

JGD50/65Cv DOWNFLOW
WARM AIR HEATER

SfB (56)
UDC 697.3

Installation & Maintenance Instructions

Publication JA58-3

The JGD50/65v is a range rated gas fired downflow warm air heater for conventional flue application. Output can be adjusted to 50.000 Btu/h (12.600 Kcal/h. 14.65 KW/h) 55.000 Btu/h (13.850 Kcal/h.16.1 KW/h) 60.000 Btu/h (15.100 Kcal/h. 17.6 KW/h). or 65.000 Btu/h (16.350 Kcal/h. 19.0 KW/h).

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1. HEATER COMPONENTS CHECK

Nuts (2) Bolts (2) and washers (4) for Base Duct fixing.
Draught Diverter (1) and Screws (2)
Gas Cock (1)
2 pin plug for Thermostat connection (1)
Room Thermostat (1).

2. PREPARATION

a) HEATER INSTALLATION CLEARANCES - from Combustible Material.

Back and Sides 0" (0mm)
Front 3" (77mm)

It is recommended that the access door to the heater cupboard be large enough to permit removal. Service access required to the front of the heater is 18" (457mm)

b) INSTALLATION ON SUSPENDED FLOORS

When an underfloor warm air plenum is used insulation can be provided by using a J.& S. Base Tray - BT.45 (SEE FIG.1 & 2).

FIG 1

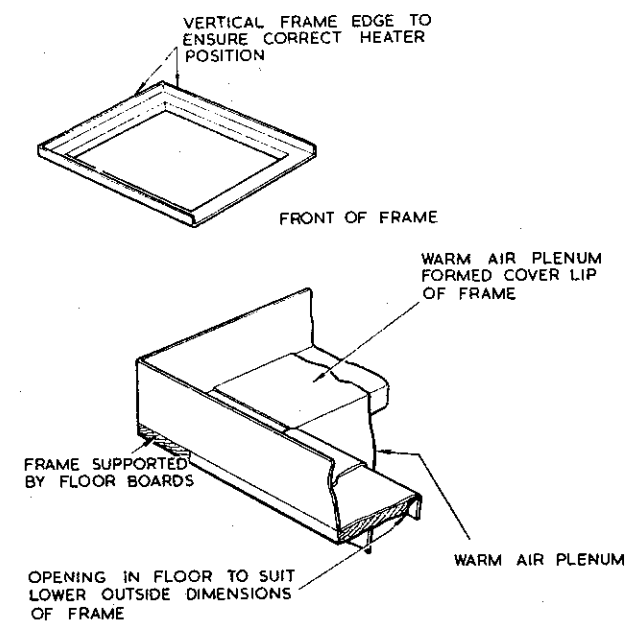


FIG 2

c) ELECTRICAL.

A 220/250 Volt socket should be provided adjacent to the heater. The 24 volt room thermostat wires should be brought into heater cupboard and sufficient length left to enable connection to be made to thermostat socket which is on left hand (facing) side of heater.

3. FITTING SEQUENCE

a) Fit draught diverter over heater flue spigot, on top of heater towards rear, and secure with two screws to top of heater cabinet.

b) Carefully lift heater into heater cupboard and set on insulating frame for suspended floors or sunken warm air plenum for solid floors. Make sure no leakage of air occurs between heater and base duct.

c) The flue should now be connected using split clip above draught diverter, and be completed before return air plenum is fitted.

NOTE: The flue must be supported to relieve its weight from the heater.

4. RETURN AIR

This may now be attached.

5. GAS SUPPLY

This may now be fitted.

The gas connection should be in 3/4" pipe or larger dependent upon length of pipe run from meter. Gas pipe may enter heater from either side, a 3/4" female elbow is fitted for connection and a 3/4" BSP. cock is also provided loose.

6. ELECTRICAL CONNECTIONS

a) **MAINS** Heater is supplied complete with mains lead connected to terminal strip, this may pass out of heater at either side, and should be fitted with a 3 pin plug having a 5 amp fuse and be suitable for mains socket provided within heater cupboard. Earth connection must be fitted.

b) **ROOM THERMOSTAT** A 24V. two pin socket is provided on left hand (facing) side of heater. The two pin plug provided should be connected to 24V. room thermostat wires brought into heater cupboard and plug fitted to heater socket. Alternatively thermostat wires may enter right hand (facing) side of heater but must then be connected directly to terminal block.

c) **TIME CONTROL** A Horstmann Type 423 Emerald or similar is recommended. It is important that Wiring Diagram Section 13 is followed, and an independent power supply is used.

7. COMMISSIONING

- Check that at least half the register/diffusers are open.
- Set room thermostat anticipator to 0.5, and set the thermostat pointer to OFF.
- Check both Fan and Limit Switches for correct settings, see specification.
- Fit gas pressure gauge to test point on burner manifold.
- Turn on gas supply and bleed of air.
- Switch on electricity.
- Light heater (See instructions inside heater lower door).

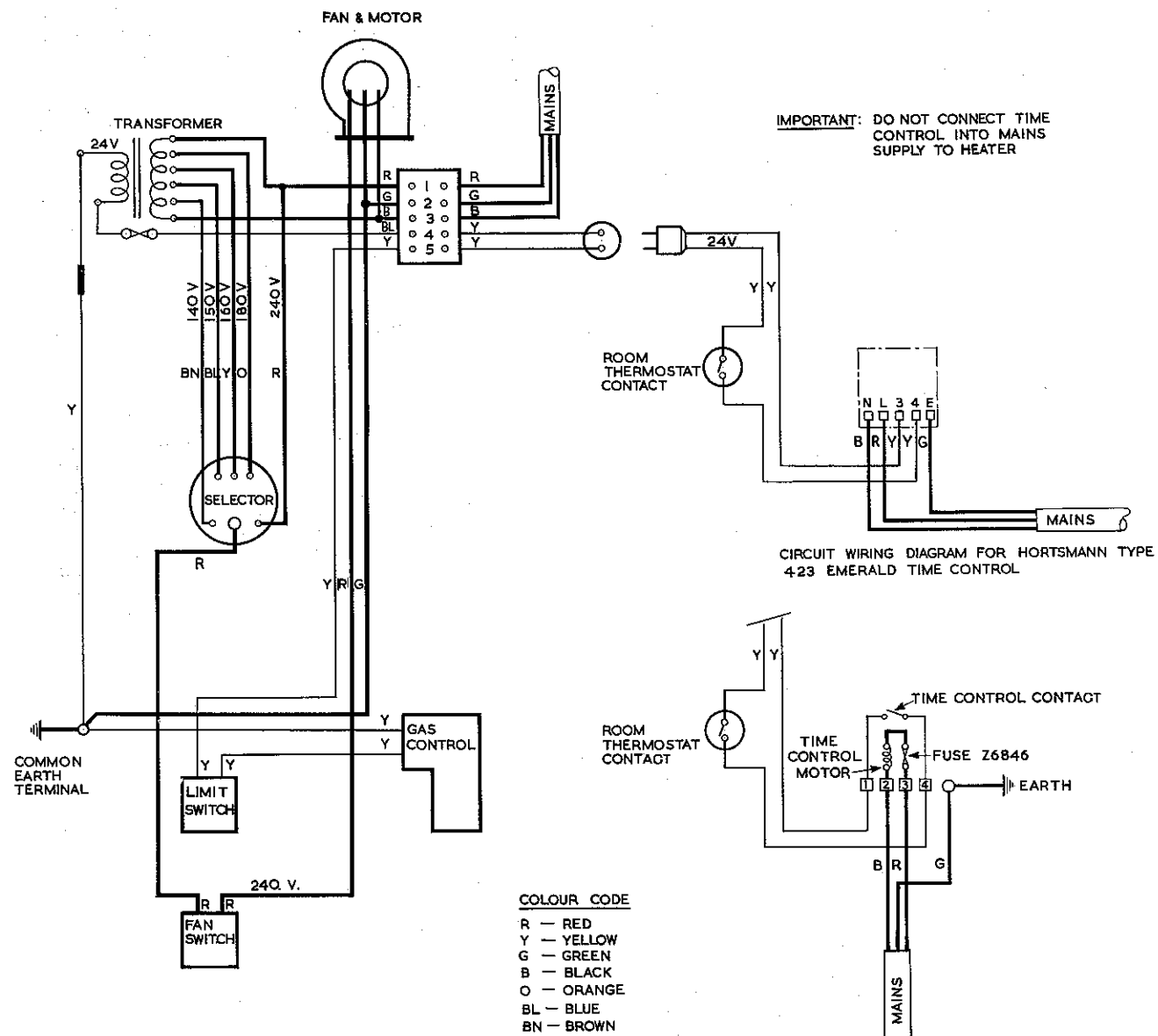
NOTE: The circulating Air Fan operates a short time after burner has lit i.e. when sufficient heat is available in heat exchanger - and shuts down a short time after main burner has gone out i.e. when all useful heat has been removed from heat exchanger.

h) Check gas rate and confirm by burner bar pressure after 20 minutes operation.

SPARE PARTS - SHORT LIST FOR JGD50/65Cv DOWNFLOW WARM AIR HEATER GAS COUNCIL APPLIANCE NUMBER 42 416 59

G.C. NUMBER	MAKERS PT. NO.	DESCRIPTION	QTY
38-86-72	90F2W	Air circulating fan with integral motor, amp-lok cap and earth wire. BOS.267. (Airflow Developments Ltd.)	1
22-97-20	BOS.225	Polyurethane washable filter, 16 1/4" x 15" x 1/2" - 20 (401.8 x 403.2 x 12.7 mm) Porosity. Filter Tray Assembly.	1
22-97-43	JWD32/147Y		1
22-98-07	BOS.262	Hinchley Size 615 Auto Transformer with selector panel and plug (Fan speed control).	1
22-95-50	L4069.1066 JGD50/500W	Honeywell Limit Control BOS.105. Transformer and Loom Assy.	1
22-95-49	L4068C1026	Honeywell Fan Control BOS.104.	1
22-98-27	BOS.384	Glass Fuse 2 amp rating 1 1/4" Long	1
39-22-44	V8292A 1225	Honeywell Gas Control BOS.34	1
39-22-45	Q314A	Honeywell Pilot Burner BOS.311.	1
39-01-38	Q309A 1236	Honeywell Thermocouple 30" long BOS.36.	1
	JGD50/750W	Burner Bar Assembly	1
	BBA/3620/C	Main Injector Gas Groups 3, 4 & 5	3
	BBA/3620/D	Main Injector Gas Group 6	3
	236/2	Bray Cross Lighting Jet	1
	225SW	Thermostat Plug and socket	1
	T803A/1001	Honeywell Room Thermostat	1
		ADDITIONAL SPARES FOR NATURAL GAS HEATERS.	
	BBA3620/J	Main Injector	3
	390686/4	Pilot Injector BCR 18	1
	236/0	Bray Cross Lighting Jet	1
	42000243-001	Gas Governor Spring	1

13. WIRING DIAGRAM



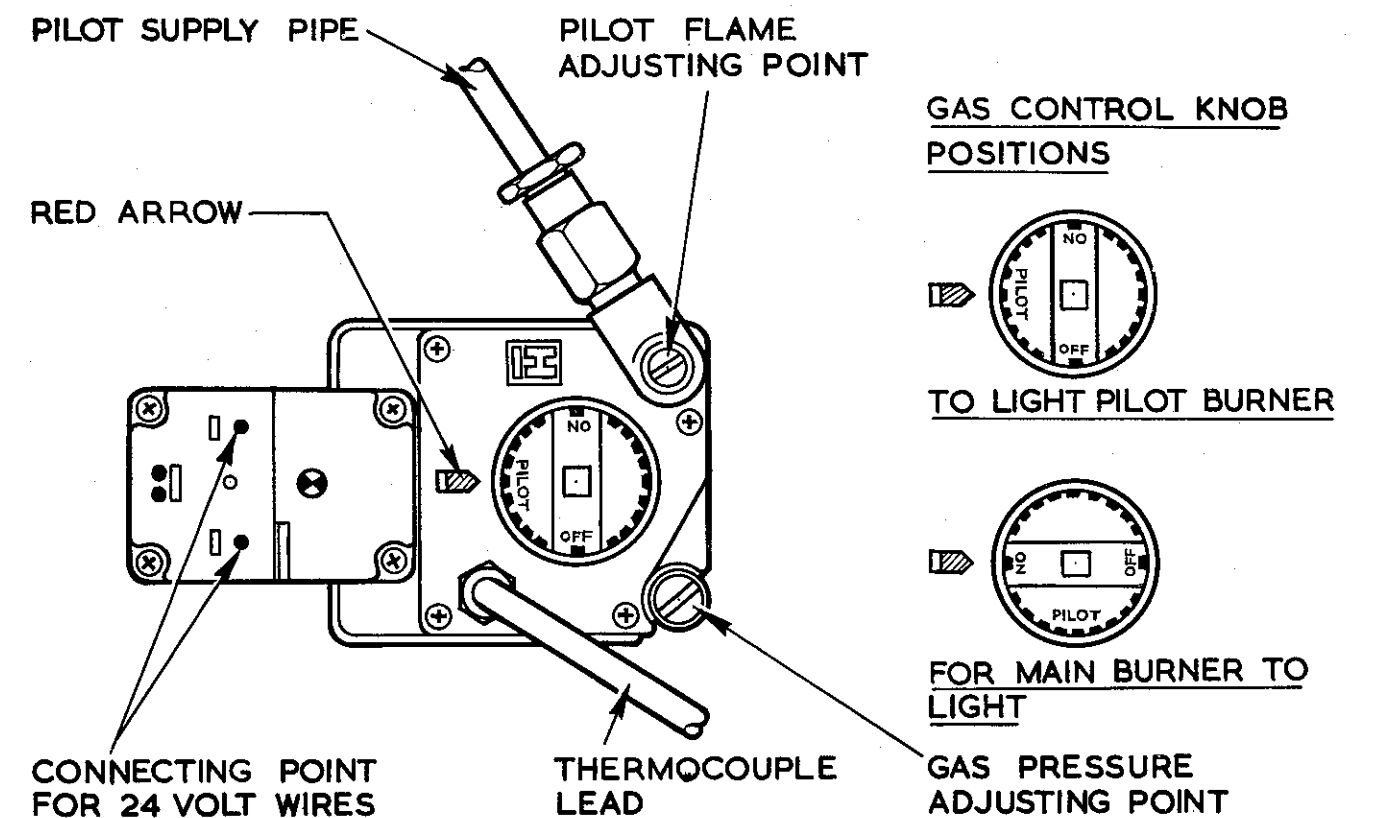
INPUT	Kcal/h	16.800	18.500	20.150	21.800
	Btu/h	66.700	73.400	80.000	86.700
	KW/h	19.5	21.5	23.4	25.4
OUTPUT	Kcal/h	12.600	13.850	15.100	16.350
	Btu/h	50.000	55.000	60.000	65.000
	KW/h	14.65	16.1	17.6	19.0
GAS RATE	TOWN GAS	133	147	160	173
	NATURAL GAS	66.7	73.4	80	86.7

Gas Rates based on 500cv & 1000cv gases

FIG 3

BURNER BAR PRESSURES AND INJECTOR SIZES										
	G.3		G.4		G.5		G.6		NATURAL	
	PRESS	INJ.	PRESS	INJ.	PRESS	INJ.	PRESS	INJ.	PRESS	INJ.
	in wg mm H ₂ O	in (mm)	in wg mm H ₂ O	in (mm)	in wg mm H ₂ O	in (mm)	in wg mm H ₂ O	in (mm)	in wg mm H ₂ O	in (mm)
50,000	1.0 (25.4)	0.166 (4.22)	1.1 (28)	0.166 (4.22)	1.3 (33)	0.166 (4.22)	1.1 (28)	0.181 (4.60)	4.4 (112)	0.089 (2.26)
55,000	1.2 (30.5)	0.166 (4.22)	1.4 (35.6)	0.166 (4.22)	1.6 (40.6)	0.166 (4.22)	1.4 (35.6)	0.181 (4.60)	5.4 (137.2)	0.089 (2.26)
60,000	1.4 (35.6)	0.166 (4.22)	1.6 (40.6)	0.166 (4.22)	1.9 (48.3)	0.166 (4.22)	1.6 (40.6)	0.181 (4.60)	6.4 (162.6)	0.089 (2.26)
65,000	1.6 (40.6)	0.166 (4.22)	1.9 (48.3)	0.166 (4.22)	2.2 (55.9)	0.166 (4.22)	1.9 (48.3)	0.181 (4.60)	7.5 (190.5)	0.089 (2.26)

FIG 4



V8292 COMBINATION GAS CONTROL

FIG 5.

j) Adjust pilot flame if necessary. The pilot flame should be adjusted to just envelope thermocouple tip. To adjust pilot flame, remove screw dust cap on Gas Control. SEE FIG.5. Within turrett will be found a small adjusting screw which increases or decreases gas flow to pilot burner if screwed anti-clockwise or clockwise respectively.

k) Adjust inlet gas pressure if necessary. Heaters are sent from Factory set to gas group specified on customers order, but to maximum output of the particular group. Adjustment is carried out by removing dust cap of gas pressure adjustment point. SEE FIG.5. After removing cap another screw can be seen which if screwed clockwise increases the gas flow and if screwed anti-clockwise decreases the gas flow. See FIGS 3 & 4 for gas rate and burner bar pressure.

l) Set time control as manufactures instructions.

m) Adjust circulating Air Fan speed by means of selector plug on front of transformer housing - SEE FIG.7, so that temperature difference between warm air at register/diffuser nearest to heater and return air entering the heater is asrequired by system design. Adjustment should then be made to each register/diffuser damper to obtain calculated CFM for each room according to design data, and damper positioning screws set accordingly. Temperature rise across heater should then be re-checked, re-adjusted if necessary and final adjustment made to each register/diffuser damper.

8. SERVICING

a) The only electrical or mechanical components which may cause trouble are listed below:-

EXTERNAL WIRING. LIMIT SWITCH BURNER

INTERNAL WIRING. FAN SWITCH MAIN INJECTOR

FAN GAS CONTROL PILOT INJECTOR

TRANSFORMER TIME CONTROL 2 AMP FUSE

SWITCH OFF ELECTRICITY REMOVE MAINS PLUG AND

TURN OFF HEATER GAS COCK BEFORE SERVICING.

b) Check the sympton against the FAULT FINDING LIST TO locate cause.

c) EXTERNAL WIRING.

Check with wiring diagram.

d) INTERNAL WIRING.

Check with wiring diagram as printed on back of upper heater door and in Section 13 of this instruction.

e) FAN.

- Remove heater door and air filter.
- Remove amp-lok plug from socket on transformer housing.
- Remove screw securing fan to heater diaphragm.

iv) Withdraw fan in horizontal plane taking care not to lift. Avoid placing fingers into fan scroll as fan impleler blades may be damaged or balance of fan disturbed.

f) TRANSFORMER.

- Remove fan as section 8E.
- Remove mains lead and thermostat wires from terminal block.
- Remove earth wires from earth terminal point on left hand side (facing) side of unit.

- Remove wires from gas control head, limit switch and fan switch.
- Remove two screws securing transformer housing to heater side.
- Transformer housing and wiring harness may now be removed from the heater.
- When replacing transformer the whole assembly of transformer, selector socket, transformer housing and wiring harness are replaced.

g) LIMIT SWITCH.

- Remove two 24V. wires from Limit Switch by inserting a screwdriver into rectangular holes adjacent to terminal holes and withdraw wires.
- Remove two self tapping screws securing switch to heater bulkhead and withdraw switch.

h) FAN SWITCH.

- Remove two 240V. wires from Fan Switch by inserting a screwdriver into rectangular holes adjacent to terminal holes and withdraw wires.
- Remove two self tapping screws securing switch to heater bulkhead and withdraw switch.

j) BURNER.

- Remove two 24V. wires from gas control head by inserting a screwdriver into rectangular holes adjacent to terminal holes and withdraw wires.
- Ensure gas supply to heater is off and unscrew union above gas control.
- Remove two pan head screws securing gas pipe steadying bracket to heater bulkhead, and two Phillips screws which hold burner steady, these are located just below the burner bar.
- Tilt gas control slightly forward and withdraw the burner, taking care not to damage.

k) GAS CONTROL.

- Remove burner as section 8J.
- Remove bush securing pilot supply to gas control turrett and ease pilot supply pipe clear.
- Remove bush securing thermocouple lead to gas control and ease lead away.
- Gas control may now be unscrewed from gas manifold.
- Remove union from gas control.

L) TIME CONTROL.

If fitted externally to heater - see Manufacturers instructions.

MAIN INJECTION

- Remove burner as section 8J
- Main injectors are now clearly visible from underside of each burner arm.
- Remove injectors with 7/16" A.F. Flat spanner, care should be taken to avoid damage to either injectors or main burner bars.

n) PILOT INJECTOR.

- Remove burner as section 8J.
- Remove bush securing pilot gas supply pipe to pilot burner and withdraw pilot gas supply pipe taking care not to damage.
- In the case of a screw-in injector, remove the second brass bush from base of pilot assembly, bush forms injector. In the case of a drop-in injector, slight pressure is required from top to ease injector from its seat.

11. SPECIFICATION

ELECTRICAL SUPPLY	220-250 Volts, 50 cycles, 5 amps.
MAINS CONNECTION	6 ft. (1830 m) external lead provided, high temperature P.V.C. sheathed.
GAS CONNECTION	3/4" B.S.P. FEMALE.
GAS COCK	3/4" UNION, provided loose.
ROOM THERMOSTAT	Honeywell T803/1001, 24V. with mercury switch.
ROOM THERMOSTAT CONNECTION	24 volt Plug and Socket on cabinet side.
TRANSFORMER	20VA. 24 volt. Hinchley size 615 with 5 way selector panel.
LIMIT SWITCH	Honeywell L4069C 180°F. OFF TEMP.
FAN SWITCH	Honeywell L4068C. Fan Off 100°F, DIFFERENTIAL 30 F. i.e. FAN ON 130°F
COMBINATION GAS CONTROL	Honeywell V8292A, 24 volt.
THERMOCOUPLE	Honeywell Q309A.
PILOT BURNER	Honeywell Q314A.
CIRCUIT FUSE	24 volt, 2 amp, 1 1/4" (31mm) cartridge.
FAN	Double entry centrifugal fan with integral motor. Type 90F2W Airflow Developments.
FAN MOTOR	Redmond Type AY6.
HEAT EXCHANGER	Crome diffused steel, welded.
FLUE CONNECTION	Socket for 4" (101mm) I.D. lightweight asbestos to BS.567
CABINET	Sheet steel galvanised, white stone enamelled externally.
WEIGHT	Air Heater with draught diverter 145 lbs. (66 kg)
BT.45	For use when heater is installed on combustible floor with underfloor plenum.

12. SUMMARY OF REQUIREMENTS AND RECOMMENDATIONS -FOR- WARM -AIR- SYSTEMS.

Regulations of importance concerning Gas Fired Warm Air Systems;
Building Regulations.
British Standard Code of Practice CP332 Part 4.
Institute of Electrical Engineers Regulations (External Wiring).

Johnson & Starley publish a "Warm Air Design Manual", Publication JA63 which is available upon request.

Information in the following paragraphs has been extracted from these regulations and, in some cases, amplified in the light of specific requirements of JGD50/65.

i) VENTILATION AND COMBUSTION AIR TO HEATER COMPARTMENT - MINIMUM REQUIREMENTS.

Low Level Grille, Free Area 65 sq. ins.
High Level Grille, Free Area 33 sq. ins.

ii) FLUES.

Building Regulations can be satisfied by a variety of materials, light weight asbestos is commonly used. NOTE that untreated asbestos is acceptable only for flues not exceeding 20 ft. (6m) serving the air heater only. Asbestos flues of over 20 ft., (6m) or of any length - if serving air heater and a water heater, must be treated with vinyl acetate or a similar protection.

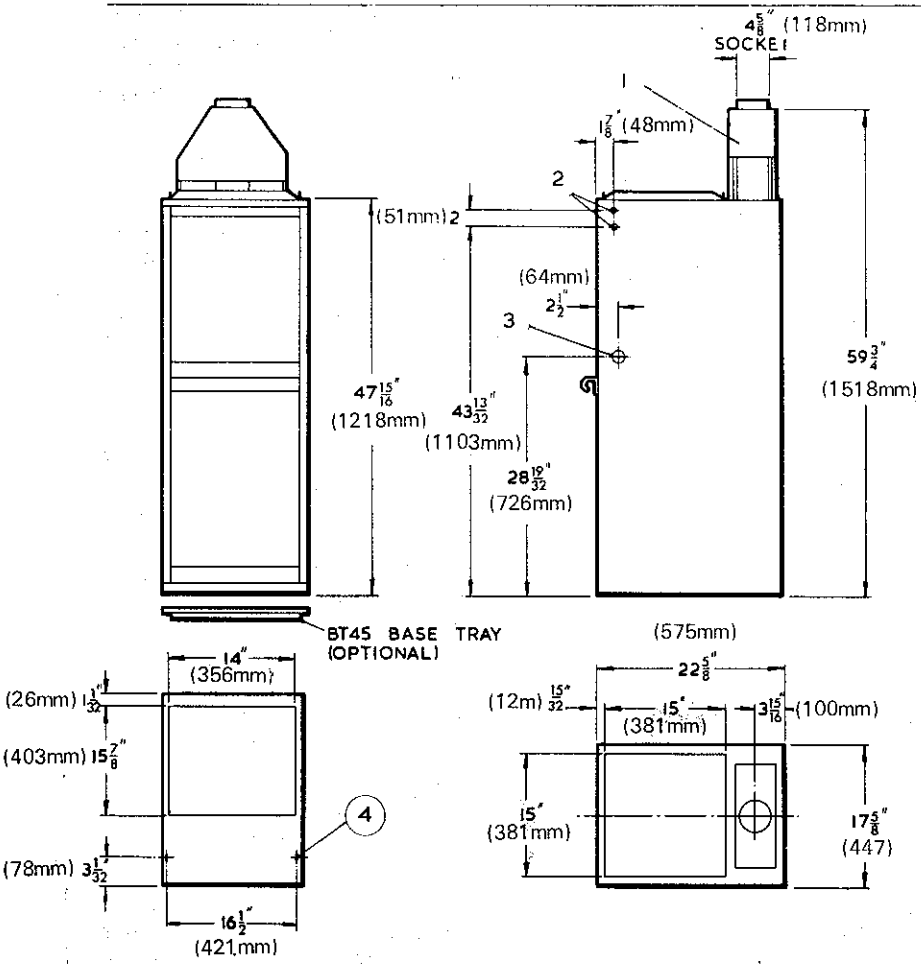


FIG 6.

JGD 50/65v

1. DRAUGHT DIVERTER.
2. GROMMET FOR ELECTRICAL CONNECTION - BOTH SIDES.
3. GAS CONNECTION APERTURE - BOTH SIDES.
4. SLOTS FOR BASE DUCT FIXING BOLTS 9/32" x 3/4". (7mm x 21mm)

AIR HEATER

1. AIR FILTER.
2. TERMINAL BLOCK.
3. FAN SPEED SELECTOR.
4. AIR CIRCULATING FAN.
5. UNION GAS COCK - LOOSE.
6. GAS CONNECTION ELBOW - 3/4" B.S.P. FEMALE.
7. COMBINATION GAS CONTROL.
8. OVERHEAT LIMIT CONTROL.
9. FAN CONTROL.
10. COMBUSTION CHAMBER FRONT PLATE.
11. SAFETY PILOT.
12. MULTI GAS BURNER.

Provided but not shown.

T803 1001 Room thermostat, draught diverter and 6ft. (1.830m) external mains lead.

FIG 7.

- o) **THERMOCOUPLE.**
 - i) Remove burner as section 8J.
 - ii) Remove bush securing thermocouple lead to gas control and ease lead away.
 - iii) Remove bush from thermocouple mounting on pilot bracket and withdraw thermocouple. The complete thermocouple and lead may now be withdrawn.
- p) **2 AMP FUSE.**

Is mounted in a standard fuse holder and merely requires pulling away for examination.
- 9 MAINTENANCE**

SWITCH OFF ELECTRICITY. REMOVE MAINS PLUG AND TURN OFF HEATER GAS COCK.

Maintenance is recommended annually and should cover the following.

 - i) **MAIN BURNER CLEANING.**

Remove burner as section 8J. Upon removal the burner merely requires a gentle removal of any dust which may have accumulated. Under no circumstances should burner holes be enlarged or distorted.
 - ii) **MAIN INJECTOR CLEANING.**

Remove main injector as section 8M. When the injector has been removed, clean the orifice by passing soft copper fuse wire through, this is sufficient to remove any foreign matter which may have gathered in the orifice. Great care must be taken when cleaning the orifice that it is not damaged or enlarged.
 - iii) **PILOT INJECTOR CLEANING.**

Remove pilot injector as section 8N. To clean the orifice, pass soft thin copper fuse wire through, this is sufficient to clean out any foreign matter which may have formed. Great care must be taken, to ensure that the orifice is not damaged or enlarged.
 - iv) **THERMOCOUPLE.**

Remove thermocouple as section 8o. The only thing that should need inspection on the thermocouple is the contact to the Gas Control, ensure that this contact is clean. To tighten this contact to the Gas Control, screw in finger tight then another 1/4 turn.
 - v) **FAN AND FAN MOTOR CLEANING.**

Remove fan and fan motor as section 8e. When the fan has been removed from the heater, remove all dust, etc. from both Fan Impeller and Fan Motor. Care must be taken whilst cleaning both items that the fan balance is not disturbed.
 - vi) **GAS PRESSURE CHECK.**

Attach a gas pressure gauge to gas pressure test point on burner manifold, check pressure and confirm by gas rate check at meter. See pressure table on FIGS 3 & 4 If gas pressure needs adjustment refer to section 7K.
 - vii) **PILOT FLAME CHECK.**

Ensure pilot flame is as described in section 7J.
 - viii) **AUTOMATIC CONTROLS INSPECTION.**

Lighting the heater and allowing to run for a short time checks these controls. If, however, a component is found to be faulty, refer to section 8 for method of removal and replacement.

10 FAULT FINDING

SYMPTOM.	POSSIBLE CAUSE.	ACTION TO RECTIFY.
Pilot will not light or pilot flame too short.	<ol style="list-style-type: none"> 1. Gas supply interrupted. 2. Pilot regulator screw blocked. 3. Pilot filter blocked. 4. Dirt in pilot jet. 	<p>Check cocks.</p> <p>Open regulator screw fully and, if gas is still not reaching pilot, remove Pilotstat head and replace filter. Clear pilot jet orifice carefully with soft copper fuse wire, disconnect, tap smartly and blow through. Blow through pilot gas pipe.</p>
Main burner not alight.	<ol style="list-style-type: none"> 1. Thermocouple insufficiently heated. Pilot flame too short. 2. Thermocouple connection contact on gas control dirty or loose. 3. Thermocouple faulty. 4. Pilotstat thermo-electric valve faulty. 5. Gas Governor faulty. 	<p>Increase pilot flame by turning adjustment screw on gas control anti-clockwise. The pilot flame should burn with a steady blue flame and should be about level with the top of the thermocouple.</p> <p>Remove connection nut and carefully clean contact. Re-tighten nut finger tight plus quarter turn.</p> <p>Replace with new part.</p> <p>Replace with new part.</p> <p>Replace with new part.</p>
Main burner not alight, pilot and thermocouple operating correctly.	<ol style="list-style-type: none"> 1. Controls not calling for heat. 2. Electrical failure or blown fuse. 3. Loose wire or disconnection on thermostat, limit control, gas control or transformer. 4. Transformer open circuit. 5. Automatic operator (24 volt) of gas control faulty. 6. Gas Governor faulty. 7. Limit control permanently open. Normal condition is closed. 	<p>Check room thermostat setting override switch on clock and clock setting.</p> <p>Check electrical supply with test meter. Inspect fuses external to heater and replace if necessary -check reason for blown fuse.</p> <p>Check connection points carefully.</p> <p>Check with test meter. Replace with new part.</p> <p>Replace with new part.</p> <p>Check by looping across control connections. Replace if faulty. Check cause of limit control operation, such as clogged air filter, registers/diffusers shut and/or return air restricted.</p>
Main burner lights then goes out then relights.	<ol style="list-style-type: none"> 1. Limit control operating (opening) and resetting (closing) caused by clogged filter, registers/diffusers closed, or restricted return air. 2. Fan failing to operate, fan control faulty, or Amp-lok connection plug not securely made. 	<p>Check air filter, remove and rinse clean. Open registers and diffusers as necessary. Remove restriction in return air path.</p> <p>Check by looping across fan control connections. Replace if faulty. Check fan Amp-lok plug connection; failing this check fan motor and fan electrical circuits.</p>
Main burner remains alight, but fan stops and starts excessively.	<ol style="list-style-type: none"> 1. Burner bar pressure low causing low gas input to heater. 2. Fan speed too fast causing low temperature rise across heater. 	<p>Adjust gas control governor to obtain correct pressure. Check consumption at gas meter.</p> <p>Adjust fan speed by means of speed selector to obtain correct temperature rise.</p>

Fan operates intermittently after main burner shuts down on thermostat switch off.

1. Fan 'ON' and Fan 'OFF' settings incorrect.

Increase differential setting and adjust fan 'OFF' setting to prevent "after cycling" of fan when room thermostat is satisfied, i.e., Heater shuts down.

Continuous low temperature air flow at diffusers or registers after main burner shuts down on thermostat switch off.

1. Fan 'OFF' setting too low.
2. Fan control permanently closed.

Adjust setting to approx. 100° F. 'OFF'

Switch off heater and check control with test meter. Replace if faulty.

Noisy operation.

1. Gas pressure too high or low.
2. Fan motor mounting loose.
3. Fan motor bearing failing.

Check Burner Bar pressure at heater and gas consumption at meter.

Inspect and tighten.

Turn off gas supply. Loop across fan control and check for motor noise. Replace faulty assembly if necessary.

Room temperatures too high or low.

1. Incorrect siting of room thermostat.
2. Insufficient return air.
3. Cold air leaking into building from outside.
4. Ducts not lagged.
5. Heater gas rate incorrect.

Check suitability of thermostat location. Re-site thermostat.

Improve return air arrangements.

Weatherstrip doors and windows and check roof insulation.

If accessible, lag ducts efficiently.

Check at gas meter and adjust accordingly.

Heater and fan shuts off directly time switch goes to 'OFF'

1. Time switch wired into electric supply to heater

Re-wire time switch control contacts into thermostat wiring. Re-wire electric mains to time switch from separate circuit. See wiring diagram.

Heater switches on and off outside normal on/off periods.

1. Time switch tappets slipping or mechanism faulty.
2. Time switch motor running slow.

Check tappets for slackness and correct position. If mechanism faulty, replace time switch.

Replace time switch.