GORDON-RAY

VENTED INFRARED
RADIANT TUBE GAS HEATER

MODEL

RTH-W50

SPECIFICATIONS
INSTALLATION, OPERATION, SERVICE
& SPARE PARTS

Roberts
Gordon

Appliance Corp.
Subsidiary of A.J. Industries Inc.
Buffalo, New York 14240

Quality Gas Heating Equipment for over 50 Years

COMPLIES WITH NATIONAL SAFETY STANDARDS
AMERICAN GAS ASSOCIATION
DESIGN-CERTIFIED

Form No. F 1796-E (REV 1-85)

UNPACKING THE HEATER

Remove the heater carefully from the shipping carton so as not to damage any components. The unit is inspected and tested at the factory before shipment and is delivered to the carrier in good condition. Check the heater for possible damage in shipment. In case of damage, the carrier should be contacted immediately.

GENERAL INFORMATION

It is important that these instructions and all applicable specifications be read in their entirety before proceeding.

This heater is intended for heating non-residential indoor spaces. Installation of this heater must comply with local codes and recommendations of the local gas company, and the National Fuel Gas Code, ANSI Z223.1-1984 (same as Bulletin #54). Units must be electrically grounded in accordance with the National Electrical Code, ANSI/NFPA 70-1984. Installation in (1) aircraft hangars must be in accordance with the standard for Aircraft Hangars, ANSI/NFPA 409-1979 and (2) garages in accordance with the standard for Parking Structures, NFPA 88A-1979 or the standard for Repair Garages NFPA 88B-1979.

For locations where there is the possibility of exposure to combustible airborne materials or vapor, consult the authorities having local jurisdiction to obtain approval for proposed installation. The authorities with local jurisdiction are usually the Fire Marshal and fire insurance carrier.

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. Local authorities such as Building Inspections or Fire Marshals should be consulted for guidance in this matter.

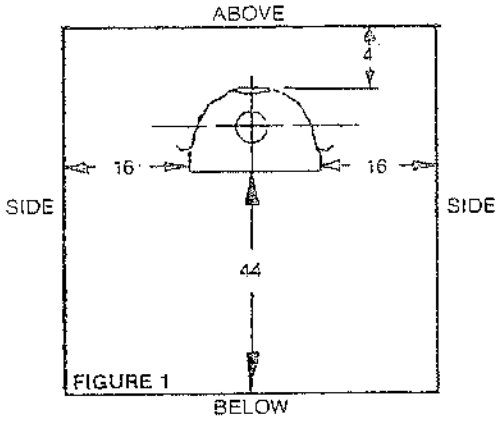
STALLATION IN PUBLIC GARAGES

In accordance with the standard for parking structures NFPA 88A-1979 or the standard for repair garages NFPA 88B-1979.

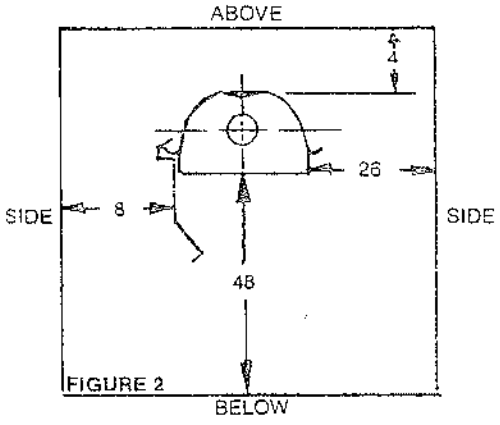
1. Heaters shall be installed in accordance with their listings and not less than eight feet above the floor. Minimum clearances to combustibles must be maintained from vehicles parked below the heater.
2. When installed over hoists, clearance to combustible must be maintained from top of vehicle on hoist or in elevated position.
3. 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 (NFTA No. 54 ANSI Z223.1-1984). IMPORTANT: Heaters should be placed so they will be readily accessible for maintenance.

CLEARANCE TO COMBUSTIBLES WITH STANDARD REFLECTOR AND OPTIONAL REFLECTORS AS SHOWN

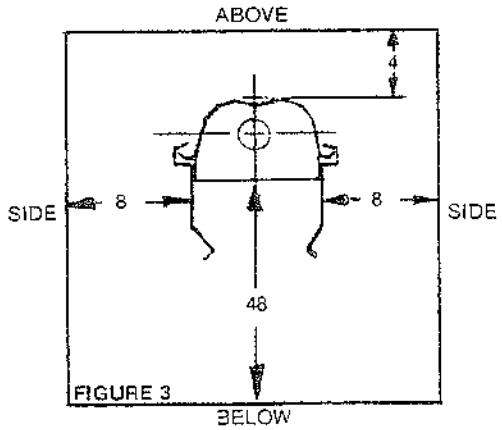
Model RTH-W50
Diagram No. 1



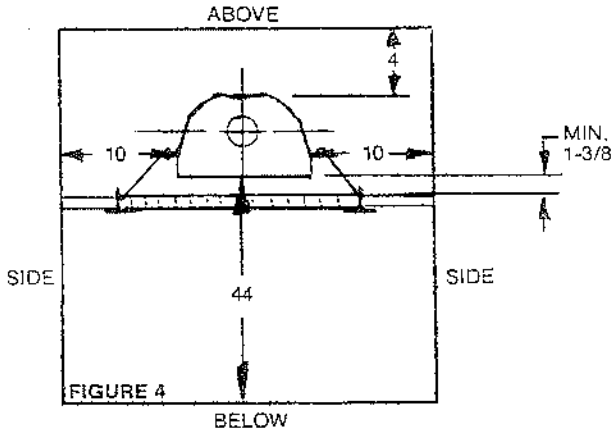
W/STANDARD REFLECTOR
OR STD. REFLECTOR
W/DECORATIVE GRILLE



W/1-SIDE EXTENSION



W/2-SIDE EXTENSIONS



W/2-FOOT CEILING
REFLECTOR

NOTE: In all situations, clearances to combustibles must be maintained.

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

GENERAL SPECIFICATIONS
Model RTH-W50

RATING: (Natural Gas) — 50,000 BTU/Hr. Input

GAS PRESSURE AT MANIFOLD:

Natural Gas ..... 3.5" W.C.
Gas Connection Size ..... 3/8" IPS

GAS INLET PRESSURE

Gas ..... Natural
Minimum ..... 4.5" W.C.
Maximum ..... 13.0" W.C.

ELECTRICAL RATING:

RTH-W50 — 120V - 60 Hz ..... Start 5.0 AMP
Run 1.5 AMP
Flue Connection Size ..... 4" O.D.
Weight of Heater ..... 150 lbs.

CLEARANCES TO COMBUSTIBLES (From Heater Surfaces)

See Diagram No. 1 on Page 2 of these Installation Instructions.

In all situations, clearances to combustibles must be maintained. (WARNING: Minimum clearance from heater must be maintained from vehicles parked below heater.)

STANDARD EQUIPMENT INCLUDES: Complete heater assembled, consisting of: burner (Stamped Steel), aluminized steel heat exchanger, fully automatic ignition (Glo-Bar), motor with thermal overload switch, balanced air rotor, combustion air proving safety pressure switches, aluminum reflector, manual gas shut-off valve, flexible gas connector, stainless steel flue baffle.

OPTIONAL EQUIPMENT: Thermostat, decorative aluminum grill, reflector side extension, thru the wall vent terminal, outside air adaptor kit, 10-foot radiant tube extension and reflector.

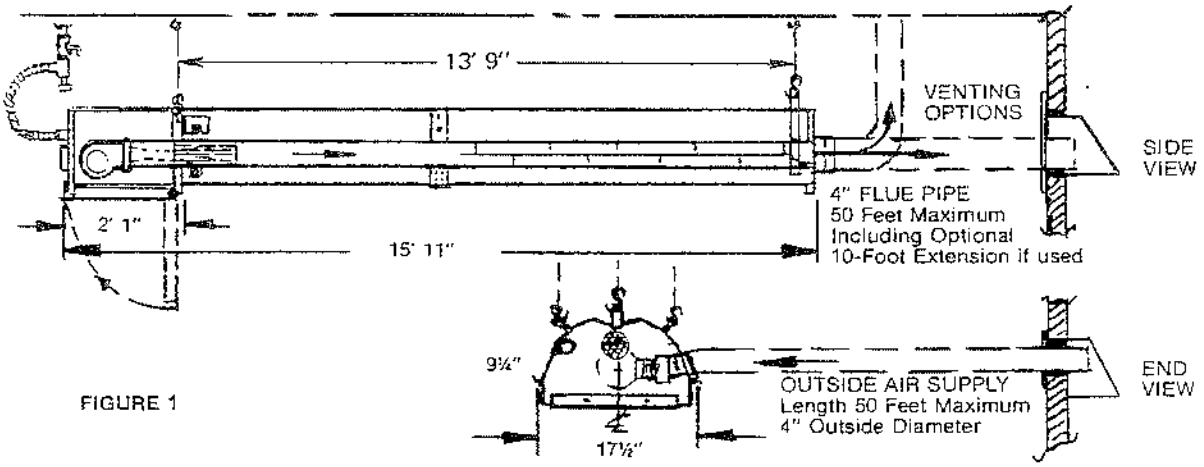


FIGURE 1

INSTALLATION IN AIRCRAFT HANGARS

Heaters must be installed in accordance with specification, ANSI/NFPA 409-1979 and with special consideration for the following:

1. 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.)
2. 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.
3. Heaters installed in aircraft hangars shall be so located 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.

INSTALLING THE HEATER

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, provide for accessibility for service, combustion and ventilating air supply as specified in ANSI Z223.1 National Fuel Gas Code.

HANGING THE HEATER

Suspension straps and "S" hooks provided with the heater should be used as the only suspension points. Chain should be used to support the unit between the ceiling and suspension straps provided. Chain should have a load rating of at least 150 lbs. at each suspension point. For instructions on mounting height and locations of heaters, refer to installation plans or supplier of equipment.

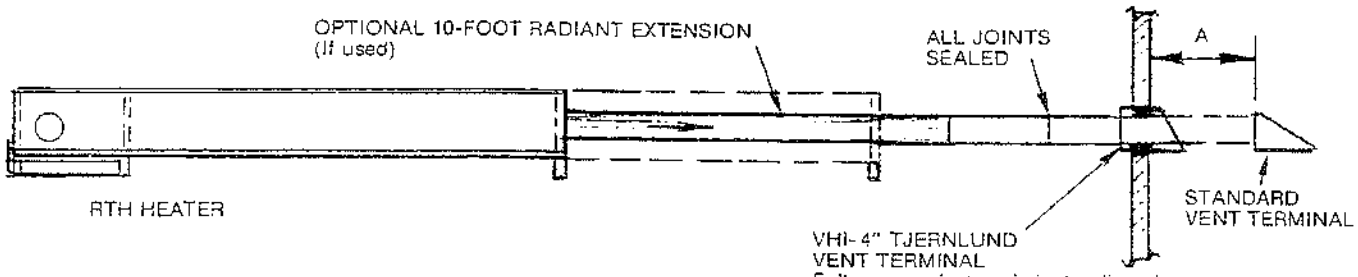
VENTING

The venting must be installed in accordance with specification ANSI Z223.1 (NFPA No. 54). Partial information relating to this specification is provided in this section with regard to size and configurations for venting arrangements. (See following tables and Diagram Nos. 2, 3, and 4.) For complete information consult ANSI Z223.1 and local codes.

1. Be sure that method selected for venting heater complies with all codes as required for each particular location.
2. Exhaust end of heater will accept a 4 inch flue pipe.
3. Heater may be vented to the outdoors either vertically or horizontally.
4. If heater is to be vented horizontally:
   a.) Vent must exit building not less than 7 feet above grade when located adjacent to public walkways.
   b.) Vent must terminate at least 3 feet above any forced air inlet located within 10 feet.
   c.) Vent shall terminate at least 4 feet below, 4 feet horizontally from or 1 foot above any door, window or gravity air inlet into building.
   d.) Vent terminal shall be located at least 12 inches from any opening through which vent gases could enter a building.
5. Vent terminal opening must be beyond any combustible overhang.
6. Any portion of flue pipe passing through a combustible wall must be dual insulated or an approved thimble must be used (refer to ANSI Z223.1).
7. Maximum flue length may be a total of 50 feet (including optional 10-foot radiant tube extension if used). Do not use more than two 90° elbows.
8. If condensation in the flue is a problem the flue length should be shortened or insulated.

VENTING OPTIONS
Model RTH-W50

HORIZONTAL VENTING
Diagram No.2

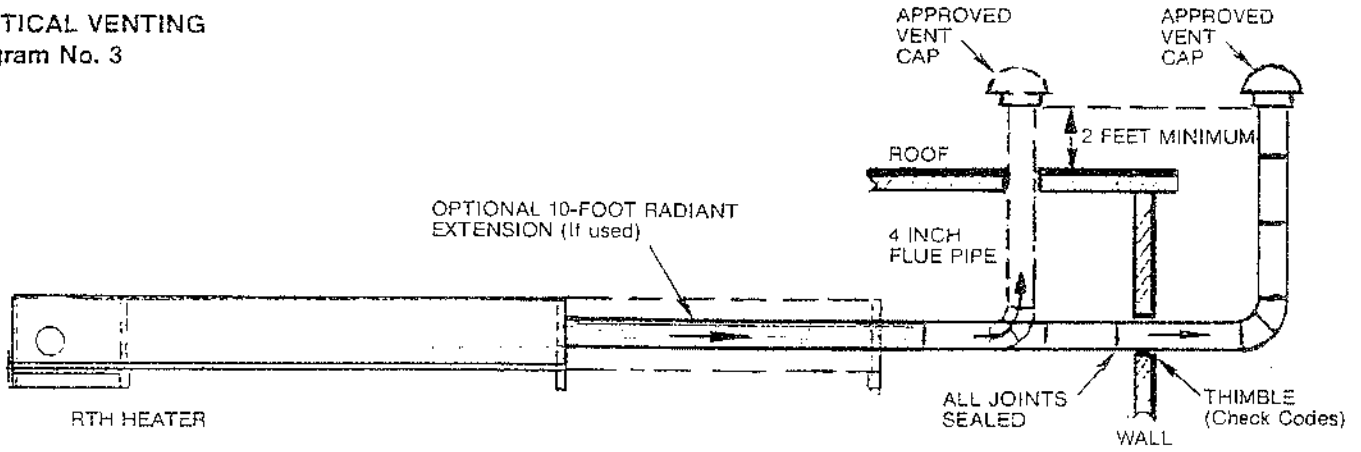


Follow manufacturer's instructions for proper installation.

4 inch O.D. Flue Pipe recommended, length 30 feet. Up to 50 feet maximum may be used if insulated in order to prevent excessive condensation. Length includes optional 10-foot extension.

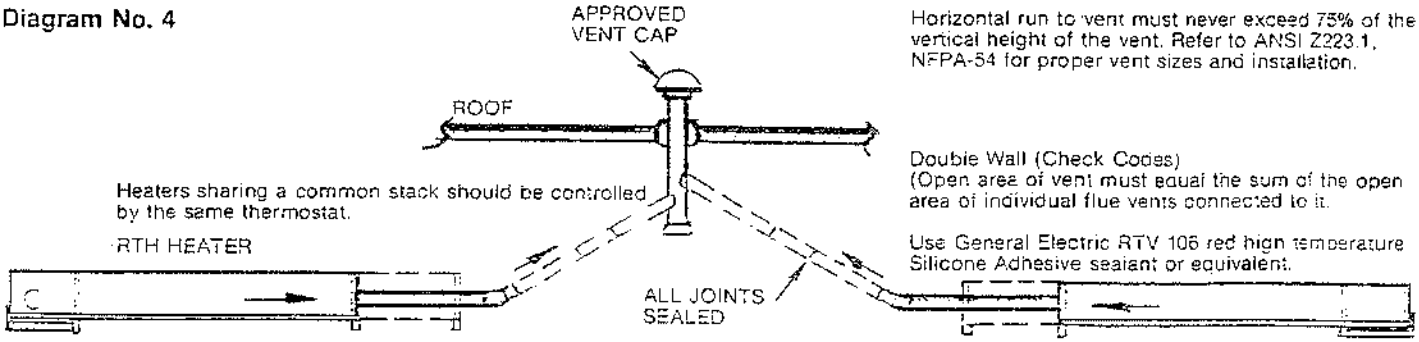
If standard vent terminal is used, dimension "A" must be maintained at 18 to 24 inches from wall.

VERTICAL VENTING
Diagram No. 3



Recommended flue pipe length 30 feet. Up to 50 feet maximum may be used if insulated in order to prevent excessive condensation, length includes optional 10-foot extension.

COMMON VENTING
Diagram No. 4



Horizontal run to vent must never exceed 75% of the vertical height of the vent. Refer to ANSI Z223.1, NFPA-54 for proper vent sizes and installation.

Double Wall (Check Codes)
(Open area of vent must equal the sum of the open area of individual flue vents connected to it.

Use General Electric RTV 106 red high temperature Silicone Adhesive sealant or equivalent.

At least 1/4 inch per foot rise or pitch must be maintained on horizontal runs from heater to vent.

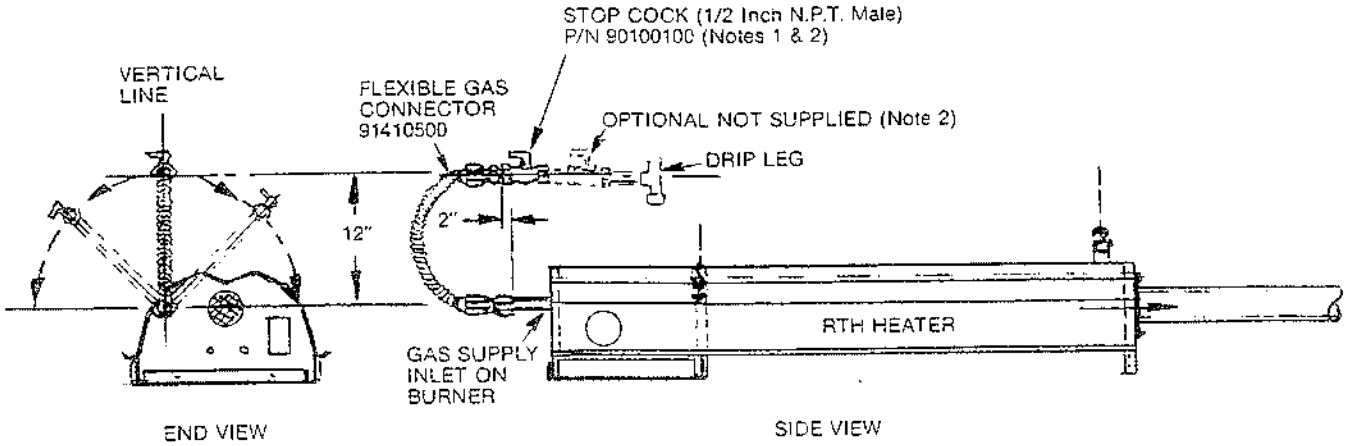
GAS PIPING

1. Check meter to be sure it is large enough to handle all the gas appliances on the line, including this heater. If necessary, request gas company to install a larger meter.
2. 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 Capacity Cu. Ft./Hr. — Specific Gravity 0.6 Pressure Drop — 0.5 Inches Water Column

Pipe Size (Inches)	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

3. All pipe should be properly supported by using suitable pipe hanging materials.
4. Wrought iron or wrought steel pipe and malleable iron fittings are recommended. All pipe and fittings should be new and free from defects.
5. Ends of pipes and tubing should be carefully reamed to remove obstructions or burrs.
6. Use a special compound in making all pipe connections. Compound should be of a type that is suitable for LP Gas.
7. Install a drip leg ahead of the heater to prevent foreign matter and moisture from entering the heater controls.
8. A 1/8 inch N.P.T. plugged tapping should be installed immediately upstream of the gas supply connected to the heater, accessible for test gage connection.
9. All gas piping is to be in accordance with the National Fuel Gas Code Z223.1, local codes, and gas company regulations.
10. 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.
    CAUTION: For high pressure testing of gas piping, disconnect completely, all burner units and shut-off cocks supplied with same; then install pipe cap on system and conduct test. Failure to follow this procedure will exceed pressure rating of both burner gas controls and shut-off cock and will require complete replacement of these parts.
11. Gas Connector:
    IMPORTANT: The flexible gas connector furnished with the heater must be used to connect the heater to the gas line.
    WARNING: There is expansion of the radiant tube with each firing cycle and this will cause the heater 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 Diagram No. 5 below.



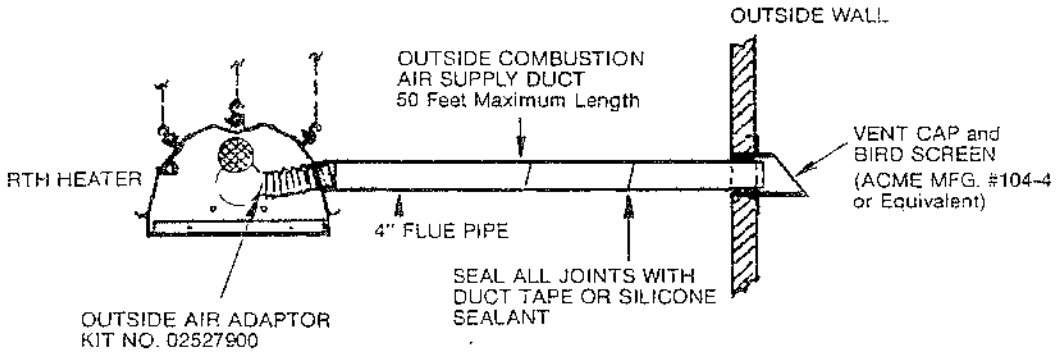
NOTES 1. Stop Cock (P/N 90100100) must be parallel to 1/2 inch burner inlet pipe.
2. High pressure stop cock as supplied by the installer if required.

Diagram No. 5

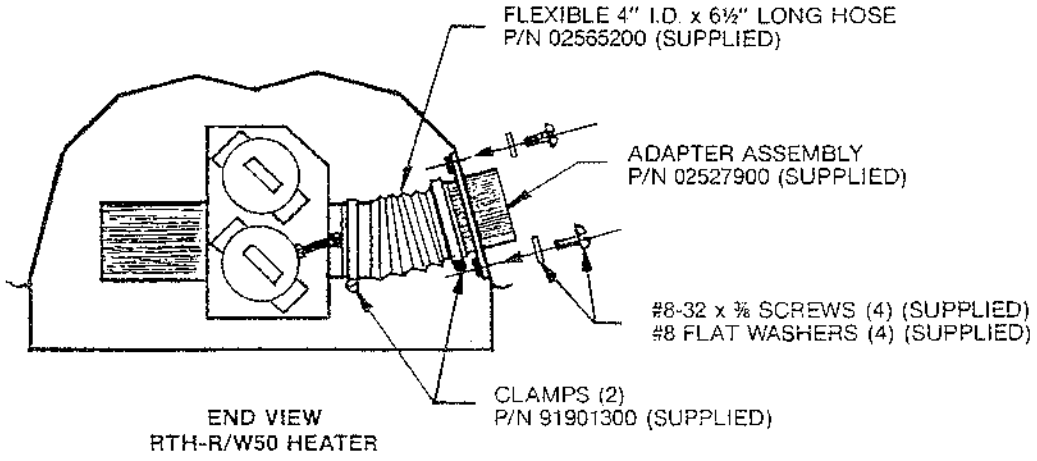
COMBUSTION AIR SUPPLY

1. If indoor combustion air is supplied to the heater in a tightly closed room, one square inch of free area opening should be provided for each 1;000 BTUH of heater input, but not less than 100 Sq. In. One opening should be within 12 inches of the top and one within 12 inches of the bottom of the enclosure.
2. If the building has a slight negative pressure or contaminants in the air are present, then outside combustion air may be supplied to the heaters using the optional outside air adapter kit.
3. A duct of 4 inches O.D. flue pipe may be attached to the heater outside air adaptor. The duct may be up to 50 feet in length maximum with no more than two 90° elbows in its total length.
4. Air supply duct may have to be insulated to prevent condensation on outer surface.
5. Air inlet vent cap should be securely fastened to outside wall by drilling (4) ¼" diameter holes in outside flange; wood screws or bolts and expansion sleeves may be used as a fastening means.

Diagram No. 6



OUTSIDE AIR SUPPLY
ADAPTER PACKAGE
P/N 02527901



END VIEW
RTH-R/W50 HEATER

FIELD WIRING

ELECTRICAL

Heaters are normally controlled by thermostats (see Diagram No. 7). Line voltage thermostats are wired directly; the recommended 24 volt thermostats use a relay per Diagram No. 8. Heaters must be grounded in accordance with National Electrical Code ANSI/NFPA 70-1984.

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

NOTE: 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.

NOTE: For wiring line voltage thermostat White Rodgers P/N 176-12 (RG 904-113) use terminals "B" and "R" and jumper terminal "W" to "R".

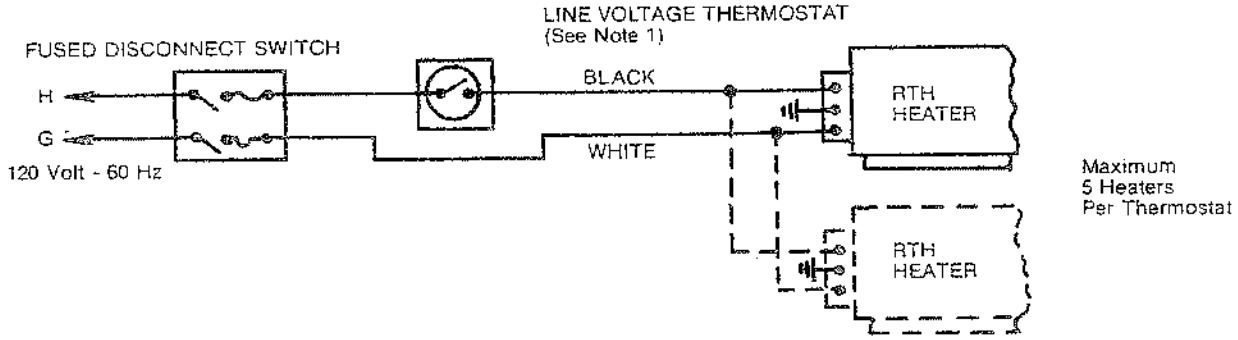


Diagram No. 7
"FIELD" WIRING OF LINE VOLTAGE THERMOSTAT

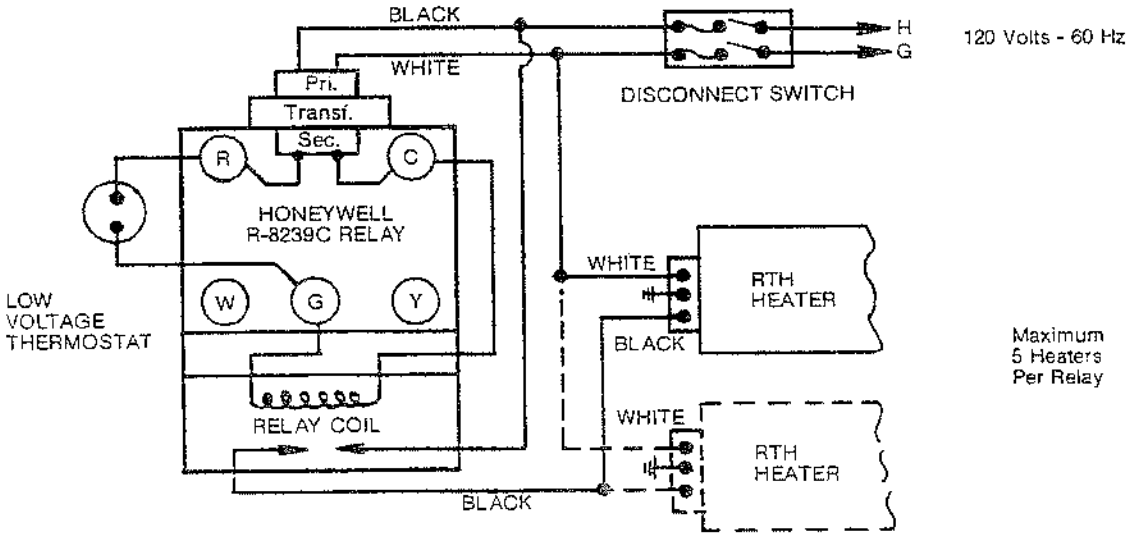
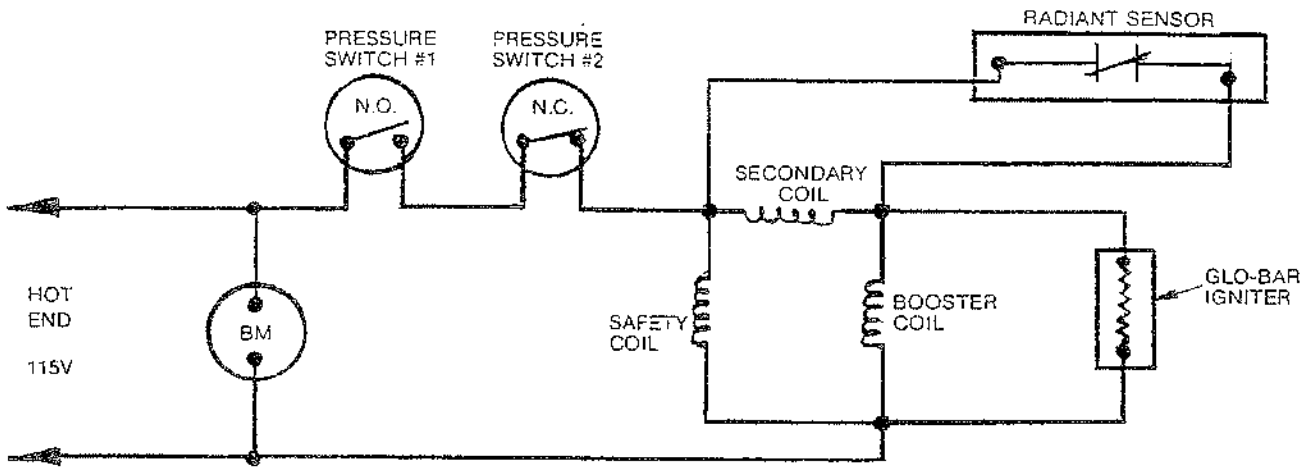


Diagram No. 8
"FIELD" WIRING OF LOW VOLTAGE THERMOSTAT AND RELAY

WIRING DIAGRAM No. 9
INTERNAL BURNER CIRCUIT
RTH-W50 HEATER
GLO-BAR IGNITION



SEQUENCE OF OPERATION

On a call for heat by the thermostat the blower motor is energized. As air pressure is established pressure switch #1 closes its contacts and allows current to flow through the closed contacts of pressure switch #2 and radiant sensor and Glo-Bar to ground (2), the safety and booster coil of the first of two redundant valves are also energized through the contacts of the radiant sensor. This allows the first valve to open and the Glo-Bar to heat. However, there is no gas flow until the second redundant valve is energized.

When the Glo-Bar reaches ignition temperature, the radiant sensor contacts open (maximum 60 seconds). The second redundant valve, in series with the Glo-Bar is opened and the gas is ignited by the Glo-Bar.

The secondary coil in series with the Glo-Bar causes the Glo-Bar to cool, however, radiant heat emitted from the burner flame causes the contacts of the radiant sensor to remain open. The booster coil of the first valve is placed in series with the secondary coil and a low current results in the coil. Current in the safety coil is only sufficient to hold the first valve open. A momentary power failure would cause the first valve to close, shutting off the gas supply to the burner. When power is restored, the safety coil alone is not sufficient to reopen the valve. As a result the radiant sensor cools, closing its contacts and recycling occurs (60 seconds maximum).

SERVICE INSTRUCTIONS
Model RTH-W50
GLO-BAR IGNITION

CAUTION: Before removing control housing cover for any type of service to heater be sure that GAS and ELECTRIC suppiy 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.
3. Blower motor defective (replace).

BLOWER OPERATES, NO GLO-BAR IGNITION:

1. Loose or broken wires to Glo-Bar ignitor.
2. Broken or defective Glo-Bar ignitor (replace).
3. Combustion air inlet blocked.
4. Heater flue outlet blocked.
5. Lines to pressure switches plugged.
6. Loose or broken wires to pressure switches.
7. Defective air proving pressure switches (replace).
8. Radiant sensor contacts open (replace).

BLOWER OPERATES, GLO-BAR HEATS UP; AFTER 45 SECONDS GLO-BAR SHUTS OFF:

1. Check gas supply to heater. See that manual gas cock is open.
2. Check burner orifice for blockage.
3. Check for loose wires to valve.
4. Defective valve (replace).

BLOWER OPERATES, GLO-BAR HEATS UP; GLO-BAR STAYS ON AFTER 1 MINUTE; NO BURNER FLAME IGNITION:

1. Dirt or soot on radiant sensor windows (clean as necessary).
2. Radiant sensor misaligned with window (does not see flame).
3. Radiant sensor contacts remain closed (replace radiant sensor).

MAIN FLAME COMES ON; CYCLES OFF AFTER 1 MINUTE:

1. Check radiant sensor for soot or dirt.
2. Radiant sensor misaligned with window.
3. Low gas pressure.
4. Restricted main orifice.

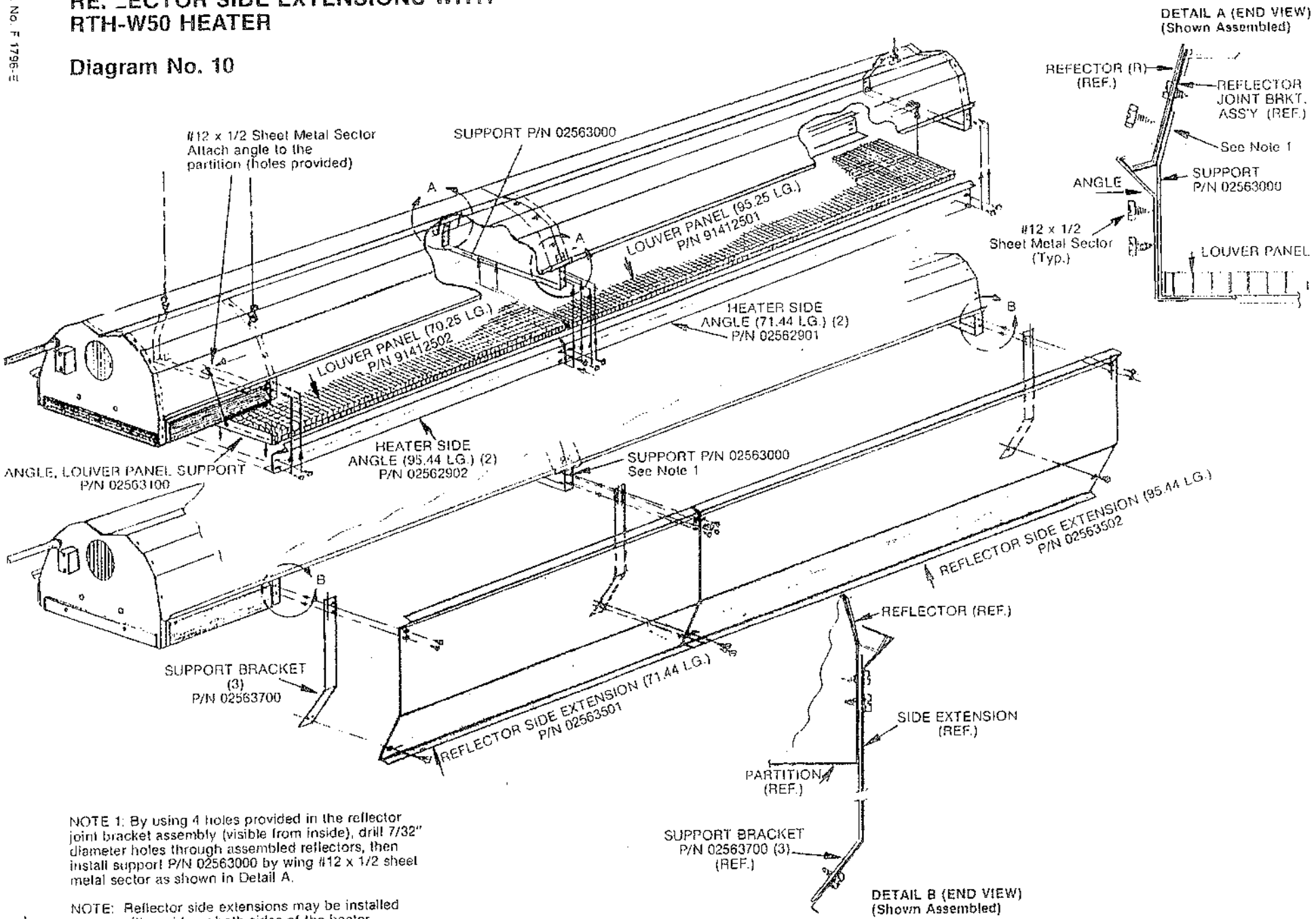
MAINTENANCE

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

1. Be sure gas and electric supply to heater are turned OFF before performing any service or maintenance on heater.
2. Open control housing cover.
3. Check condition of blower scroll and motor. Dirt and dust may be blown out with compressed air or a vacuum cleaner may be used.
4. Remove burner and check its condition. Clean or replace as necessary.
5. Make visual check of Glo-Bar ignitor. Check wires for any damage to insulation. If Glo-Bar is broken or cracked, replace Glo-Bar.
6. Check to see that burner observation window and sensor window are clean and free of cracks or holes. Clean or replace as necessary.
7. Remove rear baffle from firing tube. Brush it clean if any scale or soot deposits are found on baffle.
8. With baffle removed, 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.
9. Check firing tube inside and out for holes or cracks. Replace firing tube if any are found.
10. Replace rear flue baffle and baffle retaining screw.
11. Check flue pipe for soot or dirt or any obstruction to the outdoors. After cleaning as necessary, reattach flue pipe.
12. Outside surfaces of heater may be cleaned with damp cloth.
13. Check for leaks with soap solution on any pipe joints that were disconnected during maintenance procedure before putting heater back in service.
14. Check performance of heater and visually observe flame for proper flame characteristics.
15. A qualified service agency should be contacted for service other than routine maintenance.

RE. _ECTOR SIDE EXTENSIONS WITH RTH-W50 HEATER

Diagram No. 10



NOTE 1: By using 4 holes provided in the reflector joint bracket assembly (visible from inside), drill 7/32" diameter holes through assembled reflectors, then install support P/N 02563000 by wing #12 x 1/2 sheet metal sector as shown in Detail A.

NOTE: Reflector side extensions may be installed either side or both sides of the heater.

REPLACEMENT PARTS FOR RTH-W50

ITEM	DESCRIPTION	PART NO.
1	Motor/Blower Assembly	02517400
2	Normally Closed Pressure Switch	90433600
3	Normally Open Pressure Switch	90433700
4	Burner Assembly	02528700
5	Orifice Adapter	02593100
6	Orifice (#29 Drill)	91911629
7	Valve — White Rogers	90032200
8	Ignitor	90434300
9	Wire Harness	01327900
10	Radiant Sensor	90434400
11	Mica Window	02553200
12	Mica Window Gasket	02558501
13	Sensor Mounting Bracket	02529300
14	Sensor Mounting Bracket Gasket	02564900

ACCESSORIES

DESCRIPTION	PART NO.
Decorative Grill Package	02517700
Side Extension Package	02517800
Outside Air Adaptor Package	02527901
Radiant Tube Extension Package	02528601
Thru-the-Wall Vent Terminal	90502100