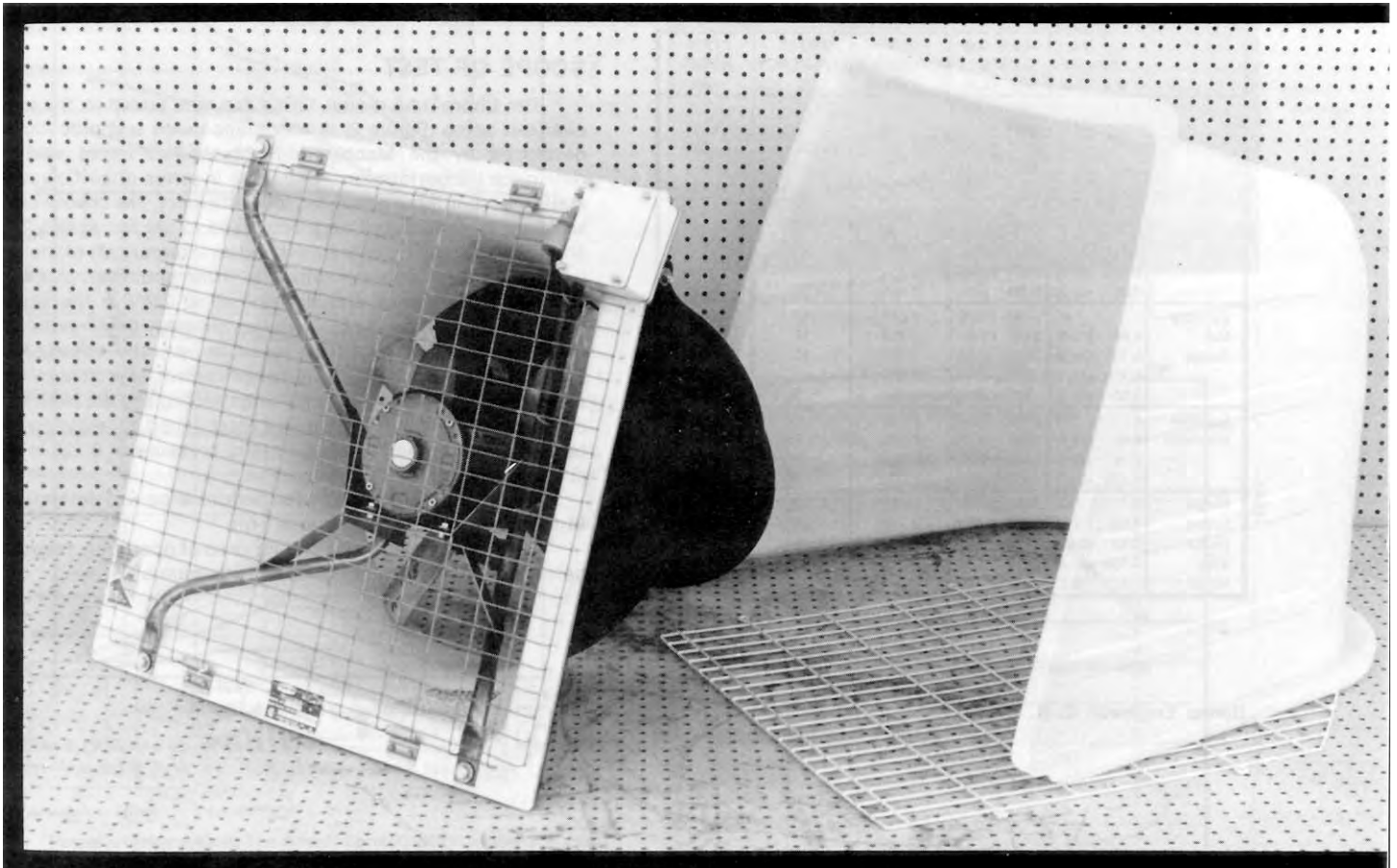


Evaluation Report

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Chore-Time Model 18RLX Ventilation Fan

A Co-operative Program Between



CHORE-TIME MODEL 18RLX VENTILATION FAN

MANUFACTURER:

Chore-Time Equipment, Inc.
P. O. Box 518
Milford, Indiana 46542

DISTRIBUTOR:

Leebe Agri Feeders Ltd.
Box 277
Leduc, Alberta
T9E 2Y1

RETAIL PRICE:

\$706.00 (April, 1985, f.o.b. Lethbridge, Alberta).

SUMMARY OF RESULTS

TABLE 1. Chore-Time Model 18RLX 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)	kWh	%	rpm
Single Speed Direct	0	(0)	3080	(1450)	0.243	24	1730
	0.05	(12.5)	2940	(1390)	0.244	27	1730
	0.10	(24.9)	2740	(1290)	0.243	31	1729
	0.125	(31.1)	2670	(1260)	0.243	32	1729
	0.25	(62.3)	2220	(1050)	0.242	36	1730
Variable Maximum	0	(0)	3010	(1420)	0.255	21	1693
	0.05	(12.5)	2800	(1320)	0.260	24	1689
	0.10	(24.9)	2680	(1260)	0.258	26	1691
	0.125	(31.1)	2620	(1240)	0.256	28	1692
	0.25	(62.3)	2080	(981)	0.255	31	1693
Variable Mid Range	0	(0)	2480	(1170)	0.249	13	1443
	0.05	(12.5)	2240	(1060)	0.253	14	1421
	0.10	(24.9)	2050	(968)	0.258	16	1390
	0.125	(31.1)	1940	(915)	0.256	17	1423
	0.25	(62.3)	642	(303)	0.269	7	1329
Variable Minimum	0	(0)	2050	(968)	0.238	7	1134
	0.05	(12.5)	1530	(720)	0.236	7	1097
	0.10	(24.9)	725	(342)	0.243	4	1040
	0.125	(31.1)	503	(237)	0.243	3	1006
Single Speed Direct with Hood	0	(0)	3060	(1440)	0.240	22	1730
	0.05	(12.5)	2900	(1370)	0.244	27	1731
	0.10	(24.9)	2780	(1310)	0.244	31	1730
	0.125	(31.1)	2710	(1280)	0.243	33	1730
	0.25	(62.3)	2370	(1120)	0.241	38	1730

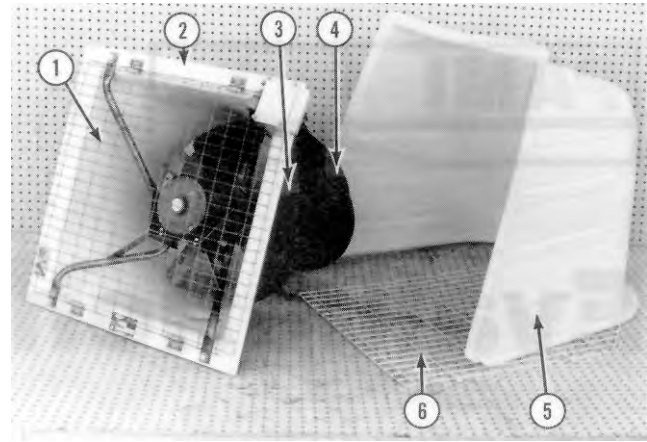


FIGURE 1. Chore-Time Model 18RLX Ventilation Fan: (1) Inlet Guard Grill, (2) Mounting Face Plate, (3) ABS Plastic Housing, (4) Shutter, (5) Fan Hood, (6) Outlet Guard Grill.

SCOPE OF TEST

The Chore-Time model 18RLX 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 shutter was standard equipment and an integral part of the fan unit, so all tests were performed with the shutter in place.

Fan performance was determined at 230V in the single speed direct mode and also with the variable speed control. A triac type speed control was used to vary the speed. Fan performance, with the variable speed control, was determined at the maximum setting, the 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 effect of the hood 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.

Senior Engineer: E. H. Wiens

Project Engineer: R. P. Atkins

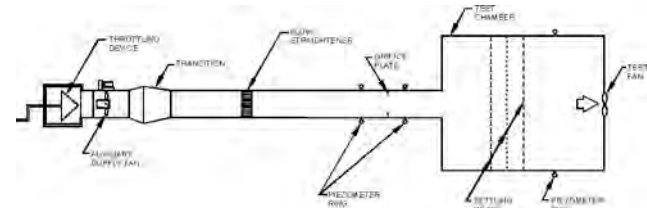


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Setup.

GENERAL DESCRIPTION

The Chore-Time model 18RLX ventilation fan is a 18.4 in (467 mm) diameter, single 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 Chore-Time fan is a flush mounted unit equipped with an inlet guard grill, a mounting face plate, a shutter, a fan hood, an outlet guard grill and two optional variable speed controls (i.e. Model 7300 and Model 7500). The four blade propeller and hub are made of cast aluminum and are mounted directly on the 0.25 hp (186 W), single phase, 230 V electric motor. The housing is constructed of molded ABS plastic and the fan hood of molded polyethylene. The motor mount consists of a stainless steel cage and mounting plate. The inlet guard grill is galvanized and the outlet guard grill is vinyl coated.

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

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.

Air Flow Rate: Fan output, at the maximum setting on the variable speed control, was less than in the single speed direct mode (FIGURE 3), due to the voltage drop created by the variable speed control. This resulted in a corresponding reduction in fan

¹Standard air is air with a density of 0.075 lb/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).

speed. Reducing the fan speed, greatly 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 the single speed direct mode to maximum to mid range to minimum setting, reduced the air flow rate from 2670 cfm (1260 L/s) to 2620 cfm (1240 L/s) to 1940 cfm (915 L/s) to 503 cfm (237 L/s) respectively. At higher static pressures the reductions were even larger.

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 2500 cfm (1180 L/s). PAMI's measured flow rate at the same conditions was 2670 cfm (1260 L/s) or 7% higher than the manufacturer's rating.

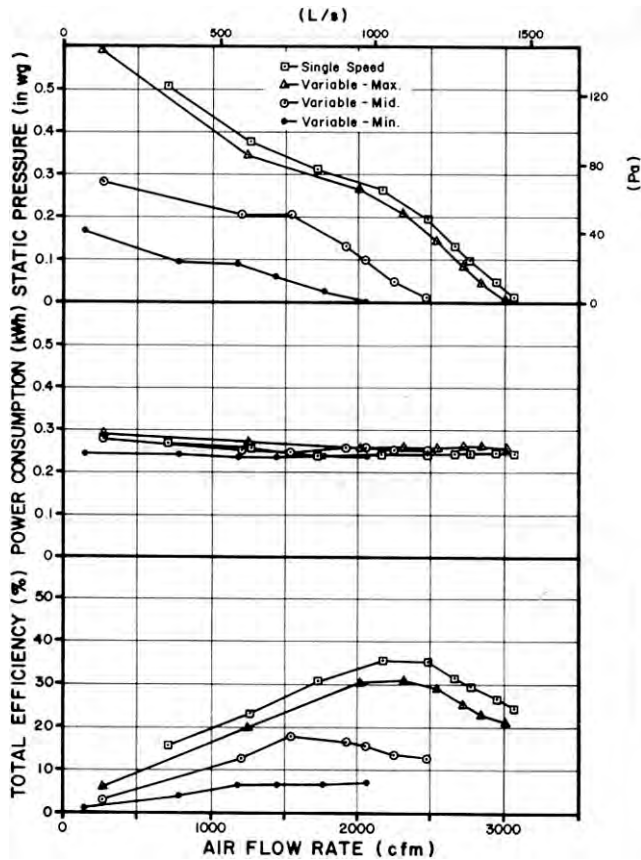


FIGURE 3. Chore-Time Model 18RLX Fan Performance Curves in the Single Speed Direct Mode and at Three Speed Settings in the Variable Speed Mode.

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 cost of the fan. For typical levels of static pressure (TABLE 1), the power consumption varied from 0.242 to 0.244 kWh in the single speed direct mode, from 0.255 to 0.260 kWh at maximum speed, from 0.249 to 0.269 kWh at mid range and from 0.236 to 0.243 kWh at minimum speed. The maximum amperage drawn by the motor was 1 amp, which was less than the rated motor amperage of 1.5 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 21 to 31% at maximum speed, 7 to 17% at mid range and 3 to 7% at minimum speed. The total efficiency at maximum fan speed and a static pressure of 0.125 in wg (31.1 Pa) was 32%.

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).

Effect of Fan Hood: The fan hood was installed on the outlet side of the fan (FIGURE 4) to determine its effect on fan output. The fan was tested under these conditions in the single speed direct mode only. Using the fan hood had little effect on air flow rates (FIGURE 5).

The use of other control devices such as louvres, dampers and screens could change air flow rates by varying amounts. The use of such control devices have to be taken into consideration when designing a ventilation system.

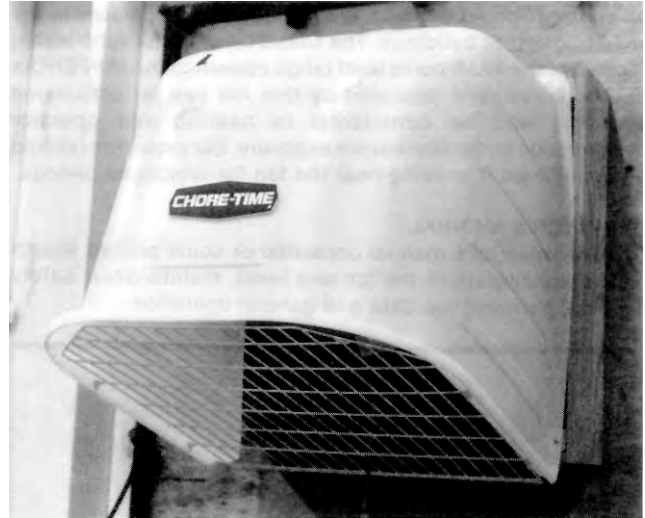


FIGURE 4. Hood on Fan Discharge.

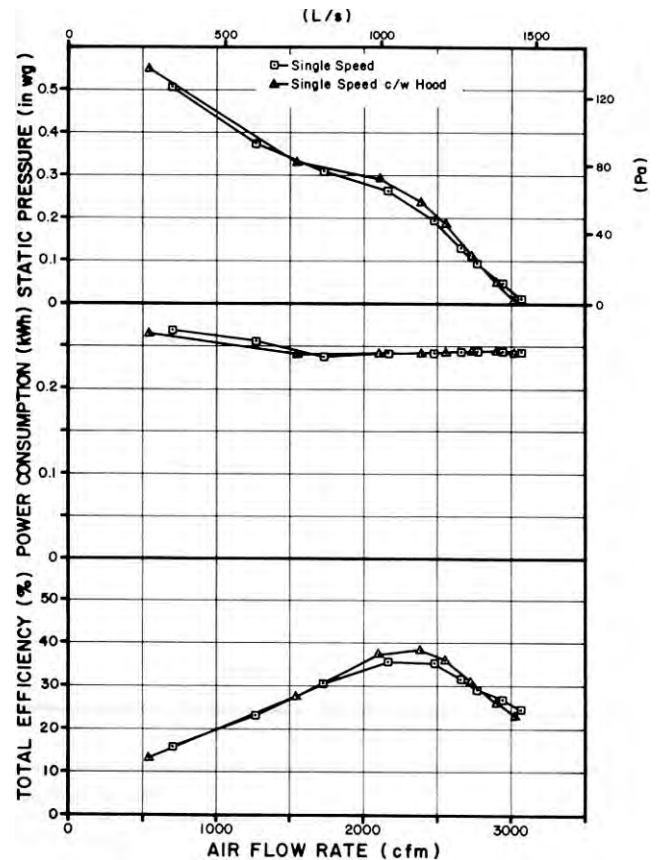


FIGURE 5. Effect of Hood on Fan Performance.

EASE OF OPERATION

Maintenance: The inlet guard grill was 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 guard grill provided adequate protection from the fan blades. The motor was a totally enclosed unit and presented no safety hazards. The Chore-Time 18RLX was CSA approved.

The noise level of the Chore-Time 18RLX, 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 Chore-Time 18RLX 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 some printed sheets on the installation of the fan and hood, maintenance, safety aspects, performance data and general operation.

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 I

SPECIFICATIONS

MAKE:	Chore-Time
MODEL:	18RLX
SERIAL NUMBER:	8404
MANUFACTURER:	Chore-Time Equipment, Inc. P. O. Box 518 Milford, Indiana 46542
OVERALL DIMENSIONS:	
- housing and flange width	25.9 in (657 mm)
- housing and flange height	25.9 in (657 mm)
- housing depth	16.5 in (419 mm)
- housing dimensions	22.5 x 22.5 in (571 x 571 mm)
- inside tube diameter	18.9 in (479 mm)
- guard grill dimensions	23 x 25 in (584 x 635 mm)
- grill opening	0.09 in (2.4 mm) diameter wire on a 1 x 2 in (25.5 x 51 mm) grid
IMPELLER:	
- diameter	18.4 in (467 mm)
- hub diameter	5.5 in (140 mm)
- number of blades	4
- blade angle	variable - 18 degrees at tip to 33 degrees at hub
WEIGHT:	36 lb (16 kg)
MOTOR NAMEPLATE DATA:	
make	Emerson
model	KSSHXCTN-9962
frame	48Y
class	B
duty	air over
rpm	1625
ambient temperature rise	°C
volts	230 V
amps	1.5A
phase	1
cycles	60 Hz
horsepower	0.25 hp (186 W)

SUMMARY CHART CHORE-TIME MODEL 18RLX VENTILATION FAN

RETAIL PRICE:	\$706.00 (April, 1985, f.o.b. Lethbridge)
FAN DESCRIPTION	18.4 in (467 mm) propeller fan, single or variable speed, direct drive, 0.25 hp (186 W) 230 V electric motor.
FAN SPEED:	
- single speed direct	1729 to 1730 rpm
- variable speed	1006 to 1693 rpm
EFFICIENCY RANGE:	
- single speed direct	24 to 36%
- variable speed	3 to 31%
EFFICIENCY AT 0.125 in wg (31.1 Pa):	
- without fan hood	32%
- with fan hood	33%
AIR FLOW RATE:	
- range	503 to 3080 cfm (237 to 1450 L/s)
- at 0.125 in wg (31.1 Pa)	2670 cfm (1260 L/s) without fan hood and 2710 cfm (1280 L/s) with fan hood
POWER CONSUMPTION:	0.236 to 0.269 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:	adequate



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