

Evaluation Report

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Massey Ferguson 885 Self-Propelled Windrower

A Co-operative Program Between



MASSEY FERGUSON 885 SELF-PROPELLED WINDROWER

MANUFACTURER:

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RETAIL PRICE:

\$44,220.00 (February, 1986, f.o.b. Humboldt with 30 ft (9.1 m) double-windrow header).

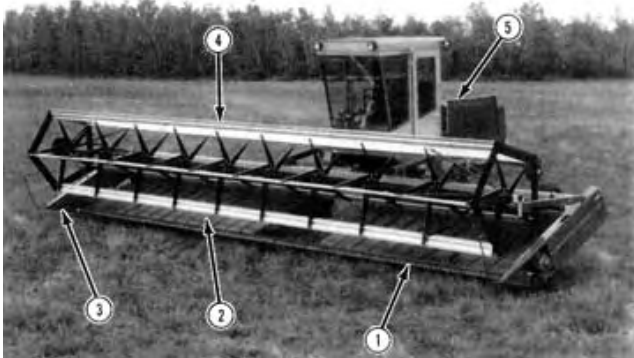


FIGURE 1. Massey Ferguson 885: (1) Cutterbar, (2) Drapers, (3) Dividers, (4) Reel, (5) Traction Unit.

SUMMARY AND CONCLUSIONS

Rate of Work: Average speeds for the Massey Ferguson 885 windrower were 4 to 6 mph (6 to 10 km/h). Maximum working speed was about 8 mph (13 km/h). Average workrates varied from 12 to 16 ac/h (4.9 to 6.5 ha/h).

Quality of Work: Performance of the dividers was very good. The optional header height gauge wheel flattened a strip of crop causing some crop loss. Reel performance was very good. Cutting ability was very good in all crops. The knife had adequate power. The skid plates or optional gauge wheels prevented the cutterbar from dragging along the ground. The gauge wheels also provided excellent contour following and helped maintain the cutting height. Header flotation was very good. Draper performance was very good when single windrowing and fair when double windrowing. Some crop material slid from the drapers onto the knife, especially when double windrowing.

Windrow formation was very good. Parallel and fantail windrows were formed in centre delivery. Parallel and angled parallel windrows were formed in end delivery. Single windrows were 3 to 5 ft (0.9 to 1.5 m) wide. Double windrows were 5 to 10 ft (1.5 to 3.0 m) wide. Windrow uniformity was excellent when single windrowing and good when double windrowing. Bunching occurred in very tall or short crops and when travelling too fast while double windrowing.

Ease of Operation and Adjustment: Operator comfort was very good. The cab was clean and quiet. Cab noise level was about 87 dBA. The header and stubble were easily viewed. The controls were very good. They were well placed and convenient to operate. The instruments were easy to view.

Handling was very good. The windrower maneuvered easily

and was stable on slopes. A side-loading transporter was needed for transporting even short distances.

Ease of adjustment was very good. Ease of lubrication and maintenance was very good. Daily lubrication took about 10 minutes. Routine maintenance was easily performed.

Engine and Fuel Consumption: The diesel engine had ample power and consumed about 2.3 gal/h (10.5 L/h) while operating.

Operator Safety: No safety hazards were apparent on the MF 885. Adjustments and controls were safe. A seat belt was not provided.

Operator's Manual: The operator's manual was very good. A separate manual was supplied for the diesel engine. The manuals included concise and well illustrated information on operation, servicing and assembly.

Mechanical History: A few mechanical problems occurred during the test. There were some hydraulic leaks and draper roller failures.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifications to reduce crop toss caused by the optional gauge wheels trampling crop behind the divider.
2. Modifications to improve crop flow on the drapers when double windrowing.
3. Providing a seat belt with the machine.

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THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. When table flotation is set correctly, the gauge wheels are not required. They are available as an accessory where the user feels gauge wheels improve header flotation.
2. There is a tendency for the crop to drift down towards the cutterbar due to gravity when double windrows are being formed. By reducing ground speed and lowering reel height, this can be controlled as indicated in your report.
3. A seat belt is under consideration for the next generation of windrowers.

GENERAL DESCRIPTION

The Massey Ferguson 885 (FIGURE 1) is a self-propelled windrower with a draper header capable of centre, left or right end delivery for laying single or double windrows. It runs on two traction drive wheels and two rear castor wheels. It is powered by a Perkins 236 cu in (3.9 L) four cylinder diesel engine. The tractor drive wheels are powered by hydrostatic transmissions and slave motors. The cutterbar is mechanically driven from the traction unit through a belt and shaft drive and wobble box crank. The two sliding drapers, the right divider draper and the reel, are driven by hydraulic motors.

Draper and reel speeds are hand controlled from the operator station. The reel and header lifts and draper delivery position are foot controlled.

The test machine was equipped with a 30 ft (9.1 m) double windrow draper header and five bat reel.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The MF 885 was operated in the conditions shown in TABLE 1 for 106 hours while cutting about 1430 ac (579 ha). It was evaluated in various cereal and oilseed crops for cutting ability, windrow formation, ease of operation and adjustment, sound level, fuel consumption, operator safety, and suitability of the operator's manual.

RESULTS AND DISCUSSION

RATE OF WORK

Uniform windrows were formed in most crops at average speeds of 4 to 6 mph (6 to 10 km/h). Slower speeds were required

in tangled or tall leaning crops and in rough fields. Speeds up to 8 mph (13 km/h) were achieved in some rapeseed crops on smooth ground.

Average workrates for the 30 ft (9.1 m) windrower varied from 12 to 16 ac/h (4.9 to 6.5 ha/h). In straight even stands on level fields, workrates as high as 26 ac/h (11 ha/h) could be achieved.

TABLE 1. Operating Conditions

Crop	Variety	Operation	Yield		Hours	Field Area	
			bu/ac	t/ha		ac	ha
Fall Rye	Puma,	Single and Double Windrows	22	1.4	32	375	152
Wheat	Muskateer						
Barley	Neepawa, Katepawa, Argyle, Bonanza, Harrington Klages						
Rapeseed	Westar	Single Windrows	30 to 41	1.6 to 2.2	19	320	130
Flax	Norland		20	1.3	3	36	15
Total					106	1430	579

QUALITY OF WORK

Dividers: Divider performance was very good. The smooth, narrow divider cleanly separated the crop, without hairpinning. However, the optional header gauge wheels trampled some crop behind the divider causing a slight crop loss (FIGURE 2). The gauge wheels and divider rod were adjusted, but crop loss still occurred. It is recommended that the manufacturer consider modifications to reduce crop loss caused by the optional gauge wheels.



FIGURE 2. Crop Flattened by the Optional Gauge Wheel.

When double windrowing, the right divider draper laid the first windrow away from the standing crop. This improved the ease of steering on the second round and reduced the chance of snagging the first windrow with the left divider.

Reel: Reel performance was very good. Reel speed was variable from 0 to 62 rpm. Reel tip speed ranged from 0 to 10 mph (0 to 16 km/h). The reel was usually operated with a tip speed 10 to 20 percent faster than ground speed to minimize shatter losses. Material did not wrap on the reel ends except in tangled flax when operating the reel too low.

The range of vertical and fore-and-aft reel adjustments was suitable for all crops. The reel was normally positioned slightly ahead of the cutterbar.

Cutterbar: Cutting ability was very good in all crops provided the knife was maintained in good condition. All field work was conducted with over-serrated knife sections. The knife had adequate power in all crops, but it began to chatter in one tough barley crop. Stubble was usually ideal (FIGURE 3). In rough fields, the header bounced and caused some undulating stubble.

Skid plates on each end of the cutterbar adequately protected the cutterbar from dragging on the ground. However, the skid plates slightly affected steering control when they contacted the ground. The optional gauge wheels were installed in place of the skid plates. The wheels rode on the ground without affecting steering, and helped to maintain the desired stubble height in rolling land.

When double windrowing, the cutterbar sometimes plugged just before the windrow opening. Crop material slid down the drapers onto the cutterbar if the reel was set too high. The knife was kept from plugging by running the reel low enough to sweep the material back onto the drapers.

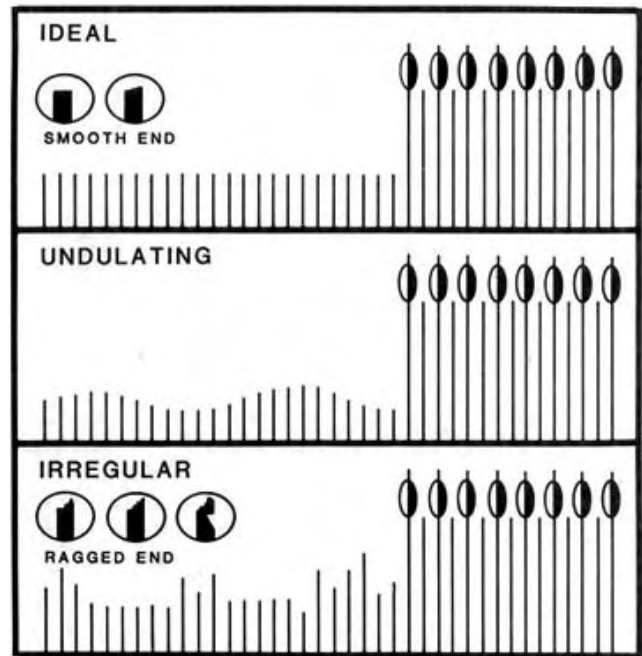


FIGURE 3. Types of Stubble.

Header Flotation: Header flotation was very good. Flotation was provided by two tension springs on the traction unit linkage (FIGURE 4). Good header flotation minimized cutterbar damage in stony fields and enabled the header to follow most ground contours.

Undulating stubble occurred in rough fields.



FIGURE 4. Header Flotation System.

Drapers: Draper performance was very good when single windrowing and fair when double windrowing. Draper speed could be varied from 0 to 660 fpm (0 to 3.4 m/s). In most crops, the drapers were run at about 400 to 460 rpm (2.0 to 2.3 m/s). Uniform windrows could usually be formed with this draper speed. Higher draper speeds usually resulted in poor quality windrows, with the butt ends of the straw sticking up.

Platform angles of less than 20 degrees are suitable for grain windrowing while steeper angles are used when windrowing hay. The platform angle of the MF 885 was 18.5 degrees at a cutting height of 6 in (150 mm) and was not adjustable. This platform angle worked well in all crops when single windrowing, but when double windrowing the crop material slid down onto the cutterbar and plugged the knife. The reel had to be lowered to sweep the material back onto the drapers, but windrows were still bunched. It is recommended that the manufacturer consider modifications to improve crop flow on the drapers when double windrowing.

The hydraulically driven drapers had adequate power to

convey most crop materials. However, the pressure relief valve for the draper motors was initially set too low, and the drapers stopped in a heavy crop. The pressure setting was increased and no further draper stoppages occurred.

When double windrowing, the right divider draper laid the first windrow about 12 to 18 in (305 to 457 mm) from the standing crop edge (FIGURE 5). This kept the divider from snagging the windrow on the second grass.

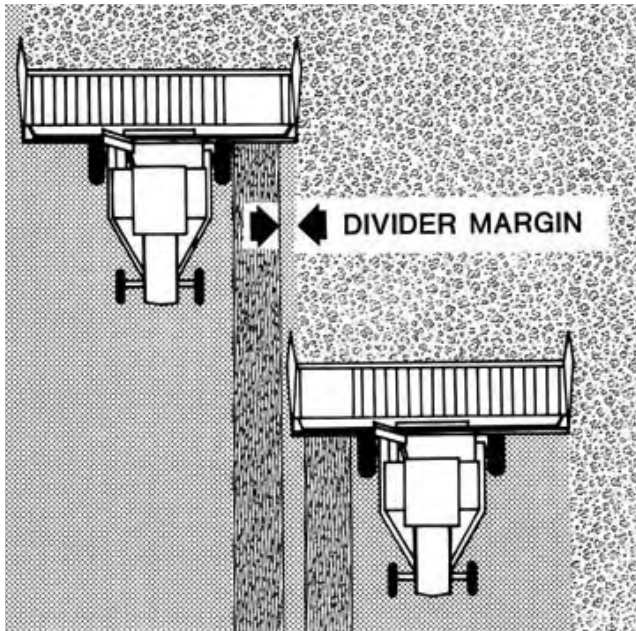


FIGURE 5. Double Windrowing.

Windrow Formation: Windrow formation was very good. Windrows may be classified into four general patterns (FIGURE 6), although many combinations and variations exist. FIGURES 7 to 11 show typical windrows formed by the MF 885. Centre delivery windrows were usually formed parallel. Herringbone windrows occurred in light crops, while fantailed windrows occurred in heavy tall stands or over-ripe crops. Alternating end delivery produced parallel or angled parallel windrows depending on direction of crop lean. Delivery to the right end often produced an offset windrow with less material on the right side, formed by the right divider draper (FIGURE 7).

Single, centre-delivery windrows were normally 3 to 5 ft (0.9 to 1.5 m) wide. Single rapeseed windrows were about 6.5 ft (2.0 m) wide. Side-by-side double windrows formed with alternating end delivery varied from 5 to 10 ft (1.5 to 3.0 m) wide. The gap between the windrows could be reduced from 20 in (508 mm) to almost 0 in (0 mm) by driving closer to the first windrow on the second pass. However, this reduced the width of cut slightly.

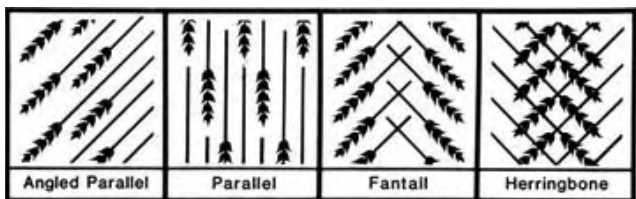


FIGURE 6. Windrow Types.

Windrow Uniformity: Windrow uniformity was very good when single windrowing and good when double windrowing. Windrows were uniform when single windrowing at speeds up to 6 mph (10 km/h). When double windrowing, some bunched windrows resulted when material slid forward on the drapers and the reel had to be lowered to sweep it back. Modifications to improve crop flow on the drapers have been recommended.

Draper platform angle could not be adjusted. Reduced travel, draper, and reel speeds resulted in a more uniform parallel windrow, especially when double windrowing. For example, in one wheat crop, travelling faster than 4.0 mph (6.4 km/h) or operating the drapers

faster than 460 ft/m (2.3 m/s), resulted in a nonuniform windrow, with some bunching and butt ends of straw sticking up.



FIGURE 7. Wheat, Double Windrow: 45 bu/ac (3.0 t/ha).



FIGURE 8. Rapeseed, Single Windrow: 41 bu/ac (2.2 t/ha).



FIGURE 9. Barley, Double Windrow: 70 bu/ac (3.8 t/ha).



FIGURE 10. Fall Rye, Single Windrow: 22 bu/ac (1.4 t/ha).

EASE OF OPERATION AND ADJUSTMENT

Operator Comfort: The MF 885 was equipped with an operator's cab positioned behind the windrow opening and above

the traction drive wheels. The header and stubble were easily viewed. Operator comfort was good. The seat and steering column were adjustable to suit most operators. Incoming air was effectively filtered and the air conditioner or heater provided comfortable cab temperatures.

Operator station sound level at full speed under load was about 87 dBA. For sound levels exceeding 85 dBA, ear protection should be worn.



FIGURE 11. Flax, Single Windrow: 20 bu/ac (13 t/ha).

Controls: Ease of operating the controls was very good. All the controls for the MF 885 (FIGURE 12) were conveniently located and properly identified. The travel speed control lever and the header clutch lever were conveniently located and easy to engage.



FIGURE 12. Operator Station Controls.

Header height was controlled by one foot pedal on the right side of the steering column. The reel lift system was conveniently operated by one foot pedal on the left side of the steering column. The reel and header raised and lowered slowly and smoothly, and responded immediately.

Reel and draper speeds were hand-controlled with levers in the cab. The control levers were clearly identified and were marked with a scale so settings could be repeated if desired. Speeds were very easy to adjust on-the-go.

For double windrowing, the sliding drapers had to be manually latched together. Draper positions and directions were then easily controlled with a foot pedal from the operator station.

Instruments: The instruments were very good as the console was conveniently located and easy to observe (FIGURE 13). It included gauges for fuel level, alternator volts, engine coolant temperature, and engine hours. Warning lights and audible alarms indicated low engine oil pressure, high engine coolant temperature, low hydrostatic oil pressure, and brakes on.

Lights: The MF 885 was equipped with four forward or side lights and one rear light. This provided ample lighting for operation at night, but the reel bats flashed through the lights causing eyestrain. Warning lights and turn signals were provided for road travel, but the wide header made road travel at night unsafe.

Handling: Handling of the MF 885 was very good in all field conditions. Steering was quick and responsive and the crop edge was visible and easy to follow. Double windrowing was convenient, since the right divider draper laid the first windrow away from the standing crop. This allowed for some error in steering on the following round without missing crop or snagging the windrow. Some

operator experience was needed.



FIGURE 13. Instrument Panel.

The hydrostatic drive made reversing direction quick and easy. The header lifted high enough to maneuver over tall windrows and similar obstacles. The windrower was quite stable. It sometimes tipped forward when operating down steep slopes or during sudden stops. Stability could be improved by adding rear weights or fluid to the rear tires.

Transporting: The 30 ft (9.1 m) wide header on the MF 885 was too wide for meeting traffic. The windrower could be backed into the ditch to allow vehicles to pass. However, for safe transporting, a side-loading windrower transporter was required. Many transporters were not suitable for transporting the MF 885 because a long hitch was needed between the truck and the 30 ft (9.1 m) header. A Blanchard 3 in 1 transporter was used during the PAMI tests. It performed well.

Adjustments: Ease of adjustments was very good. The header side-to-side levelling and flotation were easily adjusted according to the operator's manual. Reel fore-and-aft position and cutterbar clearance were easily adjusted. Common hand tools only were required.

The drapers were easily tightened by hand with over-centre spring cushioned levers.

Lubrication and Maintenance: Ease of lubrication and maintenance was very good. Daily lubrication took about 10 minutes. The MF 885 had 28 pressure grease fittings on the traction unit and header. Five of these required greasing every 10 hours. In addition, the engine and hydraulic oil levels and engine coolant level had to be checked daily, and the radiators and cab air filter cleaned if necessary. The knife was to be oiled daily, except in sandy soils where oiling was not recommended. The operator's manual contained a handy maintenance schedule.

Lubrication points were easily accessible, except the universal joints on the power take-off shafts.

Most routine maintenance and service, such as tensioning belts and chains, and changing guards and knife sections, were easily performed.

ENGINE AND FUEL CONSUMPTION

The engine had ample power for all conditions encountered. Average fuel consumption was 2.3 gal/h (10.5 L/h). The 34 gal (155 L) fuel tank permitted about 14 hours of operation between fillings.

OPERATOR SAFETY

The MF 885 was safe to operate if normal safety precautions were followed. The operator's manual emphasized safety. Several decals on the machine warned the operator of safety hazards. Moving parts were well shielded. The skid proof steps and platform made access to the cab safe and convenient. A slow moving vehicle sign was provided.

The 30 ft (9.1 m) header was too wide to allow safe travel down the road. A side-loading transporter should be used. A seat belt was not available. It is recommended that the manufacturer consider providing a seat belt.

Machine adjustments were safely and easily made. Controls were located near the operator for safe operation. Safety switches prevented the engine from starting if the speed control lever or steering wheel was not in neutral. The emergency brake safely locked the traction wheels for parking with the engine running.

OPERATOR'S MANUAL

The operator's manual was very good. It contained much useful information on operation, adjustment, and maintenance of the windrower. A separate operator's manual was supplied for the Perkins diesel engine. All information was accurate, easy to follow, and well illustrated.

A parts and service manual was not supplied with the machine.

MECHANICAL HISTORY

TABLE 2 outlines the mechanical history of the MF 885 during 106 hours of field operation while windrowing about 1430 ac (579 ha). The intent of the test was functional performance evaluation. Extended durability testing was not conducted.

TABLE 2. Mechanical History

Item	Operating Hours	Equivalent Area	
		ac	(ha)
Traction Unit:			
-Hydraulic fittings on the traction drive motors leaked and were tightened at	16, 35	215, 400	(87, 162)
-An O-ring seal on the hydrostatic transmission loosened and was damaged. The O-ring was replaced at	43, 47	520, 600	(210, 243)
-An engine coolant hose broke at a sharp bend near the radiator. It was replaced with a slightly longer hose at	52	660	(267)
-The header clutch lever came loose causing it to vibrate noisily in the cab. It was tightened at	71	925	(374)
Header:			
-Header gauge wheels were installed in place of the skid plates at	35	400	(162)
-The front bearing and rubber bushing failed on the drive roller for the right divider draper. They were replaced at	84	1115	(450)
-The drive roller for the right divider draper broke. A new roller was installed at	106	1430	(579)
-The right divider draper could not be aligned to run true on the rollers. A new draper was installed at	106	1430	(579)
-One bent guard was replaced and six others were straightened		Throughout the test	
-Three broken knife sections were replaced		Throughout the test	

Right Divider Draper: The original draper tracked toward the front end of the rollers and rubbed against the back of the cutterbar. Alignment was partially improved by tightening the front of the idler roller and loosening the back. The manufacturer provided a new draper with a different material weave. It was easily adjusted to track properly.

Misadjustment of the draper tighteners, and the poorly tracking draper may have damaged the roller and bearing.

**APPENDIX I
SPECIFICATIONS**

MAKE:	Massey Ferguson Self-Propelled Windrower
MODEL:	885
SERIAL NUMBERS:	
-- traction unit	C00117385
-- header	C10095285
CUTTERBAR:	
-- width of cut (divider points)	30.0 ft (9.1 m)
-- effective cut (inside dividers)	29.7 ft (9.1 m)
-- range of cutting height	-2.0 to 38 m (-51 to 965 mm)
-- guard spacing	3.0 in (76 mm)
-- length of knife section (over-serrated)	
-full depth	3.2 in (81 mm)
-cutting length	1.8 in (46 mm)
-- knife stroke	3.0 in (77 mm)
-- knife speed	725 cycles/min
HEADER:	
-- platform angle	
-fully raised	5.0° above horizontal
-fully lowered	20.5° below horizontal
-- number of drapers	3
-- draper width	42 in (1067 mm)
-- draper lengths	
-sliding drapers	11.7 ft (3.6 m)
-right divider draper	1.9 ft (0.5 m)
-- draper material	rubberized canvas with rubber slats
-- draper speed range	0 to 660 fpm (0 to 3.4 m/s)
-- draper roller diameter	2.3 in (58 mm)
-- height of windrow opening	3.0 ft (0.89 m)

-- width of windrow opening	<u>End Delivery</u>	<u>Centre Delivery</u>
-between windboards	4.3 ft (1.3 m)	4.3 ft (1.3 m)
-between rollers	4.2 ft (1.3 m)	4.3 ft (1.3 m)
-- raising time	2.8 s	
-- lowering time	2.4 s	
REEL:		
-- number of bats	5	
-- number of arms per bat	5	
-- diameter	4.6 ft (1.4 m)	
-- speed range	0 to 62 rpm	
-- range of adjustment		
-fore-and-aft	10 in (305 mm)	
-height above cutterbar	28 in (710 mm)	
-- raising time	2.3 s	
-- lowering time	3.5 s	
TRACTION DRIVE:		
-- type	hydrostatic transmission with motors and planetary speed reducers on wheels	
-- speed control	hand lever	
-- maximum forward speed	13.0 mph (21 km/h)	
STEERING:		
	steering wheel mechanically linked to hydrostatic pumps	
	hand lever operating mechanical drum brakes	
	hand lever operating mechanical drum brakes	
HYBRAULIC SYSTEM:		
-- hydrostatic traction drive	(see Traction Drive)	
-- reel and draper drives	belt driven pump, flow control valves and motors on reel and drapers	
-- reel lift	master and slave cylinder, one pedal control	
-- header lift	two single acting cylinders tied together, one pedal control	
NO. OF CHAIN DRIVES:		
-- header	1	
NO. OF V-BELTS:		
-- traction unit	4	
-- header	1	
LUBRICATION POINTS:		
-- pressure grease fittings	28	
NO. OF PRE-LUBRICATED BEARINGS:	29	
ENGINE:		
-- make	Perkins Diesel	
-- model	4.236	
-- displacement	236 in ³ (3.9 L)	
-- no load speed	2400 rpm	
-- power (nominal)	69 hp (51 kW)	
-- fuel tank capacity	34 gal (155 L)	
TIRES:		
-- drive wheels	18.4 - 16.1, 6-ply traction tread	
-- castor wheels	8.5L - 14, 4-ply ribbed implement	
OVERALL DIMENSIONS:		
-- width	30.9 ft (9.4 m)	
-- length	18.7 ft (5.7 m)	
-- height	9.8 ft (3.0 m)	
-- wheel tread	9.6 ft (2.9 m)	
-- wheel base	8.7 ft (2.7 m)	
WEIGHT: (fuel tank empty)		
-- right drive wheel	3500 lb (1590 kg)	
-- left drive wheel	3180 lb (1445 kg)	
-- castor wheels	1150 lb (520 kg)	
Total	7830 lb (3555 kg)	
OPTIONS AND ATTACHMENTS:		
-- Chrysler Industrial 6 cylinder gasoline engine		
-- forked tail wheel castors		
-- aspirated pre-cleaner		
-- header gauge wheels		
-- 15, 18, 21, 25, or 36 ft (4.6, 5.5, 6.4, 7.6, or 11.0 m) draper headers		
-- 12, 14, or 16 ft (3.6, 4.3, 4.9 m) auger headers		
-- hay conditioner for draper or auger headers		

**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 885 SELF-PROPELLED WINDROWER

RETAIL PRICE	\$44,220.00 (March, 1986, f.o.b. Humboldt, Sask.)
RATE OF WORK	
Average Speed	4 to 6 mph (6 to 10 km/h)
Average Workrate	12 to 16 ac/h (4.9 to 6.5 ac/h)
QUALITY OF WORK	
Dividers	Very good ; gauge wheel flattened a strip of crop
Reel	Very good
Cutterbar	Very good ; adequate power, gauge wheels maintained cutting height in rolling land
Header Flotation	Very good
Drapers	Very good ; when single windrowing
Windrow Formation	Fair ; when double windrowing, crop slid from the drapers onto the knife
Windrow Uniformity	Very good ; parallel and fantail with centre delivery, parallel and angled parallel with end delivery Excellent ; when single windrowing Good ; when double windrowing, bunchy in some crops
EASE OF OPERATION AND ADJUSTMENT	
Operator Comfort	Very good ; cab was clean and quiet, header easily viewed
Controls	Very good ; easy to operate
Handling	Very good ; fairly stable on slopes
Transporting	Side-loading transporter required
Adjustments	Very good ; all adjustments were easy
Lubrication and Maintenance	Very good ; daily lubrication took 10 minutes
ENGINE AND FUEL CONSUMPTION	2.3 gal/h (10.5 L/h); ample engine power
OPERATOR SAFETY	No safety hazards apparent
OPERATOR'S MANUAL	Very good ; separate manual for Perkins engine
MECHANICAL HISTORY	Some minor problems



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