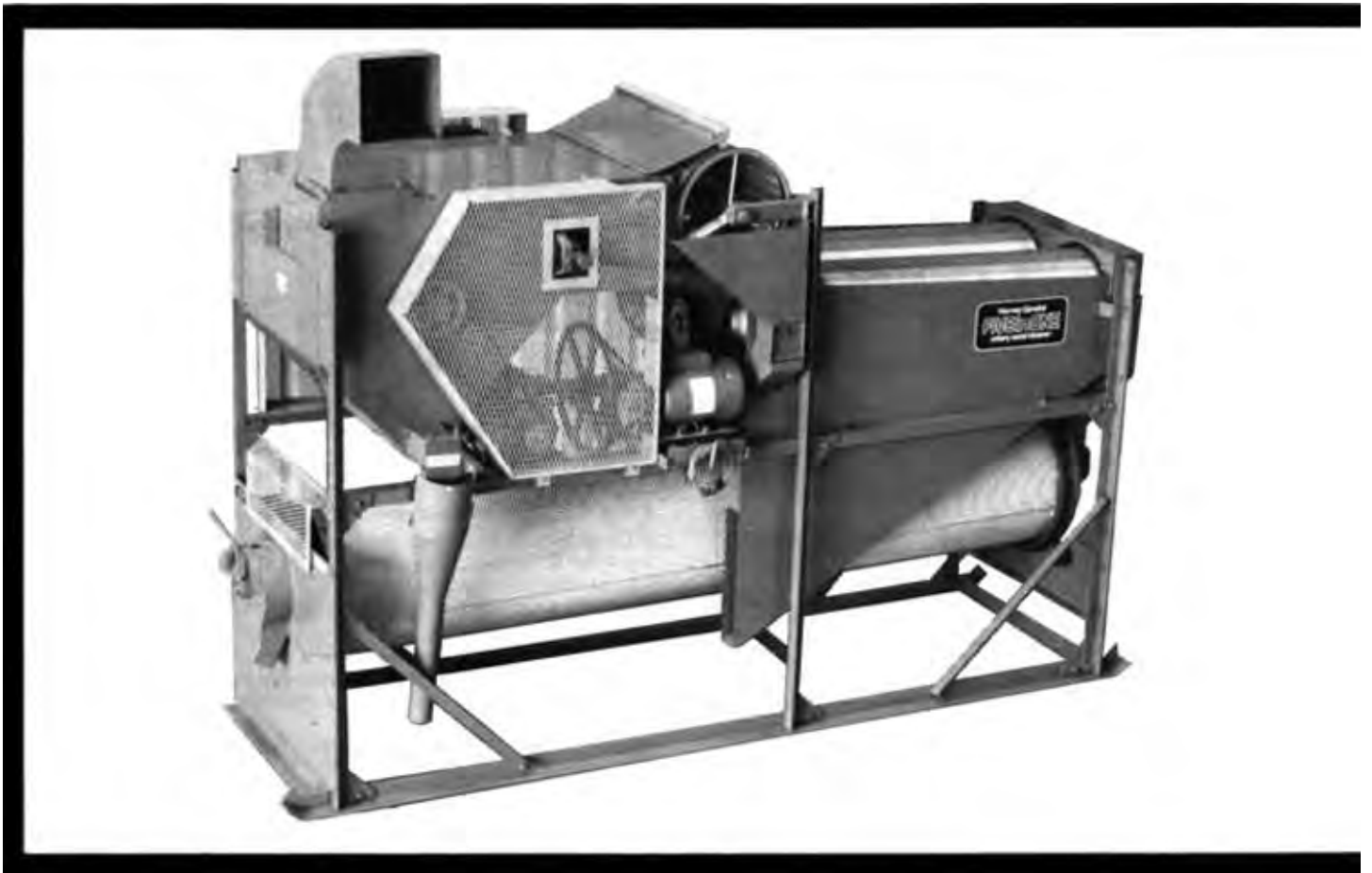


# Evaluation Report

# 422



## Harvey Gjesdal Five-In-One Rotary Seed Cleaner

A Co-operative Program Between



# HARVEY GJESDAL FIVE-IN-ONE ROTARY SEED CLEANER

## MANUFACTURER:

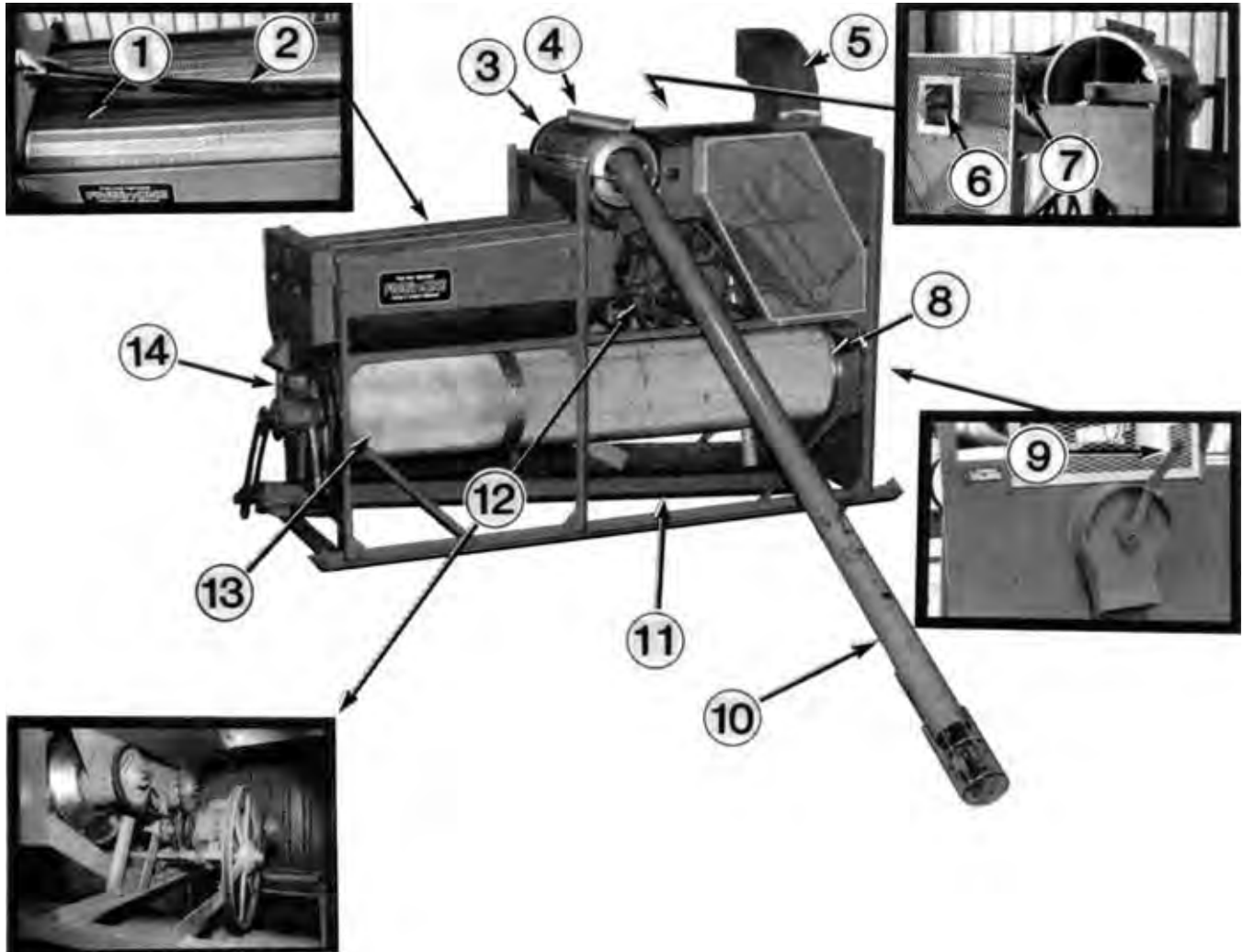
Simon-Day Ltd.  
P.O. Box 488  
1425 Whyte Ave.  
Winnipeg, Man.  
R3C 2J6

## DISTRIBUTOR:

United Grain Growers  
Farm Supply Division  
433 Main Street  
Winnipeg, Manitoba  
R3B 1B3

## RETAIL PRICE:

\$7,335 (March 1985, f.o.b. Winnipeg, Man.) with motors, intake auger, and basic screens.



**FIGURE 1.** Gjesdal Five-In-One Cleaner: (1) Grader Shells, (2) Plastic Pipe, (3) Scalper Drum, (4) Scalper Drum Cleaning Brush, (5) Air Duct (6) Scalper Drum Speed Control, (7) Scalper Drum Idler Pulley, (8) Large Pocket Indent Cylinder (9) Large Indent Cylinder Trough Adjustment, (10) Optional Intake Auger, (11) Optional Screenings Auger (12) Grader, Shell and Indent Cylinder Drive Mechanism, (13) Small Pocket Indent Cylinder, (14) Small Indent Cylinder Trough Adjustment.

## SUMMARY

**Quality of Work:** The Gjesdal Five-In-One Rotary seed cleaner was effective in removing contaminants from spring wheat, oats and canola. Certified No. 2 grade was obtainable with acceptable losses in screenings. Certified No. 1 status could be obtained if problems such as ergot in wheat, bosom oats and wild oats in oats, and ball mustard in canola were not present or if other machines were used in conjunction with the Gjesdal machine.

**Rate of Work:** Capacity of the cleaner varies depending upon the crop, contaminants and grade desired. Best results with the samples tested were obtained with incoming feed rates of 44 bu/h (1.2 t/h) in wheat, 45 bu/h (0.7 t/h) in oats, and 10 bu/h (0.2 t/h) in canola.

**Ease of Operation and Adjustment:** Adjustment of settings

such as scalper drum speed and indent cylinder trough position were easily accomplished. However, changing grader shells or indent cylinders was awkward and time consuming.

**Power Requirements:** Two electric motors, 3/4 hp (0.56 kW) and 1 hp (0.75 kW) were used.

**Operator's Manual:** The manual supplied with the test machine provided a good explanation of how the machine functioned and some suggestions of possible settings for various crops. More information concerning service, safety and grader shell and indent cylinder replacement was needed.

**Operator Safety:** The Gjesdal cleaner was safe to operate if normal safety precautions were observed.

**Mechanical History:** No durability problems occurred during testing. However, the scalper drive belt required more tension and a very slight wobble developed in the indent cylinders near the end of the test.

## RECOMMENDATIONS

It is recommended that the manufacturer consider.

1. Modifying the mixing paddles inside the scalper drum or providing a smaller slotted scalper drum to distribute wheat more evenly in the drum thus improving scalping and aspiration performance.
2. Providing extra shielding near the intake side of the machine around the scalper drum and on the sides of grader shells to reduce spillage.
3. Modifying the round hole scalper drum used for cleaning canola or changing the scalper drum brush to reduce the amount of material "plugging" the drum.
4. Modifying the drive system to allow independent operation of the grader shells and indent cylinders.
5. Cutting slots in the bottom part of the machine end cover to reduce down time when changing the grader shells.
6. Modifying the coupler and joiner on the indent cylinders to reduce down time and improve stability.
7. Improving the operator's manual to include information concerning grader shell and indent cylinder replacement and operator safety.
8. Providing safety decals on the machine to warn operators of potentially hazardous areas.
9. Increasing tension on the scalper drum idler pulley to reduce belt slippage on the scalper drum,
10. Using a key way to hold the universal joint coupler on the end of the optional intake auger.

Station Manager: G.M. Omichinski

Project Engineer: C.W. Bolton

## THE MANUFACTURER STATES THAT

1. A provision for mixing paddles or baffles for better distribution will be investigated.
2. More effective shielding will be incorporated on future machines.
3. A more effective drum cleaning mechanism will be investigated.
4. The feasibility of providing independent operation of the grader shells and indent shells will be studied.
5. Slots or similar other methods will be incorporated to reduce time to change shells.
6. An improved method of joining the indent cylinders is currently at design stage and will be incorporated in future machines.
7. The Operator's Manual will be reviewed and upgraded with more current information on maintenance and safety.
8. The test machine was not provided with safety decals. These are provided on standard order machines.
9. Increased tension on the drive will be provided on future machines.
10. The universal joint coupler will be keyed on future machines.

## GENERAL DESCRIPTION

The Gjesdal Five-In-One Rotary seed cleaner (FIGURE 1) is a small capacity grain cleaner incorporating five cleaning sections. Grain is separated by weight, width, and length. These functions are performed by a scalper drum, fan, grader shells and two different indent cylinders.

Unclean grain is fed into the scalper drum by the intake auger (FIGURE 2). Coarse material such as long straw, unthreshed heads and large kernels are then removed. As the grain falls through the scalper drum, the fan creates a flow of air drawing chaff, hulls and light kernels from the grain. The grain is then divided into the two rotary grader shells, which remove narrow materials such as small weed seeds. The first indent cylinder has small pockets, which pick up short or broken kernels and weed seeds such as wild buckwheat and drops them into a discharge trough. When cleaning small grains such as canola, good grain is picked up by this indent cylinder instead of the larger indent. The second indent cylinder has larger pockets to pick up good grain and leave long weed seeds such as wild oats to be discharged out the end of the indent cylinder.

The test machine was fitted with an optional screenings auger to collect screenings from the settling chamber, grader shells and

indent cylinders. Because of the low discharge height of the indent cylinder, the machine had to be placed on 6 in (150 mm) blocks when using the screenings auger.

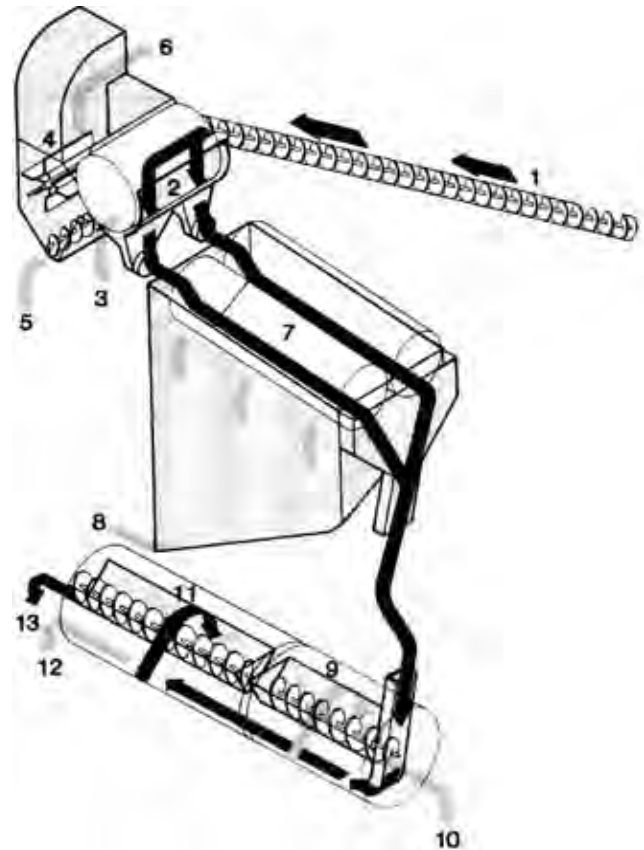


FIGURE 2. Material Flow Diagram: (1) Intake Auger, (2) Scalper Drum, (3) Coarse Material, (4) Fan, (5) Light Material, (6) Chaff, (7) Grader Shells, (8) Narrow Material, (9) Small Pocket Indent Cylinder, (10) Short Material, (11) Large Pocket Indent Cylinder, (12) Long Grain, (13) Clean Grain.

A small amount of good grain is expected to be lost with the screenings in each operation. Also, this machine does not include all possible cleaning operations and is not designed to remove all types of contaminants from every type of grain.

Detailed specifications are given in APPENDIX I.

## SCOPE OF TEST

The Gjesdal Five-In-One seed cleaner was operated for approximately 75 hours while cleaning red spring wheat, oats, and canola seed. Certified seed was mixed with known quantities of screenings, chaff, wild oats and small weed seeds. The mixture was cleaned by the test machine. The machine was evaluated for quality of work, rate of work, ease of operation and adjustment, power requirements, suitability of the operator's manual and operator safety.

A survey of 22 Manitoba owners was also conducted.

## RESULTS AND DISCUSSION QUALITY OF WORK

Before the cleaning operation begins, the operator should determine the quality of the un-cleaned sample, the grade standard to be met, the acceptable level of screenings and the time available for cleaning the grain.

As wheat and barley are two of the most common crops grown on the prairies, the standard machine came equipped with grader shells and indent cylinders designed to clean both crops with a certain amount of trade-off in the finished products. Optional sizes were readily available.

**Scalper Drum:** The ability of the optional 9/64 in x 3/4 in (3.6 mm x 19 mm) slotted scalper drum to remove coarse material from Columbus Wheat such as unthreshed heads was good. However, most of the grain fell through the first one third of the

<sup>1</sup>See APPENDIX II for detailed composition of test material

drum as shown in FIGURE 3. This adversely affected aspiration performance as grain was not uniformly exposed to the air stream underneath the scalper. It is recommended that the manufacturer consider modifying the mixing paddles inside the drum or providing a smaller slotted drum.



FIGURE 3. Scalper Drum Grain Flow.

Some spillage occurred underneath the scalper drum on the intake side. It is recommended that the manufacturer consider extending the shielding around the scalper on this side.

Also, while cleaning canola with a round hole scalper drum, short straws and hulls stuck in the drum. It is recommended that the manufacturer consider modifying the scalper drum cleaning brush or scalper drum to reduce this "plugging" problem.

**Aspiration:** The ability of the machine to remove light material from the sample was good. Although the fan had sufficient capacity to lift whole kernels of grain, a small amount of chaff remained in the finished product. Improved distribution in the scalper drum or a gradient in air velocity from one side of the scalper drum to the other would improve performance. It is recommended that the manufacturer consider these modifications to improve aspiration.

**Grader Shells:** The grader shells worked very well reducing the amount of small weed seeds. The plastic pipes kept the grader shells clean. A small amount of material was thrown over the sides of the machine particularly when the shells were spinning at high speeds. It is recommended that the manufacturer consider extending the sides of the machine to reduce spillage.

**Indent Cylinders:** Trough settings and pocket size selection of the indent cylinders were critical in obtaining the optimum performance from the machine. TABLE 1 illustrates the reduction in spring wheat screenings using a No. 10, short indent cylinder instead of the standard No. 13. The performance of the No. 10 indent cylinder was very good eliminating all the cracked kernels and wild buckwheat from the final product.

TABLE 1. Short Indent Cylinder Pocket Size

Pocket Size	Incoming Rate bu/h (t/h)	Outgoing Rate bu/h (t/h)	% Screenings
No. 13	43 (1.2)	27 (0.7)	38
No. 10	44 (1.2)	37 (1.0)	18

The No. 20 long indent cylinder very effectively reduced wild oats in spring wheat with a small amount of good wheat lost in the screenings.

**General Performance:** Certified No. 2 seed was produced from all three test samples of spring wheat, oats and canola. Certified No. 1 seed could have been produced if certain elements indicated below were not present or if other machines were used in conjunction with the test machine.

The seed regulations are very strict about the amount of ergot in wheat. The Five-In-One cleaner eliminated almost all the ergot but not enough for Certified No. 1 status. A small percentage of white caps were also seen in the finished sample but this did not affect the grade.

A large percentage of bosom oats (one oat inside another)

were left in the sample. These seeds could have been knocked apart with another cleaning machine (e.g. buffer). Wild oats in oats is considered to be an inseparable operation. The Gjesdal cleaner reduced the amount of wild oats in oats, but not to seed standards and at the expense of over 50% loss to screenings.

The test sample of canola contained a large amount of bail mustard, which is very difficult to remove. However, a Certified No. 2 sample was still obtainable with considerable adjustment.

#### RATE OF WORK

The capacity of the machine was dependent upon various factors. These included the type of crop cleaned, contaminants in the sample, the grade desired and the sizes of grader shells and indent cylinders selected.

TABLE 2 shows the maximum rates for wheat, oats and canola that achieved Certified No. 2 results with the samples of grain cleaned.

Quality was adversely affected at rates above those indicated and when rates were reduced by more than 30% from these values.

TABLE 2. Cleaning Rates

Crops	Incoming Rates		Outgoing Rates	
	bu/h	(t/h)	bu/h	(t/h)
Wheat	44	(1.2)	36	(1.0)
Oats	45	(0.7)	33	(0.5)
Canola	10	(0.2)	65	(0.1)

#### EASE OF OPERATION AND ADJUSTMENT

Adjustment of settings was easily accomplished. It was important to wait approximately five minutes before determining if a setting change achieved the desired result.

Speed adjustments to the indent cylinders and the grader shells were not independent of each other. Therefore, tradeoffs often occurred when attempting to select the correct speeds. It is recommended that the manufacturer consider modifying the drive system to allow indent cylinders and grader shells to function independently.

Changing the scalper drum, grader shells and indent cylinders was awkward and very time consuming, taking approximately 30 minutes, 60 minutes and 120 minutes respectively.

To reduce the time needed to change the grader shells, two slots were cut in the bottom part of the end cover as shown in FIGURE 4 to allow the shafts to be lifted out instead of removing this part of the cover. To further reduce down time, a second complete set of grader shell components (i.e. mixing bars and shafts) should be kept on hand. This would eliminate assembly of the grader shells during each change.



FIGURE 4. Modified End Cover.

The troughs inside the indent cylinders were connected by one short shaft sliding inside another. It was difficult to align these when joining the cylinder drums. A longer coupling would make shaft alignment easier.

It is recommended that the manufacturer consider modifications to reduce down time when changing grader shells and indent cylinders.

Cleaning of the machine between crops was very easy. The intake auger can be lifted from the machine by hand. The grader shells were inclined slightly and thus self cleaning. The troughs in the indent cylinders could be completely inverted for cleaning purposes.

**Power Requirements:** The two electric motors used to drive the Gjesdal Five-In-One were sufficient. A ¾ hp (0.56 kW) motor was used to drive the intake auger, fan and scalper drum. A 1 hp (0.75 kW) motor was used to drive the grader shells, indent cylinders and the screenings auger.

**OPERATOR'S MANUAL**

The operator's manual supplied with the test machine provided a good explanation of how the machine operated and also made helpful suggestions for machine settings in various crops. It is recommended that more information be included concerning grader shell and indent cylinder replacement and operator safety.

**OPERATOR SAFETY**

The Gjesdal Five-In-One Rotary Seed Cleaner was safe to operate if normal precautions were observed. However, no safety decals were provided on the test machine. It is recommended that the manufacturer consider providing safety decals to alert the operator of potentially hazardous areas.

**MECHANICAL HISTORY**

Shortly after testing began, the scalper drum drive belt began to slip. A weight was added to the spring-loaded idler pulley. This problem was also noted frequently in the PAMI user survey. It is recommended that the manufacturer consider increasing the tension of the idler pulley spring to eliminate belt slippage.

The universal joint and "spider" connector on the optional intake auger (FIGURE 5) became loose on the end of the auger shaft. It is recommended that the manufacturer consider using a keyway to keep the universal joint from slipping on the auger shaft.

After 70 hours of use, a very slight wobble was noticed in the indent cylinders. As indicated earlier, it is recommended that the manufacturer consider strengthening the indent cylinder joint.



FIGURE 5. Optional intake Auger Connector.

<b>APPENDIX I SPECIFICATIONS</b>	
<b>MAKE:</b>	Gjesdal
<b>MODEL:</b>	Five-in-One
<b>SERIAL NUMBER:</b>	659
<b>OVERALL DIMENSIONS:</b>	
-- width	2.8 ft (0.9 m)
-- length	86 ft (26 m)
-- height	6.4 ft (1.9 m)
-- mass	1030 lb (468 kg)
<b>DRIVES:</b>	
-- two electric motors	1, 0.75 hp (0.56 kW) 1, 1.00 hp (0.75 kW)
<b>LUBRICATION:</b>	
-- pressure grease fittings	2
-- oil caps	5
<b>SCALPER DRUM:</b>	
-- diameter	12 in (305 mm)
-- length	2.4 m (609 mm)
<b>GRADER SHELLS:</b>	
-- diameter	12 in (305 mm)
-- length	45 in (1143 mm)
<b>FIRST INDENT CYLINDER:</b>	
-- diameter	16.8 (425 mm)
-- length	30.5 in (775 mm)
<b>SECOND INDENT CYLINDER:</b>	
-- diameter	16.8 (425 mm)
-- length	49 ft (15 m)
<b>OPTIONAL INTAKE AUGER:</b>	
-- diameter	4.5 in (114 mm)
-- length	10.5 ft (3.2 m)
<b>OPTIONAL SCREENING AUGER:</b>	
-- diameter	4.5 in (114 mm)
-- length	8.2 ft (2.49 m)
<b>NUMBER OF PULLEYS:</b>	7
<b>NUMBER OF CHAINS:</b>	2
<b>NUMBER OF BELTS:</b>	2 Link belts 4 V-belts
<b>NUMBER OF DISCHARGE CHUTES:</b>	7
<b>OPTIONAL EQUIPMENT:</b>	
-- various scalper drums	
-- various grader shells	
-- various indent cylinders	
-- intake auger	
-- screenings auger	

<b>APPENDIX II TEST SAMPLE COMPOSITIONS:</b>	
<b>Wheat:</b>	82.5% Certified No. 1 Spring Wheat 15.0% Screenings (cracked wheat, small weed seeds, whole grain, chaff, ergot, unthreshed heads) 2.0% wild oats
<b>Oats:</b>	0.5% wild buckwheat 70.0% Certified No. 2 Fidler Oats 30.0% Screenings (chaff, light oats, whole oats, bosom oats, wheat, small weed seeds)
<b>Canola:</b>	80.0% Certified No. 2 Regent Canola 20.0% Screenings (hulls, ball mustard, whole canola, wheat, small weed seeds, straw, pods)

<b>APPENDIX III MACHINE RATINGS</b>	
The following rating scale is used in PAMI Evaluation Reports:	
Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

# SUMMARY CHART

## HARVEY GJESDAL FIVE-IN-ONE ROTARY SEED CLEANER

<b>RETAIL PRICE:</b>	\$7,335 (March 1985, f.o.b. Winnipeg, Man.)
<b>QUALITY OF WORK:</b>	
Light Material Removal	<b>Good</b>
Small Material Removal	<b>Very good</b>
Large Material Removal	<b>Good</b>
<b>RATE OF WORK: (Incoming Rates)</b>	Wheat 44 bu/h (1.2 t/h) Oats 45 bu/h (0.7 t/h) Canola 10 bu/h (0.2 t/h)
<b>EASE OF OPERATION:</b>	
Settings	<b>Very good</b>
Screen and Drum Changes	<b>Fair</b> (time consuming)
Cleanout	<b>Very good</b>
<b>POWER REQUIREMENTS:</b>	1-3/4 hp (0.56 kW) 1-1.0 hp (0.75 kW) Electric Motors
<b>OPERATOR SAFETY:</b>	<b>Very good</b>
<b>OPERATOR'S MANUAL:</b>	<b>Good</b>
<b>MECHANICAL HISTORY:</b>	
-Slippage of scalper drive belt.	
-Slippage of universal joint on intake auger shaft.	
-Slight wobble in indent cylinders.	

 <p><b>ALBERTA FARM MACHINERY RESEARCH CENTRE</b></p>	<p><b>Prairie Agricultural Machinery Institute</b>          Head Office: P.O. Box 1900, Humboldt, Saskatchewan, Canada S0K 2A0          Telephone: (306) 682-2555</p>		
<p>3000 College Drive South          Lethbridge, Alberta, Canada T1K 1L6          Telephone: (403) 329-1212          FAX: (403) 329-5562  <a href="http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html">http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html</a></p>	<table style="width: 100%;"> <tr> <td style="width: 50%;"> <p>Test Stations:            P.O. Box 1060            Portage la Prairie, Manitoba, Canada R1N 3C5            Telephone: (204) 239-5445            Fax: (204) 239-7124</p> </td> <td style="width: 50%;"> <p>P.O. Box 1150            Humboldt, Saskatchewan, Canada S0K 2A0            Telephone: (306) 682-5033            Fax: (306) 682-5080</p> </td> </tr> </table>	<p>Test Stations:            P.O. Box 1060            Portage la Prairie, Manitoba, Canada R1N 3C5            Telephone: (204) 239-5445            Fax: (204) 239-7124</p>	<p>P.O. Box 1150            Humboldt, Saskatchewan, Canada S0K 2A0            Telephone: (306) 682-5033            Fax: (306) 682-5080</p>
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