

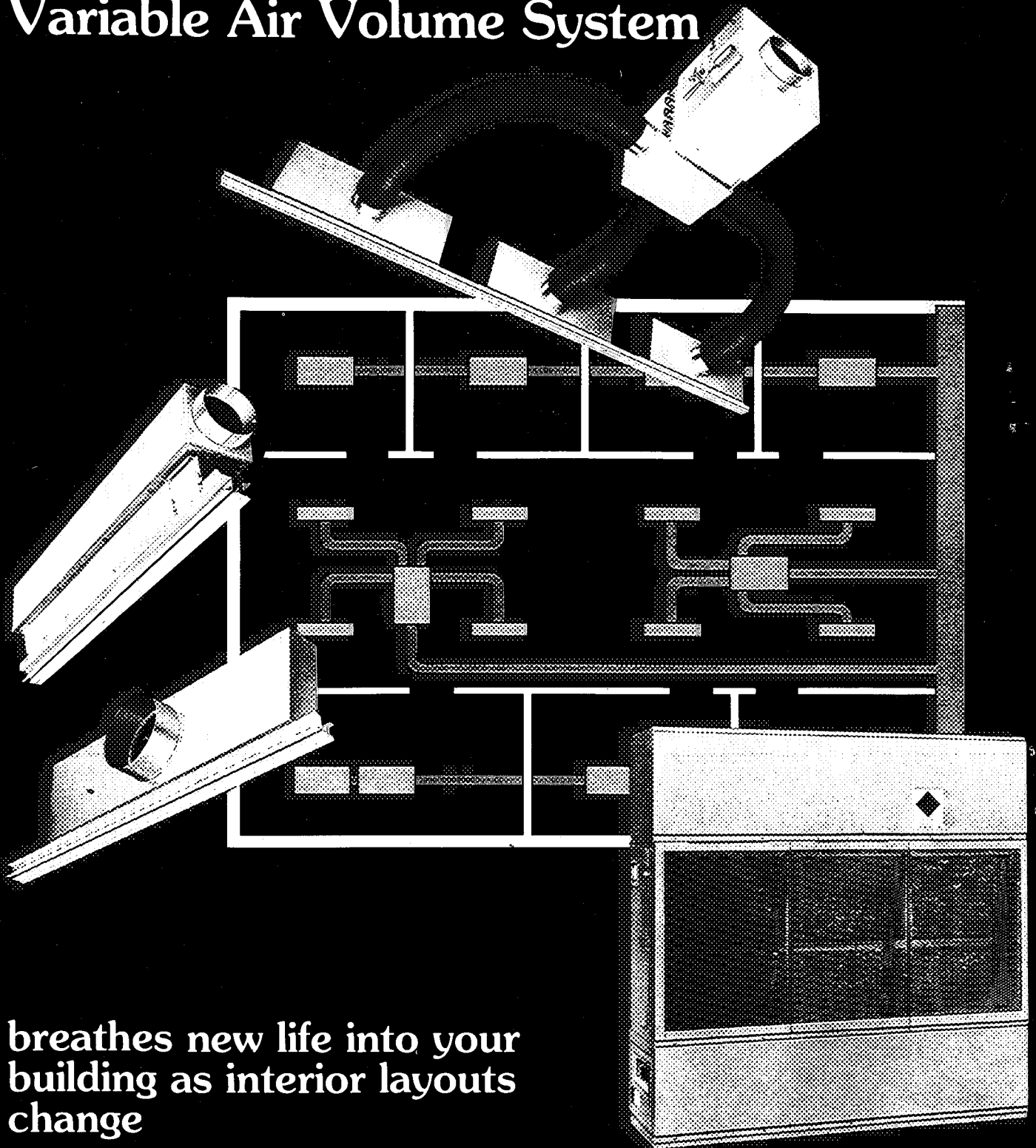
Carrier

Modu-Vac

Indoor Packaged Cooling — Variable Air Volume System

50BJ,BK

Cooling Capacities:
186,000 to 370,000 Btuh



breathes new life into your
building as interior layouts
change

Carrier

NOW — bring Single-Package economy and VAV comfort into any building.

Carrier's new Modu-Vac is the ideal cooling and air distribution system for your variable volume, constant temperature applications.

The single-package, vertical 50BJ or 50BK (condenserless) cooling unit automatically conditions the air to your exact requirements; then Modubox and Moduline®, Carrier's unique variable air volume terminals, distribute the air in precisely controlled flows to suit each area of the building.

50BJ,BK units plus Modubox and Moduline. . . together they form Modu-Vac, the modern air conditioning system that allows your building to change with the times, whenever interior layouts are updated or modified.

Whether you choose the 50BJ water-cooled unit or 50BK condenserless model, you'll get a package that can cool, dehumidify, filter and circulate air — all under a microprocessor master control that assures minimum energy consumption at full and partial load.

Now add the unparalleled flexibility of Modubox and Moduline variable volume terminals with flows from 15 thru 3000 cfm, and all your design options are kept wide open. With Moduline, a single thermostat and volume regulator located in one of the air terminals can be used to control the variable supply air quantity either individually or in a series of air terminals . . . as you choose. With Modubox, the single thermostat and volume control box can service large zones with up to 3000 cfm of precisely conditioned air. When interior partitions change, you'll see how adaptable Modu-Vac, the VAV system, really is. Changes will always be minimal.

Carrier's Modu-Vac serves any building . . . schools, offices, libraries, high rises. . . new construction or renovation. Just set the packaged cooling unit in the equipment room or conditioned space, attach the ductwork and install the self-contained Moduline and Modubox VAV terminals. Get all the performance you expect from a built-up system without the extra cost of designing and installing one. Modu-Vac does it all.

These compact, self-contained units bring complete flexibility to your building design.

Save design time — Carrier's Modu-Vac blends the simplicity of vertical, single-package air conditioners with Modubox and Moduline's unparalleled terminal flexibility so that you can reduce your design time considerably. With the 50BJ,BK/Moduline/Modubox combination, there's no need to use valuable time selecting the various components of a split system. Just select the appropriately sized 50BJ,BK indoor unit. You know the components are compatible. . . you know they've been thoroughly tested . . . there's no guesswork. And when you see how smoothly installation goes, you know you've made the right move.

Installation is easy — A trouble-free installation saves money from start to finish. And Carrier's Modu-Vac offers easy installation from the indoor unit right out to the farthest air terminal.

The 50BJ,BK cooling unit in its rugged compact package can be placed in a variety of locations, whether in the equipment room or the conditioned space. Each of the 4 sizes can be installed with either vertical or horizontal air discharge. The factory-installed piping and the prewired electrical center simplify field connections.

Moduline terminals and Modubox boot-diffusers are, of course, designed to match perfectly a wide range of custom ceilings without custom alteration and fit-up. And Moduline and Modubox System-Powered units install without wiring, water piping, extra insulation or, in most cases, return ductwork. Add to this the unique self-balancing and self-regulating capability of these units and you'll find that the Modu-Vac system is a truly economical installation.

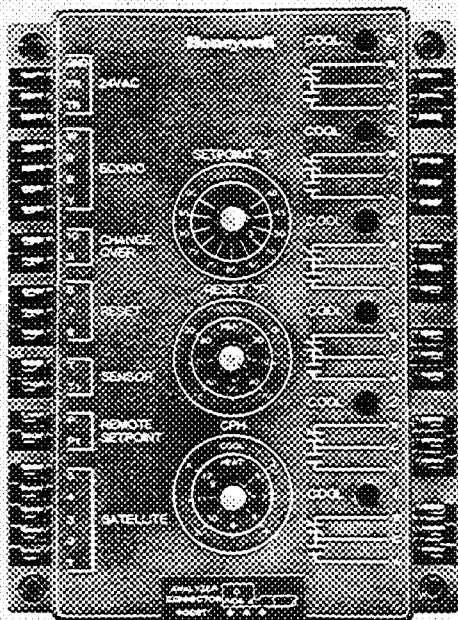
Look for minimum maintenance and service — The Modu-Vac system is designed to provide years of trouble-free service with very low maintenance.

All components of the 50BJ,BK indoor unit are mounted on a sturdy steel frame encased in a Weather Armor cabinet of heavy-gage, galvanized steel. This rugged construction provides strength and durability and affords excellent protection against damaging dirt or moisture.

Easy-to-remove panels provide complete access to internal components and controls. The time-tested serviceable hermetic compressors are sealed against dirt and moisture contamination. Their precision parts have minimum-wear surfaces that are thoroughly protected by positive pressure lubrication. Unit operation is constantly safeguarded by high- and low-pressure safeties, inherent compressor motor protection and Carrier's exclusive Time Guard® circuit.

The rest of the Modu-Vac system is equally maintenance free. Moduline and Modubox System-Powered terminals have no motor-driven dampers or remote pneumatic controllers. Their self-contained controls balance and maintain the required airflow automatically year after year.

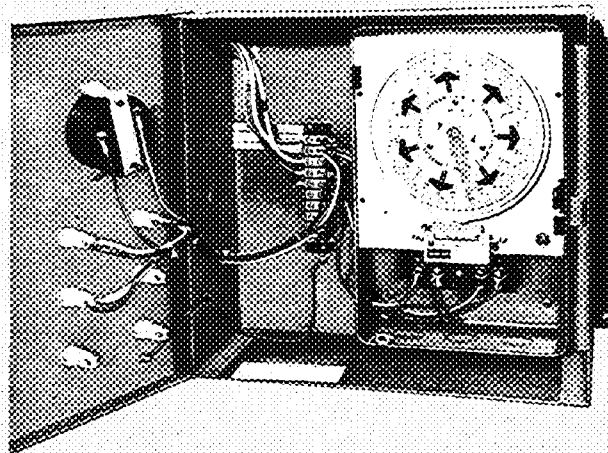
Count on low operating costs and high-capacity performance — The 50BJ,BK Modu-Vac units contain an advanced solid state microprocessor system that assures maximum operating economy. This computer brain constantly monitors unit discharge air temperature and compares it with conditioned space temperatures. Logic circuits then sequence unit start, stop and cooling stages to provide just the amount of mechanical cooling necessary for stable, comfortable conditioned space temperatures.



MODU-VAC MICROPROCESSOR

And microprocessor reset capability prevents costly overcooling of the conditioned space. The moment the microprocessor senses that overcooling is imminent, it resets the discharge air temperature to maintain the proper space comfort level.

To guard your Modu-Vac unit against excessive start-up power consumption, the microprocessor also features an adjustable cycles-per-hour set point. Once you have set the maximum cycling rate, the compressors cannot short cycle on a safety device or power interruption.



TIMER CONTROL PANEL W/7-DAY PROGRAMMABLE CLOCK

Modu-Vac saves energy with its 7-day programmable clock. Set it to shut down the system during building unoccupied periods and this 24-hour-a-day energy manager will save energy (and dollars) for you all thru the week.

One further feature; the clock contains a 10-hour spring carryover to maintain operation during power failure. No program readjustment is necessary.

Quality engineered features assure outstanding performance.

- **Carrier Serviceable Compressors** deliver quiet, reliable high cooling capacities at low cost. The Time Guard® circuit, a Carrier exclusive, prohibits short cycling and simultaneous start-up of compressors, thus minimizing power surges.
- **Automatic Capacity Control** at partial load is provided by electric unloaders and compressor cycling that tailor cooling capacity to cooling requirements. A temperature-actuated microprocessor cycles the electric unloaders and compressors to ensure positive control of the supply air temperature as it leaves the unit. The result is lower operating cost.
- **Positive Compressor Protection** is assured on all units by the use of calibrated circuit breakers and high- and low-pressure switches.
- **Crankcase Heaters** (50BK units) remain energized during the compressor off-cycle to prevent dilution of oil by refrigerant, thus preventing flooded starts.
- **High-Efficiency Condensers** of shell and coil type construction provide maximum exposed heat-exchange surface for greater heat rejection with less water consumption.

- **QT Fans** move large volumes of indoor air quietly and at a lower rpm than most comparable fans. The compact housing gives the fans superior capability for vertical or horizontal supply air discharge

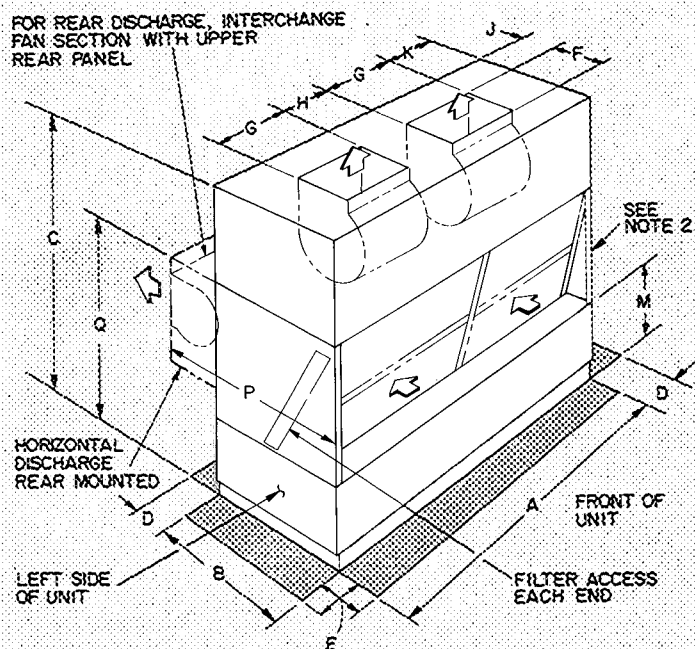
Accessories

- **Timer Control Panel** includes a 7-day programmable clock with a 10-hour spring carryover function and skip-a-day operation, 6 status lights for monitoring system modes and a 5-hour bypass timer for placing unit temporarily in occupied mode during otherwise unoccupied times.

This panel can be mounted right on the side of each unit or can be remote mounted with one timer control panel operating multiple units.

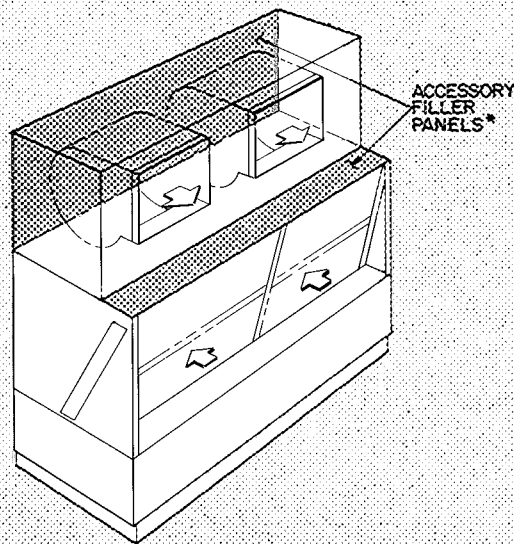
- **Return-Air Inlet Grille** (50BJ, BK016 and 024) adds an attractive touch to the front of the base unit when ductwork is not used. Hinged grille covers the filter opening with a decorative, easily attached, expanded metal panel.
- **Evaporator Defrost Thermostat Package** (50BK unit only) is used for winter start control. Thermostat provides coil freeze-up protection under low ambient start-up conditions.

Dimensions

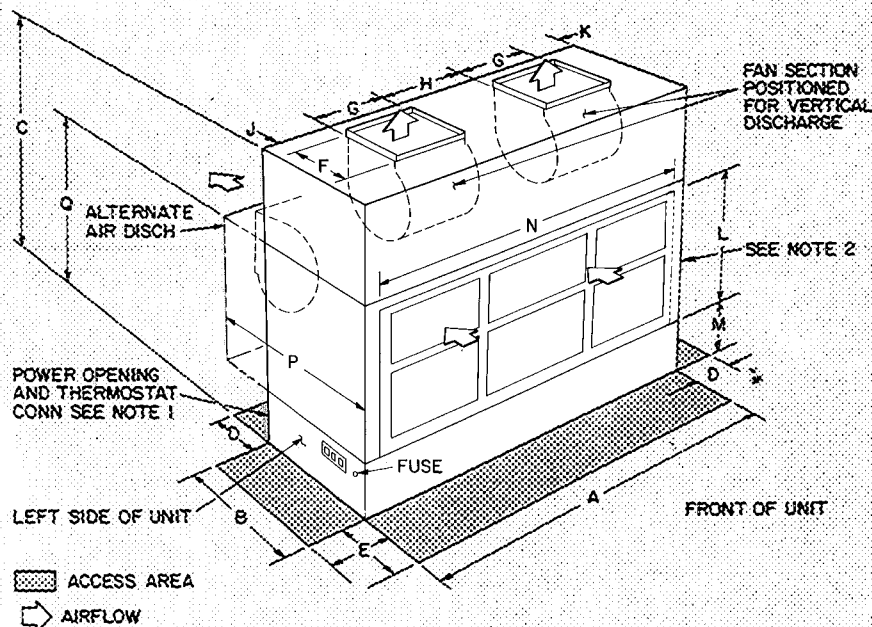


UNITS 50BJ,BK016 AND 024

OPTIONAL TOP HORIZONTAL DISCHARGE



*For optional top-mounted horizontal discharge, use accessory filler panel package as shown. See installation instructions.



UNITS 50BJ,BK028 AND 034

DIMENSIONS (ft-in.)

UNIT 50BJ,BK	016	024	028	034
A	6-8	7-9-1/4		
B	2-5-1/4	2-11-1/4		
C	6-10-1/2	8-0-1/8		
D	2-0	2-0		
E	3-0	3-0		
F	1-7-1/4	1-8-7/8		
G	1-5-1/4	1-8-7/8		
H	1-4-1/8	1-7-7/8		
J	0-0-5/8	0-2-3/8		
K	1-7	1-4		
L	—	3-2-1/4		
M	1-8	2-1-1/8		
N	—	7-4-1/4		
P	4-4-5/8	5-4-1/8		
Q	4-11-1/2	5-7-1/4		

NOTES:

1. Certified dimension drawings available on request. See certified prints or installation instructions for details.
2. Water and refrigerant connections located on right side of unit.

Physical data

MODEL 50	BJ	BK	BJ	BK	BJ	BK	BJ	BK
SIZE	016		024		028		034	
OPERATING WEIGHT (lb)	1420	1225	1900	1470	2500	2335	2610	2440
OPERATING CHARGE (lb)*	Refrigerant 22							
System 1	24	15	17	7	24	15	24	15
System 2	—	—	17	7	17	12	24	15
COMPRESSOR	Serviceable Hermetic, 1750 Rpm							
System 1 — 06DC	337	537	724	824	337	537	337	537
System 2 — 06DA	—	—	724	824	724	824	337	537
No. Unloading Cylinders	4		4		4		4	
No. Unloading Steps	3		6		6		6	
CONDENSER (BJ only)	Shell and Coil							
Number	1	—	2	—	2	—	2	—
Max Working Pressure† (psig)	385	—	150	—	385	—	385	—
INDOOR FAN	Adjustable, Belt Driven Centrifugal							
Number	2		2		2		2	
Size (in)	15 x 15		15 x 15		18 x 18		18 x 18	
Nominal Cfm	6,000		8,000		10,000		12,000	
Max Rpm	1,100		1,100		1,100		1,100	
Std FSR (Rpm)	875-1069		894-1089		925 or 1073		925 or 1073	
Nominal Hp (1750 Rpm)								
Standard Hp...Frame Size	3 182T		5 184T		7-1/2 213T		7-1/2 213T	
Alternate Hp...Frame Size	5 184T		—		10 215T		10 215T	
EVAPORATOR COIL	Copper Tubes, Aluminum Plate Fins							
Rows .Fins/in	3 13		4 11		4 11		4 15	
Total Face Area (sq ft)	16.9		18.0		22.6		24.8	
RETURN AIR FILTERS	Factory Supplied — Throwaway							
Number...Size (in)	3 16x25x2				6 26x20x2			
	3 20x25x2				2 16x20x2			

FSR — Fan Speed Range

*The 50BK operating charge does not include charge for matching air-cooled condenser or refrigerant connecting piping

†Water-side pressure on Model 50BJ024 is 385 psig if the factory-installed condenser header coupling is removed (field modification)

Selection procedure (with example)

SELECTION NOTE

For the selection example that follows, it is assumed that the mixed air quantity (cfm) and entering air temperature (t_{ewb}) have already been determined. Be aware that many factors affect the entering air cfm and temperature

Briefly, the air quantity is usually calculated on the basis of sensible room load and the temperature difference between the supply air temperature and room design temperature. Although both of these factors can be assumed, local codes frequently dictate not only the minimum outside air ventilation cfm but also the minimum air cfm for proper circulation. Carrier recommends not less than 0.5 cfm per sq ft of floor space to avoid stagnation in the room

See Part 1 of the Carrier System Design Manual for more details

I Determine design conditions.

Given	BJ	BK
Total Cooling Capacity (TC/Btuh)	230,000	220,000
Sensible Heat Capacity (SHC/Btuh)	200,000	190,000
Evaporator Air Quantity (cfm)	8000	8000
Evaporator Entering Air db (t_{edb})	82 F	82 F

Evaporator Entering Air wb (t_{ewb})	65 F	65 F
Available Condenser Water Supply (gpm)	40	—
Condenser Entering Water Temperature (t_{ew})	85 F	—
Condenser Water Fouling Factor (FF)	0005	—
Saturated Condensing Temperature (SCT)	105 F	—
Condenser Entering Air Temperature (t_{ea})	—	95 F
External Static Pressure (in. wg)	1.0	1.0

II Select unit(s) based on cooling requirements.

A. Enter Gross Cooling Capacities tables at the given evaporator air quantity (8000 cfm) and condensing temperature (BJ — 105 F; BK — 95 F).

By interpolation if required, determine total cooling capacity (TC) and sensible heating capacity (SHC) at the given entering air wb (65 F).

A 50BJ024 unit has a capacity of 232,600 Btuh (TC) and 188,200 Btuh (SHC)

A 50BK024 unit has a capacity of 222,800 Btuh (TC) and 184,800 Btuh (SHC).

Selection procedure (with example) (cont)

- B Correct the SHC for entering air db temperature other than 80 F.

Enter the SHC Correction Factor table on this page at the entering air db (82 F) and the bypass factor (.18) obtained from Gross Cooling Capacities table. By interpolation, if required, determine the correction factor (1.784).

The 50BJ024 unit has a corrected SHC of 202,472 Btuh; the 50BK024 unit, a corrected SHC of 199,072 Btuh.

Each unit can fulfill the specified load requirements.

III Determine required fan rpm and bhp.

- A. Enter the Evaporator Fan Performance curve for the selected unit(s) at given air quantity (8000 cfm) and external static pressure (1.0 in. wg).

Find that for a 50BJ or BK024 unit, fan rpm is 950 and required bhp is 4.9.

- B. In the unit Physical Data table, check the Indoor (evaporator) Fan Standard Speed Range (894 —

1089 rpm) and Nominal Hp (5) for the selected unit size. The standard fan drive package and motor fulfill the rpm and bhp requirements.

IV Determine condenser water requirements. (50BJ unit only)

- A. Enter the Condenser Water Requirements table (page 9) at the selected unit size (50BJ024) and approximate unit capacity required (240,000 Btuh) Read across to given condensing temperature (105 F) and fouling factor (.0005) to obtain required gpm (38).

Since 40 gpm is available (from Step I), the 50BJ024 condensers will operate satisfactorily.

- B. Enter the Water Pressure Drop thru Condenser(s) table at selected unit (50BJ024) and required gpm (38). By interpolation, if required, determine unit pressure drop is 6.6 ft of water or 3.0 psi.

Performance data

COOLING CAPACITY NOTES

- 50BJ,BK016-034 are tested and rated in accordance with ARI Standard 210-79.
- Operation of 50BK016-034 above 140 F saturated condensing temperature is not recommended as it may cause nuisance tripping of the high-pressure switch.
- Gross capacities do not include deduction for indoor fan motor heat.
- For 50BK combination ratings with Carrier air-cooled condensers, refer to 50 Series Combination Rating booklet.

SHC CORRECTION FACTOR

SHC is based on 80 F db temperature of air entering evaporator coil
Below 80 F db, subtract (corr factor x cfm) from SHC

Above 80 F db, add (corr factor x cfm) to SHC

BYPASS FACTOR (BF)	ENTERING AIR DRY-BULB TEMPERATURE (F)					
	79	78	77	76	75	under 75
	81	82	83	84	85	over 85
	Correction Factor					
.05	1.04	2.07	3.11	4.14	5.18	Use formula shown below
.10	.98	1.96	2.94	3.92	4.90	
.20	.87	1.74	2.62	3.49	4.36	
.30	.76	1.53	2.29	3.05	3.82	
.35	.71	1.42	2.13	2.83	3.54	

Interpolation is permissible

Correction Factor = $1.08 \times (1 - BF) \times (db - 80)$

GROSS COOLING CAPACITIES Water-Cooled Unit

1		50BJ016											
Sat. Cond Temp (F)		Evaporator Entering Air — Cfm/BF											
		3000/.11			4500/.15			6000/.19			7500/.22		
		Evaporator Entering Air Wb Temp — (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
95	TC	187	168	151	201	184	167	210	193	176	217	201	183
	SHC	87	102	116	96	118	141	107	135	163	117	151	182
	KW	12.7	12.5	12.3	13.4	13.0	12.8	13.5	13.3	13.0	13.6	13.3	13.0
100	TC	181	165	147	198	181	165	207	190	173	214	197	180
	SHC	85	100	114	95	117	139	106	134	162	115	150	180
	KW	13.4	13.1	12.8	14.0	13.7	13.4	14.2	13.9	13.6	14.3	14.0	13.7
105	TC	178	161	145	194	178	162	203	186	170	210	192	176
	SHC	84	99	113	94	116	138	105	133	161	114	148	176
	KW	14.0	13.7	13.3	14.6	14.2	13.8	14.8	14.4	14.0	14.9	14.6	14.2
110	TC	173	157	141	190	173	158	198	182	167	204	188	173
	SHC	82	97	111	92	114	136	103	131	159	113	146	173
	KW	14.7	14.4	13.9	15.2	14.9	14.4	15.4	15.1	14.6	15.6	15.2	14.8
115	TC	170	153	138	—	168	154	—	178	161	—	—	167
	SHC	81	96	110	—	113	134	—	129	157	—	—	167
	KW	15.3	15.0	14.5	—	15.6	15.1	—	15.9	15.4	—	—	15.6

See page 9 for legend

GROSS COOLING CAPACITIES
Water-Cooled Unit

2 50BJ024

Sat. Cond Temp (F)		Evaporator Entering Air — Cfm/BF											
		4000/ 10			6000/.15			8000/.18			10,000/.21		
		Evaporator Entering Air Wb Temp — (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
95	TC	240	218	196	260	238	217	276	253	231	284	260	239
	SHC	114	133	153	130	158	186	141	179	216	154	199	239
	KW	15.4	15.3	15.2	16.1	15.9	15.7	16.3	16.0	15.8	16.3	16.1	16.0
100	TC	235	213	191	254	233	212	270	247	225	277	254	233
	SHC	111	131	151	127	156	184	137	177	213	152	197	233
	KW	16.4	16.2	15.9	16.8	16.6	16.3	17.0	16.7	16.5	17.0	16.8	16.7
105	TC	230	208	187	250	228	208	264	241	220	271	249	227
	SHC	110	129	149	125	153	181	136	173	211	150	195	227
	KW	17.2	17.0	16.6	17.7	17.3	16.9	17.9	17.5	17.1	17.9	17.7	17.5
110	TC	226	204	183	244	223	204	258	236	216	266	243	222
	SHC	108	128	148	123	151	179	134	173	209	148	192	222
	KW	18.2	17.8	17.4	18.5	18.1	17.7	18.8	18.3	18.0	18.9	18.5	18.1
115	TC	221	200	179	238	218	199	252	230	210	259	236	216
	SHC	106	126	145	120	148	177	132	170	205	147	191	216
	KW	19.0	18.6	18.2	19.6	19.1	18.6	19.8	19.3	18.9	19.9	19.5	19.0

3 50BJ028

Sat Cond Temp (F)		Evaporator Entering Air — Cfm/BF											
		5000/ 11			7500/.15			10,000/.18			12,500/ 21		
		Evaporator Entering Air Wb Temp — (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
95	TC	298	269	241	329	304	272	349	319	290	358	328	298
	SHC	142	166	189	161	200	233	180	225	271	195	252	298
	KW	20.3	20.0	19.7	21.4	21.0	20.7	21.7	21.3	20.9	21.9	21.5	21.0
100	TC	291	262	234	324	298	268	343	313	285	352	322	293
	SHC	139	164	186	159	199	231	178	224	269	192	250	293
	KW	21.4	21.0	20.7	22.4	21.9	21.6	22.7	22.2	21.8	22.8	22.4	21.9
105	TC	286	256	229	318	290	262	335	306	278	344	315	287
	SHC	136	161	184	126	193	228	175	222	266	189	246	287
	KW	22.5	22.0	21.6	23.5	22.8	22.4	23.9	23.2	22.7	24.2	23.4	22.8
110	TC	278	250	224	310	283	254	328	299	271	338	309	280
	SHC	134	158	181	153	191	224	172	219	263	188	244	280
	KW	23.7	23.1	22.4	24.5	23.9	23.3	24.9	24.3	23.7	25.1	24.5	23.8
115	TC	272	244	217	—	274	247	—	292	265	—	—	277
	SHC	131	155	178	—	179	213	—	202	250	—	—	277
	KW	24.7	24.0	23.4	—	25.0	24.2	—	25.5	24.8	—	—	24.9

4 50BJ034

Sat. Cond Temp (F)		Evaporator Entering Air — Cfm/BF											
		6000/ 11			9000/ 15			12,000/.18			15,000/ 21		
		Evaporator Entering Air Wb Temp — (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
95	TC	359	323	289	399	364	329	419	384	350	429	397	363
	SHC	169	198	226	194	239	280	225	285	338	246	313	363
	KW	25.2	24.8	24.4	26.7	26.1	25.3	27.1	26.5	25.8	27.3	26.8	26.1
100	TC	352	316	282	394	360	325	414	380	346	424	394	359
	SHC	166	196	222	192	237	278	223	283	335	244	310	359
	KW	26.6	26.0	25.6	28.0	27.3	26.5	28.4	27.7	27.0	28.6	28.0	27.3
105	TC	345	309	276	382	350	316	405	370	337	416	382	349
	SHC	163	192	218	187	233	274	220	280	332	242	308	349
	KW	27.8	27.2	26.6	29.4	28.5	27.6	29.8	29.1	28.2	30.1	29.4	28.5
110	TC	338	303	271	376	342	310	396	362	330	407	376	340
	SHC	161	190	216	185	230	270	218	278	329	240	306	340
	KW	29.4	28.4	27.6	30.6	29.8	28.8	31.1	30.3	29.4	31.4	30.6	29.7
115	TC	332	297	266	—	335	303	—	354	321	—	—	332
	SHC	158	187	213	—	227	268	—	260	316	—	—	332
	KW	30.6	29.6	28.6	—	31.1	30.1	—	31.6	30.7	—	—	31.0

See page 9 for legend

Performance data (cont)

GROSS COOLING CAPACITIES Air-Cooled Unit

5 50BK016/09DE016													
Cond Ent Air Temp (F)		Evaporator Entering Air — Cfm/BF											
		3000/.10			4500/.15			6000/.19			7500/.22		
		Evpaorator Entering Air Wb Temp — (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
85	TC	181	166	151	198	182	166	207	190	176	212	196	184
	SHC	87	103	119	99	122	145	109	139	167	119	155	184
	KW	15 1	14 5	13 8	15 8	15 1	14 5	16 1	15 5	14 9	16 3	15 7	15 2
	SCT	116	114	112	118	116	114	119	117	115	120	118	116
95	TC	173	158	144	188	173	158	196	181	167	201	186	176
	SHC	83	100	115	95	119	141	106	135	163	115	151	176
	KW	16 4	15 6	14 9	17 1	16 3	15 6	17 4	16 7	16 1	17 7	17 0	16 5
	SCT	126	124	122	128	126	124	129	127	125	130	128	126
105	TC	165	151	138	178	164	150	186	171	159	190	176	168
	SHC	80	96	112	92	115	137	102	131	157	111	147	168
	KW	17 6	16 7	15 9	18 3	17 5	16 7	18 7	17 9	17 2	19 0	18 2	17 7
	SCT	136	134	132	138	136	134	139	137	135	140	138	137
115	TC	157	143	131	169	155	142	175	161	151	179	166	160
	SHC	76	93	108	88	111	133	98	128	151	107	143	160
	KW	19 0	17 8	16 9	19 5	18 6	17 7	20 0	19 0	18 3	20 2	19 3	18 9
	SCT	146	144	142	148	146	144	149	147	145	149	147	147

6 50BK024/09DD024													
Cond Ent Air Temp (F)		Evaporator Entering Air — Cfm/BF											
		4000/.12			6000/.15			8000/.18			10,000/.21		
		Evaporator Entering Air Wb Temp — (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
85	TC	227	208	190	250	230	211	262	242	222	270	248	228
	SHC	115	129	149	124	155	183	137	175	214	149	195	228
	KW	18.8	18.0	17.2	19.1	18.5	17.6	19.8	18.8	18.0	19.8	19.0	18.3
	SCT	112	110	108	115	113	111	116	114	112	117	115	113
95	TC	218	200	182	240	220	202	250	230	212	257	237	218
	SHC	104	125	145	119	150	179	133	170	207	146	191	218
	KW	20.5	19.5	18.6	21.0	20.0	19.2	21.5	20.5	19.6	21.8	21.3	20.9
	SCT	121	119	117	125	122	120	126	124	122	126	124	122
105	TC	209	190	176	229	210	192	239	220	201	245	226	207
	SHC	101	121	143	116	145	173	129	166	200	142	187	207
	KW	22.2	21.4	20.1	22.8	21.8	20.6	23.3	22.2	21.2	23.7	22.6	21.5
	SCT	131	129	127	134	132	130	135	133	131	136	134	132
115	TC	199	181	166	218	200	182	227	209	191	232	215	200
	SHC	97	117	137	111	141	169	124	162	191	137	182	200
	KW	23.9	22.9	21.6	24.6	23.4	22.1	25.2	24.0	22.7	25.5	24.3	23.0
	SHC	141	139	137	144	142	139	145	143	141	145	143	141

7 50BK028/09DD028													
Cond Ent Air Temp (F)		Evaporator Entering Air — Cfm/BF											
		5000/.12			7500/.15			10,000/.18			12,500/.21		
		Evaporator Entering Air Wb Temp — (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
85	TC	280	255	232	318	291	266	332	306	281	342	315	290
	SHC	134	159	184	158	196	234	175	224	272	191	250	290
	KW	24.5	23.3	22.5	25.7	24.5	23.4	26.4	25.2	24.1	26.7	25.6	24.4
	SCT	112	110	108	115	113	111	116	114	112	117	115	113
95	TC	268	243	224	303	277	244	316	291	267	325	299	275
	SHC	129	153	180	152	191	228	169	218	264	185	244	275
	KW	26.5	24.9	23.9	27.8	26.4	25.2	28.5	27.1	25.9	28.9	27.6	26.3
	SCT	122	119	117	125	122	120	126	124	121	127	124	122
105	TC	256	233	214	287	264	241	300	275	243	307	283	260
	SHC	123	149	174	146	185	222	163	212	242	178	237	260
	KW	28.3	26.9	25.3	29.8	28.4	26.9	30.5	29.1	27.6	31.0	29.5	28.1
	SCT	131	129	126	134	132	130	135	133	130	136	134	131
115	TC	244	220	203	272	249	228	275	260	238	280	267	245
	SHC	119	143	170	141	179	216	151	206	238	166	231	245
	KW	30.5	29.0	27.4	31.8	30.1	28.6	32.3	30.8	29.3	32.5	31.3	29.8
	SCT	141	139	137	143	141	139	144	142	140	144	143	141

GROSS COOLING CAPACITIES
Air-Cooled Unit

8 50BK034/09DD034

Cond Ent Air Temp (F)		Evaporator Entering Air — Cfm/BF											
		6000/ .12			9000/ .15			12,000/ .18			15,000/ .21		
		Evaporator Entering Air Wb Temp — (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
85	TC	342	315	284	386	355	325	405	374	343	416	385	355
	SHC	163	195	224	190	235	281	208	267	322	228	298	355
	KW	30.2	28.7	27.7	31.5	30.1	28.7	32.3	30.9	29.5	32.7	31.3	30.1
	SCT	112	109	107	114	112	110	115	113	111	116	114	112
95	TC	328	300	271	369	338	309	386	358	326	396	365	337
	SHC	157	188	217	183	229	272	204	261	316	222	289	337
	KW	32.5	30.8	29.5	34.0	32.4	30.9	34.7	33.2	31.7	35.2	33.7	32.3
	SCT	121	119	117	123	121	119	124	122	120	125	123	121
105	TC	314	285	258	350	321	288	366	332	302	375	346	318
	SHC	151	181	211	177	221	266	196	253	301	216	282	318
	KW	34.8	32.9	31.4	36.3	34.5	33.0	37.2	35.5	33.7	37.6	36.0	34.3
	SCT	130	128	126	133	131	128	134	131	129	134	132	130
115	TC	298	270	245	331	298	272	346	318	275	353	325	293
	SHC	144	174	204	170	214	259	188	245	275	208	277	293
	KW	37.1	35.0	33.1	38.6	36.8	34.9	39.4	37.6	35.8	40.0	38.2	36.3
	SCT	140	137	135	142	140	138	143	141	138	144	142	139

LEGEND

- BF — Bypass Factor
 Kw — Compressor Motor Power Input (Kilowatts)
 SCT — Saturated Condensing Temperature (F)
 SHC — Sensible Heat Capacity (1000 Btuh)
 TC — Total Capacity (1000 Btuh)

50BJ CONDENSER WATER REQUIREMENTS

UNIT 50BJ	TOTAL CAP. (MBH)	TOTAL CONDENSER WATER FLOW (gpm)																	
		Saturated Condensing Temperature (F)																	
		95						105						115					
		Fouling Factor																	
		.0005			.001			.0005			.001			.0005			.001		
		Entering Condenser Water Temperature (F)																	
		65	70	75	65	70	75	75	80	85	75	80	85	85	90	95	85	90	95
016	140	—	—	24	—	21	30	—	—	25	—	21	32	—	19	26	—	22	33
	160	—	21	29	—	25	39	—	21	30	—	26	41	—	22	31	20	26	44
	180	—	24	34	21	30	52	19	25	35	22	31	54	20	26	37	23	33	58
	200	21	28	40	25	36	71	22	28	42	26	38	—	22	29	43	28	40	—
	220	24	31	47	30	44	—	24	32	49	30	46	—	—	—	—	—	—	—
024	180	—	—	28	—	—	32	—	—	28	—	—	34	—	—	28	—	26	34
	210	—	—	32	—	28	40	—	—	32	—	30	42	—	26	34	—	30	44
	240	—	28	38	26	34	50	—	28	38	26	34	54	—	30	40	28	36	46
	270	26	32	42	30	40	66	26	34	44	30	42	70	26	34	46	32	44	74
	300	28	36	50	34	48	98	28	36	52	34	50	—	—	—	—	—	—	—
028	230	—	—	38	—	—	46	—	—	39	—	—	49	—	—	40	—	35	50
	265	—	—	45	—	39	59	—	—	46	—	41	62	—	35	48	—	41	66
	300	—	38	53	34	47	77	—	39	54	35	48	81	—	41	57	37	51	81
	335	34	44	61	40	56	104	35	45	64	41	59	—	35	46	66	44	62	—
	370	38	49	72	47	68	—	38	50	75	47	71	—	—	—	—	—	—	—
034	280	—	—	48	—	42	60	—	—	50	—	42	64	—	38	52	—	44	66
	320	—	42	58	—	50	78	—	42	60	—	52	82	—	44	62	40	52	88
	360	—	48	68	42	60	104	38	50	70	44	62	108	40	52	74	46	66	116
	400	42	56	80	50	72	142	44	56	84	52	76	—	44	58	86	56	80	—
	440	48	62	94	60	88	—	48	64	98	60	92	—	—	—	—	—	—	—

MBH — Btuh x 1000

Performance data (cont)

WATER PRESSURE DROP THRU 50BJ CONDENSERS

UNIT 50BJ		PRESSURE DROP											
		Total Water Flow Rate (Gpm)											
		20	30	40	50	60	70	80	90	100	110	120	130
016	Ft-Wg	3.0	6.0	10.0	15.0	20.0	27.0	—	—	—	—	—	—
	PSI	1.3	2.6	4.3	6.5	8.7	11.7	—	—	—	—	—	—
024	Ft-Wg	2.0	5.0	7.0	11.0	15.0	20.0	25.0	31.0	37.0	—	—	—
	PSI	0.9	2.2	3.2	4.8	6.5	8.7	10.8	13.4	16.0	—	—	—
028	Ft-Wg	—	3.0	5.0	7.3	10.0	12.8	16.3	20.0	24.0	28.0	32.8	37.5
	PSI	—	1.3	2.2	3.2	4.3	5.6	7.1	8.7	10.4	12.1	14.2	16.2
034	Ft-Wg	—	2.0	3.2	4.7	6.3	8.2	10.4	12.7	15.0	18.2	21.0	24.4
	PSI	—	0.9	1.4	2.0	2.7	3.6	4.5	5.5	6.5	7.9	9.1	10.6

NOTE Direct interpolation is permissible, do not extrapolate

HEAD PRESSURE CONTROL

One of the most common ways of controlling head pressure in air conditioning units with water-cooled condensers is with a field-supplied water regulating valve.

The valve is designed to open when it senses a rise in head pressure. The resulting increase in water flow thru the condenser carries away excess heat and head pressure drops.

Valve sizes and quantities recommended for use with 50BJ units are listed below

WATER REGULATING VALVES

UNIT 50BJ	VALVE QTY	VALVE SIZE (in.)
016	1	2
024	1	2
028	1, 1	1-1/2, 2
034	2	2

WATER PRESSURE DROP/VALVE

GPM	Δ P (PSI)	
	Valve Size (in.)	
	1-1/2	2
25	3	1.3
35	9	1.95
45	21	4
55	35	8
65	—	13
85	—	26
105	—	39

NOTE Selections are based on 30 psig available water pressure and 35 psi refrigerant head pressure rise * If your application falls outside these limits, consult with your local valve representative

*Head pressure rise =

Refrig Press @ SCT - Max Refrig Press
during OFF mode

ACCESSORY GRILLE STATIC PRESSURE LOSSES (in. wg)

MODEL 50BJ,BK	AIR QTY (Cfm)	ACC. INLET GRILLE
016	3,000	01
	4,500	02
	6,000	03
	7,500	05
024	4,000	02
	6,000	03
	8,000	06
	10,000	08
028	5,000	—
	7,500	—
	10,000	—
	12,500	—
034	6,000	—
	9,000	—
	12,000	—
	15,000	—

EVAPORATOR FAN PHYSICAL DATA

UNIT 50BJ, 50BK	FAN MOTOR (1750 Rpm)				FAN			Center Distance (in.)	
	Hp	NEMA Frame Size	Shaft Diam (in.)	Pitch Diam Range (in)	Shaft Diam (in.)	Pitch Diam (in)	Rpm Range	Min	Max
016	3	182T	1-1/8	4.5-5.5	1-3/16	9.0	875-1069	8.4	11.8
016	3	56HZ	7/8	4.5-5.5	1-3/16	9.0	875-1069	8.4	11.8
024	5	184T	1-1/8	4.6-5.6	1-3/16	9.0	894-1089	8.4	11.8
028	7-1/2	213T	1-7/16	6.5 or 5.6	1-11/16	10.6	925-1073	29.8	33.3
034	7-1/2	213T	1-7/16	6.5 or 5.6	1-11/16	10.6	925-1073	29.8	33.3

50BJ,BK016, 575-3-60 unit

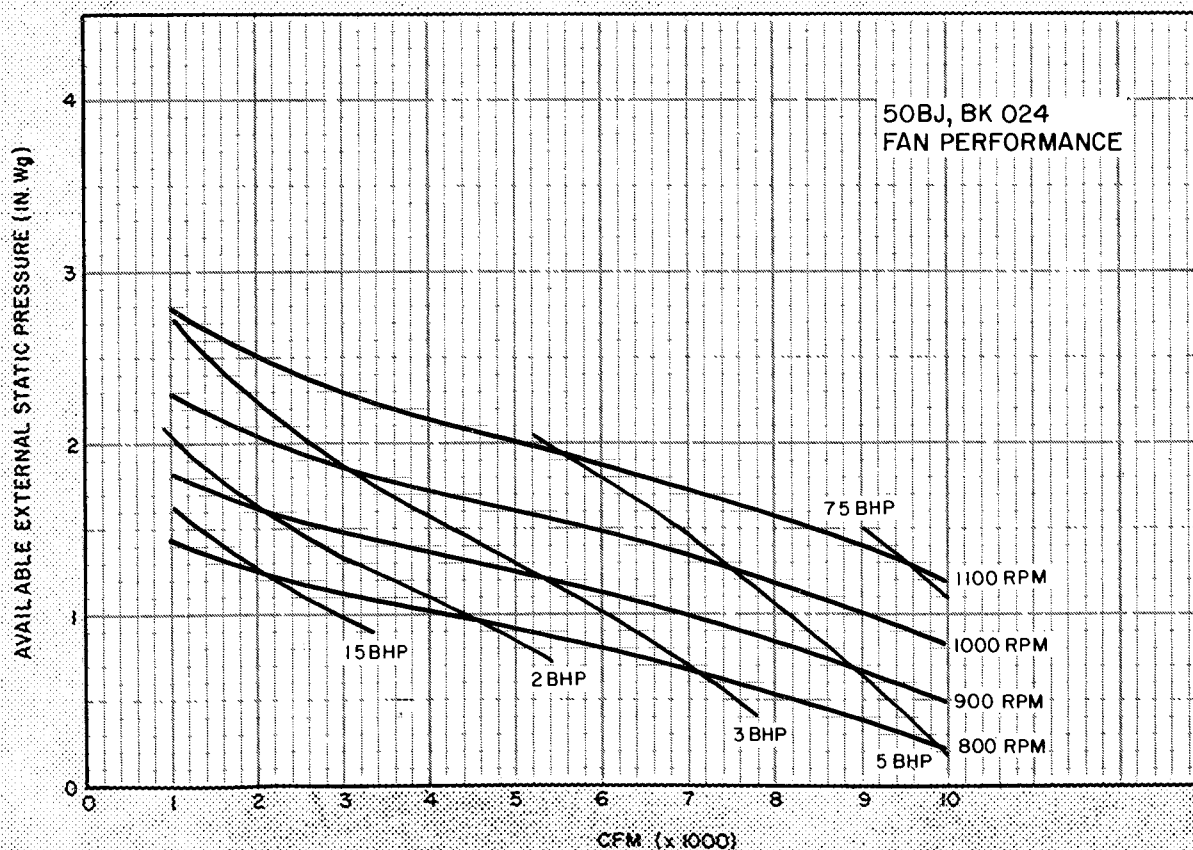
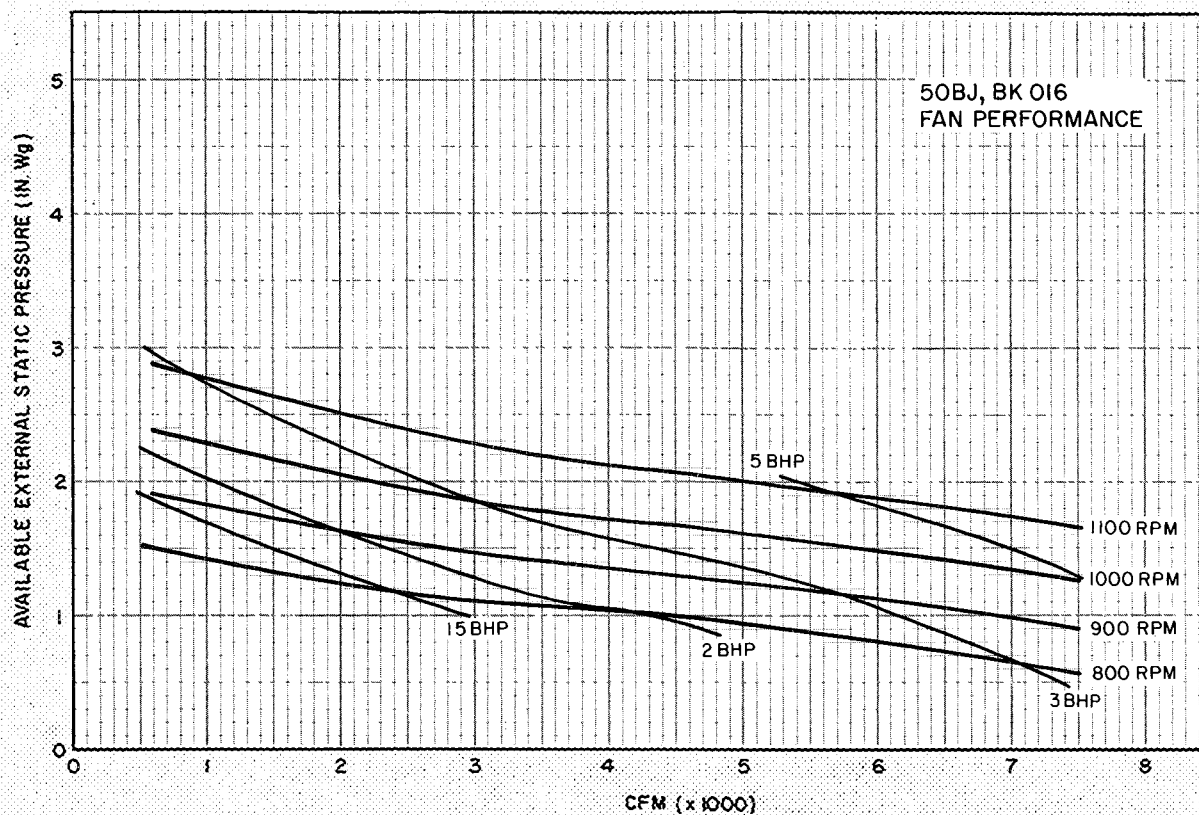
Fan performance note

Fan performance is based on wet coil, clean filters and deducted casing losses.

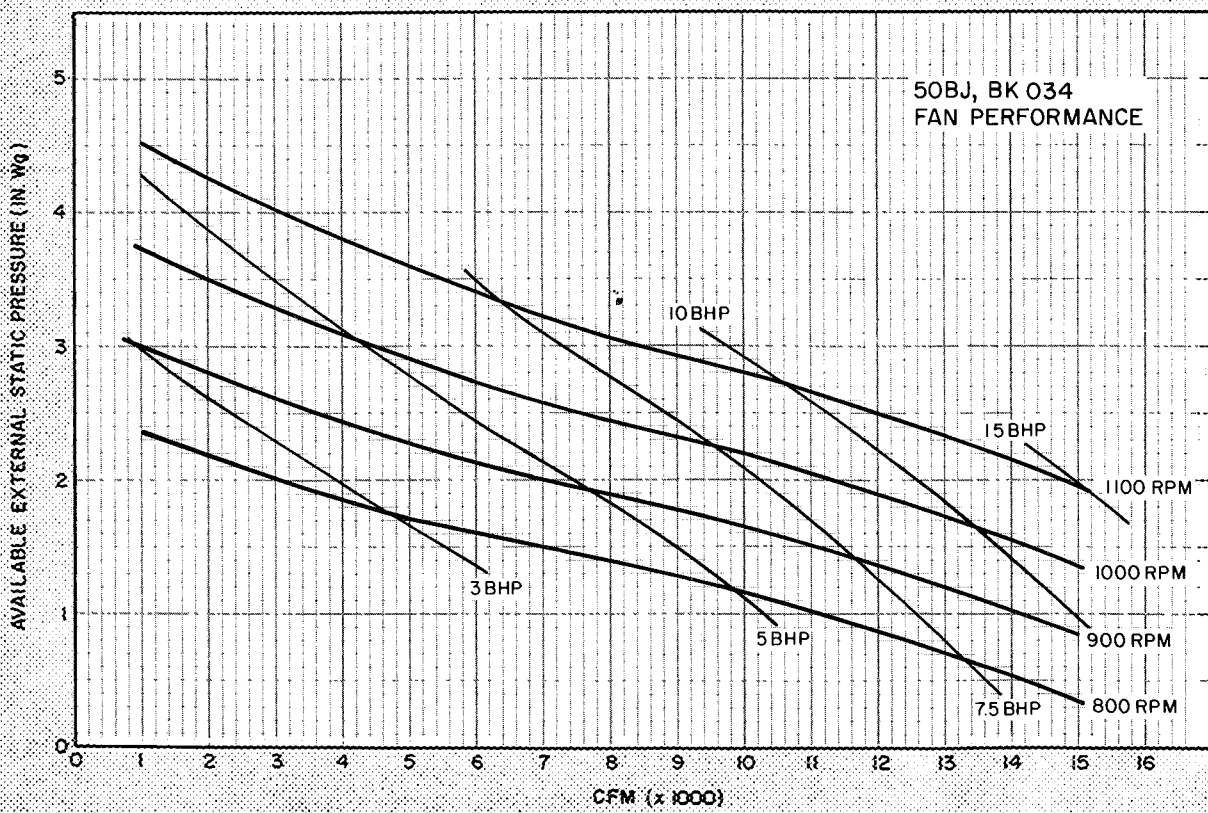
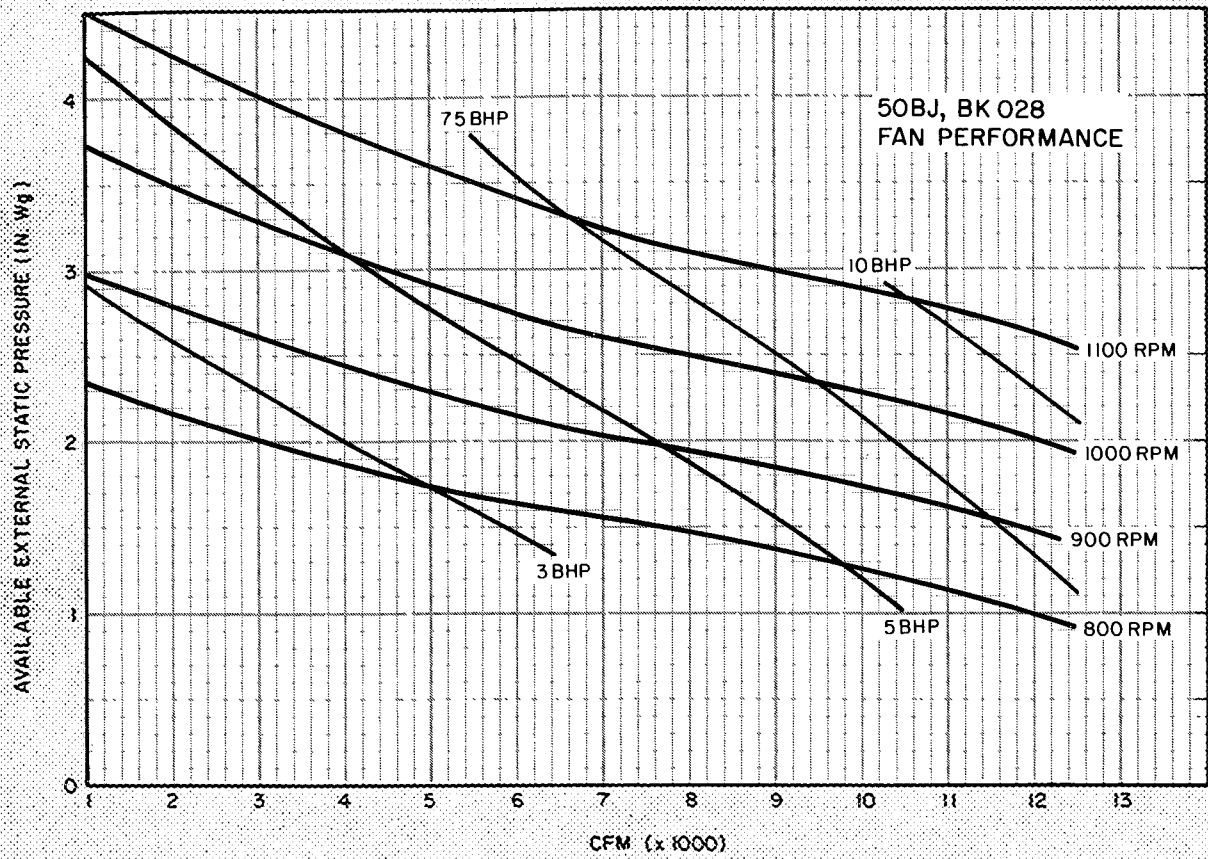
$$Kw = \frac{Bhp \times .746}{Eff}$$

AVERAGE EFFICIENCIES

1 Hp	— 79%	3 Hp	— 81%
1-1/2 Hp	— 80%	5 Hp	— 82%
2 Hp	— 80%	7-1/2 Hp	— 85%



Performance data (cont)



Electrical data

UNIT	VOLTS/PH/HZ	VOLTAGE RANGE		COMPRESSOR NO. 1		COMPRESSOR NO. 2		INDOOR FAN MOTOR		POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Hp	FLA	MCA*	MFA
508J016	208-230/3/60	187	253	50.0	191	—	—	3	9.2	71.7	110
	460/3/60	414	528	22.1	86	—	—	3	4.6	32.2	50
	575/3/60	518	660	17.9	69	—	—	3	3.7	26.2	40
508J024	208-230/3/60	187	253	36.0	137	36.0	137	5	13.2	94.2	125
	460/3/60	414	528	16.0	62	16.0	62	5	6.6	42.6	50
	575/3/60	518	660	12.9	50	12.9	50	5	5.6	35.1	45
508J028	208-230/3/60	187	253	49.3	191	35.7	137	7-1/2	22.0	120.0	150
	460/3/60	414	528	22.2	86	16.0	62	7-1/2	11.0	54.8	70
	575/3/60	518	660	18.0	69	13.0	50	7-1/2	8.7	44.2	45
508J034	208-230/3/60	187	253	49.3	191	49.3	191	7-1/2	22.0	120.0	175
	460/3/60	414	528	22.2	86	22.2	86	7-1/2	11.0	54.8	80
	575/3/60	518	660	18.0	69	18.0	69	7-1/2	8.7	44.2	50
508K016	208-230/3/60	187	253	64.0	266	—	—	3	9.2	89.2	150
	460/3/60	414	528	29.0	120	—	—	3	4.6	40.9	50
	575/3/60	518	660	23.0	96	—	—	3	3.7	32.5	35
508K024	208-230/3/60	187	253	45.0	170	45.0	170	5	13.2	114.5	150
	460/3/60	414	528	20.0	77	20.0	77	5	6.6	51.6	60
	575/3/60	518	660	16.0	62	16.0	62	5	5.6	41.6	45
508K028	208-230/3/60	187	253	64.0	266	45.0	170	7-1/2	22.0	147.4	200
	460/3/60	414	528	29.0	120	20.0	77	7-1/2	11.0	66.8	70
	575/3/60	518	660	23.0	96	17.0	62	7-1/2	8.7	54.7	70
508K034	208-230/3/60	187	253	64.0	266	64.0	266	7-1/2	22.0	166.0	200
	460/3/60	414	528	29.0	120	29.0	120	7-1/2	11.0	76.3	80
	575/3/60	518	660	23.0	96	23.0	96	7-1/2	8.7	60.5	80

FLA — Full Load Amps
Hp — Nominal Horsepower
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MFA — Maximum Fuse Amps
RLA — Rated Load Amps

*Minimum circuit amps (MCA) for wire sizing complies with NEC Section 430-24

NOTE In compliance with NEC requirements for multimotor and combination load equipment (Ref NEC Articles 430 and 440) the overcurrent protective device for the unit shall be fuse only

ELECTRICAL PROTECTION

Compressor circuit breakers are current sensitive and temperature compensated to ensure compressor cutoff if current draw becomes excessive. Breakers must be manually reset.

Inherent compressor thermal protection with automatic reset de-energizes the control circuit if extreme compressor motor temperature should occur from excessive suction gas temperature or motor overloading.

Low- and high-pressure switches automatically shut off compressor(s) if refrigerant pressure exceeds switch settings. This action protects against loss of charge.

Indoor fan motor circuit breaker protects against motor overload. Breaker requires manual reset.

CONTROL SEQUENCE

When unit power supply is on and circuit breakers are engaged, the 7-day timer clock cycles the unit on and off at programmed times for a full 7-day cycle.

At each ON point, the indoor fans start immediately and remain on as long as the 7-day clock calls for cooling.

Upon initial start-up (with 7-day clock at unit operation position), there is a delay of from 20 to 30 minutes before the first stage of cooling starts. This time interval allows the microprocessor to develop a memory bank history and allows the fan to operate until a sensor can sense conditioned space temperature rather than initial unit ambients.

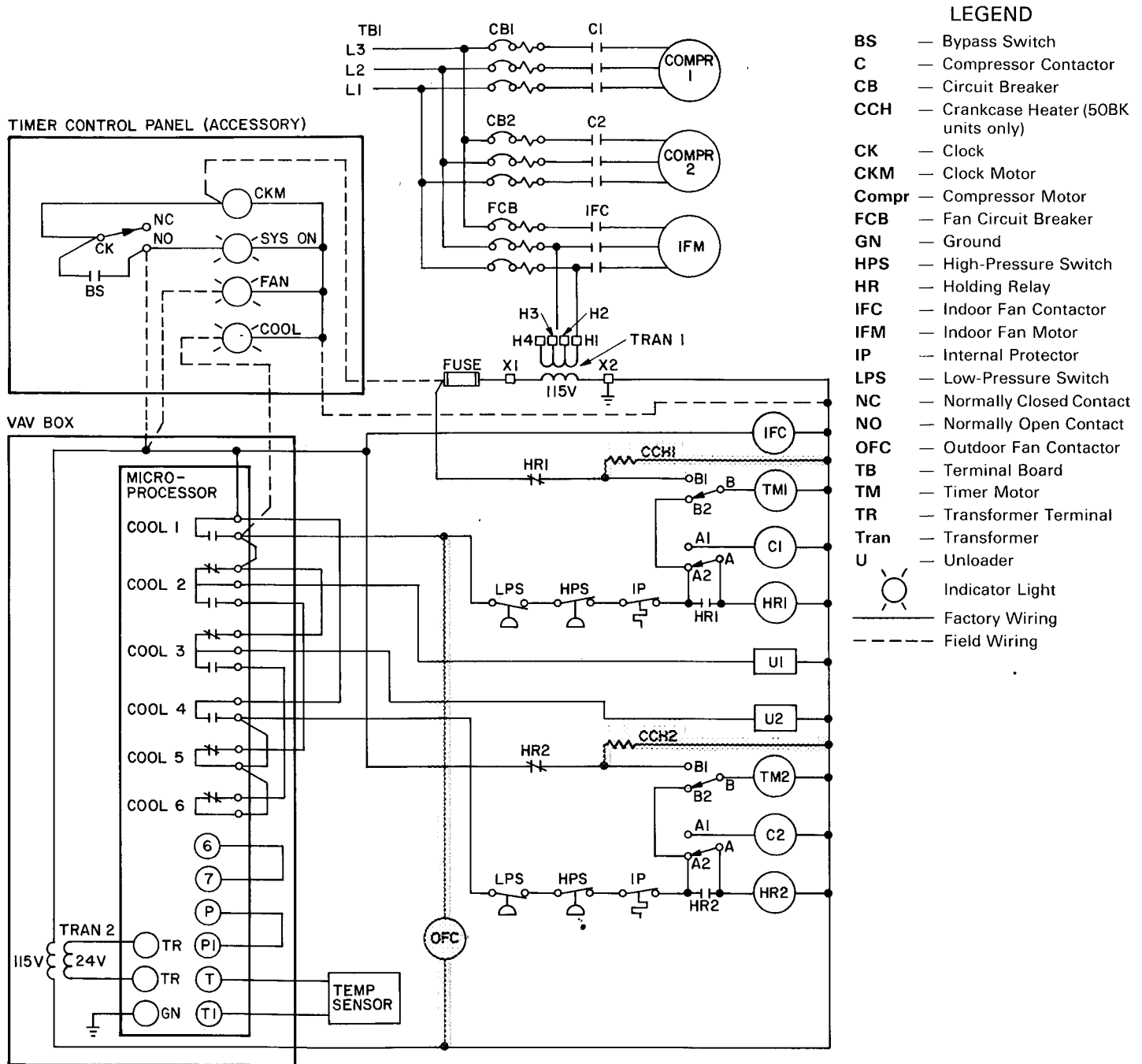
The microprocessor cycles compressors and unloaders to control discharge air temperature at a temperature close to a preselected setting.

On completion of the occupied mode on the time clock, the unit is switched to the unoccupied mode and indoor fan and compressor(s) stop.

The system can be placed temporarily in the occupied mode by means of a 5-hour spring driven bypass timer. This allows the building to be used during normally unoccupied hours without reprogramming the time clock.

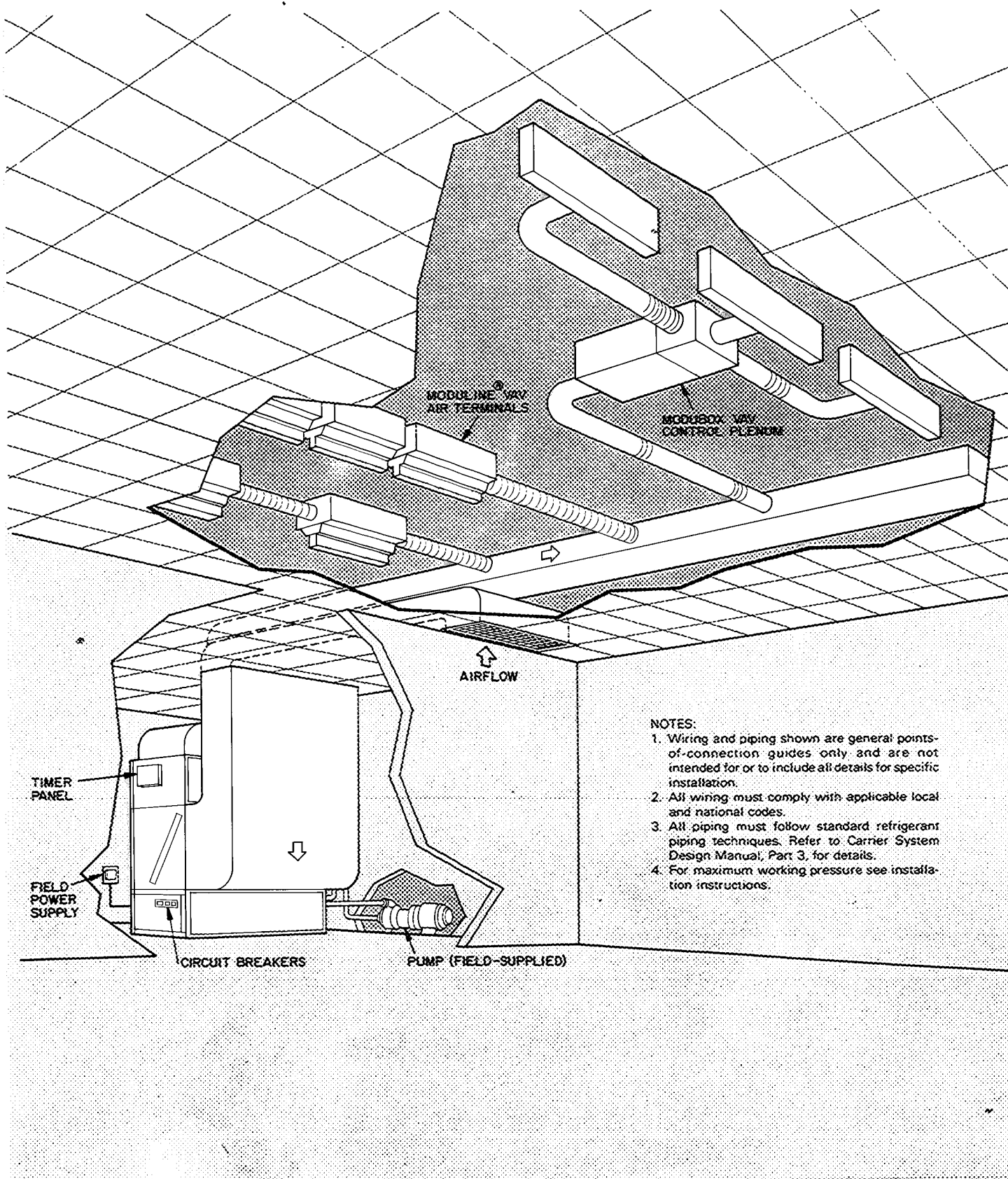
To guard against short cycling of compressors or unloaders, the microprocessor VAV controller has a built-in delay system that can be adjusted to limit the number of start/stop cycles between 3 and 6 per hour.

Typical wiring schematic



50BK UNIT ONLY

Typical piping and wiring



Guide specifications

Base unit

Unit shall be single-package vertical type and shall include self-contained water-cooled condenser(s) or have provisions for connection of _____ remote, air-cooled condenser(s).

Total cooling capacity of the unit shall be _____ Btuh or greater, at conditions of _____ cfm evaporator air entering unit at _____ F wet-bulb temperature. Total sensible capacity shall be _____ Btuh or greater, with _____ F dry-bulb temperature at the above conditions.

Compressor(s) shall be serviceable hermetic type equipped with suitable vibration isolators, crankcase heaters (50BK only), filter-drier(s), and suction and discharge service valves.

Electric unloaders providing _____ capacity steps shall be factory installed to provide close control of leaving air dry-bulb temperature regardless of load variations.

Compressor(s) shall be of same manufacture as unit and shall be located in a sound attenuating compartment within the cabinet

Power input to the compressor motor(s) shall not exceed _____ kw at the conditions specified.

Evaporator coils shall be of nonferrous construction with aluminum plate fins mechanically bonded to seamless copper tubing. Coils shall be of same manufacture as unit.

Coils shall be fed by thermostatic expansion valves. Hot gas bypass to the evaporator shall be factory installed. Evaporator coil shall always have a full face active to assure proper treatment of air flowing thru unit.

Evaporator air fans shall be capable of delivering _____ cfm of air with an external static pressure of _____ in. wg or greater. Fans shall be centrifugal, forward curved, Class I type and shall be belt-driven by a motor of _____ nominal hp or less when operating at _____ rpm.

Condenser(s) of water-cooled condenser units (50BJ) shall be shell and coil type, constructed in accordance with ASME safety code. Tubes shall be seamless with no interior joints. Threaded pipe connections shall be provided for water supply and return lines. Each 50BJ unit shall contain a full operating refrigerant charge.

Air-cooled units (50BK) shall have hot gas and liquid line shutoff valves for connection of remote, air-cooled condensers. Each 50BK unit shall be shipped with a holding charge.

Controls shall be factory wired to operate on _____ volts, _____ phase, _____ Hz power supply

The variable volume control network shall be factory installed and wired in the unit. Control network shall contain a microprocessor which will:

- provide precise control of capacity staging;
- contain an adjustable set point for discharge air temperature;
- contain a control memory function that, by effectively retaining and recalling the previous 15 minutes of operation, will maintain a stable average discharge temperature based on those 15 minutes,
- have the ability to program a reset of discharge air temperature based on temperature readings from the conditioned space. Reset function shall be adjustable in both amount of reset and point at which reset is initiated on a pre-programmed schedule,
- contain a cycles-per-hour adjustment to control the maximum cycling rate of compression equipment.

Safety controls shall include factory-installed circuit breakers. Cooling system shall be protected by a fusible plug (50BJ), high- and low-pressure switches, compressor overloads, and a timing device that will prevent compressor motor from being subjected to starting current more than once every 5 minutes.

Power wiring to unit shall be made to single-point terminal connections.

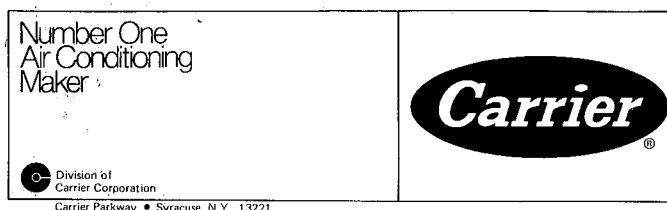
Cabinet shall be zinc surface alloyed steel that is bonderized and painted with a modified alkyd enamel. Unit sections shall be insulated to prevent sweating and to muffle sound.

A self-contained filter frame for use with standard disposable or permanent filters of _____ x _____ x _____ -in. size shall be located inside cabinet. Unit shall be factory supplied with 2-in. disposable filters.

Unit dimensions shall be _____ -in. wide, _____ -in. deep and _____ -in. high.

Accessories (field installed)

Timer control panel shall contain a 7-day, 10-hour, spring return clock, 5-hour bypass timer and six system-status indicating lights.



Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.