WORCESTER BOSCH

DANESMOOR

PJ 26-32, PJ 35-50 and PJ 50-70

OIL-FIRED PRESSURE JET BOILERS

INSTALLATION AND SERVICING INSTRUCTIONS

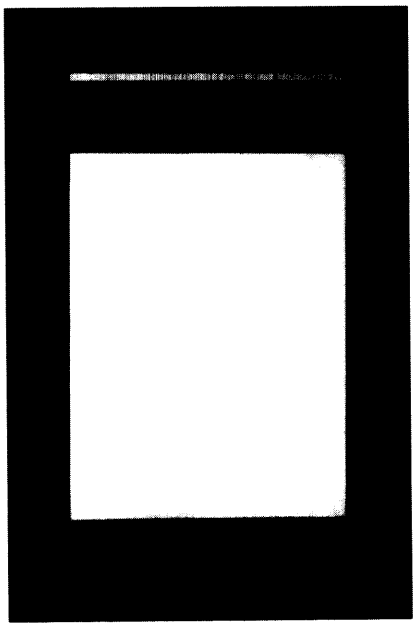
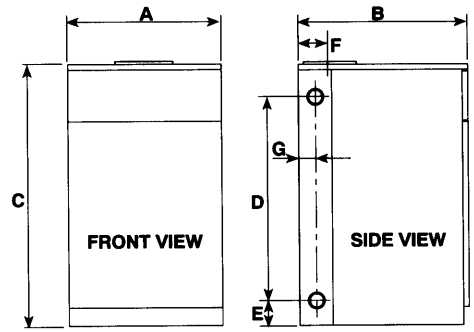


Fig. 1. Dimensions



	A	B	C	D	E	F	G
PJ 26/32	510mm (20in.)	680mm (25.6in.)	900mm (35.4in.)	752mm (29.6in.)	67mm (2.6in.)	93mm (3.6in.)	30mm (1.2in.)
PJ 35/50	550mm (21.6in.)	835mm (32.9in.)	900mm (35.4in.)	746mm (29.4in.)	70mm (2.7in.)	135mm (5.3in.)	37mm (1.4in.)
PJ 50/70	550mm (21.6in.)	835mm (32.9in.)	1000mm (39.4in.)	846mm (33.3in.)	70mm (2.7in.)	145mm (5.7in.)	37mm (1.4in.)

BOILER OUTPUT

The Worcester Danesmoor PJ 26-32, PJ35-50 and PJ 50-70 appliances have been designed to serve domestic central heating and hot water requirements and are rated as follows:

PJ 26-32 – 26 to 32 kW (89,000 to 109,000 Btu/h)
PJ 35-50 – 35 to 50 kW (119,000 to 170,000 Btu/h)
PJ 50-70 – 50 to 70 kW (170,000 to 239,000 Btu/h).

THESE INSTRUCTIONS APPLY TO UK MODELS ONLY

THESE INSTRUCTIONS ARE TO BE LEFT WITH THE APPLIANCE

IMPORTANT

The appliances are factory set to burn 28 second Kerosene heating oil. It is, however, possible to convert the appliances to burn 35 second Gas Oil. See Technical Data for further information.

The PJ 26-32 appliance may be converted to discharge the products of combustion at low level. When this conversion has been carried out, under no circumstances may 35 second gas oil be burnt

TECHNICAL DATA

PJ 26/32 TABLE 1.

SPECIFICATIONS	
POWER SUPPLY	230/240V 50Hz
HEATING FLOW	1½ in. B.S.P.
HEATING RETURN	1½ in. B.S.P.
FUEL LINE CONNECTION	¼ in. B.S.P.
CONVENTIONAL FLUE DIAMETER	125mm (5 in.)
MAXIMUM STATIC HEAD	30m (98 ft.)
PRIMARY WATER CAPACITY	41.2 litres (9.1 gallons)
WEIGHT	155.4 kg (340 lbs)
HEIGHT	900mm (35.4 in.)
WIDTH	510mm (20 in.)
DEPTH	650mm (25.6 in.)
CONTROL THERMOSTAT RANGE	55°C min. cut in to 82°C max. cut out
CONTROL THERMOSTAT DIFFERENTIAL	5.5°C
HIGH LIMIT THERMOSTAT SET POINT	97°C cut out
BURNER	Inter 2011D or Riello Mectron 5

PJ 26/32 TABLE 2. INTER 2011D and MECTRON 5 BURNERS

Electro Oil Inter 2011D Burner

NOMINAL BOILER RATINGS AT NORMAL OPERATING TEMPERATURES								
FUEL	NOZZLE	PUMP PRESSURE (p.s.i.)	FUEL FLOW (Kg/h)	FLUE GAS TEMP. (°C)	% CO_2	APPROX. AIR SETTING	APPLIANCE OUTPUT	
							kW	Btu/Hr
28 Sec. Kerosene	0.85 80°H	120	2.58	245	11.0-11.5	5.75	26	89,000
28 Sec. Kerosene	1.0 80°H	115	2.89	260	11.0-11.5	6.25	29	99,000
28 Sec. Kerosene	1.0 80°H	140	3.18	270	11.5-12.0	6.5	32	109,000
35 Sec. Gas Oil	0.65 80°H	165	2.63	245	10.5-11.0	5.75	26	89,000
35 Sec. Gas Oil	0.75 80°H	150	2.93	260	11.0-11.5	6.25	29	99,000
35 Sec. Gas Oil	0.75 80°H	185	3.24	270	11.0-11.5	6.5	32	109,000

PJ 35/50 TABLE 3.

SPECIFICATIONS	
POWER SUPPLY	230/240V 50Hz
HEATING FLOW	1½ in. B.S.P.
HEATING RETURN	1½ in. B.S.P.
FUEL LINE CONNECTION	¼ in. B.S.P.
CONVENTIONAL FLUE DIAMETER	150mm (6 in.)
MAXIMUM STATIC HEAD	30m (98 ft.)
PRIMARY WATER CAPACITY	47 litres (10.3 gallons)
WEIGHT	194 kg

PJ 35/50 TABLE 3. Continued

HEIGHT	900mm (35.4 in.)
WIDTH	550mm (21.6 in.)
DEPTH	835mm (32.9 in.)
CONTROL THERMOSTAT RANGE	55°C min. cut in to 82°C max. cut out
CONTROL THERMOSTAT DIFFERENTIAL	5.5°C
HIGH LIMIT THERMOSTAT SET POINT	97°C cut out
BURNER	Selectos D13A or Electro-Oil Inter 2020A

PJ 35/50 TABLE 4. SELECTOS D13A BURNER

NOMINAL BOILER RATINGS AT NORMAL OPERATING TEMPERATURES								
FUEL	NOZZLE (Danfoss)	PUMP PRESSURE (p.s.i.)	FUEL FLOW (ml/min)	FLUE GAS TEMP. (°C)	OFIN POSITION	AIR INLET DAMPER POSITION	APPLIANCE OUTPUT	
							kW	Btu/Hr
28 Sec. Kerosene	1.10 80°H	130	70.5	225	Low	Closed	35	119,500
28 Sec. Kerosene	1.35 80°H	130	90.0	265	Low	5°	44	150,000
28 Sec. Kerosene	1.50 80°H	130	103.5	305	High	5°	50	170,600
35 Sec. Gas Oil	1.00 80°H	150	70.5	225	Low	Closed	35	119,500
35 Sec. Gas Oil	1.25 80°H	150	90.5	265	Low	5°	44	150,000
35 Sec. Gas Oil	1.35 80°H	150	103.5	305	High	5°	50	170,600

PJ 35/50 TABLE 5. ELECTRO OIL INTER 2020A BURNER

NOMINAL BOILER RATINGS AT NORMAL OPERATING TEMPERATURES								
FUEL	NOZZLE	PUMP PRESSURE (p.s.i.)	FUEL FLOW (Kg/h)	FLUE GAS TEMP. (°C)	% CO_2	APPROX. AIR SETTING	APPLIANCE OUTPUT	
							kW	Btu/Hr
28 Sec. Kerosene	1.10 60°S	125	3.35	225	11.5-12.0	1.0	35	119,500
28 Sec. Kerosene	1.35 60°S	145	4.26	265	11.5-12.0	2.0	44	150,000
28 Sec. Kerosene	1.75 60°S	110	4.90	305	11.5-12.0	3.0	50	170,600
35 Sec. Gas Oil	0.85 60°S	170	3.41	225	11.5-12.0	1.0	35	119,500
35 Sec. Gas Oil	1.10 60°S	165	4.34	265	11.5-12.0	2.0	44	150,000
35 Sec. Gas Oil	1.25 60°S	170	5.00	305	12.0-12.5	3.0	50	170,600

PJ 50/70 TABLE 6.

SPECIFICATIONS	
POWER SUPPLY	230/240V 50Hz
HEATING FLOW	1½ in. B.S.P.
HEATING RETURN	1½ in. B.S.P.
FUEL LINE CONNECTION	¼ in. B.S.P.
CONVENTIONAL FLUE DIAMETER	175mm (7 in.)
MAXIMUM STATIC HEAD	30m (98 ft.)
PRIMARY WATER CAPACITY	57.8 litres (12.7 gallons)
WEIGHT	223 kg
HEIGHT	1000mm (39.4 in.)
WIDTH	550mm (21.6 in.)
DEPTH	835mm (32.9 in.)
CONTROL THERMOSTAT RANGE	55°C min. cut in to 82°C max. cut out
CONTROL THERMOSTAT DIFFERENTIAL	5.5°C
HIGH LIMIT THERMOSTAT SET POINT	97°C cut out
BURNER	Selectos D13B or Electro-Oil Inter 2020B

PJ 50/70 TABLE 7. SELECTOS D13B BURNER

NOMINAL BOILER RATINGS AT NORMAL OPERATING TEMPERATURES								
FUEL	NOZZLE (Danfoss)	PUMP PRESS. p.s.i.	FUEL FLOW ml/min.	F.G.T. (°C)	OFIN POSITION	AIR INLET DAMPER POSITION	APPLIANCE OUTPUT	
							kW	Btu/Hr
28 sec. Kerosene	1.50 80H	130	98.6	275	Low	5° – 10°	50	170,600
28 sec. Kerosene	1.75 80H	150	121.2	305	High	5° – 10°	60	204,750
28 sec. Kerosene	2.25 80H	130	148.5	335	High	45°	70	239,000
35 sec. Gas Oil	1.35 80H	150	98.6	275	Low	5° – 10°	50	170,600
35 sec. Gas Oil	1.75 80H	150	121.2	305	High	5° – 10°	60	204,750
35 sec. Gas Oil	2.00 80H	150	148.5	335	High	45°	70	239,000

PJ 50/70 TABLE 8. ELECTRO OIL INTER 2020B BURNER

NOMINAL BOILER RATINGS AT NORMAL OPERATING TEMPERATURES										
FUEL	NOZZLE	PUMP PRESSURE (p.s.i.)	FUEL FLOW (Kg/h)	FLUE GAS TEMP. (°C)	DIMENSION (Fig 18)		% CO_2	APPROX. AIR SETTING	APPLIANCE OUTPUT	
					A (mm)	B (mm)			kW	Btu/Hr
28 Sec. Kerosene	1.50 60°S	135	4.90	275	22	8	11.0-11.5	3.0	50	170,600
28 Sec. Kerosene	1.75 60°S	160	5.95	305	24	8	11.5-12.0	4.0	60	204,750
*28 Sec. Kerosene	2.00 60°S	180	7.04	335	27	8	11.0-11.5	5.0	70	239,000
35 Sec. Gas Oil	1.35 60°S	145	5.00	275	18	6	11.0-11.5	3.0	50	170,600
35 Sec. Gas Oil	1.50 60°S	170	6.07	305	20	6	11.5-12.0	4.0	60	204,750
*35 Sec. Gas Oil	1.75 60°S	180	7.18	335	22	6	11.0-11.5	6.0	70	239,000

* **NOTE:** At 70 kW the air guide should be removed. (See Fig. 18b).

1. SITING THE APPLIANCE

1. The appliance should be positioned on a non-combustible solid base as near to the chimney as possible. Care should be taken to ensure that the appliance is level; use packing at the corners where necessary.
2. The following clearances must be left to allow access for installation and servicing:-

(a) Above – 300mm (12 in.)

(b) In front – 600mm (24 in.)

(c) Right and left-hand side – sufficient for panel removal and access to pipe connections where required.

2. AIR SUPPLY

In order to ensure clean and efficient combustion an adequate supply of air must be delivered to the combustion chamber. To provide sufficient air, a suitable inlet should be provided into the room or space in which the boiler is situated, the sizes of which are detailed below. An air brick or other form of continuous air supply may have to be built into the installation in order to ensure an adequate supply of air

APPLIANCE	AREA OF AIR INLET	
	cm^2	$in.^2$
PL 26/32	176	27.5
PJ 35/50	275	48.5
PJ 50/70	385	59.5

3. REMOVAL OF CABINET

For installation and servicing of the appliance the cabinet should be removed as follows:-

1. Remove the cabinet top panel by lifting squarely upwards to release the four ball stud connections.
2. The front panel is removed by lifting upwards and forwards to release from its supporting ledge.
3. Prior to removing the side panels the appliance kick strip must be removed. Then release the two black pozi-drive self tapping screws located in the upper flange of each side panel and ease clear of the electrical box. Finally slide the side panel forwards to release from the locating lugs in the base plate.

4. FLUE

A flue system must be provided in accordance with B.S. 5410: Part 1 and the Building Regulations, Part J, Section J2.

1. Conventional Flue (See Fig. 2)

(a) The boiler is fitted with a conventional flue locating spigot. The conventional flue pipe fits into the spigot and should be correctly sealed with fire cement. The size of the flue pipe for each appliance is detailed below:-

APPLIANCE	CONVENTIONAL FLUE DIAMETER	
	mm	in.
PJ 26/32	125	5
PJ 35/50	150	6
PJ 50/70	175	7

NOTE: The size of flue must never be reduced from the take off diameter. An increase in flue size is permissible provided that the joint is sealed correctly.

(b) When installed the flue should be vertical and contain as few bends as possible. Where bends are necessary, then to minimise the resistance to flow of the flue gases, bends of not less than 135° should be used and a maximum of two are permitted.

(c) All brick and masonry chimneys should be lined with a suitable non-combustible material, properly jointed and able to withstand the effects of the working temperature of the appliance and any condensate which may form. Refer to B.S. 5410: Part 1 for details of materials for chimney liners.

(d) Down draught conditions will adversely effect the operation of the boiler and must be avoided. Where possible the flue should be extended beyond the apex of the roof and should always be taken beyond the eaves of the building. Where down draught is experienced an OH pot or Marcone Cowl should be fitted to the flue termination.

(e) The natural flue draught must be checked in the flue pipe immediately above the appliance. The flue draught should be no less than 0.75mm wg. and no greater than 5.1mm wg. If a flue draught of greater than 5.1mm wg. is experienced a draught stabiliser should be introduced into the flue and adjusted to achieve a flue draught within the specified range.

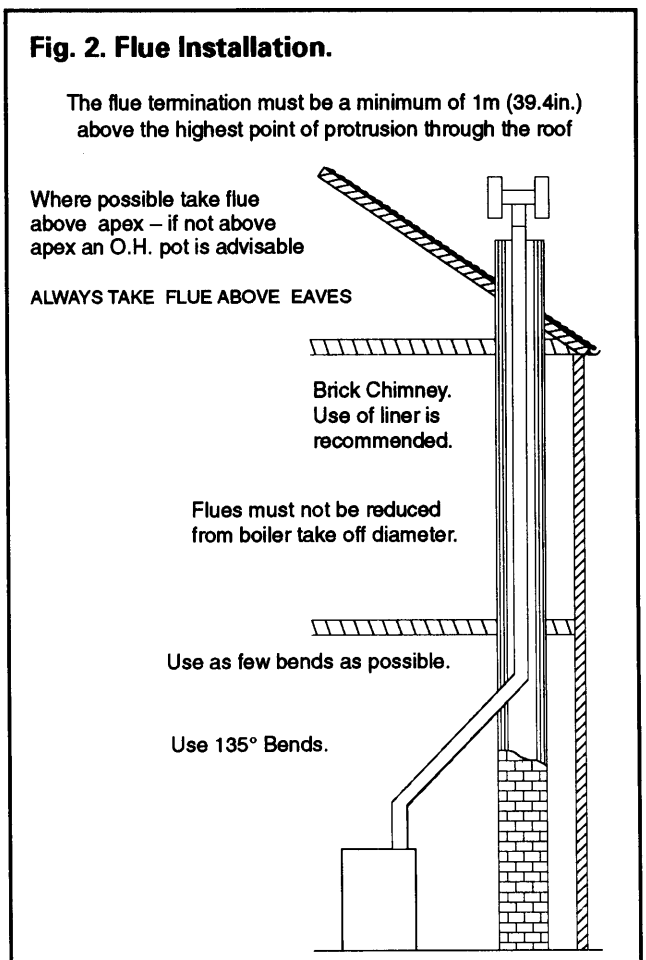
2. Low Level Discharge (See Fig. 3)

NOTE: This conversion applies to the Worcester PJ 26/32 appliance only.

The PJ 26/32 may be converted to discharge the products of combustion at low level. For this purpose a special flue terminal and associated ducting is available, allowing the conventional flue to be discarded. Detailed instructions for converting the appliance to low level discharge are supplied with the conversion kit. The flue spigot should be removed from the flue outlet plate by undoing the three retaining screws, and the hole blanked off with the plate provided in the kit.

IMPORTANT: If the PJ 26/32 has been converted to a low level discharge then 35 second Gas Oil **MUST NOT** be burnt.

Fig. 2. Flue Installation.



5. OIL SUPPLY

The burners on all appliances are supplied so as to be connected to a single pipe gravity feed system. Details of how to convert the burners to a two pipe sub-gravity feed system are shown below (see Fig. 4). If a single pipe system is employed then the tank must be positioned such that the oil level does not exceed 4m (13 ft) above the level of the burner oil pump and in addition the oil level must not fall below 0.3m (1 ft). Should it prove impossible to site the tank below the 4m maximum oil level a head breaking device must be installed between the tank and the burner (e.g. BM-30A). If a double pipe system is used then the maximum suction height allowable is 3.5m (11.5 ft).

The oil storage tank must be installed in accordance with B.S. 799: Part 5. The tank should be arranged with a slope of 1 in 24 away from the outlet valve with a sludge cock at its lower end. (See Figs. 5a and 5b.)

Having decided upon a single pipe or double pipe system, the size of the pipe diameter must be determined. Tables 9 and 10 enable the correct pipe diameter to be chosen for the position of the oil storage tank relative to the burner for the two different systems.

NOTE: These tables are applicable for either burner fitted to the PJ 26/32, 35/50 and 50/70 appliances.

Using the tables choose the correct diameter fuel pipe for the position of the oil storage tank. The fuel pipe should be laid as level as possible to avoid air pockets and unnecessary friction losses. The following components should be fitted in the fuel line between the storage tank and burner:-

1. Manual isolating valve installed as close to the tank as possible.
2. Fire valve in accordance with B.S. 799: Part 2 fitted as near to the storage tank as possible, or where this is impracticable, in the room where the oil line enters that room. A suitable fire valve is manufactured by Teddington Autocontrols Limited, reference KBB/C/150°F.
3. A filter complying with the requirements of B.S. 799: Parts 2, 3 and 4 should be fitted in the fuel line between the isolating valve and the burner and as near to the latter as possible.
4. An additional hand operated shut-off valve should be fitted in an accessible position, as close to the appliance as possible.

Fig. 3. Flue Installation (Rear Entry)

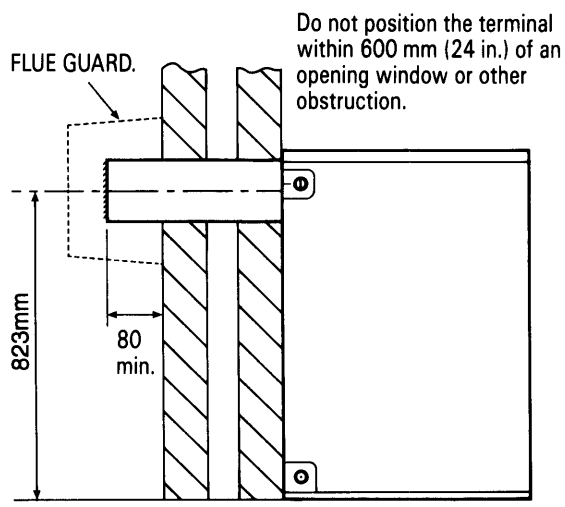
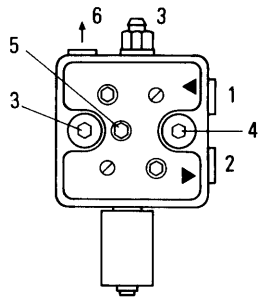


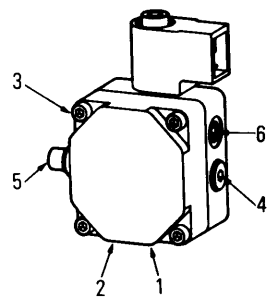
Fig. 4a. Danfoss MS11 oil pump



1 INLET
2 RETURN
3 BLEED AND PRESSURE GAUGE PORT
4 VACUUM GAUGE PORT
5 PRESSURE ADJUSTMENT
6 NOZZLE OUTLET

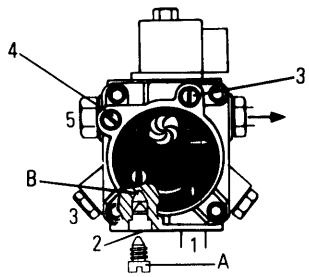
To convert to a two pipe system connect flow and return pipes to (1) and (2). No other action is necessary.

Fig. 4b. Danfoss BFP oil pump



To convert to a two pipe system remove the pump front cover and insert the grub screw provided into the threaded hole. Connect flow and return pipes to (1) and (2).
Note: When removing the pump front cover ensure that a suitable receptacle is placed below the pump to catch the oil residue.

Fig. 4c. Suntec AS47C oil pump



To convert to a two pipe system remove the return port plug (2) and insert the grub screw (A) provided into the threaded hole (B). Connect flow and return pipes to (1) and (2).

Fig. 5a. Oil Supply—Single pipe system

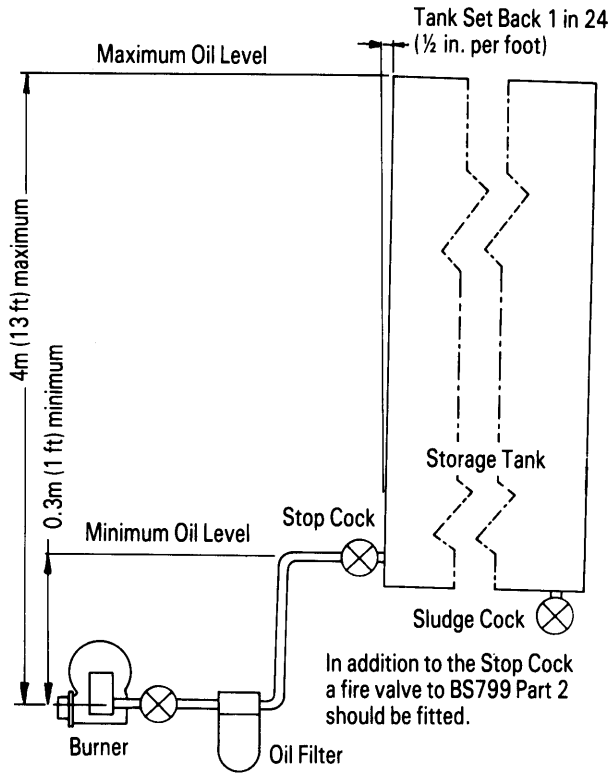


Fig. 5b. Oil Supply—Double pipe system

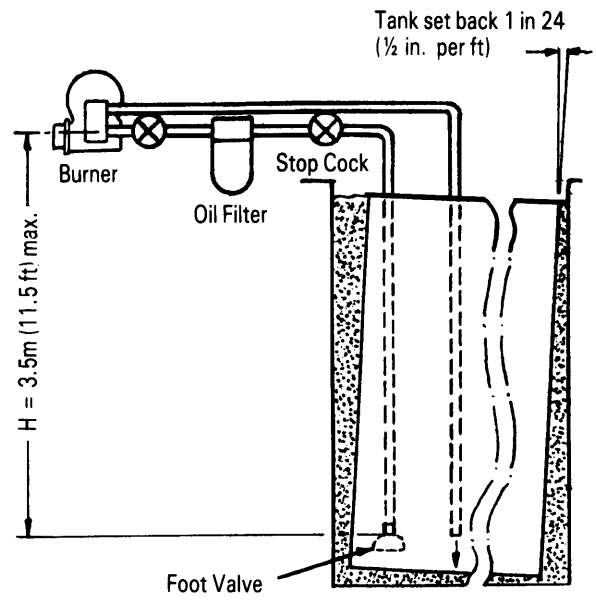


TABLE 9

Single pipe gravity feed system

HEAD H (metres)	MAXIMUM ALLOWABLE PIPE RUN (metres)	
	8mm I/D	10mm I/D
0.5	10	20
1.0	20	40
1.5	40	80
2.0	60	100

TABLE 10

Double pipe lift system

HEAD H (metres)	MAXIMUM ALLOWABLE PIPE RUN (metres)	
	8mm I/D	10mm I/D
0	35	100
−0.5	30	100
−1.0	25	100
−1.5	20	85
−2.0	15	70
−2.5	11	50
−3.0	8	30
−3.5	6	20

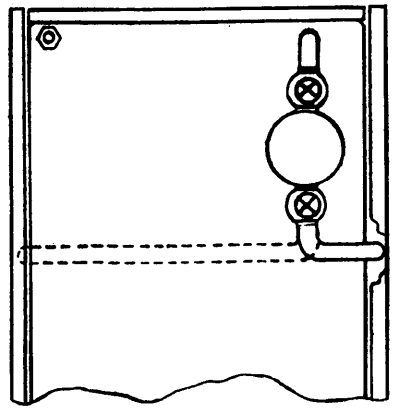
6. WATER CONNECTIONS

The appliance is suitable for connection to all conventional indirect hot water systems utilising an indirect double feed cylinder. When making the water connections, the following should be noted:-

1. The 1½ in. B.S.P. flow and return sockets are located at the rear of the appliance, two at high level and two at low level. Connection may be made to any combination of sockets.
2. Provision has been made for locating the circulating pump within the appliance cabinet. If so required, the socket located in the top front of the boiler should be used and the flow pipe run either side of the boiler. (See Fig. 6.)
3. There is **no** requirement for a system by-pass.
4. The pressure jet burner fitted to the appliance has full automatic control and hence there is **no** requirement for heat leak radiators.

Having completed the necessary water connections those connections not utilised should be plugged and the system may then be filled.

Fig. 6. Pump connections



Run central heating flow pipe either to the right or left of the boiler.

7. ELECTRICAL

MAINS WIRING

Mains supply – 230/240 V AC ~ 50 Hz 5A External Fuse.
LIVE - Brown, NEUTRAL - Blue, EARTH - Green/Yellow
Mains Cable: 0.75mm² (24 x 0.20mm) to BS 6500 Table 16.
The method of connection to the appliance must allow complete isolation of the appliance, preferably via a double pole isolator with a contact separation of 3mm in all poles supplying the boiler and controls only.
The mains supply cable should be connected into the terminals marked **L** (Live), **N** (Neutral) and **E** (Earth) on the appliance terminal strip and securely held in the cable clamp located in the right-hand side of the electrical tray base. To secure the cable. remove the clamp retaining screw and pull its inner body out to allow the cable to be fed through. With the cable in position refit the screw and fully tighten to grip the cable. Feed the cable between the side panel and the boiler insulation jacket and route to the connection point avoiding any hot surfaces.
The appliance must be earthed.
In order to gain access to the electrical terminal strip remove the top cover of the appliance and release the four black pozidrive self tapping screws retaining the wiring cover plate. Figures 7 and 8 show the PJ 26/32 appliance standard wiring and the wiring including post purge unit when the appliance is converted to low level discharge respectively. Figure 9 shows the standard wiring for the PJ 35/50 and 50/70 appliances. In addition to this the following wiring options are available:-

1. **PROGRAMMER (See Fig. 10a)**
   A plug in, colour co-ordinated, 2 channel electronic programmer is available from Worcester Heat Systems Limited. Full instructions covering installation and operation of the programmer are included with the kit. The programmer will give fully independent central (CH) and hot water (HW) programmes when the switch on the rear of the unit is set to P.
   Where the appliance is used on a gravity feed system the system will only function correctly on heating if the programmer switches the hot water programme on at the same time. To ensure that this is always the case the programmer is supplied with a gravity system switch on the rear of the unit which must be set to G.
   If an external programmer is to be fitted to the boiler the link plug should be removed from the programmer terminal strip (see Fig. 10b). The **Live, Neutral** and **Earth** wires should be connected to the **Live, Neutral** and **Earth** terminals on the main terminal strip and the switched lines connected to terminals **1** and **2**. Alternatively, the **Live, Neutral** and **Earth** from the programmer may be connected to a separate live supply with the switched lines again connected to terminals **1** and **2**. With this method it is important that the user is warned that both the boiler supply and the programmer supply must be switched off before the electrical cover is removed.
   NOTE: The mains supply cable should not be connected to an external time switch when a frost thermostat or low-level discharge post purge unit is fitted to the danesmoor standard wiring block
2. **BASIC CONTROL (Room Thermostat See Fig. 11)**
   As supplied the hot water and central heating circuits are controlled by the boiler thermostat. Additional control may be obtained by the use of a room thermostat, having removed the link from terminal **2** to terminal **4.**
3. **OFF ON NO DEMAND (Room and cylinder thermostats)**
   Refering to Fig. 12, with this control the boiler is allowed to cool when both the cylinder and room thermostats are de-energised. The boiler control thermostat must be set to a temperature above that of the cylinder thermostat for the control system to function correctly.
4. **HONEYWELL 'Y' PLAN (See Fig. 13)**
   The 'Y' Plan provides complete control on installations having pumped circulation to both domestic hot water cylinder and radiator circuits.
   The domestic hot water and radiator circuits are controlled by a 3 port motorised valve via a cylinder thermostat and a room thermostat. Water flow is diverted to either circuit or to both circuits at the same time. Both thermostats switch the water circulator and the boiler on and off.
   NOTE: The 'Y' Plan requires a live feed from the hot water 'off' switch position. In order to achieve this, using a WHS programmer, remove the orange wire from

Fig. 7. Wiring Diagram (Standard) — PJ 26/32.

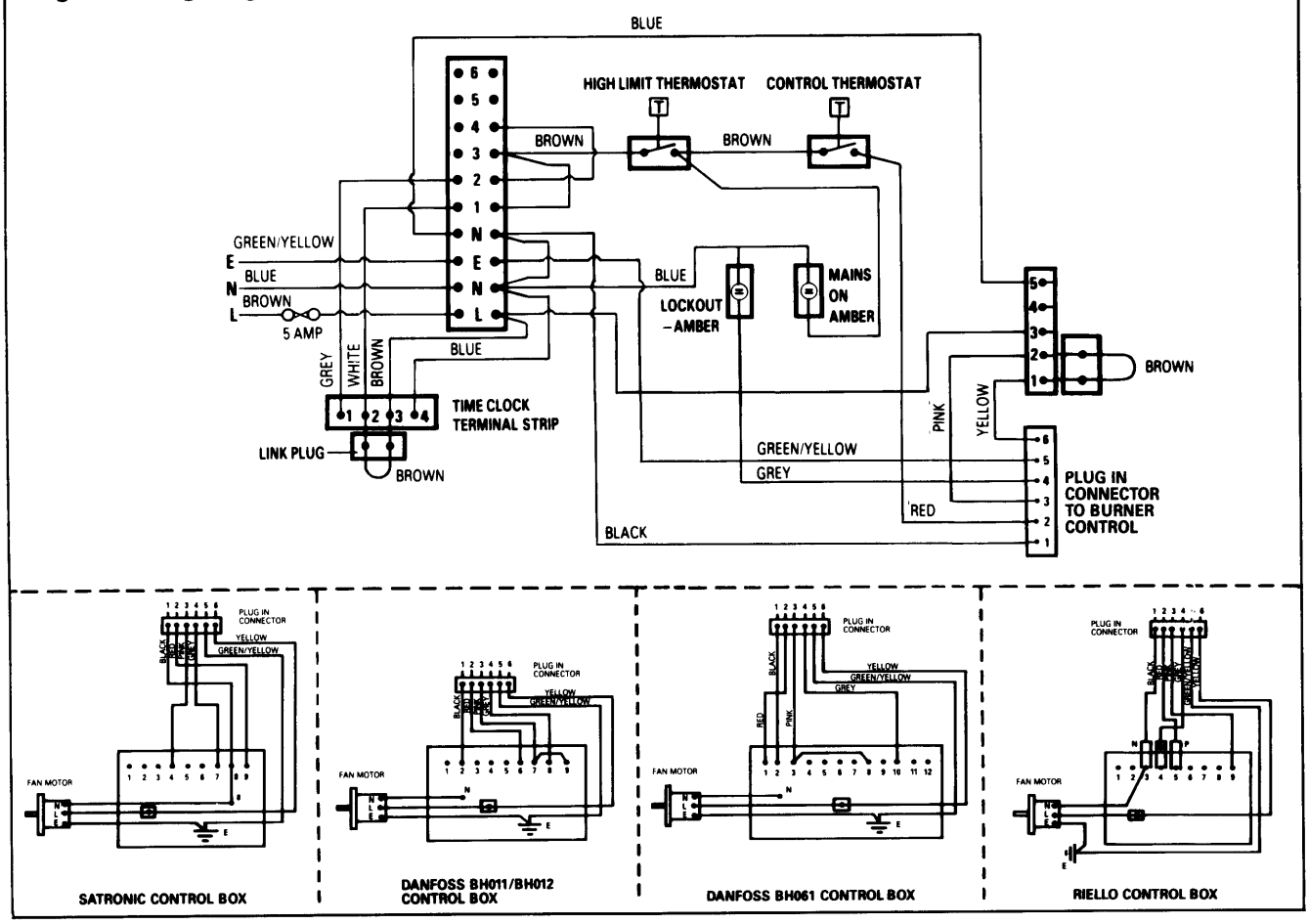


Fig. 8. Wiring Diagram (Flueless kit fitted) – PJ 26/32.

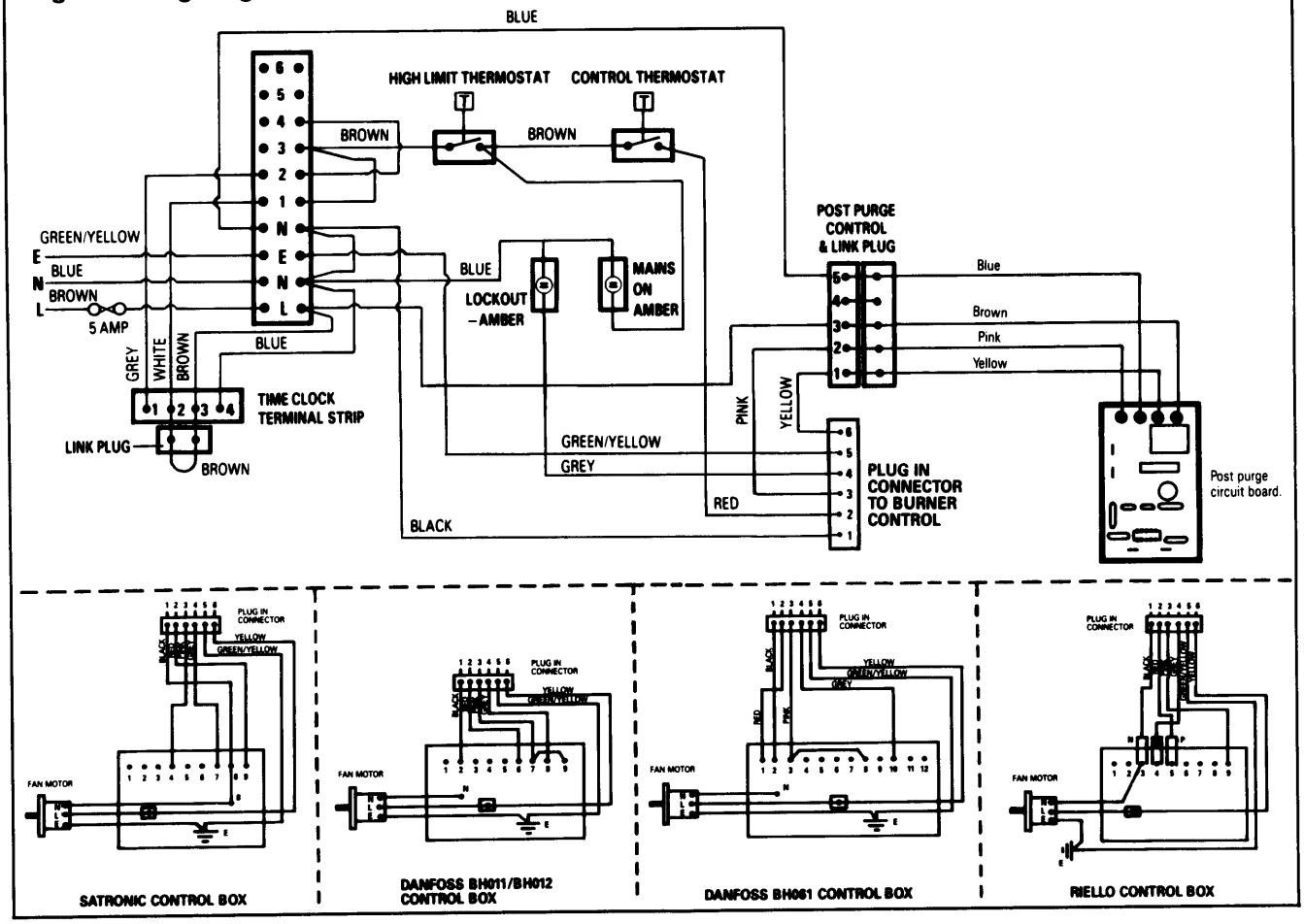


Fig. 9. Wiring Diagram – PJ 35/50 and PJ 50/70.

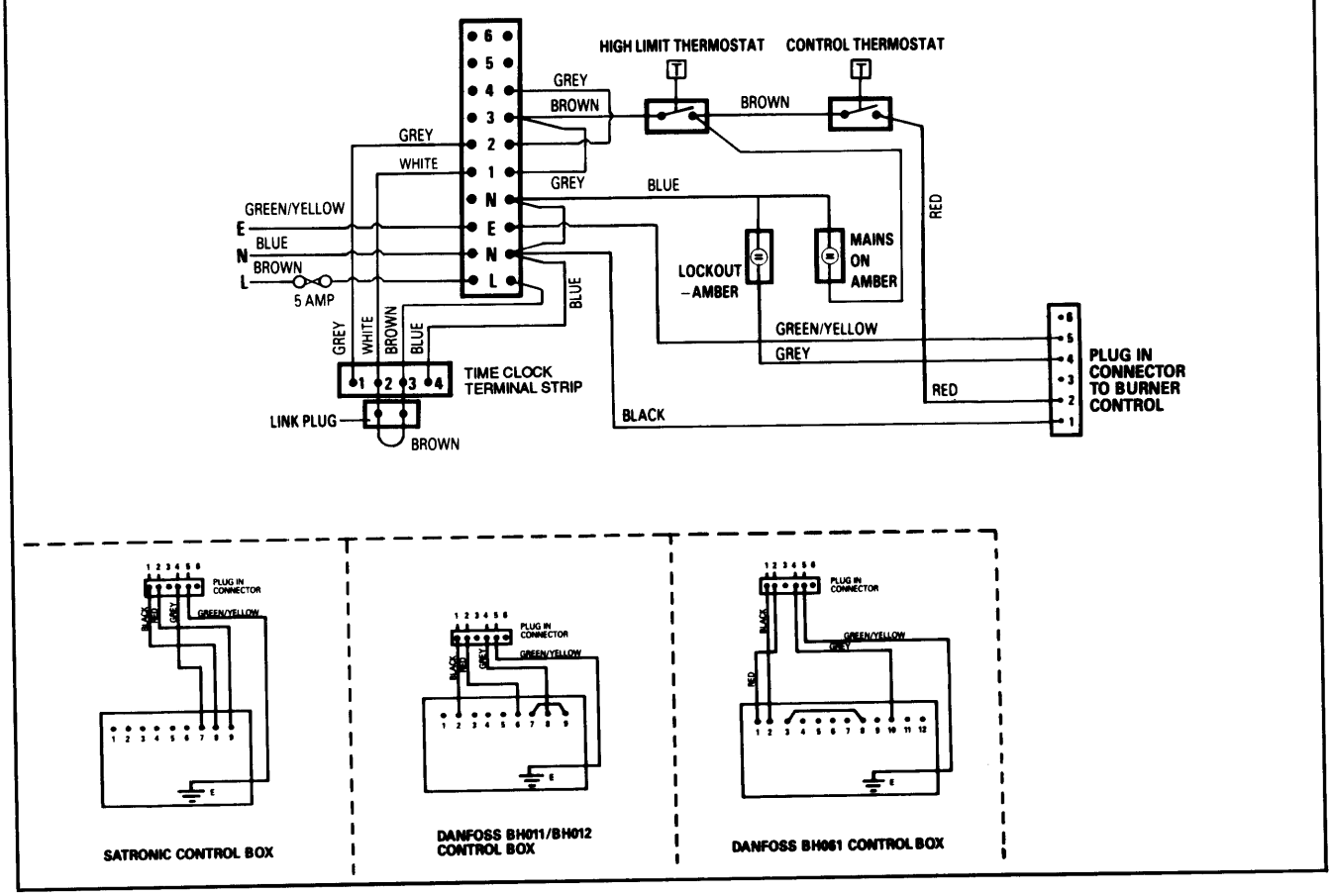


Fig. 10. Programmer Connections.

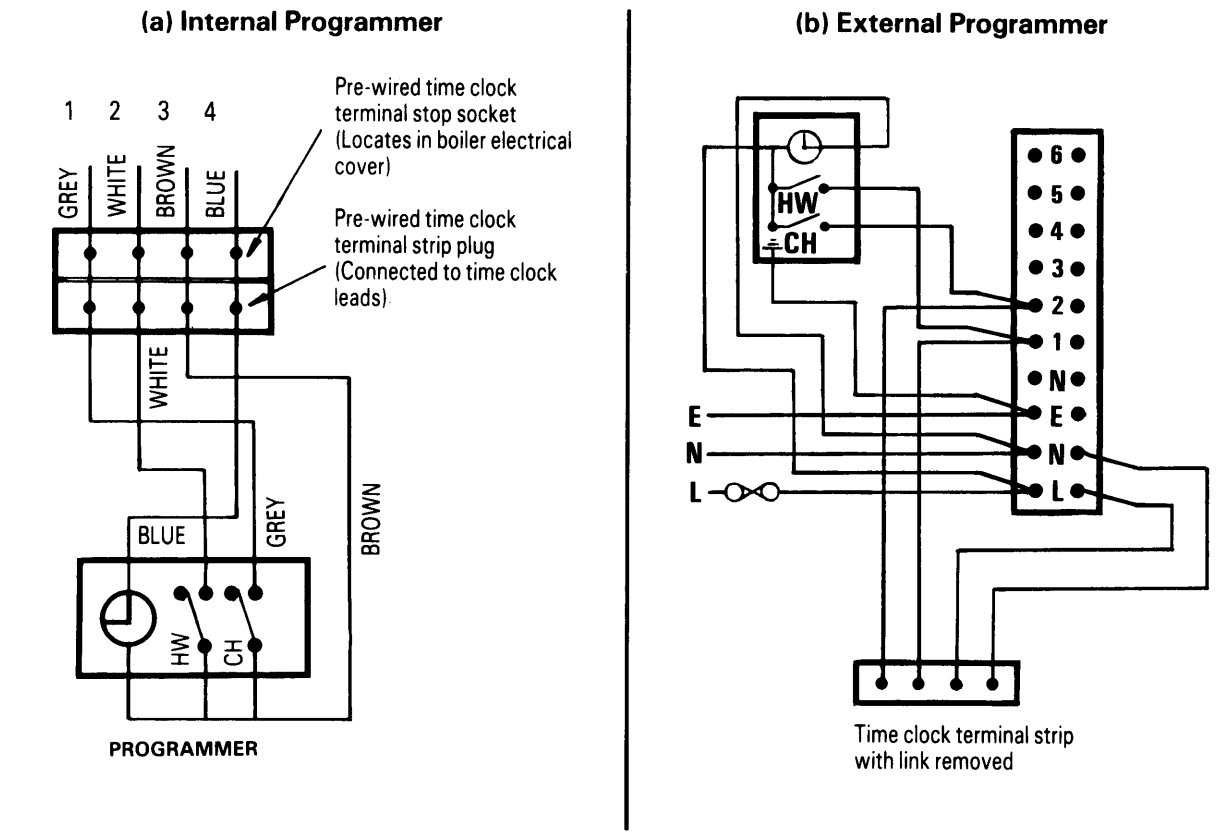


Fig. 11. Standard Wiring.

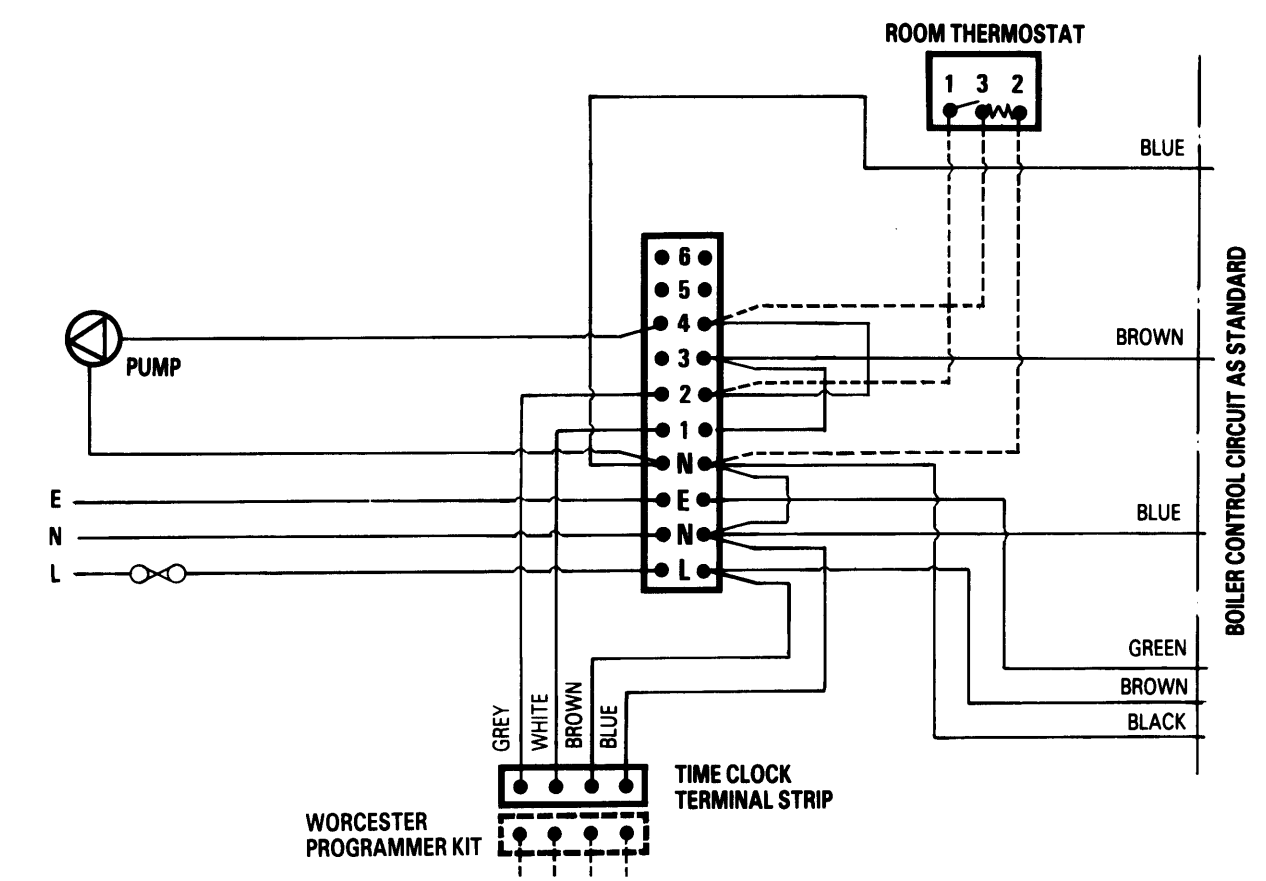


Fig. 12. Off On No Demand.

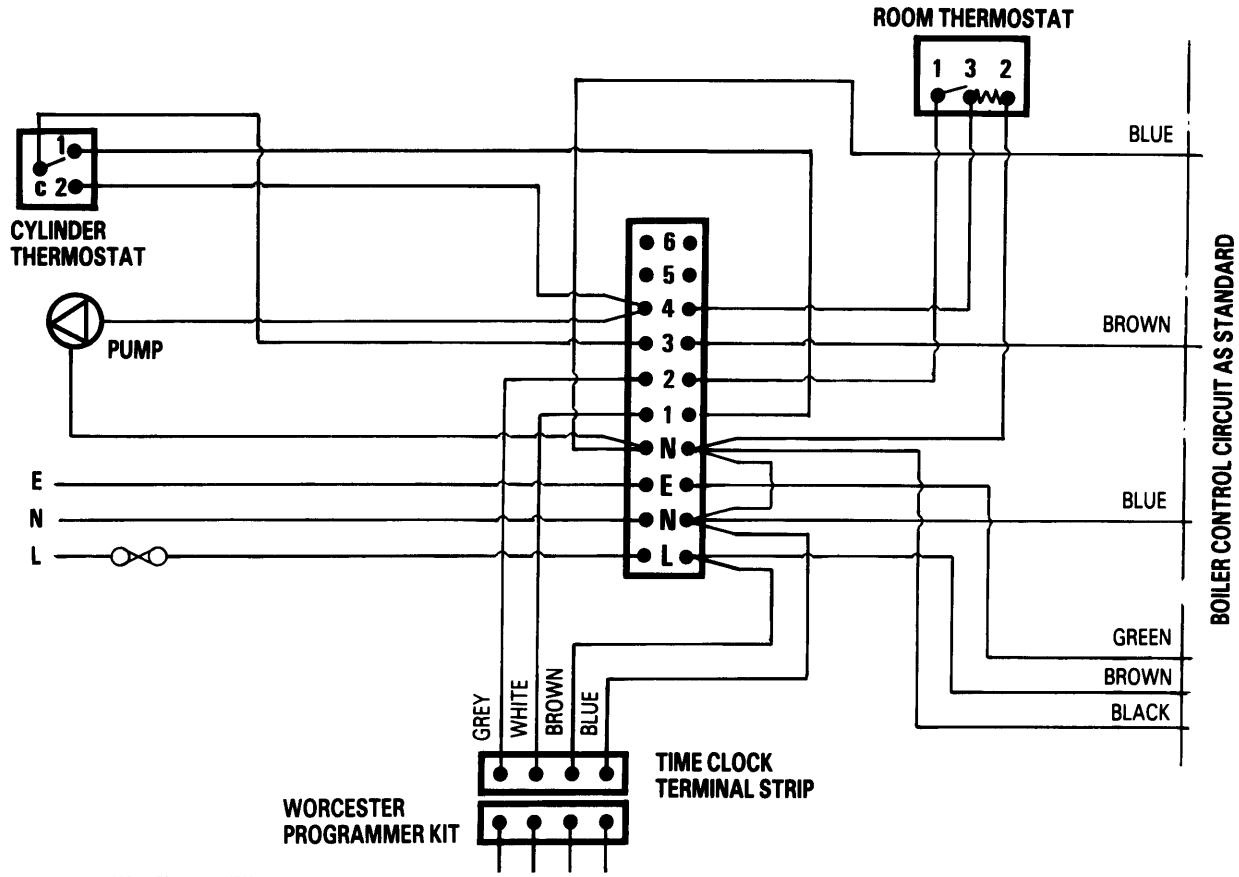


Fig. 13. Honeywell 'Y' Plan.

NOTE: When using a WHS programmer remove the orange wire from terminal 9 and connect to terminal 6. Set the switch on the rear of the programmer to 'P'.

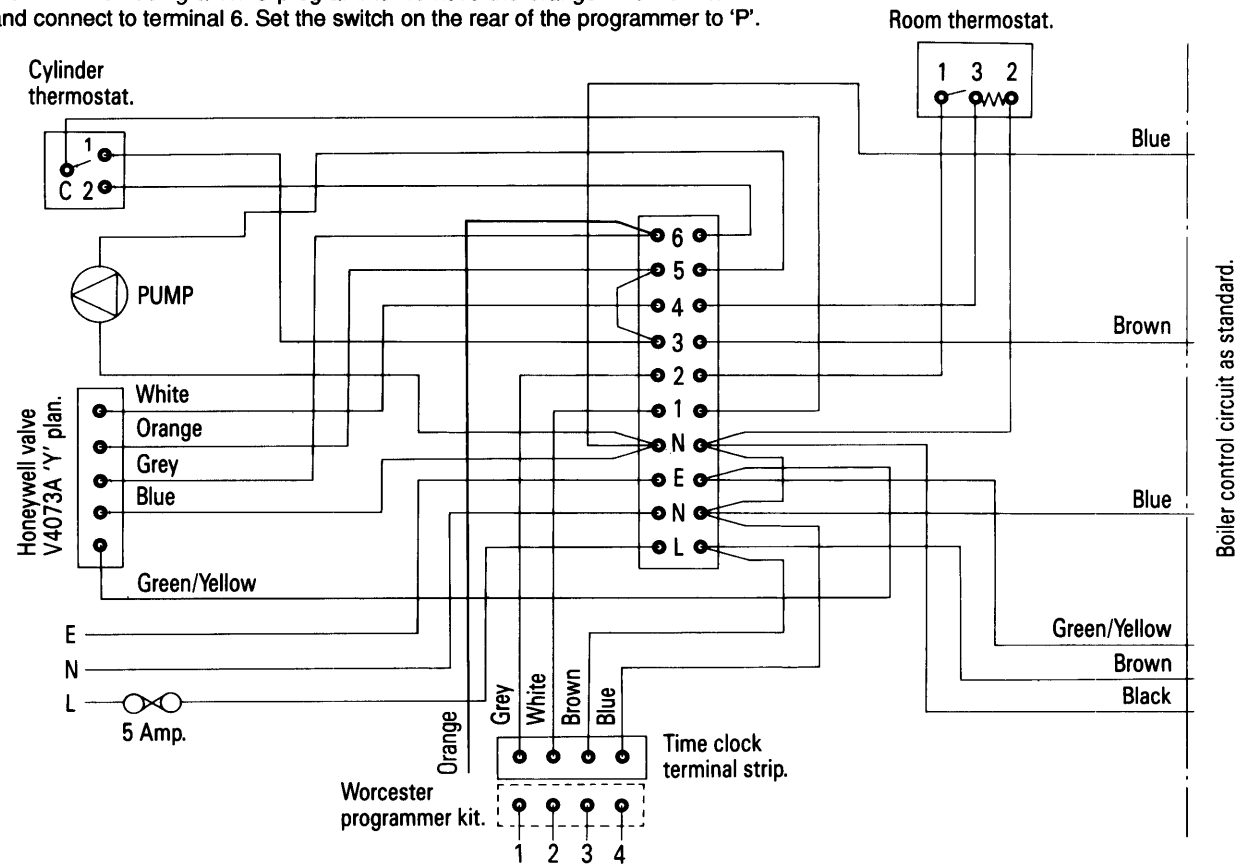
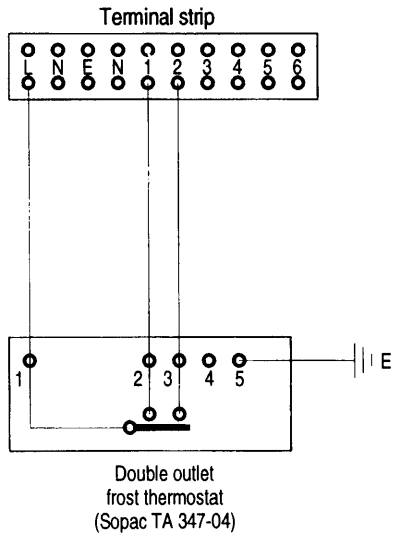


Fig. 14. Frost Protection.



terminal 3 and pull back through the tie wraps. Do not attempt to cut the tie wraps. Ensure that the brown wire is firmly secured in terminal 3. Connect the orange wire to terminal 6.

5. **FROST PROTECTION (See Fig. 14)**
For full frost protection a single pole double switch thermostat should be fitted so that both the boiler and the circulating pump circuits are energised under frost conditions. A suitable frost thermostat is manufactured by SOPAC Ltd.

8. COMMISSIONING

Remove the appliance cabinet, fill the system and check for leaks. The following procedure should then be adopted.

A. PJ 26/32 Appliance

1. Remove the Electro Oil Inter 2011D from the boiler by slackening the two M6 retaining screws located in the burner housing ring and pulling the burner clear. This will require the use of a 5mm allen key.
2. Having removed the burner, ensure that the stainless steel target wall is correctly located and the boiler baffles are all in place. Check that the ignition electrodes are correctly positioned relative to the nozzle and the position of the nozzle face in relation to the front edge of the combustion head is also correct (see Fig. 15).
   Remount the burner.
3. Fit a 3 pin plug with a 5 amp fuse to the electrical supply cable and plug into a mains supply socket. The mains cable should be passed down the side of the boiler and under no circumstances over the flue outlet plate or cleaning aperture.
4. Check that the two thermostat phials are correctly located in the boiler thermostat pocket positioned in the top front of the boiler.
5. Open all fuel supply valves.
6. Disconnect the flexible hose from the boiler oil pump and draw off at least 2.5 litres of oil, then reconnect the hose.
7. Release the fuel bleed port on the burner pump and fit a length of tubing from the port into a suitable receptacle. Turn on the boiler thermostat and allow the burner to run through to lockout. Wait two minutes and reset the burner control box. Repeat the procedure at least three times or until a steady stream of oil, without air, is exhausted from the bleed port. Relock the bleed port and disconnect the tube.
8. Prior to firing the burner, it is necessary to position the air shutter so that satisfactory ignition, and subsequent combustion, may be achieved. Air adjustment is achieved via a 4mm hexagonal headed grub screw as shown in Fig. 15.

NOTE: Persistent lockout when running indicates a fault and a Service Engineer should be consulted.

9. Run the boiler for approximately three minutes and switch off checking that there is no after spurting from the nozzle. If after-spurting occurs remove the burner from the boiler as detailed in Paragraph **1**, unscrew the nozzle and, while holding the burner in a vertical position, fill the nozzle holder with oil. Refit the nozzle and burner and continue to run the boiler for three minute periods until after-spurting stops.
10. Run the boiler for a further 15 minute period and then finally set the air control to give the CO_2 value specified in table 2 with a smoke number not exceeding No. 1.

NOTE: A flue gas sampling point is located on the boiler cleaning aperture.

B. PJ 35/50 Appliance

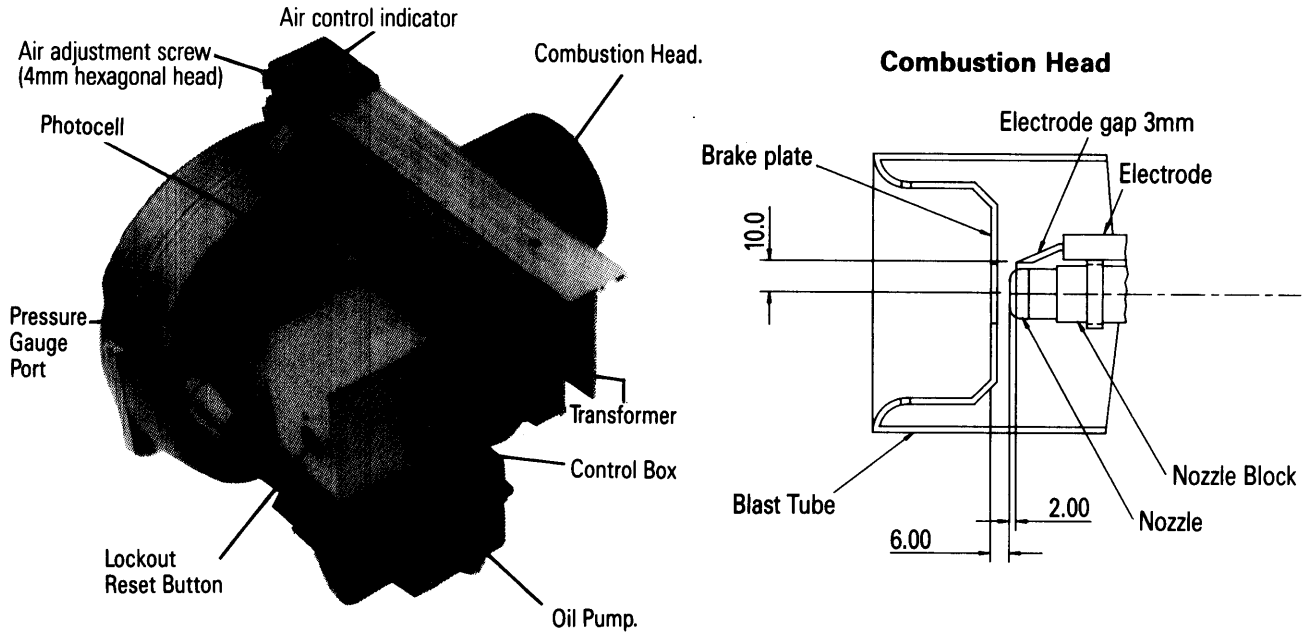
1. Remove the burner from the boiler. Both the Selectos D13A and the Electro-Oil Inter 2020 burners are flange mounted, secured to the boiler via two M10 mounting studs and nuts. However, when removing the burner, it is not always necessary to release the flange mounting, as indicated below:-

(a) **Selectos D13A**
On the Selectos burner, the mounting flange is an integral part of the main casting of the burner. Therefore, to remove the burner, the two M10 nuts securing it to the mounting studs must be removed and the burner complete may then be withdrawn.

(b) **Electro-Oil Inter 2020A**
Release the two M5 screws located in the top of the mounting flange and withdraw the burner, leaving the flange secured to the boiler.

2. Having removed the burner, ensure that the stainless steel target wall is correctly located and the boiler baffles are all in place. Check that the ignition electrodes are correctly positioned relative to the nozzle and the position of the nozzle face in relation to the front edge of the combustion head is also correct (see Fig. 16).
   Remount the burner.
3. Fit a 3 pin plug with a 5 amp fuse to the electrical supply cable and plug into a mains supply socket. The mains cable should be passed down the side of the boiler and under no circumstances over the flue outlet plate or cleaning aperture.
4. Check that the two thermostat phials are correctly located in the boiler thermostat pocket positioned in the top front of the boiler.
5. Open all fuel supply valves.
6. Disconnect the flexible hose from the boiler oil pump and draw off at least 2.5 litres of oil, then reconnect the hose.
7. Release the fuel bleed port on the burner pump and fit a length of tubing from the port into a suitable receptacle. Turn on the boiler thermostat and allow the burner to run through to lockout. Wait two minutes and reset the burner control box. Repeat the procedure at least three times or until a steady stream of oil, without air, is exhausted from the bleed port. Relock the bleed port and disconnect the tube.

Fig. 15. Electro-Oil Inter 2011D



8. Prior to firing the burner, it is necessary to position the air shutter so that satisfactory ignition, and subsequent combustion, may be achieved. The method of adjusting the volume of air required for combustion varies with each burner, as indicated below:-

(a) **Selectos D13A**
The Selectos D13 burners incorporate three variables in relation to combustion air adjustment:-

(i) An Offset Fan Intake Nozzle (OFIN) which may be set to a high or low position. To check the OFIN setting, remove the access cover (see Fig. 16) and note whether the embossed arrow on the inside of the fan housing side wall is aligned against **H** (High) or **L** (Low). In order to change the setting, remove the locking screw and turn the OFIN to the required position.

(ii) An air intake damper, located at the rear of the burner, beneath the control box (see Fig. 16), which acts as a throttle valve.

(iii) The position of the nozzle/flame-ring assembly may be varied within the venturi-type combustion head. Referring to Figure 17, adjustment of **X** is achieved by slackening the socket headed screw indicated and moving the inner assembly backwards to decrease and forwards to increase the volume of air for combustion.

(b) **Electro-Oil Inter 2020A**
Air shutter adjustment is achieved via a 4mm hexagonal headed grub screw as shown in Fig. 16b.

9. If the Electro-Oil Inter 2020 burner has been fitted to the appliance ensure that the air control is adjusted to the appropriate setting for the required appliance output. (See Table 5 in the Technical Data Section).
However, when the Selectos D13A burner is fitted to the boiler, proceed as follows:-

(a) Referring to Table 4 in the 'Technical Data' section, ensure that the OFIN is correctly positioned for the required appliance output.

(b) Release the socket headed screw and pull the inner assembly as far back as possible i.e. so that **X = 0** (see Fig. 17).

(c) Position the air inlet damper so that it is half open i.e. at 45° from its closed position.

The burner may now be started, by turning the control thermostat knob to maximum. After a pre-ignition period of approximately 15 seconds the burner should ignite. Flame sensing is carried out by means of a photocell mounted in the burner body. Should the boiler fail to establish a normal firing pattern, (or should flame failure occur during running), the absence of a flame is sensed and the control box is monitored to a safe lockout condition and the boiler is shut down. The red light in the boiler control panel will illuminate indicating the burner has gone to lockout. In this instance wait two minutes, remove the appliance front cover and press the red lockout reset button mounted in the burner control box. Another start sequence is then initiated and repeat until a flame is established.

NOTE: Persistent lockout when running indicates a fault and a Service Engineer should be consulted.

10. Run the boiler for approximately three minutes and switch off checking that there is no after-spurting from the nozzle. If after-spurting occurs remove the burner from the boiler as detailed in Paragraph **1**, unscrew the nozzle and, while holding the burner in a vertical position, fill the nozzle holder with oil. Refit the nozzle and burner and continue to run the boiler for three minute periods until after-spurting stops.

11. Allow the boiler to run for a further 15 minute period and then proceed as follows:-

(a) **Selectos D13A**
If the Selectos D13A burner has been fitted to the appliance, then proceeding from **9** above:

(i) With the inner assembly retracted as far as possible (i.e. **X = 0**), close the air inlet damper from its half open position until a CO_2 reading of 13% to 13½% is obtained.

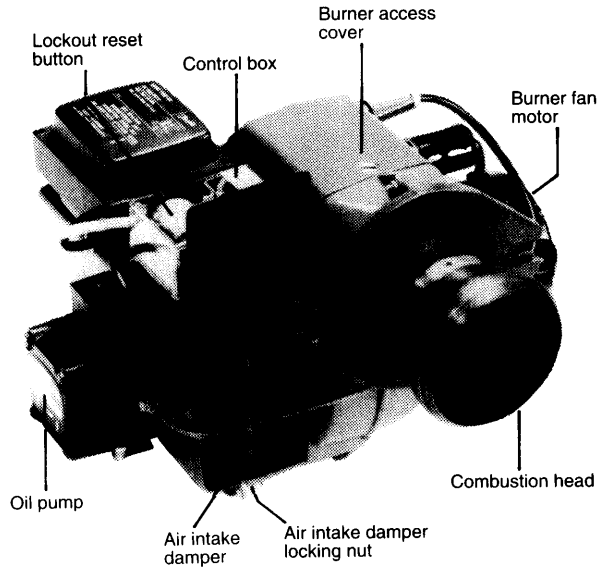
NOTE: Table 4 in the 'Technical Data' section gives an indication of the approximate air inlet damper position to achieve this CO_2 range, for the respective outputs of the appliance.

(ii) Having obtained a 13% to 13½% CO_2 reading, lock the air inlet damper in position using the locking nut indicated in Figure 16a.

(iii) Release the socket headed screw and push the inner assembly forward until the following conditions are obtained:-

Co_2 = 11% to 11½%
Smoke number = Not exceeding No. 1

Fig. 16a. Selectos D13A Burner.



Combustion Head

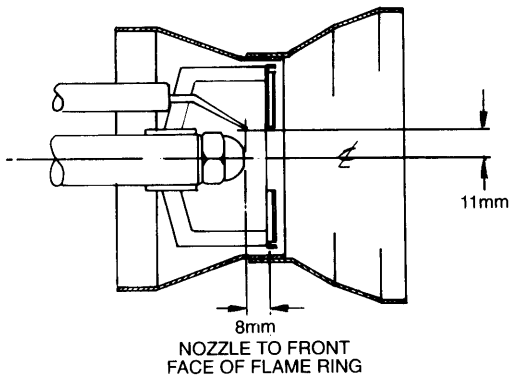
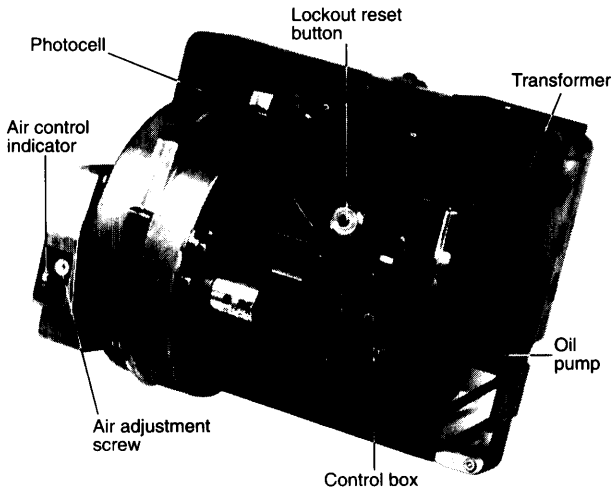
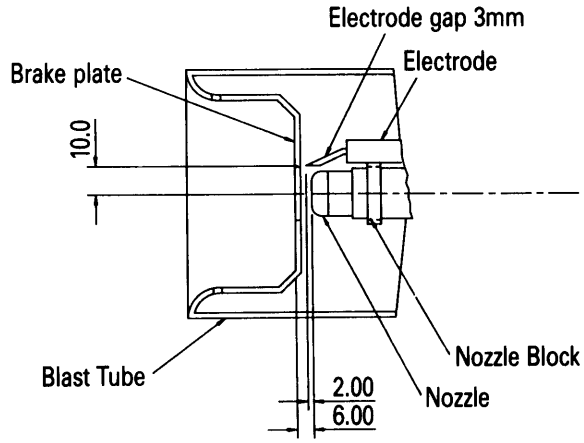


Fig. 16b. Electro-Oil Inter 2020A Burner



Combustion Head



(b) **Electro-Oil Inter 2020A**
If the Electro-Oil Inter 2020 burner is fitted to the appliance, adjust the air control to give the CO_2 value specified in table 5 with a smoke number not exceeding No. 1.

NOTE: A flue gas sampling point is located on the boiler cleaning aperture.

C. PJ 50/70 Appliance

1. Remove the burner from the boiler. Both the Selectos D13B and the Electro-Oil Inter 2020B burners are flange mounted, secured to the boiler via two M10 mounting studs and nuts. However, when removing the burner, it is not always necessary to release the flange mounting, as indicated below:-

(a) **Selectos D13B**
On the Selectos burner, the mounting flange is an integral part of the main casting of the burner. Therefore, to remove the burner, the two M10 nuts securing it to the mounting studs must be removed and the burner complete may then be withdrawn.

(b) **Electro-Oil Inter 2020B**
Release the two M5 screws located in the top of the mounting flange and withdraw the burner, leaving the flange secured to the boiler.

2. Having removed the burner, ensure that the stainless steel target wall is correctly located and the boiler baffles are all in place. Check that the ignition electrodes are correctly positioned relative to the nozzle and the position of the nozzle face in relation to the front edge of the combustion head is also correct (see Fig. 18).
Remount the burner.

3. Fit a 3 pin plug with a 5 amp fuse to the electrical supply cable and plug into a mains supply socket. The mains cable should be passed down the side of the boiler and under no circumstances over the flue outlet plate or cleaning aperture.

4. Check that the two thermostat phials are correctly located in the boiler thermostat pocket positioned in the top front of the boiler.

5. Open all fuel supply valves.

6. Disconnect the flexible hose from the boiler oil pump and draw off at least 2.5 litres of oil, then reconnect the hose.

7. Release the fuel bleed port on the burner pump and fit a length of tubing from the port into a suitable receptacle. Turn on the boiler thermostat and allow the burner to run through to lockout. Wait two minutes and reset the burner control box. Repeat the procedure at least three times or until a steady stream of oil, without air, is exhausted from the bleed port. Relock the bleed port and disconnect the tube.

8. Prior to firing the burner, it is necessary to position the air shutter so that satisfactory ignition, and subsequent combustion, may be achieved. The method of adjusting the volume of air required for combustion varies with each burner, as indicated below:-

(a) **Selectos D13B**
The Selectos D13 burners incorporate three variables in relation to combustion air adjustment:-

(i) An Offset Fan Intake Nozzle (OFIN) which may be set to a high or low position. To check the OFIN setting, remove the access cover (see Fig. 18) and note whether the embossed arrow on the inside of the fan housing side wall is aligned against **H** (High) or **L** (Low). In order to change the setting, remove the locking screw and turn the OFIN to the required position.

(ii) An air intake damper, located at the rear of the burner, beneath the control box (see Fig. 18), which acts as a throttle valve.

(iii) The position of the nozzle/flame-ring assembly may be varied within the venturi-type combustion head. Referring to Figure 17, adjustment of **X** is achieved by slackening the socket headed screw indicated and moving the inner assembly backwards to decrease and forwards to increase the volume of air for combustion.

(b) **Electro-Oil Inter 2020B**
Air shutter adjustment is achieved via a 4mm hexagonal headed grub screw as shown in Fig. 18b.

9. If the Electro-Oil Inter 2020 burner has been fitted to the appliance, ensure that the combustion head and air control are adjusted to the appropriate setting for the required appliance output (see Table 8 in the 'Technical Data' section). However, when the Selectos D13B burner is fitted to the boiler, proceed as follows:-

(a) Referring to Table 7 in the 'Technical Data' section, ensure that the OFIN is correctly positioned for the required appliance output.

(b) Release the socket headed screw and pull the inner assembly as far back as possible i.e. so that **X = 0** (see Fig. 17).

(c) Position the air inlet damper so that it is fully open i.e. at 90° from its closed position.

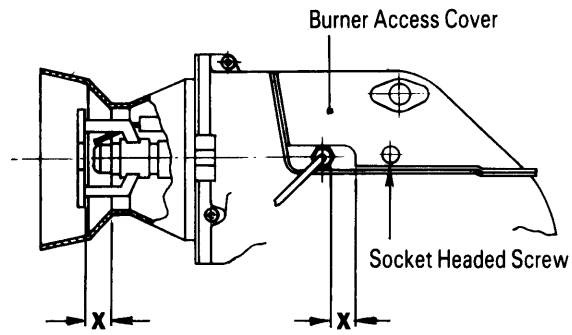
The burner may now be started by turning the control thermostat knob to maximum. After a pre-ignition period of approximately 15 seconds the burner should ignite. Flame sensing is carried out by means of a photocell mounted in the burner body. Should the boiler fail to establish a normal firing pattern, (or should flame failure occur during running), the absence of a flame is sensed and the control box is monitored to a safe lockout condition and the boiler is shut down. The red light in the boiler control panel will illuminate indicating the burner has gone to lockout. In this instance wait two minutes, remove the appliance front cover and press the red lockout reset button mounted in the burner control box. Another start sequence is then initiated and repeat until a flame is established.

Note: Persistent lockout when running indicates a fault and a Service Engineer should be consulted.

10. Run the boiler for approximately three minutes and switch off checking that there is no after spurting from the nozzle. If after-spurting occurs remove the burner from the boiler as detailed in Paragraph **1**, unscrew the nozzle and, while holding the burner in a vertical position, fill the nozzle holder with oil. Refit the nozzle and burner and continue to run the boiler for three minute periods until after-spurting stops.

11. Allow the boiler to run for a further 15 minute period and then proceed as follows:-

Fig. 17.
Air adjustment on Selectos D13 Burners.



(a) **Selectos D13B**
If the Selectos D13B burner has been fitted to the appliance, then proceeding from Paragraph **9**:

(i) With the inner assembly retracted as far as possible (i.e. **X = 0**), close the air inlet damper from its fully open position until a CO_2 reading of 13% to 13½% is obtained.

NOTE: Table 7 in the 'Technical Data' section gives an indication of the approximate air inlet damper position to achieve this CO_2 range, for the respective outputs of the appliance.

(ii) Having obtained a 13% to 13½% CO_2 reading, lock the air inlet damper in position using the locking nut indicated in Figure 18a.

(iii) Release the socket headed screw and push the inner assembly forward until the following conditions are obtained:-

Co_2 = 11% to 11½%
Smoke number = Not exceeding No. 1

(b) **Electro-Oil Inter 2020**
If the Electro-Oil Inter 2020 burner is fitted to the appliance, adjust the air control to give the CO_2 value specified in table 8 with a smoke number not exceeding No. 1.

9. MAINTENANCE

TWICE YEARLY MAINTENANCE

1. Before commencing work on the boiler ensure that the mains supply is disconnected.
2. Remove the appliance top and front panels as described in Section 3.
3. Remove the cleaning aperture from the boiler by releasing the four M10 nuts securing it to the mounting studs and lift clear.
4. Lift out the boiler flue-way baffles and the stainless steel target wall.

APPLIANCE	No. OF CROSS TUBES	No. OF FLUE-WAY BAFFLES
PJ 26/32	one	four
PJ 35/50	one	four
PJ 50/70	two	six

NOTE: The boiler flue-way baffles should be located as shown in Figure 19, two each side of each boiler cross tube.

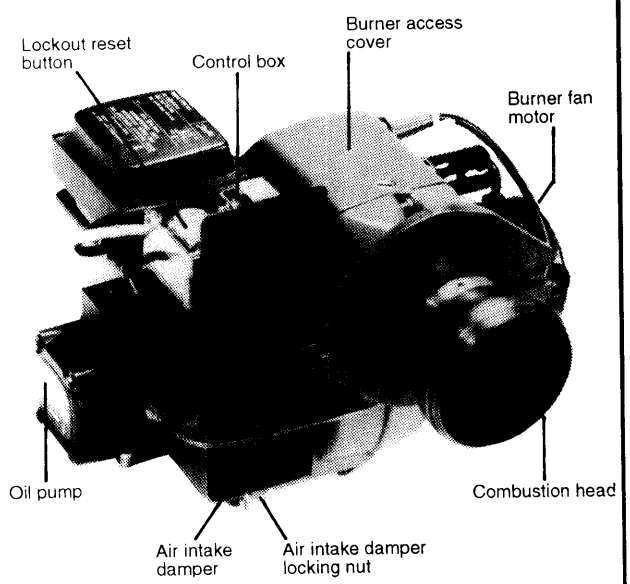
5. Remove the burner from the boiler as detailed in Section 8. Close the oil supply valves and disconnect the flexible hose from the burner.
6. Clean the boiler walls and cross tube sides with a stiff wire brush and vacuum out. Replace the boiler flue-way baffles and stainless steel target wall.
7. Dust and carbon deposits must be cleaned from the burner fan and air passages. To gain access to the fan and air passages for this operation the following procedure should be adopted:

(a) **Selectos Burner**
If the appliance is fitted with a Selectos burner (refer to 'Technical Data' section for further information) then to expose the fan and air passages, remove the two M5 screws securing the flange of the burner motor to the fan housing. The motor and fan assembly complete may then be withdrawn.

(b) **Electro-Oil Inter 2020 Burner**
If the appliance is fitted with an Inter 2020 burner then to expose the fan and air passages remove the four M6 screws from the fan housing and carefully remove.
Clean the fan impeller and air passage ways and replace the housing.

8. Remove the burner combustion head and thoroughly clean, ensuring it is free of carbon deposits.
9. Remove the atomizing nozzle and check that its combined filter is clear. Do not attempt to strip the nozzle into its component parts and do not clean the nozzle tip. If the performance of the nozzle is considered suspect replace with a new component.
It is recommended that the nozzle is replaced on each service.

Fig. 18a. Selectos D13B Burner.



Combustion Head

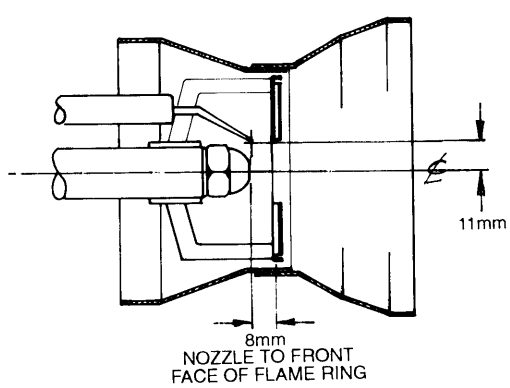
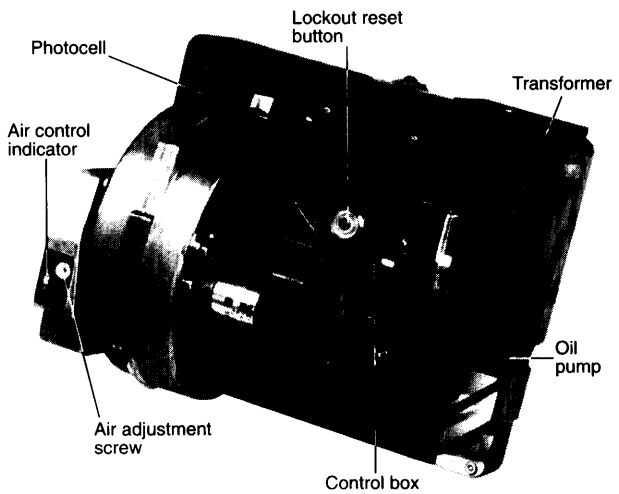


Fig. 18b. Electro-Oil Inter 2020B Burner



Combustion Head

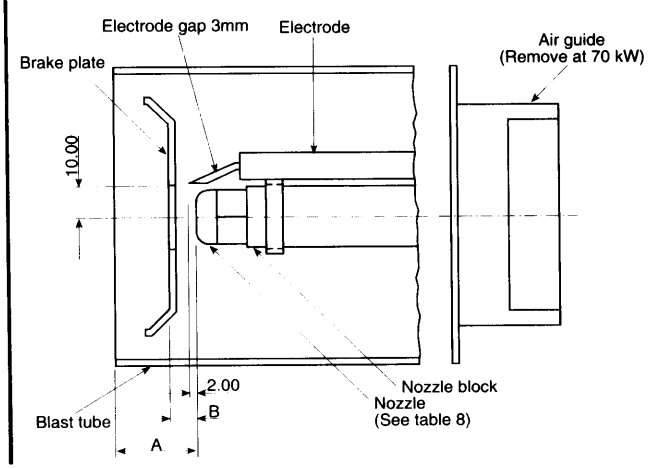
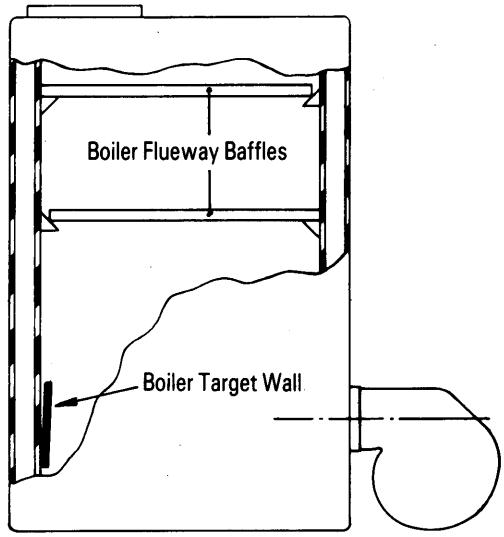


Fig. 19. Location of boiler flueway baffles.



10. Carefully re-assemble the burner. Re-open all oil supply valves and purge out the oil line assembly as detailed in Section 8.

11. Switch on the boiler and allow to run for a period of 15 minutes. The combustion performance of the appliance must then be checked and slight adjustments made to the combustion air settings if necessary to give the CO_2 value specified in tables 2 to 8 with a smoke number not exceeding No. 1 or, where not specified, to give the following conditions:-

    Smoke Number — Not exceeding No. 1
    PJ 26/32 — CO_2 — 10½% to 11%
    PJ 35/50 — CO_2 — 11% to 11½%
    PJ 50/70 — CO_2 — 11% to 11½%

Under normal operating conditions the above maintenance should be carried out twice yearly. In addition the following services should be carried out every two years.

TWO YEARLY MAINTENANCE

1. Shut off all oil supply valves.
2. Remove the paper element from oil filter and replace. If the filter contains a washable element then thoroughly clean in kerosene or gas oil and re-assemble into the filter.
3. Release the four screws retaining the oil pump cover and clean the wire filter element thoroughly with kerosene or gas oil.

10. SHORT PARTS LIST

Burner Components – Bray Selectos

Part		Manufacturers Reference	Qty	WHS Part No
Burner Control 1.	Box	Satronic TF801B	1	ZFSPA023X
	Photocell	Satronic FZ 711G	1	ZFSPA015X
Burner Control 2.	Box	Danfoss BH011/BH012	1	ZFPJT015X
	Photocell	Danfoss LD057H2020	1	ZFPJT142X
Burner Control 3.	Box	Danfoss BH061	1	ZFPJT233X
	Photocell	Danfoss LDS057H7081	1	ZFPJT234X

Burner Components – Electro Oil

Part		Manufacturers Reference	Qty	WHS Part No
Burner Control 1.	Box	Satronic TF830B	1	ZFSPA056X
	Photocell	Satronic MZ 770	1	ZFPJT215X
Burner Control 2.	Box	Danfoss BH011/BH012	1	ZFPJT015X
	Photocell	Danfoss LD057H2052	1	ZFPJT197X
Burner Control 3.	Box	Danfoss BH061	1	ZFPJT233X
	Photocell	Danfoss LDS057H7084 or 7085	1	ZFPJT235X

TROUBLE SHOOTING CHART

LOCKOUT

INDICATED BY ORANGE LAMP ON CONTROL BOX

To Re—set wait 2 mins. and press re-set button

- Ignition failure.
- No oil delivery from nozzle. Check oil supply at oil pump.
  - Oil at oil pump.
    - Air in pump. Bleed pump.
    - Nozzle blocked. Replace nozzle.
    - Faulty pump or faulty pump drive. Replace as necessary.
  - No oil at oil pump.
    - No oil in tank. Check tank and replenish if necessary.
    - Filters or oil line blocked. Check filters from tank to boiler and clean if necessary.
- Air adjustment fault. CO_2 should be as specified in tables 2 to 8.
- Flame detection fault.
  - Photocell filmed over.
  - Photocell faulty.
  - Faulty control box replace if necessary.
- Burner motor fails to operate.
  - Check motor across mains supply.
  - Control box fault replace if necessary.
- Intermittent lockout.
  - Bad electrical connection.
    - Check control box connections.
  - Downdraught.
    - Extend flue above eaves, or if possible above roof apex or adjacent obstruction.
    - Fit a downdraught cowl if flue cannot be extended.
  - Intermittent flame detection fault. See flame detection fault.
- Pulsation on start.

IGNITION FAILURE

- Electrode settings incorrect. See installation instructions.
- Faulty ignition transformer. Replace if necessary.
- Open circuit ignition.
  - Electrodes broken.
  - High tension leads faulty.
- Electrical connections not properly made in control box.
- Faulty control box. Replace control box.

BURNER FAILS TO START

Boiler does not respond to a call for heat.

- Boiler thermostat faulty. Check by linking out high limit and control thermostat.
- Programmer open circuit. Check by linking 2 & 3 on programmer
- Faulty control box. Replace if necessary.

PULSATION ON START

- Flue draught incorrect. Check flue draught.
- Combustion settings incorrect. Set up as in installation instructions.
- Faulty nozzle. Replace nozzle.

HIGH SMOKE NUMBER

- Faulty nozzle. Replace nozzle.
- Air intake blocked. Check air intake is clear.
- Incorrect combustion settings. Readjust as in installation instructions.
- Oil pressure incorrect. Adjust to recommended pressure settings.
- Incorrect components used on combustion head. Check with installation instructions.
- Target wall incorrectly positioned or faulty.

FAULTY BOILER OPERATION

- Noisy operation.
  - Pump noise.
    - Air in pump.
    - Worn pump. Replace.
  - Worn motor bearings. Replace motor.
  - Fan out of balance. Replace fan.
- Boiling.
  - Faulty boiler thermostat. Replace if necessary.
  - Short circuit boiler thermostat. Take out of circuit to check.
  - Thermostate bulb not fully home in pocket. Ensure bulb is pushed fully home.
- Short cycling.
  - External controls not operating correctly.
  - Boiler thermostat differential incorrect. Should be 10°F±2°F.
  - Boiler rating incorrect. If overrated heat load satisfied very quickly.

OIL SMELLS

- Fumes on start-up. Downdraught. Check flue with gauge.
- Oil soaked hearth.
  - Numerous lockouts. Cure the lockout condition.
  - Faulty burner operation.
- Odour in boiler room.
  - Oil leaks pipe fittings. Take apart and remake if necessary.
  - Leaks at tubing connectors. Ensure end of tubing is sealed.
- Post purge control unit faulty. (Low level discharge models only.)

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