

GLEDHILL ®

GulfStream II 13 FF35

**A Gas Boiler + Store for Domestic Hot
Water Supply and Central Heating.**

Design, Installation and Servicing Instructions

GulfStream II 13FF/35 Boiler GC No 55 317 25

FOR USE WITH NATURAL GAS ONLY (G20)
SUPPLY PRESSURE 20 mbar

These instructions are to be followed and specification of the appliance must not be modified unless recommended by Gledhill Water Storage Limited in writing.

**PLEASE LEAVE THESE
INSTRUCTIONS ADJACENT
TO THE APPLIANCE**

THE GAS SAFETY (INSTALLATION AND USE) REGULATIONS (1996)

"In your own interest, and that of safety, it is law that all gas appliances are installed by competent persons, in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution."

IMPORTANT - Control of Substances Harmful to Health:

When working with insulation materials, avoid inhalation as it may be harmful to health. Avoid contact with skin, eyes, nose and throat, use disposable protection. Dampen the material and ensure that the area is well ventilated.

In the interest of continuously improving the GulfStream II 13 FF35 range, Gledhill Water Storage Ltd reserve the right to modify the product without notice, and in these circumstances this booklet, which is accurate at the time of printing, should be disregarded.



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GLEDHILL GULFSTREAM II 13 FF35 SPECIFICATION

DESCRIPTION	PAGES	2 to 7
SYSTEM DESIGN	PAGES	8 to 14
INSTALLATION AND WIRING	PAGES	15 to 19
COMMISSIONING	PAGES	20 to 21
SERVICING	PAGES	22 to 23
COMPONENT EXCHANGE	PAGES	24 to 34
FAULT FINDING	PAGES	35 to 37
PARTS LIST & DIAGRAMS	PAGES	38 to 40
APPENDIX	PAGES	41 to 42
SALES AND WARRANTY TERMS	BACK PAGE	

IMPORTANT NOTICE

Any installation must be in accordance with the relevant requirements of the current issue of Gas Safety (Installation and Use) Regulations, Local Building Regulations, the Building Standards (Scotland) Consolidation, I.E.E. Wiring Regulations, Local Water Company Byelaws and Health & Safety Document No. 635 - The Electricity at Work Regulations 1989. Detailed recommendations are contained in the current issue of the following British Standards and codes of practice :-

BS 5440 Parts 1 & 2; BS 5449; BS 5546; BS 7074 Part 1.
BS 6700; BS 6798; BS 6891; BS 7593. IGE/UP/7/1998.

Gas Consumer Council

The Gas Consumer Council (GCC) is an independent organisation which protects the interest of gas users. If you need advice, you will find the telephone number in your local telephone directory under Gas.

GENERAL

Details of essential features of cupboard design are given in BS 6798.

This information is provided to assist generally in the selection of equipment. Responsibility for selection and specification of our equipment must, however, remain that of our customers and any experts or consultants concerned with the installation(s).

**PLEASE NOTE THAT WE DO NOT
THEREFORE ACCEPT ANY
RESPONSIBILITY FOR MATTERS OF
DESIGN SELECTION OR SPECIFICATION,
FOR THE EFFECTIVENESS OF AN
INSTALLATION OR UNIT CONTAINING ONE
OF OUR PRODUCTS.**

All goods are sold subject to our Conditions of Sale which are set out in the Appendix to this Specification.

WARNING

The GulfStream is for use on natural gas only and must not be used on any other gas.

A WBS APPROVED PRODUCT

BRITISH PATENT NOS.
BRITISH PATENT APPLICATIONS
PUBLISHED UNDER NOS: 9418928.9
9508872.0
2272105A

DESCRIPTION

Fig 1

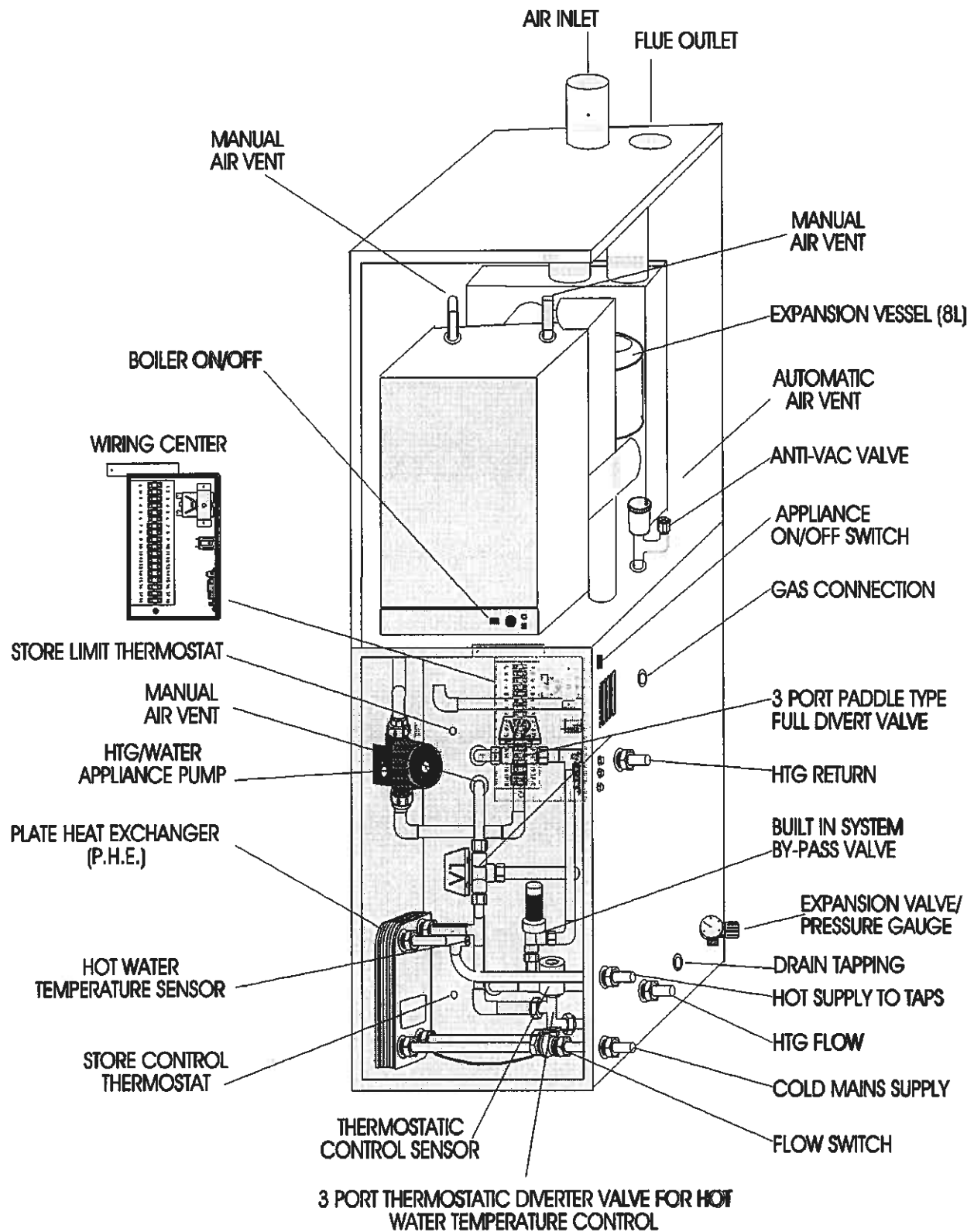
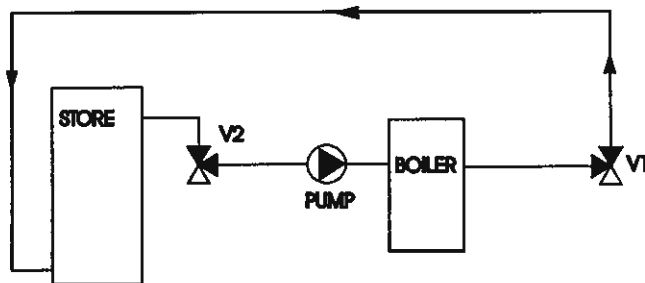


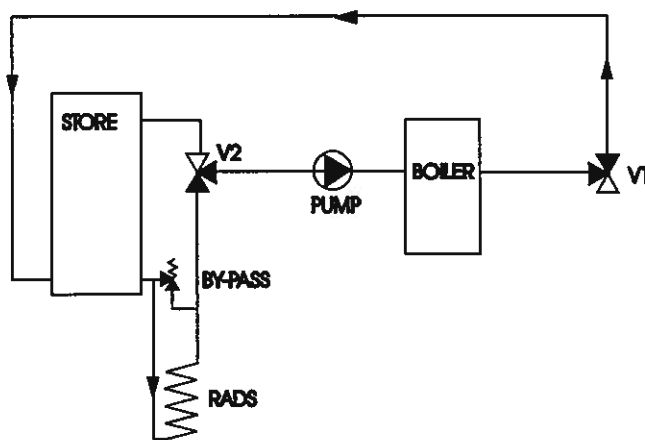
Fig 2

(A) Charge mode



In the charge mode the 3-port diverter valves V2 and V1 are de-energised and energised respectively. The store thermostat controls the store charge temperature. The water is drawn from the top of the store by the pump and passed through the boiler for reheating and is then returned to the bottom of the store.

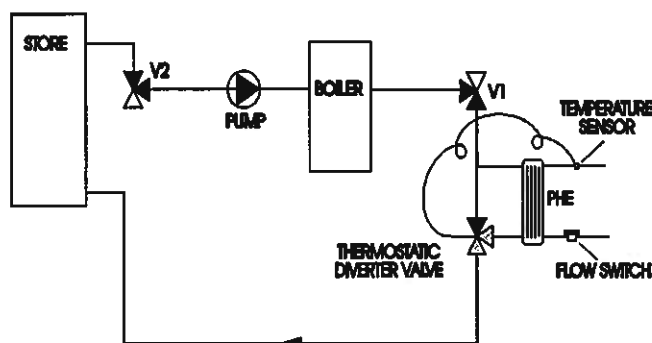
(B) Heating mode



In this mode the space heating controls (e.g. programmer) energises the 3-port diverter valve V2 and starts the pump, which circulates the water from the bottom of the store to the radiators. The return water from the radiators is passed through the boiler for reheating and returned to the bottom of the store.

This gives hot water priority by leaving the store full of hot water and also priority recovery even when space heating is on.

(C) DHW mode



In hot water mode the flow switch de-energises the diverter valves V1 and V2 and starts the pump. The hot water is taken from the top of the store and passed through the boiler for further heating and then through the plate heat exchanger where heat is transferred to the incoming cold water to produce hot water.

A non-electric self-acting sensor and a 3-port thermostatic diverter valve control the temperature of the hot water by varying the primary flow rate through the plate heat exchanger.

DESCRIPTION

INTRODUCTION

The GulfStream 13FF35 is a room sealed, gas fired, fan flued appliance for supplying wet central heating and mains pressure hot water for dwellings with a design heat loss of up to 13kW .

An important feature of this design is that domestic hot water (DHW) can be provided directly from the mains without the need for any additional safety controls in the DHW supply circuit. This is achieved by passing the mains water through a high performance plate heat exchanger, which transfers the heat from the primary water also flowing through it.

A combination of a non-electric self-acting thermostatic sensor/actuator and a 3-port diverter valve control the outlet temperature of the DHW. The sensor in the DHW outlet maintains the flow temperature within pre-set limits by controlling the opening of the 3-port modulating diverter valve, which regulates the flow rate of primary water through the plate heat exchanger.

TECHNICAL DATA

13 FF 35

Overall height 1400 mm (59 ins)
Overall width 400 mm (15.75 ins)
Overall depth 530 mm (20.8 ins)

Weight empty 65 kg
Weight full 100 kg

HEAT INPUTS AND OUTPUTS

	300 mm flue	Max. flue length
Nominal heat input	18.2kW	17.1 kW
Nominal heat output	14.74 kW	13.85 kW
Burner press. (hot)	7.9 mb (+/- 0.5mb)	6.9mb (+/-0.5mb)

Mean heat output = 14.17 kW (50,000 Btu/h)
Time for 100 litres of gas = 3m 27sec
Time for 1 cu. ft of gas = 61sec
CV = 38 MJ/m₃
Mean gas rate = 1.72 cu. m / hr.

Any variety of space heating control systems can be used, although the heating system circulating pump is an integral part of the appliance. This aspect is discussed further on in this document.

Clearances required for installation and servicing:

Top : 100mm (4in)
Base: Nil floor standing
Rear : Nil
Left Hand Side: 13mm (1/2in) from door frame.
Right Hand Side: 200mm (8in)
Front: 15mm (1/2 in.) Installed: 600mm (24in) for servicing.

Minimum internal cupboard size required:

Model	H	W	D
13FF 35	1500	600	550

Domestic Hot Water Pressure/Flow Characteristics:

Minimum flow to operate: 2.5 l/min.
Minimum inlet pressure to obtain nominal flow rate: 2 bar dynamic.
Minimum operating pressure to provide typical mains pressure performance 1 bar.

DESCRIPTION

BOILER

The GulfStream FF is a room sealed fan flued boiler with a range of flueing options. The boiler incorporates the latest in gas appliance technology.

FEATURES

Automatic control - specially designed electronic controls with electronic spark ignition, no permanent pilot and function indicating neon display mounted on the front of the appliance.

Fitted with all items required for fully pumped sealed systems. An overheat thermostat is fitted as standard.

Two pipe unbalanced flueing system. The air intake and flue products discharge pipes are led to the top of the GulfStream. From this point they may be run horizontally in any direction (straight) up to 7.5 metres. Note that each 90° bend will reduce the permissible length by 1.5m, and each 135° bend will reduce the permissible length by 0.75m.

Note : the maximum vertical distance is 1.5m. The remaining flue length must fall to the outside wall.

Unobtrusive flue terminals.

Latest pre-mix burner technology gives low Nitrous Oxide values. Meets all proposed EC requirements and helps reduce acid gas emissions and environmental damage. $\text{NO}_x = 17\text{ppm}$.

High efficiency copper heat exchanger.

GAS SUPPLY

1. The Local Gas Supplier should be consulted at the installation planning stage in order to establish the availability of an adequate supply of gas.
2. An existing service pipe **MUST NOT** be used without prior consultation with the Gas Supplier.
3. A gas meter can only be connected by the Local Gas Region or by a Gas Supplier Contractor.
4. An existing meter should be of sufficient size to carry the maximum boiler input plus the demand of any other installed appliance, (BS 6891 : 1988). See section Technical Data for the gas required for each specific model.
5. A minimum of 22mm diameter pipework to within 1 metre of the appliance gas cock should be fitted.
6. The governor at the meter must give a constant outlet pressure of 20mbar (8in wg) when the appliance is running.
7. The gas supply line should be purged. **WARNING:** before purging open all doors and windows, also extinguish any cigarettes, pipes, and any other naked lights.

8. The complete installation must be tested for gas soundness.

ELECTRICAL SUPPLY

1. The mains supply required is 230V - 50Hz fused at 3A, via a fused double pole isolator with a contact separation of at least 3mm in both poles.
2. This should be a permanent connection to the fixed wiring of the system.
3. There must be only one common isolator for the boiler and its control system, and it must provide complete electrical isolation.
4. The power supply cable to the appliance should be at least 0.75mm² (24 x 0.2mm²) PVC heat resistant, as specified in table 16 of BS 6500.
5. All external wiring to the boiler must be in accordance with the latest I.E.E. Wiring Regulations, and any local regulations which apply.
6. The appliance must be earthed.
7. In the event of an electrical fault after installation of the appliance, preliminary electrical systems checks must be carried out i.e. Earth Continuity, Short Circuit, Polarity, and Resistance to Earth.
8. All fuses must be ASTA approved to BS 1362.

APPLIANCE LOCATION

The following limitations **MUST** be observed when siting the boiler:

1. The appliance is room sealed and can be located in any room/compartment in a domestic property. (Note: Additional restrictions apply when installing in bathrooms).
2. The boiler is not suitable for external installation. The position selected for installation should be within the building, unless otherwise protected by a suitable enclosure, and **MUST** allow adequate space for installation, servicing, and operation of the appliance, and for air circulation around it.
3. This position **MUST** allow for the flue and air inlet system to be fitted in its correct position.
4. The boiler must be installed on a flat surface which is capable of supporting the weight of the appliance and any ancillary equipment.
5. If the boiler is to be fitted in a timber framed building it should be fitted in accordance with the British Gas publication 'Guide for Gas Installations Timber Frame Housing', Reference DM2. If in doubt, advice must be sought from the Local Gas Region.
6. A compartment used to enclose the appliance **MUST** be designed and constructed specifically for this purpose. An existing cupboard, or compartment, may be used provided it is modified accordingly. BS 6798 gives details of the essential features of cupboard/compartment design, including airing cupboards.

DESCRIPTION

Fig. 3

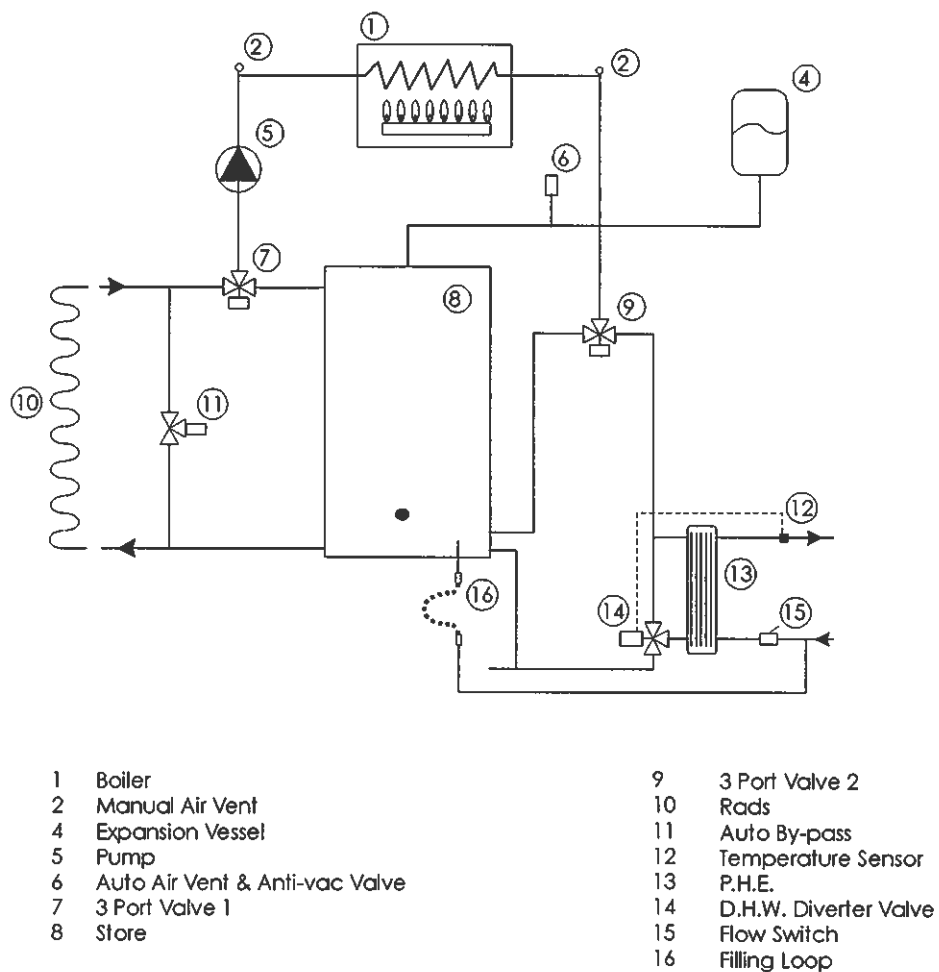
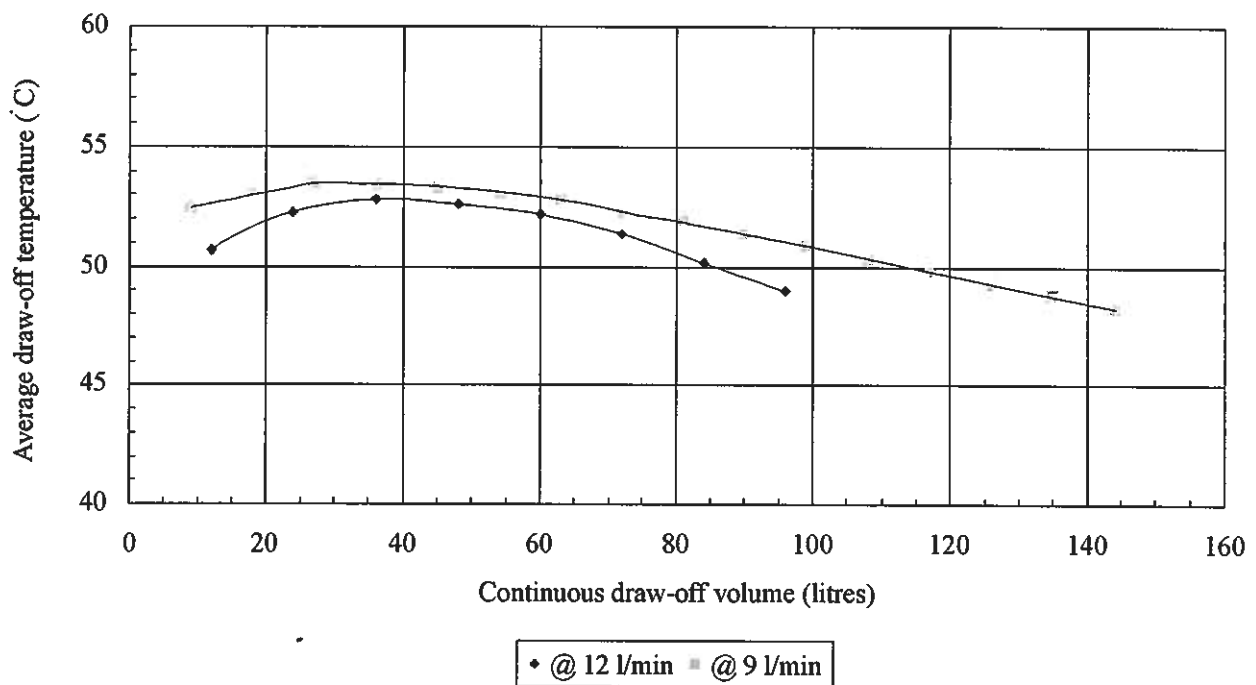


Fig 4.

Figure 4 Hot water performance of the GulfStream 35
(cold water inlet temperature 14°C)



GULFSTREAM II FF MODEL SELECTION DATA

MODEL	MAX HEAT LOSS	PROPERTY SIZE OF UNIT W D H	MIN CUPBOARD SIZE W D H	HOT WATER FLOW RATE L/MIN	WEIGHT FULL KG	PROPERTY TYPE	GUIDE UP TO	TAPPINGS
13FF 35	13kW	400X530X1400	600X550X1500	15	100	2-3 bedroom, one bathroom plus en-suite shower		1/2" BSPF expansion relief. BS21 gas cock. Htg flow and return cold mains and hot draw off all 22mm compression.

The flow rates quoted in the chart above assume normal dynamic water pressures and adequate flow to property and are the mixed flow temperature to give 35°C rise.

SYSTEM DESIGN

VENTILATION

The appliance is designed to be installed in a cupboard. It is necessary to ensure that the cupboard is adequately ventilated.

The compartment must meet with the following requirements:

1. All internal surfaces should be non-combustible or lined with non-combustible material. Doors or shelves made from combustible material eg. wood, must be at least 75mm from the front or top of the appliance.
2. Be fitted with a door of sufficient size to permit the appliance to be withdrawn.
3. The ventilation must be at high and low levels. Both vents must communicate with the same room or with the same outside wall.

Ventilation free area required	
High level 65cm ²	Low level 65cm ²

4. Air vents must not incorporate fly screens or any material which may restrict the free passage of air.

DOMESTIC HOT WATER SYSTEM MAINS WATER SUPPLY

GulfStream models are designed to be fed directly from mains. They fulfil the requirements of Water Byelaw 91, and therefore **do not require a check valve** to be fitted to the supply pipe. The performance of the GulfStream is directly related to the adequacy of the cold supply to the dwelling. This must be capable of providing for those services which could be required simultaneously and the maximum demand should be calculated.

GulfStream will operate at pressures as low as 1 bar which must be available when local demand is at its maximum, but the preferred range is upwards of 2 bar. As a general guideline, although a 15mm service may be sufficient for the smaller dwelling with one bathroom, a 22mm service is preferred (25mm MDPE) and should be the minimum for larger dwellings, and properties above two storeys.

If a water meter is fitted in the service pipe, it should have a nominal rating to match the anticipated maximum simultaneous hot and cold water demand, calculated in accordance with BS 6700. This could be 50 litres per minute in some properties.

If the incoming static mains water pressure exceeds 8 bar at any point in the 24 hour cycle then a pressure limiting valve set at 5 bar should be fitted downstream of the stop tap where the cold supply enters the property. Units must be fitted strictly in accordance with the requirements of the Local Water Undertaking who should be consulted prior to installation. In the event of any difficulty please contact us as the manufacturer.

Equipment used in the system should be suitable for a working pressure of 8 bar.

A non return valve is not required, unless ancillary equipment, requiring a non-return valve, is fitted to the same mains supply as the GulfStream.

No safety fittings are required on the secondary system.

USE IN HARD WATER AREAS

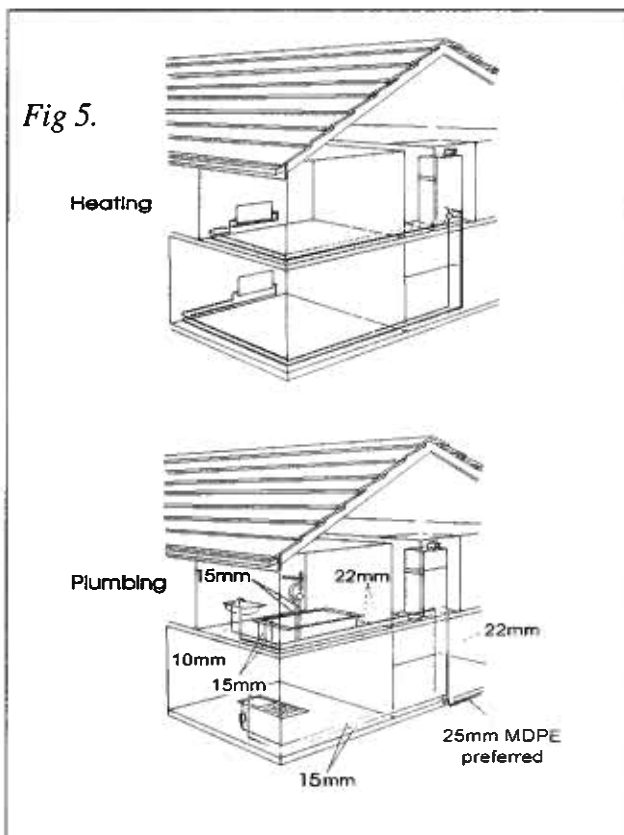
A patented control system prevents domestic water from exceeding 55°C for most of the operational time of the appliance.

IT IS NOT NECESSARY TO FIT ANY FORM OF SCALE INHIBITING EQUIPMENT IN THE DOMESTIC COLD SUPPLY TO THE APPLIANCE.

If it ever becomes necessary, the plate heat exchanger is easily isolated and replaced with a service exchange unit.

COLD & HOT WATER DISTRIBUTION SYSTEM

1. Although a 15mm copper supply may be adequate for the smaller 1 bathroom dwelling, a 22mm (25mm MDPE) supply is preferred, where possible, to make best use of this appliance.
2. Internally run in 22mm copper to the GulfStream and from the GulfStream in 22mm past the hot draw-off to the bath.
3. We would recommend that best results for a balanced system are achieved by fitting appropriate flow restrictors (see appendix for details) to each hot and cold outlet.
4. Alternatively, tee-offs to the outlets should be in 10mm except for the bath and showers which should be 15mm.
5. Alternatively, tee-offs to terminal fittings in existing properties can easily be fitted with flow restrictors to balance the simultaneous demand (see appendix for details).
6. The hot water supply to a shower mixing valve should, whenever possible, be the first draw-off point on the circuit. The cold water supply to a shower mixing valve should be fed directly from the rising main and should, whenever possible, be the first draw-off point on the cold circuit.



TERMINAL FITTINGS

1. Hot and cold taps and mixing valves used with this appliance must be suitable for operating at 10 bar.
2. Any type of shower mixing valve can be used as long as both the hot and cold supplies are mains fed. However, **PRESSURE COMPENSATING** shower mixing valves are proven to give better control when more than one fitting are open simultaneously and are therefore **STRONGLY RECOMMENDED**. Thermostatic versions are preferable.
3. No back syphonage arrangements are necessary with fixed head showers.
4. If a loose head shower with flexible hose is to be used over a bath then the hose must be fixed so that the head cannot fall closer than 25mm above the top edge of the bath. Alternatively, the shower must incorporate or be fitted with a suitable back flow protection.
5. Balancing is best achieved by fitting appropriate flow regulators to each hot and cold outlet.
6. The supply of hot and cold mains water direct to a bidet is permitted, provided that this is of the **over-rim flushing type** and that a **type 'A' air gap** is incorporated.

SPACE HEATING SYSTEM

The design heat losses for the property will need to be calculated. We would recommend that the method for heat loss calculations, radiator and boiler sizing contained in BS 5449: 1990 is used and compared to the maximum property heat loss in the Model Selection Data table on page 7. No allowance is needed for the domestic hot water.

If large baths or extra bathrooms are required please seek guidance from Technical Sales Department.

SYSTEM DESIGN

HEATING SYSTEM

The installation must comply with the requirement of BS 6798 and BS 5449. Maximum water temperature is 82°C +/- 3°C.

The appliance is supplied with the flow and return connections terminating in 22mm compression fittings. The appliance also incorporates the following components:-

Heating Pump- Integral with the appliance. The pump head available for the radiator circuit is shown in figure 7.

Expansion Vessel - 8 litres, pre-charged to 1.0 bar.

Pressure Gauge- 0 to 4 bar .

Expansion Relief Valve - set to operate at 3 bar.

Filling Loop c/w isolation valve and double check valve.

Automatic by-pass valve.

NOTE: The pump speed must be set at maximum.

At least one flushing valve should be fitted at the lowest point in the system to enable the water system to be drained.

Manual and automatic air vents are provided on the appliance, but an automatic air vent should be fitted at the highest point in the system.

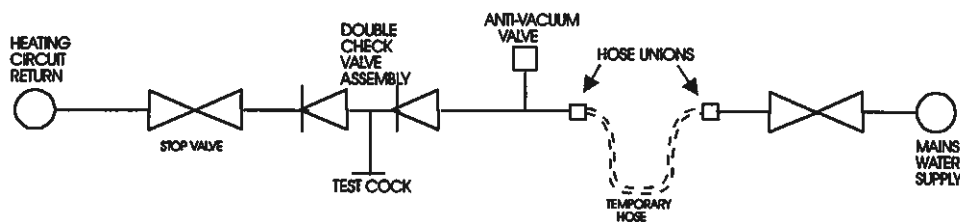
The appliance is designed for connection to any sealed central heating water system. Fig. 5 shows a typical system design.

An automatic bypass is fitted on the heating circuit within the appliance and no additional bypass is required. A sealed system must only be filled by a competent person using the approved method shown in Fig. 6. The unit incorporates the connections appropriate to this method.

METHOD OF MAKEUP: Water loss from the system should be periodically checked and replaced. This can be done by pre-pressurisation of the system via a temporary hose connection with safety devices (Fig 6). This type of approved filling loop is factory fitted to the appliance.

FILLING: There shall be no permanent connection to the mains water supply, even through a non return valve, without the approval of the Local Water Authority.

Fig 6



EXPANSION VESSEL REQUIREMENTS

Expansion relief safety valve	bar	3.0		
	psi	43.5		
Initial vessel charge pressure	bar	1	1.5	
	psi	14.5	21.8	
Initial system pressure	bar	1	1.5	1.5
	psi	14.5	21.8	21.8
Maximum total water content of heating system including the store (35litre) with the standard 8 litre (1.76 gal) supplied with the appliance	litres	73	42	51
	gal	16	9	11
For systems having a larger capacity than above, multiply the total system capacity (litres/gallons) by these factors to obtain the total minimum capacity (litres/gallons) of the expansion vessel.		0.109	0.19	0.156

In normal circumstances an initial system pressure of 1.2 bar is suitable for most domestic properties.

The minimum system pressure should be not less than the static head, (the height of the highest point in the system above the expansion vessel plus a margin of 0.5 bar).

The expansion vessel has to be suitable to accommodate the change in volume of the water in the system when heated between 10°C to 110°C. See BS 5449: 1990 clause 16.2 for further information.

NOTE: After first filling the system to a pressure of 1.2 bar at mains supply temperature (typically around 15°C in summer), the unit should be switched on, and the GulfStream II should be heated to its maximum temperature. If the pressure gauge then indicates 2.6 bar or higher, an additional expansion vessel may be required in the system.

CONTROL

The GulfStream 13 FF35 is supplied with an appliance On/Off switch only and must be installed with the following external controls:-

- (a) A two channel clock/programmer to control space heating and hot water. A suitable model is the Danfoss CP715 with the hot water mode interlock set on gravity, or equivalent from other manufacturers.

OR

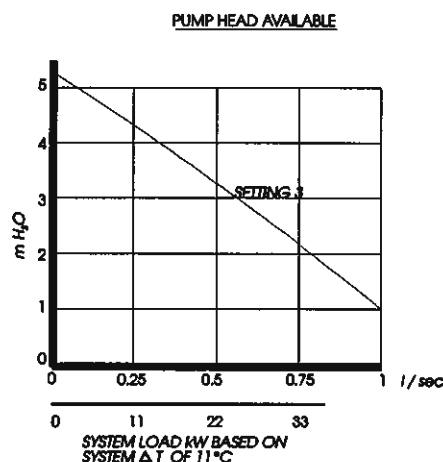
- (b) A two channel programmable room thermostat with independent control of heating and hot water.

Whichever timing device is chosen, it must incorporate an override to enable the CH to be operated in the event of time failure.

It should be noted that for the space heating to work, hot water must be selected ON clock/programmer. Also, even when the hot water selection on the clock/programmer is in the OFF mode, the energy stored in the appliance will still be available as hot water.

A room thermostat and/or thermostatic radiator valves may also be fitted to control the space heating temperature requirements.

Fig 7

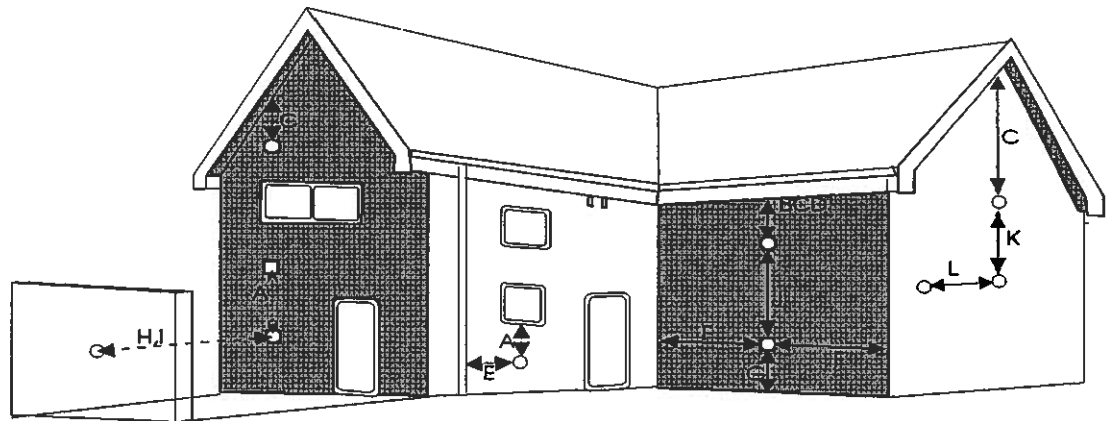


SYSTEM DESIGN

	MINIMUM DISTANCES
A: Directly below an openable window or other opening e.g. an air brick	300mm
B: Below gutters, soil pipes or drain pipes	75mm
C: Below Eaves	200mm
D: Below balconies	200mm
E: From Vertical drain pipes and soil pipes	75mm
F: From internal or external corners	75mm
G: Above ground or balcony level	300mm
H: From a surface facing a terminal	600mm
I: From a terminal facing a terminal	1200mm
K: Vertically from a terminal on the same wall	1500mm
L: Horizontally from a terminal on the same wall	300mm

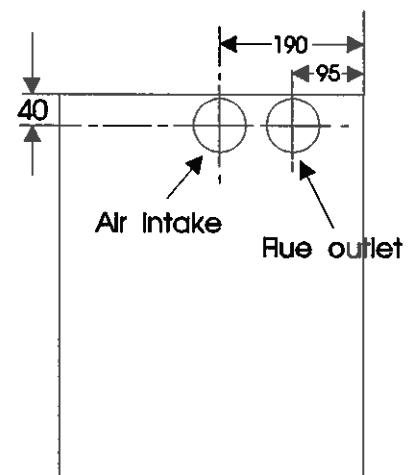
Flue Exit Terminal Location

Fig 8.



- The air inlet and flue exit terminals must be installed according to the recommendations of BS 5440 Part 1 and be installed sufficiently close to each other on the same wall to be located in sensibly similar wind conditions.
 - The terminals must be positioned on the outside of the building and must allow the free passage of air across them at all times.
 - Avoid positions where the terminals are adjacent to projections, particularly under a balcony or immediately adjacent to a drain pipe.
 - The position of the outlet terminal must ensure that products of combustion produced from the boiler cannot enter the building or any adjacent building through windows, doors or any other means.
 - Acceptable flue terminal positions are indicated in the diagram.
 - Both terminals must be positioned on the same wall.
 - The minimum distance between centres of the terminals is 150mm. There is no maximum distance.
 - If the boiler is fitted into a timber framed building - consult British Gas publication "Guide for Gas Installations in Timber Framed Housing DM2" or your Gas Supplier.
 - Where the lowest part of either flue terminal is fitted less than 2 metres (6.6 ft.) above ground, a balcony, or above a flat roof to which there is access then the flue terminal/terminals must be protected by a terminal guard, available from Gledhill.
- Ensure the terminal guard is fitted centrally.
- The terminal guard is supplied with three fixing screws & rawplugs. Fit the guard centrally over the flue pipe and secure with the plugs and screws provided.
- N.B.** With the minimum flue outlet/inlet distance of 150mm the flue terminal guards will touch if both are fitted.
- The outlet flue terminal may produce a plume of water vapour and also moisture droplets. This should be considered when positioning the flue terminal eg. over a door. This is a normal feature of a high efficiency appliance.

Fig 9



Plan view showing flue connections

SITING THE APPLIANCE AND ROUTING THE FLUE

The flue and air inlet can each be installed up to a maximum length of 9m minus the **equivalent length** of the bends.

For each bend (either 90° or 135°), you must reduce the overall flue length by :

Equivalent length	1.5m for a 90° or 0.75 for a 135° bend.
-------------------	--

In practice one 90° bend is always required above the appliance to make the flue run horizontal therefore the maximum distance the flue can run is 7.5m.

SYSTEM DESIGN

1. The flue and air intake must terminate on the same wall of the building, or at the same soffit.

2. The minimum distance between inlet and outlet terminals is 150mm between centres on the face of the wall.

3. If the inlet and outlet pipes are required to be of different lengths a ratio of 2:1 should be used as a maximum e.g. 2m inlet 4m outlet or vice versa, but it is recommended that the flue lengths are kept to similar lengths if at all possible.

Fig 10 gives some examples of flue installation: NB - When routing the flues around an external corner it is necessary to chase into the wall using a chisel etc. to allow the bends to follow the centre lines for the fixing clips. 20mm will be sufficient for the flue only. If protective ducting is used 60mm is necessary.

4. It is recommended that on longer flue installations a sketch is made of the flue runs as a guide to cutting the pipes.

5. The exhaust flue pipe must not be closer than 25mm (1in) to combustible material within the dwelling. Additional clearance must be provided when passing the flue through timber walls.

Detailed recommendations on protection of combustible materials are given in BS 5440: Part 1, (specifically Sect. 8.2.3.).

6. The exhaust flue pipe must be routed so that it cannot be touched by the user. If this is unavoidable a ducting kit is available from Gledhill to protect the flue pipe. The ducting is available in 1m lengths or universal 90° bends.

7. Installations with long flue runs may give rise to a build up of condensation in the outlet flue pipe. **This must not be allowed to run back into the boiler. When installing long flue runs angle the flue AWAY from the boiler using a 25mm drop for every 4m horizontal run.**

8. The maximum vertical flue run is 1.3m to the first 90° bend.

THE CONTENTS OF THE BASIC PACKAGE

The basic appliance is supplied with a standard flue kit.

1. 2 x 90° socketted bends.
2. 2 flue terminals, each 381mm long.
3. 2 x 0.5m flue lengths.
1. An angled union gas cock.
2. A 1/2 in. drain cock.
3. The Installation and Servicing Instructions.
4. The user instructions.

NOTE

Further flue kits should be ordered to suit the particular installation.

FLUE KIT CARTONS AVAILABLE

2m EXTENSION KIT containing:

- 2x 2m socketed straight lengths
- 1x Plastic bag assembly*

1m EXTENSION KIT containing:

- 2x 1m socketed straight lengths
- 1x Plastic bag assembly*

90° BEND KIT containing:

- 2x 90° socketed bends
- 1x Plastic bag assembly*

135° BEND KIT containing:

- 2x 135° socketed bends
- 1x Plastic bag assembly*

OTHER OPTIONAL EXTRAS

- Wall mounting clips (2 No.)
- Protective flue ducting (1m length)
- Protective flue duct bend

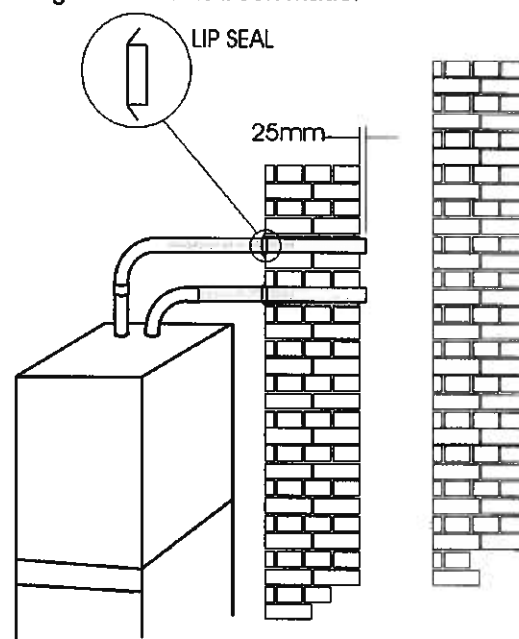
*The Plastic Bag Assembly contains:

- 2 brackets
- 4 wood screws and plugs
- 1 tube of adhesive for the joints

INSTALLATION INTO A S.E. DUCT FLUE

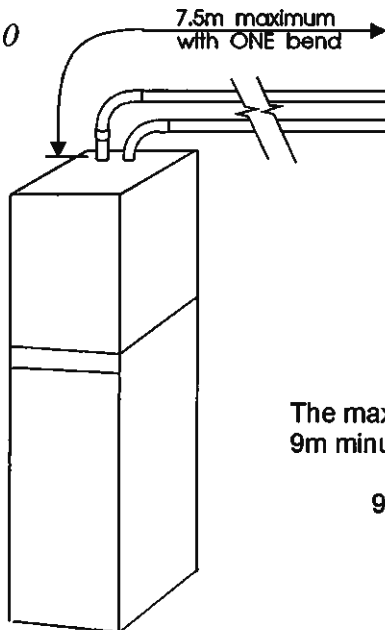
NOTE: See installation instructions for connecting flue pipes to the boiler.

1. Remove the lip seal from the flue terminals and refit the other way round (see enlarged view).
2. The flue should be cut so that they protrude into the SE duct 25mm (see diagram below).
3. After assembly of the flue pipes to the boiler apply a small amount of silocone sealant to the inside face of the lipseal - push firmly up to the wall making sure a good seal has been made.

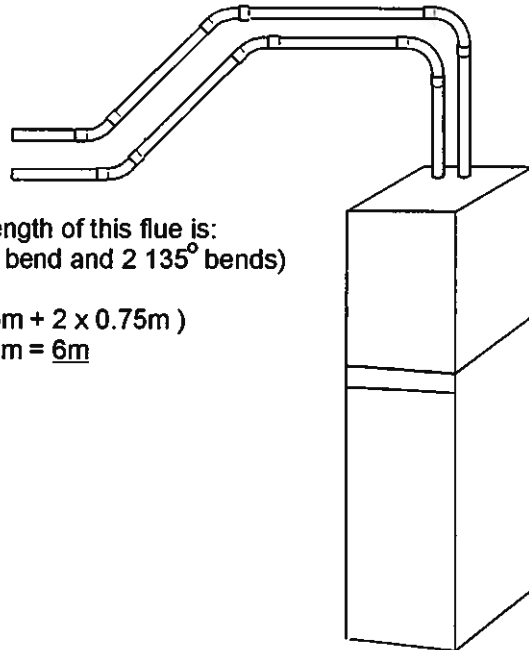


SYSTEM DESIGN

Fig 10

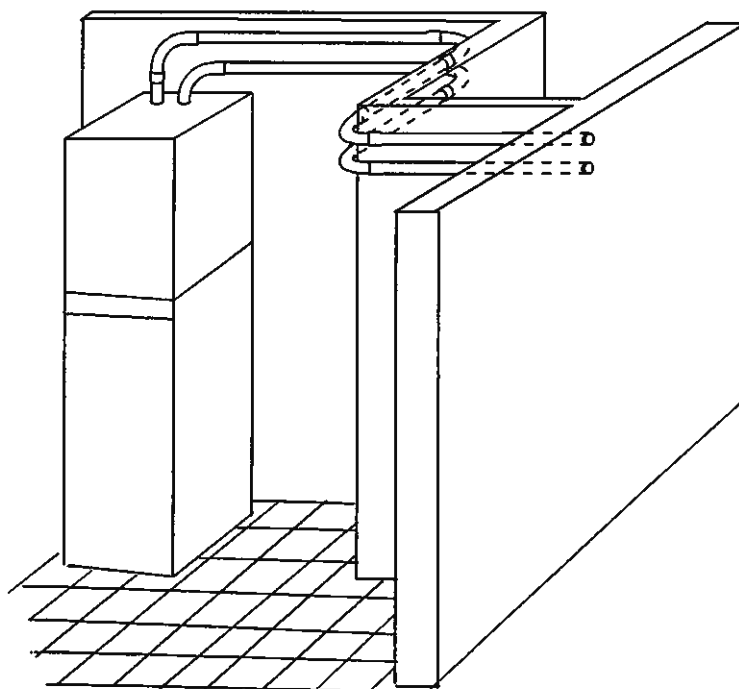


EXAMPLES OF FLUEING ARRANGEMENTS



The maximum length of this flue is:
9m minus (1 90° bend and 2 135° bends)

$$9\text{m} - (1.5\text{m} + 2 \times 0.75\text{m}) \\ = 9\text{m} - 3\text{m} = \underline{6\text{m}}$$



The maximum permissible length of this flue
is 9m minus 3 90° bends
= 9m - 3x1.5m
= 9m - 4.5m = 4.5m

Installations with long flue runs may give rise to a build up of condensation in the outlet flue pipe. This must not be allowed to run back into the boiler. When installing long flue runs angle the flue AWAY from the boiler using a 25mm drop for every 4m horizontal run.

INSTALLATION

INSTALLING THE FLUE PIPES

i) Remember the minimum distance between inlet and outlet terminals is 150mm (6in) in any direction on the face of the wall - between centres. Inlets and outlets must terminate on the same wall.

ii) There is no maximum distance required between the flue terminals.

iii) After deciding where the flues will terminate drill the two flue openings using a core drill if possible. Ensure no breakout or if possible make good externally. CORE DRILL DIAMETER 65mm.

If the flues exit close to a corner it may be easier to:

- a) drill a pilot hole from inside the property and carry out the core drill operation from outside.
- or b) use a masonry chisel to make the flue openings and make good afterwards.

Ensure that during the cutting operation the masonry does not cause any damage to property or injury to persons.

iv) Fix the pipe support clips along the pipe routes. Ensure that any bends are securely held at each end by the clips provided.

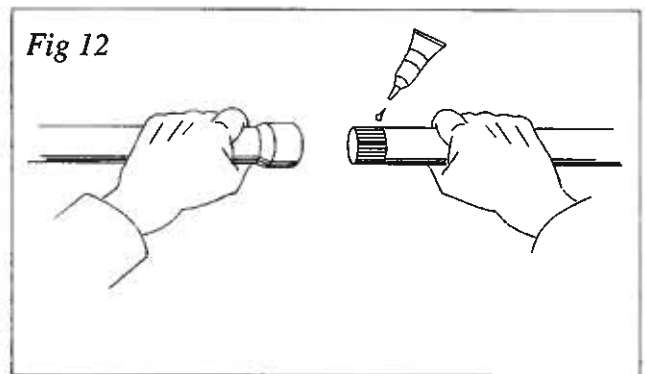
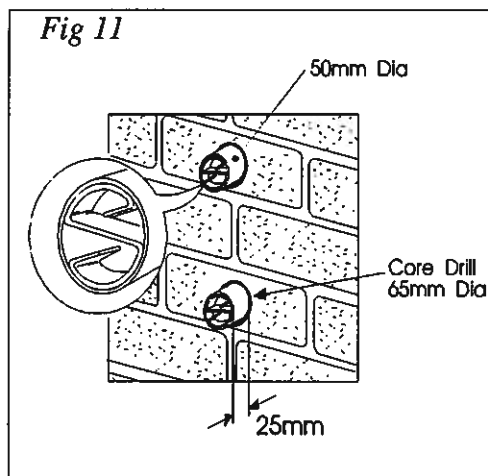
NB. No. 6 wood screws and plugs are supplied for fixing the clips.

ASSEMBLING THE FLUE PIPES

IMPORTANT

* The flue pipes must be assembled with plain (male) end of pipe (or bend) nearest the appliance and the female socket end furthest from the appliance.

* The silicone sealant must only be applied sparingly to the male end of the pipe.



* Always adjust the length of pipes by cutting the plain end. Remove any burrs both inside and out.

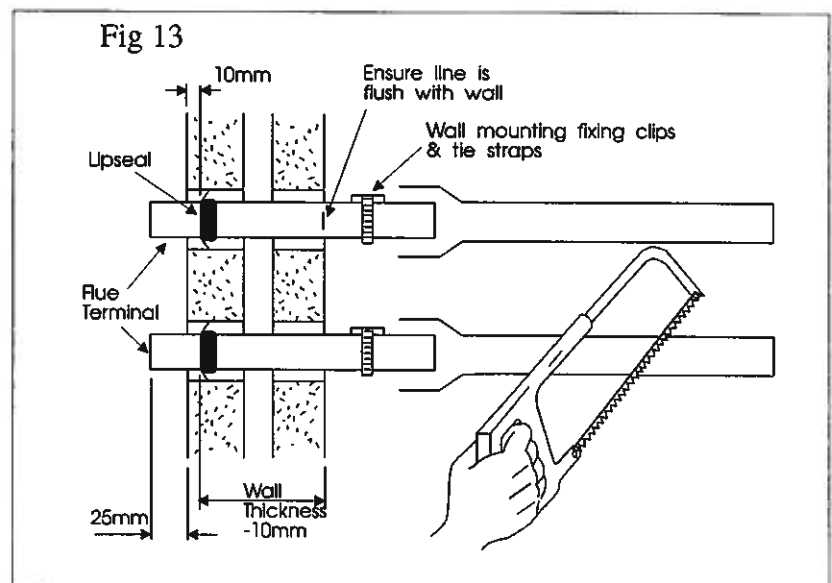
* Keep the flue pipes clean and free of oil, or grease or, swarf.

i) Work towards the wall. Before fitting the last piece, take the two lengths of flue pipe that have the flue terminal inserts and lipseals (in standard kit), measure the wall thickness, then measure from the lip seal at the end nearest the outlet, and mark the wall thickness onto the pipe minus 10mm. Minimum flue length is 300mm (12in) from appliance to external wall.

ii) Fit the two wall mounting fixing clips approx. 300mm (12in) or less from the wall in line with the inlet and outlet pipe runs. Feed the tie straps through the brackets.

iii) Push the tubes through the support clips into the wall up to the mark. Visually check that the pipes have protruded through the wall by 25mm and that the lip seal is located in the wall around its circumference. Cut the piece behind this to its correct length. The terminal length will now have to be pushed through the wall, then pulled back into the socket of the length which has just been cut. If there are any gaps present make good at this stage externally.

Join the tie straps around the pipes and pull tight so that the straps prevent any movement of the flue pipes. Any excess may be cut off.



INSTALLATION

iv) Smear a film of silicone sealant (approx. 0.5mm thick) onto the male end of the pipes (approx. 40mm along).

Do not allow the sealant to get inside the flue pipe or the air intake pipe.

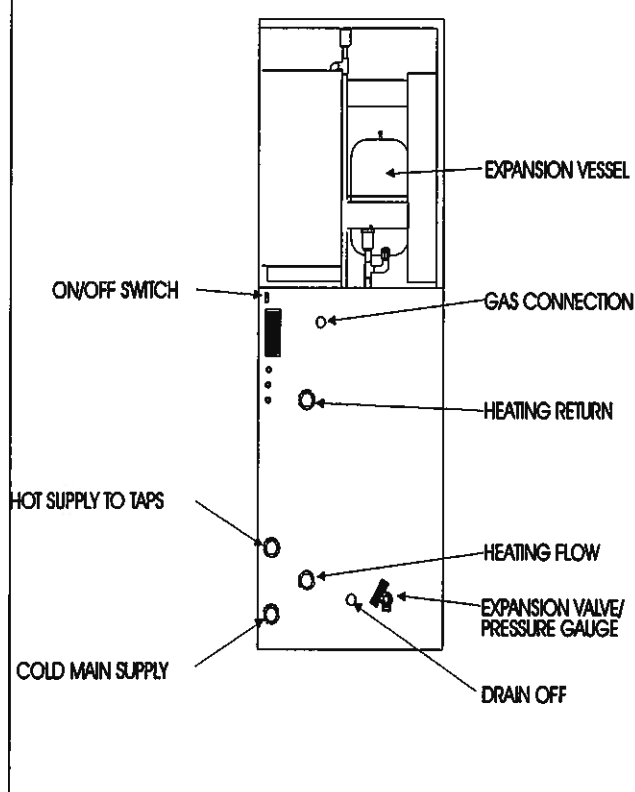
NB Observe the following precautions when applying the silicone solution:

- 1) Wear gloves and/or goggles where there is a risk of accidental contact.
- 2) Store below 30° and use in a well ventilated area.
- 3) If any silicone is spilt, wipe away any excess with a soft cloth and allow to cure.

Repeat this operation with every male pipe end, (except the final pieces of flue pipe) as the flue pipe runs are assembled.

v) Remember on long horizontal flue runs to angle the outlet flue **AWAY** from the boiler so that any condensate will run out from the terminal.

Fig 14



PLUMBING

All the water and gas connections are located on the right hand side of the appliance, (see Fig. 14).

CENTRAL HEATING

Using 22mm copper pipework connect the appliance to the central heating system (copper compression fittings 22mm). Two stop valves should be fitted as close to the appliance connections as possible. The flow and return connections are labelled.

DOMESTIC HOT WATER

Connect the cold water supply to the appliance (copper compression fitting 22 mm). A stop valve should be fitted as close to the appliance connection as possible. Connect the DHW flow to the hot water system (copper compression fitting 22mm).

EXPANSION RELIEF VALVE

The valve should be installed into a 15mm copper discharge pipe which permits the safe discharge of steam and hot water such that no hazard to persons or damage to electrical components is caused. **NOTE.** The valve incorporates plastic components which will be adversely affected by heat. For this reason we recommend the use of compression fittings for joints adjacent to the valve.

GAS

The union gas cock is supplied as a loose item in the fitting kit. The male liner, with union nut, should be fitted to the Rc 1/2in gas inlet using an approved jointing compound. The gas cock can then be fitted and the gas supply completed. The whole gas installation including the meter should be inspected and tested for soundness and purged in accordance with the recommendations of the current issue of BS 6891.

DRAIN COCK

The 1/2in drain cock, which is supplied as a loose item in the fitting kit, should be fitted to the drain connection on the appliance using an approved jointing compound.

ELECTRICAL WIRING

NOTE: THIS APPLIANCE MUST BE EARTHED.

The electricity supply must be from a double pole isolating switch or a removable plug and fused at 3 amp. Remove the front panel of the appliance. This panel is removed by removing the two screws at the top and then pulling the housing forward. Slide the control box by removing the two retaining screws and pulling forward. Thread the power supply cable through one of the cable restraining glands in the right hand case, up to the control box and make the required connection to the terminal strip. Clamp the wire in the cable gland at the entry to the appliance. When making these connections ensure that the earth wire is made longer than the live and neutral wires.

Any external controls wiring should be passed through the other cable restraining gland in the right hand case, up into the control box and the required connection made to the terminal strip. Clamp the wire in the cable gland at the entry to the appliance.

When making any connections to the control tray allow sufficient cable to enable it to slide backwards and forwards easily.

All electrical wiring to the appliance should be secured to prevent the wire touching any hot surfaces on the boiler.

The electrical installation must comply with the latest I.E.E. Wiring Regulations.

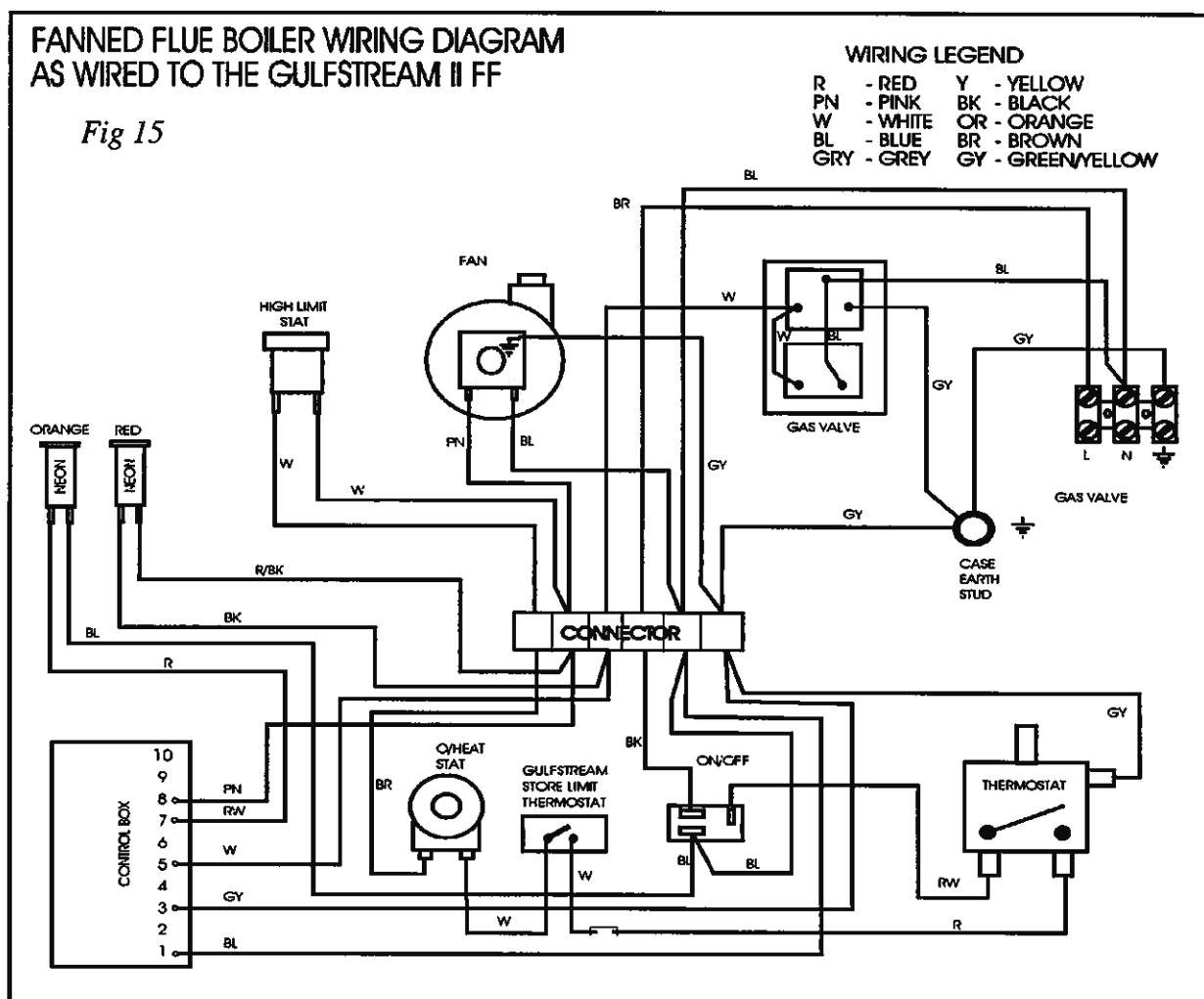
After installation of the appliance, preliminary electrical systems checks must be carried out, i.e. earth continuity polarity and resistance to earth short circuit.

On completion of the electrical installation the control box should be re-fitted along with the front cover.

DO NOT SWITCH ON THE ELECTRICITY SUPPLY AT THIS STAGE.

**FANNED FLUE BOILER WIRING DIAGRAM
AS WIRED TO THE GULFSTREAM II FF**

Fig 15



INSTALLATION

Fig 16

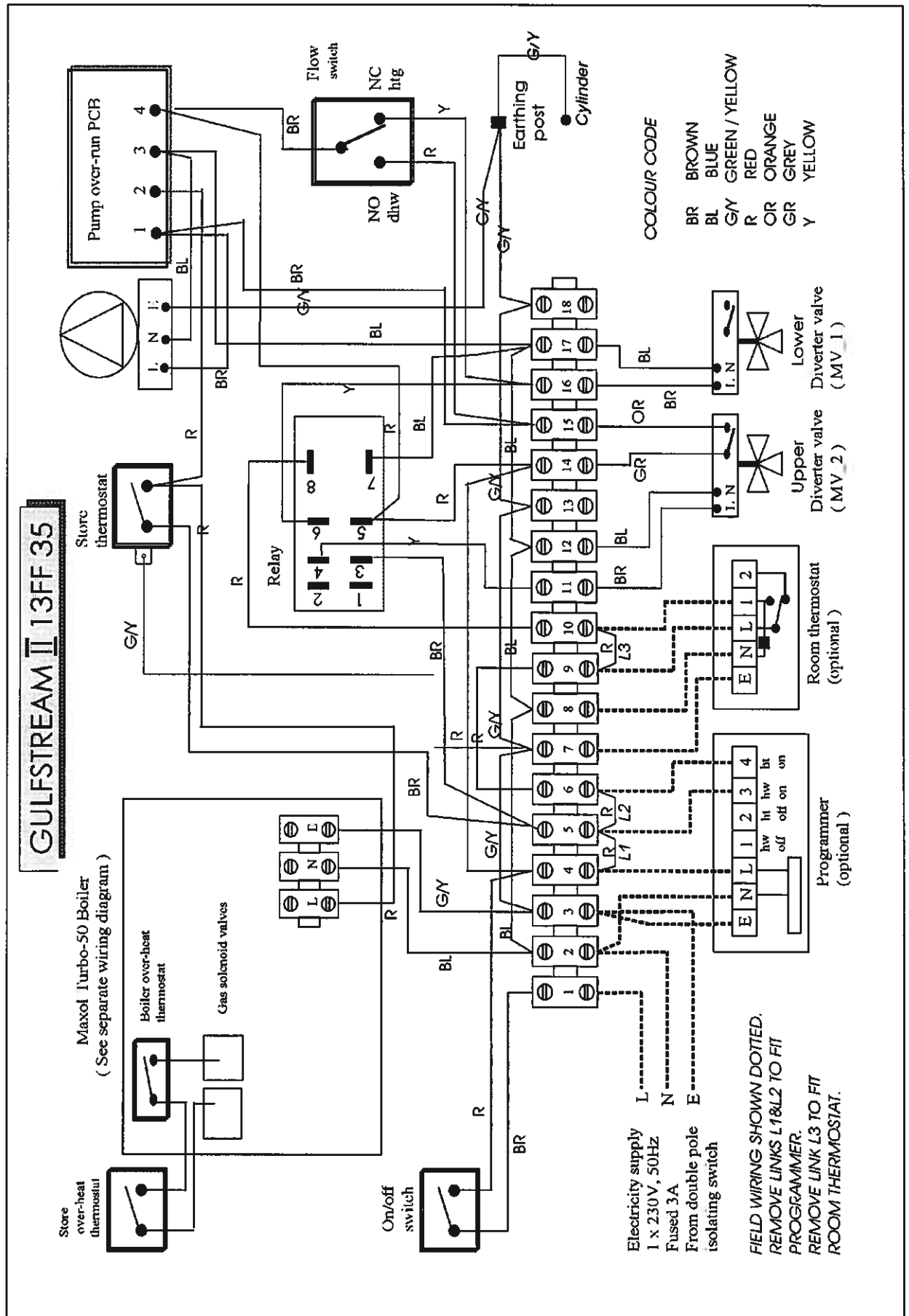
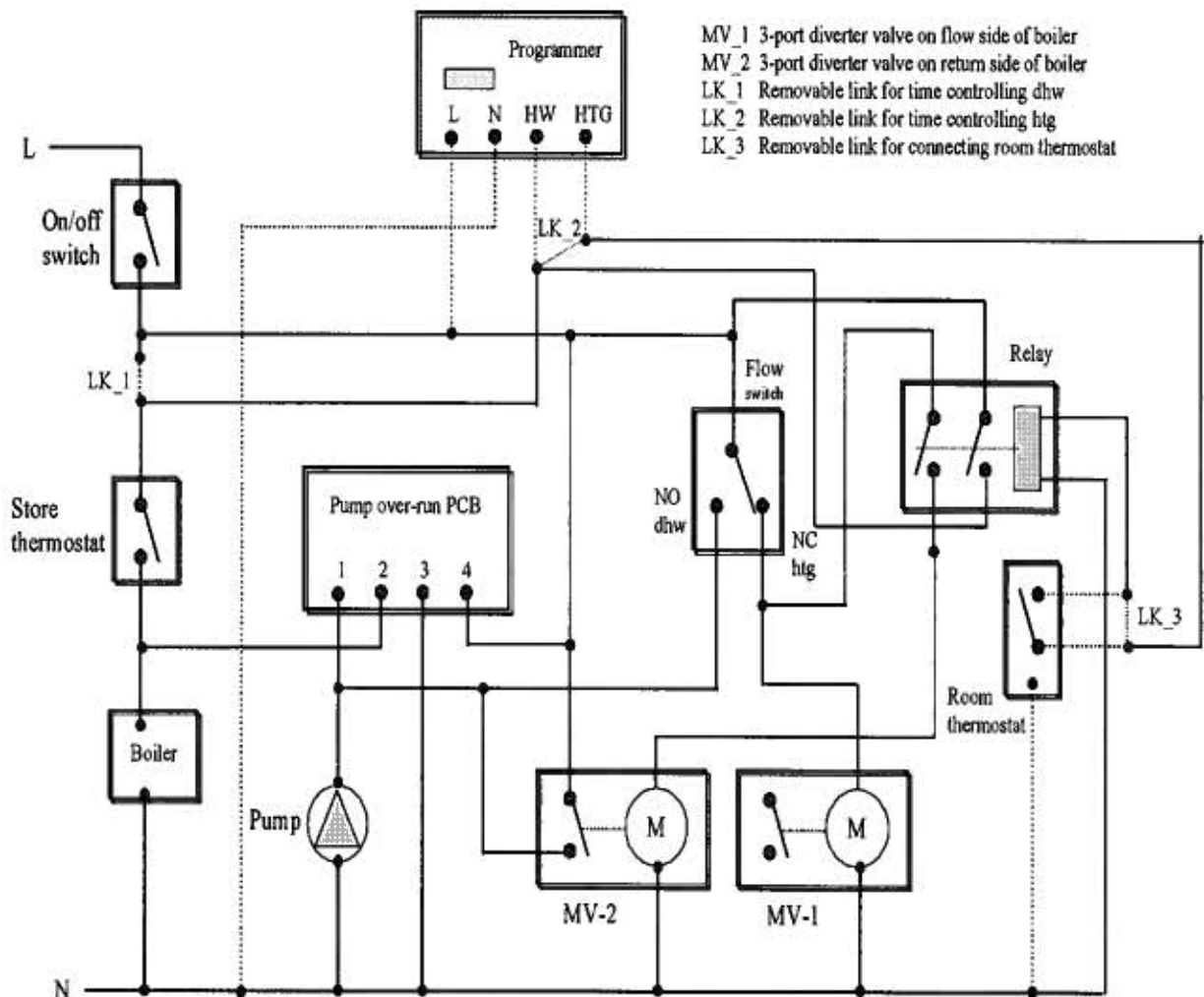


Fig 17



COMMISSIONING

INITIAL SYSTEM FILLING

Experience with sealed systems shows that make up may be needed during the first six weeks of operation. A separate Commissioning and Servicing Record sheet is provided with the appliance. The commissioning section must be completed by the installer and left along with this manual in the pocket provided on the appliance.

Open central heating flow and return isolating valves. Set both 3-port diverter valves to manual position (using the lever on the side of the valve).

Remove the front cover by removing the top screws and lifting it up and away from the appliance. Slide out the top right hand side panel.

Check the expansion vessel air pressure before filling the system, and if required adjust to the initial charge pressure of 1.0 bar (14.5 psi). Fill the system with water to a system pressure of 1.2 bar using the appliance filling loop (a standard factory fitted item).

Vent the system via the four appliance vents (one automatic and three manual), the radiator vents and system air vents in accordance with normal practice. The water system must be thoroughly flushed out, initially with cold water, ensuring that all valves are open. Refill the system. If the system is new add a cleanser such as Sentinal X300 to ensure that flux residues and installation debris are removed from the system. **When determining the quantity of cleanser required, be sure to allow for the increased volume of water in the primary circuit due to the thermal store. Vent all air from the system and boiler to ensure removal of all air locks (including pump).** Examine the system for water leaks, after re-pressurising to system pressure (1.2 bar) - rectify where necessary.

The marker on the pressure gauge should be set to the initial system pressure.

Ensure that both motorised valves are in "auto" position before firing the system.

Open the cold water inlet cock and allow water to flow through the appliance to the domestic hot water taps. Ensure all air is vented and there are no leaks.

FLUE

It is important that the integrity of all the joints on the flues are checked for leakage and remade if necessary. Experience has shown that the best way of checking the integrity of the flue joints within the boiler casing is as follows:

1. Calibrate the sampling instrument in clean air i.e. outside the dwelling.
2. Do not remove the appliance front or side panels.
3. Insert the sampling probe through the vent hole at the top of the casing and direct it towards the top-back of the appliance.
4. Cover the vents at the top of the appliance case.
5. The boiler should be continuously firing and the sampling time should not be less than 5 mins to enable a positive result to be achieved. Any evidence of a leak should be reported back to the manufacturer.

If the flue pipework is encased a similar procedure to the above can be used to test integrity at the commissioning stage. Obviously when any pipework is being enclosed the fall and fixings as well as the integrity of the joints should be checked prior to enclosure. Incorrect installation of the flue will lead to a potentially dangerous situation.

INITIAL LIGHTING

Check that the electricity supply is ISOLATED, and the boiler switch is set to the OFF position.

Turn on the gas supply and open the gas service cock to purge air from the gas line in accordance with the current issue of BS 6891.

Loosen the burner pressure test point and connect a suitable U-tube pressure gauge (see Fig 18).

Ensure that the clock is calling for hot water.

Switch on the electricity supply.

Switch the appliance on and check that the appliance circulation pump is circulating water through the boiler and store. Switch the boiler switch to ON (see Fig 19).

The boiler mains switch should illuminate (green) and the fan will start running. The red pre-purge/lockout light should also illuminate at this time. After a few seconds the solenoid valve will open and the red pre-purge lockout light will go out and the intermittent spark will commence until the main burner ignites.

Once the main burner is lit the amber neon (burner on) will illuminate.

If for any reason the burner fails to light initially, the amber neon will extinguish and the red lockout light will illuminate. The full sequential control system will have then gone to lockout. Switch off the boiler (green switch).

Switch the boiler (green switch) back ON to start the lighting sequence again. If the appliance still fails to ignite, see fault finding chart. If the appliance still fails to ignite contact the manufacturer for advice. Test for gas soundness around all the boiler gas carrying components.

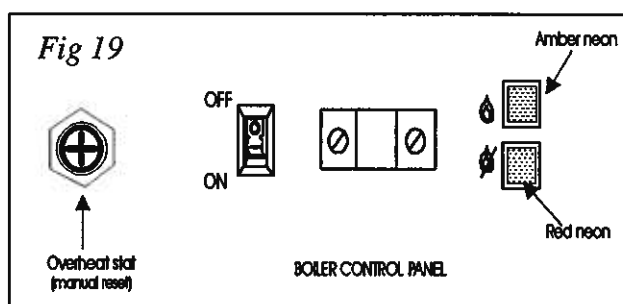
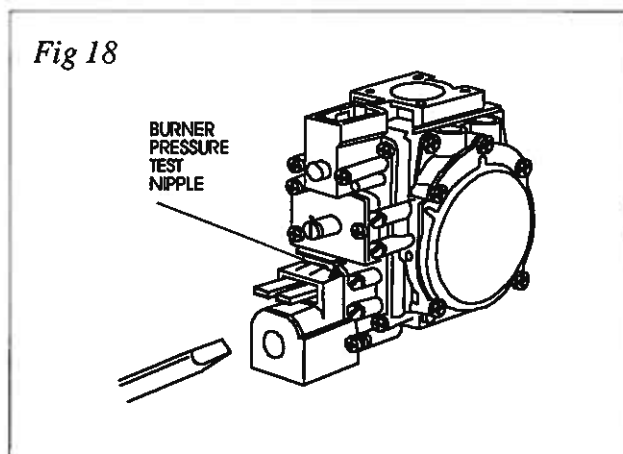
After 10 minutes, the burner pressure can be checked. The boiler is factory set to the required input and CANNOT BE ADJUSTED. The governor is factory sealed. Do not break the seal.

HEAT INPUT & OUTPUT		
	300mm Flue	Max Flue
Nominal heat input	18.2kW	17.1kW
Nominal heat output	14.74kW	13.85kW
Burner Pressure (hot)	7.9mb +/- 0.5	6.9mb +/- 0.5
The burner pressure changes with flue length but should be between the above ranges, depending on flue length.		

COMMISSIONING

If the pressure is not within the above range it could indicate a problem with the flue and should be discussed with the manufacturer.

Temporarily switch off, remove the U-tube pressure gauge and re-tighten the test point screw. Re-light and check for gas soundness at test point screw.



FINAL ADJUSTMENTS

- i) Re-light the appliance and allow the thermal store to heat to maximum. Check for water leaks, turn the boiler off, drain the system whilst hot and once the pump over-run has finished.
- ii) The in line water strainer should now be checked and cleaned if necessary. The strainer is situated in the cold inlet connection (see Fig 39).
- iii) Refill the system and adjust to the system fill pressure (1.2 bar). Check the pressure gauge pointer is set to the system design pressure. Check all air is vented from the system.
- iv) Re-light the appliance and adjust the programmer in accordance with the lighting/user instructions provided. Allow the thermal store to heat to maximum.
- v) To check the operation of the domestic hot water supply, open a domestic hot water tap and ensure that hot water is satisfactory, i.e. the flow and temperature are in accordance with TECHNICAL DATA. Turn off the tap.

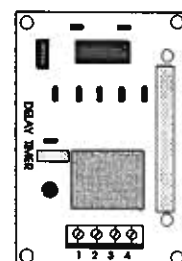
vi) To check the operation of the central heating, ensure all the external controls (should they be fitted) are calling for heat, switch the external programmer over-ride switch to the ON position. The central heating pump will come on and distribute the stored water around the central heating system. The thermal store temperature control may fire the boiler to replenish the store. Balance the heating circuits as normal practice. Itch the external programmer over-ride to OFF.

vii) Set the external programmer switch to the timed position and check that the time clock is set at the desired time periods. Set the room thermostat (if fitted) to the required setting.

PUMP OVER-RUN PCB (DELAY TIMER)

Fig 21

The delay timer will keep the store pump running after the boiler has shut down for a period of approximately 5 minutes.



EXTERNAL CONTROLS

Check that any other external controls connected in the system such as time clocks and thermostats, control the boiler as required.

USER'S INSTRUCTIONS

A User's Instructions leaflet is provided with this boiler but the householder must have the operation of the boiler and system explained by the installer. The householder must also be advised of the importance of regular servicing and of the precautions necessary to prevent damage to the system and building, in the event of the system remaining out of commission in frost conditions.

SERVICING

To ensure safe, efficient operation of the appliance, it is necessary to carry out routine servicing at regular intervals. The frequency of servicing will depend on the particular installation conditions and use to which the appliance is put. In general, once a year should be adequate.

IMPORTANT Before commencing a service or changing a component, ISOLATE the mains electric supply, TURN OFF the gas supply at the main service cock and remove the upper front and right hand case panels by pulling them away at the top (off two spring pins) and lifting them up and away from the appliance.

To remove the lower front panel, undo the two screws at the bottom, then pull the bottom forward.

To remove the boiler case, remove two screws (see Fig. 22 opposite). The case is hinged at the top. Pull forward at the base and lift off.

A combustion sampling point has been provided on the bottom section of the front cover. Remove the hex screw to access (see Fig. 23).

ROUTINE ANNUAL SERVICING

REMOVE COMBUSTION CHAMBER COVER (Fig 23)

Remove the 7 brass wing nuts securing the front cover (1)

Carefully remove the front cover and check the insulation panel (2) and the fibre sealing gasket (3) - Replace if necessary.

CLEAN THE COMBUSTION CHAMBER (Fig 24)

Check the LH, RH and rear insulation panels (1, 2 & 3)
Replace if necessary.

Inspect and clean the burner (5) - Lightly brush away any debris with a soft brush and ensure that all ports are free from obstruction

Inspect and clean the heat exchanger (6) from above and below using a soft brush to remove any debris.

Slide out the baffle (7). Inspect and clean it, ensuring that the mesh is clear from obstruction.

Inspect the fan motor (8) and fan seal (9) and clean with a soft brush if necessary.

Replace the baffle (7) sliding it between the combustion chamber base and the four screws (10).

Fig 22

Boiler case removal

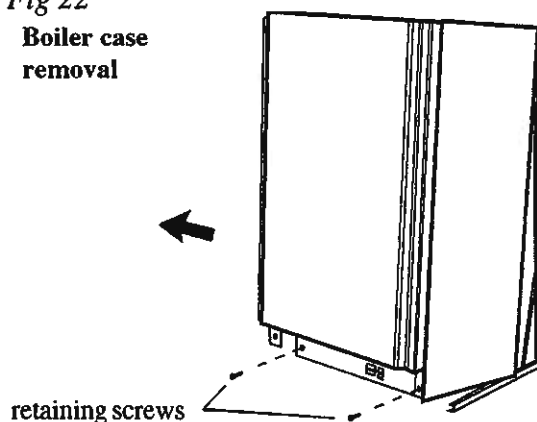


Fig 23

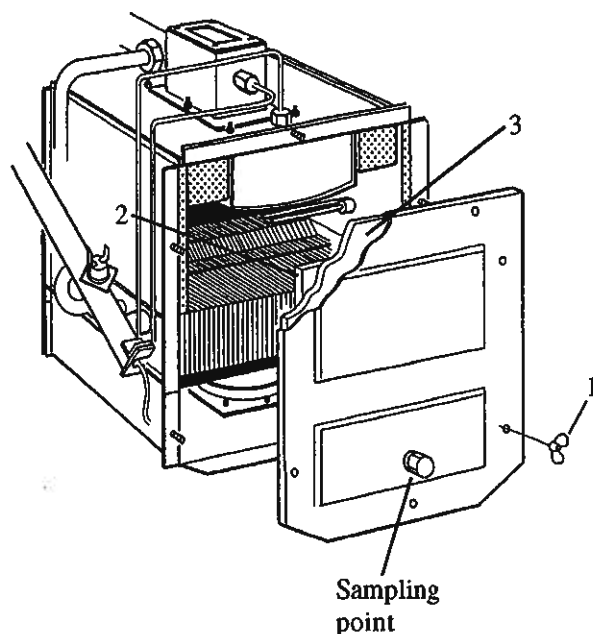
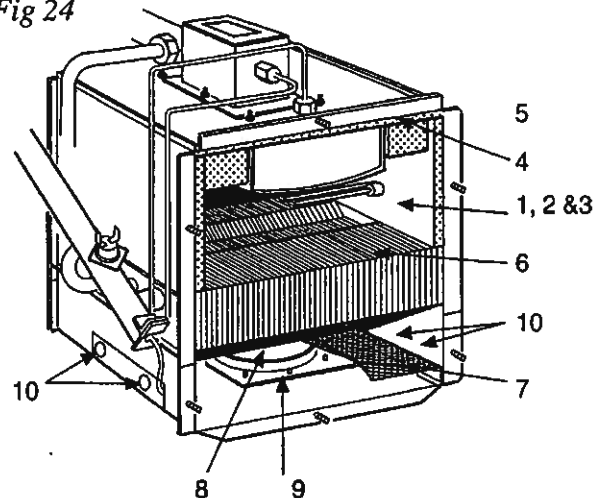


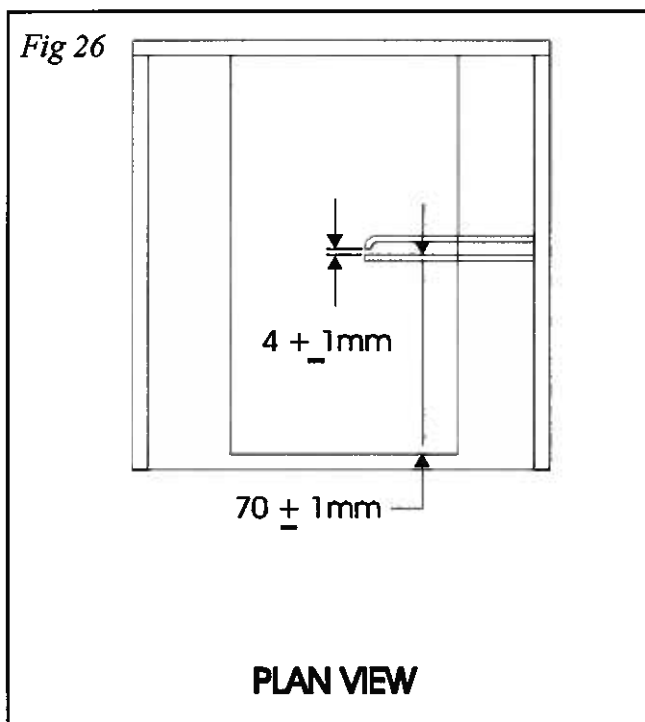
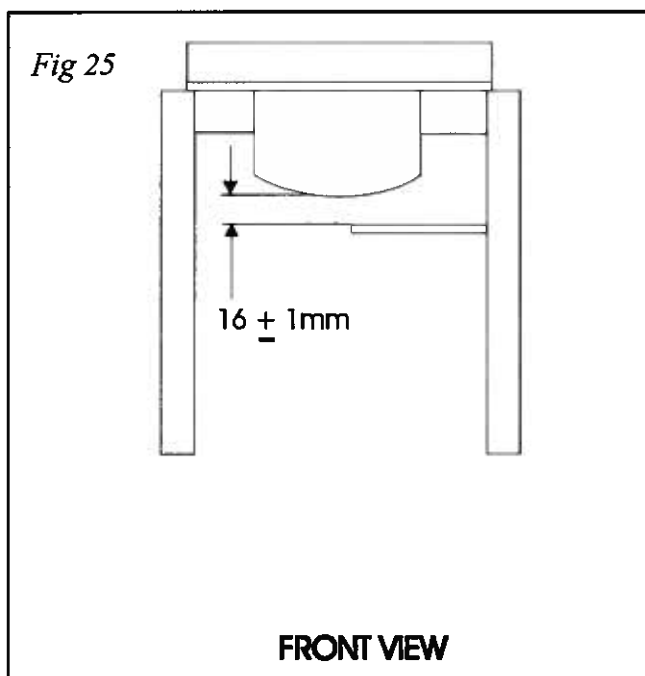
Fig 24



CHECK THE SPARK & SENSING PROBE POSITIONS (FIGS. 25 & 26)

Ensure that the dimensions shown in the diagram are still in tolerance, if necessary re-position the probes carefully without damaging the ceramic insulation.

It may be necessary to remove the spark electrode to set the gap. If so, refer to Spark Electrode and Flame Sensing Probe under Component Exchange.

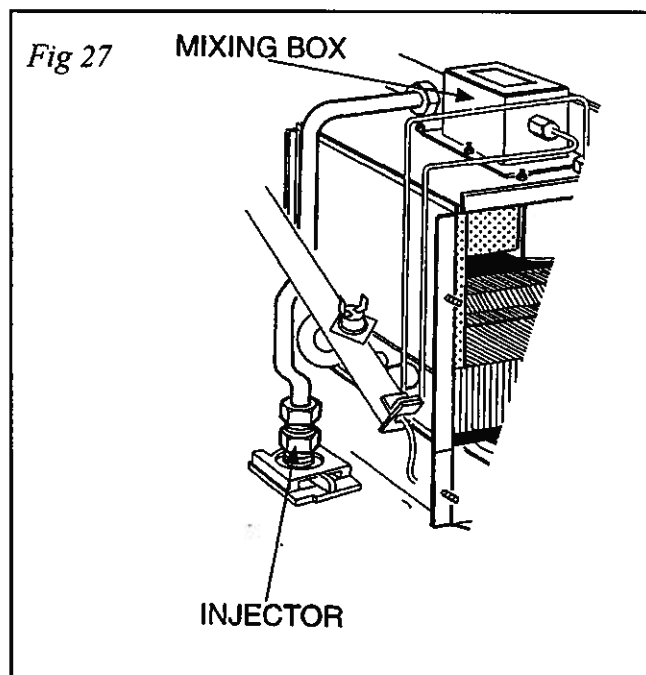


REPLACE THE COMBUSTION CHAMBER COVER

Carefully locate the door on the seven studs and push back to the combustion chamber, taking care not to damage the threads.

Re-locate the seven wing nuts and tighten fully. Check that the door is sealed completely around the combustion chamber front.

CHECK/CLEAN THE INJECTOR (FIG 27)



Disconnect the gas feed pipe from the injector. The injector is screwed into the gas valve.

Disconnect the gas feed pipe from the mixing box..

Clean or replace as necessary

Re- assemble in reverse order.

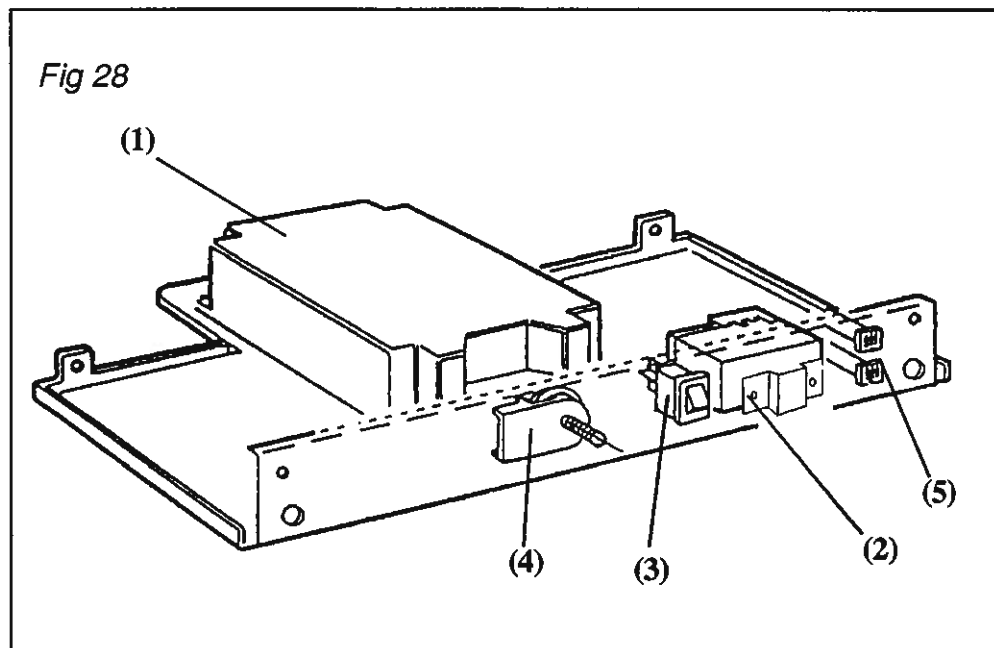
Check for gas soundness.

COMPONENT EXCHANGE

CONTROL TRAY REMOVAL

The following components are mounted on a slide-out tray: (fig 28)

- (1) Control Box
- (2) Boiler Thermostat
- (3) Appliance Switch
- (4) Overheat stat reset switch
- (5) Amber neon & Red l.e.d. indicator lights.



TO REMOVE THE TRAY (Fig 29)

Unscrew the two tray captive screws a quarter turn each (1). Pull the tray forward.

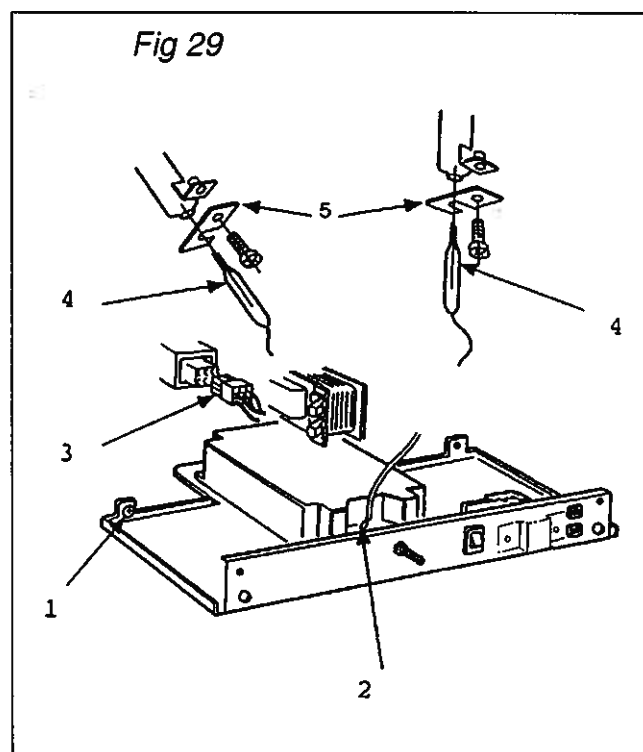
Remove the spark ignitor lead from the control box (2).

Remove the plug in connector (3).

Unscrew the phial clip screw and remove the clip (5). Pull out both thermostat phials. (4)

Slide out the tray with the thermostat phial and move to a convenient place.

After completion of task, re-assemble the tray in reverse order.



COMPONENT EXCHANGE

CONTROL BOX (Fig 30)

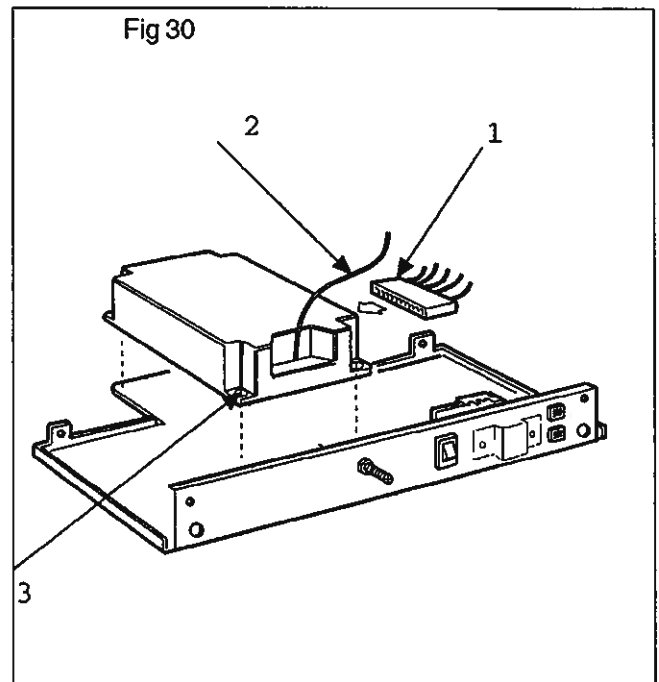
Remove the plug-in connector (1).

Remove the electrode lead (2).

Remove the two M4 screws (3).

Remove the box.

Replace in reverse order.



BOILER THERMOSTAT

Fig 29

Remove the phial clip screw (4).

Remove the phial clip (5)

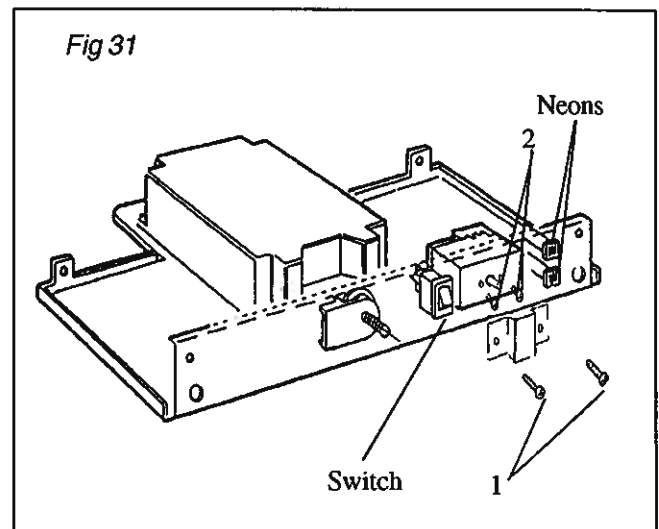
Withdraw the phial

Fig 31

Remove the two screws (1) securing the spindle cover.

Remove the two screws (2) securing the thermostat body

Re-assemble in reverse order ensuring that the phial tube is not kinked.



BOILER SWITCH (Fig 31)

Press out the switch assembly and note the position of the leads.

Remove the leads and replace the switch in the correct orientation.

Re-assemble in reverse order using the wiring diagram if necessary to re-locate the wiring correctly.

INDICATOR LIGHTS (NEONS) (Fig 31)

Push out the indicator assembly.

Remove the tags, noting the position of the wires.

Replace the indicator, ensuring correct polarity, (plastic pip to the top).

Replace the tags, ensuring correct polarity.

Push back the indicator.

COMPONENT EXCHANGE

DOUBLE SOLENOID VALVE (Fig 32)

Remove the control tray assembly as detailed on page 24.

Disconnect the nuts fixing the sensing pipes to the combustion chamber. These are on the inlet mixing box and at the flue collector.

Disconnect the inlet connection at the Neva cock.

Disconnect the burner feed pipe from the valve top (1).

Remove the wiring tags (3) noting their positions.

Remove the two fixing screws holding the bracket to the boiler.

Remove the valve and sensing pipes complete.

Remove the valve mounting bracket two screws,

Remove the sensing pipes by unscrewing the fixing nuts (2).

Replace in the reverse order.

Remove the burner pressure test point screw (6) and fit a manometer.

Remove gas valve governor cap (5) and screw governor fully in. Replace governor cap to seal.

Follow the initial lighting procedure (page 20) - once the amber neon illuminates, set the burner pressure. The burner pressure is adjusted by turning the offset screw anticlockwise to increase. (4)

300mm flue $7.9\text{mb} \pm 0.5\text{mbar}$	adjust to suit flue length
9m flue $6.9\text{mb} \pm 0.5\text{mbar}$	

If these pressures cannot be achieved contact the manufacturers.

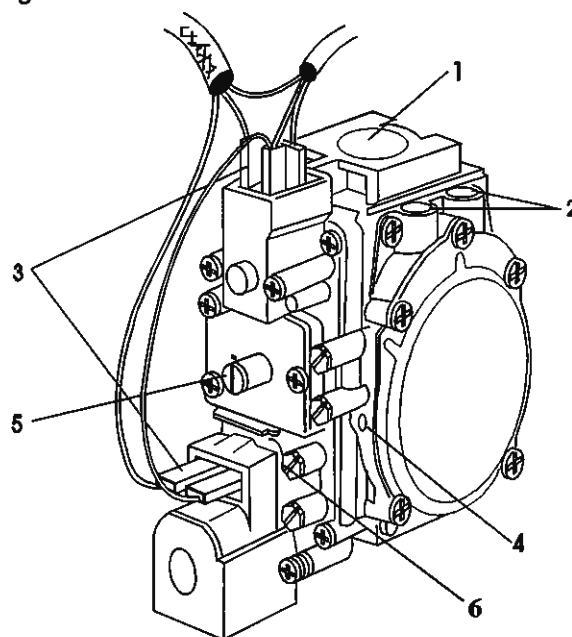
Check for gas soundness at this stage.

Turn off the mains on/off switch. Remove the pressure gauge and re-tighten test point screw.

Place the thread sealing solution provided on the offset screw and replace.

Re-light and test for gas soundness at the test point screw.

Fig 32



INJECTOR (Fig 33)

Disconnect the gas feed pipe from the injector. The injector is screwed into the gas valve.

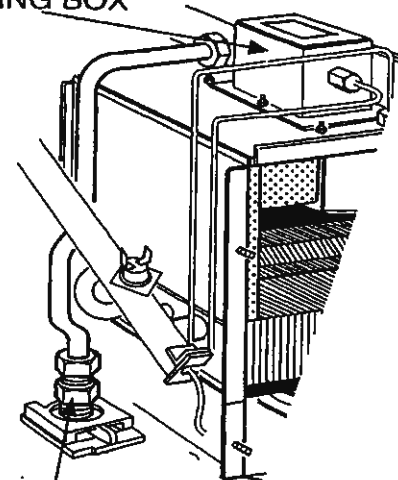
Disconnect the gas feed pipe from the mixing box..

Replace injector.

Re- assemble in reverse order.

Fig 33

MIXING BOX



INJECTOR

COMPONENT EXCHANGE

BOILER OVERHEAT THERMOSTAT (Fig 34)

Remove the two electrical tags and the nut at the front of the tray.

Remove the phial from its retaining pocket.

Replace overheat thermostat.

Re-assemble in the reverse order.

BOILER HIGH LIMIT THERMOSTAT (Fig 34)

Remove the two electrical tags (1).

Remove the two screws (2) securing the thermostat.

Replace the high limit thermostat.

Re-assemble in the reverse order.

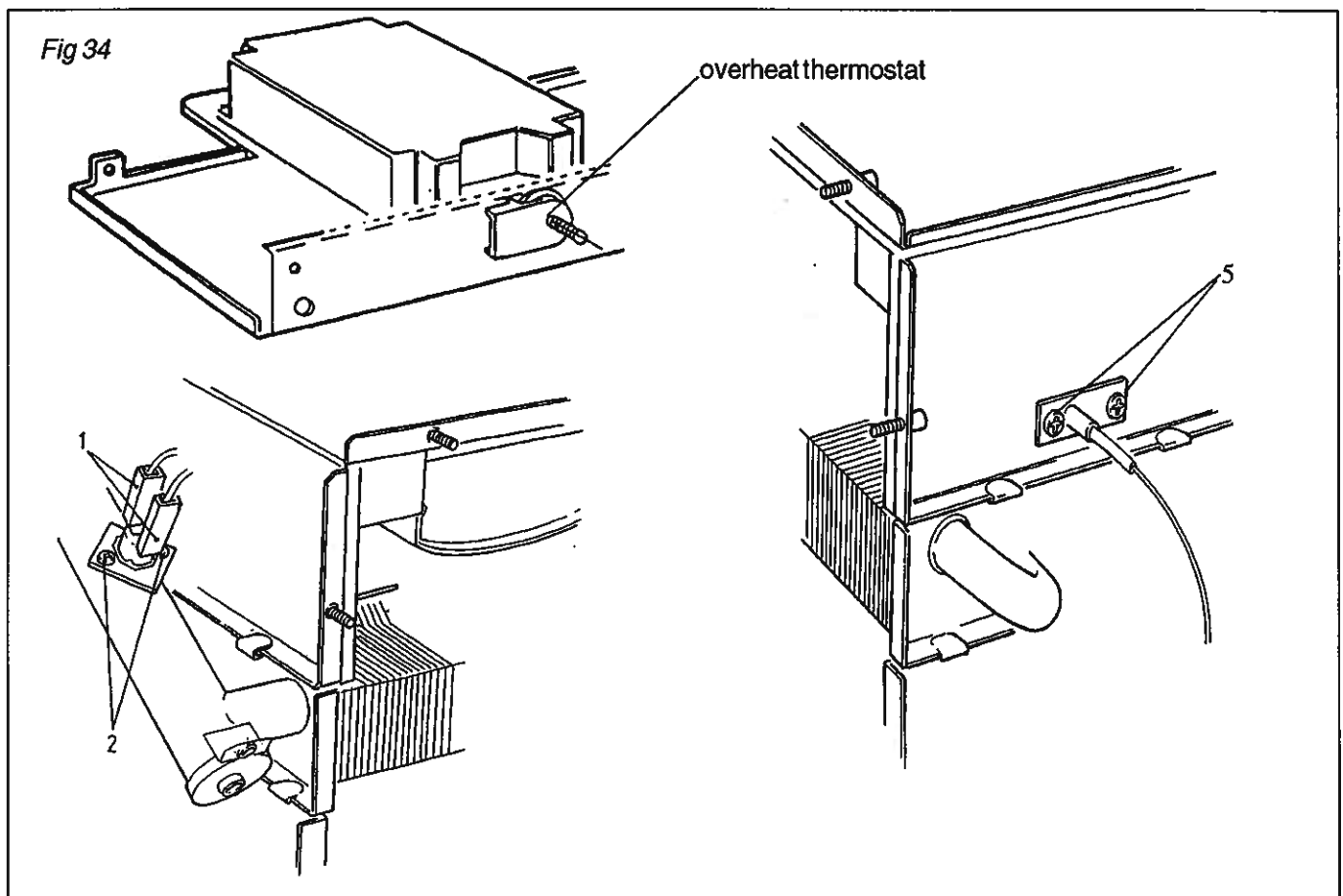
SPARK ELECTRODE (Fig 34)

Remove the seven wing nuts ((1) on Fig 23) securing the combustion chamber front cover and carefully remove taking care not to damage the fibre seal.

Remove the two screws (5) securing the probe.

Remove the probe taking care not to damage the insulation.

Re-assemble in reverse order and then re-set the positions as in Figs 25 and 26.



COMPONENT EXCHANGE

BURNER (Fig 35)

Remove the seven wing nuts (1) on Fig 23) securing the combustion chamber front cover and carefully remove taking care not to damage the fibre seal Fig. 2.

Remove the top insulation panels (1).

Remove the spark probes (page 27)

Remove the six nuts on combustion chamber top (2).

Pull the burner down carefully and pull out taking care not to damage the top fibre seal.

Re-assemble in reverse order and reset the probe positions as in Figs 25 and 26.

INSULATION PANELS

WARNING: Inhalation of particles may be injurious to health. The panels should first be dampened and the work should be carried out in a well ventilated area. Avoid contact with skin, eyes, nose and throat. Use disposable protection.

Remove the probes as on page 27.

Remove the burner as on this page.

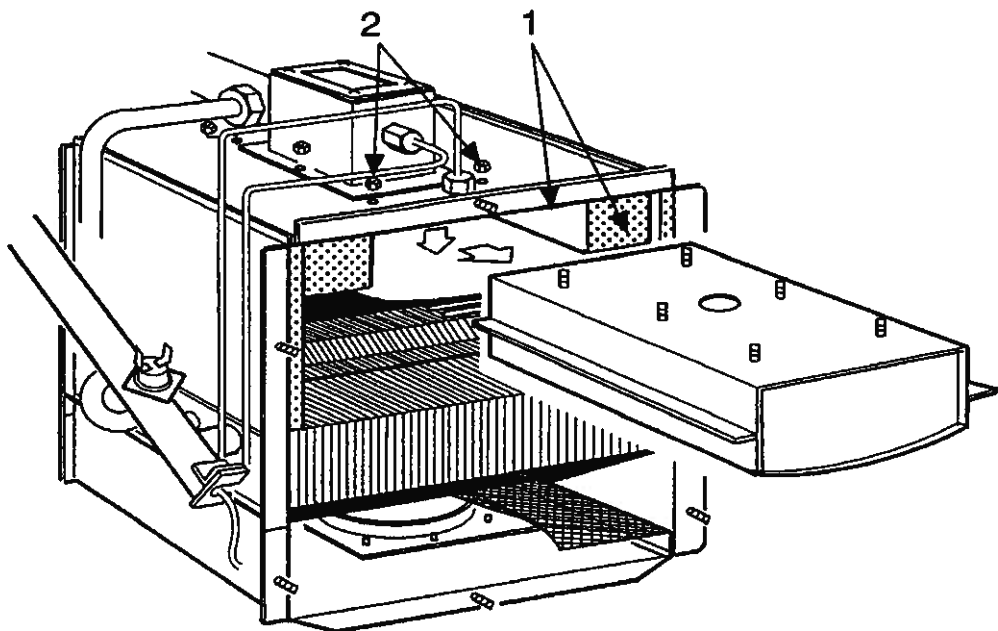
Pull out the left hand and right hand side insulation panels ((1) and (2) on Fig. 24) noting the cut-outs at the back.

Pull out the rear panel ((3) on Fig 24).

Unscrew the nut and washer on the front door and remove the door panel and fibre seal.

Re-assemble in reverse order taking care to align front door panels correctly and also to locate the rear panel correctly (cut out locations to the bottom).

Fig 35



COMPONENT EXCHANGE

FAN (Fig 36)

Remove the seven wing nuts ((1) on Fig 23) securing the combustion chamber front cover and carefully remove taking care not to damage the fibre seal.

Slide out the baffle (1) from between the four screws (2) and combustion chamber base.

Remove controls tray as detailed on page 24.

Remove the wiring tags including the earth lead from the fan.

Remove the four screws (2) from combustion chamber sides.

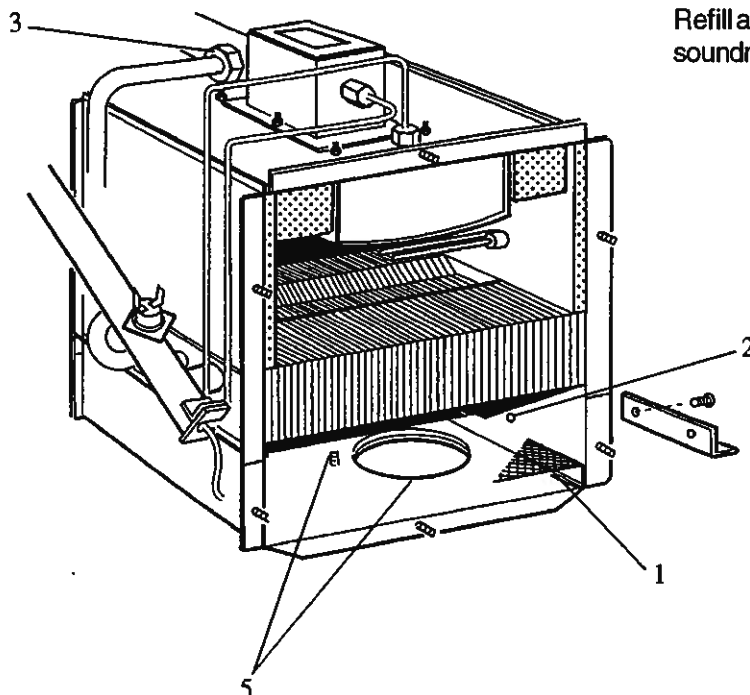
Pull the fan assembly out of the inlet and outlet seals and remove.

Remove the two screws holding the fan mounting bracket and transfer to the replacement fan.

Pull off the fan outlet reducer and transfer to the replacement fan.

Re-assemble in the reverse order.

Fig 36



HEAT EXCHANGER

Remove gas valve sensing pipes (See page 26)

Remove Overheat Thermostat. (See page 27)

Remove Spark Electrode and Flame Sensing Probe. (See page 27)

Remove Burner. (See page 28)

Remove Insulation Panels. (See page 28)

Remove Fan. (this page)

Disconnect the nut (3) from the inlet pipe to the injector assembly. (this page)

Remove the two hexheaded screws from the gas valve top ((2) on Fig. 32) and remove the inlet pipe.

Drain the water system and disconnect at the flow and return union connections.

Disconnect the two locknuts from the heat exchanger brackets and remove.

Remove the four combustion chamber retaining screws and remove the heat exchanger assembly.

Remove the six screws (5) on the fan seal clamp and transfer the seal and clamp to the replacement heat exchanger assembly.

Re-assemble in reverse order

Refill and vent the appliance and system, check for water soundness as described in the section COMMISSIONING.

COMPONENT EXCHANGE

APPLIANCE PUMP

If it is necessary to replace the pump fitted to the appliance the pump head (motor pack) only should be removed as recommended by the manufacturer (Grundfos). Assuming it is within warranty this will be accepted by a merchant as being under warranty as long as a complete pump i.e. alleged faulty motor pack and new base is left with the merchant. It is important to ensure that any air is adequately vented.

1. Isolate the heating flow and return, drain the appliance to just below the pump.
2. Disconnect the wiring on the pump.
3. Remove pump head.
4. Replace and refit in reverse order.
5. Refill and vent the appliance as described in commissioning.
6. SET the pump **speed to maximum**.

STORE CONTROL THERMOSTAT (SEE FIG 1)

1. Isolate the electricity supply.
2. Remove the front appliance cover.
3. Undo two wiring centre screws and slide out the wiring centre.
4. Undo the screws holding the thermostat to the base.
5. Remove the split pin and capillary sensor from the pocket (bottom front of store).
6. Remove the thermostat.
7. Replace in reverse order.
8. Set the control stat at the same setting as the original ($78^{\circ}\text{C} + 2$) i.e. boiler must not cycle on its internal thermostat when charging the store. This must be checked when the appliance is recommissioned.

ANTI-VACUUM VALVE (Fig 38)

1. Remove the front cover of the appliance and slide out the top right hand side panel.
2. Drain the appliance to a point just below the anti-vacuum valve.
3. Unscrew the faulty valve.
4. Replace and refit in reverse order using an approved jointing sealant.
5. Refill and vent the appliance and system as described in section COMMISSIONING.

PRESSURE GAUGE (Fig 38)

1. Drain the appliance to a point just below the pressure gauge.
2. Unscrew the faulty gauge.
3. Replace and refit in reverse order using an approved jointing sealant.
4. Refill and vent the appliance and system as described in section COMMISSIONING.

DRAINING THE GULFSTREAM

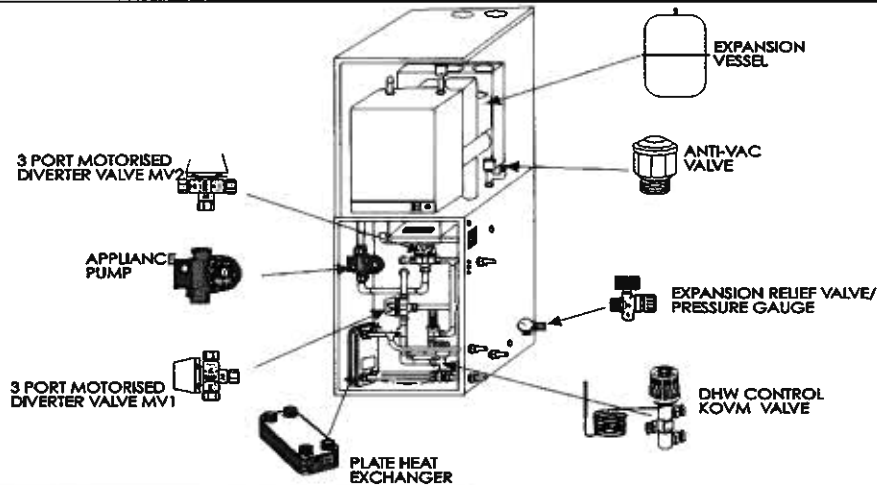
For operations involving a drain down, first switch off the appliance and isolate it electrically, then release the pressure by opening the pressure relief valve, then ensure that all air vents are open before opening the drain cock.

AUTOMATIC BY-PASS VALVE

1. Isolate the appliance electrically.
2. Isolate the heating flow and return.
3. Drain down the appliance.
4. Disconnect the two unions at the valve.
5. Fit the new valve.
6. Refill the appliance.
7. Open the heating flow and return valves.
8. Check system pressure.
9. Adjust new valve to required opening pressure.

COMPONENT EXCHANGE

Fig 38



3-PORT MOTORISED MV1 DIVERTER ACTUATOR DANFOSS

1. Isolate the appliance electrically.
2. Remove the front cover of the appliance.
3. Slide out the wiring centre by undoing the two screws.
4. Remove the appropriate valve cables from the terminal block.
5. Remove the valve head from the valve body by undoing the two nuts.
6. Replace in reverse order ensuring that the valve head is aligned the right way.

3-PORT MOTORISED DIVERTER VALVE MV1 DANFOSS

1. Switch off and isolate the appliance.
2. Drain the appliance.
3. Remove the valve head by undoing the two nuts securing it to the valve body.
4. Undo the three compression nuts on the valve body.
5. Remove the valve.
6. Replace in reverse order ensuring that both the valve body and the valve head are correctly orientated.

3-PORT MOTORISED MV2 DIVERTER ACTUATOR DANFOSS

1. Isolate the appliance electrically.
2. Remove the front cover of the appliance.
3. Slide out the wiring centre by undoing the two screws.
4. Remove the appropriate valve cables from the terminal block.
5. Remove the valve head from the valve body by undoing the two nuts.
6. Replace in reverse order ensuring that the valve head is aligned the right way.

3-PORT MOTORISED DIVERTER VALVE MV2 DANFOSS

1. Switch off and isolate the appliance.
2. Drain the appliance.
3. Remove the valve head by undoing the two nuts securing it to the valve body.
4. Undo the three compression nuts on the valve body.
5. Remove the valve.
6. Replace in reverse order ensuring that both the valve body and the valve head are correctly orientated.

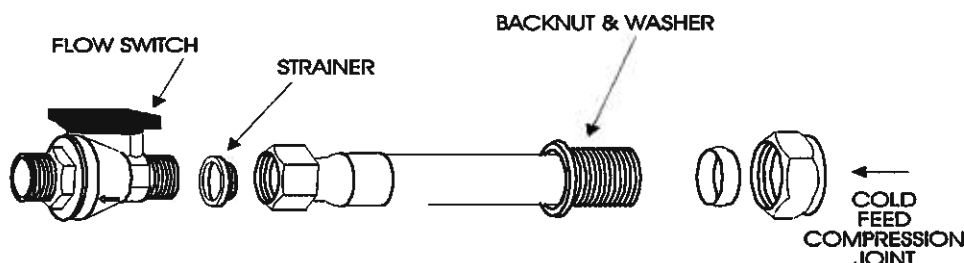
3-PORT DHW TEMPERATURE CONTROL THERMOSTATIC DIVERTER VALVE KOVM (Fig38)

1. Isolate the appliance electrically.
2. Isolate the heating flow and return, drain down the appliance.
3. Undo the screw holding bracket from the RAVK sensor and remove the sensor head from the valve.
4. Undo the three flat face connections on the valve.
5. Remove the valve and the three 3/4in hex nipples.
6. Fit the three 3/4in hex nipples to the new valve and refit the new valve using 3 new washers.
7. Refit the sensor and tighten the screw holding bracket.

COMPONENT EXCHANGE

Fig 39

Flow switch showing strainer



DHW TEMPERATURE CONTROL THERMOSTATIC DIVERTER VALVE SENSOR/ACTUATOR (RAVK) FIG 38

1. Isolate the appliance electrically.
2. Isolate the cold mains supply.
3. Open the lower hot tap in the system.
4. Undo the screw holding bracket from the RAVK sensor and remove the sensor head from the valve.
5. Undo the brass nut holding the phial in place.
6. Remove the phial and replace in reverse order.

EXPANSION RELIEF VALVE (Fig 38)

1. Drain the appliance to a point just below the pressure relief safety valve.
2. Remove the outlet pipe and fitting from the faulty valve.
3. Unscrew the faulty valve from the appliance.
4. Replace and refit in reverse order using a suitable thread sealant.
5. Refill and vent the appliance and system as described in section COMMISSIONING.

DHW FLOW SWITCH (Fig 39)

1. Isolate the appliance electrically.
2. Shut off the cold supply to the appliance and open the domestic hot water tap which is the lowest in the system.
3. Disconnect the electrical leads in the wiring terminal block making note of their correct location.
4. Undo the two flat face nuts either side of the flow switch.
5. Refit the new flow switch in reverse order using two new washers.

PLATE HEAT EXCHANGER (Fig 38)

1. Isolate the appliance electrically.
2. Isolate the heating flow and return and drain the unit.
3. Shut off the cold supply to the appliance and open the domestic hot water tap which is the lowest in the system.
4. Undo the four nuts at the front of the plate heat exchanger and remove the two short 22mm copper pipes from between the heat exchanger and the valves. Note, a small amount of water will escape at this point which was in the two short copper pipes.
5. Undo the two nuts at the rear of the plate heat exchanger, again a small amount of water will escape.
6. Withdraw the plate heat exchanger forwards.
7. Replace and refit in reverse order using six new sealing washers.
8. Refill and vent the appliance and system as described in section COMMISSIONING.

COMPONENT EXCHANGE

STRAINER (Fig 39)

1. Isolate the appliance electrically.
2. Turn off the cold mains supply and open the lowest hot tap.
3. Undo the cold feed compression joint.
4. Remove the line strainer and refit in reverse order.

EXPANSION VESSEL (Fig 38)

1. Drain the whole appliance.
2. Remove the front cover of the appliance and slide out the RHS top cover to expose the expansion vessel.
3. Undo the nut securing the expansion vessel pipe to the tank.
4. Withdraw the expansion vessel.
5. Fit the new expansion vessel.
6. Check that the vessel is pre-charged to the required pressure nominal (1.0 bar) and refit in reverse order using new sealing washers.
7. Refill and vent the appliance and system as described in section COMMISSIONING.

COMPONENT EXCHANGE

BOILER PUMP DELAY TIMER (Fig 41)

1. Isolate the appliance electrically.
2. Remove the wires from the appliance pump delay timer pcb taking note of their positions.
3. Remove the faulty pcb by pulling it off the mounting posts.
4. Replace and refit in reverse order taking care to connect the wires in the correct terminals.

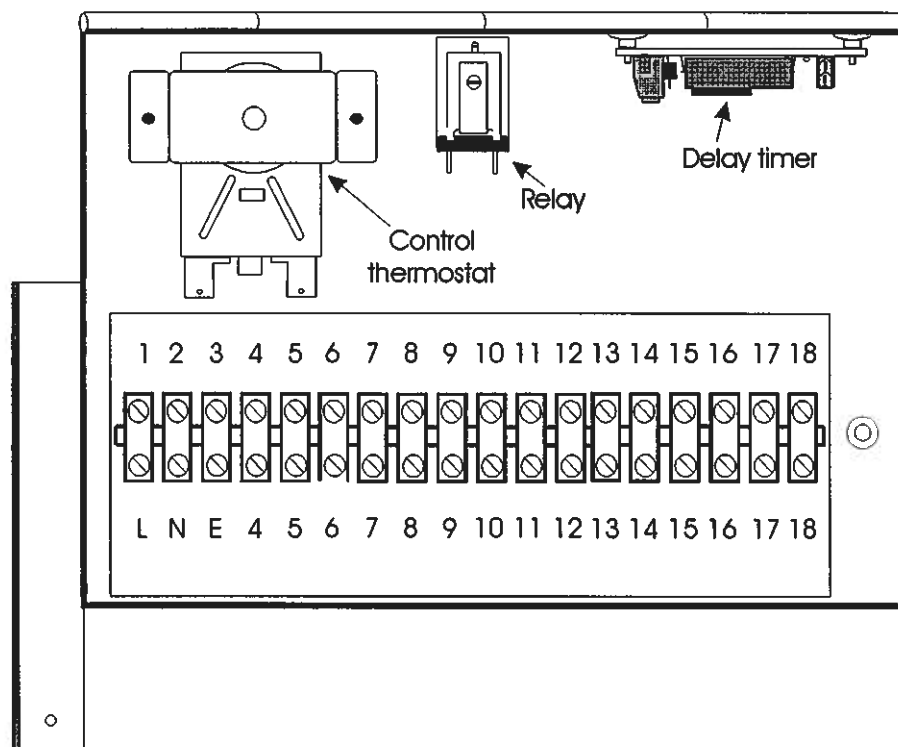
STORE LIMIT THERMOSTAT (See Fig 1)

1. Isolate the appliance electrically.
2. Remove the sensing bulb from its pocket by first taking out the retaining pin and then sliding out the bulb and spacer.
3. Remove the two electrical connections on the over-heat cut-off device taking note of their positions.
4. Remove the locking nut holding the over-heat cut-off device in position and remove the faulty device.
5. Replace and refit in reverse order making sure the route of the capillary is the same and the electrical connections are on the correct terminals.

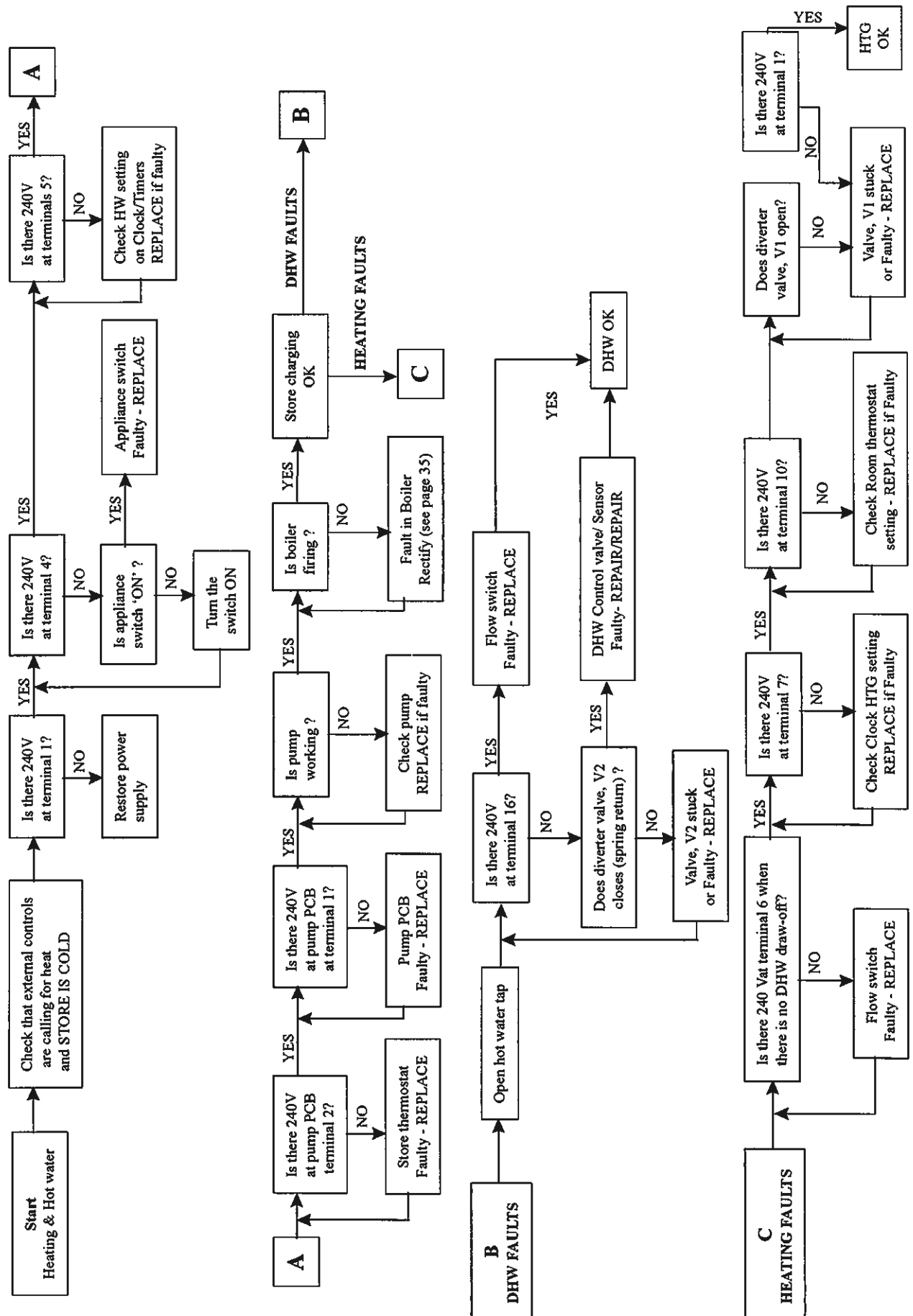
RELAY

1. Isolate the appliance electrically.
2. Unplug the relay from its socket.
3. Plug in a new one.
4. Switch on and test all functions.

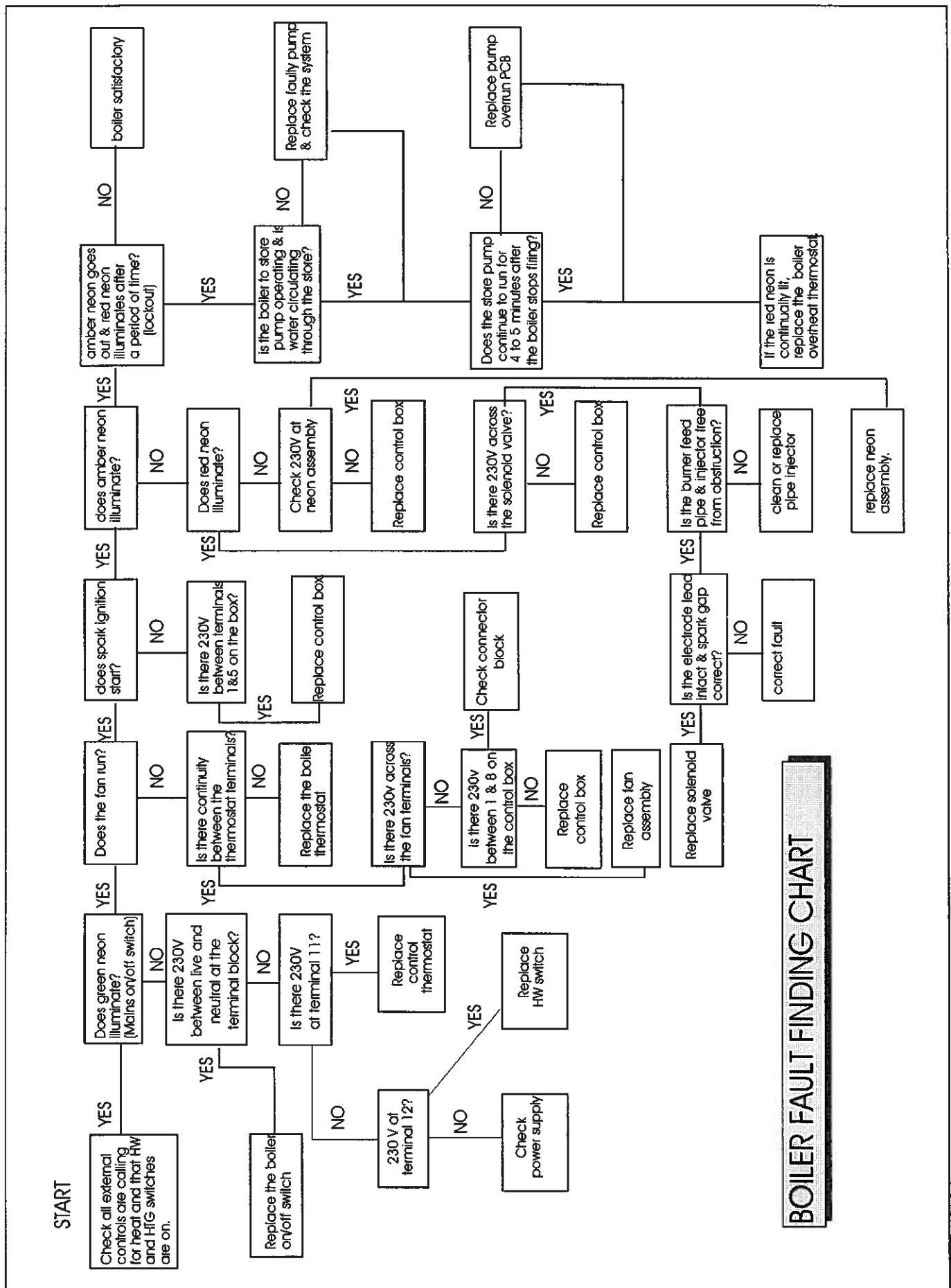
Fig 41



Appliance fault finding chart



FAULT FINDING



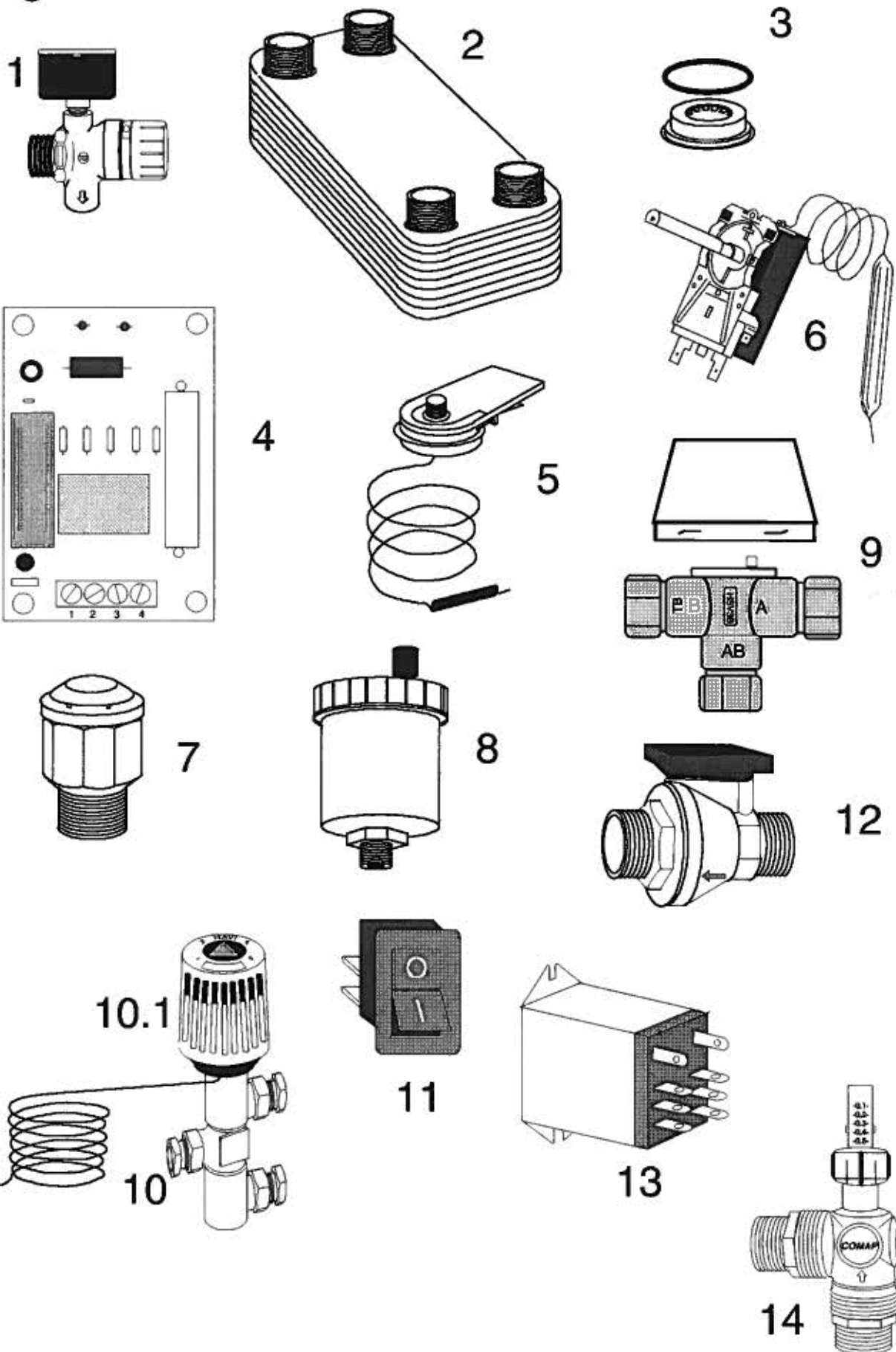
SPACE HEATING	
SYMPTOM	POSSIBLE CAUSES
Radiators will not heat up but thermal store is maintained hot.	<ul style="list-style-type: none"> ● Faulty or incorrectly set external controls e.g. (room thermostat, programmer). ● Faulty 3-port diverter valve V1 (Figs 1 and 2). ● Central heating isolating valves closed.
All radiators only warm but all at similar temperature (i.e. poor heating and hot water service)	<ul style="list-style-type: none"> ● Room thermostat and/or TRVs setting too low. ● Thermal store is not being maintained because of faulty boiler controls or faulty store thermostat. ● Pump not set at maximum speed or its performance has deteriorated (eg. by air locks). ● Heating load is in excess of that allowed (i.e. 13kW)
Not all the radiators heating up to similar temperatures but thermal store is maintained hot	<ul style="list-style-type: none"> ● System not properly balanced ● TRVs settings not correct
TRVs - Thermostatic radiator valves not functioning	<ul style="list-style-type: none"> ● Radiator valve stuck - usually opening and closing the TRVs freeze it.

DOMESTIC HOT WATER	
SYMPTOM	POSSIBLE CAUSES
DHW remains cold exiting the taps.	<ul style="list-style-type: none"> ● Thermal store is cold - Clock/programmer faulty or incorrectly set. ● Pump stuck, air locked or faulty. ● Faulty diverter valve V2 (figs 1 and 2). ● Flow switch faulty. ● Too little or too much flow rate. ● Faulty or incorrectly set DHW sensor/actuator.
DHW temperature fluctuates wildly when the flow rate is steady.	<ul style="list-style-type: none"> ● Pump air locking - system requires filling to correct pressure vented properly. ● Faulty DHW sensor/actuator.
Not sufficient hot water at higher flow rates.	<ul style="list-style-type: none"> ● Faulty or incorrectly set boiler and/or store thermostat. ● Pump not set at maximum speed.

PARTS LIST

Key No.	Description	Manufacturer	Manufacturer Part No.	Gas Council Part No.
1	Pressure relief valve / gauge	Reliance	XG154	
2	Plate heat exchanger	SWEP	GT017	
3	DHW flow regulator	Aquaflow	GT086	
4	Delay timer	Gledhill	XB041	
5	Store limit thermostat	Ranco	GT064	
6	Store control thermostat	Hawco	GT032	
7	Anti-vacuum valve	Gledhill	GT056	
-	Pumps	Grundfos	GT105	
8	Automatic air vent	Altechnic	GT015	
9	22mm 3-port diverter valve	Danfoss	GT097	
10	3-port DHW control diverter valve	(KOVN - Danfoss)	GT099	
10.1	DHW sensor/actuator	(RAVK - Danfoss)	GT098	
	Expansion vessel	Reliance	GT107	
11	Appliance switch	Arcoelectric	GT034	
12	New flow switch	Albion	GT106	
13	Relay	RS	GT123	
14	Automatic by-pass valve	Comap	XG156	
	<u>Boiler parts</u>			
15	Control thermostat	Ranco	ZS300	379444
16	Control box	Pectron		
17	Neon switch	Eaton	ZS303	378339
18	Neon orange	Arco	ZS304	378340
19	Neon red	Arco	ZS305	379449
20	Gas valve	SIT	ZS306	294071
21	Fan, including "O" ring	E.B.M.	ZS307	370274
22	Injector			
23	Boiler overheat thermostat	Ranco		
24	High limit stat	Thermoise		

Fig 42

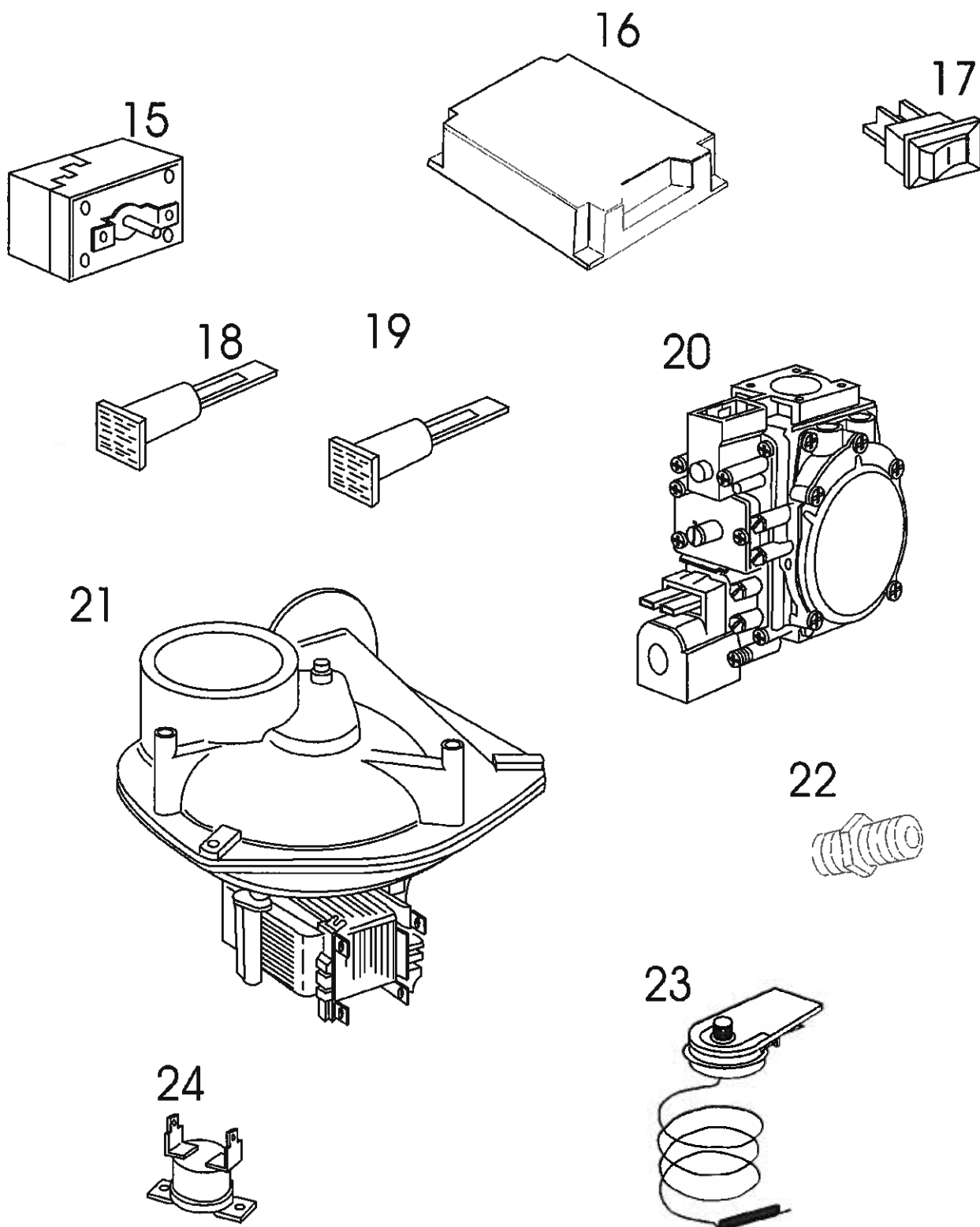


PARTS

Fig 43

Fig 43

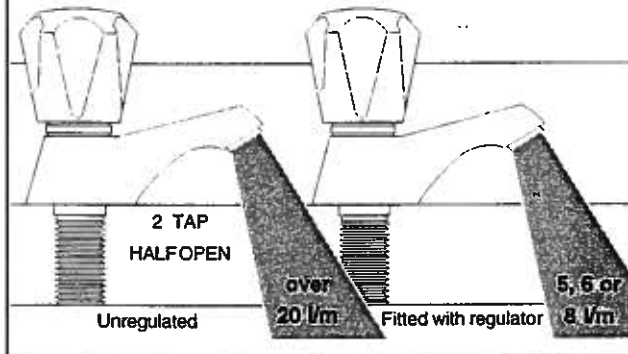
Boiler Parts



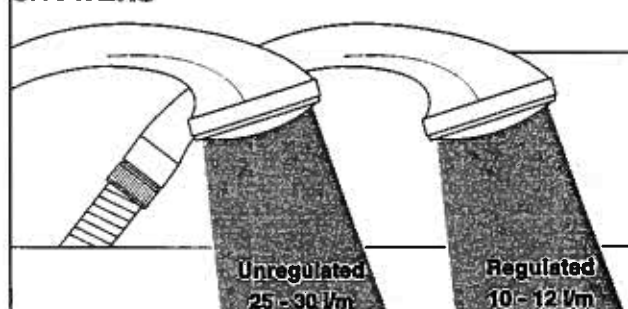
WATER SAVINGS

WATER RELATED COSTS CAN BE REDUCED BY GOOD PLUMBING PRACTICE.

TAPS & MIXERS



SHOWERS



Vast quantities of water are needlessly run off to waste due to Taps, Mixers and Showers discharging flow rates far in excess of the rates required for them to perform their duties.

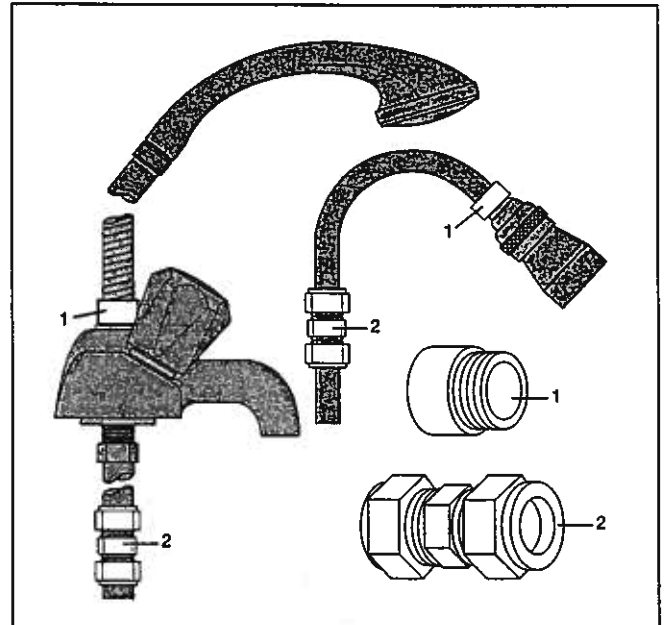
The contrasting flow rates shown on this leaflet clearly illustrate the savings that can be made whilst still providing a good performance.

British made AQUAFLOW REGULATORS provide constant flow rates by automatically compensating for supply pressure changes between 1 bar & 10 bars.

To facilitate installation into the wide range of plumbing equipment which is encountered in the U.K, FOUR FIXING OPTIONS are available:-

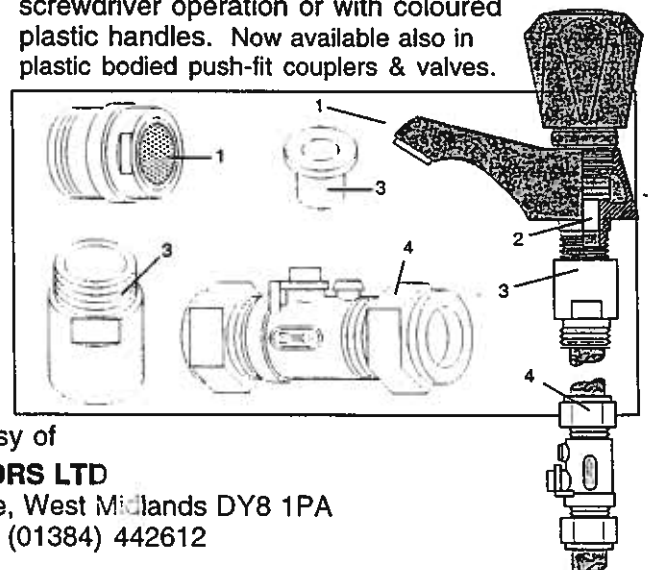
OPTIONS FOR SHOWERS

1. MXF "DW" RANGE - For fitting behind Fixed Shower Heads or onto Flexible Hoses for Handshowers (preferably onto the inlet end when lightweight hoses are used).
2. COMPRESSION FITTING RANGE. "In Line" regulators as in Option 4 for Taps & Mixers.



4 FIXING OPTIONS FOR TAPS & MIXERS

1. MK RANGE - Combined Regulators & Aerators for screwing onto Taps & Mixers with internal or external threads on their noses. Anti Vandal models also available.
2. MR05-T RANGE - Internal Regulators. Push fit into Tap or Mixer seats. Produced in three sizes - 12.5mm (BS1010), 12mm & 10mm, Flangeless models also available for Taps with Low Lift washers.
3. MXF STANDARD RANGE - Screw on tail models for Taps & Mixers. Fix onto the tails before fitting the tap connectors. Available in 3/8", 1/2", 3/4" and 1" BSP.
4. COMPRESSION FITTING RANGE - "In Line" regulators housed in 15mm & 22mm CXC COUPLERS & ISOLATING VALVES. "UK WFBS LISTED BY THE WATER RESEARCH CENTRE. Isolation valves available for slotted screwdriver operation or with coloured plastic handles. Now available also in plastic bodied push-fit couplers & valves.



Information by courtesy of

AQUAFLOW REGULATORS LTD

Haywood House, 40 New Road, Stourbridge, West Midlands DY8 1PA

Telephone (01384) 442611 Fax: (01384) 442612

Gledhill (Water Storage) Ltd

AMD. MAY 2007

CONDITIONS OF SALE & WARRANTY TERMS

1. We only do business upon the Conditions which appear below and no other. Unless we so agree in writing these Conditions shall apply in full to any supply of goods by us to the exclusion of any Conditions or terms sought to be imposed by any purchaser. These Conditions of Sale and Warranty Terms override those which are contained on the Invoice Forms and all Sales are now subject to these Conditions of Sale and Warranty terms only.

2. PRICE

Once an order or call off has been accepted the price will be held for three months but if delivery is extended beyond that period at the customer's request, then we reserve the right to amend the price when necessary. The company reviews its pricing annually to adjust for changes in our cost base. We reserve the right to alter prices at any time for severe movements in raw materials (mainly copper and steel). If there is to be a change we will give customers at least four weeks notice but anything delivered after that date will be at the revised price. An order may not be cancelled or varied after acceptance without the written consent of the company. Such cancellation or variation shall be subject to such reasonable charges as may be appropriate.

3. SPECIFICATION

The goods are supplied in accordance with the Specifications (if any) submitted to the Purchaser and any additions and alterations shall be the subject of an extra charge. Any goods not so specified shall be in accordance with our printed literature or the literature of any of our component suppliers (subject to any modifications made since publication). If we adopt any changes in construction or design of the goods, or in the specification printed in our literature, the Purchaser shall accept the goods so changed in fulfilment of the order.

4. PAYMENT

The invoice price of goods shall be payable within 30 days of despatch by us of our invoice for the goods or such longer time as may be stated by our quotation or invoice. If we receive payment in full on or before the due date we will allow an appropriate settlement discount except where we have quoted a special net price. If payment is not received in full on or before the due date we shall be entitled in addition to the invoice price to:

- (i) payment of a sum equal to any increase in the copper price supplement applicable to the particular goods sold between the date of receipt of order and the date of receipt of payment in full; and
- (ii) interest on any part of the invoice price unpaid after the due date at the rate of 3% per annum over the base rate for the time being of HSBC Bank plc.

5. TIME

We give estimates of delivery dates in good faith and time of delivery is not nor shall be made of the essence of any contract nor shall we be liable for any loss or damage occasioned by delay in delivery.

6. DELIVERY

We deliver free normally by our own vehicles within 25 miles of any of our manufacturing depots. Delivery to any place more than 25 miles from one of our manufacturing depots may be subject to our quoted delivery charges. We reserve the right to make delivery of goods contained in one order by more than one consignment and at different times. Where a period is agreed for delivery and such period is not extended by our Agreement, the Purchaser shall take delivery within that period. If the Purchaser fails to take delivery, we shall be entitled at the Purchaser's risk and expense to store the goods at the Purchaser's premises or elsewhere and to demand payment as if they had been despatched. Off loading at point of delivery shall be the responsibility of and be undertaken by the Purchaser.

7. SHORTAGES OR DAMAGE

Goods must be inspected before signature of delivery note and any damage, shortage or discrepancy noted on the delivery note and the goods returned on the same vehicle. The buyer must also give us immediate written notice of the damage, shortage or discrepancy so that we may prompt investigation.

8. RETURN OF GOODS

Goods may not be returned to the Company except by prior written permission of an authorised officer of the Company and such return shall be subject to payment by the Purchaser of handling and re-stocking charges, transport and all other costs incurred by the Company.

9. COMPANY LIABILITY

All our goods are made of the best materials from reputable manufacturers and where stated are manufactured to the appropriate British or European Standard. Complaints must be given to us immediately, before any action is taken, as responsibility cannot be accepted if repairs or renewals are attempted on site without our written authority.

Defects caused by corrosion or scale deposits are not covered by this guarantee save as expressly provided in paragraph (f) of this Condition 9.

Where we agree to rectify any defect, we reserve the right to undertake the work on our own premises.

The following guarantee covers faulty materials and manufacture for the stated period, provided that:-

- The unit has been installed in accordance with our installation and service instructions and all relevant codes of practice and regulations in force at the time of installation.
- That all necessary inlet controls and safety valves have been fitted correctly.
- It has only been used for the storage of potable water supplied from the public mains.
- Where appropriate the unit has been regularly maintained as detailed in the installation and service instructions.

(a) Domestic and Commercial Open Vented Cylinders and Tanks.

The copper storage vessel is guaranteed for ten years and if it proves to be defective either in materials or workmanship, we will either repair or supply replacement at our option with the closest substitute in the case of any obsolete product to any address in Great Britain.

- (i) free of all charge during the first year after delivery by us.
- (ii) thereafter at a charge of one-tenth of the then current list price and any copper price supplement and delivery charge during the second year after delivery by us and increasing by a further one-tenth on the second and subsequent anniversary of delivery by us.

(b) Domestic Mains Fed Products (Primary Stores)

The copper storage vessel is guaranteed for five years and if it or any integral pipework as part of the storage vessel assembly proves to be defective either in materials or workmanship, we reserve the right to either repair or supply replacements or the closest possible substitute in the case of any obsolete product and will collect and deliver to any address in England, Wales and Scotland (excluding all Scottish Islands).

- (i) free of all charge during the first year after delivery by us.
- (ii) thereafter at a charge of one-fifth of the then current list price or any copper price supplement and delivery charge during the second year after delivery by us increasing by a further one-fifth on the second and subsequent anniversary of delivery by us.

(c) Integrated Boiler and Storage Vessel Products and Stand Alone Boilers

In the case of the GulfStream range of products and the Gledhill boiler range of products, Gledhill guarantees the heat exchanger (boiler) for material and construction faults for two years and FURTHER we will meet the installer/contractors reasonable costs in removing and replacing any DEFECTIVE heat exchanger up to a MAXIMUM of one third of the extent of our liability in regard to the replacement product.

THE RESPONSIBILITY FOR THE EXECUTION OF THIS GUARANTEE LIES WITH THE INSTALLER.

The guarantee becomes null and void if the appliance is used incorrectly, or in the event of proven negligence or incorrectly implemented repairs OR FAILURE TO CARRY OUT THE RECOMMENDED INSPECTION/MAINTENANCE. The guarantee also becomes null and void if changes are made to the appliance without our knowledge, or if the serial number on the appliance is removed or made illegible.

The annual service must be carried out by a competent installer in accordance with the advice given by Gledhill and using Gledhill approved parts.

(d) Stainless Steel Unvented Cylinders

Gledhill guarantee the components including controls, valves and electrical parts for two years from the date of purchase. IT SHOULD BE NOTED THAT THE FACTORY FITTED TEMPERATURE AND PRESSURE RELIEF VALVE MUST NOT BE REMOVED OR ALTERED IN ANY WAY OR THE GUARANTEE WILL NOT BE VALID. GLEDHILL WILL NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL LOSS OR DAMAGE HOWEVER IT IS CAUSED.

The guarantee for the stainless steel vessel is for twenty five years if the original unit is returned to us AND PROVIDED THAT:

- (i) It has been installed as per the Design, Installation & Servicing Instructions, relevant standards, regulations and codes of practice.
- (ii) It has not been modified, other than by Gledhill.
- (iii) It has not been subjected to wrong or improper use or left uncared for.
- (iv) It has only been used for the storage of potable water.
- (v) It has not been subjected to frost damage.
- (vi) The benchmark log book is completed after each annual service.
- (vii) The unit has been serviced annually.

It should be noted that the guarantee does not cover:

- the effects of scale build up
 - any labour charges associated with replacing the unit or parts.
- If the stainless steel vessel proves to be defective either in materials or workmanship we reserve the right to either repair or supply replacements or the closest possible substitute in the case of any obsolete product and will collect and deliver to any address in England, Scotland and Wales (excluding all islands):

- (i) free of charge during the first year after delivery by us.
- (ii) thereafter at a charge of one twenty fifth of the then current list price during the second year after delivery by us and increasing by a further one twenty fifth on the second and subsequent anniversary of delivery by us.

ACTION IN THE EVENT OF FAILURE

If the Stainless Lite develops a leak we will ask for a deposit against the supply of a new one. This will be refunded if the failure is within the terms of the warranty when it has been examined by us.

(e) Solar Panels and ancillary equipment

Gledhill provides a five year warranty for defects in the collectors (except broken glass and collector accessories eg metal edgings). If the collector demonstrably fails to meet one of the requirements of the standard DIN 4757 part 3 we will replace it free of charge based on the date of invoice. We can not be responsible for damage caused by mechanical stress and/or changes caused by weather related influences. The warranty excludes minor surface damage that does not affect performance or malfunction due to improper assembly or installation.

Please note:

- Installation must have been carried out by a licensed specialist company (heating contractor or plumber) following the version of installation instructions in force.
- Gledhill or its representative was given the opportunity to check complaints on site immediately after any defect occurred.
- Confirmation exists that the system was commissioned properly and that the system was checked and maintenance was performed annually by a specialised company licensed for this purpose.

(f) Components of our products other than Storage Vessels and Integral Pipework.

We will either extend to the purchaser the same terms of warranty as we are given by the manufacturer of the component or if the manufacturer does not give any warranty, replace free of charge any component which becomes defective within two years after the date of the delivery by us and is returned to us at the purchaser's expense but we shall not meet the cost of removal or shipping or return of the component or any other cost charges or damages incurred by the purchaser.

If the appliance manufactured by Gledhill incorporates a factory fitted scale inhibitor then during the period of three years from the date of delivery Gledhill will replace, free of charge, any plate heat exchanger fitted in the appliance as original equipment in which scale formation occurs that materially reduces the effectiveness of the plate heat exchanger. This guarantee does not extend to any other component installed within the Gledhill appliance or elsewhere in the Purchaser's domestic water system.

(g) General

In the case of goods manufactured solely in accordance with our specification and designs and in respect of any installation work carried out by or on our behalf, our entire liability and the purchaser's sole remedies (subject to (a) - (f) above) and shall be as follows:

- (a) we accept liability for death or personal injury to the extent that it results from our negligence that of our employees agents or subcontractors.
- (b) subject to paragraph (d) below, we accept liability for direct physical damage to tangible property to the extent that such damage is caused by our negligence that of our employees agents or subcontractors.
- (c) our total liability to the purchaser over and above any liability to replace under (1 - 4) above (whether in contract or in tort including negligence) in respect of any one cause of loss or damage claimed to result from any breach of our obligations hereunder, shall be limited to actual money damages which shall not exceed £20,000 provided that such monetary limit shall not apply to any liability on the part of ourselves referred to in paragraph (a) above.
- (d) except as provided in paragraph (a) above but otherwise notwithstanding any provision herein contained in no event shall we be liable for the following loss or damage howsoever caused and even if foreseeable by us or in our contemplation :-
 - (i) economic loss which shall include loss of profits, business revenue, goodwill or anticipated savings.
 - (ii) damages in respect of special indirect or consequential loss or damage (other than death, personal injury and damage to tangible property).
 - (iii) any claim made against the purchaser by any other party (save as expressly provided in paragraph (b) above).
- (e) except in respect of our liability referred to in paragraph (a) above no claim may be made or action brought (whether in contract or in tort including negligence) by the purchaser in respect of any goods supplied by us more than one year after the date of the invoice for the relevant goods.
- (f) nothing in these Conditions shall confer on the purchaser any rights or remedies to which the purchaser would not otherwise be legally entitled.

10. LOSS OR INJURY

Notwithstanding any other provision contained herein the Purchaser's hereby agree to fully indemnify us against any damages losses costs claims or expenses incurred by us in respect of any claim brought against us by any third party for :-

- (a) any loss injury or damage wholly or partly caused by any goods supplied by us or their use.
- (b) any loss injury or damage wholly or partly caused by the defective installation or sub-standard workmanship or materials used in the installation of any goods supplied by us.
- (c) any loss injury or damage in any way connected with the performance of this contract.

PROVIDED that this paragraph (6) will not require the Purchaser to indemnify us against any liability for our own acts of negligence or those of our employees agents or sub-contractors.

FURTHER in the case of goods supplied by us which are re-sold to and installed by a third party by the Purchaser it will be the sole responsibility of the Purchaser to test the goods immediately after their installation to ensure that inter alia they are correctly installed and are in proper working order, and are not likely to cause any loss injury or damage to any person or property.

11. VARIATION OF WARRANTY AND EXCLUSION

Should our warranty and exclusion be unacceptable we are prepared to negotiate for variation in their terms but only on the basis of an increase in the price to allow for any additional liability or risk which may result from the variation.

Purchasers are advised to insure against any risk or liability which they may incur and which is not covered by our warranty.

12. RISK AND RETENTION OF TITLE

(a) goods supplied by us shall be at the Purchaser's risk immediately upon delivery to the Purchaser or into custody on the Purchaser's behalf or to the Purchaser's Order. The Purchaser shall effect adequate insurance of the goods against all risks to the full invoice value of the goods, such insurance to be effective from the time of delivery until property in the goods shall pass to the Purchaser as hereinafter provided.

(b) property in the goods supplied hereunder will pass to the Purchaser when full payment has been made by the Purchaser to us for :-

- (i) the goods of the subject of this contract.
- (ii) all other goods the subject of to any other contract between the Purchaser and us which, at the time of payment of the full price of the goods sold under this contract, have been delivered to the Purchaser but not paid for in full.
- (c) until property in the goods supplied hereunder passes to the Purchaser in accordance with paragraph (2) above.
- (i) the Purchaser shall hold the goods in a fiduciary capacity for us and shall store the same separately from any other goods in the Purchaser's possession and in a manner which enables them to be identified as our goods.
- (ii) the Purchaser shall immediately return the goods to us should our authorised representative so request. All the necessary incidents associated with a fiduciary relationship shall apply.
- (d) the Purchaser's right to possess the goods shall cease forthwith upon the happening of any of the following events, namely :-

- (i) if the Purchaser fails to make payment in full for the goods within the time stipulated in clause 4 hereof.
- (ii) if the Purchaser, not being a company, commits any act of bankruptcy, makes a proposal to his or her creditors for a compromise or does anything which would entitle a petition for a Bankruptcy Order to be presented.
- (iii) if the Purchaser, being a company, does anything or fails to do anything which would entitle an administrator or an administrative receiver or a receiver to take possession of any assets or which would entitle any person to present a petition for winding up or to apply for an administration order.

(e) the Purchaser hereby grants to us an irrevocable licence to enter at any time any vehicle or premises owned or occupied by the Purchaser or in the possession of the Purchaser for the purposes of repossessing and recovering any such goods the property in which has remained in us under paragraph (2) above. We shall not be responsible for and the Purchaser will indemnify us against liability in respect of damage caused to any vehicle or premises in such repossession and removal being damaged which it was not reasonably practicable to avoid.

(f) notwithstanding paragraph (3) hereof and subject to paragraph (7) hereof, the Purchaser shall be permitted to sell the goods to third parties in the normal course of business. In this respect the Purchaser shall act in the capacity of our commission agent and the proceeds of such sale :-

- (i) shall be held in trust for us in a manner which enables such proceeds to be identified as such, and ;
- (ii) shall not be mixed with other monies nor paid into an overdrawn bank account.

We, as principal, shall remunerate the Purchaser as commission agent a commission depending upon the surplus which the Purchaser can obtain over and above the sum, stipulated in this contract of supply which will satisfy us.

(g) in the event that the Purchaser shall sell any of the goods pursuant to clause (6) hereof, the Purchaser shall forthwith inform us in writing of such sale and of the identity and address of the third party to whom the goods have been sold.

(h) if, before property in the goods passes to the Purchaser under paragraph (2) above the goods are or become affixed to any land or building owned by the Purchaser it is hereby agreed and declared that such affixation shall not have the effect of passing property in the goods to the Purchaser. Furthermore if, before property in the goods shall pass to the Purchaser under paragraph (2) hereof, the goods are or become affixed to any land or building (whether or not owned by the Purchaser), the Purchaser shall:-

- (i) ensure that the goods are capable of being removed without material injury to such land or building.
- (ii) take all necessary steps to prevent title to the goods from passing to the landlord of such land or building.
- (iii) forthwith inform us in writing of such affixation and of the address of the land or building concerned.

The Purchaser warrants to repair and make good any damage caused by the affixation of the goods to or their removal from any land or building and to indemnify us against all loss damage or liability we may incur or sustain as a result of affixation or removal.

(i) in the event that, before property in the goods has passed to the Purchaser under paragraph (2) hereof, the goods or any of them are lost, stolen, damaged or destroyed :-

(i) the Purchaser shall forthwith inform us in writing of the fact and circumstances of such loss, theft, damage or destruction.

(ii) the Purchaser shall assign to us the benefit of any insurance claim in respect of the goods so lost, stolen, damaged or destroyed.

13. NON-PAYMENT

If the Purchaser shall fail to make full payment for the goods supplied hereunder within the time stipulated in clause 4 hereof or be in default of payment for any other reason then, without prejudice to any of our other rights hereunder, we shall be entitled to stop all deliveries of goods and materials to the Purchaser, including deliveries or further deliveries of goods under this contract. In addition we shall be entitled to terminate all outstanding orders.

14. RISK

All goods sold by us shall be at the sole risk of the Purchaser from the date of despatch by us of the invoice for their price

15. VALUE ADDED TAX

All prices quoted are exclusive of Value Added Tax which will be charged at the rate ruling at the date of despatch of invoice.

16. TRADE SALES ONLY

We are only prepared to deal with those who are not consumers within the terms of the Unfair Contract Terms Act 1977, the Sale of Goods Act 1979 and the Supply of Goods and Services Act 1982. Accordingly any person who purchases from us shall be deemed to have represented that he is not a consumer by so purchasing.

17. JURISDICTION

The agreement is subject to English/Scottish law and any dispute arising hereunder shall be settled in accordance therewith dependent upon the location.

