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May 1985

Erection and Maintenance
Instructions for the

EDEN SERIES TWO

CAST-IRON SECTIONAL BOILER

 **POTTERTON**
COMMERCIAL PRODUCTS DIVISION

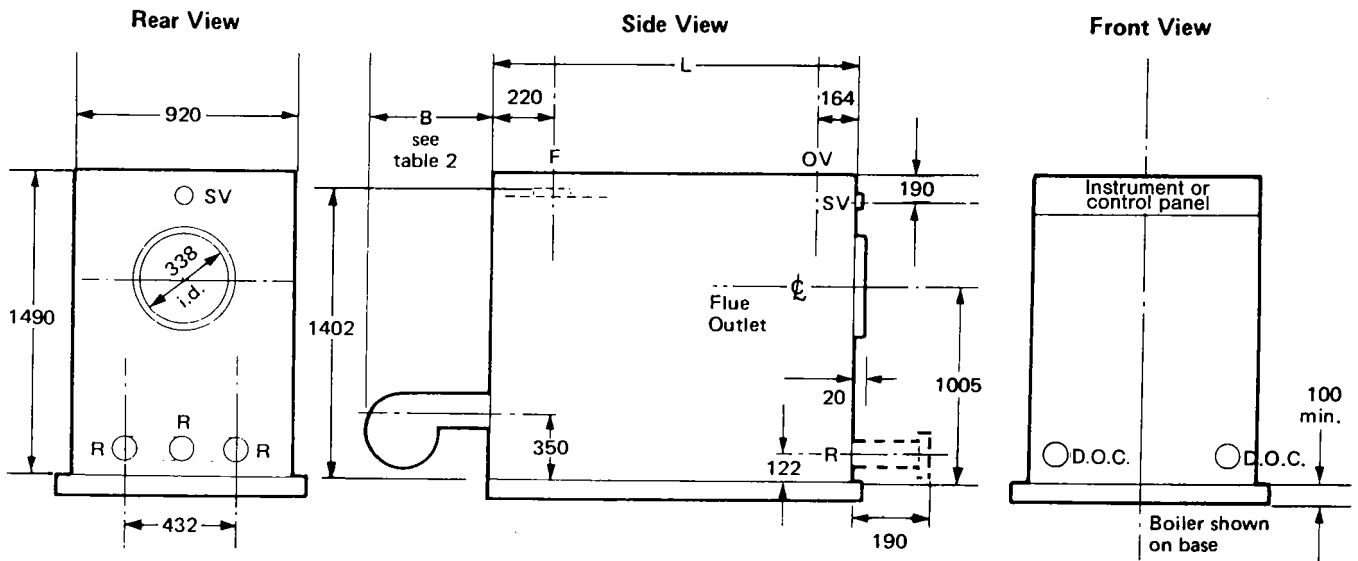
CONTENTS

Section Nos.		Page Nos.
	SECTION 1 – THE BOILER	
1	GENERAL	4
1.1	The boiler	4
1.2	The burners	4
2	SITE REQUIREMENTS	4
2.1	Related documents	4
2.2	Location	4
2.3	Access and Clearance	4
2.4	Boiler Base	4
2.5	Fuel Supply	5
2.5.1	Gas supply	5
2.5.2	Oil supply	5
2.6	Flue connection and draught requirements	5
2.7	Fresh air requirements	6
2.7.1	Natural ventilation	6
2.7.2	Mechanical ventilation	6
2.8	Electricity supply	6
2.9	Noise level	6
2.10	Water pressure, temperature and resistance	6
	SECTION 2 – BOILER ERECTION	
1	PREPARATION	6
2	ERECTION PROCEDURE	7
2.1	Waterway sections	7
2.2	Boiler platework and connections	9
2.3	Insulation	10
2.4	Fitting the jacket	10
2.5	Fitting the burner	11
2.6	Electrical connections	11
	SECTION 3 – COMMISSIONING	
1	BURNER SETTING	14
2	SETTING OF THERMOSTATS	14
2.1	Control thermostat	14
2.2	Limit thermostat	14
2.3	High/Low thermostat	14
2.4	Hours run meter	14
2.5	Flue gas thermometer	14
	SECTION 4 – SERVICING	
1	GENERAL	14
2	CLEANING OF FLUE SURFACES	14
3	SIGHT GLASS	15
4	THE BURNER	15
5	WATER SYSTEMS	15
6	IMPORTANT NOTES	15

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SECTION 1 – THE BOILER

Fig. 1. General Data and Dimensions



F = Flow Connection, 4 inch BSP screwed flanged
 R = Return Connection, 2 off 4 inch BSP screwed flanged on boiler.
 S.V. = Safety Valve Connection, 2 inch BSP female.
 O.V. = Open Vent Connection, 2 inch BSP female.
 D.O.C. = Draw Off Connection, 3/4 inch BSP female.

A header must be used to connect the return connections as shown dotted with a single central offtake.

Table One – General Data

BOILER REF.	BOILER OUTPUT		L DIMENSION		WEIGHT EMPTY*		WATER CONTENT	
	kW	Btu/h x 10 ⁶ approx.	mm	in	kg	lb	kg	lb
Two/6	190	0.648	1199	47.2	1166	2565	302	664
Two/7	241	0.822	1362	53.6	1332	2930	353	777
Two/8	291	0.993	1525	60	1497	3293	404	889
Two/9	342	1.167	1688	66.5	1663	3659	454	999
Two/10	392	1.338	1851	72.9	1828	4022	505	1111
Two/11	443	1.512	2014	79.3	1995	4389	555	1221
Two/12	493	1.682	2177	85.7	2160	4752	605	1331
Two/13	544	1.856	2340	92.1	2325	5115	656	1443
Two/14	594	2.027	2503	98.5	2492	5489	706	1553
Two/15	645	2.201	2666	105	2658	5848	757	1665

* Less Burner

1. GENERAL

1.1 The Boiler

The Potterton Eden Series Two boiler is a high efficiency, modern design, cast iron sectional boiler with push nipple joints, designed to the latest British and European standards for construction, safety and efficiency. A circular shaped combustion chamber with wide horizontal and vertical secondary flueways, gives a relatively low flue gas resistance and allows easy cleaning through a hinged door at the front and removable coverplates on top. The boiler sections are insulated by an aluminium foil backed blanket and the whole is encased by a stove enamelled, sheet steel, modular jacket.

The standard control panel mounted at the top front of the boiler incorporates control and limit thermostats and mains isolator. The electrical connection between the panel and burner is through a pre-wired plug and socket. The standard control panel is supplied with low flame start oil burners and on/off gas burners.

An optional instrument panel is also available mounted at the top front of the boiler. It incorporates control, limit and high/low thermostats, water and flue gas thermometers, indicator lights, a pressure gauge, mains isolator and hours run meters. The electrical connection between the optional instrument panel and the burner is through a pre-wired plug and socket. This optional instrument panel is supplied for high/low burners.

1.2 The Burners

A range of fully matched gas, oil and dual burners are available. All burners fully conform to the latest British Gas and British Standard specifications and are on/off or alternatively high/low type. All burners except on/off type conform to M&E3 specifications. The burners are supplied with a pre-wired trailing lead fitted with a multi-pin socket which plugs into the boiler instrument or control panel. The boiler front plate is drilled and tapped for fitting the burner to the boiler.

Fully detailed instruction manuals are provided by the burner manufacturer, but specific setting up details applicable to each size of Eden Series Two are given in section 3 of this manual.

2. SITE REQUIREMENTS

2.1 Related Documents

The installation of the boiler must conform to the relevant requirements of the Local Authority, the bye laws of the Local Water Undertaking and the I.E.E. Regulations. Where applicable, the installation should also conform to the relevant requirements of the Gas Safety (Installation and Use) Regulations 1984 and the local Gas Region. The relevant recommendations of the following British Standard Codes of Practice should also be followed:

- CP. 331 CP.332
- CP. 341 CP.342
- B.S.5410 Part 2 1977

The following two British Gas Publications should also be noted:

- "Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters" and
- "Combustion and Ventilation Air – Guidance Notes for Boiler Installations in excess of 2×10^6 Btu/hr. (586 KW) output".

Boiler Ref. Eden series	Dimension X mm
Two/6	1400
Two/7	1565
Two/8	1725
Two/9	1890
Two/10	2050
Two/11	2215
Two/12	2375
Two/13	2540
Two/14	2700
Two/15	2865

4.

2.2 Location

The location chosen for the boiler must permit the provision of a satisfactory flue system and an adequate space for servicing and air circulation around the installation.

Any combustible material near to the boiler or its flue system must be so placed or shielded to ensure its temperature does not exceed 65° C (150° F).

For further information regarding boiler location, refer to CP.332, part 3 and BS.5410.

2.3 Access and Clearance

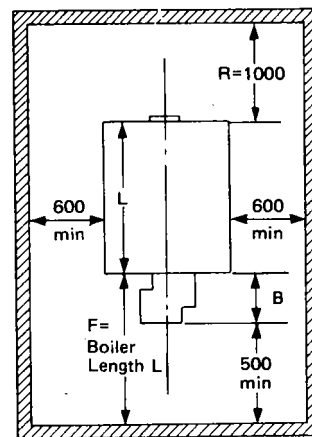
All component parts of the boiler will pass through a standard 762mm (30 in.) doorway. Individual sections can be handled by two men; section weights are as follows:

- Front section – 229 kg. (503lb)
- Intermediate section – 166 kg. (366lb)
- Rear section – 219 kg. (482lb)

It is essential to allow sufficient room for installation and servicing of the boiler and its firing equipment.

The boiler is cleaned from the front and the top and therefore access from each side is necessary for this to be carried out.

Fig. 2. Clearances



Front clearance. Keep this to a maximum practical for site conditions. This must be dimension B (burner length from burner card) plus 500mm minimum.

Rear clearance. Allow at least 1000mm for pipework and flue connection.

2.4 Boiler Base

The boiler must be installed on a level base of non-combustible material which is capable of supporting the weight of the boiler when it is full plus all ancilliary equipment. No special insulation is required other than that specified by the Local Authority and Building Regulations.

Steel floor levelling plates are provided with the boiler on which the sections are erected. These should be positioned on the base as illustrated in Fig. 3.

It is essential that the boiler base is at least 100mm (4in.) high terminating flush with the boiler front casing. For the 14 and 15 section boilers with "Electro oil" burners the base must be 150mm (6in.) high.

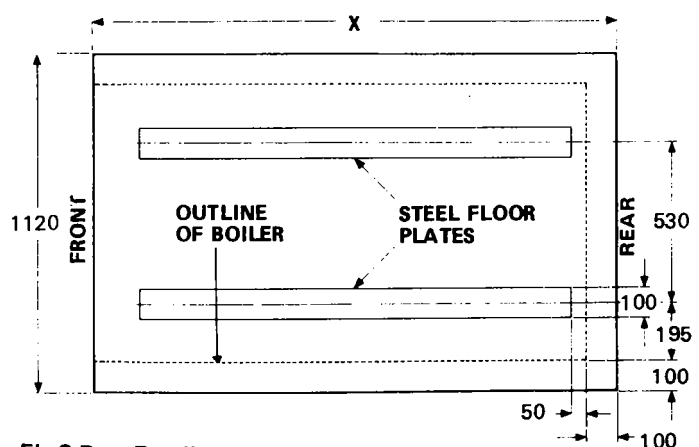


Fig.3 Base Details

2.5 Fuel Supply

Refer to the recommendations given in the burner manufacturer's manual.

2.5.1 Gas Supply

Service Pipes: The Local Gas Region should be consulted at the installation planning stage to establish the availability of an adequate supply of gas.

An existing service pipe must not be used without prior consultation with the Local Gas Region.

Meters: A gas meter is connected to the service pipe by the local Gas Region, or a local Gas Region contractor.

An existing meter should be checked preferably by the Gas Region to ensure that the meter is adequate to deal with the rate of gas supply required.

Installation Pipes: Installation pipes should be fitted in accordance with CP.331 Part 3.

Pipework from the meter to the boilers must be of adequate size. Do not use pipes of a smaller size than the boiler gas connection. A minimum working gas pressure of 17.5 mBar (7" w.g.) must be available at the burner governor inlet. A service gas cock must be fitted by the installer adjacent to the burner governor inlet.

The complete installation must be tested for soundness in accordance with CP.331 Part 3.

Boosted Supplies: Where it is necessary to employ a gas pressure booster, the controls must include a low pressure cut-off switch at the booster inlet. The local Gas Region must be consulted before a gas pressure booster is fitted.

2.5.2 Oil Supply Class 'D'

The oil in the storage tank or in the supply line to the burner should not be allowed to fall below the Cold Filter Plugging Point (CFPP). In the U.K., Class D fuel (Gas Oil) is normally distributed as Summer Grade, with a CFPP of 0° during the months March to September inclusive, and as Winter Grade, with a CFPP of -9°C during October to February.

If Summer Grade fuel is stored for use in the winter months, or if the Storage Tank is very much exposed to the elements, it may be necessary to insulate (or even heat) the tank and oil line.

The fuel supplier should be consulted regarding any recommendations for the storage and handling of fuel oil.

All pipework and fittings must be oil tight and screwed joints should be made good with an oil resisting jointing compound. It is recommended that a fire valve should be installed.

The supply should terminate close to the burner with a stop valve and filter and approximately the last ½m (18") should be run in flexible pipe to facilitate moving the burner away from the appliance during major servicing of the boiler.

The size and arrangement of pipework will depend on the distance and height of the storage tank in relation to the burner; refer to the burner manufacturer's handbook.

When a gravity feed is used, the maximum head should not exceed 4m (equivalent to a pressure of 35 kPa).

On installations where the fuel tank is situated below the level of the burner, a two-pipe (supply and return) fuel supply system must be used. Details are given in the burner manufacturer's handbook.

It is advisable to check the oil supply system with the oil supply company concerned.

2.6 Flue Connection and Draught Requirements

Refer to the Building Regulations and B.S. 337.

A 338mm (13.3in.) flue socket is provided on all boilers.

This is suitable for 250mm (12in.) nominal flue pipe.

All flue bends off the boiler outlet must be of an "easy sweep" pattern. Square 90 deg. bends and long horizontal flue runs should be avoided if possible; bends with a cleaning access should be fitted where necessary.

The boilers can be installed on either a single or common flue system (for multi-boiler installations). Any materials used in the flue system must be mechanically robust, resistant to internal and external corrosion, non-combustible and durable under the conditions to which they are likely to be exposed.

Prevention of condensation within the flue system should be taken into consideration and to this end the use of a double walled flue pipe or suitable insulation is recommended. Where condensation is likely, a means of draining must be provided.

The flue system must ensure the safe and efficient operation of the boiler(s) and should terminate in a freely exposed and unobstructed position, located to prevent the flue products causing a nuisance.

The flue system should be capable of evacuating the total flue gas products, see table three. The burner is designed to overcome boiler resistance and therefore minimal draught is required at the boiler flue outlet.

Table Three – Flue Gas Volumes

BOILER REF. EDEN SERIES	BOILER OUTPUT		FLUE GAS VOLUMES* Approx			
	kW	Btu/h x 10 ⁶ approx.	OIL		GAS	
			m ³ /h	ft ³ /h	m ³ /h	ft ³ /h
Two/6	190	0.648	302	10692	340	11988
Two/7	241	0.822	384	13563	431	15207
Two/8	291	0.993	464	16385	520	18371
Two/9	342	1.167	545	19256	612	21590
Two/10	392	1.338	625	22077	701	24753
Two/11	443	1.512	706	24948	792	27972
Two/12	493	1.682	786	27753	881	31117
Two/13	544	1.856	867	30624	973	34336
Two/14	594	2.027	947	33446	1062	37500
Two/15	645	2.201	1028	36317	1153	40720

* At s.t.p.

The above volumes have been calculated on the following assumptions:

Oil: 80% Efficiency : 30% Excess Air

Gas: 80% Efficiency : 45% Excess Air

Efficiency based on gross C.V. of fuel and a flue gas temperature of 260°C (500°F).

Minimum draught at boiler flue outlet – balanced

Maximum draught at boiler flue outlet – 6mm

If the draught exceeds 6mm under full load running conditions, either a draught stabilizer or draught break should be installed.

Whilst the responsibility for the design of the flue must lie with the contractor or customer, for technical assistance in flue sizing, please contact the Technical Department of the Commercial Division of Potterton International Limited at Warwick; the address and telephone number is on the back page of this manual.

A flue gas temperature gauge is provided on the optional instrument panel complete with capillary, phial and ½ in. BSP pocket. The installer must fit the pocket on a suitable length of flue pipe adjacent to the boiler offtake. It is also recommended that the installer should provide a tapped and plugged flue gas sampling point in the same area.

2.7 Fresh Air Requirements

2.7.1 Natural Ventilation

A permanent fresh air supply must be made available as close to the boiler as possible and at low level. This free area for ventilation must communicate directly with outside air. The grilles used should be of the 'low loss' type and must not be located in a position liable to blockage, flooding or an ingress of air from an inflammable process extraction.

If the boiler room is exposed it is desirable to have both high and low level air inlet grilles on at least two sides of the boiler room. High and low grilles must ALWAYS be on the same wall when only one external wall is used. Refer to Table four for boiler room free air vent areas at high and low level.

2.7.2 Mechanical Ventilation

For forced air ventilation 1.1m³/s per 1000kW total rated heat input shall be provided at low level and 0.45m³/s per 1000kW shall be provided at high level for extract. See B.S. Code of Practice CP.332 Part 3 for details.

Where the associated high level extract is by simple openings relying on thermal affects their area shall be the same as for natural ventilation given in table four.

High level mechanical extract and natural low level ventilation is not allowed.

NOTE: For mechanical ventilation system an automatic control should be provided to cut off the fuel supply to the boiler(s) in the event of failure of air flow in either inlet or extract fans.

Table Four – Free Air Inlets

TOTAL INPUT RATING OF BOILER(S)	POSITION OF AIR VENT(S)	AIR VENT AREAS (Air direct from outside)
60kW to 2MW	High Level	270cm ² plus 4.5cm ² per kilowatt in excess of 60kW total rated input.
	Low Level	540cm ² plus 4.5cm ² per kilowatt in excess of 60kW total rated input.

For basement boiler houses the low level ventilation shall be provided at low level by suitably sized ducting. See B.S. Code of Practice CP.332 for further information.

2.8 Electricity Supply

A 415V, 50 Hz, AC, 4 wire, three phase electrical supply is required. The incoming mains supply should be terminated at the mains isolator on the boiler instrument panel. The electrical supply should be suitably fused by the installer with regard to the start and run currents. Refer to the burner card for details. No fuses are supplied. All wiring must be in accordance with I.E.E. regulations.

2.9 Noise Level

The noise level will vary according to the various burner and fuels used. As a guide only, the noise level of a typical gas or oil fired boiler is approx. N70 to N75 under normal running conditions.

2.10 Water Pressure, Temperature and Resistances – See Fig. 4.

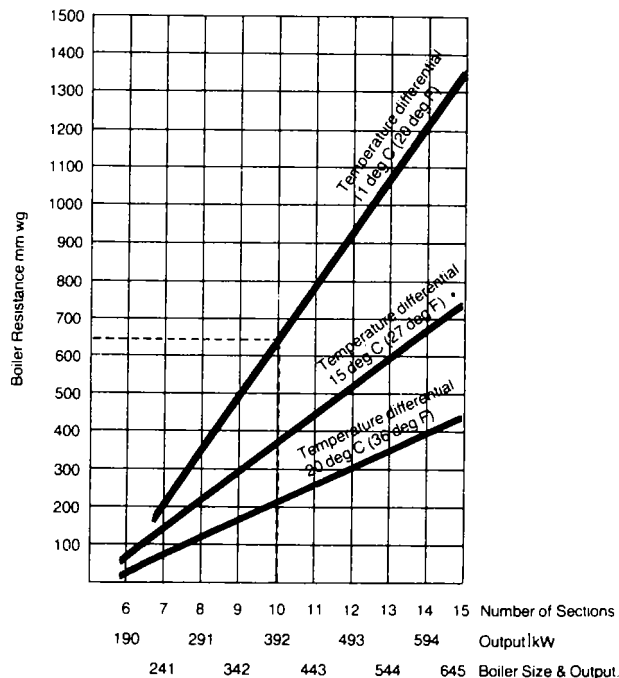
Maximum operation pressure	– 3.5 bar (50p.s.i.).
Minimum operating pressure	– 0.3 bar (4.4p.s.i.).
Maximum operating temperature	– 120°C (248°F).
Minimum operating temperature	– 60°C (140°F).

6.

The minimum return water temperature should not drop below 55°C (131°F) under normal running conditions. The maximum temperature drop across the boiler must not exceed 25°C (45°F) under normal running conditions as to minimise undue strains and stresses on the boiler.

The resistance or pressure drop through the boiler for different water flow rates is given in Fig. 4.

Fig. 4. Water Resistance



Example: For an Eden Series Two/10 rated at 392kW the resistance through the boiler for an 11 deg. C (20 deg. F) temperature drop is 650mm (26 inch) approximately.

SECTION 2 – BOILER ERECTION

1. PREPARATION

Particular attention must be paid to ensure that the boiler room and the waterway sections are clean. Dust and moisture should be removed from the sections, particularly in the sealing strip grooves, to ensure that when assembled, gas tight joints are made.

There are three types of waterway sections, front, intermediate and rear; the sections are numbered consecutively, in the reverse order of assembly. If it is found to be more convenient for handling, the flue door on the front section can be removed by knocking out the two hinge pins; do not remove the hinges from the fixing studs.

Check off all materials and parts against the delivery document. Materials delivered to site include the waterway sections, push nipples, assembly bolts with washers and nuts, sealing strip, individual top flue cover plates with gaskets, burner mounting plate, section floor plates, insulation panels and jacket.

Standard boiler erection tools will be required and these should include a crowbar, heavy duty adjustable wrench and a rawhide mallet; these items are not supplied. The boiler can be erected by two operators.

2. ERECTION PROCEDURE – See Fig. 5

2.1 Waterway Sections

2.1.1 Place the floor plates in position on the boiler base as shown in Fig. 3. On boilers of ten sections and over, two plates each side are provided.

2.1.2 Erect the back section in position on the floor plates with its rear face level with the end of the plates; support the section in this vertical position.

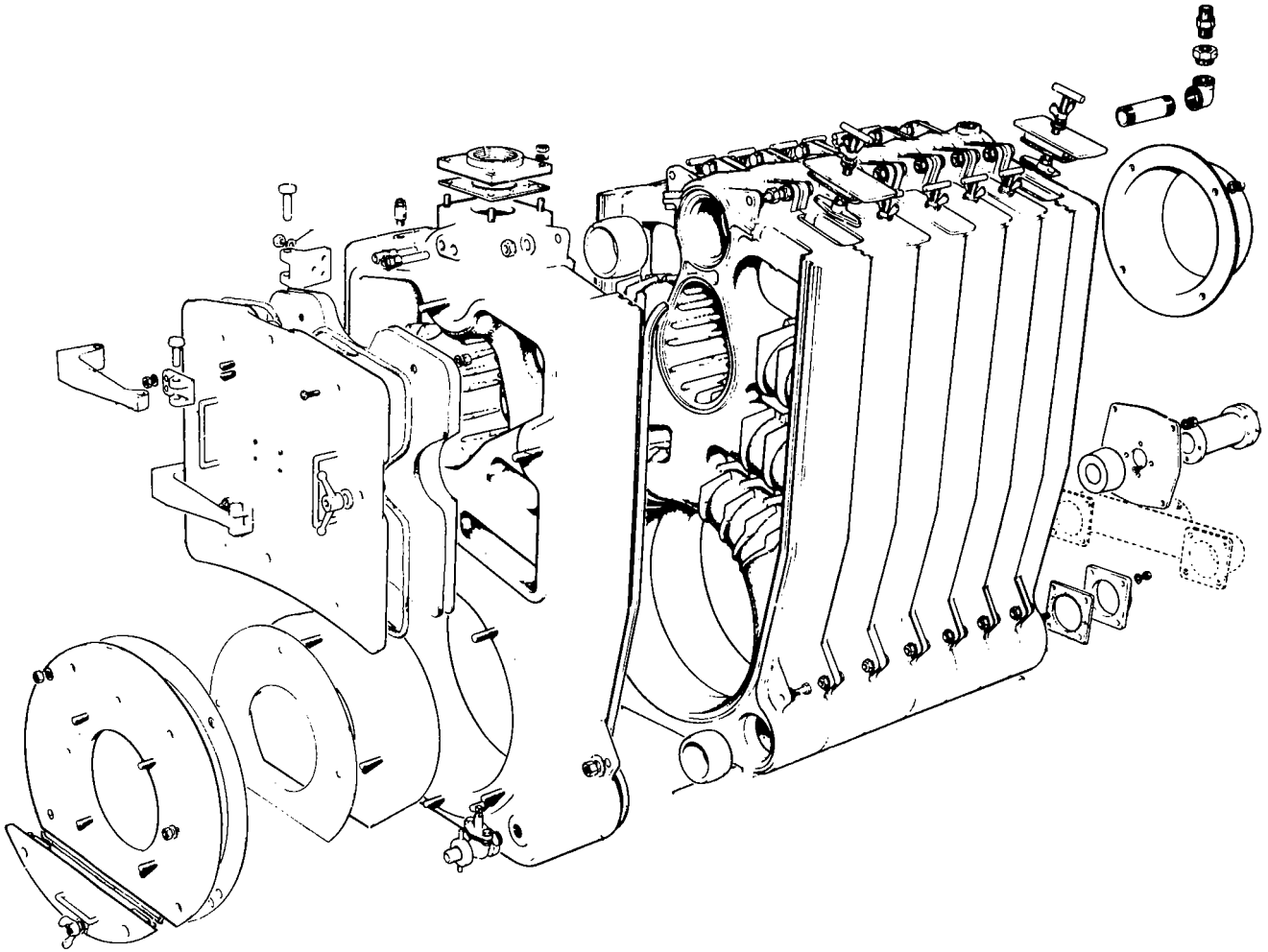


Fig. 5. – BOILER ASSEMBLY

2.1.3 Insert a set of push nipples (three) in the nipple holes in the back section.

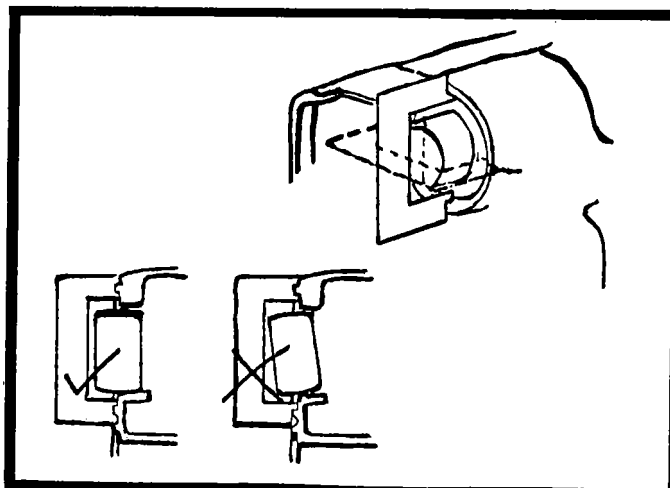
One 400 gram tin of Stag type 'A' is provided with each boiler. The boiler steel nipples should be coated evenly with the stag jointing compound provided.

It is recommended that this be applied with a brush and it is essential that care is taken to ensure that this coating is free of grit or other solid particles. When using this compound **do not** coat the nipples and section ports with oil.

Provided with this boiler are nipple alignment gauges. These should be used to ensure that the nipples are entered into the section ports squarely.

Use the smaller gauge for the bottom nipples and the larger for the top. Try the gauge over the nipple in two positions at right angles and ensure that the face of the nipple is parallel to the gauge. The actual dimension of the gap between nipple and gauge is not important.

See illustration.



2.1.4 Fit sealing strips to the grooves on the rear face of the first intermediate section. The sealing strips are supplied on reels which each hold two or three strips. Ensure that the strips are clean so that they adhere in the grooves in the section: Strips must be fitted to each of the two grooves down the side of each section, around the lower two push nipple holes, passing below the combustion chamber

orifice. An additional strip must be fitted around the centre flueway and the top push nipple hole. Another short length of strip must then be fitted above the top push nipple hole, terminating either side of the upper bolt hole lugs; see Fig.6. It is most important that a good seal is made and that the strips are pressed lightly into the grooves to retain them and form a continuous seal.

2.1.5 Place the intermediate section on the floor plates with the sealing strips towards the back section, then ensuring the strips remain in position lift the section onto the nipples already fitted to the back section.

Fig. 6

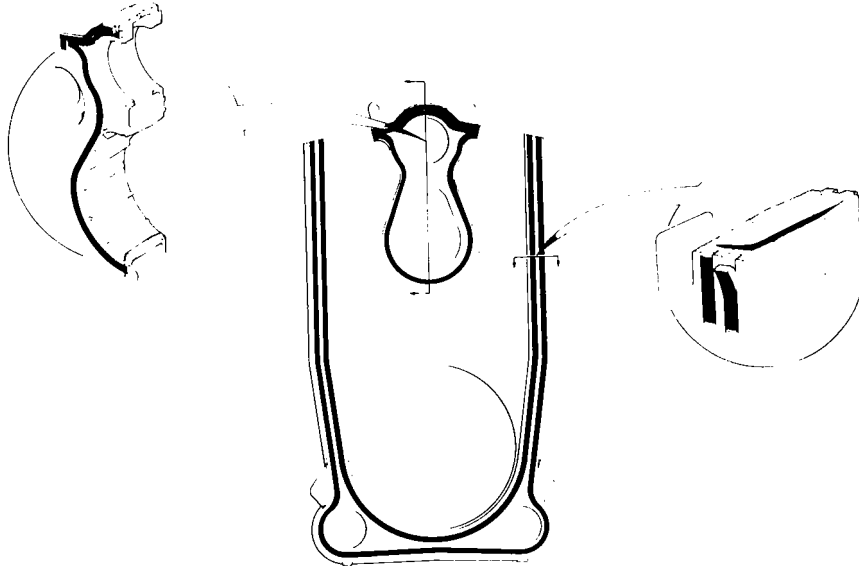
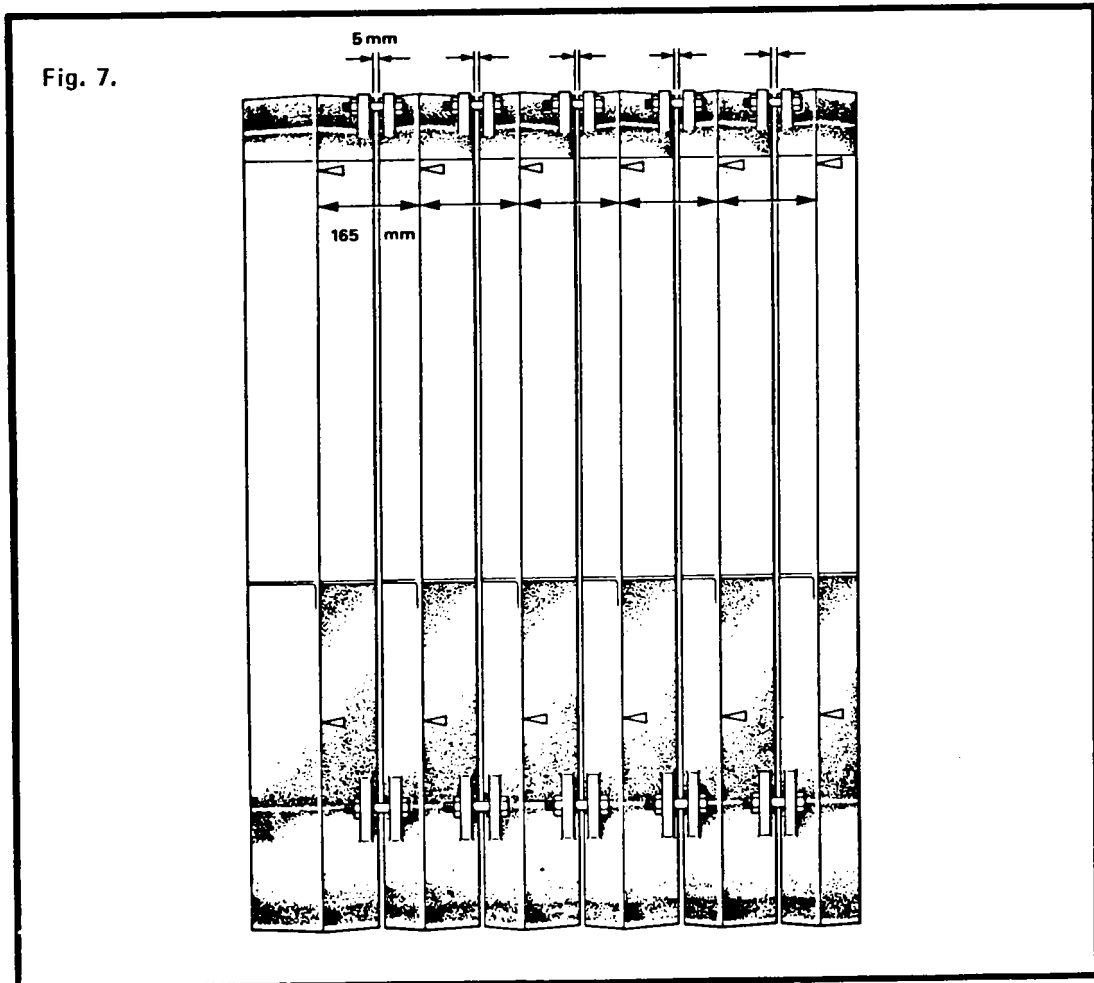


Fig. 7.



Lightly oil four assembly bolts, then fit them through the four sets of lugs on the two sections. Fit one washer under the bolt head and two washers under the nut and gently tighten to draw the sections evenly together. Tighten bottom right hand and bottom left hand simultaneously, then top right hand and left hand simultaneously. Pull up the sections until a gap of 5mm exists between the two sections. See Fig. 7. Do not over-tighten by pulling the sections completely up.

The correct position will be reached when the gap between the sections is approx. 5mm. The surfaces involved are not machined and so this approximate dimension is subject to normal manufacturing tolerances and is equivalent to a "moulding joint line to moulding joint line" dimension of 165mm (Fig. 7). Sections should not be pulled together closer than 3mm.

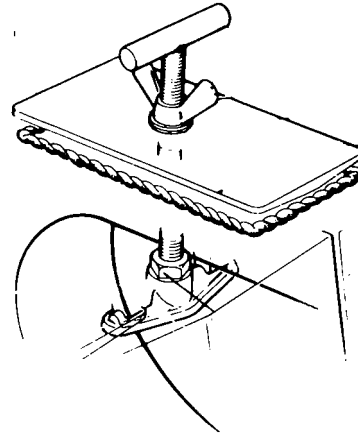
2.1.6 Continue erecting the remaining sections in a similar manner. When all sections have been assembled, slacken back all assembly bolt nuts half a turn.

2.1.7 Fit the drain off cock to the right hand connection, then plug the left hand drain off connection, the flow and return connections and the tapping for the vent, safety valve, thermostats and altitude gauge. Hydraulically test the boiler water assembly in accordance with BS 779 1976. Flush the boiler thoroughly in accordance with good practice.

2.2. Boiler Platework and Connections

2.2.1 Fit a top flue cover plate to the two shoulders on each section; each cover plate must be fitted with a gasket. The two covers with the shortened locking pieces must be fitted to the rear section; See Fig.8.

Fig.8. Fitting of Flue Cover Plates



Locate each cover plate in position, then turn the locking piece so it engages in the recess in the waterway section before tightening the wingnut.

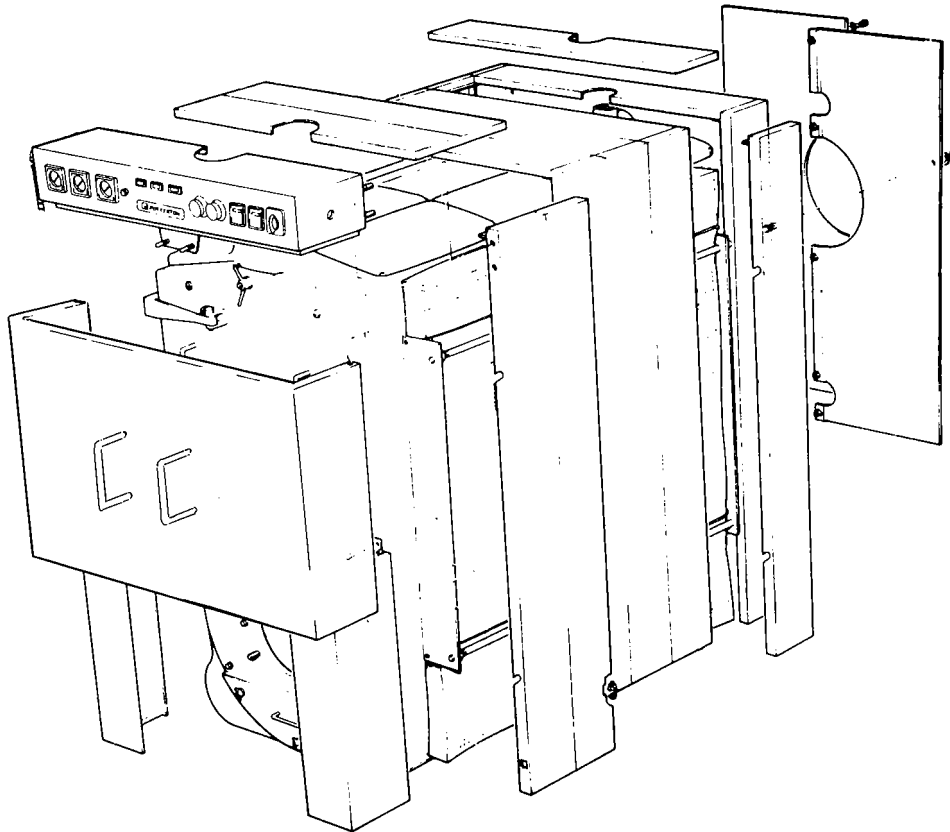


Fig.9. Exploded View of Insulation and Jacket showing Optional Instrument Panel

2.2.2 Fit the burner mounting plate, interposing the gasket, to the front section using the M12 nuts and washers supplied.

2.2.3 Fit the "half-moon" clean-out cover, beneath the burner mounting plate to the front section, using the M12 wingnuts and washers supplied.

2.2.4 Screw the 2 in. B.S.P. x 215mm 90 deg. pipe into its connection at the top of the rear waterway section. Screw the 2 in. F x F elbow into the pipe and bush down, if necessary, and fit a safety valve, in accordance with BS779-1976.

2.2.5 Connect the system open vent into the upwards facing tapping on the top rear section.

STANDARD CONTROL PANEL

2.2.6 Fit the ½ in. B.S.P. thermostat pocket in the front section on its forward face and plug the spare ½ in. tapping and the ¼ in. tapping on the front section left hand side shoulder with the plugs provided in the control panel carton.

2.2.7 Drill and plug a hole in the flue system adjacent to the boiler flue offtake for use as a sampling point.

OPTIONAL INSTRUMENT PANEL

2.2.8 Screw the ¼ in. "Ballofix" valve, supplied packed in the control panel carton, into its tapping on the left-hand shoulder of the front section.

2.2.9 Screw the two ½ in. pockets for the thermostats and the water temperature gauge into their tappings at the top of the front section in its forward face. The pockets are supplied packed in the control panel carton.

2.2.10 Connect the flue system pipework to the flue outlet connection on the rear section of the boiler. Drill and tap two connections on a section of fluepipe adjacent to the boiler offtake. One connection must be ½ in. B.S.P. to take the pocket of the flue temperature gauge and the other should be plugged to be used as a sampling point.

2.2.11 Using the couterflange supplied, fit the system flow pipework to the flow connection on top of the front section.

2.2.12 Connect the system return pipework to both the return connections at the bottom of the rear section. This must be done using a cast-iron header, available to order, or by a header designed as part of the pipework with a single, central offtake.

2.3 Insulation — See Fig. 9.

2.3.1 Assemble the four angle plate jacket support brackets to the sides of the front and back sections, using M8 set-screws and washers. The front brackets feature weld nuts for securing the tie rods and the lower front panels of the jacket.

2.3.2 Position the aluminium faced insulation panels either side of the boiler, between the jacket support brackets, with their support wires towards the top. Support the panels clear of the floor close to the shoulders of each section, then join adjacent support wires at the top to hold them in position. Ensure that the wires are clear of the flue coverplates.

2.3.3 Fit the rear insulation panel to the back section.

2.3.4 Stretch two expanding wires each side of the boiler over the insulation panels and attach them with hooks located in the small holes in the top and bottom of the jacket support brackets. This will retain the panels close to the boiler sections.

2.3.5 Stretch three wires across the rear insulation panels, again using hooks to this line, attach them to the outside edge of each rear jacket support bracket.

2.3.6 Lay the cloth covered insulation panels across the top of the boiler, locating the two panels with cut-outs over the front and rear sections to clear the flow and open vent connections respectively.

2.4 Fitting the Jacket — See Fig. 9

2.4.1 Three different types of side panel are provided and it is important that they should be correctly identified and positioned.

2.4.2 Screw an M8 screw into the weldnut on the bottom of each stanchion side panel. These panels have four holes in their sides. Boilers with 6 to 8 sections have one stanchion panel each side, boilers with 9 to 12 sections two each side and 13 to 15 section boilers have three each side.

2.4.3 Fit the four tie rods through the holes in the rear jacket support brackets with the shorter threaded end to the front.

2.4.4 Fit the appropriate number of stanchion panels to the tie rods, passing the rods through the holes in the side flanges of the panels.

2.4.5 Screw the rods fully home into the weld nuts on the front jacket support brackets, so the screwed ends just protrude through the brackets.

2.4.6 Place the two front side panels in position, locating the slots in the side flanges over the tie rods. When correctly positioned, the edge of the front jacket support brackets should locate between the front flange of the panel and the inner flange behind. The two front panels are handed and have two holes near the top and a square cut-out at the bottom of their front flanges.

2.4.7 Place the lower front panel in position across the front of the boiler, locating the clips in the square cut-outs on the front side panels. Secure the panel to the front jacket support brackets with M6 set screws and washers, screwed into the weld nuts on the brackets.

2.4.8 Secure the standard control or optional instrument panel to the two panels, engaging the studs on the back of the instrument panel through the holes in the side panels; secure with nuts and washers.

2.4.9 Taking care not to damage any wiring or capillary tubes, fit the phials from the thermostats into the right-hand pocket on the front waterway section, below the flow connection.

2.4.10 Insert the phial from the flow temperature gauge into the left-hand pocket if applicable.

2.4.11 Connect the boiler pressure gauge to the "Ballofix" valve on the left-hand shoulder of the front section using the copper pipe if applicable.

2.4.12 If applicable fit the pocket for the phial of the flue temperature gauge into the tapping previously drilled in the fluepipe adjacent to the boiler offtake. Fit the phial on the end of the capillary from the flue thermometer. Take care not to damage the capillary when routing it down the length of the boiler.

2.4.13 Fit the two halves of the boiler back panel to the ends of the tie rods. Secure the two halves together with M6 setscrews and washers, leaving out the top screw. Loosely fit M10 nuts and washers to the ends of the tie-rods; do not tighten at this stage.

2.4.14 Slide the stanchion panels along the tie-rods to their approximately final positions. Assuming that the front side panel is No.1, the stanchion panels should be located in the following positions:—

Model	Position Numbers
Two/6	No.4
Two/7	No.4
Two/8	No.5
Two/9	Nos. 4 & 7
Two/10	Nos. 4 & 7
Two/11	Nos. 4 & 8
Two/12	Nos. 5 & 9
Two/13	Nos. 3, 7 & 11
Two/14	Nos. 4, 8 & 12
Two/15	Nos. 4, 8 & 12

2.4.15 Fit the remaining side panels to the tie rods, filling all the remaining positions. Tighten the M10 nuts on the rear end of the tie-rods. Do not overtighten or distortion of the side panels could occur.

2.4.16 Screw down the setscrews in the bottom of the stanchion side panels so that their heads just touch the floor. These screws can be screwed up or down as necessary to align the tops of the panels.

2.4.17 Fit the casing top panels. The panel with the large cut-out at the front (around the flow outlet) and the two panels with smaller cut-outs at the back (around the open vent connection).

2.4.18 Finally, fit and tighten the top M6 setscrew and washer to secure the two halves of the backplate.

2.4.19 Fit the door in position by locating between the lower front panel and the instrument panel ensuring that holes and dowels engage.

2.5 Fitting the Burner

2.5.1 Fit the burner to the burner mounting plate on the front section interposing the gasket supplied with the burner. Refer to the burner manufacturer's literature.

2.5.2 The pre-wired flexible lead and plug from the burner should be plugged into the socket provided on the left hand side of the boiler standard control panel or optional instrument panel. Two cable securing clips are provided which should be attached to the side casing panel.

2.5.3 Connect the fuel supply to the burner, again referring to the burner manufacturer's literature.

2.6 Electrical Connections

2.6.1 Connect the main electrical supply to the mains isolator, refer to Fig. 10. The mains supply, enclosed in a suitable conduit, should enter the control panel through the hole provided adjacent to the isolator.

2.6.2 It is also recommended that the control system incorporates a means of low limit protection.

2.6.3 If a remote lockout indication is required, refer to the wiring diagram, Fig. 10 for versions with an instrument panel. Versions with a control panel have an unconnected terminal on the limit stat for lockout indication. See Fig. 10A.

2.6.4 For booster connections refer to Potterton Eden Two Burner Information or the Burner Manufacturers installation manual.

2.6.5 Sequence interlocks are provided on the terminal block on the optional instrument panel for any ancillary controls required; refer to the wiring diagram, Fig. 10. For versions with the standard control panel interlocks should be wired in series with the thermostats. See Fig 10A. It is not advisable to switch the mains as a means of control.

Fig. 10. EDEN TWO OPTIONAL INSTRUMENT PANEL WIRING DIAGRAM.

Gas Boosters require their own independent electrical supply and are interlocked with the burner. For details of booster connections refer to Potterton Eden Two Burner Card for each burner manufacturer or the burner installation manual.

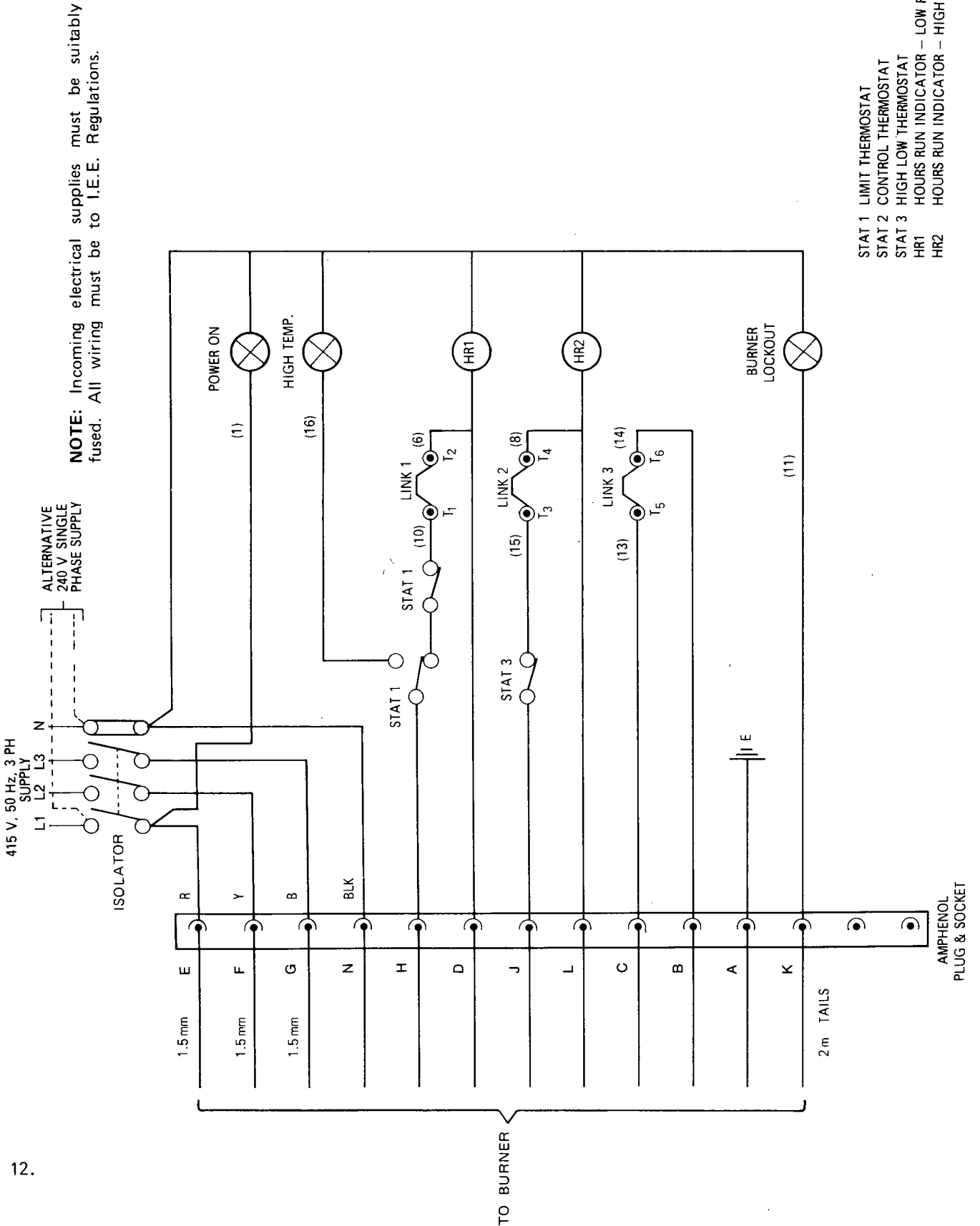
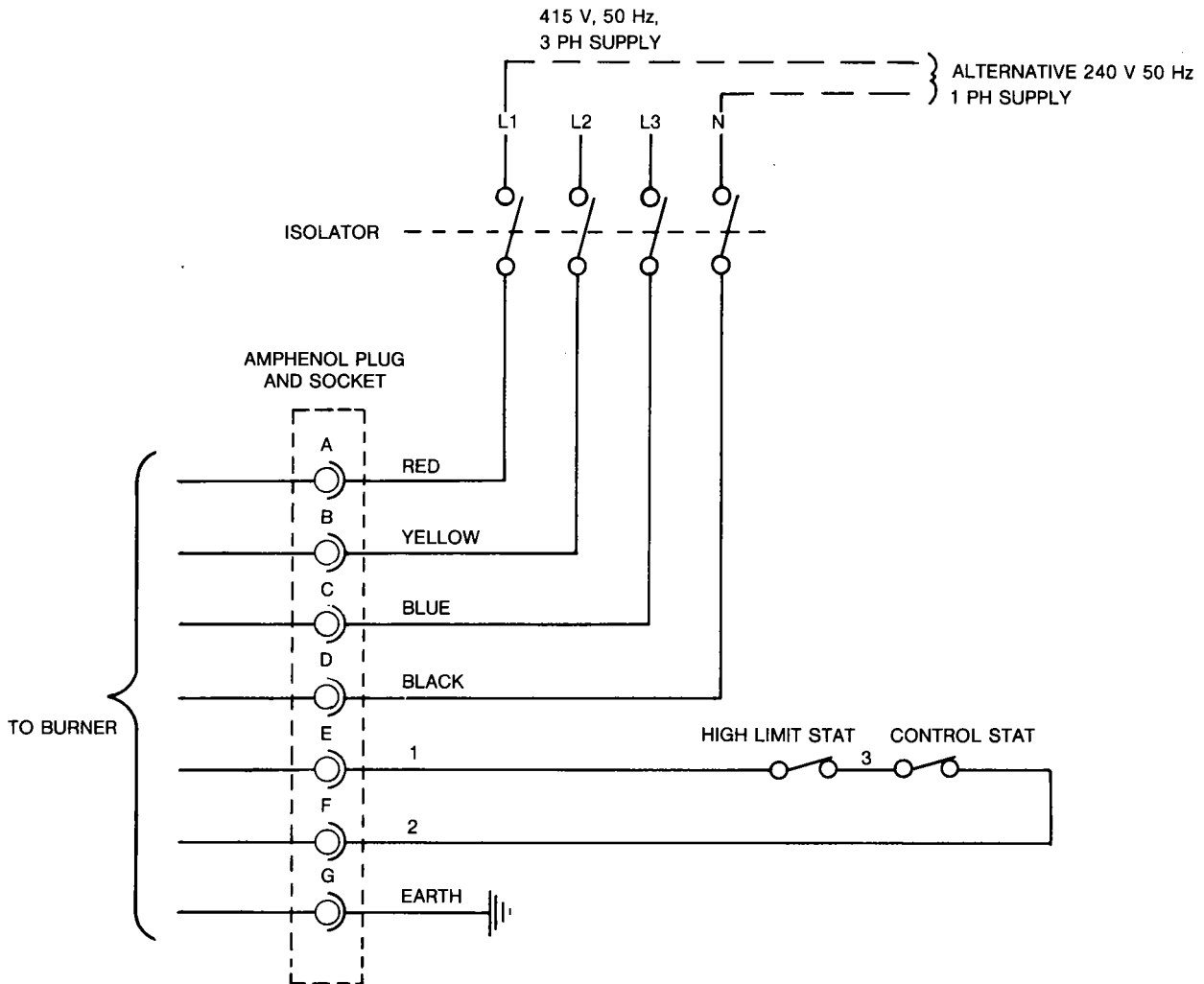


Fig. 10A. EDEN TWO STANDARD CONTROL PANEL WIRING DIAGRAM.

Gas Boosters require their own independent electrical supply and are interlocked with the burner. For details of booster connections refer to Potterton Eden Two Burner Card for each burner manufacturer or the Burner Installation Manual.



SECTION 3 COMMISSIONING AND OPERATION IN USE

1. BURNER SETTING

1.1 The burner should be set up to give the optimum operation as recommended below. Please refer to the burner manufacturer's handbook enclosed with the burner for detailed information on burner adjustment. The various burner head settings applicable to the different sizes of boiler are shown on the burner card and should be checked prior to initial firing. The boiler/burner unit should give the following typical combustion figures under normal working conditions on a clean boiler.

OIL:		High Fire	Low Fire *
CO ₂	—	12%	12%
Smoke	—	0—1	0—1
Nett Flue Gas Temp.	—	230°C	180°C
Draught	—	0—6mm	0—6mm
GAS:			
CO ₂	—	9%	9%
O ₂	—	5%	5%
CO	—	Less than 0.005%	Less than 0.005%
Flue Gas Temp.	—	230°C	180°C
Draught	—	0—6mm	0—6mm

* Low fire figures at 2:1 turn down ratio.

There is a sight glass on the rear boiler section for viewing the flame when the burner is firing.

The firing rates for each boiler are given on the burner card.

2. SETTING OF THERMOSTATS

2.1. Control Thermostat

Set to the figure stated by the Heating Design Engineer or in the absence of any specified figure, not above 80°C (180°F). The maximum setting available is 120°C (248°F) but if the system is operated at this maximum temperature, the system must also be operated at the maximum head, i.e. 50 p.s.i. (3.5 bar).

2.2 Limit Thermostat

If the limit thermostat trips due to excessive temperature, it will require manual re-setting.

2.2.1 Remove the hexagonal black plastic cover, then press the green button beneath to re-set the thermostat. The limit thermostat has a range of settings from 100°C to 130°C. The final setting must be at least 10°C (18°F) above the setting of the control thermostat to avoid nuisance shut down.

2.2.2 To adjust the setting of the limit thermostat, remove the thermostat, then using a screwdriver, turn the adjusting screw to the desired setting. Access to the thermostat can be achieved through the removable top access cover on the control panel. The thermostat is supplied pre-set to 100°C.

2.3 High/Low Thermostat (if applicable)

The high/low thermostat should be set at approximately 10°C lower than the setting of the control thermostat.

2.4 Hours Run Meters (if applicable)

Hours run meters are provided to measure the operating time of the heating plant. The low fire hours run can be

calculated from the difference between the readings of the total hours run meter and the high fire hours run meter. With an on/off burner, the high fire and total hours run meters should give identical readings.

2.5 Flue Gas Thermometer (if applicable)

The flue gas thermometer gives an indication of the exit flue gas temperature from the boiler and should generally give a temperature of between 200°C and 250°C at full rate. When a high/low burner is running on low fire, the exit flue gas temperature will be lower. Generally, if the flue gas temperature exceeds 250°C, it indicates that the boiler requires cleaning or that the burner requires adjustment.

SECTION 4 – SERVICING

1. GENERAL

It is essential for efficient and trouble free operation that the boiler plant is regularly serviced. This must be carried out by qualified and experienced engineers and this facility is available from Potterton International Ltd; details are available from the regional offices listed on the back page of this manual. We strongly recommend that a service contract be entered into with Potterton International Limited to ensure that the boiler/burner unit is correctly and properly maintained.

Before any servicing is carried out, ensure that the main electricity supply to the boiler is switched off.

2. CLEANING OF FLUE SURFACES

2.1 For maximum efficiency and economy in running, it is essential that the combustion chamber and flueway surfaces are kept clean and free from deposits. A layer of deposits 1/16 in. (2mm) thick will reduce the heat transfer through the section wall by up to 10%. Not only does this waste fuel, but the higher flue gas temperatures which result will increase the thermal stress within the boiler and could lead to joint leakage or, in extreme cases, to section failure. Paragraph 2.5 under '3 - COMMISSIONING' refers to flue gas temperatures that can be expected under clean boiler, normal running conditions.

2.2 Frequency of boiler cleaning varies and is dependent on fuel, site conditions, heat load, design of controls, running conditions and hours of use. The following recommendations apply to a boiler that is operated under average conditions.

2.3 Remove all the jacket top panels.

2.4 Open the jacket front doors. The doors can easily be removed by taking out the top hinge pins from inside the instrument panel, then lifting the doors off the lower pins.

2.5 Prior to boiler cleaning, it is essential that the burner or its air handling components are removed. Certain burners are supplied with a hinged facility which allows the burner and its air handling components to be serviced without removing the burner from the boiler. Refer to the burner manufacturer's handbook for complete information on burner servicing.

2.6 Remove all the top flue clean-out covers from the shoulders of the sections by unscrewing the wingnuts and lifting off the covers.

2.7 Open the boiler front flue door.

2.8 Using the cleaning tools, clean all the flueways horizontally from the front and vertically from the top.

2.9 Remove the clean out door below the burner mounting plate, and remove all the loose deposits from the floor of the combustion chamber.

2.10 Re-fit the burner or burner components and the top flue clean-out covers, checking that the gaskets are in good condition; renew if necessary.

2.11 Re-fit the lower clean-out door.

2.12 Check the condition of the refractory around the burner draught tube. If any damage is apparent, the refractory must be replaced immediately to prevent further possible damage to the boiler front section or the burner itself.

2.13 Close the boiler front flue door.

2.14 Refit the jacket door then refit the jacket top panels.

2.15 Natural gas boilers should be cleaned at least once a year and oil fired boilers at least twice a year, but frequency of cleaning will depend upon site conditions and hours of use.

3. SIGHT GLASS

3.1 The sight glass on the rear boiler section must be kept clean at all times.

3.2 Remove the four socket headed screws securing the frame retaining the glass, then gently prise off the frame, taking care not to damage the gasket or drop the glass.

3.3 Clean the glass, check or replace the gasket, then re-fit the glass securing the frame with the four screws.

4. THE BURNER

4.1 The burner must be regularly serviced and maintained in accordance with the burner manufacturer's instructions provided with the burner.

4.2 Details of the various burner settings applicable to each boiler are given in SECTION 3 – COMMISSIONING.

4.3 After servicing, the burner/boiler combustion performance should be checked and if necessary adjusted in accordance with the information given in SECTION 3 – COMMISSIONING.

5. WATER SYSTEMS

5.1 Pump Overrun

If the system design is such that, due to residual heat within the boiler, nuisance trip of the limit thermostat may occur, then in accordance with good practice, consideration should be given to the fitting of pump overrun thermostats. This can be incorporated by using a 'break on fall' immersion or 'strap on' thermostat positioned in the flow pipework adjacent to the boiler, set at say 60°C. This thermostat should be wired in parallel with the pump relay contacts.

5.2 Shunt Pump

If the boiler is likely to operate with a return water temperature below 50°C a shunt pump and/or diverter valve should be considered.

5.3 Water Quality

Where boilers are to be used as replacements on existing systems it is essential that the system is thoroughly flushed to remove all loose system debris and scale deposits. This is prior to fitting the boilers. Chemical descaling of the system is not considered to be desirable since it may worsen the situation. Additionally, the system should be thoroughly checked to ensure that there is no continuous raw water make up.

To protect the boilers from system debris and deposits the fitting of sludge traps and/or strainers in the system return pipework should be given consideration.

6. IMPORTANT NOTES

Reference is made in this boiler manual to the burner manufacturer's handbook and literature. It is essential that these publications are consulted and read in conjunction with this boiler manual.

Each burner is supplied with its respective handbook, however, further copies are available from:—

1. Nuway Heating Plants Ltd.,
P.O. Box 1,
Vines Lane,
Droitwich,
Worcestershire.
Telephone No. Droitwich 772331
2. Dunphy Oil and Gas Burners Ltd.,
Queensway,
Rochdale,
Lancashire.
Telephone No. Rochdale 49217

Boiler erection, commissioning and servicing is available from the Potterton International Commercial Service offices listed below.

1. Potterton International Ltd.,
10 Hardwicks Way,
London S.W.18.
Telephone No. 01-870-5278
2. Potterton International Ltd.,
Atlas House,
Chorley Old Road,
Bolton,
Lancs.
Telephone No. 0204-46524

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