3

OPTIMA ECONOMY (E) AND HIGH EFFICIENCY (HE) OVERHEAD RADIANT TUBE HEATERS

HEATER INSTALLATION

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AMBI-RAD OPTIMA 'E' & 'HE' SERIES HEATER INSTALLATION

1 STANDARDS

AMBI-RAD Optima heaters must be installed in accordance with the relevant provisions of the Gas Safety (Installations and Use) Regulations 1994, or the rules in force. Due account should also be taken of any obligations arising from the Health and Safety at Work etc. Act 1974. In addition the installation must be carried out in accordance with the I.E.E. Regulations, the Building (Standards) (Scotland) Consolidation Regulations, the requirements of BS 5440 : Part 1, BS 6891 : 1988, BS 6896 : 1991, BS 6501 : Part1 1984, BS 6500 : 1975 and any other relevant British Standards and Codes of Practice.

These heaters are for use in the United Kingdom (GB) and Ireland (IE) on Natural Gas (G20) at 20 mbar and Propane (G31) at 37 mbar supply pressure.

2 FLUE CONNECTION AND VENTILATION REQUIREMENTS

The AMBI-RAD Optima heater may be installed with or without a flue to atmosphere providing the air supply and building ventilation requirements as stated in BS6896:1991 are complied with and providing due consideration is given to the possibilities of condensation forming on cold surfaces when used an an unflued heater.

2.1 UNFLUED INSTALLATION
Permanent ventilation required is as follows:

2.1.1 Natural Ventilation (to be fitted at high and low level with minimum distance of between 3m).

Low Level - When air change rate is less that 33m3/hr/kW of total rated input.
Either: 1.4cm2 for each 1m3/h per kW below 33m3/h per kW.
Or: 52cm2/kW of total rated input.

..gh Level - Above areas where personnel are working. As above

2.1.2 Mechanical Ventilation

Minimum proven air flow - 33m3/hr/kW of total rated heated input.

For detailed information please refer to AMBI-RAD design manual. If the heater is installed without a flue, ensure that combustion gases do not impinge on combustible materials. The maximum permitted temperature for such materials is 50°C (BS7186).

2.2 FLUED INSTALLATION (See Fig. 1)

The AMBI-RAD Optima heater may be installed with a flue. A down-draught diverter (B) (supplied as an optional extra by the manufacturer) must be fitted to the induced draught fan exit by means of the screws and damp plates provided. The diverter is designed to accept a 125mm (5in.) nominal bore proprietary twin wall metal flue pipe (A) complying with BS715.

If a down draught diverter is not used, a square to round adaptor (E) is fitted to the outlet of the fan by means of the clamp plates and screws provided (D). The joint should be sealed with heat resistant caulking and faced off with fire cement. If single wall metal flue pipe complying with BS715 is used, then an adaptor will be required. A flue pipe should be adequately supported at regular intervals from the building structure and terminated externally with a British Gas Tested and Certified terminal. The maximum flue length is 9m (30ft) and maximum number of bends is two. All connections in the flue pipe must be properly sealed. Permanent ventilation is required as follows:-

2.2.1 Natual Ventilation (preferably at low level).

Up to and including 60kW - 4.5 cm2/kW. Over 60 kW - 270cm2 + 2.25 cm2/kw in excess of 60 kW total rated input.

2.2.2 Forced Ventilation

Minimum proven air flow - 2.35 m3/h/kW of total rated input.

For detailed information please refer to Section 7 BS 6896, 1991, Installation of Gas fired Overhead Radiant Heaters for Industrial and Commercial Heating (2nd and 3rd family gases).

3 FRESH AIR DUCTED INLET

(See Fig. 2).
When the AMBI-RAD Optima heater is to be installed in locations where there is airbourne dust or where there is a polluted atmosphere eg. chlorinated vapours, process dust etc., a ducted fresh air supply must be provided to the burner.

3.1 Remove existing air intake grille from burner.

3.2 Fit ducted air adaptor (D) to air inlet flange on the rear air intake chamber using 3 set pins (G).

3.3 Attach 100mmØ flexible duct (C) to the ducted air adaptor using jubilee clip (B).

3.4 Attach main 100mmØ supply duct (A).

4 IMPORTANT CONSIDERATIONS

4.1 Clearances from Combustibles must be maintanined.. (See fig. 4).

4.2 There must be a minimum clearance distance of 700mm between any part of the heating system and the building wall.

4.3 For ease of servicing and burner removal minimum clearances must be maintained. (see fig. 3a and 3b).

4.4 Ensure that the suspension is sufficiently flexible to allow for thermal expansion. (see fig. 5)

4.5 All heaters must slope downwards towards the return bend by approximately 25mm

FIG. 1 FLUE INSTALLATION

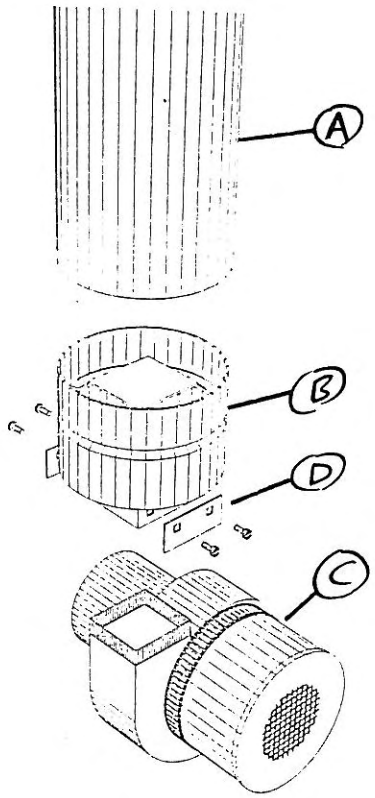


FIG. 1a CONNECTION FOR FLUE INSTALLATION WITH DOWN-DRAUGHT DIVERTER

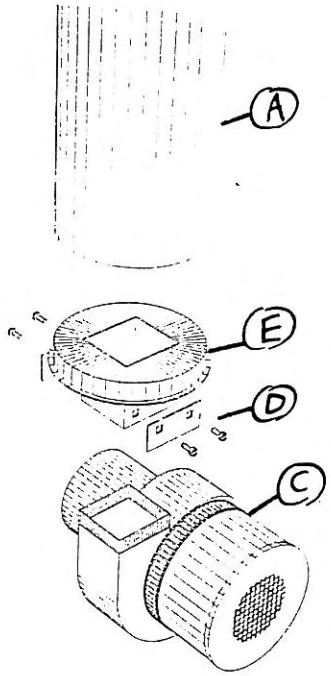
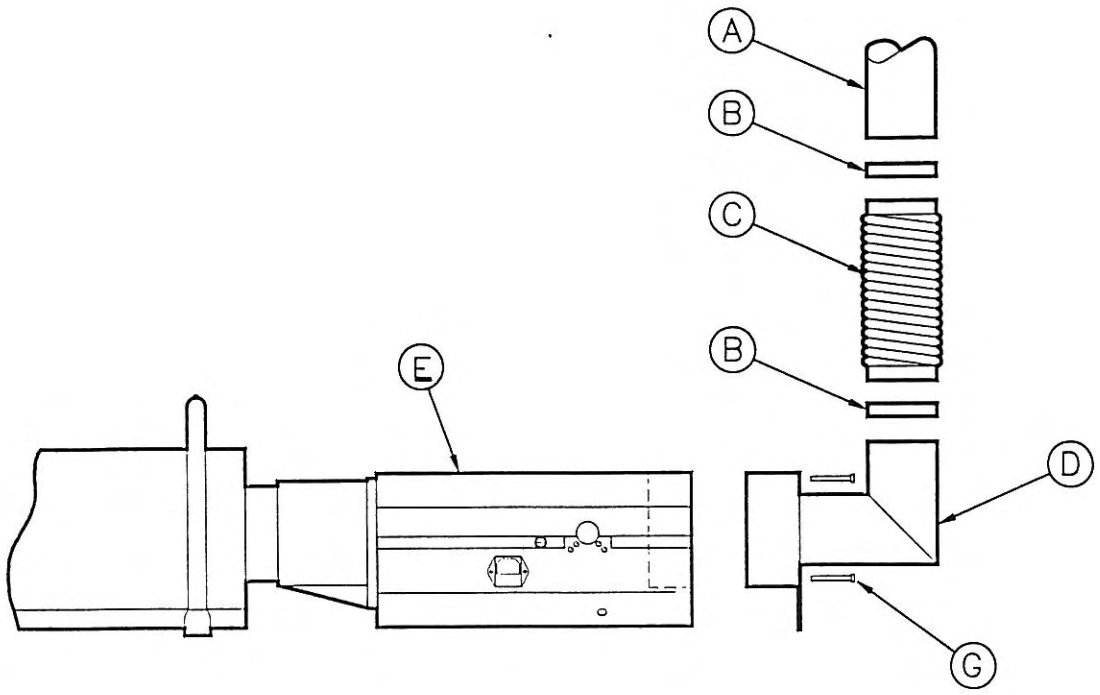


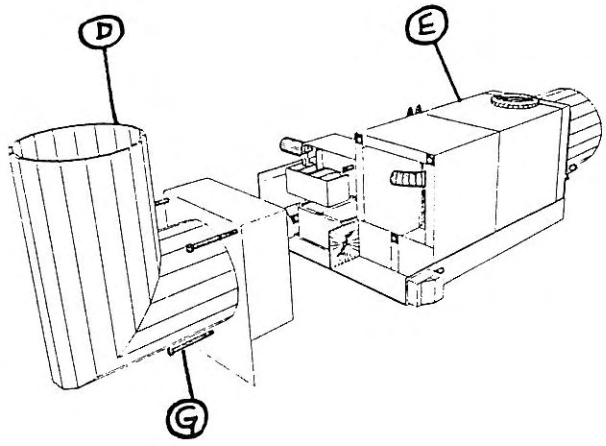
FIG. 1b CONNECTION FOR FLUE INSTALLATION WITHOUT DOWN-DRAUGHT DIVERTER

A 125mm Bore Twin Wall Flue
B Down-draught Diverter
C Fan
D Clamp Plate and Screws
E Square to Round Adaptor

FIG. 2 ATTACHMENT OF DUCTED AIR ASSEMBLY TO E & HE SERIES HEATERS



2a

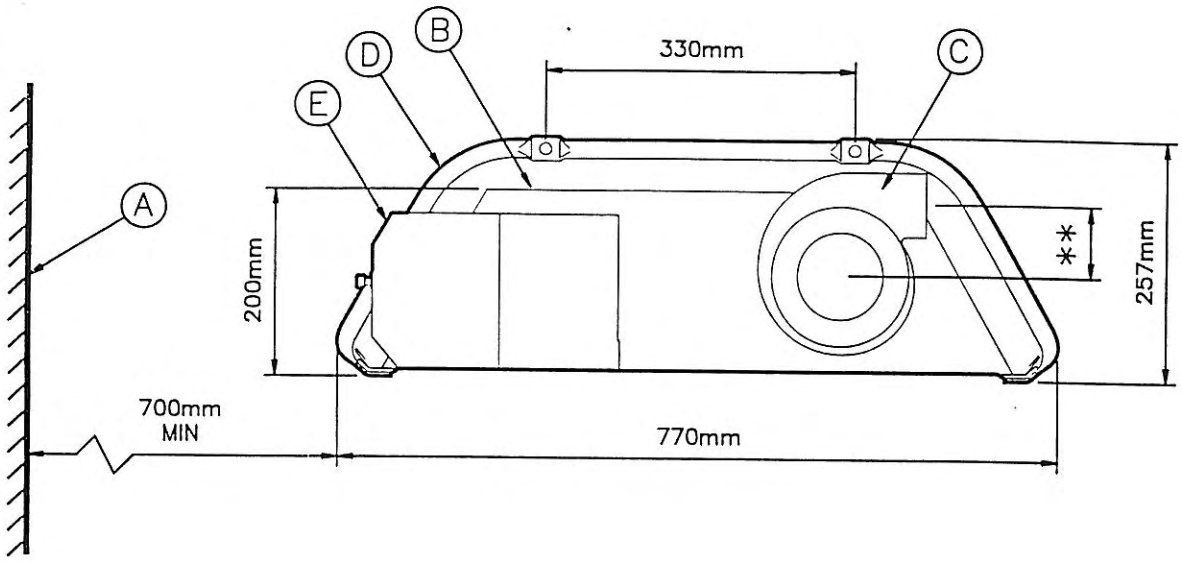


2b

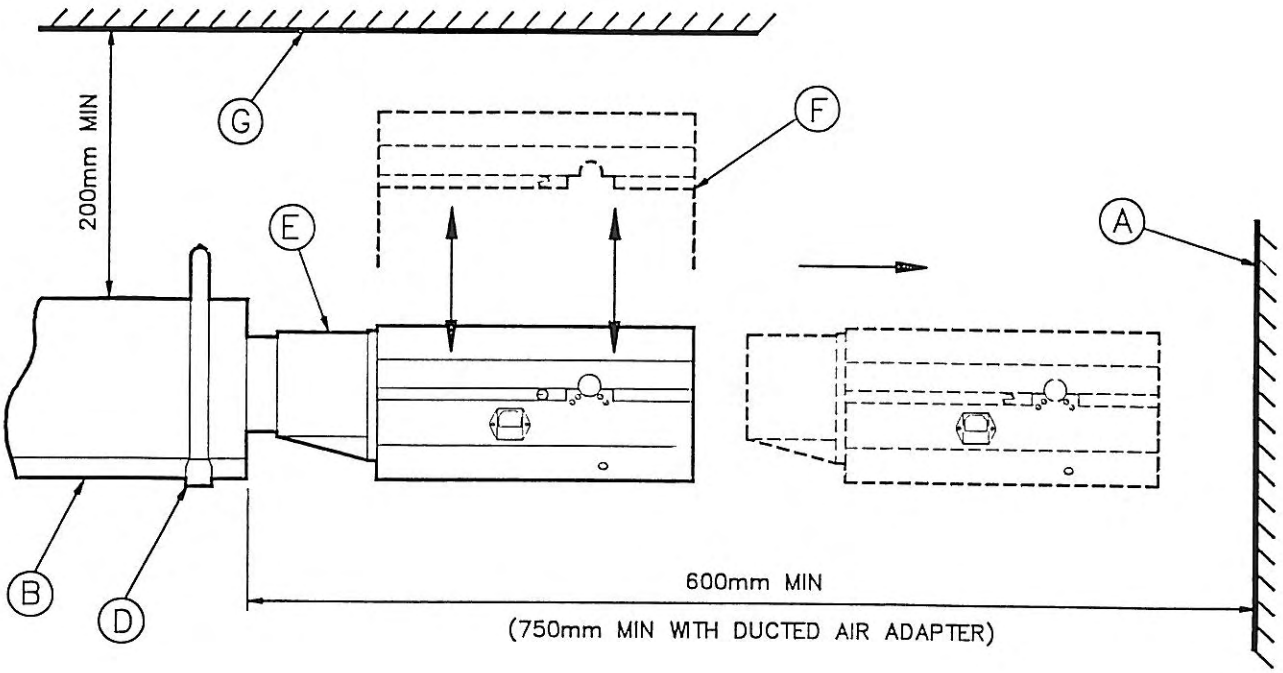
A Supply Duct - 100mmØ
B Jubilee Clip - 100mmØ
C Flexible Duct - 100mmØ
D Ducted Air Adaptor
E Burner

G Set Pins M5 x 60

FIG. 3 OVERALL DIMENSIONS/CLEARANCES TO WALLS ETC.



3a



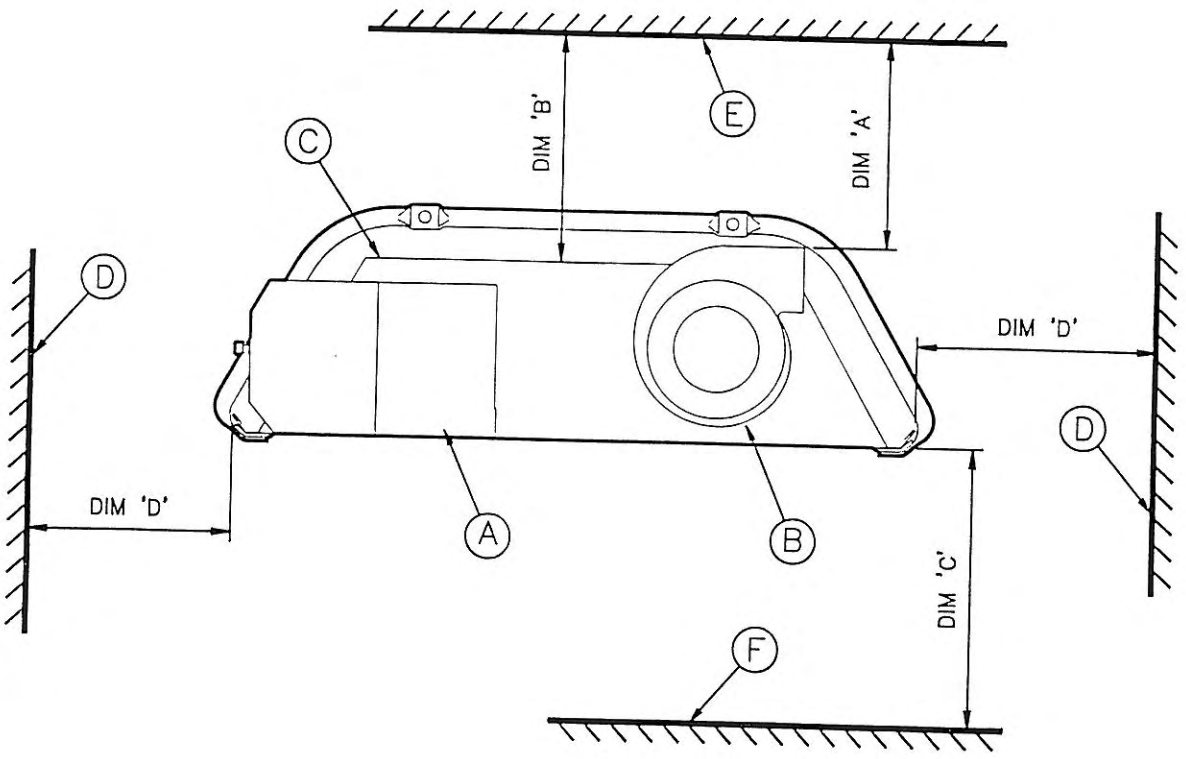
3b

A Side Wall
B Reflector
C Induced Draught Fan
D Suspension Bracket
E Burner
F Burner Lid
G Obstacle above heater

FIG. 4 CLEARANCE FROM COMBUSTIBLES

BURNER MODEL		~~E15~~ E11-15	~~E20~~ E16-20	~~E25~~ E21-25	~~E28~~ E26-28	~~E33~~ E29-33	~~E35~~ E34-35	~~E38~~ E36-38
		~~HE15~~ HE11-15	~~HE20~~ HE16-20	~~HE25~~ HE21-25	~~HE28~~ HE26-28	~~HE33~~ HE29-33	~~HE35~~ HE34-35	~~HE38~~ HE36-38
DISTANCE FROM COMBUSTIBLES mm (50°C rise in temperature above ambient of a black surface)								
ABOVE FAN	DIM. A	400	400	400	400	400	400	400
ABOVE REFLECTOR	DIM. B	150	150	150	150	150	150	150
BELOW REFLECTOR EDGE	DIM. C	1180	1360	1540	1740	1970	2060	2200
HORIZONTALLY TO SIDES	DIM. D	230	320	430	390	420	480	560
ABOVE REFLECTOR (incl. MOUNTING)	DIM. B	150	150	150	250	250	250	250
BELOW REFLECTOR EDGE (incl. MOUNTING)	DIM. C	910	1100	1290	1440	1580	1680	1850

4a



4b

A Burner
B Induced Draught Fan
C Reflector
D Combustible Material on side
E Combustible Material Above
F Combustible Material Below

5 SUGGESTED METHODS OF HEATER SUSPENSION

Attachment to the heater suspension bracket should be made by either a spring hook, 'D' shackle, speedlink, or in the case of drop rods, a formed hook. Due allowance must be made for thermal expansion of the heater.

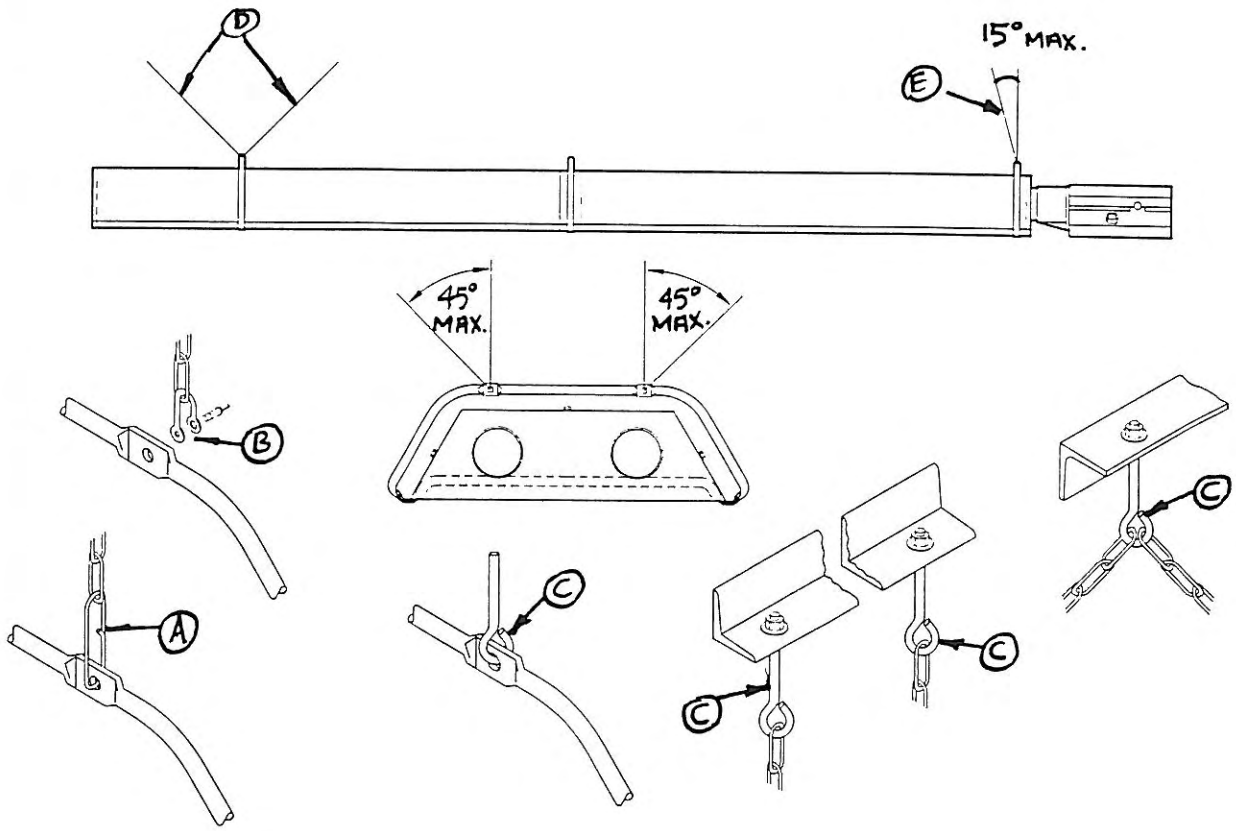
The hanging attachements to overhead steelwork etc., must be purpose made to good sound engineering practice or of a proprietary type fixing.

They must be adequately fixed and designed to carry the whole weight of the heater and to permit free movement due to linear expansion.

In the event of suitable roof steelwork not being available, additional steelwork should be fitted to enable vertical hangers to be used for suspending the heaters.

If there is any doubts as to the strength or suitability of roof steelwork to which heaters are to be suspended, please refer to the consultant/architect/owner of the building.

FIG. 5 SUGGESTED HEATER SUSPENSION



A Speedlink

B Shackle

C Drop rod with formed hook.

D Equal and opposite chain support when angle of inclination is greater than 15°.

E Vertical chain support when angle of inclination is less than 15°.

6 GAS SUPPLY

6.1 Gas connection to each burner is made using a flexible metallic hose (F) tested and certified to BS 6501 Part 1, 1991.

6.2 The connection is made to the 1/2" BSP male gas inlet connection on the burner assembly.

6.3 The gas supply pipe (D) must terminate at each burner with a service cock (E).

6.4 A gas union (G) must be fitted between the service cock (E) and the burner gas inlet connection.

6.5 The linear expansion of the heating system will move the burners relative to the gas piping and it is therefore necessary at each burner connection to form an expansion loop with the flexible metallic hose (F) provided to permit this movement.

6.6 Do not overbend the flexible hose. Elbows must be fitted to eliminate sharp bends near end fittings. It must be in line without torsion or twisting.

6.7 Jointing compound resistant to the action of liquid petroleum gas should be used on all pipe threads.

6.8 Under no circumstances should the gas controls of the burner be subjected to more than 50mbar (20in. w.g.), otherwise rupture of the control diaphragms and other damage will result.

6.9 In order to achieve a minimum inlet pressure of 12mbar for family I gases, it may be necessary to fit a gas booster.

7 ELECTRICAL SUPPLY

7.1 Each component carrying an electrical supply must be earthed.

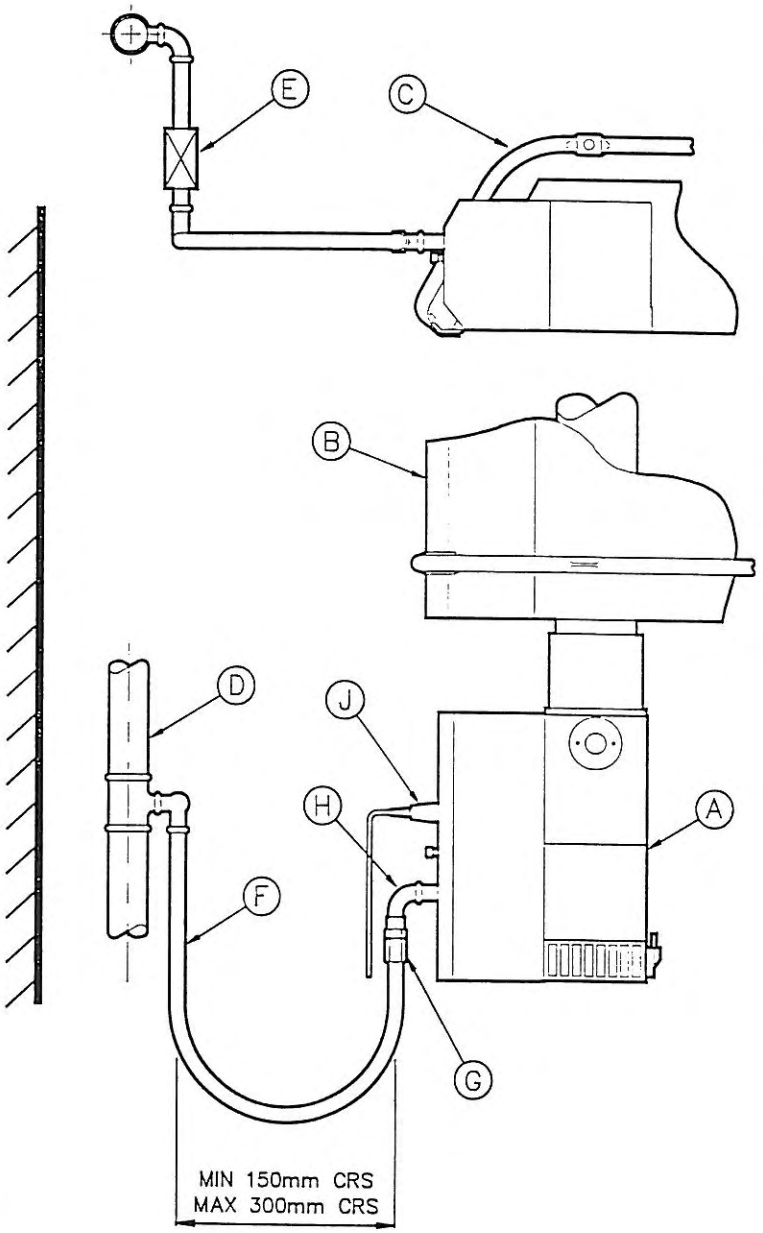
7.2 For burners a 230v 50Hz single phase supply is required.

7.3 The electrical connection to the burners is made by means of a three pin plug-in power connector. Live, neutral and earth connections should be made via a flexible supply cable to the power connector and routed clear of the heater.

7.4 The flexible cable should be of 0.5mm dia. The current rating per burner is 0.55amp (inductive). Each burner is fused internally at 1 amp and must be fused externally at 3 amp. All electrical work should be carried out to IEE standards by a competant electrician.

7.5 All such controls and switchgear must be rated to handle the total inductive load of the circuit they control. For large installations, the use of relays or contactors should be considered. The method of connection to the electrical supply must facilitate complete isolation and should be made via a fused double pole isolator having contact separation of at least 3mm in all poles and supplying the appliance only. Alternatively, connection may be made via a fused three pin plug and unswitched shuttered socket, both complying with the requirements of BS1361. Ensure that a copy of the lighting instructions plat is affixed adjacent to the electricity supply switch. Should this switch serve more than one heater it is only necessary to affix one copy per service switch.

FIG. 6 INSTALLATION OF GAS SUPPLY



A	Burner	F	Flexible Gas Hose
B	Reflector	G	Gas Union
C	Suspension Bracket	H	90° Elbow
D	Main Gas Supply Pipe	J	Mains Lead
E	Service Cock		

FIG. 7 TYPICAL EXTERNAL WIRING DIAGRAM

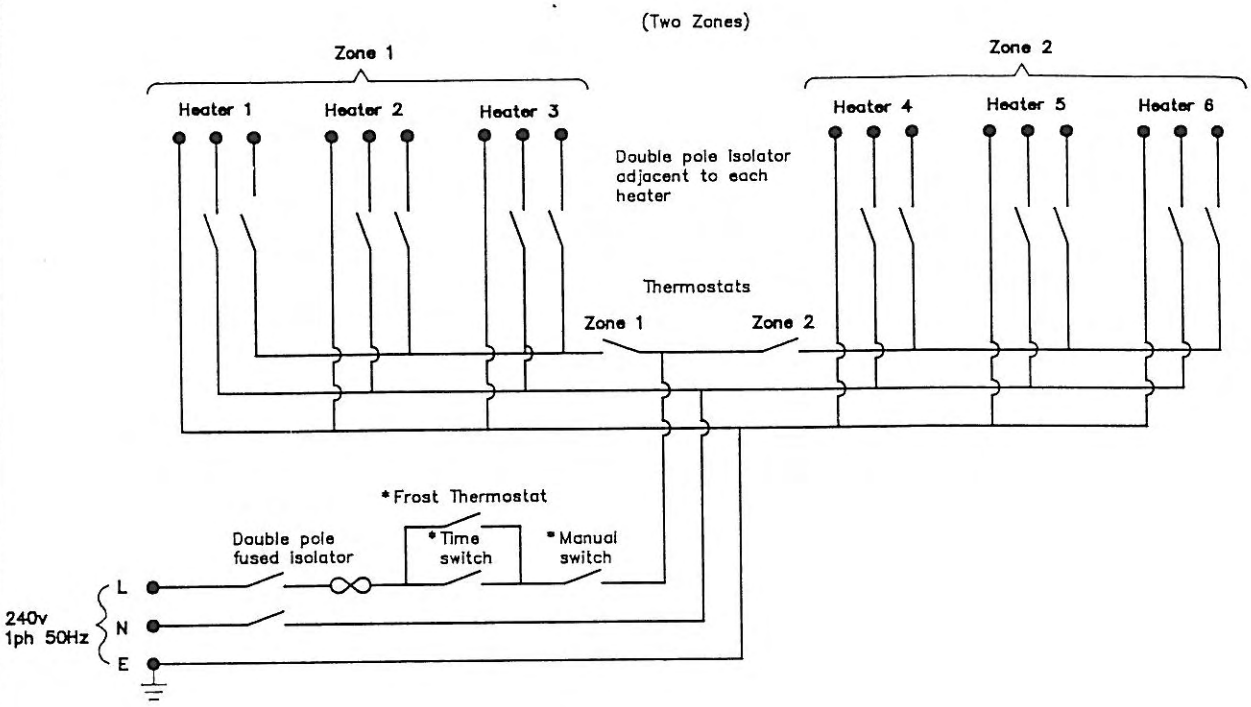


FIG. 8 INTERNAL WIRING DIAGRAM

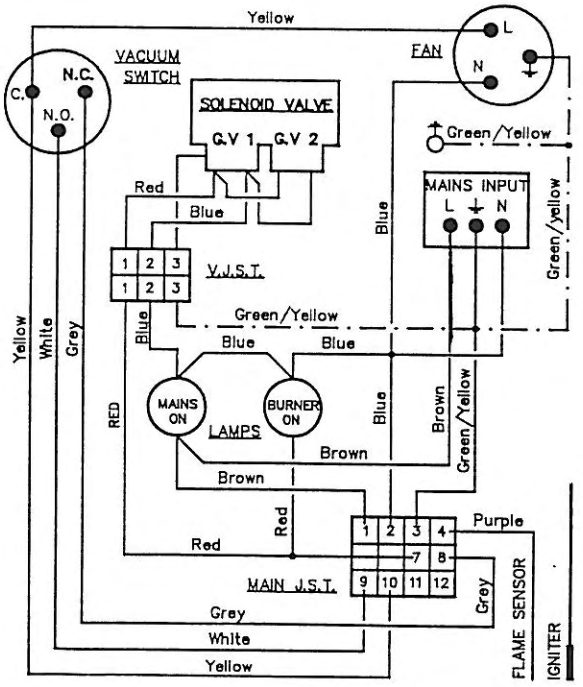
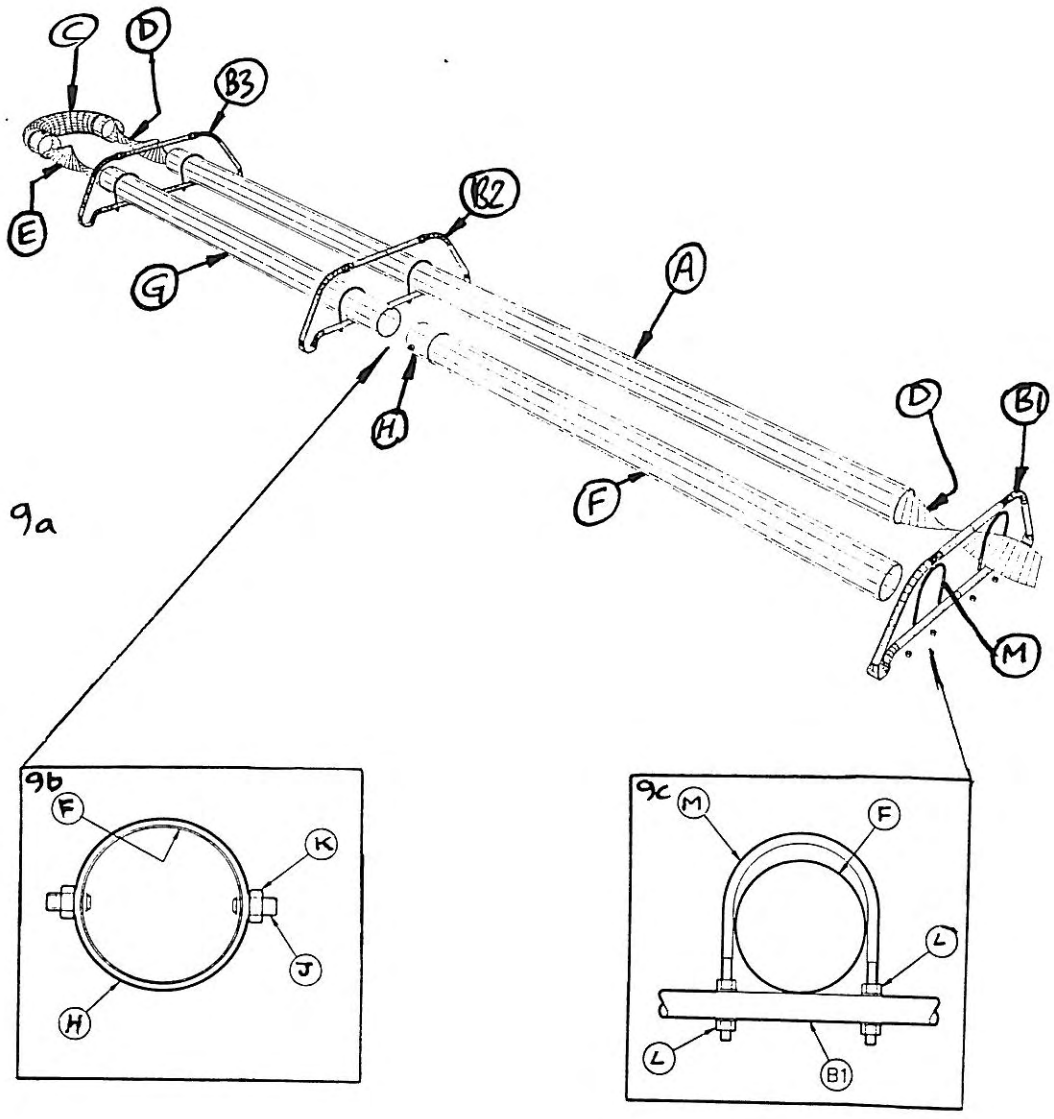
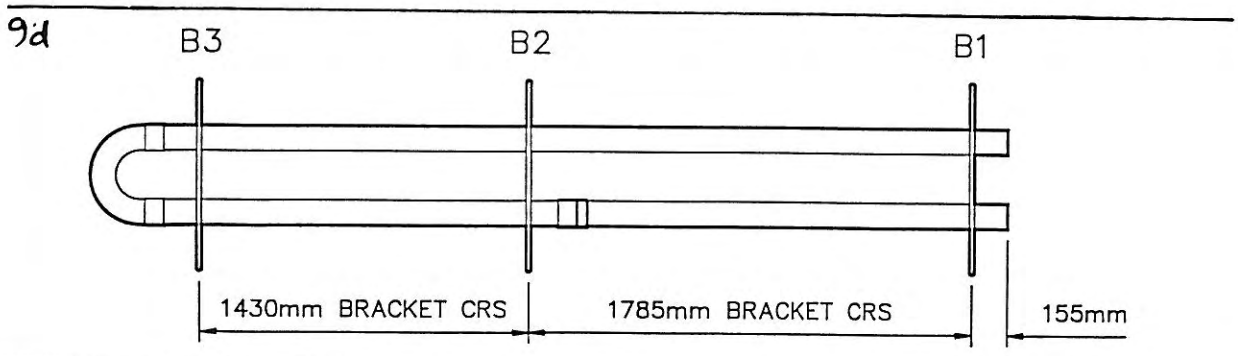


FIG. 9 ASSEMBLY OF TUBES/TURBULATORS/RETURN BEND/BRACKETS





A Return Leg Radiant Tube (m/s) 3.48m long
B1 1st Suspension Bracket (floating)
B2 2nd Suspension Bracket (fixed)
B3 3rd Suspension Bracket (floating)
C Return Bend
D Turbulator 2.6m long
E Turburlator 0.86m long
F 1st Section Firing Leg Radiant Tube (S/S) 1.72m long
G 2nd Section Firing Leg Radiant Tube (S/S) 1.72m long
H Collar
M 'U' Bolt M8
J Grub Screw
K Locknut
L M8 Nut

FIG. 11 FITTING END CAP FOR BURNER END

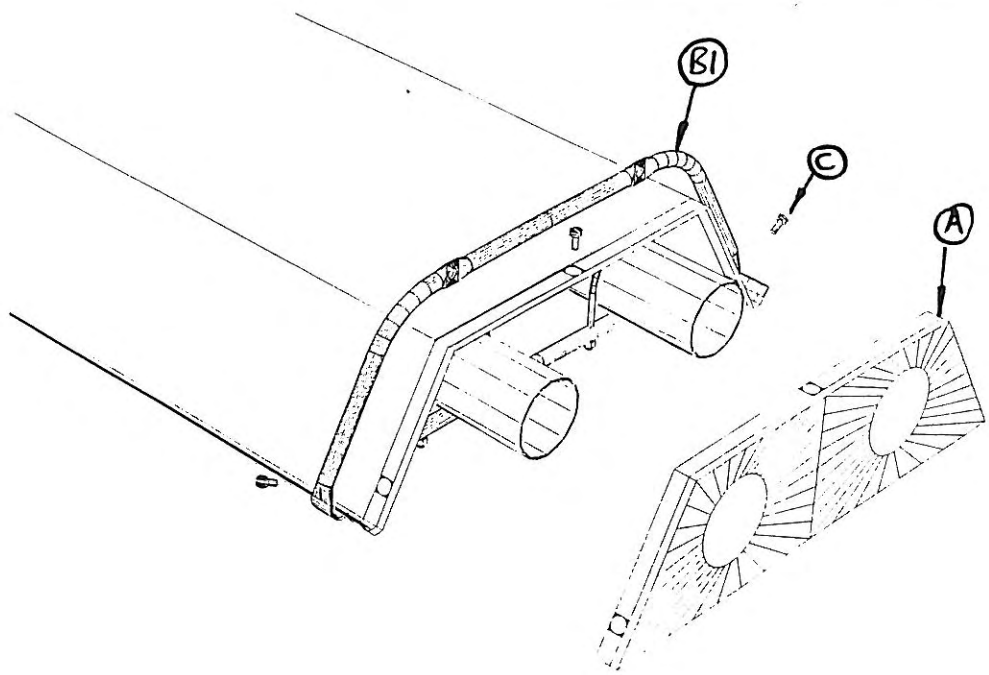
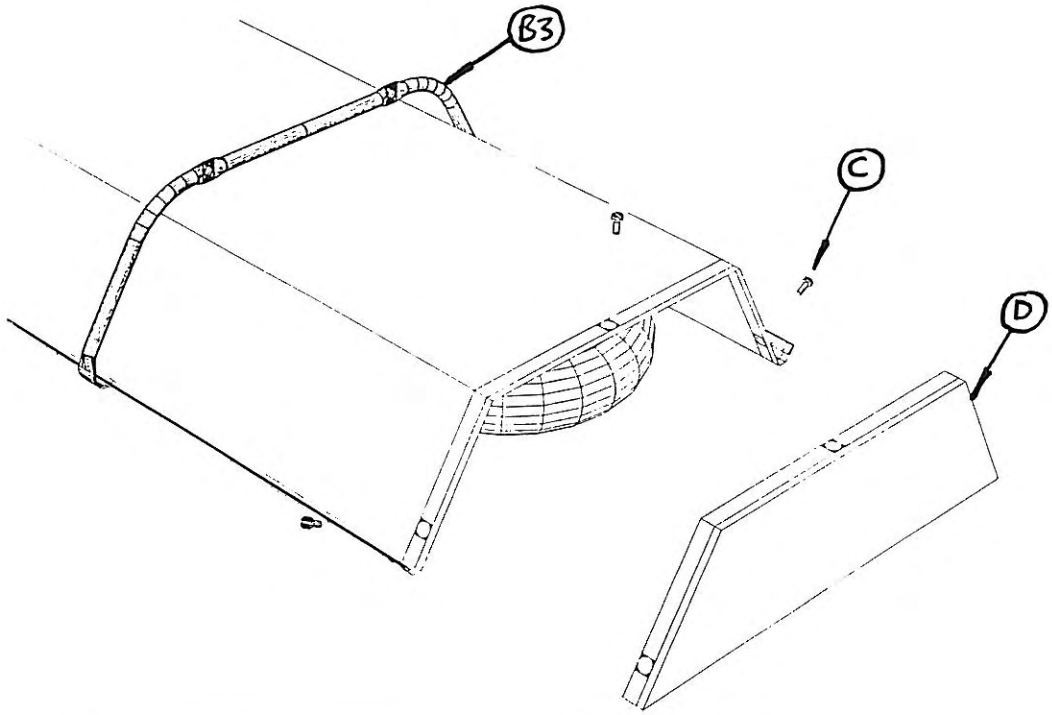


FIG. 12 FITTING END CAP FOR RETURN BEND END



A End Cap For Burner End
B1 1st Suspension Bracket
C M4 x 10 Set Pins
D End Cap for Return bend End
B3 3rd Suspension bracket

8 ASSEMBLY OF 2 MODULE HEATER (E/HE15,E/HE20, E/HE25)

8.1 ASSEMBLY OF TUBES/ TURBULATORS/RETURN BEND/ BRACKETS. (SEE FIG. 9).

8.1.1 Support radiant tubes on blocks or tresles, 300mm apart, ensuring tube weld is face down.

8.1.2 Ensure tubes are clean internally.

8.1.3 Connect 2nd section of firing leg radiant tube (G) into collar (H) and tighten M8 grub screws (J). See Fig 9b.

8.1.4 Insert turbulators. connect return bend (C) with locking pins facing up . Tighten securely.

8.1.5 Slide suspension brackets along tubes into position as shown in Fig 9d., taking care not to damage the paint finish.

8.1.6 Tighten all 'U' bolts to tube, except for first 'U' bolt on firing tube which is fitted as shown in Fig. 9c. A clearance distance of 3mm must be provided around the tube to allow for thermal expansion on this first 'U' bolt.

8.2 REFLECTORS (SEE FIG. 10).

8.2.1 Remove plastic film from reflectors.

8.2.2 Slide reflectors into position within brackets, ensuring the reflector overlaps fixing holes (OF1 and OF2) meet at the centre bracket (B2). Ensure reflector R1 rests on top of reflector R3 at overlap.

8.2.3 Fasten reflector overlap to the centre bracket (B2) as shown in Fig. 10c.

8.3 END CAPS (SEE FIG.11 & 12).

8.3.1 Fit end caps to burner end and return end of heater using set screws as supplied.

8.4 BURNER & FAN (SEE FIG. 13).

8.4.1 Fit burner and fan to tube ends and secure using M6 grub screws. Ensure burner base is horizontal when installed. Ensure that fan discharge is horizontal.

8.5 SUSPENSION OF HEATER

8.5.1 The heater must be suspended using all 3 brackets (B1, B2, B3).

9 ASSEMBLY OF 3 MODULE HEATER (E/HE28,E/HE33 E/HE35/ & E/HE38)

9.1 ASSEMBLY OF TUBES/ TURBULATORS/RETURN BEND/ BRACKETS. (SEE FIG. 14).

9.1.1 Support radiant tubes on blocks or tresles, 300mm apart, ensuring tube weld is face down.

9.1.2 Ensure tubes are clean internally.

9.1.3 Connect first section of firing leg radiant tube (G) into collar (H) and tighten M8 grub screws (J) and locknuts (K). (See Fig 9b).

9.1.4 Insert tubulators. connect return bend (C) onto tubes with locking pins facing vertically up. Tighten securely.

9.1.5 Slide suspension brackets along tubes into position as shown in Fig. 14b, taking care not to damage the paint finish.

9.1.6 Tighten all 'U' bolts to tube, except for first 'U' bolt on firing tube, which is fitted as shown in Fig. 9c. A clearance distance of 3mm must be provided around the tube to allow for thermal expansion on this first 'U' bolt.

9.2 REFLECTORS (SEE FIG. 15).

9.2.1 Remove plastic film from reflectors.

9.2.2 Slide reflectors into position within brackets ensuring the reflector overlap fixing holes (OF1, OF2, OF3, OF4) meet at brackets B2 and B3.

Ensure reflector R1 rests on top of reflector R2 at overlap. Ensure reflector R2 rests on top of reflector R3 at overlap.

9.2.3 Fasten reflector overlaps to brackets B2 and B3 as shown in Fig 15b, 15c & 15d.

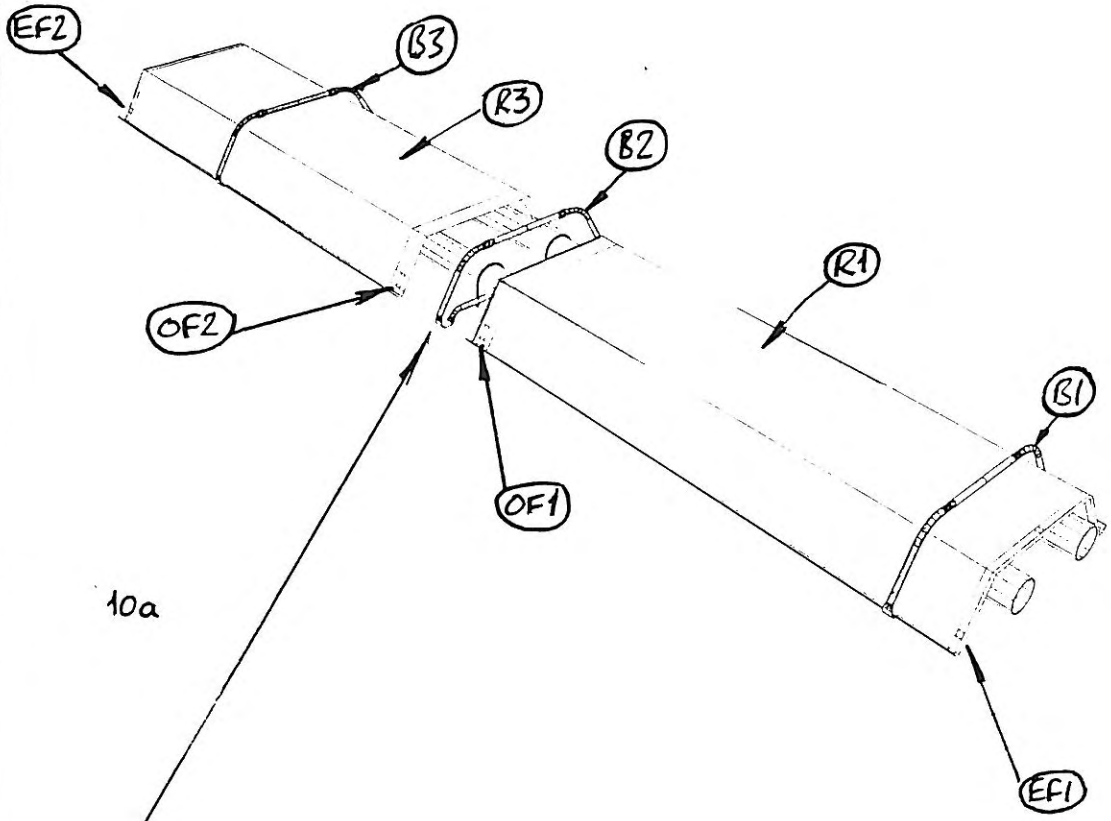
9.3 END CAPS (SEE SECTION 8.3)

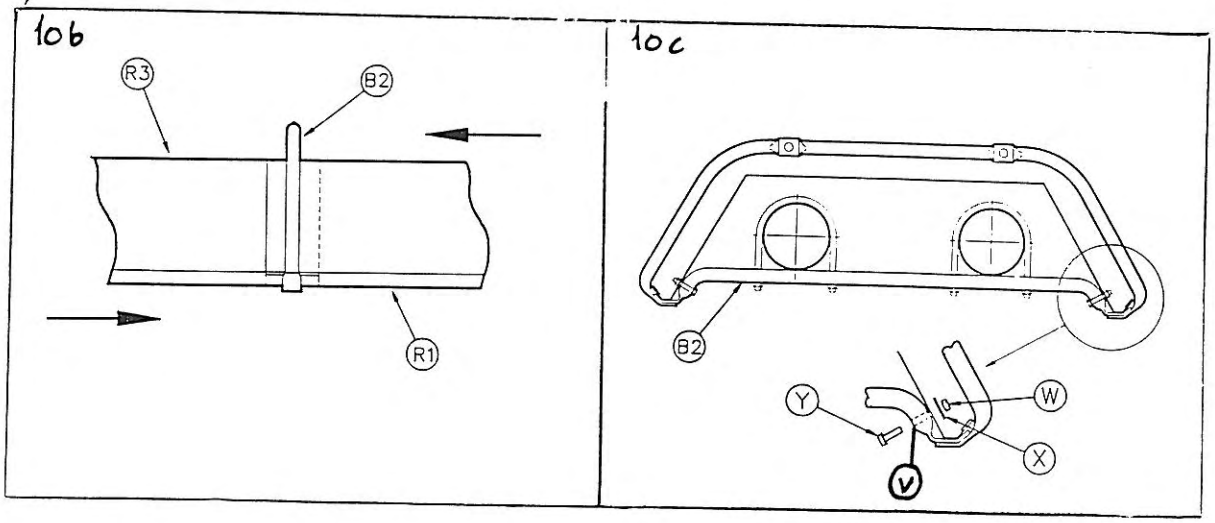
9.4 BURNER & FAN (SEE SECTION 8.4).

9.5 SUSPENSION OF HEATER

9.5.1 The heater must be suspended using all 3 brackets (B1, B2, B3).

FIG. 10 FITTING REFLECTORS

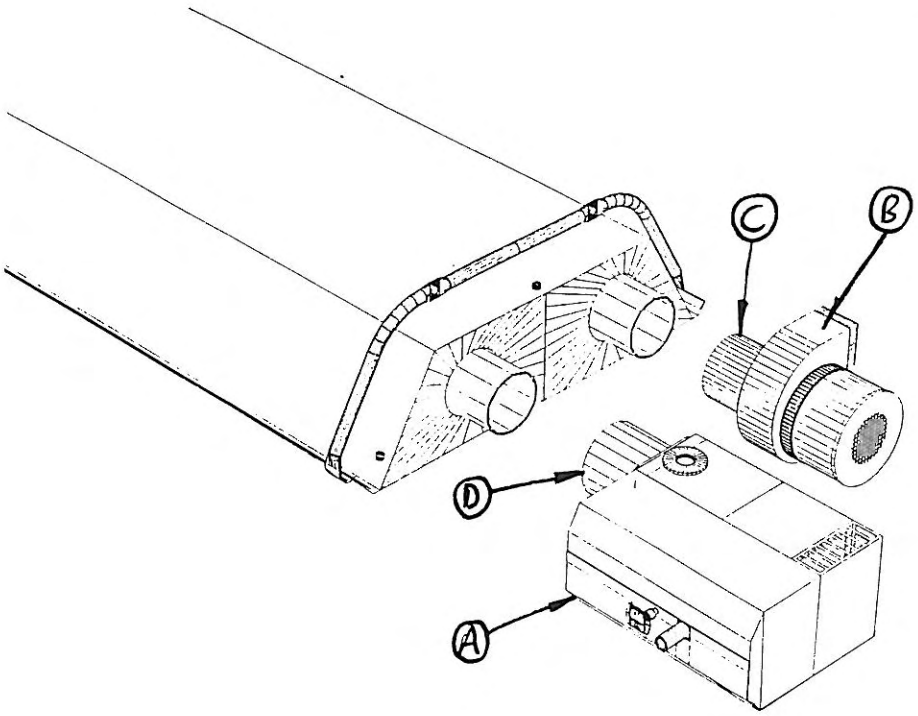




B1	1st Suspension Bracket (floating)
B2	2nd Suspension Bracket (fixed)
B3	3rd Suspension Bracket (floating)
R1,R3	Reflectors
EF1	Endcap Fixing Holes (Burner End)
EF2	Endcap Fixing Holes(ReturnBend End)

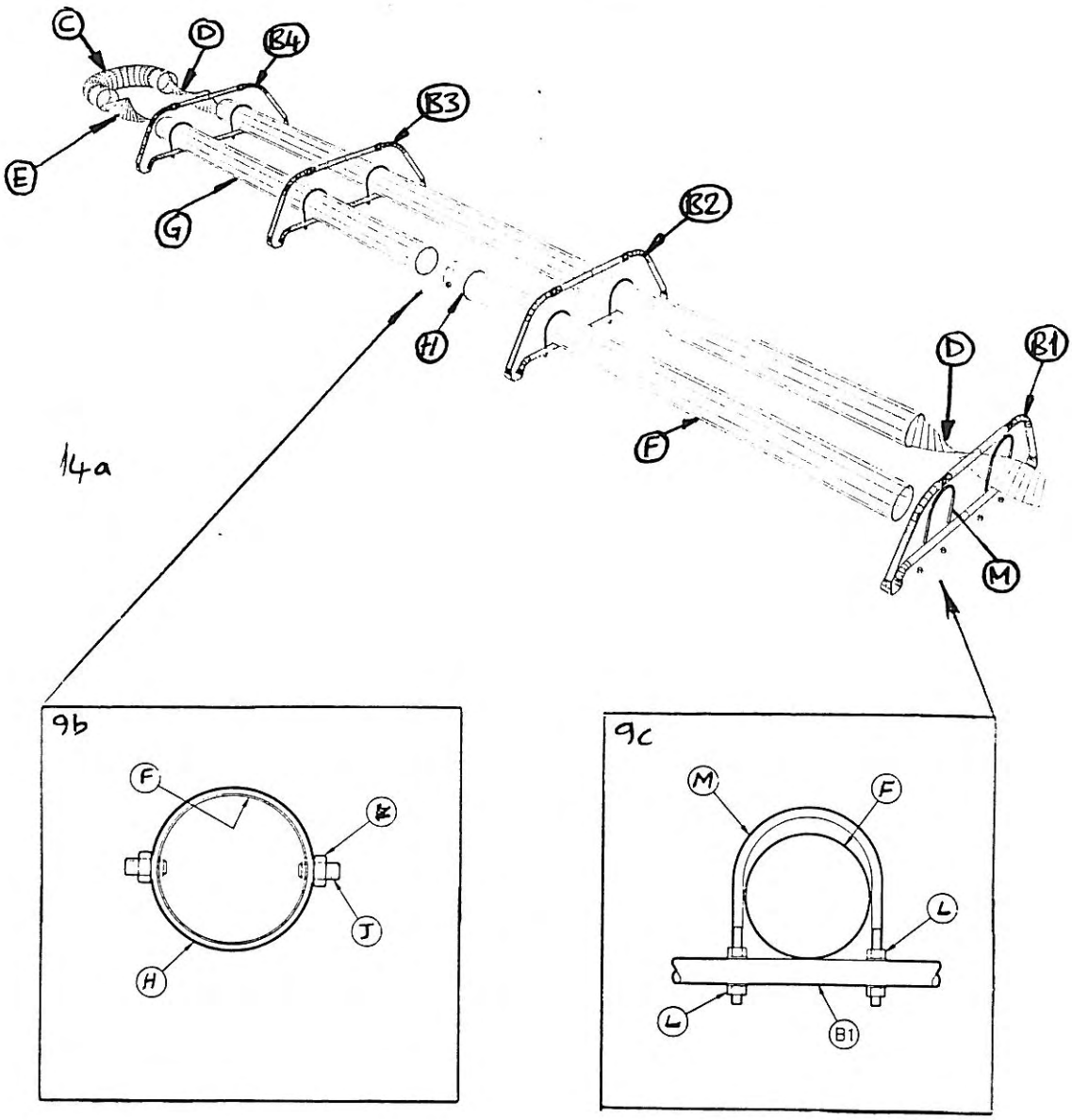
OF1,OF2	Reflector Overlap Fixing Holes
V	Bracket Fixing Holes
W	M6 Nut
X	M6 Mud Washer
Y	M6 x 40 Set Pin

FIG. 13 FITTING BURNER AND FAN

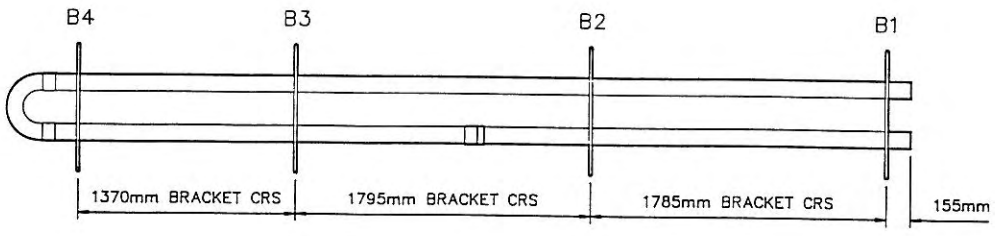


A Burner
B Fan
C Fan Support Spinning
D Burner Support Casting

FIG. 14 ASSEMBLY OF TUBES/TURBULATORS/RETURN BEND/BRACKETS

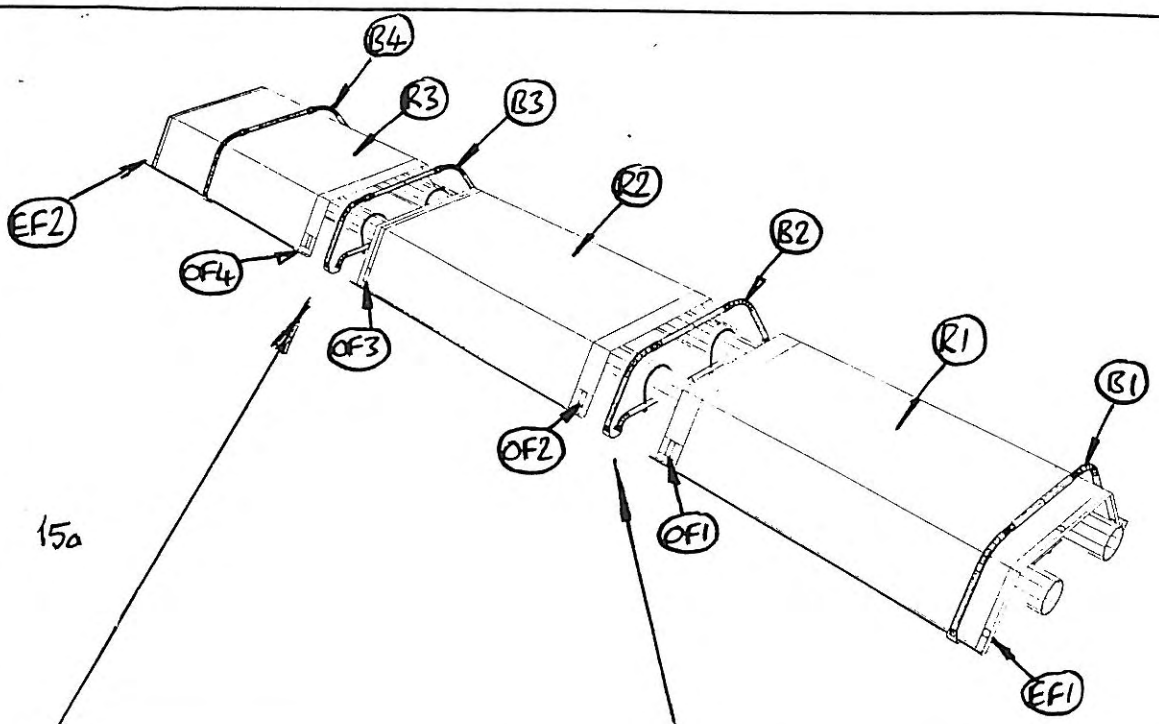


14b



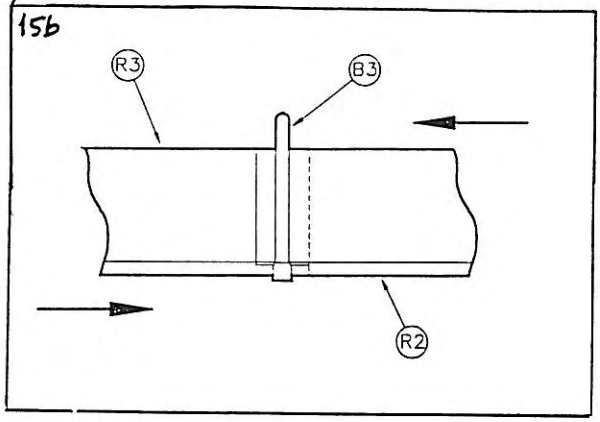
A Return Leg Radiant Tube (m/s) 5.22m long
B 1st Suspension Bracket (floating)
B2 2nd Suspension Bracket (fixed)
B3 3rd Suspension Bracket (fixed)
B4 4th Suspension Bracket (floating)
C Return Bend
D Turbulator 2.6m long
E Turbulator 0.976m long
F 1st Section Firing Leg Radiant Tube (s/s) 2.61m long
G 2nd Section Firing Leg Radiant Tube (s/s) 2.61m long
H Collar
M 'U' Bolt M8
J Grub Screw
K Locknut
L M8 Nut

FIG. 15 FITTING REFLECTORS

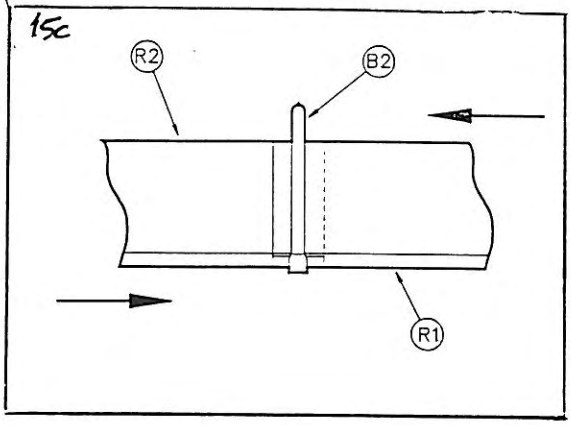


15a

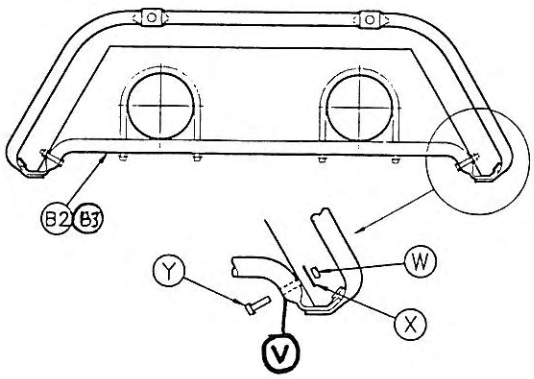
15b



15c



15d



B1	1st Suspension Bracket (floating)
B2	2nd Suspension Bracket (fixed)
B3	3rd Suspension Bracket (fixed)
B4	4th Suspension Bracket (floating)
R1,R2,R3	Reflectors
EF1	End Cap Fixing Holes (Burner End)
EF2	End Cap Fixing Holes (Return End)
OF1,OF2,OF3,OF4	Reflector Overlap Fixing Holes

V Bracket fixing hole
W M6 Nut
X M6 Mud Washer
Y M6 x 40 Set pin