



# HARTZELL GAS FIRED DOOR HEATER

## SERIES 79

### MODELS DH22 & DH24

#### 1. DESCRIPTION

The Hartzell Gas-Fired Door Heater is designed to instantly direct a high velocity of heated air towards a large door opening, when the door is opened in cold weather. It utilizes a ring type burner operating on natural gas. The propeller is a special Hartzell Ductaxial, one piece, solid *aluminum* casting, direct connected to an industrial duty, totally enclosed motor.

The direct fired burner was designed and is manufactured by Hartzell, based on many years of experience in the direct fired gas make up air and crop dryer markets.

Products of combustion, which are discharged directly into the main airstream, consist of carbon dioxide and water vapor. At maximum rated heat output the concentration of CO<sub>2</sub> is approximately 2000 PPM (parts per million) compared with a maximum allowable\* of 5000 PPM.

Although the water vapor of combustion is added, relative humidity is actually reduced, owing to the heat that is added to the air. At maximum rated heat output, and assuming 60° F. saturated entering air, the discharge air is less than 5% RH.

#### 2. MOUNTING POSITIONS

(A) Burner: The standard unit may be installed at any angle between horizontal and vertical down airflow. The control cabinet is on the left-hand side, when facing the airstream. The back panel of the cabinet must lie in a vertical plane; i.e., the burner house cannot be rotated, thus rolling the cabinet toward the top or bottom of the burner house.

(B) Plumbing: The gas piping elbows up and into the burner house on the bottom centerline. During installation, by loosening the union just outside the heater, the piping train may be rotated to any desired direction, assuring gas valves are properly oriented. (See CAUTION in Section 7.)

#### 3. INSTALLATION (MECHANICAL)

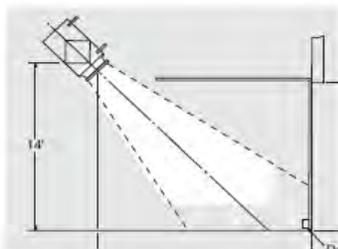
One, 24" Door Heater will handle up to approximately a 12' x 16' door opening. Larger opening require two or more heaters. See sizing chart on page 3.

**CAUTION:** No door heater can substitute for a Tempered Intake Air Unit. If in-plant negative pressure exists because of exhaust ventilation, a makeup air unit must be provided before a door heater can be expected to function properly. See your local Hartzell representative.

Your door heater should be aimed at a spot on the floor about four or five feet inside, and midway across, the door. At the inlet end there should be no obstructions to the airflow closer than 20" - 24". At the outlet end, of course, there should be nothing obstructing the airstream. Around the sides of the heater there should be no combustible material closer than three feet. Always make sure you leave access room for maintenance.

#### Overhead Door

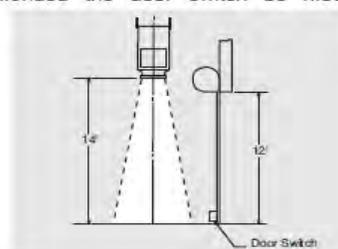
Mounted at a 45° or 30° angle, the Hartzell Automatic Door Heater directs a flow of hot air to the floor area just inside the doorway. The door switch turns on the heater when the door is opened.



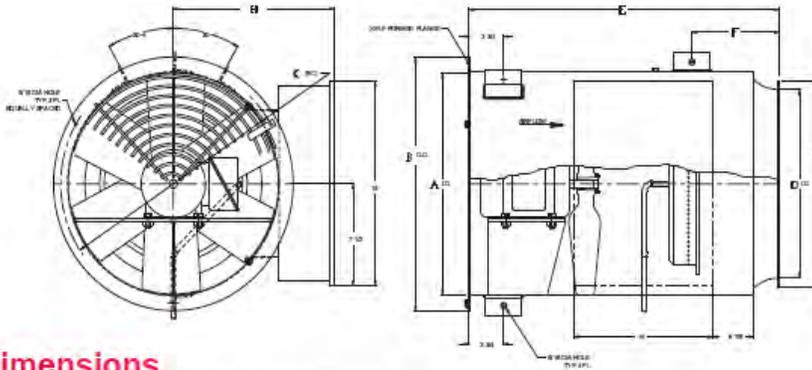
#### Roll Top Door

Alternate vertical mounting of the Hartzell Automatic Door Heater may also be used with roll top or straight lift doors, directing a flow of hot air to the floor just inside the door opening.

**NOTE:** It is recommended the door switch be mounted 24" from floor level.



# Dimensions, Rating Table and Door Heater Sizing



## Principal Dimensions

Size	A	B	C	D	E	F	G	H
22	22 <sup>7</sup> / <sub>8</sub>	26 <sup>1</sup> / <sub>8</sub>	24 <sup>1</sup> / <sub>2</sub>	20	32 <sup>11</sup> / <sub>16</sub>	8 <sup>7</sup> / <sub>16</sub>	21 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>
24	24 <sup>7</sup> / <sub>8</sub>	28 <sup>1</sup> / <sub>8</sub>	26 <sup>5</sup> / <sub>8</sub>	22	34 <sup>9</sup> / <sub>16</sub>	9 <sup>15</sup> / <sub>16</sub>	24	18 <sup>1</sup> / <sub>2</sub>

NOTE: Specifications are subject to change. Certified prints are available.

## Rating Table

Model No.	Code No. Size	Motor H.P.	Fan RPM	CFM	Input BTU	Outlet Velocity	Final Temp. 70° Ent. Air	Temp. Rise	Inlet Gas Pressure
DH22	022	1 <sup>1</sup> / <sub>2</sub>	1750	6,500	700,000	3,000	169°	99°	5"
		1 <sup>1</sup> / <sub>2</sub>	1750	6,500	765,000	3,000	179°	109°	6"
		1 <sup>1</sup> / <sub>2</sub>	1750	6,500	820,000	3,000	187°	117°	7"
DH24	024	2	1750	7,900	865,000	3,000	171°	101°	6"
		2	1750	7,900	930,000	3,000	179°	109°	7"
		2	1750	7,900	990,000	3,000	186°	116°	8"

NOTE: Based on Natural Gas Specific Gravity 0.6  
1000 BTU per cu.ft.  
Shipping weights: DH22, 350 lbs.; DH 24, 400 lbs.

## Automatic Door Heater Sizing Information

Door Size	Unit	No. of Units	Input BTU per Unit
12 x 12	DH22	1	750,000
12 x 14	DH22	1	820,000
12 x 16	DH24	1	930,000
14 x 16	DH22	2	700,000
16 x 18	DH24	2	865,000
16 x 20	DH24	2	930,000

For door sizes not covered, determine size and number of units on basis of approximately 5500 BTU/sq. ft. of door opening.

NOTE: For proper application of Hartzell Automatic Door Heaters, the maximum square foot opening should not exceed 360 sq. ft.

#### 4. GAS PRESSURE REGULATOR

Gas pressure regulator can be specified at the time of ordering, allowing proper line pressure reduction to 6" - 8" W. C. for 24" units and 5" – 7" W.C. for 22" units. Regulator can be supplied by customer.

It's suggested that a 1/8" or 1/4" I.P.S. test connection be provided in the gas supply line downstream of the regulator to facilitate taking pressure readings at time of startup and adjustment of burner equipment.

Make sure that your regulator is installed in the line with the arrow on the body pointing in the direction of the flow of the fuel.

With the regulator properly installed in the line, the following procedure is suggested when ready to light off and adjust the burner.

- (A) Remove the "top cap" of the regulator and check for shipping block or rod installed between spring and top cap. Remove, if found.
- (B) Remove plug, in vent opening of diaphragm housing. (Connect vent to outside building, if required .by plant or insurance regulations.)

The setting of the spring beneath the "top cap" on the regulator determines the outlet pressure. Screwing in on it increases the outlet pressure. Screwing out reduces the outlet pressure. The outlet pressure from the regulator will not necessarily be the same at full fire as under static conditions of no flow. Therefore, when adjusting gas pressure to very heat output, do so with the heater in operation. (See Section 9 table 1.)

\*\*\* Add a gas line manual shut off valve just upstream of the regulator for maintenance reasons.

#### 5. SUGGESTIONS FOR REGULATOR VENTING.

One purpose of the vent connection is to provide a safe means of venting gas if the regulator diaphragm should fail. The vent also provides relief from the space above the diaphragm as it moves during regulation. A restriction in the vent line can result in poor regulator performance.

The vent line should normally be piped outside the building, with as short a run of pipe as possible. There should be a minimum number of bends, and the pipe should be as large as practical, using the vent-hole size as a guide. When tubing is used, care must be exercised to avoid sharp bends and the resultant reduction in area.

Grouping vent lines together into a common header is not normally recommended. If they must be grouped, the header cross-sectional area should be at least equal to the sum of the individual vent areas.

The outside end of the vent line should either have a weatherproof vent cap or should be directed downward for weather protection. It should also be screened to prevent foreign material or insects from entering the line. Naturally, the end of the line should be located in an area where it is safe to release gas.

A high percentage of regulator problems are due to improper venting. Remember the space over the diaphragm must be able to breathe for proper regulation. If there is any regulation problem, disconnect the vent line at the regulator to see if proper venting is the solution. Then look for undersized lines, crimped tubing, clogged lines, back pressure caused by draft effect at end of vent or pressure effect from other regulators in a grouped system.

6. INSTALLATION (ELECTRICAL).

Confirm your supply voltage matches the controls ordered on this unit. It should be 230 or 460 or 575 only.

All 115 volt wiring for the door switch and remote station is picked up in the control cabinet.

All internal electric wiring is factory installed. It is only necessary to connect main power leads to (L1 - L2 - L3) to the disconnect switch (if provided). or top of starter contacts. Then wires between remote station, and door switch back to terminal block in units control cabinet.

The remote station (see DWG E029 P2) may be installed at any location for convenience in switching the heater from "OFF" or "SUM" in warm weather or "WIN" for heat.

The DOOR LIMIT SWITCH must be installed on the door frame in such a way that it is tripped as soon as the door begins opening. A switch having 2 poles, 1 normally open and 1 normally closed, is furnished so that whichever pole is closed by the opening of the door, it will actuate the heater. (Reference Hartzell Drawing E029).

This door switch must trip as soon as your door starts up and trip again just before your door closes. This prevents large volumes of cold air to be drawn into your facility.

7. INSTALLATION (GAS PIPING) Read Section 2B.

CAUTION: When making up gas piping, be sure all valves are in a horizontal portion of the gas line, with valve body properly positioned:

- (A) Main line safety valve (1V\*\*), solenoid type. Valve is 1" with proof of closure switch and 115 volt.
- (B) Pilot solenoid gas valve (2V\*\*). Valve is ¼" and 115 Volt.
- (C) Gas regulator should be mounted a few feet upstream of the unit. A manual shutoff valve should be placed just ahead (upstream) of the regulator.
- (D) High and Low gas pressure switches (manual reset). See section 8 on safety devices.

## 8. SAFETY DEVICES

- (A) High & Low Gas Pressure Switches: Two manual switches when tripped turn on the green “flame out/turn reset” light on the remote station.

Manual reset gas pressure switches are used for safety if supply pressure falls below or rises above the proper operating range. (See wiring diagram for proper setting.) Switches are pre-set at the factory during testing/inspection.

Both switches have a vent connection for venting gas in case of a ruptured diaphragm. Connect vent to atmosphere per Section 5 above. The switches lock out if tripped, and must be manually reset. Thus, whenever gas is turned off manually, 1PS (Low Gas Pressure Switch) must be reset.

- (B) Safety Shut-Off Valve: This heater is equipped with a solenoid type gas valve with proof of closure. It's a fast-open, instant close valve meeting the requirements of FM, UL, and CGA. Valve includes “proof of closure” which confirms valve is closed prior to attempting ignition.
- (C) Hi-Temperature Limit: The "Therm-O-Disc" limit switch is located near the discharge end of the heater, mounted on the top outside of the duct. This is a U.L. approved manual-reset device.
- (D) Airflow Switch: A UL/FM approved differential pressure switch in the control cabinet senses velocity plus static pressure of the airflow from the propeller. This air pressure switch closes its contact when airflow is proved.
- (E) The flame safeguard is a Honeywell RM7890A1056, which utilizes an ultraviolet flame scanner for monitoring both pilot and main flame. At any time that it doesn't sense flame when it should, or it sees flame when it shouldn't, the flame safe guard locks out which will not allow the burner to operate. When this happens, you will have to manually reset the flame safe guard in your control cabinet. Unit will start back through the ignition cycle. If electric power to the control circuit fails for any reason, whether intentional or otherwise, and no matter how briefly, the flame safeguard gives a safe start component check when power is restored. If a flame simulating component failure exists it will not proceed to the ignition cycle and will not energize the main gas valve component check when power is restored.
- (F) Fan Starter: Although not normally considered a safety device, the fan starter is wired so that its interlock powers the control system. Thus the main fan must be energized before the gas system can be powered. This provides one more assurance, in addition to the Airflow Switch, that the fan is operating before heat comes on.
- (G) Optional outdoor thermostat (1THS) can be provided. This thermostat will not let your unit light off if the winter mode when the outdoor temperature exceeds this thermostats setting.
- (H) Both the primary and secondary sides of the control voltage transformer (1T) are protected with fuses.
- (I) Motor starter overloads. Preset at Hartzell for correct motor protection.

## 9. Start UP Procedure

- Make sure remote station and door switch are wired and mounted
- Double check supply voltage matches unit. 230 or 460 or 575 volts
- Turn on gas and Leak check all plumbing up through gas main blocking valve.
- Press Manual Reset on the Low gas pressure switch.
- Confirm your supply gas pressure is between 5" and 9"
- Turn on disconnect switch
- From Floor level, flip remote station selector switch to "SUM" (fan should start) and back to off. Make sure your prop rotation is clockwise when looking in the units discharge.
- Turn your remote station selector switch to the "WIN" position and open you door.
- Fan should start as soon as the door starts up and within a few seconds you should be able to see a golf ball size pilot flame then almost immediate burner flame. Pilot flame will discontinue after 5 seconds.
- IF unit doesn't start on first try, turn remote station from winter to summer and back to winter to reset controls and let unit try again for ignition.
- Make a final gas pressure setting of your supply gas regulator with your unit running. See chart on page 3 of IOM for gas pressure settings.
- Close door and make sure unit shuts down properly.

\*\*\*\*\* On first time start-up you may need to cycle the unit two or three times to clear the gas line of air.

If you are having problems during new unit start up or need technical support please contact us Direct at 1-800-336-3267 or 1-937-773-8494 and ask for one of our Make-Up Air specialist.

## 10. MAINTENANCE

(Note: See wiring diagram for part number and manufacturer of any control component. See manufacturer's instruction sheets for more information.)

- (A) Fan Motor Bearings: Most fan motors now have double shielded bearings and will never require re-lubrication.
- (B) Burner: Side plates and their air holes should be checked periodically to be sure these parts are not fouled or plugged. A simple cleaning with a wire brush is required. Confirm pilot barrier is still in place.
- (C) Drilling of gas ports is required every heating season. Use a #47 or 5/64" drill bit, with drill bit extension, to remove any carbon build up in these ports.
- (D) Fireye: The Honeywell RM78901056 flame safeguard utilizes solid state components. The only required maintenance is on its external components; i.e., the Ultra-Violet Scanner.
- (E) U.V. Scanner: Remove scanner occasionally, clean lens with soft cloth and be sure that mounting pipe nipple is clear of insects and dirt.
- (F) Spark Igniter: Ignition takes place - by means of a spark jumping from the igniter to the side plate of the burner. The spark gap should be 1/8" to 3/16" and located downstream of an air mixing hole, so there is a gas-air mixture to be ignited. Check for carbon "bridge" between electrode and burner which may short out spark and prevent ignition. Remove protective boot and clean connection between ignition cable and igniter.

## 11. TROUBLE SHOOTING

### (A) Fan Won't Start-

- (1) Selector in "OFF" position.
- (2) Check to see if motor overload relays are tripped. Press reset.
- (3) Check 3-phase line leads for power across all 3 phases.  
If one line is dead, check fuses or breaker in main disconnect.
- (4) Check fuse on control circuit transformer 1T. You should have 115 volts off the secondary.
- (5) Try "SUM" setting. If fan runs, but won't run on "WIN", check I THS outdoor thermostat (if used) for open R-B contact; check limit switch on door for open contact.

### (B) Fan only Operates, Gas Pilot Will Not Ignite, Green "TURN RESET" Does Not Light:-

- (1) Selector in "SUM" position. Turn to "WIN".
- (2) Check wire 6 to ground 115V (defective selector switch or wiring to same).
- (3) Check wire 7 to ground (bad Auxiliary contact on starter).
- (4) 9 to ground (bad R-W contact in lo-gas switch).
- (5) 10 to ground (bad R-B contact in hi-gas switch).
- (6) 11 to ground (bad 4-5 contact in control relay).
- (7) 12 to ground (bad C-NO contact in airflow switch; pressure setting too high, turn adjustment screw CCW until switch trips; clogged tubing in airstream).
- (8) 13 to ground (reset Therm-O-Disc, inside "handy-box").
- (9) Check toggle switch in mounting base of Fireeye (must be left in "ON" position).

### (C) Fan Operates, Gas Pilot Will Not Ignite, Green "TURN RESET" Lights Continuously Whenever Fan Runs:

- (1) Defective time delay TDR. (Pull from socket, turn RESET, and try again.)
- (2) One or both gas pressure switches tripped. Press reset lever. If low pressure can't be reset, check for cause of inadequate pressure. Check supply pressure ahead of regulator; if pressure exceeds rating of regulator, it may pass no gas or fail to regulate.

### (D) Fan Operates, Gas Pilot Will Not Ignite, Green "LOCKOUT" Lights Continuously Whenever Fan Runs:

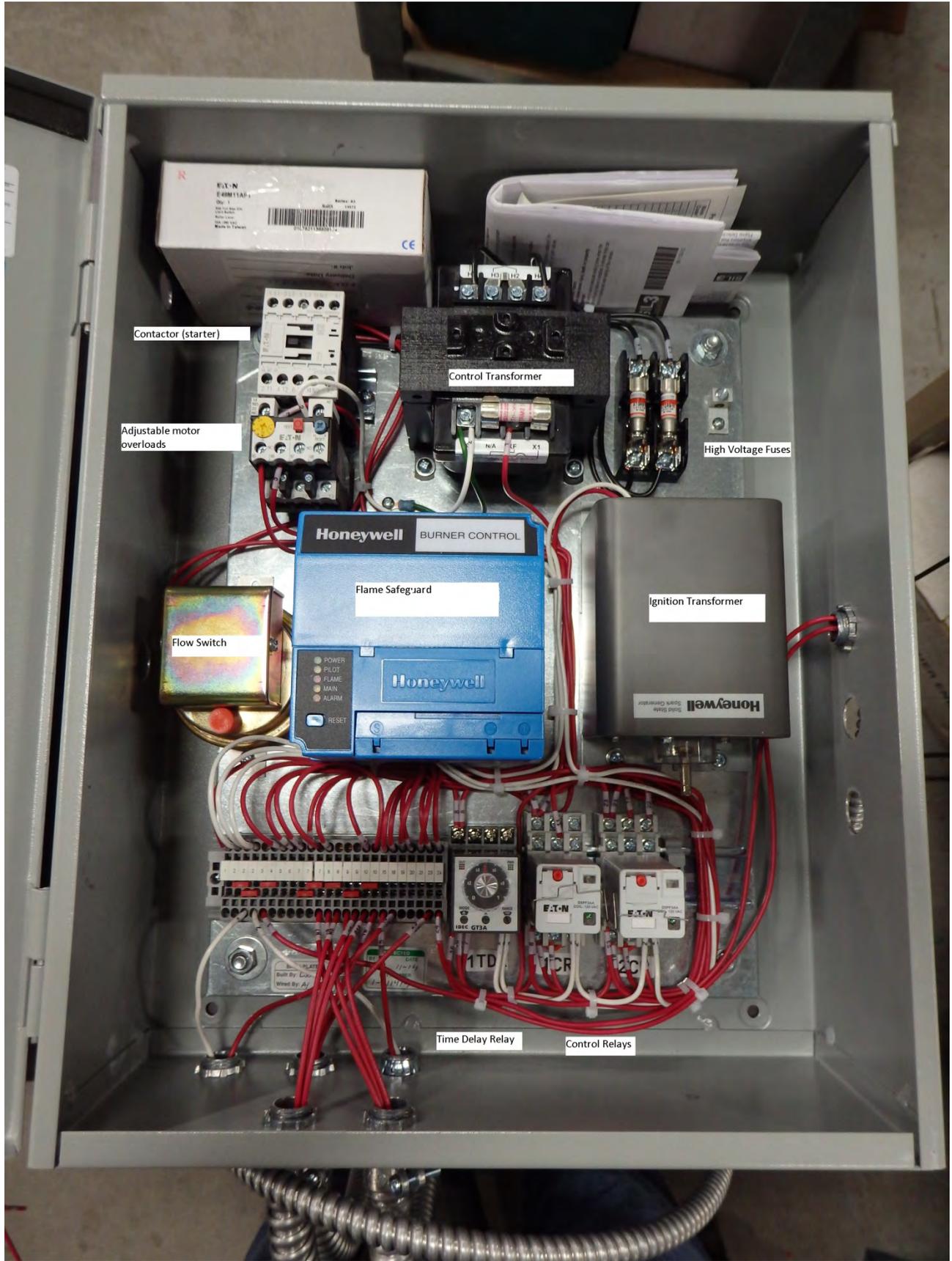
- (1) Press reset button on Fireeye.
- (2) If Fireeye won't reset, check for presence of continuous gas pilot flame.

CAUTION – In this case turn off manual cock in pilot line before stopping fan. Then investigate cause of pilot valve IV sticking open.

- (3) If Fireye can be reset, but on next try-for-ignition, "TURN RESET" lights, refer to Section E or F. If "LOCKOUT" lights refer to Section G.
- (E) Fan Operates, Little or No Pilot Flame and "TURN RESET" Lights after 5 Seconds:
- (1) Check gas pilot manual cock; should be left in open position.
  - (2) Check all gas lines for clogging and for purging of entrapped air.
  - (3) Check for moisture and/or conducting dirt on Sparktrode; check electrode for carbon "bridge" to burner, which may short out ignition spark.
  - (4) Check for adequate pilot flame. Pilot flame should be a visible "golf ball" size flame.
  - (5) Take a volt reading with your VOM meter to confirm ultra-violet scanner is seeing the pilot flame.
- (F) Fan Operates; Pilot Ignites Normally, then Goes Out as "TURN RESET" Lights:
- (1) Check all manual cocks in main gas line; these should be left open in normal operation.
  - (2) Check scanner, remove and clean lens; check mounting pipe nipple for clogging by insects, dirt, or rust.
  - (3) With selector in "WIN" but unit not operating (i.e., door switch open-contact with door closed), hold match or lighter flame in front of scanner. Flame relay in Fireye chassis should pull in with audible "click". If not, proceed to step 4.

CAUTION- Before proceeding to step 4 or 5, tum selector to "OFF", make the changes suggested, and then return the selector to "WIN". This is important, because *in* "WIN" position, the Fireye *is* energized and electrical shock could result.

- (4) Detach #20 and #21 leads from installed scanner, attach a known good scanner to terminals #20 and #21, -and repeat step 3. If flame relay now pulls in, install new scanner. If not, re-install leads from original scanner and proceed to step 5.
  - (5) Replace Fireye chassis, 'inside control cabinet, with a known good unit, and repeat step 3. If flame relay still does not pull in, have -scanner and chassis checked by Fireye distributor or by Hartzell factory.
- (G) Fan Operates, Pilot Ignites Normally; then Goes Out as "LOCKOUT" Lights:
- (1) With fan operating momentarily jumper circuit #7 to #8, this should result in control relay CR pulling in, lighting "TURN RESET" pilot and extinguishing "LOCKOUT". If so, insert new TDR relay (Amperite 115N05). If not, proceed to step 2.
  - (2) With fan operating, check for 115 volts across circuits #8 and #2 (at "coil" connections of CR control relay). If no voltage, jumper per step 1 above. If still no voltage backtrack through circuits 8, 7, 6, and 5, to determine where break in circuit exists. If 115 volts is measure but relay does not pull in, or if relay does pull in but "LOCKOUT" remains lit, replace CR relay.
  - (3) After either step 1 or 2 corrective action has been taken, continue with Sections E or F, as indicated by symptoms.



Contactor (starter)

Adjustable motor overloads

Control Transformer

High Voltage Fuses

Flow Switch

**Honeywell** BURNER CONTROL  
Flame Safeguard  
**Honeywell**  
POWER  
PILOT  
FLAME  
MAIN  
ALARM  
RESET

Ignition Transformer

Time Delay Relay

Control Relays