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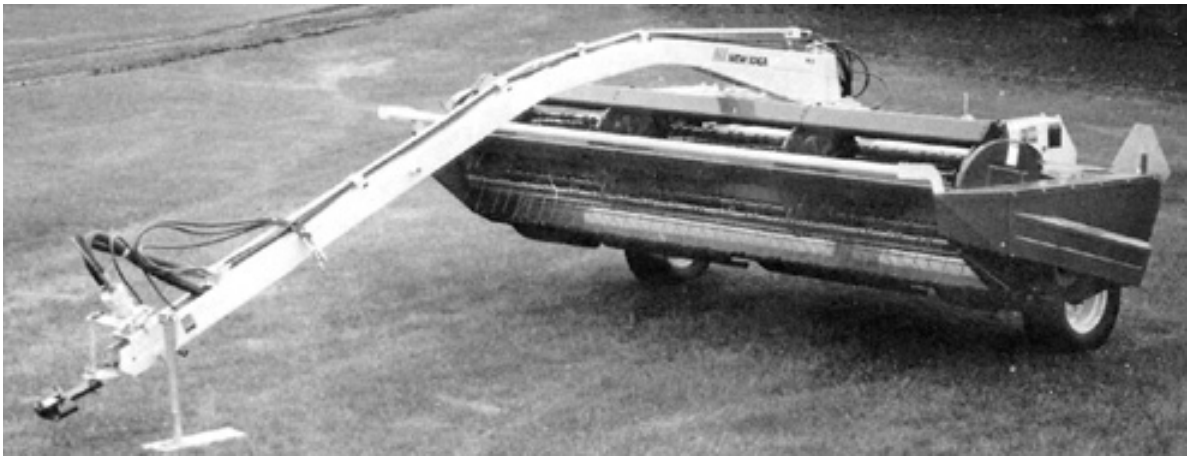

New Idea 5114 Mower Conditioner

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE

PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

NEW IDEA 5114 MOWER CONDITIONER

MANUFACTURER:

White New Idea Farm Equipment Co.
123 W Sycamore St.
Coldwater, Ohio
45828
Tel: (419) 678-5532

DISTRIBUTOR:

White New Idea Farm Equipment Co.
Box 677
Regina, SK
S4P 3A3
Tel: (306) 352-2613

RETAIL PRICE: $20,565.00 (September 1990, f.o.b. Portage la Prairie, MB)

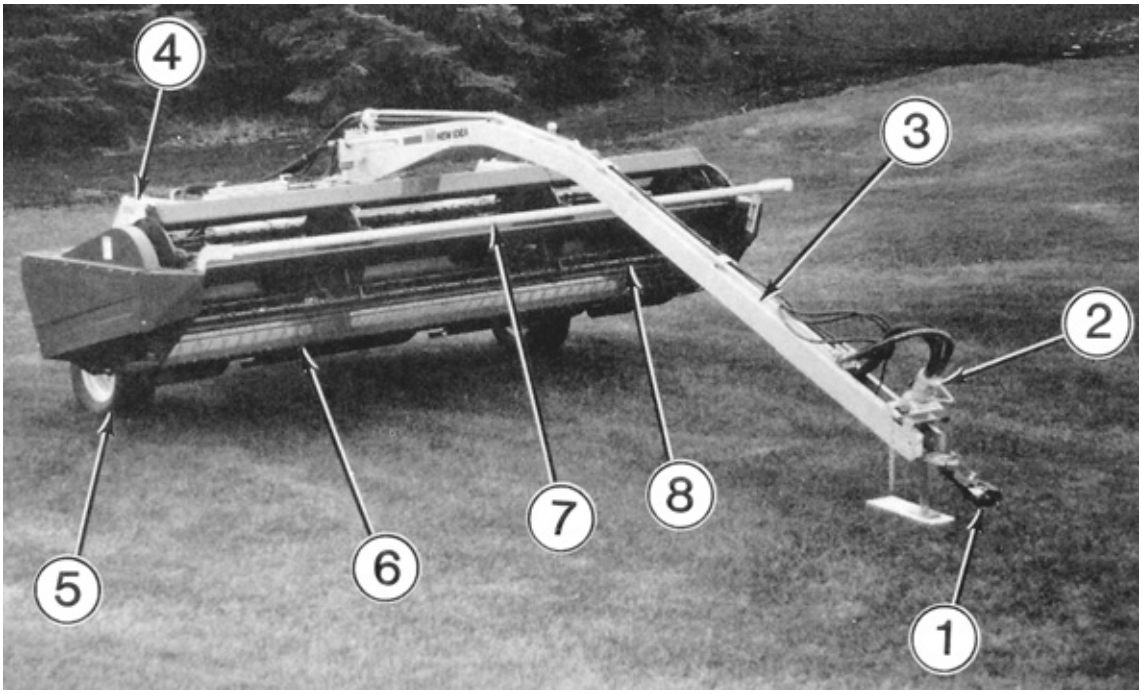

FIGURE 1. New Idea 5114 Mower Conditioner: (1) Hitch Extension, (2) Hydraulic Pump, (3) Tongue, (4) Main Frame, (5) Floatation Wheels, (6) Cutter Bar, (7) Push Bar, (8) Reel.

SUMMARY

Rate of Work: The average continuous ground speed for the New Idea 5114 mower conditioner was 6.0 mph (9.6 km/h), Average continuous work rate was 10.2 ac/h (4.1 h/h).

Quality of Work: The cutterbar performance was very good cutting alfalfa, native grasses, brome, timothy and clover. Performance of the feed auger was poor when cutting heavy crops. Performance of the conditioning rolls was very good in all crops and the windrow formation was very good. After initial adjustment, floatation was easily set to meet field conditions. Floatation was very good and leaf loss was minimal.

Ease of Operation: Ease of hitching, operating hydraulic controls, transporting and lubricating were all very good. Ease of field operation was very good. The New Idea 5114 was easy to operate and took little operator practice. Daily service took about 20 minutes.

Ease of Adjustment: Most adjustments to the New Idea 5114 were easy to carry out. Ease of adjusting the crop deflector bar, cutterbar angle, reel speed, skid shoes, swath gate, auger strippers, auger speed, roll pressure and floatation were very good. Ease of adjusting roll clearance and reel position were good. Ease of maintaining the knife was good.

Power Requirements: The New Idea 5114 required a tractor capable of at least 60 hp (45 kW), and a PTO shaft capable of 540 rpm. Two remote hydraulic circuits were required to operate the hydraulic functions.

Operator Safety: The New Idea 5114 was safe to operate if normal safety precautions were followed. The New Idea 5114 complied with all ASAE standards for safety.

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

Mechanical History: Only a few mechanical problems occurred during the 116 hours of test time.

RECOMMENDATIONS:

It is recommended that the manufacturer consider:

1. A modification that would enhance the flow of cut material along the auger to the conditioning rolls.
2. A method of manually revolving the auger, reel, and conditioning rolls to aid in the removal of a plug.
3. An alternate method of storing the wheel lock pins during operation.
4. Relocation of the hydraulic hoses on the tongue so the tractor wheel would not interfere during a tight turn.

5. Increasing the adjustment range of the deflector bar so shorter crops would be pushed forward before cutting.

Station Manager: B. H. Allen

Project Manager: R.K. Harris

THE MANUFACTURER STATES THAT

With regard to recommendation number: (1 - 5)

1. No changes planned at this time.
2. The knife drive pulley, located at the left end of the header, is easily accessible and can be rotated counter-clockwise to help remove a plug. A tool with a three to four foot handle can easily be fabricated to fit in between the pulley "spokes" to rotate the shaft. BE SURE TO DISENGAGE THE PTO DRIVE AND TURN OFF THE TRACTOR ENGINE BEFORE ATTEMPTING TO UNPLUG MACHINE.
3. No changes planned at this time.
4. Hoses provided with this machine are long enough to allow attachment to a tractor which has the remote couplers placed far from the hitch point. On the average, the hoses are too long. This requires that the operator take care during machine hook up to ensure that the hoses are not pinched in a turn.
5. In general, the bar is provided to push tall crops over before contacting the front of the reel. Shorter crops may pass under the bar and are bent forward by the reel bats, this bar is also an important structural member, therefore, no change planned at this time.

GENERAL DESCRIPTION

The New Idea 5114 swing frame mower conditioner is designed to cut, condition and windrow forage and hay crops. It is a pull-type machine and has a centre mounted hydraulically activated pivoting hitch. The hitch is also used as an oil reservoir for the hydraulic drive. The New Idea 5114 is powered by an integral hydraulic pump, which derives its 540 rpm rotary power input from the power take-off shaft of the towing tractor. It is capable of cutting a 14.2 ft (4.3 m) swath in a single pass. Cutting is accomplished with a single full width sickle cutterbar, which is mechanically driven from the left hand side of the machine. Crop is forced against the knife by a five bat reel, then into the full width feed auger. Stripper angles prevent the crop from wrapping around the auger as the crop is moved along the auger to the centre of the header from each end. The 8.8 ft (2.6 m) tire carcass rubber conditioning rolls crimp the crop and force it into the windrow forming shields at the rear of the machine. The conditioning rolls can also be hydraulically opened to remove plugs by raising the header all the way up.

The height of the machine is hydraulically adjustable to allow mechanical transport locks to be positioned. A remotely operated lock maintains the hitch perpendicular to the main frame for transporting.

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

SCOPE OF TEST

The machine evaluated by PAMI was configured as described in the General Description, FIGURE 1, and the Specifications section of this report. The manufacturer may have built different configurations of this machine before or after PAMI 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 PAMI or the manufacturer to determine changes in performance.

The New Idea 5114 mower conditioner was operated in the crops shown in TABLE 1 for 116 hours, while cutting and conditioning 820 ac (333 ha). 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.

RESULTS AND DISCUSSION

RATE OF WORK

The rate of work was dependent upon field roughness, soil moisture, crop density and operator experience. The average continuous ground speed was 6.0 mph (9.6 km/h), and the average continuous workrate was 10.2 ac/h (4.1 ha/h). Plugging in heavy crops, reduced the work rate. Average daily workrates are lower than continuous workrates because continuous rates do not account for time due to turning, and otherfield irregularities.

TABLE 1. Operating Conditions

CROP	OPERATING HOURS	EQUIVALENT FIELD AREA ac	(ha)
Alfalfa	61	425	(172)
Brome	12	85	(35)
Native Grasses	35	245	(100)
Timothy	8	65	(26)
TOTAL:	116	820	(333)

QUALITY OF WORK

Windrow Formation: The New Idea produced very good quality windrows in all crops tested. When the swath baffle lever was adjusted to its highest position, the forming shield produced a clean sharp edge that was used as a guide for the tractor wheel for the succeeding row. With the lever in its upper position, the 5114 produced windrows about 3.3 ft (1.0 m) wide. When the handle was adjusted to the lowest setting windrows up to 7.0 ft (2.1 m) resulted. The New Idea 5114 provided seven settings for the swath baffle lever. The centre delivery or discharge allowed a continuous windrow to be formed around tight corners.

Cutterbar Performance: Cutting ability of the single sickle bar was very good in all crops tested. The New Idea 5114 was effective in cutting native grasses due to the high cyclic rate of the knife (1600 cpm). Damp and fine stemmed crops did not affect cutting ability. In damp field conditions, the knife would plug if it was passed through a small mound of soil such as a mole hill. The New Idea 5114 produced ideal stubble if the header floatation was adjusted to suit the field conditions. In areas that were trampled or lodged, stubble was ragged. Stubble height was controlled by the adjustable skid shoes located on the underside of the cutterbar.

Floatation: After initial adjustment, header floatation was very good. Four large tension springs provided header floatation on the New Idea 5114. Four skid shoes allowed the header to follow ground contours.

Conditioner Performance: Conditioner performance was very good. The New Idea 5114 was equipped with two counter rotating rubber conditioning rolls. The 8.8 ft (2.6 m) rolls meshed together in a spiral design. As the crop passed between the rotating conditioning rolls, the stems were crushed or broken allowing more rapid moisture evaporation. Grasses did not appear to be as thoroughly conditioned as legumes.

The difference in curing or drying between a conditioned crop and an unconditioned crop is shown in FIGURE 2. The tests were carried out in the same crop, on the same day, and in parallel windrows. Other conditions that affect drying time are stubble height, ambient temperature, relative humidity and wind velocity. Generally, the advantage of a conditioned crop is one-half to one day advance in start of baling.

Auger Performance: The auger performance was poor in heavy crops and very good in lighter crop conditions. The auger would stop the crop and not move it toward the centre of the machine in crops that were considered to be of heavy to medium density. Constant plugging of the space between the auger and the reel arc reduced the work rate of the 5114. It is recommended that the manufacturer consider a modification that would enhance the flow of cut material along the auger to the conditioning rolls.

It is also recommended that the manufacturer consider a method of manually revolving the auger, reel, and conditioning roils to aid in the removing of a plug.

Leaf Loss: Leaf loss was minimal and considered very good on the New Idea 5114. Some leaf loss was observed in crops that were quite heavy and would not allow sunlight to penetrate to the bottom of the plant. After the mower passed, yellowed leaves could be found on the ground.

EASE OF OPERATION

Hitching: Ease of hitching was considered very good. The New Idea

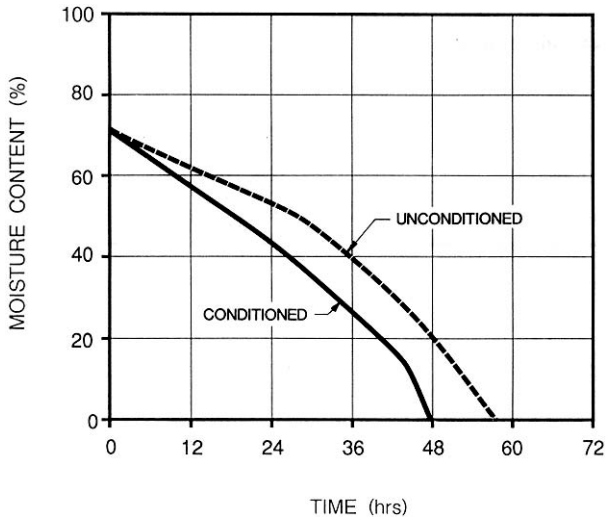

FIGURE 2. The Effect of Conditioning in Alfalfa at 1.2 ton/ac (2.7 t/ha) for the New Idea 5114.

5114 was supplied with a tractor drawbar extension which when attached to the drawbar provided additional room to install the hydraulic pump onto the PTO shaft of the tractor. The drawbar extension was fastened to the tractor drawbar with two bolts.

The New Idea 5114 was equipped with a hitch jack which allowed the hitch to be raised and then lowered over the attachment pin. Once the mower conditioner was secured to the tractor, the hitch jack was removed and stowed on a bracket provided on the hitch. The hydraulic pump was attached to the PTO shaft of the tractor and a torque arm was adjusted to bear against the drawbar to prevent the pump from rotating with the PTO shaft. A chain bolted to the torque arm was wrapped around the drawbar and fastened to the pump. A hitch safety chain was offered as optional equipment, but was not supplied on the test machine. The attachment of three hydraulic hoses to the remote hydraulic couplers on the tractor completed hook-up. Hitching was easy and took one person about 10 minutes.

Hydraulic Controls: Ease of operating the hydraulic controls was very good. The New Idea 5114 was equipped with two separate control circuits. Mower height was controlled by cylinders attached to each of the ground wheels. These single acting cylinders also lifted the mower conditioner high enough to remove or engage the transport lock pins.

The second circuit was used to power the double acting cylinder which swung the hitch to the desired side of the tractor and to steer the mower conditioner around obstacles. The cylinder allowed 45° of deflection on either side of centre. The New Idea 5114 responded well to hydraulic inputs.

Transporting: Ease of transporting was very good. The New Idea 5114 was prepared for transport by moving the hitch to the centre position and engaging the hitch transport lock. The transport lock maintained the hitch perpendicular to the frame and header. The mower was then raised to its maximum height and the transport wheel lock pins were inserted in their locked position. The 15.7 ft (4.78 m) transport width made meeting oncoming or overtaking traffic on roadways difficult and extreme caution was required. The New Idea 5114 towed well at 30 mph (50 km/h) and had sufficient ground clearance over high crowned roads. The two floatation tires provided very good floatation over damp ground and met the requirements of the Tire and Rim Association for the weight of the machine.

Lubrication: Ease of lubrication was very good. The tongue of the New Idea 5114 also served as the reservoir for the hydraulic drive and contained about 24 gal (US) (90.8 L) of type F or Dexron II automatic transmission fluid.

The reservoir was equipped with a dipstick for checking the level of the oil. The tongue had to be level when checking oil level or an erroneous reading could result. The tongue was also used to mount the replaceable hydraulic oil filter and the hydraulic line pressure relief valve. Normal daily lubrication took one person about 15 minutes. Each individual lubrication point was identified and located with a decal. The decals also indicated the frequency for lubrication in hours. The operator's manual outlined the procedures for checking fluid levels in the chain case and gear boxes. All pressure nipples with the exception of those within universal joints were easily accessible.

Field Operation: Ease of field operation was very good. The New Idea 5114 was placed in field position by raising the mower conditioner to its maximum height and removing the lock pins.

The pins were stored in brackets provided on the floatation wheel support members. It is recommended that the manufacturer consider an alternate method of storing the lock pins during operation.

The tongue locking pin was released from the transport position and the tongue was swung to the desired cutting side, the PTO engaged and the mower conditioner moved into the crop to initiate cutting. Once cutting began, a visual inspection of the cut stubble revealed what adjustments were required for that particular crop. Usually adjustments to the knife guard angle and floatation were required.

Due to the length of the tongue, at least five outside rounds had to be cut to allow room for the mower conditioner to safely turn around within the confines of the field, when back and forth cutting began. The New Idea was easy to turn at the completion of a row and swung easily from one side of the tractor to the other.

Caution should be practised when sharp turns are made to prevent the tractor wheels from accidently striking the tongue. It is recommended that the manufacturer consider relocation of the hydraulic hoses on the tongue so the tractor wheel would not interfere during a tight turn.

EASE OF ADJUSTMENTS

Crop Deflector Bar: Ease of adjusting the crop deflector bar was very good. However, the crop deflector bar was ineffective as it only allowed an adjustment range of 2 in (50 mm). Adjusted to its lowest position, the deflector bar would only brush the tops of alfalfa plants and would not push the plants forward before cutting. It is recommended that the manufacturer consider a modification that would allow the deflector bar a greater range of height adjustment. The height of the bar was adjusted by loosening two cap screws on either side of the header and retightening at the desired position. Crop deflector bar adjustments were easy and took one person minimal time.

Cutterbar: Ease of adjusting the cutterbar guard angle was very good. The adjustment consisted of raising the header to its full height. Removing the pin from the connecting link and replacing the pin in either the upper or lower adjustment hole. The upper hole allowed the ledger plates in the cutterbar guards to operate at 8 from horizontal and the lower hole provided a 4° position.

Reel: Ease of adjusting the reel speed was very good and adjusting the reel position was good. Reel speed was adjusted by the addition or removal of shims between the two halves of the reel drive sheave and ranged from 42 to 59 rpm. Speed was increased by separating the two drive sheave halves and removing the desired amount of shims. Reel speed was decreased by adding shims between the sheave halves. Adjusting reel speed on the New Idea 5114 was easy and took one person about 5 minutes.

The position of the reel was also adjustable for height and back and forward positioning. The reel adjustment for height allowed 1.5 in (38 mm) of movement, while the forward adjustment allowed 2.0 in (50 mm) of movement. Reel position adjustments were good and easy to make if directions in the operator's manual were followed. Adjustments took one person about 15 minutes. In addition, the crop release point of the bat bar tines was adjusted by loosening three cap screws and rotating the cam plate to the desired position and retightening the cap screws. This adjustment was easy and took one person about 10 minutes.

Auger: Speed adjustments were considered to be very good and were accomplished by the addition or removal of shims between the two halves of the auger drive sheave. The speed of the auger was variable and allowed a speed range of 318 rpm to 447 rpm. After auger speed adjustments on the New Idea 5114, drive belt tensioning was required. Auger speed adjustments took one person about 20 minutes. The auger position was fixed within the header frame.

Auger Strippers: Auger stripper adjustments were very good. The adjustments were carried out by loosening the mounting bolts and sliding the strippers to the desired position and retightening the bolts. Stripper adjustment was easy and took one person about 5 minutes.

Conditioner Rolls: The conditioner roll gap adjustment was good. Roll gap was adjusted by inserting or removing shims on each end of the

conditioning rolls. The adjustment was easy and took one person about 15 minutes. Adjusting the roll timing on the New Idea 5114 was very good and was accomplished by loosening the bolts in the roll timing hubs and rotating the rolls to their desired orientation.

The bolts were then retorqued to 55 ft-lb (75 N-m). Adjusting roll timing was easy and took one person about 10 minutes.

Roll pressure adjustments were very good. Pressure was adjusted by torquing tightening bolts until the roll pressure tension springs measured 25.6 in (650 mm) in length. Roll pressure adjustments were easy and took one person about 5 minutes. Two small single acting cylinders were attached to each end of the upper conditioning roll. When the header was raised to its maximum, the cylinders were activated to spread the rolls apart to aid in clearing a plug.

Floatation: Ease of adjusting header floatation was very good. Four large tension springs provided header floatation on the New Idea 5114. Header floatation adjustments were required to prevent the cutterbar from plugging in soft field conditions or to prevent undulating stubble in rough fields.

Header floatation adjustments were carried out by rotating the bolts in the ends of each tension spring until a force of 50 to 70 lb (220 to 310 N) would lift each end of the header clear of the ground.

The four skid shoes on the bottom ends of the header were easily adjusted. The outer shoe on each side was adjusted by pulling the spring loaded "eye" pin that extends outward from the header side frame on each side of the machine. The pin was released into the desired hole on the skid shoe bracket. The two inner shoes required the removal of a nut and bolt and the replacement of the nut and bolt in the desired hole. The New Idea 5114 offered 5 different height settings for both sets of shoes. The skid shoes allowed cutting heights ranging from 1.2 to 6.7 in (30 to 170 mm). Adjustments were simple and took one person 5 minutes.

Swath Gate: Adjustments for controlling the width of the windrow were very good and made with the swath baffle handle. The adjuster was located on the left hand side of the windrow forming shields. Raising the handle to its maximum produced high narrow windrows, while the lowest position provided wide flatter windrows. The swath baffle handle provided nine settings and each would produce a different width windrow. Windrow width adjustments were very easy and took one person minimal time.

Knife Maintenance: Ease of maintaining the knife was good. Changing thesingle cutterbar took one person about 15 minutes, if the guards were straight and in alignment. Guards were easily straightened or changed. Individual sickle sections were sometimes difficult to remove due to the rivets used to attach them to the knife bar.

POWER REQUIREMENTS

Average and peak PTO power requirements for the New Idea 5114 were 12.5 hp (9.3 kW) and 13.2 hp (9.9 kW) respectively. Average drawbar pull at 5 mph (8 km/h) was 443 lb (1970 N), for a crop yielding 1.5 ton/ac (3.4 t/ha). PAMI used a variety of tractors ranging from 60 to 140 drawbar horsepower (52 kW to 105 kW) throughout the evaluation. All had sufficient power reserves to effectively operate the mower conditioner.

The tractor required a 540 rpm PTO shaft and dual remote hydraulic outlets capable of at least 1750 psi (12.1 MPa).

OPERATOR SAFETY

Safety on the New Idea 5114 was good. It was safe to operate if normal safety precautions were followed. The 5114 complied with all ASAE Standards for safety. All sheaves, sprockets and other potentially dangerous mechanical devices were adequately guarded and labelled. The New Idea 5114 was equipped with a slow moving vehicle sign and offered a lighting kit as well as a hitch safety chain as optional equipment.

OPERATOR'S MANUAL

The operator's manual was excellent and contained useful information on warranty, safety, transport, lubrication, operation, adjustments, service, assembly, optional equipment, trouble shooting, and specifications. All information was found to be factual and accurate. The book was well written, organized and illustrated.

MECHANICAL HISTORY

The mechanical history of the New Idea 5114 mower conditioner over the evaluation period is outlined in TABLE 2. The intent of this evaluation was the functional performance of the machine and an extended durability evaluation was not conducted.

TABLE 2. Mechanical History

ITEM	OPERATING HOURS	EQUIVALENT AREA ac	(ha)
Swing cylinder ram bent and was repaired at:	19	135	(54.6)
Reel drive hub failed and was replaced:	87	618	(250)
Oil return hose collapsed and was replaced at:	111	788	(319)

DISCUSSION OF MECHANICAL HISTORY

Cylinder Ram Bent: The ram of the double acting hydraulic cylinder for swinging the hitch bent at 19 hours (FIGURE 4). The end cap of the cylinder was cracked as a result of a side load when the ram bent (FIGURE 5). The cylinder end cap was replaced,

Reel Drive Hub: The hub that connects the reel driven sheave to the reel axle failed at 87 hours and was replaced. The hub cracked at the broached slot for the lock key (FIGURE 6).

Pump Suction Hose: The suction hose that supplies oil to the hydraulic pump collapsed and was replaced at 111 hours.

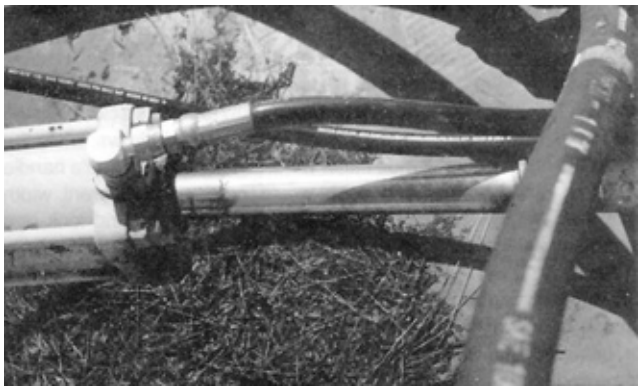

FIGURE 4. Bent Ram.

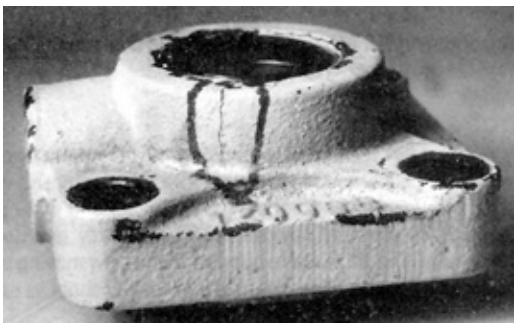

FIGURE 5. Cracked Cylinder Cap.

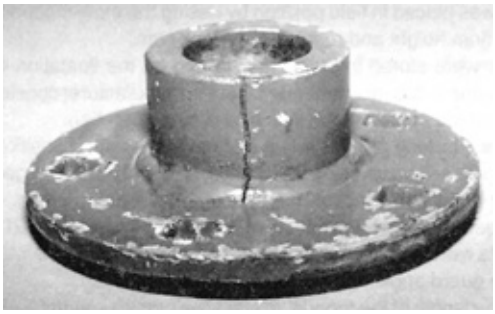

FIGURE 6. Cracked Hub.

APPENDIX I

SPECIFICATIONS

MAKE:	New Idea	
MODEL:	5114 Mower Conditioner	
SERIAL NUMBER:	102312	
OVERALL DIMENSIONS:		
	Transport Position	Field Position
-length	22.5 ft (6.8 m)	17.2 ft (5.2 m)
- width	15.8 ft (4.8 m)	20.8 ft (6.3 m)
- height	6.0 ft (1.8 m)	6.0 ft (1.8 m)
HEADER:		
- effective width of cut	14.3 ft (4.3 m)	
- range of cutting height	1.2 to 6.7 in (30 mm to 170 mm)	
- guard angle	4 to 8 above horizontal	
- guard type	Double forged (stub and strut optional)	
- guard spacing	3.0 in (76 mm)	
- knife speed	1600 cpm	
- knife section	Over serrated	
- length of knife bars	14.0 ft (4.3 m)	
REEL:		
- number of bats	5	
- number of tines per bat	19	
- bat teeth spacing	8.5 in (218 mm)	
- reel speed range	42 to 59 rpm	
AUGER:		
- speed range	318 to 447 rpm	
- length	12.3 ft (3.7 m)	
- outside diameter	11.7 in (300 mm)	
- inside diameter	6.3 in (160 mm)	
- fiighting pitch	Overshot variable flight	
CONDITIONING ROLLS:		
- number of rolls	Two	
- roll construction	Rubber ticor with meshing lugs	
- roll length	8.8 ft (2.6 m)	
- roll diameter	9.5 in (240 mm)	
- roll speed	310 rpm	
- roll pressure control	roller chain and tension springs	
WEIGHT:		
- left wheel	2179 lb (988 kg)	
- right wheel	2077 lb (942 kg)	
- hitch	900 lb (408 kg)	
TOTAL:	5156 lb (2338 kg)	
TIRES:	Two, 11L-15SL 6ply	
DRIVES:	PTO - driven, hydraulic pump with hydraulic motor	
HYDRAULIC CONTROLS:		
- header lift	Two single acting cylinders (one per wheel)	
- pivot hitch	One double acting cylinder	

APPENDIX II

MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports:

Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

SUMMARY CHART

NEW IDEA 5114 MOWER CONDITIONER

RETAIL PRICE:	$20,565.00 (September 1990 f.o.b. Portage la Prairie, MB)
RATE OF WORK:	Average continuous speed was 6.0 mph (10.2 km/h). Average continuous work rate was 10.2 ac/h (4.1 ha/h).
QUALITY OF WORK:	
Windrow Formation	**Very Good;** width and height adjustable
Cutterbar Performance	**Very Good;** cut cleanly
Floatation	**Very Good;** after initial adjustment
Conditioner Performance	**Very Good;** effectively crimped
Auger	**Poor;** in heavy crops, plugged consistently
Leaf Loss	**Very Good;** minimal
EASE OF OPERATION:	
Hitching	**Very Good;** was easy to hookup
Hydraulic Controls	**Very Good;** responded well to hydraulic inputs
Transporting	**Very Good;** transported well at 30 mph (50 km/h)
Lubrication	**Very Good;** easy to lubricate
Field Operation	**Very Good;** easy to operate
EASE OF ADJUSTMENTS:	
Crop Deflector	**Very Good;** easy to adjust
Cutterbar	**Very Good;** took minimal time
Reel Position	**Good;** adjustable vertically and horizontally
Reel Speed	**Very Good;** easy to adjust
Auger Speed	**Very Good;** easy to adjust
Auger Stripper	**Very Good;** easy to adjust
Conditioner Roll Pressure	**Very Good;** tightened two bolts
Conditioner Roll Clearance	**Good;** add or remove shims
Floatation	**Very Good;** easy to adjust
Swath Gate	**Very Good;** easy to adjust
Knife Maintenance	**Good;** used rivets
POWER REQUIREMENTS:	
Tractor Size	Required at least 60 hp (45 kW) for operation,a 540 rpm PTO shaft and two remote hydraulic circuits.
OPERATOR SAFETY:	**Good;** conformed with ASAE Standards
OPERATOR MANUAL:	**Excellent;** contained useful information
MECHANICAL HISTORY:	A few mechanical problems

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