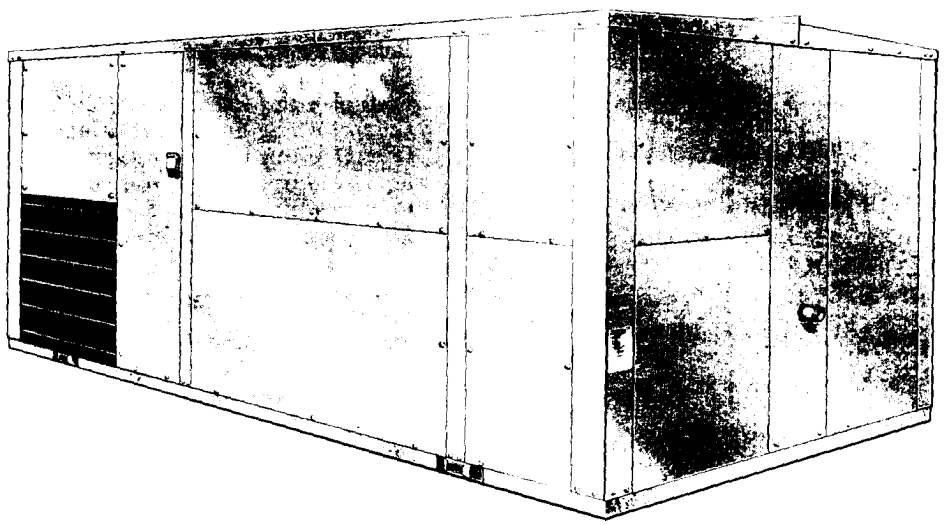
YORK®

SUNLINE SERIES SINGLE PACKAGE AIR CONDITIONERS

INSTALLATION INSTRUCTION	Supersedes: 530.25-N1Y (488)	Tab DSC	530.25-N1Y (1189)

035-08598

MODELS D1SC/D2SC300, 360 & 480



GENERAL

This instruction covers the installation, start-up and operation of these air conditioning units. If the unit includes a heating option, use this instruction in conjunction with the proper heating instruction.

Gas Heat Option	Form 530.25-N1.1
Electric Heat Option	Form 530.25-N1.9

These units are completely packaged, factory charged, cooling only or cooling/heating air conditioners, primarily designed for rooftop installation.

See Figure 1 for the internal arrangement of the unit components. These units have semi-hermetic compressors with blocked suction unloading for efficient full and part load operation and can be equipped with an economizer option to provide cooling with outdoor air when the temperatures and the humidity of the outdoor air permit. The unit can also be equipped with exhaust air fans for use in conjunction with the economizer option.

All electrical controls are located on one side of the unit and are readily accessible for maintenance, adjustment and service. All wiring (power and control) and piping can be made thru the bottom or the side of the unit.

Units are available with bottom duct connections for roof mounted installations or may be field converted for end duct connections. Refer to Form 530.25-N1.5.

INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing. Refer to Form 50.15-NM for additional information.

REFERENCE

Additional information on the design, installation, operation and service of refrigeration equipment is available in the reference material listed below.

Form 55.70-N1	General Installation
Form 55.70-N2	Pre-start & Post-start Check List

Renewal Parts: Refer to Parts Microfiche or Parts Manual for complete listing of replacement parts on this equipment.

All forms referenced in this instruction may be ordered from

Publications Distribution Center
Central Environmental Systems
P.O. Box 1592, York, PA 17405

Installer should pay particular attention to the words: *NOTE*, *CAUTION* and *WARNING*. Notes are intended to clarify or make the installation easier. Cautions are given to prevent equipment damage. Warnings are given to alert the installer that personal injury and/or equipment damage may result if the installation procedure is not handled properly.

TABLE OF CONTENTS

NOMENCLATURE

D | 1 | S C | 3 6 0 | G | 4 0 0 | 2 8 | A

PRODUCT CATEGORY
D = Single Package Air Conditioner

PRODUCT GENERATION
1 = New or Current Design
2 = 2nd Generation

PRODUCT IDENTIFIER
SC = Sunline

NOMINAL COOLING CAPACITY
300 = 25 Ton
360 = 30 Ton
480 = 40 Ton

FACTORY INSTALLED HEAT
E – Electric
G – Gas (Multi-Fuel)
A – Not Applicable

NOMINAL HEATING CAPACITY

Gas (Multi-Fuel)	Electric
400 Mbh	040 = 40 KW
560 Mbh	060 = 60 KW
800 Mbh	080 = 80 KW
	100 = 100 KW
	120 = 120 KW

VOLTAGE CODE

17 = 200-3-60	46 = 460-3-60
28 = 230-3-60	58 = 575-3-60

DESIGN STYLE OR LEVEL

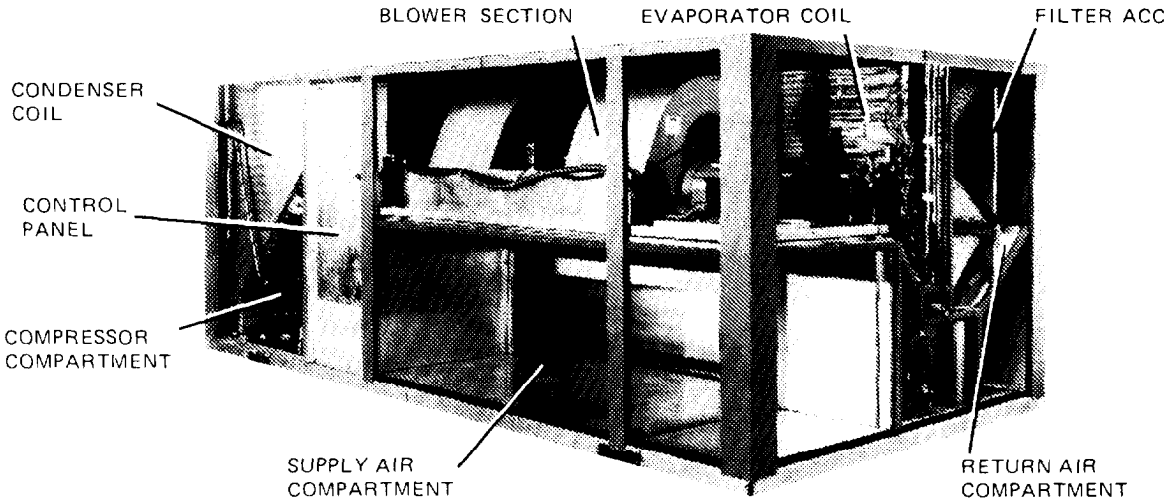


FIG. 1 – UNIT LESS PANELS (DSC 480 SHOWN)

INSTALLATION

LIMITATIONS

These units must be installed in accordance with all national and local safety codes. If no local codes apply, installation must conform with the appropriate national codes. See Table 1 for application data. Units are designed to meet National Safety Code Standards. If components must be added to a unit to meet local codes, they are to be installed at the dealer's and/or the customer's expense.

RIGGING

Sunline units are equipped with lifting lugs on the unit base. Units should be lifted by placing rigging hooks thru the lugs provided. Spreader bars should be used. See Fig. 2.

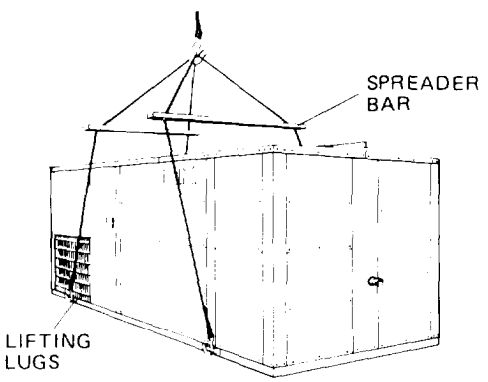


FIG. 2 – TYPICAL UNIT RIGGING

MOUNTING

The structure on which the unit or roof curb is mounted must be capable of supporting the total weight of the unit. Refer to Table 2 for individual component weights. Refer to Figure 3 for approximate centers of gravity.

A roof mounting curb accessory is available to simplify the installation of a Sunline unit. Refer to Form 530.25-N1.6 for installation instructions for assembling and mounting the curb and for installing the unit on the curb. Roof mounting curbs capable of supporting the unit's weight may also be field fabricated.

CLEARANCES

These units must be installed with the minimum clearances listed below.

Front (Control Box Side)	36" for Service Access to Controls
Left side (Condenser coil)	36" for Proper Condenser Air Flow
Rear	36" From Rain Hoods
Right side	90" Units with Gas Heat Option 36" Units with Electric Heat Option 36" Cooling Only Units
Below unit[1]	0"
Above unit[2]	120" for Condenser Air Discharge

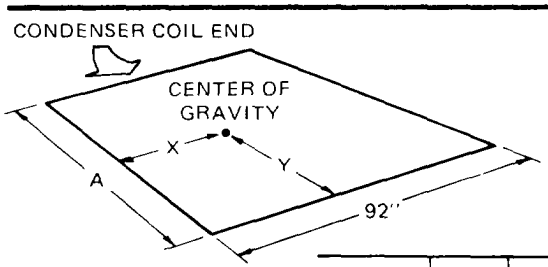
[1] *Units with a gas or an electric heating option can be installed on a combustible floor.*

[2] Units with gas heat must be installed outdoors; the products of combustion must not be allowed to accumulate within a confined space and recirculate.

These units can be installed under an outside overhang providing the overhang: (1) is at least 10 feet above the top of the unit and (2) extends no more than 3 feet beyond the end of the unit.

A 2" clearance within 3 feet of the unit must be maintained between any combustible material and the supply air duct work.

No objects should be left near the combustion air inlet to obstruct the openings. If the unit is slab mounted, shrubs and other growth should be eliminated.



MODEL	A	X	Y
DSC300	141	47	77
DSC360	164	48	84
DSC480	184	45	104

FIG. 3 – CENTERS OF GRAVITY

TABLE 1 —APPLICATION DATA

MODEL D1SC/D2SC		300	360	480
Voltage Variation, Min/Max[1]	200 Volts	187/218		
	230 Volts	216/252		
	460 Volts	432/504		
	575 Volts	540/630		
Supply Air CFM, Min/Max		8,000/12,000	9,600/14,400	12,800/19,200
Wet Bulb Temp. (°F) of Air on Evaporator Coil, Min/Max		57/72		
Dry Bulb Temp. (°F) of Air on Condenser Coil, Min/Max[2]		0/115		
Minimum Dry Bulb Temp. (°F) of Air On:	Gas Fired Heater	20		
Maximum Dry Bulb Temp. (°F) of Air Off:	Gas Fired Heater	160	145	155
	Electric Heater	180	180	180

[1] Utilization Range "A" in accordance with ARI Standard 110.
[2] Low Ambient accessory (Form 530.25-N1.7) may be required for 0°F outdoor ambient.

TABLE 2 – COMPONENT WEIGHTS (LBS.)

COMPONENT	MODEL		
	DSC300	DSC360	DSC480
Outdoor Air Option			
Fixed Outdoor Air	75	75	85
Economizer Option	220	220	247
Supply Air Motor &			
Drive 7-1/2 HP	130	–	–
10 HP	145	145	–
15 HP	–	185	185
20 HP	–	–	215
Heating Option			
Cooling Only	60	60	65
Natural Gas Heat			
G400	200	200	–
G560	300	300	300
G800	–	–	400
Electric Heat			
E040	110	110	110
E060	115	115	115
E080	120	120	120
E100	125	125	125
E120	–	130	130
Exhaust Fan	160	160	250
Accessories			
Roof Mounting Curb	300	350	400
End Outlet Kit	105	105	130

CONDENSATE DRAIN CONNECTION

The condensate drain, located on the right end of the unit, should be connected to an open drain or allowed to discharge directly onto the ground or roof. A trap MUST be installed. See Figure 4.

The 3" dimension must equal or exceed the negative static pressure developed by the supply air blowers. If it doesn't, the condensate will not drain properly and will overflow the drain pan.

The trap must be at least 2" deep to maintain a water seal under all operating conditions, especially when the blowers are starting up.

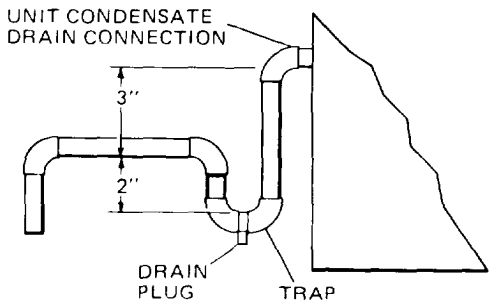


FIG. 4 – RECOMMENDED DRAIN PIPING

POWER AND CONTROL WIRING

Install electrical wiring in accordance with the latest National Electrical Code (NFPA Standard No. 70) and for local regulations. The unit should be grounded in accordance with these codes.

POWER WIRING

The field power wiring can be brought into the control box through the 4-1/2" diameter sleeve in the base of the unit (Figure 5) or through the 3" threaded conduit connector in the side of the control box (Figure 6). The unit is equipped with a conduit termination plate above the 4-1/2" diameter sleeve. The plate has 1-23/32", 2-1/2", and 3-5/8" diameter concentric knockouts. For units with disconnect switch, the power lugs can be rotated 90 degrees clockwise to facilitate entrance of the power wiring from the side of the box. To do this remove the 1/4" bolt holding the power lug. Next remove the slotted spring pin which keeps the lug from rotating. Turn the power lug 90 degrees clockwise and replace both the slotted spring pin and the 1/4" bolt.

A non-fused disconnect switch is available as a factory-mounted option on all units. When this option is not included, a field-supplied disconnect switch should be installed in the power supply wiring at a location that will meet the requirements of the National Electric Code and/or local regulations.

NOTE: Fused disconnect switches are not required because the power wiring must be fused at the source.

Either inverse time circuit breaker or dual element time delay fuses may be used for overcurrent protection on these units. They must be sized according to Table 3.

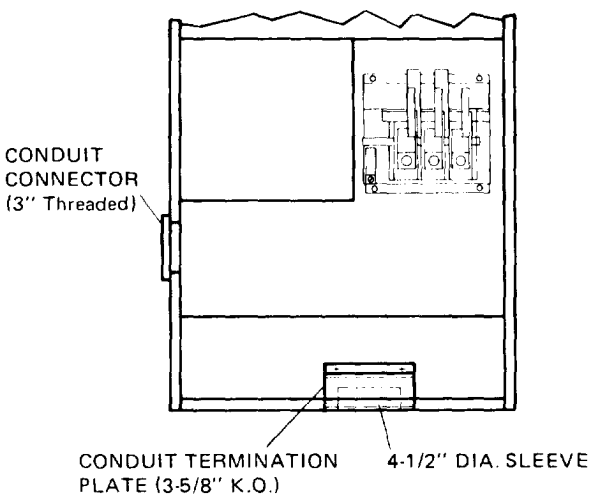
Bottom entry is recommended for:

1. Curb mounted units with a factory installed disconnect switch unless the power wiring is already above the finished roof.
2. Units that are mounted on structural steel above the finished roof unless the steel is blocking the 4-1/2 inch diameter sleeve in the base of the unit. This applies to units with or without a factory installed disconnect switch.

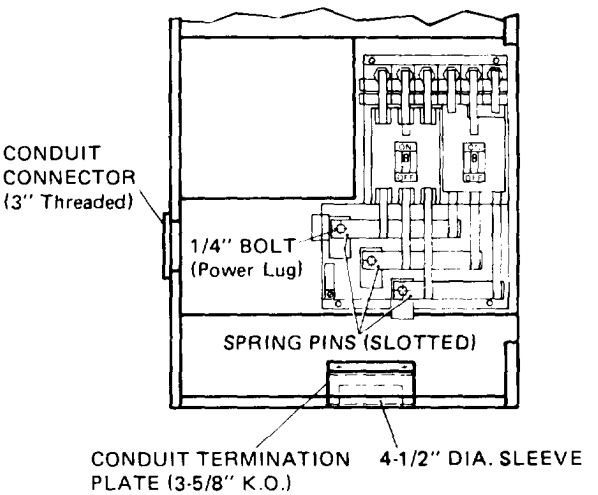
CAUTION: The 4-1/2 inch sleeve must be sealed after the power wiring has been routed to prevent possible condensation problems in the unit control box.

Side entry is recommended for:

1. Curb mounted units without a factory installed disconnect switch because the power wiring must be brought outside the unit to a field supplied disconnect switch.
2. Slab mounted units with or without a factory installed disconnect switch.

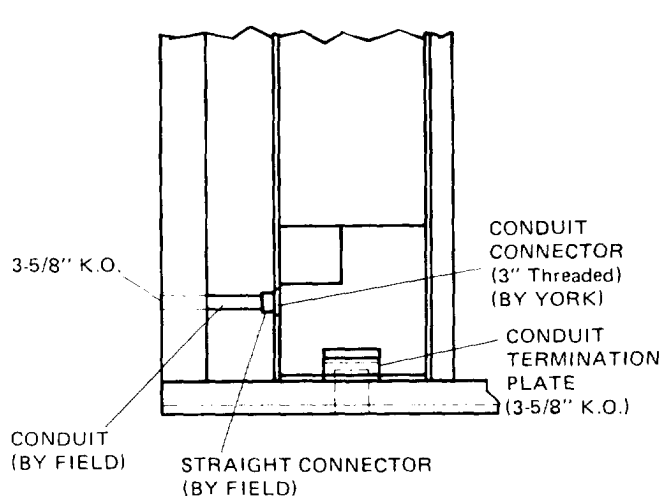


UNITS WITHOUT DISCONNECT

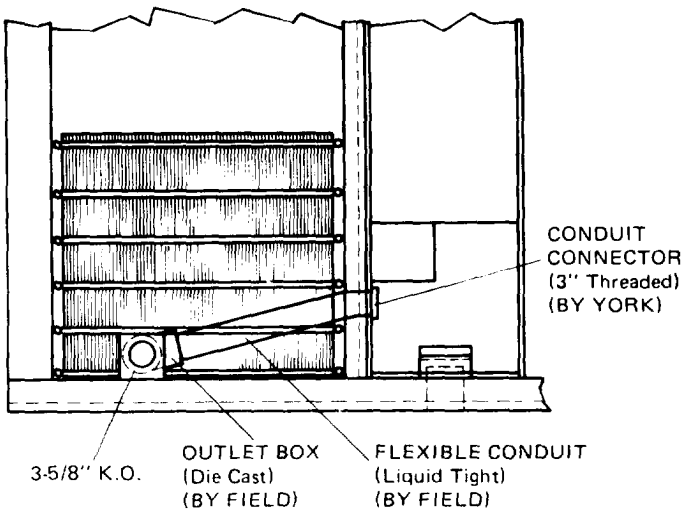


UNITS WITH DISCONNECT

FIG. 5 – BOTTOM POWER WIRING ENTRANCE



MODELS DSC300, 360



MODEL DSC480

FIG. 6 – SIDE POWER WIRING ENTRANCE

CONTROL WIRING (MODELS DSC300, 360)

For bottom entry (Figure 7), the control wiring should be routed:

1. Up through the flexible conduit and the middle deck to the proximity of the hole into the control box.
2. Through the 1-3/8 snap bushing in the condenser evaporator partition and control box.
3. Through the 2 ty-wraps positioned in the control box.
4. Connect the wires to the printed circuit board per Fig. 9, 10 or 11.

For side entry on slab mounted units, the control wiring should be routed:

1. Through the 1-1/8 inch K.O. in the corner post.
2. Through the 1-3/8 snap bushing in the condenser evaporator partition and control box.
3. Through the 2 ty-wraps positioned in the control box.
4. Connect the wires to the printed circuit board per Fig. 9, 10 or 11.

CAUTION: Wiring penetration through the side entry must be sealed to prevent the entrance of water.

CONTROL WIRING (MODEL DSC480)

For bottom entry (Figure 8), the control wiring should be routed:

1. Up through the 2-1/4 inch O.D. tubing behind the control box.
2. Through the positioned ty-wrap on the outside of the control box.
3. Through the 1-3/8 snap bushing in the control box.
4. Through the 2 ty-wraps positioned in the control box.
5. Connect the wiring to the printed circuit board per Fig. 9, 10 or 11.

For side entry on slab mounted units, the control wiring should be routed:

1. Through the 1-1/8 inch K.O. in the intermediate post.
2. Through the 1-3/8 snap bushing in the control box.
3. Through the 2 ty-wraps positioned in the control box.
4. Connect the wiring to the printed circuit board per Fig. 9, 10 or 11.

CAUTION: Wiring penetration through the side entry must be sealed to prevent the entrance of water.

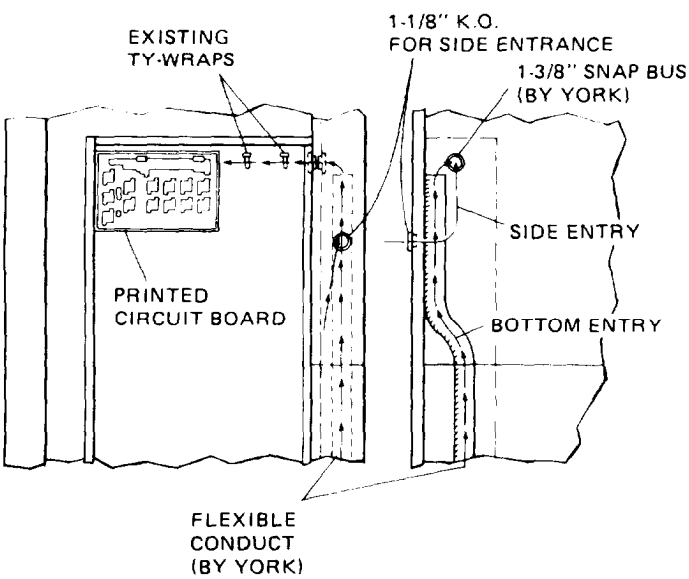


FIG. 7 – CONTROL WIRING ENTRANCE (DSC300, 360)

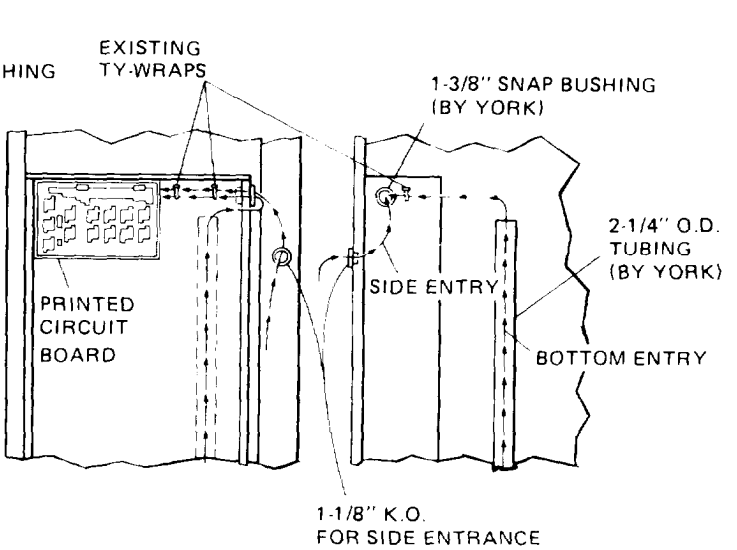
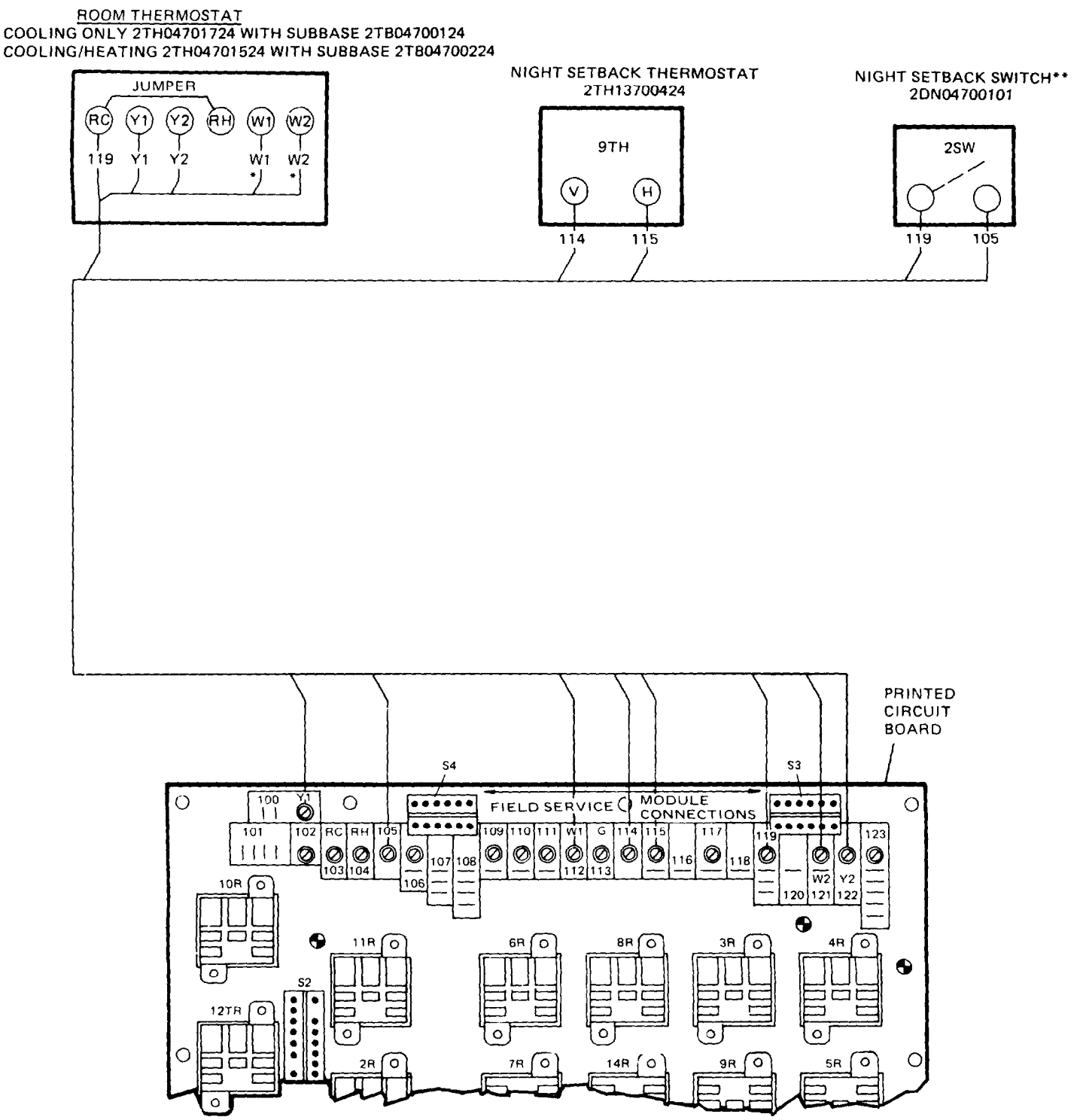
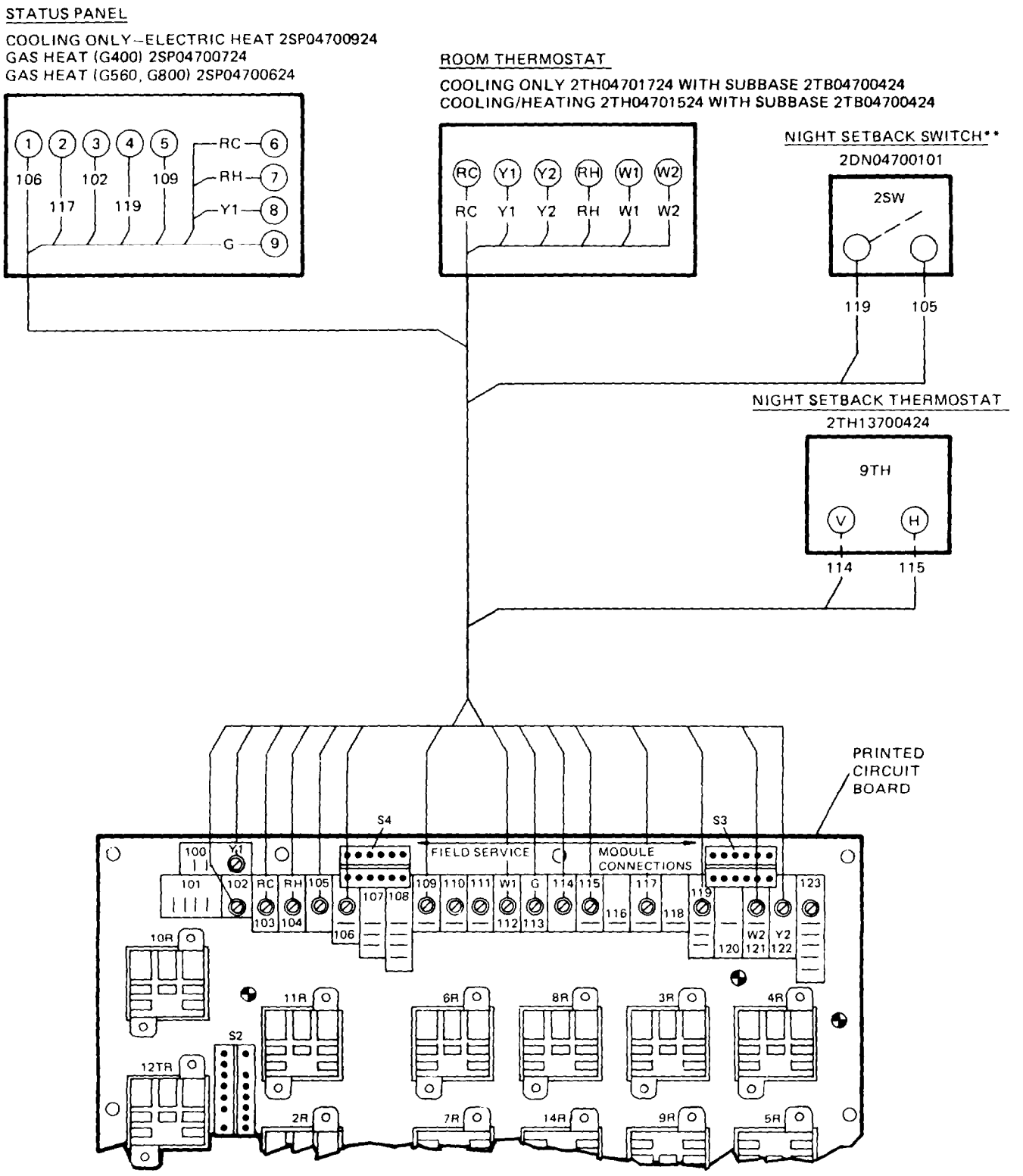


FIG. 8 – CONTROL WIRING ENTRANCE (DSC480)



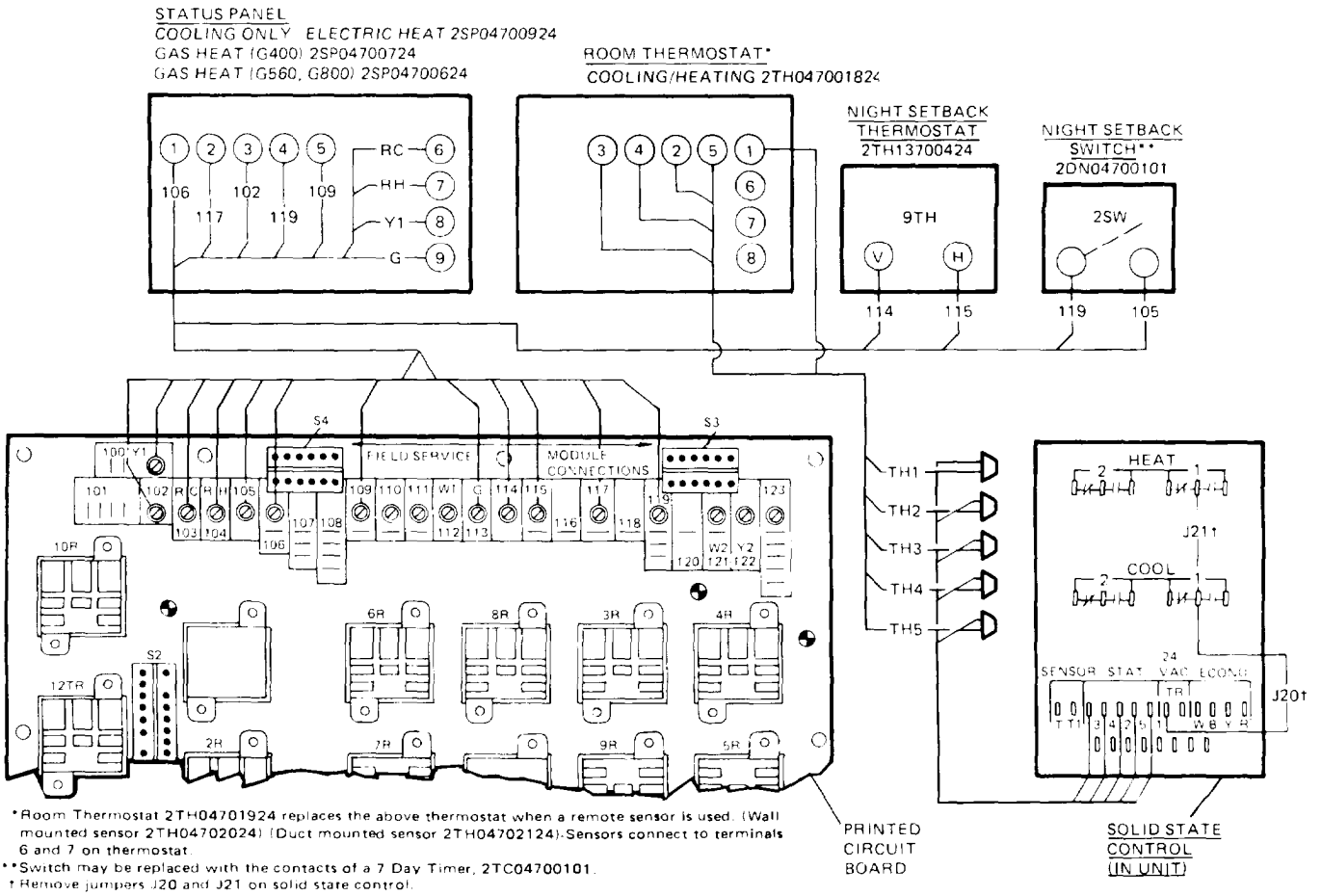
* For a cooling only unit, omit the wires from W1 and W2 to the terminals on the printed circuit board.
**Switch may be replaced with the contacts of a 7-Day Timer, 2TC04700101.

FIG. 9 – CONTROL WIRING CONNECTIONS WITHOUT STATUS PANEL



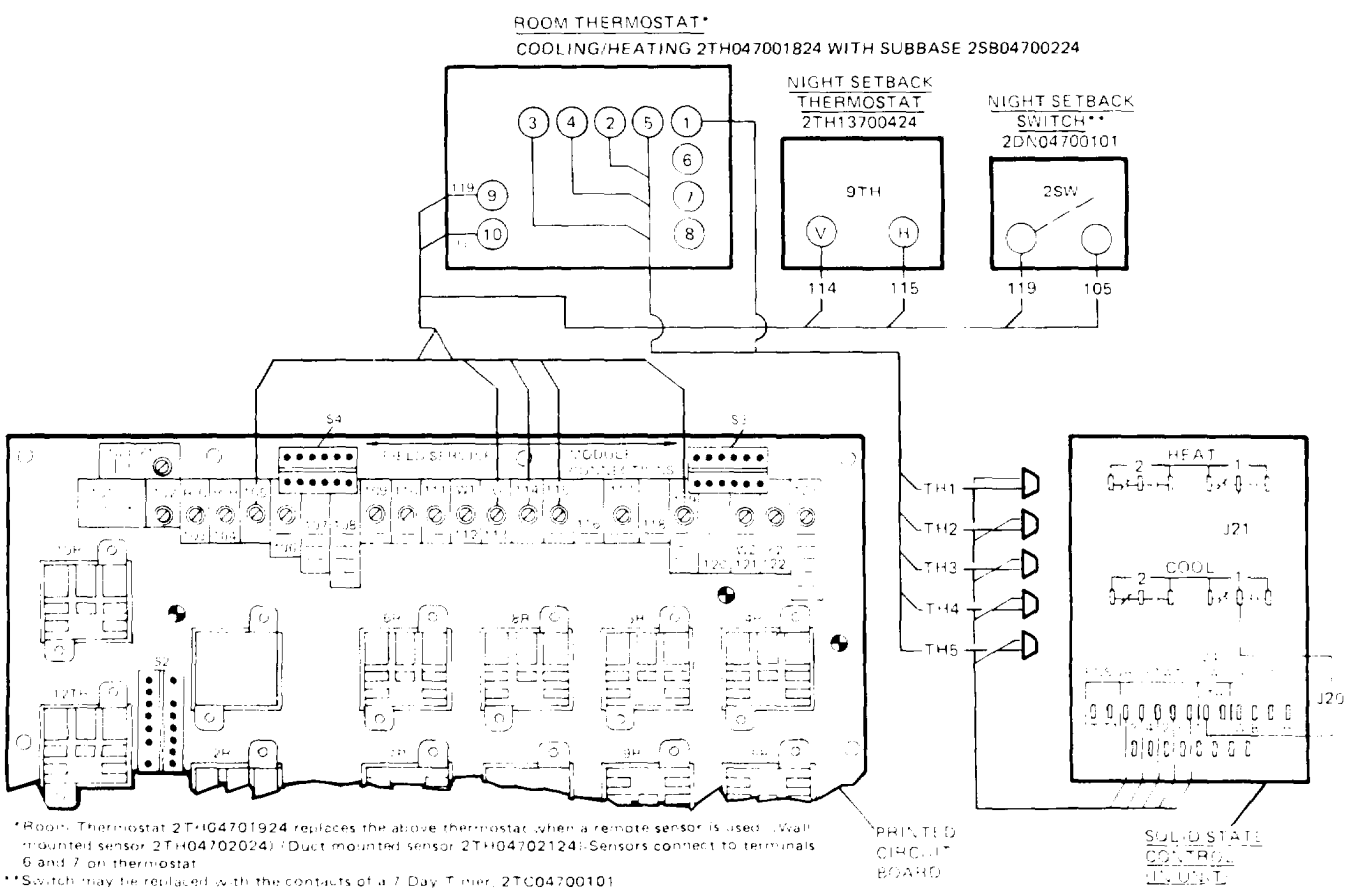
**Switch may be replaced with the contacts of a 7-Day Timer, 2TC04700101.

FIG. 10 – CONTROL WIRING CONNECTIONS WITH STATUS PANEL



*Room Thermostat 2TH04701924 replaces the above thermostat when a remote sensor is used. (Wall mounted sensor 2TH04702024) (Duct mounted sensor 2TH04702124)-Sensors connect to terminals 6 and 7 on thermostat.
**Switch may be replaced with the contacts of a 7 Day Timer, 2TC04700101.
† Remove jumpers J20 and J21 on solid state control.

FIG. 11 – CONTROL WIRING CONNECTIONS– SOLID STATE CONTROL WITH STATUS PANEL



*Room Thermostat 2TH04701924 replaces the above thermostat when a remote sensor is used. (Wall mounted sensor 2TH04702024) (Duct mounted sensor 2TH04702124)-Sensors connect to terminals 6 and 7 on thermostat.
**Switch may be replaced with the contacts of a 7 Day Timer, 2TC04700101.

FIG. 11A – CONTROL WIRING CONNECTIONS – SOLID STATE CONTROL WITHOUT STATUS PANEL

TABLE 3 — ELECTRICAL DATA

Model		Compressors (3 PH)				Supply Air Blw. Mtr. (3 PH)			Condenser Fan Motors (1 Phase)			Exhaust Air Fan Motors (1 Phase)			Unit Ampacity Amps	Max. Over Curr. Dev.[1]	Min. Wire Size[2] AWG/MCM
		Volts	Nominal Tons*	RLA	LRA	Volts	HP	FLA	Volts	HP*	FLA	Volts	HP*	FLA			
DSC300 Without Exhaust Air							7-1/2	25							165		
	17A	208	25 (1)	101	470	200	10	32	200	3/4 (3)	4.2	–	–	–	175	200	2/0
							7-1/2	22							150	175	0
	28A	230	25 (1)	92	470	230	10	28	230	3/4 (3)	4.2	–	–	–	160	200	2/0
							7-1/2	11							80	90	
	46A	460	25 (1)	46	235	460	10	14	460	3/4 (3)	2.4	–	–	–	80	100	3
							7-1/2	9							65		
	58A	575	25 (1)	37	200	575	10	11	460[3]	3/4 (3)	2.4	–	–	–	65	80	4
DSC300 With Exhaust Air							7-1/2	25							175	200	2/0
	17A	208	25 (1)	101	470	200	10	32	200	3/4 (3)	4.2	200	3/4 (2)	4.2	180	225	3/0
							7-1/2	22							160		
	28A	230	25 (1)	92	470	230	10	28	230	3/4 (3)	4.2	230	3/4 (2)	4.2	165	200	2/0
							7-1/2	11							85		
	46A	460	25 (1)	46	235	460	10	14	460	3/4 (3)	2.4	460	3/4 (2)	2.4	90	100	3
							7-1/2	9							70		
	58A	575	25 (1)	37	200	575	10	11	460[3]	3/4 (3)	2.4	460[3]	3/4 (2)	2.4	70	80	4
DSC360 Without Exhaust Air							10	32							210	250	
	17A	208	30 (1)	126	565	200	15	48	200	1/2 (6)	3.4	–	–	–	230	300	4/0
							10	28							205		
	28A	230	30 (1)	122	565	230	15	42	230	1/2 (6)	3.4	–	–	–	215	250	4/0
							10	14							105		
	46A	460	30 (1)	61	283	460	15	21	460	1/2 (6)	2.0	–	–	–	110	125	2
							10	11							85	100	
	58A	575	30 (1)	49	230	575	15	17	460[3]	1/2 (6)	2.0	–	–	–	95	110	2
DSC360 With Exhaust Air							10	32							220	250	4/0
	17A	208	30 (1)	126	565	200	15	48	200	1/2 (6)	3.4	200	3/4 (2)	4.2	235	300	250
							10	28							210	250	
	28A	230	30 (1)	122	565	230	15	42	230	1/2 (6)	3.4	230	3/4 (2)	4.2	225	100	4/0
							10	14							110	125	2
	46A	460	30 (1)	61	283	460	15	21	460	1/2 (6)	3.0	460	3/4 (2)	2.4	115	150	1
							10	11							90	110	2
	58A	575	30 (1)	49	230	575	15	17	460[3]	1/2 (6)	2.0	460[3]	3/4 (2)	2.4	100	110	1
DSC480 Without Exhaust Air							15	48							255		250
	17A	208	20 (2)	83	428	208	20	59	200	1/2 (6)	3.4	–	–	–	270	300	300
							15	42							245		
	28A	230	20 (2)	80	428	230	20	54	230	1/2 (6)	3.4	–	–	–	255	300	250
							15	21							125		
	46A	460	20 (2)	40	214	460	20	27	460	1/2 (6)	2.0	–	–	–	130	150	1
							15	17							105		
	58A	575	20 (2)	33	160	575	20	22	460[3]	1/2 (6)	2.0	–	–	–	110	125	2
DSC480 With Exhaust Air							15	48							270	300	
	17A	208	20 (2)	83	428	208	20	59	200	1/2 (6)	3.4	200	3/4 (3)	4.2	280	350	300
							15	42							255		250
	28A	230	20 (2)	80	428	230	20	54	230	1/2 (6)	3.4	230	3/4 (3)	4.2	270	300	300
							15	21							135		
	46A	460	20 (2)	40	214	460	20	27	460	1/2 (6)	2.0	460	3/4 (3)	2.4	140	150	1/0
							15	17							115		2
	58A	575	20 (2)	33	160	575	20	22	460[3]	1/2 (6)	2.0	460[3]	3/4 (3)	2.4	120	125	1

*Quantity per unit.

[1] Dual element, time delay fuse or inverse time circuit breakers.

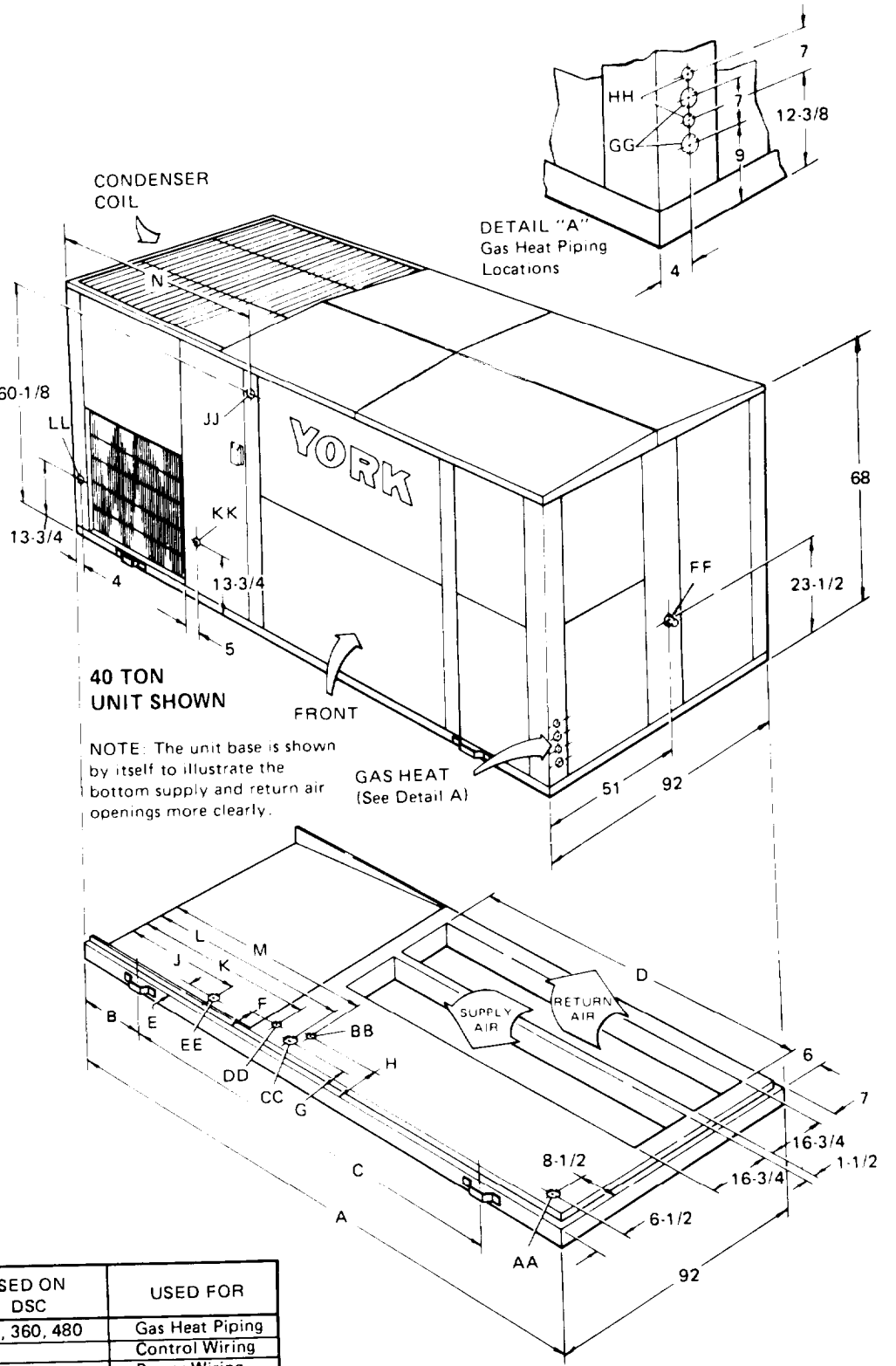
[2] Based on three 75°C insulated copper conductors in steel conduit.

[3] A 575 to 460 volt transformer is provided for these condenser and exhaust fan motors.

MINIMUM CLEARANCES	
FRONT	
Control Box Side	36"
REAR	36"
LEFT SIDE	
Condenser Coil	36"
RIGHT SIDE	
Cooling Only Units	36"
Electric Heat Units	36"
Gas Heat Units	90"
BOTTOM	0"
TOP	120"

All dimensions are in inches. They are subject to change without notice. Certified dimensions will be provided upon request.

DIM.	MODEL DSC		
	300	360	480
A	141	164	184
B	17	32	32
C	107	100	120
D	100	100	120
E	4-5/8	4-5/8	–
F	5	5	–
G	–	–	5-5/8
H	–	–	11-1/4
J	19	42	–
K	32-1/2	55-1/2	–
L	–	–	65
M	–	–	73
N	34-3/8	57-3/8	77-1/2



HOLE	OPENING SIZE & TYPE	USED ON DSC	USED FOR
AA	4-1/2 Dia. Sleeve	300, 360, 480	Gas Heat Piping
BB	2-1/4 Dia. Sleeve	480	Control Wiring
CC	4-1/2 Dia. Sleeve	480	Power Wiring
DD	2-1/4 Dia. Sleeve	300, 360	Control Wiring
EE	4-1/2 Dia. Sleeve	300, 360	Power Wiring
FF	1-1/2 Pipe	300, 360, 480	Drain Conn.
GG	2-5/8 KO	300, 360, 480	Gas Heat Piping[1]
HH	2-3/8 KO	300, 360	Gas Heat Piping[2]
JJ	1-1/8 KO	300, 360, 480	Control Wiring
KK	3-5/8 KO	480	Power Wiring
LL	3-5/8 KO	300, 360	Power Wiring

1 Heating Option G560 & G800.
2 Heating Option G400

FIG. 12 – UNIT DIMENSIONS

CES

Refer to the following accessory instructions for additional control wiring information.

Firestat	– Form 690.50-N1
Status Panel	– Form 530.11-N10.1
Low Ambient Kit	– Form 530.25-N1.7
Pumpdown Kit	– Form 530.25-N1.8
Night Setback Kit	– Form 530.11-N10.4

DUCT CONNECTIONS

The supply and return air duct can be connected to the support angles which are part of the roof curb package. This allows the installation of the duct work and roof curb before installing the unit. All duct connections are contained within the roof curb. Refer to Fig. 13 for duct connection dimensions for the bottom side-by-side arrangement.

Refer to Form 55.70-N1 for suggested means of installing and insulating ducts.

When a unit is used with a ceiling plenum return air system, sound may be transmitted from the unit thru the ceiling to the conditioned space. For such applications, there must be a sound absorption chamber installed on the unit return air inlet as shown in Figure 14. In this way, sound generated by the unit is absorbed in the chamber and not transmitted to the conditioned space. The chamber may be constructed of fiberglass duct or metal duct lined with sound absorption material. Ceiling return grilles should be located a minimum of 12 feet from the end of the sound chamber. In every installation a return air duct must be installed to the unit.

FILTERS

All filters being used in these units are 2" thick. Throwaway filters or 55% efficient bag type filters are available as factory options. Cleanable filters or 30% efficient throwaway filters are available as accessories. The cleanable filters have an aluminum mesh media that may be cleaned in hot water or steam, reoiled and reused indefinitely. The 30% and 55% efficient filters are available to meet specifications for improved air filtration. Refer to Table 4 for filter sizes and quantities.

TABLE 4 – FILTER REQUIREMENTS

Unit Model	2" Throwaway 2" Cleanable 2" 30%	55% Bag
DSC300	(10) 2 x 20 x 25	(4) 12 x 20 x 24 (4) 12 x 24 x 24
DSC360	(6) 2 x 20 x 25 (9) 2 x 20 x 20	(4) 12 x 20 x 24 (4) 12 x 24 x 24
DSC480	(6) 2 x 20 x 25 (12) 2 x 20 x 20	(5) 12 x 20 x 24 (5) 12 x 24 x 24

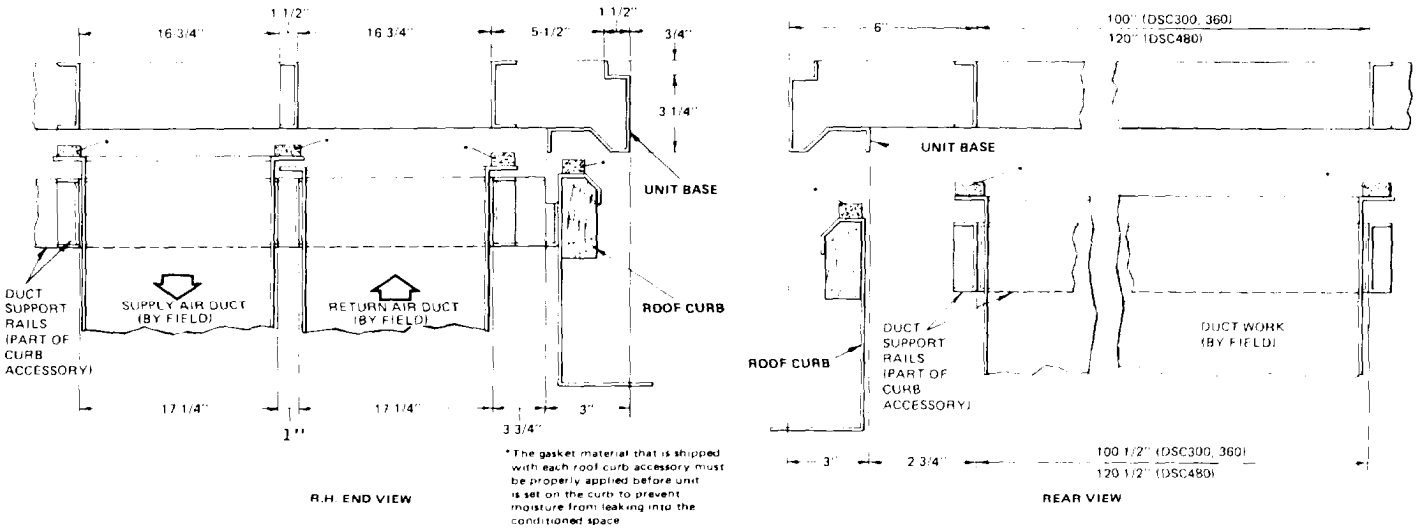


FIG. 13 – DUCT CONNECTIONS

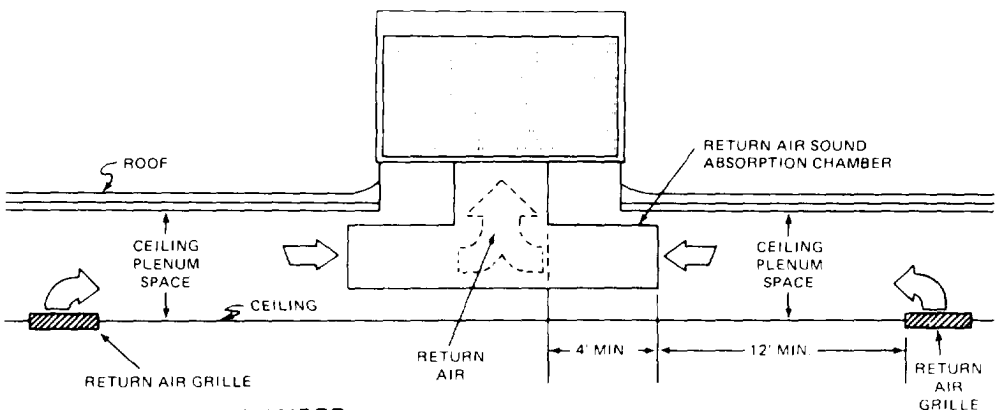


FIG. 14 – SOUND ABSORPTION CHAMBER

ECONOMIZER RAIN HOOD OPTION

The outdoor and return air dampers, the spring-return damper actuator, the linkage, the enthalpy changeover control, the mixed air temperature control and the minimum position potentiometer with manual auto switch are factory mounted as part of the economizer option. The rain hood is shipped in a separate package and must be assembled to the unit per the assembly instructions in Form 530.25-N1.4.

CAUTION: Never operate the unit without installing the hood or moisture will be drawn into the unit.

FIXED OUTSIDE AIR RAIN HOOD

The fixed outdoor air damper with a manual adjustment arm is factory mounted on all units without the economizer option. The rain hood is shipped in a separate package and must be assembled to the unit per the assembly instructions in Form 530.25-N1.3.

CAUTION: Never operate the unit without installing the hood or moisture will be drawn into the unit.

EXHAUST AIR RAIN HOOD OPTION

The barometric exhaust dampers, the powered propeller exhaust fan and the damper motor end switch are factory installed and wired as part of the exhaust air option. The rain hood is shipped in a separate package and must be assembled to the unit per the assembly instructions in Form 530.25-N1.2.

NOTE: The exhaust hood for the DSC 480 is shipped in two packages.

CAUTION: Never operate the unit without installing the hood or moisture will be drawn into the unit.

OPERATION

ELECTRO-MECHANICAL CONTROLS

The operation of these units can be divided into four systems.

1. Economizer System (optional)
2. Heating System (optional)
3. Cooling System
4. Exhaust Air (optional)

ECONOMIZER SYSTEM

The Economizer System consists of:

1. Outdoor and return air dampers.
2. Damper Actuator (Spring Return).
3. Enthalpy Control - 5TH.
4. Mixed Air Controller - 1RH.
5. Minimum outside air adjustor (potentiometer) - 2RH.

The Economizer System provides the first stage of cooling whenever the outside air is cool and dry enough to satisfy the internal cooling demand. The outside and the return air dampers are mechanically linked and are modulated by the spring return damper actuator. As the outside air dampers are opened by the damper actuator, the return air dampers are closed.

When the enthalpy control (5TH) senses outside air temperatures per Table 5, the outside air dampers close to their minimum position. The minimum position of the outside air dampers is determined by the set point of the minimum outside air adjustor (2RH) located in the terminal box of the damper motor.

The enthalpy control (5TH) is factory set. It senses both temperature and humidity and varies its setting so as to limit the introduction of outside air. As noted in Table 5 below, the control will not allow outside air to enter the unit during high humidity conditions except at a lower outside temperature. During dry conditions, air is introduced at a higher ambient.

The outside and the return air dampers are controlled by a proportional type, mixed-air controller (1RH) which senses the temperature of the air leaving the evaporator coil. The dampers can modulate anywhere from their minimum outside position to 100% open in attempting to maintain the temperature setting of 1RH. If the indoor space temperature rises, TC2 will close and the No. 1 compressor will be energized through the 5R relay contacts to provide second stage cooling.

TABLE 5 – ENTHALPY CONTROL (SET POINT "B")

OUTDOOR DRY BULB TEMP. °F	% RELATIVE HUMIDITY
62	80
67	60
71	40
73	20
74	10

DAMPER LINKAGE ADJUSTMENT

After power has been supplied to the unit, the outside and return air dampers should be checked to make sure they operate freely and close tightly. It may be necessary to readjust the linkage between the damper motor and the blades due to loosening in shipment.

Readjust linkage as follows:

1. Turn the minimum outside air adjustor to the 100% outside air position. All return air damper blades should be fully closed. Be sure that the spring-return damper actuator has completed its stroke (stopped running). If not, loosen the drive rod bolt and let the damper motor drive the crankarm until the motor stops running. Retighten the drive rod bolt to secure the drive rod.

2. Turn the minimum outside air adjustor to the 0% outside air position. All outside air damper blades should be fully closed. The linkage connecting the outside air and the return air dampers must move freely.

3. Return the minimum outside air adjustor to the 100% outside air position and check for complete freedom of linkage movement as the return air dampers close.

4. Set the minimum outside air adjustor for the minimum ventilation requirement of the job.

HEATING SYSTEM

Two different types of heat are offered as factory-mounted options. Refer to the appropriate instruction for information on the heating system.

Gas-Fired Heating Option – Form 530.25-N1.1
Electric Heating Option – Form 530.25-N1.9

COOLING SYSTEM

These units have nominal cooling capacities of 25, 30 and 40 tons. The DSC300 and DSC360 units have one semi-hermetic compressor. Two cooling stages are accomplished by unloading the compressor. The DSC480 unit has two semi-hermetic compressors. Two cooling stages are accomplished by cycling the individual compressors.

Normal sequence of operation is as follows:

1. Power is supplied to the unit through the disconnect switch. The switch can be field installed or factory-installed as an option.

2. As soon as power is supplied to the unit, the compressor crankcase heaters 1TH (and 2TH) will be energized.

   CAUTION: Do not attempt to start the compressors without at least 8 hours of crankcase heat or compressor damage will occur.

3. The system switch on the room thermostat or the status panel must be in the AUTO or COOL position to complete the circuit between the terminals 119 and 103/RC.

4. On demand of the room thermostat for cooling, contact TC1 closes and energizes 1R coil.

5. An internal connection in the thermostat or status panel energizes 7R coil. 7R contact closes energizing 3M coil. 3M contacts close, starting the supply air fan motor. After an adequate air flow is established, 5 LP closes to energize 6R coil. 6R contact closes in the compressor control circuit.

   NOTE: The above operation is for intermittent fan operation. For continuous operation, the fan switch on the room thermostat or the status panel should be manually closed to energize 7R.

6. Relay contact 1R closes and energizes 1M coil, which starts the No. 1 compressor. At the same time, 4M coil is energized to start the condenser fans.

7. If the room temperature continues to rise, contact TC2 closes and energizes 2R coil.

8. On DSC480 units the 2R contacts close, energizing the 2M coil which starts the No. 2 compressor or on DSC300 and DSC360 units the 2R contacts close de-energizing the compressor unloading solenoid which loads the compressor.

9. The compressor short cycle time and low voltage protection is part of the solid state compressor protection module. It prevents a compressor from starting unless it has been off for five minutes. It also monitors the voltage of the 120 volt control circuit and will shut down the compressor if the 120 volt control voltage drops below 85±4.5 volts.

10. To maintain sufficient head pressure during low ambient operation, condenser fan No. 1 on the DSC300 unit and condenser fans No. 1 and No. 2 on the DSC360 and DSC 480 units will be de-energized by 1TH. Condenser fan No. 2 on the DSC300 unit and condenser fans No. 3 and 4 on the DSC360 and DSC480 will be de-energized by 2TH (see Table 6).

EXHAUST AIR SYSTEM

The exhaust air fans are energized by manually closing a circuit between terminals 60 and 64 of terminal block 2TB or automatically by an end switch on the economizer damper motor. As the economizer damper opens, it closes the end switch on the damper motor and turns on the exhaust air fans. The degree of blade opening at which the exhaust fans are energized can be adjusted by the following procedure.

1. Use the black scale plate as an indicator of motor position for switch operation.

2. Loosen the thumb nut and the cam locking screws.

3. Set the operational and differential cams.

4. Check switch adjustment by moving the adjustor 2RH to move the motor. Switch should click when desired make and break points are lined up with index mark and the exhaust fan should start and stop.

WARNING: 120 volt power is connected to the switch.

5. Tighten thumb nut.

SOLID STATE CONTROLS

A Honeywell W973 solid state logic panel controls the economizer motor and stages of cooling and heating in response to a signal from a dual set point thermostat located in the controlled space or a dual set point transmitter with a remote sensor located in the controlled space. To maintain stable space temperatures, the logic panel balances the space thermostat demand signal against the system output. System output is measured by a temperature sensor located on the discharge air duct. The combined demand and output signals determine the economizer position and the number of heating or cooling stages energized. The discharge sensor also provides a positive modulating low limit signal to the logic panel, insuring that the economizer will modulate closed if discharge air gets too cold.

On a power failure, all stages go off and the damper motor goes to the 0% outside air position. When power is restored, the required stages sequence on with a time delay between stages.

The operation of these units can be divided into four systems.

1. Economizer System (optional)
2. Heating System (optional)
3. Cooling System
4. Exhaust Air (optional)

ECONOMIZER SYSTEM

The Economizer System consists of:

1. Outdoor and return air dampers.
2. Damper Actuator (Spring Return).
3. Enthalpy Control - 5TH.
4. Minimum outdoor air adjustor (potentiometer) - 2RH.

The Economizer system provides the first stage of cooling whenever the outdoor air is cool and dry enough to satisfy the internal cooling demand. The outdoor and the return air dampers are mechanically linked and are mounted by the spring return damper actuator. As the outdoor air dampers are opened by the damper actuator the return air dampers are closed.

When the enthalpy control (5TH) senses outdoor air temperatures per Table 5, the outdoor air dampers close to their minimum position. The minimum position of the outdoor air dampers is determined by the set point of the minimum outdoor air adjustor (2RH). The minimum outdoor air adjuster is factory mounted in the top of the damper motor.

The enthalpy control (5TH) is factory set. It senses both temperature and humidity and varies its setting so as to limit the introduction of outdoor air. As noted in Table 5, the control will not allow outdoor air to enter the unit during high humidity conditions except at a lower outdoor temperature. During dry conditions, air is introduced at a higher ambient.

The outdoor and return air dampers are controlled by the logic panel. The discharge sensor acts as a modulating low limit which senses the temperature of the air leaving the evaporator coil. If at any time during the cooling cycle the discharge air temperature drops to 62°F, the economizer motor starts to modulate closed. The economizer motor will be at minimum position when discharge air temperature is 50°F.

If the economizer cannot satisfy the space demand for cooling, mechanical cooling stages are energized as needed.

DAMPER LINKAGE ADJUSTMENT

After power has been supplied to the unit, the outside and return air dampers should be checked to make sure they operate freely and close tightly. It may be necessary to readjust the linkage between the damper motor and the blades due to loosening in shipment.

Readjust linkage as follows:

1. Turn the minimum outside air adjustor to the 100% outside air position. All return air damper blades should be fully closed. Be sure that the spring-return damper actuator has completed its stroke (stopped running). If not, loosen the drive rod bolt and let the damper motor drive the crankarm until the motor stops running. Retighten the drive rod bolt to secure the drive rod.

2. Turn the minimum outside air adjustor to the 0% outside air position. All outside air damper blades should be fully closed. The linkage connecting the outside air and the return air dampers must move freely.

3. Return the minimum outside air adjustor to the 100% outside air position and check for complete freedom of linkage movement as the return air dampers close.

4. Set the minimum outside air adjustor for the minimum ventilation requirement of the job.

HEATING SYSTEM

Two different types of heat are offered as factory-mounted options. Refer to the appropriate instruction for information on the heating system.

Gas-Fired Heating Option	– Form 530.25-N1.1
Electric Heating Option	– Form 530.25-N1.9

COOLING SYSTEM

These units have nominal cooling capacities of 25, 30 and 40 tons. The DSC300 and DSC360 units have one semi-hermetic compressor. Two cooling stages are accomplished by unloading the compressor. The DSC480 unit has two semi-hermetic compressors. Two cooling stages are accomplished by cycling the individual compressors.

When the temperature in the conditioned space rises above the thermostats cooling set point, the thermostat sends a modulating voltage signal to the logic panel. The thermostat signal is modified by a signal from the discharge sensor, which is mounted in the discharge air duct to provide anticipation to the system. The logic panel responds to the combined thermostat discharge sensor signal by activating the minimum amount of cooling to satisfy the thermostat demand.

Normal sequence of operation is as follows:

1. Power is supplied to the unit through the disconnect switch. The switch can be field-installed or factory-installed as an option.

2. As soon as power is supplied to the unit the compressor crankcase heaters 1TH (and 2TH) will be energized.

CAUTION: Do not attempt to start the compressors without at least 8 hours of crankcase heat or compressor damage will occur.

3. The system switch on the room thermostat or the status panel must be in the AUTO or COOL position to complete the circuit between the terminals 119 and 103/RC.

4. On demand of the room thermostat for cooling the "Cool 1" contacts on the logic panel close and energizes 1R coil.

5. An internal connection in the thermostat or status panel energizes the 7R coil. 7R contact closes energizing 3M coil. 3M contacts close, starting the supply air fan motor. After an adequate air flow is established, 5 LP closes to energize 6R coil. 6R contact closes in the compressor control circuit.

NOTE: The above operation is for intermittent fan operation. For continuous operation, the fan switch on the room thermostat or the status panel should be manually closed to energize 7R.

6. Relay contact 1R closes and energizes 1M coil, which starts the No. 1 compressor. At the same time, 4M is energized to start the condenser fans.

7. If the room temperature continues to rise, the "Cool 2" contacts on the logic panel close and energizes 2R coil.

8. On the DSC480 units the 2R contacts close, energizing the 2M coil which starts the No. 2 compressor or on the DSC300 and DSC360 units the 2R contacts close de-energizing the compressor unloading solenoid which loads the compressor.

9. The compressor short cycle time and low voltage protection is part of the solid state compressor protection module. It prevents a compressor from starting unless it has been off for five minutes. It also monitors the voltage of the 120 volt control circuit and will shut down the compressor if the 120 volt control voltage drops below 85±4.5 volts.

10. To maintain sufficient head pressure during low ambient operation condenser fan No. 1 on the DSC300 unit and condenser fans No. 1 and 2 on the DSC360 and DSC480 units will be de-energized by 1TH (see Table 6). Condenser fan No. 2 on the DSC300 unit and condenser fans No. 3 and 4 on the DSC360 and DSC480 units will be de-energized by 2TH (see Table 6).

UNIT	1TH	2TH
DSC300	55 + 6°F	25 + 6°F
DSC360	55 + 6°F	25 + 6°F
DSC480	55 + 6°F	35 + 6°F

EXHAUST AIR SYSTEM

The exhaust air fans are energized by manually closing a circuit between terminals 60 and 64 of terminal block 2TB or automatically be an end switch on the economizer damper motor. As the economizer damper opens, it closes the end switch on the damper motor and turns on the exhaust air fans. The degree of blade opening at which the exhaust fans are energized can be adjusted by the following procedure.

1. Use the black scale plate as an indicator of motor position for switch operation.

2. Loosen the thumb nut and the cam locking screws.

3. Set the operational and differential cams.

4. Check switch adjustment by moving the adjustor 2RH to move the motor. Switch should click when desired make and break points are lined up with index mark and the exhaust fan should start and stop.

WARNING: 120 volt power is connected to the switch.

5. Tighten thumb nut.

SUPPLY AIR BLOWER ADJUSTMENT

Knowing the required CFM, the unit options, and the static resistances of both the supply and the return air duct systems, the RPM for the supply air blowers can be determined from the blower performance. (See Table 11.)

Knowing the required blower RPM and the blower motor HP, the setting (turns open) for the supply air motor pulley can be determined from Table 7. The 20 HP drive for the DSC480 has a fixed motor pulley and a fixed speed.

Each motor pulley has:

1. A threaded barrel with two flats (or notched recesses) 180 degrees apart.

2. Either one or two movable flanges, each with two set screws 180 degrees apart.

After the movable flange (or flanges) has been rotated to the proper number of "turns open", the set screws should be tightened against the flats on the barrel to lock the movable flange in place. If the pulley includes a locking collar, the locking collar must be loosened to adjust the setting of the movable flange.

Note the following:

1. The supply air CFM must be within the limitations shown in Table 1.

2. Both movable flanges on a 2-groove pulley must be adjusted to the same setting (turns open) to balance the loading on both belts.

TABLE 7 – SUPPLY AIR SYSTEM ADJUSTMENT

MODEL	TURNS OPEN[1]	RPM			
		7-1/2	10	15	20
DSC300	6	913	1025	–	–
	5	950	1062	–	–
	4	987	1099	–	–
	3	1024	1136	–	–
	2	1061	1173	–	–
	1	1098	1210	–	–
DSC360	6	–	780	924	–
	5	–	812	962	–
	4	–	844	1000	–
	3	–	876	1038	–
	2	–	908	1076	–
	1	–	940	1114	–
DSC480	6	–	–	924	–
	5	–	–	962	–
	4	–	–	1000	–
	3	–	–	1038	–
	2	–	–	1076	–
	1	–	–	1114	1189[2]

[1] Pulleys can be adjusted in half turn increments.
[2] Fixed pulleys, no adjustment.

3. All pulleys can be adjusted in half-turn increments.

4. The tension on each belt shall be adjusted per the following procedure. See Figure 15.

   a. Loosen two nuts (A).

   b. Adjust by turning (B).

   c. Never loosen nuts (C).

   d. Using a belt tension checker, apply a perpendicular force to one belt at the midpoint of the span as shown. The deflection force should be applied until the specified deflection distance is obtained.

      The deflection distance equals 1/64" per inch of span length.

      To determine the deflection distance from normal position use a straight edge from sheave to sheave as a reference line.

      The recommended deflection force is as follows:

BELT SECTION	DEFLECTION FORCE (LBS.)	
	MINIMUM	MAXIMUM
"B"	4	5
"C"	11	14

   e. Tension new belts at the max. deflection force recommended for the belt section. Check the belt tension at least two times during the first 24 hrs. of operation. Any re-tensioning should fall between the min. and max. deflection force values.

   f. After adjusting, retighten nuts (A).

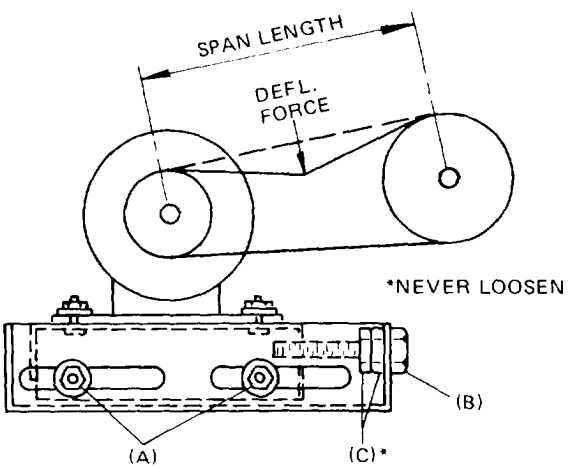


FIG. 15 – TYPICAL MOTOR MOUNTING ASSEMBLY

5. All pulleys are factory aligned.

6. All supply air motor pulleys are factory set at 2 "turns open".

After the pre-start check list has been completed:

1. Start the supply air blowers.

2. Adjust the resistances in both the supply and the return duct systems to balance the air distribution throughout the conditioned space. The job specifications may require that this balancing be done by someone other than the equipment installer.

To check the supply air CFM after the initial balancing has been completed:

1. Drill two 5/16" holes (A & B) as shown in Figure 16.

2. Install two 1/4" O.D. tubes, one between the filters and the air entering side of the evaporator coil and one between the supply air blower(s) and the air leaving side of the evaporator coil.

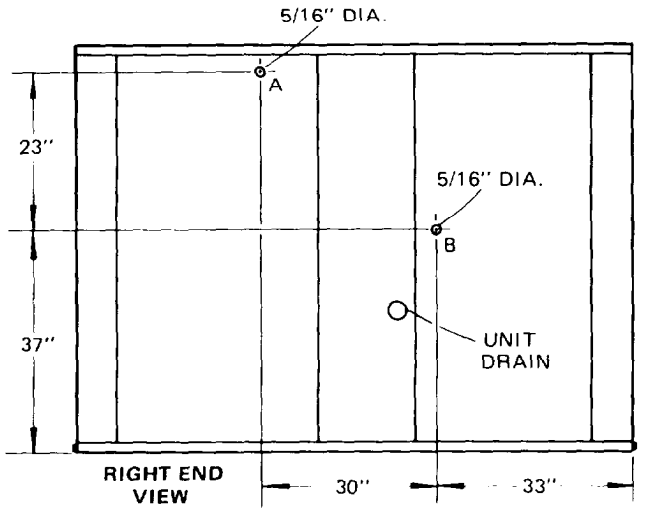


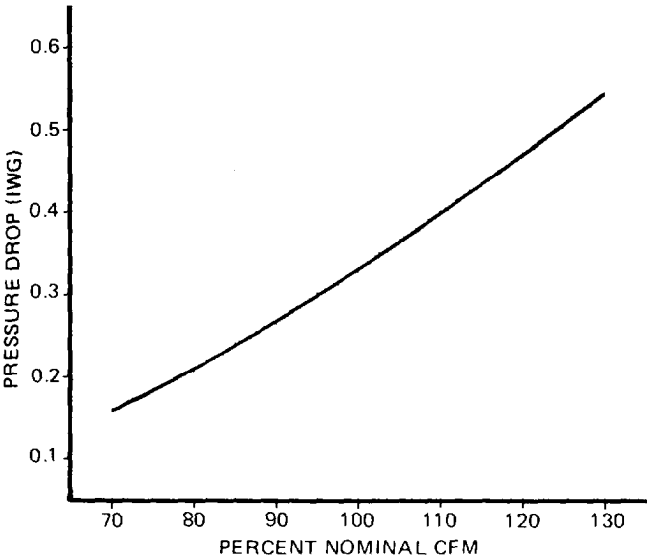
FIG. 16 – HOLE LOCATIONS FOR SUPPLY AIR CFM CHECK

NOTE: To get a proper static pressure reading, the sensing tubes should (A) be inserted through the rear or condensate drain side of the unit (B) be located approximately 6 inches away from the coil surface and as close to the center of the coil height as possible (C) extend into the unit approximately 12 inches.

3. Make sure that the access panels for both the supply air blower motor and the filters are partially secured. These panels do not have to be secured where the 1/4 inch tubes enter the units because the blower and filter compartments operate at a negative pressure.

4. Make sure that the tube openings are perpendicular to the air flow so that velocity pressure will not affect the static pressure readings.

CAUTION: If this method is used, the holes must be sealed with dot plugs (P/N 029-13880) or equivalent to prevent moisture from leaking into the unit.



MODEL	% OF NOMINAL CFM				
	80	90	100	110	120
	C.F.M.				
DSC300	8000	9000	10000	11000	12000
DSC360	9600	10800	12000	13200	14400
DSC480	12800	14400	16000	17600	19200

FIG. 17 – PRESSURE DROP ACROSS A DRY EVAPORATOR COIL VS SUPPLY AIR CFM

5. Using an inclined manometer, determine the pressure drop across a dry evaporator coil. Since the moisture on an evaporator coil may vary greatly, measuring the pressure drop across a wet coil under field conditions would be inaccurate.

NOTE: Disconnect the compressors before taking any test measurements to assure a dry evaporator coil.

6. Knowing the pressure drop across a dry coil, the actual CFM through the unit can be determined from the curve in Figure 17.

If the CFM is above or below the specified value, the supply air motor pulley may have to be readjusted. After one hour of operation, check all belts and pulleys for tightness and alignment.

WARNING: Failure to properly adjust the total system CFM can result in extensive blower damage.

MASTER PRINTED CIRCUIT BOARD & PLUG-IN RELAY ASSEMBLY

All of the control relays that are required for unit operation are mounted on the printed circuit board. Figure 9, 10 or 11 shows this assembly which is located in the main control panel. All of the relays are of the plug-in variety; no wiring connections have to be removed to replace a relay. Since the relays are transparent, the mechanical contact switching can be observed for easier electrical troubleshooting.

The low voltage field wiring is to be connected along the top of the printed circuit board at the eyelet connections. Each terminal is marked both numerically and with letters corresponding to the room thermostat for easier installation.

Two jumper plugs, one red and one white, are located at the top of the board. When they are removed and replaced with the connectors of the service analyzer, the analyzer will override the room thermostat. All system functions such as heating, cooling, economizer, and night set-back can be simulated. Malfunction indicator lights are provided to determine which system has malfunctioned.

CAUTION: When removing the connectors of the service analyzer, the two jumper plugs (one red and one white) must be reinstalled into their proper sockets before the system can function.

The procedure for troubleshooting a unit with a service analyzer connected to its printed circuit board is outlined below.

SERVICE ANALYZER

The analyzer allows complete over-ride control of room thermostat from the units Printed Circuit Board located within the control box of the unit. From this position, the user can operate the system in cooling, heating, fan or economizer operation.

Make the following connections:

1. Prior to connecting the Service Analyzer, disconnect power to the unit (high voltage).

2. Remove the red and white, 12-wire, jumper plug connectors from the field service module connections located at the top of the printed circuit board by squeezing the releases on the sides of the plug. Remove wire 119G from the PCB with solid state controls.

3. Install the female portion of the 12-wire red analyzer plug into the red module connection and the white analyzer plug into the white module connection of the printed circuit board. See Table 8.

NOTE: Make sure that all switches on the service analyzer are in the "OFF" position prior to supplying power to the unit.

TABLE 8 – SERVICE ANALYZER FUNCTION CHART

SYSTEM FUNCTION	SWITCH POSITION					LIGHTS						PROPER OPERATION
	SYSTEM	HEAT	COOL	FAN	N.S.B.	ST. 1 HEAT	ST. 2 HEAT	ST. 1 COOL	ST. 2 COOL	ECON.	FAN	
Economizer 1st Stage	Cool	Off	St. 1 Econ	Auto On	Off	Off	Off	Off	Off	ON	On	Fan on, O.S.A. dampers operate to setting of mixed air control.
Economizer 2nd Stage	Cool	Off	St. 1 St. 2 Econ	Auto On	Off	Off	Off	On	Off	On	On	Fan on, Compr. #1 on, O.S.A. dampers operate to setting of mixed air control.
Compr. 1st Stage	Cool	Off	St. 1 Cpr.	Auto On	Off	Off	Off	On	Off	Off	On	Fan & Compr. #1 on, with O.S.A. dampers open to min. position.
Compr. 2nd Stage	Cool	Off	St. 1 St. 2 Cpr.	Auto On	Off	Off	Off	On	On	Off	On	Fan, Compr. #1,2, run with O.S.A. dampers open to min. position.
Heat 1st Stage	Heat	St. 1	Off	Auto On	Off	On	Off	Off	Off	Off	On	Heat section operates on reduced capacity.
Heat 2nd Stage	Heat	St. 1 St. 2	Off	Auto On	Off	On	On	Off	Off	Off	On	Heat section operates full capacity.
Night Setback (cool)	Cool	Off	St. 1 St. 2 Cpr.	Auto On	On	Off	Off	On	On	Off	Off	No cooling, econ. or fan operation
Night Setback (heat)	Heat	St. 1 St. 2	Off	Auto On	On	On	On	Off	Off	Off	Off	Heat & fan only operate from N.S.B. Thermostat.

FIXED OUTSIDE AIR ADJUSTMENT

To adjust the amount of fixed outside air, see Figure 18. Locate the amount of outside air required and the return duct static on the chart to determine the position in which to set the blades. The blades can be adjusted by varying the position of the adjustment arm on the left side of the fixed outside air damper.

EXHAUST AIR PERFORMANCE

See Figure 19 for the performance of the exhaust air fans. Locate the amount of return duct static on the left hand side of the chart. The amount of air which will be exhausted can be read from the bottom of the chart.

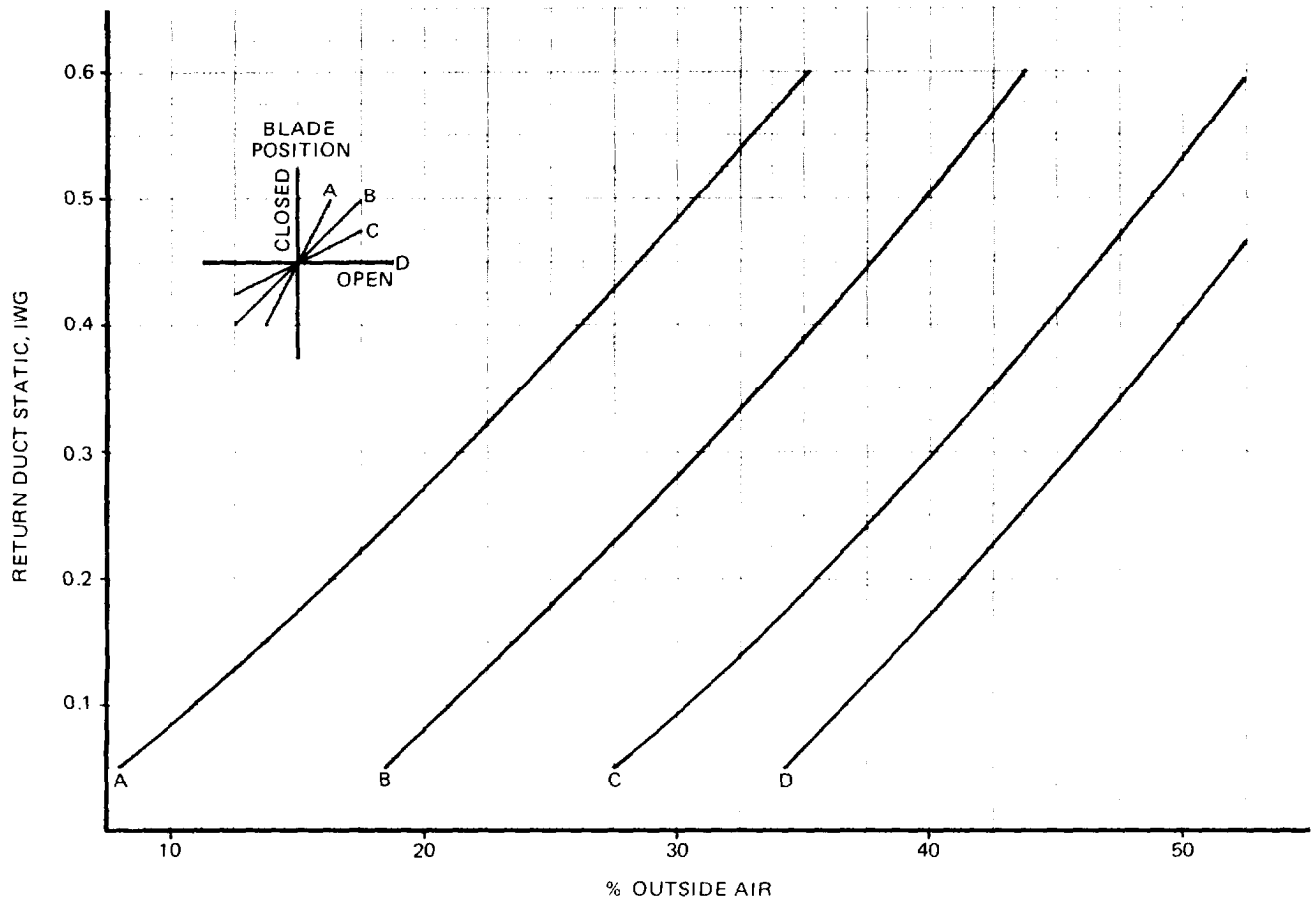


FIG. 18 – FIXED OUTDOOR AIR ADJUSTMENT

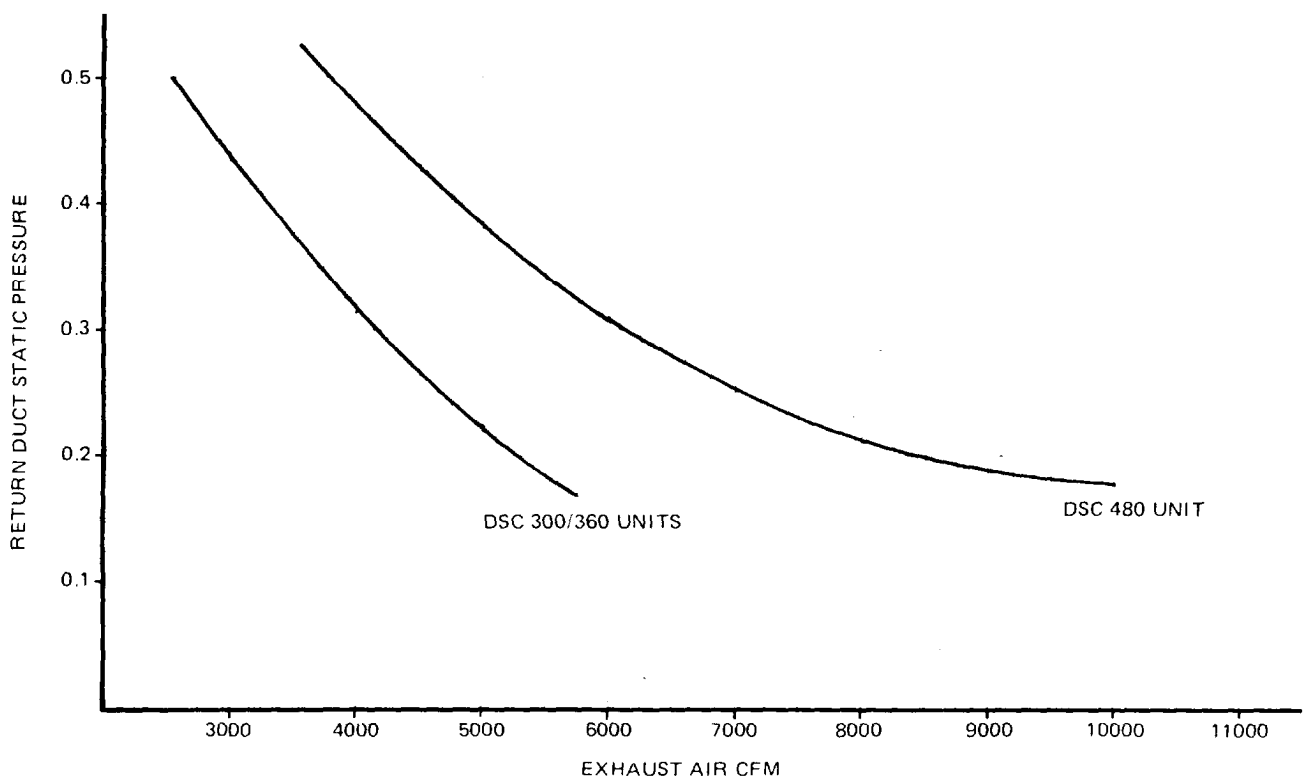


FIG. 19 – EXHAUST AIR PERFORMANCE

TABLE 9 —BLOWER MOTOR AND DRIVE DATA

MODEL DSC	BLOWER RPM RANGE	MOTOR[1]			ADJUSTABLE MOTOR PULLEY		FIXED BLOWER PULLEY		SUPER BELTS		
		HP	SERVICE FACTOR	FRAME SIZE	PITCH DIAMETER, INCHES	BORE INCHES	PITCH DIAMETER, INCHES	BORE INCHES	PITCH LENGTH, INCHES	DESIGNATION	QUANTITY
300	913-1098	7.5	1.15	213T	4.9-5.9	1-3/8	9.4	1-7/16	58.8	B57	2
	1025-1210	10	1.15	215T	5.5-6.5	1-3/8	9.4	1-7/16	58.8	B57	2
360	780-940	10	1.15	215T	4.9-5.9	1-3/8	11	1-15/16	63.8	B62	2
	924-1114	15	1.15	254T	5.8-7.0	1-5/8	11	1-15/16	63.8	B62	2
480	924-1114	15	1.15	254T	5.8-7.0	1-5/8	11	1-15/16	63.8	B62	2
	1189	20	1.15	256T	7.2*	1-5/8	10,6	1-15/16	62.9	C60	2

NOTE: All motors are 1750 RPM, Have Solid Bases, and require starters with overloads, which are factory supplied.
*20 HP drive has a fixed motor pulley.

TABLE 10 —RESISTANCES FOR UNIT OPTIONS AND ACCESSORIES (1WG)

MODEL DSC	OPTION OR ACCESSORY	RESISTANCE (IWG) @ DESIGNATED CFM				
		8000	9000	10000	11000	12000
300	G400, G560 Gas Heat	.015	.019	.024	.029	.034
	E040, 060, 080, 100, 120 Electric Heat	.009	.011	.014	.017	.020
	Exhaust Air	.015	.019	.024	.029	.034
	Return Air Damper for Economizer End Duct Connection	.124	.157	.194	.234	.279
	Return Air Damper for Economizer Side-By-Side Btm. Duct	.053	.068	.083	.101	.120
	2" 30% Efficient Filters[1]	.009	.011	.014	.016	.020
	Bag Type Filters[1]	.068	.086	.107	.129	.154
	End Duct Connection[2]	.100	.126	.156	.188	.224
		9600	10800	12000	13200	14400
360	G400, G560 Gas Heat	.002	.028	.034	.041	.049
	E040, 060, 080, 100, 120 Electric Heat	.013	.016	.020	.024	.029
	Exhaust Air	.022	.028	.035	.042	.050
	Return Air Damper for Economizer End Duct Connection	.179	.226	.279	.338	.402
	Return Air Damper for Economizer Side-By-Side Btm. Duct	.077	.097	.120	.145	.173
	2" 30% Efficient Filters[1]	.007	.009	.011	.014	.016
	Bag Type Filters[1]	.056	.071	.089	.107	.127
	End Duct Connections[2]	.143	.181	.224	.271	.323
		10800	14400	16000	17600	19200
480	G560 Gas Heat	.038	.049	.06	.073	.086
	G800 Gas Heat	.051	.065	.08	.097	.115
	E040, 060, 080, 100, 120 Electric Heat	.026	.032	.04	.048	.058
	Exhaust Air	.032	.041	.05	.061	.072
	Return Air Damper for Economizer Side-By-Side Btm. Duct	.064	.081	.10	.121	.144
	Return Air Damper for Economizer End Duct Connection	.102	.130	.16	.194	.230
	2" 30% Efficient Filters[1]	.007	.011	.015	.018	.021
	Bag Type Filters[1]	.051	.091	.122	.136	.161
	End Duct Connections[2]	.384	.486	.60	.726	.864

[1] These resistances include a deduction for 2" throwaway or cleanable filters.
[2] Add these resistance values to the available static pressure shown in blower performance data table.

TABLE 11—SUPPLY AIR BLOWER PERFORMANCE *

MODEL DSC300

Blower RPM	CFM														
	8000			9000			10000			11000			12000		
	SP	BHP	KW	SP	BHP	KW	SP	BHP	KW	SP	BHP	KW	SP	BHP	KW
900	0.88	4.00	3.50	0.61	4.72	4.10	0.30	5.38	4.67	–	–	–	–	–	–
950	1.08	4.43	3.86	0.82	5.15	4.47	0.53	5.92	5.14	0.17	6.65	5.80	–	–	–
1000	1.30	4.86	4.23	1.05	5.65	4.91	0.77	6.43	5.60	0.42	7.22	6.34	–	–	–
1050	1.52	5.38	4.67	1.29	6.23	5.42	1.03	7.03	6.16	0.69	7.87	6.97	0.27	8.85	7.53
1100	1.75	5.93	5.15	1.53	6.75	5.89	1.28	7.59	6.69	0.95	8.56	7.29	0.55	9.52	8.10
1150	1.97	6.43	5.60	1.76	7.28	6.39	1.53	8.21	7.30	1.22	9.27	7.89	0.84	10.23	8.76
1200	2.20	6.93	6.06	2.00	7.83	6.93	1.78	8.88	7.55	1.49	9.87	8.42	1.11	10.86	9.40

7-1/2 HP Motor and Drive maximum 8.65 HP

10 HP Motor and Drive maximum 11.5 HP

MODEL DSC360

Blower RPM	CFM														
	9600			10800			12000			13200			14400		
	SP	BHP	KW	SP	BHP	KW	SP	BHP	KW	SP	BHP	KW	SP	BHP	KW
800	0.97	4.71	4.09	0.76	5.46	4.71	0.48	6.16	5.30	–	–	–	–	–	–
850	1.18	5.31	4.59	1.00	6.12	5.26	0.74	6.87	5.89	0.30	7.67	6.57	–	–	–
900	1.40	5.88	5.06	1.24	6.79	5.83	1.00	7.50	6.43	0.57	8.42	7.17	0.35	9.31	7.92
950	1.67	6.60	5.67	1.53	7.73	6.62	1.29	8.36	7.13	0.86	9.25	7.87	0.65	10.43	8.96
1000	1.96	7.38	6.33	1.82	8.29	7.07	1.58	9.14	7.77	1.16	10.00	8.53	0.95	11.15	9.69
1050	2.23	8.04	6.87	2.09	9.00	7.66	1.88	9.92	8.46	1.46	11.00	9.54	1.26	12.12	10.59
1100	2.50	8.63	7.35	2.38	9.65	8.22	2.17	10.80	9.34	1.78	12.05	10.53	1.58	13.20	11.71

10 HP Motor and Drive maximum 11.5 HP

15 HP Motor and Drive maximum 17.25 HP

MODEL DSC480

Blower RPM	CFM														
	12800			14400			16000			17600			19200		
	SP	BHP	KW	SP	BHP	KW	SP	BHP	KW	SP	BHP	KW	SP	BHP	KW
900	1.12	8.84	7.55	0.75	10.11	8.76	0.30	11.59	10.03	–	–	–	–	–	–
950	1.42	9.73	8.44	1.05	11.17	9.66	0.60	12.73	11.02	–	–	–	–	–	–
1000	1.72	10.59	9.16	1.36	12.19	10.55	0.92	13.78	11.96	0.42	15.45	13.49	–	–	–
1050	2.00	11.50	9.95	1.66	13.16	11.40	1.23	14.78	12.86	0.76	16.56	14.53	0.21	18.45	16.23
1100	2.30	12.27	10.62	1.98	14.10	12.24	1.58	15.83	13.84	1.10	17.61	15.49	0.55	19.54	17.28
1150	2.62	13.16	11.38	2.33	15.00	13.06	1.93	16.93	14.87	1.47	18.74	16.50	0.92	20.60	18.38
1190	2.89	13.79	11.97	2.60	15.73	13.75	2.22	17.70	15.57	1.76	19.58	17.32	1.25	21.52	19.36

15 HP Motor and Drive maximum 17.25 HP

20 HP Motor and Drive maximum 23 HP

NOTE: SP – Available Static Pressure in IWG to overcome the resistance of additional unit options and accessories and anything external to the unit.

*Unit resistance is based on a "Cooling Only" unit with wet evaporator coil, 2" throwaway or cleanable filters, no and/or fixed outside air, and bottom side x side duct connections.

START-UP

CRANKCASE HEATERS

It is important that the crankcase heaters be energized 8 hours before starting the compressors. To energize the crankcase heaters, the room thermostat or status panel system switch must be open to prevent the compressor from starting. If a disconnect switch is installed outside the unit, turn it to "ON". The non-fused disconnect (optional) located in the unit's main supply panel must also be turned "ON".

CAUTION: Do not attempt to start the compressors without at least 8 hours of crankcase heat or compressor damage will occur.

SAFETY AND SERVICE FEATURES

The control circuit includes the following safety features:

1. The supply air blower motor is protected with manual reset starter overload protectors.
2. The condenser fan motors have inherent protection.with automatic reset.
3. The primary winding of transformer 1T is protected by fuse 12FU. The secondary winding and the 115 volt control circuit are protected by fuse 13FU.
4. All safety controls in the 115 volt circuit have the "return" or "common" side of the 1T transformer grounded. Fuse 13FU will "BLOW" whenever a dangerous condition occurs. The unit casing is also grounded.
5. The wiring to each compressor motor, each condenser fan motor and the supply air blower motor are individually fused according to the National Electrical Standards.
6. The compressor(s) are protected by a 100 watt immersion type crankcase heater(s). Heater(s) are energized whenever power is supplied to the unit. When the compressor(s) are energized, the heater(s) are turned off.

CAUTION: Do not attempt to start the compressors without at least 8 hours of crankcase heat or compressor damage will occur.

7. Each refrigeration system has a low pressure cutout (1LP for system No. 1 and 2LP for system No. 2) to shut down the compressor due to loss of refrigerant charge or a build up of frozen condensate on the compressor before the suction valve and are set to open when the suction pressure drops to 7 psig. These controls will automatically reset when the suction pressures rise to 22 psig. The opening of the low pressure cutouts will activate the lockout circuit.
8. High pressure cutouts (1HP for system No. 1 and 2HP for system No. 2) are located in each system on the compressor before the discharge valve. Should a system discharge pressure exceed 398 psig, the control will open and de-energize the compressor. The pressure cutout will close when the discharge pressure drops to 310 psig. The opening of the high pressure cutout will activate the lockout circuit. The high pressure cutouts may open due to a dirty or restricted condenser coil, loss of air flow or too high an ambient air temperature.
9. The lockout circuits mentioned above will not be energized during normal operation because they have a high resistance. The flow of electricity will normally follow the path of least resistance through the compressor contactors 1M and 2M. If, however, a low or high pressure cutout opens, the lockout relay 10R or 11R will be energized. Since the voltage across 10R or 11R will exceed 100V, the voltage across 1M or 2M will be too low to pull in the contactors. The normally closed contacts of 10R or 11R will open the circuit in series with the low or high pressure cutout. When these contacts automatically close, the lockout circuit can be reset by interrupting the control circuit at the room thermostat. Two advantages are gained by this circuit:
   a. Prevents rapid cycling of the compressors which can be damaging.
   b. The alternate use of manual reset cutoffs avoids the problem above but may require an expensive service call to reset these controls.
10. Freezestat 3TH senses the suction temperature of the No. 1 system and will shut down compressor(s) when this temperature drops to 32°F. It will reset automatically at 37°F.
11. The supply air flow must be proven by vacuum switch 5LP. In the event the belts on the supply air motor break or the supply air motor should be de-energized by its overload protectors, 5LP will open and interrupt the cooling, heating and economizer control circuits. This assures that the various modes of operation do not continue without proper air flow.
12. The compressor motor protector(s), 1MP, 2MP will interrupt the compressor control circuit when sensing an overload condition. Also an anti-recycle timer is part of this device to prevent the compressor from rapid cycling. The compressor will stay off for five minutes. It also monitors the voltage of the 120 volt control circuit and will shut down the compressor if the voltage drops below 85 ± 4.5 volts.
13. Oil pressure control switches are installed in the compressor circuits. These assure that adequate oil pressure is present to lubricate the moving parts of the compressor. If pressure is not adequate, the switch opens shutting down the compressor. It is manually reset.
14. When the pumpdown accessory, Model 2PD04700101, is installed, the compressor will continue to operate through contact 12TR-2 after the room thermostat or controller is satisfied.

Solenoid 3SOL in the liquid line is now closed and the compressor pumps most of the refrigerant out of the evaporator to the high side of the system. The system suction pressure drops until the low pressure cutoff (1LP) opens. This will shut down the compressor and de-energizes the 12TR relay which opens 12TR-2 to put the operation of the compressor under the control of the 1R relay. Also present is a 12TR-1 contact which is closed when the system is off and provides a bypass circuit to allow contactors 1M and 2M to be activated in the event the low pressure cutout has not reset. Without this pumpdown circuit, it is possible to have the oil pressure switch (OP/PS) open on light load and short cycle of the compressor. Refrigerant floods back to the compressor on each start-up, foams the oil in the compressor crankcase and pumps the oil to the condensate coil. The run times are too short to bring the oil back to the compressor so that eventually the oil pressure switch opens. This requires re-setting manually at the unit.

PRE-START CHECK

Before starting the unit, the following check list should be completed.

1. Make sure the proper clearances were considered.
2. Make sure all foreign matter has been removed from the interior of the unit (tools, construction or shipping materials).
3. Rotate all fans and blower wheels manually to check for free rotation.
4. Check belt tensions and alignment.
5. Make sure all wiring connections are tight.
6. Make sure the available power supply and unit nameplate data agree.
7. Make sure the fuse sizes and the power wire are properly sized.
8. Make sure all controls are set at their proper set points.
9. Make sure condensate drain line is trapped per instructions as indicated with Figure. 4.
10. For shipping, the compressor hold-down nuts are tightened, drawing the mounting feet down to the shipping stops. After the unit is in its final position, the four hold-down nuts must be removed to insert the rubber grommets found in the small parts bag. Replace the hold-down nuts and tighten until they start to compress the isolator springs and then give them an additional half turn.

INITIAL START-UP

1. Supply power to the unit through the disconnect switch at least 8 hrs. prior to starting the compressors.
2. Move the system switch on the thermostat or the status panel to the AUTO position.
3. The proper supply air CFM should be established at this time with an inclined manometer as outlined in this instruction. This is an important part of the start-up procedure since it directly affects nuisance trip-outs on unit safety controls, condensate water blow-off from the evaporator coil, bearing and shaft damage, noise and vibration.
4. Lower the room thermostat to energize compressor No. 1.
5. With an ammeter, check the compressor and the supply air blower amps to make sure they agree with the unit data plate.
6. Lower the room thermostat to energize compressor No. 2, or load the compressor.
7. Check the compressor amps with the unit data plate.
8. After approximately 15 minutes of operation, check the liquid line sight glasses for a proper liquid refrigerant seal in each of the refrigerant circuit(s).
9. Next increase the setting of the room thermostat until the heating contacts are energized.
10. Refer to the proper heating installation and operation instruction for the correct heating sequence of operation.
11. After the unit has been operating for several minutes, de-energize the main power and inspect all factory wiring connections and bolted surfaces for tightness.

POST-START CHECK LIST

After the entire control circuit has been energized, check the following:

1. Cooling system start-up.
2. Rotation of blower wheels. Adjust the air system if necessary per the procedures as outlined in this instruction.

NOTE: If the supply air blower rotates in the wrong direction, reverse two of the motor leads at blower motor contactor 3M.

3. Operation of the outside and return air dampers as explained under "Damper Linkage Adjustment" in this instruction.

After the unit is functioning properly, instruct the owner and operator on how to operate the unit. Replace all panels before leaving the job site.

MAINTENANCE

FILTERS

The filters must be replaced as often as necessary to assure good air flow and filtering action.
Refer to Figure 1 for filter access location.

COILS

Do not allow dirt to accumulate on the evaporator and condenser coil or other parts of the evaporator and condenser circuit. Clean as often as necessary to assure good system performance. Use a brush, vacuum cleaner attachment or other suitable means.

DRAIN PAN

The drain pan should be inspected regularly to assure proper drainage.

LUBRICATION

The bearings for the blower shaft and the blower motor are permanently lubricated and should not require any additional lubrication.

BELTS

Maintain belt tension to extend belt life. Replace when signs of failure begin to appear.

REFRIGERANT CHARGE R-22

DSC300	DSC360	DSC480
36 lbs., 0 oz.	40 lbs., 8 oz.	29 lbs., 8 oz. each system

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