



# HU, HCF, AND HCR UNIT HEATERS HLC HIGH LEVEL CIRCULATORS

## INSTALLATION, OPERATION AND MAINTENANCE MANUAL

**ATTENTION: READ THIS MANUAL AND ALL LABELS ATTACHED TO THE UNIT CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS UNIT! CHECK UNIT DATA PLATE FOR STEAM OR HOT WATER REQUIREMENTS AND ELECTRICAL SPECIFICATIONS AND MAKE CERTAIN THAT THESE AGREE WITH JOB SPECIFICATIONS. RECORD THE UNIT MODEL AND SERIAL NO. IN THE SPACE PROVIDED. RETAIN FOR FUTURE REFERENCE.**

WING Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

### SAVE THIS MANUAL

**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.**

#### INSTALLER'S RESPONSIBILITY

**Installer Please Note:** This equipment has been tested and inspected. It has been shipped free of defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. **It is the installer's responsibility to inspect and correct any problems that may be found.**

**ATTENTION: READ CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS EQUIPMENT. RETAIN THIS MANUAL FOR FUTURE REFERENCE.**

**POST AND MAINTAIN THESE INSTRUCTIONS IN LEGIBLE CONDITION**

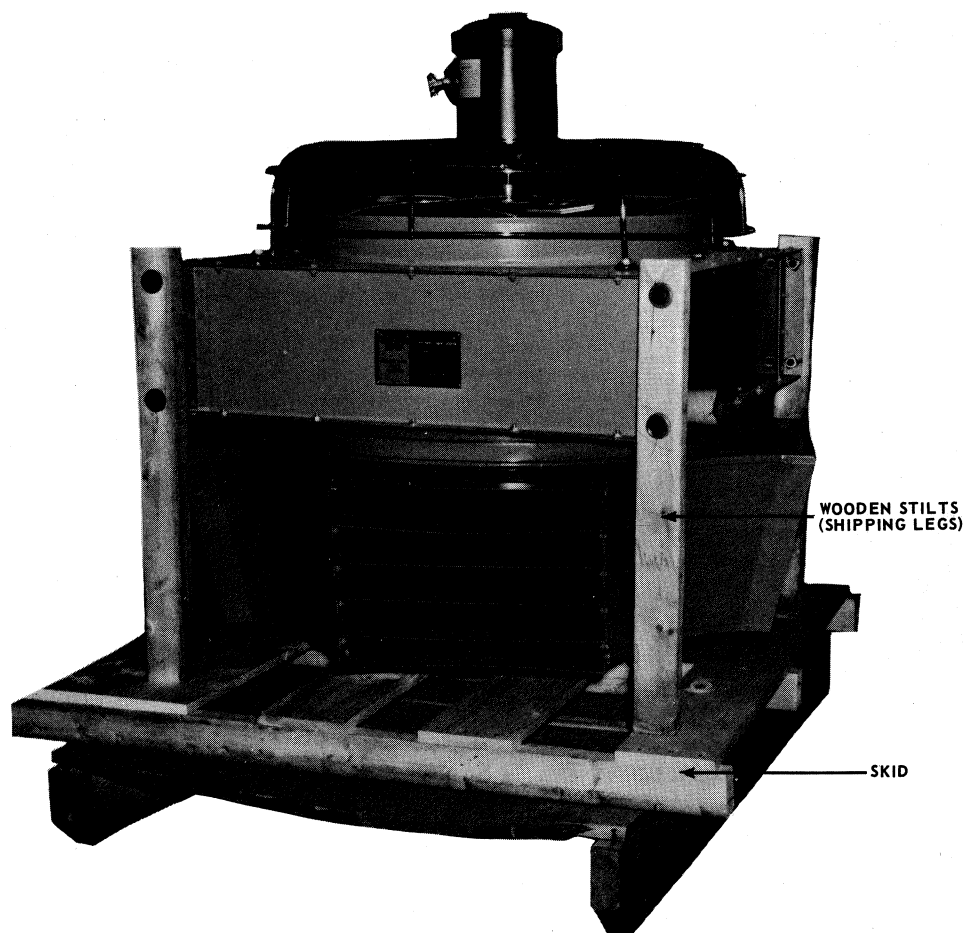
4830 TRANSPORT DRIVE, DALLAS, TEXAS 75247  
TEL.: (214) 638-6010 FAX: (214) 905-0806  
<http://www.ljwing.com>

## I. RECEIVING YOUR WING HEATER

- A. Units have been factory crated for safe shipment. However, damage to the unit may occur in transit. Check unit carefully and if damage is obvious, report it at once to the transportation company.
- B. Accessories (thermostats, starters, etc.) may be contained separately.
- C. All claims must be made within five (5) days of receipt of shipment.

## II. UNCRATING YOUR WING HEATER

- A. Wing heaters are shipped on "stilts".
- B. Do not remove wooden stilts (shipping legs) or skid when uncrating.

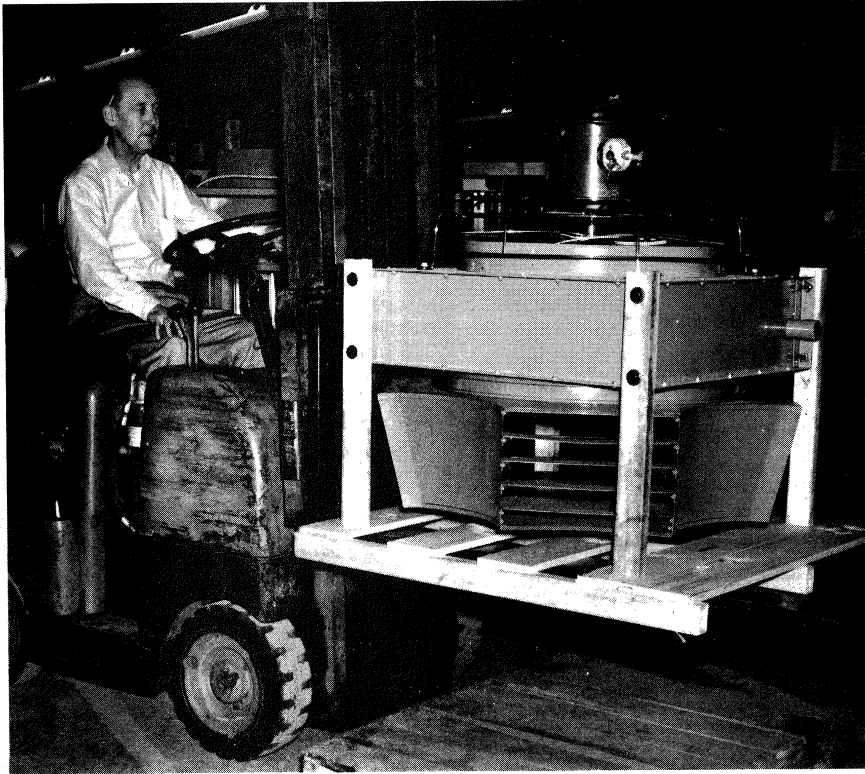


## III. INSPECTING YOUR WING HEATER

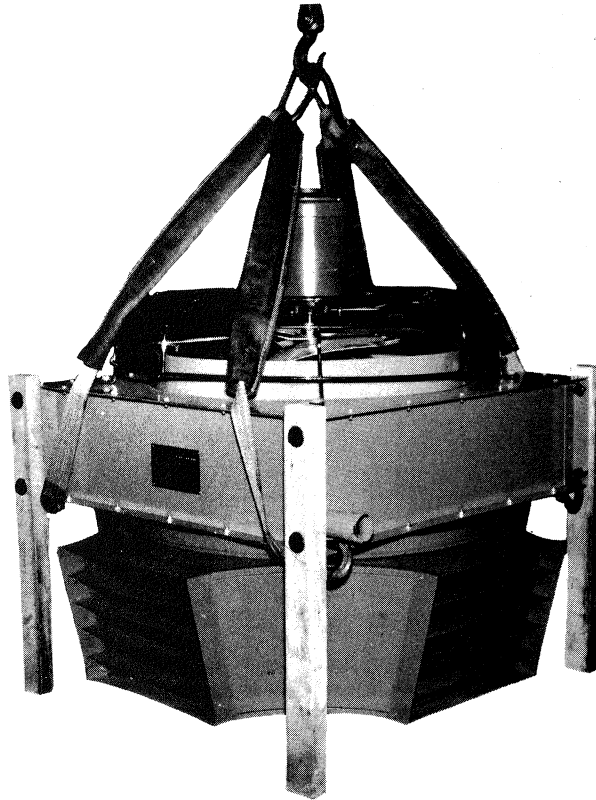
- A. Check unit nameplate to be sure that, the capacity is correct, and that it is designed for use with available steam pressure or hot water temperature.
- B. Check motor nameplate for voltage, cycles and phase.

NOTE: If discrepancies exist, contact your local Wing representative.

#### IV. LIFTING HEATER INTO MOUNTING POSITION

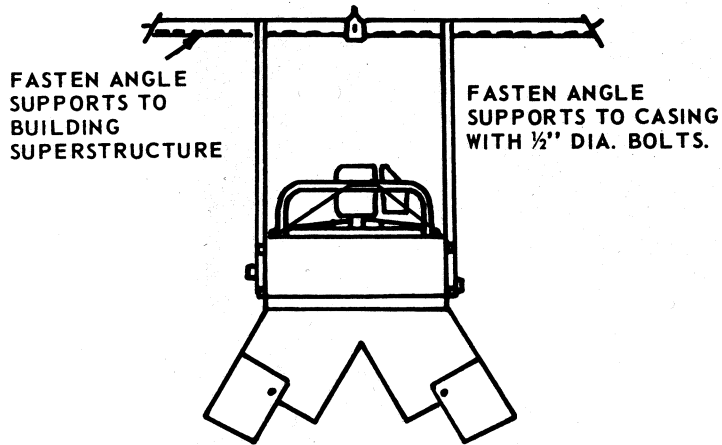


For low mounting heights, heater may be raised into position by use of a fork lift truck.



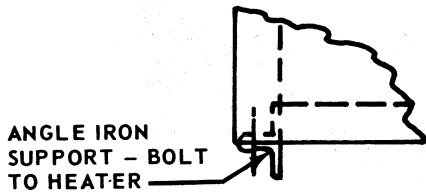
For high mounting heights, a double sling, block and tackle or crane should be used. **CAUTION: DO NOT LIFT HEATER BY MOTOR SUPPORT.**

# V. (a) SUGGESTED METHODS OF SUPPORTING HIGH CEILING HEATERS

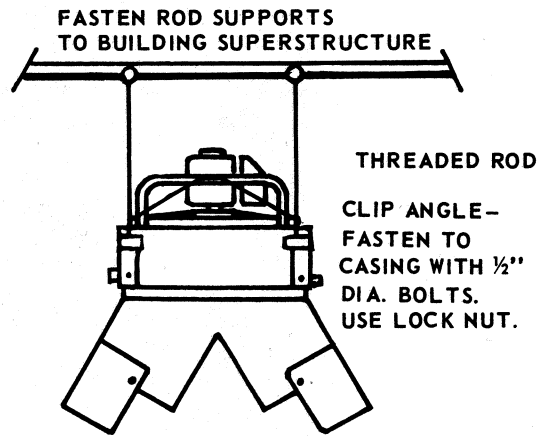


## ANGLE IRON SUPPORT

1-1/2" x 1-1/2" x 1/8" ANGLES - UP TO SIZE 26  
2" x 2" x 3/16" ANGLES - SIZE 28 THRU 44

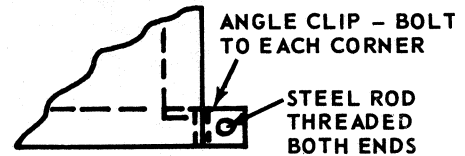


DETAIL AT EACH CORNER (PLAN VIEW)



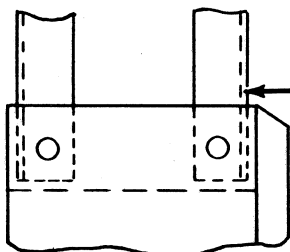
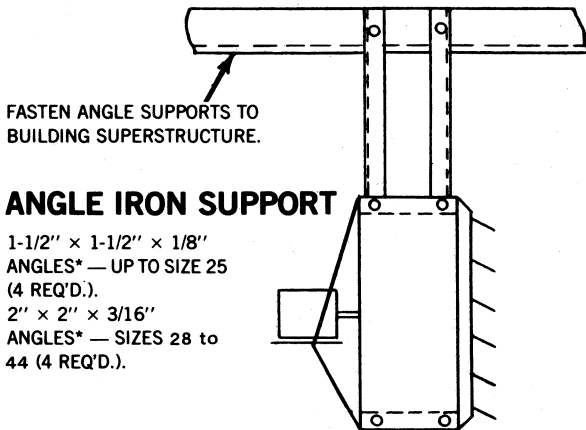
## ROD SUPPORT

1/2" DIA. RODS - UP TO SIZE 26  
5/8" DIA. RODS - SIZE 28 THRU 44

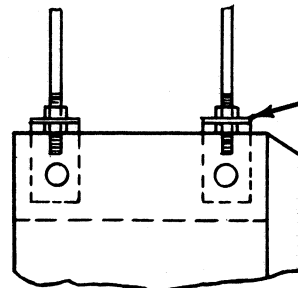
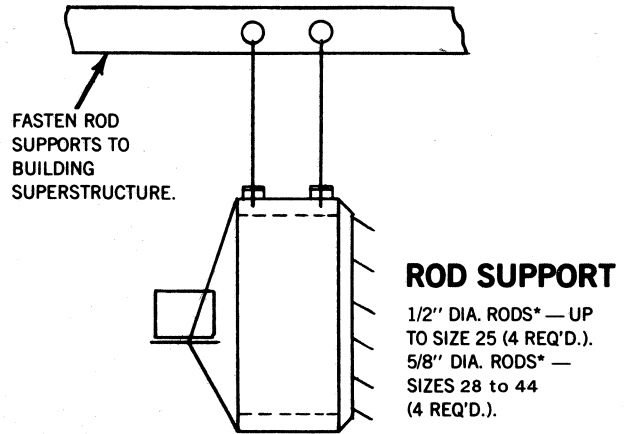


DETAIL AT EACH CORNER (PLAN VIEW)

# (b) SUGGESTED METHODS OF SUPPORTING UNIT HEATERS

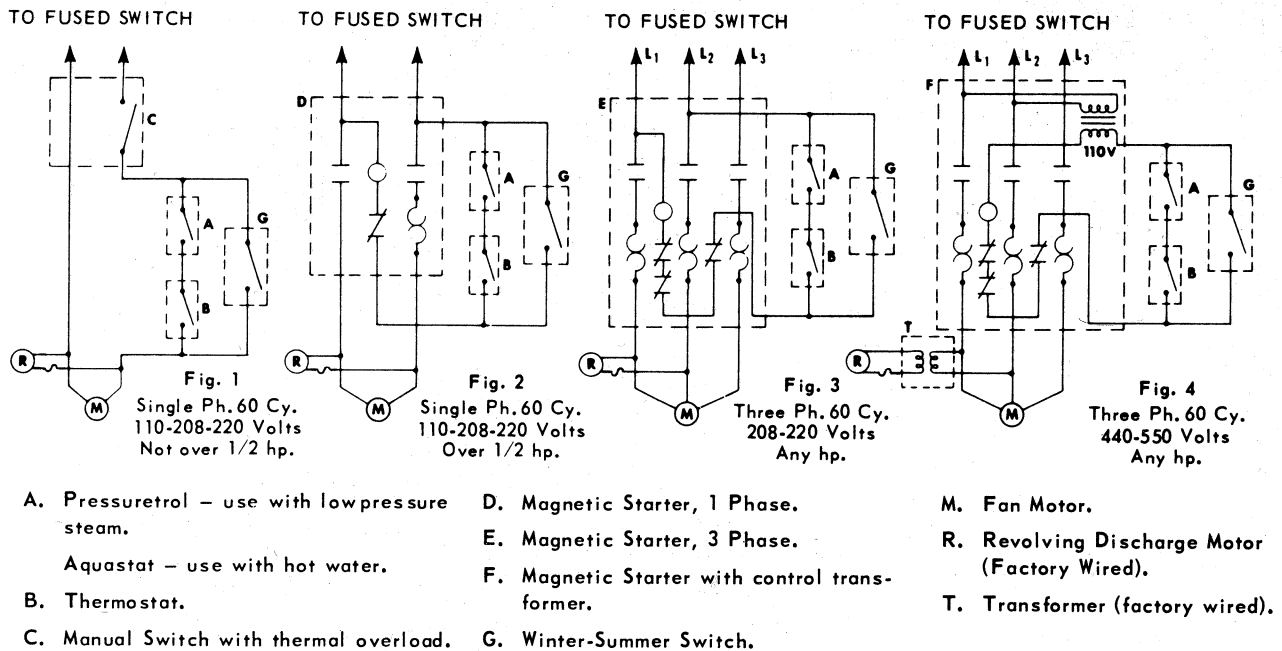


Sizes 1 1/2" to 2 1/2" are supplied with clips.



\*Mounting hardware not supplied by WING.

## VI. WIRING DETAILS



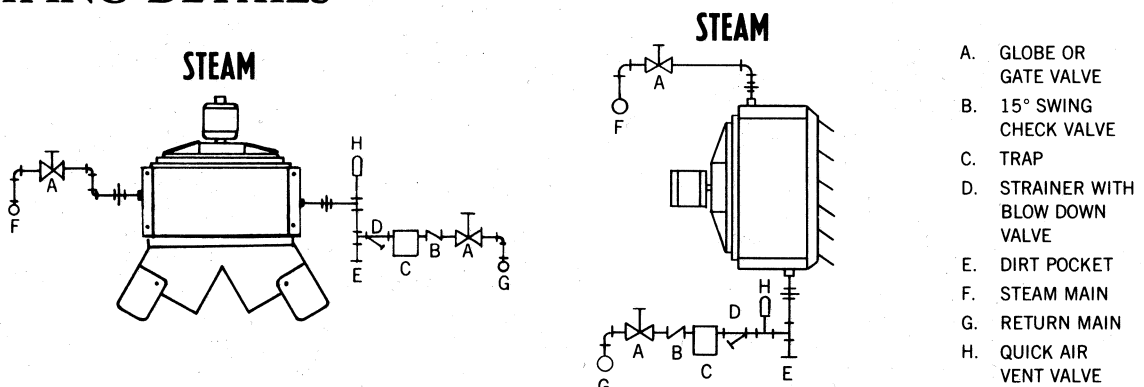
NOTE 1 - MANUAL CONTROL: When thermostatic control is not wanted, the wiring for manual control is the same as shown, but the thermostats and automatic starters are omitted. Manual thermal overload switches are used instead of the automatic starters.

NOTE 2 - If the thermostats employed have sufficient current-carrying capacity, the starter shown in Fig. 2 may be disregarded, and Fig. 1 followed.

NOTE 3 - PRESSURETROL OR AQUASTAT - In many cases an additional automatic control is provided to stop operation of the fan motor when steam supply fails. The control is wired in series with the thermostat, serving this purpose.

**CAUTION: THERMAL OVERLOAD PROTECTION** - Heater elements should be selected not to exceed 25% of the full load amp. rating of motor as shown on nameplate.

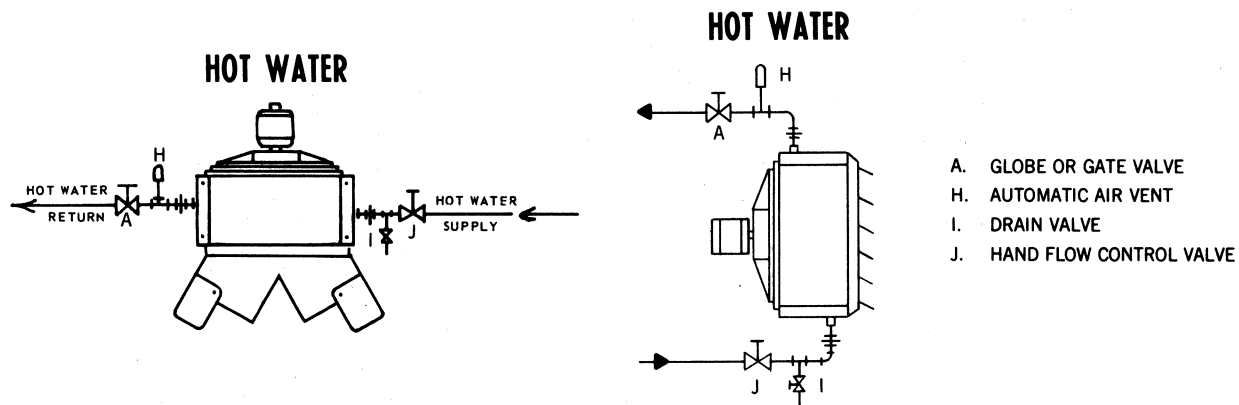
## VII. PIPING DETAILS



## INSTRUCTIONS

1. Do not pitch casing in installation. Casing must be installed level. Tubes are already pitched in the casing, therefore, do not pitch casing. Set casing level with spirit level. Do not level by measuring from building members.
2. Quick vent air valve (H) must be used with all low pressure closed return systems unless an air eliminator in the boiler room is employed. Should be omitted with open return or vacuum return systems.

3. Trap (C) – must be used with all dry return systems. (Omitted with individual wet returns). The trap must be one that will pass both condensate and air at steam temperature. When selecting trap, specify "for unit heater use" and state condensate in pounds per hour and operating steam pressure.
4. Dirt pocket (E) must be same size as header.
5. Return main (G) When high pressure is available, the return main may be located at a higher level than the return outlet of the heater. A check valve between trap and return main, just before riser, must be installed to prevent back flow of condensate.
6. Use long branches of double elbows as shown, between mains and heaters, to absorb expansion of mains.



## VIII. START UP

### INSTRUCTIONS

Initial start up of your Wing heater is an important part of the installation. Observe the following carefully:

1. Purge all steam and/or hot water lines of foreign matter. Dirt lodged in the heating element or trap can greatly affect the heater's performance.
2. Preheat heating element prior to turning on the fan. Open the blow down valve to allow free flow of steam and condensate until the entire heating element is hot. **DO NOT ENERGIZE THE FAN UNIT UNTIL THE ENTIRE COIL IS HOT.**
3. Steam or hot water should be in the heating coil at least 10 minutes before the fan unit is energized.
4. On Revolving Heaters: remove the wood shipping block between the revolving discharge motor and casing so that rubber tired wheel makes contact with discharge collar. **DO NOT TURN DISCHARGE OR GEAR BY HAND.**
5. All discharge outlets are equipped with adjustable vanes or deflectors, which permit adjustment of outlet air flow pattern. Best results can be achieved by trial of different adjustments under operating conditions. The most satisfactory adjustment is one that delivers the warm air just above the heads of the occupants.
6. Check for proper direction of rotation: In all cases the proper fan rotation for types HCR, HC and LC heaters will force the air from ceiling toward floor, and from fan towards heating coils in case of unit type heaters.
7. Ambient air around heater must be above freezing before starting unit or freeze-up can occur.

## IX. MAINTENANCE

### INSPECT REGULARLY

Under average conditions, it is recommended that unit heaters be inspected before every heating season . . . more often in locations where air is contaminated with corrosive fumes, dust, soot or oil spray. Check for dirty, clogged fin tube heating element, excessive vibrations and loose connections.

### MOTORS

#### A. Cleaning

Remove grease and dirt on motor during each inspection or lubrication. Open frame motors should be blown clean every heating season, or whenever fin tube heating element is cleaned, whichever is sooner.

#### B. Lubrication

1. Lubricate motor according to manufacturer's instructions located on the motor.
2. Motors should be thoroughly cleaned and maintained in accord with specific motor manufacturer's recommendations. Motor maintenance instructions are sent with all shipments.
3. Some motors do not have grease fittings. These motors are lubricated for long life and do not require further lubrication.

#### C. Overload Protection

A change in line voltage higher or lower than motor nameplate rating may cause overheating and serious motor damage. Check plant voltage conditions. A separate manual starter with thermal overload protection device is recommended for those units that do not have motors with built-in overload protection.

### FIN TUBE HEATING ELEMENT

#### A. Cleaning

Clean fin tube heating element at least once a year; more often under unfavorable conditions. Unless heating element is kept reasonably free of dirt, lint and grease, it's original heating capacity will be reduced . . . possibly to a serious degree, and motor damage may result.

Three commonly used cleaning methods are:

1. Loosen dirt by brushing fins on side where air enters heating element and then turn on fan to blow dirt from unit.
2. Use high pressure air hose to loosen dirt by blowing from side where air leaves heating element (side adjacent to louvers on blow-through units).
3. Vacuum Cleaning: Thoroughly vacuum intake side of fan with vacuum cleaner. For thorough cleaning of heating element, remove motor and fan and spray a mild alkaline cleaning solution over the heating element. After a few minutes, follow by a hot water rinse. (A steam gun can be used for spraying cleaning solution and hot water).

### FAN WHEEL

The fan wheel should be cleaned to avoid unbalance which would damage the motor bearings.

### CASINGS

#### A. Cleaning

Periodic cleaning of casings is recommended to remove dirt, grease and corrosive substances that may injure finish. Rusted or corroded spots should be cleaned and repainted.

#### B. General Inspection

Tighten fan guard and motor bracket. Check fan for proper clearance, free rotation and firm connection to shaft.

When servicing is complete, tag unit to indicate date of inspection, lubrication and cleaning.

# X. EMERGENCY REPAIRS

Wing Unit heaters are equipped with return bend type finned tubes. These finned tubes are secured to the inlet and return distributing headers by means of a brazed connection. An optional nut and ferrule construction permits replacement of individual tubes in the event they are damaged due to freezing, corrosive condensate, mechanical mishap, etc.

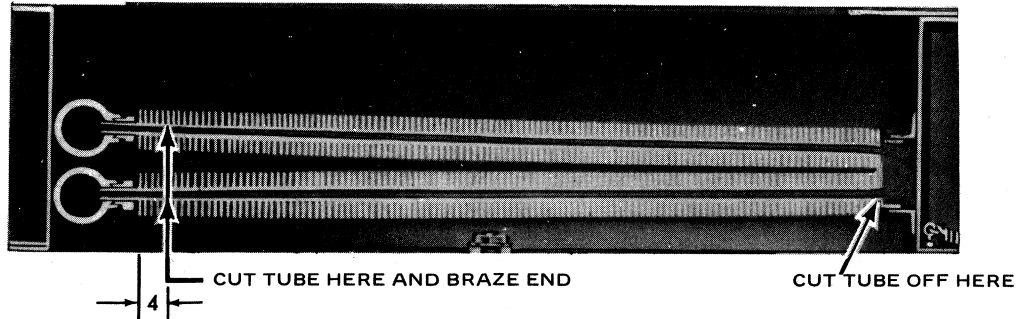
The following procedure should be followed when repairing a Wing Heating element:

1. Shut off electric power supply to heater at disconnect switch. Remove fuse to avoid the possibility of anyone energizing the fan unit.
2. Shut off steam supply.
3. Open valve to drain heating element.
4. In most cases, emergency repairs can be made with the unit installed, by reaching through the fan unit and discharge. If this is not possible, the heaters must be lowered to the floor and disassembled.

In the event that you do not have spare tubes, nuts and ferrules in stock, two emergency procedures can be followed which will allow putting the unit into operation until replacement tubes can be obtained.

### a. Brazing procedure

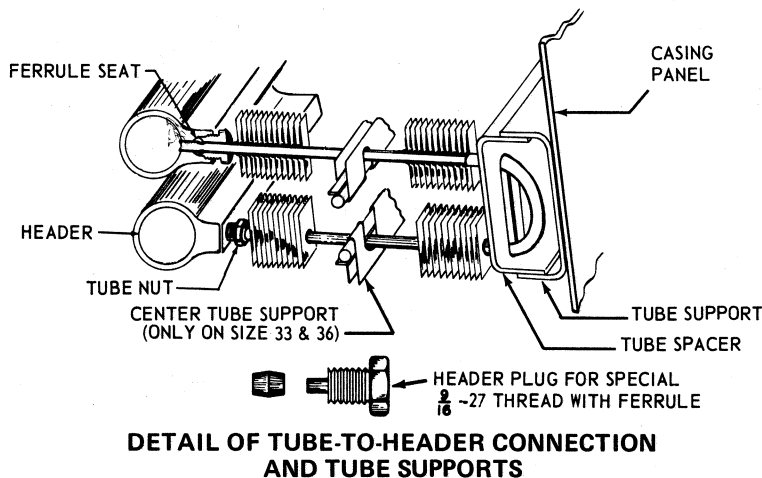
If the damaged portion of the tube is 4" or more away from the mechanical joint, cut the tube off 4" from the mechanical joint at both headers. Remove the fins, crimp the end and braze end to form leak-proof temporary repair. To remove the remaining portion of damaged tube, cut it off at the return bend and gently lift it out from between the other tubes. Avoid damaging fins on adjacent tubes.



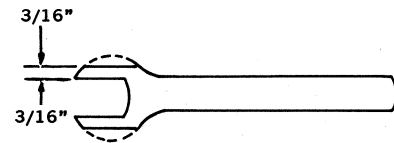
### b. Plugging procedure

Remove the damaged tube as described in (a). Using a 5/8" open end wrench, altered as shown, back off the nut, and remove the remaining portion of the tube from the headers, and replace with plugs. The tapped holes in the headers are 9/16", 27 straight machine thread, therefore, DO NOT USE PIPE PLUGS.

A 9/16"-27 machine screw can be used provided it is not more than 1/4" long. A longer screw would damage the ferrule seat. Special plugs can be obtained from your local Wing representative or from the Wing factory.



### HEADER PLUGGING



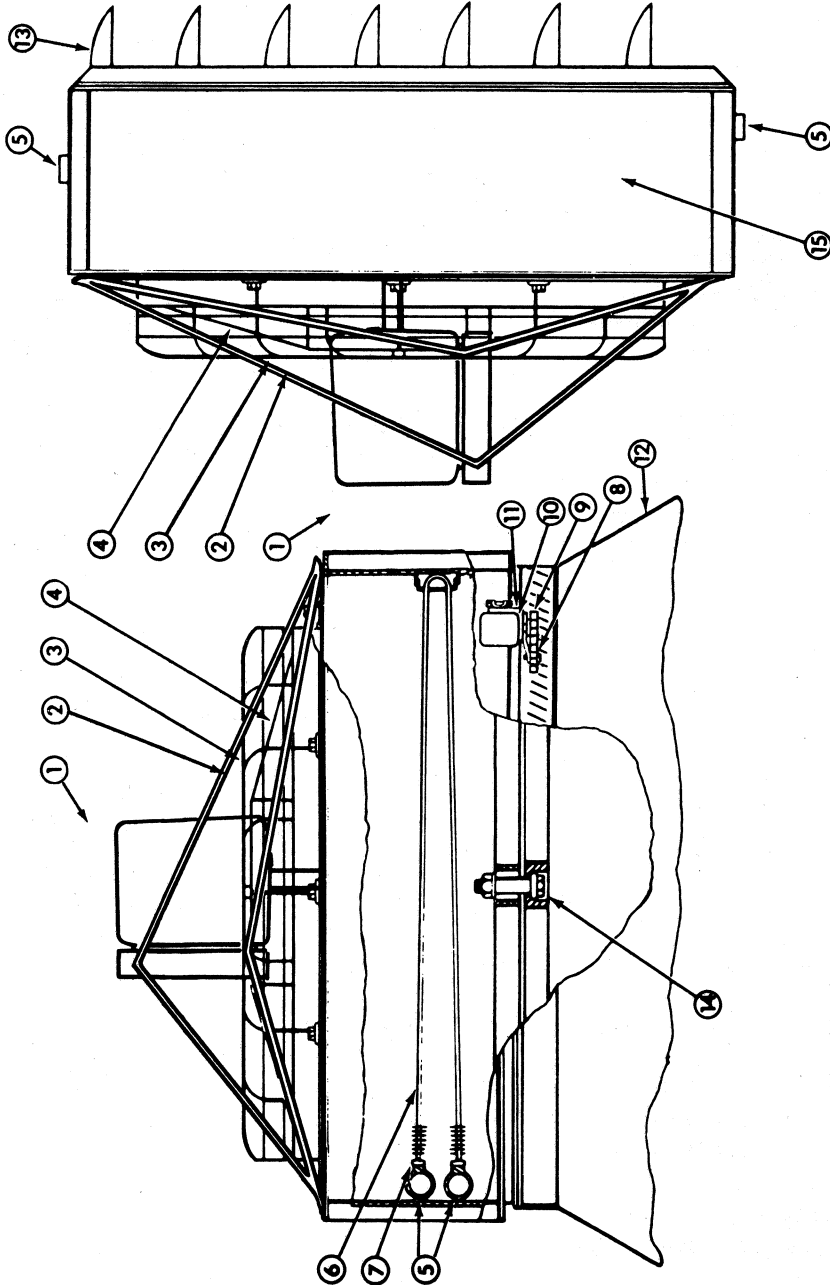
GRIND OFF ST'D. 5/8" WRENCH



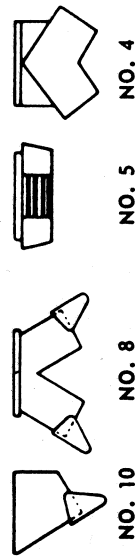
**HIGH CEILING HEATER WITH REVOLVING OR FIXED DISCHARGE**

**UTILITY HORIZONTAL THROW HEATER**

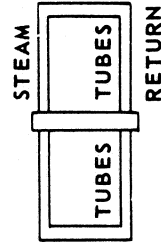
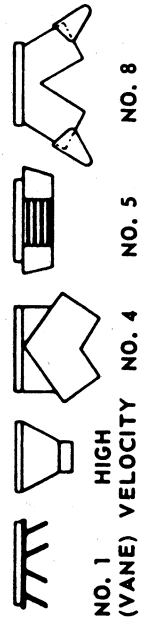
PART NO.	DESCRIPTION
1	FAN MOTOR
2	PIPE ARM SUPPORT (See Note 1)
3	FAN GUARD (Optional)
4	FAN WHEEL
5	STEAM AND RETURN HEADER
6	FINNED TUBE
7	NUT AND FERRULE
8*	REVOLVING DISCHARGE DRIVE GEAR
9*	REVOLVING DISCHARGE MOTOR GEAR
10*	REVOLVING DISCHARGE MOTOR
11*	REVOLVING DISCHARGE MOTOR BRACKET
12	DISCHARGE (See Note 2)
13	DISCHARGE VANE (UTILITY HEATERS)
14*	REVOLVING DISCHARGE BEARING ASSEMBLY
15	HEATER CASING



**REVOLVING DISCHARGES**



**FIXED DISCHARGES**



SKETCH OF HEATER WITH CENTER HEADER  
(LOOKING AT AIR INLET SIDE)

**NOTES:**

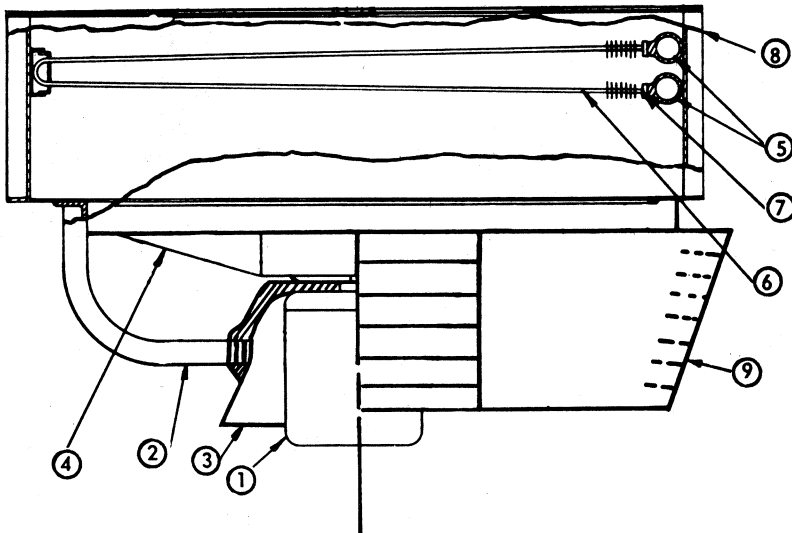
- SOME MODELS ARE FURNISHED WITH MOTOR MOUNTED DIRECTLY ON FAN GUARD IN WHICH CASE PIPE ARM SUPPORTS ARE NOT FURNISHED. PARTS MARKED WITH ASTERISK APPLY TO REVOLVING HEATERS ONLY.
- SOME UNITS ARE EQUIPPED WITH CENTER HEADERS IN WHICH CASE THERE IS AN EQUAL NUMBER OF TUBES.
- ALWAYS SPECIFY SIZE AND SERIAL NUMBER OF HEATER WHICH IS FOUND ON WING NAMEPLATE ON HEATER CASING. SERIAL NUMBER APPEARING ON MOTOR NAMEPLATE IS OF NO ASSISTANCE.
- THE FOLLOWING COMPLETE SUB-ASSEMBLIES ARE AVAILABLE:
  - FAN UNIT ASSEMBLY - MOTOR, FAN WHEEL AND MOTOR SUPPORT.
  - ELEMENT & CASING ASSEMBLY.
  - DISCHARGE ASSEMBLY.
  - REVOLVING DISCHARGE DRIVE ASSEMBLY.

**LIJING**  
A REED NATIONAL CO.  
South Windsor, CT 06074

**SPARE PARTS DRAWING  
HIGH CEILING  
AND UTILITY HEATERS**

DWG. NO. HCP-101

## XII.

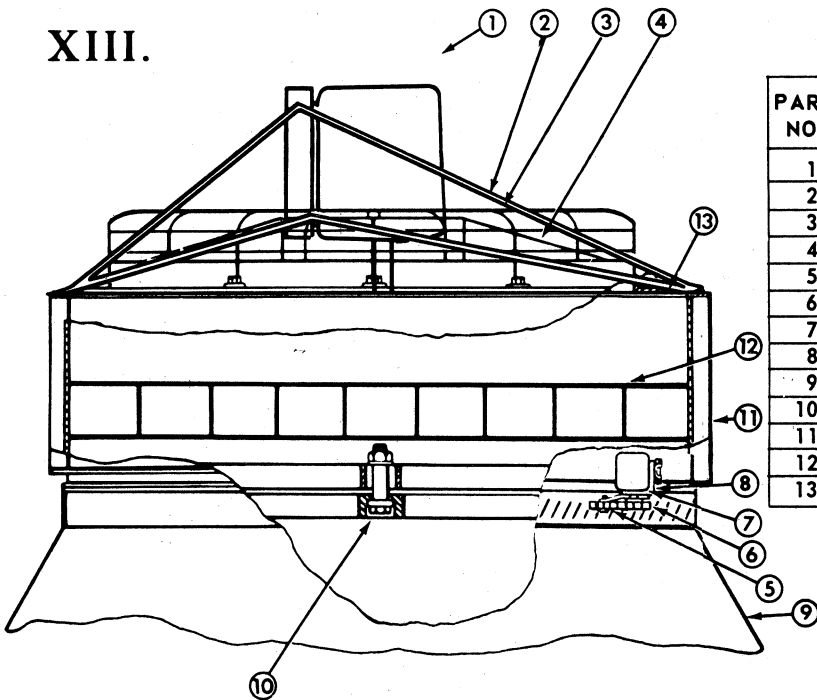


PART NO.	DESCRIPTION
1	FAN MOTOR
2	PIPE ARM SUPPORT
3	CONE DISCHARGE
4	FAN WHEEL
5	STEAM AND RETURN HEADER
6	FINNED TUBE
7	NUT AND FERRULE
8	HEATER CASING
9	DISCHARGE - 4 WAY

**SPARE PARTS DRAWING  
LOW CEILING HEATERS**

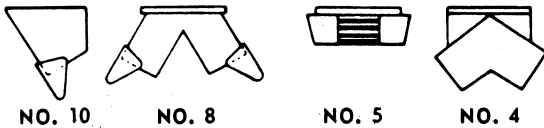
DWG. NO. LCP-101

## XIII.



PART NO.	DESCRIPTION
1	FAN MOTOR
2	PIPE ARM SUPPORT
3	FAN GUARD (OPTIONAL)
4	FAN WHEEL
5	REVOLVING DISCHARGE DRIVE GEAR
6	REVOLVING DISCHARGE MOTOR GEAR
7	REVOLVING DISCHARGE MOTOR
8	REVOLVING DISCHARGE MOTOR BRACKET
9	DISCHARGE
10	REVOLVING DISCHARGE BEARING ASSEMBLY
11	CASING
12	AIR STRAIGHTENER VANES
13	FAN PLATE

**SCHEDULE OF REVOLVING DISCHARGES**



**SPARE PARTS DRAWING  
HIGH LEVEL CIRCULATORS**

DWG. NO. HLCP-101

**NOTES:** (Applies to both drawings)

**ALWAYS SPECIFY SIZE AND SERIAL NUMBER WHICH IS FOUND ON WING NAMEPLATE CASING. SERIAL NUMBER APPEARING ON MOTOR NAMEPLATE IS OF NO ASSISTANCE.**

**THE FOLLOWING COMPLETE SUB-ASSEMBLIES ARE AVAILABLE:**

- A. FAN UNIT ASSEMBLY - MOTOR, FAN WHEEL, AND MOTOR SUPPORT.**
- B. COMPLETE CASING.**
- C. DISCHARGE ASSEMBLY.**
- D. REVOLVING DISCHARGE DRIVE ASSEMBLY.**

# XIV. SERVICE DIAGNOSIS

## FAILS TO MAINTAIN TEMPERATURE

1. Undersized heater, boiler, pump or piping.
2. Excessive exhaust air (exhaust fans may have been added since heating installed).
3. Unit heater mounted too high — heated air not delivered to floor level.
4. Thermostat — improper location or setting, or not functioning.
5. Dirty or clogged fin tube heating element.

## UNIT BLOWS COLD AIR

1. Manual shut-off valve closed.
2. Insufficient steam pressure or lack of hot water.
3. Aquastat not functioning.
4. Improper venting.
5. Steam trap not functioning.
6. Drip leg too short (steam system).
7. Return line plugged (steam system).
8. Pump undersized or not operating (hot water system).

## DOES NOT OPERATE WHEN HEAT NEEDED

1. Defective motor or electrical connections.
2. Thermostat, aquastat or pressure limit control not functioning.

## FAILS TO DELIVER HEAT TO FLOOR

1. Unit mounted too high.
2. Final air temperature too high.
3. Louvers not adjusted properly.
4. Undersized unit heater (insufficient air delivery).
5. Cross ventilation or drafts.
6. Obstructions to air flow.

## NOISY UNIT

1. Loose bolts or screws.
2. Fan blade bent, out of balance.
3. Dirt accumulation on fan blades.
4. Fan hub or blade rivets loose.
5. Motor shaft thrust bearing worn.
6. Motor mounting bent, fan not positioned properly in venturi.
7. Unit mounted too rigidly, transmits vibration noise.
8. Conduit too rigid, transmits vibration noise.
9. BX cable touching unit heater, chatters as casing vibrates.

## UNIT LEAKS

1. Nut and ferrule connection loose.
2. Internal corrosion.
3. Crack in brazed connection.

## EMPLOYEES COMPLAIN OF HOT BLAST

1. Air stream aimed directly at employees.
2. Louvers not adjusted properly.
3. Excessive final air temperature.
4. Revolving discharge not revolving.

## UNIT OPERATES TOO LONG

1. Thermostat installed on cold wall or otherwise improperly located.
2. Heavy exhaust fan load. (May have been increased since heating system was laid out.)
3. Aquastat or pressure limit control not functioning properly.
4. Unit is undersized.

## FREQUENT MOTOR FAILURE

1. Voltage fluctuations too high or too low.
2. Excessive or insufficient lubrication.
3. Wiring to motor undersized.
4. Improper electrical connections.
5. Motor operating in too high air temperature.
6. Restricted air flow through unit due to clogged fin tube heater elements, closed louvers, too much duct work connected to unit.
7. Fan out of balance.
8. Unbalanced voltage on 3 $\phi$  power.

## PREMATURE FAILURE

1. Severe internal corrosion due to condition of boiler water.

## FIN TUBE HEATING ELEMENT FAILURE

1. Severe internal corrosion from feedwater.
2. Type of boiler treatment.
3. Entrained air causing water hammer.
4. Too much outdoor air portion in freezing temperatures.



4830 TRANSPORT DRIVE, DALLAS, TEXAS  
TEL.: (214) 638-6010 FAX S 75247: (214) 905-0806  
<http://www.ljwing.com>