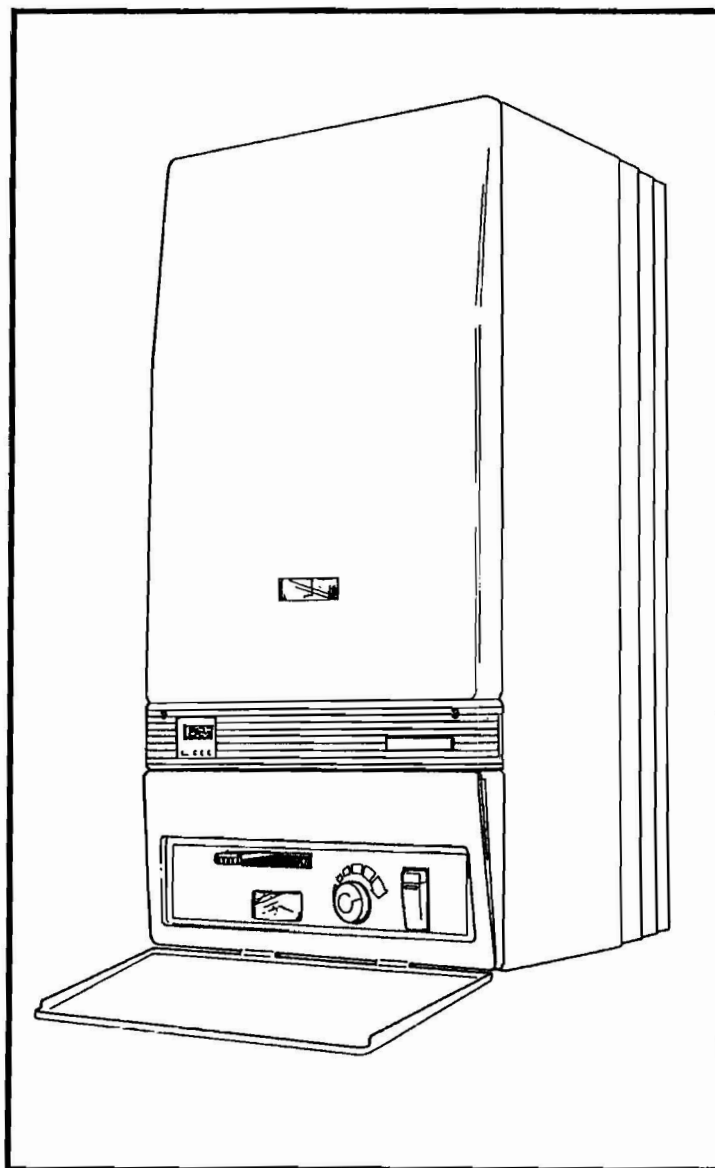




**Saunier Duval**

**Installation and Servicing Instructions  
SD623 Combination Boiler**



**Model SD623**

**G.C. No. 47 920 01**

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# INSTALLATION AND SERVICING INSTRUCTIONS

These installation instructions are the property of the user and must be left with the boiler when installation is completed.

## 1 INTRODUCTION

The Saunier Duval SD623 is a combination boiler providing both central heating and domestic hot water. It is Tested and Certificated by British Gas plc for use on Natural Gas only. It is designed for use as part of a sealed central heating system with pumped circulation. The necessary pump, expansion vessel and associated safety devices are all incorporated within the appliance.

The boiler has a fan-assisted balanced flue which both discharges the products of combustion to and draws the combustion air from, the outside air.

The boiler can be installed on either an external wall, or on an adjacent inside wall, that is, the flue system will pass directly to the rear, or to either side, to the terminal fitted on the outside wall face.

The SD623 combination boiler is available in three versions, one to operate on each of the following gases:

- Natural Gas
- Liquefied Petroleum Gas (LPG). either Butane or Propane
- Towns Gas or LPG/Air mixtures

## 2 PACKAGING

The boiler is supplied as THREE packages, as follows:

**2.1 A large cardboard carton**, which contains the boiler, complete with all casing panels fitted.

Also within this package is a small polythene bag containing the necessary sealing washers, filters and flow restrictor.

NB. This small bag can be found attached to the front panel of the boiler.

**2.2 A small cardboard carton**, which contains:

The complete wall fixing jig. The gas service cock.

The electrical connection box.

The domestic hot water expansion vessel. Also within this carton are two polythene bags one of which contains the connecting pipe and sealing washers for the domestic expansion vessel and the other the water pipe connection elbows and sealing washers.

**2.3 A long cardboard carton**, which contains the boiler flue kit (refer to 6.6 for details).

Please check that you have **all** the above items **before** starting the installation of the boiler.

### 3 CONSTRUCTION

#### 3.1 Boiler

- 1 'ON' push-button
- 2 'OFF' push-button
- 3 Boiler thermostat - to regulate central heating water temperature
- 4 Temperature gauge
- 5 Pressure gauge
- 6 Selector lever
- 7 Water pressure switch
- 8 Pump
- 9 Pump automatic air vent cap
- 10 Overheat cutout device
- 11 Automatic air vent
- 12 Burner
- 13 Combustion chamber
- 14 Hot water thermistor
- 15 High limit (overheat) thermistor
- 16 Heat exchanger
- 17 Fan resistor
- 18 Air pressure switch
- 19 Fan
- 20 Heat exchanger air vent
- 21 Expansion vessel
- 22 Pilot
- 23 Burner gas pressure test point
- 24 Gas valve assembly
- 25 Spark generator
- 26 Pump resistor
- 27 Potentiometer
- 28 Printed circuit board (housed inside lower front panel)
- 29 Microswitch assembly
- 30 Expansion vessel connection
- 31 Digital timeswitch display
- 32 Combustion gas testpoint

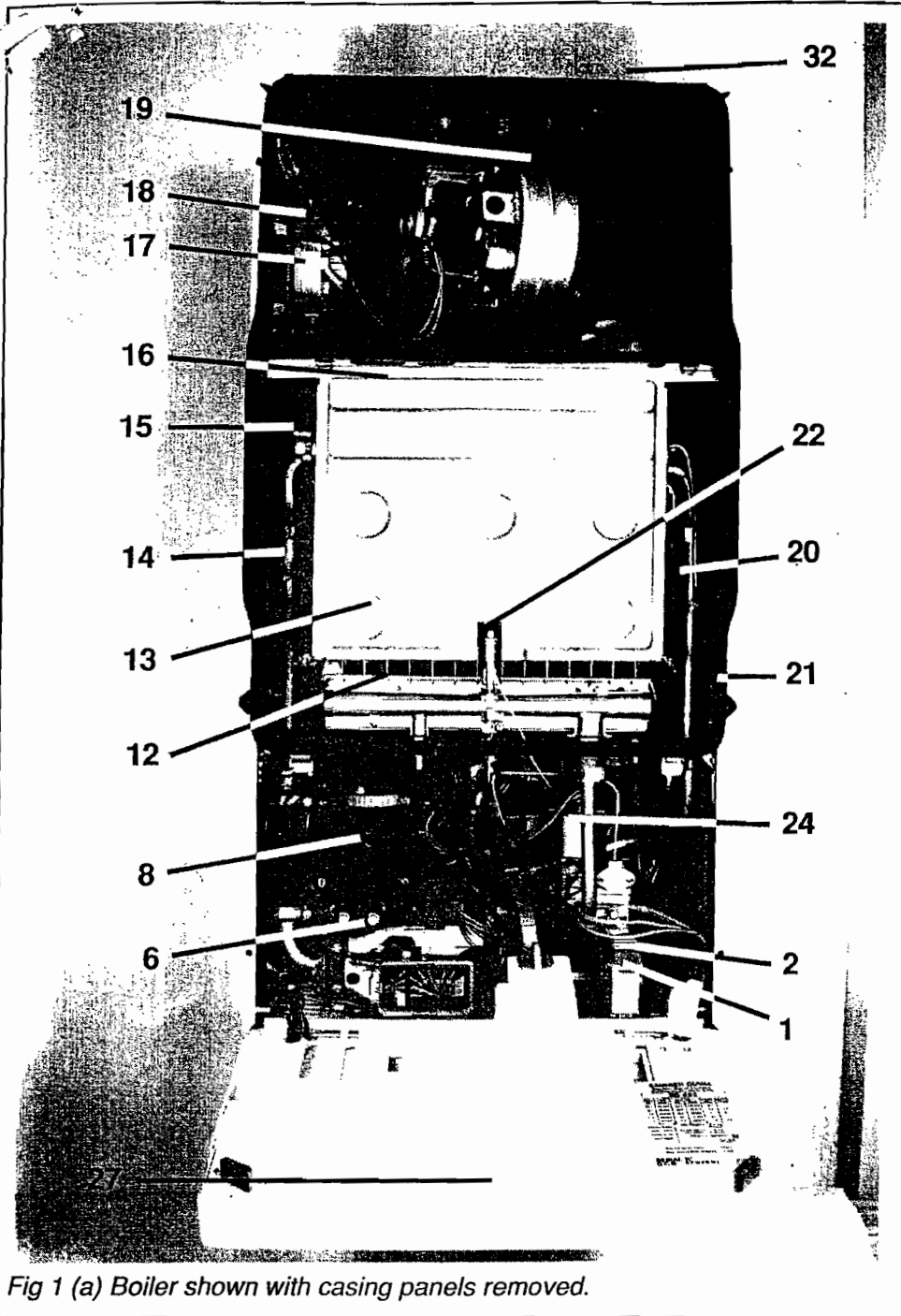


Fig 1 (a) Boiler shown with casing panels removed.

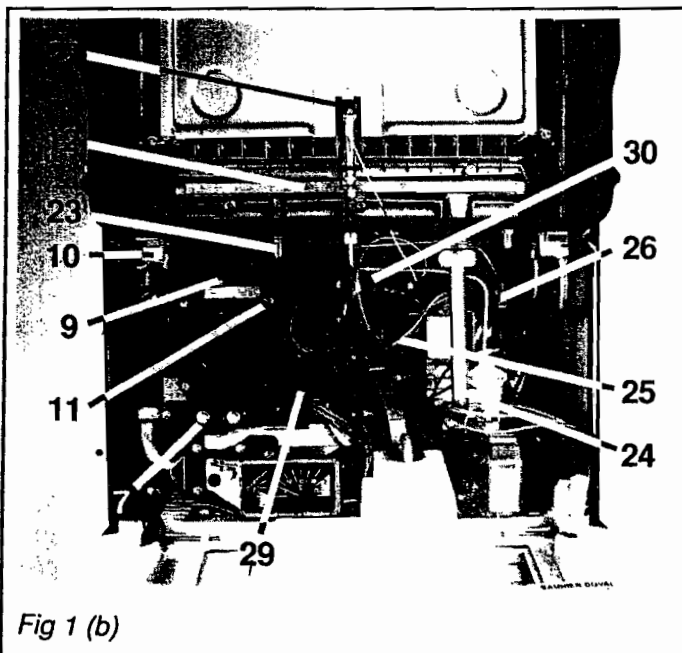


Fig 1 (b)

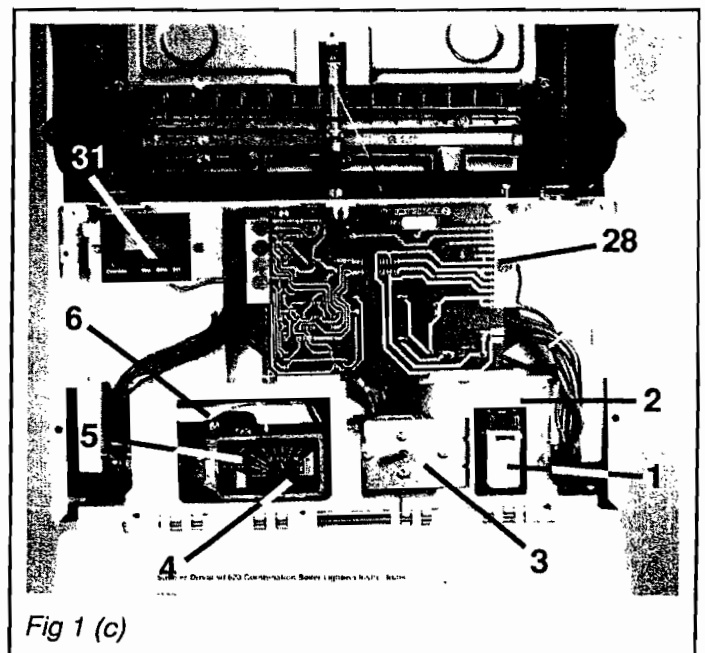


Fig 1 (c)

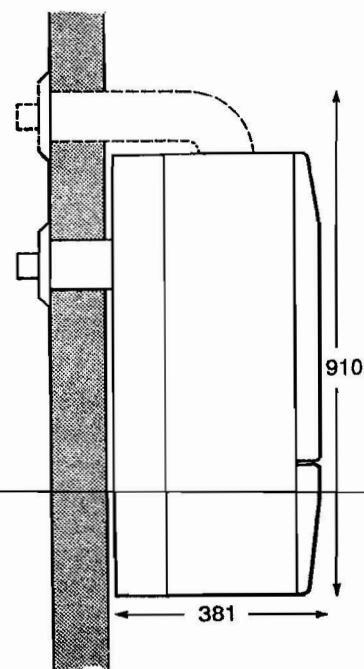
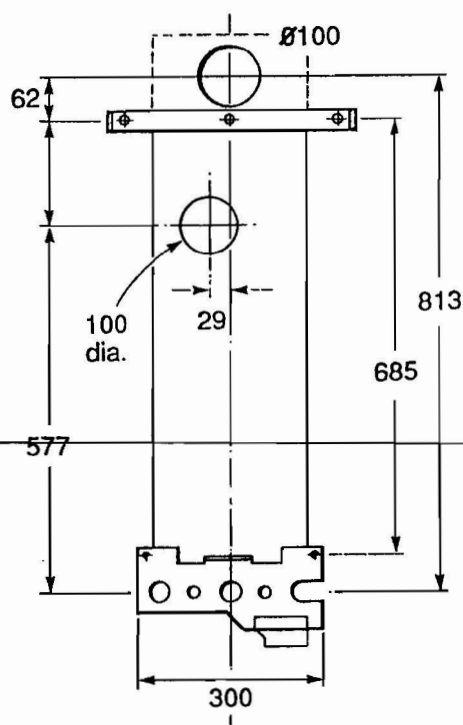
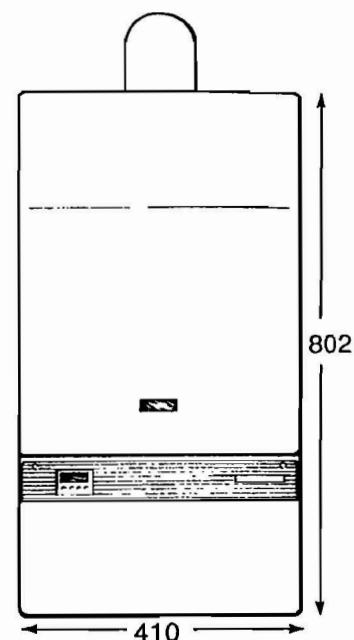
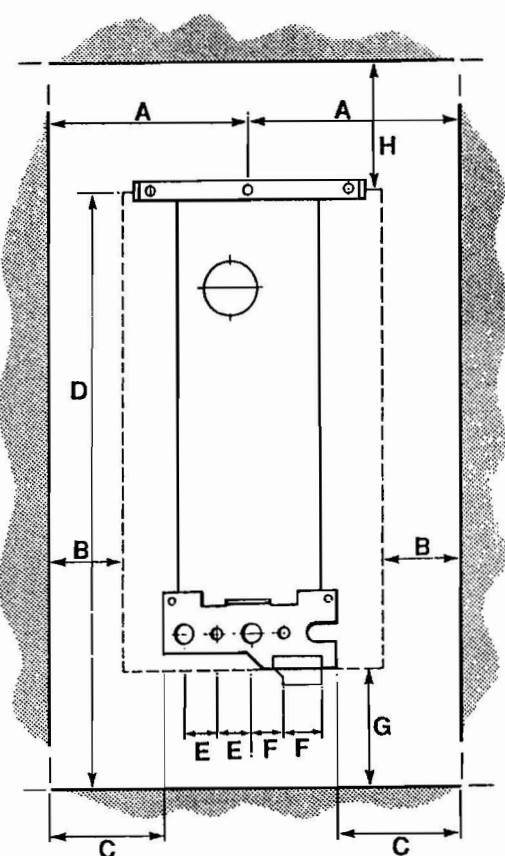
### 3.2 Wall fixing jig (supplied in three pieces)



- 1 Hook
- 2 Template
- 3 Connecting plate
- 4 Electrical connection box
- 5 Domestic hot water expansion vessel

## 4 TECHNICAL DATA

### 4.1 Dimensions



(All dimensions in millimetres)

Appliance weight: Empty 43kg(95lb)  
Full 48kg(106lb)  
Water content: Heating 0.9Litre(0.2gal)  
Hot water 0.5Litre(0.1gal)

### Dimensions and clearances

- A 255mm (10.0in) minimum
- B 50mm (2.0in) minimum
- C 105mm (4.2in) minimum
- D 1114mm (44.0in) minimum
- E 55mm (2.2in)
- F 57.5mm (2.3in)
- G 300mm (12.0in) minimum
- H 150 (6.0in) minimum - top outlet  
300 (12.0in) minimum - back outlet

## 4.2 Gas pressure/injector sizes

4.2.1 General Data (Table I)

|                                        | Nat.                      | Gas Propane               | Butane                    |
|----------------------------------------|---------------------------|---------------------------|---------------------------|
| Heat output maximum                    | 23.3kW<br>(80,000Btu/h)   | 23.3kW<br>(80,000Btu/h)   | 23.3kW<br>(80,000Btu/h)   |
| minimum                                | 8.7kW<br>(30,000Btu/h)    | 8.7kW<br>(30,000Btu/h)    | 8.7kW<br>(30,000Btu/h)    |
| Heat input maximum                     | 29.0kW<br>(100,000 Btu/h) | 29.0kW<br>(100,000 Btu/h) | 29.0kW<br>(100,000 Btu/h) |
| Gas rate maximum<br>(after 10 minutes) | 2.71m³/h<br>(96ft³/h)     | 1.05m³/h<br>(37ft³/h)     | 0.79m³/h<br>(28ft³/h)     |
| Inlet pressure                         | 20mbar<br>(8.0in wg)      | 37mbar<br>(14.9in wg)     | 28mbar<br>(11.3in wg)     |
| Burner pressure-<br>maximum            | 13mbar<br>(5.2 in wg)     | 34mbar<br>(13.4 in wg)    | 26mbar<br>(20.2 in wg)    |
| Burner injectors                       | 1.15mm                    | 0.74mm                    | 0.74mm                    |
| Pilot injectors                        | 0.28mm                    | 0.18mm                    | 0.18mm                    |

Burner pressure (Table II)

| Burner pressure |       |        |        |        |        |         |
|-----------------|-------|--------|--------|--------|--------|---------|
| Heat output     | kW    | 8.7    | 11.6   | 15.6   | 19.7   | 23.3    |
|                 | Btu/h | 30,000 | 39,000 | 53,000 | 67,000 | 80,000  |
| Heat input      | kW    | 11.3   | 15.0   | 20.0   | 25.0   | 29.0    |
|                 | Btu/h | 39,000 | 51,000 | 68,000 | 85,000 | 100,000 |
| Natural gas     | mbar  | 1.6    | 3.0    | 6.0    | 10.5   | 13.0    |
|                 | in wg | 0.6    | 1.2    | 2.4    | 4.2    | 5.2     |
| Propane         | mbar  | 4.2    | 7.8    | 14.7   | 23.5   | 34.0    |
|                 | in wg | 1.7    | 3.1    | 5.9    | 9.3    | 13.4    |
| Butane          | mbar  | 2.9    | 5.6    | 10.8   | 17.7   | 26.0    |
|                 | in wg | 1.2    | 2.2    | 4.3    | 7.0    | 10.2    |

The gas valve fitted in this boiler has been adjusted at the factory to give the correct burner pressure when the gas supply is at the above inlet pressure and requires no further adjustment. However, the heating output of the appliance may be de-rated (refer to 7.6) without affecting the hot water performance.

## 4.3 Central Heating

4.3.1 The boiler is range rated from 11.3kW (39,000Btu/h) to 29kW (100,000Btu/h) heat input (8.7kW (30,000Btu/h) to 23.3kW (80,000Btu/h) heat output and may be adjusted by the installer to suit the requirements of individual systems.

Table 2 gives approximate burner gas pressure settings and corresponding heat inputs and outputs (refer to Section 7.6 for details of adjustment method).

4.3.2 The boiler is supplied with the central heating input set to maximum.

4.3.3 Heating water flow temperature is adjustable by the user from 30°C to about 90°C.

4.3.4 Recommended maximum temperature rise across the boiler is 20°C.

## 4.4 Domestic Hot Water

4.4.1 Heat output is automatically controlled by a thermistor between 8.7kW (30,000Btu/h) to 23.3kW (80,000Btu/hr) and is not adjustable by the installer or user.

4.4.2 The nominal hot water flow rate is as follows (based on a cold water temperature of 12°C)

| Temp rise   | Flow rate            |
|-------------|----------------------|
| 30°C (54°F) | 11.0L/min (2.4g/min) |
| 35°C (63°F) | 9.5L/min (2.1g/min)  |
| 40°C (72°F) | 8.4L/min (1.9g/min)  |
| 45°C (81°F) | 7.3L/min (1.6g/min)  |

4.4.3 Minimum water flow rate (threshold rate): 3L/min (0.7g/min).

4.4.4 Water pressure Maximum: 10bar (145psi) Minimum: 1bar (14.5psi) Minimum for shower installations: 2bar (29psi)

For further information contact shower valve manufacturer.

## 4.5 Electrical Supply

Supply voltage: 240v ~ 50Hz fused 3A. Absorbed power: 150W.

Internal fuse rating: T80mA (on printed circuit board).

## 4.6 Thermocouple

Minimum current (measured across overheat device connection terminals): 120milliamps.

## 4.7 Timeswitch

Type: Smiths Industries type EMU24 - 24 hour timeswitch.

Programmes: Four 'ON' and four 'OFF'. Minimum setting one minute.

Display: Time - 8mm LCD characters heating 'ON', 'INT' (interrupt), and override indication.

Battery Reserve: 7 weeks.

## 5 BOILER OPERATION

### 5.1 Operating sequences

#### 5.1.1 Ignition

(a) Depressing 'ON' (ignition) push-button:

- opens gas inlet valve, allowing gas to pilot;
- switches fan on;

- supplies power to spark generator.

(b) After a short period - about 10 seconds - sparking occurs at pilot.

(c) After pilot is lit and thermocouple is heated, push-button can be released: - thermocouple device keeps gas inlet valve open; - fan continues to run at slow speed (to ventilate pilot).

(d) Depressing 'OFF' push-button disengages the push-button box mechanism:

- shutting off gas supply to boiler at inlet valve; pilot is extinguished;

- breaking electrical supply to boiler; fan stops.

(e) The setting of the selector lever dictates the operation of the boiler.

#### 5.1.2 Heating/hot water - selector lever in RIGHT HAND position

(a) HEATING - boiler controlled by boiler thermostat. The water temperature is set using the boiler thermostat control knob on the front of the boiler. The boiler thermostat controls the gas valve - switching it to give either full output, low output, or none - to meet the heat demand on the boiler.

WHEN THE HEATING DEMAND OF SYSTEM IS HIGH:

- burner operates at full output (maximum rated output or adjusted output);

- pump runs at normal speed;

- fan runs at normal speed.

WHEN HEATING DEMAND OF SYSTEM IS LOWER:

- burner operates at low output;

- pump runs at normal speed;

- fan runs at normal speed.

WHEN HEATING DEMAND IS MET:

- burner shuts off;

- pump runs at normal speed;

- fan runs at slow speed.

Whilst the boiler is operating in response to the demand of the room thermostat (and/or timeswitch), the boiler thermostat controls the gas valve, pump and fan as described above in (a).

## Remarks

An ignition circuit on the printed circuit board momentarily restricts the current to the gas valve coil on starting, allowing the fan to reach normal speed before burner ignition and preventing noisy ignition of the burner. A high limit thermistor - located in the left hand side of the heat exchanger - limits the heating water temperature to about 90-95°C.

In the event of the heating system pressure falling below 0.5bar a water pressure switch will prevent operation of the pump and burner.

### c) DOMESTIC HOT WATER

The domestic hot water heating coils are located inside the central heating heat exchanger. When hot water is drawn off at a rate greater than the threshold flow (3Litres/min) the water valve diaphragm is operated: - closing the reversing valve, isolating the boiler from heating circuit, dedicating all boiler heat output to domestic hot water;

- actuating the left and centre microswitches, bringing the boiler under control of the domestic hot water thermistor;
- pump runs at normal speed;
- fan runs at normal speed;
- burner operates, output controlled by domestic hot water thermistor.

The water temperature, detected by the thermistor, varies the current supplied to the coil of the gas valve, modulating the burner output such that the maximum temperature in the primary circuit of the boiler does not exceed  $65^{\circ}\text{C} \pm 2^{\circ}\text{C}$ . The required water temperature at the tap is obtained by varying the water flow rate.

**HOT WATER/HEATING position,**  
domestic hot water has **PRIORITY** over  
heating.

### 5.1.3 Hot water only - selector lever in LEFT HAND position

Setting the selector lever to the HOT WATER position:

- closes the reversing valve, isolating the boiler from the central heating circuit, dedicating all boiler heat output to domestic hot water
- pump is stopped;
- fan runs at slow speed.

When hot water is drawn off at a rate greater than the threshold (3Litres/min) the water valve diaphragm is operated:

- actuating the three microswitches,
- bringing the boiler under the control of the domestic hot water thermistor;
- pump runs at normal speed; - fan runs at normal speed;
- burner operates, output controlled by domestic hot water thermistor.

## 5.2 Boiler schematic

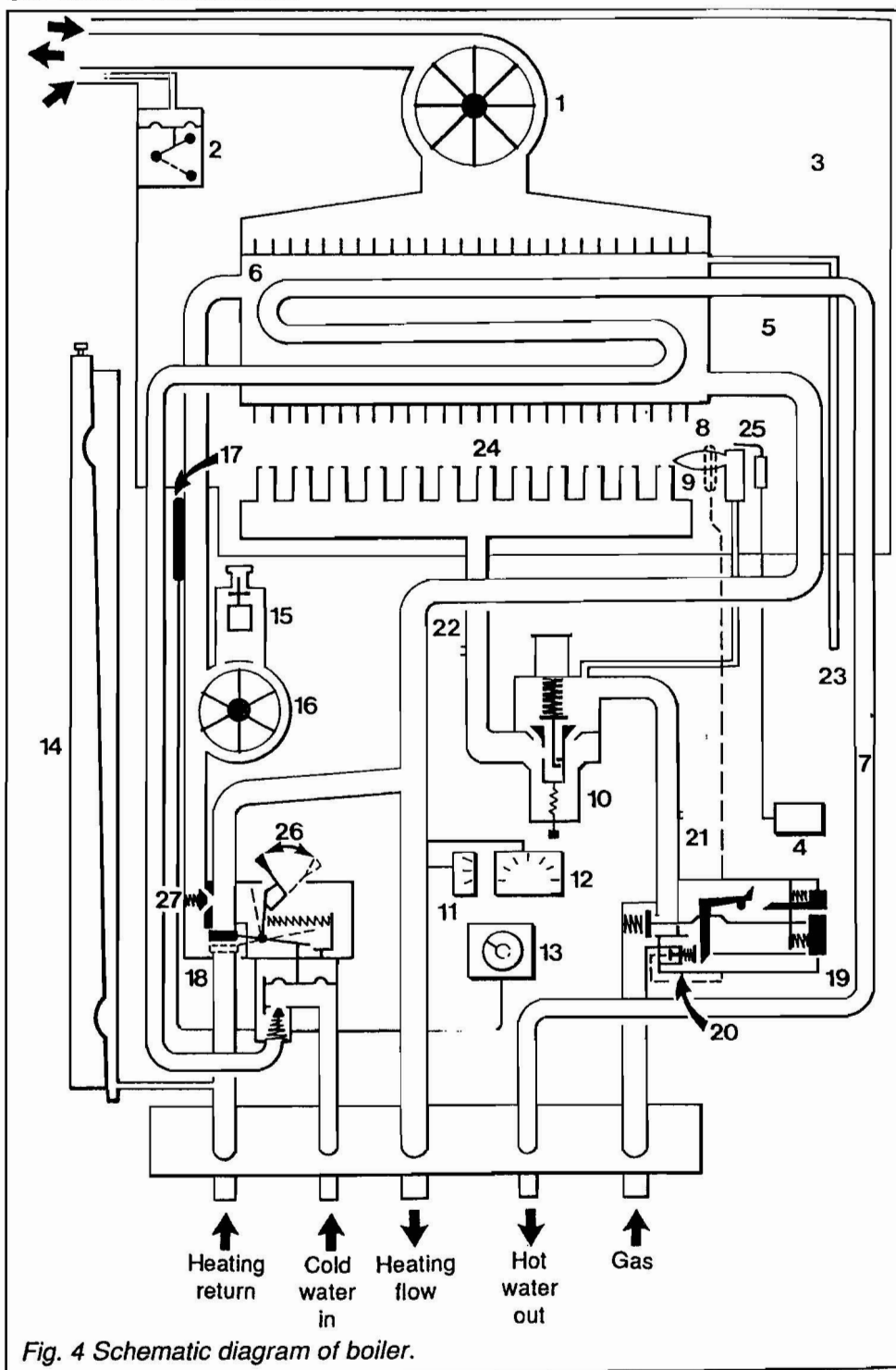


**Fig. 4 Schematic diagram of boiler.**

- |                       |                       |                               |
|-----------------------|-----------------------|-------------------------------|
| 1 Fanned flue         | 10 Gas valve          | 19 Push-button 'On-Off' box   |
| 2 Airflow switch      | 11 Pressure gauge     | 20 Thermocouple solenoid      |
| 3 Room sealed chamber | 12 Temperature gauge  | 21 Inlet pressure test point  |
| 4 Spark generator     | 13 Boiler thermostat  | 22 Burner pressure test point |
| 5 Heat exchanger      | 14 Expansion vessel   | 23 Heat exchanger air vent    |
| 6 Heating circuit     | 15 Automatic air vent | 24 Burner                     |
| 7 Hot water circuit   | 16 Pump               | 25 Ignition electrode         |
| 8 Pilot               | 17 Thermostat phial   | 26 Summer-winter lever        |
| 9 Thermocouple        | 18 Reversing valve    | 27 Pump bypass                |

## 5.3 Electrical Diagrams

### 5.3.1 Functional Flow Diagrams

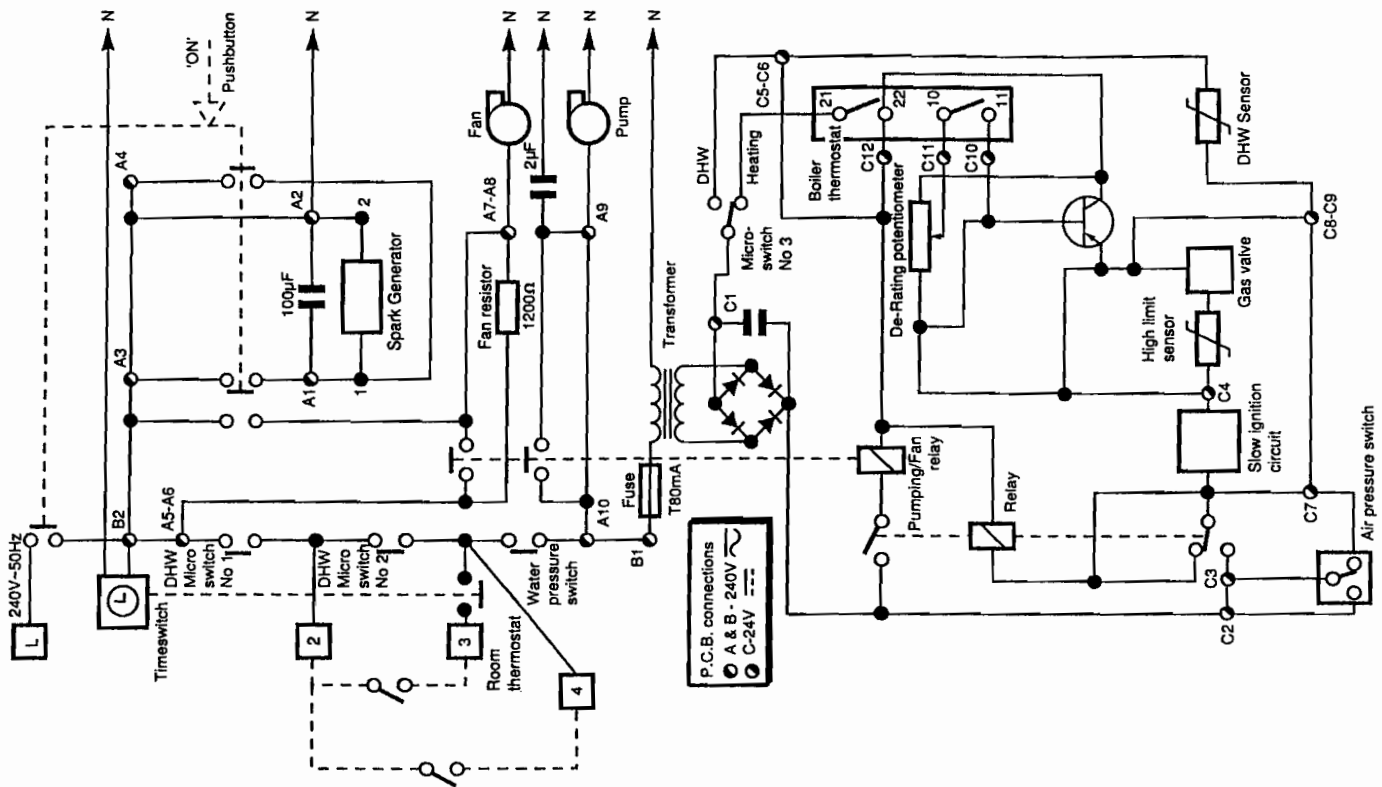


Fig. 5

### 5.3.2 Wiring Diagram

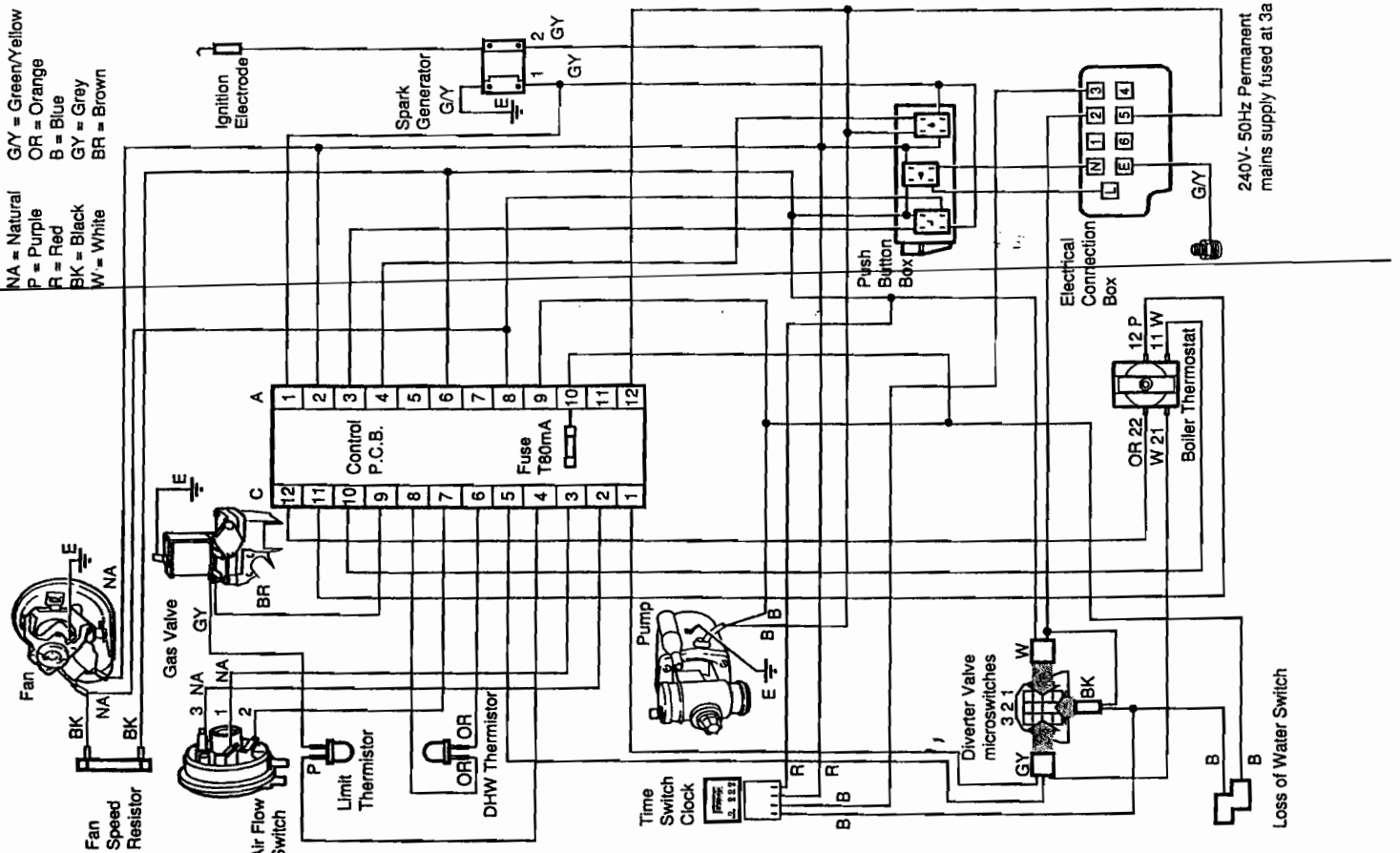


Fig. 6

## 6 INSTALLATION

### 6.1 Statutory requirements

**6.1.1 Important.** The installation of this boiler must be carried out by a competent person and must be in accordance with the relevant requirements of the current issue of The Gas Safety (Installation and Use) Regulations, relevant Building Regulations including Building Standards (Scotland) Regulations, current I.E.E. Wiring Regulations and the Bye-laws of the local water company.

**6.1.2** Installation should be in accordance with any relevant requirements of the local authority. It is in your interest and that of safety, to ensure that the law is complied with.

**6.1.3** Detailed recommendations are contained in the current issue of the following British Standard codes of practice, which must be referred to: BS4814: BS5440 Part 1 and 2: BS5449: Part 1: BS5482: BS5546: BS6700: BS6798: BS6891: BS7074 Part 1 and 2:

### 6.2 Boiler Location

**6.2.1** The boiler is not suitable for external installation.

**6.2.2** The boiler must be located such that the flue can be satisfactorily positioned with respect to external building feature, refer to 6.6.

**6.2.3** As it is a room-sealed appliance, the SD623 combination boiler can be installed in any room. However, reference must be made to the I.E.E. Regulations and in Scotland, the electrical provisions of the Building Standards (Scotland) Regulations, with regard to the installation of the boiler in a room containing a bath or shower. Where a room sealed appliance is installed in a room containing a bath or shower, any electrical switch or appliance control, utilising mains electricity, should be so situated that it cannot be touched by a person using the bath or shower.

**6.2.4** The SD623 combination boiler is a wall-mounted appliance. An area of vertical flat wall of sufficient size to accommodate the boiler and take its total weight is required.

**6.2.5** The boiler should be fitted on a fire resistant wall. If the wall is of combustible material, the wall must be protected by a sheet of fireproof material.

**6.2.6** Do not fit the boiler above a cooker. The grease present in the atmosphere over the cooker may result in poor performance or malfunction of the boiler.

**6.2.7** A compartment used to enclose the boiler must be designed and constructed specifically for this purpose.

An existing cupboard or compartment modified for the purpose may be used, refer to the current issue of BS6798 for guidance.

The doorway opening should be of sufficient size to allow easy removal of the boiler.

**6.2.8** Where the boiler is installed in a more unusual location, detailed guidance on any special procedures which may be required is given in the current issue of BS5546 and BS6798.

**6.2.9** If the appliance is to be installed in a timber frame building it should be fitted in accordance with the British Gas Publication 'Guide For Gas Installation in Timber Framed Housing' reference DM 2. If in doubt, advice must be sought from the local Gas undertaking.

### 6.3 Clearances

**6.3.1** The location of the boiler must be such that adequate space for servicing and air circulation exists around the appliance. Refer to Fig. 3.

**6.3.2** A minimum clearance of 600mm (24in) must be available in front of the boiler to enable servicing of the appliance.

**6.3.3** If the boiler is to be installed in a cupboard a minimum distance of 100mm (4in) is required between the front of the boiler and the inside face of the door.

### 6.4 Gas supply

**6.4.1** The supply from the gas meter must be of adequate size to provide a steady inlet working pressure of 20mbar (8in wg) at the boiler.

**6.4.2** The gas installation must be in accordance with the current issue of BS6891. On completion, test the gas installation and purge in accordance with the above standard.

**6.4.3** If it is an existing LPG supply installation, ensure that it is capable of providing an additional quantity of gas as given below.

| <b>Propane gas<br/>(at 37 mbar)</b>               | <b>Butane gas<br/>(at 27 mbar)</b>                |
|---------------------------------------------------|---------------------------------------------------|
| 1.05 m <sup>3</sup> /h<br>(37 ft <sup>3</sup> /h) | 0.79 m <sup>3</sup> /h<br>(28 ft <sup>3</sup> /h) |

### 6.5 Electrical

**Important. SAFETY:** Always isolate the appliance from the electrical supply before removing the boiler and connection box covers.

**6.5.1** All electrical wiring must be carried out by a competent person. All external components shall be of the approved type and shall be connected in accordance with the current I.E.E. Wiring Regulations and any local regulations which apply.

**6.5.2** The boiler must be earthed and connection of the appliance and any system controls to the mains supply must facilitate complete isolation, preferably by use of an unswitched shuttered socket outlet and a 3A fused three-pin plug -

both complying with the current issue of BS1363. Alternatively, a 3A fused double-pole isolating switch may be used, having a minimum double-pole contact separation of 3mm, serving only the boiler and system controls.

**6.5.3** The boiler is connected to the 240V ~ 50Hz supply using the connection box mounted on the wall fixing jig.

For electrical wiring instructions refer to 6.11.10.

**6.5.4** The 240V ~ 50Hz electrical supply must be maintained at all times in order that the boiler can produce domestic hot water when required. Do not interrupt the mains supply to the appliance with a time switch or programmer.

**6.5.5** In the interests of energy conservation, the central heating function of the SD623 combination boiler can be controlled using a room thermostat with an accelerating shunt resistance. For connection details refer to 6.11.11.

**6.5.6** As it is not possible to 'programme' instantaneous domestic hot water, the use of a programmer with a combination boiler is not essential.

### 6.6 Flue System

**6.6.1** Construction - the flue system basically consists of two pipes:

- a PVC outer pipe; - an aluminium inner pipe.

These are positively locked together on assembly.

The inner pipe conveys the products of combustion, forced out of the boiler by the fan, whilst fresh air is drawn in through the circular gap between the two pipes.

**6.6.2** The flue kit supplied with the boiler is nominally 750mm long - that is, the length of the aluminium tube is 750mm and comprises:

- A PVC pipe - 100mm diameter
- B Aluminium pipe
- C Rubber sealing collar
- D Plastic flange
- E Rubber connecting sleeve
- F Flue elbow
- G Fixing screws (not shown)
- H Straight flue connector

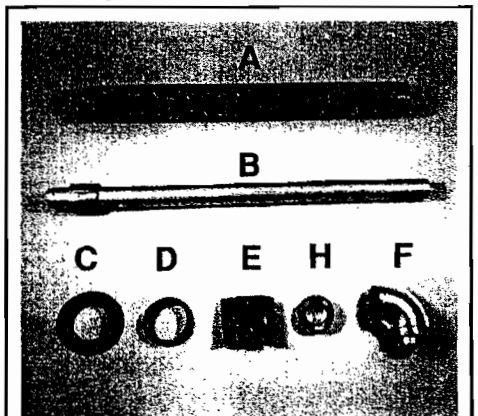


Fig. 7 Flue kit

**6.6.3** The maximum permissible length of straight flue which can be used with the D623 is 2900mm (straight flue or when elbow is used).

Flue extension kits of 750mm nominal length are available if required (Ref. No. 52695).

To determine the number of extension kits required for any particular installation refer to Table 6.

**6.6.4** The flue extension kit comprises:

- A** PVC pipe - 100mm diameter
  - B** PVC connector
  - C** Aluminium pipe - 55mm diameter - with connector fitted
  - D** Triangular pipe support
  - E** Two fixing screws
- Refer to Fig. 8.

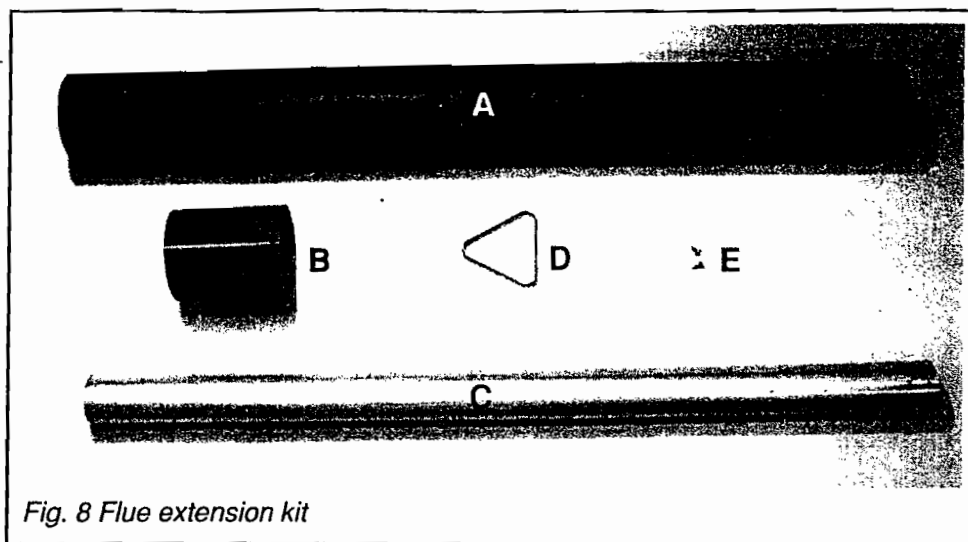


Fig. 8 Flue extension kit

**6.6.5 Back outlet flue.** Using the back flue outlet of the boiler, the flue system can be connected in either one of two ways:

**Rear flue**

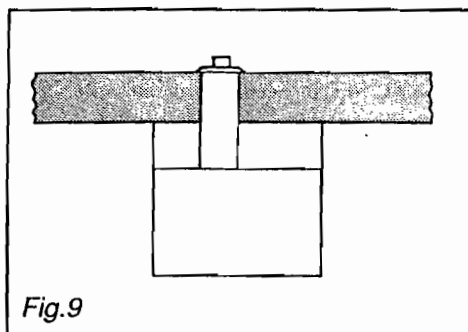


Fig. 9

**Side flue, to one side or the other, to suit the requirements of the installation.**

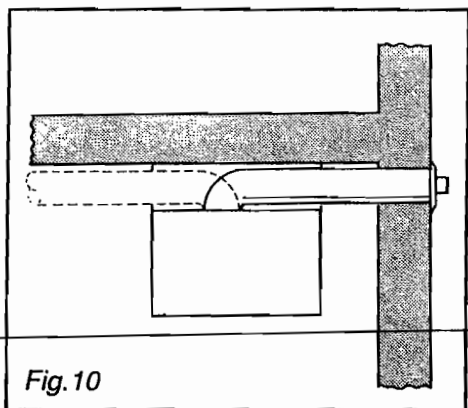


Fig. 10

**6.6.6 Top outlet flue.** Using the top flue outlet of the boiler, the flue system can be connected in either one of two ways.

**Rear Flue**

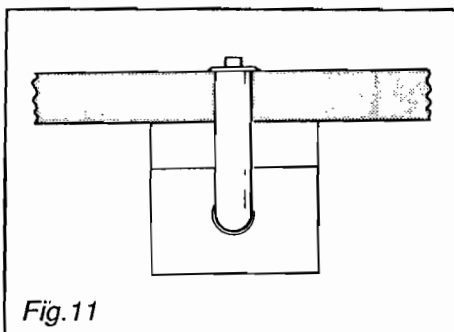


Fig. 11

**Side flue, to one side or the other to suit the requirements of the installation.**

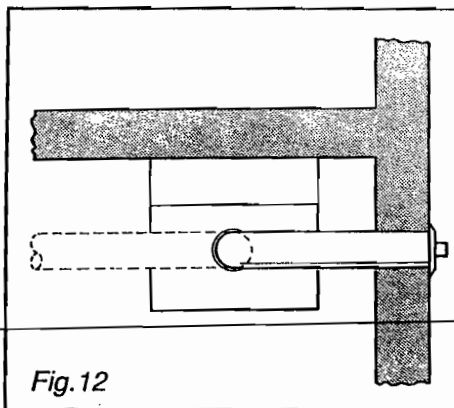


Fig. 12

**6.6.7 Flue Position.** The current issue of BS5440:Part 1 gives detailed recommendations for flueing, which must be complied with.

**6.6.8** The flue must be positioned such that the combustion products produced can disperse freely at all times - refer to Fig. 13

**6.6.9** Under certain weather conditions the flue may produce a plume of condensation (as the boiler is a high efficiency appliance), so any position where this could cause a nuisance should be avoided.

**6.6.10** If the terminal is fitted within 850mm of a plastic or painted gutter or 450mm of painted eaves, an aluminium shield of a minimum length 750mm should be fitted to the underside of the gutter or painted surface.

**6.6.11** A terminal guard is required if persons could come into contact with the terminal or the terminal could be subject to damage.

If a terminal guard is required, it must be positioned to provide a minimum of 50mm clearance from any part of the terminal and be central over the terminal. A suitable guard for this appliance is the Type C3 (GC. No 382 993) - made by Quinnell, Barrett and Quinnell - 884, Old Kent Road, London, SE15 1NL and available from Hepworth Heating (Ref. No. 52799).

**Terminal position for fan-assisted balanced flue boiler (minimum distance)**

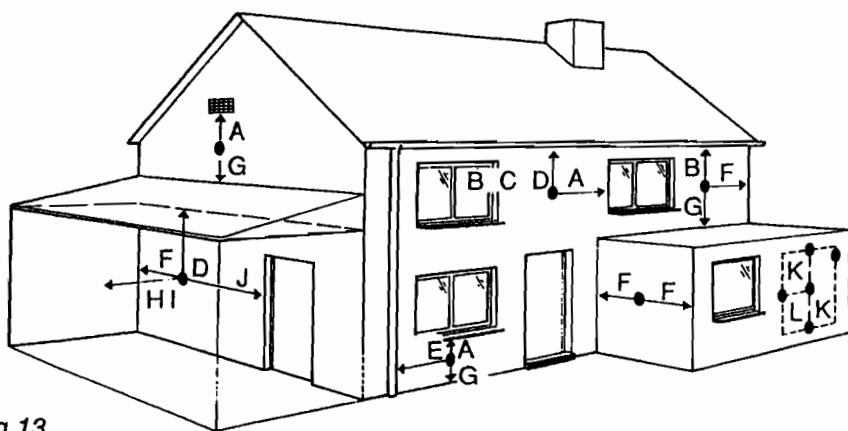


Fig. 13

- A** Directly below or beside an openable window or other opening (for example, an air brick) **300mm**
- B** Below gutters, soil pipes or drain pipes **75mm**
- C** Below eaves **200mm**
- D** Below balconies or car port roof **200mm**
- E** From vertical drain pipes and soil pipes **75mm**
- F** From internal or external corners **300mm**
- G** Above ground a balcony level **300mm**
- H** From a surface facing a terminal **600mm**
- I** From a terminal facing a terminal **1200mm**
- J** From an opening in the car port (for example, a door or window) into dwelling **1200mm**
- K** Vertically from a terminal on the same wall **1500mm**
- L** Horizontally from a terminal on the same wall

## 6.7 Air Supply

The current issue of BS5440: Part 2 gives detailed recommendations for the air supply required by the boiler which must be complied with. The following notes are for general guidance only.

**6.7.1** Being a room-sealed appliance, the SD623 combination boiler does not require the room, or internal space, in which it is installed to have a permanent air vent.

**6.7.2** When the boiler is to be installed in a cupboard, or compartment, permanent air vents are required at both high and low level for cooling purposes. These vents must either communicate with the room or internal space in which the cupboard is situated, or be direct to outside air.

The minimum effective areas for the permanent air vents required in the cupboard or compartment (in accordance with the current issue of BS5440: Part 2) are given in Table 3.

| Air vent position | Air from room or internal space              | Air direct from outside                      |
|-------------------|----------------------------------------------|----------------------------------------------|
| High level        | 270 cm <sup>2</sup><br>(42 in <sup>2</sup> ) | 135 cm <sup>2</sup><br>(21 in <sup>2</sup> ) |
| Low level         | 270 cm <sup>2</sup><br>(42 in <sup>2</sup> ) | 135 cm <sup>2</sup><br>(21 in <sup>2</sup> ) |

Table 3 Ventilation requirements

NB. Both air vents must communicate with the same room or internal space, or must be both on the same external wall to the outside air.

## 6.8 Central Heating Circulation System

**6.8.1** The SD623 combination boiler is designed for use as part of a sealed heating system and must not be used with an open vented heating system. It is suitable for use with small bore, microbore, and two-pipe central heating systems. Detailed recommendations for the water circulation system are given in the current issue of BS6798, BS5449 Part 1 and BS6700.

**6.8.2** Horizontal pipe runs should be avoided.

**6.8.3** Draining taps must be located in accessible positions which permit the

draining of the whole system, including the boiler and the hot water system.

Draining taps should comply with the current issue of BS2876.

**6.8.4** Pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated under floor spaces.

**6.8.5** Copper tubing to BS2871 Part 1 is recommended for the water carrying pipework.

For general guidance reference should be made to the British Gas publication Materials and Installation Specifications for Domestic Central Heating and Hot Water and also the current issue of BS6798 and BS5449: Part 1.

**6.8.6** The circulating pump is incorporated within the boiler.

The performance of this pump, running at maximum speed, varies according to the pump bypass setting, as shown on the graph below (refer to Fig.14).

No other circulating pump is required, or should be fitted.

**6.8.7** The pump bypass, incorporated in the diverter valve assembly, causes a partial recycling in the heating circuit within the boiler to control the pumping output from the boiler.

This is adjusted by turning the brass screw located under the reversing valve (refer to Fig.15). Turning the screw clockwise closes the bypass and turning anti-clockwise opens the bypass.

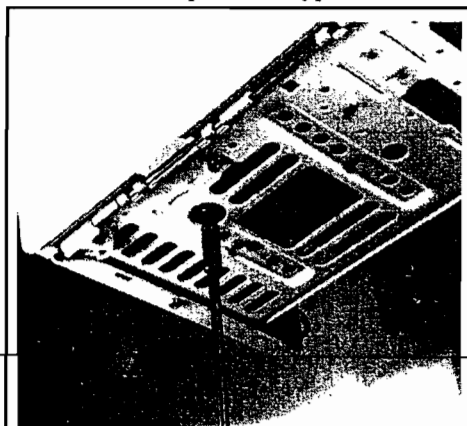


Fig.15

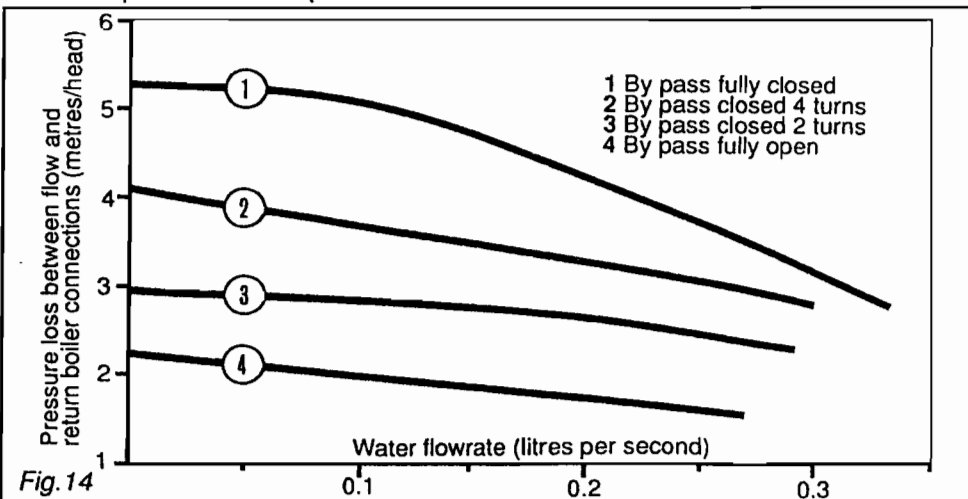


Fig.14

**6.8.8** When using thermostatic radiator valves (TRVs), or an arrangement of zone valves, a suitable system bypass must be fitted between the heating system flow and return pipes, to ensure circulation at all times. This must be designed to give the minimum flow rate - see Table 4. The system bypass must incorporate a suitable valve to regulate the flow rate and must be a pipe of at least 15mm diameter.

| Boiler output            | Minimum flowrate           | Temperature difference between heating flow and return |
|--------------------------|----------------------------|--------------------------------------------------------|
| 23.3 kW<br>(80,000Btu/h) | 24.2 l/min<br>( 5.3 g/min) | 15 °C<br>(27 °F)                                       |
| 15.0 kW<br>(51,000Btu/h) | 18.0 l/min<br>( 4.0 g/min) | 12 °C<br>(22 °F)                                       |
| 8.7 kW<br>(30,000Btu/h)  | 10.5 l/min<br>( 2.3 g/min) | 12 °C<br>(22 °F)                                       |

Table 4

To set the system bypass, first operate boiler with all radiator valves and the system bypass, fully open, until system has reached operating temperature and the burner has been switched down to 'low' output.

Adjust bypass valve to give the required temperature difference between the flow and return pipes - as given in Table 4.

**6.8.9** If an existing boiler on a heating/hot water system is being replaced, it is strongly recommended that both systems are thoroughly cleaned out, using a suitable proprietary cleaner, before installing the boiler.

**6.8.10** If the water in the central heating system is being treated, the additive must not be aggressive or capable of causing corrosion or damage within the boiler and heating system. Any such additive should be suitable for use with a copper tube heat exchanger and also be compatible with the pipe and radiator materials used.

**6.8.11** Sealed heating systems. It is important that only good quality radiator valves and fittings are used to minimise the possibility of leaks and the consequent detrimental 'topping-up' of the system.

**6.8.12** An expansion vessel is incorporated in the boiler to accommodate the expansion of the heated water in the sealed heating system. The expansion vessel is pressurised to 0.5bar (7.5psi) at the factory - this corresponds to a maximum static head of 5metres.

**6.8.13** The expansion vessel is sufficient for a sealed heating system with a maximum volume of 75Litres (16.5gallons), based on a maximum operating temperature of 90°C (194°F) and a maximum working pressure of 3bar, in accordance with the current issue of BS7074: Part 1.

**6.8.14** A pressure relief valve is incorporated in the heating flow connection on the wall fixing jig. The lift pressure is preset at 3bar (45psi) and is nonadjustable.

## 6.9 Filling the System

**6.9.1** Provision for filling the system at low level must be made.

**6.9.2** Where the local water company allows, the filling of a sealed heating system through a temporary connection from the mains supply may be used provided that:

(a) The temporary connection is made to a double check valve assembly which is permanently connected to the sealed circuit.

(b) The connection between the mains supply pipe and the sealed circuit must be removed when filling is completed. Such an arrangement is shown in Fig.16.

**6.9.3** A discharge pipe should be connected to the 1/2 in BSP threaded pressure relief valve discharge - on the central heating flow connection. This pipe should be of suitable metal, and its size should be at least the same as the discharge outlet size. The pipe should discharge to drain in a visible but safe place - such as a gully, where there is no risk of accidental contact with the hot water - in a manner which complies with the requirements of the local water company.

**Important:** No stop taps, or shut-off valves of any type, should be installed in this discharge pipe.

## 6.10 Hot Water System

**6.10.1** The boiler will supply instantaneously heated hot water to a limited number of draw-off points - but to only ONE point at a time.

**6.10.2** The boiler is suitable for use with showers, provided that the shower mixer chosen is suitable for use with mains pressure water.

To give both better temperature control

and protection against water flowing at excessively high temperatures, it is recommended that a thermostatically controlled shower mixing valve be used. The simple bath tap/shower mixer fitting is generally unsuitable for use with mains pressure water and is thus not recommended for use with this boiler. **NB.** The cold inlet of the shower mixer must be supplied with mains pressure water and not from a cold water storage tank.

Contact shower valve manufacturer for further information.

**6.10.3** To ensure economic operation, the pipe runs between the boiler and taps should be in 15mm copper - and be as short as possible.

**6.10.4** Any exposed sections of pipework should be insulated to reduce heat loss.

### Proposed method for filling a sealed heating system from water main

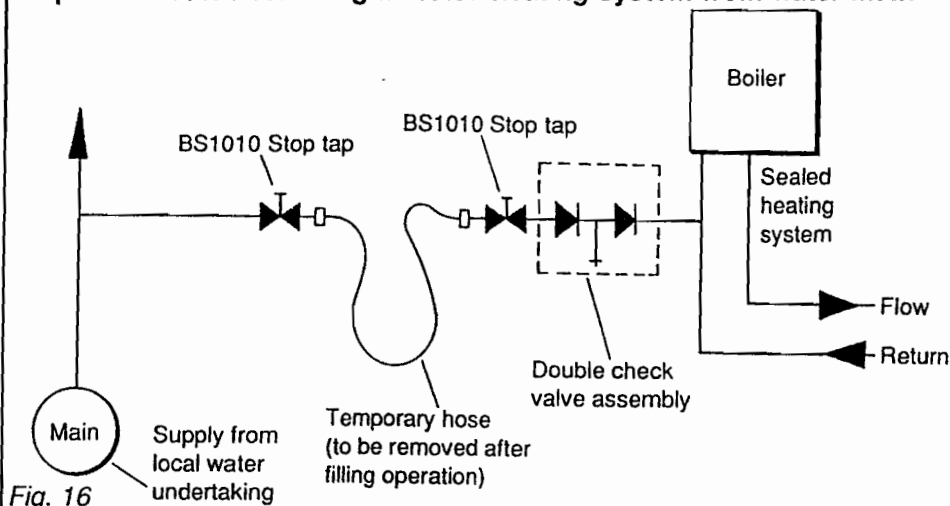


Fig. 16

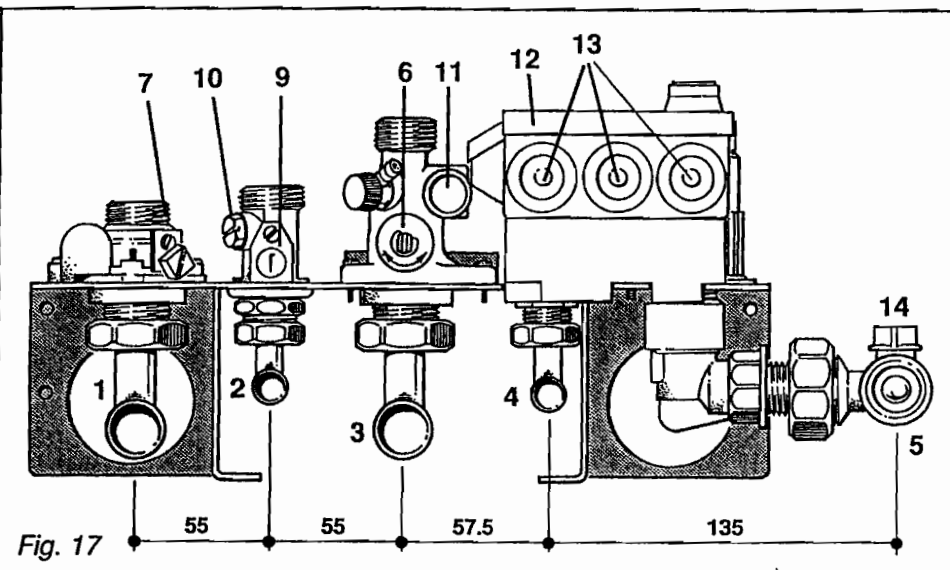


Fig. 17

#### Pipe diameters

|   |                                           |                   |
|---|-------------------------------------------|-------------------|
| 1 | Heating return                            | 22mm              |
| 2 | Cold water main inlet                     | 15mm              |
| 3 | Heating flow                              | 22mm              |
| 4 | Domestic hot water out                    | 15mm              |
| 5 | Gas supply                                | 1/2 in BSP female |
| 6 | Drain screw for central heating           |                   |
| 7 | Isolated valve for central heating-return |                   |

**N.B.** All isolating valves shown in OPEN position.

|    |                                        |
|----|----------------------------------------|
| 9  | Isolating valve for domestic hot water |
| 10 | Drain screw for hot water              |
| 11 | Pressure relief valve                  |
| 12 | Electrical connection box              |
| 13 | Cable entry - connection box           |
| 14 | Gas service cock                       |

**6.10.5** The water supply pipework should have NO loose jumper washers on any stop taps, or any non-return valves fitted.

**Important:** The SD623 combination boiler has a maximum domestic water working pressure of 10bar (145psi). This pressure must not be exceeded in service, as damage to the boiler may result. Pressures approaching 10bar are unnecessarily high and cause noisy operation of the boiler. Under such circumstances, it is strongly recommended that either a pressure reducing, or limiting valve - set to about 3.5bar (50psi) - be fitted in the cold water supply to control the pressure to an acceptable level at inlet to the boiler.

**6.10.6** In hard water areas, a scale reducing device should be fitted to the cold water supply to the boiler, to prevent premature scaling of the heat exchanger.

## 6.11 Installation Procedure

### Wall Fixing Jig

**6.11.1** The fixing jig is supplied in three parts:

(a) The connecting plate which allows the connection and soundness testing of all the pipework before the boiler is installed, and helps support the weight of the boiler;

(b) The hook, which also supports the weight of the boiler; and

(c) The template which ensures that the hook and connecting plate are correctly located relative to each other.

The position of the hole for the flue (rear flue only) is also indicated on the template. Please note that the centre line of the back outlet rear flue hole is offset to the left of the boiler centre line.

**6.11.2** The connecting plate incorporates the following for the installer's/service engineer's convenience - refer to Fig 17.

Isolating valves in both the central heating flow and return connections.  
An isolating valve in the cold water inlet connection.

A drain screw for the central heating (to allow draining of boiler heating circuit only, as required).

A spring loaded gas inlet valve.

A 1/2in BSP gas service cock (female connection).

A pressure relief valve (incorporated in central heating flow connection) - 1/2in BSP male outlet.

### 6.11.3 Fixing jig installation

- Fasten bottom end of template to connecting plate using two of the plastic clips provided.

- Fasten top end of template to hook using the two remaining plastic clips provided.

- Ensure that hook is pointing upward and lower flue hole in template is left of centre.

- Position wall fixing jig in the required location after considering all aspects relating to boiler siting, for example, flue terminal position, clearances, etc.

- Check that connecting plate is level, mark position of two fixing holes on wall. Drill, plug and fix connecting plate to wall using No. 12x2in round-head steel screws, or similar.

Stretch out and smooth template against wall, check that hanging hook is level and mark position of three fixing holes on wall. Drill, plug and fix hook to wall using No.12x2in round-head steel screws, or similar.

- Finally, check that both connecting plate and hook are level.

**NB.** Screws recommended above are for normal fixing, through plaster, into brick or blockwork. For fixing into other wall constructions use appropriate screws/fixings.

6.11.4 A small expansion vessel is supplied with the fixing jig. This must be fitted to the 1/4in BSP nipple on the cold inlet connection using the cranked copper connecting pipe provided. The expansion vessel will be located out of sight, behind the boiler once it is installed. Refer to Fig.18.

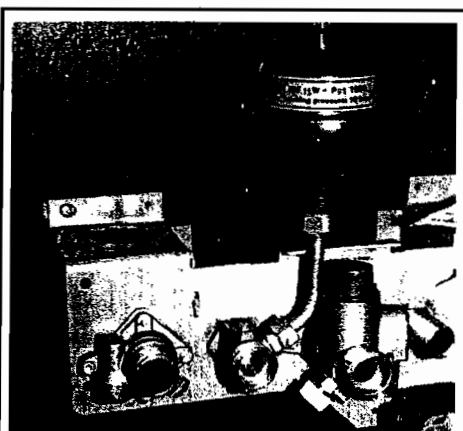


Fig. 18

**Important:** Do not touch the Schrader valve on this expansion vessel. This is not an air vent, or bleed valve. The vessel is pressurised at the factory to accept any expansion of the domestic hot water.

6.11.5 Alternatively, if there is to be vertical pipework between the boiler and the wall (up the left side of the boiler) this expansion vessel can be fitted in an alternative position. To do this adopt the following procedure before the boiler is hung on the fixing jig:

Reverse the positions of the drain screw and nipple on the cold inlet connection. Fit the cranked copper connecting pipe to the nipple, as shown in Fig.19 and tighten both connections.

6.11.6 Connect water pipes to the connecting plate using the four connection elbows provided, as shown in Fig.17.

If water pipes joints are to be made using capillary fittings, disconnect the four pipe connection elbows from the rear of the connecting plate before soldering.

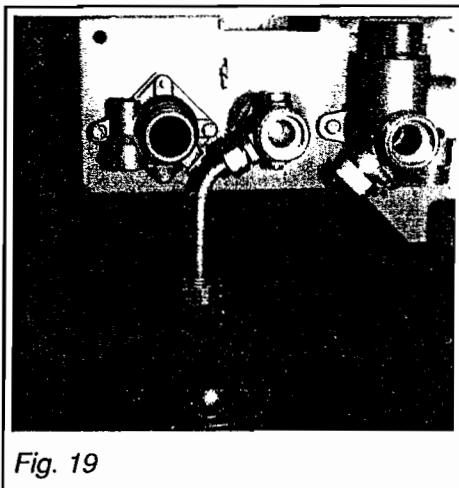


Fig. 19

**Important:** Do not solder pipework with these connections in position as damage to the joints and isolating valves may result.

Pipe connection elbows may be left in place if compression fittings are to be used.

Connect pressure relief discharge pipe to pressure relief valve and route the pipe to a suitable drainage point. Refer to 6.9.3.

Tighten all pipe connection joints.

6.11.7 Connect the gas supply to the gas service cock and gas service cock to the union on the gas inlet elbow. Refer to Fig.20.

6.11.8 Purge gas supply in accordance with the current issue of BS6891.

6.11.9 Thoroughly flush the heating system pipework to ensure that all foreign matter is removed before the boiler is installed.

**NB.** Any such foreign matter (for example, swarf, grit and flux) will eventually cause boiler operating problems and may result in damage to internal boiler components, such as the

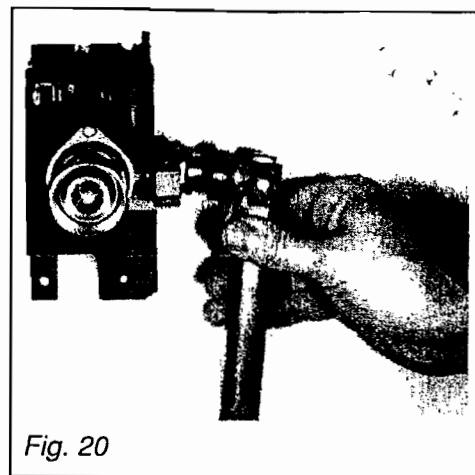


Fig. 20

pump, heat exchanger, or reversing valve.

6.11.10 Close the central heating isolating valves, the cold water isolating valve and the gas service cock, at the connecting plate.

6.11.11 Make all electrical connections to boiler connection box, prior to the hanging/connection of the boiler, as follows:

Remove cover from electrical connection box.

Connect mains power supply to terminals at left of connection box using 0.75mm<sup>2</sup> (24/0.2mm) three core PVC insulated cable - to the current issue of BS6500, Table 16.

Slacken cable grip screws, and slit centre of sealing grommet with sharp knife. Strip back insulation on cable as the dimensions given in Fig.21.

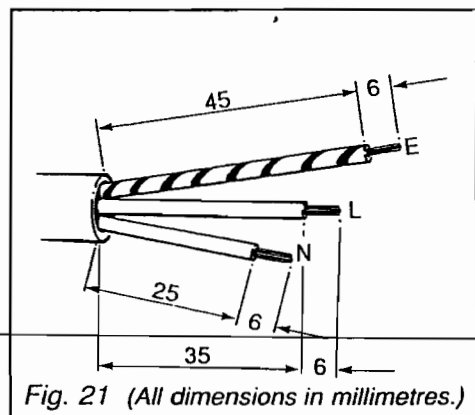


Fig. 21 (All dimensions in millimetres.)

Pass cable through grommet and cable grip and connect to terminals as follows:

- green/yellow wire to earth (E)
- blue wire to neutral (N)
- brown wire to live (L)

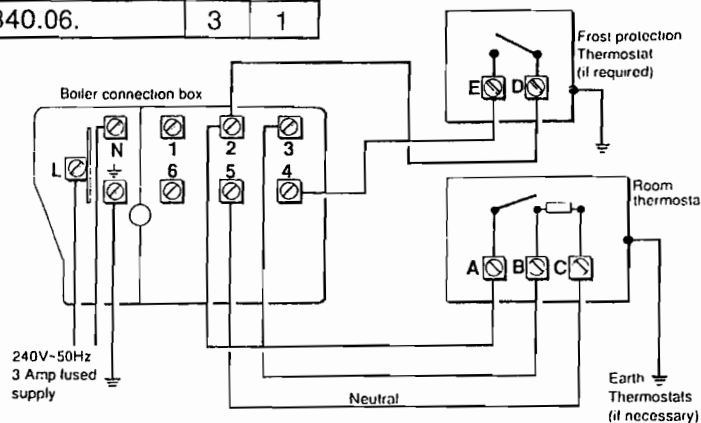
Re-tighten cable grip ensuring that cable is gripped by external PVC insulation.

6.11.12 Heating controls. Boiler will function for heating without a room thermostat being connected, provided that the brass link (fitted between terminals 2 and 3) is left in place.

For use with a room thermostat:

Connect room thermostat to terminals, as shown in Fig.22. If the thermostat has an anticipatory resistance (shunt heater) the neutral may be connected to terminal 5 (neutral connection) in the connection box. Refer to thermostat connection diagram - Fig.22.

| Frost thermostat type | D | E |
|-----------------------|---|---|
| Honeywell 4160 A      | 3 | 1 |
| Sopac TA.340.06.      | 3 | 1 |



| Thermostat type    | A | B | C |
|--------------------|---|---|---|
| Saunier Duval TA.2 | 1 | 2 | 4 |
| Honeywell T.6160B  | 1 | 3 | 2 |

Fig. 22

Ensure all cables are secured correctly by the cable grips onto the external PVC insulation.

**Important:** This appliance must be wired in accordance with these instructions. Any fault arising from incorrect wiring cannot be rectified under the terms of the Hepworth Heating guarantee.

## 6.12 Flue assembly

**6.12.1** When all gas and water pipes are connected to the fixing jig and all electrical connections have been made to the connection box, the flue system can be installed.

**6.12.2** The SD623 boiler is designed to allow the flue system to be connected either to the back of the boiler (BACK OUTLET flue connection) or to the top of the boiler (TOP OUTLET flue connection).

The boiler is supplied ready to accept a back outlet flue connection.

The flue installation procedure to be adopted depends on which of the following options are selected:

(a) Back outlet flue connection, or top outlet flue connection, and

(b) Whether the flue passes to the rear of the boiler, or to one side or the other.

**6.12.3** If required, the boiler can easily be converted to accept a TOP OUTLET flue connection, as follows:

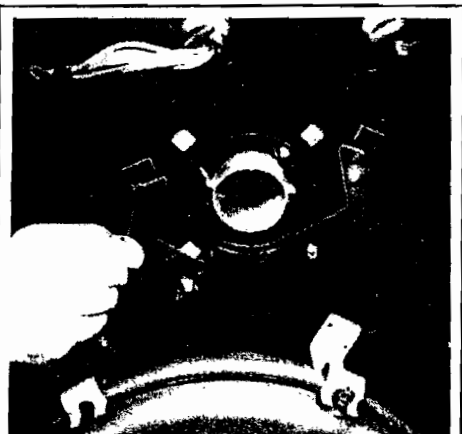


Fig. 23

(a) Unscrew and remove the four screws, and both flue outlet clamps, from rear face of boiler. Refer to Fig.23. Retain clamps and screws.

(b) Unscrew and remove the four screws, and circular blanking plate, from top of boiler.

(c) Disconnect power supply and earth leads from fan motor. Unscrew and remove the two fan retaining screws. Refer to Fig.24.



Fig. 24

Remove fan assembly from boiler, disconnect and discard connector tube.

(d) Unscrew and remove the three screws holding fan to mounting plate. Turn the fan body through 90°, in relation to mounting plate, to leave fan outlet pointing upward. Using the alternative set of three holes in the mounting plate (that is, not those from which you have just removed the screws), securely fasten the fan to the mounting plate. Refer to Fig.25.

(e) Disconnect air pressure switch tube from rear face of boiler, by turning end connector through 90°.

(f) Refit fan assembly into boiler - with front edge of mounting plate vertical, carefully guide fan outlet into top flue outlet of boiler. Locate the two retaining lugs at the back edge of mounting plate onto back edge of flue hood opening in boiler, and bring fan

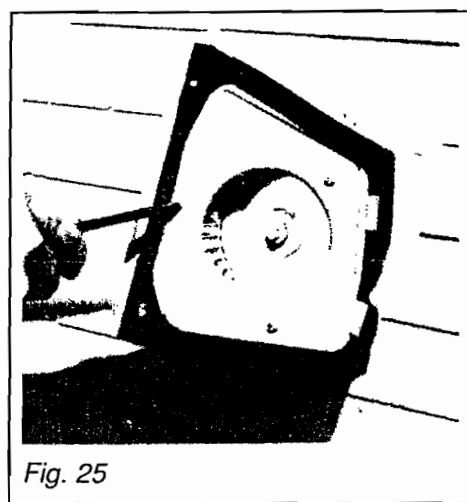


Fig. 25

mounting plate up against vertical hood face. Refer to Fig.26. Refit and tighten two fixing screws.



Fig. 26

(g) Connect air pressure switch tube into hole provided adjacent to top outlet and fasten by turning end connector through 90°.

Reconnect power supply and earth leads to fan motor terminals - power supply leads may be connected to either terminal

Fix blanking plate into back flue outlet of boiler and fasten using the four fixing screws.

(h) Before commissioning the boiler ensure that the two plastic transit clips are removed from the fan.

**6.12.4** Mark the hole position for the flue system, as follows:

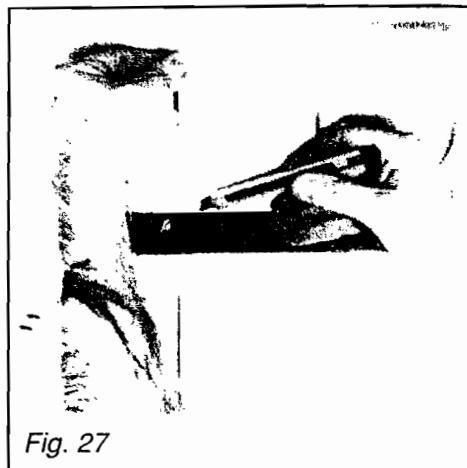


Fig. 27

(a) Flue to rear of boiler - from back outlet. Mark correct position of hole from template using hole between hook and connecting plate.

To remove unwanted upper section of template, cut along top edge of hook with sharp knife. Refer to Fig.27.

(b) Flue to rear of boiler - from top outlet. Mark correct position of hole from template using hole above the hook.

Once hole position is marked, remove unwanted upper section of template by cutting along top edge of hook with sharp knife. Refer to Fig.27.

(c) Flue to side of boiler - from back or top outlet. Mark the horizontal centre line for the hole on the rear wall, as described in (a) or (b) above for back or top outlet respectively. Extend the horizontal centre line to the side wall in question and mark the vertical centre line of the flue hole as described in Fig.28.

**Important:** When cutting the flue hole and particularly when extending the flue centre line to a side wall it must be remembered that the flue system is to be installed with a slight slope downwards from the boiler. A fall of about 35mm for every metre length of flue will ensure this. The flue must never slope upwards from the boiler.

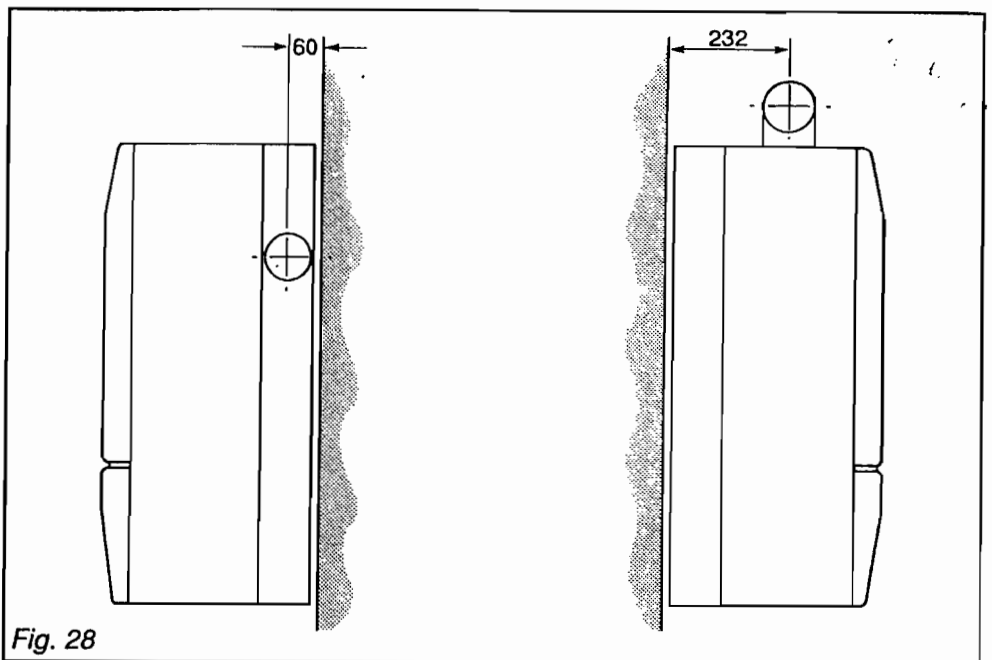
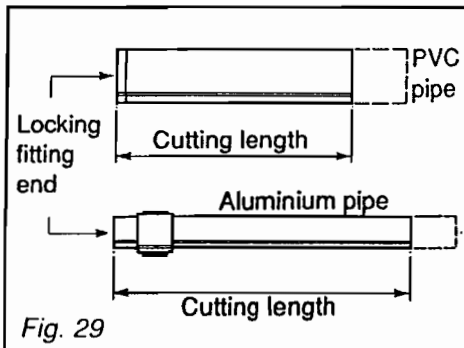


Fig. 28

Table 5 Cutting lengths for flue pipes

| Flue option                                                      | Cutting length (mm) |                      | Comments                                       |
|------------------------------------------------------------------|---------------------|----------------------|------------------------------------------------|
|                                                                  | PVC outer pipe      | Aluminium inner pipe |                                                |
| Back outlet<br>Rear flue                                         | t+70 mm             | t+195 mm             | Max wall thickness "t" without extension 551mm |
| Top outlet<br>Rear flue                                          | t+90 mm             | t+215 mm             | Max wall thickness "t" without extension 532mm |
| Back outlet<br>Side flue to left<br>Refer to Fig.30 (a)          | t+A+35mm            | t+A+155 mm           | Max. distance "X" without extension 797mm      |
| Back outlet<br>Side flue to right<br>Refer to Fig.30 (b)         | t+A+90 mm           | t+A+215 mm           | Max. distance "X" without extension 739mm      |
| Top outlet<br>Side flue ( right or left )<br>Refer to Fig.30 (c) | t+A+65 mm           | t+A+185 mm           | Max. distance "X" without extension 767mm      |

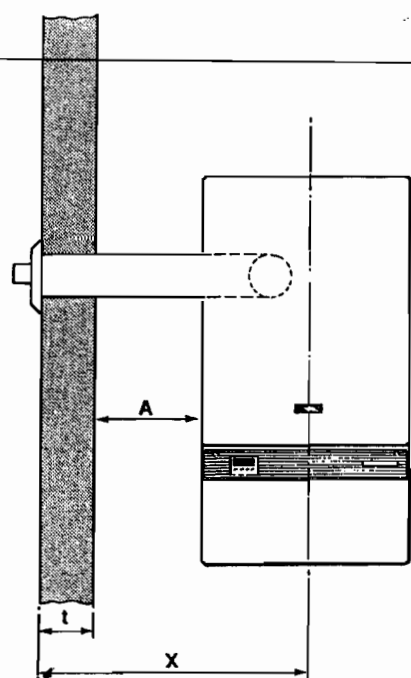


Fig. 30(a)

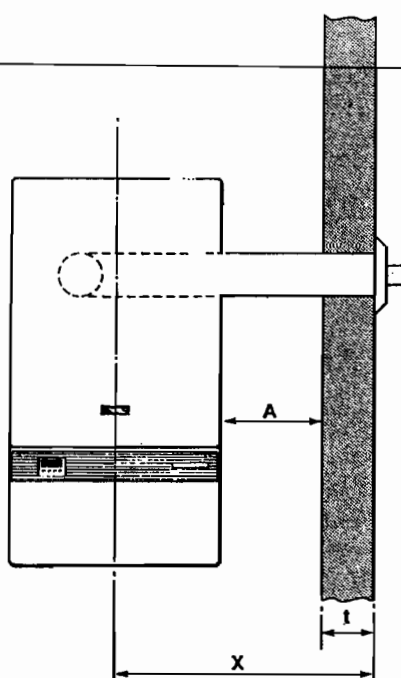


Fig. 30(b)

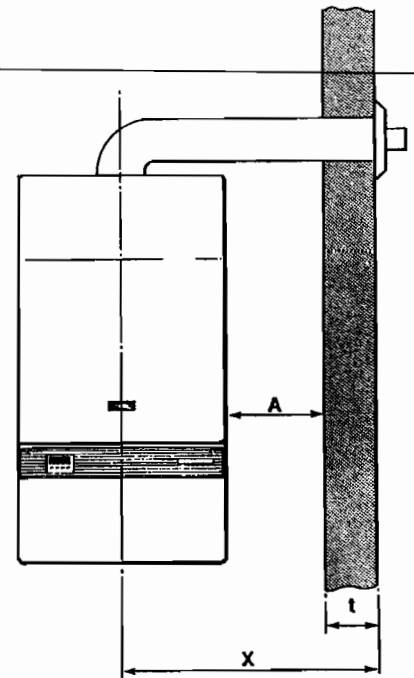


Fig. 30(c)

### 6.12.5 Cutting the flue hole.

Making due allowance for the slope of the flue, cut the hole in the external wall, preferably using a 115mm diameter core drill. If necessary, make good at both the inner and outer surfaces of the wall.

**Important:** Before cutting the hole for flues directly to the rear of the boiler, always cover the connecting plate to ensure that the fittings are not damaged.

### 6.12.6 Calculation of flue cutting lengths

(a) Measure the wall thickness - 't' (mm).

(b) For side flues, measure the distance from the inside face of the side wall to the centre line of the boiler and subtract 205mm to obtain dimension A (mm).

(c) Refer to Table 5 for the cutting lengths of both the PVC and aluminium flue pipes for each of the various flue options available.

**Important:** All cutting lengths must be measured from the locking fitting end of the flue pipes. Refer to Fig.29.

**6.12.7 Extension kits.** When the distance 'X' measured on site is greater than that given in Table 5, for the flue option chosen, flue extension kits will be required.

Refer to Table 6 for the actual number of extension kits required.

### 6.12.8 Assembly of extended flue.

The PVC connector is used to connect the PVC extension pipe to the PVC pipe supplied with the boiler (or to another extension pipe - if more than one is used). It is a secure push fit onto the pipe ends, no adhesive is required. The connector fitted to the aluminium extension pipe is a push fit onto the aluminium pipe supplied with the boiler (or onto another extension pipe - if more than one is being used). The two screws provided must be used to fasten the two pieces together once assembled - using the pre-drilled holes in both the connector and pipe end. Refer to Fig.31.

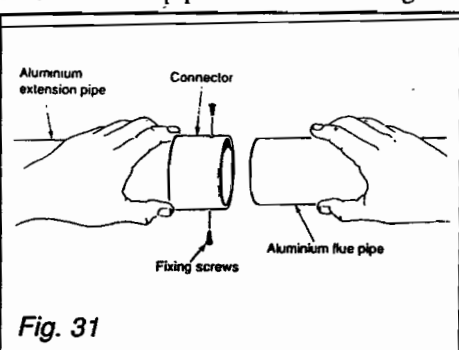


Fig. 31

The triangular pipe support should be slid onto the aluminium pipe (before final assembly) and positioned near the pipe joint to support and locate the inner pipe correctly within the outer PVC pipe. Refer to Fig.32.

### 6.12.9 Cutting lengths for extended flues.

The following instructions should be followed when cutting extended flue pipes to the required length.

Table 6 Number of extension kits required

| Flue option               | Dimension "X" | No. of extension kits |
|---------------------------|---------------|-----------------------|
| Side flue (right or left) | 767 to 1497   | 1                     |
| Top outlet                | 1497 to 2227  | 2                     |
|                           | 2227 to 2957  | 3                     |
| Side flue (left)          | 797 to 1527   | 1                     |
| Back outlet               | 1527 to 2257  | 2                     |
|                           | 2257 to 2987  | 3                     |
| Side flue (right)         | 739 to 1469   | 1                     |
| Back outlet               | 1469 to 2199  | 2                     |
|                           | 2199 to 2929  | 3                     |



Fig. 32

(a) Using the correct number of extension kits - refer to Table 6 - assemble both the extended PVC and aluminium pipes, by adding the extension pieces to the flue pipe supplied with the boiler. Do not fasten the aluminium pipes together at this stage.

(b) Mark and cut both extended flue pipes referring to Fig.33 - using the cutting lengths given in Table 5.

**Important:** All cutting lengths should be measured from the locking fitting end of the pipe.

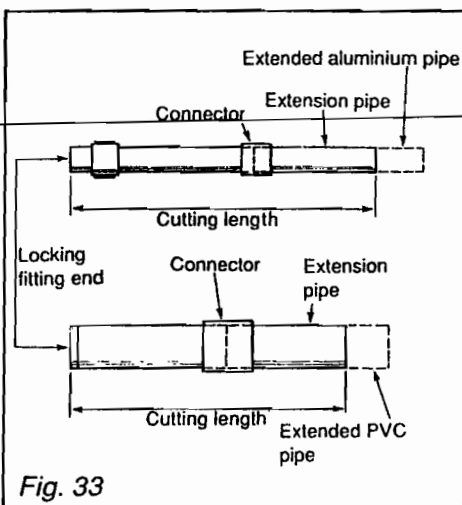


Fig. 33

c) Check before cutting - if the distance between the end of either of the cut flue pipes, or the pipe connector, will be 30mm, or less - refer to Fig.34 - it will be necessary to reduce the length of both the PVC and aluminium extension pipes and those supplied with the boiler, to achieve the required overall cutting length for the extended flue pipes.

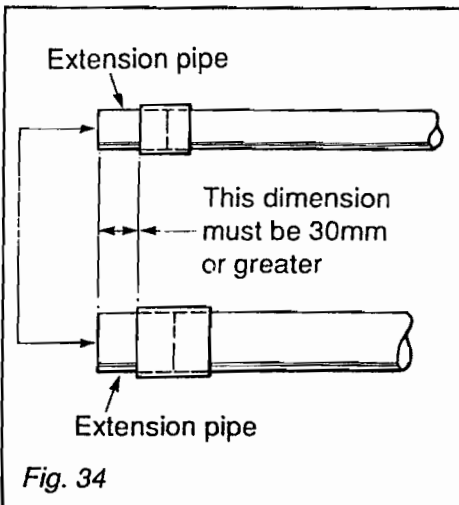


Fig. 34

**NB.** If the length of any aluminium pipes other than the final extension pipe - have to be reduced in this manner, it will be necessary to drill two fixing holes in these pipes to match the fixing holes in the aluminium connector for the fixing screws provided.

### 6.12.10 Installation of flue assembly

(a) Fit the PVC pipe into the wall, with locking fitting end to outside. Fig.35.

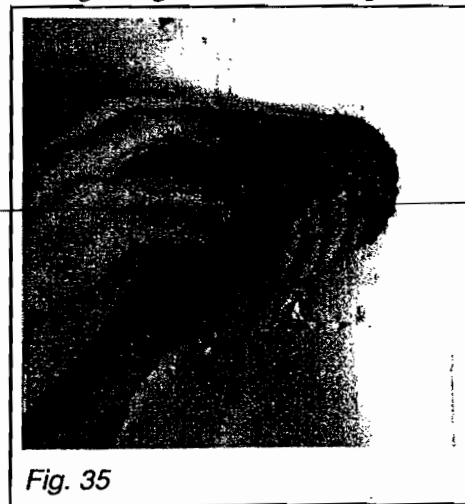


Fig. 35

**NB.** For installations where dimension 'A' is greater than 1 metre (that is, when flue extensions are used) it will be necessary to provide temporary support for the flue system at this stage.

(b) Fit the rubber sealing collar into the groove at the outer end of the PVC pipe, Fig.36



Fig. 36

(c) Pull the PVC pipe inwards so as to bring the rubber sealing collar hard against the external wall surface around the flue pipe. Fig.37.

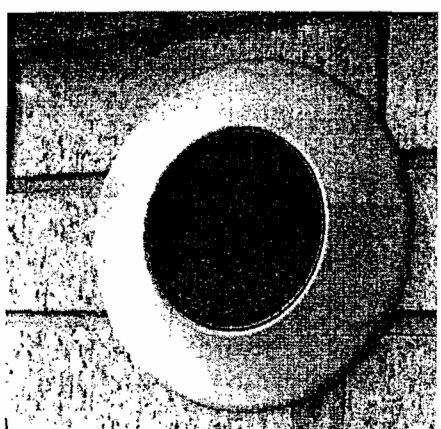


Fig. 37

(d) Fit the plastic flange as shown - push it along the pipe until hard against internal wall surface. Fig.38.



Fig. 38

**NB.** When using extension kits, plastic flange must be fitted before PVC extension pipes are connected.

(e) Pull hard on PVC pipe and ensure that the plastic flange is hard against inside wall surface. Spot drill two holes using a 2.5mm diameter drill through the flange and PVC pipe. Fig.39.

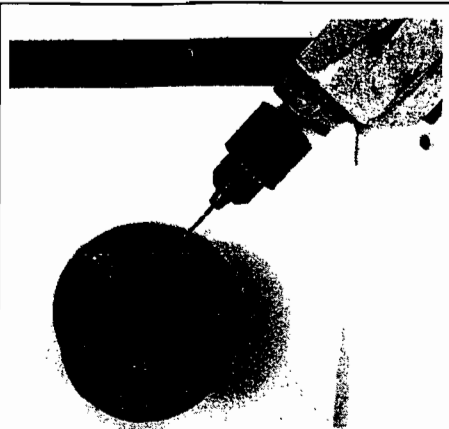


Fig. 39

(f) Fasten the plastic flange to the PVC pipe using the two self-tapping screws provided. Fig.40.

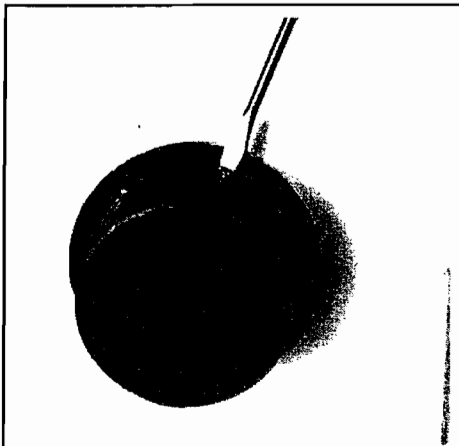


Fig. 40

(g) From inside, fully insert the aluminium pipe (locking end first) into the PVC pipe. Fig.41. Turn aluminium pipe anticlockwise as far as possible (viewed from inside).

**NB.** If extension pieces are being used, and front clearance is limited, it may be necessary for each section of the extended aluminium pipe to be separated and then joined as inserted.

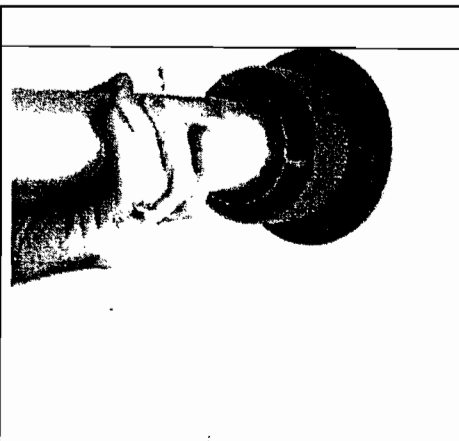


Fig. 41

(h) Fit the rubber connecting sleeve, plain end first, onto the end of the PVC pipe. Push it on as far as possible. Fig.42.



Fig. 42

(i) The boiler is supplied ready to accept a back outlet rear flue connection, but can be adapted to accept a top outlet flue (refer to 6.12.3).

If back outlet flue connection is required, first loosen the two screws holding the flue connector clamps and slide them away from flue outlet. Fit the straight flue connector (supplied in the flue kit) into rear of boiler 'short end' first. Fig.43.



Fig. 43

Slide back clamps to lock flue connector in position and retighten screws. Fig.44. **Important.** When fitting flue connector, ensure that fan outlet connecting pipe is correctly located.

To continue installation, go to 6.13 - Boiler Mounting

(j) For either a back outlet side flue, or a top outlet rear or side flue, proceed as follows

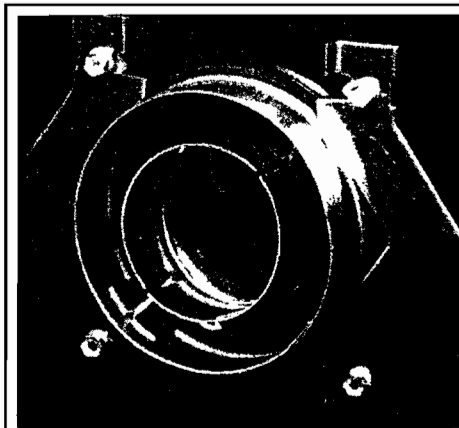


Fig. 44

**Back outlet side flue.**

Loosen the screws holding the two flue connector clamps and slide them away from flue outlet.

Fit elbow into rear of boiler - fitting flush end of elbow into boiler, to point in the required direction.

Slide back clamps to lock flue elbow in position and re-tighten screws. Fig.45.

To continue with installation, go to 6.13-Boiler Mounting.

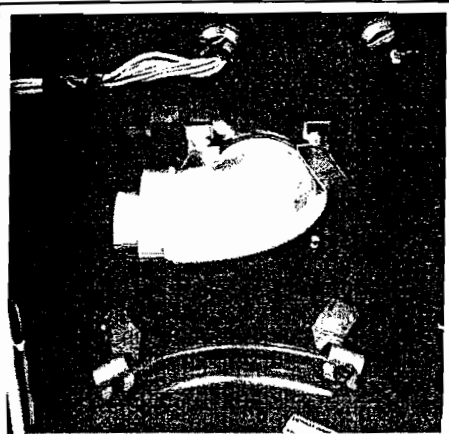


Fig. 45

(k) Top outlet, rear or side flue.

To convert boiler to accept a top outlet flue connection refer to 6.12.3.

Fit the two flue elbow clamps - one either side of the top outlet. Fasten each clamp with a single screw and position them clear of flue outlet to allow fitting of elbow. Fig.46.

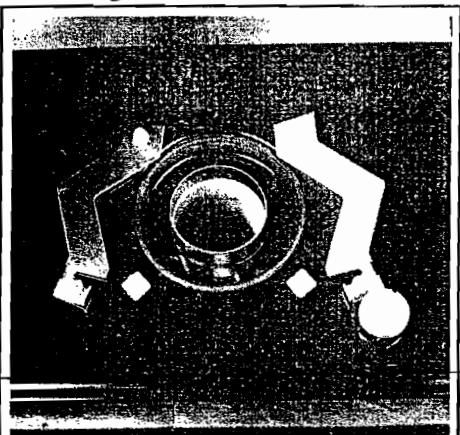


Fig. 46

Fit flush end of elbow into boiler, to point in the correct direction. Fig.47.

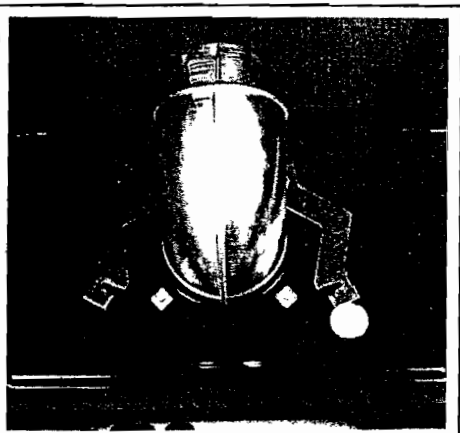


Fig. 47

Slide clamps back to lock flue elbow in position, and re-tighten screws. Fig.48.

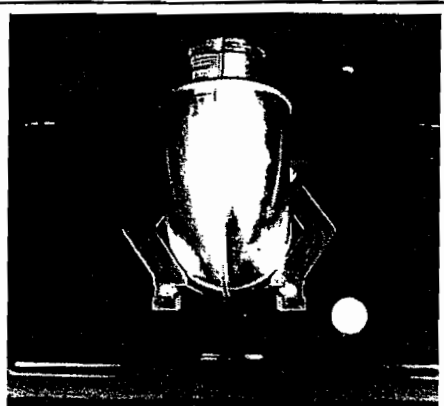


Fig. 48

## 6.13 Boiler Mounting

**6.13.1 Boiler casing.** The boiler is supplied with all casing panels fitted. However, during installation it will be necessary to remove the panels - to do so proceed as follows:

(a) Lower front (control) panel.

This is hinged along its lower edge and is designed to open to a horizontal - it being held in this position by a plastic restraining strap. Whilst holding the panel in the closed position, disengage the two 'quarter turn' panel fasteners by turning both of the recessed screw heads - located at upper right and left hand corners of the panel - a quarter turn towards the centre of the boiler, using a flat bladed screwdriver. Fig.49.

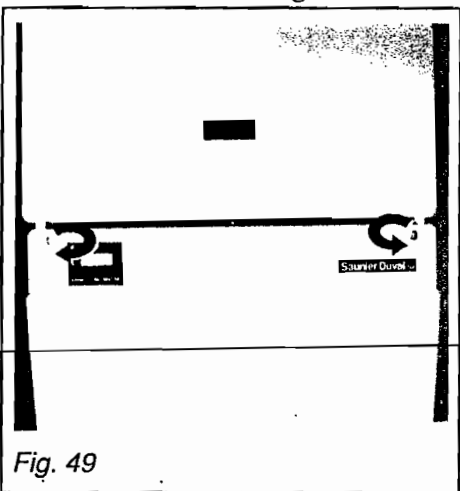


Fig. 49

Carefully allow the panel to open on its hinge until horizontal.

(b) Upper front panel. Having opened the lower front panel, locate and disconnect the earth lead from the bottom edge of the upper panel. Locate both panel retaining catches at the bottom edge of the upper front panel. Fig.50.

Pull lever of each catch forwards, and ease bottom of panel forwards until catch is disengaged from slot in bottom flange of panel. With both catches disengaged pull bottom edge of panel out, about 30mm (to clear rubber seal of sealed chamber) and lift panel upwards and off the two retaining lugs at the top of the boiler.

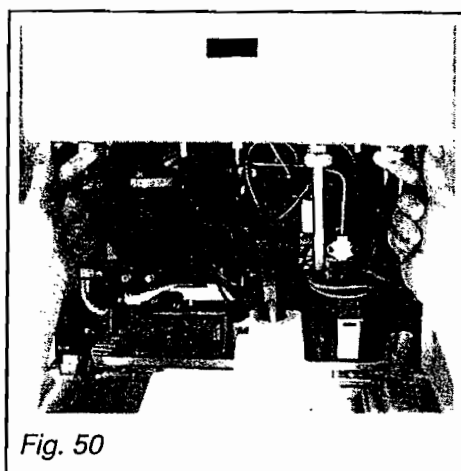


Fig. 50

**NB.** The lower front panel must be opened before the upper front panel can be removed.

(c) Side panels. Remove earth connection from bottom edge of side panel. Unscrew and remove the panel retaining screw from the underside of the boiler. Pull bottom edge of panel from boiler frame. Lift panel upwards and off the two retaining lugs at the top of the boiler. Fig.51. Repeat procedure for other side panel.

**NB.** Side panels may be removed without first removing the front panels.

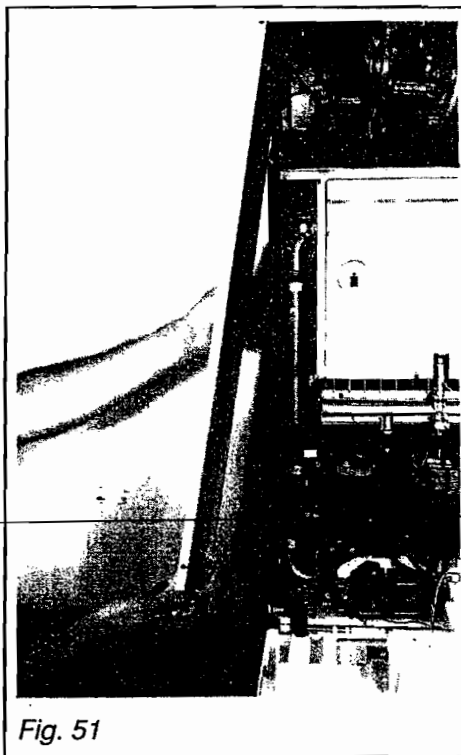


Fig. 51

**6.13.2** Remove any plastic caps protecting the pipe connections at the rear of the boiler.

Lift the boiler and engage both fixing jig hooks in the two support bracket on the rear of the boiler.

Lower the boiler until it rests on the outward facing lip at the centre of the connecting plate. Fig.52.

**NB.** Correct location of boiler on connecting plate can be checked by viewing through the boiler with the lower front panel open.

Using the sealing washers, flow regulator and filter provided, make the connections

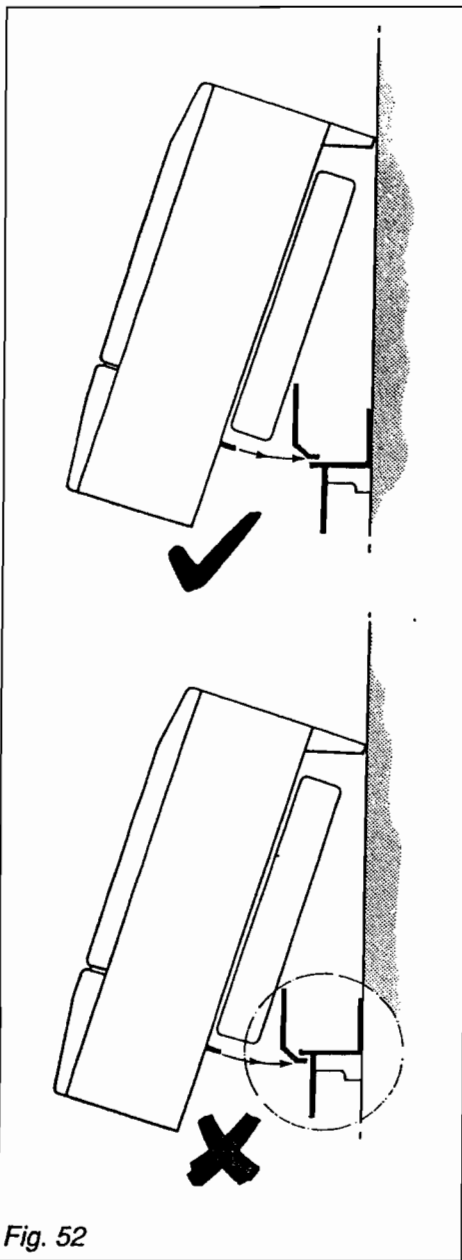


Fig. 52

between the boiler and connecting plate.

Fig.53(a)

It is important that the gas connection is made first, as there is no flexibility in this connection.

Fit the flow regulator into the 'telescopic' cold water inlet pipe on the boiler before connecting to cold water inlet connection. Fig. 53(b).

**6.13.3** After the boiler has been hung and connected to the fixing jig: Take the two flying leads from the boiler wiring loom around the right of the gas inlet valve and plug into the corresponding sockets at the rear of the electrical connection box.

Secure electrical connection box to connecting plate and fit cover.

**6.13.4** Connect the aluminium pipe onto the central outlet of either the straight flue connector or flue elbow. To do this, the aluminium pipe must be grasped and turned clockwise (as viewed from inside) - the aluminium pipe will move out from the PVC pipe, and can be twisted onto the centre of the flue connector or elbow. Fig.54.

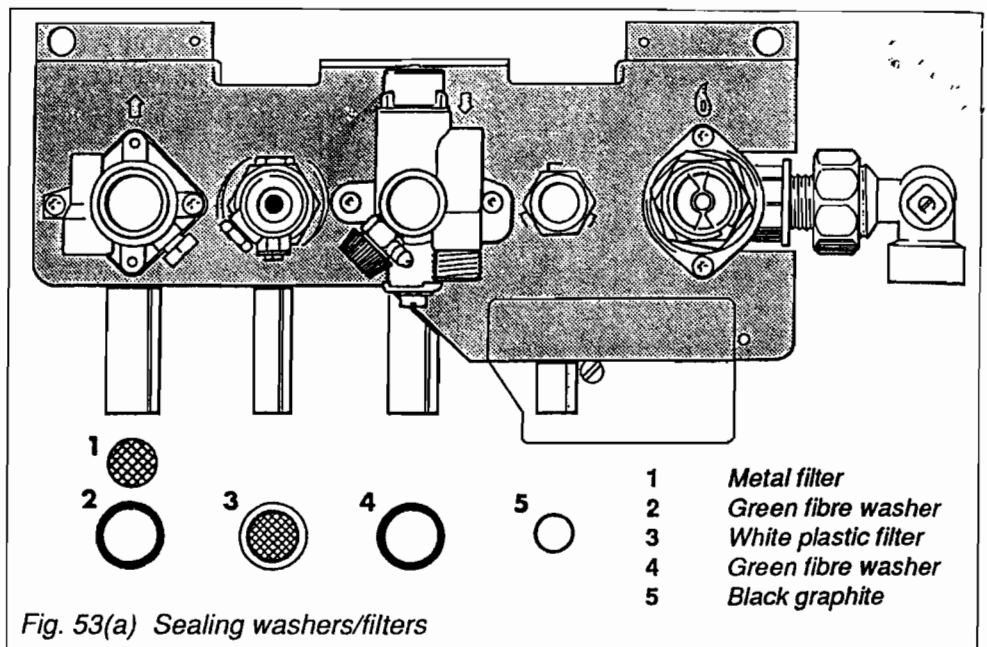


Fig. 53(a) Sealing washers/filters

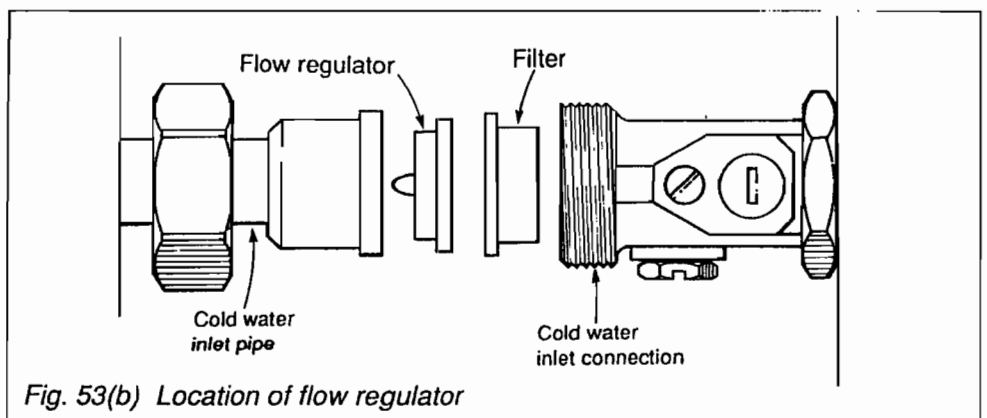


Fig. 53(b) Location of flow regulator

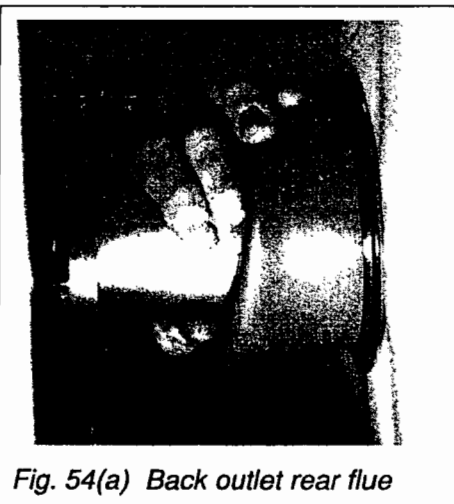


Fig. 54(a) Back outlet rear flue



Fig. 54(b) Top outlet rear flue

**6.13.5** Ensure that aluminium pipe is firmly fixed either to the flue connector or elbow and is correctly locked into the PVC outer pipe.

**NB.** The aluminium pipe is correctly located and locked only when the concentric spacer ring is **FLUSH** with the outermost end of the PVC pipe. Fig.55.

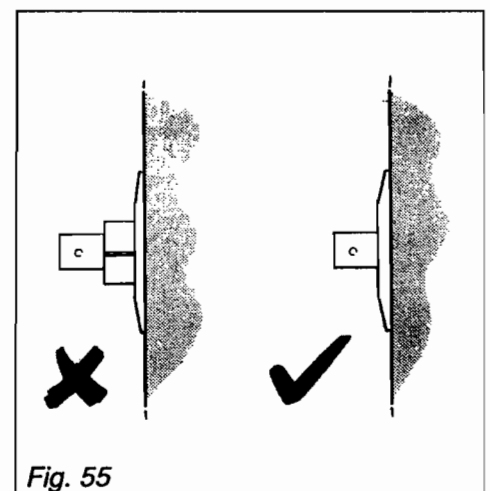


Fig. 55

**6.13.6** After checking that the aluminium pipe is correctly located - pull the rubber sleeve towards the boiler, and fit the flanged end **FULLY** over the spigot of the boiler flue connector, or elbow, to make a seal. Fig.56.

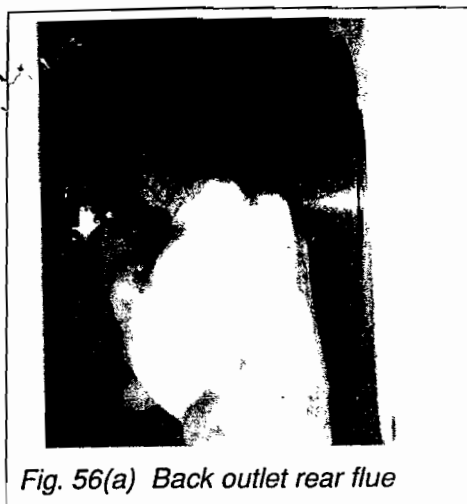


Fig. 56(a) Back outlet rear flue

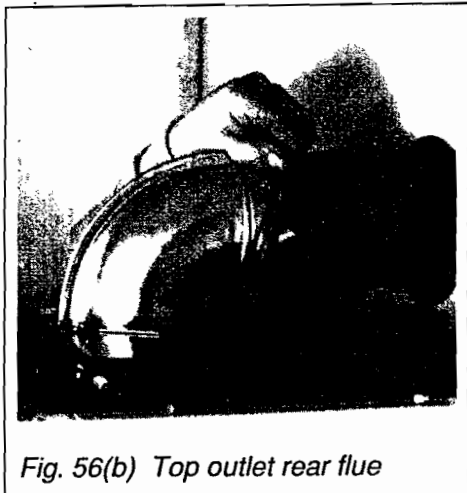


Fig. 56(b) Top outlet rear flue

6.13.7 If flue terminal guard is required, position the guard symmetrically over flue terminal and mark fixing hole centres on to wall. Drill and plug fixing holes and secure terminal guard in place using suitable fixings for the type of wall in question. Fig.57.

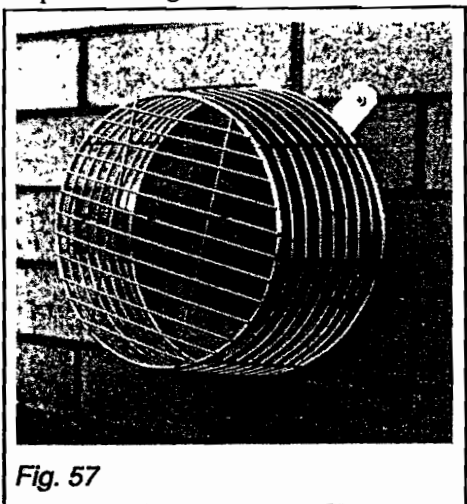


Fig. 57

## 7 COMMISSIONING

The commissioning and first firing of the boiler should only be carried out by a competent person.

There should be clear verbal instructions given to the user on how to operate the boiler and any associated system controls.

### 7.1 Gas Installation

7.1.1 The complete gas installation including the meter should be inspected, tested for soundness and purged in

accordance with the recommendations of the current issue of BS6891.

7.1.2 It is recommended that the air be purged from the pilot gas supply pipe (small diameter aluminium pipe).

After ensuring that the boiler is isolated from the electrical supply.

Disconnect the supply pipe from the pilot injector tube by unscrewing nut, using a 10mm spanner. Fig.58.

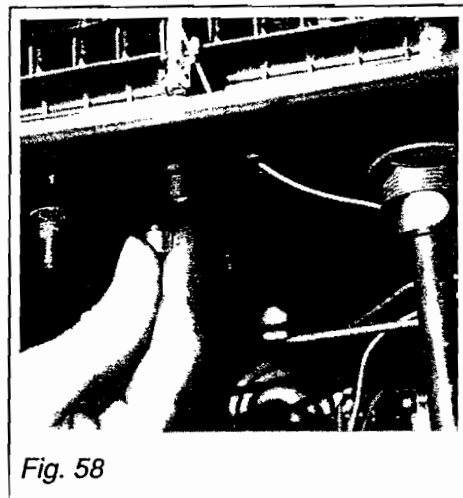


Fig. 58

Carefully pull end of supply pipe downwards from the tube. Push in and hold white (ON) button until gas is present at the end of the pipe.

Immediately release white button and reconnect pipe to pilot injector tube. DO NOT OVERTIGHTEN NUT.

NB. Ensure that 'O' ring seal is correctly fitted before reconnecting pipe.

Push in white button again and check around connection for gas soundness.

### 7.2 Electrical Installation

7.2.1 All checks to ensure electrical safety should be carried out by a competent person.

7.2.2 In the event of an electrical fault after installation, preliminary system checks must be carried out, that is, earth continuity, polarity, resistance to earth, short circuit.

### 7.3 Heating System

7.3.1 Move the boiler selector lever to the right hand position.

Fill the heating system - as described in 6.9 until the pressure gauge indicates a pressure of about 1.5bar.

Vent any air from the boiler, as follows:  
(a) Pump - unscrew the cap on the pump automatic air vent outlet 1-2 turns, and leave open. Fig.1.

(b) Heat exchanger - unscrew the knurled brass cap on the end of the heat exchanger vent pipe (on right hand side of boiler, between combustion chamber and side panel) 1-2 turns. When a continuous jet of water is obtained from this vent, screw the cap back tight. Fig.1.

NB. Do not unscrew this cap completely as the small ball located inside may fall out and be lost.

**Important.** When venting air from the boiler, do not touch the Schrader valve on either of the expansion vessels - these are NOT air vents.

7.3.2 Before starting the boiler turn the pump impeller to ensure it is free to move, as follows:

Unscrew black cap on front of pump. Place screwdriver in slot of spindle.

Fig.59.

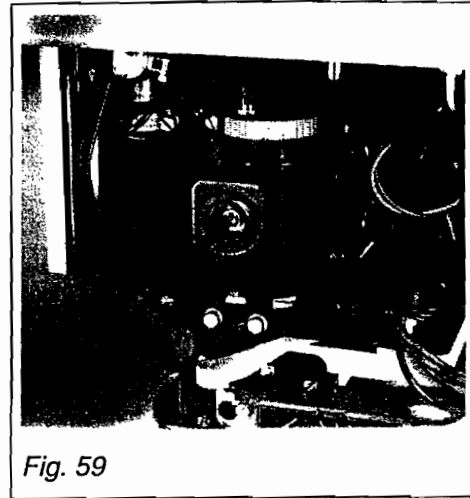


Fig. 59

Push in spindle and turn pump impeller 3-4 times to ensure free movement.

Replace black cap.

7.3.3 Replace upper front panel refer to 7.7.

Referring to the procedure given in the 'Instructions for Use', start and operate the boiler, thoroughly checking all gas and water connections and all heating system pipework and fittings for soundness.

On reaching maximum temperature the boiler should be shut down and the complete system drained to remove any residues from the heating pipework. Refill the system to a pressure of 1bar and vent as before.

7.3.4 Restart the boiler and operate until maximum temperature is reached. Shut down the boiler and vent the heating system. If necessary, top up the heating system to ensure that pressure of 1bar is indicated on the gauge when the system is COLD.

### 7.4 Domestic Hot Water System

7.4.1 To fill the domestic hot water circuit in the appliance:

Fully open the isolating valve in the cold main inlet connection.

Open all hot water taps (connected to the boiler) and draw off water until no air is present. Shut the hot water taps.

7.4.2 Thoroughly check all domestic hot water pipework for leaks.

7.4.3 Due to the design of the SD623 heat exchanger, that is, the domestic hot water coil is situated inside the central heating heat exchanger, water must be present in the central heating circuit for the boiler to produce domestic hot water.

**NB.** The boiler can be used to provide domestic hot water only (that is, if the heating system is to be installed or connected at a later date) as follows:

- Connect the central heating flow and return connections together, incorporating a filling point in this connecting pipe.
- Fill and vent the heating circuit of the boiler - as per the instructions given in 7.3.

Set the boiler selector lever to the left hand (hot water) position and inform the user that it must be left in this position whilst the appliance is being used in this manner.

## 7.5 Gas Pressures

**7.5.1** The main burner pressure should be checked during commissioning, to ensure that full boiler input is obtained, as follows:

Shut down boiler by pressing red (OFF) button.

Remove screw from test point on main burner (below sealed chamber of boiler). Fig.1.

Connect U tube gauge to test point using rubber tube.

Set selector lever to right hand (heating/hot water) position.

Start boiler using procedure given in 'Instructions for Use'. Set boiler thermostat knob to maximum (fully clockwise) and check that timeswitch and room thermostat (if fitted) are calling for heat

With burner on, check that the reading on the U tube gauge matches that given in 4.2 for the type of gas being used.

Move selector lever to left hand (hot water) position, remove rubber tube and replace screw in test point.

Reset selector lever to right hand position and with burner firing check test point for gas soundness.

**7.5.2** If measured burner pressure differs significantly from the specified figure, check the gas inlet pressure to the boiler, as follows: Shut down boiler by pressing red (OFF) button.

Remove screw from inlet test point at rear of gas valve. Fig.60.

Connect the U tube pressure gauge to test point using rubber tube.

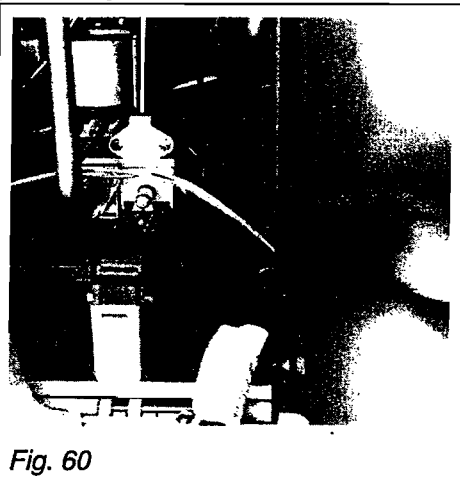


Fig. 60

Start the boiler (referring to the procedure given in 'Instructions for Use'). With the boiler operating, check that the

reading on the U tube gauge matches that given in 4.2 for the type of gas being used.

Shut down boiler, remove rubber tube and replace screw in test point

Restart boiler and check test point for gas soundness.

If the gas inlet pressure is correct, refer to Fault Finding Section.

**7.5.3** If inlet gas pressure is below that specified the gas supply pipework/meter must be checked and any fault put right. In the case of an LPG installation, check the storage tank (or cylinder), regulator and pipework.

The burner gas pressure must be re-checked when the inlet gas pressure is corrected, as in 7.5.1.

## 7.6 Adjustment of Heating Output

**7.6.1** The central heating output of the boiler can be adjusted by the Installer between 8.7kW (30,000Btu/h) and 23.3kW (80,000Btu/h), if required.

**7.6.2** The boiler is supplied set to give the maximum output. To reduce the output (for central heating only) use the following procedure:

(a) Connect U tube pressure gauge to main burner test point, as per 7.5.1.

(b) Remove small plastic cap from inner face of lower front panel. Fig.61.

(c) Using a small electrical screwdriver rotate the derating control - accessible through hole in rear face of lower front panel fully anti-clockwise (about  $\frac{3}{4}$  turn), as viewed from above. Fig.61.

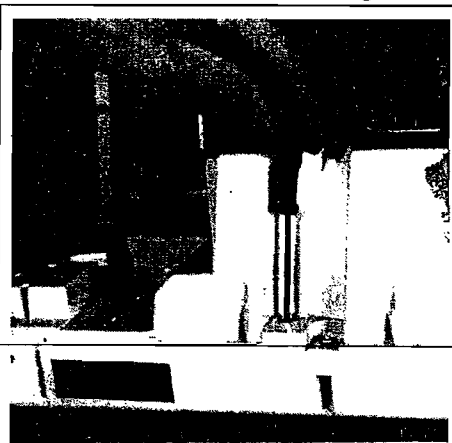


Fig. 61

(d) Set boiler thermostat to maximum, that is, turn knob fully clockwise.

(e) Check that timeswitch and room thermostat (if fitted) are calling for heat.

(f) Start the boiler (referring to the procedure given in 'Instructions for Use').

(g) Slowly turn the boiler thermostat control knob anti-clockwise until first 'click' is heard then turn control knob back to maximum.

(h) With boiler operating, slowly turn the derating control clockwise, until increasing burner gas pressure on U tube gauge corresponds to the required central heating output - see Section 4.2.

Open a hot tap to a high flowrate (at least 8 litres per minute). The burner pressure should increase to the maximum value stated in Section 4.2.

If not, refer to Fault Finding Section.

(j) Move selector lever to left hand (hot water) position, remove rubber tube and replace test point screw.

(k) Reset selector lever to right hand position and check test point for gas soundness with boiler operating.

(l) Replace plastic cap.

**7.6.3** Using a ball point pen, clearly indicate on the data badge which value of central heating output the appliance has been set to.

**7.6.4** It should be remembered that the above adjustment procedure does not reduce the domestic hot water output of the boiler.

## 7.7 Boiler Casing Replacement

### 7.7.1 Rear closure pieces

(a) Two rear closure pieces are supplied and should be attached to rear edges of side panels to conceal the expansion vessel at the back of the boiler.

(b) Both full height closure pieces are used when either: - a rear flue connection from the back outlet of the boiler is used, or - when a flue connected to the top outlet is used.

(c) If a side flue, connected to the back outlet, is used, the closure piece on the side to which the flue passes must be shortened to a length of 760mm. Fig. 62.

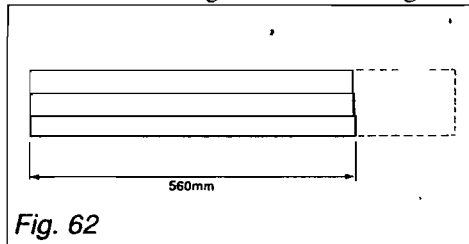


Fig. 62

The plastic closure piece may be cut using a hacksaw.

(d) To fit the rear closure pieces:

- remove boiler side panel, refer to 6.13.1.

- slide closure piece on to flange on rear edge of boiler side panel. Fig.63.

- replace side panel, reversing removal procedure.

Repeat for other side panel.

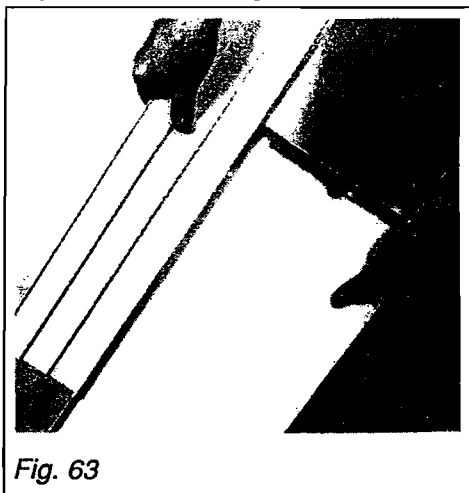


Fig. 63

**7.7.2** To replace boiler casing panels use the reverse of the removal procedure described in 6.13.1.

When fitting the upper front panel, ensure that:

- the panel is correctly located onto BOTH retaining lugs at the top of the boiler.
- the plastic restraining strap is correctly located over the combustion gas test point.

Then push the bottom edge into position, ensuring that both retaining catches are correctly engaged into bottom edge of panel.

**Important:** Check that panel is correctly fitted by pulling it forwards from the boiler. If panel is not correctly fitted, at either top or bottom, remove it and repeat replacement procedure.

**NB.** The upper front panel must be correctly fitted before the boiler can be operated. Failure to correctly fit this panel will result in the boiler failing to operate correctly, that is, the main burner will not operate for heating or hot water.

Finally, ensure that earth leads are connected to the earthing lugs on both side panels and the upper front panel.

## 7.8 Boiler/System Control

**7.8.1** After operating the boiler briefly on heating to bring it up to temperature, check the operation of the boiler thermostat, with the boiler selector lever in the right hand position and with heating controls calling for heat: Turn boiler thermostat control knob fully anticlockwise, the burner should go out. Slowly turn the boiler thermostat knob clockwise, the burner should first light and run on low flame.

Continue turning the knob until the burner fires on high flame.

**7.8.2** With the boiler selector lever in the right hand position and the boiler thermostat set to maximum (fully clockwise), manually operate the room thermostat and/or the timeswitch to check that they switch the burner off and on when required.

**7.8.3** Finally, set all central heating controls to the customer's requirements.

**7.8.4** In the event of a power failure, the boiler will stop operating but the pilot will remain alight. When power is restored, the boiler will automatically restart. If the power to the boiler is cut off for an extended period the pilot may eventually go out.

Restart the boiler following the lighting procedure given on the boiler (or in the Instructions for Use).

## 8 ROUTINE CLEANING AND INSPECTION

To ensure the continued efficient and safe operation of the boiler it is recommended that it is checked and serviced at regular intervals. The frequency of servicing will depend upon the particular installation conditions and usage, but in general once a year, at the end of the heating season should be enough.

It is the law that any servicing must be carried out by a competent person.

### 8.1 Pre-service check

Operate the appliance and check for any faults which may need to be rectified during servicing.

### 8.2 Isolate boiler from gas and electrical supply.

### 8.3 Remove boiler casing

Refer to Section 6.13 for details of boiler panel removal.

### 8.4 Remove combustion chamber

(a) Loosen the two wing nuts on the combustion chamber retaining rods - located either side of the 'dimpled' combustion chamber cover.

Disengage retaining lugs from holes in either side of combustion chamber and move retaining rods away to clear

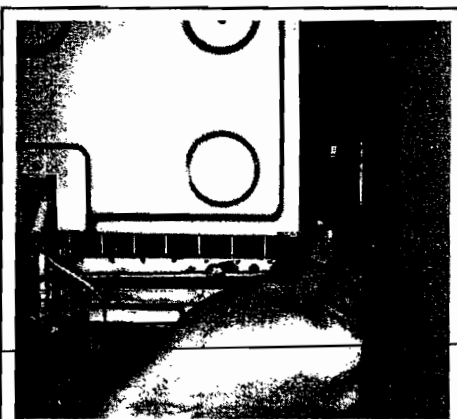


Fig. 64

combustion chamber sides. Fig.64.

(b) Unclip the two toggle clips retaining the upper part of the combustion chamber in position.

(c) Holding both sides, gently pull chamber forward - disengaging it from the underside of the heat exchanger - and out of the boiler.

Take care not to damage the insulation material attached to the internal faces of the combustion chamber.

### 8.5 Removal and cleaning of burner and pilot

(a) Unclip pilot burner retaining clip and remove pilot burner. Fig.65.

Inspect and clean if necessary by blowing through tube.

(b) Using a 10mm spanner, unscrew small nut connecting pilot supply pipe to pilot injector tube.

Carefully remove supply pipe by easing downwards. Refer to Fig.58.

**NB.** The 'O' ring seal from this connection must be retained for use on re-assembly.

(c) Undo screw and remove thermocouple retaining clip from burner injector bar bracket. Fig.65.

(d) Disengage thermocouple head from bracket, pull downwards to clear burner injector bar bracket.

(e) Undo the main gas supply pipe nut from the main burner.

(f) Undo and remove the three screws fastening the triangular retaining plate to the front face of the gas valve. Pull pipe forward to disengage from gas valve then pull down to disengage from main burner.

**NB.** The "O" ring seal behind the triangular plate and the gasket at the burner nuts be retained for use on reassembly.

(g) Unscrew and remove the locking nut and washer from both the main gas connection and burner pressure tapping point. Fig.66.

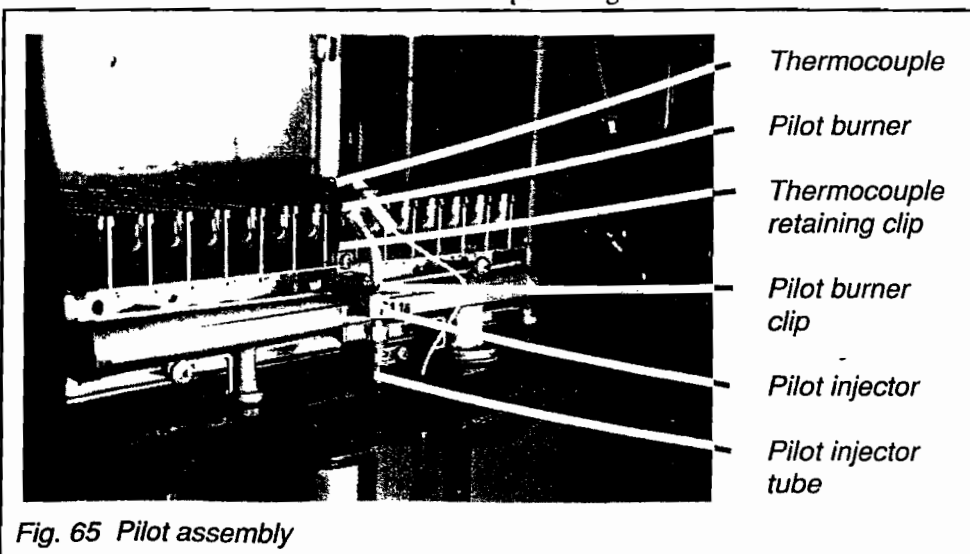


Fig. 65 Pilot assembly

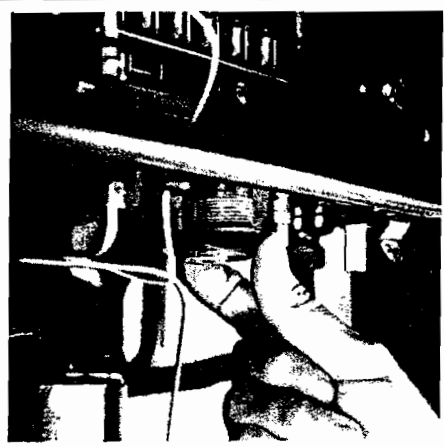


Fig. 66

- (h) Lift front edge of burner until gas pressure tapping and main gas supply tapping is free. Remove burner from boiler, Fig.67. Retain the four sealing washers for use on reassembly.
- (i) Unscrew and remove the two injector bar retaining screws and separate injector bar from burner.
- (j) Examine injectors and clean as necessary. DO NOT probe injectors with any pointed implement.

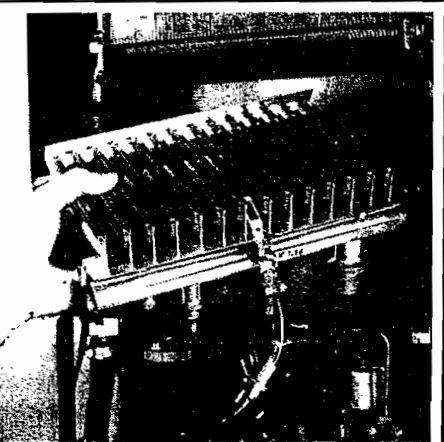


Fig. 67

- (k) Undo screw and remove pilot injector tube from burner injector bar.

Fig.67

- (l) Using a 10mm spanner unscrew and remove small injector retaining nut from injector tube. Examine injector, clean or replace as necessary. DO NOT probe injector hole with any pointed implement.
- (m) Refit injector and retaining nut to injector tube. DO NOT OVERTIGHTEN NUT.

## 8.6 Clean heat exchanger

- (a) After removal of burner, examine heat exchanger for any blockages or build-up of deposits.
- (b) Clean, if necessary, brushing away any deposits with soft brush from below heat exchanger - or use a vacuum cleaner.

## 8.7 Re-assembly of burner and combustion chamber

Re-assemble the burner in reverse order to the dismantling procedure, that is:

- (a) Refit pilot injector tube to burner injector bar, secure with screw.
- (b) Refit burner injector bar to burner, secure using the two retaining screws.
- (c) Refit burner into boiler

**NB.** Ensure that sealing washers are fitted against the flange of the main gas connection and pressure tapping before refitting burner into boiler.

Ensure that the rear of the burner is resting on the lip of the bracket at rear of boiler (visible between the two central burner elements) and that the burner pressure tapping is correctly located in hole in bottom of combustion chamber.

- (d) Replace two locking nuts and washers, then tighten.
- (e) Refit main gas supply pipe to the gas manifold ensuring the rubber gasket engages into the gas manifold. Reconnect the other end to the gas valve using the three screws to fasten the triangular retaining plate. Ensure that "O" ring is correctly located in outlet of gas valve before fitting pipe. Fit and tighten the main gas supply pipe nut ensuring the collar is correctly located against the gasket. Fig.67a.

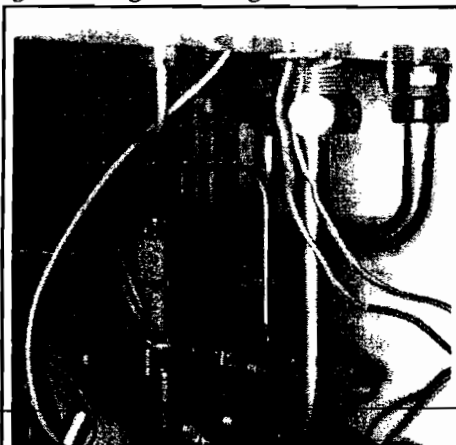


Fig. 67a

- (f) Refit thermocouple - passing it up between the two central burner elements. Locate thermocouple head in mounting bracket on burner injector bar. Secure with thermocouple clip, ensuring that the thermocouple head is correctly located into the forked end of the clip before securing with fixing screw.
- (g) Refit pilot tube - ensuring that fork on pilot burner passes either side of thermocouple head - and collar on pilot tube is located between into locating lug on cast bracket.
- (h) Fit 'O' ring seal on end of pilot supply pipe and connect to injector tube. DO NOT OVERTIGHTEN NUT.

- (i) Refit combustion chamber.

Ensure that combustion chamber sides are correctly located into grooves under heat exchanger and that when fixed the sides locate into the two recesses provided at the rear of the boiler. Holding the chamber in this position, locate and engage the retaining lugs into their respective holes on each side. Tighten both wing nuts. Latch top pair of toggle clips, after ensuring alignment with their respective catches. Finally fully tighten both wing nuts to ensure that combustion chamber is firmly held in place.

## 8.8 Check flue system

- (a) Check externally to ensure flue terminal is not obstructed.
- (b) Inspect flue system to ensure that all fittings are secure.

## 8.9 Check operation of fan

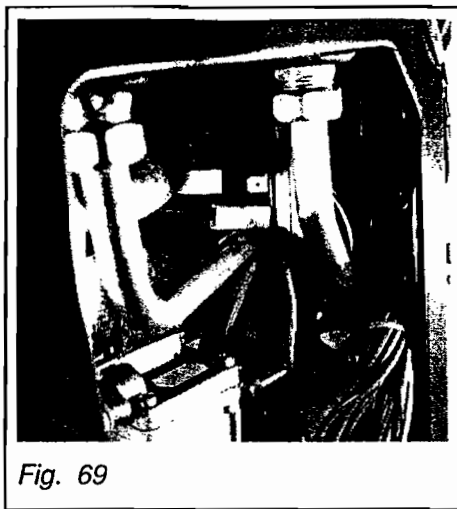
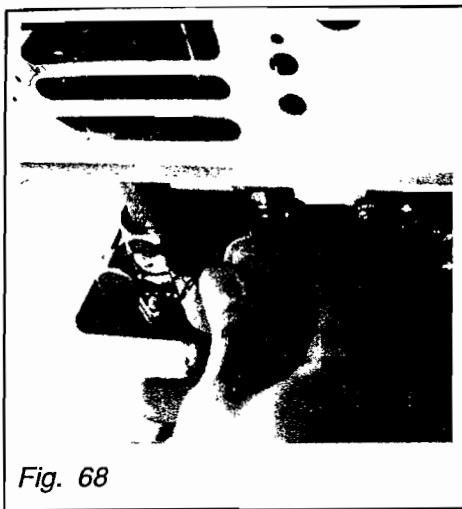
- (a) Switch on electrical supply and turn on gas.
- (b) Light pilot - as 'Instructions for Use' ensuring that selector lever is in the left hand position.
- (c) Check that, with the pilot on, the fan operates.
- (d) Light burner, by opening a hot tap. Without the white upper front panel fitted the burner should be automatically prevented from remaining on by the airflow detection system. Replace upper front panel - refer to 7.7.1. Check that fan speed increases when burner lights and decreases when the burner goes out.

## 8.10 Check operation of flame failure device

With the upper front panel removed, put the pilot flame out. The gas inlet valve to the boiler should be heard to shut within 60 seconds of the pilot going out.

## 8.11 Check cold water Inlet filter

- (a) Drain down hot water circuit of boiler refer to 10.2.
- (b) Undo connecting nut from cold water inlet connection.
- (c) Remove white filter from inlet connection. **NB.** Connecting pipe is telescopic - it may be necessary to slide sleeve back to give easier access to filter. Fig.68.
- (d) Clean and inspect filter - replace if necessary, for example, if mesh is damaged, stretched or distorted.
- (e) With both flow restrictor and filter in place, reconnect connecting pipe to inlet connection and tighten. Fully open isolating valve on cold water inlet and check for water leaks.



## 8.12 Check performance of boiler

(a) Using a U-tube gauge, connected to test point below the sealed inner casing, check burner pressure on both heating and hot water - refer to 4.2.

**NB.** If boiler has been de-rated, burner pressure will be less than maximum, on heating only. Refer to appliance data badge to determine derated output.

(b) If burner pressure is incorrect, refer to Commissioning - 7.5 gas pressures.

**Important:** Always check for gas soundness after re-connecting any gas carrying components.

(c) Check that maximum hot water flowrate is about 11 Litres/min.

## 8.13 Check operation of water valve

With selector lever in left hand (hot water only) position, slowly open a convenient tap until boiler lights up. Measure this flowrate of water - it should not be greater than about 3.5 Litres per minute.

If necessary, replace the diaphragm.

## 8.14 Replace panels

Replace remaining outer panels - refer to 7.7

## 9 REPLACEMENT OF PARTS

For replacement of the following components it will be necessary to remove the boiler casing panels - as described in Section 6.13:

**Warning:** Before commencing the replacement of any component, isolate appliance from electrical supply and turn off gas at service cock.

### 9.1 To replace thermocouple

- Remove combustion chamber cover refer to 8.4.
- Remove pilot burner - refer to 8.5a.
- Remove thermocouple retaining clip refer to 8.5b.
- Disconnect Klixon overheat device connections from thermocouple. Fig.69.

(e) Disengage thermocouple head from burner injector bar bracket, pull downwards and through rubber sealing grommet in bottom of sealed chamber.

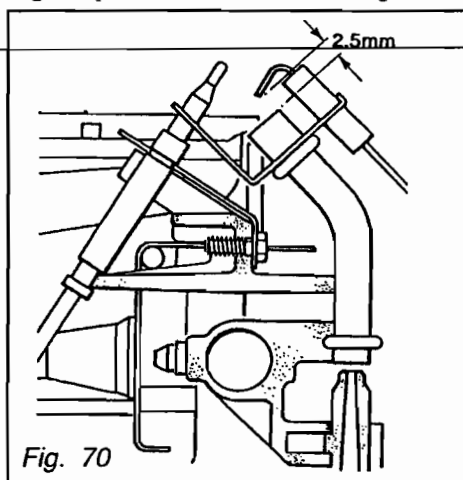
(f) Using a 10mm spanner, unscrew the thermocouple nut and disconnect thermocouple from thermocouple solenoid at rear of gas valve.

**NB.** A hole is provided in bottom plate of boiler for access to this nut.

(g) Fit new thermocouple connecting nut to thermocouple solenoid first. Push thermocouple head up through rubber sealing grommet in bottom of sealed chamber and between burner arms in centre of burner. Correctly locate head in burner injector bar bracket. Secure with thermocouple retaining clip ensuring that thermocouple head is correctly located into forked end of clip before securing with fixing screw.

**Important:** Ensure that the two electrical connectors are firmly attached and that sealing grommet is correctly fitted.

(h) Replace pilot burner - check that gap between pilot ignition electrode and top edge of pilot burner is 2.5mm. Fig.70.



(i) Replace combustion chamber - refer to 8.7(i).

(j) Relight boiler pilot - following the procedure given on the boiler (or in the Instructions for Use) - and check that when the 'ON' button is released, once thermocouple tip is heated, the pilot remains alight.

The pilot flame should be 'V'-shaped (viewed from the front) and about 12mm ( $\frac{1}{2}$ in) long on each leg of the 'V'.

### 9.2 To replace thermocouple solenoid

(a) Using a 10mm spanner unscrew thermocouple nut from solenoid - at rear of gas valve.

**NB.** A hole is provided in bottom plate of boiler for access to this nut.

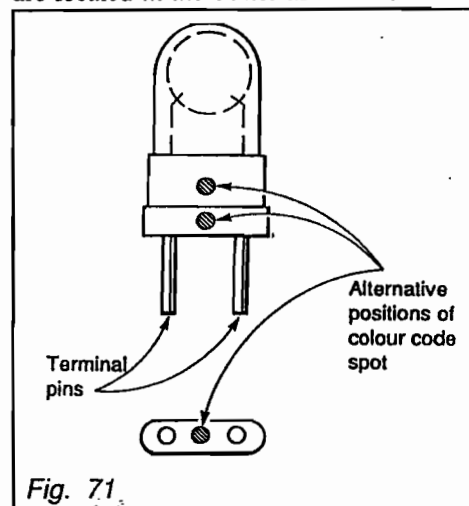
(b) Preferably using an 18mm spanner, unscrew and remove the thermocouple solenoid from the gas valve casting.

(c) Fit new solenoid, tighten and reconnect thermocouple nut.

(d) Relight boiler pilot - following the procedure given on the boiler (or in the Instructions for Use) - and check that when the 'ON' button is released, once the thermocouple tip is heated, the pilot remains alight.

### 9.3 To replace thermistors

(a) The thermistors can be easily identified by a small coloured spot - either located between the terminal pins or on the side of the plastic body (Fig.71) - and are located in the boiler as follows:



(b) Disconnect leads from terminal pins. Remove plastic retaining clip by sliding it off. Remove thermistor from pocket.

(c) Thoroughly cover head of replacement thermistor with heat sink compound provided.

(d) Carefully fit replacement thermistor into pocket. Refit retaining clip and leads to terminal pins - after checking that no heat sink compound is left on pins.

**Important:** Although of similar appearance the two thermistors fixed to this boiler are NOT the same. NEVER fit an overheat thermistor in pocket intended for hot water thermistor - or the other way round.

### 9.4 To replace microswitch assembly

(a) Disconnect microswitches by pulling off plugs from microswitch terminals. Fig.72.

| Function            | Location                        | Colour code | Part No. |
|---------------------|---------------------------------|-------------|----------|
| Overheat protection | Left side of heat exchanger     | Violet      | 52332    |
| Hot water control   | Flow pipe - left side of boiler | Orange      | 52908    |

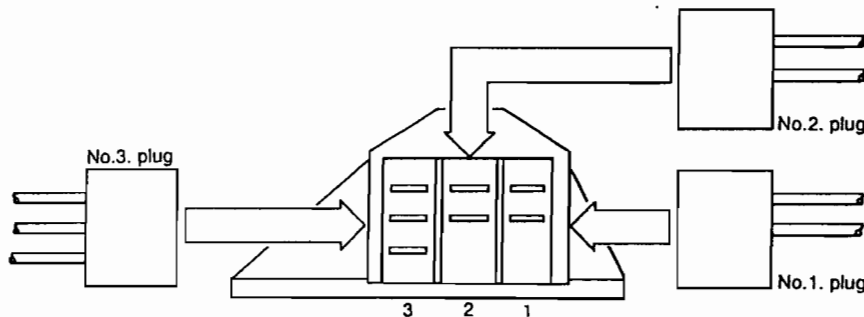


Fig. 72 Microswitch connections

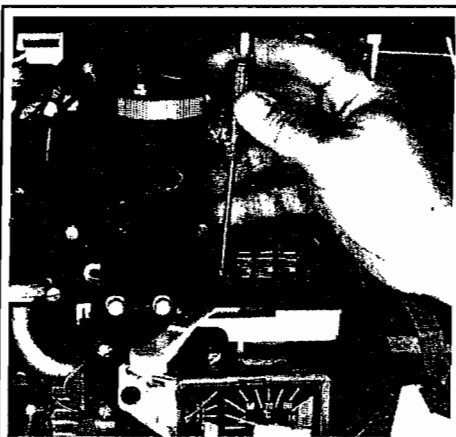


Fig. 73

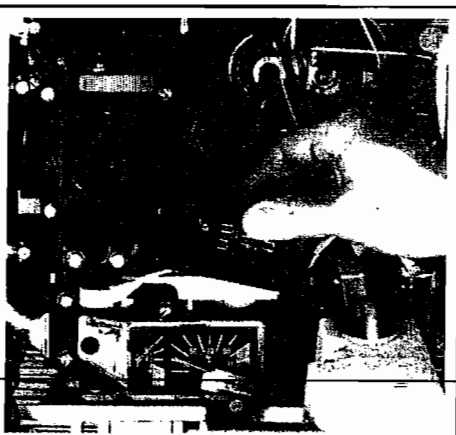


Fig. 74

(b) Undo and remove screw holding microswitch assembly down onto reversing valve assembly. Lift microswitch assembly away from reversing valve assembly. Fig.73 and 74.  
**Warning:** Do not operate selector lever whilst microswitch assembly is removed from the top of reversing valve, to ensure that link bar does not become disengaged from internal mechanism.

(c) Fit replacement microswitch assembly onto top of reversing valve - locating the two lugs (on the rear edge) into the slots provided. Secure using fixing screw.

(d) Reconnect the three plugs ensuring that the numbering on the respective plug leads correctly responds with that marked on the top of the switch housing. Fig.72.

## 9.5 To replace fan

(a) Disconnect power supply and earth leads to fan.

(b) Unscrew and remove the two fan retaining screws located at the front edge of fan mounting plate.

(c) Remove fan, with mounting plate attached, as follows:

- Boiler with BACK OUTLET flue connection:

Pull fan forward and out of boiler - complete with connector tube.

- Boiler with TOP OUTLET flue connection:

Pull back rubber sleeve from flue elbow to reveal aluminium pipe.

Rotating aluminium pipe anti-clockwise, disconnect it from flue elbow.

Loosen screws holding elbow clamps (on top of boiler) - slide back clamps and remove elbow from boiler.

Keeping front edge of fan mounting plate vertical, pull bottom edge of fan mounting plate forwards, to disengage the two retaining lugs from the rear of the gas hood.

~~Remove complete fan assembly, carefully guiding fan around pressure switch tapping (and connecting tube) and out of boiler.~~

(d) Remove original fan; fit replacement fan to mounting plate. Ensure that fan is correctly positioned on mounting plate for flue outlet being used - either top or back outlet.

(e) Refit replacement fan (complete with mounting plate) into boiler using the reverse of the above removal procedure. Ensure that mounting plate retaining lugs are correctly located onto rear edge of flue gas hood opening. Refit retaining screws. Reconnect power supply leads (to either terminal) and the earth lead to the earth tag on the motor.

**Important:** Ensure that outlet of fan is correctly located into either the flue elbow (top outlet), or the flue elbow or

connector, by the bent connector tube (back outlet). Also ensure that, for top outlet flue connections, the aluminium pipe is FULLY pushed on to outlet spigot on flue elbow, before refixing rubber sleeve - refer to Installation, 6.13.5.

(f) Before commissioning the boiler ensure that the two plastic transit clips are removed from the fan.

## 9.6 Replace air pressure switch

(a) Locate pressure switch - situated in upper left corner of sealed chamber. Refer to Fig.1. Carefully pull off tube from the left hand connection.

(b) Carefully push down both clips at the bottom of the retaining bracket - until clear of pressure switch.

(c) Grasp pressure switch and pull it away from the side and out of retaining bracket.

(d) Disconnect switch by pulling leads from switch terminals.

(e) Fit leads to terminals of replacement switch - connect each lead as indicated by the corresponding terminal numbers.

(f) Fit replacement switch into boiler by clipping it into retaining bracket.

(g) Reconnect tube to LEFT hand connector (marked P1), ensuring it is securely pushed on.

## 9.7 To replace push-button box

(a) Disconnect the three rubber plugs from the right hand side of the push-button box.

(b) Undo and remove screw holding push-button box to bottom plate of boiler.

(c) Undo and remove screw holding push-button box to front of gas valve.

(d) Remove push-button box by pulling it forwards and upwards - disengaging it from gas valve.

(e) Fit replacement push-button box into boiler, locating it in the recess on the front of the gas valve - using the reverse of the removal procedure.

**NB.** Each of the three plugs is uniquely 'keyed' to fit the correct one of the three sockets on the push-button box.

## 9.8 To replace spark generator

(a) Locate spark generator on inside rear face of boiler. Fig.1.

(b) Disconnect all four leads from spark generator.

(c) Remove the left hand and loosen the right hand fixing screws - remove spark generator.

(d) Fit and secure replacement spark generator.

(e) Reconnect two power supply leads, earth lead and ignition lead to correct terminal as follows:

- Power leads (marked 1 and 2) - terminals 1 and 2 (as marked on leads).
- Earth leads (green/yellow) - terminal 3.
- Ignition lead (white) - terminal 4.

## 9.9 To replace printed circuit board (PCB)

- (a) With lower front (control) panel in horizontal position, support external plastic panel, undo and remove the six screws holding the inner and outer lower panels together - three located at outer and three at the inner edge of lower front panel. Fig.75.
- (b) Whilst still holding the two halves together, lift and refit lower front panel to boiler -locking it in position with quarter turn fasteners.
- (c) Open control panel cover and remove boiler thermostat control knob by pulling it off the spindle. Carefully separate outer plastic panel from inner one. Fig.76.
- (d) Carefully pull off PCB connectors - one from each end of PCB - to disconnect PCB from wiring loom of boiler. Fig.77.
- (e) Unscrew and remove the two retaining screws - near upper edge of PCB, carefully disengage PCB and remove it from boiler.
- (f) Fit replacement PCB. Locate lower edge of PCB into retaining slot, refit and tighten retaining screws.

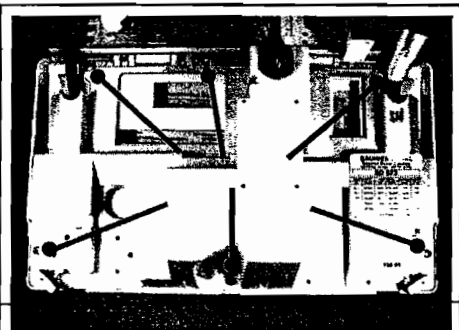


Fig. 75

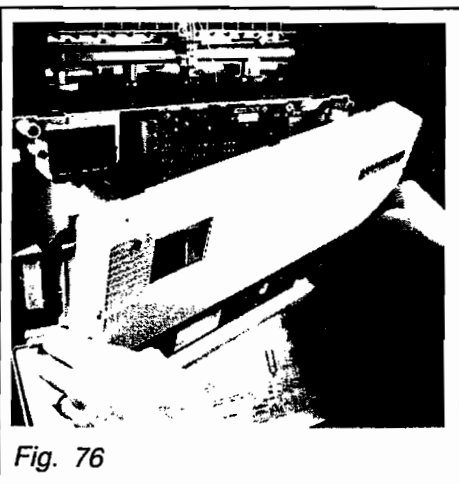


Fig. 76

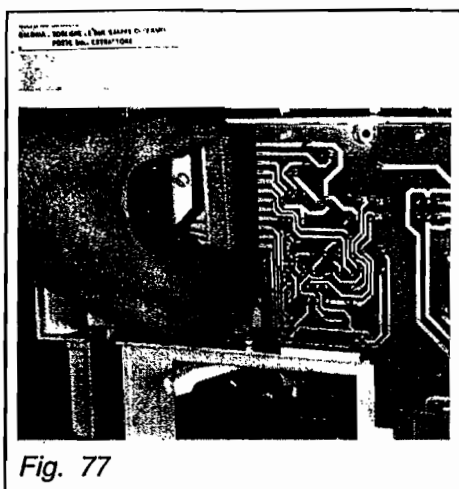


Fig. 77

**NB.** Ensure that PCB is correctly fitted - with component side of PCB facing inwards and that potentiometer adjusting spindle is located to align with the access hole in inner panel.

- Refit PCB connectors fully pushing them home onto PCB edge connectors.
- (g) Refit outer lower panel.
- Locate quarter turn fasteners correctly into holes in plastic outer panel.
- Refit boiler thermostat control knob to spindle and close control panel cover.
- Holding the two halves together, disengage the two quarter-turn fasteners, open the lower front panel to the horizontal position, refit the screws and fasten two halves together.

## 9.10 To replace boiler thermostat

- (a) Remove outer plastic section from lower front (control) panel (refer to 9.9 a to c). Unclip and remove control panel cover from boiler.
- (b) Remove combustion chamber cover, refer to 8.4.
- (c) Unclip boiler thermostat sensing bulb from heating return pipe (on left side of boiler). Fig.78. Push sensing bulb down through rubber grommet in bottom of sealed chamber.
- (d) Undo two screws and remove boiler thermostat mounting plate - with thermostat attached - from inner lower front panel.
- (e) Disconnect the four leads from rear of thermostat. Undo and remove the two retaining screws and separate thermostat from its mounting plate.
- (f) Unscrew one of the hinge rod brackets. Refer to Fig.79 (a). Remove by sliding off end of hinge rod. Slide hinge rod to one side to disengage it from remaining hinge rod bracket disengage the two quarter turn fasteners. Continue sliding rod to one side, until clear of thermostat capillary. Refer to Fig.79 (b). Remove thermostat capillary from slot in inner lower panel and remove from boiler.

(g) Fit capillary of replacement thermostat into slot and refit hinge and replace hinge rod bracket using the reverse of removal procedure.

(h) Carefully route the thermostat capillary to pass under pressure/temperature gauge and to left side of boiler. Fig.79(b)

Push sensing bulb up through rubber grommet into sealed chamber. Clip bulb into indentation on return pipe to heat exchanger after applying heat sink compound, provided, to side of bulb in contact with pipe.

(i) With inner lower panel in vertical position, fit replacement thermostat to mounting plate and secure with screws provided.

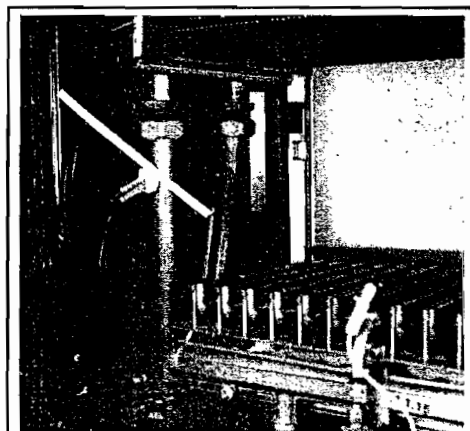


Fig. 78

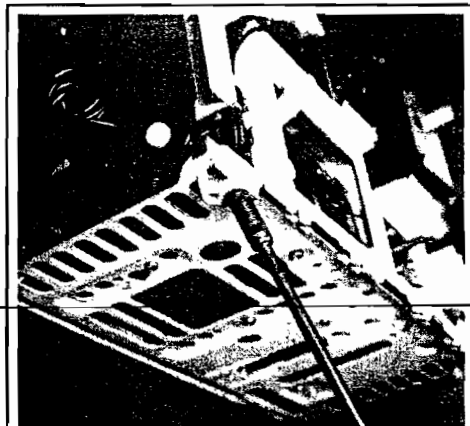
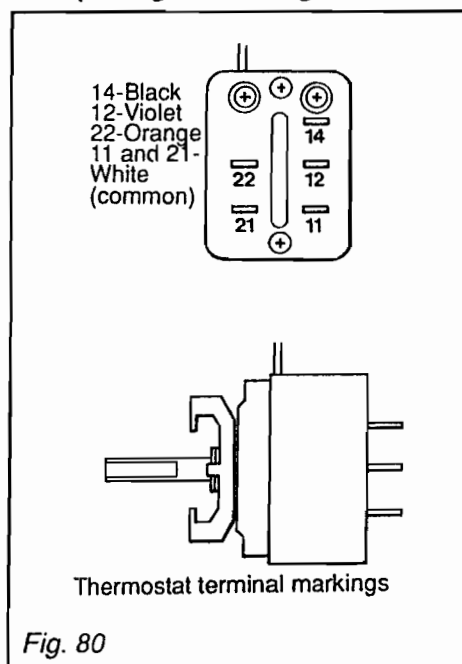


Fig. 79(a)



Fig. 79(b)

(j) Reconnect the four leads to terminals on rear of thermostat, ensuring that each lead is connected to terminal with corresponding number. Fig.80.



(k) Fit thermostat (on mounting plate) into recess in inner lower panel and secure with the two screws provided. Refit control panel cover by clipping onto hinge rod.

(l) Refit combustion chamber cover - refer to 8.7(h).

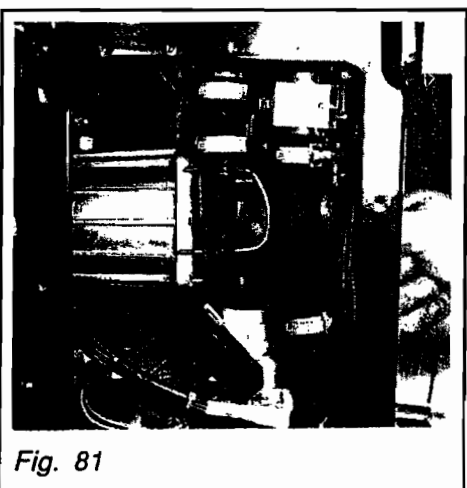
Refit outer plastic panel - refer to 9.8(h).

### 9.11 To replace pump

(a) Drain down heating circuit of boiler only refer to 10.1.

**NB.** It is not necessary to drain entire heating system to carry out this work.  
(b) Disconnect in-line electrical supply connector plug by pinching side grips and pulling two halves apart. Disconnect earth lead from earth terminal below pump capacitor.

(c) Pull out retaining clip and remove pump outlet connection - complete with flexible hose - from left side of pump. Fig.81.



(d) Undo two fixing screws and remove pump retaining bracket from front of pump.

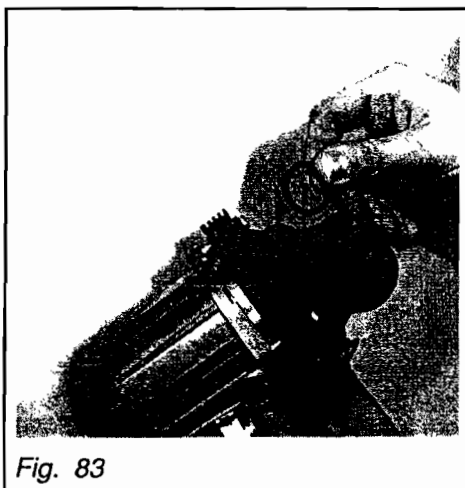
(e) Grasp pump body, lift upward to disengage pump inlet from reversing valve.

(f) When clear of reversing valve, slightly turn pump to the RIGHT and remove pump from boiler by pulling forward and over reversing valve assembly. Fig.82.



Discard old pump inlet connection 'O' ring.

(g) Apply silicone grease to new pump 'O' ring provided and fit onto pump inlet connection at bottom of pump. Fig.83.



(h) Fit replacement pump into boiler - using reverse of removal procedure. With replacement pump inclined to the RIGHT, locate spigot on rear of pump motor in large grommet at rear of boiler.  
(i) Keeping pump inlet connection clear of reversing valve, turn pump anti-clockwise to bring it vertical. Check that pump is fully pushed back into grommet and that pump inlet is directly above reversing valve outlet.

(j) Pull down pump into reversing valve. Take care to ensure that 'O' ring is correctly located. Immediately replace pump retaining bracket and fix with two screws.

(k) Reconnect pump outlet to pump body.

**NB.** Apply silicone grease to pump outlet connection 'O' ring before fitting. Secure in position using wire clip.

**NB.** Ensure clip is fully pushed home into pump moulding.

Reconnect in-line electrical supply plug and earth lead.

(I) Open isolating valves on flow and return connections, refill and vent boiler - as per Installation Instructions - check all joints for leaks.

### 9.12 To replace pressure/temperature gauge

(a) Drain down heating circuit of boiler only refer to 10.1.

**NB.** It is not necessary to drain entire heating system to carry out this work.

(b) Undo and remove fixing screw holding gauge to front of reversing valve assembly.

(c) Remove gauge, pulling pressure probe tube from reversing valve and temperature probe from pocket on heating flow pipe.

(d) Apply heat sink compound, provided, to temperature probe of replacement gauge.

(e) Fit replacement gauge - carefully locating pressure probe tube in small hole in front of reversing valve and temperature probe in pocket of heating flow pipe.

**NB.** Use new 'O' ring provided for pressure probe. Apply silicone grease to 'O' ring before assembly.

(f) Fit gauge fixing screw, taking care not to cross thread it in tapped hole in reversing valve front plate.

(g) Open isolating valves on flow and return connections on jig.

Refill and vent boiler - as Installation Instructions - and check for leaks.

### 9.13 To replace reversing valve assembly

(a) Remove pressure/temperature gauge refer to 9.12a), b) and c).

(b) Remove pump - refer to 9.11.

(c) Remove microswitch assembly - refer to 9.4.

(d) Remove retaining clip from left hand pipe connection on front section of reversing valve and disengage pipe.

(e) Unscrew and disconnect heating flow (centre) connection at fixing jig. Fig. 84. Remove retaining clip from heating flow pipe connection on right of front section of reversing valve.

Remove flow pipe from boiler and keep.

(f) Unscrew and disconnect heating return (left hand) connection at fixing jig. Fig.85.

(g) Remove retaining clip from expansion vessel pipe connection - at rear of reversing valve assembly - and disengage pipe.

Push pipe back and out of reversing valve assembly.

(h) Undo and remove large crosshead screw holding water valve to back plate of reversing valve assembly. Fig.86.

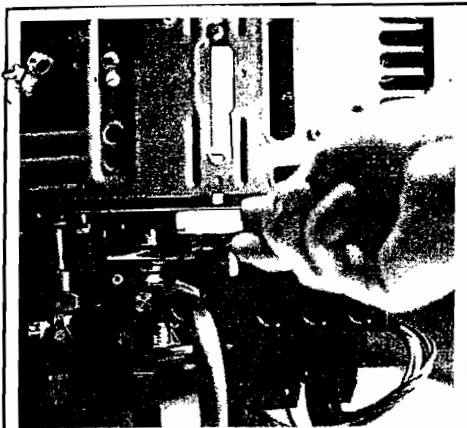


Fig. 84

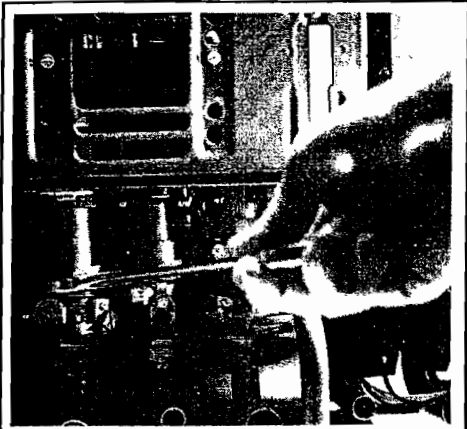


Fig. 85

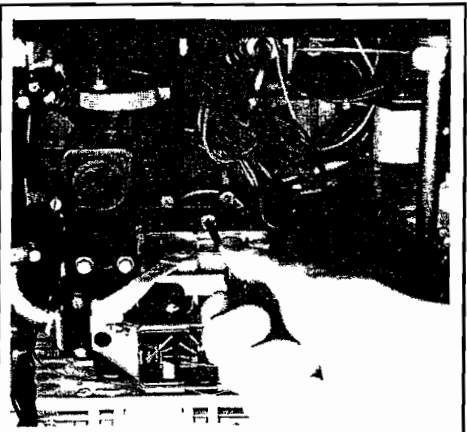


Fig. 86

Push water valve back to disengage it from reversing valve assembly.

(i) Unclip and remove water pressure switch from left side of reversing valve assembly. Fig.1.

(j) From below boiler, undo and remove three screws holding reversing valve to bottom plate of boiler. Remove complete reversing valve assembly from boiler.

(k) Undo hose clip and remove heating return connecting pipe and hose from rear of reversing valve assembly. Fit hose to replacement reversing valve assembly using hose clip.

(l) Fit replacement reversing valve into boiler using reverse of removal procedure. Use new 'O' rings, retaining clip, filter and washer provided.

Unscrew and remove microswitch assembly from top of replacement

reversing valve assembly to allow refitting of water valve.

**NB.** Fit expansion vessel pipe and water pressure switch to reversing valve assembly before pump, to ensure that it is correctly located. Apply silicone grease to all 'O' rings and hoses prior to assembly.

(m) Open isolating valves on flow and return connections, refill and vent boiler - as Installation Instructions - and check for leaks.

#### 9.14 To replace reversing valve front section

(a) Remove pressure/temperature gauge refer to 9.12(a), (b) and (c).

(b) Remove pipe connections from either side of reversing valve front section - refer to 9.13(d) and (e).

(c) Set selector lever to left hand (hot water only) position.

(d) From below boiler, undo and remove single screw holding reversing valve front plate to bottom plate of boiler.

(e) Undo and remove six screws holding front section to rear section of reversing valve. Fig.87.

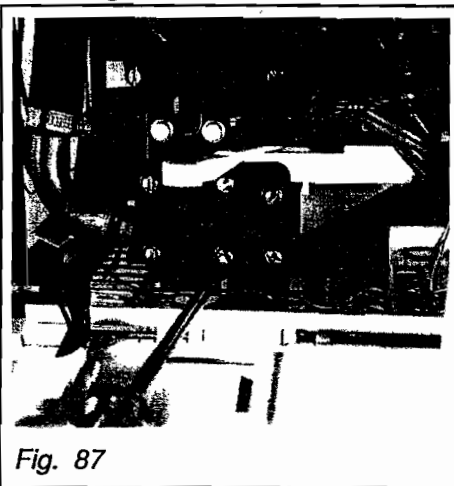


Fig. 87

(f) Remove front plate (complete with pump bracket) and then front section from reversing valve - along with rubber sealing gasket.

(g) Assemble pump bypass valve provided and fit into hole in underside of replacement front section. Fit 'U' shaped retaining clip.

**NB.** Use bypass valve fitted to original front section for guidance.

(h) Fit replacement front section, with gasket, to rear section of reversing valve. Locate front plate and replace six fixing screws. Take care to evenly tighten fixing screws and that they are not cross-threaded in tapped holes in reversing valve back plate.

(i) Refit pipe connections to either side of front section using new 'O' rings provided. Apply silicone grease to 'O' rings before fitting.

(j) Refit pressure/temperature gauge - refer to 9.12(d), (e) and (f).

(k) Open isolating valves on flow and return connections, refill and vent boiler - as Installation Instructions and check for leaks.

#### 9.15 To replace reversing valve washers

(a) Remove front section of reversing valve refer to 9.14.

(b) Remove microswitch assembly from reversing valve assembly - refer to 9.4.

(c) Set selector lever to right hand (heating/ hot water) position.

(d) Using small, flat-bladed screwdriver, carefully prise flat 'key' plate up and out of left hand crank and reversing valve shaft. Fig.88.

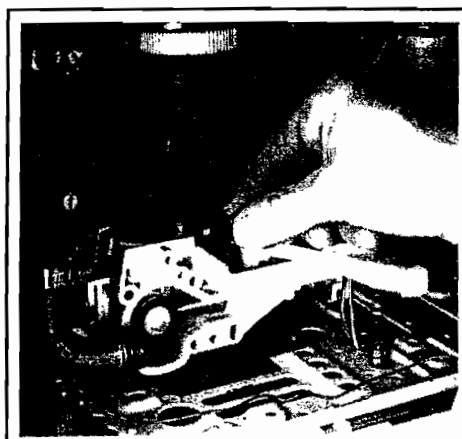


Fig. 88

(e) Through front of open reversing valve housing, pull reversing valve arm forwards.

Remove washers from two faces of reversing valve and fit replacement washers - pushing them over central retaining boss.

(f) Push reversing valve arm back until slot in shaft aligns with slot in left hand crank in mechanism. Replace key plate in slot and push fully home. Set selector lever to left hand (hot water only) position.

(g) Replace the microswitch assembly - refer to 9.4.

(h) Refit front section, with gasket - refer to 9.14(h), (i) and (j).

Open isolating valves on flow and return connections, refill and vent boiler - as per Installation Instructions - and check for leaks.

#### 9.16 To replace water pressure switch

(a) Drain down heating circuit of boiler only refer to 10.1.

**NB.** It is not necessary to drain entire heating system to carry out this work.

(b) Pinch plastic cover to release retaining clips and remove cover from switch. Disconnect two leads from switch by pulling off plug from terminals.

- (c) Remove retaining clip holding switch into left side of reversing valve assembly.
- (d) Remove switch from reversing valve - by pulling out towards left.
- (e) Fit replacement switch into reversing valve - using new 'O' ring provided apply silicone grease to 'O' ring before fitting.
- (f) Reconnect leads to switch terminals by refitting plug.

**NB.** Plug can only be fitted one way.

- (g) Open isolating valves on flow and return connections, refill and vent boiler - as per Installation Instructions - and check for leaks.

## 9.17 To replace water valve or diaphragm

- (a) Drain down hot water circuit of boiler only - refer to 10.2.
- (b) Remove microswitch assembly - refer to 9.4.
- (c) Unscrew connecting nut from cold water inlet connection (second from left on fixing jig), retain filter and flow regulator.
- (d) Remove retaining clip holding connecting pipe in rear of water valve - from below boiler, grip the clip with long-nosed pliers and remove by pulling downwards.

**NB.** This connecting pipe is 'telescopic' - it may be necessary to slide brass sleeve back to allow easier removal.

- (e) Remove clip holding pipe to heat exchanger in rear of water valve - from front of boiler, grip clip with long-nosed pliers and remove by pulling upwards.

Fig.89.



Fig. 89

- (f) Unscrew and remove large crosshead screw holding water valve to back plate of reversing valve assembly. Refer to Fig.86.

Push water valve back, to disengage it from reversing valve and remove it from boiler. Fig.90.

**NB.** When disengaging water valve from heat exchanger pipe. check if small flow control device - fitted in water valve outlet - is not held on end of pipe. If so, carefully separate pipe from water valve

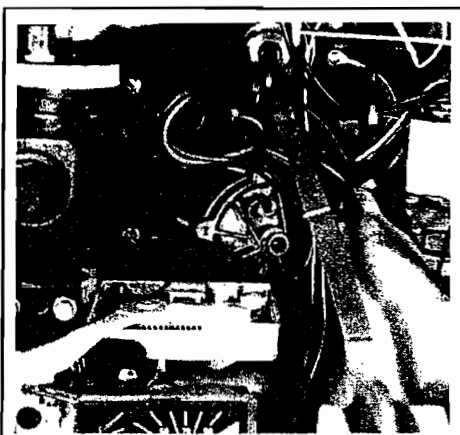


Fig. 90

to ensure that small spring and jumper do not fly out and are lost

- (g) To replace diaphragm - undo five screws and separate main components of water valve.

If white diaphragm cover is to be replaced, separate original from water valve nose end casting and fit replacement cover.

- (h) Fit replacement diaphragm - ensuring that metal disc FACES diaphragm cover and beaded edge of diaphragm is correctly located in corresponding groove in both cover and plastic housing. Fig.91. Reassemble water valve, taking care to evenly tighten five screws.

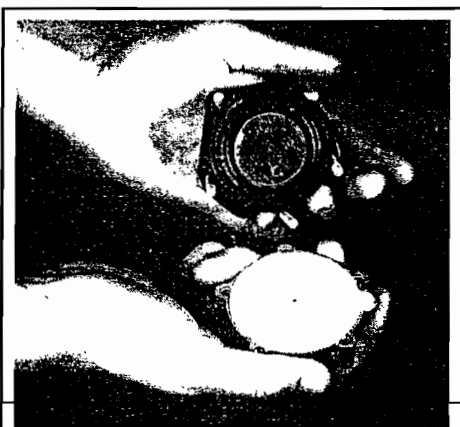


Fig. 91

- (i) Fit water valve actuating pin into hole in diaphragm cover - through nose end of valve - and push in until flush (or slightly below) nose end of water valve. **NB.** Apply silicone grease to pin before fitting.

- (j) Replace water valve in boiler - locating nose end into rear of reversing valve assembly - 'springing' heat exchanger pipe to gain clearance as necessary. Fit large crosshead water valve retaining screw but do not fully tighten at this stage.

- (k) Apply silicone grease to 'O' ring, and fit onto end of heat exchanger pipe. Fit pipe into water valve by pulling it forwards - ensuring that 'O' ring is correctly located.

Whilst holding pipe in rear of water valve, fit retaining clip. This should easily clip over pipe and should not have to be forced. If resistance to fitting clip is experienced, either pipe is not correctly located in rear of water valve, or clip is not being correctly fitted through slot between back plate and plastic housing of water valve. When clip is fitted, check connection by pushing pipe back away from water valve.

- (l) Refit telescopic connecting pipe to inlet of water valve after applying silicone grease to 'O' ring. Fit retaining clip into groove on connecting pipe - through slot between back plate and plastic housing of water valve. Check connection by pulling pipe. Ensure that clip is not loose, and prone to fall out at a later date. If in doubt, fit a new clip.

- (m) With both flow regulator and plastic filter washer in place, refit connecting nut to inlet connection and tighten. Open isolating valve on cold water inlet connection and check for water leaks.
- (n) Replace microswitch assembly - refer to 9.4.

## 9.18 To replace gas valve

- (a) Ensure that gas supply to boiler is turned off at gas cock.

- (b) Remove push-button box - refer to 9.7a) to d).

- (c) Disconnect thermocouple from thermocouple solenoid - refer to 9.1.

- (d) Disconnect gas valve from wiring loom by pulling off two spade connectors on gas valve coil and disconnect earth lead from top of gas valve coil.

- (e) Undo two screws and remove pilot supply pipe retaining plate and cork gasket from front of gas valve.

Carefully disengage pilot supply pipe from top of gas valve body by pulling upwards and out of 'O' ring seal.

- (f) Undo the main gas supply pipe nut from the main burner. Undo and remove the three screws fastening the triangular plate to the front face of the gas valve. Pull pipe forward to disengage from gas valve then pull down to disengage from the main burner.

**NB.** The gasket at the burner must be retained for use on reassembly.

- (g) Undo main gas union nut - between gas valve and gas inlet valve - at right hand rear of boiler.

- (h) From below boiler, undo and remove two gas valve retaining screws.

Withdraw gas valve from boiler.

Unscrew and remove thermocouple solenoid from rear of gas valve.

(i) Fit thermocouple solenoid to replacement gas valve. Ensure that actuating pin, in gas valve inlet, is free to move. Fit replacement gas valve into boiler, engaging threaded inlet on to inlet valve. Do not fully tighten gas union nut at this stage.

(j) From below boiler, fit two gas valve retaining screws and tighten. Tighten main gas union nut.

(k) Undo two screws and remove pilot supply pipe retaining plate and cork gasket from front of replacement gas valve. Apply silicone grease to the smaller 'O' ring provided and fit into pilot supply pipe connection of top of gas valve.

Replace retaining plate and cork gasket with supply pipe passing through the 'forked' top of the plate. Fit and tighten retaining screws.

(l) Apply silicone grease to the larger "O" ring provided and fit into the pipe connection in front of gas valve.

Refit main gas supply pipe. Refer to Section 8.7(e).

(m) Refit push button box using reverse of removal procedure.

(n) Reconnect wiring loom spade connectors to gas valve.

(o) Reconnect thermocouple to thermocouple solenoid.

### 9.19 To replace pressure relief valve

(a) Drain down entire heating system.

(b) From below boiler, disconnect heating flow pipe from rear of fixing jig.

(c) Remove pressure/temperature gauge refer to 9.12.

(d) Undo heating flow connection on front of fixing jig. Remove retaining clip from heating flow pipe connection, on the right of front section of reversing valve. Pull pipe towards right and out of reversing valve. Remove pipe from boiler and keep.

(e) From below boiler - disconnect relief valve discharge pipe.

(f) Working through the boiler, from the front, using a long screwdriver, undo and remove the screw holding relief valve assembly to fixing jig connecting plate.

(g) From below boiler, undo heating flow pipe connection from relief valve assembly, at rear of connecting plate.

(h) Remove complete pressure relief valve assembly from connecting plate, and withdraw from boiler.

(i) Fit replacement relief valve assembly. Fasten in place using fixing screws.

(j) Reconnect flow pipe to rear of jig and pipe between reversing valve and front of jig, using the sealing washers provided.

NB. Apply silicone grease to 'O' ring before fixing pipe into right hand side of reversing valve.

(k) Replace pressure/temperature gauge using reverse of removal procedure.

(l) Refill heating system and boiler, and vent - as Installation Instructions - and check for leaks.

### 9.20 To replace heat exchanger

(a) Drain down both heating and hot water circuits of boiler only - refer to 10.1 and 10.2.

NB. It is not necessary to drain entire heating system to carry out this work.

(b) Remove combustion chamber cover refer to 8.4.

(c) Disconnect overheat thermistor on left side of heat exchanger - refer to 9.3 (b).

(d) Unscrew and disconnect two heating connections to left side of heat exchanger.

(e) Unscrew and disconnect two hot water connections to right side of heat exchanger.

(f) Grasp both sides of heat exchanger - pull it forwards on slide rails and out of boiler.

(g) Transfer overhead thermistor to pocket on left side of replacement heat exchanger refer to 9.3.

(h) Fit replacement heat exchanger into boiler. Locate outward facing flanges - one on each side of heat exchanger - into slide rails. Push heat exchanger into boiler until connections line up. Fig.92.

(i) Reconnect heating and hot water connections - ensuring that sealing washers provided are fitted, before tightening nuts.

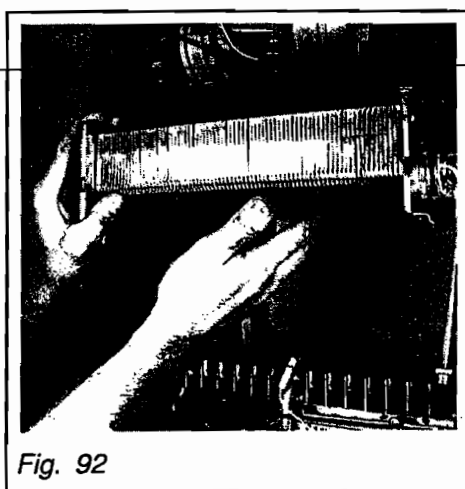


Fig. 92

(j) Reconnect thermistor - refer to 9.3.

(k) Replace combustion chamber - refer to 8.7.

(l) Open isolating valves on flow and return connections, refill and vent boiler - as Installation Instructions - and check all joints for leaks.

### 9.21 To replace fan resistor

(a) Locate fan resistor - mounted immediately beside air pressure switch in top left corner of boiler. Refer to Fig.1.

(b) Holding both ends of resistor, pull it forwards to disengage it from retaining clip.

(c) Disconnect two leads by pulling off connectors from terminals - remove resistor from boiler.

(d) Connect leads to replacement resistor. Each lead can be fitted to either terminal.

(e) Fit replacement resistor into boiler using the reverse of the above procedure.

### 9.22 To replace expansion vessel

#### 1 Boiler in place

The expansion vessel can be replaced, with the boiler in place, provided that a minimum clearance of 400mm clearance exists on one side of the boiler and that no vertical pipework passes between boiler and wall on that side. To do so, proceed as follows:

(a) Drain down the heating circuit of the boiler - refer to 10.1.

NB. It is not necessary to drain the entire heating system to carry out this work.

(b) Remove pump from boiler - refer to 9.11.

(c) Unscrew pipe connection nut from expansion vessel connection - located at centre rear of boiler and disengage pipe from connection. Retain sealing washer.

(d) Provide a temporary support for the lower front panel - in open position.

(e) Remove back nut, and plastic restraining strap anchor loop, from expansion vessel connection.

Remove cap from expansion vessel Schrader valve.

(f) Whilst supporting weight of expansion vessel, push bottom of expansion vessel away from boiler - disengaging threaded connection from hole in rear of boiler - and allow it to drop out of two upper retaining brackets.

(g) Remove vessel to side of boiler with adequate clearance.

NB. If expansion vessel has to be removed to left side of boiler, it will be necessary to first remove the domestic expansion vessel (unless this has been located in the alternative position on installation).

(h) To remove domestic expansion vessel: - drain the domestic hot water circuit of the boiler only - refer to 10.2.

- unscrew and disconnect the cranked copper connecting pipe from the nipple on the cold inlet connection.
- remove vessel, complete with pipe, from boiler. Retain the sealing washer.
- refit the domestic expansion vessel - after replacement of the heating expansion vessel

using the reverse of the above procedure, ensuring that the sealing washer is fitted before tightening the connection.

- (i) Fit the replacement expansion vessel, to the rear of the boiler, using the reverse of the removal procedure, ensuring that:
  - the Schrader valve is located in the fork of the upper left retaining bracket.
  - the plastic restraining strap anchor loop is correctly located behind the back nut.
  - the sealing washer is fitted to expansion vessel pipe connection before tightening.
- (j) Check that expansion vessel charge pressure is 0.5bar (7.5psi) using a tyre pressure gauge; if necessary increase pressure using a car or cycle tyre pump connected to the Schrader valve.
- (k) Open isolating valve on flow and return connections, refill and vent boiler - as Installation Instructions - check all joints for leaks

**2 Boiler removed from wall**  
If replacement of the expansion vessel is not possible with the boiler in place (that is, insufficient clearance), it will be necessary to remove the boiler from the wall. To do so, proceed as follows:

- (a) Drain down both heating and hot water circuits of boiler only - refer to 10.1 and 10.2.
- (b) Ensure that gas supply to boiler is turned off at gas cock and that electrical supply is isolated.
- (c) Disconnect flue from either flue connector or flue elbow whichever is applicable.

## 2 Boiler removed from wall

(d) Unscrew and disconnect the five connections between fixing jig and boiler. Disconnect the two boiler electrical plugs from rear of electrical connection box on fixing jig.

(e) Disengage pipe connections. Lift boiler off fixing jig and place, face up, on a convenient work surface.

(f) Remove expansion vessel from boiler using procedure given in steps (b) to (g) of 9.22-1.

(g) Fit replacement expansion vessel, and check charge pressure - as described in steps (i) and (j) of 9.22-1.

(h) Replace boiler on fixing jig, tighten all connections - gas connection first - ensuring that all sealing washers, filters, and the cold water flow restrictor, are fitted before tightening - refer to 6.13.

(i) Reconnect flue - ensuring that aluminium pipe is correctly located onto either flue outlet or flue elbow, whichever is applicable BEFORE refitting rubber sleeve - refer to 6.13.6.

(j) Open isolating valves on flow and return connections, refill and vent boiler - as Installation Instructions - and check all joints for leaks.

(k) Reconnect boiler electrical plugs to electrical connection box - refer to 6.13.3.

(l) Reconnect electrical supply. Open gas cock, operate boiler and check all joints for soundness.

**3 External replacement expansion vessel**  
If replacement of a faulty expansion vessel is both unnecessary, for example, it is not leaking and impossible, due to lack of adequate clearance on one side, it is possible for a replacement expansion vessel to be connected to the heating circuit outside of the boiler. To conform with the requirements of the current issue of BS6798, this expansion vessel should be connected to the heating circuit as close to the inlet to the pump, that is, as close to the heating return connection on the fixing jig as possible.

**9.23 To replace digital timeswitch**

## 1 Replacing timeswitch display module

- (a) Remove main printed circuit board - refer to 9.9(a) to (e).
- (b) Unscrew and remove small PCB retaining screw. Slide timeswitch PCB forward and disconnect flying lead plug from small timeswitch printed circuit board. Fig.93.



Fig. 93

- (c) Unscrew and remove the two timeswitch retaining screws and remove display module - complete with mounting plate - from boiler.

(d) Undo two screws and separate mounting plate from display module.

(e) Fit replacement display module to mounting plate. Secure with the two screws.

(f) Refit mounting plate onto inner lower front panel and secure with screws.

(g) Connect display module flying lead plug to timeswitch printed circuit board. Slide PCB back and refit retaining screw.

(h) Replace main printed circuit board, and outer plastic section of lower front panel refer to 9.9 f) and 9)

## 2 Replacing timeswitch printed circuit board

- (a) Remove main printed circuit board - refer to 9.9 (a) to (e).
- (b) Unscrew and remove small PCB retaining screw. Remove printed circuit board by sliding it forward and out of the slots in inner lower front panel Fig.94.



Fig. 94

- (c) Disconnect display module flying lead plug, power supply and switching connections from timeswitch printed circuit board.
- (d) Reconnect display module flying lead plug, power supply and switching connections to replacement printed circuit board.
- (e) Fit replacement printed circuit board sliding it into the retaining slots. Refit PCB retaining screw.
- (f) Replace main printed circuit board and outer plastic section of lower front panel refer to 9.9(f) and (g).
- (g) Reset timeswitch, as required, in accordance with procedure given in the Instructions for Use.

## 9.24 To replace overheat thermostat

- Locate the overheat thermostat on the heating flow pipe - immediately below the sealed chamber on the left side of the boiler. Refer to Fig.1.
- Disconnect the two leads from the thermostat.
- Undo and remove the retaining clip screw.
- Remove retaining clip from pipe - complete with overheat thermostat.
- Fit replacement thermostat into clip and thoroughly cover the contact surface of the thermostat with the heat sink compound, provided.
- Refit retaining clip/overheat thermostat onto pipe, locating thermostat onto the flat section indented into the pipe.
- Fasten clip in place with screw.
- Reconnect the two leads (to either terminal).

## 9.25 To replace combustion chamber insulation

Each of the four insulation panels, used to line the combustion chamber, can be individually replaced, as follows:

### 1 Front section

- Remove combustion chamber from boiler - refer to 9.4.
- To remove insulation panels - slide panel out of retaining lugs on combustion chamber sides.
- To remove front insulation panel - first remove the two spring steel retaining clips by pulling tab away from and then out of, combustion chamber panel. Fig.95.

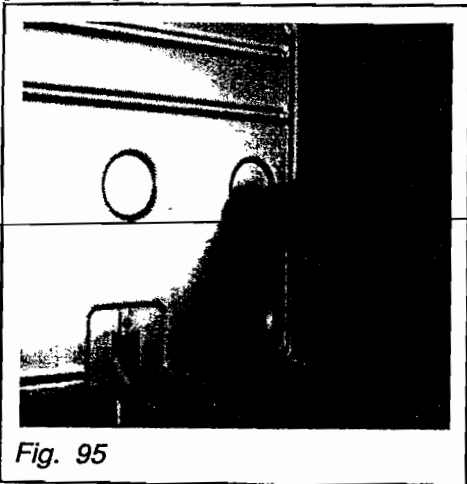


Fig. 95

Lift insulation panel free from two retaining lugs and away from chamber.

- Fit replacement insulation panels using the reverse of the removal procedure.

### 2 Rear panel

- Remove burner from boiler - refer to 8.4 and 8.5(a) to (h).
- Carefully pull bottom edge of rear insulation panel forwards, downwards and out from behind heat exchanger. Remove insulation panel from boiler.
- Fit replacement panel, using the reverse of the removal procedure.

- Replace burner into boiler, using reverse of removal procedure - refer to 8.7.

## 9.26 To replace pilot assembly

- Remove combustion chamber - refer to 8.4.
- Remove pilot burner from main burner refer to 8.5(a).
- Disconnect ignition lead from spark generator.
- Remove pilot from boiler - pulling ignition lead through sealing grommet in bottom of sealed chamber.
- Fit replacement pilot burner - complete with ignition electrode, using reverse of removal procedure.

## 9.27 To replace burner

- Remove burner - refer to 8.4 and 8(a) to (h).
- Undo screw and remove pilot injector tube from burner injector bar.
- Assemble replacement burner (supplied in breakdown form) as follows:
  - fit burner injectors to burner injector bar and tighten.

NB. Ensure that injector size (marked on each injector) matches that given in Table 1 for the gas being used.

- fit injector shrouds to injectors (on LPG boilers only).

- assemble burner elements (14) into front and rear burner supports, with securing pins and rods, using original burner for guidance.

- Fit pilot injector tube to burner injector bar, and secure with screw.
- Fit burner injector bar to burner, secure using the two retaining screws.
- Fit replacement burner into boiler, using reverse of removal procedure - refer to 8.7.

## 9.28 To replace pilot and burner injectors

- Remove burner - refer to 8.4 and 8.5(a) to (h).
- Undo screw and remove pilot injector tube from burner injector bar.
- Using a 10mm spanner, unscrew and remove injector retaining nut from injector tube.
- Remove and replace injector, ensuring that the size (marked on the injector) matches that given in Table 1 for the gas being used.

- Unscrew and remove the two injector bar retaining screws and separate injector bar from burner.

- Unscrew and remove the 14 injectors from the injector bar - after first removing the injector shrouds (on LPG boilers only).
- Fit replacement injectors to burner injector bar, and tighten. On LPG boilers, also fit burner injector shrouds to all injectors.

NB. Ensure that injector size (marked on each injector) matches that given in Table 1 for the gas being used.

- Re-assemble burner and replace into boiler - refer to 8.7.

## 10 TO DRAIN BOILER ONLY

**Important:** Shut down boiler by pressing 'OFF' button BEFORE commencing any draining operation.

### 10.1 Heating circuit

- Close isolating valves on flow and return connections - on fixing jig connecting plate. Refer to Fig.17.
- NB. These valves are closed when the slots are at a right angle to the direction of flow.
- Lift spindle on top of pressure relief valve using a screw-driver to reduce pressure in boiler. Fig. 96.

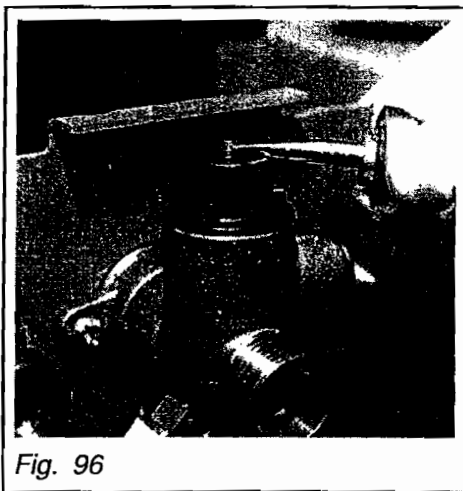


Fig. 96

- Position a suitable container below the drain valve outlet to collect the water drained from the heating circuit of the boiler.

A plastic tube, which can be pushed onto the drain valve outlet, may be used to simplify the draining operation.

- Open the drain valve by turning the drain valve knob anti-clockwise to drain the boiler. Refer to Fig. 96.

When draining is complete, fully close the drain valve by turning the valve knob clockwise.

### 10.2 Hot water circuit

- Close isolating valve on cold water inlet connection on fixing jig connecting plate. Refer to Fig.17.
- Open one, or more, hot water taps to drain boiler circuit.
- Finish draining by removing drain screw from underside of cold water inlet connection. Refer to Fig.17.

## 11 FAULT FINDING

### 11.1 Use of fault finding charts

Fault finding charts 1-6 will enable the majority of faults to be diagnosed, and faulty component (or components) identified, by following a structured and logical approach. However, to use this fault finding information effectively, it is necessary to determine exactly which aspects of the boiler are working correctly and which are not, before starting to follow the various flow diagrams.

For example:

If pilot cannot be lit refer to Chart No.1.

If pilot is OK, the domestic hot water works correctly but heating does not: refer to Chart No.2. If heating works correctly, but hot water does not refer to Chart No.3.

If neither heating nor hot water functions of the boiler work: refer to Chart No.4.

Remember - always adopt a step-by-step logical procedure to fault finding.

To effectively 'fault find' on the SD623, ask yourself what is working correctly and what is not? Having the answers to these simple questions will make the job much easier.

### Safety

**Important** Always isolate the appliance from the electrical supply before removing the boiler and connection box covers. After any service work, always check the appliance for gas soundness, with special attention being given to the union between the gas inlet valve and the boiler.

## 11.2 Microswitches

### 11.2.1 Location.

The three microswitches are housed in a plastic moulding located in the bottom left hand corner of the boiler mounted on top of the reversing valve and immediately to the right of the pump. Refer to Fig.97

### 11.2.2 Function

Switch 1 - Switches 240V to pump and 240V/24V transformer. Actuated by either selector lever (when put to right hand position) or water valve diaphragm (when lever is in 'left' hand position). Switch **MUST** be closed for burner (and pump) to operate.

Switch 2 - Switches 240V to pump and 240V/24V transformer. Overrides external heating controls (timeswitch and/or room thermostat) to operate burner for domestic hot water when they are 'off'.

Switch 3 - Changeover switch, supplies 24V to gas valve solenoid through either boiler thermostat (normal position), or domestic hot water control thermistor (when actuated by water valve diaphragm).

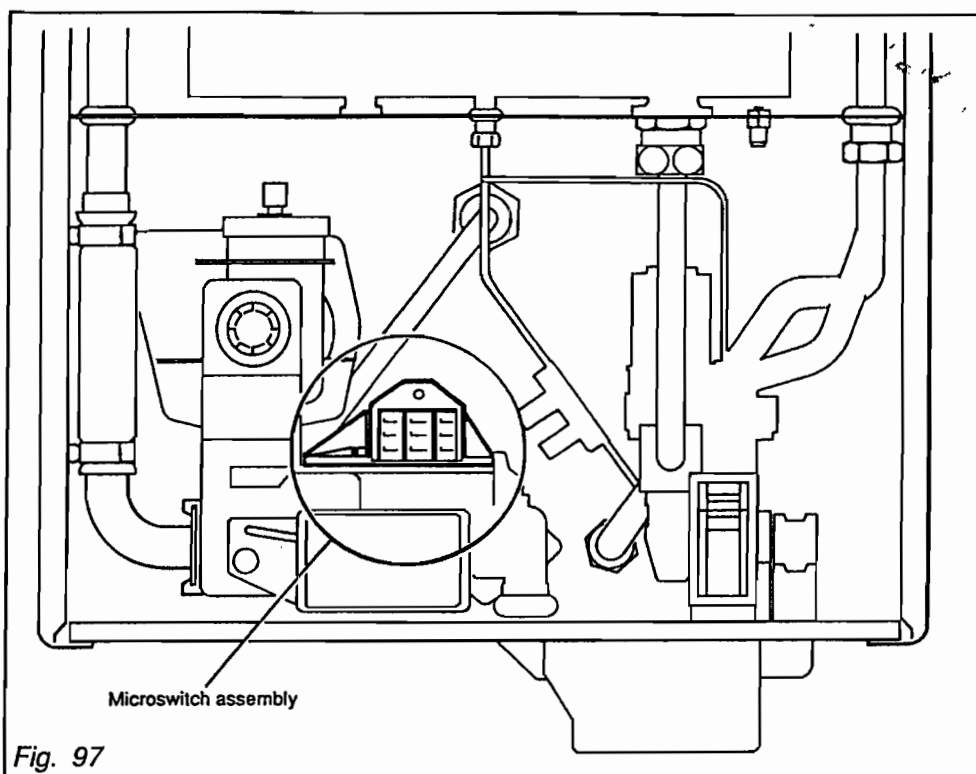


Fig. 97

### 11.2.3 Testing

Isolate boiler from electrical supply.

**NB.** It is not necessary to press the 'OFF' button and switch off the boiler pilot.

Pull off all three connections from the microswitch terminals.

Check each switch for continuity or open circuit (using a continuity tester or multimeter) with selector lever in either right or left position and hot taps either 'on' or 'off'.

If continuity is as indicated in Figs. 98A, B, C, and D, microswitches and water valve diaphragm are operating correctly.

**NB.** To use multimeter for continuity testing, set it to a resistance - ohms - scale and connect meter test leads to the two terminals being checked. Full meter movement indicates continuity, no meter movement indicates an open circuit condition.

Operation of water valve diaphragm and microswitches should be checked at a low water flow (about 3Litres/min) as well as at the maximum flow (12Litres/min).

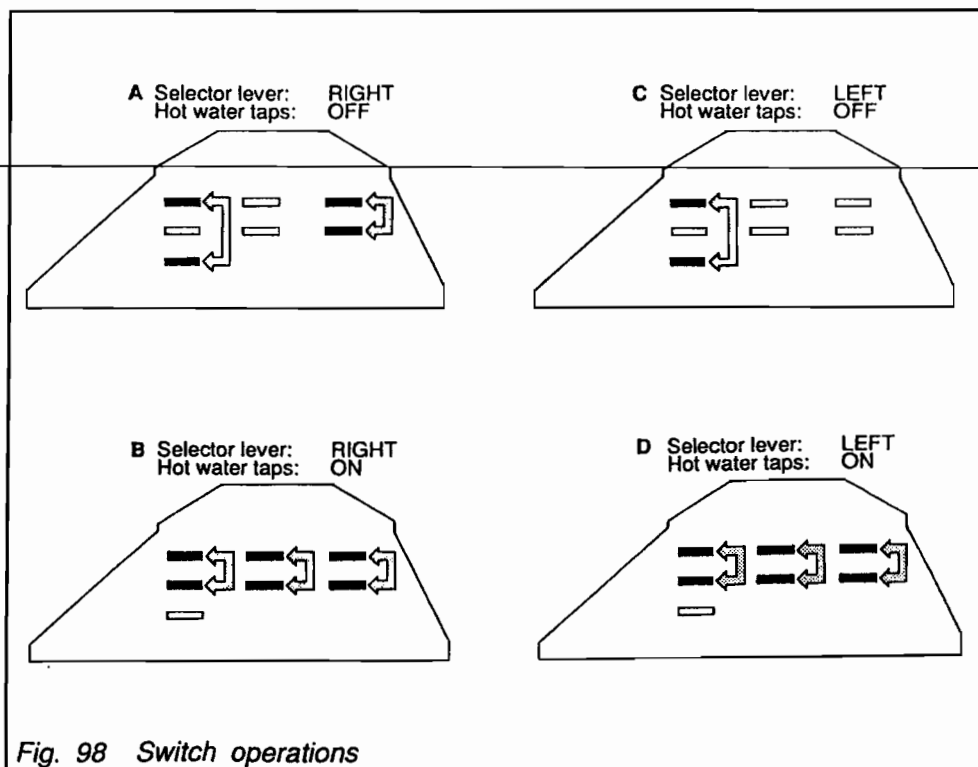


Fig. 98 Switch operations

# Saunier Duval SD623 Combination Boiler

## Fault Finding Chart number 1

### PILOT WILL NOT LIGHT

Check gas supply line-open any gas cocks,clear any blockages, purge out air.

Does pilot light

NO

After holding "On" button in for approx. 20 seconds-is there a spark across electrode gap and does fan run ?

YES

Remove pressure tapping screw at rear of gas valve-is gas present when "On" button is pushed ?

NO

YES

Remove gas valve and check that pushrod operating spring loaded gas inlet valve is present and correctly located.

Undo nut connecting pilot supply pipe to injector tube. Does gas flow freely when "on" button is pushed.

YES

NO

Check pilot supply pipe for blockage-rectify or replace as necessary.

Is the electrical supply to the boiler switched on?

NO

YES

Switch on electrical supply to boiler.

Check that 240V power supply is present at electrical connection box(between top and middle terminals on left hand side).

Check that plugs at rear of connection box are fully inserted, and that the terminal connectors inside the box have not been dislodged.

Check that plugs fitted into side of push button box are fully inserted.

Check that ignition leads are securely connected to spark generator.

Check pilot burner tube and spark electrode-replace if necessary.

Does pilot stay alight when "On" button is released ?

NO

YES

Is pilot lifting off?

YES

NO

Purge air from gas supply-check for blocked pilot injector and clean if required

Is pilot flame the correct "v" shape (each leg  $\frac{1}{2}$ " long) and enveloping thermocouple ?

NO

YES

Check for partially blocked pilot burner or injector, and rectify. Do not probe with any pointed implement. Check inlet gas pressure.

Check thermocouple/solenoid-replace if necessary

Check overheat cut-off device and connections to thermocouple-replace if necessary.

Check that crosshead retaining screw fixing push button box to gas valve is tight.

Is fan running at half speed?

NO

YES

Is power to boiler being turned off, i.e. by a time switch?

NO

YES

Check slow speed fan resistor-replace if necessary.

Check and rectify external wiring.

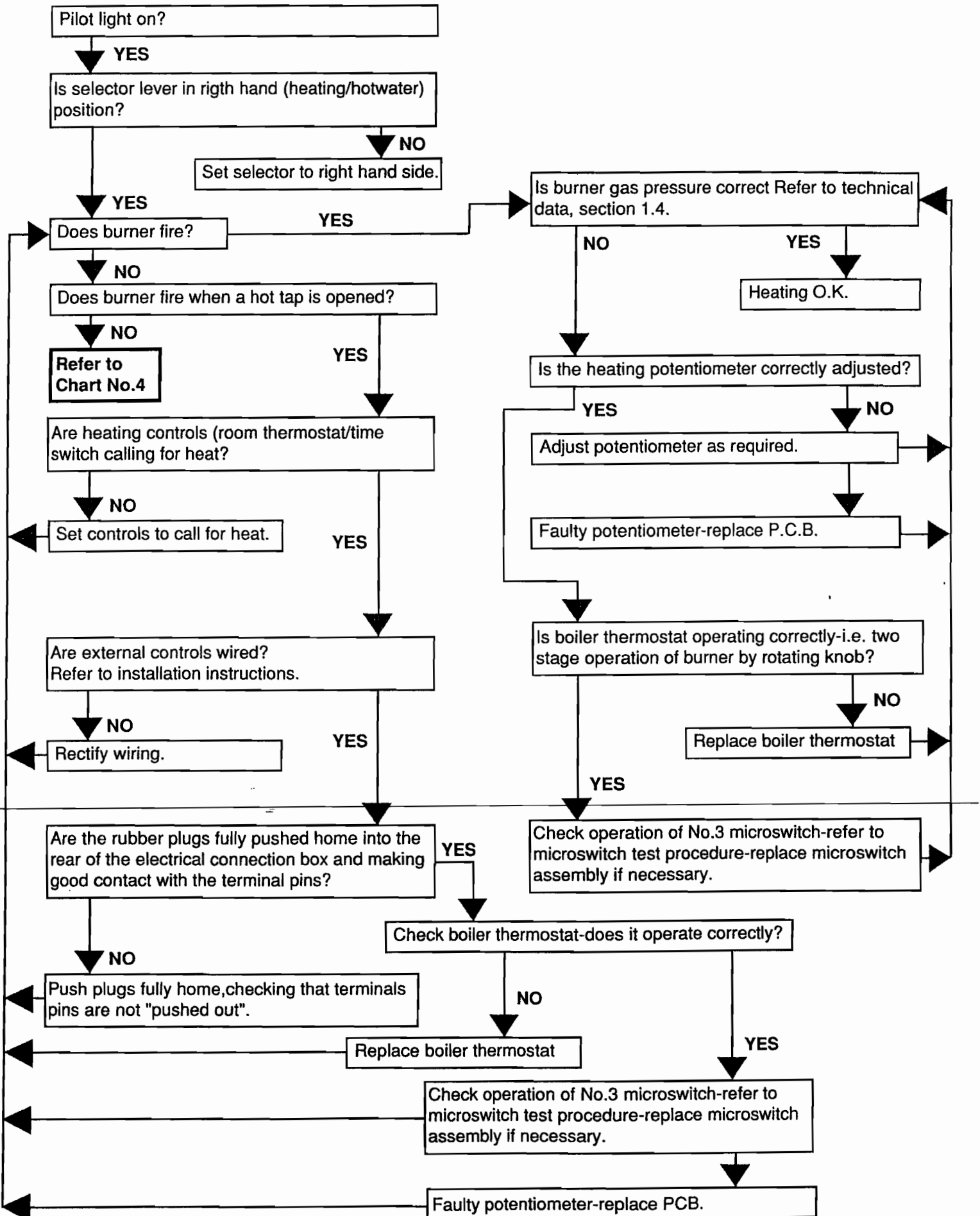
Check that flue is correctly fitted and is not obstructed.

Check spark generator-ensure that it is earthed to the boiler casing. Replace if necessary.

Check push button box-replace if necessary.

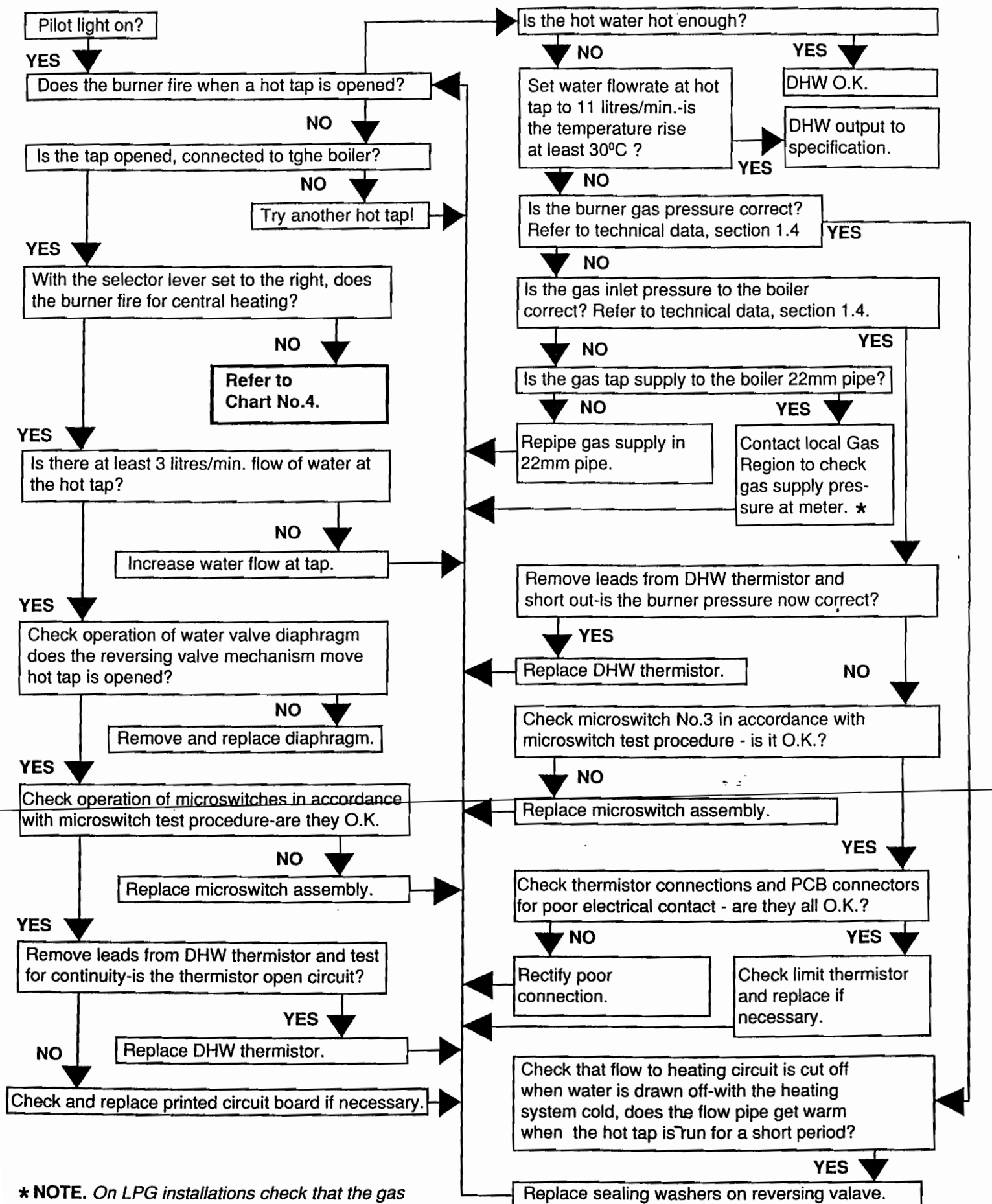
# Saunier Duval SD623 Combination Boiler Fault Finding Chart number 2

## NO CENTRAL HEATING



# Saunier Duval SD623 Combination Boiler Fault Finding Chart number 3

## NO DOMESTIC HOT WATER



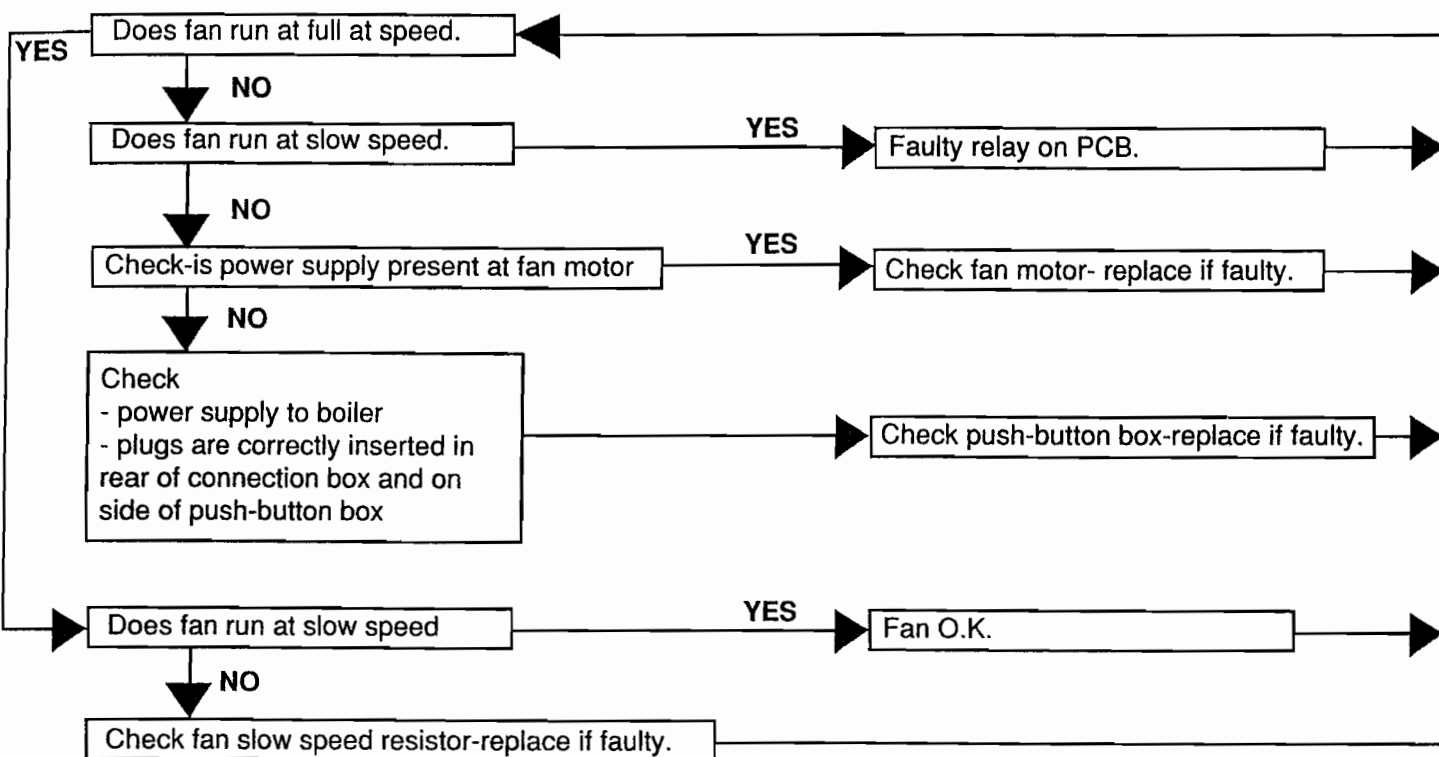
**BURNER WILL NOT FIRE**

**Refer to  
Chart No.5.**



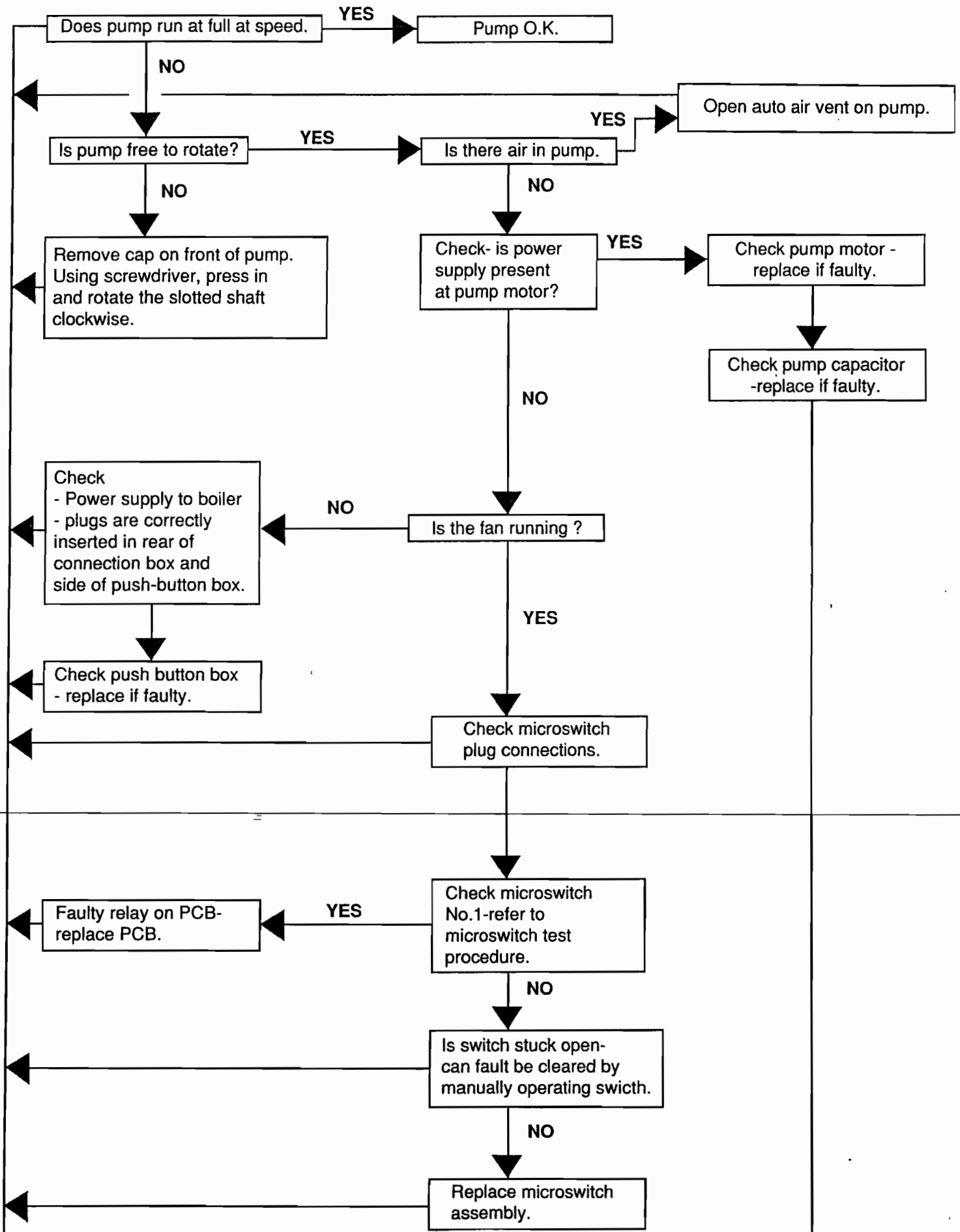
Saunier Duval SD623 Combination Boiler  
Fault Finding Chart number 5

**FAN NOT RUNNING**



# Saunier Duval SD623 Combination Boiler Fault Finding Chart number 6

## PUMP NOT RUNNING



## 12 SPARE PARTS

### 12.1 General

12.1.1 The following is a 'short' parts list covering the more commonly used components.

12.1.2 Use the item key number to identify each part shown in Figs. 99(a) and (b).

When ordering spare parts, please quote the part number and description - stating the appliance model number and serial number off the data badge.

### 12.2 Short parts list.

| No. | Description                       | Part No. | GC No.  |
|-----|-----------------------------------|----------|---------|
| 1   | Fan                               | 51606    | 373 510 |
| 2   | Pump                              | 51407    | 373 *** |
| 3   | Spark generator                   | 52106    | 373 501 |
| 4   | Boiler thermostat                 | 52916    | 373 506 |
| 5   | Air pressure switch               | 51560    | 373 *** |
| 6   | Jig/boiler washer /filter kit     | 52128    | 373 513 |
| 7   | Printed circuit board             | 51596    | 373 505 |
| 8   | Water valve-diaphragm kit         | 52519    | 373 507 |
| 9   | Hose clips (pack of 10)           | 54254    | 373 516 |
| 10  | Hoses-pump (pack of 2)            | 51624    | 373 514 |
| 11  | Hoses-reversing valve (pack of 5) | 54599    | 373 515 |
| 12  | Hose-flow pipe (pack of 3)        | 54680    | 373 714 |
| 13  | Microswitch assembly              | 51590    | 373 713 |
| 14  | Pressure /temperature gauge       | 53242    | 373 511 |
| 15  | Thermocouple                      | 52664    | 373 502 |
| 16  | Domestic hot water thermistor     | 52908    | 373 508 |
| 17  | High limit thermistor             | 52332    | 573 509 |
| 18  | Thermocouple solenoid             | 54800    | 373 503 |
| 19  | Gas washer kit (not shown)        | 7507     | 373 517 |
| 20  | Water washer kit (not shown)      | 7506     | 373 518 |

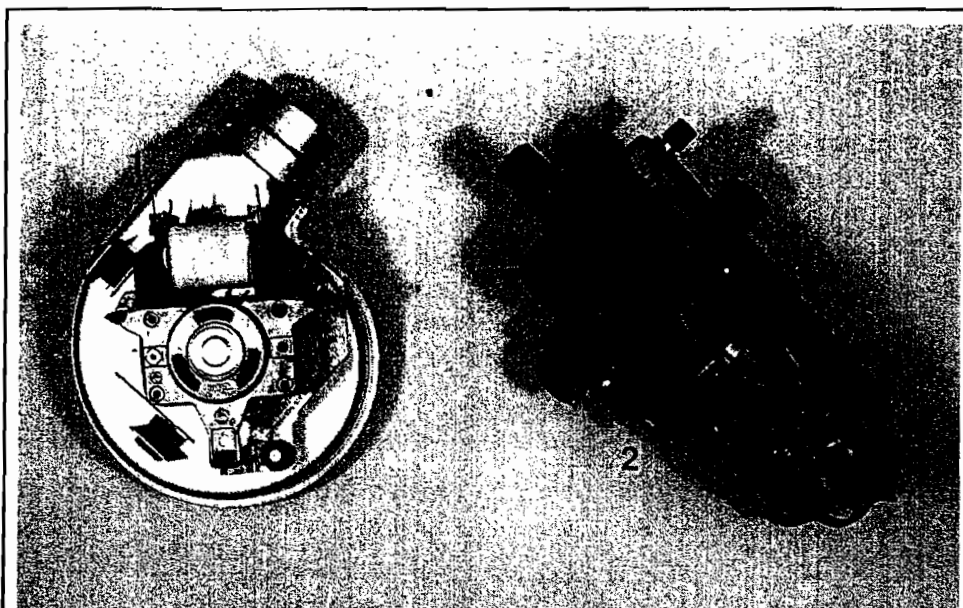


Fig. 99(a)

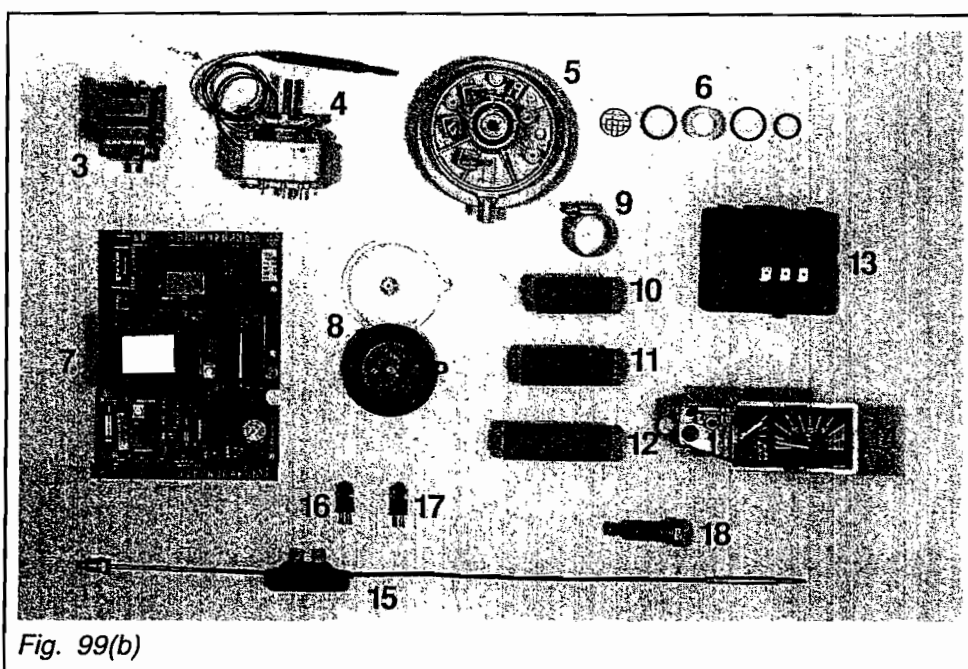


Fig. 99(b)



**Saunier Duval**

**HEPWORTH HOME PRODUCTS**

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