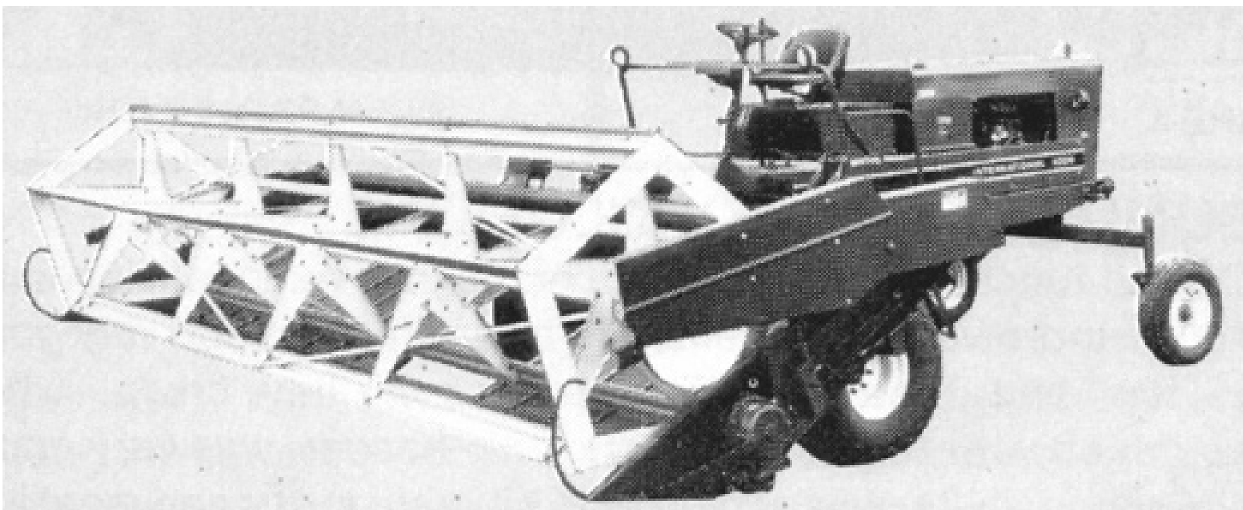
Evaluation Report No. E0677A
Printed: August, 1978
Tested at: Portage la Prairie
ISSN 0383-3445

Evaluation Report 51



International Harvester 4000 Self-Propelled Windrower

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE

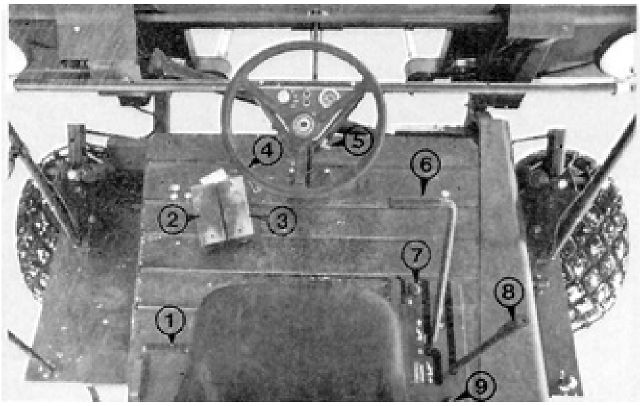
PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

INTERNATIONAL HARVESTER 4000 SELF-PROPELLED WINDROWER

MANUFACTURER:
International Harvester Company of Canada
208 Hillyard Street
Hamilton, Ontario

DISTRIBUTOR:
International Harvester Company of Canada
660 Wall Street
Winnipeg, Manitoba
R3C 2W8

RETAIL PRICE:
$12,617.00 (August, 1978, f.o.b. Winnipeg with 6 m (19.5 ft) draper platform, 16.5L x 16.1 tires and optional windrow deflection rods.



1. Parking Brake Lever
2. Reel Hydraulic Control Pedal
3. Header Hydraulic Control Pedal
4. Steering Wheel
5. Ignition Switch
6. Speed Control Lever
7. Throttle
8. Header Control Lever
9. Choke

FIGURE 1. Operator's Platform.

SUMMARY AND CONCLUSIONS

Overall functional performance of the International Harvester 4000 windrower was *excellent* in all grain crops and *very good* in flax and rapeseed. Performance in hay crops, when equipped with the 6 m (19.5 ft) grain header, was *very good.*

Cutting ability was *excellent* in all grain crops and most hay crops. In very heavy, tough hay crops, cutting ability was *good.* Table floatation was *very good.*

Windrow formation and quality were *very good.* Parallel and angled parallel windrows were predominant in both hay and grain crops. Fantail patterns occurred in very heavy crops while herringbone patterns frequently occurred in light crops.

Engine power was adequate. Suitable field speeds were 9 to 11 km/h (5.5 to 7 mph) in average grain crops and 7 to 10.5 km/h (4 to 6.5 mph) in average hay crops. Normal fuel consumption was about 14.5 L/h (3.2 gal/hr).

The traction drive generated less torque when backing up than when travelling forward. As a result, it was sometimes impossible to back out of soft spots in the field if the windrower was driven too far into the soft ground. It was also not possible to back out of the cradles on some windrower transporters, due to lack of wheel torque in reverse.

Operator controls were convenient and well positioned. Handling characteristics and maneuverability were *excellent.* Most adjustments were simple and convenient. Daily maintenance took from 15 to 20 minutes.

Operator station sound level was about 91 db (A). Operators are advised to wear suitable ear protection especially when working long days. Visibility from the operator's platform was *very good.*

Two minor safety problems were evident: the variable speed control lever had a tendency to creep, resulting in a change of forward speed when travelling up or down steep hills, while the engine safety lockout came out of adjustment three times during the test. No other safety hazards were evident when operating according to normal recommended procedures.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifying the speed control to prevent creeping of the control lever when travelling up or down steep hills.
2. Modifying the engine safety lockout system to reduce the frequency of necessary field adjustments.
3. Modifying the drive to increase traction wheel driving torque when operating in reverse.
4. Reducing the lift speed for the header and reel height control cylinders.
5. Increasing the fuel tank capacity.
6. Modifying the operator's manual to clarify the header float spring adjustment for the 6 m (19.5 ft) grain header and to clarify adjustment of the engine safety lockout system.
7. Reducing operator station noise level.

Chief Engineer- E.O. Nyborg
Senior Engineer -- J.C. Thauberger
Project Engineer -- S.T. Enns

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. The variable speed control lever is equipped with a friction device which can be adjusted so as to prevent creeping of the lever. A more positive method of positioning the lever will be investigated.
2. The safety lockout system has been redesigned and the improved version is now in production. This provides a much more positive method of locking the mechanism and greatly reduces the frequency of adjustment.
3. Special sprockets are available and may be installed in place of the standard sprockets to obtain a 25% increase in drive torque.
4. The lift speed of the header and reel has already been reduced by reducing the displacement of the hydraulic pump. In addition, an orifice plate has been added to the reel lift circuit to control reel lift speed.
5. An increase in fuel tank capacity of 33% is being considered for the model 4000 Windrower.
6. Modifications of the Operator's Manual to clarify the header float spring adjustment for all headers have already been made and the float mechanism has been improved. Adjustment procedure for the safety lockout mechanism has also been revised.
7. A noise reduction program has been initiated to develop improvements in this area.

GENERAL DESCRIPTION

The International Harvester 4000 is a self-propelled centre delivery windrower with two traction drive wheels and two rear castor wheels. It is powered by an American Motors six cylinder gasoline engine. The traction drive is hydrostatic with two pumps driven directly from the engine crankshaft. Roller chains are used between the hydrostatic motors and wheels. The header is driven through a belt and driveshaft arrangement.

A steering wheel is provided while a hand lever controls the speed and direction of travel. The hydraulic header and reel controls are foot operated. FIGURE 1 shows the layout of the operator station and controls.

The test machine was equipped with a 6 m (19.5 ft) grain header with a draper platform, a bat reel and optional windrow deflector rods. This header is offset 915 mm (3 ft) to the right of the windrower. Several other table options and accessory attachments are available.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The IH 4000 was operated in the conditions shown in TABLES 1 and 2 for 200 hours while cutting about 607 ha (1497 ac). It was evaluated in forage crops, cereal grains and oil seed crops for windrow formation, cutting ability, ease of operation and adjustment, noise level, fuel consumption, operator safety and suitability of the operator's manual.

TABLE 1. Operating Conditions

CROP	SOIL TEXTURE	HOURS	FIELD AREA ha (ac)
Alfalfa	Sandy Loam	8	24 (60)
Bromegrass/Alfalfa	Sandy Loam	8	22 (55)
Mixed Hay	Sandy Loam to Loam	15	48 (120)
Slough Grass	Sandy Loam to Loam	7	7 (17)
Fall Rye	Sandy Loam	14	43 (105)
Barley	Sandy Loam to Clay Loam	46	140 (345)
Wheat	Sandy Loam to Clay Loam	32	105 (260)
Oats	Sandy Loam	12	35 (85)
Rapeseed	Sandy Loam to Silty Loam	38	110 (270)
Flax	Loam	20	73 (180)
TOTAL		200	607 (1497)

TABLE 2. Operation in Stony Fields

FIELD CONDITION	HOURS	FIELD AREA ha (ac)
Stone Free	122	362 (892)
Moderately Stony	78	245 (605)
TOTAL	200	607 (1497)

RESULTS AND DISCUSSION

WINDROW FORMATION

Windrow Types: Windrows may be classified into four general patterns (FIGURE 2) although many combinations and variations exist. The IH 4000 produced parallel and angled parallel windrows in most hay and grain crops. Herringbone windrows occurred in very light crops while fantail occurred in heavy crops. TABLE 3 describes the types of windrows produced by the IH 4000 in various crops while FIGURES 3 to 12 illustrate typical windrows.

Leaning Crops: The direction of cut was important when windrowing lodged or leaning grain crops. Cutting in the direction of crop lean usually resulted in parallel windrows while cutting at an angle to the direction of lean generally resulted in angled parallel windrows.

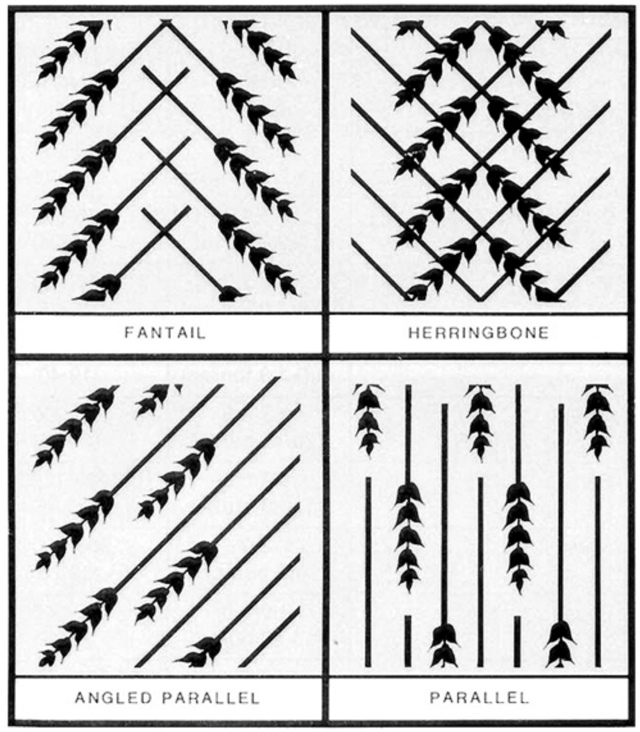


FIGURE 2. Windrow Types.

Uniformity: Windrows were very uniform in most crops with bunching infrequently occurring only in certain crop conditions. In light short hay crops, hay sometimes collected on the cutterbar resulting in slight bunching. Some bunching also occurred in badly lodged crops due to variation in crop flow on the d rapers. In flax, windrow bunching sometimes occurred at speeds above 9 km/h (5.5 mph).

Deflector Rods: The optional windrow deflector rods, which mounted in the windrow opening behind the cutterbar, aided in formation of a narrow, denser windrow in light hay or grain crops. I n normal crop conditions, their benefit to wind row formation was negligible.

Draper Speed: Draper speed could be varied from 125 to 160 m/min (410 to 535 ft/min) by changing the number of spacers in the roller drive pulleys. Higher draper speeds were beneficial in forming denser, narrower, easier-to-pick windrows in light crops. Lower draper speeds were suitable for heavier crops, resulting in wider, more uniform windrows.

Header Angle: The header angle on the IH 4000 was adjustable permitting a range of draper inclinations from 20 to 30 degrees. Header angles from 25 to 30 degrees seemed most suitable for hay crops while angles from 20 to 25 degrees appeared most suitable for grain crops. More parallel windrows generally resulted from lower header inclination angles.

Forward Speed: The forward speed had little effect on windrow formation. Speed limitations were usually due to field roughness or cutting performance. In very heavy crops, the ability of the windrower to clear the crop through the windrow opening closely matched its ability to cut.

Windrow Opening: Windrow opening clearance was adequate, even on very heavy, matted crops. In long, heavy, slough grass, the windrow sides were occasionally caught and turned outward as they passed through the opening, causing some windrow distortion. Clearance of the windrow under the windrower frame and past the drive wheels was adequate. In very heavy crops, the rear castor wheels occasionally ran over the outer fringes of the windrow.

Windrow Spacing: Due to the offset of the windrower header to the right side, windrow spacing was not uniform when cutting back and forth. In this type of operation, with a full width of cut, centre-to-centre windrow spacing alternated between 4.9 and 6.7 m (16 and 22 ft).

TABLE 3. Windrow Formation in Various Crops

CROP	RANGE t/ha	CUT CROP LENGTH mm (in)	SPEED km/h (mph)	WINDROW TYPE	FIGURE No.
Alfalfa	3.5-5.0 (1.5-2.0 ton/ac)	600-750 (24-30)	6.5-9.5 (4-6)	Parallel and fantail	
Bromegrass/Alfalfa	1.7-2.8 (0.7-2.8 ton/ac)	150-600 (6-24)	6.5-9.5 (4-6)	Parallel; fantail where heavy	
Mixed Hay	1.0-2.2 (0.5-1.0 ton/ac)	150-700 (6-28)	7.0-11.0 (4.5-7)	Mixed where light; parallel where heavier	3
Slough Grass	2.2-2.8 (1.0-1.3 ton/ac)	300-1000 (12-40)	6.5-7.0 (4-4.5)	Angled parallel and herringbone; fantail where heavy	4
Wheat	1.3-3.0 (20-45 bu/ac)	500-900 (20-36)	9.5-13.0 (5.8)	Parallel and angle parallel; herring-bone where light	5
Barley	0.8-3.2 (15-60 bu/ac)	200-1050 (8-42)	5.5-11.0 (3.5-7)	Parallel predominant: some herring-bone and angle parallel	6, 7, 8
Oats	3.0 (80 bu/ac)	800-900 (32-36)	13.0 (8)	Angled parallel; herringbone where lighter	
Rye	1.0-3.0 (15-50 bu/ac)	200-1050 (8-42)	4.5-11.0 (3-7)	Parallel and angle parallel; fantail where heavy	9, 10
Rapeseed	0.8-2.2 (15-40 bu/ac)	500-1050 (20-42)	4.5-9.0 (3-5.5)	Parallel predominant	11
Flax	0.8-1.5 (13-25 bu/ac)	450-550 (18-22)	9.5-11.0 (6-7)	Parallel predominant	12

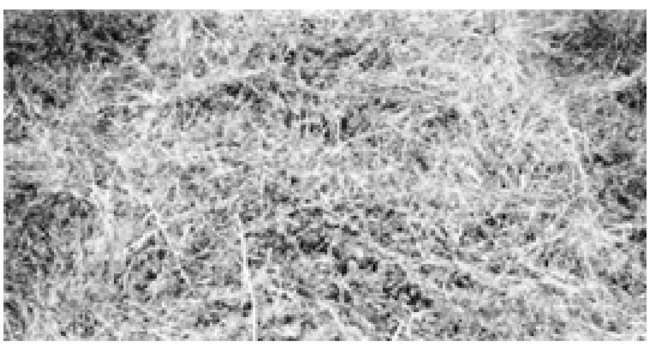


FIGURE 3. Mixed Hay (2.8 t/ha).


FIGURE 4. Heavy Slough Grass.

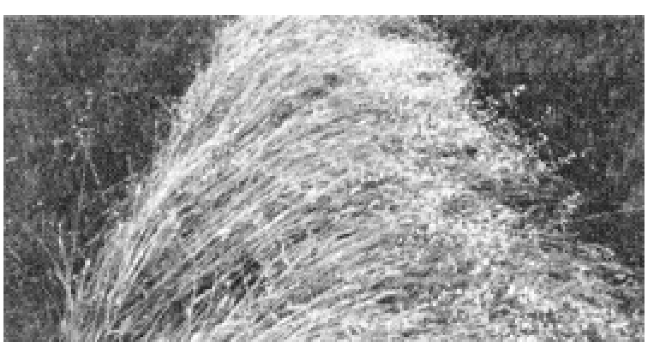


FIGURE 5. Wheat (3.0 t/ha).

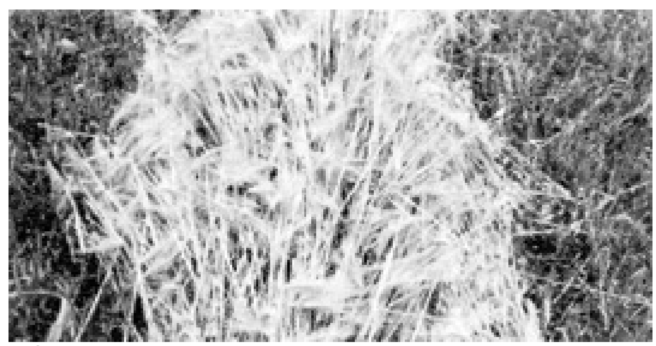


FIGURE 6. Barley (3.0 t/ha).

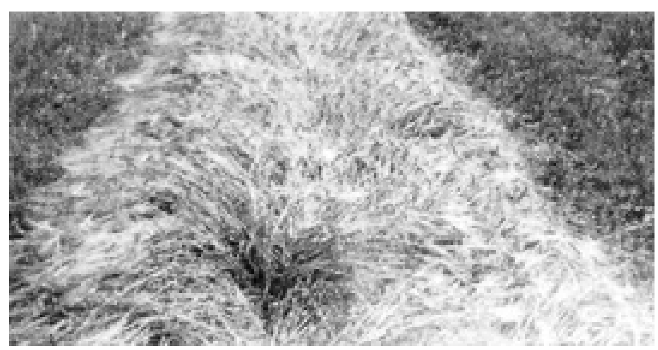


FIGURE 7. Barley (2.5 t/ha).

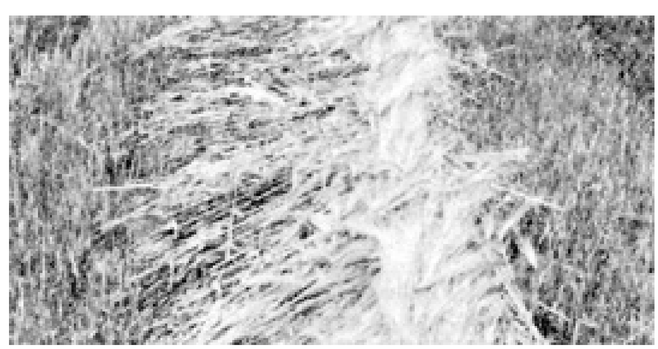


FIGURE 8. Barley Leaning Perpendicular to Direction of Travel (2.5 t/ha).

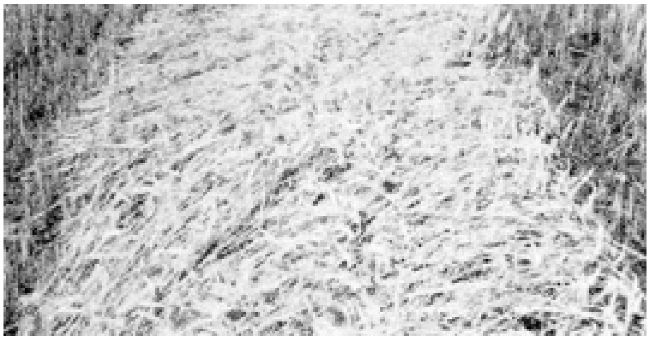


FIGURE 9. Rye (2.2 t/ha).

FIGURE10. Rye (3.0 t/ha).

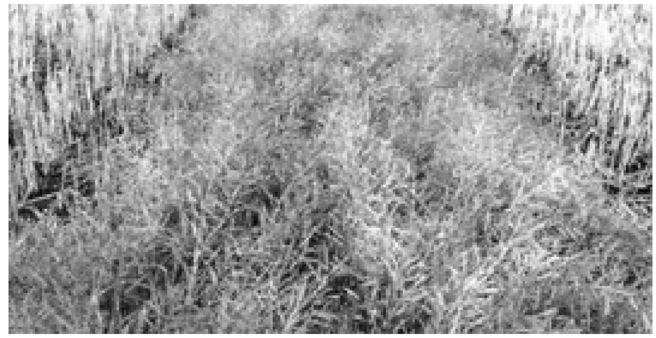


FIGURE 11. Rapeseed (2.2 t/ha).

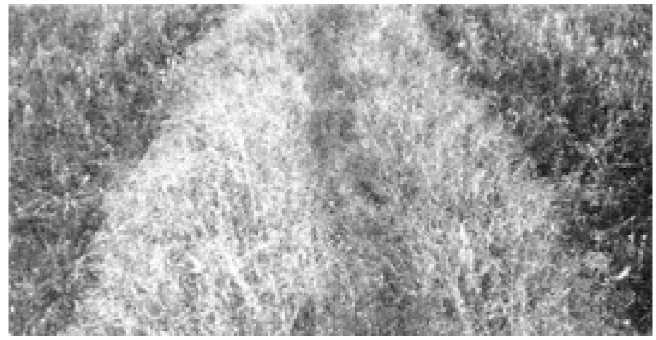


FIGURE 12. Flax (1.0 t/ha).

CUTTING ABILITY

Cutterbar: All test work was conducted with underserrated knife sections. Cutting ability of the IH 4000 was excellent in both hay and grain crops. Cutterbar hammering was not a problem, even in damp or excessively heavy crops. Only in heavy slough grass, heavily lodged crops or in damp flax was the cutterbar plugged. In lodged crops it was best to cut parallel to crop lodging. Performance in lodged rapeseed was best when travelling in the direction of crop lean. In grain crops, performance was best working opposite to the direction of crop lean.

Stubble: The types of stubble formed by a windrower may be divided into three types; ideal, undulating and irregular as shown in FIGURE 13. The IH 4000 generally produced ideal stubble in all grain crops at speeds up to 12 km/h (7.5 mph) provided that the knife and guards were in good condition. In flax or partially lodged rapeseed, ideal stubble was formed at speeds up to 10.5 km/h (6.5 mph). Higher speeds resulted in irregular stubble. Undulating stubble was formed only when the table was allowed to float freely while cutting well above the ground.

In any crops, the stubble formed was generally ideal provided that forward speed was matched to crop conditions. Excessive speed in tough hay crops resulted in irregular stubble.

Dividers: In average straight standing grain and hay crops, divider performance was satisfactory. A slight amount of hairpinning occurred on the dividers in tall leaning grain crops, such as rye. The dividers worked satisfactorily in most rapeseed crops, however, it was usually best to cut rapeseed back-and-forth since the dividers worked on the principle of pushing the crop down during separation. The path of pushed down crop was about 100 mm (4.5 in) wide and could best be retrieved by cutting in the opposite direction on the next pass. In heavy, green, matted rapeseed, buildup of crop on the divider rod was a problem. Generally, all leaning or lodged crops were best cut parallel to the crop lean.

Reel: Reel performance was adequate in most crops. Drive belt slip occurred only in very heavy or matted crops when the reel was lowered too close to the cutterbar. The range of vertical and horizontal adjustment was adequate for all crops.

Reel speed could be varied from 34 to 50 rpm by adjusting the drive pulley. For optimum performance it is best to have a reel index* from 1.1 to 1.2.

**Reel index is defined as the ratio of reel tip speed to travel speed.*

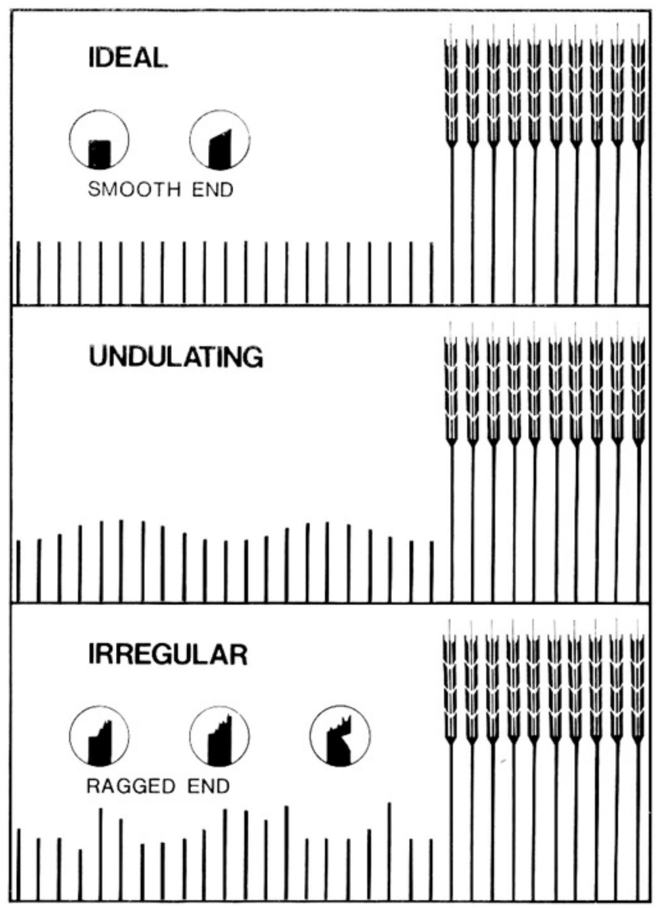


FIGURE 13. Types of Stubble Formed by Windrowers.

On the IH 4000, the optimum reel index was obtained at forward speeds ranging from 7.4 to 11.7 km/h (4.6 to 7.3 mph). These speeds were adequate for most crops. Operation outside this speed range was also possible in many crops.

Table Floatation: The IH 4000 was equipped with a table floatation system as standard equipment. Performance of the table floatation system was excellent. It was especially suitable for cutting hay crops close to the ground. Floatation was achieved through an arrangement of four springs (FIGURE 14). By adjusting individual spring tensions, the header could be levelled while suspended off the ground. Further equal changing of spring tensions adjusted the end-to-end header floatation while vertical floatation was achieved by adjusting a detent screw on the hydraulic control valve. When properly adjusted, the header followed ground contours very well.

In cutting grain crops where floatation was not desirable, the header could be locked by inserting an additional link in the header support mechanism to prevent side-to-side floatation.

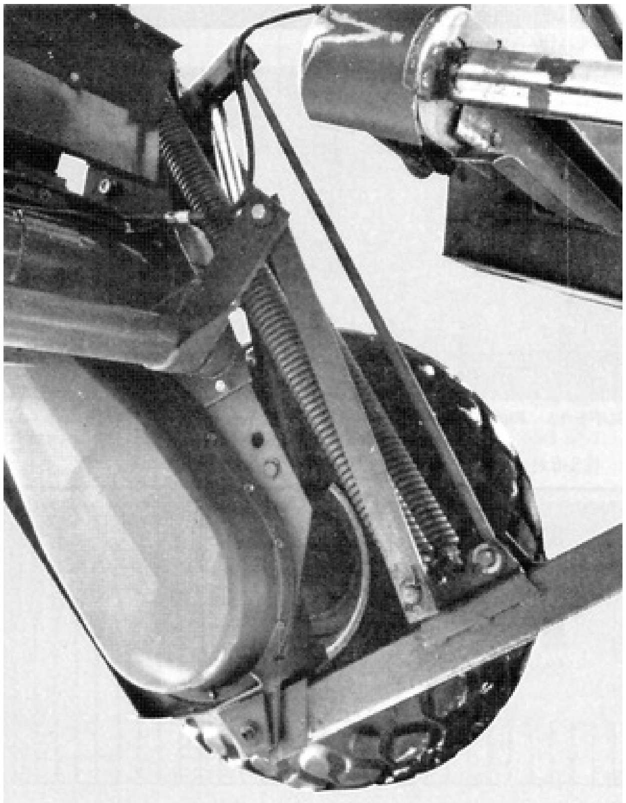


FIGURE 14. Table Floatation System.

EASE OF OPERATION AND ADJUSTMENT

Steering: Directional control and maneuverability of the IH 4000 were excellent. Steering was positive and effortless. Operators unfamiliar with the hydrostatic drive and steering system on the IH 4000 are cautioned that steering, while in reverse, is opposite to that of conventional machine operation. In addition, when the variable speed lever is returned to neutral, the steering wheel must also be returned to neutral to stop machine motion. A safety lockout is provided which prevents engine start-up unless these two conditions are met. Although this steering system differs from that on most machines, operators found no difficulty in getting accustomed to it.

The IH 4000 did not pull sideways in soft fields, as is common with many windrowers with conventional drive systems. In addition, steering was not influenced by different tire pressures in each drive wheel.

Speed Control: Infinite forward speed variation from 0 to 20 km/h (0 to 12.6 mph) was possible with the hydrostatic speed control lever. Speed control was excellent on level fields but was only fair on hilly fields. On steep slopes, the speed control lever had a tendency to move towards neutral, reducing forward speed when climbing uphill and had a tendency to move away from neutral, increasing forward speed when travelling downhill. The operator had to exert considerable force on the speed control lever to hold it in the desired position. It is recommended that the manufacturer consider modifications to eliminate creeping of the speed control lever on steep slopes.

Braking: Braking was accomplished hydrostatically with the speed control lever. A mechanical parking brake was also provided. The parking brake had to be engaged before the engine could be started. Brakes were adequate under all conditions.

Header Controls: The header drive was engaged with a conveniently located hand lever. Reel and table lifts were both hydraulically operated with foot pedals on the left of the steering column. The action of both the table and reel lift cylinders was extremely fast. In most conditions a slower lift speed would have been preferable.

Soft and Muddy Fields: Wheel floatation and traction generally were good in soft or muddy fields. If rolling resistance, due to sinkage, became too great the drive wheels usually stopped due to a lack of driving torque, rather than a loss of traction. If soil resistance became great enough to stop the drive wheels, it sometimes was not possible to back up because the maximum driving torque in reverse was less than that while travelling forward. It is recommended that the manufacturer consider modification to increase the maximum torque in reverse to aid operation in soft or muddy fields.

Transporting: Maximum forward speed was about 20 km/h (12.5 mph). The 0.9 m (3 ft) right hand header offset aided when meeting vehicles on roads by reducing the road centre line overhang. As with most hydrostatic drive windrowers, the final drive had to be removed to prevent damage to the hydrostatic units if the windrower was towed with the drive wheels on the ground. The IH 4000 towed well on windrower transporters and castor wheel shimmy usually occurred only at speeds above 40 km/h (25 mph).

Adjustments: Reel and draper speeds were adjusted by varying the number of spacers between the two halves of the d rive sheave. The reel lift cylinders could be repositioned by pinning the bottom cylinder pivot in any one of a series of holes. Horizontal reel repositioning required removal of one pin at each end of the reel and sliding the reel to a new position. Drive belt tension was not affected by reel position.

Seasonal changing of the header angle, from the recommended hay to grain settings required several hours. The adjustment was not complicated but binding between the header and the lift support arms (FIGURE 15) prevented support arms from shifting freely to the desired new position. Additional adjustment of the header tilt angle was easily made by adjusting the turnbuckle which acted as the third header attachment link.

Servicing: Daily lubrication of the IH 4000 took from 15 to 20 minutes. A grease gun with a flexible hose was needed for greasing the drive shaft universal joints. All other grease nipples were more easily accessible.

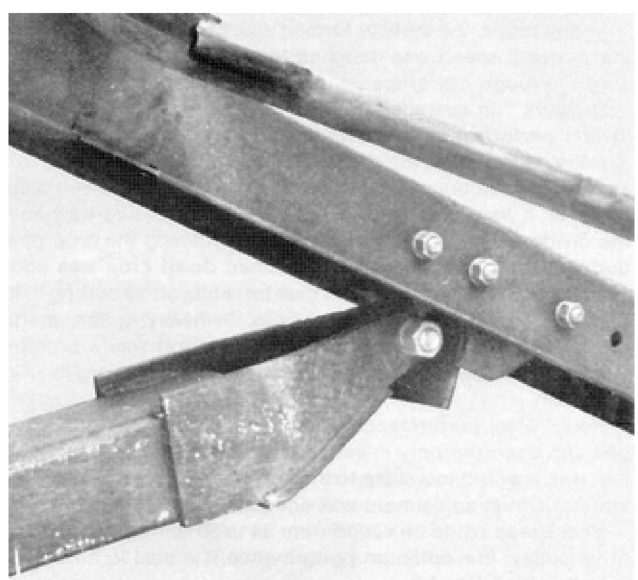


FIGURE 15. Lift Support Arms.

NOISE LEVEL

Total noise at operator ear level was about 91 db(A) when operating on flat fields at normal speed in average wheat crops. It is recommended that an operator wear suitable ear protection, especially on long working days.

POWER AND FUEL CONSUMPTION

The engine on the IH 4000 had adequate power for all conditions encountered. Average fuel consumption was about 14.5 L/h (3.2 gal/hr). Fuel consumption would be greater in extreme conditions. The 114 L (25 gal) fuel tank permitted about 8 hours of operation between fillings. This was inconvenient during the extended working hours normally experienced during harvesting. It is recommended that the manufacturer consider increasing fuel tank capacity.

OPERATOR SAFETY

The centre of gravity was located above and behind the main drive wheels. Overall machine stability was satisfactory. Only when operating on steep slopes or at high speeds over rough ground was there any tendency to tip forward.

Access to the operator's platform was safe and convenient. Controls were well positioned and identified with standardized symbols. Visibility was good. The two headlights and rear working light provided sufficient illumination for night operation. The IH 4000 was equipped with a slow moving vehicle sign and flashing safety lights for transport on public roads.

Both the steering wheel and speed control lever had to be in neutral to stop the windrower. Inexperienced operators may initially encounter problems while attempting to back the IH 4000, since the steering, when in reverse, is opposite to that for conventional vehicles. If the variable speed lever is in neutral and the steering wheel is not in neutral, the windrower will continue to turn. Inexperienced operators are cautioned that initial operation should be attempted in an open area, to become familiar with the steering system.

A safety lockout device ensured that both the speed control lever and steering wheel were in neutral before the engine could be started. It was essential that lockout linkages were properly adjusted. Attempting to start the engine without proper lockout adjustment was hazardous since the windrower would begin to move or turn as soon as the engine started. The test machine required adjustment of the safety lockout three times. One of the required adjustments was not discussed in the operator's manual. It is recommended that the manufacturer consider modification of the lockout device to reduce the frequency of adjustment and include additional adjustment information in the operator's manual.

No other safety hazards were apparent, if recommended safety procedures were followed during servicing and operation. Drives were adequately shielded and the windrower was stable on slopes and rough terrain.

OPERATOR'S MANUAL

The operator's manual contained much useful information on operation, safety, adjustment and servicing. It was clear and well written. The operator's manual contained two omissions: Adjustment of the safety interlock system was not completely outlined while header float spring adjustment instructions were not suitabte for windrowers equipped with the 6 m (19.5 ft) grain header. The operator's manual recommended attaching the left float springs in the front position and the right float springs in the rear position. Table levelling could be accomplished only with both sets of float springs in the rear position. It is recommended that the operator's manual be modified to correct these omissions.

DURABILITY RESULTS

TABLE 4 outlines the mechanical history of the IH 4000 windrower during 200 hours of operation while windrowing about 607 ha (1497 ac). The intent of the test was evaluation of functional performance. The following failures represent those which occurred during functional testing. An extended durability evaluation was not conducted.

TABLE 4. Mechanical History

ITEM	OPERATING HOURS	EQUIVALENT AREA ha	(ac)
The rear universal joint on the main driveshaft required disassembly at	0	0	(0)
The engine safety lockout system required adjustment at	14	33	(80)
This recurred at	28 & 100	75 & 270	(185 & 670)
The four bolts securing the knife drive box sheared and were replaced at	28	75	(185)
Engine governor and drive belt were replaced at	154	450	(1110)

DISCUSSION OF MECHANICAL PROBLEMS

The rear universal joint cross on the main driveshaft was originally assembled so that the grease fitting faced the flywheel, making it inaccessible. This was corrected by disassembling and reversing the cross.

The cause of failure of the four bolts holding the knife drive box to the table frame was not determined. After replacement with new Grade 8 bolts no further problems occurred.

The engine governor had to be replaced after the rivets on the belt drive pulley failed, causing the drive belt to twist and bend the governor shaft.

Several readjustments of the safety lockout device were necessary before the components affecting the lockout linkage were worn into a proper fit. The slot adjustment for positioning the safety interlock plate also loosened resulting in a need for additional adjustment.

APPENDIX I SPECIFICATIONS

Model:	International Harvester 4000 Windrower
Serial No.:	1300 00 00 00 1586
Cutterbar:	
-- width of cut (divider points)	5900 mm (232 in)
-- effective cut (inside divider)	5750 mm (226 in)
-- range of cutting height	
-- hay	-3 to 745 mm (-0,1 to 29.3 in)
grain	41 to 822 mm (1.6 to 32.4 in)
-- guard spacing	76 mm (3 in)
-- length of knife section (underserrated)	76 mm (3 in)
-- knife stroke	76 mm (3 in)
-- knife speed	595 cycles/min
Header:	
-- header angle (from horizontal)	
hay setting -- fully raised	21°
-- fully lowered	25° to 30°
grain setting -- fully raised	16°
-- fully lowered	20° to 25°
-- number of drapers	2
-- width of drapers	1040 mm (41 in)
-- length of drapers -- right	2760 mm (108.5 in)
-- left	1815 mm (71.4 in)
-- draper speed range	2.1 to 2.7 m/s (408 to 534 ft/min)
-- draper roller diameter	57 mm (2.3 in)
-- height of windrow opening	875 mm (34.4 in)
-- width of windrow opening	
-- between windboards	1220 mm (48 in)
-- between rollers	980 mm (38.6 in)
-- between roller shields	890 mm (35 in)
-- raising time of header	1.2 s
-- lowering time of header	2.0 s
Reel:	
-- number of bats	5
-- number of reel arms/bat	5
-- diameter	1405 mm (55.4 in)
-- speed range	34 to 50 rpm
-- range of adjustment	
-- fore and aft	230 mm (9 in)
-- height above cutterbar	0 to 685 mm (0 to 27 in)
-- raising time	0.8 s
-- lowering time	1.0 s
Ground Drive:	
-- type	hydrostatic with final chain drive
-- speed control	hand lever
-- range of forward speed	0 to 20 km/h (0 to 12.6 mph)
-- range of reverse speed	0 to 5 km/h (0 to 3.1 mph)
Steering:	steering wheel operating hydrostatic pumps
Brakes:	hydrostatic speed control lever
--	lever operated parking brake
Hydraulic System:	
-- traction drive	Sundstrand tandem hydrostatic pumps
	2 Sundstrand 8-3021 MF dydrostatic drive motors
-- table and reel lift	Borg Warner hydraulic pump
No. of Chain Drives:	4
No. of V-belts:	
-- single V	6
-- multiple V	1
No. of Pressure Lubrication Points:	21
No. of Prelubricated Bearings:	11
Engine:	
-- make	American Motors
-- model	C232 -- 6 cylinder
-- no load speed	2 570 rpm
-- fuel tank capacity	114 L (25 gal)
Tire Size:	
-- main drive wheels	2 -- 16.5 L x 16.1, 6-pty
-- castor wheels	2 -- G70 x 15, 4-ply rating
-- wheel tread	
-- drive wheels	2645 mm (104 in)
-- castors	2110 mm (83 in)
-- wheel base	3135 mm (t23 in)
-- overall width	6165 mm (243 in)
-- overall length	6 200 mm (244 in)
Weight as Tested: (header raised)	
right drive wheel	1130 kg (2486 lb)
-- left drive wheel	1140 kg (2508 lb)
-- castor wheels	430 kg (946 lb)
-- TOTAL	2700 kg (5940 lb)
Centre of Gravity: (header raised)	
height above ground	1370 mm (54 in)
-- distance behind drive wheels	500 mm (20 in)
-- distance left of right drive wheel	1330 mm (52 in)

OPTIONS AND ATTACHMENTS AVAILABLE: auger header, pickup reel, hay conditione cab, 12.5 L x 20 tires, header gauge wheels, lean bar. skid shoes, windrow deflector rods.

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

METRIC UNITS

In keeping with the Canadian metric conversion program.this report has been prepared in SI units. For comparative purposes, the following conversions may be used:

1 hectare (ha)	= 2.47 acres (ac)
1 kilometre/hour (kin/h)	= 0.62 mites/hour (mph)
1 tonne (t)	= 2204.6 pounds (lb)
1 tonne/hectare (t/ha)	= 0.45 ton/acre (ton/ac)
1 metre (m) = 1000 milimetres (mm)	= 39.37 inches (in)
1 kilowatt (kW)	= 1.34 horsepower (hp)
1 kilogram (kg)	= 2.2 pounds (lb)
1 litre/hour (L/h)	= 0.22 Imperial gallons/hour (gal/h)

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