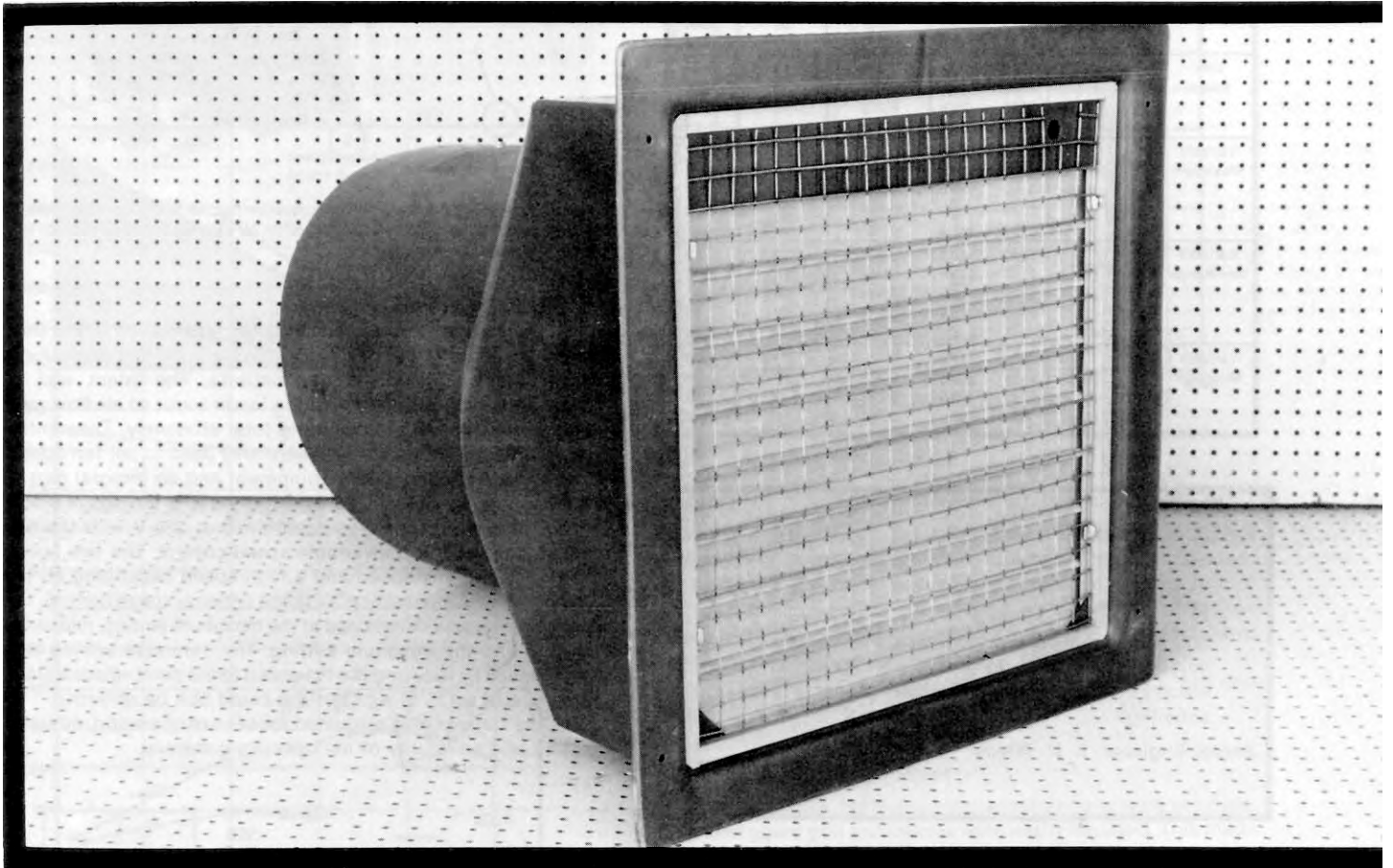


Evaluation Report

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Prairie Pride Model TR18 Ventilation Fan

A Co-operative Program Between



PRAIRIE PRIDE MODEL TR18 VENTILATION FAN

MANUFACTURER & DISTRIBUTOR:

Prairie Pride Enterprises Ltd.
P.O. Box 25
Sanford, Manitoba
R0G 2J0

RETAIL PRICE:

\$450.00 (February, 1985, f.o.b. Lethbridge, Alberta)

SUMMARY OF RESULTS

TABLE 1. Prairie Pride Model TR18 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
High Speed	0	(0)	3730	(1760)	0.413	24	1641
	0.05	(12.5)	3560	(1680)	0.413	26	1643
	0.10	(24.9)	3380	(1600)	0.410	28	1645
	0.125	(31.1)	3280	(1550)	0.407	28	1646
Low Speed	0	(0)	2610	(1230)	0.259	13	1209
	0.05	(12.5)	2370	(1120)	0.255	15	1217
	0.10	(24.9)	2020	(953)	0.252	16	1236
	0.125	(31.1)	1760	(828)	0.245	15	1268
Variable Maximum	0	(0)	3530	(1670)	0.395	22	1574
	0.05	(12.5)	3390	(1600)	0.394	24	1576
	0.10	(24.9)	3150	(1490)	0.389	26	1581
	0.125	(31.1)	3070	(1450)	0.390	26	1580
Variable Mid Range	0	(0)	2990	(1410)	0.338	14	1340
	0.05	(12.5)	2730	(1290)	0.340	17	1342
	0.10	(24.9)	2520	(1190)	0.336	18	1355
	0.125	(31.1)	2360	(1110)	0.333	18	1363
Variable Minimum	0	(0)	957	(452)	0.352	8	1296
	0	(0)	2270	(1070)	0.275	7	1050
	0.05	(12.5)	1854	(875)	0.273	8	1074
	0.10	(24.9)	1170	(552)	0.272	6	1080
	0.125	(31.1)	652	(308)	0.282	3	947

RECOMMENDATIONS

It is recommended that the manufacturer consider:

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

Supplying more detailed operating instructions containing illustrations and information on general operation, installation, maintenance, safety aspects and trouble shooting.

Senior Engineer: E. H. Wiens

Project Engineer: R. P. Atkins

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Fan performance data will be provided in the future.
2. A full set of wiring diagrams, service centre locations, and installation and maintenance data will be provided with each fan.

GENERAL DESCRIPTION

The Prairie Pride model TR18 ventilation fan is a 18.25 in (464 mm) diameter, two speed or 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.

The Prairie Pride fan is a flush mounted unit equipped with an inlet guard grill, inlet louvres, a mounting face plate, chromed outlet guard grill, optional two speed control and optional

modulating fan speed control. The three polypropylene blades and aluminum hub are mounted directly on the 0.33 hp (246 W), single phase, 115/230 V electric motor. The housing is constructed of molded polyethylene. The motor mount consists of a chromed wire cage.

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

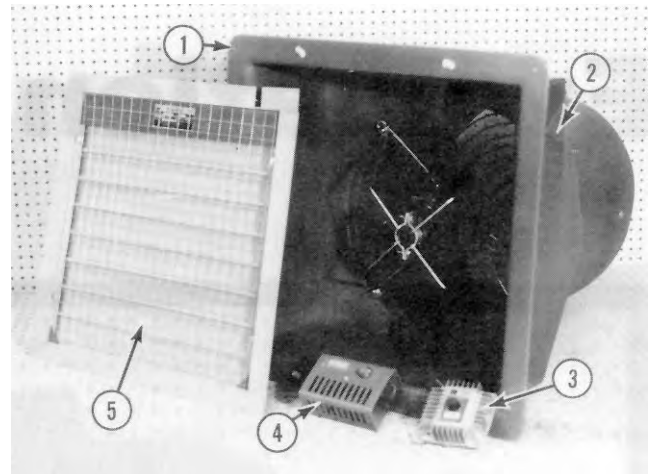


FIGURE 1. Prairie Pride Model TR18 Ventilation Fan: (1) Mounting Face Plate, (2) Polyethylene Housing, (3) Two Speed Control, (4) Variable Speed Control, (5) Inlet Guard Grill and Louvres.

SCOPE OF TEST

The Prairie Pride model TR18 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. The control units were not evaluated and were only used to set fan speed. The louvres were standard equipment and an integral part of the fan unit, so all tests were performed with louvres in place.

Fan performance was determined at 230 V with the two speed control and the variable speed control. The two speed control had a low speed and a high speed depending on the temperature range setting. With the variable speed control, fan performance was determined at the maximum setting, mid-range setting and the minimum setting. The minimum setting was established by reducing the fan speed to the point where a static pressure of 0.125 in wg (31.1 Pa) could still be obtained.

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

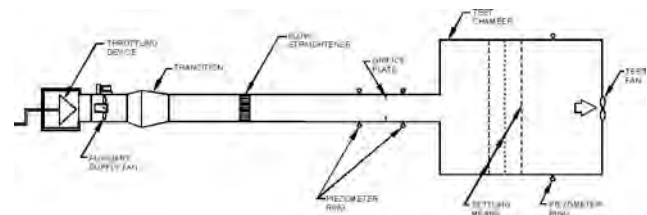


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Setup.

RESULTS AND DISCUSSION

FAN PERFORMANCE

All fan performance results in this report are given at standard air¹ 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.

¹Standard air is air with a density of 0.075 lbm/ft³ (1.2 kg/m³) which occurs at 68°F (20°C), 50% relative humidity and a barometric pressure of 29.92 in Hg (101.325 kPa).

Air Flow Rate: Fan output in both the high speed mode and at the maximum setting on the variable speed control were similar (FIGURES 3 & 4). Reducing the fan speed, reduced the air flow rate for a given static pressure². For example, at a static pressure of 0.125 in wg (31.1 Pa), reducing the speed from high speed to low speed reduced the air flow rate from 3280 cfm (1550 L/s) to 1760 cfm (828 L/s). Similarly, at a static pressure of 0.125 in wg (31.1 Pa), reducing the speed from maximum to mid-range to minimum settings on the variable speed control, reduced the air flow rates from 3070 cfm (1450 L/s) to 2360 cfm (1110 L/s) to 652 cfm (308 L/s), respectively.

Air flow rates at typical levels of operation (i.e. static pressure) are given in TABLE 1. Livestock building 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 condition in the high speed mode was 3280 cfm (1550 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 include a table or curve of air flow rates over a complete range of static pressures.

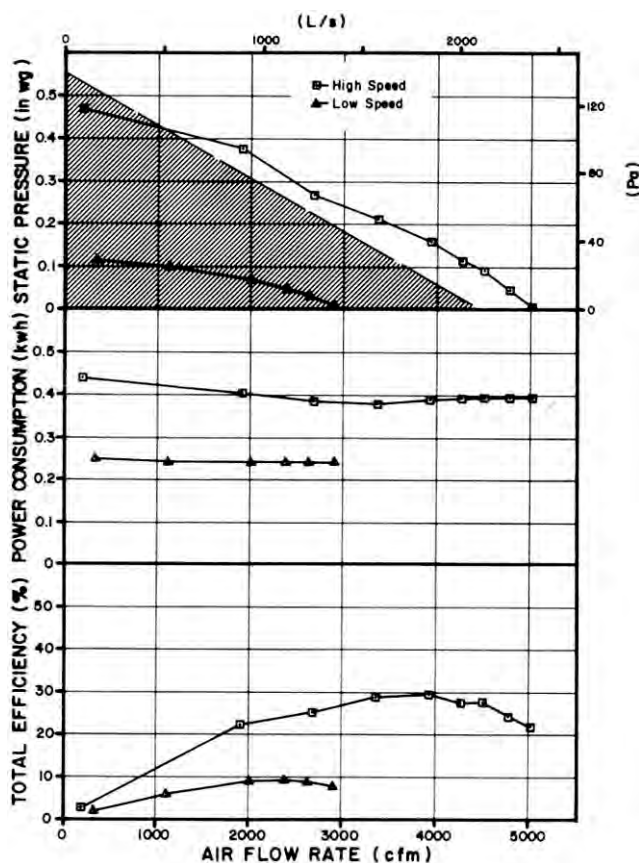


FIGURE 3. Prairie Pride Model TR18 Fan Performance Curves in the Two Speed Mode.

Power Consumption: The power consumption is the amount of energy (kWh) used by the fan motor. These numbers can be used directly to determine operating costs of the fan. For typical levels of static pressure (TABLE 1), the power consumption varied from 0.387 to 0.413 kWh at high speed, from 0.245 to 0.259 kWh at low speed, from 0.362 to 0.395 kWh at maximum speed, from 0.333 to 0.352 kWh at mid-range and from 0.272 to 0.282 kWh at minimum speed. The rated amperage of the motor was 1.9 amps. The shaded zones in FIGURES 3 and 4 illustrate operating levels where the rated motor amperage was exceeded. Current draw up to 2.3 amps occurred at the lower fan speeds.

²Static 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).

Prolonged operation in excess of the rated amperage could reduce motor life.

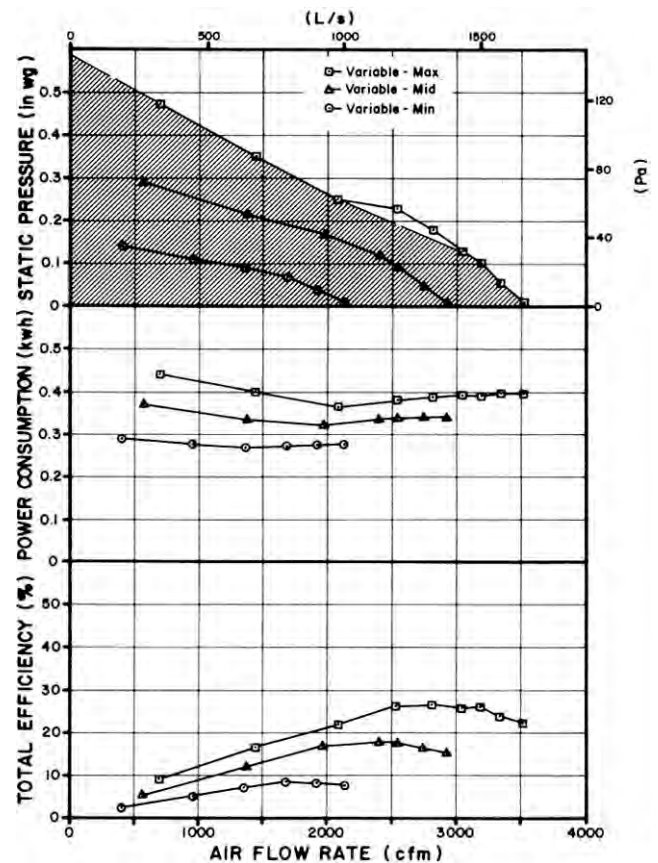


FIGURE 4. Prairie Pride Model TR18 Fan Performance Curves at Three Speed Settings in the Variable Speed Mode.

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 24 to 28% at high speed, 13 to 16% at low speed, 22 to 26% at maximum speed, 8 to 18% at mid-range and from 3 to 8% at minimum speed. The total efficiency at high speed and a static pressure of 0.125 in wg (31.1 Pa) was 28%.

EASE OF OPERATION

Maintenance: No maintenance instructions were supplied. The inlet guard grill and louvers were easily removed. This made for easy access for cleaning the housing and fan blades. Regularly scheduled cleaning and maintenance will ensure longer motor life and optimum performance.

OPERATOR SAFETY

The inlet and outlet guard grills provided adequate protection from the fan blades. The Prairie Pride model TR18 was CSA approved.

The noise level of the Prairie Pride fan 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 77 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Prairie Pride fan 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 few printed sheets on the installation and wiring of the two-speed and variable speed controls. It is recommended that the manufacturer supply a detailed manual containing illustrations and information on general operation, maintenance, rated performance, safety aspects and trouble shooting.

APPENDIX I

SPECIFICATIONS

MAKE:	Prairie Pride
MODEL:	TR18
MANUFACTURER:	Prairie Pride Enterprises Ltd. P.O. Box 25 Sanford, Manitoba R0G 2J0
OVERALL DIMENSIONS:	
housing and flange width	26.2 in (667 mm)
housing and flange height	26.8 in (679 mm)
housing depth at bottom	27.2 in (692 mm)
housing depth at top	31.2 in (794 mm)
housing dimensions	22.2 in (565 mm) by 22.6 in (575 mm)
inside tube diameter	19 in (483 mm)
inlet guard grill dimensions	21.6 in (549 mm) by 22 in (559 mm)
inlet grill opening	0.06 in (2 mm) diameter wire on 1 in (25 mm) grid
outlet guard grill dimensions	19 in (483 mm)
outlet grill opening	0.19 in (5 mm) diameter wire spaced at 1.06 in (27 mm) in a circular pattern
PROPELLER:	
diameter	18.25 in (464 mm)
hub diameter	3.9 in (98 mm)
number of blades	3
blade angle	variable - 27 degrees at tip to 40 degrees at hub
WEIGHT:	49 lb (22 kg)
MOTOR NAMEPLATE DATA:	
make	Leeson
model	A4P17NZ9A
frame	NS56
class	B*
code	D
type	PN
duty	air over
rpm	1625
service factor	1
ambient temperature rise	40°C
volts	115/230 V
amps	3.8/1.9
phase	1
cycles	60 Hz
horsepower	0.33 hp (246 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.

SUMMARY CHART PRAIRIE PRIDE MODEL TR18 VENTILATION FAN

RETAIL PRICE:	\$450.00 (February, 1985, f.o.b. Lethbridge)
FAN DESCRIPTION:	18.25 in (464 mm) propeller fan, two speed or variable speed, direct drive, 0.33 hp (246 W) electric motor.
FAN SPEED:	
- two speed	1209 to 1268 rpm or 1641 to 1660 rpm
- variable speed	947 to 1611 rpm
EFFICIENCY RANGE:	
- two speed	13 to 28 percent
- variable speed	3 to 26 percent
EFFICIENCY AT 0.125 in wg (31.1 Pa):	
- high speed	28 percent
AIR FLOW RATE:	
- range	652 to 3730 cfm (308 to 1760 L/s)
- at 0.125 in wg (31.1 Pa)	3280 cfm (1550 L/s) at high speed
POWER CONSUMPTION:	0.272 to 0.413 kWh
OPERATOR SAFETY:	inlet and outlet guard grill provided CSA approved noise level = 77 dB(A) at 4.9 ft (1.5 m) from fan discharge
OPERATOR'S MANUAL:	more details required



**ALBERTA
FARM
MACHINERY
RESEARCH
CENTRE**

3000 College Drive South
Lethbridge, Alberta, Canada T1K 1L6
Telephone: (403) 329-1212
FAX: (403) 329-5562
<http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html>

Prairie Agricultural Machinery Institute

Head Office: P.O. Box 1900, Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-2555

Test Stations:
P.O. Box 1060
Portage la Prairie, Manitoba, Canada R1N 3C5
Telephone: (204) 239-5445
Fax: (204) 239-7124

P.O. Box 1150
Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-5033
Fax: (306) 682-5080