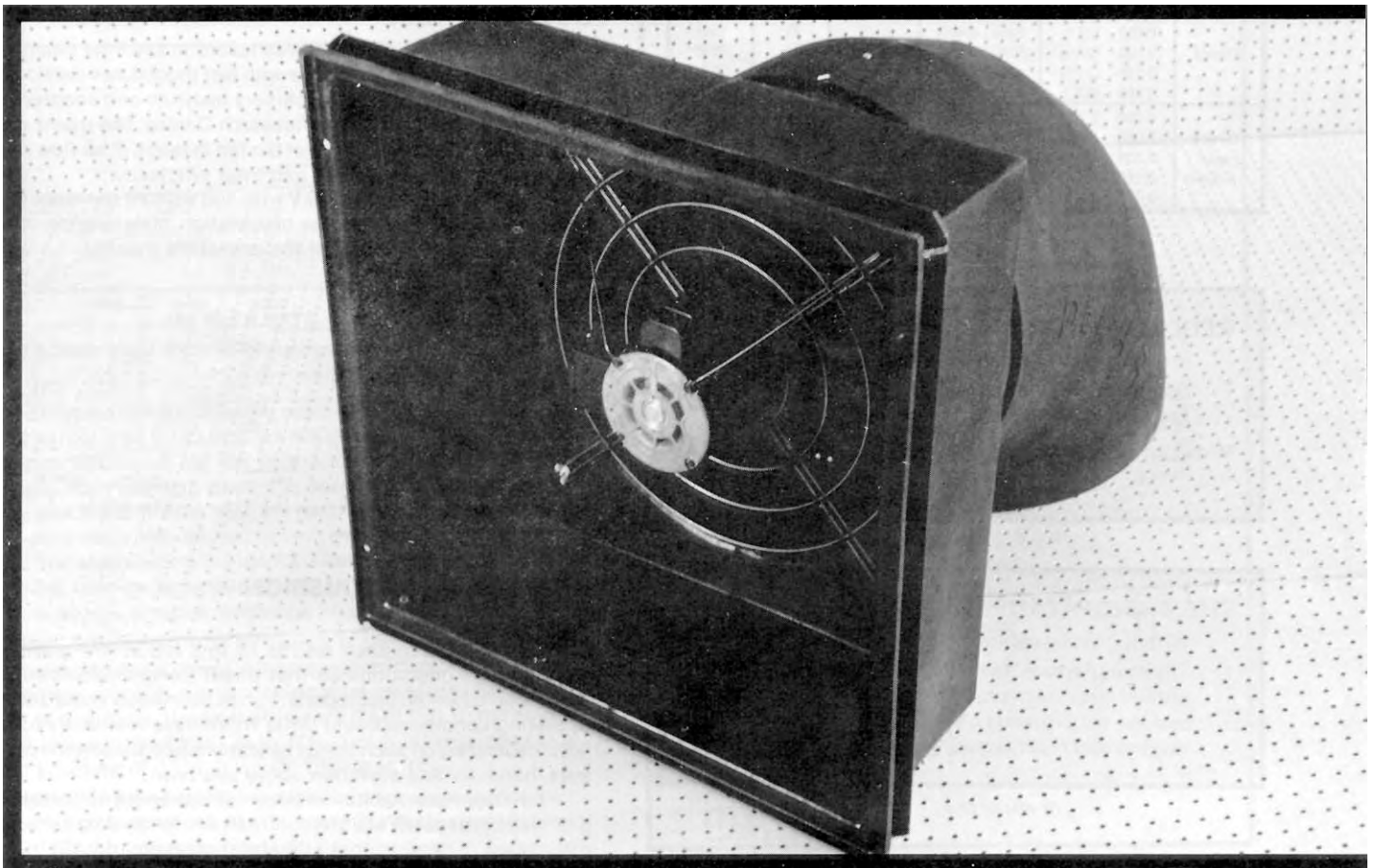


# Evaluation Report

# 608



## Del-Air Model JH-20 Ventilation Fan

A Co-operative Program Between



ALBERTA  
FARM  
MACHINERY  
RESEARCH  
CENTRE

**PAMI**

PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

## DEL-AIR MODEL JH-20 VENTILATION FAN

### MANUFACTURER AND DISTRIBUTOR:

Del-Air Systems Ltd.  
P.O. Box 2500  
1704 Fourth Avenue  
Humboldt, Saskatchewan  
S0K 2A0  
Ph: (306) 682-5011

RETAIL PRICE: \$660.00

(June 1989, f.o.b., Lethbridge, Alberta)

## SUMMARY OF RESULTS

TABLE 1. Del-Air Model JH-20 Fan Performance at Typical Levels of Operation.

SETTING	STATIC PRESSURE		AIR FLOW RATE		INPUT POWER kW	TOTAL EFF. %	FAN SPEED rpm
	in wg	(Pa)	cfm	(L/s)			
Direct	0.000	( 0.0)	5230	(2470)	0.732	30	1593
	0.050	(12.5)	5080	(2400)	0.738	31	1591
	0.100	(24.9)	5000	(2360)	0.744	34	1586
	0.125	(31.1)	4910	(2320)	0.747	34	1584
	0.250	(62.3)	4590	(2170)	0.754	37	1569
Direct with Dampers	0.000	( 0.0)	5060	(2390)	0.707	26	1617
	0.050	(12.5)	4940	(2330)	0.759	28	1611
	0.100	(24.9)	4780	(2250)	0.767	29	1600
	0.125	(31.1)	4710	(2220)	0.767	30	1597
	0.250	(62.3)	4300	(2030)	0.765	32	1585

## RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying fan performance data over a complete range of static pressures.

Manager: R. P. Atkins

Project Engineer: Robert Maze

## 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 Del-Air J series fans at varying static pressures.

## GENERAL DESCRIPTION

The Del-Air Model JH-20 ventilation fan is a 19.5 in (495 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 JH-20 ventilation fan is a flush-mounted unit equipped with an inlet guard grill, optional inlet louvres, a mounting face plate, integral fan shroud, outlet dampers and an insulating door. The 6-blade polypropylene propeller and aluminum hub are mounted directly on a 0.63 hp (466 kW), single phase, 115/230 V electric motor. The motor mount is integral with the wire inlet guard grill and is bolted to the motor and the fan housing.

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

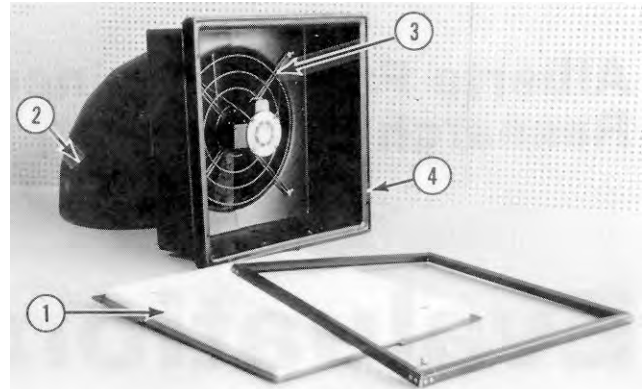


FIGURE 1. Del-Air Model JH-20 Ventilation Fan: (1) Insulating Door, (2) Outlet Damper, (3) Inlet Guard Grill, (4) Mounting Face Plate.

## SCOPE OF TEST

The Del-Air Model JH-20 was tested in the inlet chamber set-up (FIGURE 2) in accordance with test procedures developed by the Prairie Agricultural Machinery Institute and adopted by the Alberta Farm Machinery Research Centre. The intent was to determine the performance of the fan in terms of air flow rate, static pressure, input power and total efficiency.

The fan was tested at 230 V with and without dampers. The fan was also evaluated for ease of operation, maintenance, operator safety and suitability of the operator's manual.

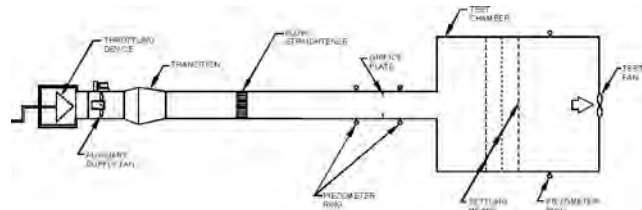


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Set-Up.

## 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). The Alberta Farm Machinery Research Centre's measured flow rate at these conditions was 4910 cfm (2320 L/s). There was no manufacturer's performance information provided. Since building ventilation design is possible over a range of static pressures, it is recommended that, for fan selection purposes, the manufacturer consider supplying a table or curve of air flow rates over a complete range of static pressures.

**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.

<sup>1</sup>Standard air is air with a density of 0.0751 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).

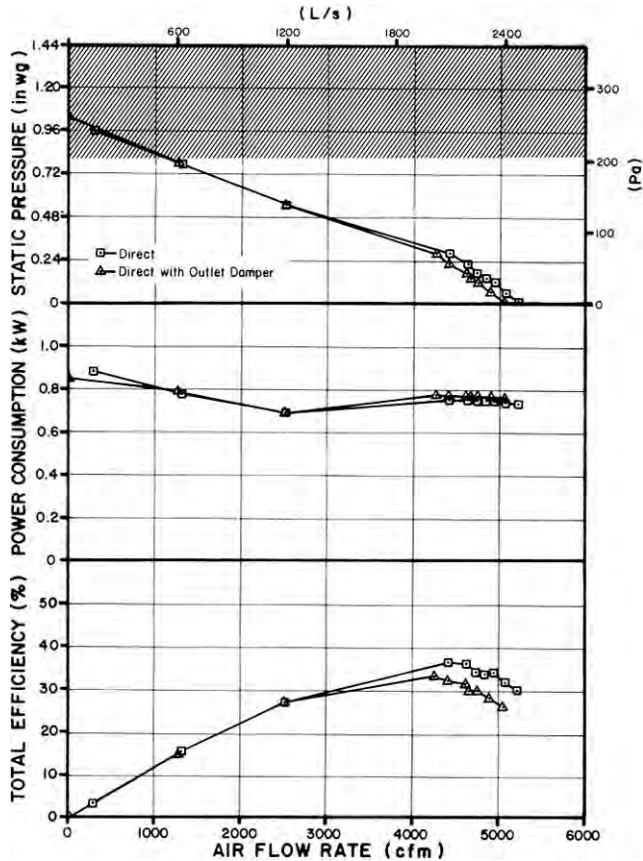


FIGURE 3. Del-Air Model JH-20 Fan Performance Curves.

For typical levels of static pressure (TABLE 1), the input power varied from 0.732 to 0.754 kW in the single speed mode and from 0.707 to 0.767 kW in the single speed mode with dampers. The maximum amperage drawn by the motor was 3.71 amps, which was greater than the rated motor amperage of 3.00 amps plus the  $\pm 10\%$  allowable limit established by CSA Standards. The shaded zone in FIGURE 3 illustrates operation levels where the rated motor amperage was exceeded. Prolonged operation in excess of rated amperage could reduce motor life.

**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), in the single speed mode, ranged from 30 to 37%. The total efficiency at a static pressure of 0.125 in wg (31.1 Pa) was 34%.

**Effect of Dampers:** The optional dampers were installed on the outlet side of the fan to determine their effect on fan output. The fan was tested under these conditions in the single speed mode only. Using the dampers reduced the air flow rate by 3 to 6% (FIGURE 3) over the typical range of operation. For example, at a static pressure of 0.125 in wg (31.1 Pa), the dampers reduced the air flow rate by 4% from 4909 cfm (2317 L/s) to 4712 cfm (2223 L/s) (TABLE 1). The efficiency was in turn reduced from 34 to 30%. The use of other control devices such as shutters, screens and hoods would also reduce air flow rates by varying amounts. The use of such control devices have to be taken into consideration when designing a ventilation system.

#### EASE OF OPERATION

**Maintenance:** The operator's manual advised a routine cleaning program to remove dust and dirt build-up and yearly check of the free movement of the fan if it had been idle for long periods. The inlet louvres were easily removed, which made for easy access to clean the fan blades and housing.

#### 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 Del-Air Model JH-20 was CSA approved.

The noise level of the Del-Air Model JH-20 at a distance of 4.9 ft (1.5 m) from the centre of the fan inlet, while operating at a 0.125 in wg (31.1 Pa) static pressure, was 81 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Del-Air Model JH-20 falls within range 3 of the Alberta Farm Machinery Research Centre's 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 manual provided detailed information on installation, maintenance and troubleshooting.

#### APPENDIX I

##### SPECIFICATIONS

<b>MAKE:</b>	Del-Air
<b>MODEL:</b>	JH-20
<b>SERIAL NUMBER:</b>	PAMI-4
<b>MANUFACTURER:</b>	Del-Air Systems Ltd. P.O. Box 2500 1704 Fourth Avenue Humboldt, Saskatchewan S0K 2A0

##### OVERALL DIMENSIONS:

- housing width	28.0 in (711 mm)
- housing depth (motor included)	41.5 in (1054 mm)
- housing height	28.0 in (711 mm)
- discharge opening	19.75 in (502 mm)
- guard grill diameter	20.25 in (514 mm)
- grill opening	0.25 in (6 mm) dia. wire spaced at 2.0 in (51 mm)

##### IMPELLER:

- diameter	19.5 in (495 mm)
- hub diameter	3.75 in (95 mm)
- number of blades	6
- blade angle	Hub 41°, Tip 21°

##### WEIGHT:

52 lb (23 kg)

##### MOTOR NAMEPLATE DATA:

make	FASCO
model	7124-0807
class	B
type	V24B1
rpm	1650
ambient temperature rise	40°C
volts	115/230
amps	6.0/3.0
phase	1
cycles	60
horsepower	0.63 hp (466 W)

#### APPENDIX II

##### NOISE LEVELS RANGES

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.

# SUMMARY CHART

## DEL-AIR MODEL JH-20

### VENTILATION FAN

<b>RETAIL PRICE:</b>	\$660.00 (June 1989, f.o.b. Lethbridge)
<b>FAN DESCRIPTION:</b>	19.50 in (495 mm) propeller fan, single speed, direct drive, 0.63 hp (466 W), 115/230 V electric motor.
<b>FAN PERFORMANCE:</b>	
<b>Air Flow Rate:</b>	
range	4300 to 5230 cfm (2030 to 2470 L/s)
at 0.125 in wg (31.1 Pa)	4910 cfm (2320 L/s) without dampers 4710 cfm (2220 L/s) with dampers
<b>Power Consumption:</b>	0.707 to 0.767 kW
<b>Efficiency Range:</b>	
without louvres	30 to 37%
with dampers	26 to 32%
<b>Efficiency at 0.125 in wg (31.1 Pa):</b>	
without dampers	34 %
with dampers	30%
<b>OPERATOR SAFETY:</b>	Inlet guard provided CSA approved noise level = 81 dB(A) at 4.9 ft (1.5 m) from fan inlet
<b>OPERATOR'S MANUAL:</b>	Good, provided information on installation, maintenance and troubleshooting.



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