'ARC' Continuous

RADIANT TUBE
HEATING SYSTEM

TECHNICAL MANUAL - VOLUME 2

INSTALLATION

LLOYD'S REGISTER QUALITY COMPANY ISO9002

CERTIFIED ™

DESIGN CERTIFIED ™

AMBIRAD®

ENERGY EFFICIENT HEATING SYSTEMS

'ARC' SERIES CONTINUOUS RADIANT TUBE HEATING SYSTEM

SECTION INDEX

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'ARC' SERIES CONTINUOUS RADIANT TUBE HEATING SYSTEM

SYSTEM INSTALLATION

GENERAL WARNING'S

⚠ GENERAL WARNING

READ THIS MANUAL BEFORE ANY INSTALLATION OR SERVICE WORK IS ATTEMPTED.

KEEP IN A SAFE PLACE.

THE SYSTEM MUST BE INSTALLED/SERVICED BY A COMPETENT PERSON FULLY AWARE OF THE CODES FOR LIFTING SAFETY

A FIRE OR EXPLOSION HAZARD

Clearances to combustibles must be maintained in all situations. Failure to maintain clearances to combustibles could result in a serious fire hazard, injury or death. Minimum clearances must be maintained from vehicles, aircraft and all items below the system.

In locations used for the storage of combustible materials signs shall be posted to specify the maximum permissible stacking height to maintain required clearances from the heater to the combustibles. In addition the manufacturer recommends posting these signs adjacent to the heater thermostats for enhanced visibility.

B MECHANICAL/SUSPENSION HAZARD

During each operating cycle, this equipment will expand and contract. The suspension method, gas connection and the total installation must safely allow for this movement . Failure to comply with the above, could result in serious fire or explosion hazard.
Beware of sharp edges on reflectors, tubes and metal components. Always wear protective gloves as sharp edges could cause injury.

Use due care in lifting any component of the system to high level - use adequately sized lifting tackle for the weight of the component. Do not lift components when personnel could be exposed to danger if the lifting tackle were to fail.

All hooks should be closeable safety link type. If 'S' hooks are utilized, they must be closed to prevent any possibility of equipment becoming disengaged.
Do not lean ladders or other objects against the system. Failure to comply with any of the above could result in serious injury.

C GAS EXPLOSION HAZARD

To avoid the possibility of gas leaks, which can cause damage and death, the gas connections should be made as indicated below. Allow for system expansion, use relevant jointing compounds on gas connections and do not exceed maximum gas pressure at burners.

D ELECTRIC HAZARDS

The heater/vacuum pump must be grounded in accordance with the relevant codes in the USA and Canada. All electrical connections should be made in accordance with these codes.
A competent electrician familiar with relevant codes and practice should install the system.

E MECHANICAL HAZARD - VACUUM PUMP

High-speed rotation of vacuum pump can cause serious injury. Care must be taken when working near pumps, to avoid loose clothing becoming entangled. Avoid touching rotating parts with hands. When inspecting vacuum pumps ensure that electrical supply is switched off.

F TESTING AND BALANCING

On completition of installation start-up should be undertaken by a competent gas engineer following the commissioning instructions provided by the manufacturer. Special attention should be given to testing and confirming the correct operation of the ignition and burner fail safe system and the correct setting of the gas pressure regulator.

G ELECTRICAL/MECHANICAL HAZARDS

When checking for faults do not put hands near rotating parts of vacuum pumps.
Do not touch live electrical components or wiring in the burner housing.
When working inside the burner-housing switch off/disconnect the electrical supply.

H HAZARDOUS AREAS

Do not install the system in hazardous areas containing halogenated hydrocarbons, corrosive chemicals or volatile atmospheres.
Serious injury or death can result.

⚠ WARNING

GENERAL

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment

1 STANDARDS

The ARC heating system installation shall conform with local building code requirements and with National Fuel Code ANSI-Z223.1.A (latest edition) and section 7.8A-3; Z223.1 (latest edition).

The equipment shall be electrically grounded in accordance with National Electric Code ANSI/NFPA 70-1987.

The heating system may be installed in aircraft hangars when conforming with ANSI/NFPA 409-1985 for Aircraft Hangars and in automotive garages when conforming with ANSI/NFPA88A (latest edition) for parking Structures and ANSI/NFPA 88B (latest edition) for repair garages.

Ventilation Requirements

The ARC Series heating system must be flued externally. Venting must be installed in accordance with ANSI Z223.1 (NFPA-540 and local codes).

2 FIRST CONSIDERATIONS

2.1 Clearances from Combustibles must be maintained. (see fig. 2)

2.2 For ease of servicing and burner removal minimum clearances must be maintained. (see fig. 1b).

2.3 The burner lid will hinge open if a min. clearance of 18" is maintained from the top of the burner cabinet.

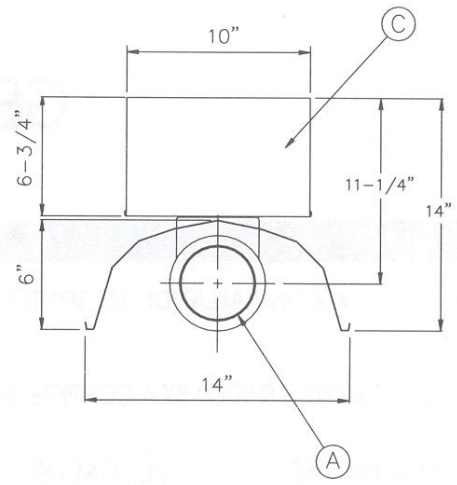
2.4 Ensure that the suspension is sufficiently flexible to allow for thermal expansion. (see fig. 3)

2.5 All radiant tube must have a fall of 3/8in. in every 20ft, towards the vacuum fan.

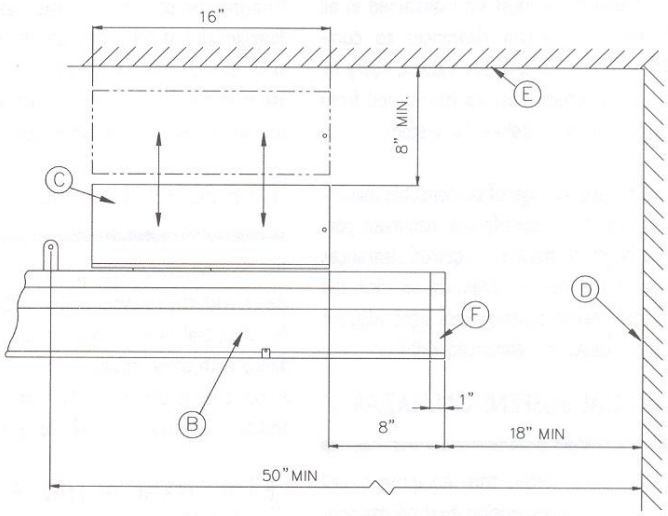
2.6 All tailpipe must have a fall of 1in. in every 20ft. towards the vacuum fan.

FIG. 1 PREFERRED DIMENSIONS/CLEARANCES TO WALLS/CLEARANCES FOR SERVICE.

1a



1b



A	Radiant Tube	D	Side Wall
B	Reflector	E	Obstacle over burner
C	Burner	F	End Vent Module

⚠ WARNING

A FIRE OR EXPLOSION HAZARD

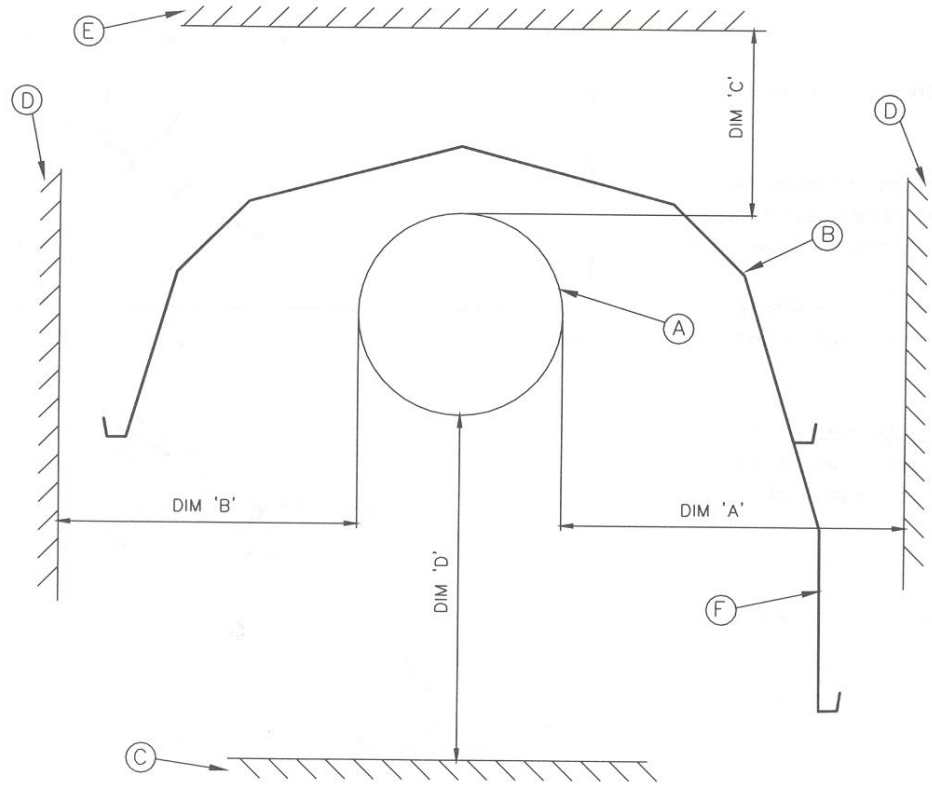
Clearances to combustibles must be maintained in all situations. Failure to maintain clearances to combustibles could result in a serious fire hazard, injury or death. Minimum clearances must be maintained from vehicles, aircraft and all stationary combustible items below the system. In locations used for the storage of combustible materials signs shall be posted to specify the maximum permissible stacking height to maintain required clearances from the heater to the combustibles. In addition the manufacturer recommends posting these signs adjacent to the heater thermostats for enhanced visibility. Where clearance cannot be maintained secondary shielding may be used, consult factory.

FIG 2 CLEARANCE FROM COMBUSTIBLES

2a

BURNER MODEL		ARC12LR	ARC18LR	ARC24LR	ARC32LR	ARC38LR	ARC46LR
DISTANCE FROM COMBUSTIBLES in (90°F rise in temperature above ambient)							
BELOW TUBE		End vent/In-line	End vent/In-line	End vent/In-line	E nd vent/In-line	End vent/In-line	End vent/In-line
WITHOUT UNDERSHIELD	DIM D	44/50	44/50	44/50	56/67	63/83	67/83
WITH UNDERSHIELD	DIM D	30/34	30/34	30/34	30/34	31/41	34/41
ABOVE TUBE	DIM C	4	4	4	4	4	4
HORIZONTALLY							
STANDARD REFLECTOR	DIM B	20	20	28	28/34	28/39	28/39
PERIMETER REFLECTOR	DIM A	12	12	12	12/20	12/24	12/24

2b



A Radiant Tube
B Standard Reflector
C Combustible Material Underneath
D Combustible Material on Side
E Combustible Material Above
F Perimeter Reflector

⚠ WARNING

B MECHANICAL/SUSPENSION HAZARD

During each operating cycle, this equipment will expand and contract. The suspension method, gas connection and the total installation must safely allow for this movement . Failure to comply with the above, could result in serious fire or explosion hazard.
Beware of sharp edges on reflectors, tubes and metal components. Always wear protective gloves as sharp edges could cause injury.
Use due care in lifting any component of the system to high level - use adequately sized lifting tackle for the weight of the component. Do not lift components when personnel could be exposed to danger if the lifting tackle were to fail.
All hooks should be closeable safety link type. If 'S' hooks are utilized, they must be closed to prevent any possibility of equipment becoming disengaged.
Do not lean ladders or other objects against the system. Failure to comply with any of the above could result in serious injury.

3 TUBE COUPLERS

Tubing, combustion chambers, dampers and tube fittings are connected by 'wrap-around' stainless steel couplers which clamp by means of two high tensile stainless steel set pins.
(see fig. 4a and 4b)

3.1 Ensure tube/fittings (B) are square and undamaged.

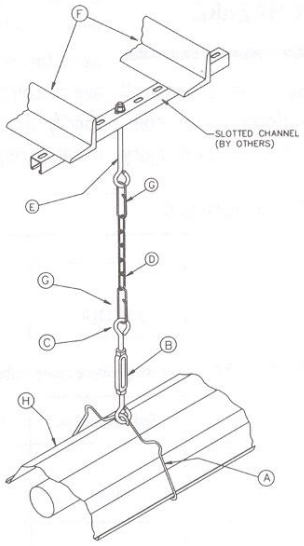
3.2 When assembling tube ends into the coupler (A) ensure that they are in line and the tube ends (C) butt against the stop pin (D) inside the coupler.

3.3 Tighten both set screws (E) using a 1/4in. Allen key (F), ensuring that equal pressure is applied to each set screw in turn.

3.4 A power tool can be used with a suitable 1/4in. Allen Key attachment to achieve a quicker assembly. In this instance, a torque limit setting of 6.6 lbf.ft must be used.

NOTE: :
Position set pins (E) on horizontal center line of the tube.

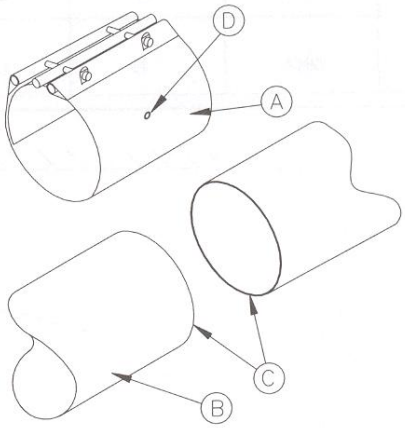
FIG. 3 TYPICAL SUSPENSION DETAILS



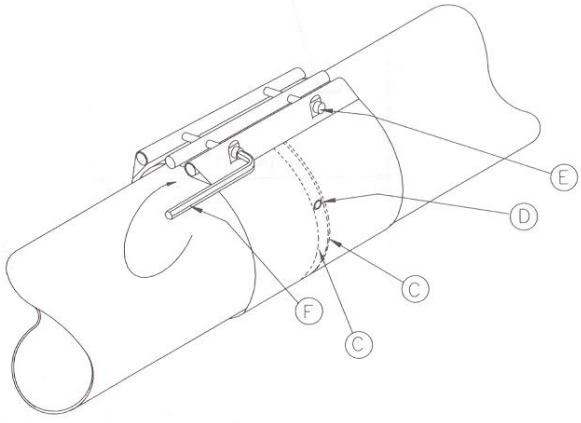
A Suspension Support Bracket
B Turnbuckle adjust eye (C) approx 15.0in. above radiant tube
D Chain
E Eye-Bolt (By others)
F Support Beam (By others)
G Speed Link (By others)
H Reflector

FIG. 4 FIXING TUBE COUPLER

4a



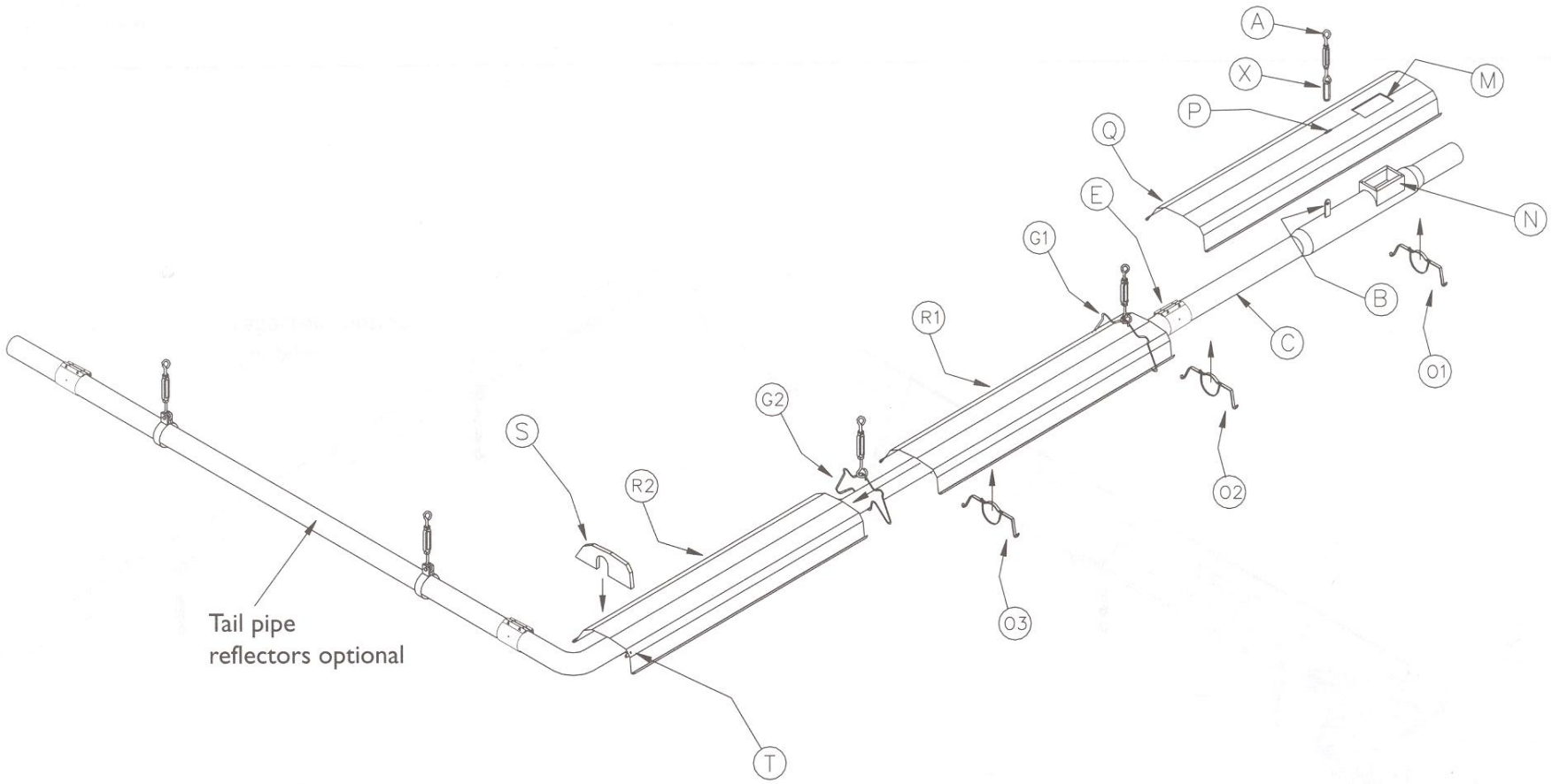
4b



A Tube Coupler
B Tube/fittings
C Tube End
D Stop pin
E Set pin
F Allen key

FIG. 5 TYPICAL INSTALLATION OF TUBE AND REFLECTORS

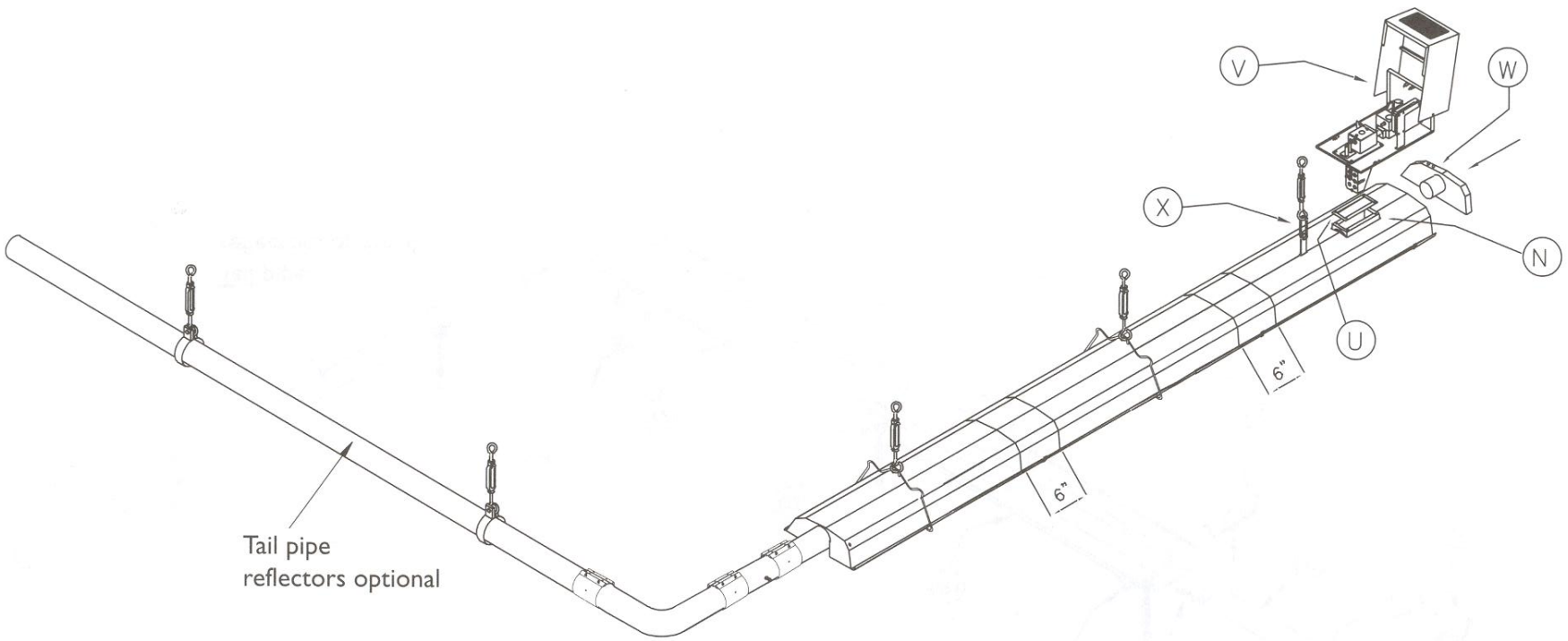
5a



A Turnbuckle
B Suspension lug
C Combustion chamber
E Tube coupler
G Suspension support bracket
M Reflector cut-out
N Combustion chamber turret
O Reflector bracket
P Location hole for suspension lug
Q Combustion chamber reflector
R Plain reflector
S End cap
T Fixing hole for end cap
X Speedlink

FIG. 5 TYPICAL INSTALLATION OF TUBE AND REFLECTORS

5b



N Combustion chamber turret
U Burner gasket
V Burner assembly
W End vent module - EVM
X Speedlink

4 SUSPENSION POINTS

(see fig. 5a)

4.1 The first support (A) is positioned at the suspension point (B) on the end vent burner combustion chamber (C).

4.2 Subsequent supports (F) are placed no more than 12ft. apart, including one at each combustion chamber location.

4.3 A support must be located at a maximum distance of 6ft. from a Tee or Elbow fitting.

4.4 Except for the combustion chamber suspension points (B), suspension support brackets (G) are installed for the tube section which is covered with reflectors.

4.5 Tailpipe Hangers (L) may be installed for the tube section which will be without reflectors.

5 HANGING THE TUBE

(see fig. 5a)

5.1 Suspend the end vent combustion chamber (C) by locating the speedlink (X) through the eye of the suspension lug (B), and then connect the speedlink (X) to the turnbuckle (A).

5.2 Connect a length of radiant tube (H) to the end vent combustion chamber (C), ensuring it is supported by the suspension support brackets (G).

5.3 Repeat this procedure coupling the radiant tube to successive combustion chambers in the position shown in the layout drawing.

5.4 Ensure the radiant tube has the correct fall ($^3/_8$ in. in every 20ft. towards the fan).

5.5 Dampers (JJ) must be located as indicated in the layout drawing. The adjustment lever must be positioned to one side to allow clear access for setting.

5.6 Connect the radiant tube section to the tailpipe section (K) as per the layout drawing.

5.7 Ensure the tailpipe section has the correct fall (1in. in every 20ft. towards the fan).

6 REFLECTORS

6.1 MAIN REFLECTORS
(see fig. 5b)

6.1.1 Starting at the end-vent combustion chamber position, disconnect the speedlink (X) from the combustion chamber suspension lug (B). Ensure combustion chamber is supported adequately to prevent undue strain on the tube coupling (E).

6.1.2 Locate the cut-out (M) of the combustion chamber reflector (Q) over the combustion chamber turret (N).

6.1.3 Reconnect the speedlink (X) on to combustion chamber suspension lug (B).

6.1.4 Install the first reflector bracket (01) behind the combustion chamber turret (N).

6.1.5 Install the second reflector bracket (02) 4in. from the other end of the combustion chamber reflector (Q).

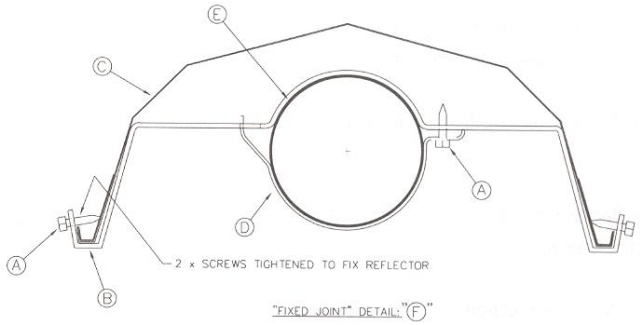
6.1.6 Slide the first plain reflector (R1) through the first downstream suspension support bracket (G1), then under the combustion chamber reflector (Q) and into the second reflector bracket (02). Ensure that the reflector overlap is **6in** minimum.

6.1.7 The third reflector bracket (O3) is installed 4in. from the end of the first plain reflector (R1).

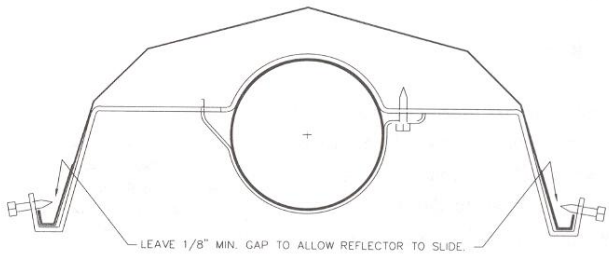
6.1.8 Slide the second plain reflector (R2) through the second downstream suspension support bracket (G2), then over the first plain reflector (R1) and into the third reflector bracket (O3). Ensure that the reflector overlap is **6in** minimum.

6.1.9 Continue this sequence, installing additional combustion chambers / reflectors where required until the radiant branch is complete.

FIG. 6 ATTACHMENT OF REFLECTOR BRACKET



"FIXED JOINT" DETAIL: "F"



"SLIDING JOINT" DETAIL: "S"

ATTACHMENT OF REFLECTOR BRACKET

1. Fit the reflector bracket (B) around the tube (E) and tighten the set pin (A) to clamp the central clip (D) to the tube (E).
2. The set pins (A) positioned at both edges of the bracket (B) are used to provide either a 'fixed joint' (F) or a sliding joint' (S).
3. The reflector overlap after each burner must be a 'sliding joint' (S), to allow for thermal expansion.
4. The next downstream reflector overlap must be a 'fixed joint' (F).
5. This pattern of alternate sliding and fixed joints will continue up to the next in-line burner.

6.2 END CAPS
(see fig. 8)

At the end of the reflector next to the reflector tee.

6.2.1 Secure ref. end cap to the reflector with 4 "S" type tinnerman clips or 3 sheet metal screws.

6.3 CORNERS
(see fig. 7)

The corner section must first be assembled by joining together the two reflector pieces and securing along the center flanges using 7x1/2 sheet metal screws.

6.3.1 Position the reflector corner assembly (A) over the ends of the two plain reflectors (B).

6.3.2 Ensure that the two reflector overlaps (D) are 6in minimum.

6.3.3 Position a reflector bracket (C) at the center of each reflector overlap.

6.4 TEES
(see fig. 8)

6.4.1 Position the reflector with side cut out (A) over the ends of the two plain reflectors (B).

6.4.2 Ensure that the reflector overlaps are 6in minimum.

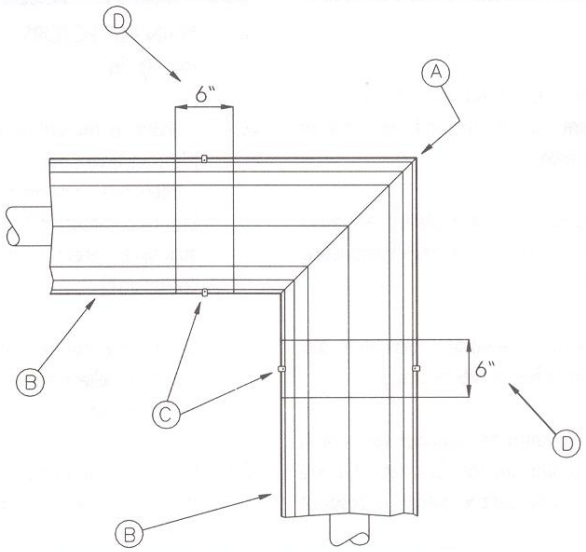
6.4.3 Position a reflector bracket (C) at the center of each reflector overlap.

6.4.4 At the entry to the tee section the plain reflector (B) is capped with a reflector end cap (E).

6.5 PERIMETER REFLECTORS

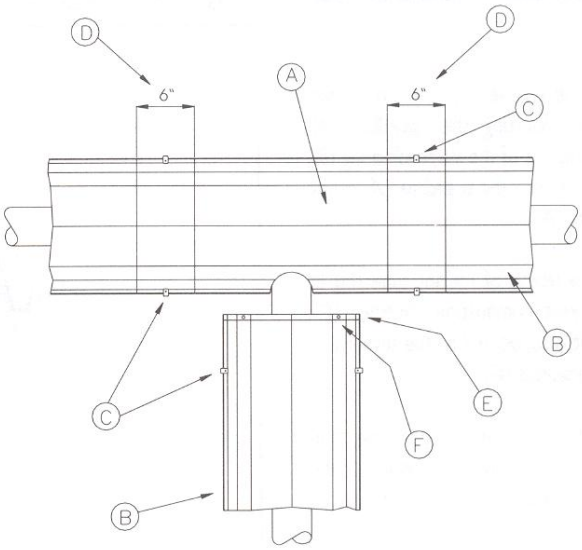
Perimeter reflectors are used when the radiant tube is mounted at the perimeter of the building. They are standard 8ft. long reflectors but with one side extended to direct the radiant heat away from the wall. Special perimeter suspension support brackets and perimeter reflector bracket assemblies are provided and the assembly procedure is the same as above, with the exception of the perimeter combustion chamber reflectors. The perimeter combustion chamber reflectors have a cut-out for the combustion chamber turret and suspension lug at both ends so that the one reflector can be used for either left or right hand perimeter systems. Thus, the overlap at the perimeter combustion chamber reflector with the second perimeter reflector must be such that the cut-outs are adequately covered, i.e., **3' 3" overlap.**

FIG. 7 INSTALLATION OF REFLECTOR CORNER



A Reflector corner assembly
B Main Reflector
C Reflector bracket
D Reflector overlap

FIG. 8 INSTALLATION OF REFLECTOR TEE



A Reflector with side cut-out
B Main Reflector
C Reflector bracket
D Reflector overlap
E Reflector end cap
F End cap fixing position

7 BURNER ASSEMBLY

(see fig. 9a.)

7.1 Each burner is marked with its rated heat input and the correct burner must be located as indicated on the layout drawing.

7.2 Fit each burner onto the flanged turret (H) at the top of the combustion chamber. Ensure that the gasket (A) is located between the turret (H) and the burner base plate.

7.3 Secure the burner to the turret using the four M6 bolts (C) and washers (B) provided.

8 END VENT MODULE

(see fig. 9b, 9c)

8.1 An End Vent Module (EVM) is positioned at each end vent burner position.

Each end vent module must be fitted with the correct end vent orifice plate. The orifice plate which is supplied loose, **must** be fitted within the end vent module using the 2 self-tapping screws provided.

9 SCHEDULE 40 TUBE SYSTEM

9.1 The installation of this system is similar to the normal installation procedure except a number of components which differ due to the size and weight of the schedule 40 tube which are detailed below.

9.2 **Combustion Chamber (P.No L101023-SUB)** The firing chamber is constructed in 5" schedule 40 tube reduced to 4" schedule 40 tube at each end. Overall length 4'-3".

The 4" schedule 40 tubing (weight 10.9 Lbs./Ft) forming the radiant section is welded to each end of the combustion chamber where the burner is in-line. At the end burner position a special end vent module is fitted.

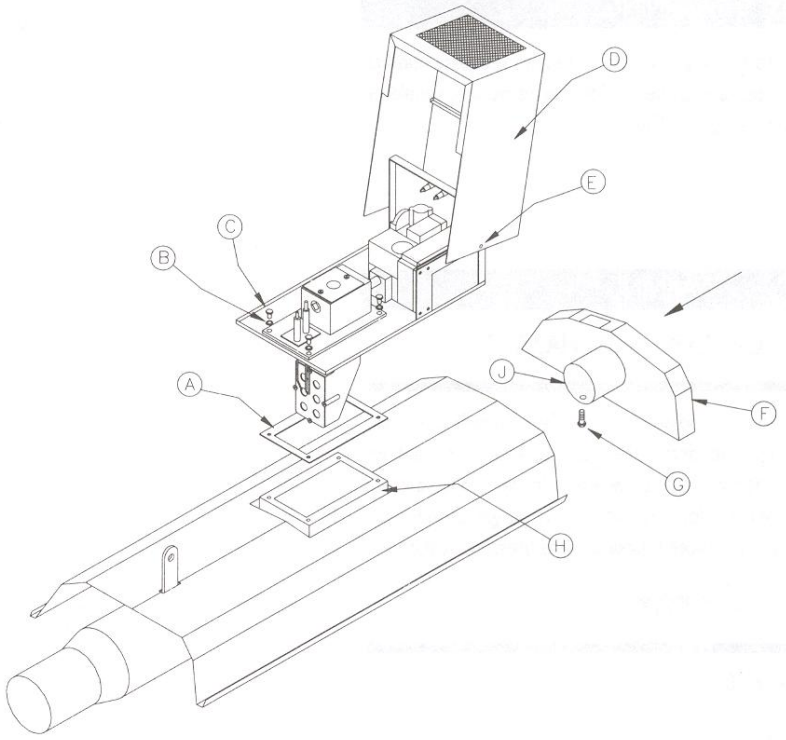
The schedule 40 tube sections are welded together or joined with screwed sockets.

9.3 **End Vent Module (P.No EVM-SCH40)** - Fits over the schedule 40 combustion chamber inlet in the end burner position.

9.4 **System Support Bracket (P.No L105151)** - Schedule 40 tube is secured to 1" sq. mild steel bracket section with 'U' bolt, with the hanging chain attached to 3/16" thk flat. Maximum centers between hanging brackets 10 ft..

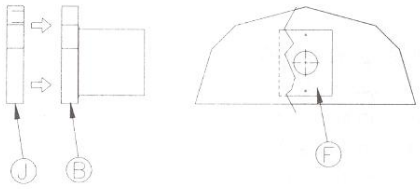
FIG. 9 INSTALLATION OF BURNER AND END VENT MODULE

9a

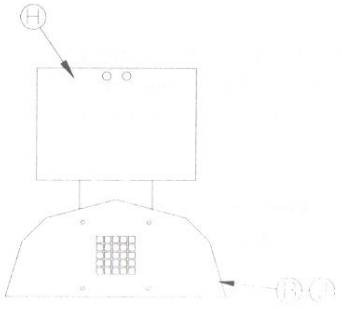


A Burner gasket
B Washer
C M6 bolts
D Burner lid
E Pivot point for lid
F End Vent Module
G Fastener
H Combustion chamber turret
J EVM attachment spinning

9b



9c



B End vent module (front section)
F Orifice Plate
H End vent burner
J Cover plate

9.5 **Reflector Support Bracket (P.No L105102-SUB)** - Supports the reflector at 10ft centers.

⚠ WARNING

Due to the weight of this system an adequate number of supports must be used and extreme care should be taken during installation.

⚠ WARNING

C GAS EXPLOSION HAZARD

To avoid the possibility of gas leaks, which can cause damage and death, the gas connections should be made as indicated below. Allow for system expansion, use relevant jointing compounds on gas connections and do not exceed maximum gas pressure at burners.

10 GAS SUPPLY

(see fig. 10)

10.1 Gas connection to each burner is made using a 1/2" or 3/4" MIP, 2ft to 3ft long CSA approved stainless steel gas flexible connector or manufacturers approved connector for the application incorporating a union.

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

10.3 The gas supply pipe (B) must incorporate a burner service cock (D) before the flexible connector (C).

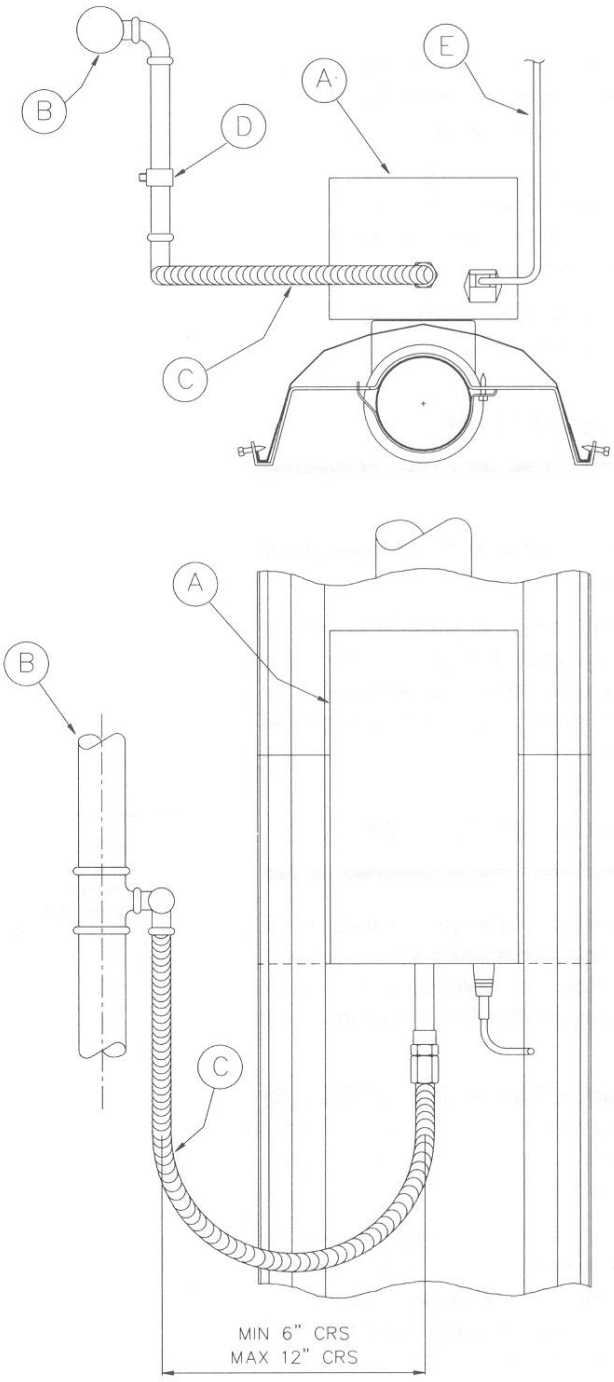
10.4 The linear expansion of the heating system will move the burners relative to the gas piping and it is therefore necessary at each burner connection to form an expansion loop with the flexible gas connector (C) provided to permit this movement.

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

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

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

FIG. 10 INSTALLATION OF GAS SUPPLY



A Burner housing lid
B Main gas supply pipe
C Flexible gas connector with union
D Service cock with test point nipple
E Flexible electrical cable

⚠ WARNING

D ELECTRICAL HAZARD

The heater/vacuum pump must be grounded in accordance with the relevant codes in the USA and Canada. All electrical connections should be made in accordance with these codes. A competent electrician familiar with relevant codes and practice should install the system.

11 ELECTRICAL SUPPLY

11.1 Each component carrying an electrical supply must be grounded.

11.2 For burners a 120v, 60Hz single phase supply is required.

11.3 Exhaust fans and control panels are supplied for either 120v, 60Hz single phase or 230v, 60Hz single phase.

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

11.5 The flexible cable should meet local and state codes.

12 OUTSIDE AIR SUPPLY

12.1 FITTING DUCTED AIR ADAPTORS TO BURNER ASSEMBLY
(see fig. 11)

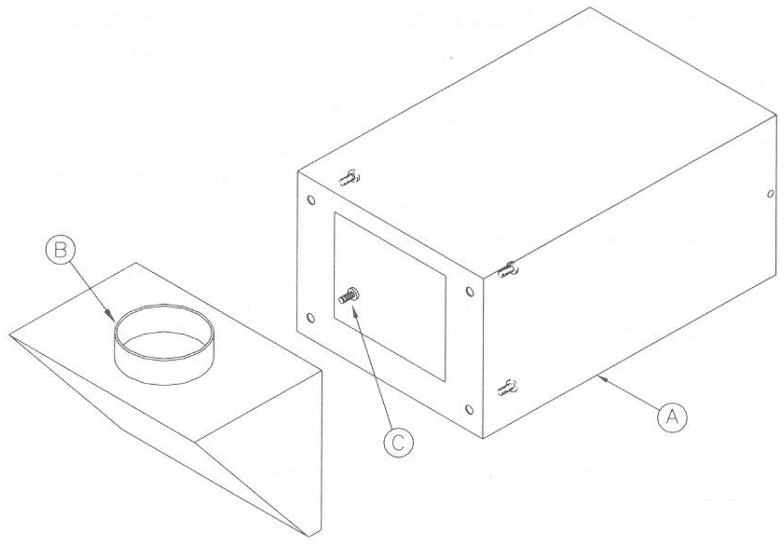
12.1.1 The ducted air adaptor (B) is fitted over the air inlet position of the burner housing lid (A) using the four M4 bolts(C).

12.1.2 The primary air filter will remain in place inside the housing lid (A).

12.2 FITTING DUCTED AIR ADAPTOR TO END VENT MODULE
(see fig. 12)

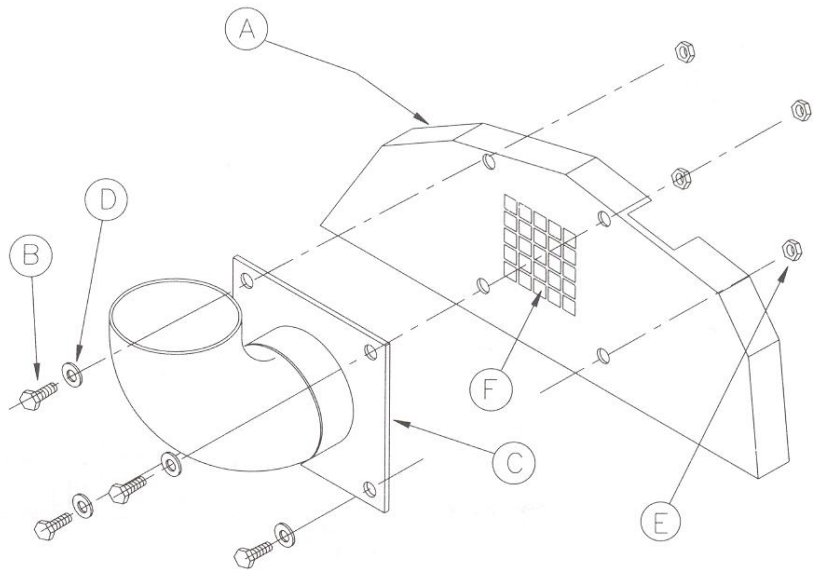
The ducted air adaptor spinning (C) is fitted to the air inlet position of the EVM (F) using the four M4 bolts (B), washers (D) and nuts (E) provided.

FIG. 11 FITTING DUCTED AIR ADAPTOR TO BURNER



A Burner housing lid
B Ducted air adaptor
C M4 bolts

FIG. 12 FITTING DUCTED AIR ADAPTOR TO END VENT MODULE



A EVM Cover Plate
B Set pin
C Ducted air adaptor
D Washer
E Nut
F Air intake grille

12.3 CONNECTION TO HEADER DUCT
(see fig. 13)

12.3.1 Heat resistant flexible tube 18in. long and 4in. diameter is connected to the burner assembly ducted air adaptor (C) and the EVM ducted air adaptor (F) and secured with 4in. diameter hose clamps (K).

12.3.2 The 4in. diameter flexible tube supplying the burners and End Vent Modules is connected to the branch air supply duct (B). **The maximum length of 4in. diameter ductwork is 6.5ft.**

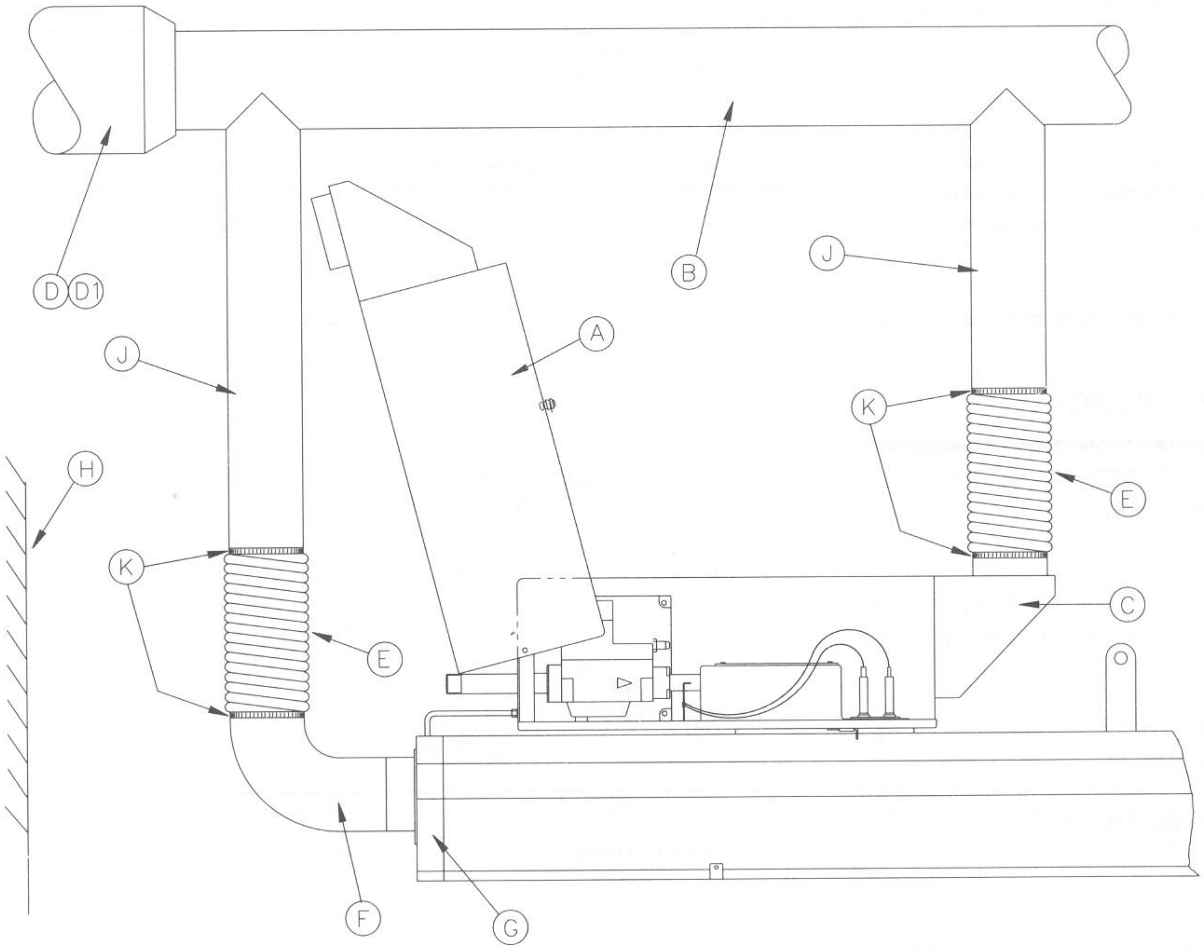
12.3.3 Ensure that the flexible supply duct (E) does not drape over or touch the reflector.

12.3.4 Ensure that the flexible ductwork is installed to allow for expansion of the heating system.

12.3.5 The main air supply header duct (D) which is feeding the individual branch ducts (B) must have a maximum pressure drop of 0.1in. w.c.

12.3.6 All joints and seams in the air supply system must be made air tight and a bird screen used at the inlet.

FIG. 13 SUGGESTED INSTALLATION OF DUCTED AIR SUPPLY



A Burner housing lid
B 4in. Ø branch duct 12 - 24LR
B1 6in. Ø branch duct 32 - 46LR
C Burner ducted air adaptor
D 6in. Ø main header duct for 12-24LR
D1 8in. Ø header duct for 32 - 46LR
E 4in. Ø flexible duct 3ft long
F EVM ducted air adaptor
G End vent module EVM
K 4 in. Ø hose clamp
J 4 in. solid duct

⚠ WARNING

E MECHANICAL HAZARD - VACUUM PUMP

High-speed rotation of vacuum pump can cause serious injury. Care must be taken when working near pumps, to avoid loose clothing becoming entangled. Avoid touching rotating parts with hands. When inspecting vacuum pumps ensure that electrical supply is switched off.

13 VACUUM FAN

13.1 LOCATION AND FIXING

13.1.1 The vacuum fan must be located as shown in the layout drawing.

13.1.2 The vacuum fan must have discharge as shown on drawing.

13.1.3 The fan must be firmly fixed to the wall or building structure. Anti-vibration mountings are fitted between the fan and the mounting platform.

13.1.4 Fix the fan mounting platform to the wall or building structure.

13.1.5 Locate the fan mounting stool in position on the platform using anti-vibration mountings and secure in position.

13.2 FAN INLET PIPEWORK

13.2.1 The system tailpipe (F) is connected via a flexible connector (G) to the 4in/6in. condensate trap assembly.

13.2.2 The condensate assembly (C) is connected to the fan inlet connection via an acoustic joint (G) and secured by clips at each end. A gap of approximately 6in. must be maintained between the fan inlet connection and the condensate assembly (C).

13.3 FAN EXHAUST DUCT FOR VERTICAL DISCHARGE

13.3.1 All ducting must be sealed using silicone sealant to avoid condensate leaking to the outside of the ductwork.

13.3.2 Ensure that an adequate weatherproof seal is made where the duct passes through the roof.

13.4 FAN EXHAUST DUCT FOR HORIZONTAL DISCHARGE

13.4.1 The exhaust duct must incline downwards away from the fan to avoid condensate running back into the fan.

13.4.2 All ducting must be sealed using silicone sealant to avoid condensate leaking to the outside of the ductwork.

13.4.3 A non-combustible sleeve (not supplied by Ambi-Rad) must be fitted between the exhaust duct and a combustible wall.

13.5 CONDENSATE TRAP

13.5.1 Ensure that a 1" drain tube is fitted to the connection on the under side of the condensate assembly. The drain tube must be resistant against the action of flue gas condensate and suitable for operation up to a maximum temperature of 120°F.

Ensure that the drain tube is adequately supported.

FIG. 14 VACUUM PUMP VERTICAL DISCHARGE DETAIL

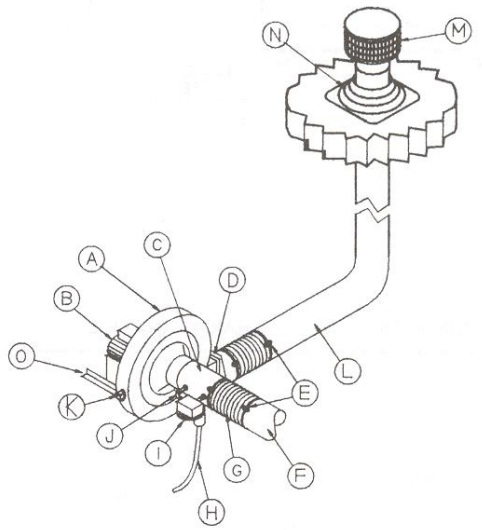
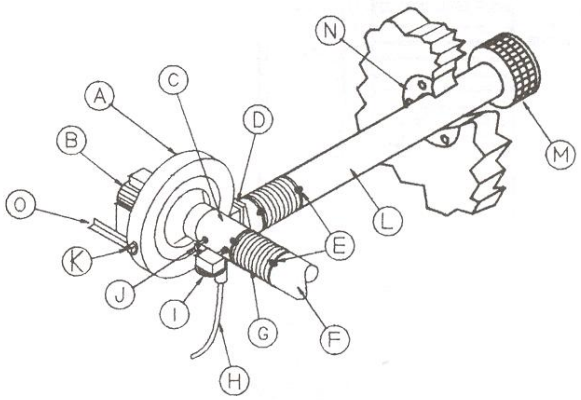


FIG. 14 VACUUM PUMP HORIZONTAL DISCHARGE DETAIL



A	Vacuum Fan	H	Condensate Drain
B	Fan Motor	I	Vacuum Switch
C	Condensate Assembly	J	Damper Adjuster
D	Discharge Adapter	K	Drain Plug for vertical discharge
E	Clips	L	Discharge Pipe
F	Tail Pipe	M	Flue Terminal
G	Flexible Connector	N	Wall/Roof Seal
		O	Support Frame

FIG. 14a F100 VACUUM PUMP PHYSICAL CHARACTERISTICS

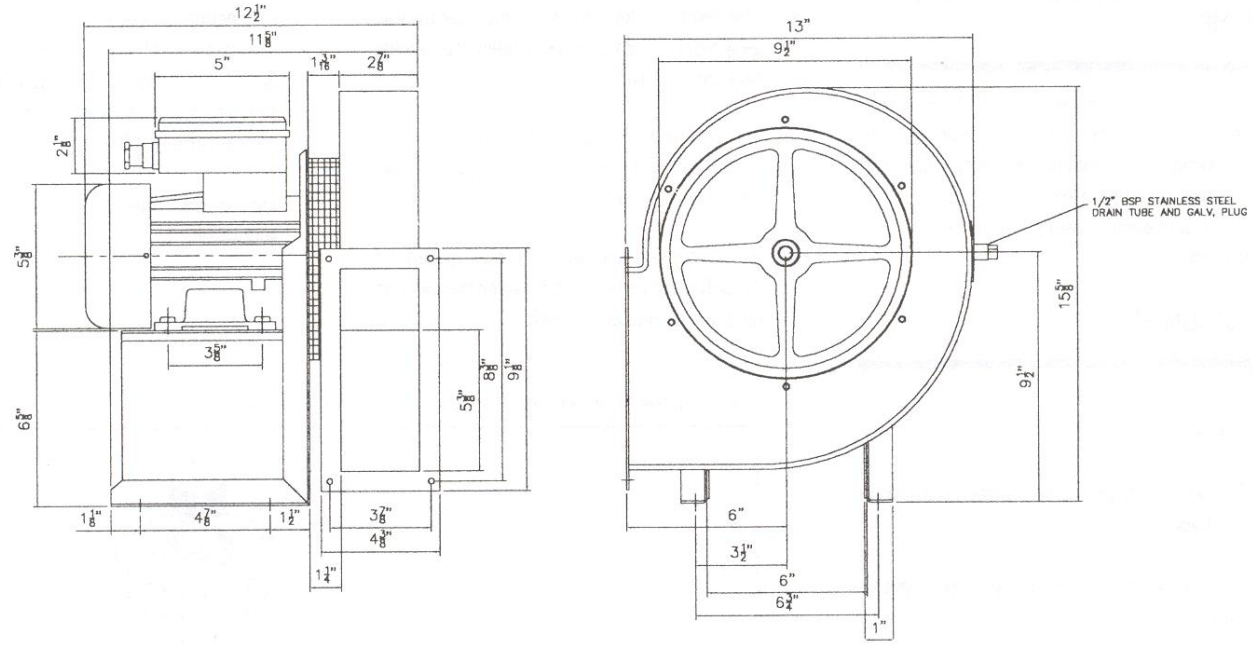
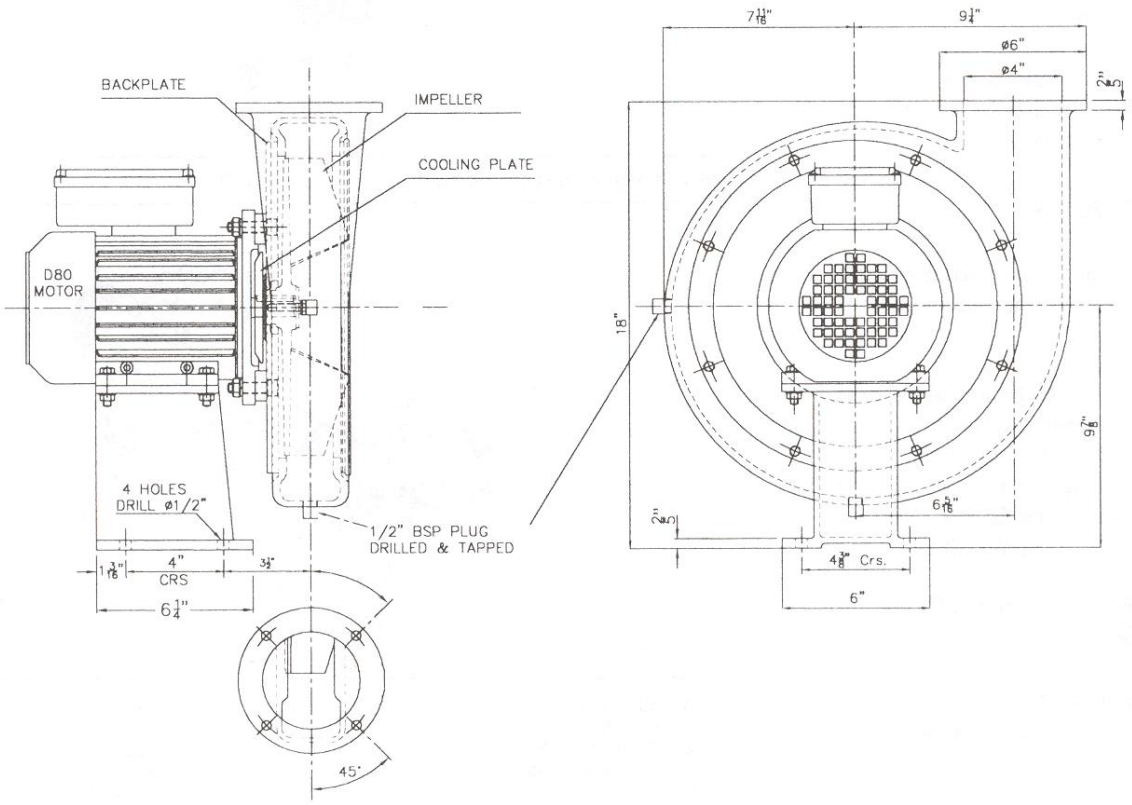


FIG. 14b F200 VACUUM PUMP PHYSICAL CHARACTERISTICS

Dimensions are Approx.



14 PROTECTIVE GUARD SYSTEM

The ARC protective guard system consists of standard 8ft. long protective guard modules which are supported from the underside of the radiant tube. If necessary a standard 8ft. long protective guard system can be shortened by the installation engineer. The protective guard system sections are fitted in tandem along the system.

14.1 INSTALLATION
(see fig. 15)

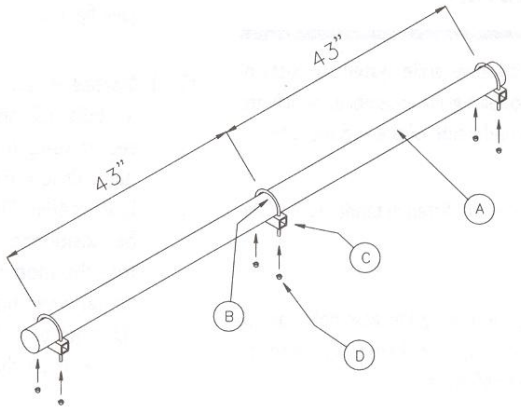
14.1.1 Starting at each system end vent, position the 3 'U' bolts (B) onto the radiant tube (A) and secure using square tubes (C) with M8 nuts (D). Ensure that the distance between the 'U' bolts is approximately 43in. The 'U' bolt assemblies should be positioned perfectly square to ensure that the protective guard system modules lie horizontal when fitted.

14.1.2 A retaining plate (E) is positioned on the underside of the ballguard at each 'U' bolt assembly position and secured using M8 nuts (D).

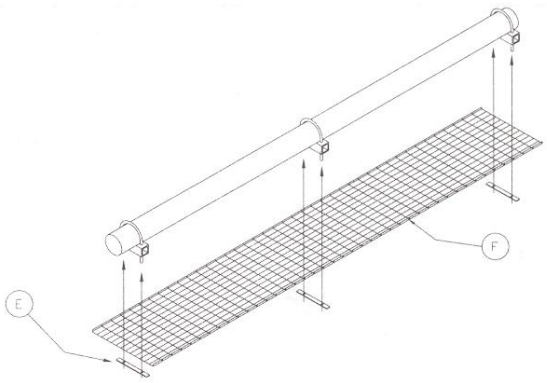
14.1.3 It is necessary to cut the protective guard system section (G) at the interface with the suspension support bracket (H).
(see fig. 15d).

FIG. 15 INSTALLATION OF BALLGUARD SYSTEM

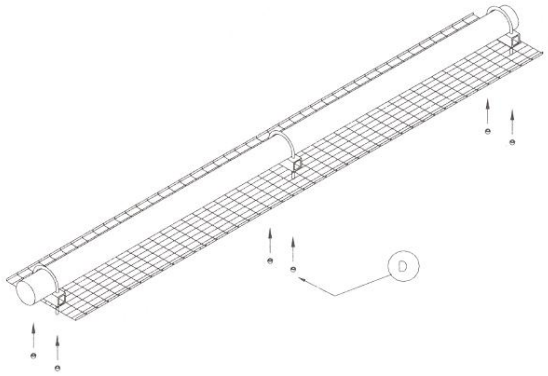
15a



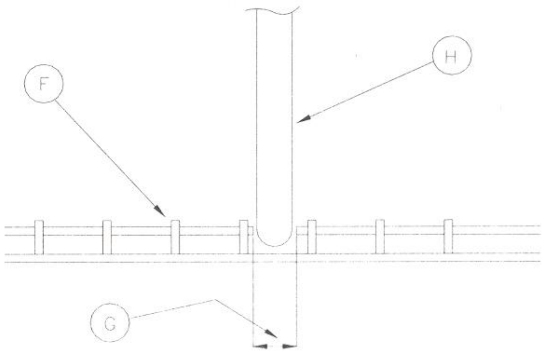
15b



15c



15d



A Radiant tube
B 'U' bolt
C Square tube
D M8 nut
E Retaining plate
F Protective Guard System
G Cut-out
H Suspension support bracket

15 SLIMLINE 'M' DECORATIVE GRILLE SYSTEM

The Slimline 'M' Decorative grille system consists of standard 8ft. long modular grille assemblies which are supported from the underside of the radiant tube.

The modular assemblies are fitted in tandem along the system.

A standard 8ft. long modular grille assembly can be shortened to suit the system layout and also to accommodate corner reflector sections.

15.1 STANDARD 8FT. LONG MODULAR GRILLE ASSEMBLIES
(see fig. 16)

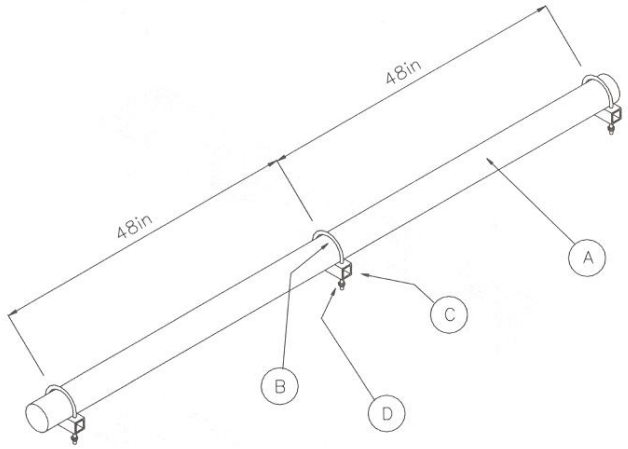
15.1.1 Starting at each system end vent, position the 'U' bolts (B) onto the radiant tube (A) and secure using the square tube (C) with M8 nuts. Ensure that the distance between 'U' bolts is 48in. The 'U' bolt assemblies should be positioned perfectly square to ensure that the modular grille assembly lies horizontal when fitted. Position 2 M8 locknuts (D) onto each 'U' bolt (B) to approximately 3/8in. from the ends of the threads.

15.1.2 Fit 2 eggcrate grille pieces (E) into the standard 8ft. long grille support frame (F).

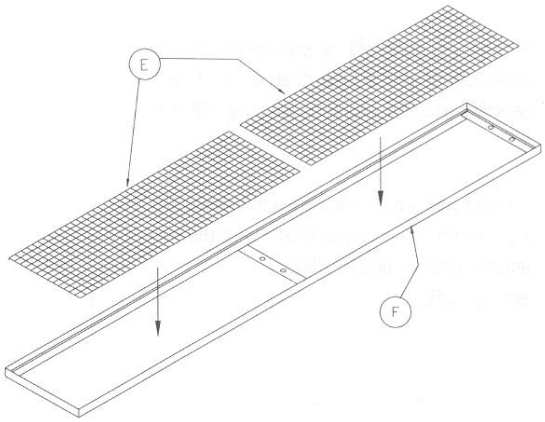
15.1.3 Raise the modular grille assembly (G) and pass the threaded ends of the three 'U' bolts through the three sets of fixing holes.

15.1.4 Fit the M8 dome head nuts (H) to the threaded ends of the 'U' bolts and tighten down the M8 locknuts (D).

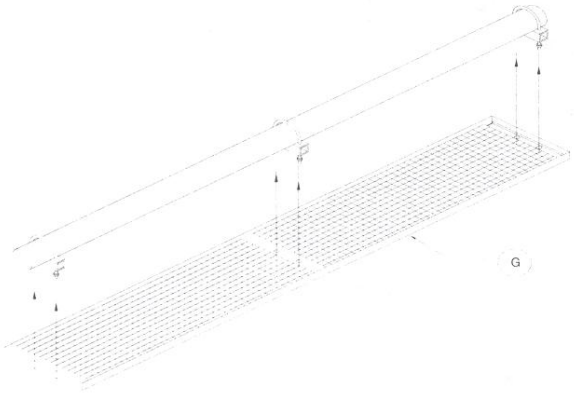
FIG. 16 INSTALLATION OF SLIMLINE 'M' SYSTEM



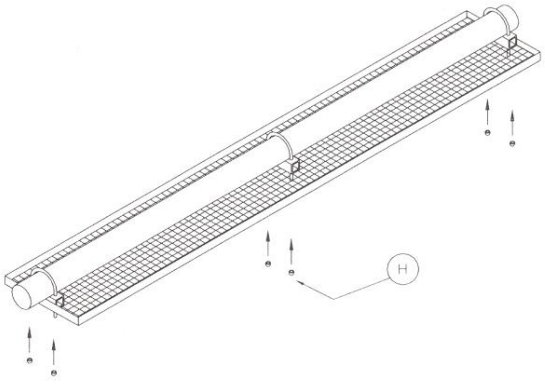
16a



16b



16c



16d

A Radiant tube
B 'U' bolt
C Square tubes
D Nut
E Eggcrate grille
F Grille support frame
G Modular grille assembly
H Dome nuts

CHECK THAT THE MODULE IS SECURE

15.1.5 Addition modules are fitted in tandem along the system using the same procedure.

15.2 SHORTENED MODULAR GRILLE ASSEMBLIES
(see fig. 16)

15.2.1 Carefully disconnect one end support (M) from the standard 8ft. long grille support frame.

15.2.2 Cut the side support (J) to the required length, ensuring that the cut ends are square and free from burrs. Reposition the end support (M) and mark the fixing hole centers onto the side supports (J).

Drill 2 sets of $^{1}/_{4}$in. diameter holes through the marked positions on the side supports (J). Secure the end support (M) to the support frame using $^{3}/_{16}$ in. pop rivets.

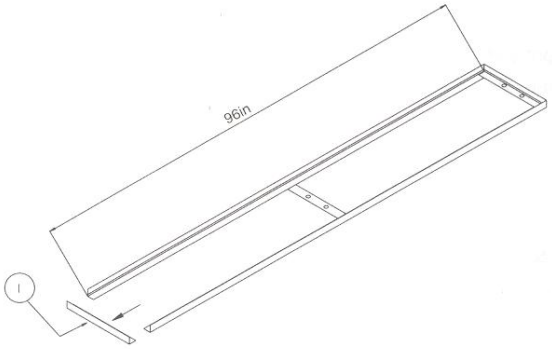
15.2.3 Cut grille (K) to the required length and position into the support frame.

15.2.4 Ensure that the 'U' bolts are positioned onto the tube to suit the new support frame fixing positions.

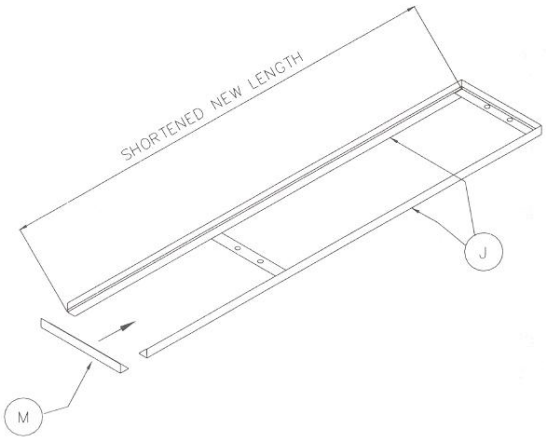
15.2.5 The shortened modular assembly can now be fitted to the heater using the procedure as stated in section 14.1.

FIG. 17 SHORTENING OF SLIMLINE 'M' SYSTEM MODULES

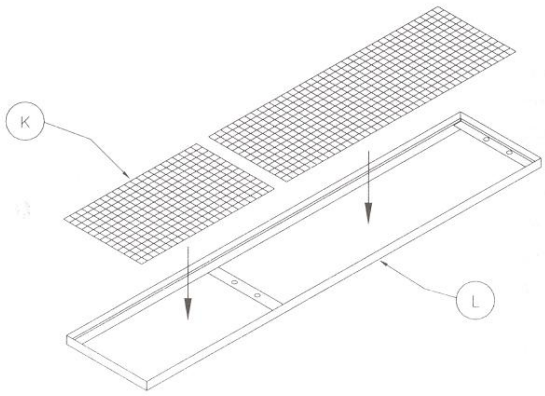
17a



17b



17c



M End support
J Side supports

K Shortened eggcrate grille
L Shortened grille support frame

16 CONTROL SYSTEM

The control system must be installed in accordance with the design specification.

16.1 CONTROL PANEL DESIGN

ARC control panels are available as an option to control single or multiple zones of heaters.

Pre-purge and post-purge timers are incorporated into ARC panels. To ensure that the system is purged before ignition and condensate is evacuated after shut down.

If an ARC control panel is not used, pre and post-purge should be incorporated into the control system.

16.2 Control Panel Sequence

a. Power on to panel through mains isolator.
b. 24v supply sent from panel to remote thermostat.
c. On demand for heat fan starts and vacuum switch pulls in
d. Pre-purge runs for approximately 1 minute (adjustable)
e. Following purge burners start in sequence beginning with burner nearest fan (number 1) in each leg. Dip switches in burners are set on site to allow this. Burners furthest from fan start last.
f. When zone reaches temperatures set at thermostat electrical supply to burners is switched off and post purge of 6 mins is activated. (adjustable)
g. At call for more heat sequence runs from (d) onwards after the post purge period is completed.

16.3 INSTALLATION OF CONTROL PANEL

To install the ARC control panel remove the plastic plugs from the four 3/8 in. diameter holes in the back of the control box. Using these holes fix the box in a convenient position to a suitable wall or solid structure with No. 10 gauge wood screws or 1/4 in. bolts or set screws. Access to the holes may be gained from the inside of the box without the necessity of removing the wiring chassis. Make the electrical connections in accordance with relevant wiring diagrams.

FIG. 18 WIRING DIAGRAM FOR CONTROL PANEL TYPE: ARC/CP/4Z/IF/IP C/W PRE/POST PURGE TIMERS

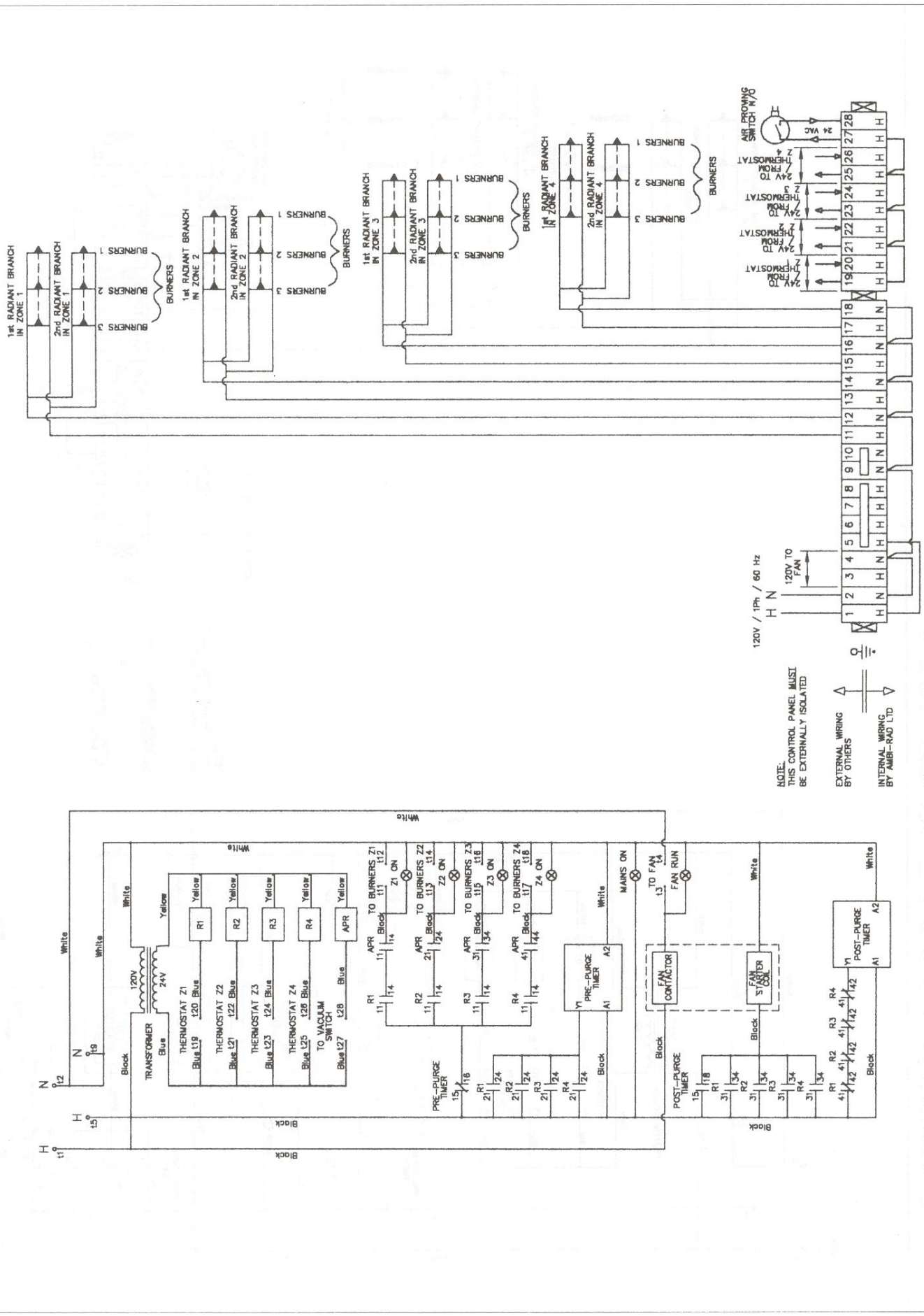


FIG. 19 WIRING DIAGRAM FOR CONTROL PANEL TYPE: ARC/CP/ZZ/1F/1P C/W PRE/POST PURGE TIMERS

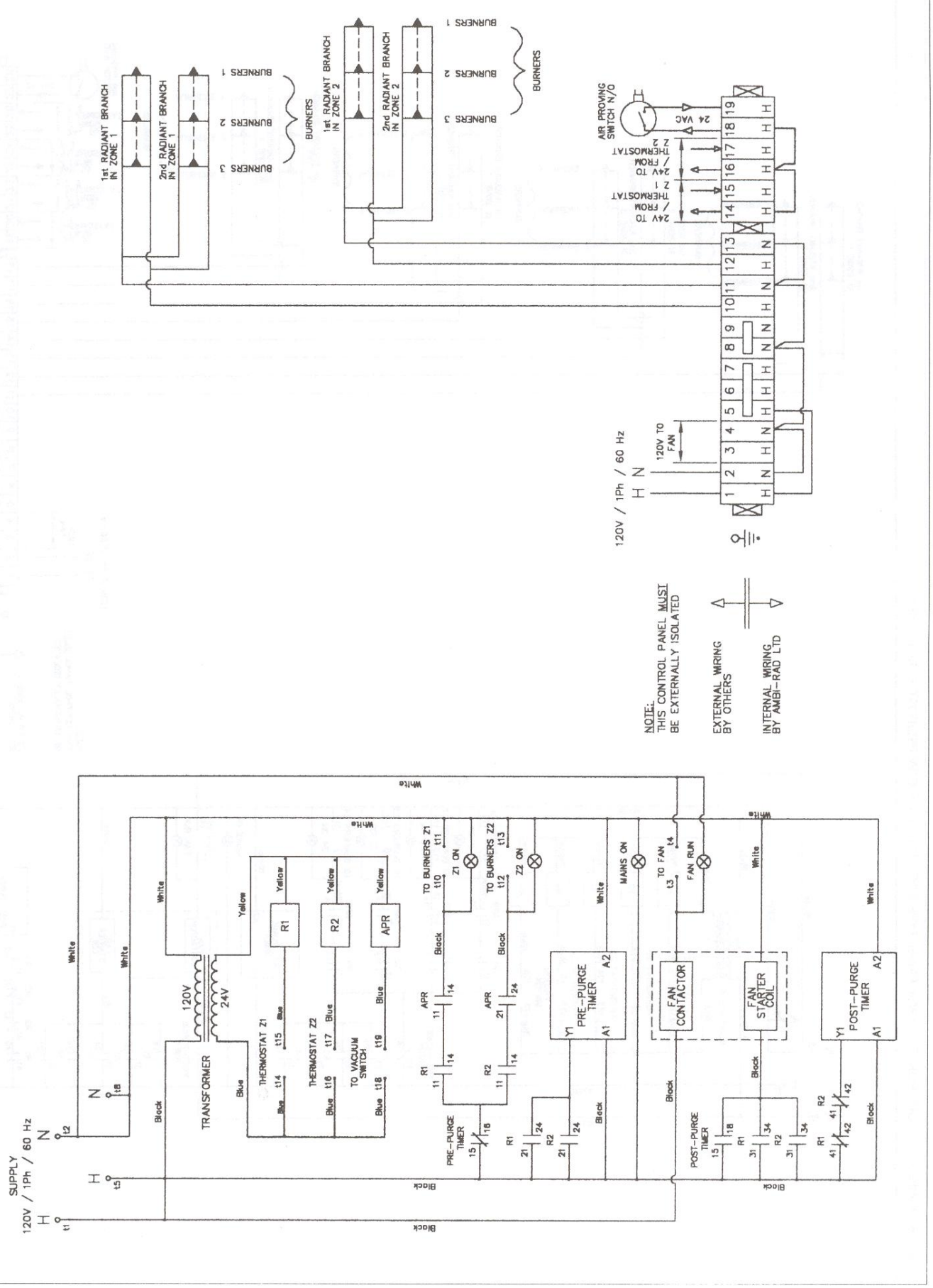


FIG. 20 TYPICAL ARC SCHEMATIC OF EXTERNAL WIRING

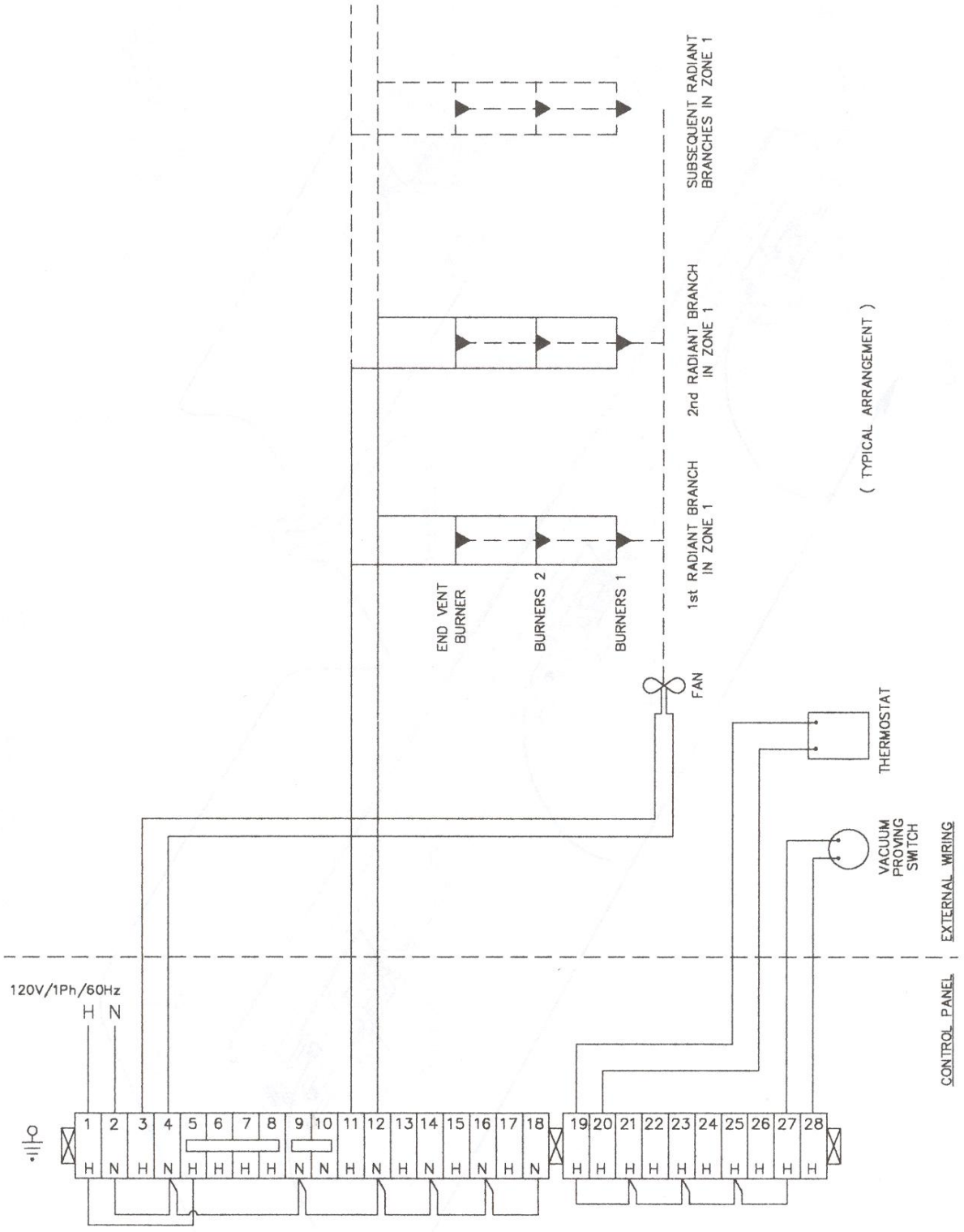
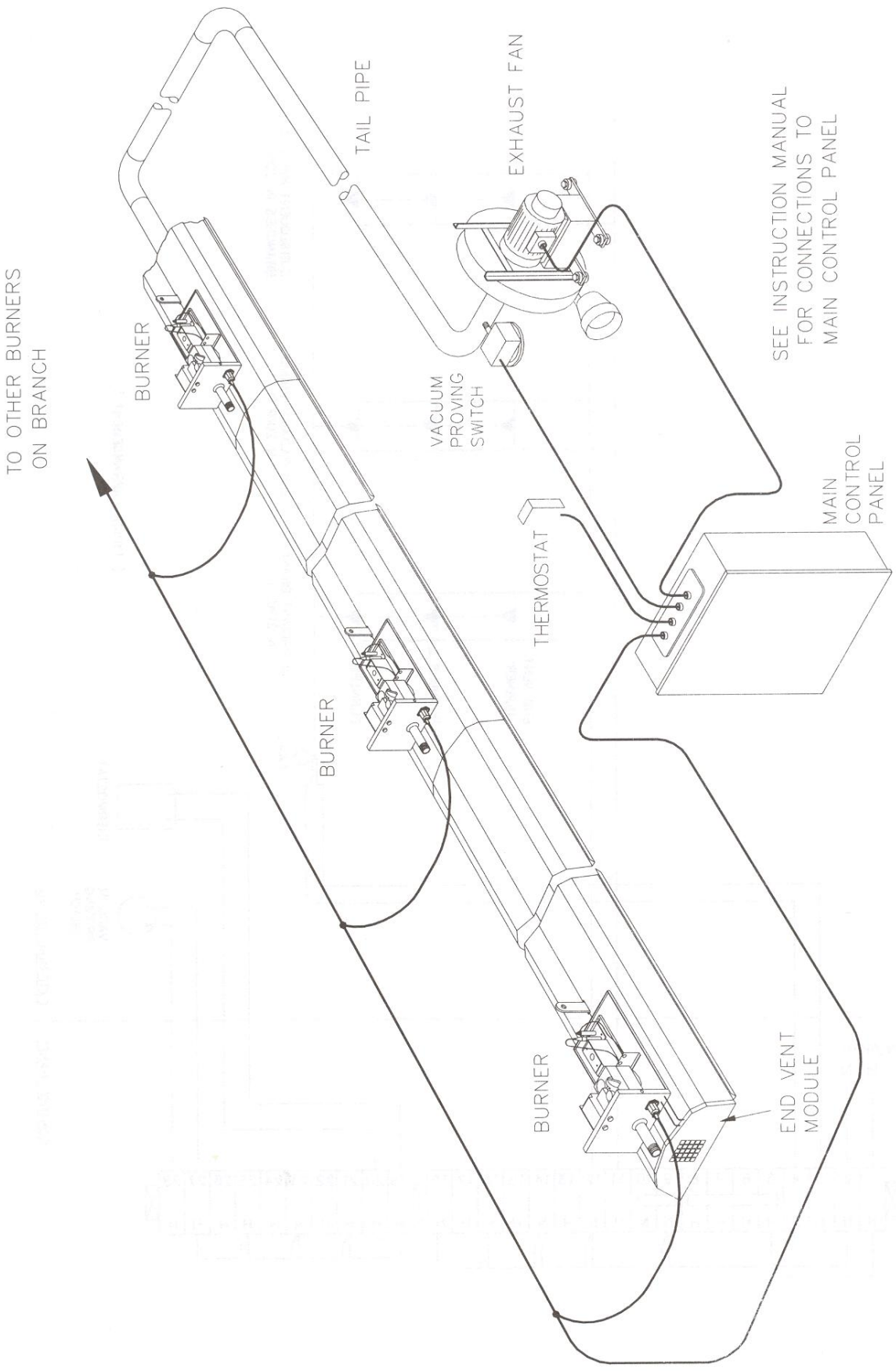


FIG. 21 PICTORIAL DETAIL OF ARC WIRING ARRANGEMENT



TYPICAL ARC INSTALLATION

FIG. 22 ARC LR BURNER INTERNAL WIRING DIAGRAM

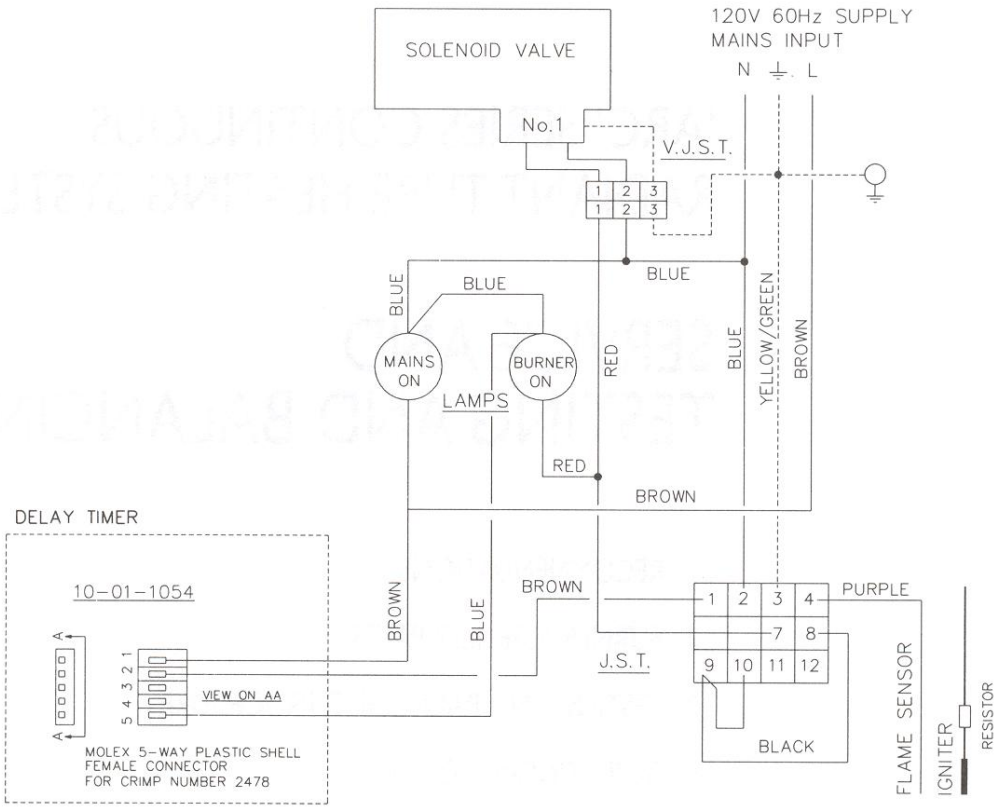
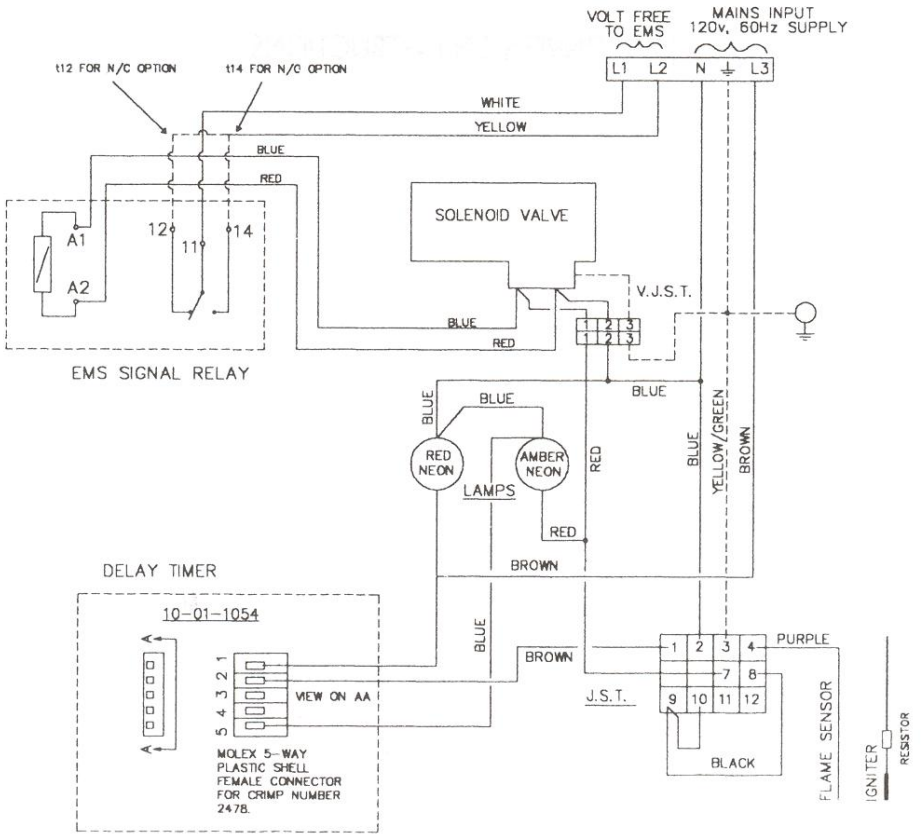


FIG. 23 ARC LR BURNER INTERNAL WIRING DIAGRAM C/W N/C OR N/O LOCKOUT CONTACTS



4

'ARC' SERIES CONTINUOUS RADIANT TUBE HEATING SYSTEM

SERVICE AND TESTING AND BALANCING

CONTENTS:

1 RECOMMENDATIONS

Under normal working conditions it is recommended that the ARC Series System is regularly maintained to ensure long life and efficient operation. Normally, maintenance is required only once per year. In dusty or dirty conditions more frequent maintenance is desirable. Servicing work must be carried out by a qualified gas service engineer.

IMPORTANT:

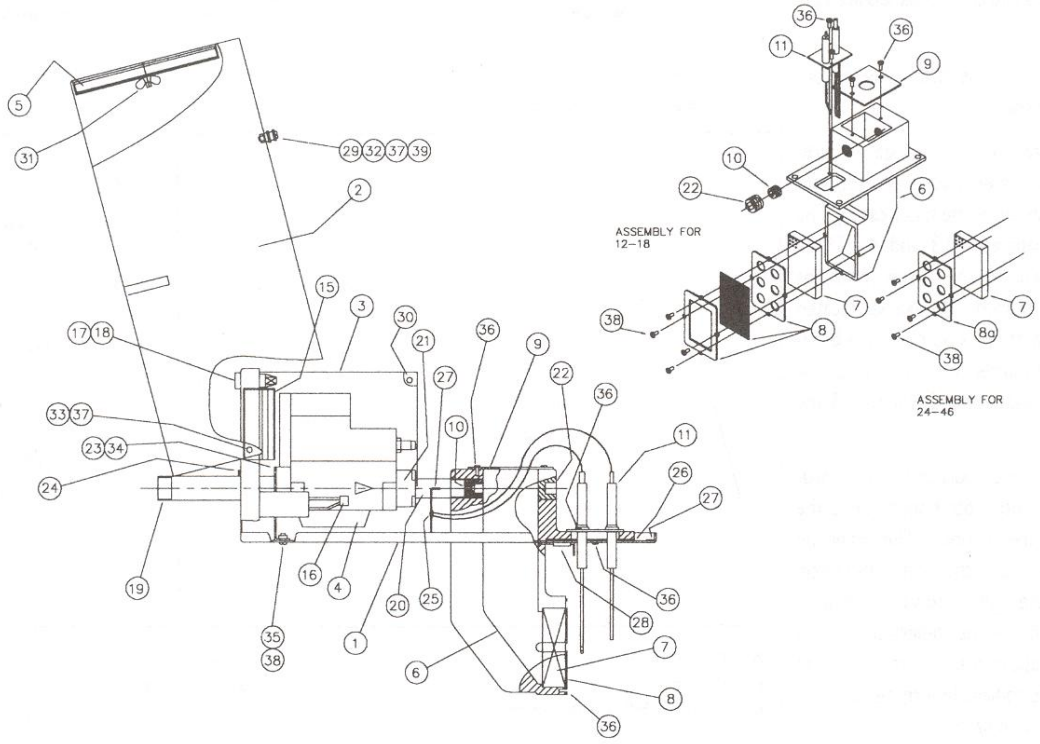
When maintaining or servicing the ARC Series Systems:–

(a) Never rest anything, especially ladders against heating system.

(b) Isolate gas and electrical supplies before commencing any service work.

2 BURNER ASSEMBLY PARTS

FIG. 1 BURNER ASSEMBLY



ITEM	DESCRIPTION	PART NO.	ITEM	DESCRIPTION	PART NO.
1	Control Housing Base Plate	L102001	22	1/2" Plug	L100202
2	Control Housing Lid	L102009	23	Valve Mounting Bracket	L102020
3	Full Sequence Gas Controller	3256-11	24	Grommet (gas supply)	B200500
4	Multi Functional Gas Valve	L100500	25	Grommet 3/8 in.	2310
5	Air Filter	L102013	26	Burner Gasket	L102032
6	Burner Head Casting	L100103-Sub	27	Silicone Gasket	L102031
7	Burner Port Insert	L100155	28	Slide Latch	L100200
8	Flame Retention Grid 12-18 LR	L100175-S (12/18)	29	Slide Latch Plate	L100201
8a	Flame Retention Grid 24-46 LR	L100171 (24-46)	30	Push Clip	C110714
9	Air Shutter Plate	various	31	Wiring Nut	C111700
10	Burner Jet	various	32	Set Pin M4 x 16	5325
11	Electrode Assembly	L100401	33	Set Pin M4 x 8	5306
15	Delay Timer	L102025-Sub	34	Set Pin M4 x 10	5314
16	Wiring Harness	E200067	35	Set Pin M5 x 10	5363
17	Red Neon Light	2180	36	Set Pin M4 x 6	5326-1
18	Amber Neon Light	2175	37	Washer M4	5322
19	Gas Inlet Connection Pipe 3/8" x 4"	2360	38	Washer M5	5374
20	Gas Outlet Inlet Connection Pipe 3/8" x 21/2"	2314-1	39	Nut M4	5315
21	1/2" - 3/8" Reducing Bush	2320			

⚠ WARNING

F TESTING & BALANCING

On completition of installation testing and balancing should be undertaken by a competent gas engineer following the instructions provided by the manufacturer. Special attention should be given to testing and confirming the correct operation of the ignition and burner fail safe system and the correct setting of the gas pressure.

3 TESTING & BALANCING PROCEDURE

3.1 Check that the installation is to the design layout drawing and installed in accordance with the installation instructions.

3.2 Check installation electrically. Ensure that the vacuum fan, burners and control panels are correctly wired.

3.3 Ensure that each burner is electrically disconnected at the plug/socket.

Each burner is fitted with an adjustable burner,delay timer. The timer is adjusted using dip-switches located on top of the timer casing. The dip-switches are labeled 1,2,3 and 4. These numbers correspond to the burner positions within the radiant branch. The burner located closest to the exhaust fan is burner 1, the burner directly behind burner 1 is burner 2, the burner directly behind burner 2 is burner 3 and so on.

For example, the timer on burner 1 is set by sliding the white dip-switch, positioned above the figure 1, towards the number. The timer on burner 2 is set by sliding the white dip-switch, positioned above the figure 2, towards the number (see fig. 5). Other burner timers are set in a similar manner as above. If there are more than four burners in the radiant branch, set the dip-switches as indicated in fig. 5.

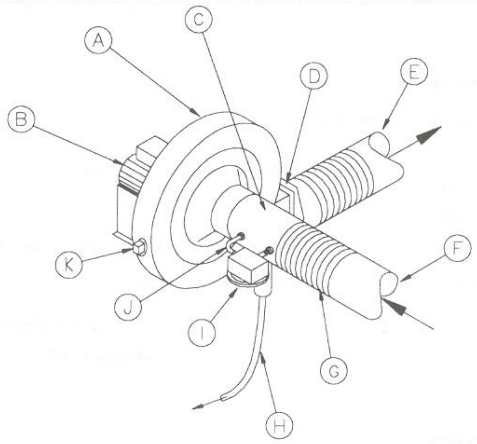
3.4 Start the vacuum fan. For control systems where the temperature starts the vacuum fan it is necessary to set the thermostat(s) to above room temperature. Check for correct fan rotation.

3.5 Check gas is turned on at meter and take meter gas pressure reading. Fit pressure manometer to the inlet pressure test point on the burner furthest from the gas supply and with all burners off observe pressure reading. Turn off gas at meter and again observe reading. If pressure falls check system for leaks.

3.6 The gas pressure at the burner inlet connection must not exceed 20in.w.c.

3.7 Check vacuum fan inlet damper is fully open. (see fig 3 for adjustment instruction).

FIG. 3 VACUUM FAN DAMPER ASSEMBLY



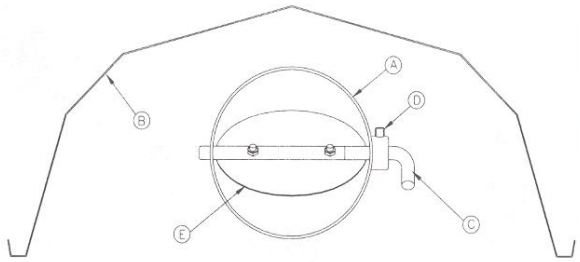
Adjustment instruction for fan damper

The fan damper is integral to the fan inlet condense assembly.

1. Loosen grub Screw at (J).
2. Turn Adjustment lever (J).
3. Position of damper blade is indicated by position of bent lever (J).
4. Tighten grub screw at (J) to secure damper position.

A Fan
B Fan Motor
C Condense Assembly
D Discharge Adapter
E Discharge Pipe
F Tail Pipe
G Flexible Connector
H Condensate Drain
I Vacuum Switch
J Damper
K Drain Plug for vertical discharge

FIG. 4 BRANCH DAMPER

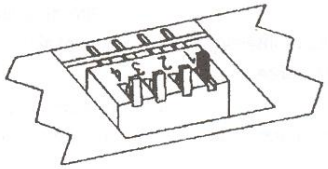


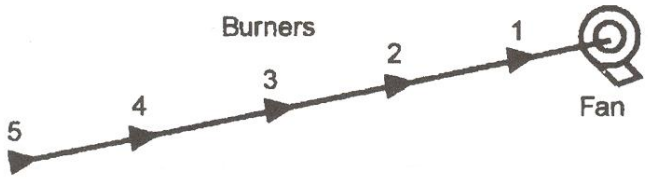
Adjustment instruction for Branch Damper

1. Loosen grub screw (D).
2. Turn adjusting level (C).
3. Position of damper blade is indicated by position of bent lever (C).
4. Tighten grub screw (D) to secure damper position.

A Damper tube
B Reflector
C Damper Adjustment Lever
D Grub screw
E Damper blade

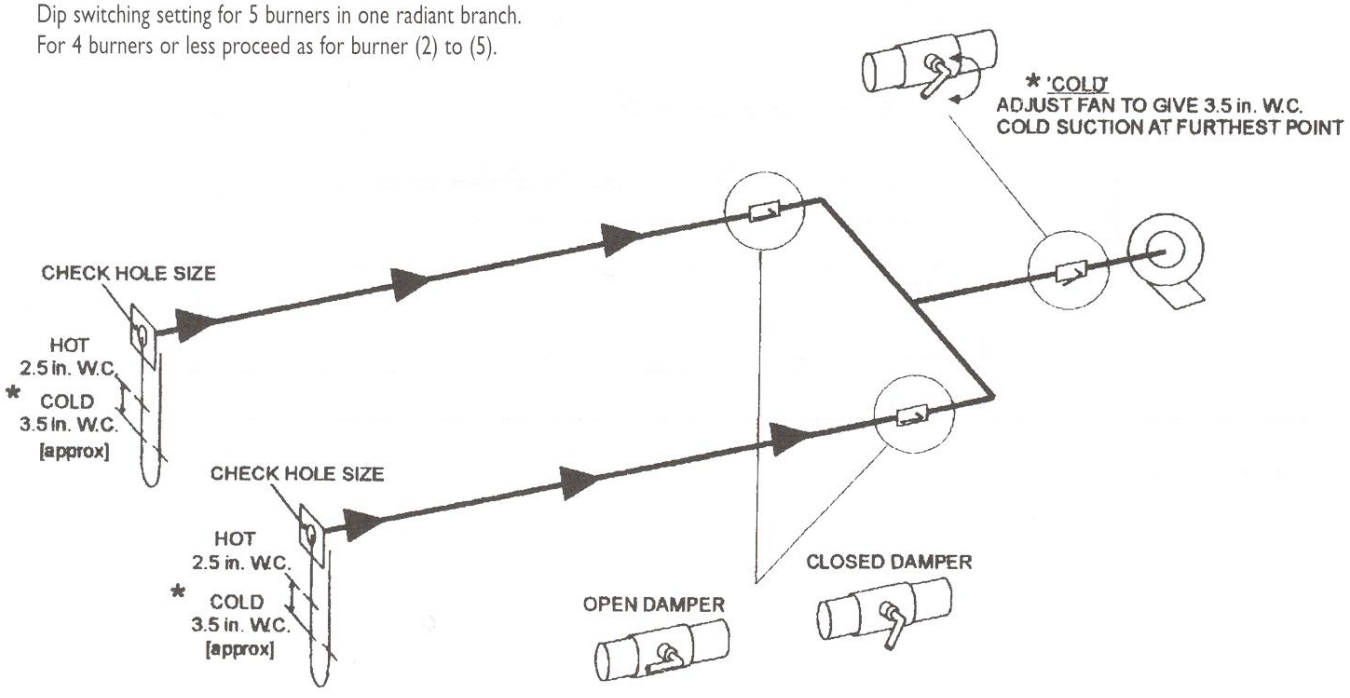
To set Dip-switch slide the white switch toward the numbers (1~4) (No. 1 switch shown set)





Burner No.	Dip-Switch Position. No. Of Burners in line.				
	1	2	3	4	5
1	1	1	1	1	1
2	-	2	2	2	1
3	-	-	3	3	2
4	-	-	-	4	3
5	-	-	-	-	4

NOTE:
Dip switching setting for 5 burners in one radiant branch.
For 4 burners or less proceed as for burner (2) to (5).



IMPORTANT NOTE:
REDUCE SUCTION FIRST USING FAN DAMPER
THEN ADJUST SUCTION FOR EACH BRANCH
USING BRANCH DAMPERS TO ENABLE
BRANCH DAMPER TO BE OPEN AS POSSIBLE

3.8 Measure the vacuum pressure at each end vent burner (see fig. 6) and adjust each branch damper to obtain 3.6in.w.c. See fig. 4 for adjustment instruction for damper.

The end vent vacuum is measured by inserting a small tube through the end vent orifice.

3.9 Set the thermostat(s) below room temperature.

3.10 Turn on the gas supply and reconnect the electrical supply to the burners in one radiant branch.

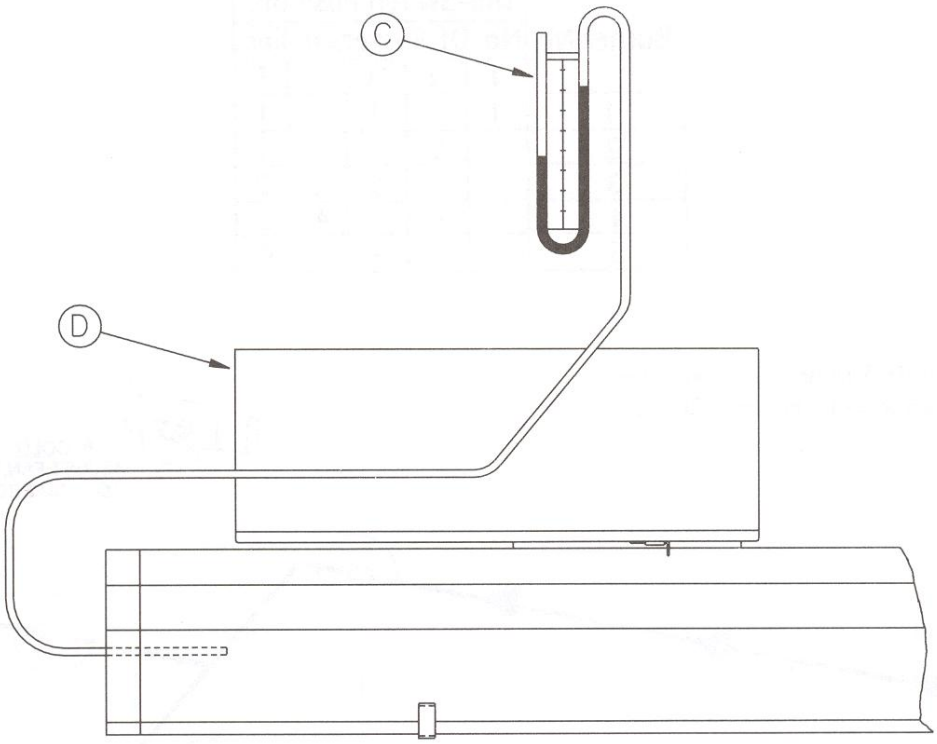
3.11 Set the thermostat(s) to above room temperature.

3.12 Observe the ignition of the burners in this radiant branch.

3.13 It may be necessary to temporarily break the union at a burner in order to purge the gas pipe of air.

3.14 Proceed to the next radiant branch and repeat the procedure.

FIG. 6 END VENT VACUUM MEASUREMENT



C Manometer
D End vent burner

3.15 When all burners have been running for thirty minutes check all end vent vacuum readings.

The correct setting must be 2.5in.w.c. (± 0.2in.wc.).

End vent vacuum adjustments are made first by means of the damper at the vacuum fan inlet this brings the end vent with the lowest reading to the normal operating vacuum. The dampers in the branches are then adjusted to bring the vacuum readings in other branches to the normal operating figure. Ensure that all dampers are locked securely after adjustment.

3.16 Check that the burner injector pressures are zero ±0.1in.w.c. Adjust if necessary. (see fig. 7 for adjustment instruction).

3.17 Check operation of thermostat controllers a number of times, allowing the burner ignition cycle to complete each time, checking that each burner relights.

3.18 Reset thermostat controllers to required setting (see section 15 of Installation instructions).

3.19 Check correct setting and operation of time clock (see section 15 of Installation instructions)

3.20 With all burners firing check the inlet gas pressure at the burner furthest away from the gas supply. The minimum inlet pressure is 4.8in.w.c. The difference between gas pressure at the burner, with all the burners on and all the burners off should not be more than 1in.w.c.

3.21 Take gas consumption meter readings for each separate ARC system or building heated ensuring all other loads are off.

3.22 After the system has reached equilibrium: take the following measurements.

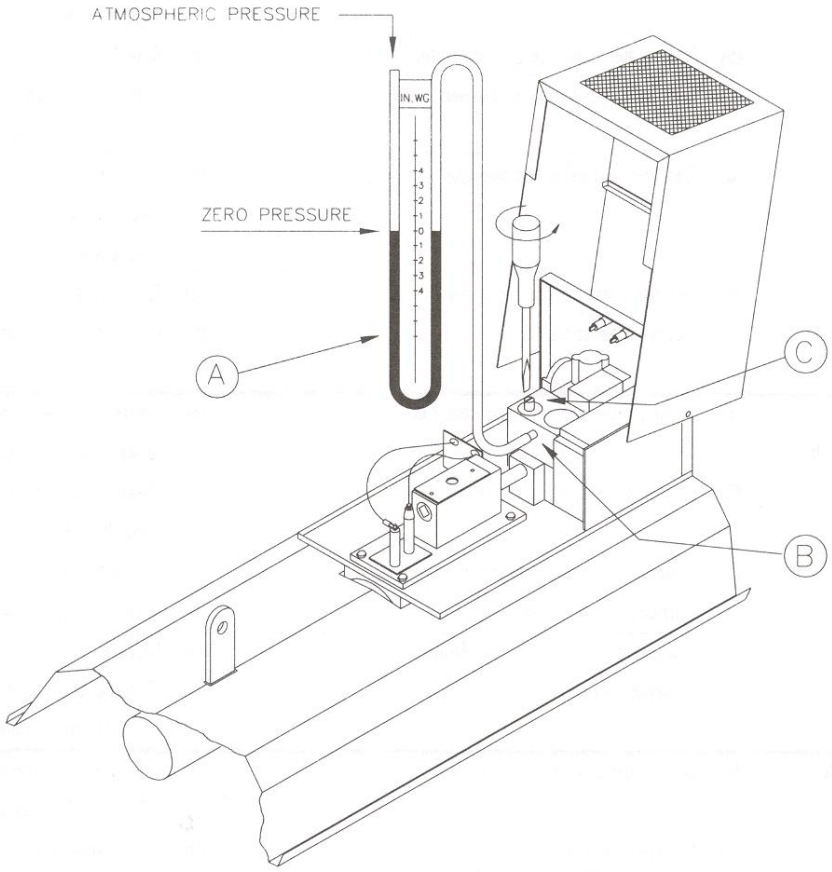
(a) The flue gas temperatures entering the vacuum fan.

(b) The surface temperature of the underside of the tube at the end of each radiant branch.

(c) The surface temperature of the underside of the tube at a point directly underneath each combustion chamber suspension lug.

3.23 Complete service report sheet.

FIG. 7 MEASUREMENT OF INJECTOR PRESSURE



A Pressure manometer
B Pressure test point
C Governor Adjustment screw

⚠ WARNING

G ELECTRICAL/MECHANICAL HAZARDS

When checking for faults do not put hand near rotating parts of the vacuum pumps. Do not touch live electrical components or wiring in the burner housing. When working inside the burner-housing switch off/disconnect the electrical supply.

4 FAULT FINDING GUIDE

PROBLEM	CAUSE	ACTION
4.1 Vacuum fan is running but there is no power at burner. Neon lights are off.	(a) Thermostat is satisfied.	(a) Check to see thermostat is calling for heat.
	(b) No power at burner.	(b) Check for 120v or 230v supply.
	(c) Blown fuse in supply to heater.	(c) Check and replace if necessary.
	(d) End vent vacuum too low.	(d) Vacuum at end vent should be 2.5in w.c. Check for air leaks on burner (see section 5.5).
	(e) Pressure switch not operating.	(e) Check and replace if necessary (see section 7.8).
4.2 Red neon comes on but ignition sequence does not start and Amber neon remains off.	(a) Loose or broken leads to full sequence gas controller.	(a) Check and replace.
	(b) Fault in full sequence gas controller.	(b) Replace.
4.3 Red neon comes on. Amber neon comes on for ignition period. Then Amber neon goes off.	(a) No ignition spark.	(a) Check for loose or broken high tension lead to spark electrode. Check spark gap and position of spark electrode (see fig. 8). Check ceramic is not cracked. Check for loose earthwire connection on full sequence gas controller.
	(b) Fault in full sequence gas controller.	(b) Replace.
	(c) Insufficient gas supply to burner.	(c) Check service cock is open and gas pressure is available at inlet to gas valve.
	(d) Gas solenoid valve not opening.	(d) Check for loose or broken wires to the gas valve. Check for adequate end vent vacuum. Replace valve if necessary.
	(e) Injector pressure not set at zero.	(e) Check and adjust (see fig. 7).
	(f) Incorrect aeration.	(f) Check that air shutter plate on mixing chamber is correctly positioned.
4.4 As 4.3 but burner lights for short time and then goes out. Amber neon off.	(a) Flame probe faulty or lead detached.	(a) Check for broken ceramic. Check for correct position or flame probe. (see fig. 8).
	(b) Fault in full sequence gas controller.	(b) Measure flame current (see fig. 9). The minimum signal MA. (D.C).
	(c) Polarity of line and neutral incorrect.	(c) Check for correct polarity of the electrical supply.
	(d) Burner ground is poor.	(d) Check and ensure burner is correctly grounded.
	(e) Full sequence gas controller faulty.	(e) Replace.
	(f) Incorrect aeration.	(f) Check that air shutter plate on mixing chamber is correctly positioned.
4.5 End vent vacuum too low (i.e below 2.5in.w.c).	(a) Branch damper closed or broken.	(a) Open branch damper until end vent vacuum is 2.5 in.w.c. Replace damper if necessary.
	(b) Fan speed wrong.	(b) Check voltage at motor. Replace if necessary.
	(c) Fan impellor loose defective.	(c) Tighten or replace if necessary.
	(d) Restriction to fan inlet.	(d) Cear restriction, repair flueduct.
	(e) Air leaks into system via poor joints.	(e) Replace defective tube couplers gaskets or acoustic joints.
	(f) Insufficient fall of system towards fan allowing condensate to form in tube.	(f) Re-instate system fall.

5 ROUTINE MAINTENANCE

5.1 VACUUM FAN

Inspect fan and flue ductwork for any contamination. Inspect acoustic joints for damage and replace if necessary.

5.2 TUBES

Inspect radiant tubes and fittings internally. If there is any appreciable build up of dust or deposits the tubes should be cleaned internally. If corrosion is present replace as necessary.
Note: It may be necessary to determine whether chlorinated hydrocarbons are being used by the client.

5.3 TUBE COUPLERS

Inspect for evidence of holes and cracks and replace if necessary.

5.4 REFLECTORS

If necessary the reflectors may be cleaned with a soft cloth and detergent in water.

5.5 CONDENSATE TRAP

Inspect for dirt and scale and clean if necessary.

5.6 BURNER ELECTRODES
(see fig. 8)

Check ceramic visually for build up of carbon or cracks. Check the spark distance and position of the electrodes relative to the burner head.

5.7 BURNER HEAD INSERT AND FLAME RETENTION GRID
(see fig. 13)

Check condition of burner heads insert (7) and flame retention grid (8) and replace if necessary.

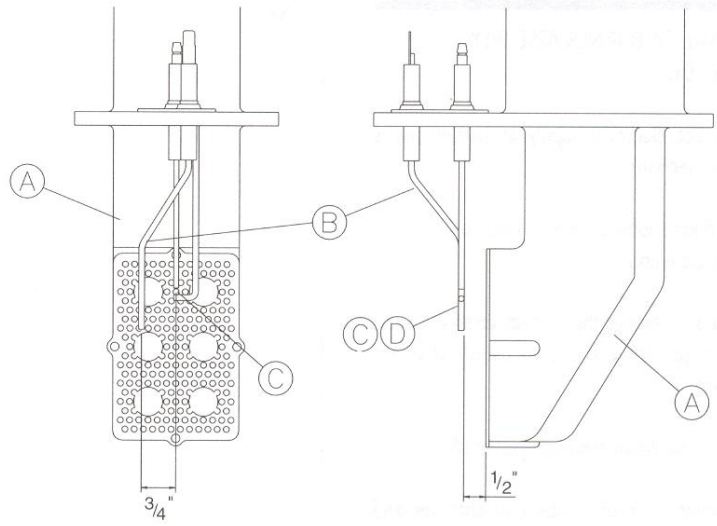
5.8 FILTER
(see fig. 11)

Replace if contaminated with dirt.

5.9 COMBUSTION CHAMBER VIEWING WINDOW

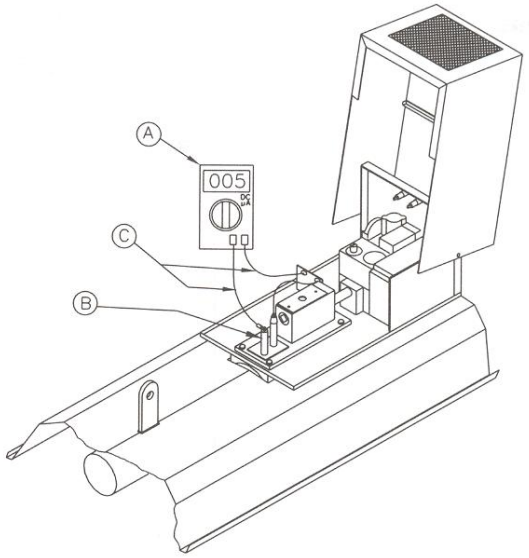
Window should be clean and free from cracks. Replace if necessary.

FIG. 8 BURNER ELECTRODE DETAIL



A Burner head
B Flame sense probe
C Spark gap 0.14 in.
D Arcing rod for spark

FIG. 9 MEASUREMENT OF FLAME SIGNAL



A D.C. microammeter
B Flame sense probe
C Flame sense leads

6 REMOVAL OF COMPONENTS

6.1 REMOVAL OF BURNER ASSEMBLY (see fig. 10a)

6.1.1 Disconnect electrical supply at burner mains inlet connection.

6.1.2 Turn-off gas supply at service cock and disconnect union.

6.1.3 Release and remove the four set screws (C) and washers (B) from the combustion chamber flange (F).

6.1.4 Retain combustion chamber gasket (A).

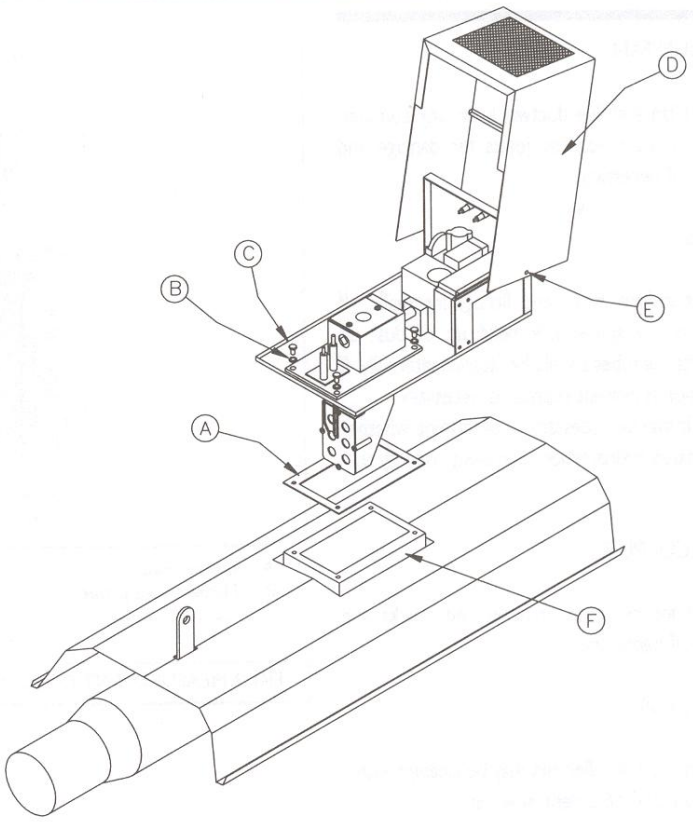
6.1.5 Lift burner clear of combustion chamber and withdraw.

6.1.6 When replacing do so in the reverse order ensuring that the gasket between the burner and combustion chamber (A) is undamaged or replaced.

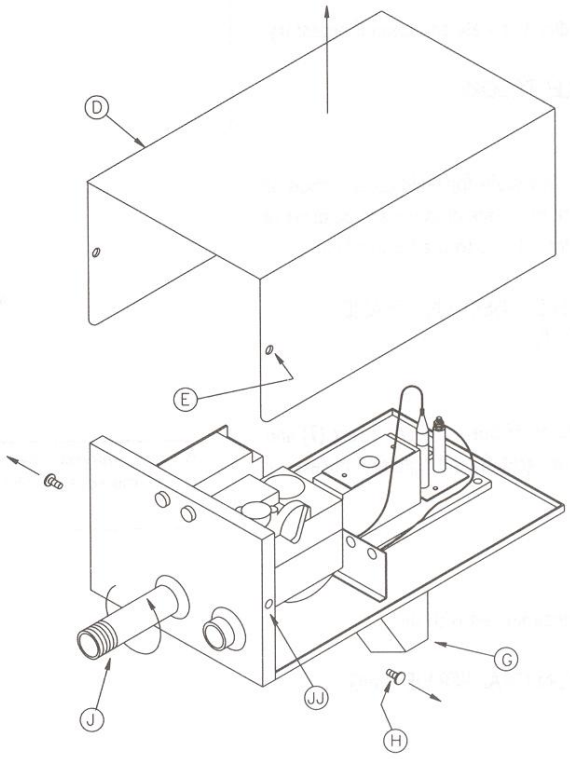
6.1.7 Check for gas leaks.

FIG. 10 DISMANTLING BURNER ASSEMBLY TO CHANGE GAS VALVE

10a



10b



A	Gasket	F	Combustion Chamber Turret
B	Washer	G	Burner Head
C	Set Pin	H	Set pin
D	Burner housing lid	JJ	Hank Bush
E	Lid pivoting point	J	Gas inlet pipe

6.2 REMOVAL OF GAS VALVE

6.2.1 Remove burner assembly from combustion chamber.
(see section 6.1)

6.2.2 Remove burner housing lid (D) by unscrewing set pins (H) from base plate fixings (JJ)
(see fig. 10b)

6.2.3 Secure burner head (G) and unscrew gas inlet pipe (J).
(see fig. 10b)

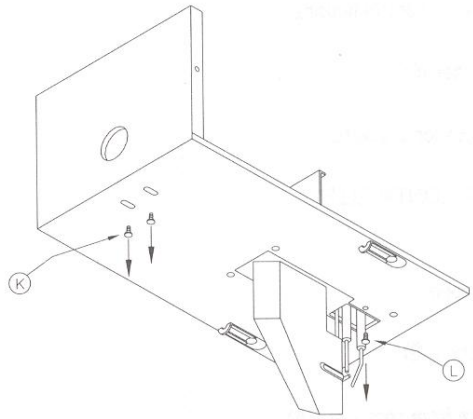
6.2.4 Remove set screws (L) and (K) from burner base plate.
(see fig. 10c)

6.2.5 Withdraw burner head and valve from base plate. Retain burner gasket (M).
(see fig. 10d)

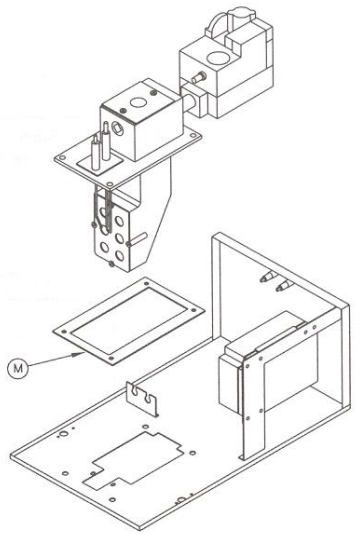
6.2.6 Secure burner head (G) and unscrew gas valve (N).
(see fig. 10e)

FIG. 10 DISMANTLING BURNER ASSEMBLY TO CHANGE GAS VALVE

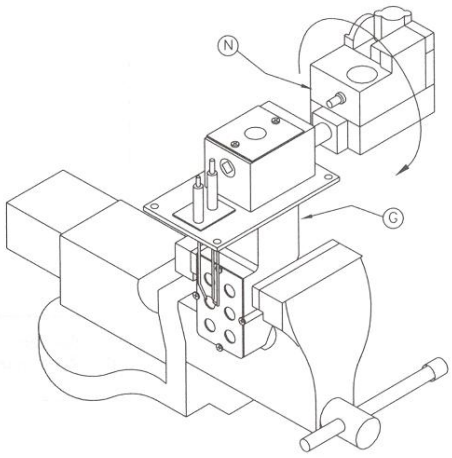
10c



10d



10e



G Burner head
K Set pin M5
L Set pin M3
M Gasket
N Gas valve

6.3 TO EXCHANGE FILTER
(see fig. 11)

6.3.1 Lift the lid (A) from burner control housing.

6.3.2 Unscrew wing nut fastener (B).

6.3.3 Slide filter (C) out of location brackets.

6.4 TO REPLACE BURNER CONTROLLER
(see fig. 12)

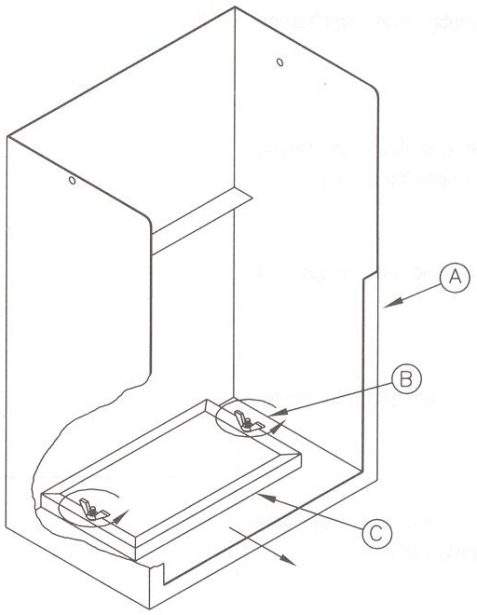
6.4.1 Disconnect electrical supply.

6.4.2 Disconnect JST connection (B).

6.4.3 Disconnect ignition wire from controller (A).

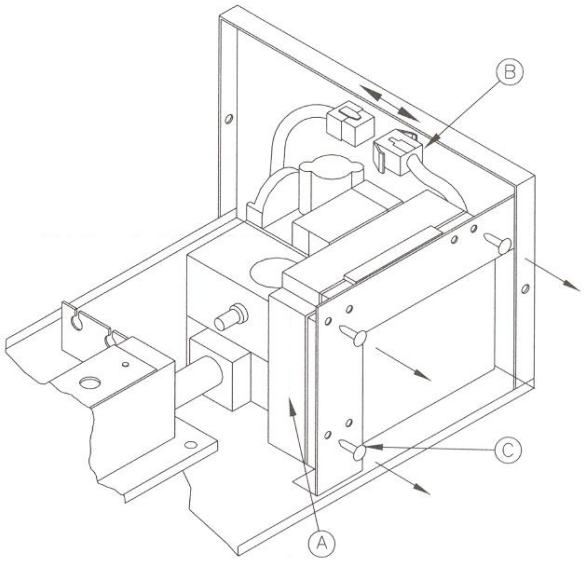
6.4.4 Release three push clips (C) from controller fixing holes.

FIG. 11 REPLACEMENT OF FILTER



A Burner housing lid
B Wing Nut
C Filter

FIG. 12 REPLACEMENT OF BURNER CONTROLLER



A Burner controller
B JST connection
C Plastic push clip

6.5 TO EXCHANGE ELECTRODE ASSEMBLY
(see fig. 13)

6.5.1 Disconnect electrical supply.

6.5.2 Remove fixing screws (36) from electrode mounting flange (11).

6.5.3 Withdraw electrode assembly from burner.

6.6 TO CHANGE JET
(see fig. 13)

6.6.1 Turn off gas and disconnect electrical supply.

6.6.2 Remove plug (22).

6.6.3 Unscrew brass jet (10) inside mixing chamber using 8mm allen key and withdraw through 1/2in. BSP hole.

6.6.4 Replace in reverse order.

6.7 TO CHANGE COMBUSTION CHAMBER VIEWING WINDOW
(see fig. 13)

6.7.1 Turn off the system including the vacuum fan.

6.7.2 Release nuts (E), metal frame (D), gasket (C) and mica window (B).

6.7.3 Replace in reverse order.

FIG. 13 BURNER HEAD ASSEMBLY

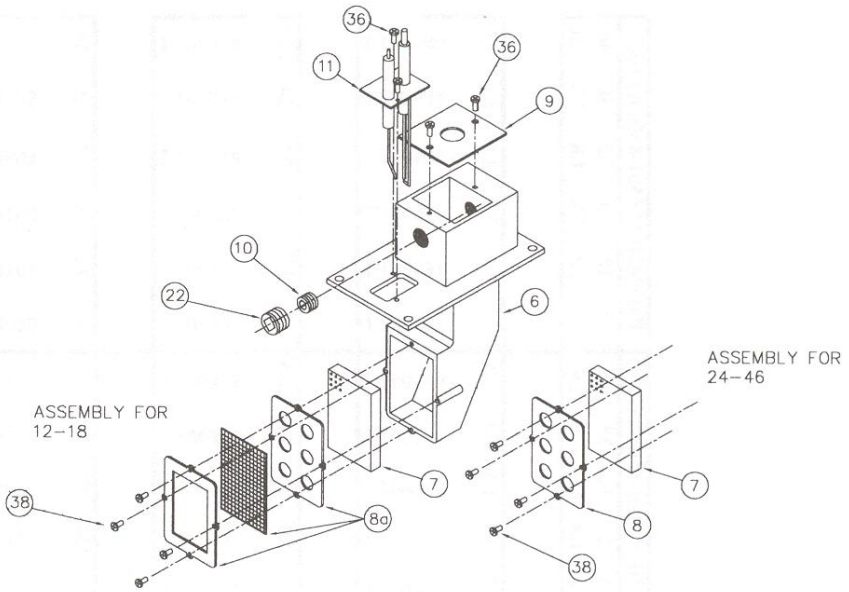
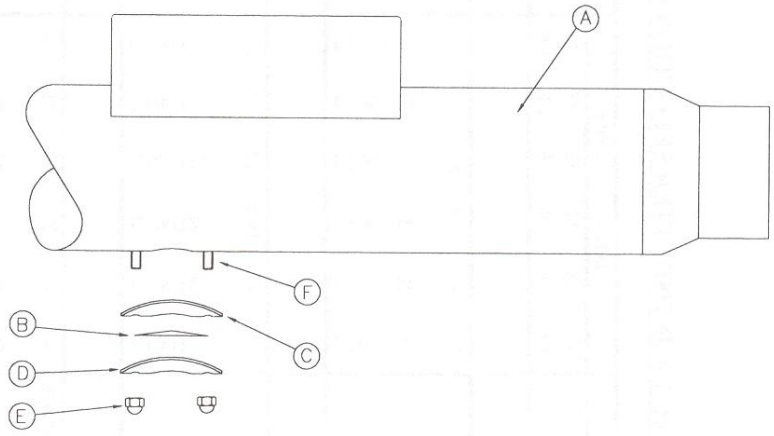


FIG. 14 REPLACEMENT OF COMBUSTION CHAMBER VIEWING CHAMBER WINDOW



A Combustion chamber
B Mica glass
C Gasket
D Metal frame
E Nuts
F Stud

TABLE A - ARC LR JET/SHUTTER SELECTION CHART

GAS	NATURAL* 0-10000 ft						PROPANE** 0-2000 ft						PROPANE** 2001-6500 ft (0.74)						PROPANE** 6501-8500 ft (0.66)					
BURNER TYPE	12 LR	18 LR	24 LR	32 LR	38 LR	46 LR	12 LR	18 LR	24 LR	32 LR	38 LR	46 LR	12 LR	18 LR	24 LR	32 LR	38 LR	46 LR	12 LR	18 LR	24 LR	32 LR	38 LR	46 LR
JET SIZE dia. mm	3.6	4.4	4.9	5.4	5.8	6.3	2.9	3.5	4.0	4.4	4.8	5.2	2.6	3.2	3.7	4.0	4.4	4.8	2.5	3.1	3.5	3.9	4.2	4.6
PART NO.	L105336	L100544	L100549	L100554	L100558	L100563	L100529	L100535	L100540	L100544	L100548	L100552	L100526	L100532	L100537	L100540	L100544	L100548	L100525	L100531	L100535	L100539	L100542	L100546
SHUTTER SIZE dia. mm	13	17	19.5	22	24	26.5	13	17	19.5	22	24	26.5	13	17	20	22	24	26.5	13	17	19.5	22	24	26.5
PART NO.	L100322	L100321	L100320	L100314	L100316	L100318	L100322	L100321	L100320	L100314	L100316	L100318	L100322	L100321	L100320	L100314	L100316	L100318	L100322	L100321	L100320	L100314	L100316	L100318
END VENT ORIFICE PLATE dia. mm	14.5	16	24	27	28	38	14.5	16	24	27	28	38	15	16	24	27	28	38	14.5	16	24	27	28	38
PART NO.	L104102	L104101	L104100	L104093	L104103	--------	L104102	L104101	L104100	L104093	L104103	--------	L104102	L104101	L104100	L104093	L104103	--------	L104102	L104101	L104100	L104093	L104103	--------

*Altitude adjustment - heat input reduced naturally without adjustment by -4% per 1000 ft (assumming natural gas is 1041 Btu/ft³ at1015 mbar atmospheric pressure)

( ) Altiitude factor

**Propane - for altitudes above 8501 ft refer to Ambi-Rad Heat input is reduced by 0.74 at 2001-6500 ft and 0.66 at 6501 to 8500 ft

Continuous

'ARC' SERIES OPERATING INSTRUCTIONS

1. Ensure that gas supply is turned on at each burner.

2. Switch on electrical supply to heaters.

3. Set thermostats (if fitted) to call for heat or to temperature settings required.

4. The vacuum fan will purge for approximately 1 min. and then 'RED' neon lights will illuminate at each burner. The burners closest to the fan in each branch will light first, with both 'RED' and 'AMBER' neons illuminated at each burner.
   The next mid-branch burners will light after a time delay of approximately 25 seconds each. After approximately another 30 seconds the end vent burner will light.

5. If the lighting up sequence fails, switch off the electrical supply. After approximately 1 min switch on.

   If lighting up fails again refer to Installation and Service manual.

6. On reaching zone temperature the fan will purge for approximately 6 mins. with burners off.

7. **CAUTION**
   The heaters must be grounded. The ignition sequence depends upon a properly grounded circuit.

8. To switch off, turn off electrical supply.

9. The system must be installed and serviced regularly by a competent person in accordance with the technical manual, local and national codes.

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