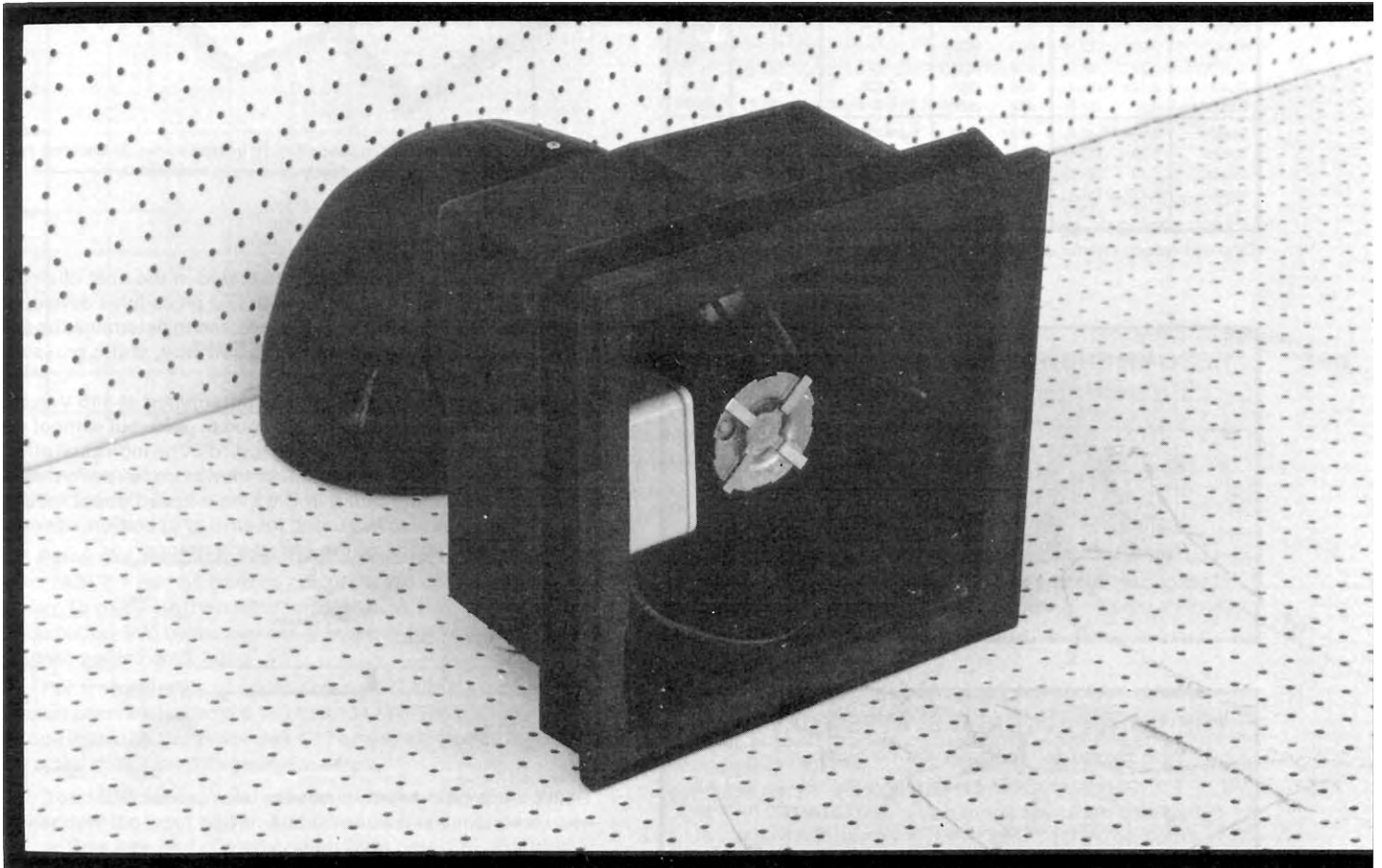


# Evaluation Report

# 481



## Del-Air Model F8 Ventilation Fan

A Co-operative Program Between



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CENTRE



PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

# DEL-AIR MODEL F8 VENTILATION FAN

## MANUFACTURER AND DISTRIBUTOR:

Del-Air Systems Limited  
 P.O. Box 2500  
 Humboldt, Saskatchewan S0K 2A0

## RETAIL PRICE:

\$277.00 (June, 1986, f.o.b. Lethbridge, Alberta).

## SUMMARY OF RESULTS

TABLE 1. Del-Air Model F8 Fan Performance at Typical Levels of Operation.

SETTING	STATIC PRESSURE		AIR FLOW RATE		POWER CONSUMPTION	TOTAL EFFICIENCY	FAN SPEED
	in wg	(Pa)	cfm	(L/s)	kW	%	rpm
Single Speed Direct	0.0	(0.0)	679	(320)	0.130	14	3314
	0.05	(12.5)	662	(312)	0.131	16	3303
	0.10	(24.9)	639	(302)	0.133	17	3284
	0.125	(31.1)	634	(299)	0.132	18	3282
	0.25	(62.3)	582	(275)	0.134	21	3271
Single Speed Direct, Outlet Damper	0.0	(0.0)	600	(283)	0.134	9	3287
	0.05	(12.5)	583	(276)	0.136	11	3282
	0.10	(24.9)	559	(264)	0.135	12	3279
	0.125	(31.1)	559	(264)	0.136	13	3278
	0.25	(62.3)	472	(223)	0.134	15	3287
Single Speed Direct, Intake Louvres	0.0	(0.0)	619	(292)	0.131	10	3288
	0.05	(12.5)	602	(284)	0.133	12	3285
	0.10	(24.9)	581	(274)	0.133	14	3281
	0.125	(31.1)	571	(270)	0.134	14	3279
	0.25	(62.3)	481	(227)	0.129	16	3300

motor mount consists of four steel wire struts bolted to the motor casing and the molded PVC fan housing. The steel guard grill is plastic coated for corrosion protection.

FIGURE 1 shows the location of major components while detailed specifications are given in APPENDIX I.

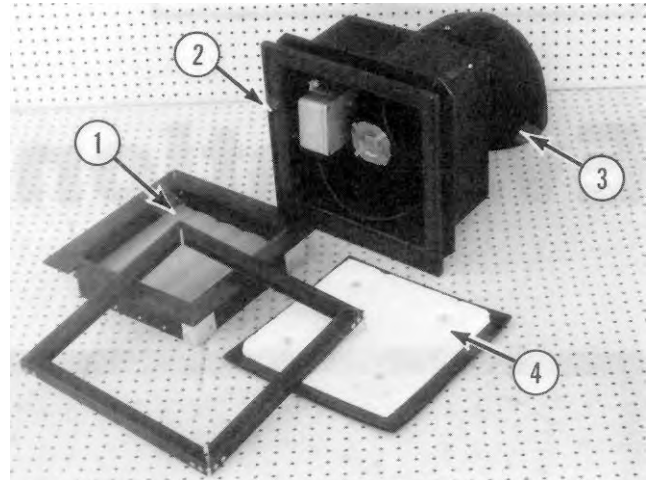


FIGURE 1. Del-Air Model F8 Ventilation Fan: (1) Intake Louvres, (2) Mounting Face Plate, (3) Fan Hood and Outlet Butterfly Damper, (4) Insulated Door.

## SCOPE OF TEST

The Del-Air Model F8 fan was tested in the inlet chamber setup (FIGURE 2) in accordance with test procedures developed by the Machinery Institute. The intent was to determine the performance of the fan in terms of air flow rate, static pressure, input power and total efficiency.

Fan performance was initially determined at 115 V in the single speed direct mode with the hood in place but without the outlet butterfly damper and intake louvres. The individual effect of both the outlet damper and intake louvres on fan performance were then also determined in the single speed direct mode.

The fan was also evaluated for ease of operation, operator safety and suitability of the operator's manual.

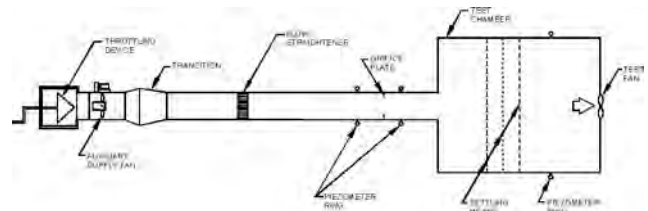


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Setup.

## RESULTS AND DISCUSSION

### FAN PERFORMANCE

All fan performance results in this report are given at standard air<sup>1</sup> conditions so that direct comparisons can be made with other fan test reports. Fan performance under actual operating conditions could differ from these results by up to 10%, depending on such things as temperature, barometric pressure, humidity and elevation above sea level.

**Air Flow Rate:** Air flow rates at typical levels of operation (i.e. static pressure<sup>2</sup>) are given in TABLE 1. Ventilation fans are often rated on their output at a static pressure of 0.125 in wg (31.1 Pa). PAMI's measured flow rate at this same condition was 634 cfm (299 L/s). There was no manufacturer's performance in-

<sup>1</sup>Standard air is air, with a density of 0.075 lbm/ft<sup>3</sup> (1.2 kg/m<sup>3</sup>) which occurs at 68°F (20°C), 50% relative humidity and a barometric pressure of 29.92 in Hg (101.325 kPa).

<sup>2</sup>Static pressure is a measure of the pressure difference between the pressure inside the building and the pressure on the outside of the building. Static pressure is usually expressed in inches of water gauge (in wg) or Pascals (Pa).

## RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying fan performance data over a complete range of static pressures.
2. Supplying a detailed operator's manual containing illustrations and information on general operation, installation, maintenance, rated performance, and trouble shooting.

Manager/Senior Engineer: E. H. Wiens

Project Engineer: K. Shimek

## THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. The manufacturer is considering the revision of all printed material containing fan performance data to include performance of the 5 sizes of Del-Air fans at varying static pressures.
2. The manufacturer, at PAMI's suggestion, is preparing a detailed Operator's Manual to be included with each fan.

## GENERAL DESCRIPTION

The Del-Air Model F8 ventilation fan is an 8 in (203 mm) diameter, single speed, direct drive, propeller type axial flow fan. It is primarily used in livestock and poultry barns as an exhaust fan located in the wall.

The Del-Air Model F8 is a flush mounted unit equipped with an inlet guard grill, mounting face plate, fan hood, optional PVC intake louvres, outlet butterfly damper, and insulated door. The fan hood is an integral part of the fan housing. The 5 blade propeller and hub are made of plastic and are mounted directly on a 1.2 amp, 115 V, single phase, high speed electric motor. The

formation provided. Since building ventilation design is possible over a range of static pressures, it is recommended that, for fan selection purposes, the manufacturer include a table or curve of air flow rates over a complete range of static pressures.

of operation. For example, at a static pressure of 0.125 in wg (31.1 Pa), the louvres reduced the air flow rate by 10%, from 634 to 571 cfm (299 to 270 L/s) (TABLE 1). The efficiency was in turn reduced from 18 to 14%.

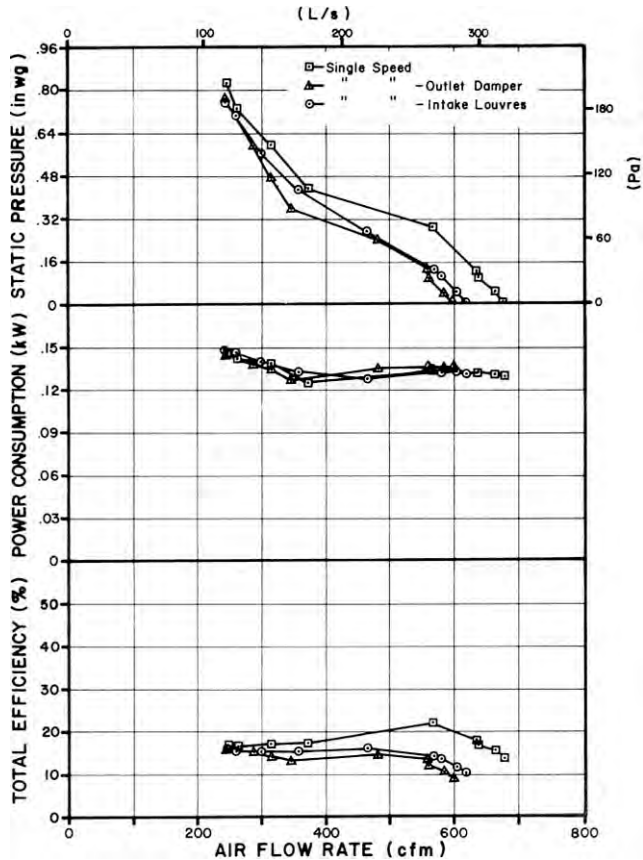


FIGURE 3. Del-Air Model F8 Fan Performance Curves, With and Without the Outlet Damper and Louvres, in the Single Speed Direct Mode.

**Power Consumption:** The power consumption numbers given in TABLE 1 can be used to calculate the cost of operating the fan. To calculate the cost of fan operation, multiply the power consumption (kW) by the number of hours of fan operation times the cost per kilowatt hour.

For typical levels of static pressure (TABLE 1), the power consumption varied from 0.130 to 0.134 kW. The maximum amperage drawn by the motor was 1.12 amps, which was less than the rated motor amperage of 1.2 amps.

**Total Efficiency:** Total efficiency is the ratio of air horsepower over the input power. Air horsepower is dependent upon the air flow rate and corresponding total pressure. For typical levels of operation, the total efficiency (TABLE 1) ranged from 4 to 21%. The total efficiency at a static pressure of 0.125 in wg (31.1 Pa), in the single speed direct mode, was 18%.

**Effect of Outlet Butterfly Damper:** The optional outlet butterfly damper was installed within the fan hood on the outlet side of the fan to determine its effect on fan output. The fan was tested under these conditions in the single speed direct mode only. Using the butterfly damper reduced the air flow rate by 12 to 19% (FIGURE 3) over the typical range of operation. For example, at a static pressure of 0.125 in wg (31.1 Pa), the damper reduced the airflow rate by 12%, from 634 to 559 cfm (299 to 264 L/s) (TABLE 1). The efficiency was in turn reduced from 18 to 13%.

**Effect of Louvres:** The optional intake louvres were installed on the intake side of the fan (FIGURE 4) to determine their effect on fan output. The fan was tested under these conditions in the single speed direct mode only. Using the louvres reduced the air flow rate by 9 to 18% (FIGURE 3) over the typical range

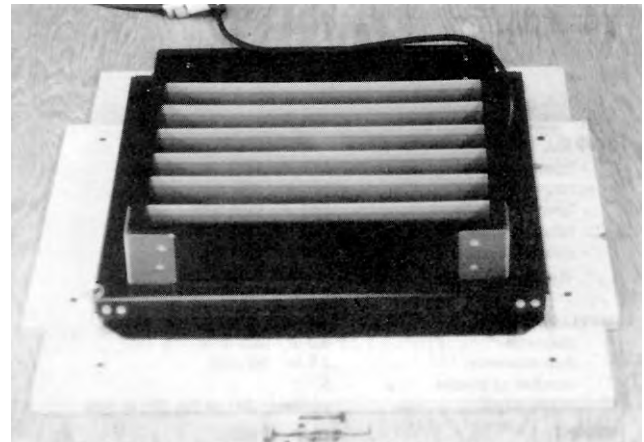


FIGURE 4. Louvres Located on Fan Intake.

### EASE OF OPERATION

**Maintenance:** The inlet guard grill, motor mount and motor could all be easily removed for cleaning. Regularly scheduled cleaning and maintenance will ensure longer motor life and optimum performance.

### OPERATOR SAFETY

The inlet guard grill provided adequate protection from the fan blades. The motor was a totally enclosed unit and presented no safety hazards. The Model F8 was CSA approved.

The noise level of the Model F8, at a distance of 4.9 ft (1.5 m) from the centre of the fan discharge, while operating at a 0.125 in wg (31.1 Pa) static pressure, was 66 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Model F8 falls within range 3 of the PAMI noise level range classification (APPENDIX II). The noise level produced by this fan can be considered annoying and be detrimental to hearing and operator performance under continuous exposure. Ear protection should be considered if working near the fan for prolonged periods.

### OPERATOR'S MANUAL

The operator's instruction sheet contained information on installation of the fan. It is recommended that the manufacturer supply a detailed manual containing illustrations and information on general operation, installation, maintenance, rated performance, safety aspects and trouble shooting.

**APPENDIX I**

**SPECIFICATIONS**

**MAKE:** Del-Air  
**MODEL:** F8  
**SERIAL NUMBER:** EW8-006  
**MANUFACTURER:** Del-Air Systems Limited  
 P.O. Box 2500  
 Humboldt, Saskatchewan  
 S0K 2A0

**OVERALL DIMENSIONS:**  
 housing width 14.2 in (360 mm)  
 housing height 14.2 in (360 mm)  
 housing length 23.4 in (594 mm)  
 housing diameter 8.5 in (216 mm)  
 guard grill diameter 8.6 in (219 mm)  
 grill opening 0.3 in (7 mm) wire spaced at  
 1.1 in (27 mm)

**IMPELLERS:**  
 diameter 8.0 in (203 mm)  
 hub diameter 3.5 in (89 mm)  
 number of blades 5  
 blade angle variable - 34° at tip, 32° at hub

**WEIGHT:** 14 lb (6 kg)

**MOTOR NAMEPLATE DATA:**  
 make Fasco  
 model 7102-1312  
 type U62  
 rpm 3200  
 volts 115V  
 amps 1.2 A  
 cycles 60 Hz

**APPENDIX II**

**NOISE LEVELS**

RANGE	SOUND LEVEL (dBA)	COMMENTS
1	up to 45	Tolerable, low level background noise.
2	45 to 60	Dominating background noise that would interfere with normal conversation.
3	60 to 85	Could be annoying and be detrimental to hearing and operator performance under long-term continuous exposure. Ear protection should be considered.
4	over 85	Could damage hearing, depending on level and exposure time. Ear protection is definitely recommended.

**APPENDIX III**

**CONVERSION TABLE**

cubic feet/minute (cfm) x 0.472 = litres/second (L/s)  
 horsepower (hp) x 745.7 = watts (W)  
 inches (in) x25.4 = millimeters (mm)  
 inches water gauge (in wg) x 249.1 = pascals (Pa)  
 pounds (lb) x 0.45 = kilograms (kg)

**SUMMARY CHART  
 DEL-AIR MODEL F8  
 VENTILATION FAN**

**RETAIL PRICE:** \$277.00  
 (June, 1986, f.o.b. Lethbridge)

**FAN DESCRIPTION:** 8 in (203 mm) propeller fan, single speed, direct drive, 1.2 A, 115 V electric motor

**FAN SPEED:**  
 - single speed direct 3271 to 3314 rpm

**EFFICIENCY RANGE:**  
 - without damper or louvres 14 to 21%  
 - with damper 9 to 15%  
 - with louvres 10 to 16%

**EFFICIENCY AT 0.125 in wg (31.1 Pa):**  
 - without damper or louvres 18%  
 - with damper 13%  
 - with louvres 14%

**AIR FLOW RATE:**  
 - range 472 to 679 cfm (223 to 320 L/s)  
 - at 0.125 in wg (31.1 Pa) 634 cfm (299 L/s) without damper or louvres  
 559 cfm (264 L/s) with damper  
 571 cfm (270 L/s) with louvres

**POWER CONSUMPTION:** 0.130 to 0.134 kW

**OPERATOR SAFETY:** inlet guard provided  
 CSA approved  
 noise level = 66 dB(A) at 4.9 ft (1.5 m) from fan discharge

**OPERATOR'S MANUAL:** installation instructions only.



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