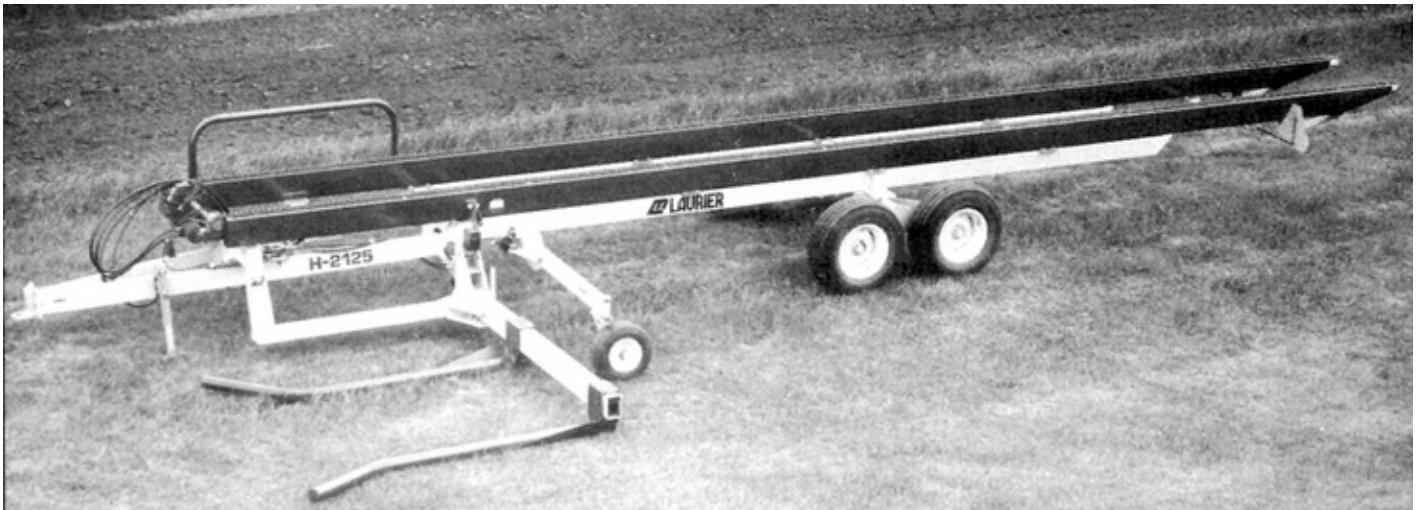


Evaluation Report

593



Laurier H-2125 Round Bale Mover

A Co-operative Program Between



ALBERTA
FARM
MACHINERY
RESEARCH
CENTRE



PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

LAURIER H-2125 ROUND BALE MOVER

MANUFACTURER AND DISTRIBUTOR:

Laurier Manufacturing Ltd.
Box 85
Laurier, Manitoba
R0J 1A0
Telephone: (204) 447-2245

RETAIL PRICE: \$8,100 (f.o.b. Portage la Prairie, MB, March 1989).

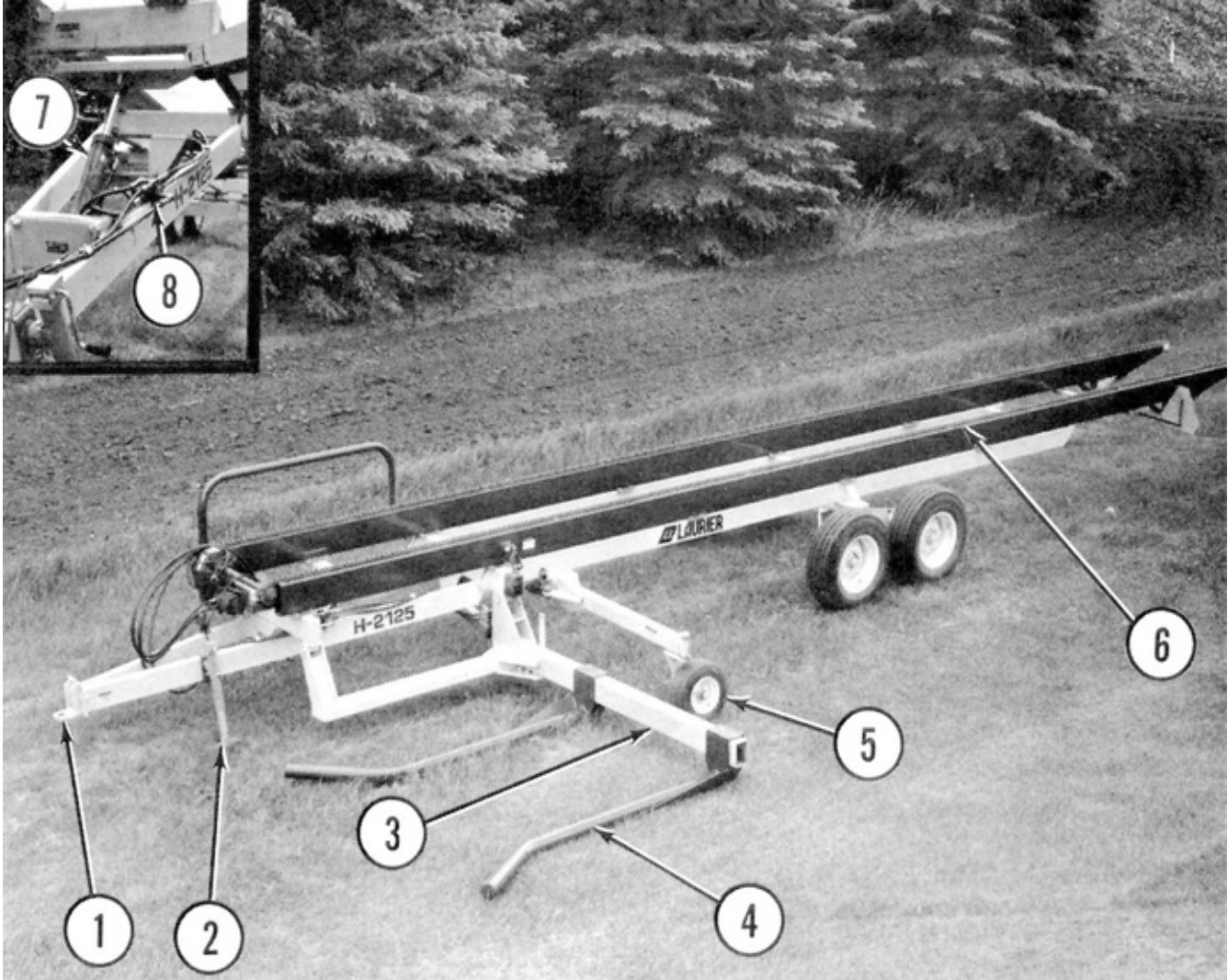


FIGURE 1. Laurier H-2125 Round Bale Mover: (1) Adjustable Hitch, (2) Hitch Jack, (3) Lift Arm, (4) Bale Forks, (5) Outrigger Wheel, (6) Conveyor Chains, (7) Deck Tilt Cylinder, (8) Hydraulic Valves.

SUMMARY

Rate of Work: The Laurier 2125 could be loaded with six round bales in about seven minutes, if the bales were situated in close proximity to each other in the field. Loading performance was limited by time required to operate the hydraulic functions, distance the bales were apart, field roughness, operator experience and dexterity. Backing to the previous load and unloading took about four minutes.

The Laurier 2125 allowed room for six bales 6 ft (1.8 m) in length, and seven bales 5 ft (1.5 m) in length. Assuming an average bale weight of 1500 lbs (680 kg) the wagon would carry 4.5 tons (4.0 t) in a single load.

Quality of Work: The quality of work was good. The Laurier 2125 was gentle with the bales and did not break twine during loading. Sometimes twine was damaged when hauling long distances over rough ground. The sharp edges of the conveyor chain would sometimes cut the twine. Bales were picked from the field and unloaded in a different orientation from which they were in the field.

Ease of Operation and Adjustment: Ease of operation and adjustment was very good. The machine effectively retrieved round bales as they sat in the field with very little operator experience. Unloading was easy.

Adjusting the Laurier consisted of tensioning the bale bed conveyor chains and adjusting the width of the bale forks. Each adjustment was simple and straightforward.

Power Requirements: The Laurier 2125 required a towing vehicle with dual remote hydraulic outlets capable of supplying 1500 psi (10.3 MPa) and a 12 volt electrical supply. The bale mover was designed to be operated with a tractor or truck. The Laurier 2125 was effectively operated with a 72 hp (54 kW) tractor.

Operator Safety: Operator safety was very good. The Laurier 2125 was safe to operate if normal safety precautions were followed.

Operator's Manual: The operator's manual was good. It was well written and illustrated and contained useful information on parts, assembly, operation, maintenance, safety and warranty.

Mechanical History: A few mechanical problems were noted during the test period. The stabilizing outrigger wheel separated from its mounting, and the deck tilt cylinder mounting lug tore loose.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. A modification to facilitate attachment of the loading apparatus on the right or left hand side of the machine.
2. Strengthening the deck tilt cylinder attachment to the main frame.
3. A modification that would prevent the stabilizer wheel from separating from its mounting.

THE MANUFACTURER STATES THAT:

With regard to recommendations: (1 - 3)

1. Presently considering moving the loading apparatus to the right hand side for tractor operation.
2. Deck tilt cylinder attachment will be strengthened on current production machines.
3. A modification to the attaching weld has been implemented on current production machines.

Station Manager: G.M. Omichinski

Project Technologist: R.K. Harris

GENERAL DESCRIPTION

The Laurier 2125 round bale mover is a self loading, tilting, single row, four wheel trailer. It is designed to retrieve, transport, place and reload round bales. Suspension is arranged two wheels per side in a walking beam design. The Laurier 2125 is intended for use with either a truck or tractor as the towing vehicle. The towing vehicle must have dual remote hydraulic outlets capable of supplying 1500 psi (10.3 MPa) and a 12 volt electrical source.

Bales are picked up on the left side of the machine by a hydraulic lift arm and placed on the single bale bed. An outrigger arm with a wheel automatically extends on the left side to prevent the bale mover upsetting while the first one or two bales are loaded. An orbit motor driving twin conveyor chains moves the bales to the rear, so that more bales can be loaded. The single bale bed holds 6 or 7 bales, depending on the size of the bales. For unloading, the bed is hydraulically tilted and the conveyor chains are activated. The chains carry the bales off the beds. Bales can be reloaded by tilting the bed and backing into the row of bales with the conveying chains moving in reverse.

Detailed specifications are presented in APPENDIX I.

SCOPE OF TEST

The Laurier 2125 was operated in typical prairie fields for 116 hours while moving approximately 3500 bales. It was evaluated for rate of work, quality of work, ease of operation and adjustment, power requirements, operator safety, and suitability of the operator's manual. The purpose of the test was functional performance, and an extended durability test was not conducted. However, mechanical problems were noted throughout the evaluation. TABLE 1 outlines the operating conditions.

TABLE 1. Operating conditions.

CROP	HOURS	BALES	FIELD CONDITIONS
Native grasses	18	200	Some rough fields with large stones
Alfalfa	69	2700	Usually smooth fields
Brome & Timothy	10	200	Soft, with ditches & stones
Straw	19	400	Smooth crop land
TOTAL	116	3500	

RESULTS AND DISCUSSION

RATE OF WORK

Rate of work was dependent on the roughness of the field, hydraulic cycling time, crop proximity, experience and dexterity of the operator. The condition of the field determined comfortable ground speed, reducing the rate of work when operating on rough ground. If bales were placed close together, the operator had to slow down or stop until the hydraulic operating sequences were completed. In general, the Laurier 2125 could be fully loaded in about 7 minutes, and could be unloaded in about 4 minutes.

Capacity: The Laurier 2125 had a load capacity of 4.5 tons (4.0 t) if the four 9 x 15LT tires were inflated to 60 psi (414 kPa) and the travel speed was limited to normal agricultural speeds of 25 mph (40 km/h) maximum. The 33.4 ft (10.2 m) bale bed allowed room for 6 bales, 6 ft (1.8 m) in length or 7 bales, 5 ft (1.5 m) in length. The lift arm was capable of lifting 2620 lb (1190 kg). The Laurier 2125 was stable when operated across rough terrain.

QUALITY OF WORK

Quality of work was very good. The Laurier 2125 did not impart aggressive action to the bales during loading. The loading action rotated the bales, placing them on the bale bed in a different orientation from which they sat on the ground. During loading, the bales rolled from the lift arm forks onto the bale bed with the ground flattened spot in the up position and the previously weathered spot down. In this position the bales would have less ability to shed moisture. Sometimes during transport over rough terrain the sharp edges of the conveyor chain would cut twine if the bales were allowed to bounce on the bed. Reducing ground speed lessened the amount of twine damage. The Laurier 2125 was effective in unloading bales in straight neat wind-rows.

EASE OF OPERATION AND ADJUSTMENT

Hitching: Ease of hitching was good. The Laurier 2125 was equipped with an adjustable tongue hitch that allowed 8 in (203 mm) of vertical adjustment. The hitch height was adjusted by removing two bolts, moving the hitch tongue to the desired position and replacing the bolts. Hitch tongue adjustment was easy and took one person about 5 minutes. A hitch jack was provided to raise the hitch tongue to drawbar height. A suitably sized pin and locking device made the hookup reliable and safe. The Laurier 2125 was not supplied with a hitch safety chain. Hookup was completed by connecting four hydraulic hoses to the remote couplers of the towing vehicle and connecting the 12 volt power lead to a suitable power source. The power lead was equipped with an integral switch that was located within the operator's reach.

Loading: Ease of loading was very good. The Laurier 2125 was placed in field position by removing the lift arm safety lock and lowering the lift arm to the ground. Bales were approached with their longitudinal axis parallel to the direction of travel (FIGURE 2). Just before the first bale was picked up, the bale forks were adjusted to ensure their proper width for the size of bales being handled. The lift forks adjustment was accomplished by loosening the bolts that hold the forks in place on the lift arm, and sliding the forks to the desired position. Once the forks were located in the desired position, they were locked in place by tightening the bolts. Adjusting the lift forks was easy and took one person about 5 minutes. The Laurier 2125 was moved ahead until the bale contacted the lift arm, the lift arm was raised and the bale rolled from the forks to the bale bed. The hydraulic motor was activated and the conveyor chains moved the bale to the rear to make room for another bale. This process was continued until the load was completed.

The lift arm and bale fork were located on the left hand side of the machine so that if a truck were used as the towing vehicle, the operator would be able to see the bale as it was loaded. However, this contributed to operator fatigue when the Laurier 2125 was used with a tractor. The hydraulic controls of most tractors are situated on the right hand side of the operator's station and the operator had to turn uncomfortably in the seat to operate the controls and watch the bale being loaded. It is recommended that the manufacturer consider a modification to facilitate attachment of the loading apparatus on the right or left hand side of the machine.



FIGURE 2. Approaching Bales.

Unloading: Ease of unloading was very good. Before unloading, the lift arm was lowered slightly so that the arm would not interfere with bales as they were moved off the bale bed. The switch that controlled the flow of oil between the lift cylinder and the deck tilt cylinder was energized and the deck was tilted slightly to allow some visibility to the rear. The bale mover was backed and stopped about 24 in (600 mm) from the previously unloaded bales. The deck was then tilted to its maximum, the tractor placed in its slowest forward gear and the conveying chains were engaged. The tractor was allowed to move forward at the same speed as the conveying chains were carrying the bales off the bale bed. Once the bales were clear of the bale bed, the deck was returned to the load/transport position and unloading was completed. It took about four minutes to completely unload the bale mover.

Reloading: Ease of reloading was fair. The Laurier 2125 was capable of reloading bales from the rear. The deck was tilted to the maximum elevation and the conveying chains were activated in reverse. The bale mover was backed into the windrow of bales and they were drawn up onto the bale bed. When bales were reloaded in this manner, significant twine damage resulted.

Transporting: Transporting was very good. When transporting the lift arm should be raised to its maximum height to reduce the overall width. Care had to be taken when transporting on busy roads as visibility to the rear was restricted. In general the Laurier 2125 was gentle with the bales and crop losses were minimal. Sometimes when transporting straw bales over rough terrain, the edges of the conveyor chains would cut the twine if the bales were allowed to bounce. Reducing the ground speed eliminated the damaged twine. The Laurier 2125 provided good flotation over most fields and was stable when working on hill sides or ditches. The Laurier 2125 was maneuverable and was easy to back to previously unloaded bales. The Laurier 2125 towed very well at speeds up to 25 mph (40 km/h), however PAMI suggests speed should not exceed 18 mph (29 km/h) in order to stop within 50 ft (15.2 m), when towed with a 72 hp (56 kW) tractor, in accordance with ASAE Standard S365.1T for safety.

Conveyor Chains: Ease of adjusting the conveyor chains was very good. The Laurier 2125 was equipped with dual conveyor chains to move bales to the rear. The chains were driven by a hydraulic motor, and required tension adjustments at the start of each work day. Adjustments were easy and consisted of turning the adjustment nuts located in the bed rails at the rear of the machine (FIGURE 3). Adjusting the chain tension took one person about 5 minutes per chain.

Lubrication: Ease of lubrication was very good. Lubrication on the Laurier 2125 was easy and consisted of greasing the eight pressure nipples at the start of each work day. In addition, the conveyor chains were brushed with used motor oil at the start of each work day.

POWER REQUIREMENTS

ASAE Standard S365.1T (Brake Test Procedure and Brake Performance Criteria For Agricultural Equipment), states that the weight of the towed equipment should not exceed the weight of the towing vehicle. The operator's manual suggested a tractor of at least 60 hp (45 kW) to safely operate the Laurier 2125. PAMI effectively operated the bale

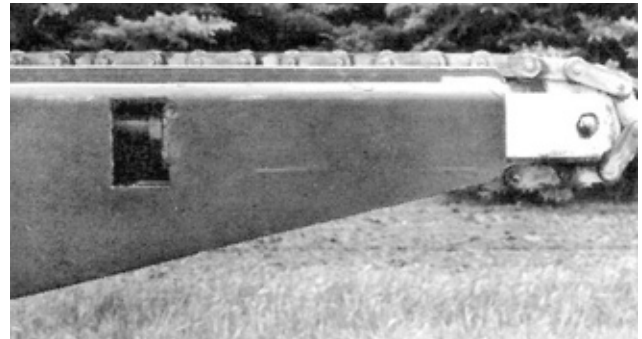


FIGURE 3. Conveyor Chain Adjustment.

mover with a 72 hp (54 kW) tractor. At a speed of 6 mph (10.4 km/h) it took 7.7 hp (5.8 kW) to keep the fully loaded bale mover rolling on a firm alfalfa field. The Laurier 2125 required two remote hydraulic outlets capable of supplying 1500 psi (10.3 MPa) and a 12 volt electrical source. One circuit was required to operate the hydraulic cylinders, and the other was used to operate the hydraulic motor for the conveyor chains. The lift arm and bale fork were powered by one double acting cylinder. The outrigger was positioned by a double acting cylinder that was plumbed into the circuit that controlled the lift arm. In addition, the deck was tilted by a double acting cylinder. One solenoid valve controlled the flow of oil between the deck cylinder and the lift arm cylinder and was energized by a selector switch that was positioned within the operator's reach. The conveyor chains were powered by a hydraulic orbit motor and were controlled from the operator's station.

OPERATOR SAFETY

Overall operator safety was very good if normal safety precautions were followed by the operator. Extreme care should be exercised when transporting on busy public roads as visibility to the rear is obscured by the load of bales. Additionally, when backing to an unloading site the operator should dismount the cab and check the area for obstructions. The fully loaded bale mover could be brought to a full stop in 29 ft (8.8 m) when traveling at 15 mph (24 km/h) on a paved surface, and towed with a 72 hp (54 kW) tractor. The test machine was equipped with a slow moving vehicle sign of the proper dimensions and decals were in place that would warn operators or bystanders of danger zones. The Laurier 2125 conformed with ASAE Standards for Safety..

OPERATOR'S MANUAL

The operator's manual supplied with the test machine was good.

The book was well written and illustrated and contained useful information on parts, assembly, operation, maintenance, safety and warranty.

MECHANICAL HISTORY

The Laurier 2125 was operated for 116 hours in varying conditions and crops. During that period only a few mechanical problems were observed. The intent of the test was a functional evaluation and an extended durability test was not conducted. TABLE 2 outlines the mechanical history.

TABLE 2. Mechanical History

ITEM	HOURS	BALES
Frame crossmember failed where deck tilt cylinder attaches and was repaired at:	40	450
Outrigger wheel fell off and was repaired at:	62 & 89	2500 & 3000
Conveyor chain link failed and was repaired at:	98	3300

DISCUSSION OF MECHANICAL HISTORY

Frame: The hitch crossmember failed where the deck tilt cylinder mounting lug attaches (FIGURE 4). Repairs took one person about 2 hours. It is recommended that the manufacturer consider strengthening the deck tilt cylinder attachment to the main frame.

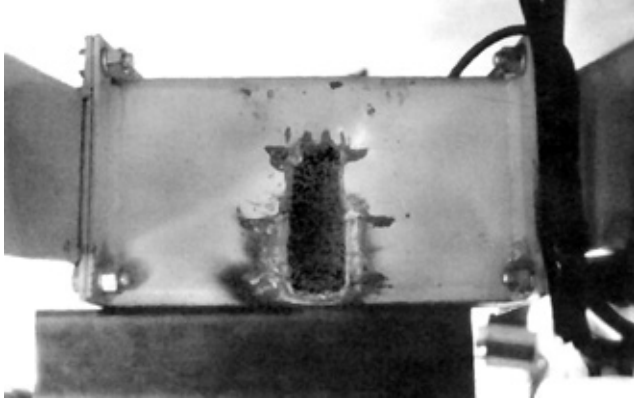


FIGURE 4. Failed Crossmember.

Outrigger Wheel: The outrigger wheel fell off on two separate occasions. It was held in place by a collar that fit over the pivot shaft of the castoring wheel and a pin that prevented the collar from coming off. The pin broke and was replaced with a grade 8 bolt. It is recommended that the manufacturer consider a modification that would prevent the stabilizer wheel from separating from its mounting. It took one person about 15 minutes to affect repairs.

Conveyor Chain: At 98 hours one conveying chain link failed. It took one person about 1 hour to repair.

APPENDIX I

SPECIFICATIONS

MAKE: LAURIER

MODEL: H-2125

SERIAL NUMBER: H2134

OVERALL DIMENSIONS:

- length	37.7 ft	(11.5 m)
- road width	7.5 ft	(2.4 m)
- field width	13.9 ft	(4.2 m)
- bed height	3.2 ft	(1.0 m)
- bed length	33.5 ft	(10.2 m)
- bed rail width	30.0 in	(762 mm)
- ground clearance at axles	13.0 in	(335 mm)

SUSPENSION:

- walking beam	
- tires	four, 9 x 15 LT

HYDRAULICS:

Fork and lift arm cylinder:

- bore	3.5 in	(90 mm)
- retracted length	23.3 in	(590 mm)
- extended length	36.3 in	(920 mm)
- stroke	13.0 in	(330 mm)

Stabilizer wheel cylinder:

- bore	3.3 in	(85 mm)
- retracted length	20.3 in	(515 mm)
- extended length	28.3 in	(718 mm)
- stroke	8.0 in	(203 mm)

Bed Tilt Cylinder:

- bore	3.5 in	(90 mm)
- retracted length	20.5 in	(520 mm)
- extended length	32.5 in	(825 mm)
- stroke	12.0 in	(305 mm)

Hydraulic Controls:

- type	Electrically activated solenoid.
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Orbit Motor:

- make	Roller Stator
- displacement	17.9 cu in/rev (293 cc/rev)

WEIGHT:

- left wheels	1642 lb	(745 kg)
- right wheels	924 lb	(419 kg)
- hitch	913 lb	(414 kg)

TOTAL: 3479 lb (1578 kg)

LIFT ARM: 2620 lb (1190 kg)

LOAD: 4.5 tons (4.0 t)

CAPACITY: 6 bales 6 ft (1.8 m)
7 bales 5 ft (1.5 m)

BED TILT: 10 degrees

CONVEYOR CHAINS MATERIAL: ANSI C 2060 H

APPENDIX II

MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports:

Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

SUMMARY CHART

LAURIER H-2125 ROUND BALE MOVER

RETAIL PRICE:	\$8100.00 (March, 1989 f.o.b. Laurier, MB.)
RATE OF WORK:	In general, it took about 7 minutes to load and about 4 minutes to unload.
Capacity	Six bales 6 ft (1.8 m) in length; seven bales 5 ft (1.5 m) in length; would carry 4.5 tons (4.0 t).
QUALITY OF WORK:	Very Good; did not impart aggressive action to the bales.
EASE OF OPERATION & ADJUSTMENTS:	
Hitching	Good; Hookup was reliable and safe, hitch height was adjustable.
Loading	Very Good; Bales were easily picked up.
Unloading	Very Good; Could be unloaded in about 4 minutes.
Reloading	Fair; effectively reloaded bales but damaged twine.
Transporting	Very Good; minimal crop loss.
Conveyor chains	Very Good; Effective and non-aggressive. Chains were easily adjusted.
Lubrication	Very Good; easy to lubricate.
POWER REQUIREMENTS:	PAMI effectively operated with 72 hp (54 kW) tractor with two remote hydraulic outlets and 12 volt power source.
OPERATOR SAFETY:	Very Good; was safe to operate.
OPERATOR'S MANUAL:	Good; Contained useful information.
MECHANICAL HISTORY:	Only a few small problems occurred during 116 test hours.



**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