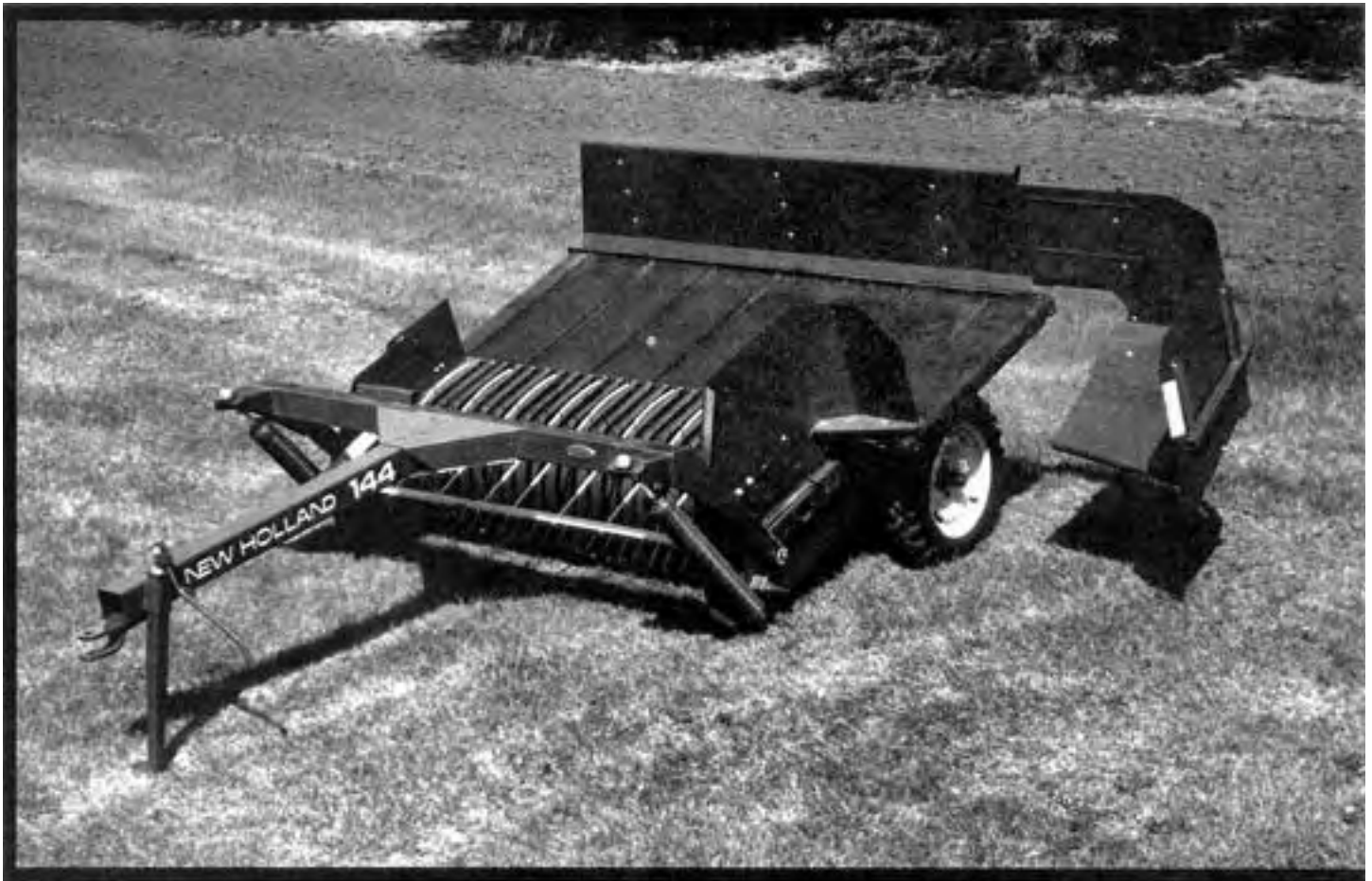


# Evaluation Report

# 621



**Ford New Holland 144 Swath Inverter**

A Co-operative Program Between

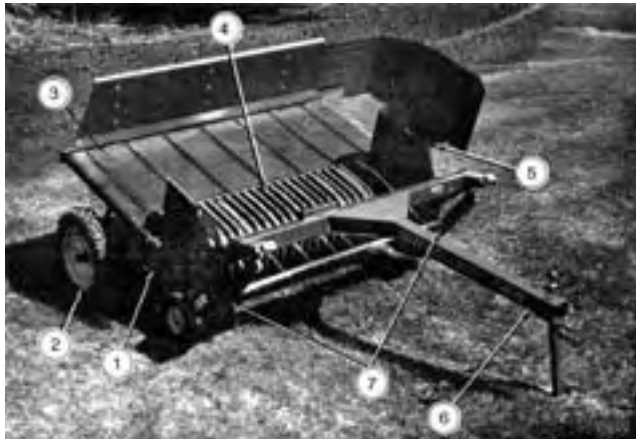


# FORD NEW HOLLAND 144 SWATH INVERTER

**MANUFACTURER:**  
 Ford New Holland  
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 New Holland, PA  
 Tel: (717) 354-1112

**DISTRIBUTOR:**  
 Ford New Holland (Canada)  
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 Calgary, Alberta  
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 Tel: (403) 273-6771

**RETAIL PRICE:**  
 \$4,998.00 (September 1989, f.o.b. Portage la Prairie, MB including optional drive wheel and 23 tooth pickup sprocket at \$120.00).



**FIGURE 1.** Ford New Holland 144 Swath Inverter: (1) Ground Drive Gearbox, (2) Ground Drive Wheel, (3) Draper Conveyor, (4) Pickup, (5) Discharge Chute, (6) Hitch, (7) Floatation Springs.

## SUMMARY

**Rate of Work:** The average continuous ground speed was 5 mph (8 km/h). Ground speed was limited by swath density, width, and field roughness. Average continuous workrate was governed by the width of swath and the density of windrows.

**Quality of Work:** The performance of the Ford New Holland 144 was very good. The 144 effectively inverted windrows in all crops tested. Leaf loss was minimal if crop moisture content was above 25%.

**Ease of Operation:** Ease of hitching, lubricating, and transporting were all very good. Ease of field operation was very good. The Ford New Holland 144 was easy to operate and took little operator practice. Daily service took about 5 minutes.

**Ease of Adjustment:** Adjustments to the Ford New Holland 144 were easy to carry out. Ease of adjusting the tension on the draper and the position of the discharge chute were very good. Adjusting the height of the pickup gauge wheel was good.

**Power Requirements:** The Ford New Holland 144 required a towing vehicle that offered sufficient clearance to straddle the windrow. PAMI effectively operated the swath inverter with a 30 hp (22.5 kW) tractor.

**Operator Safety:** The Ford New Holland 144 swath inverter was safe to operate if normal precautions for safety were followed. The Ford New Holland 144 complied with all applicable ASAE standards for safety.

**Operator's Manual:** The operator's manual was excellent. It contained useful and accurate information.

**Mechanical History:** Only one minor mechanical problem occurred during the 122 hours of evaluation.

## RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Increasing the strength of the formed metal angle that supports the discharge chute.

Station Manager: B. H. Allen

Project Manager: R. K. Harris

## THE MANUFACTURER STATES THAT

With regard to the recommendation:

1. Ford New Holland is currently investigating and developing improvements in this area.

## GENERAL DESCRIPTION

The Ford New Holland 144 swath inverter is a pull-type machine designed to pickup and invert a hay or forage windrow. The Ford New Holland 144 is ground driven and powers a baler type pickup and a draper belt. The windrow is lifted by the pickup and placed on the moving draper belt. The belt moves across the machine at 90 degrees to the incoming swaths. Therefore, the crop is moved to the left side of the machine where its direction is again changed 90 degrees by a curved guide, which directs the crop onto the discharge chute on the front of the unit. The moving crop is forced off the end of the discharge chute where it contacts the ground and is pulled off the machine in an inverted swath. The pickup is adjustable in height and an optional sprocket is available that increases the rotational speed of the pickup. An optional ground drive wheel is available to increase the traction of the ground drive.

Detailed specifications are given in APPENDIX I, while FIGURE 1 shows the location of major components.

## SCOPE OF TEST

The Ford New Holland 144 was operated in the crops shown in TABLE 1 for 122 hours. It was evaluated for rate of work, quality of work, ease of operation and adjustment, power requirements, operator safety and suitability of the operator's manual. In addition, mechanical problems were monitored throughout the test.

**TABLE 1.** Operating Conditions

Crop	Hours	Equivalent Field Area	
		ac	ha
Alfalfa	65	390	158
Alfalfa/Clover	12	72	30
Brome & Timothy	15	90	36
Native Grasses	30	180	73
Total	122	732	297

## RESULTS AND DISCUSSION

### RATE OF WORK

The rate of work was governed by the width of swath, the density of the windrows, and the field conditions encountered. The average continuous groundspeed was 5 mph (8 km/h). Acreage per hour was influenced by the width of swath. For example, when 18 ft (5.5 m) swath windrows were inverted the rate of work was 10.9 ac/h (4.4 ha/h), and when 9 ft (2.7 m) swath windrows were inverted, the rate of work was 5.4 ac/h (2.1 ha/h) providing the ground speed of 5 mph (8 km/h) remained the same. Heavy, high moisture windrows required a reduced ground speed to prevent plugging. Rough uneven fields also demanded reduced ground speeds to prevent damage to the machine.

### QUALITY OF WORK

The Ford New Holland 144 was effective in inverting the windrows of swaths up to 18 ft (5.5 m) wide. It was capable of picking up, inverting, and replacing the windrow on dry ground, to promote quicker drying. Its performance in all crops tested was considered very good. Leaf loss was considered to be negligible if windrows were inverted while moisture content was above 25%. Below 25% MC, leaf loss increased to about the same as could be expected from the pickup of a baler.

**Pickup Performance:** Pickup performance was very good. The rotating pickup was gentle on the crop and did not rely upon

excessive aggressive action. The pickup lifted the crop without changing the orientation of the stems and conveyed it to the draper belt. Pickup speed was directly proportional to the ground speed of the swath inverter. Ford New Holland offers an optional 23 tooth pickup drive sprocket that increased the rotational speed of the pickup. This sprocket eliminated hesitation of material flow between the pickup and the conveyor. The pickup was adjustable for height and floatation and when properly adjusted for the crop being processed, the pickup picked the windrow cleanly.

**Floatation:** After initial adjustment, floatation was very good. Two large tension springs provided pickup floatation on the Ford New Holland 144. A single adjustable gauge wheel controlled pickup height and allowed the pickup to follow ground contours.

**Draper:** The draper belt performance was very good and was effective in moving crop into the discharge chute.

**Discharge Chute:** The performance of the discharge chute was fair. In heavy crops of native grass or slough grass, the discharge chute did not allow the crop to flow as freely as it did for legumes. Plugging would occur (FIGURE 2) where the discharge chute forced the change of direction of the moving crop. The chute was adjustable to accommodate different sized windrows.



FIGURE 2. Plugged Discharge Chute.

## EASE OF OPERATION

**Hitching:** Hitching the Ford New Holland 144 was very good. The swath inverter was easy to hitch and took a minimal amount of time. Hitching consisted of placing the hitch on the tractor drawbar and inserting a suitable sized pin. Once the 144 was connected to the tractor, the hitch jack was raised to the storage position and hitching was complete.

**Transporting:** Ease of transporting was very good. The Ford New Holland 144 was placed in transport position by lifting the pickup and engaging the spring loaded lock pin. The discharge chute was removed from its field position by removing a lock pin and sliding the chute from its attachment point and relocating it to the transport location on the hitch cross-member. The discharge chute was locked in the transport position with the same pin that locked it in the field position. The ground drive was disconnected by moving an over centre lever to the transport position. The ground drive connect/disconnect pin was located on the axle that supported the right wheel. The Ford New Holland 144 towed very well at speeds up to 30 mph (50 km/h).

**Lubrication:** Ease of lubrication was very good. The Ford New Holland 144 was easily lubricated and utilized only three pressure nipples that required grease every 10 hours. Grease was also applied to the meshing teeth of the drive bevel gears at 10 hour intervals. The main drive chain and pickup drive chain were lubricated with SAE 30 motor oil at the start of each workday. Lubrication took one person 5 minutes.

**Field Operation:** Ease of field operation was very good. The Ford New Holland 144 was placed in field position by placing the discharge chute in its field position and locking it in place with the pin. The pickup was lowered to the ground by lifting the pickup by hand to its maximum height and pulling out and rotating the spring lock pin. The lever that disengaged the ground drive was moved to the engaged position.

Windrow inverting began when the towing tractor straddled the windrow and moved ahead. Once the inverting process began, a visual inspection revealed what adjustments were required.

## EASE OF ADJUSTMENTS

**Pickup Height:** Ease of adjusting the pickup height was good and consisted of removing a bolt that held the wheel to the pickup. The Ford New Holland 144 offered 4 adjustment holes and allowed an adjustment range of 4 in (100 mm). The desired height was selected and the bolt reinstalled.

**Pickup Floatation:** Ease of adjusting pickup floatation on the Ford New Holland 144 was very good. One large tension spring on each side of the machine provided pickup floatation. Adjustment was accomplished by turning the heads of two bolts that attach the upper end of the tension springs to the main frame. The bolts were rotated in unison until about 40 lb (178 N) was required to lift either side of the pickup. Pickup floatation adjustments took one person about 10 minutes.

**Windguard:** The windguard was very good to adjust. Adjustments were easy and consisted of loosening a stop bolt and retightening at the desired position.

**Draper Tension:** The adjustment for the draper tension was very good and easy to accomplish. Changing the Ford New Holland 144 draper tension was carried out by rotating the hex nut attached to a pawl quadrant at the rear of the machine. The draper was properly adjusted when the belt was 1 to 1.5 in (25 to 35 mm) below the inverter frame at the centre of the span. The time required was minimal. In addition, the draper belt was kept square with the frame by "L" bolts. Adjustments to this were not necessary during the 122 hours of evaluation.

**Chain Tension:** Chain adjustment was very good. The ground drive chains on the Ford New Holland 144 required tensioning periodically. Tensioning was carried out by loosening the chain idler retaining bolt, repositioning the idler and retightening the bolt. Chain tension adjustments were easy and took about 10 minutes.

**Discharge Chute:** The adjustment for windrow size on the discharge chute was very good. The discharge chute was adjusted for windrow size by removing the pin, which held the discharge chute in field position and selecting another hole that provided the desired dimension. The Ford New Holland 144 offered an adjustment range of 12 in (305 mm). The floor of the discharge chute was also adjustable, or could be removed completely to allow for free flow of heavy crops.

## POWER REQUIREMENTS

The Ford New Holland 144 required a towing vehicle that offered sufficient ground clearance to pass over the windrow. Ford New Holland did not provide a recommendation for tractor size. PAMI adequately operated the 144 with a 30 hp (22.5 kW) tractor. No power shaft or remote hydraulics were required.

## OPERATOR SAFETY

Safety on the Ford New Holland 144 was very good. The 144 was ground driven. Therefore when the towing tractor was stopped, so did the mechanism of the swath inverter. All chains and sprockets were adequately guarded and labelled and complied with all applicable ASAE standards for safety. The Ford New Holland 144 was provided with a slow moving vehicle sign mounting bracket. A safety chain is available as optional equipment.

## OPERATOR'S MANUAL

The operator's manual was excellent and contained useful information on warranty, owner assistance, safety, assembly, transporting, operation, lubrication, maintenance, optional equipment, and specifications. It also provided a table of contents and a delivery report. The manual was well written and illustrated.

## MECHANICAL HISTORY

The intent of this evaluation was the functional performance of the machine and an extended durability evaluation was not conducted. During the 122 hours of evaluation, only one minor mechanical problem occurred. The formed steel angle that supports the discharge chute failed (FIGURE 3). The angle was replaced with one fabricated from heavier material and the problem did not reoccur. It is recommended that the manufacturer consider increasing the strength of the formed metal angle that supports the discharge chute.



FIGURE 3. Failed Steel Angle.

**APPENDIX I  
SPECIFICATIONS**

<b>MAKE:</b>	Ford New Holland	
<b>MODEL:</b>	144 Swath Inverter	
<b>SERIAL NUMBER:</b>	797448	
<b>OVERALL DIMENSIONS:</b>	<u>Transport Position</u>	<u>Field Position</u>
-- length	11.7 ft (4.3 m)	11.7 ft (3.6 m)
-- width	7.8 ft (2.4 m)	9.8 ft (3.0 m)
-- height	5.9 ft (1.3m)	4.5 ft (1.4 m)
<b>WEIGHT:</b>	975 lb (443 kg)	

<b>WHEELS:</b>	Two, 5:00 x 15, 4-ply traction tread 15 x 4 J drop centre 20 psi (138 kPa)
<b>DRIVE:</b>	RC 40 chain driven from ground cast level gears RC 2040 roller chain
<b>PICKUP:</b>	65.0 in (1652 mm) 4 44 double steel tines
<b>DRAPER BELT:</b>	35.3 in (895 mm) 86.0 in (2184 mm) 2 ply rubber cleated fabric with fibreglass reinforcement
<b>NUMBER OF LUBRICATION POINTS:</b>	3 pressure grease nipples
<b>OPTIONAL EQUIPMENT:</b>	23 tooth pickup sprocket Additional ground drive wheel

**APPENDIX II  
MACHINE RATINGS**

The following rating scale is used in PAMI Evaluation Reports:

Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

**SUMMARY CHART  
FORD NEW HOLLAND 144 SWATH INVERTER**

<b>RETAIL PRICE:</b>	\$4,998.00 (September 1989, f.o.b. Portage la Prairie, MB)
<b>RATE OF WORK:</b>	Average continuous ground speed was 5 mph (8 km/h). Average work rate was influenced by width of swath.
<b>QUALITY OF WORK:</b>	
-Pickup Performance	<b>Very Good;</b> was gentle with crop
-Floatation	<b>Very Good;</b> after initial adjustment
-Draper	<b>Very Good;</b> effective in moving crop
-Discharge chute	<b>Fair;</b> tended to plug in some crops
<b>EASE OF OPERATION:</b>	
-Hitching	<b>Very Good;</b> was easy to hitch
-Transporting	<b>Very Good;</b> towed well at 30 mph (50 km/h)
-Lubrication	<b>Very Good;</b> easy to lubricate, took 5 minutes
-Field Operation	<b>Very Good;</b> was simple to operate
<b>EASE OF ADJUSTMENT:</b>	
-Pickup Height	<b>Good;</b> 1 bolt changed adjustment
-Pickup Floatation	<b>Very Good;</b> easy to adjust
-Windguard	<b>Very Good;</b> easy to adjust
-Draper Tension	<b>Very Good;</b> easy to adjust
-Chain Tension	<b>Very Good;</b> easy to adjust
-Discharge Chute	<b>Very Good;</b> easy to adjust
<b>POWER REQUIREMENTS:</b> 3	0 hp (22.5 kW) tractor with sufficient ground clearance. PTO and hydraulics not required
<b>OPERATOR SAFETY:</b>	<b>Very Good;</b> safe to operate
<b>OPERATOR'S MANUAL:</b>	<b>Excellent;</b> well organized
<b>MECHANICAL HISTORY:</b>	Only one minor problem



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