1.0 INSTALLATION

1.1 Mounting

Perimeter mounting of these infrared heaters provides for the most efficient installation. In Figures 1-1 and 1-2, the heaters are mounted around the perimeter of the space to be heated. Refer to the Installation Chart for the recommended distances on the models being installed.

Buildings that require the rows of heaters to be farther apart than the recommended distance in the Installation Chart may need additional heaters placed in the center of the space as in Figure 1-2. When positioning heaters, keep in mind the clearances-to-combustible materials, lights, sprinkler heads, overhead doors, storage areas with stacked materials, gas and electrical lines, parked vehicles, cranes, etc. Refer to the warnings, cautions and the clearance-to-combustibles chart on the previous page to verify that a safe installation condition exists.

Typical exhauster, air intake louvre and thermostat locations are shown on the sample buildings in figure 1-1 and 1-2.

DR Heater Installation Chart

Model No.	Mounting Height (Dimension A)				Distance Between Heaters (Dimension B)		Distance Between Heater Rows (Dimension C)		Distance Between Heater and Wall	
	30º Angle Standard Reflector		30º Angle Parabolic Reflector							
	Ft.	Meter	Ft.	Meter	Ft.	Meter	Ft.	Meter	Ft.	Meter
DR 30(S)	12 - 14	3.7-4.2	12 - 15	3.7-4.6	8 - 30	2.4- 9.1	10 - 70	3.0-21.3	6	1.8
DR 45	12 -14	3.7-4.2	16 - 19	4.9-5.8	14 - 40	4.2-12.2	14 - 80	4.2-24.2	10	3.0
DR 50	12 - 14	3.7-4.2	17 - 20	5.2-6.1	14 - 40	4.2-12.2	14 - 80	4.2-24.2	10	3.0
DR 60	14 - 16	4.2-4.9	18 - 21	5.5-6.4	15 - 43	4.6-13.1	15 - 90	4.6-27.4	12	3.7
DR 75	15 - 17	4.6-5.2	19 - 22	5.8-6.7	16 - 50	4.9-15.2	20 - 100	6.1-30.5	12	3.7
DR 80	15 - 17	4.6-5.2	19 - 22	5.8-6.7	16 - 50	4.9-15.2	20 - 100	6.1-30.5	12	3.7
DR 90	16 - 18	4.9-5.5	21 - 25	6.4-7.6	20 - 55	6.1-16.8	20 - 100	6.1-30.5	12	3.7
DR 100	17 - 20	5.2-6.1	23 - 27	7.0-8.2	20 - 60	6.1-18.3	20 - 120	6.1-36.6	12	3.7
DR 130	21 - 24	6.4-7.3	26 - 32	7.9-9.8	22 - 65	6.7-19.8	23 - 140	7.0-42.7	14	4.2
DR 160	24 - 28	7.3-8.5	29 - 35	8.8-10.7	25 - 70	7.6-21.3	25 - 160	7.6-48.8	14	4.2

NOTE: The above chart is provided as a guideline. Actual conditions may dictate variation from the above data.

Legend:


Infrared Heater


Exhauster


Thermostat


Air intake louver

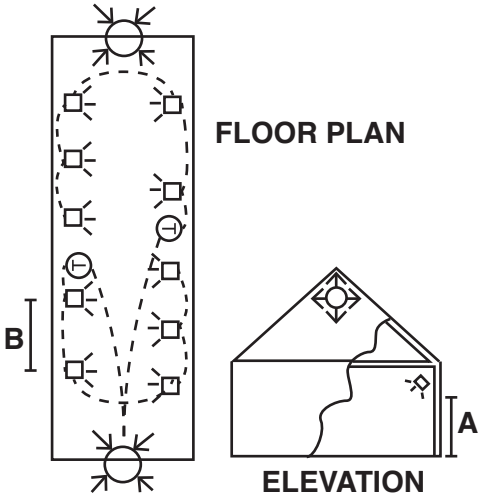

Figure 1-1
PERIMETER MOUNTING

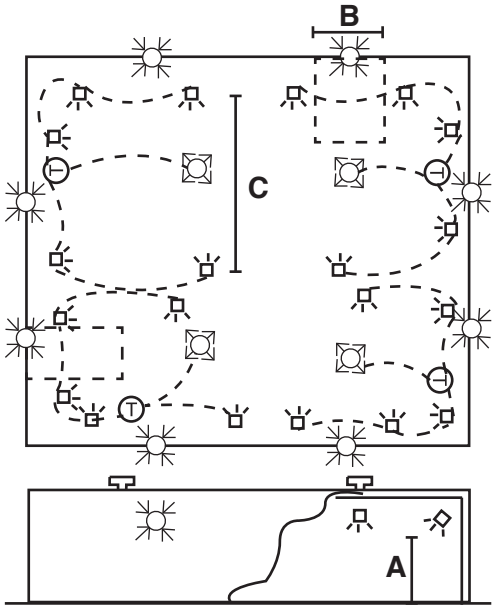

Figure 1-2
PERIMETER AND CENTER-ROW MOUNTING

Figures 1-3 and 1-4 illustrate the more commonly used methods for the mounting of heaters. Figure 1-3 shows the fastest and most economical method. Some local codes or application conditions, such as drafts that could cause units to swing, stipulate that if flexible gas connectors are used then the heater **must** be rigidly mounted (Figure 1-4).

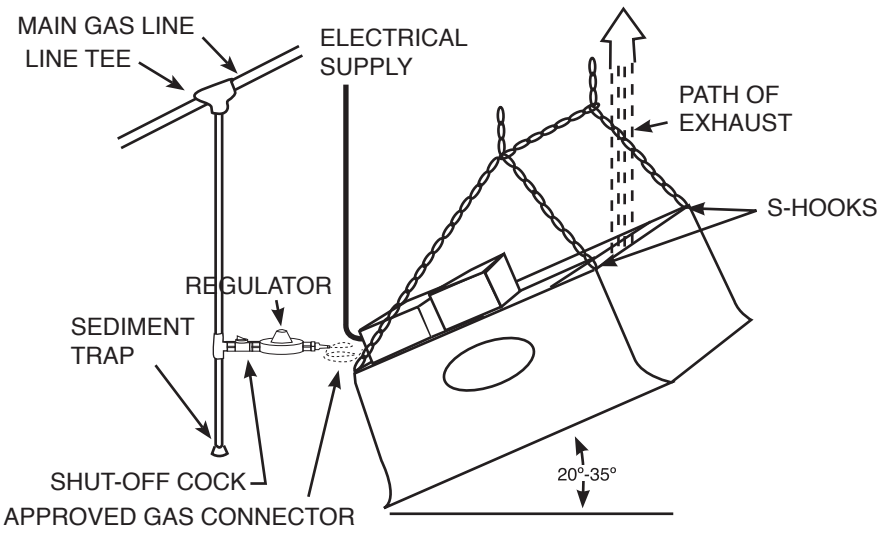

Figure 1-3
TYPICAL HEATER MOUNTING

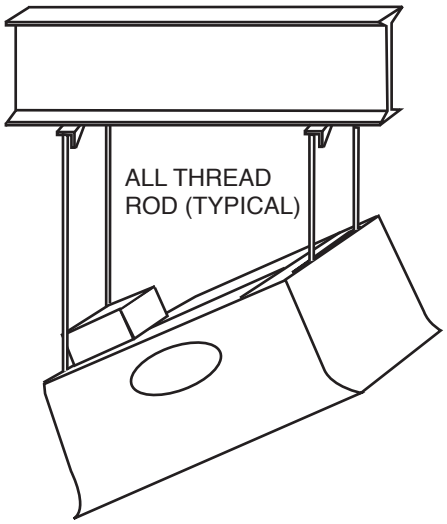

Figure 1-4
RIGID HEATER MOUNTING

The heater must be level from side to side. The units must be mounted at a 20º to 35º angle from horizontal, so the controls (or manifold end) are located at the lower end (Figure 1-5). Gas and electrical lines must not be located above the path of exhaust.

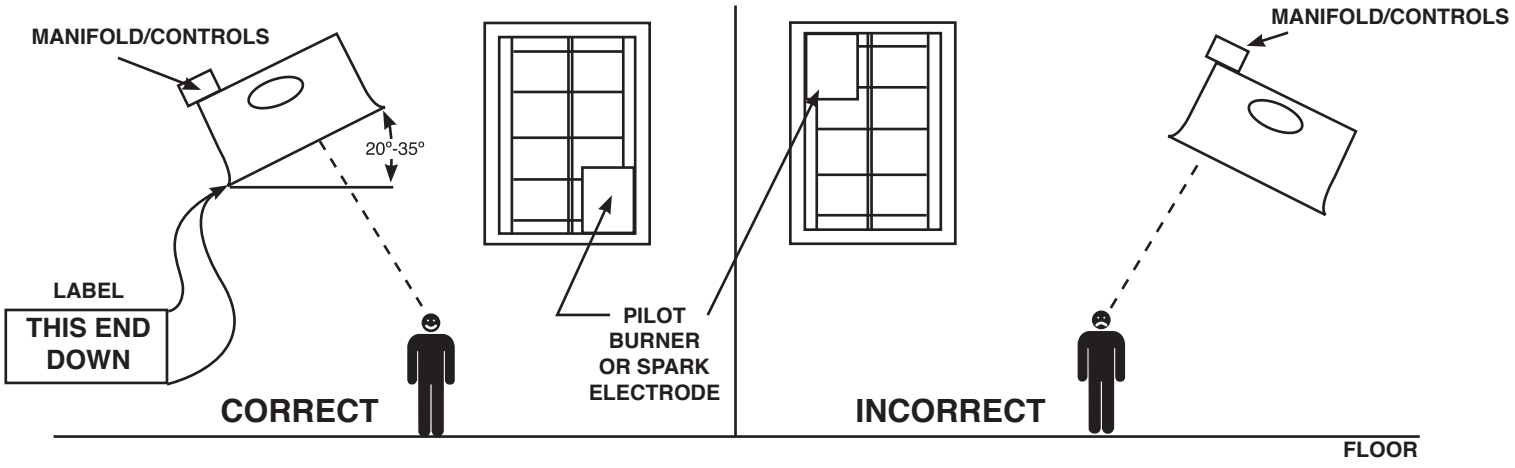

Figure 1-5 BURNER ASSEMBLY RELATION TO GROUND LEVEL

1.2 Gas Supply

NOTE: Correct inlet pressures are vital to efficient operation of the heaters. See CSA rating plate.

If all or a portion of the supply line consists of used pipe, it must be cleaned and inspected to determine its equivalency to new pipe. Test all main gas supply lines at 1.5 times the working pressure. Isolate heater gas valve during the test to avoid damage. Excessive torque on manifold may misalign orifice. Always use two wrenches when mating pipe connections.

WARNING
Never use a match or lighted flame to test for gas leaks. Use soap and water solution to check for leaks.

If any portion of the supply line is located in an area that could cause an abnormal amount of condensation to occur in the pipe, a sediment trap should be installed (Figure 1-3). The tapping of the main gas supply line should be made as shown in Figure 1-3. This method will decrease the possibility of any loose scale or dirt in the supply line from entering the heater's control system and causing a malfunction. Provide a 1/8 in. NPT plugged tapping accessible for test gauge connection immediately upstream of gas connection to heater.

- **Natural Gas**: The gas supply line must be of sufficient size to provide the required capacity and inlet pressure to the heater (consult Gas Company). To obtain the required manifold pressure of 6 in. W.C. (Water Column), a minimum inlet pressure of 7 in. W.C. is necessary for purposes of input adjustment. A maximum inlet pressure of 14 in. W.C. is allowed.

- **Propane Gas**: To obtain the required manifold pressure of 10 in. W.C., a minimum of 11 in. W.C. (for input adjustment purposes), to a maximum of 14 in. W.C. must be provided ahead of the control system on each heater. Do not exceed a manifold operation pressure of 10 in. W.C.

Use only a pipe joint compound that is resistant to liquified petroleum gases. Other piping and leak check methods apply as stated for natural gas supplies.

1.3 Electrical Supply

WARNING
The unit must be electrically grounded in accordance with the Canadian Electrical Code, C22.1-current issue when an external electrical source is utilized.

WARNING
Unless the gas piping to the heater is complete and all main and heater gas line valves are open, do not close the electrical circuit.

Control systems are energized by either 120 VAC, 24 VAC or millivolt energy. The 120 VAC system can be used directly from a 120 VAC line. On 24 VAC systems, transformers must be used to supply power of sufficient VA rating for single or multiple connected installations. Millivolt systems require NO external power, as energy needed to operate the valve is developed by the power-pile generator. Do not use multiple connections.

For wiring of controls on the unit see the wiring diagram on the insert provided with each heater.

It is recommended that the thermostat be installed on the hot side of the fused supply line and have a sufficient ampere capacity rating for the heater(s) it will control. Schematics in Figures 1-6 and 1-7 show typical heating system wiring.

Figure 1-6 shows mechanical interlock of the exhauster with heaters to provide ventilation anytime units are operating. In some cases this is required by code.

Figure 1-7 shows an example of an exhaust fan controlled by air proving switch which closes on static pressure rise.

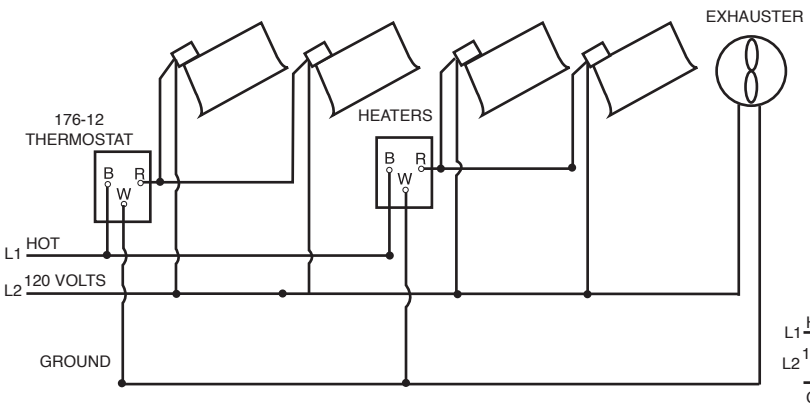

Figure 1-6
TYPICAL 120V WIRING INTERLOCKING EXHAUSTER WITH THERMOSTAT

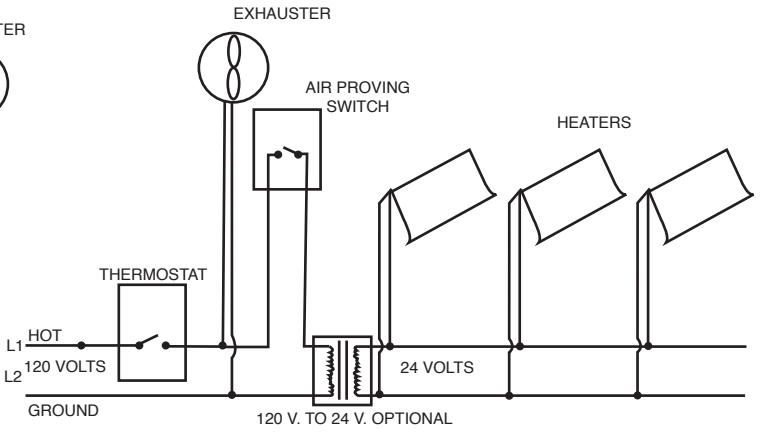

Figure 1-7
TYPICAL WIRING WITH AIR PROVING SWITCH

1.4 Ventilation
Ventilation of upper levels of the space to be heated is required to supply combustion air to the heaters to sufficiently dilute the products of combustion. This also prevents excessive humidity buildup. With heaters mounted overhead and a properly designed ventilation system, products of combustion and excessive drafts will never be present at occupancy levels.

For proper ventilation, **a positive air displacement of 3.9 cfm per 1000 BTUH** of natural gas consumed must be provided. If propane is used, **a positive air displacement of 4.5 cfm per 1000 BTUH** of propane gas consumed must be provided. Many industrial buildings have sufficient air movement to satisfy these dilution requirements. However, in tightly constructed buildings where insufficient air movement exists, induced air displacement is required. This air displacement may be acomplished by either gravity or mechanical means. Provisions must be made to provide sufficient fresh air intake area and exhaust air outlet area. This is essential to provide a balanced system to avoid negative building pressures which cause excessive infiltration and unfavorable drafts thereby effecting efficient combustion of infrared heaters.

Mechanical exhausters are preferred and typically mounted at high points of the building, on areas of the roof where stagnant air can accumulate under the deck. For a flat roof, considerations of prevailing winds, high and low pressure areas on the roof, interlock with heater zones and distribution of air movement must be taken into consideration when locating exhausters.

Best air distribution is accomplished by using a number of small exhausters versus one large exhauster. Approximately **one square inch of net free inlet area per 1000 BTUH** is adequate for combustion air supply. Inlet openings in the buildings should be well distributed high in the sidewalls and should direct incoming air upward to dilute products of combustion while preventing drafts at lower levels. Inlets are typically 1-3 square feet.

Local codes may require that a mechanical exhaust system be interlocked with the heaters to enable both to function simultaneously (Figure 1-6). Other codes may allow control of exhausters with a ceiling mounted humidistat. Exhausters then operate when relative humidity rises above humidistat settings. Since the products of combustion increase the relative humidity level of the space, this is a feasible method of controlling exhausters. Selection of a humidistat will vary with different conditions and areas of the country.

1.5 Insulation
Roof insulation or built-up roofing is required for metal decks to maintain inside surface temperatures above the dew point of the air. If the roof is uninsulated bare metal, the inside surface temperature may become cold enough for moisture to form. Vapor barriers must be applied to insulation that is permeable to water vapor. Tears or gaps must be sealed and insulation without a vapor barrier is not acceptable.

2.0 Operation
Upon satisfactory completion of the electrical supply and the purging of the gas supply line to the heater(s), follow the “Lighting Instructions” on the heater’s rating plate to put heater into operation.

3.0 Maintenance

WARNING
Disconnect all power sources related to the installation before servicing any component.

WARNING
Use protective glasses when cleaning the heater. If the control assembly is not completely disconnected from the manifold, the high air pressure will cause the controls to become defective.

It is recommended that the following become a standard yearly procedure, to obtain maximum operating efficiency and trouble free operation.

Main Burner

1. Use an air hose to blow any accumulated dust and/or dirt off the heater. Air hose pressure should not exceed 30 psig.
2. Pass the air hose over the entire exposed area of the ceramic.
3. Place the air hose outlet into each venturi tube and allow the air to flow for approximately one minute.

Pilot Burner

1. Remove pilot access door.
2. Use an air hose and blow the pilot-burner free of dust.
3. Remove pilot orifice and clean with a wire of less than 0.012 in. diameter.
4. Clean pilot burner's primary air-inlet passage.
5. Replace orifice and then pilot access door.

During long periods of non-usage, cover heater with a polyethylene bag and shut OFF gas and electrical supply. If further service to the heater is desired, contact your representative or the factory.

4.0 Spare Parts

When ordering parts, have the model and serial number of the heater ready to give with your order.

Part No.	**Description**
DR-RH	Rayhead Assembly
DR-ROD	Rod
32-508	Eelctrode (NFS-2)

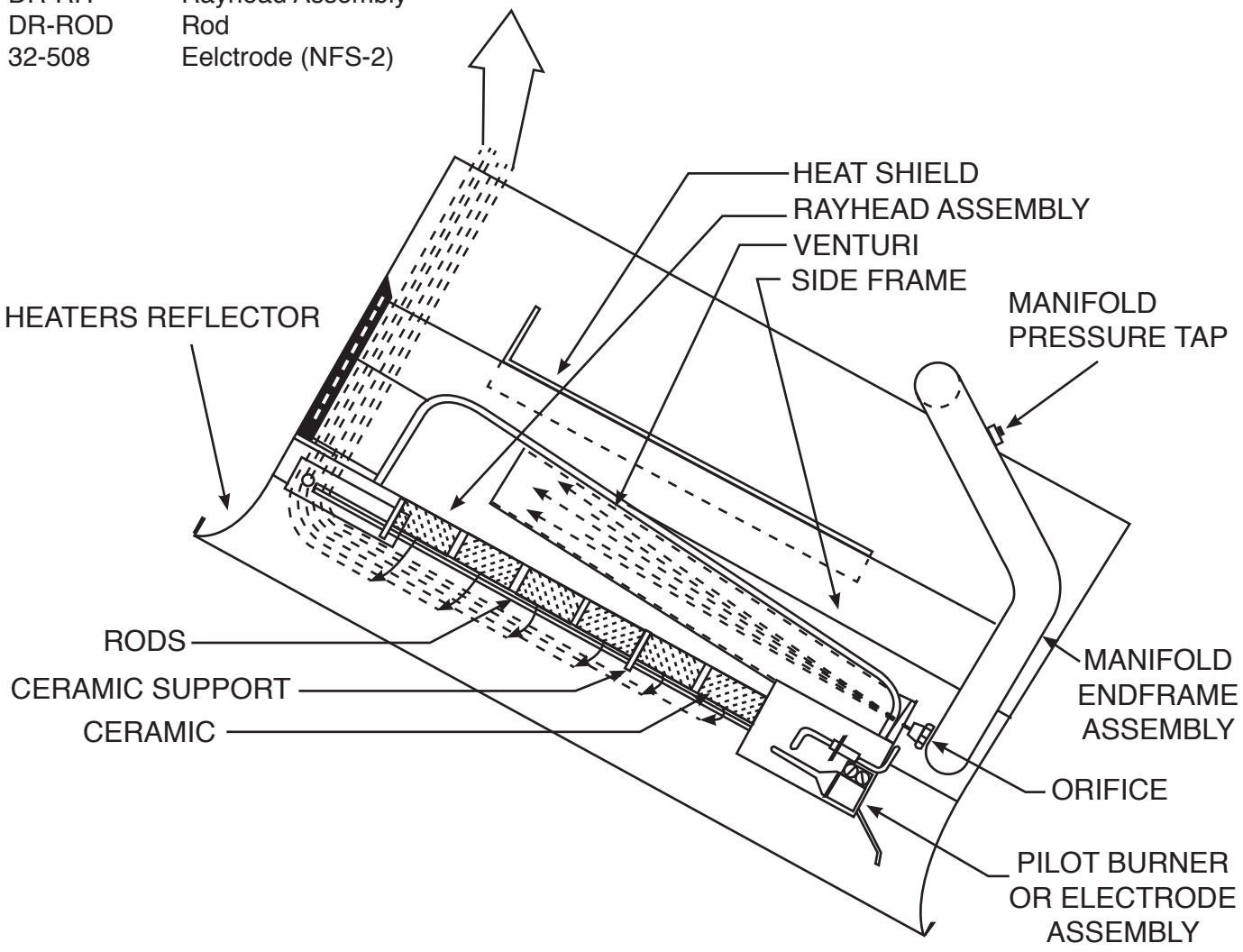

Figure 4-1
DR SERIES UNVENTED GAS-FIRED INFRARED HEATER ASSEMBLY

5.0 Troubleshooting

SYMPTOM	CODE	POSSIBLE CAUSE	CORRECTIVE ACTION
Burning of gas-air mixture inside plenum (flashback).	A, C A, C A, C A, C A, C	1. Heater mounted at incorrect angle. 2. Excessive drafts. 3. Gas leaking at: orifice, spud, pilot tube. 4. Seperation of ceramic grids. 5. Ceramic grids cracked.	1. Mounting angle 20º-35º from horizontal. 2. Relocate or shield from draft. 3. Check with leak detector solution. 4. Replace rayhead. 5. Replace rayhead.
Delayed ignition.	A A, C A, C A, C A, C	1. Electrodes out of specification. 2. Low gas pressure. 3. Partially blocked orifice. 4. Improper orifice size. 5. Incorrect gas.	1. See Ignition System insert. 2. See Section 1.2, Gas Supply. 3. Clean or replace. 4. Consult dealer. 5. See unit nameplate.
Low ceramic surface temperature.	A, C A, C A, C A, C A, C A, C A, C A, C A, C	1. Dirty or plugged rayhead ceramics. 2. Paritally blocked orifice. 3. Low inlet pressure. 4. Low manifold gas pressure. 5. Foreign matter in venturi tube. 6. Misaligned manifold from excessive torque applied on pipe during installation. 7. Excessive dark spots on rayhead. 8. Gas supply piping too small. 9. Incorrect gas.	1. See periodic maintenance instructions. 2. Remove and clean. 3. See Section 1.2, Gas Supply. 4. Adjust main valve regulator for 6” W.C. natural gas, 10” W.C. propane. 5. See periodic maintenance instructions. 6. Replace manifold. 7. See periodic maintenance instructions. 8. Increase inlet pressure or replace undersized piping. 9. See unit nameplate.
Control system overheating.	A, C A, C	1. Heater not mounted correctly. 2. Heater mounted too close to ceiling.	1. Mounting angle 20º-35º from horizontal. 2. Observe clearance to combustibles chart located on heater rating plate.
Gas odor.	A, C C	1. Loose pipe connection. 2. Pilot not lit.	1. Check all connections with leak-detector solution, tighten as necessary. 2. Cycle thermostat or manually light.
Heater cycles repeatedly.	A, C A A, C C C	1. Heater located in drafty area. 2. Low gas pressure. 3. Thermostat located in drafty area. 4. Weak pilot flame. 5. Defective flame detector.	1. Relocate or shield from draft. 2. See Section 1.2, Gas Supply, for propane. 3. Relocate thermostat. 4. Clean or adjust pilot. 5. Replace.
Pilot light goes out when hold down button released.	C C C C	1. Defective thermocouple. 2. Defective pilot generator. 3. Pilot not properly heating flame detector. 4. Incorrect wiring.	1. Replace. 2. Replace. 3. Check pilot orifice and alignment of flame sensor. 4. See wiring diagram on unit nameplate.
Pilot on, no gas to main burner.	C C C C C C	1. Weak pilot flame. 2. Pilot sensor element not located in pilot flame. 3. Defective main valve solenoid. 4. Defective pilot generator. 5. Excessive thermostat wire length with millivolt system. 6. Manual valve off.	1. Clean or adjust pilot. 2. Locate upper 3/4 of element in pilot flame. 3. Isolate. Ohm for resistance, replace if 0. 4. Replace. 5. Wire not to exceed length stated by stat manufacturer. 6. Turn to “ON” position.
No spark; no ignition.	A A A A A A A	1. Lack of 120V or 24V incoming voltage. 2. Open high voltage wire. 3. Improper electrode gap. 4. Loose or open wire connection. 5. Poor or no equipment ground. 6. Unit in “safety lockout” mode. 7. Defective “Gaslighter” control.	1. Check thermostat, manual switch or circuit breaker. 2. Isolate and ohm for resistance, replace if 0. 3. See Ignition System insert. 4.Check all wires, tighten or replace. 5. Trace ground wire for complete circuit back to equipment ground from control. 6. Interrupt power source, repeat trial for ignition 7. Replace.
Heater lights, and “locks out” after approximately 10 sec.	A A A A A	1. Poor or no equipment ground. 2. Polarity is reversed. 3. Low gas pressure. 4. Electrode not sensing. 5. Heater mounted at incorrect angle.	1. Check all connections, provide positive earth ground. 2. 120v to black, neutral to white. 3. See Section 1.2, Gas Supply. 4. Relocate or replace if defective. 5. Mounting angle 20º-35º from horizontal.
Spark is present. No main gas operation. Unit “locks out”.	A A A	1. Gas valve in “OFF” position. 2. Defective main valve solenoid. 3. Defective “Gaslighter” control.	1. Turn to “ON” position. 2. Isolate and check for resistance. Replace if 0. 3. Replace.
Heater will not shut off.	A, C A, C A, C	1. Defective thermostat or wiring. 2. Gas valve stuck open. 3. High gas pressure.	1. Replace or repair. 2. Replace. 3. See Section 1.2, Gas Supply.

Codes: A) Direct Spark Ignition C) Standing Pilot

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