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installation, operation, and maintenance instructions

PACKAGED GAS HEATING
ELECTRIC COOLING UNITS

585H & J

Sizes 018040 thru 060150

& 579J060125

Cancels: 40585DP33-A

40585DP33-B
1/1/86

NOTE TO INSTALLER: Leave these instructions, the Owner's Manual, and Parts Replacement Guide with the unit after installation.

WARNING: Improper installation, adjustment, alteration, service, maintenance, or use can cause carbon monoxide poisoning, explosion, fire, electric shock, or other occurrences which may injure you or damage your property. Consult a qualified installer, service agency, or the gas supplier for information or assistance.

NOTE: The installation of this unit must conform to the guidelines presented in these unit Installation Instructions. Read and become familiar with this publication before starting the installation.

INTRODUCTION

Models 585H, 585J, and 579J Packaged Gas/Electric Units are fully self-contained, combination gas heating/electric cooling units designed for outdoor installation. Models 585H & J may be installed either on a rooftop or ground-level slab. See Figure 1. Model 579J is used with an accessory roof-mounting curb (P/N 304851-304) and incorporates a down-discharge/return-air plenum as an integral part of the unit.

Model 585H Units meet the California maximum oxides of nitrogen (No_x) emission regulations.

These units are equipped with an energy-saving, automatic, intermittent, electric spark ignition system that does not have a continuously burning pilot. All units are manufactured with natural gas controls.

Models 585H, 585J, and 579J are A.G.A. designed-certified. See Tables I thru IV for the heating input ratings.

These units are factory-charged with R-22 refrigerant. Installation is simple: connect gas supply, air ducts, high- and low-voltage wiring, condensate drain, and install a field-supplied air filter in the return-air ductwork (except for Model 579J, which has factory-supplied air filters).

All units can be connected into existing duct systems *that are properly sized and designed to handle an airflow of 350 to 450 ft³/min per each 12,000 Btuh of rated cooling capacity.* See Tables I thru IV for cooling and heating airflow requirements.

NOTE: When installing any accessory item, see the manufacturer's Installation Instructions packaged with the accessory.

IMPORTANT—READ BEFORE INSTALLING

1. This installation must conform with all applicable local and national codes.
2. The power supply (volts, hertz, and phase) must correspond to that specified on unit rating plate.
3. The electrical supply provided by the utility must be sufficient to handle load imposed by this unit.
4. Refer to the 585H, 585J, or 579J dimensional drawing for locations of gas inlet, electrical inlets, condensate drain, duct connections, and required clearances before setting unit in place.
5. Locate the unit where the vent cap will be a minimum of 4 feet from openable windows or doors.
6. This installation must conform with local building codes and with the National Fuel Gas Code ANSI Z223.1-1984 or NFPA 54-1984.

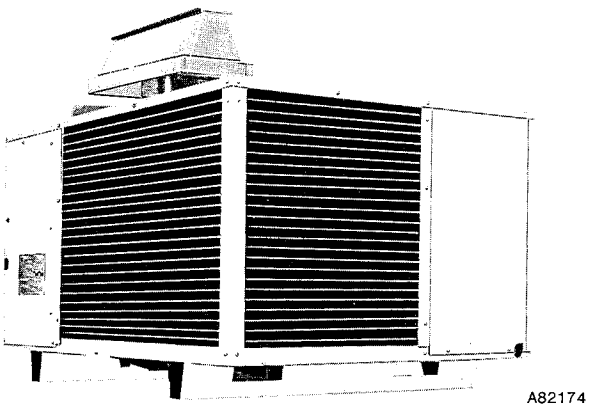

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Figure 1—Models 585H & J

WARNING: On some models, the high voltage ignition cable is not connected to the spark generator terminal on the control head/gas valve assembly when shipped from the factory. The cable is fastened to the manifold on these models. Push the boot toward center of the cable to expose the connector on the end of the cable. Attach the connector securely to the terminal on the end of the control head/gas valve assembly. Push the boot over connector to insulate the high voltage connection.

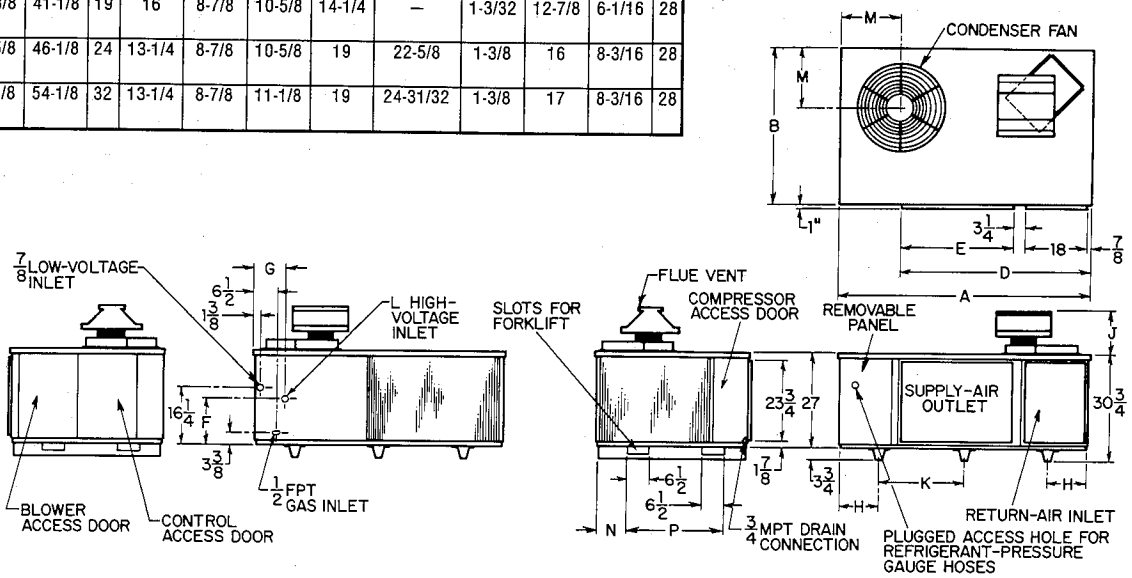
GENERAL

Models 585H, 585J, and 579J Packaged Gas/Electric Units have been designed and tested in accordance with ANSI Z21.47b-1984, ARI Standard 210-81, and ARI Standard 270-84. The appliance design is certified by the American Gas Association (A.G.A.) for use with natural or LP (propane) gases with appropriate controls and orifices.

This publication contains the following sections:

585H & J DIMENSIONS (Inches)

Size	A	B	D	E	F	G	H	J	K	L	M	N	P
018040 & 024040	53-5/8	30-3/8	38-1/8	16	16	7-1/4	11-5/8	14-1/4	—	1-3/32	12-7/8	4-1/16	22
024075, 030040, 030075, & 036060	53-5/8	40-3/8	41-1/8	19	16	8-7/8	10-5/8	14-1/4	—	1-3/32	12-7/8	6-1/16	28
036100, 036125, 042060 & 042125	65-5/8	44-5/8	46-1/8	24	13-1/4	8-7/8	10-5/8	19	22-5/8	1-3/8	16	8-3/16	28
048080, 048125, 060100, & 060150	72-3/8	44-5/8	54-1/8	32	13-1/4	8-7/8	11-1/8	19	24-31/32	1-3/8	17	8-3/16	28



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585H & J REQUIRED CLEARANCES (Inches)

Above flue vent	36	Blower access panel side	30
Duct side of unit	6	Side opposite blower access panel	30
Side opposite ducts	30	Bottom of unit	0

NOTE: Provision must be made for fresh ambient air to reach the outdoor coil without recirculation of the air from the outdoor fan discharge.

Figure 2—585H & J Dimensional Drawing

579J REQUIRED CLEARANCES (Inches)

Above flue vent	36	Blower access panel side	30
Plenum side of unit	12	Side opposite blower access panel	30
Side opposite plenum	30	Bottom of unit	0

NOTE: Provision must be made for fresh ambient air to reach the outdoor coil without recirculation of the air from the outdoor fan discharge.

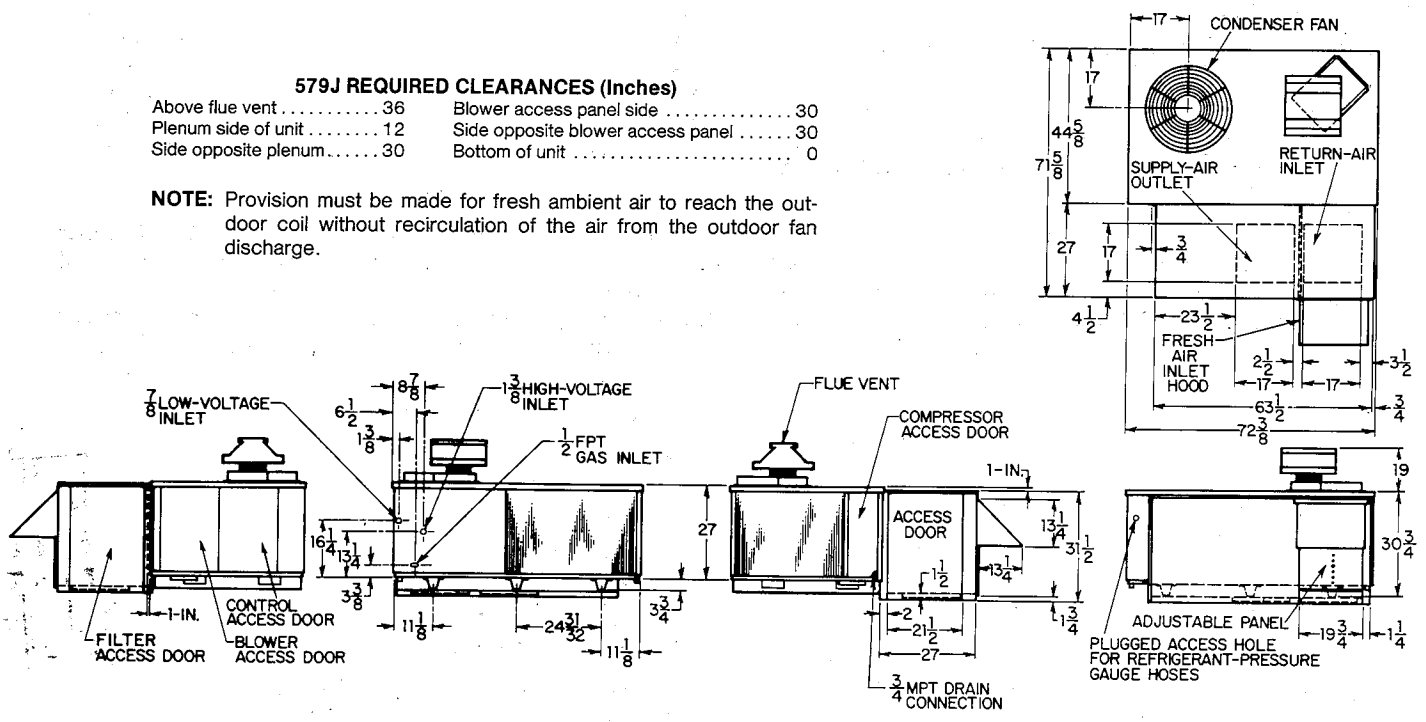

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Figure 3—579J060125 Dimensional Drawing

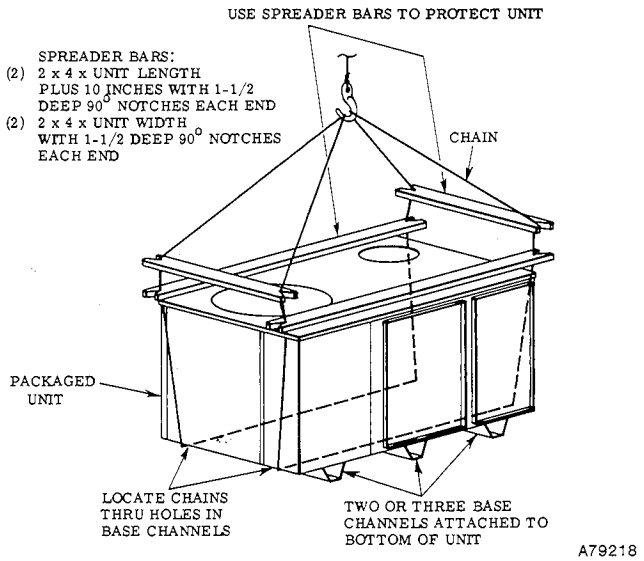


Figure 4—585H & J Suggested Rigging

I. MOVING AND SETTING UNIT IN PLACE

CAUTION: Use spreader bars when rigging the unit to be lifted. Model 579J must be rigged for lifting as shown in Figure 5. Models 585H & J must be rigged for lifting as shown in Figure 4. Use extreme caution to prevent damage when moving the unit. Unit must remain in an upright position during all rigging and moving operations. The unit must be level for proper condensate drainage; therefore, the ground-level pad or accessory roof-mounting curb must be level before setting the unit in place. When a field-fabricated support is used, ensure that the support is level and properly supports the unit and plenum.

A. Rooftop Installation

CAUTION: When installing the unit on a rooftop, be sure that the roof will support the additional weight. Refer to the Product Data Sheet (PDS) for Models 585H, 585J, and 579J to obtain total weight and corner weight information.

When installing a Model 579J downflow unit, the accessory roof-mounting curb must be installed on, and flashed into, the roof before unit installation. The instructions for installing the accessory curb are packaged with the curb.

When installing a Model 585H or 585J end-discharge unit, place the unit on a level base that provides proper support. On flat roofs, be sure that the unit is located at least 4 inches above the highest expected water level on the roof to prevent flooding.

B. Ground-Level Installation

Place the unit on a solid, level, concrete pad that is a minimum of 4 inches thick and that extends approximately 2 inches beyond the casing on all four sides of the unit. Do not secure the unit to the pad *except* when required by local codes.

C. Clearances

The required minimum operating and service clearances are shown in Figures 2 and 3. Adequate combustion, ventilation, and condenser air must be provided.

CAUTION: Do not restrict condenser airflow. An air restriction at either the outdoor-air inlet (the entire surface of the outdoor coil) or the fan discharge can be detrimental to compressor life.

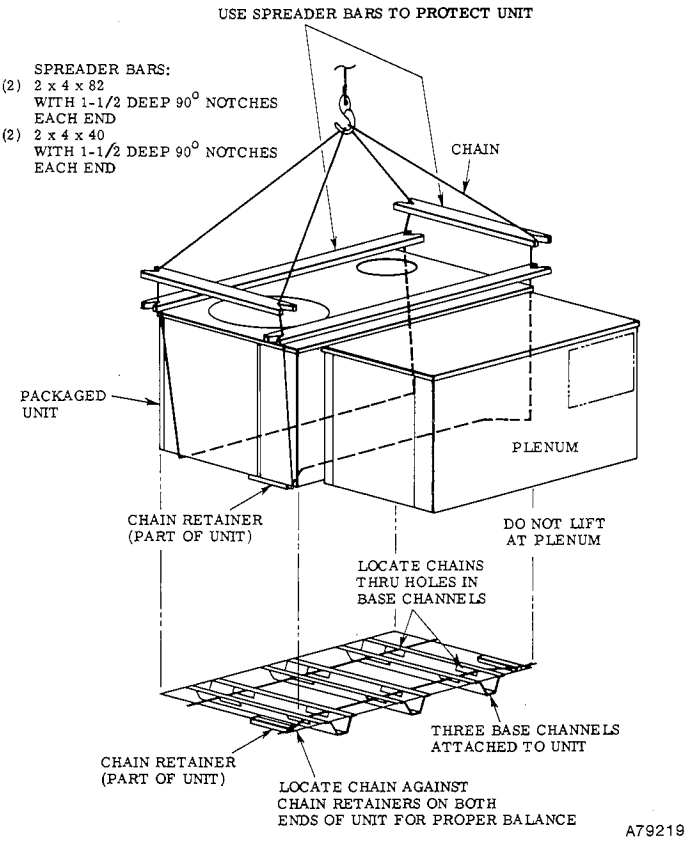


Figure 5—579J060125 Suggested Rigging

The condenser fan discharges through the top of the unit. Ensure that the fan discharge does not recirculate to the condenser coil. Do not locate the unit in either a corner or under a complete overhead obstruction. The minimum clearance under a partial overhang (such as a normal house roof overhang) is 36 inches above the vent cap. The maximum horizontal extension of a partial overhang must not exceed 48 inches.

Do not locate the unit where water, ice, or snow from an overhang or roof will damage or flood the unit by falling on the top. Do not locate the unit where grass, shrubs, or other plants will interfere with the airflow either into or out of the unit. Do not install the unit on carpeting, tile, or other combustible material other than wood flooring.

D. Special Procedures for Model 579J

Model 579J units are shipped with the fresh-air inlet hood, two cleanable high-capacity air filters, and a filter support disassembled and secured in the plenum section of the unit. This unit also has a shipping brace which is used to protect the belt-drive blower motor. After setting the unit in place, proceed as follows to remove and install these components:

1. Remove filter access door from plenum section. See Figure 3.
2. Remove tape used to secure filters to inlet hood, remove filters and filter support from unit, then remove two screws used to secure inlet hood to base of plenum section, and remove hood from unit. Save screws.
3. Remove screw and slide adjustable panel on plenum (See Figure 3.) downward to provide desired amount of outside air for ventilation, when required.
4. Mount inlet hood on plenum, using two screws saved in step 2.
5. Remove two screws used to secure metal plate portion

TABLE I—SPECIFICATIONS—MODELS 585H & J (SIZES 018040 THRU 036060)

MODEL	585H	585H	585J	585H	585J	585H	585H	585H
SIZE	J018040	J024040	J024075	J030040	J030075	J036060	P036060	E036060
SERIES	B	B	B	B	B	B	B	B
Unit Volts—Phase (60 Hz)	208-230—1	208-230—1	208-230—1	208-230—1	208-230—1	208-230—1	208/230—3	460—3
Operating Voltage Range	197—253	197—253	197—253	197—253	197—253	197—253	187—253	414—506
Unit Full Load Amps	10.9	14.4	15.7	17.8	17.6	23.2	17.2	7.6
Maximum Fuse Size (Amps)	20	25	25	30	30	40	25	15
Minimum Ampacity for Wire Sizing	13.1	17.4	18.7	21.2	21.0	27.6	20.1	8.9
Minimum Wire Size (75°C Copper)*	14	12	12	10	10	10	10	14
Maximum Wire Length (Ft)*	75	89	82	115	116	88	137	272
Cooling Capacity (Btuh)†	17,800	23,800	24,000	29,600	29,600	36,000	36,000	36,000
Rated Cooling Airflow (Ft³/Min)†	630	800	800	1000	1000	1200	1200	
External Static Pressure (In. wc)†	0.10	0.10	0.10	0.15	0.15	0.15	0.15	
ARI Sound Rating‡	8.0	8.0	8.0	8.0	8.0	8.0	8.0	
Rated Heating Input (Btuh)	40,000	40,000	75,000	40,000	75,000	60,000	60,000	
Output Capacity (Btuh)**	32,000	32,000	58,000	32,000	58,000	47,000	45,000	
AFUE (%)**	75	75	75	75	75	75	—	
Rated Heating Airflow (Ft³/Min)	505	505	947	462	947	758	758	
Recommended Minimum Field-Supplied Filter Size (Sq In.)††								
Disposable-Type	302	384	454	480	480	576		
Cleanable- or High-Capacity Type	202	257	303	320	320	384		

(Applicable notes are listed below Table IV.)

TABLE II—SPECIFICATIONS—MODELS 585H & J (SIZES 036100 THRU 042125)

MODEL	585H	585H	585J	585J	585H	585H	585J	585J
SIZE	J036100	P036100	J036125	P036125	J042060	P042060	J042125	P042125
SERIES	B	B	B	B	B	B	B	B
Unit Volts—Phase (60 Hz)	208-230—1	208/230—3	208-230—1	208/230—3	208-230—1	208/230—3	208-230—1	208/230—3
Operating Voltage Range	197—253	187—253	197—253	187—253	197—253	187—253	197—253	187—253
Unit Full Load Amps	22.2	18.1	22.2	18.1	28.8	21.9	28.6	21.3
Maximum Fuse Size (Amps)	40	25	40	25	50	35	50	35
Minimum Ampacity for Wire Sizing	26.6	21.1	26.6	21.0	34.8	25.8	34.6	25.2
Minimum Wire Size (75°C Copper)*	10	10	10	10	8	10	8	10
Maximum Wire Length (Ft)*	92	130	92	130	113	108	114	111
Cooling Capacity (Btuh)†	36,400		36,400		42,000		42,000	
Rated Cooling Airflow (Ft³/Min)†	1200		1200		1400		1400	
External Static Pressure (In. wc)†	0.15		0.15		0.15		0.15	
ARI Sound Rating‡	8.0		8.0		8.0		8.0	
Rated Heating Input (Btuh)**	100,000	100,000	125,000	125,000	60,000	60,000	125,000	125,000
Output Capacity (Btuh)**	79,000	75,000	97,000	93,750	47,000	45,000	97,000	93,750
AFUE (%) **	75	—	75	—	75	—	75	—
Rated Heating Airflow (Ft³/Min)	1155	1155	1445	1445	695	695	1445	1445
Recommended Minimum Field-Supplied Filter Size††								
Disposable-Type	576		694		672		694	
Cleanable- or High-Capacity Type	384		462		448		462	

(Applicable notes listed below Table IV.)

TABLE III—SPECIFICATIONS—MODELS 585H & J (SIZES 048080 & 048125)

MODEL	585H	585H	585H	585J	585J
SIZE	J048080	P048080	E048080	J048125	P048125
SERIES	B	B	B	B	B
Unit Volts—Phase (60 Hz)	208-230—1	208/230—3	460—3	208-230—1	208/230—3
Operating Voltage Range	197—253	187—253	414—506	197—253	187—253
Unit Full Load Amps	30.1	24.7	11.5	29.3	22.7
Maximum Fuse Size (Amps)	50	35	20	50	35
Minimum Ampacity for Wire Sizing	36.1	28.4	13.3	35.3	26.4
Minimum Wire Size (75°C Copper)*	8	10	14	8	10
Maximum Wire Length (Ft)*	108	96	180	111	104
Cooling Capacity (Btuh)†	49,000			49,000	
Rated Cooling Airflow (Ft³/Min)†	1600			1600	
External Static Pressure (In. wc)†	0.2			0.2	
ARI Sound Rating‡	8.4			8.4	
Rated Heating Input (Btuh)	80,000	80,000		125,000	125,000
Output Capacity (Btuh)**	63,000	60,000		97,000	93,750
AFUE (%)**	75	—		75	—
Rated Heating Airflow (Ft³/Min)	925	925		1445	1445
Recommended Minimum Field-Supplied Filter Size††					
Disposable-Type	768	768		768	768
Cleanable- or High-Capacity Type	512	512		512	512

(Applicable notes are listed below Table IV.)

TABLE IV—SPECIFICATIONS—MODELS 585H & J (SIZES 060100 & 060150) & MODEL 579J (SIZE 060125)

MODEL	585H	585H	585H	585J	585J	579J	579J
SIZE	B060100	P060100	E060100	B060150	P060150	P060125	E060125
SERIES	B	B	B	B	B	B	B
Unit Volts—Phase (60 Hz)	230—1	208/230—3	460—3	230—1	208/230—3	208/230—3	460—3
Operating Voltage Range	207—253	187—253	414—506	207—253	187—253	187—253	414—506
Unit Full Load Amps	35.9	30.7	15.3	36.2	29.7	28.5	14.3
Maximum Fuse Size (Amps)	60	50	25	60	50	50	25
Minimum Ampacity for Wire Sizing	42.9	35.9	17.9	43.2	34.9	33.7	16.9
Minimum Wire Size (75°C Copper)*	8	8	12	8	8	8	12
Maximum Wire Length (Ft)*	100	122	214	99	126	132	229
Cooling Capacity (Btuh)†	60,000			60,000		60,000	
Rated Cooling Airflow (Ft^3/Min)†	2000			2000		2000	
External Static Pressure (In. wc)†	0.2			0.2		0.2	
ARI Sound Rating‡	8.4			8.4		8.4	
Rated Heating Input (Btuh)	100,000	100,000		150,000	150,000	125,000	
Output Capacity (Btuh)**	79,000	75,000		116,000	112,500	93,750	
AFUE (%)**	75	—		75	—	—	
Rated Heating Airflow (Ft^3/Min)	1155	1155		1735	1735	1445	
Recommended Minimum Field-Supplied Filter Size††							
Disposable-Type	960	960		960	960	‡‡	
Cleanable- or High-Capacity Type	640	640		640	640	‡‡	

*If other than 75°C copper wire is used, determine size from unit ampacity and the National Electrical Code. Voltage drop of wire must be less than 2% of unit rated voltage. Maximum wire length is for one way along the wire path from unit to service panel.

†Rated in accordance with U.S. Government D.O.E. test procedures and/or ARI Standard 210-81.

‡Rated in accordance with ARI Standard 270-84.

**The capacity ratings of single-phase units are in accordance with U.S. Government D.O.E. test procedures and/or A.G.A. certification requirements. For 3-phase units, the efficiency rating is a product thermal efficiency rating determined under continuous operating conditions, independent of any installed system.

††Required filter areas shown are based on the ARI-rated cooling airflow or the heating airflow at a velocity of 300 ft/min for disposable type (450 ft/min for high-capacity type), depending on whichever is larger. Air filter pressure drop must not exceed 0.08 in. wc.

‡‡Model 579J units are furnished with two permanent (cleanable) air filters (20 x 16 x 1).

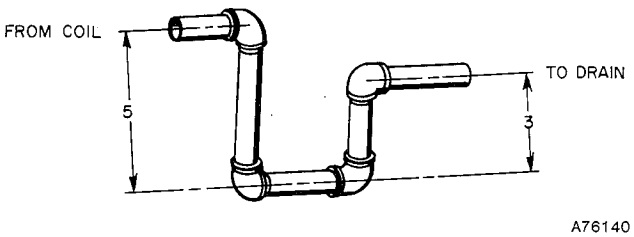


Figure 6—Condensate Trap

of blower motor shipping brace, then discard brace and screws.

6. Position filter support so that bottom of support provides an upper filter channel for filter channel on plenum section base, then proceed as follows:
   a. Slip end of support onto top of vertical filter support on far side of plenum section.
   b. Line-up hole in near end of support with hole provided in plenum section casing and secure support in place, using screw provided.
   c. Slip two air filters into vertical and diagonal positions created by installation of filter support. Be sure that airflow arrows on filters point toward blower compartment.
7. Replace filter access door.

II. CONDENSATE DISPOSAL

NOTE: Ensure that condensate-water disposal methods comply with local codes, restrictions, and practices.

Models 585H, 585J, and 579J dispose of condensate water through a 3/4-inch MPT drain fitting. See Figure 2 or 3 for location.

Install a 3-inch trap at the drain fitting to ensure proper drainage. See Figure 6. Make sure that the outlet of the trap is at least 2 inches lower than the unit drain pan connection to prevent the pan from overflowing. Prime the trap with water.

If the installation requires draining the condensate water away from the unit, connect a drain tube using a minimum of 7/8-inch OD copper tubing, 3/4-inch galvanized pipe, or 7/8-inch plastic pipe. *Do not undersize the tube.* Pitch the drain tube downward at a slope of at least 1 inch in every 10 feet of horizontal run. Be sure to check the drain tube for leaks.

Condensate water can be drained directly onto the roof in rooftop installations (where permitted) or onto a gravel apron in ground-level installations. When using a gravel apron, make sure it slopes away from the unit.

III. VENTING

The vent-cap, combustion-air shroud, and flue assembly are shipped in either the blower or control compartment. The vent screen is taped to the blower housing. Remove the access doors to locate the assemblies. See Figure 2 or 3 for door locations.

CAUTION: The venting system is designed to ensure proper venting. The vent-cap assembly must be installed as indicated in this section of the unit Installation Instructions.

NOTE: Screw holes in the flue assembly and the unit top are *not* symmetrically located; thereby, ensuring proper orientation when installing these components.

Refer to Figure 7 and install the vent cap as follows:

1. Place combustion-air shroud over combustion-air opening in unit top, and line up screw holes in shroud with holes in top. Secure shroud to top, using screws with rubber washers (provided).
2. The flue gasket is shipped in the literature assembly envelope. Place gasket and flue assembly through hole in combustion-air shroud, orient screw holes in base of flue assembly with holes in unit top, and secure gasket and flue assembly to unit top, using screws provided.

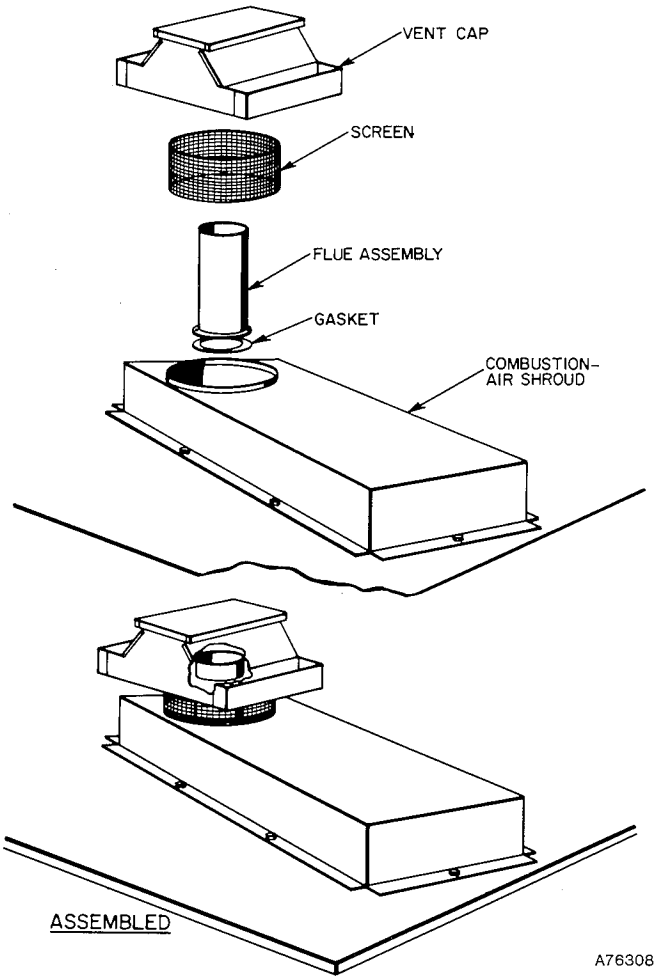


Figure 7—Vent Cap Assembly

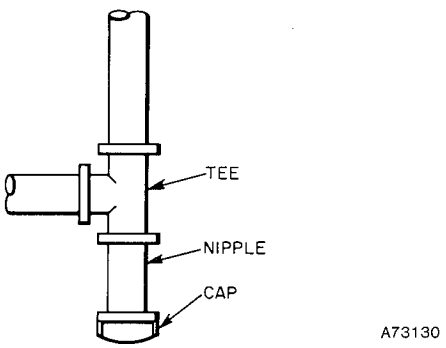


Figure 8—Sediment Trap

3. Place vent cap onto flue assembly, orient screw holes in vent cap with holes in flue, and secure vent cap in place, using screws provided.
4. Form flat wire screen (provided) into circular shape around protruding lip of combustion-air shroud, and bend wire ends through holes of screen mesh to secure screen in place.

IV. GAS PIPING

A manual shutoff is shipped loose in the burner compartment or blower compartment. Connect one end of a field-supplied 1/2-inch straight nipple to the gas valve inlet. Connect the other end of the nipple to the manual shutoff as shown in Figure 9.

The gas supply pipe enters the unit through the access hole provided. See Figure 2 or 3 for location. The gas connection to the unit is made to the 1/2-inch FPT gas inlet on the manual shutoff. See Figure 9 for inlet location.

Install a separate gas supply line that runs directly from the meter to the heating section. *Do not use cast-iron pipe.* Check the local utility for recommendations concerning existing lines. Choose a supply pipe that is large enough to keep the pressure loss as low as practical. *Never use pipe smaller than the 1/2-inch FPT gas inlet on the unit manual shutoff.*

When installing the gas supply line, observe local codes pertaining to gas pipe installations. Refer to the National Fuel Gas Code ANSI Z223.1-1984 or NFPA 54-1984 in the absence of local building codes. Adhere to the following pertinent recommendations:

1. Avoid low spots in long runs of pipe. Grade all pipe 1/4-inch in every 15 feet to prevent traps. Grade all horizontal runs downward to risers. Use risers to connect to heating section and to meter.
2. Protect all segments of piping system against physical and thermal damage. Support all piping with appropriate straps, hangers, etc. Use a minimum of one hanger every 6 feet. For pipe sizes larger than 1/2 inch, follow recommendations of national codes.
3. Apply joint compound (pipe dope) sparingly and only to male threads of joint when making pipe connections. Use only pipe dope that is resistant to action of liquefied petroleum gases as specified by local and/or national codes. *Never use teflon tape.*
4. Install sediment trap in riser leading to heating section. This drip leg functions as a trap for dirt and condensate. Install trap where condensate can not freeze. Install this sediment trap by connecting a piping tee to riser leading to heating section, so that straight-through section of tee is vertical. See Figure 8. Then, connect capped nipple into lower end of tee. Extend capped nipple below level of gas controls.
5. Install an accessible, external, manual main shut-off valve in gas supply pipe within 6 feet of heating section.

NOTE: The unit manual shutoff has a 1/8-inch tapping on the outlet side of this shutoff for measuring gas input pressure.

6. Install ground-joint union close to heating section between unit manual shutoff and external manual main shut-off valve.
7. Pressure-test all gas piping in accordance with local and national plumbing and gas codes before connecting piping to unit.

NOTE: When pressure testing the gas supply system *after* the gas supply piping has been connected to the unit gas valve, the supply piping must be disconnected from the gas valve during any pressure testing of the piping systems at test pressure in excess of 0.5 psig. When pressure testing the gas supply piping system at test pressures equal to or less than 0.5 psig, the unit heating section must be isolated from the gas piping system by closing the external main manual shut-off valve and slightly opening the ground-joint union.

CAUTION: Unstable operation may occur, particularly under high-wind conditions, when the gas valve and manifold assembly are forced out of position while connecting improperly routed rigid gas piping to the gas valve. Use a backup wrench when making connection to avoid strain on, or distortion of, the gas control piping.

CAUTION: If a flexible conductor is required or allowed by the authority having jurisdiction, black iron pipe shall be installed at the gas valve and extend a minimum of 2 inches outside the furnace casing.

WARNING: Never use a match or other open flame when checking for gas leaks.

8. Check for gas leaks at all field-installed and factory-installed gas lines after all piping connections have been completed. Use soap-and-water solution (or method specified by local codes and/or regulations).

V. DUCT CONNECTIONS

Models 585H & 585J have duct flanges on the supply- and return-air openings on the side of the unit. See Figure 2 for connection sizes and locations.

Model 579J has duct flanges on the supply- and return-air openings on the bottom of the unit. See Figure 3 for connection sizes and locations.

WARNING: The design and installation of the duct system must be in accordance with the standards of the National Fire Protection Association for installation of nonresidence-type air conditioning and ventilating systems, NFPA No. 90 or residence-type, NFPA No. 90B; and/or local codes and ordinances.

Adhere to the following criteria when selecting, sizing, and installing the duct system:

1. Select and size ductwork, supply-air registers, and return-air grilles according to ASHRAE recommendations and as presented in BDP training materials.

CAUTION: When the duct-system fastening holes are being drilled into side of Model 585H or 585J instead of the unit duct flanges, use extreme care to avoid puncturing the coil or coil tubes.

2. Use flexible transition between rigid ductwork and unit to prevent transmission of vibration. The transition may be screwed or bolted to duct flanges. Use suitable gaskets to ensure weather and airtight seal.
3. Install external, field-supplied air filter(s) in return-air ductwork where it is easily accessible for service. Recommended filter sizes are shown in Tables I thru IV. [Model 579J has factory-supplied permanent (washable) air filters.]
4. Size all ductwork for maximum required airflow (either heating or cooling) for unit being installed. Avoid abrupt duct size increases or decreases.
5. Adequately insulate and weatherproof all ductwork located outdoors. Insulate ducts passing thru unconditioned space, and use vapor barrier in accordance with latest issue of SMACNA and NESCA minimum installation standards for heating and air conditioning systems. Secure all ducts to building structure.
6. Flash, weatherproof, and vibration-isolate all openings in building structure in accordance with local codes and good building practices.

VI. ELECTRICAL CONNECTIONS

WARNING: The unit cabinet must have an uninterrupted, unbroken, electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to the unit ground lug in the control compartment, or conduit approved for electrical ground when installed in accordance with the National Electrical Code ANSI/NFPA 70-1984 and local electrical codes. *Do not use gas piping as an electrical ground.* A failure to follow this warning could result in the installer being liable for the personal injury of others.

CAUTION: A failure to follow these precautions could result in damage to the unit being installed.

1. Make all electrical connections in accordance with National Electrical Code ANSI/NFPA 70-1984 and local electrical codes governing such wiring.
2. Use only *copper* conductor for connections between field-supplied electrical disconnect switch and unit. DO NOT USE ALUMINUM WIRE.
3. Ensure that high-voltage power to unit is within operating voltage range indicated on unit rating plate. On 3-phase units, ensure that phases are balanced within 2%. Consult local power company for correction of improper voltage and/or phase balance.
4. Insulate low-voltage wires for highest voltage contained within conduit when low-voltage control wires are run in same conduit as high-voltage wires.
5. Do not damage internal components when drilling thru any panel to mount electrical hardware, conduit, etc.

A. High-Voltage Connections

The unit must have a separate electrical service with a field-supplied, waterproof, fused disconnect switch mounted at, or within sight of, the unit. Refer to the unit rating plate for maximum fuse size and minimum circuit amps (ampacity) for wire sizing. Tables I thru IV show recommended wire sizes and lengths based on rating plate data.

The field-supplied disconnect switch box may be mounted on the unit over the high-voltage inlet hole in the control corner panel. See Figure 2 or 3.

WARNING: Label P/N A-7419IB, which is shipped loose in bag of parts, *must be affixed* to the disconnect switch box. This label states: "DO NOT DISCONNECT THE ELECTRICAL POWER TO THIS APPLIANCE WITHOUT FIRST TURNING OFF THE GAS SUPPLY."

Proceed as follows to complete the high-voltage connections to the unit:

1. Connect ground lead to chassis ground connection when using separate ground wire.
2. Run high-voltage leads into unit control box and connect to contactor. See unit wiring label, and Figures 9 and 10.

NOTE: On 3-phase units, connect the third high-voltage lead to the brown high-voltage pigtail lead. See unit wiring label and Figure 10.

B. Special Procedures for 208-V Operation

WARNING: Make sure that the power supply to the unit is switched OFF before making any wiring changes.

For operation on 208 volts, disconnect the orange transformer-primary lead from the contactor. See the unit wiring label and Figure 9. Remove the tape and cover from the terminal on the end of the red transformer-primary lead. Save the cover. Connect the red lead to the contactor terminal from which the orange lead was disconnected.

Using the cover removed from the red lead, insulate the loose terminal on the orange lead. Wrap the cover with electrical tape so that the metal terminal can not be seen.

NOTE: For some 585H and 585J units, the factory-wired blower-motor speed connections may require changing for 208-V operation to ensure adequate airflow at the rated

external static pressure. See Tables VI, VII, VII, and the unit wiring label. Insulate all unused motor leads following the same procedures described for the transformer leads.

C. Low-Voltage Connections

For manual system changeover, use thermostat and subbase P/N P271-3496. For automatic and/or manual system changeover, use thermostat P/N P272-2781 with subbase P/ N P272-1882.

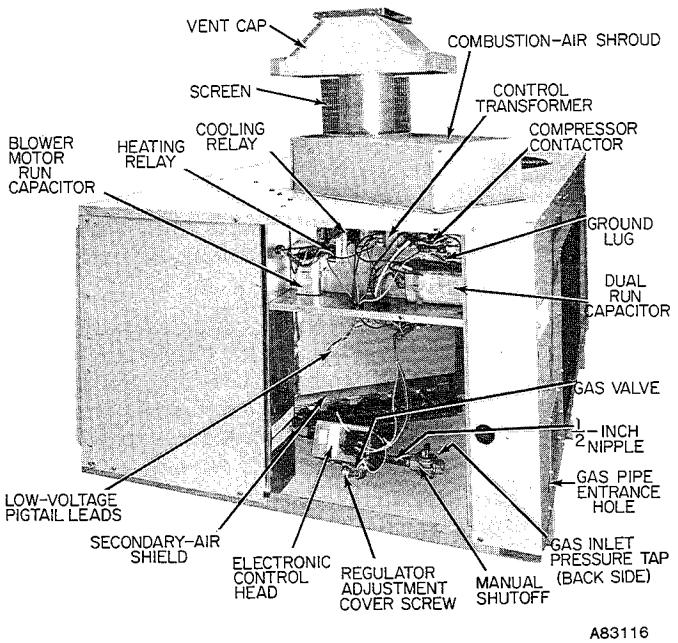


Figure 9—
Partial Side View With Access Doors Removed
(Model 585H036060, 208-230V—1Ø)

Locate the room thermostat on an inside wall in the space to be conditioned where it will not be subjected to either a cooling or heating source, or direct exposure to sunlight. Mount the thermostat 4 to 5 feet above the floor.

Use No. 18 AWG color-coded, insulated (35°C minimum) wires to make the low-voltage connections between the thermostat and the unit. If the thermostat is located more than 100 feet from the unit (as measured along the low-voltage wires), use No. 16 AWG color-coded, insulated (35°C minimum) wires.

A grommeted, low-voltage inlet hole is located in the panel adjacent to the control access panel. See Figure 2 or 3. Run the low-voltage leads from the thermostat, thru the inlet hole, and to the low-voltage flagged pigtail leads that run through a hole in the bottom of the unit control box. See Figure 9. Connect the thermostat leads to the pigtail leads as shown in Figure 10.

D. Heat Anticipator Setting

The room thermostat heat anticipator must be properly adjusted to ensure proper heating performance. Set the heat anticipator, using an ammeter to determine the exact required setting as explained in BDP training materials.

NOTE: For thermostat selection purposes, use 1.0 amps for the approximate required setting.

Failure to make a proper heat anticipator adjustment will result in improper operation, discomfort to the occupants of the conditioned space, and inefficient energy utilization; however, the required setting may be changed slightly to provide a greater degree of comfort for a particular installation.

VII. PREPARING UNIT FOR STARTUP

WARNING/DANGER: Failure to observe the following warnings could result in serious personal injury:

1. Follow recognized safety practices and wear protective goggles when checking or servicing refrigerant system.
2. Do not operate compressor or provide any electric

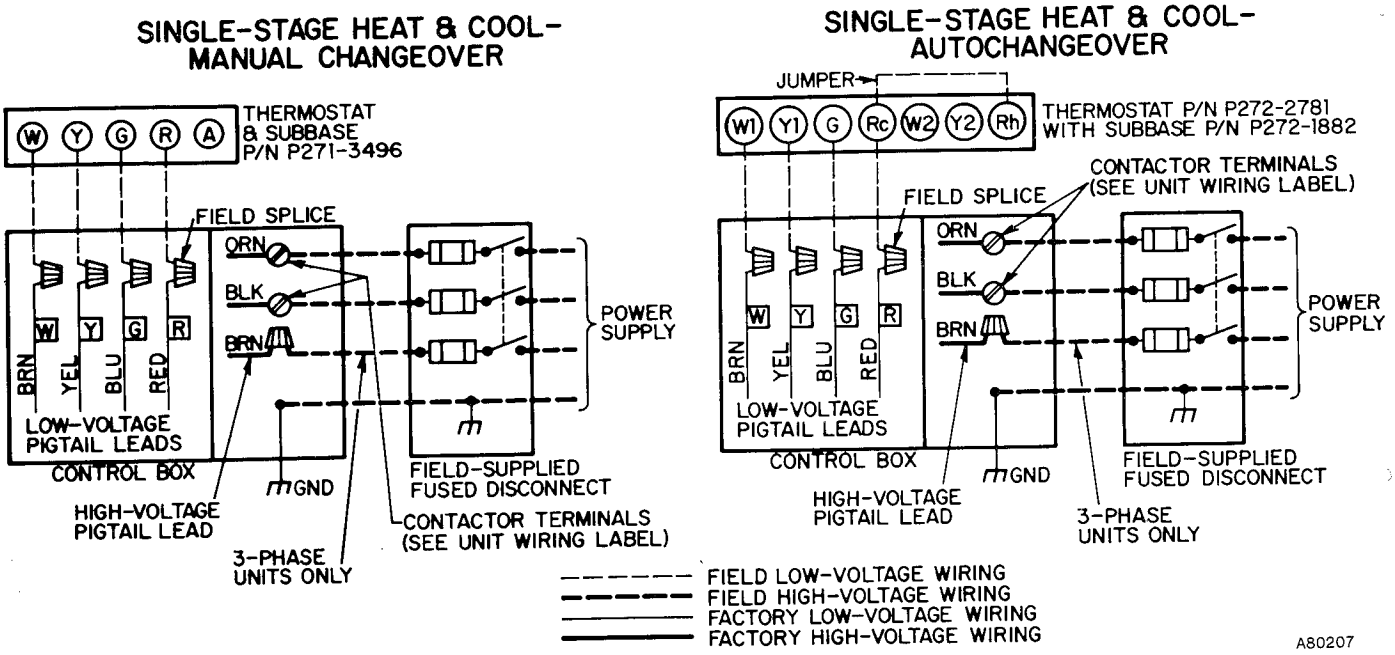


Figure 10—High- & Low-Voltage Connections

power to unit unless compressor terminal cover is in place and secured.

3. Do not remove compressor terminal cover until all electrical sources have been disconnected.
4. Relieve all pressure from system before touching or disturbing anything inside terminal box if refrigerant leak is suspected around compressor terminals.
5. Never attempt to repair soldered connection while refrigerant system is under pressure.
6. Do not use torch to remove any component. System contains oil and refrigerant under pressure. To remove a component, wear protective goggles and proceed as follows:
   a. Shut off gas supply and *then* electrical power to unit.
   b. Relieve all pressure from system.
   c. Cut component connecting tubing with tubing cutter and remove component from unit.
   d. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

A. Prestartup Procedures

Proceed as follows to inspect and prepare the unit for initial startup:

1. Remove all access panels.
2. Read and follow instructions on all WARNING, CAUTION, and INFORMATION labels attached to, or shipped with, unit.
3. Make the following inspections:
   a. Inspect for shipping and handling damages such as broken lines, loose parts, disconnected wires, etc.
   b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using electronic leak detector, halide torch, or liquid-soap solution. If refrigerant leak is detected, see "Refrigerant Leaks" in the next part of this section.
   c. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight.
   d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following conditions:

WARNING: Do not purge gas supply into the combustion chamber. Do not use a match or other open flame to check for gas leaks.

   a. Make sure that gas supply has been purged, and that all gas piping has been checked for leaks.
   b. Make sure that outdoor fan blade is correctly positioned in fan orifice. *Blades should clear fan motor by no more than 1/4 inch.*
   c. Make sure that air filter(s) is in place.
   d. Make sure that condensate drain pan is filled with water to ensure proper drainage.
   e. Make sure that all tools and miscellaneous loose parts have been removed.

Unit is now ready for initial startup.

NOTE: Model 579J060125 is equipped with a 3-phase blower motor. Check blower wheel for correct rotation as indicated by arrow on blower housing. If blower wheel rotates in opposite direction, reverse any two blower motor leads or any two line voltage leads. Recheck blower wheel rotation if necessary to reverse leads.

B. Refrigerant Leaks

Proceed as follows to repair a refrigerant leak and to charge the unit:

1. Locate leak and ensure that refrigerant system pressure has been relieved.
2. Repair leak following accepted practices.

NOTE: Install a filter-drier whenever the system has been opened for repair.

3. Add a small charge of R-22 refrigerant vapor to system and leak-test unit.
4. Evacuate refrigerant system if additional leaks are not found.
5. Charge unit with R-22 refrigerant, using a volumetric-charging cylinder or accurate scale. *Refer to unit rating plate for required charge.* Be sure to add extra refrigerant to compensate for internal volume of filter-drier.

NOTE: See Section IX, part B for checking and adjusting refrigerant charge.

VIII. HEATING SECTION STARTUP AND ADJUSTMENTS

CAUTION: Complete the required procedures given in Section VII, "Preparing Unit for Startup," before starting the unit.

Do not jumper any safety devices when operating the unit.

Ensure that burner orifices are properly aligned. Unstable operation may occur when the burner orifices in the manifold are misaligned. To ensure correct burner orifice alignment, check the orifice angle with a machinist's protractor or other suitable device. The orifice angle must be from horizontal to 3 degrees down, as measured from the unit base.

Follow the instructions on the heating section operation label (located in the unit near the gas valve) to start the heating section.

A. Checking Heating Control Operation

Start and check the unit for proper heating control operation as follows:

Place the room thermostat SYSTEM switch in the HEAT position and the FAN switch in the AUTO position. Set the heating temperature control of the thermostat above room temperature. Observe that after built-in time delays, the pilot automatically lights, the burners light, and the blower motor starts. Observe that the burners and pilot go out, and that after a built-in delay the blower motor stops when the heating control setting of the thermostat is satisfied.

B. Gas Input

CAUTION: These units are designed to consume the rated gas inputs using the fixed orifices at specified manifold pressures as shown in Table V. DO NOT REDRILL THE ORIFICES UNDER ANY CIRCUMSTANCES.

The rated gas inputs shown in Table V are for altitudes from sea level up to 2000 feet above sea level. These inputs are based on natural gas with a heating value of 1050 Btu/ft^3 at 0.65 specific gravity, or LP (propane) gas with a heating value of 2500 Btu/ft^3 at 1.5 specific gravity. For elevations above 2000 feet, reduce input 4% for each 1000 feet above sea level. When the gas supply being used has a different heating value or specific gravity, refer to BDP training manuals, national and local codes, or contact your BDP Distributor or Branch to determine the required orifice size.

C. Adjusting Gas Input

The gas input to the unit is determined by measuring the

gas flow at the meter or by measuring the manifold pressure. Measuring the gas flow at the meter is recommended for natural gas units. The manifold pressure must be measured to determine the input of LP (propane) gas units.

1. Measuring Gas Flow at Meter Method—Natural Gas Units

Minor adjustment can be made by changing the manifold pressure. The manifold pressure must be maintained between 3.2 and 3.8 inches water column. If larger adjustments are required, change main burner orifices following the recommendations of national and local codes.

NOTE: All other appliances that use the same meter must be turned off when gas flow is measured at the meter.

Proceed as follows:

a. Turn off gas supply to unit.
b. Remove pipe plug on bottom of gas valve, then connect water manometer at this point. Turn on gas to unit.
c. Record number of seconds for gas meter test dial to make one revolution.
d. Divide number of seconds in step c into 3600 (number of seconds in 1 hour).
e. Multiply result of step d by the number of cubic feet shown for one revolution of test dial to obtain cubic feet of gas flow per hour.
f. Multiply result of step e by Btu heating value of gas to obtain total measured input in Btuh. Compare this value with heating input shown in Table V. (Consult the local gas supplier if the heating value of gas is not known.)

Example: Assume that the size of test dial is 1 cubic foot, one revolution takes 30 seconds, and the heating value of the gas is 1050 Btu/ft^3, then proceed as follows:

a. 30 seconds to complete one revolution.
b. 30 divided into 3600 equals 120.
c. 120 times 1 equals 120 cubic feet of gas flow per hour.
d. 120 times 1050 equals 126,000-Btuh input.

If the desired gas input is 125,000 Btuh, only a minor change in the manifold pressure is required.

Observe manifold pressure and proceed as follows to adjust gas input:

a. Remove cover screw over regulator adjustment screw on gas valve.
b. Turn regulator adjustment screw clockwise to increase gas input, or turn regulator adjustment screw counterclockwise to decrease input. Manifold pressure must be between 3.2 and 3.8 inches wc. UNSAFE OPERATION OF THE UNIT MAY RESULT IF MANIFOLD PRESSURE IS OUTSIDE THIS RANGE.
c. Replace cover screw cap on gas valve.
d. Turn off gas supply to unit. Remove manometer from pressure tap. Replace pipe plug on gas valve. Turn on gas to unit. Check for leaks.

2. Measuring Manifold Pressure—LP (Propane) Gas Units

The main burner orifices on a propane gas unit are sized for the unit rated input when the manifold pressure is 10.5 inches water column.

Proceed as follows to adjust gas input on an LP (propane) gas unit:

a. Turn off gas to unit.
b. Remove pipe plug on bottom of gas valve identified as PRESS. TAP, then connect manometer at this point.
c. Turn on gas to unit.
d. Remove cover screw over REG ADJ screw on gas valve.
e. Adjust regulator adjustment screw for a manifold pressure reading of 10.5 inches water column. Turn adjusting screw clockwise to increase manifold pressure, or turn adjusting screw counterclockwise to decrease manifold pressure.
f. Replace cover screw.
g. Turn off gas to unit. Remove manometer from pressure tap. Replace pipe plug on gas valve, then turn on gas to unit. Check for leaks.

D. Adjusting Burner Air Shutters

After the burners have operated at full input for at least 10 minutes, adjust the primary air to each burner to ensure optimum heating performance. Make these adjustments when the unit is being installed and during routine maintenance inspections at the beginning of each heating season. *Be sure that each burner is clean and free of deposits before adjusting the primary air.*

TABLE V—RATED GAS INPUTS AT INDICATED MANIFOLD PRESSURES

Model No.	Number of Orifices	Gas Supply Pressure (In. wc) Natural Min	Natural Max	Propane Min	Propane Max	Manifold Pressure (In. wc) Natural	Manifold Pressure (In. wc) LP (Prop.)	Natural Gas Orifice P/N	Natural Gas Heating Input (Btuh)*	LP (Propane) Gas Orifice P/N	LP (Propane) Gas Heating Input (Btuh)*
585HJ018040, 585HJ024040, & 585HJ030040	2	5.0	13.6	11.0	13.0	3.5	10.5	55365-45	40,000	55365-55	40,000†
585HJ036060, 585HJ042060	3	5.0	13.6	11.0	13.0	3.5	10.5	55365-45	60,000	55365-55	60,000†
585HP036060, 585HE036060, & 585HP042060	3	5.0	13.6	11.0	13.0	3.5	10.5	55365-45	60,000	55365-55	60,000
585JJ024075 & 585JJ030075	3	5.0	13.6	11.0	13.0	3.5	10.5	55365-42	75,000	55365-53	75,000
585HJ048080	4	5.0	13.6	11.0	13.0	3.5	10.5	55365-45	80,000	55365-55	80,000†
585HP048080 & 585HE048080	4	5.0	13.6	11.0	13.0	3.5	10.5	55365-45	80,000	55365-55	80,000
585HJ036100 & 585HB060100	5	5.0	13.6	11.0	13.0	3.5	10.5	55365-45	100,000	55365-55	100,000†
585HP036100, 585HP060100, 585HE060100	5	5.0	13.6	11.0	13.0	3.5	10.5	55365-45	100,000	55365-55	100,000
585JJ036125 & 585JP042125 585JJ042125, 585JP042125, 585JJ048125, 585JP048125, 579JP060125 & 579JE060125	5	5.0	13.6	11.0	13.0	3.5	10.5	55365-42	125,000	55365-53	125,000
585JB060150 & 585JP060125	6	5.0	13.6	11.0	13.6	3.5	10.5	55365-42	150,000	55365-53	150,000

*Based on altitudes from sea level up to 2000 feet above sea level. For altitudes above 2000 feet, reduce input rating 4% for each 1000 feet above sea level.

†When a 585H is converted to propane, all the No_x burners must be modified. See kit instructions.

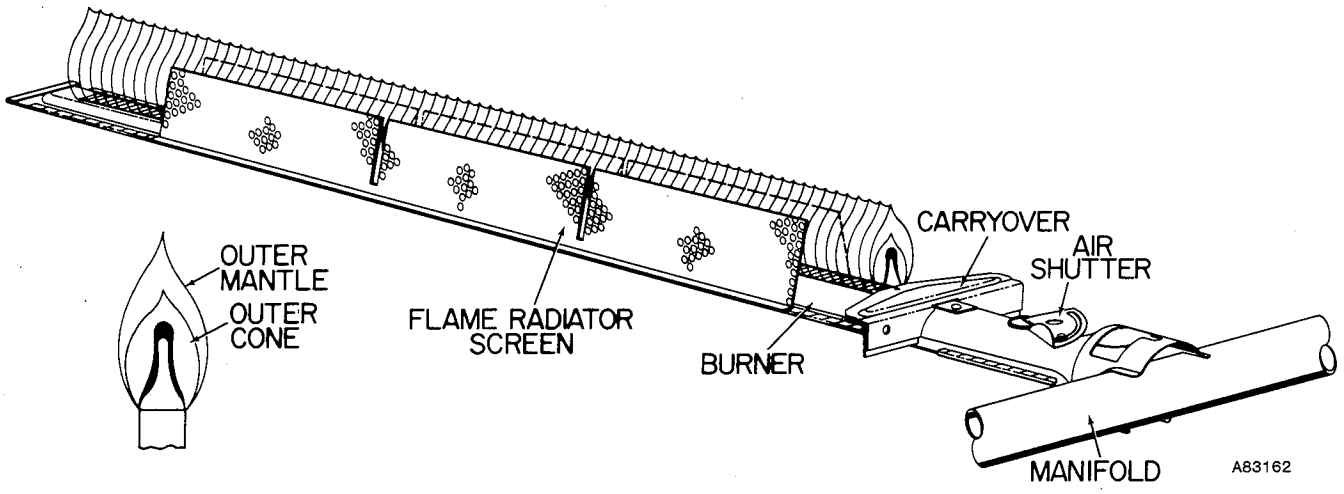


Figure 11A—Burner Flames—Model 585H

The primary air to each burner is regulated by the burner air shutter on each burner. See Figures 11A & 11B for the 1 location of the burner air shutter. With all burners operating, adjust the primary air to each burner as follows:

1. Loosen locking screw that secures air shutter in place on burner, then partially close air shutter until a slight yellow tip appears on top of burner flames.
2. Open air shutter *very slowly* until yellow tip just disappears, then secure air shutter in place with locking screw.
3. Repeat steps 1 and 2 for each burner.

After the air shutter adjustments have been completed, observe that the flames on each burner are light blue and "soft" in appearance, and that the flames are the same height along the entire length of each burner. See Figures 11A & 11B.

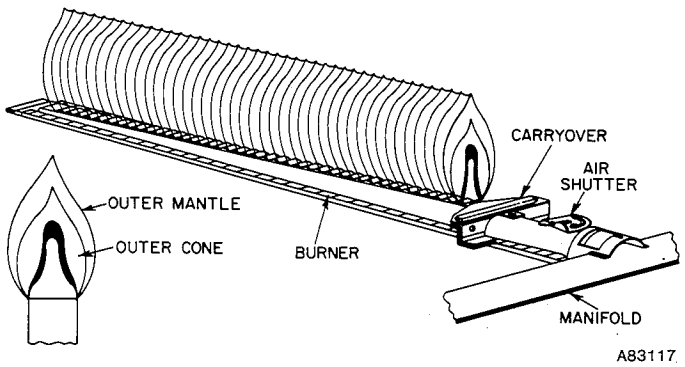


Figure 11B—Burner Flames—Models 585J & 579J

E. Blower Heat-Relay Operation

Heat relay 2G (See Figure 9 and the unit wiring diagram.) is located in the control box and adjusts to permit either longer or shorter "off" cycles. The "on" cycle automatically adjusts as the "off" cycle changes. The adjusting lever on the relay is factory-set at the center position to provide optimum performance for most installations. On unusual installations, or where the line voltage is considerably above or below the rated voltage, the length of time the blower remains on may require increasing or decreasing. To increase blower operation time, move the adjusting lever toward the right-hand position. To decrease blower operation time, move the lever toward the left-hand position.

F. Airflow and Temperature Rise

The heating section of each size of unit is designed and approved for heating operation within the temperature rise range stamped on the unit rating plate.

Table VI shows the approved temperature rise range for each unit, and the air delivery (Ft^3/Min) at various temperature rises. The heating operation airflow must produce a temperature rise that falls within the approved range.

Refer to Section IX, part C, of these instructions to adjust heating airflow, when required.

G. Heating Sequence of Operation

Models 585H, 585J, and 579J have an intermittent spark ignition system without a standing flame. When the manual shutoff is opened, gas flows to the gas valve 5F. On a "call for heating" by the thermostat, unit terminal R "makes" to unit terminal W. Pilot valve solenoid PV of gas valve 5F and the spark generator are energized. Gas flows to pilot 6H and the pilot is ignited within 4 seconds. The flame sensor proves the presence of the pilot flame within 0.8 seconds after pilot ignition. The internal switching of the gas valve deenergizes the spark generator, energizes main valve solenoid MV, and also energizes heating delay relay 2G. Gas flows to the main burners and is ignited by the pilot flame. The contacts of the heating relay will close between 60 and 90 seconds after the burners are ignited and blower motor 3D2 will start. The heating cycle is now in normal operation. The unit will continue operating in the heating cycle until the thermostat is satisfied. When this occurs, the thermostat switching removes the 24-volt control circuit voltage from gas valve 5F and heating delay relay 2G. Gas valve 5F will close instantly; however, the contacts of deenergized heating relay 2G will remain closed and keep blower motor 3D2 running for an additional 2 to 3 minutes. The contacts of heating relay 2G open after the 2- to 3-minute delay and blower motor 3D2 stops. The heating section is now in a "standby" condition waiting on another "call for heating" from the thermostat.

NOTE: The ignitor will continue to spark for approximately 10 seconds after the burners are ignited.

H. Limit and Pressure Switches

Furnace limit switch 7H (See Figure 12.) closes the gas valve if the leaving-air temperature exceeds 175°F.

Normally closed limit switch 7H completes the control circuit through pigtail lead W to gas valve 5F. See Figure 12.

TABLE VI—AIR DELIVERY (Ft³/Min) AT INDICATED TEMPERATURE RISE AND RATED HEATING INPUT

Nominal Size	Heating Input (Btuh)	Temperature Rise (°F)†																				
		35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75
018040	40,000	794	751	712	678	646	617	591	567	545	524	505	487	471	455	441	427	–	–	–	–	–
024040	40,000	794	751	712	678	646	617	591	567	545	–	–	–	–	–	–	–	–	–	–	–	–
024075	75,000	–	–	–	–	1212	1158	1109	1063	1022	983	947	914	883	854	827	809	778	–	–	–	
030040	40,000	794	751	712	678	646	617	591	567	545	524	505	487	471	455	–	–	–	–	–	–	–
030075	75,000	–	–	–	1271	1212	1158	1109	1022	983	947	914	883	854	–	–	–	–	–	–	–	
036060	60,000	1190	1126	1068	1016	969	926	887	850	817	786	758	731	706	683	–	–	–	–	–	–	–
036100	100,000	1984	1877	1781	1694	1615	1543	1478	1417	1362	1310	1263	1218	1177	1138	1102	1068	1036	1006	978	951	926
036125	125,000	–	–	–	2117	2109	1930	1848	1771	1701	1638	1579	1523	1472	1423	1378	1336	1296	1268	1223	1189	1158
042060	60,000	1190	1126	1068	1016	969	926	887	850	817	786	758	731	706	683	661	641	622	604	587	571	556
042125	125,000	–	–	–	–	–	1930	1846	1771	1701	1638	1579	1523	1472	1423	1378	1336	1296	1258	1223	1189	1158
048080	80,000	1587	1502	1425	1355	1292	1235	1182	1134	1089	1048	1010	975	942	911	–	–	–	–	–	–	–
048125	125,000	–	–	2326	2117	2019	1930	1846	1771	1702	1638	1579	1523	1472	1423	1378	1336	1296	1258	1223	1189	1158
060100	100,000	1984	1877	1781	1694	1615	1543	1478	1417	1362	1310	1263	1218	1177	1138	1102	–	–	–	–	–	–
060125	125,000	–	–	2326	2117	2019	1930	1846	1771	1702	1638	1579	–	–	–	–	–	–	–	–	–	–
060150	150,000	–	–	–	–	–	2325	2226	2135	2051	1974	1902	1835	1773	1715	1660	1609	1561	1516	1473	1426	1395

NOTE: Shaded areas of the table fall below the approved temperature rise range of the unit. Dashed areas of the table fall beyond the air delivery capability of the unit within the operating voltage range for all voltage options for each size unit.

Should the leaving-air temperature rise to 175°F, the switch opens and the W control circuit "breaks." Any interruption in the W control circuit instantly closes the gas valve and stops gas flow to the burners and pilot. The blower motor continues to run until the time-delay sequence of heat relay 2G is completed.

When the air temperature at the limit switch drops to the low-temperature setting of the limit switch, the switch closes and completes the W control circuit. The electric-spark ignition system cycles and the unit returns to normal heating operation.

I. Blower Safety Switch

Blower safety switch 7J is a temperature-actuated switch and is connected in parallel with the contacts of heat relay 2G. The function of the switch is to activate the blower should the gas valve fail to close when the thermostat is "satisfied." The safety switch is mounted on the blower divider panel. When the temperature at the safety switch reaches approximately 175°F, the switch closes to start the blower. The switch opens when the temperature at the switch drops to approximately 116°F.

IX. COOLING SECTION STARTUP AND ADJUSTMENTS

CAUTION: Complete the required procedures given in Section VII, "Preparing Unit for Startup," before starting the unit.

Do not jumper any safety devices when operating the unit.

Do not operate the compressor when the outdoor temperature is below 55°F (single-phase units) or 40°F (3-phase units).

Do not rapid-cycle the compressor. Allow 5 minutes between "on" cycles to prevent compressor damage.

A. Checking Cooling Control Operation

Start and check the unit for proper cooling control operation as follows:

1. Place room thermostat SYSTEM switch in OFF position. Observe that blower motor starts when FAN switch is placed in ON position and shuts down when FAN switch is placed in AUTO position.
2. Place SYSTEM switch in COOL position and FAN switch in AUTO position. Set cooling control below room temperature. Observe that compressor, condenser fan, and evaporator blower motors start. Observe that cooling cycle shuts down when control setting is satisfied.
3. When using an autochangeover room thermostat, place both SYSTEM and FAN switches in AUTO positions. Observe that unit operates in heating mode when temperature control is set to "call for heating" (above room temperature) and operates in cooling mode when temperature control is set to "call for cooling" (below room temperature).

B. Checking and Adjusting Refrigerant Charge

The refrigerant system is fully charged with R-22 refrigerant, tested, and factory-sealed. For most applications, the factory charge is the correct amount for the best performance; however, this charge may require a slight adjustment to attain rated performance.

NOTE: Adjustment of the refrigerant charge is not required unless the unit is suspected of not having the proper R-22 charge. For all applications, the correct R-22 charge for the best performance is the charge that results in a suction gas superheat of 5°F at the compressor inlet when the unit is operating at the ARI rating conditions of 95°F DB outdoor and 80°F DB/67°F WB indoor.

A superheat charging label is attached to the outside of the compressor access door. The label includes a "Field Superheat Charging Table" and a "Required Suction-Tube (°F)" temperature chart.

An accurate superheat-, thermocouple-, or thermistor-type thermometer, a sling psychrometer, and a gauge manifold are required when using the superheat charging method for evaluating the unit charge. *Do not use mercury or small dial-type thermometers because they are not adequate for this type of measurement.*

CAUTION: When evaluating the refrigerant charge, an indicated adjustment to the specified factory charge must always be very minimal. If a substantial adjustment is indicated, an abnormal condition exists somewhere in the cooling system; such as insufficient airflow across either coil or both coils.

Proceed as follows:

1. Remove caps from low- and high-pressure service fittings. See Figure 2 or 3 for location of entrance for refrigerant pressure gauge hoses.
2. Using hoses with valve core depressors, attach low-and high-pressure gauge hoses to low- and high-pressure service fittings, respectively.
3. Start unit in cooling mode and let unit run until system pressures stabilize.

4. Measure and record following:
   a. Outdoor ambient-air temperature (°F DB).
   b. Evaporator inlet-air temperature (°F WB).
   c. Suction-tube temperature (°F) at low-side service fitting.
   d. Suction (low-side) pressure (PSIG).
5. Using "Field Superheat Charging Table," compare outdoor-air temperature (°F DB) with evaporator inlet-air temperature (°F WB) to determine desired system operating superheat temperature.
6. Next, using "Required Suction-Tube (°F)" table, compare desired superheat temperature with suction (low-side) operating pressure (PSIG) to determine proper suction-tube temperature.
7. Compare actual suction-tube temperature with proper suction-tube temperature. Using a tolerance of ± 3°F, add refrigerant if actual temperature is more than 3°F higher than proper suction-tube temperature, or remove refrigerant if actual temperature is more than 3°F lower than required suction-tube temperature.

NOTE: If the problem causing the inaccurate readings is a refrigerant leak, see Section VII, part B, of these instructions.

C. Indoor Airflow and Airflow Adjustments

CAUTION: For cooling operation, the recommended airflow is 350 to 450 ft³/min per each 12,000 Btuh of rated cooling capacity. For heating operation, the airflow must produce a temperature rise that falls within the range stamped on the unit rating plate.

Models 585H & J end-discharge units have direct-drive blower motors. All motors are factory-connected to deliver the proper heating and cooling airflows at normal external static pressures (except for some 208-V applications). Model 579J bottom-discharge units have belt-drive blower motors which have the motor pulley factory-set at two turns open.

Table VI shows the temperature rise at various airflow rates. Tables VII and VIII show both heating and cooling airflows at various external static pressures for Models 585H & J direct-drive units. Table IX shows the airflows for Model 579J belt-drive units at various external static pressures and motor pulley settings. Refer to these tables to determine the airflow for the system being installed. See Tables I thru IV for the rated heating and cooling airflows.

NOTE: Be sure that all supply- and return-air grilles are open, free from obstructions, and adjusted properly.

WARNING: Disconnect electrical power to the unit before changing blower speed. (Be sure to turn off gas supply *before* disconnecting electrical power.)

NOTE: When operating the 208/230-volt, 3-phase versions of Models 585J sizes 048125 and 060150 at 208 volts; the lead connections of the blower motor must be changed as indicated on the unit wiring label to insure proper airflow.

CAUTION: Do not change the blower-motor lead connections on 460-V units from the factory setting.

The heating and/or cooling airflow of 208/230-V direct-drive blower motors can be changed by changing the lead connections of the blower motor. The motor leads are color-coded as follows:

black = high speed
blue = medium speed
red = low speed

NOTE: Some direct-drive blower motors do not have the lead for medium speed. Factory connections and available optional connections are shown in Tables VII and VIII.

For all direct-drive units, the motor lead connected to heat relay 2G determines the heating speed and resulting airflow; and the motor lead connected to cooling relay 2C (2F on 460-V units) determines the cooling speed and resulting airflow. See the unit wiring label.

To change the heating and/or cooling speed of a direct-drive motor, connect the appropriate color-coded lead to the appropriate relay. Be sure to properly insulate any unused motor lead. See Section VI, part B, for the proper procedures to insulate an unused electrical lead.

When installing a 208- or 230-V direct-drive unit that is factory-connected for heating and cooling speeds that are not the same, and the same speed for both heating and cooling is required for a particular application, connect the appropriate color-coded lead to terminal 2 of cooling relay 2C and connect a field-supplied jumper between heat relay 2G and terminal 2 of cooling relay 2C. Be sure to properly insulate the unused motor lead(s).

The system airflow for Model 579J belt-drive units can be changed from the factory setting (two turns open), when necessary, by adjusting the blower motor pulley as follows:

CAUTION: Increasing the blower speed places a heavier load on the motor. Do not exceed the blower motor service factor amperage. The motor service factor amperage is equal to the motor full load amps times the motor service factor.

1. Turn off gas supply, then disconnect electrical power to unit.
2. Relieve belt tension, then remove drive belt from motor pulley.
3. Loosen setscrew in movable flange on motor pulley and turn flange *in to increase airflow* or *out to decrease airflow.* (Pulley can only be adjusted in half-turn increments.)
4. When desired setting is reached, make sure that setscrew is over flat surface on pulley hub, then tighten setscrew.
5. Replace belt, then adjust belt tension for approximately one inch of sag under normal finger pressure midway between pulleys.

D. Unit Controls

All compressors have the following internal-protection controls:

1. *High-pressure Relief Valve*—This valve opens when the pressure differential between the low and high side becomes excessive.
2. *Compressor Overload*—This overload interrupts power to the compressor when either the current or internal temperature become excessive, and automatically resets when the internal temperature drops to a safe level. This overload may require up to 60 minutes (or longer) to reset; therefore, if the internal overload is suspected of being open, disconnect the electrical power to the unit and check the circuit thru the overload with an ohmmeter or continuity tester.

E. Cooling Sequence of Operation

The following sequence of operation pertains to all 208/230-volt, 3-phase units; however, the sequence of operation of single-phase and 460-volt units is very similar. Refer to the line-to-line wiring diagram in Figure 12.

NOTE: Although the actual unit wiring may vary slightly from that shown in Figure 12, the sequence of operation will

TABLE VII—MODELS 585H & J AIR DELIVERY (Ft³/Min) AT INDICATED EXTERNAL STATIC PRESSURE & VOLTAGE (Sizes 018040 thru 042125)*

585 Size	Unit Volts—Phase (60Hz)	Blower Motor Speed	Coil†	External Static Pressure—Inches wc																
				208V									230V or 460V							
				0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
018040	208-230—1	Low ●	Dry	740	700	660	615	565	510	—	—	—	805	765	725	675	625	565	—	—	—
			Wet	700	665	625	580	535	480	—	—	—	760	720	680	635	585	525	—	—	—
		High △	Dry	795	750	705	660	610	555	—	—	—	870	825	780	735	685	630	—	—	—
			Wet	745	705	665	620	570	520	—	—	—	810	775	730	690	640	590	—	—	—
024040	208-230—1	Low △	Dry	895	850	800	750	700	645	—	—	—	950	905	855	800	745	680	—	—	—
			Wet	865	820	775	725	675	620	—	—	—	920	875	825	770	715	650	—	—	—
		High ●	Dry	980	930	875	820	760	700	—	—	—	1030	975	920	865	810	755	—	—	—
			Wet	940	895	845	790	730	665	—	—	—	985	935	885	835	780	725	—	—	—
024075	208-230—1	Low ●	Dry	995	925	890	855	815	780	—	—	—	1030	990	955	920	880	840	—	—	—
			Wet	935	900	870	835	800	765	—	—	—	1000	965	935	890	860	820	—	—	—
		High △	Dry	1125	1075	1030	980	930	880	—	—	—	1160	1115	1065	1015	965	915	—	—	—
			Wet	1080	1035	990	950	900	855	—	—	—	1120	1075	1030	980	935	885	—	—	—
030040	208-230—1	Low △	Dry	700	680	655	635	610	585	—	—	—	850	820	795	765	735	705	—	—	—
			Wet	690	670	650	630	605	580	—	—	—	835	810	785	755	725	695	—	—	—
		High ●	Dry	1325	1270	1210	1150	1090	1020	—	—	—	1370	1310	1245	1180	1110	1035	—	—	—
			Wet	1270	1220	1165	1110	1045	975	—	—	—	1305	1245	1190	1125	1060	990	—	—	—
030075	208-230—1	Low ●△	Dry	1125	1070	1015	955	900	840	—	—	—	1175	1115	1050	985	925	855	—	—	—
			Wet	1085	1035	985	925	870	815	—	—	—	1130	1070	1010	950	890	830	—	—	—
		High	Dry	1225	1165	1105	1040	980	915	—	—	—	1260	1200	1140	1080	1020	955	—	—	—
			Wet	1175	1120	1065	1005	945	885	—	—	—	1205	1155	1100	1040	985	925	—	—	—
036060	208-230—1	Low △	Dry	950	945	940	930	915	900	—	—	—	1250	1205	1160	1115	1065	1015	—	—	—
			Wet	945	940	935	925	910	890	—	—	—	1210	1165	1125	1080	1035	990	—	—	—
		High ●	Dry	1570	1500	1425	1355	1280	1200	—	—	—	1610	1540	1470	1400	1330	1255	—	—	—
			Wet	1475	1410	1345	1275	1205	1140	—	—	—	1510	1450	1390	1325	1260	1190	—	—	—
	208/230—3	Low △	Dry	1165	1155	1140	1125	1100	1075	1040	995	930	1365	1345	1320	1295	1265	1225	1180	1120	1020
			Wet	1155	1145	1125	1110	1085	1050	1015	960	855	1345	1320	1295	1265	1235	1190	1135	1060	900
		High ●	Dry	1525	1490	1450	1415	1375	1330	1280	1220	1135	1620	1580	1540	1495	1450	1405	1355	1300	1230
			Wet	1475	1440	1405	1370	1325	1280	1225	1155	1045	1560	1520	1475	1435	1390	1345	1295	1235	1155
	460—3	Low △	Dry	—	—	—	—	—	—	—	—	—	1185	1175	1160	1135	1110	1095	1060	1005	940
			Wet	—	—	—	—	—	—	—	—	—	1165	1155	1135	1120	1095	1060	1015	970	895
		High ●	Dry	—	—	—	—	—	—	—	—	—	1535	1500	1460	1425	1385	1340	1290	1230	1145
			Wet	—	—	—	—	—	—	—	—	—	1485	1450	1415	1380	1335	1290	1235	1165	1055
036100 & 036125	208-230—1	Low ●	Dry	1280	1260	1240	1215	1190	1160	—	—	—	1510	1480	1445	1400	1340	1275	—	—	—
			Wet	1265	1245	1220	1195	1165	1130	—	—	—	1475	1440	1395	1345	1280	1210	—	—	—
		High △	Dry	1825	1765	1700	1630	1540	1425	—	—	—	1905	1845	1775	1700	1595	1475	—	—	—
			Wet	1735	1670	1595	1515	1410	1270	—	—	—	1790	1725	1655	1565	1455	1320	—	—	—
	208/230—3	Low ●	Dry	1275	1270	1260	1240	1220	1195	1165	1135	1100	1505	1490	1470	1445	1415	1375	1330	1280	1230
			Wet	1270	1260	1245	1225	1205	1175	1145	1110	1075	1490	1470	1445	1415	1375	1330	1285	1235	1185
		Med	Dry	1625	1605	1575	1540	1500	1455	1400	1350	1295	1845	1805	1760	1710	1655	1595	1535	1480	1415
			Wet	1590	1565	1530	1490	1445	1395	1350	1300	1245	1770	1725	1675	1625	1575	1520	1465	1405	1350
		High △	Dry	2035	1980	1920	1855	1785	1715	1645	1570	1495	2130	2070	2010	1940	1870	1800	1725	1645	1570
			Wet	1915	1860	1800	1740	1675	1610	1545	1480	1410	1995	1940	1875	1815	1745	1680	1615	1545	1475
042060	208-230—1	Low △	Dry	855	850	835	820	795	760	—	—	—	1035	1025	1010	995	975	950	—	—	—
			Wet	855	845	830	815	790	750	—	—	—	1030	1020	1005	990	965	935	—	—	—
		High ●	Dry	1700	1635	1565	1495	1425	1355	—	—	—	1770	1705	1635	1555	1470	1385	—	—	—
			Wet	1635	1575	1505	1440	1375	1305	—	—	—	1695	1630	1560	1480	1405	1325	—	—	—
	208/230—3	Low △	Dry	970	965	960	945	935	910	880	835	780	1190	1185	1175	1165	1145	1120	1080	1020	940
			Wet	965	960	955	940	930	905	870	820	765	1190	1180	1170	1155	1135	1105	1055	990	910
		High ●	Dry	2040	1980	1915	1850	1785	1715	1640	1550	1450	2145	2080	2010	1940	1865	1790	1705	1610	1500
			Wet	1950	1890	1835	1770	1705	1635	1555	1465	1380	2030	1970	1905	1840	1770	1695	1610	1515	1400
042125	208-230—1	Low △	Dry	1410	1385	1355	1315	1255	1175	—	—	—	1580	1530	1475	1420	1360	1290	—	—	—
			Wet	1390	1365	1330	1280	1215	1120	—	—	—	1535	1485	1435	1380	1315	1240	—	—	—
		High ●	Dry	1705	1650	1590	1525	1450	1365	—	—	—	1770	1710	1645	1575	1500	1415	—	—	—
			Wet	1650	1590	1535	1465	1390	1300	—	—	—	1705	1640	1580	1510	1435	1345	—	—	—
	208/230—3	Low △	Dry	1405	1400	1395	1385	1365	1335	1295	1240	1175	1650	1635	1610	1585	1545	1500	1445	1380	1305
			Wet	1400	1395	1385	1370	1345	1310	1260	1205	1145	1630	1605	1575	1540	1495	1445	1385	1320	1250
		High ●	Dry	1725	1710	1685	1655	1615	1565	1505	1440	1370	1935	1885	1835	1780	1730	1670	1610	1540	1455
			Wet	1705	1685	1655	1615	1570	1515	1455	1390	1320	1870	1820	1770	1720	1665	1610	1550	1470	1360

(See next page for applicable notes.)

not be affected.

With the room thermostat SYSTEM switch in the COOL position and the FAN switch in the AUTO position, the cooling sequence of operation is as follows:

When the room temperature rises to a point that is slightly above the cooling control setting of the thermostat, the thermostat cooling bulb tilts and completes the circuit between thermostat terminal R to terminals Y and G. These completed circuits through the thermostat connect contactor coil 2D (through unit wire Y) and relay coil 2C (through unit wire G) across the 24-volt secondary of transformer 1B.

The two sets of normally open contacts of energized contactor 2D close and complete the circuit through compressor motor 3F and condenser fan motor 3D1. Both motors start instantly.

TABLE VIII—MODELS 585H & J AIR DELIVERY (Ft³/Min) AT INDICATED EXTERNAL STATIC PRESSURE & VOLTAGE (Sizes 048080 thru 060150)*

585H/J Size	Unit Volts—Phase (60Hz)	Blower Motor Speed	Coil†	External Static Pressure—Inches wc																
				208V									230V or 460V							
				0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
048080	208-230—1	Low △	Dry	1180	1170	1160	1040	1090	980	—	—	—	1350	1340	1330	1310	1275	1190	—	—	—
			Wet	1175	1165	1155	1130	1075	960	—	—	—	1345	1335	1325	1300	1255	1120	—	—	—
		High ●	Dry	1780	1720	1660	1610	1550	1500	—	—	—	1920	1845	1770	1695	1625	1550	—	—	—
			Wet	1770	1710	1645	1590	1525	1470	—	—	—	1860	1790	1725	1655	1585	1515	—	—	—
	208/230—3	Low △	Dry	1200	1195	1190	1180	1170	1150	1145	1135	1115	1420	1410	1400	1390	1385	1370	1355	1330	1300
			Wet	1195	1190	1180	1170	1160	1145	1130	1110	1415	1405	1395	1385	1380	1365	1350	1320	1285	
		Med	Dry	1805	1800	1785	1765	1735	1700	1665	1625	1585	2080	2050	2015	1970	1920	1865	1805	1745	1680
			Wet	1800	1790	1770	1745	1715	1680	1640	1605	1565	2050	2020	1975	1930	1880	1820	1765	1705	1640
		High ●	Dry	2200	2155	2110	2055	2000	1940	1880	1815	1755	2325	2275	2220	2160	2095	2030	1965	1895	1825
			Wet	2155	2110	2060	2005	1950	1890	1835	1775	1710	2265	2215	2160	2100	2040	1975	1910	1840	1770
	460—3	Low △	Dry	—	—	—	—	—	—	—	—	—	1500	1480	1460	1435	1410	1380	1350	1325	1295
			Wet	—	—	—	—	—	—	—	—	—	1490	1470	1450	1425	1395	1370	1340	1310	1280
		High ●	Dry	—	—	—	—	—	—	—	—	—	2040	1995	1950	1895	1835	1775	1710	1645	1580
			Wet	—	—	—	—	—	—	—	—	—	2000	1960	1910	1855	1795	1735	1670	1610	1540
048125	208-230—1	Low △	Dry	1690	1650	1600	1545	1480	1420	—	—	—	1790	1730	1665	1600	1530	1450	—	—	—
			Wet	1684	1640	1585	1525	1455	1390	—	—	—	1750	1690	1630	1565	1495	1410	—	—	—
		High ●	Dry	1890	1820	1760	1690	1625	1560	—	—	—	1975	1900	1820	1745	1665	1590	—	—	—
			Wet	1880	1810	1745	1670	1600	1530	—	—	—	1915	1845	1770	1695	1625	1550	—	—	—
	208/230—3	Low △‡	Dry	1440	1435	1425	1415	1400	1385	1365	1340	1305	1730	1720	1700	1675	1645	1610	1560	1520	1470
			Wet	1435	1430	1420	1410	1395	1380	1355	1330	1290	1725	1710	1685	1660	1625	1585	1545	1495	1445
		Med ●	Dry	1755	1740	1725	1700	1665	1625	1580	1530	1470	1970	1945	1910	1875	1825	1775	1720	1660	1600
			Wet	1745	1730	1710	1680	1645	1600	1550	1500	1440	1950	1920	1880	1840	1790	1735	1685	1625	1570
		High	Dry	1950	1920	1880	1840	1795	1750	1700	1645	1590	2175	2130	2085	2030	1970	1905	1840	1765	1695
			Wet	1925	1890	1850	1810	1765	1715	1665	1615	1560	2130	2085	2035	1980	1920	1855	1790	1720	1650
060100	230—1	Low △	Dry	—	—	—	—	—	—	—	—	—	1610	1600	1580	1560	1530	1495	—	—	—
			Wet	—	—	—	—	—	—	—	—	—	1595	1585	1575	1550	1515	1475	—	—	—
		High ●	Dry	—	—	—	—	—	—	—	—	—	2375	2280	2185	2095	2000	1905	—	—	—
			Wet	—	—	—	—	—	—	—	—	—	2270	2185	2100	2015	1930	1840	—	—	—
	208/230—3	Low △†	Dry	1320	1310	1305	1300	1290	1280	1260	1255	1240	1585	1580	1570	1555	1545	1535	1515	1490	1455
			Wet	1310	1305	1300	1290	1280	1265	1255	1250	1235	1580	1570	1560	1545	1535	1530	1510	1475	1440
		Med	Dry	1555	1550	1545	1540	1535	1530	1520	1510	1495	1885	1875	1860	1840	1820	1795	1770	1740	1710
			Wet	1550	1545	1540	1535	1530	1525	1515	1505	1485	1880	1985	1845	1825	1805	1780	1750	1720	1695
		High ●	Dry	2395	2365	2330	2280	2230	2170	2105	2040	1970	2615	2560	2500	2430	2360	2285	2210	2135	2055
			Wet	2360	2325	2275	2225	2170	2105	2045	1980	1915	2535	2475	2415	2345	2275	2205	2130	2060	1985
	460—3	Low △	Dry	—	—	—	—	—	—	—	—	—	1640	1630	1625	1615	1605	1590	1575	1555	1530
			Wet	—	—	—	—	—	—	—	—	—	1635	1630	1620	1610	1595	1585	1565	1545	1515
		High ●	Dry	—	—	—	—	—	—	—	—	—	2380	2355	2320	2275	2220	2160	2095	2030	1960
			Wet	—	—	—	—	—	—	—	—	—	2350	2315	2270	2215	2160	2095	2035	1970	1905
060150	230—1	Low	Dry	—	—	—	—	—	—	—	—	—	1880	1875	1860	1825	1770	1700	—	—	—
			Wet	—	—	—	—	—	—	—	—	—	1875	1865	1840	1790	1725	1650	—	—	—
		Med △	Dry	—	—	—	—	—	—	—	—	—	2130	2075	2015	1955	1890	1810	—	—	—
			Wet	—	—	—	—	—	—	—	—	—	2075	2025	1965	1900	1835	1760	—	—	—
		High ●	Dry	—	—	—	—	—	—	—	—	—	2345	2260	2180	2095	2010	1930	—	—	—
			Wet	—	—	—	—	—	—	—	—	—	2255	2175	2100	2020	1945	1865	—	—	—
	208/230—3	Low	Dry	1340	1335	1330	1320	1305	1290	1265	1225	1160	1565	1560	1555	1545	1530	1505	1475	1440	1395
			Wet	1335	1330	1320	1315	1300	1280	1250	1205	1140	1560	1555	1550	1540	1520	1490	1460	1420	1375
		Med △‡	Dry	1610	1605	1600	1595	1590	1580	1570	1545	1515	1920	1915	1910	1895	1875	1845	1810	1775	1740
			Wet	1605	1600	1595	1590	1585	1575	1560	1535	1495	1915	1910	1900	1880	1850	1820	1790	1750	1715
		High ●	Dry	2160	2145	2125	2100	2075	2040	1995	1930	—	2430	2385	2340	2295	2245	2195	2130	2070	—
			Wet	2145	2125	2100	2075	2045	2000	1945	1860	—	2375	2335	2290	2245	2195	2140	2075	1985	—

●Factory blower motor speed setting for cooling operation.

△Factory blower motor speed setting for heating operation.

*Air delivery values are without air filter. Deduct field-supplied air filter pressure drop to obtain external static pressure available for ducting.

†Dry coil airflow values are measurements during heating operation. Wet coil airflow values are measurements during cooling operation.

‡For 208-V operation, change the blower motor speed setting for heating to the next higher speed. See the unit wiring label.

—Dashes indicate portions of the table that are beyond the blower motor capability or that are not applicable.

NOTE: Do not operate the unit at a cooling airflow that is less than 350 Ft³/Min per each 12,000 Btuh of rated cooling capacity. Indoor coil icing may occur at airflows below this point.

The set of normally open contacts of energized relay 2C closes and completes the circuit through evaporator blower motor 3D2. The blower motor starts instantly.

NOTE: Three-phase units are equipped with a two-speed condenser fan motor and a temperature-actuated switch (7K). Fan motor 3D1 will operate at high speed when the outdoor temperature rises to 75±3°F and continue to operate at high speed until the outdoor temperature drops to 61±4°F. At 61°F or lower, the fan motor will operate at low speed and permit cooling operation down to 40°F.

The cooling cycle remains "on" until the room temperature drops to a point that is slightly below the cooling control setting of the room thermostat. At this point, the thermostat cooling bulb tilts and "breaks" the circuit between thermostat terminal R to terminals Y and G. These open circuits deenergize contactor coil 2D and relay coil 2C. The condenser, compressor, and blower motors stop. The unit is in a "standby" condition, waiting for the next "call for cooling" from the room thermostat.

TABLE IX—MODEL 579J060125 MOTOR PULLEY SETTINGS FOR AIR DELIVERY AT INDICATED EXTERNAL STATIC PRESSURE (In. wc)—(WITH WET COIL & STANDARD AIR FILTERS)

Airflow (Ft³/Min)	1-HP Motor, 1.5 Service Factor, 1.5 Max BHP, 1035-1466 Fan RPM Drive Range																	
	0.0		0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	T.O.	BHP	T.O.	BHP	T.O.	BHP	T.O	BHP	T.O.	BHP	T.O.	BHP	T.O.	BHP	T.O.	BHP	T.O.	BHP
1800	5	0.69	4-1/2	0.74	4	0.77	3-1/2	0.82	3	0.87	3	0.92	2-1/2	0.97	2	1.02	1	1.07
2000	3-1/2	0.97	3-1/2	1.01	3	1.04	2-1/2	1.07	2	1.17	1-1/2	1.23	1	1.29	1/2	1.35	—	—
2200	2-1/2	1.28	2	1.35	1-1/2	1.39	1	1.45	1/2	1.50	0	1.56	—	—	—	—	—	—
2400	1	1.63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTES: 1. T.O. = Motor pulley turns open. Factory setting is 2 T.O.
2. Shaded portions of table are beyond standard drive range or motor horsepower at rated voltage.
3. Do not operate unit in cooling at airflow rate below 1750 ft³/min or indoor coil icing may occur.
4. BHP = Brake horsepower.
5. RPM = Blower fan revolutions per minute.

X. CARE AND MAINTENANCE

To ensure continuing high performance, and to minimize the possibility of premature equipment failure, periodic maintenance must be performed on this equipment. This combination heating/cooling unit should be inspected at least once each year by a service person.

NOTE TO EQUIPMENT OWNER: Consult your local Dealer about the availability of a maintenance contract.

WARNING: The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools, and equipment. If you do not possess these, do not attempt to perform any maintenance on this equipment other than those procedures recommended in the Owner's Manual. A FAILURE TO HEED THIS WARNING COULD RESULT IN SERIOUS PERSONAL INJURY AND POSSIBLE DAMAGE TO THIS EQUIPMENT.

The minimum maintenance requirements for this equipment are as follows:

1. Inspect air filter(s) each month. Clean or replace when necessary.
2. Inspect cooling coil, drain pan, and condensate drain each cooling season for cleanliness. Clean when necessary.
3. Inspect blower motor and wheel for cleanliness and check lubrication each heating and cooling season. Clean and lubricate when necessary.
4. Check electrical connections for tightness and controls for proper operation each heating and cooling season. Service when necessary.
5. Check and inspect heating section before each heating season. Clean and adjust when necessary.

WARNING: A failure to follow these warnings could result in serious personal injury:
1. Turn off gas supply, *then* turn off electrical power to the unit before performing any maintenance or service on the unit.
2. Use extreme caution when removing panels and parts. As with any mechanical equipment, personal injury can result from sharp edges, etc.
3. Never place anything combustible either on, or in contact with, the unit.
4. Should overheating occur, or the gas supply fail to shut off, shut off the external main manual gas valve to the unit, *then* shut off the electrical supply.

A. Unit Top Removal

WARNING: When removing the unit top, use extreme caution to protect the seal that isolates the heat exchanger and flue products from other sections. Removal of the top must never be attempted by anyone other than qualified technicians.

CAUTION: Condenser fan and motor are fastened to the unit top. When removing the top, use extreme care to not pull the fan motor leads loose.

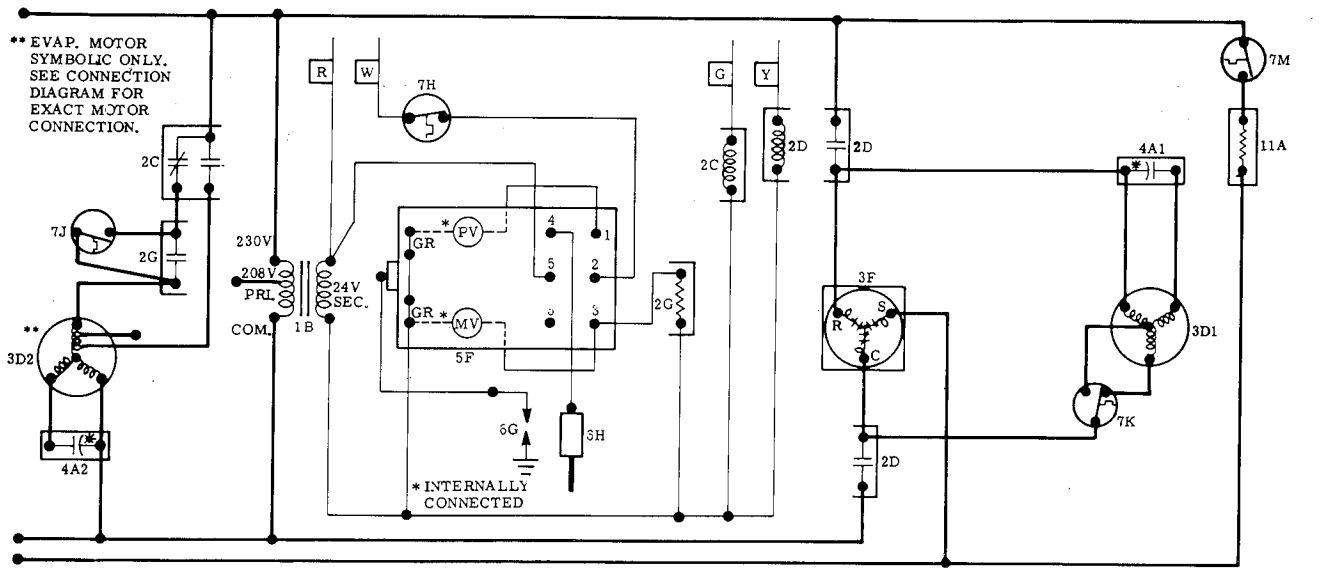
NOTE: When performing maintenance or service procedures that require removal of the unit top, be sure to perform *all* of the routine maintenance procedures that require top removal, including: inspection of the heat exchanger area, coil inspection and cleaning, and condensate drain pan inspection and cleaning.

When performing maintenance and service procedures that require unit top removal, refer to the following top removal procedures:

1. Turn off gas supply, *then* turn off electric power to unit.
2. Remove vent cap and combustion-air assemblies. Do not damage gasket. (Refer to Section III and reverse assembly procedures shown.)
3. Remove all screws that secure unit top, including screws around four sides and those on top that screw into internal divider panels. Save all screws.
4. Tape all side panels at each seam near unit top. Use tape strips that are at least 5 inches long to prevent sides from falling when top is removed.
5. Lift top from unit carefully. Set top on edge and ensure that top is supported by unit side that is opposite duct (or plenum) side. *Use extreme care to prevent damage to either seal that isolates heat exchanger and flue products or fan blades, motor, and insulation.*

WARNING/DANGER: If the seal that isolates the heat exchanger and flue products is damaged, repair the seal, using the same type of foil-back insulation used at the time of manufacture and/or aluminum duct tape, depending on the severity of the damage. A FAILURE TO HEED THIS WARNING COULD RESULT IN SERIOUS PERSONAL INJURY (OR WORSE) TO THE OCCUPANTS OF THE CONDITIONED SPACE.

6. Carefully replace and secure unit top to unit, using screws removed in step 3, when maintenance and/or service procedures are concluded. (Be sure to use original screws that have rubber washers to seal out water when securing top to internal divider panels.)
7. Reinstall vent cap and combustion-air assemblies. (Refer to Section III.)



LEGEND

1B-Transformer	3F-Compressor	7J-Blower Safety Switch (N. O.)
2C-Cool Relay (SPDT)	4A1 & 4A2-Run Capacitors	7K-Two-Speed Fan Switch (SPDT)
2D-Contactor DPST (N. O.)	5F-Gas Valve	7M-Crankcase Heater Thermostat (N. O.)
2G-Heat Relay (N. O.)	6G-Pilot Igniter	11A-Crankcase Heater
3D1-Condenser Fan Motor	6H-Safety Pilot (Flame-Sensing)	11E-Chassis Ground
3D2-Evap Blower Motor	7H-Limit Switch (N. C.)	

Figure 12—Typical Line-to-Line Wiring Diagram

B. Air Filter

CAUTION: Never operate the unit without a suitable air filter in the return-air duct system. Always replace the filter with the same dimensional size and type as originally installed. See Tables I thru IV for recommended filter sizes.

Inspect air filter(s) at least once each month and replace (disposable-type) or clean (cleanable-type) at least twice during each heating and cooling season or whenever the filter(s) becomes clogged with dust and lint.

Models 585H & J units do not have factory-supplied air filters. The field-supplied air filter(s) may be either disposable or cleanable. Model 579J units have two factory-supplied, permanent (washable) air filters located in the plenum section of the unit. Remove the access door on the return-air inlet side of the plenum to gain access to the filters. See Figure 3. Replace these filters with the same dimensional size and type as originally provided, when necessary.

C. Evaporator Blower and Motor

For longer life, operating economy, and continuing efficiency; clean accumulated dirt and grease from the blower wheel and motor annually.

Lubricate the motor every 5 years if the motor is used intermittently (thermostat FAN switch in AUTO position), or every 2 years if the motor is used continuously (thermostat FAN switch in ON position).

WARNING: Turn off the gas supply, *then* disconnect and tag electrical power to the unit before cleaning and lubricating the blower motor and wheel.

Clean and lubricate the blower motor and wheel as follows:

1. **Remove and disassemble blower assembly on Models 585H & J as follows:**
   a. Remove blower and control access doors.
   b. Refer to unit wiring label and disconnect blower motor leads from their termination points in unit control box. (Be sure to mark wiring label appropriately if lead terminations were not previously marked.) Pull leads into blower compartment.
   c. Remove blower assembly from unit. Be careful not to tear insulation in blower compartment.
   d. Ensure proper reassembly by marking blower wheel and motor in relation to blower housing before disassembly.
   e. Loosen setscrew(s) that secures wheel to motor shaft, remove screws that secure motor mount brackets to housing, and slide motor and motor mount out of housing.

   Remove blower assembly and motor on Model 579J as follows:
   a. Remove blower, control, and filter access doors from unit. Remove filters.
   b. Refer to unit wiring label. Mark and disconnect blower motor leads from their termination points in unit control box. Pull leads into blower compartment.
   c. Remove blower assembly and motor from unit. Be careful not to tear insulation in blower compartment.
2. Lubricate motor as follows:
   a. Thoroughly clean all accumulations of dirt or grease from motor housing.
   b. Remove dust caps or plugs from oil ports located at each end of motor.
   c. Use a good grade of SAE 20 nondetergent motor oil and put one teaspoon, 5cc, 3/16 oz., or 16 to 25 drops in each oil port.
   d. Allow time for oil to be absorbed by each bearing, then wipe excess oil from motor housing.
   e. Replace dust caps or plugs in oil ports.

3. **Remove and clean blower wheel on Models 585H & J as follows:**
   a. Ensure proper reassembly by marking wheel orientation and cutoff plate location.
   b. Remove screws holding cutoff plate, and remove plate from housing.
   c. Lift wheel from housing. When handling and/or cleaning blower wheel, be sure not to disturb balance weights (clips) on blower wheel vanes.
   d. Remove caked-on dirt from wheel and housing with a brush. Remove lint and/or dirt accumulations from wheel and housing with vacuum cleaner, using soft brush attachment. Remove grease and oil with mild solvent.
   e. Reassemble wheel and cutoff plate into housing.
   f. Reassemble motor into housing. Be sure setscrews are tightened on motor shaft flats and not on round part of shaft.

   Remove and clean blower wheel on Model 579J as follows:
   a. Remove blower belt, then remove blower pulley.
   b. Remove blower shaft bearing retainers.
   c. Loosen blower wheel setscrew, then pull blower shaft from wheel.
   d. Remove screws holding cutoff plate, then remove cutoff plate.
   e. Lift wheel from housing. When handling and/or cleaning, be sure not to disturb balance weights on blower wheel vanes.
   f. Remove caked-on dirt from wheel and housing with a brush. Remove lint and/or dirt accumulations from wheel and housing with vacuum cleaner, using soft brush attachment. Remove grease and oil with mild solvent.
   g. Reassemble wheel and cutoff plate into housing.
   h. Reinstall blower shaft, bearing retainers, blower pulley, and belt.
4. Reinstall blower assembly into unit, route blower motor leads into control compartment, and reconnect all blower motor leads to proper termination points in unit control box. Replace panels.
5. Restore electrical power, then gas supply, to unit. Start unit and check for proper blower rotation and motor speeds during heating and cooling cycles.

D. Heating Section

Ensure dependable and efficient heating operation by inspecting the heating section before each heating season, and cleaning when necessary.

Proceed as follows to inspect and clean heating section:

1. Turn off gas supply, *then* disconnect electrical power to unit.
2. Inspect and clean heating section as follows:
   a. Remove control access door.
   b. Remove unit top, following procedures in part A of this section.
   c. Remove secondary-air shield, flue baffles, pilot, and burners. (Flue baffles may be removed after partial loosening of collector front panel.) Inspect and clean all of these components. Be sure to remove any residue that may have collected on a component.
   d. Clean flue ways with brush and/or vacuum, and inspect heat exchanger for leaks and cracks.
   e. Inspect indoor-air passages in unit for cleanliness, and check tightness of screws and parts.
   f. Replace all components removed in step c, and replace unit top.
3. Restore electrical power, *then* gas supply, to unit. Start heating cycle and adjust burner air shutters. See Section VIII, part D, for procedures.

WARNING: Never use a match or other flame to check for gas leaks.

4. Inspect gas control area for gas leaks, using a soap-and-water solution.
5. Replace control access panel.

E. Pilot

Inspect the pilot and clean (when necessary) at the beginning of each heating season. Remove the accumulation of soot and carbon from the pilot. The pilot flame must be high enough for proper impingement of the flame-sensing element and to light the burners.

F. Condenser Coil, Evaporator Coil, and Condensate Drain Pan

Inspect the condenser coil, evaporator coil, and condensate drain pan at least once each year. Proper inspection and cleaning requires the removal of the unit top. See part A of this section.

The coils are easily cleaned when dry; therefore, inspect and clean the coils either before or after each cooling season. Remove all obstructions, including weeds and shrubs that interfere with the airflow, through the condenser coil. Straighten bent fins with a fin comb. If coated with dirt or lint, clean the coils with a vacuum cleaner, using the soft brush attachment. Be careful not to bend the fins. If coated with oil or grease, clean the coils with a mild detergent-and-water solution. Rinse coils with clear water, using a garden hose. Be careful not to splash water on motors, insulation, wiring, or air filter(s). For best results, spray condenser coil fins from inside to outside the unit. On units with an outer and inner condenser coil, be sure to clean between the coils. Be sure to flush all dirt and debris from the unit base.

Inspect the drain pan and condensate drain line when inspecting the coils. Clean the drain pan and condensate drain by removing all foreign matter from the pan. Flush the pan and drain tube with clear water. Do not splash water on the insulation, motor, wiring, or air filter(s). If the drain tube is restricted, clear it with a "plumbers snake" or similar probe device.

The bottom of the drain tube has a 1/8-inch diameter hole. This hole is located in the portion of the drain tube that runs through the drain pan. Clean this hole with a stiff wire that has a 3/8-inch long, 90° bend.

G. Condenser Fan

CAUTION: Keep the condenser fan free from all obstructions to ensure proper cooling operation. Never place articles on top of the unit.

Inspect the fan blades for cracks or bends each year. *Ensure that blades clear the motor by no more than 1/4 inch.* If the blade assembly has slipped down the motor shaft, adjust the fan position on the motor shaft by loosening the setscrew(s), then moving the blade assembly up. Be sure that the setscrew(s) is on the flat(s) of the motor shaft before tightening.

H. Electrical Controls and Wiring

Inspect and check the electrical controls and wiring annually. *Be sure to turn off the gas supply and then the electrical power to the unit.*

TABLE X—HEATING SERVICE ANALYSIS CHART

SYMPTOM	CAUSE	REMEDY
Pilot will not light.	No spark at electrode	Check air gap between electrode tip and pilot target. Gap should be as shown in Figure 13. Readjust as necessary.
		Clean moisture or dirt accumulation on electrode ceramic with cloth.
		Cracked ceramic—replace pilot electrode assembly.
		Check for loose or broken wiring at and between electronic control head and electrode. Replace wire or tighten connection as necessary.
		Check fuses or circuit breaker to insure voltage to unit.
		Check for 24-volts between 2 and GR, and between 5 and GR. If you read 24 volts and above steps have been completed, replace electronic control head portion of control head/gas valve assembly.
	Spark shorting out to main burner	Realign electrode tip away from main burner but maintain spark gap to pilot burner. See Figure 13.
	No gas at pilot burner	Clean pilot orifice.
		Check for 24 volts between terminals 1 and GR. If you read 24 volts and above steps have been completed, replace gas valve portion of control head/gas valve assembly.
Burners will not ignite.	Water in gas line	Drain—install water trap.
	No power to furnace	Check power supply, fuses, wiring, or circuit breaker.
	No 24-volt power supply to control circuit	Check transformer—replace if necessary.
	Miswired or loose connections	Check all wiring and wirenut connections.
	Dirty pilot—yellow flame	Clean pilot orifice.
	Pilot burning improperly—sharp blue flame	Replace pilot.
	Burned-out heat anticipator in thermostat	Replace thermostat.
	No gas at main burners	1. Check for 24 volts between terminals 3 and GR on control head. If you read 24 volts, replace gas valve portion of control head/gas valve assembly. 2. If 24 volts is not present, check flame sensor for cracked ceramic insulator or shorted sensor cable. Replace electronic head if sensor circuit is not defective.
	Broken thermostat wire	Run continuity check to locate break.
Inadequate heating	Dirty air filter	Clean or replace filter as necessary.
	Gas input to furnace too low	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure, or replace with correct orifices.
	Unit undersized for application	Replace with proper unit—or add additional unit.
	Restricted airflow	Clean or replace filter—or remove any restriction.
	Blower speed too low	Use faster speed tap—or install optional blower.
	Limit switch cycles main burners	Dirty air filters-clean or replace.
		Registers closed, restricted ductwork—open or remove restriction.
		Check heat anticipator setting on thermostat—readjust.
Poor flame characteristics	Incomplete combustion results in: Aldehyde odors, (CO), sooting flame—floating flame	Air shutters on burners closed—adjust to soft blue flame.
		Check all screws around flue outlets and burner compartment—tighten.
		LACK OF COMBUSTION AIR.
		Cracked heat exchanger—replace.
		Overfired furnace—reduce input, or change orifices.
		Check vent for restriction—clean as required.
		Check orifice to burner alignment.

Remove the control, blower, and compressor compartment access panels to locate all the electrical controls and wiring. Check all electrical connections for tightness. Tighten all screw connections. If any smoky or burned connections are noticed: disassemble the connection, clean all the parts, restrip the wire end, and reassemble the connection properly and securely.

After inspecting the electrical controls and wiring, replace all the panels. Start the unit, and observe at least one complete heating cycle and one complete cooling cycle to ensure proper operation. If discrepancies are observed in either or both operating cycles, or if a suspected malfunction has occurred, check each electrical component with the proper electrical instrumentation. Refer to the unit wiring label when making these checkouts.

NOTE: Refer to the heating and/or cooling sequence of operation in this publication as an aid in determining proper control operation.

TABLE XI—COOLING SERVICE ANALYSIS CHART

SYMPTOM	CAUSE	REMEDY
Compressor and condenser fan will not start.	Power failure	Call power company.
	Fuse blown or circuit breaker tripped	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay	Replace component.
	Insufficient line voltage	Determine cause and correct.
	Incorrect or faulty wiring	Check wiring diagram and rewire correctly.
	Thermostat setting too high	Lower thermostat setting below room temperature.
Compressor will not start but condenser fan runs.	Faulty wiring or loose connections in compressor circuit	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open	Determine cause. Replace compressor.
	Defective run/start capacitor, overload, start relay	Determine cause and replace.
	One leg of three-phase power dead	Replace fuse or reset circuit breaker. Determine cause.
Compressor cycles. (other than normally satisfying thermostat)	Refrigerant overcharge or undercharge	Blow refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor	Replace and determine cause.
	Insufficient line voltage	Determine cause and correct.
	Blocked condenser	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay	Determine cause and replace.
	Defective thermostat	Replace thermostat.
	Faulty condenser fan motor or capacitor	Replace.
	Restriction in refrigerant system	Locate restriction and remove.
Compressor operates continuously.	Dirty air filter	Replace filter.
	Unit undersized for load	Decrease load or increase unit size.
	Thermostat set too low	Reset thermostat.
	Low refrigerant charge	Locate leak, repair, and recharge.
	Leaking valves in compressor	Replace compressor.
	Air in system	Blow refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted	Clean coil or remove restriction.
Excessive head pressure	Dirty air filter	Replace filter.
	Dirty condenser coil	Clean coil.
	Refrigerant overcharged	Purge excess refrigerant.
	Air in system	Blow refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling	Determine cause and correct.
Head pressure too low	Low refrigerant charge	Check for leaks, repair, and recharge.
	Compressor valves leaking	Replace compressor.
	Restriction in liquid tube	Remove restriction.
Excessive suction pressure	High heat load	Check for source and eliminate.
	Compressor valves leaking	Replace compressor.
	Refrigerant overcharged	Purge excess refrigerant.
Suction pressure too low	Dirty air filter	Replace filter.
	Low refrigerant charge	Check for leaks, repair, and recharge.
	Metering device or low side restricted	Remove source of restriction.
	Insufficient evaporator airflow	Increase air quantity. Check filter—replace if necessary.
	Temperature too low in conditioned area	Reset thermostat.
	Outdoor ambient below 55°F	Install low-ambient kit.
	Field-installed filter-drier restricted	Replace.

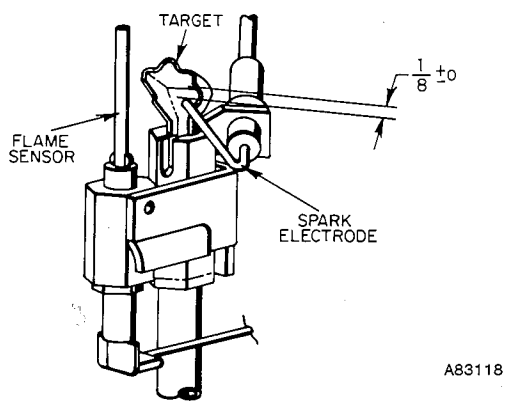


Figure 13—Position of Electrode to Pilot

I. Refrigerant Circuit

Inspect all refrigerant tubing connections and the unit base for oil accumulations annually. Detecting oil generally indicates a refrigerant leak.

If oil is detected or if low cooling performance is suspected, leak-test all refrigerant tubing; using an electronic leak-detector, halide torch, or liquid-soap solution. If a refrigerant leak is detected, see Section VII, part B, "Refrigerant Leaks," in this publication.

If no refrigerant leaks are found and low cooling performance is suspected, see Section IX, part B, "Checking and Adjusting Refrigerant Charge," in this publication.

J. Gas Input

The gas input does not require checking unless improper heating performance is suspected. If a problem exists, refer to Section VIII of this publication.

K. Evaporator Airflow

The heating and/or cooling airflow does not require checking unless improper performance is suspected. *If a problem exists, be sure that all supply- and return-air grilles are open and free from obstructions, and that the air filter is clean.* When necessary, refer to Section IX, part C, of this publication to check the system airflow.