

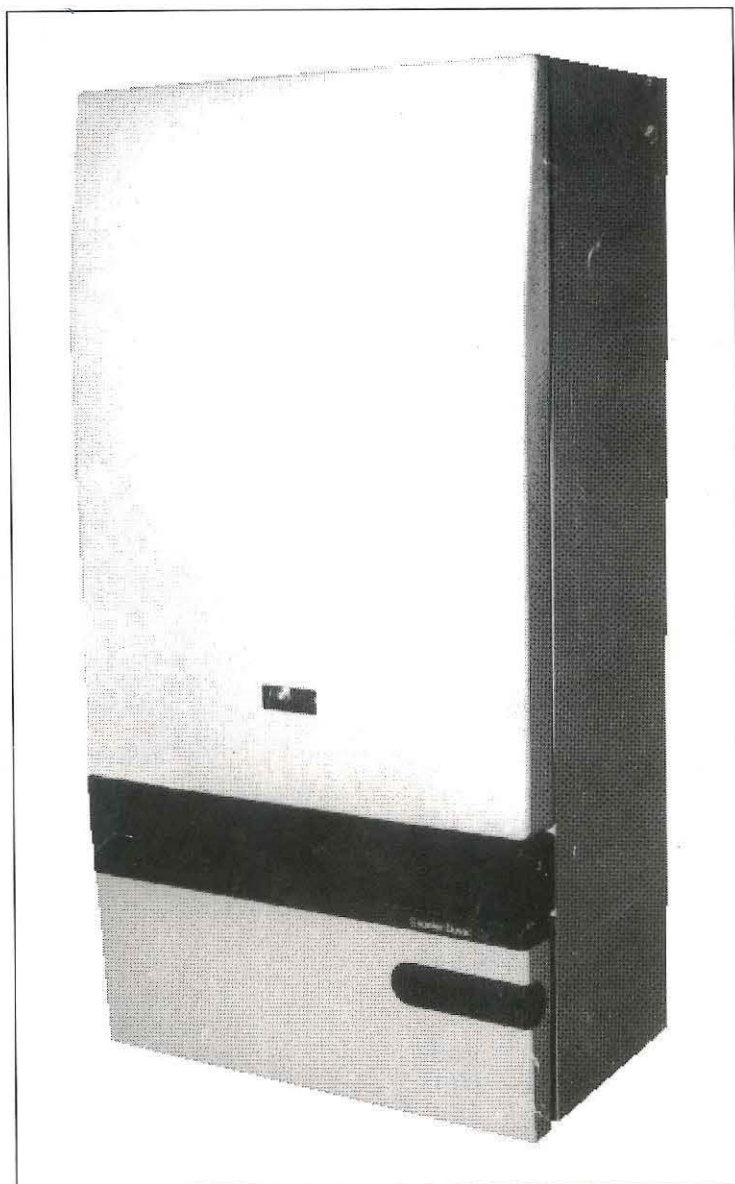


Saunier Duval

INSTALLATION AND SERVICING INSTRUCTIONS

THELIA 623 (WITH TIMECLOCK) G.C. No. 47 313 11

AND THELIA 623NC (WITHOUT TIMECLOCK) G.C. No. 47 313 12



Hepworth Heating Ltd., Nottingham Road, Belper, Derbyshire. DE56 1JT

Technical Services Department : Telephone : Belper (0773) 828100

1 Introduction

The instructions consist of two parts, Installation and Servicing and Instructions for Use, they are the property of the user and must be handed to them when the installation is completed.

Wherever possible, all materials, appliances and components to be used shall comply with the requirements of applicable British Standards.

Where no British Standards exists, materials and equipment should be fit for their purpose and of suitable quality and workmanship.

1 Introduction

This is a wall mounted combination boiler providing both central heating and instantaneous domestic hot water.

The boiler is for use with natural gas as distributed in the United Kingdom (G20), LPG, Town gas or LPG/air mixtures.

The boiler is certificated to the current issue of BS5258 Part 15 for performance and safety. It is, therefore, important that no alteration is made to the boiler, without permission, in writing, from Hepworth Heating Ltd.

Any alteration that is not approved by Hepworth Heating Ltd., could invalidate the certification of the boiler, the warranty and could also infringe the current issue of the Statutory Requirements.

The boiler is designed for use as part of a sealed water central heating system with fully pumped circulation. The pump, expansion vessel and associated safety devices are all fitted 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.

Boilers burning LPG or similar gas **MUST NOT** be fitted in basements or below ground level.

2 Statutory Requirements

The installation of this boiler must be carried out by a competent person in accordance with the relevant requirements of the current issue of:

The Gas Safety (Installation and Use) Regulations, The Building Regulations, The I.E.E. Wiring Regulations, The Local Water Company Bye-laws, The Building Standards (Scotland) Regulations (applicable in Scotland), The Health and Safety at Work Act, The Control of Substances Hazardous to Health and any applicable local regulations.

Detailed recommendations are contained in the current issue of the following British Standard specifications/codes of practice.

BS5440 Part 1 and 2, BS6798, BS5449, BS6700, BS5546, BS6891, BS4814, BS7074 Part 1 and 2, BS7593 and as applicable BS5482 Part 1.

3 Sheet Metal Parts

WARNING. When installing or servicing this boiler care should be taken when handling the edges of sheet metal parts to avoid any possibility of personal injury.

4 Packaging

4.1 The boiler is supplied in three packs as below:

A large cardboard carton which contains:

The boiler, complete, with all casing panels fitted.

There is also a small polythene bag, taped to the front of the boiler, containing the sealing washers, filters and flow restrictor.

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

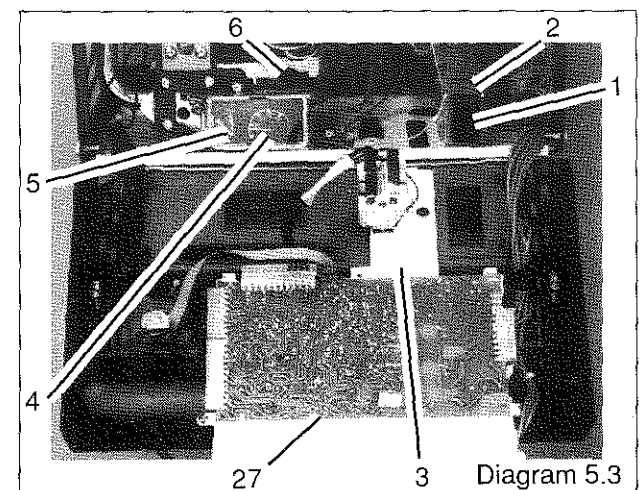
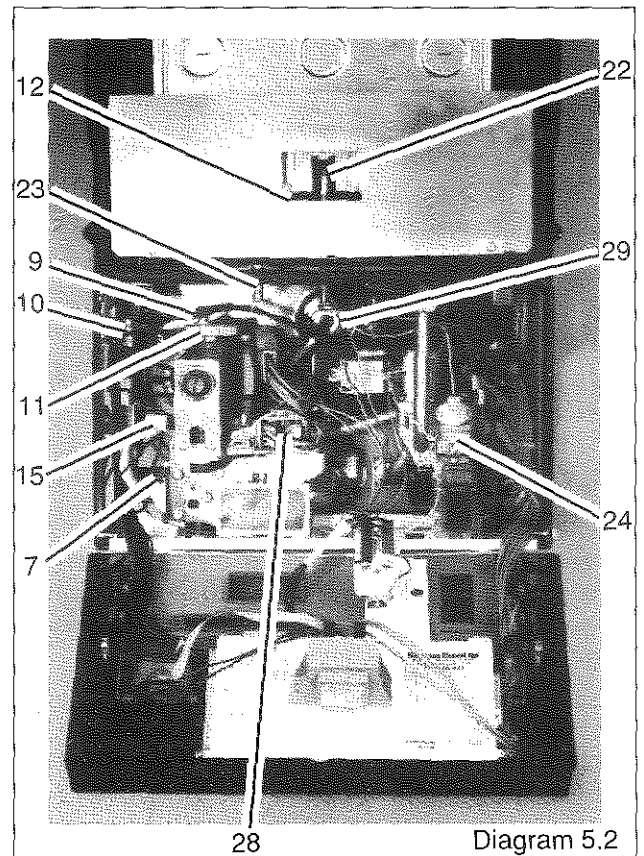
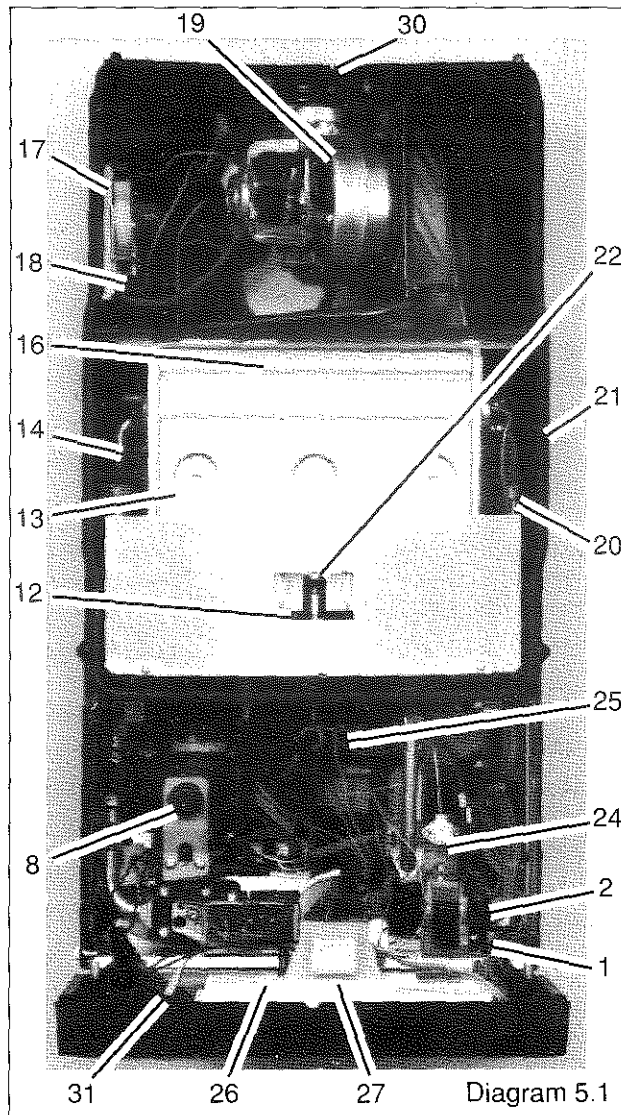
4.3 A long cardboard carton, which contains:

The boiler flue kit, refer to Section 7.4 for details.

Please check that you have all the above items before starting to fit the boiler.

5 Construction

5.1 Boiler



KEY TO COVER DIAGRAMS 5.1,5.2,5.3 5 CONSTRUCTION

- 1 'ON' push-button
- 2 'OFF' push-button
- 3 Control thermostat-to regulate central heating water temperature
- 4 Temperature gauge
- 5 Pressure gauge
- 6 Selector lever
- 7 Loss of water switch
- 8 Pump
- 9 Pump automatic air vent cap
- 10 Overheat cut-out device
- 11 Automatic air vent
- 12 Burner
- 13 Combustion chamber
- 14 Hot water thermistor
- 15 High limit thermostat
- 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 Multi-functional control
- 25 Spark generator
- 26 Potentiometer
- 27 Printed circuit board (housed inside lower front panel)
- 28 Microswitch assembly
- 29 Expansion vessel connection
- 30 Combustion gas testpoint
- 31 Timeclock (if fitted)

5 Construction

5.4 Wall Fixing Jig

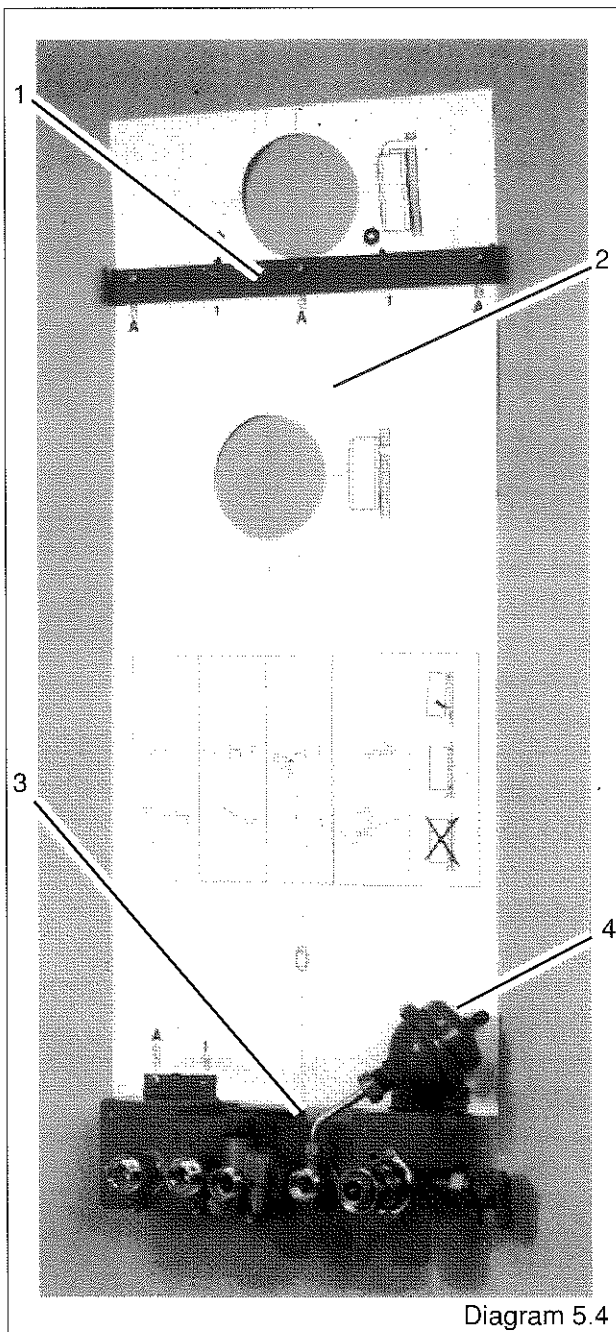
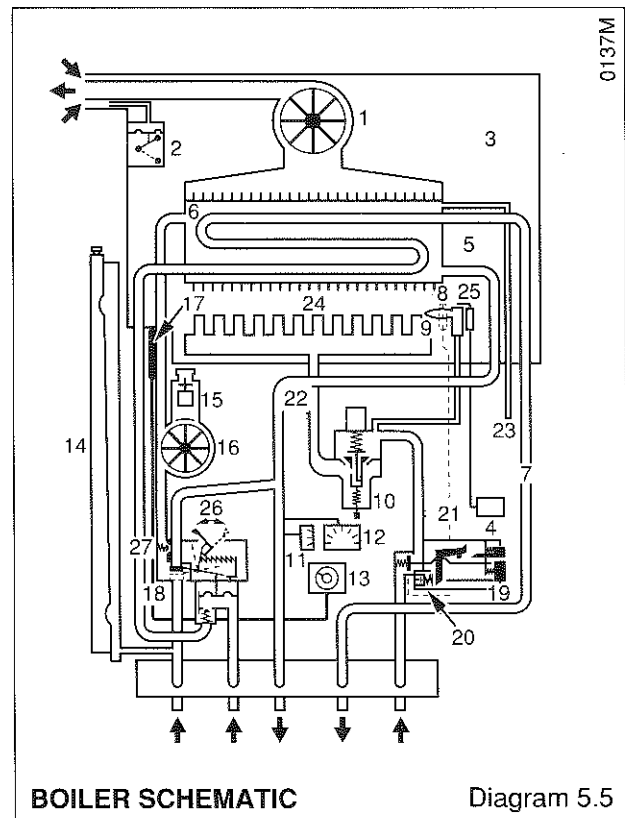


Diagram 5.4

KEY TO COVER DIAGRAM 5.4

- 1 Hook
- 2 Template
- 3 Connecting plate
- 4 Domestic hot water expansion vessel



BOILER SCHEMATIC

Diagram 5.5

KEY TO COVER DIAGRAM 5.5

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

6 Technical Data

6.1 Dimensions

Drawings are not to scale.

All dimensions are given in millimetres.

Dotted line shows outline of the boiler.

Table 6.1 General Data			
	Nat.	Gas propane	Butane
Heat output maximum	23.4kW (80,000Btu/h) 8.8kW (30,000Btu/h)	23.4kW (80,000Btu/h) 8.8kW (30,000Btu/h)	23.4kW (80,000Btu/h) 8.8kW (30,000Btu/h)
Heat input maximum	29.0kW (100,000Btu/h)	29.0kW (100,000Btu/h)	29.0kW (100,000Btu/h)
Gas rate maximum (after 10 minutes)	2.71m ³ /h (96ft ³ /h)	1.05m ³ /h (37ft ³ /h)	0.79m ³ /h (28ft ³ /h)
Inlet pressure	20mbar (8.0in wg)	37mbar (14.9in wg)	28mbar (11.3in wg)
Burner pressure maximum	13mbar (5.2in wg)	34mbar (13.4in wg)	26mbar (20.2in wg)
Burner injectors	1.15mm	0.74mm	0.74mm
Pilot injectors	0.28mm	0.18mm	0.18mm

Table 6.2 Burner pressure						
Heat output	kW Btu/h	8.8 30,000	11.4 39,000	15.5 53,000	19.6 67,000	23.4 80,000
Heat input	kW Btu/h	11.4 39,000	15.0 51,000	20.0 68,000	25.0 85,000	29.0 100,000
Natural gas	mbar in wg	1.6 0.6	3.0 1.2	6.0 2.4	10.5 4.2	13.0 5.2
Propane	mbar in wg	4.2 1.7	7.8 3.1	14.7 5.9	23.5 9.3	34.0 13.4
Butane	mbar in wg	2.9 1.2	5.6 2.2	10.8 4.3	17.7 7.0	26.0 10.2

6 Technical Data

6.2 Gas Pressure/Injector Sizes

The multi functional control fitted to 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.

6.3 Central Heating

The boiler is range rated from 11.4kW (39,000Btu/h) to 29kW (100,000Btu/h) heat input to provide 8.8kW (30,000Btu/h) to 23.4kW (80,000Btu/h) central heating output. It may be adjusted to suit individual system requirements within this range.

Table 6.2 gives approximate burner gas pressure settings for the ranges.

The central heating water flow temperature can be adjusted from about 30° to about 90°C.

The recommended maximum temperature rise across the boiler is 20°C.

6.4 Domestic Hot Water

The heat output, for domestic hot water is automatically controlled at 8.8kW (30,000Btu/h) to 23.4kW (80,000Btu/h) and cannot be adjusted.

The nominal domestic hot water flow rate is as follows, based on a cold water temperature of 12°C:

Temperature 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)

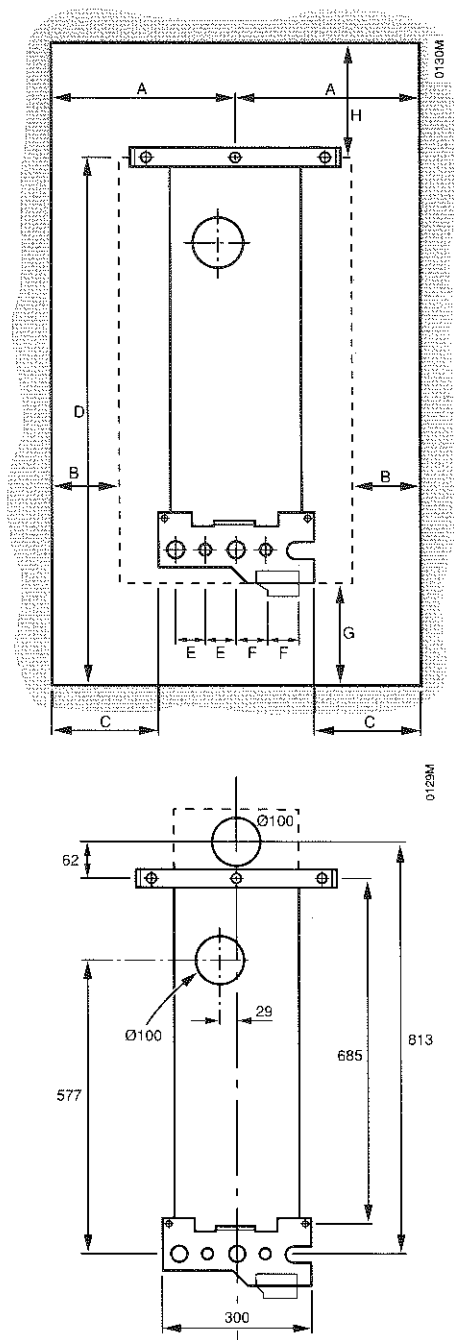
45°C (81°F) 7.3L/min (1.6g/min)

Minimum water flow rate, threshold rate, 3.0L/min (0.7g/min).

Water pressure, maximum 10bar (145lb/in²), minimum 1bar (14.5lb/in²).

Minimum for shower installations, 2bar (29lb/in²).

For further information contact shower valve manufacturer.



(All dimensions in millimetres)

Appliance weight: Empty 43kg (95lb)

Full 48kg (106lb)

Water content: Heating 0.9Litre (0.2 gal)

Hot water 0.5Litre (0.1 gal)

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 150mm (6.0in) minimum - back outlet

300mm (12.0in) minimum - top outlet

Diagram 6.3

6 Technical Data

6.5 Clearances

The position of the boiler must be such that there is adequate space for servicing.

A minimum clearance of 50mm either side of the boiler is required.

A minimum clearance of 600mm must be left in front of the boiler for servicing.

A minimum space of 300mm is required below the boiler.

6.6 Electrical

WARNING. This boiler must be earthed.

Supply voltage: 240V~50Hz fused 3A

Absorbed power: 150W

Internal fuse rating: T80mA (on PCB).

All system components shall be of an approved type. The electrical installation must be in accordance with the current issue of the I.E.E. Wiring Regulations, together with any local requirements.

Connection of the whole electrical system and any heating system controls to the electrical supply must be through a common isolator.

Isolation should preferably be by a double pole switched fused spur box having a minimum contact separation of 3mm on each pole. The fused spur box should be readily accessible and preferably adjacent to the boiler. It should be identified as to its use.

A fused three pin plug and shuttered socket outlet may be used instead of the fused spur box, provided that,

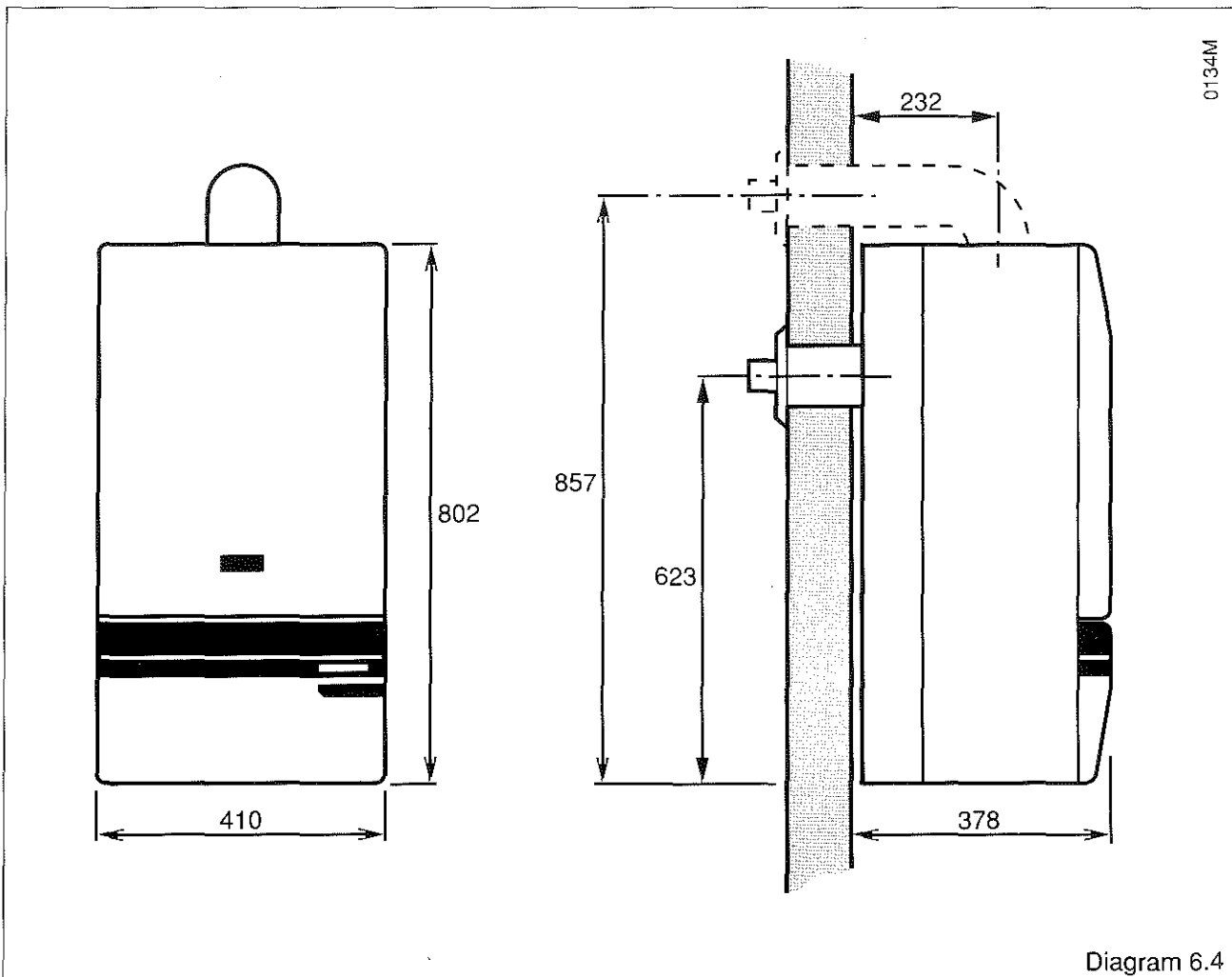
(a) they are not used in a room containing a fixed bath or shower.

(b) both the plug and socket comply with the current issue of BS1363.

The mains supply cable and other cables connected to the boiler must be PVC flexible type of at least 0.75mm² (24/0.20mm) to the current issue of BS6500, Table 9.

The mains electrical supply must be maintained at all times in order to provide domestic hot water.

Do not interrupt the supply with a time switch or programmer.



7 Boiler Location

7.1

This boiler is not suitable for external installation.

An area of flat wall of sufficient size to accommodate the boiler is required, refer to diagram 6.3.

The boiler should be fitted on a fire resistant wall, if this is not possible the wall must be protected by a sheet of fireproof material.

The wall should be of robust construction, sufficient to take the total weight of the boiler.

7.2 Air Supply

The current issue of BS5440 Part 2 gives detailed guidance for the air supply required.

The boiler is room sealed, so when installed in a room or space a permanent air vent is not required.

7.3 Flue

The flue must be installed in accordance with the current issue of BS5440 Part 1.

7.4 Flue System

The flue system consists of two parts, a PVC outer pipe and an aluminium inner, they are positively locked together when assembled.

The flue kit supplied, see diagram 7.1, is 750mm long and comprises:

- A** 100mm PVC pipe
- 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

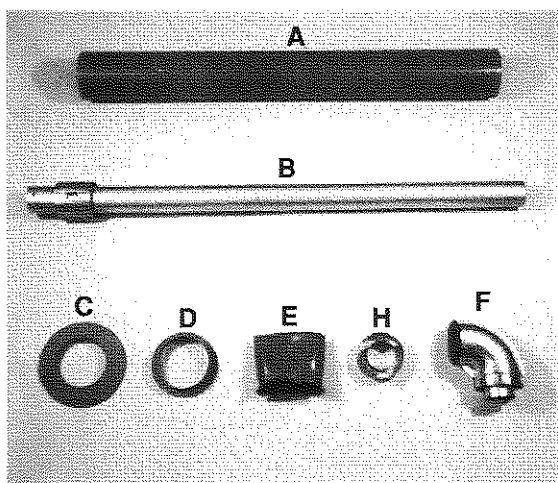


Diagram 7.1

The maximum permissible length of straight flue which can be used is 2900mm - straight flue or when elbow is used.

Flue extension kit of 730mm nominal length are available, if required, Part No. 90348.

To determine the number of extension kits required for any particular installation refer to Table 10.21.

The flue extension kit, see diagram 7.2, comprises:

- A** 100mm PVC pipe
- B** PVC connector
- C** 55mm aluminium pipe with fitted connector
- D** Triangular pipe support
- E** Two fixing screws

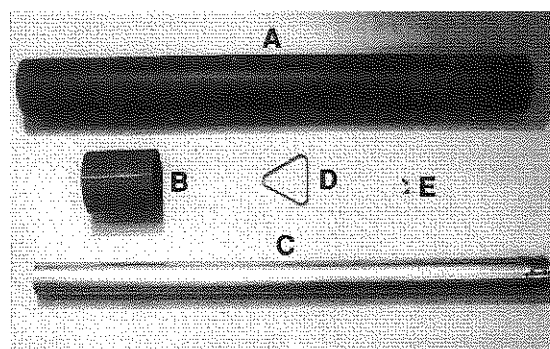


Diagram 7.2

7 Boiler Location

Back outlet flue. Using the back flue outlet of the boiler, the flue system can be connected in either one of two ways, see diagram 7.3 and 7.4.

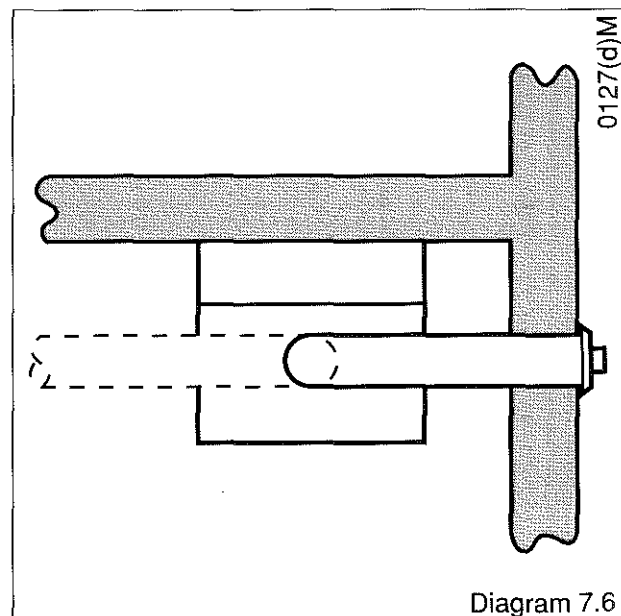
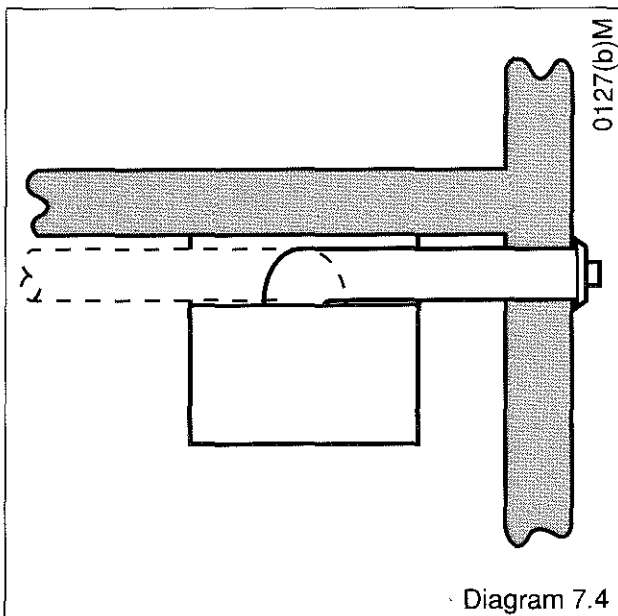
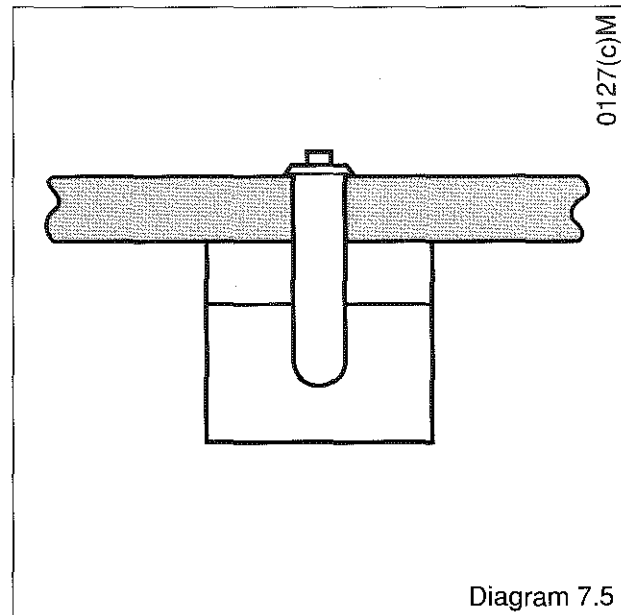
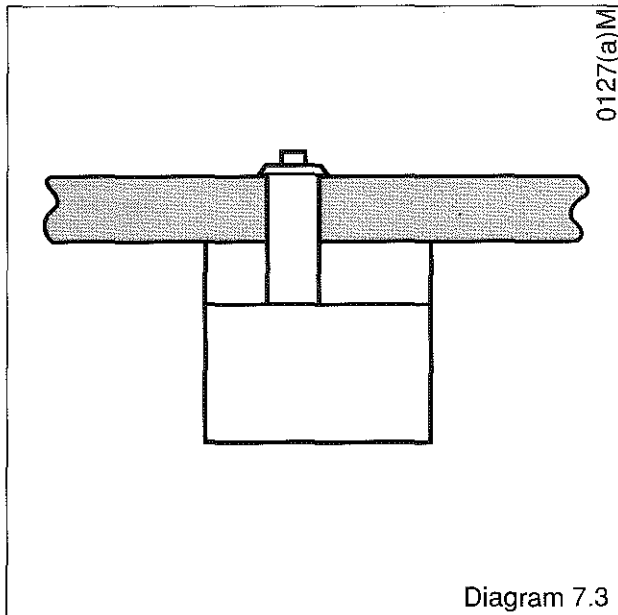
Rear Flue - diagram 7.3.

Side flue, diagram 7.4 to one side or the other, to suit the requirements of the installation.

Top outlet flue. Using the top flue outlet of the boiler, the flue system can be connected in either one of two ways, see diagram 7.5 and 7.6.

Rear Flue - diagram 7.5.

Side flue, diagram 7.6 to one side or the other to suit the requirements of the installation.



7 Boiler Location

7.5 Terminal Position

The minimum acceptable spacings from the terminal to obstructions and ventilation openings are as shown in diagram 7.7.

The boiler must be installed so that the terminal is exposed to the external air.

It is important that the position of the terminal allows free passage of air across it at all times.

Note. Under certain weather conditions the flue may produce a plume of condensation.

Car ports or similar extensions of a roof only, or a roof and one wall require special consideration with respect to any openings, doors, vents or windows under the roof. Care is required to protect the roof if it made of plastic sheeting.

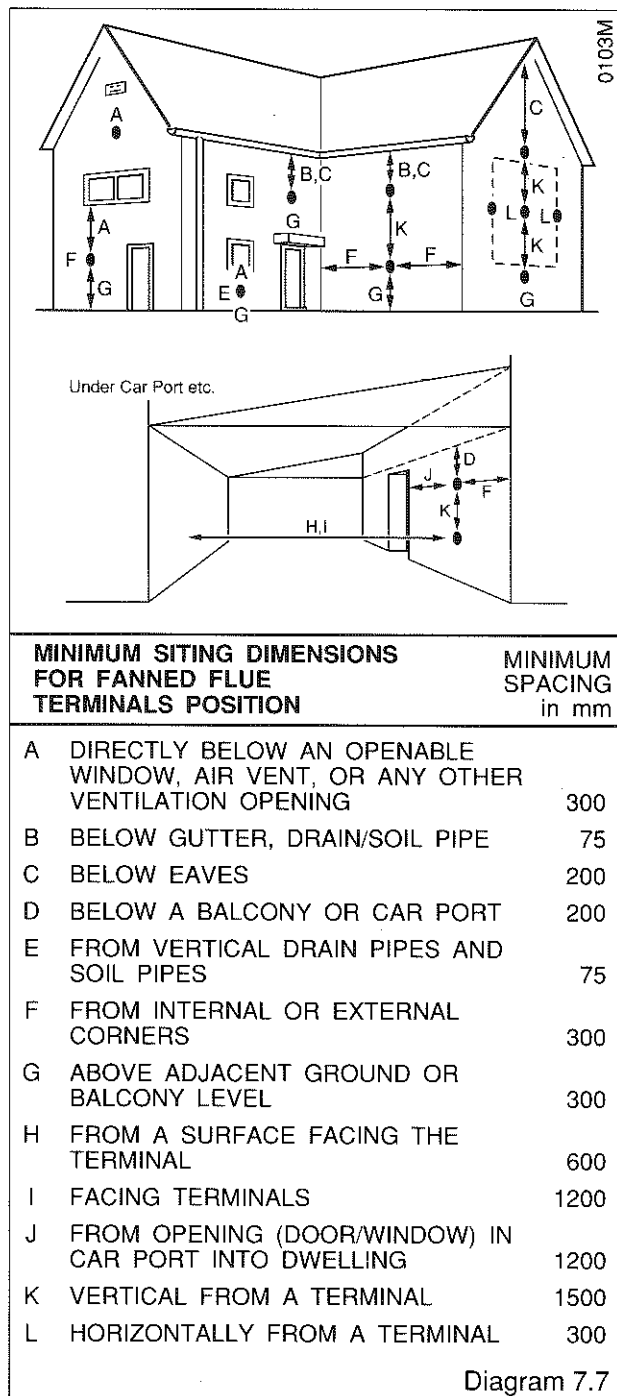
If the terminal is fitted within 850mm of a plastic or painted gutter or 450mm of painted eaves, an aluminium shield of a minimum length 750mm should be fitted to the underside of the gutter or painted surface.

7.6 Terminal Guard

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, Type C3, Part No. 52799 can be obtained from Hepworth Heating Ltd.



7 Boiler Location

7.7 Cupboard or Compartment Ventilation

Where the boiler is fitted in a cupboard or compartment, permanent high and low level ventilation must be provided. The ventilation areas required are given in Table 7.8.

Where the installation of the boiler will be in an unusual location special procedures are necessary, refer to the current issue of BS6798 for guidance.

Make sure that the cupboard or compartment air vents are positioned to be clear of obstructions at all times.

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 for easy removal of the boiler.

7.8 Timber Frame Buildings

If the boiler 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 DM2. If in doubt, advice must be sought from the local gas company or Hepworth Heating Ltd.

7.9 Gas Supply

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

On completion the gas installation must be tested using the pressure drop method and purged in accordance with the current issue of BS6891.

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

Propane gas (at 37 mbar)	Butane gas (at 27mbar)
1.05 m³/h (37 ft³/h)	0.79 m³/h (28 ft³/h)

Table 7.8

Air vent position	Air from room or internal space	Air direct from outside
High level	270 cm ² (42 in ²)	135 cm ² (21 in ²)
Low level	270 cm ² (42 in ²)	135 cm ² (21 in ²)

Ventilation requirements

8 Installation

8.1 Heating System

General Notes

The installation of the boiler should comply with the requirements of the current issue of BS6798.

The boiler is intended for use in a sealed system only.

8.2 Safety Valve

The safety valve is an integral part of the boiler.

It cannot be adjusted.

8.3 Pressure Gauge

A pressure gauge is incorporated into the boiler to indicate the system pressure.

8.4 Pump

The pump is integral with the boiler.

The performance of this pump, running at maximum speed, varies according to the pump bypass setting, see diagram 8.1.

The pump bypass, fitted into the diverter valve assembly, causes a partial recycling in the heating circuit within the boiler to control the pump output from the boiler.

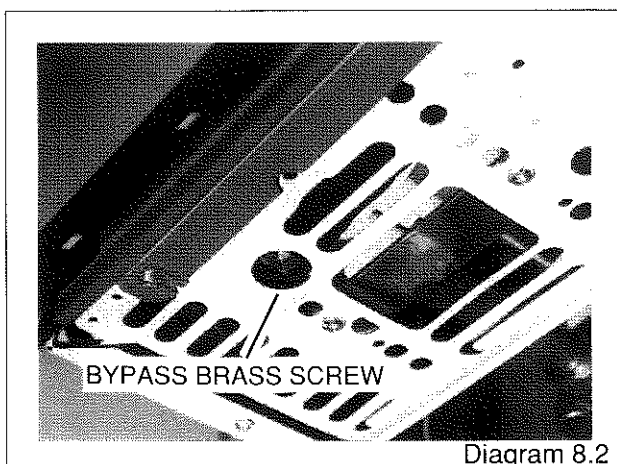
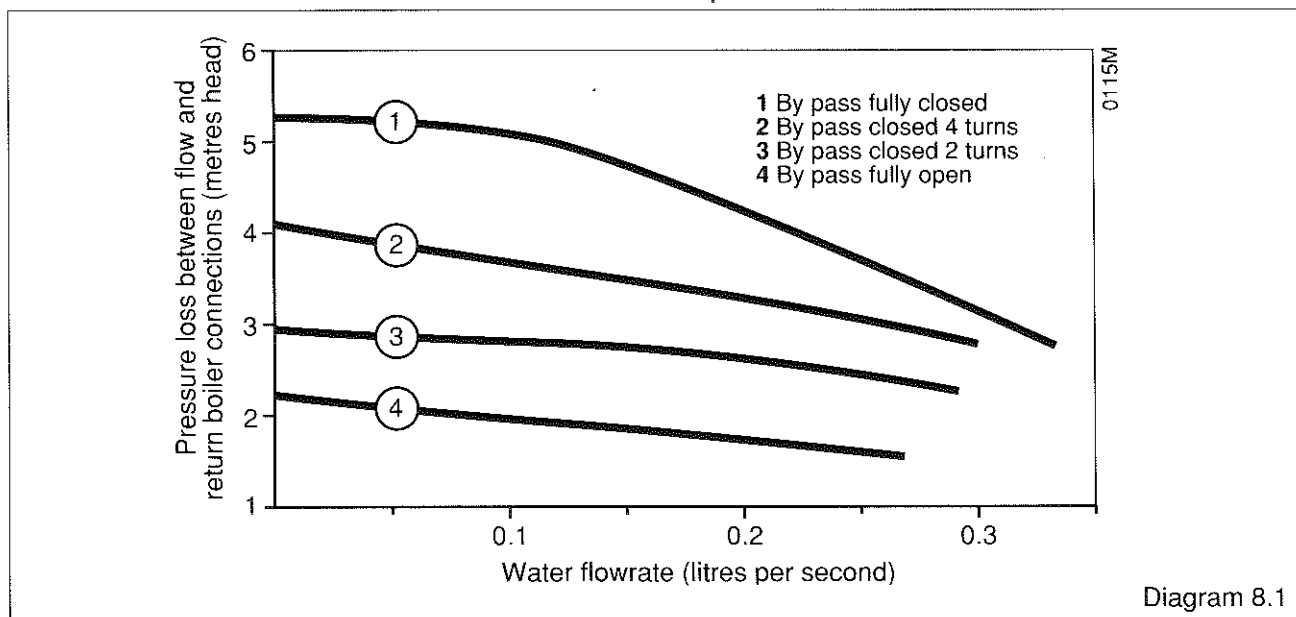
It is adjusted by turning the brass screw under the reversing valve, see diagram 8.2. Turn the screw clockwise to close the bypass.

8.5 Expansion Vessel

The boiler has an integral expansion vessel with a capacity of 6.5Litres (1.42gal), which is suitable for a heating system with a maximum volume of 75Litres (16.5gals). If the system water content exceeds this an additional vessel should be connected into the system as close as possible to the central heating return connection of the boiler, see diagram 8.3.

Further information can be obtained from the British Gas publication "British Gas Specification for Domestic Wet Central Heating Systems" and from the current issue of BS5449 and BS7074 Part 1. The pressure shall not be less than the static head at the point of connection, the height of the top point of the system above the expansion vessel.

CLOCKWISE TO CLOSE



8.6 Bypass

It is essential that a bypass is fitted in all installations, 22mm o.d. minimum. The bypass must have a lockable valve "B" in diagram 8.3, fitted in a position so that inadvertent closure or unauthorised interference is not possible.

The bypass MUST be fitted before any system control. A radiator by pass is not recommended.

8 Installation

8.7 Flow Rate

A valve must be incorporated in the main flow or return of the system, valve "A" shown in the diagram 8.3. This valve must be lockable and be positioned so that inadvertent closure or unauthorised interference is not possible.

8.8 Make-up

Provision should be made for replacing water lost from the system using a make-up bottle mounted in a position higher than the top point of the system, or a filling loop connected through a non-return valve to the return side of the heating circuit, see diagram 8.3.

Alternatively, provision for make-up can be made by pre-pressurisation of the circuit.

8.9 Filling Sealed Systems

Provision for filling the system at low level must be made. Three methods of filling are shown in diagram 8.4.

There must be no permanent connection to the mains water supply, even through a non-return valve.

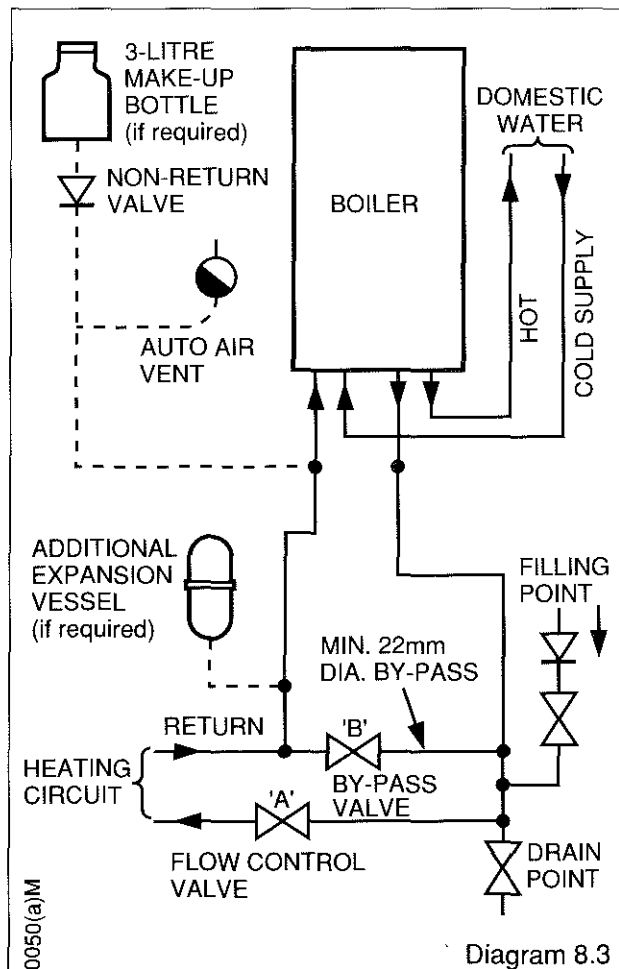


Diagram 8.3

8.10 Corrosion Inhibitor

Attention is drawn to the current issue of BS5449 and BS7593 on the use of inhibitors in central heating systems.

In an inhibitor is to be used in the system, contact an inhibitor manufacturer so that they can recommend their best product to use.

When fitting the boiler into an existing system, special care should be taken to drain the entire system, including radiators, then thoroughly cleaning out before fitting the boiler whether or not adding an inhibitor.

8.11 Draining

A draining tap must be provided at the lowest points of the system, which will allow the entire system to be drained.

Draining taps should be to the current issue of BS2879.

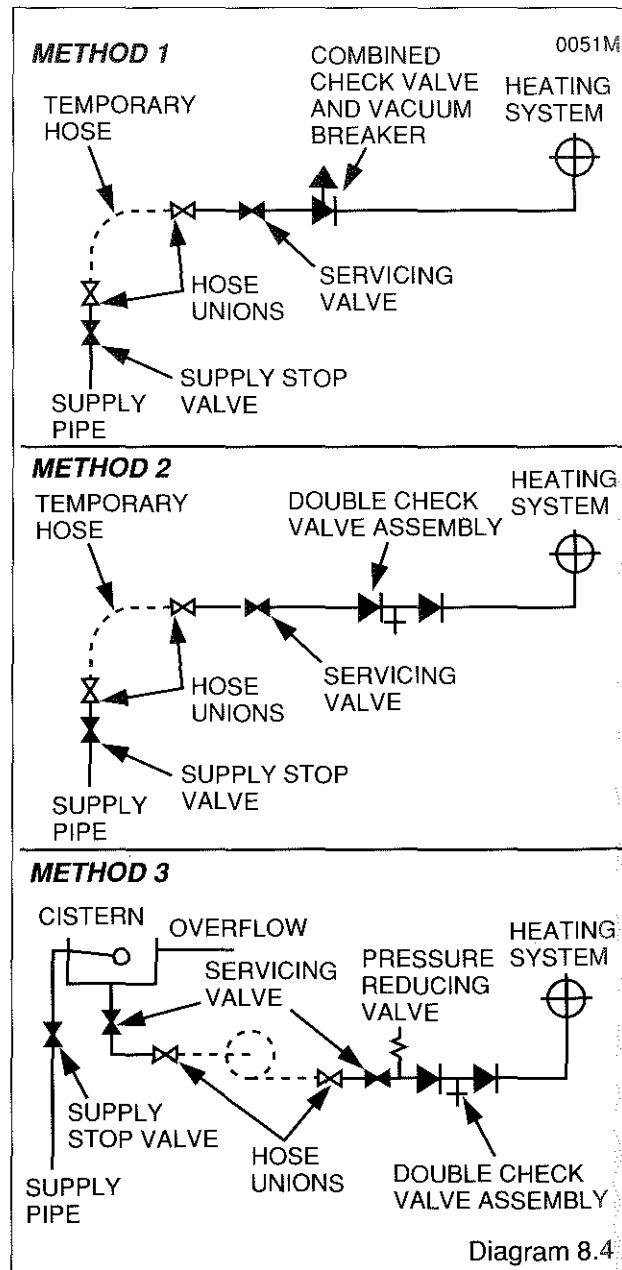


Diagram 8.4

9 Domestic Hot Water System

General

The domestic hot water service must be in accordance with the current issue of BS5446 and BS6700.

9.1 Water Pressure

For the minimum and maximum working pressures of the domestic hot water circuit of the boiler refer to Section 6.4 Data.

If the cold water supply pressure exceeds the maximum a governor must be fitted in the supply to the boiler to reduce the pressure to within the limits given.

9.2 "Hard" Water Areas

In areas where the water is "hard", more than 200mg/litre, it is recommended that a proprietary scale reducer is fitted in the cold water supply to the boiler. Consult the local water company for further advice.

A double check valve assembly must be fitted upstream of the scale reducer. For the relative position of the scale reducer and pressure reducing valve, if required, refer to manufacturer's instructions.

10 Installation

10.1 Wall Fixing Jig

The fixing jig is supplied in three parts:

- (1) The connecting plate which allows the connection and soundness testing of all the pipework before the boiler is fitted and helps support the weight of the boiler.
- (2) The hook, which also supports the weight of the boiler.
- (3) The template which ensures that the hook and connecting plate are correctly fitted relative to each other.

The position of the hole for the flue, rear flue only, is also shown 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.

The connecting plate has fitted to it isolating valves for the central heating flow and return. An isolating valve for the cold water inlet connection.

A drain screw for draining the central heating circuit of the boiler.

A spring loaded gas inlet valve.

A $\frac{1}{2}$ in gas service cock.

A $\frac{1}{2}$ in safety valve, fitted into the central heating flow connection, see diagram 10.1.

10.2 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 other two plastic clips.

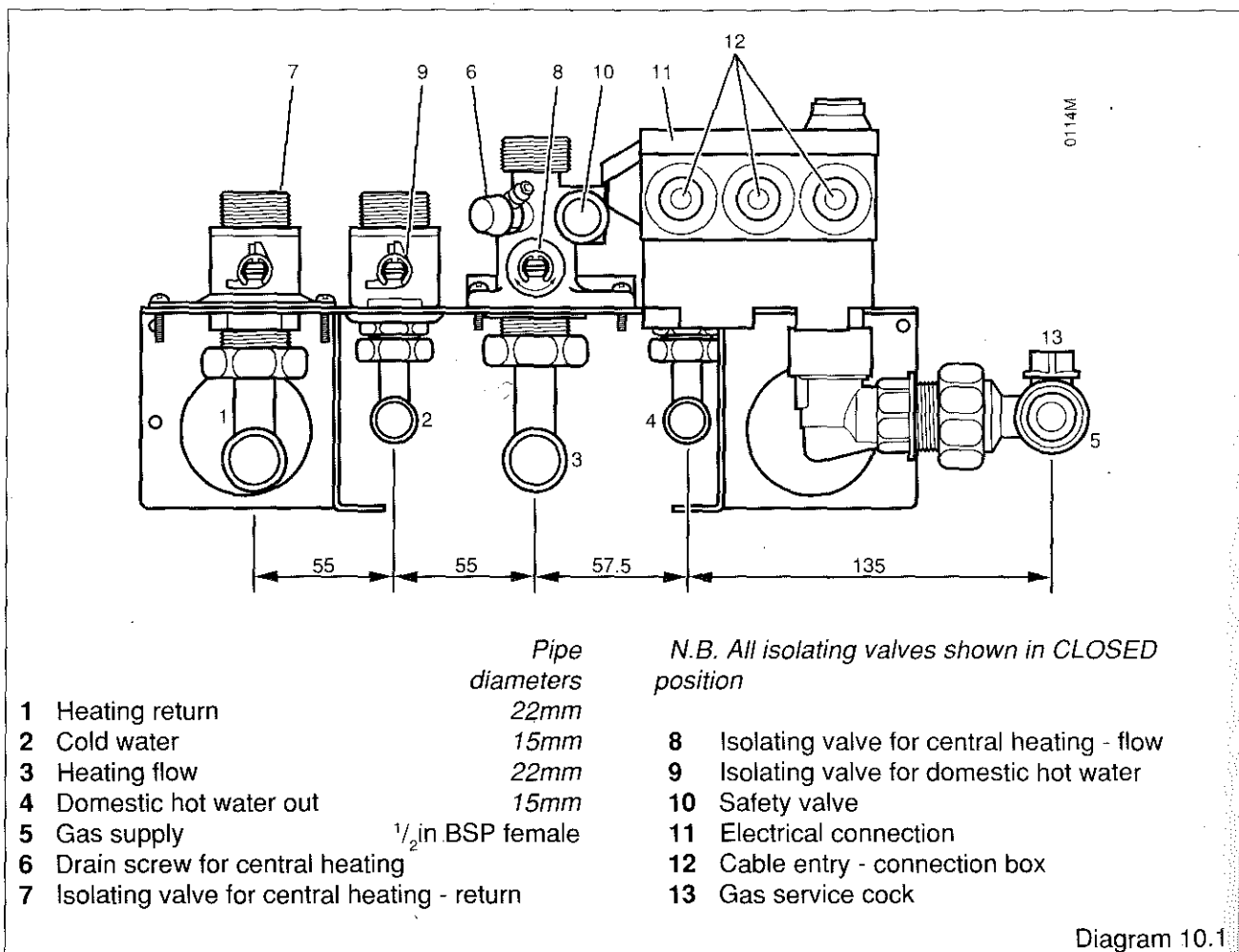
Make sure the hook is pointing upward and the lower flue hole in template is left of centre.

Position wall fixing jig in the required position after making sure it is clear of all obstructions.

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 screws.

Place template on wall, check that hanging bracket is level and mark position of the three fixing holes on wall. Drill, plug and fix hook to wall using No.12x2in round head screws.

Now check that both the connecting plate and hook are level.



10.3 Domestic Hot Water Expansion Vessel

Caution. Do not touch the Schrader valve on this expansion vessel. It is not a vent or drain.

A small expansion vessel is supplied with the fixing jig. This must be fitted to the $\frac{1}{4}$ in BSP nipple on the domestic hot water outlet connection, using the cranked copper connection provided. The expansion vessel will be out of sight, behind the boiler once it is fitted, see diagram 10.2.

Connect water pipes to the connecting plate using the four connection elbows provided, see diagram 10.1.

CAUTION. Do not solder pipework with the connections in place 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.

10.4 Safety Valve Discharge

WARNING. It must not discharge above an entrance or window or any type of public access area.

Connect the safety valve discharge pipe to the valve, the discharge must be extended, using not less than 15mm o.d. pipe, to discharge, in a visible position, outside the building, facing downward, preferably over a drain. The pipe must have a continuous fall and be routed to a position so that any discharge of water, possibly boiling or steam cannot create any danger to persons, damage to property or external electrical components and wiring.

Tighten all pipe connection joints.

10.5 Gas Connection

Connect the gas supply to the gas service cock and then the gas service cock to the union on the gas inlet elbow, see diagram 10.3.

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

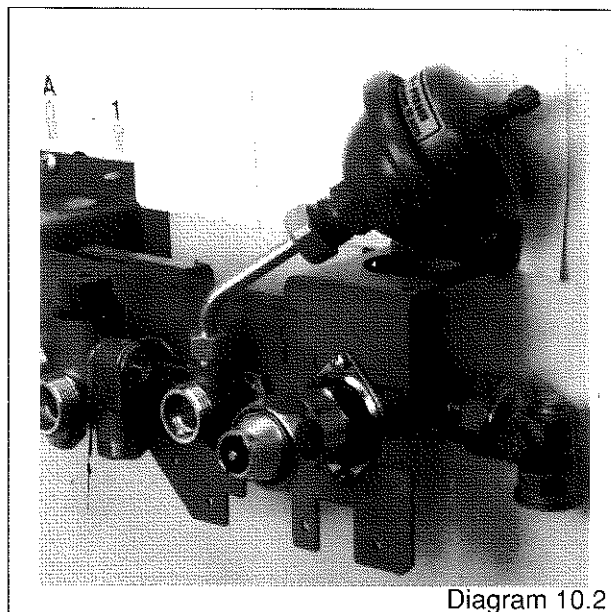


Diagram 10.2

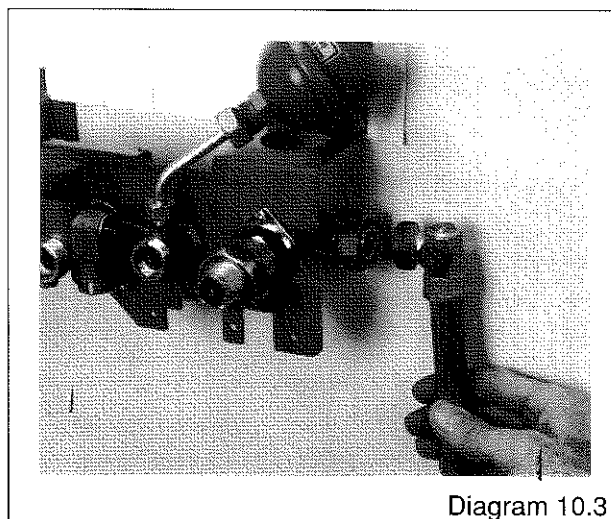


Diagram 10.3

10 Installation

10.6 Water Connection

Thoroughly flush the heating system pipework to clear out any foreign matter.

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

10.7 Electrical Connection

Make all electrical connections to the boiler connection box, before hanging/connection of the boiler.

Remove cover from electrical connection box.

Connect mains power supply to terminals at left of connection box using 0.75mm² (24/0.2mm) three core PVC insulated cable, to the current issue of BS6500 Table 9.

Slacken cable grip screws and slit centre of sealing grommet with sharp knife. Strip back insulation on cable as shown in diagram 10.4.

Pass cable through grommet and cable grip and connect to terminals,

Brown wire to L (live)

Blue wire to N (neutral)

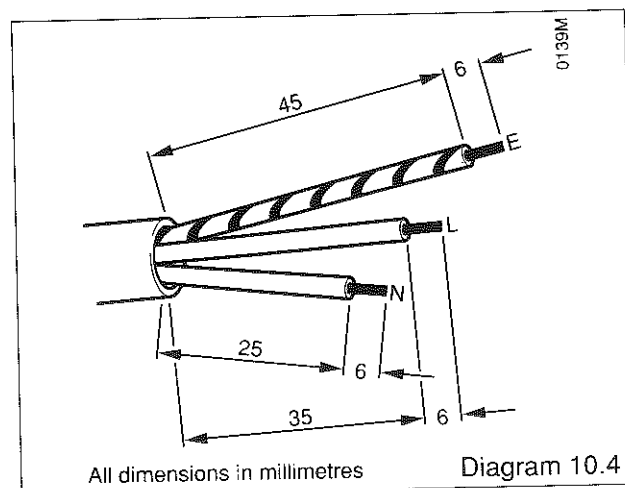
Green/yellow to E (earth) $\perp$.

Retighten cable grip ensuring that cable is gripped by external PVC insulation.

10.8 Heating Controls

WARNING. On no account must any external voltage be applied to terminals 1 to 6.

WARNING. This appliance must be wired in accordance with these instructions. Any fault arising from incorrect wiring cannot be put right under the terms of the Hepworth Heating guarantee.



THELIA 623 and THELIA 623NC

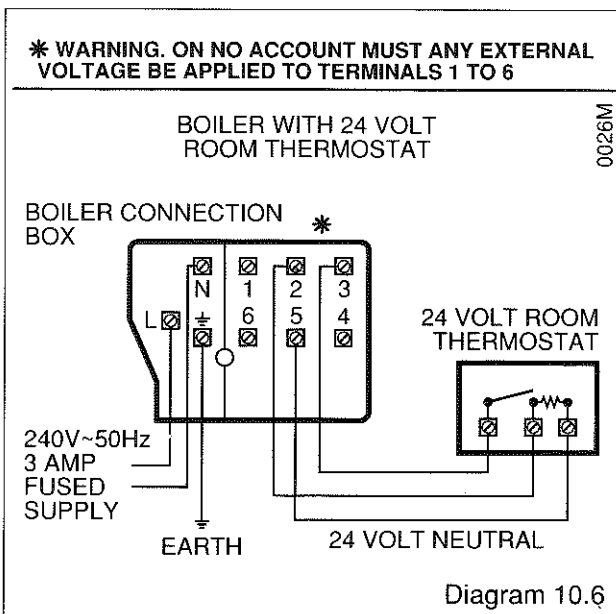
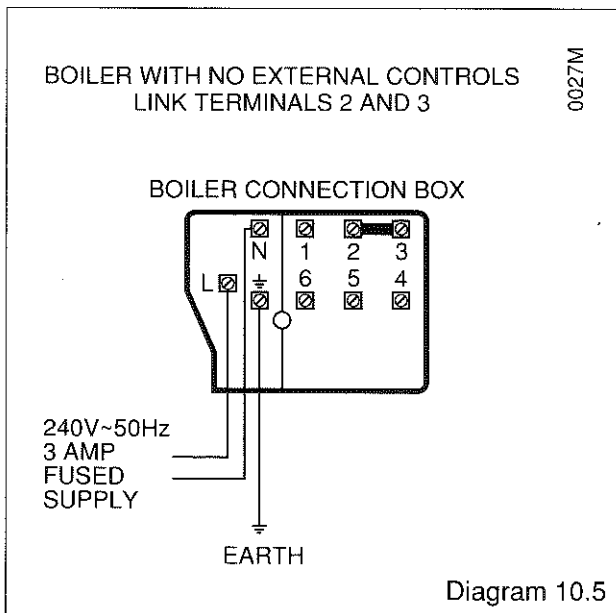
The boiler will work for heating without a room thermostat being connected, provided that the brass link, fitted between terminals 2 and 3 is left in place, see diagram 10.5.

For use with a room thermostat, it is recommended that a 24V room thermostat is used with the compensating resistor connected to terminal 5 in the electrical connection box.

A mains room thermostat may be used, but on NO ACCOUNT must any electrical voltage be applied to terminals 1 to 6 in the electrical connection box.

The compensating resistor must not be connected to terminal 5.

Note. For more accurate control of room temperature the use of a 24V room thermostat is recommended, see diagram 10.6.



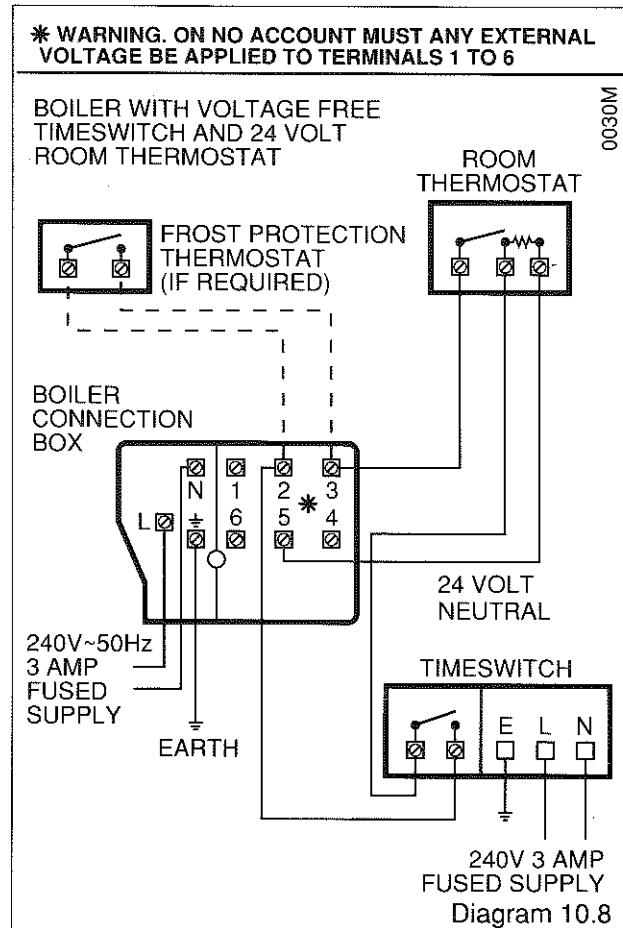
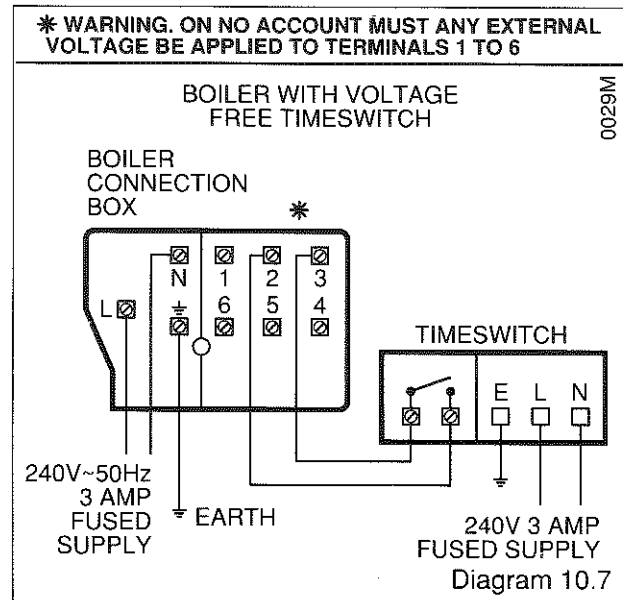
THELIA 623NC Only

The boiler will work for heating without a room thermostat and/or a timeswitch being connected, provided that the brass link, fitted between terminals 2 and 3 is left in place, see diagram 10.5.

For use with a timeswitch with voltage free contacts, see diagram 10.7.

For use with a timeswitch with voltage free contacts and room thermostat 24V operation, see diagram 10.8.

Make sure that all cables are secured correctly by the cable grips onto the external PVC insulation.



10 Installation

10.9 Flue Assembly

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 fitted.

The boiler is supplied for back outlet flue connection.

Alternatively the boiler is designed to allow the flue system to be connected to the top of the boiler, top outlet flue connection.

The installation of the flue depends on which connection is to be used, that is, as above and whether the flue is to pass to the rear or one side of the boiler.

10.10 Top Outlet Flue Connection

For a top outlet unscrew and remove the four screws and both flue outlet clamps, from the rear face of the boiler, see diagram 10.9.

Keep the clamps and screws.

Unscrew and remove the four screws and circular blanking plate from top of boiler.

Disconnect power supply and earth leads from fan motor. Unscrew and remove the two fan retaining screws, see diagram 10.10.

Remove fan assembly from boiler, disconnect and throw away connector tube.

Unscrew and remove the three screws holding fan to mounting plate. Turn the fan body through 90°, in relation to the 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, see diagram 10.11.

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

Refit fan assembly into boiler, with the front edge of mounting plate vertical, carefully guide fan outlet into top flue outlet of boiler. Fit the two retaining lugs at the back edge of the mounting plate onto back edge of flue hood opening in boiler and bring fan mounting plate up against vertical hood face. Refit and tighten the two fixing screws.

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, the polarity is not important.

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

Before commissioning the boiler **MAKE SURE** that the **TWO** transit clips are **REMOVED** from the fan.

Mark the hole position for the flue system as follows,

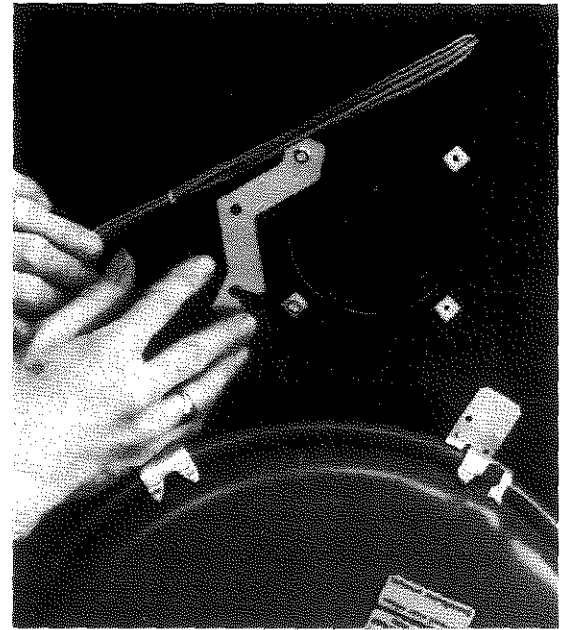


Diagram 10.9

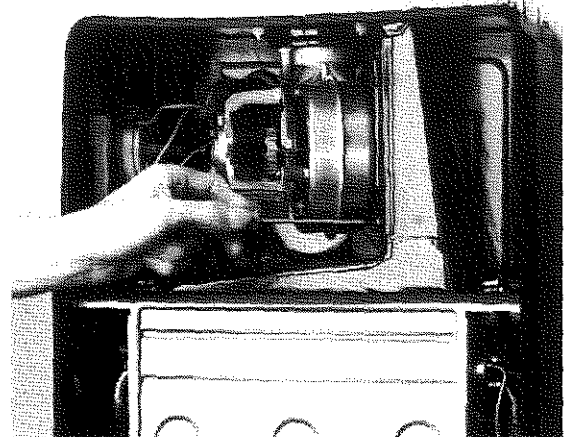


Diagram 10.10



Diagram 10.11

10.11 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 a sharp knife.

10.12 Flue to rear of boiler, from top outlet.

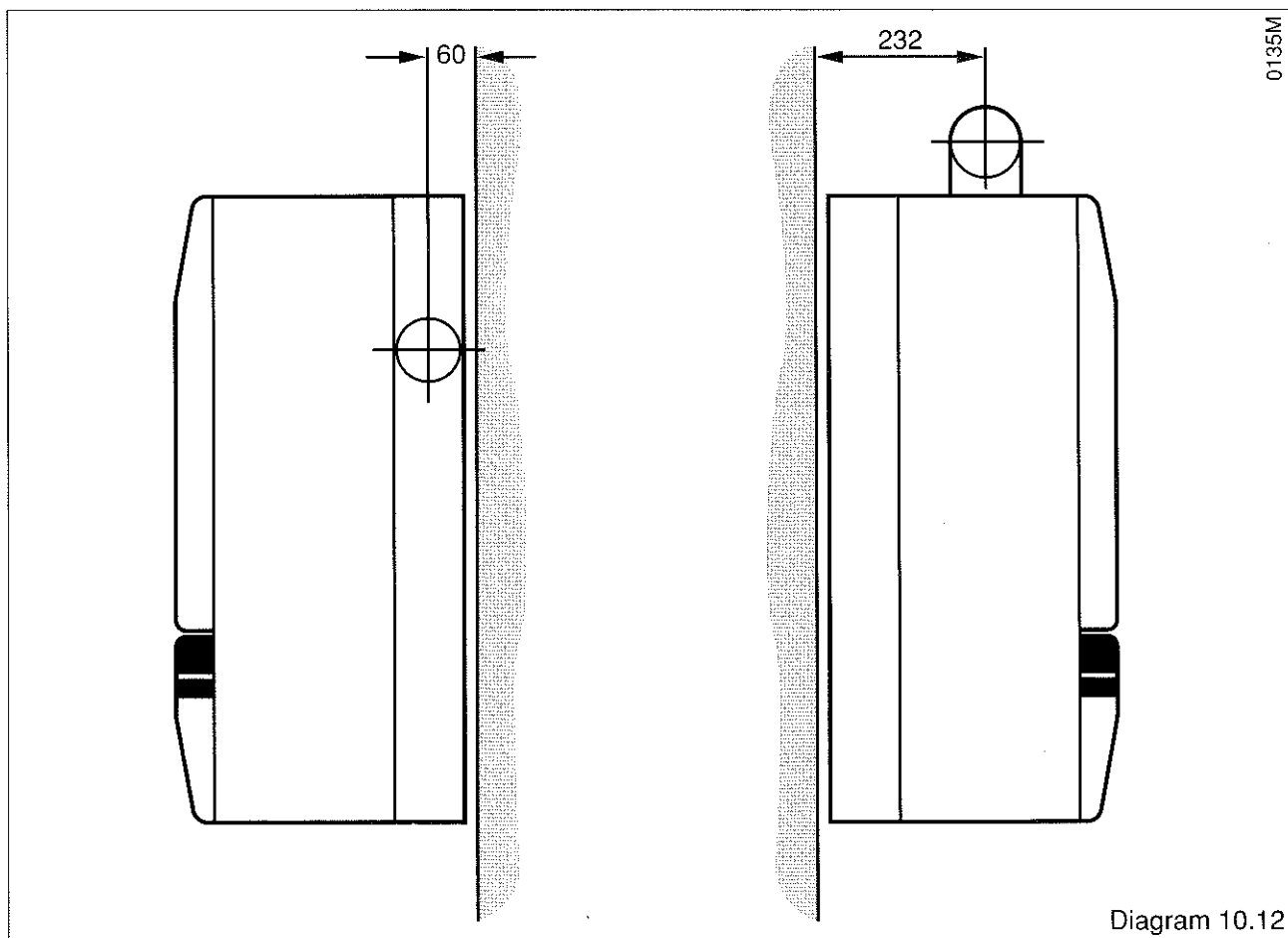
Mark correct position of hole from template using hole above the hook.

Once position is marked, remove unwanted upper section of template by cutting along top edge of hook with a sharp knife.

10.13 Flue to side of boiler, from back or top outlet.

Mark the horizontal centre line for the hole on rear wall, as above for back or top outlet respectively. Extend the horizontal centre line to the side wall and mark the vertical centre line of the flue hole as shown in diagram 10.12.

Important. When cutting the flue hole and when extending the flue centre line to a side wall remember that the flue system must have a fall of about 35mm per metre of flue **DOWNWARD** from the boiler. There must **NEVER** be an upward incline.



0135M

10 Installation

Cutting length (mm)			
<i>Flue option</i>	<i>PVC outer pipe</i>	<i>Aluminium inner pipe</i>	<i>Comments</i>
Back outlet Rear flue	$t+70\text{mm}$	$t+195\text{mm}$	Max. wall thickness "t" without extension 551mm
Top outlet Rear flue	$t+90\text{mm}$	$t+215\text{mm}$	Max. wall thickness "t" without extension 532mm
Back outlet Side flue to left Refer to Diagram 10.15	$t+A+35\text{mm}$	$t+A+155\text{mm}$	Max. distance "X" without extension 797mm
Back outlet Side flue to right Refer to Diagram 10.16	$t+A+90\text{mm}$	$t+A+215\text{mm}$	Max. distance "X" without extension 739mm
Top outlet Side flue (right or left) Refer to Diagram 10.17	$t+A+65\text{mm}$	$t+A+185\text{mm}$	Max. distance "X" without extension 767mm

Table 10.13

10.14 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 surface of the wall.

Important. Before cutting the hole for flues directly to the rear of the boiler always cover the connecting plate to make it is not damaged.

10.15 Calculation of flue cutting lengths.

Measure the wall thickness "t" (mm)

For side flues, measure distance from the inside face of the side wall to the centre line of the boiler and subtract 205mm to get dimension "A" (mm), see relevant diagram 10.15, 10.16 or 10.17.

Refer to Table 10.13 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 diagram 10.14.

Extension kits, when the distance "X" measured on site is greater than that given in Table 10.13, for the flue option chosen a flue extension kit(s) will be required.

Refer to Table 10.18 for the number of extension kits required.

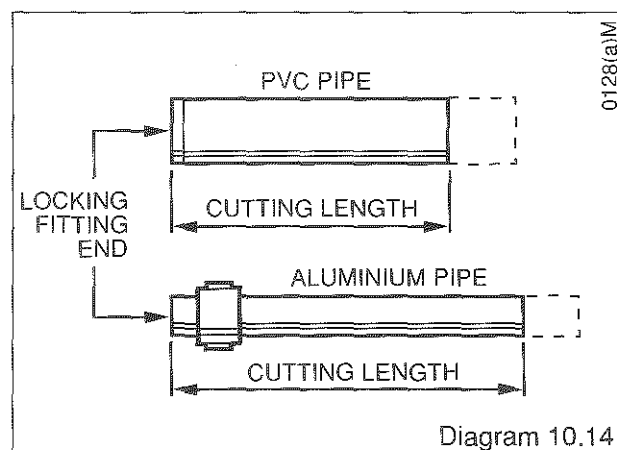


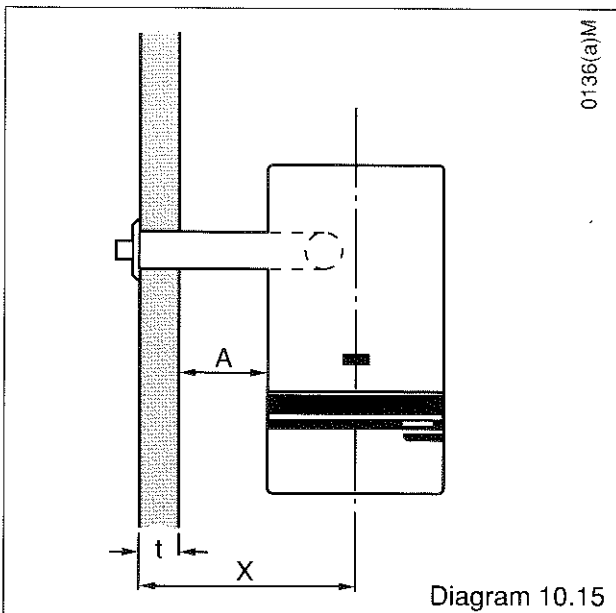
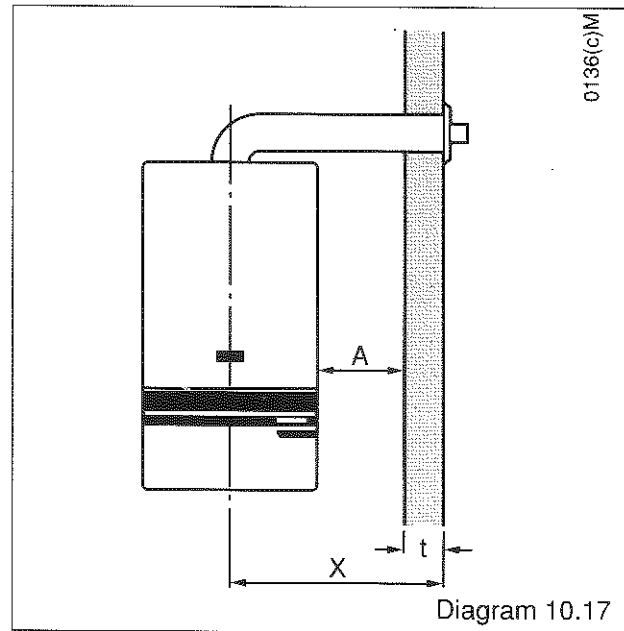
Diagram 10.14

10.16 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.

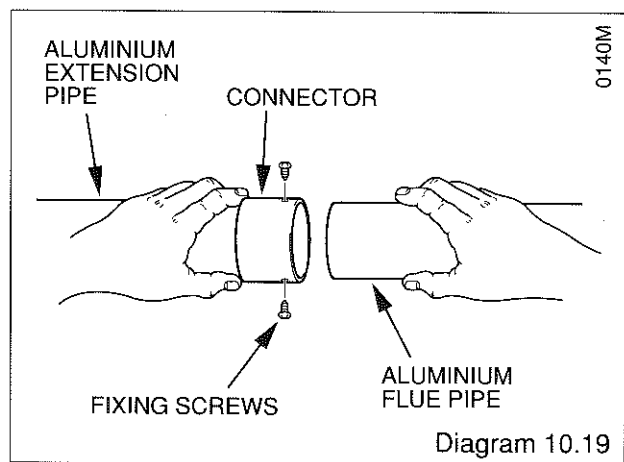
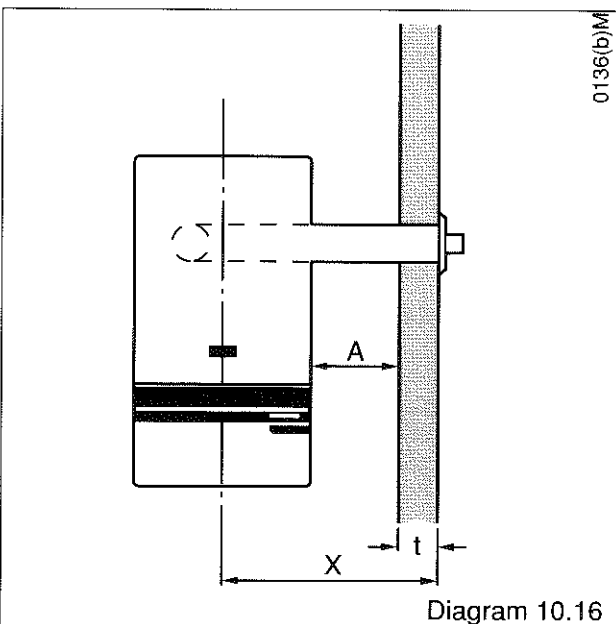
The connector fitted to the aluminium extension pipe is a push fit onto the aluminium pipe supplied with the boiler or onto another extension pipe, if more than one is used. The two screws provided must be used to fasten the two pieces together once assembled, using the predrilled holes in both the connector and pipe end, see diagram 10.19.

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, see diagram 10.20.



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

Table 10.18



10 Installation

10.17 Cutting lengths for extended flues

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

Using the correct number of extension kits, as Table 10.18, 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.

Mark and cut both extended flue pipes, referring to diagram 10.21, using the cutting lengths given in Table 10.13.

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

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 diagram 10.22, 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.

Note. If the length of any aluminium pipes other than the final extension pipes 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.



Diagram 10.20

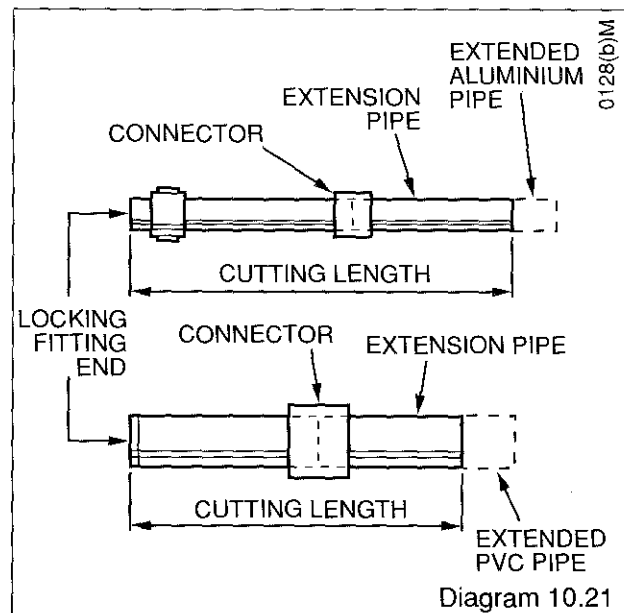


Diagram 10.21

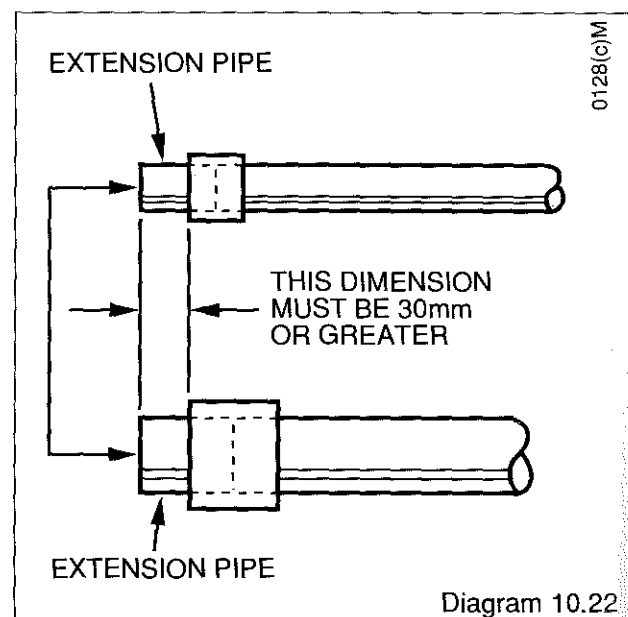


Diagram 10.22

10.18 Installation of flue assembly

Fit the PVC pipe into the wall with locking fitting end to outside, see diagram 10.23.

Note. For installation where dimension "A" is greater than 1metre, that is, when flue extensions are used, it will be necessary to provide temporary support for the flue system at this stage.

Fit the rubber sealing collar into the groove at the outer end of the PVC pipe, see diagram 10.24.

Pull the PVC pipe inward so as to bring the rubber sealing collar hard against the external wall surface around the pipe, see diagram 10.25.

Fit the plastic flange as shown, push it along the pipe until hard against internal wall surface, see diagram 10.26.

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

Pull hard on PVC pipe and make sure 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, see diagram 10.27.

Fasten the plastic flange to the PVC pipe using the two self tapping screws provided, see diagram 10.28.

From inside, fully insert the aluminium pipe, locking end first, into the PVC pipe, see diagram 10.29.

Turn aluminium pipe anticlockwise as far as possible, viewed from inside.

Note. 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 jointed as inserted.

Fit the rubber connecting sleeve, plain end first, onto the end of the PVC pipe. Push it on as far as possible, see diagram 10.30.

The boiler is supplied ready to accept a back outlet rear flue connection but can be adapted to accept a top outlet flue, see Section 10.10.

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, see diagram 10.31.

Slide back clamps to lock flue connector in position and retighten screws, see diagram 10.32.

Important. When fitting flue connector, make sure that fan outlet connecting pipe is correctly fitted.

To continue installation go to Section 11 "Boiler Mounting".

For either a back outlet side flue or a top outlet rear or side flue, proceed as follows:

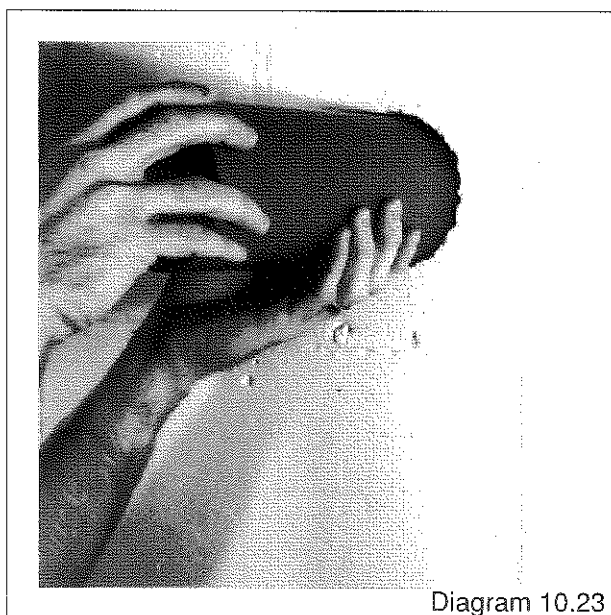


Diagram 10.23

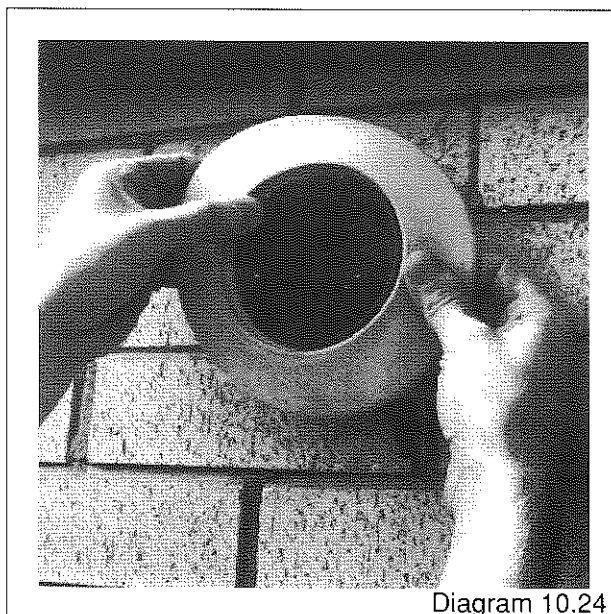


Diagram 10.24

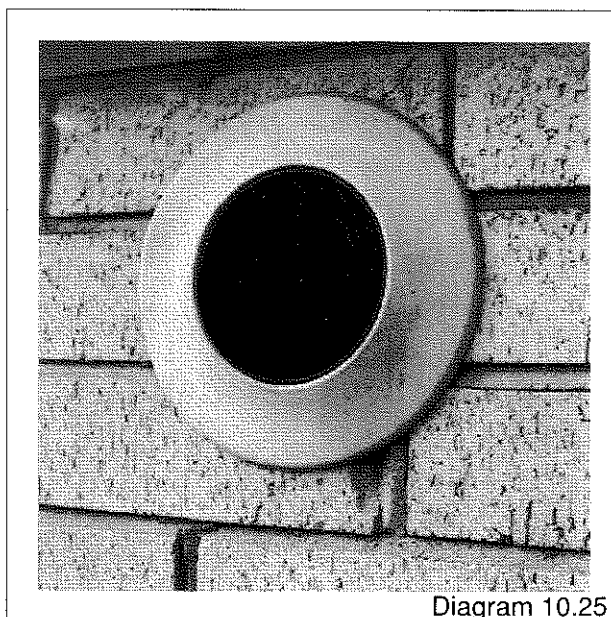
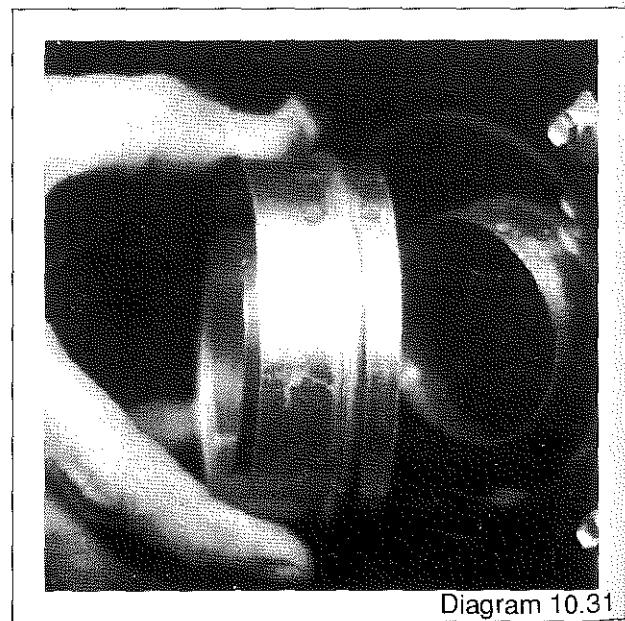
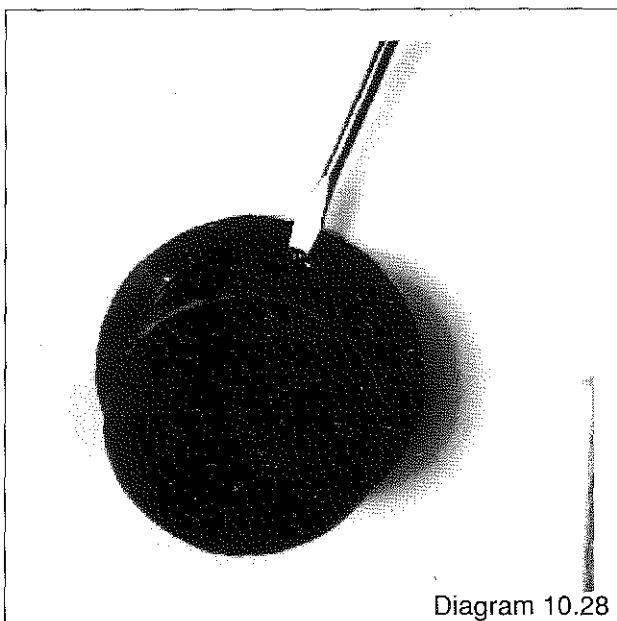
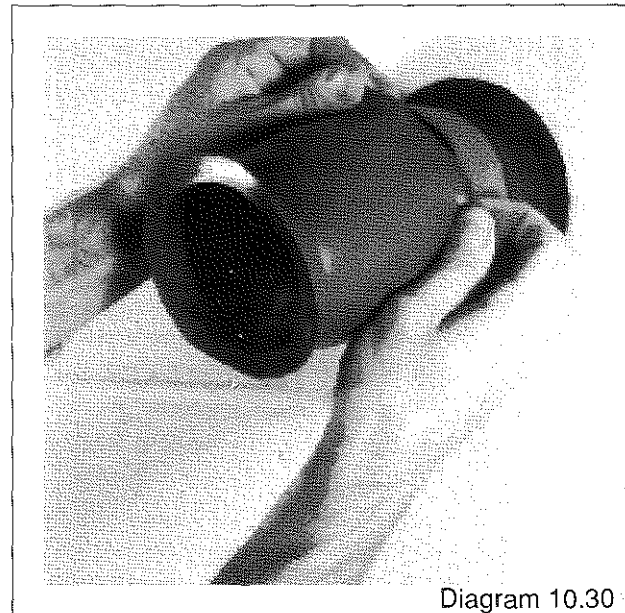
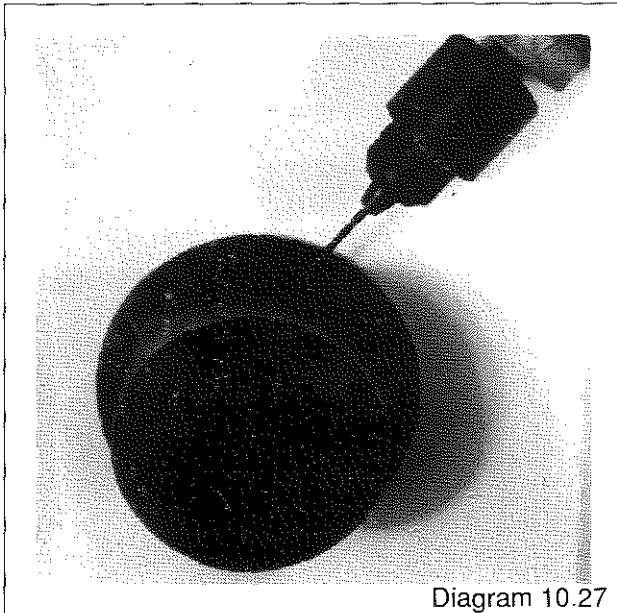
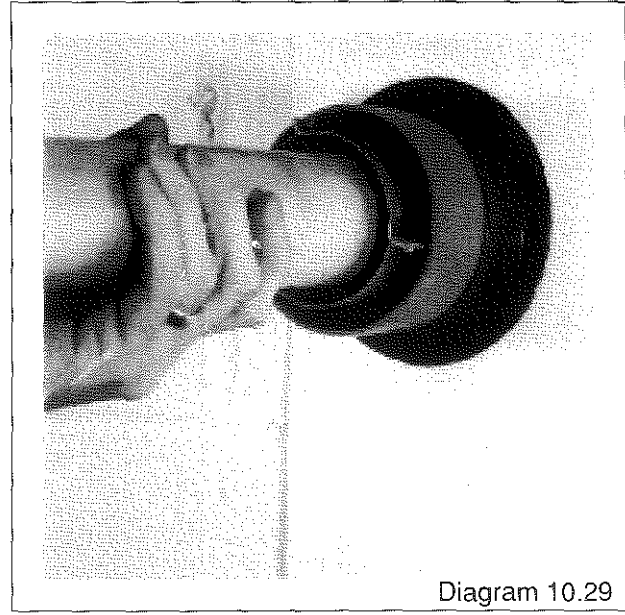


Diagram 10.25

10 Installation



10 Installation

10.19 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 retighten screws, see diagram 10.33.

To continue with the installation go to Section 11 "Boiler Mounting".

10.20 Top outlet, rear or side flue

To convert boiler to accept a top outlet flue connection, see Section 10.10.

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 the elbow, see diagram 10.34.

Fit flush end of elbow into boiler, to point in the correct direction, see diagram 10.36.

Slide clamps back to lock elbow in position and retighten screws, see diagram 10.36.

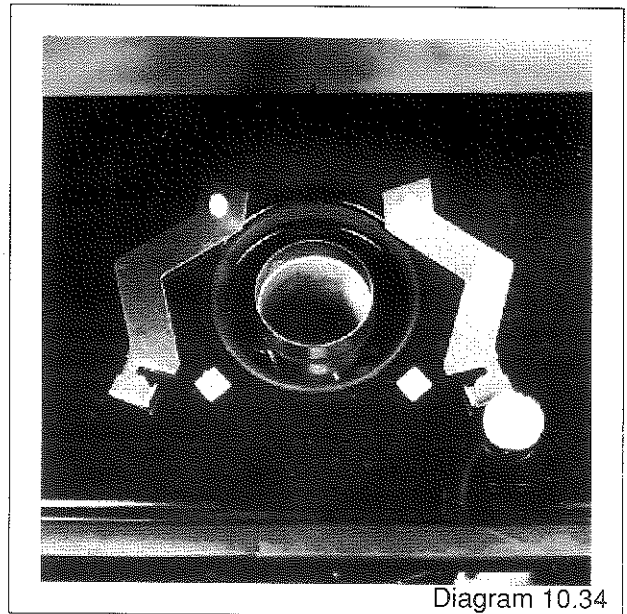


Diagram 10.34

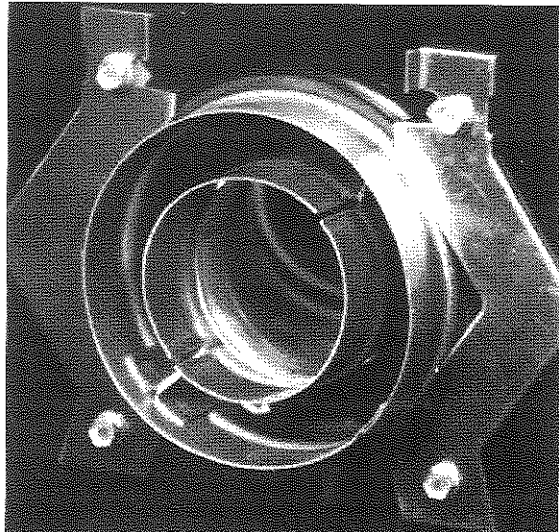


Diagram 10.32

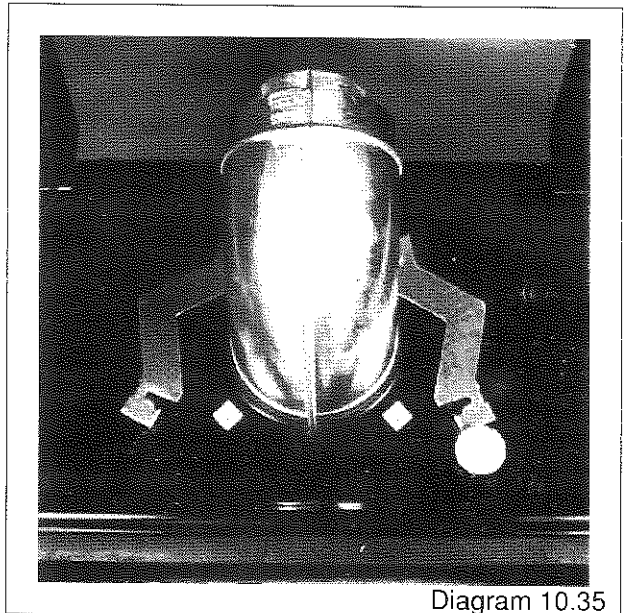


Diagram 10.35

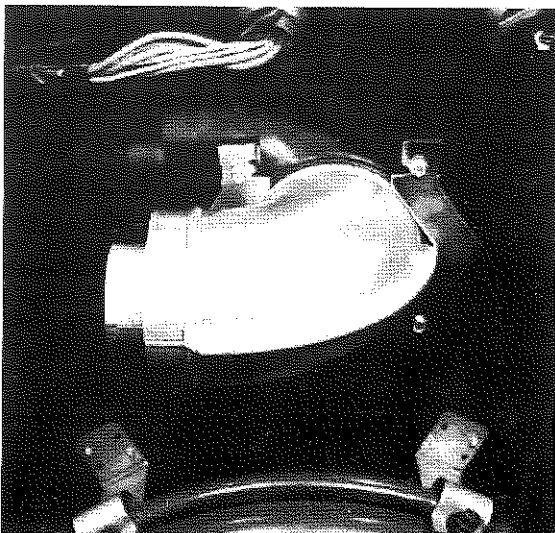


Diagram 10.33

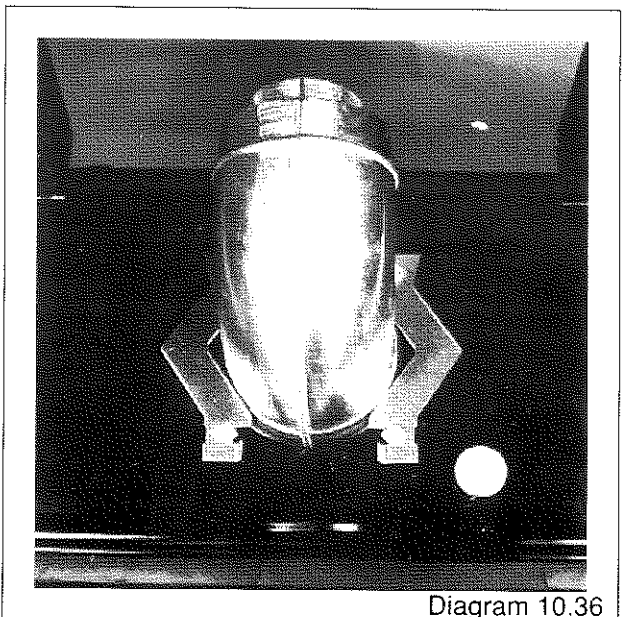


Diagram 10.36

11 Boiler Mounting

Boiler Casing

The boiler is supplied with all casing panels in place.

For installation of the boiler it is necessary to remove them, as follows:

11.1 Lower front (control) panel

This is hinged at the bottom edge and will open flat. Open the control cover door, by pressing the brown finger plate, hold the control panel in the closed position. To disengage the two "quarter turn" fasteners at the top of the panel, use a flat bladed screw driver and turn the screws a quarter turn toward the centre of the boiler, see diagram 11.1.

11.2 Upper front panel

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

Pull the lever of each panel retaining catch forward and ease the bottom of the panel forward until it is freed from the slot in bottom flange of panel, see diagram 11.2.

With both catches free, pull bottom edge of panel out, about 30mm, to clear rubber seal of sealed chamber and lift panel upward and off the two retaining lugs at the top of the boiler.

Carefully release the plastic restraining strap from the combustion gas test point.

11.3 Side panels

Note. Side panels may be removed without first removing the front panels.

Unscrew and remove the panel retaining screw from the underside of the boiler. Pull bottom edge of panel from boiler frame. Lift panel upward and off the two retaining lugs at the top of the boiler, see diagram 11.3. Repeat for other side panel.

Remove any plastic caps protecting the pipe connections at the back of the boiler.

Lift the boiler and engage both fixing jig hooks in the two support brackets on the back of the boiler.

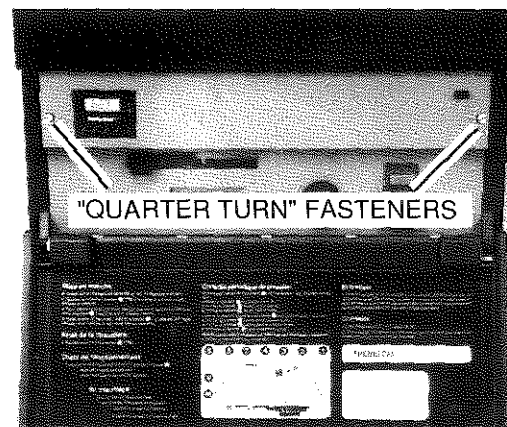


Diagram 11.1

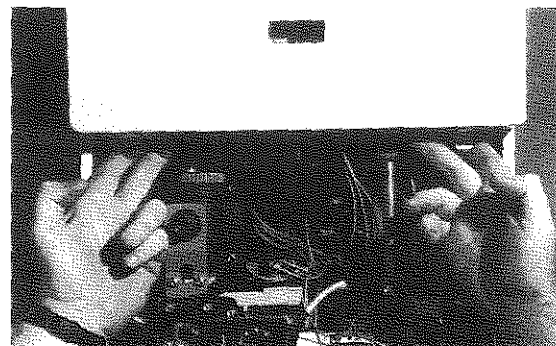


Diagram 11.2



Diagram 11.3

11 Boiler Mounting

Lower the boiler until it rests on the outward facing lip at the centre of the connecting plate, see diagram 11.4.

Note. Correct fitting of the boiler on connecting plate can be checked by looking through the boiler with the lower front panel open.

Using the sealing washers, flow regulator and filter provided make the connections between the boiler and connecting plate, see diagram 11.5.

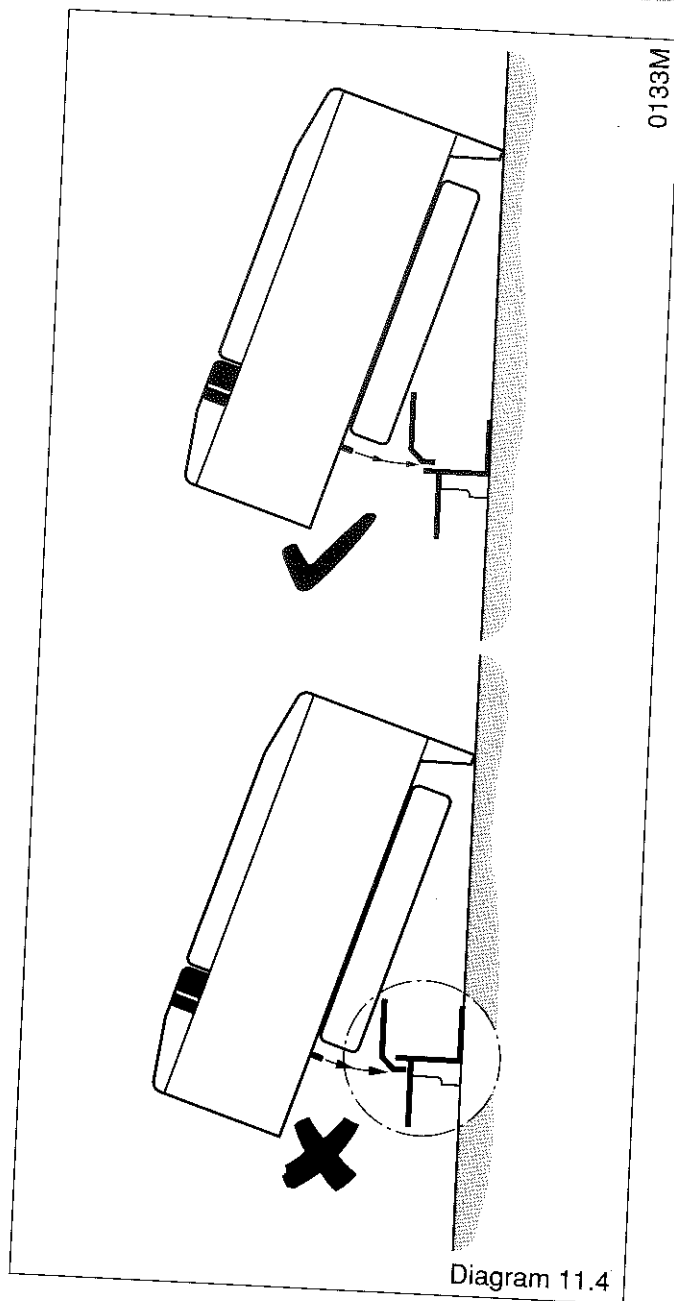
It is important that the gas connection is made first as there is no flexibility in this connection.

Fit the flow regulator into the "telescopic" cold water inlet pipe on the boiler before connecting to cold water inlet connection, see diagram 11.6.

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 socket at the rear of the electrical connection box. Make sure that the terminal pins are not pushed out.

Secure electrical connection box to connecting plate and fit cover.



11 Boiler Mounting

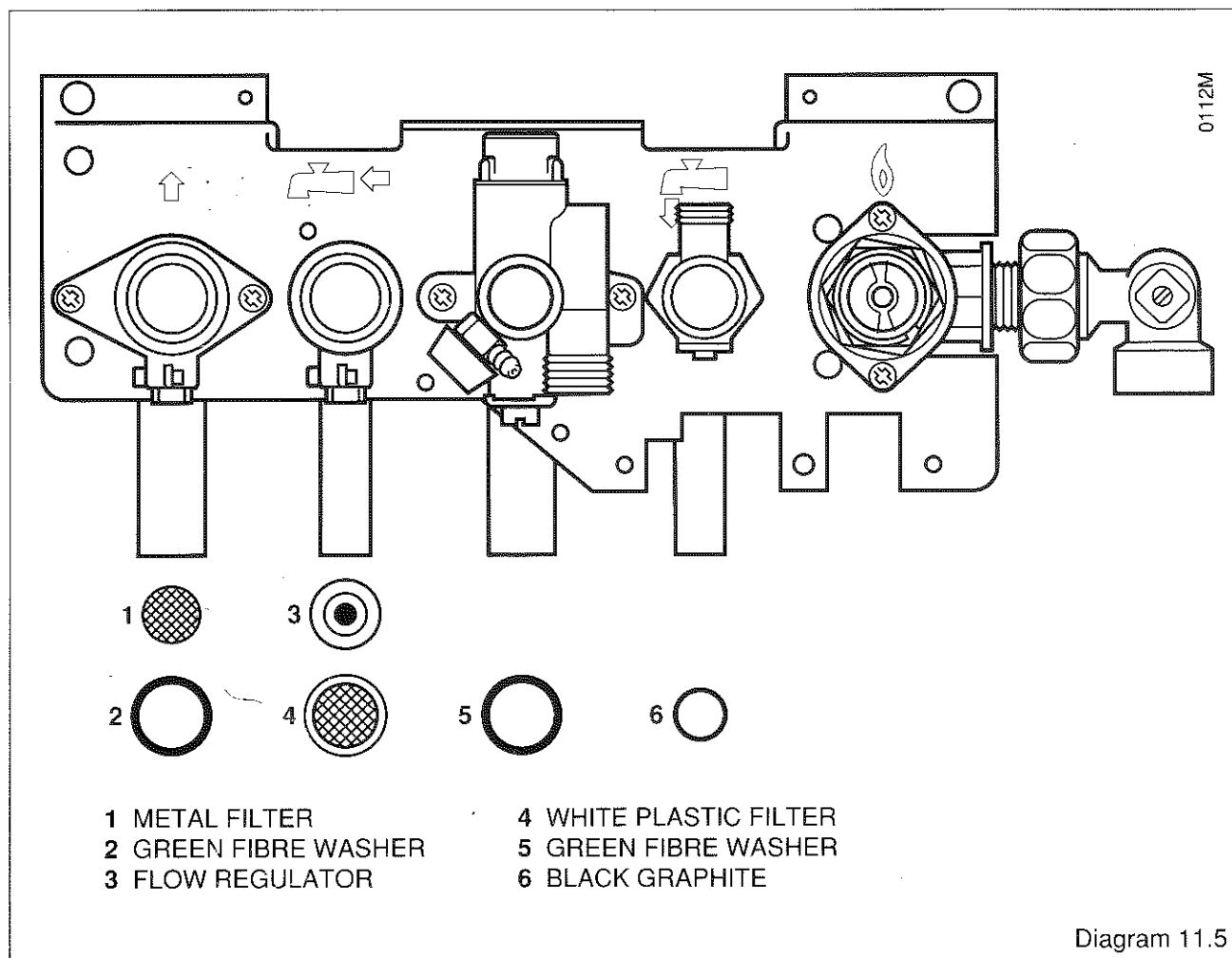


Diagram 11.5

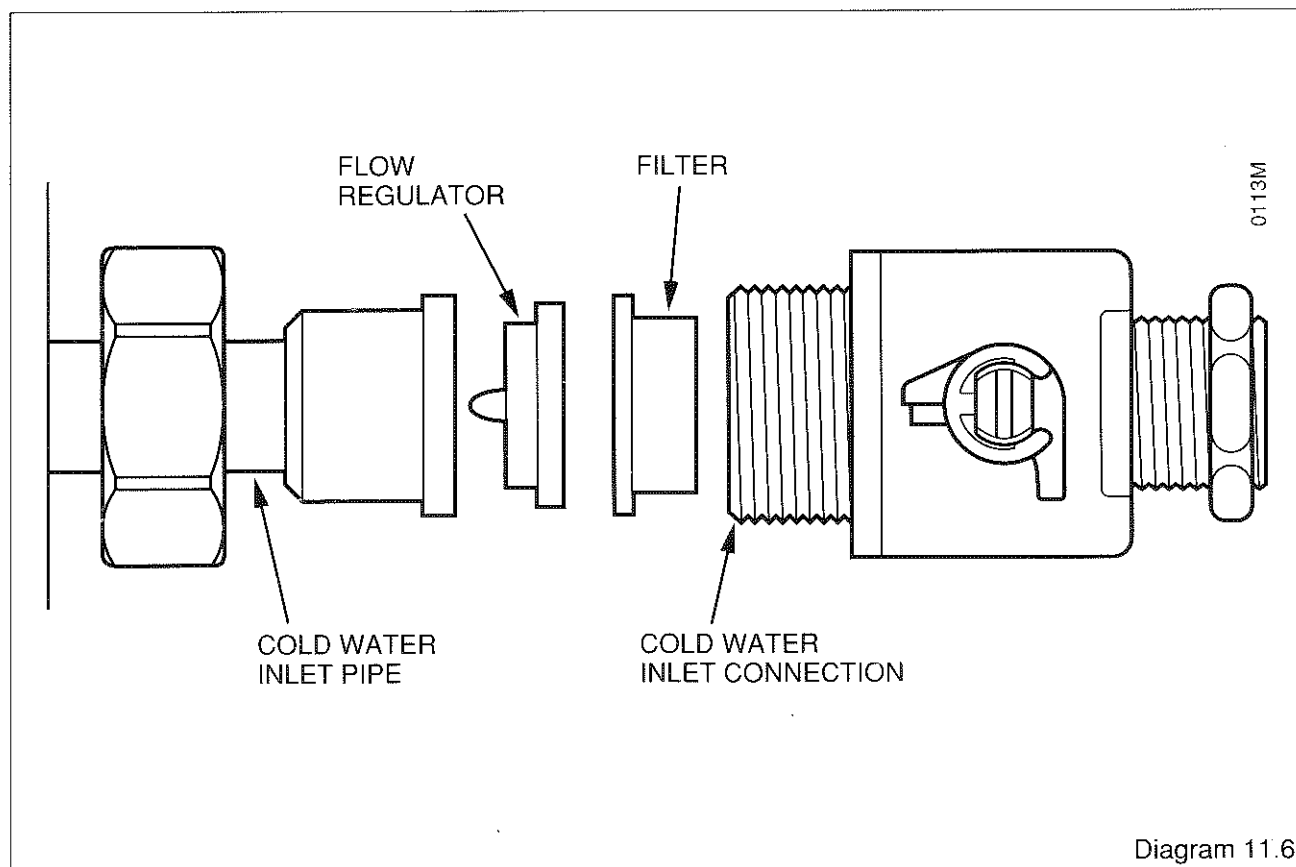


Diagram 11.6

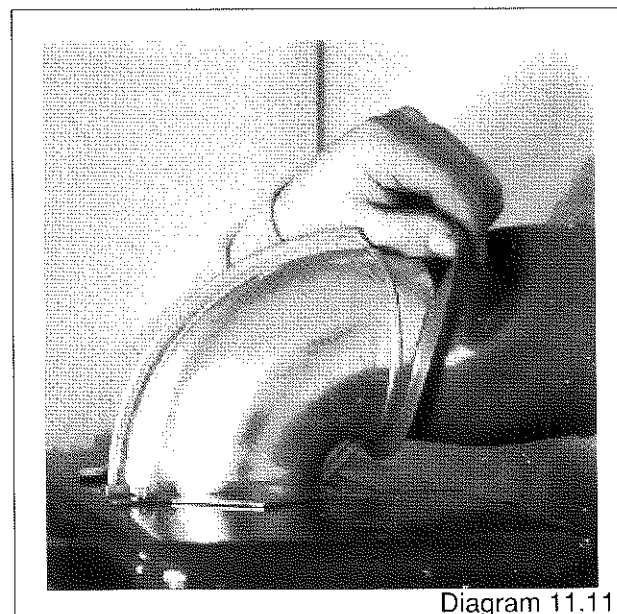
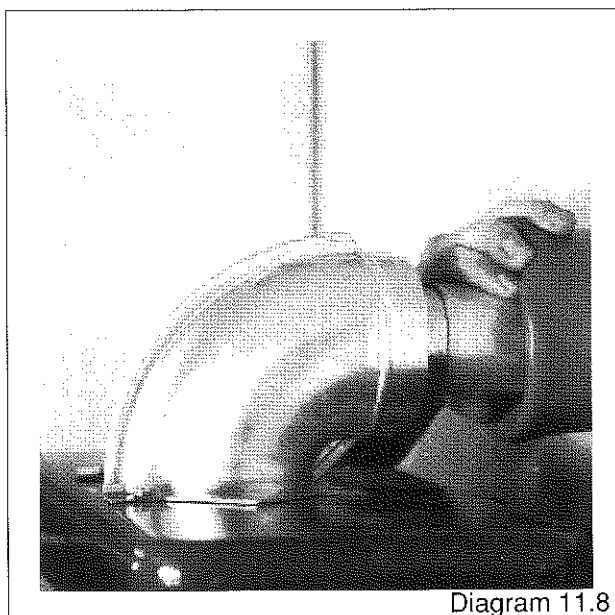
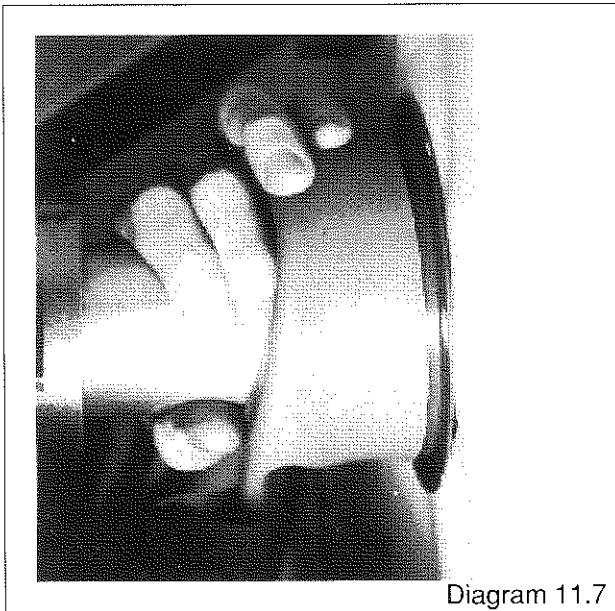
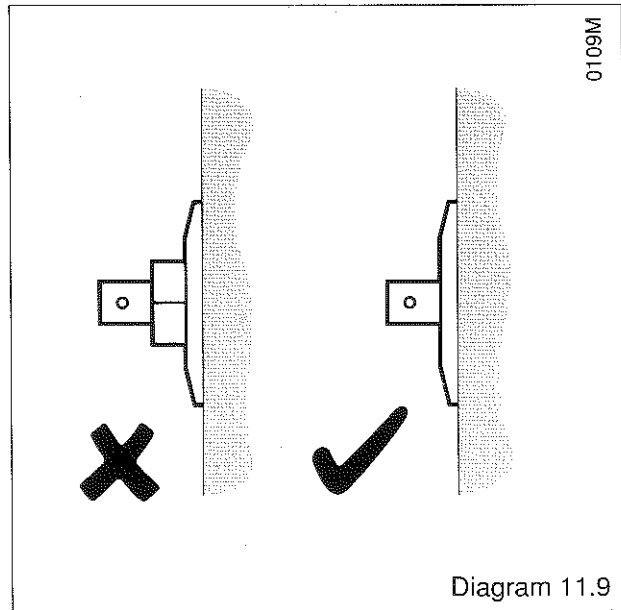
11 Boiler Mounting

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 held 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, see diagram 11.7 and 11.8.

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

Note. The aluminium pipe is correctly fitted and locked only when the concentric spacer is **FLUSH** with the outermost end of the PVC pipe, see diagram 11.9.

After checking that the aluminium pipe is correctly fitted, pull the rubber sleeve toward the boiler and fit the flanged end **FULLY** over the spigot of the boiler flue connector, or elbow, to make a seal, see diagram 11.10 and 11.11.



12 Commissioning

The commissioning and first firing of the boiler must only be done by a competent person.

Put out all naked lights and cigarettes.

12.1 Gas Installation

The complete gas installation including the meter should be inspected, tested for soundness and purged in accordance with the current issue of BS6891.

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

Make sure the boiler is isolated from the electrical supply.

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

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

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

Note. Make sure that "O" ring seal is correctly fitted before reconnecting pipe.

Push black button in again and check for gas soundness around the connections.

12.2 Electrical Installation

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

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

12.3 Heating System

Move the boiler selector lever to the right hand position.

Fill the heating system as Section 8.9, until the pressure gauge reads about 1.5bar.

Vent any air from the boiler, as follows:

Important. When venting air from the boiler, do not touch the Schrader valves on the expansion vessels, they are NOT vents.

Pump, unscrew the cap on the pump automatic air vent outlet by 1 to 2 turns and leave open.

Heat exchanger, unscrew the knurled brass cap on the end of the heat exchanger vent pipe, on right hand side of boiler by about 1 to 2 turns.

When a continuous jet of water is seen at this vent, screw the cap back tight, see diagram 5.1.

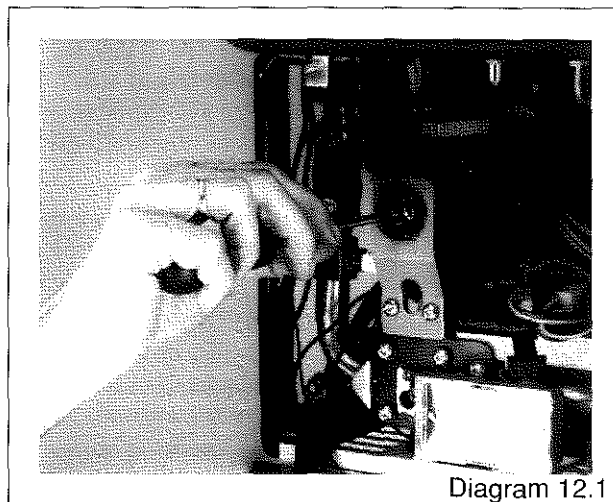


Diagram 12.1

Note. Do not unscrew this cap completely as the small ball inside may get lost.

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

Unscrew black cap on front of pump.

Place screw driver blade in slot of spindle, see diagram 12.1.

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

Replace black cap.

Replace front panel by reversing instructions in Section 11.2.

12.4 Domestic Hot Water System

To fill the domestic hot water circuit in the boiler:

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.

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

Note. The boiler can be used to produce domestic hot water only as follows:

Connect the central heating flow and return connections together, fitting a filling point in this connecting pipe.

Fill and vent the heating circuit, as the instructions in Section 12.3.

Set the selector lever to the left hand, hot water, position.

12.5 Starting Boiler

Refer to the lighting instructions in the "Instructions for Use" to start and operate the boiler, thoroughly checking all gas and water connections and pipework for water soundness.

On reaching maximum temperature the boiler should be turned off and the system drained off as rapidly as possible whilst still hot.

Refill the system to a pressure of 1 bar and vent as before.

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 make sure that a pressure of 1 bar is indicated on the pressure gauge when the system is COLD.

12.6 Gas Pressures

The main burner pressure should be checked during commissioning, to make sure the correct 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, see diagram 5.2.

Connect a suitable pressure gauge.

Set selector lever to right hand, heating/domestic hot water position.

Start the boiler as instructions in "Instructions for Use".

Set control thermostat to maximum, fully clockwise and check that any external controls and time clock, if fitted, are calling for heat.

With the burner on, check that the reading on the gauge matches that given in Table 6.2 for the type of gas being used.

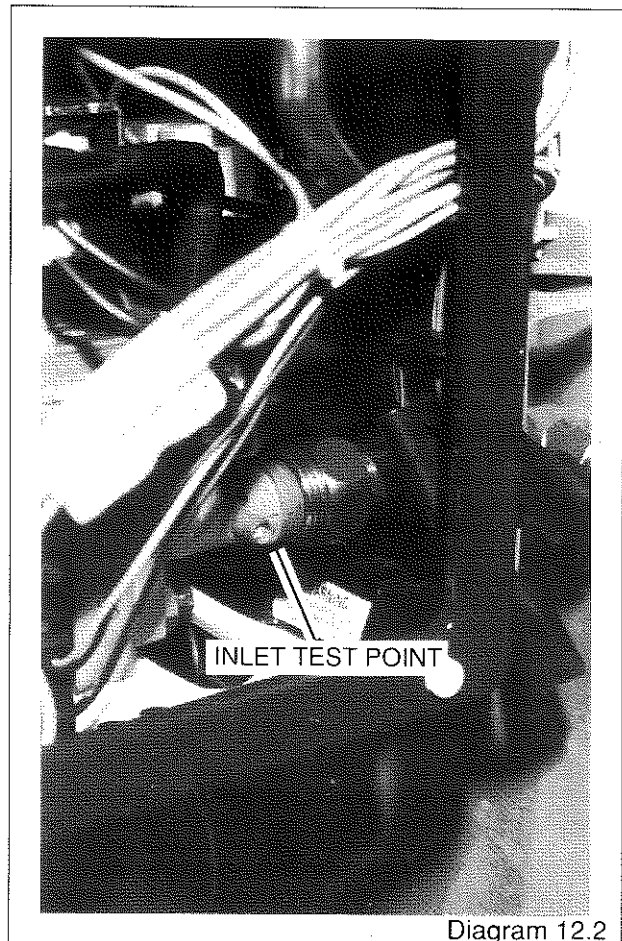


Diagram 12.2

Move the selector lever to the left hand position, domestic hot water and remove the pressure gauge, replace test point screw and make sure a gas tight seal is made.

If measured burner pressure differs greatly from the given 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 multi-functional control, see diagram 12.2.

Connect a suitable pressure gauge.

Start the boiler as the instructions in "Instructions for Use".

With the boiler working, check that the reading on the gauge matches that given in Table 6.2 for the type of gas being used.

Shut down boiler and remove pressure gauge, refit test point screw and ensure a gas tight seal is made.

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

If inlet pressure is below that given 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 pressure must be rechecked when inlet gas pressure has been corrected.

12.7 Adjustment of Heating Output

The boiler is supplied set to maximum output, it can be adjusted between 8.8kW (30,000Btu/h) and 23.4kW (80,000Btu/h), central heating ONLY, as follows:

Connect a suitable pressure gauge to the main burner test point, as Section 12.6.

Remove small plastic cap from inner face of lower front panel, see diagram 12.3.

Using a small electrical screwdriver turn the derating control, accessible through hole in rear face of lower front panel, fully anticlockwise, about $\frac{3}{4}$ turn, as seen from above, see diagram 12.3.

Set control thermostat to maximum, that is, turned fully clockwise.

Check that external controls and timeclock, if fitted, are calling for heat.

Start the boiler by following the instructions in the "Instructions for Use".

Slowly turn the control thermostat control knob anticlockwise until first "click" is heard then turn control knob back to maximum.

With the boiler working, slowly turn the derating control clockwise, until increasing burner gas pressure on gauge corresponds to the required central heating output, see Table 6.3.

Open a hot water tap to a high flow rate, at least 8Litres per minute. The burner pressure should increase to the maximum values stated in Table 6.3.

If not, refer to Fault Finding Section.

Move selector lever to left hand, hot water, position and remove pressure gauge.

Refit pressure test point screw and make sure a gas tight seal is made.

Replace plastic cap.

Using a ball point pen, clearly indicate on the data label the value the boiler is set to.

It should be remembered that this adjustment does not affect the domestic hot water output.

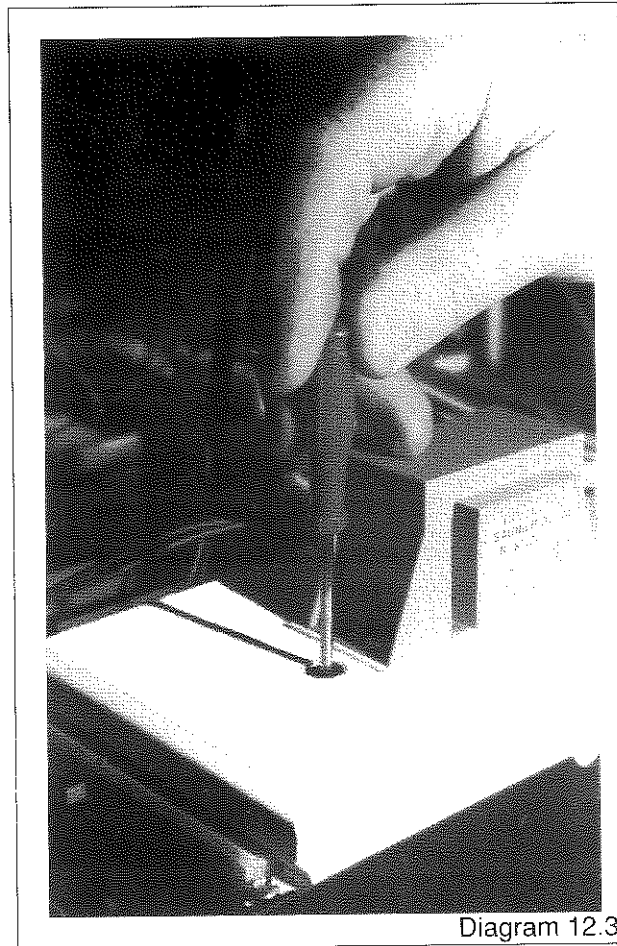


Diagram 12.3

12.8 Boiler Casing - Refitting

Rear Closure Pieces

Two rear closure pieces are supplied and should be attached to rear edge of side panels to hide the expansion vessel at the back of the boiler.

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.

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 560mm, see diagram 12.4.

The plastic closure piece may be cut using a hacksaw.

To fit the rear closure pieces, remove the boiler side panel, refer to Section 11.3, slide closure piece on to flange on rear edge of boiler side panel, see diagram 12.5.

Replace side panel by reversing removal instructions.

Repeat for other side panel.

To replace the boiler casing panels use the reverse instructions for removal, as Section 11.1, 11.2 and 11.3.

When fitting the upper front panel make sure that, the panel is correctly fitted onto BOTH retaining lugs at the top of the boiler and the plastic retaining strap is correctly fitted over the combustion gas test point.

Then push the bottom edge into position making sure that both retaining catches are correctly fitted into the bottom edge of the panel.

Important. Check that panel is correctly fitted by pulling it forward from the boiler. If the panel is not fitted correctly, at either top or bottom, remove it and refit.

Note. The upper front panel must be correctly fitted before the boiler can be operated.

12.9 Boiler/System Controls

After operating the boiler briefly on heating to bring it up to temperature, check the operation of the control thermostat, with the boiler selector lever in the right hand position and with external controls calling for heat:

Turn control thermostat control knob fully anticlockwise, the burner will go out.

Slowly turn the control thermostat knob clockwise the burner will light and run on low flame, continue turning the knob until the burner fires on high flame.

With the boiler selector lever in the right hand position and the control thermostat set to maximum, fully clockwise, operate the room thermostat and or the time switch, to check they operate the boiler.

Lastly, set all central heating controls as required.

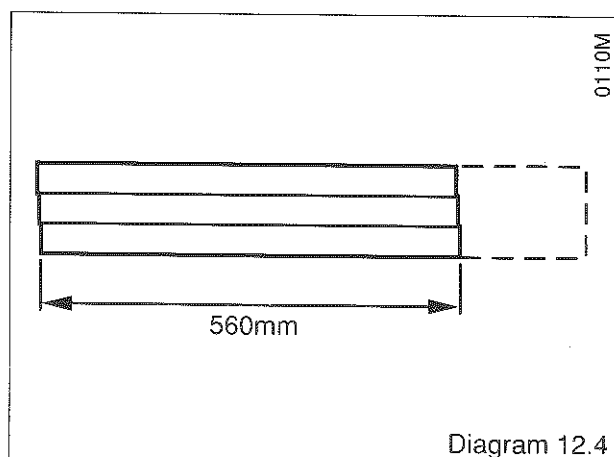


Diagram 12.4

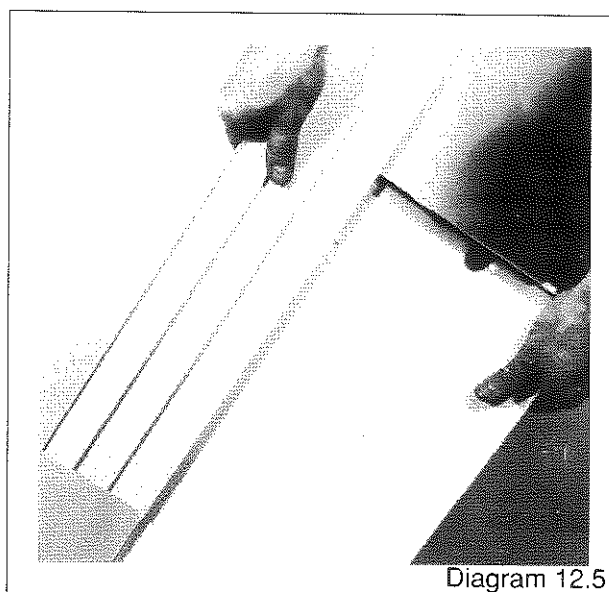


Diagram 12.5

12.10 Electrical Power Failure

In the event of a power failure the boiler will stop but the pilot will stay alight. When power is restored the boiler will restart automatically. If the power supply is cut for any great length of time the pilot may eventually go out.

If this does happen restart the boiler as the instructions in the "Instructions for Use".

13 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 is carried out by a competent person.

13.1 Service Check and Preparation.

Operate the boiler and check for any faults that need to be put right.

Isolate the boiler from the gas and electrical supplies.

On completion check all gas carrying parts for soundness with a leak detection fluid.

The maximum domestic hot water flow rate is 11Litres a minute.

Remove the boiler casing as Section 11.1, 11.2 and 11.3.

13.2 Combustion Chamber

Slacken, but do not remove, the two screws holding the front temperature shield and lift off.

Loosen the two wing nuts on the combustion chamber retaining rods, either side of the "dimpled" combustion chamber cover.

Disengage retaining lugs from holes in either side of combustion chamber and move the retaining rods away to clear combustion chamber sides, see diagram 13.1.

Unclip the two toggle clips keeping the upper part of the combustion chamber in place.

Holding both sides, gently pull chamber forward, to release it from the underside of heat exchanger and out of the boiler.

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

13.3 Cleaning of Burner and Pilot

Slacken, but do not remove, the two screws holding the front temperature shield and lift out.

Unclip pilot burner retaining clip and remove pilot burner, see diagram 13.2.

Inspect and clean if necessary by blowing through tube.

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

Carefully remove supply pipe by easing downward, see diagram 12.1.

Note. The "O" ring seal from this connection must be kept for reuse on reassembly.

Undo screw and remove thermocouple retaining clip from burner injector bar bracket, see diagram 13.2.

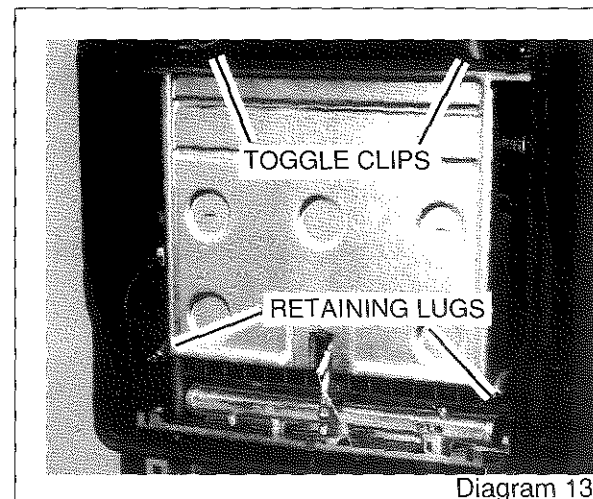


Diagram 13.1

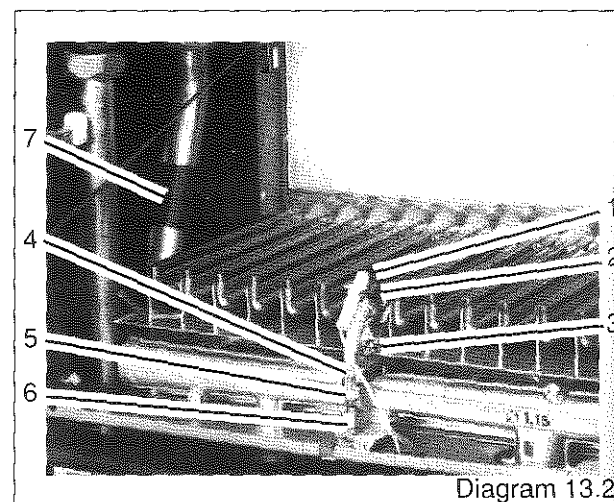


Diagram 13.2

KEY TO COVER DIAGRAM 13.2

- 1 Thermocouple
- 2 Pilot burner
- 3 Thermocouple retaining clip
- 4 Pilot burner clip
- 5 Pilot injector
- 6 Pilot injector tube
- 7 Sensing bulb clip

13 Routine Cleaning and Inspection

Remove thermocouple head from bracket, pull downward to clear burner injector bar bracket.

Undo the main gas supply pipe nut from the main burner.

Undo and remove the three screws fastening the triangular retaining plate to the front face of the multi-functional control. Pull pipe forward to disengage from the multi-functional control then pull down to disengage from the main burner.

Note. The "O" ring seal behind the triangular plate and the gasket at the burner nuts must be kept for use on reassembly.

Unscrew and remove the locking nut and washer from both the main gas connection and burner pressure test tapping point.

Lift front edge of burner until gas pressure tappings and main gas supply tapping is free. Remove burner from boiler. Keep the four sealing washers for use on reassembly.

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

Examine and clean injector if necessary.

Do not use a wire or sharp instrument on the holes.

Undo screw and remove pilot injector tube from burner injector bar.

Using a 10mm spanner unscrew and remove small injector retaining nut from injector tube.

Examine injector and clean if necessary.

Do not use a wire or sharp instrument on the hole.

Refit injector and retaining nut to injector tube.

Do not overtighten nut.

13.4 Heat Exchanger

After removal of burner, examine heat exchanger for any blockages or build up of deposits.

Clean, from below, with a soft brush or vacuum cleaner.

13.5 Reassembly of Parts Removed for Servicing

All parts are replaced in the reverse order to removal.

13.6 Flue System

Check externally to make sure the flue is not blocked.

Inspect flue system to make sure that all fittings are secure.

13.7 Operation of Fan

Switch on electrical supply and turn on gas.

Set selector lever to left hand position and light pilot as "Instructions for Use".

Check that, with the pilot lit, the fan works.

Light burner, by opening a hot water tap.

Without the white upper front panel in place the burner should be automatically prevented from staying on by the airflow detection system.

Refit upper front panel as Section 11.2.

Check that fan speed increases when burner lights and decreases when it goes out.

13.8 Flame Supervision Device

With the upper front panel removed, put the pilot flame out. The multi-functional control should shut within 60 seconds, indicated by a "click".

13.9 Cold Water Inlet Filter

Drain down hot water circuit of boiler as Section 15.2.

Undo connecting nut from cold water inlet connection.

Remove white filter from inlet connection.

Note. Connecting pipework is telescopic, it may be necessary to slide sleeve back for easier access to filter.

Clean and inspect filter, replace if necessary.

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.

13.10 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 flow rate of water, it should not be greater than 3.5 Litres per minute.

If necessary, replace the diaphragm.

Finally replace remaining outer panels as Section 11.

14 Replacement of Parts

For replacement of the following components it will be necessary to remove the boiler casing panels - as described in Section 11:

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

14.1 To replace thermocouple

Remove combustion chamber cover refer to Section 13.2.

Remove pilot burner - refer to Section 13.3.

Remove thermocouple retaining clip refer to Section 13.3.

Disconnect Klaxon overheat device connections from thermocouple, see diagram 14.1.

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

Using a 10mm spanner, unscrew the thermocouple nut and disconnect thermocouple from thermocouple solenoid at rear of multi-functional control.

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

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.

Replace pilot burner - check that gap between pilot ignition electrode and top edge of pilot burner is 2.5mm, see diagram 14.2.

Replace combustion chamber - refer to Section 13.2.

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'.

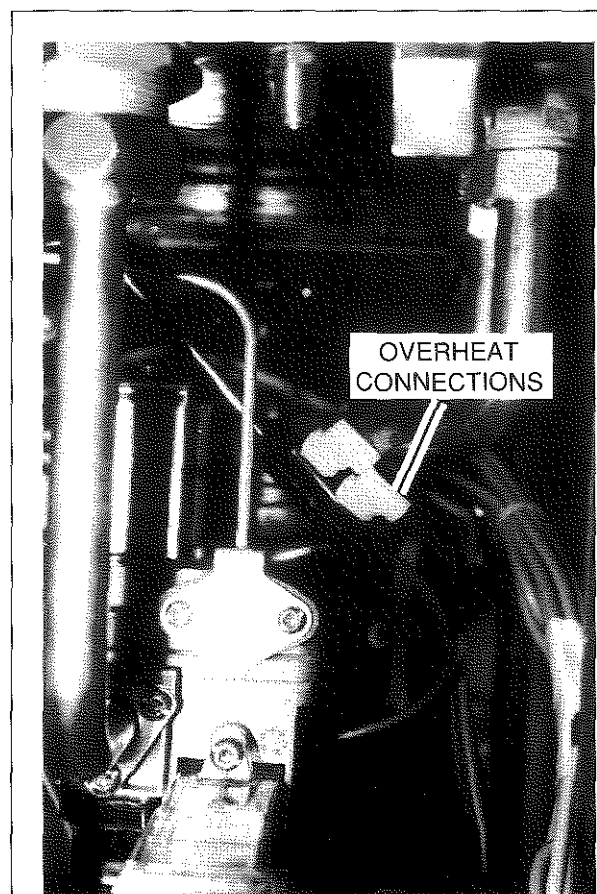


Diagram 14.1

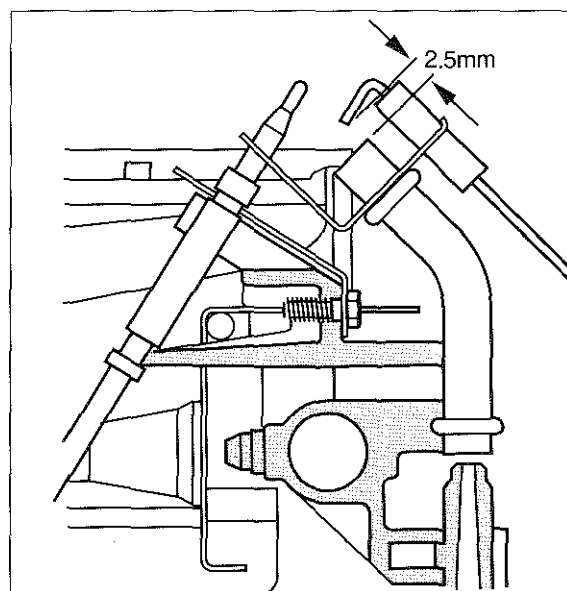


Diagram 14.2

14 Replacement of Parts

14.2 To Replace Thermocouple Solenoid

Using a 10mm spanner unscrew thermocouple nut from solenoid - at rear of multi-functional control.

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

Preferably using an 18mm spanner, unscrew and remove the thermocouple solenoid from the multi-functional control casting.

Fit new solenoid, tighten and reconnect thermocouple nut.

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.

Lift microswitch assembly away from reversing valve assembly.

CAUTION: 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.

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.

Reconnect the two plugs making sure that the grey plug is fitted to No. 3 microswitch and that the white plug is fitted to No. 1 microswitch as marked on the top of the switch housing, see diagram 14.4.

14.3 To Replace Domestic Hot Water Thermistor

The replacement thermistor must be marked with an orange dot as diagram 14.3 and is fitted as follows:

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

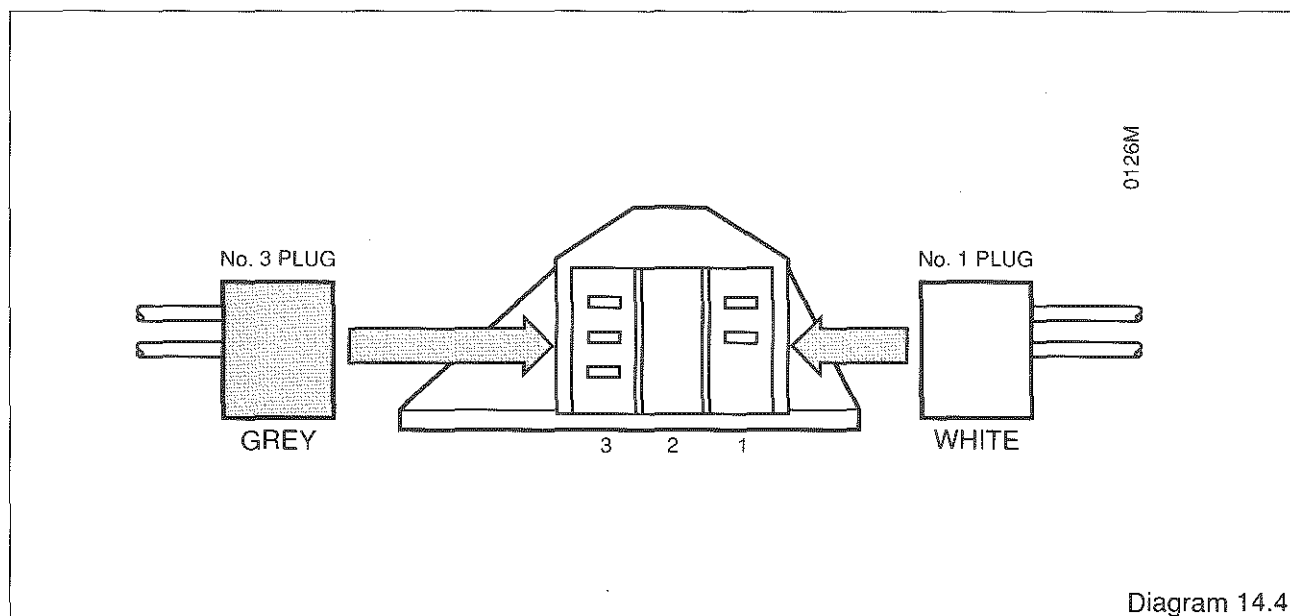
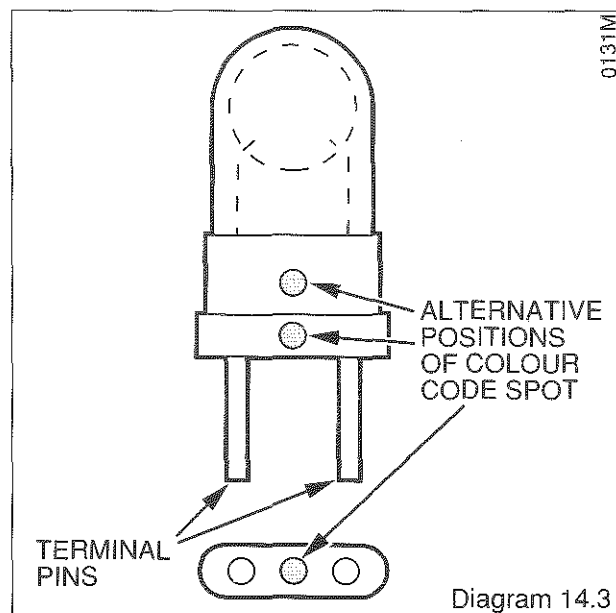
Thoroughly cover head of replacement thermistor with heat sink compound provided.

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.

14.4 To Replace Microswitch Assembly

Disconnect microswitches by pulling off plugs from microswitch terminals, see diagram 14.4.

Undo and remove screw holding microswitch assembly down onto reversing valve assembly, see diagram 14.5.



14 Replacement of Parts

14.5 To Replace Fan

Disconnect power supply and earth leads to fan.

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

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.

Turning 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.

Remove original fan; fit replacement fan to mounting plate. Make sure that fan is correctly positioned on mounting plate for flue outlet being used either top or back outlet.

Refit replacement fan, complete with mounting plate, into boiler using the reverse of the above removal procedure. Make sure that mounting plate retaining lugs are correctly fitted 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: Make sure that outlet of fan is correctly fitted into either the flue elbow, top outlet, or the flue elbow or connector, by the bent connector tube, back outlet). Also make sure 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, Section 10.

Before commissioning the boiler make sure that the two plastic transit clips are removed from the fan.

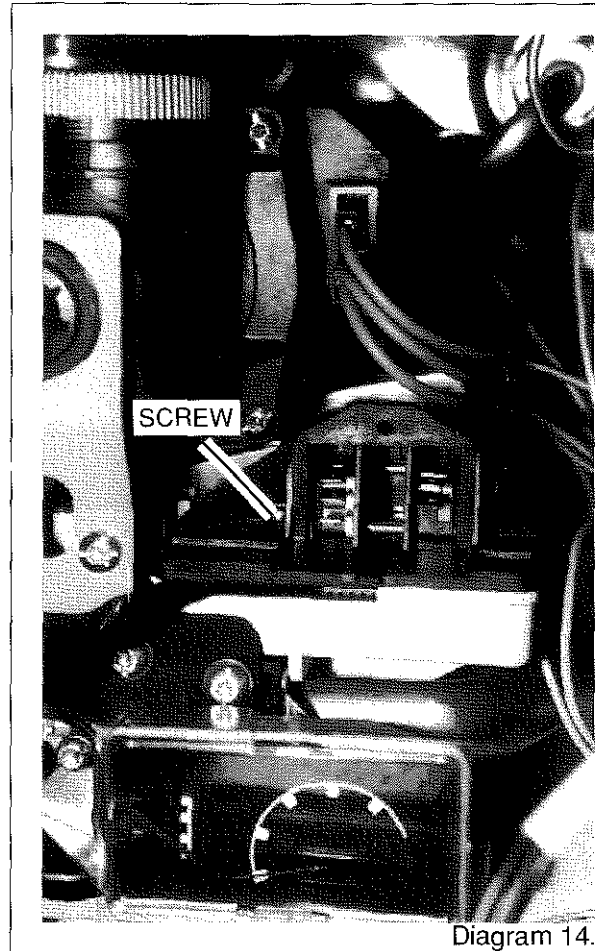


Diagram 14.5

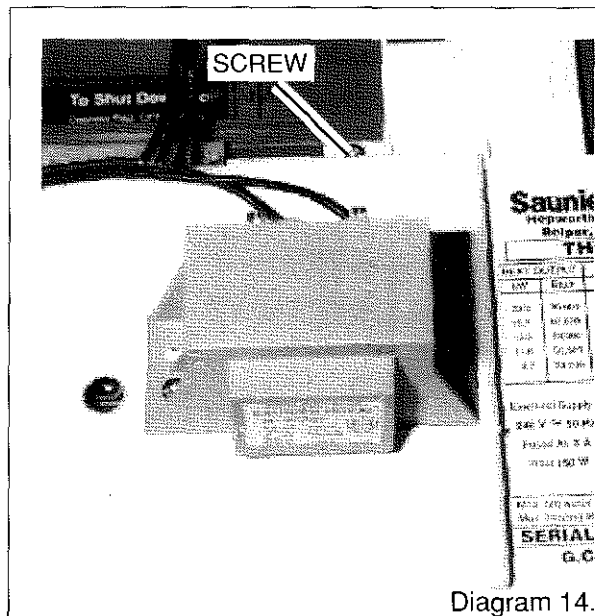


Diagram 14.6

14 Replacement of Parts

14.6 To Replace Air Pressure Switch

Locate pressure switch, situated in upper left corner of sealed chamber. Refer to diagram 5.1. Carefully pull off tube from the left hand connection.

Carefully push down both clips at the bottom of the retaining bracket, until clear of pressure switch.

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

Disconnect switch by pulling leads from switch terminals.

Fit leads to terminals of replacement switch, connect each lead as follows:

Black terminal cover to terminal number 1.

Red terminal cover to terminal number 2.

Clear terminal cover to terminal number 3.

Fit replacement switch into boiler by clipping it into retaining bracket.

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

14.7 To Replace Push-button Box

Disconnect the two rubber plugs from the right hand side of the push-button box.

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

Undo and remove screw holding push-button box to front of multi-functional control.

Remove push-button box by pulling it forwards and upwards, disengaging it from multi-functional control.

Fit replacement push-button box into boiler, locating it in the recess on the front of the multi-functional control, using the reverse of the removal procedure.

Note. The two plugs are uniquely 'keyed' to fit the correct socket on the push-button box.

14.8 To Replace Spark Generator

Locate spark generator on inside rear face of boiler, see diagram 5.2.

Disconnect all four leads from spark generator.

Remove the left hand and loosen the right hand fixing screws, remove spark generator.

Fit and secure replacement spark generator.

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

Power leads, grey, terminals 1 and 2.

Earth lead, green/yellow - terminal 3.

Ignition lead, white - terminal 4.

14.9 To Replace Printed Circuit Board (PCB)

With lower front panel down, as Section 11, undo and remove the screw securing the PCB cover to the lower front panel, see diagram 14.6.

Open the PCB cover to gain access to the PCB, see diagram 14.7.

Lift PCB out of its location and carefully pull off the PCB connections.

Fit replacement PCB in reverse order to removal.

Note. Make sure that PCB connections are pushed fully onto the replacement PCB and that the PCB is correctly fitted into the lower front panel.

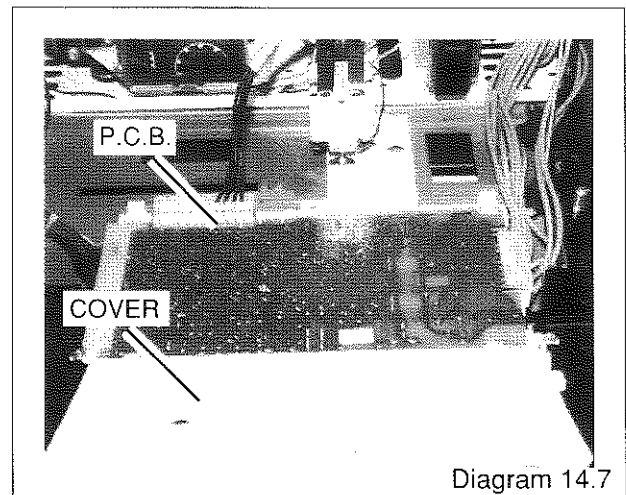


Diagram 14.7

14 Replacement of Parts

14.10 To Replace Control Thermostat

With lower front panel flat, as Section 11.1.

Remove combustion chamber cover as Section 13.2.

Unclip control thermostat sensing bulb from heating return pipe, see diagram 13.2.

Push sensing bulb down through rubber grommet in bottom of sealed chamber.

Note route of capillary for when replacing.

Remove the control thermostat knob.

Remove the three screws securing the PCB housing/control thermostat mounting to lower front panel.

Lift out the PCB housing/control thermostat mounting for access to the control thermostat.

Disconnect wires from control thermostat.

Undo the two screws and remove the control thermostat from its mounting.

When fitting the replacement, carefully route the capillary to pass UNDER temperature/pressure gauge and to the left hand side of the boiler.

Attach the sensing bulb to the return pipe with clip, using the heat sink compound supplied.

Refit thermostat and other parts removed by reversing the above instructions.

Note. Make sure that the four leads to the replacement control thermostat are connected correctly, that is, black terminal covers to terminals 11 and 14, red terminal covers to terminals 21 and 22, see diagram 14.8.

14.11 To Replace Pump

Drain down heating circuit of boiler only, refer to Section 15.1.

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

Disconnect the two leads from the pump connection box.

Disconnect earth lead from earth terminal below pump connection box.

Pull out retaining clip and remove pump outlet connection, complete with flexible hose, from left side of pump, see diagram 14.9.

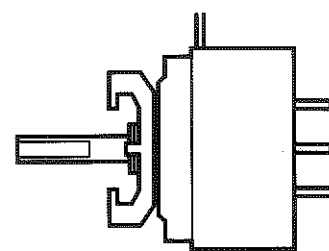
Undo two fixing screws and remove pump retaining bracket from front of pump.

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

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

Throw away old pump inlet connection 'O' ring.

Apply silicone grease to new pump 'O' ring provided and fit onto pump inlet connection at bottom of pump.



Thermostat terminal markings

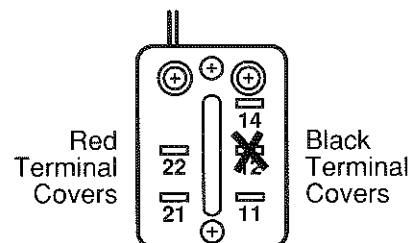


Diagram 14.8

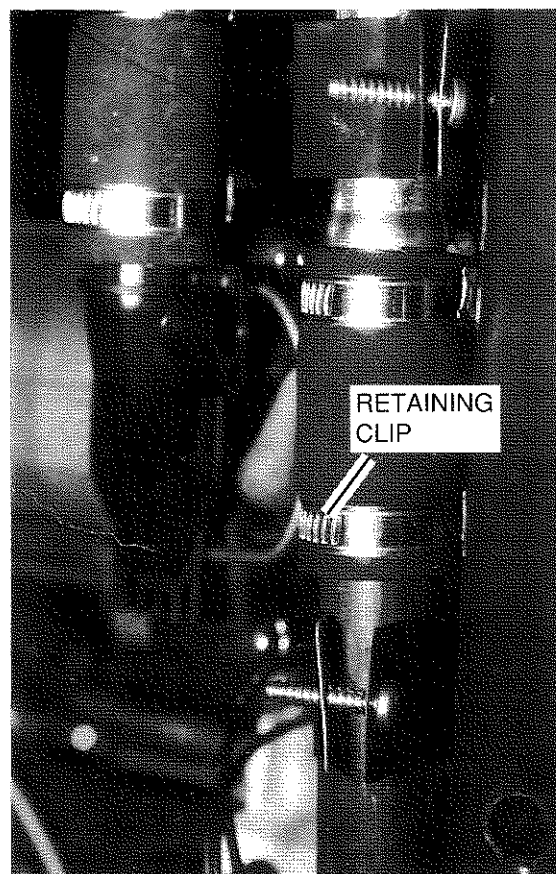


Diagram 14.9

14 Replacement of Parts

Fit replacement pump into boiler, using reverse of removal procedure.

With replacement pump inclined to the RIGHT, fit spigot on rear of pump motor in large grommet at rear of boiler.

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.

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.

Reconnect pump outlet to pump body.

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

Note. Make sure clip is fully pushed home into pump moulding.

Reconnect the two leads to the pump connection box and earth lead.

Open isolating valves on flow and return connections, refill, vent and pressurise boiler, as Section 12.3 and check all joints for leaks.

14.12 To Replace Pressure/temperature Gauge

Drain down heating circuit of boiler only as Section 15.1.

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

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

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

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

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.

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

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

Open isolating valves on flow and return connections on jig.

Refill, vent and pressurise boiler, as Section 12.3 and check for leaks.



Diagram 14.10

14.13 To Replace Reversing Valve Assembly

Remove pressure/temperature gauge refer to Section 14.12.

Remove pump, refer to Section 14.11.

Remove microswitch assembly, refer to Section 14.4.

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

Unscrew and disconnect heating flow (centre) connection at fixing jig.

Remove retaining clip from heating flow pipe connection on right of front section of reversing valve.

Remove flow pipe from boiler and keep.

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

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.

Undo and remove large screw holding water valve to back plate of reversing valve assembly, see diagram 14.10.

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

Unclip and remove water pressure switch from left side of reversing valve assembly, see diagram 5.2.

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

14 Replacement of Parts

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.

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.

Note. 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.

Open isolating valves on flow and return connections, refill, vent and pressurise boiler, as Section 12.3 and check for leaks.

14.14 To Replace Reversing Valve Front Section

Remove pressure/temperature gauge refer to Section 14.12.

Remove pipe connections from either side of reversing valve front section, refer to Section 14.13.

Set selector lever to left hand, hot water only, position.

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

Undo and remove six screws holding front section to rear section of reversing valve, see diagram 14.11.

Remove front plate, complete with pump bracket and then front section from reversing valve, along with rubber sealing gasket.

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

Note. Use bypass valve fitted to original front section for guidance.

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.

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

Refit pressure/temperature gauge, refer to Section 14.12.

Open isolating valves on flow and return connections, refill, vent and pressurise boiler, as Section 12.3 and check for leaks.

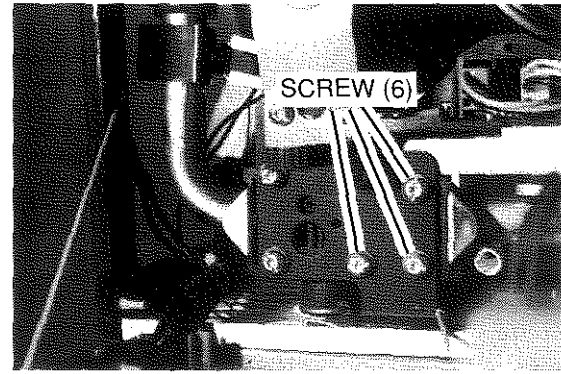


Diagram 14.11

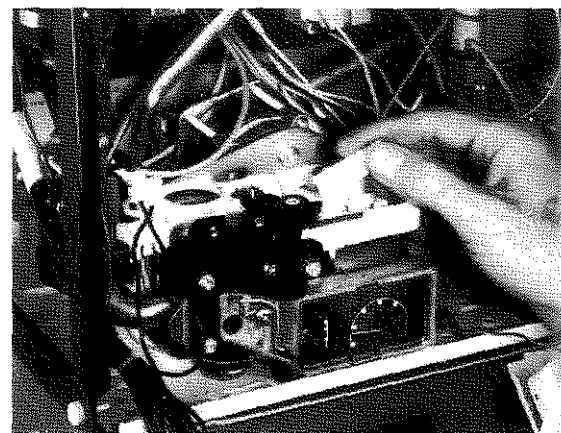


Diagram 14.12

14.15 To Replace Reversing Valve Washers

Remove front section of reversing valve refer to Section 14.14.

Remove microswitch assembly from reversing valve assembly, refer to Section 14.4.

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

Using small, flat-bladed screwdriver, carefully prise flat 'key' plate up and out of left hand crank and reversing valve shaft, see diagram 14.12.

Through front of open reversing valve housing, pull reversing valve arm forward.

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

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.

Replace the microswitch assembly, refer to Section 14.4.

Refit front section, with gasket, refer to Section 14.10. Open isolating valves on flow and return connections, refill, vent and pressurise boiler, as Section 12.3 and check for leaks.

14 Replacement of Parts

14.16 To Replace Water Pressure Switch

Drain down heating circuit of boiler only refer to Section 15.1.

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

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

Remove retaining clip holding switch into left side of reversing valve assembly.

Remove switch from reversing valve, by pulling out towards left.

Fit replacement switch into reversing valve, using new 'O' ring provided apply silicone grease to 'O' ring before fitting.

Reconnect leads to switch terminals by refitting plug.

Note. Plug can only be fitted one way.

Open isolating valves on flow and return connections, refill, vent and pressurise boiler, as Section 12.3 and check for leaks.

14.17 To Replace Water Valve or Diaphragm

Drain down hot water circuit of boiler only, refer to Section 15.2.

Remove microswitch assembly, refer to Section 14.4.

Unscrew connecting nut from cold water inlet connection, second from left on fixing jig, keep filter and flow regulator.

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 downward.

Note. This connecting pipe is 'telescopic', it may be necessary to slide brass sleeve back to allow easier removal.

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 upward, see diagram 14.13.

Unscrew and remove large screw holding water valve to back plate of reversing valve assembly. Refer to diagram 14.10.

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

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

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.

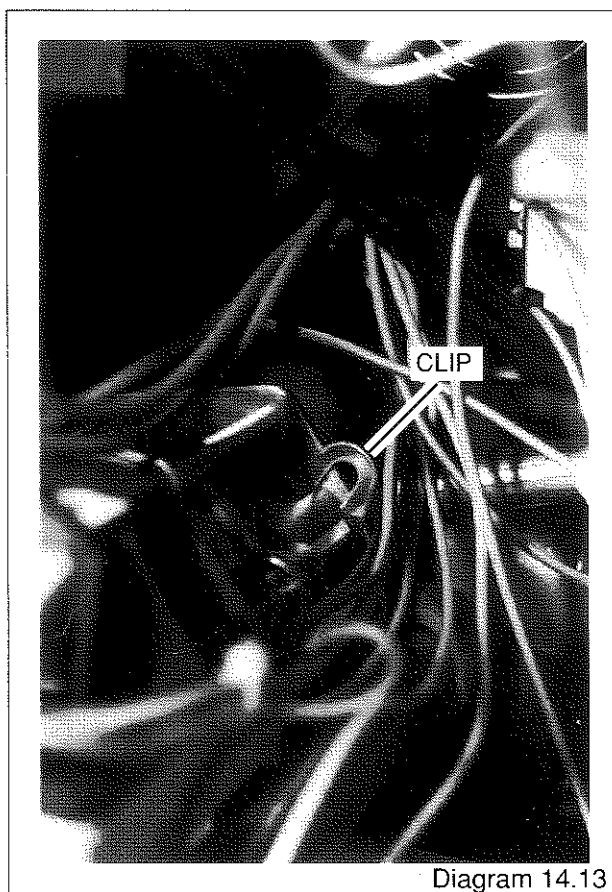


Diagram 14.13

14 Replacement of Parts

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Fit replacement diaphragm, making sure that metal disc FACES diaphragm cover and beaded edge of diaphragm is correctly located in corresponding groove in both cover and plastic housing, see diagram 14.14.

Reassemble water valve, taking care to evenly tighten five screws.

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.

Note. Apply silicone grease to pin before fitting.

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 water valve retaining screw but do not fully tighten at this stage.

Apply silicone grease to 'O' ring and fit onto end of heat exchanger pipe. Fit pipe into water valve by pulling it forward, make sure 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.

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. Make sure that clip is not loose and likely to fall out at a later date. If in doubt, fit a new clip.

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.

Replace microswitch assembly, refer to Section 14.4.

14.18 To Replace Multi-functional Control

Ensure that gas supply to boiler is turned off at gas cock.

Remove push-button box, refer to Section 14.7.

Disconnect thermocouple from thermocouple solenoid, refer to Section 14.2.

Disconnect multi-functional control from wiring loom by pulling off two spade connectors on multi-functional control coil and disconnect earth lead from top of multi-functional control coil.

Undo two screws and remove pilot supply pipe retaining plate and cork gasket from front of multi-functional control. Carefully disengage pilot supply pipe from top of multi-functional control body by pulling upward and out of 'O' ring seal.

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 multi-functional control. Pull pipe forward to disengage from multi-functional control then pull down to disengage from the main burner.



Diagram 14.1

Note. The gasket at the burner must be kept for use on reassembly.

Undo main gas union nut, between multi-functional control and gas inlet valve, at right hand rear of boiler.

From below boiler, undo and remove two multi-functional control retaining screws. Withdraw multi-functional control from boiler.

Unscrew and remove thermocouple solenoid from rear of multi-functional control.

Fit thermocouple solenoid to replacement multi-functional control.

Make sure that actuating pin, in multi-functional control inlet, is free to move. Fit replacement multi-functional control into boiler, engaging threaded inlet on to inlet valve. Do not fully tighten gas union nut at this stage.

From below boiler, fit two multi-functional control retaining screws and tighten. Tighten main gas union nut.

Undo two screws and remove pilot supply pipe retaining plate and cork gasket from front of replacement multi-functional control. Apply silicone grease to the smaller 'O' ring provided and fit into pilot supply pipe connection on top of multi-functional control.

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

Apply silicone grease to the larger 'O' ring provided and fit into the pipe connection in front of multi-functional control. Refit main gas supply pipe, refer to Section 13.5.

Refit push button box using reverse of removal procedure.

Reconnect wiring loom spade connectors to multi-functional control.

Reconnect thermocouple to thermocouple solenoid.

14 Replacement of Parts

14.19 To Replace Safety Valve

If safety valve seating is damaged it will be necessary to replace safety valve, heating flow connection.

Drain down entire heating system.

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

Remove pressure/temperature gauge refer to Section 14.4.

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.

From below boiler, disconnect safety valve discharge pipe.

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

From below boiler, undo heating flow pipe connection from safety valve assembly, at rear of connecting plate.

Remove complete safety valve assembly from connecting plate and withdraw from boiler.

Fit replacement safety valve assembly. Fasten in place using fixing screws.

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

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

Replace pressure/temperature gauge using reverse of removal procedure.

Refill heating system and boiler, vent and pressurise as Section 12.3 and check for leaks.

14.20 To replace heat exchanger

Drain down both heating and hot water circuits of boiler only - refer to Section 15.

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

Remove combustion chamber cover refer to Section 13.2.

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

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

Grasp both sides of heat exchanger, pull it forward on slide rails and out of boiler.

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.

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

Replace combustion chamber, refer to Section 13.2.

Open isolating valves on flow and return connections, refill, vent and pressurise boiler, as Section 12.3 and check all joints for leaks.

14.21 To Replace Fan Resistor

Locate fan resistor, mounted immediately beside air pressure switch in top left corner of boiler. Refer to diagram 5.1.

Holding both ends of resistor, pull it forward to disengage it from retaining clip.

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

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

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

14.22 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:

Drain down the heating circuit of the boiler, refer to Section 15.1.

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

Remove pump from boiler, refer to Section 14.11.

Unscrew pipe connection nut from expansion vessel connection, located at centre rear of boiler and disengage pipe from connection. Keep sealing washer.

Remove back nut and plastic restraining strap anchor loop, from expansion vessel connection. Remove cap from expansion vessel Schrader valve.

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.

Remove vessel to side of boiler with adequate clearance.

Note. 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.

14 Replacement of Parts

To remove domestic expansion vessel: - drain the domestic hot water circuit of the boiler only, refer to Section 15.2.

- 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.

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.

Check that expansion vessel charge pressure is 1.0bar (15.0psi) using a pressure gauge; if necessary increase pressure using a car or cycle tyre pump connected to the Schrader valve.

Open isolating valve on flow and return connections, refill, vent and pressurise boiler, as Section 12.3 and 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 this, proceed as follows:

Drain down both heating and hot water circuits of boiler only refer to Section 15.

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

Ensure that gas supply to boiler is turned off at gas cock and that electrical supply is isolated.

Disconnect flue from either flue connector or flue elbow whichever is applicable.

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.

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

Remove expansion vessel from boiler using procedure given in Section 14.22 (1).

Fit replacement expansion vessel and check charge pressure, as described in Section 14.22(1).

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 Section 11.3.

Reconnect flue, make sure that aluminium pipe is correctly located onto either flue outlet or flue elbow, whichever is applicable BEFORE refitting rubber sleeve, refer to Section 11.3.

Open isolating valves on flow and return connections, refill vent and repressurise boiler as Section 12.3 and check all joints for leaks.

Reconnect boiler electrical plugs to electrical connection box, refer to Section 11.3.

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.

14.23 To Replace High Limit Thermostat

Find the high limit thermostat on the heating flow pipe, immediately below overheat thermostat, below the sealed chamber on the left side of the boiler, see diagram 5.2

Disconnect the two leads from the thermostat.

Undo and remove the retaining clip screw.

Remove retaining clip from pipe, complete with high limit thermostat.

Fit replacement thermostat into clip and thoroughly cover the contact surface of the thermostat with heat sink compound provided.

Refit retaining clip/high limit thermostat onto clip, fitting thermostat onto the flat section on the pipe.

Fasten clip in place with screw.

Reconnect the two leads, the polarity is not important.

14.24 To Replace Overheat Thermostat

Find the overheat thermostat on the heating flow pipe, immediately below the sealed chamber on the left side of the boiler, refer to diagram 5.2.

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.

14 Replacement of Parts

Refit retaining clip/overheat thermostat onto pipe, locating thermostat onto the flat section of the pipe.

Fasten clip in place with screw.

Reconnect the two leads, the polarity is not important.

14.25 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 Section 13.2.

To remove insulation panels, slide panel out of retaining lugs on combustion chamber sides.

Lift front 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 Section 13.3.

Carefully pull bottom edge of rear insulation panel forward, downward 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 Section 13.3.

14.26 To Replace Pilot Assembly

Remove combustion chamber, refer to Section 13.2.

Remove pilot burner from main burner refer to Section 13.3.

Disconnect ignition and earth lead from spark generator.

Remove pilot from boiler, pulling ignition and earth lead through sealing grommet in bottom of sealed chamber.

Fit replacement pilot burner, complete with ignition electrode, using reverse of removal procedure.

14.27 To Replace Burner

Remove burner, refer to Section 13.3.

Undo screw and remove pilot injector tube from burner injector bar.

Assemble replacement burner, supplied in parts, as follows:

- fit burner injectors to burner injector bar and tighten.

Note. Make sure that injector size, marked on each injector is the same as that given in Table 6.2 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 Section 13.3.

14.28 To Replace Pilot and Burner Injectors

Remove burner, refer to Section 13.3.

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, make sure that the size (marked on the injector) is the same as that given in Table 6.2 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.

Note. Make sure that injector size, marked on each injector is the same as that given in Table 6.2 for the gas being used.

Re-assemble burner and replace into boiler, refer to Section 13.3.

14.29 To Replace Digital Timeclock

With lower front panel down, as Section 11, undo and remove the screw securing the PCB cover to the lower front panel, see diagram 14.7.

Open the PCB cover to gain access to the timeclock plug. Pull the plug off at the PCB.

Carefully remove the timeclock by pushing it out of the moulded opening in the lower front panel.

Fit replacement timeclock in reverse order to removal.

15 To Drain Boiler Only

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

15.1 Heating Circuit

Close isolating valves on flow and return connections, on fixing jig connecting plate, refer to diagram 10.1.

Note. These valves are closed when the slots are at a right angle to the direction of flow.

Lift spindle on top of safety valve using a screw driver under pin located through valve spindle to drain boiler, see diagram 15.1.

Finish draining by opening the drain valve knob anticlockwise and attaching a plastic tube to the drain outlet.

When finished, fully close the drain valve.

15.2 Domestic Hot Water Circuit

Close isolating valve on cold water inlet connection on fixing jig connecting plate, refer to diagram 10.1.

Open one, or more, hot water taps to drain boiler circuit.



Diagram 15.1

16 Fault Finding

16.1 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.

Safety

WARNING. 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.

16.2 Microswitches

Location.

The two 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 diagram 16.1.

16.3 Function

Switch 1 - 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.

There is no Switch 2.

Switch 3 - Actuated by water valve diaphragm when lever is in left or right hand position.

16.4 Testing

Isolate boiler from electrical supply.

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

Pull off both connections from the microswitch terminals and 3.

Check each switch for continuity or open circuit with selector lever in either right or left position and hot taps either 'on' or 'off'.

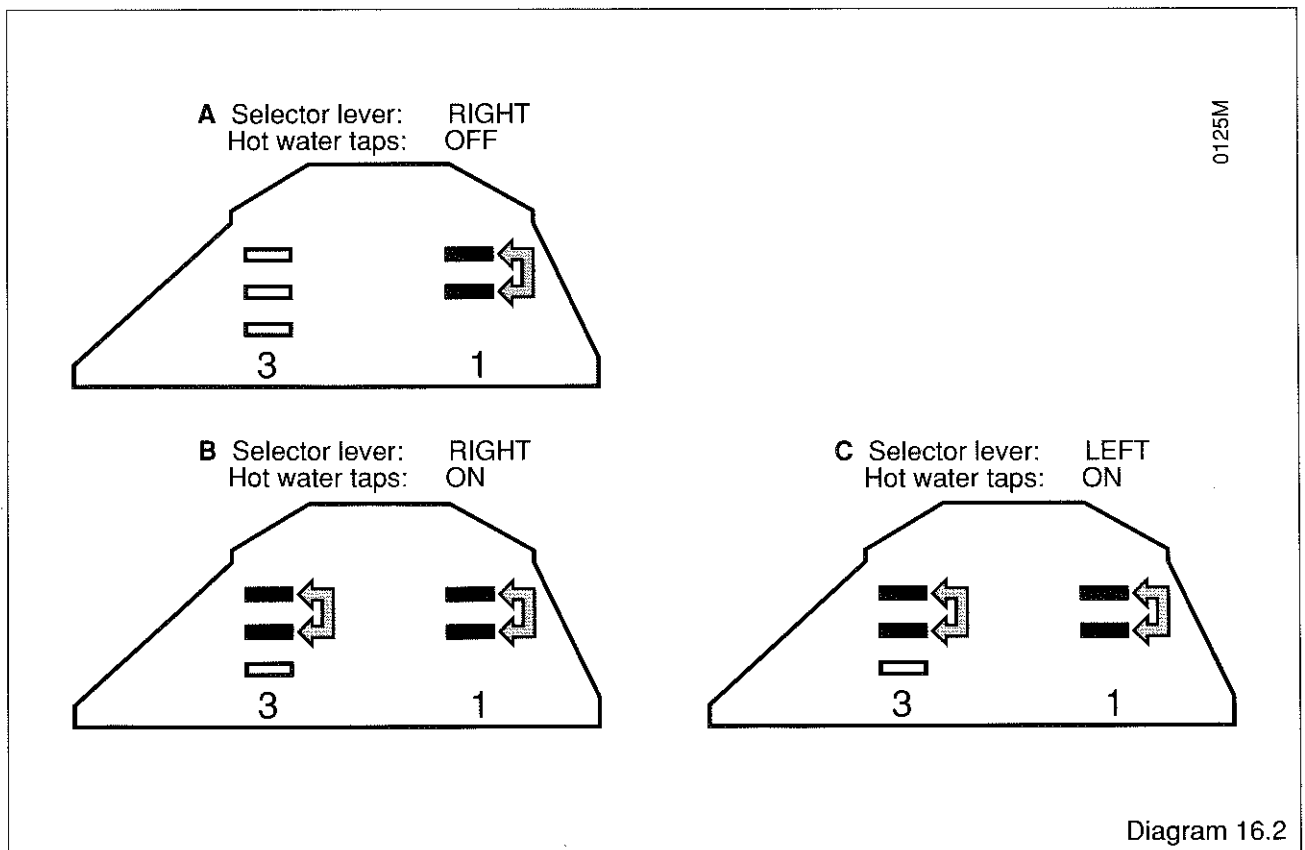
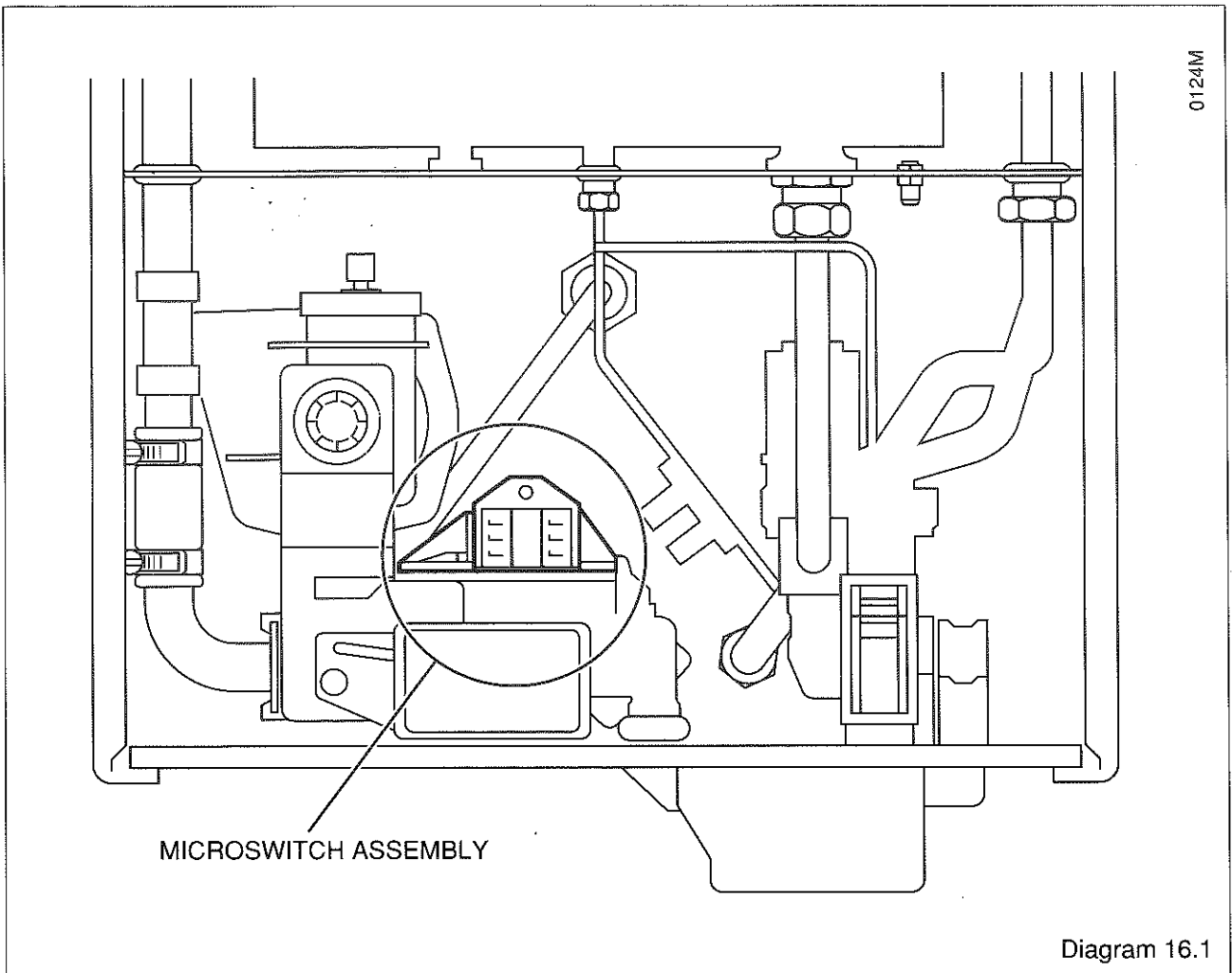
If continuity is as indicated in diagram 16.2, microswitch and water valve diaphragm are operating correctly.

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).

16.5 Digital Timeclock

If the digital timeclock has failed it can be bypassed by disconnecting the plug at the P.C.B. Refer to Section 14.2. The operation of the heating can then be controlled using the Summer/Winter selector lever.

This is a temporary measure and the timeclock should be replaced as soon as possible.



16 Fault Finding

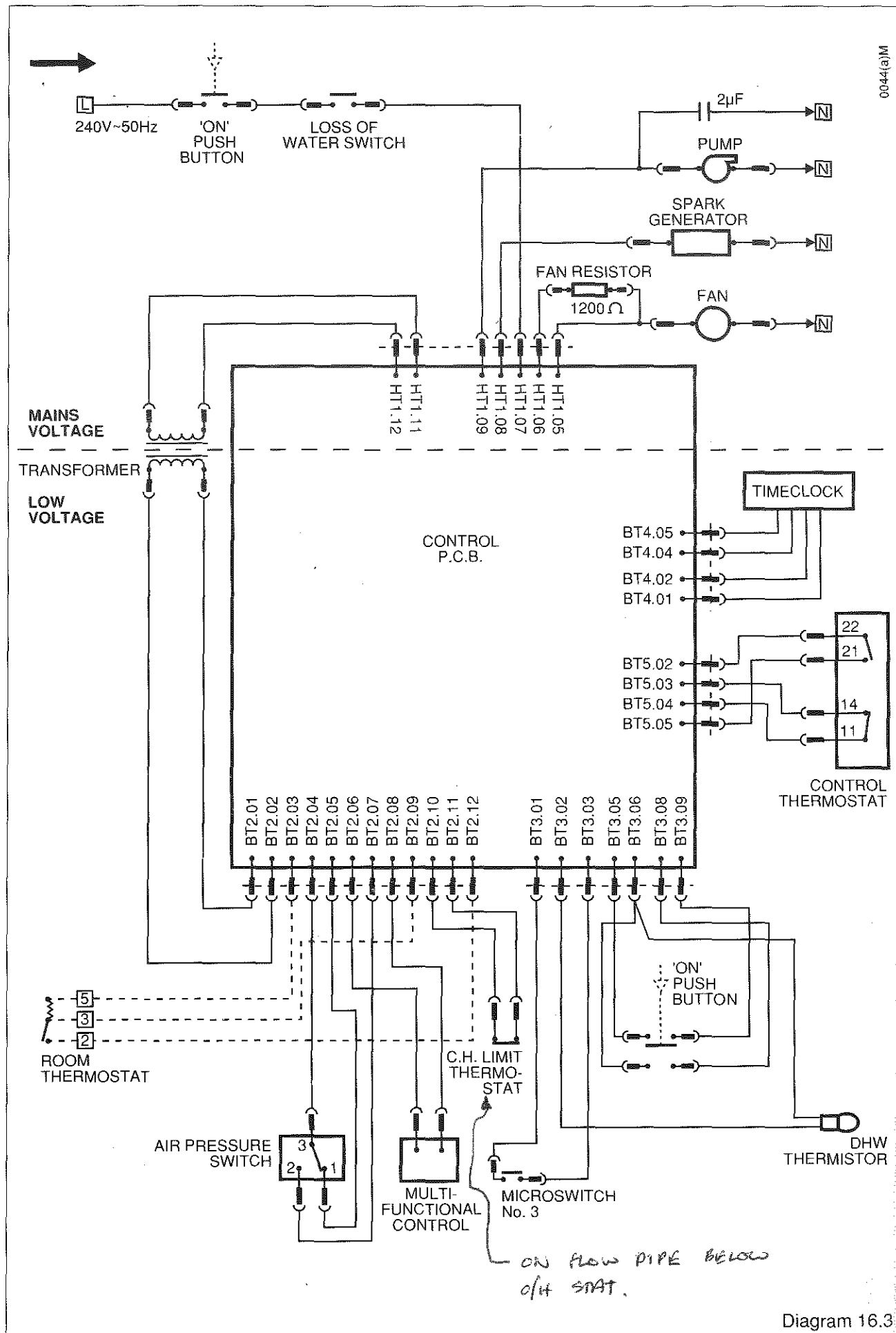


Diagram 16.3

16 Fault Finding

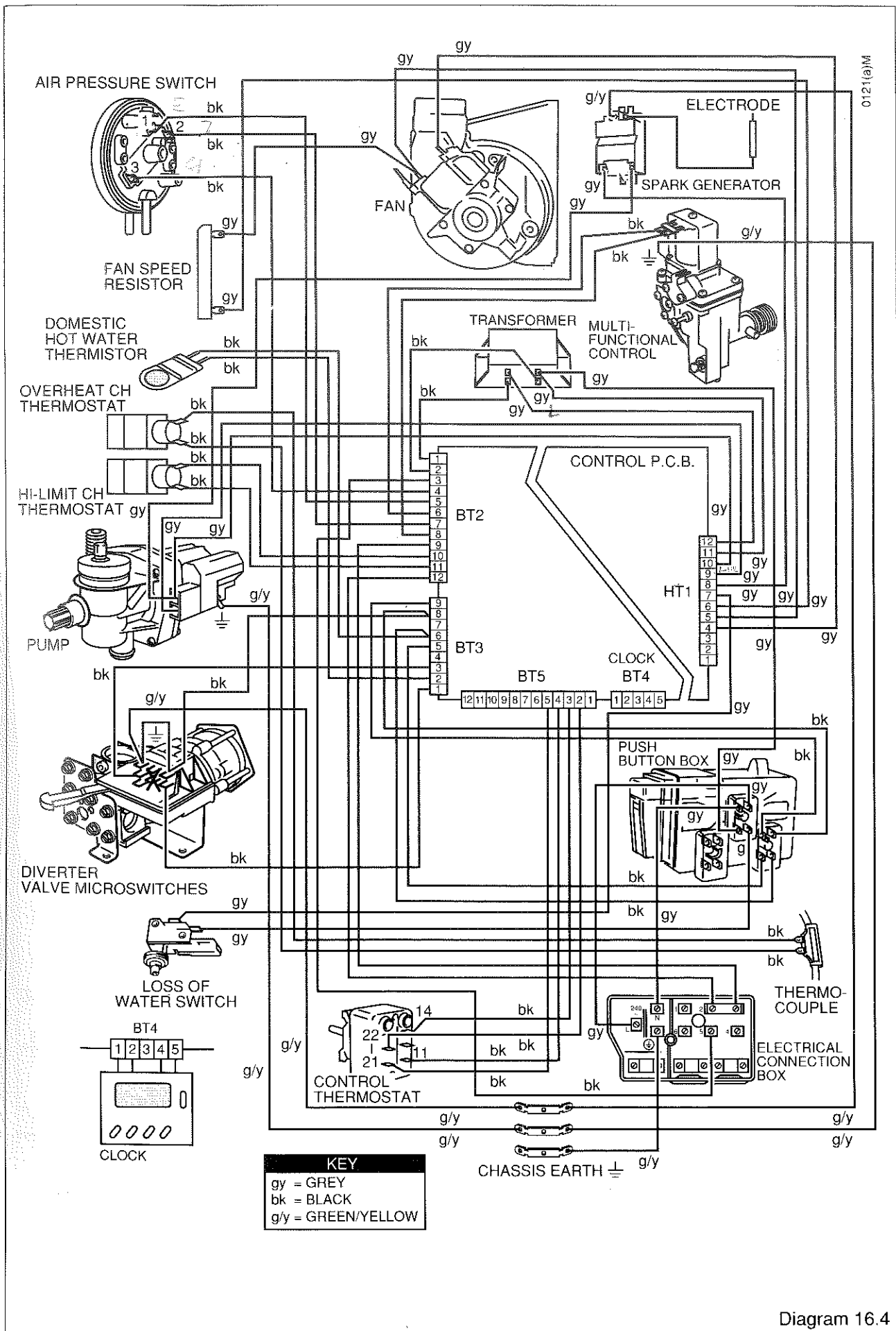


Diagram 16.4

16 Fault Finding

0045M

PILOT WILL NOT LIGHT

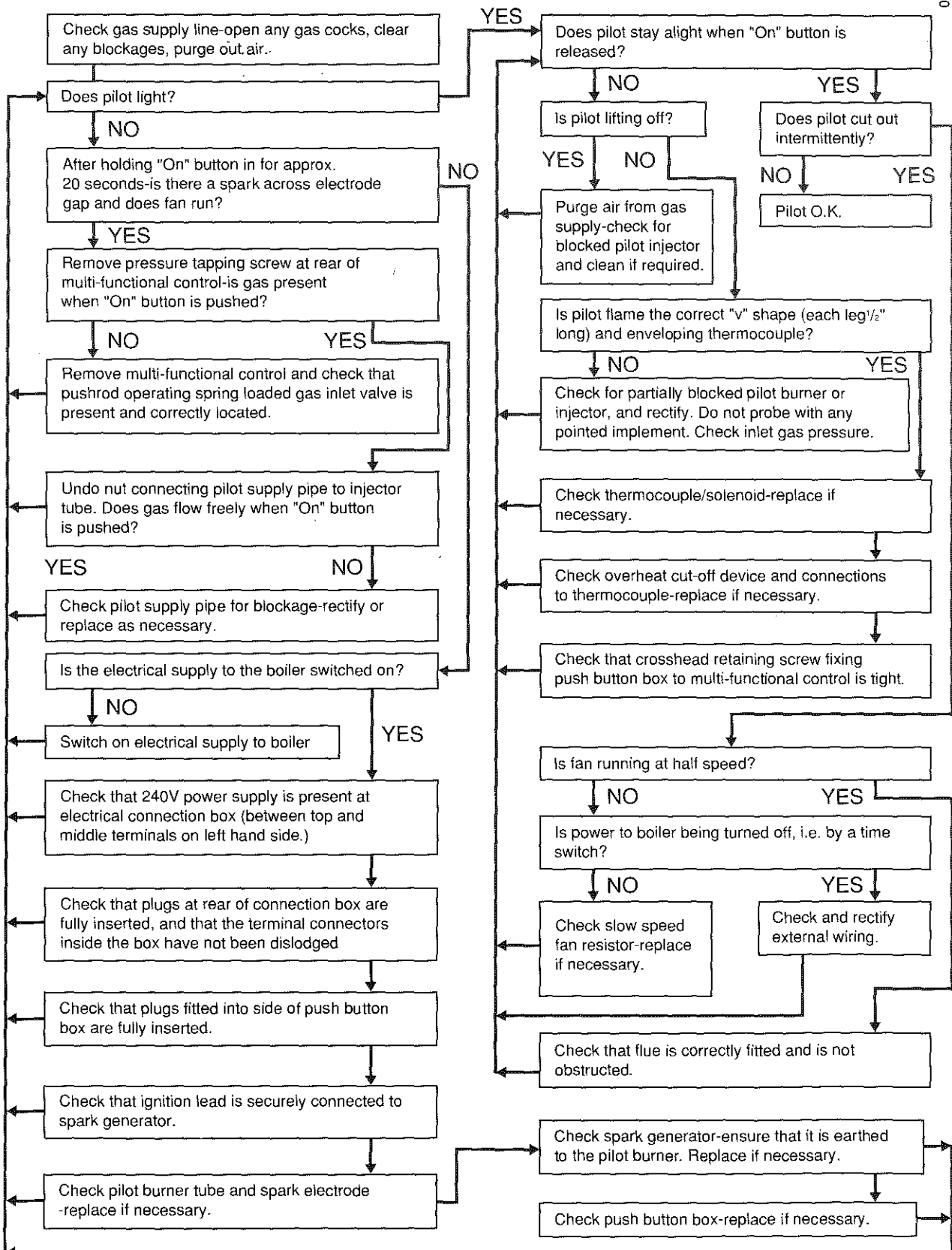
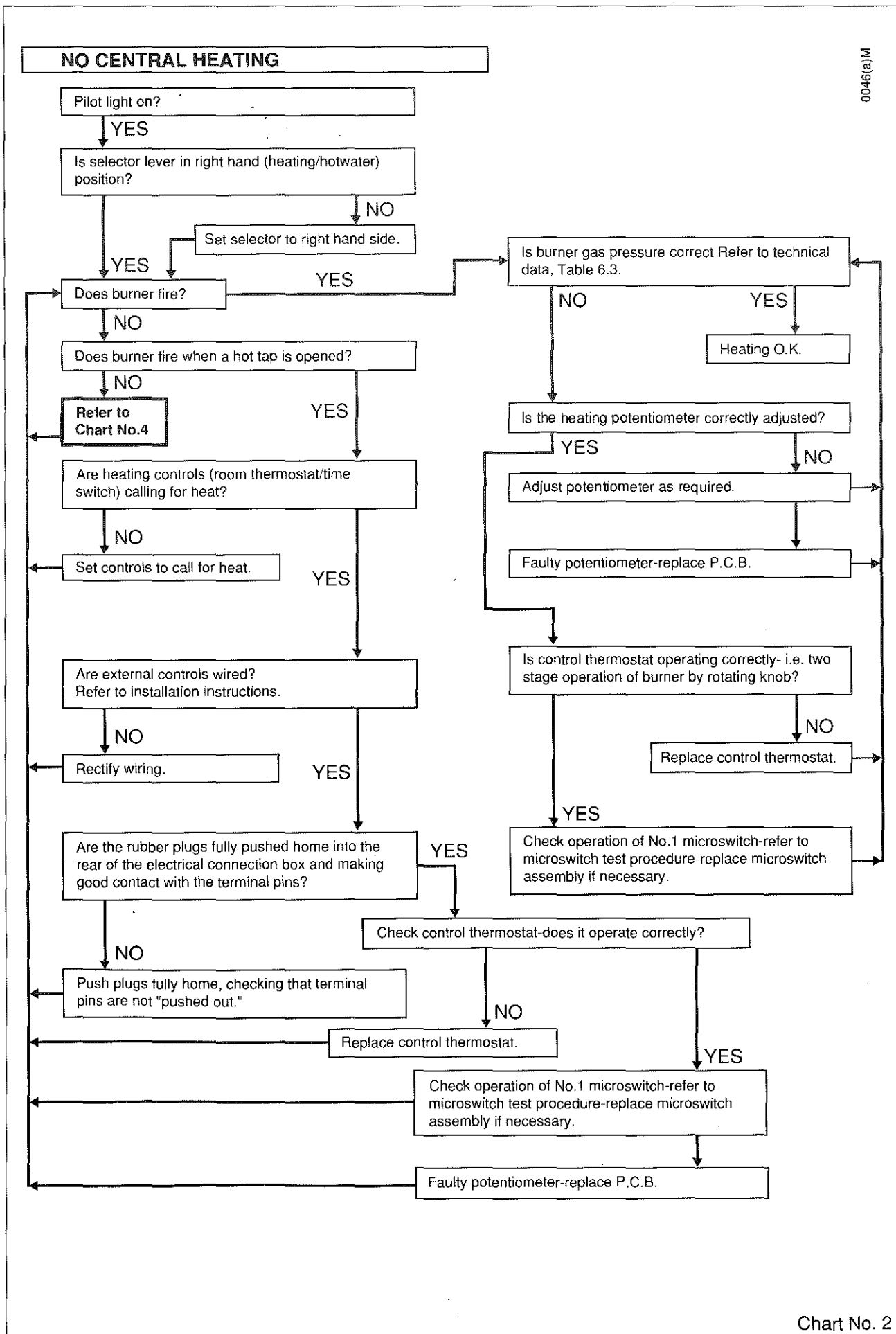


Chart No. 1

16 Fault Finding



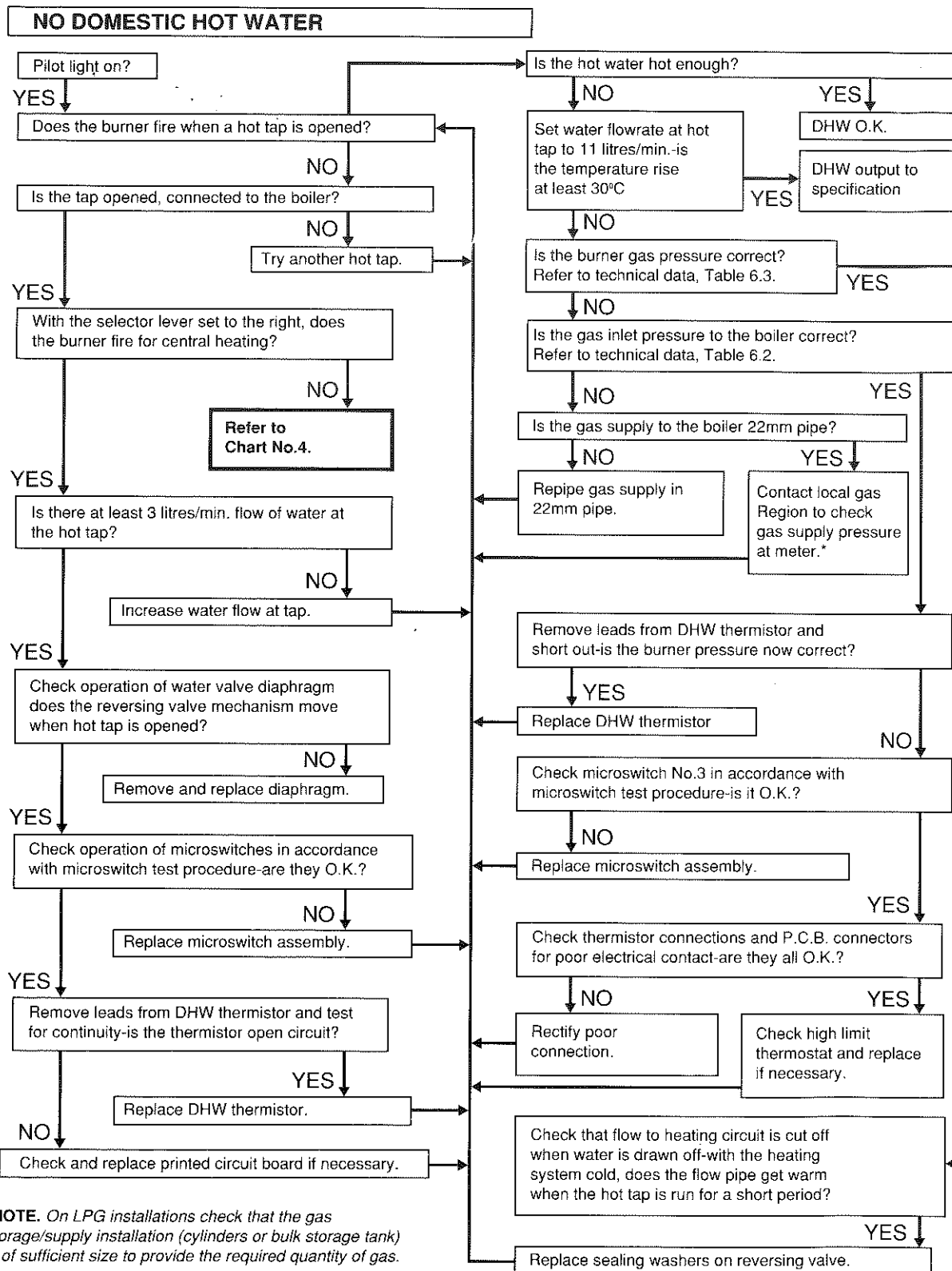


Chart No. 3

16 Fault Finding

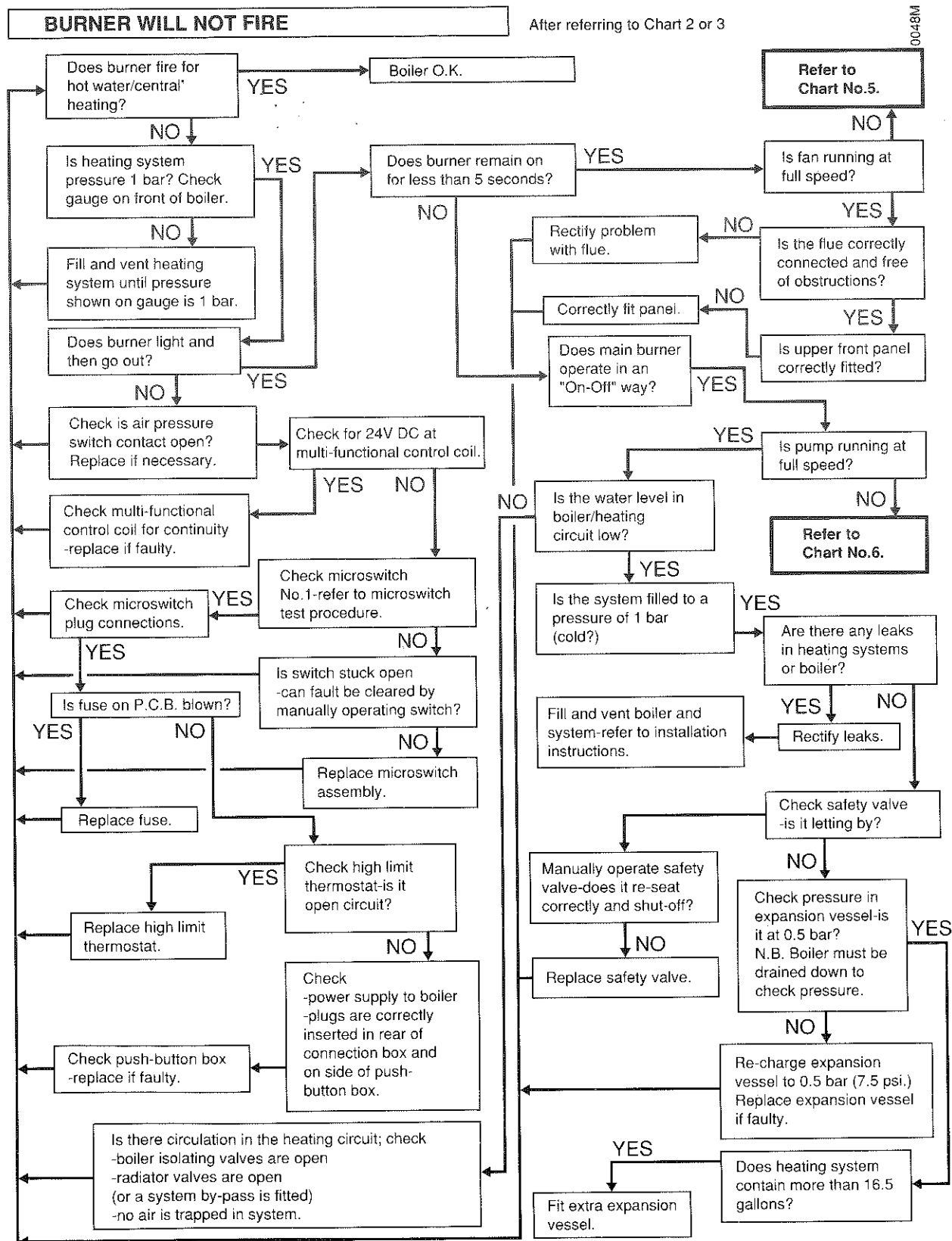
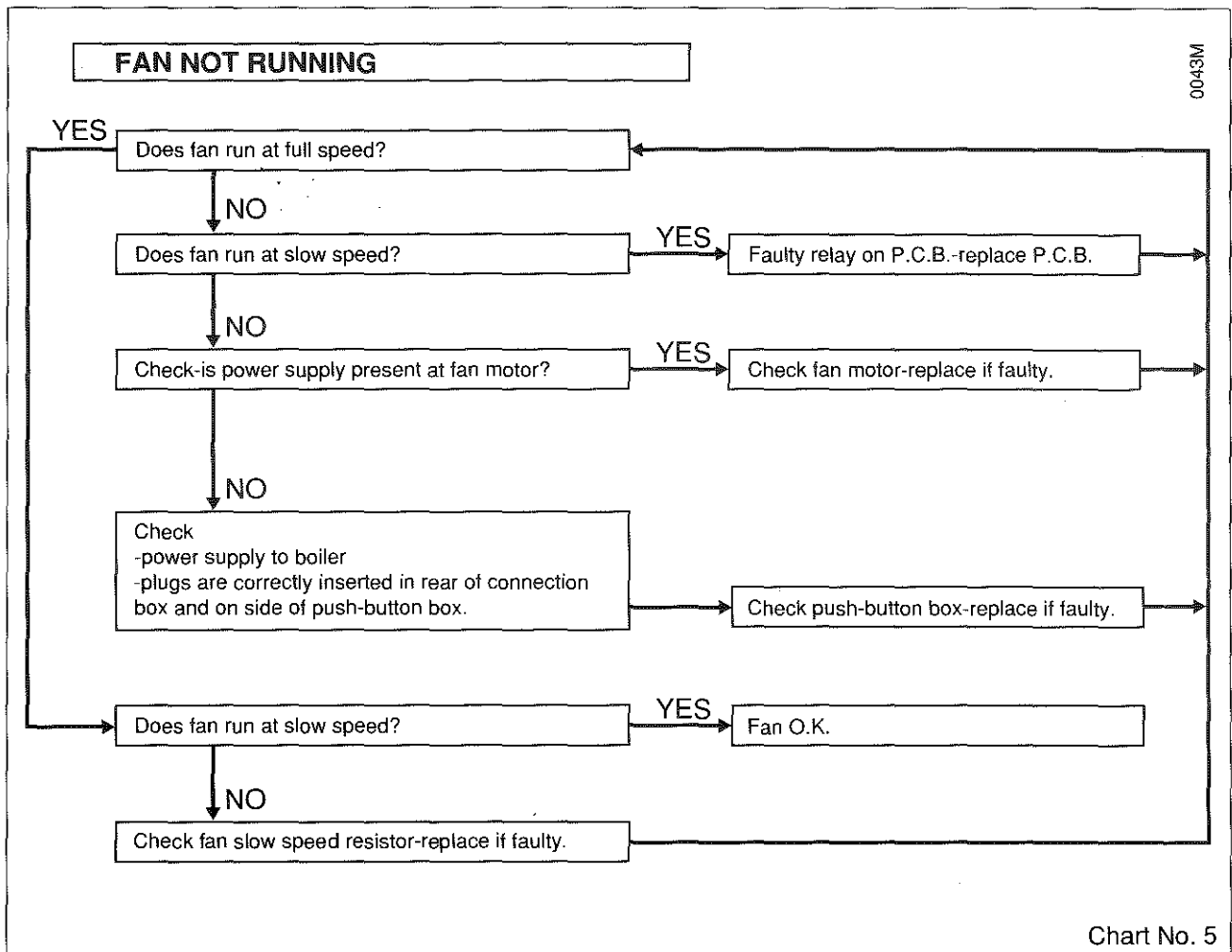


Chart No. 4



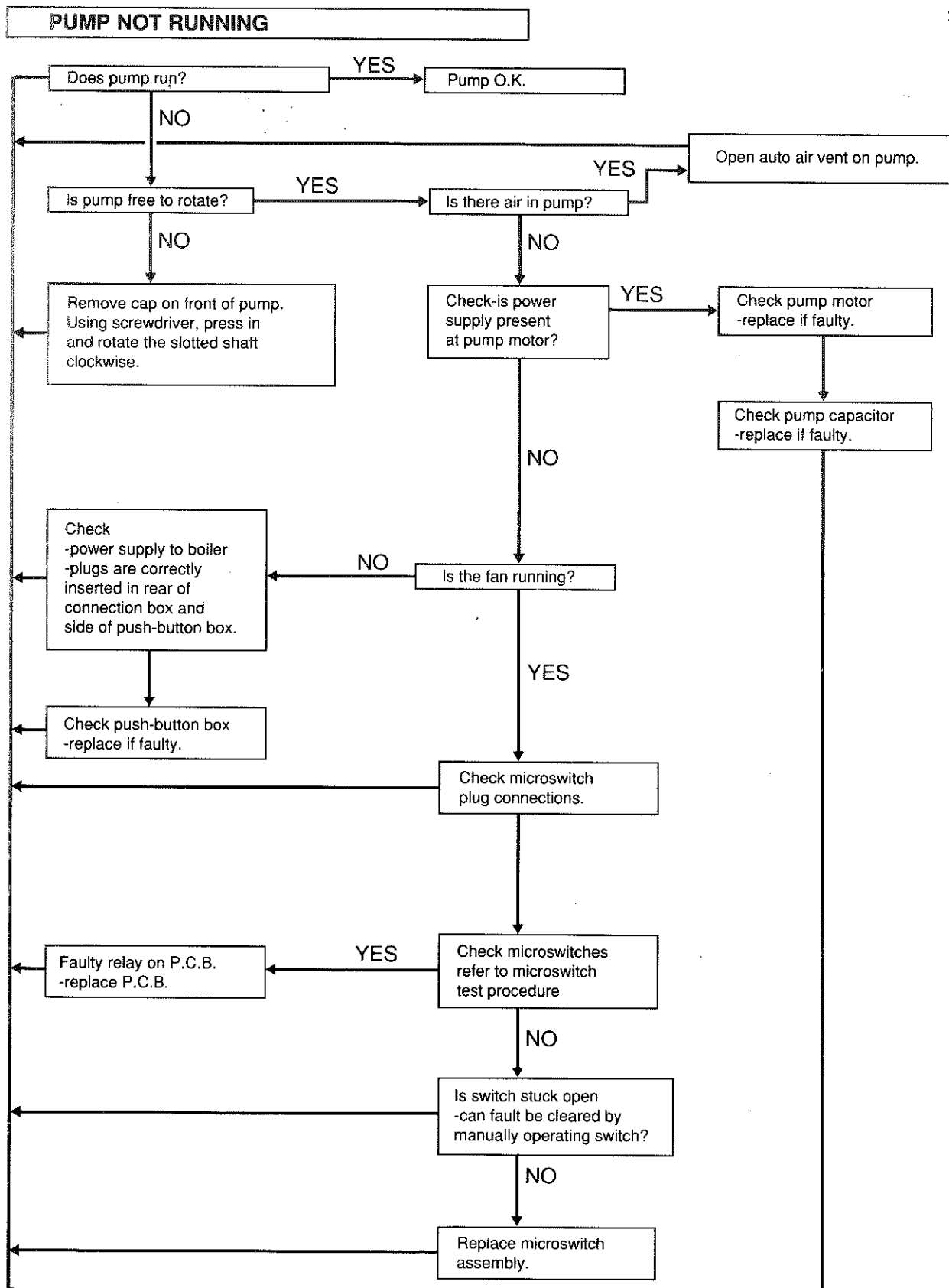


Chart No. 6

17 Spare Parts

17.1 General

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

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

17.2 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	Control thermostat	52916	373 506
5	Air pressure switch	51692	373 ***
6	Jig/boiler washer/filter kit	52128	373 513
7	Printed circuit board	51217	**
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		
14	Pressure/temperature gauge	51342	**
15	Thermocouple	52664	373 502
16	Domestic hot water thermistor	52908	373 508
17	High limit thermostat	51511	**
18	Thermocouple solenoid	52798	**
19	Gas washer kit (not shown)	7507	373 517
20	Water washer kit (not shown)	7506	373 518

These instructions are accurate at the date of printing but due to a continuous policy of product improvement they may be superseded and should be disregarded if specification and/or appearances change.