



J54-64/MAF Warm Air Heaters with MODAIRFLOW Controls

Installation & Maintenance Instructions

(56-53)
UDC 697.3

Publication ZZ 195/3

The J54-64/MAF is a Gas Fired Warm Air Heater fitted with MODAIRFLOW Electronic Controls for open flue application.

Output is adjustable between 15.8 – 18.8 kW (57 MJ/h, 54,000 Btu/h to 67.5 MJ/h, 64,000 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 J54-64/MAF/JAN.

To fit a JANUS water heater on site, obtain from Johnson & Starley Ltd. a JANUS 3 Water Heater and KK64 Fittings Kit.

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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

Johnson & Starley Ltd

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

J54-64 & J54-64/MAF AIR HEATER

- 1 Air Filter.
- 2 Air Circulating Fan
- 3 3A Fuse (basic model)
- 3A 1.5A Fuse (Modairflow model)
- 4 Fan Override Switch (Modairflow model)
- 5 Fan Speed Selector
- 6 Position of X-A Time Control (when fitted)
- 7 Gas Connection Tee — ½" BSP (with blanking plug)
- 8 Overheat Limit Control
- 9 Union Gas Tap — ½" BSP Female (supplied loose)
- 10 Fan Control (basic model)
- 10A Airflow Sensor (Modairflow model)
- 11 Combination Gas Control
- 12 Data Plate
- 13 Pressure Test Point
- 14 Safety Pilot Burner
- 15 Burner Bar Assembly
- 16 Thermista-stat (Modairflow model)
- 17 Fan Speed Regulator (Modairflow model)
- 18 Balancing Knob (Modairflow model)

KK64 WATER HEATER FITTINGS KIT

- 51 22mm water 'flow' elbow and pipe (not provided)
- 52 Gas feed pipe to water heater
- 53 Flue cap and connection
- 54 Water heater mounting bracket

JANUS 3 WATER HEATER

- A 'Flow' connection — ¾" BSP. Female
- B Thermostat Phial
- C 'Return' connection — ¾" BSP. Female
- D Water Heater Body
- E Pilot Burner
- F Water Temperature Control Knob
- G START Button
- H Gas connection
- J OFF Button
- K Burner and Controls

These items are supplied loose:—

- Draught Diverter — fixing screws in heater top
 - Thermista-stat Plug
 - Gas Tap
 - Thermista-stat — in air heater
- } supplied in linen bag*

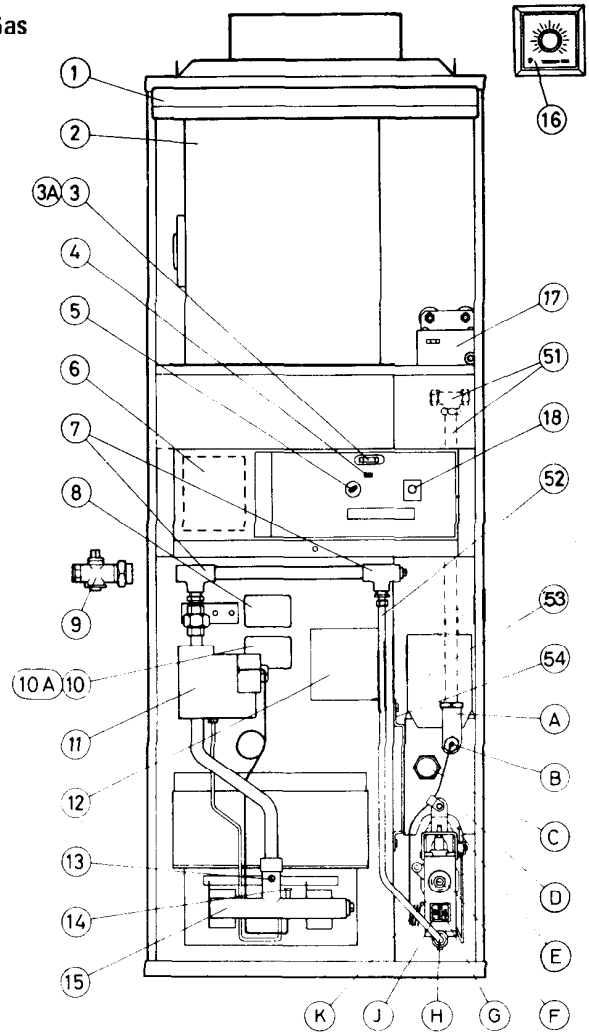


Fig. 1

2. WARM AIR INSTALLATION REQUIREMENTS

Installation should be in accordance with:—

Building Regulations.

British Standard Code of Practice CP 332 Part 4.

Institute of Electrical Engineers Regulations.

British Standard Code of Practice CP337 : 1963 (Flues for Gas Appliances).

British Gas Material and Installation Spec. Latest Edition.

(a) Ventilation of Heater Compartment

	Ventilation from inside building	Ventilation direct from outside building
Low Level grille	free area. 548 cm ² (85 in ²)	274 cm ² (42 in ²)
High Level grille	free area. 274 cm ² (42 in ²)	137 cm ² (21 in ²)

(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 105 cm² (16 in²).

The above areas allow combustion air for Janus water heater.

(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 5 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. This cable suitable for 240V, 50 Hz, single phase supply, must be protected by a 3A 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 (facing) side of 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 + side on electronic panel.
- (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. 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:

- Sides – 75mm (3") total.
25mm (1") minimum at only one side.
- Front – 75mm (3") minimum.
- Back – 25mm (1") minimum.

Servicing access required to the front of the heater is 560mm (22"). It is recommended that the access door to the heater cupboard be large enough to permit 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 BT 64 See Figs. 2 and 3.

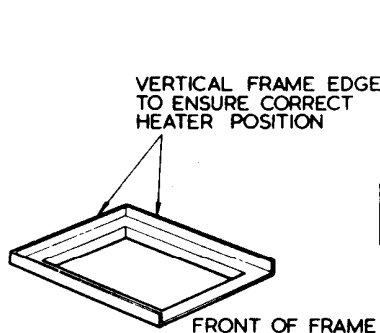


Fig. 2

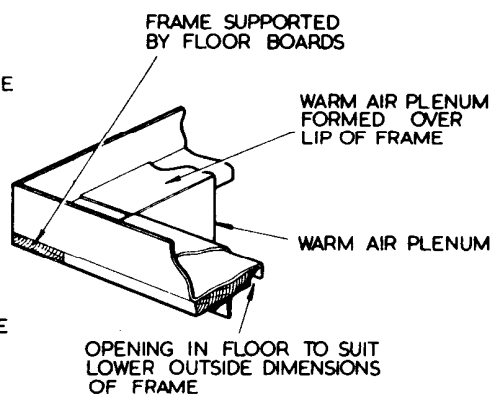


Fig. 3

4. AIR HEATER FIXING

- (a) FIT DRAUGHT DIVERTER over heater flue spigot on the top of heater and secure with three 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 4 and 12 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 210°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 envelopes thermocouple tip. To adjust flame, remove screw cap from adjustment point (see Fig. 1) 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	Btu/h	MJ/h	kW	Btu/h	MJ/h	kW	Btu/h	MJ/h	
INPUT		22.4	76,500	80.7	24.6	84,000	88.6	26.0	88,500	93.4	
OUTPUT		15.8	54,000	57.0	17.6	60,000	63.3	18.8	64,000	67.5	
GAS RATE (500cv)		4.33 m ³ /h		(153ft ³ /h)	4.75 m ³ /h		(168ft ³ /h)	5.01 m ³ /h		(177ft ³ /h)	
GAS RATE (1000cv)		2.16 m ³ /h		(76.5ft ³ /h)	2.38 m ³ /h		(84ft ³ /h)	2.50 m ³ /h		(88.5ft ³ /h)	
GAS	INJECTOR dia.mm	BURNER BAR PRESSURES (measured hot)									
G4	5.2	3.7mbar	1.5in	4.5mbar	1.8in	5.2mbar	2.1in				
G5	5.2	4.5mbar	1.8in	5.2mbar	2.1in	6.0mbar	2.4in				
G6	5.7	3.7mbar	1.5in	4.5mbar	1.8in	5.2mbar	2.1in				
NATURAL	2.65	12.4mbar	5.0in	14.9mbar	6.0in	16.5mbar	6.7in				
PROPANE	1.7	Lower rates not available					35.0mbar	14.0in			

Fig. 4

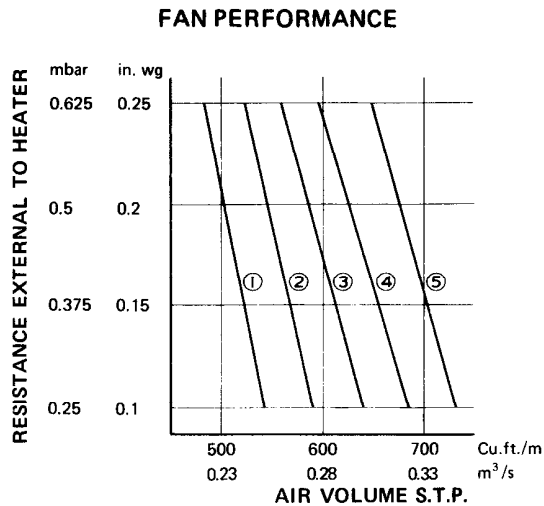


Fig. 5

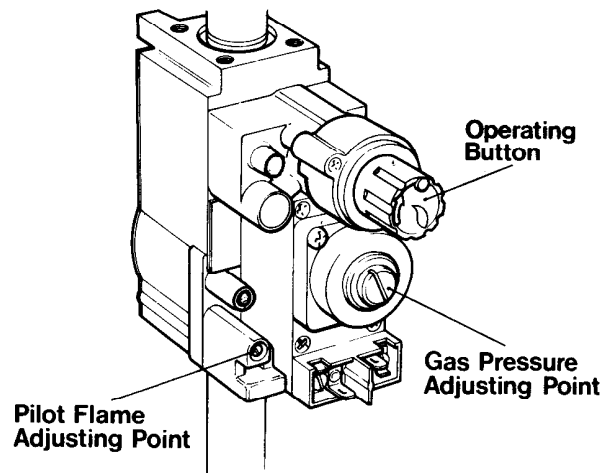


Fig. 6

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.

N.B. For access to Electronic Panel, Time Control (if fitted) and 1.5A Fuse, remove Electronic Panel Cover.

For access to Air Circulating Fan and Fan Speed Regulator, remove Electronic Panel Cover, Air Filter and Fan Chamber Door.

(j) Time Control Removal

- (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, 6 way and Thermista-stat plugs.
- (ii) Disconnect all leads from terminal block.
- (iii) Remove Time Control together with its mounting plate from Electronic Panel.
- (iv) Loosen four retaining screws and lift off panel.

(l) Fan Speed Regulator Removal

- (i) Disconnect 3 way and 6 way plugs from Electronic Panel.
- (ii) Release harness from cable clip.
- (iii) Disconnect fan plug from Fan Speed Regulator.
- (iv) Remove nut and bolt fixing.

Note: It is important that harness is retained in cable clip when replacing.

(m) Air Circulating Fan Removal

- (i) Disconnect plug from Fan Speed Regulator and remove fan retaining plate.
- (ii) Withdraw fan assembly, handling with care.

Note: It is important that lead is retained in cable clip when replacing fan assembly.

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).	(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: (a) Break in circuit. (b) Reversed polarity. (vi) Faulty Thermista-stat. (vii) Faulty Limit Control (viii) Faulty Electronic Panel.	Check supply. Replace fuse. Disconnect wires to gas control and if fuse remains intact, replace operator and check connections. Replace Electronic Panel. 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.
(f) Main burner lights but fan fails to operate when override switch is set to CONTINUOUS.	(i) Poor electrical connections on fan circuit.	Check connections, especially plug and socket contacts. It is important that the 6 way plug and cap is making good contact.

- | | | |
|--|---|---|
| <p>(g) Main burner lights but fan fails to run when override switch is set to AUTO from CONTINUOUS.</p> <p>(h) Main burner remains ON with controls set to OFF.</p> <p>(j) Insufficient heating.</p> | <p>ii) Faulty fan assembly.</p> <p>iii) Faulty panels.</p> <p>i) Faulty panels.</p> <p>ii) Faulty Air Flow Sensor.</p> <p>i) Faulty Thermista-stat</p> <p>ii) Short to earth in external wire to Thermista-stat.</p> <p>i) Heater gas rate low.</p> <p>ii) Limit control operation due to:</p> <p>a) Temperature rise set too high.</p> <p>b) Air filter or return-air path restricted.</p> <p>c) Excessive number of outlets closed.</p> <p>d) Limit Control out of calibration.</p> <p>iii) Incorrect siting of Thermista-stat.</p> <p>iv) Thermista-stat out of calibration.</p> <p>v) Insufficient return-air relief.</p> <p>vi) Substandard installation e.g. Poor insulation, faulty duct connections or damaged ductwork.</p> <p>i) Time Control motor running slowly.</p> <p>ii) Time Control tappets slipping.</p> <p>iii) Time Control tappets not set in correct sequence.</p> | <p>Replace fan assembly.</p> <p>Replace Electronic Panel and Fan Speed Regulator – ONE at a time.</p> <p>Replace Electronic Panel and Fan Speed Regulator – ONE at a time.</p> <p>Short across Air Flow Sensor. If Fan runs, replace sensor.</p> <p>Replace Thermista-stat.</p> <p>Check and rectify. Note: return wire from Thermista-stat is connected to earth within heater.</p> <p>Check and adjust gas rate accordingly.</p> <p>Adjust fan speed and/or gas rate accordingly.</p> <p>Check filter for cleanliness and return-air path for obstruction. Open additional outlets.</p> <p>Replace Limit Control.</p> <p>Reposition.</p> <p>Replace Thermista-stat.</p> <p>Check for relief and where no provision has been made, fit grilles to area/s where no positive return-air collection is made.</p> <p>Check velocities and underfloor heat losses.</p> <p>Replace Time Control.</p> <p>Replace Time Control.</p> <p>Refer to Time Control operating instructions and set tappets accordingly.</p> |
| <p>(k) Heater operates outside required periods (applicable only when equipped with a Time Control)</p> | | |

8. DIMENSIONS & DATA

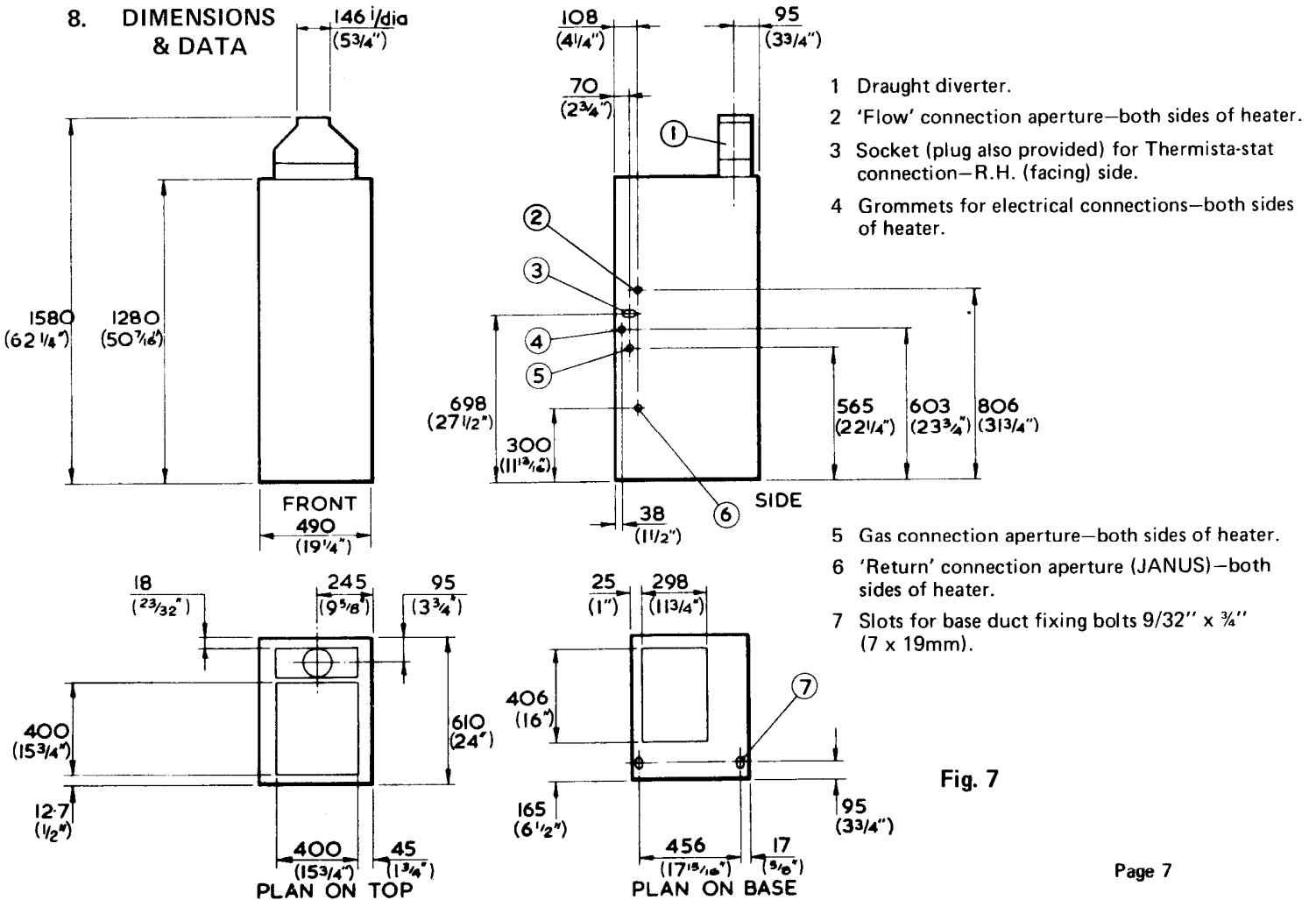


Fig. 7

9. WIRING DIAGRAM

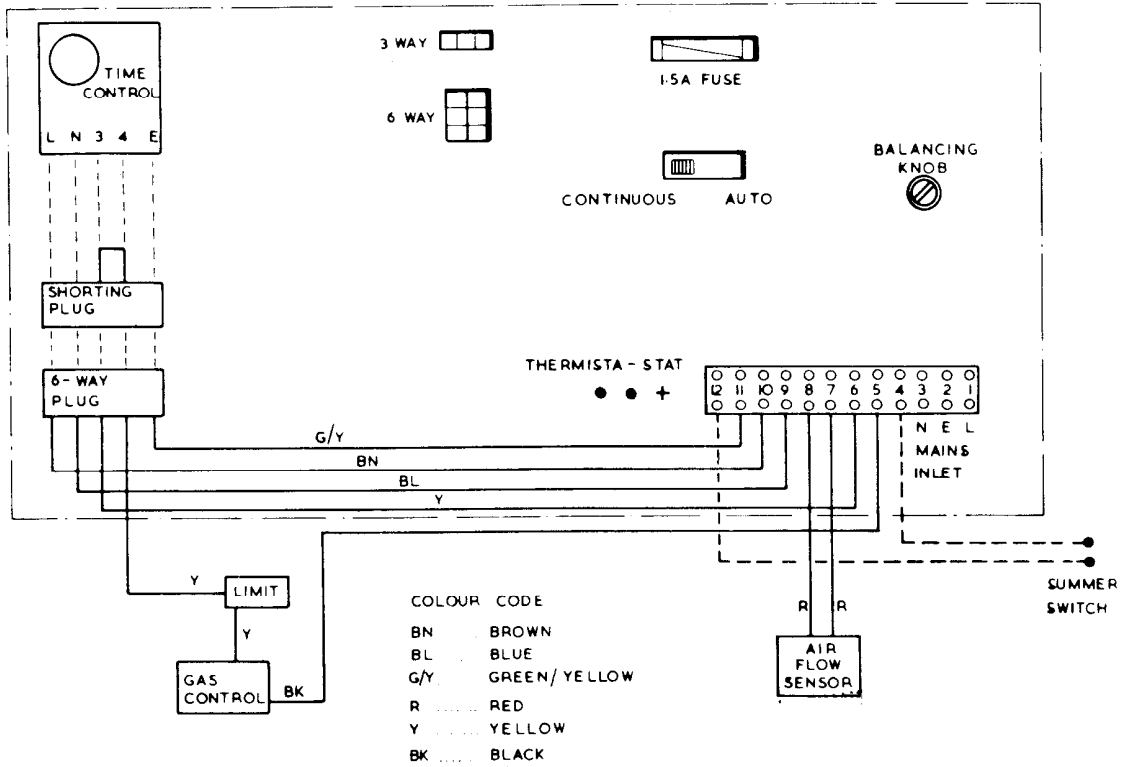


Fig. 8

10. SHORT LIST OF SPARE PARTS FOR J54-64/MAF WARM AIR HEATER

G.C. Number	Makers' Number	Description	Qty.
389 076	BOS 685/2	Torin Corp. Ltd. Air Circulating Fan with integral motor - 6mf capacitor, special flange. Amp-lok connection and earth wire. Ref. DDN 913-824 spec. 2805 with UE 1/8 HP motor U54430.	1
230 265	S.0069	Replacement Motor Kit with mounting brackets - Torin 2939	1
	J54-64/146Y	Filter Tray Assembly.	1
	BOS 1250	Electronic Panel	1
	BOS 1245	Air Flow Sensor	1
385 102	BOS1244	Fan Speed Regulator	1
	BOS 105	Honeywell Limit Control - L4069C 1066	1
390 210	BOS 1301	Honeywell 'Compact' Gas Control - 1/2" BSP - V8600C 1020	1
	BOS 36	Honeywell Thermocouple - Q309A/1236	1
390 420	BOS 1237	Fuse - 1.5A, 1 1/2" long	1
	BOS 311	Honeywell Pilot Burner with BCR 18 orifice - Q314A	1
230 271	BBA 3826X	Burner Arm	2
399 382	BBA 3825/CM	Main Injector - 2.65mm dia.	2
230 061	BOS 377/2	Cross Lighting Injector - Bray size 236/1	1
	BOS 457	Thermista-stat plug Belling & Lee ref. L1495/P	1
	BOS 1242	Thermista-stat	1
ADDITIONAL SPARES FOR TOWN GAS HEATERS			
230 269	BBA 3825/AM	Main Injector - Groups 4 & 5 - 5.2mm dia.	2
230 270	BBA 3825/BM	Main Injector - Group 6 - 5.4mm 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/DM	Main Injector - 1.7mm 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