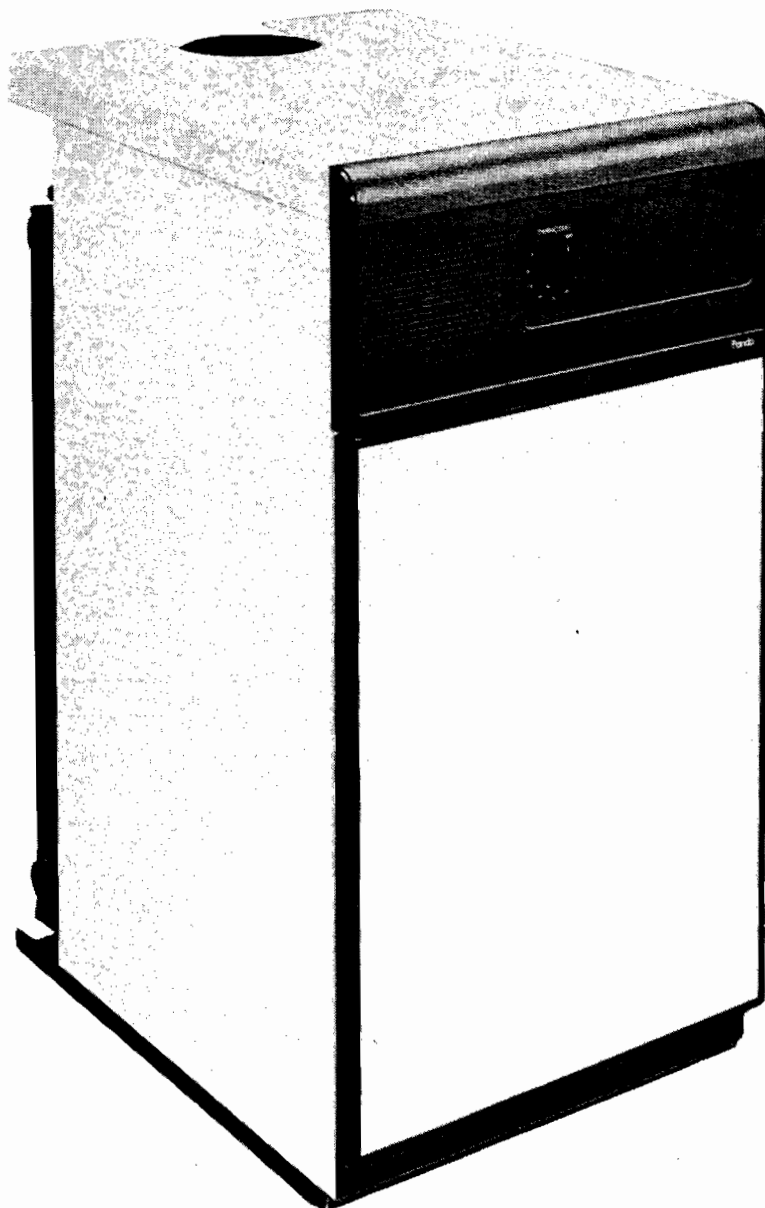


Installation and Servicing Instructions

Panda 50, 65, 90 and 120 Pressure jet oil boilers



Panda 90

Read these instructions thoroughly before working on the boiler.

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1. INTRODUCTION

The Panda range are steel shell boilers with plain sided combustion chamber and heat exchange surfaces. Baffles within the shell provide high efficiency of heat transfer.

The Panda 50 is rated from an output of 11.7 to 14.7 kW (40 000 to 50 000 Btu/h).

The Panda 65 is rated from an output of 16.0 to 19.0 kW (55 000 to 65 000 Btu/h).

The Panda 90 is rated from an output of 20.5 to 26.4 kW (70 000 to 90 000 Btu/h).

The Panda 120 is rated from an output of 27.9 to 35.2 kW (95 000 to 120 000 Btu/h).

All models are preset for use with kerosine (Class C2) at the maximum output rate.

For alternative rates with gas oil (Class D) see Technical Data, below.

Note: The Panda 50 is only suitable for use with kerosine.

These boilers are designed for use with an open central heating system and/or an indirect domestic hot water system.

THEY MUST NOT BE CONNECTED TO A DIRECT CYLINDER.

2. TECHNICAL DATA

BOILER			Panda 50		Panda 65		Panda 90				Panda 120					
Heat output		kw	11.7	14.7	16.0	19.0	20.5		26.4		27.9		35.2			
		Btu/h	40 000	50 000	55 000	65 000	70 000		90 000		95 000		120 000			
Fuel			Kerosine only		Gas oil	Kerosine	Kerosine	Gas oil	Kerosine	Gas oil	Kerosine	Gas oil	Kerosine	Gas oil		
* Flue gas temp. approx.			°C	200	210	200	210	205		225		210		235		
			°F	392	410	392	410	401		437		410		455		
* CO ₂ approx.			%	10.0	10.5	10.5		10.5		11.0		11.0		11.5		
Nozzle and burner	80° Monarch R	0.5 (Electro-oil)		—		—		—		—		0.85 (Selectos)		1.0 (Selectos)		
	80° Monarch NS	—		—		0.6 (Electro-oil)		0.6 (Electro-oil)		0.75 (Electro-oil)		—		—		
	80° Monarch AR	—		—		—		—		—		0.85 (Electro-oil)		1.0 (Electro-oil)		
	80° Danfoss H	0.5 (Selectos)		0.5 (Both)		0.6 (Both)		0.6 (Selectos)		0.75 (Selectos)		—		—		
Oil pump pressure	Monarch nozzle	bar	5.5	7.0	—		8.6		10.7	7.6	11.4	8.6	8.3	7.6	9.7	8.6
		lb/in ²	80	100	—		125		155	110	165	125	120	110	140	125
	Danfoss nozzle	bar	5.5	7.0	7.6	8.3	9.0	7.9	10.3	8.3	8.3	7.0	11.0	8.3		
		lb/in ²	80	100	110	120	130	115	150	120	120	100	160	120		
Typical fuel flow rate		kg/h	1.27	1.46	1.40	1.80	1.95	1.97	2.51	2.57	2.60	2.50	3.30	3.20		
		ml/min	27.0	31.5	31.0	39.0	41.0	39.0	53.0	51.0	56.0	54.0	71.0	68.5		
Burner	Electro-oil	model	INTER 99/PLI		INTER 99/PLI		INTER 109/PLI				INTER 109/PLI					
	Selectos	model	D11/P001		D11/P002		D11/P003				D11/P004					
Weight with burner and case		kg	95		110		147				174					
		lb	210		242		325				384					
Water content		kg	17		18		27				31					
		lb	38		40		60				68					
* Minimum draught		N/m ²	—12.5													
		in wg	—0.05													
Smoke No.		Bacharach	0—1													
Max. working head		m	30													
		ft	100													
Hearth temperature Category		°C	Below 100													
Electricity supply			240V 50Hz 150W Fuse 3A (Burner only, excludes circulating pump)													

* Low level flue kit

The above data for kerosine as the fuel is to be used with the following exceptions:

14.7 kW output; flue gas temperature is 215°C (419°F) and CO₂ is 10.0%

19.0 kW output: CO₂ is 10.0%

20.5 kW output: CO₂ is 10.0% (if Selectos burner is used)

35.2 kW output: CO₂ is 11.0%

Minimum draught: not applicable

3. GENERAL REQUIREMENTS

The boiler must be installed in accordance with: Local Building Regulations, Bye-laws of the local water undertaking and the IEE Wiring Regulations.

Detailed recommendations are stated in the following British Standards: BS5410:1:1977 and BS5449:1:1977.

4. DELIVERY

The boiler is despatched protectively wrapped without the burner or case. The burner and case parts are supplied in two separate cartons for assembly to the boiler during installation.

Uncased models require a special control box which is packed separately.

If required, pump, programmer and low level flue kits are despatched separately.

5. OIL SUPPLY

Galvanised pipe must not be used.

The storage tank should incline 1:50 towards the drain cock, but away from the fuel outlet.

A metal bowl filter with replaceable micron element must be fitted. If the boiler is installed in a kitchen the filter should be outside the house. Leave unions for purging the oil supply line.

The fuel supplier will be able to advise on pipe sizes, valves, etc., if required.

Gravity supply (Fig. 1). Maximum head 8 m, minimum head 0.5 m. Avoid high points in the pipeline which can cause air locks.

Low level supply (Fig. 2). Maximum lift 4 m. A by-pass plug is supplied with the pump for a 2-pipe system. See Fig. 6, page 7.

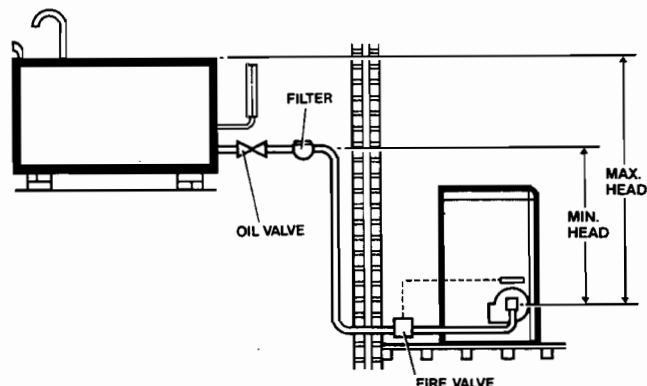


Fig. 1 One pipe installation (gravity supply)

Head (m)	Max. Length of pipe run (m)	
	4 mm bore	6 mm bore
4.0	100	100
3.5	100	100
3.0	100	100
2.5	100	100
2.0	79	100
1.5	55	100
1.0	31	100
0.5	7	36

For notes on fire valves see BS799, BS5410:1 and CP3002

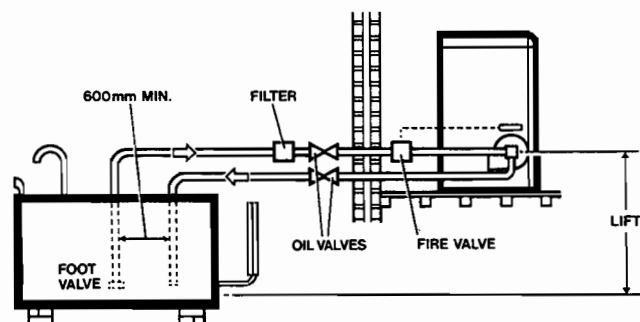


Fig. 2 Two pipe Installation (low level supply)

Lift (m)	Max. pipe length—intake or return (m)	
	8 mm bore	10 mm bore
0.0	100	100
0.5	100	100
1.0	87	100
1.5	72	100
2.0	57	100
2.5	41	100
3.0	26	64
3.5	10	26
4.0	0	0

6. ELECTRICITY SUPPLY

240V 50Hz via a fused double pole switch or a fused 3-pin plug and shuttered outlet socket, adjacent to the boiler.

Fuse the supply at 3 amp. If a circulating pump is wired to the boiler terminal block the supply should be fused at 5 amp. The external wiring between the appliance and the electrical supply shall comply with the latest IEE Wiring Regulations, and any local regulations which apply.

The appliance must be earthed.

7. AIR SUPPLY

There must be adequate air for combustion and, if the boiler is installed in a confined space, additional air for ventilation. If the boiler is installed in a room, the room must have a permanent air vent either direct to the outside air or to an adjacent room which itself has a permanent air vent to the outside air.

The minimum effective area of the air vent(s) required for combustion is:

Panda 50 — 81 cm² (13 in²)

Panda 65 — 105 cm² (16 in²)

Panda 90 — 145 cm² (23 in²)

Panda 120 — 193 cm² (30 in²)

If the boiler is installed in a confined space permanent air vents are required for ventilation IN ADDITION to the air vents for combustion, one at high level and one at low level, either direct to the outside air or to a room which itself is ventilated to the outside air as previously described.

Both high and low level air vents must communicate with the same room or must be on the same wall to outside air. The minimum effective area of each of the vents for ventilation is given in the following table:

Boiler	Vents to outside	Vents to a room
Panda 50	162 cm ² (26 in ²)	243 cm ² (39 in ²)
Panda 65	210 cm ² (32 in ²)	315 cm ² (48 in ²)
Panda 90	290 cm ² (46 in ²)	435 cm ² (69 in ²)
Panda 120	386 cm ² (60 in ²)	549 cm ² (90 in ²)

8. FLUE SYSTEM

A normal flue will give 12.5-25 N/m² (0.05-0.1 in wg) draught at the boiler outlet when it is operating at rated output. An insulated flue terminating in a down draught free area, eg 600 mm (24 in) above the ridge of a one or two storey building will usually provide the necessary draught. Unless extreme conditions, above 30 N/m² (0.12 in wg) prevail, a separate stabiliser should not be needed. These are not suited to kitchen installations since they will emit noise.

Precautions are needed against excessive cooling of flue gases, and if a suitable internal stack is available it should be used. If an existing internal or external brick chimney is used it must be lined with a liner suited to oil fuels. The annular space must be sealed at top and bottom and may be loosely filled with insulating material. In a new building the chimney must conform to the current Building Regulations.

An independent external flue of whatever material, must be effectively insulated and given a waterproof cladding, or made of double wall construction.

A sealed cleaning door must be provided in the flue or chimney near the connecting flue entry.

The first flue length off the boiler must be cast-iron or steel.

A minimum clearance of 25 mm (1 in) must be maintained between the flue pipe and any adjacent combustible material.

Flue runs must be direct as possible, avoiding 90° bends.

The boiler must not share a flue with any other appliance.

Nominal flue size: All models except Panda 120-127 mm (5 in). Panda 120-150 mm (6 in). If a suitable 100 mm (4 in) flue already exists this may be used for the Panda 50 or 65.

9. WATER CONNECTIONS

There are two flow and return tappings, Rp 1 (1 in BSP parallel), [Rp 1¼ (1¼ in BSP parallel) for the Panda 120] on each side of the boiler. One pair may be used for heating and one pair for the hot water primaries. If only two of the tappings are used, it is preferable to use opposite top and lower ones. An additional Rp ¾ (¾ in BSP parallel) connection is provided on the front of the boiler for the pump kit. If the front tapping is used other than for the pump kit connection, ensure that any pipe routed over the top of the boiler does not obstruct access to the cleaning cover.

Fit one or more drain cocks to enable the water system to be fully drained.

10. BOILER DIMENSIONS

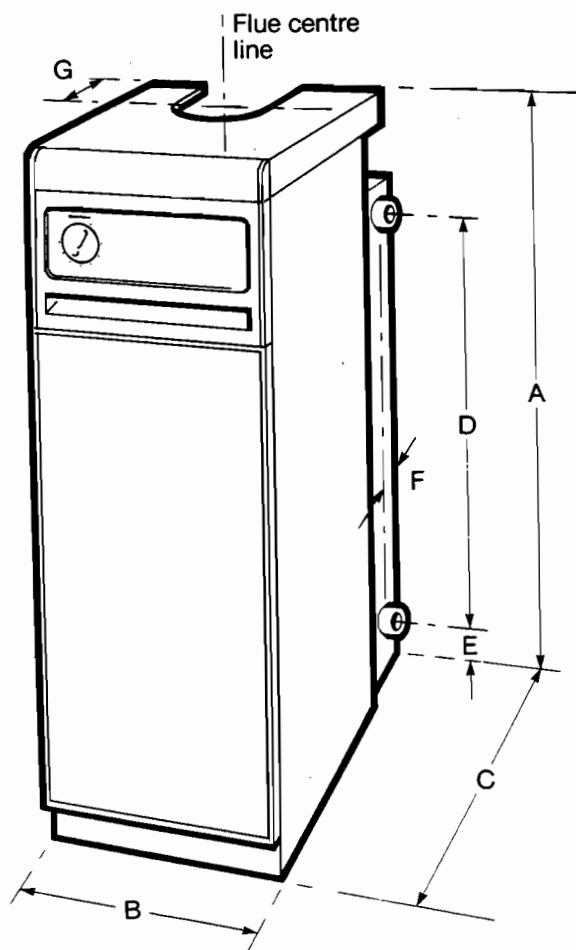


Fig. 3

Dimension (mm)	A	B	C	D	E	F	G
Panda 50 and 65	900	300	600	640	90	50	85
Panda 90	900	450	600	640	90	50	85
Panda 120	900	450	735	640	90	50	100

11. BOILER LOCATION

The base of the boiler is insulated so no special hearth is required. The floor surface must be firm and level. If the floor covering is a material which softens when warm it should be protected, for example by a steel sheet.

The following minimum clearances for access and servicing are required:

- above the boiler case—450 mm (18 in).
- in front of the boiler case—600 mm (24 in).

12. INSTALLATION PROCEDURE

Place the boiler shell in position and connect the flue and water pipes. Ensure that the flue is adequately sealed to the boiler. If a pump kit is being fitted, refer to the instructions supplied with the kit.

The burner is supplied set at its maximum rating and the pump pressure pre-set for kerosine. If it is necessary to change the fuel or rating, refer to the Technical Data, page 3, for alternative nozzles and pump pressures. If necessary remove the inner oil tube assembly from the burner, see Burner servicing, page 11, and change the nozzle. Adjust the pump pressure when commissioning the boiler. **Note:** The Panda 50 is only for use with kerosine.

Before fitting the burner make sure that the burner head settings are correct, see below.

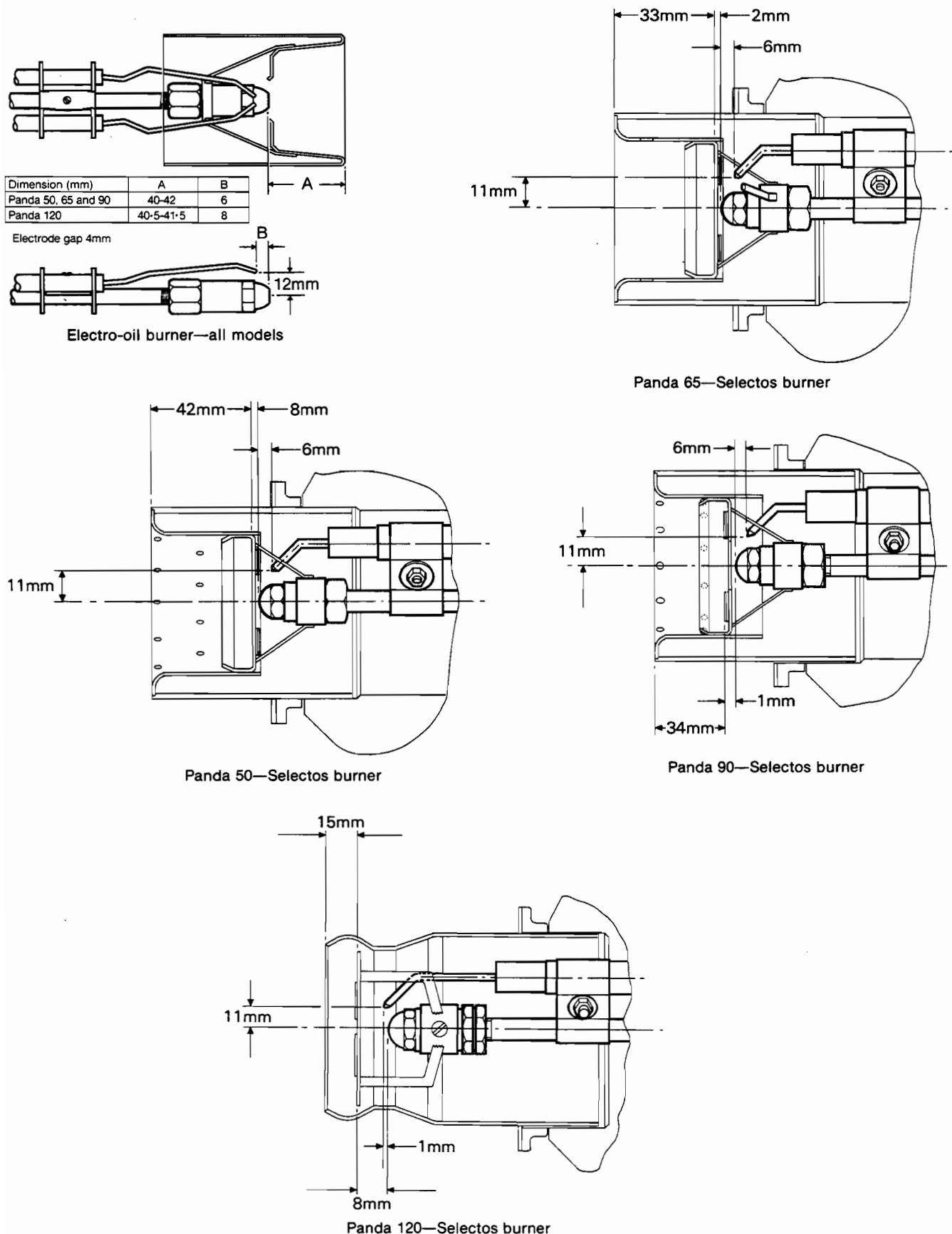


Fig. 4

Assemble the mounting flange to the burner and fit the assembly to the boiler shell with the gasket between the flange and the shell.

Remove the boiler top cover and remove the packing from above the heat exchanger baffles. Check that the baffles are in position as shown in Fig. 5. Replace the top cover.

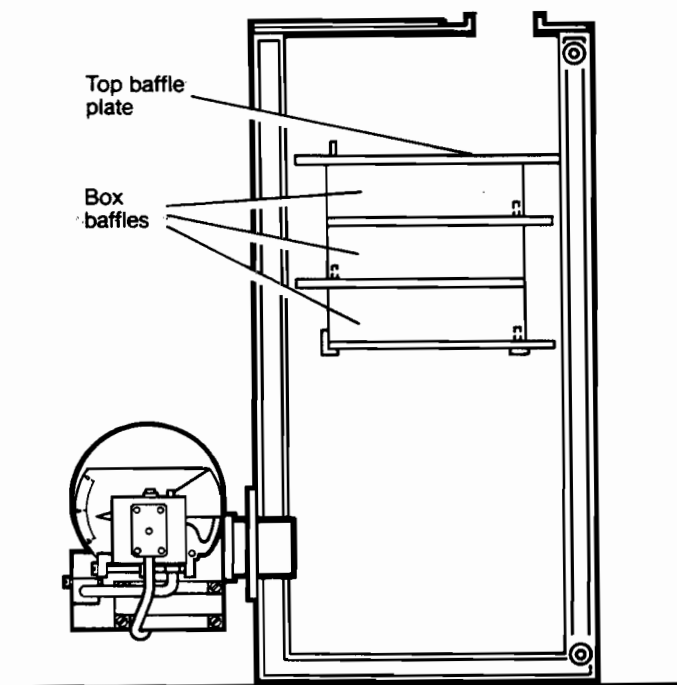
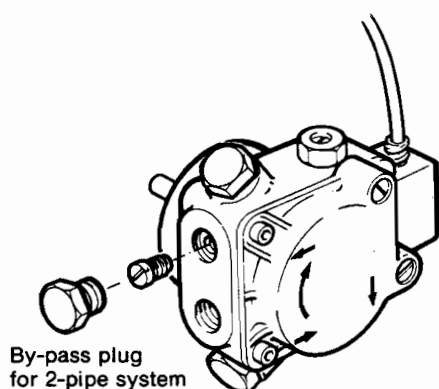


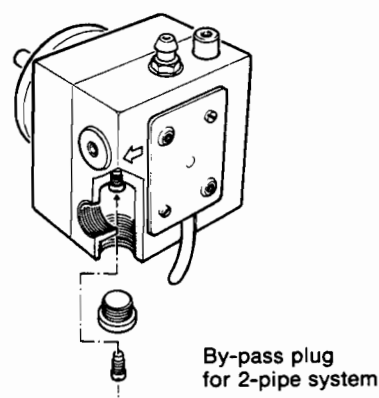
Fig. 5

Connect the oil supply to the pump. The inlet and return ports are Rp $\frac{1}{4}$ ($\frac{1}{4}$ in BSP parallel). The pump manufacturer's recommended connection is by a corresponding Rp $\frac{1}{4}$ shouldered fitting with a sealing washer. BSP taper or NPTF fittings may also be used with a suitable jointing compound. If a tapered thread fitting is used care should be taken to ensure that a correct seal is made without the body of the fitting impinging on the pump body.

Note: The Danfoss pump is mounted to the Electro-oil burner as shown below, when it is fitted to the Selectos burner it is mounted the other way up.



Alternative Sunstrand pump
Electro-oil burner only



Danfoss pump
Electro-oil and Selectos burners

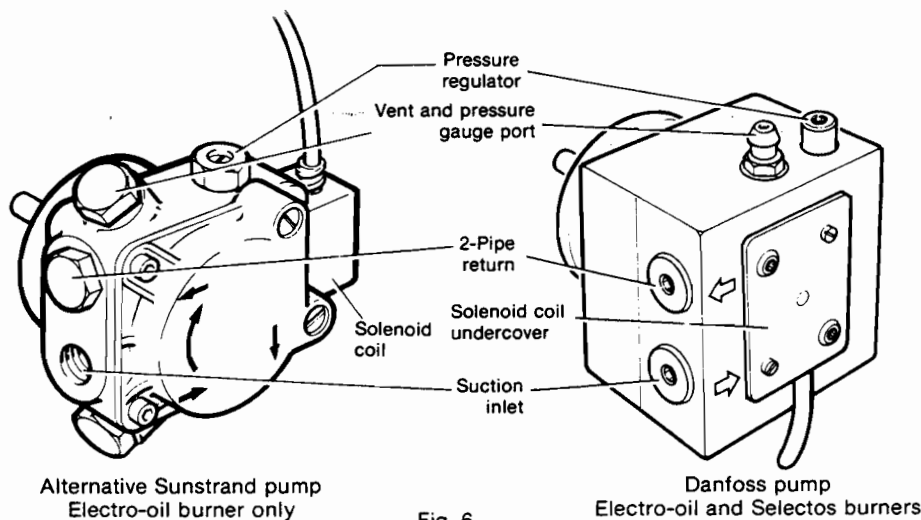


Fig. 6

To assemble the case side panels.
Refer to Fig. 7.

Fit the four case top clips, 1 to the case side panels in the holes shown.

Fit the two spire nuts 2, to the bottom of the side panels.

Fit the door catch 3, to the right hand side panel.

Fit the burner cable support clip 4, to the right hand side panel just above the door catch.

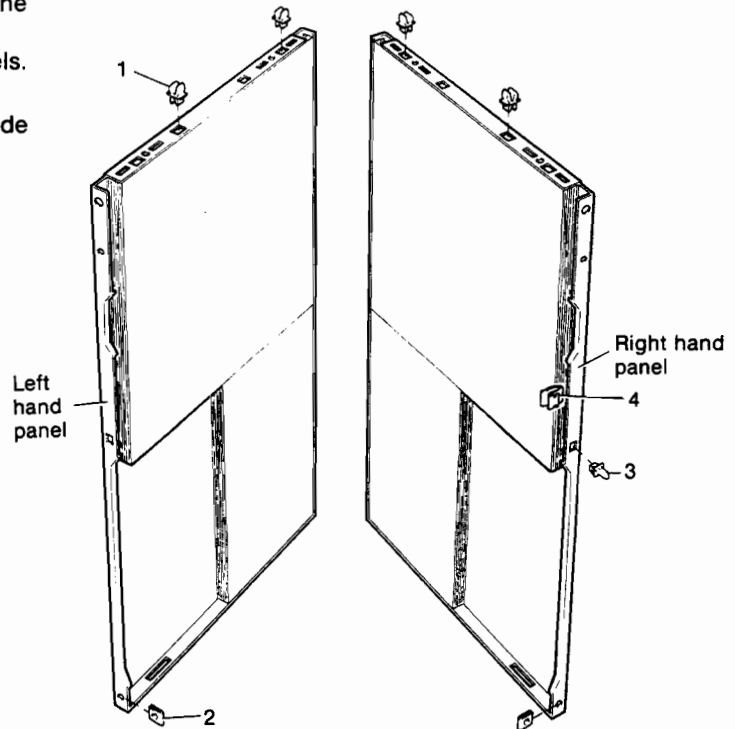


Fig. 7

To fit the case refer to Fig. 8, page 9 together with the following instructions.

Remove the nut and washer 1, from the stud 2, on the front of the boiler shell. Locate the support bracket 3, over the stud and loosely secure with nut and washer, finger tight only.

Remove the nut and washer from the stud 4, in front of the flue. Fit the support strap 5, over the stud and loosely secure with the nut and washer, finger tight only.

Fit the right hand side panel 6, so that the rectangular cut-outs in the bottom return fit over the lugs 7, on the boiler case. Note that the panels are handed. The full returns are at the rear and the cut-away returns are at the front on each side. Push the panel rearwards to lock it in the correct position.

Note: If the case is being fitted to a Panda 120 the side extension panels 8, must be secured to the side panels using the M6 screws and nuts 9 and 10, before fitting the side panels.

Spring up the end of the support strap, bring the side panel up to a vertical position and drop the end lug of the support into the slot in the top return of the side panel. Repeat for the left hand side panel 11.

Position the control box 12, between the case sides with its top returns under the case side panel top returns and its front returns on the outside of the case front returns. Secure in position with four countersunk screws 13.

Remove the four screws securing the control box facia panel, disconnect the thermostat 3-way plug and socket and remove the facia panel. Secure the control box, from inside, to the support bracket using the No. 8 x 1/2" lg blunt nose screw 14.

Connect the electric wiring. See section 13, page 10.

If the Panda programmer kit is used, the boiler thermostat must be removed from the facia panel and fitted to the programmer facia. Remove the thermostat knob by carefully pushing with a screwdriver through the cut-outs in the back of the facia panel. Remove the two fixing screws (accessible from the front after removing the knob). Fit the thermostat to the programmer facia, ensuring that the capillary is uppermost. Connect the thermostat 3-way plug to the socket in the control box. If a programmer is fitted connect the 6-way plug to the socket in the control box. Secure the facia panel in position with four screws. Ensure that the thermostat capillary passes through the cut-out in the control box base.

Locate the spigots (two on the Panda 50 and 65, three on the Panda 90 and 120), under the top return of the control panel 15, into the cut-outs on top of the control box and swing the panel down into position. Secure the bottom of the panel to the control box using No. 8 x 12 lg screws 16, (two for the Panda 50 and 65, three for the Panda 90 and 120).

Carefully uncoil the boiler and limit thermostat capillaries, place the coiled end of the limit thermostat over the end of the boiler thermostat phial. Ensure that the limit capillary is in the groove on the boiler thermostat phial. Remove the thermostat phial fixing (screw or split pin) from the thermostat pocket 17, and insert the phials into the pocket. Secure in position with the fixing previously removed.

If a decor panel is to be fitted to the door the material should be 1 mm thick and cut to the following size.

Panda 50 and 65: 600mm deep x 294 mm wide.

Panda 90 and 120: 600 mm deep x 444 mm wide.

Remove the fixing screws securing the plastic trim on top of the case door. Remove the trim and carefully slide in your decor panel. Replace the trim.

Loosely secure the plinth 18, to the right hand case side with a No. 8 x 12 lg screw 19. Ensure that the bottom return is located over the case side front return. Engage the lower hinge pin on the left hand end of the plinth with the bush in the bottom of the door 20. Hold the door and plinth together. Raise the door and engage the upper hinge pin on the control panel with the bush on top of the door. Ensure that the bottom return of the plinth is located over the case side front return. Secure the plinth to the left hand case side with a No. 8 x 12 lg screw. Tighten both plinth screws. Square up the case to bring the top of the door parallel to the control panel. Tighten the nut securing the support strap and the nut securing the control box support bracket. Check the squareness of the case. If necessary slacken the fastenings to make final adjustments, then tighten. Secure the burner cable to the right hand side panel using the clip just above the door catch. Press the case top 21, into position, engaging the retaining clips into the slots.

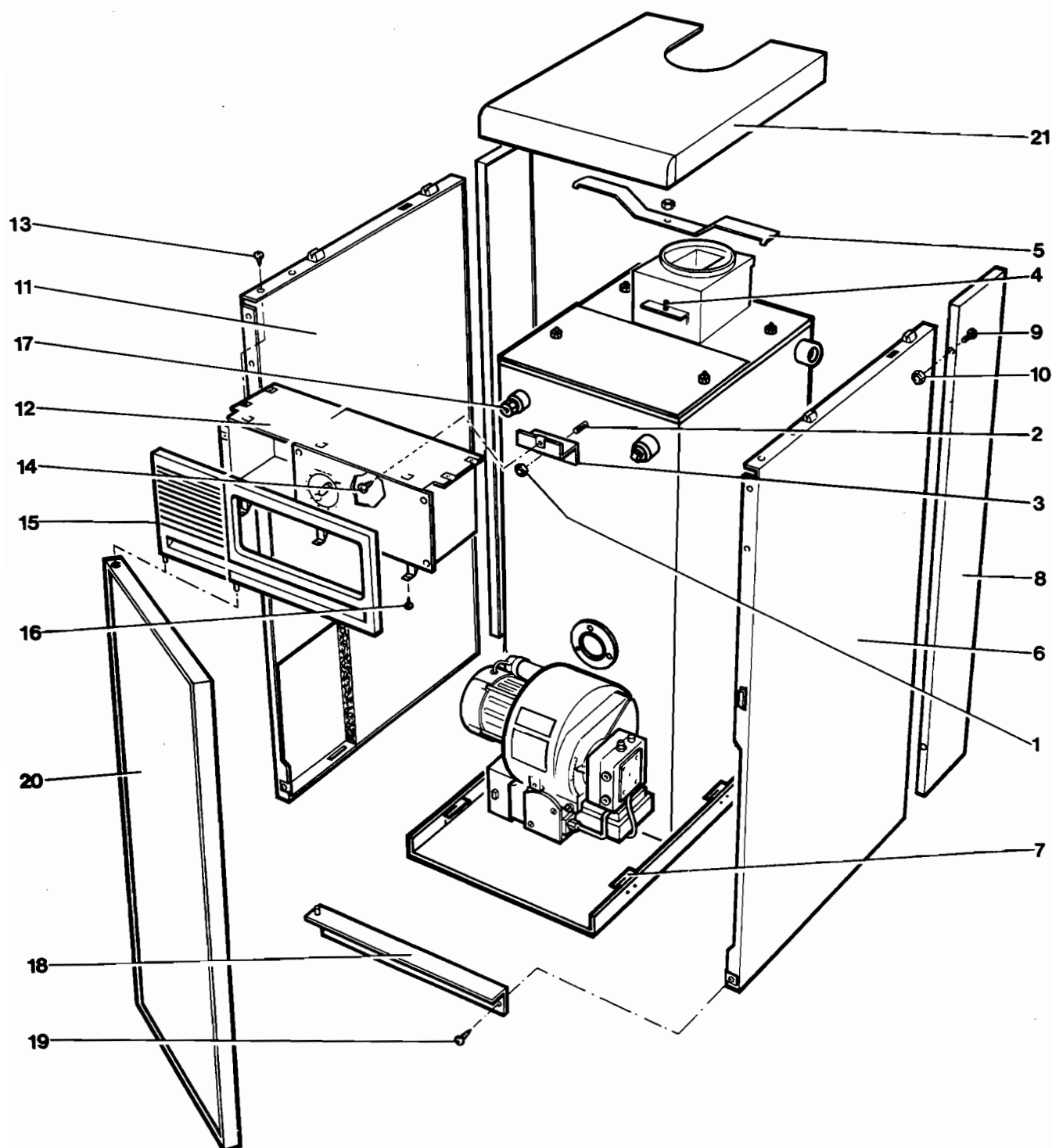


Fig. 8

13. ELECTRICAL CONNECTION

Refer to Fig. 9.

Slacken two screws 1, in the cable clamp 2, underneath the control box. Feed the mains lead under the clamp and through the bush 3. Connect the wires to L, N and \perp on the terminal block 4. Pass any external wiring under the clamp, through the bush and connect to the terminal block. See wiring diagram.

If the Panda programmer is being used, remove the relevant link. See wiring diagram. Take up excess slack in the leads and tighten the cable clamp screws. Bind together all the cables leading to the control box and secure with cable ties, provided, to the case side. Make sure that the cables do not come into contact with hot surfaces, particularly the boiler top and flue.

Remove the burner cable clamping bracket 5, from underneath the control box. Push the burner cable support 6 (fitted to the burner cable) into the U slot in the clamping bracket. Pass the burner cable plug through the base of the control box and connect it to the 3-way socket 7. Secure the clamping bracket in position on the control box base.

Continue to fit the case as described on page 8.

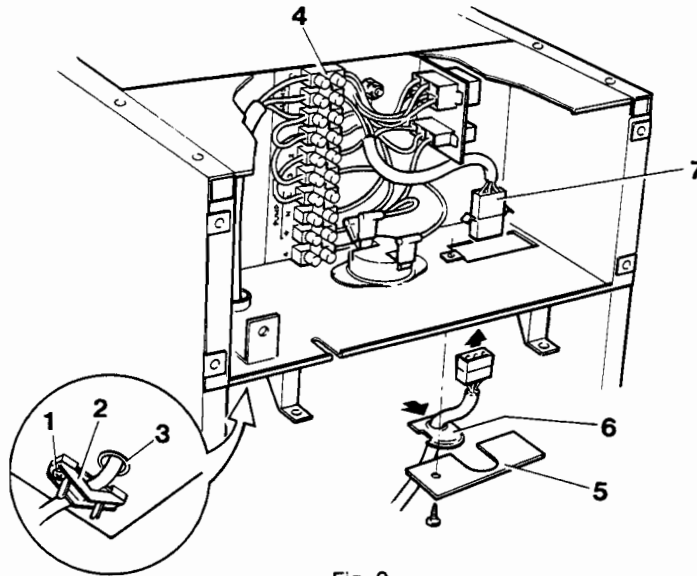


Fig. 9

14. COMMISSIONING

Refer to Figs. 10 and 11.

Disconnect the oil supply to the filter. Run off oil into a container to purge the line of air and foreign matter. Re-connect the oil pipe. If the filter is away from the boiler, next disconnect at the boiler and purge the whole of the supply line. Allow the collected oil to settle and pour it back into the storage tank. Purge the air from the pump, refer Fig. 6, page 7, for position of vent port. Check that the water system is full and air is released from all radiators. Check both water and oil systems for leaks, rectify where necessary.

Set the boiler thermostat to the required setting. If a Panda programmer is fitted, set the programme selector to Continuous. Other types of time control should be set to an 'ON' position. If a room thermostat is fitted, set this to the desired temperature. Press the reset button on the burner control box in case the relay has been accidentally tripped. Switch on the mains electricity supply. The boiler will normally light within 20 seconds of switching on. There may be a brief period of erratic firing while the last of the air is purged. If the flame is not established within 20-30 seconds the controls will go to lockout, and the warning light on the burner control box will light. Wait two minutes before pressing the reset button to start again.

After about fifteen minutes firing, check the combustion, CO₂, flue gas temperature, smoke number and pump pressure in accordance with the Technical data, given on page 3. A test point screw is positioned on top of the boiler shell at the left hand side of the flue.

Adjustments, if any, should be limited to the air shutter. **Note:** The Electro-oil burner has a lockscrew (3 mm hex. key) on the air shutter which must be slackened before any adjustment is attempted.

If a programmer is fitted set the timer to the correct time and the selector to the required programme.

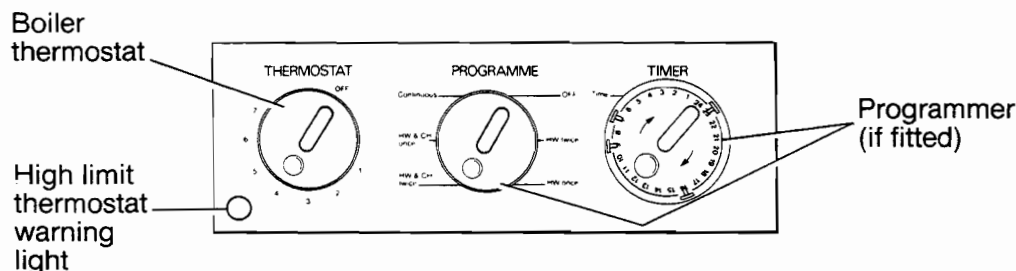


Fig. 10

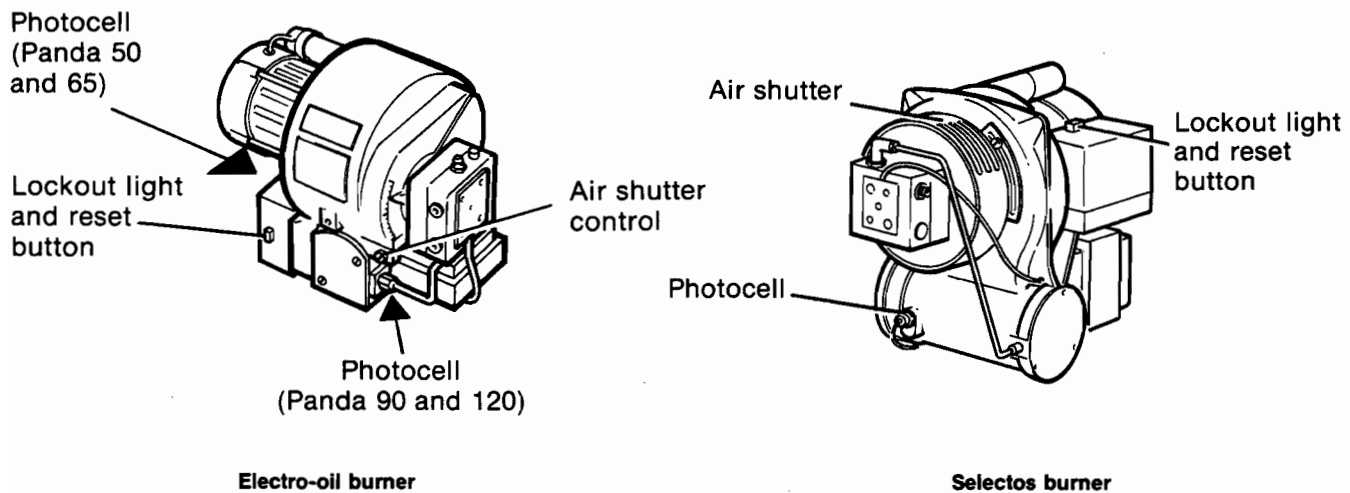


Fig. 11

15. FAILURE TO START

The commonest causes of failure are:

- Fuel starvation. Check for stock, shut valves, filter blockage, air lock or water in the fuel line.
- Dirty photocell. Remove the photocell from its housing, clean and replace ensuring it is facing towards the flame. Press the reset button.
- Dirty electrodes. Switch off mains electricity. Remove the inner assembly and clean the electrodes. See Burner servicing, page 11.
- Electricity supply. Check that electricity is available at the boiler. Examine fuses.

16. HAND OVER THE INSTALLATION

Hand the User instructions to the user and instruct in the safe operation of the boiler and controls.

Advise the user that for continued efficient operation of the boiler it is important that adequate servicing is carried out at least once a year by a qualified service engineer.

17. ANNUAL SERVICE

Servicing is a skilled operation to be carried out once or twice a year depending on the operating conditions and amount of use. Renew parts as necessary if failure occurs. The service engineer should observe the working conditions of the installation; for example continuous free access of combustion air to the boiler; and condition of the flue, which may need to be swept while the boiler is dismantled for servicing. A routine check for sludge in storage tank is recommended.

WARNING: Switch off mains electricity before beginning any servicing operation.

a. Preparation

Switch off the electricity and oil supply to the boiler. Open the case door and disconnect the oil pipe from the pump. Remove the screw securing the burner lead clamping plate to the base of the boiler control box. Carefully withdraw the lead and disconnect the 3-way plug and socket. Undo either the clamping screw in the burner flange or remove the two fixing nuts on the boiler shell. Remove the complete burner from the boiler.

If access is restricted it may be necessary to remove the left hand screw from the plinth, and remove the case door to allow the burner to be removed.

Remove the case top by carefully lifting it upwards.

b. To gain access to the boiler control box

(To replace the boiler thermostat, limit thermostat or programmer)

Remove the left hand plinth screw, push the plinth down and remove the case door.

From underneath the boiler control box remove the screws (two for the Panda 50 and 65, three for the Panda 90 and 120) securing the plastic control panel to the control box. Swing the panel forward and up to disengage the mounting spigots from the top of the control box.

Remove the four screws securing the facia panel for access to components in the boiler control box.

When replacing the facia panel ensure that the capillaries pass through the cut-out in the front of the control box base.

c. Boiler servicing

Remove the flueway cover plate, taking care not to damage the gasket. Withdraw the heat exchanger baffles through the top of the boiler. Clean the inside of the boiler and the baffles with a brush and scraper if necessary. Remove all deposits from inside the boiler shell.

Replace the heat exchanger baffles and make sure they are correctly seated on their supports. See Fig. 5, page 7. Replace the flueway cover plate and gasket.

d. Burner servicing

Withdraw the photocell and carefully wipe it clean. Remove the burner back plate and unscrew the outer oil tube. Partially withdraw the inner assembly, unclip the ignition leads and withdraw completely. Unscrew the motor fixings and withdraw the fan and motor assembly. Clean the fan and fan housing. Refit the fan and motor assembly, ensuring that the pump drive couplings are engaged.

Inspect the nozzle for carbon build up on the tip, replace if necessary. To remove the nozzle on the Selectos burner the flame ring must be removed by slackening the lock screw (3 mm hex key) and sliding it off the nozzle holder. Clean the electrodes, check the settings, see page 6, and adjust if necessary.

Selectos burner only—check the flame ring to nozzle setting, see page 6 and adjust if necessary by slackening the lock screw (3 mm hex key).

Refit the inner assembly, ignition leads and backplate. Replace the photocell ensuring it is facing towards the flame. Remove the solenoid from the pump, see Fig. 12 below.

Note: The Danfoss pump is mounted to the Electro-oil burner as shown below, when it is fitted to the Selectos burner it is mounted the other way up.

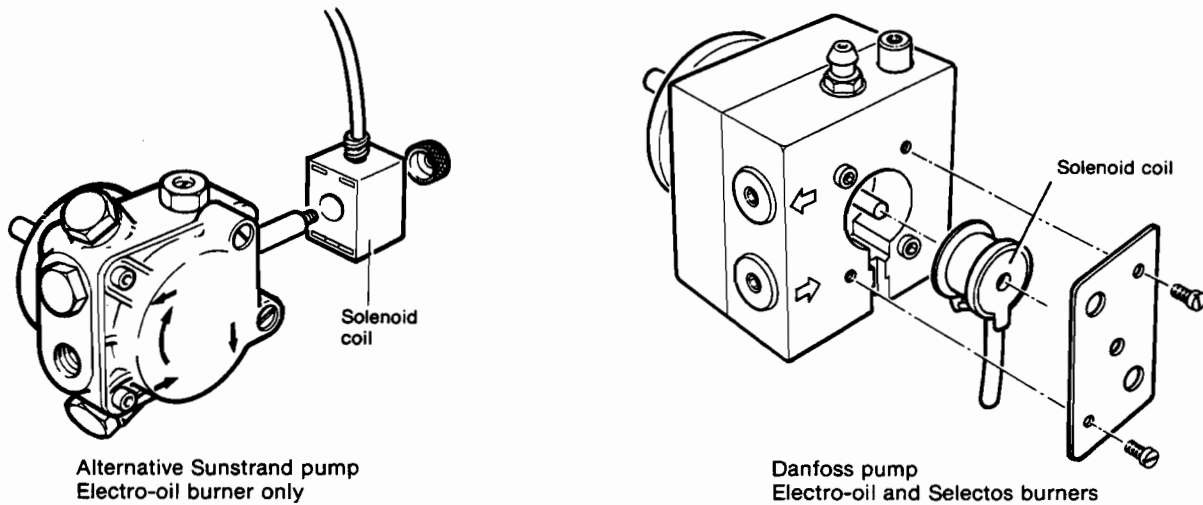


Fig. 12

To remove the pump-Electro-oil burner.

Make a note of the air shutter position. Slacken the lockscrew (3 mm hex key positioned on the air shutter) and fully close the air shutter. Slacken the two grub screws (3 mm hex key) which secure the pump to the burner body, now accessible through the two cut-outs in the air shutter and remove the pump.

To remove the pump-Selectos burner.

Remove the two screws (6 mm hex key) securing the pump to the burner body and withdraw the pump.

Holding the pump over a suitable container, remove the socket screws (4 mm hex key) and separate the pump. Clean the filter and filter housing. Reassemble and replace the pump, solenoid coil and outer oil tube. Return the air shutter to its original position (Electro-oil burner only).

Clean the main filter in the oil supply line. Renew the element if necessary.

Refit the burner to the boiler shell. Remake the oil and electrical connections.

e. Check the combustion

Connect a pressure gauge to the oil pump. See Fig. 6, page 7. Turn on the oil and electricity. Run the burner, stopping and starting as necessary to remove all air from the pump and oil pipes.

Allow the burner to run for fifteen minutes and check the pump pressure, flue gas temperature, CO₂ and smoke number against the figures given in the Technical Data section on page 3. A test point screw is positioned on top of the boiler shell at the left hand side of the flue.

Note: The Electro-oil burner has a lockscrew (3 mm hex key) on the air shutter which must be slackened before any adjustment is attempted.

With the burner running, check the safety operation by removing the photocell and shielding it from light. The ignition should be restored and after about 30 seconds the burner control should go to lockout with the warning light on. Replace the photocell ensuring it is facing towards the flame.

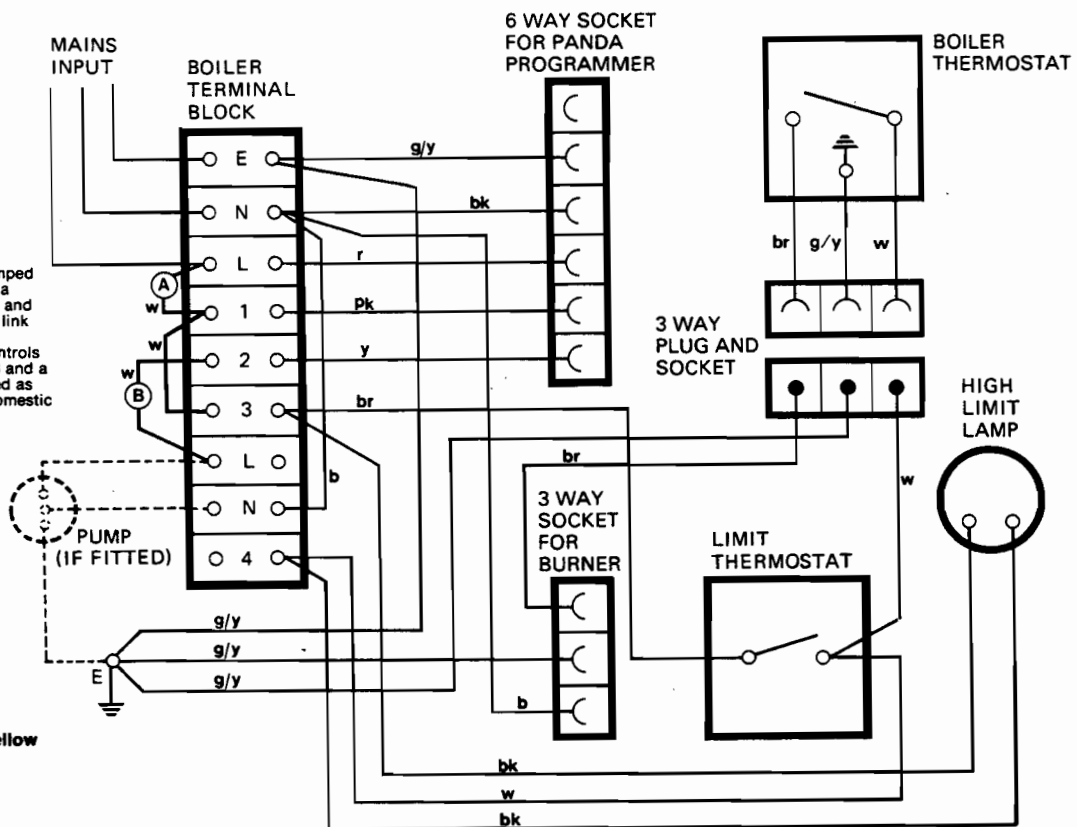
Remove the pressure gauge from the pump and replace the plug. Restart the burner and replace the casing parts.

18. WIRING DIAGRAMS

If the Panda is used on a fully pumped system with external controls and a Panda programmer. Links L-1, 1-3 and 2-pump L must be removed and a link fitted between 3 and pump L. The switched live from the external controls should be connected to terminal 3 and a permanent mains supply connected as shown. Terminal 1 will give the Domestic Hot Water live and terminal 2 the Central Heating live.

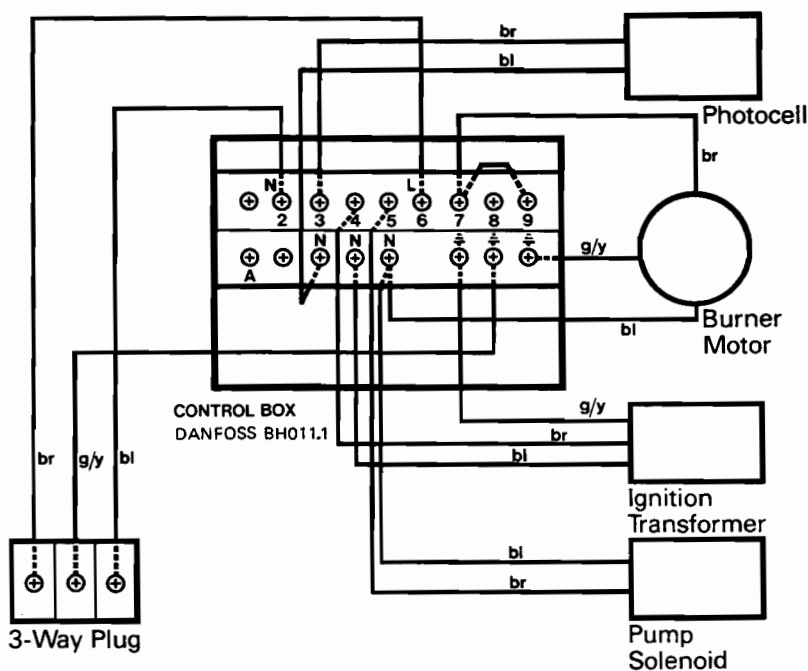
COLOUR CODE

b—blue
bk—black
br—brown
g—green
gy—grey
o—orange
pk—pink
p—purple
v—violet
r—red
w—white
y—yellow
g/y—green and yellow



Boiler Control Box

- NOTES:
1. If a Panda programmer is fitted, link A must be removed.
 2. If an external programmer is fitted, link A must be removed and the boiler and pump switched lines connected to terminals 1 and 2 respectively.
 3. In addition to 1 and 2, if a room thermostat is fitted, link B must be removed and the room thermostat connected in its place.

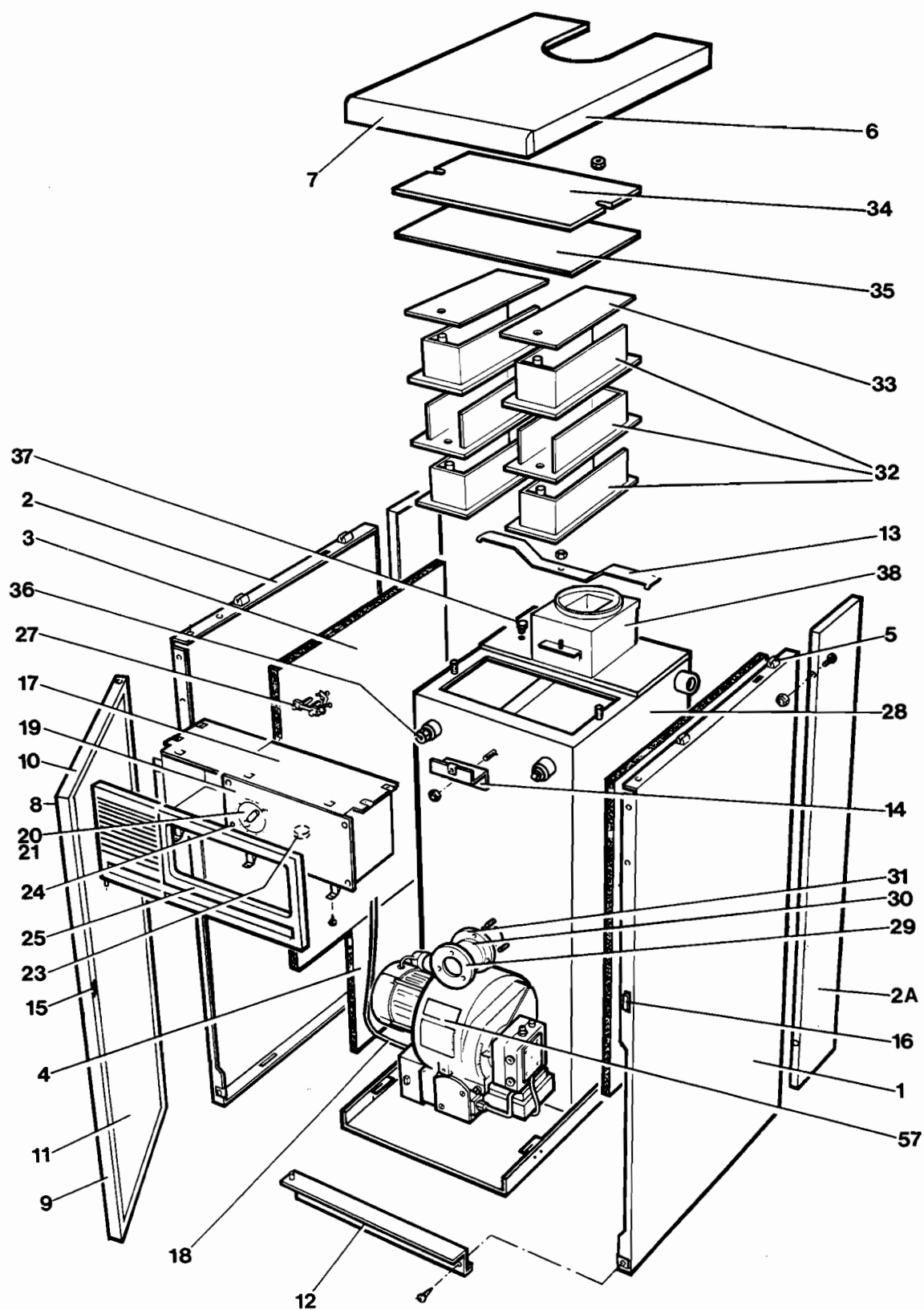


Burner Controls

19. FAULT FINDING

Symptom	Probable cause	Action
1. Flame established but extinguishes. Control goes to lockout.	Photocell dirty. Defective control box. Air in oil line or pump.	Remove and clean. Replace control box. Purge oil line and nozzle assembly.
2. Motor starts but flame not established. Control goes to lockout.	Lack of oil. Defective oil pump. Defective drive to oil pump. Blocked or restricted nozzle.	Check tank stock. Check supply of oil to burner. Renew oil pump. Check and renew if necessary. Renew nozzle.
3. Motor runs and delivers oil, but flame not established. Control goes to lockout.	Defective ignition relay. Electrodes dirty or incorrectly set. Ignition transformer defective. Ignition leads faulty or disconnected. Poor atomisation at nozzle.	Renew control box. Clean and adjust electrodes. Check, renew if necessary. Check, renew if necessary. Renew nozzle.
4. Motor does not start. Control goes to lockout.	Faulty motor or faulty motor circuit in control box.	Make independent electrical connection to motor. If motor does not start, change motor. If motor starts, check control box.
5. Motor does not start. Lockout lamp does not light.	Faulty thermostat or limit stat. Fuse, timeswitch electrical equipment failure. Defective control box. False light on photocell.	Short out thermostat and limit stat in turn. If motor runs, renew thermostat or limit stat. Check other external electrical components (fuse, etc). Renew control box. Check setting of photocell.
6. High limit warning lamp, on fascia panel lights.	Boiler thermostat failed in closed position.	Change boiler thermostat.

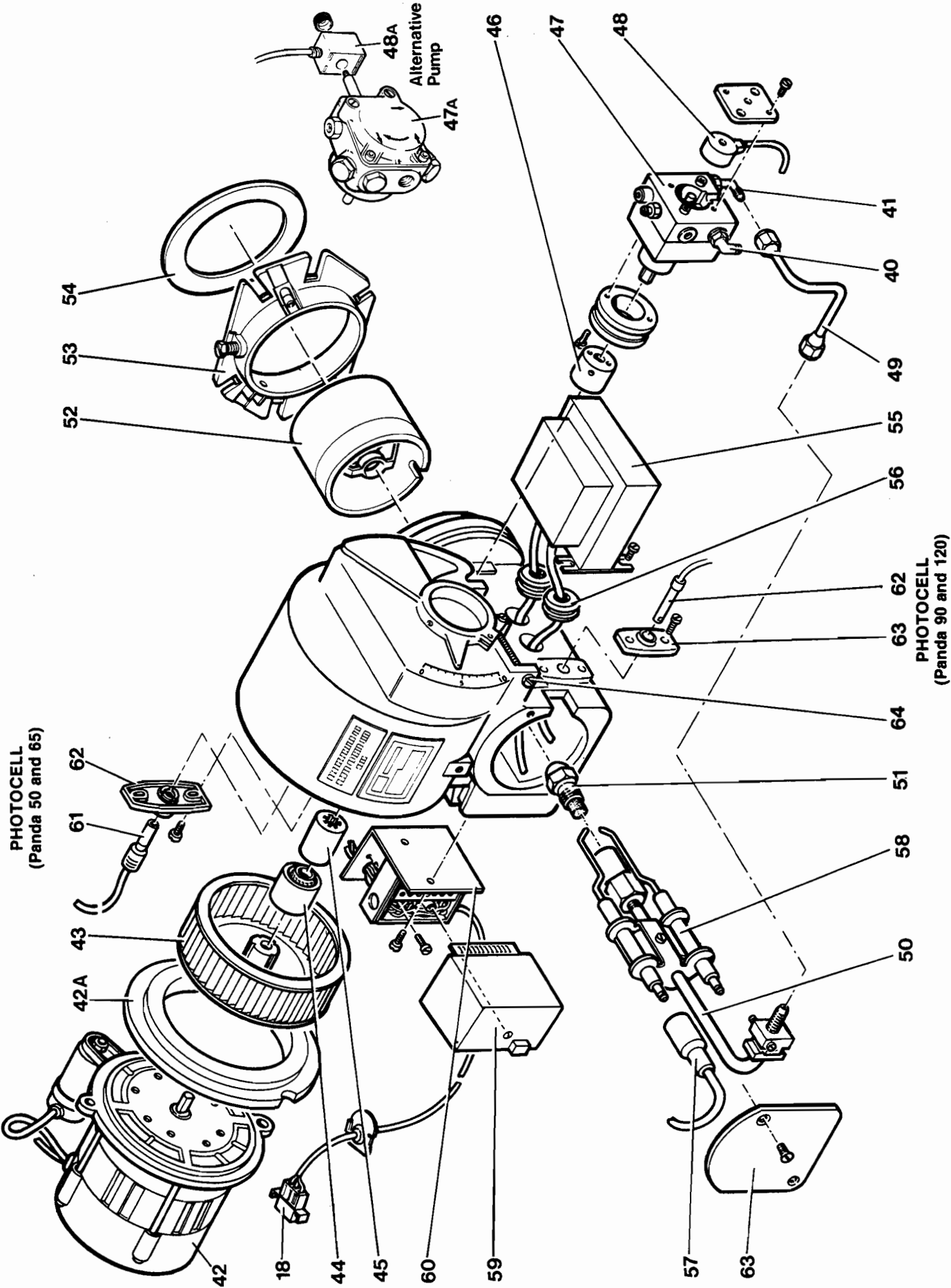
20. BOILER AND CASE EXPLODED VIEW



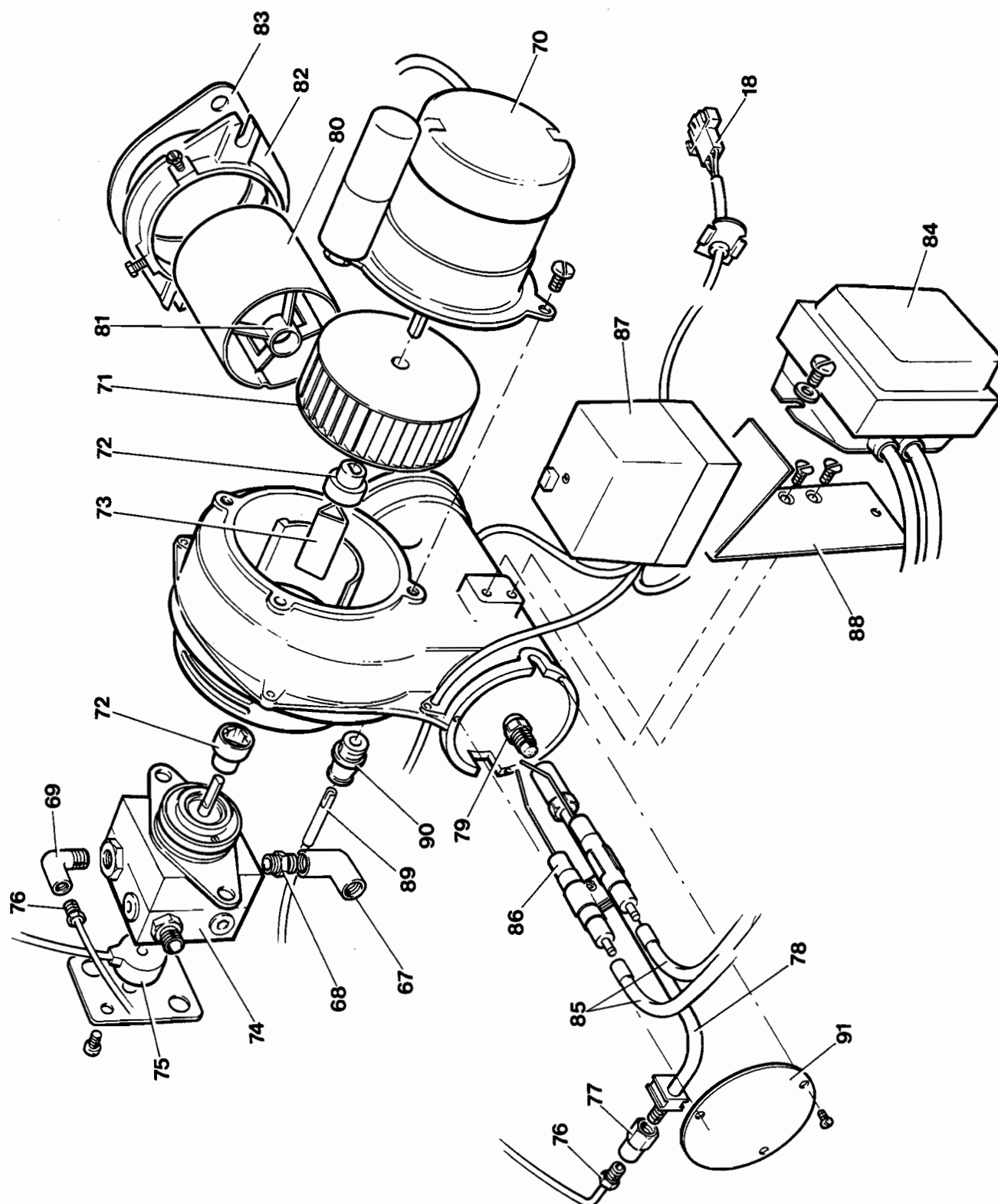
21. BOILER AND CASE PARTS LIST

Key No.	Description	Qty.	Part No.
1	Case side panel assembly. RH	1	508A148
2	Case side panel assembly. LH	1	508A147
2A	Case side extension (120)	2	507C257
3	Case side insulation. RH or LH Upper	2	507C046
4	Case side insulation. RH or LH Lower	2	507C047
5	Retaining clip	4 (6 for 120)	B53065
6	Case top and trim assembly (50 and 65)	1	508A151
6	Case top and trim assembly (90 and 120)	1	508A152
7	Case top trim (50 and 65)	1	305C1120
7	Case top trim (90 and 120)	1	305C1121
8	Door and trim assembly (50 and 65)	1	508A149
8	Door and trim assembly (90 and 120)	1	508A150
9	Door side trim	2	305C1116
10	Door top/bottom trim (50 and 65)	2	305C1117
10	Door top/bottom trim (90 and 120)	2	305C1118
11	Door insulation (50 and 65)	1	508C171
11	Door insulation (90 and 120)	1	508C172
12	Plinth (50 and 65)	1	305A1078
12	Plinth (90 and 120)	1	305A1079
13	Support strap (50 and 65)	1	305C225
13	Support strap (90 and 120)	1	305C226
14	Control box support bracket (50, 65 and 90)	1	507C080
14	Control box support bracket (120)	1	507C259
15	Door latch	1	P3504
16	Door catch	1	P3505
17	Complete control box assy. with thermostats (50 and 65)	1	508A143
17	Complete control box assy. with thermostats (90 and 120)	1	508A144
18	Cable assembly, burner to control box	1	507A021
19	Facia panel	1	305A1083
20	Thermostat	1	508S157
21	Thermostat knob with clip	1	305A1088
22	Terminal block and wiring assembly	1	508A155
23	Limit thermostat	1	507S077
24	Indicator lamp	1	508S216
25	Control panel moulding (50 and 65)	1	508A231
25	Control panel moulding (90 and 120)	1	508A232
26	Programmer	1	305A1089
27	Mains cable clamp	1	307S504
28	Boiler shell (50)	1	508A112
28	Boiler shell (65)	1	508A003
28	Boiler shell (90)	1	508A019
28	Boiler shell (120)	1	508A030
29	Window frame	1	B53096
30	Window glass	1	B53097
31	Window gasket	1	507C350
32	Heat exchanger box baffle (50)	3	508A113
32	Heat exchanger box baffle (65)	6	508A010
32	Heat exchanger box baffle (90)	9	508A023
32	Heat exchanger box baffle (120)	9	508A032
33	Heat exchanger top baffle plate (50)	1	508C121
33	Heat exchanger top baffle plate (65)	2	508C044
33	Heat exchanger top baffle plate (90)	3	508C024
33	Heat exchanger top baffle plate (120)	3	508C035
34	Flueway cover plate (50 and 65)	1	507C056
34	Flueway cover plate (90)	1	507C156
34	Flueway cover plate (120)	1	507C251
35	Flueway gasket (50 and 65)	1	507C049
35	Flueway gasket (90)	1	507C149
35	Flueway gasket (120)	1	507C277
36	Thermostat pocket	1	B53944
37	Test screw M8 slotted hex. hd.	1	056-0810-0-00
38	Flue cover and silencer assembly (50 and 65)	1	507A357
39	Hearth refractory (50 only)	1	P3587

22. BURNER EXPLODED VIEW
a. Electro-oil burner



b. Selectos burner



23. BURNER PARTS LIST
a. Electro-oil burner

Key No.	Description	Qty.	Part No.
40	Pump inlet elbow	1	P3602
41	Pump outlet elbow	1	P3617
42	Burner motor	1	P3530
42A	Motor ring (90 and 120 only)	1	P3507
43	Fan rotor (50 and 65)	1	P3508
43	Fan rotor (90 and 120)	1	P3563
44	Fan dog (50 and 65)	1	P3509
44	Fan dog (90 and 120)	1	P3612
45	Drive coupling (50 and 65)	1	P3607
45	Drive coupling (90 and 120)	1	P3613
46	Pump dog (50 and 65)	1	P3608
46	Pump dog (90 and 120)	1	P3614
47	Oil pump, Danfoss	1	606/071B1101
47	Alternative oil pump, Sunstrand	1	699/AS47C7455
48	Danfoss oil pump solenoid	1	P3529
48A	Sunstrand oil pump solenoid	1	699/3713744
49	Danfoss pump outer oil tube (50 and 65)	1	P3512
49	Danfoss pump outer oil tube (90 and 120)	1	P3533
49A	Sunstrand pump outer oil tube (50 and 65)	1	699/0439-059550
49A	Sunstrand pump outer oil tube (90 and 120)	1	P3618
50	Oil tube-inner assembly (50 and 65)	1	P3609
50	Oil tube-inner assembly (90 and 120)	1	P3615
51	Nozzle, Monarch 0.5 80°R (40 000, 50 000)	1	614/50X80R
51	Nozzle, Danfoss 0.5 80°H (55 000)	1	606/50X80H
51	Nozzle, Monarch 0.6 80°NS (65 000, 70 000)	1	614/60X80NS
51	Nozzle, Danfoss 0.6 80°H (65 000)	1	606/60X80H
51	Nozzle, Monarch 0.75 80°NS (90 000)	1	614/75X80NS
51	Nozzle, Monarch 0.85 80°AR (95 000)	1	614/85X80AR
51	Nozzle, Monarch 1.0 80°AR (120 000)	1	614/100X80AR
52	Blast tube	1	P3517
53	Flange (50 and 65)	1	P3518
53	Flange (90 and 120)	1	P3605
54	Gasket	1	P3606
55	Transformer	1	606/052L0082B
56	Grommet	2	P3520
57	Ignition lead	2	P3521
58	Electrode	2	P3522
59	Control box	1	606/057H2011
60	Mounting bracket	1	507C089
61	Photocell	1	606/057H2020
62	Mounting flange	1	P3490
63	Back plate	1	P3523
64	Air control screw	1	P3611
65	Flexible oil pipe	1	P3601
66	Burner assembly complete (50)	1	508A114
66	Burner assembly complete (65)	1	508A082
66	Burner assembly complete (90)	1	508A267
66	Burner assembly complete (120)	1	508A268

b. Selectos burner

Key No.	Description	Qty.	Part No.
67	Pump inlet elbow	1	P3619
68	Nipple	1	P3620
69	Pump outlet elbow	1	P3621
70	Burner motor	1	P3622
71	Fan rotor	1	P3623
72	Fan/pump dog	2	P3624
73	Drive coupling	1	P3625
74	Danfoss oil pump	1	606/071B1101
75	Danfoss oil pump solenoid	1	606/071B00300
76	Outer oil tube	1	P3626
77	Oil tube adaptor	1	P3627
78	Oil tube inner assembly (50)	1	P3628
78	Oil tube inner assembly (65)	1	P3629
78	Oil tube inner assembly (90)	1	P3630
78	Oil tube inner assembly (120)	1	P3631
79	Nozzle. Danfoss 0.5 80°H (40 000, 50 000, 55 000)	1	606/50X80H
79	Nozzle. Danfoss 0.6 80°H (65 000, 70 000)	1	606/60X80H
79	Nozzle. Danfoss 0.75 80°H (90 000)	1	606/75X80H
79	Nozzle. Monarch 0.85 80°R (95 000)	1	614/85X80R
79	Nozzle. Monarch 1.0 80°R (120 000)	1	614/100X80R
80	Blast tube (50)	1	P3632
80	Blast tube (65)	1	P3633
80	Blast tube (90)	1	P3634
80	Blast tube (120)	1	P3635
81	Flame ring assembly (50, 65)	1	P3636
81	Flame ring assembly (90)	1	P3637
81	Flame ring assembly (120)	1	P3638
82	Flange	1	P3639
83	Gasket	1	P3640
84	Transformer	1	606/052L0003B
85	Ignition lead	2	P3641
86	Electrode	2	P3642
87	Control box	1	606/057H2011
88	Mounting bracket	1	P3643
89	Photocell	1	606/057H2020
90	Photocell bush	1	606/057H2400
91	Inspection window	1	P3644
92	Flexible oil pipe	1	P3645
93	Burner assembly complete (50)	1	508A235
93	Burner assembly complete (65)	1	508A236
93	Burner assembly complete (90)	1	508A237
93	Burner assembly complete (120)	1	508A238

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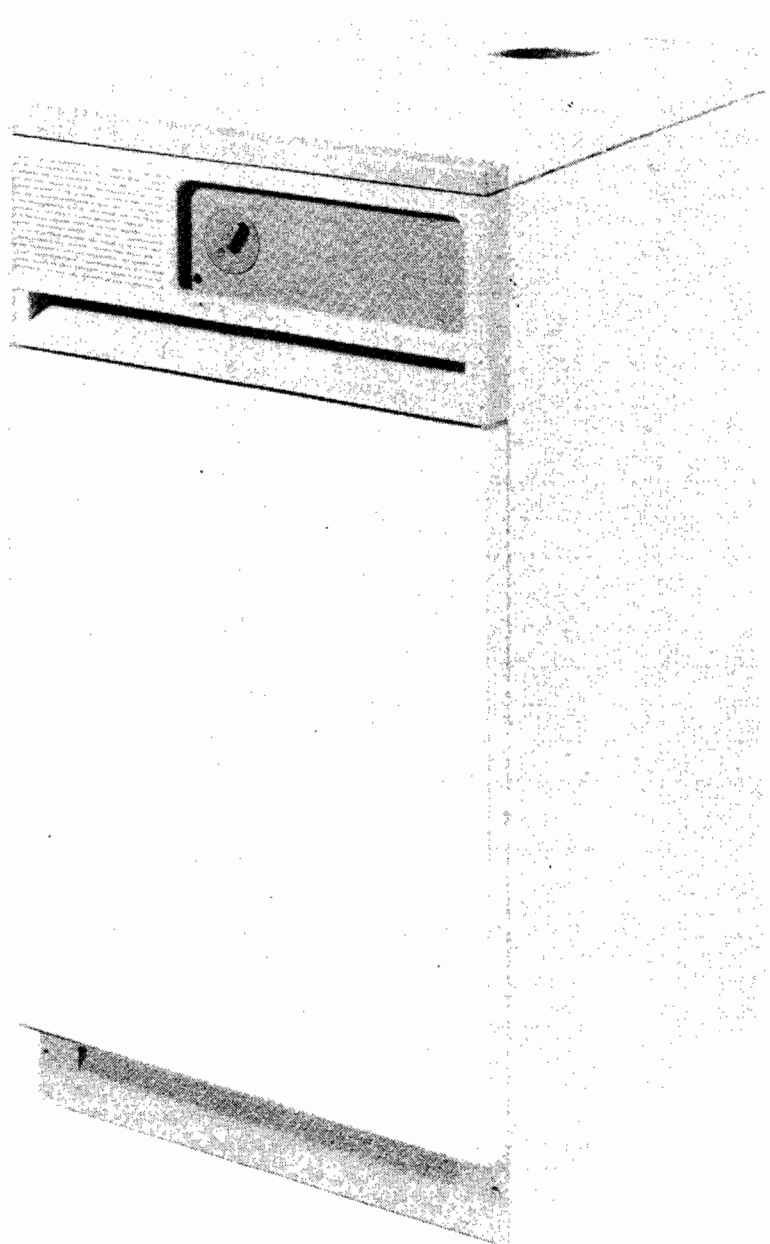
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"All descriptions and illustrations contained in this catalogue have been carefully prepared, but we reserve the right to make changes and improvements in our products which may affect the accuracy of the information contained in this catalogue"

OMYSON

Installation and Servicing Instructions

Panda 500, 650, 900 and 1200 Pressure jet oil boilers



Panda 900

Read these instructions thoroughly before working on the boiler.

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1. INTRODUCTION

The Panda range are steel shell boilers with plain sided combustion chamber and heat exchange surfaces. Baffles within the shell provide high efficiency of heat transfer.

The Panda 500 is rated from an output of 11.7 to 14.7 kW (40 000 to 50 000 Btu/h).

The Panda 650 is rated from an output of 16.0 to 19.0 kW (55 000 to 65 000 Btu/h).

The Panda 900 is rated from an output of 20.5 to 26.4 kW (70 000 to 90 000 Btu/h).

The Panda 1200 is rated from an output of 27.9 to 35.2 kW (95 000 to 120 000 Btu/h).

All models are preset for use with kerosine (Class C2) at the maximum output rate.

For alternative rates with gas oil (Class D) see Technical Data, below.

Note: The Panda 500 is only suitable for use with kerosine.

These boilers are designed for use with an open central heating system and/or an indirect domestic hot water system.

THEY MUST NOT BE CONNECTED TO A DIRECT CYLINDER.

2. TECHNICAL DATA

BOILER			Panda 500		Panda 650		Panda 900				Panda 1200			
Heat output		kw	11.7	14.7	16.0	19.0	20.5		26.4		27.9		35.2	
		Btu/h	40 000	50 000	55 000	65 000	70 000		90 000		95 000		120 000	
Fuel			Kerosine only		Gas oil	Kerosine	Kerosine	Gas oil	Kerosine	Gas oil	Kerosine	Gas oil	Kerosine	Gas oil
★ Flue gas temp. approx.		°C	200	210	200	210	205		225		210		235	
		°F	392	410	392	410	401		437		410		455	
★ CO ₂ approx.		%	10.0	10.5	10.5		10.5		11.0		11.0		11.5	
Nozzle and burner	80° Monarch R		0.5 (Electro-oil)		—	—	—		—		0.85 (Selectos)		1.0 (Selectos)	
	80° Monarch NS		—		—	0.6 (Electro-oil)	0.6 (Electro-oil)		0.75 (Electro-oil)		—		—	
	80° Monarch AR		—		—	—	—		—		0.85 (Electro-oil)		1.0 (Electro-oil)	
	80° Danfoss H		0.5 (Selectos)		0.5 (Both)	0.6 (Both)	0.6 (Selectos)		0.75 (Selectos)		—		—	
Oil pump pressure	Monarch nozzle	bar	5.5	7.0	—	8.6	10.7	7.6	11.4	8.6	8.3	7.6	9.7	8.6
		lb/in ²	80	100	—	125	155	110	165	125	120	110	140	125
	Danfoss nozzle	bar	5.5	7.0	7.6	8.3	9.0	7.9	10.3	8.3	8.3	7.0	11.0	8.3
		lb/in ²	80	100	110	120	130	115	150	120	120	100	160	120
Typical fuel flow rate		kg/h	1.27	1.46	1.40	1.80	1.95	1.97	2.51	2.57	2.60	2.50	3.30	3.20
		ml/min	27.0	31.5	31.0	39.0	41.0	39.0	53.0	51.0	56.0	54.0	71.0	68.5
Burner	Electro-oil	model	INTER 99/PLI		INTER 99/PLI		INTER 109/PLI				INTER 109/PLI			
	Selectos	model	D11/P001		D11/P002		D11/P003				D11/P004			
Weight with burner and case		kg	95		110		147				174			
		lb	210		242		325				384			
Water content		kg	17		18		27				31			
		lb	38		40		60				68			
★ Minimum draught		N/m ²	—12.5											
		in wg	—0.05											
Smoke No.		Bacharach	0—1											
Max. working head		m	30											
		ft	100											
Hearth temperature Category		°C	Below 100											
Electricity supply			240V ~ 50Hz 150W Fuse 3A (Burner only, excludes circulating pump)											

* Low level flue kit

The above data for kerosine as the fuel is to be used with the following exceptions:

14.7 kW output; flue gas temperature is 215°C (419°F) and CO₂ is 10.0%

19.0 kW output; CO₂ is 10.0%

20.5 kW output; CO₂ is 10.0% (if Selectos burner is used)

Minimum draught: not applicable

THE LOW LEVEL FLUE KIT IS NOT SUITABLE FOR USE WITH THE PANDA 1200.

3. GENERAL REQUIREMENTS

The boiler must be installed in accordance with the current issue of the Local Building Regulations, Bye-laws of the local water undertaking and the IEE Wiring Regulations.

Detailed recommendations are stated in the following British Standards: BS5410:1:1977 and BS5449:1:1977.

4. DELIVERY

The boiler is despatched protectively wrapped without the burner or case. The burner and case parts are supplied in two separate cartons for assembly to the boiler during installation.

Uncased models require a special control box which is packed separately.

If required, pump, programmer and low level flue kits are despatched separately.

5. OIL SUPPLY

Galvanised pipe must not be used.

The storage tank should incline 1:50 towards the drain cock, but away from the fuel outlet.

A metal bowl filter with replaceable micron element must be fitted. If the boiler is installed in a kitchen the filter should be outside the house. Leave unions for purging the oil supply line.

The fuel supplier will be able to advise on pipe sizes, valves, etc., if required.

Gravity supply (Fig. 1). Maximum head 8 m, minimum head 0.5 m. Avoid high points in the pipeline which can cause air locks.

Low level supply (Fig. 2). Maximum lift 4 m. A by-pass plug is supplied with the pump for a 2-pipe system. See Fig. 6, page 7.

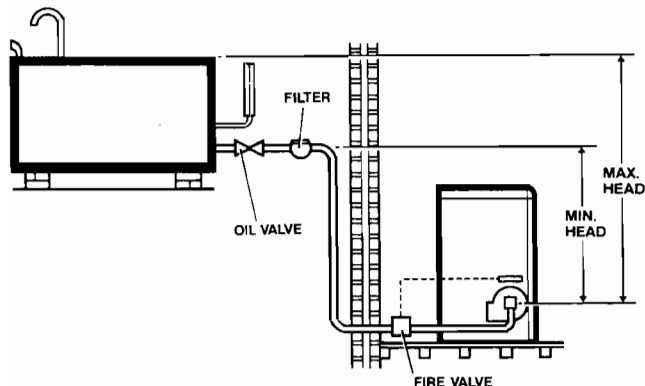


Fig. 1 One pipe installation (gravity supply)

Head (m)	Max. Length of pipe run (m)	
	4 mm bore	6 mm bore
4.0	100	100
3.5	100	100
3.0	100	100
2.5	100	100
2.0	79	100
1.5	55	100
1.0	31	100
0.5	7	36

For notes on fire valves see BS799, BS5410:1 and CP3002

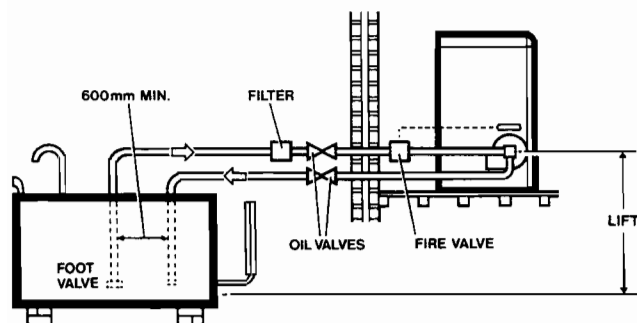


Fig. 2 Two pipe Installation (low level supply)

Lift (m)	Max. pipe length—intake or return (m)	
	8 mm bore	10 mm bore
0.0	100	100
0.5	100	100
1.0	87	100
1.5	72	100
2.0	57	100
2.5	41	100
3.0	26	64
3.5	10	26
4.0	0	0

6. ELECTRICITY SUPPLY

240 V ~ 50Hz via a fused double pole switch or a fused 3-pin plug and shuttered outlet socket, adjacent to the boiler.

Fuse the supply at 3 A. If a circulating pump is wired to the boiler terminal block the supply should be fused at 5 A.

The external wiring between the appliance and the electrical supply shall comply with the latest IEE Wiring Regulations, and any local regulations which apply.

The appliance must be earthed.

7. AIR SUPPLY

There must be adequate air for combustion and, if the boiler is installed in a confined space, additional air for ventilation. If the boiler is installed in a room, the room must have a permanent air vent either direct to the outside air or to an adjacent room which itself has a permanent air vent to the outside air.

The minimum effective area of the air vent(s) required for combustion is:

Panda 500 — 81 cm² (13 in²)

Panda 650 — 105 cm² (16 in²)

Panda 900 — 145 cm² (23 in²)

Panda 1200 — 193 cm² (30 in²)

If the boiler is installed in a confined space permanent air vents are required for ventilation IN ADDITION to the air vents for combustion, one at high level and one at low level, either direct to the outside air or to a room which itself is ventilated to the outside air as previously described.

Both high and low level air vents must communicate with the same room or must be on the same wall to outside air. The minimum effective area of each of the vents for ventilation is given in the following table:

Boiler	Vents to outside	Vents to a room
Par.da 500	162 cm ² (26 in ²)	243 cm ² (39 in ²)
Panda 650	210 cm ² (32 in ²)	315 cm ² (48 in ²)
Panda 900	290 cm ² (46 in ²)	435 cm ² (69 in ²)
Panda 1200	386 cm ² (60 in ²)	549 cm ² (90 in ²)

8. FLUE SYSTEM

A normal flue will give 12.5-25 N/m² (0.05-0.1 in wg) draught at the boiler outlet when it is operating at rated output. An insulated flue terminating in a down draught free area, eg 600 mm (24 in) above the ridge of a one or two storey building will usually provide the necessary draught. Unless extreme conditions, above 30 N/m² (0.12 in wg) prevail, a separate stabiliser should not be needed. These are not suited to kitchen installations since they will emit noise.

Precautions are needed against excessive cooling of flue gases, and if a suitable internal stack is available it should be used. If an existing internal or external brick chimney is used it must be lined with a liner suited to oil fuels. The annular space must be sealed at top and bottom and may be loosely filled with insulating material.

An independent external flue of whatever material, must be effectively insulated and given a waterproof cladding, or made of double wall construction.

A sealed cleaning door must be provided in the flue or chimney near the connecting flue entry.

The first flue length off the boiler must be cast-iron or steel.

A minimum clearance of 25 mm (1 in) must be maintained between the flue pipe and any adjacent combustible material.

Flue runs must be direct as possible, avoiding 90° bends.

The boiler must not share a flue with any other appliance.

Nominal flue size: All models except Panda 1200-127 mm (5 in). Panda 1200-150 mm (6 in). If a suitable 100 mm (4 in) flue already exists this may be used for the Panda 500 or 650.

9. WATER CONNECTIONS

There are two flow and return tappings, Rp 1 (1 in BSP parallel), [Rp 1¼ (1¼ in BSP parallel) for the Panda 1200] on each side of the boiler. One pair may be used for heating and one pair for the hot water primaries. If only two of the tappings are used, it is preferable to use opposite top and lower ones. An additional Rp ¾ (¾ in BSP parallel) connection is provided on the front of the boiler for the pump kit. If the front tapping is used other than for the pump kit connection, ensure that any pipe routed over the top of the boiler does not obstruct access to the cleaning cover.

Fit one or more drain cocks to enable the water system to be fully drained.

10. BOILER DIMENSIONS

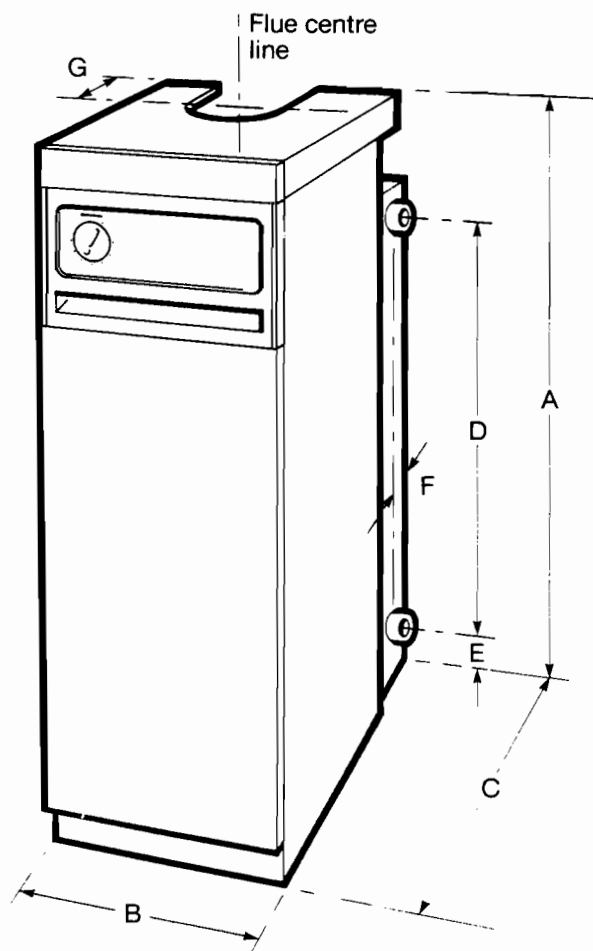


Fig. 3

Dimension (mm)	A	B	C	D	E	F	G
Panda 500 and 650	850	300	600	640	90	50	85
Panda 900	850	450	600	640	90	50	85
Panda 1200	850	450	735	640	90	50	100

11. BOILER LOCATION

The base of the boiler is insulated so no special hearth is required. The floor surface must be firm and level. If the floor covering is a material which softens when warm it should be protected, for example by a steel sheet.

The following minimum clearances for access and servicing are required:

a) above the boiler case—450 mm (18 in).

b) in front of the boiler case—600 mm (24 in).

c) under a worktop—10 mm (½ in). **THE WORKTOP MUST BE REMOVABLE TO ALLOW THE BOILER TO BE SERVICED.**

12. INSTALLATION PROCEDURE

Place the boiler shell in position and connect the flue and water pipes. Ensure that the flue is adequately sealed to the boiler. If a pump kit is being fitted, refer to the instructions supplied with the kit.

The burner is supplied set at its maximum rating and the pump pressure pre-set for kerosine. If it is necessary to change the fuel or rating, refer to the Technical Data, page 3, for alternative nozzles and pump pressures. If necessary remove the inner oil tube assembly from the burner, see Burner servicing, page 12, and change the nozzle. Adjust the pump pressure when commissioning the boiler. **Note:** The Panda 500 is only for use with kerosine.

Before fitting the burner make sure that the burner head settings are correct, see below.

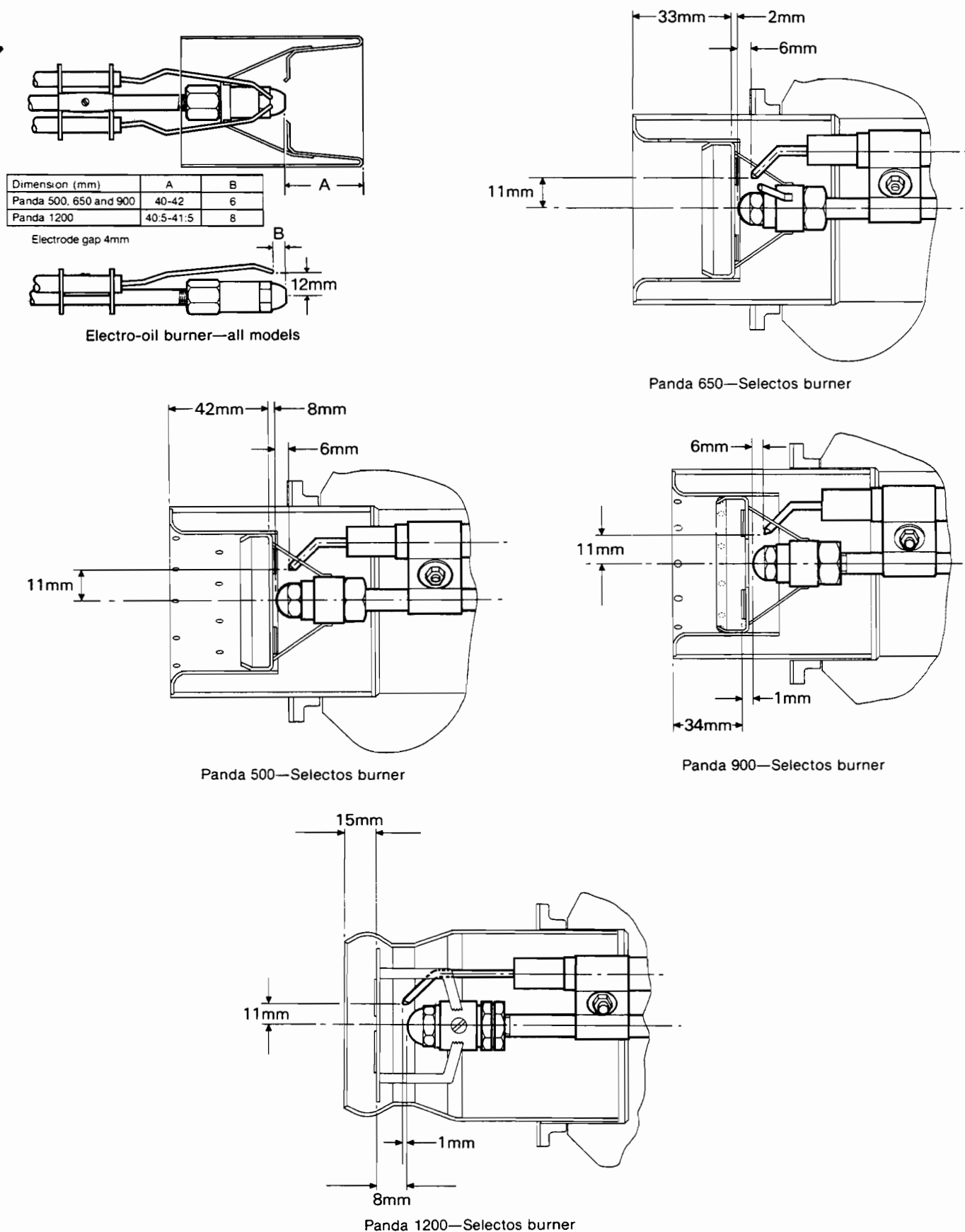


Fig. 4

Assemble the mounting flange to the burner and fit the assembly to the boiler shell with the gasket between the flange and the shell.

Remove the boiler top cover and remove the packing from above the heat exchanger baffles. Check that the baffles are in position as shown in Fig. 5. Replace the top cover.

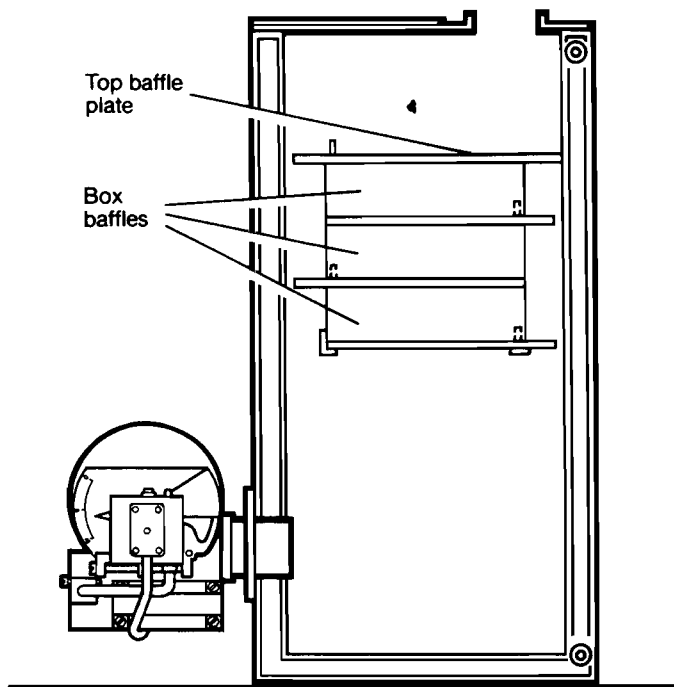
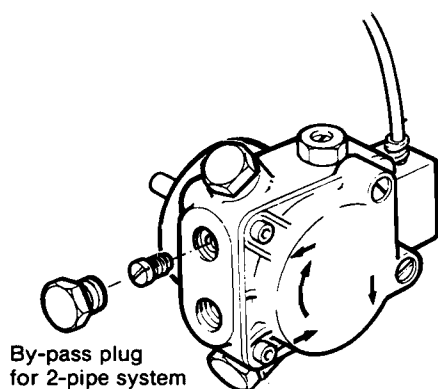


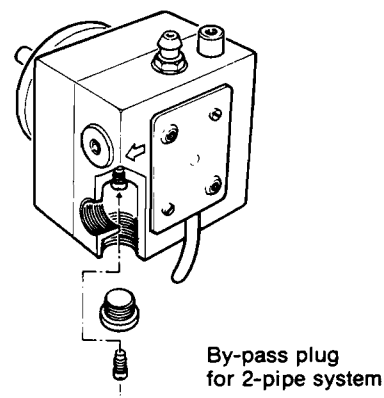
Fig. 5

Connect the oil supply to the pump. The inlet and return ports are Rp $\frac{1}{4}$ ($\frac{1}{4}$ in BSP parallel). The pump manufacturer's recommended connection is by a corresponding Rp $\frac{1}{4}$ shouldered fitting with a sealing washer. BSP taper or NPTF fittings may also be used with a suitable jointing compound. If a tapered thread fitting is used care should be taken to ensure that a correct seal is made without the body of the fitting impinging on the pump body.

Note: The Danfoss pump is mounted to the Electro-oil burner as shown below, when it is fitted to the Selectos burner it is mounted the other way up.



Alternative Sunstrand pump
Electro-oil burner only



Danfoss pump
Electro-oil and Selectos burners

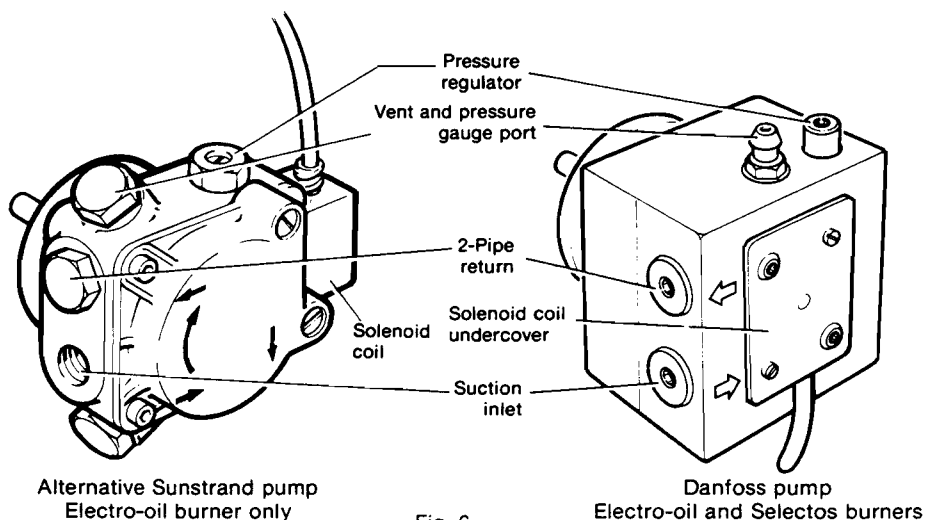


Fig. 6

Unpack the case

Refer to Figs. 7 and 8.

Carefully unpack the case. Do not discard the packing until all the items are found.

(The control panel moulding and control box illustrated are for the Panda 900 and 1200).

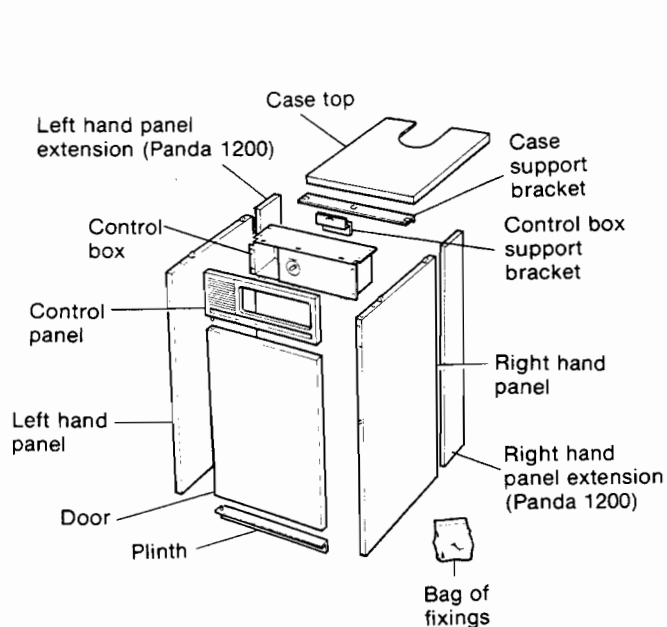
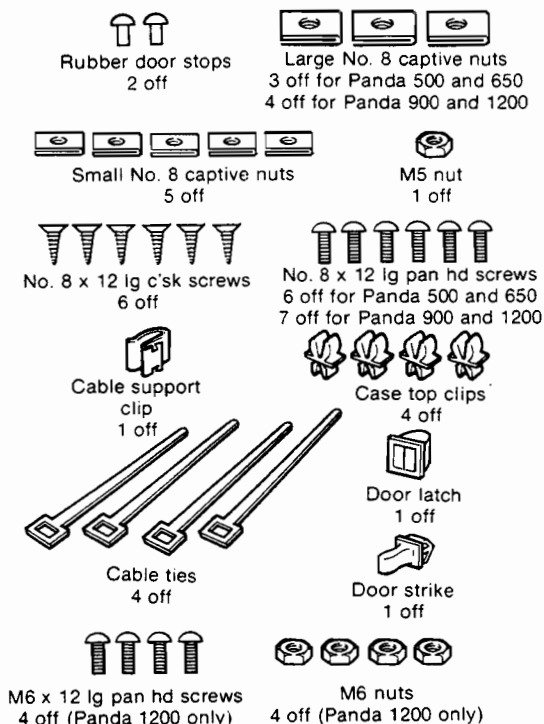


Fig. 7



Contents of fixing bag.

Fig. 8

To assemble the case parts

Refer to Figs. 9, 10, 11, 12 and 13

Rear view of control panel moulding

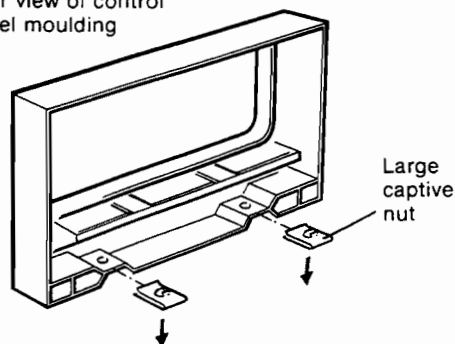


Fig. 9

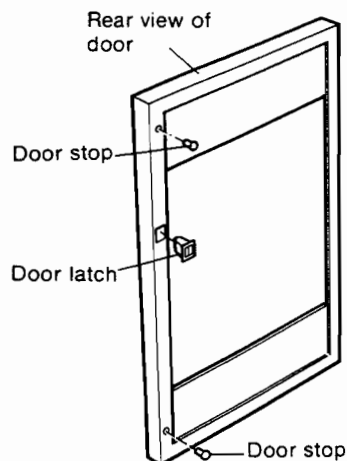


Fig. 10

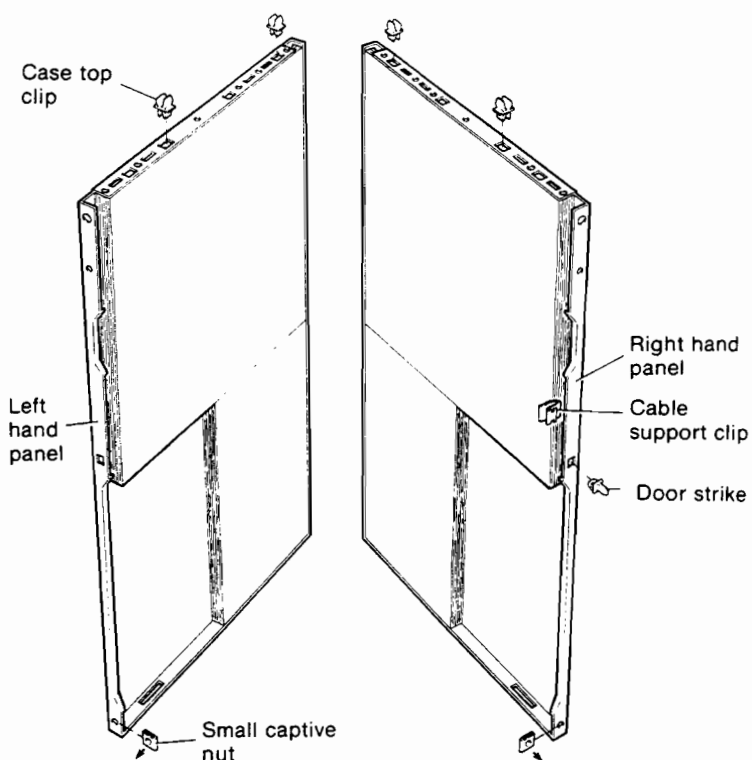


Fig. 11

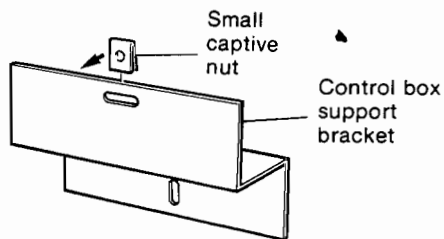


Fig. 12

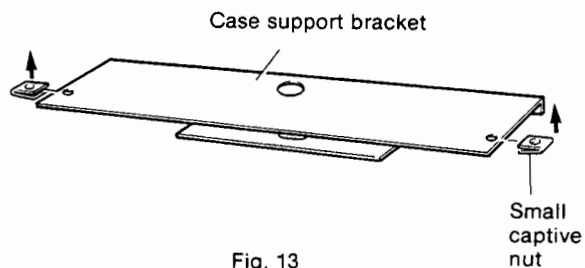


Fig. 13

Fit the large captive nuts to the bottom of the control panel moulding, two for the Panda 500 and 650 as shown in Fig. 9 or three for the Panda 900 and 1200. Ensure that the flat side of the captive nuts face outwards (in the direction of the arrow). Fit the door latch and two rubber door stops to the rear of the door as shown in Fig. 10.

Fit the four case top clips to the case side panels in the holes shown in Fig. 11.

Fit the door strike to the right hand side panel as shown in Fig. 11.

Fit the burner cable support clip to the right hand side panel, just above the door strike, as shown in Fig. 11.

Fit two small captive nuts to the bottom of the side panels as shown in Fig. 11. Ensure that the flat side of the captive nuts face outwards (in the direction of the arrow).

Fit a small captive nut to the control box support bracket as shown in Fig. 12. Ensure that the flat side of the captive nut faces in the direction of the arrow.

Fit two small captive nuts to the support bracket as shown in Fig. 13. Ensure that the flat side of the captive nuts face in the direction of the arrow.

To fit the case refer to Fig. 14, page 10 together with the following instructions.

Locate the control box support bracket 1, over the stud 2, on the front of the boiler shell and loosely secure with an M5 nut 3, finger tight only.

Fit the case support bracket 4, to bracket in front of the flue and loosely secure with a No. 8 x 12 lg screw 5.

Fit the right hand side panel 6, so that the rectangular cut outs in the bottom return fit over the lugs 7, on the boiler shell. Note that the panels are handed. The full returns are at the rear and the cut-away returns are at the front on each side. Push the panel rearwards to lock it in the correct position.

Note: If the case is being fitted to a Panda 1200 the side extension panels 8, must be secured to the side panels using the M6 screws and nuts 9 and 10, before fitting the side panels.

Bring the side panel up to a vertical position and secure it to the case support bracket with a No. 8 x 12 lg c'sk screw 11. Repeat for the left hand side panel 12.

Position the control box 13, between the case sides with its top returns under the case side panel top returns and its front returns on the outside of the case front returns. Secure in place with four No. 8 x 12 lg screws 14.

Remove the four screws securing the control box fascia panel, disconnect the thermostat 3-way plug and socket and remove the fascia panel. Secure the control box, from inside, to the support bracket using a No. 8 x 12 lg screw 15.

Connect the electric wiring. See section 13, page 10.

If the Panda programmer kit is used, the boiler thermostat must be removed from the fascia panel and fitted to the programmer fascia. Remove the thermostat knob by carefully pushing with a screwdriver through the cut-outs in the back of the fascia panel. Remove the two fixing screws (accessible from the front after removing the knob). Fit the thermostat to the programmer fascia, ensuring that the capillary is uppermost.

Push out and discard the small plastic plug from the fascia panel below the thermostat position to reveal the limit thermostat warning light, see Fig. 16. Connect the thermostat 3-way plug to the socket in the control box. If a programmer is fitted connect the 6-way plug to the socket in the control box. Secure the fascia panel in position with four screws previously removed. Ensure that the thermostat capillary passes through the cut-out in the control box base.

Locate the spigots (two on the Panda 500 and 650 or three on the Panda 900 and 1200) under the top return of the control panel moulding 16, into the cut-outs on top of the control box and swing the panel down into position. Secure the bottom of the panel to the control box using No. 8 x 12 lg screws 17, (two for the Panda 500 and 650 or three for the Panda 900 and 1200).

Carefully uncoil the boiler and limit thermostat capillaries, place the coiled end of the limit thermostat over the end of the boiler thermostat phial. Ensure that the limit capillary is in the groove on the boiler thermostat phial. Remove the thermostat phial fixing (screw or split pin) from the thermostat pocket 18, and insert the phials into the pocket. Secure in position with the fixing previously removed.

Loosely secure the plinth 19, to the right hand case side with a No. 8 x 12 lg screw 20. Ensure that the bottom return is located over the case side front return. Engage the lower hinge pin on the left hand end of the plinth with the bush in the bottom of the door 21. Hold the door and plinth together. Raise the door and engage the upper hinge pin on the control panel moulding with the bush on top of the door. Ensure that the bottom return of the plinth is located over the case side front return. Secure the plinth to the left hand case side with a No. 8 x 12 lg screw. Tighten both plinth screws.

Square up the case to bring the top of the door parallel to the control panel. Tighten the nut securing the case support bracket and the nut securing the control box support bracket. Check the squareness of the case. If necessary slacken the fastenings to make final adjustments, then tighten.

Secure the burner cable to the right hand side panel using the clip just above the door catch.

Press the case top 22, into position, engaging the retaining clips into the slots.

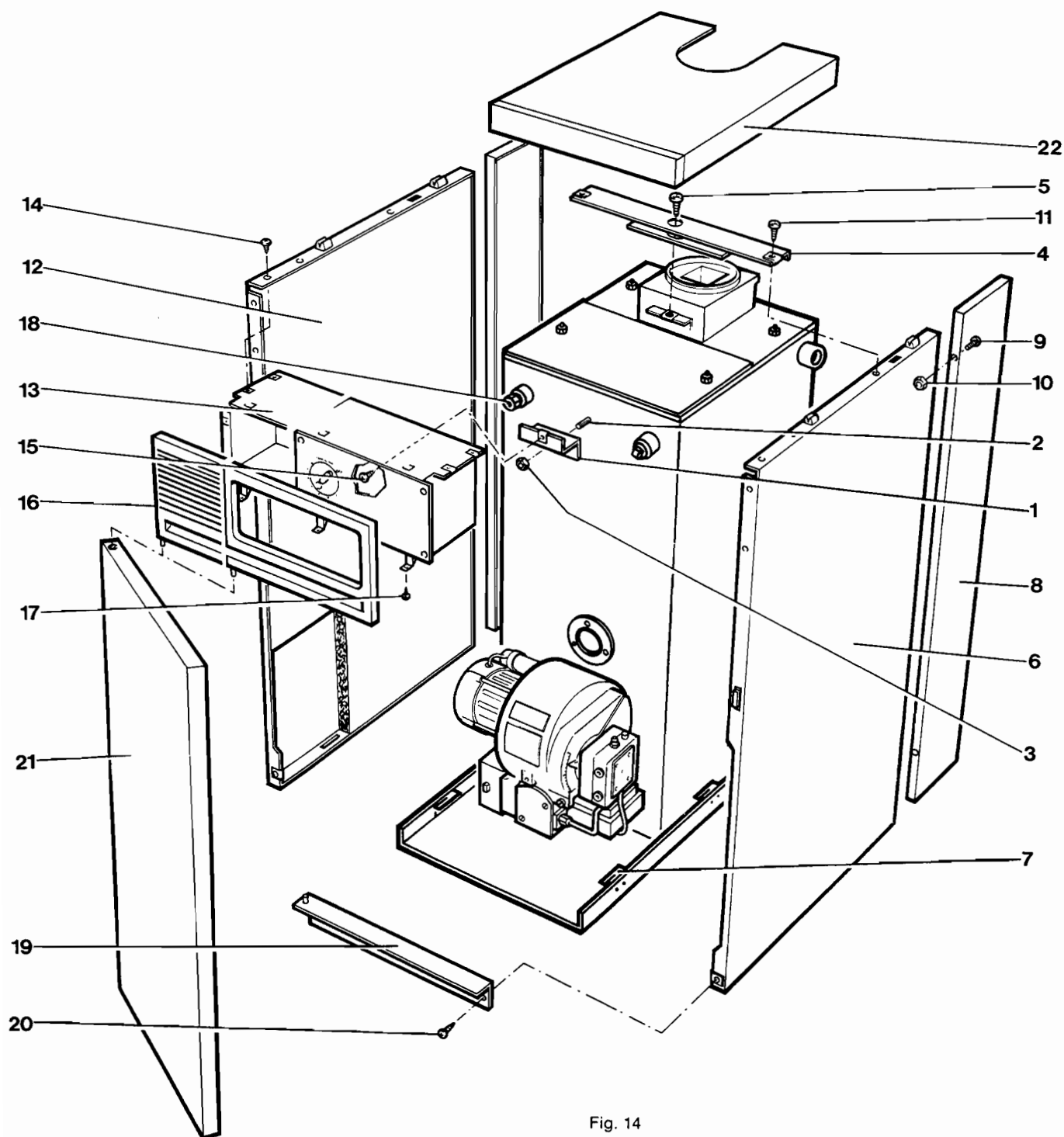


Fig. 14

13. ELECTRICAL CONNECTION

Refer to Fig. 15.

Slacken two screws 1, in the cable clamp 2, underneath the control box. Feed the mains lead under the clamp and through the bush 3. Connect the wires to L, N and \perp on the terminal block 4. Pass any external wiring under the clamp, through the bush and connect to the terminal block. See wiring diagram.

If the Panda programmer is being used, remove the relevant link. See wiring diagram. Take up excess slack in the leads and tighten the cable clamp screws. Bind together all the cables leading to the control box and secure with cable ties, provided, to the case side. Make sure that the cables do not come into contact with hot surfaces, particularly the boiler top and flue.

Remove the burner cable clamping bracket 5, from underneath the control box. Push the burner cable support 6 (fitted to the burner cable) into the U slot in the clamping bracket. Pass the burner cable plug through the base of the control box and connect it to the 3-way socket 7. Secure the clamping bracket in position on the control box base.

Continue to fit the case as described on page 9.

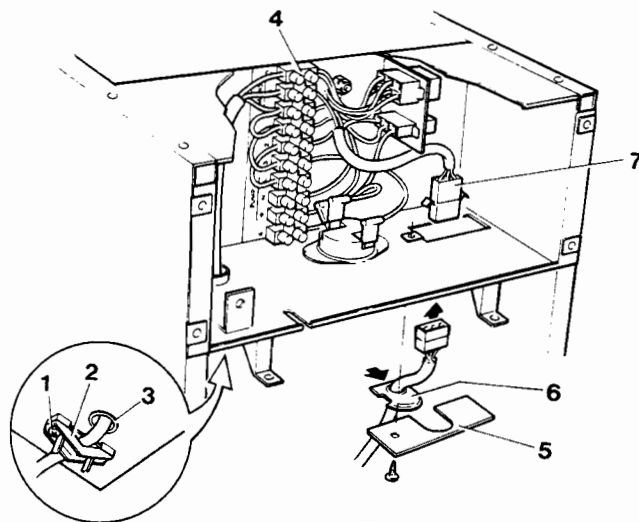


Fig. 15

14. COMMISSIONING

Refer to Figs. 16 and 17.

Disconnect the oil supply to the filter. Run off oil into a container to purge the line of air and foreign matter. Re-connect the oil pipe. If the filter is away from the boiler, next disconnect at the boiler and purge the whole of the supply line. Allow the collected oil to settle and pour it back into the storage tank. Purge the air from the pump, refer Fig. 6, page 7, for position of vent port. Check that the water system is full and air is released from all radiators. Check both water and oil systems for leaks, rectify where necessary.

Set the boiler thermostat to the required setting. If a Panda programmer is fitted, set the programme selector to Continuous. Other types of time control should be set to an 'ON' position. If a room thermostat is fitted, set this to the desired temperature. Press the reset button on the burner control box in case the relay has been accidentally tripped. Switch on the mains electricity supply. The boiler will normally light within 20 seconds of switching on. There may be a brief period of erratic firing while the last of the air is purged. If the flame is not established within 20-30 seconds the controls will go to lockout, and the warning light on the burner control box will light. Wait two minutes before pressing the reset button to start again.

After about fifteen minutes firing, check the combustion, CO₂, flue gas temperature, smoke number and pump pressure in accordance with the Technical data, given on page 3. A test point screw is positioned on top of the boiler shell at the left hand side of the flue.

Adjustments, if any, should be limited to the air shutter. **Note:** The Electro-oil burner has a lock screw (3 mm hex. key) on the air shutter which must be slackened before any adjustment is attempted.

If a programmer is fitted set the timer to the correct time and the selector to the required programme.

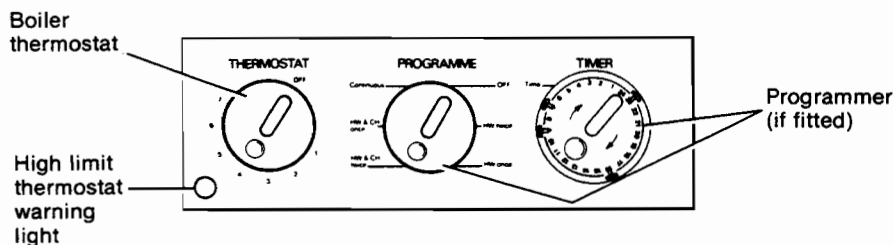


Fig. 16

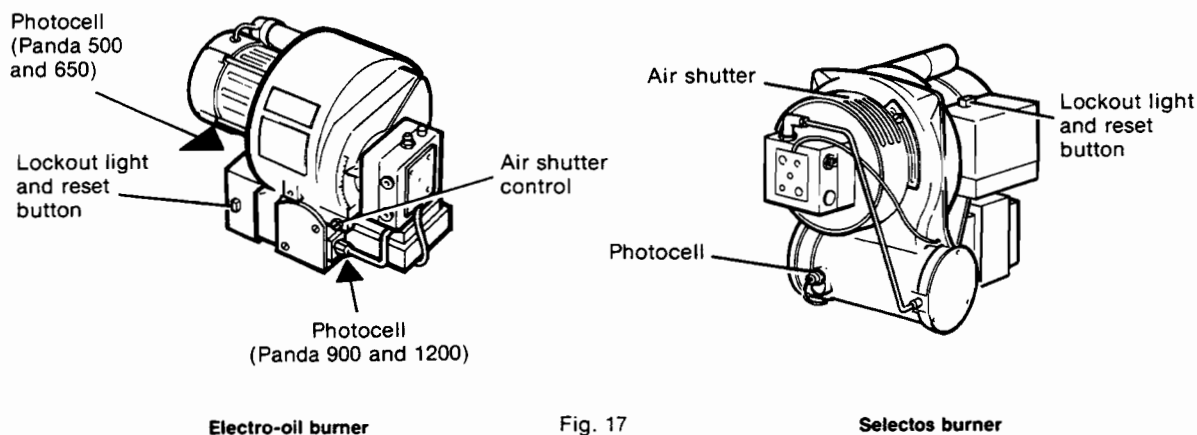


Fig. 17

15. FAILURE TO START

The commonest causes of failure are:

- Fuel starvation. Check for stock, shut valves, filter blockage, air lock or water in the fuel line.
- Dirty photocell. Remove the photocell from its housing, clean and replace ensuring it is facing towards the flame. Press the reset button.
- Dirty electrodes. Switch off mains electricity. Remove the inner assembly and clean the electrodes. See Burner servicing, page 12.
- Electricity supply. Check that electricity is available at the boiler. Examine fuses.

16. HAND OVER THE INSTALLATION

Hand the User instructions to the user and instruct in the safe operation of the boiler and controls.

Advise the user that for continued efficient operation of the boiler it is important that adequate servicing is carried out at least once a year by a qualified service engineer.

17. ANNUAL SERVICE

Servicing is a skilled operation to be carried out once or twice a year depending on the operating conditions and amount of use. Renew parts as necessary if failure occurs. The service engineer should observe the working conditions of the installation; for example continuous free access of combustion air to the boiler; and condition of the flue, which may need to be swept while the boiler is dismantled for servicing. A routine check for sludge in storage tank is recommended.

WARNING: Switch off mains electricity before beginning any servicing operation.

a. Preparation

Switch off the electricity and oil supply to the boiler. Open the case door and disconnect the oil pipe from the pump. Remove the screw securing the burner lead clamping plate to the base of the boiler control box. Carefully withdraw the lead and disconnect the 3-way plug and socket. Undo either the clamping screw in the burner flange or remove the two fixing nuts on the boiler shell. Remove the complete burner from the boiler.

If access is restricted it may be necessary to remove the left hand screw from the plinth, and remove the case door to allow the burner to be removed.

Remove the case top by carefully lifting it upwards.

b. To gain access to the boiler control box

(To replace the boiler thermostat, limit thermostat or programmer)

Remove the left hand plinth screw, push the plinth down and remove the case door.

From underneath the boiler control box remove the screws (two for the Panda 500 and 650, three for the Panda 900 and 1200), securing the plastic control panel to the control box. Swing the panel forward and up to disengage the mounting spigots from the top of the control box.

Remove the four screws securing the fascia panel for access to components in the boiler control box.

When replacing the fascia panel ensure that the capillaries pass through the cut-out in the front of the control box base.

c. Boiler servicing

Remove the flueway cover plate, taking care not to damage the gasket. Withdraw the heat exchanger baffles through the top of the boiler. Clean the inside of the boiler and the baffles with a brush and scraper if necessary. Remove all deposits from inside the boiler shell.

Replace the heat exchanger baffles and make sure they are correctly seated on their supports. See Fig. 5, page 7. Replace the flueway cover plate and gasket.

d. Burner servicing

Withdraw the photocell and carefully wipe it clean. Remove the burner back plate and unscrew the outer oil tube. Partially withdraw the inner assembly, unclip the ignition leads and withdraw completely. Unscrew the motor fixings and withdraw the fan and motor assembly. Clean the fan and fan housing. Refit the fan and motor assembly, ensuring that the pump drive couplings are engaged.

Inspect the nozzle for carbon build up on the tip, replace if necessary. To remove the nozzle on the Selectos burner the flame ring must be removed by slackening the lock screw (3 mm hex key) and sliding it off the nozzle holder. Clean the electrodes, check the settings, see page 6, and adjust if necessary.

Selectos burner only—check the flame ring to nozzle setting, see page 6 and adjust if necessary by slackening the lock screw (3 mm hex key).

Refit the inner assembly, ignition leads and backplate. Replace the photocell ensuring it is facing towards the flame.

Remove the solenoid from the pump, see Fig. 18 below.

Note: The Danfoss pump is mounted to the Electro-oil burner as shown below, when it is fitted to the Selectos burner it is mounted the other way up.

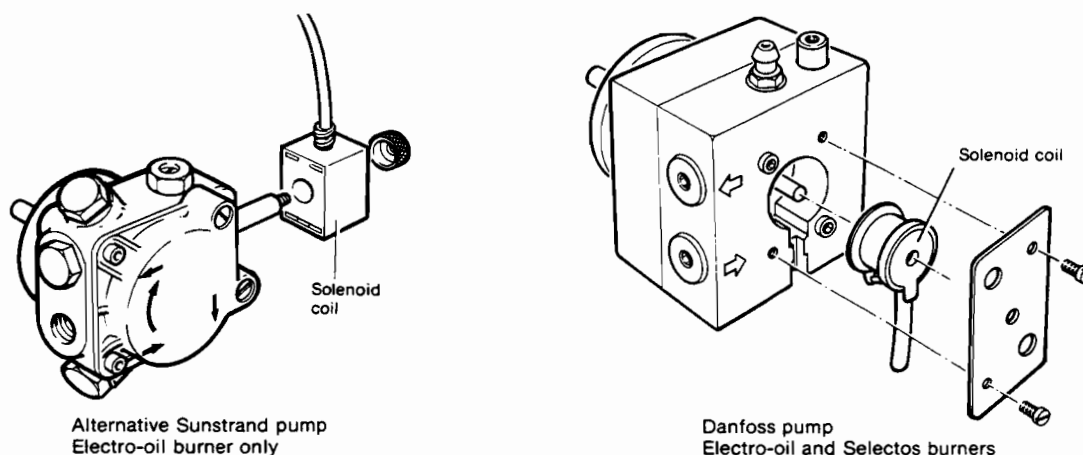


Fig. 18

To remove the pump-Electro-oil burner.

Make a note of the air shutter position. Slacken the lock screw (3 mm hex key positioned on the air shutter) and fully close the air shutter. Slacken the two grub screws (3 mm hex key) which secure the pump to the burner body, now accessible through the two cut-outs in the air shutter and remove the pump.

To remove the pump-Selectos burner.

Remove the two screws (6 mm hex key) securing the pump to the burner body and withdraw the pump.

Holding the pump over a suitable container, remove the socket screws (4 mm hex key) and separate the pump. Clean the filter and filter housing. Reassemble and replace the pump, solenoid coil and outer oil tube. Return the air shutter to its original position (Electro-oil burner only).

Clean the main filter in the oil supply line. Renew the element if necessary.

Refit the burner to the boiler shell. Remake the oil and electrical connections.

e. Check the combustion

Connect a pressure gauge to the oil pump. See Fig. 6, page 7. Turn on the oil and electricity. Run the burner, stopping and starting as necessary to remove all air from the pump and oil pipes.

Allow the burner to run for fifteen minutes and check the pump pressure, flue gas temperature, CO₂ and smoke number against the figures given in the Technical Data section on page 3. A test point screw is positioned on top of the boiler shell at the left hand side of the flue.

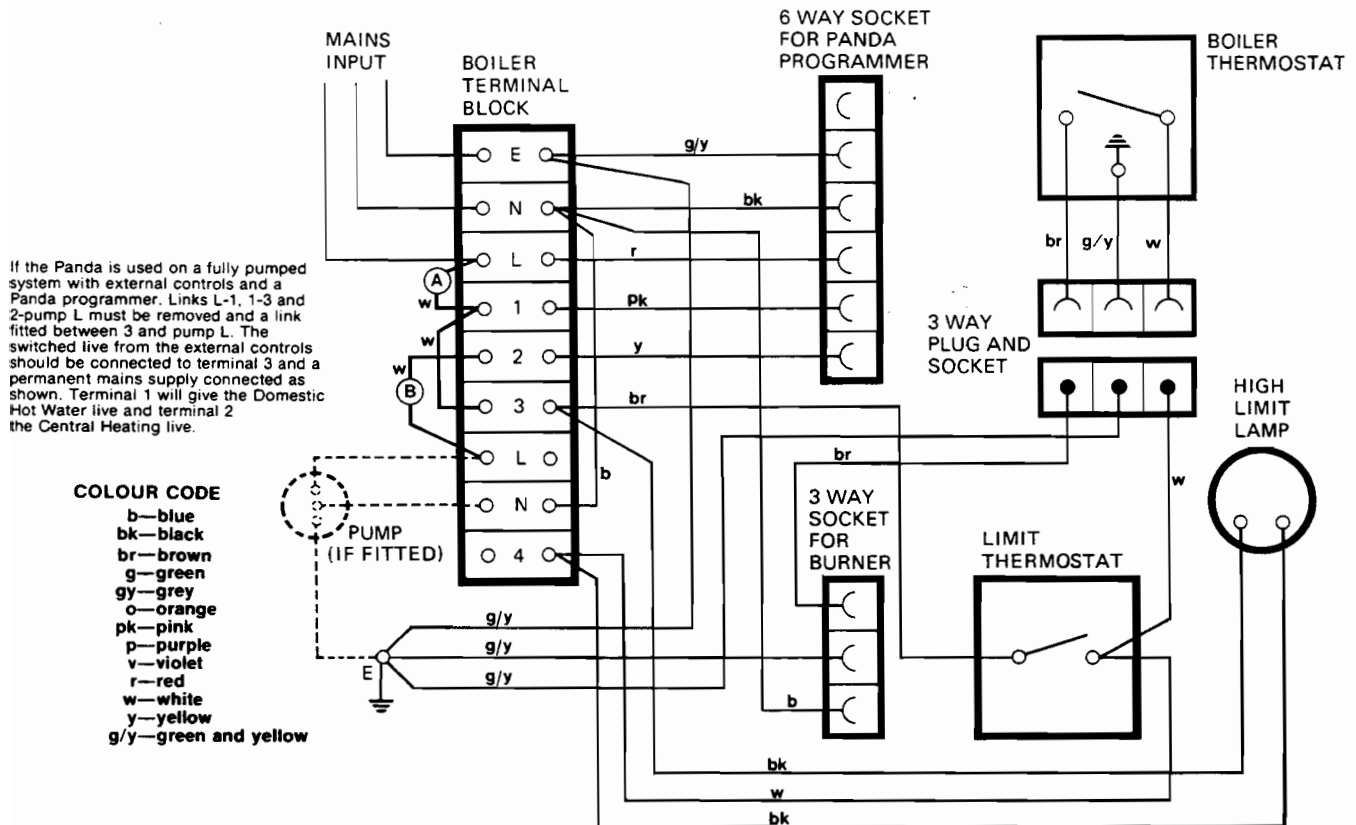
Note: The Electro-oil burner has a lock screw (3 mm hex key) on the air shutter which must be slackened before any adjustment is attempted.

With the burner running, check the safety operation by removing the photocell and shielding it from light. The ignition should be restored and after about 30 seconds the burner control should go to lockout with the warning light on. Replace the photocell ensuring it is facing towards the flame.

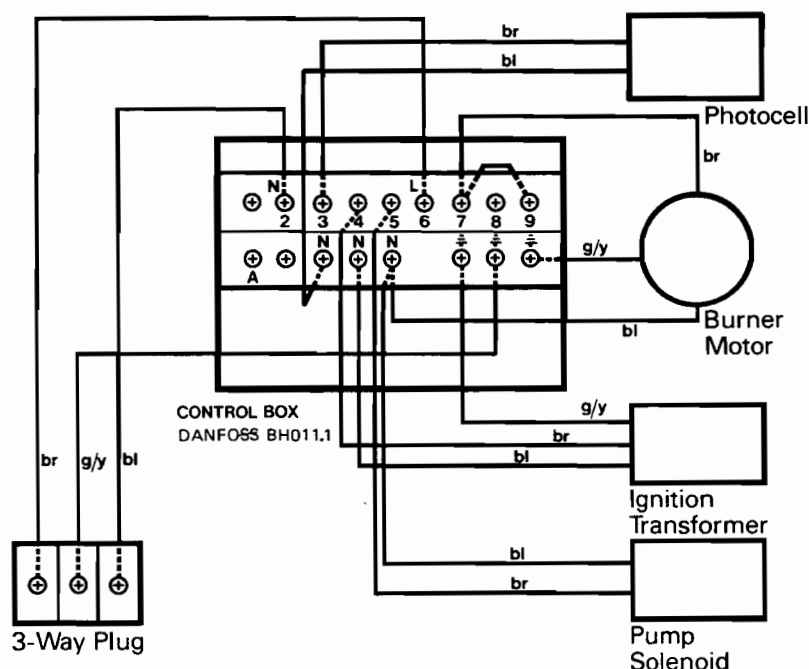
Remove the pressure gauge from the pump and replace the plug. Restart the burner and replace the casing parts.

18. WIRING DIAGRAMS

a. Boiler control box



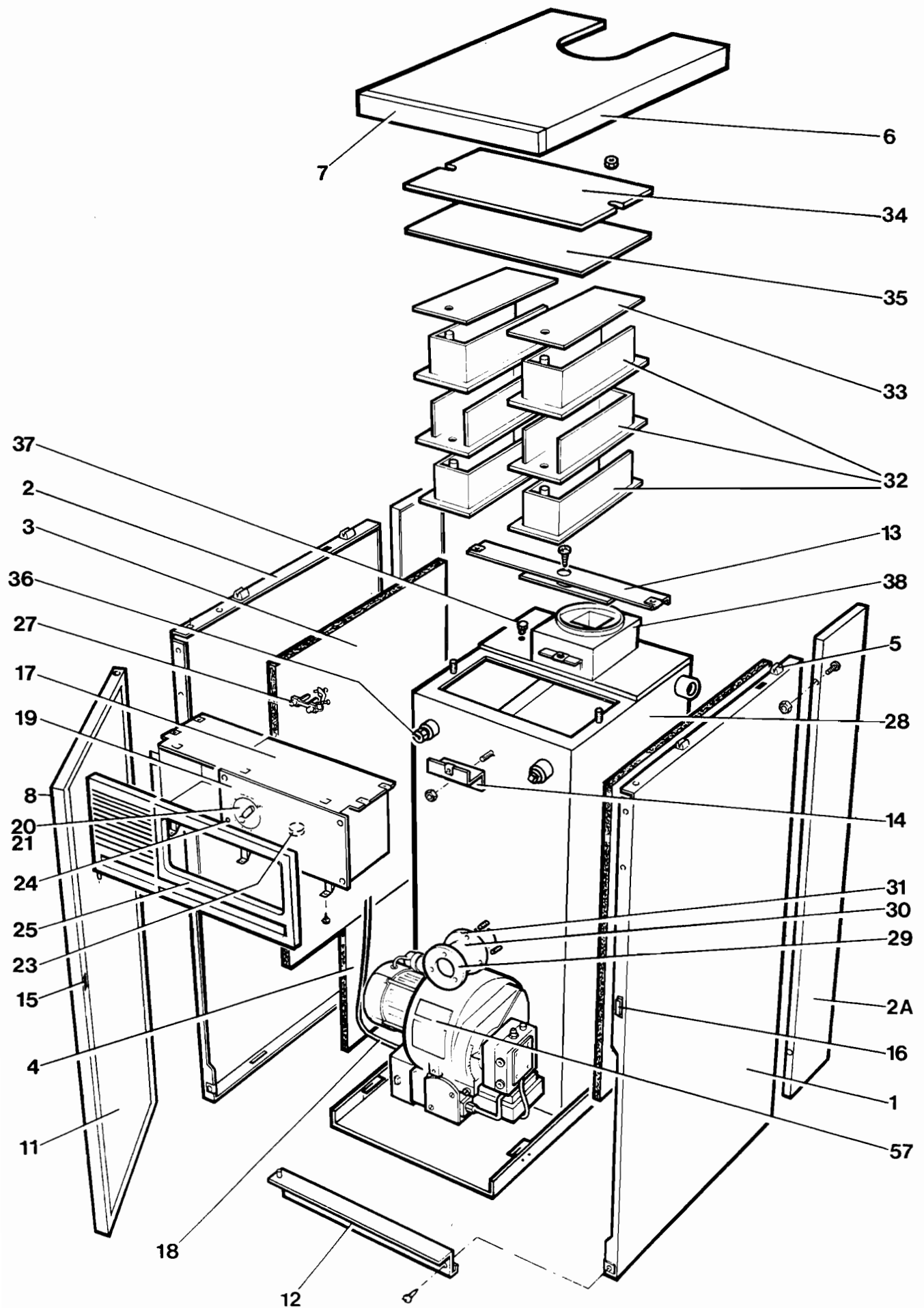
b. Burner controls



19. FAULT FINDING

Symptom	Probable cause	Action
1. Flame established but extinguishes. Control goes to lockout.	Photocell dirty. Defective control box. Air in oil line or pump.	Remove and clean. Replace control box. Purge oil line and nozzle assembly.
2. Motor starts but flame not established. Control goes to lockout.	Lack of oil. Defective oil pump. Defective drive to oil pump. Blocked or restricted nozzle.	Check tank stock. Check supply of oil to burner. Renew oil pump. Check and renew if necessary. Renew nozzle.
3. Motor runs and delivers oil, but flame not established. Control goes to lockout.	Defective ignition relay. Electrodes dirty or incorrectly set. Ignition transformer defective. Ignition leads faulty or disconnected. Poor atomisation at nozzle.	Renew control box. Clean and adjust electrodes. Check, renew if necessary. Check, renew if necessary. Renew nozzle.
4. Motor does not start. Control goes to lockout.	Faulty motor or faulty motor circuit in control box.	Make independent electrical connection to motor. If motor does not start, change motor. If motor starts, check control box.
5. Motor does not start. Lockout lamp does not light.	Faulty thermostat or limit stat. Fuse, timeswitch electrical equipment failure. Defective control box. False light on photocell.	Short out thermostat and limit stat in turn. If motor runs, renew thermostat or limit stat. Check other external electrical components (fuse, etc). Renew control box. Check setting of photocell.
6. High limit warning lamp, on fascia panel lights.	Boiler thermostat failed in closed position.	Change boiler thermostat.

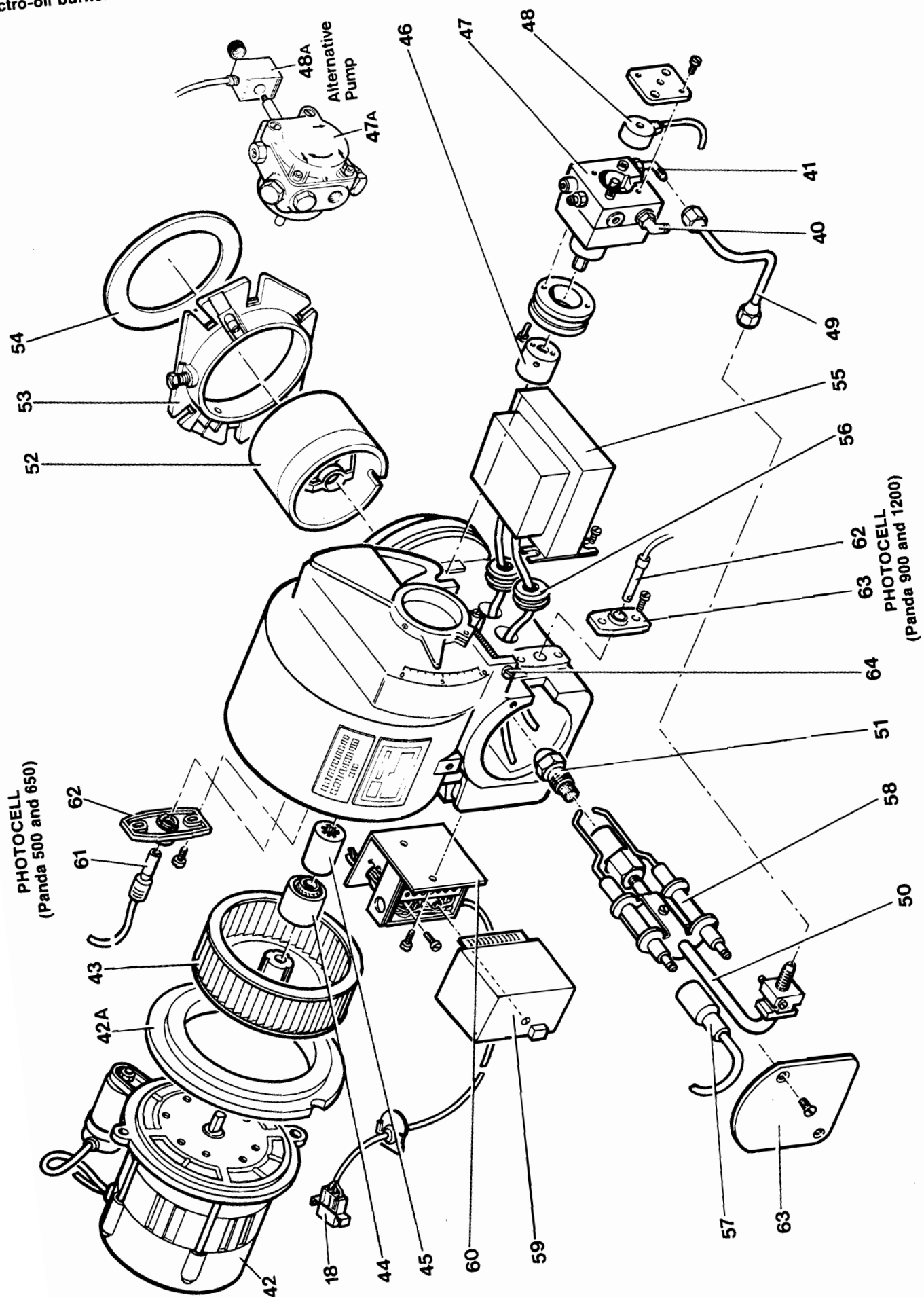
20. BOILER AND CASE EXPLODED VIEW



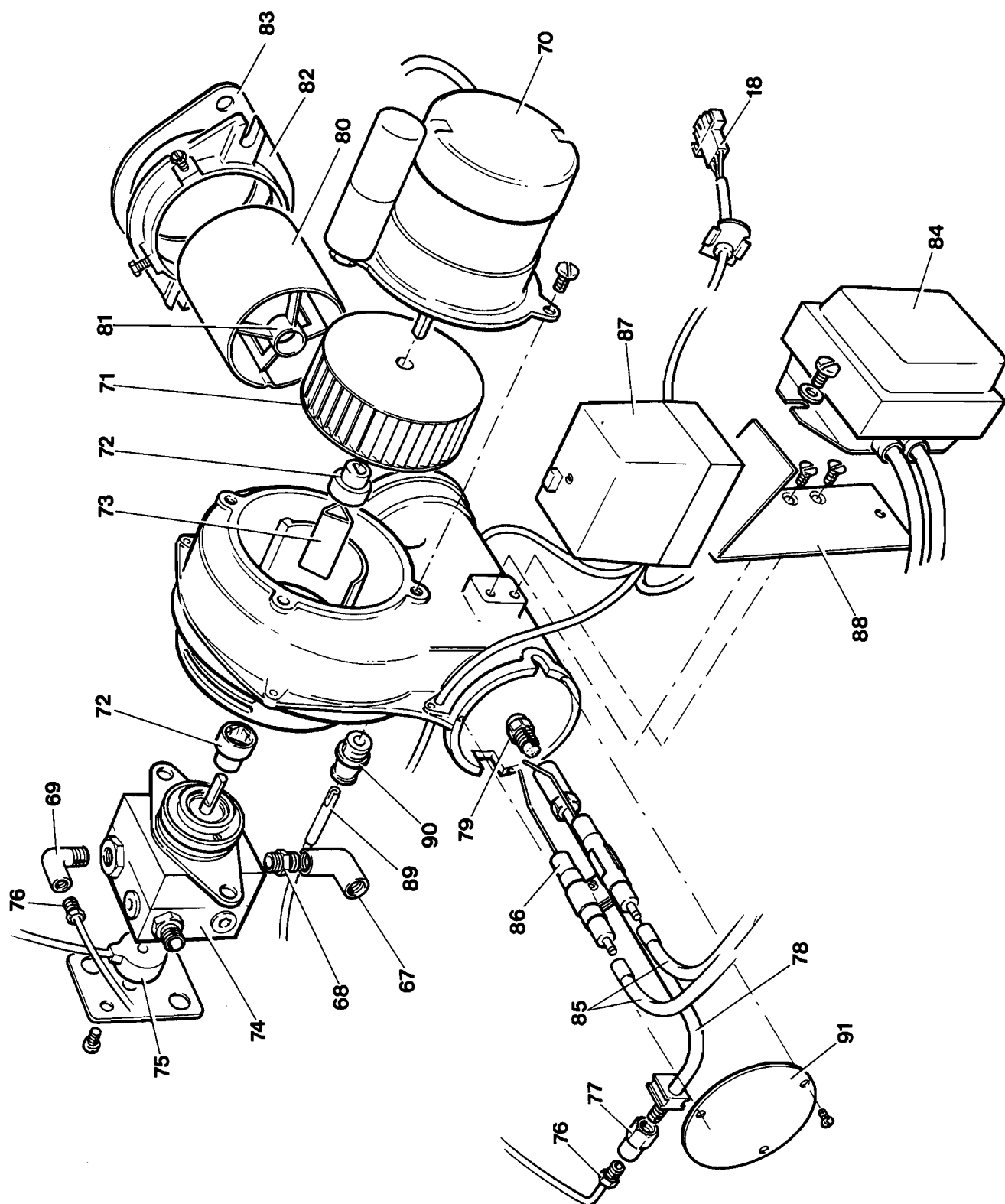
21. BOILER AND CASE PARTS LIST

Key No.	Description	Qty.	Part No.
1	Case side panel assembly. RH	1	508A290
2	Case side panel assembly. LH	1	508A291
2A	Case side extension (1200)	2	508C307
3	Case side insulation. RH or LH Upper	2	508C306
4	Case side insulation. RH or LH Lower	2	507C047
5	Retaining clip	4 (6 for 1200)	B53065
6	Case top and trim assembly (500 and 650)	1	508A294
6	Case top and trim assembly (900 and 1200)	1	508A295
7	Case top trim (500 and 650)	1	305C1437
7	Case top trim (900 and 1200)	1	305C1438
8	Door assembly (500 and 650)	1	508A292
8	Door assembly (900 and 1200)	1	508A293
9	N/A		
10	N/A		
11	Door insulation (500 and 650)	1	508C299
11	Door insulation (900 and 1200)	1	508C300
12	Plinth (500 and 650)	1	305A1404
12	Plinth (900 and 1200)	1	305A1405
13	Case support bracket (500 and 650)	1	305C1434
13	Case support bracket (900 and 1200)	1	305C1435
14	Control box support bracket (500, 650 and 900)	1	508C080
14	Control box support bracket (1200)	1	508C259
15	Door latch	1	P3504
16	Door strike	1	P3505
17	Complete control box assy. with thermostats (500 and 650)	1	508A288
17	Complete control box assy. with thermostats (900 and 1200)	1	508A289
18	Cable assembly, burner to control box	1	507A021
19	Facia panel	1	305A1425
20	Thermostat	1	508S157
21	Thermostat knob with clip	1	309S371
22	Terminal block and wiring assembly	1	508A155
23	Limit thermostat	1	507S077
24	Indicator lamp	1	508S216
25	Control panel moulding (500 and 650)	1	508A297
25	Control panel moulding (900 and 1200)	1	508A298
26	Programmer	1	B4101
27	Mains cable clamp	1	307S504
28	Boiler shell (500)	1	508A353
28	Boiler shell (650)	1	508A354
28	Boiler shell (900)	1	508A355
28	Boiler shell (1200)	1	508A356
29	Window frame	1	B53096
30	Window glass	1	B53097
31	Window gasket	1	507C350
32	Heat exchanger box baffle (500)	3	508A113
32	Heat exchanger box baffle (650)	6	508A010
32	Heat exchanger box baffle (900)	9	508A023
32	Heat exchanger box baffle (1200)	9	508A032
33	Heat exchanger top baffle plate (500)	1	508C121
33	Heat exchanger top baffle plate (650)	2	508C044
33	Heat exchanger top baffle plate (900)	3	508C024
33	Heat exchanger top baffle plate (1200)	3	508C035
34	Flueway cover plate (500 and 650)	1	507C056
34	Flueway cover plate (900)	1	507C156
34	Flueway cover plate (1200)	1	507C251
35	Flueway gasket (500 and 650)	1	507C049
35	Flueway gasket (900)	1	507C149
35	Flueway gasket (1200)	1	507C277
36	Thermostat pocket	1	B53944
37	Test screw M8 slotted hex. hd.	1	056-0810-0-00
38	Flue cover and silencer assembly (500 and 650)	1	508A283
38A	Flue cover and silencer assembly (900)	1	508A284
39	Hearth refractory (500 only)	1	P3587

22. BURNER EXPLODED VIEW
a. Electro-oil burner



b. Selectos burner



23. BURNER PARTS LIST**a. Electro-oil burner**

Key No.	Description	Qty.	Part No.
40	Pump inlet elbow	1	P3602
41	Pump outlet elbow	1	P3617
42	Burner motor	1	P3530
42A	Motor ring (900 and 1200 only)	1	P3507
43	Fan rotor (500 and 650)	1	P3508
43	Fan rotor (900 and 1200)	1	P3563
44	Fan dog (500 and 650)	1	P3509
44	Fan dog (900 and 1200)	1	P3612
45	Drive coupling (500 and 650)	1	P3607
45	Drive coupling (900 and 1200)	1	P3613
46	Pump dog (500 and 650)	1	P3608
46	Pump dog (900 and 1200)	1	P3614
47	Oil pump, Danfoss	1	606/071B1101
47	Alternative oil pump, Sunstrand	1	699/AS47C7455
48	Danfoss oil pump solenoid	1	P3529
48A	Sunstrand oil pump solenoid	1	699/3713744
49	Danfoss pump outer oil tube (500 and 650)	1	P3512
49	Danfoss pump outer oil tube (900 and 1200)	1	P3533
49A	Sunstrand pump outer oil tube (500 and 650)	1	699/0439-059550
49A	Sunstrand pump outer oil tube (900 and 1200)	1	P3618
50	Oil tube-inner assembly (500 and 650)	1	P3609
50	Oil tube-inner assembly (900 and 1200)	1	P3615
51	Nozzle, Monarch 0.5 80°R (40 000, 50 000)	1	614/50X80R
51	Nozzle, Danfoss 0.5 80°H (55 000)	1	606/50X80H
51	Nozzle, Monarch 0.6 80°NS (65 000, 70 000)	1	614/60X80NS
51	Nozzle, Danfoss 0.6 80°H (65 000)	1	606/60X80H
51	Nozzle, Monarch 0.75 80°NS (90 000)	1	614/75X80NS
51	Nozzle, Monarch 0.85 80°AR (95 000)	1	614/85X80AR
51	Nozzle, Monarch 1.0 80°AR (120 000)	1	614/100X80AR
52	Blast tube	1	P3517
53	Flange (500 and 650)	1	P3518
53	Flange (900 and 1200)	1	P3605
54	Gasket	1	P3606
55	Transformer	1	606/052L0082B
56	Grommet	2	P3520
57	Ignition lead	2	P3521
58	Electrode	2	P3522
59	Control box	1	606/057H2011
60	Mounting bracket	1	507C089
61	Photocell	1	606/057H2020
62	Mounting flange	1	P3490
63	Back plate	1	P3523
64	Air control screw	1	P3611
65	Flexible oil pipe	1	P3601
66	Burner assembly complete (500)	1	508A114
66	Burner assembly complete (650)	1	508A082
66	Burner assembly complete (900)	1	508A267
66	Burner assembly complete (1200)	1	508A268

b. Selectos burner

Key No.	Description	Qty.	Part No.
67	Pressure gauge elbow	1	P3619
68	Nipple	1	P3620
69	Pump outlet elbow	1	P3621
70	Burner motor	1	P3622
71	Fan rotor	1	P3623
72	Fan/pump dog	2	P3624
73	Drive coupling	1	P3625
74	Danfoss oil pump	1	606/071B1101
75	Danfoss oil pump solenoid	1	606/071B00300
76	Outer oil tube	1	P3626
77	Oil tube adaptor	1	P3627
78	Oil tube inner assembly (500)	1	P3628
78	Oil tube inner assembly (650)	1	P3629
78	Oil tube inner assembly (900)	1	P3630
78	Oil tube inner assembly (1200)	1	P3631
79	Nozzle. Danfoss 0.5 80°H (40 000, 50 000, 55 000)	1	606/50X80H
79	Nozzle. Danfoss 0.6 80°H (65 000, 70 000)	1	606/60X80H
79	Nozzle. Danfoss 0.75 80°H (90 000)	1	606/75X80H
79	Nozzle. Monarch 0.85 80°R (95 000)	1	614/85X80R
79	Nozzle. Monarch 1.0 80°R (120 000)	1	614/100X80R
80	Blast tube (500)	1	P3632
80	Blast tube (650)	1	P3633
80	Blast tube (900)	1	P3634
80	Blast tube (1200)	1	P3635
81	Flame ring assembly (500 and 650)	1	P3636
81	Flame ring assembly (900)	1	P3637
81	Flame ring assembly (1200)	1	P3638
82	Flange	1	P3639
83	Gasket	1	P3640
84	Transformer	1	606/052L0003B
85	Ignition lead	2	P3641
86	Electrode	2	P3642
87	Control box	1	606/057H2011
88	Mounting bracket	1	P3643
89	Photocell	1	606/057H2020
90	Photocell bush	1	606/057H2400
91	Inspection window	1	P3644
92	Flexible oil pipe	1	P3645
93	Burner assembly complete (500)	1	508A235
93	Burner assembly complete (650)	1	508A236
93	Burner assembly complete (900)	1	508A237
93	Burner assembly complete (1200)	1	508A238

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OMYSON

OMYSON

INSTALLATION

Panda II 95/120

Pressure jet oil boiler

OUTPUT: 27.9 kW (95 000 Btu/h) with kerosine or gas oil

35.2 kW (120 000 Btu/h) with kerosine or gas oil

General Description

This is a steel shell boiler with plain sided combustion chamber and heat exchange surfaces. Baffles within the shell provide high efficiency of heat transfer. There is a removable top cover on the boiler shell to give access for removing the baffles and for cleaning the shell.

A fully automatic pressure jet burner is fixed to the front of the shell.

The boiler is enclosed in a white stove enamelled casing with the boiler thermostat and optional programmer under a lift-up transparent cover. A high limit thermostat with an indicator light is also incorporated.

The boiler is despatched protectively wrapped and the casing and burner are packed in separate cartons. The boiler will operate on either Class C2 (kerosine) or Class D (gas oil) boiler fuels.

The burner is preset for use with kerosine at the 35.2 kW (120 000 Btu/h) output rating.

1. Site

The base of the boiler is insulated so no special hearth is required.

The floor surface must be firm and level. If the floor covering is a material which softens when warm it should be protected for example by a steel sheet.

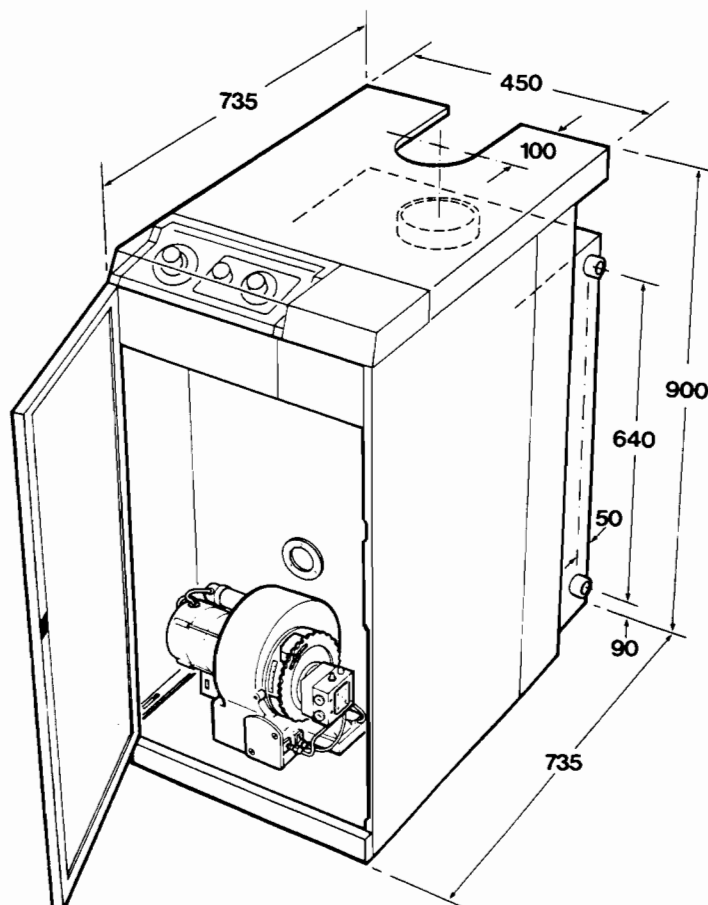


Fig. 1. General dimensions

The following services are required:

- 1.1. A suitable flue. See para 2.
- 1.2. Water connections. See para 3.
- 1.3. Oil supply from a storage tank. See para 4.
- 1.4. Electricity supply: Twin and earth, 1 phase, 240V a.c. 50Hz, via a fused double pole switch or a fused 3-pin plug and shuttered socket outlet, adjacent to the boiler. Fuse the supply at 3 amp. for the burner alone; fit a larger fuse to include a circulating pump.
- 1.5. Adequate air supply for combustion and ventilation. See para 5.
- 1.6. There must be clearance for servicing, at least 450 mm (18 in.) above and 600 mm (2 ft.) in front of the boiler, and space at the sides to make the water connections.
- 1.7. The whole installation must conform to current Building Regulations and Codes of Practice in particular BS 5410:1 and BS 5449:1.

2. Flue

- 2.1. A normal flue will give 12.5–25 N/m² (0.05–0.1 in w.g.) draught at the boiler outlet when it is working at rated output.
- 2.2. An insulated flue terminating in a down draught free area, e.g. 600 mm above the ridge of a one or two storey building, will usually provide the conditions specified in 2.1.
- 2.3. Unless extreme conditions, above 30 N/m² (0.12 in w.g.) prevail, a separate stabiliser should not be needed. These are not suited to kitchen installations since they will emit noise.
- 2.4. Precautions are needed against excessive cooling of flue gases, and if a suitable internal stack is available it should be used.
- 2.5. If an existing internal or external brick chimney is used it must be lined with a liner suited to oil fuels. The annular space must be sealed at top and bottom and may be loosely filled with insulating material. In a new building the chimney must conform to the current Building Regulations.
- 2.6. An independent external flue, of whatever material, must be effectively insulated and given a waterproof cladding, or made of double wall construction.
- 2.7. A sealed cleaning door must be provided in the flue or chimney near the connecting flue entry.

One pipe installation

Head H m	Max. Length of pipe run (m)	
	4mm	6mm
4.0	100	100
3.5	100	100
3.0	100	100
2.5	100	100
2.0	79	100
1.5	55	100
1.0	31	100
0.5	7	36

Two pipe installation

Lift L m	Max. pipe length —intake or return (m)	
	8mm	10mm
0.0	100	100
0.5	100	100
1.0	87	100
1.5	72	100
2.0	57	100
2.5	41	100
3.0	26	64
3.5	10	26
4.0	0	0

- 2.8. The first flue length off the boiler must be of cast iron or steel.
- 2.9. Flue runs must be as direct as possible, avoiding 90° bends.
- 2.10. The boiler must not share a flue with any other appliance.
- 2.11. The flue must be 6 in. dia. minimum.

3. Water connections. See Fig. 1

There are two flow and return tapings, Rp 1¼ (1¼ in. BSP parallel) on each side of the boiler. One pair may be used for heating, one pair for the hot water supply primaries. If only two of the tapings are used, it is preferable to use opposite top and lower ones.

A pump kit is available to accommodate a circulating pump within the boiler casing. When fitting this kit to the 95/120 boiler, the medium length pipe, supplied in the kit, should be replaced by one 135 mm longer, or suitably extended, to reach the back of the boiler. An additional Rp ¾ (¾ in. BSP parallel) connection on the front of the boiler is provided for the pump kit. If the front tapping is used other than for the pump kit connection, ensure that any pipe routed over the top of the boiler does not obstruct access to the cleaning cover.

The water system must be indirect.

A drain cock must be fitted to the lowest point of the system.

4. Oil supply. See Figs. 2 and 3.

- 4.1. Gravity supply. Maximum head K—8m. Minimum head H—0.5m. Avoid high points in the pipe line which can cause air locks.
- 4.2. Low level supply. Maximum lift L—4m. A bypass plug is supplied, attached to the pump, for a 2-pipe system. See Fig. 6.
- 4.3. Galvanised pipe must not be used.
- 4.4. The storage tank should incline 1:50 towards the drain cock, but away from the fuel outlet.
- 4.5. A metal bowl filter with replaceable micronic element must be fitted.
- 4.6. In a boiler house the filter may be near the boiler.

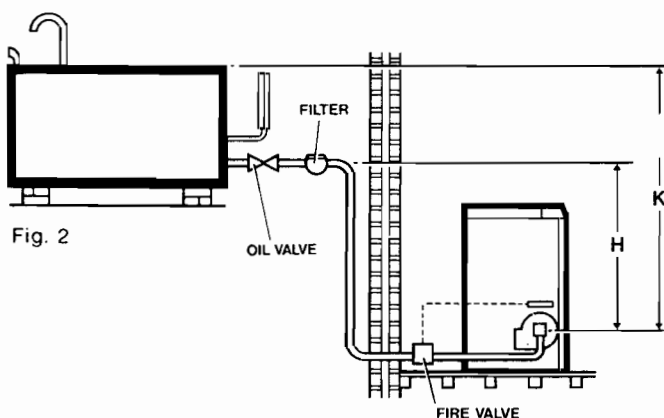


Fig. 2

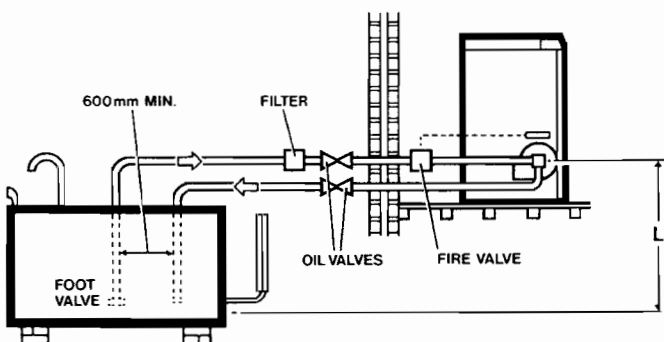


Fig. 3

For notes on fire valves see BS799, BS5410 Part 1 and CP3002

- 4.7. In a kitchen installation the filter should be outside the house. Leave unions for purging the oil supply line.
- 4.8. An air vent is incorporated in the pump.
- 4.9. Multiple boiler installations will probably require a ring main system.
- 4.10. The fuel supplier will be able to advise on pipe sizes, valves etc., if required.

5. Air supply

There must be adequate air for combustion and if the boiler is installed in a confined space, additional air for ventilation.

The recommended sizes of free area of openings are:

Air for combustion 193 cm² (30 in.²).

Air for ventilation—in confined spaces add to combustion air:

- (a) air from a heated space—387 cm² (60 in.²) at high level and 387 cm² (60 in.²) at low level.
- (b) air from outside—193 cm² (30 in.²) at high level and 193 cm² (30 in.²) at low level.

6. Heat exchanger baffles

6.1 The heat exchanger baffles are fitted inside the boiler shell.

6.2 Remove the boiler top cover and remove the packing from above the baffles. Check that the baffles are in position as shown in Fig. 4. Replace the top cover.

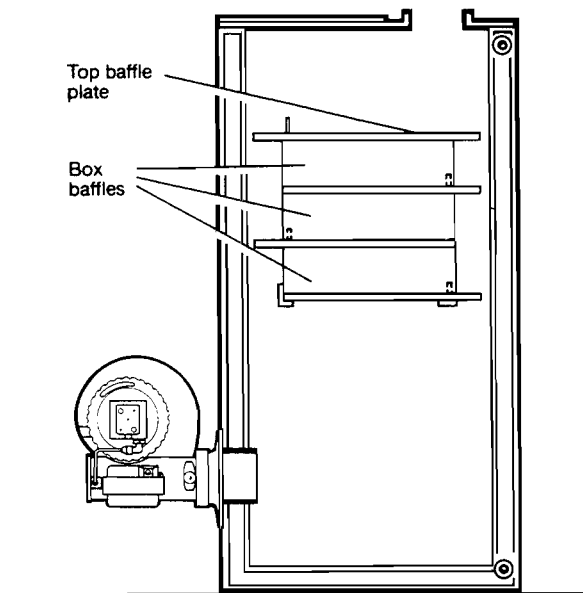


Fig. 4

7. Burner

7.1. The burner is supplied fitted with a 1.0 USg/h nozzle for the 35.2 kW (120 000 Btu/h) rating and the pump pressure is set for kerosine.

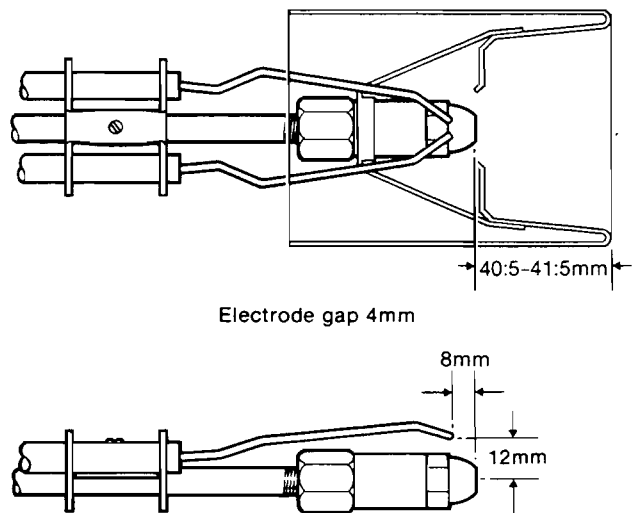
If it is required to change fuel or rating, it will be necessary to change the nozzle or pump pressure as appropriate. See Specification and Data table.

The nozzle is accessible after removing the inner oil tube assembly.

7.2. Before fitting the burner make sure that the combustion head settings are correct. Fig. 5.

7.3. Fit the mounting flange over the blast tube and up against the burner casting. Fit the assembly to the boiler shell with the gasket between the flange and the shell. Tighten in position.

7.4. Connect the oil supply to the pump with the filter in the line, see para 4 and Fig. 7. The inlet and return ports are Rp $\frac{1}{4}$ ($\frac{1}{4}$ in. BSP parallel thread). The pump manufacturer's recommended connection is by a corresponding Rp $\frac{1}{4}$ shouldered fitting with a sealing washer. BSP taper or NPTF fittings may also be used with a suitable jointing compound. If a tapered thread fitting is used care should be taken to ensure that a correct seal is made without the body of the fitting impinging on the pump body.



Electrode gap 4mm

Fig. 5

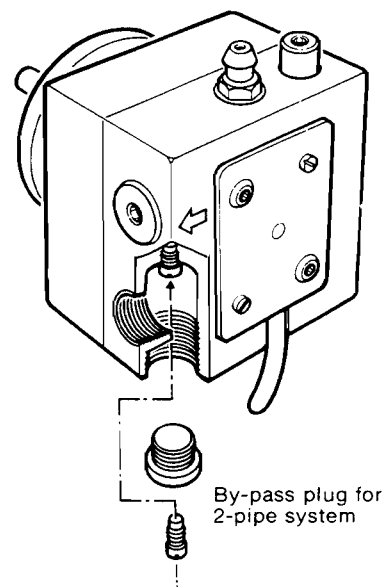


Fig. 6

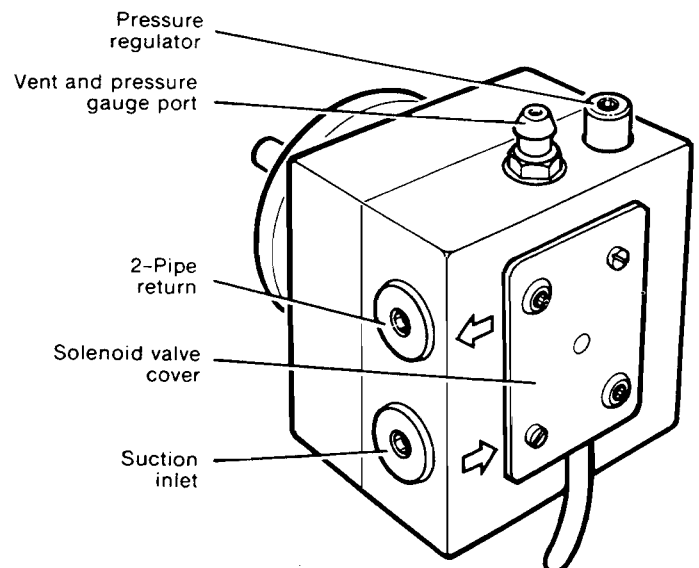


Fig. 7

8. Casing assembly. See Fig. 8.

If the optional THORN EMI Programmer is being used, fit this to the wiring centre first. (See Instructions packed with Programmer Kit).

8.1. Fit the casing strap, 4, on the stud, 5, and fix in position with the nut, 6.

8.2. Fit the right hand side panel, 2, to the extension panel, 2A, with the two bolts, 20, and two nuts, 21. Fit this assembly to the boiler base so that the rectangular cut-outs in the bottom return fit over the lugs, 3, on the boiler base. Note that the panels are handed. The full returns are at the rear and the cut-away returns are at the front on each side.

Push the panel rearwards to lock it in the correct position.

8.3. Spring up the end of the casing support, 4, bring the side panel up to a vertical position and drop the end lug of the support into the cut-out in the top return of the side extension panel.

8.4. Repeat operations 8.2 and 8.3 to fit the left hand side panel, 1, and extension panel, 2A.

8.5. Fit the wiring centre, 7, with its side returns inside the casing front returns and with the feet of the moulded panel engaged in the slots in the top return of the L.H. side panel. Slide the assembly forward to lock the feet in position.

On the right hand side, ease the side panel outwards at the top to allow the top return of the wiring centre to drop below the top return of the side panel.

Secure the wiring centre with three countersunk screws, 8, one through the top of the side panel and two through the front. (see Fig. 8).

8.6. Fit the support bracket, 9, onto the stud, 10, on the front of the boiler shell and secure with the nut, 11.

8.7. Remove the two screws, 12, at the bottom and the two screws, 13, at the front of the wiring centre and slide out the wiring panel. Insert the screw, 14, from inside the wiring centre into the captive nut in the support bracket.

Temporarily replace the wiring panel.

8.8. Partially secure the plinth, 15, to the right hand side cover with one of the long screws, 16.

8.9. Engage the lower-hinge pin on the plinth into the socket in the bottom of the door, 17. Raising both plinth and door together, engage the upper hinge pin on the moulded panel into the socket on the top of the door. Secure the plinth to the left hand cover with the second of the screws, 16.

8.10. Press the top cover, 18, into position, engaging the retaining clips into the slots.

8.11. Check the casing for squareness and close the door. Slacken fixing screws where necessary to make adjustments. Finally tighten all fixing screws.

8.12. Press the black top infill panel, down onto the spring clips on the top of the wiring centre.

8.13. Fit the plastic cover to the wiring centre.

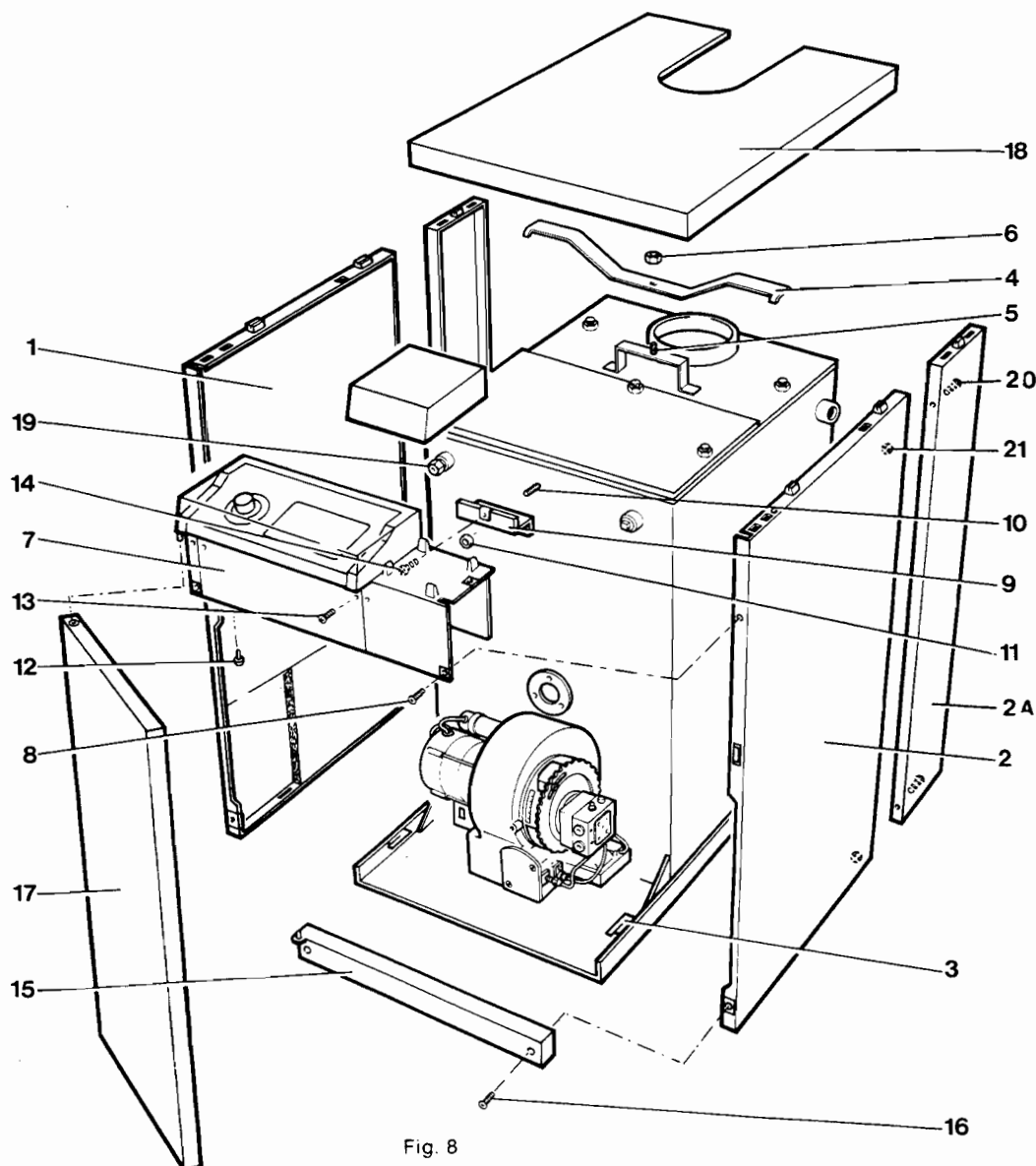


Fig. 8

9. Electrical connection. See Fig. 9.

- 9.1 Open the casing door and slide out the wiring panel.
- 9.2 Push the cable support, 1, on the burner cable into the U-shaped cut-out in the panel.
- 9.3 Plug the 3-way connector, 2, into the 3-way socket, 3. There is a key on the plug and a keyway in the socket. These must be correctly aligned to allow engagement.
- 9.4 Slacken two screws, 4, in the cable clamp, 6, on the back of the wiring centre. Feed the mains lead under the clamp and through the bush, 7. Connect the wires to L, N and ⏏ on the terminal block, 5.
- 9.5 If the optional integral programmer is being used, check that the appropriate connections have been made and link wires removed. (See wiring diagram).
- 9.6 If an external timeswitch, circulating pump or room thermostat is being fitted, wire these into the wiring centre. Run the wiring under the cable clamp and through the bush. Remove the appropriate link wires from the terminal block. (See wiring diagram).
- 9.7 Keeping the wiring panel in the open position, take up excess slack in the cables between the terminal block and the rear bush, 7, then tighten the cable clamp screws, 4. Check that the wiring panel will open and close freely, without straining the cables.
- 9.8 Replace the wiring panel and the fixing screws.
- 9.9 Carefully uncoil the boiler and limit thermostat capillaries and insert the phials into the thermostat pocket, see Fig. 8 (19) and Fig. 10.
- 9.10 Secure the incoming cables with the cable ties provided, so that the cables do not come into contact with hot surfaces, particularly the boiler top and flue.

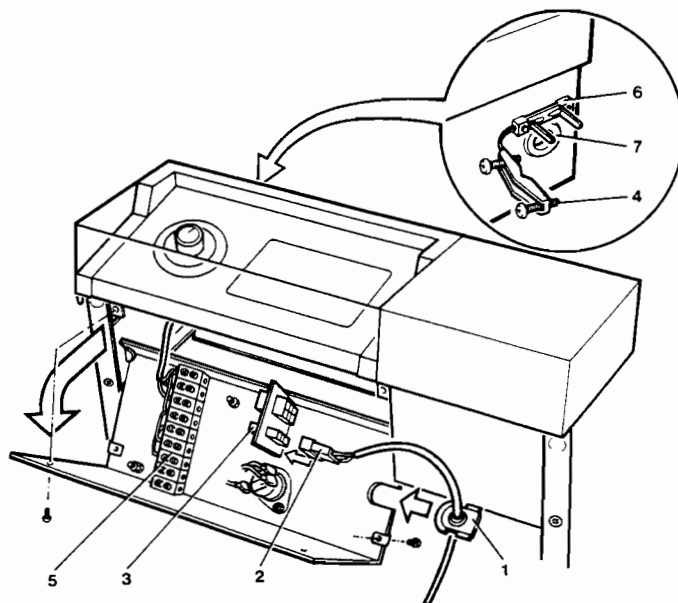


Fig. 9

10. Putting to work. See Fig. 11

- 10.1 Disconnect the oil supply to the filter. Run off oil into a container to purge the line of air and foreign matter. Reconnect the oil pipe. If the filter is away from the boiler (see 4.7), next disconnect at the boiler and purge the whole of the supply line. Allow the collected oil to settle and pour it back into the storage tank.
- 10.2 Purge the air from the pump.
- 10.3 Check that the water system is full and air is released from all radiators.
- 10.4 Check both water and oil systems for leaks.
- 10.5 Set the boiler thermostat to the required setting.
- 10.6 Set the clock control (if fitted) to an ON position.
- 10.7 Press the reset button on the burner control in case the relay has been accidentally tripped.
- 10.8 Switch on the mains electricity supply.

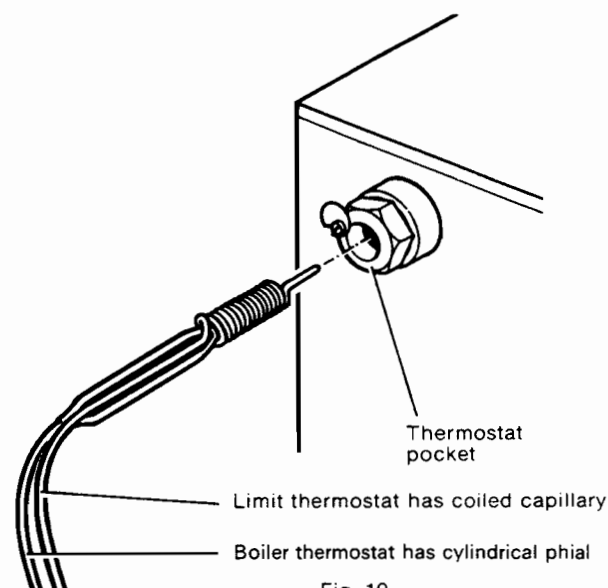


Fig. 10

11. Operation

- 11.1 The boiler will normally light within 20 seconds of switching on. There may be a brief period of erratic firing while the last of the air is purged.
- 11.2 If the flame is not established within 20-30 seconds the controls will go to lockout, and the warning light on the burner control box will light. Wait two minutes before pressing the reset button to start again.
- 11.3 After about 15 minutes firing, check the combustion; CO₂, flue gas temperature and smoke number in accordance with the data in the table. Adjustments, if any, should be limited to the air shutter.

12. Failure to start

The commonest causes of failure are:

- 12.1 Fuel starvation. Check for stock, shut valves, filter blockage, air lock or water in the fuel line.
- 12.2 Dirty photocell. Remove the photocell from its housing, clean and replace. Press the reset button.
- 12.3 Electricity supply. Check that electricity is available at site. Examine fuses.

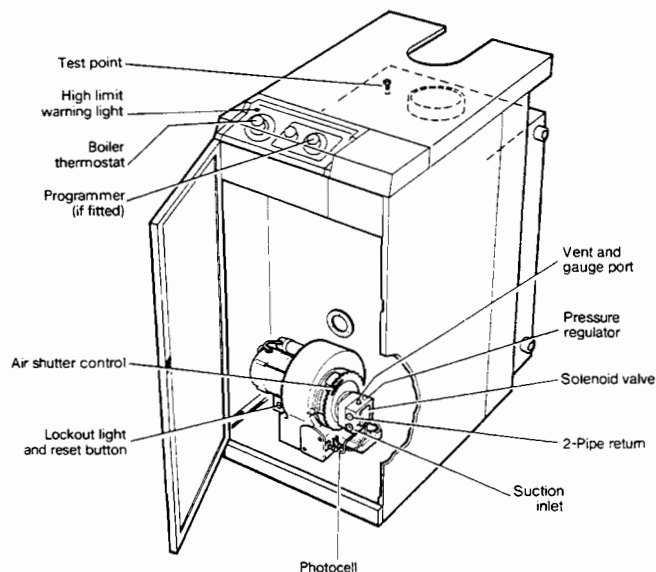
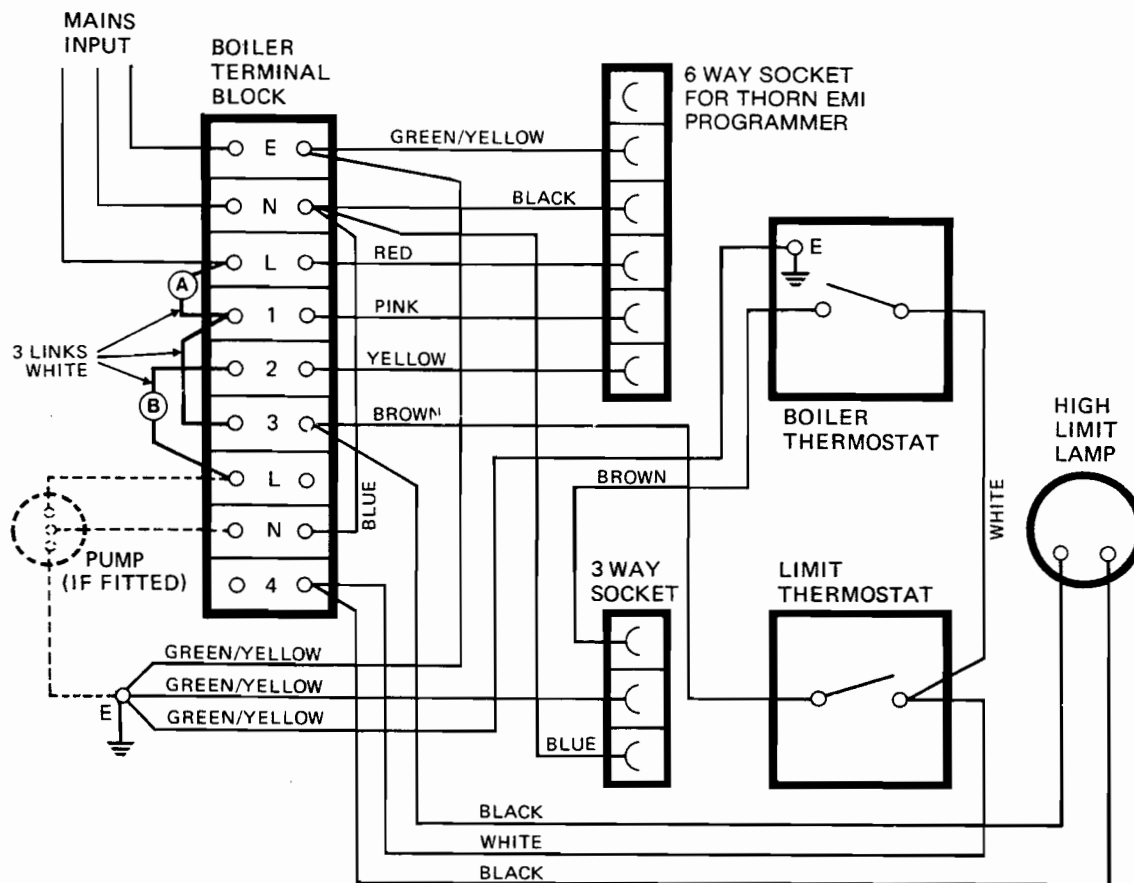
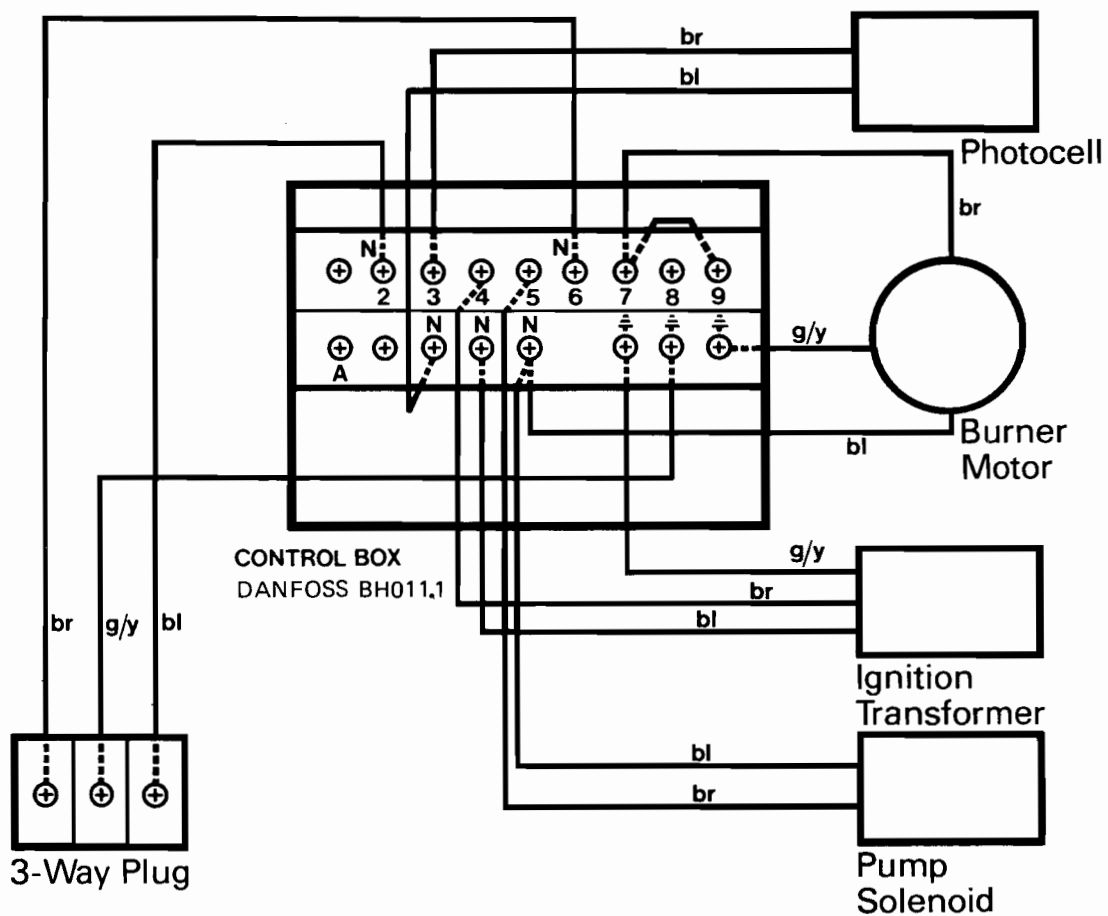


Fig. 11



WIRING DIAGRAM—BOILER WIRING CENTRE

- NOTES:
1. If a THORN EMI Programmer is fitted, link A must be removed.
 2. If an external programmer is fitted, link A must be removed and the boiler and pump switched lines connected to terminals 1 and 2 respectively.
 3. In addition to 1 and 2, if a room thermostat is fitted, link B must be removed and the room thermostat connected in its place.



WIRING DIAGRAM—BURNER CONTROLS

Specification and Data

Heat output	kW Btu/h	27.9 95 000		35.2 120 000	
Fuel: kerosine K, gas oil G.		K	G	K	G
Flue gas temp. approx.	°C °F	210 410	210 410	235 455	235 455
Smoke No. Bacharach		0—1	0—1	0—1	0—1
CO ₂ approx.	%	11.0	11.0	11.5	11.5
Draught minimum	N/m ² in w.g.	—12.5 —0.05	—12.5 —0.05	—12.5 —0.05	—12.5 —0.05
Nozzle. 80° Monarch AR	size	0.85	0.85	1.0	1.0
Oil pump pressure	bar lb/in ²	8.4 120	7.6 110	9.8 140	8.6 125
Typical fuel flow rates	kg/h ml/min	2.6 56.0	2.5 54.0	3.3 71.0	3.2 68.5
Burner, Electro-oil	model	INTER 11 Mk II/PL1			
Electricity to be fused	amp	3 (burner only, excludes circulating pump)			
Power consumed (running, 240V)	W	150			
Weight with burner and case	kg lb	174 384			
Water content	kg lb	31 68			
Working head max.	m ft	30 100			
Hearth temperature category	°C	Below 100			

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OMYSON

MAINTENANCE

Panda II 95/120 Pressure jet oil boiler

OUTPUT: 27.9 kW (95 000 Btu/h) with kerosine or gas oil
35.2 kW (120 000 Btu/h) with kerosine or gas oil

Maintenance: This is a skilled operation to be carried out once or twice a year depending on the operating conditions and amount of use. Renew parts as necessary if failure occurs.

General: The service engineer should observe the working conditions of the installation; for example continuous free access of combustion air to the boiler; condition of the flue, which may need to be swept while the boiler is dismantled for service. A routine check for sludge in the storage tank is recommended.

Warning: Switch off mains electricity before beginning any servicing operation.

1. Check functioning of boiler. See Fig. 1.

- 1.1. Disconnect the oil supply to the filter. Run off oil into a container to purge the line of air and foreign matter. Reconnect the oil pipe. If the filter is away from the boiler, next disconnect at the boiler and purge the whole of the supply line.
- 1.2. Purge the air from the pump.
- 1.3. Check that the water system is full and air is released from all radiators.
- 1.4. Check both water and oil systems for leaks.
- 1.5. Set the boiler thermostat to the required, or a high setting.
- 1.6. Set the clock control (if fitted) to an ON position.
- 1.7. Press the reset button in case the relay has been accidentally tripped.
- 1.8. Switch on the mains electricity supply.

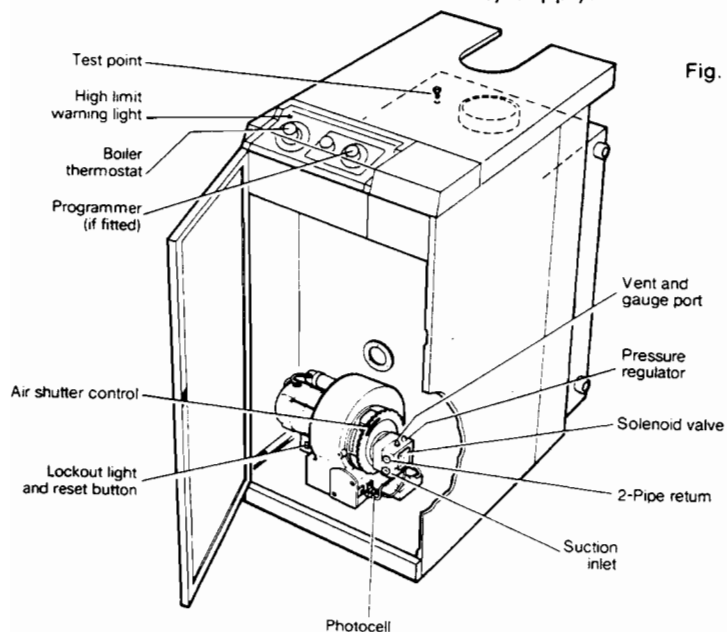


Fig. 1

2. Operation

- 2.1. The boiler will normally light within 20 seconds of switching on. There may be a brief period of erratic firing while the last of the air is purged.
- 2.2. If the flame is not established within 20—30 seconds the controls will go to lockout, and the lockout light on the burner control box will light.

3. Failure in service

The commonest causes of failure are:

- 3.1. Fuel starvation. Check for stock, shut valves, filter blockage, air lock or water in the fuel line.
- 3.2. Dirty photocell. Remove the photocell from its housing, clean and replace. Press the reset button.
- 3.3. Dirty electrodes. Switch off mains electricity. Remove the inner oil tube assembly (see paras 6.2, 6.3, 6.4 and 6.7) and clean the electrodes.
- 3.4. Electricity supply. Check that electricity is available at site. Examine fuses.

4. Preparation for routine service

- 4.1. Switch off electricity supply.
- 4.2. Shut off the oil supply.
- 4.3. Pull off the casing top cover.
- 4.4. Open the casing door. Disconnect the oil pipe from the pump.
- 4.5. Remove the two screws, A, Fig. 2, at the front and two screws, B, beneath the wiring centre. Slide out the wiring panel. Disconnect the 3-way connector on the burner lead and slide out the cable clamp from the panel.

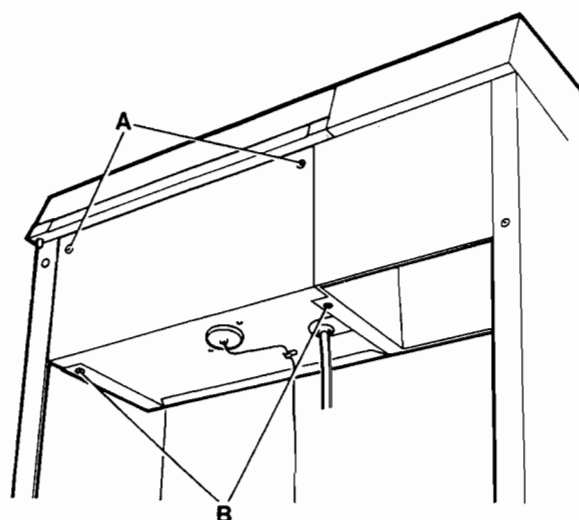


Fig. 2

- 4.6. Undo either the clamping screw in the burner flange or remove the two fixing nuts on the boiler shell. Remove the complete burner from the boiler. If access is restricted it may be necessary to remove the left hand screw from the plinth, and remove the casing door to allow the burner to be removed.

5. Boiler

- 5.1. Remove the flueway cover plate. Do not damage the gasket.
- 5.2. Withdraw the heat exchanger baffles through the top of the boiler.
- 5.3. Clean the inside of the boiler and the baffles with a brush and scraper if necessary.
- 5.4. Remove all deposits from inside the boiler shell.
- 5.5. Replace the heat exchanger baffles and make sure they are correctly seated on their supports. See Fig. 3.
- 5.6. Replace the flueway cover plate and gasket.

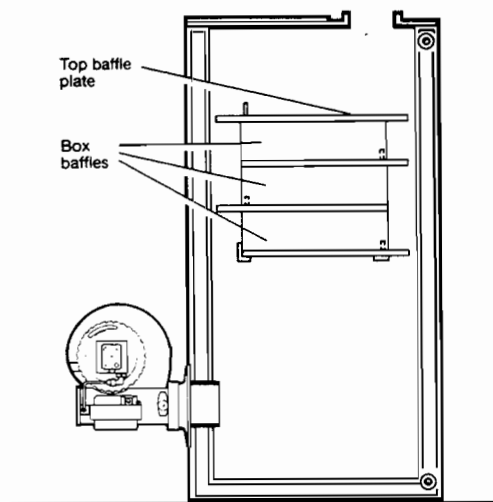


Fig. 3

6. Burner

- 6.1. Withdraw the photocell and carefully wipe it clean.
- 6.2. Remove the burner backplate.
- 6.3. Unscrew the outer oil tube.
- 6.4. Partially withdraw the inner assembly, unclip the ignition leads and withdraw completely.
- 6.5. Unscrew the motor holding bolts. Withdraw the fan and motor assembly. Clean the fan and the fan housing.
- 6.6. Refit the fan and motor assembly. The nylon dog must engage in the splined flexible coupling.
- 6.7. Clean the electrodes. Check the settings and adjust if necessary. See Fig. 4.
- 6.8. Refit the inner assembly, ignition leads and backplate.
- 6.9. Check the setting of the combustion head, Fig. 4.
- 6.10. Replace the photocell.
- 6.11. Remove the solenoid valve cover from the pump, Fig. 5, and withdraw the solenoid coil.
- 6.12. Undo the two grub screws securing the pump to the burner body (3mm hex. key) and remove the pump.
- 6.13. Holding the pump over a suitable container, remove the two socket screws (4mm hex. key) and separate the pump.
- 6.14. Clean the filter and the filter housing, reassemble and replace the pump and solenoid coil.
- 6.15. Clean the main filter in the oil supply line. Renew the element if necessary.
- 6.16. Refit the burner to the boiler shell. Remake the oil and electrical connections.

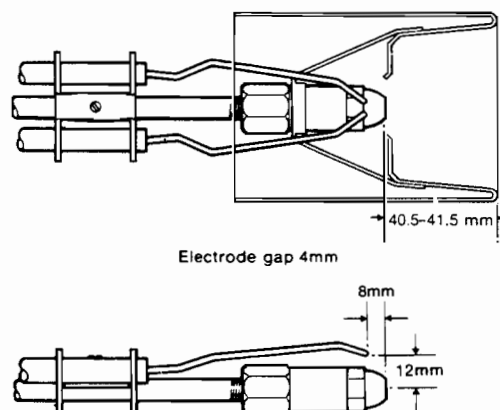


Fig. 4

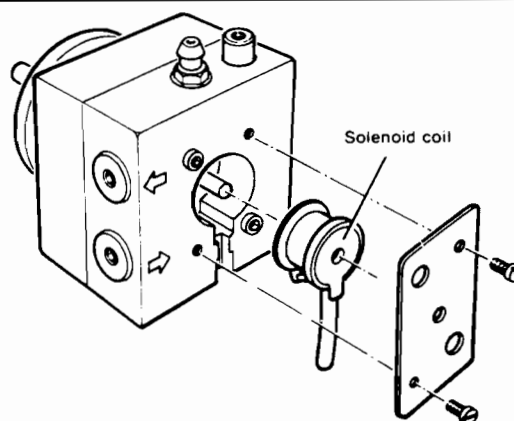


Fig. 5

7. Combustion

- 7.1. Fit a pressure gauge to the oil pump. See Fig. 6.
- 7.2. Turn on the oil and electricity. Run the burner, stopping and starting as necessary to remove all air from the pump and oil pipes.
- 7.3. Run the burner for fifteen minutes and check the pump pressure, flue gas temperature, CO₂ and smoke number against the figures given in the Specification and Data table.
- 7.4. With the burner running, check the safety operation by removing the photocell and shielding it from light. The ignition should be restored and after about 30 seconds the burner control should go to lockout with the warning light on.
- 7.5. Remove the pressure gauge from the pump and replace the plug. Restart the burner and replace casing parts.

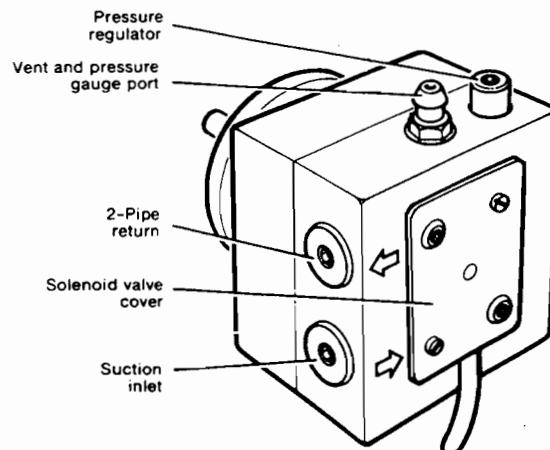


Fig. 6



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- The diagram illustrates the electrical control system for a burner. A 3-Way Plug provides three input lines: blue (br), green/yellow (g/y), and black (bl). These lines connect to a central Control Box (Danfoss BH011.1). The control box contains terminals numbered 1 through 9. Terminal 1 is connected to the blue (br) line. Terminal 2 is connected to the green/yellow (g/y) line. Terminal 3 is connected to the black (bl) line. Terminal 4 is connected to the green/yellow (g/y) line. Terminal 5 is connected to the black (bl) line. Terminal 6 is connected to the blue (br) line. Terminal 7 is connected to the green/yellow (g/y) line. Terminal 8 is connected to the black (bl) line. Terminal 9 is connected to the blue (br) line. The control box is wired to several components: a Photocell (connected to terminal 1), a Burner Motor (connected to terminal 2), an Ignition Transformer (connected to terminal 3), and a Pump Solenoid (connected to terminal 4). The Burner Motor is also connected to the green/yellow (g/y) line. The Ignition Transformer is connected to the black (bl) line. The Pump Solenoid is connected to the blue (br) line.

FAULT FINDING

Symptom

1. Flame established but extinguishes. Control goes to lockout.

2. Motor starts but flame not established. Control goes to lockout.

3. Motor runs and delivers oil, but flame not established. Control goes to lockout.

4. Motor does not start. Control goes to lockout.

5. Motor does not start. Lockout lamp does not light.

6. High limit warning lamp lights.

Probable cause

Photocell dirty.
Defective control box.
Air in oil line or pump.

Lack of oil.

Defective oil pump.
Defective drive to oil pump.
Blocked or restricted nozzle.

Defective ignition relay.
Electrodes dirty or incorrectly set.
Ignition transformer defective.
Ignition leads faulty or disconnected.
Poor atomisation at nozzle.

Faulty motor or faulty motor circuit in control box.

Faulty thermostat or limit stat.

Fuse, timeswitch, electrical equipment failure.
Defective control box.
False light on photocell.

Boiler thermostat failed in closed position.

Action

Remove and clean.
Replace control box.
Purge oil line and nozzle assembly.

Check tank stock.
Check supply of oil to burner.
Renew oil pump.
Check and renew if necessary.
Renew nozzle.

Renew control box.
Clean and adjust electrodes.
Check, renew if necessary.
Check, renew if necessary.

Renew nozzle.

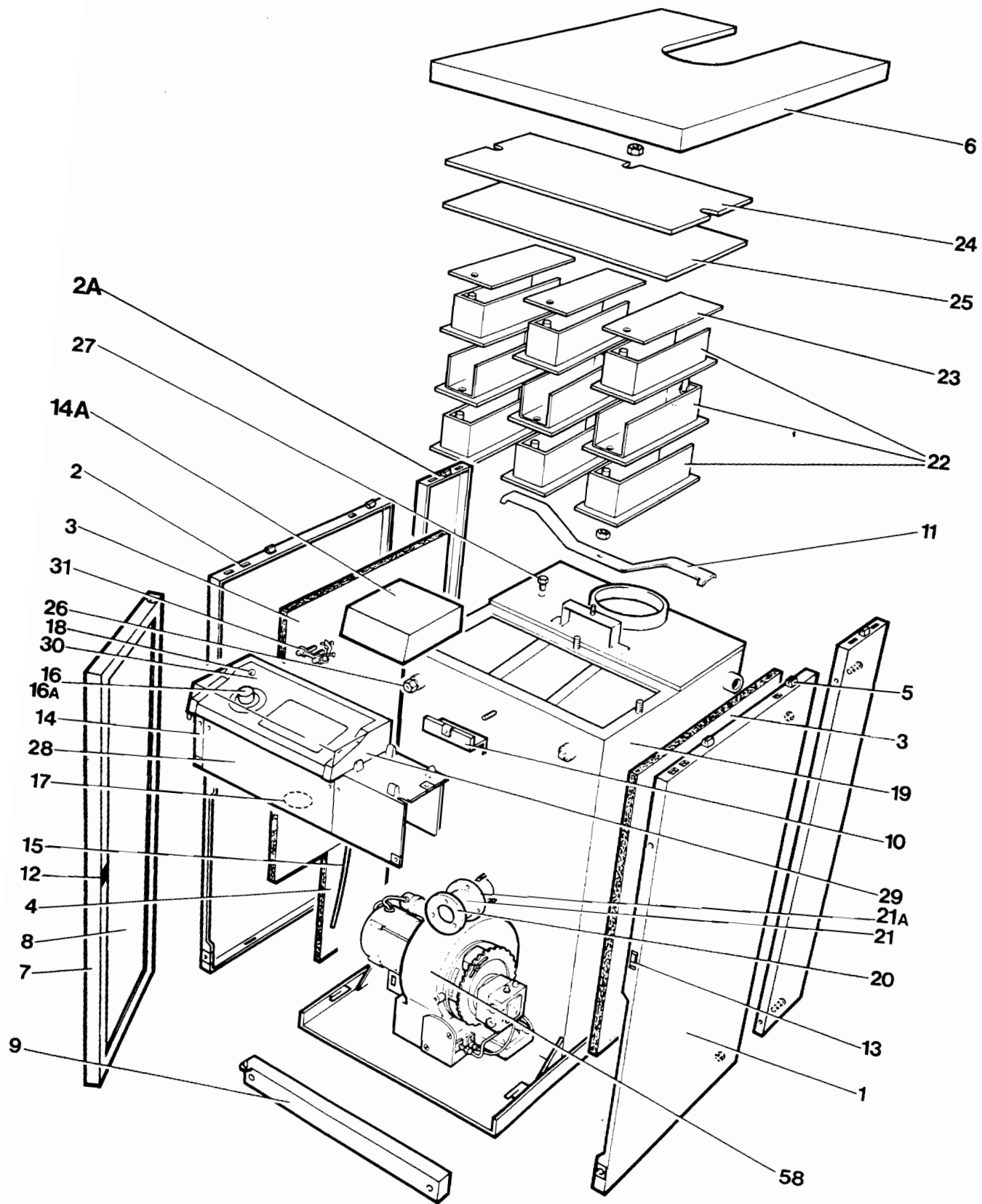
Make independent electrical connection to motor. If motor does not start, change motor. If motor starts, check control box.

Short out thermostat and limit stat in turn. If motor runs, renew thermostat or limit stat.
Check other external electrical components (fuse, etc.).
Renew control box.
Check setting of photocell.

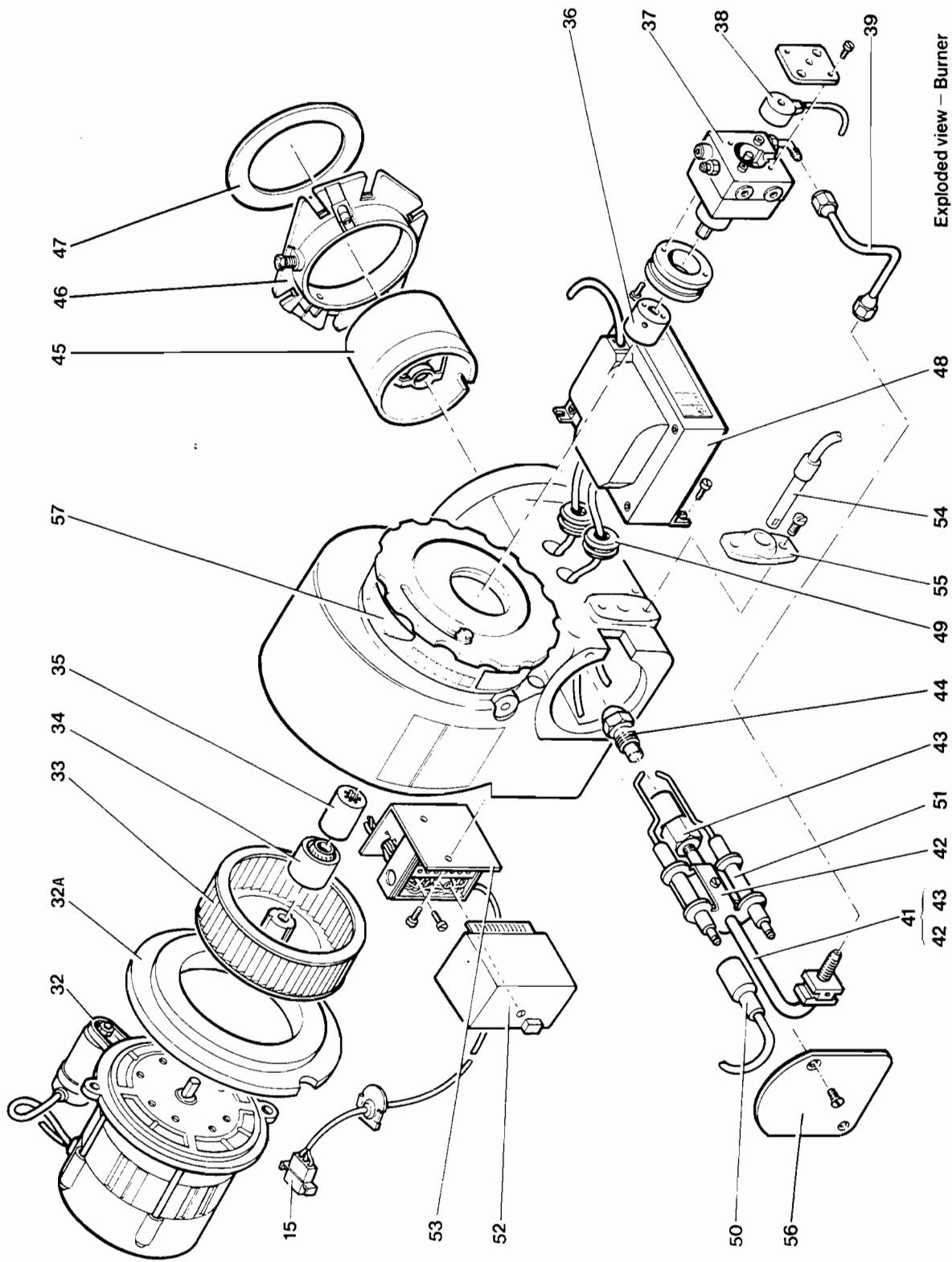
Change boiler thermostat.

Specification and Data

Heat output	kW Btu/h	27.9 95 000		35.2 120 000	
Fuel: kerosine K, gas oil G.		K	G	K	G
Flue gas temp. approx.	°C °F	210 410	210 410	235 455	235 455
Smoke No. Bacharach		0—1	0—1	0—1	0—1
CO ₂ approx.	%	11.0	11.0	11.5	11.5
Draught minimum	N/m ² in w.g.	—12.5 —0.05	—12.5 —0.05	—12.5 —0.05	—12.5 —0.05
Nozzle. 80° Monarch AR	size	0.85	0.85	1.0	1.0
Oil pump pressure	bar lb/in ²	8.4 120	7.6 110	9.8 140	8.6 125
Typical fuel flow rates	kg/h ml/min	2.6 56.0	2.5 54.0	3.3 71.0	3.2 68.5
Burner, Electro-oil	model	INTER 11 Mk II/PL1			
Electricity to be fused	amp	3 (burner only, excludes circulating pump)			
Power consumed (running, 240V)	W	150			
Weight with burner and case	kg lb	174 384			
Water content	kg lb	31 68			
Working head max.	m ft	30 100			
Hearth temperature category	°C	Below 100			



Exploded view—boiler in case



Exploded view - Burner

PANDA II 95/120 PARTS LIST

Key No.	Description	Qty.	Part No.
1	Side Cover, RH	1	507A017
2	Side Cover, LH	1	507A018
2A	Casing side extension	2	507C257
3	Insulation, RH or LH, Upper	2	507C046
4	Insulation, RH or LH, Lower	2	507C047
5	Retaining Clip	6	B53065
6	Casing Top	1	507C258
7	Casing door	1	507A114
8	Insulation, door	1	507C145
9	Plinth	1	305A089
10	Support bracket	1	507C259
11	Casing strap	1	305C226
12	Door Latch 576-0003-9-00	1	P3504
13	Door Strike 576-0001-9-00	1	P3505
14	Wiring Centre Assembly	1	508A068
14A	Casing Top Infill	1	305C248
15	Cable assembly, burner to wiring panel	1	507A021
16	Boiler thermostat	1	507S075
16A	Boiler thermostat knob	1	B53116
17	Limit thermostat	1	507S077
18	Indicator lamp	1	508S069
19	Boiler shell	1	508A030
20	Window frame	1	B53096
21	Window glass	1	B53097
21A	Window gasket	1	507C350
22	Heat exchanger box baffle	9	508A032
23	Heat exchanger top baffle plate	3	508C035
24	Flueway cover plate	1	507C251
25	Flueway gasket	1	507C277
26	Thermostat pocket	1	B53944
27	Test plug, M8 hex hd. 057-0810-0-00	1	P3506
28	Wiring Panel Assembly	1	508A066
29	Plastic Control Panel, without cover	1	508A064
30	Transparent Plastic Control Panel Cover	1	305C211
31	Cable Clamp	1	307S504
32	Burner Motor	1	P3530
32A	Motor Ring	1	P3592
33	Fan rotor	1	P3593
34	Fan dog	1	P3509
35	Drive coupling	1	P3532
36	Pump dog	1	P3511
37	Oil pump, complete with hub	1	KD4020
38	Solenoid, oil pump	1	P3529
39	Oil tube, outer c/w flare nuts	1	P3595
41	Oil tube, inner assembly, complete with Key nos. 42 and 43	1	P3596
42	Electrode block assembly	1	—
43	Nozzle holder	1	—
44A	Nozzle, Monarch 1·0 80° AR—for 120 000	1	KX9053
44B	Nozzle, Monarch 0·85 80° AR—for 95 000	1	KX9052
45	Blast tube	1	P3517
46	Flange	1	P3605
47	Gasket	1	P3606
48	Transformer	1	KD4021
49	Grommet	2	P3520
50	Ignition Lead c/w Rajah terminals	2	P3521
51	Electrode	2	P3522
52	Control box, complete with base	1	KD4003
53	Mounting bracket	1	507C089
54	Light detector	1	KD4006
55	Mounting flange	1	P3490
56	Back plate	1	508A087
57	Air Control	1	P3561
58	Burner assembly complete, 120 000	1	P3562

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OMYSON