

DX SERIES

TUBE HEATER

INSTALLATION, OPERATION,
MAINTENANCE
AND PARTS MANUAL



Detroit Radiant Products Company

FOR YOUR SAFETY!

IF YOU SMELL GAS:

1. Open windows.
2. Do not touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

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

FOREWORD

WARNING!

THIS HEATER **MUST** BE INSTALLED AND SERVICED BY TRAINED GAS INSTALLATION AND SERVICE PERSONNEL ONLY. READ AND UNDERSTAND THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THE DETROIT RADIANT PRODUCTS COMPANY HEATER. FAILURE TO COMPLY WITH THESE WARNINGS AND INSTRUCTIONS, AND THOSE ON THE HEATER COULD RESULT IN PERSONAL INJURY, DEATH, FIRE, ASPHYXIATION, AND/OR PROPERTY DAMAGE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

Detroit Radiant Products units comply with or are certified by the following organizations or standards:

- ❖ American National Standards (ANSI Z83.6)
- ❖ Occupational Safety and Health Act (OSHA)
- ❖ American Gas Association (AGA)
- ❖ International Approval Services (IAS)

IMPORTANT

Any alteration of the system or of the factory authorized components specified either in this manual or by Detroit Radiant Products Company voids all certification and warranties.

Detroit Radiant Products Company

21400 Hoover Road ♦ Warren MI 48089 ♦ (586) 756-0950 ♦ Fax: (586) 756-2626
<http://www.reverberray.com> E-mail: sales@detroitradiant.com

TABLE OF CONTENTS

	<u>Page</u>
1. SAFETY INFORMATION	2
2. INSTALLATION	4
2.1 Design Criteria	4
2.2 Prechecks	6
2.3 Heater Mounting	8
2.4 Reflector Assembly	10
2.5 Optional “L” or “U” Configuration	12
2.6 Flue Venting	14
2.7 Installation for Unvented Operation (Optional)	16
2.8 Combustion Air Requirements	17
2.9 Gas Supply	18
2.10 Electrical Requirements	20
2.11 Lighting Instructions	20
2.12 Shutdown Instructions	20
3. THEORY OF OPERATION	21
4. MAINTENANCE	23
4.1 Troubleshooting Chart	24
5. PARTS LIST	26
5.1 Basic Parts List	26
5.2 Optional Parts	26

1. SAFETY INFORMATION

WARNING!

NOT FOR RESIDENTIAL USE!

Do not use in the home, sleeping quarters, attached garages, etc.

WARNING!

This is not an explosion proof heater. Where there is the possibility of exposure to flammable vapors, consult the local fire marshal, the fire insurance carrier or other authorities for approval of the proposed installation

This infrared heater is designed for use in industrial and commercial buildings such as warehouses, manufacturing plants, aircraft hangars, service garages, etc.

WARNING!

Detroit Radiant Products Company cannot anticipate every use which may be made of their heaters. Check with your local fire safety authority if you have questions about local regulations.

The following information **must** be reviewed before installing this heater:

- Check the AGA rating label on the heater to verify the proper gas to be used. Check the other labels on the heater to verify proper mounting and clearance to combustibles.
- Signs should be posted in storage areas to specify maximum stacking height allowed in order to maintain clearance to combustibles. DRP Part # PLQ warning plaques are recommended.
- The installation of this heater must conform with local building codes or, in the absence of local codes, to the latest edition of the National Fuel Gas Code, ANSI Z223.1 (NFPA54).
- The installation of this heater in public garages must conform to the latest edition of the Standard for Parking Structures, ANSI/NFPA88A, or the Standard for Repair Garages ANSI/NFPA88B, and must be at least 8 ft. above the floor.
- The installation of this heater in aircraft hangars must conform with the latest edition of the Standard for Aircraft Hangars, ANSI/NFPA409. The heater must be installed at least 10 ft. above the upper wing surfaces and engine enclosures of the highest aircraft that might be stored in the hangar. In areas adjoining the aircraft storage area, the heaters must be installed at least 8 ft. above the floor. The heaters must be located in areas where they will not be subject to damage by aircraft, cranes, and moveable scaffolding or other objects.
- The heater, when installed, must be electrically grounded in accordance with the latest edition of the National Electrical Code, ANSI/NFPA70.
- Under no circumstance is either the gas supply line or the electrical supply line to the heater to provide any assistance in the suspension of the heater.
- The weight of the heater must be entirely suspended from a permanent part of the building structure having adequate load characteristics.
- Neither the gas supply line, electrical supply line or sprinkler heads shall be located within the minimum clearance to combustibles as shown in the Clearance to Combustibles Chart 1 on page 3.

WARNING!

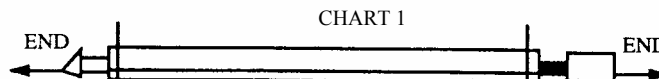
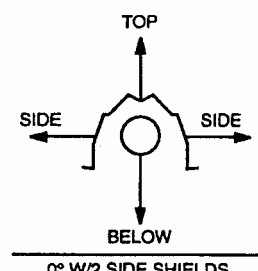
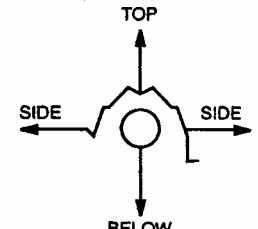
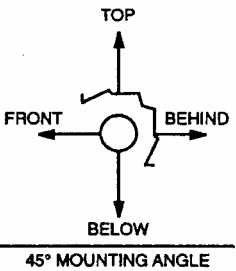
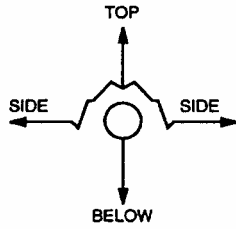
Failure to comply with the stated clearances to combustibles could result in personal injury, death and/or property damage.

WARNING!

This heater should be installed so that the minimum clearances to vehicles, as marked on the heater, will be maintained. If vehicle lifts are present, ensure that these clearances will be maintained from the highest raised vehicle.

For the safe installation of this heater, the following table contains clearances that must be maintained:

CLEARANCES TO COMBUSTIBLES (IN.)					
MODEL NO.	MOUNTING	SIDE		TOP	BELOW
	ANGLE	FRONT	BEHIND		
DX (20,30,40) -50(N,P)	0°	9	9	6	47
	45°	39	8	10	47
	0°	29	8	6	47
	0°	9	9	6	47
20 ft from burner	0°	7	7	6	30
DX (20,30,40) -60(N,P)	0°	9	9	6	47
	45°	39	8	10	47
	0°	29	8	6	47
	0°	9	9	6	47
20 ft from burner	0°	7	7	6	30
DX (20,30,40) -75(N,P)	0°	9	9	6	60
	45°	39	8	10	60
	0°	29	8	6	60
	0°	9	9	6	60
20 ft from burner	0°	7	7	6	30
DX (30,40,50) -100(N,P)	0°	14	14	6	66
	45°	39	8	10	66
	0°	29	8	6	66
	0°	16	16	6	66
20 ft from burner	0°	7	7	6	30
DX (40,50,60) -125(N,P)	0°	20	20	6	76
	45°	58	8	10	76
	0°	42	8	6	76
	0°	20	20	6	76
20 ft from burner	0°	7	7	6	30
DX (40,50,60) -150(N,P)	0°	24	24	6	81
	45°	58	8	10	81
	0°	42	8	6	81
	0°	23	23	6	81
20 ft from burner	0°	11	11	6	44
DX (50,60,70) -175(N,P)	0°	34	34	6	92
	45°	63	8	10	92
	0°	50	8	6	92
	0°	30	30	6	92
20 ft from burner	0°	11	11	6	44
DX (50,60,70.80) -200(N,P)	0°	41	41	6	94
	45°	63	8	10	94
	0°	54	8	6	94
	0°	30	30	6	94
20 ft from burner	0°	11	11	6	44



THE MINIMUM CLEARANCE FOR ALL MODELS IS 12 INCHES

2 INSTALLATION

2.1 Design Criteria

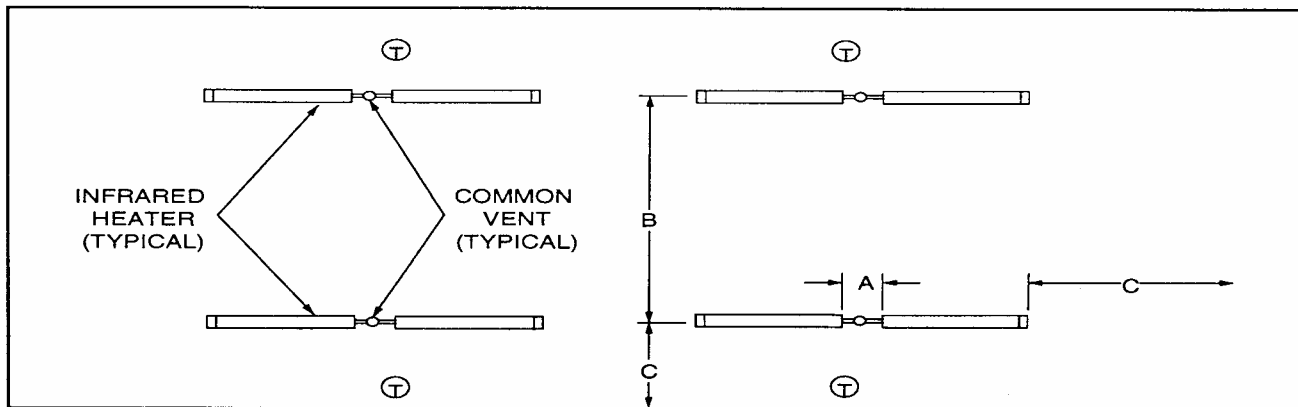
Perimeter mounting of these infrared heaters provides for the most efficient installation. In Figure 2-1, the heaters are mounted at the perimeter of the space to be heated. Refer to the DX Heater Installation Chart for the recommended distances on the models being installed.

Buildings that require the rows of heaters to be farther apart than the recommended distance in the chart may need additional heaters placed in the center of the space.

DX HEATER INSTALLATION CHART				
MODEL NO.	TYPICAL MOUNTING HEIGHT (FT)	DISTANCE BETWEEN HEATERS (FT) DIM "A"	DISTANCE BETWEEN HEATER ROWS DIM "B"	MAXIMUM DISTANCE BETWEEN HEATER AND WALL (FT) DIM "C"
DX (20,30,40) -50 (N,P)	10-15	10-25	12-60	16
DX (20,30,40) -60 (N,P)	11-16	11-30	14-65	17
DX (20,30,40) -75(N,P)	12-18	12-35	15-70	20
DX (30,40,50) -100 (N,P)	13-20	13-40	16-85	20
DX (40,50,60) -125 (N,P)	15-25	14-43	17-90	25
DX (40,50,60) -150 (N,P)	16-30	15-45	18-100	25
DX (40,50,60) -175 (N,P)	17-35	16-50	19-110	30
DX (50,60,70) -200 (N,P)	18-40	17-55	20-120	30

CHART 2

NOTE: This chart is provided as a guideline. Actual conditions may dictate variation from this data.



(T) Thermostat

Figure 2-1

TYPICAL BUILDING LAYOUT

When positioning heaters, keep in mind the clearance to combustible materials, lights, sprinkler heads, overhead doors, storage areas with stacked materials, gas and electrical lines, parked vehicles, cranes and any other possible obstructions or hazards. Refer to the Warnings, Cautions and the Clearance to Combustibles chart in the Safety Information Section and on the heater to verify that a safe installation condition exists.

The following guidelines must also be met to ensure a good installation and proper heater performance:

- DX 200 models normally **must not** be mounted closer than stated.

<u>Model</u>	<u>Above Finished Floor</u>
DX 200	17 ft.
DX 175	16 ft.
DX 150	15 ft.
DX 125	15 ft.

Consult Detroit Radiant Products if you have a special case requiring a lower mounting height.

- A maximum of two 90° elbows or one 180° elbow can be installed on DX model heaters. The gas input of the heaters, as stated on the rating label, will determine the minimum length of radiant pipe from the control box to the first elbow. (See optional 90° and 180° elbows section.)

NOTE: Flue vent requirements do not change when elbows are installed.

- **Do not** exceed the maximum vent length (20 feet) for exhausting the heater. Consult the Flue Venting Chart (5) in section 2.6 for proper cap usage.
- **Do not** combine the exhaust vents of two heaters into a straight through tee. Part No. Y or a staggered tee arrangement **must be** used. Heaters sharing the same vent must have a 6-inch diameter (Figure 2-22, 2-24).
- Outside air for combustion must be ducted to the heater if the building atmosphere where the heater is installed contains one of the following:
 - Chemicals such as chlorinated or fluorinated hydrocarbons.
 - High humidity such as car washes.
 - Contaminants such as sawdust, welding smoke, etc.
 - Negative static pressure.

Consult Combustion Air Requirements section on page 17.

- Do not exceed the maximum duct length for fresh air intake (usually 20 feet). Consult Air Intake Duct Chart on page 17.
- Do not draw fresh air to the heater from an attic space. There is no guarantee that adequate air will be supplied.
- All unvented heaters must use Part No. WVE-GALV vent with flapper.

Once all of the safety precautions and design criteria are met, the actual installation of the heater may begin.

2.2 Prechecks

1. Verify that all parts have been received by checking them against the packing list. If anything is missing, notify the Re-Verber-Ray representative or Detroit Radiant Products.
2. Check the AGA rating label on the heater to verify the model number, the gas to be used and that the clearance to combustibles will be met.
3. Make sure the finished installation will conform to the design requirements listed in the Clearance to Combustibles Chart (1) and the figure shown on page 3, and Figure 2-1.

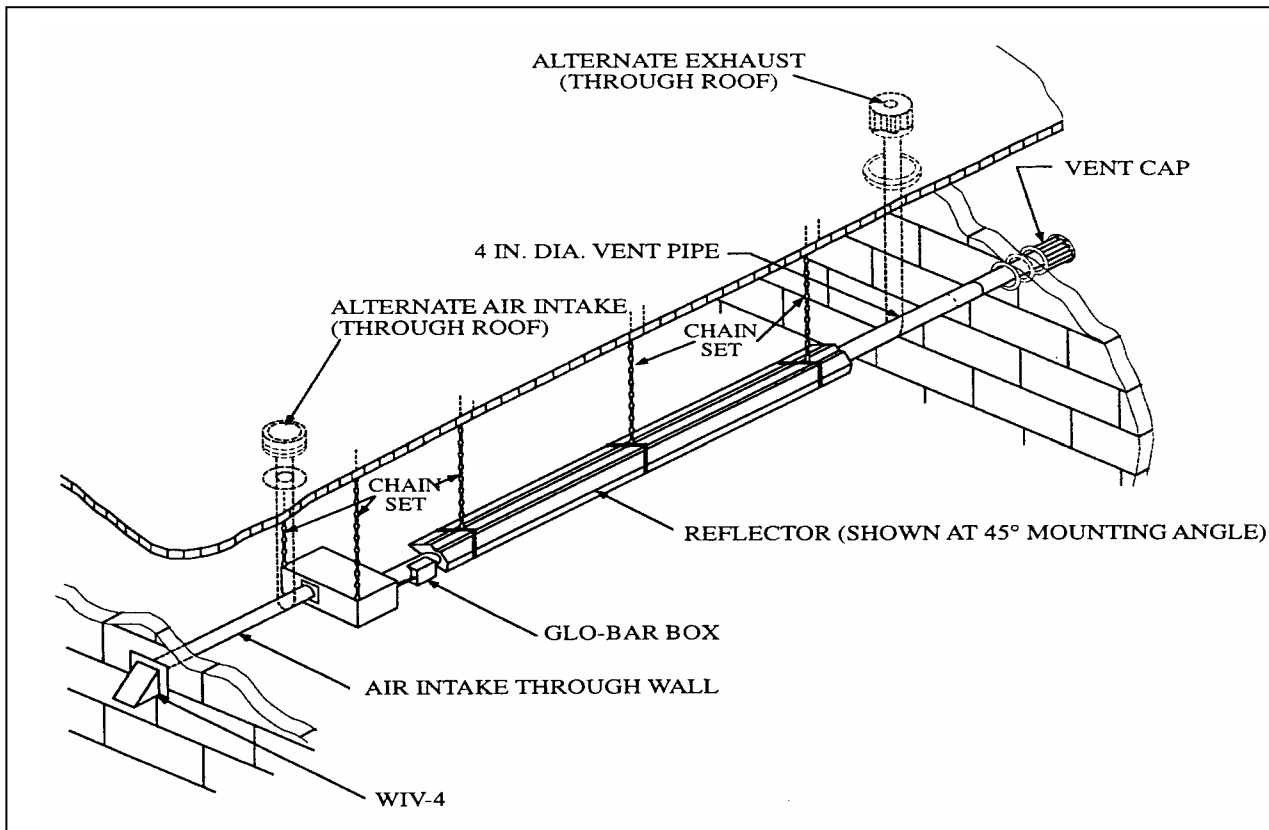
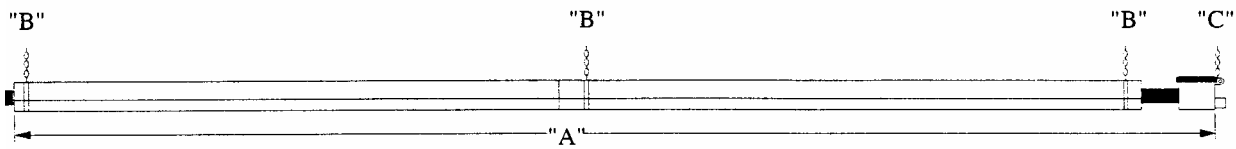


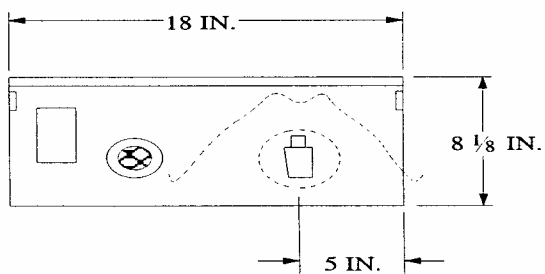
Figure 2-2

TYPICAL INSTALLATION DRAWING

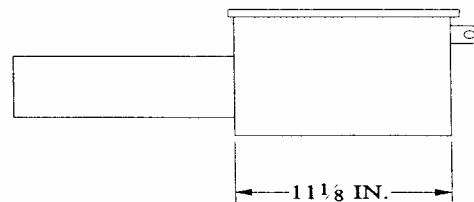


MODEL NUMBER	DIMENSION "A"	SUSPENSION POINTS "B"	CONTROL BOX STABILIZER "C"
DX 20	259"	3	2
DX 30	375"	4	2
DX 40	491"	5	2
DX 50	607"	6	2
DX 60	723"	7	2
DX 70	839"	8	2
DX 80	955"	9	2

CHART 3



END VIEW



ENLARGED SIDE VIEW

Figure 2-3

DIMENSIONS FOR DX MODELS

2.3 Heater Mounting

1. Each heater comes equipped with the necessary hangers (Figure 2-4) for hanging.

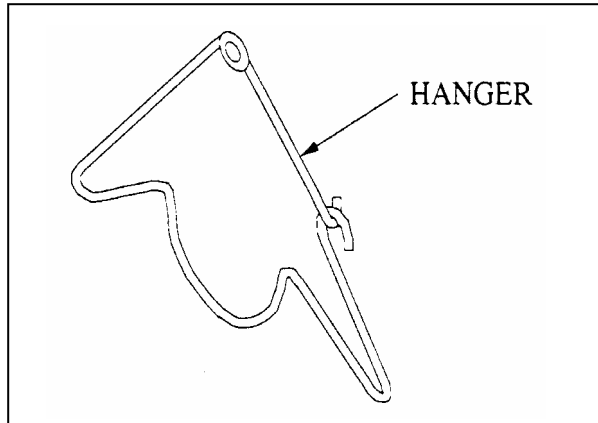


Figure 2-4

2. Use of number 1 double loop chain is recommended for heater hanging (Accessory No. THCS). See Figure 2-5.

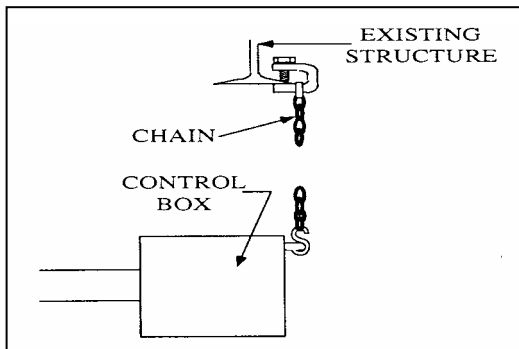


Figure 2-5

NOTE: If windy conditions exist in the space around the heater, it may be necessary to rigidly mount the heater to prevent swaying. It is recommended that threaded rod be used for the two hanging points at the burner control box (see Figure 2-6). The remaining hanging points should use chains to allow for heater expansion.

3. Mount hangers on approximately 10-ft. centers. Slide tubes through hangers with weld seam downward (see Figure 2-7) and fasten with tube clamps (see Figure 2-8). Center clamps on seams.

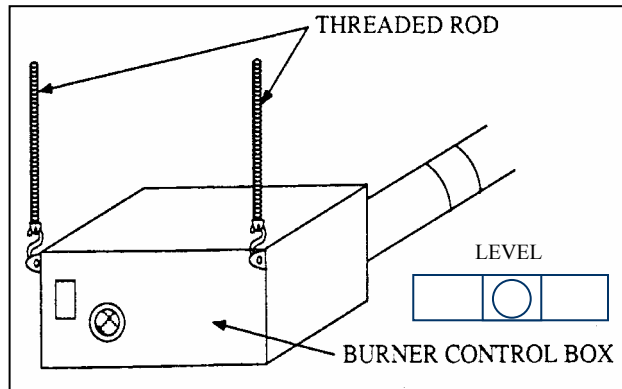


Figure 2-6

IMPORTANT: Mount burner control box level to ground. Do not rotate assembly.

IMPORTANT: DX 175,000 and 200,000 BTU/H models must be installed with a stainless steel tube clamp at the second joint of the exchanger between the first and second radiant tubes.

NOTE: The tube clamps provided with the heater are pre-assembled at the factory. If a clamp is dismantled, it is important that upon reassembly the spacer is properly inserted (see Figure 2-8). The spacer's concave surface **must** face the radiant tube. Incorrect spacer placement will result in shearing of the bolt when torqued to the recommended specifications (40-60-lb. ft.).

IMPORTANT: DX models 150 MBTU/H, 175 MBTU/H and 200 MBTU/H must be installed with the 10 foot, titanium alloy aluminized tube directly following the burner box. Titanium tubing may be identified by the identification sticker found on the swaged end of the tubing. A stamped "5A-TI" may also be found on this end.

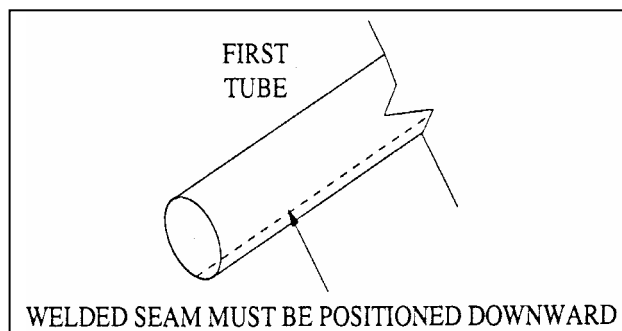


Figure 2-7

IMPORTANT: Radiant tubes with baffles must be installed last (furthest from the burner). See Figure 2-9. All baffles must be in the vertical position.

4. Mount heaters in conformance with approval standards referenced in the foreword.

5. Install chains perpendicular to the heater.

6. Install heater so that it is independently supported and must not rely on the gas or electrical line for any of its support.

7. Mount heater so that burner sight glass is visible from the floor.

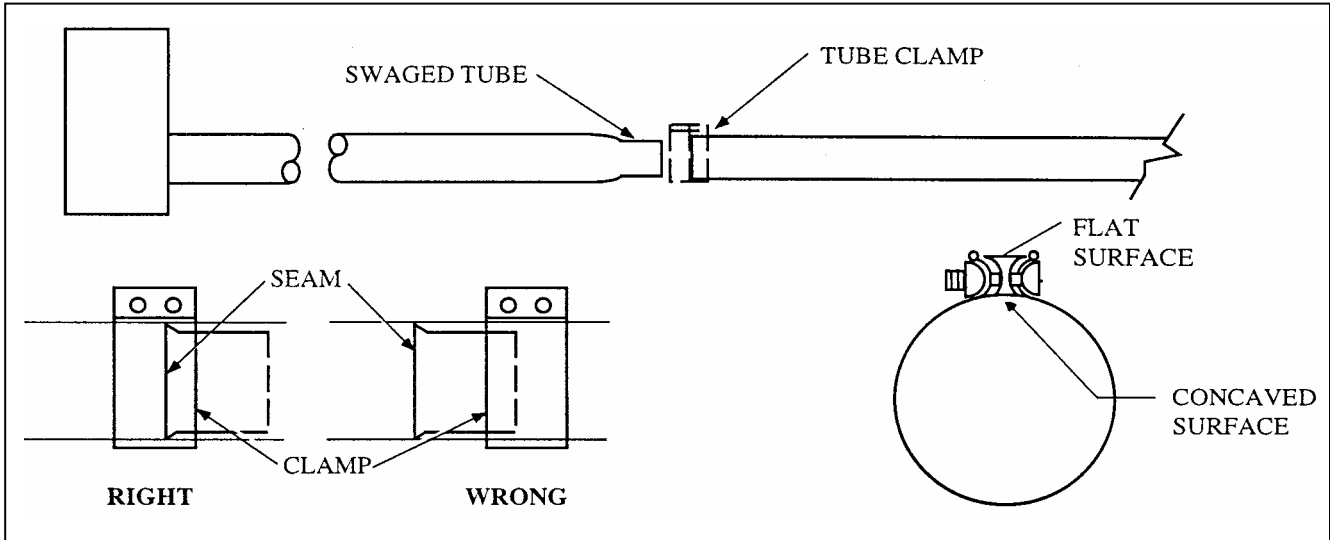


Figure 2-8

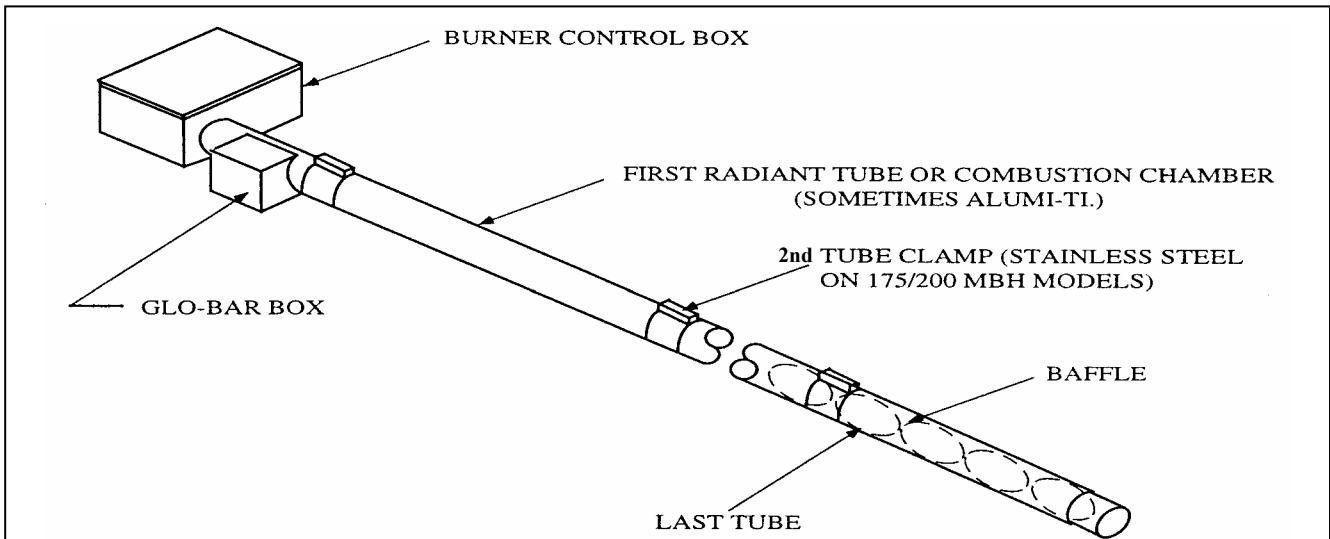


Figure 2-9

2.4 Reflector Assembly

1. Install reflector center supports (RCS) as shown in figure 2-10.
2. Slide reflector through wire hangers and adjust the reflector positioning spring in the V-groove on top of the reflector as shown in Figure 2-11. Overlap reflectors 4 in. for support (see Figure 2-10).

NOTE: Assemble the reflector after every 10 ft. section of emitter pipe is installed.

3. Secure reflectors together with sheet metal screws (not supplied) at points indicated by arrows (see figure 2-12). Make sure to leave an expansion joint.

NOTE: The screws prevent the reflectors from shifting position due to heater operation.

4. Install reflector end caps at exposed ends of the reflector runs with clips (Figure 2-11).

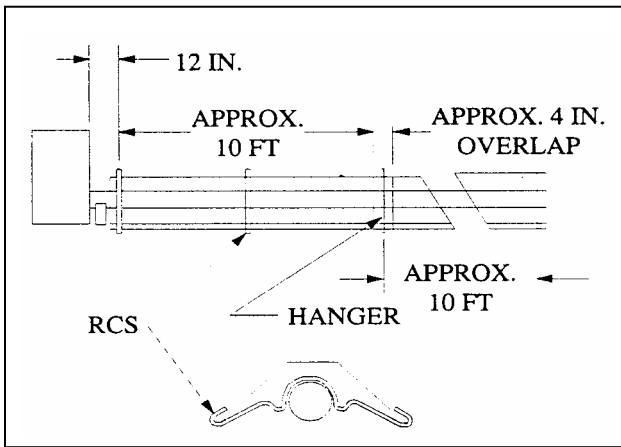


Figure 2-10

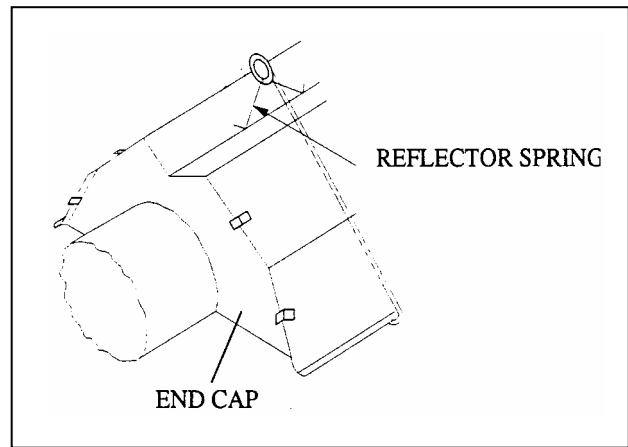


Figure 2-11

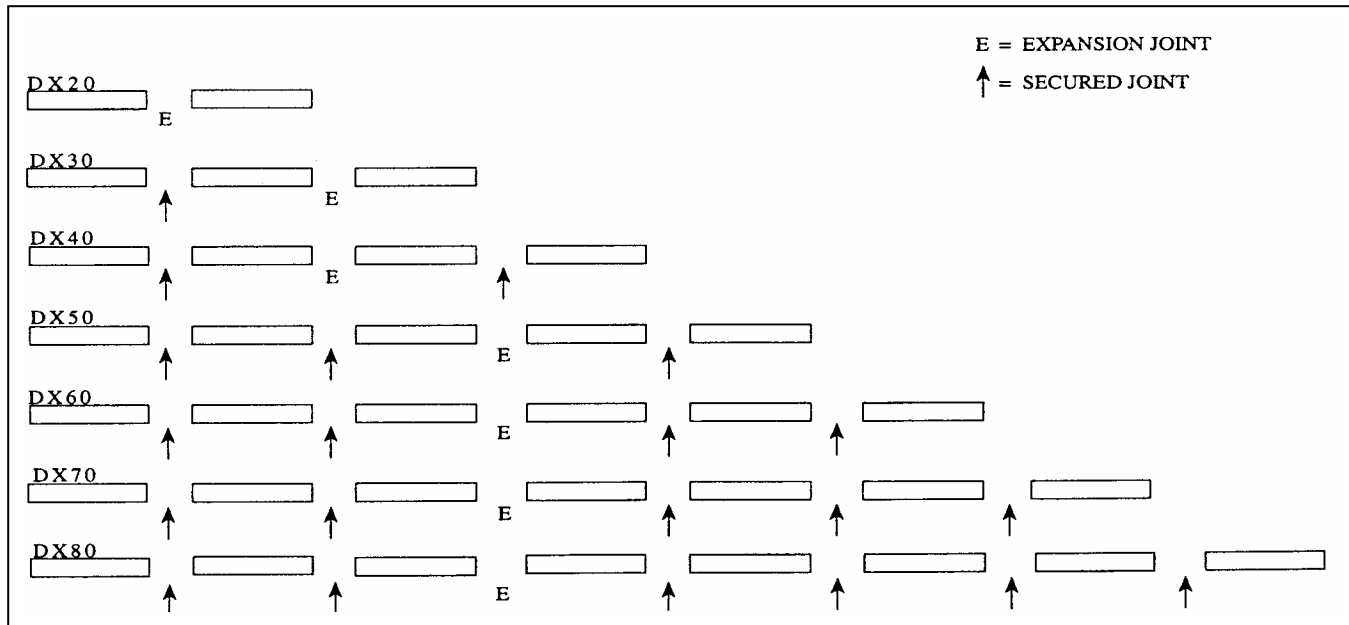


Figure 2-12

Optional Side Shield Installation

1. Install an additional two reflector center supports (RCS) 2 1/2-ft. on each side of the standard RCS.
2. Install the side shield by hooking the edge holes onto the RCSs (Figure 2-13).

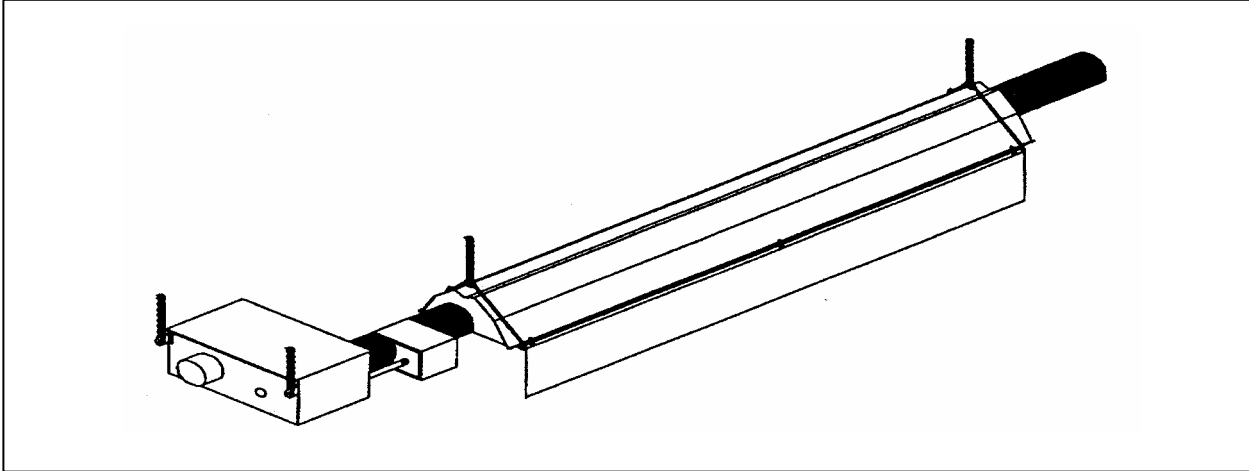


Figure 2-13

2.5 Optional “L” or “U” Configuration

A 90° elbow (DRP Accessory No. E6) or 180 degree “U” (DRP Accessory No. TF1B) may be installed in the exchanger to make an “L” or “U” configuration. See Chart 4 and figures below for dimensions and distance requirements from the burner control box to an elbow or “U”.

NOTE: Only (2) E6 or (1) TF1B may be used on a DX heater.

IMPORTANT: When using TF1B “U” fitting and outside combustion air a minimum distance of 8 ft. separation between intake and exhaust must exist.

Consult insert with E6 or TF1B fittings for proper baffle length changes with these fittings.

MINIMUM DISTANCE FROM THE BURNER TO AN ELBOW OR “U” FITTING	
MODEL NO.	FT.
DX (20,30,40)-50(N,P)	10
DX (20,30,40)-60(N,P)	
DX (20,30,40)-75(N,P)	
DX (30,40,50)-100(N,P)	15
DX (40,50,60)-125(N,P)	20
DX (40,50,60)-150(N,P)	
DX (50,60,70)-175(N,P)	25
DX (50,60,70,80)-200(N,P)	

CHART 4

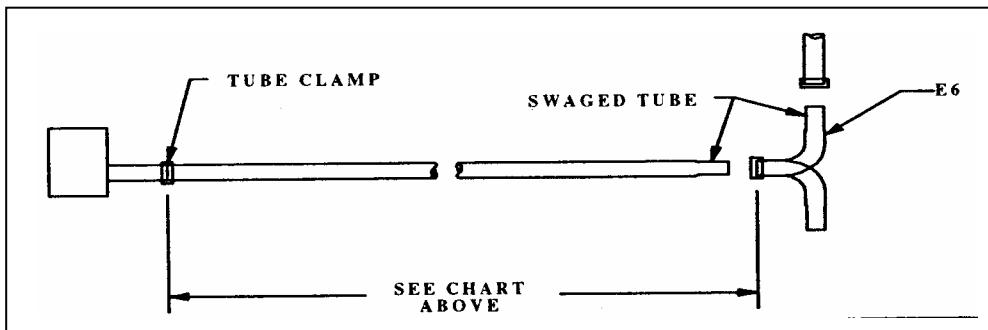


Figure 2-14

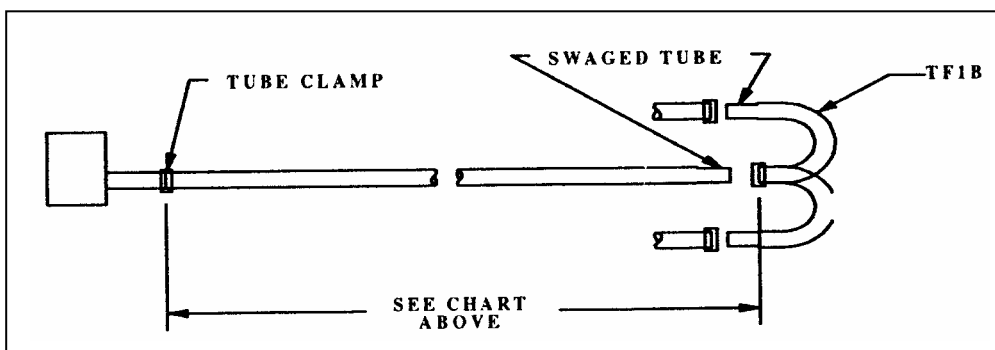


Figure 2-15

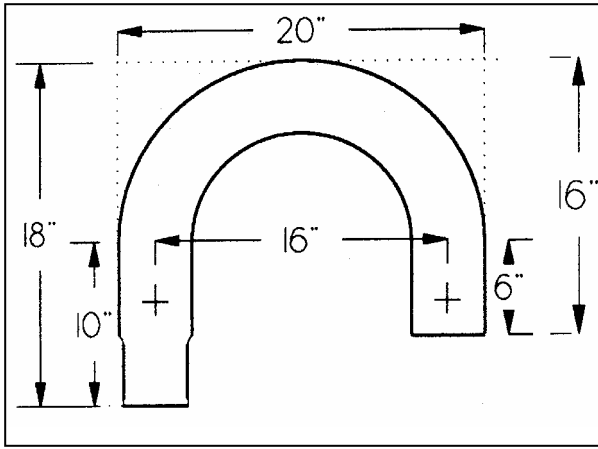


Figure 2-16

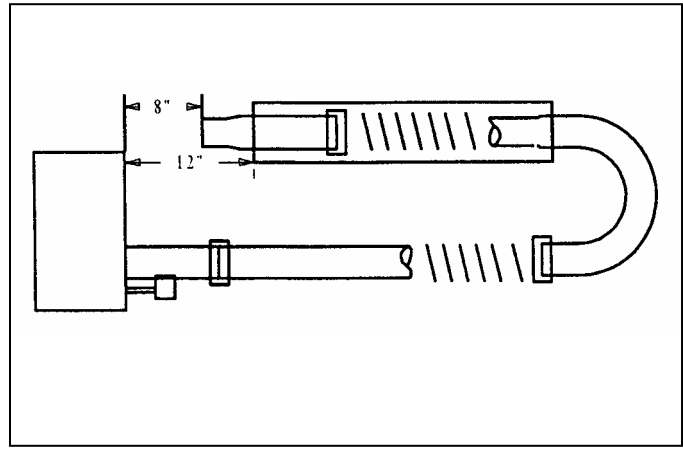


Figure 2-17

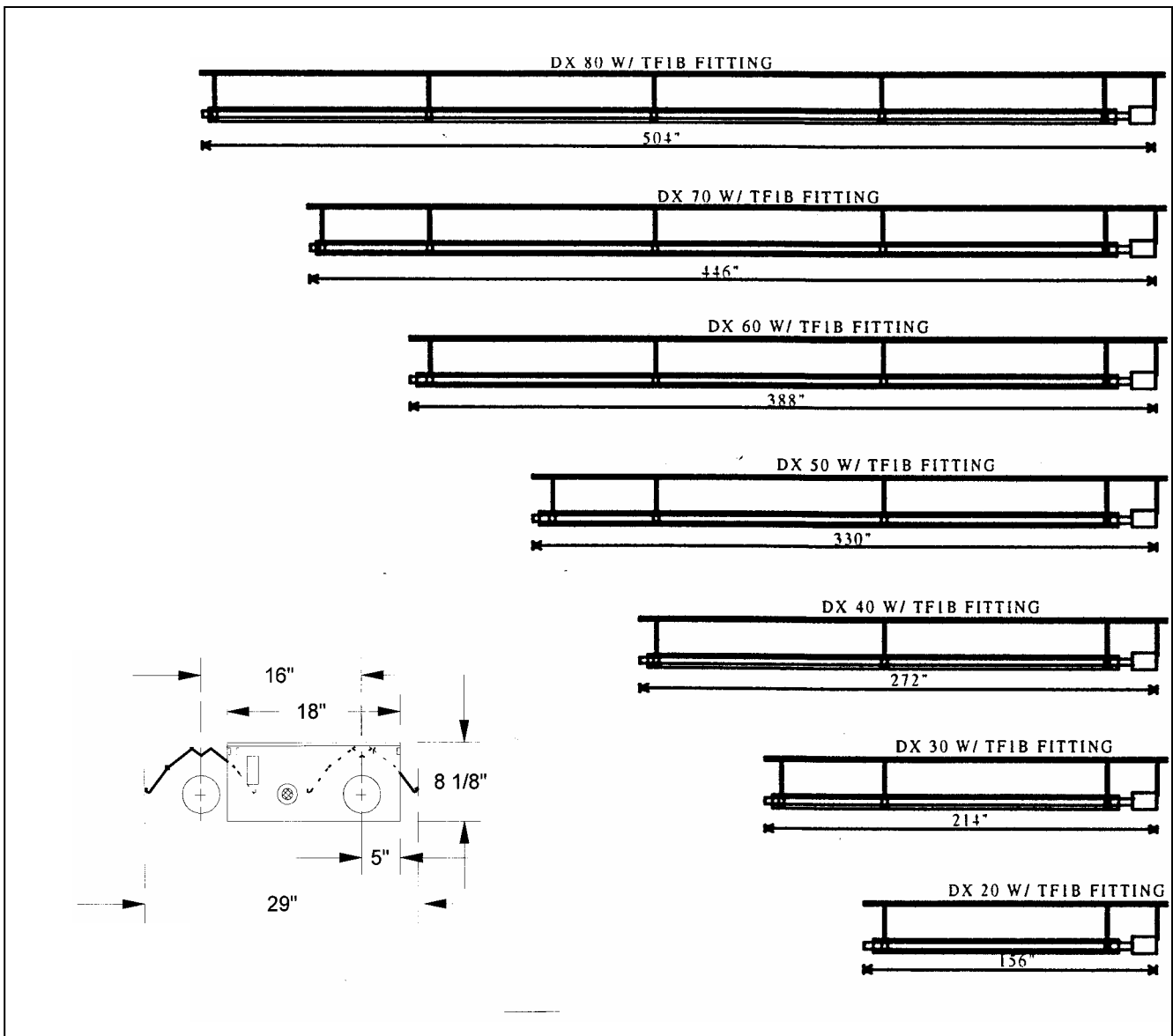


Figure 2-18

2.6 Flue Venting

The following guidelines must be observed to ensure proper system performance and safety:

- Check all applicable codes prior to installing flue stacks. Local codes may vary. In the absence of local codes see the National Fuel Code ANSI Z223.1 (NFPA54) latest edition.
- The heater is designed to operate with a 4 in. diameter exhaust stack.
- Single wall galvanized flue pipe or Dura-Connect single wall, flexible connectors must be used. The portion of the flue pipe which goes through combustible material in the building wall or roof must pass through a type “B” vent to maintain clearances (see Figures 2-19 and 2-20).
- Maximum vent length for all models is 20 feet.
- The venting system shall terminate at least 3 ft. (0.9m) above any forced air inlet located within 10 ft. (3.1m).
- The venting system shall terminate at least 4 ft. (1.2m) below, 4 ft. (1.2m) horizontally from, 1 ft. (30cm) above any door, window, or gravity air inlet into any building. The bottom of the vent terminal shall be located at least 12 in. (30 cm) above grade.
- Uninsulated single wall metal pipe shall not be used in cold climates for venting gas utilization equipment.
- The vent terminal of a horizontal venting system must be installed to prevent blockage by snow and protect building materials from degradation by flue gases.
- Stacks may exit the building either horizontally or vertically. Vertical venting exiting the roof should be 2 ft. above the roof. For horizontal venting, the flue

should be 2 in. from the sidewall. Care should be exercised to ensure that vent opening is beyond any combustible overhang (see Figure 2-19).

- A common flue of 6 in. diameter must be used for double venting of units. One thermostat must control both units. **When common venting is used, flue should be connected so that the byproducts of one heater cannot flow into the adjoining flue of the other heater.** A dual exhaust assembly is available from Detroit Radiant, Part No. Y or RT (see Figures 2-22 through 2-24). A Field Controls SK-6 vent cap must be used for sidewall common venting of DX 200 Models.

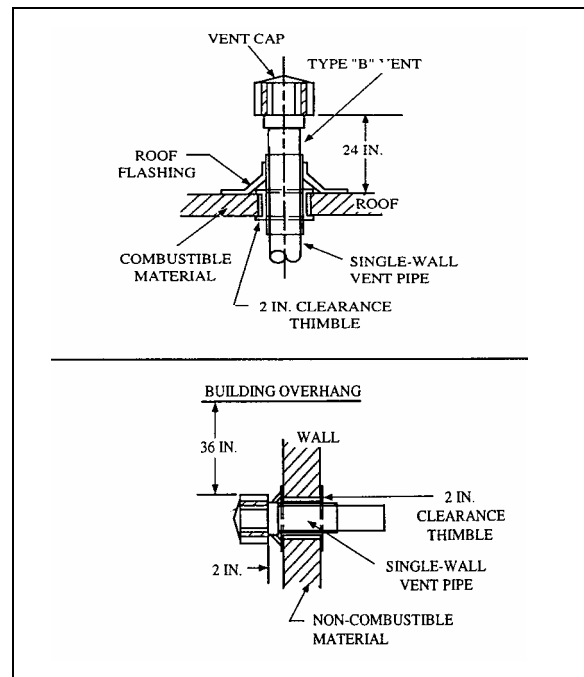


Figure 2-19

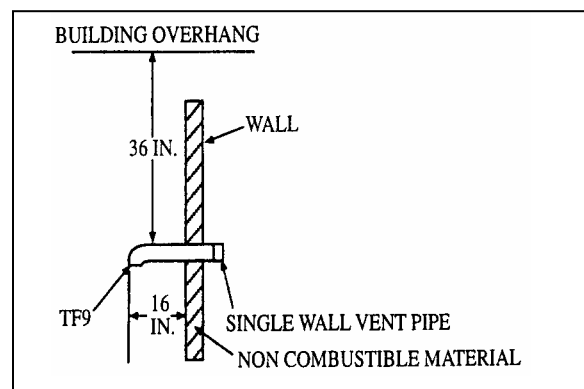


Figure 2-20

FLUE VENTING CHART

IMPORTANT	
DX MODELS	APPROVED VENT PACKAGES
50,000 thru 175,000 BTUH	4 DSK TF-9
200,000 BTUH	SK-4, SK-6 ONLY

Chart 5

- 4VC & 6VC Breidert Vent Caps are **not** approved for use with DX models.
- Vertical venting may utilize standard “B” vent caps or the above listed vent caps (except for TF9).

- Do not use more than two 90° elbows in the exhaust vent (all models).
- All vent pipes must be sealed with high temperature sealant and 3 No. 8 sheet metal screws to prevent leakage of flue gas into building.
- Horizontal flues should be pitched down toward outlet, ¼ in. per ft. of the vent length, to prevent rain from entering the heater (see Figure 2-21). Do not pitch heater.

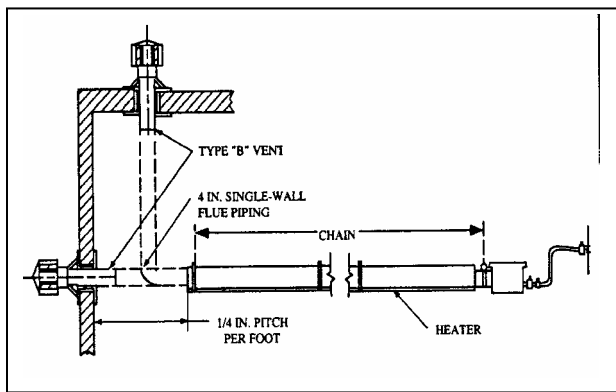


Figure 2-21

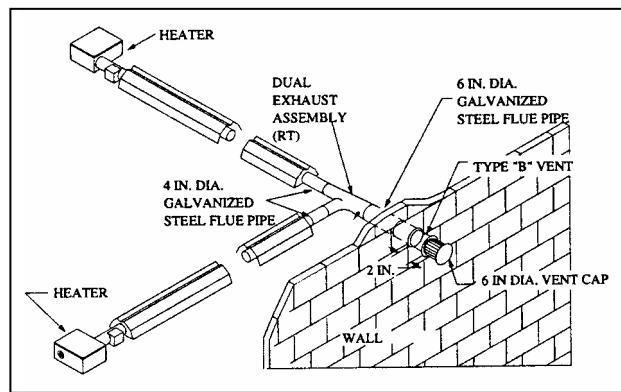


Figure 2-23

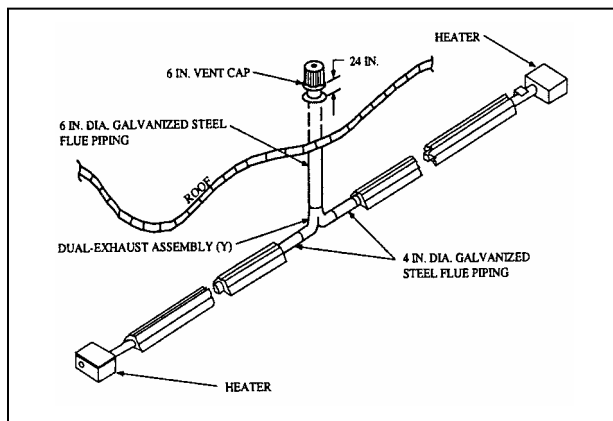


Figure 2-22

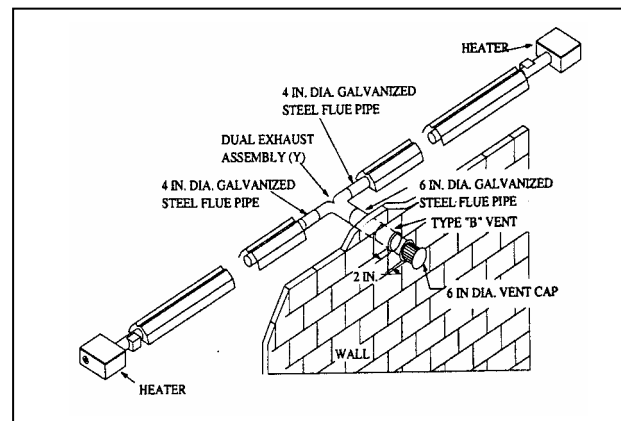


Figure 2-24

DUAL-EXHAUST ASSEMBLY
(THROUGH ROOF)

DUAL-EXHAUST ASSEMBLY
(THROUGH WALL)

2.7 Installation for Unvented Operation (Optional)

The model DX units are approved for unvented operation when equipped with a factory supplied end cap/diffuser, Part No. WVE-GALV (see Figure 2-25). This allows the products of combustion to be discharged from the unit into the space being heated.

Ventilation of the space is required to dilute those products of combustion sufficiently. For proper ventilation, it is recommended that a positive air displacement of at least 3.8 CFM per 1000 BTU/H of natural gas input be provided.

If propane is used, a positive air displacement of at least 4.5 CFM per 1000 BTU/H of gas input is recommended. Either gravity or mechanical means may accomplish this air displacement. Provisions must be made for a sufficiently large fresh air intake area and exhaust air outlet area, to accomplish the displacement. Local codes may require that the mechanical exhaust system be interlocked with the electrical supply line to the heaters, enabling both to function simultaneously.

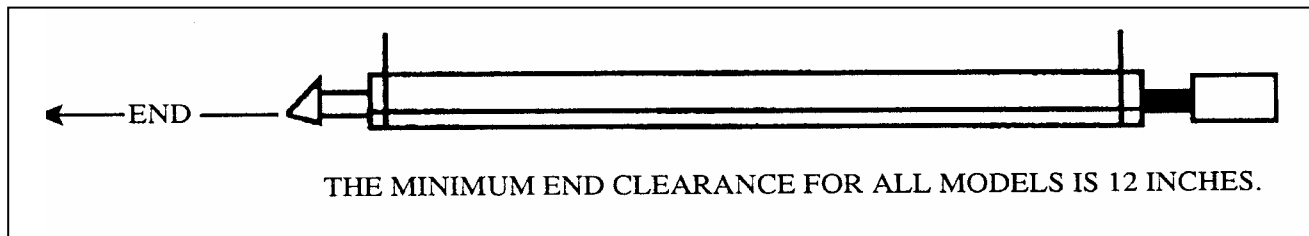


Figure 2-25

2.8 Combustion Air Requirements

Combustion air intake has a factory present air orifice. If indoor combustion air is to be supplied for a tightly closed room, one square inch of free air opening should be provided for each 5,000 BTU/H of heater input.

Non-contaminated air for combustion **must** be ducted to the heater if chlorinated or fluorinated contaminants are present in the area where the heater is installed, or if the building has a negative pressure. Typical sources of these contaminants are refrigerants, solvents, adhesives, degreasers, paint removers, paints, lubricants, pesticides, etc.

Outside combustion air may be provided by an accessory 4 in. air duct, and directly attached over the air orifice (see Figure 2-26). A WIV-4 wall inlet vent must be used with horizontal outside air intake ducts.

The maximum number of 90° elbows allowed is two.

The air intake terminal must be installed to prevent blockage by snow.

NOTE: Use insulated duct or PVC pipe to prevent condensation on outer surface. Keep intake opening at least 3 ft. from any exhaust vent openings. For limitation of length and size, see the Air Intake Duct Chart.

AIR INTAKE DUCT CHART		
MODEL	AIR INTAKE DUCT SIZE [in.]	MAXIMUM INTAKE LENGTH [ft]
ALL	4	20
MODELS	5	30

CHART 6

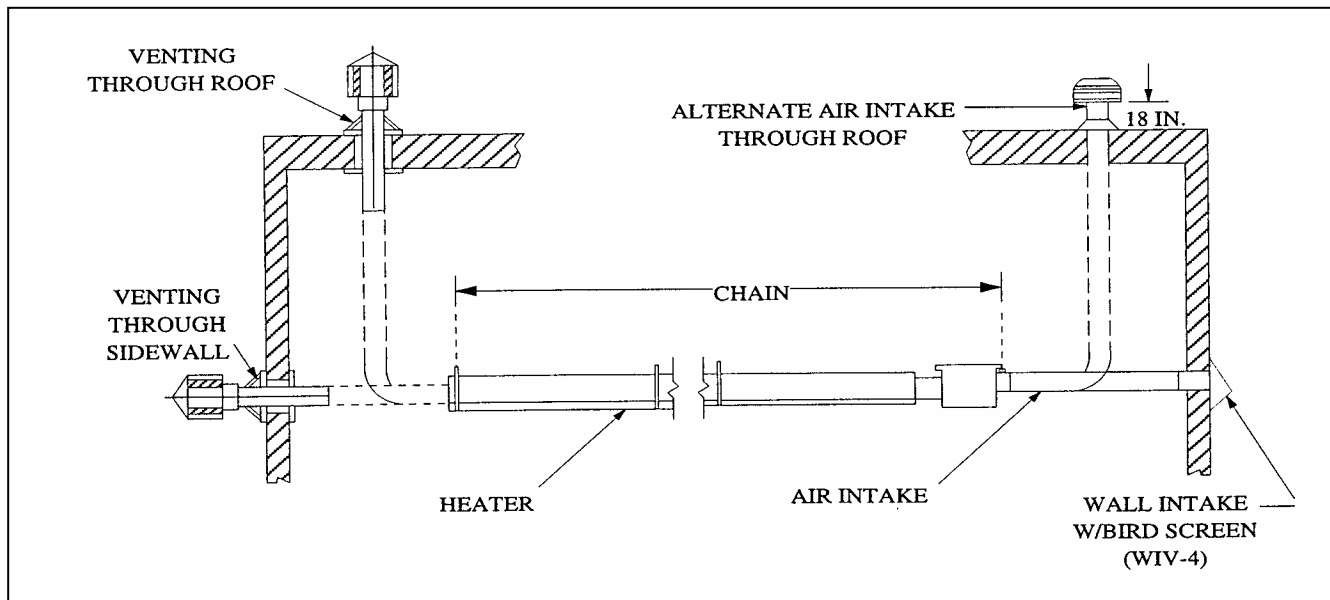


Figure 2-26

2.9 Gas Supply

CAUTION!

CORRECT INLET PRESSURES ARE VITAL FOR EFFICIENT OPERATION OF HEATER. REFER TO AGA RATING PLATE AND, IF NECESSARY, CONSULT GAS COMPANY.

If all or a portion of the gas supply line consists of used pipe, it must be cleaned and then inspected to determine its equivalency to new pipe. Test all main supply lines according to local codes. **(Isolate heater gas valve and supplied gas cock during test.)**

Excessive torque on manifold may misalign orifice. Always use two wrenches when tightening mating pipe connections.

WARNING!

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

If any portion of the gas supply line is located in an area that could cause an abnormal amount of condensate to occur in the pipe, a sediment trap should be installed (see Figure 2-27).

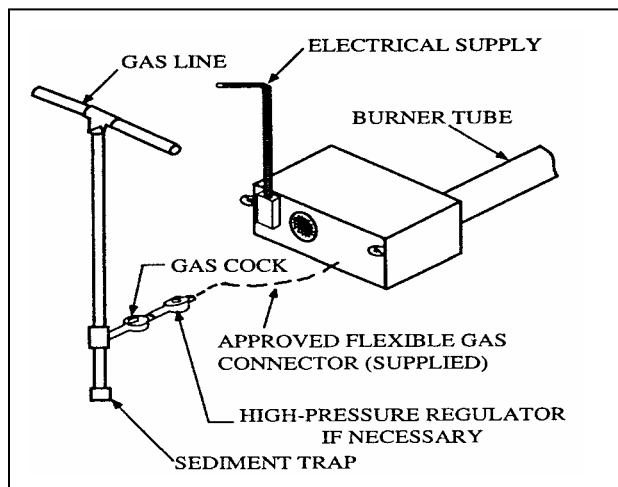


Figure 2-27

NOTE: For high pressure gas above 14 in. W.C.P. (Water Column), a high pressure regulator and gas cock must be used. If compressed air is used to detect leaks in the gas supply line, disconnect and cap shutoff cock to avoid damage to regulator and gas valve.

A typical gas supply line connection is illustrated in Figure 2-28. The method shown will decrease the possibility of any loose scale or dirt in the supply line entering the heater's control system and causing a malfunction. Provide a 1/8 in. (3.2mm) NPT, plugged tapping accessible for test gauge connection immediately up stream of gas connection to heater. The gas supply line must be of sufficient size to provide the required capacity and inlet pressure to the heater (consult gas company) as follows:

NOTE: Manifold pressure should be checked at the tap on the gas valve. Readings will be above atmospheric pressure.

- **Natural Gas**

To obtain the required manifold pressure of 3.5 in. W.C.P., a minimum inlet pressure of 5.0 in. W.C.P. is necessary for purposes of input adjustment. A maximum inlet pressure of 14.0 in. W.C.P. is allowed for all units.

- **Liquefied Petroleum Gas**

To obtain the required manifold pressure of 10.0 in W.C.P., a minimum of 11.0 in. W.C.P. for purposes of input adjustment to a maximum of 14.0 in. W.C.P. must be provided ahead of the control system on each heater. **Do not** exceed a manifold operating pressure of 10.0 in. W.C.P.

Use only a pipe joint compound that is resistant to liquefied petroleum gases.

- **Pressure Equivalents**

- 1 in. W.C.P. equals 0.58 oz./sq. in.

- Allowance for Expansion

Allowances must be made for the system to expand. The supplied stainless steel, flexible gas connector is recommended. If, however, local codes require rigid piping to the heater, a swing joint can be used.

- Gas Line Connection

- a. The gas outlet shall be in the same room as the appliance and the connector must not be concealed within or run through any wall, floor or partition.
- b. The connector shall be of adequate length.
- c. The final assembly shall be tested for leaks. CAUTION: Matches, candles, open flame or other sources of ignition shall not be used for this purpose. Leak test solutions may cause corrosion-water rinse after test.

- d. Contact with foreign objects or substances should be avoided.
- e. The connector should not be kinked, twisted or torqued.
- f. Connectors are not designed for movement after installation. Bending, flexing or vibration must be avoided.
- g. Connectors are for use only on piping systems having fuel gas pressures not in excess of ½ pound per square inch.

CAUTION!

CONNECTOR NUTS MUST NOT BE CONNECTED DIRECTLY TO PIPE THREADS. THIS CONNECTOR MUST BE INSTALLED WITH ADAPTORS PROVIDED. DO NOT REUSE.

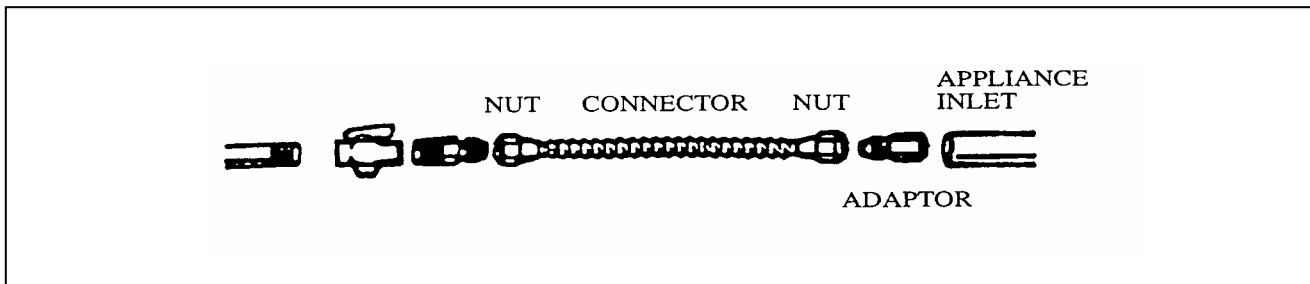


Figure 2-28

2.10 Electrical Requirements

1. Heaters operate on 120 Volts, 60 Hz, single phase. The maximum amperage requirement (starting current) is 4.8 amps per heater. The running current is 1.1 amps.
2. Heater must be grounded in accordance with the National Electrical Code ANSI/NFPA70 (latest edition).
3. Wiring must not be run above or below the heater, nor exposed to the radiant output.
4. Observe proper electrical polarity.

It is recommended that the thermostat be installed on the hot side of a fused supply line and have a sufficient ampere rating for the heater(s) that it controls.

2.11 Lighting Instructions

1. Purge main gas supply line at start-up.
2. Rotate heater's manual gas valve knob to the "ON" position.
3. Close electrical circuit.
4. If heater fails to light, turn off gas and wait five minutes before repeating the above procedure.

2.12 Shutdown Instructions

1. Open electrical circuit.
2. Rotate heater's manual gas valve knob to the "OFF" position.

3 THEORY OF OPERATION

3.1 DX MODELS

- **Starting Circuit (Figures 3-1 and 3-2)**

When voltage is applied to L1 and L2, a circuit is completed from L1 via the blower motor to L2. The blower fan is mounted in the control box and rated to supply sufficient air for combustion.

Air pressure generated by the blower will cause the normally open burner pressure switch No. 1 to close. Another circuit is completed from L1 to the hot surface ignition control and back to L2. There is a five second delay, then the glo-bar is powered. After the glo-bar has been powered for 45 seconds, the control causes the gas valve to open and initiates the ignition trial.

Power to the glo-bar is shut off during the last two or three seconds of the ignition trial.

- **Running Circuit**

After ignition, the flame rod monitors the flame. As long as a flame is present, the valve is held open. If the flame is lost, the control acts to close the valve within one second, and a new trial sequence identical to that at start-up is initiated. If proof of flame is not established within 8.5 seconds, the unit will lock out. If lockout occurs, the control can be reset by briefly interrupting the power source.

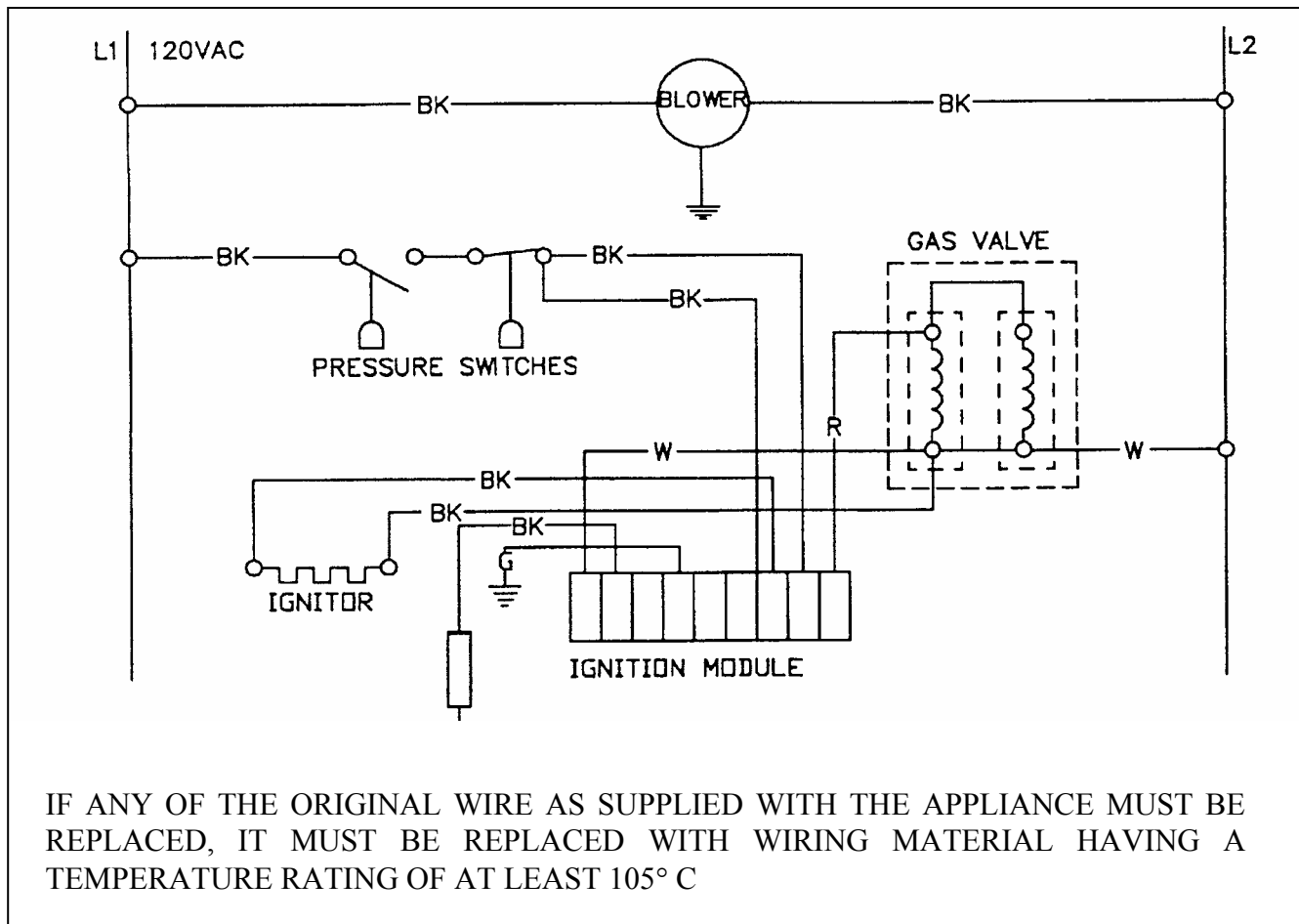


Figure 3-1

DX BLOCK DIAGRAM

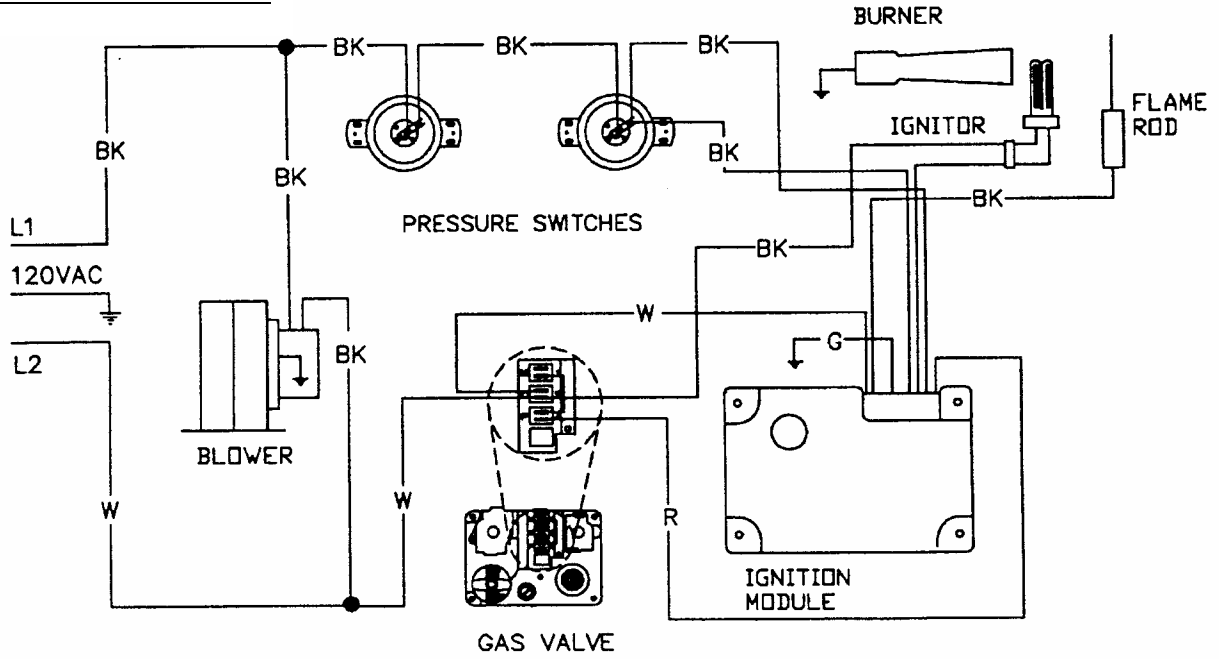


Figure 3-2

4 MAINTENANCE

Model DX gas fired, infrared heaters require a minimum of routine maintenance to keep them operating at peak performance.

WARNING!

Use protective glasses when cleaning the heater.

1. Ensure that the squirrel cage in the blower is kept clean. If dirt becomes a problem, installation of outside air intake ducts for combustion is recommended. Oiling the blower motor will extend bearing life beyond the 30,000 hour minimum.
2. Keep the aluminum reflectors clean.

DX / XTS GENERAL TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Thermostat closed, fan does not operate.	<ol style="list-style-type: none"> 1. Blown fuse. 2. Faulty thermostat. 3. Loose or disconnected wire. 4. Faulty fan. 	<ol style="list-style-type: none"> 1. Replace. 2. Replace. 3. Repair as required. 4. Lubricate, repair or replace.
Thermostat closed. Fan operates. No glo-bar energization.	<ol style="list-style-type: none"> 1. Loose or disconnected wire. 2. Box lid or gasket not in place. 3. Plugged pressure switch lines. 4. Plugged or restricted exhaust vent. 5. Faulty pressure switches. 6. Faulty circuit control. 7. Faulty glo-bar. 	<ol style="list-style-type: none"> 1. Repair as required. 2. Put in place. 3. Clean as necessary. 4. Remove foreign matter. 5. Replace only. Do not adjust. 6. Replace circuit control. 7. Replace.
Thermostat closed. Fan and glo-bar operate. After 45 seconds glo-bar shuts off. No reignition.	<ol style="list-style-type: none"> 1. Closed gas supply. 2. Dirty or restricted orifice. 3. Faulty valve. Disconnected wire. 4. Inlet pressure exceeds 14" W.C.P. 	<ol style="list-style-type: none"> 1. Open all gas connections. 2. Remove and clean with a soft object. 3. Replace or repair. 4. Lower inlet pressure.
Thermostat closed. Fan and glo-bar operate. Ignition occurs. Burner cycles off and will not recycle.	<ol style="list-style-type: none"> 1. No electrical ground. 2. Faulty circuit control. 3. Low gas pressure. 4. Open circuit control connection. 5. Reversed polarity. 	<ol style="list-style-type: none"> 1. Connect electrical ground to junction box. 2. Replace. 3. Provide required gas pressure. 4. Repair or replace. 5. Change as necessary.
Thermostat closed. Fan and glo-bar operate. Ignition occurs. Burner cycles off. Burner cycles on.	<ol style="list-style-type: none"> 1. Low gas pressure. 2. Baffle improperly positioned. 3. Faulty exhaust pressure switch. 4. Restricted flue vent. 	<ol style="list-style-type: none"> 1. Provide required gas pressure. 2. Reposition baffle at vent end. 3. Replace. 4. Remove foreign matter.
Loss of heater efficiency.	<ol style="list-style-type: none"> 1. Low gas pressure. 2. Dirty or restricted orifice. 3. Foreign matter inside burner. 4. Unit cycles on and off. 5. Reflector is sooted and has lost its reflective ability. 6. Reflector not in place. 7. Clogged fan blower. 	<ol style="list-style-type: none"> 1. Provide required gas pressure. 2. Remove and clean with a soft object. 3. Clean as necessary. 4. Check previous symptom. 5. Clean with aluminum cleaner and soft wiping cloth. 6. Put in place. 7. Clean.
Radiant tube leaking burnt gases.	<ol style="list-style-type: none"> 1. Loose tube connections. 2. Holes or cracks in radiant tubes. 	<ol style="list-style-type: none"> 1. Assure that tube is fully inserted into flared end and properly clamped. 2. Replace.
Condensation.	<ol style="list-style-type: none"> 1. Stack length too long. 2. Light gauge flue stack used. 3. Contaminated combustion air. 	<ol style="list-style-type: none"> 1. Shorten stack. 2. Minimum of 26 gauge vent pipe required. 3. Provide fresh air inlet duct.
Tube bowing.	<ol style="list-style-type: none"> 1. Insufficient combustion air. 2. Overfired. 3. Contaminated combustion air. 4. Heater unable to expand properly. 	<ol style="list-style-type: none"> 1. Provide 2 sq. in. of free air per 5000 BTU/H of input. 2. Check gas pressure and orifice size. 3. Provide fresh air inlet duct. 4. Remount with flexible inlet or vent pipe.
Tube corroding.	<ol style="list-style-type: none"> 1. Contaminated combustion air. 	<ol style="list-style-type: none"> 1. Provide fresh air inlet duct.
Visual inspection of burner operation not possible.	<ol style="list-style-type: none"> 1. Dirty or sooted sight glass. 2. Unit mounted upside down. 	<ol style="list-style-type: none"> 1. Remove, clean or replace. 2. Mount correctly.
Stack sooting.	<ol style="list-style-type: none"> 1. Insufficient combustion air. 2. Improper gas. 	<ol style="list-style-type: none"> 1. Provide 1 sq. in. of free air for every 5000BTU/H of input. 2. Correct with proper gas input.
Odor or fumes in space.	<ol style="list-style-type: none"> 1. Vaporized solvents decomposing when contacting radiant tubes. 2. Evaporation of oils/solvents at floor levels. 3. Fork lifts. 4. Loose tube connections. 	<ol style="list-style-type: none"> 1. Address ventilation concerns. 2. Address ventilation concerns. 3. Address ventilation concerns/repair. 4. Tighten tube clamps to 50-100 ft. lb.

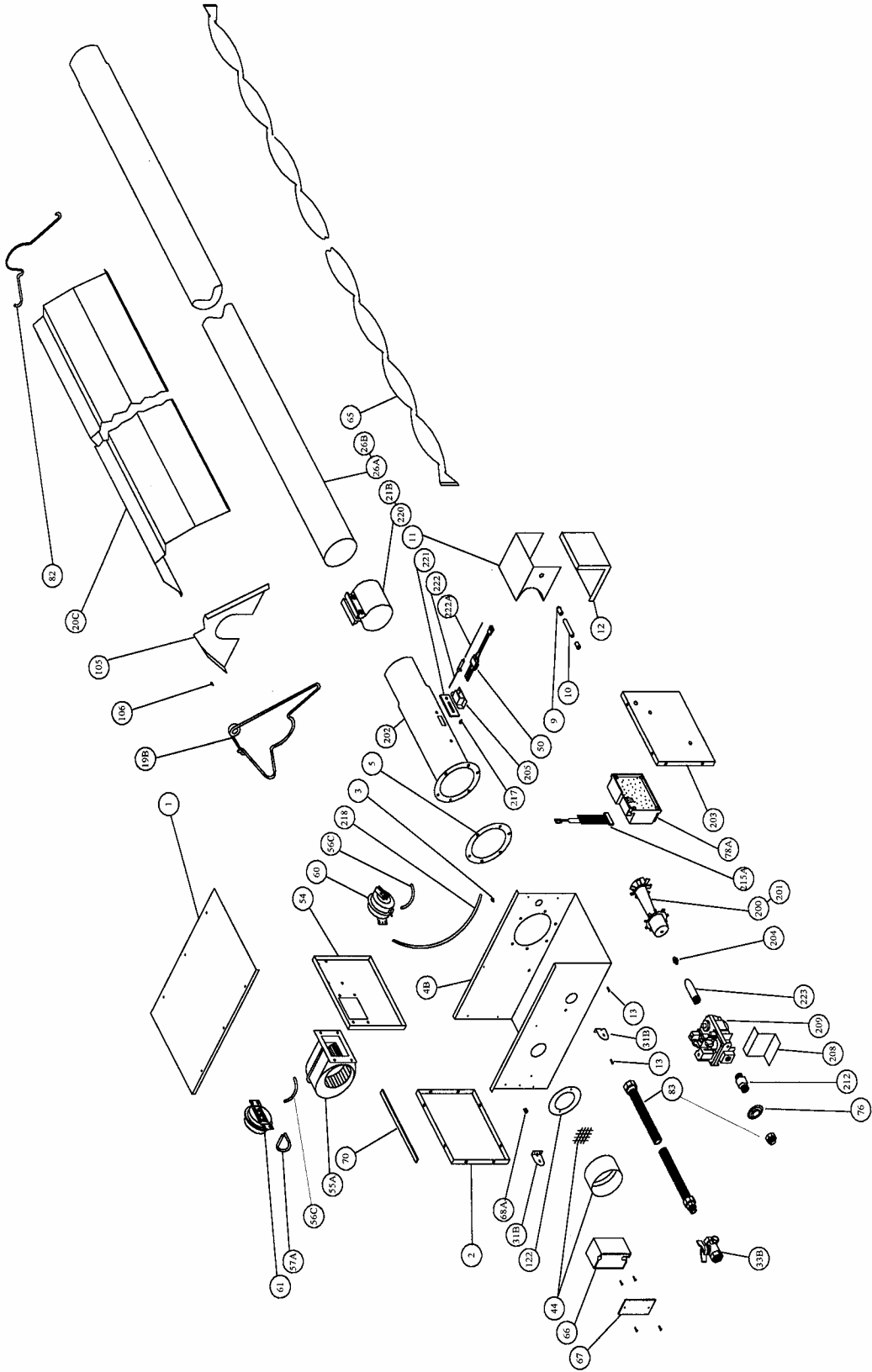
CHART 7

5 PARTS LIST

5.1 Basic Parts List

DX SERIES PARTS LISTING		KEY	KEY	TP#	ITEM	ITEM
KEY	TP#					
	TP-1				CONTROL BOX COVER	
	TP-2			TP-68A	STRAIN RELIEF BUSHING	
	TP-4B			TP-70	CONTROL BOX COVER GASKET (PER FOOT**)	
	TP-5			TP-76	RUBBER GROMMET	
	TP-9			TP-78A	MARK 17X-117 CIRCUIT BOARD	
	TP-10			TP-82	REFLECTOR CENTER SUPPORT	
	TP-11			TP-83	STAINLESS STEEL FLEX CONNECTOR	
	TP-12			TP-101	SUB TP-223	
	TP-14			TP-104	SUB TP-223	
	TP-15			TP-105	REFLECTOR END CAP	
	TP-16			TP-106	REFLECTOR CLIP	
	TP-19B			TP-108	5' AL-TI TUBE, PAINTED W/ ONE CLAMP	
	TP-20C			TP-111	5' ALUM. TUBE, PAINTED W/1 CLAMP	
	TP-21B			TP-112	5' REFLECTOR	
	TP-26A			TP-122	GASKET FOR AIR ORIFICE & AIR COLLAR	
	TP-26B			TP-200	BURNER (50 TO 100 MBTU/H NAT GAS)	
	TP-31B			TP-200A	BURNER (50 TO 100 MBTU/H LP GAS)	
	TP-33B			TP-201	BURNER (125 TO 200 MBTU/H NAT OR LP GAS)	
	TP-44			TP-202	16" BURNER TUBE WITH FLANGE	
	TP-50			TP-203	DX END PANEL - RIGHT	
	TP-54			TP-204	GAS ORIFICE - CONSULT FACTORY	
	TP-55A			TP-205	GLO-BAR HOLDER	
	TP-56C			TP-208	"2" MOUNTING BRACKET	
	TP-57A			TP-209	36E36A-246 GAS VALVE - NAT GAS ASSY	
	TP-60F			TP-209P	36E36A-240 GAS VALVE - LP GAS ASSY	
	TP-61B			TP-212	1/2" X 3" PIPE NIPPLE	
	TP-61C			TP-215	DX WIRING HARNESS	
	TP-61D			TP-215A	DX WIRING HARNESS (USE W/ FLAME ROD)	
	TP-65A			TP-217	PRESSURE BARB FITTING	
	TP-65B			TP-218	EXHAUST PRESSURE TUBE (VINYL)	
	TP-65C			TP-220	STAIN. STL. TUBE CLAMP (175 & 200 MBTU/H)	
	TP-65D			TP-221	GLO-BAR HOLDER GASKET	
	TP-66			TP-222	FLAME ROD	
	TP-67			TP-222A	FLAME ROD WIRE	
				TP-223	GAS MANIFOLD	

** 6' TOTAL NEEDED TO COVER OUTER EDGES OF A BURNER BOX.



N:\RADIAN\SALESCO-1\PRICE\1-1888PR-1188PART-1188DISE-1188PARTS.VCD 8/26/1988

