



JWD 38/50 MAF Warm Air Heaters with MODAIRFLOW Controls

(56-53)
UDC 697.3

Installation & Maintenance Instructions

Publication ZZ 183/4

JWD38/50/MAF is a Gas Fired Warm Air Heater fitted with MODAIRFLOW Electronic Controls for open flue application.

Output is adjustable between 11.1 kW - 14.6 kW (40.1 MJ/h, 38,000 Btu/h - 52.7 MJ/h, 50,000 Btu/h).

X-A TIME CONTROL – air heaters have a plug-in facility for easy on-site fitting of a Time Control. This is a Horstmann Emerald control complete with wiring tail and plug.

JANUS 3 CIRCULATOR WATER HEATER – air heaters have provision for the internal fitting of a JANUS 3 water heater.

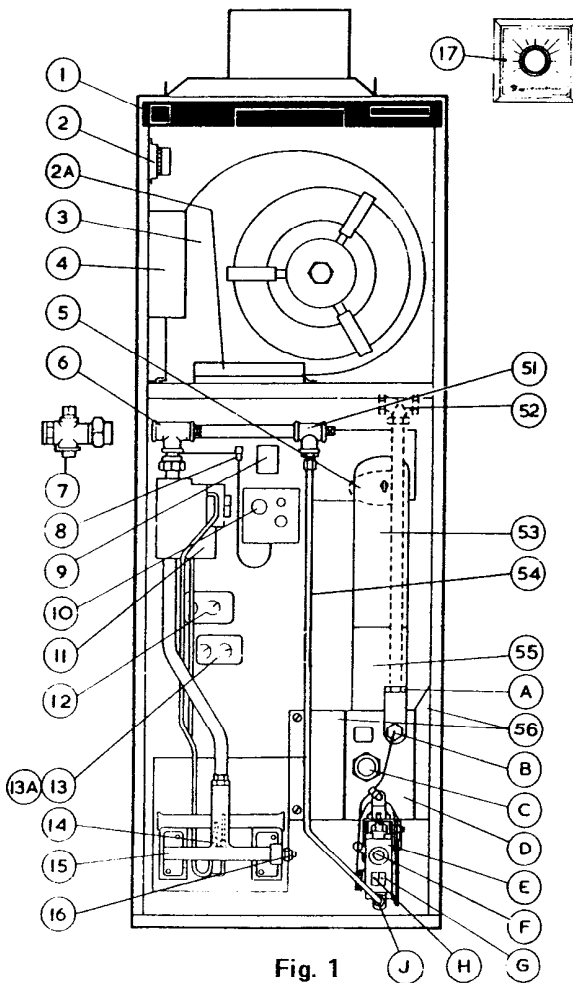
If a JANUS is provided factory fitted, the heater designation is JWD38/50/MAF/JAN.

To fit a JANUS water heater on site, obtain from Johnson & Starley Ltd. a JANUS 3 Water Heater and KK50 Fittings Kit.

When the air heater is to be used in a Top Closure application (TC50) a special draught diverter is required. This is supplied against heater order code JWD38/50/MAF/OSD. CHECK FOR CORRECT DRAUGHT DIVERTER BEFORE FITTING.

| | | | | | | | |
|----------|---|-------------|-----------|-----------|----------------------------------|-------------------|----------|
| 1 | Components Check | Page | 1 | 6 | Maintenance | Page | 4 |
| 2 | Warm Air Installation requirements | 2 | 7 | 7 | Fault Finding | 5 | |
| 3 | Preparation | 2 | 8 | 8 | Dimensions and Data | 7 | |
| 4 | Air Heater Fixing | 3 | 9 | 9 | Wiring Diagram | 7 | |
| 5 | Commissioning | 3 | 10 | 10 | Short List of Spare Parts | Back Cover | |

1. COMPONENTS CHECK N.B. Check that Gas Group on heater data plate is as required.



JWD 38/50 & JWD 38/50 MAF AIR HEATER

- 1 Air Filter
- 2 Electrical Panel (basic model)
- 2A Electronic Panel (Modairflow model)
- 3 Air Circulating Fan
- 4 Fan Speed Regulator (Modairflow model)
- 5 Flue spigot for water heater (with blanking cap)
- 6 Gas connection tee with blanking plug
- 7 Union gas tap 1/2" (supplied loose)
- 8 Mounting and plug-in connection for X-A time control
- 9 Data plate
- 10 Position of X-A Time Control (when fitted)
- 11 Combination Gas Control
- 12 Overheat Limit Control
- 13 Fan Control (basic model)
- 13A Air Flow Sensor (Modairflow model)
- 14 Safety Pilot Burner
- 15 Burner Bar assembly
- 16 Pressure Test Point
- 17 Thermista-stat (Modairflow model)

KK50 WATER HEATER FITTINGS KIT

- 51 Gas Pipe and Tee
- 52 22mm flow pipe and elbow (not provided)
- 53 Flue connection sleeve (and insulating sleeve)
- 54 Gas feed to water heater

- 55 Flue Cap and Connection (casting)
- 56 Water Heater Mounting Plate

JANUS WATER HEATER

- A 'Flow' connection (3/4" B.S.P. female)
- B Thermostat Phial
- C 'Return' connection (3/4" B.S.P. female)
- D Water Heater body
- E Burner and Controls
- F Water Temperature Control Knob
- G START Button
- H OFF Button
- J Gas Connection

These items are supplied loose:—
 Draught Diverter – fixing screws in heater top
 Thermista-stat Plug } supplied in linen bag
 Gas Tap }
 Thermista-stat – in air heater

For safety, use a competent installer to install this appliance. CORGI (The Confederation for the Registration of Gas Installers) requires its registered installer to work to satisfactory standards.

MAF



2. WARM AIR INSTALLATION REQUIREMENTS

Installation should be in accordance with:—

Building Regulations.

British Standard BS 5864.

Institute of Electrical Engineers Regulations.

British Standard BS 5400 Pts. 1 & 2.

British Gas Material and Installation Spec. Latest Edition.

Gas Safety Regulations

(a) Ventilation of Heater Compartment

| | | Ventilation from inside building | Ventilation direct from outside building |
|-------------------|------------|---|---|
| Low Level grille | free area. | 442 cm ² (69 in ²) | 221 cm ² (34 in ²) |
| High Level grille | free area. | 221 cm ² (34 in ²) | 111 cm ² (17 in ²) |

Areas include air requirement for Janus.

(b) Ventilation of Building

A purpose designed ventilation opening must be provided in an outside wall. This opening must be either:

- (i) Into the room containing the heater, or
- (ii) Into an adjacent room which has a purpose designed opening into the room containing the heater.

Openings must have minimum effective areas of 79 cm² (12 in²).

(c) Return Air

Return Air Grille/s must be connected to the return air opening of the air heater by duct/s. Each heated room with the exception of Kitchens, Bathrooms and W.C.s, must have either a return air grille or purpose made relief opening communicating with a collection area served by a return air grille. Openings must have minimum areas of 25 cm² per MJ/h (1 in² per 250 Btu/h) of designed heat input to the rooms they serve.

3. PREPARATION

a) **Flues.** A single 4 in. lightweight asbestos or suitable twin wall flue is required.

b) **Electrical Connections.**

- (i) **MAINS.** The heater is supplied complete with mains cable (P.V.C. sheathed, high temp. resistant, 3 core, 5A, 0.75mm²) connected to the terminal strip and can leave the heater from either side or the top. This cable, suitable for 240V, 50 Hz, single phase supply, must be protected by a 3 amp fuse and the earth wire connected. A double pole switch or fused spur box should be used or, a 3 pin plug into an unswitched socket outlet.
- (ii) **THERMISTA-STAT.** Should be positioned on an internal wall approximately 1.5 metres (5 ft.) from the floor away from direct sunlight, draughts and local warmth. A two pin socket is provided on the right hand top face of the heater. The two pin plug should be connected to the thermista-stat and polarity of these wires must be observed, i.e. + side on thermista-stat to the larger of the two pins on the plug. Alternatively the thermista-stat wires may enter either side of the heater and be connected to the terminal block of the electronic panel. Polarity must be observed, i.e. + side on thermista-stat to terminal 5 and other side to terminal 4.
- (iii) **TIME CONTROL.** A plug-in time control facility is provided on the air heater. Use X-A Time Control Kit (based on Horstmann Type 423 Emerald) obtainable only from Johnson & Starley Ltd. If a remote time control is required it is important that reference is made to the wiring diagram (see Section 9), and an independent power supply is used.

c) **Gas Supply**

The gas connection should be in ½" B.S.P. pipe or larger dependent upon length of pipe run from the meter. The gas pipe may enter the heater from either side, or through the floor of the cabinet. A ½" B.S.P. Union Gas Tap is supplied for external fitting. The leg of the internal tee not used must remain plugged. *Installation should conform to British Gas requirements and Building Regulations.*

d) **Heater Installation Clearances** (all dimensions are minimum)

(i) **CUPBOARD INSTALLATION** Sides and back — 25 mm (1 in.), Front — 75 mm (3 in.)

(ii) **SLOT FIX INSTALLATION**

Method ONE using SS50 Side Closure Strips.

Back — 60 mm (2.4 in.), Sides — 56 mm (2.2 in.). The space around the heater must be unobstructed (apart from pipes and cables serving the heaters) from the level of its base to:—

- (a) the level of its top, and
- (b) 100 mm (4 in.) above its top to rearward of the return air opening.

Method TWO using air relief grille opposite draught diverter.

Sides — 25 mm (1 in.), Back — 65 mm (2.5 in.).

(iii) **SERVICING ACCESS** 460 mm (18 in.) to front of heater. Access should be sufficient to allow heater removal.

e) **Installation on Suspended Floors:**

Combustible floors must be insulated from the heater.

When a base duct is used, the base duct provides sufficient insulation and no insulation is needed underneath the base duct.

When an underfloor warm air plenum is used, insulation can be provided by using a J & S Base Tray BT50, see Figs. 2 and 3.

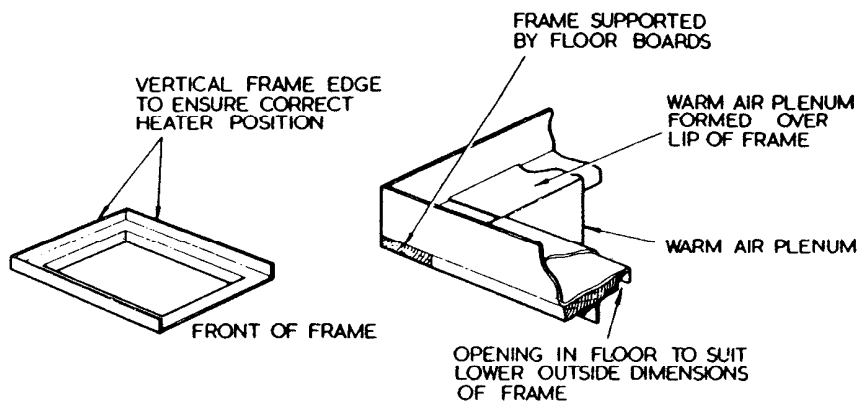


Fig. 2

Fig. 3

4. AIR HEATER FIXING

NB: For Top Closure (TC50) or Slot Fix (TS50) applications refer to appropriate instructions provided with fitting kits.

- (a) FIT DRAUGHT DIVERTER over heater flue spigot on top of heater and secure with two screws.
- (b) POSITION HEATER ON BASE DUCT OR PLENUM.— Make sure no air leakage can occur.
- (c) CONNECT FLUE — Use split clip above draught diverter and complete before return air plenum is fitted (flue must be supported to relieve weight from heater).
- (d) CONNECT RETURN AIR DUCT.
- (e) MAKE GAS CONNECTION — Fit union gas tap provided.
- (f) MAKE ELECTRICAL CONNECTIONS — see Section 3 (b).

If a summer switch is required, fit switch in a suitable position external to heater and connect wires to terminals 7 and 8 as shown in wiring diagram (see Section 9).

5. COMMISSIONING

- (a) Check that WARM AIR DELIVERY OUTLETS are open.
- (b) Check LIMIT control is correctly set at 180°F.
- (c) Fit GAS PRESSURE GAUGE to test point.
- (d) Turn on GAS supply and bleed off air.
- (e) Light PILOT BURNER.
- (f) Adjust pilot flame if necessary so that it just envelops thermocouple tip. To adjust flame, identify adjustment point (see Fig. 6) and turn screw *clockwise to decrease, anti-clockwise to increase flame*.
- (g) Switch on ELECTRICITY.
- (h) Turn Thermista-stat to MAXIMUM setting and ensure Time Control is at an ON period.
- (j) Balance Warm Air System.
 - (i) Set Fan Override Switch to CONTINUOUS.
 - (ii) Turn Balancing Knob to a number corresponding to the fan curve selected from Fig. 5. Fan should run at selected speed.
 - (iii) Adjust burner bar pressure to output required (see table Fig. 4). Heaters are factory set to pressure giving maximum output at gas group specified. To adjust pressure, remove screw cap from adjustment point (see Fig. 6) and turn screw *clockwise to increase, anti-clockwise to decrease pressure*.
 - (iv) Check velocities to design figures and adjust fan speed if necessary by the BALANCING KNOB.

Note: If the system includes ceiling diffusers, it is important that the velocities of air through these (except in very small rooms e.g. bathrooms etc.) is at least 300 ft/m. To achieve this, it may be necessary to blank-off part of the outlet face.
 - (v) Check temperature rise (85°-100°F) across heater and adjust fan speed if necessary.
- (k) Turn Fan Override Switch to AUTO.
- (l) CHECK THAT FLUE OPERATES EFFECTIVELY with heating system on, all doors closed and extractor fan/s if fitted, running.

| | kW | MJ/h | Btu/h | kW | MJ/h | Btu/h | kW | MJ/h | Btu/h | kW | MJ/h | Btu/h |
|--------------------|--|---|-----------|---|-----------|----------|---|----------|-----------|---|------|--------|
| INPUT | 15.7 | 56.4 | 53,500 | 17.0 | 61.2 | 58,000 | 18.7 | 67.5 | 64,000 | 20.2 | 72.8 | 69,000 |
| OUTPUT | 11.1 | 40.1 | 38,000 | 12.3 | 44.3 | 42,000 | 13.5 | 48.5 | 46,000 | 14.6 | 52.8 | 50,000 |
| GAS RATE (500 cv) | 3.03m ³ /h (107ft ³ /h) | | | 3.28m ³ /h (116ft ³ /h) | | | 3.62m ³ /h (128ft ³ /h) | | | 3.91m ³ /h (138ft ³ /h) | | |
| GAS RATE (1000 cv) | 1.51m ³ /h (53.5ft ³ /h) | | | 1.64m ³ /h (58ft ³ /h) | | | 1.81m ³ /h (64ft ³ /h) | | | 1.95m ³ /h (69ft ³ /h) | | |
| GAS | INJECTOR dia. mm | BURNER BAR GAS PRESSURES (measured hot) | | | | | | | | | | |
| G4 | 4.7 | 2.7 mbar | 1.1 in wg | 3.5 mbar | 1.4 in wg | 4.2 mbar | 1.7 in wg | 4.7 mbar | 1.9 in wg | | | |
| G5 | 4.7 | 3.5 | 1.4 | 4.2 | 1.7 | 5.0 | 2.0 | 5.8 | 2.3 | | | |
| G6 | 5.1 | 2.7 | 1.1 | 3.5 | 1.4 | 4.2 | 1.7 | 4.7 | 1.9 | | | |
| NATURAL | 2.35 | 11.3 | 4.5 | 13.7 | 5.5 | 16.5 | 6.6 | 18.3 | 7.3 | | | |
| PROPANE | 1.6 | lower rates not available | | | | | | 35.0 | 14.0 | | | |

Fig. 4

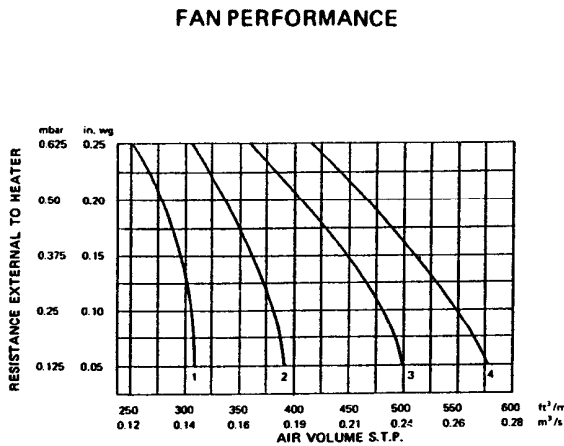


Fig. 5

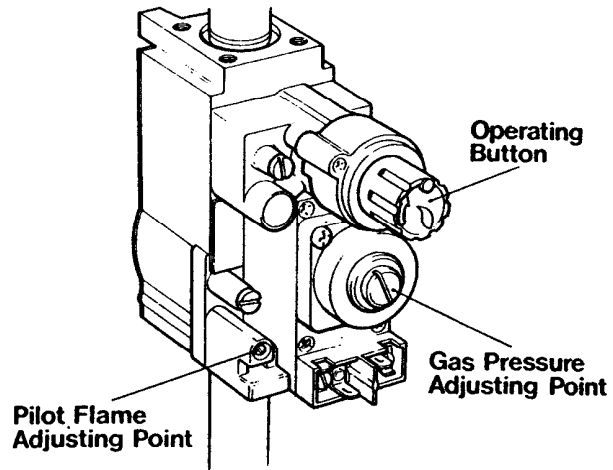


Fig. 6

6. MAINTENANCE (Recommended annually)

SWITCH OFF ELECTRICITY, REMOVE MAINS PLUG AND TURN OFF HEATER GAS TAP

(a) Main Burner Cleaning – with burner assembly removed

Detach burners. For cleaning access, remove internal blanking piece by releasing top screw. Brush gently both inside and out. *Under no circumstances should burner holes be enlarged or distorted, or brushed strongly.*

(b) Injector Cleaning – (Main Injector, Pilot Burner Injector and Cross Lighting Injector)

Remove injectors and clean carefully avoiding damage to orifice in each case. When injector replacement is a preferred alternative to cleaning, ensure that replacement injectors are of the correct orifice size.

(c) Thermocouple

Ensure that thermocouple connection to Gas Control is tight (finger tight + quarter turn).

(d) Fan and Fan Motor Cleaning

Remove fan and fan motor. Remove all dust, etc, from both fan impeller and fan motor. *Great care must be taken whilst cleaning both items that the fan balance is not disturbed.*

(e) Gas Pressure Check

Attach a gas pressure gauge to gas pressure test point on burner manifold, light heater and check pressure and confirm by gas rate check at meter. See pressure table, Fig. 4 if gas pressure needs adjustment refer to Section 5 (j).

(f) Gas Control 'fail-safe' Operation Check

Reduce flame of pilot burner by turning screw clockwise at pilot flame adjusting point (see Fig. 6) until it extinguishes. Check that main burner extinguishes i.e., gas control 'fails safe'.

(g) Pilot Flame Check

Pilot flame should just surround thermocouple probe. Adjust if necessary (see Section 5 (f)).

(h) Automatic Controls Inspection

Lighting the heater and allowing to run for a short time checks these controls.

NB: For access to Electronic Panel, 1.5A Fuse, Air Circulating Fan and Fan Speed Regulator, remove Fan Chamber Door.

- (j) **Time Control Removal (if fitted)**
 - (i) Loosen fixing screw in bottom of Time Control casing, withdraw casing and disconnect leads.
 - (ii) Release mounting screw (situated centrally on the rear top face of the mechanism), lift slightly and withdraw mechanism.
 - (iii) Position replacement mechanism onto the lugs of the mounting plate and lock by a downward movement. Tighten mounting screw, remake electrical connections and replace casing.
- (k) **Electronic Panel Removal**
 - (i) Disconnect 3 way and 6 way plugs.
 - (ii) Disconnect all leads from terminal blocks after identifying and marking connection to terminal 5.
 - (iii) Remove two fixing screws.
- (l) **Fan Speed Regulator Removal**
 - (i) Disconnect 3 way and 6 way plugs from Electronic Panel.
 - (ii) Disconnect fan plug from Fan Speed Regulator.
 - (iii) Remove single fixing bolt.
- (m) **Air Circulating Fan Removal**
 - (i) Remove Electronic Panel and Fan Speed Regulator as described in (b) and (c).
 - (ii) Remove Fan Speed Regulator Mounting Bracket.
 - (iii) Remove Air Circulating Fan retaining screw.
 - (iv) Withdraw fan assembly, handling with care.

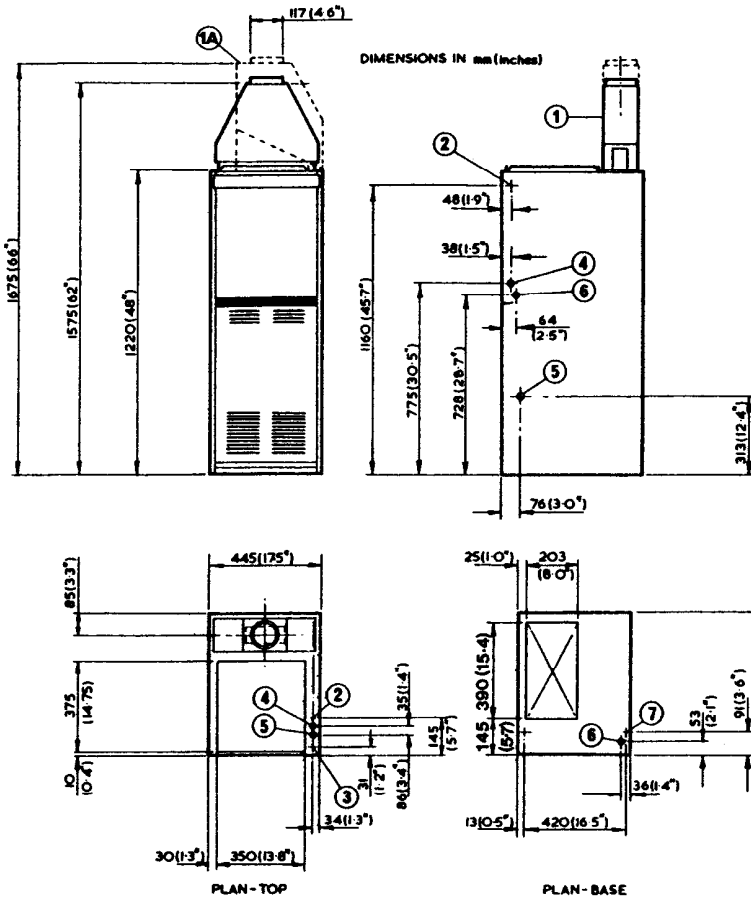
7. FAULT FINDING

- Note: (i) When purging or checking gas supplies, ensure there is adequate ventilation to the room or cupboard and all naked lights are extinguished.
- (ii) Before commencing fault finding, turn Thermista-stat to maximum setting, turn mains supply on and check that Time Control is at an ON position.
- (iii) Care must be taken during replacement and handling of electronic assemblies, viz. Electronic Panel, Fan Speed Regulator, Air Flow Sensor, 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.

| <i>Symptom</i> | <i>Possible Cause</i> | <i>Remedy</i> |
|---|--|--|
| (a) Pilot will not light | (i) No gas supply to heater. (ii) Gas supply not purged. (iii) Pilot orifice restricted. | Break gas tap union and listen for escape. Break gas tap union until gas is detected. Clear pilot orifice carefully or replace injector. |
| (b) Pilot lights but goes out on releasing START button. | (i) Connection between thermocouple and gas control not secure. (ii) Pilot flame too small. (iii) Faulty thermocouple. (iv) Faulty power unit on gas control. | Check connection is secure. Adjust. Replace thermocouple. Replace power unit. |
| (c) Pilot lights but goes out after normal operation. | As stated above for (b). | As stated above for (b). |
| (d) Main burner not lighting (Pilot alight, 24V across gas control. | (i) Pressure regulator set too low. (ii) Gas control operator faulty. | Screw down and adjust to required pressure. Replace operator. |

| | | |
|---|--|--|
| (e) Main burner not lighting (Pilot alight, NO 24V across gas control). | <ul style="list-style-type: none"> i) Fault in mains supply. ii) Internal 1.5A fuse blown. iii) Replacement fuse blows due to fault in gas control operator. iv) Replacement fuse blows due to fault in Electronic Panel. v) Fault in external wiring to Thermista-stat: <ul style="list-style-type: none"> a) Break in circuit. b) Reversed polarity. vi) Faulty Thermista-stat. vii) Faulty Limit Control. viii) Faulty Electronic Panel. | <p>Check supply. Replace fuse. Disconnect wires to gas control and if fuse remains intact, replace operator and check connections. Replace Electronic Panel.</p> <p>Check for continuity by shorting wires at Thermista-stat. Main burner should light. Check for correct polarity by reversing connections at Thermista-stat terminal block. Replace Thermista-stat. Short across control and replace if necessary. Replace Electronic Panel.</p> |
| (f) Main burner lights but fan fails to operate when override switch is set to CONTINUOUS. | <ul style="list-style-type: none"> i) Poor electrical connections on fan circuit. ii) Faulty fan assembly. iii) Faulty panels. | <p>Check connections, especially plug and socket contacts. It is important that the 6 way plug and cap is making good contact Replace fan assembly. Replace Electronic Panel and Fan Speed Regulator – ONE at a time.</p> |
| (g) Main burner lights but fan fails to run when override switch is set to AUTO from CONTINUOUS. | <ul style="list-style-type: none"> i) Faulty panels. ii) Faulty Air Flow Sensor. | <p>Replace Electronic Panel and Fan Speed Regulator – ONE at a time. Short across Air Flow Sensor. If Fan runs, replace sensor.</p> |
| (h) Main burner remains ON with controls set to OFF. | <ul style="list-style-type: none"> i) Faulty Thermista-stat. ii) Short to earth in external wire to Thermista-stat. | <p>Replace Thermista-stat. Check and rectify. Note: return wire from Thermista-stat is connected to earth within heater.</p> |
| (j) Insufficient heating. | <ul style="list-style-type: none"> i) Heater gas rate low. ii) Limit control operation due to: <ul style="list-style-type: none"> a) Temperature rise set too high. b) Air filter or return-air path restricted. c) Excessive number of outlets closed. d) Limit Control out of calibration. iii) Incorrect siting of Thermista-stat. iv) Thermista-stat out of calibration. v) Insufficient return-air relief. vi) Substandard installation e.g. Poor insulation, faulty duct connections or damaged ductwork. | <p>Check and adjust gas rate accordingly. Adjust fan speed and/or gas rate accordingly. Check filter for cleanliness and return-air path for obstruction. Open additional outlets. Replace Limit Control. Reposition. Replace Thermista-stat. Check for relief and where no provision has been made, fit grilles to area/s where no positive return-air collection is made. Check velocities and underfloor heat losses.</p> |
| (k) Heater operates outside required periods (applicable only when equipped with a Time Control). | <ul style="list-style-type: none"> i) Time Control motor running slowly. ii) Time Control tappets slipping. iii) Time Control tappets not set in correct sequence. | <p>Replace Time Control. Replace Time Control. Refer to Time Control operating instructions and set tappets accordingly.</p> |

8. DIMENSIONS & DATA



- 1 Draught Diverter – standard type used with compartment or Slot-Fix installations.
- 1A Special Draught Diverter which **MUST** be used with Top Closure Sets **ONLY**. Diverter vents from one side only, and must be mounted with vent to exposed side of heater.
- 2 Grommets for electrical connection – both sides and top of heater.
- 3 Socket for Thermista-stat connection (plug also provided).
- 4 Knockouts for Flow connection – both sides and top of heater.
- 5 Knockouts for Return connection – both sides and top of heater.
- 6 Knockouts for gas connections – both sides and bottom of heater.
- 7 Slots for base duct fixing bolts 7 x 19 mm (9/32 x 3/4").

Fig. 7

9. WIRING DIAGRAM

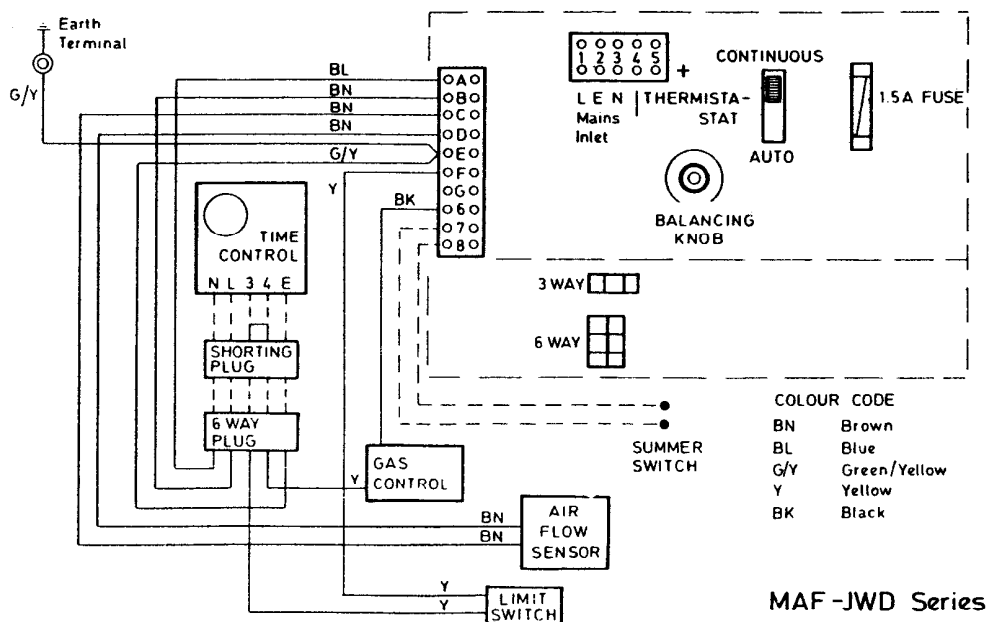


Fig. 8

10. SHORT LIST OF SPARE PARTS FOR MODEL JWD38/50/MAF WARM AIR HEATER

| G.C. Number | Makers' Number | Description | Qty. |
|--|------------------------|--|--------------|
| 389 185 | BOS 227 | Torin Corporation Ltd. Air Circulating Fan with integral motor. Amp-lok connection and earthwire Ref. DDN 913-700. | 1 |
| 388 968 | S-0016 | Replacement Motor Kit with mounting brackets Torin type U62010. | 1 |
| 230 416 | JWD38/153Y | Filter Tray Assembly. | 1 |
| | BOS 1248 | Electronic Panel. | 1 |
| 385 102 | BOS 105 | Honeywell Limit Control – L4069C 1066. | 1 |
| | BOS 1245 | Air Flow Sensor | 1 |
| | BOS 1301 | Honeywell 'Compact' Gas Control – ½" B.S.P.– V8600 1020 | 1 |
| 390 420 | BOS 311 | Honeywell Pilot Burner Assembly with BCR 18 orifice – Q314A | 1 |
| 390 210 | BOS 36 | Honeywell Thermocouple – Q309A 1236 | 1 |
| | BOS 1237 | Fuse 1.5A, 1¼" long. | 1 |
| 230 061 | BOS 457 | Plug for Thermista-stat connection – Belling & Lee L1495/P. | 1 |
| 230 399 | BBA 3640X | Burner Arm. | 2 |
| 229 814 | BOS 3025/KM | Main Injector – 2.35mm dia. | 2 |
| 399 382 | BOS 377/2 | Cross Lighting Injector – Bray size 236/0. | 1 |
| | BOS 1249 | Wiring Harness. | 1 |
| | BOS 1244 | Fan Speed Regulator | 1 |
| | BOS 1242 | Thermista-stat. | 1 |
| ADDITIONAL SPARES FOR TOWN GAS HEATERS | | | |
| 230 417 | BBA 3825/JM | Main Injector – Groups 4 & 5 – 4.7mm dia. | 2 |
| 230 269 | BBA 3825/AM | Main Injector – Group 6 – 5.2mm dia. | 2 |
| 399 385 | BOS 377/3 | Cross Lighting Injector – Bray size 236/2 | 1 |
| | BOS 371/4 | Pilot Orifice – Honeywell CAR 22. | 1 |
| ADDITIONAL SPARES FOR PROPANE GAS HEATERS | | | |
| | BBA 3825/MM | Main Injector – 1.60mm dia. | 2 |
| | BOS 377/4 | Cross Lighting Injector – Bray size 236/00. | 1 |
| | BOS 371/3 | Pilot Orifice – Honeywell BBR 10. | 1 |
| | BOS 847 | Honeywell Gas Control Blanking Plate Kit. | 1 |
| WHEN A TIME CONTROL IS FITTED (optional extra) THE FOLLOWING SPARE IS AVAILABLE | | | |
| 390 068 | BOS 310 | Horstmann Time Control – type 'Emerald' 423/J&S4W. | 1 |

Johnson & Starley Ltd

Rhosili Road, Brackmills, Northampton NN4 0LZ.
Telephone 0604 62881 Telex 312461

PRINTED IN ENGLAND