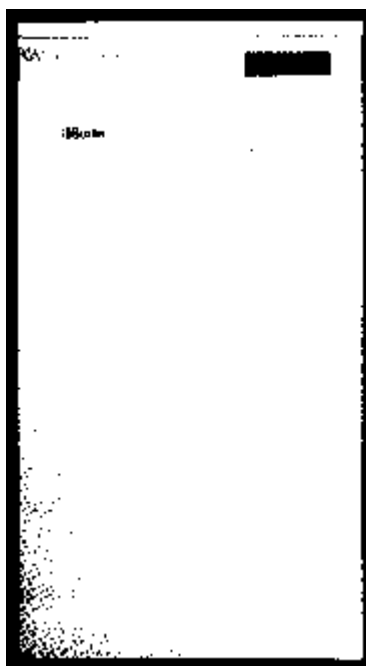


 Boulter

# Camray



Installation & Maintenance Manual  
For Camray 5  
and Camray Utility 5  
Oil Fired Boilers

Manual Part No. PL 47000  
Issue No. 4  
Date of Issue: November 2001



By Appointment to  
H.M. Queen Elizabeth II  
Boulter Boilers Limited  
Boiler Manufacturers



93/2339

## HEALTH AND SAFETY

### INFORMATION FOR THE INSTALLER AND SERVICE ENGINEER.

Under the Consumer Protection Act 1987 and the Health and Safety at Work Act 1974, it is a requirement to provide information on substances hazardous to health (COSHH Regulations 1988).

The Company takes every reasonable care to ensure that these products are designed and constructed to meet these general safety requirements, when properly used and installed.

To fulfil this requirement products are comprehensively tested and examined before despatch.

This appliance may contain some of the materials below.

When working on the appliance it is the Users/Engineers responsibility to ensure that any necessary personal protective clothing or equipment is worn appropriate to parts that could be considered as being hazardous to health and safety.

### INSULATION & SEALS

Glass Rope, Mineral Wool, Insulation Pads, Ceramic Fibre, Fibre Glass Insulation.

May be harmful if inhaled. May be irritating to the skin, eyes, nose or throat. When handling avoid inhalation and contact with the skin or eyes. Use (disposable) gloves, face masks and eye protection.

After handling wash hands and other exposed parts. When disposing, reduce dust with water spray, ensure parts are securely wrapped.

#### GLUES, SEALANTS & PAINT

Glues, Sealants and Paint are used in the product and present no known hazards when used in the manner for which they are intended.

#### Kerosene & GAS OIL FUELS (MINERAL OILS)

1. The effect of mineral oils on the skin vary according to the duration of exposure.
2. The lighter fractions also remove the protective grease normally present on the surface of the skin rendering the skin dry, liable to crack and more prone to damage caused by cuts and abrasions.
3. Skin rashes (oil Acne). Seek immediate medical attention for any rash, wart or sore developing on any part of the body, particularly the scrotum.
4. Avoid as far as possible any skin contact with mineral oil or with clothing contaminated with mineral oil.
5. Never breath any mineral oil vapours. Do not fire the Burner in the open i.e. out of the Boiler as a miss fire will cause unburnt oil vapours.
6. Barrier cream containing lanolin such as Rosalex Antisolv, is highly recommended together with a strict routine of personal cleansing.
7. Under no circumstances should mineral oils *be* taken internally.

OFTEC Code of Practice OCP/1: 1995 For the Safe Installation, Commissioning, Maintenance and Fault Rectification of Oil Firing Equipment should be consulted.

#### BOULTER BOILERS

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### 1:1 INTRODUCTION

Getting to Know your New Camray 5 Boiler Thank you for choosing the Camray 5 -manufactured in the UK by Boulter Buderus who are renowned oil-firing specialists. Before using your new Boiler, we ask that you carefully read the following information.

All Camray appliances are the result of many years of research, development and experience. Whilst our Boilers are designed with simplicity of operation in mind, there are certain features and benefits which only become obvious when you thoroughly understand how best to use your new Camray product.

We trust that you will enjoy many years of reliable service from your new Camray Boiler and, once again, thank you for choosing Camray.

### USEFUL INFORMATION


*Your installer will help you complete this where necessary.*




#### About the Boiler\*

Boiler Model	
Serial Number	
Burner Type	
Fuel Type:	Kerosene C2

*\*Information can be found on appliance data label located inside the front left hand side panel of the casing. Also on the front cover of the installation manual and front panel.*

#### About the installation

Installer	
	
Installation Date	
Service Engineer	

		
Oil Tank Capacity		<i>Litres</i>
Oil Supplier 1		
Oil Supplier 2		

## 1:2 IMPORTANT SAFETY NOTES

To obtain the best possible performance and trouble free operation from your Boiler, it is important that you read these instructions carefully. Your Camray Boiler has built-in safety features, which are detailed in the relevant section of this manual.

### 1:2.1

The heating system must comply with the latest editions of British Standard 5410 and The Building Regulations.

**Please note: It is essential in the interest of the Boiler efficiency and reliable performance that once the Boiler has been installed it is first commissioned by a competent and preferably an O.F.T.E.C.\* registered engineer. It is the responsibility of the installer to ensure that the Boiler is commissioned.**

**If an engineer is not known, Boulter Buderus will be pleased to provide details of commissioning and servicing engineers from their register.**

*\*The Oil Firing Technical Association for the Petroleum Industry - Banstead, Surrey 01737 373311.*

- If it is known or suspected that a fault exists on the Boiler, it MUST NOT be used until the fault has been corrected by a competent engineer (see [Failure to Start](#)).
- It is essential that the instructions in this booklet are strictly followed for safe and economic operation of the Boiler. Failure to observe these instructions may invalidate your right to free breakdown cover during the guarantee period.

We recommend that you keep these instructions in a place near your appliance for easy reference.

### 1:2.2 Air Supply to Boiler - Conventional Flue

Where your Boiler is used on an open conventional flue system, a permanent air supply is required for combustion. Clearances provided at the sides and rear of the appliance for air entry must be kept free of obstruction. For further explanation please refer to [section 4.6](#) of this installation manual.

Your Camray Boiler should be connected to an electrical supply complying with the Electrical Wiring Regulations (BS7671): as well as an oil supply complying with BS5410 Pt.1; and an appropriate flue system.

- ALWAYS SWITCH OFF THE ELECTRICAL SUPPLY before removing any of the covers for cleaning.

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If any part of the Boiler or its flue is modified, then the guarantee/warranty will be invalidated.

## 1:3 INSTALLATION & COMMISSIONING

After your Camray Boiler has been installed it MUST be commissioned by a competent engineer preferably an O.F.T.E.C. registered engineer, or by one of our registered service engineers. Commissioning involves testing the Boiler to ensure that it is working correctly, and also setting the Burner correctly to ensure the most efficient operation and use of fuel. If the Boiler has not been commissioned, it may not be operating at the maximum efficiency possible for your heating system, and may also invalidate the guarantee.


## 1:4 BOILER CONTROL PANEL

Boiler Control Panel (see fig 1)

1. Boiler Control Thermostat Switch/Mains On Switch.
2. Boiler Overheat/Limit Thermostat Reset Button.
3. 'Lockout' Indicator- RED.  }These will not be lit until activated
4. Mains Indicator- ORANGE  }These will not be lit until activated
5. Limit Indicator - RED.  }These will not be lit until activated
6. Burner on Indication - ORANGE. 

## 1:5 OPERATING INSTRUCTIONS

### 1:5.1 BOILER CONTROL THERMOSTAT

The Boiler Control Thermostat is also the ON/OFF switch for the Boiler. The 'MAINS ON' orange neon indicator on the Control Panel is lit  when external power is being supplied to the boiler. To Switch the Boiler off, turn the Thermostat to the 'OFF' position and isolate at the mains isolating switch or external control until the orange neon indicator is no longer lit.

The Boiler Control Thermostat also controls the water temperature within the Boiler. The recommended Control Thermostat settings are as follows:

WINTER HEATING & HOT WATER [SEE FIG 1](#)

SUMMER HOT WATER ONLY [SEE FIG 1](#)

The Boiler Control Thermostat automatically switches the Burner ON and OFF to maintain the selected temperature. The Burner is lit by an automatic ignition system and therefore there is no pilot flame.

The Boiler should not be operated below 60°C as this will cause corrosion which will reduce the life of the Boiler (Summer position).

### 1:5.2 BOILER OVERHEAT/LIMIT THERMOSTAT

The Boiler is fitted with a safety overheat/limit thermostat. This will interrupt the power supply to the Boiler and shut it down completely in the unlikely event of overheating.

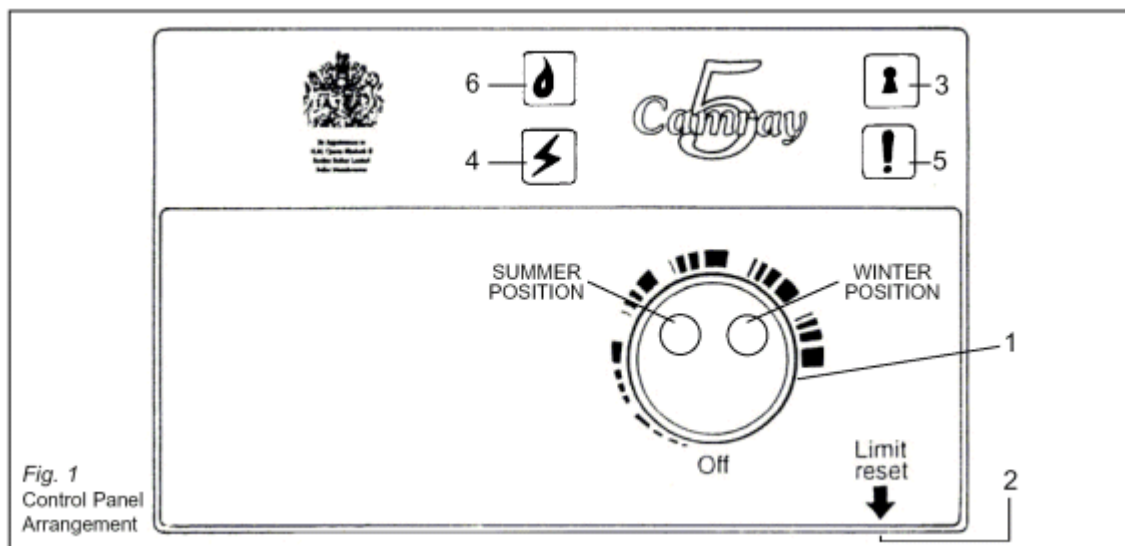
Should this occur, the red limit indicator on the Control Panel will be illuminated. Wait for the Boiler to cool, and then reset the thermostat by pressing the limit thermostat reset button located under the Control Panel - [see fig 1](#).

If this problem still persists, turn off the Boiler and consult your installer.

### 1:5.3 BURNER RUNNING INDICATOR

**(Camray5 Kitchen Model only)** 

The boiler is quieter than most oil fired boilers and to indicate the burner is running a indicator neon is included. If the indicator is lit and the burner is not firing contact your installer.



### Control Panel Arrangement

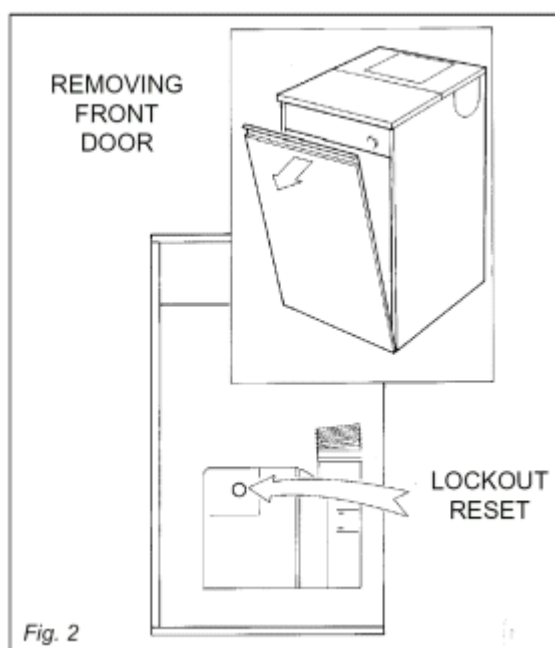
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#### 1:5.4 LOCKOUT INDICATOR (Camray 5 Kitchen Model Only)

In the unlikely event of a Burner malfunction, it will automatically shutdown, and the red lockout indicator on the Control Panel will be lit.

To restart the Burner, wait for a period of at least 45 seconds. Remove the front door panel (as illustrated) and press the lockout reset button located on the front of the Burner (see fig 2). If the Burner immediately goes to lockout again, wait three minutes and then repeat the procedure, once more only, by pressing the reset button again.

If this problem still persists, turn off the Boiler and consult your engineer.





### 1:5.5 STARTING THE BOILER

1. Ensure that all external controls, e.g. programmer, timer, room thermostat etc., are turned on and calling for heat.
2. Make sure the Boiler Control Thermostat is set within the recommended range (see fig 1) and that the mains electricity and oil are turned on.

### 1:5.6 SWITCHING THE BOILER OFF - TEMPORARILY

The Boiler may be stopped by turning the boiler control thermostat to the OFF position on the standard Control Panel, or the programme switch to the OFF position on the optional programmer. Alternatively, the Boiler may be stopped by:

1. Turning off the mains switch controlling the Boiler, or
2. Turning the programmer (if fitted to the heating system) to its off position.

### 1:5.7 SHUTTING OFF FOR THE SUMMER

If the Boiler is to be shut off for the summer, it is advisable to have it thoroughly serviced. Thorough cleaning will minimise corrosion during the idle period. Remember, when the Boiler is required, to ensure that the oil supply is open before switching on.

### 1:5.8 SEALED SYSTEM CENTRAL HEATING

If your Camray 5 or UTILITY Boiler is used on a SEALED SYSTEM, it is important that the correct operating system pressure is maintained. Your Installer should give guidance on this.

### 1:5.9 FROST PROTECTION

If there is any danger that your Boiler may freeze up during severe weather conditions, it is recommended that you consult your installer who will be able to advise you on an appropriate course of action, either by installing a frost thermostat or the addition of system anti-freeze.

### 1:5.10 OIL DELIVERY

Where possible, it is advisable to temporarily switch the Boiler off when your oil supply is being replenished. This is to allow any sediment to settle and not be drawn into the Boiler. If not this could result in an inconvenient break down.

We advise that you keep your Boiler off for one hour after the oil is delivered to your tank. Please ask your supplier, or the driver to notify you before the oil is discharged.

### 1:5.11 MAINTENANCE AND TROUBLE SHOOTING GUIDE

#### 1:5.11.1 MAINTENANCE

For normal cleaning of the outside casing, simply wipe with a dry cloth. To remove stubborn marks and stains, wipe with a damp cloth and finish off with a dry cloth. DO NOT use abrasive cleaning materials.

The Boiler must be serviced at regular intervals by a qualified service engineer. Failure to have

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the Boiler serviced at the recommended intervals will invalidate the guarantee/warranty.

Using Kerosene Class C2 fuel, the Boiler should be serviced at twelve monthly intervals to ensure that the efficiency and performance of your boiler is maintained.




Please also note that on conventional flue models, it is possible for the air intake at the rear of the Boiler casing to become blocked with household debris. This air intake must remain clear at all times and so it is advisable to inspect and clean this area regularly. Please refer to [section 1:2.2](#) in this booklet.

### Flue Terminal Plumbing

Due to the high efficiency of the Camray 5 range white water vapour from the flue discharge - called plumbing may be observed from time to time under certain weather conditions. This is perfectly normal and should be no cause for concern.

#### 1:5.11.2 FAILURE TO START

If the Burner fails to start, adopt the following procedure:

1. Check that there is oil in the tank and that the supply valve is open.
2. Check the programmer or time switch to ensure that it is operating and set to the correct time to be "ON".
3. Check that the Boiler Control Thermostat is set high enough to be "ON" or calling for heat.
4. Check that the Burner indicator is lit. (Camray 5 kitchen model.) 
5. Check whether the limit indicator on the control fascia is glowing,  if so it indicates an overheat situation. Press the reset button once the temperature has dropped sufficiently.
6. Check whether the red LOCKOUT indicator  on the Control Panel (Camray 5 Kitchen Model) and Burner Control box are glowing. This indicates that the Burner has attempted to start but has not fired successfully. Press the reset button on the Control box, when released, the lights will go out and the Burner will again attempt to start. If the Burner does not run and again goes to lockout with red indicators glowing:
  - Wait three minutes.
  - Repeat the procedure by pressing the button.
  - Failure to start on the second attempt indicates a fault requiring attention.
  - Switch off the mains supply and call your service engineer.

#### 1:5.12 OPTIONAL TIMER/PROGRAMMER (WHITE CASED KITCHEN MODEL ONLY)

An optional timer/programmer kit is available as a plug-in extra for the concealed Control Panel. This facilitates full control over hot water and heating requirements. Part No. EL47034C

Refer to [Section 4:11](#).

This programmer must only be fitted by a qualified electrical engineer/installer

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### 2:1 INTRODUCTION

This Manual covers Installation, Commissioning and Maintenance of the Camray 5 and Camray 5 Utility Boilers.

The Camray 5 and Camray 5 Utility are:

1. Designed for Central Heating and Hot Water.
2. Suitable for conventional open vented Central Heating systems.

3. Suitable for sealed Central Heating systems which are within the maximum permitted working pressure. All Boilers are supplied with a manual reset limit thermostat.

4. Suitable for new installations and for replacing existing boilers.

CAMRAY Boilers offer greater freedom to select the most suitable position for siting and the opportunity to install the boiler in a suitable outbuilding if required.

All models are supplied as standard with low level horizontal firing Oil Burner, they are suitable for connection to a conventional chimney or any of the Camray 5/Utility Balanced Flue options. Note: The nozzle on this appliance is only covered by a 1 year guarantee.

## 2:2 FLUE OPTIONS

CAMRAY Boilers are designed to operate with high efficiency, clean combustion and low noise level. They offer unique versatility and can be used in the following modes:

1. Low level rear outlet balanced flue.
2. High level rear outlet balanced flue.
3. Vertical outlet balanced flue. (Insulated balanced draught chimney).
4. Low level side outlet balanced flue.
5. High level side outlet balanced flue.
6. For connection to a conventional chimney (via conventional Flue Kit, 40/95 Part No. FC4CF, 100/140 Part No. FC5CF.)
7. Other options may be available. Please contact Boulter Buderus.

The tested balanced flue terminals and connections afford an adequate supply of air for combustion and equalisation of pressure between exhaust and intake as required for operation under unfavourable wind conditions.

Balanced flues are supplied in a carton which includes ALL parts for balanced flue installation. The horizontal terminals are designed to avoid the possibility of staining outer walls through which they pass.

## 2:3 COMMISSIONING

It is essential in the interest of boiler efficiency and reliable performance that once the boiler has been installed it is first commissioned by a qualified engineer.

If an engineer is not known, Boulter Boilers will be pleased to provide details of commissioning and servicing engineers from their register.

See [Section 7](#) for Commissioning Procedure.

## IMPORTANT

**It is the responsibility of the installer to ensure that the boiler is commissioned by a competent engineer, preferably an OFTEC\* Registered Commissioning Engineer.**

\*The Oil Firing Technical Association for the Petroleum Industry, Banstead, Surrey



(01737) 373311.

## 2:4 SAFETY

**READ HEALTH AND SAFETY INFORMATION ON INSIDE FRONT COVER OF THIS MANUAL.**

### IMPORTANT

**Should you wish to remove or dismantle any covers or parts of the boiler for cleaning or maintenance ALWAYS FIRST SWITCH OFF THE**

### ELECTRICITY SUPPLY.

1. On no account should any part of the Boiler or its Flue be modified with the exception of flues which require adjusting to length to suit site conditions, as detailed in this manual.
2. The wiring of the control panel should be as the wiring diagrams included in this Manual. Wiring should not be tampered with, modified or changed for any reason.
3. Only use Boulter replacement parts.

Non compliance with the above will invalidate the Guarantee.

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## 3:1 LIQUID FUELS

The Camray 5 and Camray 5 UTILITY Boilers will burn liquid fuels complying with BS2869 Part 2 1988 Class C2 as specified in the Code of Practice for Oil Firing BS5410 Part 1.

### Class C2 (Kerosene)

This fuel is suitable for all Camray 5 and Camray 5 Utility models. Burners are supplied with the appropriate nozzle and pump pressure as standard for this fuel. They are set for mid-range output. Details of all nozzle sizes and pump pressure for all outputs are shown on [section 3.6](#).

<b>3:2 BOILER TECHNICAL DETAILS</b>	
Maximum Boiler working pressure	3 Bar - 30.6m Water Head
Minimum recommended return water temperature	60°C
Maximum hearth temperature	less than 85°C.
Maximum side panel temperature	less than 35°C above room temperature.
Minimum Conventional flue draught at boiler flue outlet	0.035"w.g. (8.75N/m <sup>2</sup> ).
Maximum Conventional flue draught at boiler flue outlet	0.15"w.g. (37.5N/m <sup>2</sup> ).
Water Resistance	Less than 300 m.m.w.g.
	with 11°C temperature rise across the boiler.

## 3:3 BURNER DETAILS

Burner type - RIELLO 484T50, 483T50 or 487T50

Pressure Jet - supplied as standard. Manually adjustable air regulator.

The burner must be set to details given in [section 3.6](#).

For further details of the burner, refer to the [burner data](#) sheets supplied in the literature envelope.

## 3:4 ELECTRIC'S

Electrical Supply 230v., 1 Ph., 50Hz.

### IMPORTANT

The Electrical Installation of this appliance must be performed by a suitably qualified electrical engineer/installer.

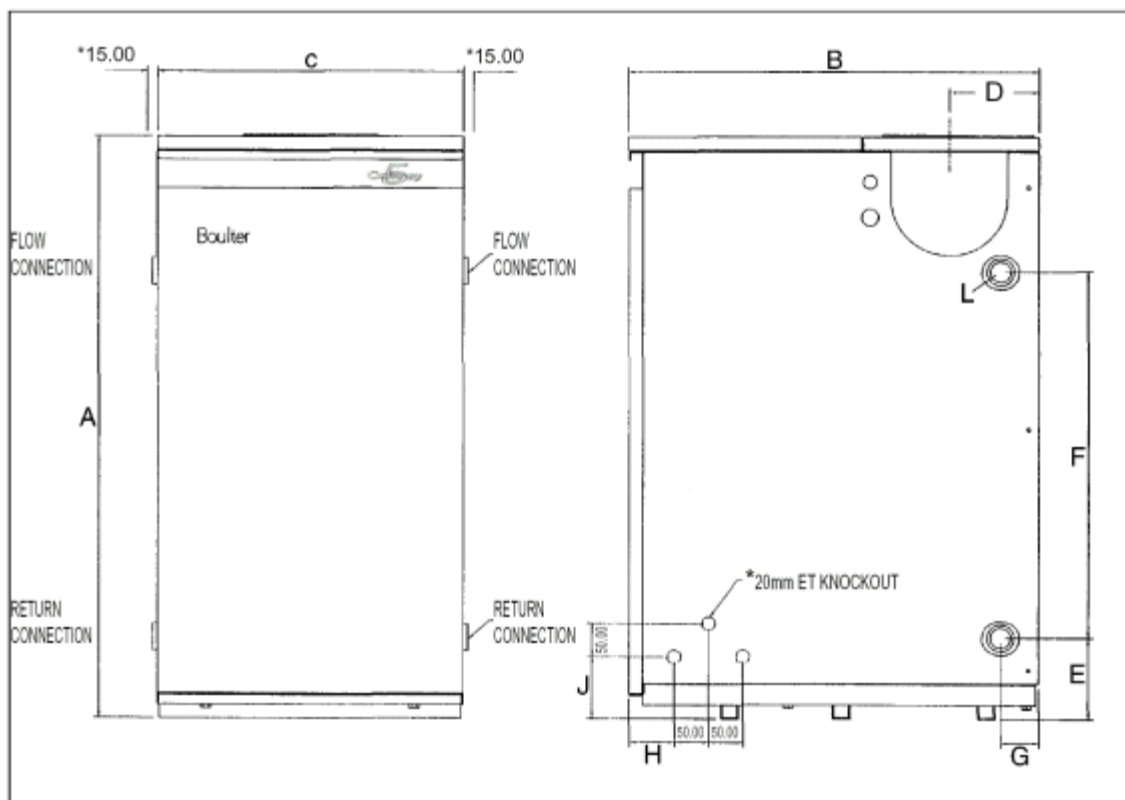
All wiring to supply and all system components external to boiler must comply with the latest edition of BS7671:1992 formerly IEE Wiring Regulations.

This appliance must be effectively earthed and connection to the supply must be through a double pole isolating switch fused 5 amp.

The isolating switch must have all pole contact separations at least 3mm

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### 3:5 DIMENSIONS



Model	Output		A	B	C	D	E	F	G	H	J	Flue K*	L	Weight Empty	Water Content	Filled Weight
	kW	Btu/h x 1000	mm	mm	mm	mm	mm	mm	mm	mm	mm	ø ins	ø ins	Kgs	Litres	Kgs
40/65	11.7/19	40/65	860	596	446	130	121	540	55	65	92	4"	1 BSP	112	17.5	130
65/90	19/26.4	65/95	860	596	446	130	121	540	55	65	92	4"	1 BSP	114	21.0	135
95/130	27.8/38.1	100/140	1000	704	508	149	139	640	66	100	112	5"	1 1/4 BSP	166	29.8	196

\* Conventional Flue Size

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**3:6 COMMISSIONING DATA****3:6.1 Class C2, Kerosene Oil RIELLO BURNER**

Model Camray5 Utility & System	Output		Riello R D B TYPE	Nozzle Danfoss Delevan US/GPH	Pump Pressure		Fuel Rate Kg/h	CO2%	Smoke No.	Flue Exit Temp °C Gross	Boiler Test Point Temp °C
	kW	Btu/h x1000			BAR	psi					
	11.7	40		0.4x60°ES	7.0	100	1.08	10	0-1	165-195	215-245
40/65	16.1	55	484T50	0.5x60°ES	8.0	115	1.49	11	0-1	180-225	260-285
	19	65		0.6x60°ES	7.6	110	1.76	12	0-1	180-245	295-320
	19	65		0.6x60°ES	7.6	110	1.76	10	0-1	180	280
65/90A	23.4	80	483T50	0.75x60°W	7.2	105	2.17	11	0-1	200	304
	26.4	90		0.85x60°W	8.0	115	2.41	12	0-1	204	335
	27.8	95		0.85x60°W	8.0	115	2.54	11	0-1	170	190
95/130A	35.2	120	487T50	1.1x60°W	7.0	100	3.21	12	0-1	190	220
	38.1	130		1.25x60°W	7.0	100	3.48	12	0-1	200	230

1. There are two columns in the table for combustion gas temperature:-

FLUE EXIT temperature, and

BOILER TEST POINT temperature.

2. Where possible CO<sub>2</sub>, smoke and flue gas temperatures should be sampled from the FLUE EXIT (i.e. external balanced flue discharge, or from the test point provided in the conventional flue adaptor)

3. These figures may be used to calculate combustion efficiency.

4. Alternatively (where the forgoing is impractical such as vertical BF) gases can be sampled at the BOILER TEST POINT inside the casing.

Because the gas temperatures at this point are significantly higher it should **not** be used to calculate or measure efficiency.

5. If the BOILER TEST POINT temperature agrees with the data in Table 3:6.1, then use the appropriate FLUE EXIT temperature from the table to calculate the combustion efficiency.

6. On conventional flue only - flue draught should be measured at the flue exit test point.

	40/65	65/90A	95/130A
<b>Maximum Temperature of Adjustable Controls</b>	<b>Control Stat 85°C +/- 2°C</b>		
	<b>Limit Stat 110°C +0/-6°C</b>		
<b>Maximum Emissions Limit (Class 1)</b>	<b>NO<sub>x</sub> 250 mg/kWh-CO 125 mg/kWh</b>		
<b>Range of Temperature Control</b>	<b>Control Stat 0 - 85°C</b>		
	<b>LOW</b>	<b>6.69</b>	<b>9.61</b>
	<b>MID</b>	<b>8.46</b>	<b>11.84</b>
	<b>HIGH</b>	<b>9.24</b>	<b>12.79</b>

<b>Heat Input (Full Load) kW (based on Net efficiency of 91%)</b>	<b>22.1</b>	<b>29.0</b>	<b>41.9</b>
<b>Heat Output (Full Load) kW</b>	<b>19</b>	<b>26.4</b>	<b>38.1</b>

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#### 4:1 STANDARDS & REGULATIONS

The installation of the Boiler must comply with the latest edition of :

BS 5410 Oil Installations

Pt 1 up to 44kW;

Pt 2 and over 44kW

BS 5449 Forced circulation hot water central heating systems for domestic premises.

BS 4543 Pt. 1 & 3 Factory made insulated chimneys.

BS 7593 Code of practice for the treatment of water in domestic hot water central heating systems.

BS 7671 (1992) Electrical Wiring Regulations.

BUILDING REGULATIONS.

Part J England and Wales

Part F Section III Scotland

Part L Northern Ireland

The Control of Pollution (Oil) Regulations Oil boilers should be installed in accordance with good practice as recommended by OFTEC (Ref. [2:3 Commissioning page 6](#)).

#### 4:2 THE HEATING SYSTEM

This should be installed in accordance with current good practice as advised by HVCA. It is not the purpose of the manual, nor is it possible, to adequately deal with the subject in this manual. When designing and installing the controls of the heating system, it must be remembered that if the control system is such that the water circulation through the boiler can be totally or substantially reduced whilst the oil burner can still fire, the water in the boiler will reach very high or boiling temperature before the boiler thermostat can sense it and switch off the Burner.

If this condition is likely wire the controls so that the electrical supply to the burner is switched off simultaneously with the stopping of circulating pumps or the closing of motorised valves.

On existing heating systems where a Boiler is replaced, ensure that the system is chemically cleaned.

The system should contain clean water and be free from leaks. Suitable inhibitors against limescale and corrosion should be added to the system. Refer to BS 7593.

Kettling and system noises can be avoided by suitable pre-treatment (i.e. Chemical Cleaning) at the onset. This is essential when fitting a new boiler to an existing system.

#### 4:3 SITING & POSITIONING

The noise level from Camray boilers is quite low and kitchen installations have not given rise to complaints.

Consideration must be given however, to the following points.

1. Noise may be accentuated by the installation in small rooms or recesses with hard or hollow stud wall surfaces. Due consideration to the siting of boilers should be given.

Further advice from BOULTER BUDERUS should be sought where any doubt exists.

2. Some individuals may be particularly sensitive to even low noise levels and this should be discussed before installation.

3. The type of chimney, position relative to the boiler and whether a draught stabiliser is to be fitted may affect sound level in the room.

4. The 40/65 & 65/95 Boiler models are serviced from the front. A space of 450mm (18") in front should be available.

5. The 100/130 Boiler models are serviced from the front and top. A space of 450mm (18") in front and above the Boiler should be available.

6. Any kitchen work top above the 100/130 Boiler must be removable for service access.

#### **4:4 THE HEARTH**

The Camray 5 & Camray 5 Utility have a Hearth Temperature of less than 85°C. The boiler requires a level hearth on which to stand which should comply with the Building Regulations.

If the Boiler is to stand on a floor made of combustible material then protection between the Boiler and the floor should be provided by means of non combustible material.

Consideration should be given to the Weight of the Boiler and the Building Regulations regarding floor loading.

**The filled Boiler weight can be found in 3:5.**

Advice should be sought from your local Building Control Office if there are any doubts regarding the floor supporting the Boiler.

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#### **4:5 THE CHIMNEY - (FLUE Ø 4" OR 5")**

CONVENTIONAL CHIMNEY INSTALLATION ONLY.

#### **VERY IMPORTANT**

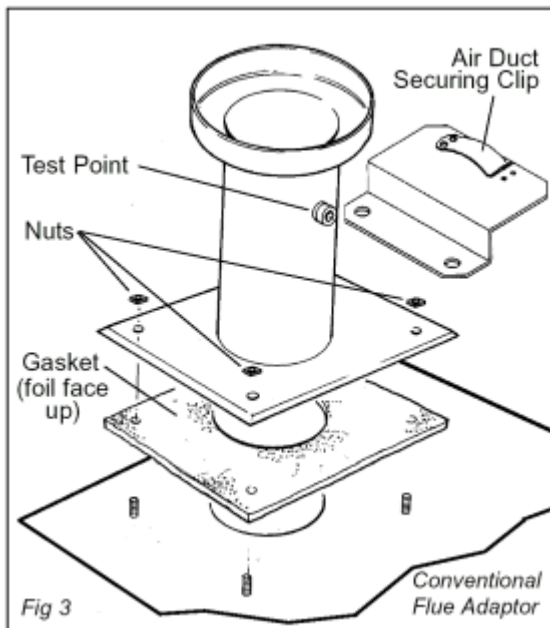
**All Camray 5 and Camray 5 Utility boilers are supplied in Balanced Flue Form.**

**To connect either size of boiler to a conventional chimney you must use The Conventional Flue adaptor (40/95 Part No. FC4CF, 100/140 Part No. FC5CF).**

**This includes all parts necessary to make the connection to the boiler. A test point is also provided for ease of installation and commissioning. Secure the air duct in the clip provided.**

**The use of this adaptor is essential for safe performance and is a condition of the guarantee that this must be fitted.**





The boiler requires a minimum stable draught of 0.1 mbar (0.04w.g.).

If the chimney exceeds 6m (20 feet) in length, it may produce a draught exceeding 0.37 mbar (0.15" w.g.) and a draught stabiliser should be fitted.

The chimney should comply with the latest edition of the Building Regulations and BS 5410: Part 1.

Factory built chimneys must comply with the Building Regulations and BS 4543 Parts 1 and 3.

Compliance with the Building Regulations does not indicate that the chimney is satisfactory in respect of draught conditions, or is positioned so that 'down draughts' will not occur.

Special pots and cowls which might restrict the flow of gases must not be fitted and should be removed.

A brick chimney must be fitted with a suitable stainless steel liner. Insulation between the liner and an exposed chimney may be necessary to avoid condensation.

A flexible liner should be the same diameter as the Flue Offtake size of the boiler - 4"(100mm) or 5" (125mm). (see page 8)

The Flue pipe, connecting the boiler to the chimney adaptor should be the same diameter as the Boiler Flue Offtake and should not be more than 1.8m (6'-0") long. Flue Pipes when fitted should satisfy or be 'deemed to satisfy' the Building Regulations.

Flue pipe bends - 90° bends must not be used -use 135° bends. Bends with soot doors should be used where necessary

FOR BALANCED FLUE INSTALLATIONS SEE SECTION 6.

#### 4:6 AIR SUPPLY

##### CONVENTIONAL CHIMNEY INSTALLATION ONLY

A permanent adequate supply of air is required for combustion and correct operation of a draught stabiliser, if fitted.

This air enters the Boiler through the back panel. At least 15mm clearance is required at the rear of all boilers.

When the boiler is situated in a confined space or chamber a permanent adequate supply of air is required for ventilation to prevent over heating.

#### **4:6.1 Opening Sizes**

The clear opening required for combustion only should be based on a requirement of 550mm<sup>2</sup>/kW, (or 1in<sup>2</sup> per 4000 Btu/h) above 5kW

When a draught stabiliser is fitted to the flue pipe or chimney in the room in which the boiler is situated the clear air intake should be 1100mm<sup>2</sup>/kW.

When the boiler is situated in a confined space with Combustion or Ventilation air from outside - Allow 550mm<sup>2</sup>/kW at low level and in addition 550mm<sup>2</sup>/kW at high level;

When Combustion and Ventilation air is taken from a heated adjoining space the allowance should be 1650mm<sup>2</sup>/kW at low level and in addition 1100mm<sup>2</sup>/kW at high level. Ensure that the heated adjoining space itself has an adequate supply of air.

When the Boiler is installed in a basement or low level boiler house where air can enter only from high level, the incoming air supply for Combustion and Ventilation should be ducted to low level. A high level outlet should be provided for ventilation.

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### **4:7 OIL STORAGE**

#### **4:7.1 Oil Tank**

Consideration to the access by fuel delivery lorries should be given when positioning the oil tank.

Tank positioning should be in accordance with BS 5410 Part 1 and OFTEC Technical Book 3.

In the interest of most economical deliveries the Oil Tank should be of 3,000 litres (600 gallons) capacity.

It should be complete with the following:

1. Sludge Cock - on steel tanks.
2. Outlet Valve.
3. Contents Indicator.
4. Screw fill connection and independent vent. The Fill and Vent should be suitably capped to prevent ingress of water or fitted with return bends.

#### **4:7.2 Steel Tanks**

Tanks should be mounted on suitable supports, if these are of brick or blocks, a damp proof membrane should be inserted between the tank and its supports.

Tanks should slope 20mm per 1m of length downwards from the Oil Outlet to the Sludge Cock situated at the opposite end.

#### **4:7.3 Plastic Oil Tanks**

Tanks made from plastic are now available. These should be UV stabilised for protection against sunlight, and

coloured green. Plastic tanks do not need to stand on piers, but should be supported across the entire base area, ideally on 50mm thick garden slabs or a concrete base. As there is only one tapped outlet they are more suited to single pipe feed as gravity supply or with a Boulter 3K Oil Loop Deaerator where suction lift is required. (Part No. BS 03060)

#### 4:8 OIL SUPPLY

The oil entry holes in the boiler casing are shown in the diagram in [Section 3:5](#) of this manual. Flexible Hoses supplied with the Boiler MUST NOT pass through these holes.

All joints in the Oil Lines must be oil tight and the Oil Line should be flushed clean before connecting to the burner.

Note that no soldered joints are permissible in the oil line.

##### 4:8.1 Oil Filter

An Oil Filter is supplied with the Boiler.

Connections are 1/4 BSP Female, see [fig. 4:8c](#).

**It is essential for reliable operation that the Oil Filter is fitted in the Oil Pipe supplying Oil from the Tank to the Burner. It should be fitted as close to the Boiler as practicable, but NOT inside the Boiler casing.**

**It is a condition of the guarantees that the Filter is fitted correctly.**

##### 4:8.2 Fire Check Valve (Not Supplied)

A Remote acting FIRE VALVE\* must be fitted in the suction line at the time of installation - see BS 5410: Part 1.

The valve must be fitted external to the Boiler, preferably at point where the Oil Pipe enters the building. The sensor should be located above the Burner in the clip provided, see [figs. 4:8a, 4:8b, 4:8d & 4:8f](#).

The entry point for the Fire Valve Sensor should be through any of the 20mm ET knockouts located at the top of the rear casing, or side panels.

To prevent damage to the capillary always pass the sensor through the blind grommet (supplied), it will be necessary to cut across the diaphragm.

\*Remote Acting Fire Valves are available from Boulter, through your merchant or installer e.g.

Ref:	Operating Temperature	Capillary Length
RAF9015C	90°C	1.5m
RAF9030C	90°C	3.0m
RAF9060C	90°C	6.0m
RAF9090C	90°C	9.0m

##### 4:8.3 Single Pipe System

[Fig. 4:8b](#)

If the bottom of the Oil Tank is above the oil Burner, install a 10mm copper supply pipe to the Burner incorporating the correct Filter, Shut Off Valve and Fire Check Valve.

Ensure that the Burner Oil Pump is correctly set for 'Single Pipe' operation. (See [4:9.2](#)).

#### 4:8.4 Two Pipe System

Fig. 4:8d

When the bottom of the Oil Tank is below the level of the Oil Pump on the Burner it is necessary to install an additional 10mm return pipe.

The Oil Filter, Shut Off Valve, spring loaded Non-Return Valve and Fire Check Valve are always in the suction line supplying oil from the Tank to the Burner.

The Non-Return Valve must be fitted to allow the

BOULTER BUDERUS CAMRAY 5 PAGE 12

flow in the correct direction and prevent drain back to the Tank, see [fig. 4:8e](#).

**Ensure that Valves are NOT fitted in the Return Line. The Return Line must be unobstructed at all times.**

Ensure that the Burner Oil Pump is correctly set for 'two Pipe' operation. (See 4:9.1)

#### 4:8.5 Deaerator Oil Pipe System

Fig. 4:8f

An alternative two pipe arrangement can be achieved using a 3K-Oil Loop Deaerator which removes the air from the oil feed on a single pipe lift. The Burner Pump is piped to the Deaerator, which should be positioned close to the burner, but NOT inside the Boiler Case. **A Non-Return Valve is not required in the return line.**

The advantage of this system is gained where a two pipe run from the oil supply tank is long or difficult to achieve.

Boulter 3K Deaerators are available as an optional extra from your merchant (Part No. BS 03060).

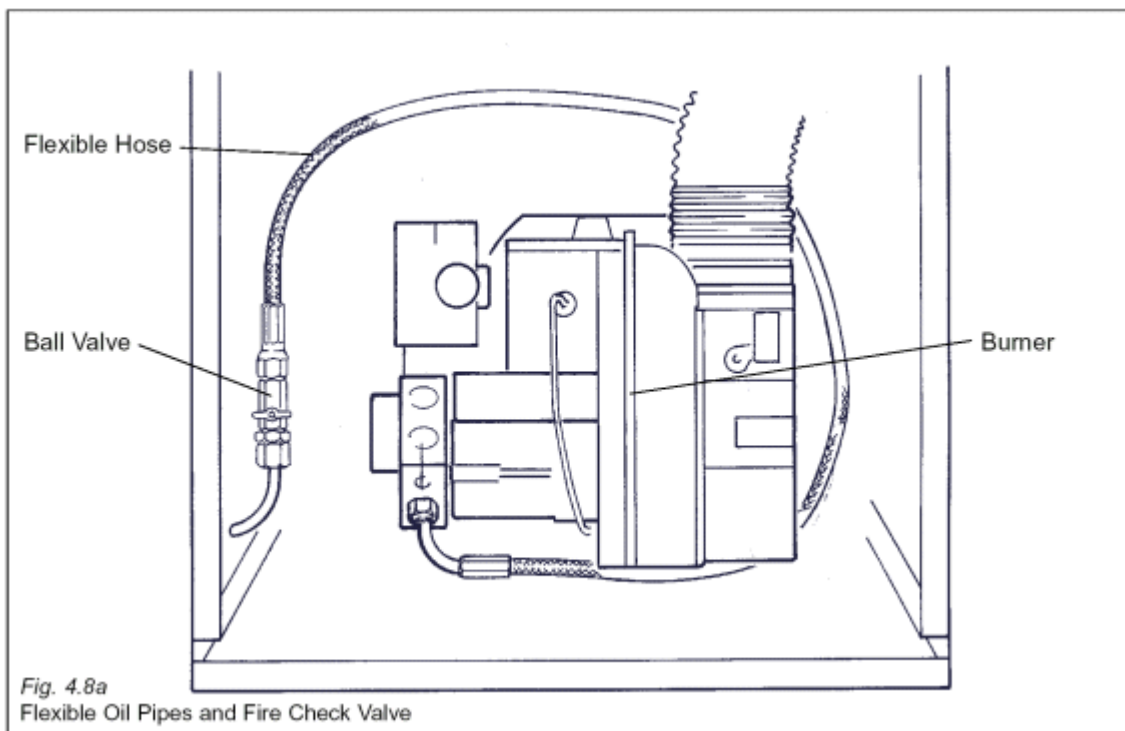
#### 4:8.6 Water Separator Oil Filter

For changeover applications, the use of a Water Separator Oil Filter, available from BOULTER BUDERUS is recommended (BS03052).

#### 4:8.7 Flexible Oil Pipes

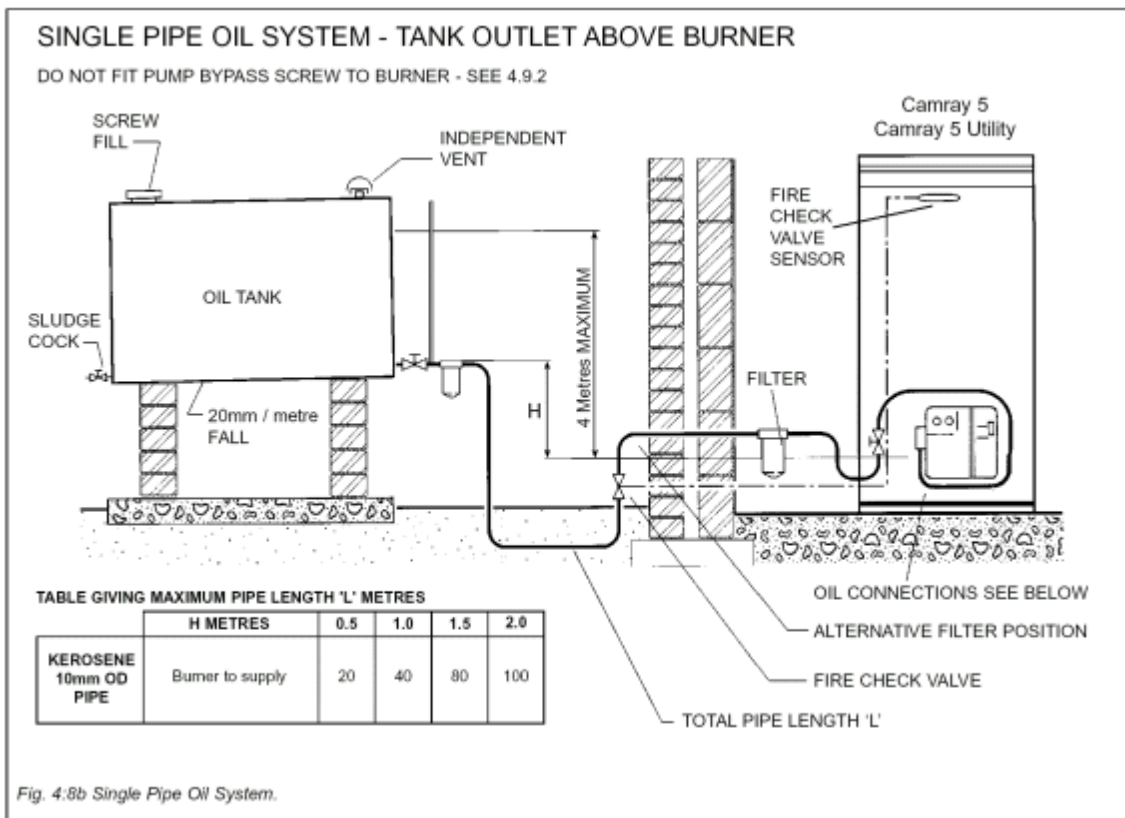
Camray 5 Boilers and 3K Deaerator Fitting Kits are supplied with long life Flexible Oil Pipes.

The Flexible Oil Pipes are fitted inside the Boiler casing and are of adequate length to enable the Burner to be removed without disconnecting. When fitted correctly the pipes should be curved round the Burner as shown in [Fig.4:8a](#).



Flexible Oil Pipes and Fire Check Valve

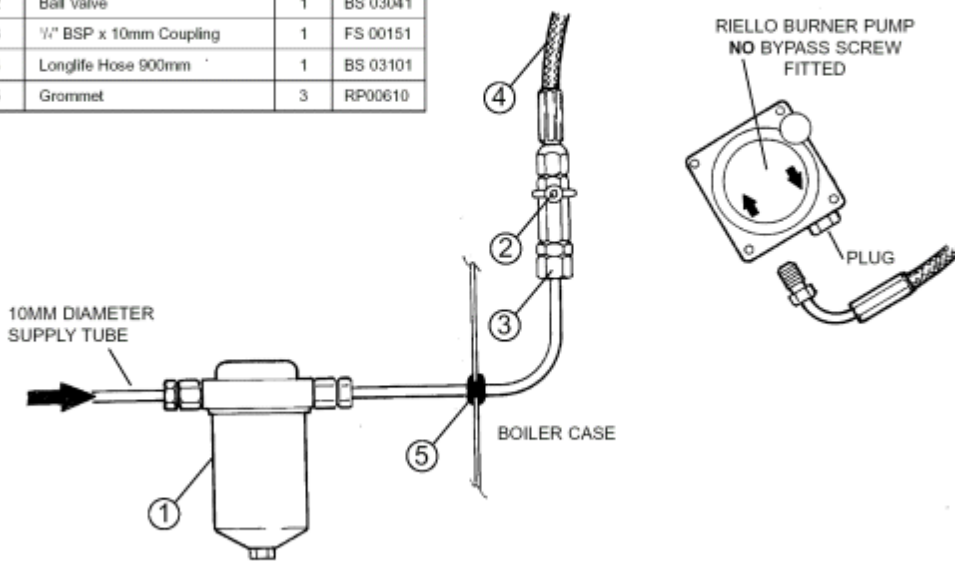
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### SINGLE PIPE OIL SYSTEM - OIL CONNECTIONS

Items 1 - 5 supplied with Boiler

ITEM	PART	QTY	CODE
1	Filter 25l	1	BS 00496
2	Ball Valve	1	BS 03041
3	1/2" BSP x 10mm Coupling	1	FS 00151
4	Longlife Hose 900mm	1	BS 03101
5	Grommet	3	RP00610



LH & RH FUEL ENTRY AVAILABLE (LH SHOWN)  
SCHEMATIC DIAGRAM FIT HOSE AS SHOWN IN FIG. 4:8a

Fig. 4:8c Schematic Oil Pipe Connectors

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### TWO PIPE OIL SYSTEM - TANK OUTLET BELOW BURNER

FIT PUMP BYPASS SCREW TO BURNER

SAW CUT OR SMALL HOLE IN RETURN PIPE INSIDE TANK TO PREVENT SYPHON

INDEPENDENT VENT SCREW FILL

FIRE CHECK VALVE

RETURN PIPE

SUCTION PIPE 'L' MAX

FIRE CHECK VALVE SENSOR

FILTER

NON RETURN VALVE

ALTERNATIVE FILTER POSITION

Camray 5  
Camray 5 Utility

TABLE GIVING MAXIMUM PIPE LENGTH 'L' METRES

		H METRES				
		0	0.5	1.0	1.5	2.0
KEROSENE	Burner to supply	100	100	100	90	70
10mm OD	PIPE					

Fig. 4:8d Two Pipe Oil System.

### TWO PIPE OIL SYSTEM - OIL CONNECTIONS

Items 1 -5 are supplied with the Boiler. See Fig 4.8c.

ITEM	PART	QTY	CODE
6	Non Return Valve	1	BS 00538
8	Longlife Hose 900mm	1	BS 03103
9	Washers	2	FS 00159
10	1/2" BSP x 10mm Coupling	3	FS 00157

Items 6 -10 NOT supplied with boiler.

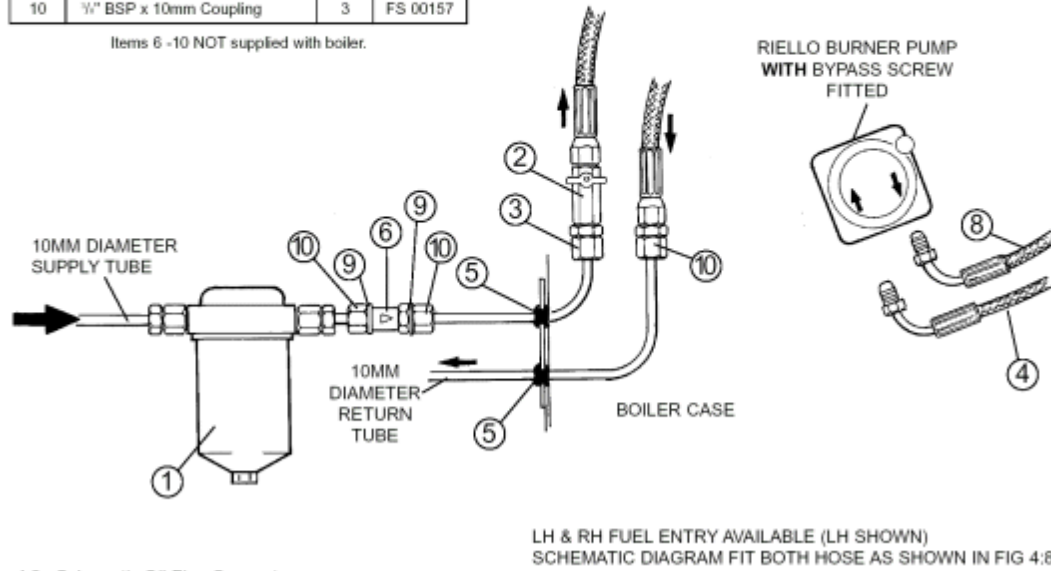
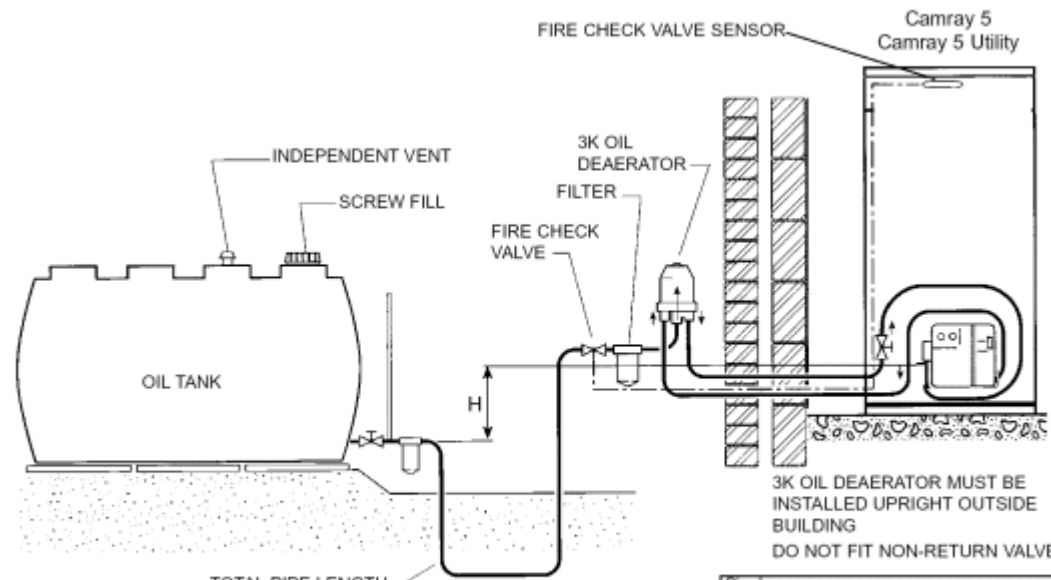


Fig. 4.8e Schematic Oil Pipe Connectors

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### DEAERATOR OIL SYSTEM - TANK OUTLET BELOW BURNER

FIT PUMP BYPASS SCREW TO BURNER



The table right shows total Pipe Length 'L' metres

Fig. 4.8f. Deaerator Oil Systems

## DEAERATOR PIPE OIL SYSTEM - OIL CONNECTIONS

Items 1-5 are supplied with the Boiler. See Fig. 4:8c

LH & RH FUEL ENTRY AVAILABLE (LH SHOWN)  
SCHEMATIC DIAGRAM FIT BOTH HOSE AS SHOWN  
IN FIG 4:8c

ITEMS 7, 8, & 10 ARE AVAILABLE AS A KIT NO. BS 03058C.

ITEM	PART	QTY	CODE
6	3K Oil Loop	1	BS 03060
7	1/2" BSP x 10mm Coupling	3	FS 00151
8	Longlife Hose 900mm	1	BS 03103
10	3/4" x 10mm Coupling	1	FS 00157

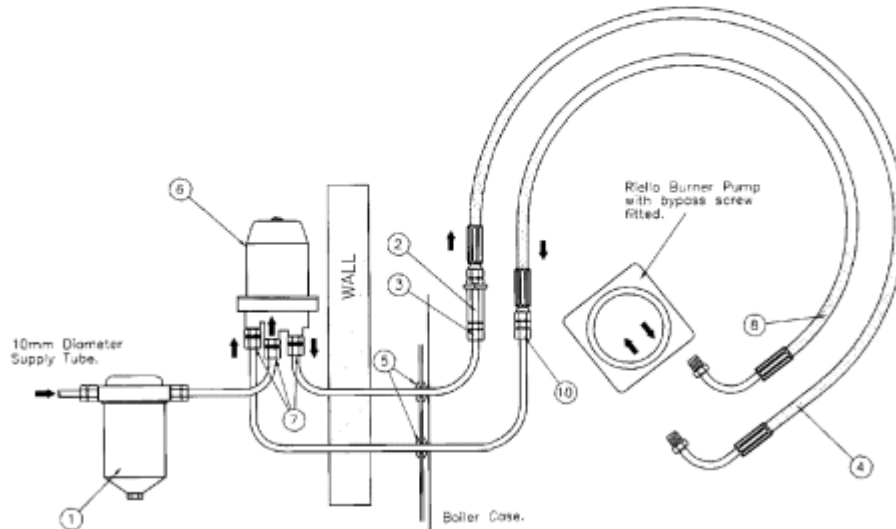


Fig. 4:8g Schematic Oil Pipe Connections.

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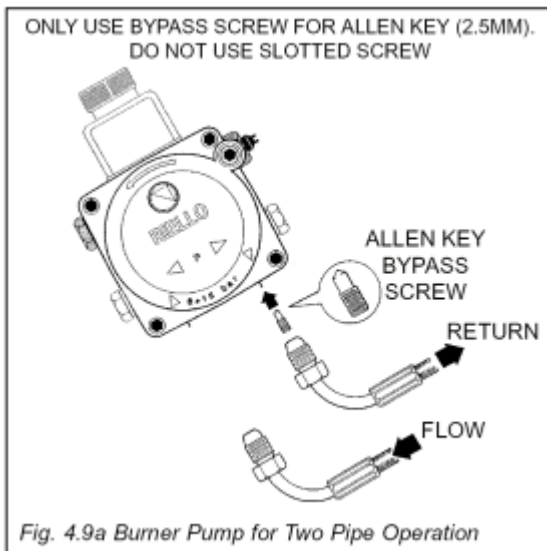
### 4:9 OIL BURNER

The Burner makers' technical leaflet is supplied with this manual and provides supplementary information not included in this manual.

#### 4:9.1 Burner Pump for Two Pipe and Deaerator System

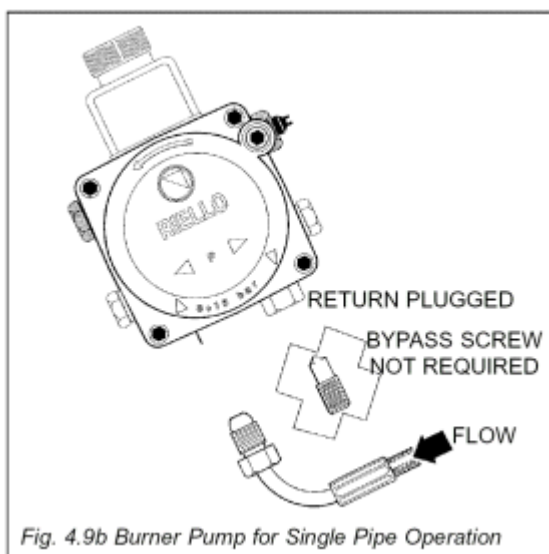
For two pipe oil systems the Burner Oil Pump has to be fitted with the Bypass Screw supplied. Boilers are despatched with the Bypass Screw in a labelled envelope attached to the Burner. This socket screw is inserted into the return port as shown in [Fig. 4:9a](#).





#### 4:9.2 Burner Pump for Single Pipe System

The burner is supplied set for single pipe operation. The return port is plugged and the Bypass Screw is not fitted. See [Fig. 4:9b](#).



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#### 4:10 CONTROL PANEL

The Control Panel is pre-wired and fitted to the Boiler ready for connection to the system wiring.

##### 4:10.1 Connecting Control Panel

If a Boulter Programmer is to be fitted refer to [section 4:11](#) of this manual for fitting instructions before connecting mains.

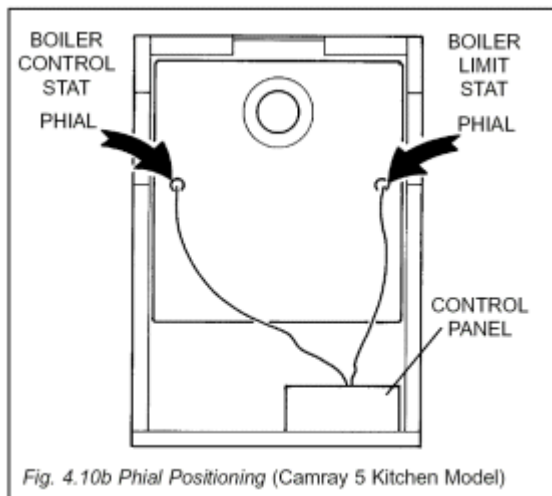
1. Connect the mains electrical supply to the 3 pin Mains Plug. See [Fig. 4:10a](#).

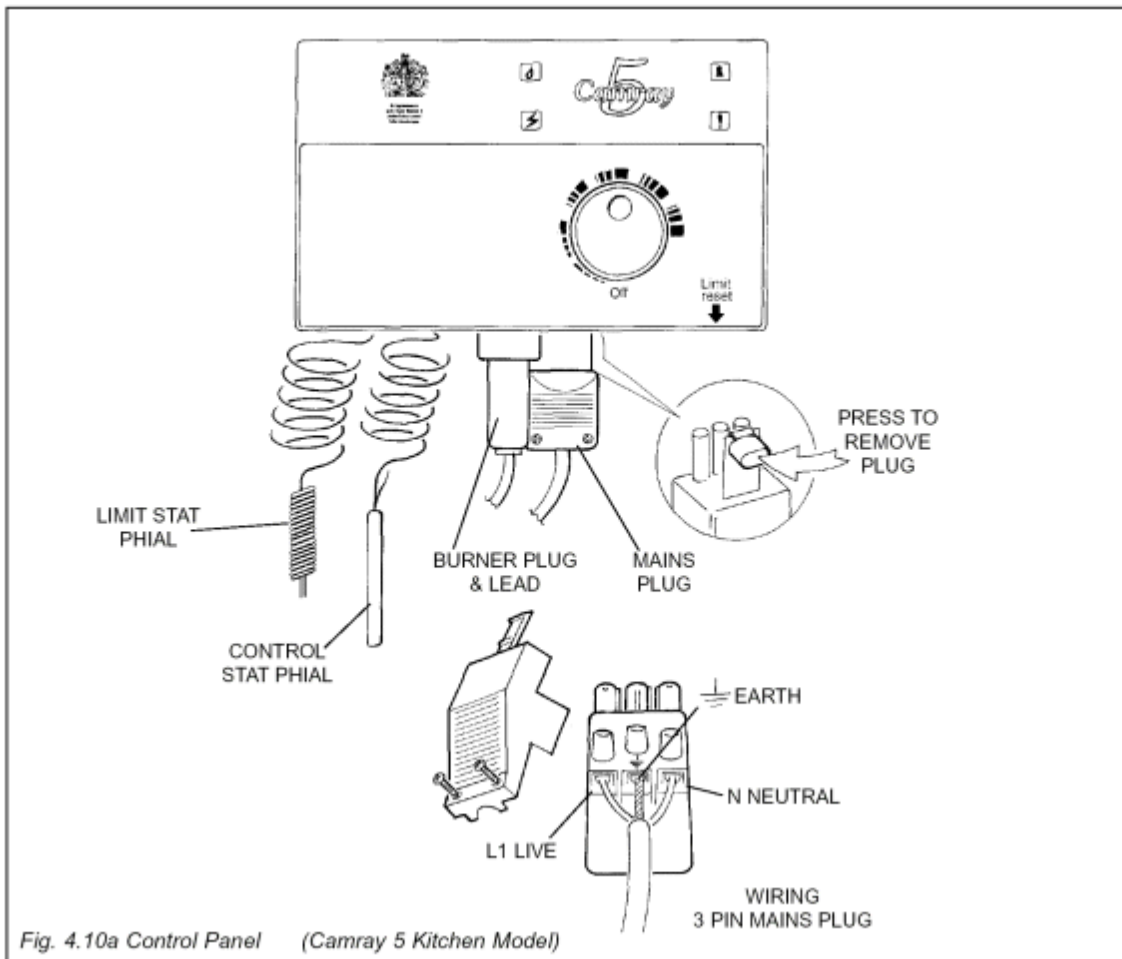
2. Insert Mains Plug into the mating Mains Socket on the underside of the Control Panel.
3. Insert 4 pin Burner Plug on the end of the Burner Cable into its mating Socket on the underside of the Control Panel. See [Fig. 4:10a](#).

NOTE: The 4 pin plug has an engagement peg. Depressing the peg with a small screwdriver allows the release of the plug from the socket.

#### 4:10.2 Phial Positions

1. Insert the Boiler Control Stat 8mm Plain Phial into a pocket on the top of the Boiler Heat Exchanger as shown in [Fig. 4:10b](#).
2. Insert the Limit Stat 8mm Coiled Phial into the second pocket on the top of the Boiler Heat Exchanger. See [Fig. 4:10b](#).





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#### 4:11 PROGRAMMER - CAMRAY 5 ONLY

#### IMPORTANT

**The Electrical Installation of the programmer must be carried out by a suitably qualified electrical engineer/installer**

The Programmer kit is available as an optional extra. ( FOR THE WHITE CASED KITCHEN MODEL ONLY)

The unit is supplied pre-wired to a 12-way Terminal block as detailed in the wiring diagram and is available as Kit Part No. EL47034C

#### WARNING

#### ISOLATE THE ELECTRICITY SUPPLY TO THE BOILER BEFORE PROCEEDING

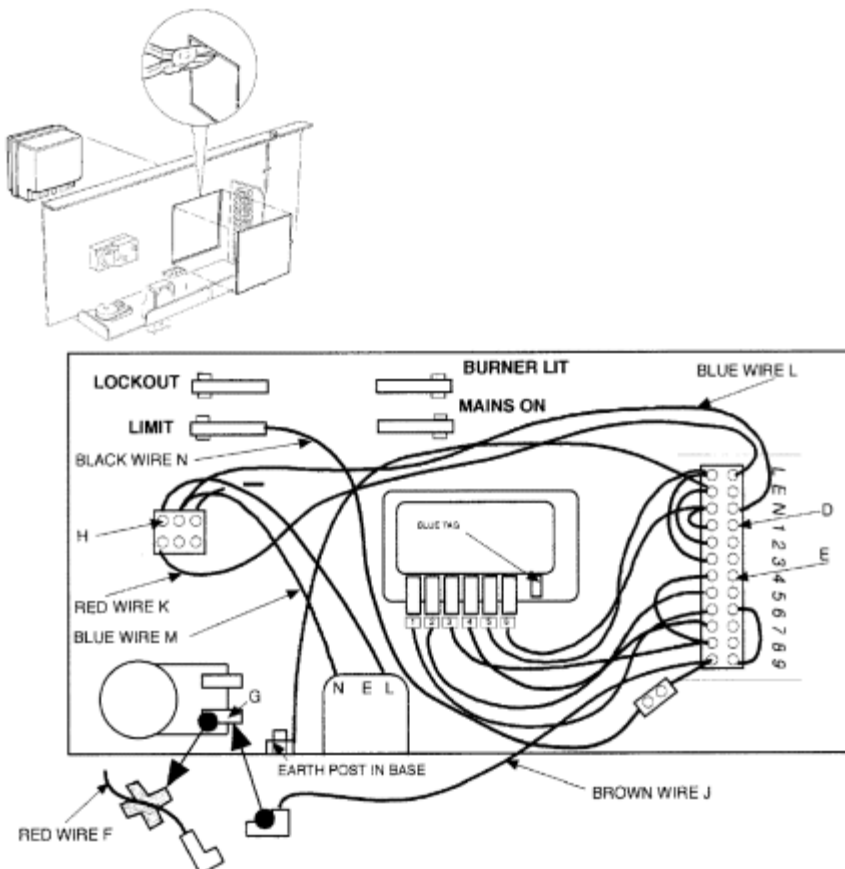
Fitting Programmer

1. Isolate mains supply to the boiler.
2. Remove Control Panel cover (2 screws).
3. Using the slots as a guide carefully saw through or use snips to remove the tabs holding the mounting plate in position.

4. Remove the plate and carefully cut through the overlay with a sharp knife.
5. Feed the pre-wired terminal block and wires through the hole now exposed in the Control Panel. Click the Programmer in place from the front.
6. Screw the terminal block and Legend Plate to the support bracket the LEN going uppermost.

#### Wiring Programmer

1. Remove Red Wire (F) from Limit Thermostat Terminal (G) and 3 way Terminal block (H) and discard.
2. Fit Brown Wire (J) spade onto vacated Terminal (G).
3. Secure Red Wire (K) into the vacated hole in 3 way terminal block (H).
4. Fit Blue Wire (L) in alongside the existing Blue Wire (M) in 3 way terminal block (H).
5. Remove Black Wire (N) from terminal block (H) and connect this into the single connector which is wired to number 9 of terminal block (D).
6. Connect appropriate flag terminals to the programmer as shown in [fig 4:12.C](#).
7. Fit Green/Yellow Earthwire (P) securely to Earth Post.
8. Make all necessary connections to the 12 way block (D) as Wiring Diagram Section.
9. Check all connections refit Control Panel back cover.
10. Restore mains supply to boiler - digital display will show 12:00.



## PROGRAMMER INSTRUCTIONS

### 4:11.1 INTRODUCTION

The Boulter Programmer is available in kit form as an optional extra for Boulter Buderus.

Fitting Instructions for the programmer are included in the Programmer Kit.

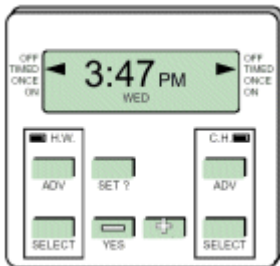
The Timer/Programmer is supplied pre-programmed with a 'Standard' set of times. These may be as required but can be easily changed if not. See 4.11.6 for Standard Time Settings.

### 4:11.2 OPERATION

The Timer/Programmer will automatically switch the heating and/or hot water ON and OFF once each day for three times each day, whichever is selected.

Any times can be programmed with different settings for the five weekdays and the two weekend days.

The unit has a recharging battery back-up system to protect the programme settings for up to 24 hours.



### 4:11.3 DAY TO DAY USE OF THE PROGRAMMER

The Programmer has 6 options to select for CH and HW, these are printed on the unit and the arrow on the display points to the option when selected using the SELECT button.



OFF	Off all the time
TIMED	On for three periods each day ON1 > OFF1 ON2 > OFF2 ON3 > OFF3
ONCE	On for one period each day ON1 > OFF3
ON	On all the time


The programmed switching times can be overridden using the Advance Button.

The Advance Button switches OFF to ON and ON to OFF without changing the normal switching times.


Certain heating installations do not allow for the Hot Water to be OFF whilst the Central Heating is ON.

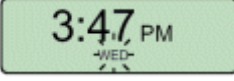
The installer of the system should explain the relevant operations of the Timer/Programmer.

#### 4:11:4 SETTING THE CLOCK

1. Switch ON the Electrical Supply to the Boiler - the Clock Display should come on.
2. Press and release  once.

Display > 

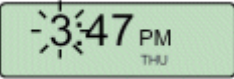
3. Press and release  once to answer. The Day on the Display will flash.

Display > 

4. Use  or  to select Day.


5. Press and release  once.

6. The Hour on the display will flash.


Display > 

Use the  or  to change Hour.


The Clock is a 12 hour display - check the AM and PM.

7. Press and release the  once.

8. The Minutes on the display will now flash.

Display > 



Use the  or  to change Minutes.

9. Press and release  four times to revert to operating mode.

Display > 

For Programming refer to [section 4:11.8](#)

#### HELP!!

If during resetting Clock or Programme you get confused and wish to start again - Press  and  at the same time for a moment. The unit will revert to 12:00am (midnight) and the 'Standard' Programme.

#### 4:11.5 NOTES ON PROGRAMMING

1. If no button is pressed for 1 to 2 minutes during programming, the unit will revert to normal operating mode.
2. The + and - buttons are used to change times. Press and release for small changes. Press and hold to skip through quickly.
3. The 6 switching times ON1 OFF1, ON2 OFF2, ON3 OFF3 must be in time order. The unit will not accept times if they are not correct.
4. The first switching time ON1 must be set after 12:00am (Mid-night).
5. The last switching time OFF3 can be set after 12:00am (Mid-night).
6. The longest time from ON1>OFF3 is 23hrs 50mins.

#### 4:11.6 PROGRAMMES

STANDARD PROGRAMME		MON - FRI PROGRAMME		SAT & SUN PROGRAMME	
		HW	CH	HW	CH
FIRST PERIOD	ON 1	6:30am	6:30am	7.00am	7.00am
	OFF 1	8:30am	8:30am	9.00am	9.00am
SECOND PERIOD	ON 2	12 noon	12 noon	12 noon	12 noon
	OFF 2	12 noon	12 noon	12 noon	12 noon
THIRD PERIOD	ON 3	4:30pm	4:30pm	4.00pm	4.00pm
	OFF 3	10:30pm	10:30pm	11.00pm	11.00pm

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Pencil in your own programme below for reference

CUSTOM PROGRAMME		MON - FRI PROGRAMME		SAT & SUN PROGRAMME	
		HW	CH	HW	CH
FIRST PERIOD	ON 1				
	OFF 1				
SECOND PERIOD	ON 2				
	OFF 2				
THIRD PERIOD	ON 3				
	OFF 3				

#### 4:11.7 PROGRAMMING SEQUENCE

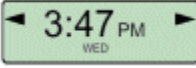
MONDAY to FRIDAY		SATURDAY & SUNDAY	
1. ON1	- CH ON	13. ON1	- CH ON
2. OFF1	- CH OFF	14. OFF1	- CH OFF
3. ON2	- CH ON	15. ON2	- CH ON
4. OFF2	- CH OFF	16. OFF2	- CH OFF
5. ON3	- CH ON	17. ON3	- CH ON
6. OFF3	- CH OFF	18. OFF3	- CH OFF
7. ON1	- HW ON	19. ON1	- HW ON

8. OFF1	- HW OFF	20. OFF1	- HW OFF
9. ON2	- HW ON	21. ON2	- HW ON
10. OFF2	- HW OFF	22. OFF2	- HW OFF
11. ON3	- HW ON	23. ON3	- HW ON
12. OFF3	- HW OFF	24. OFF3	- HW OFF

#### 4:11.8 PROGRAMMING PROCEDURE

To create a programme the same method is used as for setting the Clock.

With the Timer/Programmer in the operating mode and the Display showing the correct Time and Day. (Refer to [section 4:11.4](#))

Display > 


Press  twice


Display > 

Press  to answer


Display > 

Press  to change ON1 in sequence or -


Press  to continue through sequence

Display >  (after )

Use  and  to change time by 10 min intervals.

Press  - time is now set.

Continue through sequence pressing  to change setting and  to continue.

On completion Press  three times to return to operating mode.

#### 4:11.9 TEST



The Test facility is a unique feature of the Boulter Programmer. Test enables a quick review of the 7 day programme.


TO USE 'TEST' With the Timer/Programmer in the operating mode and the Display showing the correct Time and Day.




Press  three times.

Display > 

Press  - then press and hold  and the display will 'run' and pause for 2-3 seconds on the first ON time of the day you are at. The On indicator lights will illuminate and heating/hot water circuits will be energised. Releasing the YES button will stop the display running.

Continue pressing  button to run through the 7 days of the programme pausing at each switching time.

Press  twice to cancel Test and return to operating mode.



#### 4:11.10 HOLIDAY

The Holiday Setting is a unique feature of the Boulter Programmer. This enables a period of days to be set (up to 99) during which time the Heating System is OFF. When the Holiday Period is over the Programmer reverts back to the normal programme. Each count through mid-night = 1 day.

TO SET 'HOLIDAY MODE' With the Timer/Programmer in operating mode and the Display showing the correct Time and Day

Press  four times and  once.

Display > 

Use  and  to set number of holiday days.

Press  once

Display > 

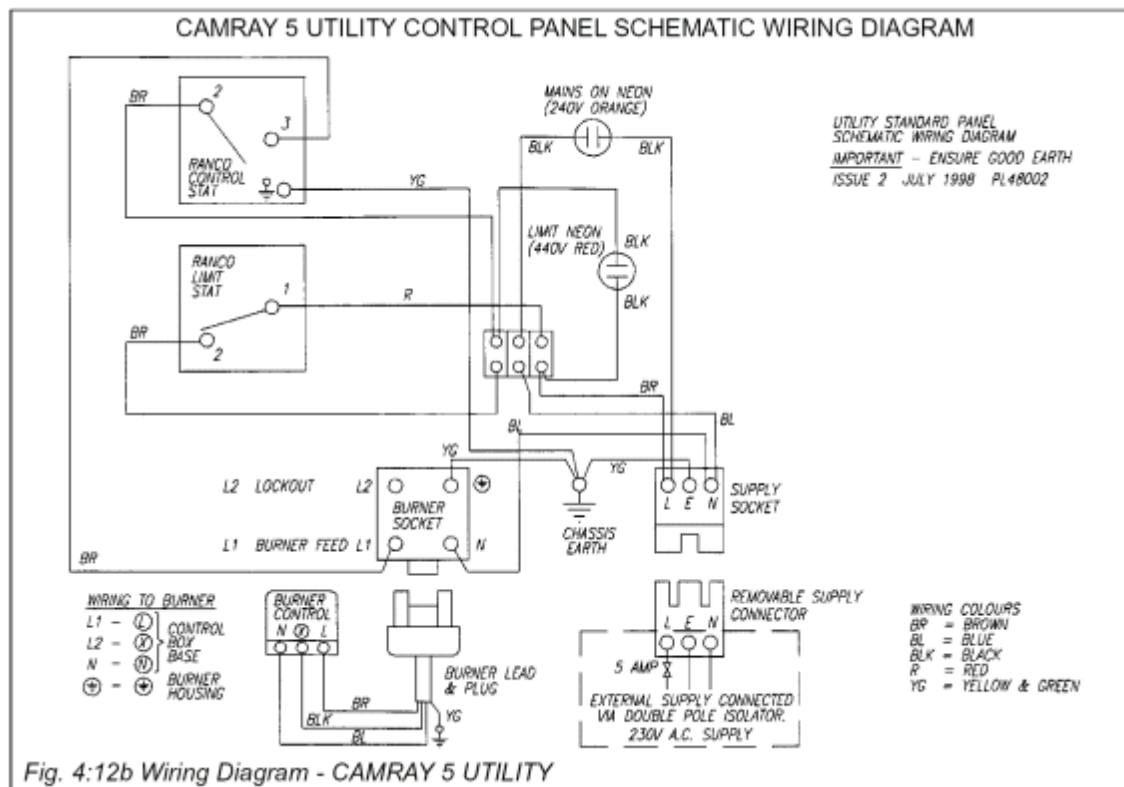
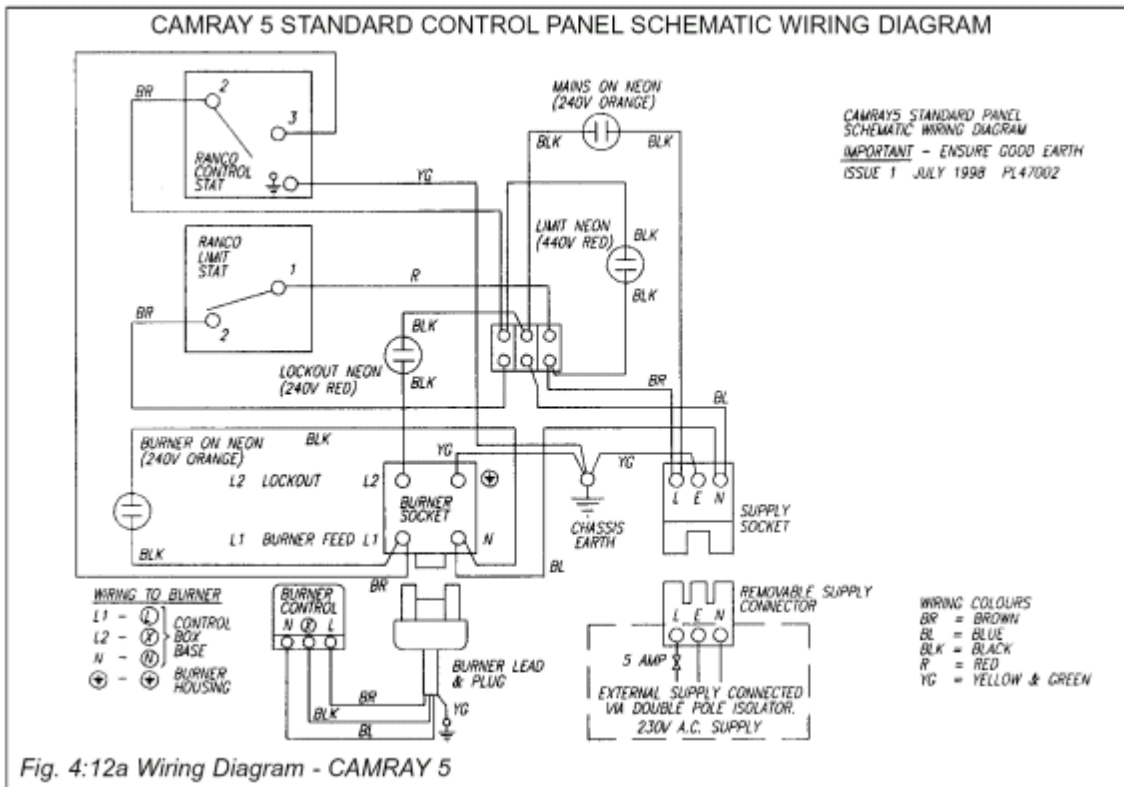
The Programmer is now in 'Holiday Mode' for the period set.  
*Have a Good Holiday!*

To cancel 'Holiday Mode' press any button.

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#### 4:12 PANEL WIRING DIAGRAM

#### IMPORTANT ENSURE GOOD EARTH



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**IMPORTANT ENSURE GOOD EARTH**

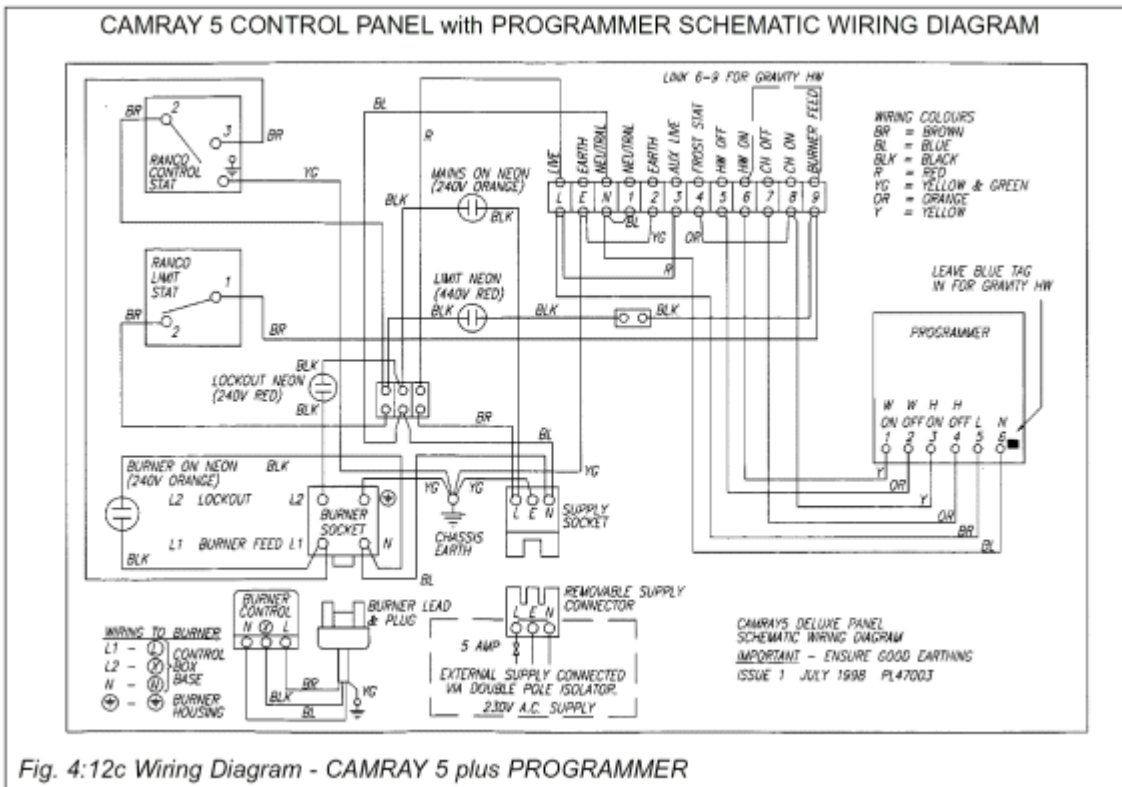
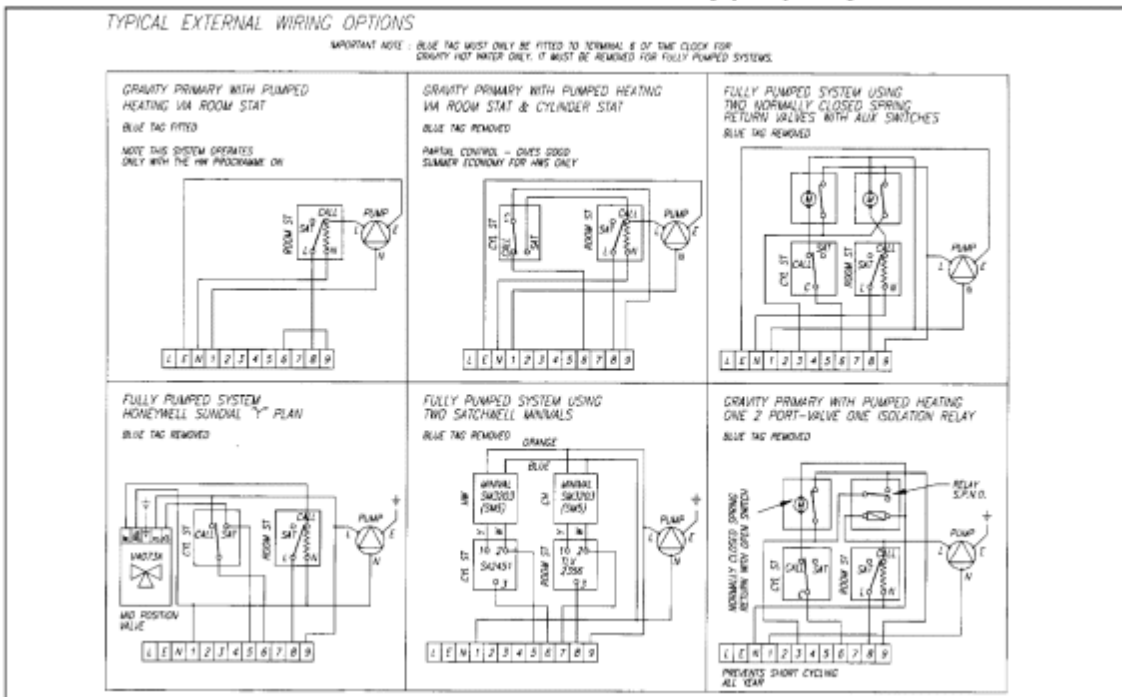


Fig. 4:12c Wiring Diagram - CAMRAY 5 plus PROGRAMMER

4:12.1 Typical External Wiring options

**IMPORTANT** Blue tag must only be fitted to terminal 6 of time clock for gravity hot water only. It must be removed for fully pumped systems.



5:1 BALANCED FLUE BOILERS

A range of Balanced Flue Kits are available as optional extras for Camray 5 & Utility.

Balanced Flues permit considerable choice of siting of the Boiler. Boilers may be installed in situations where no chimney exists, where the chimney is unsatisfactory or in outhouses.

**It is important that care is exercised in choosing a suitable location for the Boiler and Flues. It is to be expected that with the help of this manual and the application of caring engineering experience and common sense unreasonable liberties will not be taken.**

It is a mandatory requirement that:-

1. The terminals of balanced flues which can be touched are to be fitted with a guard.

Any proposed installation which deviates from the details provided or gives rise to any doubt should be referred to BOULTER BOILERS LTD. who will be pleased to consider and discuss it.

### 5:1.1 Balanced Flue Types

Three types are available

1. Low Level Horizontal
  - Rear & Side
  - Discharge L/R
2. High Level Horizontal
  - Rear & Side
  - Discharge L/R
3. Vertical (Flat or Pitched Roof)

Only Kerosene fuel may be used when the Low level Horizontal flues are installed.

### 5:2 HORIZONTAL BALANCED FLUES

The Terminals of Horizontal Balanced Flues should be installed on a plain surface of wall preferably not less than 900mm from internal corners of the building and away from any recesses and any projections on the wall face that could affect wind flow across it.

Listed are the general restrictions as to the positioning of Horizontal Balanced Flue Terminals. Refer to [Fig 5:4a](#)

1. Positions should be avoided where the exhaust of combustion products could cause nuisance.
2. Terminals must be situated more than 600mm distance from any opening in the building.
3. Avoid close proximity to internal corners where products of combustion may not freely disperse and may enter the air intake to the boiler.
4. Avoid positions such as narrow passageways, especially with a closed end, where easy dispersion could be adversely affected.
5. Avoid positions where the terminal may be discharging close to and in the direction of a near neighbouring dwelling or exhausting immediately over adjoining property.
6. Avoid positioning immediately under openable windows.
7. Care should be taken to ensure that there is clearance between the outer surface of the flue and any combustible material.
8. Positioning the Flue terminal within a CAR PORT is not recommended.

### 5:3 VERTICAL BALANCED FLUES

Vertical Balanced Flues enables boilers to be installed in single storey outhouses or utility rooms where it may not be convenient for it to be sited near an outer wall. It may also be employed to exhaust vertically to avoid nearby windows or doors.

Vertical Balanced Flues may also be preferred in cases where close proximity to adjoining houses or property dictates minimum exhaust noises.

### 5:3.1 Positioning of Vertical Flues

Listed are general restrictions as to the positioning of Vertical Balanced Flues. Refer to [Fig. 5:4a](#).

1. Avoid positions where Vertical Flues will exhaust adjacent to a higher wall. The minimum distance for operation from a higher vertical wall must be 600mm.
2. Ensure Vertical Flues do not exhaust below the level of any openable window less than 2300mm horizontally from the terminal (see BS 5410:1).
3. Care should be taken to ensure that there is clearance between the outer surface of the flue and any combustible material.

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### 5:4 POSITIONING THE BOILER

Read [Sections 5:2 & 5:3](#)

Some combustion noise occurs at the Exhaust Terminal of Balanced Flues and care should be exercised to ensure that the position of the exhaust is not near doors or opening windows of the house it serves, or doors or windows of any neighbouring house. See [Fig. 5:4a](#).

#### RECOMMENDED FLUE TERMINAL POSITION

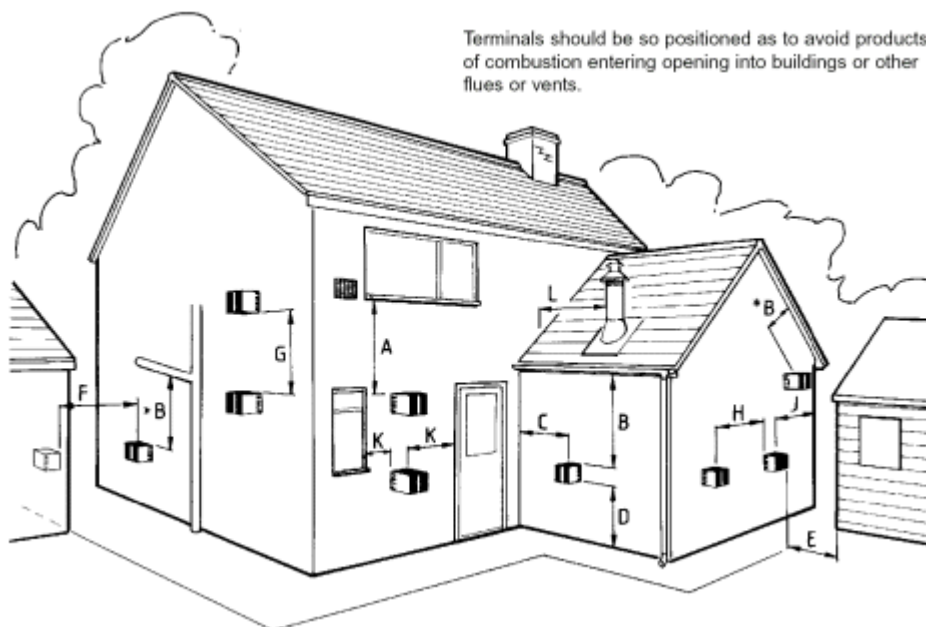


Table to above Flue Terminal Positions - MINIMUM dimensions

REF	DESCRIPTION	DISTANCE IN MM	
A	Directly below an Opening, Air Brick or Window	600	
B	Below a Gutter, Sanitary Pipework or Eaves	75	(600*)

C	From any Internal Corner	300	(900)
D	Above Ground	300	(600)
E	From a surface facing the Terminal	600	(1200)
F	From a Terminal facing a Terminal	1200	
G	Vertically between Two Terminals on the same wall	1500	
H	Horizontally between Two Terminals on the same wall	750	(1200)
J	From any External Corner	300	(600)
K	Horizontally from any Opening, Air Brick, Window or Door	600	
L	Vertical Flue from Wall (Flat or Pitched Roof)	750	

\*Where the terminal is within 1m of any plastic material, such material should be shielded from the effects of the combustion products of the flues

**NOTE:- Whilst the dimensions in BS 5410 are shown in the table, it is stressed that possible variances in local site conditions may not always be obvious and that if in any doubt the dimensions in brackets should be observed.**

BOULTER BUDERUS would be pleased to advise on any difficult positioning

*Fig. 5.4a Balanced Flue Terminal Positions*

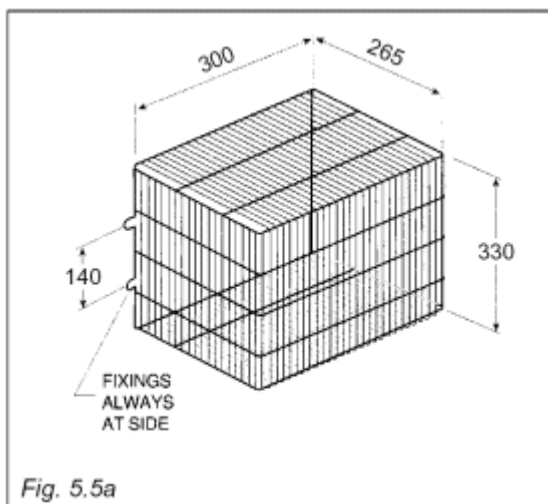
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## 5:5 TERMINAL GUARDS

When the terminal is positioned where there is the possibility of accidental contact by persons, or of damage to the terminal, an approved guard is necessary (Boulter Code FL26160).

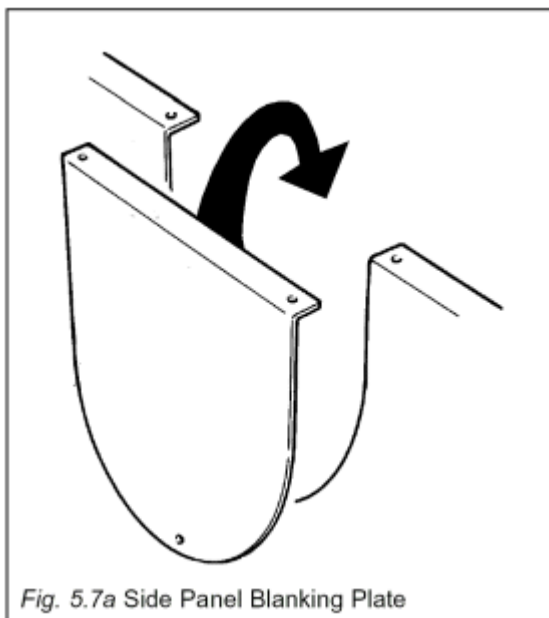
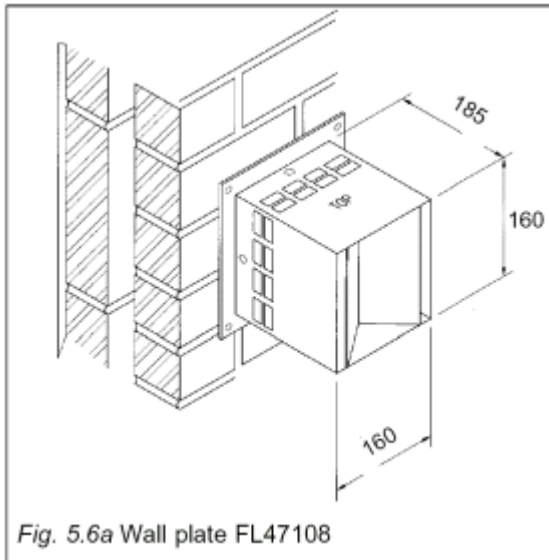
Generally, exhaust 2 metres above ground level alleviates the necessity for a guard.

A suitable guard is available from BOULTER BUDERUS as shown below.



## 5:6 HORIZONTAL FLUE TERMINAL

The Terminal for Horizontal Balanced Flue is secured to the wall by means of four screws. The indexing plate should have its four edges siliconed to the outside wall to provide a weather seal.



### 5:7 BLANKING PLATES

The Boiler is supplied in Balanced Flue form. With 2 full side/rear Blanking plate and one top blanking plate.

The Blanking plates should be fitted to prevent access to hot surfaces and to maintain the efficiency of the boiler.

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### 6:1 NOTES ON INSTALLATION

#### LOW LEVEL AND HIGH LEVEL BALANCED FLUES

1. The Terminal must be slightly angled down to ensure correct operation of the boiler. Due to the efficiency levels of Camray 5 plumbing from the terminals may occur under certain conditions. Any condensation may be

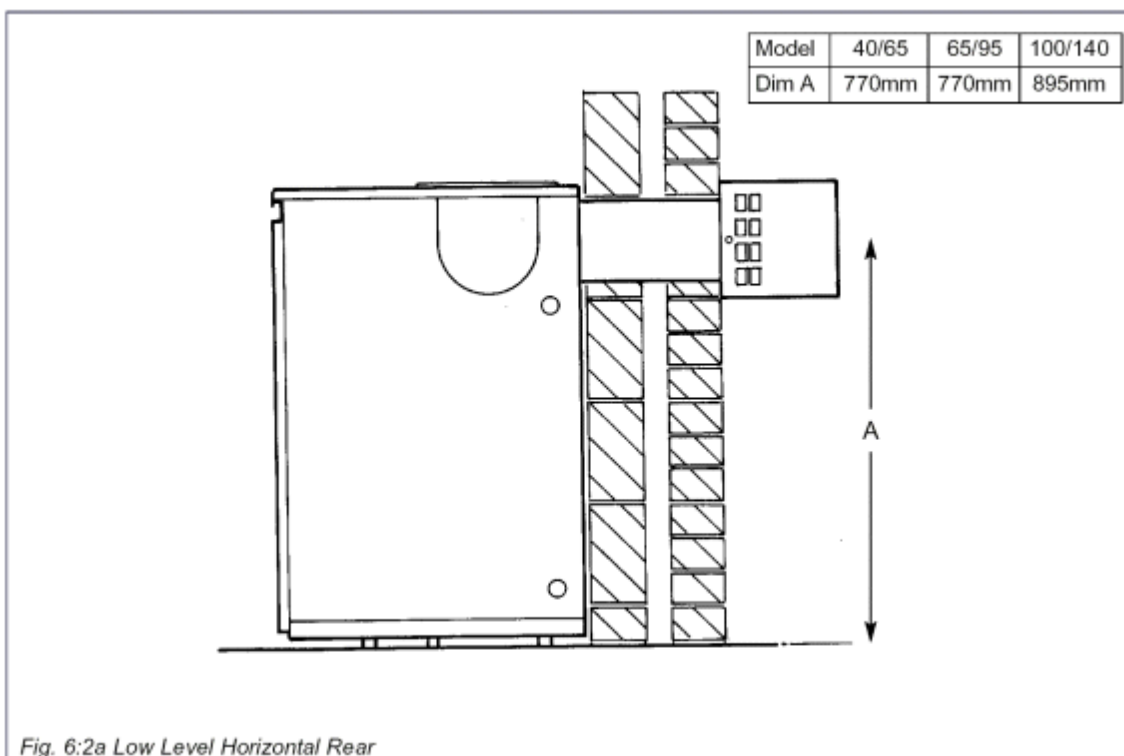
acidic due to the fuel characteristics and it is advisable not to install the flue in any position where the condensation could cause damage to paint surfaces etc.

2. The Terminal index plate should be sealed to the external wall using silicon sealant or other impervious material to prevent water ingress.
3. Ensure that the outlet of the Terminal points downward (TOP upper-most and Boulter correct way up).
4. Ensure that the boiler to offtake gasket is fitted (foil face upwards) and the clamp is made with four nuts and washers securely fixed.
5. Ensure that the 'Sealing Rings' are fitted in the correct groove. Use a mild detergent as a lubricant to ease assembly.
6. The Flue is telescopic and no cutting of the flue pipes is necessary.
7. 500mm and 1000mm flue extension kits are available. Do not exceed the maximum flue lengths stated in this manual.
8. The flexible air duct is an integral part of the appliance and must be used on all balanced flue kits. Ensure that it is not damaged and that either end is connected via the jubilee clip provided to ensure correct boiler operation.

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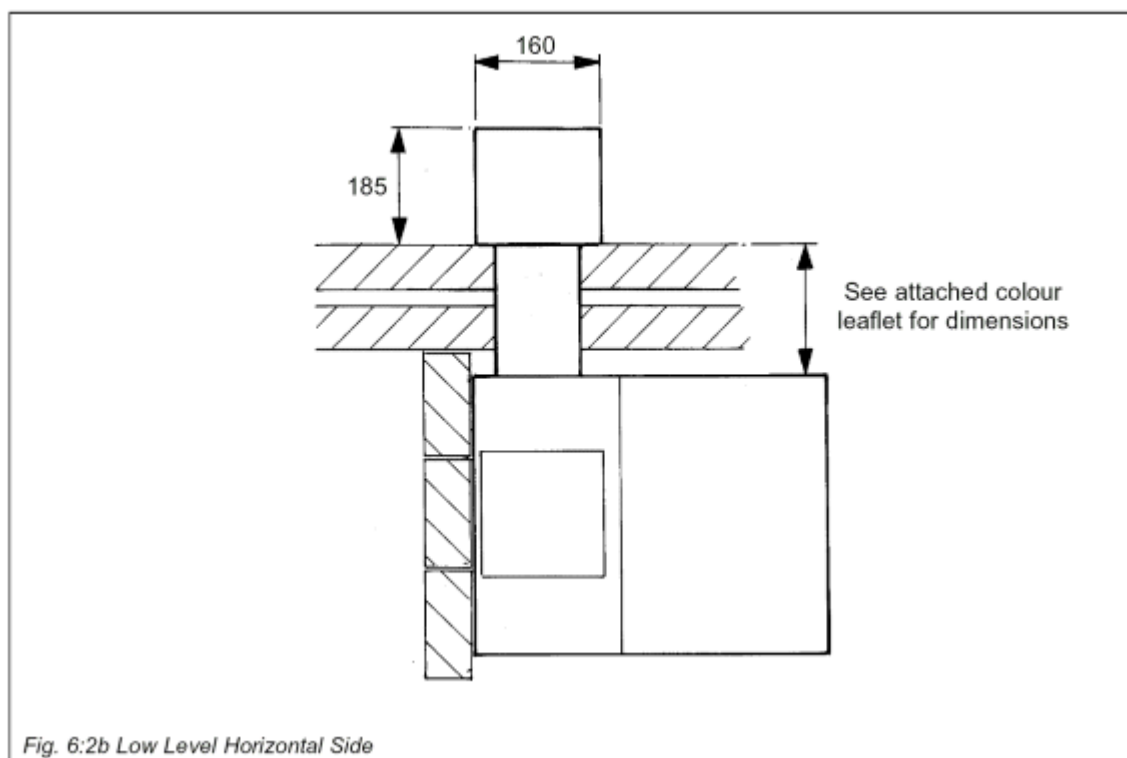
## 6:2 LOW LEVEL HORIZONTAL FLUE

### 6:2.1 Rear

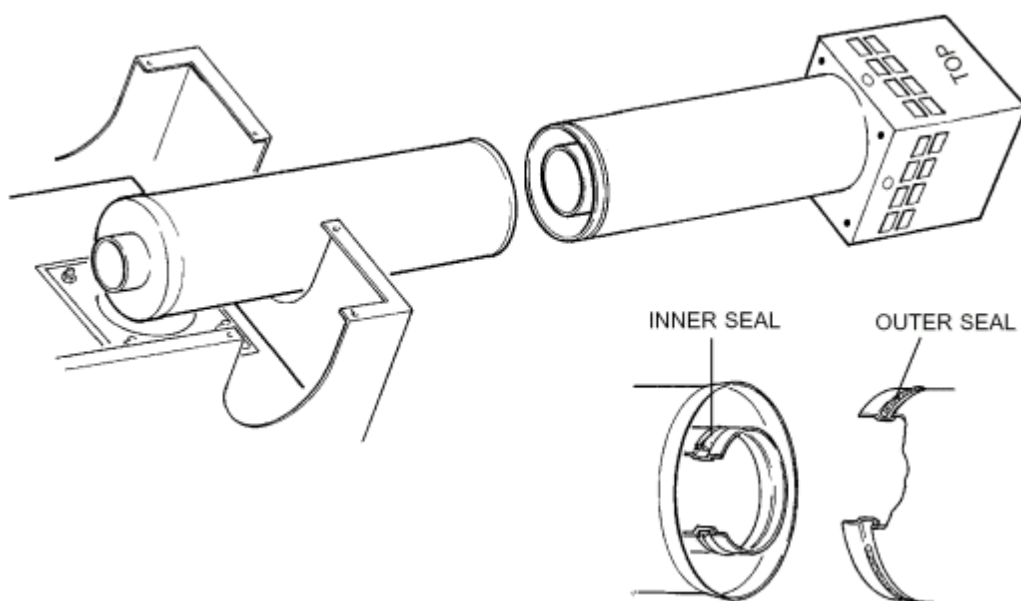


### 6:2.2 Side - Right or Left Hand





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#### LOW LEVEL FLUE INSTALLATION

Site conditions will dictate to a certain extent the best method of assembling low level balanced flues.

The illustration shows a typical rear outlet flue.

Assemble the flue generally as follows:

1. Position boiler check that water connections and flue proposed is according to clearances specified.

2. Mark flue position.
3. Move boiler away from the wall and using a diamond tipped core drill drill a 6" (150mm) hole, ensuring the hole is horizontal.
4. Remove rear top panel of boiler and identify flue outlet (rear, LH or RH side). Move blanking plate to appropriate position using nuts and washers.
5. Ensure flue exhaust seal is in position and in good condition, ie undamaged. Lubricate with a mild detergent.
6. Place boiler offtake gasket in position on top of boiler (foil face upwards).
7. Lay internal flue in appropriate position in boiler and offer up to hole in wall.
8. Secure internal flue to boiler via four nuts and washers as supplied.
9. Remove outer terminal 4 screws and put terminal to one side.
10. Taking outer air duct ensure Seal is fitted and in good condition. Lubricate with a mild detergent.
11. Ensuring that there is no wall debris present in either ducts slide outer air duct into inner air duct.
12. Using the four holes on the external wall plate as a guide drill four fixing holes into the external wall.
13. Replace the outer air duct and pushing firmly home screw into position (4 screws). Weather seal all edges.
14. Taking the terminal end keeping it square to the external flange push home over the internal flue exhaust pipe until the four holes on the flange align. NB Ensure that TOP is on the upper most surface of the terminal and 'Boulter' is upright.
15. Secure the terminal to the flange using the four screws.
16. Fit an approved terminal guard if in an accessible position. Available from Boulter Buderus.
17. Inside:  
  
Using the clips supplied fix the flexible air duct to the burner spigot and flue offtake securely.

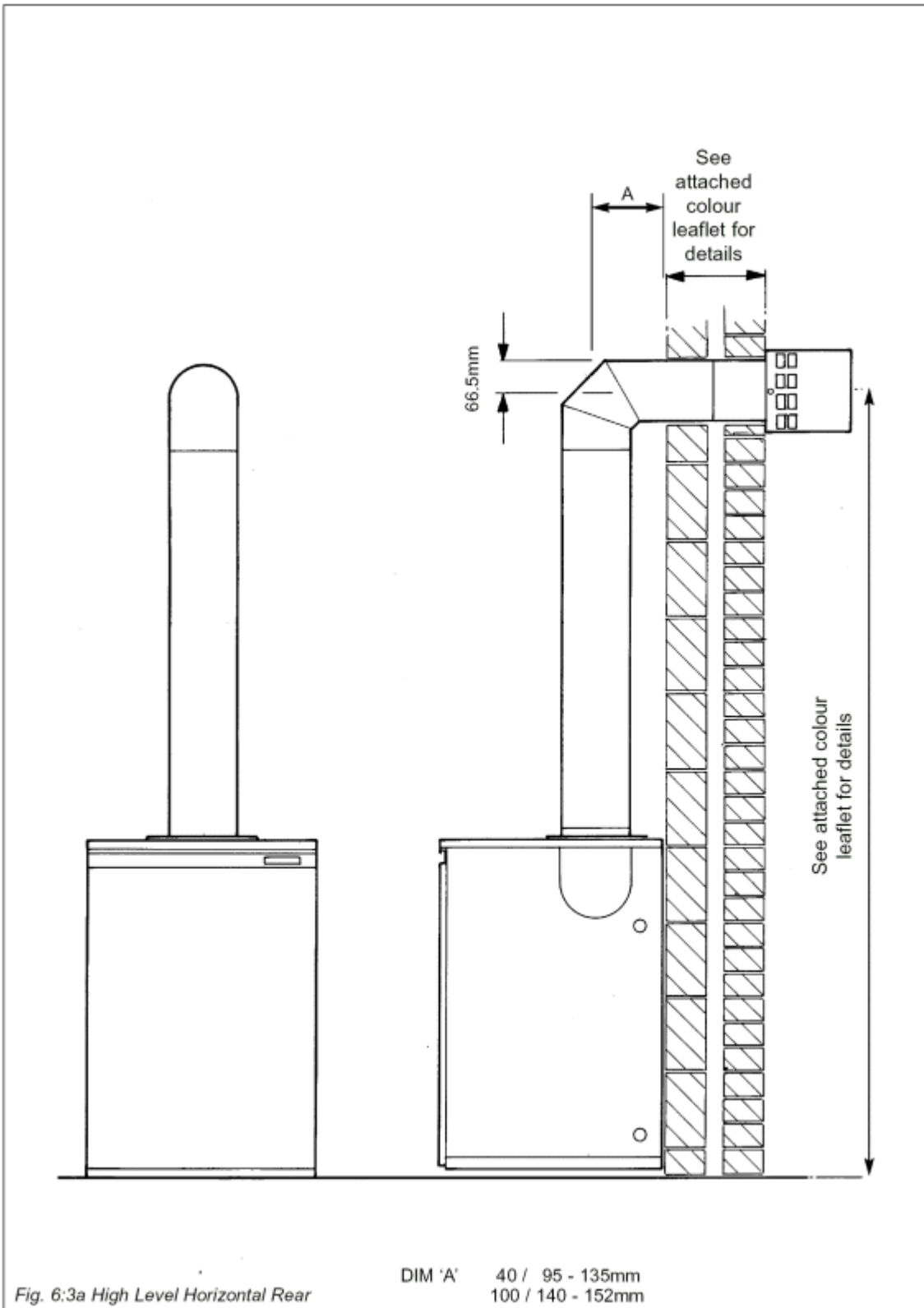
Continue on with the rest of the installation.

*Fig. 6:2c Low Level Horizontal Flue Assembly*

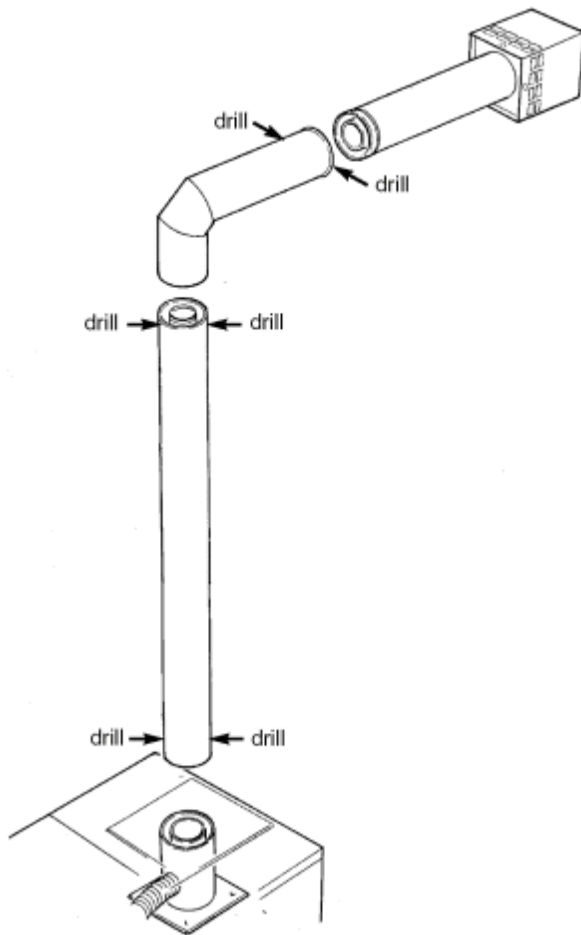
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## **6:3 HIGH LEVEL HORIZONTAL FLUE**

### **6:3.1 Rear**



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#### HIGH LEVEL SIDE & REAR INSTALLATION

Assemble the flue generally as follows:

1. Position boiler check that all water connections and proposed flue position are according to clearances specified.
2. Mark the flue position on the wall.
3. Move the boiler away from the wall and using a diamond tipped core drill drill a 6" 150mm hole in the wall ensuring the hole is level.
4. Remove the top panels of the boiler and fit the appropriate blanking plate to rear panel using the nuts and washers provided.
5. Fit the boiler offtake gasket to the four studs and fit offtake spigot with the four nuts and washers provided.
6. Ensure the flue exhaust seal is in position and undamaged.

Lubricate with a mild detergent.

7. Fit the vertical flue offtake plate to the rear top panel of the boiler and fit the assembly into position over the vertical offtake spigot.
8. Take the 1000mm vertical extension and fit an O Ring seal to the outer duct, lubricate with a mild detergent and ensure that the flue exhaust seal is fitted to the inner duct undamaged and in the correct orientation.
9. With the seals fitted slide the extension into the offtake socket external O Ring end first.

10. Take High Level elbow fit larger O Ring seal to short arm, lubricate with a mild detergent and ensure flue exhaust seal is fitted to the inner duct undamaged and in the correct orientation.

11. Ensuring there is no debris in the wall place longer arm through drilled hole and slide into second extension being careful not to scratch metal work.

The high level elbow must be slightly sloped downwards.

12. Using the drill provided drill 6 holes as indicated on the drawing and secure with the self tapping screws supplied.

13. FROM OUTSIDE

Remove the outer terminal four screws and put terminal to one side.

14. Taking outer air duct ensure Seal is fitted and in good condition.

15. Check wall cavity for debris and remove if necessary. Slide the outer air duct into the inner air duct until home.

16. Using the four holes on the external wall plate as a guide drill four fixing holes into the external wall to suit those supplied.

17. Replace the outer air duct and pushing firmly home screw into position (4 screws). Weather seal all edges.

18. Taking the terminal end, keeping it square to the external flange push home over the internal flue exhaust pipe until the four holes on the flange align.

NB. Ensure that TOP is on the upper-most surface of the terminal and BOULTER is upright.

19. Secure the terminal to the flange using the four screws. 20. Fit an approved terminal guard if in accessible position. Available from Boulter Buderus.

21. INSIDE

Use the clips supplied to fix the air duct to the burner spigot and vertical flue offtake spigot Continue with the rest of the installation.

*Fig. 6:3b High Level Horizontal Flue Assembly*

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### **6:3.2 Side - Right or Left Hand**

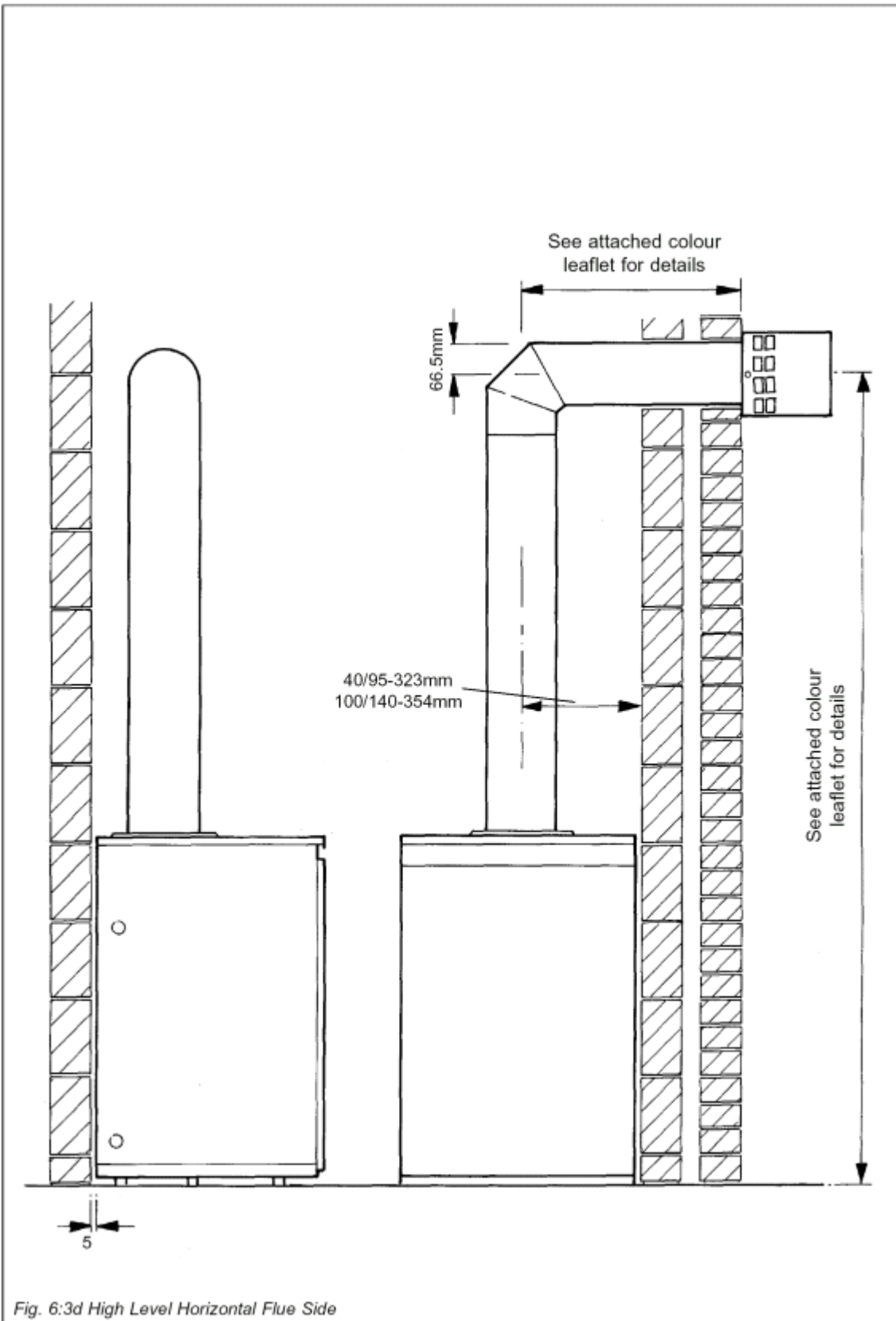
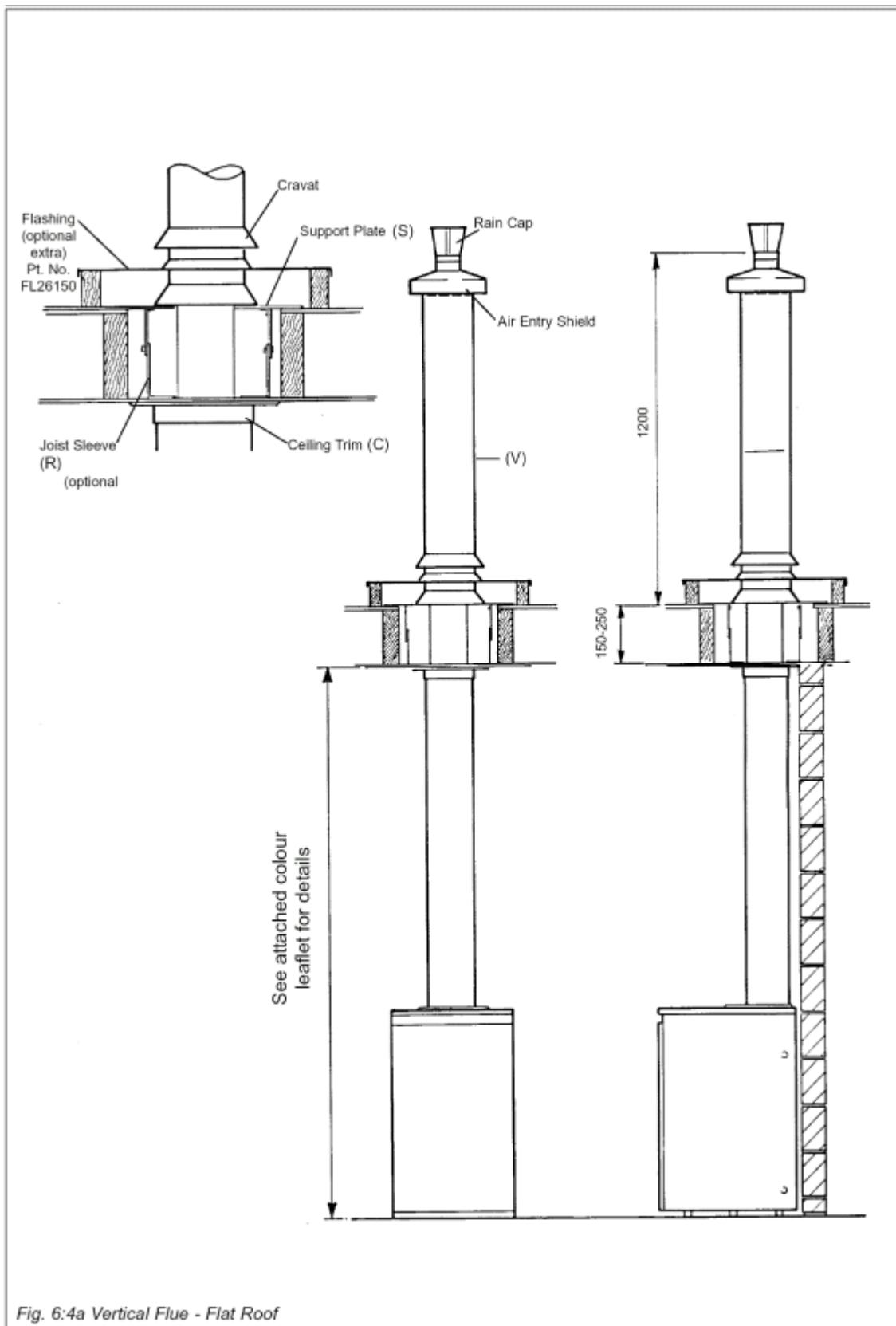


Fig. 6:3d High Level Horizontal Flue Side

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**6:4 VERTICAL FLUE FLAT ROOF INSTALLATION**



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6:4 VERTICAL FLUE FLAT ROOF INSTALLATION - CONTINUED

**6:4.1 Notes on installation**

Site conditions will dictate the best method of assembling the Vertical Balanced Flue.

The following illustrations show boilers up against a rear wall as an example. It is not essential for the boiler to be positioned this way; As long as the joists are capable of supporting the flue via the support plate supplied in the kit.

The Vertical Flue is telescopic to allow for various ceiling heights. (See attached colour leaflet).

To increase the height additional 500mm or 1000mm extensions can be added up to the maximum number indicated.

To reduce the height push the sections down to the desired height and lock in place using the screws provided.

### **IMPORTANT WARNING**

Where a flue system passes through a joist frame, it is essential that the integrity of the ceilings' fire barrier is retained. This can be achieved by ALWAYS using the support plate and firestop ceiling trim.

We would also recommend strongly the use of the Adjustable Joist Sleeve (optional) to complete the fire stop.

Alternatively this can be achieved by following the requirements of Section J of the current Building Regulations.

NOTE:-

1. Joints in the Flue Pipe must not be situated with the joist space.
2. Joints in the Flue Pipe must be a minimum of 150mm below the ceiling

Flat Roof Assembly Procedure:

Generally where conditions allow, the simplest assembly procedure is as follows:-

1. Position the Boiler, check water connections are possible.
2. Mark Flue position on ceiling.
3. Move Boiler away from position and cut the ceiling neatly, keeping the opening size in the plaster board as close to the round Ducts of the Flue Terminal as practicable (say 10mm all round).
4. Cut the opening in the flat roof, allowing more than 50mm clearance on all sides from the timber joists.
5. Create 3-4 sided timber framed box for the Support Plate (S).
6. Bolt Joist Sleeve (R) (optional) to Support Plate (S) and screw onto timber frame.
7. Slide Flue Terminal (V) down into position, having previously removed the Rain Cap, Air Entry Rain Shield and Cravat so that its support cone rests on the Support Plate (S).
8. Screw the Ceiling Trim (C) to the Joist Sleeve (R), or ceiling if Joist Sleeve (R) is not used.
9. Remove the top rear panel of the boiler and fit the appropriate blanking plate to the rear panel using the nuts and washers provided.
10. Fit the boiler offtake gasket to the four studs and clamp it in place with the vertical offtake spigot with the four nuts and washers provided. Ensure the combustion test point screw remains accessible.
11. Ensure the flue exhaust seal is in position and undamaged.



12. Fit the vertical flue offtake plate to the rear top panel of the boiler and fit the assembly into position over the vertical offtake spigot.

13. Take one of the 500mm vertical extensions or 1000mm, fit an O Ring Seal to the outer duct, and ensure that the flue exhaust seal is fitted to the inner ducts undamaged and in the correct orientation. Lubricate all seals with a mild detergent.

14. With the seals fitted slide the extension in to the offtake socket external O Ring end first.

15. Repeat steps 13 & 14 above for next section. Slide ceiling trim over the next section before engagement. Fix the ceiling trim in position.

16. Using the drill provided drill 6 holes to secure sections to adjacent ones and secure with the self tapping screws supplied.

17. Fit flashing plate and cravat. Seal joint between Cravat and Flue with a suitable weatherproof sealant. Keep Cravat as low as possible onto flashing plate to prevent entry of animals, birds or insects.

18. Inside:

Using the clips supplied fix the air duct to the burner spigot and vertical flue offtake spigot.

Continue with the rest of the installation.

**BOULTER BUDERUS CAMRAY 5 PAGE 34**

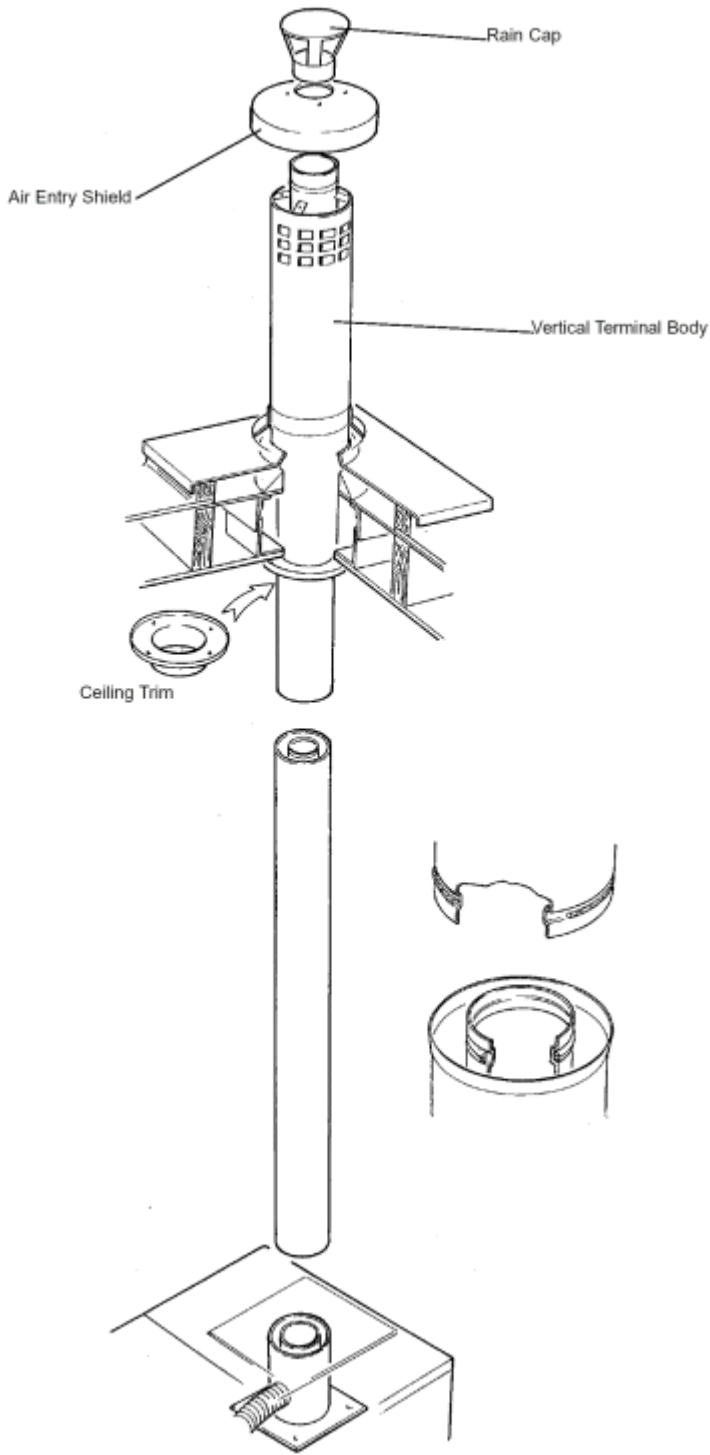


Fig. 6:4b Vertical Flue - Flat Roof Assembly

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**6:5 VERTICAL FLUE PITCHED ROOF INSTALLATION**

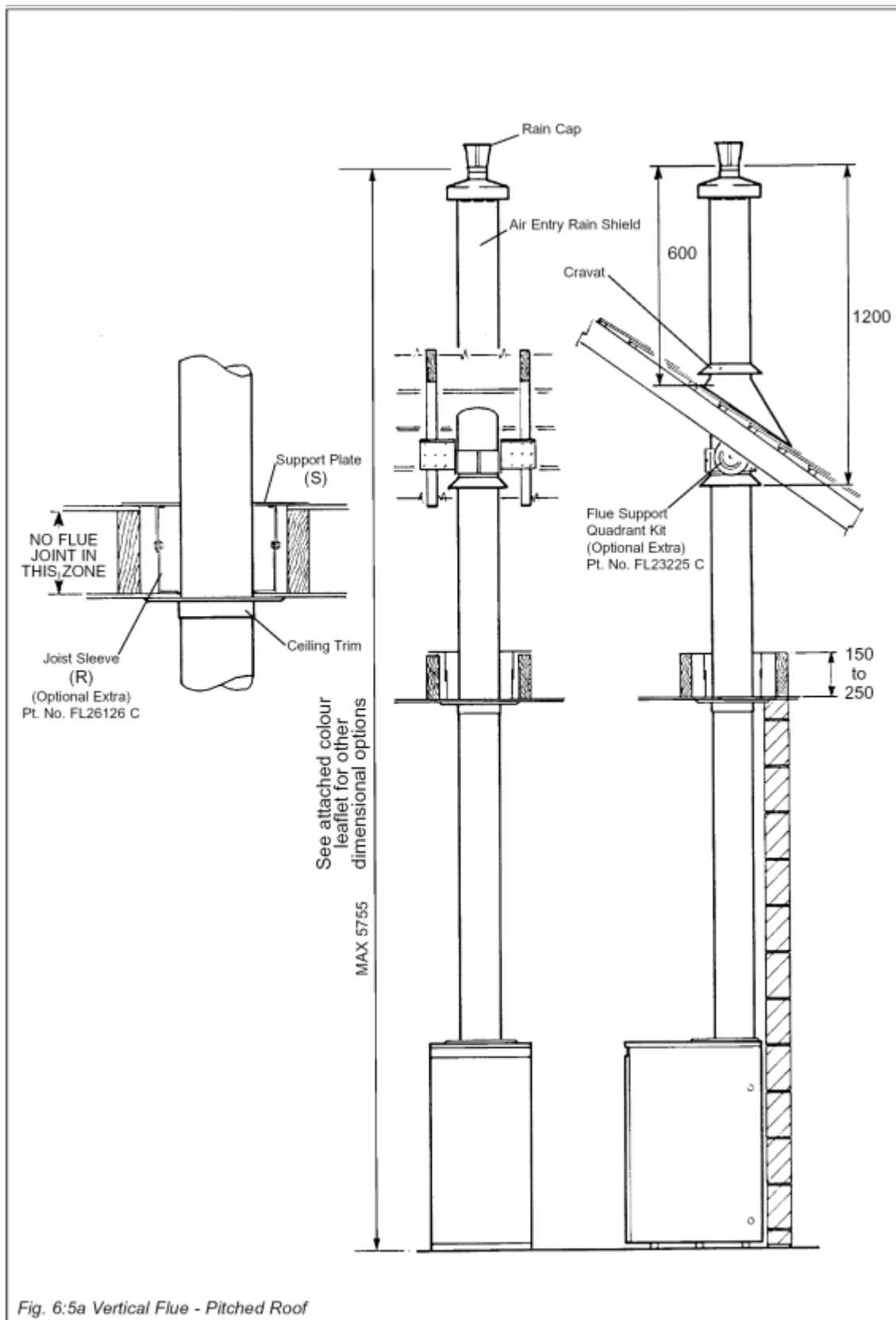


Fig. 6:5a Vertical Flue - Pitched Roof

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**6:5 VERTICAL FLUE PITCHED ROOF INSTALLATION - CONTINUED**

**6:5.1 Notes on installation**

Site conditions will dictate the best method of assembling the Vertical Balanced Flue.

The following illustrations show boilers up against a rear wall as an example. It is not essential for the boiler to be positioned this way. As long as the joists are capable of supporting the flue via the support plate supplied in the Kit or the Flue support quadrant kit (optional).

The vertical flue kit is telescopic to allow for various ceiling heights.

To increase the height additional 1000 or 500mm extensions can be added up to the maximum number indicated.

To reduce/adjust the height push the section down to the desired height and lock in place using the screws provided.

### **IMPORTANT WARNING**

Where a flue system passes through a joist frame, it is essential that the integrity of the ceilings' fire barrier is retained. This can be achieved by ALWAYS using the support plate and firestop ceiling trim.

We would also recommend strongly the use of the Adjustable Joist Sleeve (optional) to complete the fire stop.

Alternatively this can be achieved by following the requirements of Section J of the current Building Regulations.

NOTE:-

1. Joints in the Flue Pipe must not be situated with the joist space.
2. Joints in the Flue Pipe must be a minimum of 150mm below the ceiling

Pitched Roof Assembly Procedure:

Generally where conditions allow, the simplest assembly procedure is as follows:-

1. Position the Boiler, check water connections are possible.
2. Mark Flue position on ceiling.
3. Move Boiler away from position and cut the ceiling neatly, keeping the opening size in the plaster board as close to the round Ducts of the Flue Terminal as practicable (say 10mm all round).
4. Cut the opening in the roof, allowing more than 50mm clearance on all sides from the timber joists.
5. Create 3-4 sided timber framed box for the Support Plate (S).
6. Bolt Joist Sleeve (R) (optional) to Support Plate (S) and screw onto timber frame.
7. Cut opening in the pitched roof allowing more than 50mm clearance on all sides from timber.
8. Remove the top rear panel of the boiler and fit the appropriate blanking plate to the rear panel using the nuts and washers provided.
9. Fit the boiler offtake gasket to the four studs and clamp it in place with the vertical offtake spigot with the four nuts and washers provided. Ensure the combustion test point screw remains accessible.
10. Ensure the flue exhaust seal is in position and undamaged.
11. Fit the vertical flue plate to the rear top panel of the boiler and fit the assembly into position over the vertical offtake spigot.

12. Take the extension, fit O Ring seals to the outer duct and ensure that the flue exhaust seal is fitted to inner ducts undamaged and in the correct orientation. Lubricate all seals with a mild detergent.

13. With both seals fitted slide the 1st extension into position.

14. Add extensions until the joint nearest the ceiling is 150mm away. Slide the ceiling trim onto this last extension ensuring it is the correct way up (screws at the top).

15. Using a 3mm drill bit drill 2 holes per extension top and bottom and secure with self tapping screws supplied.

16. From within the roof space if space permits: Fit next extension(s) in line with points 12 to 13

17. From outside lower Flue Terminal into roof opening having previously removed the rain cap, air entry Rain shield and Cravat.

#### IMPORTANT ENSURE ALL SEALS ARE IN POSITION

18. From within the roof space align the terminal with the extension beneath and push fully home.

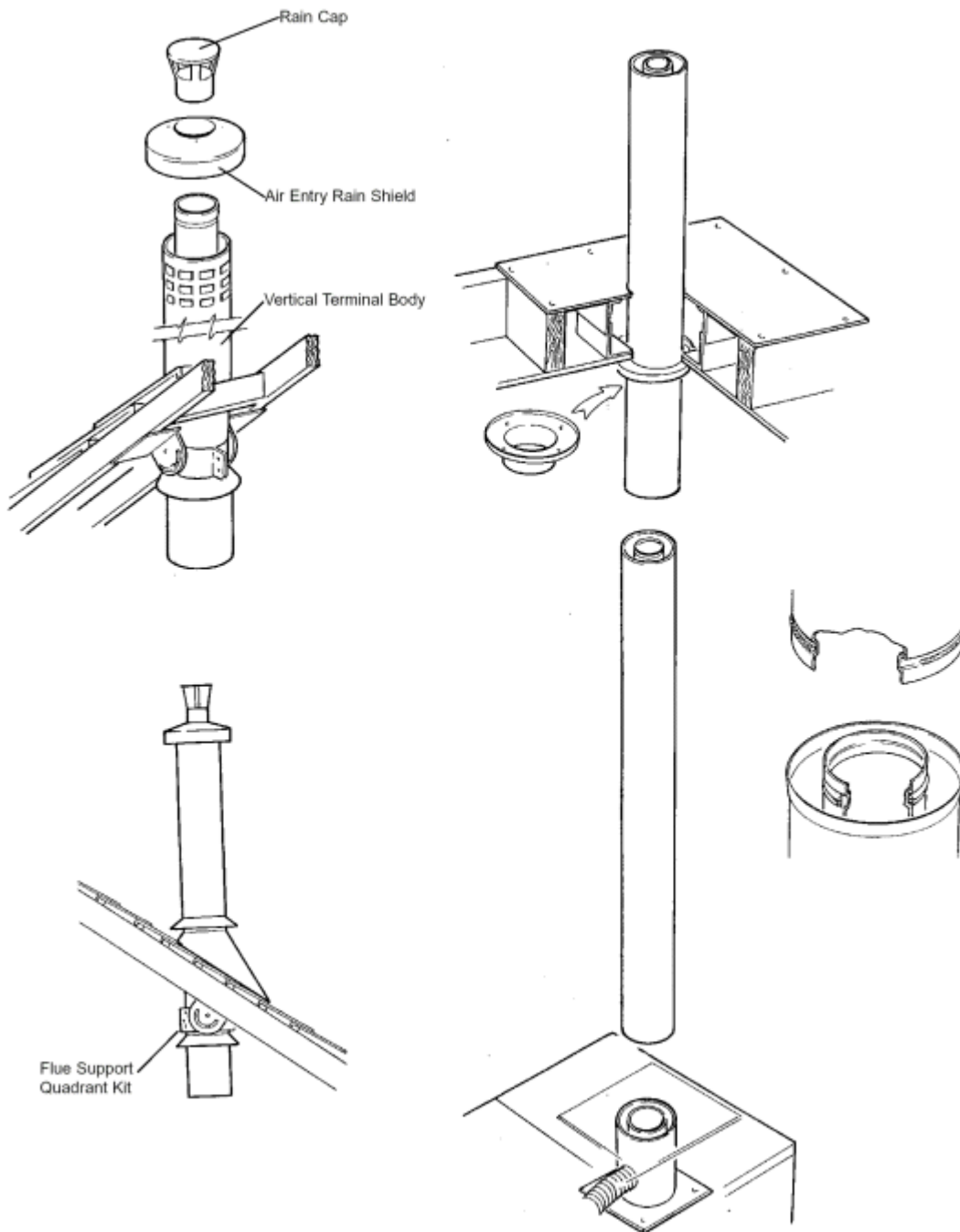
19. Secure the terminal to the roof timbers with the optional Flue Support Quadrant Plate Assembly. Adjust the angle to suit the pitch of the roof.

20. Drill the outer air ducts to secure extension to extension by 4 self tapping screws.

21. Using the clips supplied fix the air duct to the burner spigot and vertical flue offtake spigot.

Continue with the rest of the installation.

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*Fig. 6:5b Vertical Flue - Pitched Roof Assembly*

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### **6:6 HIGH LEVEL FLUE LENGTH ALTERATION**

There is a certain amount of adjustment available on the vertical height and horizontal length.

This is attained by pushing two telescopic flues together until the desired dimension is obtained. Secure any vertical lengths by using a drill and 4 self tapping screws supplied.

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### **7:1 COMMISSIONING**

It is essential in the interest of boiler efficiency and reliable performance that once the boiler has been installed it is first commissioned by a competent engineer, preferably an OFTEC commissioning engineer.

If an engineer is not known Boulter Boilers will be pleased to provide details of commissioning and servicing engineers from their register.

Commissioning must be carried out at the point of first firing.

Incorrect emissions can cause premature fouling of the flue ways.

## 7:2 RESPONSIBILITY

It is the responsibility of the installer to ensure that the boiler is properly commissioned. It is essential that the commissioning procedures detailed in this manual are carried out by a qualified engineer using recognised test equipment.

It is recommended that the relevant section of BS 5410: Part 1: latest edition is carefully read.

## 7:3 REPORTING

It is recommended that you use a report sheet and check list. Make comments on the report where necessary, and give a copy to whoever has engaged your services, and retain and file your own copy. A suggested layout is shown over.

## IMPORTANT

**It is the responsibility of the installer to ensure that the boiler is commissioned by a competent engineer, preferably an OFTEC\* Registered Commissioning Engineer.**

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## 7:4 BOULTER BUDERUS RECOMMENDED COMMISSIONING CHECK LIST - SHEET 1 OF 2

Customer .....
Site Address .....
.....

Tick off each item

### OIL TANK

- Is there sufficient oil, and of the correct grade for the appliance?
- Is the tank adequately supported?
- Is a damp-proof membrane inserted between the tank and support? (Non plastic tanks).
- Does the tank slope at least 20mm per metre of length downwards towards the sludge cock? (Non plastic tanks).
- Is the tank painted or suitably protected externally?

Is the tank fitted with the following:

- Contents gauges
- Screw fill and independent vent cover or capped fill and vent pipes.
- Outer valve
- Filter
- Sludge cock (Non plastic tanks).

#### HEIGHT OF TANK

- Is the bottom of the tank above the oil pump if a single pipe system is installed?

#### OIL SUPPLY LINE

- Ensure that galvanised iron has not been used.
- If black iron has been used, is it protected against corrosion?
- Ensure that soldered connections on copper pipes have not been used.
- Is the size of the pipe adequate for the boiler rating?
- Are all joints leak proof?
- Is a fire valve fitted?
- Is a filter fitted? (correct way round)
- Is the oil line connected to the correct inlet connection of the pump?

Appliance Model.....
Serial No.....
Fuel.....

- Is the oil supply clean and free of water or other contamination?
- Disconnect the oil supply as close to the burner as possible and drain approximately a gallon of oil into a very clear container. Inspect the oil for impurities and repeat the process if necessary.

Do not re-connect the oil line until water and all impurities have been removed from the oil supply.



IF NOT THIS MAY DAMAGE THE PUMP.

- Clear oil filters and de-sludge the tank if necessary.

#### **TWO PIPE OIL SYSTEMS**

- Is a spring-loaded non-return oil valve fitted in the suction line? (or a 3K Oil Deaerator).
- Does the return oil line terminate in the tank at the same level as the suction outlet?
- Has an anti-syphon cut been made in the return oil line (inside the tank)?

#### **BOILER**

- Is the boiler standing on a level incombustible hearth?
- Are the thermostat phials inserted in their pockets?
- Are the baffles and bottom insulation (where applicable) correctly located?
- Is the boiler set for the fuel being supplied?
- Has the system and boiler been filled with water and inhibitor as required?
- Is the boiler flueway inspection cover screwed down sufficiently firmly to form a seal?

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#### **7:4 BOULTER BUDERUS RECOMMENDED COMMISSIONING CHECK LIST - SHEET 2 OF 2**

#### **CASING PANELS**

- Have grommets been fitted to relevant oil supply entry points (knockouts)?
- Does electrical cabling pass through a grommet to prevent chaffing?

#### **BURNER**

- Is the oil pump by-pass screw fitted, if applicable?
- Remove the burner. Is the correct nozzle fitted?

NOTE:- Burner operating instructions can conflict because they are intended for general guidance. Since the burner has been specifically matched to the particular boiler, the information in the Boiler manual takes precedence.

#### **FLUE AND CHIMNEY**

- Is the flue adequately sized for the appliance rating?
- Is the flue free of any obstruction?
- Has the chimney been adequately lined and insulated?

NOTE:- Lining the flue and back filling will help prevent condensate problems

#### **BALANCED FLUE APPLIANCES**

- Is the correct flue kit fitted?
- Is the Flue off take correctly secured to the boiler by four nuts and washers. Is the gasket provided fitted correctly?
- Has the rear Air Entry Plate been fitted with Blanking Plates where necessary?
- Can leakage from flues tubes or air ducts occur? All seals fitted correctly?
- Is the sampling test point (on high level or vertical kits) resealed?

#### **VENTILATION**

##### **CONVENTIONAL FLUED BOILERS**

- Is the ventilation opening from the outside to the boiler room adequate?
- Is there sufficient clearance for air to enter the Boiler at the rear of appliance?
- Will any ventilation fans prevent adequate supply of combustion air?
- Is the CF adaptor fitted correctly to the boiler with all nuts and gaskets?
- Is the sampling test point resealed?

#### **ELECTRICAL POWER SUPPLY**

- Is the electrical supply to the appliance appropriate?
- Are the electrical input connections to the control panel correct?
- Is the supply fuse correct?
- Does the wiring comply with the latest IEE regulations?

- Does the power supply cable enter the casing through a grommet?

## GENERAL

- Has the boiler been installed in accordance with manufacturers instructions?

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## 7:5 BOULTER BUDERUS RECOMMENDED COMMISSIONING TESTS

- Have the manufacturers on-site assembly instructions been followed?

## COMMISSIONING TESTS

BEFORE ATTEMPTING TO START THE BOILER PLEASE THOROUGHLY CHECK ALL ITEMS ON THE COMMISSIONING CHECK LIST. THIS WILL HELP TO AVOID UNNECESSARY CALL BACKS

ENSURE THAT THE BOILER IS MATCHED MOST CLOSELY TO THE HEATING SYSTEM REQUIREMENTS BY FITTING THE CORRECTLY SIZED NOZZLE AND/OR CHOOSING THE CORRECT OIL PRESSURE.

Fit combined air bleed manifold and 0-300psi (0-20 bar) pressure gauge to the appropriate oil pump connection, and replace burner.

Set the boiler thermostat to between Summer and Winter positions, see [fig. 1](#).

Switch on the electrical supply to the boiler, checking that programmers are switched to the 'ON' position, and that the room thermostats are calling for heat.

When the burner motor starts, on one pipe systems it may be necessary to temporarily open the air bleed screw on the test manifold.

If the burner locks out during the ignition attempt, wait 45 seconds before pressing the reset button on the control box. Several attempts on first firing may be necessary.

Once the burner is firing check and if necessary adjust the oil pressure.

CARRY OUT COMBUSTION CHECKS BY INSERTING PROBES INTO SAMPLING POINTS PROVIDED:

Low level balanced flue, rear or side - end of terminal.

High level balanced flue, rear or side - end of terminal, or TEST POINT in boiler.

Vertical balanced flue - TEST POINT in boiler.

Conventional flue - hole provided via screw in vertical offtake section.

Check the Smoke No., if clean wait 10 minutes and measure CO<sub>2</sub>.

- Adjust the air shutter if necessary, open to reduce CO<sub>2</sub>, close to increase CO<sub>2</sub>.

If the air shutter is adjusted, re-check the Smoke No.

- Check the flue gas temperature.

The figures should agree with the Boiler Commissioning Data.

- Check lockout function, either cover the photocell or remove solenoid coil, to simulate flame failure. Reinstall components and press lockout button.

- Check the operation of the limit thermostat

- Complete commissioning report and enter the details on to the guarantee form which should be returned to BOULTER BOILERS in the envelope provided.

- Instruct the user on the operation of the appliance and leave this manual with the customer.

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## **8:1 MAINTENANCE**

A boiler fired with Class C Oil should only require attention once each year.

### **8:1.1 General Inspection**

With the Boiler operating, inspect for signs of unsatisfactory operation, i.e. leakage of combustion products, leakage of oil, or unusual noises from the pump or motor.

Check the commissioning list if it is your attendance to the appliance. Is there a reason why the Boiler might fail after you leave?

It is useful to measure the combustion data, i.e. CO<sub>2</sub>, Smoke No. and flue gas temperature, and a check on the oil pressure, prior to carrying out maintenance work.

### **8:1.2 Maintenance Procedure**

**Switch off electrical supply at the MAINS ISOLATING SWITCH.**

#### **OIL TANK**

De-sludge oil tank (if necessary), and draw off any accumulated water.

Check the correct grade of oil is being used.

#### **FILTERS**

Inspect and clean all oil filters. Change paper elements for new.

#### **BURNER**

Turn off the oil cock and disconnect the flexible oil hose from the oil cock.

Remove burner and clean thoroughly, the burner draught tube, the electrodes and generally the head assembly. CHANGE the nozzle for one with the specified make, oil rate, spray pattern and angle.

Inspect the ignition electrodes for crazing in the porcelain. Replace if there are signs of deterioration.

A dirty fan impeller can impair the performance of a burner, inspect and clean if necessary.

Inspect photocell, if badly discoloured, change it. Inspect the flexible oil hose for leaks or discolouration. Use only replacement flexible oil hoses that are detailed in the spare parts section of this manual.

## BOILER

The 40/95 Boilers are serviced from the front. The larger 100/130 Boilers are serviced from the front and top.

Remove flue inspection cover/s, and baffles, and clean all heat transfer surfaces and baffles. Replace any damaged or unserviceable parts with manufacturers proprietary parts.

Inspect flue and air ducts for deterioration of seals, and repair if necessary. Re-lubricate with a mild detergent when refitting.

Refit parts and inspect seals etc. which should be replaced if required.

## COMBUSTION TESTS

Fit combined air bleed manifold and 0-300psi (0-20 bar) pressure gauge to the appropriate oil pump connection, and replace burner.

Switch on the electric supply to the boiler.

When the burner motor starts, on one pipe systems, it may be necessary to temporarily open the air bleed screw on the test manifold.

Once the burner is firing check and if necessary adjust the oil pressure.

Carry out combustion checks by inserting probes into sampling points provided or at the flue outlet.

Check the Smoke No., if clean wait 10 minutes and measure CO<sub>2</sub>.

Adjust the air shutter (see [fig 8.2a](#)), if necessary, open to reduce CO<sub>2</sub>, close to increase CO<sub>2</sub>. If the air shutter is adjusted, re-check the Smoke No.

Check the flue gas temperature.

The figures should agree with data in Boiler Commissioning Data, Section 3.

## FINAL CHECKS

Check lockout function, either remove photocell and cover it, or remove solenoid coil, to simulate flame failure. Reinstall components and press lockout reset button.

Check that the control thermostat is operating when the set temperature is reached.

Check the operation of the limit thermostat if possible.

Reset Limit thermostat once appliance temperature has dropped sufficiently.

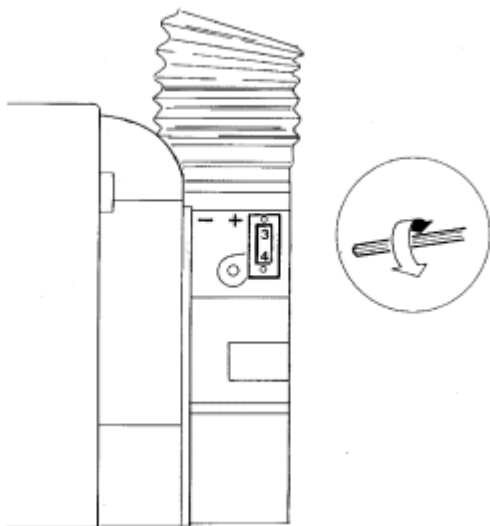
Complete a maintenance report and give the customer a copy, retaining a copy for your records.

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### 8:2 AIR SHUTTER ADJUSTMENT

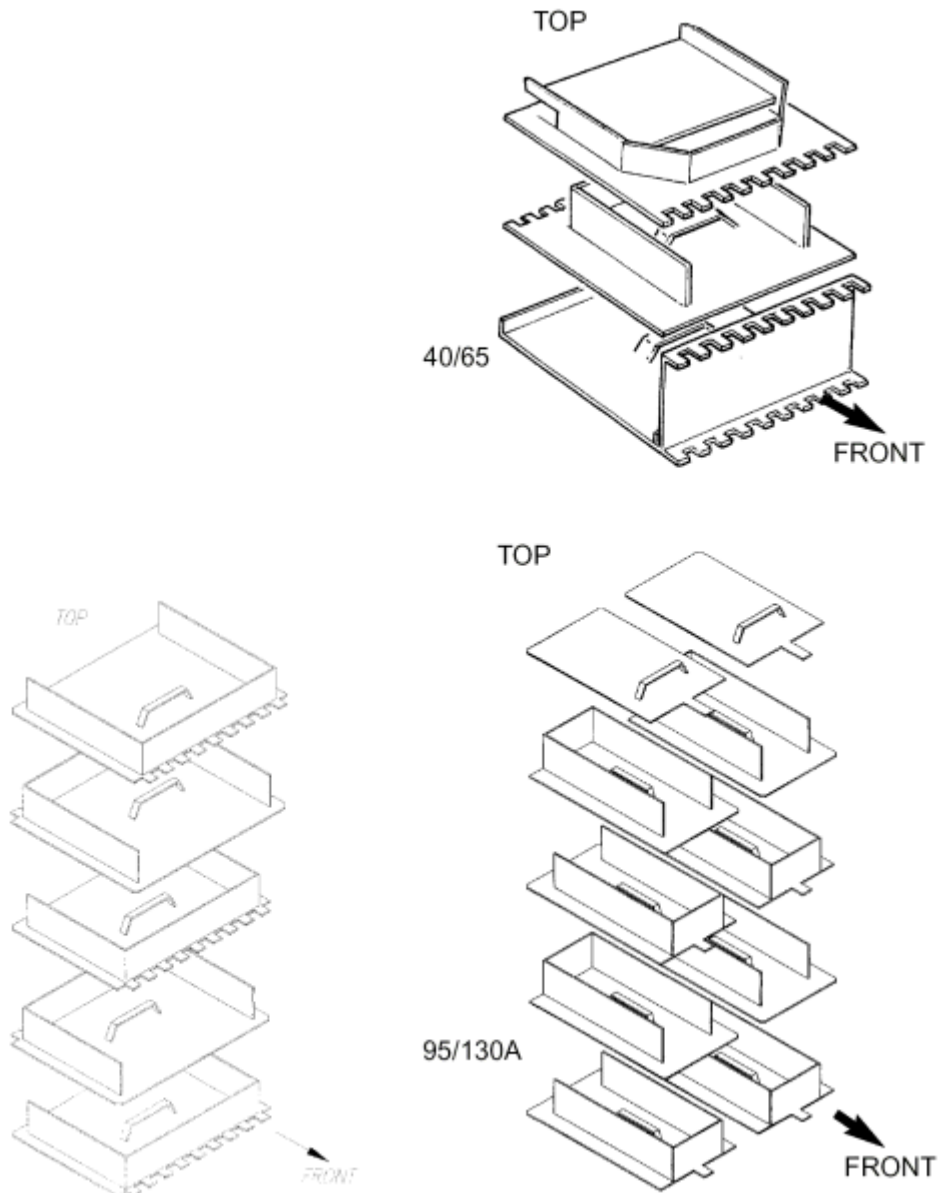
The Burner has a fixed Air Shutter with manual adjustment.

To adjust the CO<sub>2</sub> at the Air Shutter use a 3mm allen key as shown. To increase the setting turn the airshutter clockwise (+) and to decrease turn anticlockwise (-).



*Fig. 8:2a Air Shutter Adjustment*

### 8:3 BAFFLE ARRANGEMENT



*Fig. 8.3a Baffle Arrangement*

To ensure correct placement of baffles ensure that castellated edges are positioned towards the heat exchanger and:

1. All baffles are horizontal
2. All baffle handles are in the forward position.

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### **10:1 FAULT FINDING**

If the Boiler fails to start, make the following checks before calling a service engineer:-

1. Is there sufficient fuel in the storage tank?
2. Are all fuel supply valves open (turned fully anti-clockwise) and ball valves open?
3. Is the mains electricity supply switched on?

4. Is the programmer (or Boiler Operating Switch) set to call for heat?
5. Is the Boiler Thermostat set to the desired temperature?
6. Is the Lock-out Reset Button on the Control Box and Control Panel Neon illuminated? If so, press to reset Burner.
7. Check the fuse which should have been fitted to the mains electricity supply to the programmer/boiler operating switch. If the fuse has blown, replace it. If it blows again, call a Service Engineer.

### IMPORTANT - Electrical Safety

IT IS ESSENTIAL THAT BEFORE ANY PANELS OR COMPONENTS ARE REMOVED FROM THE BOILER, THAT THE MAINS ISOLATOR IS SWITCHED OFF.

### 10:2 Fault Finding Chart

	<i>Trouble or Complaint</i>	<i>Possible Cause</i>	<i>Action</i>
1.	Suspect oil supply	No oil in tank  Supply valves closed Blockage in oil supply (Gravity head feed)  Wrong grade of oil  Water contamination Tank vent blocked Filter blocked Air locks in supply pipe Air lock in pump	Check and arrange for tank to be filled if necessary  Open all supply valves Shut off the burner isolating valve. Disconnect the oil supply at the pump entry. Place receptacle under the pipe. Slowly open the valve, not is the flow is unrestricted, restricted or blocked. Check for correct grade of fuel (see <a href="#">technical data</a> ) Open tank, drain valve and check Check Check for water or blockage Check for high points in main oil supply Bleed pump, check flexible oil line.
2.	Burner will not start	Interruption or absence of electrical supply at burner (Check this at Control Box mains terminal with test lamp) Control Box is locked out, refer to <a href="#">symptom 4</a> Photo-resistor receiving false light Faulty control box	Check mains switch on. Check fuse in switched spur or plug. Check that time switch or programmer contacts are closed. Check that the auxiliary stat is closed. Check boiler stat, cylinder stat, room stat are calling for heat. Press reset button on the burner box  Check that the photo-resistor is fully home in its housing. Burner will not start with illuminated cell. Replace.
3.	Burner lights up but locks out after 15 seconds	No oil supply Photo-electric cell not receiving light from flame Photo-electric cell connections loose Control box photo-electric cell circuit faulty Flame instability	Check oil in the tank. Check that photo-electric cell is clean and fully home in housing  Check and tighten if necessary. Replace control box. Check combustion setting out and reset if necessary.

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- |    |                                     |  |  |
|----|-------------------------------------|--|--|
| 4. | Burner starts but will not light up | This can be due either to absence of oil of ignition.<br>Oil pump air locked (repeat air locking may be due to poor pipe | Pump should be self-venting with two pipe system only. If a one pipe gravity feed is employed it must be purged through the vent port. |
|----|-------------------------------------|--|--|



		joints or defective gland packings)		
		Motor not driving pump shaft	Check that flexible drive is functioning correctly and not slipping.	
		Blocked atomiser nozzle	Remove and replace nozzle.	
		Oil pressure abnormally low	Check oil pressure on gauge and set to the correct pressure (see <a href="#">technical data</a> ).	
		Solenoid valve faulty	Break union at outlet to check presence of oil. Check that seat is clear. Check coil for continuity. Inspect coil feed wiring to control box.	
		Pump rotation incorrect	Check.	
		<i>Ignition failure:</i>		
		Electrodes dirty	Inspect and clean if necessary.	
		Electrodes mis-set	Inspect and reset gap 3 to 4mm between tips. 2mm in front of nozzle face.	
		Cracked electrode insulator.	Check and replace if cracked or crazed.	
		Electrode leads	Check for proper connections	
5.	Burner lights up, runs continuously and emits visible smoke or shows excess smoke on combustion check	Air shutter closed	Reset to correct position.	
		Wrong nozzle	Check make, type and spray angle.	
		Worn atomiser nozzle	Replace if necessary.	
		Oversize nozzle fitted in error	Check size and replace with correct size of necessary.	
		Nozzle incorrectly stamped	Replace with correct nozzle.	
		Burner air supply inadequate	Inspect air intake and fan for fouling of impeller with dirt.	
		Burner oil pressure excessive	Check pressure and reset to correct pressure (see <a href="#">Technical Data</a> ).	
6.		Burner lights up, runs normally but flame cuts off slowly on shut down (possibly with smoke or pulsation)	Air in nozzle	Should self-correct; if air repeatedly present; for leaks on oil line and flexible. Inspecting and replace if necessary.
			Magnetic valve not operating correctly	
			Shut off piston in pump sticking	Replace pump.
7.	Burner Pulsates (a) continuously	Air shutter setting incorrect or fan inlet blocked	Inspect and reset or remove blockage.	
		Grossly oversized nozzle	Checked and replace with correct size and type (see <a href="#">Technical Data</a> )	
		Air supply inadequate	Check fan operation and cleanliness.	

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7.	Burner pulsates (a) continuously (b) at initial firing	Worn nozzle with excess throughout or uneven spray pattern	Replace with nozzle of correct type and size (see <a href="#">Technical Data</a> ).
		Air in supply line	Purge at pump to remove.
8.	Burner locks out on morning starts then runs perfectly for rest of day	Blocked flue ways	Clean boiler and flue.
		Localised low voltage supply in early morning	Check with local Electricity Board to fit recorder. Enlist aid of the Board.
		Air present in oil supply	Restart burner several times - press lockout reset button repeat 7(b) above.
		Bottom of oil tank below level of oil pump	Raise tank or install a two pipe oil supply from tank.
9.	Burner fails due to blown fuse.	Non-return valve faulty or air leak in two pipe oil supply system.	Renew non-return valve. Rectify air leak
		Short circuit in wiring	Inspect wiring, sheathing and inter-component connections for broken or damaged leads. Replace

		Motor seized	if necessary.
		Breakdown of insulation of motor windings	Check by hand and replace if necessary.
			Replace motor.
10.	Burner runs normally but will not reach desired temperature	Oil throughput insufficient	Check nozzle size and pressure against rating
		Boiler has become undersized due to heating system expansion	Check with heating installer.
		Low efficiency and CO <sub>2</sub>	Check combustion readings, reset air.
		Low efficiency due to high flue gas temperature	Clean heat exchanger surfaces
		Faulty boilerstat.	Replace, check and clean.
		Partially blocked filter	
11.	Poor combustion readings	Low CO <sub>2</sub>	Check: CO <sub>2</sub> , oil pressure, nozzle size (see <a href="#">Technical Data</a> )
		High CO <sub>2</sub>	Check: CO <sub>2</sub> , oil pressure, nozzle size (see <a href="#">Technical Data</a> )
		High smoke	Check: CO <sub>2</sub> , oil pressure, nozzle size (see <a href="#">Technical Data</a> )
		High flue gas temperature	Check all Baffles are in place and correctly located.
		Leaking joints	Check: air shutter, nozzle size (see <a href="#">Technical Data</a> ), clean heat exchanger surfaces.
12.	Oil odour		Break all leaking joints and re-make

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13.	High operating temperature	Control stat failed and operating on limit stat	Replace control stat and reset Limit Thermostat
14.	Fumes in Boiler Room	Inadequate draught due to unsatisfactory chimney or blockage of boiler flue ways or flue pipe	Take necessary corrective action
15.	Unstable flame, some puffing, ignition cuts in intermittently	Air damper on burner improperly adjusted or faulty nozzle or unsatisfactory draught conditions or fault in oil supply	Set up burner as for commissioning using oil pressure gauge, smoke pump, CO <sub>2</sub> indicator and draught gauge, adjust settings as necessary, replace nozzle if necessary. See <a href="#">Commissioning Check List</a> and Servicing Notes.

Due to a policy of continual development Boulter Buderus reserves the right to alter or amend the design of its products without prior notice.

Indicates changes from previous issue

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