Number One Air Conditioning Maker

Carrier

Carrier Parkway • Syracuse N Y 13221

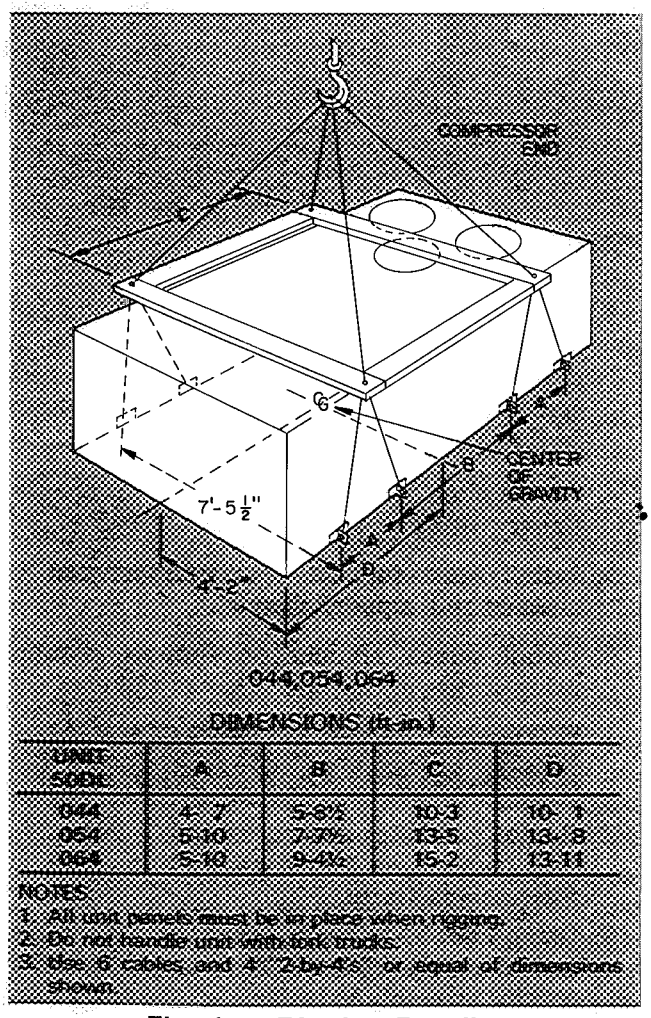
Installation, Start-Up and Service Instructions

50DL
044,054,064

Single-Package Cooling Units

INSTALLATION

Rigging and Unit Placement — Inspect unit for transportation damage. File claim with transportation agency. Do not remove shipping skid until unit is ready to be set in final location. Do not drop unit; keep upright. Use spreader bars over unit to prevent sling or cable damage. Rollers may be used to move unit across a roof. Level by using unit frame as reference. See Fig. 1 for additional information. Unit weight is shown in Table 1.



UNIT 50DL	A	B	C	D
044	4-7	5-8½	10-3	10-1
054	5-10	7-7½	13-5	13-3
064	5-10	9-4½	15-2	13-11

NOTES:
1. All unit panels must be in place when rigging.
2. Do not handle unit with fork trucks.
3. Use 5/8 cables, and 4 "2-by-4's" or equal of dimensions shown.

Fig. 1 — Rigging Details

Units are designed to be hoisted only. However, units with optional shipping skids may be moved with a fork truck. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

Roof Curb — Assemble and install as described in instructions shipped with this accessory. Accessory roof curb and information required to field fabricate a roof curb of 2-in. x 14-in. planks is shown in Fig. 2. Install insulation, cant strips, roofing and flashing as required. For unit drains to function properly, curb must be level or within tolerances shown in Fig. 3.

Roof Mount — Check building codes for weight distribution requirements. Unit weight is shown in Table 1.

Slab Mount — Provide a level concrete slab that extends beyond unit cabinet at least 6 inches. Make a slab 8 in. thick with 4 in. above grade. Use gravel apron in front of condenser air inlet to prevent grass and foliage from obstructing airflow.

Alternate Unit Support Methods — Where the preferred curb or slab mount cannot be used, support unit with sleepers on perimeter, using curb support area. However, if sleepers cannot be used, support long sides of unit (dimension "A," Fig. 4) with 4-in. x 4-in. pads equally spaced on each side. Unit may sag if supported by corners only.

Positioning — Unit condenser air inlets and outlets may be located in any compass direction since they are not affected by wind. Provide clearances around and above unit for airflow, safety and service access (Fig. 4).

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents or other sources of contaminated air.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Field-Fabricated Ductwork — Secure all ducts to building structure. Use flexible duct connectors between unit and ducts as required. Insulate and weatherproof all external ductwork, joints and all roof openings with flashing and mastic in accordance with applicable codes.

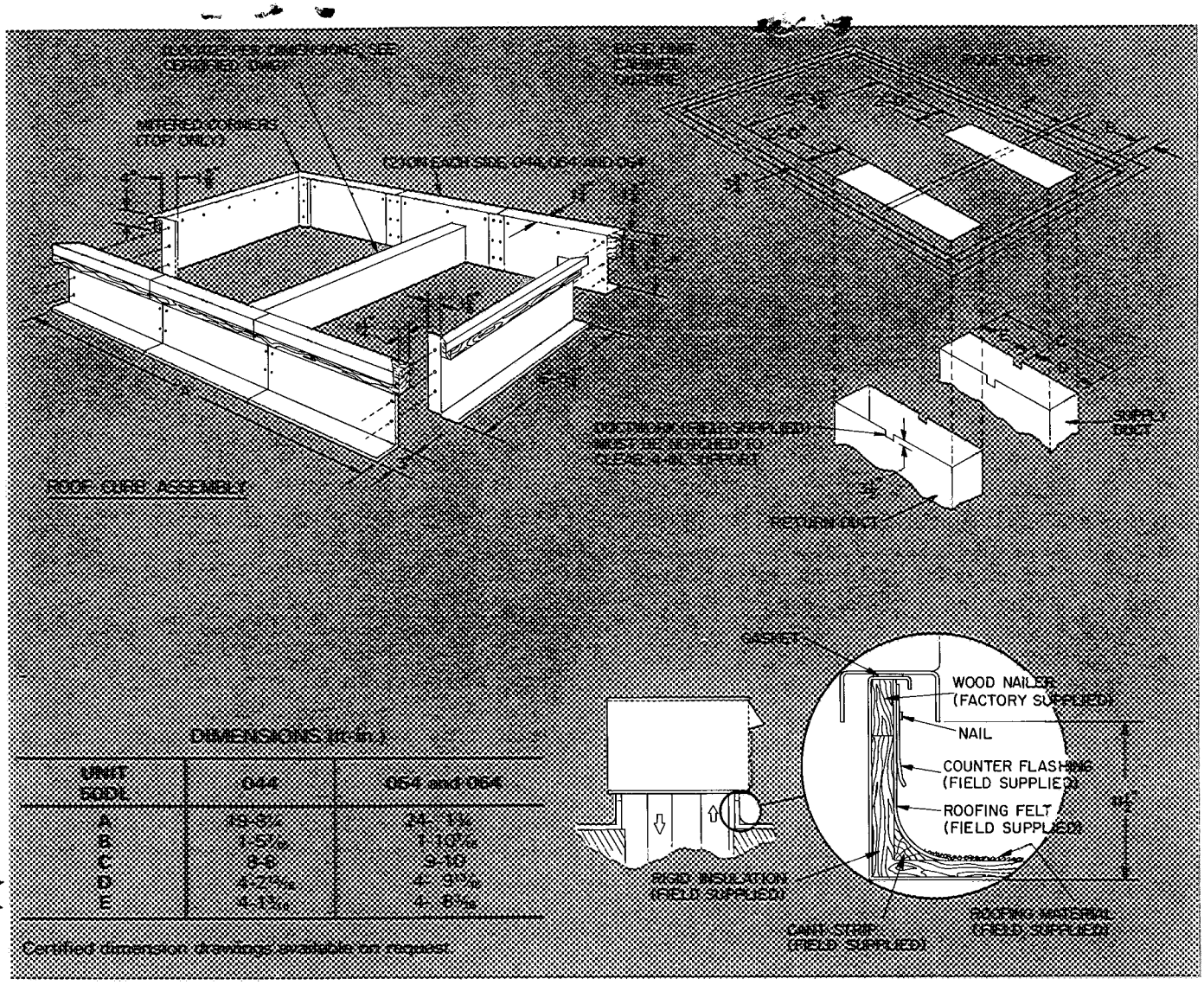


Fig. 2 — Roof Curb Dimensions

Insulate ducts passing thru unconditioned spaces and cover with a vapor barrier.

Maintain one-in. minimum clearance between supply air duct and any combustible material for at least 3 ft of duct run from unit.

Unit is shipped set up for thru-the-bottom duct connections. Ductwork openings are shown in Fig. 4.

Economizer Section

ECONOMIZER HOODS INSTALLATION (Fig. 5) — The economizer mechanism and all electrical connections are factory installed and adjusted except as noted below. Hood assembly, outdoor air inlet screens and required hardware are shipped separately and must be field installed. Units have 2 hood assemblies.

Install economizer hoods and enthalpy control as follows:

1. Loosen unit top panel sheet metal screws above outdoor air inlet opening.
2. Assemble hood top panel, side panels and support channel.
3. Insert hood flange between unit top panel flange and unit. Slots are provided in hood flange to clear sheet metal screws. Tighten sheet metal screws. Apply RTV sealant to surfaces as shown in Fig. 5.
4. Secure hood side panels to outdoor air opening flanges, using screws provided.
5. Install hood support bracket(s) between U-channel and support channel.
6. Install screen retainer on support channel, using screws in the slots. Do not tighten.
7. CAUTION: Shut off main power to unit before installing enthalpy control assembly.
8. Remove enthalpy control assembly from shipping location on horizontal deck in return air filter compartment.
9. Using 4 no. 10-1/2 screws from envelope in control assembly junction box, mount enthalpy control assembly to inside of economizer hood side panel nearest condenser section (Fig. 4).

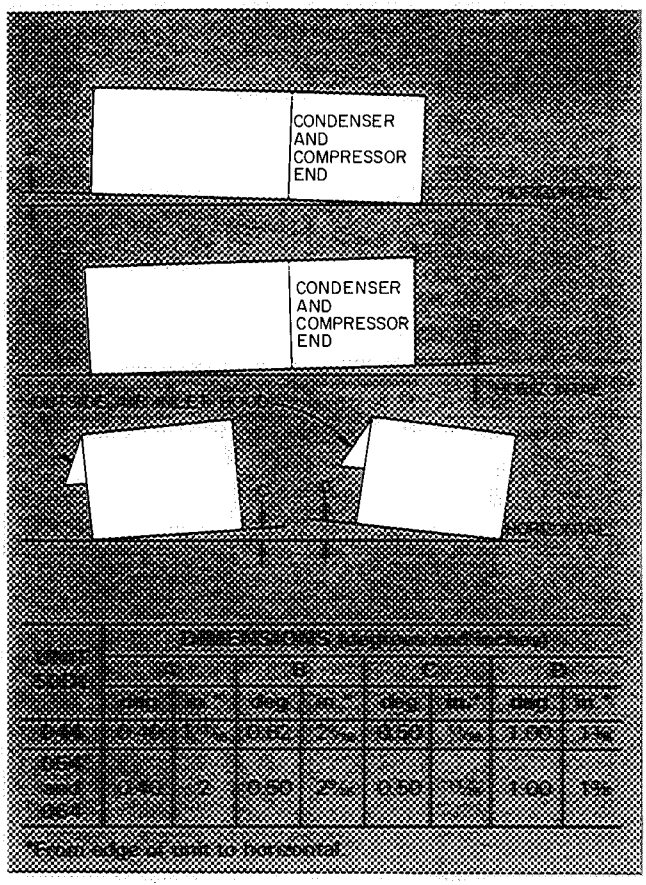


Fig. 3 — Unit Leveling Tolerances

10. Route the red and yellow wires thru knockout in side plate. Wrap end of blue wire with electrical tape. Using wire connectors from envelope in junction box, wire enthalpy control assembly as shown in Fig. 6. Use strain reliefs from envelope on side plate and junction box.
11. Install outdoor air screens.
12. Push retainer snugly against screens and tighten screws.

Exhaust Air Hood Installation — The optional power exhaust package hood damper assemblies and required sheet metal screws are shipped in the compartment at right of indoor air fan motor compartment. Using screws provided, install a hood damper assembly over each exhaust air opening as shown in Fig. 4. Power exhaust is applied only to economizer units using bottom duct connections. Exhaust fan and motor assembly is factory wired and adjusted. Refer to Service, Power Exhaust Air Fan Adjustment if required.

Indoor Air Fans — The fan belt and pulleys are factory installed and adjusted. If required, adjust as described in Service, Indoor Air Fan Adjustment.

Condensate Drains — See Fig. 4 for drain locations. Condensate drain is open to atmosphere and must be trapped. Install a trapped drain line at connection to be used. Trap must be at least 3 in. deep and made of flexible material or be installed to prevent freeze-up.

Condensate drain pan under unit is fitted with a one-in. FPT coupling. A gasket is shipped taped to this drain. Install gasket in unit basepan opening or alternate opening on end of unit.

Field Power Supply — Unit is factory wired for voltage shown on nameplate. The main power terminal block is suitable for use with aluminum or copper wire. Units have circuit breakers for compressors, fan motors and control circuit. If required by local codes, provide an additional disconnect switch.

If an external electrical source is used, unit must be electrically grounded in accordance with local codes, or in the absence of local codes, with the National Electrical Code, ANSI C1-1978.

All field wiring must comply with National Electrical Code and local requirements.

Install conduit connector in unit basepan or side panel openings provided as shown in Fig. 4. Route power lines thru connector to terminal connections in control box as shown in Fig. 8, 9 and 10.

Affix crankcase heater sticker to unit disconnect switch.

Voltage to compressor terminals during compressor operation must be within voltage range indicated on unit nameplate. Also, see Tables 2 and 3. Phases must be balanced within 2%. Contact local power company for correction of improper voltage or phase unbalance. Failure due to operation of unit on improper line voltage or with excessive phase unbalance constitutes abuse and may cause damage to unit electrical components.

Field Control Wiring

STANDARD UNIT (WITHOUT ENERGY MANAGEMENT OPTION) — Install a Carrier-approved accessory electronic thermostat on a subbase (or a transmitter on subbase if remote sensor is used) per installation instructions included with the accessory. Note that the subbase must be used on constant volume units without night setback. Locate thermostat, or remote sensor, if used, in the conditioned space where it will sense average temperature.

Route thermostat cable or equivalent single leads of no. 18 AWG colored wire from subbase terminals thru connector on unit to low-voltage connections in main control box as shown on unit wiring diagram and in Fig. 8.

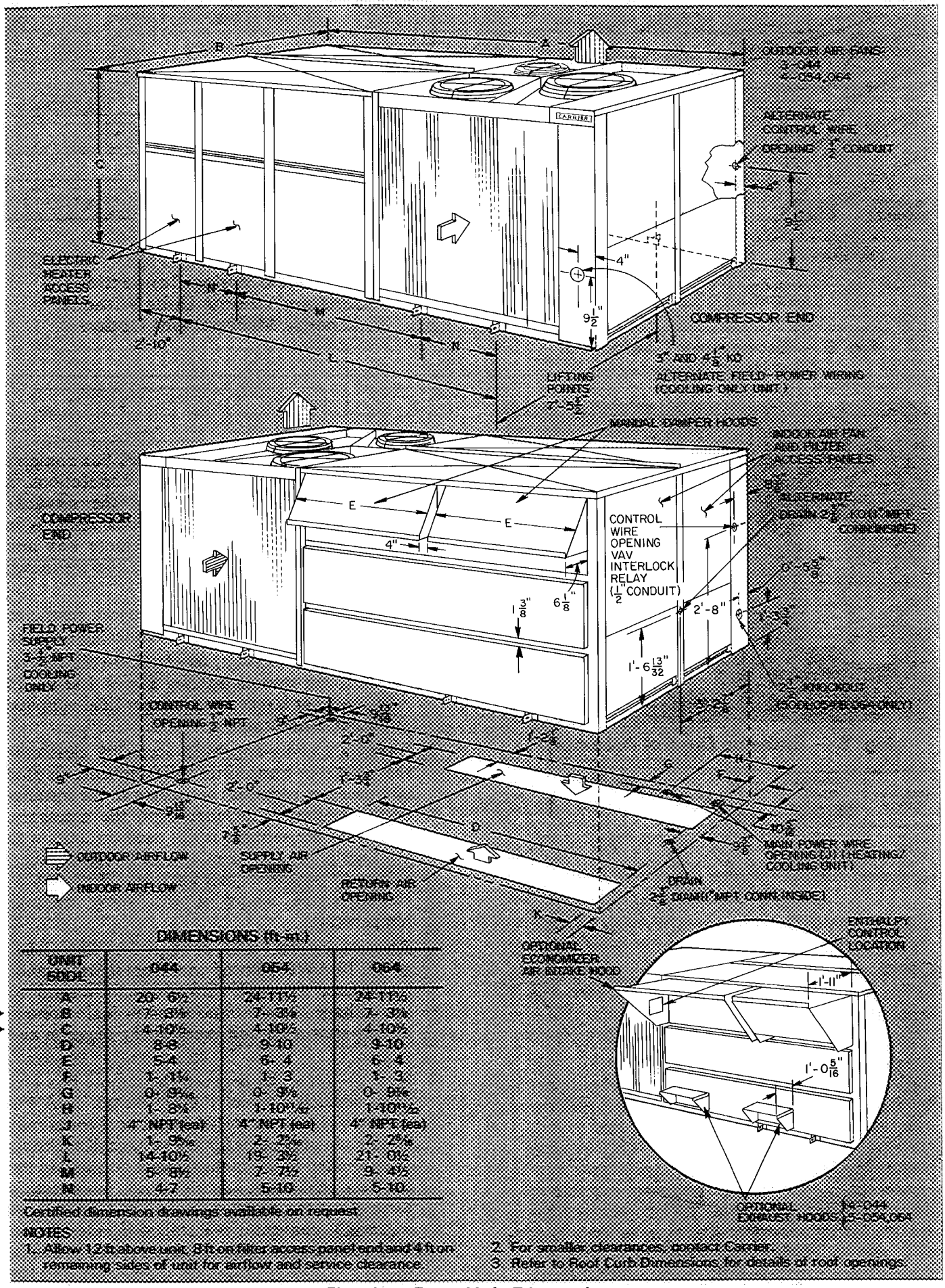
UNITS WITH ENERGY MANAGEMENT OPTION — In addition to the standard control box, units with Energy Management option are also equipped with a remote box and a night setback box. The remote box contains a 7-day time clock, a bypass switch that can manually bypass the time clock for up to 5 hours, 6 indicator lights and 2 terminal blocks for field wiring connections. Mount this box remote from the unit in an indoor or

Table 1 — Physical Data

UNIT 50DL	044	054	064
OPERATING WEIGHT (lb)			
Base Unit	5406	6100	6485
Economizer	225	250	250
Roof Curb	200	225	225
COMPRESSOR		Serviceable, Hermetic	
Quantity...Type	2 06E	2. .06E*	2 06E
Quantity Cylinders (ea)...Rpm	4 1750	4 6 1750	6 1750
Capacity Steps (%) (Standard)	50, 100	60, 100	50, 100
With Accessory Unloaders	25, 50, 75, 100	20, 40, 60, 80, 100	16, 33, 50, 67, 83, 100
Capacity Steps (%) (Variable Volume) With Electric Unloaders	25, 50, 75, 100	20, 40, 60, 80, 100	16, 33, 50, 67, 83, 100
REFRIGERANT CHARGE		Type 22; Controlled by Thermostatic Expansion Valve	
System 1...System 2 (lb)	37 0 37 0	53 0 42 0	81 0 81 0
OUTDOOR AIR FANS		Direct Driven, Propeller Type	
Quantity...Diameter (in.)	3 30	4 30	4 30
Nominal Cfm	21,000	28,000	31,000
Motor Hp...Rpm	1 1050	1 1050	1 1150
CONDENSER COIL			
Rows...Fins/in.	3 15 8	3 15 8	4 15.8
Total Face Area (sq ft)	61 0	81 5	81 25
INDOOR AIR FAN†		Belt Driven, Centrifugal Type	
Quantity...Size (in.)	4 15x9	4 15x11	4 15x11
Maximum Allowable Rpm	1300	1300	1450
Nominal Cfm	16,000	20,000	24,000
Standard Motor and Drive			
Motor Hp	15	20	25
Motor Frame Size			
Single Speed	254T	256T	284T
Two Speed	284T	286T	286T
Fan Pulley Pitch Diameter (in.)	10 6	10 6	8 0
Fan Pulley Bore	1 11/16	1 11/16	1 11/16
Single-Speed Motor Rpm	1750	1750	1750
Two-Speed Motor Rpm	1750/1170	1750/1170	1750/1170
Motor Pulley Pitch Diameter (in.)			
Pulley A	6 5	6 5	5 6
Pulley B	5 6	6 0	6 0
Resulting Fan Rpm			
Single-Speed with Pulley A. .B	1073 925	1073 ..991	1225 1312
Two-Speed with Pullley A...B	1073/751 925/617	1073/751 991/661	1225/817. 1312/875
Alternate Motor and Drive			
Motor Hp	20	25‡	30‡
Motor Frame Size			
Single Speed	256T	284T	286T
Two Speed	286T	286T	—
Fan Pulley Pitch Diameter (in.)	8 0	8 0	10 6
Fan Pulley Bore	1 11/16	1 11/16	1 11/16
Single-Speed Motor Rpm	1750	1750	1750
Two-Speed Motor Rpm	1750/1170	1750/1170	1750/1170
Motor Pulley Pitch Diameter (in.)			
Pulley A	5 3	5 3	8 0
Pulley B	5 6	5 6	**
Resulting Fan Rpm			
Single-Speed with Pulley A...B	1159 1225	1159 1225	1321 —
Two-Speed with Pulley A...B	1159/773. 1225/817	1159/773. 1225/817	1321/881 —
EXHAUST FAN MOTOR Quantity...Hp	2 3	2 3	2 3
EVAPORATOR COIL			
Rows...Fins/in	4 15	4 15	4 13 9
Total Face Area (sq ft)	30 2	35 4	35 4
ELECTRIC RESISTANCE HEATERS Heat:kW	Open Nichrome Wire Elements with Multiple-Stage Control See Electrical Data tables		
INDOOR AIR FILTERS			
No. ...Size			
Standard; 2-in Throwaway	27 16x25	9 20x25 21 16x25	9 20x25 21 16x25
Bag Type; 12-in. (Optional)	6 12x24 6 24x24	7 12x24 7 24x24	—

*Unit contains one 06EA250 and one 06EA275 compressor
†Standard fan motor supplied with standard fan drive pulleys and belts; alternate fan motor supplied with alternate fan drive pulleys and belts Other combinations are field supplied Pulley A is installed in unit; Pulley B is shipped with unit (044 and 054).

‡Due to large frame size, the 25-hp, 208-230-volt and 30-hp motors are available in single speed only
**The 50DL064 alternate drive is supplied with Pulley A only



DIMENSIONS (ft-in.)

UNIT 50DE	044	054	064
A	20- 6½	24-11½	24-11½
B	7- 3⅛	7- 3⅛	7- 3⅛
C	4-10½	4-10½	4-10½
D	8-8	9-10	9-10
E	5-4	6- 4	6- 4
F	1- 1¼	1- 3	1- 3
G	0- 8⅝	0- 8⅝	0- 8⅝
H	1- 3⅛	1-10½	1-10½
J	4" (NPT (ea)	4" NPT (ea)	4" NPT (ea)
K	1- 9⅝	2- 2⅝	2- 2⅝
L	14-10½	19- 2½	21- 0½
M	5- 8⅝	7- 7½	9- 4½
N	4-7	5-10	5-10

Certified dimension drawings available on request.

NOTES:
1. Allow 12 ft above unit, 3 ft on filter access panel end and 4 ft on remaining sides of unit for airflow and service clearance.
2. For smaller clearances, contact Carrier.
3. Refer to Roof Curb Dimensions for details of roof openings.

Fig. 4 — Base Unit Dimensions

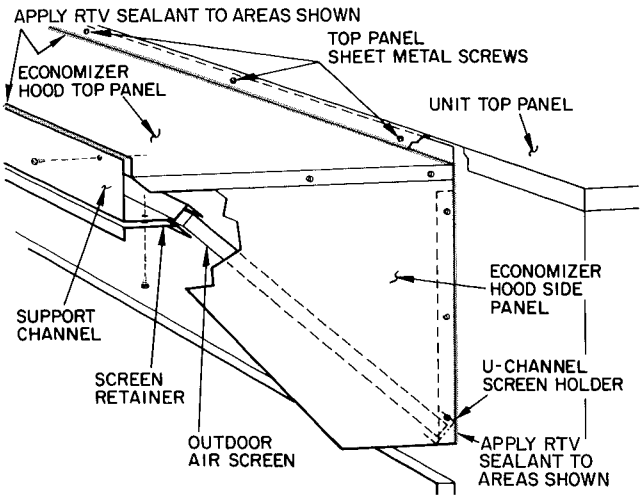


Fig. 5 — Economizer Outdoor Air Inlet Hood Assembly

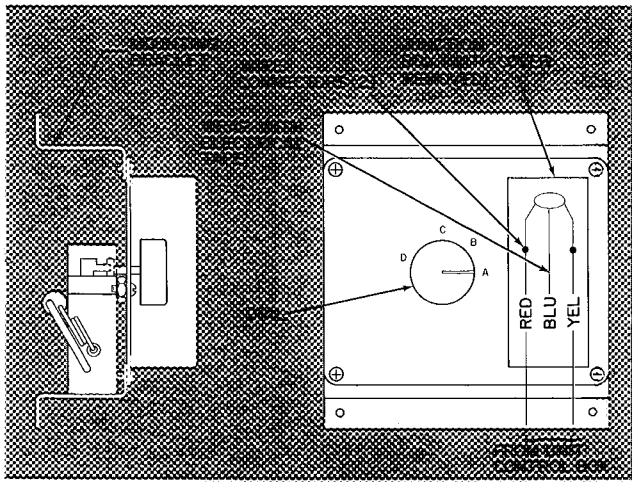


Fig. 6 — Enthalpy Control Assembly

CONTROL CURVE	CONTROL POINT (Approx Deg.) AT 50% RH
A	73
B	68
C	63
D	58

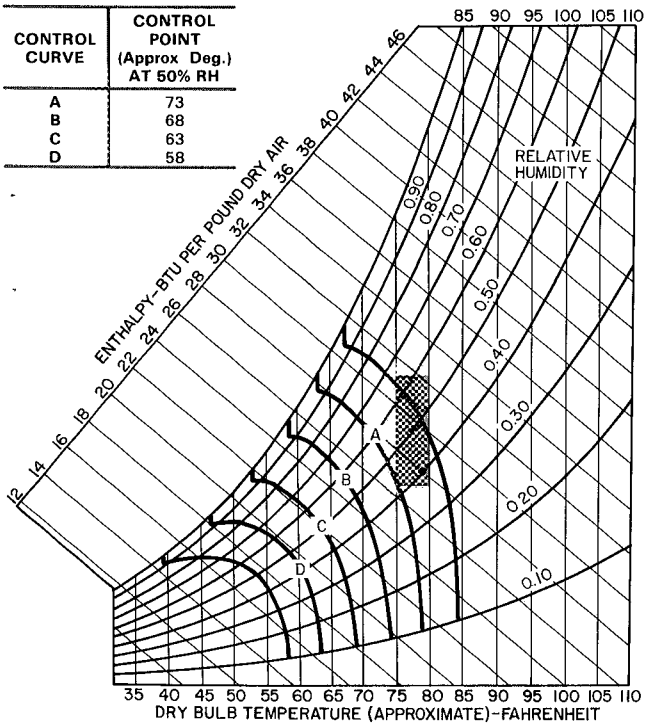
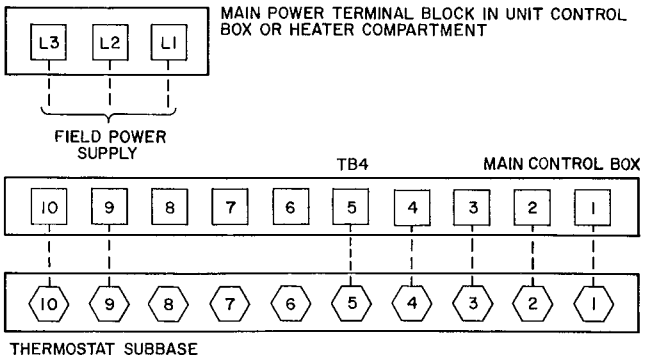


Fig. 7 — Psychrometric Chart for Enthalpy Control



NOTE Thermostat subbase required.

Fig. 8 — Field Wiring Connections — Constant Volume Units Without Energy Management Option

weathertight space. The night setback box contains a terminal block for field wiring connections, a morning warmup thermostat and the setback/setup module. The night setback box remains in the unit. Shipping locations of remote box and permanent location of night setback box are shown in Fig. 11.

1. Remove remote box and mount in a restricted access area (indoors or in a weathertight space).
2. Run separate 115-volt, 60-Hz (230-volt, 50-Hz) power to the remote box per Fig. 9. Use no. 14 AWG wire or larger and a proper field-supplied electrical connector.
3. Install a Carrier-approved accessory electronic thermostat or transmitter if remote sensor is used (subbase not required) according to the installation instructions included with the accessory. Note that the subbase is *not* used on units with the Energy Management option. Locate the thermostat or remote sensor, if used, in the conditioned space where it will sense average temperature.

   Route thermostat cable or equivalent single leads of no. 18 AWG colored wire from thermostat or transmitter terminals thru connector on unit to low-voltage (TB4) connections in main control box as shown on unit label wiring diagram and in Fig. 9.
4. Run 24-volt wires between the remote box and night setback box per Fig. 9. Use no. 18 AWG wire for lengths up to 100 feet. Local codes may dictate use of conduit for low voltage. Knockouts are provided in the night setback box and in the fan deck separating heating section from section containing the night setback box (Fig. 11). A watertight connector is installed in side of unit. Two rubber grommets are taped inside the night setback box. Use grommets in knockouts in fan deck and night setback box.

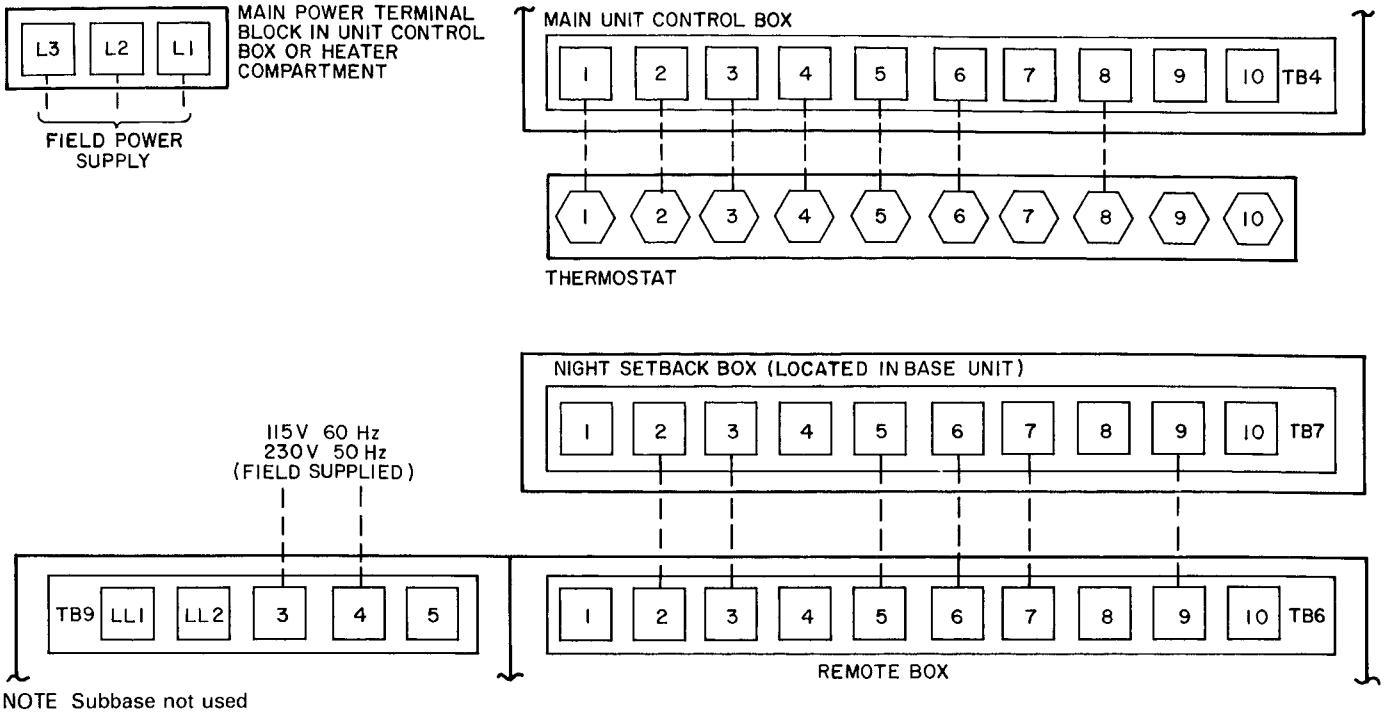


Fig. 9 — Field Wiring Connections — Constant Volume Unit With Energy Management Option

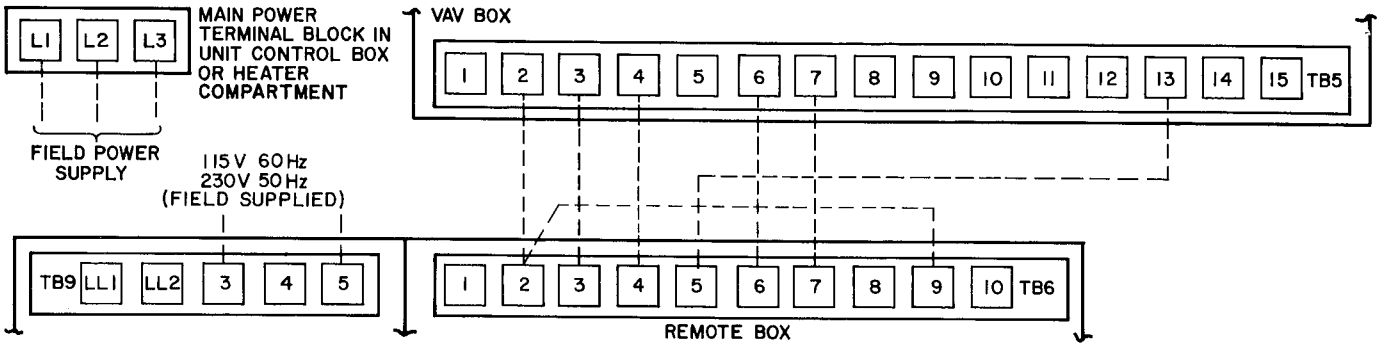


Fig. 10 — Field Wiring Connections for 50DL VAV

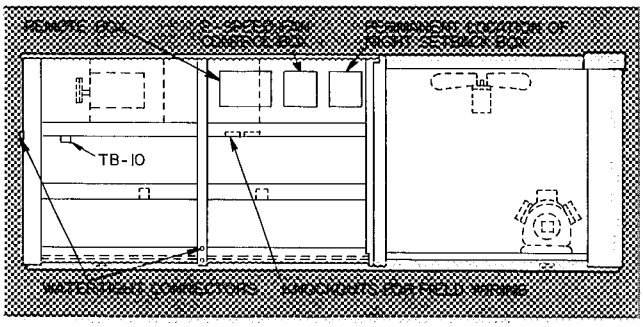


Fig. 11 — Shipping Location — Remote Box

UNITS WITH VARIABLE VOLUME OPTION — Units do not use room thermostats or sensors. In addition to the main control box, units are equipped with a remote box and a variable volume box. Remote box is described above (Units With Energy Management Option). The variable volume box (Fig. 12) contains a microprocessor, a morning warmup thermostat, a time-delay relay, 3 unloader relays, an interlock relay, a night relay, a day relay and a terminal block for field wiring. Shipping location of remote box is shown in Fig. 11.

1. Remove the remote box and mount in a restricted access area (indoors or in a weathertight space).
2. Run separate 115-volt, 60-Hz (230-volt, 50-Hz) power to the remote box per Fig. 10. Use no. 14 AWG wire or larger and proper electrical connector (field supplied).
3. Run 24-volt wires between remote box and variable volume box per Fig. 10. Use no. 18 AWG wire for lengths up to 100 feet. Run wire in conduit to unit if local codes dictate. Knockouts are provided in the variable volume box and the fan deck separating heating section from section containing the variable volume box (Fig. 11). Watertight connectors are installed in unit cornerpost and side of unit. Two rubber grommets are shipped taped inside variable volume box. Use grommets in knockouts in fan deck and variable volume box.

4. If the unit is equipped with electric heat, the room terminals must be controlled to go fully open when unit goes into heating. An interlock relay is provided in the variable volume box. When unit goes into heating, the interlock relay energizes providing switch closure to open the room terminals. Field connections for the interlock relay are terminals 1 and 2 of the terminal block (TB10) located in upper left corner of electric heat section (Fig. 11).

Route field-supplied power wiring thru watertight connector supplied in unit cornerpost. Make TB10 connections as shown in Fig. 13.

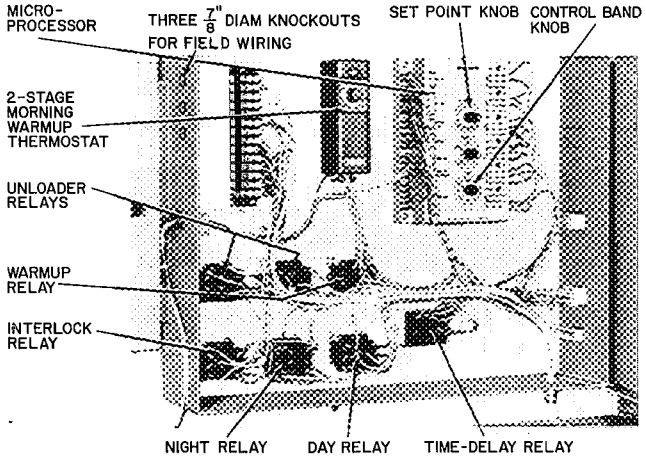


Fig. 12 — Variable Volume Box

Return Air Filters — Check that return air filters are of the correct type and size and installed in unit filter racks. Filter data is shown in Table 1. Do not operate unit without return air filters.

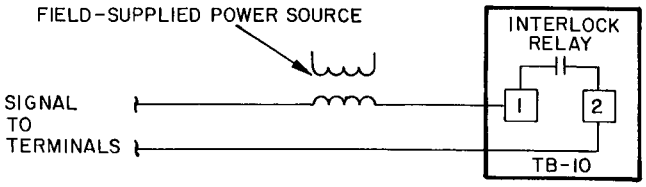


Fig. 13 — Morning Warmup Interlock

Outdoor Air Inlet Screens — Outdoor air inlet screens must be in place before operating unit.

Compressor(s) — Loosen compressor holddown bolts until sidewise movement of the washer under each holddown bolt head occurs. Do not loosen completely as bolts are self-locking and will maintain their adjustment.

Open the compressor discharge and suction service valves. Replace and tighten valve caps to prevent leaks.

Liquid Line Service Valve — Open the liquid line service valve. Replace and tighten valve cap to prevent leaks.

Low Ambient Compressor Lockout (Fig. 14) — All units are equipped with an adjustable low ambient lockout thermostat to lock off the compressor(s) at low outdoor air ambients. Thermostat is located in the main control box. Setting will depend on specific installation but should be approximately 50 F on VAV units and 55 F on constant volume units.

Convenience Outlet — All units are equipped with a 115-volt convenience outlet for handling small power load or service light. See Fig. 14.

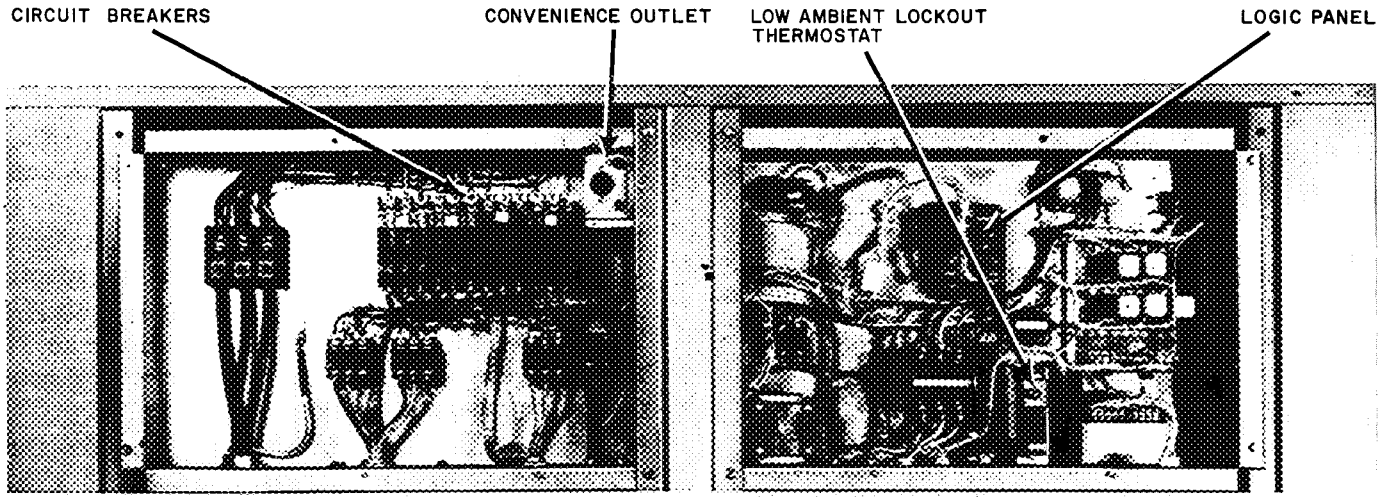


Fig. 14 — Control Box

Table 2 — Electrical Data — 50DL044 and 054

MODEL NOMINAL VOLTS-PH-HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		OUTDOOR FAN MOTORS		INDOOR FAN MOTOR		EXHAUST FAN MOTOR		HEATERS		POWER SUPPLY	
	Min	Max	RLA	LRA	RLA	LRA	Qty	FLA	Hp	FLA	Hp	FLA	kW	FLA	MCA	MOCP*
50DL044 208/230-3-60	187	254	80	345	80	345	3	7 6 (ea)	15	46 0	—	—	—	—	249	300
									15	46 0	3	11	—	—	271	350
									20	60 0	—	—	—	—	263	300
									15	46 0	—	—	45/54 9	125/138	249	300
									15	46 0	—	—	60/73 2	166/184	265/288	350/350
									20	60 0	3	11	—	—	285	350
									15	46 0	3	11	45/54 9	125/138	271	350
									15	46 0	3	11	60/73 2	166/184	271/288	350
									20	60 0	—	—	45/54 9	125/138	263	350
									20	60 0	—	—	60/73 2	166/184	283/305	400
									20	60 0	3	11	45/54 9	125/184	285	350
									20	60 0	3	11	60/73 2	166/184	285/305	400
50DL044 460-3-60	414	508	37	173	37	173	3	3 3 (ea)	15	21 0	—	—	—	—	115	150
									15	21 0	3	4 8	—	—	124	150
									20	27 0	—	—	—	—	121	150
									15	21 0	—	—	54 9	69	115	150
									15	21 0	—	—	73 2	92	142	175
									20	27 0	3	4 8	—	—	130	150
									15	21 0	3	4 8	54 9	69	124	150
									15	21 0	3	4 8	73 2	92	142	175
									20	27 0	—	—	54 9	69	121	175
									20	27 0	—	—	73 2	92	149	200
									20	27 0	3	4 8	54 9	69	130	175
									20	27 0	3	4 8	73 2	92	149	200
50DL044 575-3-60	518	632	30	120	30	120	3	2 7 (ea)	15	17	—	—	—	—	93	110
									15	17	3	3 9	—	—	101	125
									20	22	—	—	—	—	98	125
									20	22	3	3 9	—	—	106	125
50DL054 208/230-3-60	187	254	117	506	78 5	345	4	7 6 (ea)	20	60	—	—	—	—	312	400
									20	60	3	11	—	—	334	450
									25	75	—	—	—	—	327	400
									20	60	—	—	60/73 2	166/184	312	400
									20	60	—	—	75/91 5	208/230	335/363	400/450
									25	75	3	11	—	—	349	450
									20	60	3	11	60/73 2	166/184	334	450
									20	60	3	11	75/91 5	208/230	335/363	450
									25	75	—	—	60/73 2	166/184	327	450
									25	75	—	—	75/91 5	208/230	354/382	500
									25	75	3	11	60/73 2	166/184	349	450
									25	75	3	11	75/91 5	208/230	354/382	500
50DL054 460-3-60	414	508	53	253	36	173	4	3 3 (ea)	20	27	—	—	—	—	141	175
									20	27	3	4 8	—	—	151	200
									25	34	—	—	—	—	148	200
									20	27	—	—	73 2	92	149	200
									20	27	—	—	91 5	115	178	200
									25	34	3	4 8	—	—	158	200
									20	27	3	4 8	73 2	92	151	200
									20	27	3	4 8	91 5	115	178	200
									25	34	—	—	73 2	92	158	225
									25	34	—	—	91 5	115	187	250
									25	34	3	4 8	73 2	92	158	225
									25	34	3	4 8	91 5	115	187	250
50DL054 575-3-60	518	632	42 5	176	28 6	120	4	2 7 (ea)	20	22 0	—	—	—	—	113	150
									20	22 0	3	3 9	—	—	121	150
									25	27 0	—	—	—	—	118	150
									25	27 0	3	3 9	—	—	126	150

See Legend and Notes on page 10

Table 3 — Electrical Data — 50DL064

MODEL NOMINAL VOLTS-PH-HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		OUTDOOR FAN MOTORS		INDOOR FAN MOTOR		EXHAUST FAN MOTOR		HEATERS		POWER SUPPLY	
	Min	Max	RLA	LRA	RLA	LRA	Qty	FLA	Hp	FLA	Hp	FLA	kW	FLA	MCA	MOCP*
50DL064 208/230-3-60	187	254	119	506	119	506	4	6 6/6 0	25	75	—	—	—	—	370	400
									25	75	3	11	—	—	392	450
									30	88	—	—	—	—	383	450
									25	75	—	—	60/73 2	166/184	370	450
									25	75	—	—	75/91 5	208/230	370/382	500
									30	88	3	11	—	—	405	450
									25	75	3	11	60/73 2	166/184	392	450
									25	75	3	11	75/91 5	208/230	392	500
									30	88	—	—	60/73 2	166/184	383	500
									30	88	—	—	75/91 5	208/230	383/398	500
									30	88	3	11	60/73 2	166/184	405	500
									30	88	3	11	75/91 5	208/230	405	500
50DL064 460-3-60	414	508	53	253	53	253	4	3 0	25	34	—	—	—	—	166	200
									25	34	3	4 8	—	—	175	200
									30	40	—	—	—	—	172	200
									25	34	—	—	73 2	92	166	225
									25	34	—	—	91 5	115	187	250
									30	40	3	4 8	—	—	181	200
									25	34	3	4 8	73 2	92	175	225
									25	34	3	4 8	91 5	115	187	250
									30	40	—	—	73 2	92	172	250
									30	40	—	—	91 5	115	194	250
									30	40	3	4 8	73 2	92	181	250
									30	40	3	4 8	91 5	115	194	250

LEGEND (Tables 2 and 3)

Compr — Compressor
FLA — Full Load Amps
Hp — Nominal Horsepower
kW — Kilowatts
LRA — Locked Rotor Amps
MCA — Minimum Circuit Ampacity
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps

*Fuse only.

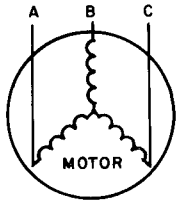
NOTES (Tables 2 and 3)

1 All outdoor fan motors are single-phase motors
2 All heaters are 3-phase assemblies
3 **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase unbalance in supply voltage is greater than 2% Use the following formula to determine the % voltage unbalance

% Voltage Unbalance

$$= 100 \times \frac{\textit{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 460-3-60



AB = 452 volts
BC = 464 volts
AC = 455 volts

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

$$= \frac{1371}{3} = 457$$

Determine maximum deviation from average voltage

(AB) 457 - 452 = 5 volts
(BC) 464 - 457 = 7 volts
(AC) 457 - 455 = 2 volts

Maximum deviation is 7 volts
Determine % voltage unbalance

$$\%\,\text{Voltage Unbalance} = 100 \times \frac{7}{457} = 1\ 53\%$$

This amount of phase unbalance is satisfactory as it is below the maximum allowable 2%

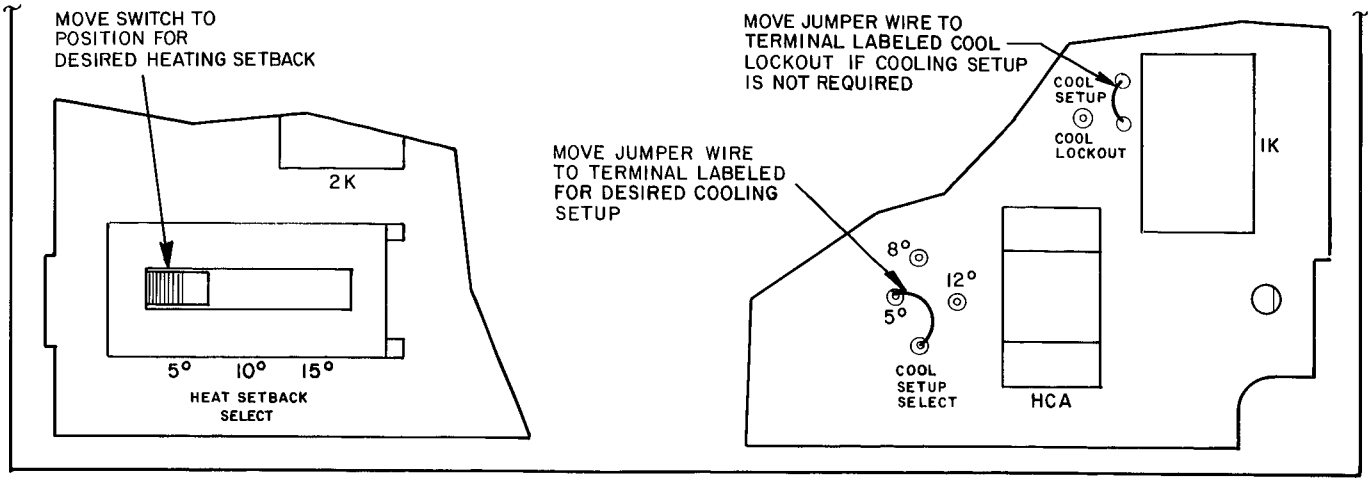
IMPORTANT If the supply voltage phase unbalance is more than 2% contact your local electric utility company immediately

START-UP

Constant Volume Units

COOLING (WITH OR WITHOUT ENERGY MANAGEMENT OPTION)

1. Open compressor service valves. Make sure the crankcase heater has been on for at least 24 hours to remove liquid refrigerant from compressor crankcase. Check compressor oil level. Oil sight glass should be half full.
2. Be sure that the liquid line service valve is open and that high- and low-side refrigerant service ports are closed as applicable.
3. On units equipped with the Energy Management option, move the COOL SETUP SELECT jumper wire to the desired setting (5°, 8°, or 12°). If cooling is not desired during the unoccupied periods, move jumper wire from COOL SETUP to COOL LOCKOUT. See Fig. 15.
4. Turn on power to unit. On standard units, set the subbase selector switch to COOL. On units with the Energy Management option, set the 7-day time clock as required. Refer to 7-Day Time Clock Adjustment. Check that compressor low ambient lockout contacts and morning warm-up contacts (on units with Energy Management option) are closed.



(A) HEATING SETBACK

(B) COOLING SETUP OR LOCKOUT

Fig. 15 — Setback/Setup Module (Partial)

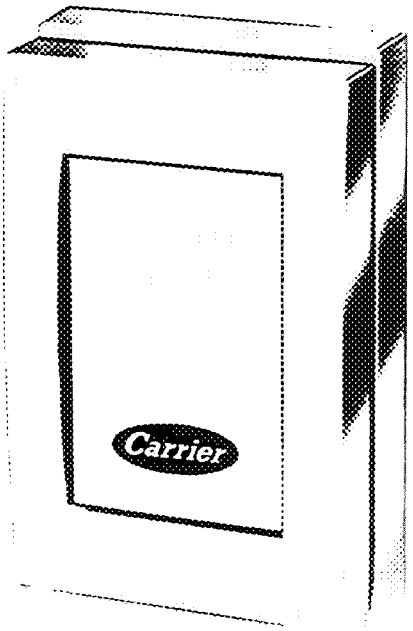
5. Remove cover from thermostat (or from transmitter if a remote sensor is used); note the red diagnostic light-emitting diodes (LED's). See Fig. 16.
6. To call for cooling, move the thermostat or transmitter cooling set point (blue lever) below room temperature. Cooling LED on the right-hand side of thermostat or transmitter should begin to glow. Check the cooling effect at supply duct outlets.If the mechanical cooling does not come on, see Service, Electronic Component Checkout.
7. Move the thermostat or transmitter cooling set point above room temperature. The cooling equipment should cycle off and the cooling LED intensity should decrease to a faint glow or go off completely. The economizer should move to minimum position.

To Shut Off Unit — For standard units, set the subbase selector switch to OFF or set the cooling temperature selector lever above room temperature. For units with Energy Management option, set the cooling temperature selector switch above room temperature.

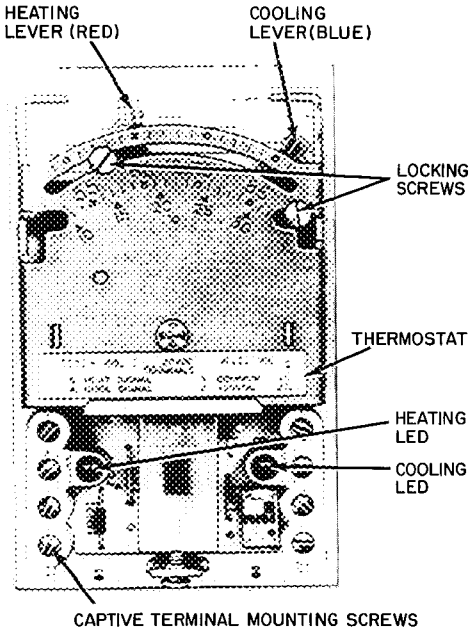
Do not shut off unit circuit breakers except when unit is serviced. *Crankcase heater is energized only when unit power is on.*

HEATING (Electric Heat Units)

1. Turn on unit power; set circuit breakers at ON.
2. On units with Energy Management option, position the HEAT SETBACK SELECT switch in the setback/setup module to the desired position (5°, 10°, or 15°). See Fig. 15.
3. Move the thermostat or transmitter heating set point (red lever) above room temperature. The



COVER



THERMOSTAT/TRANSMITTER

Fig. 16 — Electronic Thermostat/Transmitter (Without Subbase)

heating LED on the left-hand side of thermostat or transmitter should begin to glow. Electric heat should cycle on. Check supply duct outlets for heat. If heating equipment does not cycle on, see Service, Electronic Component Checkout.

4. Move the heating set point below room temperature. The heating equipment should cycle off and the heating LED intensity should decrease to a faint glow or go off completely.
5. Return the heating and cooling set points to desired settings and lock in place. On standard units, return subbase switch to desired position. On units with Energy Management option, an adjustable morning warmup thermostat is used to hold dampers closed until return air reaches the setting on the thermostat located in the night setback box.

To Shut Off Unit — Standard units, set the subbase selector switch to OFF or set the heating temperature selector lever below room temperature. For units with Energy Management option, set the heating temperature selector switch below room temperature.

AUTOMATIC CHANGEOVER — Standard units automatically switch from heating to cooling mode when the subbase selector switch is set at AUTO. and the temperature of the conditioned space rises to the cooling selector lever setting. When the temperature of conditioned space falls to heating selector lever setting, the unit automatically changes from cooling mode to heating mode.

The thermostat and unit are so connected that cooling and heating systems do not operate simultaneously.

On units with Energy Management option, with dual set point thermostat or transmitter, changeover is also automatic. There is a minimum 3 F deadband between the heating and cooling set points.

ECONOMIZER OPERATION — If unit is equipped with modulating outdoor air control (economizer), set enthalpy control (Fig. 4 and 6) at "A." Unit capability to integrate economizer with mechanical cooling allows for a higher changeover point than conventional economizer systems. Because of this, outside air is desired whenever its enthalpy (total heat content) is below return air enthalpy. Typical return air conditions, shaded portion of Fig. 7, indicate that setting "A" should be used for maximum operating economy.

OPERATING SEQUENCE WITH ECONOMIZER (without Energy Management option) using thermostat with subbase.

Cooling — System switch set at AUTO. or COOL, fan switch at ON or AUTO. (indoor air fan runs intermittently). Thermostat set at desired setting.

When thermostat calls for cooling and outdoor air enthalpy is below setting of enthalpy controller, the economizer modulates open. (If outdoor air enthalpy is above enthalpy set point, the outdoor air dampers remain at minimum position.) Economizer acts as the first stage of cooling, providing "free cooling" with outside air. If outside air alone cannot satisfy the cooling requirements of conditioned space, economizer cooling is integrated with mechanical cooling.

Compressor(s), working simultaneously with economizer, will come on in stages to meet the cooling load.

As the conditioned space temperature approaches the thermostat's cooling set point, stages cycle off, last stage first. After all stages of mechanical cooling are off, economizer modulates to minimum position.

During the cooling cycle, a discharge air sensor senses discharge air temperature. If discharge air temperature drops below 62 F, economizer starts to modulate toward minimum position. At 50 F discharge temperature, the economizer will be at minimum position.

Heating — System switch set at HEAT or AUTO., fan switch at ON or AUTO., thermostat set at desired setting. When thermostat calls for heating, one or 2 stages of heat energize to satisfy heating demand.

As space temperature approaches the heating temperature set point, heating stages cycle off.

During heating, economizer is limited to the minimum position to provide outdoor air for ventilation requirements.

OPERATING SEQUENCE WITH ECONOMIZER AND ENERGY MANAGEMENT option (using electronic thermostat or transmitter).

Clock in remote control box switches controls to OCCUPIED mode. Indoor air fan runs continually while in OCCUPIED mode.

If return air temperature is below the adjustable setting of morning warmup thermostat, outdoor-air dampers remain closed.

When return air temperature goes above setting of morning warmup thermostat, economizer goes to adjustable minimum position.

When thermostat calls for cooling and outdoor air enthalpy is below setting of enthalpy controller, economizer modulates open. (If outdoor air enthalpy is above enthalpy set point, economizer remains at minimum position.) The economizer acts as the first stage of cooling, providing "free cooling" with outside air. If outside air alone cannot satisfy cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling.

Compressor(s), working simultaneously with economizer, will come on in stages to meet the cooling load.

As the conditioned space temperature approaches the thermostat's cooling set point, stages cycle off, last stage first. After all stages of mechanical cooling are off, economizer modulates to minimum position.

During the cooling cycle, a discharge air sensor senses discharge air temperature. If discharge air temperature drops below 62 F, the economizer modulates toward minimum position. At 50 F discharge temperature, the economizer will be at minimum position.

At the end of the DAY (OCCUPIED) mode on the clock, unit controls enter the NIGHT (UNOCCUPIED) mode. Economizer closes. Indoor air fan runs only on a call for heating or cooling. Temperature controls go into HEATING SETBACK, COOLING SETUP or COOLING SHUTDOWN mode.

HEATING SETBACK is field selectable at the unit for 5°, 10°, or 15° below set point on room thermostat.

COOLING SETUP is field selectable at the unit for 5°, 8°, or 12° above set point on room thermostat.

During the UNOCCUPIED mode, unit continues to use economizer cooling first and then integrates economizer cooling with mechanical cooling to meet cooling requirements.

A 5-hour bypass timer is located in the remote control box to provide air conditioning during normally unoccupied hours.

TWO-SPEED INDOOR FAN OPTION — Table 1 lists the 2-speed indoor fan motor hp, frame size and shaft diameter. Due to the larger frame size, the 208/230-volt, 25-hp motors and all 30-hp motors are available in single speed only.

The 2-speed motors are 2 winding (4 pole/6 pole) design, with speeds of 1750/1170 rpm. Indoor fans automatically operate at low speed until high speed is necessary to maintain comfort conditions. No field wiring or adjustment is necessary.

COOLING mode sequence of operation is outlined in Table 4.

In HEATING mode, the indoor fan operates at low speed for ventilation only, and operates at high speed during active heating. A 2-heat/4-cool logic panel provides the necessary fan control.

The circuit breakers, contactors, and relays required for 2-speed motor control are located in the 2-speed indoor fan motor control box (Fig. 17).

POWER EXHAUST OPERATION — Units have an auxiliary switch located on the damper motor. This switch is factory set to prevent the power exhaust fans from operating when the economizer damper is less than 30% open.

If other than factory setting is desired, adjust as follows:

Table 4 — Two-Speed Indoor Air Fan Staging; Cooling Mode

ECONOMIZER COOLING (Enthalpy Permitting)

OPERATING CONDITION	FAN SPEED	ECONOMIZER DAMPER POSITION	COMPRESSOR OPERATION
NO CALL FOR COOLING (Ventilation Air)	Low	Minimum Position	Off
CALL FOR MINIMUM COOLING	Low	Modulating Between Min and Full Open	Off
STAGE 1 OF LOGIC PANEL (Economizer Cooling)	High	Full Open	Off
STAGE 2 OF LOGIC PANEL (Integrated Econ/Mech Cooling)	High	Full Open	Compr 1
STAGE 3 AND 4 OF LOGIC PANEL (Integrated Econ/Mech Cooling)	High	Full Open	Compr 1 and 2

MECHANICAL COOLING
(Enthalpy Not Permitting Economizer Cooling)

OPERATING CONDITION	FAN SPEED	ECONOMIZER DAMPER POSITION	COMPRESSOR OPERATION
NO CALL FOR COOLING (Ventilation Air)	Low	Minimum Position	Off
STAGE 1 OF LOGIC PANEL	Low	Minimum Position	Off
STAGE 2 OF LOGIC PANEL	Low	Minimum Position	Compr 1
STAGE 3 OF LOGIC PANEL	Low	Minimum Position	Compr 1 and 2
STAGE 4 OF LOGIC PANEL	High	Minimum Position	Compr 1 and 2

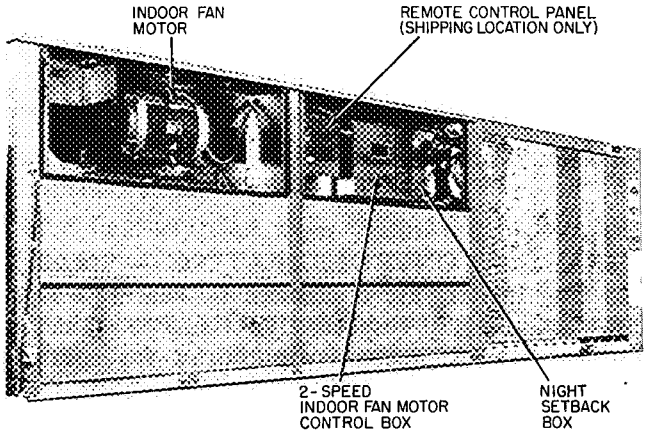


Fig. 17 — Two-Speed Fan Control Box Location

NOTE: Adjustment does not require running the motor.

1. Motor must be in the fully closed position.
2. Referring to Fig. 18, take off "C" clip and drive bracket. Remove screws at 4 corners of housing. Pull off return spring housing.
3. Remove spring on motor shaft.
4. Adjust switch as shown in Fig. 19.
5. After adjustment, replace spring on motor shaft and reassemble return spring housing.

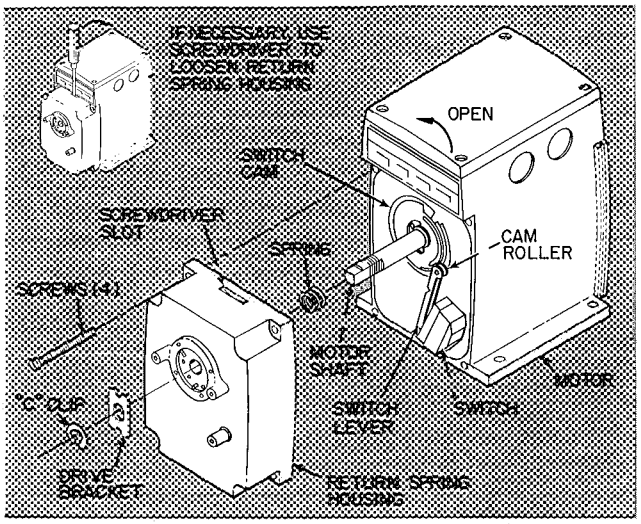
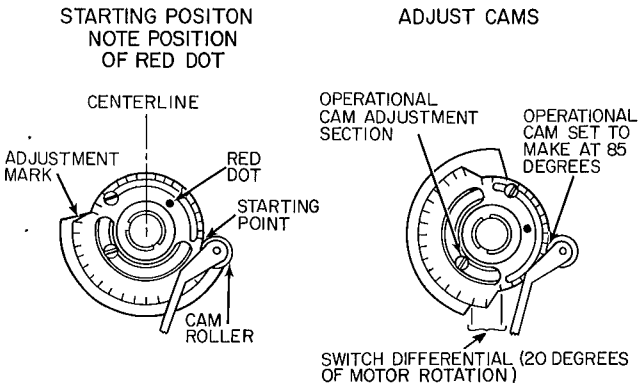


Fig. 18 — Removing Return Spring Mechanism



Each adjustment mark represents 10 degrees of motor rotation Use marks and center of cam roller as adjustment guide

Loosen operational cam adjustment screw Rotate both cams clockwise the number of degrees motor must travel before switch makes Tighten screw

Red dot will be to right of centerline if switch is properly adjusted

Fig. 19 — Adjusting Switch Make and Break Points

CAPACITY CONTROL, HEATING — Stages 1 and 2 of heaters are controlled by heating relays HR1 and HR2, respectively. Using a suitable ammeter, check heater current draw for heating assemblies or elements. When checking second-stage heater operation, be sure heating thermostat is set high enough to activate second-stage heaters. Also, check operation of outdoor air thermostats if additional staging is provided.

Modu-Pac® Variable Volume Units — Units suitable for use with Modu-Pac variable air volume systems (i.e. Carrier 37 Series terminal units) are equipped with electric unloaders on the no. 1 compressor and hot gas bypass on the no. 1 refrigerant system.

Before starting unit, open compressor service valves and liquid line shutoff valve. Be sure compressor crankcase heaters are on and crankcase oil level is half full. See Compressor and Crankcase Heaters as applicable.

CONTROL SEQUENCE CHECKOUT

1. Turn on unit main power supply. Be sure unit is ready to operate. Turn off compressor circuit breakers.
2. Set the control band knob (Fig. 12) on microprocessor to 8° (50DL044) or 6° (50DL054,064).
3. If unit is not in DAY (OCCUPIED) mode, turn on unit by overriding time clock with manual bypass switch on remote box cover.
4. To check for cooling, turn set point knob (Fig. 14) on microprocessor to 40 F. As corresponding stage of cooling come on, the LED's should glow. Indicator light, located on remote box cover, should also be lit.
5. Turn set point knob on microprocessor to 90 F. The LED's on microprocessor should go out as corresponding stages turn off (providing ambient temperature is below 90 F).
6. To check for heating on units with electric heat, set morning warmup thermostat (Fig. 12), located in variable volume box, to its maximum position. If return air temperature is below the set point, first stage of heat should come on. The outdoor dampers should be tightly closed. Light marked HEATING on the cover of remote box should come on. NOTE: If unit has been in cooling mode, it will be necessary to shut off unit power momentarily in order to check out heating mode; once unit goes into cooling mode, a holding relay locks out heating mode.
7. The morning warmup thermostat is a 2-stage device. When first stage is satisfied, control shuts down electric heat (if used). An adjustable deadband of 3 F to 10 F exists between first and second stage. In the deadband zone, indoor air fan runs but cooling mode will not begin until return air temperature exceeds adjustable set point of the second stage. Note that the difference between heating and cooling set points will always be 3 F to 10 F.
8. When checkout is complete and unit operation is satisfactory, turn off bypass switch, position the set point knob on microprocessor to desired setting (approximately 55 F) and replace all unit panels.

ECONOMIZER OPERATION — Refer to Constant Volume Units, Economizer Operation.

7-DAY TIME CLOCK ADJUSTMENT

Setting ON and OFF Times (Fig. 20) — NOTE: 14 trippers (7 sets, one set for each day) are included. If more than 7 ON-OFF operations per week are required, additional trippers are needed.

1. To set ON (OCCUPIED) time, slip the ON tripper over edge of time dial and position at desired *day of the week* and *time of the day* (AM or PM). (When switch is turned on, normally open contacts close and normally closed contacts open.)

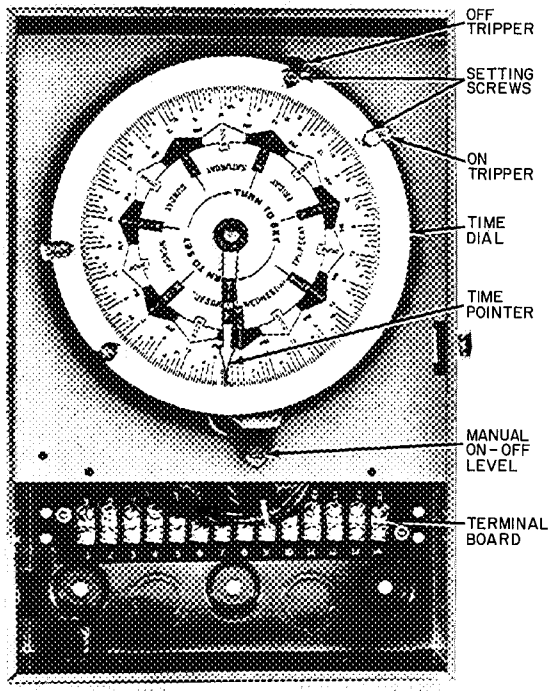


Fig. 20 — Setting the 7-Day Time Clock

NOTE: Dial turns clockwise when power is connected and time clock is operating.

2. Hold tripper firmly against the edge of dial and tighten knurled screw by hand. *(Do not use pliers.)*
3. To set OFF (UNOCCUPIED) operation, use OFF tripper and repeat steps 1 and 2, setting the time desired for the switch to turn off. (Normally open contacts open and normally closed contacts close.)
4. Time clock can be set for up to 3 ON-OFF operations per day or 21 per week. To omit operation, do not place trippers on the dial for that day(s).

NOTE: Minimum time from an ON operation to an OFF operation is 3-1/2 hours.

Minimum time from an OFF operation to an ON operation is 3-1/2 hours (limited by the width of the trippers which cannot be set closer).

Setting the Time of Day (Fig. 20)

1. Apply power to timer motor.
2. Turn time dial clockwise until the TIME pointer is aligned with correct time and day. *Do not turn time dial counterclockwise and do not move the TIME pointer.*

Time clock has a spring wound carryover mechanism to keep timer on schedule during power failure up to 10 hours. When power is restored, mechanism automatically rewinds.

VARIABLE VOLUME OPERATING SEQUENCE (with accessory electric heat) — Clock in remote control box switches controls to DAY (OCCUPIED) mode. Indoor air fan runs for one minute before any other control can function. (This allows sensing of unit discharge air to start from the conditioned space ambient rather than initial unit ambient.)

If return air is below adjustable set point of first stage of the morning warmup thermostat, heaters energize. Outdoor air dampers remain closed. Normally open contacts in base unit override the field-supplied VAV terminal controls and room terminals remain open during heating.

When first stage of morning warmup thermostat is satisfied, heaters shut down, indoor air fan runs continuously and outdoor air dampers remain closed.

When conditioned space temperature rises to adjustable set point of second stage of morning warmup thermostat, unit switches to COOLING mode. Outdoor air dampers go to at least the minimum position. (Once the unit has gone into cooling mode, heat cannot come on during OCCUPIED time period set on the clock.)

If outdoor air enthalpy is below setting of enthalpy controller, economizer modulates open. (If outdoor air enthalpy is above enthalpy set point, economizer remains at minimum position.) Economizer acts as first stage of cooling, providing "free cooling" with outside air. If outside air alone cannot satisfy cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling.

Compressor(s) will start, stop, load and unload and economizer will modulate to maintain an average discharge air temperature. If outside air temperature drops below the adjustable setting (normally 50 F) of the low ambient lockout, the compressor(s) will shut down.

At end of DAY (OCCUPIED) mode on the clock, unit enters the NIGHT (UNOCCUPIED) mode. The outdoor air damper closes and indoor fan and compressors shut down.

If a field-supplied night thermostat is installed in the conditioned space, indoor air fan runs only on a call for heating or cooling. Dampers open only on a call for cooling. On a call for cooling, economizer cooling occurs first and then integrates with mechanical cooling to meet the cooling requirement.

A 5-hour, manual bypass timer is provided in remote control box. This timer, when manually set by building occupant, overrides the UNOCCUPIED mode and places unit in OCCUPIED mode for up to 5 hours.

Constant and Variable Volume Units

TIME GUARD® CIRCUIT — Timer sequence for a particular unit depends on unit and compressor arrangement. The Time Guard device provides a delay in compressor start-up after thermostat closes. On normal unit start-up, outdoor air fans energize 15 seconds before the compressor. If compressor shutdown is due to satisfied thermostat or automatic resetting of a safety device, the com-

pressor automatically restarts after a 5-minute interval. If compressor shutdown is due to tripped overloads, the circuit breakers must be manually reset before compressor will start.

Timer (Time Guard®) for second compressor has a 6-minute interval to prevent compressors from starting simultaneously.

Refer to unit label diagram for specific timer sequence.

CRANKCASE HEATER — Unit main power supply must remain on to provide crankcase heater operation. Crankcase heater in each compressor keeps oil free of refrigerant while compressor is off.

HEAD PRESSURE CONTROL — Each unit has a fan cycling thermostat to shut off 2 outdoor fan motors at 55 F. This permits unit to operate with correct condensing temperatures down to 35 F outdoor air temperature.

SERVICE

Electronic Component Checkout

CONSTANT VOLUME UNITS

CAUTION: Control circuit must be checked with system power on. Disconnect power before checking wiring and use care to avoid electrical shock and prevent equipment damage.

The checkout procedures in this section will determine whether:

1. The logic panel is controlling the heating and cooling equipment properly.
2. System components are correctly wired to the logic panel.

Prior to checking out control circuit, establish setting on the low ambient lockout thermostat. Compressors will not start below this setting (cooling mode only). Recommended setting is approximately 50-55 F.

NOTE: To complete the electronic component checkout, a volt-ohmmeter (Simpson 260 is recommended) is required.

LOGIC PANEL (Fig. 21)

1. Check that 24 VAC is supplied to logic panel. Connect meter to terminals TR.
2. Check thermostat supply voltage at STAT terminals 1 and 2. Reading should be 20 VDC.
3. Remove thermostat supply wires from STAT terminals 1 thru 5 on logic panel.
4. Set meter to volts AC scale equal to relay switching voltage (50-volt scale for 24 VAC).
5. To simulate a call for cooling, jumper between STAT terminals 2 and 4. Normally open Logic Panel contacts (Cool 1 and 2) should close and cooling equipment should cycle on.
6. Connect meter leads to the normally open cooling contacts 1 and 2 on logic panel. Meter should read zero if contacts have closed and contacts are made.

   If meter is reading zero and cooling equipment has not cycled on, logic panel is not at fault.
7. To simulate a call for heating, jumper between STAT terminals 2 and 5. Normally open logic panel contacts (HEAT 1 and 2) should close and heating equipment should cycle on.
8. Connect meter leads to the normally open heating contacts on logic panel. Meter should read zero if contacts have closed.

   If meter is reading zero and heating equipment has not cycled on, logic panel is not at fault.
9. Replace thermostat wiring to terminals 1 thru 5.

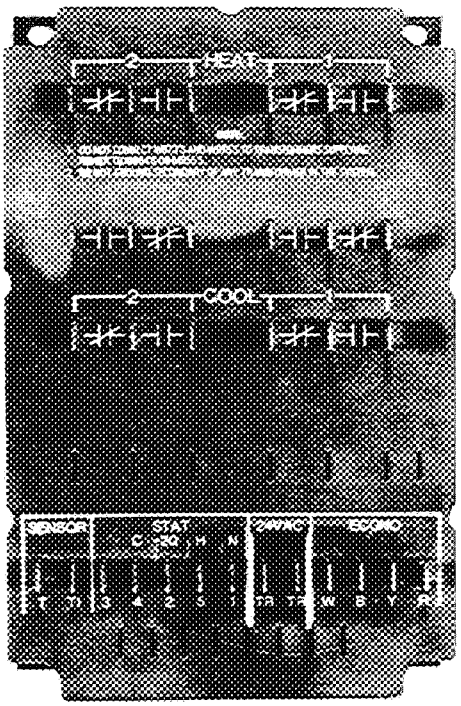


Fig. 21 — Logic Panel

DISCHARGE SENSOR

1. Set resistance on meter to R x 100.
2. Disconnect lead from SENSOR terminal T1 on logic panel.
3. Connect one meter lead to logic panel terminal T and the other meter lead to the loose lead wire from the sensor.
4. Meter readings depend on temperature. Discharge sensor readings should be between 1500 and 4500 ohms. See Fig. 22.

THERMOSTAT/TRANSMITTER (Fig. 16)

1. Set meter to 20 VDC scale.
2. Check for power to thermostat. Connect negative (–) lead to terminal 1 and positive (+) lead to terminal 2. Meter should read 20 VDC.
3. Connect the negative (–) lead to terminal 1 and the positive (+) lead to terminal 4.
4. Slowly move the cooling lever below room temperature to simulate a call for cooling. Meter

reading should gradually increase to about 16 VDC. (See Fig. 23.)

5. Move the cooling lever above room temperature. Meter reading should drop to less than 2 VDC.
6. Remove the (+) meter lead from terminal 4 and connect it to terminal 5.
7. Slowly move the heating lever above room temperature to simulate a call for heating. Meter reading should gradually increase to about 16 VDC. (See Fig. 23.)
8. Move the heating lever below room temperature. The meter reading should drop to less than 2 VDC.

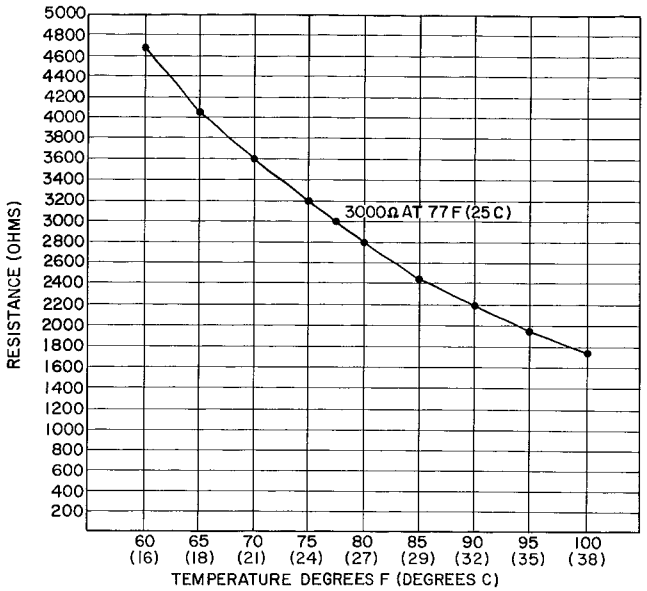
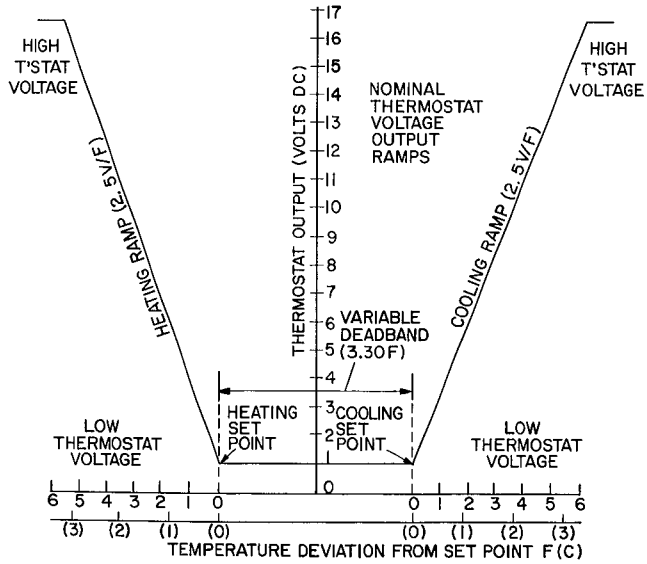


Fig. 22 — Resistance Range of the Discharge Sensor



VOLTAGES NECESSARY TO ACTIVATE LOGIC PANEL

HEAT STAGE	VOLT DC	COOL STAGE	VOLT DC
1	4 63	1	5 00
2	5 88	2	5 88

Differential: 63 ± 07 volts Tolerance: ± 25 volts

Fig. 23 — Thermostat/Transmitter Output Voltage Ramps

ECONOMIZER (Motor Operation) — Check to see 115 V is at the economizer motor. Remove wire from the W terminal on damper motor. Dampers should go fully open.

Short between R-W on motor terminals. Dampers should go fully closed.

Logic Panel Economizer Signal

1. Disconnect terminal W on logic panel.
2. Connect meter (2.5 VDC scale) with negative (-) lead to R and the positive (+) lead to W.
3. Set thermostat for a call for cooling. Meter reading should rise to 1.5 VDC. If thermostat was already calling for cooling, reading will be 1.5 V when meter is connected.
4. Turn thermostat up so that no cooling is called for. Voltage should fall from 1.5 VDC to 0.

Conduct the above test with air temperature at the discharge sensor (located at unit air discharge) above 62 F. If air is below 50 F, there will be no voltage signal. If air is between 50 F and 62 F, voltage will be in the same proportions.

CAUTION: When servicing unit, shut off all electrical power to unit to avoid shock hazard or injury from rotating parts.

Cleaning — Inspect unit interior at the beginning of each heating and cooling season and during each season as operating conditions require. Remove unit top panel(s) and/or side panels as required to expose unit interior.

EVAPORATOR COILS — Clean with a stiff brush, vacuum cleaner or compressed air.

CONDENSER COILS — Clean with a stiff brush or vacuum cleaner. When cleaning with compressed air or low-pressure water or steam, guard against damaging compressor wiring and nearby controls. Condenser fan motor(s) is drip-proof but not waterproof.

CONDENSER SECTION DRAIN — Check that area under coil is clear and drains freely.

CONDENSATE DRAIN — Check and clean annually at start of cooling season. In winter, keep drain and trap dry or protect against freeze-up.

FILTERS — Replace filters at start of each heating and cooling season or as often as necessary during each season, depending on operating conditions. Refer to Table 1 for type and size of filter used. Filter access panels are shown in Fig. 4. Return air filter tracks will accept 2 layers of 1-in. thick filters if 2-in. filters are not available. Do not install bag filters in standard filter tracks. Do not install

standard filters or 2-in. high-efficiency filters in bag filter tracks.

OUTDOOR AIR INLET SCREEN(S) — Clean screens with steam or hot water and mild detergent. Do not use throwaway filter in place of these screens. Loosen fastening-bracket screws and slide out screens.

Lubrication

COMPRESSORS — Each compressor is charged with correct amount of oil at the factory. Oil level should be between bottom and mid-level of sight glass when compressor is warm. Refer to 06D or 06E Compressor Service Manual if additional information regarding compressor lubrication system is required.

FAN SHAFT BEARINGS — Charge each grease fitting with a suitable bearing grease at least once a year. Do not overlubricate.

FAN MOTOR BEARINGS — No relubrication of outdoor air fan motors is necessary for first 2 to 5 years of use, depending on operating conditions. Annually thereafter, open, clean and repack each bearing with a suitable bearing grease.

Indoor air fan motor bearings should be cleaned and repacked with a suitable bearing grease annually after initial unit installation.

Power Exhaust Air Fan Adjustment (if fitted) — Adjust belt tension so that 1/8-in. deflection at 5- to 8-pounds pressure between pulley centers can be obtained. To change tension, loosen motor mounting bolts, reposition motor and tighten mounting bolts. Tighten locknut and bolt under motor mounting plate to secure in fixed position.

Outdoor (Condenser) Air Fan Adjustment (Fig. 24) — Shut off unit power supply. Remove fan guard and loosen fan hub setscrews. Adjust fan height using a straight edge laid across venturi. Tighten setscrews and replace rubber hubcap to prevent hub from rusting to motor shaft. Fill hub recess with permagum if hub has no rubber hubcap.

Damper Vent Position Setting

1. On constant volume units, adjust thermostat or transmitter so there is no call for cooling. On variable volume units, adjust set point knob on microprocessor so there is no call for cooling. The economizer dampers go to minimum position.
2. Remove cap from vent adjustment screw on top of damper motor terminal box cover.
3. Turn adjustment screw slowly until dampers assume desired vent position. *Do not manually operate damper motor. Damage to motor will result.*

POWER FAILURE — Dampers have a spring return. In the event of a loss of power, dampers close until power is restored. *Do not manually operate damper motor. Damage to motor will result.*

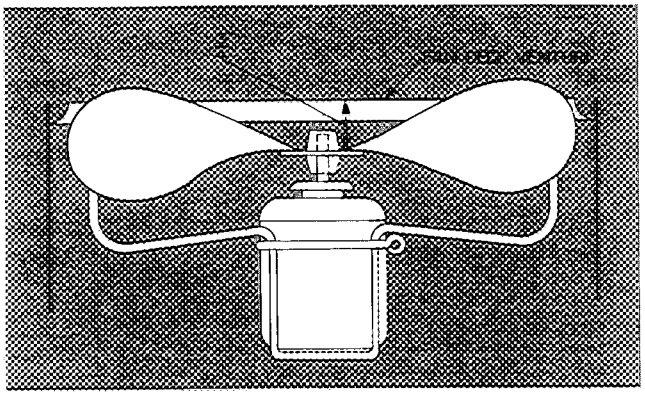


Fig. 24 — Outdoor Air Fan Adjustment

Refrigerant Charge — Amount of refrigerant charge is shown on unit nameplate and in Table 1. When charging refrigerant system, refer to Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants. When adding a complete charge, evacuate the system using standard evacuating procedures and weigh in specified amount of refrigerant. A charging chart (Fig. 25, 26, and 27) is provided on unit control box door above compressor and may be used (use of sight glass not required).

When using refrigerant liquid line sight glass to charge system:

1. Install a jumper on the low-pressure switch if required.
2. Operate unit with restricted condenser airflow to achieve an operating discharge pressure of about 375 psig.
3. Slowly add refrigerant until sight glass clears.
4. Remove jumper from low-pressure switch and remove condenser air restriction.

Indoor Air Fan Adjustment — Fixed fan speeds are set as shown in Table 1. If other than available fan speeds are required, select field-supplied motor or pulleys, using data from Tables 5 and 6, and Fig. 28 and 29.

PULLEY REMOVAL — Pulleys are of the fixed type and have taper-lock bushings. To remove, shut off unit power. Loosen fan motor mounting plate and remove belt. Relocate taper-lock bushing bolts in removal holes to loosen bushing. Remove pulley from shaft.

After reinstalling pulley and belt, check pulley alignment and belt tension as described below.

PULLEY ALIGNMENT — Loosen fan shaft pulley bushing and slide pulley along shaft. Make angular adjustment by loosening motor mounting plate and repositioning it as required.

BELT TENSION — Adjust belt tension by moving motor back until only a *slight bow* appears in the belts on the slack side of the drive while running under full load. Secure motor. Recheck belt tension after 24 hours of operation, adjust as necessary.

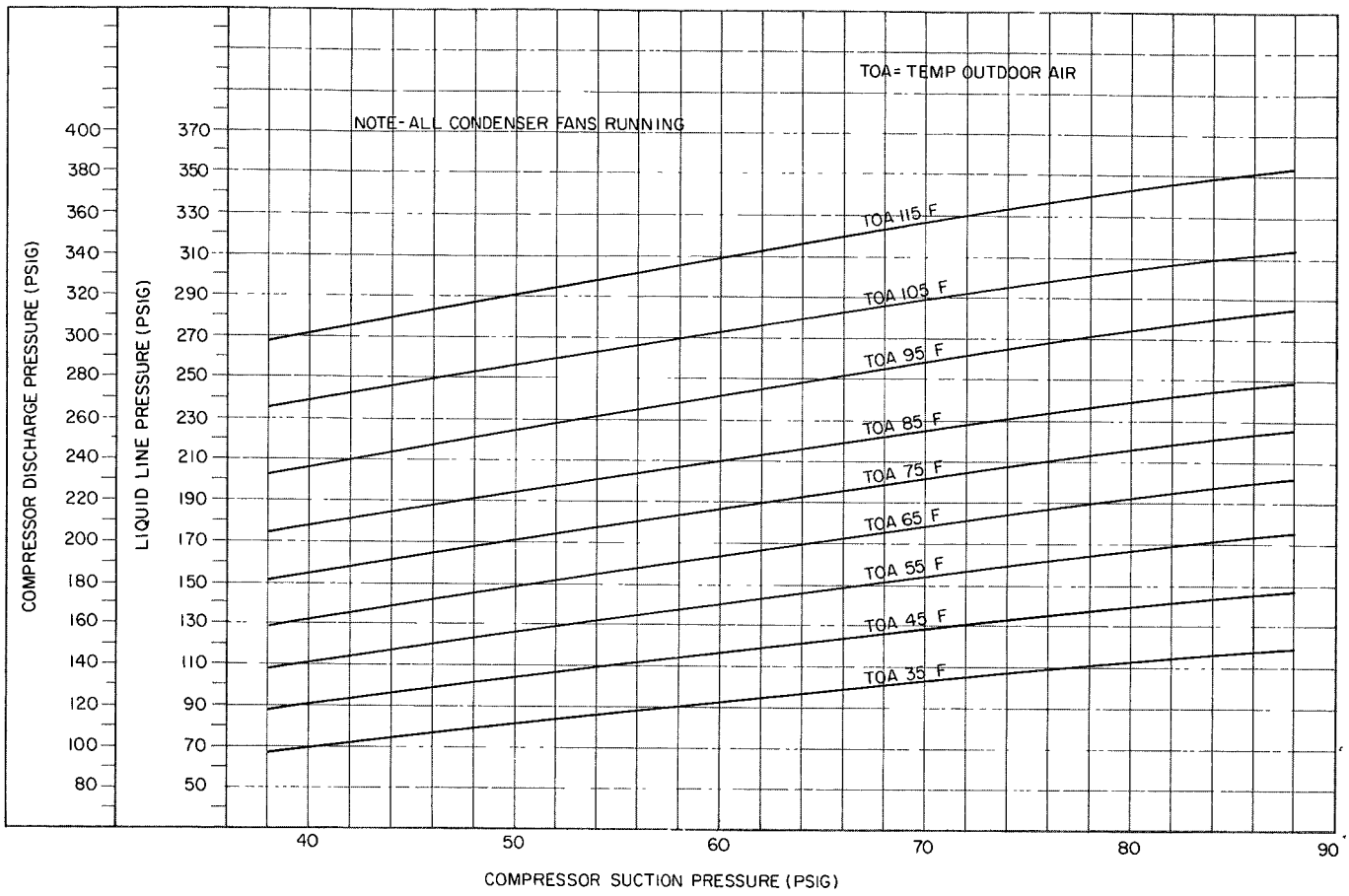


Fig. 25 — Charging Chart; 50DL044, System 1 and System 2

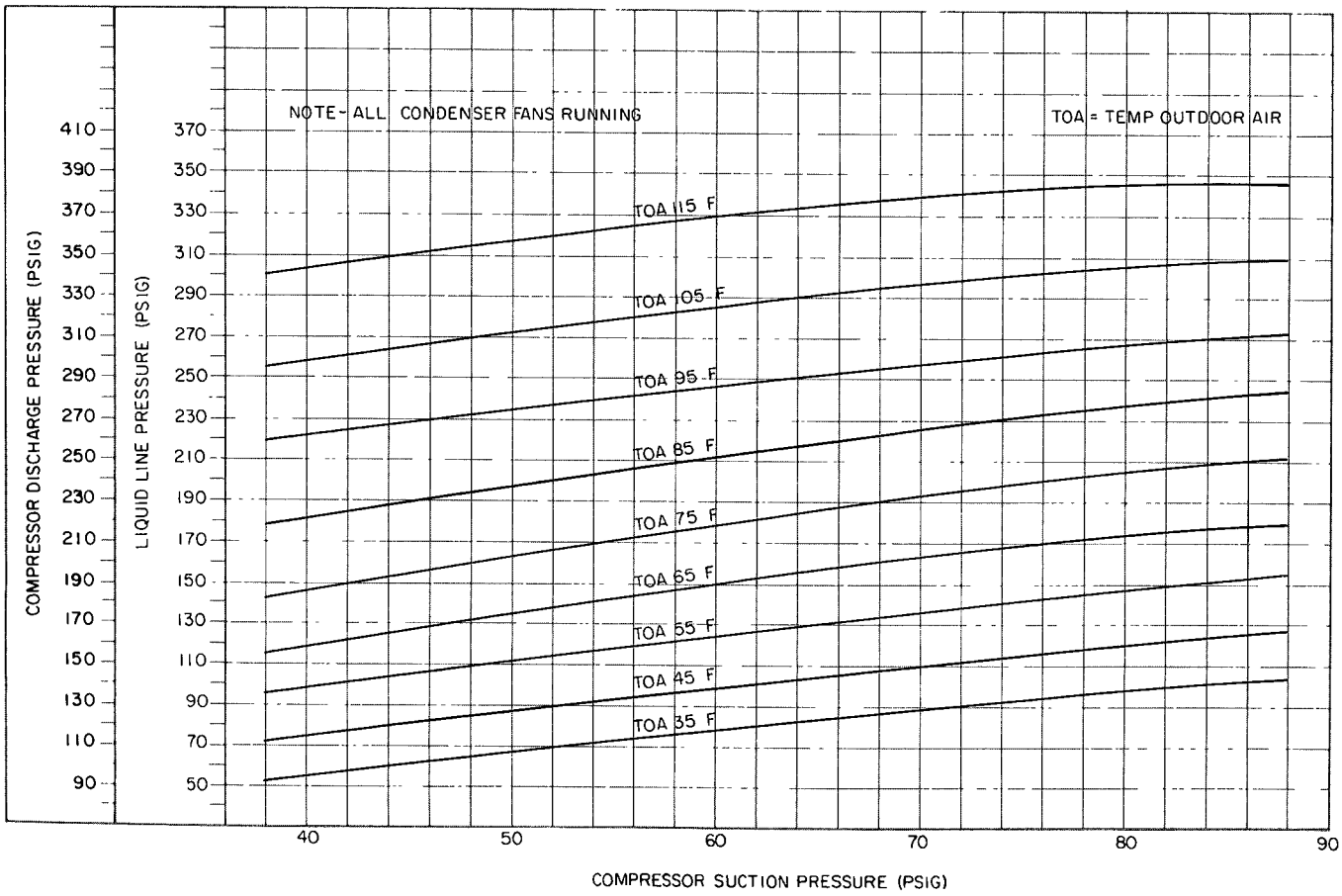


Fig. 26 — Charging Chart; 50DL054, System 1 and System 2

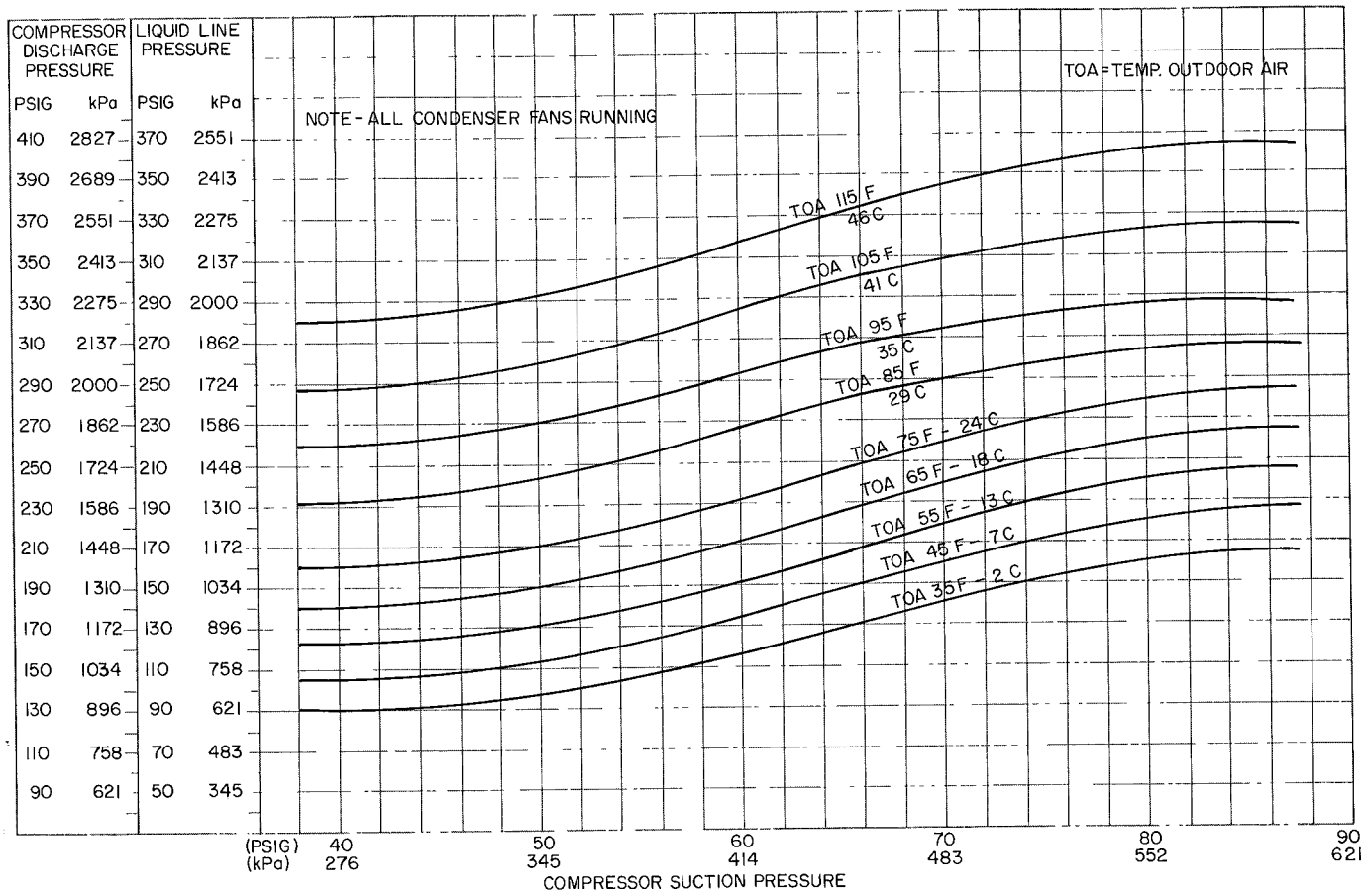


Fig. 27 — Charging Chart; 50DL064, System 1 and System 2

Table 5 — Indoor Air Fan Pulley Data

UNIT 50DL	FAN RPM	MOTOR PULLEY	FAN PULLEY	SINGLE-SPEED BELT	TWO-SPEED BELT
		No Grooves - Type - In.		NO. - SIZE	NO - SIZE
044	925	5 - 3V - 5.6	4 - 3V - 10.6	5 - 3V - 750*	5 - 3V - 770
	991	3 - 3V - 6.0	3 - 3V - 10.6	3 - 3V - 750	3 - 3V - 770
	1073	4 - 3V - 6.5	4 - 3V - 10.6	4 - 3V - 750	4 - 3V - 770
	1093	4 - 3V - 5.0	4 - 3V - 8.0	4 - 3V - 710	4 - 3V - 710
	1159	5 - 3V - 5.6	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 720
	1226	4 - 3V - 5.6	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 710
	1300	4 - 3V - 6.0	4 - 3V - 8.0	4 - 3V - 710	4 - 3V - 710
054	925	4 - 3V - 5.6	4 - 3V - 10.6	4 - 3V - 750	4 - 3V - 750
	991	5 - 3V - 6.0	4 - 3V - 10.6	4 - 3V - 750	4 - 3V - 770
	1039	5 - 3V - 4.75	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 710
	1073	4 - 3V - 6.5	4 - 3V - 10.6	4 - 3V - 750	4 - 3V - 770
	1093	5 - 3V - 5.0	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 720
	1159	5 - 3V - 5.6	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 720
	1225	5 - 3V - 5.6	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 720
064	825	4 - 3V - 5.6	4 - 3V - 10.6	4 - 3V - 750	4 - 3V - 750
	991	4 - 3V - 6.0	4 - 3V - 10.6	4 - 3V - 750	4 - 3V - 770
	1039	5 - 3V - 4.75	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 710
	1073	4 - 3V - 6.5	4 - 3V - 10.6	4 - 3V - 750	4 - 3V - 770
	1093	5 - 3V - 5.0	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 720
	1159	5 - 3V - 5.3	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 720
	1225	5 - 3V - 5.6	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 720
	1292	5 - 3V - 6.0	5 - 3V - 8.0	5 - 3V - 710	5 - 3V - 720
	1450	5 - 3V - 5.0	5 - 3V - 8.0	5 - 3V - 670	—

Shaded values indicate standard or optional pulley combinations available as shown in Physical Data table All other combinations are field supplied

*Three belts are required, 4 may be used if desired
†Remove one belt

Table 6 — Indoor Air Fan Data

UNIT 50DL	CFM	EXTERNAL STATIC PRESSURE (in. wg)																	
		0.20		0 40		0.60		0.80		1.00		1.20		1.40		1.60		1.80	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
044	8,000	467	1 22	546	1 61	628	2 12	705	2 66	774	3 24	839	3 85	900	4 47	956	5 09	1010	5 72
	9,000	508	1 65	575	2 02	649	2 54	721	3 14	789	3 75	852	4 40	911	5 08	967	5 77	1020	6 46
	10,000	552	2 18	609	2 56	674	3 06	741	3 67	806	4 35	867	5 03	924	5 73	978	6 48	1031	7 24
	11,000	596	2 83	648	3.21	704	3 70	764	4 32	825	5 01	883	5 75	939	6 50	992	7 26	1043	8.06
	12,000	642	3 60	688	4 00	738	4 48	791	5 07	847	5 78	902	6 54	956	7 35	1008	8 17	1057	8 99
	13,000	689	4 52	730	4 93	775	5 41	822	5 98	873	6 68	924	7 46	975	8 28	1025	9 15	1074	10 04
	14,000	736	5 57	774	6 00	814	6 49	857	7 06	902	7 72	949	8 51	997	9 35	1045	10 23	1091	11 17
	15,000	783	6 79	818	7 24	855	7 74	894	8 31	935	8 96	978	9 70	1022	10 57	1067	11 47	1111	12 40
	16,000	831	8 18	864	8 65	898	9 17	933	9 74	971	10 38	1009	11 11	1050	11 93	1092	12 86	1134	13 82
	17,000	879	9 75	910	10 24	941	10 78	974	11 36	1008	12 00	1044	12 72	1081	13 51	1119	14 40	1159	15 40
	18,000	927	11 52	956	12 03	986	12 58	1016	13 18	1048	13 83	1081	14 54	1115	15 31	1150	16 17	1186	17 12
	19,000	976	13 48	1003	14 02	1031	14 59	1059	15 21	1089	15 86	1119	16 58	1151	17 35	1183	18 19	1217	19 10
	20,000	1024	15 67	1050	16 23	1076	16 82	1103	17 45	1131	18 12	1159	18 84	1189	19 61				
054, 064	10,000	487	1 47	577	1 89	659	2 40	733	2 99	802	3 60	863	4 21	922	4 86	977	5 58	1030	6 27
	11,000	519	1 90	601	2 30	679	2 84	750	3 42	817	4 09	879	4 76	935	5 42	989	6 11	1041	6 88
	12,000	554	2 42	626	2 77	702	3 34	770	3 95	833	4 62	895	5 35	952	6 08	1003	6 79	1054	7 54
	13,000	590	3 04	654	3 35	724	3 92	791	4 57	852	5 23	910	5 97	967	6 77	1020	7 57	1069	8 33
	14,000	627	3 76	684	4 05	749	4 58	813	5 25	873	5 96	928	6 69	982	7 49	1035	8 35	1085	9 21
	15,000	664	4 59	716	4 87	775	5 34	836	6 02	894	6 77	949	7 52	1000	8 32	1051	9 18	1100	10 11
	16,000	703	5 54	750	5 81	803	6 24	860	6 90	917	7 66	970	8 47	1021	9 27	1069	10 12	1116	11 05
	17,000	741	6 62	785	6 88	833	7 28	886	7 88	940	8 66	993	9 49	1042	10 35	1089	11.21	1134	12 11
	18,000	780	7 83	820	8 09	865	8 47	914	9 01	965	9 77	1016	10 62	1064	11 51	1110	12 42	1155	13 33
	19,000	819	9 19	857	9 45	898	9 81	943	10 31	991	11 00	1039	11 86	1087	12 78	1132	13 74	1176	14 69
	20,000	859	10 69	894	10 95	932	11 30	973	11 77	1018	12 41	1064	13 24	1110	14 17	1155	15 14	1197	16 16
	21,000	898	12 35	932	12 62	967	12 96	1005	13 40	1047	13 99	1090	14 76	1134	15 70	1178	16 69	1220	17 72
	22,000	938	14 18	970	14 45	1003	14 78	1039	15 21	1077	15 76	1118	16 47	1159	17 35	1201	18 37	1243	19 42
	23,000	978	16 18	1008	16 45	1040	16 78	1073	17 20	1109	17 72	1146	18 38	1186	19.20	1226	20 20	1266	21 27
	24,000	1018	18 36	1047	18 64	1076	18 97	1108	19 38	1141	19 88	1177	20 50	1214	21 26	1252	22 19	1290	23 28

UNIT 50DL	CFM	EXTERNAL STATIC PRESSURE (in. wg)															
		2.00		2.20		2.40		2.60		2.80		3 00		3.20		3.40	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
044	8,000	1061	6 37	1110	7 04	1155	7 69	1201	8 38	1245	9 09						
	9,000	1070	7 15	1118	7 87	1164	8 57	1209	9 33	1252	10 08						
	10,000	1081	8 01	1128	8 78	1173	9 54	1218	10 34	1260	11 13						
	11,000	1091	8 89	1139	9 73	1184	10 57	1228	11 43	1269	12 25						
	12,000	1105	9 84	1150	10 72	1195	11 63	1238	12 55	1280	13 46						
	13,000	1120	10 93	1165	11 82	1208	12 76	1250	13 72	1291	14 70						
	14,000	1137	12 12	1181	13 08	1223	14 04	1264	15 00								
	15,000	1155	13 40	1198	14 42	1240	15 44	1280	16 48								
	16,000	1176	14 80	1217	15 85	1257	16 93	1297	18 03								
	17,000	1198	16 41	1238	17 45	1277	18 54										
	18,000	1224	18 18	1261	19 25												
	19,000																
	20,000																
054, 064	10,000	1078	6 91	1125	7 63	1169	8 35	1210	9 10	1253	9 89	1293	10 71	1332	11 52	1371	12 37
	11,000	1090	7 67	1138	8 43	1181	9 12	1225	9 90	1266	10 70	1303	11 50	1342	12 34	1380	13 22
	12,000	1102	8 33	1149	9 18	1194	10 05	1237	10 87	1278	11 64	1318	12 45	1356	13 32	1393	14 19
	13,000	1116	9 12	1161	9 94	1206	10 83	1249	11 76	1290	12 70	1330	13 60	1369	14 45	1405	15 27
	14,000	1132	10 05	1175	10 88	1219	11 75	1260	12 64	1302	13 60	1342	14 61	1380	15 62	1418	16 60
	15,000	1148	11 03	1193	11 94	1234	12 81	1275	13 72	1315	14 66	1354	15 63	1392	16 66	1429	17 73
	16,000	1162	12 03	1208	13 01	1251	13 99	1291	14 95	1329	15 87	1368	16 86	1405	17 87	1441	18 89
	17,000	1178	13 09	1222	14 13	1266	15 17	1307	16 22	1347	17 25	1384	18 25	1419	19 24		
	18,000	1197	14 29	1239	15 31	1281	16 40	1322	17 51	1362	18 61	1400	19 72	1437	20 80		
	19,000	1218	15 65	1258	16 66	1297	17 72	1337	18 85	1376	20 02	1415	21 19				
	20,000	1239	17 17	1279	18 18	1317	19 23	1354	20 33	1392	21 50	1430	22 73				
	21,000	1260	18 79	1300	19 85	1338	20 90	1375	22 01	1410	23 14	1446	24 35				
	22,000	1283	20 51	1321	21 63	1359	22 74	1395	23 84	1431	24 99						
	23,000	1306	22 38	1344	23 52	1380	24 69	1416	25 85								
	24,000	1329	24 39	1367	25 55	1403	26 75	1438	27 98								

Bhp — Brake horsepower
Rpm — Revolutions per minute

NOTES
1 Fan performance has deductions for unit casing losses, wet coil and clean standard filters
2 Fan motor bhp is based on minimum voltages and 80 F air access motor
3 Consult physical data and indoor air fan pulley data for appropriate motor and pulley sizes with corresponding rpm
4 For rpm's outside of published data, field-supplied drive may be required

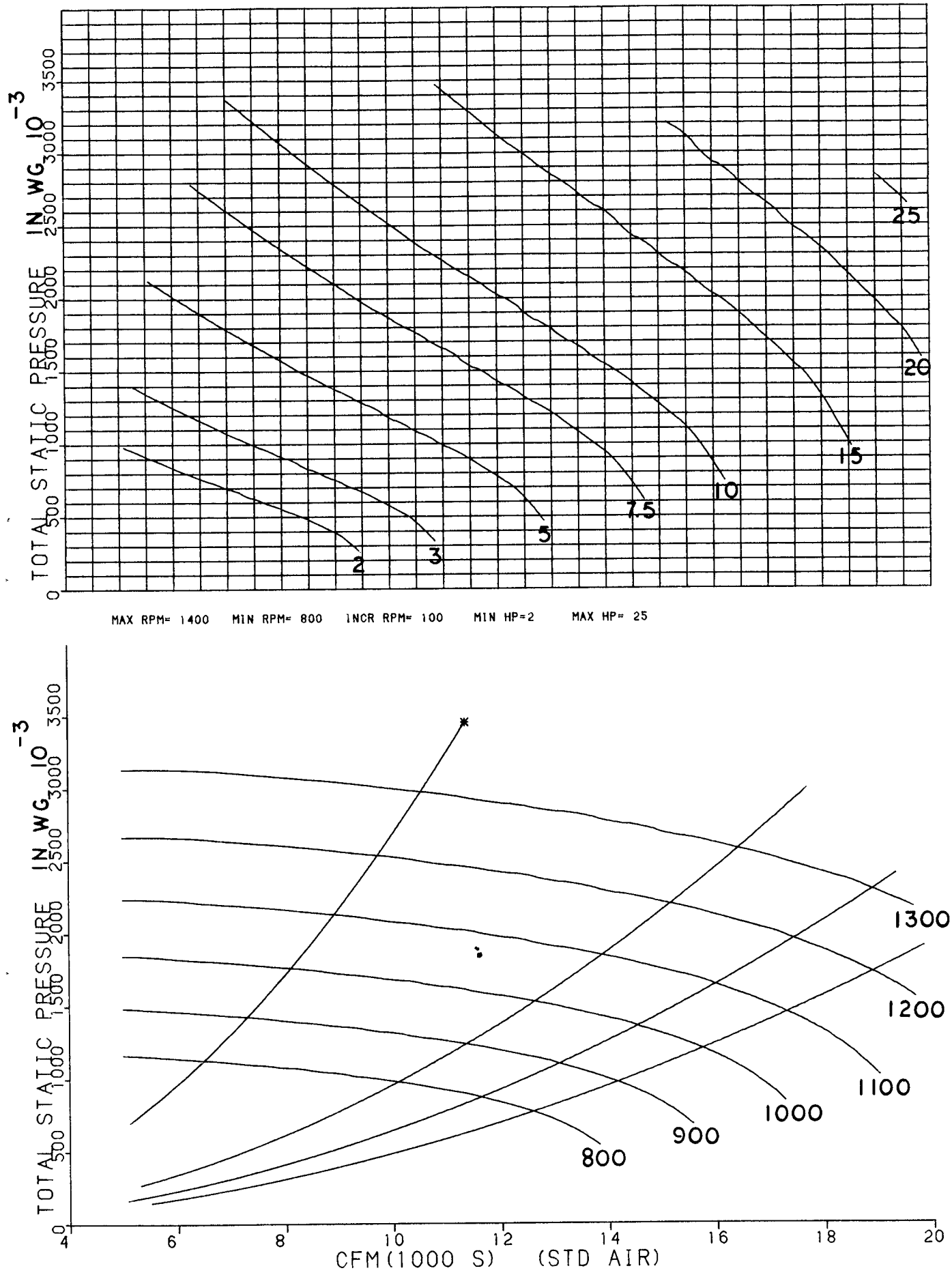


Fig. 28 — 50DL044 Indoor Air Fan Data

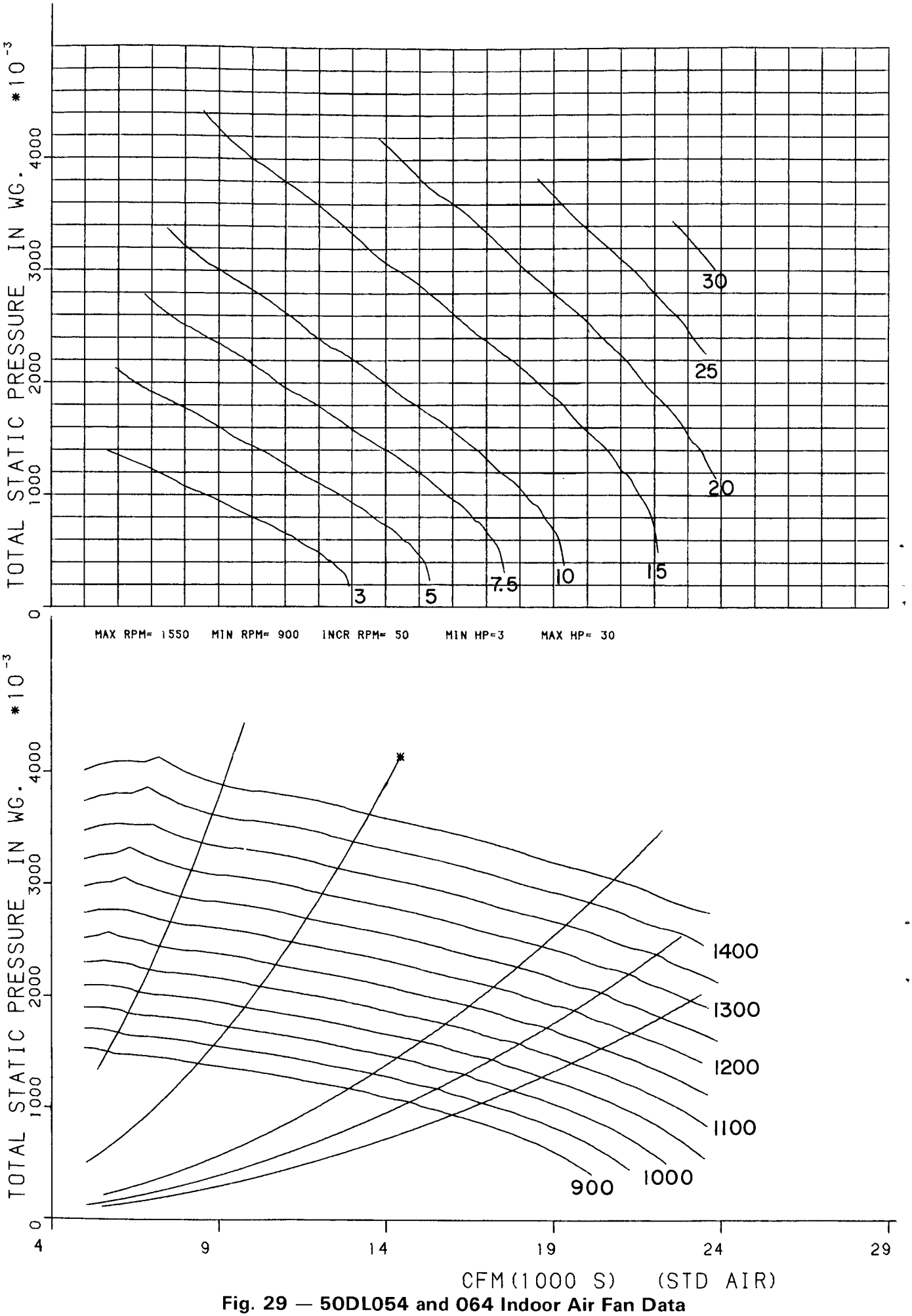


Fig. 29 — 50DL054 and 064 Indoor Air Fan Data