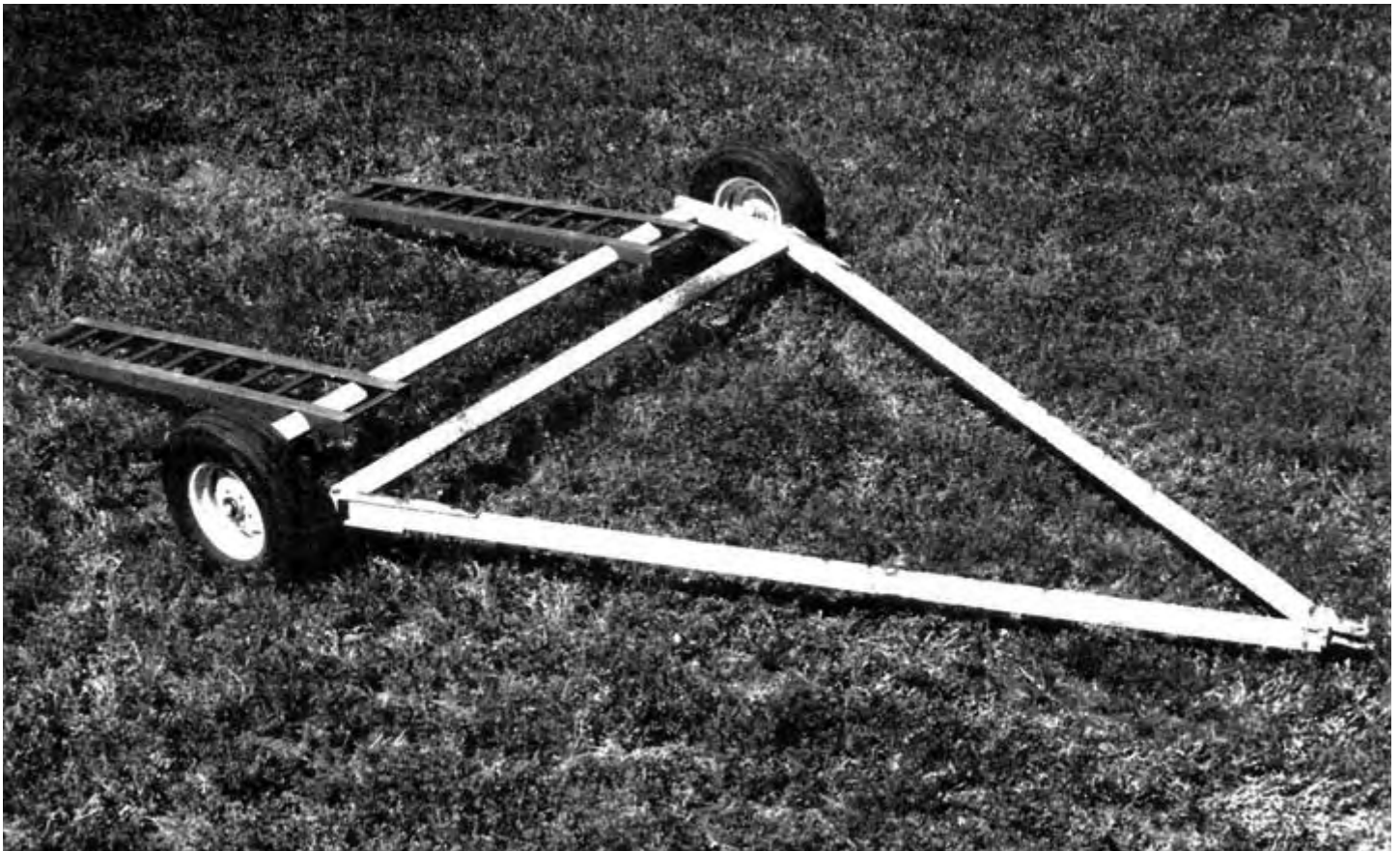


Evaluation Report

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Bergen Windrower Transporter

A Co-operative Program Between



BERGEN WINDROWER TRANSPORTER

MANUFACTURER & DISTRIBUTOR

Bergen Manufacturing Ltd.
Drake, Saskatchewan
S0K 1H0

RETAIL PRICE:

\$1,821.00 (February, 1980, f.o.b. Drake, Saskatchewan, with optional 3 x 4.3 m wooden tilting deck attachment).

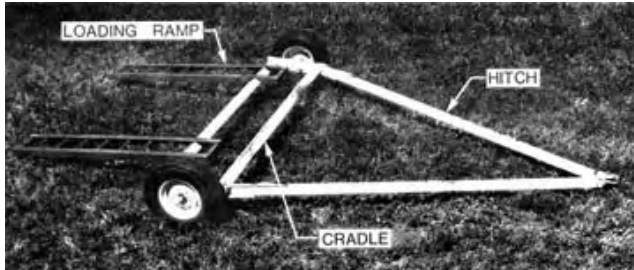


FIGURE 1. Bergen Transporter.

SUMMARY AND CONCLUSIONS

Overall functional performance of the Bergen windrower transporter was very good. Maneuverability, ease of loading and ease of unloading were very good.

The Bergen transporter was easily towed with a one-half ton truck in most situations, however, a larger towing vehicle is preferable due to better braking capability.

Transport speeds up to 50 km/h (30 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 Bergen transporter was not compatible with some self-propelled windrowers, due to limited windrower table lift, which did not permit adequate clearance above the transporter tires. The tires supplied with the Bergen permitted safe transport of 1800 kg (3960 lb) loads at speeds up to 30 km/h (20 mph). The weight of most windrowers produced tire loads of 2400 to 3000 kg (5300 to 6600 lb) resulting in overloads of up to 65 percent with large machines.

Performance of the optional deck attachment was very good. A suitable jack was needed for hitching when the deck was used, due to the increased hitch weight. Adequate transport speeds were possible when using the deck attachment.

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

No mechanical problems occurred during evaluation or load testing.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing a means of increasing windrower header clearance over the transporter tires, to accommodate a wider range of machines.
2. Supplying a hitch jack with the optional deck.
3. Supplying a hitch safety chain as standard equipment.
4. Supplying safety recommendations, outlining items such as tire load ratings, tire pressures, maximum transport speeds, the use of a slow moving vehicle sign, and other pertinent safety considerations.

Chief Engineer -- E.O. Nyborg

Senior Engineer -- J.C. Thauberger

Project Engineer -- Gregory R. Pool

THE MANUFACTURER STATES THAT:

With regard to recommendation number:

1. We have short ramps available to permit the windrower to be loaded by backing up. To provide adequate clearance, blocks may be needed under the long ramps if the windrower is not backed onto the transporter using the short ramps.
2. A hitch jack is available as an option. As well, the platform should be positioned to balance the load.
3. Safety chains have not been supplied, as we classify the transporter as a farm implement. If necessary, we may provide safety chains.
4. Safety Recommendations: Recommended speed is 25 km/h for windrowers with castor wheels on the ground. If castor wheels are locked, or if the deck is used, recommended speed is approximately 60 km/h. The windrower should be tied down for long moves or travel over rough roads. Proper flags or a slow moving vehicle sign should be used, according to transport regulations.

Note: This report has been prepared using SI units of measurement. A conversion table is given in APPENDIX III.

GENERAL DESCRIPTION

The Bergen transporter (FIGURE 1) is designed primarily for transporting self-propelled windrowers. The 3.1 m wide, tubular cradle is supported by two wheels and an A-frame hitch.

Windrowers are driven forward up a pair of ramps, which can be adjusted to accommodate various tread widths, until the drive wheels rest in the cradle. Windrowers are transported with the rear castor wheels on the ground.

An optional 3.0 by 4.3 m tilting wooden deck (FIGURE 2) may be fitted for general transporting and hauling jobs.

Detailed specifications are given in APPENDIX I.



FIGURE 2. Optional Wooden Deck.

SCOPE OF TEST

The Bergen transporter was operated over a wide range of conditions varying from rough field trails to paved roads. A variety of self-propelled windrowers were transported over a total distance of about 200 km, while the optional deck was used over a distance of about 600 km while hauling other farm machinery. The Bergen was evaluated for ease of operation and operator safety. In addition, it was subjected to a dynamic load test on an obstacle track.¹

RESULTS AND DISCUSSION

EASE OF OPERATION

Hitching: The Bergen transporter was equipped with a clevis hitch. A large bolt with a safety lock nut was used as a draw-pin. The unloaded hitch weight was 48 kg. No hitch jack was provided.

Towing Vehicle: For most field and road conditions, the loaded transporter was readily 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 load a windrower, the transporter had to be hitched to a suitable towing vehicle. The loading ramps were easily unfolded and positioned manually, to match the windrower wheel tread. No tools were needed.

¹PAMI T7717-R79 Detailed Test Procedures for Windrower Transporters.

Windrowers were loaded by driving forward, up the ramps, until the drive wheels dropped into the cradle. Extensions on the ramps caused them to be automatically raised for transport when the windrower was loaded. Some windrowers did not have sufficient table lift to clear the wheels during loading. For loading these machines, the transporter had to be placed in a small ditch to provide adequate clearance. It is recommended that the manufacturer consider modifications to increase windrower header clearance over the transporter tires to accommodate a wider range of windrowers.

In all cases, the windrower drive wheels seated firmly in the cradle, with little possibility of them bouncing out during transport. The operator should, however, secure the wheels to the cradle for transport on public roads.

The 3.1 m wide cradle was wide enough to accommodate all common windrowers.

Transporting: The Bergen transported well at speeds up to 20 km/h on rough roads and 50 km/h on smooth roads and paved highways. On rough roads, transport speed was limited by windrower bouncing. On smooth roads, transport speed was usually limited by shimmy of the windrower castor wheels. Caution had to be exercised due to the 3.8 m width of the transporter, as the right wheel had to run on the road shoulder, in most instances.

Maneuverability: The Bergen was maneuverable, both loaded and unloaded. Sharp turns and backing were easy. The width of the windrower header established the operating width. As a result, passing vehicles on narrow roads with sharp ditches, created problems due to the overhang of the windrower header. Ground clearance over ridges and road shoulders was adequate.

Unloading: To unload a windrower from the Bergen, the ramps automatically dropped to the ground as the windrower was backed off the cradle. No problems were encountered with drive wheel slippage on the cradle.

Optional Deck: The optional tilting deck was attached to the transporter cradle with 2 U-bolt clamps, which allowed it to pivot about the cradle member. The deck was convenient for transporting components such as small combine headers, provided adequate tie-downs were used. A suitable jack was needed for hitching, when the deck was used, due to the increased hitch weight. Maneuverability was very good, while transport speed was limited only on rough roads. Loading and unloading were convenient, due to the low deck height. The front of the deck was fastened to the hitch frame with the tie-down chains supplied, to prevent inadvertent tilting during transport. It is recommended that the manufacturer consider providing a hitch jack with the optional deck attachment.

OPERATOR SAFETY

The Bergen was safe to operate if normal safety precautions were observed.

Since the transporter was not equipped with brakes, the towing vehicle must have adequate brakes, and be large enough to stop safely in emergency situations.

A slow moving vehicle sign was required at the rear of the windrower during transport on public roads. The windrower header obstructed rear visibility when towing with a small truck. Truck brake lights and rear signal lights were obscured by the windrower. The operator must be responsible for ensuring that adequate signal devices are installed for use on public roads.

The Bergen was equipped with two, 9.5L x 15, 6-ply agricultural implement tires. Tire manufacturer specifications indicated that the tires were capable of supporting a total load of 1800 kg, including the weight of the transporter. This rating was based on maximum speeds of 30 km/h and 220 kPa tire pressure. Large windrowers could result in a load of up to 3000 kg on the tires. This would produce a tire overload of 65% at 30 km/h. Tire overloads of this magnitude should be avoided. Smaller windrowers caused tire overloads in the range of 40%.

With an unloaded hitch weight of 110 kg with the deck attachment, a hitch jack would have improved hitching safety and convenience. When the deck was loaded, the hitch point was very heavy. No safety chains were provided. It is recommended that the manufacturer supply an approved hitch safety chain as standard equipment.

No operating instructions were provided with the Bergen transporter, and due to the simplicity of the machine, there may be little need for them. However, it is recommended that safety

instructions be provided for 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 mechanical failures occurred during functional testing.

In addition, the Bergen 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 the test.

**APPENDIX I
SPECIFICATIONS**

Make:	Bergen	
Model:	Two-wheel	
Overall Dimensions:	<u>with ramps</u>	<u>with optional deck</u>
-- length	6150 mm	5500 mm
-- width	3750 mm	3750 mm
-- height	850 mm	740 mm
-- wheel tread	3490 mm	3490 mm
-- ground clearance	220 mm	240 mm
Cradle:		
-- opening	420 mm	
-- width	3100 mm	
-- height	410 mm	
--material	100 mm square tubing	
Loading Ramps:		
-- width	400 mm	
-- length	2290 mm	
-- angle	12°	
Tires:	two, 9.5L x 15, 6-ply	
Hitch:		
-- type	clevis	
-- pin size	19 mm	
Weight:	<u>with ramps</u>	<u>with optional deck</u>
-- hitch point	48 kg	110 kg
-- transport wheels	294 kg	592 kg
Total	342 kg	702 kg
Optional Deck:		
-- width	3000 mm	
-- length	4290 mm	
-- weight	472 kg	
-- number of wooden planks	9	
-- section size of wooden planks	65 x 240 mm	
-- spacing between planks	75 mm	
-- frame material	80 x 80 mm angle and 65 mm square tubing	

**APPENDIX II
MACHINE RATINGS**

The following rating scale is used in PAMI Evaluation Reports:

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

**APPENDIX III
CONVERSION TABLE**

1 kilometre/hour (km/h)	= 0.6 mile/hour (mph)
1 metre (m)	= 3.3 feet (ft)
1 kilogram (kg)	= 2.2 pounds mass (lb)
1 kilopascal (kPa)	= 0.15 pounds/inch ² (psi)
1 millimetre (mm)	= 0.04 inches (in)



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