



Leave these Instructions with the User or with the appliance

## J55-65 WARM AIR HEATER

### MODAIRFLOW and Conventional Control Installation, Commissioning & Servicing Instructions

Publication No. ZZ432/3

March 1994

GC No. 42-417-68

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

Note: If a water heater is fitted, the Installation, Commissioning and Servicing Instructions for the water heater (Publication No. ZZ360) must also be observed.

#### 1. COMPONENTS CHECK

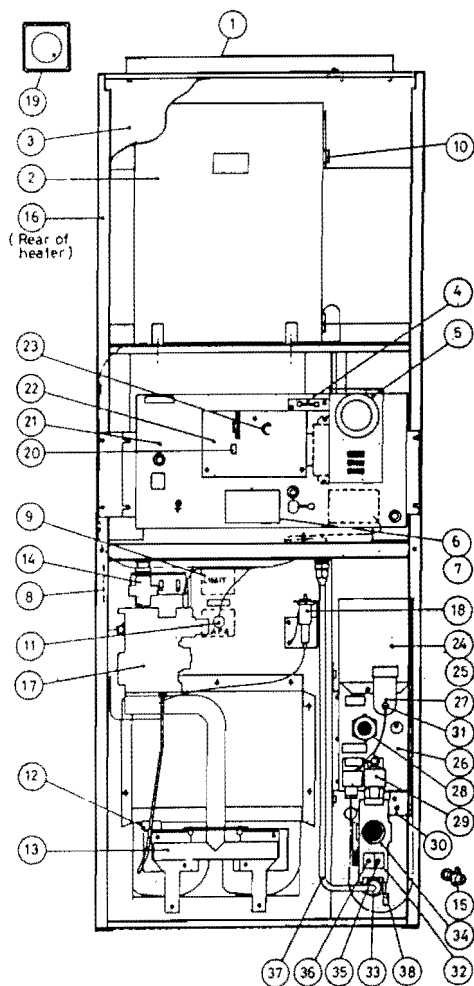


Fig. 1

J55-65 is an open-flued, fan assisted, downflow ducted warm air heater, which may be supplied with Modairflow controls and in combination with an Eljan (electrically switched) water heater. A basic (non-Modairflow) control is available as an option. Air heater output can be adjusted between 16.2kW (58.3MJ/h, 55,300 Btu/h) and 18.9kW (68.0MJ/h, 64,500 Btu/h). Eljan output is 3.2kW (11.5MJ/h, 11,000 Btu/h).

1. Air filter
  2. Air circulating fan
  3. Fan chamber door
  4. Fuse
  5. Time control
  6. Connection for Thermista-stat/thermostat
  7. Terminal strip
  8. Data badge
  9. Overheat (limit) switch
  10. Secondary overheat switch
  11. Airflow sensor (Modairflow)  
OR Fan 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 selector plug (non-Modairflow)
  21. Control panel (Modairflow or non-Modairflow).
- Modairflow models only:-
22. Electronics module
  23. Balancing screw

#### ELJAN WATER HEATER

24. Flue pipe
25. Flue cap connection
26. Water heater body
27. Flow connection Rp $\frac{3}{4}$  (¼ BSP female)
28. Return connection Rp $\frac{3}{4}$
29. Solenoid valve
30. Pilot burner
31. Thermostat capillary/phial
32. Burner and controls assembly
33. Gas connection
34. Water temperature control
35. Start button
36. OFF button
37. Gas feed pipe
38. Data plate

THIS APPLIANCE CONFORMS TO BS800

## GENERAL REQUIREMENTS

### Related documents (refer to latest issues):-

This appliance **MUST BE** installed in accordance with the relevant requirements of the Gas Safety (Installation and Use) Regulations (as amended), the Building Regulations and the I.E.E. Wiring Regulations for electrical installations.

It should be in accordance also with any relevant requirements of the local Region of British Gas and Local Authority and the relevant recommendations of the following:-

Building Standards (Scotland) (Consolidation) Regulations

BS 5440 Pt.1 (Flues for Gas Appliances)

BS 5440 Pt.2 (Air Supply for Gas Appliances)

BS 5546 Installation of Domestic Hot Water Supplies

BS 5864 Installation of Gas Fired Ducted Air Heaters

BS 6891 Installation of Low Pressure Gas Pipework of up to 28mm (R1) in domestic premises (2nd family gases).

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):-

**IMPORTANT:** If the heater is to be fitted to an existing base duct (warm air plenum), always ensure that installation is carried out such that the rear left hand corner of the heater lines up with the rear left hand corner of the base duct. Thus any overhang or blanking off will be at the front and/or right hand side.

In any event, blanking plates **must** be secured and **all joints sealed**.

The heater must be fixed to the base duct, using self-tapping screws, to prevent movement of the heater.

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 600mm(24in) 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 sections 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 appropriate sections 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 BT65/90 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 101cm<sup>2</sup> (16in<sup>2</sup>). 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 0.017m<sup>3</sup>/s(36 cfm) i.e. 1.39m/s(275ft/min) velocity in a 125mm bore pipe. If this arrangement is used, a non-closable 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 and assume that an Eljan water heater is fitted.

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/are not adversely affected. A spillage test as specified in Section 6.12. should be carried out and any remedial work undertaken.

**TABLE 1**

Ventilated from inside building	Low level grille	529cm <sup>2</sup> (80in <sup>2</sup> )
	High level grille	265cm <sup>2</sup> (40in <sup>2</sup> )
Ventilated from inside building	Low level grille	265cm <sup>2</sup> (40in <sup>2</sup> )
	High level grille	132cm <sup>2</sup> (20in <sup>2</sup> )

#### 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 are used. For heaters on maximum output the return air duct size should not be less than 300mm x 300mm(12in x 12in). The return air grille should have a free area of not less than 1593cm<sup>2</sup> (291in<sup>2</sup>).

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 0.0088m<sup>2</sup>/kW(1in<sup>2</sup>/250Btu/h) of heat supplied to the room. The only exceptions are kitchens, bathrooms and WC'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

Note: For Eljan circulator Installation Instructions see separate Publication No. ZZ360.

### 5.1 FLUES (see British Standard 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, carry out a visual check of the flue system as directed in the relevant section of BS5440 Pt.1, then check the flue performance 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 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, 0.75mm<sup>2</sup>), connected to a terminal block and exiting through the heater at the top right hand front. The cable is suitable for a 240V 50Hz single phase supply, and must be protected by a 3 amp fuse and earth wire connected. A double pole switch or fused spur box should be used. All wiring must be to IEE regulations.

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 BS 800, BS 3955 and BS 4201 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. 0.2amp. 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 outside door or windows, or on outside walls.
  - 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 1.0 mbar (0.4in. w.g.) pressure drop (see table of discharge in BS6891).

The ½in union gas cock (supplied) 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 R½ (½ B.S.P. 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 compartment 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 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 control setting is 100° OFF, 40° Diff..

Overheat (limit) control setting is 200°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 selector plug 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 multifunctional control.
    - b) Disconnect the pipe union at the multifunctional 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 step d).
    - g) Refit the burner assembly into the combustion chamber.

- 6.8.2 Light the pilot burner as follows:-

- a) Turn the Thermosta-stat/room thermostat to the lowest or OFF setting.
- b) Remove the cover from the adjustment point on the multifunctional 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 that the 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 multifunctional 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 Thermosta-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. 18.9kW(64,500Btu/h) at 12.4mbar(5.0in 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.

Flame to just envelop thermocouple tip.

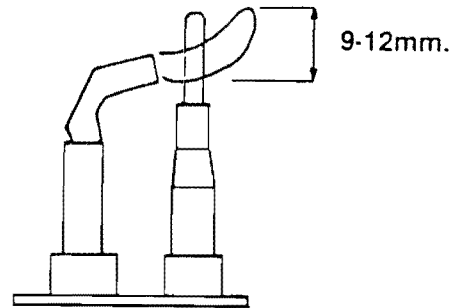


Fig. 2 Pilot flame adjustment

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 position of the fan speed selector plug (Fig.1, Item 20) on the control panel, (see Fig.4 for fan performance range). 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).

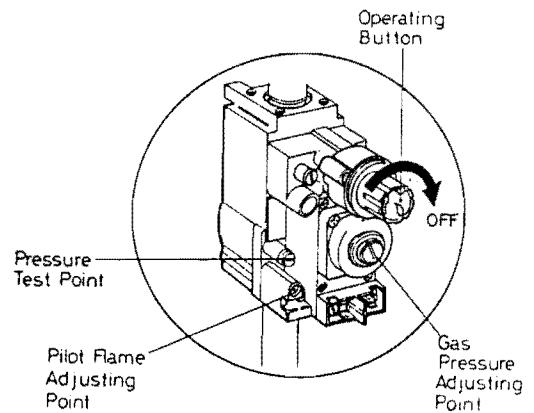


Fig. 3 Multifunctional Control

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 1¼ 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 room temperature has fallen slightly, the burner will re-ignite, followed by fan operation.

**6.12 Safety checks**

- 6.12.1 Check the 'fail safe' section of the multifunctional 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.
- 6.12.2 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.
- 6.12.3 With heating system on, check for gas soundness within the appliance.
- 6.12.4 Light the appliance and check that the flue operates effectively with heating system on, all doors closed and extractor fans, if fitted, running. Then, within 5 minutes of lighting, 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 and fan running.

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

**TABLE 2**

	Low Rate			Medium rate			High rate		
	kW	MJ/h	Btu/h	kW	MJ/h	Btu/h	kW	MJ/h	Btu/h
Input	22.2	79.9	75,750	23.7	85.2	80,800	25.0	90.0	85,300
Output	16.2	58.3	55,300	17.6	63.3	60,000	18.9	68.0	64,500
Gas Rate (1037cv)	2.07m <sup>3</sup> /h(73.1ft <sup>3</sup> /h)			2.21m <sup>3</sup> /h(77.9ft <sup>3</sup> /h)			2.33m <sup>3</sup> /h(82.3ft <sup>3</sup> /h)		
BURNER PRESSURES (measured hot)	9.8 mbar (3.92in.w.g.)			11.2mbar (4.5in.w.g.)			12.4mbar (5.0in.w.g.)		

Main Injector: Bray Cat. 23/1000  
 Pilot Injector: HONEYWELL Type 38/36A  
 Gas supply pressure: 20 mbar

**7. INSTRUCTIONS FOR USER**

- If the building is unoccupied, ensure that the Instructions for Use (including those for the Water Heater, if fitted) are left at or near the meter for the User. Leave also these 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 multifunctional control and switch off the electricity supply to the heater.
  - d) How to remove, clean and re-fit the air filter and at what intervals i.e. fortnightly, except for new houses where it is 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 injector as necessary. Examine the main burner 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 exchange 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 5.

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

**8.1 Removal of burner assembly:-**

Remove the lower louvre door.

Remove the electrical connections from the multifunctional control and the electrode lead from the piezo unit.

Disconnect the water heater if necessary.

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 pilot tube from the pilot assembly. Remove the pilot injector by lightly tapping the side of the pilot assembly - the injector should drop out. After reassembling, ensure that the gap between the spark electrode and burner tip is 3mm approx. After servicing, check for correct pilot flame length and adjust if necessary (see Fig.2 and para.6.8.2f in Section 6).

**8.5 To remove thermocouple:-**

With burner assembly removed (see 8.1),

Remove the electrode lead from the pilot tube, and the thermocouple lead, and disconnect the thermocouple from the multifunctional control. Disconnect the thermocouple from the pilot assembly and withdraw it.

When replacing, ensure that the thermocouple connection to the multifunctional control is tight (quarter turn past finger tight), and that there are no sharp bends in the thermocouple lead.

**8.6 To remove multifunctional control:-**

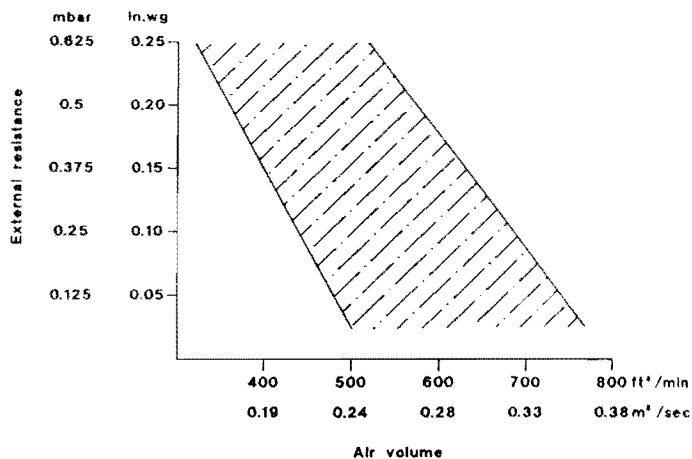
With burner assembly removed (see 8.1),

Disconnect the inlet pipe and remove.

Disconnect the thermocouple and pilot burner supply tube.

Unscrew the four screws securing the multifunctional control to the manifold assembly and remove the multifunctional control. (Make sure that the sealing ring is retained).

Before refitting, check that the sealing ring is in good condition, and replace if necessary.



**Fig. 4 Fan performance range**



**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 multifunctional control.  
Remove the electrode lead from the pilot tube, and the thermocouple lead.  
Disconnect the thermocouple lead and pilot tube from the pilot burner.  
NOTE: be careful not to lose or damage the pilot injector.  
Unscrew the two securing screws and remove the pilot burner and mounting bracket.  
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 3mm 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 multifunctional control (see Fig.3). Light the heater, check the pressure and confirm by a gas rate check at meter. Adjust, if necessary, at the gas pressure adjusting point after removing the cap. Turn clockwise to increase the burner pressure and vice versa.

**8.10 Control panel removal:-**

Ensure that the mains supply is off.  
Remove the fan chamber door (see 8.2).

**(i) 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 multifunctional control.  
Unscrew the four securing screws and remove the control panel assembly.

**(ii) Non-Modairflow models:-**

Disconnect the connections to the mains lead, fan control, secondary overheat control, multifunctional 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 models only:-**

Ensure that the mains supply is off.  
With fan chamber door removed (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.  
With fan chamber door removed (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.  
With fan chamber door removed (see 8.2),  
Unscrew the fixing screw in the bottom of the time control assembly, then 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.

With fan chamber door removed (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.

**8.15 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 exchanger 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 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 (see 8.2),

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, taking care not to drop the loose nuts into the fan.

**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.

Release the capacitor from its retaining clip.

8. 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 13 & 14 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. (ii)Gas supply pipe not purged. (iii)Pilot orifice restricted. (iv)Piezo system faulty.	Check for gas at inlet pressure test point on multi-functional control. Purge gas supply pipe in accordance with BS 6891. Clean pilot injector orifice carefully, or replace injector. Check/replace piezo unit, lead or electrode.
(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.

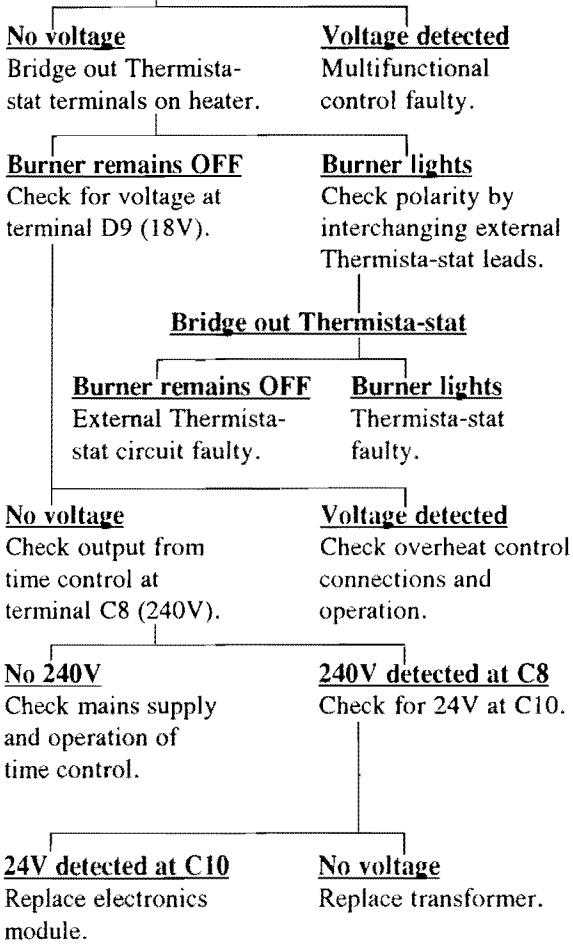
## 9. FAULT FINDING (cont.)

SYMPTOM	POSSIBLE CAUSE	REMEDY
(e) Main burner operating with intermittent fan operation.	(i) Gas rate or burner pressure setting. (ii) Fan control settings incorrect.	Check gas rate and burner 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.
<b>Modairflow Control Heaters only:-</b>		
(h) Incorrect operation of fan or main burner.	(i) Fault related to Modairflow control system.	Consult diagnostic chart and follow recommended procedure.
<b>Non-Modairflow Control Heaters only:-</b>		
(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. (v) Transformer open circuit. (vi) Multi-functional control faulty. (vii) Multi-functional control governor faulty. (viii) Overheat control faulty. (ix) Secondary overheat control faulty. (x) Room thermostat or external wiring faulty.	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. Check with test meter and replace electrical panel if necessary. Replace multi-functional control. Replace multi-functional control. Short across control and replace if necessary. Short across control and replace if necessary. Fit temporary loop in heater thermostat socket. If heater fires, external circuit or room thermostat is faulty.

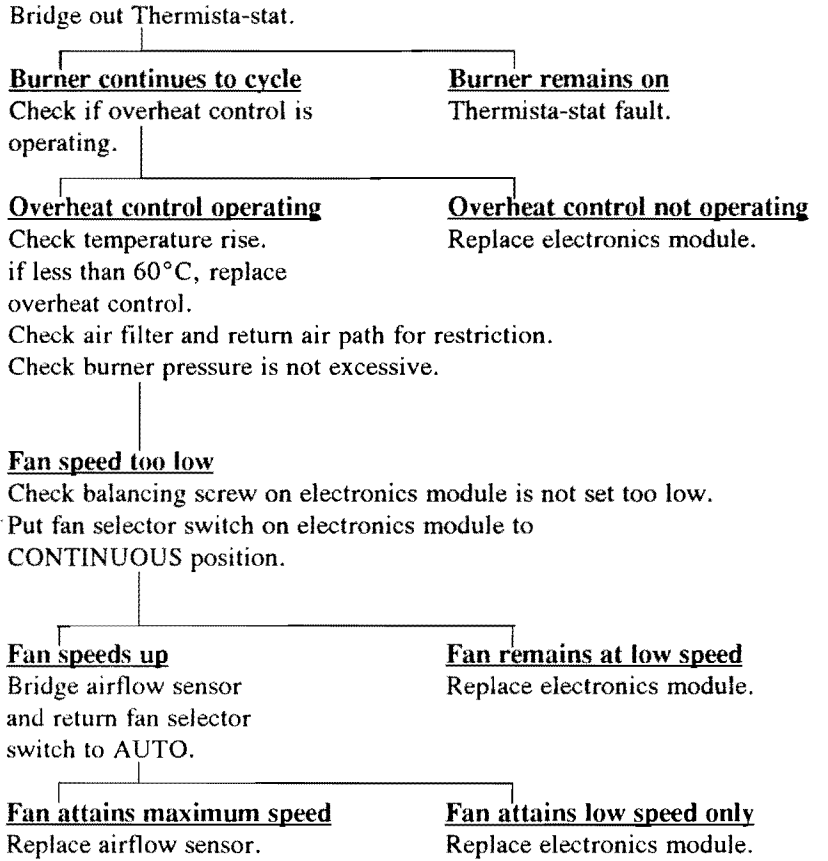
**MODAIRFLOW SERIES 2 OPERATIONAL CHECKS**

**MAIN BURNER NOT OPERATING**

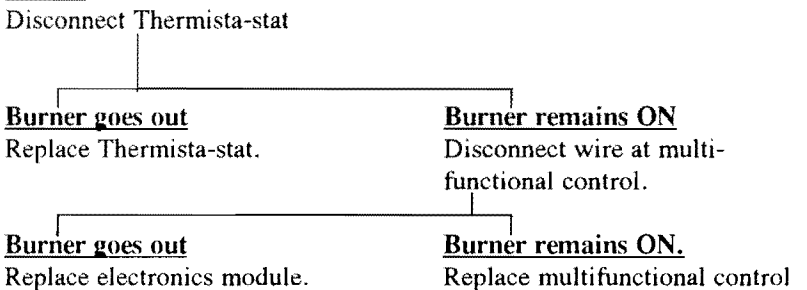
Check pilot burner is lit, time control is on and Thermista-stat turned up.  
Check mains electrical supply.  
Check fuses on electronic panel.  
Check for 24V at multifunctional control.



**FAN ON, BUT BURNER CYCLING BEFORE DESIRED ROOM TEMPERATURE REACHED**



**MAIN BURNER NOT CYCLING (ROOM TEMPERATURE TOO HIGH)**



**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.

**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.

# CIRCUIT DIAGRAM FOR J55-65 AIR HEATER MODAIRFLOW

COLOUR CODE		
RED	r	GREEN/YELLOW g/y
BROWN	br	WHITE w
BLUE	b	GREY gy
YELLOW	y	PINK pk
VIOLET	v	ORANGE or
BLACK	bk	

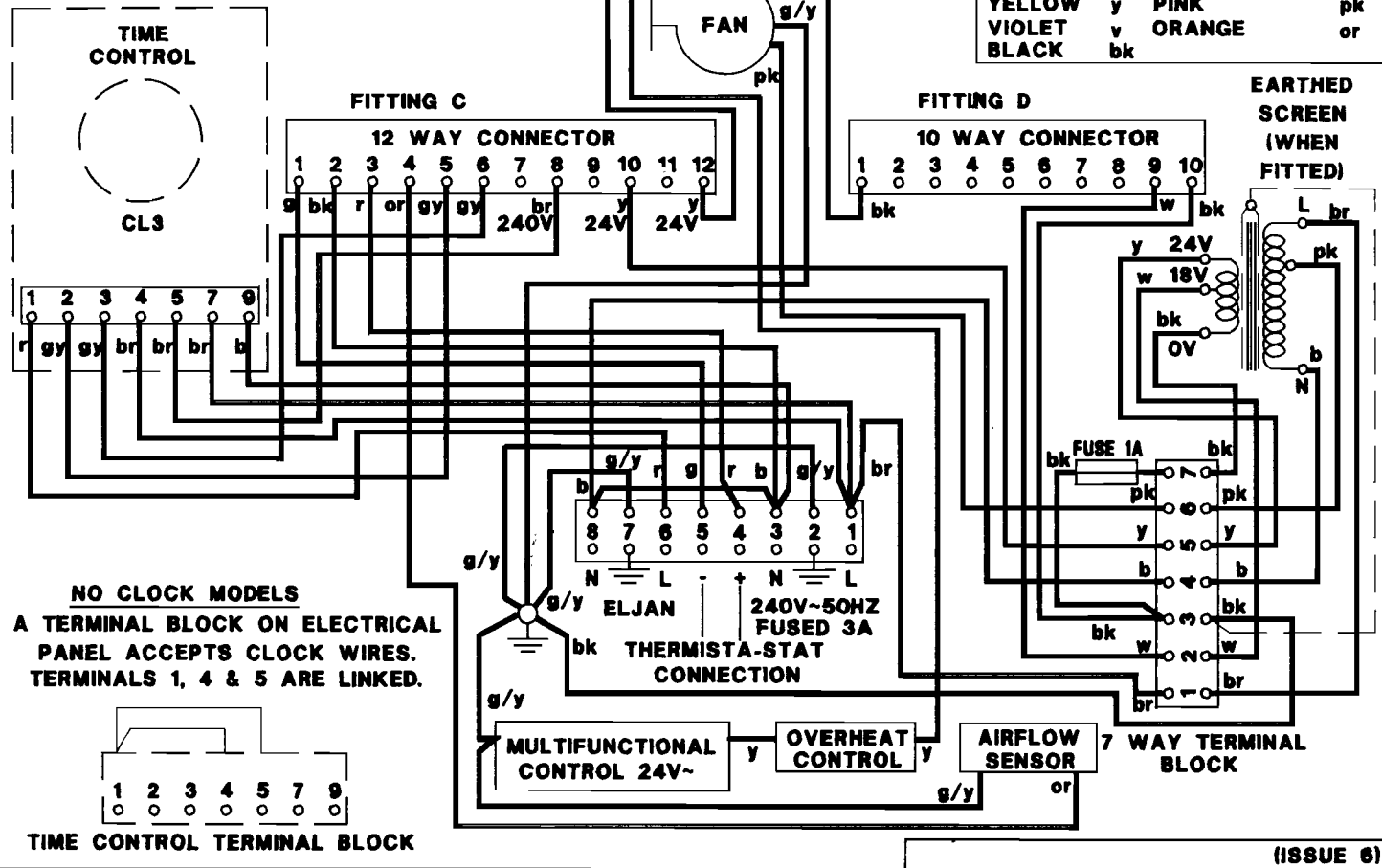
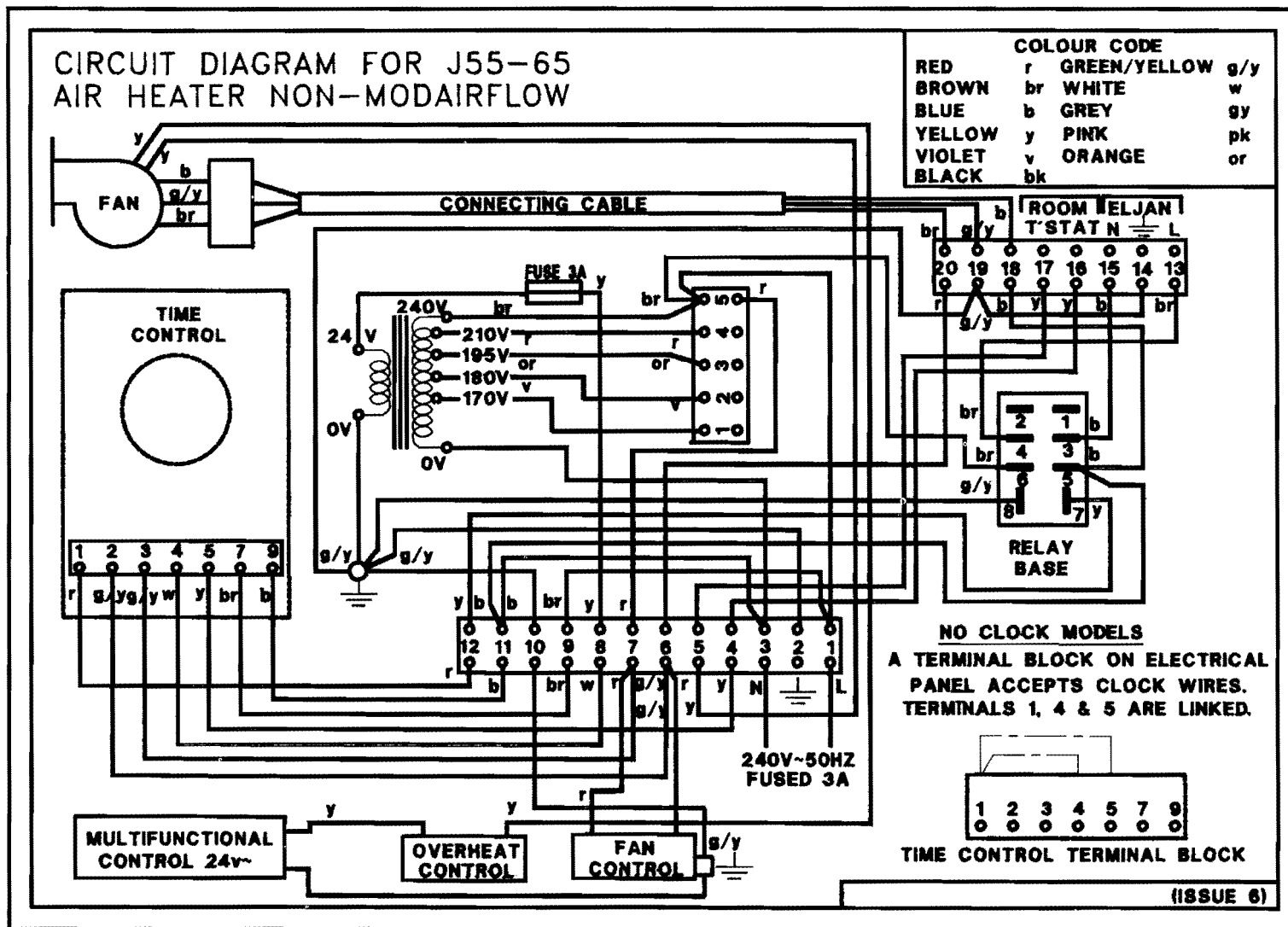


Fig. 5a Circuit Diagram - J55-65 Air Heater with Modairflow control

Fig. 5b Circuit Diagram - J55-65 Air Heater (non - Modairflow)





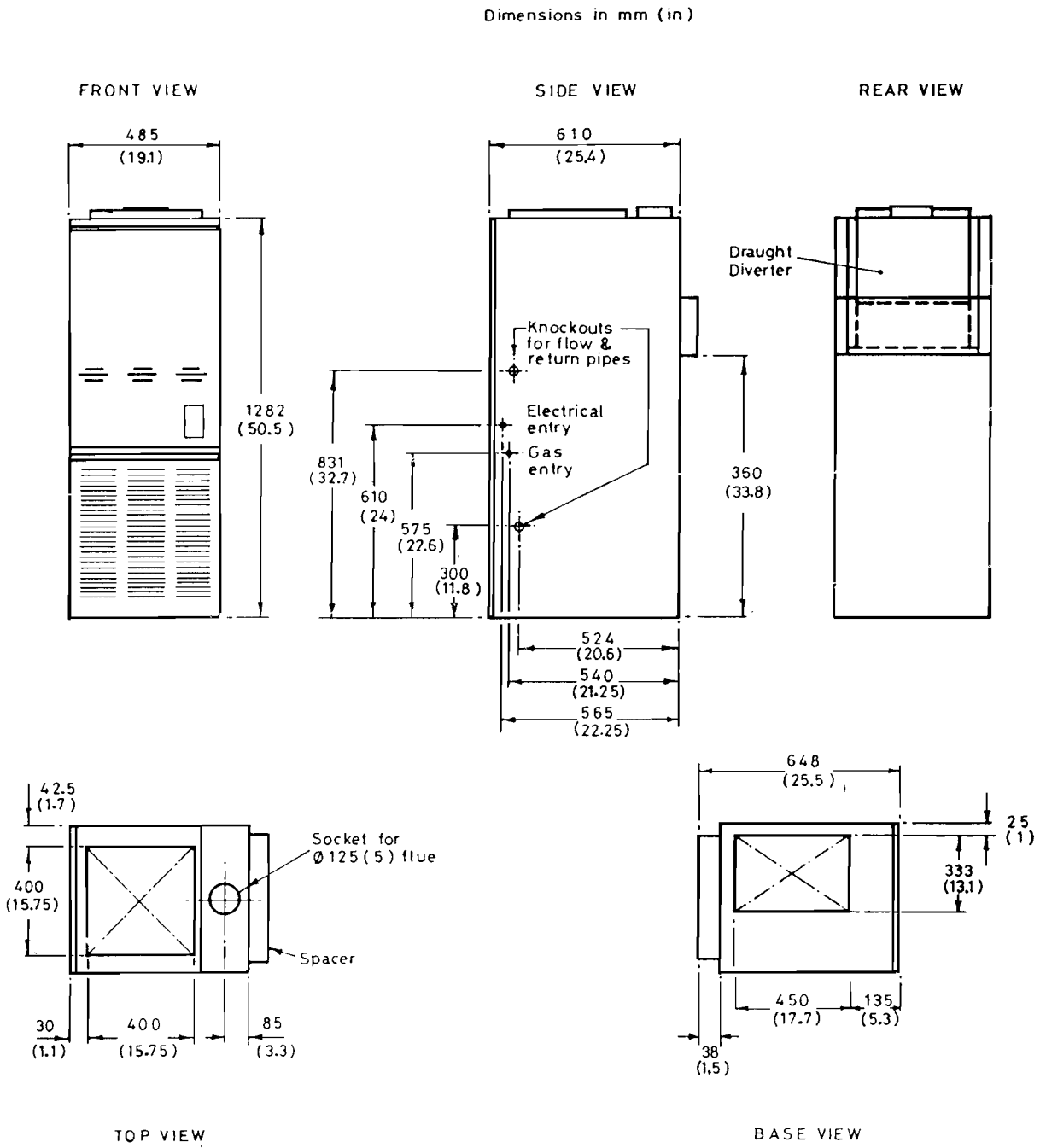


Fig. 6 J55-65 Air Heater - General Dimensions

9. SHORT LIST OF SPARES

**IMPORTANT:** For units with Appliance Serial Numbers greater than 001699, order those components indicated in brackets, where two similar components are listed.

G.C. NUMBER	MAKER'S NUMBER	DESCRIPTION	QTY	J55-65 MAF	J55-65
245 176	J650-0525000	Fan Assembly	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
385 012	BOS 00105	Overheat (Limit) Control Honeywell L4069C	1	X	X
386 634	1000-0503730	Secondary Overheat Control	1	X	X
393 412	BOS 01301	Multifunctional Control Honeywell V8600C	1	X	X
232 903	BOS 02061	Sealing Ring (for multifunctional control)	1	X	X
391 734	1000-0700060	Pilot Burner Honeywell Q359A 1009	1	X	X
(386 681)	(1000-0701490)	(Pilot burner Honeywell Q385A 1061)	(1)	(X)	(X)
390 210	BOS 00036	Thermocouple Honeywell Q309A	1	X	X
245 177	1000-0700630	Burner Assembly	1	X	X
398 280	BOS 01204/1	Main Injector Bray Cat.23/1000	2	X	X
245 183	1000-0701745	Pilot Injector Honeywell 38/36A	1	X	X
245 184	J650-0350005	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)
386 633	1000-0700660	Piezo electrode	1	X	X
(245 086)	(BOS 02394)	(Electrode lead)	(1)	(X)	(X)
230 394	BOS 00836	Heat exchanger access cap gasket	2	X	X

**Modairflow models only:-**

245 174	J650-0530005	Control Panel with transformer, but excluding Time Control & Electronics Module	1	X	-
245 137	J650-0519005	Wiring Harness	1	X	-
245 182	1000-0501900	Transformer	1	X	-
245 178	R010	Electronics Module	1	X	-
245 170	1000-0505690	Airflow Temperature Sensor	1	X	-
244 933	1000-0500170	Fuse 1 amp 1 ¼ " Long Glass	1	X	-
386 475	BOS 01242	Thermista-stat	1	X	-

**Non-Modairflow models only:-**

245 142	J650-0510000	Control Panel with transformer, but excluding Time Control	1	-	X
245 094	J650-0520005	Wiring Harness	1	-	X
385 013	BOS 00104	Fan Control Honeywell L4068C	1	-	X
230 267	BOS 00689	Fuse 3amp 1"Long BS1352	1	-	X
230 157	BOS 00566	Fan Speed Selector Plug	1	-	X
245 322	1000-0500910	Relay (appliances fitted with Eljan only)	1	-	X

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