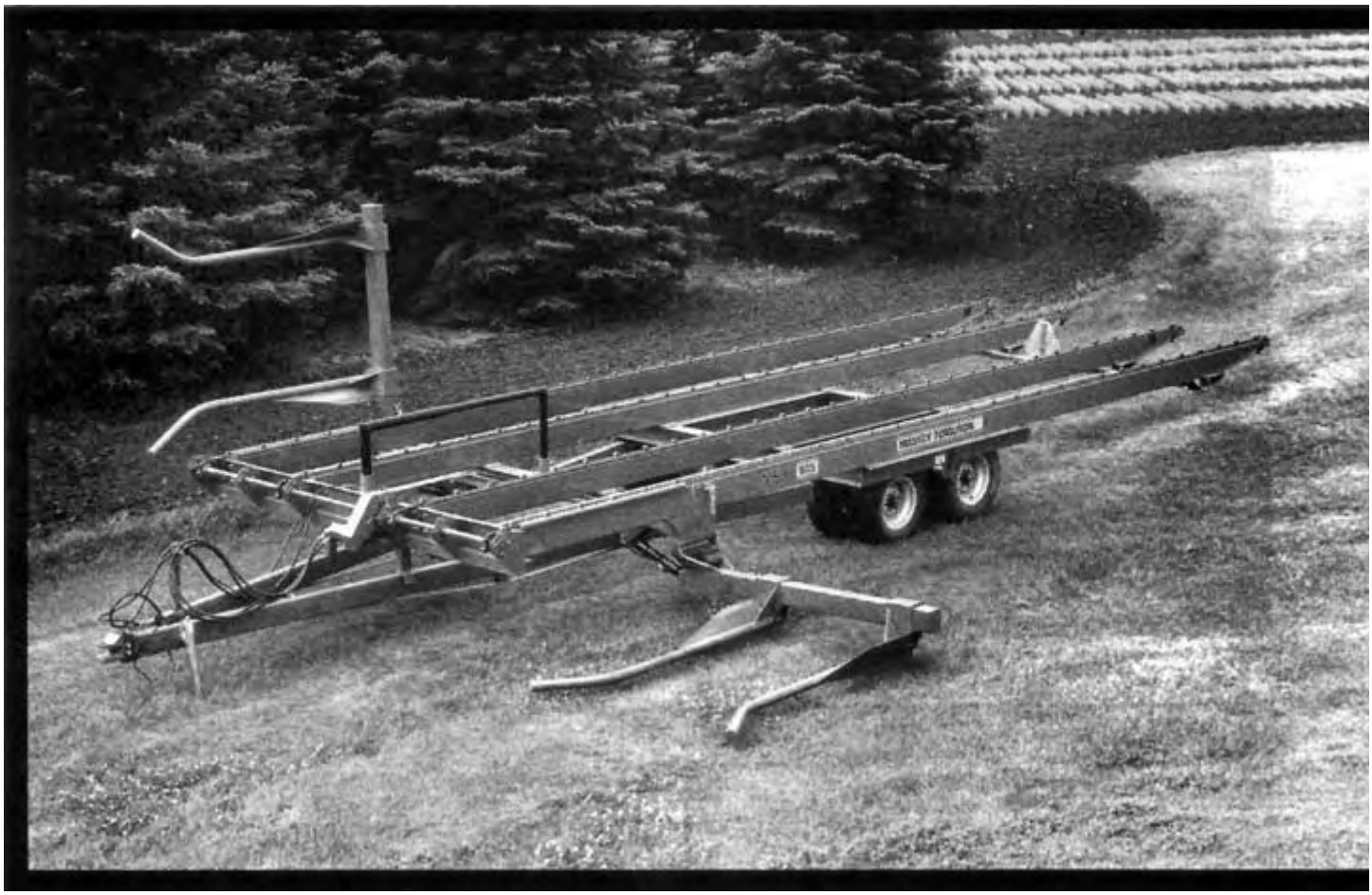
Printed: March, 1986
Tested at: Portage la Prairie
ISSN 0383-3445

# Evaluation Report 485



## Massey Ferguson 505 Round Bale Mover

A Co-operative Program Between
ALBERTA FARM MACHINERY RESEARCH CENTRE
PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

## MASSEY FERGUSON ROUND BALE MOVER

**MANUFACTURER AND DISTRIBUTOR:**

Greenbelt Farm Systems Inc.
3 Winfield
Winnipeg, Manitoba
R2R 1V8

**RETAIL PRICE:**

$12,724.00 (October 1985 fob Winnipeg Manitoba)

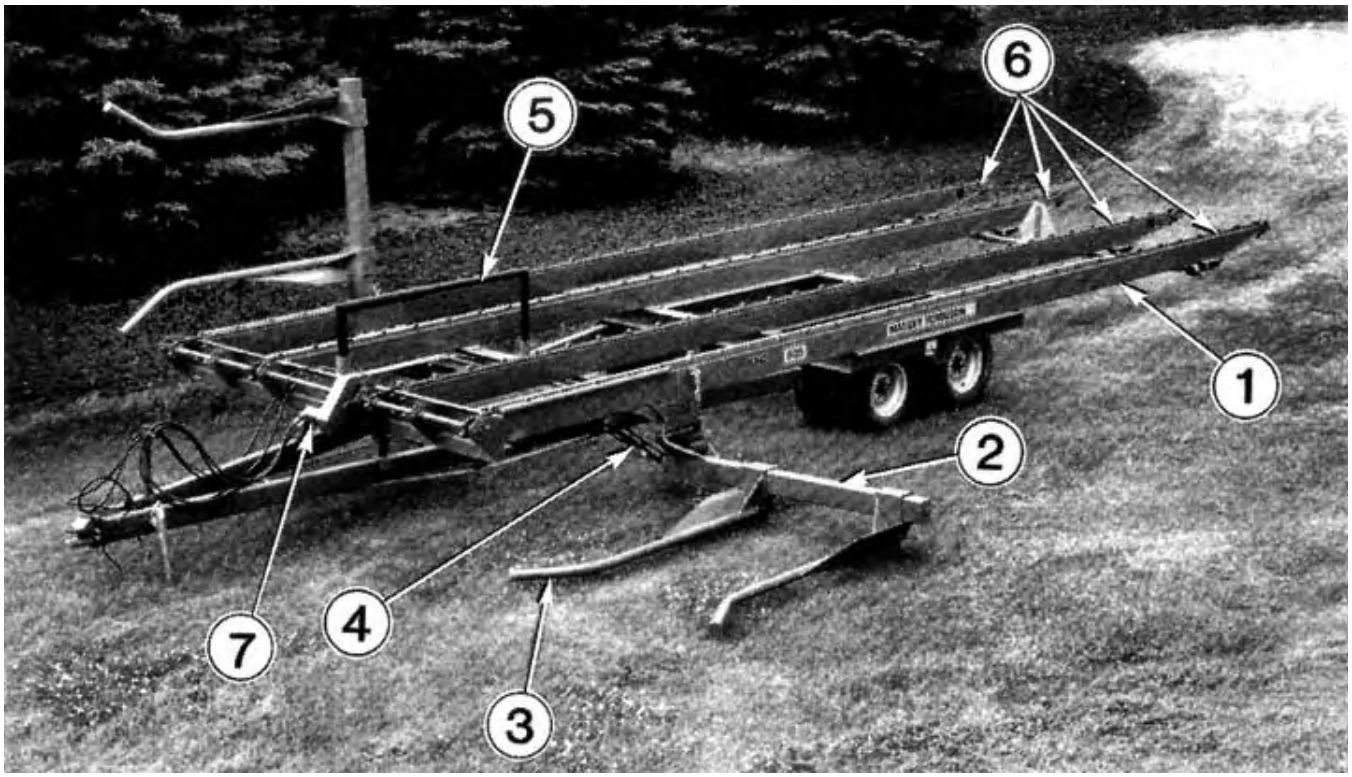



**FIGURE 1.** Component Parts: (1) Load Rails, (2) Lift Arms, (3) Bale Forks, (4) Lift Arm Cylinders, (5) Roll Bar, (6) Conveyor Chains and (7) Orbit Motor.


### SUMMARY

**Ease of Operation and Adjustment:** The Massey 505 bale mover was easy to operate. Operators required about 2 hours of operational time to become familiar with the controls and necessary procedures in order to load/unload bales in an orderly manner.

Bale forks had to be adjusted to be compatible with different sizes of bales. Two setscrews on each bale fork were loosened and the bale forks were moved along the lift arms to accommodate varying bale sizes.

Conveyor chain tensions were individually adjustable from the rear of the bale mover.

**Capacity:** The Massey Ferguson 505 round bale mover has a load capacity of 17,000 lb (7711 kg). The 30 ft (915 m) deck allowed space for 12 bales 5 ft (1.5 m) long or 10 bales 6 ft (1.8 m) long.

**Quality of Work:** The Massey 505 round bale mover's performance rated very good in all conditions. The Massey was effective in retrieving and moving round bales of all sizes. Operator experience was needed before bales could be loaded or unloaded in a continuous, uniform and orderly manner.

Crop losses and bale damage were very slight if well formed bales were handled. Some twine damage occurred when older ovate bales were loaded/unloaded.

**Rate of Work:** In average field conditions, it took an experienced operator about 13 minutes to load 10 bales. The Massey 505 towed very well at speeds of 18 mph (29 km/h) when fully loaded. Unloading took about 3 minutes.

**Power Requirements:** Tractors of at least 75 hp (56 kW) were required to safely operate the Massey in most field conditions.

**Operator Safety:** The Massey 505 was safe to operate as long as usual safety precautions were followed and a tractor of sufficient size and weight was used.

**Operator's Manual:** The operator's manual was well organized and contained useful information on assembly, warranty, operation, servicing and parts.

**Mechanical History:** The implement jack was damaged from tractor wheel contact. The hitch truss failed due to fatigue at the end of the test.


### RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifications to the roll bars, which would prevent the front bar from dislocating.
2. Relocation of the implement jack that would prevent contact with the tractor wheel.
3. Modifications to the ends of the bale forks so they would not snag the bale twine.

*Senior Engineer: G. M. Omichinski*
*Proiect Technologist: R. K. Harris*

### THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. This change has already been incorporated for 1986 production at the same time further reinforcing the front drive beam.
2. We appreciate your bringing this to our attention. The jack location can and will be moved.
3. This one is a little more difficult. Fabricating a point on a 3" pipe is expensive and would not keep the twine from getting outside the fork. We are considering a slightly longer fork and making a wider flare at the open end.

## GENERAL DESCRIPTION

The Massey 505 round bale mover is a self-loading, tilting twin bed, eight wheel trailer with four axles. Suspension is arranged four wheels per side, in a walking beam design. It is intended for use with a tractor of at least 75 hp (57 kW) with dual hydraulics. Bales are picked up on either the left or right, with hydraulically operated forks, which place the bales lengthwise on either bed. A hydraulic orbit motor driving twin chains per bed, move the bales to the rear, so that more bales can be loaded.

The twin beds consist of two chain rails spaced at 35 in (900 mm) each, 30.8 ft (9.4 m) in length. Each bed holds five bales. For unloading, the beds are tilted and the unloading chains are moved in reverse. The chains carry the bales off the rear of the beds.

## SCOPE OF TEST

The Massey 505 was operated in typical prairie fields (TABLE 1) for 240 hours, while moving approximately 3000 bales. It was evaluated for ease of operation and adjustment, quality of work, operator safety, and suitability of the operator's manual.

**TABLE 1.** Operating Conditions

| Crop | Hours | Field Conditions |
|---|---|---|
| Native Grass | 20 | Rough, with drainage ditches |
| Alfalfa | 120 | Moderately smooth |
| Barley Straw | 10 | Soft, Smooth |
| Wheat Straw | 90 | Soft, Smooth |

## RESULTS AND DISCUSSION

### EASE OF OPERATION AND ADJUSTMENT

**Hitching:** The Massey 505 was equipped with an adjustable clevis hitch, and an implement jack to raise the hitch to the proper height. A properly sized hitch pin with a suitable locking device, made the hook-up reliable and safe. Four hydraulic hoses had to be attached to the tractor. The Massey 505 was equipped with electrically controlled solenoid valves that control the flow of oil from the tractor to the various cylinders. An electrical selector switch for the solenoid valves had to be installed within reach of the operator.

**Loading:** The Massey 505 was placed in field position by removing the lift arms locking chains. The selector switch was moved to either the left or right position, depending on which side is to be loaded first. Bales were approached with the axis of the bale parallel to the direction of travel. As the bale was approached, the bale forks were lowered so they just cleared the ground. Being certain that the bale was centred on the bale, the forks were raised when the bale touched the fork back brace. The bale rolled from the forks onto the bed. The fork was then moved down to about 45°, so that it would not interfere with the bale when it was moved rearward. The selector switch was moved to the opposite side, and the opposite side was loaded in a like manner. Once a bale was positioned on each bed, the chains were actuated, moving the bales rearward just enough to leave room for two more bales. This procedure was repeated until the loading was complete.

Operator experience was required before bales could be loaded non-stop and to prevent gaps in the load. Bales that were not lined up with their axis parallel to the direction of travel were sometimes knocked askew and tumbled onto their ends.

On some occasions the blunt ends on the bale forks snagged twine while they were sliding under the bale. It is recommended that modifications be made to the ends of the bale forks to prevent twine from snagging.

The Massey 505 can also be loaded from the rear. In order to do this the deck was tilted and the conveyor chains activated to forward rotation. The machine was then backed into the bale, and the aggressive action of the conveyor chains dragged the bale onto the bale beds. Bales loaded in this manner were subject to twine damage.

Conveyor chain tensions frequently required adjustment. This adjustment was easily accomplished by tightening the adjusting nuts provided at the rear of the machine (FIGURE 2).

**Capacity:** The Massey 505 round bale mover has a load capacity of 17,000 lb (7711 kg). The 30 ft (9.15 m) deck allowed space for 12 bales, 5 ft (1.52 m) long or 10 bales 6 ft (1.82 m) long. However, when the Massey was loaded with 12 bales the load was unstable and rough field conditions sometimes caused the two rear bales to fall off.

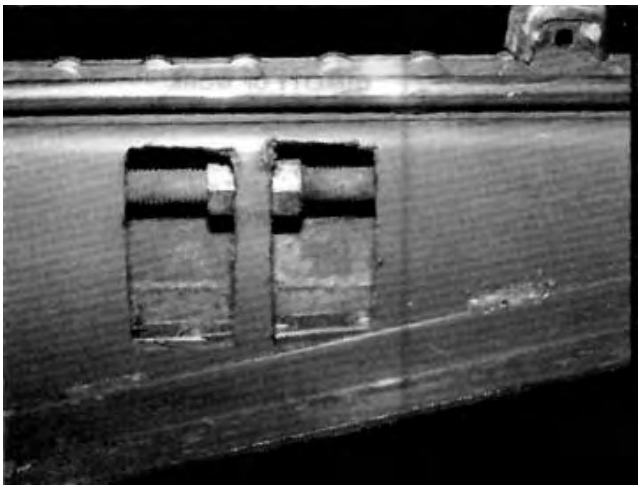


**FIGURE 2.** Chain Adjuster.

### QUALITY OF WORK

The Massey 505 rotated bales during loading, placing them on the beds in a different orientation from which they sat on the ground. During loading, the bales rolled from the lift forks onto the beds resulting in the previously weathered side placed down, and the ground-flattened spot placed up. In this position, bales would have less ability to shed moisture, tending to have increased spoilage. The Massey 505 was effective in unloading bales in straight, neat windrows. Distance between bale circumferences depended on the size of the bales being handled. Some twine damage was encountered when unloading. Both the quality of work and the rate of work were very dependent on operator experience.

### RATE OF WORK

TABLE 2 gives the average time required to load, transport and unload ten firm and well formed bales.

**TABLE 2.** Average Time Required to Load.

| | |
|---|---|
| Travel and Unload Load 10 bales | 13.0 min |
| Travel 1/2 mi (0.8 km) and back to stack | 8.5 min |
| Unload 3 | .0 min |
| TOTAL: | 24.5 min |

This table gives the average time, based on 10 trips or 100 bales. The field surface was fairly smooth, allowing a ground speed of about 14 mph (22.5 km/h). The operator had about 10 hours of experience on this machine.

**Transporting:** When fully or partially loaded, the lift arms should be raised as high as possible, to reduce the overall width of the machine, and to allow attachment of the safety chains (FIGURE 3). Extreme care had to be taken when transporting on busy roads and highways, as rear visibility was limited. The Massey 505 towed very well at speeds up to 20 mph (32 km/h).

**FIGURE 3.** Safety Chain.

**Unloading:** Before unloading, the lift arms were lowered slightly, so they would not interfere with the two front bales when moving rearward. The selector switch was moved to the “deck” position and the deck was tilted about halfway up, in order to provide some visibility when backing to the stack. It is recommended that the operator dismount the tractor and check the unloading area for obstructions, as visibility was limited.

The Massey 505 bale mover was unloaded by backing up and stopping about 2 ft (610 mm) away from the previous unloaded bales. The deck was then raised to its full height and the conveyor chains activated in the reverse direction. As the bales were moved off the trailer, they butted against the previous load and started to push the Massey 505 and tractor ahead. It was necessary to engage the tractor in a slow forward speed to aid the conveyor chain and to prevent twine and bale damage. When all bales are unloaded, the chains were stopped and the deck lowered to the Load/Transport position. The Massey 505 came equipped with a roll bar, positioned at the front of the deck between the two beds. The purpose of this roll bar is to prevent bales from rolling off the bed and jamming into the space between the two beds. Sometimes during a trip back to the field, this bar would jump from its socket and swing to one side (FIGURE 4). The operator had to stop and reposition this bar. It is recommended that the manufacturer make modifications to prevent this bar from coming out of position.

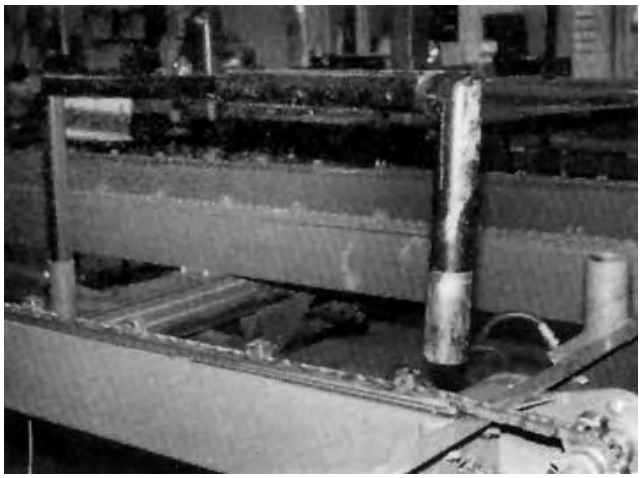


**FIGURE 4.** Dislocated Roll Bar.

## POWER AND HYDRAULIC REQUIREMENTS

The Massey 505 required a tractor of at least 75 hp (56 kW) equipped with dual hydraulics. Although smaller tractors had sufficient power to pull the fully loaded bale mover, they did not have enough weight to maintain positive control.

## OPERATOR SAFETY

The Massey 505 was safe to use, if normal safety precautions were observed. During transport, extreme care should be exercised when operating on busy public roads as visibility to the rear is obscured. Additionally, when backing to an unloading site, the operator should dismount the tractor cab and check the area for obstructions. As the Massey did not have trailer brakes, considerable distance was required to bring its 17,000 lb (7727 kg) mass to a stop. As a result it was determined that the 60 hp (45 kW) minimum tractor recommendation of the manufacturer was not of sufficient weight to safely handle the bale mover.

## OPERATOR’S MANUAL

Assembly instructions, a complete parts list as well as schematics for hydraulic and electrical connections were provided. The manual also contained useful information on adjustment, operation and safety.

## MECHANICAL HISTORY

The Massey 505 was operated for 240 hours under typical prairie conditions. During this period two mechanical problems were encountered. The implement jack was damaged when it came in contact with the tractor wheel during a tight turn to the left. It is recommended that the implement jack and mount be moved further back on the hitch (FIGURE 5), beyond the reach of the tractor wheel.

Additionally, a strap, which was used to form a truss under the hitch tongue failed due to fatigue. It was rewelded and no further problems occurred (FIGURE 6).

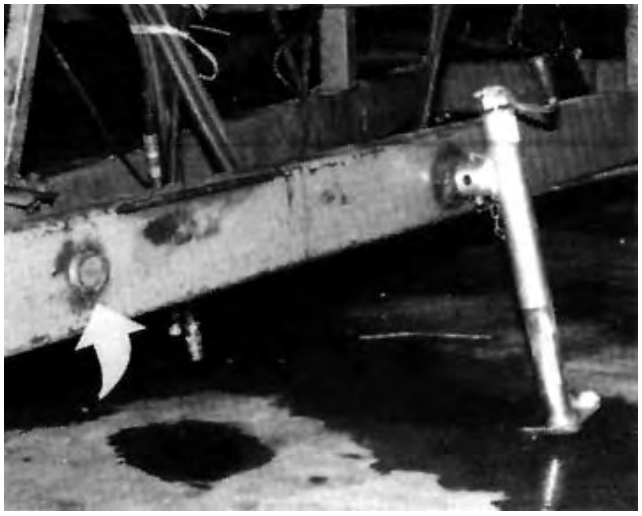


**FIGURE 5.** Relocated Implement Jack (arrow indicates original position which allowed interference with the tractor wheel).

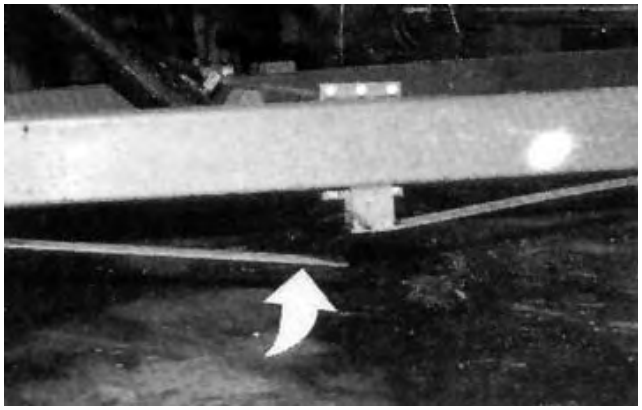


**FIGURE 6.** Broken Hitch Truss.

**APPENDIX I**
**SPECIFICATIONS:**

| | |
|---|---|
| **MAKE:** | Massey Ferguson |
| **MODEL:** | 505 |
| **SERIAL NUMBER:** | 000110 |
| **OVERALL DIMENSIONS:** | |
| -- length | 38.1 ft (11.6 m) |
| -- road width | 14.8 ft (4.5 m) |
| -- field width | 23.8 ft (7.27 m) |
| -- bed height | 4.8 ft (1.48 m) |
| -- bed length | 30.8 ft (9.39 m) |
| -- bed rail width centre to centre | 35 in (989 mm) |
| -- ground clearance | 9.2 in (233 mm) |
| **TIRES:** | eight, 11L-15 |
| **SUSPENSION:** | walking beam tandems |
| **HYDRAULICS:** | |
| -- fork cylinders | |
| -bore | 1.5 in (38 mm) |
| -stroke | 14 in (360 mm) |
| -retracted length | 21.5 in (550 mm) |
| -extended length | 36 in (910 mm) |
| -- bed cylinders | |
| -bore | 1.5 in (38 mm) |
| -stroke | 21.5 in (550 mm) |
| -retracted length | 30 in (760 mm ) |
| -extended length | 4.3 ft (1.31 m) |
| -- orbit motor displacement | 10 $in^3$/rev |
| **WEIGHT:** | |
| -- Empty | 6400 lbs (2909 kg) |
| -- Gross | 23009 lbs (10454 kg) |

| TRACTOR REQUIREMENTS: | |
|---|---|
| -- manufacturer's recommended minimum size | 60 hp (45 kW) |
| -- hydraulics | Dual remote |

**APPENDIX II**
**MACHINE RATINGS**

The following rating scale is used in Machinery Institute Evaluation Reports:

| | |
|---|---|
| Excellent | Fair |
| Very Good | Poor |
| Good | Unsatisfactory |

# SUMMARY CHART

# MASSEY FERGUSON 505 ROUND BALE MOVER

| | |
|---|---|
| **RETAIL PRICE** | $12,724.00 (October 1985, f.o.b. Winnipeg, Manitoba) |
| **EASE OF OPERATION** | **Good;** once an operator became proficient, the Massey 505 was easy to use. |
| **QUALITY OF WORK** | **Very Good;** very little hay loss or twine damage was experienced if bales were firm and well formed. |
| **RATE OF WORK** | **Very good;** very dependent on operator dexterity and experience. The high load capacity of 17,000 lbs (7727 kg) made high rates of work possible. |
| **POWER REQUIREMENTS** | 75 hp (56 kW) minimum. Smaller tractors have enough power to draw and operate but not enough weight to effectively control bale wagon in a sudden stop situation. |
| **OPERATOR SAFETY** | Safe to use if safety precautions were followed and a tractor of sufficient size and weight were used. |
| **OPERATOR'S MANUAL** | **Very Good;** well written, organized and illustrated. |
| **MECHANICAL HISTORY** | Implement jack interfered with the tractor wheel during tight turns to the left. Hitch truss strap failed due to fatigue. |

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