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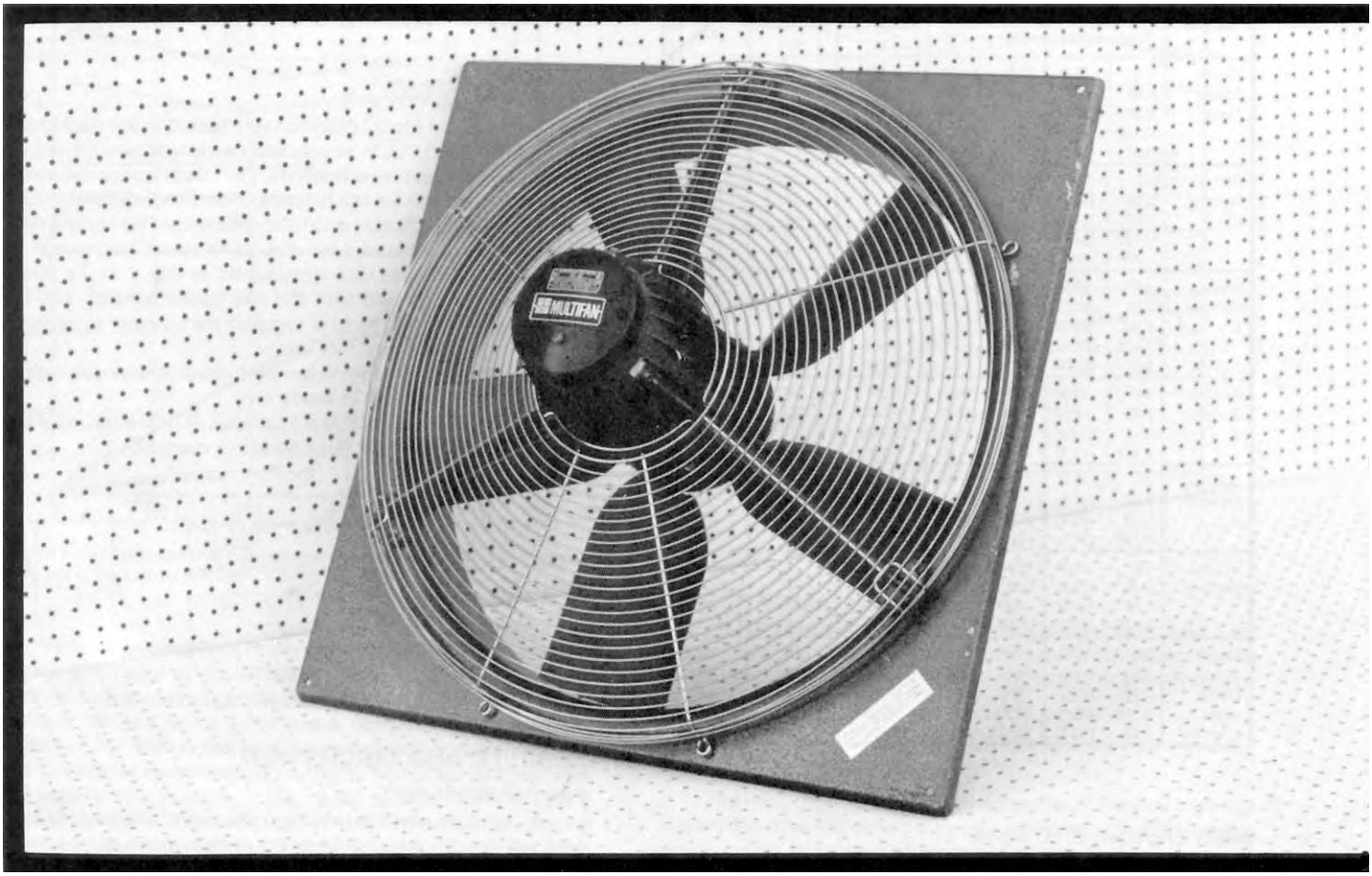

Multifan Model 6E63 Ventilation Fan

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE

PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

MULTIFAN MODEL 6E63 VENTILATION FAN

MANUFACTURER:

A. Vostermans BV
P.O. Box 366-5900 AJ
Venlo, Holland

DISTRIBUTOR:

Godro Equipment Inc.
P.O. Box 280
Roxton Pond, Quebec
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RETAIL PRICE:

$392.00 (November, 1985, f.o.b. Roxton Pond, Quebec).

SUMMARY OF RESULTS

TABLE 1. Multifan Model 6E63 Fan Performance at Typical Levels of Operation

SETTING	STATIC PRESSURE in wg	(Pa)	AIR FLOW RATE cfm	(L/s)	POWER CONSUMPTION kWh	TOTAL EFFICIENCY %	FAN SPEED rpm
Single	0.0	(0.0)	7340	(3470)	0.709	35	1095
Speed	0.05	(12.5)	7160	(3380)	0.723	38	1091
Direct	0.10	(24.9)	6970	(3290)	0.727	40	1088
	0.125	(31.1)	6900	(3260)	0.741	42	1085
	0.25	(62.3)	6450	(3040)	0.767	47	1076
Setting	0.0	(0.0)	7340	(3460)	0.703	35	1095
Number	0.05	(12.5)	7140	(3370)	0.721	37	1091
5	0.10	(24.9)	6980	(3300)	0.736	40	1088
	0.125	(31.1)	6890	(3250)	0.741	41	1084
	0.25	(62.3)	6420	(3030)	0.763	46	1072
Setting	0.0	(0.0)	6750	(3190)	0.589	33	1001
Number	0.05	(12.5)	6460	(3050)	0.601	34	989
4	0.10	(24.9)	6210	(2930)	0.611	36	975
	0.125	(31.1)	6080	(2870)	0.609	38	973
	0.25	(62.3)	5430	(2560)	0.634	41	939
Setting	0.0	(0.0)	3970	(1880)	0.357	11	585
Number	0.05	(12.5)	3460	(1640)	0.358	13	557
3	0.10	(24.9)	2680	(1260)	0.353	12	529
	0.125	(31.1)	2410	(1140)	0.365	12	538
Setting	0.0	(0.0)	2920	(1380)	0.227	7	430
Number	0.05	(12.5)	2090	(985)	0.221	8	387
2	0.10	(24.9)	692	(327)	0.222	4	386
	0.125	(31.1)	228	(108)	0.228	2	333
Setting	0.0	(0.0)	2890	(1360)	0.223	7	424
Number	0.05	(12.5)	2020	(955)	0.223	8	382
1	0.10	(24.9)	630	(297)	0.227	3	388
	0.125	(31.1)	280	(132)	0.231	2	346
Single	0.0	(0.0)	7080	(3340)	0.733	30	1095
Speed	0.05	(12.5)	6850	(3230)	0.746	32	1088
Direct	0.10	(24.9)	6580	(3110)	0.755	34	1083
with	0.125	(31.1)	6490	(3070)	0.759	35	1077
Louvres	0.25	(62.3)	5950	(2810)	0.795	39	1078

Senior Engineer: E. H. Wiens

Project Engineer: R. P. Atkins

GENERAL DESCRIPTION

The Multifan Model 6E63 ventilation fan is a 24.9 in (633 mm) diameter variable 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 or ceiling.

The Multifan Model 6E63 is a flush mounted unit equipped with an inlet guard grill and a mounting face plate. Optional features include PVC louvres, a five speed control, a two speed control, a single speed control and a thermostatic control. The five polypropylene blades are attached to a nylon reinforced hub. The propeller is directly mounted to a 0.80 hp (600 W), single phase, 220 V, electric motor. The motor is suspended by three tapered supports bolted directly to the motor casing and fan housing. The cast aluminum housing, motor casing and motor supports are coated with a lacquer finish for corrosion protection.

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

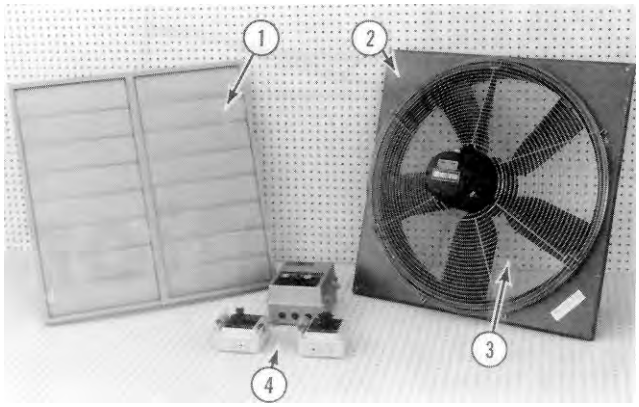

FIGURE 1. Multifan Model 6E63 Ventilation Fan: (1) Optional Louvres, (2) Mounting Face Plate, (3) Inlet Guard Grill, (4) Speed Controls.

SCOPE OF TEST

The Multifan Model 6E63 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, power consumption and total efficiency. The control units were not evaluated and were only used to set fan speed.

Fan performance was determined at 230 V in the single speed direct mode and with the five speed control. The five speed control consisted of a stepped transformer to regulate the speed at predetermined levels.

The effect of louvres on fan performance was determined in the single speed direct mode only.

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

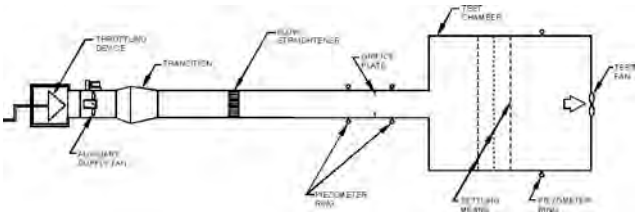

FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Setup.

RESULTS AND DISCUSSION

FAN PERFORMANCE

All fan performance results in this report are given at standard air[1] 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: Fan output in the single speed direct mode and at the number 5 setting on the five speed control were similar (FIGURE 3). Reducing the fan speed, greatly reduced the air flow rate for a given static pressure[2]. For example, at a static pressure of 0.125 in wg (31.1 Pa), reducing the speed control setting from number5 to settings number 4, 3, 2 and 1 reduced the air flow rate from 6890 cfm (3250 L/s) to 6080 cfm (2870 LJs), 2680 cfm (1260 L/s), 228 cfm (108 L/s) and 280 cfm (132 L/s) respectively.

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

[2]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).

Air flow rates at typical levels of operation (i.e. static pressure) 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 manufacturer's rated air flow rate at 0.125 in wg (31.1 Pa), in the single speed direct mode, was 7000 cfm (3300 L/s). PAMI's measured flow rate at the same conditions was 6890 cfm (3260 L/s) or 2% less than the manufacturer's rating.

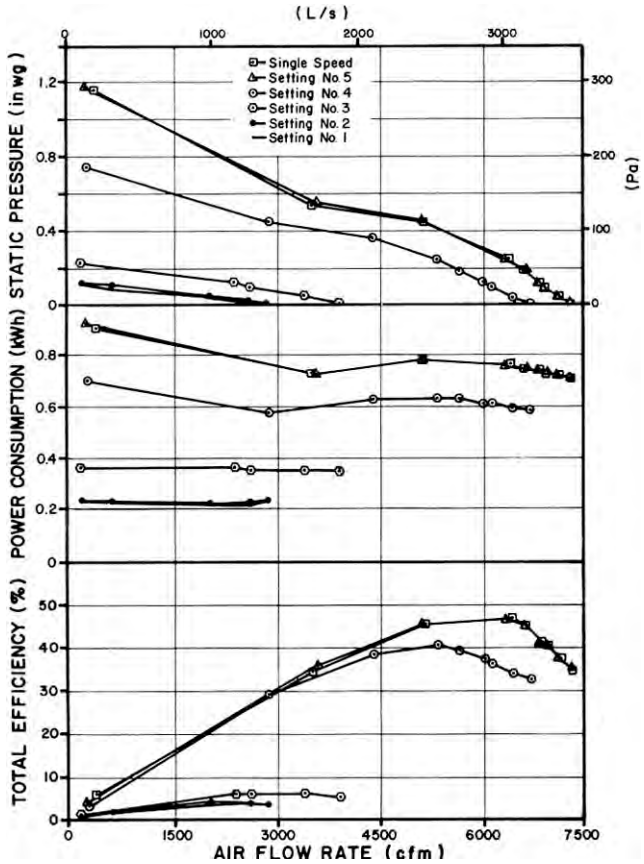

FIGURE 3. Multifan Model 6E63 Fan Performance Curves in the Single Speed Direct Mode and at Five Speed Settings.

Power Consumption: Power consumption is the amount of energy (kWh) used by the fan motor. These numbers can be used directly to determine fan operating costs. Fdr typical levels of static pressure (TABLE 1), the power consumption varied from 0.709 to 0.767 kWh, in the single speed direct mode, from 0.703 to 0.763 kWh at speed setting number 5, from 0.589 to 0.634 kWh at speed setting number 4, from 0.353 to 0.365 kWh at speed setting number 3, and from 0.221 to 0.228 kWh at speed setting number 2, and from 0.223 to 0.231 kWh at speed setting number 1. The maximum amperage drawn by the motor was 3.5 amps, which was less than the rated motor amperage of 4.0 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, when using the five speed control, the total efficiency (TABLE 1) ranged from 35 to 46% at speed setting number 5, 33 to 41% at speed setting number 4, 11 to 13% at speed setting number 3, and 2 to 8% at speed setting number 2 and number 1. The total efficiency in the single speed direct mode at a static pressure of 0.125 in wg (31.1 Pa) was 42%.

Effect of Louvres: The optional louvres 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 direct mode only. Using the louvres reduced the air flow rate by 4 to 8% (FIGURE 4) over the typical range of operation. For example, at a static pressure of 0.125 in wg (31.1 Pa), the louvres reduced the air flow rate by 6%, from 6900 cfm (3260 L/s) to 6490 cfm (3070 L/s) (TABLE 1). The efficiency was in turn reduced from 42 to 35%. The use of other control devices such as shutters, dampers, 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.

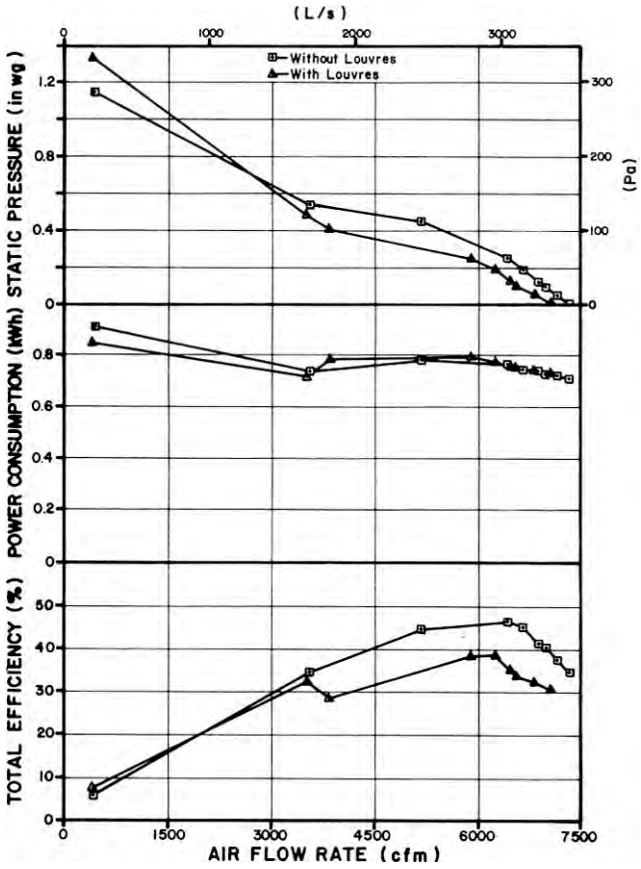

FIGURE 4. Effect of Louvres on Fan Performance.

EASE OF OPERATION

Maintenance: The inlet guard grill was easily removed. This made for easy access to clean the housing and fan blades. 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 6E63 was CSA approved.

The noise level of the model 6E63, 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 75 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The model 6E63 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 manual consisted of a series of booklets and information sheets on the general operation, installation, maintenance, specifications, rated performance and trouble shooting of the Multifan and its controls.

APPENDIX I

SPECIFICATIONS

MAKE:	Multifan
MODEL:	6E63
MANUFACTURER:	A. Vostermans BV P.O. Box 366-5900 AJ Venlo, Holland
OVERALL DIMENSIONS:	
- housing width	29.0 in (737 mm)
- housing height	29.0 in (737 mm)
- housing depth (motor included)	13.6 in (346 mm)
- housing diameter	25.1 in (637 mm)
- guard grill diameter	27.7 in (703 mm)
- grill opening	0.13 in (3 mm) diameter wire spaced at 0,4 in (14 mm) in a circular pattern
PROPELLER:	
- diameter	24.9 in (633 mm)
- number of blades	5
- blade angle	variable - 24° at the tip, 31° at the hub
WEIGHT:	35 lb (29 kg)
MOTOR NAMEPLATE DATA:	
make	Multifan
model	IP55
class	E
type	TP
rpm	1050
ambient temperature rise	40°C
volts	220 V
amps	4A
phase	single
cycles	60 Hz
horsepower	0.80 hp (600 W)

APPENDIX II

NOISE LEVEL 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.

APPENDIX III

CONVERSION TABLE

cubic feet/minute (cfm) x 0.472	= litres/second (L/s)
horsepower (hp) x 745.7	= watts (W)
inches (in) x 25.4	= millimetres (mm)
inches water gauge (in wg) x 249.1	= pascals (Pa)
pounds (lb) x 0.45	= kilograms (kg)

SUMMARY CHART
MULTIFAN MODEL 6E63
VENTILATION FAN

RETAIL PRICE:	$392.00 (November, 1985, f.o.b. Roxton Pond)
FAN DESCRIPTION:	24.9 in (633 mm) propeller fan, variable speed, direct drive, 0.80 hp (600 W) 220 V electric motor.
FAN SPEED:	
- single speed direct	1076 to 1095 rpm
- 5 speed setting	333 to 1095 rpm
EFFICIENCY RANGE:	
- without louvres	35 to 47%
- with louvres	30 to 39%
EFFICIENCY AT 0.125 in wg (31.1 Pa):	
- without louvres	42%
- with louvres	35%
AIR FLOW RATE:	
- range	228 to 7340 cfm (108 to 3470 L/s)
- at 0.125 in wg (31.1 Pa)	6900 cfm (3260 L/s) without louvres and 6490 cfm (3070 L/s) with louvres
POWER CONSUMPTION:	0.223 to 0.795 kWh
OPERATOR SAFETY:	inlet guard provided CSA approved noise level = 75 dB(A) at 4.9 ft (1.5 m) from fan discharge
OPERATOR'S MANUAL:	adequate

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