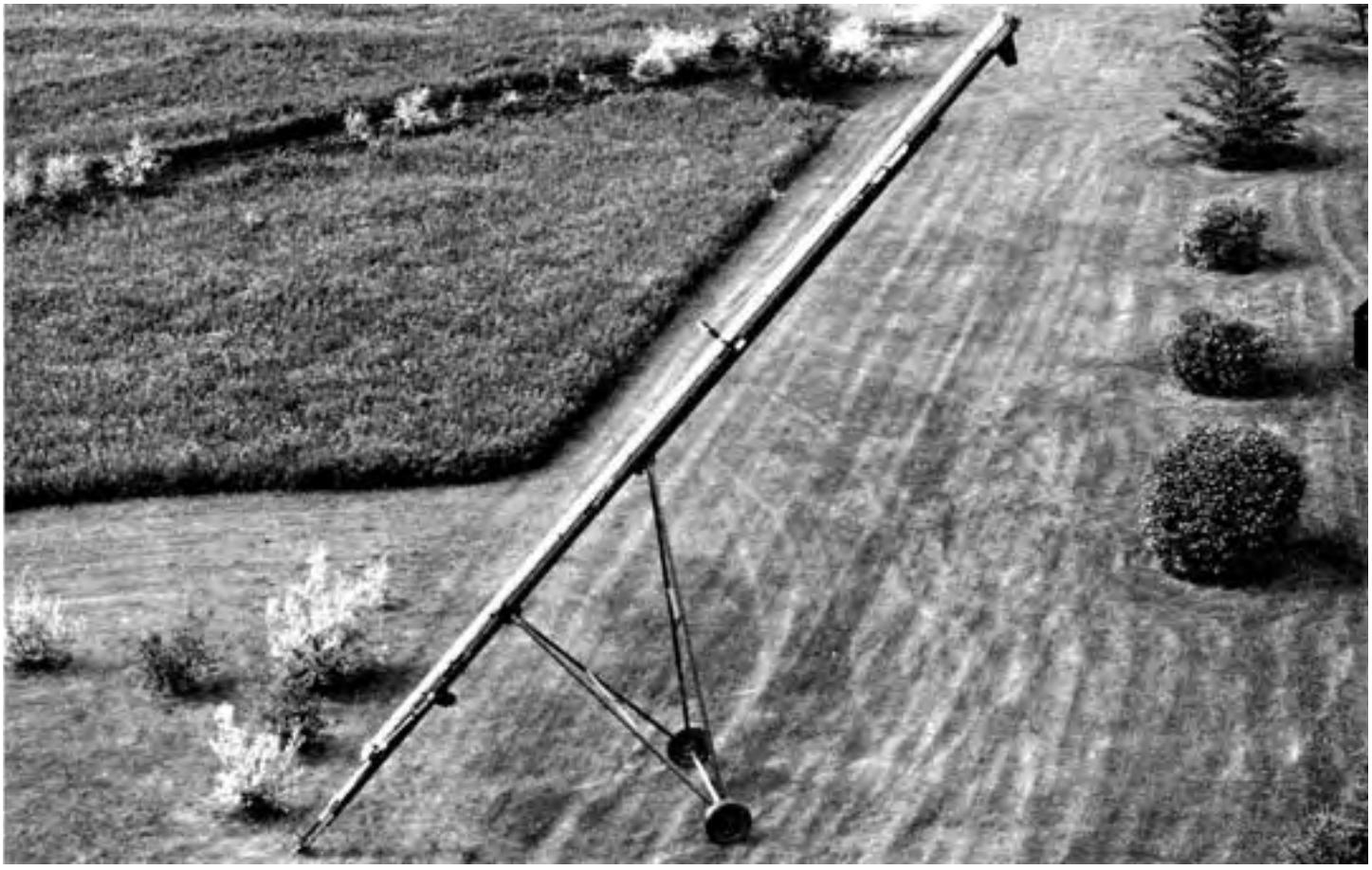
Printed: July, 1983
Tested at: Portage la Prairie
ISSN 0383-3445

Evaluation Report 321



Westgo 1210 Grain Auger

A Co-operative Program Between
ALBERTA FARM MACHINERY RESEARCH CENTRE
PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

WESTGO 1210 GRAIN AUGER

MANUFACTURER:
Westgo Industries Ltd.
200-8th St. West
West Fargo, North Dakota
58078K0

DISTRIBUTORS:
Robinson Alamo Dist. Ltd.
1380 Waverley St.
Winnipeg, Manitoba

RETAIL PRICE:
$4,408.00 (July 1983, f.o.b. Portage la Prairie, Manitoba)

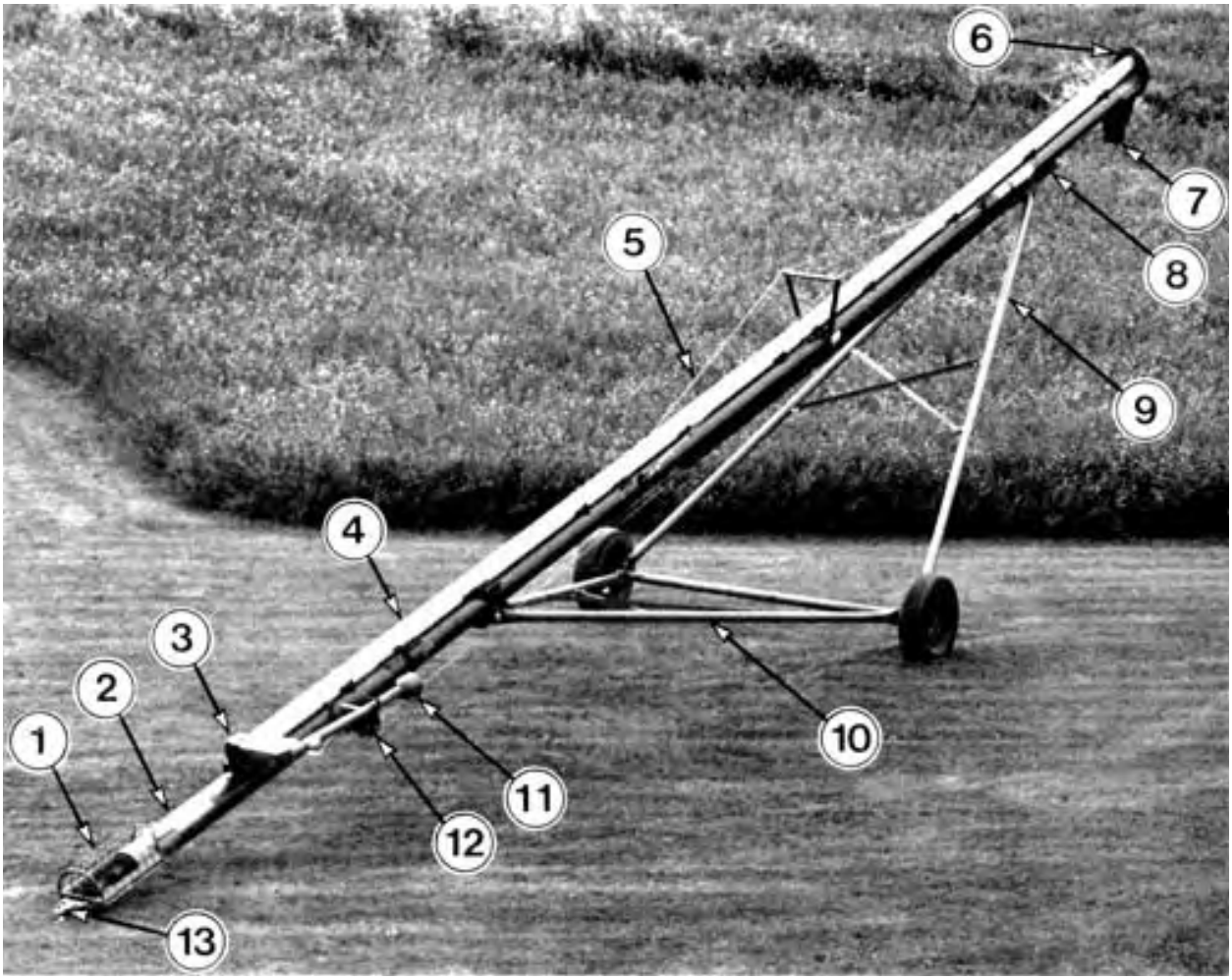


FIGURE 1. Westgo 1210 Grain Auger: (1) Inlet, (2) Auger Tube, (3) Gear Box, (4) Drive Shaft, (5) Truss Cables, (6) Upper End Drive, (7) Discharge Spout, (8) Elevating Track, (9) Lift Arms, (10) Lower Arms, (11) Power Take-off Driveline, (12) Cable Winch, (13) Tow Hitch.

SUMMARY AND CONCLUSIONS

Overall Performance: Performance of the Westgo 1210 Grain Auger was good[1]. At the 30° elevation angle, corresponding to a discharge height of 24.7 ft (7.5 m), and at the manufacturer's recommended flighting speed of 450 rpm, capacities were 1980 bu/h (54.0 t/h) in wheat, 2560 bu/h (39.5 t/h) in oats, 1870 bu/h (47.7 t/h) in corn and 1550 bu/h (35.2 t/h) in rapeseed. Maximum capacities were obtained at flighting speeds between 550 and 650 rpm.

Power Requirements: These ranged from 5 to 20 hp (4 to 15 kW) in dry grain. Capacity and power depended on flighting speed, elevation angle, grain type and moisture content.

Grain Damage: In dry wheat, damage was less than 0.2% for each pass through the auger.

Maneuverability: This was regarded as fair due to the heavy hitch weight and the location of the cable winch at high elevations.

Safety: All pulleys, nip points, rotating drive shafts and the inlet flighting were guarded, in accordance with current safety standards[2].

Operator Manual: An operator manual was provided with adequate instructions for operation of the machine,

Durability: No durability problems occurred during the test.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Relocating the cable winch for easier operation at high auger elevations.
2. Changing the location or length of the PTO driveline to allow it to operate without interference with the tractor PTO shield when the auger is fully raised.
3. Modifying the undercarriage to reduce the hitch weight and improve maneuverability.

Senior Engineer -- G.M. Omichinski

Project Engineer -- C. W. Bolton

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. The winch is mounted at a position we feel optimizes ease of handling in normal operation of the auger. We will however,

[1] *See rating table APPENDIX III.*
[2] *American Society of Agricultural Engineers Tentative Standard ASAE S361.1 T "Safety, for Agricultural Auger Conveying Equipment," December 1981.*

review this recommendation and decide if a change is in order.

2. The P.T.O. driveline is positioned to allow for adequate truck or wagon clearance when unloading, while minimizing the P.T.O. driveline angle at normal auger operating angles. We will again analyze this recommendation and decide if a change is required.
3. The hitch weight of this model has been slightly reduced. Safety is the main consideration in determining the hitch weight. The auger may become top heavy if there is not adequate hitch weight and the grain flow is abruptly cut off. We feel the maneuverability is now quite satisfactory.

GENERAL DESCRIPTION

The Westgo 1210 Grain Auger (FIGURE 1) is an 8 in (203 mm)[3] diameter, 51 ft (15.5 m) long portable screw conveyor. The auger tube is mounted on a tubular undercarriage and supported by truss cables. A hand-operated cable winch is used to adjust the discharge height.

The test machine was equipped with a 540 rpm tractor power take-off direct drive. The Westgo may be equipped with a power take-off belt drive, gasoline engine or electric motor.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST[4]

The Westgo 1210 was operated for about 15 hours while conveying dry wheat, oats, corn and rapeseed. A standard test material (APPENDIX II) was also used. The machine was transported over gravel and paved highways for a distance of 30 miles (50 km). It was evaluated for ease of operation and adjustment, rate of work, power requirements, quality of work, operator safety and suitability of the operator manual.

RESULTS AND DISCUSSION

EASE OF OPERATION AND ADJUSTMENT

Discharge Height: The discharge height could be varied from 9.5 to 34.5 ft (2.9 to 10.5 m) with the hand operated cable winch. Corresponding elevation angles varied from 12° to 45°.

Adjustment of the discharge height was difficult at high elevations. FIGURE 2 shows a 6 ft (1.8 m) man attempting to reach the winch handle when the auger was at maximum elevation. It is recommended that the manufacturer consider relocating the cable winch to a more suitable location.

FIGURE 2. Cable winch position at maximum elevation.

With the auger empty, and the lift mechanism well lubricated, it took a maximum winch handle force of 33 lb (147 N) to raise the

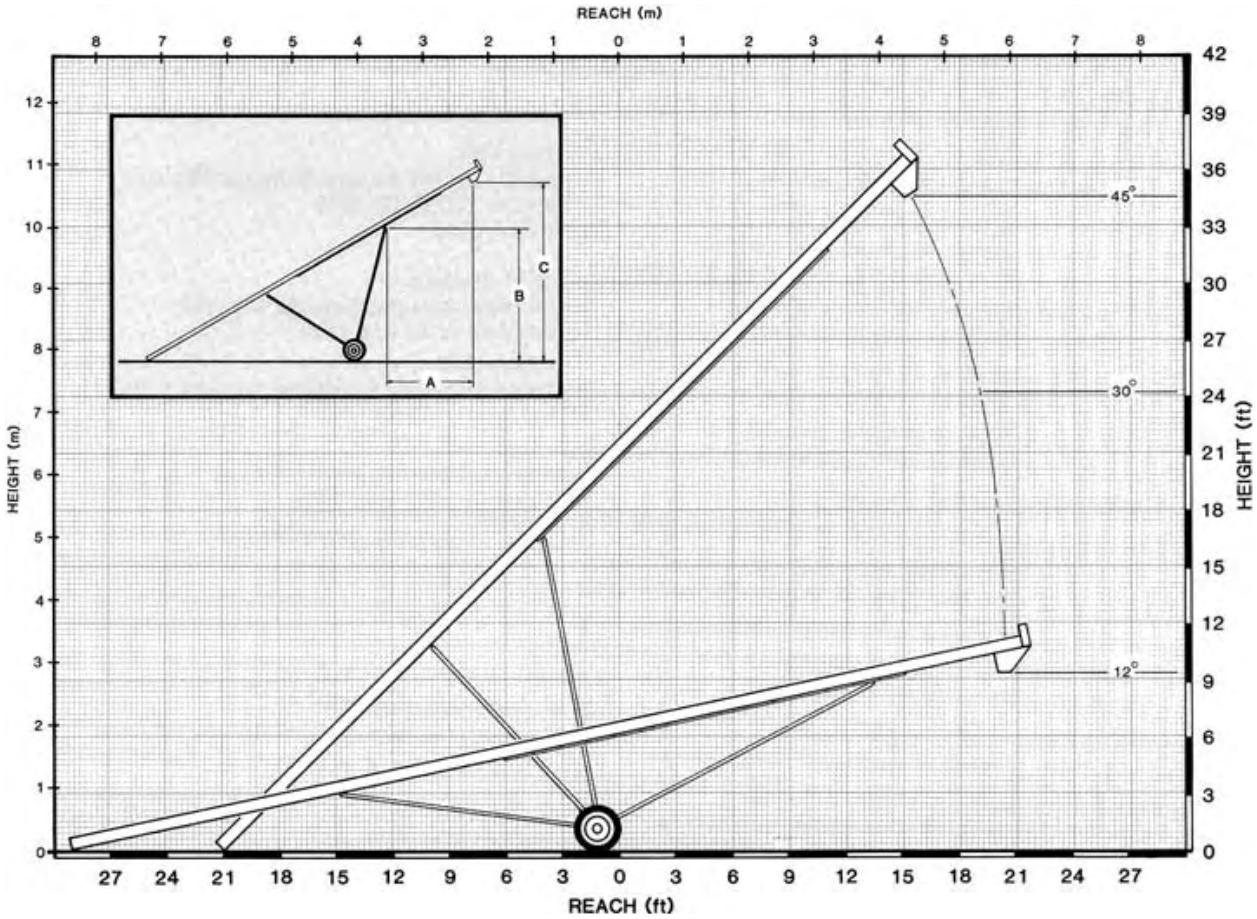


FIGURE 3. Reach and clearance at various heights: (A) Reach, (B) Bin Eave Clearance, (C) Discharge Height.

[3] *A conversion table is provided in APPENDIX IV.*
[4] *Prairie Agricultural Machinery Institute Detailed Test Procedures for Grain Augers.*

auger. It took about 200 turns of the winch handle to fully raise or lower the auger. At maximum elevation, the PTO driveline interfered with the tractor PTO shield. It is recommended the manufacturer consider changing the location or length of the PTO driveline to allow operation without interference with the shields at high auger elevations. The operator manual specified operating the auger with a power shaft angle not to exceed 15°. However, this limit was exceeded at higher elevations and operation was satisfactory when universal joints were in phase (equal angle). Some clarification is required in the operator manual on this point.

Auger Reach: The bin eave clearance and horizontal reach of the Westgo 1210 are shown in FIGURE 3. Bin eave clearance, measured from the ground to the foremost part of the undercarriage, varied from 8.8 ft (2.7 m) at 12° to 20.0 ft (6.1 m) at 45° elevation. The reach measured from the foremost part of the undercarriage to the centre of the discharge, ranged from 6.0 ft (1.8 m) to 14.2 ft (4.3 m).

Maneuverability: Hitch weight varied from 123 lb (56 kg) at minimum elevation to 181 lb (82 kg) at maximum elevation. This heavy weight made maneuvering of the auger by hand very difficult. It is recommended that the manufacturer modify the undercarriage to reduce the weight on the hitch.

The Westgo 1210 transported well and was stable at speeds up to 50 mph (80 km/h) on paved highways and up to 30 mph (50 km/h) on gravel roads. The removable clevis hitch provided a reliable coupling to the tow vehicle. The operator should use a suitable hitch pin and safety chain to prevent accidental unhitching when transporting on public roads.

Clearance under power lines was adequate. The transport height was 12 ft (3.7 m) when fully lowered.

Adjustments: Chain tension in top end drive should be checked annually. The chain case must be removed and then refilled with oil after inspection is completed.

RATE OF WORK

Capacity: FIGURE 4 shows the capacities[5] of the Westgo 1210 in various grains at 30° elevation angle. Maxim um capacities were 2160, 2760, 2090, and 1880 bu/h (58.9, 42.6, 53.1 and 42.6 t/h) in dry wheat, oats, corn and rapeseed respectively. As flighting speeds are increased, the capacity of screw conveyors increases to a peak, then levels off or decreases. Maximum or peak capacities for the Westgo 1210 occurred at flighting speeds ranging from 550 to 650 rpm, which corresponded to power take-off speeds of 550 to 650 rpm.

The effect of elevation angle on capacity is illustrated in TABLE 1. Peak capacities in wheat dropped 33% from 2530 bu/h (68.9 t/h) at 20° elevation to 1700 bu/h (46.3 t/h) at maximum elevation.

TABLE 1. Peak Capacity, Specific Capacity and Power Requirement Vs Elevation Angle (Wheat)

Elev. Angle Deg.	Discharge Height		Peak Capacity		Specific Capacity		Power Input	
	ft	m	bu/h	t/h	ton/hp•h	t/kW•h	hp	kW
20	16	5	2530	69	6.7	8.1	11	8
30	25	8	2160	59	5.2	6.4	12	9
40	32	10	1800	49	4.5	5.4	12	9
45	35	11	1700	46	4.2	5.1	12	9

Specific Capacity: Specific capacity is the amount of grain moved per horsepower hour (kilowatt hour). A high specific capacity indicates efficient use of energy. In general, specific capacity decreases (less grain is moved per horsepower-hour) with increasing the flighting speed and elevation angle. FIGURE 4 shows that at 30° elevation, the specific capacity ranged from 7.00 to 2.36 ton/hp-h (8.56 to 2.88 t/kW-h) in wheat, oats, corn and rapeseed. Table 1 indicates the effect of the elevation angle on peak and specific capacities for the Westgo 1210.

Critical Speeds: At certain critical flighting speeds, auger vibration becomes excessive. This phenomenon, known as resonance, is common to all augers and varies with grain type and operating conditions. Care should be taken not to operate at or near critical speeds.

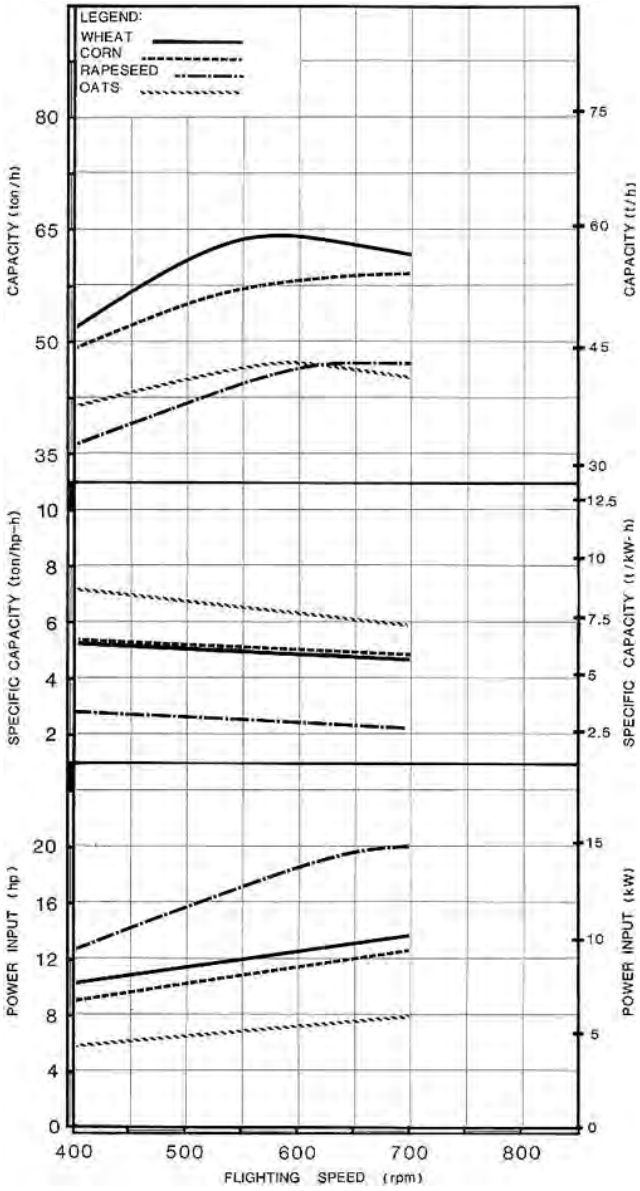


FIGURE 4. Capacity, specific capacity and power input for various flighting speeds at 30° elevation angle.

Power Requirements: FIGURE 4 gives power requirements for the Westgo 1210 in dry wheat, oats, corn and rapeseed at a 30° elevation angle. Power requirements ranged from 5 to 20 hp (4 to 15 kW). More power would be needed in high moisture grain.

QUALITY OF WORK

Grain Damage: Damage in dry wheat was less than 0.2% for each pass through the auger. This was insignificant as long as the same grain was not augered many times. Crackage would be lower at higher moisture contents. Further testing is required to determine the significance of the unique rubber inlet flighting on reducing the degree of grain damage to large grains such as corn and beans.

OPERATOR SAFETY

The Westgo 1210 met current safety standards for grain augers. It was safe to operate if normal precautions were observed. The rubber inlet flighting provides additional safety.

Shielding was provided for all rotating shafts, pulleys and pinch points. An adequate inlet safety guard (FIGURE 5) was provided. All capacities were determined with this inlet safety guard in position. The Institute strongly recommends that grain augers be operated with all safety equipment in place.

Safety signs were appropriately displayed, alerting the operator of potentially hazardous areas.

---

[5]Since the capacity is greatly dependent upon grain properties, such as variety and moisture content, FIGURE 4 should not be used for comparing different augers. The data presented in FIGURE 6, APPENDIX II, using a standard medium, may be used for comparisons of different augers.

FIGURE 5. Inlet safety guard.

OPERATOR MANUAL

An operator manual was provided with the Westgo and contained appropriate operating, servicing and safety instructions.

DURABILITY RESULTS

The Westgo was operated for about 15 hours. The intent of the test was evaluation of overall performance. An extended durability evaluation was not conducted. No mechanical problems occurred during the test.

APPENDIX I
SPECIFICATIONS

MAKE:	Westgo
MODEL:	1210
SERIAL NUMBER:	AH 1286
OVERALL DIMENSIONS:	
-- length	`52.1 ft (15.9 m)
-- width	9.8 ft (3.0 m)
-- transport height	12.0 ft (3.7 m)
DRIVE:	
-- 540 rpm tractor power take-off	
-- direct drive	
-- auxiliary drives	
-chains	1
-gearboxes	1
-- power take-off to flighting speed ratio	1:1
LUBRICATION:	
-- pressure grease fittings	5
-- sealed bearings	9
-- packed wheel bearings	2
AUGER TUBE:	
-- inside diameter	7.9 in (200 mm)
-- material thickness	0.12 in (3.0 mm)
-- discharge spout	7.0 in dia. (t80 mm)
FLIGHTING:	
-- diameter	7.3 in (185 mm)
-- pitch	
-exposed (rubber)	7.3 in (185 mm)
-covered	7.3 in (185 mm)
-- exposed length	15.0 in (385 mm)
INLET SAFETY GUARD:	
-- material dimensions	0.20 in dia. (5.1 mm)
-- overall size	23 in L x 12 in dia. (585 mm x 305 mm)
-- grill openings	
-maximum open area	7.60 in² (49.0 cm²)
-maximum open dimension	2.75 in (70.0 mm)
WINCH:	
-- make	Work Winch
-- model	K-1500
-- maximum handle force	33.0 lb (147 N)

WEIGHT:	**Maximum Elevation**	**Minimum Elevation**
-- right wheel	734 lb (333 kg)	763 lb (346 kg)
-- left wheel	734 lb (333 kg)	763 lb (346 kg)
-- hitch	181 lb (82 kg)	123 lb (56 kg)
TOTAL	1649 lb (748 kg)	1649 lb (748 kg)

OPTIONAL EQUIPMENT:
-- overflow spout
-- hydraulic or electric winch
-- swivel axle kit
-- bucket type flex pipe
-- various hoppers
-- 8” swing-a-way hopper

APPENDIX II
PERFORMANCE WITH STANDARD TEST MATERIAL

The standard test material is a high density granular polyethylene. The material is consistent and not subject to damage or changes in physical properties as are grains.

FIGURE 6 gives the capacity, specific capacity and power requirements for the Westgo 1210 in the standard test material. These data may be used for comparison of different grain augers.

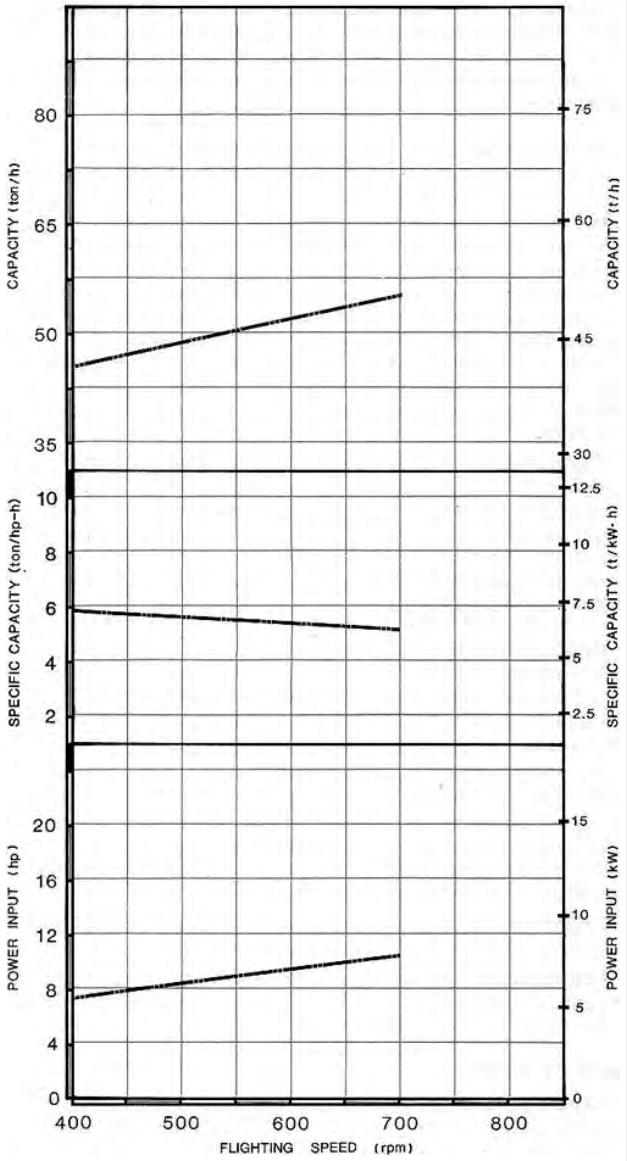


FIGURE 6. Capacity, specific capacity and power requirements with a standard test material at 30° elevation angle.

APPENDIX III
MACHINE RATINGS

The following rating scale is used in Machinery Institute Evaluation Reports:

Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

APPENDIX IV
CONVERSION TABLE

Acre (ac) x 0.40	= Hectare (ha)
Foot (ft) x 0.305	= Metre (m)
Inches (in) x 25.4	= Millimetres (mm)
Horsepower (hp) x 0.75	= Kilowatt (kW)
Miles/Hour (mph) x 1,61	= Kilometre/Hour (km/h)
Pounds Force (lb) x 4.45	= Newton (N)
Pounds Force/Foot (lb/ft) x 14.6	= Newton/Metre (N/m)
Pounds Force-Feet (lb-ft) x 1.36	= Newton-Metre (N-m)
Pounds Force/Square Inch (psi) x 6.89	= Kilopascal (kPa)
Pounds Mass (lb) x 0.454	= Kilogram (kg)
Tons Mass (ton) x 1.1	= Tonnes (t)

ALBERTA FARM MACHINERY RESEARCH CENTRE

3000 College Drive South
Lethbridge, Alberta, Canada T1K 1L6
Telephone: (403) 329-1212
FAX: (403) 329-5562
http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html

Prairie Agricultural Machinery Institute
Head Office: P.O. Box 1900, Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-2555

Test Stations:

P.O. Box 1060
Portage la Prairie, Manitoba, Canada R1N 3C5
Telephone: (204) 239-5445
Fax: (204) 239-7124

P.O. Box 1150
Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-5033
Fax: (306) 682-5080