

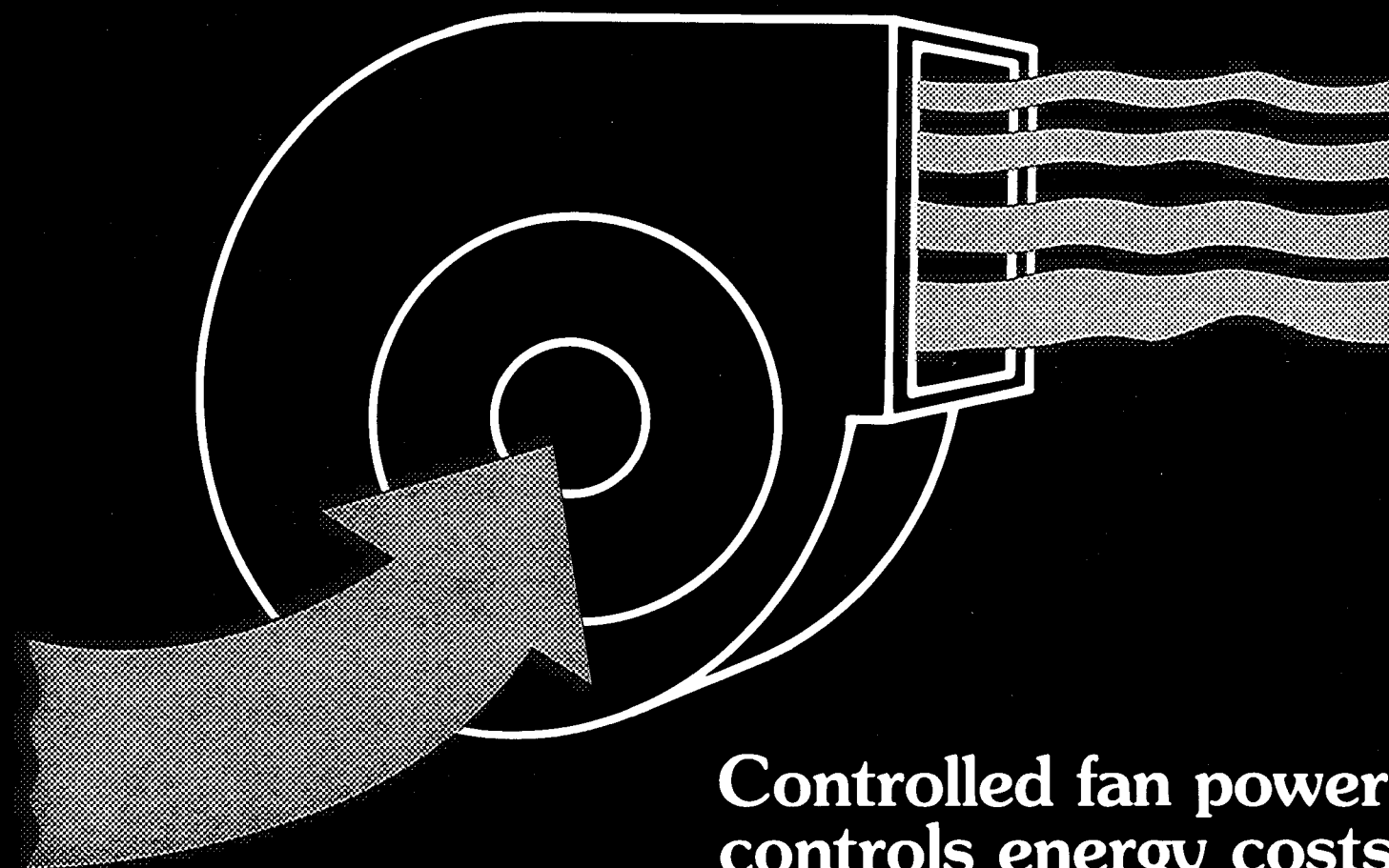
Carrier Controlled Speed Fan Drive

39E,ER

Modudrive



for Central Station Variable Air Volume
Air Handling Units



Controlled fan power
controls energy costs

Carrier

For. . .

- **Energy savings**
- **Lower operating costs**
- **Low sound levels**
- **Versatile VAV application**

It's Carrier's Modudrive!

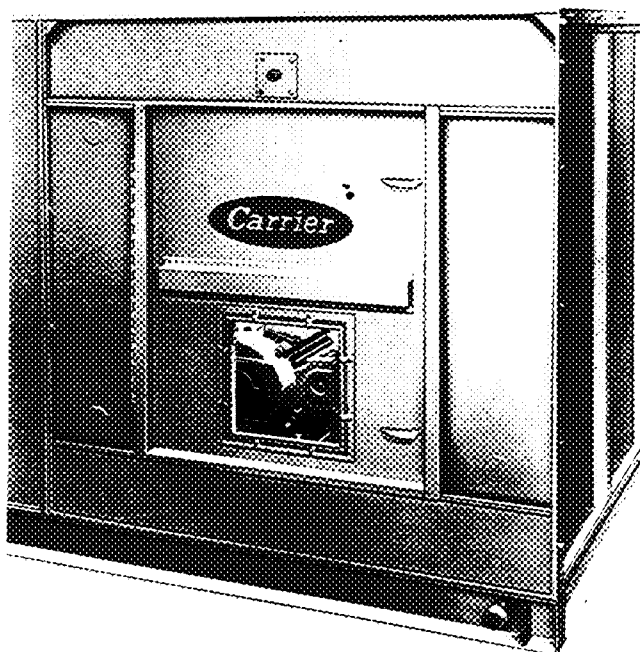
Modudrive is the perfect complement to your variable air volume system. With Modudrive, fan speed is automatically varied to provide just the right air quantity at minimum static pressure over a wide load range. Modudrive's smooth response to each change in system needs keeps motor power input at a minimum and provides maximum energy savings for your VAV system.

And now you can specify Modudrive on ten of the thirteen sizes of Carrier 39E and 39ER (Roofrite) air handling units. The Modudrive fan section comes completely assembled in a module that fits right along with the other Carrier 39E Series modular components.

Like all Carrier fan sections, Modudrive is a complete package, including movable motor frame, motor

and drive components. Choose airfoil or forward-curved fan. Apply Modudrive to draw-thru or blow-thru configurations on either vertical, horizontal or Roofrite units. And add any of the current 39E or ER accessories and options to Modudrive as you wish.

Of course, you're likely to find that Modudrive's standard features are all you really need. Each Modudrive fan section is internally isolated on nominal 2-inch deflection springs to dampen low and high frequency vibrations. The Modudrive control box, with either electric or pneumatic controls, is factory supplied with each Modudrive fan section, ready to mount in the location of your choice. And for easy inspection and access, Modudrive comes equipped with a factory-installed marine light, view port and hinged access door.



Hinged access door is standard on Modudrive fan section. Large handles make access and entry easy.

Modudrive reduces system power consumption at part load.

Modudrive automatically varies fan speed to match system airflow and static pressure requirements in response to an electric or pneumatic signal. With Modudrive's unique fan speed control, the reduction in fan speed at part load is matched by a substantial reduction in motor power input. For example, only 17% of the motor's full load input power is required when Modudrive drops the fan speed to 40% of full speed.

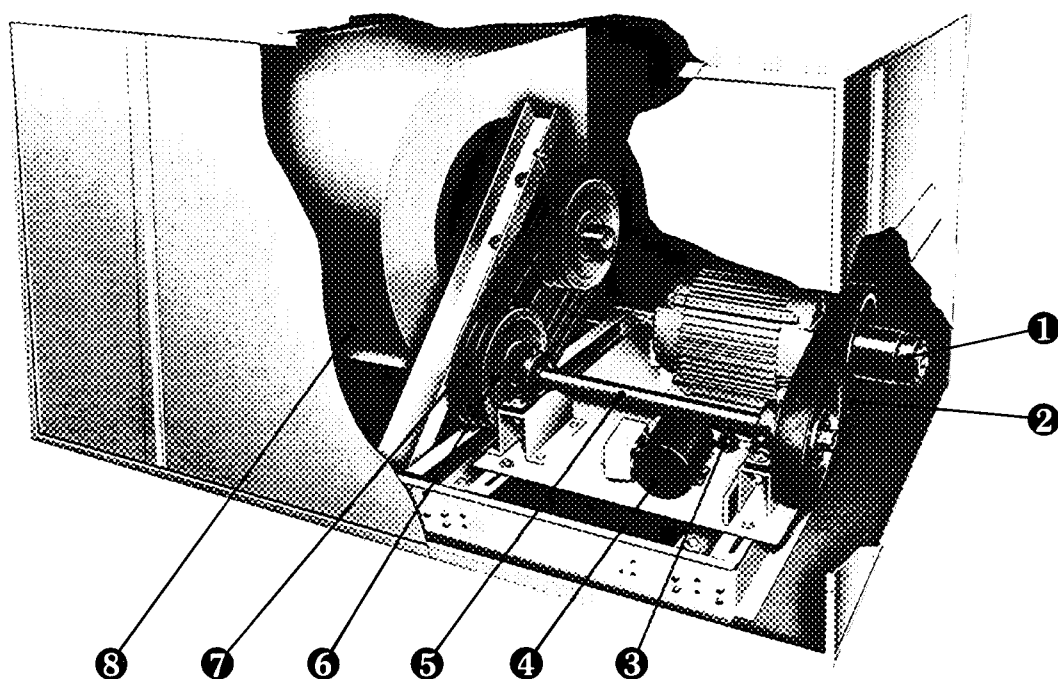
To vary the fan speed, a 1/10-hp motor moves the fan motor and pulley a precise distance along polished rails. As the distance from the driven pulley changes, spring tension on the movable side of the motor pulley causes the drive belt to ride up or down the sheave.

This effectively changes the sheave diameter and therefore the fan speed.

Modudrive pays for itself — quickly

The initial investment of a Modudrive system in comparison to ordinary fan sections with inlet guide vanes or discharge dampers can be rapidly returned thru energy savings, even where power is relatively inexpensive. Especially now, when lower power consumption is everyone's goal, you owe it to yourself to check out Modudrive. Contact your Carrier Representative. Let him show you how Modudrive can reduce your power needs — and costs — with an economic evaluation based on your application.

- ① Adjustable Pulley
- ② Adjustable Belt
- ③ Sprocket Chain
- ④ Gear Motor
- ⑤ Jackshaft
- ⑥ Sheave
- ⑦ Variable Speed Belt
- ⑧ Airfoil or Forward-Curved Fan



Modular Modudrive fits right in — for fast, easy installation.

The Modudrive one-piece fan section is an integral part of the 39E or 39ER air handling unit. The fan section mates with all the other Carrier modular components, minimizing installation time. In addition, the Modudrive single-fan design provides a straight run to the ductwork, eliminating the need to fabricate "Y's" or "pair of pants" transition pieces.

All sizes of the Modudrive fan section, from 15 to 90, come factory equipped with standard internal isolation that does away with field installation of vibration isolators, hangers and flexible connections.

Low sound levels — a Modudrive advantage

The Modudrive fan section automatically modulates fan speed with changing load requirements. Sound levels at full load operation compare favorably with standard centrifugal fans, and sound levels decrease

significantly as air volume drops. The factory-installed internal spring isolators effectively dampen vibration and prevent unwanted sound from being transmitted to the building structure.

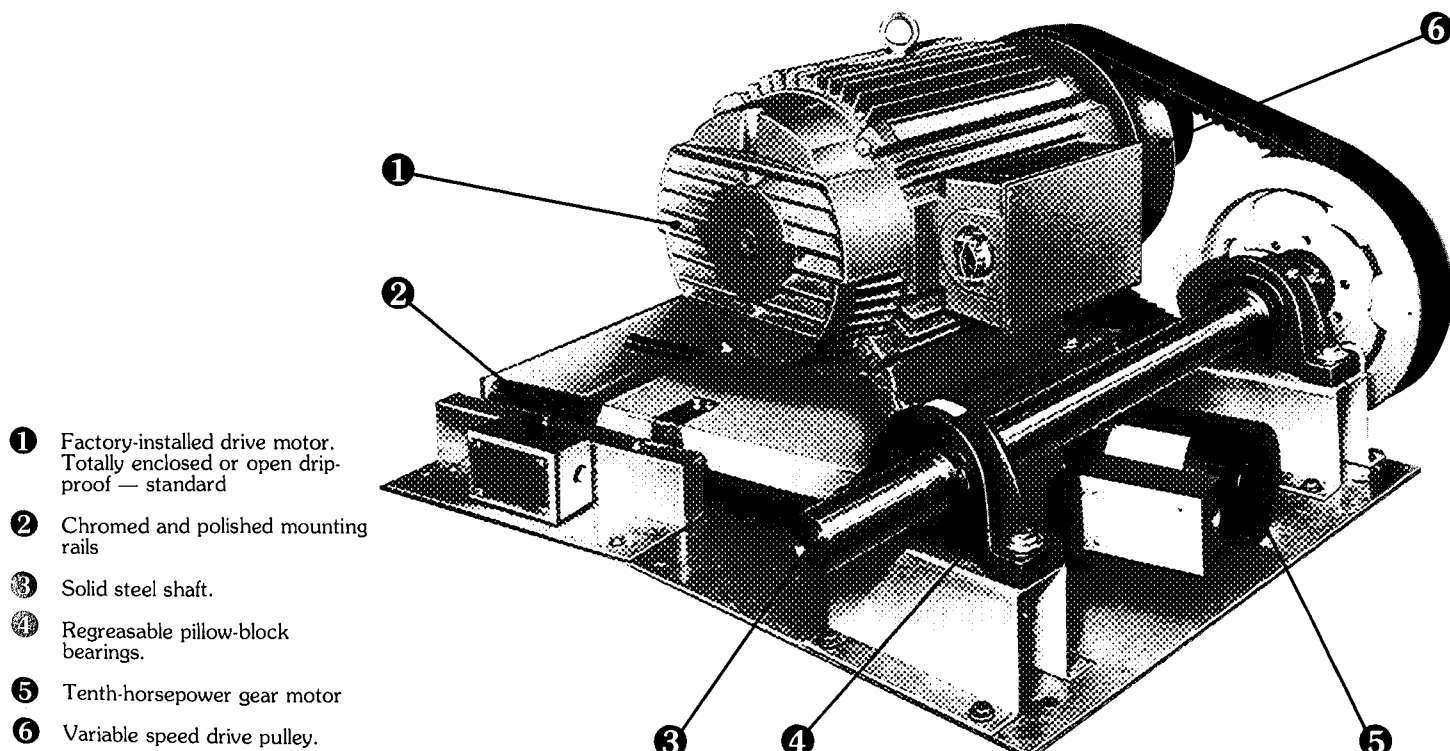
Engineered for performance and maintainability — built to last.

The Modudrive fan section features chrome-plated rails for corrosion resistance and permanently lubricated bronze motor rail bearings. The drive nut is manganese bronze. Pulley faces are anodized aluminum alloy or high grade cast iron.

Fan, control motor and jackshaft are factory mounted and aligned on a rigid base. Also incorporated is the rigid steel A-frame that Carrier uses on all forward-curved and airfoil fan sections to ensure

the precise location and lasting alignment of the rugged pillow block fan bearings and solid steel fan shaft.

Every Modudrive fan section is equipped with a hinged door on the drive side of the fan for easy access to all components. The access door, standard marine light and glass viewing port allow close inspection while the unit is in full operation.



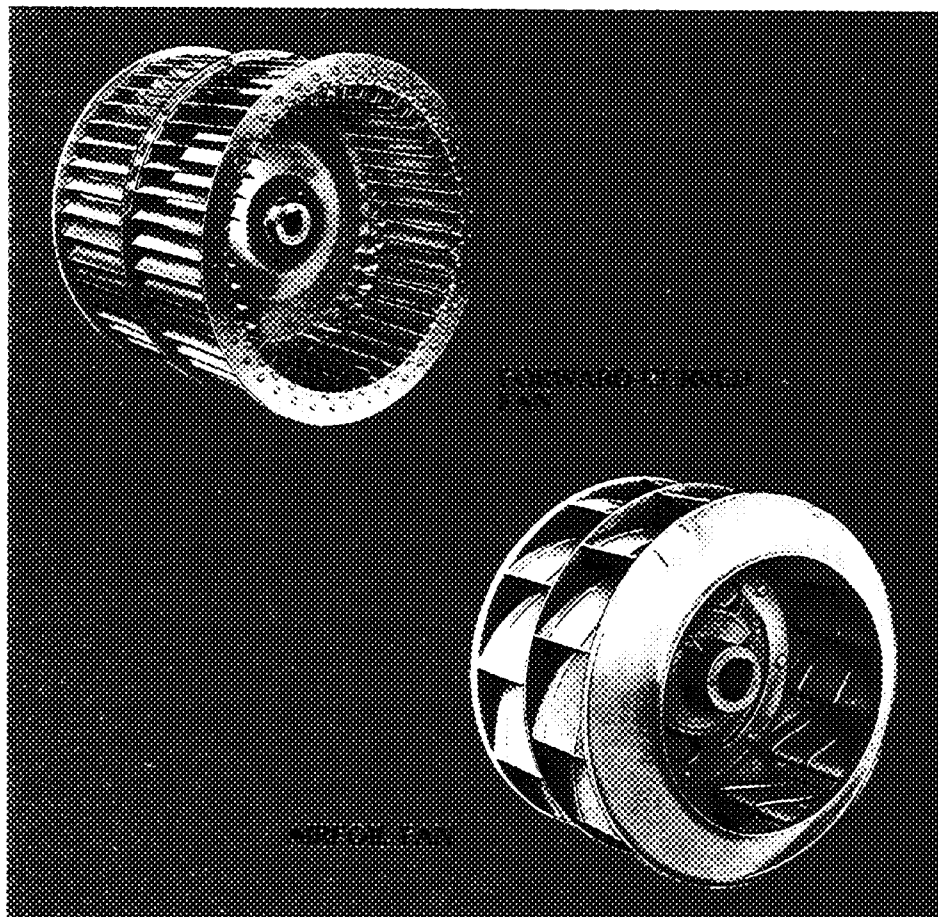
Two fan choices for greater VAV flexibility

Choose either a forward-curved fan or an airfoil fan; then combine it with Modudrive for precise variable air volume capability in your 39E or 39ER air handling system.

The forward-curved fan, generally applied with static pressures of 0 to 5 in. wg, is available as standard on unit Sizes 15 thru 57. The airfoil fan, for pressures in the 3 to 9 in. wg range, is available as standard on all Sizes 15 thru 90.

Seven fan discharge arrangements

- Top horizontal front
- Top horizontal rear
- Bottom horizontal front
- Bottom horizontal rear
- Downblast front
- Upblast front
- Upblast rear



Modudrive offerings

UNIT SIZE 39E OR 39ER	DRIVE MOTOR HORSEPOWER						
	3	5	7-1/2	10	15	20	25
15,18	X	X	X	X	X	AFS	NA
21	NA	X	X	X	X	X	NA
26,32	NA	X	X	X	X	X	X
39	NA	NA	X	X	X	X	X
48 (Note 2)	NA	NA	NA	FCS	X	X	X
57 (Note 2)	NA	NA	NA	NA	X	X	X
75,90	NA	NA	NA	NA	AFS	AFS	AFS

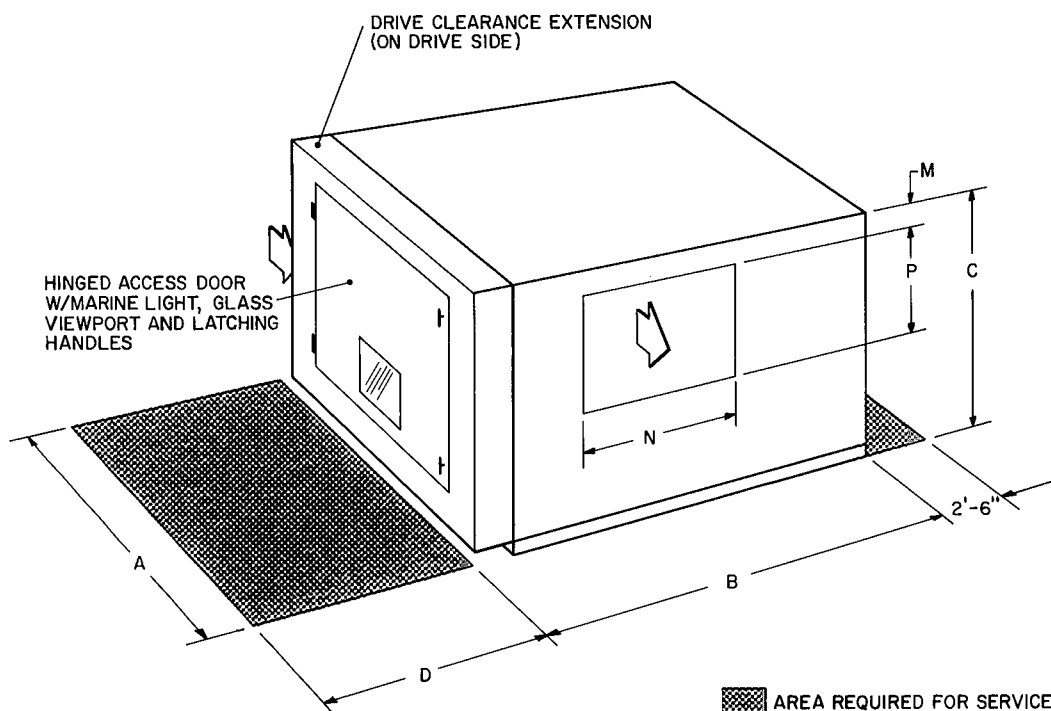
X — Available on airfoil and forward-curved fan sections
 AFS — Available only on airfoil fan section
 FCS — Available only on forward-curved fan section
 NA — Not Available

NOTES:

1. Modudrive is not available on unit sizes 08, 10 or 12
2. On 39ER (Roofrite) Size 48 and 57 units, Modudrive is available on Special Order only because shipping width is greater than 12 feet
3. A bag filter extension (BFE) is required on all 39ER (Roofrite) units with a coil connection housing on motor side. With motor on opposite side, BFE is not required
4. Modudrive is available with factory-installed TEFC or ODP motors only

→ Physical data and dimensions

MODUDRIVE FAN SECTION DIMENSIONS (ft.-in.)



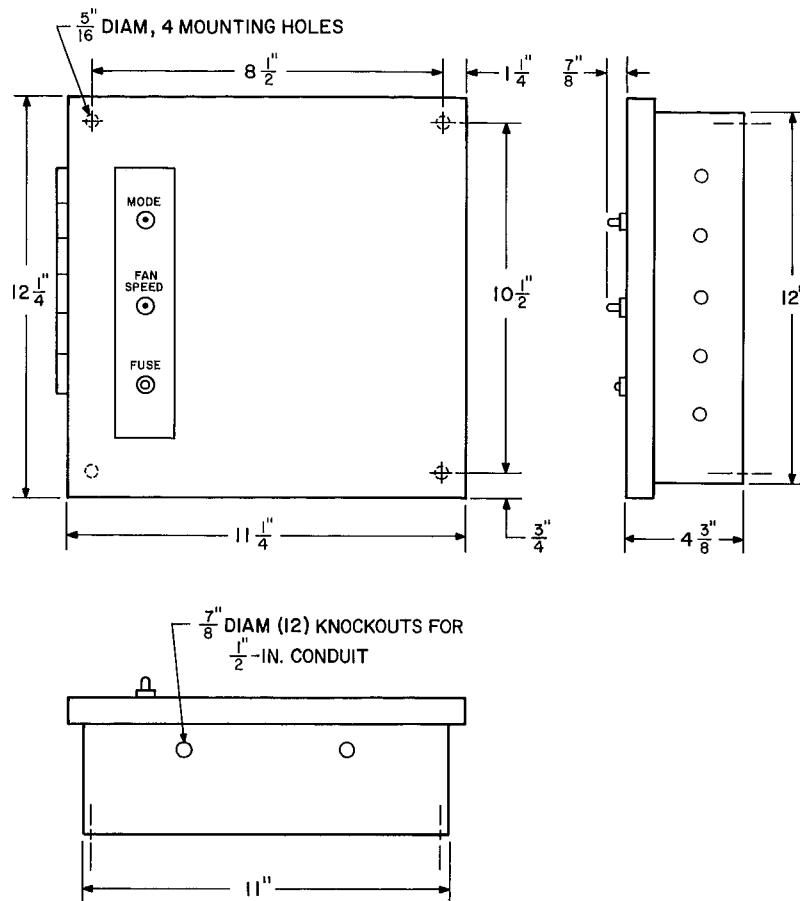
UNIT SIZE	FAN TYPE	WEIGHT (lb)*				ROUGH-IN DIMENSIONS (ft.-in.)†						
		Motor Hp				Length	Width	Height	Service	M	N	P
		3, 5	7-1/2, 10	15, 20	25	A	B	C	D			
15	FCS	965	1065	1165	—	3-6	8- 9-1/2	3-10-3/4	4-1	0-2-1/2	1- 5-3/4	2- 0-3/4
	AFS	1000	1095	1200	—					0-6	2- 2-1/2	1- 3-3/8
18	FCS	990	1090	1195	—	3-6	8- 9-1/2	3-10-3/4	4-4	0-2-1/2	1- 7-3/4	2- 0-3/4
	AFS	1033	1130	1235	—					0-4-3/16	2- 5-1/2	1- 5-1/8
21	FCS	1010	1115	1215	—	3-6	9- 5-1/2	3-10-3/4	4-7	0-2-1/2	1-10-3/4	2- 0-3/4
	AFS	1090	1185	1290	—					0-2-1/2	2- 8-1/4	1- 6-7/8
26	FCS	1265	1360	1465	1555	4-3-1/2	9- 4-1/2	4- 8-1/4	4-8	0-2-3/4	2- 2-3/4	2- 7-1/4
	AFS	1305	1405	1505	1595					0-4-7/8	2-11-3/4	1-11-1/4
32	FCS	1360	1460	1565	1650	4-3-1/2	10-10-1/2	4- 8-1/4	5-3	0-2-3/4	2- 7-3/4	2- 7-1/4
	AFS	1465	1560	1665	1755					0-2-11/16	3- 3-1/2	1-11
39	FCS	—	1680	1785	1875	5-5-1/2	10- 7-1/2	5-10-1/2	5-6	0-6-7/8	2-10-1/2	2-10-1/2
	AFS	—	1955	2060	2150					0-7-3/8	3- 7-3/8	2- 1-3/4
48	FCS	—	2425	2530	2620	6-3-1/2	12- 2-1/2	6- 8-1/2	6-6	0-5-7/16	3- 0-7/8	3- 7-1/4
	AFS	—	—	2860	2950					0-2-3/4	4- 5-1/4	2- 7-1/4
57	FCS	—	—	2540	2630	6-3-1/2	12- 2-1/2	6- 8-1/2	6-6	0-5-7/16	3- 0-7/8	3- 7-1/4
	AFS	—	—	2890	2975					0-2-3/4	4- 5-1/4	2- 7-1/4
75	FCS	—	—	—	—	7-8	13-3	8- 7-1/2	7-8	—	—	—
	AFS	—	—	4140	4225					0-3	5- 4-3/4	3- 2
90	FCS	—	—	—	—	7-8	13-3	8- 7-1/2	7-8	—	—	—
	AFS	—	—	4120	4205					0-3	5- 4-3/4	3- 2

AFS — Airfoil Fan Section
FCS — Forward-Curved Fan Section

*Weights include fan, all Modudrive components, drive motor, control box and unit extension panels

†Dimensions are for roughing-in purposes only and are not intended for specification or construction. Certified drawings are available on request.

MODUDRIVE CONTROL BOX DIMENSIONS (in.)



FAN DATA (With Modudrive)

UNIT SIZE	15		18		21		26		32	
TYPE OF FAN	FC	AF	FC	AF	FC	AF	FC	AF	FC	AF
Wheel Diameter (in.)	20	17-13/16	20	19-11/16	20	21-9/16	25	24	25	26-7/16
Max Fan Bhp	12.9	17.2	12.9	17.2	17.2	17.2	21.5	21.5	21.5	21.5
Max Motor Bhp	15	20	15	20	20	20	25	25	25	25
Shaft Diameter (in.)*	1-7/16	1-15/16	1-7/16	1-15/16	1-7/16	2-3/16	1-15/16	2-3/16	1-15/16	2-7/16
Shaft Length (in.)	32	40-5/8	34-3/8	42-5/8	37-3/8	46-3/8	40-1/2	49-1/8	45-1/2	53-3/4
Shaft Weight (lb)	15	35	15	35	17	49	35	52	37	73
No. of Fan Blades	53	12	53	12	53	12	56	12	56	12
Fan Wheel Weight (lb)	40	36	50	54	55	61	65	78	80	101

UNIT SIZE	39		48		57		75		90	
TYPE OF FAN	FC	AF	FC	AF	FC	AF	—	AF	FC	AF
Wheel Diameter (in.)	27-1/2	29-1/8	30	32-3/8	36	35-9/16	—	39-3/8	—	43-7/16
Max Fan Bhp	21.5	21.5	21.5	21.5	21.5	21.5	—	21.5	—	21.5
Max Motor Bhp	25	25	25	25	25	25	—	25	—	25
Shaft Diameter (in.)*	1-15/16	2-11/16	2-3/16	2-7/16	2-3/16	2-7/16	—	2-15/16	—	2-15/16
Shaft Length (in.)	49	59	54-1/4	69-3/4	54-1/4	69-3/4	—	84-1/8	—	84-1/8
Shaft Weight (lb)	41	94	58	135	58	135	—	—	—	—
No. of Fan Blades	56	12	66	12	78	12	—	12	—	12
Fan Wheel Weight (lb)	92	136	110	172	144	189	—	228	—	411

*Measured at fan sheave

AF — Airfoil
Bhp — Brake horsepower
FC — Forward-Curved
Hp — Horsepower

Fan selection and sound power determination procedures

Fan selection criteria

The procedure for selecting fans with Modudrive is similar to those described in the 39E and 39ER (Roofrite) Product Data Digests. The maximum drive motor hp, however, is 25 on Modudrive applications.

Within this horsepower limitation, the standard 39E and 39ER fan performance curves apply. To determine motor bhp, use following formula:

$$\text{Motor BHP} = \frac{\text{fan BHP}}{0.86}$$

When selecting your Modudrive package, specify the unit size, fan rpm and motor bhp. These values can be obtained thru the fan performance curves in this publication. For static pressure values of components other than the fan section, refer to the 39E and 39ER Product Data Digests as applicable.

IMPORTANT: For best operating economy, keep the following criteria in mind when selecting your Modudrive fan:

1. Consider operating the fan at a maximum speed somewhat lower than that required to match the indicated full load rpm. Very few, if any, operating hours are spent at full load. Therefore, cutting back slightly on peak horsepower by lowering the fan maximum speed can result in a significant reduction in electrical demand charges.
2. Determine the required system static pressure with care. An overestimate here can result in oversizing the motor and in uneconomical operation of the fan at higher than necessary speeds.
3. Do not oversize the motor. Your Modudrive fan will be operating most of the time at part load. An oversized motor will be operating at a lower percentage of its full load rating than a properly sized motor. And it is at these lower percentages that the motor efficiency drops off rapidly.

The following items also have an effect on fan performance:

1. Omission of outlet duct at fan discharge.
2. Obstructed fan inlet.
3. Elbow at fan inlet or outlet.

Fan ratings shown are based on units tested and rated in accordance with ARI Standard 430-74. Units were tested with an outlet duct.

Range of application

The Modudrive fan performance curves in this digest apply to 39E horizontal draw-thru units, 39E horizontal blow-thru units, 39ER supply air fan sections and 39ER return air fan sections as noted in the performance data section which follows. To determine the ratings for 39E vertical draw-thru units, refer to the horizontal draw-thru curves and then multiply the rpm and bhp by factors listed in the upper right corner of each curve.

Sound power determination

The Modudrive fan sound power is determined by the formula:

$$L_w = A + B + C$$

Where:

L_w = Sound power generated by fan and radiated in direction of airflow. Measured in dB re 10^{-12} watts.

A = Base value of sound power (by octave band in dB re 10^{-12} watts).

B = Component of sound power due to fan bhp, cfm and total static pressure (TSP).

$$B = B_1 + B_2 + B_3$$

B_1 = fan bhp component

B_2 = fan cfm component

B_3 = fan total static pressure component

The value of each of the above components is determined from the charts on page 10. The value of B is added to the value of A in each octave band.

C = Component of sound power due to blade passage frequency (bpf). To determine the octave band in which the bpf occurs, enter the horizontal chart on page 10 as instructed in Step III, C of the Selection Procedure.

SOUND POWER DETERMINATION EXAMPLE

OCTAVE BAND	1	2	3	4	5	6	7	8
MID BAND FREQUENCY (Hz)	63	125	250	500	1000	2000	4000	8000
Value A	137	133	129	129	125	119	113	105
Value B ($B_1 + B_2 + B_3$)	-41	-41	-41	-41	-41	-41	-41	-41
Value C					3			
SOUND POWER ($L_w = A + B + C$)	96	92	88	88	87	78	72	64

I Determine the fan requirements from job specifications.

Given:

Air Quantity 11,220 cfm
 Unit Size 39E21
 Unit Arrangement Horizontal draw-thru
 Total Static Pressure (TSP) 3.85 in. wg
 (determined as follows:)

From 39E Product Data Digest:

Chilled water coil: 4-row, fin series 14, fpm 500	.70 in.
Hot water coil: 2-row, fin series 14, fpm 550	.30 in.
Air filter: 45% high efficiency, normal length (final resistance)	.60 in.
External static pressure	<u>2.25 in.</u>
TSP	3.85 in.

II Determine required fan rpm, bhp and drive motor hp.

Because TSP required is less than 5.0 in. wg, first consider a forward-curved fan.

Enter fan curve for 39E21 horizontal draw-thru- unit with forward-curved fan (page 12) at 11,220 cfm and 3.85 in. TSP. Read values of 1010 rpm and 12.0 bhp.

Compare this with airfoil fan performance (page 19) which shows values of 2000 rpm and 12.5 bhp.

In the example, the lower bhp of the forward-curved fan plus its lower price determines our selection.

$$\begin{aligned}\text{Required Motor HP} &= \frac{\text{Fan BHP}}{0.86} \\ &= \frac{12.0}{0.86} \\ &= 13.9\end{aligned}$$

Use a 15 hp motor.

III Determine fan sound power (L_w) at full load cfm.

Where:

$$L_w = A + B + C$$

A. Find and record component A of sound power. Enter the table entitled Values of Sound Power Component A at the selected unit size and fan type. Record the listed A values under each octave band in the Sound Power Determination table (see sample).

B. Find and record sound power component B.

Where:

$$B = B_1 + B_2 + B_3$$

Enter the Sound Level Nomographs for FAN BHP, FAN CFM and FAN TSP and find:

at 12.0 bhp (from Step II)	$B_1 = 27$
at 11,220 cfm (given)	$B_2 = -65$
at 3.85 TSP (from Step I)	$B_3 = -3$
	<u>$B = -41$</u>

Record B value in each column of the Sound Power Determination table.

C. Record sound component C.

To record C properly, we must first know the number of fan blades. Reenter the Component A table at selected unit size and fan type and note the number of blades per wheel.

For a 39E21 unit with an FC fan, the number of blades is 53.

Now determine the octave band number:

1. Locate fan rpm (from Step II) on the FAN RPM nomograph.
2. Locate the number of fan blades on the NUMBER OF FAN BLADES nomograph.
3. Connect the two points. Where the generated line intersects the nomograph of FAN BLADE PASSAGE FREQUENCY, read the octave band number.

In the example, the line intersects BPF nomograph within octave band 5.

Enter the Sound Power Determination table and record C value only in the column containing the octave band determined in Step III,3 above.

- D. Add all values of A, B and C to obtain the sound power level in each octave band.

NOTE: The sound power just determined is at maximum Modudrive fan speed. Fan sound power drops off significantly at part load fan speeds. For example, when Modudrive slows to its minimum of 40% full speed in the given 39E21 unit, the deduction for B value increases to about 58 dB. This translates into a 17 dB drop in sound power.

In many instances, depending upon your application, the sound power determination can be based on Modudrive operation at 50 to 80% of full load and need not be based on the few operating hours at 90% full load or higher.

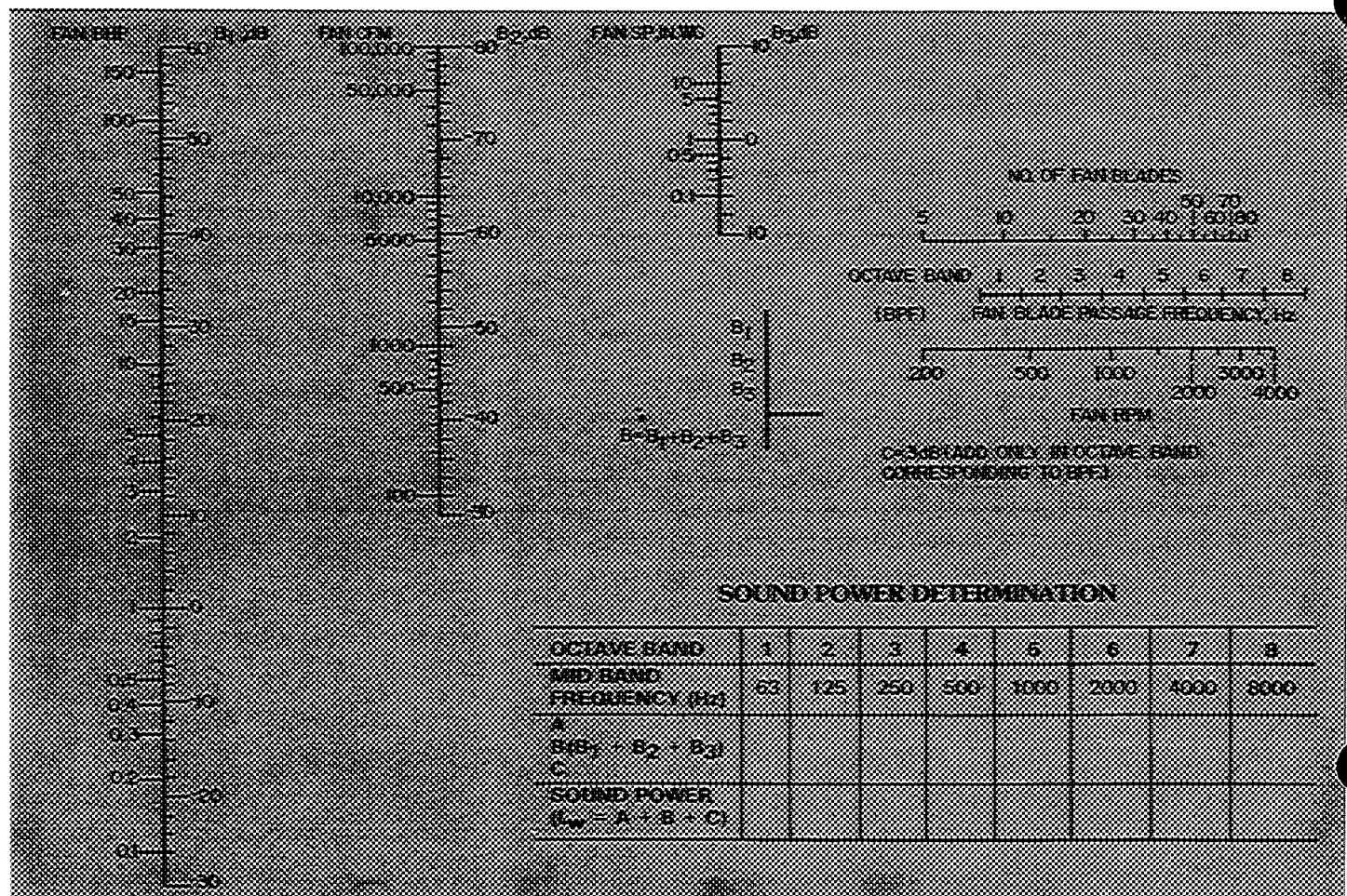
Values of sound power component A

(by octave band) in dB re 10^{-12} watts

UNIT 39E	FAN TYPE	FAN WHEEL DIAM (in.)	NO. BLADES PER WHEEL	OCTAVE BAND							
				1	2	3	4	5	6	7	8
				Octave Band Center-Frequency (F, Hz)							
				63	125	250	500	1000	2000	4000	8000
15	FC	20	53	137	133	129	128	125	119	113	105
	AF	17-13/16	12	138	134	131	128	125	121	113	105
18	FC	20	53	137	133	129	129	125	119	113	105
	AF	19-11/16	12	138	134	131	127	124	119	111	103
21	FC	20	53	137	133	129	129	125	119	113	105
	AF	21-9/16	12	138	133	130	127	123	118	110	102
26	FC	25	56	137	132	128	128	123	118	111	102
	AF	24	12	138	133	129	127	123	117	109	101
32	FC	25	56	137	132	128	128	123	117	110	100
	AF	26-7/16	12	138	133	129	126	122	117	109	100
39	FC	27-1/2	56	136	132	128	127	122	116	109	99
	AF	29-1/8	12	138	133	129	126	122	117	109	100
48	FC	30	66	136	131	128	126	123	116	108	99
	AF	32-3/8	12	138	133	129	125	122	116	108	99
57	FC	36	78	136	131	129	126	121	115	107	96
	AF	35-9/16	12	138	133	129	125	122	116	108	99
75	FC	NA	—	—	—	—	—	—	—	—	—
	AF	39-3/8	12	138	133	129	125	122	116	108	99
90	FC	NA	—	—	—	—	—	—	—	—	—
	AF	43-7/16	12	138	133	129	125	122	116	108	99

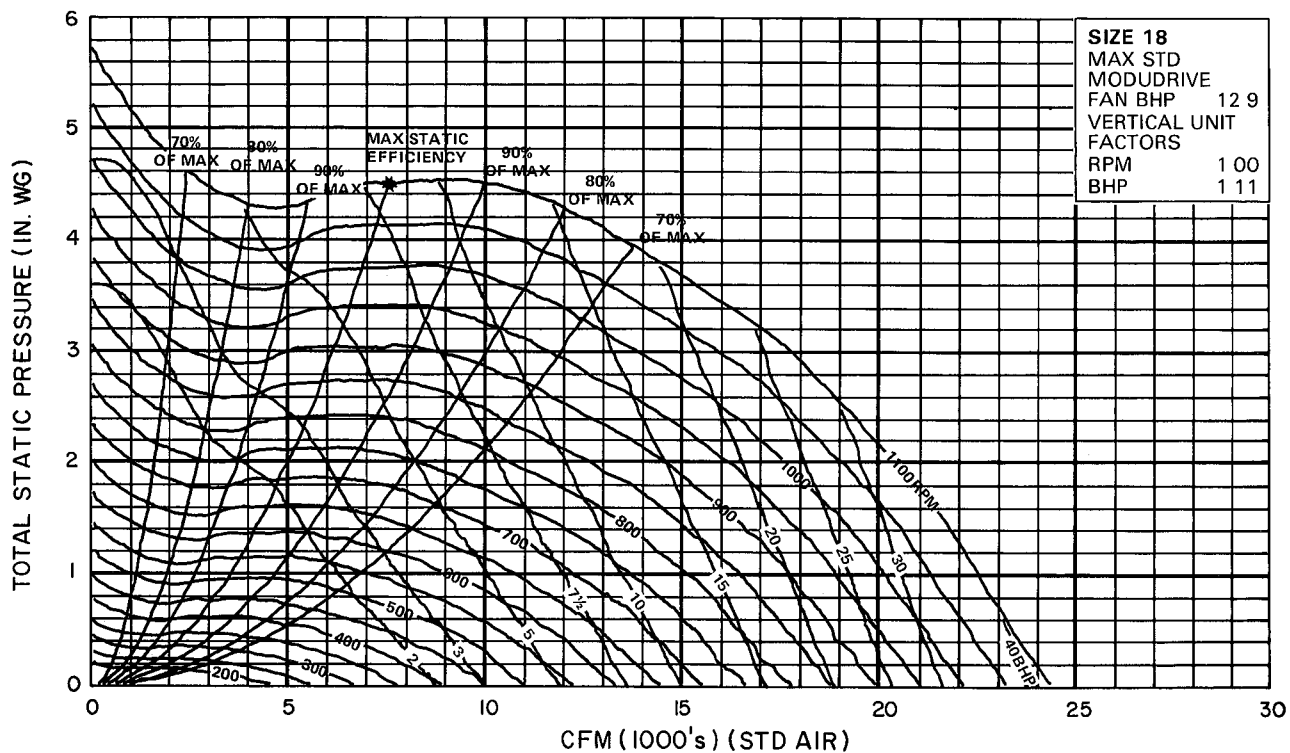
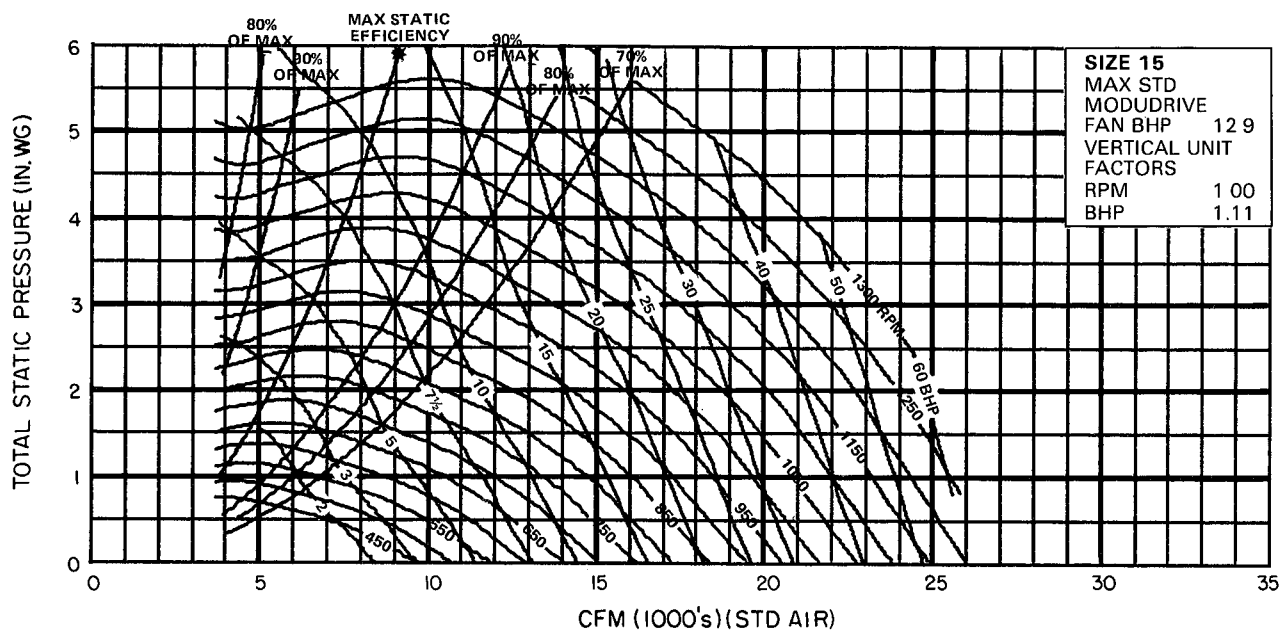
FC — Forward Curve
AF — Airfoil
NA — Not Available

Sound level charts



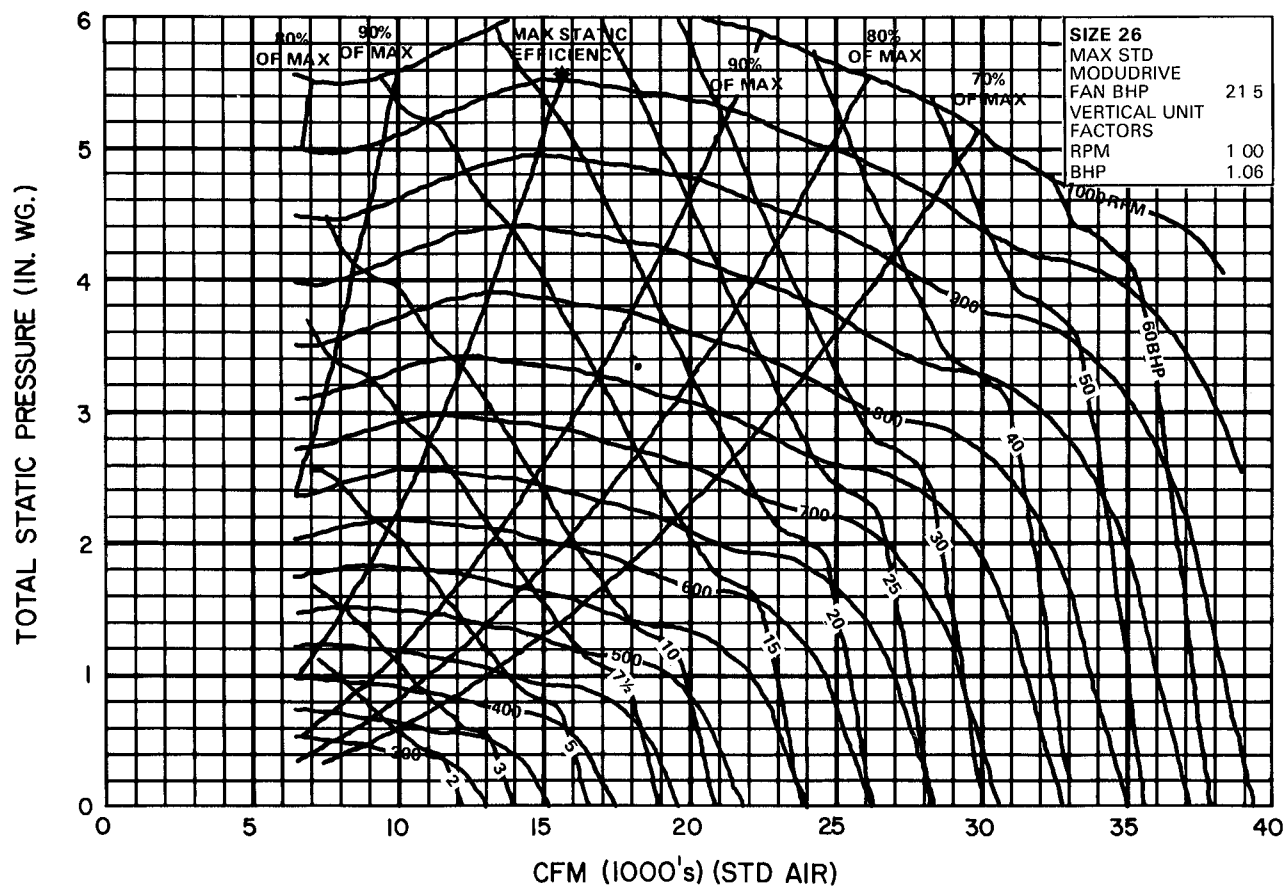
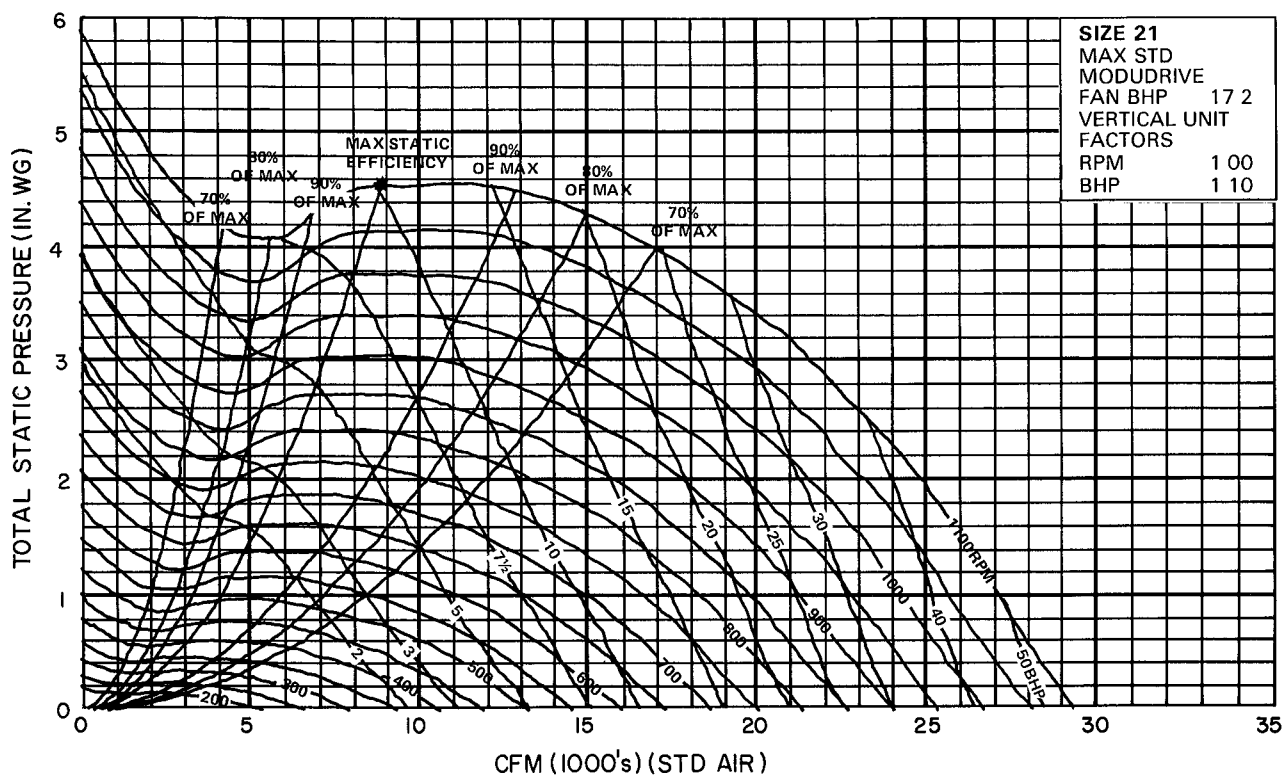
Forward curved fan performance

39E HORIZONTAL DRAW-THRU UNITS AND 39ER SUPPLY-AIR FAN SECTIONS

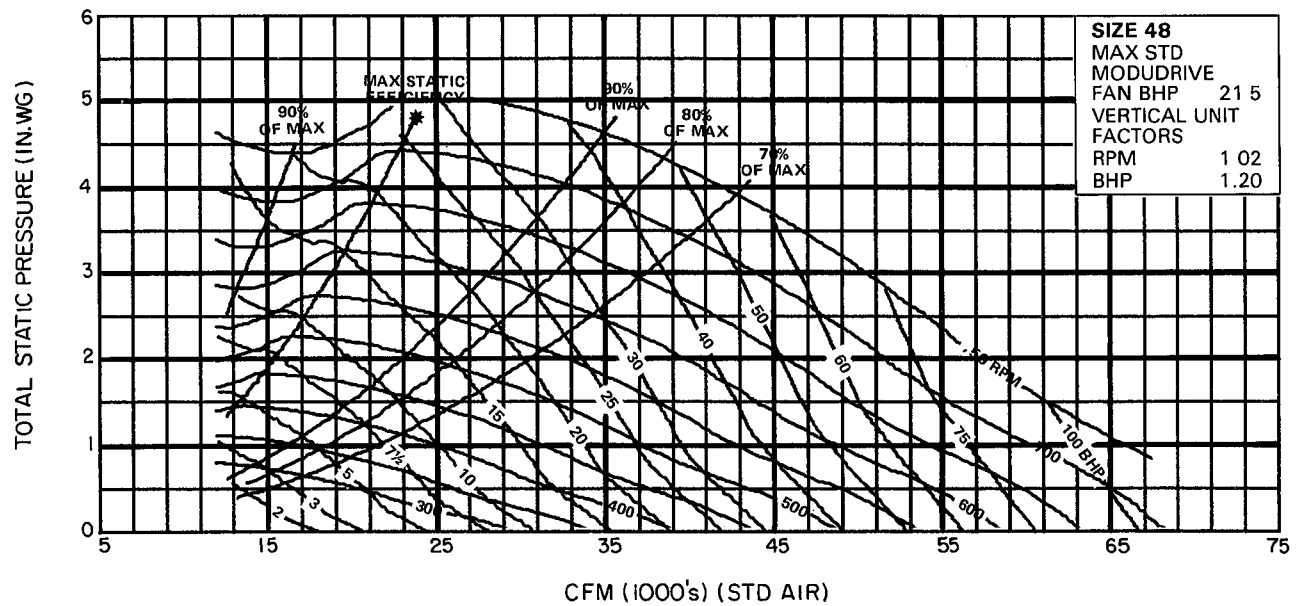
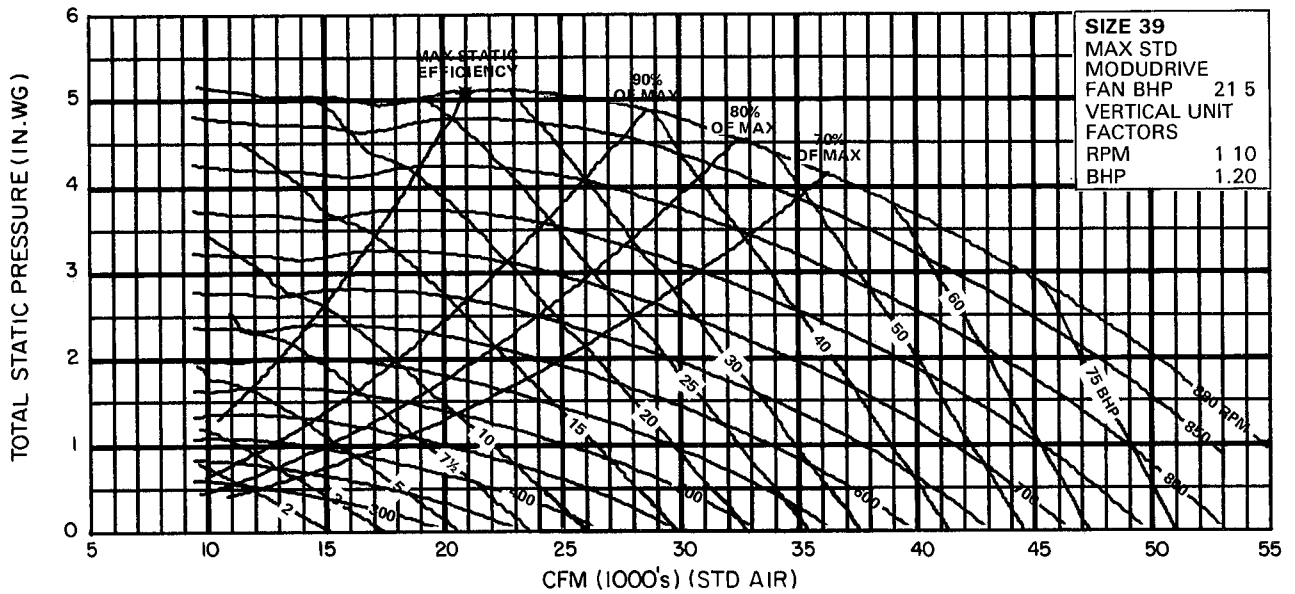
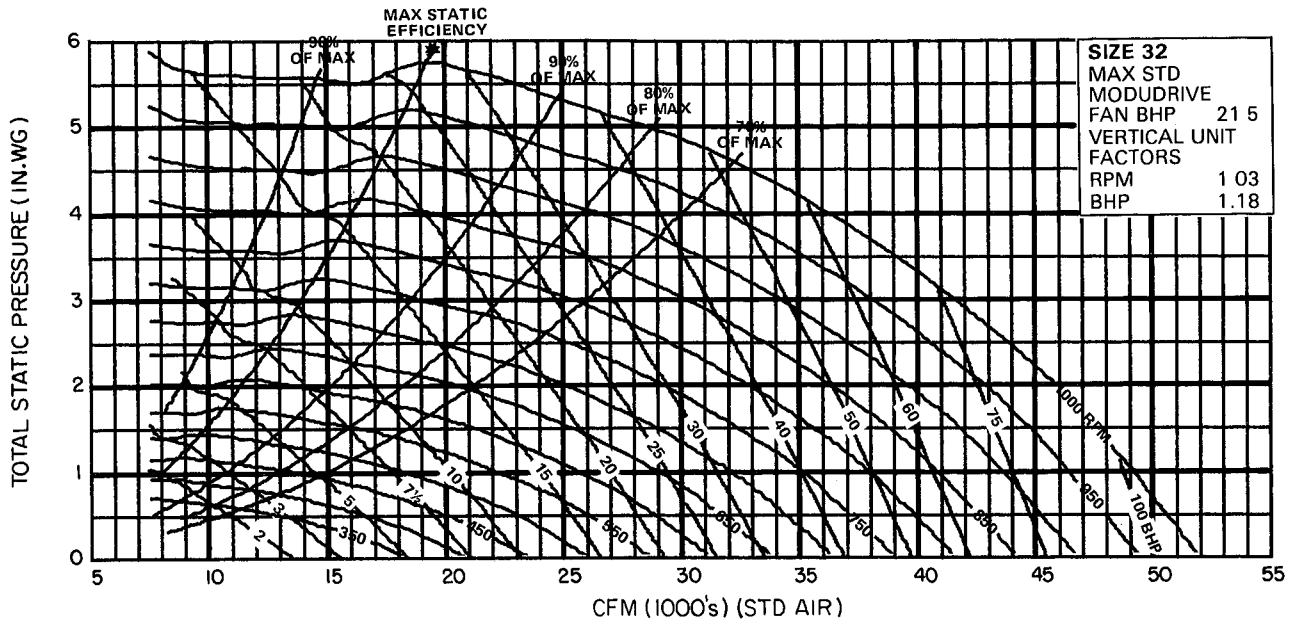


Forward curved fan performance (cont)

39E HORIZONTAL DRAW-THRU UNITS AND 39ER SUPPLY-AIR FAN SECTIONS

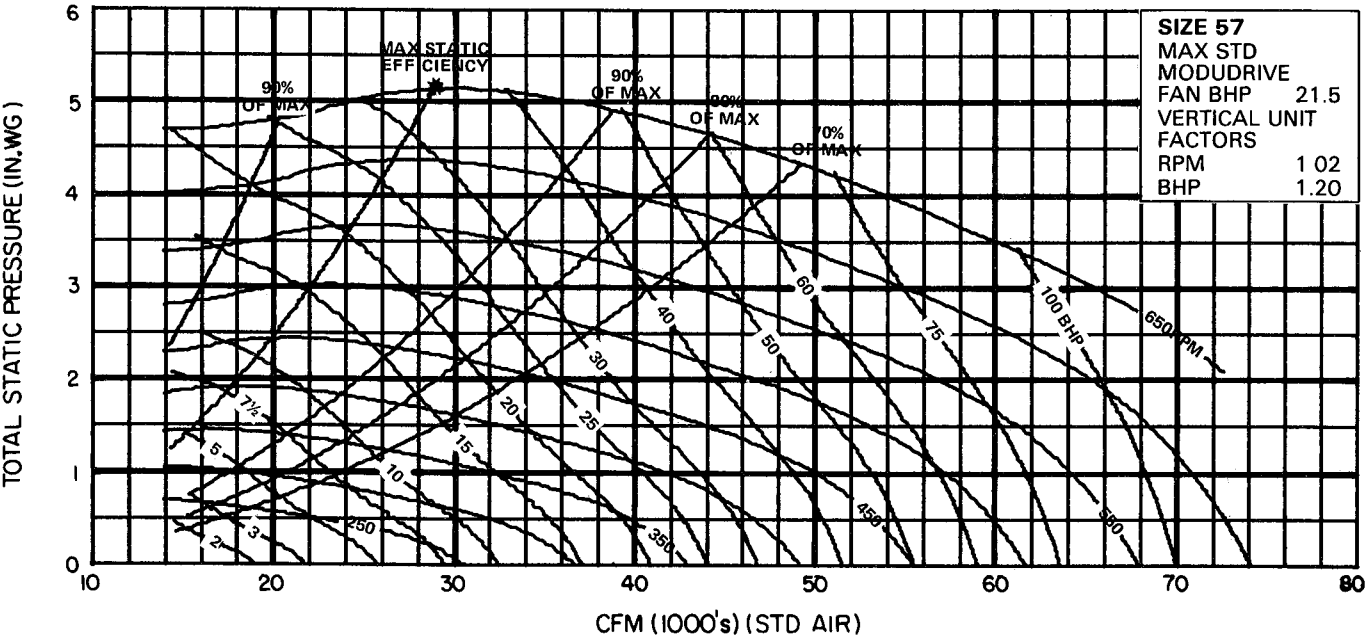


39E HORIZONTAL DRAW-THRU UNITS AND 39ER SUPPLY-AIR FAN SECTIONS

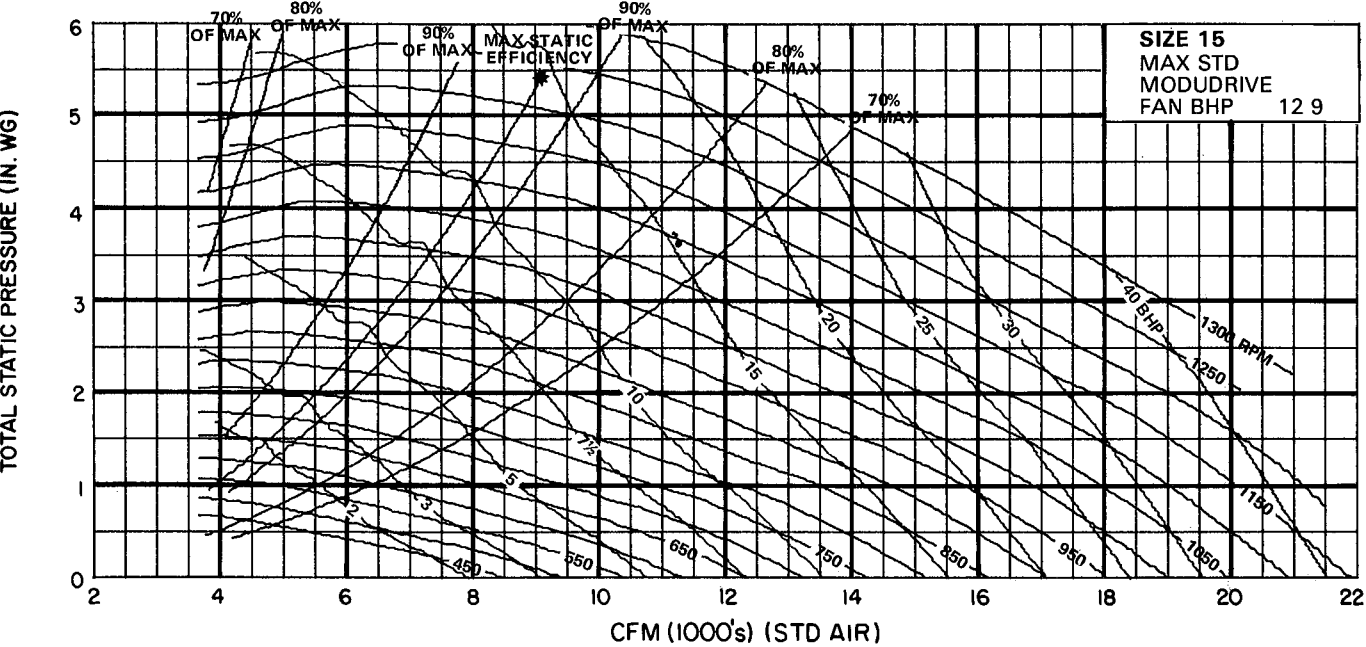


Forward curved fan performance (cont)

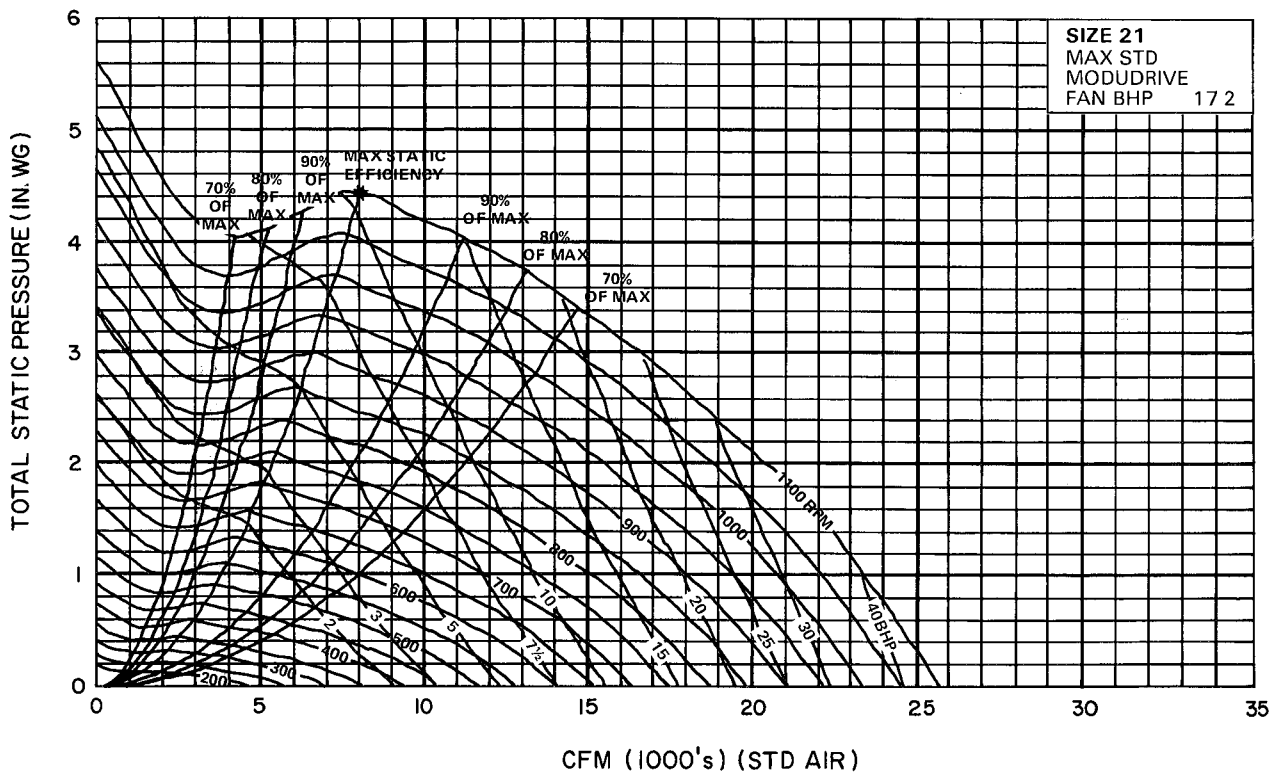
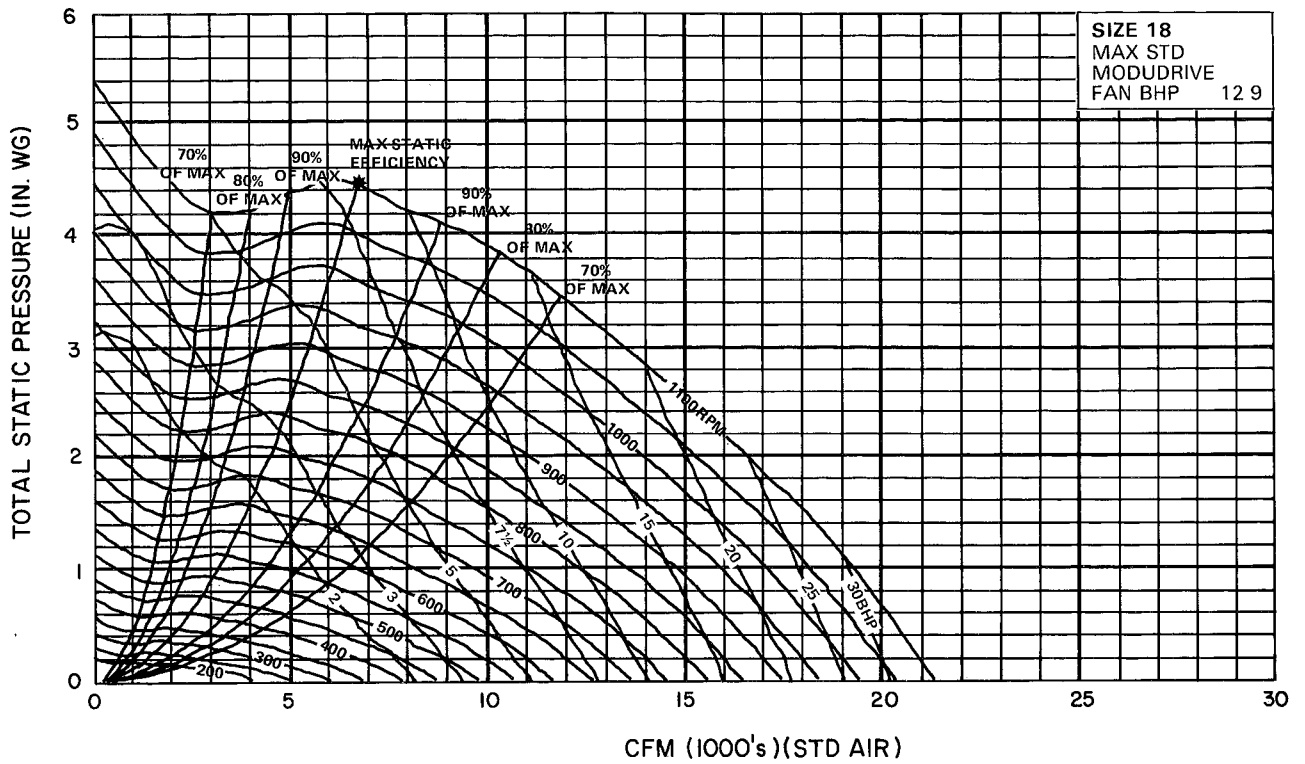
39E HORIZONTAL DRAW-THRU UNITS AND 39ER SUPPLY-AIR FAN SECTIONS



39E BLOW-THRU UNITS AND 39ER RETURN-AIR FAN SECTIONS

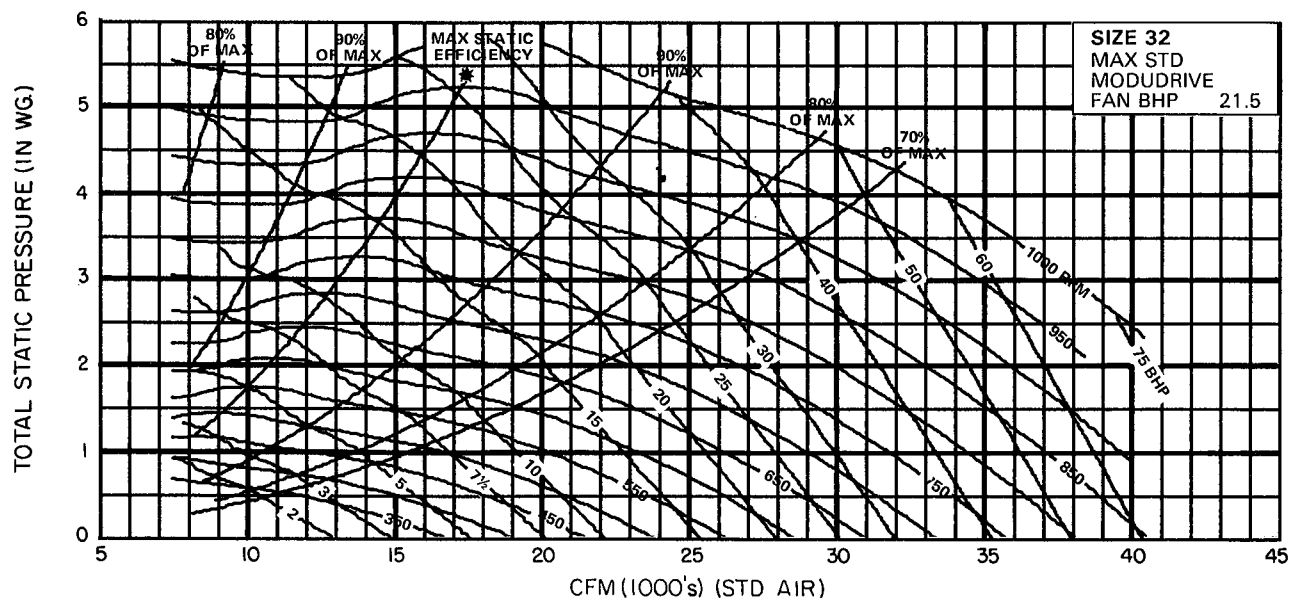
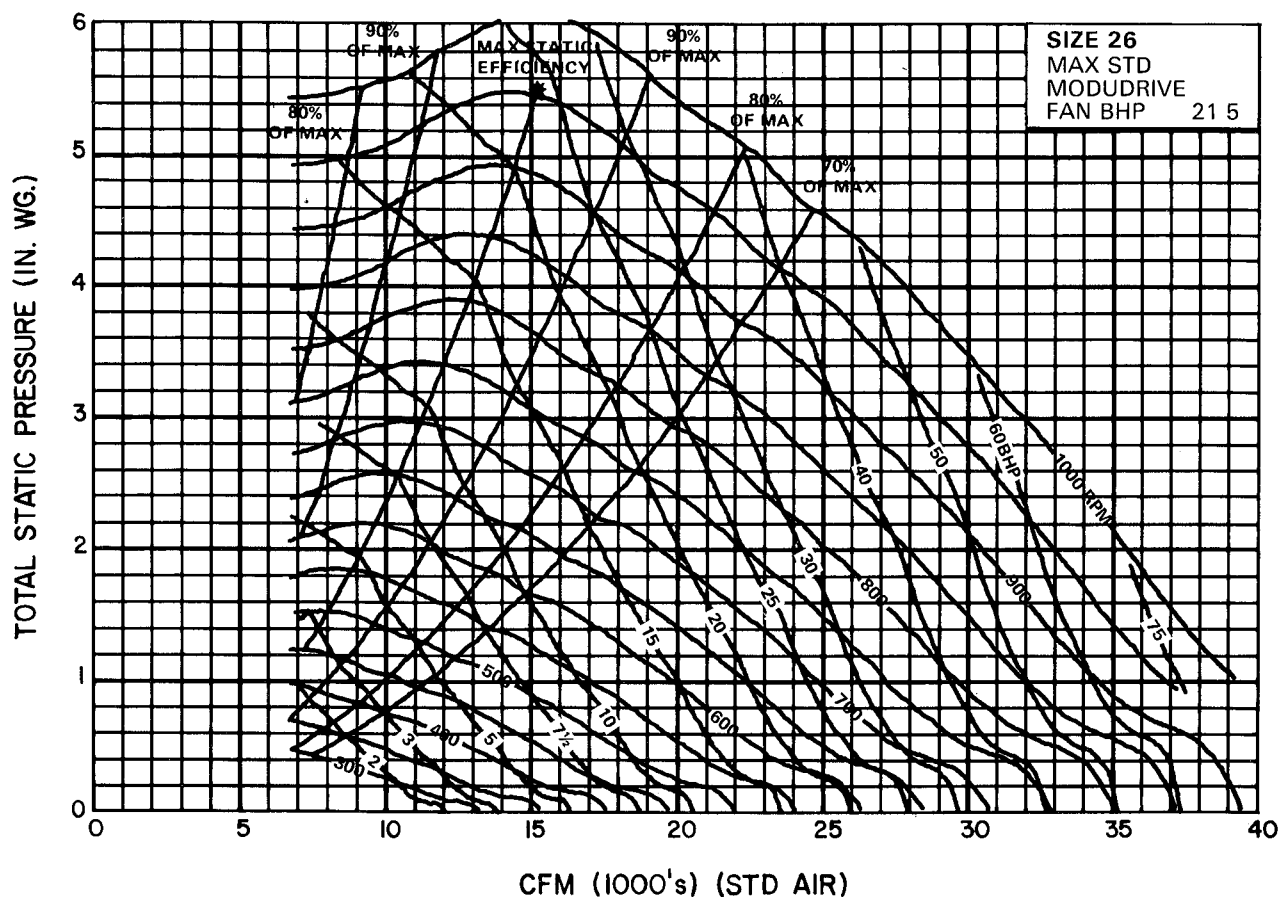


39E BLOW-THRU UNITS AND 39ER RETURN-AIR FAN SECTIONS

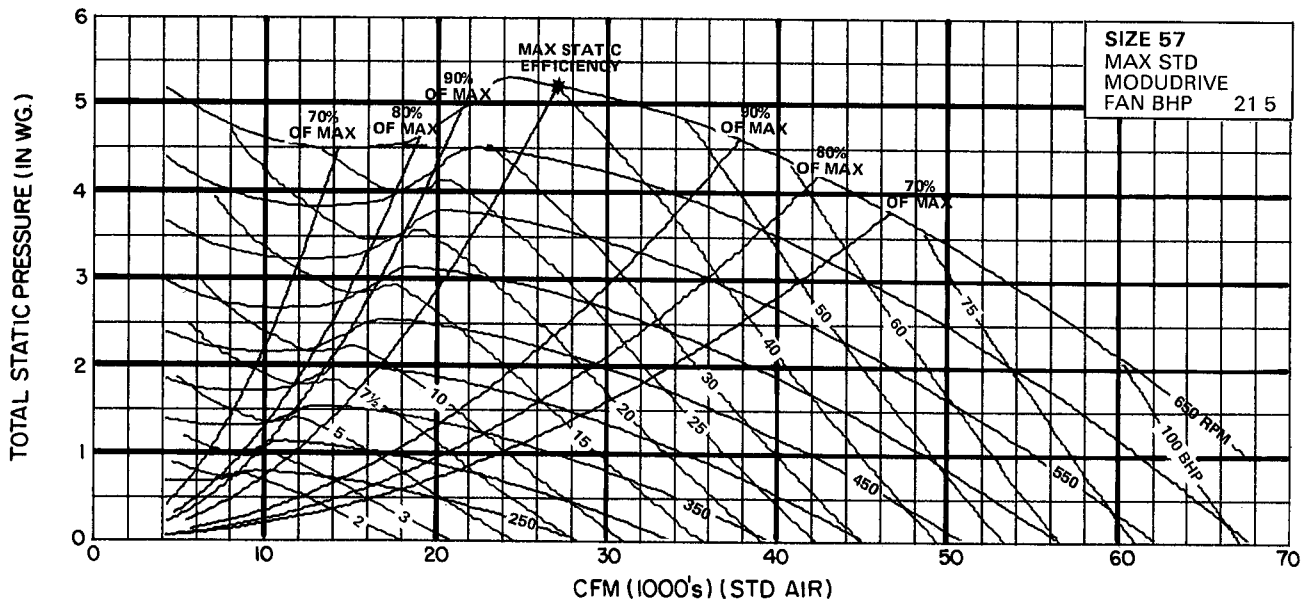
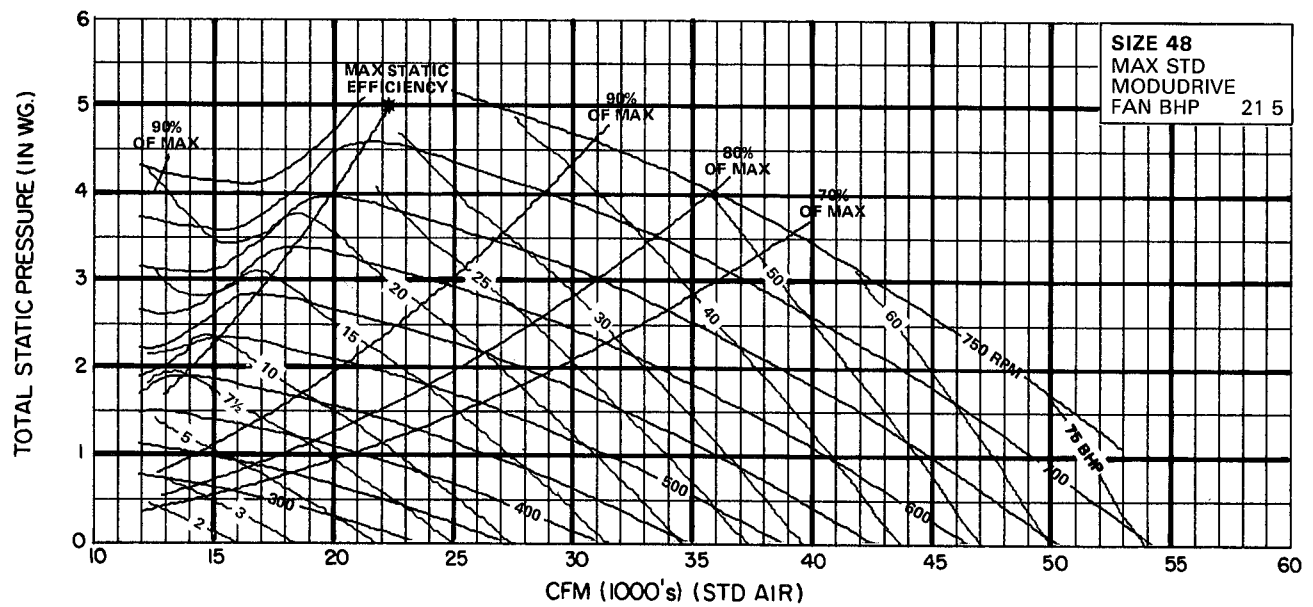
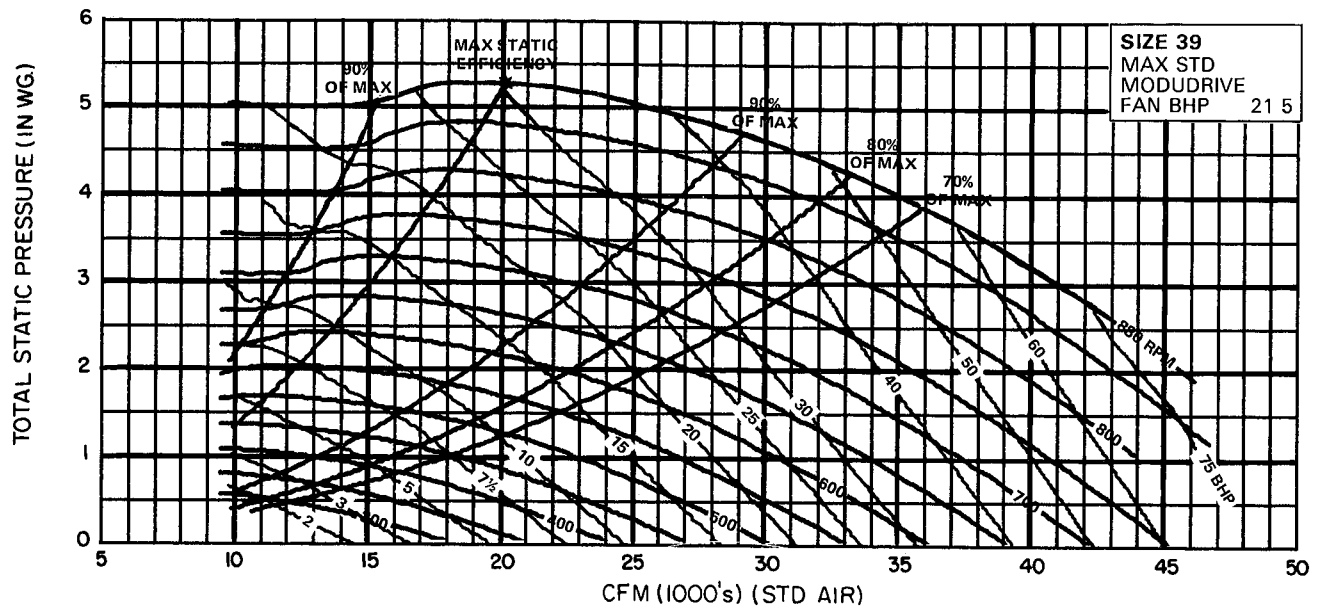


Forward curved fan performance (cont)

39E BLOW-THRU UNITS AND 39ER RETURN-AIR FAN SECTIONS

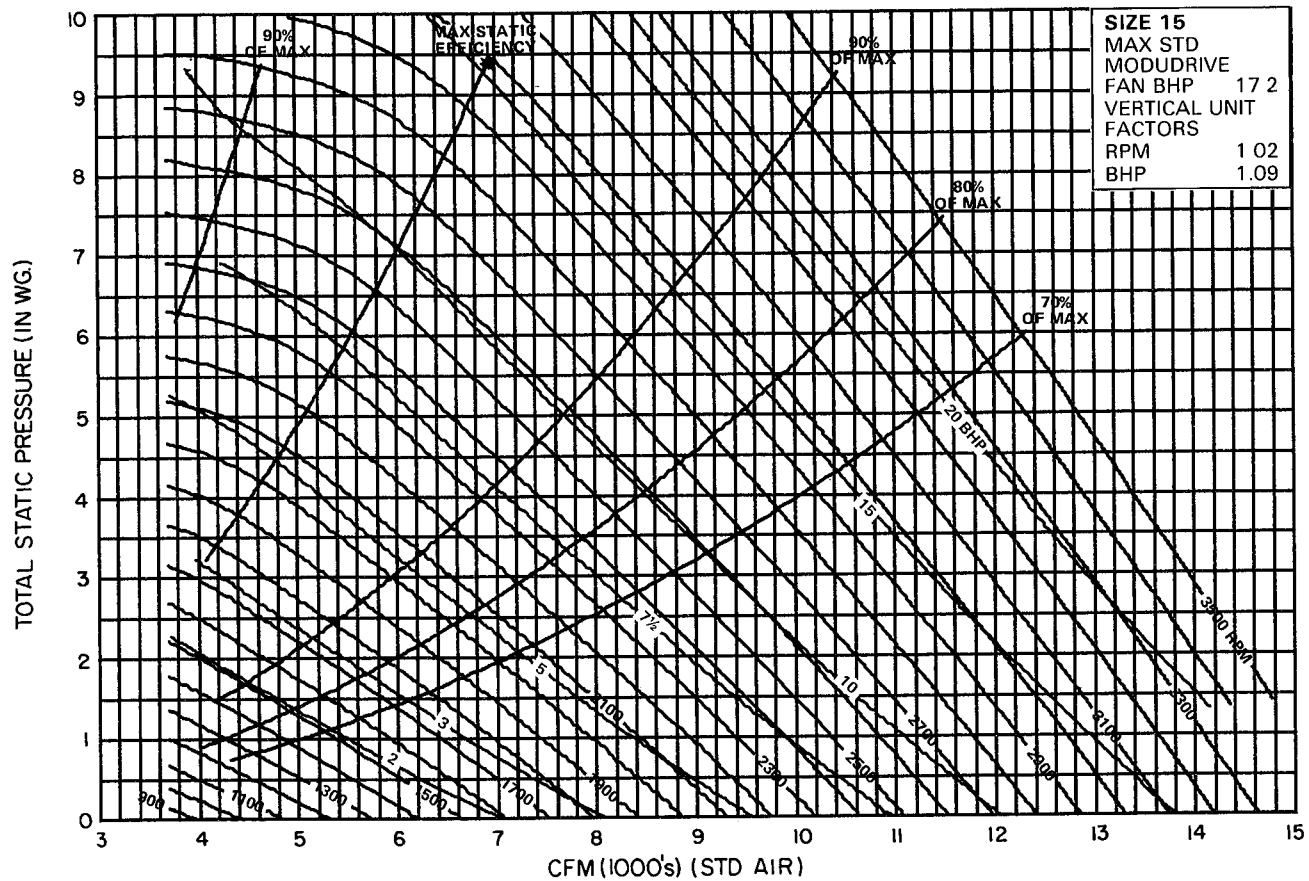


39E BLOW-THRU UNITS AND 39ER RETURN-AIR FAN SECTIONS

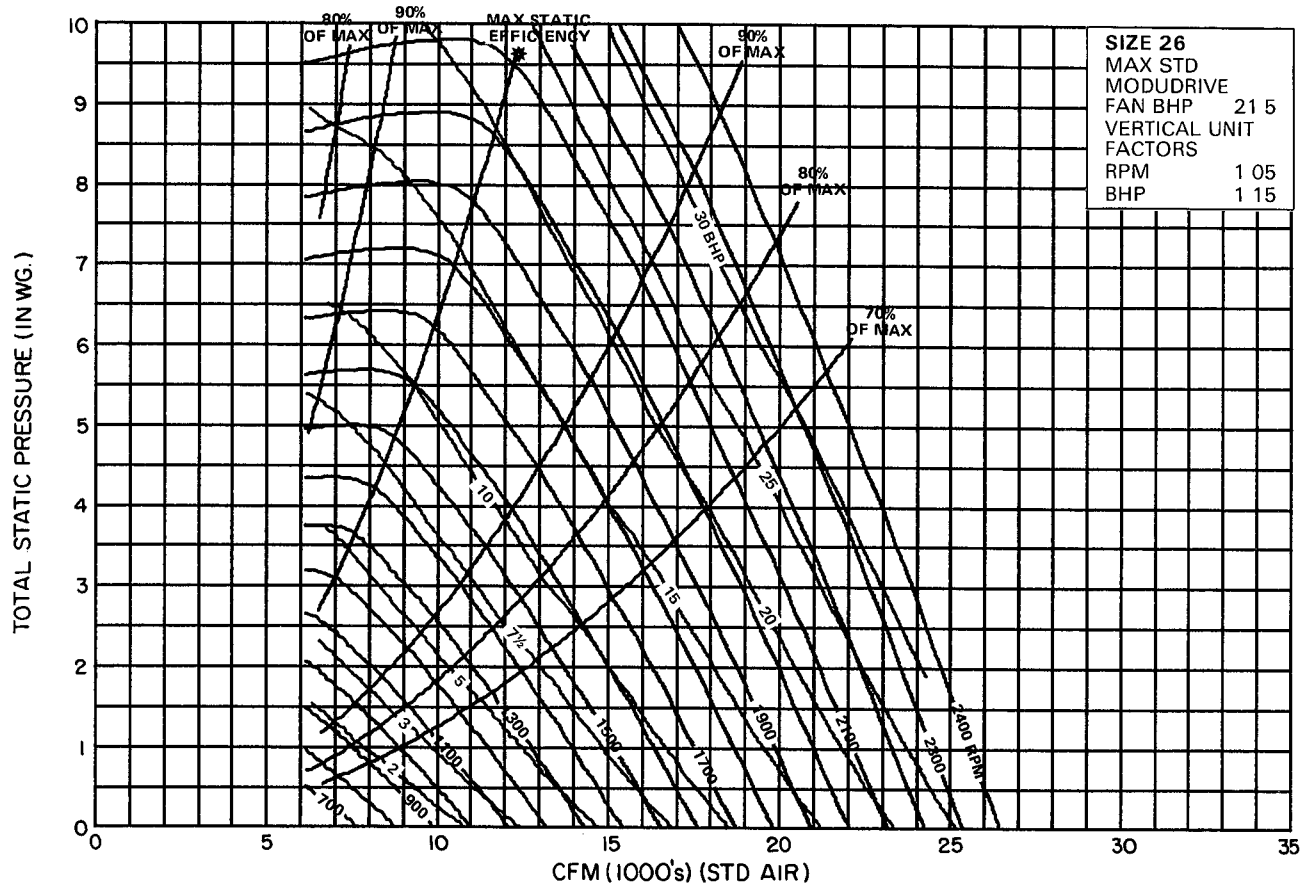
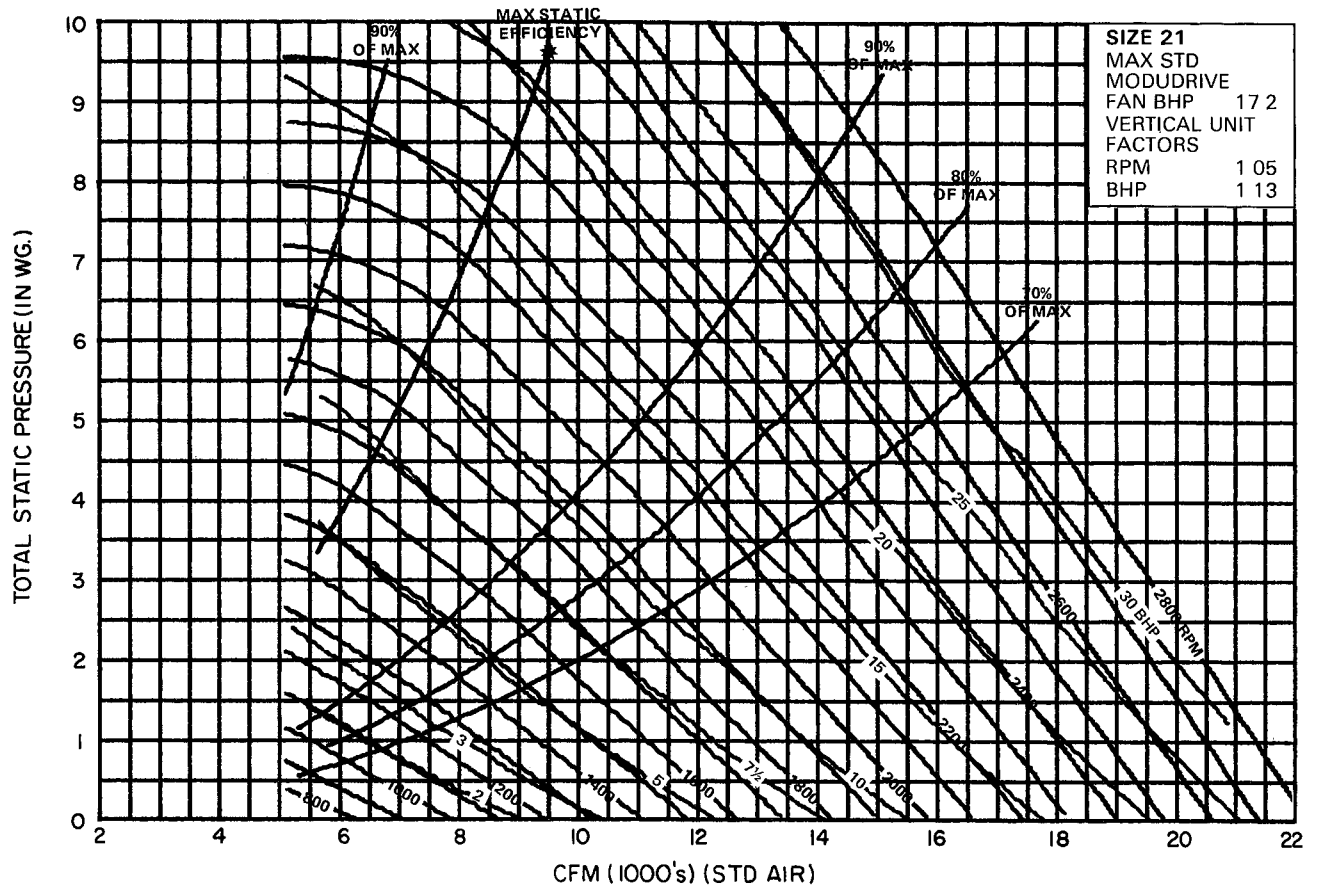


Airfoil fan performance

39E HORIZONTAL DRAW-THRU UNITS AND 39ER SUPPLY-AIR FAN SECTIONS



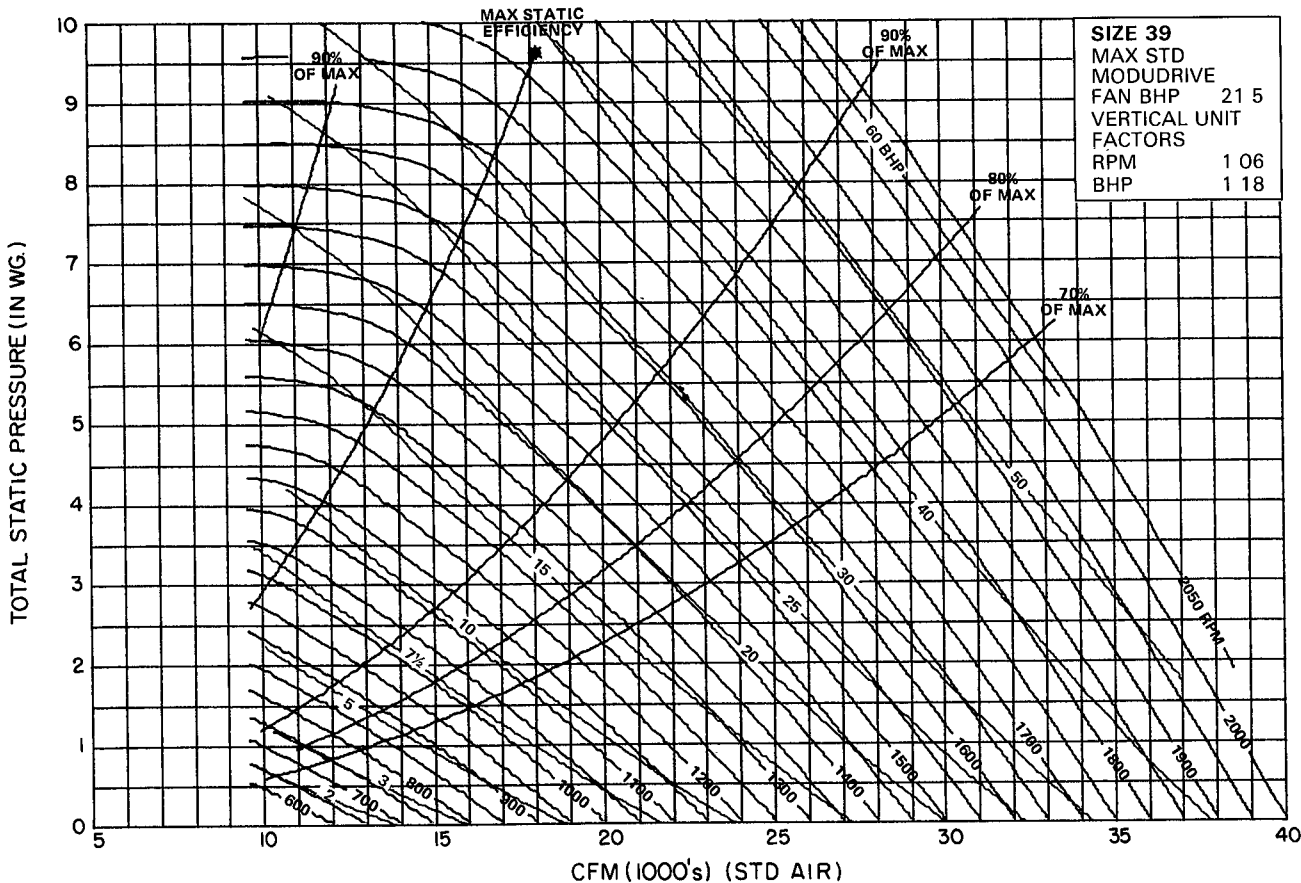
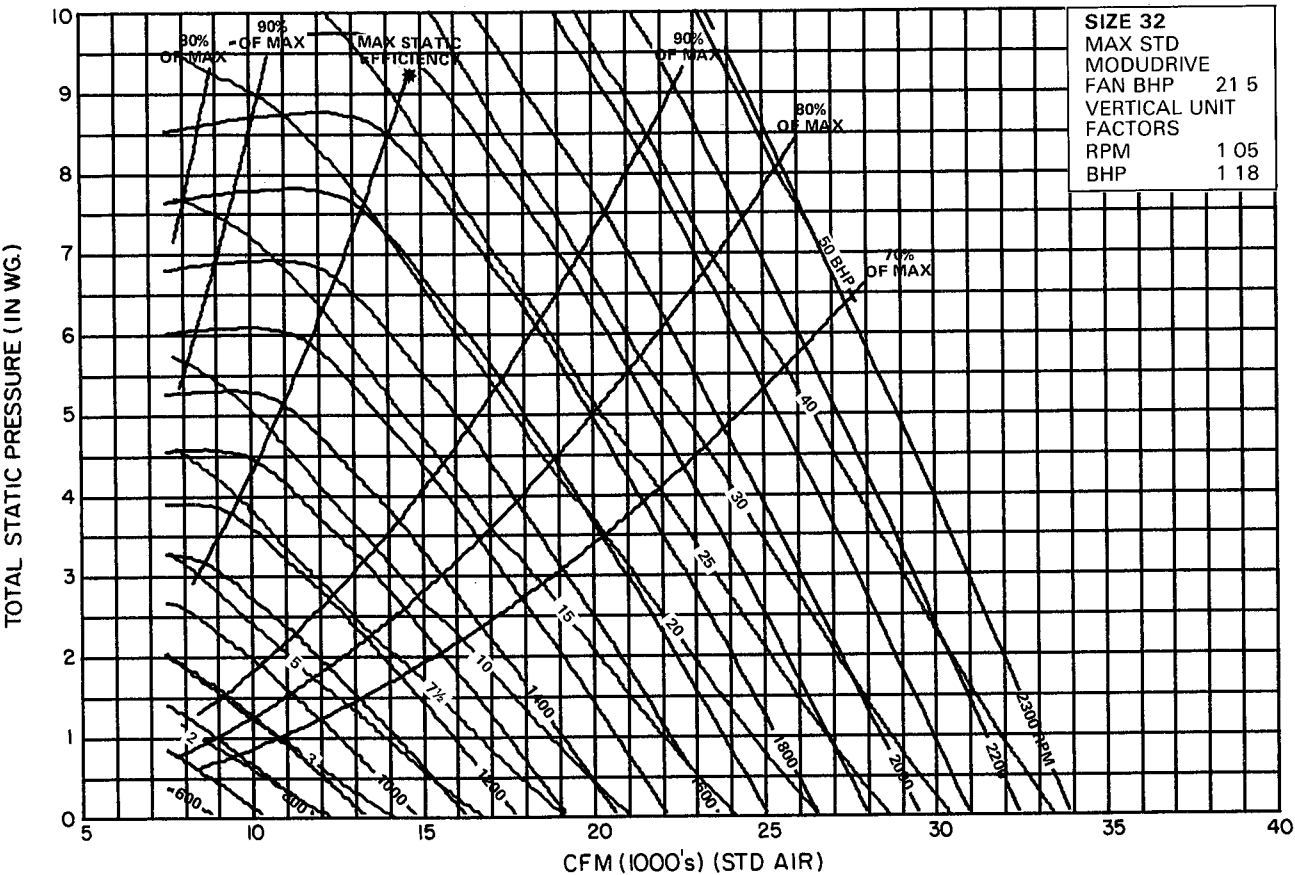
39E HORIZONTAL DRAW-THRU UNITS AND 39ER SUPPLY-AIR FAN SECTIONS



NOTE: For speeds in excess of maximum RPM, consult Carrier

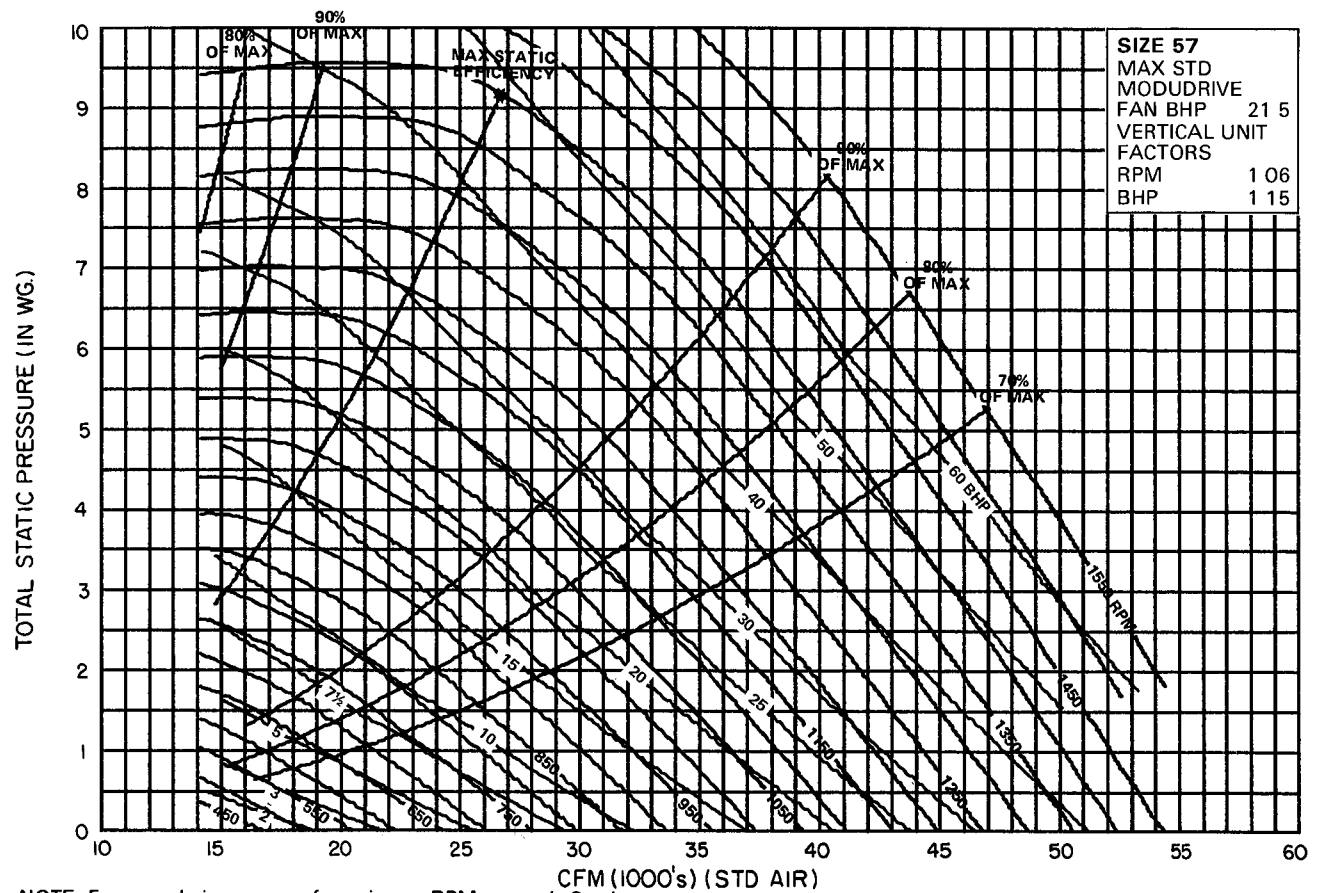
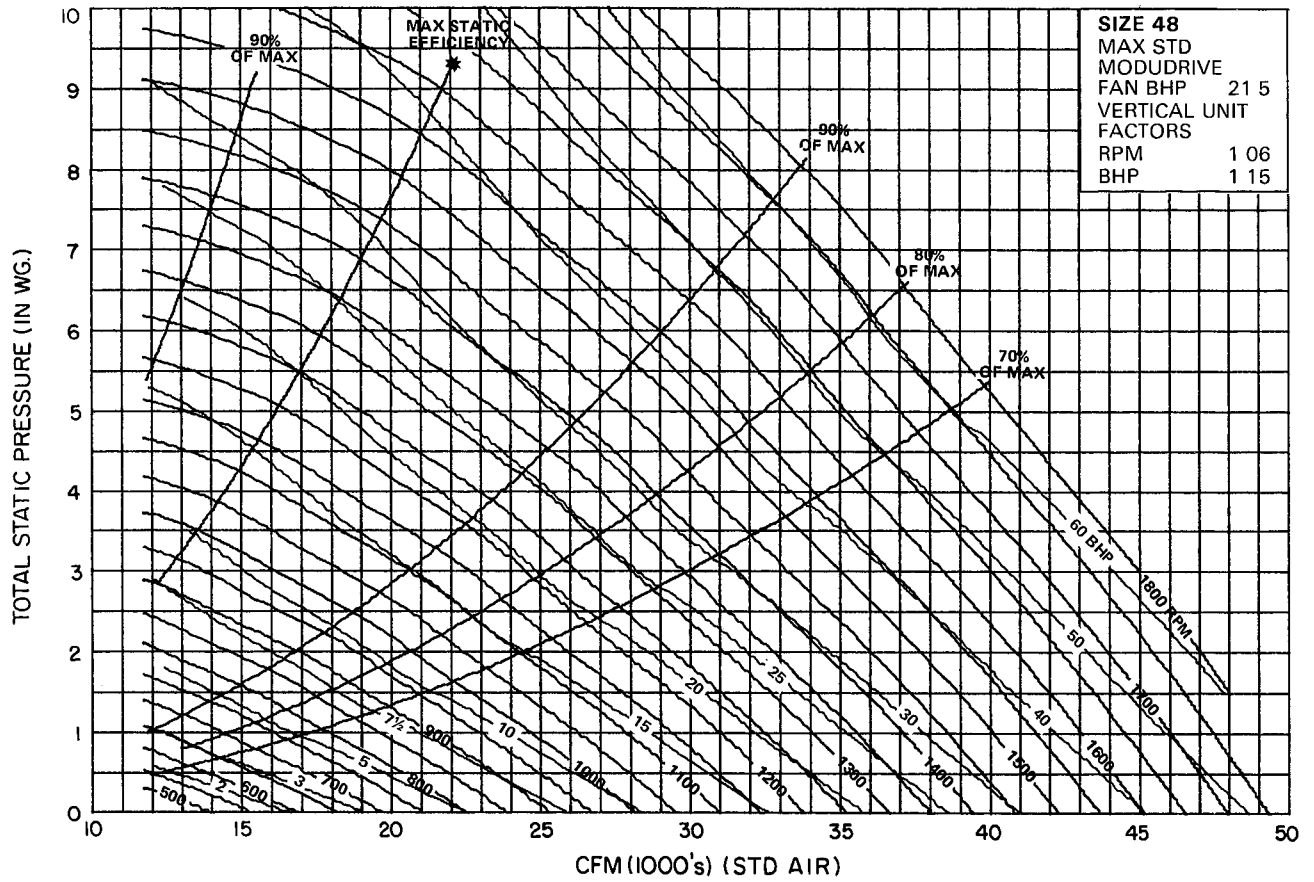
Airfoil fan performance (cont)

39E HORIZONTAL DRAW-THRU UNITS AND 39ER SUPPLY-AIR FAN SECTIONS



NOTE: For speeds in excess of maximum RPM, consult Carrier

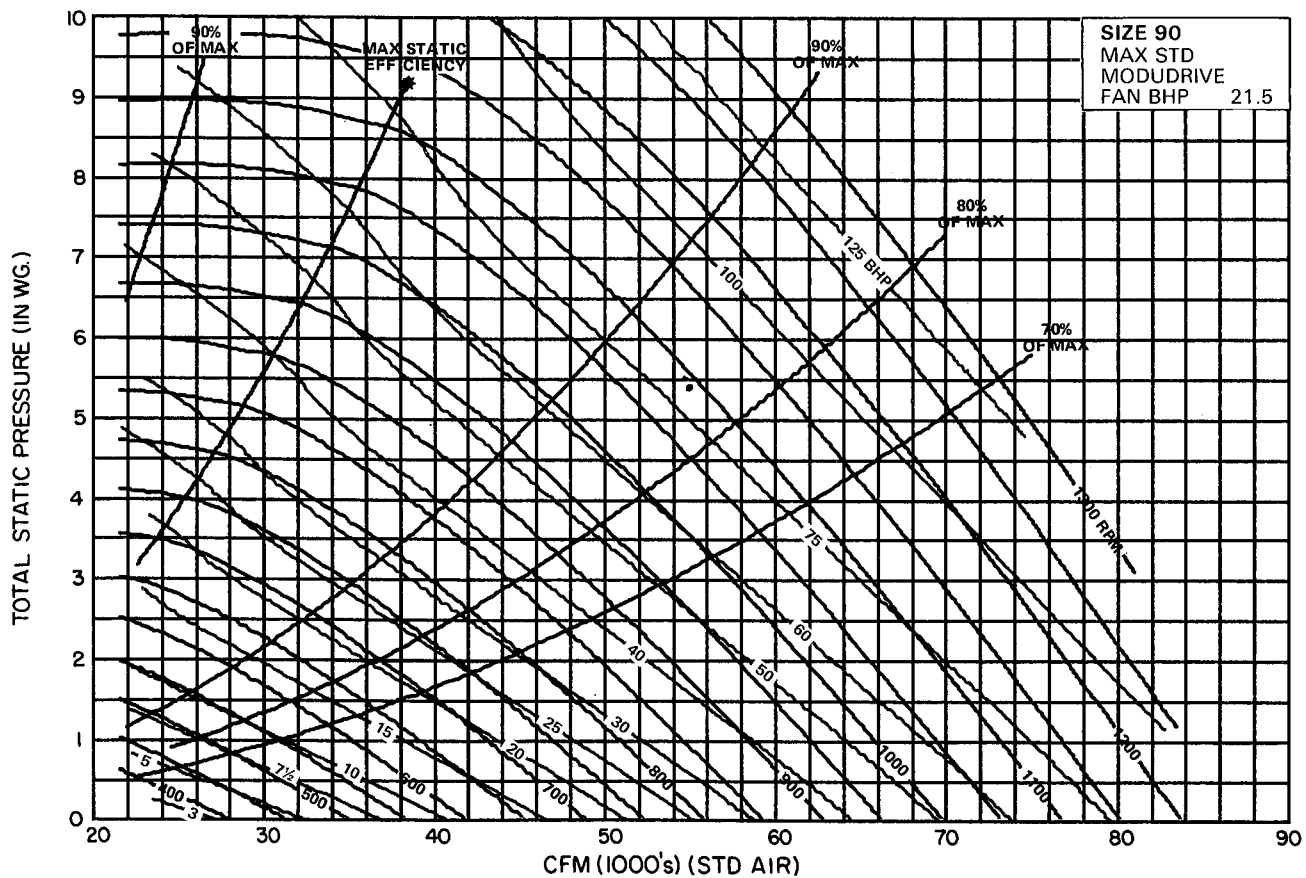
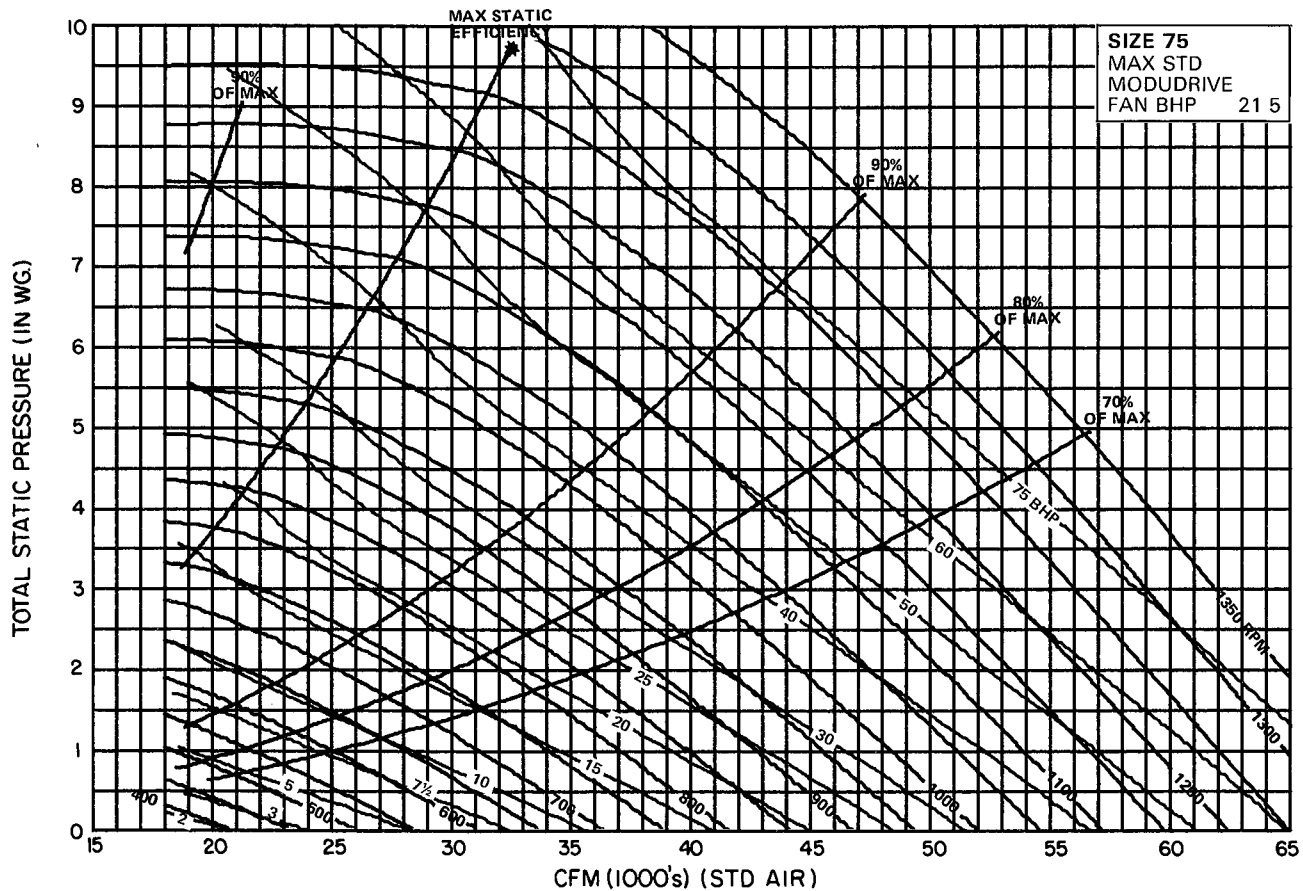
39E HORIZONTAL DRAW-THRU UNITS AND 39ER SUPPLY-AIR FAN SECTIONS



NOTE: For speeds in excess of maximum RPM, consult Carrier.

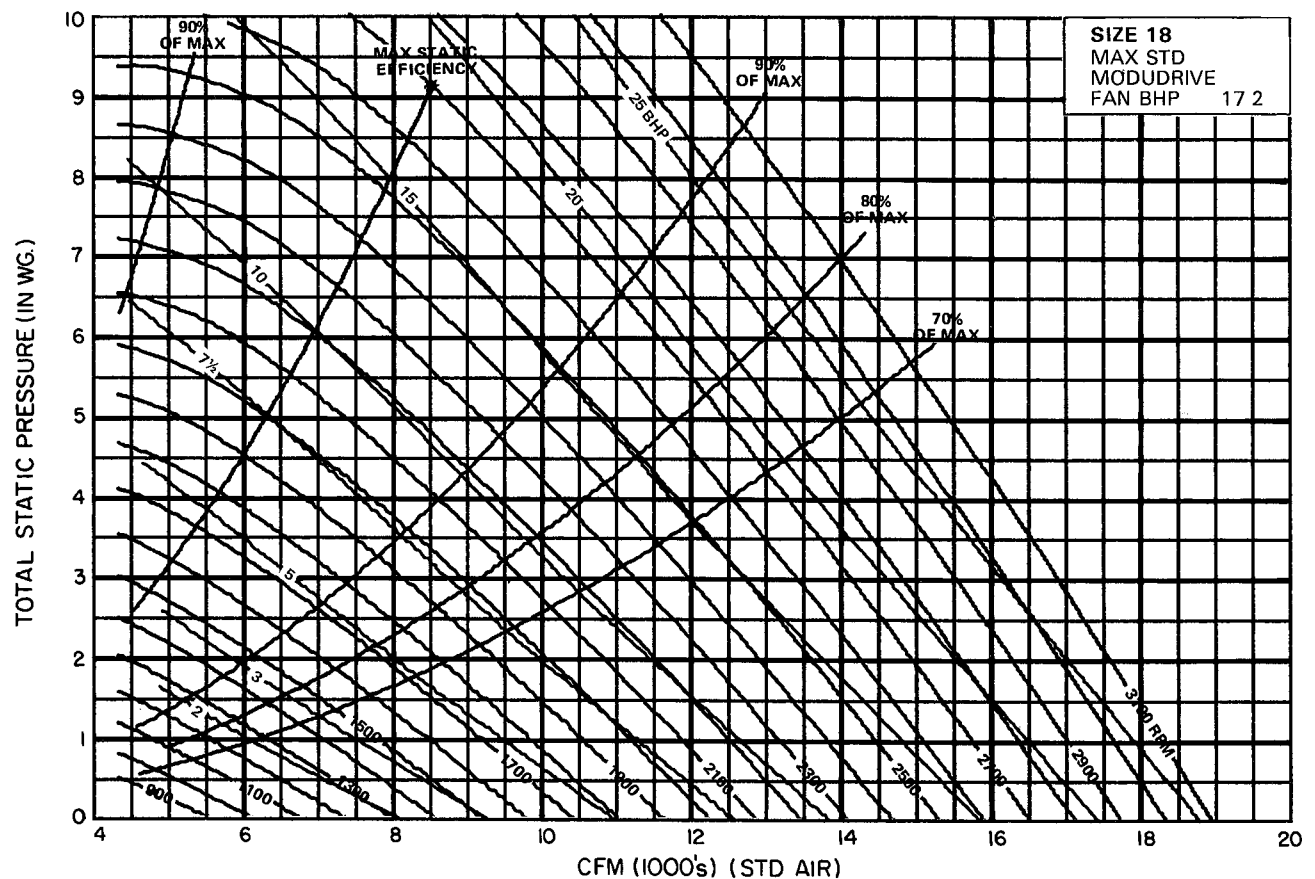
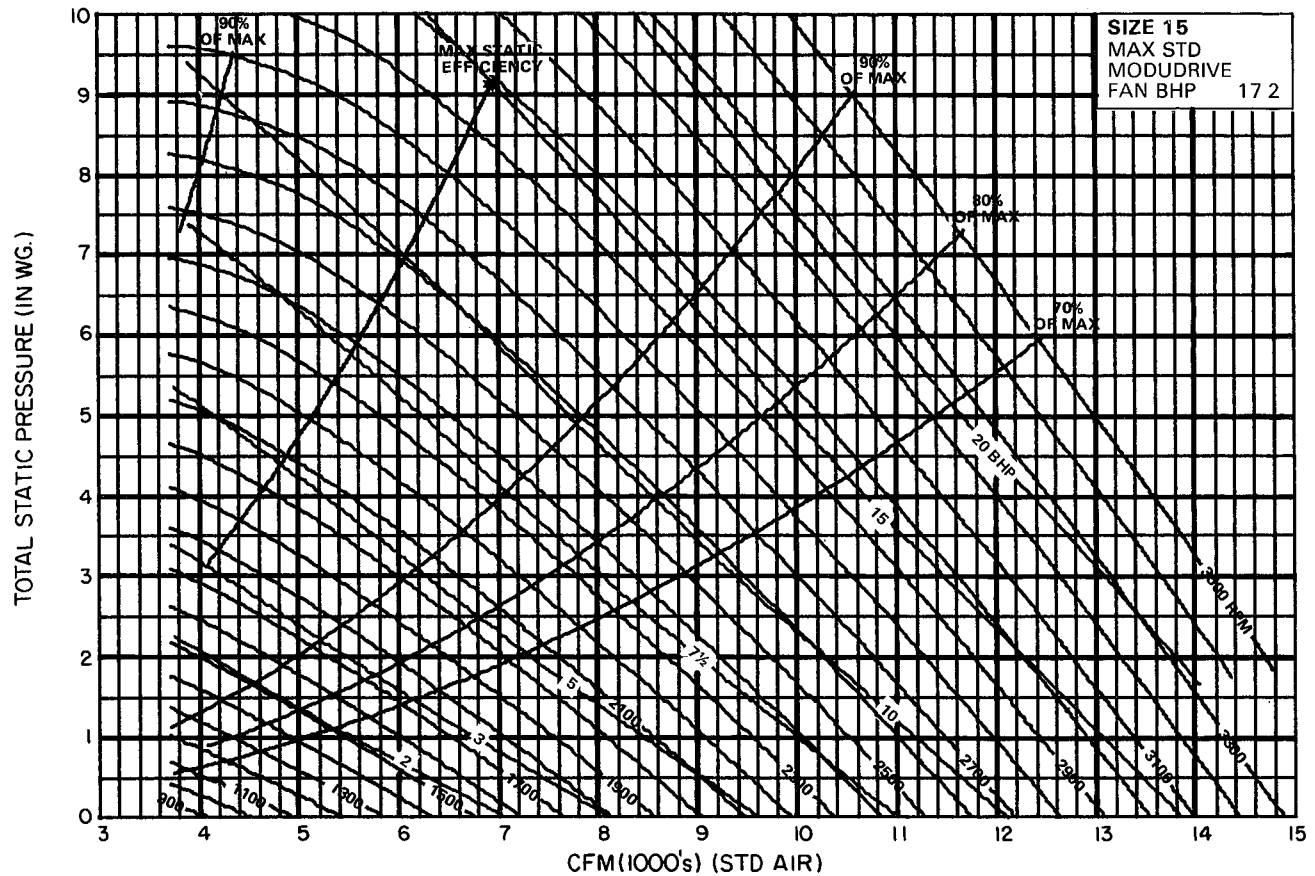
Airfoil fan performance (cont)

39E HORIZONTAL DRAW-THRU UNITS AND 39ER SUPPLY-AIR FAN SECTIONS



NOTE: For speeds in excess of maximum RPM, consult Carrier

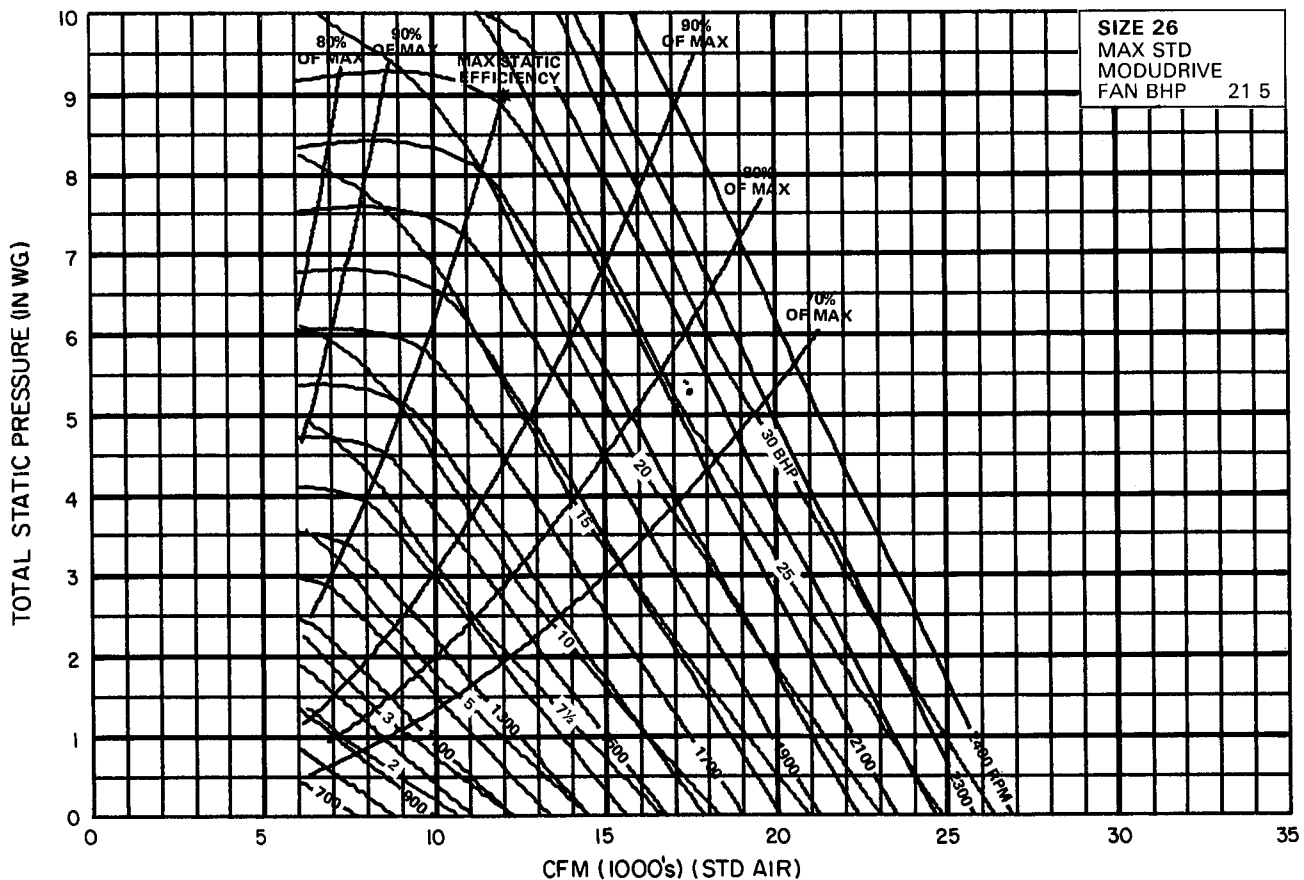
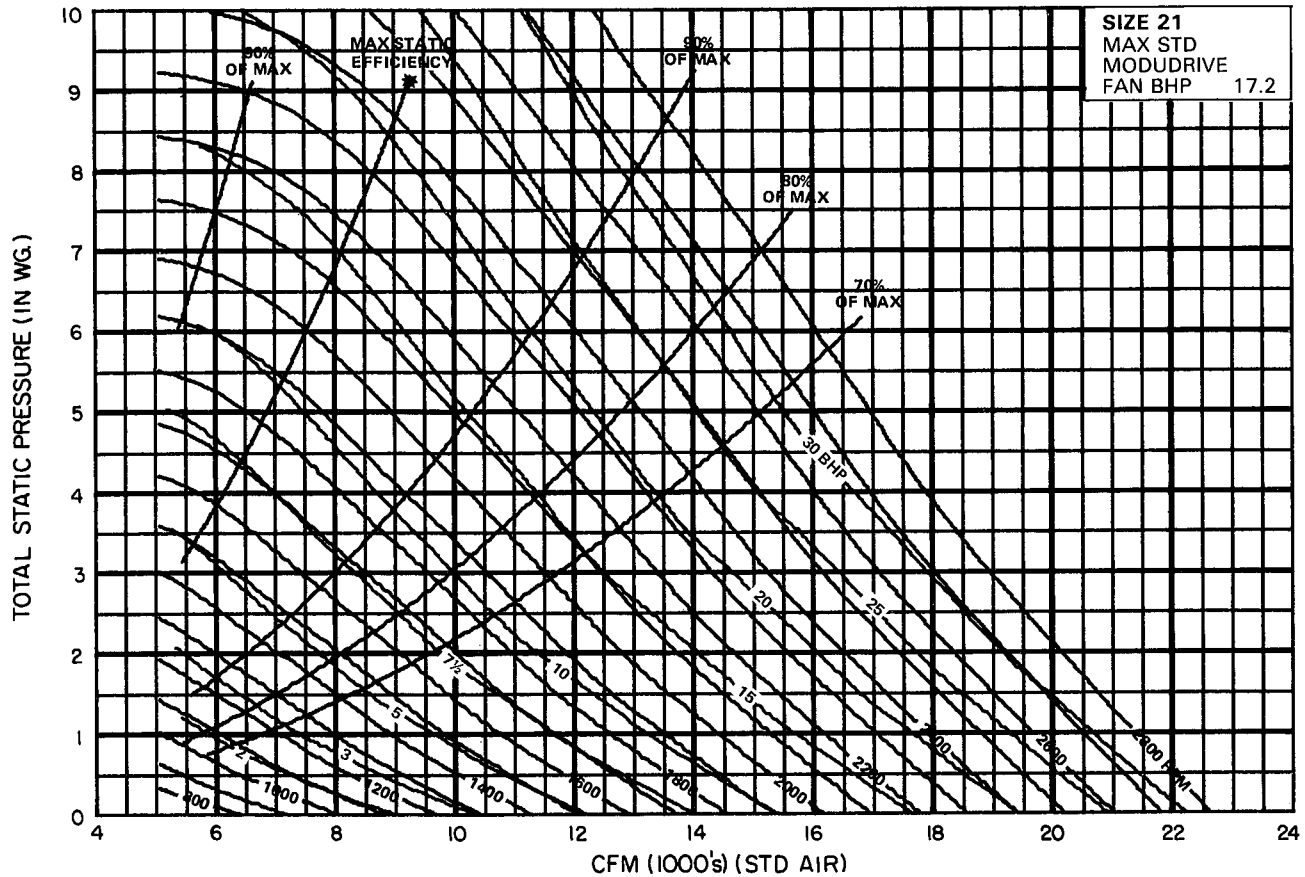
39E BLOW-THRU UNITS AND 39ER RETURN-AIR FAN SECTIONS



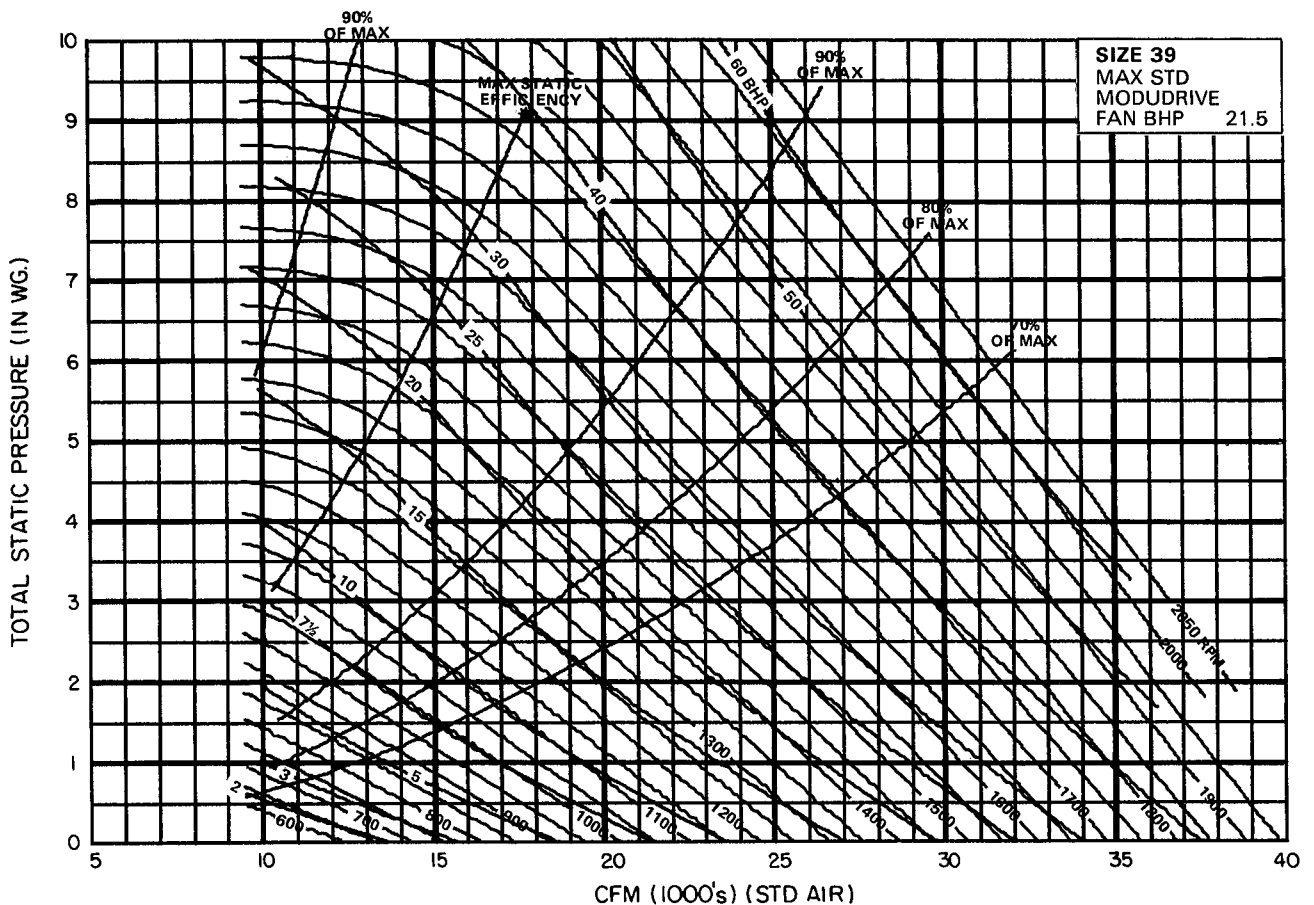
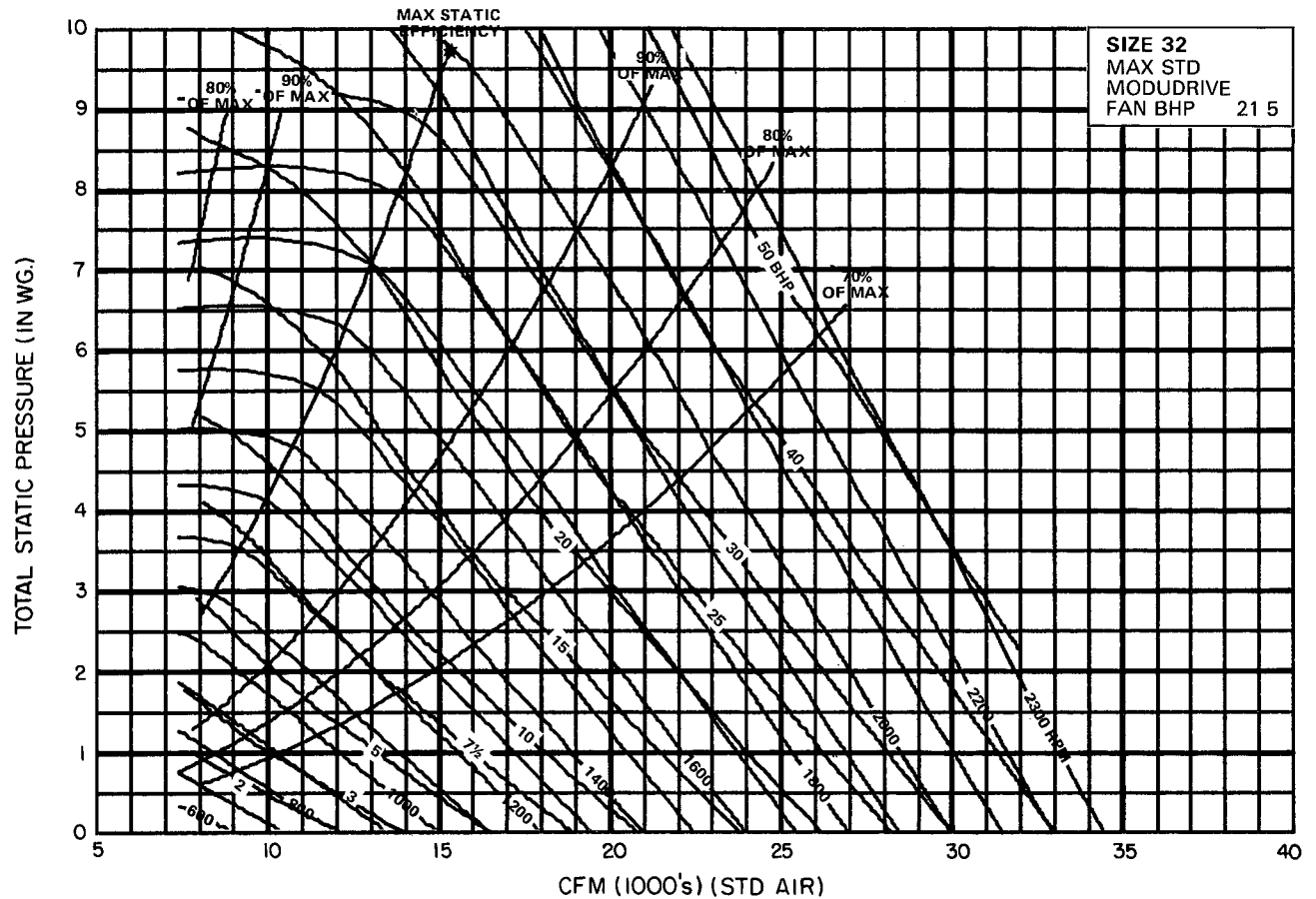
NOTE: For speeds in excess of maximum RPM, consult Carrier

Airfoil fan performance (cont)

39E BLOW-THRU UNITS AND 39ER RETURN-AIR FAN SECTIONS

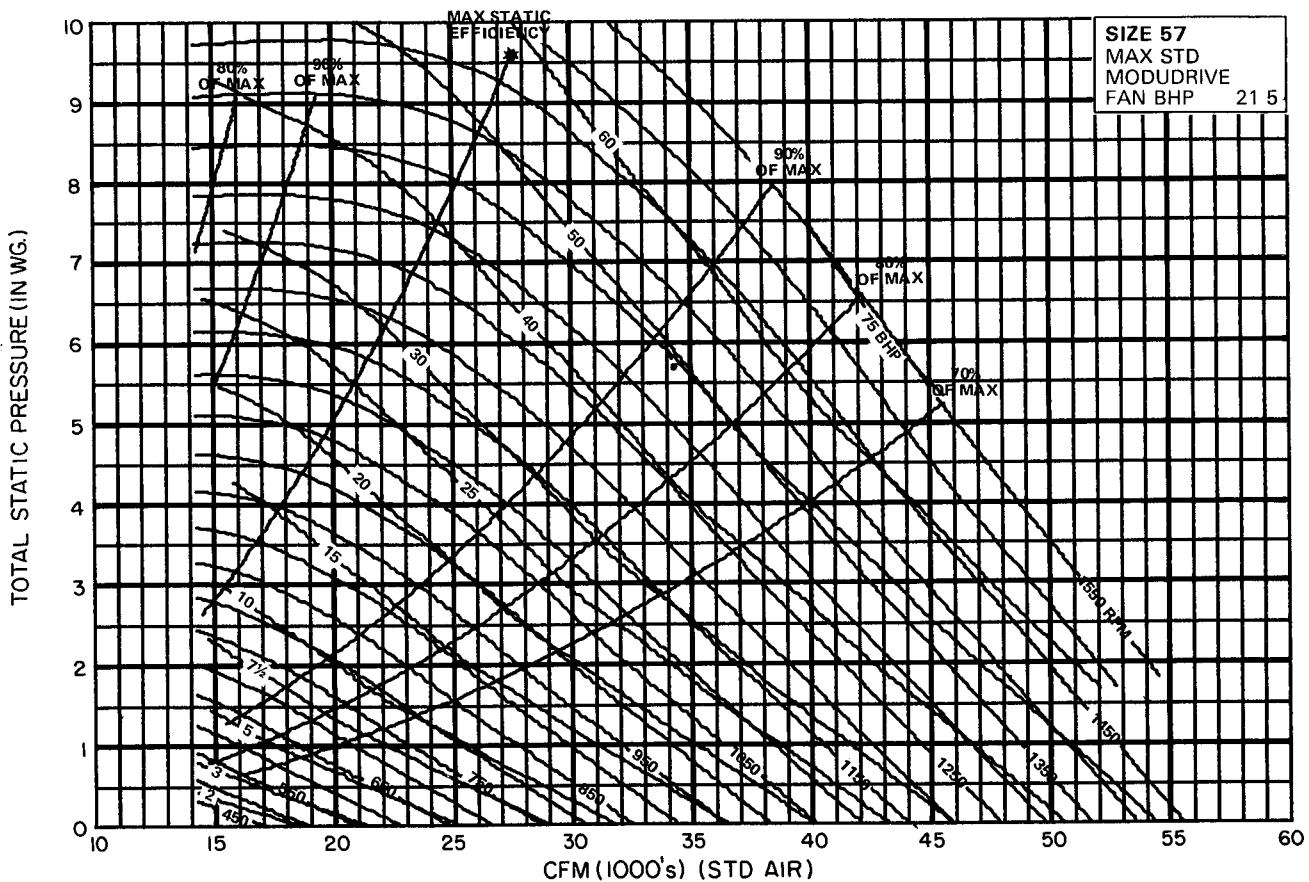
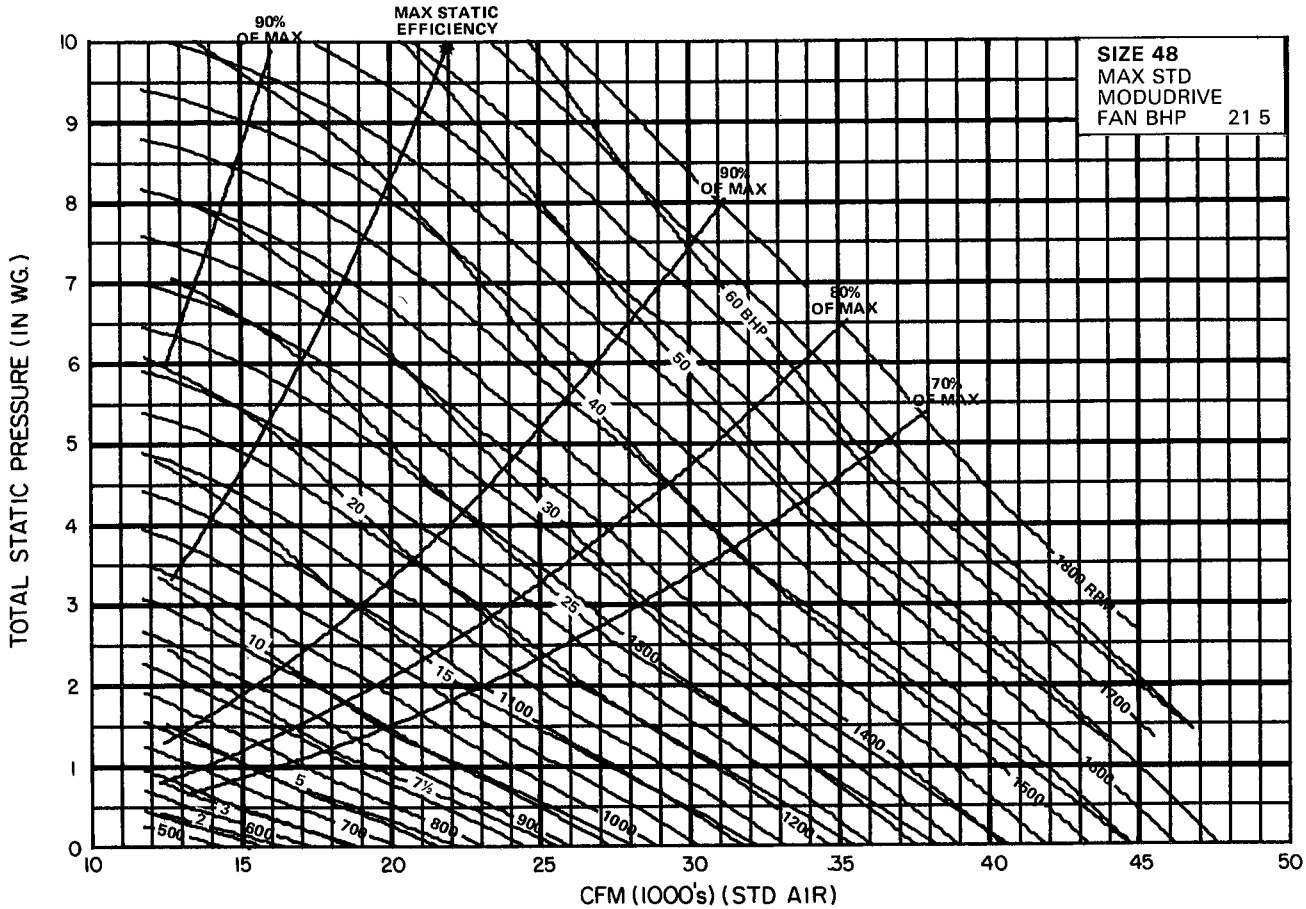


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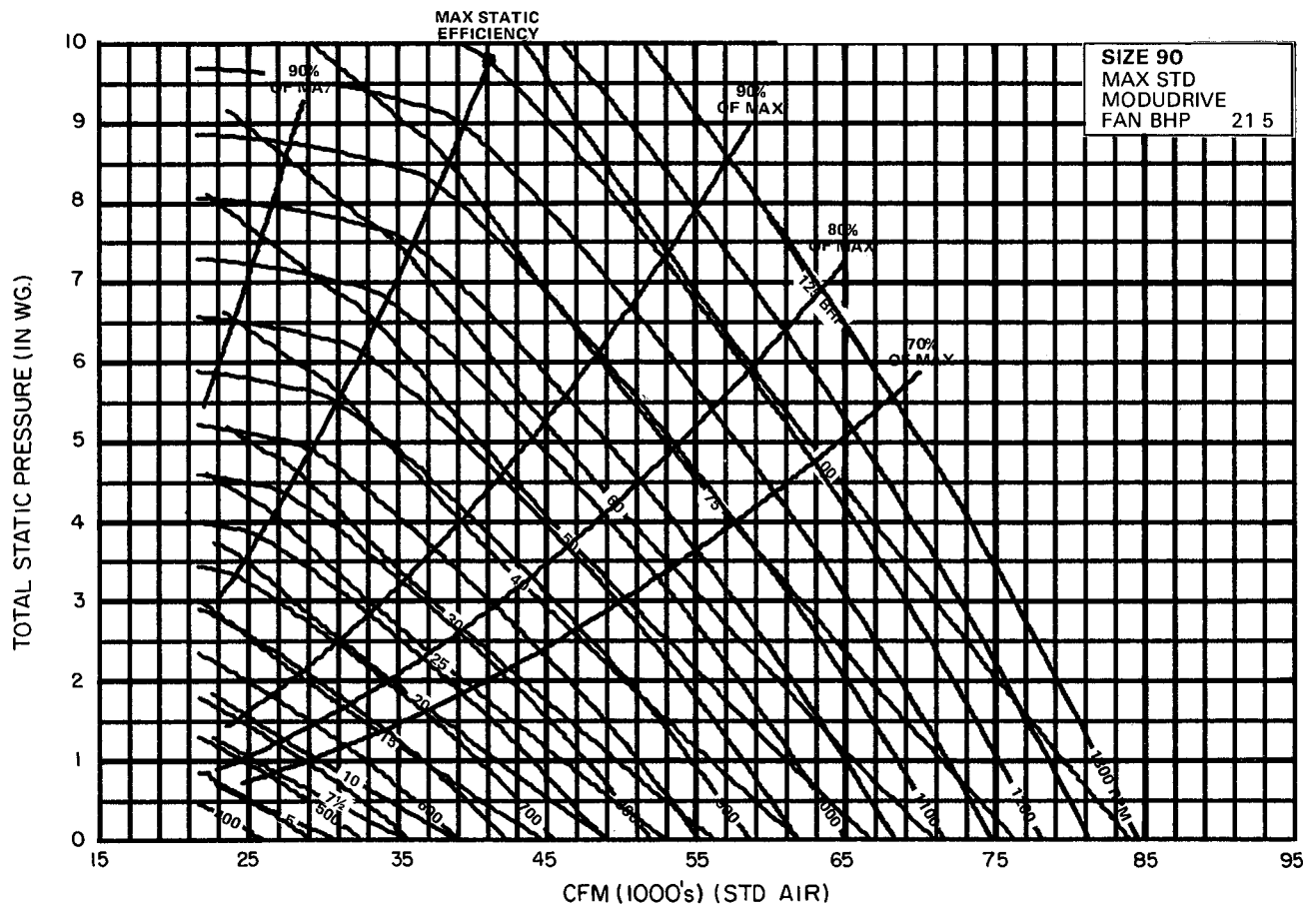
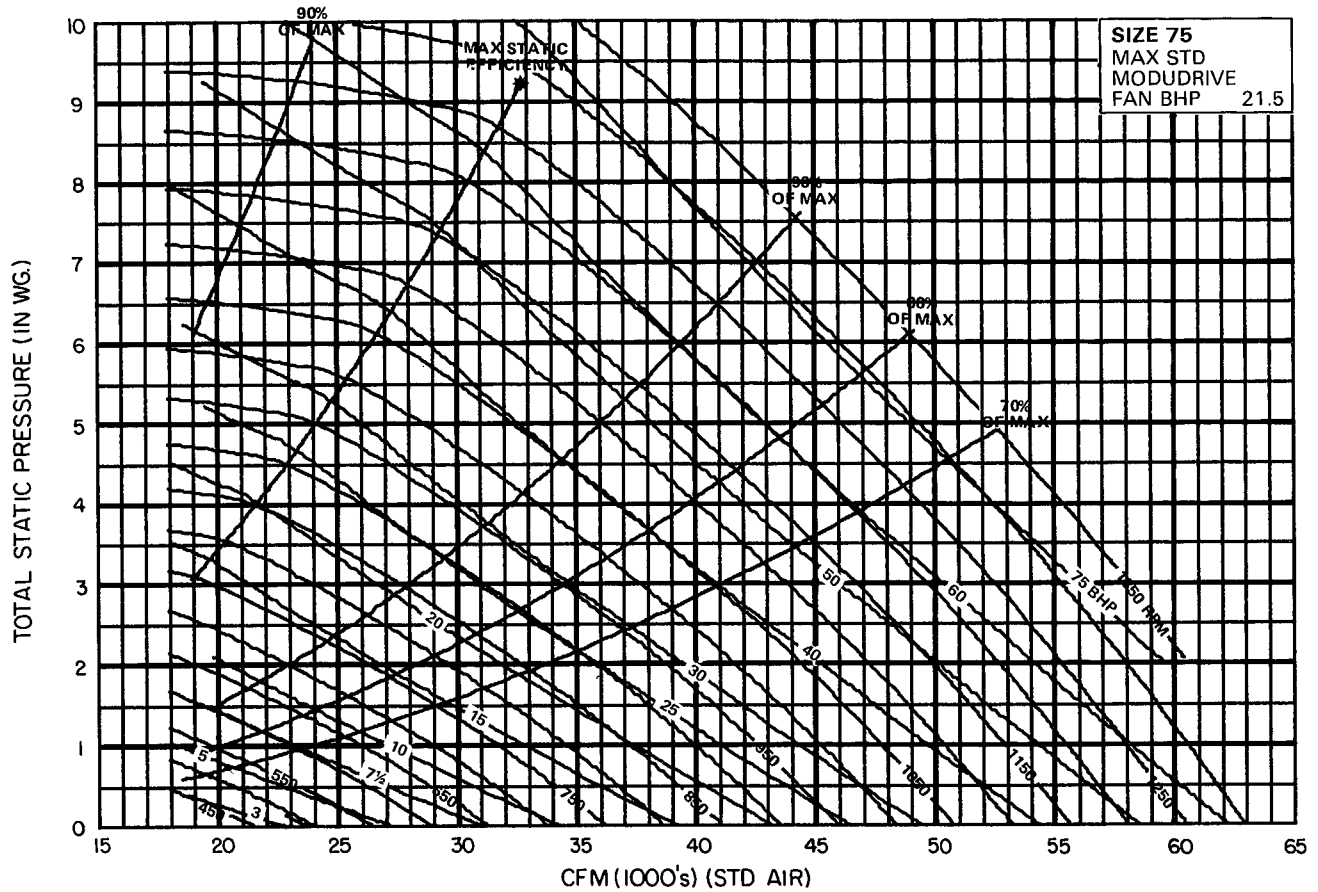


Airfoil fan performance (cont)

39E BLOW-THRU UNITS AND 39ER RETURN-AIR FAN SECTIONS



39E BLOW-THRU UNITS AND 39ER RETURN-AIR FAN SECTIONS



→ Modudrive control system

Control description

Modudrive has two standard control options. Option M1 is an electronic control panel. Option M2 is a control panel designed for pneumatic systems. The M2 panel is equipped with two electro-pneumatic pressure switches.

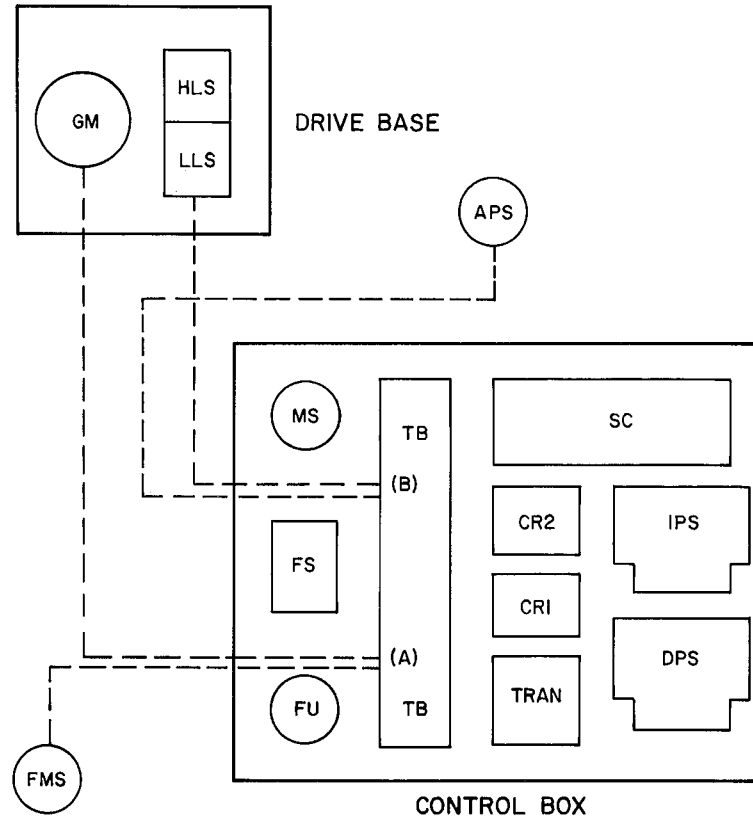
The Modudrive control panel is shipped inside the fan section and must be field mounted and wired. A wiring diagram is included with the control panel. The control panels for M1 and M2 options are identical in external appearance. Both control panels are for indoor installation only unless enclosed in a field-supplied waterproof enclosure.

The M1 electronic control panel uses an ON-NUL-ON duct static pressure switch and accepts a 24-volt signal in the control panel. This pressure switch must be field supplied and may be a Dwyer Model 1640-2, Honeywell P246A or equivalent.

The M2 pneumatic control panel accepts a 3 - 15 psig air signal. The two factory-supplied electro-pneumatic pressure switches replace the electronic ON-NUL-ON switch of the M1 option.

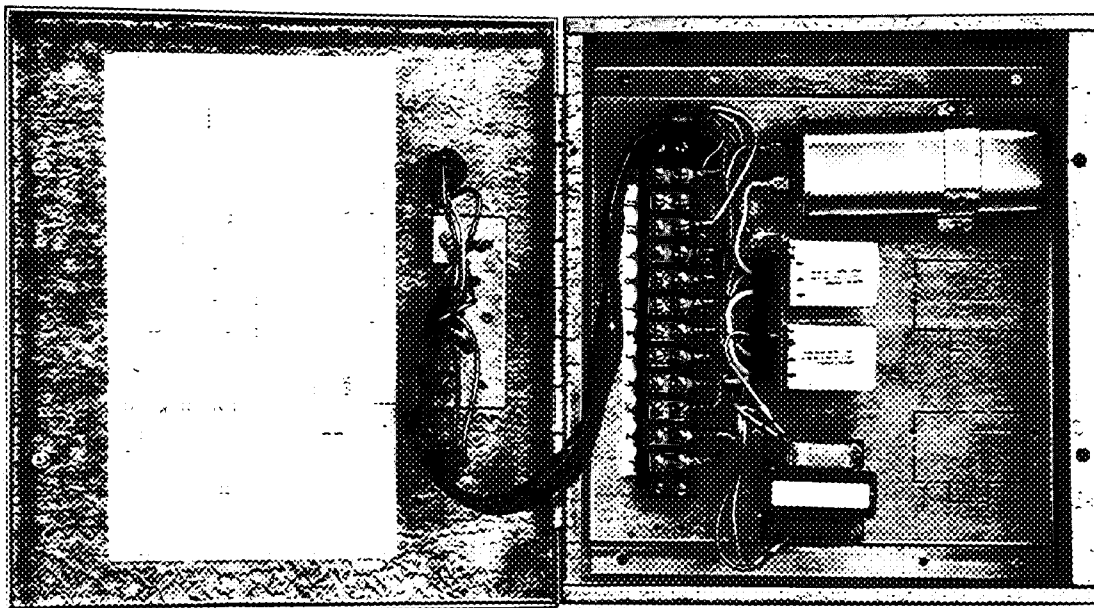
Both control options respond similarly to changes in duct pressure.

Control components



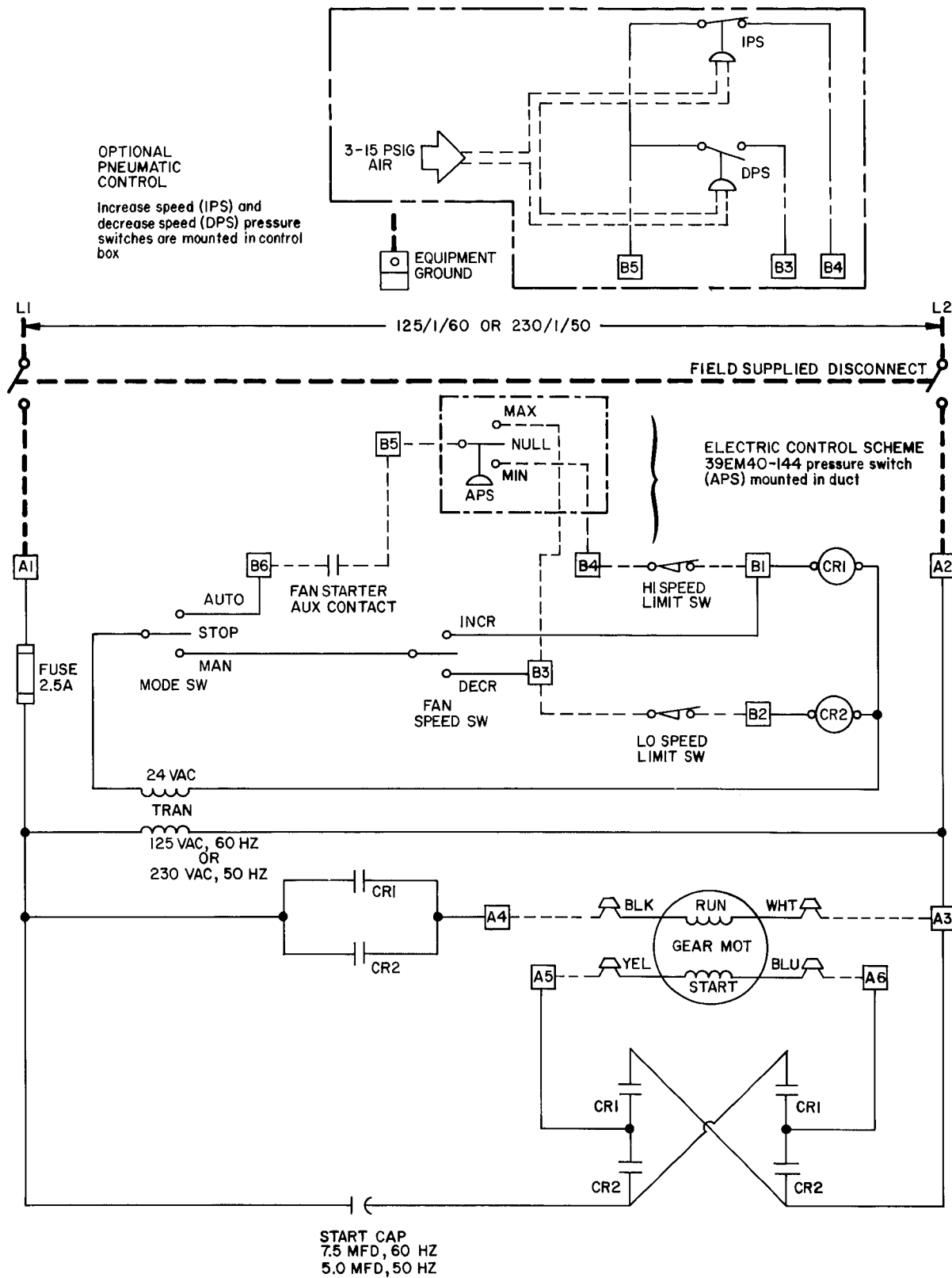
LEGEND

APS — Air Pressure Switch	HLS — High (speed) Limit Switch
CR — Control Relay	IPS — Increase (speed) Pressure Switch (pneumatic control)
DPS — Decrease (speed) Pressure Switch (pneumatic control)	LLS — Low (speed) Limit Switch
FMS — Fan Motor Starter	MS — Mode Switch
FS — Fan (speed) Switch	SC — Start Capacitor
FSAC — Fan Starter Auxiliary Contact	TB — Terminal Block
Fu — Fuse	Tran — Transformer
GM — Gear Motor	



□ PNEUMO-ELECTRIC (P.E.) SWITCH LOCATION FOR PNEUMATIC CONTROL UNITS

→ Control schematic



- APS** — Air Pressure Switch
CR — Control Relay
DPS — Decrease Speed Pressure Switch
IPS — Increase Speed Pressure Switch
CAP. — Capacitor
- Terminal Block Connection (Marked)

LEGEND

- Terminal (Unmarked)
 ⏏ Field Splices
 — Factory Wiring
 - - - Field Control Wiring
 - - - Field Power Wiring

NOTES

- 1 Gear motor is thermally protected
- 2 Use 90°C wire, or equivalent, for replacement wiring
- 3 IPS pressure setpoint OPEN at 8 psig
- 4 DPS pressure setpoint CLOSE at 12 psig

Technical support data

Fan sections are constructed of galvanized steel and have a formed channel base for integral mounting of fan, motor and casing panels. Fan scroll and bearings are mounted on an "A" or "H" frame rigidly secured to the channel base. Entire fan, motor, and drive assembly is internally isolated by nominal 2-in. deflection springs. Internally mounted motor is factory installed. Large hinged door on drive side of unit permits adjustment or removal of fan wheel, motor and drive.

Fan bearings are self-aligning, pillow block, regreaseable, ball types selected for an average life of 200,000 hours at design operating conditions. Fan bearings have a grease line extending to drive side of fan scroll. Shafts are solid steel, turned, ground and polished.

Fan wheels are keyed to the shaft and are designed for continuous operation at the maximum rated fan speed and motor horsepower. Fan wheels and shafts are statically and dynamically balanced as an assembly.

Low- and medium-pressure fans (for total static pressures up to 5-1/2 in. wg) are double width, double inlet type with forward-curved blades. Wheels are bonderized steel, painted with baked-on enamel, or are unpainted mill galvanized steel.

Medium- and high-pressure fans (for total static pressures to 9 in. wg) are double width, double inlet type with backward-curved airfoil blades. Wheels are painted with a zinc-chromate primer and an enamel finish coat.

Motors — Units are supplied with factory-installed motors of either the open drip-proof or totally enclosed fan-cooled type. Factory installed only.

Drives are variable speed, up to 25 horsepower.

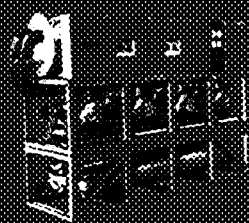
Internal isolation of entire fan, motor, and drive assembly by use of nominal 2-in. deflection springs is standard on sizes 15 thru 90.

Marine light and viewport are standard.

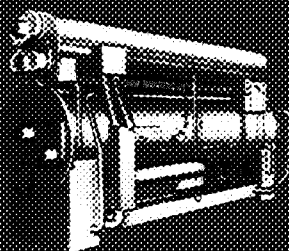
Hinged access door with latching handles is standard on drive side.

Build your system around matched Carrier components

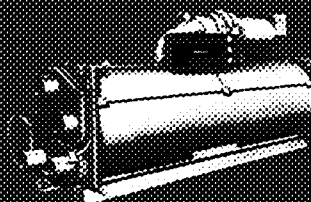
DEPENDABLE REFRIGERATION



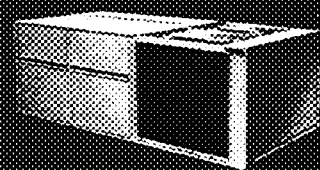
REFRIGERATION



REFRIGERATION



REFRIGERATION

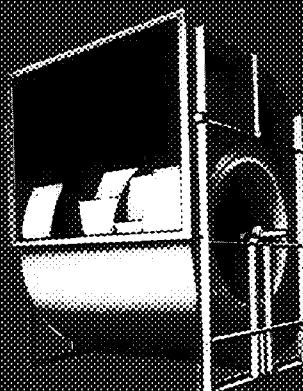


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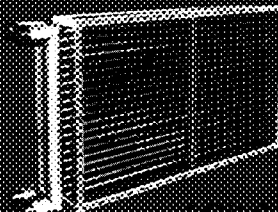
RUGGED AIR HANDLING



AIR HANDLING



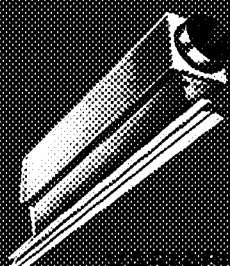
AIR HANDLING



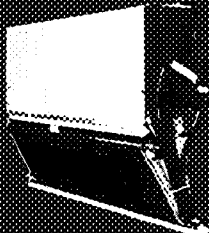
AIR HANDLING



AIR HANDLING



VARIABLE VOLUME

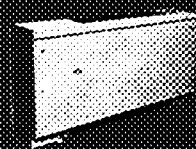


VARIABLE VOLUME

VERSATILE AIR TERMINALS



AIR TERMINALS



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