220039.01.91

Glow-worm

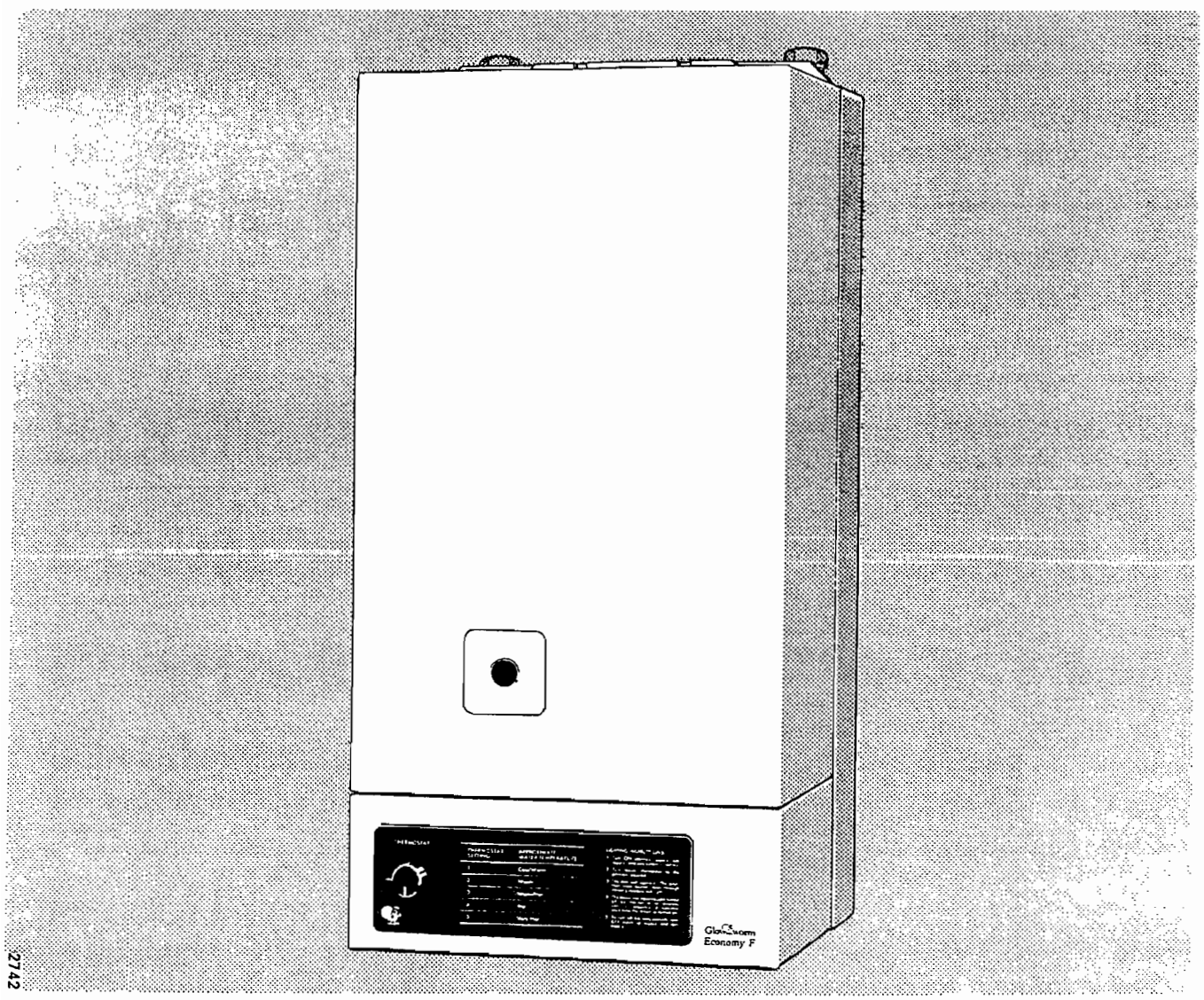
Installation & Servicing Instructions

To be left with the user

ECONOMY 30F G.C No. 41 319 05

ECONOMY 40F G.C No. 41 319 06

ECONOMY 50F G.C No. 41 319 07



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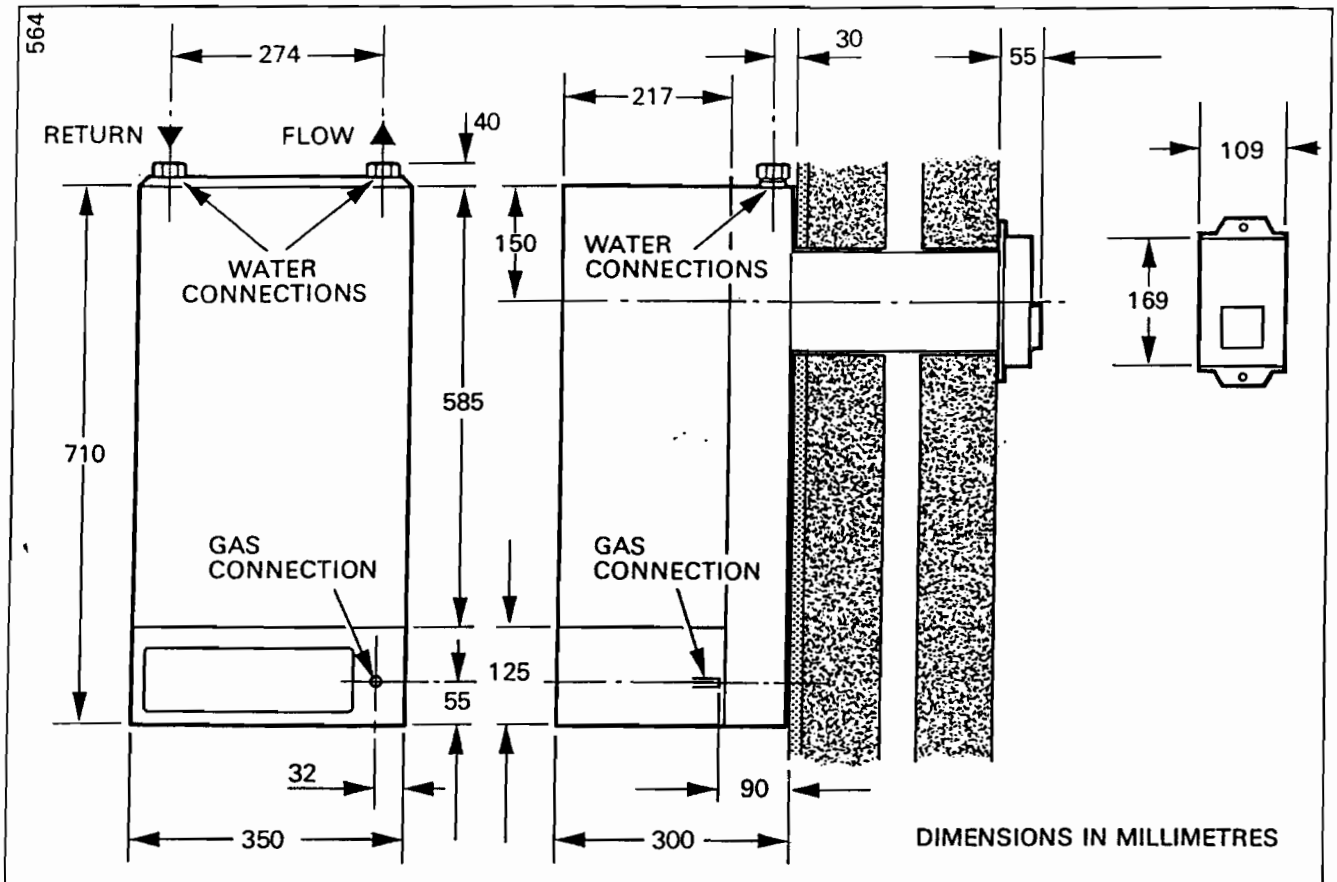
Hepworth Heating Ltd., Nottingham Road, Belper, Derby. DE5 1JT Tel: Belper (0773) 824141 Telex 37586



OVERALL DIMENSIONS

Diagram 1.1

1 General

IMPORTANT NOTICE

The Economy boilers are for use on natural gas only and must not be used on any other gas.

1.1 Introduction

These boilers are fully automatically controlled wall mounted, fanned flue, room sealed boilers, specially designed for fully pumped systems, giving ease of siting, installation and servicing.

The operation of these boilers is very simple with the user having only to turn the thermostat knob on or off as required.

1.2 Range Rating

These boilers are range rated and may be adjusted to suit individual systems. The appropriate table gives settings and outputs.

The boiler input is factory preset at maximum rating and should be adjusted to suit the system requirements.

A self adhesive arrow indicator is supplied in the loose items pack for fixing on to the data badge, to indicate the adjusted setting.

ECONOMY 30F			
RANGE RATING	*Min.*	*Med.*	*Max.*
NOMINAL HEAT INPUT *kW*	7.44	-	11.08
NOMINAL HEAT INPUT *Btu/h*	25 400	-	37 800
NOMINAL HEAT OUTPUT *kW*	5.86	-	8.79
NOMINAL HEAT OUTPUT *Btu/h*	20 000	-	30 000
BURNER SETTING PRESSURE *m bar*	5.5	-	10.0
BURNER SETTING PRESSURE *in. w.g.*	2.2	-	4.0

1.3 Data

The data badge is positioned at the lower right of the boiler, above the model and serial number plate, visible when the white casing has been removed.

Dimensions shown in diagrams are in millimetres.

Gas connection - Rc$^1/_2$ ($^1/_2$BSPT)

Water connection - 22mm compression

Electrical supply - 240V~50Hz Fused at 3A

ECONOMY 40F			
RANGE RATING	*Min.*	*Med.*	*Max.*
NOMINAL HEAT INPUT *kW*	9.96	13.50	15.17
NOMINAL HEAT INPUT *Btu/h*	34 000	46 000	51 750
NOMINAL HEAT OUTPUT *kW*	7.33	10.26	11.72
NOMINAL HEAT OUTPUT *Btu/h*	25 000	35 000	40 000
BURNER SETTING PRESSURE *m bar*	5.1	8.8	11.1
BURNER SETTING PRESSURE *in. w.g.*	2.0	3.5	4.4

1.4 B.S.I. Certification

These boilers are certified by B.S.I. for safety and performance. It is therefore important that no alteration is made to the boilers unless approved, in writing from Hepworth Heating Ltd.

Any alteration that is not approved by Hepworth Heating Ltd., could invalidate the B.S.I. certification, boiler warranty and could also infringe the Statutory Requirements.

ECONOMY 50F			
RANGE RATING	*Min.*	*Med.*	*Max.*
NOMINAL HEAT INPUT *kW*	13.04	-	18.39
NOMINAL HEAT INPUT *Btu/h*	44 500	-	62 750
NOMINAL HEAT OUTPUT *kW*	10.26	13.19	14.65
NOMINAL HEAT OUTPUT *Btu/h*	35 000	45 000	50 000
BURNER SETTING PRESSURE *m bar*	6.4	9.6	11.7
BURNER SETTING PRESSURE *in. w.g.*	2.6	3.9	4.7

1.5 Procedure

It is essential that the boiler is installed strictly in accordance with the instructions and information in this booklet.

MODEL	ECONOMY 30F	ECONOMY 40F & 50F
Weight of complete boiler	24 kg 53 ib	25 kg 55 lb
Water content	0.55 litre 1 pint	0.62 litre 1 $^1/_8$ pint

1.6 Sheet Metal Parts

When installing or servicing this boiler, care should be taken when handling sheetmetal parts, to avoid any possibility of injury.

1.8 Statutory Requirements

This boiler must be installed by a competent person in accordance with the current issue of, The Gas Safety (Installation and Use) Regulations, The Building Regulations, The I.E.E. Wiring Regulations, local Water Company regulations, The Building Standards(Scotland) Regulations (applicable in Scotland).

Detailed recommendations are contained in the current issue of the following British Standard codes of practice,

BS6798, BS5440 Part 1 and 2, BS5546, BS5449 BS6891 and BS7074 Part 1 and 2.

1.9 Gas Supply

The gas installation should be fitted in accordance with the current issue of BS6891. Pipework from the meter to the boiler must be of adequate size, a smaller size than the boiler inlet connection should not be used.

The gas meter governor must ensure a constant outlet pressure of 20mbar (8in wg).

Always test the complete installation for soundness and purge in accordance with the current issue of BS6891.

The size of the meter and pipework must take into account any other demand for gas.

1.10 Electrical

The electrical installation must be carried out by a service engineer. All external components shall be of the approved type and shall be connected in accordance with the requirements of the current issue of The I.E.E. Wiring Regulations.

The boiler must be earthed.

Connection of the boiler and any system controls to the mains supply should be through an unswitched shuttered socket outlet fused at 3A and 3 pin (BS1363) plug. Alternatively a 3A fused double pole isolating switch may be used, having a minimum double pole separation of 3mm, serving only the boiler and system controls.

Heat resistant flexible cable of at least 0.75mm² (24/0.2mm) to the current issue of BS6500 Table 9 must be used for all connections within the boiler casing to the control box.

1.10 Boiler Location

This boiler is not suitable for outdoor installation.

The boiler position should be such that the minimum clearances are provided as shown in diagram 1.2. Additional clearances may be required around the boiler for installation purposes. Sufficient clearance must be left in front of the boiler for servicing.

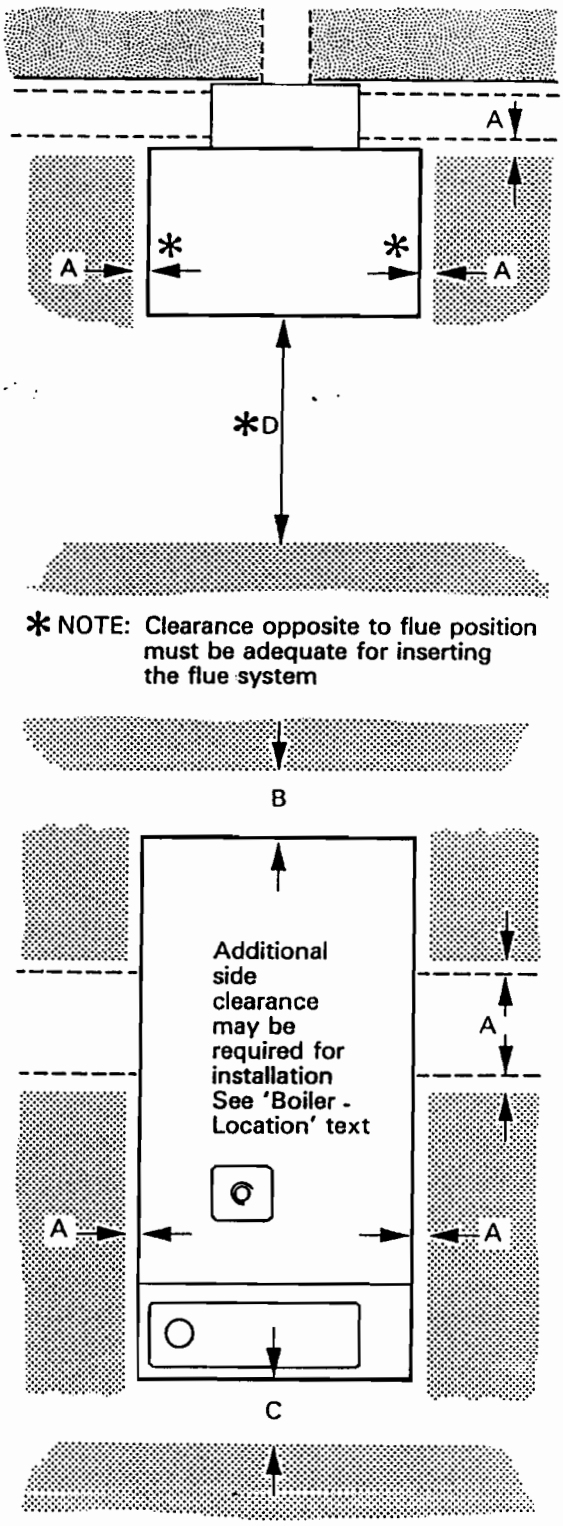
The boiler may be installed in any room, although particular attention is drawn to the requirements of the current issue of The I.E.E. Wiring Regulations with respect to the installation of a boiler in a room containing a bath or shower. Any electrical switch using mains supply should be so situated that it cannot be touched by a person using the bath or shower. The electrical provisions of the Building Standards (Scotland) Regulations are applicable to such installations in Scotland.

Where the installation of the boiler will be in an unusual location special procedures are necessary and the current issue of BS6798 gives detailed guidance.

A compartment used used to enclose the boiler must be designed and constructed specifically for this purpose. An existing cupboard or compartment may be used provided that it is modified for the purpose, refer to ventilation requirements, Section 2.5. Details of essential features of cupboard and compartment design are given in the current issue of BS6798.

The boiler must be mounted on a flat non-combustible surfaced wall which is sufficiently robust to take its weight.

Combustible materials on the wall surface must be protected by a non-combustible sheet, at least the size of the boiler and not less than 25mm thick.



Minimum Clearances from Walls, Ceiling, Floor, Cupboards, Worktops, etc.

		mm
A	Side, Ducting (operational)	5
B	Upper	75
C	Lower	80
D	Front (from a permanent surface)	305

1371 BOILER, SIDE & REAR FLUE MINIMUM CLEARANCES

Diagram 1.2

2.1 Flue

Detailed recommendations for flues are given in the current issue of BS5440 Part 1.

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 the free passage of air across it all times, see diagram 2.1.

Flue Systems. Various types of flue systems are available where access to the outside wall is possible, to suit various installation requirements, see diagrams A1, B1 and C1.

Internal Access Kits. Where access to the outside terminal position is not practical, additional kits of parts are available to enable the flue and terminal to be installed from the inside of the building, see diagrams D1, E1 and F1.

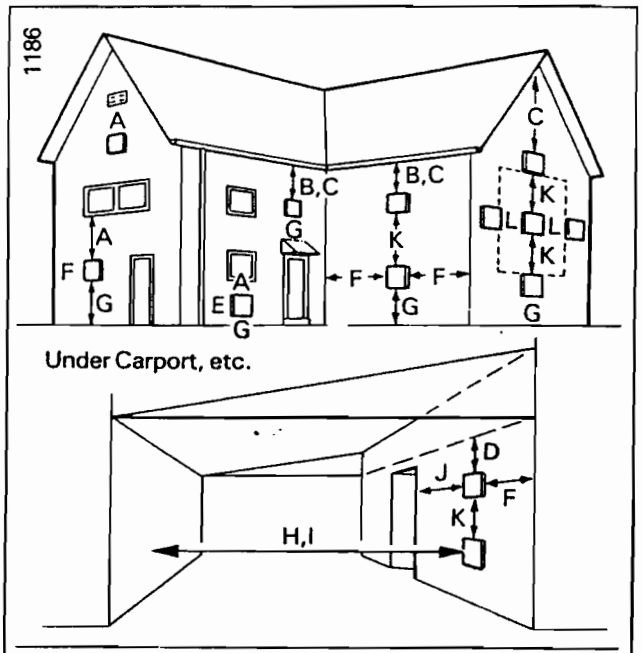
Note. The boiler is supplied with the standard flue pack, any additional flue kit(s) will need to ordered, quoting the kit number required.

The minimum spacings from the terminal to obstructions, other terminals and ventilation openings are specified in diagram 2.1.

Car port or similar extensions of a roof only, or 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 made from plastic sheeting. Seek further advice if the car port comprises of a roof and two or more walls, from the local gas undertaking.

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

The air inlet/products outlet duct and the terminal of the boiler must not be closer than 25mm to combustible material. Refer to the current issue of BS5440 Part 1.



MINIMUM SITING DIMENSIONS FOR FANNED FLUE TERMINALS

POSITION		MINIMUM SPACING
		mm
A	DIRECTLY BELOW AN OPENABLE WINDOW, AIR VENT, OR ANY OTHER VENTILATION OPENING	300
B	BELOW GUTTER, DRAIN/SOIL PIPE	25
C	BELOW EAVES	25
D	BELOW A BALCONY OR CAR PORT	25
E	FROM VERTICAL DRAIN PIPES AND SOIL PIPES	25
F	FROM INTERNAL OR EXTERNAL CORNERS	25
G	ABOVE ADJACENT GROUND OR BALCONY LEVEL	300
H	FROM A SURFACE FACING THE TERMINAL	600
I	FACING TERMINALS	1200
J	FROM OPENING (DOOR/WINDOW) IN CAR PORT INTO DWELLING	1200
K	VERTICAL FROM A TERMINAL	1500
L	HORIZONTALLY FROM A TERMINAL	300

Diagram 2.1

2.2 Timber Frame Housing

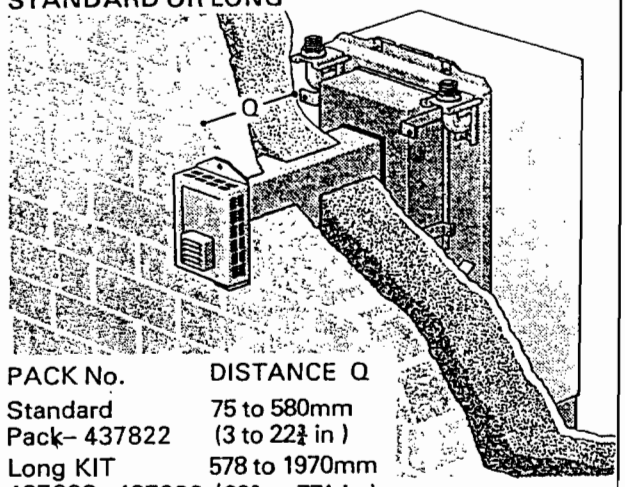
If the boiler is to be installed in a timber frame building it should be fitted in accordance with the British Gas publication "Guide for Gas Installation in Timber Framed Housing" reference DM2. If in doubt seek further advice from the local gas undertaking or Hepworth Heating Ltd.

2.3 Protecting the Terminal

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

Type A

REAR FLUE —
STANDARD OR LONG



PACK No.	DISTANCE Q
Standard Pack– 437822	75 to 580mm (3 to 22¾ in)
Long KIT 437823+437822	578 to 1970mm (22¾ to 77½ in)

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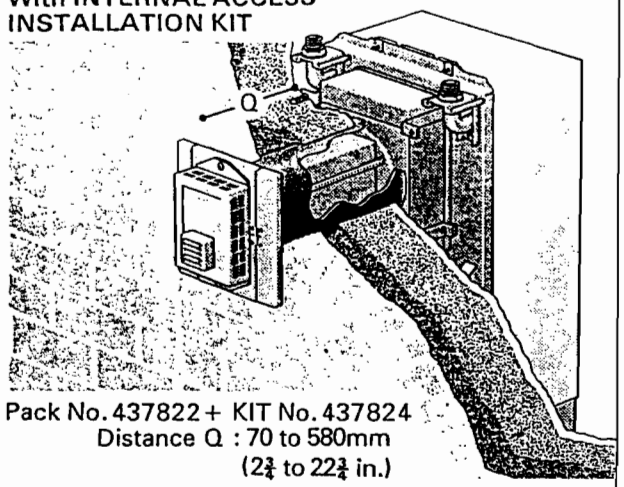
Diagram A1

Type D

REAR FLUE
With INTERNAL ACCESS
INSTALLATION KIT



Pack No. 437822 + KIT No. 437824
Distance Q : 70 to 580mm
(2¾ to 22¾ in.)

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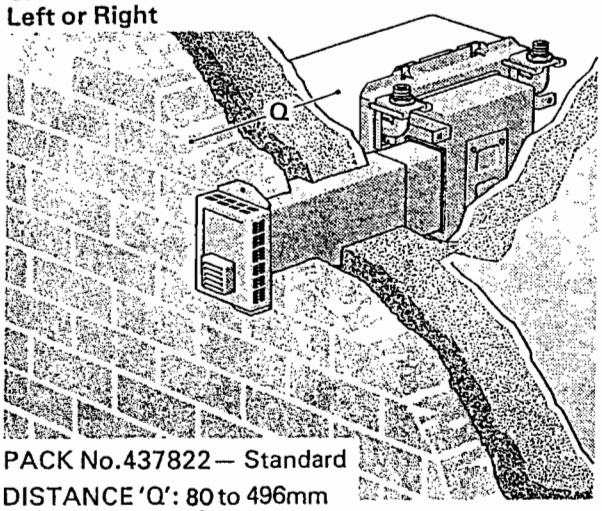
Diagram D1

Type B

SIDE FLUE — STANDARD
Left or Right



PACK No. 437822 — Standard
DISTANCE 'Q': 80 to 496mm
(3¼ to 19½ in)

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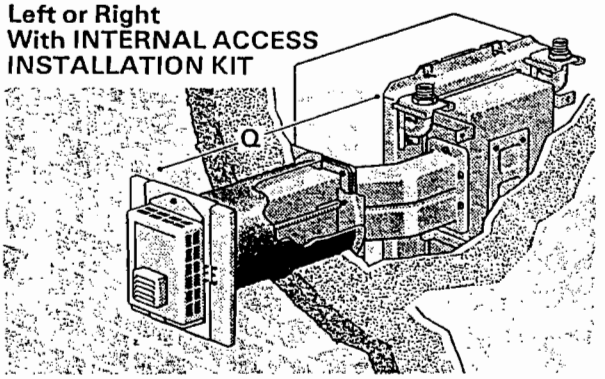
Diagram B1

Type E

SIDE FLUE — STANDARD
Left or Right
With INTERNAL ACCESS
INSTALLATION KIT



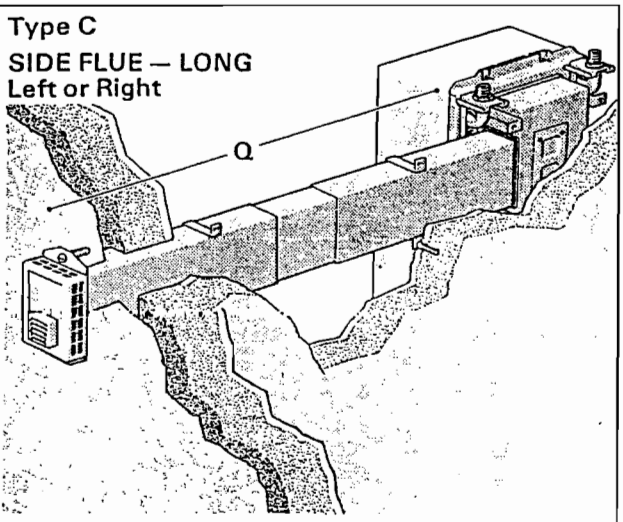
PACK No. 437822 + KIT No. 437824
+ ADAPTOR KIT No. 437825
DISTANCE Q: 204 to 625mm (8 to 24⅝ in)
WALL THICKNESS: 75 to 492mm (3 to 19⅜ in)

2750

Diagram E1

Type C

SIDE FLUE — LONG
Left or Right



KIT No. 437823 — Long + Standard Pack No. 437822
DISTANCE 'Q': 496 to 1887mm (19½ to 74¼ in)

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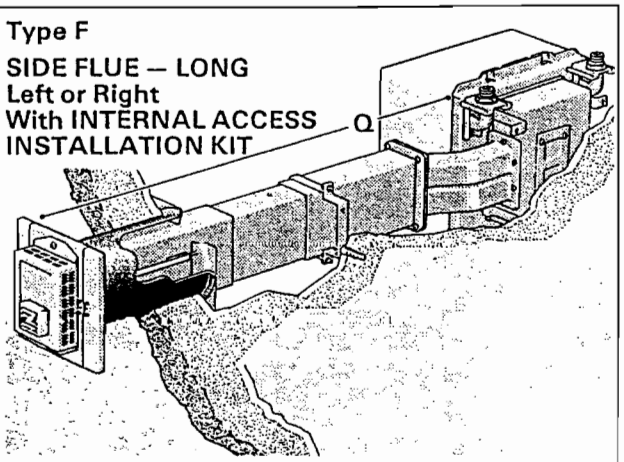
Diagram C1

Type F

SIDE FLUE — LONG
Left or Right
With INTERNAL ACCESS
INSTALLATION KIT



PACK No. 437822 + KIT No. 437824
+ KIT No. 437823 + ADAPTOR KIT No. 437825
DISTANCE Q: 625 to 2016mm (24⅝ to 79⅜ in)
WALL THICKNESS: 75 to 492mm (3 to 19⅜ in)

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Diagram F1

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.

Guards are available from Tower Flue Components Ltd., Morley Road, Tonbridge, Kent, TN9 1RA telephone Tonbridge 351555, quoting reference "H" or from Messrs Quinell, Barrett and Quinell Ltd., 884, Old Kent Road, London, SE15, quoting reference type "C52".

2.4 Room Ventilation

Where the boiler is fitted in a room, or internal space, no permanent air vent is required.

2.5 Cupboard/Compartment Ventilation

Where the boiler is fitted in a cupboard or compartment, the ventilation area must be in accordance with the Air Vent Table.

Note. Both high and low level air vents must communicate with the same room or internal space, or must both be on the same wall to outside air.

AIR VENT TABLE FOR COMPARTMENT INSTALLATIONS 2753

POSITION OF AIR VENTS		AIR VENT AREAS					
		AIR FROM ROOM OR INTERNAL SPACE			AIR DIRECT FROM OUTSIDE		
		30F	40F	50F	30F	40F	50F
HIGH VENT	cm^2	100	137	165	50	69	83
	in^2	16	21	26	8	11	13
LOW VENT	cm^2	100	137	165	50	69	83
	in^2	16	21	26	8	11	13

3.1 Pump

The pump should be fitted in the flow from the boiler with valves each side, integral if possible.

A pump producing at least 2.5m (8ft) head should be used to produce a temperature difference across the boiler of 11°C (20°F).

The flow rate should be:

Economy 30F 11.4 litre/min (2.5gal/min)

Economy 40F 15.2 litre/min (3.3gal/min)

Economy 50F 19.0 litre/min (4.2gal/min)

For details of pressure loss through the boiler, see diagram 3.1 or 3.2.

High resistance microbore systems may require a higher duty pump.

3.2 Cylinder

The hot water cylinder must be double feed type fully indirect. Single feed, self priming type cylinders are not recommended and MUST NOT be used on sealed systems.

3.3 Safety Valve

A safety valve need not be fitted to an open vented system, however if a safety valve is fitted it must comply with details in Section 4.2.

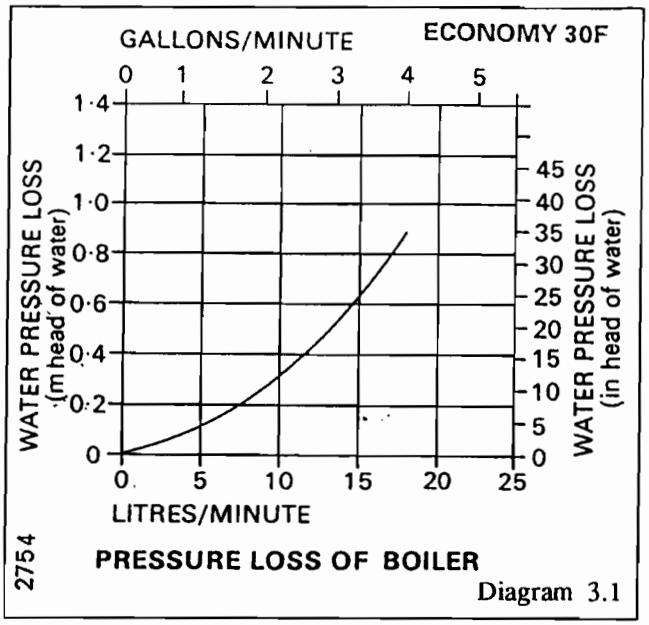


Diagram 3.1

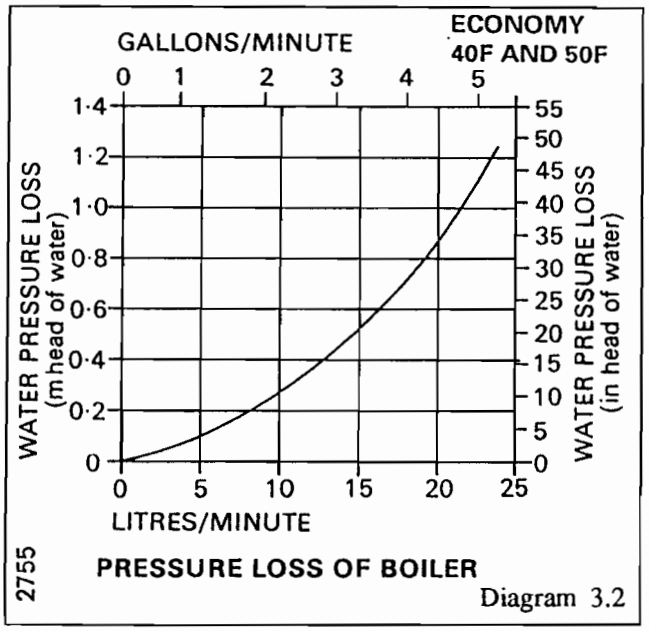


Diagram 3.2

3.4 By Pass

It is essential to fit a by pass on ALL installations. A suggested convenient position is shown in diagram 3.3.

3.5 Open (Vented) Water Systems

A 22 mm outside diameter open vent must be fitted in the flow from the boiler and terminate above the cold feed and expansion cistern The cistern should have a capacity of not less than 22 litres (5 gallons), see diagram 3.3.

The vent must have a continuous rise to discharge over the cistern. Horizontal runs should be avoided. It is essential that no valve is fitted to the open vent.

The cistern must not be situated more than 27.5 metres (90ft) above the boiler.

A 15mm outside diameter minimum cold feed must be fitted in the system.

For an open, vented, water system it is important that the relative positions of the pump, cold feed and open vent should be as shown in diagram 3.3.

3.6 Controls

Any remote boiler switch control must be connected to replace the red link between terminals 7 and 12(SL), on the boiler.

The pump must be connected directly to the boiler control box in accordance with diagram 7.3.

Any remote system controls should be installed in accordance with the manufacturers' instructions.

Draining Taps

A draining tap must be provided at the lowest points of the system which allow the draining of the entire system and hot water cylinder. Draining taps shall be to the current issue of BS2979.

A draining point is provided on the boiler for heat exchanger draining.

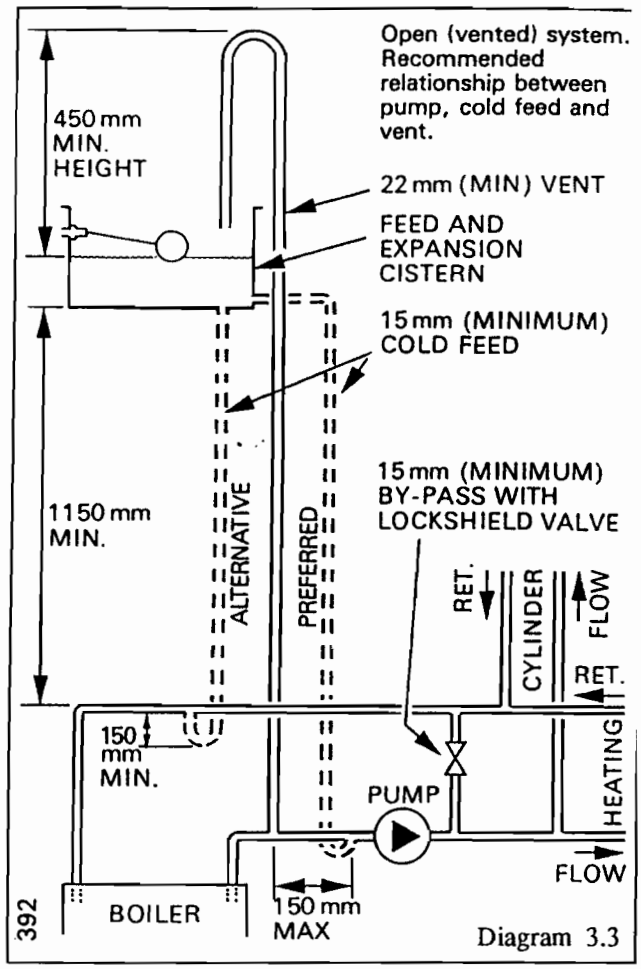


Diagram 3.3

3.8 Water Connections

The boiler has compression connections, with nuts and olives supplied loose, to accept 22mm outside diameter copper tube to BS2871.

The right hand connection is the flow.

3.9 Inhibitor

If an inhibitor is to be used in the system contact a manufacturer for them to recommended their most suitable product.

When fitting the boiler into an existing system, special care should be taken to drain the entire system, including the radiators, then thoroughly flushing before fitting the boiler and adding the inhibitor.

4.1 General Requirements

The installation should comply with the requirements of the current issue of BS5449 Part 1, BS6798 and BS7074 Parts 1 and 2.

See diagram 4.1 for a suggested layout.

4.2 Safety Valve

A safety valve must be fitted in a sealed system.

The safety valve must be fitted to the requirements of the current issue of BS6798.

4.3 Expansion Vessel

A diaphragm type expansion vessel conforming with the requirements of the current issue of BS4814 (see also the current issue of BS7074 Parts 1 and 2) shall be connected at a point close to the inlet side of the circulating pump. It shall be fitted in accordance with the manufacturers instructions, see diagram 4.1 for a suggested layout.

The expansion vessel must be chosen to suit the volume of water in the system, refer to the current issue of BS5449 Part 1, clause 25. The charge pressure shall not be less than the static head at the point of connection, that is, height of the top point of the system above the expansion vessel.

The expansion vessel should have an acceptance volume that is sufficient to accommodate the volume change of the system water when heated from 10°C to 110°C (50°F to 230°F). The practical acceptance volume is that which the vessel will accommodate when the gauge pressure developed rises to 0.35bar (5lb/in²), less than the safety valve setting. For most systems the ratio will be between 8:1 and 12:1.

See the current issue of BS5449 Part 1 for more information.

The water capacity of the boiler is given in Section 1 "Data".

4.4 Pressure Gauge

A pressure gauge with a set pointer and covering the range 0 to 4 bar (0 to 60lbf/in²), shall be permanently fitted to the system in a position visible to the person filling the system.

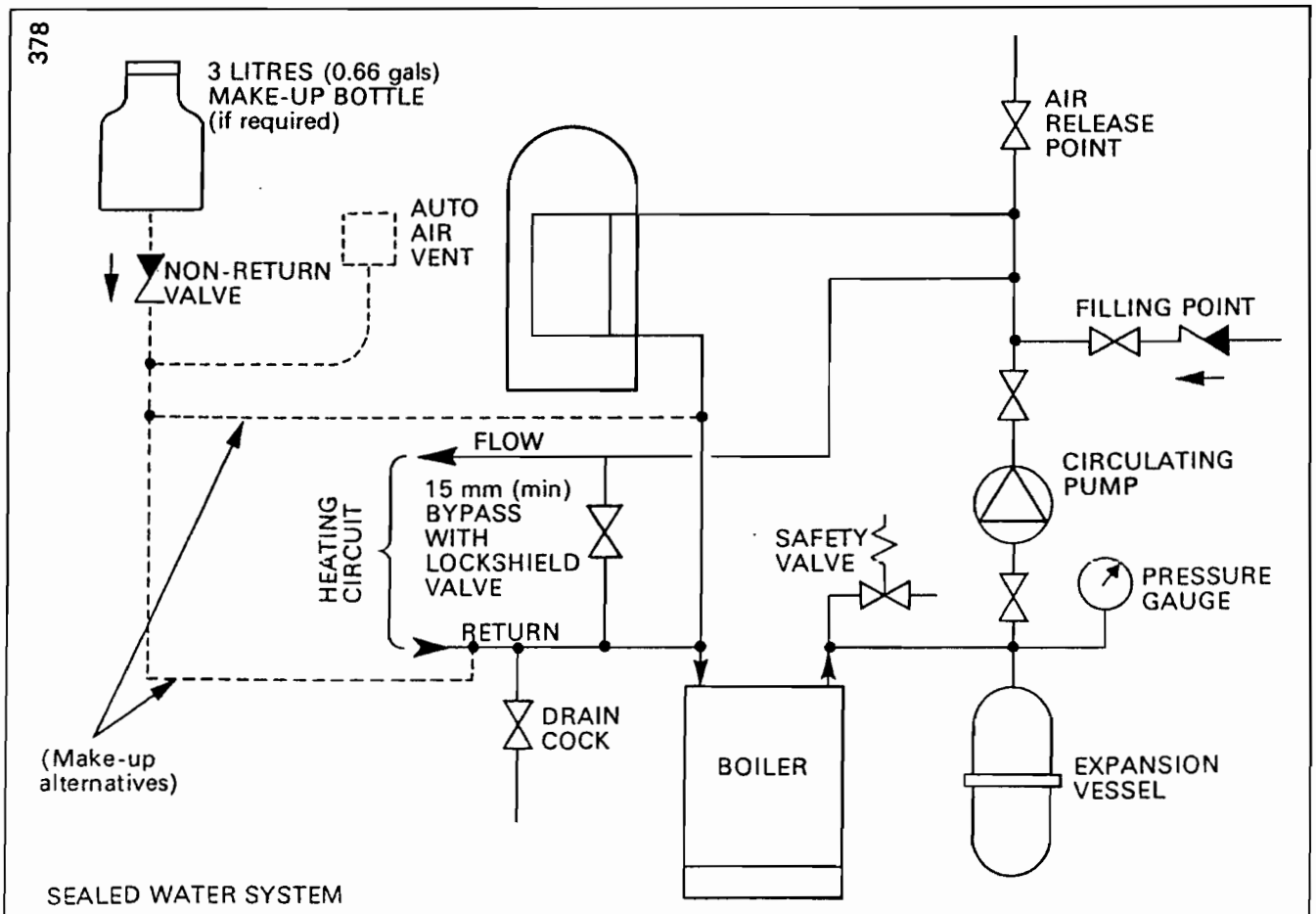


Diagram 4.1

4.5 Cylinder

SINGLE FEED INDIRECT CYLINDERS ARE NOT SUITABLE FOR SEALED SYSTEMS.

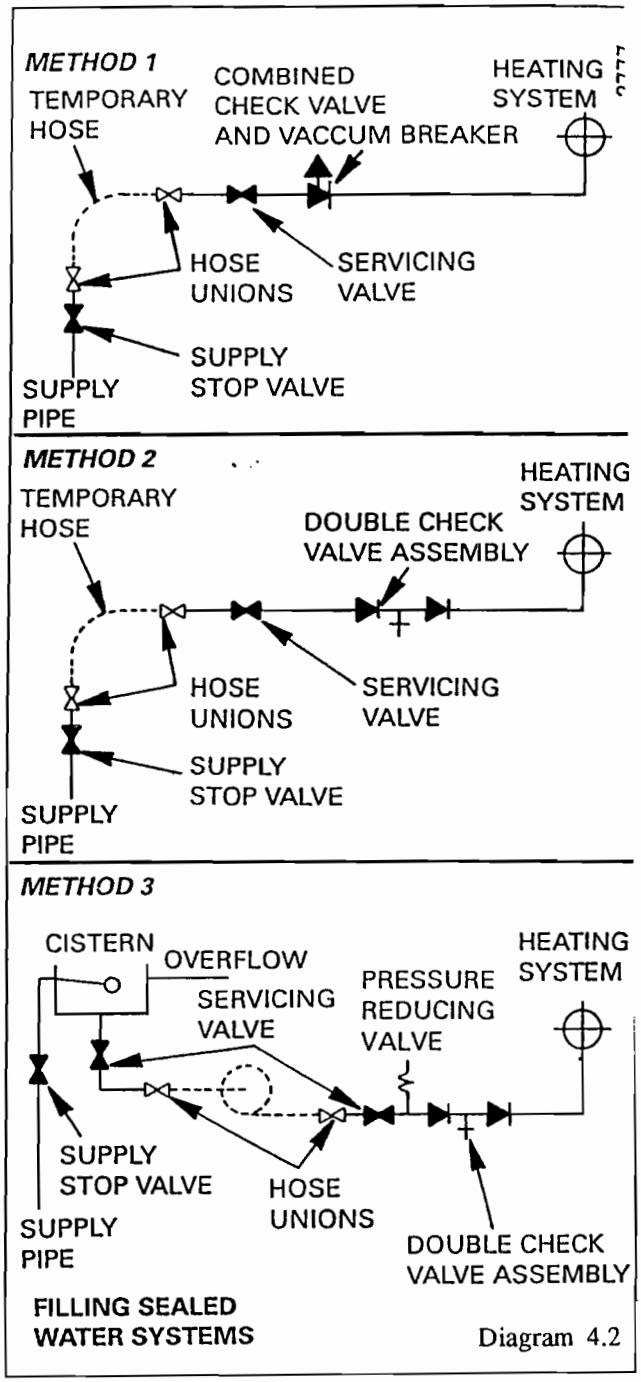
The domestic hot water cylinder shall be either of the indirect coil type or a direct cylinder fitted with an immersion calorifier which is suitable for working at a gauge pressure of 0.35bar (5lbf/in²), above the safety valve setting.

4.6 Water Make Up

Provision must be made for replacing water lost from the system by using a make up vessel mounted in a position higher than the top point of the system. The vessel shall be connected through a non-return valve to the system on the return side of either the hot water cylinder or heating circuit. Where access to a make up vessel would be difficult provision for make up can be made by pre-pressurisation of the system.

4.7 Filling Sealed Systems

Provision for filling the system at low level must be made. Three methods of filling are shown in diagram 4.2. There must be no permanent connection to the mains supply.



FILLING SEALED WATER SYSTEMS Diagram 4.2

5.1 Unpacking

Remove wall template and cardboard fitting from the boiler carton and remove the rear side panels which are packed within this fitting.

Slide the controls cover forward to remove from boiler.

Remove boiler from the carton and place on its back. The loose items pack will be found in the carton.

5.2 Flue Box

Remove the casing after unscrewing the two upper and two lower securing screws, see diagram 5.1.

Remove the flue box from behind the back panel of the boiler by removing the four screws, see diagram 5.2.

The flue box is used with the flue components to mount on the wall as described in the appropriate flue instructions, supplied in the flue pack and kits.

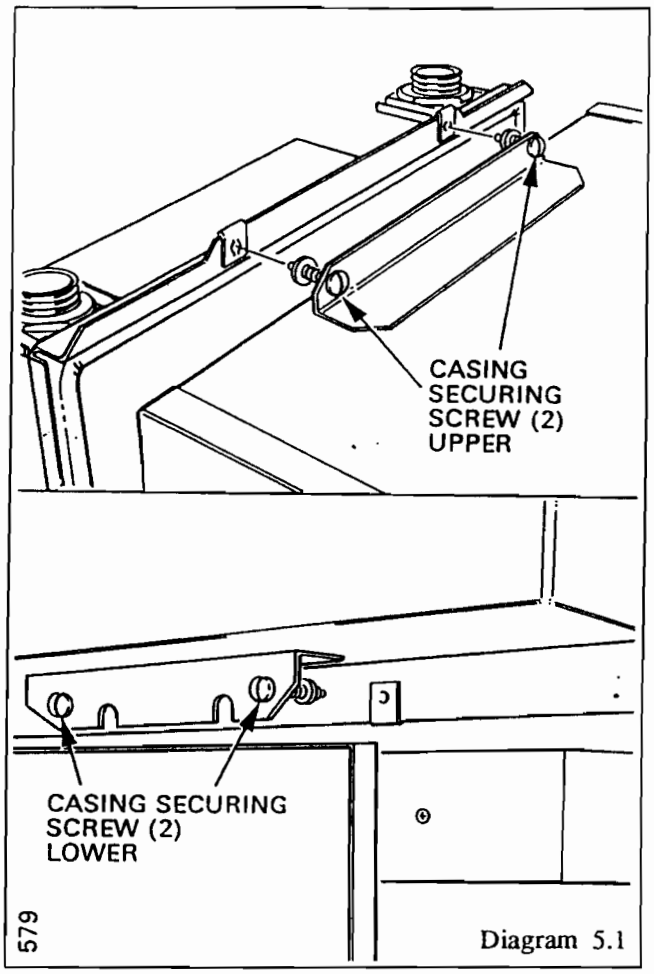


Diagram 5.1

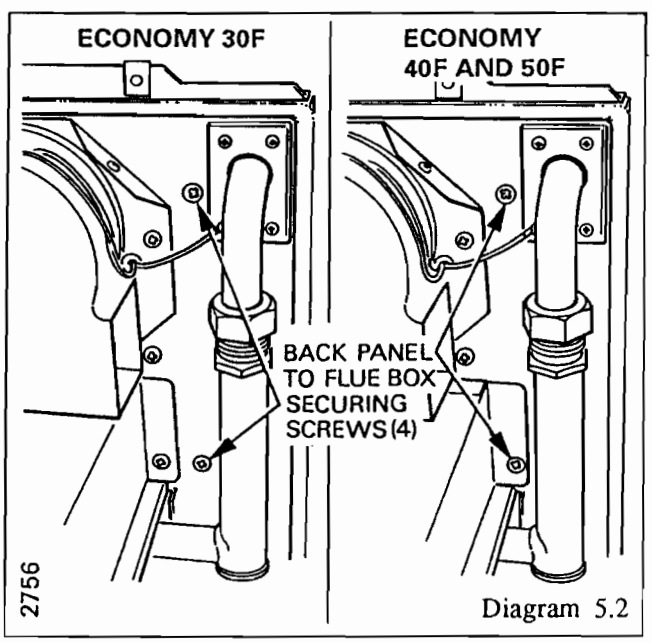


Diagram 5.2

6.1 Flue System

Refer to instructions supplied with the flue pack to be used. Ensuring that the flue is correct for the installation, including any internal access flue kit if applicable.

The flue box, lower support bracket and flue system must now be fitted to enable the boiler to be installed, refer to the appropriate flue instructions.

6.2 Mounting the Boiler

Proceed as follows after installing the flue system required.

Take one or both rear side panels, if required, then hook on at the top and secure with the No.6 self tapping screws provided.

In the case of a side flue installation the rear side panel on the flue side will require the knock out panel removing after the larger flange has been cut, see diagram 6.1.

Position the boiler centrally on the lower support bracket previously fixed on the wall and ease the boiler back to the flue box, securing with the four screws previously removed, see diagram 5.2.

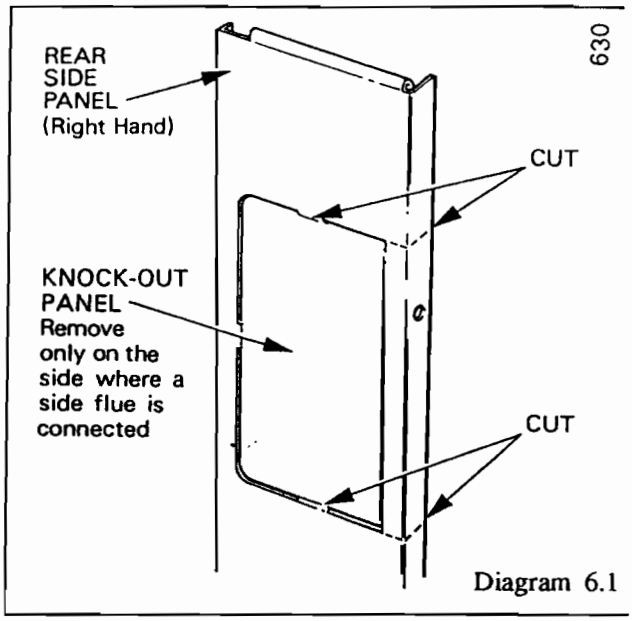


Diagram 6.1

6.3 Gas Connection

Make the connection to the gas supply at the union gas service cock at the base of the boiler.

Test the complete gas installation for soundness and purge in accordance with the current issue of BS6891.

7.1 Supply Cable Connection

THIS BOILER MUST BE EARTHED AND HAVE A PERMANENT MAINS SUPPLY.

Remove the control box by supporting it and removing the two fixing screws at the front above the fascia, then lower the front of the box until it is clear of its cover. Push box to the rear to disengage its hinging arrangement, lower the box and pull forward clear of its cover, see diagram 7.1. The box will still be attached via the retaining strap. If the box is to be removed entirely, pull the strap off the plastic fastener. Care should now be taken not to damage thermostat and over heat cutoff capillaries or any electrical cables.

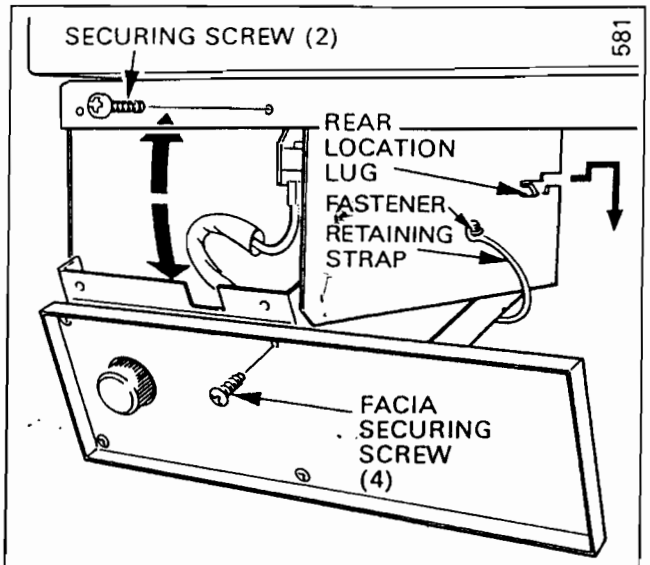
Using heat resistant flexible cable of suitable length and rating as stated in Section 1.9, thread the mains cable in through a hole in the rear of the control box, through the cable clamp and connect to the appropriate terminals and earth stud, see diagrams 7.2 and 7.3.

When making connections, ensure that the earth conductor is made longer than the live and neutral conductors, so that if the cable is strained the earth conductor would be the last to be disconnected

For installations with less than 150mm lower clearance, allow an extra 300mm of installation cable to allow servicing of the control box. Make a loop in the cable and secure with a cable clip at the rear.

It is essential that the polarity is correct, the live, brown cable connected to 11 and the neutral,blue cable, connected to 10, see diagram 7.3.

The electrical isolator must isolate both the boiler and any system controls, be adjacent to the boiler and clearly marked showing its use, refer to Section 1.9.



CONTROL BOX REMOVAL Diagram 7.1

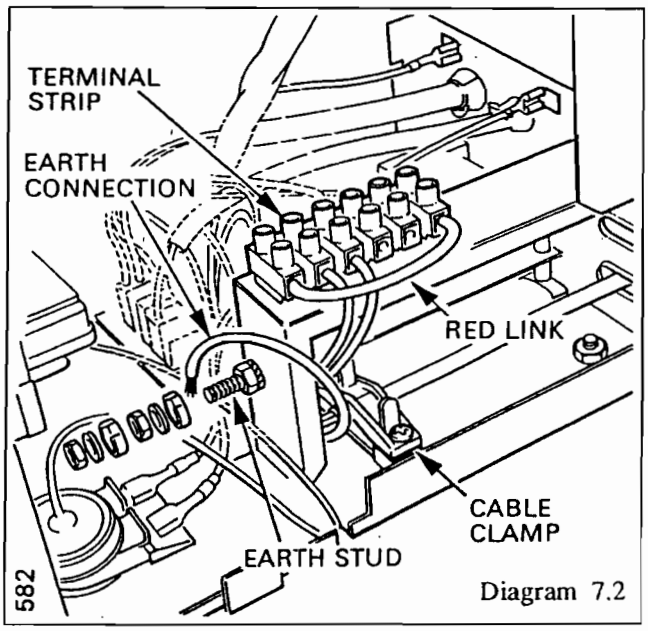


Diagram 7.2

7.2 Pump Cable Connection

The pump must be connected directly to the boiler control box as shown in the wiring diagram 7.3 passing the cable through the hole in the rear of the control box.

7.3 Testing

Checks to ensure electrical safety should be carried out by a service engineer.

In the event of an electrical fault after installation of the appliance, preliminary system checks must be carried out using a suitable multimeter.

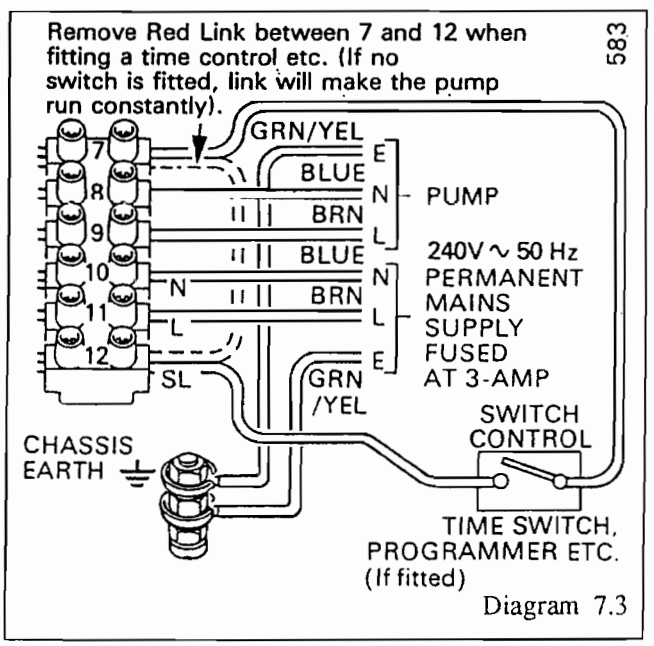


Diagram 7.3

8.1 Preliminaries

The system must be thoroughly flushed out with cold water without the pump in place.

Refit the pump and fill the system, making sure that all air is properly vented from the system and pump.

8.2 Sealed Systems

Flush the whole system with cold water without the pump in place. Refit the pump and fill the system until the pressure gauge registers 1.5bar, (21.5lbf/in²). Clear any air locks and check for water soundness.

Check the operation of the safety valve, preferably by allowing the water pressure to rise until the valve discharges. This should be within +/- 0.3bar (+/-4.3lbf/in²), of the preset pressure. Where this is not possible a manual check should be made.

Release the cold water to initial system design pressure.

8.3 Initial Lighting, Testing and Adjustment.

Check that the main electrical supply to the boiler is switched off and that the boiler thermostat is turned to "O", see diagram 8.1.

Turn on the main gas supply at the gas service cock.

Test for gas soundness around the pilot connection as follows: Remove the cover from the gas valve, see diagram 8.1. Temporarily disconnect the black cable from the gas valve solenoid and insulate the connector. Switch on the electrical supply to the system.

WARNING. THE GAS VALVE AND FAN OPERATE ON MAINS VOLTAGE, TERMINALS WILL BECOME "LIVE".

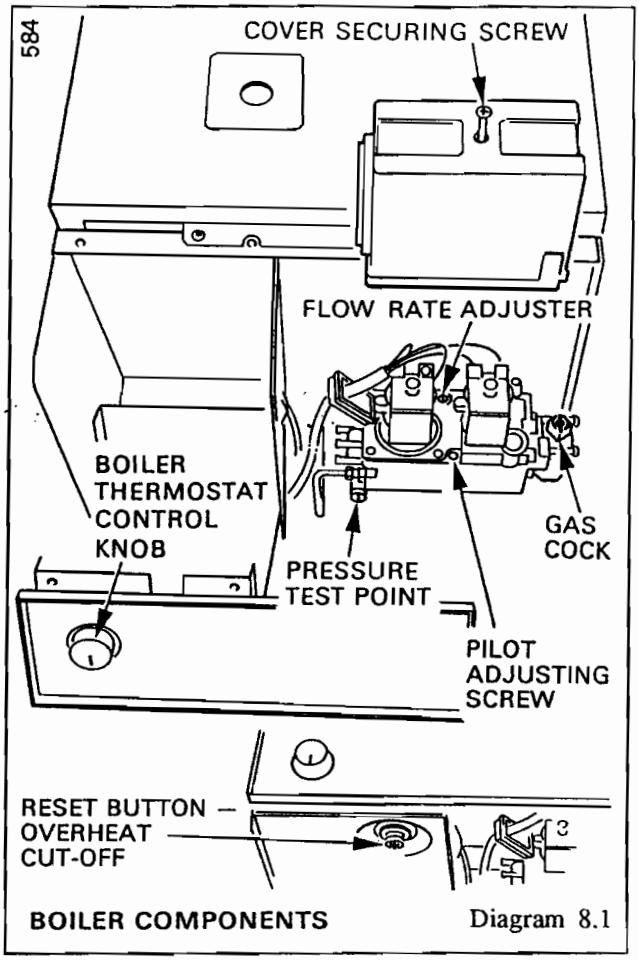
Temporarily attach rubber tubing over the open end of the pressure tube and position the open end of the rubber tube adjacent to the fan outlet, see diagram 8.2.

Turn the thermostat knob fully clockwise and the fan will start, sparks should be generated and the pilot light, press the reset button under the control box, see diagram 8.1.

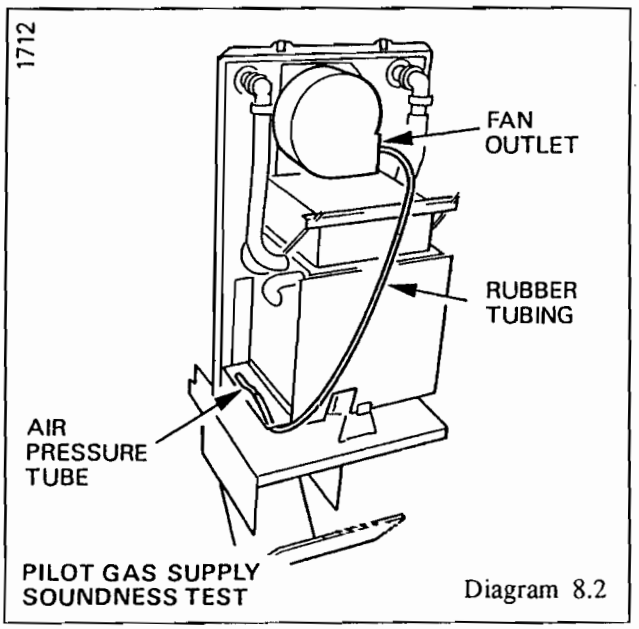
Check around the pilot connections for gas soundness, using a suitable leak detection fluid.

Turn thermostat knob to "O" and isolate the boiler from the electrical supply.

Replace the black cable and remove the rubber tubing.



BOILER COMPONENTS Diagram 8.1



PILOT GAS SUPPLY SOUNDNESS TEST Diagram 8.2

Position the self adhesive arrow indicator, from the loose items pack, on to the data badge against the output to which the boiler has been set.

Fit the outer casing making sure it is correctly located, sealed and secured with the two upper and two lower screws previously removed, see diagram 3.1.

NOTE. BEFORE LIGHTING THE BOILER ENSURE THAT THE CASING HAS BEEN CORRECTLY FITTED AND THAT THE EDGE OF THE COVER MAKES A TIGHT SEAL WITH THE SEALING STRIP IN THE GROOVE AROUND THE BOILER BACKPLATE.

Remove the cap screw and fit a suitable pressure gauge, see diagram 8.1.

WARNING. THE GAS VALVE OPERATES ON MAINS VOLTAGE AND THE TERMINALS WILL BECOME "LIVE".

Ensure that all remote controls are calling for heat.

Switch on the mains electrical supply to the system and check that the pump is working and circulating water.

Turn the boiler thermostat knob clockwise to a high setting and after a period of time the main burner will light, view through window in boiler casing.

If the burner does not light, press the reset button under the control box, see diagram 8.1.

Should the burner still not light then check all electrical connections and refer to fault finding section.

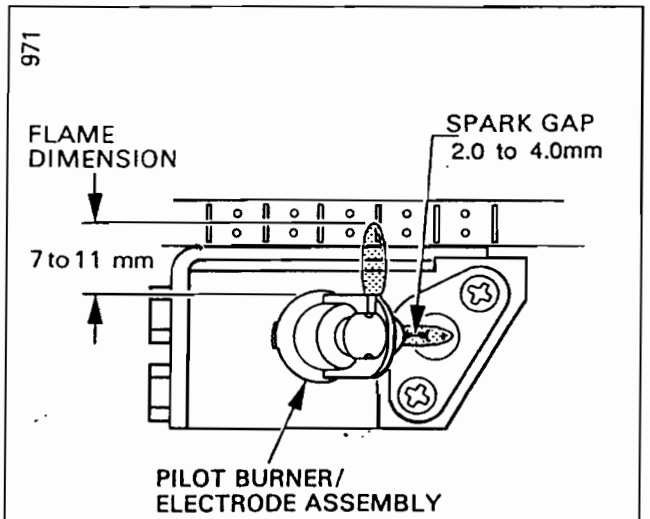
The pilot gas rate is preset fully open on the gas valve and no adjustment should be necessary. Check that the flame lengths are as shown in diagram8.3. If any adjustment is required, turn the pilot adjusting screw clockwise to decrease, see diagram 8.1.

Set the gas rate required by means of the flow rate adjusting screws, see diagram 8.1, turning clockwise to decrease. BEWARE, MAINS VOLTAGE ON GAS VALVE. Refer to pressure settings for heat output for the boiler in Range Rating Tables, Section 1.

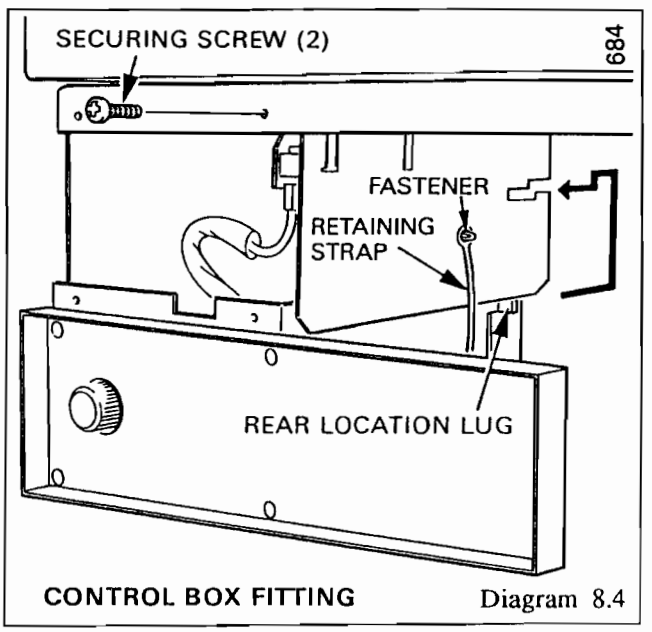
Turn the thermostat control knob to "O" and isolate the boiler from the electrical supply. Remove the pressure gauge, refit the screw and ensure that a gas tight seal is made.

Replace gas valve cover and secure with the screw.

Relight the burner and check that there is adequate air for combustion by the correct appearance of the flames.



PILOT FLAME AND SPARK GAP DIMENSIONS Diagram 8.3



CONTROL BOX FITTING Diagram 8.4

Should any doubt exist about the gas rate check at the meter 10 minutes after lighting up. The gas rate should be in the range of:

Economy 30F - 0.7 to 1.1m³/h (25 to 38ft³/h)

Economy 40F - 1 to 1.5m³/h (34 to 51ft³/h)

Economy 50F - 1.3 to 1.8m³/h (45 to 62ft³/h)

These rates are for guidance only.

Test for gas soundness around all gas carrying components with a suitable leak detection fluid.

The boiler may give off a burning smell for a period of time after initial lighting.

Replace the control box, engage the rear location lugs on the side of box on to the bottom edge of cover and slide the box backward. When the box is at rear of cover raise rear of box to engage pivot arrangement and raise front of box then replace the two screws previously removed, see diagram 8.4. Refit the retaining strap on to the fastener if the control box had been removed completely.

8.4 System

Check that any remote controls control the boiler as required.

For sealed systems refer to Section 4.

Allow the system to reach maximum working temperature and check for water leaks. The system should then be turned off and drained as rapidly as possible whilst hot.

Refill the system, vent all air and again check for water leakage.

Sealed systems should be adjusted to the initial system design pressure. Any set pointer on the pressure gauge should be set to coincide with the indicating pointer.

The overrun thermostat will keep the pump running when the boiler has shut down, as long as the water temperature within the boiler is above a predetermined limit.

When commissioning the system the boiler should first be fired with the bypass valve fully closed on full service, that is, central heating and domestic hot water. The system should then be balanced, adjusting the pump and lockshield valve as necessary. Having achieved a satisfactory condition, operate the boiler with the by pass valve fully closed on minimum load, normally this will be on central heating only with one radiator operating in the main living area. The valve should then be opened gradually to achieve the appropriate flow rates as quoted in Section 3.1. If necessary readjust the pump.

UNDER NO CIRCUMSTANCES MUST THIS VALVE BE LEFT IN THE FULLY CLOSED POSITION.

8.5 Operational Checks

Adjust the boiler thermostat to the required setting together with any remote controls.

Operate the boiler on full service again and check that the balancing is satisfactory, making further adjustments, if necessary.

If thermostatic radiator valves are fitted care must be taken to ensure that there is an adequate flow rate when they close.

Check, on an open vented system, that when the pump is switched on or off air is not drawn into the system or water discharged from the open vent.

8.6 Normal Lighting Sequence

THE BOILER MUST NOT BE OPERATED WITHOUT THE CASING BEING CORRECTLY LOCATED, SEALED AND SECURED TO THE BACK PANEL.

Mains electrical supply to the boiler "ON"

Gas supply "ON"

All remote controls calling for heat.

Turn the boiler thermostat control knob clockwise to the setting required, the following automatic lighting sequence will follow:

a) The fan will run.

b) The air pressure switch operates.

c) The first, pilot solenoid valve opens.

d) The spark igniter operates.

e) Pilot burner will light.

f) Ignition spark goes off.

g) The second solenoid opens giving main burner operation until the boiler thermostat or a remote control switches the boiler off.

When the boiler switches off, all burners go out, the complete sequence works when heat is again required.

If the boiler thermostat is turned off, wait for 30 seconds before turning on to the setting required.

8.7 Completion and User Information

Refit the controls cover by sliding it on to the runners.

Hand the Instructions for Use to the user for their retention, instruct and demonstrate the efficient and safe operation of the boiler and system

Advise the user that for the continued efficient and safe operation of the boiler it is important that regular servicing is carried out as recommended by the local gas undertaking, preferably once a year at the end of the heating season.

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

Leave these instructions with the user for use during future service calls.

This boiler must be serviced by a service engineer.

BEFORE COMMENCING A SERVICE, TURN OFF THE GAS SUPPLY AT THE GAS SERVICE COCK AND ISOLATE THE ELECTRICAL SUPPLY.

AFTER COMPLETING ANY SERVICING OR REPLACEMENT OF GAS CARRYING COMPONENTS, ALWAYS TEST FOR GAS SOUNDNESS and CARRY OUT FUNCTIONAL CHECKS OF CONTROLS.

9.1 Heat Exchanger Cleaning

Remove controls cover by pulling forward and clear of boiler.

Unscrew the two upper and two lower casing securing screws and remove the outer casing by withdrawing forward, see diagram 9.1.

Remove the wing nuts and the flue hood securing angle, see diagram 9.2.

Remove the two screws securing the flue hood to the backplate and lift off the flue hood, taking care not to damage the gasket at the back.

Remove the combustion chamber front panel by removing the wing nut at the bottom and the four screws securing it to the combustion chamber sides.

Disconnect the ignition lead from the electrode, taking care not to damage the lead insulation.

Support the main burner and unscrew the tubing nut at the base of the pilot burner. Spring the pilot tube downward sufficiently to allow the main burner to move forward to disengage from the injector at the rear. Raise the burner up through the combustion chamber and remove. Take care not to damage the insulation inside the combustion chamber.

Protect the pilot tube and injector. Brush any deposits from the heat exchanger, collect and remove.

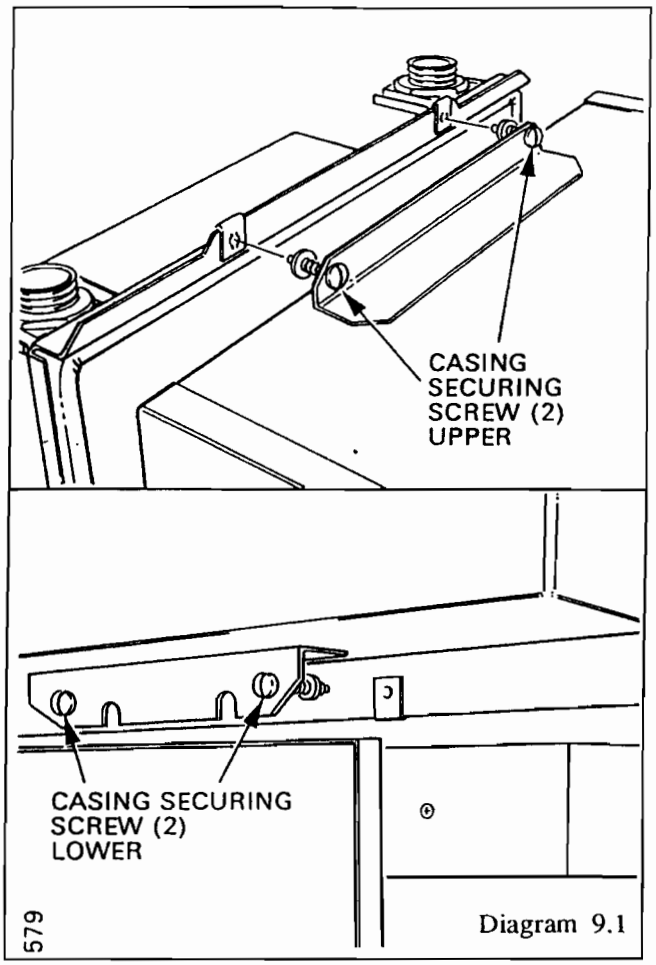


Diagram 9.1

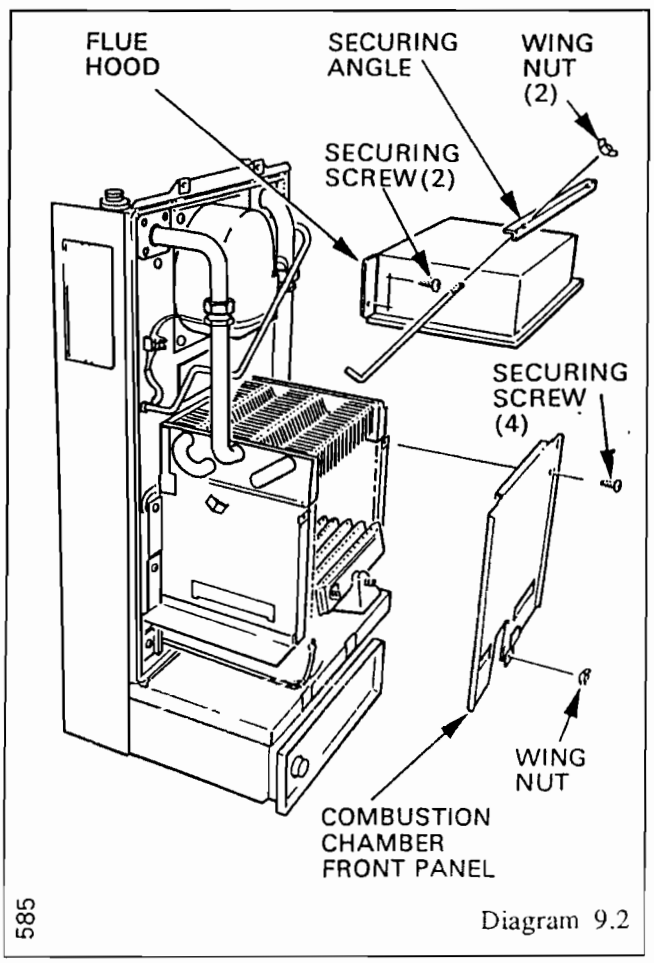


Diagram 9.2

9.2 Burner Injector and Pilot Cleaning

With the main burner already removed, brush any deposits from the burner, ensuring that the flame ports are unobstructed. Do not use a brush with metallic bristles.

Check the main burner injector for blockage or damage and remove if necessary. When replacing, make sure that the sealing washer is in position to ensure a gas tight seal.

Inspect the pilot burner and ignition electrode, clean if necessary. Check the condition of components.

Replace parts in reverse order.

Make sure that the main burner is pushed fully home on to the injector and between the vertical guides near the injector.

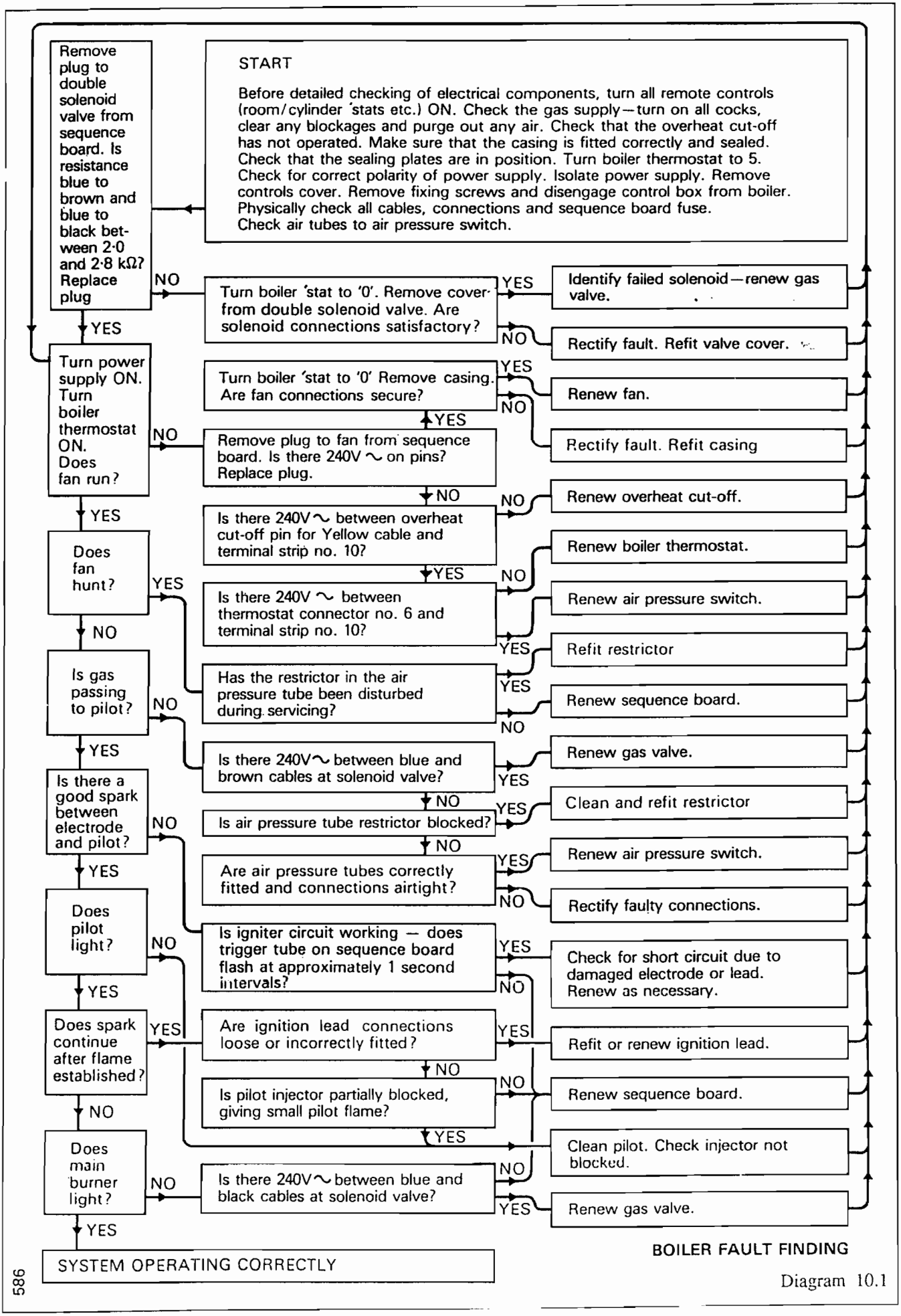
When replacing the flue hood make sure that a good seal is made to the back panel by replacing two screws at the rear then two hook bolts, angle and wing nuts at the front. Do not overtighten the wing nuts.

9.3 Operational Checks

After completion of the service, before fitting the casing, check the casing seal to ensure it is in good condition, renew if necessary.

THE BOILER WILL NOT OPERATE CORRECTLY WITHOUT THE CASING BEING LOCATED, SEALED AND SECURED TO THE BACK PANEL. Before turning the boiler on after completing the service, make sure that this is checked.

Light the burner and carry out the operational checks as described in Section 8.3.



BOILER FAULT FINDING

Diagram 10.1

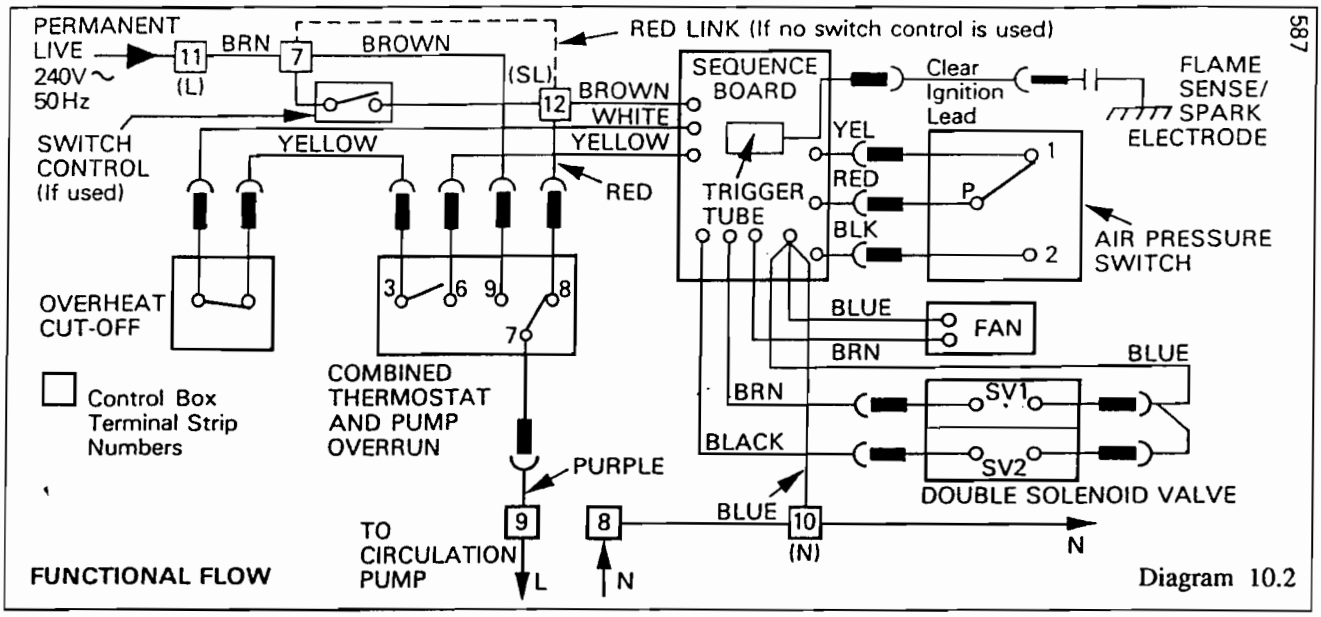


Diagram 10.2

10.1 Electrical

Important. On completion of the service/fault finding task which has required the breaking and remaking of electrical connections then checks, Earth continuity, Polarity and Resistance to earth must be repeated, using a suitable multimeter

Refer to fault finding diagram 10.1 and functional flow diagram 10.2

A spare fuse for the sequence board is supplied in the front of the control box.

THE BOILER WILL NOT OPERATE CORRECTLY UNLESS THE OUTER CASING ISLOCATED, SEALED AND SECURED TO THE BACK PANEL.

FAULT AND CAUSE	*REMEDY*
14.2 Burner Will Not Ignite	
Electrical fault.	Refer to fault finding diagram 10.1.
Boiler thermostat not operating.	Check that boiler thermostat is in an "ON" position and functioning correctly.
Overheat cut-off operated.	Allow system to cool and press reset button, see diagram 8.1.
Case sealing fault.	Ensure that the case is fitted correctly and sealed. Check that the sealing plates are in position.
14.3 Thermostat Will Not Cut Out	
Thermostat phial not correctly fitted.	Fit phial in pocket, using heat sink compound and secure with pin.
Faulty thermostat.	Renew thermostat.
14.4 Overheat Cut-off Operates Prematurely.	
Air in heating body.	Vent system. Alter system layout if necessary.
Water circulation low or stopped.	Pump not functioning correctly. Check that the pump is connected to the boiler, to run while boiler is on. Alter layout if necessary.
Overheat cut-off operates before boiler cycles on maximum boiler thermostat setting.	Change faulty overheat cut-off.
Correctly set overheat cut-off operates prematurely (causes 1 and 2 satisfactory.	Change faulty heating body.
14.5. Insufficient Heat	
Thermostat set too low.	Increase setting. Check for correct operation.
Gas supply pressure inadequate.	Check gas supply, clear any blockage, make sure all cocks are fully open.
Burner pressure incorrect (While measuring pressure ensure thermostat is on maximum setting).	Check burner pressure against data badge. Reset only if more than 10% away from required figure.
14.6 Boiler Noisy in Operation*	
Overgassed.	Check burner pressure against data badge and adjust if necessary, but only if more than 10% away from the required figure.
Complete lack of water flow.	Check system controls for correct installation or correct type of controls.
Air in system.	Remove air from the system. When boiler is first commissioned the air dissolved may take some time to boil out, therefore attempts should be made to remove air periodically during the first weeks of the installation. Check venting of system as air bubbles can remain suspended in the water if system is not well vented.
Water flow rate.	Check that flow rate is correct. Check that pump is correct size and is correctly adjusted. Bypass not fitted or correctly set.

** There remains on most boilers a residual noise which is more noticeable at high temperatures. Normal operation of the boiler over a period should remove most noise.*

11.1 Notes

Replacement of parts must be carried out by a service engineer.

Replace parts in the reverse order to removal, unless stated otherwise.

BEFORE REMOVING ANY PARTS, TURN OFF THE GAS SUPPLY AT THE SERVICE COCK AND ISOLATE THE ELECTRICAL SUPPLY.

AFTER REPLACEMENT OF ANY GAS CARRYING COMPONENT ALWAYS TEST FOR GAS SOUNDNESS.

THE BOILER WILL NOT OPERATE CORRECTLY WITHOUT THE CASING BEING LOCATED, SEALED AND SECURED TO THE BACK PANEL. Before turning the boiler on again make sure that this is checked.

CARRY OUT FUNCTIONAL CHECKS OF CONTROLS AFTER REPLACING ANY COMPONENT.

11.2 Burner Injector

Remove the main burner as Section 9.1.

The injector, at the rear of the combustion chamber, can be unscrewed and replaced as necessary. Renew the sealing washer to ensure gas soundness.

When replacing the main burner ensure that it is pushed fully home on to the injector and between the vertical guides near the injector.

11.3 Gas Valve

Make sure that the gas and electrical supplies to the boiler are off.

Remove the controls cover by sliding it forward.

Remove the four screws and fascia from the control box, see diagram 11.1.

Remove the cover to the gas valve by removing the screw, see diagram 11.2.

Disconnect the electrical connectors at the gas valve.

Disconnect the pilot supply tube nut at the gas valve, ease tube from pilot adaptor and transfer adaptor to the replacement valve.

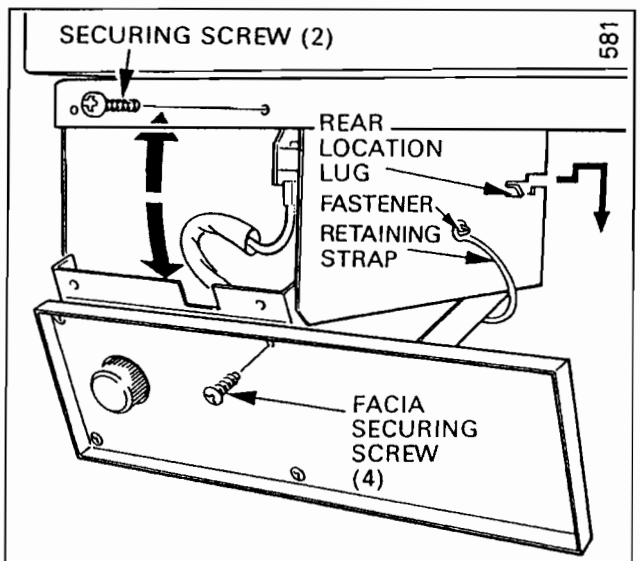
Support the gas valve, remove the four screws from the flanged connections at each end of the valve and remove the valve by easing the flanges apart.

Ensure that the new "O" rings are in place in the flanged connections when replacing.

The gas pipe may have to be purged of air after this operation. Test for gas soundness with a leak detection fluid.

Refer to diagram 11.3 when connecting the electrical connectors.

Follow the instructions in Section 8.3.



CONTROL BOX REMOVAL Diagram 11.1

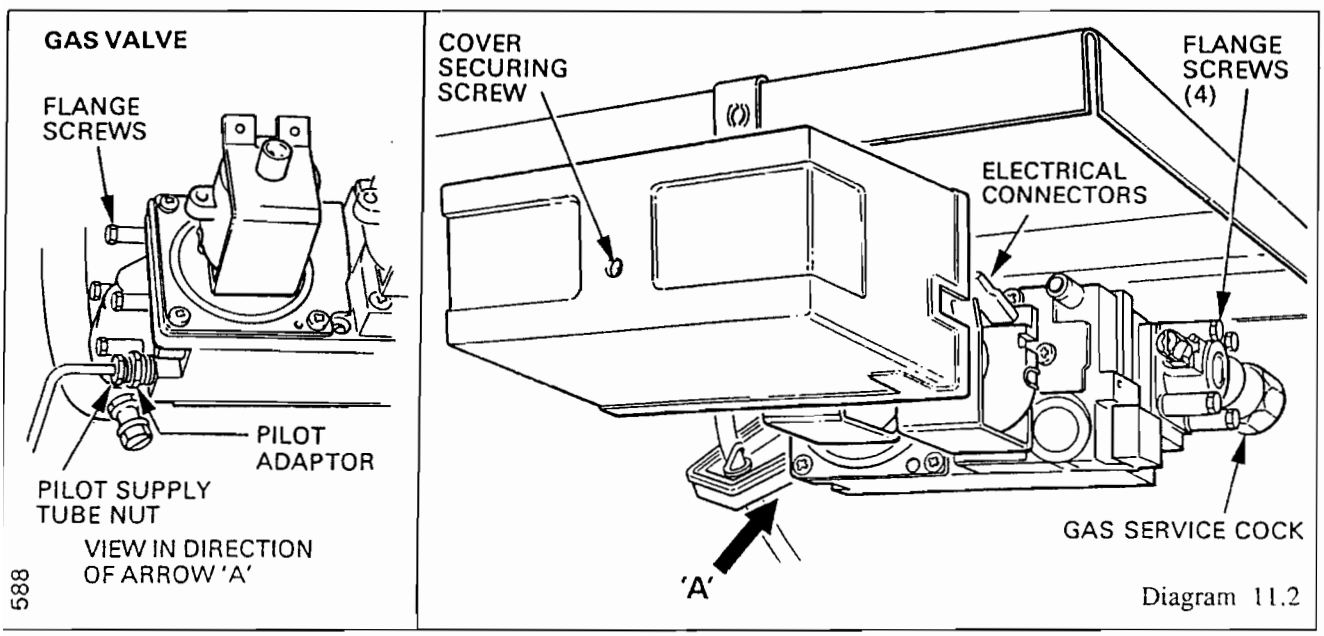


Diagram 11.2

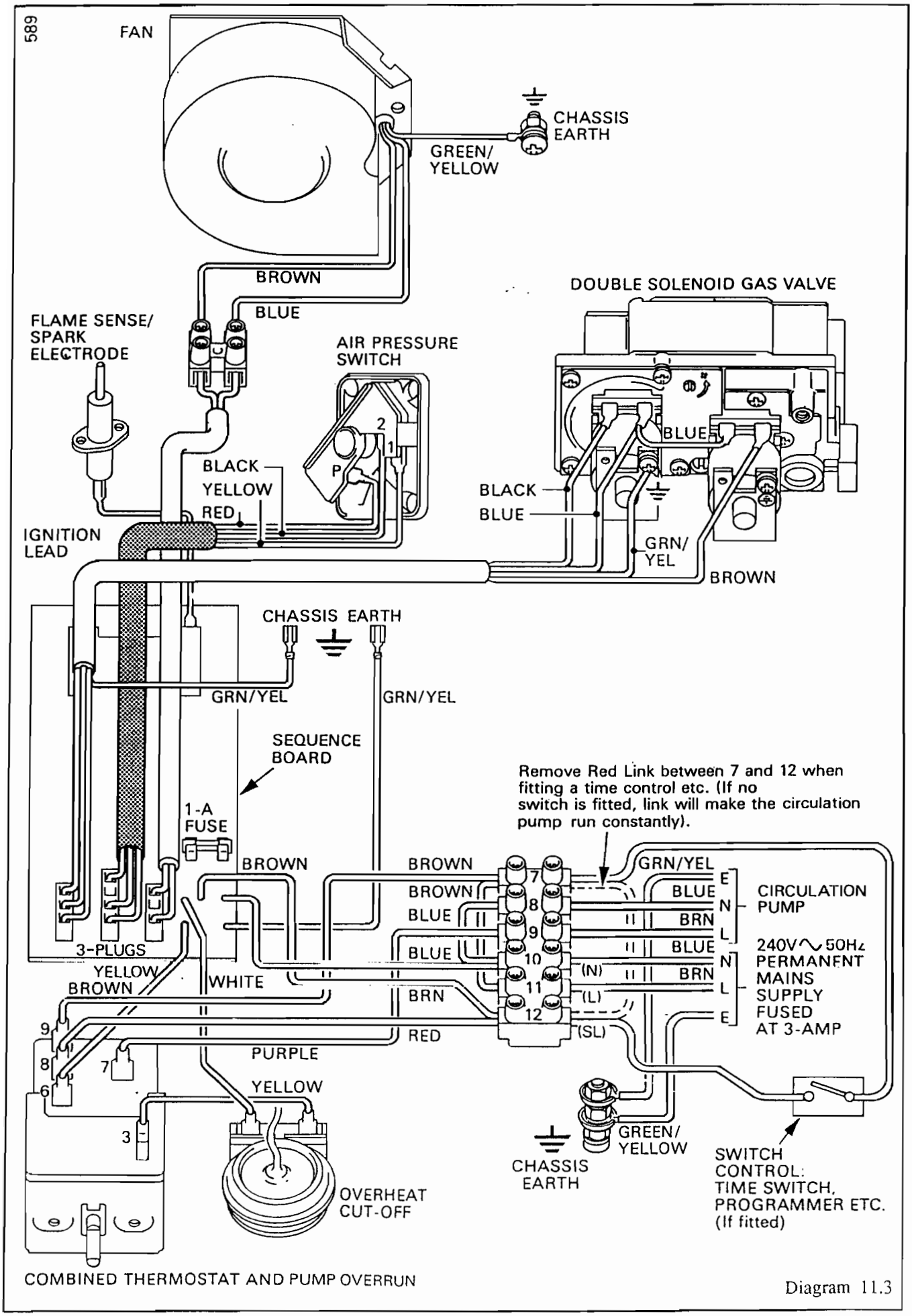

589
FAN
CHASSIS EARTH
GREEN/ YELLOW
BROWN
BLUE
DOUBLE SOLENOID GAS VALVE
FLAME SENSE/ SPARK ELECTRODE
AIR PRESSURE SWITCH
BLACK
YELLOW
RED
BLUE
BLACK
BLUE
GRN/ YEL
BROWN
IGNITION LEAD
CHASSIS EARTH
GRN/YEL
GRN/YEL
SEQUENCE BOARD
1-A FUSE
Remove Red Link between 7 and 12 when fitting a time control etc. (If no switch is fitted, link will make the circulation pump run constantly).
BROWN
BROWN
BROWN
BLUE
BLUE
GRN/YEL
BLUE
BRN
BLUE
BRN
CIRCULATION PUMP
240V~50Hz PERMANENT MAINS SUPPLY FUSED AT 3-AMP
3-PLUGS
YELLOW
BROWN
WHITE
BRN
RED
PURPLE
YELLOW
GREEN/ YELLOW
CHASSIS EARTH
SWITCH CONTROL: TIME SWITCH, PROGRAMMER ETC. (If fitted)
OVERHEAT CUT-OFF
COMBINED THERMOSTAT AND PUMP OVERRUN

Diagram 11.3

11.4 Air Pressure Switch

Ensure that the electrical supply is isolated.

Remove the controls cover by sliding it forward. Turn off the gas cock.

Remove the control box as Section 7.1.

Disconnect the electrical connectors at the air pressure switch, see diagram 11.4.

Push the air pressure switch upward against the spring plate and pull the bottom to the left to disengage form the clips.

Disconnect the flexible tubes at the rear of the switch, taking care not to lose the air restrictor in the lower connections.

When replacing the tubes to the air pressure switch, note that the air restrictor must be fitted into the lower connection marked (-). Make sure that the flexible tubes are not kinked when replacing the switch.

Refer to diagram 11.3 when reconnecting the electrical connectors.

Replace the control box as Section 8.3.

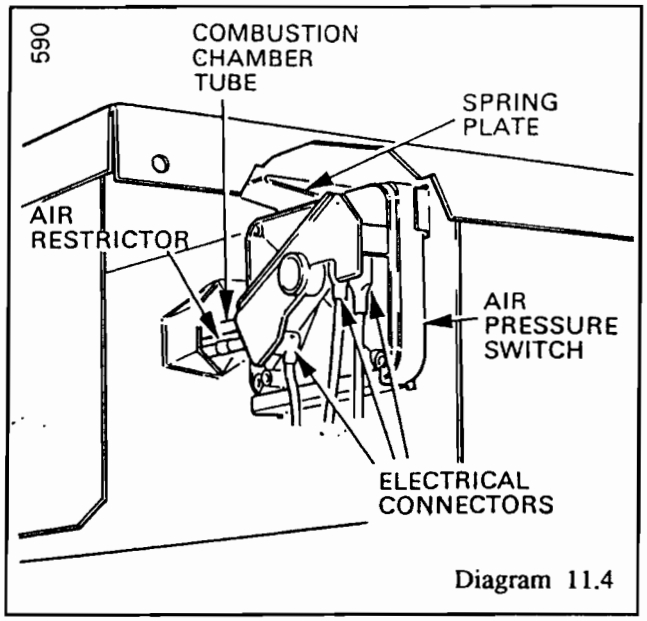


Diagram 11.4

11.5 Air Restrictor

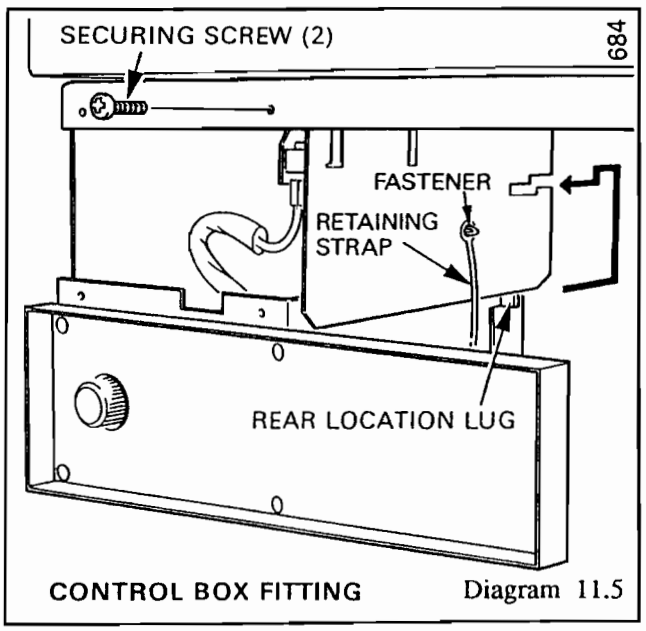
Isolate the electrical supply and release or remove the control box as Section 7.1.

Remove the air pressure switch and lower flexible tube as in Section 11.4, see diagram 11.4.

Remove the air restrictor, marked "A", from the lower air pressure switch connection. Renew it or clean by blowing out any obstruction. Fit into the lower connection marked (-).

When replacing the air restrictor and pressure switch, ensure that the flexible tubes are not kinked.

Replace the control box as Section 8.3.



CONTROL BOX FITTING Diagram 11.5

11.6 Sequence Board

Ensure that the electrical supply is isolated. Remove the controls cover by sliding it forward.

Release or remove the control box as Section 7.1.

Disconnect the three multi pole plugs at the front of the board and the ignition lead at the back, see diagram 11.6.

Disconnect the white cable at the over heat cutoff.

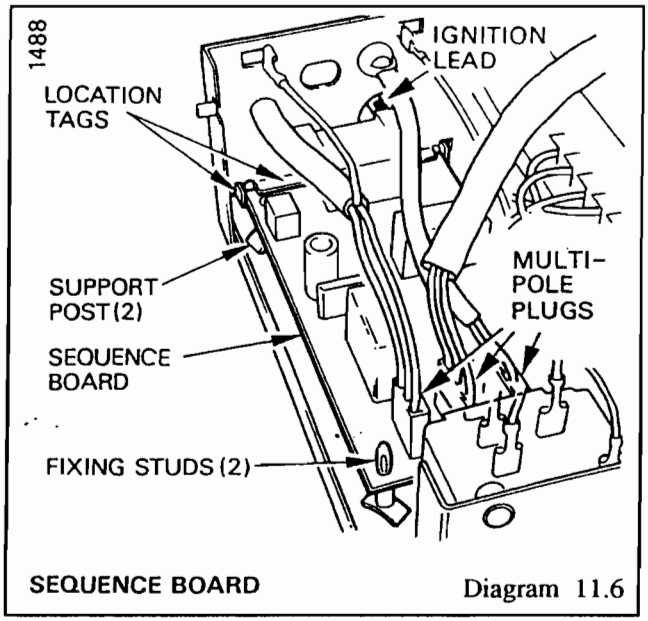
Disconnect the yellow cable from No.6 terminal of the thermostat.

Disconnect the live, brown or neutral,blue cable connections of the sequence board at the terminal strip and the board earth cable, green/yellow.

The board can now be eased off the two front fixing studs and removed from the rear location tags and support posts.

Refer to diagram 11.3 when reconnecting.

Refit the control box as Section 8.3.



SEQUENCE BOARD Diagram 11.6

11.7 Thermostat

Ensure that the electrical supply is isolate. Remove the controls cover by sliding it forward.

Remove the fascia by removing the four small screws, see diagram 11.1.

Pull off the thermostat control knob.

Release or remove the control box as Section 7.1.

Remove the casing after unscrewing the two upper and two lower securing screws, see diagram 9.1.

Remove the sealing angle on the right hand side where the capillaries pass through the back panel, see diagram 11.7.

Remove the screw and nut securing the capillary clips to the control box to release the capillaries, then pull the surplus through the hole in the back panel.

Remove the retaining clip that secures the phials into the pocket and remove the phial and coil, see diagram 11.7.

Feed the capillary through the hole in the back panel and pull clear at the bottom.

Disconnect the electrical connectors at the thermostat. Remove the two screws securing the thermostat to remove it from the control box.

Refer to diagram 11.3 when reconnecting.

Refit the control box as Section 8.3.

When refitting the thermostat, push the phial upward at the rear right hand side of the boiler into the guide until it is visible and can be passed through the sealing angle hole in the back panel, pulling available capillary through the hole.

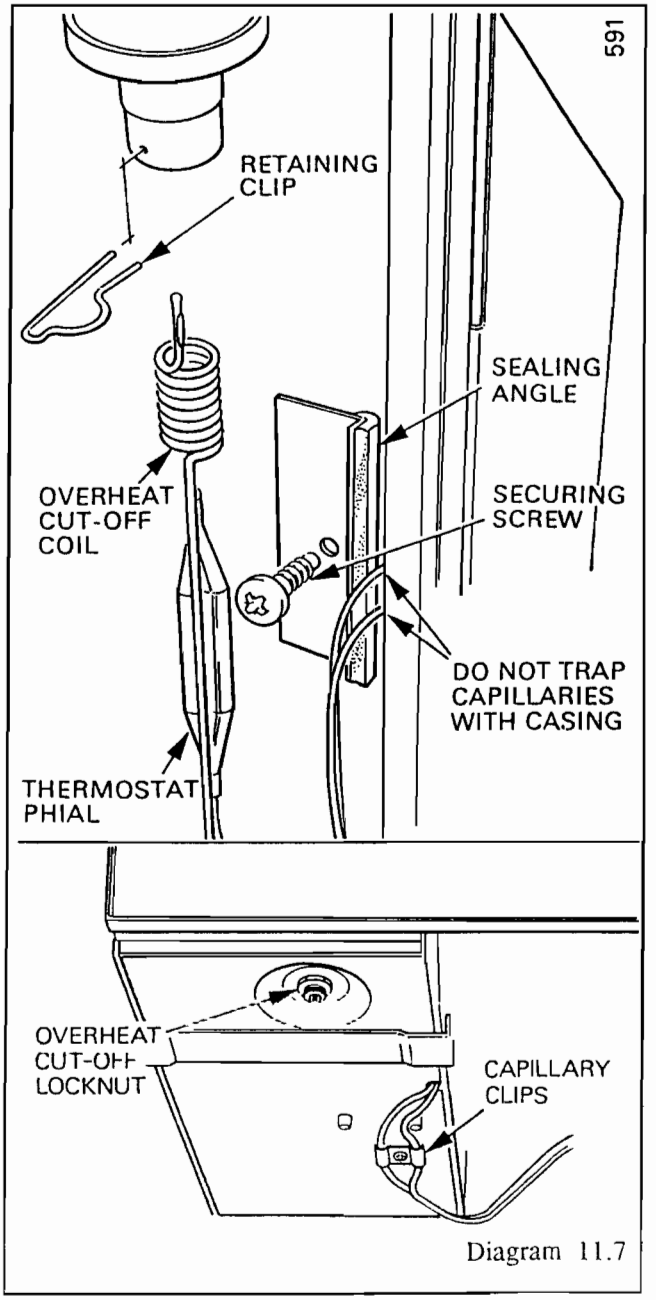


Diagram 11.7

When replacing the phial smear it with heat sink compound supplied, before replacing and secure in the pocket with the retaining clip, see diagram 11.7.

Feed the surplus capillary back through the hole in the back panel before fitting the sealing angle.

11.8 Overheat Cutoff

Ensure that the electrical supply is isolated.

Remove the controls cover by sliding it forward.

Remove the control box as Section 7.1.

Remove the casing, sealing angle and capillaries as in Section 11.7.

Disconnect the electrical connectors at the overheat cutoff, noting their positions.

Remove the locknut to release the cutoff from the control box.

When refitting follow the instructions in Section 11.7 for phial and capillaries.

After securing and connecting the cutoff, press the rest button, see diagram 8.1.

Refit the control box as Section 8.3.

11.9 Ignition Lead

Ensure the electrical supply is isolated.

Remove the controls cover by sliding it forward.

Remove the casing as Section 11.7

Release or remove the control box as Section 7.1.

Pull off the ignition lead at the connection at the back of the sequence board and electrode, see diagrams 11.6 and 11.8.

Remove one of the sealing angles where the lead passes through the back panel and replace the lead, feeding it through in the same way as the original, securing it to the pilot supply tube by passing it through the plastic tubing guides.

Fit the clear insulated end to the electrode.

Refit the control box as Section 8.3.

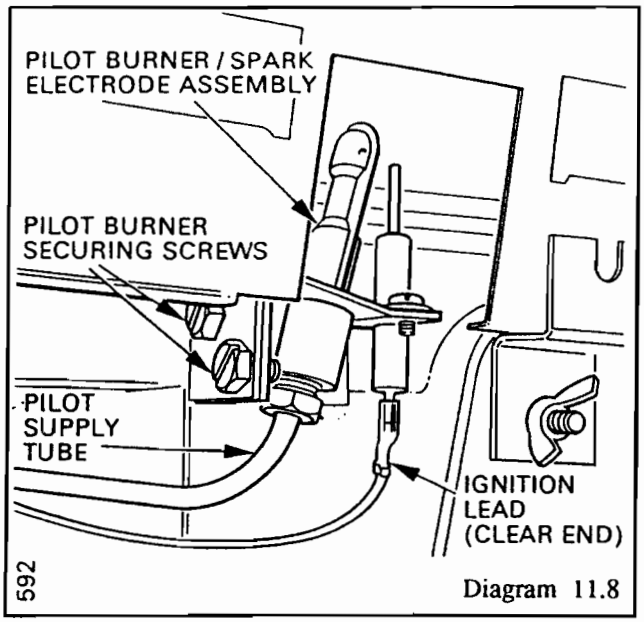


Diagram 11.8

11.10 Pilot Burner/Electrode Assembly

Ensure the electrical supply is isolated.

Remove the controls cover by sliding forward.

Remove the casing as Section 11.7.

Pull off the ignition lead from the electrode, see diagram 11.8. Take care not to damage the insulation.

Disconnect the pilot supply tube at the base of the pilot burner and ease out from the pilot burner.

Remove the two screws securing the pilot burner/ electrode assembly to the main burner and lift off.

Fit new pilot/electrode assembly and check the spark gap, see diagram 8.3.

Check that the pilot flame is correct, see diagram 8.3. If any adjustment is required, turn pilot adjusting screw, clockwise to decrease, see diagram 8.1. The pilot gas rate is normally fully open.

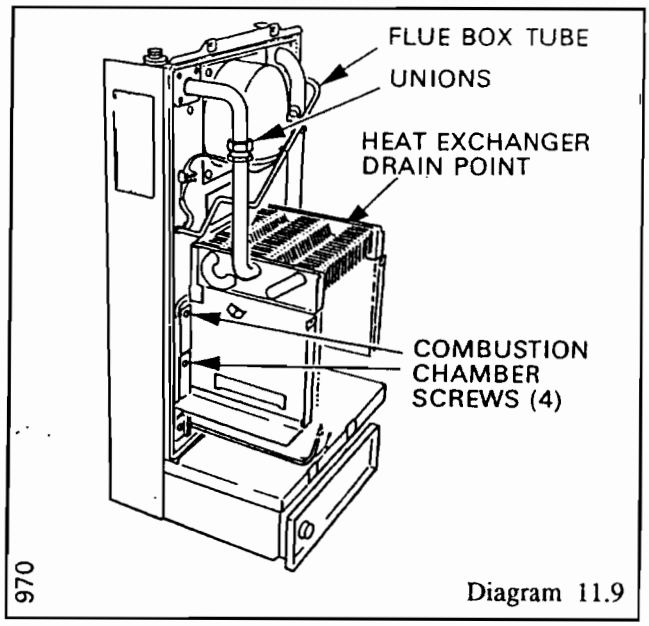


Diagram 11.9

11.11 Fan Assembly

Ensure the electrical supply is isolated.

Remove the controls cover by sliding it forward.

Remove the casing as Section 11.7.

Disconnect the cables to the fan, at the two way terminal strip and at the earth connection. Release the cables from the support clip.

Remove the screw and clip securing the flue box tube to fan casing.

Remove the three screws securing the fan assembly and it is free to be replaced, by withdrawing forward and upward. Do not disturb the position of the flue box tube, see diagram 11.9.

Refit plastic clip to route and support the cables.

11.12 Heat Exchanger Body

Ensure the electrical supply is isolated.

Remove the controls cover by sliding it forward.

Remove the casing as Section 11.7.

Drain the boiler circuit of water at the draining tap(s). A draining point is provided for draining residual water in the boiler, see diagram 11.9.

Remove the flue hood as Section 9.1.

Remove the combustion chamber front as Section 9.1.

Remove the burner and cover the pilot tube as Section 9.1.

Remove the retaining clip and thermostat phials as Section 11.7, see diagram 11.7.

Remove the four screws securing the combustion chamber sides to the back plate, see diagram 11.9 then lower the combustion chamber taking care not to damage the insulation.

Disconnect the flow and return unions above the heat exchanger.

The heat exchanger assembly can now be removed and replaced.

Replace the heat exchanger. Locate the lugs on the combustion chamber sides into the slots in the side plates of the heat exchanger.

Lift the heat exchanger and combustion chamber together and secure with the four screws to the back plate. The baffle/air tube assembly is also secured by the lower left hand screw.

When replacing the combustion chamber front panel, loosely fit screws until the flue hood has been secured.

Feed the capillaries as Section 11.7, then smear the thermostat phial and overheat cut off coil with heat sink compound supplied.

Make sure that the coil and phial are fully pushed into the pocket and are retained by the clip, see diagram 11.7.

When replacing the flue hood make sure that a good seal is made to the back panel by replacing the two screws at the rear then the two hook bolts and wing nuts at the front. Do not overtighten the wing nuts.

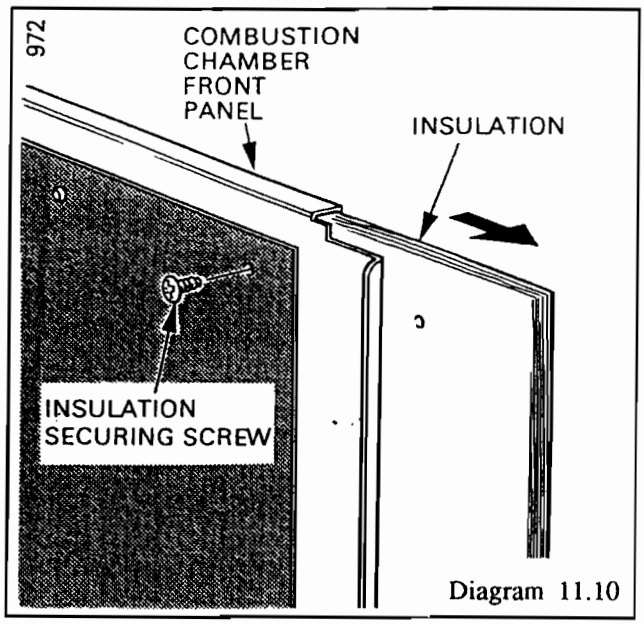


Diagram 11.10

11.13 Combustion Chamber Insulation

Gain access to the combustion chamber as Section 9.1.

Remove the screw securing the front insulation and slide it out, see diagram 11.10.

Each side insulation pad can be removed by sliding it forward.

Follow instructions in Section 9.1 to remove the burners.

Release and lower the combustion chamber as in Section 11.12.

The rear insulation can now be lifted out.

When replacing the combustion chamber front panel and flue hood refer to Section 11.12.

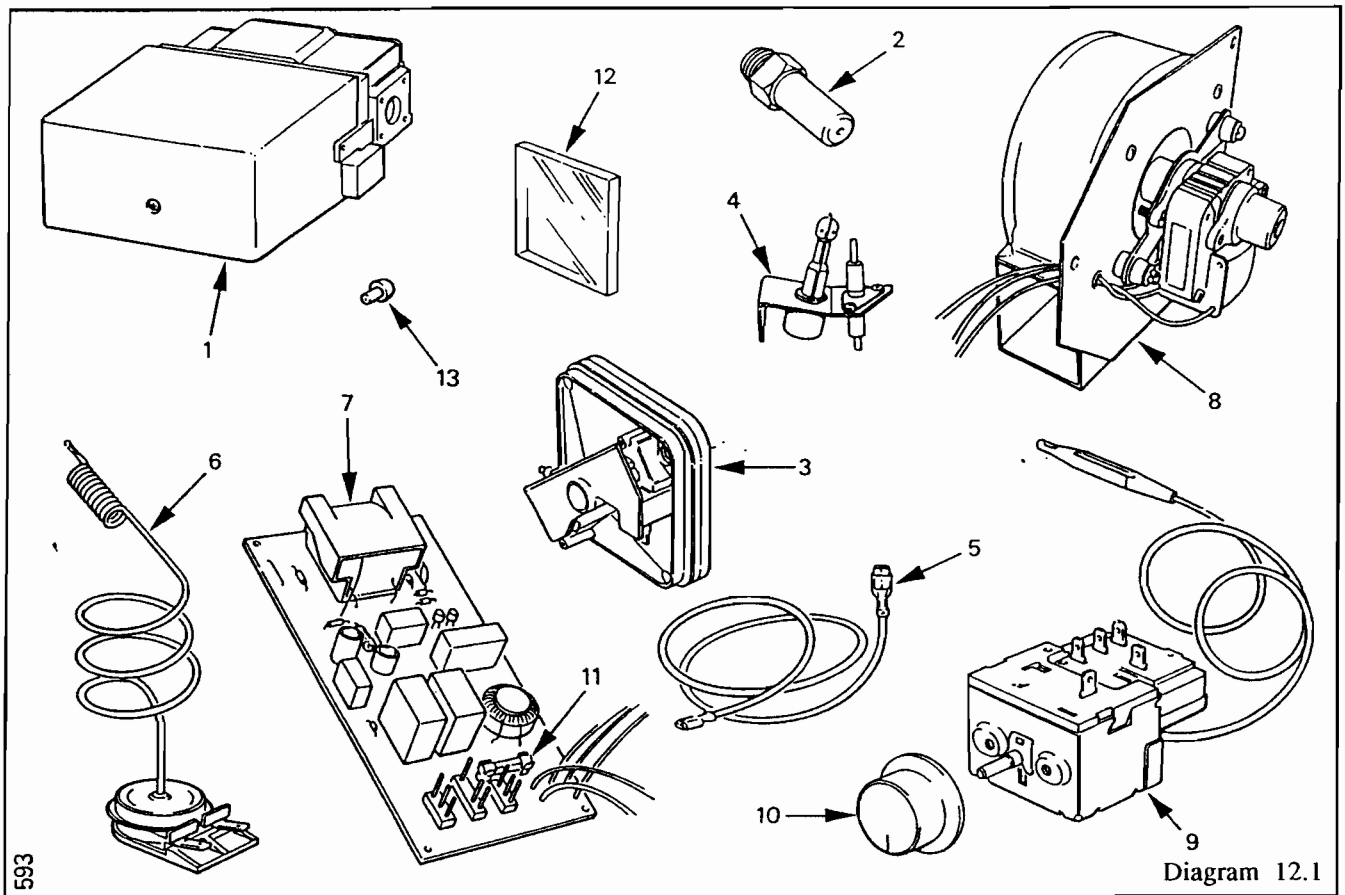


Diagram 12.1

Key No.	GW Part No.	Description	GC Part
1	417517	Gas control assembly	334 702
2	203021	Injector - 30F	334 641
2	203059	Injector - 40F	312 779
2	203020	Injector - 50F	334 594
3	202005	Air pressure switch	395 802
4	417268	Pilot burner/electrode assembly	334 602
5	WW4606	Ignition lead	334 621
6	202505	Overheat cutoff assembly	395 799
7	417281	Sequence board	334 623
8	417135	Fan assembly	334 610
9	202504	Thermostat assembly	395 779
10	416144	Thermostat knob assembly	355 401
11	202015	Fuse - 1A, 5x20mm	334 750
12	411194	Sight glass	355 153
13	204194	Air restrictor - marked "A"	312 780

12.1 Part Identification

The key number in the first column of the list will help to identify each part in diagram 12.1.

12.2 Ordering

When ordering spare parts quote the part number, description and the appliance name, Economy 30F, 40F or 50F also its serial number off the plate, visible after the controls cover has been removed by sliding it forward.

Gas regions will also require to quote the GC number of the part, refer to the list.