscrew the two screws securing the venturi assembly to the fan and ease out of the fan outlet. Any dust or fluff accumulated on the fan or venturi should be removed with a soft brush or by blowing. Reassemble the venturi and fan mounting plate in the reverse order. See Fig. 35.

Clean the Burner.

Brush the blade tops and mixing tube with a soft brush and check that all the flame ports are clear. Remove any blockages with a non-metallic brush.

Clean the Main Burner Injector.

Inspect the main burner injector located at the rear of the inner casing. Clean with a soft brush. Do not use a wire brush or anything likely to cause damage.

Clean the Pilot Bracket.

Brush with a soft brush. Clean the pilot injector by rinsing it in warm water. Check the condition of the electrode.

Clean the Gas to Water Heat Exchanger.

Cover the main burner injector and pilot bracket with a cloth. Clean the heat exchanger using a soft brush. Remove the deposits from the bottom of the combustion chamber. The heat exchanger is manufactured from copper take care not distort any of the fins.

Combustion Chamber Insulation.

Examine and replace any pads that are damaged.

Controls.

Remove any dust or deposits using a soft brush. Take care not to mishandle any component connections.

NOTE: Should any of the components be damaged they must be replaced before the service is completed. Refer to the appropriate item in Section 15 "Replacement of Parts."

After servicing, reassemble the appliance in the reverse order. Check that all components are in place and correctly fixed. See Fig.16 and 35. Leave the cabinet front panel to be fitted after checking the operation of the appliance.

14.4 Test the Appliance.

On completion of the service and reassembly of the appliance, check for gas soundness and the correct operation of the appliance as described in Section 12 - Commissioning.

Refit the cabinet front panel and reset the controls to the users requirements.

15. Replacement of Parts

WARNING. Switch off the electricity and gas supplies before replacing any components. After the replacement of any components check for gas soundness (where relevant) and carry out functional checks as described in Section 14.

15.1 COMPONENT ACCESS.

To replace components:

It is necessary to remove one or more sections of the cabinet and cover plates within the appliance. Refer to Section 14.2 a, b, c and d.

To access the control box:

Place the facia and control box in the Service Position. Refer to Section 14.2, (b) and Fig. 14. Pull the two thermostat knobs clear of the facia. Unscrew two fixing screws at the top and two on the underside securing the facia to the control box. Ease the facia clear of the control box. Take care not to over stretch the capillary tubes or wiring. Ensure the facia is supported when out of the control box. See Fig. 14.

IMPORTANT:

The following components are secured to the appliance with clips, screws, union fittings or "O" ring seals to ensure the joints are water sound. See Fig. 16.

- Expansion Vessel.
- Circulating Pump.
- Water Diverter Valve.
- Water to Water Heat Exchanger.
- Gas to Water Heat exchanger.
- Flow switch.
- Gas valve.
- Pressure relief valve.

Comprehensive gasket/ O-ring packs are available for the gas and water connections on the appliance.

Refer to Section 18 - Short Parts List.

When replacing these components the connections must be fully entered so that the clips can pass completely into the locating groove. The clips must not be forced into place.

When a component is replaced or disturbed it is recommended the "O" is replaced.

The "O" rings can be lubricated with a suitable lubricant (i.e. silicon based grease or glycerine) which is non-reactive with the ethylene - propylene nitrile "O" rings.

15.2 Draining The Appliance.

Check that the electricity supply to the appliance is turned off.

Remove the kick strip secured to the cabinet side panels and base plate with five screws. See Fig. 14.

Before removing any component holding water it is important that as much water as possible is drained from the appliance.

CAUTION: Some water will remain in the expansion vessel, pump, water diverter valve, water to water heat exchanger and gas to water heat exchanger. Extra care must be taken when removing these components.

Place a towel or cloth beneath the component to absorb the excess system water.

The water will be contaminated and any absorbent material used must be destroyed or washed thoroughly after any component has been replaced.

(a) Appliance Heatbank and Heating Circuit:

Turn off the central heating flow and return valves at the appliance using a flat blade screwdriver. See Fig. 17. Fit a tube to the drain tap located on the right hand side, front, of the heatbank and open the tap. See Figs. 16.

NOTE: The heatbank contains about 60 litres (13.5 gallons) of primary water sufficient time must be allowed to drain the heatbank. Close the drain tap when the flow has stopped.

(b) Appliance Hot Water Circuit:

Turn off the mains water supply valve at the appliance using a flat blade screwdriver. See Figs. 16 and 17. Fit a tube to the drain tap located on the left hand side of the gas valve. See Fig. 16.

Open the tap and drain the hot water circuit.

A quantity of water will remain in the water to water heat exchanger, extra care must be taken when removing this component.

15.3 COMPONENT REPLACEMENT.

1. Automatic Air Vent. See Figs. 16, 17 and 35.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Drain the heating circuit as described in Section 15.2 (a).

Unscrew the automatic air vent and discard. Fit the replacement assembly. Ensure the plastic cap is removed and discarded.

Open the valves, fill and re-pressurise the system as described in Section 12.2.

Ensure the joint is water tight. Reassemble the appliance in the reverse order.

2. Fan. See Figs. 9, 16 and 35.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a,b,c and d.

Remove the fan assembly as described in Section 14.2 (e) and discard.

Fit the replacement fan in the reverse order.

Reassemble the appliance in the reverse order.

3. Gas to Water Heat Exchanger. See Figs. 9, 16, 17, 35 and 36.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Drain the heating circuit as described in Section 15.2 (a).

Remove the fan, flue hood, combustion chamber cover as described in Sections 14.2 e, f and g. Remove the Safety Temperature Limiter Thermostat phial from the thermostat pocket as described in Section 15.3 - 11.

Ease the three electrical connections off the pump overrun thermostat. Remove the left hand fibre insulation pad from the combustion chamber. Remove the access cover in the left hand side of the combustion chamber held in position with one screw. Unscrew the front and rear heat exchanger union connections.

Lift the heat exchanger off the right hand side of the combustion chamber support and clear of the union connections. Remove the heat exchanger clear of the inner casing.

WARNING: There will be a small quantity of water remaining in the heat exchanger.

Follow the procedure as described in 15.2.

Unscrew the two screws securing the pump overrun thermostat to the heat exchanger. Retain the screws and pump overrun thermostat. Discard the heat exchanger.

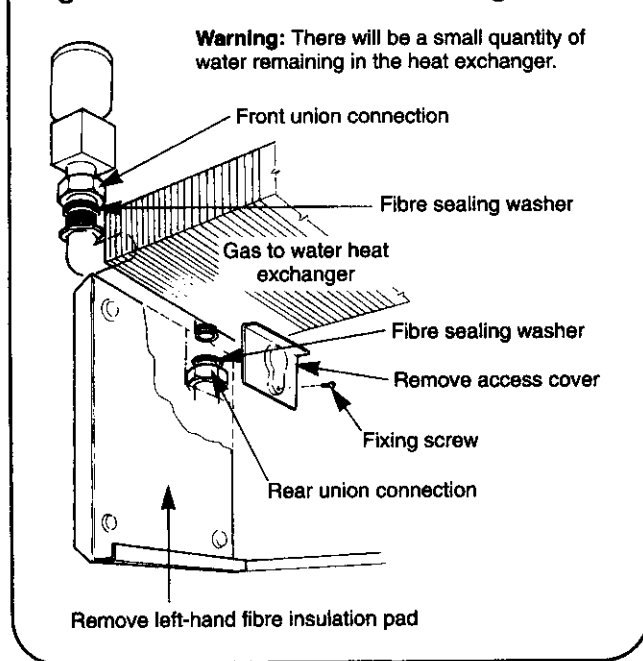
Fit the pump overrun thermostat to the replacement heat exchanger using the original screws. Ensure a layer of heat sink compound is on the sensing head before fixing.

Fit the replacement heat exchanger in the reverse order using new fibre sealing washers. Ensure the washers are in place and the heat exchanger correctly aligned.

Tighten the union connections. Refit the access cover to the left hand side of the combustion chamber and replace the fibre insulation pad. Refit the combustion chamber cover. Refit the overheat thermostat phial with a layer of heat sink compound. Reconnect the electrical connections to the pump overrun thermostat. (Red lead to terminal No.1, White lead to terminal No.2 and Black lead to terminal No. 3. Refer to Wiring Diagram Fig. 9). Reassemble the appliance in the reverse order.

Open the valves, fill and re-pressurise the system as described in Section 12.2.

Fig. 36. Gas to water heat exchanger.



4. Combustion Chamber Insulation. See Figs. 9, 16, 17, 35 and 37.

Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel, place the facia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Drain the heating circuit as described in Section 15.2 (a).

Remove the combustion chamber cover as described in Section 14.2 (g).

Remove the gas to water heat exchanger as described in Section 15.3 - 3.

Remove the fibre insulation pads from the combustion chamber side, rear and front sections and discard.

Fit replacement fibre insulation pads in the reverse order.

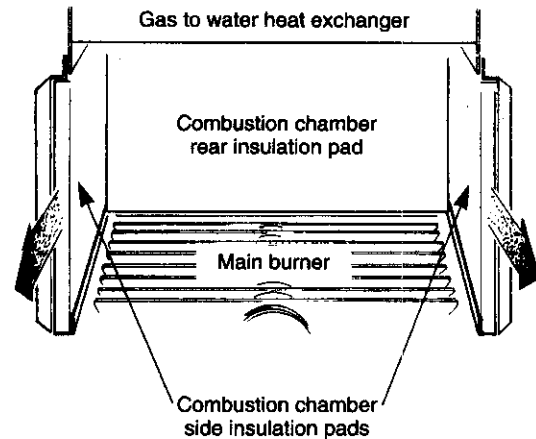
Note: The fibre pads are fragile take care they are not damaged.

Ensure the insulation pad fitted to the combustion chamber cover has the pilot observation hole correctly aligned.

Reassemble the appliance in the reverse order.

Open the valves, fill and re-pressurise the system as described in Section 12.2

Fig. 37. Combustion chamber insulation.



5. Main Burner. See Figs. 16, 34 and 35.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Remove the combustion chamber cover and main burner assembly as described in Sections 14.2 g and h.

Discard the burner.

Fit a replacement main burner in the reverse order. Ensure the main burner is fitted correctly on the main burner injector located at the back of the inner casing. Reassemble the appliance in the reverse order.

6. Main Burner Injector. See Figs. 16, 35 and 38.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Remove the combustion chamber cover and main burner assembly as described in Sections 14.2 g and h.

Unscrew the brass injector at the rear of the inner casing and discard.

Fit the replacement injector in the reverse order. Thread sealing compound is not required. Reassemble the appliance in the reverse order.

Fig. 38. Main burner injector.

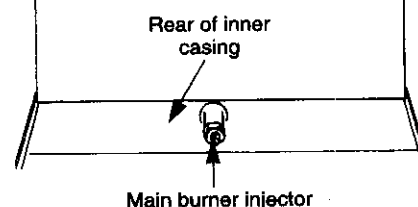
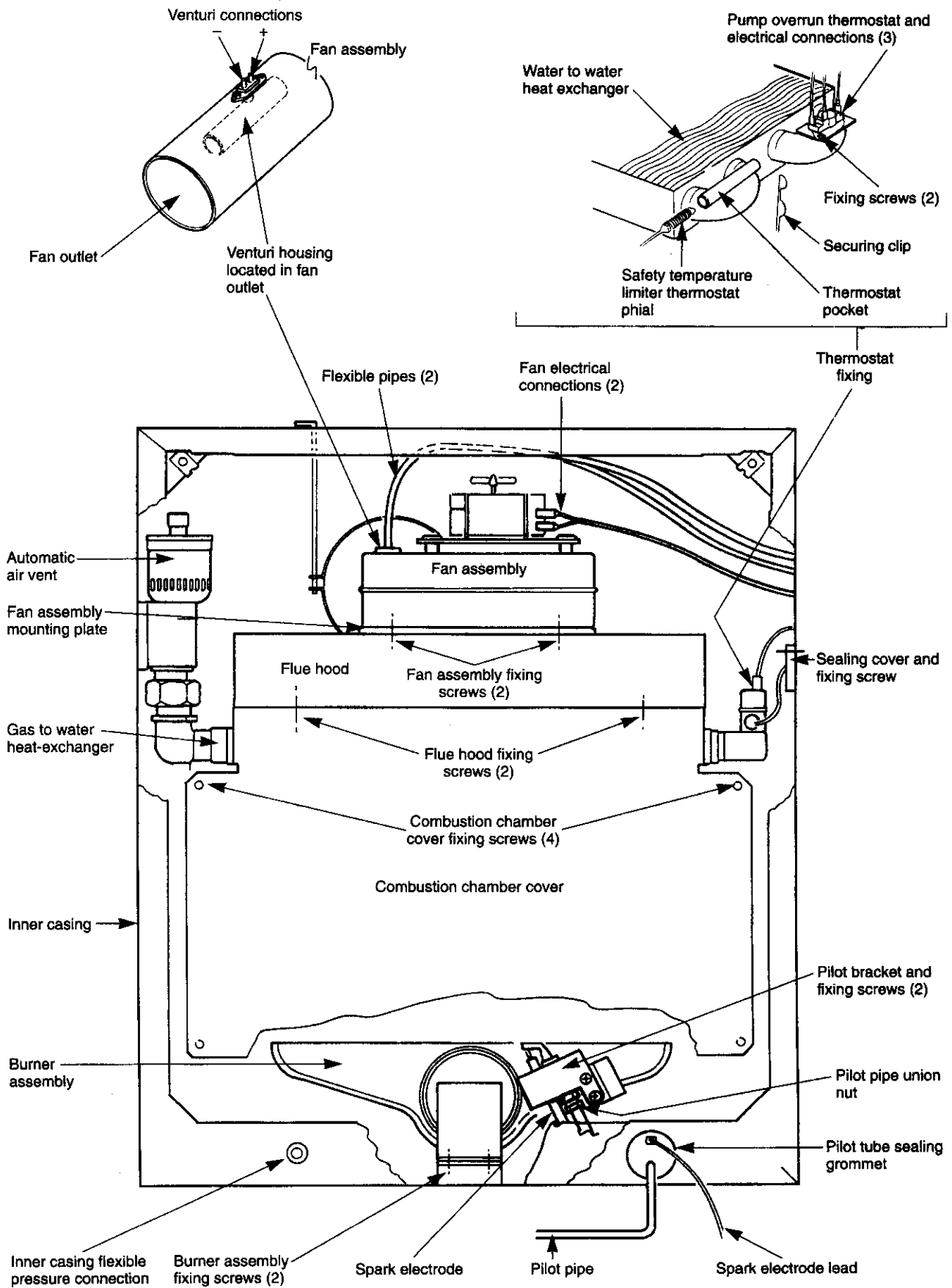


Fig. 35. Inner casing assembly.



7. Pilot Burner. See Figs. 16, 34, 35 and 39.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Remove the combustion chamber cover as described in Section 14.2 g.

Unscrew the two screws securing the pilot burner to the main burner. Ease the pilot burner forwards sufficiently to allow a suitable tool to support it.

The spark electrode is held in position with a clip. Ease the clip backwards and remove the spark electrode and retain.

Unscrew the union nut securing the pilot pipe and ease the pipe clear. Remove the pilot injector which is a push fit inside the pilot burner and retain.

Discard the pilot burner.

Fit a replacement pilot burner in the reverse order. Check the pilot burner settings and spark electrode gap is as shown in Fig. 39.

Reassemble the appliance in the reverse order.

8. Pilot Injector. See Figs. 16, 34, 35 and 39.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Remove the combustion chamber cover as described in Section 14.2 g.

Unscrew the two screws securing the pilot burner to the main burner. Ease the pilot burner forwards sufficiently to allow a suitable tool to support it.

The spark electrode is held in position with a clip. Ease the clip backwards and remove the spark electrode and retain.

Unscrew the union nut securing the pilot pipe and ease the pipe clear. Remove the pilot injector which is a push fit inside the pilot burner and discard. Fit a replacement pilot injector in the reverse order. Check the pilot burner settings and spark gap is as shown in Fig. 39.

Reassemble the appliance in the reverse order.

9. Spark Electrode. See Figs. 16, 34, 35 and 39.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Remove the combustion chamber cover as described in Sections 14.2 g.

Unscrew the two screws securing the pilot burner to the main burner. Ease the pilot burner forwards sufficiently to allow access.

The spark electrode is held in position with a clip. Ease the clip backwards and remove the spark electrode. Pull off the spark electrode cable and discard the spark electrode.

Fit a replacement spark electrode in the reverse order. Check the pilot burner settings and spark electrode gap is 4 to 5mm (0.8in), as shown in Fig. 39. Reassemble the appliance in the reverse order.

10. Spark Electrode Lead. See Figs. 16, 34, 35 and 39.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Remove the combustion chamber cover as described in Sections 14.2 g.

Unscrew the two screws securing the pilot burner to the main burner. Ease the pilot burner forwards sufficiently to allow access.

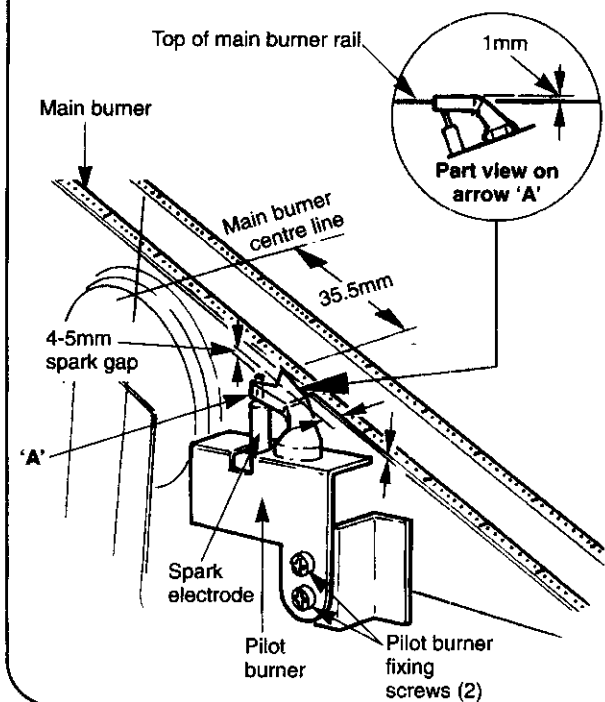
Remove the pilot tube supply sealing grommet from the front of the inner casing and retain. Remove the fascia as described in Section 15.1.

Carefully pull one end of the lead from the electrode and ease the other end off the tag on the spark ignition sequence board. Remove the lead from the appliance and discard.

Fit replacement lead in reverse order, ensure the inner casing is sealed correctly. Reassemble the appliance in the reverse order.

Check the pilot burner settings and spark electrode gap is 4 to 5mm (0.8in), as shown in Fig. 39. Reassemble the appliance in the reverse order.

Fig. 39. Pilot burner setting.



11. Safety Temperature Limiter Thermostat. See Figs. 9, 16, and 53.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Remove the fascia as described in Section 15.1.

Remove the sealing cover from the inner casing sealing the capillary tube. Remove the clip and pull the phial from the pocket on the gas to water heat exchanger. Carefully feed the capillary tube and phial through the hole in the side of the inner casing. Pull off the two electrical connections to the safety temperature limiter thermostat accessible from inside the control box on the right hand side. Note the position of the connections. Remove the central clamping nut. Withdraw the thermostat and thread the capillary through the hole in the control box. Discard the thermostat.

Fit a new safety temperature limiter thermostat in the reverse order and ensure the cover is replaced correctly and seals the inner casing. Ensure the electrical connections are made to the terminals inside the control box, polarity is not important. Apply a smear of heat sink compound to the thermostat phial.

Reassemble the appliance in the reverse order.

12. Pump Overrun Thermostat. See Figs. 9, 16 and 35.

Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel, place the fascia and control box in the Service Position, lower the expansion vessel into the Service Position and remove the inner casing cover, as described in Section 14.2 a, b, c and d.

Carefully pull off the three electrical connections to the pump overrun thermostat. Unscrew the two fixing screws securing the thermostat to the gas to water heat exchanger. Discard the pump overrun thermostat.

Fit a new pump overrun thermostat in the reverse order. Ensure a smear of heat sink compound is applied to the sensing head and the electrical connections are made correctly. (Red lead to terminal No.1, White lead to terminal No. 2 and Black lead to terminal No. 3. Refer to Wiring Diagram Fig. 9.)

Reassemble the appliance in the reverse order.

13. Hot Water Thermostat. See Figs. 9, 16, 40, 53 and 54.

Check that the electricity supply to the appliance is turned off. Remove the cabinet front panel and place the fascia and control box in the Service Position, as described in Section 14.2 a and b. Remove the fascia as described in Section 15.1.

Remove the spring clip from the thermostat pocket located on the front left hand side of the heatbank.

NB. There are two thermostat phials fitted in the pocket. The Hot Water thermostat phial is at the front of the pocket. To identify the phial follow the capillary tube from the thermostat body located inside the control box (marked on the fascia "Hot Water" thermostat) to the thermostat pocket.

Ease the phial out of the pocket and unclip the capillary from the left hand side of the cabinet panel.

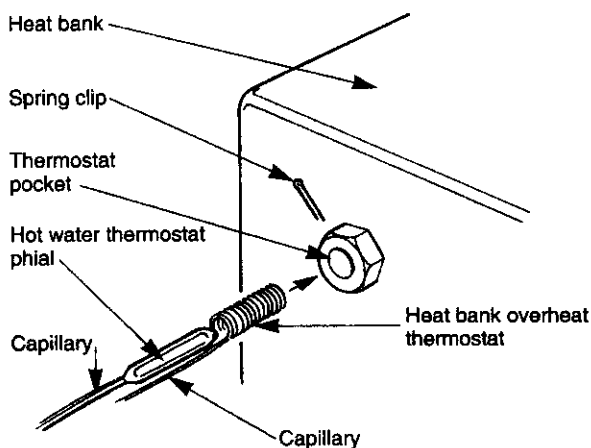
Unscrew the two screws on the underside of the control box securing the mounting bracket to the control box. Ease the bracket out of the control box allowing the capillary tubes to feed through the slot in the rear of the control box.

Unscrew the left hand central clamping nut. Pull off the two electrical connections from the rear of the thermostat. Push the thermostat body back to disengage the spindle from the mounting bracket. Withdraw the thermostat threading the capillary through the slot in the rear of the control box and discard.

Fit a new thermostat and re-assemble in the reverse order. The capillary of the replacement thermostat must be uncoiled to assist its passage through the control box opening. Ensure the capillary is re-clipped to the left hand side panel, clear of any hot surfaces and without tight bends. Apply a smear of heat sink compound to the thermostat phial and replace the spring clip into the thermostat pocket.

Reassemble the appliance in the reverse order.

Fig. 40. Hot water thermostat and heatbank overhear thermostat.



14. Heating Thermostat. See Figs. 9, 16, 41, 53 and 54.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, as described in Section 14.2 a and b. Remove the fascia as described in Section 15.1.

Ease the spring wire retaining clip off the top location on the front of the top manifold assembly. Pull the retaining clip and capillary gently downwards out of the thermostat pocket located in the top manifold. Continue pulling gently downwards until the phial is clear of the thermostat pocket. Remove the spring wire retaining clip and retain. Unclip the capillary from the left hand side of the cabinet panel.

Unscrew the two screws on the underside of the control box securing the mounting bracket to the control box. Ease the bracket out of the control box allowing the capillary tubes to feed through the slot in the rear of the control box.

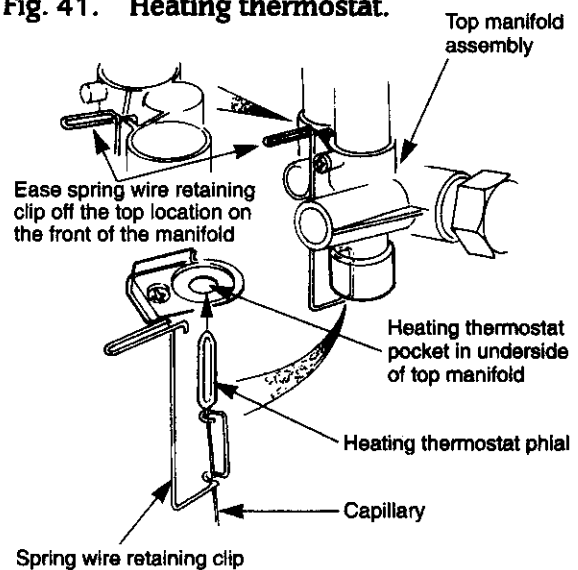
Unscrew the right hand central clamping nut. Pull off the two electrical connections from the rear of the thermostat. Push the thermostat body back to disengage the spindle from the mounting bracket. Withdraw the thermostat threading the capillary through the slot in the rear of the control box and discard.

Fit a new thermostat and re-assemble in the reverse order. Apply a smear of heat sink compound to the thermostat phial. The capillary of the replacement thermostat must be uncoiled to assist its passage through the control box opening. Ensure the capillary is re-clipped to the left hand side panel, clear of any hot surfaces and without tight bends. The spring wire retaining clip must be re-located on the capillary and in the thermostat pocket.

Clip back into position on the top of the manifold assembly.

Reassemble the appliance in the reverse order.

Fig. 41. Heating thermostat.



15. Hot Water High Limit Thermostat. See Figs. 9, 16, 42 and 53.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, as described in Section 14.2 a and b. Remove the fascia as described in Section 15.1.

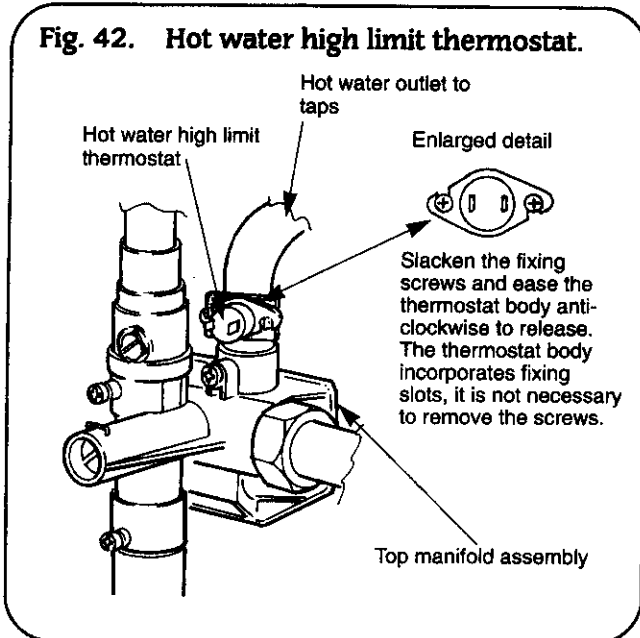
Remove the flow switch and lay to one side. Refer to Section 15.3-30.

Slacken the two M3 taptite screws holding the high limit thermostat to the hot water flow pipe. Ease the thermostat body anti-clockwise to release.

Unplug the thermostat leads marked, X16 (DHW Overhea), from the control board and the earth lead from the earthing bracket located in the control box.

Release the strain relief bush by compressing the loose section of the bush and carefully withdraw the leads from the control box. Remove the high limit thermostat and discard.

Fit a new high limit thermostat using the original fixing screws in the reverse order. Apply a smear of heat sink compound to the contact surface. Ensure the leads are connected to the control board and earthing bracket correctly. Replace the strain relief bush. Reassemble the appliance in the reverse order.



16. Heat Bank Overheat Thermostat. See Figs. 9, 16, 40, 53 and 54.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel and place the facia and control box in the Service Position, as described in Section 14.2 a and b. Remove the facia as described in Section 15.1.

Remove the spring clip from the thermostat pocket located on the front left hand side of the heatbank.

Note: There are two thermostat phials fitted in the pocket. The Heat Bank Overheat Thermostat phial is located at the rear of the pocket. To identify the phial follow the capillary from the thermostat body inside the control box to the thermostat pocket.

Ease the first phial clear of the pocket and place to one side. Ease the overheat thermostat phial clear of the pocket and unclip the capillary from the left hand side of the cabinet panel.

Unscrew the two screws on the underside of the control box securing the mounting bracket holding the Hot Water and Heating thermostats to the control box. To access the Heat Bank Overheat thermostat ease this bracket sufficiently clear of the control box allowing the capillary tubes to feed through the slot in the rear of the control box.

Ease off the two electrical connections from the rear of the thermostat. Unscrew the central clamping nut. Withdraw the overheat thermostat and thread the capillary through the hole in the left hand side of the control box. Discard the thermostat.

Fit a new thermostat and re-assemble in the reverse order. The capillary of the replacement thermostat must be uncoiled to assist its passage through the hole in the control box. Ensure the capillary is re-clipped to the left hand side panel, clear of any hot surfaces and without tight bends. The spring clip must be replaced into the thermostat pocket.

Ensure the electrical connections are made to the terminals inside the control box, polarity is not important. Apply a smear of heat sink compound to the thermostat phial. Reassemble the appliance in the reverse order.

17. Air Flow Pressure Switch. See Figs. 9, 35, 43 and 53.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel and place the facia and control box in the Service Position, as described in Section 14.2 a and b.

Remove the facia as described in Section 15.1.

Carefully pull off the suction tubes and the electrical connections from the switch.

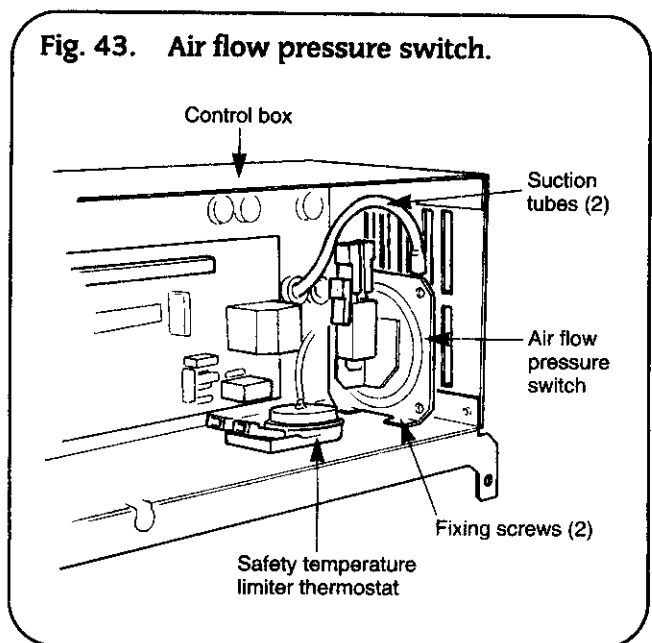
Note the position of the suction tubes and electrical connections.

Unscrew the two fixing screws from the bottom right hand side of the control box securing the air pressure switch.

Remove air pressure switch from the control box and discard.

Fit the replacement switch in reverse order. Ensure the electrical connections have been made to the correct terminals (Brown to "C" tag, White to "NC" and the Grey to "NO") and the suction tubes fitted to the correct connections on the switch. Connect Tube marked positive (+) to the connection marked "H" and the tube marked negative (-) to connection marked "L".

Reassemble the appliance in the reverse order.



18. Gas Valve. See Figs. 9, 16, 35 and 44.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position and lower the expansion vessel into the Service Position as described in Section 14.2 a, b and c.

Turn off the gas supply at the service cock.

Disconnect the pilot pipe at the gas valve. Unscrew the bracket supporting the domestic drain from the left hand side of the gas valve. Retain bracket and screw.

Unscrew the four M4 extended hexagon headed screws securing the outlet flange connection to the side of the of the gas valve. Unscrew the inlet gas union at the gas service cock. Support the valve and unscrew the retaining screws from the solenoid electrical connection plugs and pull each plug off its respective set of terminals.

NOTE: The plugs are dissimilar and not inter-changeable.

Pull off the pressure compensating tube.

Remove the gas valve and flange sealing washer clear of the appliance.

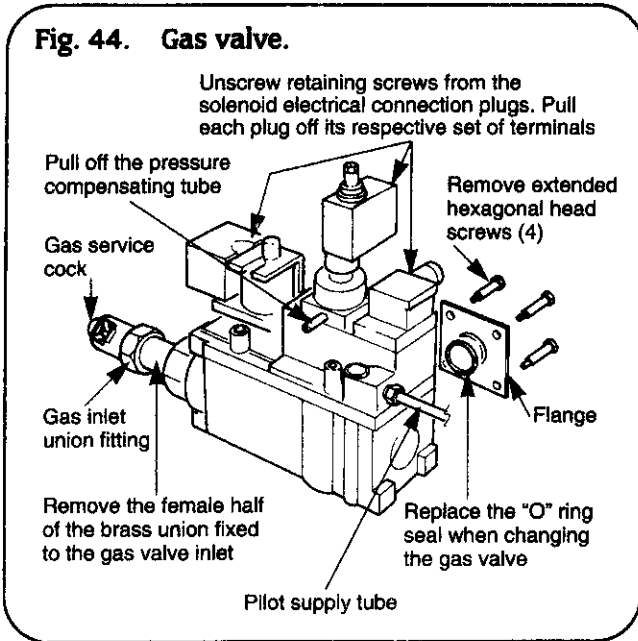
Remove the female half of the brass union connector fixed to the gas valve inlet. Discard the gas valve and sealing washer.

Using an approved jointing compound complying with BS5292 fit the female half of the brass union to the replacement gas valve inlet.

Fit the replacement gas valve in the reverse order ensure the flange washer is renewed. Reconnect the pressure compensating tube. Reassemble the appliance in reverse order.

Turn on the gas supply at the service cock and check for gas soundness.

Re-commission the appliance and check the burner setting pressure. Refer to Section 12: Commissioning.



19. Pilot Filter.

If problems are experienced with the pilot filter fit a replacement gas valve as described in Section 15.3.18.

20. Circulating Pump. See Figs. 9, 16 and 45.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position and lower the expansion vessel into the Service Position, as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Remove the pump cover and disconnect the electrical connections. Release the cable clamp and remove the cable.

Withdraw the two securing clips from the pump body. Ease the pump forwards about 10 mm off the "O" ring seals and remove from the appliance.

WARNING: There will be a small quantity of water remaining in the pump and pipework. Follow the procedure as described in 15.2. Discard the pump and "O" ring seals.

Fit new "O" ring seals. Fit a replacement pump in the reverse order taking care to ensure the securing clips are properly entered into the slots and not scoring the O-rings on entry. A smear of lubricant on each O-ring will ease the re-assembly. Check the pump head is set to maximum.

The pump head is a Grundfos 15/60. A replacement head may be transferred to the special body. Take care not to mark the mating surfaces.

Reconnect the cable and refit the cable clamp.

Open the valves, fill and repressurise the system as described in Section 12.2.

Reassemble the appliance in the reverse order.

21. Water Diverter Valve. See Figs. 9, 16, 45 and 46.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position and lower the expansion vessel into the Service Position, as described in Section 14.2 a, b and c. Remove the facia as described in Section 15.1 .

Drain the heating circuit as described in Section 15.2 a.

Remove the circulating pump as described in Section 15.3 - 20.

Note: It is not necessary to disconnect the electrical cable. The cable length is sufficient to allow the pump head to rest on top of the appliance. Do not allow the pump head to be suspended by the cable. Secure the pump head.

Pull off the Molex plug marked X7 'Diverter Valve' from the control board located in the control box. Release the strain relief bush by compressing the loose section of the bush and carefully withdraw the lead from the control box.

Using a pair of long nose pliers, remove the two clips securing the 6 mm copper pressure pipe, to the top left hand corner of the valve and pump connection. Retain the clips. Ease the pressure pipe out of the connections and clear of the appliance.

Retain the pressure pipe.

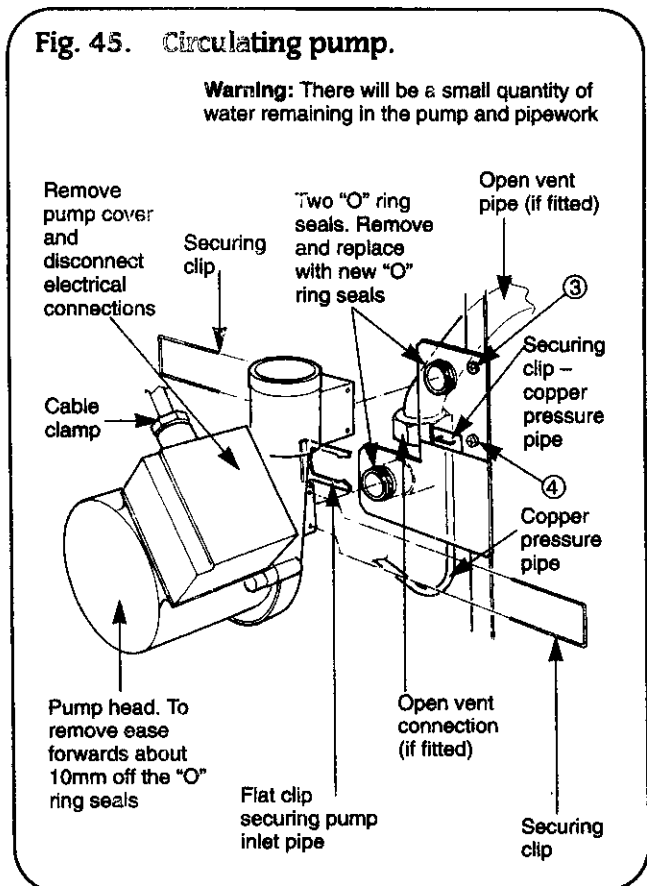
Unscrew the four fixing screws securing the water diverter valve to the bottom manifold. The bottom right hand screw is accessible using a "chubby" type screwdriver. Remove the water diverter valve clear of the appliance. Discard the valve and "O" ring seals. Retain the fixing screws.

WARNING. There will be a small quantity of water remaining in the valve and lower manifold. Follow the procedure as described in 15.2.

NOTE: Three new "O" ring seals are provided with the replacement valve. Two of the "O" rings are identical in diameter and cross - section and are required for the outer ports. The third "O" ring is smaller in diameter and cross-section and will seal the centre port.

IMPORTANT: Fit the two larger diameter "O" rings into the outer locations on the replacement valve. Fit the smaller diameter "O" ring over the centre spigot on the bottom manifold. Ensure the "O" ring is located correctly against the shoulder on the centre spigot.

Fit the replacement valve in reverse order ensure the four fixing screws are correctly engaged. Replace the "O" ring seals and refit the pressure pipe. Ensure the securing clips are fully engaged in the locating holes.



Reconnect the electric cable to the control board and replace the strain relief bush. Replace the circulating pump as described in Section 15.3-20.

Open the valves, fill and repressurise the system as described in Section 12.2. Reassemble the appliance in the reverse order.

22. Water to Water Heat Exchanger. See Figs. 16, 41, 45, 46, 47, 48, 49, 51 and 52.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position and lower the expansion vessel into the Service Position, as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Drain the hot water circuit as described in Section 15.2 b.

WARNING: The weight of the water to water heat exchanger is 2 kg. approx. A quantity of water will remain in the heat exchanger and pipework. Follow the procedure as described in 15.2.

Remove the circulating pump as described in Section 15.3-20.

Remove the water diverter valve as described in Section 15.3-21.

NOTE: i). It is not necessary to disconnect the electrical cable from these components. The length of cable is sufficient to allow them to rest on top of the appliance cabinet. Do not allow them to be suspended by the cable. Secure the pump head and diverter valve.

NOTE: ii). Unless otherwise stated all water joints are sealed with "O" rings. To disconnect twist the pipe and / or ease the joint apart. When re-connecting the joint a new "O" ring must be fitted. Silicone grease must be applied to the "O" ring.

Remove the pressure relief valve and manual air vent assembly as described in Section 15.3-27 and retain. See Fig. 51.

Unscrew locating screw No.1 in the bottom manifold two full turns. See Fig. 47.

Unscrew the flat faced union fitting below the flow switch. Remove the sealing washer and discard. See Fig. 52. Move the cold water inlet pipe to the left to clear the flow switch. Ease the pipe upwards, 10 mm approx. and remove from the bottom manifold. Retain the pipe.

Unscrew the union fitting below the cold water inlet valve and remove the flow switch and water filter assembly. See Fig. 52.

Place the flow switch and water filter assembly on top of the appliance cabinet and secure.

Unscrew locating screw No. 2 in the top manifold two full turns. See Fig. 47. Ease the heating return pipe downwards 10 mm approx. into the slip joint in the bottom manifold.

Move the pipe to the left to clear the top manifold. Ease the pipe upwards 10 mm approx. and remove the pipe from the bottom manifold. Retain the pipe.

Remove the heating control thermostat phial as described in Section 15.3-14. See Fig. 41. Place the phial to one side.

If the appliance is fitted to an open vent system unscrew the open vent union connection and remove the washer. See Fig. 45.

Remove the flat clip securing the pump inlet pipe to the pump lower support plate. Retain the clip. See Fig. 45.

Remove the two screws Nos. 3 and 4 securing the pump inlet pipe support plate and remove the plate. See Fig.45.

Unscrew two full turns locating screw No. 5. See Fig. 47. Ease the pump inlet pipe upwards 10 mm approx. and remove from the bottom manifold. Retain the pipe, plate and screws.

To access the water to water heat exchanger the top manifold must first be removed:

Unscrew locating screw Nos. 6, 7 and 8 in the top manifold two full turns. Unscrew and remove screws Nos. 9 and 10 securing the manifold to the water to water heat exchanger support bracket. Retain the screws. See Fig. 47.

Unscrew the flat faced union securing the manifold to the inner casing pipework. See Fig. 47.

Remove the sealing washer and discard. See Fig. 47.

Ease the manifold assembly downwards, 10 mm approx., until clear of the heating flow and return pipes and hot water outlet pipe. See Fig. 47.

Remove the top manifold clear of the appliance and retain.

Unscrew locating screws Nos.11 and 12 two full turns. Unscrew and remove screws Nos.13 and 14 securing the bottom manifold to the water to water heat exchanger support bracket. See Figs. 47 and 48. Retain the screws. Unscrew the bracket supporting the domestic drain from the left hand side of the gas valve. Using long nose pliers remove the clip securing the drain pipe to the bottom manifold. Ease the drain pipe downwards out of the manifold and remove. See Fig. 48.

Retain the clip, screw, bracket and drain pipe.

Ease the bottom manifold and water to water heat exchanger upwards 10 mm approx. until clear of the heat bank flow and return pipes. See Fig. 48.

NOTE: It may be necessary to push down on the flow and return pipes to release the "O" ring fittings. Before entering the heat bank the flow and return pipes are fitted into slip joints. The joints are sealed with "O" rings and allow some movement forwards or backwards when removing the bottom manifold and water to water heat exchanger. See Fig.48.

Ease the water to water heat exchanger and bottom manifold from the support bracket and clear of the appliance.

Release screw No.15 and remove the bottom manifold off the locations on the water to water heat exchanger. See Figs. 47 and 48. Discard the heat exchanger. Retain the fixing screw.

Remove the two "O" ring seals from the rear of each manifold and discard.

IMPORTANT: Two new "O" ring seals must be fitted to the rear of each manifold. See Fig. 49.

If the flow and return pipes to the heat bank have been disturbed when removing the water to water heat exchanger the "O" ring seals must be replaced :

Ease the heat bank flow pipe out of the front slip joint and return pipe out of the rear slip joint and clear of the push in elbows. See Fig. 48.

Remove and discard the "O" ring seals from each pipe. Replace with new "O" ring seals.

Pull out the flat clip from the front push in elbow and remove the elbow. Retain the clip and push in elbow. See Fig. 48.

To release the rear elbow reach under the water to water heat exchanger bracket and push in fully the flat plate clamp mechanism. Remove the rear push in elbow and retain. See Fig.48.

Remove and discard the elbow "O" ring seals. Replace with new "O" ring seals.

Re-assemble the rear and front push in elbows. Ensure the rear clamp mechanism is engaged and fully pulled into the location. Engage the front flat clip into the slot correctly.

Re-assemble the flow and return pipes into the slip joints. The pipe lengths are not identical, the longest pipe is the rear/return pipe. See Fig. 48.

Re-assemble the bottom manifold to the replacement water to water heat exchanger. Ensure the heat exchanger is located correctly with the internally threaded boss fitting through the fixing hole in the manifold and the raised section on the manifold port fitting into the bottom right hand port on the heat exchanger. See Fig. 49. Replace screw No. 15 and tighten.

Fit the replacement water to water heat exchanger and bottom manifold assembly into the support bracket. Ensure the heat bank flow and return connections are fully engaged. Secure the assembly to the support bracket with screw Nos.13 and 14. Fully tighten the screws fixing the "O" rings Nos. 11 and 12. See Figs. 47 and 48.

Re-assemble the top manifold in the reverse order.

Ensure the heating flow and heating return and hot water pipes are fully engaged.

Ensure a new sealing washer and "O" ring is fitted when re-connecting the union securing the top manifold to the inner casing pipework. Replace the manifold top fixing screws Nos.9 and 10. Tighten screws Nos. 6, 7 and 8 and manifold union fitting. See Fig. 47.

Re-assemble the pump outlet pipe and tighten screw No. 5. Re-fit the pump support plate and secure with screw Nos. 3 and 4. Ensure the flat clip is re-located.

Re-connect the open vent pipe (if applicable). Ensure a new sealing washer is fitted. Replace the heating thermostat phial and wire clip.

Re-assemble the heating return pipe using the slip joint in the bottom manifold to manoeuvre the pipe into position.

Re-assemble the cold water inlet pipe and flow switch ensure the sealing washer is renewed. Re-connect the union fitting to the cold water inlet valve. See Fig. 52.

Re-assemble the pressure relief valve ensure clip is replaced. See Fig. 51.

Re-assemble the domestic drain pipe renewing the "O" seal. Relocate the securing clip and fixing bracket to the gas valve. See Fig. 48.

Before continuing ensure screws 1, 2, 5, 6, 7, 8, 11 and 12 are fully engaged. The "O" ring seals must be pushed fully into the housing.

Re-assemble the water diverter valve. Re-assemble the 6 mm diameter pressure pipe to the pump inlet pipe and diverter valve renewing the "O" ring seals. Ensure the securing clips are replaced.

Re-assemble the circulating pump ensure the securing clips are re-placed.

Open the valves, fill and repressurise the system as described in Section 12.2. Reassemble the appliance in the reverse order.

23. Water to Water Heat Exchanger Top Manifold. See Figs. 41, 45, 46, 47, 48, 49, 51 and 52.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position and lower the expansion vessel into the Service Position, as described in Section 14.2 a, b and c.

Drain the heating and hot water circuit as described in Section 15.2

Refer to Section 15.3-22 and remove the Top Manifold commencing from the instruction:

WARNING: The weight of the water to water heat exchanger is 2 kg. approx. A quantity of water will remain in the heat exchanger and pipework. Follow the procedure as described in 15.2.

Remove the manifold clear of the appliance Remove and retain the brass stub connection and nut from the manifold.

Withdraw the by-pass adjuster retaining clip and unscrew the adjuster from the manifold retaining both items.

Undo and remove the phial pocket securing clip screw and clip. Retain both the clip and screw. Extract the phial pocket and retain.

Unscrew and retain all locating screws.

Before reassembling the appliance refit the by-pass adjuster and phial pocket in the reverse order using new "O" rings.

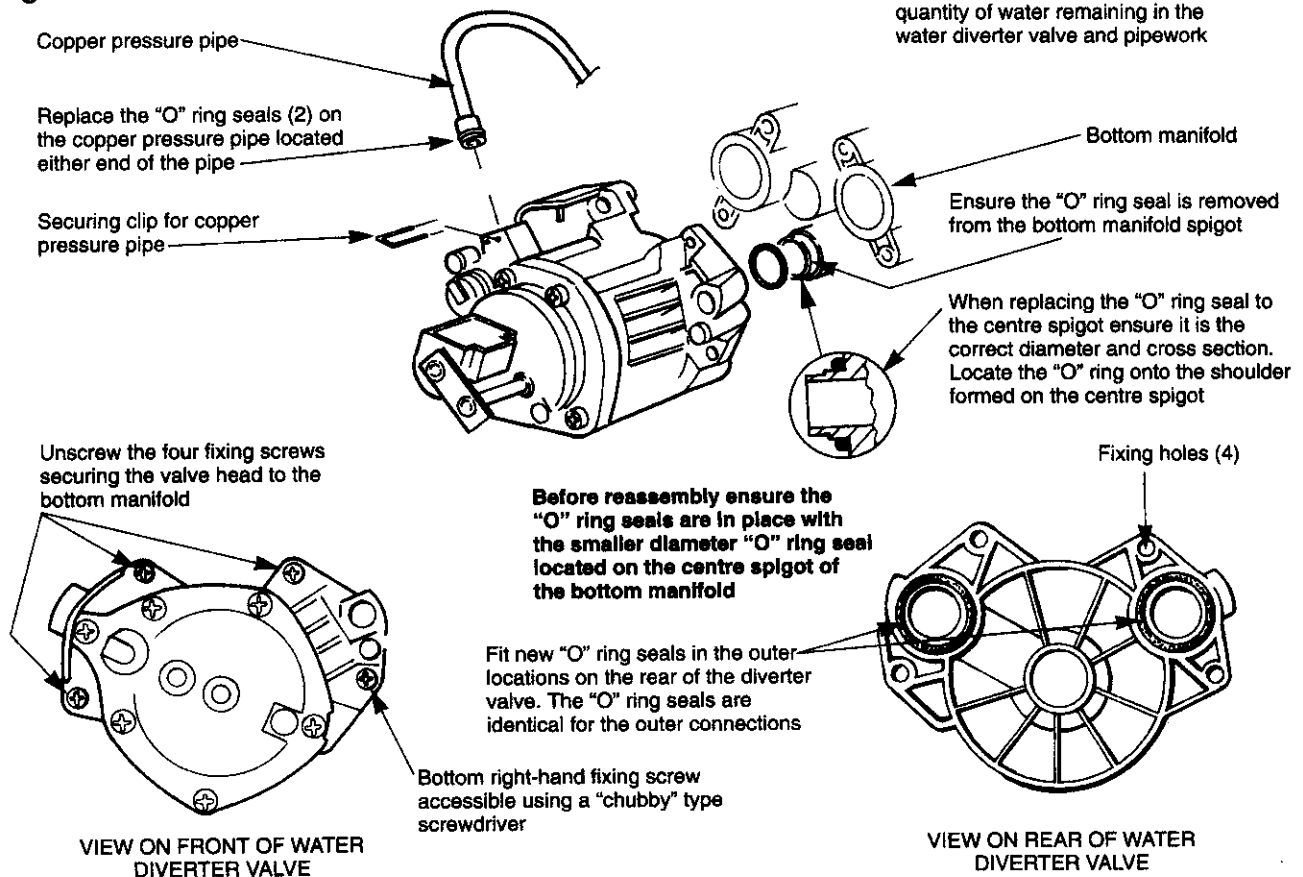
Screw all locating screws fully home then unscrew each of them two full turns. Check that none of the screws protrude into their relevant bores.

Reassemble the manifold in the reverse order using new "O" rings to replace any "O" rings which have been disturbed. Use new sealing washers where appropriate.

Ensure that all clips and screws are correctly refitted.

Open the valves, fill and repressurise the system as described in Section 12.2. Reassemble the appliance in the reverse order.

Fig. 46. Water diverter valve.



24. Water to Water Heat Exchanger Bottom Manifold.

Refer to Section 15.3-22 Water to Water Heat Exchanger.

Follow this procedure and replace the bottom manifold after the bottom manifold/ water to water heat exchanger assembly has been removed from the appliance. Retain the original water to water heat exchanger and fit the new manifold using new "O" rings.

Reassemble the appliance as described in Section 15.3-22.

25. Expansion Vessel. See Figs. 16 and 50.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position and lower the expansion vessel into the Service Position, as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Unscrew the union fitting on the right hand side of the expansion vessel and remove the sealing washer. Ease the expansion vessel assembly upwards to clear the support bracket and remove from the appliance. Take care when removing as a small quantity of water remains inside the vessel. Follow the procedure as described in 15.2. Discard the expansion vessel.

Fit a replacement expansion vessel into the support bracket and reconnect the union fitting using a new sealing washer.

Open the valves, fill and repressurise the system as described in Section 12.2.

Reassemble the appliance in the reverse order.

26. Expansion Vessel Flexible Hose. See Figs. 16 and 50.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position and lower the expansion vessel into the Service Position, as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Unscrew the union fitting on the right hand side of the expansion vessel. Remove and discard of the sealing washer. Ease the expansion vessel assembly upwards to clear the support bracket and remove from the appliance. Take care when removing as a small quantity of water remains inside the vessel. Follow the procedure as described in Section 15.2.

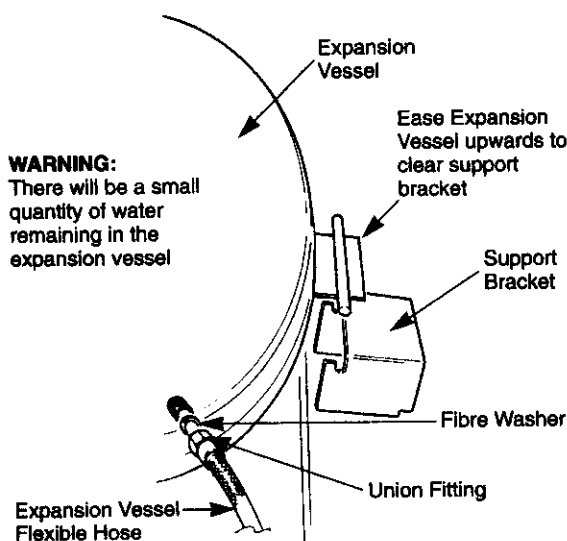
Unscrew the union fitting on the right hand side of the heatbank. Remove and discard of the sealing washer.

Reconnect the hose in the reverse order using new sealing washers. Ensure the orientation of the hose fittings does not cause twisting or crimping of the hose when the expansion vessel is repositioned in the boiler.

Open the valves, fill and repressurise the system as described in Section 12.2.

Reassemble the appliance in the reverse order.

Fig. 50. Expansion vessel and flexible hose.



27. Pressure Relief Valve. See Figs. 16 and 51.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Withdraw the securing clip from the top manifold and ease the pressure relief valve assembly forwards until clear of the appliance. Unscrew the manual air vent and disconnect the overflow pipe. Discard the valve and "O" ring seal.

Re-connect the overflow pipe and manual air vent to the replacement valve. Fit a new "O" ring seal to the valve.

Re-connect the assembly to the appliance and replace the securing clip.

Open the valves, fill and re-pressurise the system as described in Section 12.2. Reassemble the appliance in the reverse order.

28. Manual Air Vent. See Figs. 16 and 51.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Remove the Pressure Relief Valve as described in Section 15.3-27.

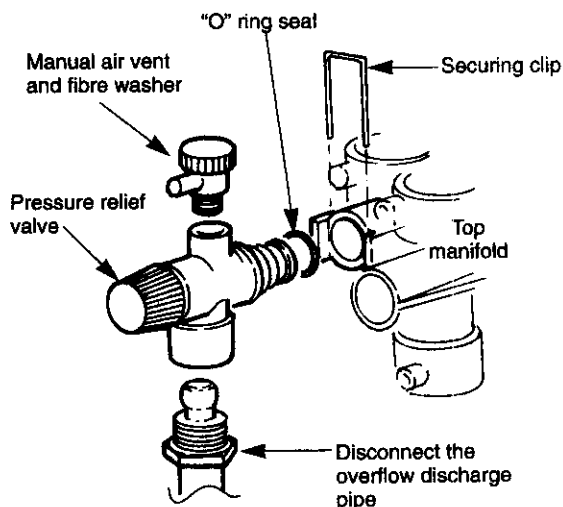
Unscrew the manual Air Vent and discard along with its washer.

Replace with a new Manual Air Vent and washer.

Re-connect in the reverse order using a new "O" ring seal.

Reassemble the appliance in the reverse order.

Fig. 51. Pressure relief valve and manual air vent.



29. Pressure Gauge. See Fig. 16.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position and lower the expansion vessel into the Service Position, as described in Section 14.2 a, b and c.

Drain the heating circuit as described in Section 15.2 a.

Unscrew the pressure gauge out of the heat bank. Fit the replacement pressure gauge using suitable thread sealing compound. Open the valves, fill and re-pressurise the system as described in Section 12.2.

Reassemble the appliance in the reverse order.

30. Flow Switch. See Figs. 9, 16, 52 and 53.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position and lower the expansion vessel into the Service Position, as described in Section 14.2 a, b and c.

Fig. 47. Water to water heat exchanger.

Note: Screw Nos. ① ② ⑤ ⑥ ⑦ ⑧, ⑪ ⑫ unscrew two full turns – **Do not remove.**
Screw Nos. ③ ④ (Refer to Fig. 45) ⑨ ⑩, ⑬ ⑭ ⑮ remove and retain.

Warning: There will be a small quantity of water remaining in the pipework and water-to-water heat exchanger.

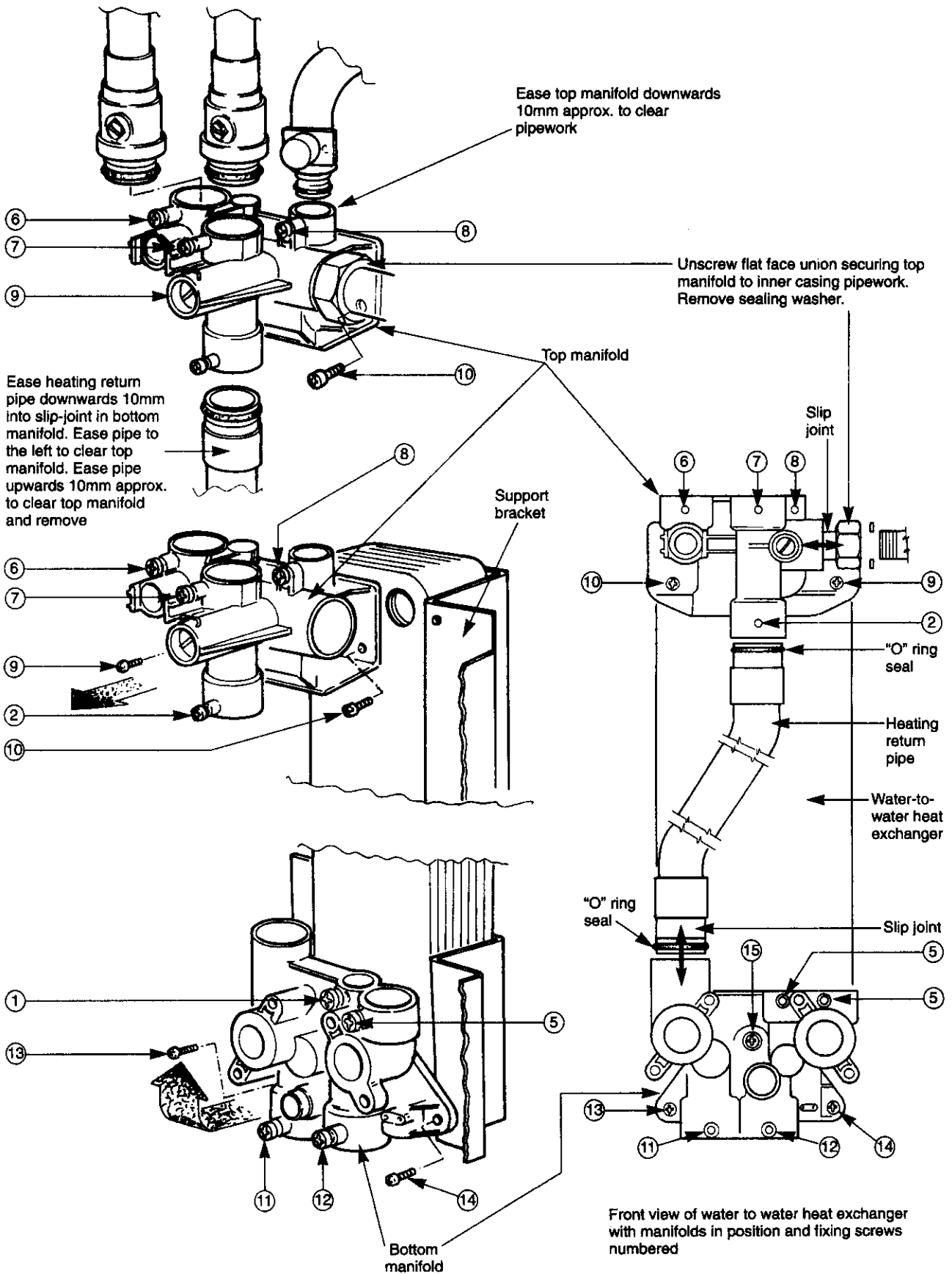


Fig. 48. Water to water heat exchanger.

WARNING: There will be a small quantity of water remaining in the pipework and water-to-water heat exchanger

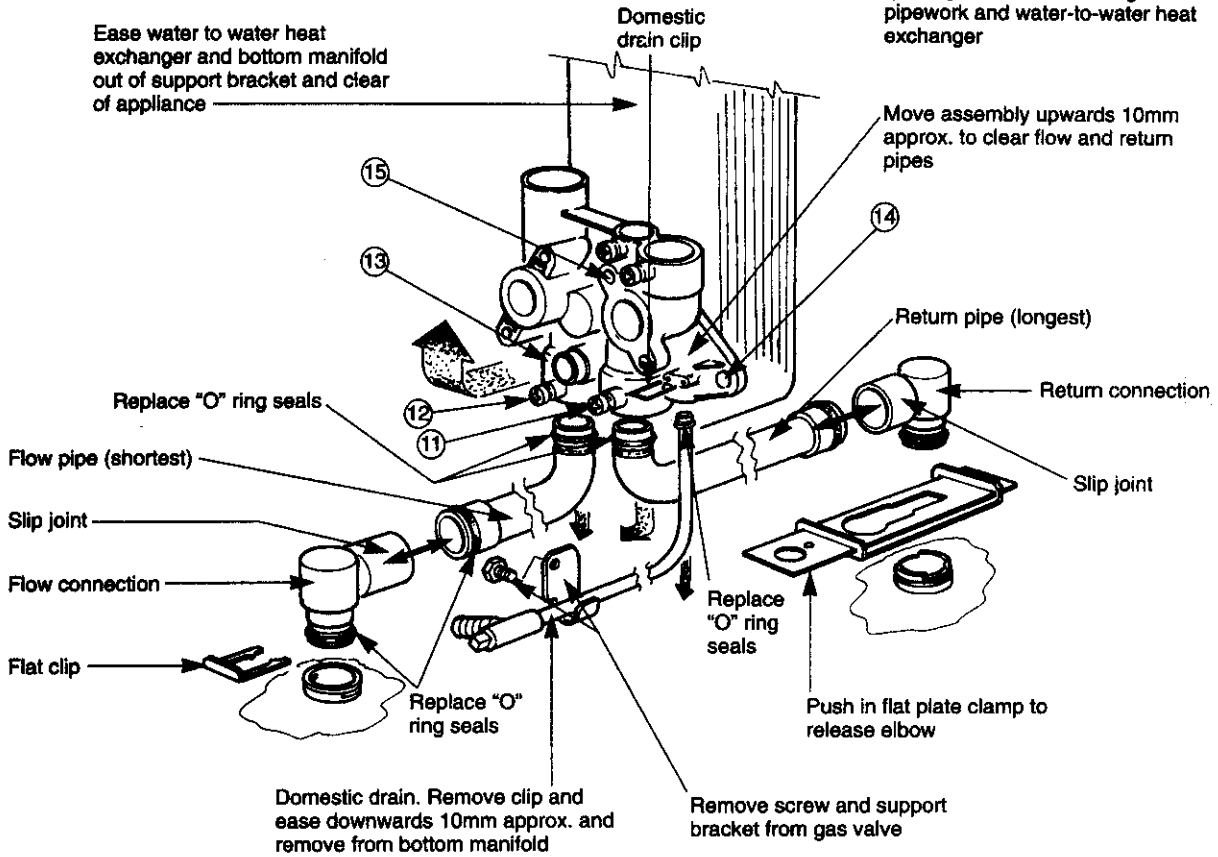
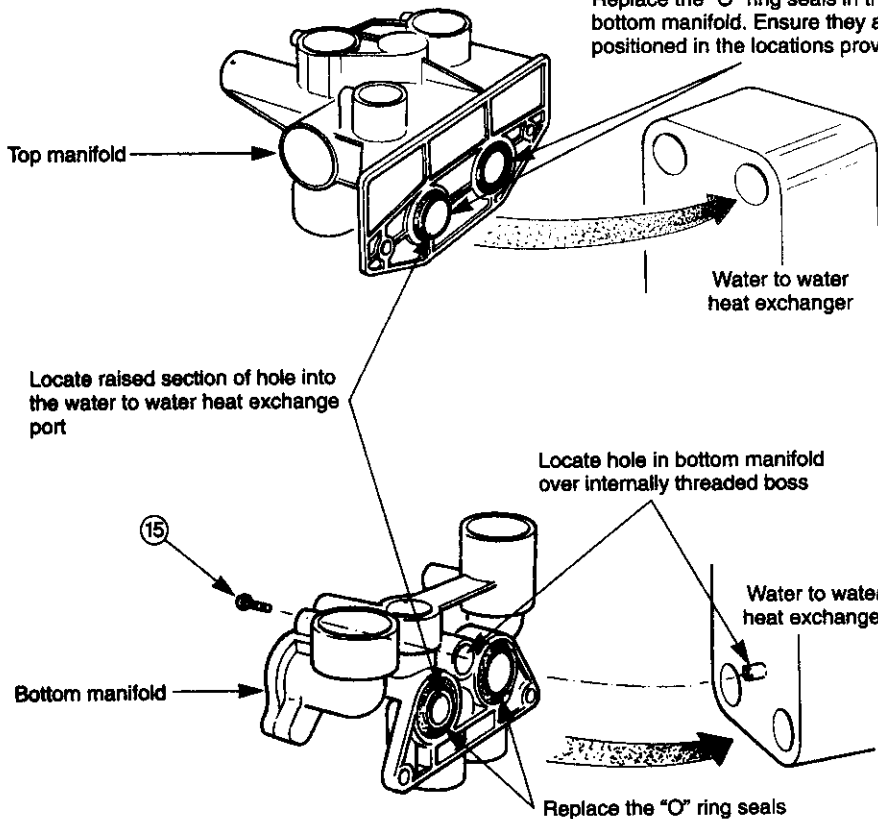


Fig. 49. Replacing the "O" ring seals in top and bottom manifolds.

Replace the "O" ring seals in the top and bottom manifold. Ensure they are positioned in the locations provided



IMPORTANT:

Before the water diverter valve is re-assembled ensure the domestic drain pipe and clip are fitted to the bottom manifold. Refer to Fig. 48.

Before tightening screws ① ② ⑤ ⑥ ⑦ ⑧ ⑪ ⑫ ensure the "O" ring seals are fully pushed into their respective housing.

Ensure screws ⑬ and ⑭, securing the bottom manifold to the support bracket, are fully tightened.

Ensure screws ⑨ and ⑩, securing the top manifold to the support bracket, are fully tightened.

Drain the hot water circuit as described in Section 15.2 b.

Remove the fascia as described in Section 15.1. Unplug the Molex plug marked X1 'Flow Switch', from the control board. Release the strain relief bush by compressing the loose section of the bush and carefully withdraw the leads from the control box. Unscrew the two flat faced union fittings connecting the flow switch body to the mains cold water inlet. Remove the flow switch, leads and sealing washers clear of the appliance and discard.

Fit a replacement flow switch in the reverse order. Ensure the arrow on the end of the black plastic body points **downwards** and new sealing washers are fitted.

Reconnect the Molex plug.

Open the valve and fill the hot water circuit.

Reassemble the appliance in the reverse order.

31. Water Filter. See Figs. 16 and 52.

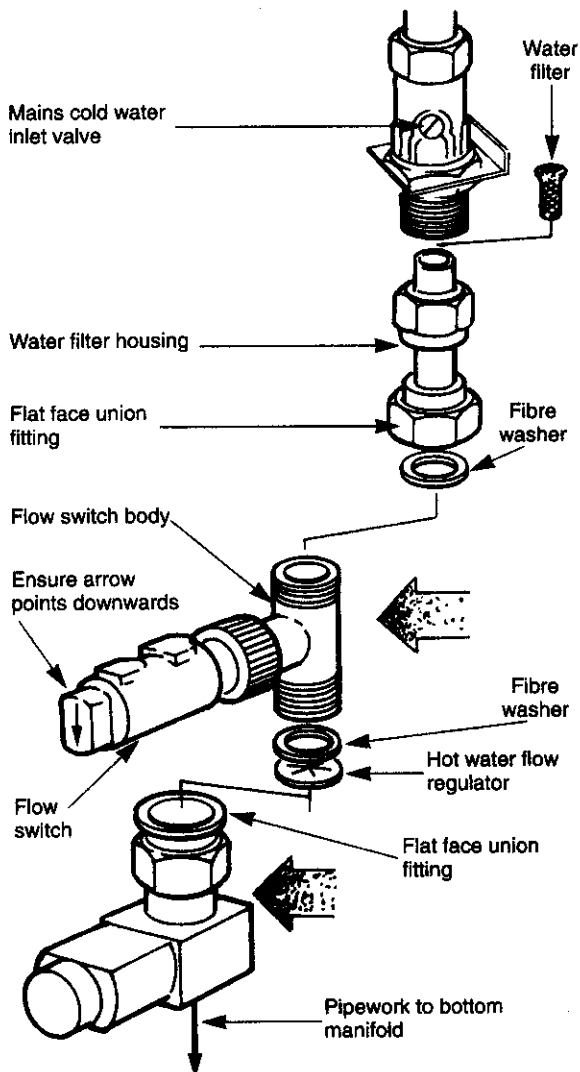
Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, as described in

Section 14.2 a, b and c.

Drain the domestic hot water circuit as described in Section 15.2 b.

Fig. 52. Flow switch, water filter and hot water flow regulator.



Undo the flat faced union above the flow switch. Swivel the flow switch and pipework sideways sufficiently to clear the union. Remove the sealing washer and discard.

Undo the union below the mains water supply valve and remove the filter housing clear of the appliance. The water filter is located in the top of the housing. Remove the filter clean or replace.

Reassemble in the reverse order and replace the sealing washer. No sealing compound is required. Open the mains water valve and fill the hot water circuit.

Reassemble the appliance in the reverse order.

32. Hot Water Flow Regulator. See Figs. 16 and 52.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position, as described in Section 14.2 a, b and c.

Drain the domestic hot water circuit as described in Section 15.2 b.

Undo the flat faced union below the flow switch. Ease the pipework sideways sufficiently to clear the flow switch. Remove the sealing washer and discard.

The water flow regulator is located in the union fitting. It may be necessary to prise the regulator from its housing. Remove and discard.

Fit a new flow regulator, small diameter section first. Reassemble in the reverse order and replace the sealing washer. No sealing compound is required.

Open the mains water valve and fill the hot water circuit.

Reassemble the appliance in the reverse order.

33. Inner Casing Cover Seal. See Fig. 16.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position and lower the expansion vessel into the Service Position, as described in Section 14.2 a, b and c.

Remove the inner casing cover as described in Section 14.2 d.

Remove the inner casing cover seal and discard. Fit a replacement seal using silicon adhesive. Check that the seal passes completely around the edge of the inner casing cover leaving no gaps.

Reassemble the appliance in the reverse order.

34. Operating Switch. See Figs. 9 and 16.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position as described in

Section 14.2 a and b.

Remove the fascia as described in Section 15.1.

Remove the terminals from the rear of the switch making note of their positions. Squeeze together the two plastic retaining lugs to remove from the fascia. Discard the switch.

Snap in the replacement switch and reconnect the terminals. Refer to the wiring diagram Fig. 9. Reassemble the appliance in the reverse order.

35. Control Board. See Figs. 9 and 53.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the fascia and control box in the Service Position as described in

Section 14.2 a and b.

Remove the fascia as described in Section 15.1.

Carefully pull off all the Molex plugs, note the positions. Disconnect the room thermostat and frost thermostat if fitted, note the positions.

Disconnect the mains supply at the terminal strip located bottom left hand corner of the control board, marked X11 'Mains Supply'. Unplug the Operating Switch or programmer if fitted, from terminal marked X12 "Programmer/Switch".

Release the plastic catch at each mounting post pulling the printed circuit board forward approximately 3 mm to prevent the plastic catch from returning. Pull the board off the remainder of the mounting post until it is free. Discard the board.

Locate the new board over the four mounting posts and push back squarely until the plastic catch on the end of each post clicks into place.

Reassemble in the reverse order and ensure that :

- i) the mains supply, room and frost thermostat are connected correctly.
- ii) the Operating Switch or programmer is plugged into the terminal strip.
- iii) the Molex connectors are fitted to the correct terminals. Connectors are not interchangeable and will only fit the terminals from which they were removed.

Refer to the wiring diagram. Fig. 9 Reassemble the facia in the reverse order.

36. Ignition Board. See Figs. 9 and 53.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position as described in Section 14.2 a and b.

Remove the facia as described in Section 15.1.

Carefully pull off all the Molex plugs, note the positions.

Ease the spark electrode lead off the connection at the top right hand corner of the ignition board. Release the plastic catch at each mounting post pulling the printed circuit board forward approximately 3 mm to prevent the plastic catch from returning. Pull the board off the remainder of the mounting post until it is free. Discard the board.

Locate the new board over the four mounting posts and push back squarely until the plastic catch on the end of each post clicks into place.

Reassemble in the reverse order and ensure that :

- i) the spark electrode lead is connected to the terminal at the top right hand corner of the ignition board.
- ii) the Molex connectors are fitted to the correct terminals.

Connectors are not interchangeable and will only fit the terminals from which they were removed.

Refer to the wiring diagram Fig. 9. Reassemble the facia in the reverse order.

37. Facia Mounted Programmer. See Fig. 9 and 16.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position as described in Section 14.2 a and b.

Remove the facia as described in Section 15.1.

Unplug the programmer from the control board terminals marked X12 "Programmer/Switch". Undo the four nuts securing the programmer to the facia and remove. Fit a new programmer in the reverse order and connect the plug at the driver board.

Reassemble the facia in the reverse order.

38. Remote Mounted Programmer. See Fig. 9.

Check that the electricity has been turned off and isolate the programmer.

Disconnect the leads from the programmer noting their alignment. Fit the replacement programmer and reconnect the leads checking that they are correctly positioned.

39. Neon Indicator Lights. See Figs. 9, 53, 55 and 56.

Check that the electricity supply to the appliance is turned off.

Remove the cabinet front panel, place the facia and control box in the Service Position as described in Section 14.2 a and b.

Remove the facia as described in Section 15.1.

Unplug the neon connection at terminal X3 (marked "Indicators") on the control board. Use an electrical screwdriver to carefully push down through the locking clip slot to depress the locking clips and withdraw the appropriate leads of the failed neon.

Remove the neon from the facia panel.

Push the replacement neon into the facia panel. Insert the new neon leads into the plug with the locking clip in the correct position.

Reconnect the plug to the control board referring to the wiring diagram Fig. 9.

Reassemble the facia in the reverse order.

Fig. 53. Control Box.

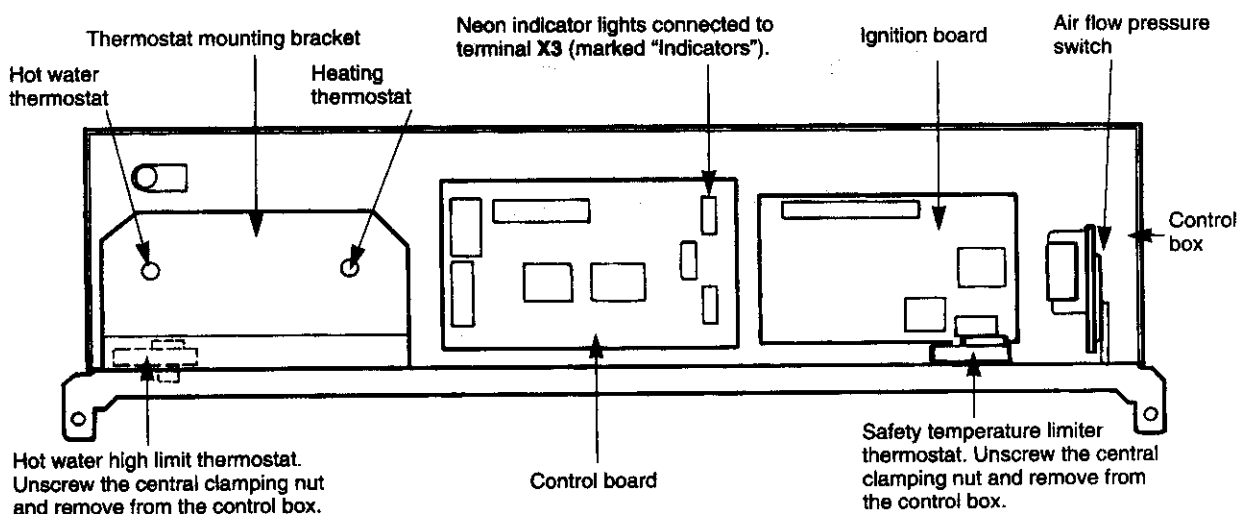


Fig. 54. Control box and thermostat bracket.

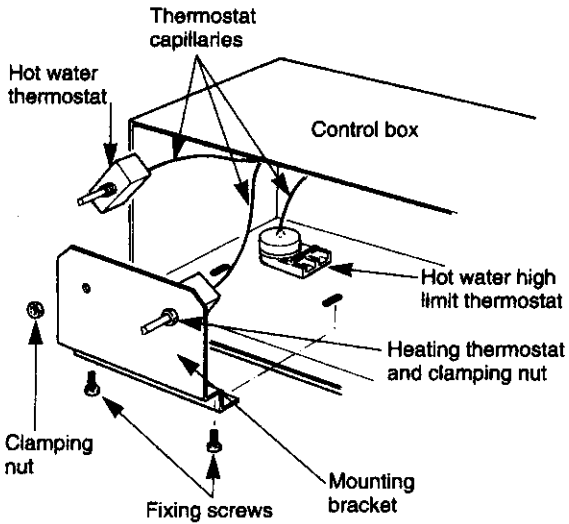


Fig. 56. Neon indicator light connections.

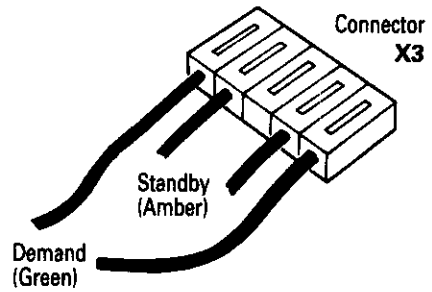
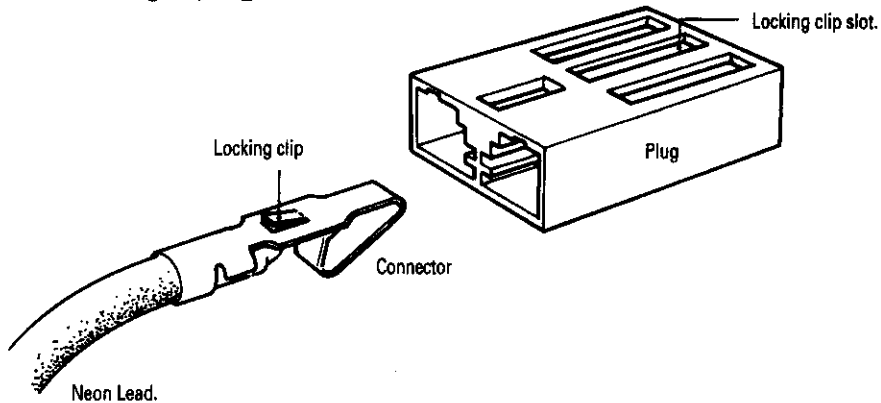
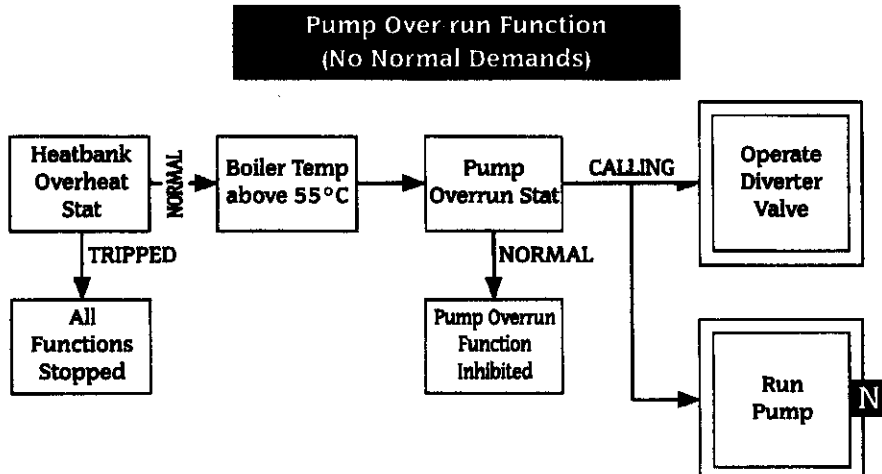


Fig. 55. Neon indicator light plugs.

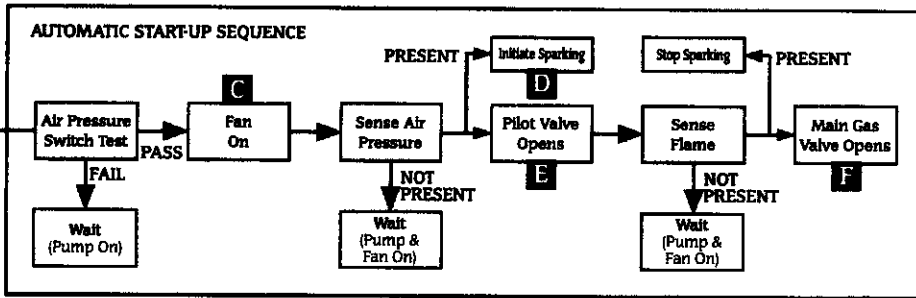
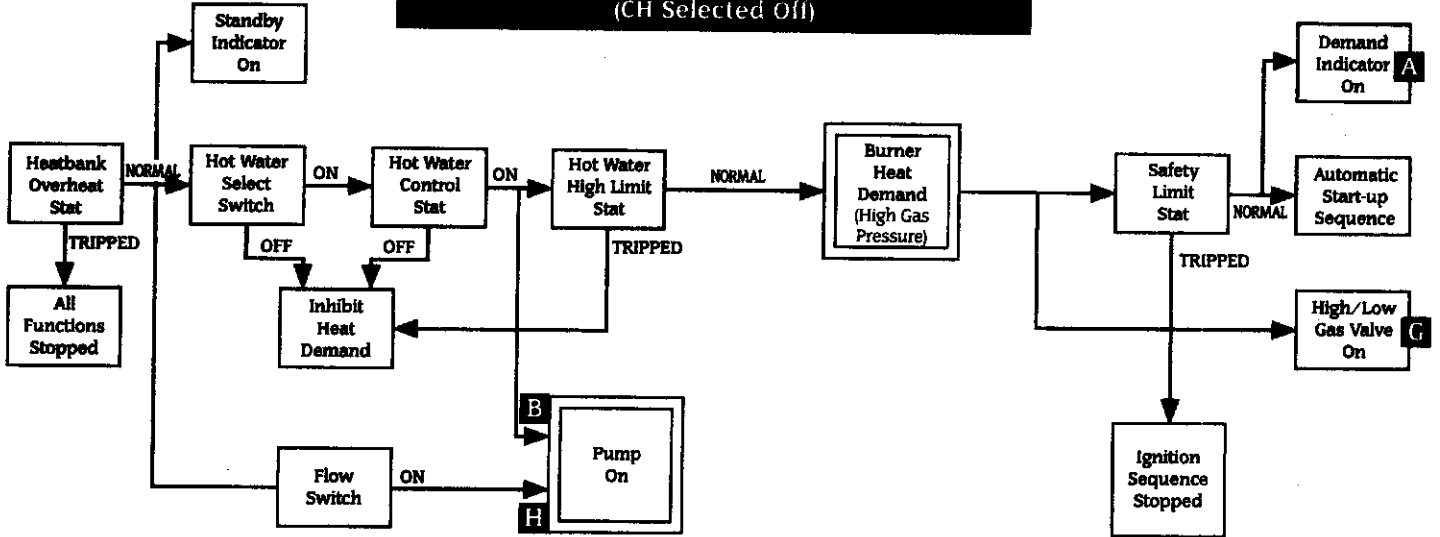


16. Operational Flow Diagrams

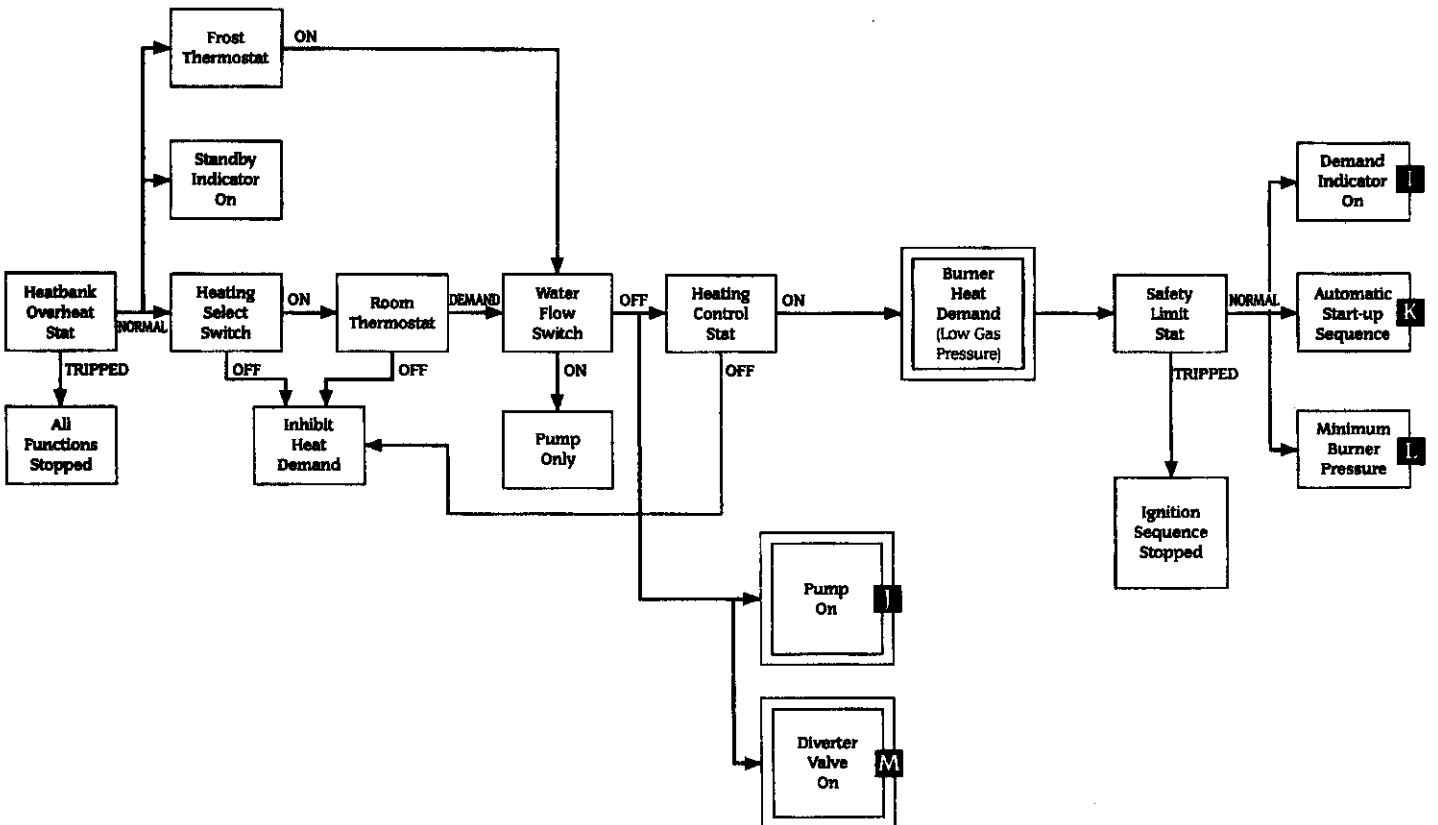
Note: The alpha references in these charts are to be used for cross-referencing when fault finding. See Section 17.



Domestic Hot Water Operational Flow Diagram (CH Selected Off)



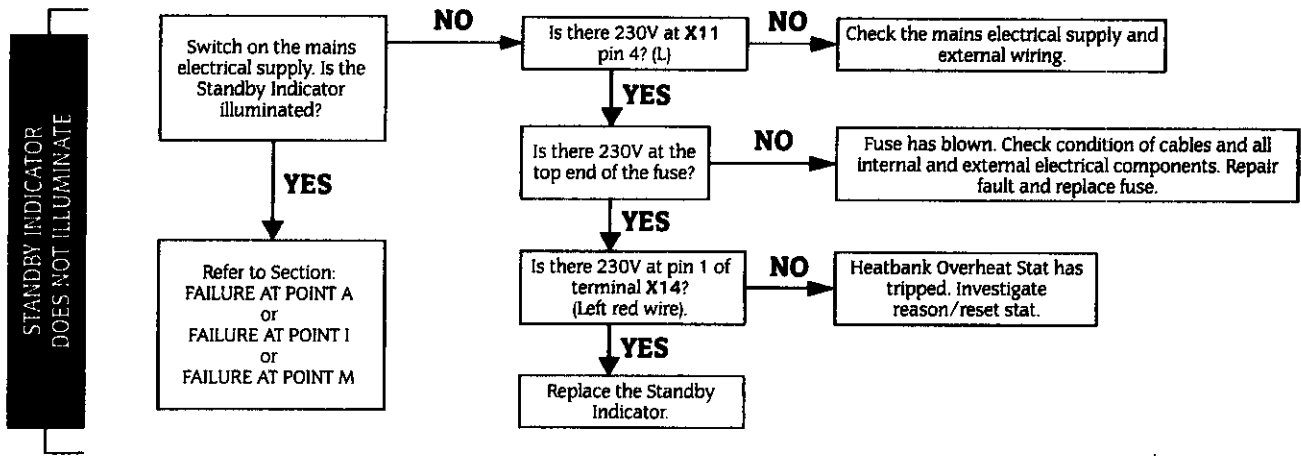
Central Heating Operational Flow Diagram (HW Selected Off)



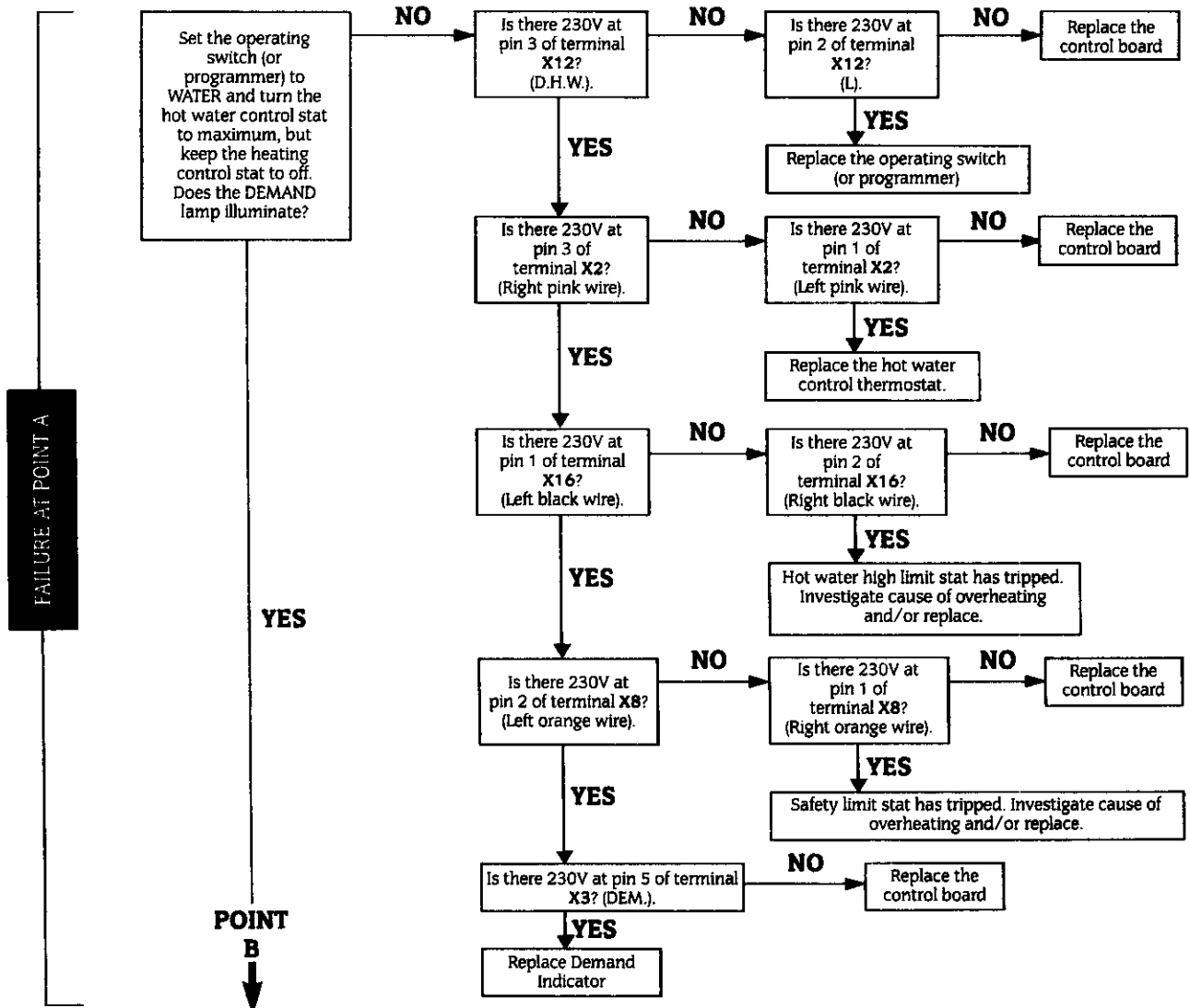
17. Fault Finding

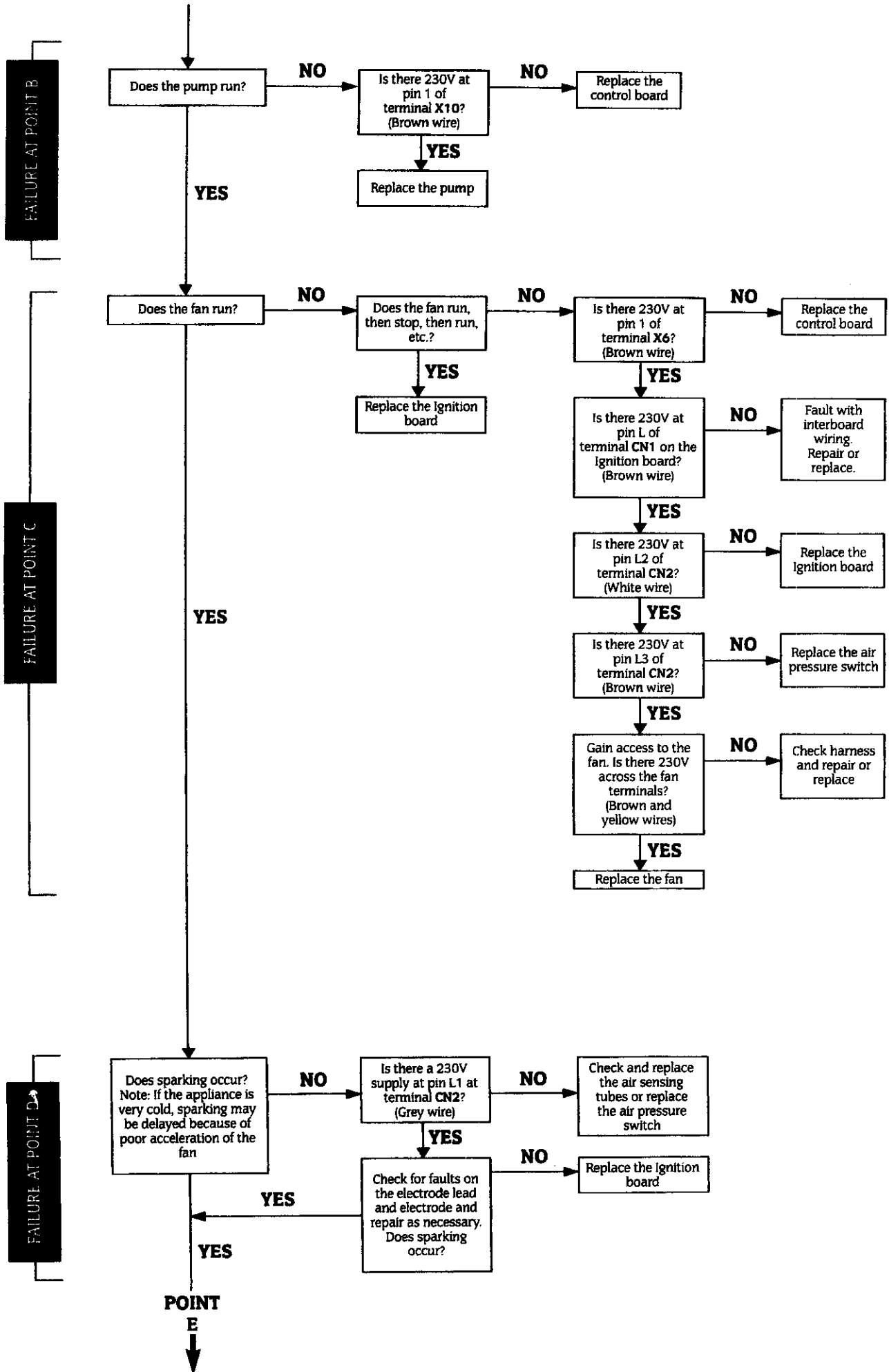
This Fault Finding Chart is to be used in conjunction with the Operational Flow Diagrams in Section 16. To find the fault, locate the point on the flow diagram at which the appliance has failed, e.g. letter B. Then read the corresponding section in the fault finding chart, e.g. Failure at point B. Note: Each section assumes that the appliance operates correctly up to that point.

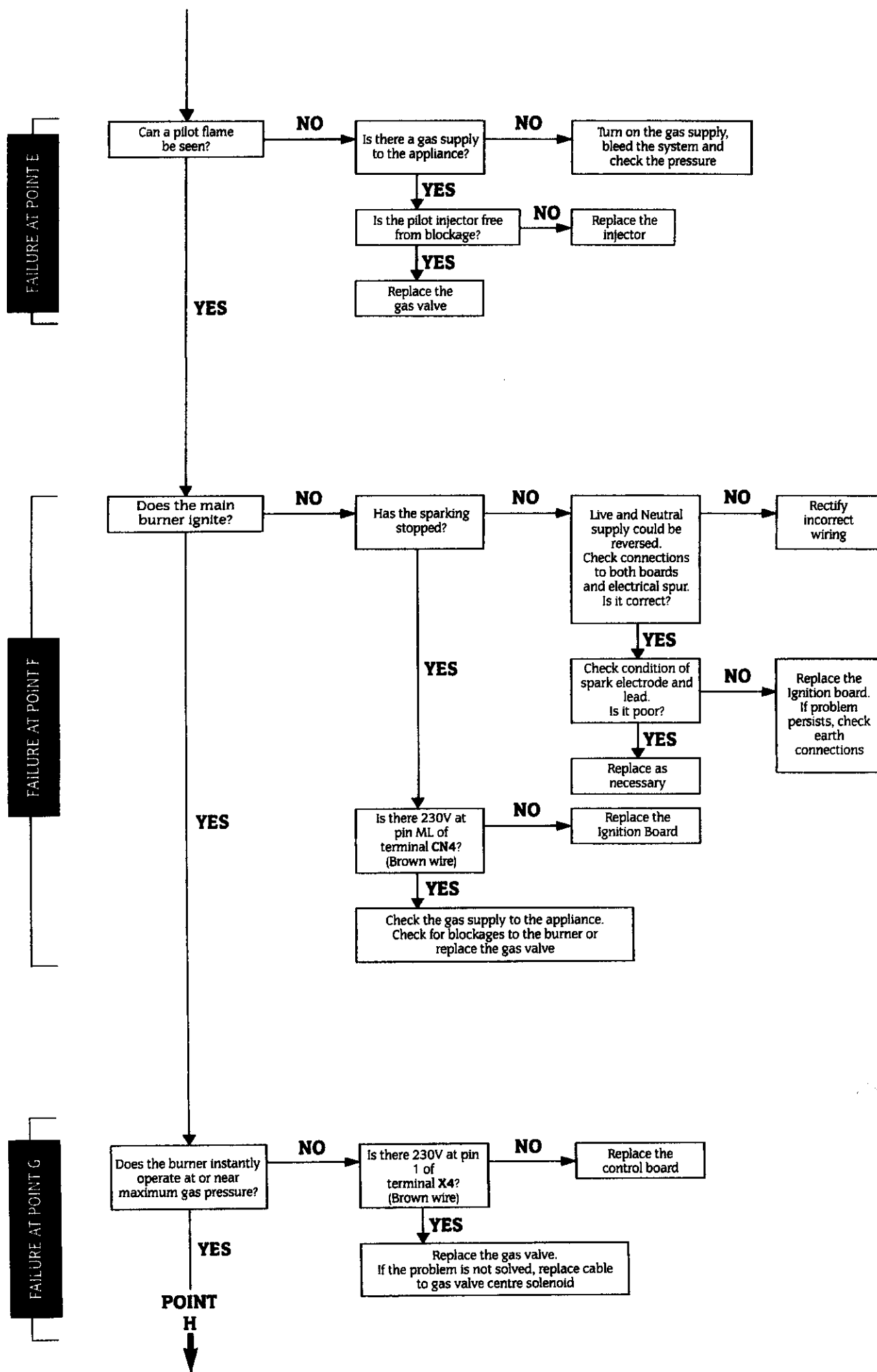
Note: 1. All voltage measurements are with respect to neutral unless otherwise stated. 2. Before changing any component indicated in the chart, it is essential that the associated wiring is checked for continuity, condition and correct routing. 3. Preliminary electrical system checks are the first electrical checks to be carried out during a fault finding procedure. On completion of the Service/Fault Finding task which has required the breaking and remaking of electrical connections, check – (a) EARTH CONTINUITY, (b) SHORT CIRCUIT CHECK, (c) POLARITY and (d) RESISTANCE TO EARTH.



START OF DOMESTIC HOT WATER TEST



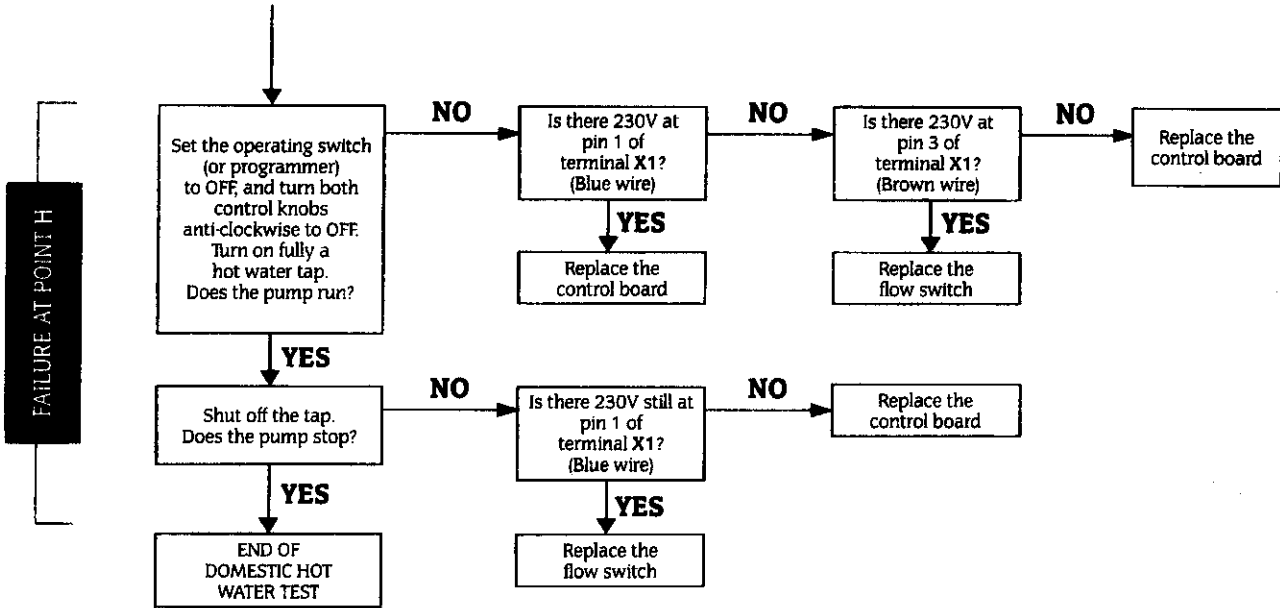




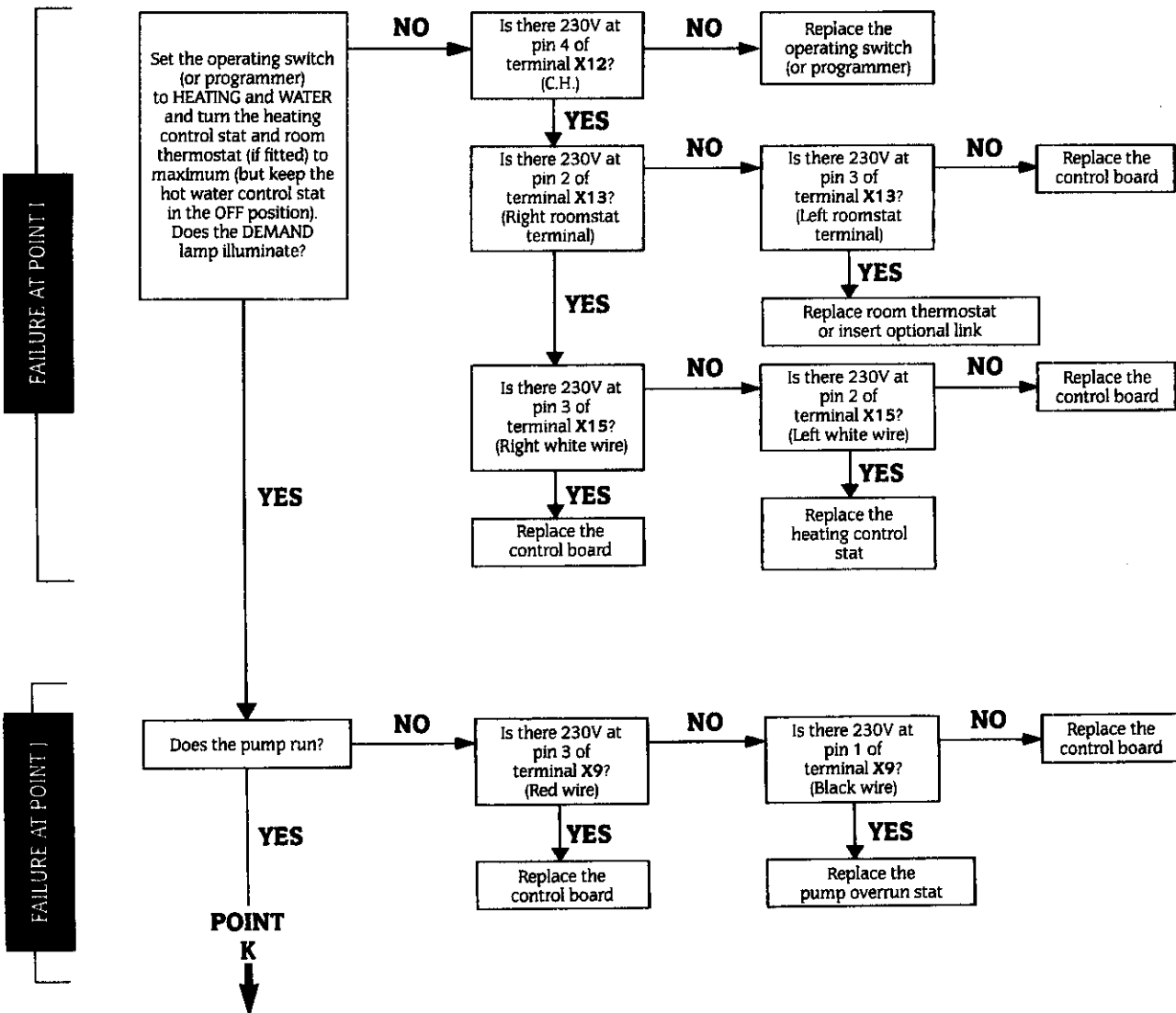
FAILURE AT POINT E

FAILURE AT POINT F

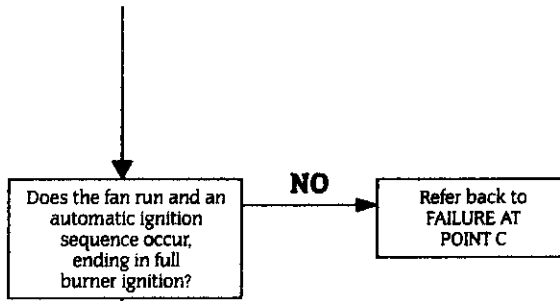
FAILURE AT POINT G



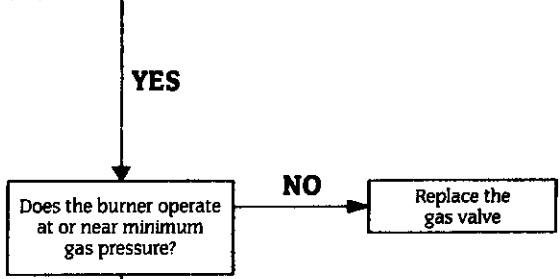
START OF CENTRAL HEATING TEST



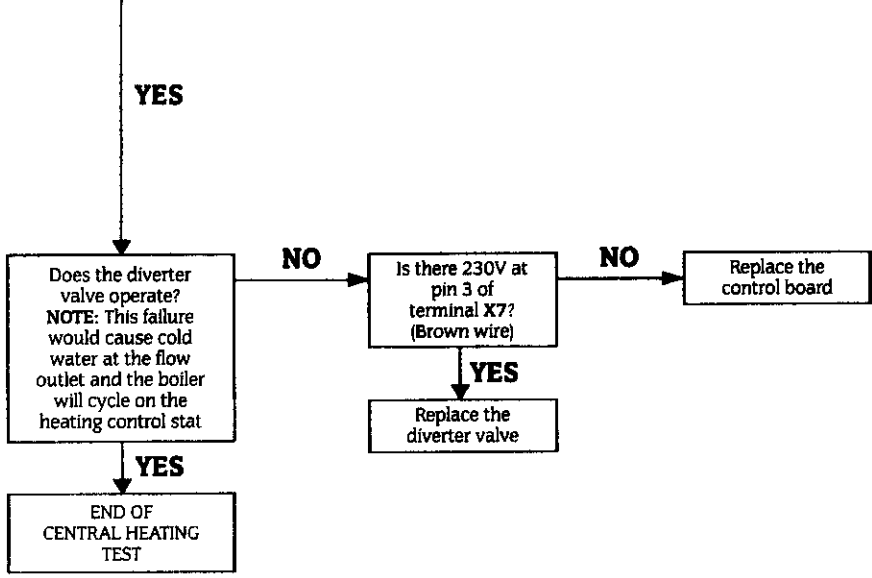
FAILURE AT POINT K



FAILURE AT POINT L

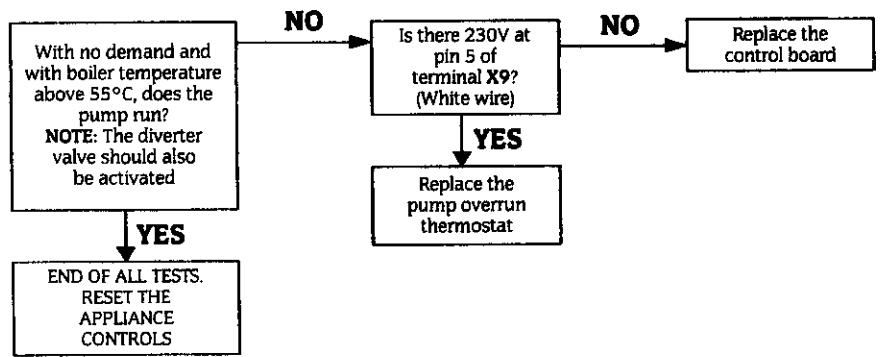


FAILURE AT POINT M

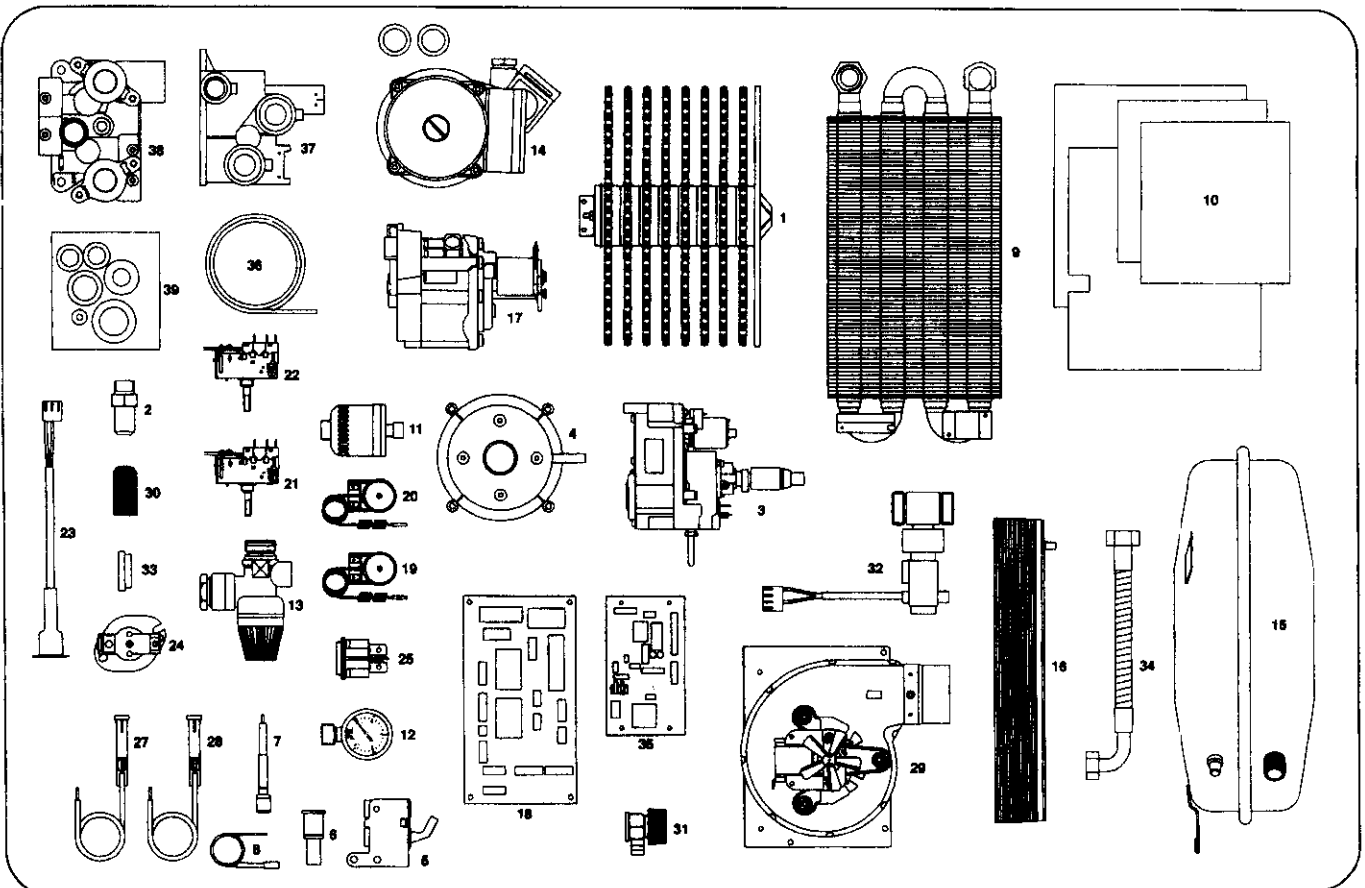


START OF PUMP OVERRUN TEST

FAILURE AT POINT N



Key No.	GC No.	Description	Manufacturer's Reference	Qty	WHS Part No.
1	299 305	Burner Assembly RSF	Aeromatic - AC 23/053576	1	SSA7223/1
2	379 040	Injector	4.4mm diameter	1	ZAGAS163
3	299 326	Gas Valve	Honeywell VR4601QA2003	1	ZAGAS024
4	378 819	Air Pressure Switch	SIT	1	ZAGAS049
5	379 562	Pilot Burner	Honeywell Q385A 2051 KTip	1	ZBGAS079
6	382 850	Pilot Injector	Honeywell 45.004.108.001 38/36A	1	ZBGAS016
7	386 575	Electrode	Honeywell 45.900.413-004	1	ZBGAS093
8	324 982	Electrode Lead	1000mm	1	ZBGAS033
9	299 328	Gas to Water Heat Exchanger	(With washers)	1	ZAGAS153
10	374 607	Combustion Chamber Insulation	Complete	1	SPK0034
11	379 419	Auto Air Vent	Intermes 02.50.010	1	ZMMIS055
12	386 244	Pressure Gauge with Washer	Cewal	1	ZBUNC205
13	378 810	Relief Valve	Caleffi 3141 3 bar	1	ZCVLV006
14	386 224	Pump with "O" Rings	Grundfos 15-60 Special	1	ZAMAJ168
15	299 341	Expansion Vessel	12 litres with washers	1	ZMMIS207
16	299 323	D.H.W. Heat Exchanger with "O" Rings	SWEP	1	ZAMAJ079
17	299 329	Water Diverter Valve with "O" Rings (5 + 2)	Bosch	1	ZAMAJ081
18	378 813	PCB Boiler Control (Relay board)	Pactrol	1	ZAGAS237
19	299 330	Heatbank O/H Thermostat (BBA)	Ranco LM7 P5079	1	ZAGAS044
20	299 331	Safety Temperature Limiter	Ranco LM8 P2041	1	ZAGAS043
21	299 332	CH Thermostat	Ranco K36-P1332	1	ZAGAS041
22	299 332	HW Thermostat	Ranco K36-P1333	1	ZAGAS042
23	299 333	HW Limit Thermostat	Elmwood	1	SSAHAR253
24	299 277	Pump Over-run Thermostat with Paste	Thermodisc 60T	1	ZAMAJ165
25	386 778	Operating Switch	Arrow 2004E	1	ZDELE237
26	371 539	Programmer Kit	WHS Single Channel (Optional)	1	ZAMAJ164
27	371 524	Neon (Green)	IMO Ref.NI9L 240R/S-Green	1	SSAHAR081
28	371 525	Neon (Amber)	IMO Ref.NI9L 240R/S-Amber	1	SSA010815
29	299 338	Fan Assembly		1	SSA010815
30	324 822	Gauze Filter	3/5211 Worcester	1	ZBUNC230
31	378 809	Manual Air Vent	1/4 inch BSP	1	ZMMIS097
32	299 336	Flow Switch Assembly with washers	SIKA	1	SSA010781
33	378 811	Flow Regulator	Type A 18 l/min. ± 15%, purple	1	ZBUNC204
34	299 337	Expansion Vessel	Flexible hose with washers	1	ZMMIS183
35	324 978	Sequence PCB Board	Pactrol	1	ZAGAS096
36	299 093	Inner Casing Seal		1	ZEGAS090
37	299 342	Top Manifold Block with "O" Rings		1	ZBUNC227
38	299 343	Bottom Manifold Block with "O" Rings		1	ZBUNC228
39	299 346	Gasket Pack		1	SPK0134





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This booklet is accurate at the date of printing but will be superseded and should be disregarded if specifications and/or appearances are changed in the interest of continued improvement.
All goods sold are subject to our official Conditions of Sale, a copy of which may be obtained on application.

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