

# ECLIPSE AIR HEAT BURNER\* DUCT UNITS

Bulletin 145

5/85

formerly H-105

## SERIES "AH-D" AND "RAH-D"

\*U.S. Pat. No. 3,265,376 Canadian Pat. No. 743,782

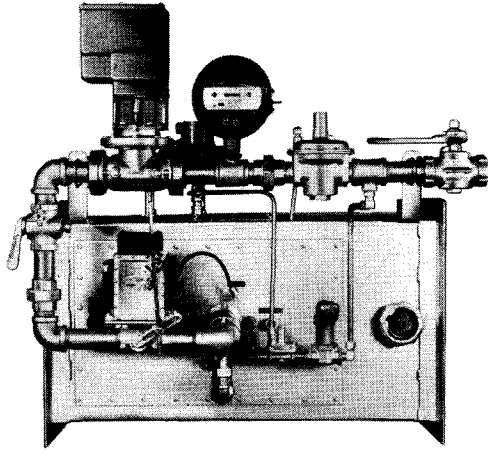


FIGURE 1—120 AH-DP Eclipse Air Heat Burner Duct Unit located on the pressure side of the fan. Fresh air past the burner. Input 1,200,000 Btu/hr. and FM type piping.

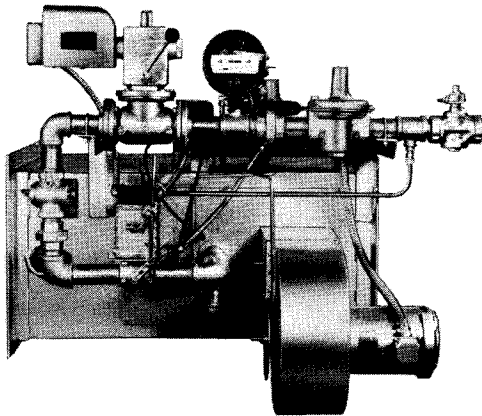


FIGURE 2—200 RAH-DS Eclipse Air Heat Burner Duct Unit located on suction side of fan. Recirculated air past the burner. Input 2,000,000 Btu/hr. and FM type piping.

## DESCRIPTION

Eclipse Series "AH-D" and "RAH-D" Air Heat Burner Duct Units adapt the "AH" and "RAH" series burners (see Bulletin H-100) to duct sections as shown in Figures 1 and 2 above. The Duct Units are completely packaged with either FM or IRI type gas valve trains.

The "AH-D" Duct Units are used in fresh air systems and the "RAH-D" Duct Units are used in recirculating air systems. Both types are divided into two categories: suction systems ("AH-DS" and "RAH-DS") for use on the suction side of the circulating fan, and pressure systems ("AH-DP" and "RAH-DP") for use on the pressure side of the circulating fan. Duct Units for all four types of systems may be selected from this specification sheet for inputs from 400,000 Btu/hr. through 6,000,000 Btu/hr. For units with capacities greater than 6,000,000 Btu/hr., consult factory. Duct units are designed to burn propane or natural gas. Contact Eclipse for information on using other fuels.

## OPERATION

A small and a large duct are available for each size burner. Both duct sizes are required so that duct selection can be based on an average velocity of 1500 fpm past the burner. At any given Btu/hr. input more air is required past the burner for a low outlet tem-

perature than is required for a high outlet temperature. Therefore, the small duct sizes are for high outlet temperatures of 200-600° F. and the large duct sizes are for low outlet temperatures of 80-200° F.

The outlet air temperature from each Duct Unit should be limited to 600° F. Recirculated air temperature past the "RAH" series Duct Unit should be limited to 500° F.

The air ducts both upstream and downstream of the Air Heat Burner Duct Unit must be designed to provide a uniform air velocity past the burner, (see Page 5.) All Air Heat Duct Units have a 30:1 turndown or greater.

Standard Duct Units are arranged to fire horizontally with air flow from left to right when facing the gas piping. Other arrangements are available to fit your requirements.

## ADVANTAGES

- • • Packaged for complete control and safe operation.
- • • Capable of 30:1 turndown or greater.
- • • Used on suction or pressure side of circulating fan.
- • • Used for fresh air or recirculated air systems.
- • • Constructed of heavy gauge steel.
- • • Pre-selected and assembled gas valves to match burner capacities.
- • • Can be used with a wide range of velocities past the burner.

## DESIGN FEATURES

All Duct Units are supplied with a combustion air blower except on the "RAH-DP" systems (recirculating system on the pressure side of the circulating fan). The combustion air blower for these units must be selected on the basis of the actual pressure required as described on page 6 of Bulletin H-100.

Valve train components will vary depending on whether the system is designed to fulfill FM or IRI requirements. However, each system will include a main gas lubricated plug cock, back-loaded main gas pressure regulator, gas pressure switch or switches, motorized safety shut-off valve, checking lubricated plug cock, checking pet cock, and electric proportioning control motor mounted on control valve.

The pilot gas line will include a backloaded gas pressure regulator, pilot solenoid valve, adjustable orifice gas valve, pilot gas/air mixer, and electrically ignited pilot. An additional pilot gas pressure regulator is provided where the inlet gas pressure exceeds ½ psi.

The ignition transformer, along with the combustion air flow switch and circulating air flow switch, are mounted on the duct. All electric control items and valves are 115/1/60.

**CAUTION: It is dangerous to use any fuel burning equipment unless it is equipped with suitable flame sensing device(s) and automatic fuel shut-off valve(s). Eclipse can supply such equipment or information on alternate sources.**

## CONSTRUCTION

Duct Unit shells are 10 gauge steel with 2" x 2" x ¼" structural steel angle at duct inlet and outlet. Continuous welding is used on end joints to seal against air leakage.

The Air Heat Burner is mounted to a side plate and bolted to the Duct Unit. A small inspection plate is provided for easy access to the spark plug and flame rod. Each unit is equipped with peepsights to view the main flame and to view the pilot flame.

# CAPACITIES — DIMENSIONS

(Refer to Drawings on Page 3)

Burner Number	Input BTU/Hr.	Combustion Blower H. P. <sup>1</sup>		"A" Gas Inlet Pipe Size <sup>3</sup> - NPT		
		"AH-D" Suction & Pressure Systems	"RAH-D" <sup>2</sup> Suction Systems Only	10 - 14" W. C. Gas Pressure	1/2 - 1 PSI Gas Pressure	5 - 25 PSI Gas Pressure
40	400,000	1/10	1/10	1	1	1
80	800,000	1/4	1/3	1	1	1
120	1,200,000	1/4	1/3	1-1/4	1	1
160	1,600,000	1/3	1/3	1-1/4	1-1/4	1-1/2
200	2,000,000	1/3	3/4	1-1/2	1-1/2	1-1/2
280	2,800,000	1/2	3/4	2	1-1/2	1-1/2
400	4,000,000	3/4	1-1/2	2-1/2	2-1/2	2
480	4,800,000	1	1-1/2	2-1/2	2-1/2	2
600	6,000,000	2	2	2-1/2	2-1/2	2

Burner Number	Dimensions - Inches									
	Large Ducts <sup>4</sup> (For Outlet Temperature of 80-200°F.)					Small Ducts <sup>4</sup> (For Outlet Temperatures of 200-600°F.)				
	B	C	D	E	Max. Cross-Sectional Free Area Sq. Ft. (Duct area minus Burner area) <sup>5</sup>	B	C	D	E	Max. Cross-Sectional Free Area Sq. Ft. (Duct area minus Burner area) <sup>5</sup>
40	30	30	36	18	2.70	18	22	36	18	0.52
80	30	30	36	18	4.80	18	22	36	18	1.43
120	38	38	36	18	8.20	20	28	36	18	2.10
160	44	44	40	18	11.10	20	34	40	18	2.60
200	48	48	40	20	13.10	20	40	40	20	3.10
280	54	54	40	20	16.80	22	52	40	20	4.70
400	68	72	48	20	28.50	24	72	48	20	7.70
480	68	86	54	20	33.40	24	86	54	20	7.40
600	68	104	60	15	40.70	24	104	60	15	8.90

**IMPORTANT NOTES:**

(1) Standard motors are 115/1/60 for 1/10 through 1/2 h.p. and 220/440/3/60 for 3/4 h.p. and over. Other electrical characteristics available if required.

(2) Combustion blower h.p. shown is for "RAH-DS" suction systems with minus 0.1" w.c. to minus 3.0" w.c. during cold condition.

For "RAH-DS" suction systems with minus 3.0" w.c. or higher suction during cold condition, combustion air blower can be omitted. This is based on no less than minus 1.5" w.c. suction at hot condition. Consult factory for further assistance if required.

For "RAH-DP" pressure systems, select blower as described on page 6 of Bulletin H-100.

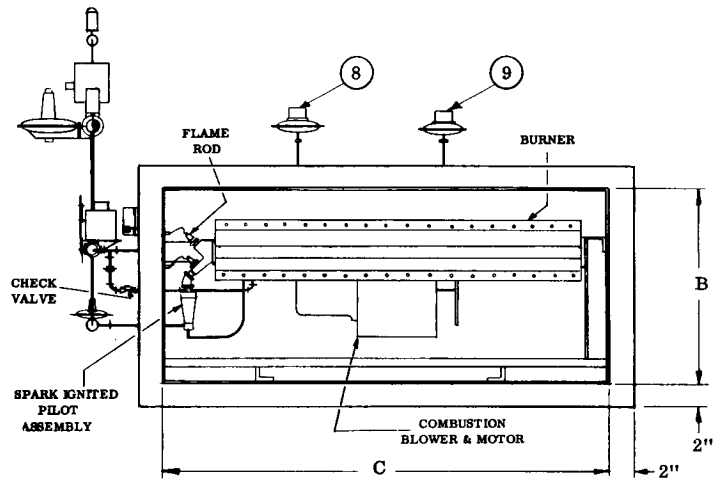
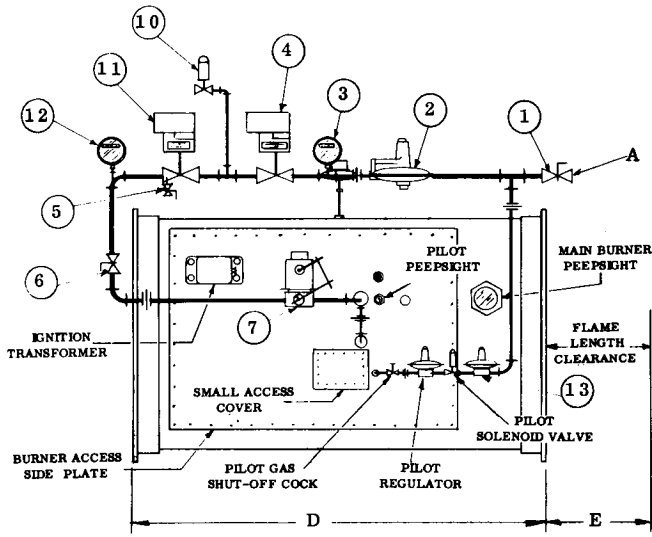
Blower selection for "RAH-DS" and "RAH-DP" systems is based on a duct maximum differential pressure change of 50% from cold to hot condition.

(3) Gas pressures refer to natural gas; for propane applications...consult factory. Inlet pipe size shown is the size of the inlet lubricated plug cock; other valves in the system may be larger or smaller since the valves are selected for the best pressure drop. Gas pressures less than 10" w.c. can be used ..... consult factory.

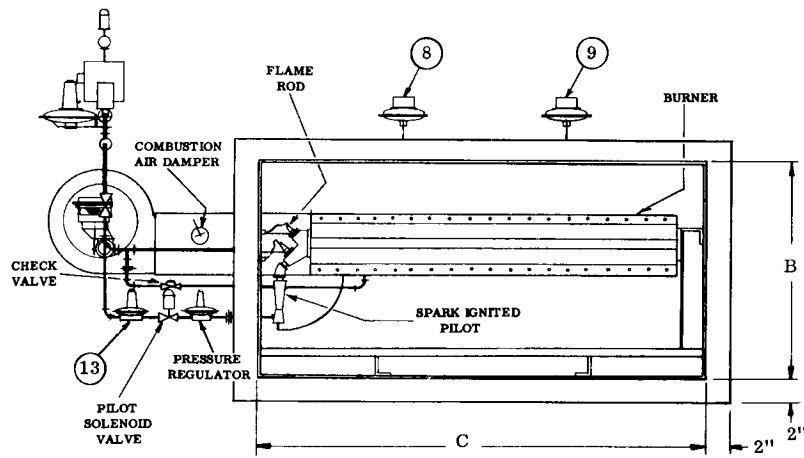
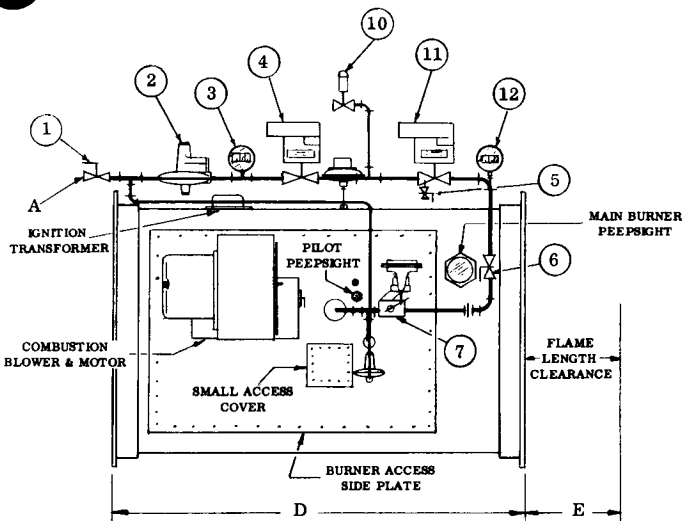
(4) In order to maintain average velocities of 1200 fpm to 3000 fpm past the burner, two sizes of ducts are available for each input.

(5) This column lists the maximum cross sectional free area in square feet for each duct size available. The cross sectional free area may be reduced by adding a profile plate to obtain an optimum air flow of 1500 fpm. The area will be sized based on the circulating air volume past the burner.

## FRESH AIR SYSTEMS SERIES "AH-DS" AND "AH-DP"



## RECIRCULATING AIR SYSTEMS SERIES "RAH-DS" AND "RAH-DP"



The following items apply to both *fresh air* and *recirculating systems* and are numerically keyed to both of the above drawings.

### Components Included in FM Type Systems

1. Lubricated Plug Cock
2. Pressure Regulator
3. Low Gas Pressure Switch
4. Motorized Safety Shut-Off Valve
5. Checking Pet Cock
6. Checking Gas Cock
7. Gas Control Valve w/Operator
8. Air Flow Press. Switch for Combustion Air
9. Air Flow Press. Switch for Circulating Air

### Additional Items Included for IRI Type Systems

10. Normally Open Vent Valve
11. Motorized Safety Shut-Off Valve
12. High Gas Pressure Switch

**The Following Is Used Only When Gas Pressure Exceeds ½ PSIG**

13. Second Pilot Regulator

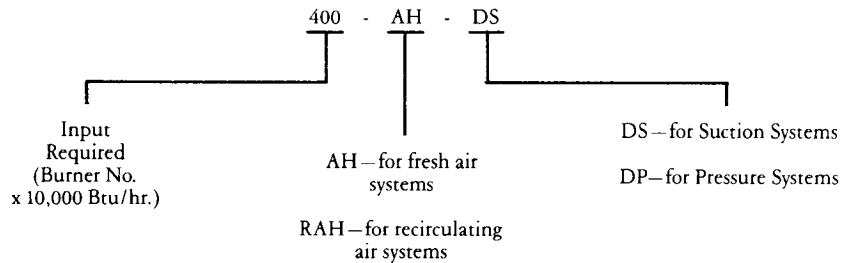
## OPTIONAL FEATURES

1. Pneumatic motor operator can be substituted for the electric proportioning control motor on the gas control valve. The electric proportioning control motor can be replaced with a mechanically controlled temperature control valve.
2. Duct Units can be arranged to fire vertically up or down, or to fire horizontally from right to left when facing the gas piping (standard is left to right air flow).
3. Units available with low fire start.
4. Electrical components can be wired to an enclosed numbered terminal strip mounted on the Duct Unit.
5. Flame safety cabinets available.
  - A. STANDARD FM TYPE CONTROL PANEL  
Panel No. CC1 consisting of:
    - a. General Purpose Cabinet
    - b. RA890E Flame Safety Relay
    - c. Non-return of Ignition
    - d. 24 Volt Control Motor Transformer
    - e. Three (3) Lights
  - B. STANDARD IRI TYPE CONTROL PANEL  
Panel No. CC4 consisting of:
    - a. General Purpose Cabinet
    - b. RA890E Flame Safety Relay
    - c. Non-return of Ignition
    - d. Low Fire Start
    - e. 0-5 Minute Adjustable Prepurge
    - f. Alarm Silencing Relay and Push Button
    - g. Alarm Horn (not mounted)
    - h. 24 Volt Control Motor Transformer
    - i. Five (5) Lights
    - j. On-Off Switch
    - k. Motor Starter
    - l. Fuse Block with Fuse
    - m. Numbered Terminal Strip

## EQUIPMENT SELECTION

1. Choose Duct Unit catalog number as follows:

Example: 4,000,000 Btu/hr. required using fresh air on suction side of fan. Required outlet air temperature is 350° F.



Selection: 400 - AH - DS with small duct.

2. If "RAH-DP" is required, select proper blower as described on Page 6 of Bulletin H-100, or consult factory as necessary.
3. Select the duct size by maximum input and temperature requirements.

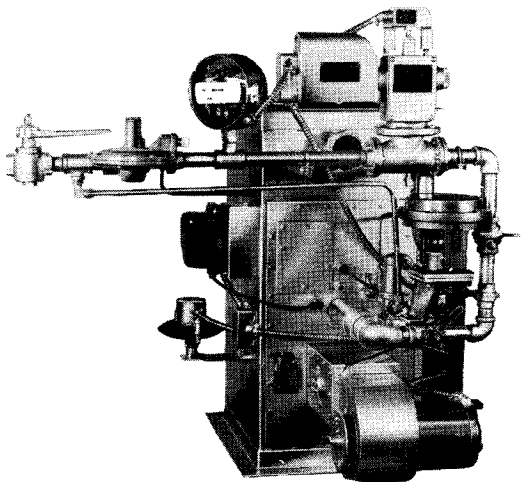
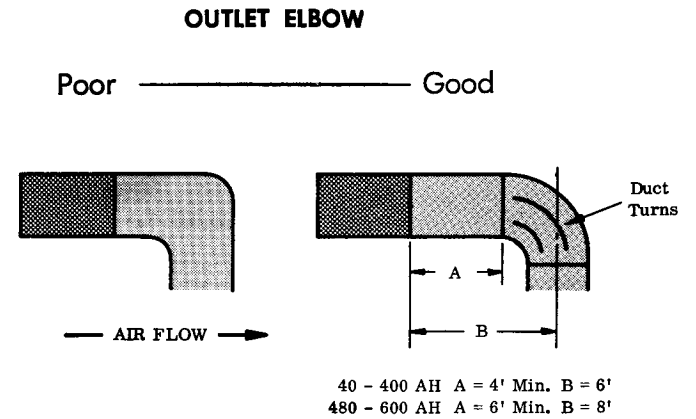
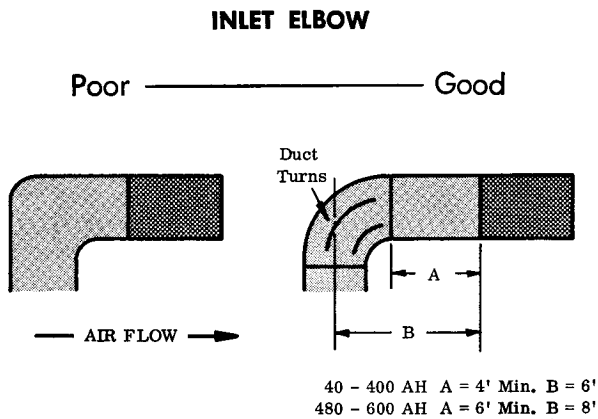
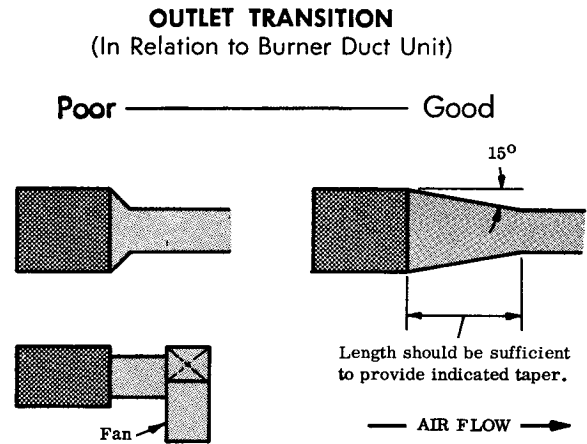
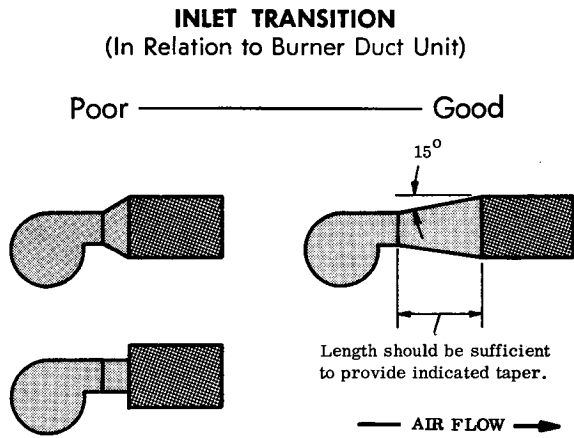
## ORDERING INFORMATION

When ordering, the following should be specified on the face of the order to avoid delays in processing.

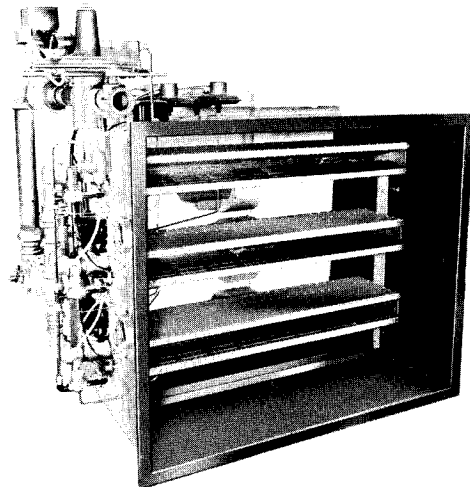
1. Duct Unit complete catalog number (i.e., 120 AH-DP) which indicates input desired, fresh or recirculating air system, and whether the Duct Unit will be located on the suction or pressure side of the circulating fan.
2. Type of gas available (natural, propane, or manufactured).
3. Gas Pressure available to the system.
4. Exact electrical characteristics (115/1/60; 220/3/60; 550/3/60; etc.)
5. Advise type of piping to be used, i.e., FM or IRI type.
6. Minimum and maximum *inlet* air temperature which will be supplied to Air Heat Burner Duct Unit.
7. Minimum and maximum *outlet* air temperature required from the Air Heat Burner Duct Unit.
8. Minimum and maximum suction or pressure on cold system before the circulated air is heated.
9. Cfm of circulated air past the burner.
10. Advise optional features desired.
11. If provision is to be made for the addition of insulation, please advise on the face of the order the thickness of the insulation which will be used.

## GOOD DUCT DESIGN FOR UNIFORM AIR FLOW PAST THE BURNER

To eliminate or reduce the possibilities of creating turbulent air flow past the burners it is necessary to use good duct design practice. The sketches below show practices used to eliminate the effect of abrupt duct changes. The shaded portion of each sketch represents the Air Heat Burner Duct Unit.



80 RAH-DS Eclipse Special Air Heat Burner Duct Units located on suction side of fan. Recirculated air past the burner. Burner to fire vertically up. Input 800,000 Btu/hr. and FM type piping.



(3) 360 AH-DP Eclipse Special Air Heat Burner Duct Unit located on pressure side of fan. Fresh air past the burner. Unit includes three 360 AH Air Heat Burners. Input 10,800,000 Btu/hr. and FM type piping.



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