

Evaluation Report 299



Avco New Idea Model 486 Round Baler

A Co-operative Program Between



AVCO NEW IDEA MODEL 486 ROUND BALER

MANUFACTURER:

Avco New Idea
Coldwater, Ohio
U.S.A. 45828

DISTRIBUTOR:

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Cambridge (P), Ontario
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RETAIL PRICE:

\$15,917.00 (May 1983, f.o.b. Lethbridge, Alberta)

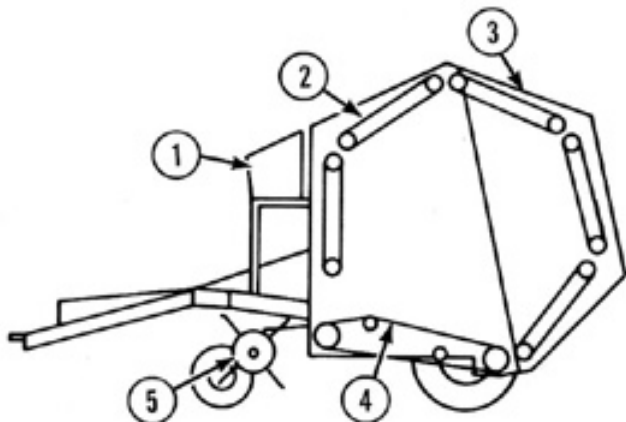


FIGURE 1. Avco New Idea Model 486 Round Baler: (1) Twine Box, (2) Bale Forming Belts, (3) Rear Gate, (4) Platform Belts, (5) Pickup.

SUMMARY AND CONCLUSIONS

Overall Performance: The performance of the Avco New Idea Model 486 round baler was very good in hay and most straw crops. Similar to most round balers, it was difficult to bale short, chopped up straw, similar to that passed through a rotary combine.

Capacity: The average capacity of the Avco New Idea 486 varied from 3.3 ton/h (3.0 t/h) in bromegrass-timothy mixture to 11.2 ton/h (10.2 t/h) in alfalfa-bromegrass mixture. Maximum instantaneous feedrates up to 23.1 ton/h (21 t/h) were measured in heavy, uniform greenfeed windrows. Feedrate was usually limited by pickup and feeding performance rather than by bale chamber capacity.

Bale Quality: Bale quality was very good, with well formed and neat bales in most crops. Bale quality was reduced to fair in unconditioned greenfeed and short straw crops due to poor bale shape and bale durability. Hay bales weighed from 1255 to 1970 lb (570 to 895 kg) and straw bales from 818 to 1124 lb (372 to 511 kg).

Weatherability: Bale moisture penetration and spoilage was minimal after 170 days of weathering.

Leaf Loss: Total leaf loss was comparable to that of other large round balers. In heavy windrows, baled under ideal moisture conditions, bale chamber loss was 1% while pickup loss was less than 1%. In dry windrows, bale chamber loss was 9%, and pickup loss was 2%.

Power Requirements: Peak power requirements were about 73 hp (55 kW) in hay and straw on level fields. However, a 100 hp (75 kW) tractor was needed to fully utilize baler capacity on soft or hilly fields.

Ease of Operation: It was very easy to start and form a bale with the Avco New Idea 486. In greenfeed and tough hay a reduced ground speed was required when starting a bale.

The twine wrapping process was simple but required some experience. Twine wrapping was difficult in short straw due to backfeeding. In good conditions, a bale could be wrapped and discharged from the bale chamber in about one minute.

Feeding was positive and aggressive in most crops. In very dry, short straw, backfeeding into the pickup area occurred near bale completion, causing plugging and shear bolt failure.

The Avco New Idea 486 was easy to maneuver and transport. Visibility to the rear was restricted.

Ease of Adjustment: Adjusting the Avco New Idea 486 was simple. Platform and forming belts, chain drives and the pickup were easy to adjust. No platform or forming belts required repair or replacement.

Lubrication was easy.

Operator Safety: The New Idea 486 was safe to operate if normal safety precautions were observed.

Operator's Manual: The operator's manual was clearly written and useful.

Mechanical Problems: No significant mechanical problems occurred during the test.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Re-evaluating the belt tension adjustment range for the platform belts.

Senior Engineer: E. H. Wiens

Project Technologist: P. A. Bergen

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. The bolt tension adjustment range for the platform belts was increased for all machines produced in 1983.

MANUFACTURERS ADDITIONAL COMMENTS

The report indicates a piece of stiff wire was needed to thread the twine through the twine tube. All 1984 models will be provided with a twine threading wire.

GENERAL DESCRIPTION

The Avco New Idea model 486 is a pulF-type, power take-off driven baler with a cylindrical baling chamber and a floating drum pickup. The twine wrapping mechanism is hydraulically actuated.

Hay is fed directly into the baling chamber by the pickup. The baling chamber consists of five, 11 in (280 mm) wide floor belts on the bottom directly behind the pickup and five sets of forming belts around the top. Each set of five belts contains 11, 4.7 in (120 mm) wide belts. The baling chamber has a fixed volume, with all belts rotating in a fixed location during bale formation.

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

SCOPE OF TEST

The Avco New Idea model 486 round baler was operated in a variety of crops (TABLES 1 and 2) for 110 hours while producing 905 bales. It was evaluated for rate of work, power consumption, ease of operation, ease of adjustment, operator safety and suitability of the operator's manual.

TABLE 1. Operating Conditions.

CROP	HOURS	NUMBER OF BALES	FIELD AREA acres (ha)
Alfalfa	5	56	20 (8)
Alfalfa, Bromegrass	41	354	135 (55)
Alfalfa, Bromegrass & Crested Wheatgrass	4	28	12 (5)
Bromegrass & Timothy	15	68	60 (24)
Greenfeed	9	92	48 (19)
Barley Straw	17	122	40 (16)
Wheat Straw	19	185	125 (51)
TOTAL	110	905	440 (178)

TABLE 2. Operation in Stony Fields.

FIELD CONDITION	HOURS	FIELD AREA acres (ha)
Stone free	38	172 (70)
Occasional stones	49	160 (65)
Moderately stony	23	108 (43)
TOTAL	110	440 (178)

RESULTS AND DISCUSSION

RATE OF WORK

Average throughput depended on windrow size and uniformity, crop condition, field surface, available tractor speeds and operator skill. Average throughput for the Avco New Idea 486 (TABLE 3) varied from 3.3 ton/h (3.0 t/h) in bromegrass-timothy to 11.2 ton/h (10.2 t/h) in alfalfa-bromegrass mixture. The daily average throughputs reported in TABLE 3 are average workrates for daily field operation. They are representative of the actual workrates that may be expected in typical field operation. These values are based on the total operating time and the total baler throughput for each day of baling. The maximum average throughputs reported in TABLE 3 are representative of maximum average workrates obtained over short periods of operation under ideal operating conditions.

In heavy, uniform greenfeed windrows, instantaneous throughputs up to 23.1 ton/h (21 t/h) were measured. These were peak values, representing maximum baler capacity, which cannot be achieved continuously.

In most crops, the feedrate was limited by pickup and feeding performance and not by bale chamber capacity. In light windrows the ground speed was normally limited to about 10 mph (16 km/h) due to bouncing on rough ground and poorer pickup performance at higher speeds. Heavy windrows are desirable to fully utilize baler capacity.

Feeding was aggressive in most crops.

TABLE 3. Average Throughputs

CROP	CROP YIELD ton/ac (t/ha)	AVERAGE SPEED mph (km/h)	DAILY AVERAGE THROUGHPUT ton/h (t/h)	MAXIMUM AVERAGE THROUGHPUT ton/h (t/h)
Alfalfa	1.2-2.2 (2.7-4.9)	5.3 (8.6)	8.4 (7.6)	9.6 (8.7)
Alfalfa, Bromegrass	2.4 (5.3)	5.3 (8.6)	11.2 (10.2)	13.3 (12.1)
Alfalfa, Bromegrass & Crested Wheatgrass	1.7 (3.7)	5.3 (8.6)	9.4 (8.5)	
Bromegrass & Timothy	1.0 (2.2)	6.5 (10.4)	4.1 (3.7)	5.8 (5.1)
Greenfeed	1.9 (4.2)	5.3 (8.6)	10.7 (9.7)	11.7 (10.6)
Barley Straw	1.5 (3.3)	6.5 (10.4)	4.5 (4.1)	5.8 (5.3)
Wheat Straw	0.6-0.8 (1.4-1.7)	6.1 (10.0)	4.5 (4.1)	5.1 (4.6)

QUALITY OF WORK

Bale Quality: The Avco New Idea 486 produced firm, durable bales with flat ends and uniform diameter in most crops (FIGURE 2). Bales quality in unconditioned greenfeed was reduced significantly due to bale appearance and reduced durability. Similar to most round balers it was difficult to consistently produce uniform, durable bales in dry, short, chopped up straw,

similar to that combined with rotary combines. In short straw conditions, bale quality was greatly improved if the straw was baled when slightly tough.

Due to the low density bale core, bales were slightly more difficult to handle with some bale handlers than bales with a high density core.

A typical hay or straw bale averaged 59 in (1.5 m) in length and 71 in (1.8 m) in diameter. Bales usually settled to about 85% of their original height after 100 days. Although the bales had a low density core, the bales settled only slightly more than high density core bales. Average hay bales weighed from 1255 to 1970 lb (570 to 895 kg) with average densities ranging from 8.8 to 13.8 lb/ft³ (147 to 230 kg/m³). Average straw bales weighed from 818 to 1124 lb (372 to 511 kg) with average densities ranging from 5.4 to 7.4 lb/ft³ (90 to 123 kg/m³).



FIGURE 2.. Typical Hay Bale.

Bale Weathering: A common practice in the prairie provinces is to storeround bales outside. Bales were closely stacked in rows, situated in a level area with one side exposed to the prevailing winds. Bales were exposed to about 4.5 in (115 mm) of moisture and above average prairie wind conditions over a period of about 170 days. FIGURE 3 shows the condition of a typical Avco New Idea 486 hay bale (alfalfa and bromegrass mixture) after 170 days of weathering. The condition of weathered bales was good. Moisture had penetrated to a maximum of 3 in (75 mm) on the windward side in the area where another bale was touching. Spoilage occurred to a depth of about 1.5 in (40 mm) in the ground contact area and where other bales touched the sides.

Leaf Loss: Leaf loss was comparable to that of other large round balers. The Avco New Idea 486 was tested in a heavy crop of mixed alfalfa and bromegrass which had been cut with a 14 ft (4.3 m) mower-conditioner. Average crop yield was about 2.4 ton/ac (5.3 t/ha). Total leaf loss ranged from 11% when baled at 9% hay moisture content to about 2% when baled at 22% hay moisture content. At 9% hay moisture content, pickup loss was about 2% and bale chamber loss about 9%, whereas at 22% hay moisture content, pickup loss was less than 1% and bale chamber loss about 1%. FIGURE 4 shows the importance of baling at higher moisture contents. This figure represents an accumulation of data for several round balers showing the total measured leaf loss over a range of hay moisture contents, in fields of mixed alfalfa, crested wheatgrass and bromegrass. Although the Avco New Idea 486 was tested in a different crop, its performance was within the range presented in the figure with the exception of slightly lower losses at higher moisture contents.

FIGURE 4 represents nearly ideal baling conditions with relatively heavy windrows which had been conditioned to enhance drying of the hay stems. Much higher leaf loss can be expected in light, unconditioned windrows. While feedrate did not appreciably affect losses in the ideal conditions shown in FIGURE 4, loss tests in light unconditioned windrows have shown that round baler losses can be reduced by keeping the

feedrate as high as possible to minimize time in the baling chamber. Bale chamber losses in light crops can also be reduced by running the tractor at a lower power take-off speed to reduce the number of turns needed to form a bale.

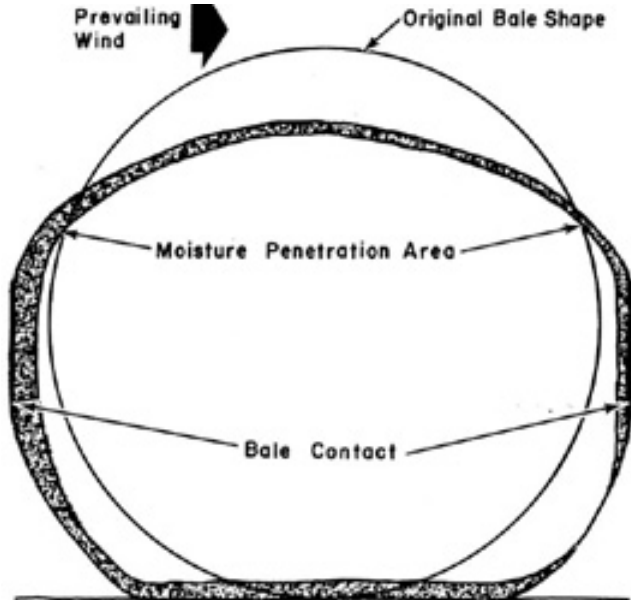


FIGURE 3. A Typical Hay Bale After 170 Days of Weathering.

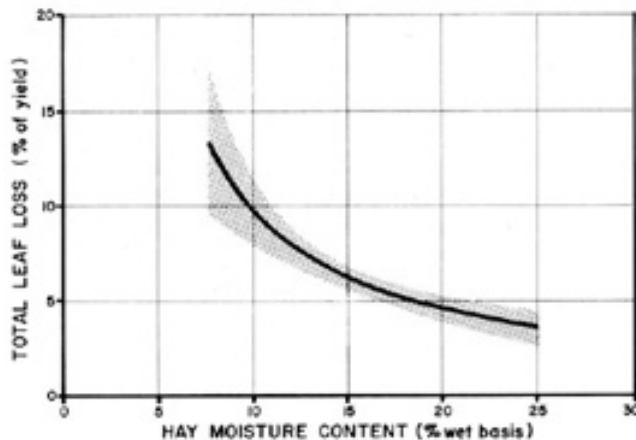


FIGURE 4. Leaf Loss in Mixed Alfalfa, Crested Wheatgrass and Bromegrass.

POWER CONSUMPTION

Power Requirements: FIGURE 5 shows the power take-off and drawbar input for the Avco New Idea 486. The power input is plotted against bale weight to show the power requirements while a bale is formed. Power take-off input varied from 4 hp (3 kW) at no load to a maximum of 67 hp (50 kW). Drawbar requirements at 6.8 mph (11 km/h) on flat firm fields were about 5.5 hp (4 kW). Although maximum power requirements did not exceed 73 hp (55 kW), additional power was needed to suit field conditions. In soft, hilly fields a 100 hp (75 kW) tractor would be needed to fully utilize baler capacity.

Specific Capacity: Specific capacity is a measure of how efficiently a machine performs a task. A high specific capacity indicates efficient energy use while low specific capacity indicates inefficient operation. The specific capacity of the Avco New Idea 486 was about 0.52 ton/hp-h (0.65 t/kW-h) in hay and 0.25 ton/hp-h (0.31 t/kW-h) in barley straw. This compares to an average specific capacity of 0.6 to 1.2 ton/hp-h (0.7 to 1.4 t/kW-h) for small square balers in alfalfa. These values represent average field conditions and not peak outputs.

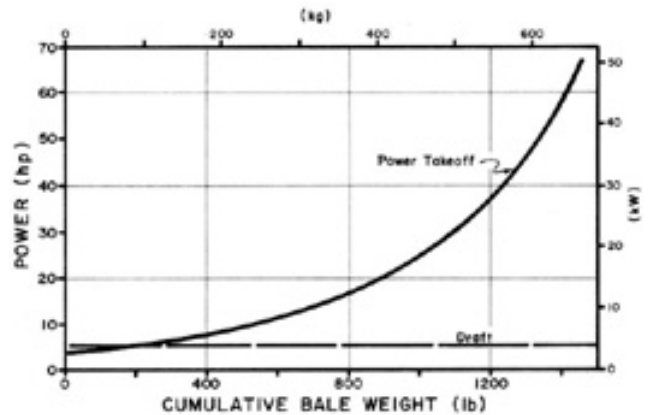


FIGURE 5. Power Consumption During Bale Formation in Alfalfa Bromegrass.

EASE OF OPERATION

Forming a Bale: It was easy to form a neat, durable bale in most crops. Feeding hay across the entire width of the bale chamber during bale core formation was not critical as the hay tumbled within the bale chamber distributing itself quite evenly across the chamber. Alternate side-to-side feeding was required during the later stages of bale formation to produce bales of uniform diameter. FIGURE 6 shows stages of bale formation in the Avco New Idea 486. In very heavy windrows, especially greenfeed and tough hay, the feeding area would plug occasionally if the ground speed was too high when starting a bale. The plugging resulted from the hay not beginning to tumble. Starting the bale at a reduced ground speed usually eliminated this problem.

In very dry and short straw, backfeeding into the pickup area occurred when the bale was nearing completion (FIGURE 7). This occasionally resulted in the pickup plugging or shear bolt failure. When this happened, wrapping was usually not successful and the bale had to be discharged without twine. Baling short straw when it was slightly tough eliminated this problem.

Wrapping the Twine: An amber light at the front of the baler lit up when the bale was completed and ready for twine wrapping. In heavy baling conditions, feeding had to be stopped almost immediately after the light came on to prevent overfilling and failure of the main drive shear bolt. The test baler was equipped with the optional hydraulic twine actuator. The twine wrapping process was controlled by the tractor's remote hydraulics. To start wrapping, the twine tube was moved to the centre of the bale chamber. Once the twine had been caught by the rolling bale, the twine tube was moved to about 6 in (150 mm) from the extreme right of the bale chamber and the tractor forward movement was stopped, allowing the power take-off to run. When the twine had made at least two full wraps around the right bale end, the twine tube was intermittently moved back across the front of the bale chamber. The desired twine spacing was obtained by intermittently actuating the tractor remote hydraulics. With tractors having hydraulics with high flowrates, it was easier to control the twine tube properly if the tractor was throttled back slightly.

Once the twine tube reach to about 6 in (150 mm) from the left end of the bale, allowing at least two complete wraps around the end, the twine tube was moved quickly to its home position, snapping the twine cutter closed. The twine was cut as the bale pulled on the twine.

The twine cutter performed very well. However, if a bale was wrapped with the rear gate slightly open, the twine did not move into the right position to be cut when the twine tube was moved into its home position.

Twine wrapping was difficult in short straw, Backfeeding of the straw into the pickup area made it very difficult to neatly space the twine wraps across the bale. Also, if the wraps of twine on the ends of the bale were closer than about 8 in (200 mm) from the end, the twine would usually slip off the ends during

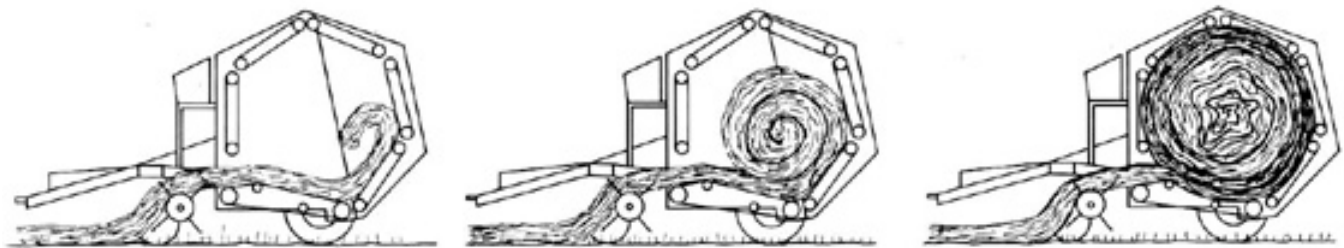


FIGURE 6. Stages of Bale Formation: (Left) Starting Bale, (Centre) Partially Completed Bale, (Right) Completed Bale.

wrapping or when the bale was discharged. Baling short straw when it was slightly tough greatly improved wrapping problems.

Twine consumption was about 403 ft/ton (135 m/t) in hay. This compares to a twine consumption of about 670 ft/ton (225 m/t) for small square balers. In short straw, about 820 ft/ton (275 m/t) was required to provide bales of adequate durability. Twine requirements varied with the type of crop, conditions of crop, type of twine and the desired durability.

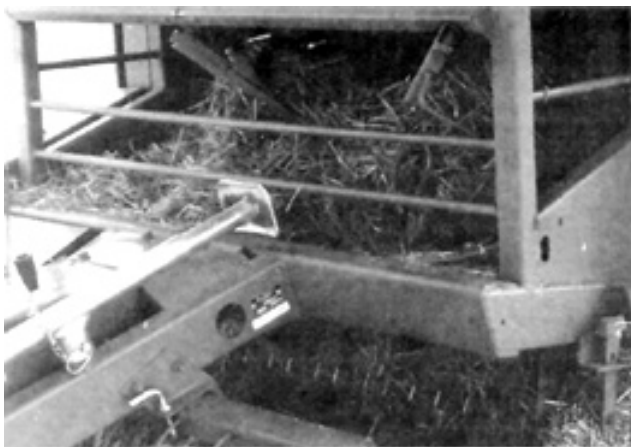


FIGURE 7. Backfeeding of Very Dry, Short Straw into the Pickup Area When the Bale was Nearing Completion.

Discharging a Bale: once the twine was cut, the power take-off was allowed to run and the tractor and baler were backed up about 20 ft (6 m). The gate was then hydraulically opened, ejecting the bale. The tractor and baler were then moved ahead about 15 ft (4.5 m) allowing the gate to be closed. The amber light went out when the gate was fully closed. A minimum of about one minute was needed to wrap and discharge a bale.

Transporting: The Avco New Idea 486 was easy to maneuver and transport. Ground clearance was adequate and there was ample hitch clearance for turning sharp corners. Care had to be taken when backing up or transporting on roadways due to obstructed visibility to the rear. The baler could be easily towed behind a tractor or a suitably sized truck.

Hitching: The Avco New Idea was inconvenient to hitch to a tractor due to the precise alignment required when hitching the baler to the drawbar extension of the equal angle hitch. Initial mounting of the drawbar extension and the electrical wiring harness took about 15 minutes if there was a convenient location to connect the harness to the tractor electrical system.

Feeding: Feeding was positive and aggressive in most crops, with only infrequent plugging. In very dry and short straw the straw would backfeed into the pickup area when the bale was nearing completion. In extreme conditions this caused frequent plugging or shear bolt failure when the accumulated straw fed back into the bale chamber. Baling short straw when it was slightly tough eliminated this problem. Reduced ground speed was required when starting a bale in very heavy windrows to prevent plugging.

Twine Threading: Twine threading was quite easy. Usually a piece of stiff wire was needed to thread the wire through the twine tube.

EASE OF ADJUSTMENT

Forming Belts: The forming belts rotated in a fixed location in the bale chamber. The forming belts could easily be adjusted but required adjustment only once during the test. Each set of bale forming belts were chain driven through a drive roller. The drive chains required frequent checking and occasional tension adjustment. The roller scrapers were adjustable but required no adjustment during the test.

Platform Belts: The platform belts rotated in a fixed position. The belt tension could be easily adjusted and required adjustment twice during the test. After two adjustments there was very little adjustment range left. Although no problems were encountered during the test, the adjustment range may not be adequate for the service life of the belts. It is recommended that the manufacturer consider re-evaluating the belt tension adjustment range for the platform belts. The main rollers had adjustable scrapers but required no adjustment during the test.

Main Drives: The main drive chain was equipped with a string loaded idler. No chain adjustment was required.

The main drive shear bolt was convenient to replace.

Pickup: Pickup height adjustment was made by repositioning the pickup gauge wheels. A wrench was required to make this adjustment. The adjustment range was sufficient for all conditions encountered during the test. The pickup could easily be latched into transport position. The recommended pickup floatation adjustment was adequate.

The pickup windguard could easily be removed by hand to make it easier to unplug the pickup area. The windguard had no adjustment but was effective in all crops.

The pickup drive belt tension was maintained with a spring loaded idler. The belt would slip if there was an overload on the pickup. The belt required replacement once during the test due to prolonged slipping on one occasion.

Bale Density Springs: The spring tension on the gate latches, controlled the bale density at which the amber light would come on. The recommended spring tension was adequate for all conditions encountered during the test.

Servicing: The Avco New Idea 486 had seven drive chains, eleven grease fittings and one gearbox. The operator's manual recommended daily oiling of the drive chains, lubrication of nine grease fittings every 10 hours and two grease fittings every 50 hours. Also recommended was that the gearbox be checked every 50 hours with oil changed annually and the wheel bearings repacked annually. About 12 minutes were needed to fully service the Avco New Idea 486.

OPERATOR SAFETY

The operator is cautioned that a round baler is potentially very dangerous. The operator must disengage the power take-off and stop the tractor engine to clear blockages or to make adjustments.

Many serious and fatal accidents have occurred with round balers. Most of these are caused by operators dismounting from the tractor while leaving the baler running. The manufacturer can only go to certain limits in providing shielding and safety devices and must rely on the operator's common sense in following established safety procedures.

The Avco New Idea 486 was safe to operate and service as long as common sense was used and the manufacturer's safety recommendations were followed. Rotating parts were well shielded. The pickup and feeding area well shielded to discourage operators from attempting to clear blockages with the baler in operation. The safety shields were secured with a small cable so they could not be completely removed.

The Avco New Idea 486 had rear gate Cylinder lockout valves to permit safe servicing with the rear gate open.

A slow moving vehicle sign was permanently fastened at the rear of the baler.

OPERATOR'S MANUAL

The operator's manual was well written and contained much useful information on operation, servicing, adjustments, and safety procedures.

MECHANICAL PROBLEMS

TABLE 4 outlines the mechanical history of the Avco New Idea 486 during 110 hours of operation while baling 905 bales. The intent of the test was functional evaluation. The following failures represent those which occurred during functional testing. An extended durability evaluation was not conducted.

TABLE 4. Mechanical History

ITEM	OPERATING HOURS	NUMBER OF BALES
DRIVES		
- The forming belt drive chains were adjusted at	3, 28	26, 261
- The main drive chain required adjustment at	28	261
- The connecting link on the main drive chain came apart and was lost. It was replaced at	55	444
- The pickup drive belt broke when the pickup plugged. The belt was replaced at	110	905
BELTS		
- The bottom platform belts required adjustment at	3, 26	26, 220
- All forming belts were tightened at	73	583
HYDRAULICS		
- The right gate cylinder leaked around the base mount. The "O"ring was replaced at	63	508
PICKUP		
- One pickup tooth broke and was replaced at	63	598
- Two cam follower bearings were loose and were tightened at	110	905

DISCUSSION OF MECHANICAL PROBLEMS

Pickup Drive Belt: The pickup drive belt slipped if there was an overload on the pickup. Slipping occurred only rarely even when the pickup plugged. However, on one occasion when the pickup plugged, prolonged slipping caused the belt to break.

APPENDIX I

SPECIFICATIONS

MAKE:	Avco New idea	
MODEL:	486	
SERIAL NUMBER:	03437	
MANUFACTURER:	Avco New Idea Coldwater, Ohio U.S.A. 45828	
OVERALL DIMENSIONS:		
- width	95 in	(2420 mm)
- height	96 in	(2440 mm)
- length	173 in	(4405 mm)
- ground clearance	8 in	(215 mm)
TIRES:		
- size	2, 11L-15, 6-ply tubeless	
- pickup gauge	2, 4.80/4.00-8, 4-ply	
WEIGHT (field position and two balls of twine)		
- left wheel	1672 lb	(760 kg)
- right wheel	1782 lb	(810 kg)
- gauge wheels (2)	29 lb	(13 kg)
- hitch point	598 lb	(272 kg)
Total	4081 lb	(1855 kg)
BALE CHAMBER:		
- width	59 in	(1500 mm)
- maximum diameter (fixed)	71 in	(1800 mm)
- tension method	spring and latch	
- bale peripheral speed (at 540 rpm)	3.9 mph	(6.3 km/h)
BALE CHAMBER PLATFORM:		
- number of belts	5	
- belt width	11.0 in	(280 mm)
- thickness	0.16 in	(4 mm)
- spacing (centre to centre)	11.73 in	(298 mm)
- belt speed (at 540 rpm)	5.7 ft/s	(1.74 m/s)
- number of rollers	4, tubular steel	
- roller length	58.8 in	(1494 mm)
- roller diameter	2 - 7.16 in	(197 mm)
	2 - 4.53 in	(115 mm)
- roller surface	smooth	
- roller speed (drive)	169 rpm	
FORMING SECTIONS:		
- number of sections	5	
- number of belts per section	11	
- belt width	4.72 in	(120 mm)
- thickness	0.16 in	(4 mm)
- spacing (centre to centre)	5.31 in	(135 mm)
- belt speed (at 540 rpm)	5.7 ft/s	(1.74 m/s)
- number of rollers per section	2	
- roller diameter	4.53 in	(115 mm)
- roller speed (at 540 rpm)	282 rpm	
BALE SIZE INDICATOR:		
	gate latch switch with amber light	
PICKUP:		
- type	floating cam actuated drum with spring teeth	
- height adjustment	gauge wheels, 4 positions, transport latch	
- width	69.3 in	(1760 mm)
- diameter	13.78 in	(350 mm)
- number of tooth bars	4	
- tooth spacing	2.76 in	(70 mm)
- speed (at 540 rpm)	101 rpm	
- tooth tip speed (at 540 rpm)	7.3 mph	(11.8 km/h)
TWINE SYSTEM:		
- capacity	6 balls	
- recommended twine size	none	
- twine feed	hydraulic (optional)	
- twine cutter	stationary knife with jam plate	
DRIVES:		
- number of belt drives	1	
- number of chain drives	7	
- number of gear drives	1	
- number of universal joints	3	
SAFETY DEVICES:		
- main drive shear bolt		
- rear gate cylinder locks		
- safety shields cannot be completely removed		
SERVICING:		
- grease fittings	9, every 10 hours	
	2, every 50 hours	
- chains	7, oil daily with #30 SAE machine oil	
- gearbox	1, check every 50 hours	
	change oil annually	
- wheel bearings	2, repack annually	

**APPENDIX II
MACHINE RATINGS**

The following rating scale is used in PAMI Evaluation Reports:

- Excellent
- Very good
- Good
- Fair
- Poor
- Unsatisfactory

APPENDIX III

CONVERSION TABLE

acres (ac) x 0.40	= hectares (ha)
miles/hour (mph) x 1.61	= kilometres/hour (km/h)
tons (ton) x 0.91	= tonnes (t)
tons/hour (ton/h) x 0.91	= tonnes/hour (t/h)
tons/acre (ton/ac) x 2.24	= tonnes/hectare (t/ha)
inches (in) x 25.4	= millimetres (mm)
feet (ft) x 0.305	= metres (m)
horsepower (hp) x 0.75	= kilowatts (kW)
pounds (lb) x 0.45	= kilograms (kg)
pounds/cubic foot (lb/ft ³) x 16.1	= kilograms/cubic meter (kg/m ³)
tons/horsepower hour (ton/hp-h) x 1.22	= tonnes/kilowatt hour (t/kW-h)



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