IDF SERIES

Installation Operation And Maintenance Manual

Concepts & Designs Inc.

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<u>This manual shall be placed in a specific location and maintained in legible condition, with directions on unit as to the location where the manual is to be stored.</u>

Installing Contractors Name:

_____

Address:

Street_____

City _____

State _____ Zip code _____

Country _____

Telephone # : (_____)_____

Date of Installation:_____/_____/_____

Unit Model #_____

Unit Serial # _____

The **Installing Contractor** Must Identify all of the emergency shut-off devices.

All wiring will be done in accordance with the **National Electrical Code.**

A manual shut-off shall be installed on the outside of the unit's gas vestibule to be used as the main shut-off of the unit's gas supply, when local codes require the installation of such a valve.

A minimum 1/8 inch NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the unit.

Incase of Emergency:

1. Close main manual gas supply valve.
2. Shut off main disconnect.

When shutting down unit for extended periods of time we recommend that the following be done:

1. Shut off main disconnect.
2. Close main manual gas supply valve to prevent the leaking of gas into the combustion chamber.

When restarting the unit after long periods of shut down the following should be done:

1. Check the unit for general cleanliness; any debris small or large has been removed and the unit is clean.
2. Make sure all wire terminals and connections been checked for tightness.
3. Check the supply air outlet, and the blower inlets have been checked and are free from any obstructions.
4. Check blowers to make sure the shaft rotates freely, sheaves are aligned, sheaves, blowers, and motor bolts or set screws checked for tightness.
5. Make sure all damper linkages are free to move, no binding will occur.
6. Open main manual gas supply valve and check for leaks.
7. Turn on main disconnect.

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CONCEPTS & DESIGNS, INC.

HAZARDS

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.

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

FOR YOUR SAFETY

If you smell gas:

1. **Open Windows**
2. **Don't touch electrical switches**
3. **Extinguish any open flames**
4. **Immediately call your gas supplier**

INSTALLATION

The following recommendations are not intended to supplant any requirements of federal, state, or local codes having jurisdiction. This equipment shall be installed and wired in accordance with regulations of the National Boards of Fire Underwriters, National Electric Code, and local governing bodies. In Canada, equipment should be installed in accordance with the applicable provincial regulations. Furthermore, this document does not exempt the installer, designer, or user of this equipment from its correct application, nor from the safe and correct operation of this unit(s) and any required ancillary systems. Including, but not limited to, pre-cooling and post cooling equipment, duct distribution, vapor barriers, controls, etc.

1.0 LOCATING THE UNIT

Prior to locating the unit, authorities that have jurisdiction should be consulted before installations are made.

The IDF unit must be LEVEL and located so that there is enough clearance for opening the access doors. In addition to allowing room for access door swing, NEC or others may require 42" or more of clearance in front of the electrical panel or vestibule. Refer to the submittal documents for airflow direction through the unit so that it may be positioned to accommodate necessary ductwork. Also note from the submittal where electrical and gas hookup points are located so that proper connections can be made. Remember to verify position and ability of support beams, pad, or curb to properly support the unit. At a minimum all IDF units are to be supported around the perimeter and across any shipping split. Verify that support structure dimensions coincide with the unit.

Locate the unit so that air intakes are not to close to any exhaust fan outlets, gasoline storage, or other contaminants that could potentially cause dangerous situations. The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous. The AHU series may possibly on some applications be burning gas directly into the air stream being heated; therefore anything passing across the burner may be combusted. If the IDF series unit is used in an explosion proof environment verify that the potentially explosive materials cannot enter the unit intake(s).

2.0 CLEARANCE

For horizontally vented units the distances from adjacent public walkways, adjacent buildings, windows that can be opened, and building openings, shall conform with the local codes.

Except where required for service access or venting, IDF series units may be installed on top of combustibles with O" of clearance. A minimum of 6" clearance on other sides, and tops is to be provided.

When located on a roof, the unit intake needs to be a minimum of 14" above the roof to prevent intake of snow or splashed rain. The unit should be located so that prevailing winds do not blow into the unit inlet. The optional fresh air inlet hood (if supplied) is not designed for extreme weather conditions. If the application is critical, other provisions must be made to protect the unit inlet from driving winds.

Outdoor, gravity vented furnaces are designed for a minimum stack height of 5 feet or three feet above any structure or obstruction within a horizontal distance of 10 feet. On power vented units make sure the flue discharge is not directed at fresh air inlets.

3.0 CURBS

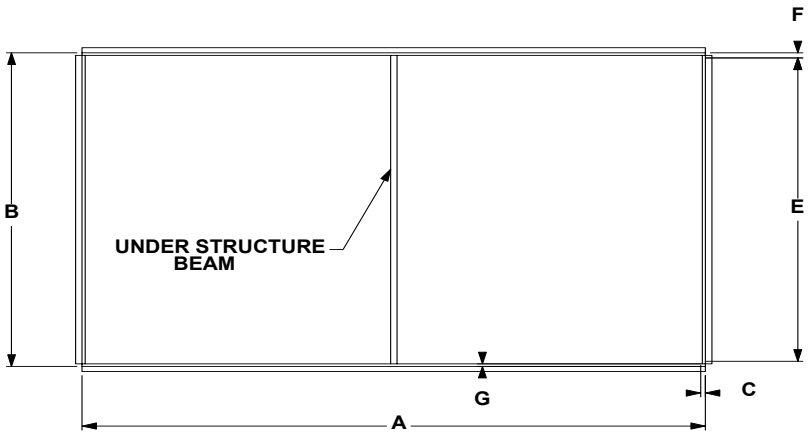
When units are installed on rooftop curbs, there must be a gasket between the top of the curb and the base surface of the unit to prevent moisture from leaking into the building from either driving rains or melting snow. When Concepts and Designs provides the curbs the gasket will also be provided and shipped with the unit.

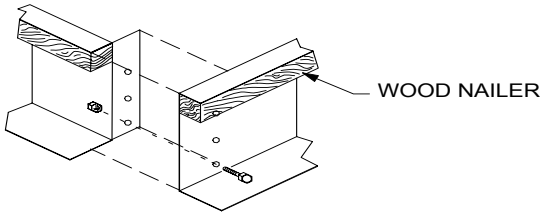
Under structure beam spacing should also be checked to preclude any interference with air ducts.

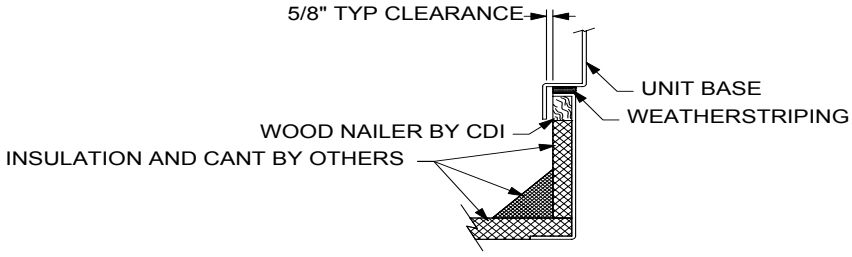
Curb Dimensions

A=Length of unit minus 1”

B=Width of unit minus 1”







4.0 HANDLING THE EQUIPMENT

The IDF unit is designed for handling by two methods. In both cases it is lifted from the bottom base in a fashion that holds it level, keeps it from tipping, falling or twisting. If the unit is severely twisted during handling permanent damage may occur. It is not to be lifted from the top unless the optional top lifting or suspension package has been provided. It is the installer's responsibility to verify the handling equipment's ability to safely handle the equipment.

The preferred method of lifting would be by forklift. provided that the forks extend completely underneath the unit and reach the unit base frame on the opposite side. Forks which do not reach to the other side of the unit could cause it to tip resulting in unsafe conditions or damage to the unit.

The alternative method of handling is through the unit's channel base frame and/or special lifting lug hooks installed on the unit (See Figure 4.1). All lifting operations must be accomplished with a load spreader of sufficient width to insure that the lifting cables clear the side of the unit. If this type of spreader is not available, wood strips should be inserted between the cables and unit where necessary.

Note: All lifting points must be used and will be marked "Lift Here" on the unit.

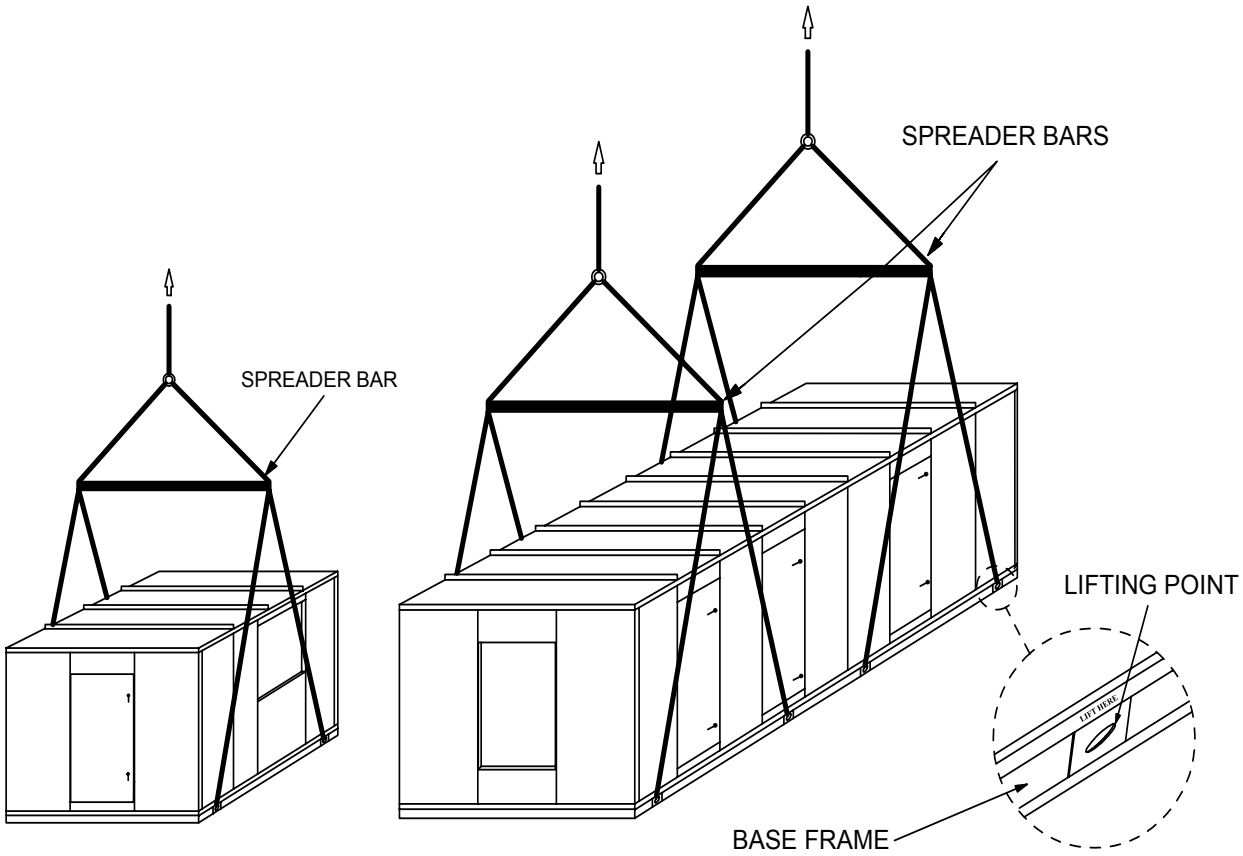


Figure 4.1

5.0 PREPARING UNIT FOR INSTALLATION

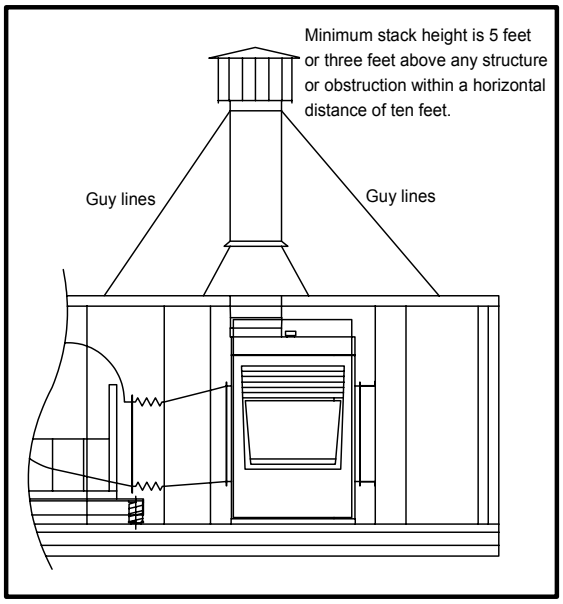
Be sure to look for shipping brackets or other packaging that should be removed prior to assembling the unit. It is the installers responsibility to remove protective coverings and shipping supports. All such items should be removed prior to unit startup.

6.0 ASSEMBLING THE UNIT

All sections not shipped attached to the basic unit must be field assembled at the job site using assembly hardware provided. The determination of the general arrangement of the assembly can be made by referencing the submittal drawings for the specific factory shop order number. The loose hardware will usually be found in the blower compartment or electrical vestibule.

All sections must be gasketed with waterproof gasketing at the assembly joint. This gasketing must be placed directly onto the face of the joint to be bolted together in order to form a tightly sealed joint. Some of this gasketing material might squeeze out of the joint as it is pulled together. This excess should be trimmed off. The assembly joint may be trimmed with regular silicone caulk to improve appearance if required by the customer. Concepts and Design provides the gasketing as required. Caulk will also be supplied if required to provide proper sealing or if specifically requested for cosmetic purposes.

A minimum stack height of 5 feet or three feet above any structure or obstruction within a horizontal distance of ten feet must be added to gravity vented units to operate properly. then install the vent cap on top of the flue stack.



7.0 CHECK FOR TIGHTNESS

During the transit, unloading, and setting of the unit, bolts and nuts may have become loosened. Particularly in the pillow block ball bearing assemblies on blower section. It is required that all nuts and setscrews be checked and tightened as required. Turn blower fan shaft by hand to make certain that no rubbing occurs and to check that bearing lock rings or setscrews are tight.

Open the cover on the electrical control box located on the side of the burner blower section. The box can be opened by turning main fused disconnect switch to the “off’ position (disconnect switch is optional). Inspect all wire terminals and wiring termination’s to ensure that all connections are tight.

8.0 LOCATION OF ACCESSORIES

The optional remote control panel and /or room stats as required will typically be located in the blower section of the unit for shipment and must be removed and installed by the electrical contractor.

The optional remote control panel is furnished with one heavy-duty switch and three signal lights. The switch controls the blower and the burner. The signal lights indicate supply blower operation, burner operation, and safety lockout.

The following steps must be performed installation of the remote panel:

A) Locate a proper location for the remote.

B) Align box with spirit level.

C) Examine wiring box and control panel for clearance before providing conduit hole(s).
D) All wiring must comply with applicable electric codes.

E) Minimum wire size of 16 USWG should be used for proper low voltage wiring of the remote control panel.

F) Wires in remote are numbered and will match the numbers on the terminal strip in the electrical vestibule on the unit.

9.0 ELECTRICAL CONNECTIONS

All wiring must comply with all applicable local, state, provincial, and national electric codes. Visually inspect all nameplates, control voltage wiring, control transformer, and main fused disconnect switch on the unit prior to running power to the unit. Cross check voltage with submittal to insure that the voltage option ordered is the voltage received.

If (optional) motorized dampers are used and have been shipped loose, connect electrical wires from unit to damper motor as shown on electrical wiring diagram. Complete all wiring to any optional accessories as shown on electrical wiring diagram as required before applying voltage to the unit.

A wiring junction box may be provided at the shipping split if the unit is large enough to be shipped in pieces. Be sure to reconnect the numbered wires to the numbered terminals.

The total amperage of the main fused disconnect switch is the combination of the blower motors full load amps and control circuit transformer fusing, plus the addition of 50% to the full load amps.

Check the supply voltage before energizing the unit. The maximum variations should not exceed +/-- 10%. Phase voltage unbalance must not exceed 2%. Use proper wire sizing practices when running wires for the remote control panel.

10. PIPING CONNECTIONS

A manual shut-off shall be installed on the outside of the unit's gas vestibule to be used as the main shut-off of the unit's gas supply, when local codes require the installation of such a valve.

A minimum 1/8 inch NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the unit.

Gas piping connection drawings are not shown in this manual because of the many manifold arrangements available due to approval codes and types of gas modulation. All gas piping must comply with "Standards of National Board of Fire Underwriters" and all applicable local codes.

Contact factory if exact gas piping dimensions are required. Standard pipe caps are furnished on manifold for shipment from factory. Run correctly sized gas line to unit. Install manual shutoff valve and regulator if required. A 1/4 inch pressure tap upstream of the unit regulator is recommended.

NOTE: Gas line pressure must be as shown on specification plate when unit is operating at full Input.

On Indoor Units vent the pressure regulators(s) and vent valve, if included with unit, to outside of building. With vent pipe outside, install a proper vent cap and/or screen to prevent entrance of foreign material and plugging.
When optional chilled water pre-cooling and/or post cooling coils are provided, insure that distribution piping is of adequate size, and that required specialties, such as three-way valves, vent and drain valves, are correctly installed, and that actuators and valves (if provided) are mounted and wired.

11. CONDENSATE DRAIN CONNECTION

The unit is provided with a male NPT condensate drain connection. Refer to certified drawings for the exact location and size. The unit and drain pan must be level side to side and a P-trap must be installed for proper drainage.

CDI units may have positive or negative pressure sections. It is recommended that the P-traps be used in both cases with care given to the negative pressure sections. In Figure 11.1, dimension “A” should be a minimum of 8”. As a conservative measure to prevent the cabinet static pressure from blowing or drawing the water out of the trap and causing air leakage, dimension “A” should be two times the maximum static pressure encountered in the coil section in inches of W.C.

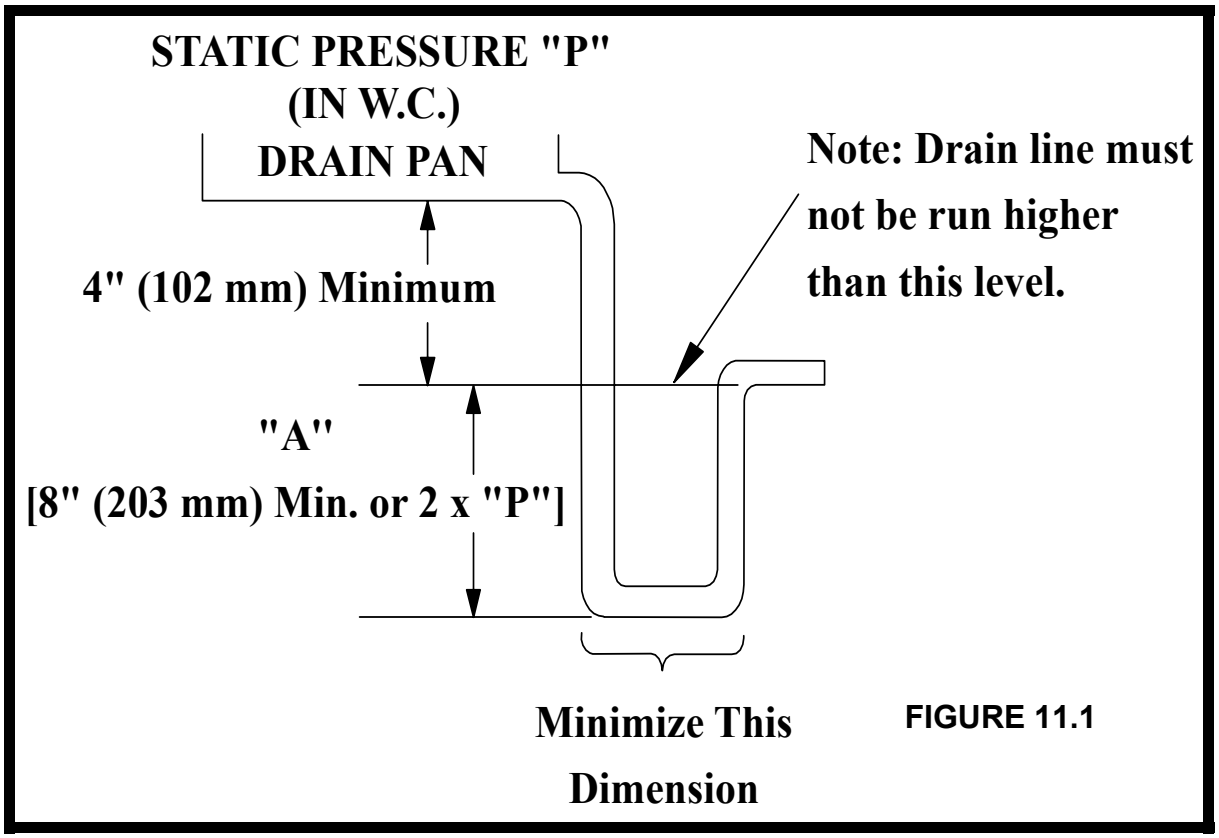


FIGURE 11.1

Drainage of condensate directly onto the roof may be acceptable; refer to local codes. It is recommended that a small drip pad of either stone, mortar, wood or metal be provided to protect the roof against possible damage.

If condensate is to be piped into the building drainage system, the drain line should be pitched away from the unit at a minimum of 1/8 inch per foot. The drain line must penetrate the roof external to the unit. Refer to local codes for additional requirements. Sealed drain lines require venting to assure proper condensate flow.

Where the coils have intermediate condensate pans on the face of the evaporator coil, PVC tubes on the end of the intermediate pan provides drainage into the main drain pan.

Because drain pans in any air conditioning unit will have some moisture in them, algae, etc. will grow. Periodic cleaning is necessary to prevent this buildup from plugging the drain and causing the drain pan to overflow. Also, the drain pans should be kept clean to prevent the spread of disease. Only qualified personnel should perform cleaning.

12. DUCT CONNECTION(S)

A. The following steps must be performed for indoor Units

1). Lifting lugs serve as suspension points on all indoor type units.

2). Make required fresh air opening in wall and line with an angle frame. Inside should be completed before outside is started to avoid any crumbling of penetrated wall.

3). Utilize an insulated fresh air collar through the opening with flanges turned out to provide rigidity.

4). Anchor intake hood with bird screen (if supplied) to outside of wall.

5). Caulk perimeter of opening to make connection watertight.

NOTE: Intake hood and bird screen and any appropriate ductwork must be full size of unit opening on Indoor units.

B. The following steps must be performed for outdoor units:

1). Fasten the intake hood and bird screen directly to unit inlet. Caulk the perimeter of opening to make connection water tight.

2). Connect discharge air duct or discharge grill to unit outlet. If unit is installed outdoors, be sure that duct opening to building is adequately flashed and sealed to prevent leakage.

3). Intake hood may require additional support in certain wind loading conditions or hood designs. Provide adequate support from building structure taking care not to reduce the weather integrity of the building or intake hood.

13. MAKE-UP AIR APPLICATIONS

Refer to submittal documents for specific information about any pre-conditioning equipment, such as enthalpy recovery devices, pre-cooling coils, mixing boxes, etc.

14. RETURN AIR APPLICATIONS

Refer to submittal documents for specific information about any pre-conditioning equipment, such as enthalpy recovery devices, pre-cooling coils, mixing boxes, etc.

15. HEATING APPLICATIONS

Refer to submittal documents for specific information about post-heating devices, such as direct, or indirect heating equipment, steam or hot water coils, etc.

16. OTHER ELECTRICAL OPTIONS

NIGHT SETBACK

As an option to most temperature control systems, a night set-back thermostat can be furnished. It is furnished with a selector switch labeled day/night, or a seven day time clock. The circuitry is arranged so that in the day position, the customer exhaust system interlock will cycle that unit to the “On” position. With the selector switch in the night position, the setback thermostat will cycle both the fan and burner to maintain space temperatures, Note: Whenever the option is furnished it is recommended that freeze protection also be provided. (This also depends on job location and minimum design.)

FREEZE PROTECTION

Freeze protection consists of a freeze thermostat with a startup by-pass timer and will prevent intemperate air to be discharged into the area being heated. Freeze protection is actually for building protection only and is recommended whenever a make-up air unit will be operating unattended for any period of time. All Concepts and Designs Make-Up Air Units are provided, as standard, with a flame failure lockout relay. This relay de-energizes the unit whenever a flame failure occurs that can be detected by the flame rod or optional UV detector. There are many circumstances which could prevent the burner from lighting that the flame detector cannot detect. Should a malfunction or trip of a safety or operating control prevent burner operation, intemperate air may be discharged into the heated area.

INLET ECONOMIZER SWITCH

This is an On/Off remote bulb control with the bulb mounted to sense outside air temperatures. It is connected electrically to cycle the burner off during mild weather to provide an automatic summer/winter changeover. This device will enable a customer to purchase a unit without a remote summer/winter switch or leave the summer/winter switch in the winter position, and still have the burner automatically cycle off during periods of mild weather.

CIRCUIT ANALYZER

The circuit analyzer is a series of lights mounted on the unit which enables a service man to both monitor the operation of the unit and assist in tracing down a component failure. Components are electrically connected in series and should a component fail, then the light indicating that component and all lights downstream of the series circuit will de-energize. The first light out then indicates the malfunction.

AIR FLOW SWITCH

A vacuum switch sets to de-energize the burner when the filters become dirty and prevent adequate air movement across the burner profile. Operating the unit in this condition would result in improper combustion. This device is mandatory for units meeting the Chicago Code RT requirements.

BUILDING PRESSURE SENSOR AND MIXING BOX OPTIONS

Building pressure is used to control a set of dampers in a mixing box, allowing up to 80% return air and 20% outside air to be heated across the burner. As building pressure falls due to exhaust fans starting or large doors opening, the building pressure sensor modulates dampers to allow more outside air and less return air, maintaining building pressure.

STARTUP

17. SPECIAL TOOLS REQUIRED

Ammeter, Amprobe or Equal

Ohm Meter

Tachometer

Volt Meter

Gas Pressure Gauge 0 to 30"

Gas Pressure Gauge 0 to 15 PSIG

U-Tube Manometer 0 to 8" W.C.

Temperature gage (250 degree F maximum)

18. PRECAUTIONS BEFORE ATTEMPTING STARTUP

A) Locate and have ready the “Field Startup “ form; one copy is included in the electrical control panel with the O & M manual. Complete the form as the start up is performed using the Instructions on the startup form.

B) All units are run and tested at the factory to assure proper operation in the field. Nevertheless, the following check, test, and start procedures must be preformed to properly start the unit. ***In order to obtain full warranty coverage, the startup form supplied with the unit must be completed, signed, and returned to Concepts and Designs Inc.*** A representative of the owner or the operator of the equipment should be present during startup to receive instructions in the operation, care, and maintenance of the unit.

C) Perform the Pre-Start Inspection, Including but not necessarily limited to:

1) Verify that the unit is completely and properly installed with ductwork connected.

2) Measure supply voltage and make sure it agrees with the unit nameplate.

3) Check all electrical connections in the main control panel and remote control panel (if supplied) for tightness.

4) Check to see that all fuses are installed, and are of correct value.

5) Make sure all fuel connections are tight and that all joints have been properly sealed. Use soap test for assurance.

6) Verify that supply gas line to the heater was blown clean prior to connection to the heater, Purge gas lines of air. Close Manual gas valves before supplying main gas pressure.

7) Measure the supply gas pressure and make sure it agrees with the unit nameplate. Gas pressure over that specified in the nameplate can result in damage to components.

8) Insure that all insulation (if supplied) is fastened securely to the unit casing.

9) Check unit supply air outlet, and supply blower inlets for obstructions.

10) Check supply air blower assembly (if supplied) to insure freedom of shaft rotation and proper belt tension.

11) Check supply air blower assembly (if supplied) to insure that pulleys are aligned and secure.

12) Check unit return air inlet, and supply blower inlets for obstructions.

13) Check return air blower assembly to insure freedom of shaft rotation and proper belt tension.

14) Check return air blower assembly to insure that pulleys are aligned and secure.

15) Check filters (if supplied) for cleanliness, if dirty or damaged replace.

16) Check any dampers, mixing boxes, or 80/20 dampers (if supplied). Make certain that all damper linkage is free to move and that no binding will occur. If dampers are of the modulating type, check control capillary tubes to insure that the tubes are in the proper location and will not rub against anything.

Note: Air dampers which operate in normally open position are shipped in closed position in order to minimize shipping contamination.

17) Check inside unit for general cleanliness, close and secure access doors.

18) Main gas and pilot manual gas valves must be in the “off” or “closed” position.

19. START-UP

The following startup is only a sample of a basic startup proceedure and may be different than that of the unit you have purchased and installed. Be sure to follow the startup form shipped with the unit, to insure that all items have been thoroughly tested before putting the unit into service..

All safety and operating controls have been checked during the factory test period, however, it is advisable to complete a similar check when first opening the unit.

A) Remove any shipping blocks from units.

B) Manual high limit switch may have to be reset (if supplied).

C) Gas pressure switch(es) (if supplied) may have to be reset. The first manual valve must be open to reset the low pressure switch.

D) Open pilot cock and purge air from gas line through plugged tee in pilot line.

E) Check setting of inlet economizer switch (if supplied). This is factory set at 65 degrees Fahrenheit to shut down burner when outside temperature rises above 65 degrees. If unit is to be test run when outside temperature is above 65 degrees, this setting will have to be raised for burner to operate. After unit has been test run, reset controller at desired setting.

F) If 70 degree Fahrenheit discharge temperature is not desired, move appropriate discharge controller dial to new position. (Optional) inlet air controller adjustment may be required on modulating gas valve. High and low fire positions are factory set for proper operation. In some cases, it may be desirable to reduce the low fire or increase high fire.

G) Close main disconnect switch.

H) All three phase motors were properly phased during factory testing. If rotation is reversed, interrupt main power supply and interchange any two of the incoming power leads. Reestablish power and recheck blower operation.

I) On three phase units, the starter contacts should pull in and hold quietly without “clatter” (relays serve as starters on single phase units). If they do not operate quietly, check immediately for proper line voltage. Even temporary low voltage at startup will cause constant operating trouble and must be corrected before unit is placed in service.

J) Recheck all set screws on motor sheave, blower sheave, and blower wheel(s). Check alignment of belts and pulleys. Run blower for a few minutes and adjust belt tension, if necessary. Do not over tighten belts since excessive tension will reduce belt life and cause excessive load on bearings. After initial startup has been made, give the belts a few days running time to become seated in pulley grooves readjust take-up bolt(s) as necessary. Run unit and adjust belt tension until only a slight bow appears in the slack side of the belts.

NOTE: DO NOT roll belts over grooves or sheaves, as this results in permanent belt damage.

K) Unit manifold pressure is factory preset to provide the required capacity as stated on the unit name plate for the burner at high fire. Before making any regulator adjustments, be sure there is adequate supply pressure.

L) The System should run in AUTO and operate properly.

M) Test for gas leaks in the gas train.

EVAPORATIVE COOLING OPTION

20. WATER SUPPLY-INLET

A float valve is used to control the water level in the sump. It must be properly adjusted to maintain the water level in the sump during all phases of operation. During startup, water will be retained by the CELdek media at a rate of approximately 0.5 gal/cubic foot of media, until the media has been saturated. The float valve must be able to quickly replace this water. It is important to adjust the water level in the sump so that after shutdown, when most of the water returns, it does not over flow the sump or flood the bottom of the media.

The float valve is sized by first determining which is greater; the water needed to make up for evaporation plus bleed-off, or the water needed for startup. Typically the float valve only delivers it's rated capacity when in the full open position.

Make-up water line pressure should be high enough to fill the sump in a reasonable amount of time at start up, and maintain makeup water level in the sump during operation. Note that the available water pressure for the float valve of a cooler located on a roof may be considerably less than the available pressure of the first floor water supply. For each 2.3 feet of rise there is a 1 PSI loss in head pressure. Conversely, if the line pressure is too high, the float may not be capable of exerting enough pressure on the valve to close it.

In the make-up line to the float valve, a hose bib, or similar valve connection should be included to provide easy access to a source of water. This source can be used for flushing the media and sump during normal maintenance.

21. BLEED-OFF

Bleed-off is required to maintain the water quality of the system regardless of the quality of the make-up water. When water evaporates pure water vapor is released and minerals and other impurities are left behind. As new water is introduced into the system via the make up source, more minerals and impurities are introduced. Impurities are also scrubbed and concentrated from the air. Evaporation continues to concentrate these materials until deposits form on the media. This process makes it important to bleed off a certain amount of recirculation water from each system.

The highest impurity concentration is found in the water which drains off the pads. Bleed-off is taken from the discharge side of the pump, and is set by adjusting a small bleed valve. Recommended Row rate should be 5% to 15% of the water volume supplied to the distribution header feeding the evaporative pads. This bleed off is plumbed with tubing to the overflow drain. The bleed-off can be controlled either manually or as an option, mechanically. Mechanical systems are recommended over manual operation. Mechanical systems may consist of timers which completely empty the sump at preset intervals or a conductivity sensor which opens a bleed line when the water reaches a set concentration. The time sequence would be overridden by the conductivity controller when the conductivity (a measure of mineral level) of the re circulating water reaches a preset limit.

22. OVERFLOW

A system overflow is supplied to guard against exceeding the maximum water level in the sump.

23. DRAIN

A drain is supplied to facilitate sump clean-out and seasonal maintenance. Typically a manual ball or gate valve should be installed at the drain. Solenoids can be installed for remote activation or wired into an inlet economizer that will open the valve to drain the water out if the temperature falls below a desired set point. In selecting a solenoid, avoid the type which depends on water pressure to hold the valve open. The water level in the system may not be high enough to keep the valve open until the sump is completely emptied.

The size of the drain valve and line are chosen to provide a reasonable time to empty the sump. The free passage must be large enough to handle normal debris. The drain line is normally piped into the same drain and trap as the overflow, or into a roof or floor drain.

NOTE: It is against The National Plumbing Code to reduce the size of the drain line outside of the system.

24. EVAPORATIVE SECTION CHECK-OUT AT STARTUP

A) Clean out the sump, remove any debris leftover from installation of the unit and wipe the water tank dry.

B) Check media pads, distribution piping, and sump pump for shifting out of position from shipping and unit installation.

C) Purge water inlet line before connecting to unit to remove any foreign debris.

D) Check that the float switch and sump pump are wired into their junction box.

E) Cap the sump drain, or close the drain valve on the sump.

F) Turn on the water supply and allow the sump to fill. Check that the float is adjusted to close off the water supply when the water level reaches just below the overflow drain.

G) Energize the unit per the sequence of operations.

H) Check the evaporative media for water being drawn through the pads, and being carried in the air stream past the sump pan. The unit has a DeZURIK balancing valve installed on the outlet of the pump, feeding the distribution header on top of the pads. Adjust the balancing valve to the desired flow of water across the evaporative media.

NOTE: The volume of water required (after saturation) is dependent on the static pressure In the down stream ducting.

I) Unlock the set screw on the clamp ring of the valve and adjust the volume of water to the distribution header to a setting where water droplets are not carried past the stainless steel sump on the floor of the unit.

25. WINTER STORAGE

Prepare the evaporative cooler for winter storage by performing the following steps:

A) Clean evaporative cooling media pads.

B) Shut off inlet water supply and drain piping back past the freezing point.

C) Drain the water from the sump tank of the unit.

D) Remove the pump from the unit for winter storage.

26. EVAPORATIVE MAINTENANCE

To insure your evaporative cooler system provides optimum service life and performance, a periodic inspection of the unit should be conducted and required maintenance performed. The purpose of these inspections is to determine the level of maintenance required. These inspections should be done on a bi-weekly basis and needed maintenance items reported to the maintenance supervisor so that required work can be scheduled.

Inspect the following items on the Evaporative Cooler:

A) Assure that there is even distribution of water across the entire face of the media surface is established without excessive blow over.

B) Check operation of flow control valves for proper operation.

C) Check the condition of the media for soft and or collapsing.

D) Does any media need to be replaced?

E) Is there any evidence of bacteria growth?

F) Is there any water being bled off from the system?

G) Check the condition of the water in the collection sump pan, drain and clean if necessary.

VAV OPTION

27. VAV GENERAL DESCRIPTION

The VAV option on the IDF Series is provided on applications requiring variable make up air where return air through the unit is unacceptable. The controlling of variable air volume is accomplished by three methods.

A) Discharge Air Damper: This method incorporates the use of a damper located at the discharge end of the IDF unit. The damper responds to a building pressure sensor and regulates amount of air being supplied by the unit.

B) Variable Inlet Vanes (VIV): The VIV uses inlet vanes at the blower to reduce the amount of supply air. Partially closing the inlet vanes allows for the regulation and reduction of the amount of air being supplied from the unit. This method is much more efficient then regulating the airflow at the fan discharge.

C) Variable Frequency Drive (VFD): The Variable Frequency Drive method uses solid state technology to control the blower motor speed. The Variable Frequency Drive provides the ability to fully control the speed of a motor from zero to the maximum speed of the blower, thereby regulating the amount of air being supplied by the unit. This improves process control and results in a softer/smoother acceleration of the motor increasing the life of the motor.

28. CONTROL OVERVIEW

The Dwyer 604 Building Pressure Controller (PS-01) converts sensed differential pressure ranging from 0.0 W.C. to .08 W.C. into a DC reading of 4 to 20 mA. The Series 604 Transmitter is used with receivers requiring 4 to 20 mA input control signal.

29. TYPICAL SEQUENCE OF OPERATION FOR VAV SECTION

NOTE: This sequence is written only for the dampers or controls related to the VAV option. Other control systems for burner safety and temperature control are not Included.

A) With:
230/460 volt, 3 phase, 60 hertz power on SW-01, and Exhaust fan interlock or other required interlocks closed between terminals # 1 and 3. High limit switch, HLS-1 closed, and Summer Off Winter Switch, SW-12, in Summer position.

B) The optional discharge air damper, (DM-01), will begin to open, once the damper is open an end switch, in the damper motor will close, energizing motor starter, (ST-01), and the supply fan motor, (MT-01), will start.

C) With the circuit now complete to building pressure sensor (PS-01), PS-01 will begin to send out a 4mA-20mA signal to the VAV Device. The signal is in response to internal pressure of the building in relationship to atmospheric pressure. The VAV Device will be modulated according to signal output from PS-01.

MIXING BOX

30. MIXING BOX OPTION SET-UP

THESE INSTRUCTIONS DETAIL STEPS REQUIRED TO CALIBRATE THE BUILDING PRESSURE CONTROLLER TO MAINTAIN MINIMUM OUTSIDE AIR DAMPER POSITIONING AT HIGH BUILDING PRESSURE. This is only one of many possible ways to control the mixing box option.

A) Locate the Dwyer “Model 604” building pressure transmitter and remove the transmitter cover plate.

B) Connect a ammeter in the current loop for checking output of the 4-20 mA signal.

C) With the transmitter connected to its companion receiver and power supply according to the damper circuit per the unit wiring diagram, a controllable pressure source capable of achieving the desired pressure range of 0.00" W.C. through 0.08" W.C. should be connected to the high pressure port of the transmitter and an accurate reference pressure gage or manometer. Be sure low pressure port is vented to the atmosphere. The transmitter must be calibrated in the same position in which it will be used. The model 604-A must be mounted and operated only in a vertical position due to its sensitivity to gravitational forces.

D) Shielded two wire cable is recommended for the control loop wiring. Where wiring length is under 100 feet, lead wire as small as 22 AWG can be used.

E) Apply electrical power to the system and check for proper operation. Slowly apply pressure and observe whether loop current increases above the 4 mA zero pressure value.

F) Apply the full range pressure required (.08" W.C.) and adjust the SPAN control on left for a reading of around 20 mA in the current loop.

G) Relieve pressure and allow transmitter to stabilize for 2 minutes and adjust the ZERO control on right for a reading of 4 mA in the current loop.

H) ZERO and SPAN adjustments are slightly interactive so steps D and E should be repeated until outputs are consistently 4 and 20 mA, respectively.

I) Remove the ammeter from the current loop, replace the cover, make connections to the systems pressure sources and place unit in service.

MAINTENANCE

Preventive maintenance is the best way to avoid unnecessary expense and inconvenience. Have this system inspected at regular intervals by a qualified service technician. The required frequency of inspections depends on the total operating time and the indoor and outdoor environmental conditions. Routine maintenance should cover the following items:

31. MAINTENANCE SCHEDULE

EVERY MONTH

AIR FILTERS:	Check for cleanliness and replace if necessary.
CONDENSATE DRAIN	Check drain for blockage and seal

EVERY 3 MONTHS

BLOWER V-BELTS:	Check for belt wear, belt tension, belt alignment.
LIMIT CONTROL:	Check control to insure operation.
BLOWER BEARINGS:	Lubricate with Shell Alvania EP Grease #2 or its equivalent.

EVERY 6 MONTHS

BLOWER MOTOR:	Check sheave alignment Lubricate motor (follow blower manufacturer's grease specifications and lubrication procedure; Do Not Over Lubricate).
PILOT ASSEMBLY:	Clean pilot assembly Check spark electrode.

ONCE A YEAR

ELECTRICAL COMPONENTS:	Turn disconnect off and open electrical control box. Make sure controls are clean and free from dust and grease. Inspect for loose wires.
	Check and clean relay and starter contacts.
BURNER:	Check gas supply pressure
	Check pilot flame
	Check burner operation
	Check for rust or any foreign material accumulation on heat exchanger surface.
GAS TRAIN:	Do a leak Test on entire gas train.

CDI STANDARD WARRANTY
AND
LIMITATION OF REMEDIES FOR BREACH OF WARRANTY

Concepts and Designs, Inc. (hereafter referred to as CDI) warrants all products to be free of defects in material and workmanship for eighteen (18) months from the date of shipment. CDI shall only be liable under this warranty if the product is installed and used according to the directions furnished by CDI.

CDI's obligation shall be limited to the replacement of new parts of the products for those returned to CDI's factory at the purchaser's expense and found to be defective by CDI. Replacement parts will be shipped F.O.B. CDI's factory. Replacement of parts shall not extend the original warranty period of the original total product, including replacement parts supplied.

This warranty does not cover corrosion; normal deterioration; misapplication; labor charges paid for parts replacement, adjustments, repairs or other work; loss of refrigerant or natural gas, oil, or other fuel; components supplied by others; defects in parts resulting from neglect, negligence, accident, fire, explosion, high or low voltage, jumpering or jamming controls, shorting out of components; improper or contaminated fuel, excessive or inadequate fuel pressure; frozen heating coils; or any acts of nature.

This warranty does not cover failure of the purchaser to provide normal maintenance, lubrication, adjustments, cleaning or service on the heating system; improper repairs or alterations; or misapplication of the equipment.

It is expressly understood that this warranty is made IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WHETHER ARISING FROM STATUTE, COMMON LAW, CUSTOM, OR OTHERWISE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE, QUALITY, DESIGN, CONDITION, DURABILITY OR SUITABILITY, and in consideration of the express warranty herein contained, BUYER EXPRESSLY WAIVES ANY RIGHT TO CLAIM OTHER WARRANTIES, EXPRESSED OR IMPLIED.

It is further understood that CDI's liability for breach of warranty shall be limited to terms of this warranty and buyer agrees that CDI SHALL NOT, IN ANY EVENT, BE LIABLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, OR DELAY. The buyer's remedies are exclusive, and shall be limited to those provided herein.

CDI neither assumes and does not authorize any person to assume any obligation or warranty other than those stated herein.

Any suggestion to the contrary not withstanding, CDI shall not, in any event, have any liability under this warranty unless and until it has been paid in full for the products. The warranty period shall begin as described above, whether or not payment has been made.

WARRANTY CLAIMS

Defective material may be repaired or replaced at our option. If replaced, full credit will be issued in the amount of the original purchase price, plus freight, for the returned material in the event the material is found to be not defective, or to be damaged or abused, we reserve the right to return the material “as is” to the sender and at his freight cost. If CDI agrees to keep such material, credit will be issued minus the cost of repair and reconditioning, less freight for the return and less restocking charges.

REPLACEMENT PARTS

When writing or calling to Concepts and Designs Inc. for service parts, provide the model number and serial number of the unit as stamped on the unit plate attached to the electrical door. For questions regarding wiring diagrams, it will be necessary to provide the number on the specific diagram. If replacement parts are required, include the date of installation, the date of failure, an explanation of the malfunction, and a description or part number of the replacement parts required.

Troubleshooting Guide

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
NO BLOWER OPERATION	**Mode Selector Switch**	
	Switch in OFF position	Place switch in proper mode
	Control Transformer	
	No input voltage	Check disconnect and supply fusing
	Blower control fuse	Replace control fuse
	Defective transformer	Replace transformer
	Unit in Reset (Optional)	
	Freezestat delay timed out (Outside temperature below 30º F in vent mode or unit not calling for heat)	Turn unit OFF momentarily and turn unit back ON
	Damper End Switch (if equipped)	
	Switch not made	Adjust end switch setting
	Damper not operating	Check damper operation
	Defective Damper Motor	Replace damper motor
	Motor Protection	
	Overload tripped	Reset overload and check motor amps/overload setting
	Overload relay defective	Replace overload relay
	Motor Starter	
	Defective starter	Replace motor starter
	Motor	
	No input voltage	Check fusing
	Improper wiring	Correct wiring
	Defective motor	Replace motor
	Blower Damage	
	Defective or locked bearings	Replace bearings
	Check for physical damage	Replace or repair blower
	Belts	
	Belt slipping	Tighten belts
	Belt broken or missing	Replace belts
	Control Relays	
	Improper part	Check relay voltage
	Improper wiring	Check wiring
	Defective relay	Replace relay

Troubleshooting Guide

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
NO BLOWER OPERATION	**Open Thermostat**	
	Thermostat satisfied	Adjust thermostat, if applicable
	Defective thermostat	Replace thermostat
BLOWER RUNS; NO HEAT;	**Mode Selector Switch**	
	Switch in VENT position	Place switch in proper mode
	Burner Service Switch (if so equipped)	
	Switch in OFF position	Place switch in auto position
	Manual Gas Valve	
	Gas valve(s) closed	Open gas valve(s)
	Supply Entering Air Thermostat	
	Thermostat satisfied	Adjust thermostat, if applicable
	Airflow Switch	
	Blower running backwards	Reverse motor direction
	Belts slipping	Tighten and/or replace belts
	Blocked intake or discharge	Find and remove obstructions
	Clogged airflow tube or pick-up ports	Clean or replace tubing or pick-up ports
	Defective switch	Replace switch
	Igniter	During trial for ignition:
	No current (open igniter)	Check igniter current and spark
	No voltage	Check voltage output to igniter
	Gas Valve	
	Pilot valve does not open	Check voltage output to pilot valve during ignition trial
		Check gas valve circuit and wiring
		Compare supply voltage to nameplate voltage
		Inlet gas pressure too high
		Clean and/or replace gas valve parts
	Defective solenoid	Replace solenoid or valve assembly

Troubleshooting Guide

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
BLOWER RUNS; NO HEAT;	**High Limit**	
	High limit tripped	Reset high limit
	Defective high limit	Replace high limit
	Pilot Too Small	
	Pilot fire set too low	Adjust pilot fire to achieve proper flame
	Regulator	
	Clogged vent orifice	Clean or replace orifice
	No supply pressure	Check all gas cocks and piping
	Improper manifold pressure	Adjust regulator
	Defective regulator	Replace regulator
	High or Low Gas Pressure Switch	
	Gas pressure switch tripped	Check gas supply for low gas pressure or no gas
		Check manifold gas pressure for high pressure reading
	Pressure switch defective	Replace gas pressure switch
	Fluctuating Flame	
	Unit over firing	Check manifold pressure
	Defective burner	Replace burner
	Intermittent ground connection	Tighten all ground points

Troubleshooting Guide

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
BLOWER RUNS; UNIT HEATS; SHORT CYCLES WITHOUT RESETTING	**Airflow Switch**	
	Blower running backwards	Reverse motor direction
	Belt slipping	Tighten and/or replace belts
	Blocked intake or discharge	Find and remove obstruction
	Air delivery below unit specs	Increase fan RPM for air delivery to comply with minimum requirements
	Clogged airflow tubing or pick-up ports	Clean or replace airflow tubing or pick-up ports
	Defective switch	Replace switch
	Operating Thermostat	
	Differential temperature setting too tight	Increase differential temperature setting
	Damper Motor End Switch	
	End switch not adjusted properly	Adjust end switch
	Entering Air Thermostat	
	Differential temperature setting too tight	Increase differential temperature setting
HIGH LIMIT TRIPPED	**High Limit**	
	Temperature reading for high limit went above 160º F	Reset high limit
	High limit will not reset	Replace high limit
	Unit Over firing	
	The discharge temperature with burning operating exceeds allowable temperature rise for heater	Adjust modulating valve or regulator to obtain temperature rise specified for unit
	Discharge Damper	
	Damper blades partially closed	Adjust damper linkage
	Damper motor defective	Replace damper motor
	Airflow Restricted	
	Blower running backwards	Reverse motor direction
	Belts slipping	Tighten and/or replace belts
	Blocked intake or discharge	Find and remove obstruction

Troubleshooting Guide

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
HIGH LIMIT TRIPPED	**Continuous High Fire**	
	Foreign material holding valve open	Clean, replace valve and/or seat if necessary
	Plunger jammed	Clean, or if necessary, replace plunger
	Faulty amplifier	Replace faulty amplifier
	Open circuit in discharge temperature sensor	Follow instructions in the brochure for the appropriate item in the complete O & M manual supplied with the unit.
BLOWER RUNS; UNIT HEATS; WILL NOT CYCLE	**Operating Thermostat**	
	Open in thermistor circuit	Check thermistor wiring and/or replace thermistor
	Thermostat defective	Replace thermostat
	Thermostat located improperly	Thermostat in cold draft-relocate
		Thermostat not satisfied-turn down
	Thermostat differential setting too wide	Reduce differential setting
	Burner Service Switch (Optional)	
	Switch in MANUAL position	Place switch in AUTO position
	Auxiliary Control	
	Auxiliary contacts closed	Check auxiliary circuit wiring and contacts
MODULATING VALVE DOES NOT MODULATE; CONTINUOUS HIGH FIRE	**Modulating Valve**	
	Foreign material holding valve open	Disassemble valve remove foreign material replace valve and/or seat if necessary
	Plunger jammed	Clean or if necessary replace plunger

Troubleshooting Guide

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
MODULATING VALVE DOES NOT MODULATE; CONTINUOUS LOW FIRE	**Transformer**	
	No voltage output to amplifier	Replace transformer (also check for short in modulating valve coil)
	Modulating Valve	
	Valve coil is open or shorted	Replace coil if its resistance is less than 40W or greater than 85W.
	Plunger jammed	Clean or replace plunger
	Ruptured main or balancing diaphragm	Determine diaphragm condition and replace if defective
	Amplifier	
	No output voltage to valve	Replace if defective

MAINTENANCE LOG

MODEL No. **SERIAL No.**

Date	Activity	Technician

NOTES