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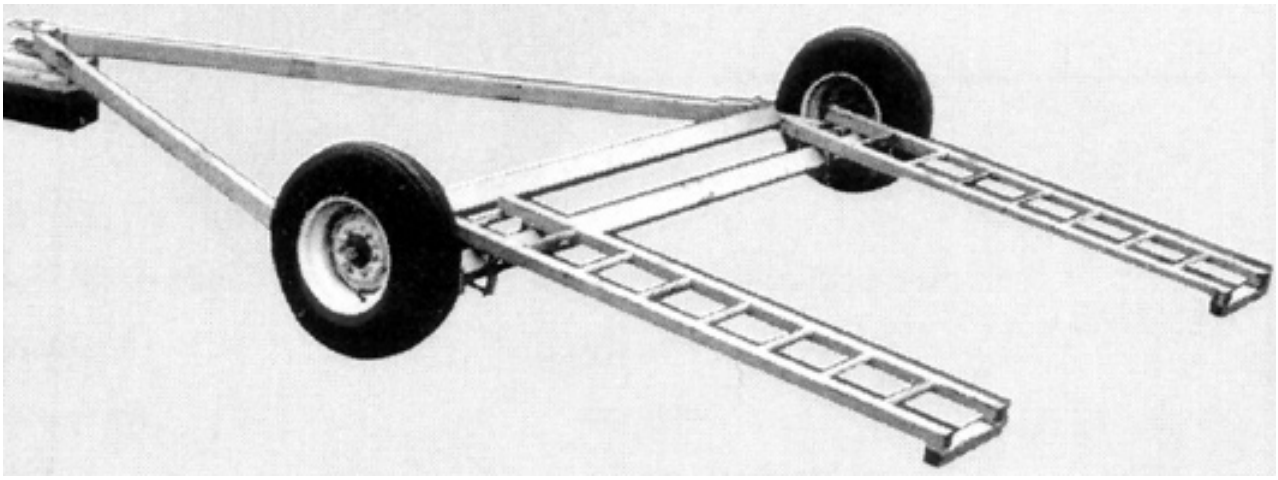
Evaluation Report 50



Laurier Welding Windrower Transporter

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE

PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

LAURIER WELDING WINDROWER TRANSPORTER

MANUFACTURER AND DISTRIBUTOR:

Laurier Welding Limited
Box 85
Laurier, Manitoba
R0J 1A0

RETAIL PRICE:

$550.00, (January 1978, f.o.b. Winnipeg, with 9.5L x 15, 8 ply tires)

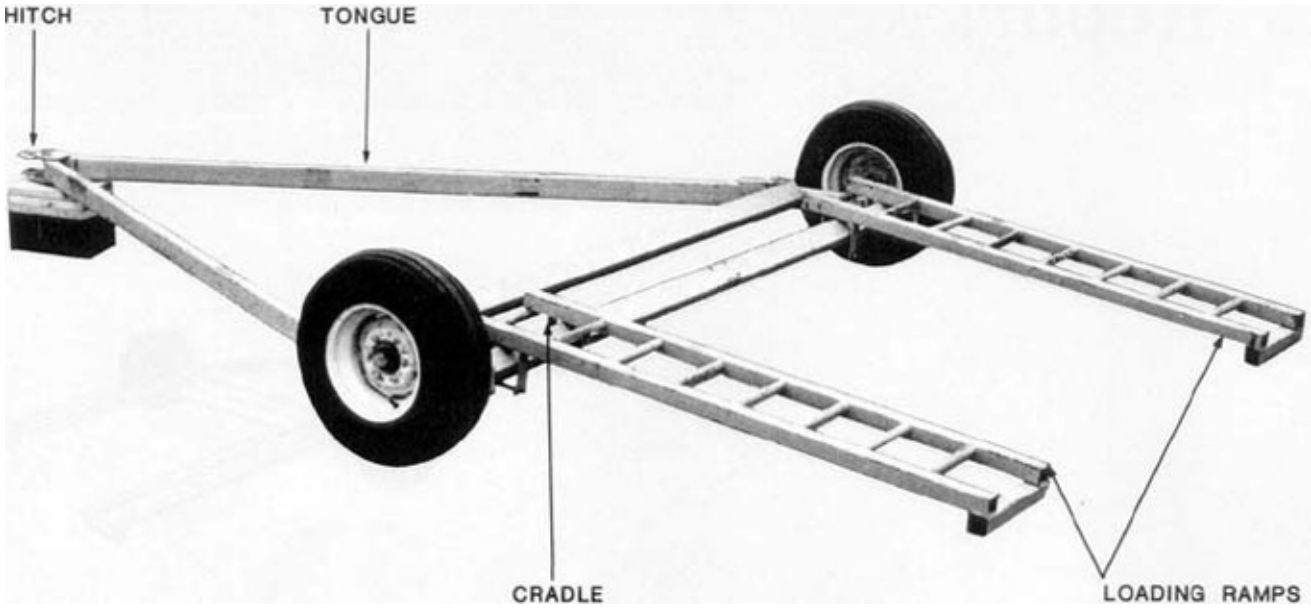


FIGURE 1. Laurier Transporter.

SUMMARY AND CONCLUSIONS

Overall functional performance of the Laurier Welding windrower transporter was *good.* Maneuverability and ease of loading were *very good.* Ease of unloading was *very good* for windrowers with large drive wheels, but was *poor* for windrowers with small drive wheels.

The Laurier transporter was easily towed with a one-half ton truck in most conditions, however, a heavier towing vehicle is preferable.

Transport speeds up to 40 km/h (25 mph) were possible without excessive sway or bounce, but speeds were usually limited from 15 to 30 km/h (10 to 20 mph) due to shimmy of the windrower castor wheels. Transport speed usually depended upon the make and model of windrower being transported.

The Laurier transporter was readily adaptable to a wide variety of windrowers. The cradle was too narrow to accept one model of windrower.

The tire load rating permitted safe transport of loads of 1940kg (4220 lb) at speeds up to 30 km/h (20 mph). This meant that all currently used windrowers could be safely transported at speeds up to 15 kmlh (10 mph) and most could be transported at speeds up to 30 km/h (20 mph). Tires were overloaded by 29% when transporting one large windrower at 30 km/h (20 mph).

Rear visibility was completely obstructed when towing windrowers with a small truck. Transport width was established by the windrower header width. As a result, the operator should install suitable signal devices when transporting on public roads.

No mechanical problems occurred during evaluation or load testing.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Reducing the height of the transporter cradle, thereby reducing windrower castor shimmy during transport.
2. Increasing the cradle width to permit the transporter to accept windrowers with wide wheel treads.
3. Modifying the cradle to permit easier unloading of windrowers with small drive wheels.
4. Supplying approved hitch safety chains as standard equipment.
5. Supplying safety recommendations with the transporter, outlining items such as tire load ratings, tire pressures, maximum transport speeds, the use of slow moving vehicle signs and other pertinent safety considerations.

Chief Engineer - E. O. Nyborg
Senior Engineer - J. C. Thauberger
Project Engineer - S. T. Enns

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. The transporter may be inverted to reduce the cradle height although some windrower headers may not have sufficient clearance for loading, in this configuration.
2. New production models will have the frame width increased by 300 mm (12 in) to accommodate wide tread machines.
3. Cradles on all new production models have been modified to permit easier windrower unloading.
4. Safety chains will be adopted as standard equipment.
5. The supplying of an operator's manual will be taken under considerat ion.

GENERAL DESCRIPTION

The Laurier Welding transporter is designed for transporting self-propelled windrowers. The 3 m (10 ft) wide cradle is supported by two wheels and an A-frame hitch.

Windrowers are driven forward, up self-raising ramps, until the drive wheels rest in the cradle and are towed with the windrower castor wheels on the ground. The loading ramps are adjustable to accommodate various windrower tread widths.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The Laurier transporter was operated over a wide range of conditions varying from rough field trails to paved roads, while transporting a variety of self-propelled windrowers for a total distance of about 95 km (60 mi). It was evaluated for ease of operation and operator safety. In addition it was subjected to a dynamic load test[1] on an obstacle track.

RESULTS AND DISCUSSION

EASE OF OPERATION

Hitching: The Laurier transporter was equipped with a fixed clevis hitch. A properly sized hitch pin with asuitable locking device made a safe hook-up. No hitch jack was provided. The unloaded hitch weight was 48 kg (106 lb).

Towing Vehicle: For most field and road conditions, the loaded transporter could readily be towed with a one-half ton truck. Selection of a suitable towing vehicle should be based on road conditions. Although a one-half ton truck may have adequate power to easily transport a windrower, it may not have adequate brakes or weight for emergency situations that may occur during high speed transport or on hills.

Loading: To loadawindrower, the transporter had to be hitched to a suitable towing vehicle, the loading ramps had to be lowered and the ramp spacing adjusted to match the windrower wheel tread. Loading ramps were easily positioned manually. No tools were needed.

Windrowers were loaded by driving forward up the ramps until the drive wheels dropped into the cradle, causing the ramps to automatically raise off the ground (FIGURE 2).

FIGURE 2. Drive Wheels Seated in Cradle.

All windrowers had ample table lift to clear the transporter wheels during loading. On one dual-wheel equipped windrower, the ramps contacted the windrower frame while raising, preventing the drive wheels from seating fully in the cradle. This problem was corrected by adjusting the ramps to fit only the outer windrower wheels. In all cases the windrower drive wheels seated firmly into the cradle with little possibility of them coming out during transport. It is, however, recommended that the operator secure the wheels to the cradle for transport on public roads.

The 3 m (10 ft) wide cradle was too narrow for one windrower and the drive wheels rested on the outer frame members rather than within the cradle. It is recommended that the manufacturer increase the cradle width to accommodate wide tread windrowers.

Transporting: The Laurier transported well at speeds up to 15 km/h (10 mph) on rough roads and 40 km/h (25 mph) on smooth roads. On rough roads, transport speed was limited by machine bounce while on smooth roads transporter swaying sometimes occurred at speeds above 40 km/h (25 mph). In most instances transport speed was limited by shimmy of the windrower castor wheels rather than by bounce or swaying of the transporter.

Windrower castor wheels are usually most stable when the windrower is level. Whenawindrower is placed on the transporter, the castor axes are inclined rearward, increasing the tendency for shimmy. In an attempt to reduce castor wheel shimmy, the transporter was turned upside down (FIGURE 3). Since the transporter wheels were attached below the transporter frame, inverting the frame reduced the transporter cradle height from 530 mm (21 in) to 370 mm (15 in) and reduced the inclination of the windrower castor axes. This significantly reduced castor wheel shimmy on some windrowers. It is recommended that the manufacturer reduce cradle height to improve windrower castor wheel performance during transport. This would also require a reduction in length of the loading ramps to reduce loading ramp interference with the windrower castor wheels during loading.

No trailing problems occurred while towing the unloaded transporter at high speeds. The loading ramps remained folded and did not bounce excessively.

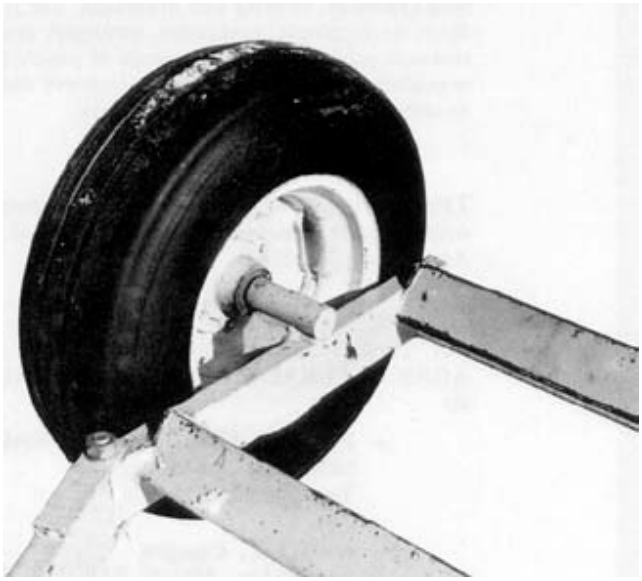


FIGURE 3. Laurier Transporter with Frame Inverted to Reduce Transport Height.

Maneuverability: The loaded transporter was very maneuverable. Sharp turns and backing were easy. The width of the windrower table established the transport width. Asa result, passing vehicles on narrow roads with sharp ditches created problems due both to the overhang of the windrower header and the wide wheel tread of the transporter. Ground clearance was adequate, even with the transporter frame inverted.

Unloading: To unload a windrower from the Laurier transporter, the windrower is backed off the cradle while the ramps automatically drop to the ground as the drive wheels contact them. Due to the wide cradle spacing, which caused the drive wheels to seat deep within the cradle, windrowers

[1] *PAMI T771 Detailed Test Procedure for Windrower Transporters*

equipped with 7.50 x 16 drive wheels, or smaller, had considerable difficulty backing out of the cradle. This problem was aggravated if the cradle was wet from dew or rain as the drive wheels would spin rather than climb out of the cradle. One hydrostatically driven windrower also had difficulty in backing out of the cradle due to lack of power in reverse. It is recommended that the cradle be modified to reduce unloading problems for windrowers equipped with small drive wheels.

OPERATOR SAFETY

The Laurier windrower transporter was safe to operate if normal safety precautions were observed.

Since the transporter is not equipped with brakes, the towing vehicle must have adequate brakes and be heavy enough to be able to stop safely in emergency situations. A one-half ton truck may not be adequate for certain situations.

A slow moving vehicle sign is required on the rear of the windrower before transport on public roads. The windrower header obstructs rear visibility when towing with a small truck. Truck brake lights and rear signal lights are obscured by thewindrower. It is not practical to recommend to the manufacturer that brake lights, clearance lights or a slow moving vehicle sign be installed on the transporter since these would probably be obscured by the windrower. It must be the operator's responsibility to ensure that adequate signal devices are installed when operating the transporter on public roads.

The Laurier transporter was equipped with two 9.5L x 15 agricultural implement tires. Tire manufacturer specifications indicate that the transporter is capable of carrying a 1940 kg (4220 lb) load at speeds up to 30 km/h (20 mph). Speeds above 30 km/h (20 mph) are not recommended for implement tires. The largest windrower used in the evaluation placed a load of 2500 kg (5510 lb) on the tires resulting in atire overload of 29% at 30 km/h (20 mph). Tire overloads with smaller windrowers were insignificant.

Although the unloaded hitch weight is only 48 kg (106 lb), a transporter hitch jack stand is desirable for safer and more convenient hitching. No safety chains were provided. It is recommended that the manufacturer supply approved hitch safety chains as standard equipment.

No operating instructions were provided with the Laurier transporter and due to the simplicity of the machine, there may be little need for them. It is, however, recommended that safety instructions be supplied to the purchaser. These should include tire and wheel load ratings, maximum transport speeds, tire pressures, recommended size of towing vehicle, attachment of a slow moving vehicle sign and other pertinent safety considerations.

DURABILITY RESULTS

The intent of the test was evaluation of functional performance. An extended durability evaluation was not conducted. No failures occurred during functional testing.

In addition, the Laurier was subjected to a dynamic load test on an obstacle track to assess wheel and frame strength. No permanent deformation or mechanical failures occurred during this test.

APPENDIX I

SPECIFICATIONS

MAKE:	Laurier Welding windrower transporter
LOAD RATING (based on tires):	2330 kg (5140 lb)
OVERALL DIMENSIONS:	
- length	4030 mm (159 in)
- width	3660 mm (144 in)
- height	750 mm (30 in)
- ground clearance (min.)	250 mm (10 in)
- wheel tread	3410 mm (134 in)
CRADLE:	
- width	3050 mm (120 in)
- opening	550 mm (21.5 in)
- height	530 mm (21 in)
- material	101 x 101 mm (4 x 4 in) square tubing
LOADING RAMPS:	
- length	2140 mm (84 in)
- width	445 mm (17.5 in)
- angle	14°
TIRES:	2, 9.5L x 15, 8 ply
HITCH:	fixed clevis, pin type
WEIGHT:	
- hitch point	48 kg (101 lb)
- wheels (2)	264 kg (582 lb)
Total	312 kg (688 lb)

APPENDIX II

MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports:

(a) excellent	(d) fair
(b) very good	(e) poor
(c) good	(f) unsatisfactory

APPENDIX III

METRIC UNITS

In keeping with the Canadian metric conversion program, this report has been prepared in SI Units. For comparative purposes, the following conversions may be used:

1 kilometre/hour (km/h)	= 0.62 miles/hour (mph)
1 metre (m) = 1000 milimetres (mm)	= 39.37 inches (in)
1 kilogram (kg)	= 2.2 pounds (lb)

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