

VANTAGE

MODELS

CTH1-80 CTH1-100

CTH1-125 CTH1-150

INSTALLATION, OPERATION AND SERVICE INSTRUCTIONS

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.

Roberts

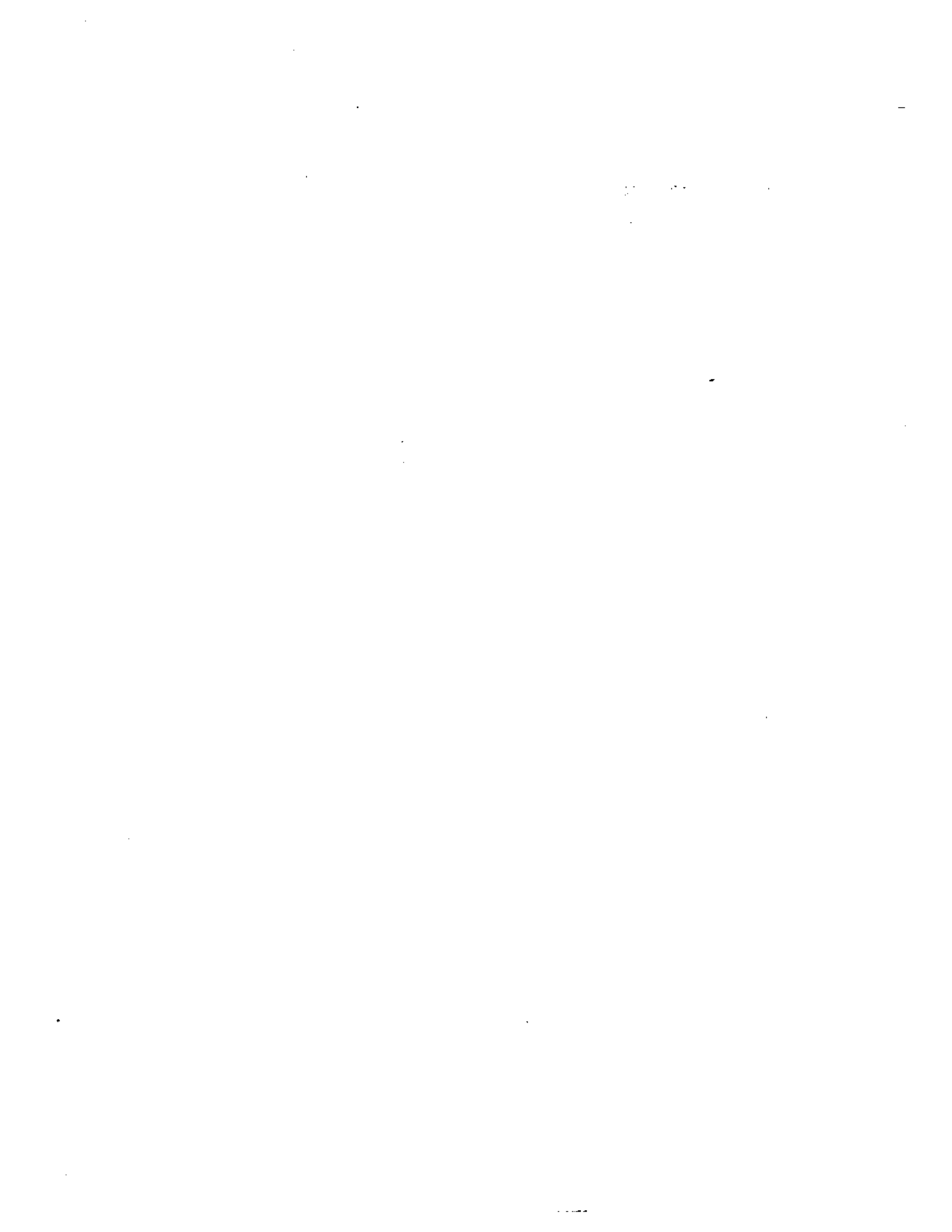


Gordon

**A LEADER IN HEATING EQUIPMENT
FOR OVER 50 YEARS**

INSTALLER — Please take time to read and understand these instructions prior to any installation.

OWNER — Keep this manual in a safe place to provide your serviceman with helpful information if the need arises.



VANTAGE™ SPECIFICATIONS INSTALLATION, OPERATING, SERVICE INSTRUCTIONS

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INTRODUCTION

UNPACKING THE HEATER

As material is being delivered, check shipment against Bill of Lading for shortages. Also check for external damage to cartons. Shortages and/or external damage to cartons (see Standard Parts List, page 2) must be noted on the Bill of Lading in the presence of the delivery trucker. The delivery trucker should acknowledge any shortages or damage by initialling this "noted" Bill of Lading.

Claims for damaged material, or shortages that were not evident upon receipt of shipment must be reported to carrier and Roberts-Gordon Sales Representative as soon as they become known.

NOTE: Packing inside burner housing must be removed before installing heater.

IMPORTANT: This heater is designed for heating non-residential indoor spaces. These instructions, the layout drawing, local codes and ordinances, and applicable standards such as apply to gas piping, electrical wiring, venting, etc., must be thoroughly understood before proceeding with the installation.

NATIONAL STANDARDS AND APPLICABLE CODES

Installation must comply with local codes and recommendations of the local gas company, and the National Fuel Gas Code, ANSI Z223.1-1988 (same as Bulletin 54).

Installation in (1) aircraft hangars must be in accordance with the Standard for Aircraft Hangars, ANSI/NFPA 409-1985 and (2) garages in accordance with the Standard for Parking Structures, NFPA 88A-1985 or the Standard for Repair Garages, NFPA 88B-1985.

ELECTRICAL GROUNDING

Burner units must be electrically grounded in accordance with the National Electrical Code, ANSI/NFPA 70-1987.

HAZARDOUS LOCATIONS

Where there is the possibility of exposure to combustible airborne materials or vapor, consult the local Fire Marshal, the fire insurance carrier or other authorities for approval of the proposed installation.

IMPORTANT

DO NOT USE IN AN ATMOSPHERE CONTAINING HALOGENATED HYDROCARBONS OR OTHER CORROSIVE CHEMICALS.

Some compounds in the air can be ingested into the equipment and cause an accelerated rate of corrosion of some of the parts of heating components. The use of such chemical compounds in or near the enclosure should be avoided where a longer life of the burner, tubing and other parts is desirable.

INSTALLER QUALIFICATIONS

All heaters and associated gas piping should be installed in accordance with applicable specifications and this installation made only by firms (or individuals) well qualified in this type of work. Consult local building inspectors, Fire Marshals or the local Roberts-Gordon Representative for guidance.

INSTALLER RESPONSIBILITY

VANTAGE™ heaters are installed on the basis of information given in a layout drawing, which together with these instructions and the cited codes and regulations, comprise the basic information needed to complete the installation. The installer must furnish all needed material that is not furnished as standard equipment, and it is his responsibility to see that such materials, as well as the installation methods he uses result in a job that is workmanlike and in compliance with all applicable codes.

Roberts-Gordon Factory Representatives have had training and experience in the application of this equipment and can be called on for suggestions about installation which can save material and labor.

GENERAL SPECIFICATIONS

General specifications for Vantage™ heaters are as follows:

RATING:

- Model CTH1-80**
(Natural & L.P. Gas) — 80,000 BTU/Hr. Input
- Model CTH1-100**
(Natural & L.P. Gas) — 100,000 BTU/Hr. Input
- Model CTH1-125**
(Natural & L.P. Gas) — 125,000 BTU/Hr. Input
- Model CTH1-150**
(Natural & L.P. Gas) — 150,000 BTU/Hr. Input

GAS INLET PRESSURE:

Gas	Minimum	Maximum
Natural	4.6" W.C.	14.0" W.C.
L.P.	11.0" W.C.	14.0" W.C.

ELECTRICAL RATING:

Models CTH1-80, 100, 125, 150
 120V - 60Hz - 2.6 AMP
 Flue Connection Size 4" O.D.

GAS PRESSURE AT MANIFOLD:

Natural Gas 3.5" W.C.
 L.P. Gas 10.5" W.C.
 Gas Connection Size 1/2" NPT

DIMENSIONS:

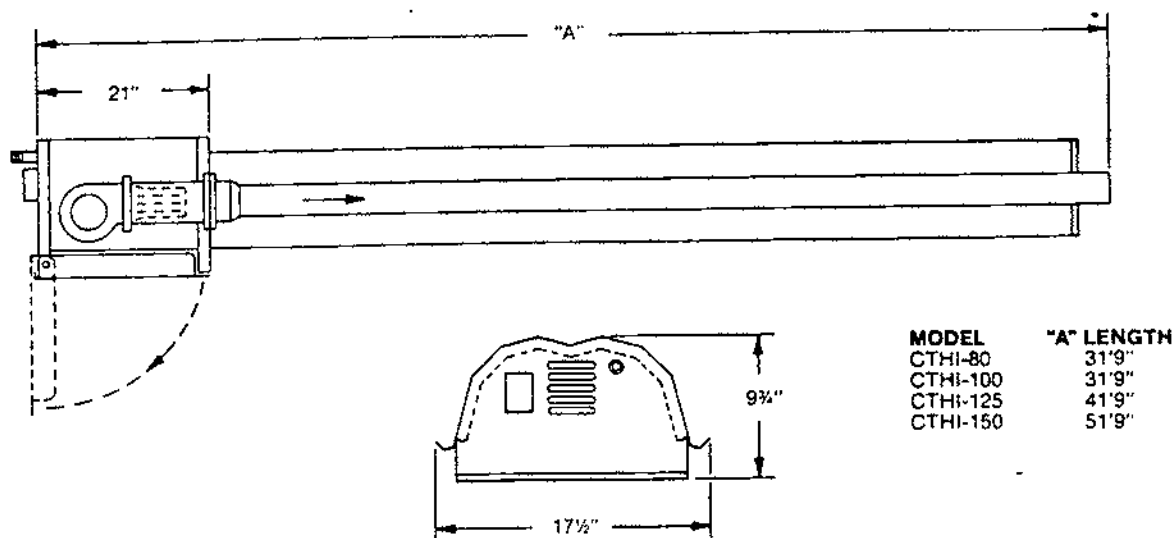
Refer to Figure 1 on page 3 of these instructions for dimensional information.

VANTAGE™ STANDARD PARTS LIST

DESCRIPTION	PART NO.
Burner and Control Assembly - CTH1-80 — Natural	02539206
Burner and Control Assembly - CTH1-80 — LP	02539207
Burner and Control Assembly - CTH1-100 — Natural	02539204
Burner and Control Assembly - CTH1-100 — LP	02539205
Burner and Control Assembly - CTH1-125 — Natural	02539202
Burner and Control Assembly - CTH1-125 — LP	02539203
Burner and Control Assembly - CTH1-150 — Natural	02539200
Burner and Control Assembly - CTH1-150 — LP	02539201

*Includes: (1) Gasket (Control Housing to Transition Tube) P/N 02568200
 (1) Flexible Gas Connector and Shut-off Valve P/N 91412200
 Miscellaneous Hardware

For system components parts list see Figure 4, Page 8.



VANTAGE™ SYSTEM DIMENSIONS
Figure 1

INSTALLATION

IMPORTANT: The type of gas appearing on the heater nameplate must be the type of gas used. Read all accompanying literature carefully before proceeding with installation. Allow for adequate clearances around air openings in heater, clearances to combustible materials, accessibility for service, combustion and ventilating air supply as specified in ANSI Z223.1-1988, National Fuel Gas Code (see Considerations and Planning Sections Below.).

CRITICAL CONSIDERATIONS

The Vantage™ is a suspended heater which requires that consideration be given to the factors that determine its stability, flexibility, safety, and satisfactory operation. Before starting installation, be sure the following requirements can be met:

- Maintain specified clearances to combustibles, and to heat-sensitive material, equipment and work stations (see Figure 2).
- Provide approved heat-radiation shielding or barriers where needed. Refer to the National Fuel Gas Code for guidance.
- Be sure suspension system is sufficiently flexible to accommodate thermal expansion which occurs as the system heats up.
- Provide for a minimum of clearance (see Figure 2) between ends of the heater and building walls.
- System must be suspended pitched down (one-half inch in 20 ft.).

PLANNING

Take maximum advantage of the building upper structure, beams, joists, purlins, etc., from which to suspend the system.

There is no one correct sequence for installation of the tubing. Onsite observation will usually reveal a logical sequence.

Begin the installation at the most critical dimension. This could save time. Watch for swinging doors, overhead cranes, car lifts, etc.

Reflectors and tube could be installed as you move along. Carefully adjust system pitch at each position to level the heater (pitch down one-half inch in 20 ft. away from burner).

INSTALLATION

Don't —

- Pressure test the gas line using high pressure (greater than 1/2 PSIG) without closing the high pressure shut-off cocks. Failure to do so may result in damage to the burners.
- Set ALL hangers before hanging the system.

Do —

- Familiarize yourself with local and national codes.
- Develop a planned installation procedure which will conserve material and labor on the job.
- Check to see that all material and equipment is on the job before starting installation.
- Be sure to accommodate thermal expansion of the hot tube.
- **INSTALL THE GAS CONNECTOR ONLY AS SHOWN IN INSTRUCTIONS.**
- Provide end clearance so tubing won't expand and touch a wall or a structural member.
- Have slip joints in reflectors to keep them from buckling or coming apart.
- Provide access to burner for servicing.
- Provide one square inch of free area air opening for each 1,000 BTU/Hr. of heater input (but not less than 100 square inches) in enclosed spaces. One opening should be within 12 inches of the top and one within 12 inches of the bottom of the enclosure.

CLEARANCE TO COMBUSTIBLES (From Heater Surfaces)

Caution must be used when running the system near combustible materials such as wood, paper, rubber, etc. Consideration should be given to partitions, storage racks, hoists, building construction, etc. Figure 2 gives MINIMUM clearances.

WARNING: Minimum clearance from heater must be maintained from vehicles parked below heater.

NOTE: 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.

IN PUBLIC GARAGES

Additional guidelines are provided for public garages in accordance with the standard for parking structures (NFPA 88A-1985) or the standard for repair garages (NFPA 88B-1985):

- Heaters shall be installed in accordance with their listings and not less than eight feet above the floor. Minimum clearances to combustibles must be maintained from vehicles parked below the heater.
- When installed over hoists, clearance to combustible material must be maintained from uppermost point on hoist.
- Clearance between the heater and its vent and adjacent combustible material (which is part of the building or its contents) shall be maintained to conform with the standard for installation of gas appliances and gas piping (NFPA No. 54 ANSI Z223.1-1988, National Fuel Gas Code).

IN AIRCRAFT HANGARS

Heaters for use in aircraft hangars must be installed in accordance with specification, ANSI/NFPA 409-1985 and with special consideration for the following:

- Heaters in aircraft storage or service areas shall be installed at a height of at least 10 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 wing or engine enclosure, whichever is highest from the floor.)
- In other sections of aircraft hangars, such as shops or offices communicating with airplane storage or servicing area, heaters shall be installed in accordance with their listings and not less than eight feet above the floor.

CAUTION: CLEARANCE AS SHOWN ARE NOT FOR USE IN FOUR SIDED ENCLOSURES

MODEL	FIG. 1			FIG. 2			FIG. 3			FIG. 4			FIG. 5			FIG. 6			FIG. 7								
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	D	ABOVE	UNVENTED	VENTED		
DIM. (Inches)																											
CTH1-80	4	31	52	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	50	38	18	24	18
CTH1-100	4	35	62	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	63	50	18	24	18
CTH1-125	4	41	72	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	68	52	18	24	18
CTH1-150	4	45	78	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	74	56	18	30	18

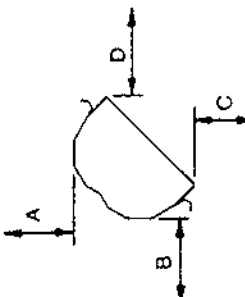


FIG. 1 STANDARD REFLECTOR

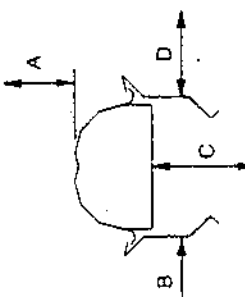


FIG. 2 ONE SIDE EXTENSION

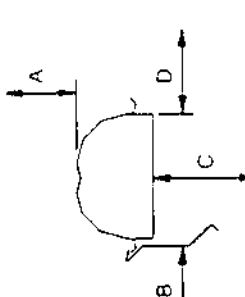


FIG. 3 TWO SIDE EXTENSIONS

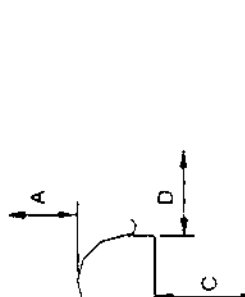


FIG. 4 45° STANDARD REFLECTOR

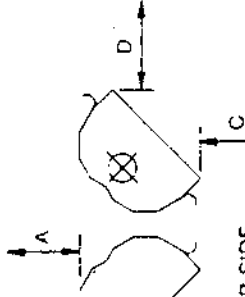


FIG. 5 STANDARD REFLECTOR "U" CONFIGURATION OPPOSITE 45°

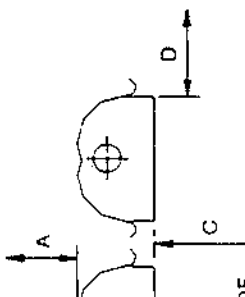


FIG. 6 STANDARD REFLECTOR "U" CONFIGURATION

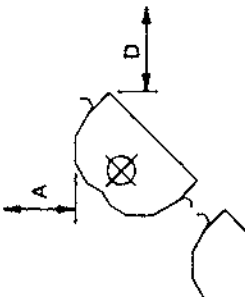


FIG. 7 STANDARD REFLECTOR "U" CONFIGURATION 45°

NOTES: IN ALL SITUATIONS CLEARANCES TO COMBUSTIBLES MUST BE MAINTAINED. MINIMUM CLEARANCES MUST BE MAINTAINED FROM VEHICLES PARKED BELOW HEATER. SIGNS SHOULD BE POSTED IN STORAGE AREAS TO SPECIFY MAXIMUM STACKING HEIGHT TO MAINTAIN REQUIRED CLEARANCE TO COMBUSTIBLES.

**MINIMUM CLEARANCES TO COMBUSTIBLES
CTH1 SERIES RADIANT HEATER
Figure 2**

INSTALLATION

cont. from page 4

- Heaters installed in aircraft hangars shall be located so as not to be subject to damage by aircraft, cranes, moveable scaffolding or other objects. Heaters shall be placed so they will be readily accessible for maintenance purposes.

FIELD ASSEMBLY

Assemble the heater components as shown in Figure 3. Optional reflector and hanging positions shown in Figure 4.

Install appropriate suspension hardware (see Figure 5), beam clamps, chain (rod or perforated strap) at predetermined locations. Adjustment of chain length will provide uniform pitch. Weight to be supported may be figured as follows:

Tubing — 3.5 lbs. per foot
Burner — 40 lbs. per unit

COUPLINGS (See Figure 6, page 9 for coupling details)

Tubing and tube fittings are connected by wrap-around couplings which clamp by means of a tapered hammer-driven lock member. The starting ends of the coupling and lock member are identified by ¼-inch holes which are put together when starting assembly.

Be sure tubes are in line and tube ends butt against stop pin(s) inside coupling. The slide bar is to be hammer-driven to a point of securing the coupling to the tubes. Over driving will result in distortion of the coupling or slide bar lip to a point decreasing the holding capability of the coupling.

The slide bar has a 2-inch tolerance in reference to it lining up with the end of the coupling at the point of being secure. (Slide bar may tighten coupling when driven two inches short or two inches past the edge of the coupling.)

BURNER UNIT (See Figure 3)

The burner unit is secured to the transition tube using three hex nuts, one hex screw and lockwashers. Align the gasket with the studs, install the lockwashers, hex nuts and hex screws and tighten securely. Assemble the burner unit to the transition tube assembly after tubes are hung.

IMPORTANT: Locate the suspension hangers as indicated in Figure 3 to provide proper support of the heater.

FLUE BAFFLE

IMPORTANT: For heaters supplied with a flue baffle, the baffle must always be installed in the last standard section of radiant tube at exhaust end of heater.

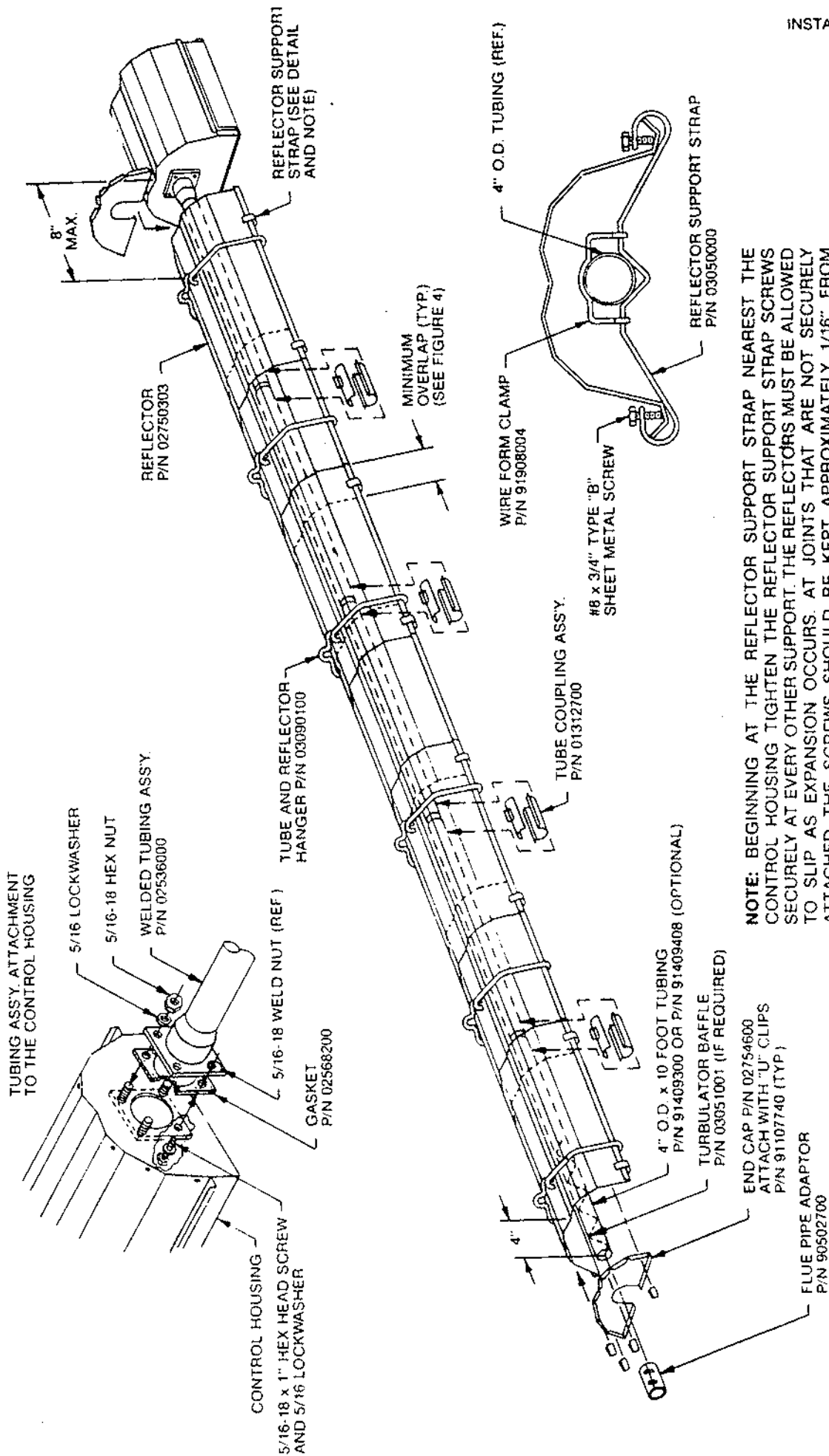
REFLECTORS

Locate the reflectors and slip joints as shown in Figure 3. For optional reflector positioning see Figure 7.

IMPORTANT: This is the part of the system that is most apparent and where a neat job marks the installer as a craftsman.

To insure a workmanlike installation:

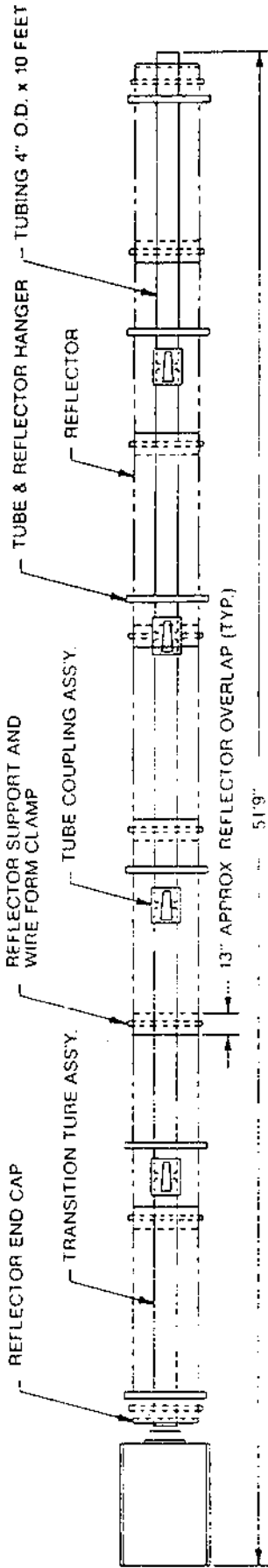
- Locate the slip joints only as shown. Reflectors at all other joints are locked with reflector support screws.
- Reflector supports should be used as shown.
- Reflectors not supported by a hanger or reflector support should rest on a reflector that is supported. Provide an overlap to provide for thermal expansion (see Figure 4).
- Reflectors should be level side to side.
- Reflector end cap must be used at each end of the reflectors.
- Reflectors must be carefully handled to avoid fingermarks and dents.
- Fingermarks are best removed with window spray cleaner.



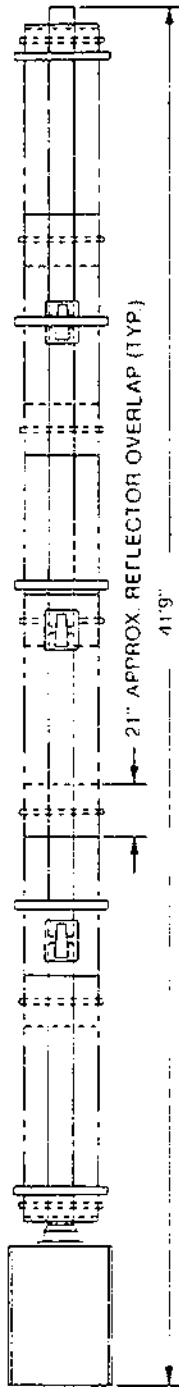
TYPICAL ASSEMBLY OF A MODEL CTH1 HEATER

Figure 3

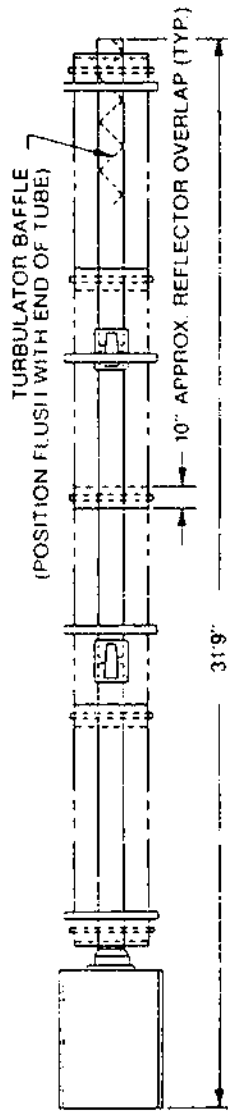
INSTALLATION



MODEL CTH1-150



MODEL CTH1-125



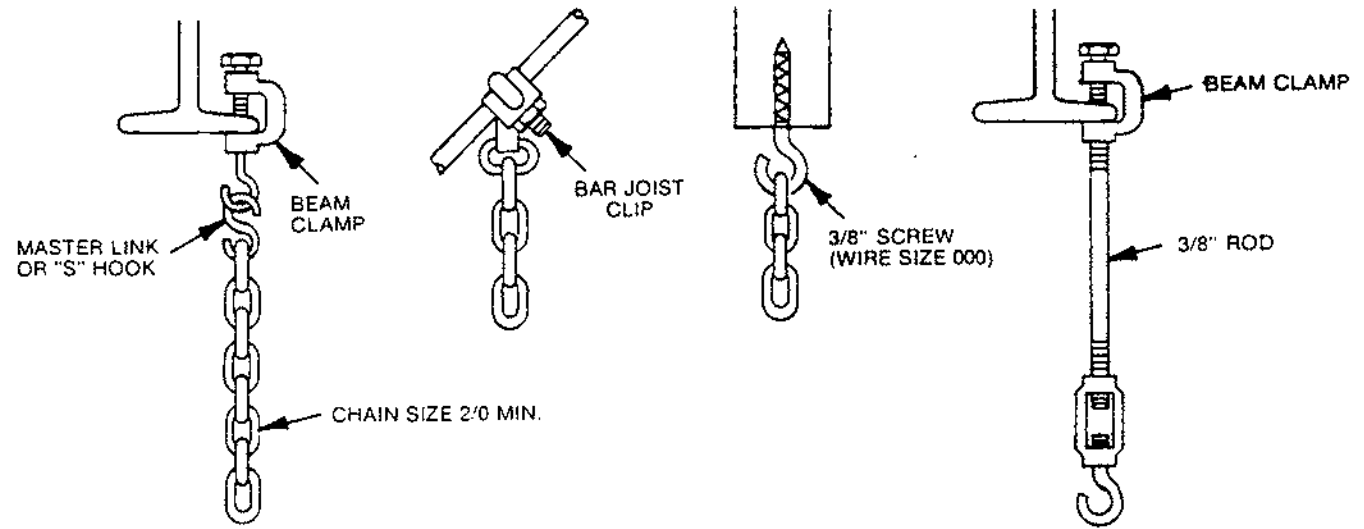
MODELS CTH1-100 & CTH1-80

CTH1 SERIES SYSTEM COMPONENTS ASSEMBLY

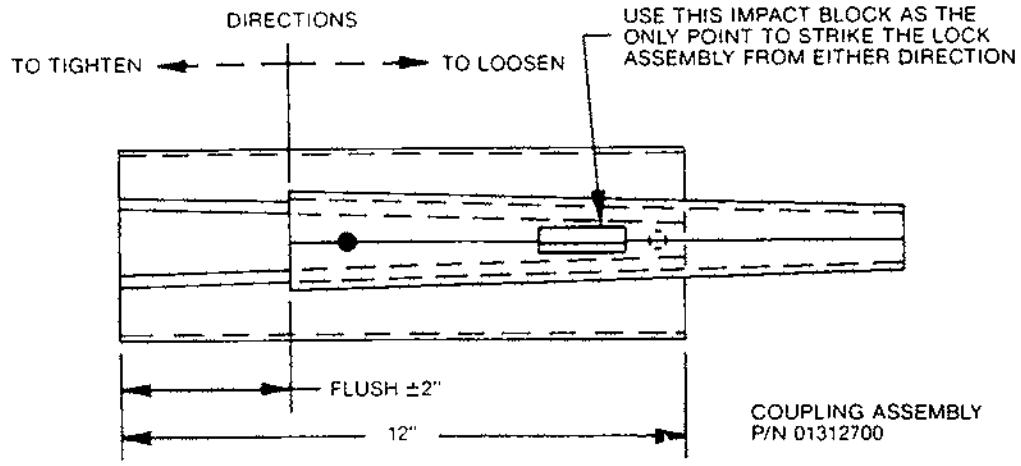
Figure 4

PART NO.	DESCRIPTION	MODEL	
		CTH1-150	CTH1-100 CTH1-80
02536000	TRANSITION TUBE ASSY.	1	1
91409300	TUBING 4" O.D. x 10 FEET (HOT ROLLED STEEL)	4	3
91409408	TUBING 4" O.D. x 10 FEET (ALUMINIZED STEEL) OPTIONAL		2
01312700	TUBE COUPLING ASSEMBLY	4	3
02750303	REFLECTOR 8 FEET	7	6
03080100	TUBE & REFLECTOR HANGER	6	5
03050000	REFLECTOR SUPPORT STRAP	8	7
91908004	WIRE FORM 4"	8	7
94320812	#8x $\frac{1}{2}$ " TYPE "B" SHT. MTL. SCREW	16	14
02754600	REFLECTOR END CAP	2	2
91107740	"U" CLIP PACKAGE	1	1
90502700	4" FLUE PIPE ADAPTOR	1	1
03051001	TURBULATOR BAFFLE 5 FT.	---	---
91907302	S-HOOK 2 $\frac{1}{2}$ "	6	5

INSTALLATION

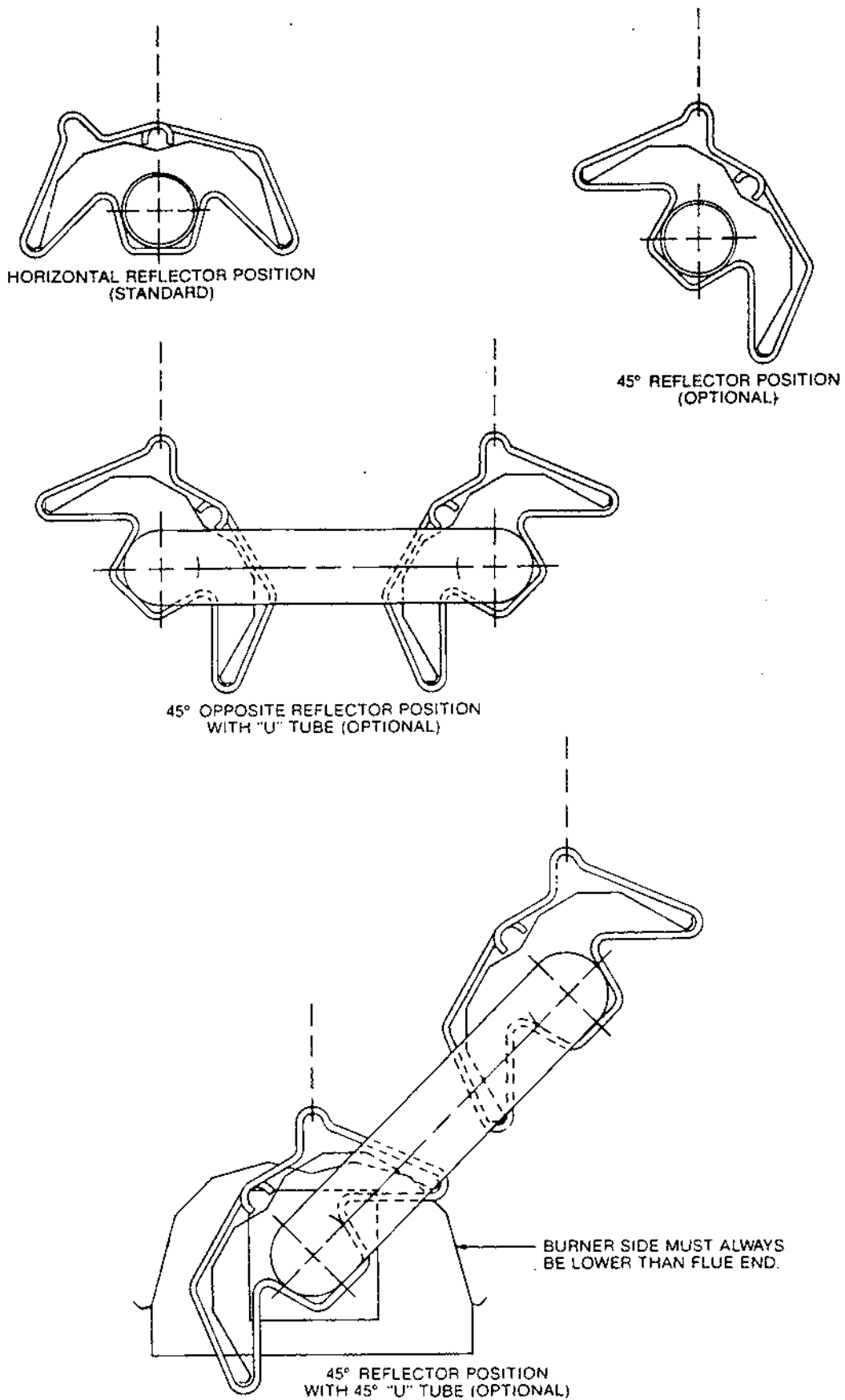


TYPICAL SUSPENSION DETAILS
Figure 5



COUPLING DETAILS
Figure 6

INSTALLATION



REFLECTOR POSITION VARIATIONS
Figure 7

VENTING

GENERAL REQUIREMENTS

Heater vent must be installed in accordance with specification ANSI Z223.1-1988 (NFPA No. 54). Partial information relating to this specification is provided in this section with regard to size and configurations for venting arrangements (see Figures 8, 9, 10, 11 and 12). For complete information consult ANSI Z223.1-1988 and applicable local codes.

Using the following guidelines to help insure an adequate, safe venting arrangement:

- Be sure that method selected for venting heater complies with all codes as required for each particular location.
- Exhaust end of heater will accept a four-inch flue pipe using the flue pipe adaptor provided.
- Heater may be vented to the outdoors either vertically or horizontally.
- If heater is to be vented horizontally:
 - a.) Vent must exit building not less than seven feet above grade when located adjacent to public walkways.
 - b.) Vent must terminate at least three feet above any forced air inlet located within 10 feet.
 - c.) Vent must terminate at least four feet below, four feet horizontally from or one foot above any door, window or gravity air inlet into any building.
 - d.) Vent terminal shall be located at least 12 inches from any opening through which vent gases could enter a building.
- Vent terminal opening must be beyond any combustible overhang.
- If condensation in the flue is a problem, the flue length should be shortened or insulated.
- For vent specifications:

All three (3) of the following conditions must be met.

 - a.) Maximum vent length allowed is 45 feet.
 - b.) Maximum intake length allowed is 45 feet.
 - c.) Maximum total of vent length **plus** intake length **plus** optional extension shall not exceed 65 feet.

IMPORTANT: Heaters should be placed so they will be readily accessible for maintenance.

ALTERNATE ARRANGEMENTS/OPTIONAL EQUIPMENT FOR VENTING

Alternate venting configurations and optional equipment for venting are shown in Figures 8 through 12.

For horizontal venting (see Figure 8):

- In combustible or non-combustible walls use Tjernlund VH1-4" (P/N 90502100). Follow vent manufacturer's instructions for proper installation. (Alternate vent Roberts-Gordon P/N 02537800, non-combustible wall only.)
- Four-inch O.D. flue pipe is required, 30 feet in length is recommended. Up to 45 feet maximum may be used if insulated to prevent excess condensation.
- All flue joints should be sealed using suitable product such as General Electric RTV106 or Permatex Form-a-Gasket Red High Temperature Silicone Adhesive Sealant.
- Vent terminal should be installed at a height sufficient to prevent blockage by snow.
- Building materials should be protected from degradation by flue gases.

For vertical venting (see Figure 9):

- A four-inch O.D. flue pipe, maximum 45 feet in length may be used as shown with an approved vent cap.
- An insulating thimble may be required to pass through combustible walls (check local codes).
- All flue joints should be sealed using suitable products (see recommendation for horizontal venting).

For vertical venting using a draft hood (see Figure 10):

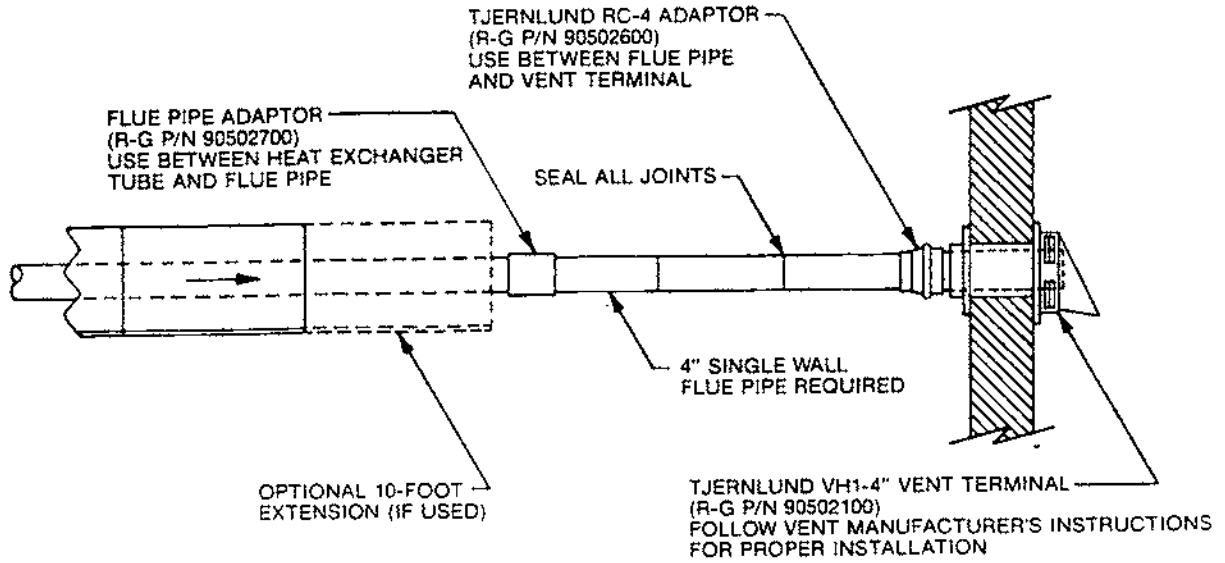
- Refer to ANSI Z223.1-1988 (NFPA No. 54) for heights and vent sizes recommended for proper venting. (Check local codes for additional information.)
- Minimum six-inch O.D. vent is recommended.

For common venting (see Figure 11):

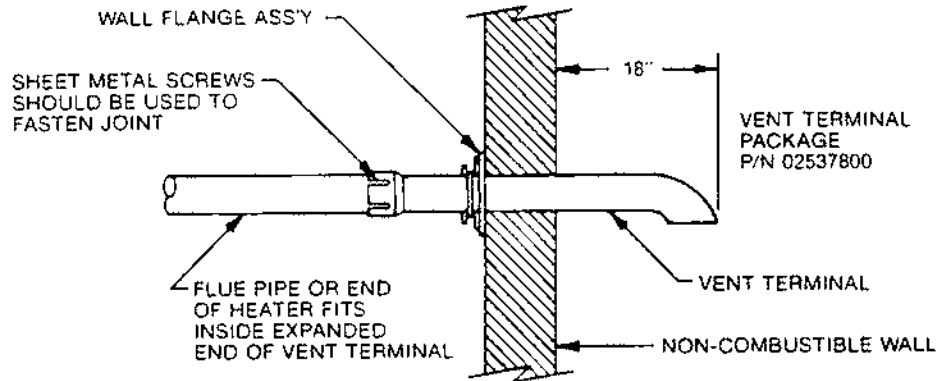
- Horizontal run to vent must never exceed 75% of the vertical height of the vent. (Refer to ANSI Z223.1-1988, NFPA No. 54 for proper vent sizes and installation.)
- Open area of common vent must equal the sum of the open area of individual flue vents connected to it (see chart on diagram).
- Use double wall vent as required (check codes).
- Heaters sharing a common vent should be controlled by the same thermostat.
- All joints must be sealed using suitable products (see recommendation for horizontal venting).

For unvented operation (see Figure 12):

- Sufficient ventilation must be provided in the amount of 4 cfm per 1000 BTU/HR firing rate.
- Refer to ANSI Z223.1-1988 (NFPA No. 54) and local codes for additional information.
- Use of optional outside combustion air is not recommended with unvented heaters.

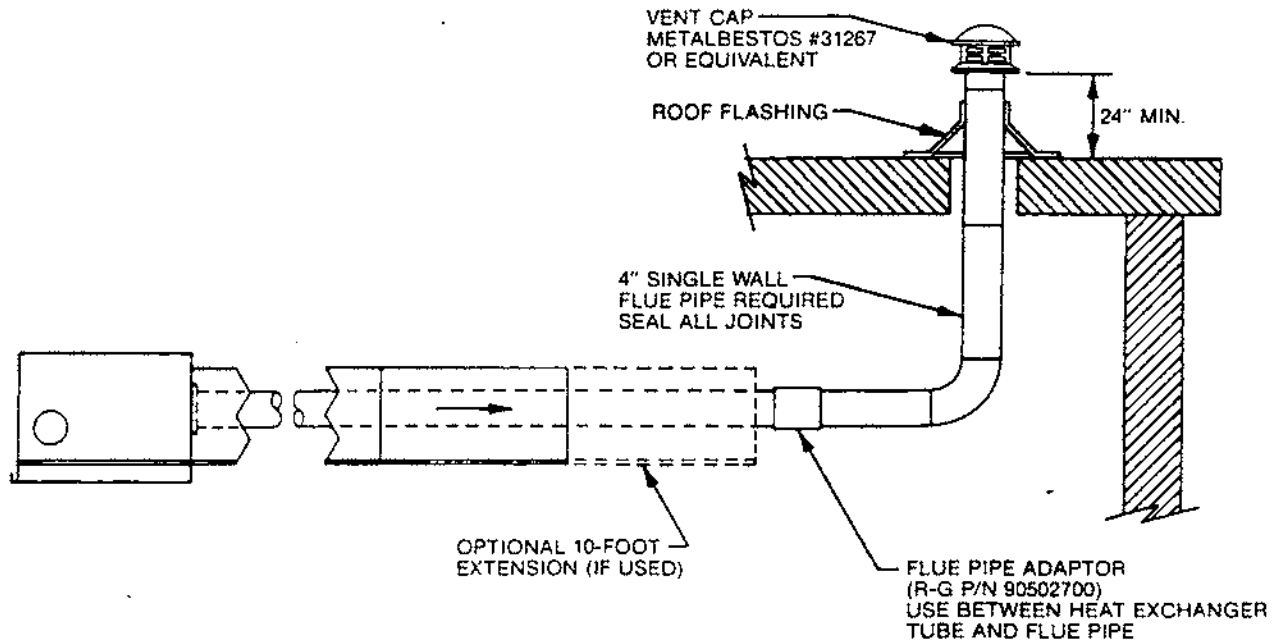


RECOMMENDED FLUE PIPE LENGTH 30 FEET (MINIMUM TWO FEET).
UP TO 45 FEET MAXIMUM MAY BE USED IF INSULATED IN ORDER
TO PREVENT EXCESSIVE CONDENSATION. LENGTH INCLUDES
OPTIONAL 10-FOOT EXTENSION.



HORIZONTAL VENTING
Figure 8

VENTING

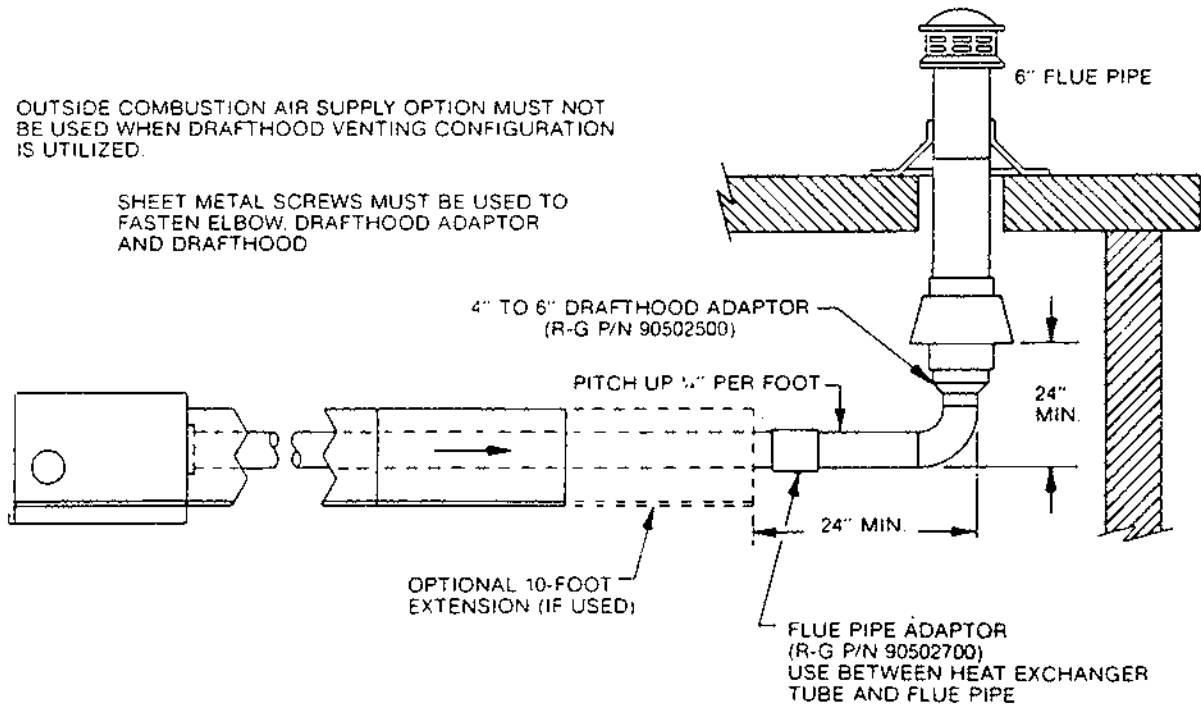


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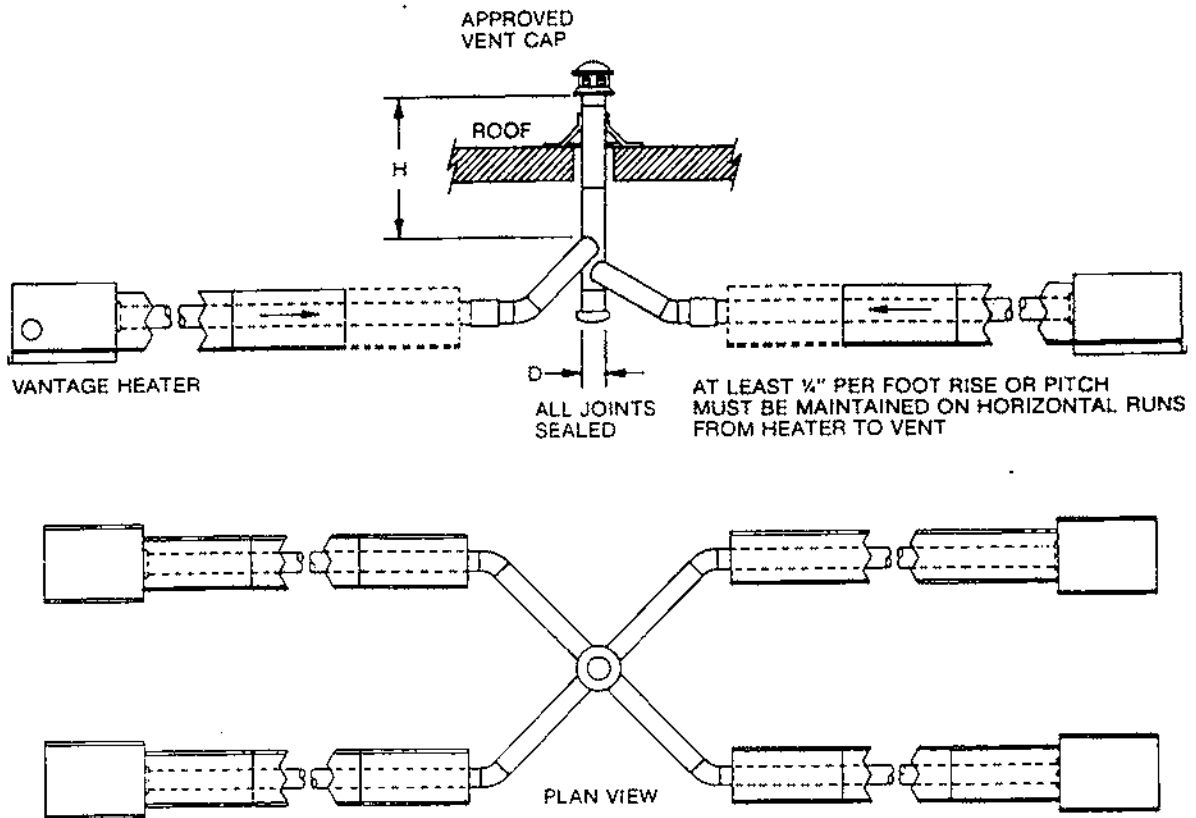
VERTICAL VENTING
Figure 9

OUTSIDE COMBUSTION AIR SUPPLY OPTION MUST NOT BE USED WHEN DRAFTHOOD VENTING CONFIGURATION IS UTILIZED.

SHEET METAL SCREWS MUST BE USED TO FASTEN ELBOW, DRAFTHOOD ADAPTOR AND DRAFTHOOD



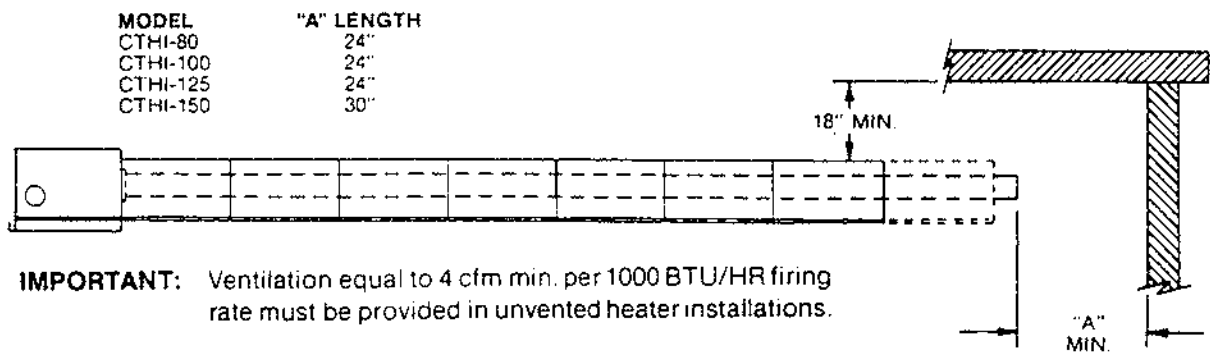
VERTICAL VENTING WITH DRAFTHOOD
Figure 10



Model Number	No. of Heaters	Stack Height "H" (Min.)		
		6'	8'	15'
		Vent Dia. "D" (Min.)		
CTH1-80	2	8"	7"	6"
CTH1-80	4	10"	10"	10"
CTH1-100	2	8"	8"	7"
CTH1-100	4	N/A	12"	10"
CTH1-125	2	10"	10"	8"
CTH1-125	4	N/A	12"	10"
CTH1-150	2	10"	10"	8"
CTH1-150	4	N/A	N/A	12"

- NOTES:**
1. HORIZONTAL RUN TO VENT MUST NEVER EXCEED 75% OF THE VERTICAL HEIGHT OF THE VENT. REFER TO ANSI Z223.1-1988 NFPA No. 54 FOR PROPER VENT SIZES AND INSTALLATION (SEE TABLE).
 2. HEATERS SHARING A COMMON STACK MUST BE CONTROLLED BY THE SAME THERMOSTAT.
 3. CONNECTIONS TO COMMON STACK MUST BE POSITIONED TO AVOID DIRECT OPPOSITION BETWEEN STREAMS OF COMBUSTION GASES.

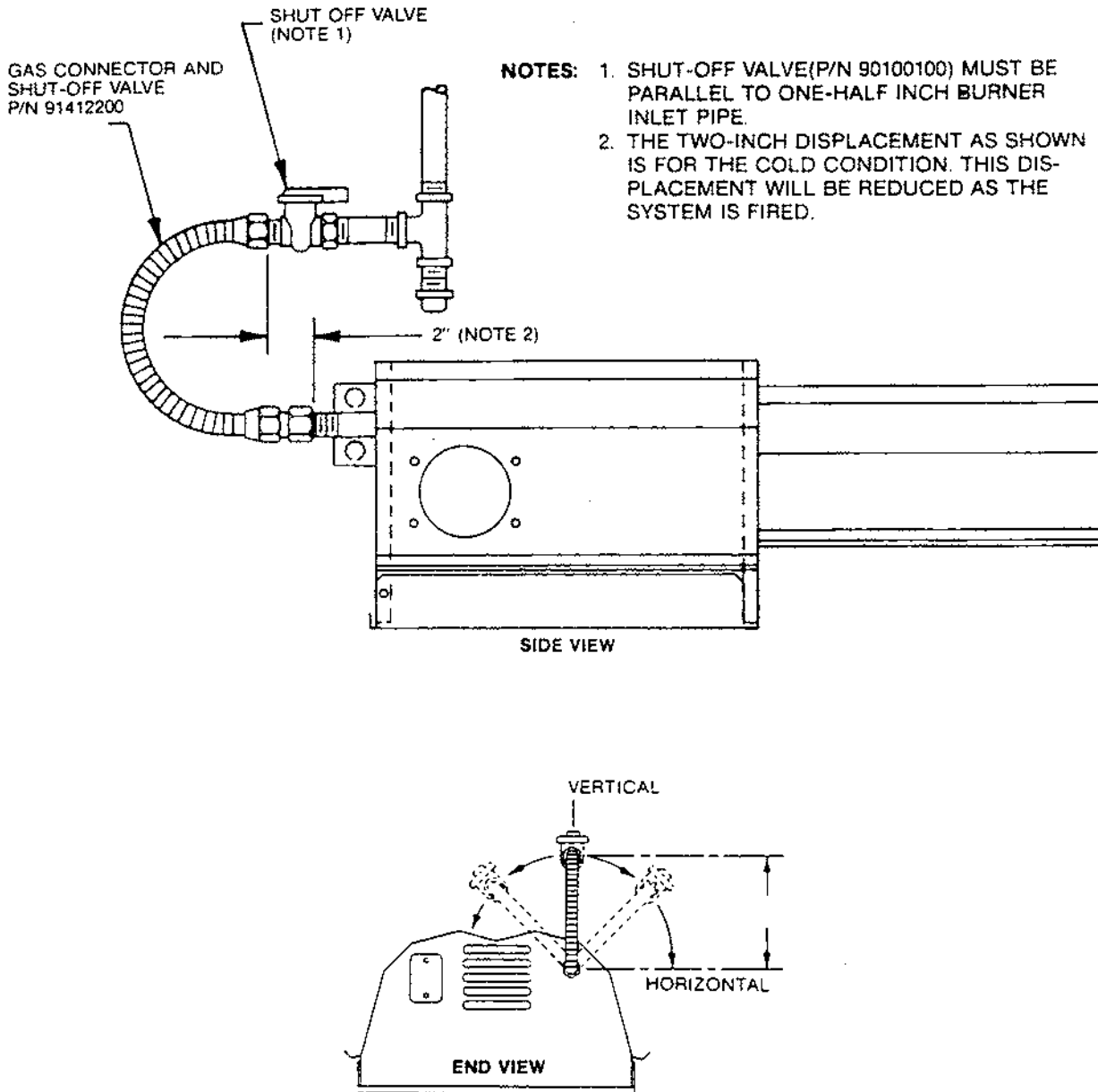
COMMON VENTING
Figure 11.



UNVENTED OPERATION
Figure 12

GAS PIPING

Meter and service must be large enough to handle all the burners being installed plus any other connected load. When gas piping is not included in the layout drawing, the local gas supplier will usually help in planning the gas piping. A three-quarter inch tapping at each burner location must be located and oriented as shown on Figure 13. To check system pressure, a plugged one-eighth inch pipe tapping should be incorporated in the gas line at the connection to the burner most remote from the meter or supply. Joint compound resistant to the action of L.P. gas should be used on all pipe threads.



**GAS LINE CONNECTION TO BURNER
WITH FLEXIBLE METALLIC CONNECTOR ASSEMBLY
Figure 13**

CAUTION: For high pressure testing on gas piping, THE HIGH PRESSURE SHUT-OFF COCKS MUST BE CLOSED. Failure to follow this procedure will exceed pressure rating of burner gas controls and this will require complete replacement of these parts.

The following is provided as a guide to insure a workmanlike, gas supply system installation:

- All pipe should be properly supported by using suitable pipe hanging materials.
- Wrought iron or wrought steel pipe and malleable iron fittings are recommended. All pipe and fittings should be new and free from defects.
- Ends of pipes and tubing should be carefully reamed to remove obstructions or burrs.
- All gas piping is to be in accordance with the National Fuel Gas Code Z223.1-1988, local codes and local gas company regulations.
- All gas piping should be checked for leaks before placing heating equipment into service. In checking for gas leaks use a soap and water solution; NEVER use an open flame.

GAS PIPING SIZING

The gas line which feeds the heater(s) must be large enough to supply the required gas with a maximum pressure drop of 0.5 inches water column. If there is any question, check with the gas company. Use the following capacity table as a guide:

Pipe (Inches)	Pressure Drop — 0.5 Inches Water Column						
	Length of Straight Pipe (Feet)						
	20	40	60	80	100	150	200
1/2	120	82	66	57	50	40	35
3/4	250	170	138	118	103	84	72
1	465	320	260	220	195	160	135

PIPE CAPACITY CU. FT. HR.

Table 1

GAS CONNECTIONS

The purpose of the gas connector from the heater to the gas piping is twofold as follows:

- To facilitate installation and replacement of the burner.
- To accommodate any movement between the heater and the gas piping. See warning below.

The flexible metallic connector assembly, as supplied, must be installed as shown in Figure 13.

Before connecting heaters to the supply system, verify that all high pressure testing of the gas piping has been completed.

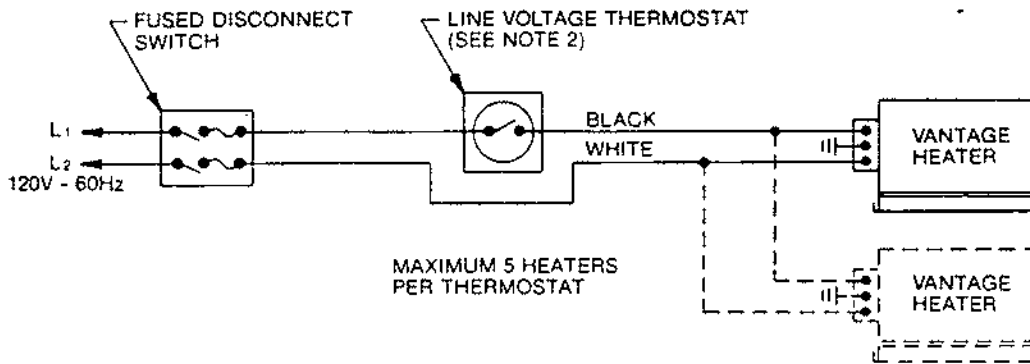
WARNING: There is expansion of the radiant pipe with each firing cycle, and this will cause the burner to move with respect to the gas line. This can cause an unsafe condition if the gas connection is not made strictly in accordance with Figure 13.

FIELD WIRING

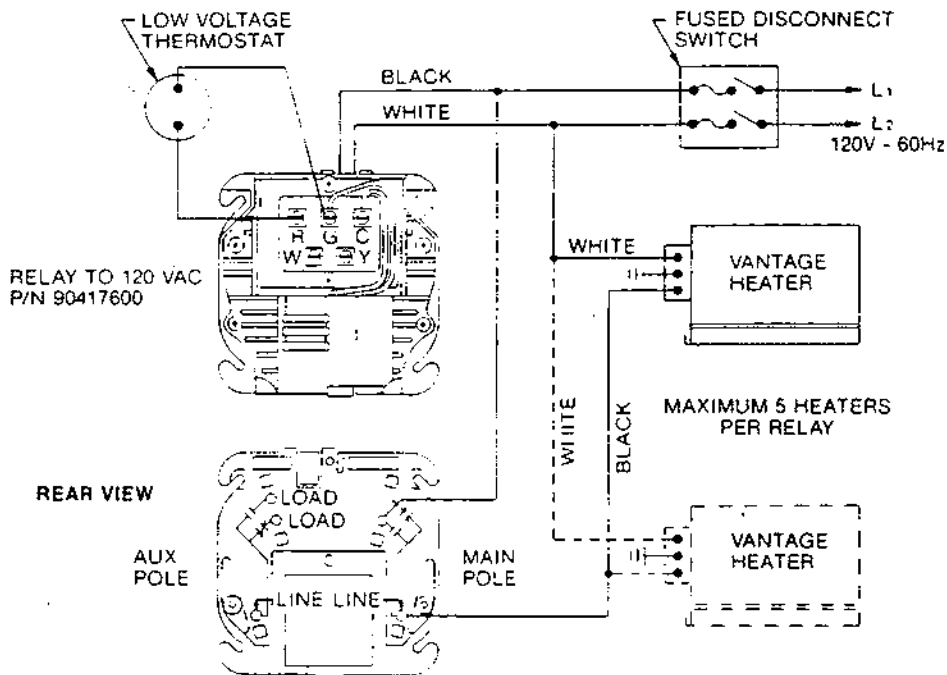
Heaters are normally controlled by thermostats (see Figure 14). Line voltage thermostats are wired directly; the recommended 24-volt thermostats use a relay per Figure 15. Heaters must be grounded in accordance with National Electrical Code ANSI/NFPA 70-1987.

Heaters can also be controlled with a manual line voltage switch or timer switch in place of the thermostat.

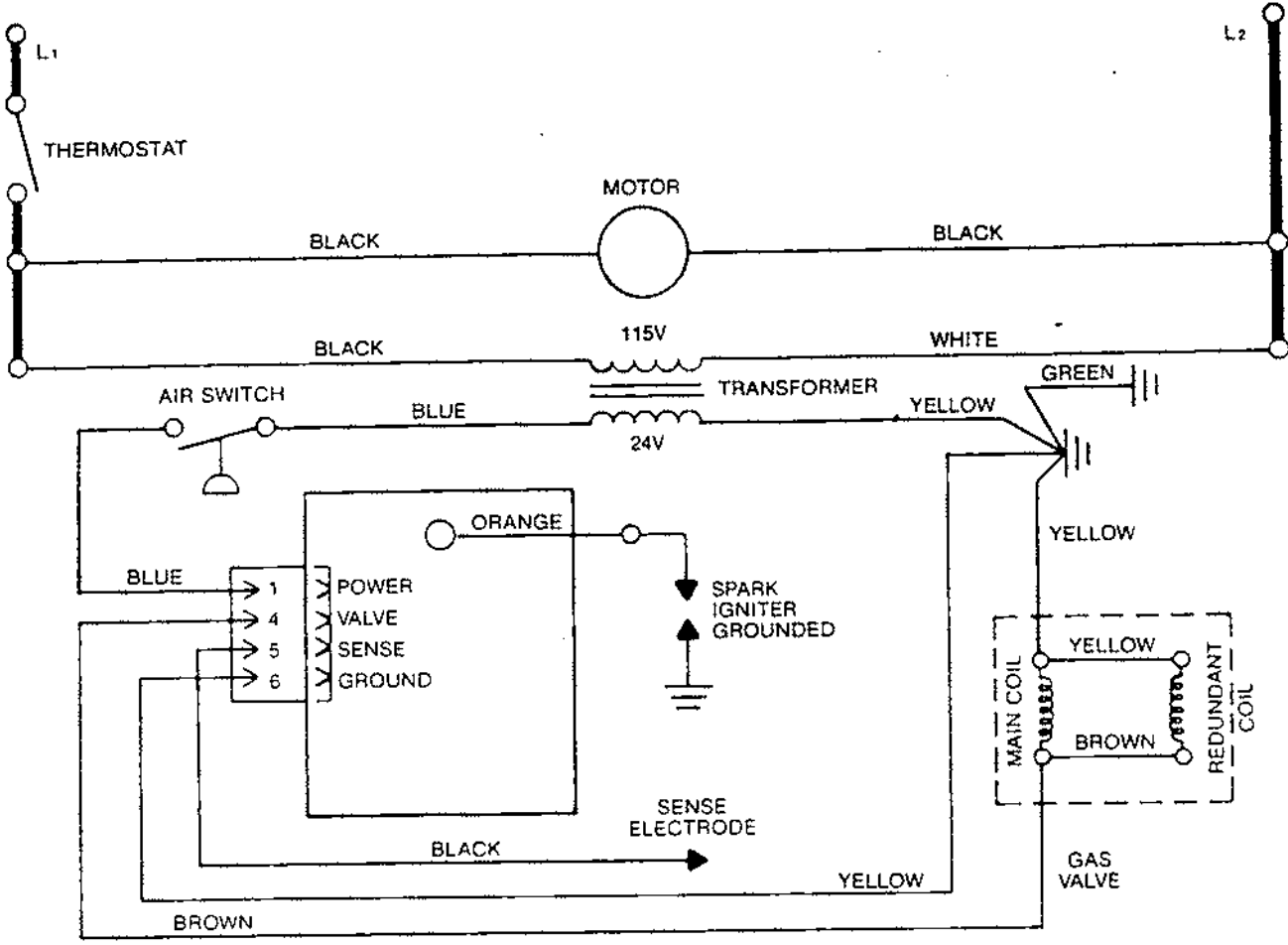
- NOTES:**
1. If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C.
 2. For wiring line voltage thermostat (R-G 90411300) use terminals "B" and "R" and jumper terminal "W" to "R".



WIRING OF LINE VOLTAGE THERMOSTAT
Figure 14



WIRING OF LOW VOLTAGE THERMOSTAT AND RELAY
Figure 15



WIRING DIAGRAM
Figure 16

OPTIONAL EQUIPMENT

OUTSIDE COMBUSTION AIR SUPPLY

The VANTAGE heater is approved for installation with an outside air supply system.

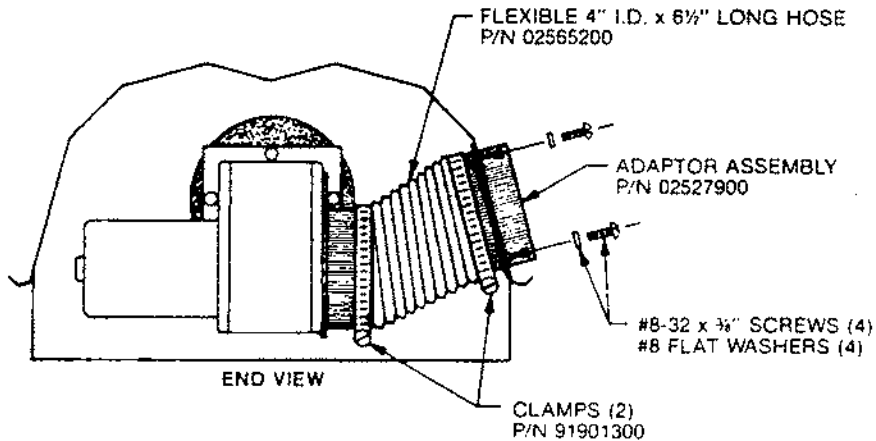
Some compounds such as halogenated hydrocarbons or other corrosive chemicals in the air can be ingested into the equipment and cause an accelerated rate of corrosion of some of the heater components. The use of such chemical compounds near the enclosure should be avoided.

If the building has a slight negative pressure or contaminants in the air are present, then outside combustion air must be supplied to the heaters using the optional outside air adaptor kit. Install the adaptor as shown in Figure 17 using hardware supplied. (This requires removal of the four-inch diameter "knockout" in the burner housing reflector.)

A duct of four inches O.D. single wall pipe may be attached to the heater outside air adaptor. The duct may be up to 45 feet in length maximum with no more than two 90° elbows in its total length (see Figure 18). A minimum length of two feet is recommended.

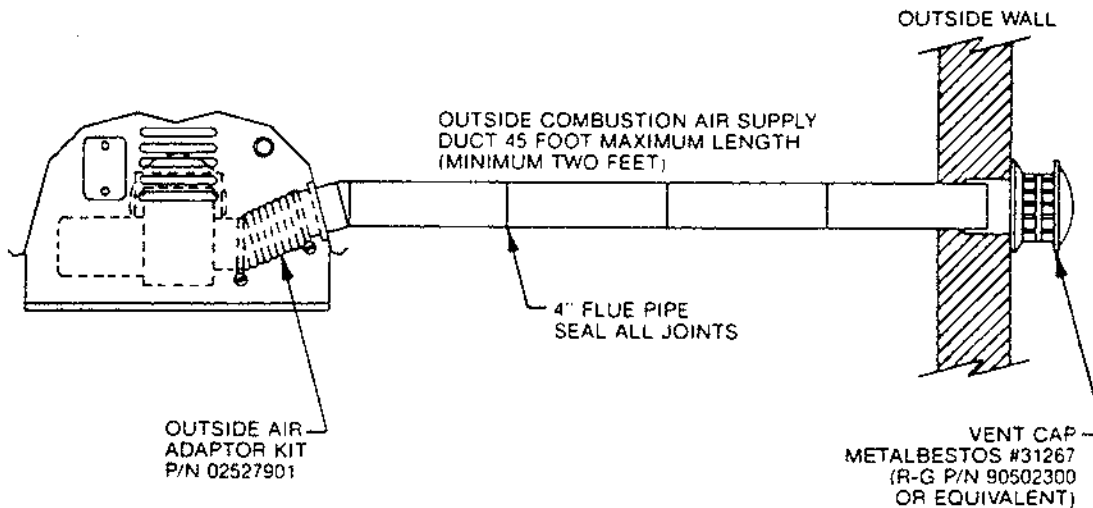
The air supply duct may have to be insulated to prevent condensation on outer surface.

The air inlet vent cap should be securely fastened to outside wall by drilling four ¼" diameter holes in outside flange; wood screws or bolts and expansion sleeves may be used as a fastening means.



**OUTSIDE COMBUSTION AIR SUPPLY
ADAPTOR PACKAGE P/N 02527901**

Figure 17



OUTSIDE COMBUSTION AIR INSTALLATION

Figure 18

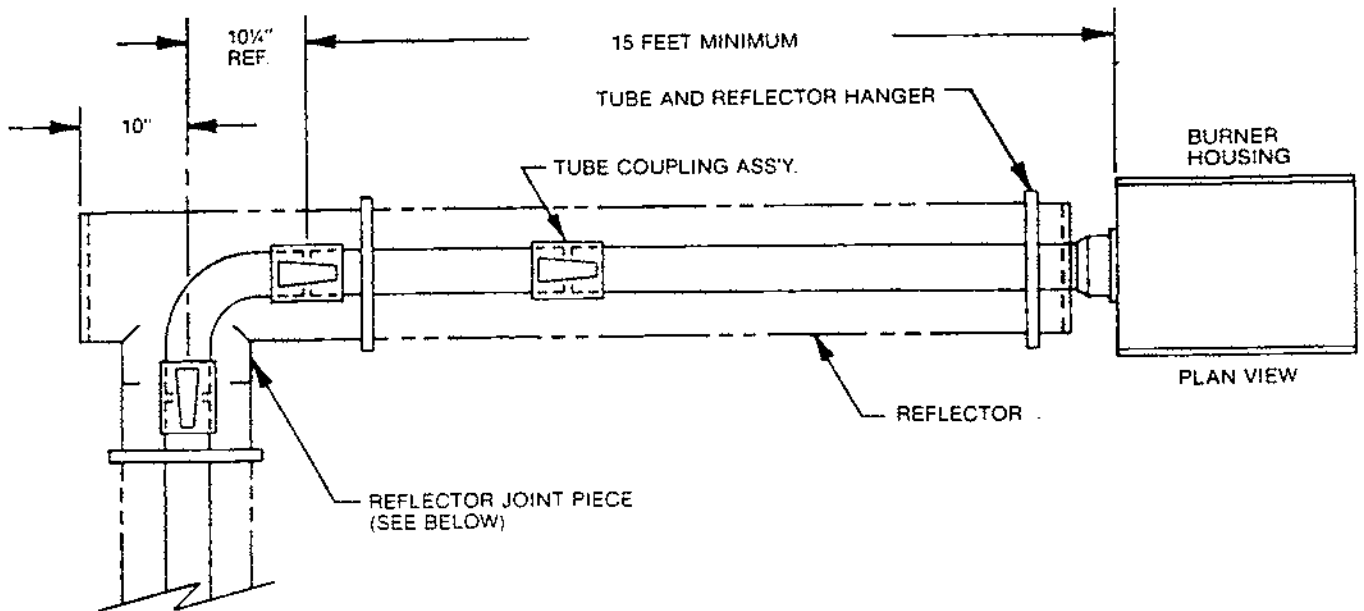
OPTIONAL EQUIPMENT

Optional heater configurations are approved for VANTAGE as follows:

- 90° Elbow Package P/N 02718700.
- Tube Extension Package P/N 02519201 - HRS. Tube.
- Tube Extension Package P/N 02519202 - Aluminized Tube.
- 180° U-Package P/N 03011000.

Refer to Figures 19, 20, 21 and 23 for assembly details and optional configurations.

NOTE: Do not install the 90° elbow or 180° U-bend closer to the burner than 15 feet downstream.



NOTE: 90° ELBOW MAY BE INSTALLED IN EITHER DIRECTION.

ASSEMBLY DETAILS (OPTIONAL HEATER ASSEMBLY) Figure 19

INSTALLATION OF REFLECTOR JOINT PIECE AND END CAP

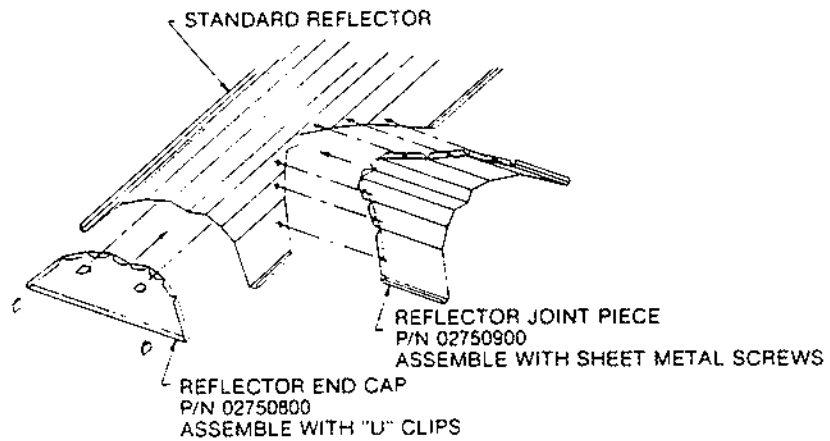
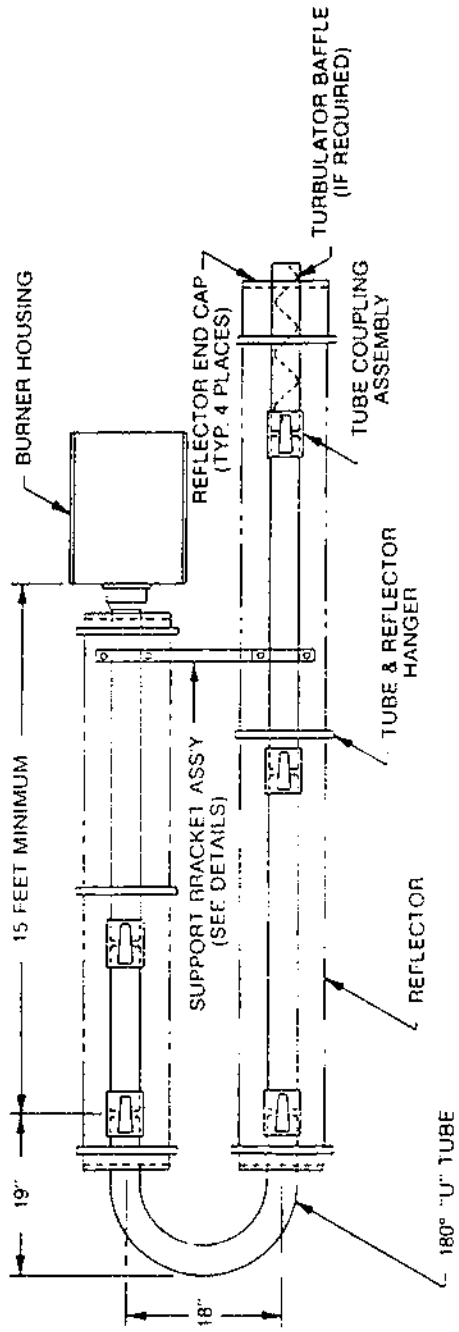
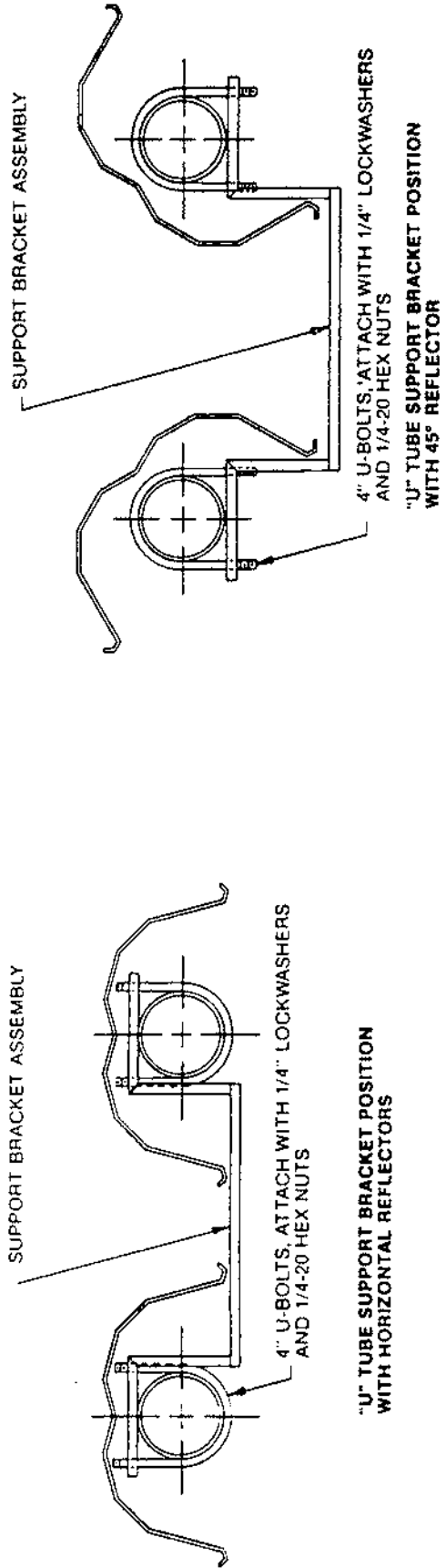


Figure 20



PLAN VIEW



INSTALLATION OF 180° U-PACKAGE
Figure 21

SIDE EXTENSION REFLECTORS

Optional side extension reflectors may be installed on either side of the unit as follows (see Figure 22):

- Attach a reflector side extension support bracket (P/N 01329910) to tube as needed. These brackets should be located adjacent to the overlapped joints of the reflector side extension.
- Insert lower edge of reflector side extension in extension support bracket.
- Cut suitable relief notch for each reflector support bracket (P/N 03050000 and/or tube and reflector hanger P/N 03090100).
- Hook top edge of side extension reflector (P/N 01368000) over edge of reflector (P/N 02750303) (see Detail "A").
- A slip joint must be provided in the perimeter side extension at the location of each slip joint in the reflector. The overlap should be the same as the reflector.
- Where severe air movement may be encountered, as at large door, one (1) or two (2) sheet metal screws in each reflector should be used, except where slip joint is required.
- Install at least two brackets (P/N 02751200) for each side extension.

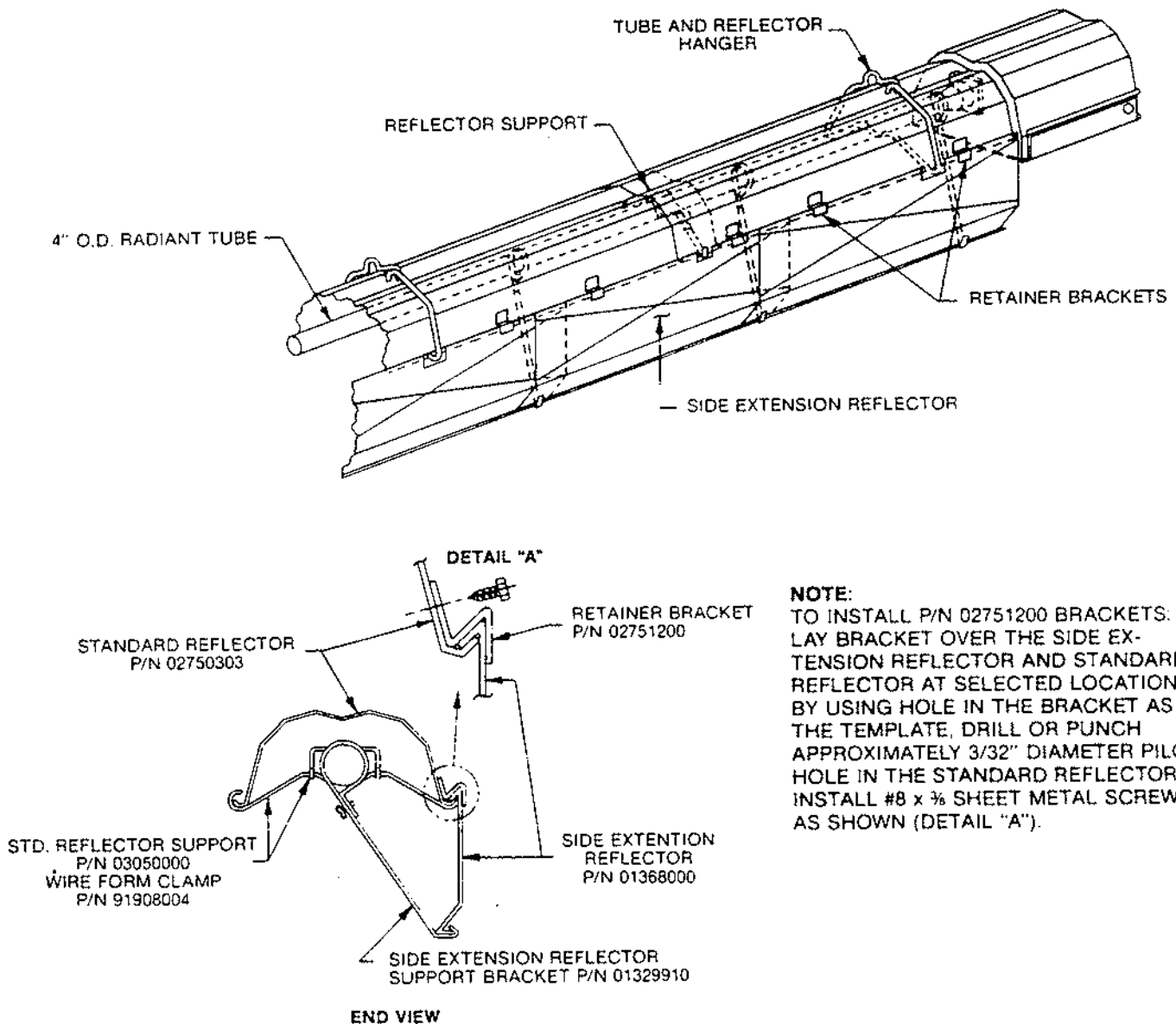


Figure 22

OPTIONAL EQUIPMENT

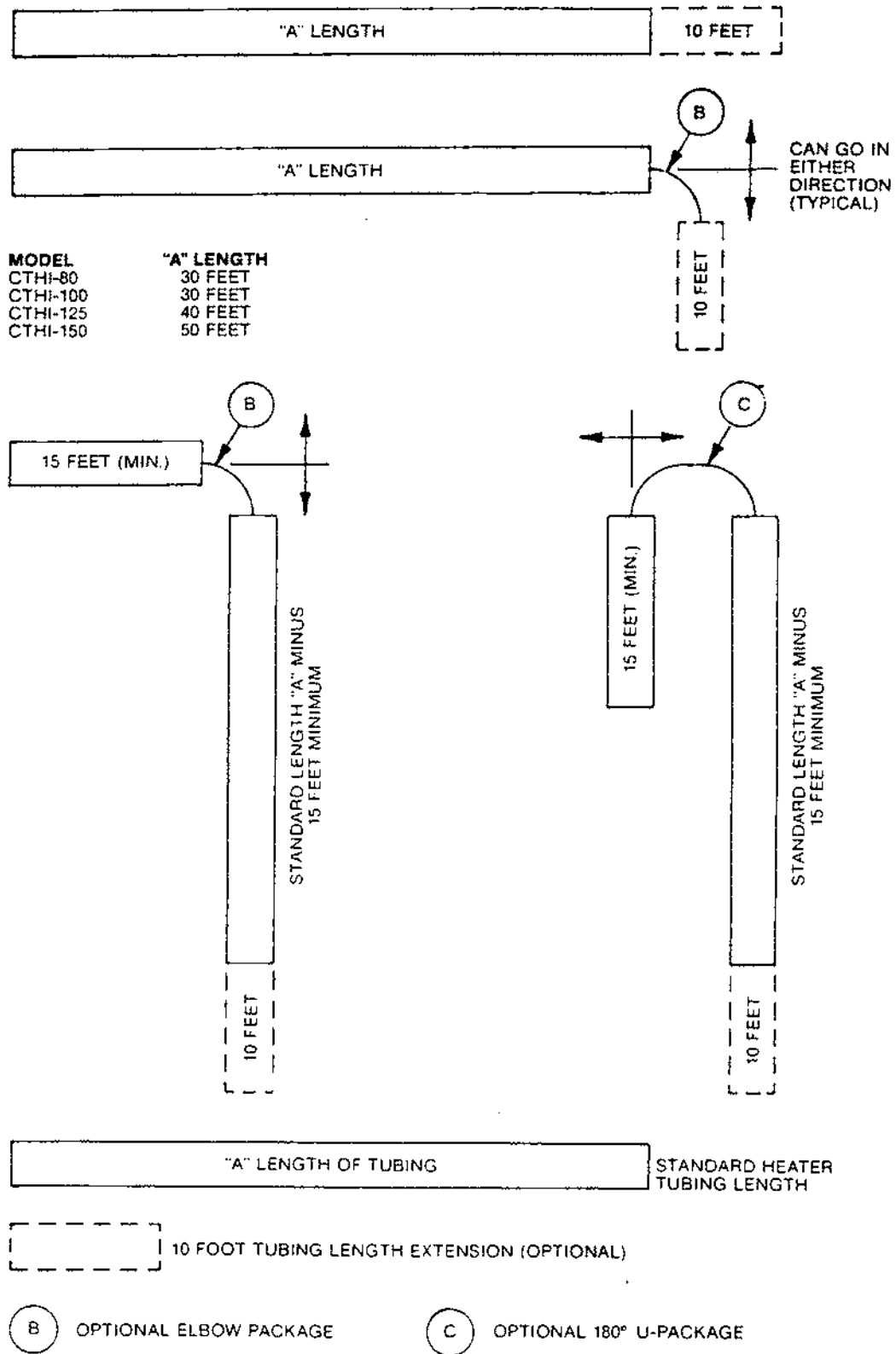


Figure 23

SERVICE INSTRUCTIONS

SEQUENCE OF OPERATION

The Vantage™ Heater is equipped with a direct spark ignition system. Operation sequence is as follows:

- Thermostat on a call for heat energizes the blower motor.
- When motor approaches nominal running RPM, the air proving pressure switch closes, energizing the control board which energizes the spark ignitor and opens the redundant gas valve.
- With normal operation as the flame is established, the spark ceases.
- If the flame is not established during the flame establishing period, the system closes the gas valve and locks out.
- If the flame is extinguished during the duty cycle, the igniter will provide one immediate retry for ignition before going into lockout.
- After lockout, control must be reset by turning down thermostat for five seconds and then raising it again to desired temperature.
- When thermostat is satisfied, all power to the unit is de-energized.

TROUBLESHOOTING

CAUTION: Before removing control housing cover for any type of service to heater, be sure that gas and electric supply to heater are turned OFF.

NO POWER TO HEATER:

1. Check to see that thermostat is calling for heat.
2. Check for blown fuse in electrical supply to heater.
3. Check for power on hot and ground leads entering heater junction box.
4. Check for loose or broken wire at heater junction box.

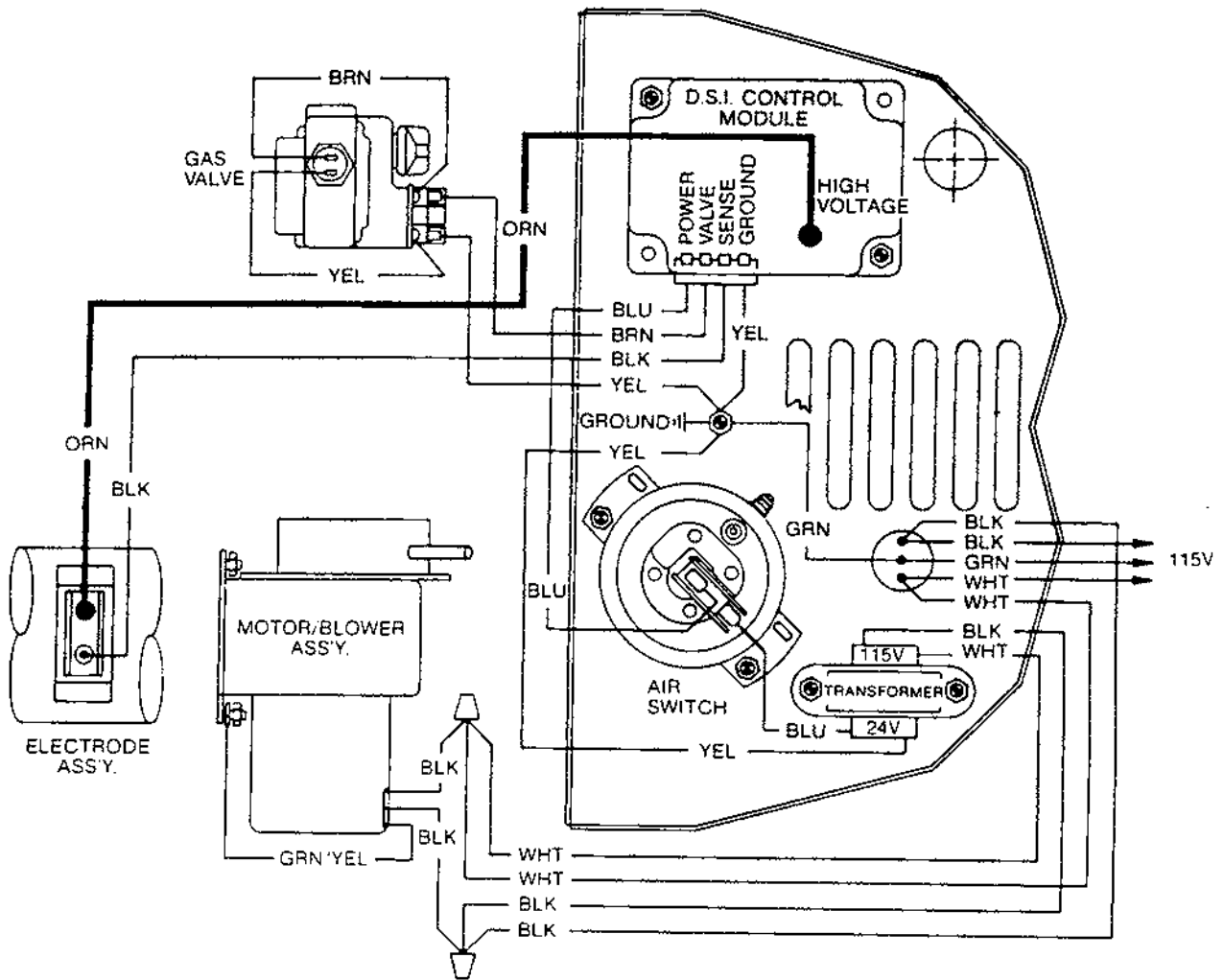
BLOWER MOTOR FAILS TO RUN:

1. Check for loose or broken wires from motor to hot and ground leads entering heater junction box.
2. Check to see if blower impeller turns freely; it may be hitting blower housing or motor shaft may be seized. Adjust to free impeller or repair or replace blower motor.

NO SPARK:

With gas to heater turned OFF, set the thermostat above room temperature. When blower motor attains running speed the air proving pressure switch energizes the spark module. The spark electrode may be observed by looking through the observation window of the burner control housing. Spark should appear as a bright blue arc across the electrodes. Spark duration is only a few seconds since main flame is not established, so recycling of the thermostat may be necessary for observation purposes. If no spark appears:

1. Check for loose or broken leads from air proving pressure switches.
2. Check for carbon bridge or broken porcelain insulator on spark electrode.
3. Check spark electrode gap: should be .125 inches.
4. Check leads from electrode for loose connections or frayed insulation.
5. Replace direct spark ignition module if defective; module is not field repairable.



- NOTES:**
1. 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 105° C.
 2. Each burner must be electrically grounded in accordance with National Electrical Code ANSI 70-1987.
 3. For low voltage thermostat and/or parallel burner operation see Wiring Diagram, Figures 14, or 15, Page 18.

INTERNAL WIRING DIAGRAM
Figure 24

NO GAS PRESENT

Set thermostat above room temperature. When blower attains running speed, air proving pressure switch energizes main gas valve. If no gas flow or flame is established:

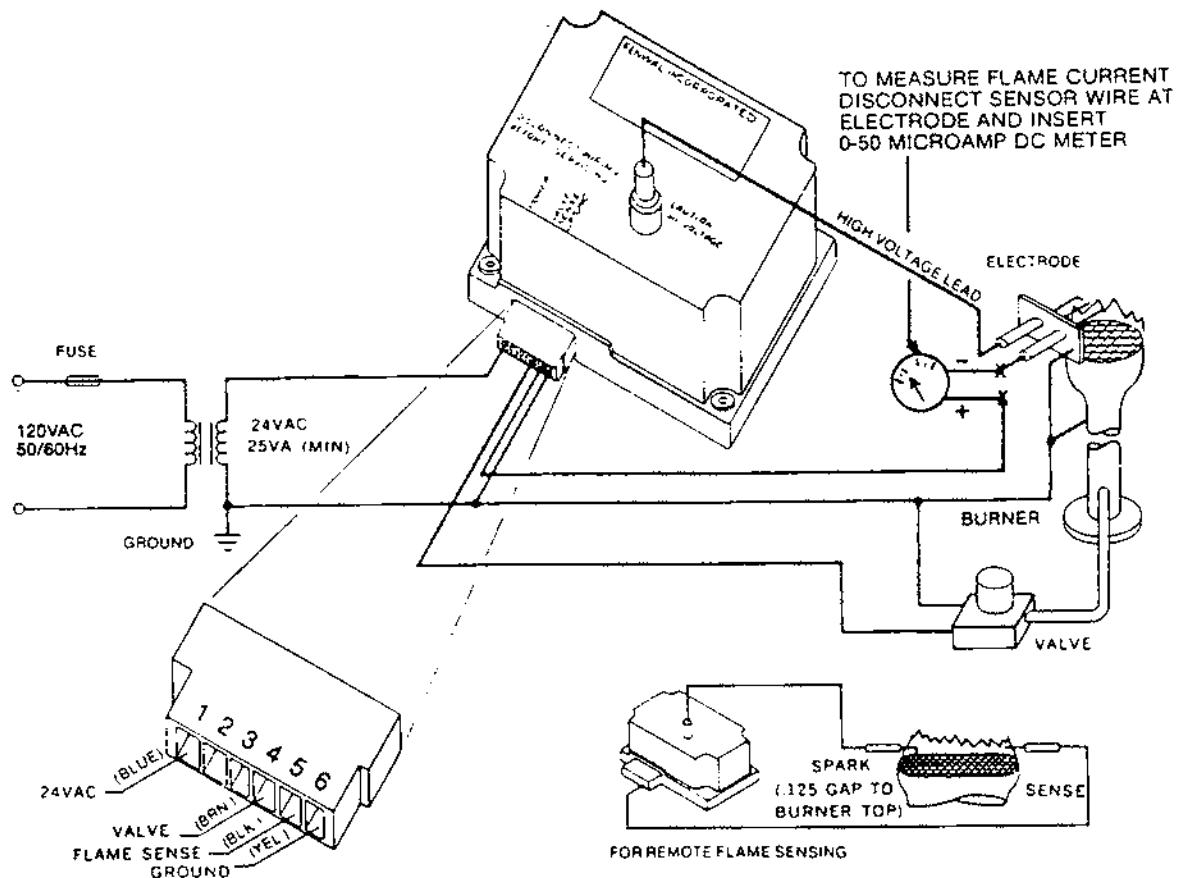
1. Check to see that manual gas supply valve to heater is ON.
2. Check to see that dial knob on redundant valve in control housing is turned to ON.
3. Check for gas pressure at 1/8" NPT Gauge tapping upstream of burner control.
4. Check for loose or broken wire leads from air proving pressure switches.
5. Check for loose or broken wire leads from gas valve to circuit board.
6. Replace defective gas valve.
7. Replace direct spark ignition module. Module is not field repairable.

FENWAL CONTROL (see Figure 25)

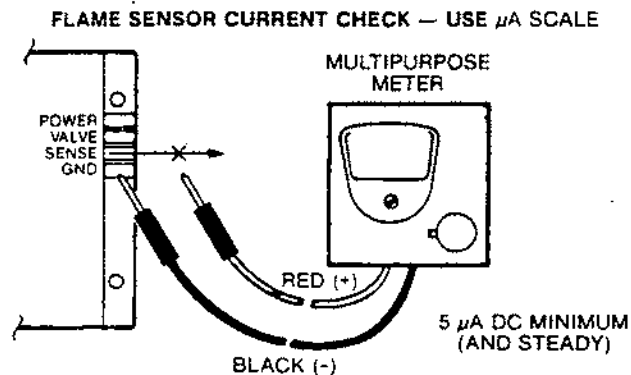
Flame current is the current which passes through the flame from the sensor to ground to complete the primary safety circuit. The minimum flame current necessary to keep the ignitor from lockout is five microamps. To measure flame current, DISCONNECT INPUT VOLTAGE then remove low voltage sensing lead wire from electrode terminal and insert a 0-50 DC microamp meter in a series with the sensor probe and sensor wire. Meter reading should be 5 microamps or higher (see Figure 25).

If meter reads below "0" on scale, the leads are reversed. Disconnect power and reconnect leads for proper polarity.

If the flame current reading is less than 5 microamps, reposition the electrode in the flame to get a higher reading.



FENWAL CONTROL
Figure 25



FLAME CURRENT MEASUREMENT

Figure 26

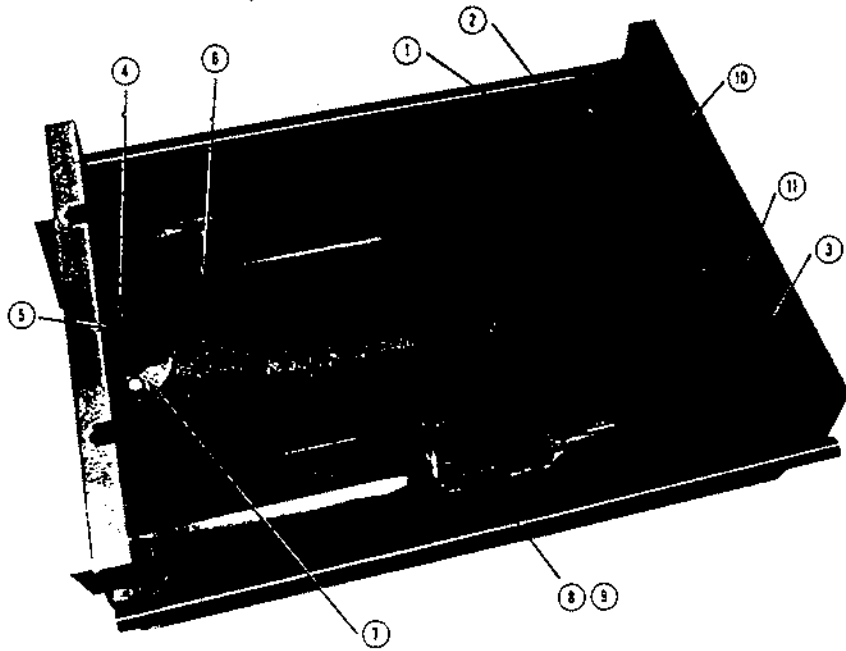
MAINTENANCE

For best performance, maintenance procedures should be performed before each heating season.

- Be sure gas and electric supply to heater are turned OFF before performing any service or maintenance on heater.
- Open control housing cover.
- Check condition of blower scroll and motor. Dirt and dust may be blown out with compressed air or a vacuum cleaner may be used.
- Remove burner and check its condition (see below). Clean or replace as necessary.
- Make visual check of electrode. Replace if there is excessive carbon residue, erosion of electrodes, or other defects. Gap should be .125 inches.
- Check to see that burner observation window is clean and free of cracks or holes. Clean or replace as necessary.
- Check inside of firing tube with flashlight. If carbon or scale are present, scrape out deposits with wire brush on rod or metal plate attached to wooden pole.
- Check firing tube inside and out for holes or cracks. Replace firing tube if any cracks are found.
- Check flue pipe for soot or dirt or any obstruction to the outdoors. After cleaning as necessary, reattach flue pipe.
- Outside surfaces of heater may be cleaned with damp cloth.
- Check for leaks with soap solution on any pipe joints that were disconnected during maintenance procedure before putting heater back in service.
- Check performance of heater and visually observe flame for proper flame characteristics.
- A qualified service agency should be contacted for service other than routine maintenance.

PROCEDURE TO REMOVE BURNER (see Figures 27 and 28)

- Remove gas connector from heater.
- Open housing cover.
- Disconnect wires between blower, valve, igniter/sensor and front component partition.
- Remove (6) screws holding burner housing top to burner tube partition (Figure 28, Item *A).
- Remove partition with control components and housing from burner; this exposes the blower and burner.
- Remove blower from burner tube.
- Remove burner.
- To reassemble, reverse above steps.



Items 12, 13, 14 internal to assembly (not shown).

**VANTAGE BURNER AND CONTROL HOUSING
(ITEM 15 REMOVED)
Figure 27**

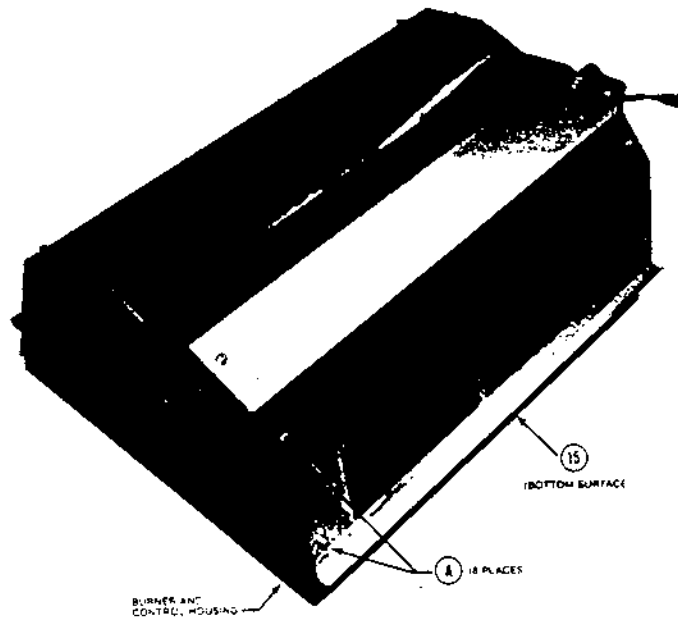


Figure 28

VANTAGE™ REPLACEMENT PARTS (REFER TO FIGURES 27 and 28)

ITEM	DESCRIPTION	PART No.
1	Motor/Blower Assembly	02517400
2	Transformer	02535700
3	Fenwal DSI Control Module	90427302
4	Fenwal Electrode	90427400
5	Electrode Mounting Package (Includes bracket, gaskets and hardware)	02516200
6	Ignition Cable Assembly	90434800
7	Mica Window Package (Includes ring, window, gasket and hardware)	02519600
8	Gas Valve (LP Gas)	90031100
9	Gas Valve (Natural Gas)	90031200
10	Air Sensing Switch (normally open)	90434900
11	Wire Harness	02535600
12	Burner Casting Assembly	02525200
13	Orifice Adaptor	02591800
14	Orifice CTH1-80 Natural	91910418
	Orifice CTH1-80 L.P.	91910437
	Orifice CTH1-100 Natural	91910412
	Orifice CTH1-100 L.P.	91910433
	Orifice CTH1-125 Natural	91910403
	Orifice CTH1-125 L.P.	91910430
	Orifice CTH1-150 Natural	91910496
	Orifice CTH1-150 L.P.	91910428
15	Control Housing Door	02567401

VANTAGE OPTIONS

DESCRIPTION	PART No.	DESCRIPTION	PART No.
10 Foot Extension Package (Hot rolled steel tube)	02519201	Conversion Kit CTH1-150 LP to Natural	02519904
10 Foot Extension Package (Aluminized steel tube)	02519202	Conversion Kit CTH1-150 Natural to LP	02519905
90° Elbow Package	02718700	Conversion Kit CTH1-125 LP to Natural	02519700
180° "U" Bend Package	03011000	Conversion Kit CTH1-125 Natural to LP	02519800
8 Foot Side Extension Reflector	02712700	Conversion Kit CTH1-100 LP to Natural	02519902
Side Extension Reflector Support	01329910	Conversion Kit CTH1-100 Natural to LP	02518302
Outside Air Adapter Package	02527901	Conversion Kit CTH1-80 LP to Natural	02519901
Outside Air Vent Cap	90502300	Conversion Kit CTH1-80 Natural to LP	
Vent Terminal — Tjernlund	90502100		
Vent Terminal Adaptor (use with Tjernlund Vent Terminal)	90502600		
Vent Terminal Package (non-combustibles wall)	02537800		
Draft Hood, Six Inch	90502400		
Four to Six Inch Adaptor (use with Draft Hood)	90502500		
Line Voltage Thermostat	90411300		
Low Voltage Thermostat (use with relay 90417600)	90425100		
Relay (use with Low Voltage Thermostat)	90417600		

**ROBERTS-GORDON, INC.
LIMITED WARRANTY**

WARRANTY COVERAGE: ROBERTS-GORDON, INC. ("Seller") warrants that entire heating systems sold by it (individually a "System") and any replacement parts which it sells relating to any System ("Parts") shall be free from defects in workmanship and material for the time periods described as follows. With respect to a System this warranty shall apply for a period of three years from delivery to the original purchaser ("Buyer"). With respect to Parts, this warranty shall apply for the longer of the original System warranty period or for a period of one year. ("Systems" and "Parts" are hereinafter collectively referred to as "Products".) This warranty extends only to the original purchaser of Products.

Seller manufactures products which are designed only to provide predetermined ranges of heat rises in various enclosures when properly used in systems designed by purchaser or others and installed by others. Seller makes no representation or warranty with respect to the effect upon enclosure, or upon any of the contents of the enclosure, including, without limitation, all plant or animal life, kept or processed in the enclosure subject to the limitations outlined below.

WARNING: THIS WARRANTY IS VOID IF THE PRODUCTS HAVE BEEN DAMAGED DUE TO ACCIDENT, ABUSE, MISHANDLING OR ANY OTHER CAUSE WHATSOEVER OTHER THAN DEFECTS IN MATERIAL OR WORKMANSHIP. Specifically, Seller's warranty shall not apply: (a) to damage to Products when used in an atmosphere containing halogenated hydrocarbons or other corrosive chemicals. Some compounds in the air can be ingested into the equipment and can cause an accelerated rate of corrosion of some of the Products. The use of such chemical compounds in or near the enclosure should be avoided where a longer life of the burner, tubing and other parts is desirable; (b) to Products which have been repaired or replaced with other than factory parts, modified in any way, misused or damaged, or which have been installed and used contrary to Seller's written instructions or manuals; or (c) to any damage resulting from improper service or a lack of proper maintenance.

LIMITATIONS OF WARRANTY: OTHER THAN AS STATED HEREIN OR IN ANY OTHER WRITTEN WARRANTY OF SELLER, THERE ARE NO OTHER WARRANTIES OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, AND ALL OTHER EXPRESS AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR ANY PARTICULAR PURPOSE ARE HEREBY SPECIFICALLY DISCLAIMED.

EXCLUSIVE REMEDY: THE SOLE AND EXCLUSIVE REMEDY FOR ANY LOSS, DAMAGE OR LIABILITY, OR OTHERWISE, IS LIMITED TO THE OBLIGATION OF SELLER TO REPAIR OR REPLACE PARTS. AT ITS FACTORY, OF ANY PRODUCT OWNED BY ORIGINAL BUYER AND RETURNED TO SELLER'S FACTORY WITHIN THREE (3) YEARS AFTER SHIPMENT TO JOB SITE IN THE CASE OF SYSTEMS AND WITHIN ONE (1) YEAR AFTER SHIPMENT TO JOB SITE IN THE CASE OF PARTS, TRANSPORTATION CHARGES PREPAID, WHICH EXAMINATION REVEALS TO HAVE BEEN DEFECTIVE. UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR ANY LOSS, DAMAGE, COSTS, EXPENSES, OR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, IN CONNECTION WITH THE SALE, INSTALLATION, USE, MAINTENANCE, OR REPAIR, OF ANY PRODUCT.

BUYER RESPONSIBLE FOR DATA: Seller and its representative may furnish Buyer, upon Buyer's request, data relating to the function and use of Products. Seller shall not be liable for loss, damage, cost, expenses or incidental or consequential damages of any kind, sustained directly or indirectly, by any person, or to any property, if Buyer adopts and uses such data in whole or in part.

LIMITATIONS ON AUTHORITY OF REPRESENTATIVES: No representative of Seller, other than an Executive Officer, has authority to change or extend these provisions. Changes or extensions shall be binding only if confirmed in writing by Seller's duly authorized Executive Officers.

Direct any questions or warranty claims to the original installer:

Company: _____

Address: _____

Phone: _____

Or to: Warranty Claims, ROBERTS-GORDON, INC., 1250 William Street, Buffalo, New York 14206.

WARRANTY CARD

Vantage Installation Information

Name _____
Address Where Installed _____

Phone No. _____ Person To Contact _____
Installation Date _____ Installer _____
Purchased From _____
DID THESE UNITS REPLACE AN EXISTING HEATING SYSTEM? YES NO
Type _____ BTU's Replaced _____
Vantage Units No. _____ Type _____
Serial No's. _____

Type of Application — Please Indicate

- | | | |
|---|---|--|
| <input type="checkbox"/> AIRPORT FACILITY
<input type="checkbox"/> Hangar <input type="checkbox"/> Warehouse
<input type="checkbox"/> Other _____ | <input type="checkbox"/> FARM IMPLEMENT DEALER
<input type="checkbox"/> FIRE STATION
<input type="checkbox"/> GARAGE
TYPE _____ | <input type="checkbox"/> SCHOOL
TYPE _____ |
| <input type="checkbox"/> AUTO BODY SHOP
<input type="checkbox"/> AUTO DEALER
<input type="checkbox"/> AUTO SERVICE SHOP
<input type="checkbox"/> ASSEMBLY PLANT
<input type="checkbox"/> BOTTLING PLANT OR
WAREHOUSE
<input type="checkbox"/> CAR WASH
<input type="checkbox"/> CONSTRUCTION EQUIP. DEALER
<input type="checkbox"/> FABRICATION PLANT
TYPE _____ | <input type="checkbox"/> GREENHOUSE
<input type="checkbox"/> HOCKEY RINKS
<input type="checkbox"/> HIGHWAY DEPT. BUILDING
TYPE _____
<input type="checkbox"/> LUMBER COMPANY
<input type="checkbox"/> MANUFACTURING PLANT
TYPE _____
<input type="checkbox"/> MACHINE SHOP
<input type="checkbox"/> PUBLIC BUILDING
TYPE _____ | <input type="checkbox"/> STORE
TYPE _____
<input type="checkbox"/> SWIMMING POOL
<input type="checkbox"/> TENNIS COURT
<input type="checkbox"/> TRUCKING COMPANY
<input type="checkbox"/> UTILITY COMPANY BUILDING
TYPE _____
UTILITY _____
<input type="checkbox"/> WAREHOUSE
<input type="checkbox"/> WELD SHOP
TYPE _____ |
| <input type="checkbox"/> FARM <input type="checkbox"/> Cattle <input type="checkbox"/> Dairy
<input type="checkbox"/> Horse <input type="checkbox"/> Pig <input type="checkbox"/> Poultry
<input type="checkbox"/> FARM BUILDING
TYPE _____ | <input type="checkbox"/> POST OFFICE
<input type="checkbox"/> RESTAURANT
TYPE _____ | <input type="checkbox"/> ZOO
<input type="checkbox"/> OTHER _____

_____ |



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*This Roberts-Gordon Gas-Fired
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dedicated to producing quality products.*



What you should know about Roberts-Gordon, Inc.

- Pioneer developer and manufacturer of low-intensity gas-fired infrared heaters and heating systems.
- More than 60 years experience in the heating equipment industry.
- We cherish and work hard to protect our reputation for quality products.



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