



Leave these Instructions with the User or with the appliance

J70-90 Mk.2 WARM AIR HEATER

MODAIRFLOW and Conventional Control

Installation, Commissioning and Servicing Instructions

GC No. 42 417 70

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This appliance has been tested and certificated by British Gas for use with natural gas.

1. COMPONENTS CHECK

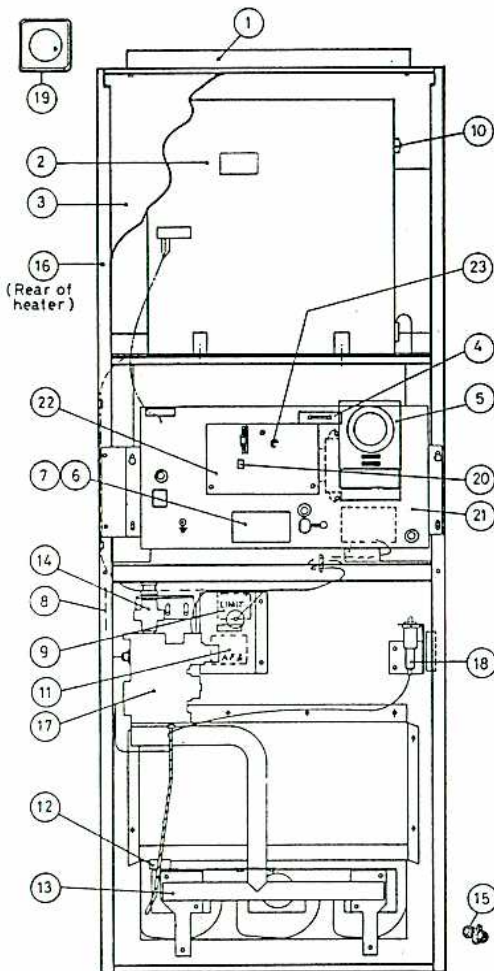


Fig. 1

1. Air filter
2. Air circulating fan
3. Fan chamber door
4. Fuse
5. Time control
6. Connection for
Thermista-stat/room thermostat
7. Terminal strip
8. Data badge
9. Overheat (limit) control
10. Secondary overheat control
11. Airflow sensor (Modairflow)
OR fan delay control (non-Modairflow)
12. Pilot burner
13. Main burner assembly
14. Gas connection
15. Gas service cock (supplied loose)
16. Draught diverter
17. Multifunctional control
18. Piezo unit
19. Thermista-stat (Modairflow only-
supplied loose)
20. Fan selector switch (Modairflow)
OR fan speed transformer tapping (non-
Modairflow)
21. Control panel (Modairflow or
non-Modairflow)

Modairflow models only:-

22. Electronics module
23. Balancing screw

JB70-90 is an open-flued, fan-assisted, downflow ducted warm air heater, which may be supplied with Modairflow controls.

A basic (non-Modairflow) control is available as an option.

Air heater output can be adjusted between 20.5kW(73.9MJ/h, 70,000Btu/h) and 26.4kW(94.9MJ/h, 90,000Btu/h).

A free-standing kit FS65/90 is available with this appliance.

THIS APPLIANCE CONFORMS TO BS800

Installation shall be in accordance with:-

Building Standards (Scotland) (Consolidation) Regulations
Building Regulations
Gas Safety (Installation and Use) Regulations (as amended)
Institute of Electrical Engineers (I.E.E.Reg)
BS6891 Installation of low pressure pipework up to 28mm(R1) in domestic premises (2nd family gases).
BS5440 Pt.1 (Flues for Gas Appliances)
BS5440 Pt.2 (Air Supply for Gas Appliances)
BS5864 Installation of Gas Fired Ducted Air Heaters
British System Design Manual "Gas Fired Warm Air Heating"
Model and Local Authority Bylaws

IMPORTANT: It is the law that all gas appliances are installed by competent persons e.g. Corgi dealers, in accordance with the Gas Safety (Installation and Use) Regulations (current edition). Failure to install appliances correctly could lead to prosecution.

2. HEATER COMPARTMENT AND CLEARANCES (See BS5864).

When the heater is fitted into a compartment, a minimum clearance from the compartment walls of 38mm(1½in) at the rear, 75mm(3in) total at the sides (with a minimum of 25mm(1in) at any one side) and 63mm(2½in) at the front must be left. Consideration should also be given to the space required for the removal and replacement of the filter tray and the entry of the gas and electrical supplies.

For service access, a minimum clearance of 700mm(27½in) is required at the front of the heater. Space must also be allowed, in a compartment installation, to permit the removal of the heater. The compartment must be of a fixed rigid structure and the internal construction must be half-hour fire resistant from internal fire; the inside lining or finishing of the enclosure must be non-combustible or a class 1 finish - see also BS476.

In airing cupboard installations, the part used as the air heater compartment must comply with the relevant section of BS5864, and must be completely separated by either a non-combustible partition or a perforated metal partition with the perforations not exceeding 13mm(½in). The secondary flue must be a tight fit where it passes through the partition and must be suitably protected (see BS5440:Part 1).

In under-stairs installations, the compartment must comply with the relevant section of BS5864, provided that, in addition, all internal surfaces, including the base, are non-combustible or lined with non-combustible material. This requirement is applicable only to dwellings of not more than two storeys.

The base duct on which the air heater stands must be placed only on a non-combustible floor. A BT64 Base Tray is available for fitting the heater directly onto combustible floors.

3. VENTILATION AND COMBUSTION AIR

The room or internal space in which the heater is installed requires a permanent air vent of minimum effective area 125cm²(19in²). The air vent should be either direct to outside air or to an adjacent room or internal space (other than a bedroom, toilet, bathroom) that itself has an equivalent air vent direct to outside.

Combustion air may be introduced via a 125mm(5in) nominal bore pipe connected to a return air duct or plenum from a ventilated area and fitted with a lockable damper. The damper should be adjusted to control combustion air flow to not less than 0.019m³/s(41cfm) i.e. 1.56m/s(310ft/min) velocity in a 125mm(5in) bore pipe. If this arrangement is used, a non-closeable warm air register **MUST** be provided in the same area as the front of the air heater or heater compartment if a return air grille is not located in that area.

When installed in a compartment, two permanent ventilation openings into the compartment are required, one at high level and one at low level, both communicating either directly with outside air or with a ventilated room or space. The minimum effective areas specified in Table 1 are related to the rated heat input of the air heater.

If any room or area from which air is drawn for ventilation or combustion contains an extractor fan, the permanent vents must be sized to ensure that the operation of the appliance(s) at full rate is not adversely affected. A spillage test as specified in Section 6.12 (Safety Checks) should be carried out and any remedial work undertaken.

TABLE 1

Ventilated from inside building	Low level grille	627cm ² (97in ²)
	High level grille	314cm ² (49in ²)
Ventilated from outside building	Low level grille	314cm ² (49in ²)
	High level grille	157cm ² (25in ²)

4. DUCT SYSTEM

(See British Design Manual - Gas fired Warm Air Heating)

4.1 Return Air

All return air must be POSITIVELY ducted from outside the compartment to the top of the unit. It is recommended that the return air duct is not routed directly from the main living area, but from a convenient central area serving the remainder of the dwelling.

The return air system should be constructed of fire-resistant material. The flue must not be run through an area serving as a return air path. It is extremely important that the correct size of return air grilles and ducting is used. For heaters on maximum output the return air duct size should not be less than 400mm x 300mm(16in x 12in). The return air grille should have a free area of not less than 2118cm²(328in²).

An adequate and unobstructed return air path is essential from areas not served by a directly ducted return and to which warm air is delivered. All such rooms should be fitted with relief grilles which have a free area of 0.0088m²/kW (1in²/250Btu/h) of heat supplied to the room. The only exceptions are kitchens, bathrooms and w.c's.

The return air plenum should allow for ease of removal for access to the flue.

All ductwork in the room or internal space in which the heater is installed must be secured, and sealed with ducting tape.

4.2 Warm Delivered Air.

All ductwork, including riser ducts, should be fully insulated with 50mm(2in) glass fibre or similar. If short extended duct runs are taken below floor level these should be similarly insulated and in addition wrapped with a sound vapour-proof barrier and protected from crushing.

The duct system should be carefully designed (as given in the guidelines in the British System Design Manual) to suit the needs of its specific heating requirements and building layout. The type of duct system, i.e. radial/extended plenum/stepped should be installed using the least number of fittings to minimise air flow resistance. The warm air plenum, which equalises the air pressure to supply ducts, must be constructed to support the weight of the heater, which must be secured to the plenum with screws on at least two sides, and sealed using self-adhesive foam strip, ducting tape or sealing compound.

5. INSTALLATION REQUIREMENTS

5.1 FLUES (see British Standards BS5440 Pt.1 Flues)

- a) All joints must be soundly sealed.
- b) The flue should be kept as short and as warm as possible.
- c) Sufficient support brackets must be installed to bear the weight of the total flue system.
- d) The spigot connection of the heater draught diverter will accept internally the spigot end of a non asbestos flue to BS567 or twin wall metal flue to BS715 of nominal 125mm(5in) diameter.
- e) A split collar should be fitted to provide for flue maintenance or inspection.
- f) The flue must be in accordance with the Building Regulations and British Gas Materials and Installations Specification (3rd edition) with regard to clearance and shielding from combustible materials.
- g) All materials must be in accordance with local Gas Region and Building Regulations requirements.
- h) The flue should run as vertically as possible and under no circumstances should there be any horizontal run. A directional change should be as gentle as possible; for every 0.3m(1ft) run of offset (measured horizontally) there must be 1m(3ft) of vertical flue.
- i) Special consideration must be given to external flues with a view to prevention of condensation and weathering problems.
- j) An approved terminal should always be used; a ridge terminal or 'GC1' terminal is specifically recommended. The latter should be positioned in a free air space where it is not shielded by any structure. A minimum of 1m(3ft) from any vertical or inclined roof structure must be allowed for.
- k) Where flue blocks are used, builders should ensure that no obstruction is created during erection. The installer should ensure that the connection flue does not project beyond the internal wall of the flue blocks and that there is provision for examination and servicing.

IMPORTANT: Before installing the appliance, check the flue performance in accordance with BS5440 Part 1 as follows:-

- a) Close all doors and windows in the room in which the appliance is to be installed.
- b) Introduce some heat into the flue, using a blow torch or other means.
- c) Carry out a flow visualisation check with a smoke pellet at the intended position for the appliance. Ensure that there is no discharge of smoke from the correct terminal only, and no spillage into the room.

Smoke coming out of other than the correct terminal only, or a downdraught or 'no flow' condition, indicates that the flue has failed the test, and the appliance shall not be connected until the defect has been found and rectified, and the test satisfactorily completed.

5.2 ELECTRICAL

Mains.

The heater is supplied with mains cable (PVC sheathed, heat resisting (85°C), 3-core Brown-Blue-Green/Yellow, 5A, 0.75mm²), connected to a terminal block and exiting through the heater at either side. The cable is suitable for a 240V 50Hz single phase supply and must be protected by a 3A fuse and an earth wire must be connected. A double pole switch or fused spur box should be used. All wiring must be to IEE regulations.

Facility is provided to switch electrically an external Johnson & Starley water heater (not Janus). See Fig.5a) and b) for connection details. Note: To use this facility on a non-Modairflow heater, it is necessary to fit a relay. Order Johnson & Starley Part No. 1000-0500910.

A Thermista-stat is provided with all Modairflow models; this acts as a room thermostat.

For non-Modairflow models, a 24V Room Thermostat, which complies with BS800, BS3955 and BS4201 must be supplied and is essential to ensure close control of comfort conditions. An anticipator is located within the thermostat and is graded in amps. The amp reading should correspond with that of the multifunctional control, i.e. 0.2A. The anticipator should be checked and adjusted as necessary.

Thermista-stat/room thermostat and its location.

- a) The Thermista-stat/room thermostat should be located where there is free air circulation approx. 1.5m(5ft.) from the floor.
- b) Avoid the following locations:-
 - i) In a room where temperature is greatly affected by the sun, any other heat source, e.g. radiant fire, wall light fittings or TV set.
 - ii) Near an outside door or windows, or on an outside wall.
 - iii) Where affected by warm air ducts, diffusers, waste pipes or the heater itself.
 - iv) Where subject to vibration.

For Modairflow units, connect the Thermista-stat wires to terminals numbered 4 and 5 on the control panel (see Fig.5a). When connecting the Thermista-stat, correct polarity must be observed i.e. + side on control panel to + side on Thermista-stat.

For conventional (non-Modairflow) controls, connect the room thermostat wires to terminals numbered 16 and 17 on the control panel (see Fig.5b).

5.3 GAS (See BS5864 and BS6891)

An independent gas supply pipe from the meter is to be preferred wherever possible. However, when this is not possible, the pipe must be capable of taking the complete input of the heater and all other gas appliances being served by this same pipe. This supply should be suitably sized to conform to British Standards requirements of no more than 1.0mbar(0.4in wg) pressure drop (See table of discharge in BS6891).

The ½in union gas cock (supplied loose) must be fitted in the gas inlet of the heater for easy isolation during servicing. The gas pipe should be so fitted and installed as to be durable, substantial and gas tight. Gas entry to the air heater is through either side to a Rc½ (½ BSP external (taper) thread).

6. COMMISSIONING

- 6.1 Ensure that gas and electrical supplies are off.
- 6.2 Test for soundness and purge the whole gas pipe as described in BS6891. To assist in determining where a gas connection may not be tight, a leak detection fluid should be brushed around the connection. Under no circumstances should a flame be used to locate a gas leak.
- 6.3 Make sure that the filter, fan and fan chamber are free of obstructions.
- 6.4 Check that all of the registers or grilles are open and conform to design specifications.
- 6.5 Check that return air, relief air and ventilation air installation is adequate.
- 6.6 Check that both the fan delay and overheat (limit) controls are set correctly. (Remove the cover from the fan control by removing the two securing screws.)

Non-Modairflow models only: Fan delay control setting is 100° OFF, 20° Diff..

Overheat (limit) control setting is 190°F and must NOT be adjusted.

- 6.7 With the fan chamber door and air filter removed:-
Modairflow models: Set the fan selector switch to CONTINUOUS and turn the balancing screw fully clockwise (maximum speed).
Non-Modairflow models: Set the fan speed transformer tapping to a number appropriate to the desired heater output, e.g. for maximum output set plug to number 5.
- 6.8 Replace the fan chamber door and filter, then test the pilot connection for soundness and light the pilot as follows:-
 - 6.8.1 Test the pilot connection for soundness thus:-
 - a) Disconnect the igniter connection at the piezo unit, and the two electrical connections to the multi-functional control.
 - b) Disconnect the pipe union at the multi-functional control inlet, remove the two screws securing the burner tees and remove the burner assembly.
 - c) Reconnect the burner outside the combustion chamber to give access to the pilot connection.
 - d) Reconnect the igniter to the piezo unit, then turn on the gas supply (**not the electrical supply**).
 - e) Light the pilot burner as described in 6.8.2 d) and e) below and test the pilot gas connection for soundness, using a proprietary leak detection fluid.
 - f) If any leakage occurs, turn off the gas, remove the piezo electrode and, if necessary, the thermocouple. Seal the leak, refit the thermocouple and electrode and repeat from e).
 - g) Refit the burner assembly into the combustion chamber.
 - 6.8.2 Light the pilot burner thus:-
 - a) Turn the Thermista-stat/room thermostat to the lowest or OFF setting.
 - b) Remove the cover from the adjustment point on the multi-functional control (see Fig.3), release the pressure test point screw and attach a pressure test gauge.
 - c) Ensure that the gas supply to the heater is turned on.

WARNING:- If the pilot light is extinguished either intentionally or unintentionally no attempt should be made to relight the gas until at least 3 mins. has elapsed. Ensure electrical supply is OFF, that the time control is in an OFF position and that the selector switch is in the OFF position.

d) Push the START BUTTON (marked with the flame symbol) on the multi-functional control (see Fig.3) fully in and hold it in. Repeatedly push and release the lighting button until the pilot is alight. N.B. If the piezo unit should fail to spark, the pilot burner may be lit by applying a lighted taper to the pilot whilst the START BUTTON is pushed in.

e) After 20 seconds release the START button and let it spring out. The pilot should remain alight; if it does not, twist the START BUTTON clockwise as indicated by the arrow (about ¼ turn) and wait three minutes before repeating from step d).

f) Adjust the pilot flame if necessary, (a low energy pilot is fitted, which requires the pilot adjustment screw to be screwed four full turns anti-clockwise from closed (see Figs.2 and 3)).

g) When the pilot is alight, switch on the mains electrical supply to the heater. Set the time control to the required 'Heating On' periods and set the selector switch to the 'Timed' position. Adjust the Thermista-stat or room thermostat to maximum; the main burner will now operate.

h) Using a proprietary leak detection fluid, test for gas soundness the supplies and connections from the multifunctional control to the pilot and main burners. Seal any leakages after turning off the heater.

6.9 Allow the heater to operate for 15 min., then adjust the burner pressure to the output required (see Fig. 3 and Table 2).

NOTE: Heaters are factory set to a burner setting pressure giving high rate output i.e. 26.4kW(90,000Btu/h) at 10.6mbar(4.2in wg).

To adjust the burner pressure, remove the cover from the gas pressure adjusting point (see Fig.3) and turn the flow rate screw clockwise to increase, anti-clockwise to decrease.

Fix the pressure set arrow under the appropriate column on the data badge.

Turn off the heater before removing the pressure test gauge and re-tightening the pressure test point screw. Replace the cover on the adjustment point.

6.10 Balance the warm air system as follows:-

Light the main burner and leave it to operate for at least 15 minutes. With the fan chamber door in place, check that the temperature rise across the heater is 45°-55°C. Adjust the fan speed if necessary; increase speed to reduce temperature rise, decrease speed to increase temperature rise.

On Modairflow units, maximum fan speed is increased by adjusting the balancing screw clockwise.

On non-Modairflow units, the fan speed is altered by changing the fan speed transformer tapping (Fig.1, Item 20) on the control panel, (see Fig.4 for fan performance curves). Maximum speed is at Setting 5.

Balance the system to give the required volume proportions at the warm air outlets.

Modairflow units only: Set the fan selector switch to 'Auto', or to 'Ventilation' if a permanent supply of ventilation air is required (when air heater time control is ON only).

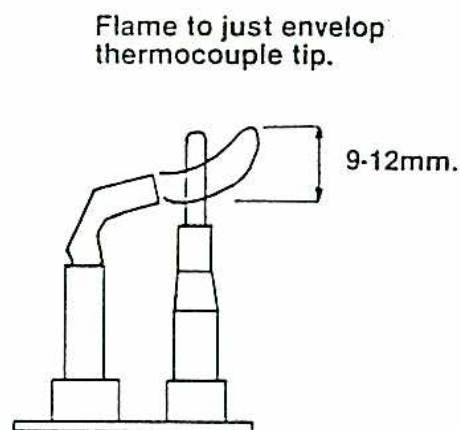


Fig. 2 Pilot flame adjustment

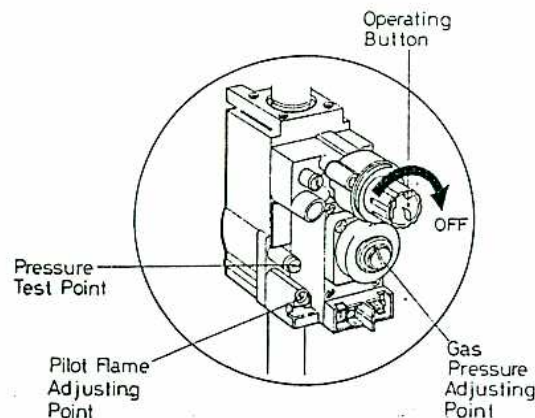


Fig. 3 Multifunctional Control

NOTE: If the system includes ceiling diffusers, it is important that the velocities of air through these (except in very small rooms like bathrooms etc.) are at least 1.5m/s(300ft/min). To achieve this, it may be necessary to blank off part of the outlet face.

6.11 Automatic controls check - lighting the heater and allowing it to run for a short time checks these controls.

a) Modairflow controls:-

With the time control on, turn the Thermosta-stat control knob slowly clockwise until the main burner ignites. Shortly afterwards the fan will start at a low speed and gradually build up to top speed. When room temperature is under control, the main burner will cycle on and off at approximately 1 ¼ to 2 minute intervals. The fan will run continuously at lower speeds.

b) Non-Modairflow controls:-

With the time control on, increase the room thermostat setting slowly until the main burner ignites. Shortly afterwards the fan will start. When room temperature is under control the main burner will switch off, followed shortly afterwards by the fan. After the room temperature has fallen slightly the burner will re-ignite, followed by fan operation.

6.12 Safety checks

Check the 'fail safe' section of the multi-functional control by turning off the gas at the gas service cock and checking that the control fails safe (loud click heard from control) within 60 seconds.

Check the overheat (limit) control by operating the heater with the main burner alight and the fan disconnected - the main burner must extinguish within 2-3 minutes. To disconnect the fan, turn off the electrical supply, remove the fan chamber door and unplug the fan connection from the socket on the electrical control panel.

With heating system on:-

Check for gas soundness within the appliance.

Check that the flue operates effectively with heating system on, all doors closed and extractor fans, if fitted, running, then, after connection to the flue system, follow the lighting procedure and run the appliance for twenty minutes to preheat the flue. Use the following procedure to test for spillage:-

a) **If the draught diverter is accessible**, introduce smoke, e.g. by means of a puffer or smoke match, into the draught diverter. Spillage is indicated by displacement of smoke downwards and out of the draught diverter.

b) **If access to the draught diverter is not possible, or if it is not visible**, insert a lighted smoke pellet, or part of a pellet, on a non-combustible support into, but not in contact with, the heat exchanger. Turn off the appliance. Spillage is indicated by the discharge of smoke from the draught diverter. In a compartment this would be indicated by the presence of smoke within the compartment.

c) In the case of a fan in an adjoining or adjacent room, the spillage test procedure must be carried out with interconnecting doors open.

Check the flue performance at the draught diverter within 5 min of lighting. There shall be no spillage.

If spillage occurs leave the appliance operating for a further 10 min and then recheck. If there is still spillage switch off the fan, disconnect the appliance and rectify the fault.

The appliance shall not be left connected to the gas supply unless it has successfully passed the above spillage tests.

TABLE 2

	Low Rate			Low medium rate			High medium rate			High rate		
	kW	MJ/h	Btu/h	kW	MJ/h	Btu/h	kW	MJ/h	Btu/h	kW	MJ/h	Btu/h
Input	28.1	101.0	95,760	30.5	109.8	104,050	32.8	118.2	112,000	34.8	125.2	118,750
Output	20.5	73.9	70,000	22.6	81.2	77,000	24.6	88.6	84,000	26.4	94.9	90,000
Gas Rate (1037cv)	2.62m ³ /h(92.3ft ³ /h)			2.84m ³ /h(100.3ft ³ /h)			3.06m ³ /h(108.0ft ³ /h)			3.24m ³ /h(114.5ft ³ /h)		
BURNER PRESSURES (measured hot)												
	6.8 mbar (2.7in.w.g.)			8.0mbar (3.2in.w.g.)			9.5mbar (3.8in.w.g.)			10.5mbar (4.2in.w.g.)		

Main injector: 23/1000

Pilot Injector: HONEYWELL Type 38/36A

Gas: G20 Natural

Gas supply pressure: 20mbar

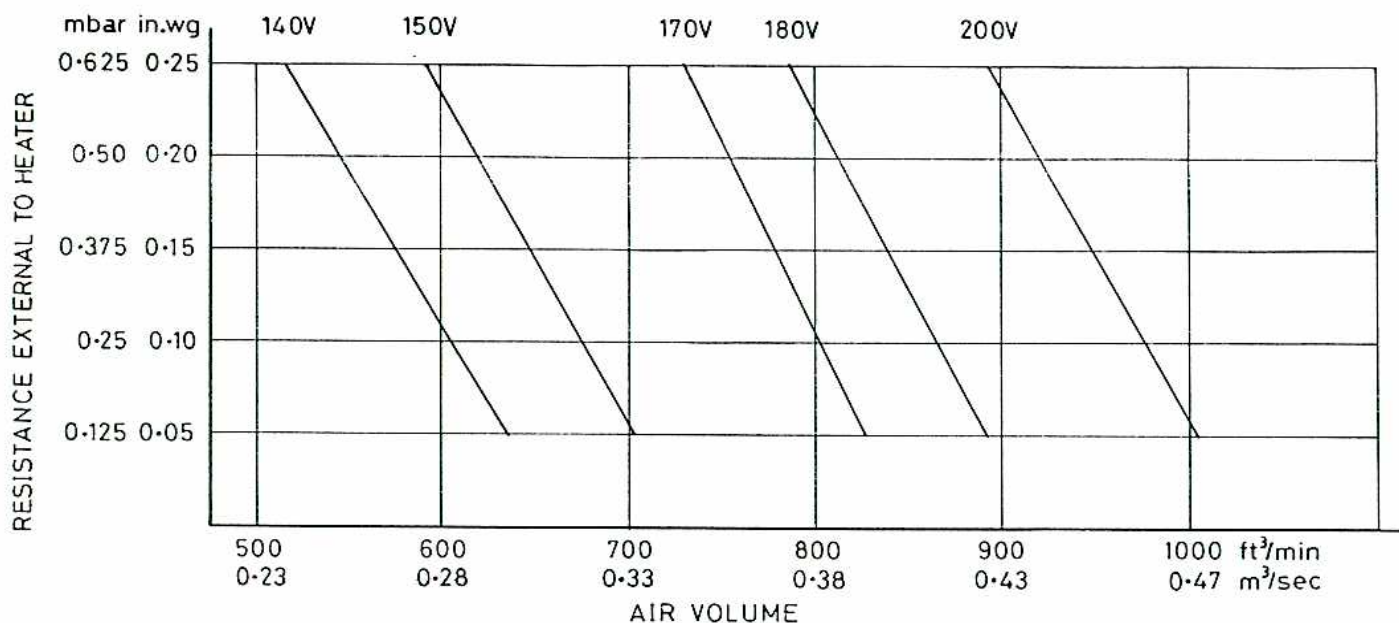


Fig. 4 Fan Performance Range

7. INSTRUCTIONS FOR USER

If the building is unoccupied, ensure that the User Instructions are left at or near the meter for the User. Leave also these Installation Instructions at or near the meter for use on future service calls.

If the building is occupied, hand the User Instructions over and make sure the User knows:-

- a) How to light the pilot burner.
- b) How to operate the Thermista-stat/room thermostat, time and heater ON/OFF switch and summer air circulation switch. Also that the User knows that, after a power failure, the time control must be reset.
- c) How to turn off the pilot and main burner at the gas control, and switch off the electrical supply to the heater.
- d) How to remove, clean and refit the air filter and at what intervals i.e. fortnightly, or, for new houses, weekly.
- e) How to control the heating system by opening and closing warm air outlets.
- f) That the air grilles on the heater or heater compartment, or any grilles or ventilators in the walls, windows and doors of the building must not be obstructed.
- g) That the heater must be serviced at least once a year by a competent person to ensure efficient and safe operation.
- h) That the red instructions for safe use have been pointed out and understood.

8. SERVICING (Refer to Fig.1 for parts layout)

IMPORTANT: Before commencing any servicing or exchange of components, always turn off the gas supply and isolate the electricity supply. After completing any service work, always test for gas soundness.

Operate the appliance and check for correct function of the burner and controls.

Remove the burner and controls assembly, inspect and clear the main burners and injectors as necessary. Examine the main burners for cracks, including hairline cracks, at the burner ports and exchange burners if necessary.

Inspect and clear the pilot burner and injector as necessary.

Check the condition of the thermocouple and spark electrode/leads. Clean or replace as necessary.

Inspect the heat exchanger flueways. Clean by brushing thoroughly from above and below.

Reassemble all items in reverse order and carry out the recommissioning procedure as detailed in Section 6.

Test for gas soundness and check that the appliance and controls are functioning correctly. Finally ensure that the flue products are clearing satisfactorily.

8. SERVICING (cont.)

- 8.1 Removal of burner assembly:-
Remove the lower louvre door.
Remove the electrical connections from the multi-functional control, and the electrode lead from the piezo unit.
Disconnect the union at the input side of the multifunctional control. Remove the two burner assembly fixing screws from the manifold assembly and withdraw the burner.
- 8.2 For access to control panel, fuse, time control and air circulating fan:-
Remove the air filter, remove the two screws at the bottom of the fan chamber door and lift the door to remove.
- 8.3 Main burner cleaning - with burner assembly removed (see 8.1):-
Unscrew the two pilot burner securing screws and disconnect the pilot assembly from the main burner.
Unscrew the three screws securing the manifold assembly to the burner assembly and remove.
Unscrew the two screws from each burner and remove the venturi tubes.
Brush lightly both inside and out. Under no circumstances should the burner holes be enlarged, distorted or brushed strongly.
- 8.4 To remove pilot injector and piezo electrode:-
With burner assembly removed (see 8.1),
Disconnect the thermocouple lead from the pilot assembly.
Disconnect the electrode lead from the piezo electrode, lift the electrode retaining clip (with a small screwdriver) whilst withdrawing the electrode manually.
Disconnect the pilot tube from the pilot assembly. Remove the pilot injector by lightly tapping the side of the pilot assembly - the injector should drop out. Before reassembling, ensure that the electrode retaining clip is correctly located. Ensure that the gap between the spark electrode and burner tip is 3.0mm approx. After servicing, check for correct pilot flame length and adjust if necessary (see Fig.2 and Item 6.8f) in Section 6).
- 8.5 To remove thermocouple:-
With burner assembly removed (see 8.1),
Remove the electrode lead from the pilot tube and thermocouple lead, and disconnect the thermocouple from the multi-functional control.
Disconnect the thermocouple from the pilot assembly and withdraw it.
When replacing, ensure that the thermocouple connection to the multi-functional control is tight (quarter turn past finger tight), and that there are no sharp bends in the thermocouple lead.
- 8.6 To remove multi-functional control:-
With burner assembly removed (see 8.1),
Disconnect the inlet pipe and remove.
Disconnect the thermocouple and pilot burner supply tube.
Unscrew the four screws securing the manifold assembly and remove the multi-functional control. (Make sure that the sealing ring is retained).
Before refitting, check that the sealing ring is in good condition, and replace if necessary.
- 8.7 To remove piezo unit:-
Disconnect the electrode lead(s) from the unit.
Unscrew and remove the two screws securing the piezo unit bracket to the bulkhead.
Remove the bracket and turn it upside down. Undo the piezo unit fixing nut with a large spanner and remove the unit.
- 8.8 To remove pilot burner:-
With burner assembly removed (see 8.1),
Disconnect the thermocouple and pilot supply tube from the multi-functional control.
Remove the electrode lead from the pilot tube and thermocouple lead.
Disconnect the thermocouple lead; lift the electrode retaining clip (with a small screwdriver) whilst withdrawing the piezo electrode; disconnect the pilot tube from the pilot burner
NOTE: Be careful not to lose or damage the pilot injector or electrode retaining clip.
Unscrew the two securing screws and remove the pilot burner.
Reassembly is the reverse of the above procedure. After reassembly, check that the gap between the spark electrode and the burner tip is 3.0mm approx.
- 8.9 Gas Pressure check (see Fig.3 and Table 2):-
Attach a gas pressure gauge to the burner setting pressure test point on the multi-functional control (see Fig.3). Light the heater, check the pressure and confirm by a gas rate check at the meter. Adjust, if necessary, at the gas pressure adjusting point after removing the cap. Turn clockwise to increase burner pressure and vice versa.

8. SERVICING (cont.)

8.10 Control panel removal:-

Ensure that the mains supply is off.

Remove the fan chamber door (see 8.2).

8.10.1 Modairflow models:-

Disconnect the fan connections at the terminal block on the front of the fan.

Disconnect the mains lead, water heater lead, (if fitted) and Thermista-stat connections from the terminal block below the electronics module. Release the clamp retaining the mains lead.

Disconnect the wires from the airflow sensor, overheat (limit) control, secondary overheat control (at inlet to terminal block on side of fan) and multi-functional control.

Unscrew the four securing screws and remove the control panel assembly.

8.10.2 Non-Modairflow models:-

Disconnect the connections to the mains lead, fan delay control, secondary overheat control, multi-functional control and overheat (limit) control (terminals 1-12). Release the clamp retaining the mains lead.

Disconnect the connections to the fan, water heater (if fitted) and room thermostat (terminals 13-20).

Unscrew the four screws and remove the control panel assembly.

Note: If the panel is to be replaced, remove the time control (see 8.13) and harness.

8.11 Electronics module removal - Modairflow model only:-

Ensure that the mains supply is off.

Remove the fan chamber door (see 8.2).

Unscrew the three securing screws and release the electronics module.

Disconnect fittings 'C' and 'D' (see Fig.5a) from the electronics module.

8.12 Air circulating fan removal and cleaning:-

Ensure that the mains supply is off.

Remove the fan chamber door (see 8.2).

Disconnect the two overheat (limit) control leads at the terminal block on the side of the fan.

Disconnect the fan input leads at the terminal block on the front of the fan.

Remove the two fan retaining screws.

Handling with care, withdraw the fan assembly. Remove all dust from both impeller and motor, taking care not to disturb the balance of the fan.

To replace, reverse the above procedure.

8.13 Removal of time control:-

Ensure that the mains supply is off.

Remove the fan chamber door (see 8.2).

Unscrew the fixing screw in the bottom of the time control assembly and carefully lift the assembly off its mounting bracket.

Disconnect the wiring harness from the terminal block in the rear of the time control.

8.13.1 To replace time control:-

Remake the electrical connections, locate the top rear flange of the clock assembly over the top edge of the mounting plate and press down firmly.

Press in the bottom edge of the clock assembly and secure with the fixing screw.

8.14 To replace the transformer (Modairflow models only):-

Ensure that the electrical supply is off.

Remove the fan chamber door (see 8.2).

Remove the four screws securing the control panel and turn the panel over to give access to the transformer at the rear of the panel.

Disconnect the wires from the terminal block on the rear of the panel.

Remove the two retaining screws on the transformer.

Remove the transformer and shroud.

To replace, reverse the above procedure.

Note: On non-Modairflow models it is necessary to replace the control panel (see 8.10) if the transformer fails.

8. SERVICING (cont.)

8.15 Heat Exchanger Access (N.B. new access cap gaskets are required for re-assembly):-

Ensure that gas and electrical supplies are turned off.

Remove the burner assembly, air filter, fan chamber door and control panel (see 8.1, 8.2 and 8.10).

Remove the six screws securing the access cover on the front bulkhead and remove the cover.

Remove the four screws securing each access cap at the top front of the heat exchanger, and remove the access caps together with their gaskets.

Remove the heat exchange baffles.

The heat exchanger can now be inspected and brushed through.

IMPORTANT: When reassembling, ensure that the baffles are pushed fully home. Fit new gaskets to the access caps and ensure that the caps are sealed soundly.

Recommission the heater, carrying out checks as detailed in Section 6. In the event of heat exchanger or burner replacement being necessary, contact Johnson and Starley Service Department.

8.16 Relay replacement (non-Modairflow models with external water heater only):-

With the electrical supply turned off and the fan chamber door removed (see 8.2),

Unplug the relay and fit a replacement. Use only Johnson and Starley Part Number 1000-0500910.

8.17 Airflow sensor (Modairflow models only), fan control (non-Modairflow models only) and overheat (limit) control replacement:-

With the electrical supply turned off and the bottom door removed,

Remove the fan control cover.

Remove the electrical connections to the control/sensor.

Remove the two securing screws and withdraw the control/sensor.

8.18 Secondary overheat control replacement:-

With the electrical supply turned off and the fan chamber door removed (see 8.2),

Partially withdraw the air circulating fan (see 8.10) to gain access to the control.

Remove the electrical connections to the control, release the two securing bolts and remove the control.

8.19 Fan capacitor replacement:-

With the electrical supply turned off and the fan chamber door removed (see 8.2),

Disconnect the capacitor connections to the terminal block on the fan, and release the capacitor from its retaining clip.

9. FAULT FINDING

IMPORTANT: If an electrical fault occurs after installation of the appliance, preliminary earth continuity, polarity, and resistance to earth checks should be carried out with a multimeter. On completion of any service/fault-finding task which has required the breaking and remaking of electrical connections, then checks of continuity, polarity, and resistance to earth must be repeated.

NOTE: When purging or checking gas supplies, ensure that there is adequate ventilation to the room or cupboard, and all naked lights are extinguished.

MODAIRFLOW Models only: See pages 14 & 15 for fault diagnostic chart.

Before commencing fault finding, turn the Thermista-stat to maximum setting, turn the mains supply on and check that the time control is at an ON position.

Care must be taken during replacement and handling of electronic assemblies, viz. electronics module, airflow sensor and Thermista-stat. It is not practical to rectify any faults in these assemblies except in the factory, and any attempt to do so may render any guarantee or factory replacement arrangement void.

SYMPTOM	POSSIBLE CAUSE	REMEDY
(a) Pilot will not light.	(i) No gas supply to heater.	Check for gas at inlet pressure test point on multi-functional control.
	(ii) Gas supply pipe not purged.	Purge gas supply pipe in accordance with BS6891.
	(iii) Pilot orifice restricted.	Clean pilot injector orifice carefully, or replace injector.
	(iv) Piezo system faulty.	Check/replace piezo unit, lead or electrode.

9. FAULT FINDING (cont.)

SYMPTOM	POSSIBLE CAUSE	REMEDY
(b) Pilot lights but goes out on releasing START button during initial light-up, or after normal operation.	(i) Connection between thermocouple and multi-functional control not secure. (ii) Faulty power unit on multi-functional control. (iii) Faulty thermocouple. (iv) Pilot flame too small. (v) Pilot orifice restricted.	Check connection is secure. Replace multi-functional control. Replace thermocouple. Adjust. Clean pilot injector orifice carefully or replace injector.
(c) Main burner lights but fan fails to run after approx. 3 min.	(i) Loose electrical connection on fan control. (ii) Fan control settings incorrect. (iii) Faulty fan assembly. (iv) Faulty fan control. (v) Burner setting pressure not correct.	Check connections for soundness. Check settings. Replace, taking care not to damage impeller. Replace. Adjust pressure as necessary.
(d) Main burner operating intermittently with fan running.	(i) Gas rate or burner pressure setting high. (ii) Temperature rise excessive. (iii) Air filter or return air path restricted. (iv) Excessive number of outlets closed.	Check gas rate and burner pressure setting. Adjust fan speed or gas rate accordingly. Check filter is clean and air path is clear. Open additional outlets.
(e) Main burner operating with intermittent fan operation.	(i) Gas rate or burner (ii) Fan control settings incorrect.	Check gas rate and burner pressure pressure setting. Check settings.
(f) Fan runs for excessive period or operates intermittently after main burner shuts down.	Fan control settings incorrect.	Check settings.
(g) Noisy operation.	(i) Gas pressure too high. (ii) Noisy fan motor. (iii) Fan speed setting too high.	Check burner pressure setting. Replace fan. Adjust fan speed.
Modairflow Control Heaters only:-		
(h) Incorrect operation of fan or main burner.	(i) Fault related to Modairflow control system.	Consult diagnostic chart and follow recommended procedure.
Non-Modairflow Control Heaters only:-		
(j) Pilot alight but main burner not igniting.	(i) Mains electrical supply not connected to heater. (ii) Controls not calling for heat. (iii) 3A fuse failed. (iv) Loose connection on room thermostat, overheat control, secondary overheat control, gas control lead, time control, or transformer.	Check mains supply. Check that time control (if fitted) and room thermostat are operating correctly. Replace. If failure occurs again, check external room thermostat leads for short to earth. Check connections for soundness.

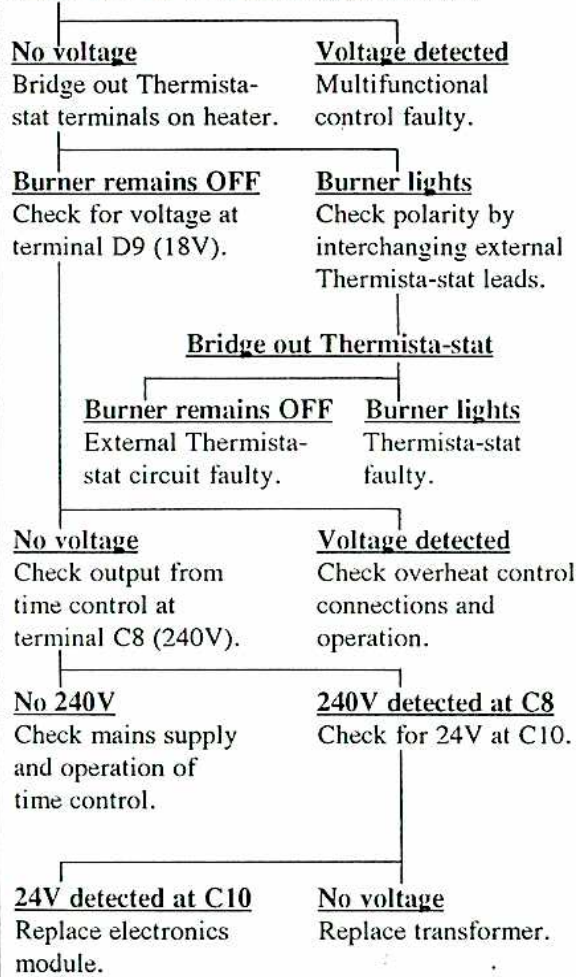
9. FAULT FINDING (cont.)

SYMPTOM	POSSIBLE CAUSE	REMEDY
(j) Pilot alight but main burner not lighting.	(v) Transformer open circuit.	Check with test meter and replace electrical panel if necessary.
	(vi) Multi-functional control faulty.	Replace multi-functional control.
	(vii) Multi-functional control governor faulty.	Replace multi-functional control.
	(viii) Overheat control faulty.	Short across control and replace if necessary.
	(ix) Secondary overheat control faulty.	Short across control and replace if necessary.
	(x) Room thermostat or external wiring faulty.	Fit temporary loop in heater thermostat socket. If heater fires, external circuit or room thermostat is faulty.

MODAIRFLOW SERIES 2 OPERATIONAL CHECKS

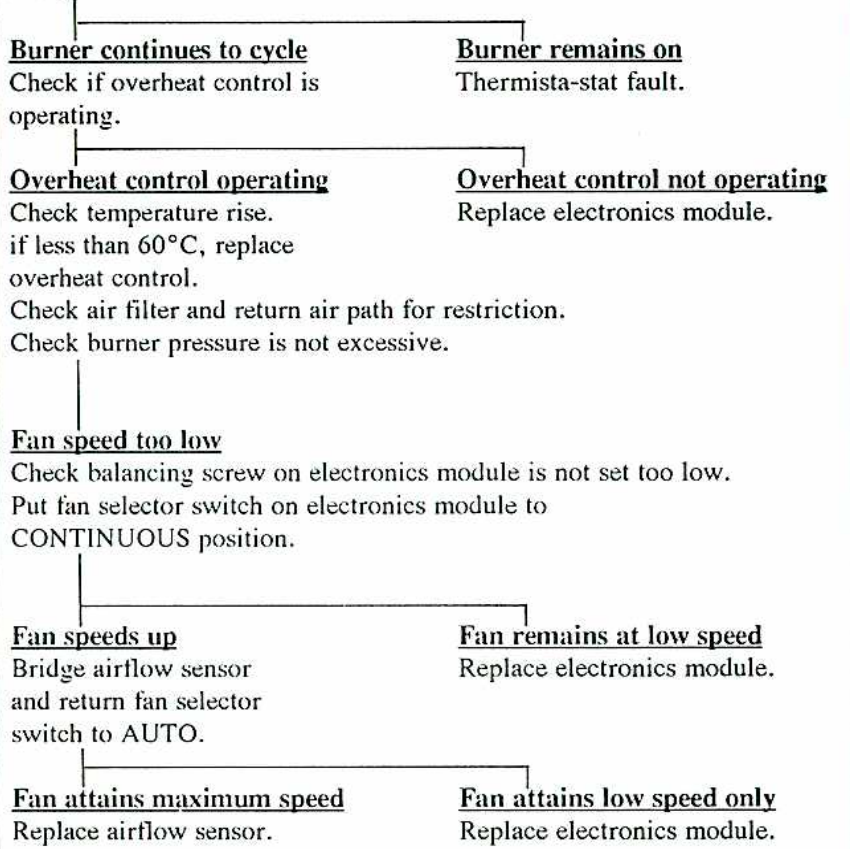
MAIN BURNER NOT OPERATING

Check pilot burner is lit, time control is on and Thermista-stat turned up.
 Check mains electrical supply.
 Check fuses on electronic panel.
 Check for 24V at multifunctional control.



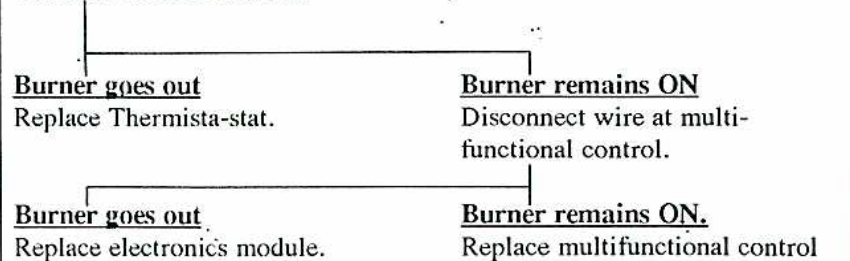
FAN ON, BUT BURNER CYCLING BEFORE DESIRED ROOM TEMPERATURE REACHED

Bridge out Thermista-stat.



MAIN BURNER NOT CYCLING (ROOM TEMPERATURE TOO HIGH)

Disconnect Thermista-stat.



MODAIRFLOW SERIES 2 OPERATIONAL CHECKS (cont.)

MAIN BURNER ON, BUT FAN NOT OPERATING

Check for voltage across pink lead at fan and any blue neutral wire.

No voltage

Bridge air flow sensor.

Voltage detected

Fan motor faulty.

Fan starts

Replace airflow sensor.

Fan fails to start

Check for voltage between pink and earth wires.

No voltage

Replace fuse or transformer.

Voltage detected

Replace electronics module.

FAN CONTINUES TO RUN OR CYCLES AFTER HEATING TURNED OFF

Check fan selector switch on electronics module.

If it is set to 'ventilation', fan will run continuously at low speed.

Check that fan selector switch is set to AUTO and Summer air circulation switch is OFF.

Disconnect airflow sensor.

Fan stops

Check that pilot flame is not too large.

Replace airflow sensor.

Fan continues to run

Replace electronics module.

MAIN BURNER FIRES FOR BRIEF PERIOD ONLY

Check Thermista-stat control knob is on maximum setting. Bridge out Thermista-stat socket or connections at heater.

Burner lights and remains on

Reconnect Thermista-stat at heater.

Check polarity by interchanging external Thermista-stat leads.

Bridge out Thermista-stat leads at Thermista-stat.

Burner does not remain on

Replace electronics module.

Burner remains on

Thermista-stat faulty.

Burner does not remain on

Break in external circuit to Thermista-stat.

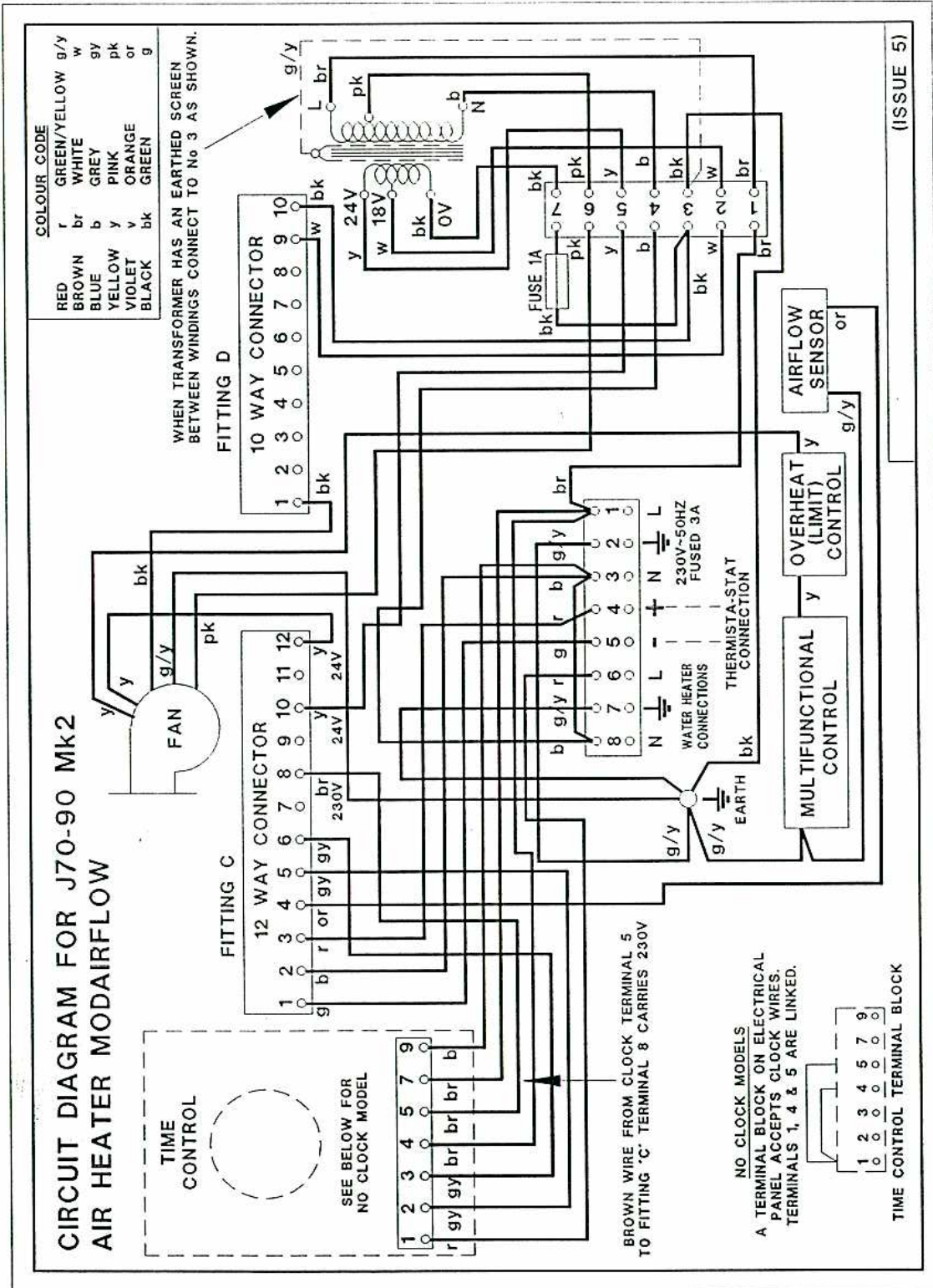


Fig. 5a Circuit Diagram - J70-90 Mk.2 Air Heater with Modairflow control

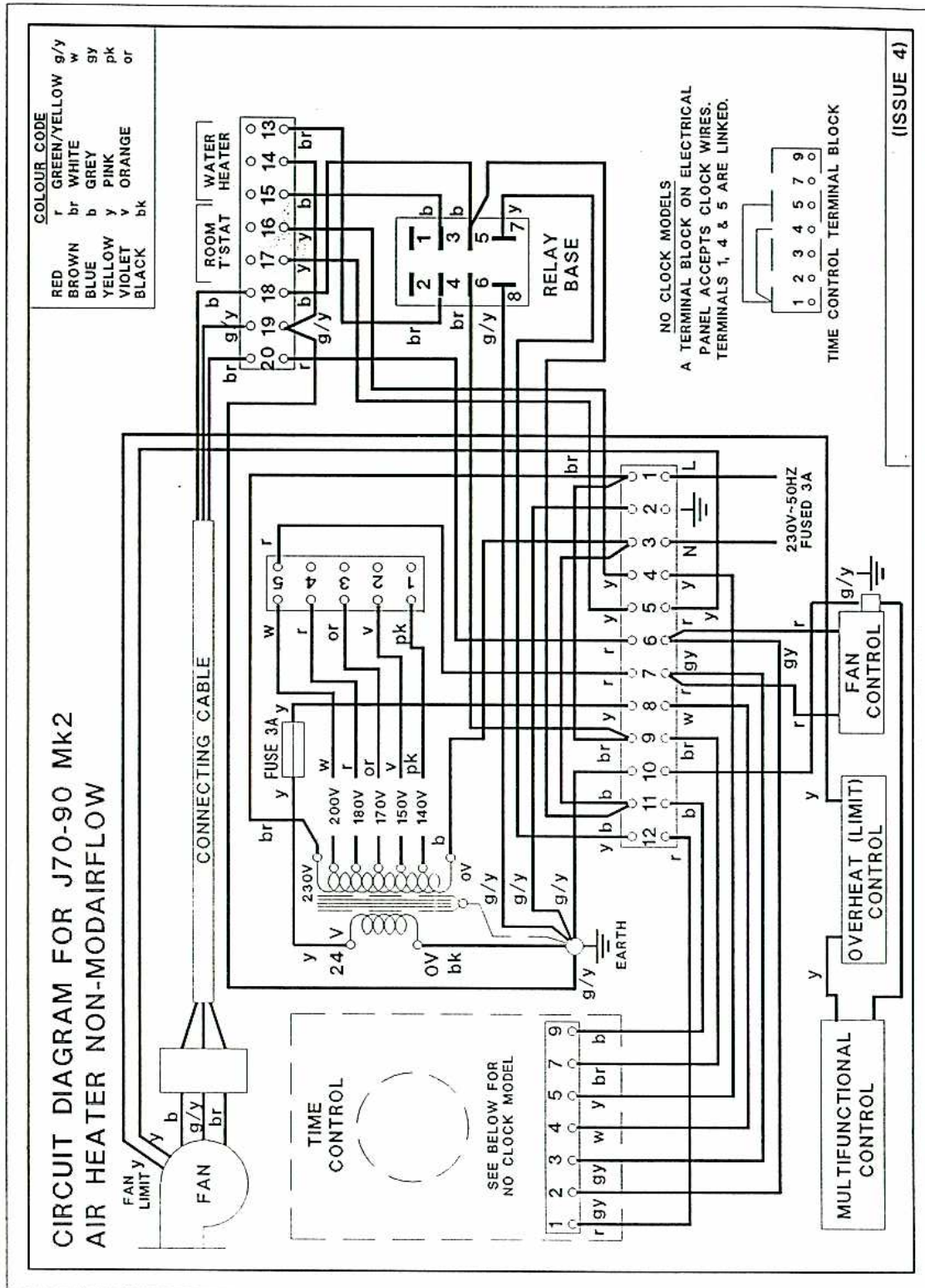


Fig. 5b Circuit Diagram - J70-90 Mk.2 Air Heater (non - Modairflow)

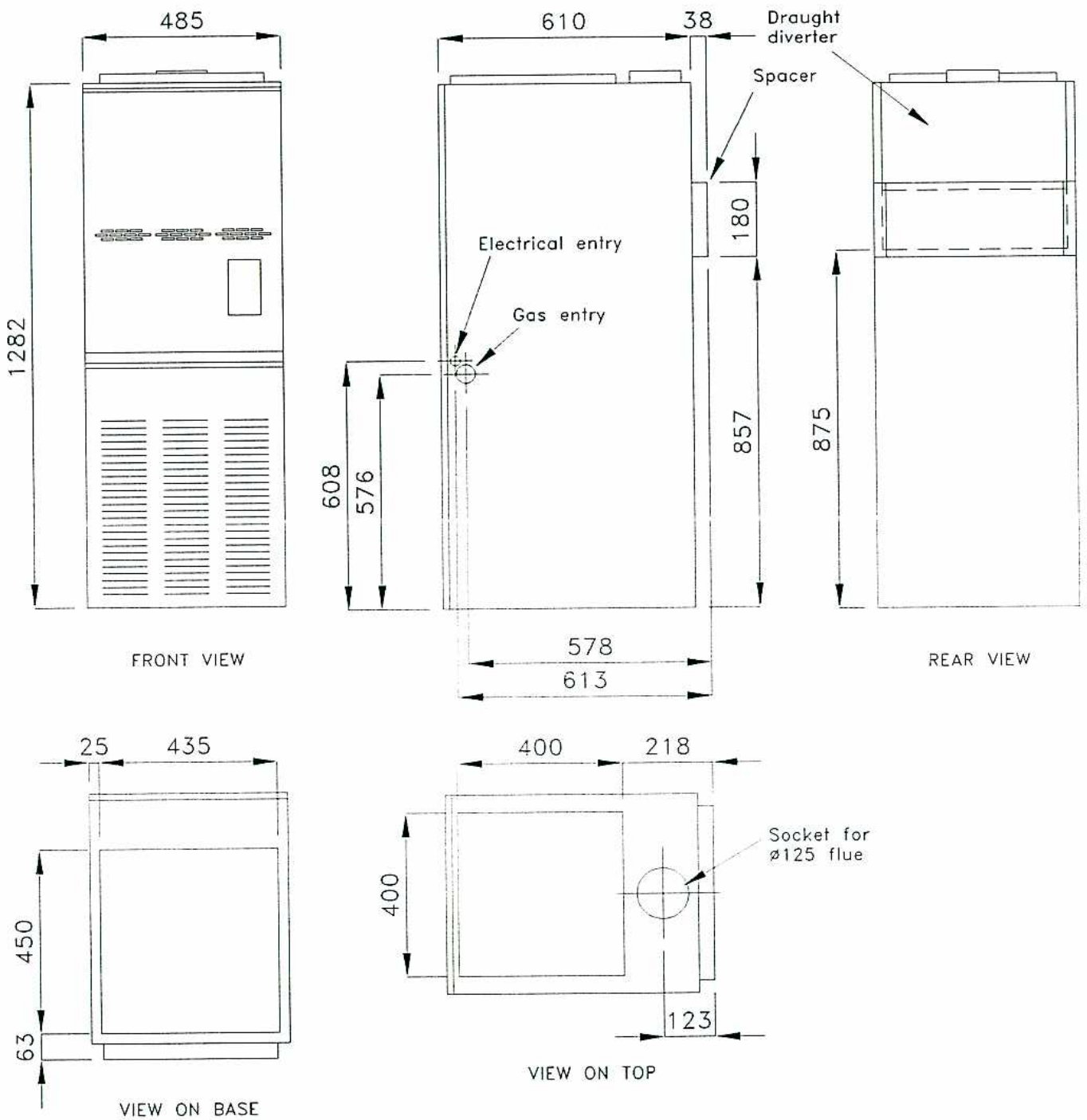


Fig. 6 J70-90 Mk.2 Air Heater - Principal Dimensions

10. SHORT LIST OF SPARES

IMPORTANT: For units with Appliance Serial Numbers greater than 000689, order those components indicated in brackets, where two similar components are listed.

G.C. NUMBER	MAKER'S NUMBER	DESCRIPTION	QTY	J70-90 MAF	J70-90
245 182	J900-0525000	Fan assembly complete with secondary overheat control	1	X	X
245 092	J650-0182000	Filter tray assembly	1	X	X
244 985	CL3S	Time control CL3	1	X	X
244 986	1000-0000040	Time control cover	1	X	X
385 102	BOS 00105	Overheat (limit) control-Honeywell L4069C	1	X	X
393 412	BOS 01301	Multi-functional control-Honeywell V8600C	1	X	X
232 903	BOS 02061	Sealing ring (for gas control)	1	X	X
390 210	BOS 00036	Thermocouple- Honeywell Q309A	1	X	X
386 636	1000-0700960	Burner assembly-Robinson	1	X	X
(388 681	1000-0701490	Pilot burner-Honeywell Q385A	1	X	X)
245 183	1000-0703150	Pilot injector-Honeywell 38/36A	1	X	X
398 280	BOS 01204/1	Main injector-Bray Cat. 23/1000	3	X	X
245 185	J900-0350005	Heat exchanger exchange kit	1	X	X
395 945	1000-0700570	Piezo unit	1	X	X
(386 682	1000-0701500	Piezo electrode	1	X	X)
(397 819	BOS 02394	Electrode lead	1	X	X)
230 394	BOS 00836	Heat exchanger access cap gasket	3	X	X
Modairflow models only:-					
245 136	J900-0530005	Control panel (with transformer, but excluding time control and electronics module	1	X	-
245 137	J650-0519005	Wiring harness	1	X	-
245 180	R011	Electronics module	1	X	-
245 138	BOS 01245	Airflow temperature sensor	1	X	-
244 933	1000-0500170	Fuse 1A, 1 ¼ in long glass	1	X	-
386 475	BOS 01242	Thermista-stat	1	X	-
Non-Modairflow models only:-					
245 264	1000-0501650	Control panel (with transformer, but excluding time control	1	-	X
245 094	J650-0520005	Wiring harness	1	-	X
385 103	BOS 00104	Fan control	1	-	X
230 267	BOS 00689	Fuse 3A 1in long BS1352	1	-	X