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Evaluation Report 245

OMC 280 Self-Propelled Windrower

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

OMC 280 SELF-PROPELLED WINDROWER

MANUFACTURER AND DISTRIBUTOR:

Owatonna Manufacturing, Inc.
Owatonna, Minnesota
USA 55060

RETAIL PRICE:

$28,298.62 [November, 1981, f.o.b. Portage la Prairie, Manitoba with 6.1 m (20 ft) draper head and flasher kit]

SUMMARY AND CONCLUSIONS

Overall functional performance of the OMC 280 windrower was very good in forage crops and fair to good in grain and oil seed crops. Cutting ability was excellent in all grain and forage crops of average yield. Header floatation was very good. Maximum header lift was not adequate to clear heavy windrows.

Windrow formation was fair. Angled parallel and herringbone were the predominant windrow types in grain crops. The draper speed and draper angle were not adjustable. The reel was provided with two speed adjustments.

The header windrow opening was adequate for all crops except very heavy rapeseed. Maximum field speeds were about 12 km/h in average grain crops and about 10 km/h in average hay crops.

Operator controls were convenient and well positioned. Adjustments were simple and convenient, Daily maintenance took about 10 minutes. Operator sound level was about 92 dBA. Visibility from the operator's platform was excellent. Machine stability, on slopes, was excellent.

The operator manual was very good.

A few minor durability problems occurred during the test.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing better control when lowering the header, for operation in cereal crops.
2. Modifying the header to provide a lower draper angle, for windrowing cereal crops, and to increase the maximum lift height to increase clearance over heavy windrows.

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Project Engineer - R.R. Hochstein

THE MANUFACTURER STATES THAT:

With regard to recommendation number:

1. Future units will allow smoother lowering of the head and will be capable of overriding the detente system in the header valve.
2. Future units will have adjustable table angles of 15° and 25° as well as one canvas with adjustable speed. Maximum lift height has been increased to 27" above ground.

MANUFACTURER'S ADDITIONAL COMMENTS

The windrow opening will be enlarged on future production machines.

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

GENERAL DESCRIPTION

The OMC 280 is a self-propelled, centre delivery windrower with two traction drive wheels and dual rear caster wheels. It is powered by a Ford six cylinder gasoline engine. The hydrostatic traction drive is driven directly from the engine crankshaft. Two hydraulic motors drive the wheels directly through planetary gear reducers. The header is driven through a belt and driveshaft arrangement.

A steering wheel and a lever on the console control the direction and speed of travel. The header and reel lift controls are foot operated.

The test machine was equipped with a 6.1 m (20 ft.) draper header and a bat reel, adjustable skid shoes and windrow forming rods.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The OMC 280 was operated in the conditions shown in TABLE 1 for 242 hours while cutting about 800 ha (200 ac). It was evaluated in forage crops, cereal grains and oil seed crops for windrow formation, cutting ability, ease of operation and adjustment, sound level, fuel consumption, operator safety and suitability of the operator manual.

TABLE 1. Operating Conditions

Crop	Hours	Field Area ha
Alfalfa	58	192
Grass	14	49
Rye	5	12
Barley	26	77
Wheat	100	350
Oats	22	84
Flax	3	10
Buckwheat	7	14
Rapeseed	7	18
Total	242	800

RESULTS AND DISCUSSION

WINDROW FORMATION

Windrow Types: Windrows may be broadly, classified into four general patterns (FIGURE 1) although many combinations and variations exist.

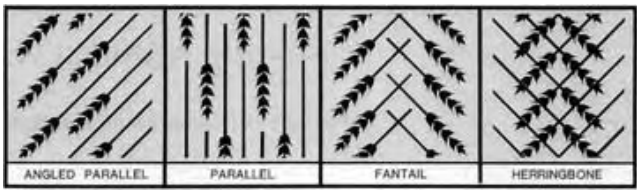

FIGURE 1. Windrow Types.

The OMC 280 produced herringbone, angled parallel and parallel windrows in most grain crops. Angled parallel windrows were formed in crops leaning perpendicular to the cutting direction. Ground speed was usually best set just a little slower than the reel speed. APPENDIX IV illustrates typical windrows, formed by the OMC, in different crops.

Leaning Crops: Direction of travel was important when windrowing lodged or leaning grain crops. Herringbone windrows usually resulted when cutting parallel to crop lean and angled parallel windrows resulted when cutting perpendicular to crop lean.

Uniformity: Windrows were generally uniform in most crops. Slight non-uniformity occurred due to the tendency of crop to fall down the steep draper angle to the cutterbar and collecting there. Bunching occurred in badly lodged crops and in heavy stands of rapeseed. In lodged cereal crops, bunching was primarily due to crop accumulation on the cutterbar while in rapeseed, bunching occurred at the dividers at speeds above 8 km/h (5 mph).

Draper and Reel Speed: The draper speed was not adjustable. Speeds were 2.7 m/s (8.9 ft/sec) for the right draper and 3.0 m/s (9.8 ft/sec) for the left draper. Two reel speeds were possible, 40 and 52 rpm. Resulting reel tip speeds were 2.7 and 3.5 m/s (8.9 and 11.5 ft/sec). This permitted forward travel speeds of 9 and 11.5 km/h (5.6 and 7 mph) for a reel speed index of 1.1.

Header Angle: The header angle was not adjustable and changed only slightly with changes in cutting height. The 30° header angle did not suit most cereal crop conditions. The high angle usually caused the crop to travel along the lower edge of the drapers. The guard angle was suitable for downed crops and hay crops. It is recommended that the manufacturer consider modifications to provide a lower draper angle more suitable for windrowing grain crops.

Travel Speed: At the 1.1 reel speed index, the travel speed was 11.5 km/h (7 mph) for the higher reel speed. Windrow formation was not greatly affected by ground speed. Maximum forward speed was usually limited by field roughness and cutting performance.

Windrow Opening: Windrow opening clearance was adequate in most crops. In heavy, matted crops such as rapeseed, the windrow sometimes hesitated as it cleared the windboards. Clearance under the windrower frame, between the drive wheels was adequate.

CUTTING ABILITY

Cutterbar: All test work was conducted with high-rise under-serrated knife sections. Cutting ability was excellent in both grain and hay crops. Cutterbar plugging occasionally occurred in heavy sloughgrass and damp flax, but cutterbar hammering did not result. In hay crops the maximum forward speed of 8 km/h (5 mph) was governed by the ability of the cutterbar to cut.

Adjustable skid shoes permitted the minimum cutterbar height to be set from 60 to 150 mm (2.5 to 6 in) above the soil surface. The skid shoes, when folded under the header, allowed the windrowing of hay crops.

Dividers: Divider performance was excellent in average stands of grain and hay crops and adequate in lodged crops. It was usually best to cut rapeseed back and forth since the dividers worked on the principle of pushing the crop down at the divider. The resulting narrow path of pushed down crop was best recovered while cutting in the opposite direction on the next pass. In heavy green matted rapeseed it was necessary to operate with the reel almost completely lowered to clear the cutterbar of crop near the divider.

Header Floatation: Header floatation, provided by the floating cylinders, was good for cutting hay and pulse crops close to the ground. Header floatation for cutting cereal crops at normal stubble heights was also good. At the recommended floatation setting, the windrower negotiated stones along the ground and followed ground contours very well. When cutting cereal crops with the header off the ground, the automatic floatation locking detente made it always necessary to raise the header after lowering. Field roughness had marginal effect on the header at the recommended floatation setting. An undulating stubble resulted at speeds above 10 km/h (6 mph).

EASE OF OPERATION AND ADJUSTMENT

Operator and Controls: Visibility of the cutterbar and dividers was excellent. The operator had full view of the cutterbar without having to sit forward on the seat. Steering wheel tilt, fore and aft seat position, and operator weight adjustment provided adequate comfort for a wide range of operators.

All of the controls were conveniently placed and easy to use (FIGURE 2).

Location of the header drive control leaver to the left side of the operator seat eliminated any confusion when operating the controls. Stopping the wind rower quickly was convenient due to the stop located at the neutral position of the travel speed control lever. Backing the windrower was done simply by sliding the lever past the stop.

The header and reel height controls located on the left of the steering column were foot operated. Pedal angle and location were convenient for most operators. The header height control pedal locked into a detent when the pedal was depressed, causing the header to drop rapidly and rest on the skid shoes. Although this feature was very convenient for windrowing hay and pulse crops, it was inconvenient in grain crops since the header had to be raised to obtain the desired stubble height each time it was lowered. It is recommended that the manufacturer provide header control for operation in cereal crops.

Total noise at the operator ear level was about 92 dBA.

Steering: Directional control and maneuverability were excellent. Steering was positive and effortless. The OMC 280 did not pull sideways in soft fields or on moderate slopes.

Travel Speed Control: Travel speed was variable from 0 to 19 km/h (0 to 12 mph) in the forward direction and from 0 to 15 km/h (0 to 9 mph) in reverse. The speed control was positive and effortless. In wet fields, travel was impeded due to mud accumulating on the caster wheel forks, jamming the wheels. There was little clearance between the wheels and forks.

Braking: Hydrostatic braking was accomplished with the speed control lever. Braking motion usually was smooth and no rear ballasting was needed to prevent upending. A mechanical parking brake was provided.

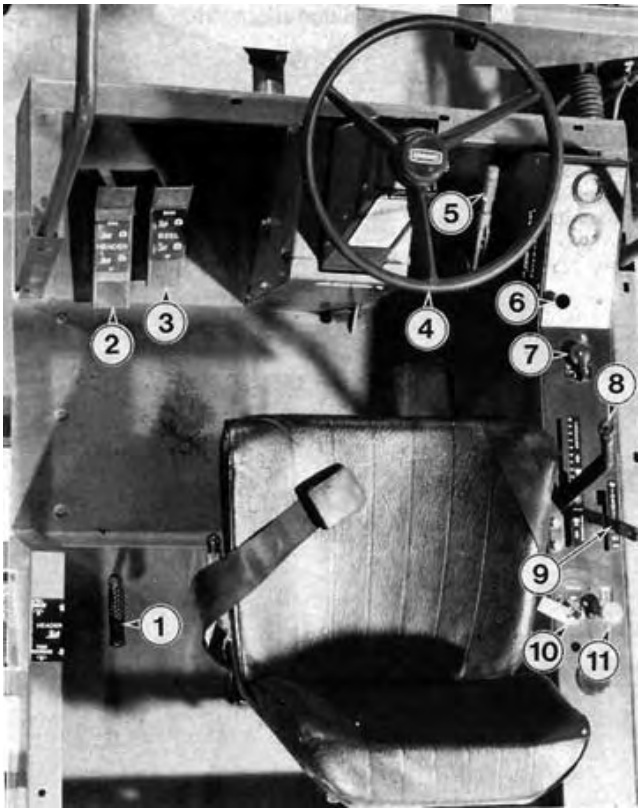

FIGURE 2. Operator Station. (1) Header drive control (2) Header height control pedal (3) Reel height control pedal (4) Steering wheel (5) Parking brake (6) Warning lights switch (7) Turn indicator switch (8) Travel speed control lever (9) Throttle (10) Ignition switch (11) Choke.

Transporting: Towing the OMC 280 with drive wheels on the ground was possible by unlocking the planetary gear reducers at the drive wheels. Backing the windrower onto a transporter did not present any stability problems. The maximum safe downward slope that the windrower could negotiate with the rear wheels in contact with the ground was a comfortable 24°.

Adjustments: Fore-and-aft reel position could only be adjusted after removing the drive shield which took 10 minutes. Draper tension adjustment was convenient. All belt tension adjustments were convenient.

The knife register and sway bar/knife clearance were easy to adjust. Header floatation adjustment was convenient, however the header angle could not be adjusted.

Servicing: Daily lubrication of the OMC 280 took about ten minutes. Few adjustments were needed during the test period.

POWER AND FUEL CONSUMPTION

The engine had sufficient power for all conditions. Average fuel consumption, while windrowing wheat, was 11 L/h (2.4 gal/h). The 144 L (32 gal) fuel tank permitted about 13 hours of operation between fillings.

OPERATOR SAFETY

Access to the operator station was safe and convenient. Controls were well positioned with respect to the operator. Optional headlights were available although the test machine was not equipped with them. The slow moving vehicle sign on the rear, and flashing safety lights, located at either end of the header, provided proper marking for transport on public roads. These lights doubled as turn indicators through the turn indicator switch on the console.

No safety blocking devices were provided on hydraulic cylinders for safe servicing and maintenance to the header. All components were well shielded.

A safety switch ensured that the steering wheel was centred when starting the engine and a lock was provided for holding the steering wheel on centre.

OPERATOR MANUAL

The operator manual was clear, concise and contained much useful information on the operation of the windrower.

DURABILITY RESULTS

TABLE 2 outlines the mechanical history of the OMC 280 windrower during 242 hours of operation while windrowing 800 ha.

TABLE 2. Mechanical History

Item	Operating Hours	Equivalent Area ha
-The draper drive belts began slipping and the right drive belt was replaced at	40	130
-A main header drive shaft bearing seized and was replaced at	50	165
-The right draper drive idler sheave broke and was replaced at	75	248

The intent of the test was evaluation of functional performance. An extended durability evaluation was not conducted.

APPENDIX I
SPECIFICATIONS

Make:	OMC
Model:	280
Serial Number:	
-- tractor	1593
-- header	1447
Cutterbar:	
-- width of cut (divider points)	6240 mm
-- effective cut (inside divider)	6155 mm
-- range of cutting height	45 - 110 mm
-- guard spacing	76 mm
-- length of knife section (under-serrated)	82 mm
-- knife stroke	76 mm
-- knife speed	550 cycles/min
Header:	
-- maximum height (to cutterbar)	430 mm
-- header angle (from horizontal)	
- fully raised	21°
- fully lowered	30°
-- number of drapers	2
-- width of drapers	1115 mm
-- length of drapers	2500 mm
--draper speed range	2.7 m/s right, 3.00 m/s left
-- draper roller diameter	57.5
-- height of windrow opening	868 min
-- width of windrow opening	
- between windboards	996 mm
- between rollers	1043 mm
-- raising time of header	1.0 sec.
-- lowering time of header	0.5 sec.
Reel:	
-- number of bats	6
-- number of reel arms/bat	5
-- diameter	1290 mm
-- speed range	40 and 52 rpm
-- ground synchronization speed	10 and 13 km/h
-- range of adjustment	
- fore and aft	185 mm
- height above cutterbar	40 - 700 mm
-- raising time	1.2 sec.
-- lowering time	2.0 sec.
Traction Drive:	
-- type	Sperry Vickers hydrostatic motors driving Borg-Warner planetarys on drive wheels
-- speed control	hand lever
-- maximum forward speed	18.8 km/h
-- maximum reverse speed	15 km/h
Steering:	Steering wheel operated hydrostatic motors
Brakes:	Disk-hand lever operated and hydrostatic control stick
Hydraulic System:	
-- traction drive	(See Traction Drive)
-- header lift	Two single acting cylinders
-- reel lift	Master and slave single acting cylinders
No. of Chain Drives:	1
No. of V-belts:	
-- multiple V	6
-- single V	1
No. of Pressure Lubrication Points:	20
No. of Pre-lubricated Beatings:	7
Engine:	
-- make	Ford
-- model	3.3 L gasoline
-- no load speed	2600
-- power 52 kW	
-- fuel tank capacity	144 L
Tire Size:	
-- main drive wheels	two, 16.5 L - 16.1 L
-- caster wheels	two, 6.7 - 15
Machine Dimensions:	
-- wheel tread	
- drive wheels	2710 mm
- caster rear wheels	2540 mm
-- wheel base	3245 mm
-- overall width	6600 mm
-- overall length (castors forward)	5400 mm
Weight as Tested: (header raised)	
-- right drive wheel	1186 kg
-- left drive wheel	1278 kg
-- caster wheels	380 kg
TOTAL	2844 kg
Centre of Gravity: (header raised)	
-- height above ground	885 mm
-- distance behind drive wheels	435 mm
-- distance left of right drive wheel	1400 mm
Options and Attachments Available:	
-- lighting equipment	
-- crop conditioner	
-- tall crop divider	
-- various wheel and tire options	
-- various operator cab and accessory options	

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
CONVERSION TABLE

1 hectare (ha)	= 2.5 acres (ac)
1 kilometre/hour (km/h)	= 0.6 miles/hour (mph)
1 tonne (t)	= 2200 pounds mass (lb)
1 tonne/hectare (t/ha)	= 0.45 ton/acre (ton/ac)
1 metre (m)	= 3.3 feet (ft)
1 litre (L)	= 0.22 Imperial gallons (gal)

APPENDIX IV
TYPICAL WINDROW FORMATION

FIGURE 3. Rye Yield: 2.5/ha (40 bu/ac).

FIGURE 4. Wheat, Yield: 2.5 t/ha (40 bu/ac).

FIGURE 5. Wheat, Yield: 2.4 t/ha (35 bu/ac).

FIGURE 6. Oats, Yield: 2.1 t/ha (60 bu/ac).

FIGURE 7. Barley, Yield: 2.1 t/ha (40 bu/ac).

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