SUNRAY manufactured by CALCANA INDUSTRIES LTD. Calgary Alberta Canada

Calgary, Alberta, Canada 1 -800-778-6729

Specification, Installation, Operation Service and Spare Parts Manual

SUNRAY 40A, 50A & 75A SERIES



Vented Radiant Tube Heater,
Infrared Garage Heater
Gravity Vented Wall Furnace
for Residential Garages as well as Industrial
Commercial, Agricultural,
Restaurant and Patio Applications.
For either indoor or outdoor installation

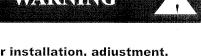


FOR YOUR SAFETY

What to do if you smell gas:

- Do not try to light any appliance
- Do not touch electrical switch;
 do not use any phone in your building
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

WARNING



Improper installation, adjustment, alteration, service or maintenance can cause properly damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment, For assistance or additional information, consult a qualified installer, service agency or the gas supplier.

FOR YOUR SAFETY

"Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance."

CONSIGNES DE SECURITE

"Ill es interdit d"utiliser des liquids imnflammables ou degageant des vapeurs inflammables, a proximite de tout appareil fonctionnant au gaz."

WARNING



Heat exchanger surface is hot. Do not touch surface or burn may result. Combustible material or articles should not be placed on or near the heater.

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OWNERS RESPONSIBILITY

Thank you for purchasing our product. We have designed this unit to provide you with years of trouble-free heating enjoyment.

READ THIS MANUAL IN ITS ENTIRETY. If you do not understand any of the safety or hazardous warnings contained in this manual, or have questions or concerns about the installation, operation, maintenance or service of this heater, or any other questions or concerns relating to this heater, you MUST CALL Calcana Industries Ltd. (hours of operation: 8:00 A.M. to 4:30 P.M. MST), at 1-800-778-6729 BEFORE operating this unit. Store this manual in a location near the heater, for future reference. Make sure installation is performed by well-qualified, licensed contractors in the required field of work. If in doubt DO NOT allow units to be installed. DO NOT park vehicles or place combustible objects close to the heater, other than specified on the Clearance to Combustibles chart located in this manual and on the heater. Property damage, injury or death could occur.

Important Notice - The installation portion of these instructions are for the use of qualified individuals specially trained, licensed and experienced in the installation of this type of equipment and related system components.

Note — The words "shall" or "must," indicate a requirement, which is essential to satisfactory and safe performance.

GENERAL HAZARD WARNING:



The heater and related gas piping, fitting & wiring must be installed by individuals or firms qualified, licensed and specially trained and experienced in installation of this type of equipment and related system components.

Only persons who can understand and follow the instructions shall install or service this heater.

Persons not qualified shall not install this equipment nor interpret these instructions.

Failure to comply with the precautions end instructions provided with this heater can result in death, serious bodily injury and property loss or damage from hazards of fire, explosion, bum, asphyxiation, carbon monoxide poisoning or electrical shock.

WARNING



Warranty is void if heater is NOT installed by a licensed/qualified gas fitter or contractor. Regular inspection and maintenance must be performed at least annually, by a qualified service person, prior to heating season, Heaters used in dusty locations such as brooder barns, sawmills, woodworking shops, etc. will require more frequent maintenance. It is Imperative that the control compartment, air passageways and burner(s) of the heater be kept clean. No one should work on a heater unless they are a licensed/qualified gas fitter or contractor. For all repairs, parts MUST originate from the manufacturer of this heater in order not to void CGNAGA certification.

Continued on page 2

WARNING:

Improper Installation, adjustment, alteration, servicing or maintenance can cause property damage, injury or death.

WARNING:

Only allow qualified, licensed, service people trained to service gas-fired heating equipment to perform an repairs on this unit. All replacement parts MUST originate from the manufacturer of this heater in order not to void CGA/AGA certification.

Safety devices are not allowed to be rendered inoperative and left unattended. Failure to do any of the above can cause property damage, injury or death.

WARNING:

Do not store or use halogen-emitting substances in the vicinity of this heater, Such substances include chlorine based cleaners and swimming pool chemicals, water softening chemicals, de-icing salts and chemicals, cleaning solvents such as carbon. tetrachloride or perchloroethylene, halogen type refrigerants, printing inks, paint and paint removers, varnishes, hydrochloric acid, cements and glues, and masonry acid washing materials. The air used by the burner for combustion must be free of halogens to avoid possible corrosion to the heating surfaces, which could result in asphyxiation, fire and/or death.

WARNING:

Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burns or clothing ignition.

Young children should be carefully supervised when they are in the same place as the heater.

Clothing or other flammable materials should not be hung froth the heater, or places on or near the heater.

Any guard or other protective device removed for servicing a heater must be replaced prior to operating the heater.

WARNING:

Operation of this heater, when not connected to a properly installed and maintained venting system, can result in carbon monoxide (CO) poisoning and possible death.

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WARNING

FIRE OR EXPLOSION HAZARD

The heater and related gas piping and wiring must be installed only by individuals or firms well qualified and licensed in the required field of work.

Read and understand this manual in its entirety BEFORE you install this heater. If you have any questions call your local representative. Verity that the fuel on the installation site is the same as what is required for this heater. Check heater for damage or missing parts. If damage has occurred, notify carrier or point of purchase at once for reconciliation of damaged goods. We are not responsible for transit damage. Do not install if heater is damaged.

If YOU do not understand any of the safety or hazardous warnings contained in this manual, or have questions or concerns about the installation, operation, maintenance or service of this heater, or any other questions or concerns relating to this heater, you MUST CALL Calcana Industries Ltd. (hours of operation; 8:00 A.M. to 4:30 P.M, MST), at 18OG-T78-6729 BEFORE operating this unit,

Verify that model, input & length is what was ordered and is appropriate for installation; If heater is too small for the heating load of the building, property damage can occur due to freezing. If unit is too large, severe heat damage can occur to the building and/or lts contents, fire, explosion, injury or death. If in doubt compare heat loss of building with unit on site. If you are unable to calculate heat loss call your local representative for assistance.

Installation shall be in accordance with local codes, (see code compliance).

If installation requires tilting, DO NOT over tilt the unit. Units are certified for installations up to 45°, however the maximum recommended tilt is 25°.

Install unit according to the Clearance to Combustibles for that particular heater and type of installation, Make sure that clearances are maintained from vehicles parked below and in front of heater, Take into consideration hoists. Failure to do so could result in property damage, injury or death.

Make sure unit is adequately suspended from ceiling or roof. Select hanging location that has adequate strength to support heater,

This heater needs fresh air for safe operation and must be installed so there are provisions for adequate combustion and ventilation air. Do not operate this heater without installing air intake duct (pin #800209) and/or exhaust/chimney vent, Refer to the installation instructions for installation details. See pages 29 & 30)

If unit is to be sidewall vented, use p/n #800208 sidewall vent kit. Make sure vent cap is past eave. (see pages 31 & 32 titled 'Venting').

Do not render safety devices inoperable. Make sure gas line and/or service have adequate capacity for the increased load of heater.

Check line and manifold pressure with a manometer to confirm unit is set according to the specification on the rating plate and altitude, Perform check with all gas-fired appliances operating, (see pages 40,41,47 & 48 for further details).

Continued on page 4



FIRE OR EXPLOSION HAZARD

Make sure units are operating as quiet and efficient a possible before leaving the job site and instruct owner/s on the safe operation of the heater as well as safety and hazardous issues as they relate to the heater, ft's installation, operation and this manual.

CODE COMPLIANCE:

Installation shall be in accordance with local building codes, or in the absence of Local codes, in accordance with:

A) <u>CANADA</u>: CANICGA-6149,1 INSTALLATION CODES or latest edition. <u>USA:</u> NATIONAL FUEL GAS CODE ANSI Z 223.1/NFPA 54, Most current edition.

B) ELECTRICAL; GROUNDING:

<u>CANADA</u>: CANADIAN ELECTRICAL CODES- Part 1 — CSA 022,1 latest edition. <u>USA:</u> (NEC) NATIONAL ELECTRICAL CODE ANSI/NFPA 70 or latest edition.

C) PUBLIC GARAGE INSTALLATION: Adequate clearances must be maintained. according to the following:

CANADA: CAN/CGA-2149.1 latest edition

USA: STANDARD FOR PARKING STRUCTURES ANSI/NFPA 88A, or THE STANDARD FOR REPAIR GARAGES, ANSI/NFPA 886.

- Heaters must be installed a minimum of eight feet above the floor. Minimum required safe distances to combustibles must be maintained from vehicles parked below the heater.
- When installed over hoists, the minimum required safe distances to combustibles must be maintained from the uppermost point of the combustible materials placed on the hoist.
- D) AIRCRAFT HANGARS: Adequate clearances must be maintained according to the following:

CANADA: CGA B149.1

USA: (NFPA) STANDARD FOR AIRCRAFT HANGARS ANSI/NFPA 409

- Heaters in aircraft storage or service areas must be installed a minimum of ten feet above the upper surface of wings or engine enclosures of the highest aircraft which may be housed in the hangar. (This should be measured from the bottom of the heater to the top of the wing or engine enclosure, whichever is highest from the floor.)
- in other sections of aircraft hangars, such as shops or offices, heaters must be installed a minimum of eight feet above the floor.
- Heaters installed in aircraft hangars shall be located so as not to be subject to damage by aircraft, cranes, movable scaffolding or other objects.
- When installed over hoists, the minimum safe distances to combustibles must be maintained from the uppermost point of the combustible materials placed on the hoist.
- E) OTHER TYPES OF INSTALLATIONS: If the installation is such that it doesn't meet the above mentioned criteria or there is a possibility of airborne combustible vapor or material in the building (HAZADOUS LOCATION), consult the local Fire Marshall, the Fire Insurance Carrier or other authorities for approval of the proposed installation prior to installing the heater.

SPECIFICATIONS

General specifications

Rating (Input:Natural and L.P. Gas) (0-4500 feet Canada Only)

Model	Burner Input Btu/hr		Tube
	Min	Max	Length
SUNRAY-40A	N/A	40,000	10'
SUNRAY-40AHL	20,000	40,000	10'
SUNRAY-40AM	20,000	40,000	10'
SUNRAY-50A	N/A	50,000	15'
SUNRAY-50AHL	25,000	50,000	15'
SUNRAY-50AM	25,000	50,000	15'
SUNRAY-75A	N/A	75,000	20'
SUNRAY-75AHL	37,500	75,000	20'
SUNRAY-75AM	37,500	75.000	20'

Gas Pressure at Manifold:

Natural Gas	.3.5"	W.C.
L.P. Gas	10.5"	W.C.
Gas Connection Size	0.5"	N.P.T.

Gas Inlet Pressure:

GAS	MINIMUM	MAXIMUM
Natural	4.5" W.C.	14.0" W.C.
L.P.	11.5" W.C.	14.0" W.C.
Flue conne	ction	3"

Electrical Rating:

DSI Ignition
120v. 60hz, 1 Amps
Appliance, 3 prong plug connection
24 volt low voltage thermostat

Standard Equipment:

Burner control housing is pre-assembled and prewired, unit comes complete with the following: industry standard gas, electrical and venting connections, balanced air rotor, thermal overload protected motor, visual burner inspection sight glass, combustion and air proving safety switches, 3-try spark ignition control, low voltage thermostat connection, 4" aluminized steel combustion tube, polished aluminum standard reflector, 4" aluminized steel radiant heat exchanger, tube couplers, joint/hanger pieces, heat economizer baffle, low voltage thermostat, and hanging chain kit.

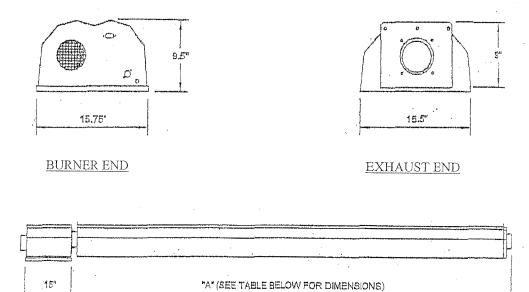
Optional Equipment:

- 90° Elbow Kit - Hi/Lo Control - Sidewall Vent Kit

- Modulating Control - Two Piece Construction - Three Piece Construction

- Stainless Steel Construction - 180⁰ U-Bend Kit

DIMENSIONS



SIDE VIEW

FIGURE #1 EQUIPMENT DIMENSIONS

TABLE OF DIMENSIONS

MODEL	DIMENSION "A"
Burner Input	Length
40,000 Btu/Hr	10' - 4''
50,000 Btu/Hr	15' - 4''
75,000 Btu/Hr	20' - 4''

INSTALLATION CLEARANCES AND CLEARANCE TO COMBUSTIBLES

Installation of overhead heaters in garages or hangers MUST meet the requirements for bottom (below) clearances detailed in CAN/CGA-B-149.1 INSTALLATION CODES or NATIONAL FUEL CODE ANSI Z 223.1/NFPA 54. (All clearances are in inches):

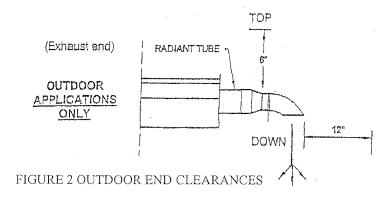
WARNING

In all situations, clearances to combustibles must be maintained. Minimum clearance from heater must be maintained from vehicles parked below heater. The posting of signs maybe required in storage areas referring to clearances to combustibles to the heater and/or limiting the stacking height of stored Items near the heater specifying a maximum height. Clearances are not for use in four (4) sided enclosures. (All clearances are in inches). Certain materials or items, when stored under the heater, will be subjected to radiant heat and could be seriously damaged.

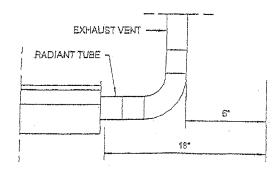
END CLEARANCES (Burner Head End)

Minimum clearances from air intake end of burner head to object is 12",

Provide adequate accessibility clearances for serving and proper operation.



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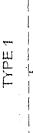


CLEARANCE TO COMBUSTIBLES FOR SPACE HEATING AND BROODER INSTALLATION

For US: residential Garage Heater Installations, an eight (8) foot floor clearance is required below the tube. In Canada, Residential Garage Installations, floor clearance is seven (7) feet. All other installations, maintain minimum clearance to combustibles.



from vehicles parked below heater The posting of signs may be required in storage areas referring to clearances to combustibles to the heater and/or limiting the stacking height of stored items near the heater specifying a maximum height. Clearances are not for use in four (4) sided enclosures. (All clearances are in inches). Certain materials or items, when In all situations, clearances to combustibles must be maintained. Minimum Clearance from heater must be maintained stored under the heater, will be subjected to radiant heat and could be seriously damaged.



TYPE 2

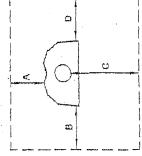


FIGURE #4

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INSTALLATION TYPE 1

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IGURE #5	ΓO 45° TILT
FIGI	5° TO
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	D	28	28	31
TYPE 2	၁	36	40	45
INSTALLATION TYPE 2	В	4	4	4
INSTAL	A	4	4	4
	INPUT	40	50	75
			•	

Μ

INPUT 40 50 75

36

4 4 4

15

48 43

15

E 2	C D	36 28	40 28	5 31
777		3	4	45
	В	4	4	4
7777	A	4	4	4
	INPUT	40	50	75

PRE-INSTALLATION INSPECTION:

Refer to pages 11 to 15 for packaging contents.

Inspect the shipping container and heater for any evidence of shipping damage. if heater damage is found, notify freight carrier and file a claim.



WARNING



If heater is damaged, DO NOT install.

Check that all parts and pieces are present and accounted for. Report any missing items to carrier or point of purchase at once,

Check that overall general appearance, source of fuel required and model numbers match unit requested. Report any discrepancy to carrier or point of purchase at once,

THOROUGHLY INSPECT THE EQUIPMENT IMMEDIATELY UPON ARRIVAL

OUR RESPONSIBILITY FOR THIS SHIPMENT CEASED WHEN THE CARRIER. SIGNED THE WAYBILL.

If goods are received short or in damage condition, It is important that you notify the carrier and insist on a notation of the loss or damage across the face of the freight bill, otherwise no claim can be enforced against the transportation company.

If concealed loss or damage is discovered, notify your carrier at once and request an inspection. This is absolutely necessary. A concealed damage report must be made within 15-days of delivery of shipment Unless you do this the carrier will not entertain any claim for loss or damage. The Agent will make an Inspection and grant a concealed damage notation. If you give the Transportation Company a clear receipt for goods that have been damaged or lost in transit, you do so at your own risk and expense.

WE ARE WILLING. TO ASSIST YOU IN EVERY POSSIBLE MANNER TO COLLECT CLAIMS FOR LOSS OR DAMAGE, BUT THIS WILLINGNESS ON OUR PART DOES NOT MAKE US RESPONSIBLE FOR COLLECTION OF CLAIMS OR REPLACEMENT OF MATERIAL. THE ACTUAL FILING AND PROCESSING OF THE CLAIM ISYOUR RESPONSIBILITY.

WE ARE NOT RESPONSIBLE FOR FREIGHT DAMAGED IN TRANSIT!

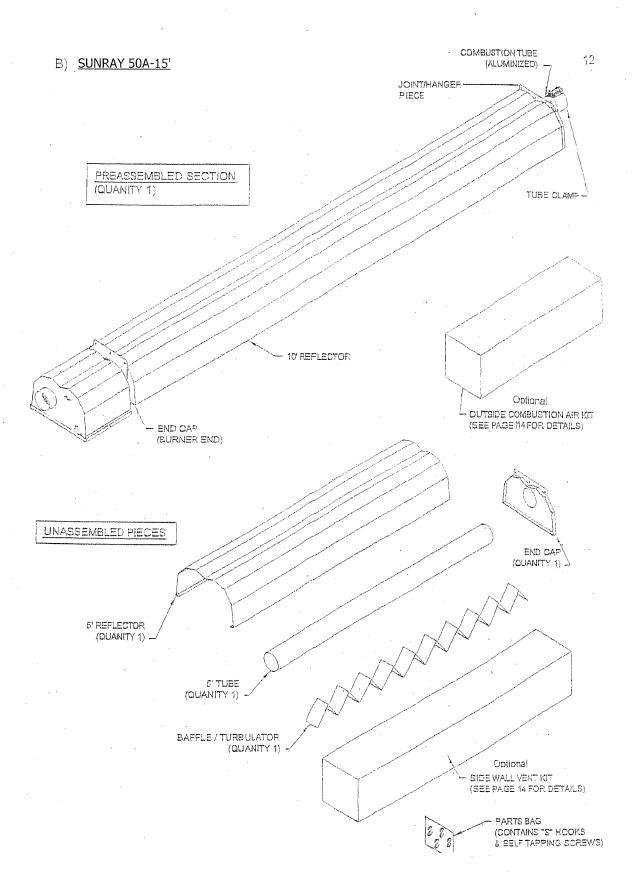
IF CONTENTS ARE DAMAGED,

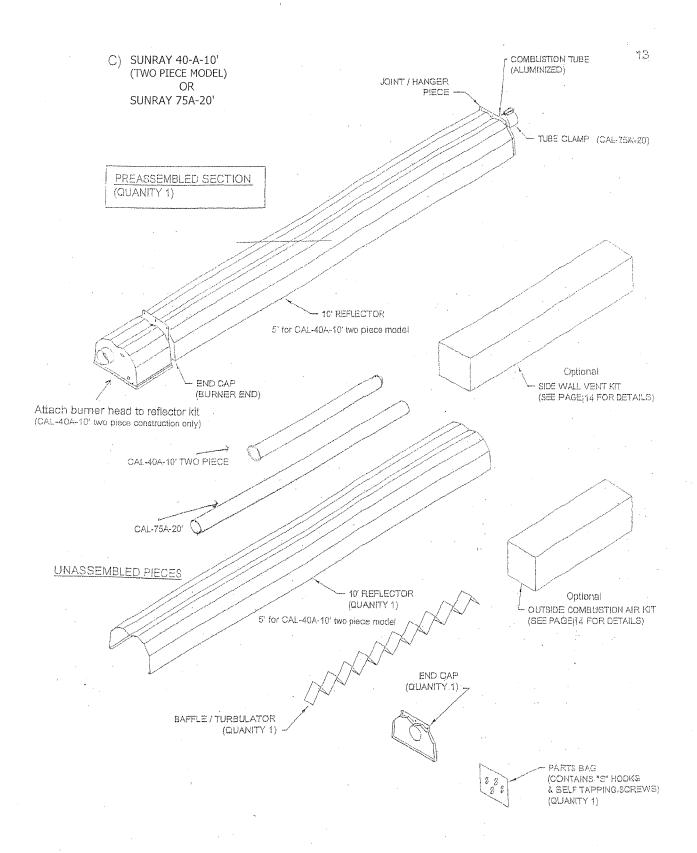
EVEN THOUGH CARTON DOES NOT LOOK DAMAGED:

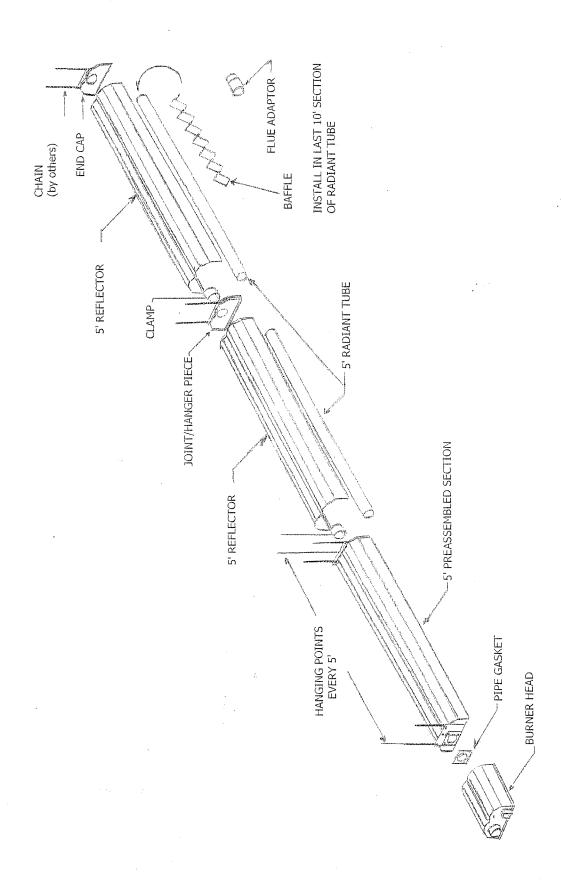
A. MAKE CLAIM TO DELIVERY CARRIER AT ONCE B. SAVE CARTONS FOR INSPECTION BY CARRIER



A) SUNRAY 40A-10 Preassembled Model COMBUSTION TUBE (ALUMINIZED) C/W BAFFLE INSTALLED (For two piece model see page 13 for details) END CAP (EXHAUST VENT END) 10' REFLECTOR END CAP (BURNER END) PARTS BAG (CONTAINS "S" HOOKS) Optional Optional OUTSIDE COMBUSTION AIR KIT (SEE PAGE 14 FOR DETAILS) SIDE WALL VENT KIT (SEE PAGE 14 FOR DETAILS) FIGURE #6 SUNRAY 40A-10 ASSEMBLED MODEL







SUNRAY 50A-15 (Three piece model)

D) OUTSIDE COMBUSTION AIR KIT

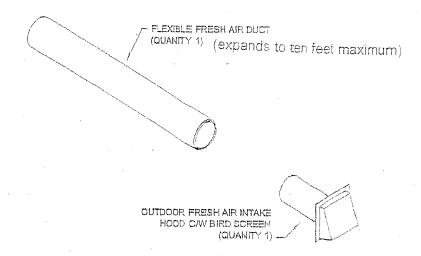
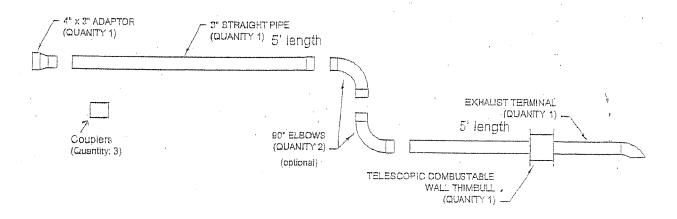


FIGURE #9.. OUTSIDE COMBUSTION AIR KIT

E) SIDE WALL VENT KIT



F) 90° ELBOW PACKAGE

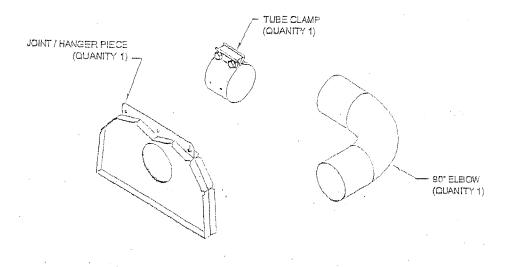


FIGURE #11. 90° ELBOW PACKAGE CONTENTS

G) 180° U-BEND PACKAGE

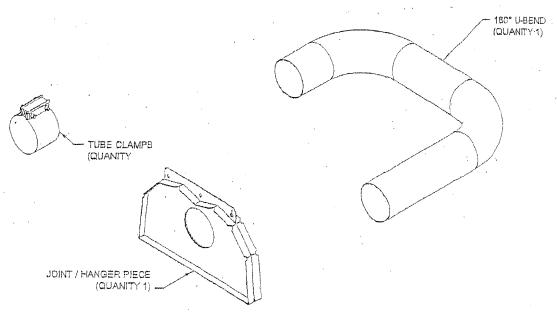


FIGURE #12. 180° U-BEND PACKAGE CONTENTS

INSTALLATION:

Provide for adequate clearance around air openings into the combustion chamber, clearances from combustible material, provisions for accessibility and for combustion and ventilating air supply.

PLANNING:

- Familiarize yourself with the equipment and any accessories that you may require.
- Locate the area where unit is to be installed
- Locate area where any holes might have to be cut for.
 - a) Venting
 - b) Any gas piping requirements
- Make sure that there is no obstruction such as hidden electrical wiring, water lines etc.. in the areas of concern.
- Locate the thermostat location.



- Locate a grounded, three prong electrical outlet within 12" of the air intake end of the burner box, This outlet should be ceiling mounted and on a dedicated circuit.
- Measure required amount of various materials required to do the installation, and have these materials on site in an organized manner prior to commencement.

SUSPENSION OF HEATER:

Horizontal Installation:

Locate suspension points on ceiling or roof, Heater is suspended at standard 10' intervals (refer to page 17). Adequately secure chains to beam (refer to page 17 suspension points. Hang chains down from suspension point to desired level. Heater is to be hung level. NOTE: Front & rear end caps are double chained.

Tilt Installation:

Refer to page 19, for 25° & 45° tilts. Locate suspension points as described above, Horizontal Installation. It is important NOT lo over tilt the heater, Units are certified for installation up to 45°, however the **MAXIMUM** recommended tilt is 25°.



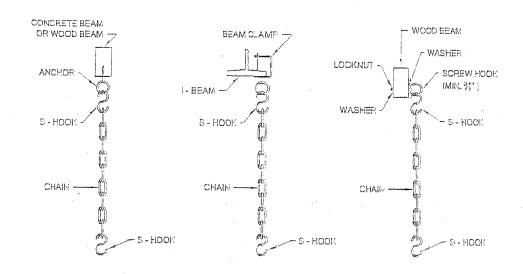
Use chain that is a minimum size of 2/0. Make sure suspension points are adequate to support weight of heater. If the suspension system fails, property damage, severe injury or death can occur.

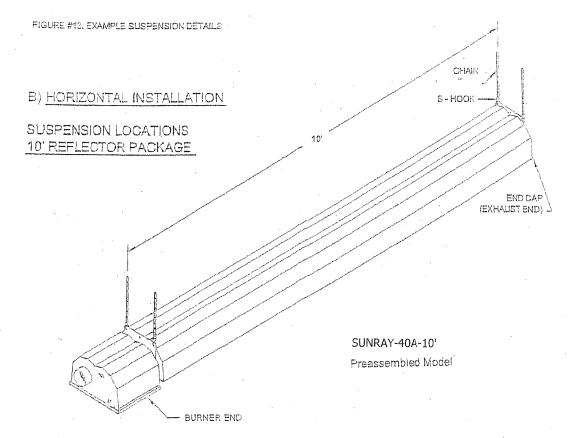
Refer to pages 20 to 28 for ASSEMBLY OF COMPONENTS and ASSEMBLY OVERVIEW.

mimumun clearance to combustibles SUNRAY 40A-10' 25 degree filt _Eave _Overhang Maintain ~Tlimble Outside -Exhaust TYPICAL GARAGE INSTALLATION SUNRAY 40A- 36" SUNRAY 50A- 43" SUNRAY 75A- 48" (Plan view) Garage Door Optional Fresh Air Supply Burner Head / Thermostat Walk in Door

FIGURE #12A. TYPICAL GARAGE NUSTALLATION

A) SUSPENSION POINTS





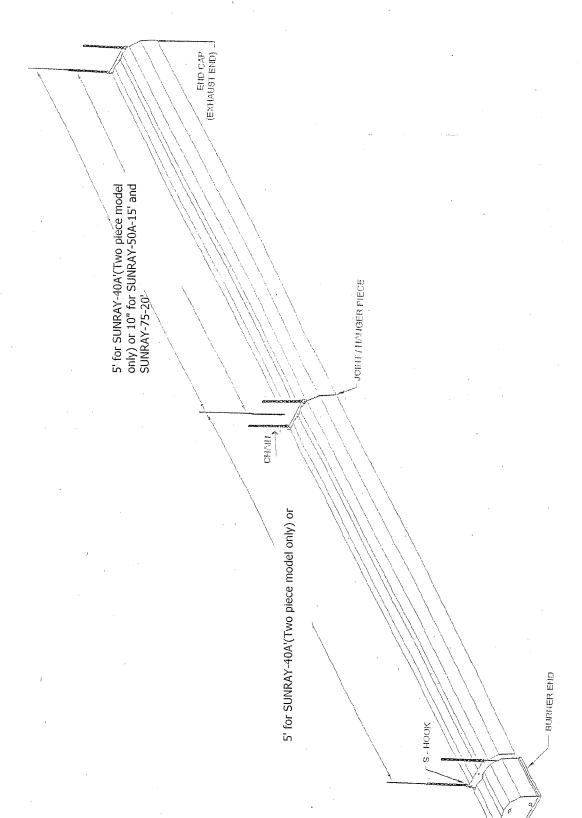


FIGURE #15 HORIZONTAL INSTALLATIONS SUNRAY-40A-10' TWO PIECE, SUNRAY-50A-15' AND SUNRAY-75A-20'

D) 25° TILT (ALL LENGTHS)

NOTE: 25° Tilt is the maximum recommended tilt for most tilt installations.

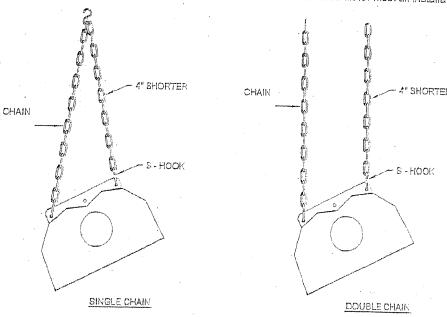
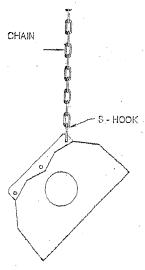


FIGURE #16, 25" TILT

E) 45° TILT (ALL LENGTHS)

NOTE: 45 degree tilt is NOT RECOMMENDED. This angle of Tilt causes the ambient air to form convection currents over the tube. The net effect of this action is reduced infrared output (decreasing heating capacity) as well as decreased exhaust temperature which may increase the chance of condensation of combustion by-products.



SINGLE CHAIN

ASSEMBLY OF COMPONENTS

Refer to text & figures in section titled ASSEMBLY OVERVIEW Refer to COMPONENT ASSEMBLY (see pages 21 to 28)

SUNRAY 40A-10 TWO PIECE:

- 1) Attach burner head to 5' preassembled reflector section via 4 bolts and washers.
- 2) Assemble two piece baffle by inserting end with locking tabs into receiving end at 90° angle then rotating 90° until tabs are locked and baffle is in a straight line (see figure 22 page 23). Set these baffles aside. They must be installed in the last 10' tube of the heater. (see page 23)
- 3) Install S-hooks onto joint hangers. Hang preassembled burner box, combustion tube and reflector (first 5' of heater) from chains. (see warnings on page 16)
- 4) Secure joint/hanger piece to one end of a reflector by overlapping onto joint/hanger piece 3/4 inch (see page 21) and securing via provided self tapping screws.
- 5) Attach the above mentioned reflector to the pre-assembled joint/hanger by overlapping reflector on hanger and securing via provided self-tapping screws. (see page 21)
- 6) Hang assembly from suspended chains via 'S' hooks, installed from ceiling trusses (see warnings on page 16)
- 7) Install radiant tube by positioning one end into the joint/hanger and butting the other end to the previously installed radiant tube. Secure with clamp and self-tapping screws.

IMPORTANT: Make sure to secure clamp to tube via self-tapping screws. (see diagram 19 on page 21)

- 8) Secure remaining joint/hanger pieces to reflectors as per item #4.
- 9) Continue to item 10 and connect venting

SUNRAY 50A-15' THREE PIECE:

- 1) Follow SUNRAY 40A-10' Two Piece instructions item #1 thru #8 and then repeat from #4 thru item #8 for the remaining items.
- 2) Continue to item 10 and connect venting

SUNRAY 40A 50A & 75A

- 1. Remove baffles from transport location on tube, Set these baffles aside. They must be installed in the last 10' tube of the heater. (see page 23) The only exception to this is the SUNRAY-40A-10' pre-assembled model reflector package The baffle is already installed in the last portion of the tube at the factory.
- 2. Install S-hooks onto joint hangers. Hang preassembled burner box, combustion tube, and reflector (first 10' of heater) from chains. (see warnings on page 16)

NOTE: If you are installing a pre-assembled SUNRAY-40, 10', your installation is complete. Go to #9, if not then continue to #3

- 3) Secure end cap to one end of a reflector by overlapping reflector onto end cap piece 3/4 inch (see page 22) and securing via provided self-tapping screws.
- 4) Attach the above-assembled reflector to the pre-assembled joint/hanger by overlapping reflector on hanger and securing via provided self-tapping screws. (see page ??)
- 5) Hang assembly from suspended chains via 'S' hooks.
- 6) Install radiant tube by positioning one end into joint/hanger and butting the other end to the previously installed radiant tube. Secure tubes with clamp and self-tapping screws.

IMPORTANT: Make sure to secure damp to tube via self-tapping screws. (see diagram 19 on page 21)

7) Install baffles in the final radiant tube (see page 23)

IMPORTANT: Install baffle into last piece of radiant tube.

- 8) Install a flue/vent adaptor (see page 23)
- 9) Connect to vent (see page 31 to 34 for details)
- 10) Install to outside combustion air (see page 29 & 30 for details).
- 11) Connect gas (see pages 36 to 39), electricity and controls (see page 42 to 46)

SUNRAY-40A-10' TWO PIECE SUNRAY-50A-15' TWO AND THREE PIECE SUNRAY-75A-20'

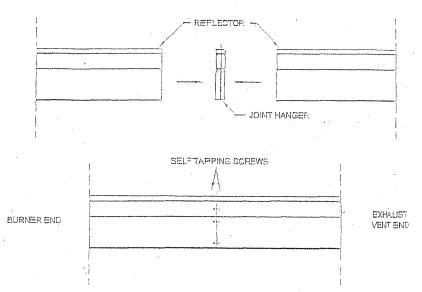


FIGURE #18. JOINT HANGER INSTALLATION

CLAMP COUPLER

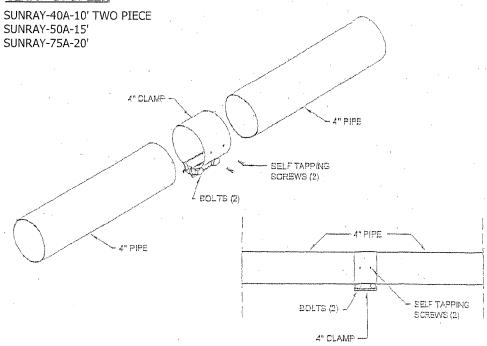


FIGURE #18. CLAMP COUPLER INSTALLATION

END CAP TO REFLECTOR

SUNRAY-40A-10' TWO PIECE SUNRAY-50A-15' SUNRAY-75A-20'

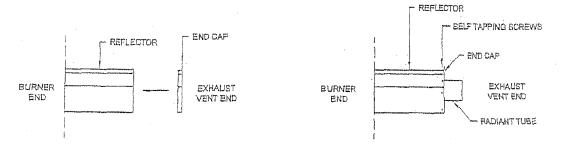


FIGURE #21. END CAP INSTALLATION

BAFFLE/TURBULATOR INSTALLATION SUNRAY-40A-10' TWO PIECE MODEL, SUNRAY-50A-15 AND SUNRAY-75A-20

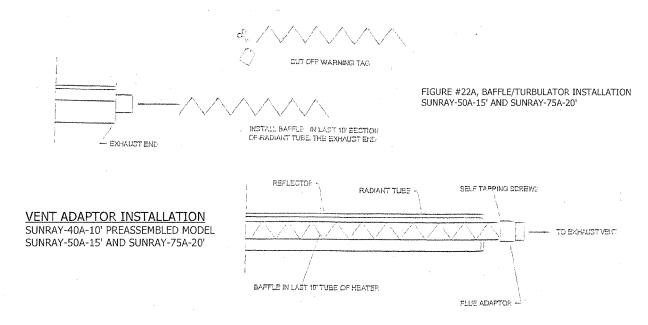


FIGURE #23 VENT ADAPTOR SUNRAY-40A-10', SUNRAY-50A-15' AND SUNRAY-75A-20'

Γ

ASSEMBLY (OVERVIEW)

- 1. Verify length of refrector package to be installed. Read 'ASSEMBLY OF COMPONENTS", on page 20 and view related diagrams on pages 21 23.
- Locate section of manual that corresponds with length to be installed. View the corresponding exploded view. The Illustration contains the details required to install the unit.

Reflector Package Length 10' 15'	Corresponding Page 25
.20'	26 27

ASSEMBLY OF OPTIONS

Refer to section of manual containing accessories to be installed.

Accessories 90° Elbow Kit (optional 15' & 20' Units) 180° Elbow Kit (optional 15' & 20' Units) Combustion Air Kit Sidewall Vent Kit Outdoor Installation Kit Low Voltage Thermostat	Corresponding Page 28 28 30 32 35
Low Voltage Thermostat Line Voltage Thermostat	45 46

View exploded Illustration, install accordingly.

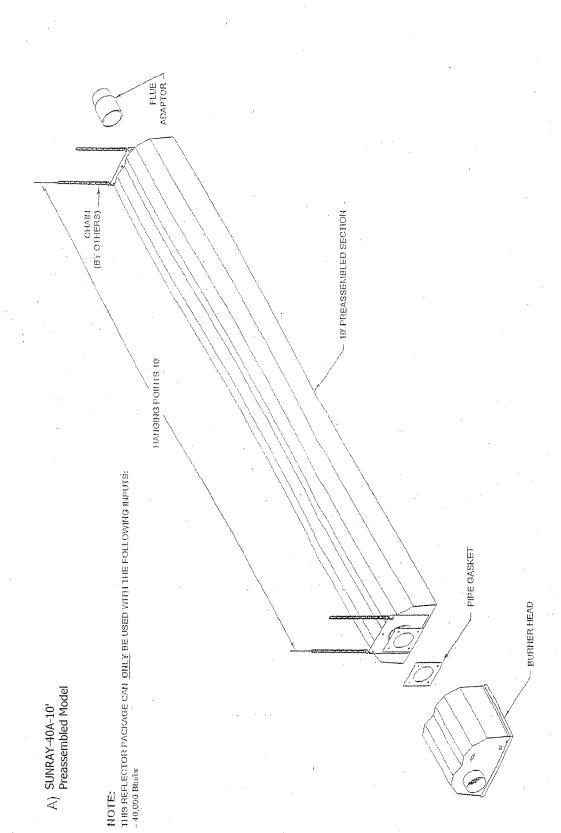


FIGURE #24. SUNRAY-40A-10' PREASSEMBLED MODEL

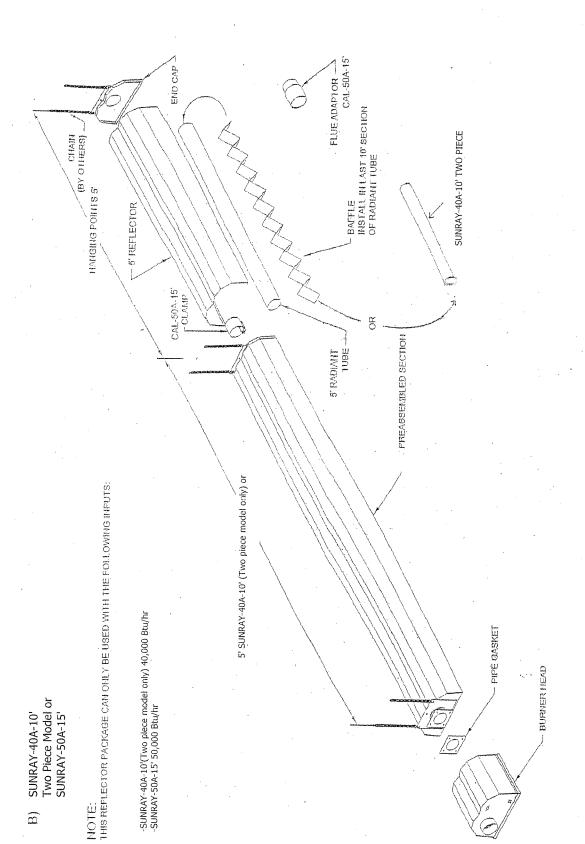


FIGURE #25 SUNRAY-40A-10' TWO PIECE MODEL AND SUNRAY-50A-15'

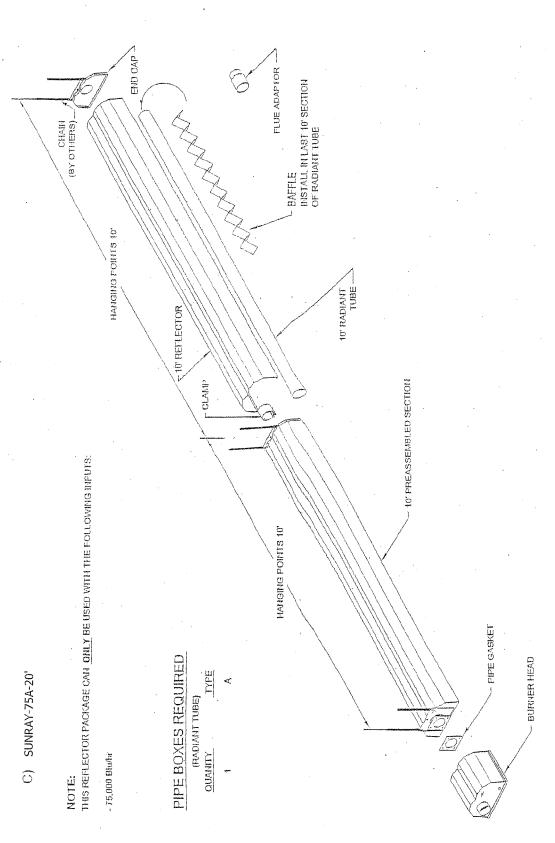
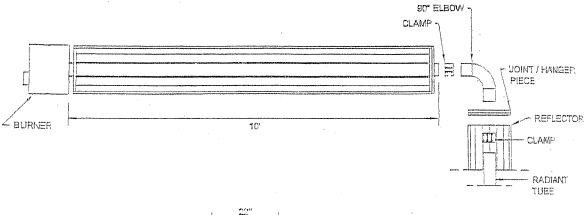


FIGURE #28, SUNRAY-75-A-20'



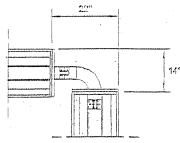


FIGURE #27, 90° ELBOW KIT INSTALLATION

180° U - BEND KIT

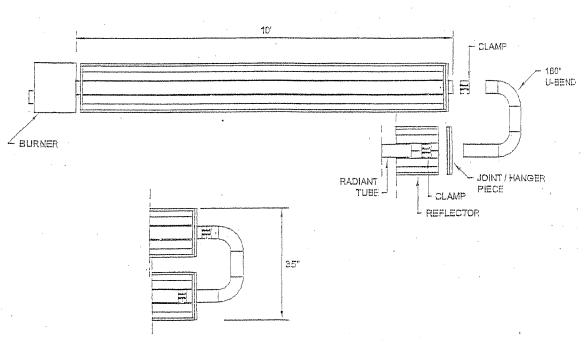


FIGURE #28. 180" U - BEND KIT INSTALLATION

OUTSIDE COMBUSTION AIR SUPPLY (refer to page 30)

The heater must be installed in a location where there is adequate air supply for combustion to take place.

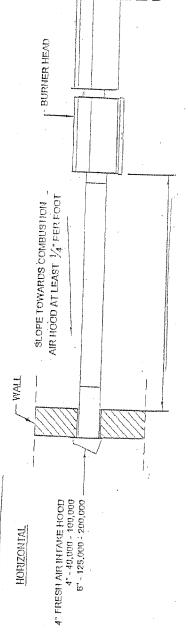
Outside Combustion Air is required for U. S. Residential Garage Heater Installations, and optional for others.

Provisions for adequate combustion and ventilation air must be provided. Adequate clearances around air openings into the combustion chamber must be provided.

NOTE: Maximum Ducí Length is 10'. This length can have up to 2 - 90° elbows included, thereafter, deduct 10' for every 90° elbow and 5' for every 45° elbow used.

If condensation occurs, insulate duct or contact distributor for alternate methods for your installation. Slope duct down, away from burner box towards the combustion air intake hood. The combustion air intake hood must be installed at a height sufficient enough to prevent any blockage by snow.

COMBUSTION AIR



MAXIMUM LENGTH IS 10'
INCLUDING 2 - 90° ELBOWS.
DEDUCT 10' FOR EVERY 90°
ELBOW AND 5' FOR
EVERY 45° ELBOW USED.

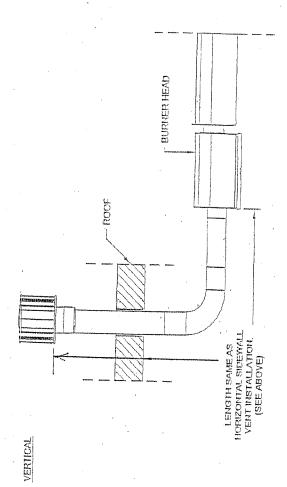


FIGURE #29, OUTSIDE COMBUSTION AIR SUPPLY

VENTING 31

(Refer to pages 32 - 35)

Venting of the unit must comply with the Installation Codes CAN/CGA-B149.1. In the USA, refer to NATIONAL FUEL CODE ANSI Z223.1/NFPA 54; current edition or local codes.

A) Select exhaust point:

A vent shall not terminate:

- a) within 6 feet (1.8m) of a mechanical air supply inlet to a building;
- b) above a meter/regulator assembly within 3 feet (900m) horizontally of the vertical center line of the regulator;
- c) within 6 feet (1.8m) of any gas service regulator vent outlet;
- d) less than 1 foot (300m) above grade level;
- e) less than 7 feet (2.1m) above a paved sidewalk or a paved highway,
- f) within 3 feet (900m) of a window or door which can be opened in any building, any non-mechanical air supply inlet to any building or the combustion air inlet or any other appliance.

NOTE: May be reduced to 1 foot for inputs up to 100,000 BTUH (30kW) and 3 feet (1m) for inputs exceeding 100,000 BTUH.

In the U.S.: The National Fuel Gas code, ANSI Z 223.1/NFPA 54, specifies a 4 foot (1.22m) vent terminal clearance from gas and electrical meters, regulators and relief equipment.

B) If sidewall exhaust; then use sidewall vent kit. (see page 32)

NOTE: Maximum length is 15 feet including, two (2) 90° elbows deduct 10' for every additional 90° elbow and 5' for every 45° elbow

- C) If roof exhaust; then use 'B' style chimney. (see page 33 or 34)
- Vent terminal must be installed at a height sufficient to prevent any blockage by snow.
- E) Protect building materials from any degredation that may be caused by flue gases.
- F) Support vent to prevent sagging.

Make sure that all flue joints are sealed. Use only suitable products equal to General Electric RTU106 or Permatex Form a Gasket Red High Temperature Silicone Adhesive Sealant (not supplied).

For sidewall venting, the heater must not be connected to a separate chimney, but must be installed using the venting system supplied with the heater.

If condensation in flue is present then flue should be insulated or shortened. Install according to CAN/CGA-B149.1codes. In the USA, refer to ANSI Z 223.1/NFPA 54 NATIONAL FUEL GAS CODE current edition.

NOTE: Refer to the CAN/CGA-B149.code for venting of two or more heaters into one common vertical chimney. In the USA, refer to ANSI Z 223.1/NFPA 54 NATIONAL FUEL GAS CODE current edition.

NOTE: A small amount of condensation may occur from the heater when it starts the heating cycle. The condensation will stop once the heater warms up. Make sure all venting is sealed.

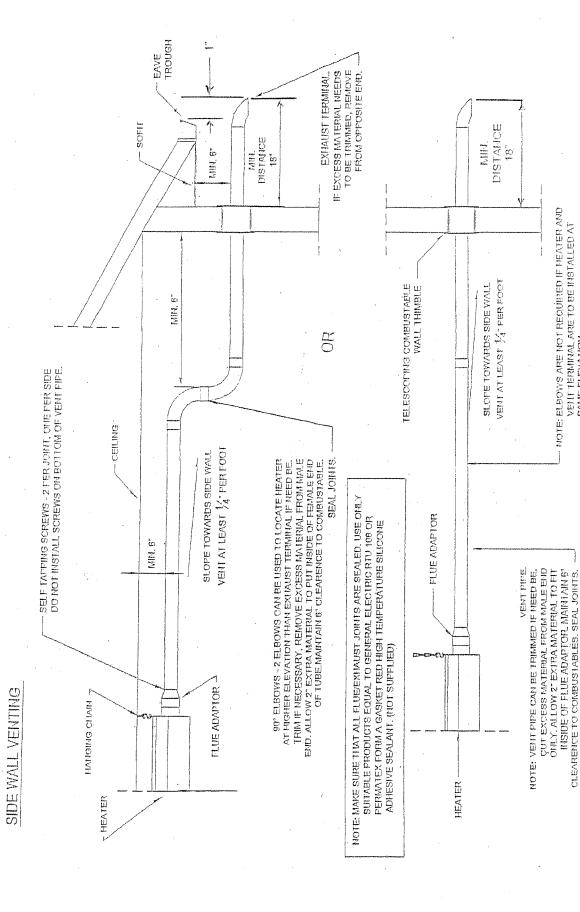


FIGURE #30. SIDE WALL VENTING, SINGLE UNIT

NOTE: ELBOWS ARE NOT REQUIRED IF HEATER AND VEHT TERMINAL ARE TO BE INSTALLED AT SAME ELEVATION.
NOTE: ONE ELBOW CAN BE USED TO INSTALL HEATER 90" TO EXHAUST TERMINAL.

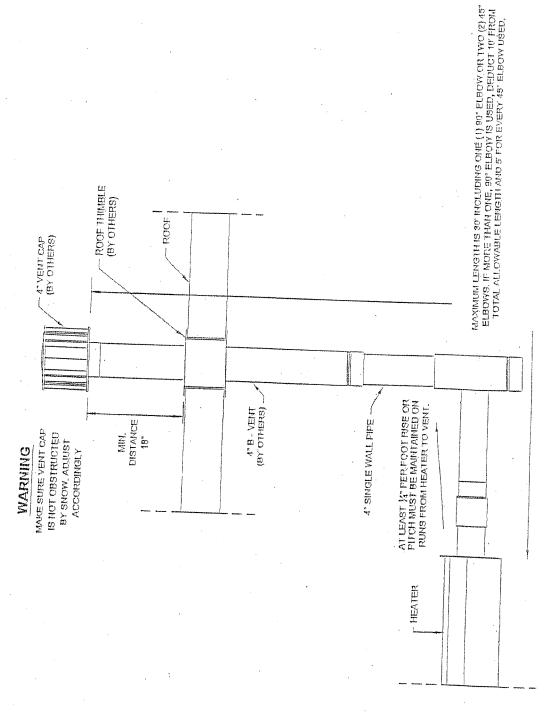


FIGURE #31, VERTICAL VENTING, SINGLE UNIT

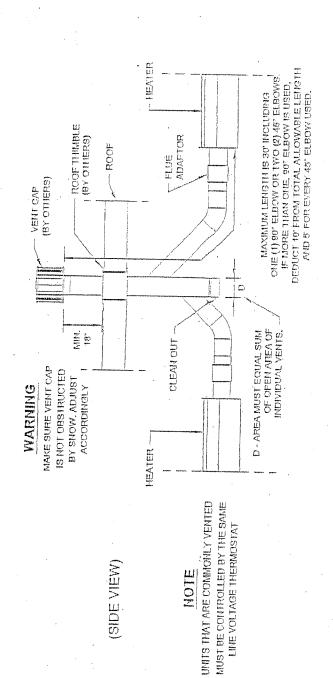


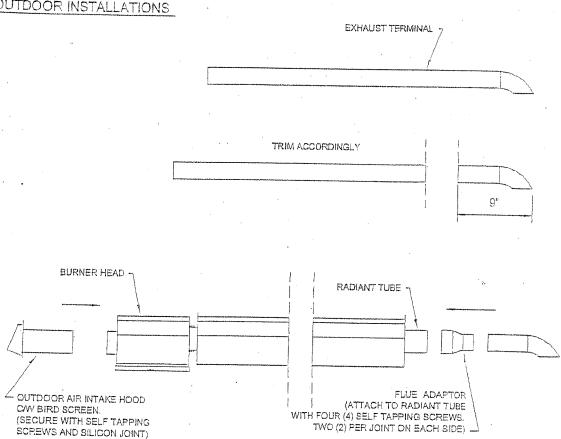
FIGURE #32, COMMON VERTICAL VENTING, TWO UNITS INTO CHE COMMON VENT

Units can be installed in outdoor locations.

Procedure:

- Attach Outdoor Air Intake Hood to air intake coliar located on end of burner box with three (3) screws. Apply silicone adhesive to seal joint.
- Attach vent cap to exhaust end of heater with two (2) screws. Trim excess length from vent cap prior to installing into adaptor.
- Electrical connections for outdoor locations must be made in accordance with CSA C22.1 CANADIAN ELECTRICAL CODE PART 1 as well as/or local codes, conditions and authorities. In the USA, refer to NATIONAL ELECTRIC CODE ANSI/NFPA 70 1987 or most current edition.
- Gas connection is to be via an approved stainless steel gas flex. Refer to CAN/CGA B149-M86.1 INSTALLATION CODES and/or local codes, conditions and authorities. In the USA, refer to ANSI Z 223. 1/NFPA 54 NATIONAL FUEL GAS CODE or current edition.

OUTDOOR INSTALLATIONS



GAS PIPING



All gas work MUST be performed by qualified/licensed personnel with adequate training and experience in this field.



Use only the type of gas for which the heater is equipped. Using the wrong gas could create a hazard, resulting in damage, personal injury or death.

Refer to CAN/CGA-B149.1INSTALLATION CODES and/or local codes, conditions and authorities. In the USA refer to ANSI Z 223.1/NFPA 54, National Fuel Gas Code current edition.

- a) Adequate supply of gas to the heater is required for it to produce the designed amount of heat output. The gas meter must have a large enough capacity to handle the extra consumption required by the heater.
- b) The gas line must be of an adequate size to deliver the necessary amount of fuel to the unit.
- c) If there is any question concerning a) or b) call your local gas company for further assistance.
- d) Make sure that all piping is supported properly.
- e) All connections must have special sealing compound applied to them.
- f) A drip leg must be installed before the heater to prevent contaminating matter interfering with the operation of the unit.
- g) Check piping for leaks via pressure test. Install a 1/8-inch N.P.T. plugged tapping immediately ahead of heater in gas supply. Use this location for test gauge. A soap and water test can be used to verify location of any possible leak.



Do not use an open flame for testing!



The heater and it's individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing for that system at test pressures in excess of $\frac{1}{2}$ psig.

The heater must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ psig.

Refer to pages 38 & 39 for gas connection to heater.

THE HEATER CAN BE CONNECTED TO THE GAS PIPING SYSTEM ONE OF THE FOLLOWING TWO (2) METHODS.

#1 HARD PIPE

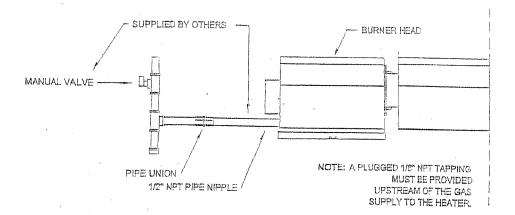
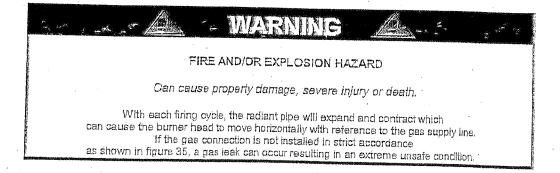
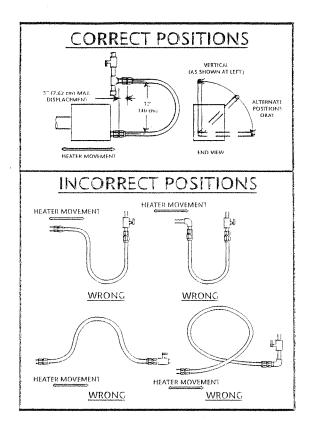


FIGURE #34, HARD PIPE GAS CONNECTION

#2 FLEX CONNECTOR

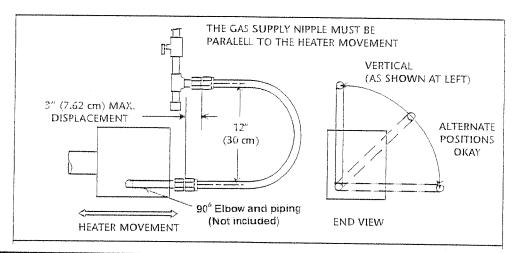


" Certified connectors are recommended to be installed as shown, (figure 35 page 39) in one plane, and without sharp bends, kinks, or twists. The gas take off must be parallel to the burner gas inlet connection." (CSA)



Installation Position Instructions

Connector Installation



WARNING

CONNECTOR MUST BE INSTALLED AS PER THE CONFIGERATION ILLUSTRATED ABOVE. USE ONLY THE 36" LONG CONNECTOR OF 1/2" NOMINAL ID FOR LENGTHS FROM 10' TO 70' AND A 36" LONG CONNECTOR OF 3/4" NOMINAL ID FOR LENGTHS GREATER THAN 70'.

IN CANADA: "A radiant tube-type infrared heater shall only be connected with a Type 1 hose connector that is (a) certified as being in compliance with the Standard for Elastomeric Composite Hose and Hose couplings for Conducting Propane and Natural Gas, CAN/CGA 8.1 and (b) of a length of 36 +/- 6" (90 +/- 15 cm)."

IN USA: Flexible Metallic connectors must be certified for use on a radiant tube-type infrared heater as per the Standard for Connectors for Gas Appliances, ANSI Z21.24/CSA 6.10.

Connector is available from manufacturer.

CHECKING GAS INPUT RATE



Natural gas heating values can vary widely. It is the responsibility of the installer to make sure that the input rate to the heater as installed does not exceed the nameplate rating of the heater. Failure to do so can cause radiant tube failure, resulting in injury or death.

The maximum BTUH input capacity for each model is shown on the heater's rating plate and in the specification table. This input must not be exceeded.

The input shown may be used in geographic areas where the elevation is from 0 to 4,500 feet above sea level (Canada only). In accordance with CGA 2.17, no change required to main burner orifice. In the U.S.: For installations above 2000 feet (610m), the appliance shall be derated 4 percent for each 1000 feet (305m) of elevation above sea level. The BTU input depends on the calorific heating value of the gas, orifice size, and manifold pressure. Orifice sizes are based on gas values of 1000 BTU/cu.ft. for natural gas and 2500 BTU/cu.ft. for LP (propane) gas.

🔼 warning 🙎

NEVER ATTEMPT TO MODIFY THIS HEATER – FIRE, EXPLOSION, OR ASPHYXIATION MAY RESULT. If malfunction is apparent, contact qualified service agency and/or gas utility for assistance.

How to Determine Gas Input Rate:

Where gas is metered, the input rate may be determined by the following method, Contact the gas supplier, public utility company or LP (propane) gas distributor to obtain the calorific gas value of the gas being used. When checking the gas input rate, any other gas burning appliances connected to the same meter must be completely off. The heater should be allowed to operate for 5 minutes before attempting to check the gas input rate.

To check flow rate, observe the one cubic fool dial on the gas meter and determine the number of seconds required for the dial hand to complete one revolution (seconds to flow one cubic foot).

To determine the number of seconds per cubic foot that is necessary to achieve the correct input rate, use the following formula:

GAS VALUE X 3600 / DESIRED INPUT = SECONDS NEEDED

Example: 1000 BTU gas, heater input 100,000 BTUH

Seconds for one cubic foot = 1000 X 3600 / 100,000 = 36 seconds

If when clocking the meter, the one cubic foot dial makes a complete revolution in less time than was calculated that it should be derated. It if takes more time for the meter to make one revolution than was calculated, the unit is underfired.

The orifice size must be changed to correct an overfired or underfired condition. If it is determined that different orifices are needed, please contact your distributor for assistance in selecting the correct replacement.

ELECTRICAL CONNECTION

Refer to rating plate on heater for electrical specificætions. All electrical connections must be made by a qualified/licensed experienced electrician.

Supply adequate electricity to a three prong electrical junction box located to within 12 inches of the air intake end of the burner box.

WARNING: DO NOT operate heater until it has been thoroughly installed, inspected and is ready for initial fire-up.

NOTE: All connections and wiring must be made in a coordance with CSA C22.1 CANADIAN ELECTRICAL CODE PART 1 as well as/or local codes, conditions and authorities. Refer to wiring diagrams on pages 43 & 44. In the USA refer to NATIONAL ELECTRIC CODE ANSI/NFPA 70 - 1987 or most current edition.

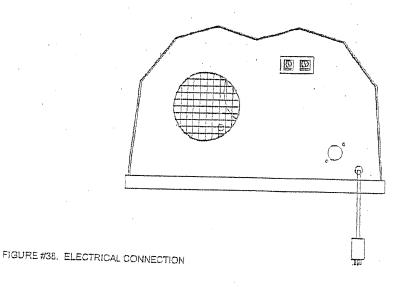
NOTE: Original wire is to be replaced with same type and size or equivalent.

The heater, when installed must be electrically grounded in accordance with local codes or, in the absence of local codes, with ANSI/NFPA 70.

DO NOT use an extension cord as the electrical source for the heater.

This heater is equipped with a three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptable. Do not out or remove the grounding prong from this plug.

ELECTRICAL CONNECTION BURNER HEAD

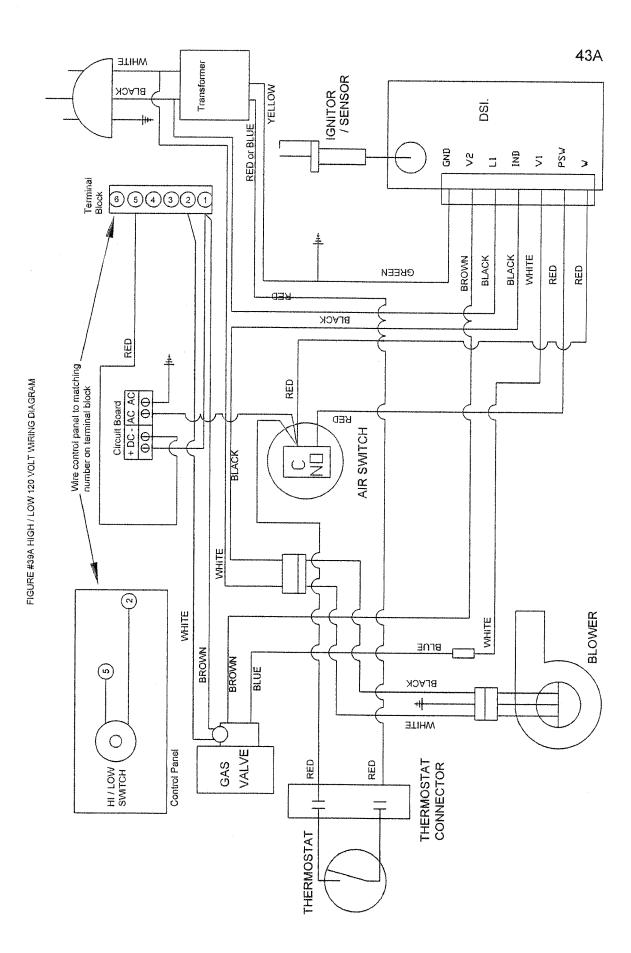


SUNRAY WIRING DIAGRAM

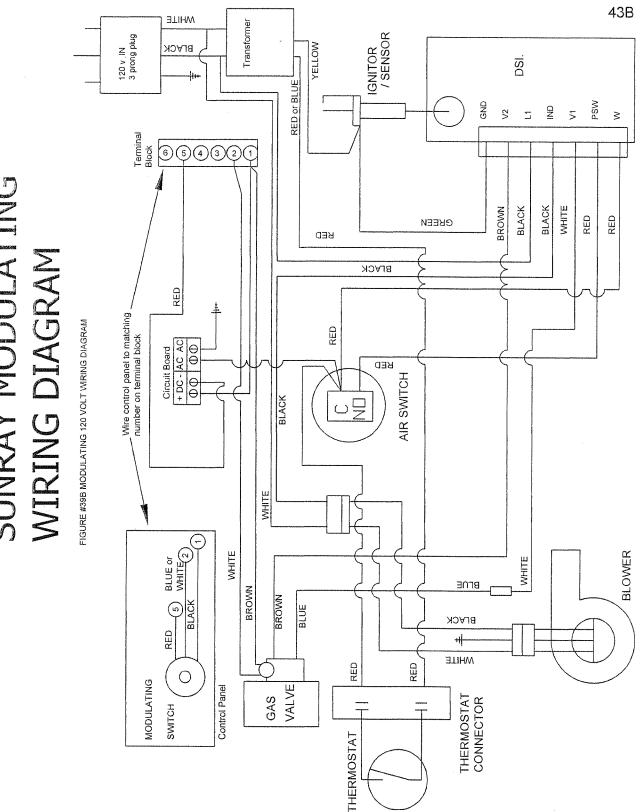
FIGURE #39 SINGLE INPUT 120 VOLT WIRING DIAGRAM

IGNITOR / SENSOR FENWAL TRITON TRANSFORMER DSI. IND MSd GND ۲ ا 5 Ξ WHITE **LEFFOM** BLACK BLACK BLACK WHITE CBEEN BROWN RED **AIR SWITCH** WHITE BLACK $\cup \mathbb{Z}$ BLOWER GREEN BROWN WHITE BLACK GREEN WHITE VALVE GAS THERMOSTAT CONNECTOR RED RED GREEN BLACK THERMOSTAT 12 _

SUNRAY HI/LOW WIRING DIAGRAM



SUNRAY MODULATING



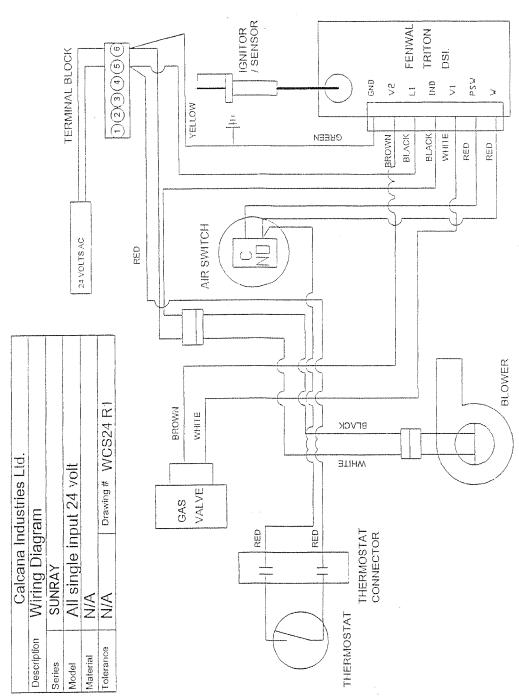


FIGURE #40 SINGLE INPUT 24 VOLT WIRING DIAGRAM

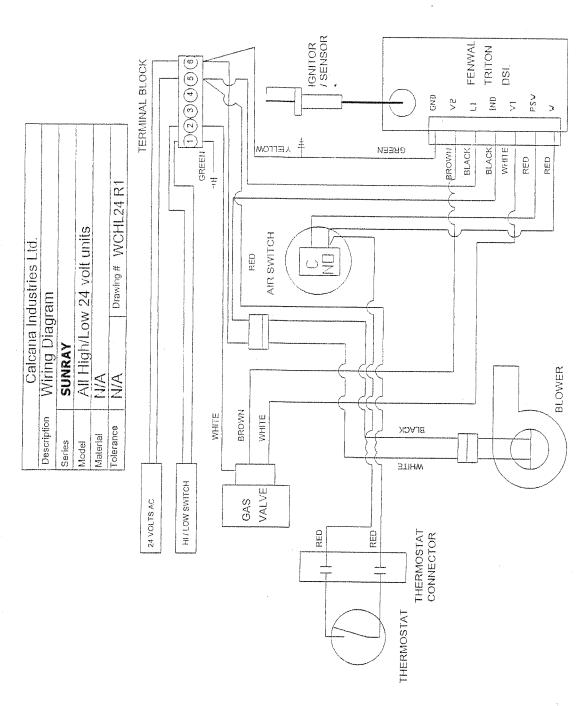
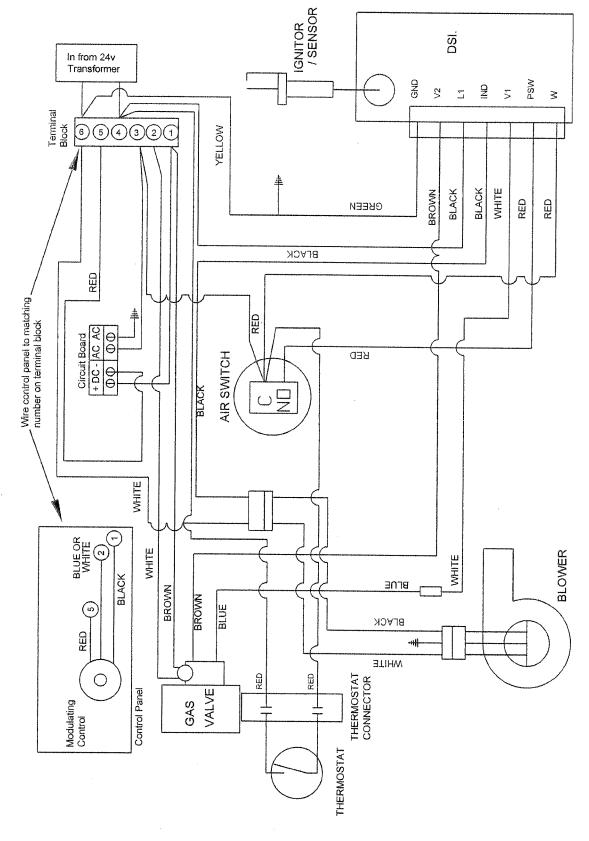


FIGURE #40A HI/LO 24 VOLT WIRING DIAGRAM

SUNRAY SS 24v MODULATING WIRING DIAGRAM

FIGURE #40B MODULATING 24 VOLT WIRING DIAGRAM

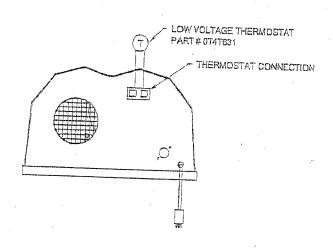


THERMOSTATS

LOW VOLTAGE (SINGLE HEATER) (for wiring diagram, refer to pages 43 & 44)

DO NOT use thermostats that have heat anticipators in them. The heat anticipators will cause the unit to cycle unnecessarily reducing its heating capacity, which can cause incomplete combustion and the combustion by products to condensate. A low voltage thermostat as described above can be purchased from the manufacturer of this heater.

- a) Locate thermostat in a convenient location away from drafts.
- b) Mount thermostat to wall with hardware supplied.
- c) Attach low voltage wire to connector block on heater.
- d) Run wire from unit to thermostat securing wire to joists or study along the way.
- e) Trim excess wire and attach to thermostal accordingly.



THERMOSTATS - CONTINUED

LINE VOLTAGE (TWO OR MORE HEATERS), If two or more heaters are to be controlled by one common thermostat, proceed as follows: (for wiring diagram, refer to pages 43 & 44)

- a) Provide a common switched line voltage circuit to heaters controlled by a line voltage thermostat.
- b) Connect a short piece of wire between the two low voltage thermostat connections to close low voltage circult.

Recommended line voltage thermostats are as follows:

Honeywell (or equivalent): - T631

- T4098A

- T410A

A line voltage thermostat can also be purchased from the manufacturer of this heater.

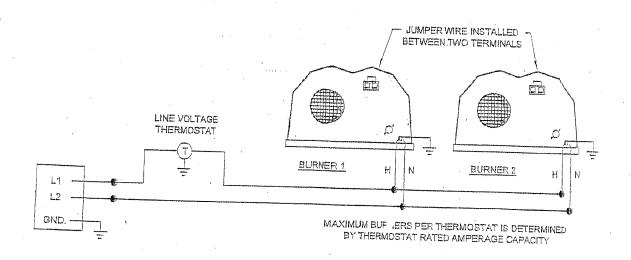


FIGURE #42, LINE VOLTAGE THERMOSTAT WIRING





DO NOT ATTEMPT TO IGNITE HEATER BY HAND

IMPORTANT NOTICE: This heater is not to be used as a construction heater to supply heat to an unfinished building during the finishing phases of construction. This practice exposes the unit to an abnormally corrosive atmosphere from sources such as paint, varnish and adhesives, which can lead to premature radiant tube exchanger or vent failure. The practice also allows foreign materials such as sawdust or sheet rock-dust to enter the combustion blower, burner, heat exchanger and vent system, resulting in shorter life of the unit.

Use of the heater as a construction heater will void the warranty.

Procedure:

Make sure gas is turned on.

- Check for any possible blockages in combustion air intake and exhaust areas of b)
- Make sure that venting material is properly fastened to the unit. c)
- Make sure all options are attached securely.
- e) Make sure electricity is on to unit.
- Turn thermostat up past room temperature. f)
- Check the flame port to see flame has established.
- If flame is not established, turn the thermostat down for 5 seconds then turn back up or interrupt electrical supply to unit for 5 seconds, and allow unit to try again.
- Verify that the manifold pressure (outlet pressure tap) on the gas valve is the same pressure as stated on the rating plate of the unit. Use a manometer that measures inches of water column for this procedure. If adjustment is required, remove the capscrew from the pressure regulator housing. Adjust the white pressure regulator adjusting screw clockwise (in) to increase pressure, counterclockwise (out) to reduce pressure. Replace capscrew. After measurement has been taken, replace pipe plug in outlet pressure tap. Check for leaks. (see pages 3, 4 & 48)
- Verify gas input rate. (see page 40)

NOTE: Oil smoke might appear off of exchanger tube after it heats up initial firing. Do not be alarmed. The smoke is just a small amount of oil on the surface of the tube from manufacturing. If smoke is excessive, open door and 'air out' the building until smoke is removed.

NOTE: Heater will have higher heat output by the burner head as compared to the exhaust end. This is normal.

NOTE: A small amount of condensation may occur from the heater when it starts the heating cycle. The condensation will stop once the heater warms up. Make sure venting is sealed.

.

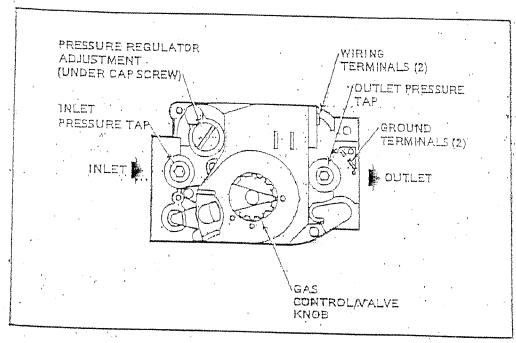
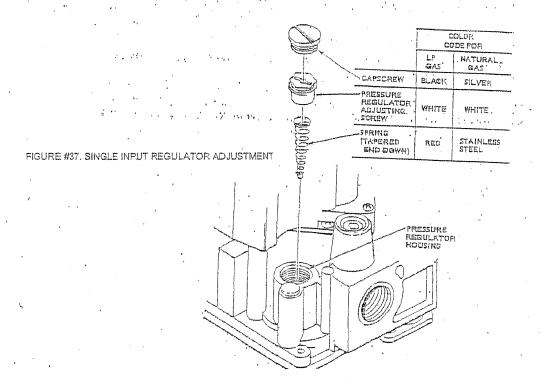


FIGURE #36. SINGLE INPUT GAS VALVE



Check and Adjust Gas input and Burner Ignition

IMPORTANT

- Do not exceed input rating stamped on appliance nameplate, or manufacturer recommended numer orifice pressure for size orifice(s) used.
- IF CHECKING GAS INPUT BY CLOCKING GAS METER: Make certain there is no gas flow through the meter other than to the appliance being checked. Other appliances must remain off with the pilots extinguished (or deduct the consumption from the meter reading). Converl flow rate to Btuh and compare to Btun input rating on appliance namepiate.
- 3. IF CHECKING GAS INPUT WITH MANOMETER: Make sure the gas control knob or the ignition control switch is in the OFF position before removing outlet pressure tap plug to connect manometer (pressure gauge). Also move the gas control knob or the ignition system control switch to the OFF position when removing the gauge and replacing the plug, shut off the gas supply at the manual valve in the gas piping to the appliance or, for LP, at the tank. Also shut off the gas supply before disconnecting the manometer and replacing the plug. Repeat the Gas Leak Test at the plug with the main burner operating.

NOTE: Check the inlet pressure before adjusting the pressure regulator,

Two-stage regulator models require that you check and adjust both high and low pressure regulator settings.

Two-stage appliance operating sequences vary, consult the appliance manufacturer instructions for the specific operating sequence and regulator adjustment procedures for the appliance in which the centrol is installed: The regulator adjustment instruction is as follows:

- 1. Turn ON/OFF switch to ON. Set HI/LO switch to HI
- 2. Carefully check the main burner lightoff. Make sure that the main burner lights smoothly and that all parts remain !!!
- ports remain III.

 Walt for control to move to high pressure (second stage) and then check the full rate manifold pressure listed on the appliance nameplate for high pressure. The gas control full rate outlet pressure should match this rating.
- 4. With main burner operating, check the gas control flow rate using the meter clocking method or check pressure using a manometer connected to the outlet pressure tap on the control.

- If necessary, adjust the high pressure regulator to match the appliance rating.
 - a. Remove the pressure regulator adjustment cap
 - b. Using a screwdriver, turn the inner adjustment screw for FII pressure clockwise to increase or counterclockwise to decrease the gas pressure to the burner.
- 6. After high pressure is checked, check low pressure Regulation by setting HI/LO switch to LO
- Check the low rate manifold pressure listed on the appliance nameplate. Gas control low rate guillet pressure should match this rating.
- With mein burner operating, check the control flow rate as before (using the meter clocking method or check pressure using a manameter connected to the autiat pressure tap on the control).
- If necessary, adjust the low pressure regulator to match the appliance rating.
 - a. Remove the pressure regulator adjustment cap

Using a screwdriver, turn the inner adjustment screw for LO pressure clockwise to decrease the gas pressure to the burner.

10. Once high and low pressure have been checked and adjusted, replace pressure regulator adjustment cap. If the däsired outlet pressure or flow rate cannot be achieved by adjusting the gas control, check the gas control inlet pressure using a manometer at the inlet pressure is in the nominal range (see rating plate) replace the gas control. Otherwise, take the necessary steps to provide proper gas pressure to the control.

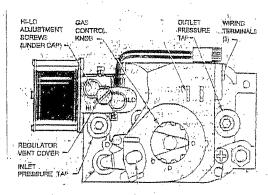


FIGURE #36A. HI/LO GAS VALVE

SETTING MANIFOLD PRESSURE

Setting the modulator

Caution Always set Min first since

Setting Min

from modulator

Caution

Max is adjusted simultaneously!

A Remove electrical connection 18

Caution Do not use ball head tools with a 3 mm shaft. Otherwise Min

B Set small load, setting screw 15

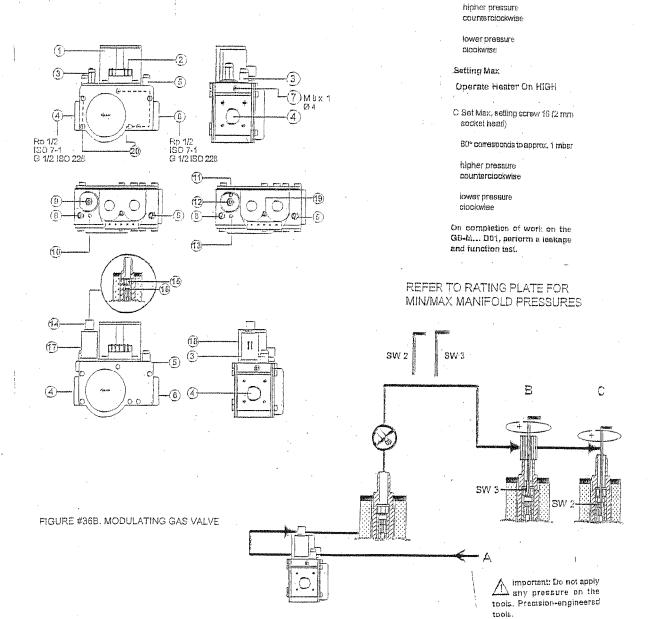
is adjusted simultaneously!

(use 3 mm socket head);

VALVE DETAILS

- Solenolds V1 + V2
- Electrical connection V1/V2 Molex Serie 3000
- Servo governor
- Main gas outlet
- Test nipple p, Main gas inlet p, В
- Ignilion gas outlet
- 8
- Test nipple p₂ Setting screw for governor with
- Setting screw for governor war.
 SW 2 spocket head
 Setting screw for start gas volume or stotted screwdriver
 anty GB-GD...D01 and
- GB-N... D01
- Signal P_{al-}connection 12 only GB-GD...D01 and
- GB-N... D01 "Min" setting screw K (SW 2) 0-point offset

- 13 only GB-GD...D01 and GB-N... D01
 - "Max" setting screw V (SW 2) Ratio adjustment
- 14 GB-M ... D01 only Cover
- 15 GB-M... D01 only
- setting screw SW 3 Min
- 16 GB-M... D01 only setting screw SW 2 Max 17 GB-M... D01 pnly
- Modulator 18 GB-M... D01 only
- Modular power supply, Male connector AMP 6,3 x 0,8 mm
- 19 Scienald retaining screw
- 20 Side cover with screws



SEQUENCE OPERATION

DESCRIPTION OF 3-TRY DIRECT SPARK IGINITION SYSTEM:

The TRITON 2461D is a 24 VAC Microprocessor Based Direct Spark Ignition Control designed for use in all types of heating applications such as gas furnaces, boilers, water heaters and other similar appliances. The control utilizes a microprocessor to continually and safely monitor, analyze and control the proper operation of the gas burner. Value added features such as combustion blower control, LED diagnostics, automatic one hour reset, and flame current test pins highlight the controls benefits.

OPERATION:

POWER UP / STANDBY

Upon applying power (24 volts) to 24 VAC/R, the control will reset, perform a self
check routine; initiate fulltime flame sensing, flash the diagnostic LED for up to four
seconds, and enter the thermostal scan state.

HEAT MODE.

- When a call for heat is received from the thermostat supplying 24 volts to TH/W, the
 control will check the pressure switch for normally open contacts. The combustion
 blower is then energized and once the pressure switch contacts close, a pre-purge
 delay begins. Following the pre-purge period the gas valve is energized and sparks
 commence for the trial for ignition period.
- When flame is detected during the trial for ignition, sparks are shut off immediately and the gas valve and combustion blower remains energized. The thermostat, pressure switch, and main burner flame are constantly monitored to assure the system continues to operate properly. When the thermostat is satisfied and the demand for heat ends, the main valve is de-energized immediately, the control senses the loss of flame signal and de-energizes the combustion blower.

FLAME FAILURE - RE-IGNITION

If the established flame signal is lost while the burner is operating, the control will respond within 0.8 seconds. The HV spark will be energized for a trial for ignition period in an attempt to re-light the burner. If the burner does not light the control will make two more attempts to re-light the burner. If the burner does not re-light, the control will go into lockout and flash the LED 3-times. If flame is re-established, normal operation resumes.

TROUBLESHOOTING

NO POWER TO HEATER...

CAUTION: Prior to performing any service or maintenance work on the unit:

- a) disconnect the electrical supply
- b) shut off gas to supply unit
- c) make sure unit has cooled down before opening service panel

WARNING:

Only allow qualified, licensed, service people trained to service gas fired heating equipment to perform any repairs on this unit. All replacement parts MUST originate from the manufacturer of this heater in order not to void CGA/AGA certification.

Safety devices are not allowed to be rendered inoperative and left unattended. Failure to do any of the above can cause property damage, injury or death.

INITIAL ELECTRICAL CHECKS

- a) Make sure thermostat is calling for heat.
- b) Make sure electrical connection is secure.
- c) Check electrical supply for blown fuse or breaker.
- d) Test for power to burner head.
- e) Check wiring to components. Refer to wiring diagram on pages 62 &
 63. Also refer to legend below. This legend is located on the control module.

TERMINAL DESIGNATIONS

	1 m (11) (1 m m m m (14) (1 m (14) (1 m m m m m m m m m m m m m m m m m m
S1	NOT USED
GND	SYSTEM GROUND (GREEN)
V2**	VALVE GROUND (BROWN)
R	NOT USED
L1 .	120/240 VAC INPUT (HOT) (BLACK)
IND	INDUCER BLOWER OUTPUT (BLACK)
V1 .	VALVE POWER (WHITE)
PSW	PRESSURE SWITCH INPUT (RED)
W ·	THERMOSTAT INPUT (RED)

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. A functional checkout of a replacement control is recommended.

INITIAL GAS CHECKS

- a) Make sure manual valve is turned on:
- b) Make sure gas valve knob is turned on.
- c) Check for gas supply and proper pressure to valve.
- d) Check wires and make sure that they and their connections are in good condition.
- e) Check for power to valve.
- f) If no power, check control board. (see page 71)

ELECTRICITY AND GAS TO HEATER, BUT STILL IS INOPERATIVE

If after confirming that adequate gas and electricity are present and unit still does not operate, review the symptoms below. After the symptom has been identified, refer to the corresponding cause/cure. Review CHECK CONTROL BOARD section, and finalize troubleshooting procedure.

Symptom	Gause/Cure
1. Dead	A) Miswired
	B) Transformer bad
	C) Fuse/circuit breaker bad
V***	 D) Bad control (check LED for steady
2. Thermostat on – No Blower Output	on)
- Mermestat off - No Blower Output	A) Miswired (check PSW termina)
	voltage)
	B) Bad thermostat - no voltage @
· · · · · · · · · · · · · · · · · · ·	terminal W
	C) Bad control (check LED for steady
	on)
B. Pressure Switch, input okay but no Trial	A) Miswired (check PSW terminal)
for Ignition after purge delay	voltage)
	B) Flame sense problem (existing
•	flame-check LED-2 flashes)
	C) Bad control (check voltage between
	L1 & IND)
. Valve on, no spark	A) Shorted electrode
	B) Open HV cable
	C) Bad control
Spark on, no valve	
	A) Valve coil open
	B) Open valve wire
	C) Bad control (check voltage between
Flame okay during TFI, no flame sense	V1 &·V2) ·
(after TFI)	A) Bad electrode
	B) Bad S1 or HV wire
	C) Poor ground at burner
	D) Poor flame (check flame current)

NOTE: TFI = Trial For Ignition

CHECK CONTROL BOARD

Open access door and view the diagnostic red LED, located on the grey direct spark ignition module.

FAULT CONDITIONS

Error Mode	LED indication
Internal Control Failure	Steady On
Air Flow Fault	1 flash
Flame with No Call for Heat	2 flashes
Ignition Lock Out	3 flashes

The LED will flash on for $\frac{1}{2}$ second, then off for $\frac{1}{2}$ second during a fault condition. The pause between fault codes is 3-seconds.

INTERNAL CONTROL FAULT

If power supply cycle are fluctuating beyond 50/60 cycles such as with an
unstabilized power supply from a generator, unit will not operate. If the circuit board
is faulty the unit will not operate.

AIRFLOW FAULT - LOCK OUT (Combustion Air Flow Problems)

- Combustion airflow is continually monitored during an ignition sequence by the airflow switch (PSW). If during the initial call for heat the pressure switch contacts are in the closed position for 30-seconds without an output to the Combustion Blower, an airflow fault will be declared and the control will remain in this mode with the combustion blower off.
- If the airflow switch remains open for more than 30-seconds after the combustion blower output (L1 & IND) is energized, an airflow fault will be declared and the control will stay in this mode with the combustion blower off.
- If the airflow signal is lost while the burner is firing, the control will immediately deenergize the gas valve and the combustion blower will remain on. If the call for heat remains, the control will wait for proper airflow to return. If proper airflow air is not detected after 30-seconds an airflow fault signal will be declared.

Proceed as follows to verify reason for airflow lockout:

- 1. Check air intake and exhaust for blockage. Remove any blockage.
- 2. Check combustion air blower for dirt. Clean and/or replace as necessary.
- 3. If there is no blockage, disconnect fresh air intake at burner head (if equipped). Retry for ignition. If unit does ignite, check to verify that duct size to unit is of proper size and length and that there is no blockage (refer to 'OPTIONAL COMBUSTION AIR' on page 46). Replace ducting as necessary to reduce amount of air restriction to unit.

- 4. If unit still does not ignite, disconnect exhaust vent at heater and retry for ignition. If unit does ignite, check to verify that vent size to unit is of proper size and length and that there is no blockage. (Refer to VENTING on page 49). Replace venting as necessary to reduce amount of restriction.
- 5. If after 2, 3 and 4 are performed and unit still does not operate, replace air switch.
- 6. Reconnect venting and ducting, verify operation of unit.

FLAME WITH NO CALL FOR HEAT (Flame Fault)

If at anytime the main valve falls to close completely and maintains a flame, the full
time flame sense circuit will detect it and energize the combustion blower. Should
the main valve later close off completely removing the flame signal, the combustion
blower will power off.

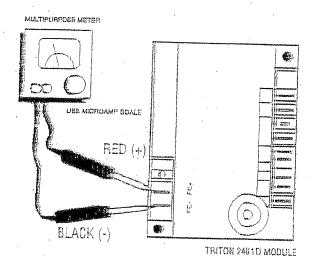
IGNITION LOCK OUT (Failure to Light)

- FENWAL DSI Module will attempt three ignition trials before going into lockout. The
 valve relay will be de-energized immediately, and the combustion blower will be
 turned off.
- Recovery from lockout requires a manual reset by either resetting the thermostat or removing 24 volts, or removing the electrical power supply for a period of 5-seconds.
- If the thermostat is still calling for heat after one hour, the control will automatically reset and attempt to ignite the burner again.

If units still does not operate, proceed as follows:

- Check flame sensor current. (see below)
- · Check electrode for cracks and proper location. (see page 73)

FLAME SENSOR GURRENT CHECK



SERVICE CHECKS

Flame current is the current which passes through the flame from the sensor to the ground. The minimum flame current necessary to keep the system from lockout is .7 microamps. To measure flame current, connect an enalog DC microammeter to the FC- FC+ terminals-per figure. Meter should read .7 uA or higher. If meter reads below "0" on scale, meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.

PROPER ELECTRODE LOCATION

Proper location of the electrode assembly is important for optimum system performance. The electrode assembly should be located so that the tips are inside the flame envelope about $\frac{3}{4}$ to 1 inch.

CAUTIONS

- 1. Ceramic insulators should not be in or close to the flame
- Electrode assemblies should not be adjusted or disassembled. Electrodes should nave a gap spacing of .125" (3.175mm). If this spacing is not correct, the assembly must be replaced. Electrodes are NOT field adjustable.
- 3. Exceeding the temperature limits can cause nuisance lockouts and premature electrode failure.

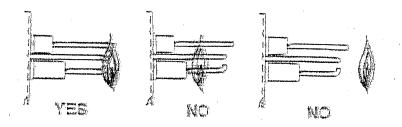


FIGURE #44, PROPER ELECTRODE LOCATION

MAINTENANCE

Maintenance is required once a year. Annually inspect your heater, before the heating season starts. If unit is in a dusty environment, maintenance will be required more often. If dust conditions are extreme, monthly or weekly maintenance may be required.



WARNING



Disconnect electrical supply to heater and shut off gas prior to inspection.

- A) Check combustion air intake for blockage.
- B) Check vent terminal and/or roof terminal for blockage. Remove as necessary for cleanliness and reinstall. Check for cracks or holes. Replace as necessary.
- C) Open service door.
- D) Check blower motor and scroll for dirt and/or locked rotor. Remove dirt with compressed air or vacuum cleaner. If rotor is locked, replace assembly.
- E) If burner needs cleaning, remove burner head from tube and use a combination of compressed air and/or a wire brush to remove any deposits or debris that may be on the actual burner.
- F) Make sure all wiring is intact and in good condition.
- G) Check electrode for proper gap and cleanliness. Clean or replace as necessary.
- H) Check ignition system for spark. Replace as necessary.
- Check exchanger tube for holes and/or cracks, dirt and/or deposits. Clean and/or replace as necessary.
- J) Wash any dirt or dust off of the unit with a soap and water solution.
- K) Check any gas connections that were disconnected during maintenance for leaks. Use soap and water solution. DO NOT USE FLAME.
- L) Test fire unit by setting thermostat above room temperature. Make sure unit is operating quietly and efficiently.
- M) Periodically visually check burner through view port to confirm proper operation.
- N) Check all couplers for tightness and/or leakage.



WARN NE



Only allow qualified/licensed service people, trained to service gas fired heating equipment, to perform any repairs on this unit. All replacement parts MUST originate from the manufacturer of this heater in order not to void CGA/AGA certification. Safety devices are not allowed to be rendered inoperative.



MARNINE



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.

The heater area must be kept clear and free from combustible materials, gasoline and other flammable vapors and liquids.

The flow of combustion and ventilation air to heater must not be obstructed.

(Refer to page 58 for part numbers & description)

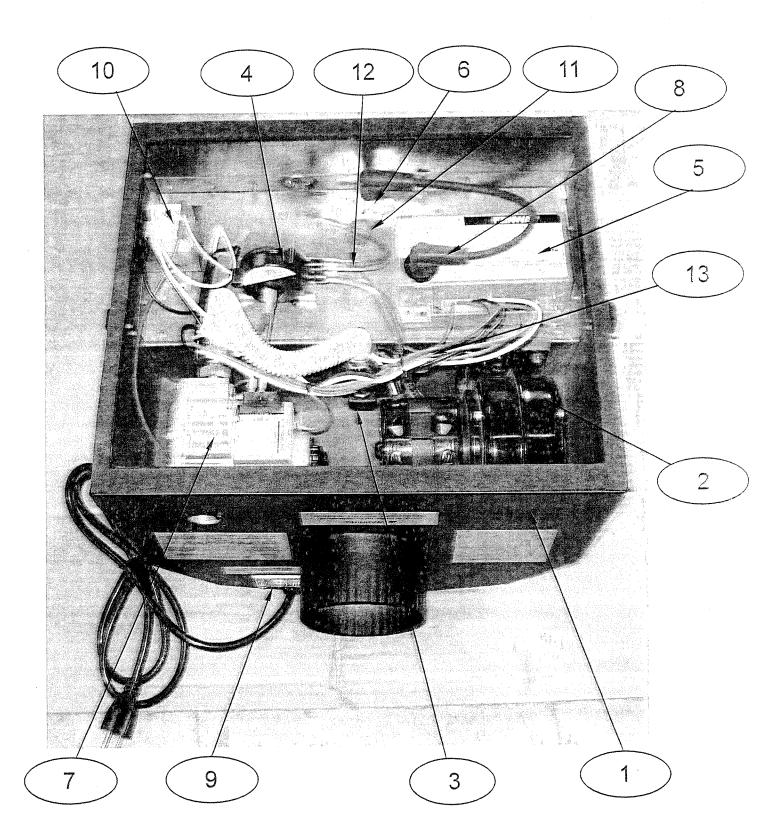


FIGURE #45 BURNER HEAD PARTS

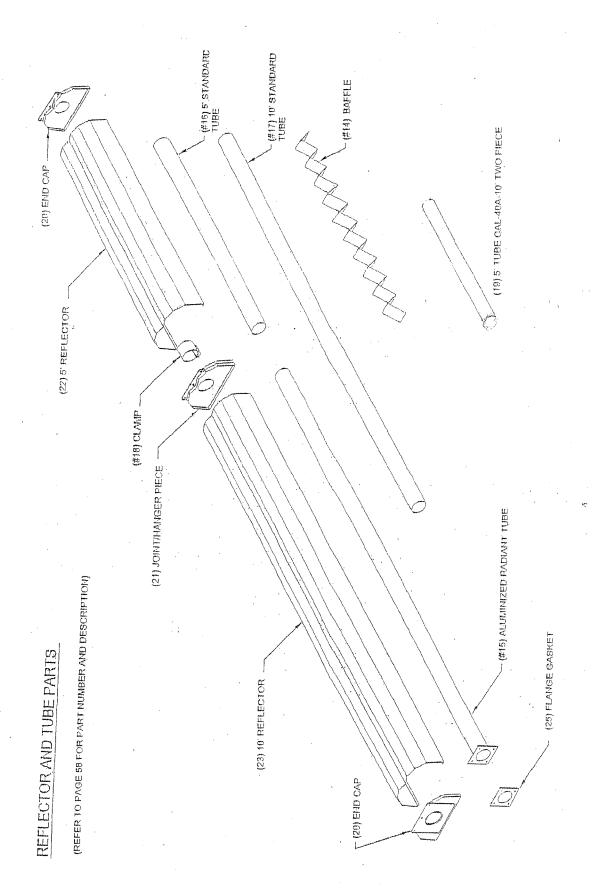


FIGURE #46, REFLECTOR AND TUBE PARTS

Parts List

See page 56 & 57 for visual detail

REPLACEMENT BURNER HEADS

ITEM#	PIN	MODEL	INPUT	FUEL	LENGTH	WEIGHT
						(LBS)
	N X 1000 15 1000 1000 1000 1000 1000 1000					

STANDARD Output Burner Head Only - NG & LPG, includes Thermostat

1	6120175	SUNR-40A	40,000	NG	10'	36
1	5120177	SUNR-50A	50,000	NG	15'	36
1	6120179	SUNR-75A	75,000	NG	20'	36
1	6120176	SUNR-40A	40,000	LPG	10'	36
1	6120178	SUNR-50A	50,000	LPG	15'	36
1	6120180	SUNR-75A	75,000	LPG	20'	36

HIGH/LOW Burner Head Only - NG & LPG includes Thermostat & HL control

1	SUNR-40A HL	40,000 - 20,000	NG	10'	36
1	SUNR-50A HL	50,000 - 25,000	NG	15'	36
1	SUNR-75A HL	75,000 - 37,500	NG	20'	36
1	SUNR-40A HL	20,000 - 40,000	LPG	10'	36
1	SUNR-50A HL	25,000 - 50,000	LPG	15'	36
1	SUNR-75A HL	37,500 - 75,000	LPG	20'	36

MODULATING Burner Head Only - NG & LPG includes Thermostat & Modulating control

1	SUNR-40A M	40,000 - 20,000	NG	10'	36
1	SUNR-50A M	50,000 - 25,000	NG	15'	36
1	SUNR-75A M	75,000 - 37,500	NG	20'	36
1	SUNR-40A M	20,000 - 40,000	LPG	10'	36
1	SUNR-50A M	25,000 - 50,000	LPG	15'	36
1	SUNR-75A M	37,500 - 75,000	LPG	20'	36

Parts List

		BURNER HEAD COMPONENTS	
ITEM#	PIN	DESCRIPTION	WEIGHT (lbs)
2	3010001	Blower Motor Assembly	**
2	3010003	Blower Motor Assembly Cal SS	**
3	3090079	Burner Assembly	**
4	3070417	Air Switch 40,000 BTU	**
4	3070418	Air Switch 50,000 BTU	**
4	3070419	Air Switch 75,000 BTU	**
5	3030613	Direct Spark Ignition Module (Fenwal)	**
6	3030633	Electrode Assembly	**
7	3020005	Gas Valve LP	**
7	3020003	Gas Valve NG	**
7	3020006	Variable Gas Valve	**
8	3030026	High Voltage Ignition Wire	**
9	3070025	Thermostat Connector	**
10	3070016	Transformer	**
10	3070017	50 VA Transformer	**
11	3110022	View Port - Mica Window	**
12	5040374	Vinyl Hose for Differential Air Proving Switch	**
13	3070321	Wire Harness	**
	LX1000	DC Board	**
	542170	Knob	**
	RHS125	Rheostat	**
	90-0001	Toggle Switch	**
	5110903	Variable Controller	**
	3080026	Rubber Grommet	**
	TF12024	Outdoor Transformer 24 Volt	2
		TUBE COMPONENTS	
ITEM#	PIN	DESCRIPTION	WEIGHT (lbs)
14	5170743	7' Baffle Turbulator	7
14	5170742	7' Baffle Turbulator - 2 pcs	7
15	5170163	Tube Aluminized 4"x124" (complete with mounting flange)	30
16	5170171	Tube 4" x 5' Standard	5
17	3170169	Tube 4" x 10' Standard	28
18	3170201	Tube Clamp	**
		REFLECTOR COMPONENTS	
20	5190139	End Cap	**
21	5190137	Hanger / Joint Piece	**
22	5180163	Reflector 5'	**
23	5180164	Reflector 10'	**
25	5080319	Flange Gasket	**

Non-Transferable Limited Warranty Calcana Garage Heaters – Model "SUNRAY"

Calcana ("the Manufacture") warrants to the original owner at the original installation site that the Calcana model "SUNRAY" ("the Product") will be free from defects in material and workmanship for one (1) year from date of shipment from the factory. Calcana further warrants that the heat exchanger, reflectors, brackets, burner and burner box will be free from defects in material and workmanship for three (3) years from the date of shipment from the factory. If upon examination by the Manufacturer the Product is shown to have a defect in the material or workmanship during the warranty period, the Manufacturer will repair or replace, at its option, that part of the product which is shown to be defective. In no event shall the customer be entitled to consequential, indirect or special damages of any nature for defective merchandise, and in no instance may damages include loss of profit. Calcana reserves the right to inspect the system involved in any claim against the warranty. The warranty is null and void if any of the components installed are not original Calcana parts, or the installation does not conform to the supplied installation manual.

This limited warranty does not apply:

- a) if the Product has been subjected to misuse or neglect, has been accidentally or intentionally damaged, has not been installed, maintained or operated in accordance with the furnished written instructions, or has been altered or modified in any way by an unauthorized person.
- b) To any expenses, including labour or material, incurred during removal or reinstallations of the Product.
- c) To any damage due to corrosion by chemicals, including halogenated hysrocarbons precipitated in the air.
- d) To any workmanship of the Installer of the Product
- e) If system is not paid for in a timely manner and in accordance with payment terms
- f) If system or any part of it is damaged by any act of nature including, but not limited to; hurricanes, gales, tornadoes, wind snow, sleet, hail, rain, flood, fire or any other similar or dissimilar condition, or by normal wear and tear, which included marks and/or dents to

the reflector caused by improper transportation or installation.

- g) If system or any part of it is damaged by vandalism, improper use, accumulation of weight or heavy loads on the heater.
- If system is damaged due to lack of cleaning or maintenance, whether routine or otherwise.

The limited warranty is conditional upon;

- a) advising the installing contractor, who will in turn notify the distributor or manufacturer
- b) shipment to the Manufacturer of that part of the Product thought to be defective. Goods can only be returned with prior written approval of the Manufacturer. All returns must be freight prepaid.
- c) Determination in the reasonable opinion of the Manufacturer that there exists a defect in material or workmanship.

Repair or replacement of any part under the Limited Warranty shall not extend the duration of the warranty with respect to such repaired or replaced part beyond the stated warranty period.

This Limited Warranty is in lieu of all other warranties, either express or implied, and all such other warranties, including without limitation implied warranties or merchantability or fitness for a particular purpose, are hereby disclaimed and excluded from this limited warranty. The warranty cannot be transferred or assigned by the Customer. All disputes arising from this warranty are to be governed by the laws of the Province of Alberta and any action to enforce this warranty must be initiated in the Province of Alberta. In no event shall the manufacturer be liable in any way for any consequential, special, or incidental damages of any nature whatsoever, or for any amounts in excess of the selling price of the product or any parts thereof found to be defective. This limited warranty gives the original owner of the product specific legal rights. You may also have other rights which may vary by each jurisdiction.

CALCANA INDUSTRIES LTD. 5507 – 6th St SE Calgary, AB T2H 1L6 Canada Tel: 1-800-778-6729 Fax: 403-777-0807 www.calcana.com





Failure to follow these instructions will cause death, personal Injury or property damage. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment. Fire or Explosion Hazard

SAFETY INSTRUCTIONS READ BEFORE OPERATING

A. This heater does not have a pilot. It is equipped with an ignition device which automatically lights the burner. DO NOT ify to light the burner with a match.

B. BEFORE OPERATING, smell all around the heater area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle to the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to operate heater.
- Do not touch any electric switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to turn the gas valve handle. Never use tools. If the handle will not turn by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
 - D. Do not use this heater if any part had been under water, Inmediately call a qualified service technician to inspect the heater and to replace any part of the control system which has been under water.

OPERATING INSTRUCTIONS

- 1, STOP! Read the safety instructions on this label.
- Open the manual gas valve in the heater supply line.
- 3. Turn on electric power to the heater.
- 4. Set the thermostat to the desired setting.

5.This heater is equipped with an ignition device, which automatically lights the burner. Do not try to light the burner with a match.

6. If the heater will not operate, follow the instructions "To Turn Off Gas To Heater" and call your service technician or gas supplier.

TO TURN OFF THE GAS TO HEATER

- Set the thermostat to the lowest setting.
- . Turn off electric power to the heater if service is to be performed.
- 3. Turn off the manual gas valve in the heater supply
- 4. Walt 5 minutes before attempting to relight heater.