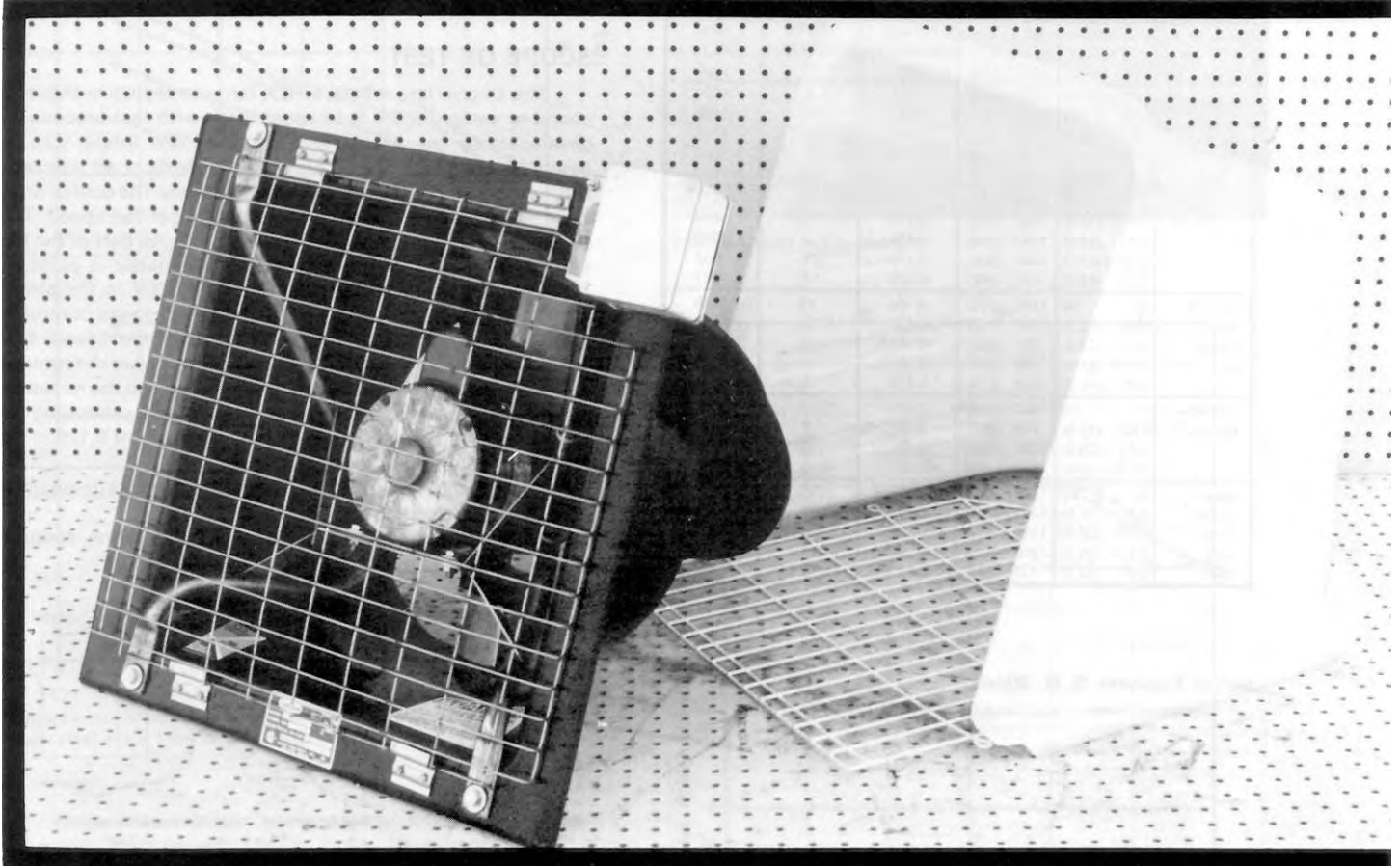


Evaluation Report

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Chore-Time Model 14RLX Ventilation Fan

A Co-operative Program Between



CHORE-TIME MODEL 14RLX 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:

\$617.00 (April, 1985, f.o.b. Lethbridge, Alberta).

SUMMARY OF RESULTS

TABLE 1. Chore-Time Model 14RLX 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 Speed Direct	0 (0)	1480 (699)	0.118	16	1689
	0.05 (12.5)	1330 (627)	0.121	18	1686
	0.10 (24.9)	1230 (581)	0.122	20	1685
	0.125 (31.1)	1190 (563)	0.122	22	1685
	0.25 (62.3)	642 (303)	0.125	16	1680
Variable Maximum	0 (0)	1430 (674)	0.114	14	1627
	0.05 (12.5)	1260 (594)	0.115	16	1618
	0.10 (24.9)	1190 (560)	0.116	20	1617
	0.125 (31.1)	1140 (537)	0.116	21	1617
	0.25 (62.3)	556 (262)	0.123	14	1601
Variable Mid Range	0 (0)	1220 (576)	0.104	10	1445
	0.05 (12.5)	1100 (519)	0.107	13	1417
	0.10 (24.9)	967 (456)	0.109	15	1411
	0.125 (31.1)	828 (391)	0.107	14	1433
	0.25 (62.3)	238 (112)	0.115	6	1384
Variable Minimum	0 (0)	963 (454)	0.096	6	1155
	0.05 (12.5)	748 (353)	0.098	7	1129
	0.10 (24.9)	275 (130)	0.10	3	1070
	0.125 (31.1)	209 (97)	0.10	3	1073
Single Speed Direct with Hood	0 (0)	1440 (680)	0.115	15	1691
	0.05 (12.5)	1360 (640)	0.119	18	1685
	0.10 (24.9)	1280 (606)	0.120	22	1685
	0.125 (31.1)	1250 (590)	0.120	24	1685
	0.25 (62.3)	722 (341)	0.121	19	1685

Senior Engineer: E. H. Wiens

Project Engineer: R. P. Atkins

GENERAL DESCRIPTION

The Chore-Time model 14RLX ventilation fan is a 14 in (356 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 0.125 hp (93 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.

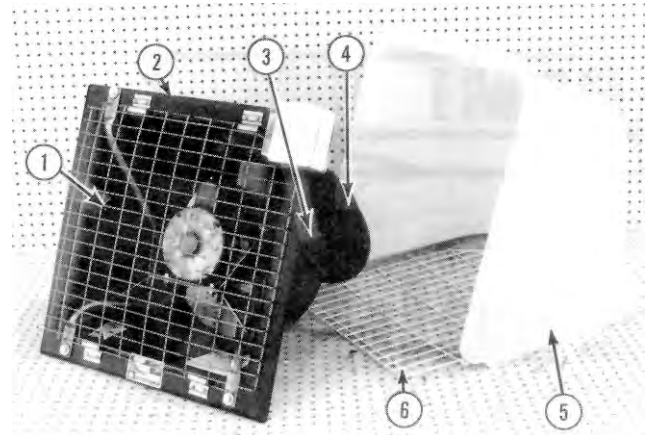


FIGURE 1. Chore-Time Model 14RLX Ventilation Fan: (1) Inlet Guard Grill, (2) Mounting Face Plate, (3) ABS Plastic Housing, (4) Shutter, (5) Fan Hood, (6) Outlet Guard Grill.

SCOPE OF TEST

The Chore-Time model 14RLX 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.

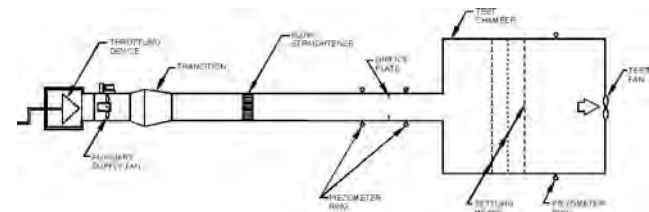


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Setup.

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.

Air Flow Rate: Fan output, at the maximum setting on the variable speed control, was slightly less than that 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 speed. Reducing the fan speed, greatly reduced

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).

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 1190 cfm (563 L/s) to 1140 cfm (537 L/s) to 828 cfm (391 L/s) to 209 cfm (97 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 1290 cfm (609 L/s). PAMI's measured flow rate at the same conditions was 1190 cfm (563 L/s) or 8% lower than the manufacturer's rating.

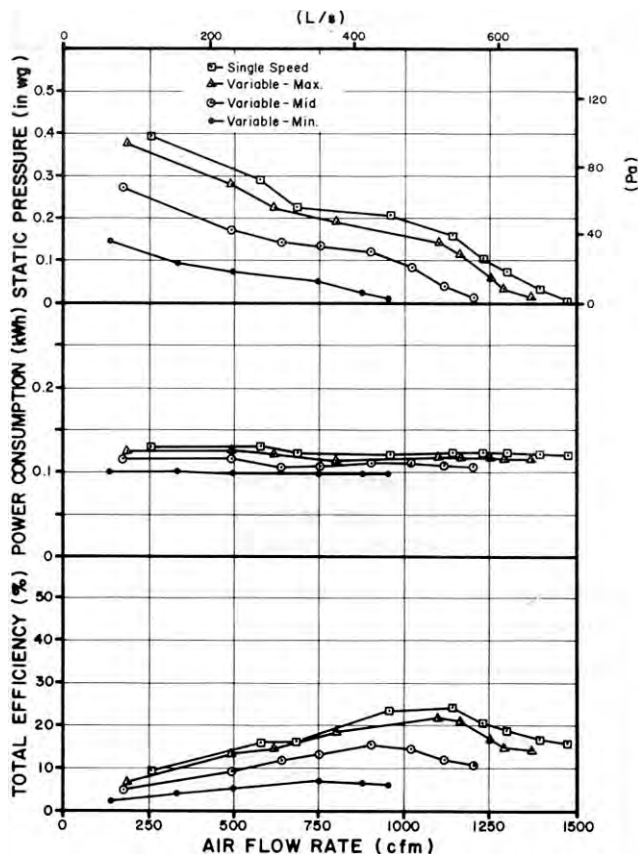


FIGURE 3. Chore-Time Model 14RLX Fan Performance Curves in the Single Speed Direct Mode and at Three Speed Settings in the Variable Speed Mode.

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 0.118 to 0.125 kWh in the single speed direct mode, from 0.114 to 0.123 kWh at maximum speed, from 0.104 to 0.115 kWh at mid range and from 0.096 to 0.10 kWh at minimum speed. The maximum amperage drawn by the motor was 0.53 amps, which was less than the rated motor amperage of 0.6 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 14 to 21% at maximum speed, 6 to 15% 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 22%.

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.

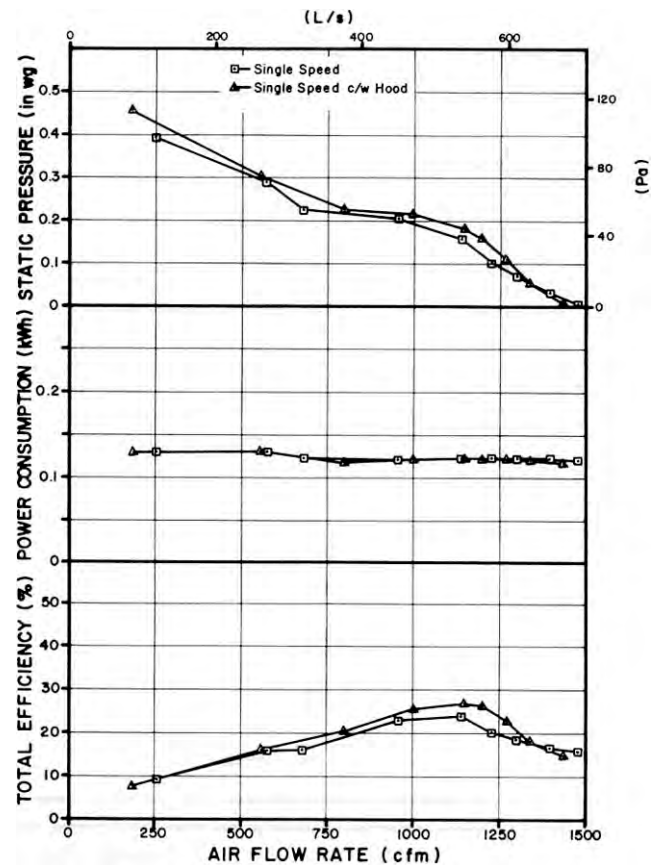


FIGURE 5. Effect of Hood on Fan Performance.

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 14RLX was CSA approved.

The noise level of the Chore-Time 14RLX, 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 70 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Chore-Time 14RLX 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:	14RLX
SERIAL NUMBER:	8501
MANUFACTURER:	Chore-Time Equipment, inc. P. O. Box 518 Milford, Indiana 46542
OVERALL DIMENSIONS:	
- housing and flange width	21 in (533 mm)
- housing and flange height	21 in (533 mm)
- housing depth	13.8 in (349 mm)
- housing dimensions	17.8 x 17.8 in (451 x 451 mm)
- inside tube diameter	14.5 in (368 mm)
- guard grill dimensions	19 x 19 in (483 x 483 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	14 in (356 mm)
- hub diameter	5.5 in (140 mm)
- number of blades	4
- blade angle	variable - 22 degrees at tip to 31 degrees at hub
WEIGHT:	27 lb (12 kg)
MOTOR NAMEPLATE DATA:	
- make	General Electric
- model	5KCP39DGH 1495
- class	B
- duty	air over
- rpm	1625
- ambient temperature rise	40°C
- volts	230 V
- amps	0.6 A
- phase	1
- cycles	61 Hz
- horsepower	0.125 hp (93 W)

SUMMARY CHART	
CHORE-TIME MODEL 14RLX VENTILATION FAN	
RETAIL PRICE:	\$617.00 (April, 1985, f.o.b. Lethbridge)
FAN DESCRIPTION	14 in (356 mm) propeller fan, single or variable speed, direct drive, 0.125 hp (96 W) 230 V electric motor.
FAN SPEED:	
- single speed direct	1680 to 1689 rpm
- variable speed	1070 to 1627 rpm
EFFICIENCY RANGE:	
- single speed direct	16 to 22%
- variable speed	3 to 21%
EFFICIENCY AT 0.125 in wg (31.1 Pa):	
- without fan hood	22%
- with fan hood	24%
AIR FLOW RATE:	
- range	209 to 1480 cfm (97 to 699 L/s)
- at 0.125 in wg (31.1 Pa)	1190 cfm (563 L/s) without fan hood and 1250 cfm (590 L/s) with fan hood
POWER CONSUMPTION:	0.096 to 0.125 kWh
OPERATOR SAFETY:	inlet and outlet guard grill provided CSA approved noise level = 70 dB(A) at 4.9 ft (1.5 m) from fan inlet
OPERATOR'S MANUAL:	adequate



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