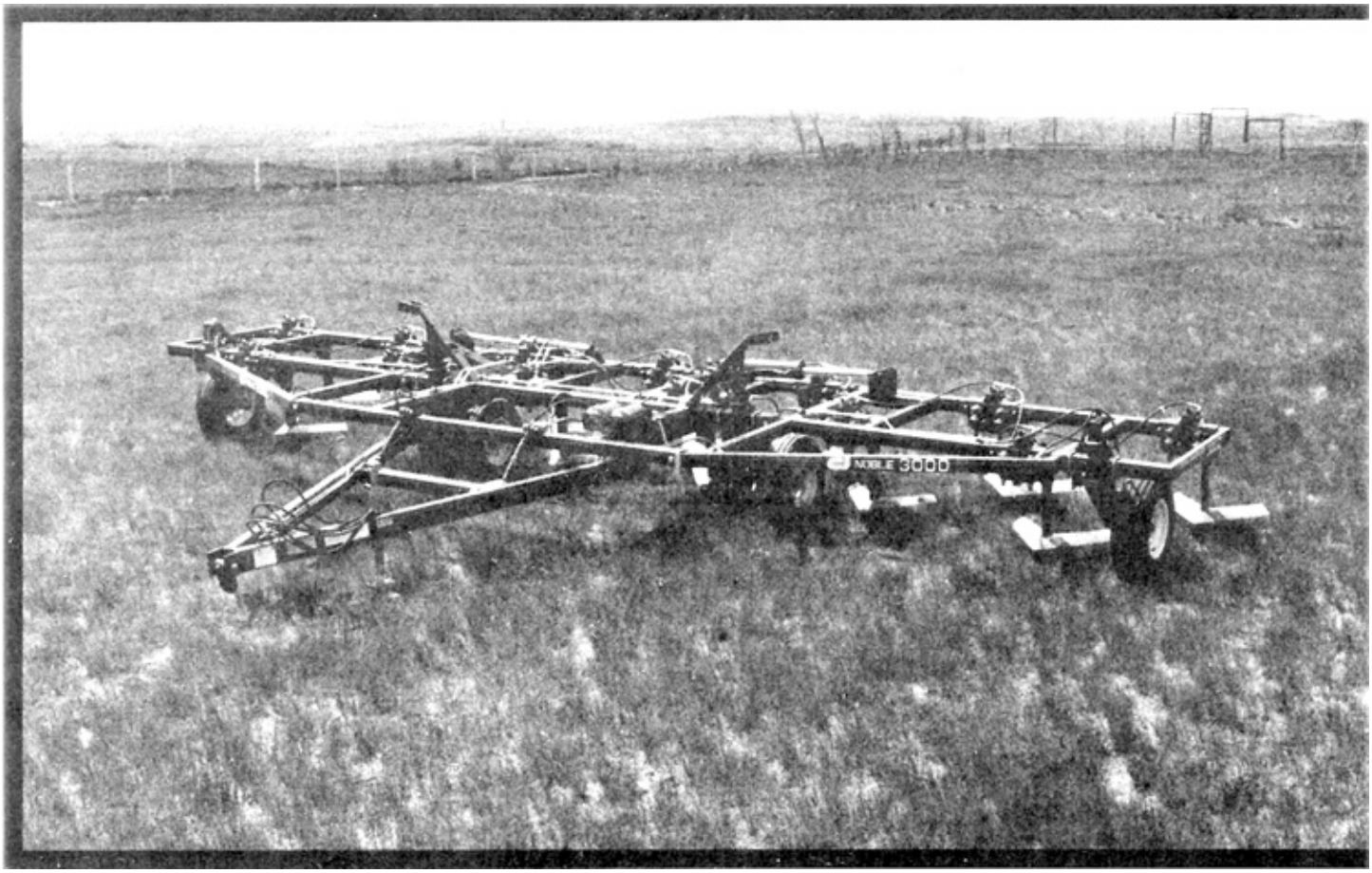
Alberta Farm Machinery Research Centre

Printed: January 1991
Tested at: Lethbridge
ISSN 0383-3445
Group 10 (a)

Evaluation Report 639



Cereal Implements 3000 Ultrasweep

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE

PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

CEREAL IMPLEMENTS 3000 ULTRASWEEP

MANUFACTURER AND DISTRIBUTOR:

Cereal Implements
P.O. Box 1420
1000 Sixth Avenue NE
Portage la Prairie, Manitoba
R1N 3N9
Phone: (204) 239-7043

RETAIL PRICE: $22,750 (February 1991, f.o.b. Nobleford, Alberta) Cereal Implements 3000 Ultrasweep 32.5 ft (9.9 m) unit with no sweeps.

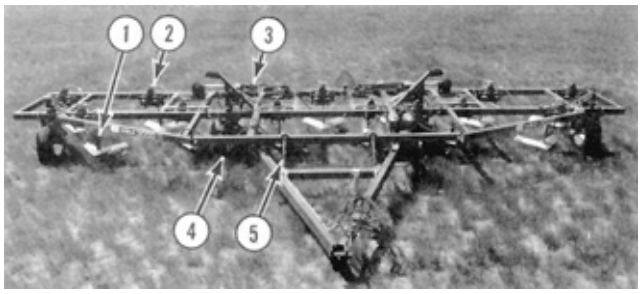


FIGURE 1. Cereal Implements 3000 Ultrasweep: (1) Sweep Standard, (2) Autotrip Cylinder, (3) Wing Lift Cylinder, (4) Dual Transport Wheels, and (5) Hitch Height Adjustment.

SUMMARY

QUALITY OF WORK:

The 3000 Ultrasweep tested was equipped with autotrip three-way hyclrauiic standards. The trip forces on the standards were varied by changing the hydraulic pressure of the trip cylinders. The standards tripped from side to side or straight back.

Penetration of the 3000 Ultrasweep was very good. Adding weights may improve the penetration of the unit in dry fields or hardpan, conditions.

Penetration was uniform across the blade plow width if the unit was properly levelled. The unit followed most rolling field contours. Large variations in tillage depth occurred in fields with abrupt contour changes.

Soil finishing of the 3000 Ultrasweep was very good. The majority of the trash was left on the surface in all conditions. The amount of trash buried in the furrows depended on tillage depth, speed of tillage and soil conditions. The sweeps did not totally scour in moist soils and in fields that required shallow operating depths.

Trash clearance of the Ultrasweep was very good. Trash was cleared in all test field conditions except a heavy stubble field where the unit plugged at the dual wheels on the center section.

Operation in stony conditions was very good. No damage occurred to the standards or the sweeps (hardfaced and plain) during the test.

The 3000 Ultrasweep was used to apply anhydrous ammonia fertilizer during the test. Good retention of fertilizer occurred in average secondary fields but did not always occur in primary fields. Ground speed and tillage depth affected the amount of fertilizer lost to the atmosphere in primary fields.

EASE OF OPERATION AND ADJUSTMENT:

Ease of performing routine maintenance on the 3000 Ultrasweep was very good.

Ease of transporting the 3000 Ultrasweep was very good. Transport width was 16.5 ft (5.0 m), while transport height was 13.5 ft (4.1 m). The unit transported well at a speed of 20 mph (32 km/h). Hitching to the 3000 Ultrasweep in field position was difficult because of the negative hitch weight.

Ease of maneuvering the unit in the field was good. Visibility of the end standard was blocked by the wing frame.

Ease of setting the tillage depth and replacing the sweeps was very good. Two men required one hour to remove and replace the thirteen sweeps on the unit,

POWER REQUIREMENTS:

Tractor size needed to pull the 3000 Ultrasweep at all tillage depths was 215 power take-off hp (161 kW).

OPERATOR SAFETY:

The 3000 Ultrasweep was safe to operate if normal safety precautions were observed, Transport locks were provided for the depth and the wings. A slow moving vehicle sign was provided. A safety tow chain and accommodations to secure a safety tow chain were not provided.

OPERATOR'S MANUAL:

The operator's manual was very good. A parts manual was also provided.

MECHANIAL HISTORY:

Fasteners used to securethe socket assemblies loosened during the test.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing a safety tow chain and the accommodations to secure a safety tow chain.
2. Using a better fastener to secure the socket assemblies.

Manager: R.P. Atkins

Project Engineer: L.W. Papworth

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. A safety tow chain and the correct mounting lug and hardware were incorporated on this machine in 1989, as standard equipment. All machines built in 1989 and since are so equipped, Machine evaluated was a R & D prototype.
2. Changes in the socket assembly, with more positive fasteners, are being evaluated for future models.

Additional Comments:

"The replacement blades have been widened to 36 in (914 mm) in width for better overlap and weed kill. The standard angle has been changed from 7 degrees rearward to vertical for improved performance in trash handling. Suggested retail cost, 1990, of the Anhydrous Application Kit was $50 per standard."

GENERAL DESCRIPTION

The Cereal Implements 3000 Ultrasweep is a trailing three section wide sweep tillage tool used for primary and secondary conservation tillage operations. It is available with 9 or 13 standards, in widths of 22.5 or 32.5 ft (6.9 or 9.9 m), respectively. The blade plow is available with rigid, shear-bolt or autotrip standards. The 34 in (864 mm) wide, 70 degree sweeps are available with various treatments: plain, top hardfaced or bottom hardfaced. Standards are spaced on 30 in (762 mm) centres. Tillage depth is set by a master slave hydraulic system consisting of four cylinders. Options available are granular fertilizer distribution tubes, coulters, end marker, tag-a-long marker, tongue weight pan and frame weights.

Top hard-surfaced sweeps are commonly used in soils that are abrasive so that wear on the leading face is prolonged. Bottom hard-surfaced sweeps are commonly used in heavy soils so the

leading face will scour. Plain sweeps are commonly used in stoney conditions because they are stronger than hard-surfaced sweeps.

The 3000 Ultrasweep tested was 32.5 ft (9.9 m) wide with 13 standards. The unit had optional autotrip standards. A set of top hardfaced and plain sweeps were used during the test. A tractor with three sets of remote hydraulics was needed to operate the test unit.

FIGURE 1 shows the location of major components while detailed specifications are given in APPENDIX I. Sweep terminology is given in APPENDIX II.

SCOPE OF TEST

The Cereal Implements 3000 Ultrasweep was operated in the field conditions shown in TABLE 1 for 292.5 hours while cultivating 4750 ac (1900 ha). The unit was evaluated for quality of work, ease of operation and adjustment, power requirements, operator safety and suitability of the operator's manual.

The machine evaluated by the AFMRC was configured as described in the General Description, FIGURE 1, and the Specifications section in APPENDIX I of this report. The manufacturer may have built different configurations of this machine before or after the AFMRC tests. Therefore, when using this report, check that the machine under consideration is the same as the one reported here. If differences exist, assistance can be obtained from the AFMRC or the manufacturer to determine changes in performance.

TABLE 1.

FIELD CONDITION	HOURS	FIELD AREA ac	(ha)
TILLAGE			
- Primary	159.0	2600	(1040)
- Secondary	133.5	2150	(860)
TOTAL	292.5	4750	(1900)
SOIL TYPE			
- Sand	16.0	240	(95)
- Loam	188.5	3010	(1205)
- Clay	88.0	1500	(600)
TOTAL	292.5	4750	(1900)
STONY PHASE			
- Stone Free	74.5	1140	(455)
- Occasional Stones	163.5	2595	(1040)
- Moderately Stony	51.5	975	(390)
- Very Stony	3.0	40	(15)
TOTAL	292.5	4750	(1900)

RESULTS AND DISCUSSION

QUALITY OF WORK

Shank Characteristics: The 3000 Ultrasweep tested was equipped with autotrip three way hydraulic standards. The standards tripped three ways: side-to-side or straight back. Each standard was held in position by a single hydraulic cylinder. The cylinders were pressurized by the tractor hydraulics and held under pressure by two nitrogen charged accumulators (FIGURE 2) controlled by the pressure reducing valve (FIGURE 3). The system pressure was shown on the gauge. The pressure of the hydraulic cylinders was varied from 0 to 1000 psi (6900 kPa) by adjusting the pressure reducing valve. The system pressure was released using the drain valve.

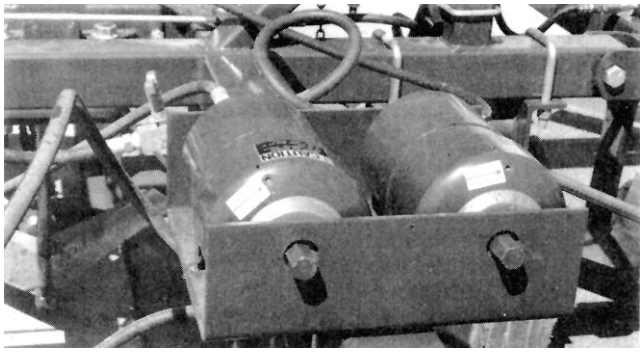


FIGURE 2. Nitrogen Charged Accumulators.

FIGURE 4 shows the forces required to trip the standards at different system pressures. The recommended system pressure was 500 to 750 psi (3450 to 5175 kPa), which gave average standard trip forces of 900 to 1400 lbs (4005 to 6230 N). The hydraulic cylinders acted as cushion springs because the forces continued to rise as the standards tripped back. The standards, when tripped, were allowed to pivot from side to side or straight back.

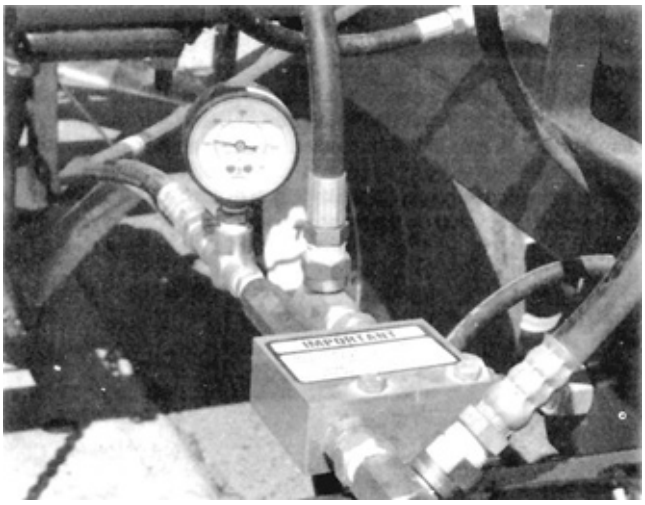


FIGURE 3. Pressure Reducing Valve.

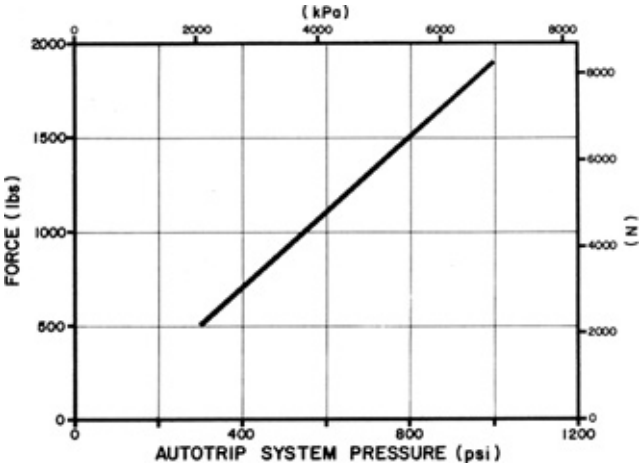


FIGURE 4. Standard Trip Forces at Various Cylinder Pressures.

Penetration: Penetration of the 3000 Ultrasweep was very good. Penetration was adequate in all test field conditions except dry fields where the sweeps would ride on the hardpan of the soil. Penetration of the 3000 Ultrasweep may improve with the addition of weights.

The unit could be set to work at depths of 2.5 to 6 in (64 to 152 mm) in firm soils. Standard movement only occurred when operating in excessive conditions such as a 6 in (152 mm) depth in primary conditions with the cylinder pressure set at 600 psi (4140 kPa).

Penetration was uniform across the width if the unit was properly levelled. Front-to-back levelling of the unit was also important for proper penetration. The manufacturer recommended operating the heel of the sweeps slightly deeper than the nose when penetration was a problem.

The unit followed most rolling field contours. Large variations in tillage depth occurred in fields with abrupt contour changes. Flotation of the unit was adequate for all the test field conditions.

Stony Conditions: Operation in stony conditions was very good. The autotrip system provided adequate protection during the test. No damage occurred to either the standards, the top hardfaced or the plain sweeps during the test. The manufacturer recommended using an autotrip system hydraulic pressure of 500 psi (3450 kPa) while operating in very stony conditions. Maximum lift height of the standard, when tripped directly back, was 10.5 in (267 mm) at the

nose and 25.5 in (648 mm) at the end of the sweep wing. The standards were also allowed to pivot from side to side. Maximum lift height, when fully pivoted to one side, was 5.5 in (140 mm) at the nose and 18.5 in (470 mm) at the end of the sweep wing.

Trash Clearance: Trash clearance of the 3000 Ultrasweep was very good. Trash was cleared in all test field conditions except a heavy stubble field where the unit plugged at the dual wheels on the center section. Some plugging also occurred in adverse weed conditions. Weeds tended to wrap and build up around the standards.

Soil Finishing: Soil finishing of the 3000 Ultrasweep was very good. The majority of the trash was left on the surface in all test conditions. FIGURE 5 shows the trash cover in a tilled stubble field with silt loam soil. Some trash was buried in the furrows left by the standards. The size of the furrow left by the standard depended on tillage depth, speed of tillage and soil conditions. Deeper tillage depths and operating speeds above 5 mph (8 km/h) left larger furrows. Soil tended to build up on the standards in moist conditions and weeds tended to wrap around the standards. These conditions caused an increase in the furrow size.

FIGURE 6 shows an example of large furrow sizes caused by operation in a moist black loam soil. The soil was built up around the standards. FIGURE 7 shows the soil surface before and after tillage in a previously tilled field.

In some moist soils and fields that required shallow operating depths the sweeps did not totally scour as shown in FIGURE 8. This poor scouring was caused by the lack of resistance of the soil while flowing over the sweep surface. Extended operation in poor scouring conditions might affect the wear of the sweeps. The sweeps scoured adequately during operation in black loam soil.

FIGURE 5. Field Surface after Operation in a Stubble Field with Silt Loam Soil.

FIGURE 6. Field Surface after Operation in a Stubble Field with moist Black Loam Soil.

Skewing and Stability: The 3000 Ultrasweep was very stable and did not skew sideways in normal field conditions. Slight skewing on steep hills did not cause weeds to be missed.

Weed Kill: Weed kill was good. The standard spacing of 30 in (762 mm) resulted in a 4 in (102 mm) sweep overlap. Sweep wear did not cause weeds to be missed. Operation in dry soil conditions improved weed kill. Operation in moist soil occasionally resulted in inadequate weed kill. Good weed kill occurred when the sweeps were operated at the shallowest possible depth.

Fertilizer Application: The 3000 Ultrasweep was used for 135.5 hours to apply anhydrous ammonia fertilizer on 2205 ac (882 ha) during the test. The unit was outfitted with a distribution manifold, hoses, converters and anhydrous tubes as shown in FIGURE 9. The distribution tubes fit under the top edge of the sweep and were held in place by two of the sweep bolts. Spacing of the outlet holes on the distribution tubes was 7.5 in (191 mm).

FIGURE 7. Field Surface Before and After Operation in a Previously Tilled Field.

FIGURE 8. Poor scouring of sweeps.

FIGURE 9. 3000 Ultrasweep Outfitted with Anhydrous Ammonia Fertilizer System.

Good retention of anhydrous ammonia occurred in average secondary fields but did not always occur in primary fields. Ground speed and tillage depth affected the amount of fertilizer lost to the atmosphere in primary fields. Ground speeds of 4 mph (6.4 km/h) or less and tillage depths of at least 4 in (102 mm) provided the best retention of the anhydrous ammonia in primary fields.

Adding fertilizer distribution tubes to the standards caused moist soil to easily build up around the standards as shown in FIGURE 10. This caused the size of the furrow left by the standard to increase.

Sweep wear caused the wings of the fertilizer distribution tubes to bend back near the end of the test. Excessive operation with worn sweeps would have caused permanent damage to the fertilizer distribution tubes.

EASE OF OPERATION AND ADJUSTMENT

Maintenance: Ease of performing routine maintenance on the 3000 Ultrasweep was very good. The grease fittings were accessible and required lubrication every 50 hours. Wheel hubs required servicing annually.

Transporting: Ease of transporting the 3000 Ultrasweep was very good. Five minutes were required to place the unit in transport position (FIGURE 11). Pins were provided to lock the wings in transport

position. Hold-out bars (FIGURE 12) were provided to lock the depth cylinders on the center section in transport position.

The unit required the use of three sets of remote hydraulics. The hydraulics were used to control the operating depth, lift the wings and pressure the autotrip system.

Transport width was 16.5 ft (5.0 m), while transport height was 13.5 ft (4.1 m). The unit towed well at a speed of 20 mph (32 km/h). Sweep-to-ground clearance during transport was 8.5 in (216 mm). Wheel tread width was 10 ft (3.1 m), which made the unit stable during transport.

Hitching to the 3000 Ultrasweep in field position was difficult because of negative hitch weight. Resting the sweeps on the ground eliminated negative hitch weight. Negative hitch weight may occur in transport position, depending on the front-to-back levelling. Access to the hitch jack was good.

The unit should not be transported with the autotrip system unpressurized. Hydraulic oil would leak from the relief valves on each cylinder. The standards on the wings would also move continuously during transportation.

FIGURE 10. Soil Built Up Around Standard andFertitizer Distribution Tube.

FIGURE 11. Transport Position.

FIGURE 12. Hold-Out Bar to Lock Depth Cylinders.

Maneuverability: Ease of maneuvering the 3000 Ultrasweep in the field was good. The hitch did not interfere with the rear wheels of the tractor during normal cornering. Visibility of the end standard was blocked by the frame. The end sweeps extended out past the edge of the tires and frame so blading close to fences was difficult.

Depth Adjustment: Ease of setting the tillage depth was very good. Tillage depth was controlled by the four hydraulic cylinders located along the blade plow frame. Depth adjustment required positioning the stop plate for the hydraulic shut valve (FIGURE 13) located on the master cylinder. The master cylinder was located on the left wing.

Side-to-side levelling of the frame was made by vertically positioning the hydraulic depth cylinders using lug and jam nuts located on the top of each cylinder.

Front-to-back levelling of the unit was adjusted by the pitch control links located on the hitch. Caution had to be taken not to tighten the two links against each other.

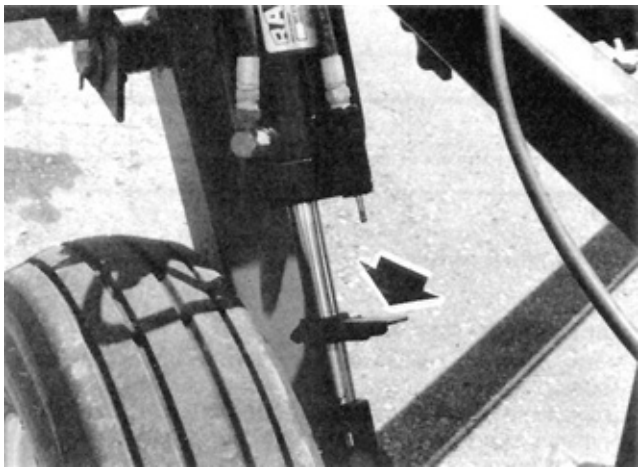


FIGURE 13. Depth Adjustment on Master Cylinder.

Sweep Replacement: Ease of replacing the sweeps was very good. Two men required one hour to remove and replace the thirteen sweeps on the unit. High frame clearance permitted easy movement underneath the unit. The six bolts holding the sweep to the standard were tightened from front to back to reduce the chance of any stress on the weld at the nose of the sweep.

POWER REQUIREMENTS

Draft Characteristics: Draft requirements for a blade plow in a field may vary significantly due to changes in soil conditions. Variation in soil conditions affect draft as much or more than variation in machine make. This makes it impossible to measure any significant draft differences between different makes of blade plows.

In primary tillage average draft at 5 mph (8 km/h) varied from 200 lb/ft (2.9 kN/m) at a 2.5 in (64 mm) depth to 320 lb/ft (4.8 kN/m) at a 5 in (127 mm) depth. For the 32.5 ft (9.9 m) wide unit this corresponded to a total draft ranging from 6500 to 10400 lb (28.9 kN to 46.3 kN).

In secondary tillage average draft at 5 mph (8 km/h) varied from 110 lb/ft (1.6 kN/m) at a 2.5 in (64 mm) depth to 265 lb/ft (3.9 kN/m) at a 5.0 in (127 mm) depth. This corresponds to a total draft ranging from 3580 to 8620 lb (15.9 kN to 38.3 kN).

Tractor Size: FIGURE 14 shows the horsepower requirements for blade plows in average primary and secondary tillage at a speed of 5 mph (8 km/h). Tractor size needed to pull the test unit at all tillage depths was 215 power take-off hp (161 kW). This tractor size has been adjusted to include tractive efficiency and represents a tractor operating at 80% of the maximum power take-off rating. This rating was determined by Nebraska tests or presented by the tractor manufacturer, The tractor size given will have ample power reserve to operate in the stated conditions.

OPERATOR SAFETY

The 3000 Ultrasweep was safe to operate if normal safety precautions were observed. The transport height of 13.5 ft (4.1 m) and width of 16.5 ft (5.0 m) allowed for safe transportation of the unit. Transport locks were provided for the depth control cylinders on the center

section. Lock pins were provided for each wing. A slow moving vehicle sign was provided. A safety tow chain and accommodations for securing a safety tow chain were not provided. It is recommended that the manufacturer consider providing a safety tow chain and the accommodations to secure a safety tow chain,

Tire loads did not exceed the maximum load ratings for transport speeds up to 25 mph (40 km/h).

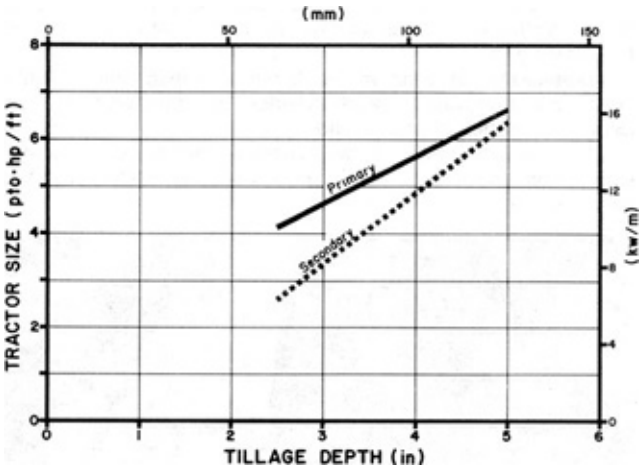


FIGURE 14. Average Horsepower Requirements for Blade Plows at 5 mph (8 km/h).

OPERATOR'S MANUAL

The operator's manual was very good. Information on safety, operation, lubrication, maintenance and assembly was contained in the operator's manual. A separate parts manual was also provided. The manuals were clearly written, with photographs and illustrations for explanations.

MECHANICAL HISTORY

The 3000 Ultrasweep was operated for 292.5 hours while cultivating about 4750 ac (1900 ha). The intent of the test was evaluation of functional performance and an extended durability evaluation was not conducted. TABLE 2 outlines the mechanical problems that did occur during the functional testing.

TABLE 2. Mechanical History

ITEM	OPERATING HOURS	EQUIVALENT FIELD AREA ac	(ha)
faulty socket casting pivot broke. Replaced at	51.5	715	(286)
replaced sweeps at	157.0	2545	(1018)
depth lug broke off a dual wheel axle. Rewelded at	178.5	3065	(1226)
several socket assembly fasteners loosened. Retightened the fasteners at	198.0	3335	(1334)
handle for pitch control link was lost. Replaced at	232.0	3840	(1536)
replaced missing hitch pin clip on depth cylinder pin at	end of test		

DISCUSSION OF MECHANICAL PROBLEMS

Sweep Wear: FIGURES 15 and 16, respectively, show the average wear of the top hardfaced and plain sweeps during the test. The top hardfaced sweeps were used for 2545 ac (1018 ha) or 196 ac (78 ha) per sweep. The plain sweeps were used for 2205 ac (882 ha) or 170 ac (68 ha) per sweep. The plain sweeps were worn out and the hard-surfaced sweeps were still useable at the end of the test. The amount of wear on the sweeps behind the tractor tire tracks was higher than the average wear.

Suggested retail cost, 1990, for the plain sweep was $49.50 and for the top hardfaced sweep was $89.75.

Loose Fasteners: The fasteners which secured the socket assemblies were free spinning nuts with serrated faces. These fasteners were not vibration resistant during the test. It is recommended the manufacturer consider using a better fastener to secure the socket assemblies.

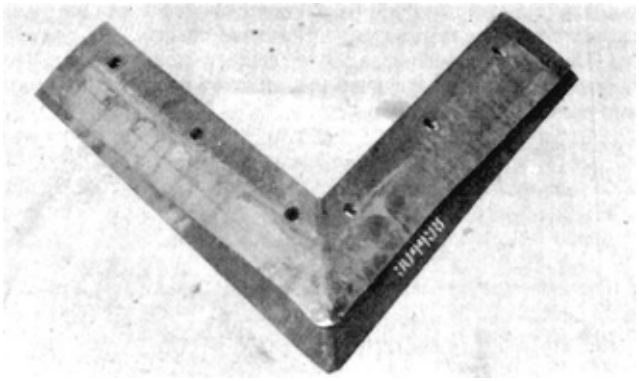


FIGURE 15. Typical Wear on the Top Hardfaced Sweep During the Test.

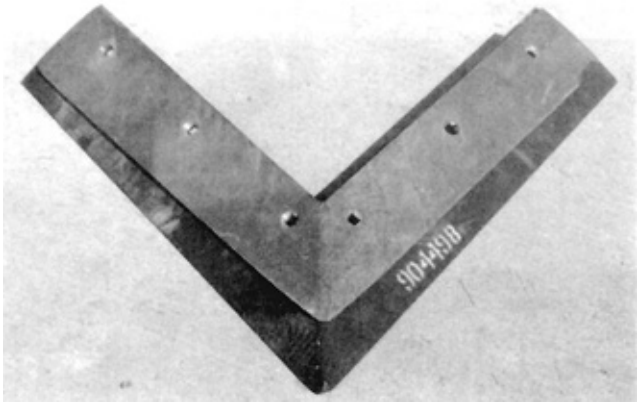


FIGURE 16. Typical Wear on Plain Sweep During the Test.

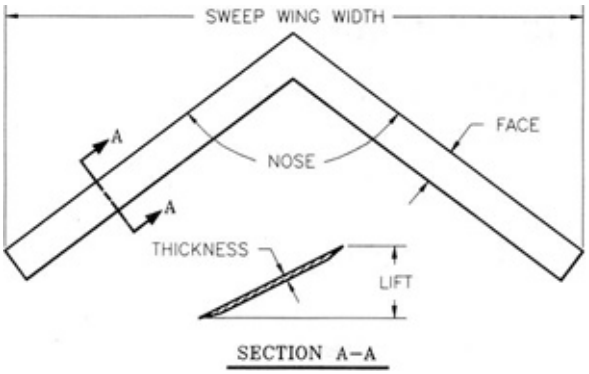
APPENDIX I

SPECIFICATIONS

MAKE:	Cereal implements	
MODEL:	3000 (RD-PROTO)	
SERIAL NUMBER:	0017	
MANUFACTURER:	Vicon Manufacturing Inc. P.O. Box 3200 1000 - 6 Ave. N.E. Portage la Prairie, Manitoba R1N 3R3	
DIMENSIONS OF TEST UNIT:	**Field Position**	**Transport Position**
- height	5.3 ft (1.6 m)	13.5 ft (4.1 m)
- length	19.9 ft (6.1 m)	19.9 ft (6.1 m)
- width	32.5 ft (9.9 m)	16.5 ft (5.0 m)
- maximum ground clearance		8.5 in (216 mm)
- wheel tread		10 ft (3.1 m)
STANDARDS:		
- number	13	
- spacing	30 in (762 mm)	
- sweep to frame clearance	29 in (737 mm)	
- sweep to standard assembly clearance	24 in (610 mm)	
- number of rows	2	
- distance between rows	3.2 ft (1.0 m)	
- standard thickness	1.1 in (27.9 mm)	
SWEEP:		
- number of mounting bolts	6	
- bolt size	0.5 x 0.75 in (12.7 x 19.1 mm)	
- sweep wing width	34.5 in (876 mm)	
- sweep nose angle	70 degrees	
- sweep face width	6.5 in (165 mm)	
- sweep lift height	3.0 in (76 mm)	
DEPTH CONTROL:	Master cylinder with three slave cylinders.	
FRAME:		
- cross section	4 in (102 mm) square tubing	
TIRES:	Six, 9.5L - 15, 6 ply	
NUMBER OF LUBRICATION POINTS:		
- grease fittings	18	
- wheel bearings	12	
HYDRAULIC CYLINDERS:		
- depth control	4	
- wing lift	2	
- autotrip	13	
WEIGHTS:	**Field Position**	**Transport Position**
- right wing wheel	1000 lb (450 kg)	–
- right dual wheel	2580 ib (1160 kg)	3570 lb (1605 kg)
- left dual wheel	2910 lb (1310 kg)	3840 lb (1725 kg)
- left wing wheel	1000 lb (450 kg)	–
- hitch	50 lb (-25kg)	30lb (15kg)
TOTAL	7440 lb (3345 kg)	7440 lb (3345 kg)
OPTIONS INCLUDED ON TEST MACHINE:	autotrip standards, anhydrous ammonia distribution tubes	
OTHER AVAILABLE OPTIONS:	shear-bolt or rigid standards, plain, bottom hardfaced or top hardfaced sweeps, granular fertilizer distribution tubes, coulters, end marker, tag-a-long marker, tongue weight pan, frame weights	

APPENDIX II

FIGURE 17. Sweep Terminology



APPENDIX III

The following rating scale is used:
- Excellent
- Very Good
- Good
- Fair
- Poor
- Unsatisfactory

SUMMARY CHART
CEREAL IMPLEMENTS 3000 ULTRASWEEP

RETAIL PRICE:	$22,750.00
QUALITY OF WORK:	
Penetration	**very good;** weights required in dry soil or hardpan conditions
Soil Finishing	**very good**; left the majority of the trash on surface
Trash Clearance	**very good;** plugged only in a heavy stubble conditions
Stony Conditions	**very good;** no damage to standards or sweeps
Fertilizer Application	**good** retention of anhydrous ammonia in average secondary conditions
EASE OF OPERATION AND ADJUSTMENT:	
Maintenance	**very good**
Transporting	**very good;** towed well
Maneuverability	**good;** visibility of end standard blocked
Depth Adjustment	**very good;** used master cylinder
Sweep Replacement	**very good**
POWER REQUIREMENTS:	215 PTO hp (161 kW) sufficient for all depths and conditions
OPERATOR SAFETY:	safe; transport locks provided, slow moving vehicle sign supplied
OPERATOR'S MANUAL:	**very good;** clearly written
MECHANICAL HISTORY:	fasteners used to secure alignment sockets for standards loosened

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