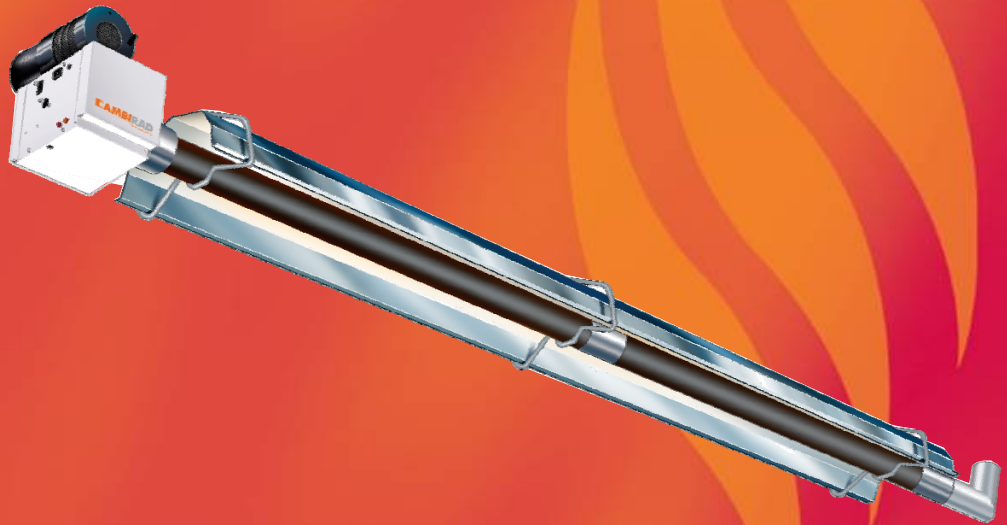


INSTALLATION / OPERATION / MAINTENANCE

**Applies to: Model VPLUS 120V 60Hz
Gas-Fired, Tubular, Radiant,
Low-Intensity Infrared Heater**



Vision Range

VPLUS OWNERS MANUAL

! **WARNING:** 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.



AMBIRAD

HEATING AND VENTILATION SOLUTIONS

Part No. 700100

Introduction.

Welcome to the new range of powered infra-red heaters. Local regulations may vary and it is the installer's responsibility to ensure that such regulations are satisfied.

All installation, assembly, commissioning and service procedures must be carried out by suitable qualified competent persons and conform with local building codes, or in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1/NFPA 54 or the National Gas and Propane Installation Code CSA B149.1

When assembling, installing, commissioning and servicing is undertaken on radiant tube

heaters specified in these instructions, due care and attention is required to ensure that working at height regulations are adhered to.



PLEASE READ this document prior to installation to familiarize yourself with the components and tools you require at the various stages of assembly.

All dimensions shown are in inches unless otherwise stated.

The manufacturer reserves the right to alter specifications without prior notice.

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1. Installation Requirements.

1.1 Health and Safety

- A. Heater is intended for heating non-residential indoor spaces and should only be installed where flammable gases or vapors are not generally present.
- B. Heaters may be suspended either horizontal or at any angle. See section 1.3 for clearance dimensions.
- C. The installation must conform with local building codes or, in the absence of local

codes, with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* or the *Natural Gas and Propane Installation Code, CSA B149.1*.

- D. The unit shall be electrically grounded in accordance with National Electric Code ANSI/NFPA 70 and Canadian Electrical Code CSA C22.1.

- E. The heater may be installed in aircraft hangars in accordance with the Standard for *Aircraft Hangars, ANSI/NFPA 409* and in automotive garages when installed in

accordance with the Standard for *Parking Structures, ANSI/NFPA 88A*, or the Standard for *Repair Garages, ANSI/NFPA 88B*, or the *Canadian Natural Gas and Propane Installation Code, CSA B149.1*, and are so marked.

Ensure that minimum clearances will be maintained to vehicles parked below the heater.

F. The standard heaters are approved for installations between 0 - 2000ft (0 - 610m) for the US and 0 - 4500 ft (1370m) for Canada. Conversion kits are available on installations above these heights in the USA.

1.2 Heater Suspension

Attachment to the heater support lugs should be made by D shackle. The hanging attachments to overhead steelwork etc. must be purpose made to sound engineering practice or supplied by others.

They must be adequately fixed and designed

to carry the whole weight of the heater. In the event of suitable roof steelwork being unavailable, additional steelwork should be fitted to enable vertical hangers to be used for suspending the heaters.

These methods are illustrated in Figure 1. If there are any doubts as to the strength or suitability of roof steelwork to which heaters are to be suspended, please refer to a Consultant, Architect or owner of the building.


It is recommended that the heater is raised to its final position once the assembly of the tube/ bracket/reflector has been completed. Longer tube assemblies may be raised in more than one sub-assembly with final tube connection made in the air.

The suggested mounting heights for heaters are given in the chart next page.

1.3 Clearance to Combustibles.

Minimum clearance to combustibles are show in Table 1 overleaf.

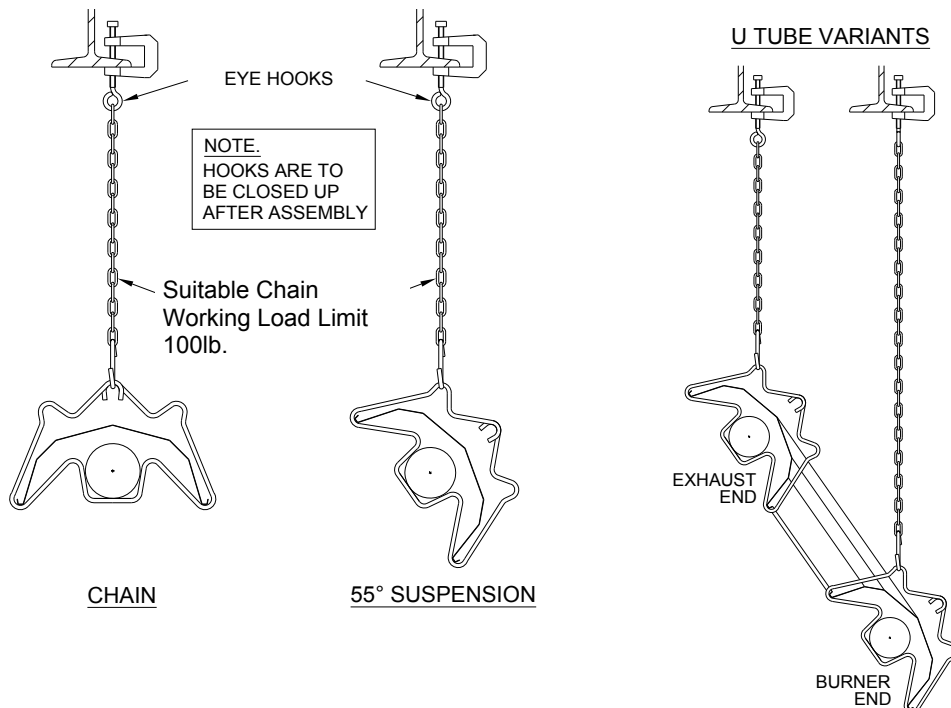
IMPORTANT: The stated clearance to com-



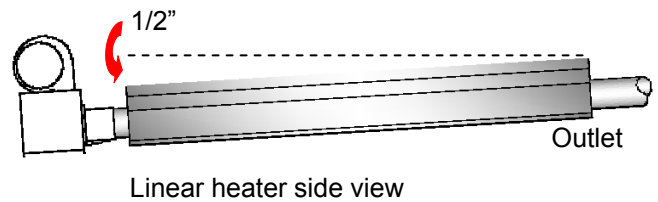
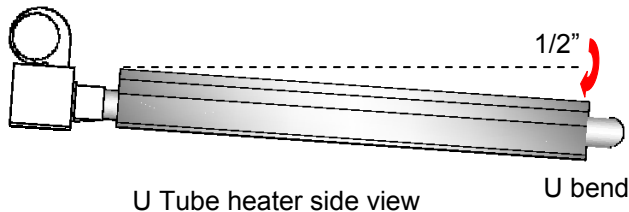
WARNING:

If not installed, operated and maintained in accordance with the manufacturer's instructions, this product could expose you to substances in fuel or from fuel combustion which are known to the state of California to cause cancer, birth defects or other reproductive harm.

Figure 1. Recommended Methods of Heater Suspension.



! ON U TUBE VARIANTS THE HEATER SHOULD SLOPE DOWNWARDS TOWARDS THE RETURN BEND AND ON LINEAR VARIANTS SHOULD SLOPE DOWNWARDS TOWARDS BURNER BY APPROX. 1/2" FOR HORIZONTAL INSTALLATIONS AS SHOWN BELOW (DIAGRAMS EXAGGERATED FOR CLARITY)



combustibles represents a surface temperature

of 90°F (50°C) above room temperature. Building material with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation.

Building material with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures.


It is the installer's responsibility to assure that adjacent materials are protected from degradation.

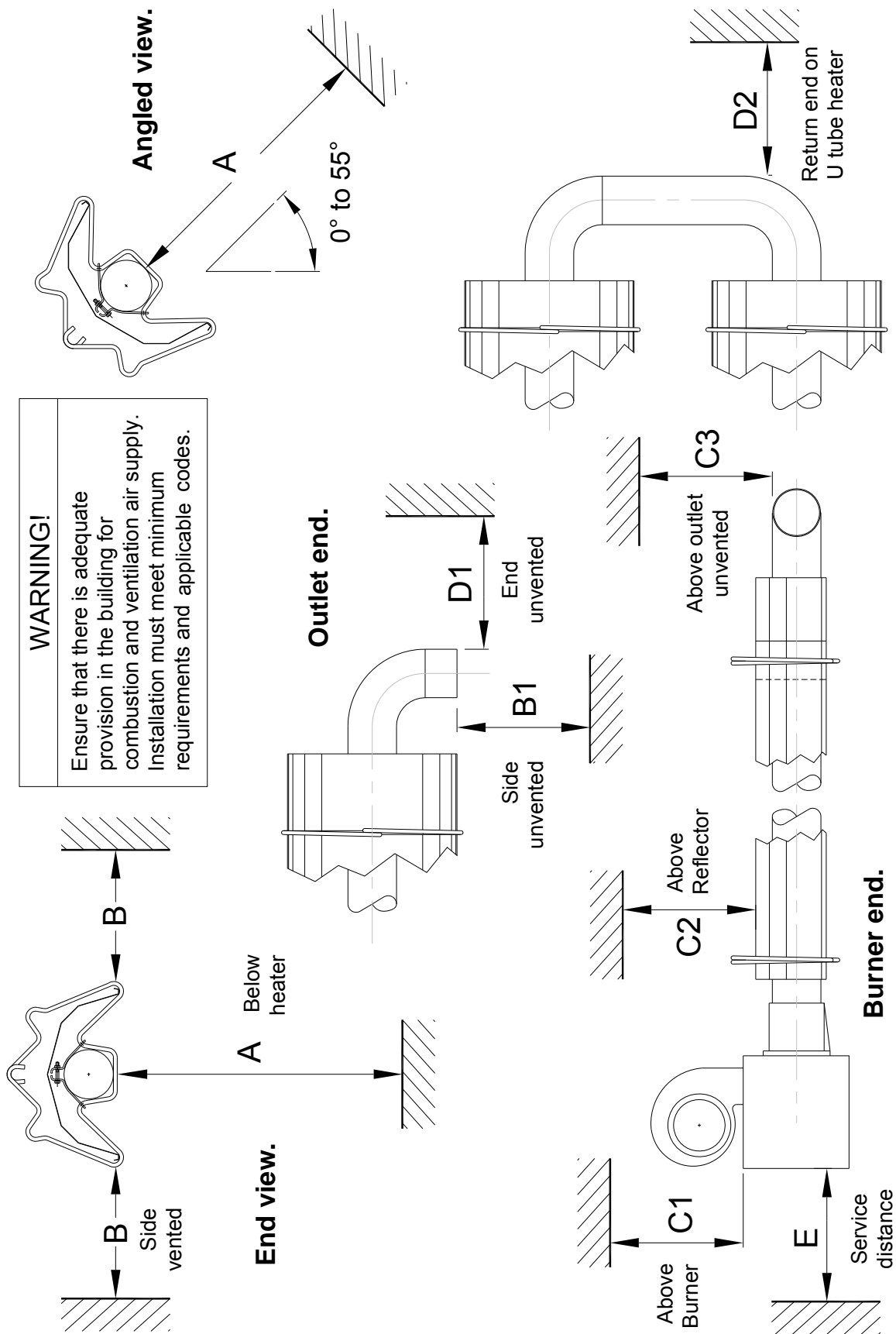
Table 1		Clearance to Combustibles, inches (cm)							
MODEL	A	B	B1	C1	C2	C3	D1	D2	E
40	49 (125)	24 (61)	41 (105)	20 (51) / 10* (26)*	8 (21)	22 (56)	8 (21)	12 (31)	12 (31)
60	74 (188)	29 (74)	41 (105)	20 (51) / 10* (26)*	8 (21)	22 (56)	8 (21)	12 (31)	12 (31)
80	74 (188)	29 (74)	41 (105)	20 (51) / 10* (26)*	8 (21)	22 (56)	8 (21)	12 (31)	12 (31)
100	74 (188)	32 (82)	41 (105)	20 (51) / 10* (26)*	8 (21)	22 (56)	8 (21)	16 (41)	12 (31)
125	74 (188)	39 (99)	47 (120)	20 (51) / 10* (26)*	8 (21)	22 (56)	20 (51)	18 (46)	12 (31)
150	74 (188)	39 (99)	48 (122)	20 (51) / 10* (26)*	8 (21)	22 (56)	20 (51)	18 (46)	12 (31)
170	86 (219)	48 (122)	48 (122)	20 (51) / 10* (26)*	11 (28)	22 (56)	20 (51)	20 (51)	12 (31)
200	86 (219)	48 (122)	48 (122)	20 (51) / 10* (26)*	11 (28)	22 (56)	20 (51)	20 (51)	12 (31)

* distance with end caps fitted.

! WARNING: Minimum clearance from the heater must be maintained from vehicles parked below heater. In all situations, clearances to combustibles must be maintained. Signs should be posted in storage areas to specify maximum stacking height to maintain required clearance to combustibles. Such signs must either be posted adjacent to the heater thermostats or in the absence of such thermostats in a conspicuous location. Refer to mounting clearance tables.

Figure 2 Clearance to Combustibles.

 The minimum clearances to combustible materials are given in the tables below. These minimum distances **MUST** be adhered to at all times. Adequate clearance **MUST** be provided around air openings into the combustion chamber and there **MUST** be suitable clearance for accessibility and for combustion / ventilating air supplies.



1.4 Gas Connection and Supply

WARNING: Before installation, check that the local distribution conditions, nature of gas and pressure, and adjustment of the appliance are compatible.

The gas connection on the heater is ½" N.P.T internal thread.

Injector sizes and manifold pressure for the burners are shown in the table 4. The gas supply piping and connections must be installed so that the minimum pressure stated is achieved.

A gas shut off valve and union should be fitted in the gas supply line close to the heater and a ⅛" N.P.T plugged tapping, accessible for test gauge connection, provided immediately upstream of the appliance gas inlet.

It is essential to provide some flexibility in the final gas connection by use of an approved flexible gas connector. See Fig 4.

i Take care when making a gas connection to the heater not to apply excessive turning force to the internal controls.

Care must be taken to observe the minimum pipe bend diameter (minimum 10" - 250mm, maximum 14" - 350mm) & pipe expansion distance (minimum 1⅛" - 28mm, maximum 3¾" - 95mm).

i The correct installation as shown will allow for approx 4" of movement due to expansion.

Figure 3. Correct orientation of Ball Valve

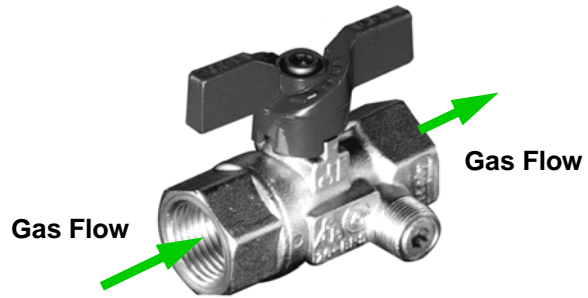
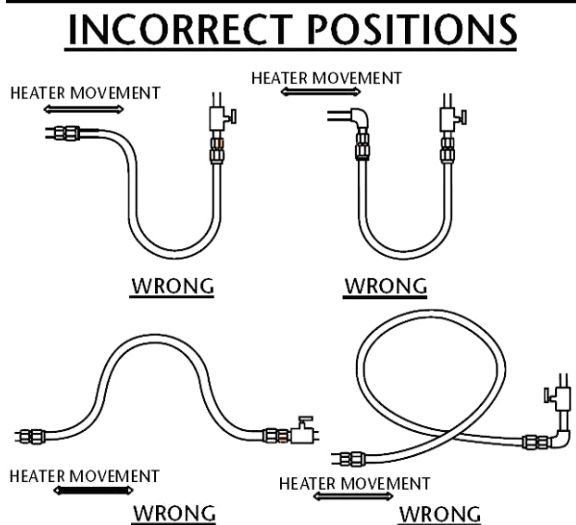
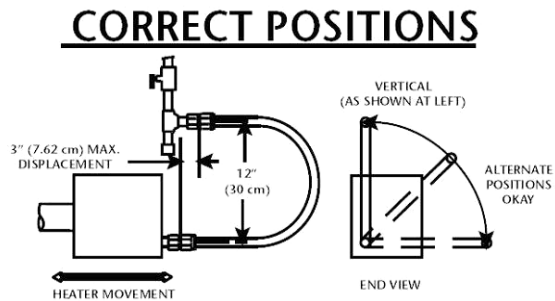


Figure 4. Correct Installation of Flexible Gas Connection



WARNING: FIRE OR EXPLOSION HAZARD - Expansion of the radiant pipe occurs with each firing cycle causing the burner to move with respect to the gas line. This can result in a gas leak producing an unsafe condition. It is therefore essential to provide some flexibility in the final gas line connection by use of an approved flexible connector as shown in the drawings.

* Connector must be certified for use on a radiant tube type infrared heater and must comply with Standards for Connectors for Gas Appliances, ANSI Z21.24/CSA 6.10 or with the Standard for Elastomeric Composite Hose and Hose Couplings for Conducting Propane and Natural Gas, CAN/CGA 8.1.

For heaters up to 150,000Btu/h, 1/2" ID x 24" long

For heaters above 150,000Btu/h, 3/4" ID x 36" long

NOTE: For Canada all heaters MUST use a hose 36" long.

See Table 3.

Table 3

HOSE SIZE	PART No.
3/4"	A4129
1/2"	A4128



	<p>CONNECTOR MUST BE INSTALLED IN A "U" CONFIGURATION. FOR HEATERS UPTO 150,000 BTU/H, A 24" LONG CONNECTOR OF AT LEAST 1/2" ID MUST BE USED. FOR HEATERS ABOVE 150,000 BTU/H, A 36" LONG CONNECTOR OF AT LEAST 3/4" NOMINAL ID MUST BE USED.</p>
---	--

Table 4 Gas Supply & Pressures

Gas Type	Natural Gas	LP/Propane Gas
Required Gas Pressure (in W.C) (60,000 TO 150,000 BTU)	5.0	11.0
Required Gas Pressure (in W.C) (170,000 TO 200,000 BTU)	7.0	11.0
Max Supply Pressure (in W.C)	14.0	14.0
Gas Supply	Connection 1/2" N.P.T thread	

1.5 Electrical Connections

<p> WARNING: Before making electrical connections, switch OFF the main electrical disconnect. There may be more than one disconnect switch. Lock out and tag switch with a suitable warning label. Electrical shock can cause personal injury or death.</p>

This appliance must be electrically grounded.

Supply 120V 60Hz single phase.

Standard heater 0.16HP.

Current rating 1.2 amp max (inductive).

Fuse: external 3 amp.

Important: All electrical work should be done by a qualified electrician in strict accordance with the National Electrical Code ANSI/NFPA 70 or Canadian Codes CSA C22.1.

The electrical supply to the heater is by three wires: live, neutral and ground connections. Install in accordance with all state & local codes.

Where alternative manufacturers controls are used, please refer to their instructions for their installation details.

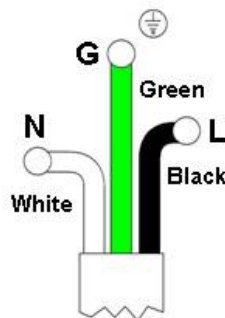


Figure 5a. Single and Multiple Heater Installations 120V Control

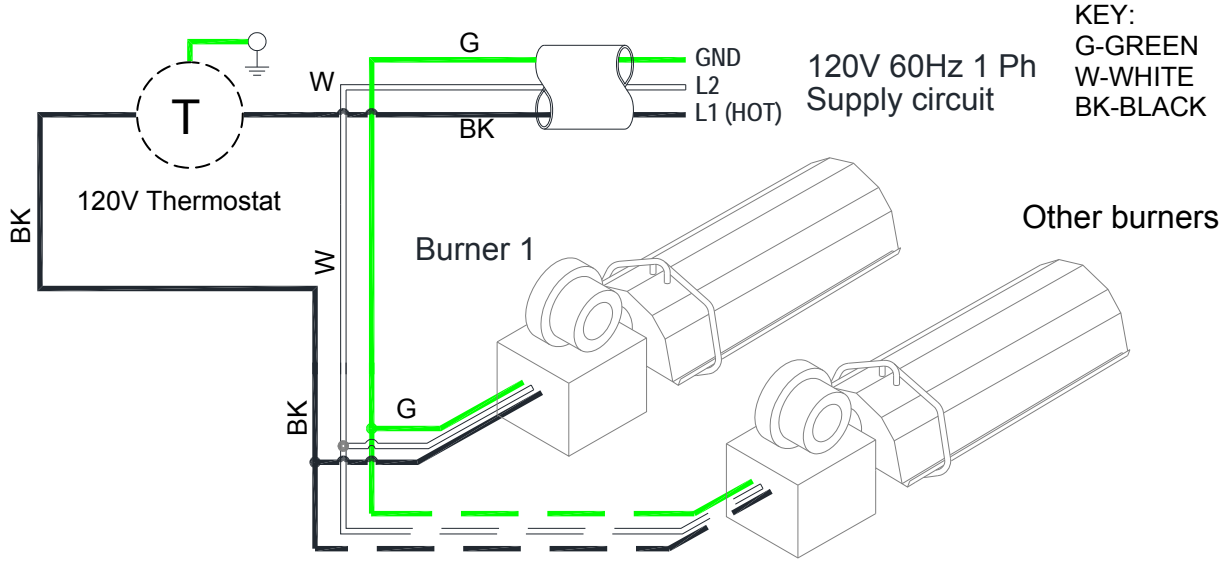


Figure 5b. Single Heater Installations 24V Control

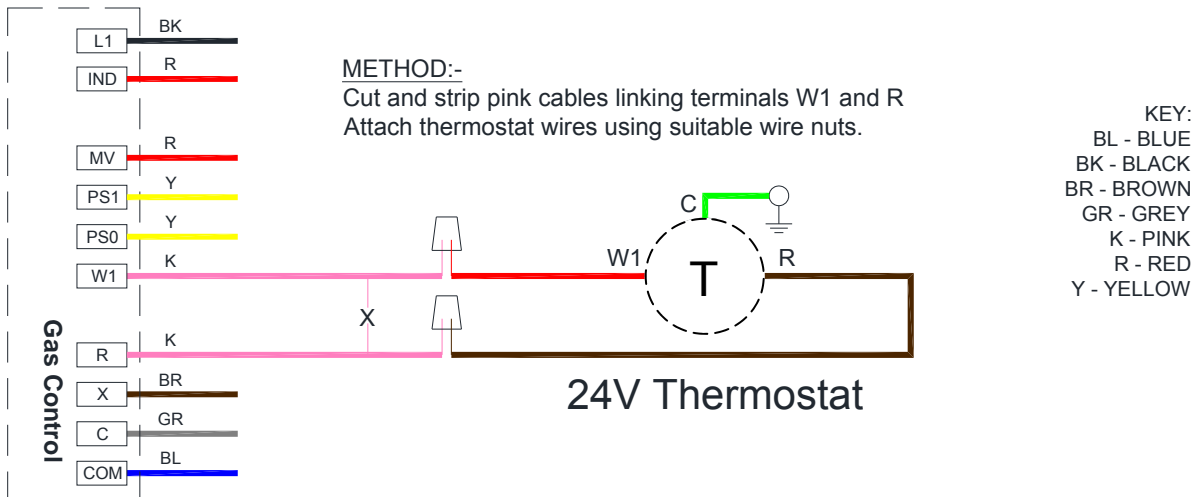


Figure 5c. Multiple Heater Installations 24V Control

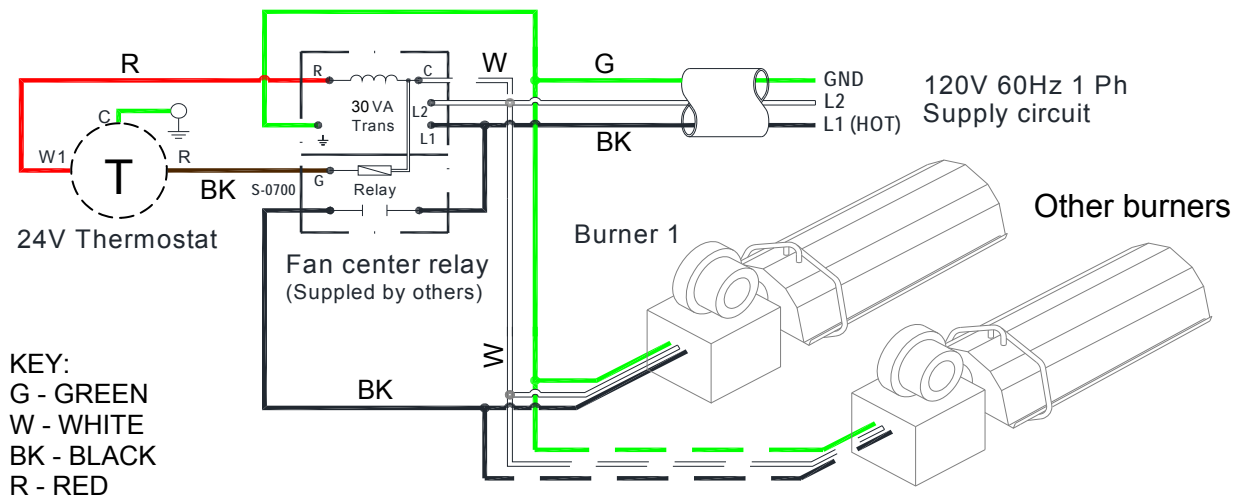
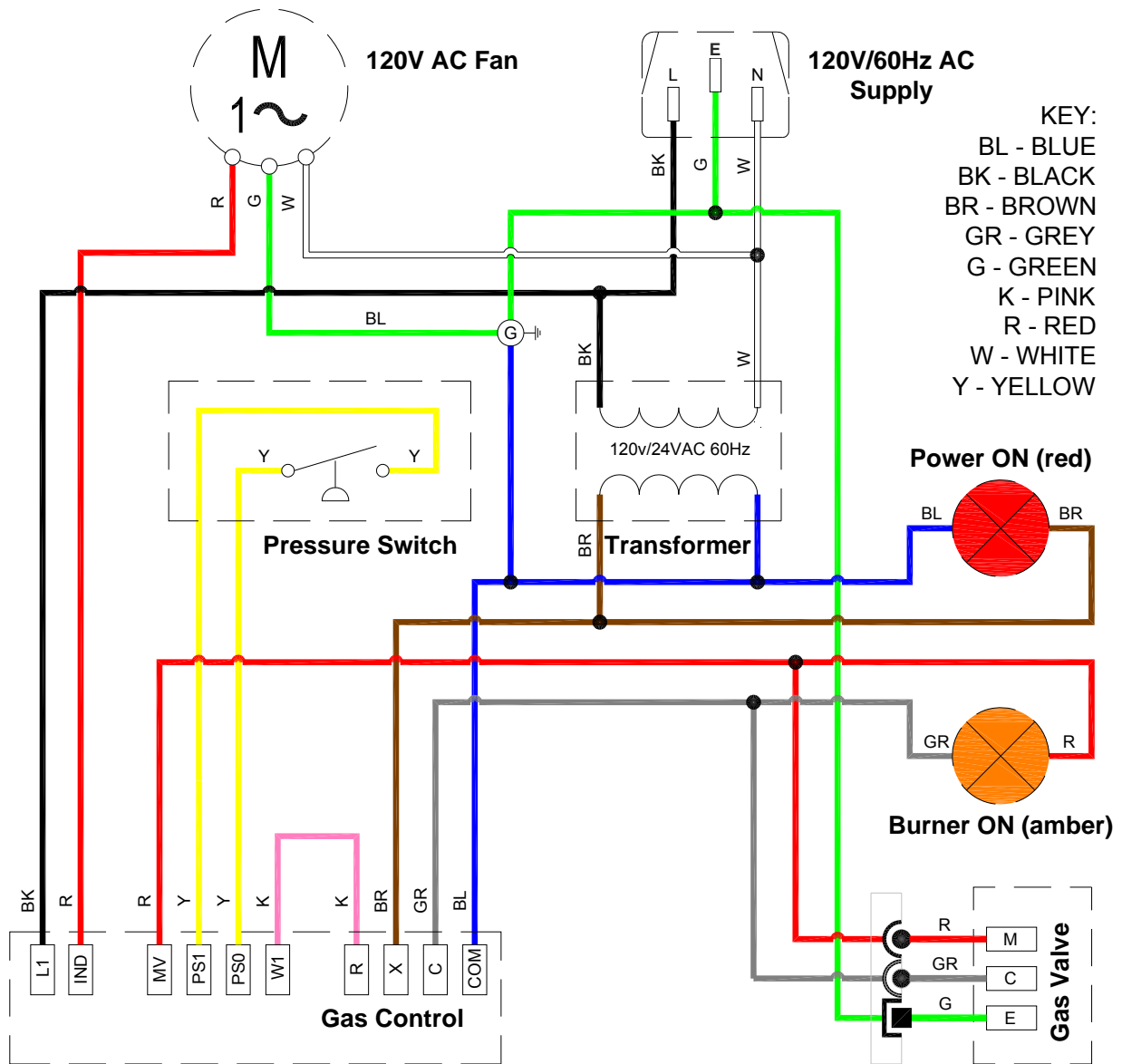


Figure 6. Internal Burner Wiring Diagram.



NOTES:-

Power On light is permanently illuminated when 120V / 60 Hz AC external supply is connected to burner.

Additional wiring is required to install an optional extra thermostat and / or time clock.

If no thermostat is required then a jumper is fitted between terminals R and W1. In this configuration the burner will continuously fire until the 120V power supply is disconnected.

Wire specification:- 18 AWG (1.0mm²), Tri-rated, 105°C

! If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 220°F/105°C

1.6 Vent Requirements and Details

1.6.1 Unvented units

Heaters may be installed without a vent providing the governing building codes are met and consideration is properly given to possibilities of condensation on cold surfaces.

Installation shall meet the following requirements when unvented:

- Natural or mechanical means shall be provided to supply and exhaust at least 4 CFM per 1000 BTU per hour input of installed heaters.
- Combustion gasses shall not impinge on combustible materials.

1.6.2 Vertical venting

The heater can be installed with a vertical vent.

All vent piping should be adequately supported from the building structure and terminated with an approved terminal. **The maximum recommended vent length is 25ft (7.6m) with a maximum of two elbows.** All connections should be properly sealed. Refer to fig 7a.

1.6.3 Horizontal venting

Individual units can be vented horizontally through side walls. Recommended terminals are Part Numbers V0700 for 4" and V0800 for 6".

Distances from adjacent public walkways, adjacent buildings, openable windows and building openings, consistent with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* or the *Natural Gas and Propane Installation Code, CSA B149.1*.

Maximum length of vent is 25ft (7.6m) with two - 90° elbows.

Runs of 12ft (3.6m) or shorter can use 4" (101mm) dia vent. Runs over 12ft (3.6m) should use 6" (152mm) vent pipe.

Any portion of vent that passes through a combustible wall must be insulated, or use an approved insulating thimble.

Standard vent terminals must extend at least 6" (152mm) from the wall and at least 24" (609mm) from any combustible overhang.

This protects the building material from degradation by the vent gasses.

Vent joints should be sealed and secured according to the vent manufacturers instructions. Should condensation occur the vent should be shortened or insulated.

The terminal should be at least 3ft (0.91m) away from any air intake to the building.

If the heater is equipped with ducted combustion air, the vent terminal must be at least 3ft (0.91m) away from the air inlet and located higher than the inlet.

The vent terminal must be installed at a suitable height above the ground to prevent blockage by snow.

1.7 Fresh Air Intake

Whenever the heater is installed in locations where airborne dust or other pollutants are present, a fresh air supply should be ducted to the burner.

A fresh air duct of 4"(101mm) dia. should be installed from the fresh air to the air intake connection on the fan housing. A flexible jointing piece should be installed at the fan connection with hose clamps to facilitate expansion and contraction.

The maximum recommended length air duct is 25ft (7.6m) and the maximum number of elbows is two. The minimum length is 18" (456mm).

The location of the fresh air duct inlet must be where it will receive dust free clean air. An inlet cap with bird screen must be fitted at the inlet of the duct. If the duct inlet is located above the roof the underside of the inlet terminal must be at least 2ft (0.61m) above roof level and at least 10" (254mm) above any projection on the roof within 7ft (2.1m) of the inlet. Intake pipe, fittings and sealant are not furnished by the manufacturer. Refer fig 7c & d.

Figure 7.a Vertical Venting.

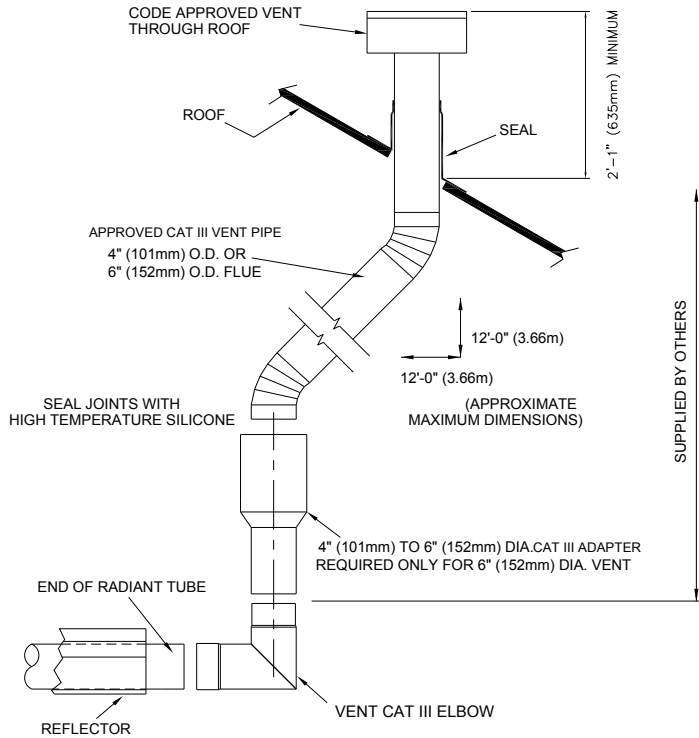


Figure 7.b Horizontal Venting.

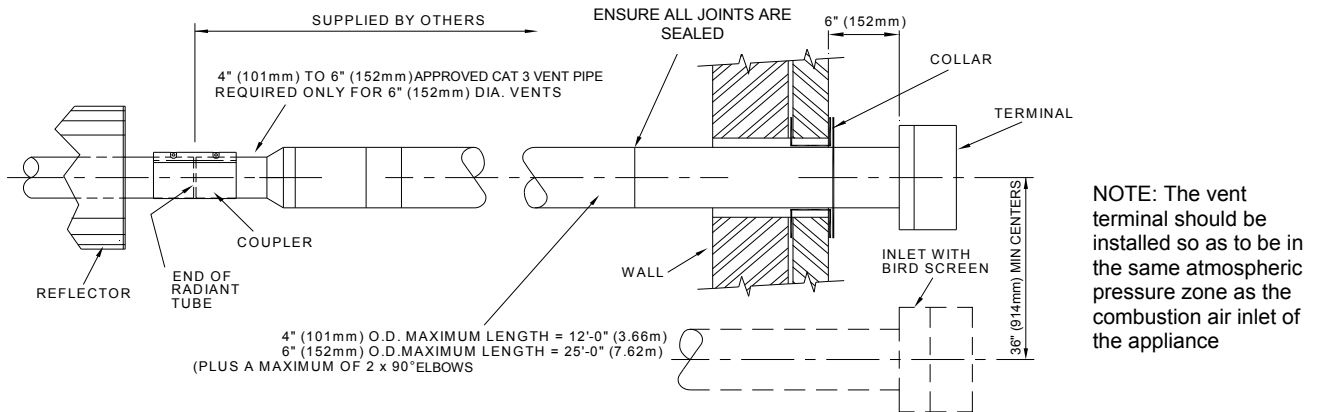


Figure 7.c Fresh Air Ducted Intake.

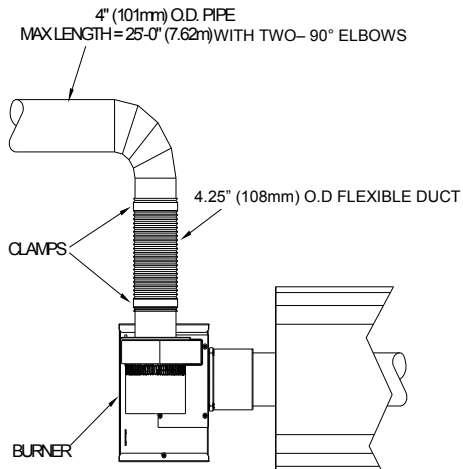
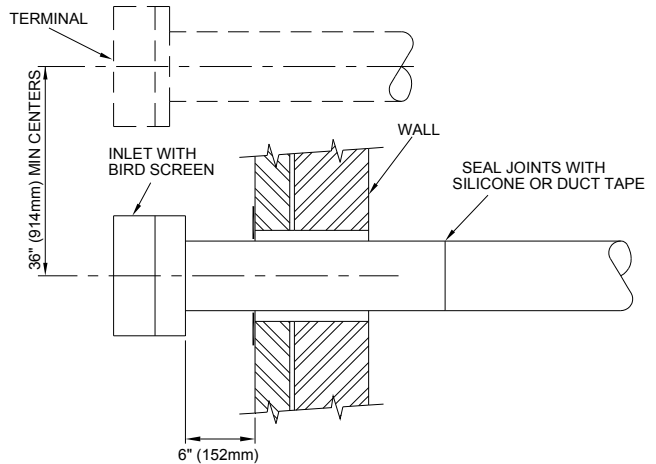


Figure 7.d Wall Terminal Intake Kit.



1.8 Technical Details - Table 5

No of Injectors	1
Gas Connection	½" N.P.T
Electrical Supply	120 volt 1 phase 60Hz
Vent size (in)	4" or 6" (101mm or 152mm)
Unitary Fan Motor Details	120 volt 1 phase 60Hz
Current Rating	1.2A MAX
Ignition	Electronic Program Start up with Spark Ignition

MODEL	Natural Gas	LP Gas	Min. Heater Length	Max. Heater Length	Min. Heater Length	Max. Heater Length
	BTU/Hr	BTU/Hr	S ft (m)	S ft (m)	U ft (m)	U ft (m)
40	41,500	41,500	10 (3.0)	30 (9.1)	20 (6.1)	20 (6.1)
60	60,000	60,000	20 (6.1)	40 (12.1)	20 (6.1)	40 (12.1)
80	80,000	80,000	20 (6.1)	40 (12.1)	20 (6.1)	40 (12.1)
100	100,000	100,000	30 (9.1)	50 (15.2)	40 (12.1)	40 (12.1)
125	123,500	125,000	40 (12.1)	60 (18.3)	40 (12.1)	60 (18.3)
150	150,000	150,000	40 (12.1)	70 (21.3)	40 (12.1)	60 (18.3)
170	169,000	169,000	50 (15.2)	80 (24.4)	60 (18.3)	80 (24.4)
200	200,000	N/A	50 (15.2)	80 (24.4)	60 (18.3)	80 (24.4)

Appliances can be installed up to 10,000 ft in the USA. Altitude conversion kits are available on request.

USA	Natural Gas 0- 2000 ft (0-610m)							
Size	40	60	80	100	125	150	170	200
"WC	3.2	4.2	3.5	3.5	4.1	4.2	3.4	3.5

USA	LP Gas 0- 2000 ft (0-610m)							
Size	40	60	80	100	125	150	170	200
"WC	4.5	6.0	5.2	8.2	6.6	7.0	5.7	N/A

USA	Natural Gas 2001- 4000 ft (611-1220m)							
Size	40	60	80	100	125	150	170	200
"WC	3.0	4.0	3.3	3.3	3.9	4.0	3.2	3.3

USA	LP Gas 2001- 4000 ft (611-1220m)							
Size	40	60	80	100	125	150	170	200
"WC	4.3	5.8	5.0	8.0	6.4	6.8	N/A	

CANADA	Natural Gas 0- 2000 ft (0-610m)							
Size	40	60	80	100	125	150	170	200
"WC	3.2	4.2	3.5	3.5	4.1	4.2	3.4	3.5

CANADA	LP Gas 0- 2000 ft (0-610m)							
Size	40	60	80	100	125	150	170	200
"WC	4.5	6.0	5.2	8.2	6.6	7.0	5.7	N/A

CANADA	Natural Gas 2001- 4500 ft (611-1370m)							
Size	40	60	80	100	125	150	170	200
"WC	3.0	4.0	3.3	3.3	3.9	4.0	3.2	3.3

CANADA	LP Gas 2001- 4500 ft (611-1370m)							
Size	40	60	80	100	125	150	170	200
"WC	4.3	5.8	5.0	8.0	6.4	6.8	N/A	

Technical Details continued

USA & CANADA	Natural Gas 0- 2000 ft (0-610m)							
Size	40	60	80	100	125	150	170	200
Burner Orifice Plate Part No.	201063-57	201063-45	201063-29	201063-23	201063-26	201063-25	201063-24	201063-24
Fan Type	2576T							2560-1
Fan Orifice Part No.	201970	L200281	201654	L200281	L200262	201637	201425	201911
Injector Part No.	201007-13	201007-15	201007-18	201007-21	201007-24	201007-30	201631-28	201631-32
Pressure Switch Part No.	201508	201676						201697

USA & CANADA	LP Gas 0- 2000 ft (0-610m)							
Size	40	60	80	100	125	150	170	200
Burner Orifice Plate Part No.	201063-75	201063-74	201063-72	201063-56	201063-55	201063-54	201063-68	N/A
Fan Type	2576T						2560-1	
Fan Orifice Part No.	201970	L200301	L200301	201825	L200244	L200246	202352	
Injector Part No.	201007-10	201007-11	201007-13	201007-13	201007-15	201007-17	201007-19	
Pressure Switch Part No.	201508	201676						

Technical Details continued

MODEL	U Tube				Straight Tube							
	U20	U40	U60	U80	S10	S20	S30	S40	S50	S60	S70	S80
40	•				•	•	•					
60	•	•				•	•	•				
80	•	•				•	•	•				
100		•					•	•	•			
125		•	•					•	•	•		
150		•	•					•	•	•	•	
170			•	•					•	•	•	•
200*			•	•					•	•	•	•

MODEL	Tube Type Material		Min. Distance to Bend ft (m)
	Calcoat™	Mild Steel	
40	TUBE 1	REMAINDER	10 (3.0)
60	TUBE 1	REMAINDER	10 (3.0)
80	TUBE 1	REMAINDER	10 (3.0)
100	TUBE 1	REMAINDER	15 (4.6)
125	TUBE 1	REMAINDER	20 (6.1)
150	TUBE 1	REMAINDER	20 (6.1)
170	TUBE 1 & 2	REMAINDER	25 (7.6)
200*	TUBE 1 & 2	REMAINDER	25 (7.6)

Options * Not available on LP Gas

- 1 All standard units fitted with unvented vent, natural gas and aluminized reflectors.
- 2 1 off 180° 'U' bend or up to 2 off 90° 'L' bends can be fitted at no less than 50% of the total heater length.
- 3 5ft tube kit,
- 4 4" (101mm) or 6" (152mm) vent terminal.
- 5 Combustion air kit.
- 6 Reflector end caps.
- 7 Altitude conversion kit.
- 8 LP Gas and high altitude LP Gas conversion kits.

2.Assembly Instructions.

i **PLEASE READ** this section prior to assembly to familiarize yourself with the components and tools you require at the various stages of assembly. Carefully open the packaging and check the contents against the parts and check list.

The manufacturer reserves the right to alter specifications without prior notice.

i Please ensure that all packaging is disposed of in a safe environmentally friendly way.

i For your own safety we recommend the use of safety boots and leather faced gloves when handling sharp or heavy items. The use of protective eye wear is also recommended.

2.1 Tools Required.

The following tools and equipment are advisable to complete the tasks laid out in this manual.



Saw Horses



Leather Faced Gloves



Phillips Screwdriver



Wrench Set



Cordless Drill



5/16" Drive



3/16" (5mm)
5/32" (4mm)
Allen wrench



Tape Measure



Suitable alternative tools may be used.

2.2 Assembly Notes.



Please read these assembly notes in conjunction with the correct assembly drawings (figs 9 to 19).

2.2.1 Tubes

Each heating unit has two types of emitter tube. For details of the tube types please refer to the table (page 13 of this instruction manual).

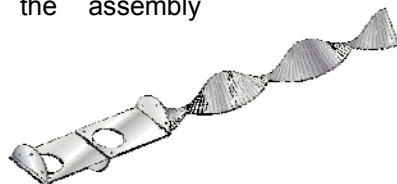
Identify and position tubes on saw horses. For aesthetics it is advisable to position **all tube seams facing down**. Position coupling fastener so that these cannot be seen from beneath the heater.

Mark out the position of the bracket centers from the dimensions shown on the assemblers' drawings.

Turbulators: Ensure that the correct turbulator or burner insert is fitted, as this could void your warranty if they are incorrectly fitted or omitted when necessary.

2.2.2 Turbulators (where fitted)

Insert turbulator into correct tube as indicated in the assembly drawings.

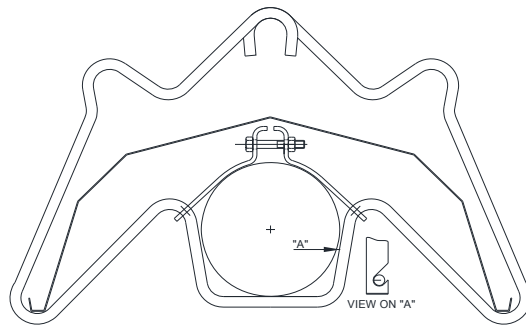


2.2.3

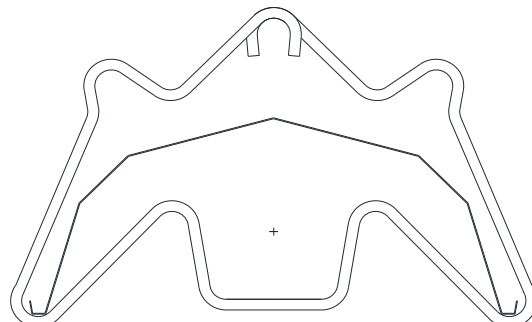
Brackets

There can be four types of brackets supplied with these heaters:

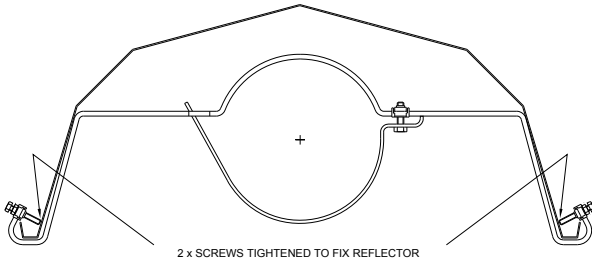
- Type 'H' are suspension brackets with tube straps.



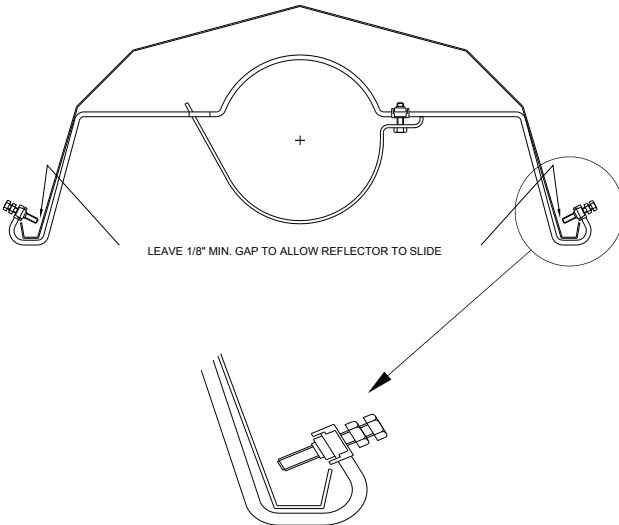
- Type 'G' are suspension brackets with no tube straps.



- Type 'F' are fixed reflector brackets.



- Type 'S' are sliding reflector brackets.



Slip the suspension brackets onto the tube assembly. The fixed suspension point 'H' shown on the drawings are adjacent to the burner and secures the first suspension bracket to the tube with a tube strap. All other suspension brackets 'G' shown on the drawings, have floating suspension points.

Reflectors are fixed at point 'F' with a reflector support bracket and reflectors are held in position with fixing screws. Fixed and sliding joints alternate along the heater at the spacings indicated on the individual heater assembly sheets.



2.2.4 Couplers

The couplers are used for joining radiant tubes and U or L bends.

Slide the coupler over the tube ensuring that the screw stop has butted up to the tube ends. Using the 9/16" wrench to tighten the bolts.

! At this point raise the tube assembly into position and suspend from previously fixed chains (Working Load 100lb). Longer tube assemblies may be raised in more than one sub-assembly with final tube connection made in the air.

DO NOT OVERTIGHTEN.

Moving between the four bolts, tighten each ensuring that equal pressure is applied to each bolt in turn. Complete assembly by drilling and screwing self tapping retention zip screws.

2.2.5 Reflectors.

After removing the protective plastic coating (if fitted), slip the reflectors through the hanger brackets until they overlap each other.

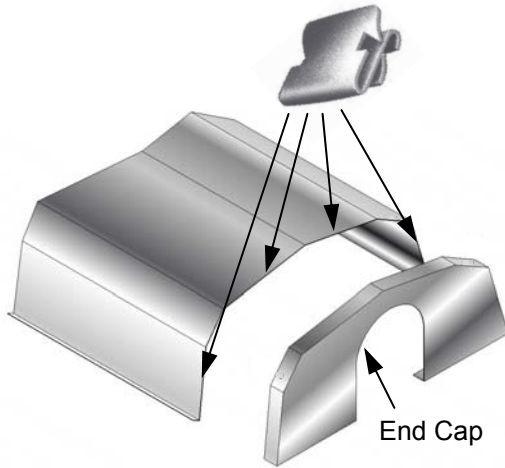
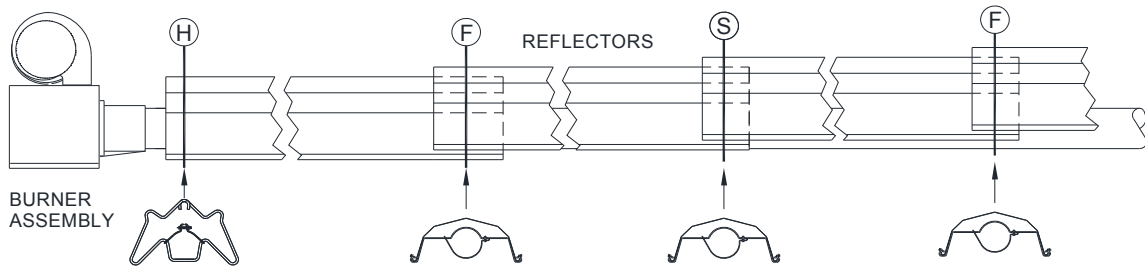
! All reflectors must be positioned/ attached to the brackets exactly as detailed in the assembly drawings.

The first and second reflector are fixed at the point F by a type F reflector support bracket and are held in place by tightening the fixing screws.

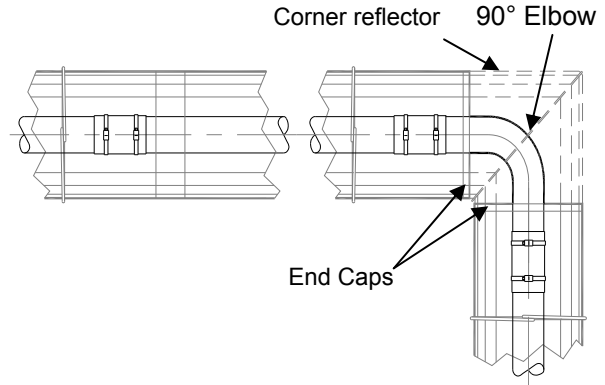
! Each subsequent reflector must **OVERLAP** the previous one as shown below and to a distance as indicated by their individual assembly sheets.

Alternate fixings of further reflectors by type S and type F reflector brackets and space as indicated by individual assembly sheets.

! Reflector support bracket assemblies are fitted at each reflector joint, with the clamp screws adjusted so that reflectors are fixed together.



Typical usage of optional bend kits:



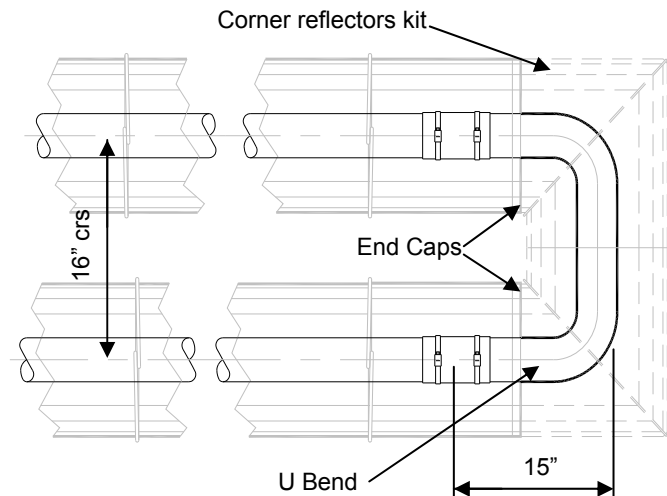
2.2.6 End Caps (optional)

Position an end cap beneath the reflector profile (where required) with the end cap flanges facing inwards. Fasten to reflector using the four 'Z' clips.

2.2.7 Bend(s) (where fitted)

The heater can be installed with 1 or 2 90° bends or a 180° U bend.

Slide the bend into the open end of the coupler ensuring that the screw stop has butted up to the tube ends. Refer to 2.2.4 for fastening.



2.2.8 Burner/Fan Assembly.

Slide the burner assembly onto the open tube end, ensuring it is fully engaged. Secure with set screws.

For the purpose of unvented applications, a 4" 90° elbow should be used on the terminating end of the radiant tube sections. This elbow should be turned with the outlet facing either side.

Connect Gas and Electrical supplies as described in sections 1.4 and 1.5.

2.2.9 Detailed Assembly Drawings

The following pages show the technical dimensional details of the range of heaters.

Please note the heater type, length and reference number from the delivery/advice note before identifying the correct model drawing.

! Bends must be fitted at a distance of at least 50% of the total heat exchanger e.g. for a 60ft long heater, the closest to the burner a bend can be is 30ft.

Figure . 8. Possible Heater Orientations



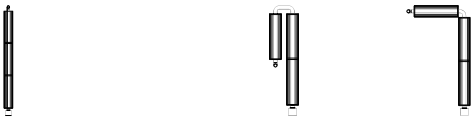
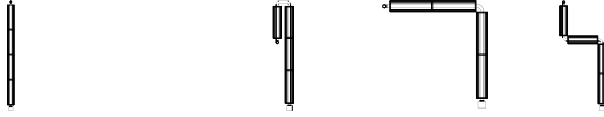
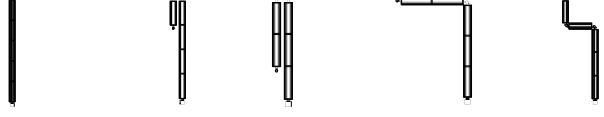
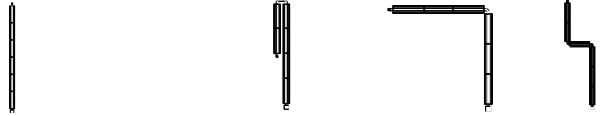
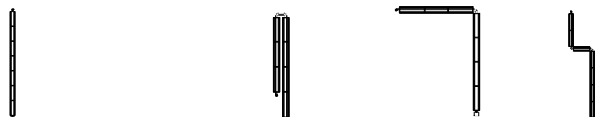
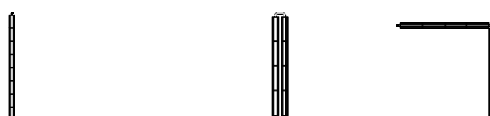




S10	
S20	
S30	
S40	
S50	
S60	
S70	
S80	
U20	
U40	
U60	
U80	

Figure 10. Heater Assembly: Model Linear 40-S20, 60-S20, and 80-S20.

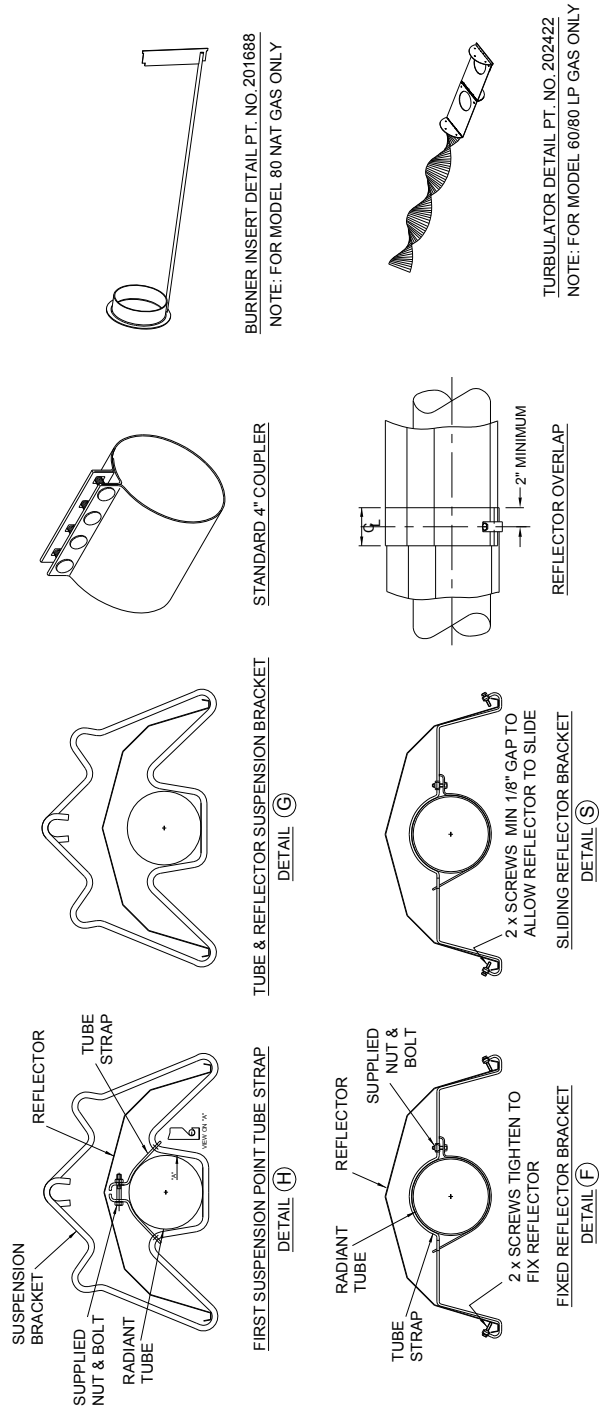
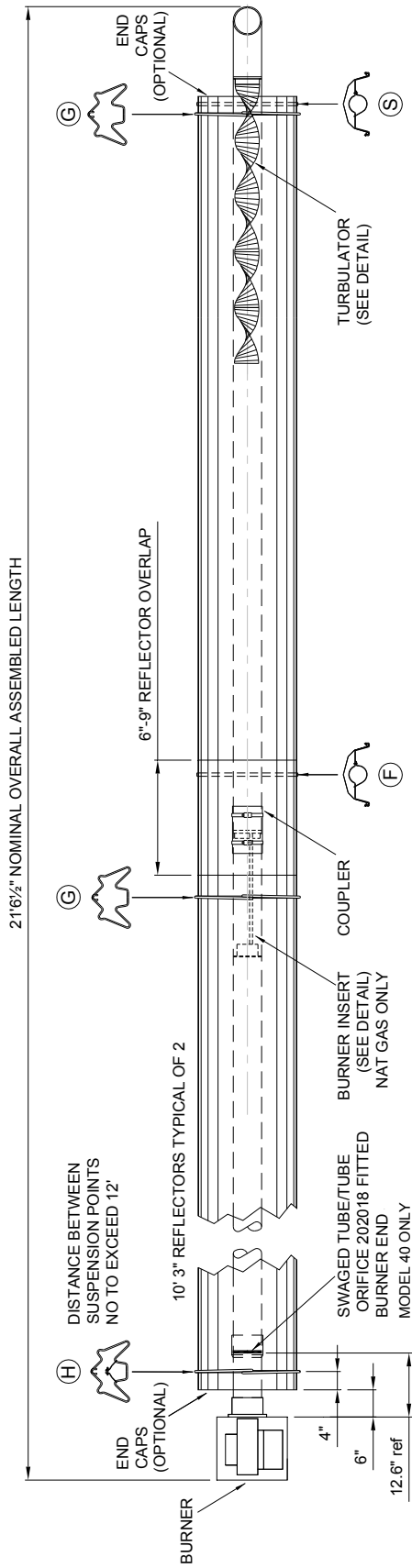


Figure 17. Heater Assembly: Model U tube 40-U20, 60-U20 and 80-U20.

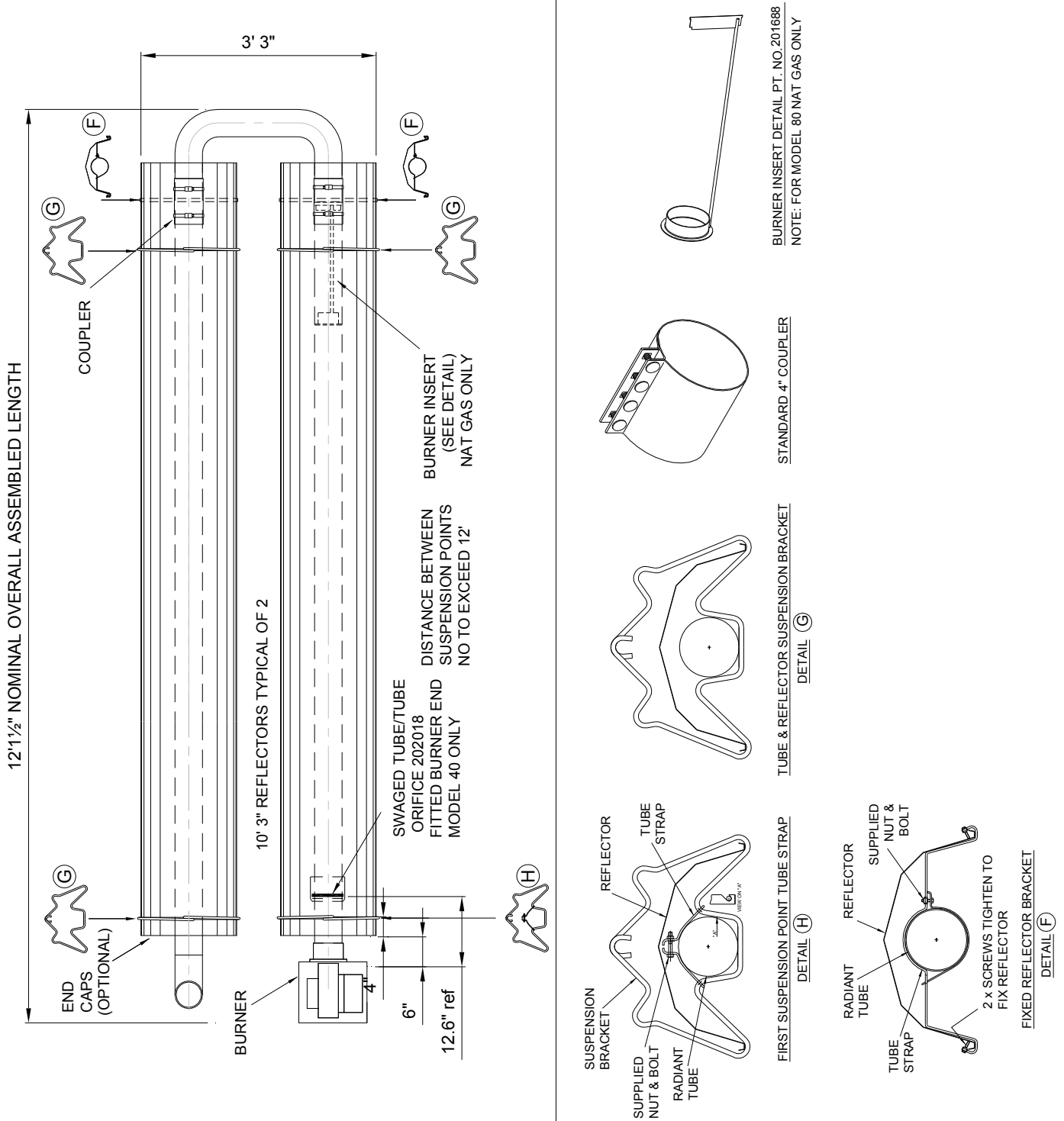
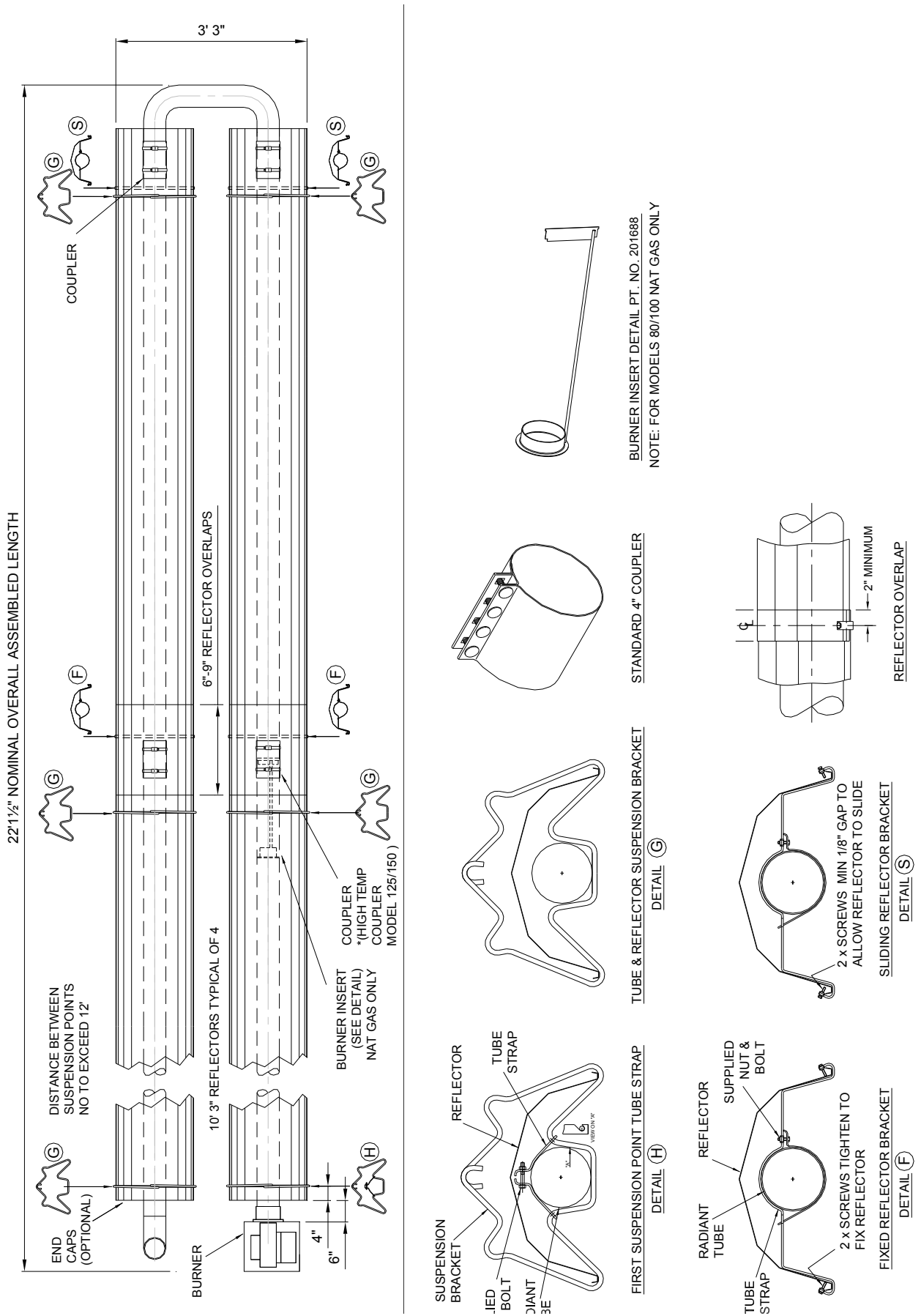


Figure 18. Heater Assembly: Model U tube 60-U40, 80-U40, 100-U40, 125-U40 and 150-U40.



3. Start Up Instructions.



These appliances should be commissioned by a qualified mechanical contractor.

3.1 Tools Required.

The following tools and equipment are advisable to complete the tasks laid out in this manual.



Suitable alternative tools may be used.



3.2 Start Up procedure

Inspect installation and ensure that it has been carried out in accordance with these instructions. Remove burner and inspect the electrode assemblies ensuring these are securely fixed and all electrical connections securely made.

Re-fit the burner ensuring that it is correctly positioned and the screws are fully tightened. Ensure that electrical and gas supplies are isolated.

The gas supply should be purged and tested for soundness in accordance with local and National Safety codes.

Open isolating gas valve and test gas connections for soundness using soap solution.

Open the control housing door by unscrewing the securing screw. Ensure all internal components are securely fixed and all connections securely made.

Open the manual gas valve outside the control housing.

Switch on the electrical supply to start the heater and observe the correct start up sequence. Ensure that the setting of any time switch and thermostat are such that the heating system will be required to operate.

The fan will start to run and the 'power on' lamp will illuminate. Safe-start checks are carried out automatically.

After the fan has run up to full speed and a satisfactory pressure condition has been established, the ignition sequence will commence. The spark ignition will be energized producing a spark at the ignition electrode. The gas solenoid valve will at the same time be energized and the 'burner on' lamp will illuminate. If the ignition is successful, the flame is detected by the flame sensing probe and the 'burner on' lamp will remain on.

If ignition is unsuccessful the gas valve will close and the spark ignition de-energized after approximately 15 seconds.

For approximately 30 seconds the fan will purge the system then re-ignition will be attempted. After 2 further attempts at ignition the control unit will 'lock-out', the 'power on' lamp will remain illuminated and the fan will run for 120 seconds and then stop.

To reset after 'lockout' switch off the power supply to the system and wait 2 minutes. Then turn the power on. If repeated 'lockout' occurs, investigate the cause.

Set burner gas pressure as follows:
Switch off the power supply to the heating system.

Connect a 'U' tube manometer to the pressure test point provided on the combination gas control valve.

Remove the cover from the pressure regulator revealing the adjustable screw.

Start the heater and using a suitable screwdriver adjust the pressure regulator, turning the screw clockwise to increase the pressure or counter-clockwise to decrease the pressure.

Set the pressure to appropriate inches w.c. from the table of gas pressures and orifice plate dimensions for correct heater description.

Switch off the power supply to the heating system. Disconnect 'U' tube manometer, then secure screw in pressure test nipple.

Check the operation of the flame safeguard equipment as follows:

With the heater running normally, switch off the gas supply at the shut off valve. The heater should attempt to relight. If the gas valve has been left off, 'lock-out' should occur. This is indicated by the 'power on' lamp being illuminated and fan running, but the 'burner on' lamp being off.

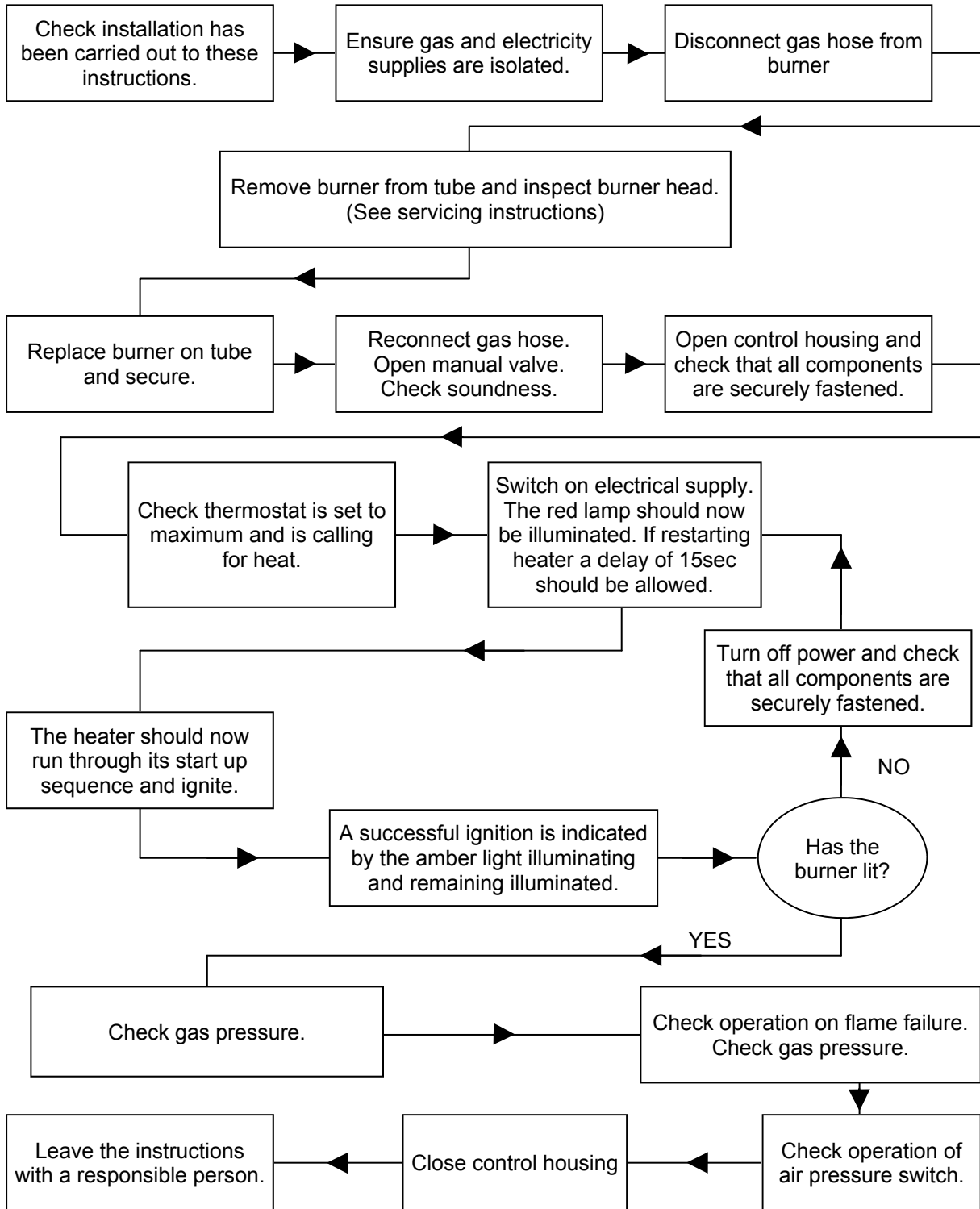
Check the operation of the pressure proving switch as follows:

With the heater running normally, pull off the silicone rubber tube connecting the vacuum switch to the combustion chamber. Within 4 seconds the burner should shut off.


Then replace the tube securely and observe that the heater proceeds to ignite in the normal way.

Close the controls door securing it with the screw.


Commissioning chart



4. Servicing Instructions.

 **These appliances should be serviced annually by a competent person to ensure safe and efficient operation. In mildly dusty or polluted conditions more frequent servicing may be required. Servicing work should be carried out by a qualified mechanical contractor.**

4.1 Tools Required.

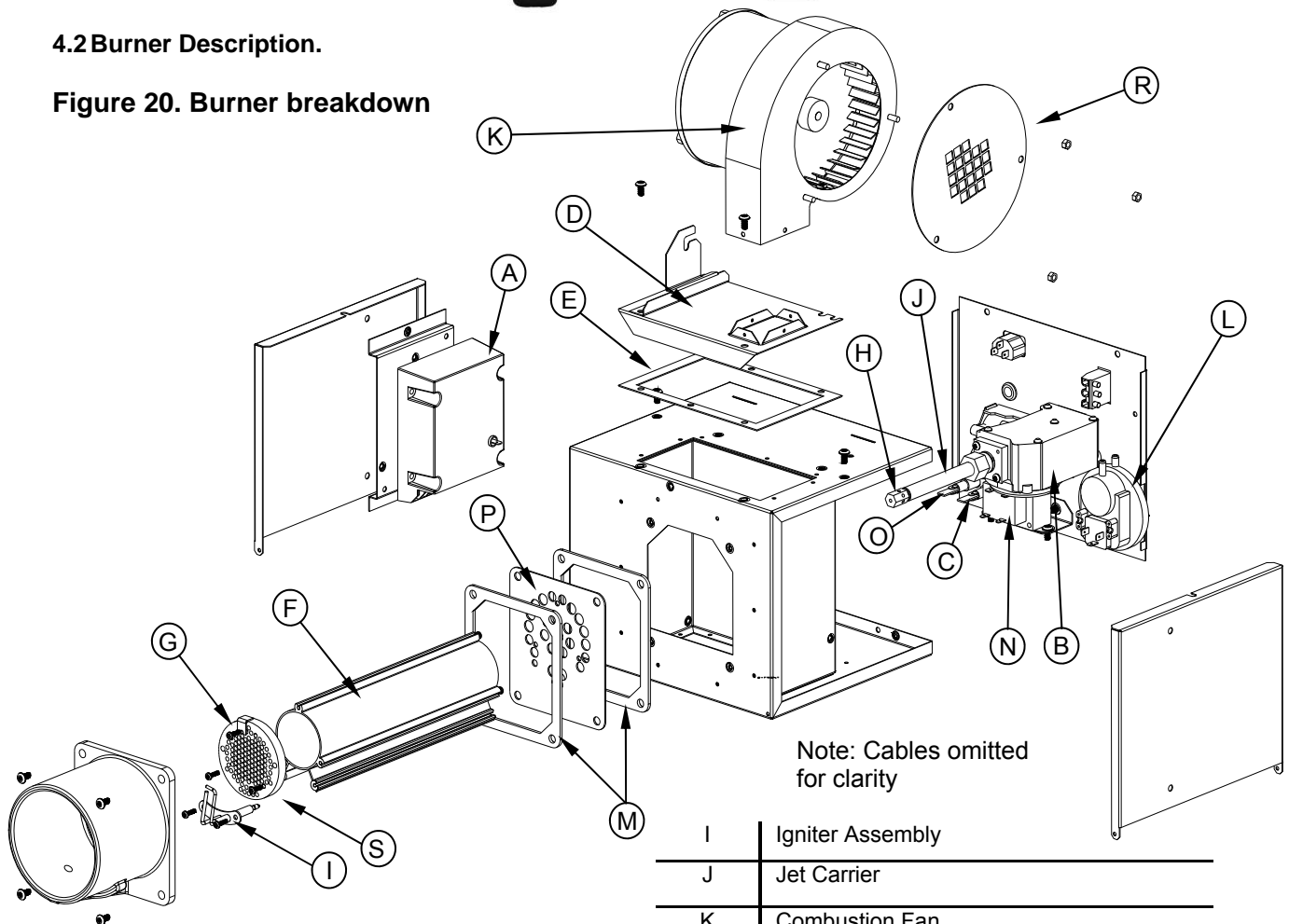
 *Suitable alternative tools may be used.*

The following tools and equipment are advisable to complete the tasks laid out in this manual.



4.2 Burner Description.

Figure 20. Burner breakdown




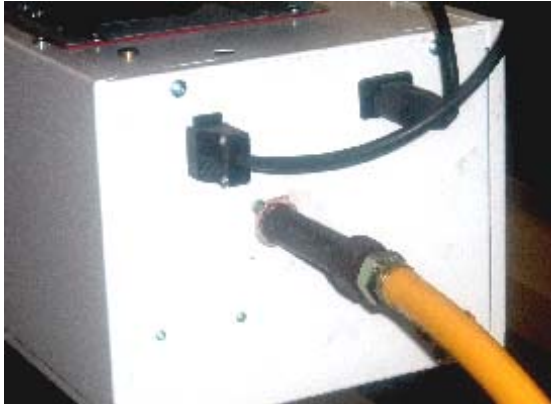
Note: Cables omitted for clarity

A	Ignition Controller
B	Gas Valve
C	Power On Red Lamp
D	Fan Mount Plate
E	Fan Mount Plate Gasket
F	Burner Tube
G	Burner Head
H	Injector

I	Igniter Assembly
J	Jet Carrier
K	Combustion Fan
L	Pressure Switch
M	Gaskets
N	Transformer
O	Burner On Amber Lamp
P	Burner Orifice Plate
R	Fan Orifice Plate
S	Flame Plate Location (if fitted)

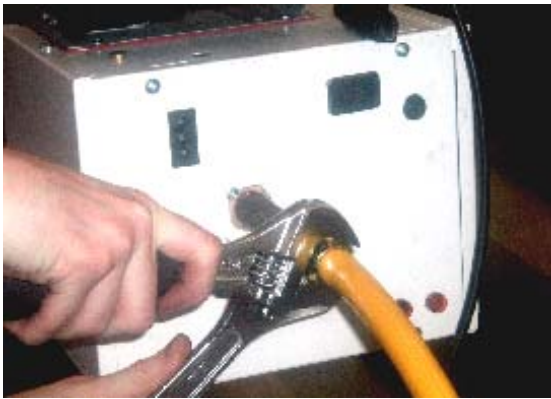
4.3 Burner Removal

 **Step 1:** Isolate power and gas supplies.



Step 2: Unplug the power connectors.


Step 3: Detach the gas supply as shown below, taking care to support the burner connection.



Step 4: If fresh air is connected, slacken hose clip and remove the flexible hose from the burner.



Step 5: Loosen the set screw on the burner support casting to enable the burner to be removed from the radiant tube.

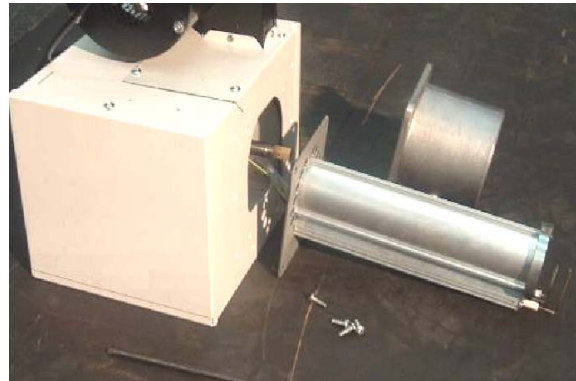
 **Step 6:** Remove the burner and position in a safe area to prevent the burner



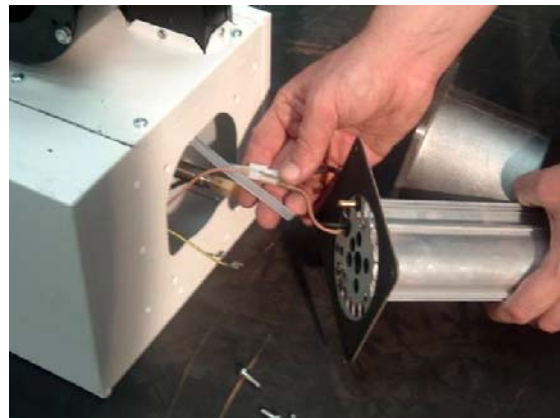
or components attached to the burner from falling to the ground.

4.4 Burner Gas Injector Servicing


Step 1.a: Remove the burner support casting and gasket.



Step 1.b: The burner head assembly can be disconnected by separating the connectors of the ignition lead, ground lead assembly and removing the pressure switch silicon tube.



Step 2: The gas injector can be inspected and replaced if contaminated or blocked.

 When replacing the gas injector ensure approved thread sealant is used.



Step 3: Reconnect ignition leads, ground lead and silicone tube to test nipple. Refit gasket and support casting.

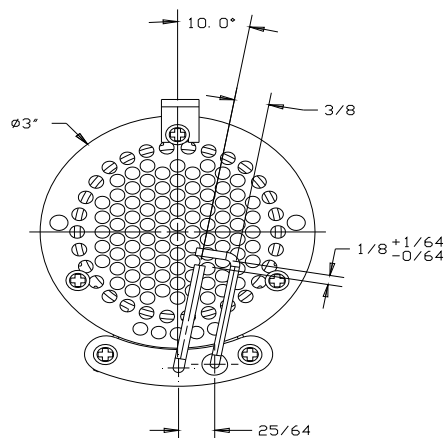
4.5 Burner Head and Electrode Servicing

Step 1: Check the pepper pot burner head for contamination. If necessary this can be removed, see below. This can be cleaned together with the Inside of the burner head.



Step 2: The pepper pot burner head can be replaced ensuring the 5 holes on the outer ring are aligned alongside the probes.

Step 3: The condition of the igniter assembly can be checked for deterioration. However, we advise replacement at each service to ensure continued reliability. Detach the electrode assembly from the burner head by re-



moving the two screws and separating the igniter lead connectors.



Step 4: Refit the electrode assembly and ensure the connections are secure to prevent incorrect sparking .

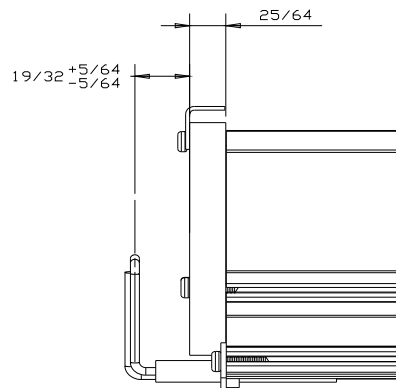
Step 5: Check the positions and spark gap as shown below.

Step 6: The burner assembly is ready to refit after servicing the combustion fan and the radiant tube assembly.

4.6 Combustion Fan Assembly

Step 1: If ducted air is fitted, loosen hose clamp and remove the flexible hose from the fan.

Step 2: Remove fan retaining screws and un-



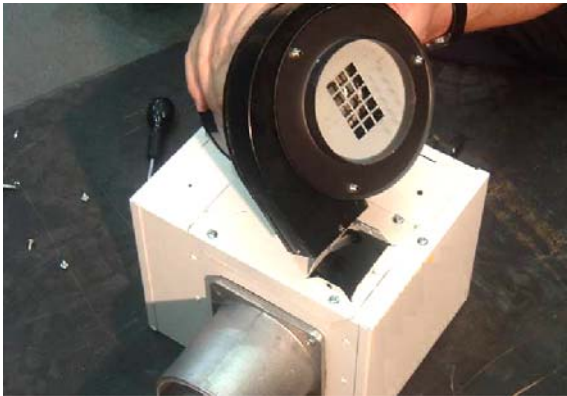
plug from burner box.

Step 3: The combustion fan can now be



detached.

Step 4: Remove the fan orifice plate and



ducted air connection (If fitted).

Step 5: Inspect the impeller and remove any dust with a soft brush.

Step 6: Remove any dust from fan scroll and from around the motor.

Step 7: Ensure the impeller rotates freely.

Step 8: Refit components.

4.7 Radiant Tube Servicing

Step 1: Brush any dust from the exterior of the tubes.

Step 2: Visually inspect inside the tubes. If they are clean, skip to servicing the reflector.

Step 3: If required the interior of the tubes can then be cleaned using an industrial vacuum cleaner, or by using long poles and a scraper.

4.8 Reflector Servicing

The condition of the reflectors should be noted. If necessary the reflectors can be cleaned with a mild detergent. This can significantly improve the efficiency of the appliance.

4.9 Cleaning of Vent

Inspect the fresh air inlet duct and vent to ensure they are free from any blockage or obstruction. The air inlet terminal and vent terminal should be inspected to ensure they are not liable to obstruction.

4.10 Re-commissioning After Service

After servicing has been undertaken, it will be necessary to re-commission the heater as detailed in Section 3 of these instructions.




5.Spare Parts.

Required Spares

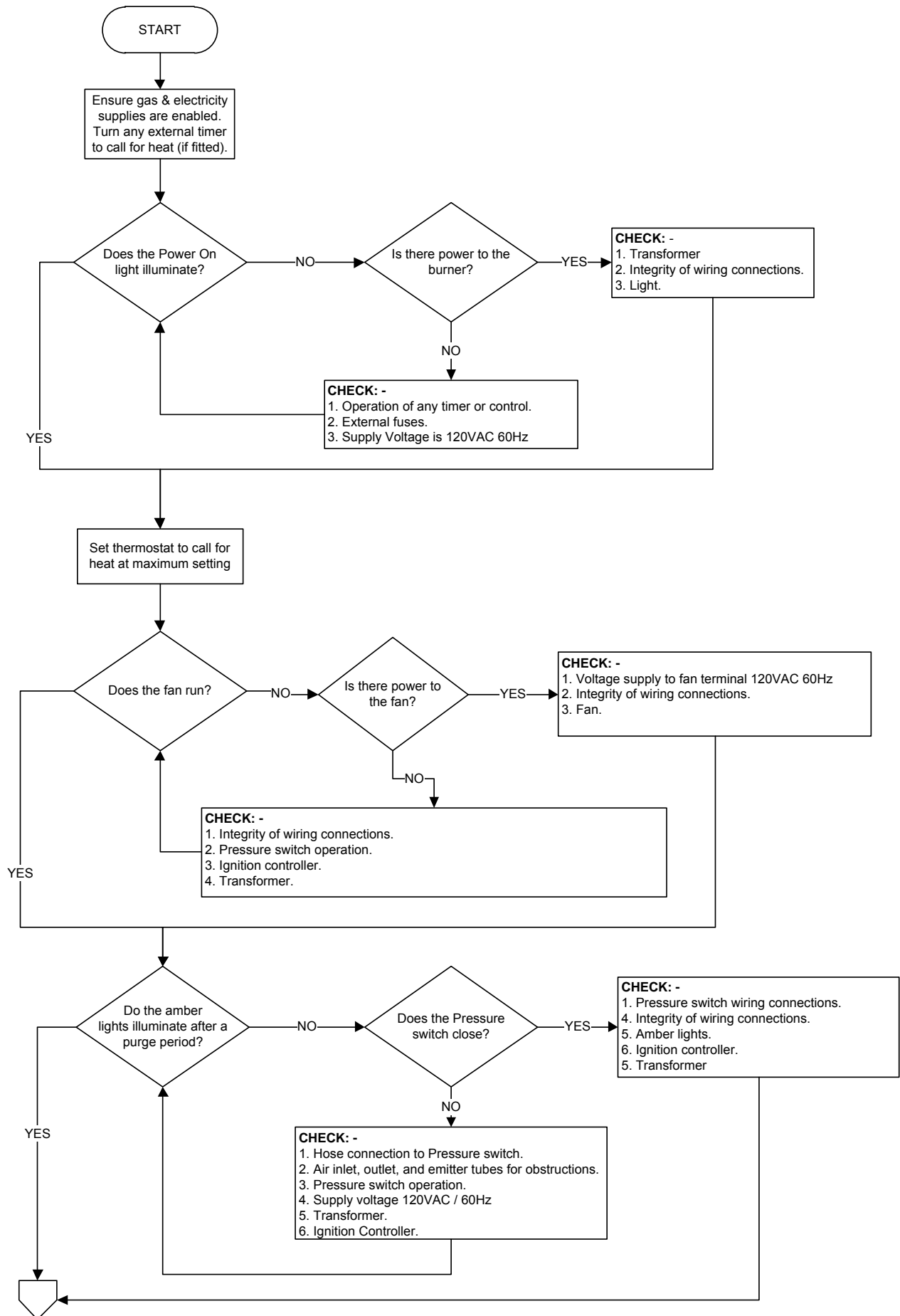
In order to aid troubleshooting and servicing we recommend that the components shown in this section should be stocked.

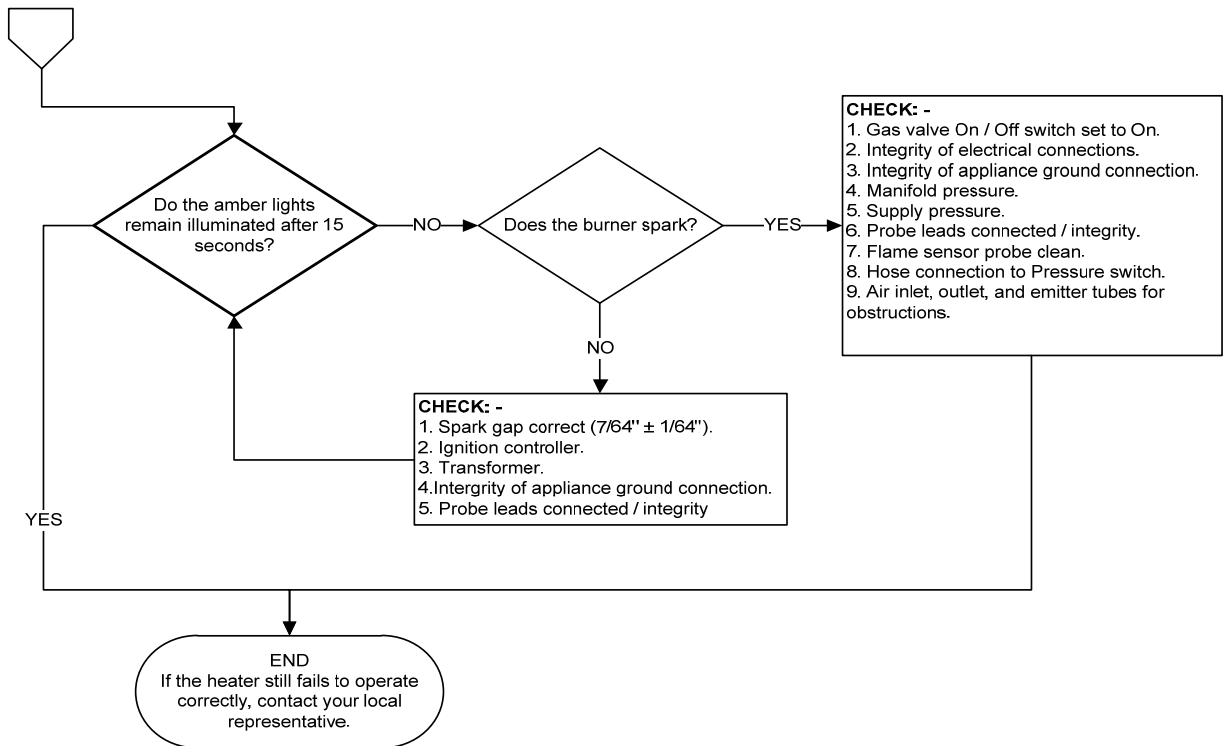
! *Note: Any spare part components that are not approved by the manufacturer could invalidate the approval of the appliance and the warranty.*

Item	Description	Part No.	Item	Description	Part No.
	Transformer (30VA)	900531		Pressure Switch Model 40 Models 60 - 170 Model 200 NG	201508 201676 201697
	Gas Valve NG LPG	202444 202525		Single Probe Ignitor with Connector Lead	202531
	Flame Plates Models 60 NG & LPG 40/80/100 LPG 125 / 150 LPG 170 LPG	201358 201571 201854 201905		Amber Neon (Burner On)	2175-1
	Jet Carriers Models 40 - 150 NG 40 - 170 LPG Model 170/200 NG	202261 202262		Red Neon (Power On)	2180-1
	Burner Head	200988		24V UT Ignition Controller	900545
	Burner Tube	200358		Injector	See section 1.8
				Combustion Fans Models 40 - 170 NG, 40 - 150 LPG Models 200 NG, 170 LPG	2576T 2560-1

TURBULATORS		
		
202422 40 S10 LPG	201704 40 S10 NG	201688 80 /100 NG
60 S20 LPG		
80 S20 LPG		

6.Troubleshooting Guide.






To aid the troubleshooting process, the UT controller has a LED flash code diagnostic sequence:

- Steady Off** No control power
- Steady On** Power applied, control OK
- 1 Flash** Combustion pressure switch open with blower on
- 2 Flashes** Combustion pressure switch closed with blower off
- 3 Flashes** Lockout from the three ignition trials
- 4 Flashes** Lockout from five flame losses
- 5 Flashes** Control hardware fault detected
- 6 Flashes** Lockout from five pressure switch losses

7.Replacing Parts.

 Turn off gas and any electrical supplies to the heater before starting repair work.

7.1 Burner Controller Replacement

Step 1: Loosen screw in right hand burner access door and open.

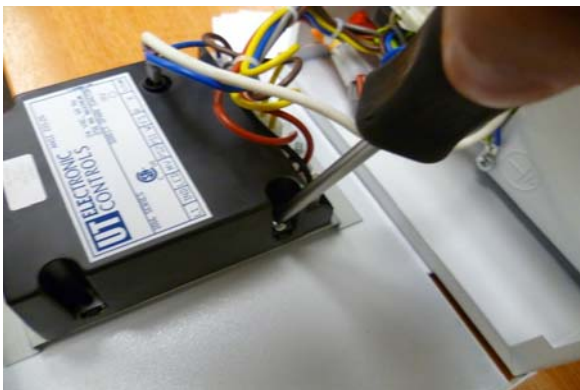
Step 2: Disconnect burner controller from the wiring harness.



Step 3: Disconnect the spark lead from burner controller.



Step 4: Remove the two screws attaching the controller to the burner door and remove.



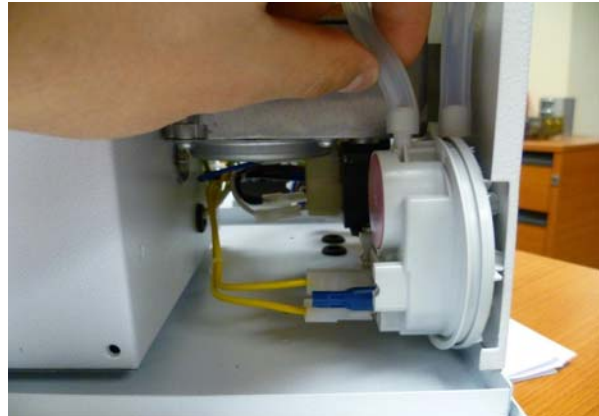
Step 5: Attach new burner controller.

Step 6: Reattach leads.

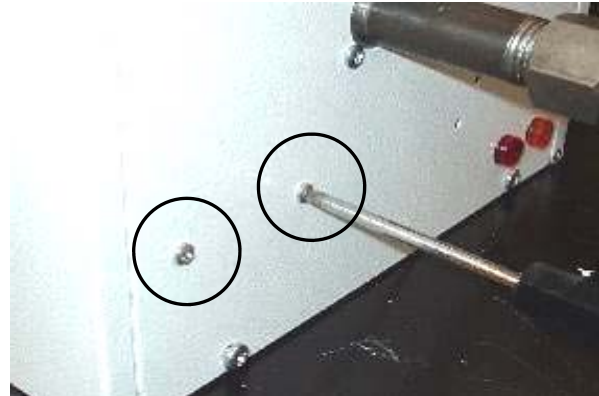
Step 7: Test product and close access door.

7.2 Air Pressure Switch Replacement

Step 1: Open left hand door. Disconnect the two silicone tubes from the pressure switch.



Step 2: Remove the two screws shown below.



Step 3: Remove electrical connections. The air pressure switch can now be removed.

Step 4: Fit the new air pressure switch ensuring the silicon tubes are connected as shown below.



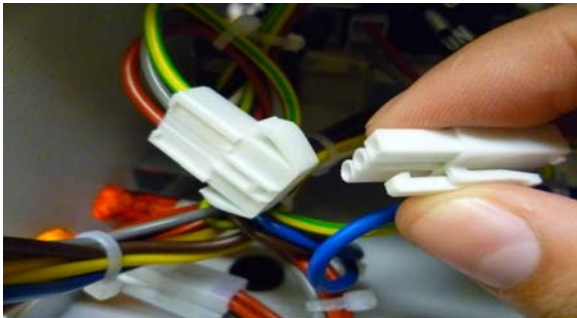
Step 5: Test product and close access doors.

7.3 Gas Valve Replacement

Step 1: Remove the burner assembly as described in the servicing section.

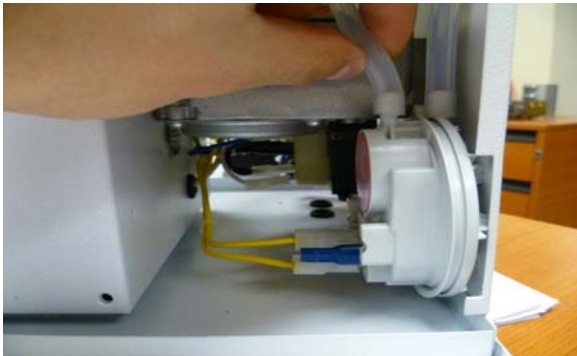
Step 2: Open the right hand access door and detach the burner controller from the wiring harness.

Step 3: Open the left hand access door and



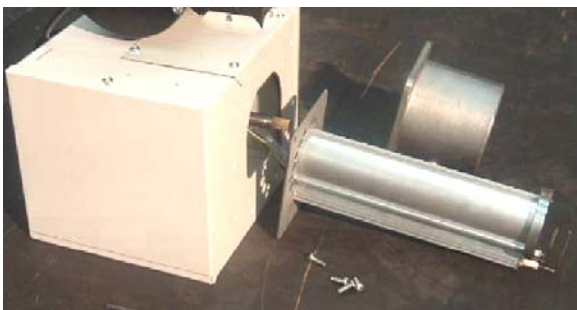
detach the silicon hoses from the air pressure switch.

Step 4: Remove the 4 screws holding the



burner head onto the burner assembly.

Step 5: The burner head can now be



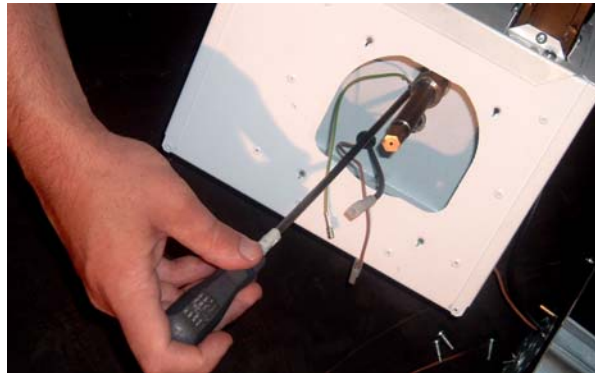
detached by disconnecting the silicon tube and the burner head wiring.

Step 6: Detach the two screws securing the



front of the gas valve.

Step 7: Remove the four screws (arrowed),

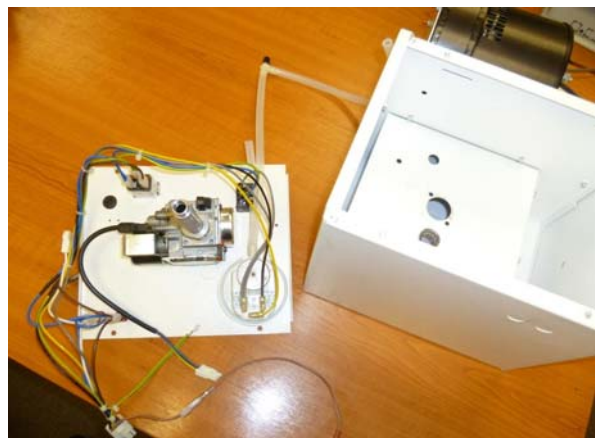


holding the rear burner plate in position.

Step 8: Remove the rear plate.



Step 9: The jet carrier, gas inlet, and wiring



harness can now be detached from the gas valve.

Step 10: The two screws retaining the gas valve can now be removed.

Step 11: The gas valve can now be replaced.

Step 12: Reattach all components.

Step 13: Set pressures and test for reliable burner performance.

Step 14: Close access door.

7.4 Optional Extra Kits.

MODEL	Natural Gas Altitude Conversion Kit	Propane Gas & Propane Altitude Conversion Kit	Combustion Air inlet Kit	Aluminized Steel End Cap Kit (1Pair)	90° Elbow Kit (1 Off)	180° U-Bend Kit
40	202579	202568	202566	202587	202631	202632
60	202580	202569				
80	202580	202570				
100	202582	202571				
125	202583	202572				
150	202584	202573				
170	202585	202577*				
200	202586	202578**				

* Burner de-rated when converted to propane

** Burner de-rated when converted to propane. Not for use at altitude.

8. User & Operating Instructions.

Radiant tubular infrared heaters are designed for overhead heating of industrial and commercial buildings. Individual heating units are suspended from the roof.



1. **This appliance must only be installed by qualified installer in accordance with the requirements of local and National Codes.**
2. **This appliance must be grounded in accordance with the National Electrical Code ANSI/NFPA No.70 or Canadian Codes.**
3. **Never rest anything, especially ladders against the heaters.**

8.1 To Start the Heater

1. First ensure that the gas supply to each heater is turned on by opening the main gas shut off valve.
2. Ensure that the setting of any time switch and thermostat are such that the heating system will be required to operate.
3. Switch on the electricity supply to the heater. The fan will start, the 'power on' light on the burner will illuminate and ignition commence.
4. Ignition will occur.
5. If ignition is unsuccessful the gas valve will close and the spark ignition de-energize after approximately 15 seconds. For approximately 30 seconds the fan will purge the system then re-ignition will be attempted. After 3 attempts at ignition the control unit will 'lock-out', the 'power on'

lamp will remain illuminated and the fan will continue to run. To reset after 'lockout', switch off the power supply to the heater and wait 5 minutes. Then turn the power on. If repeated 'lockout' occurs investigate the cause.

8.2. To Switch Off Heater

Switch off electrical supply to the heater. The burner will stop and the fan will shut off.

8.3. Servicing

To ensure continued, efficient and safe operation it is recommended that the heater be serviced regularly by a qualified person every year in normal working environments, but in exceptionally dusty or polluted environments more frequent servicing may be needed.



AmbiRad Limited P.O. Box 617
Fishers, Indiana 46038
Telephone 317-577-0337
Facsimile 317-842-3989
Website www.ambirad.com/us

For the Distributor Nearest please call
1-888-330-4878

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