Bale Pro®

Complete Feed Ration
Grain Tank 960

Operators Manual

Highline MANUFACTURING LTD.

E15258V1

Grain Tank
on the
BalePro®
Complete Feed Ration 960

Operator's
Manual

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E15258V1

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Highline Team Message

Congratulations on your purchase of the Grain Tank on the CFR 960 *manufactured by Highline Manufacturing Ltd.*

This operator's manual has been prepared to provide information necessary for safe and efficient operation. In the manual you will find safety procedures, maintenance routines and detailed operational instructions.

If you find that you require information not covered in this manual, please feel free to consult your local dealer. Your dealer is always able to contact Highline for this technical information.

Highline Manufacturing Ltd. thanks and congratulates you for selecting the Grain Tank on the CFR 960 as your machine of choice.

Highline Manufacturing Ltd.

Table of Contents

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GENERAL DESCRIPTION OF THE GRAIN TANK ON THE CFR 960

The Grain Tank on the CFR 960 is an attachment to the CFR 960 Bale Processor. When the ground drive is engaged, the forward motion of the processor's wheel turns a drive system connected to an auger at the bottom of the grain tank. The auger is driven by the processor's ground wheel through an electric clutch and changeable chain sprockets. The auger discharges the metered feed directly into the tub of the CFR 960 Bale Processor.

When the addition of feed into the processed material is desired, the clutch is engaged and the auger is turned according to the chain sprocket ratios. The rate of feed mix is controlled by calibrating the auger discharge per revolution for a particular product and installing the chain sprockets that drive the auger to achieve the desired rate of feed intermix.

When the drive clutch is not turned on, the CFR 960 Bale Processor discharges material without any feed intermixed.

The operator of the Grain Tank CFR 960 is located in the tractor cab where they drive the tractor, control the speed of driving and engaging of the auger drive system.

INTENDED USE OF THE GRAIN TANK ON THE CFR 960

The Grain Tank on the CFR 960 is designed to add animal feed materials into materials that have been initially processed by the CFR 960 Bale Processor.

The Grain Tank is intended for use in conjunction with the Bale Processor.
The Grain Tank is intended for use in farming applications.
The Grain Tank is intended for the mixing of animal feed in farming applications.
The Grain Tank is intended for off road use only.

Any uses of the Grain Tank on the CFR 960 other than the above stated Intended Uses shall be considered misuse of the Grain Tank . This misuse shall included (but not limited to):

- Using the Grain Tank in non-farming applications
- Using the Grain Tank on public roads
- Metering of feeds or grains for seeding purposes
- Metering materials other than animal feed materials
- Using the auger to move materials when the tank is not connected to the CFR 960 Bale Processor

Always use the Grain Tank on the CFR 960 according to the instructions contained in this Operator's Manual and the safety and instruction decals on the machine.

Perform regular maintenance and repair to ensure that the Grain Tank on the CFR 960 operates safely and efficiently.

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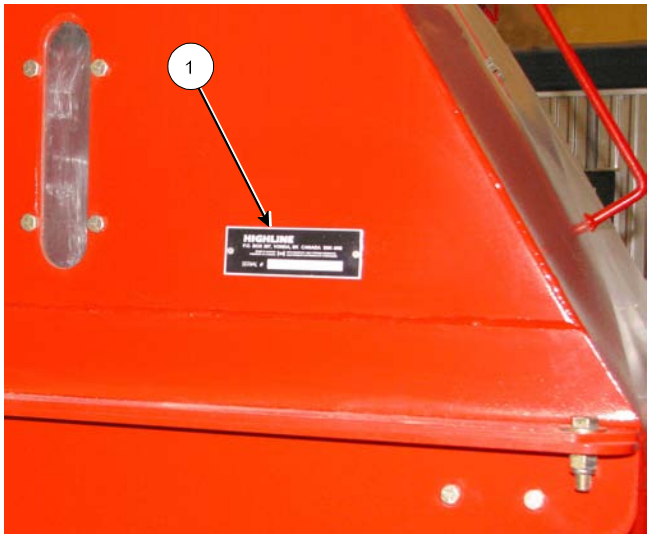
SERIAL NUMBER

Your serial number is found on the serial number plate (1) attached to the tank.



Serial Plate Location 215058C

It is important to record the serial number for proof of ownership and for any service or maintenance assistance.

Serial Number _____

Owner _____

Model _____

Date of Purchase _____

SAFETY SIGN-OFF FORM

Highline Manufacturing Ltd. follows the general Safety Standards specified by the American Society of Agricultural Engineers (ASAE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and/or maintaining the machine should read and clearly understand all Safety, Operating and Maintenance information presented in this manual.

Do not operate or allow someone to operate this equipment until this information has been reviewed. This information should be reviewed by all operator's before the season start-up.

This sign-off sheet is provided for record keeping to indicate that the person working with the equipment has read and understood the information in the Operator's Manual and has been instructed in the safe operation of the equipment.

Date	Employee's Signature	Employer's Signature

SAFETY ALERT SYMBOL

The Safety Alert Symbol means:

ATTENTION!
BECOME ALERT!
YOUR SAFETY IS INVOLVED!

The Safety Alert Symbol combined with a Signal Word alert to the presence of a hazard and the degree of possible injury.

Indicates an imminently hazardous situation that, if not avoided, WILL result in DEATH OR SERIOUS INJURY. The color is Red with White lettering.

Indicates a potentially hazardous situation that, if not avoided, COULD result in DEATH OR SERIOUS INJURY, and includes hazards that are exposed when guards are removed or unsafe practices. The color is Orange with Black lettering.

Indicates a potentially hazardous situation that, if not avoided, MAY result in MINOR INJURY. The color is Yellow with Black lettering.

GENERAL SAFETY

1. Ensure that anyone who is going to operate, maintain or work near the machine is familiar with the recommended operating, maintenance procedures and safety information contained in this manual and follows all the safety precautions.

2. In addition to the design and configuration of the equipment, hazard control and accident prevention are dependant upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of this equipment.

3. The CFR 960 Grain Tank shall not be operated without all the guards in place.

SAFETY DECALS

1. Keep the decals and signs clean and legible at all times.
2. Replace decals and signs that are damaged, missing or have become illegible.
3. Parts that have been replaced should display a current decal.
4. Decals are available from the Highline Parts Department.
5. Be familiar with the decals, the type of warning and the area or function(s) related to the area(s) that requires your awareness.

DO NOT CONTACT THE ROTATING AUGER

Keep fingers and hand out of the auger tube and chamber.
Never attempt to manually remove debris while the auger is rotating.
Contact with the rotating auger will cause serious injury or death.
Keep all auger guards in place.

DO NOT ENTER THE TANK

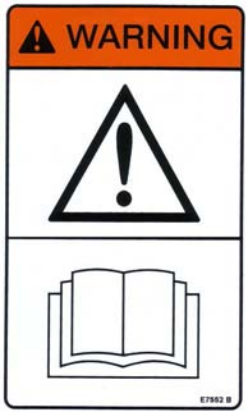
The tank is a confined space not meant to be entered.

DO NOT RIDE ON THE MACHINE

Riders may fall from the machine causing serious injury or death.

DO NOT PLACE HAND IN THIS AREA WHEN RAISING OR LOWERING THE LID

Serious injury could result if hands are placed in this clamping area.



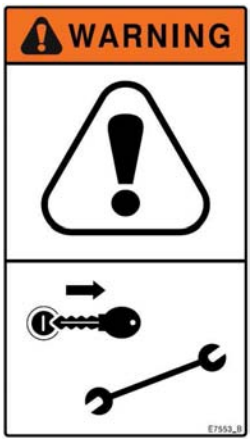
READ, UNDERSTAND, AND FOLLOW SAFETY INSTRUCTIONS

Read, understand and follow all instructions and safety messages included in this manual and on decals attached to the machine. These instructions and safety messages contain important information.

Allow only responsible, properly instructed individuals to operate and service the machine.

Failure to follow the instructions and safety messages in this manual and on the decals attached to the machine could result in serious injury or death.

Keep all safety and instruction decals in good condition. Replace any missing or damaged decals.

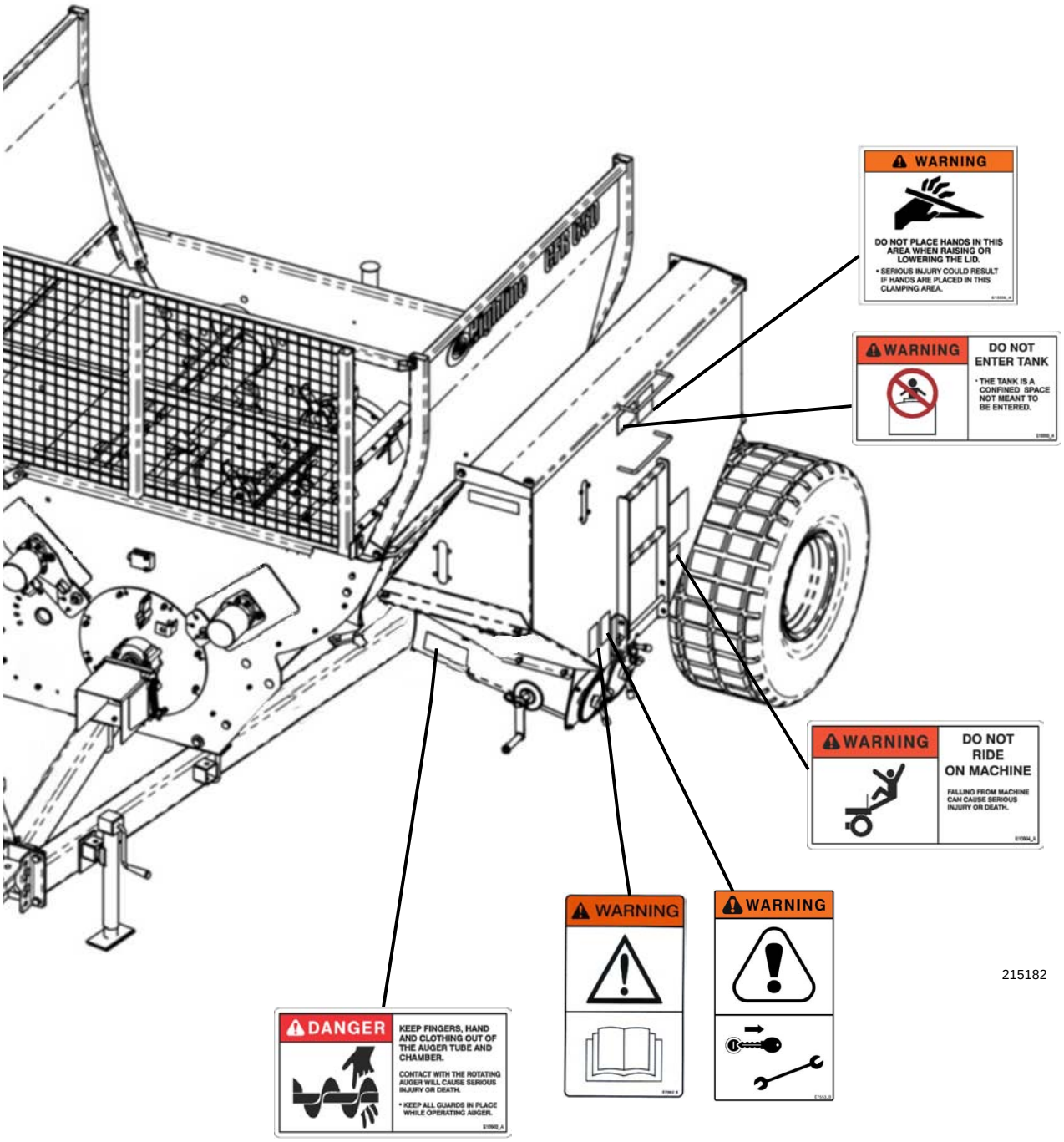


SHUTDOWN THE TRACTOR BEFORE DISMOUNTING TRACTOR

Shut down the tractor and remove the key before repairing, servicing or adjusting, lubricating or cleaning.
Set the park brake.
Disengage power take off.
Before servicing or adjusting, wait for all parts to stop rotating.
Keep guards in place and in good condition.

Never transport unit on highway with product in tank.

SAFETY DECAL LOCATIONS



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The following are Sample Feeding Rations for feeding with the CFR 960 and Grain Tank.
Adapted from www.agriculture.gov.sk.ca/livestock

Note: Consult a Nutritionist for specific recommendations.

Note: During periods of cold temperatures, increase feeding with additional grain at a rate of one (1) lb. (0.45 kg) per cow per day for every -5º C that the temperature is below -20º C at midday. For example, if the afternoon air temperature was -35º C, feed an additional three (3) lb. (1.36 kg) of grain per cow.

Low Quality Forage **Example Feeding Rations (Consult a Nutritionist for specific recommendations.)** Pounds (kg) per cow per day on an "as fed" basis			
	1,200 lb. (544 kg) Cow Mid-Pregnancy Early Winter Conditions No wind, -10º C Six months pregnant Calving mid March Calf birth weight 80 lbs (36.2 kg)	1,200 lb. (544 kg) Cow Late-Pregnancy Winter Conditions No wind, -20º C Eight months pregnant Calving mid March Calf birth weight 80 lbs (36.2 kg)	1,200 lb. (544 kg) Cow Lactating Early Spring Conditions No wind, -5º C First month lactaion Fourth lactation Calf birth weight 80 lbs (36.2 kg)
Cereal Straw + Oats or Barley	17 lbs + 9 lbs (7.7 kg + 4 kg)	17 lbs + 11 lbs (7.7 kg + 5 kg)	15 lbs + 16 lbs (6.8 kg + 7.3 kg)
Pea or Lentil Straw + Oats or Barley	21 lbs + 5 lbs (9.5 kg + 2.3 kg)	24 lbs + 8 lbs (10.9 kg + 3.6 kg)	18 lbs + 15 lbs (8.2 kg + 6.8 kg)
Slough Hay + Oats or Barley	26 lbs + 3 lbs (11.8 kg + 1.4 kg)	29 lbs + 3 lbs 13.1 kg + 1.4 kg)	21 lbs + 12 lbs (9.5 kg + 5.4 kg)

High Quality Forage **Example Feeding Rations (Consult a Nutritionist for specific recommendations.)** Pounds per cow per day on an "as fed" basis	
	1,200 lb. (544 kg) Cow Lactating Early Spring Conditions No wind, -5º C First month lactaion Fourth lactation Calf birth weight 80 lbs (32.6 kg)
Alfalfa Grass Hay + Oats or Barley	31 lbs + 3 lbs (14 kg + 1.4 kg)
Canola Hay + Oats or Barley	31 lbs + 9 lbs (14 kg + 4 kg)
Canola Silage + Oats or Barley	60 lbs + 9 lbs (27.2 kg + 4 kg)
Cereal Greenfeed + Oats or Barley	31 lbs + 3 lbs (14 kg + 1.4 kg)
Cereal Silage + Oats or Barley	58 lbs + 7 lbs (26.3 kg + 3.2 kg)
Clover Silage + Oats or Barley	56 lbs + 9 lbs (25.4 kg + 4 kg)
Pea or Lentil Hay + Oats or Barley	27 lbs + 7 lbs (12.3 kg + 3.2 kg)

	Dry Matter %	DE Mcal/lb DE(MJ/kg)	TDN %	Protein %	Ca %	P %	Mg %	K %	S %	S alt %	Vit. A KIU/K g	Cu mg/kg	Mn mg/kg	Zn mg/kg	Se mg/kg	I mg/kg
Feed Name																
ALF-GRASS HAY	87%	1.22 (11.3)	61.04	14.00	1.2	0.19	0.26	1.65	0.17	0.00	0	6	40	23	0.23	0.00
CANOLA HAY	85%	1.13 (10.4)	56.62	13.20	1.2	0.32	0.39	1.90	0.51	0.00	0	8	30	20	0.12	0.00
GRASS HAY	90%	1.24 (11.4)	62.26	10.70	0.5	0.17	0.17	1.32	0.18	0.00	0	6	75	24	0.21	0.00
GREENFEED	86%	1.20 (11.0)	60.13	10.90	0.5	0.17	0.17	1.50	0.14	0.00	6	45	20	0.13	0.00	0.00
LENTPEA HAY	86%	1.16 (10.7)	58.00	14.10	1.3	0.24	0.36	1.28	0.14	0.00	0	7	46	29	0.15	0.00
SLOUGH HAY	88%	1.06 (9.7)	53.00	7.80	0.4	0.12	0.14	1.27	0.19	0.00	0	5	33	20	0.11	0.00
CANOLA SILAGE	35%	1.18 (10.8)	59.00	14.00	1.1	0.32	0.21	1.90	0.51	0.00	0	5	33	27	0.12	0.00
CEREAL SILAGE	37%	1.23 (11.3)	61.50	11.10	0.5	0.27	0.27	1.60	0.22	0.00	0	5	33	27	0.08	0.00
CLOVER SILAGE	37%	1.15 (10.6)	57.74	14.80	1.4	0.22	0.27	1.59	0.19	0.00	0	8	27	27	0.11	0.00
CEREAL STRAW	89%	0.89 (8.2)	44.57	4.50	0.1	0.08	0.13	1.40	0.12	0.00	0	3	3	16	0.13	0.00
LENTPEA STRAW	89%	0.96 (8.8)	48.00	7.20	0.9	0.08	0.23	1.30	1.50	0.00	0	4	41	18	0.20	0.00
GRAIN BRLYOAT	89%	1.59 (14.6)	79.59	11.90	0.1	0.36	0.14	0.54	0.14	0.00	0	6	17	40	0.11	0.00
11% SCR PELL	90%	1.43 (13.1)	71.65	12.20	0.2	0.78	0.17	0.33	0.14	0.00	0	6	17	40	0.11	0.00
14%VMR PELLET	89%	1.47 (13.5)	73.65	15.50	0.9	0.33	0.22	0.82	0.13	0.28	22	39	89	172	0.33	3.30
32%PROT SUPP	90%	1.22 (11.2)	61.13	35.60	5.9	0.67	0.33	1.00	0.33	5.00	100	222	378	1667	1.67	13.30
ALFA SUNCURE	90%	1.24 (11.4)	62.13	16.60	1.7	0.20	0.29	1.62	0.21	0.00	0	5	37	21	0.21	0.00
CANOLA MEAL	92%	1.40 (12.9)	70.03	39.20	0.8	1.26	0.62	1.31	1.16	0.00	0	9	58	97	0.60	0.00
18:18 MINERAL	99%	0.00	0.00	0.00	18.2	18.18	0.00	0.00	0.00	0.00	505	3182	5303	10227	30.30	90.90
19:9 MINERAL	99%	0.00	0.00	0.00	19.2	9.09	0.00	0.00	0.00	0.00	202	505	1515	3030	10.10	90.90
LIMESTONE 1	99%	0.00	0.00	0.00	38.4	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0.00	0.00
TM SALT+SE	99%	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	97.47	0	2525	5050	7575	121.20	70.70
ADE 10 M	99%	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	10101	5	20	20	0.01	0.00

Adapted from www.agriculture.gov.sk.ca

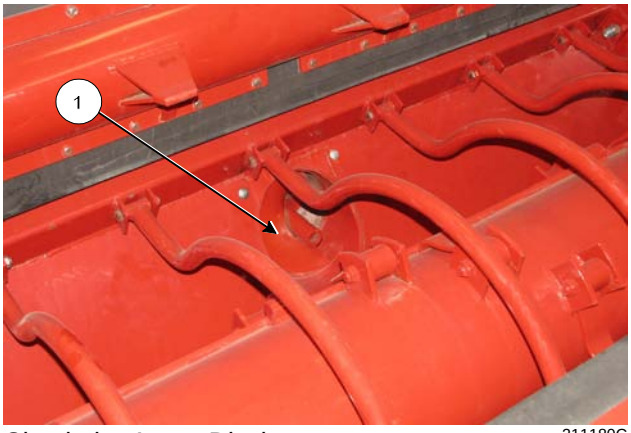
OPERATING THE GRAIN TANK

Check the Auger Discharge in the Processor Tub

1. Ensure the Grain Tank auger discharge (1) inside the processor tank is clear of any material that would block commodity from entering the processor.

2. Clear any blockages.

3. Check that the auger can rotate.



Check the Auger Discharge 211180C

Filling the Tank

Do not enter the tank.
The tank is a confined space not meant to be entered.

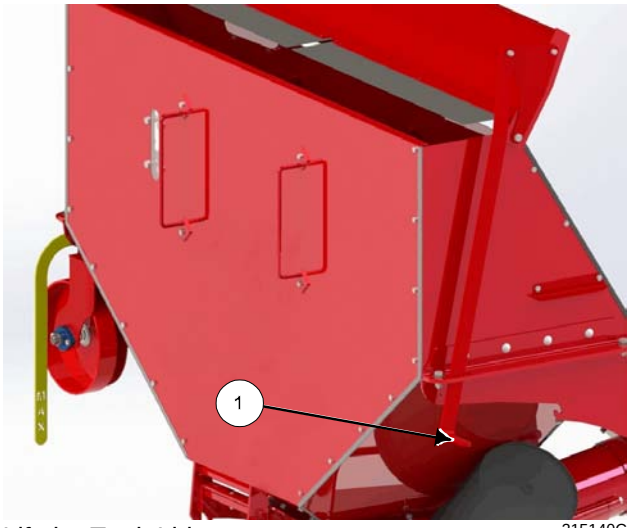
1. Lower the tank access ladder.

   - Lift the ladder up the slots.
   - Rotate the ladder and lower it.

Lower the Access Ladder 215139

2. Lift the lid of the tank.

   - Use the handle (1) to push the lid up.



Lift the Tank Lid 215140C

3. Fill the tank with the desired commodity.
   - The Grain Tank holds 30 bushels (1058 liters).

   - The tank can be filled with an auger or with bags of commodity.

Fill the Tank 215142

   - Only fill the tank to the top of the internal support braces.

Commodity in the Tank 215143

4. Close the tank lid.

    - Use the handle to lower the lid.

Close the Tank Lid 215144

5. Raise the ladder.

    - Slide ladder down to secure it into the storage slots.

Raise and Secure the Ladder 211165C

Ensure The Wheel Drive Sprocket Is Engaged

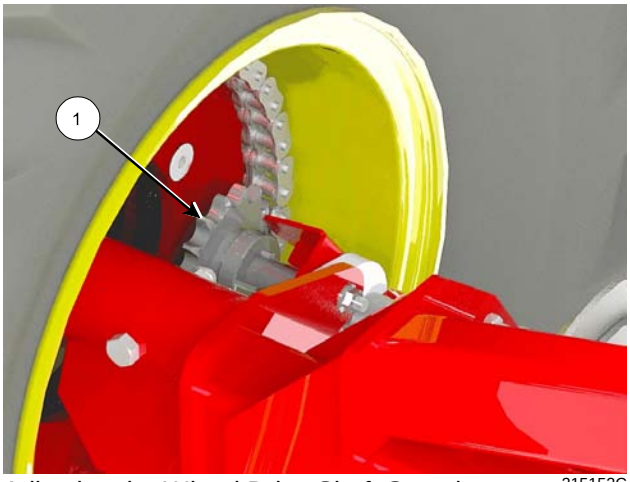
1. The drive shaft sprocket (1) at the wheel needs to be fully engaged in the wheel drive chain.

2. To tighten into the wheel drive chain:

   - Loosen the upper and lower bolts (2) on the inner and outer bearing mounts.

   - Rotate the drive shaft bearings around the upper bolts until the sprocket (1) is fully engaged into the wheel chain.

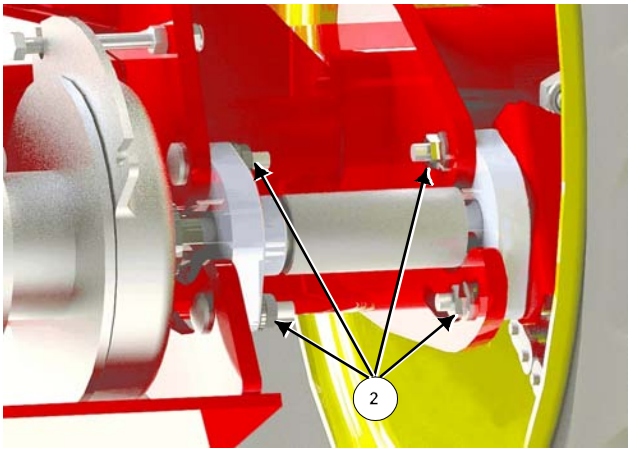
   - Tighten all the bearing bolts (2).



Adjusting the Wheel Drive Shaft Sprocket 215152C

Transporting - (Only for Long Distance or High Speed Transport)

- Disengage the drive shaft sprocket.
  - Loosen the upper and lower bolts (2) on the inner and outer bearing mounts.
  - Rotate the drive shaft and clutch to disengage the drive sprocket (1) from the wheel drive chain.
  - Tighten all the bearing bolts (2).

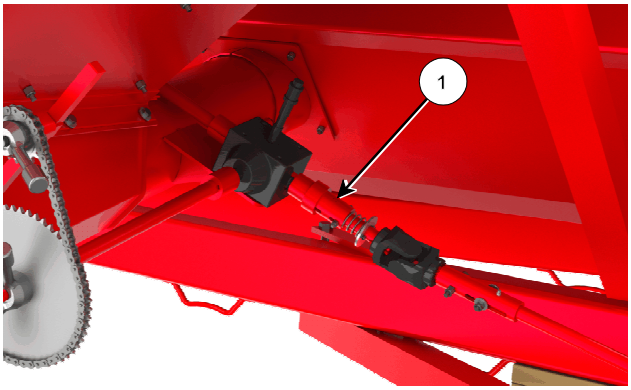


Check the One Way Clutch (1)

- When rotated in one direction, the clutch spring should allow the engagement dogs to pass over each other.

- When rotated the other direction, the spring should push the engagement dogs together to drive the auger.

- Check that the engagement dog next to the spring can slide on the shaft.



Check The One Way Clutch 213187C

Feeding With The Processor and The Grain Tank

Instructions:	**A Feeding Example:**
Step 1 Determine the feed sources that are intended to be used.	- Alfalfa Hay Grass and Barley Grain
Step 2 Determine the required amount of feed sources per cow. Some Sample Rations are included in Section 2 of the manual. Note: Waste is not accounted for in the sample rations. Make adjustments to account for waste.	From the sample ration chart for Alfalfa Hay Grass + Barley Grain : - 1,200 lb (544 kg) Cow - First month lactation - Early Spring Conditions, No wind, -5º C - Fourth lactation - Calf birth weight 80 lbs (36 kg) Use 31 lbs (14 kg) Hay + 3 lbs (1.4 kg) Barley
Step 3 Determine the weight of the bales being used.	Bale weight is 1200 lbs (544 kg)
Step 4 Determine the number of cattle intended to be fed.	Intend to feed 50 cows
Step 5 Determine how many bales are required. Multiply number of cows by lbs/cow = lbs. Divide lbs. by weight per bale = number of bales to feed number of cattle.	50 cows x 31 lbs (14kg) / cow = 1550 lbs (703 kg). 1550 lbs (703 kg)/ 1200lb (544 kg) per bale = 1.3 bales

Step 6 Determine the travel distance for the number of cattle intended to be fed. Multiply number of cows by 5 ft (1.5 m)/cow Note: Travel distance will vary with bale type, processor guard rod aggression setting and feed roller speed. Adjust these settings to achieve the desired output and travel distance. Divide the lbs/bale by the lbs/cow. Multiply by travel distance.		Note: There may be slight variations between the Imperial Units and the Metric units and the calculations because of the rounding of the decimal points. 50 cow x 5 ft (1.5 m) / cow = 250 feet (75 m) Travel how far with a single bale? A 1200 lb single bale at 31 lbs/cow for a cow every 5 feet will go for 194 feet: = 1200 lbs/bale / 31lbs /cow x 5ft/cow = 194 feet A 544 kg single bale at 14 kg/cow for a cow every 1.5 m will go 58.3 m = 544 kg/bale / 31lbs/cow x 5ft /cow =58.3 m)
Step 7 Select the Sprocket Set required for metering the desired grain output. Use the Sprocket Selection Chart: Use either: Method 1 - “Quick Reference Chart” OR Method 2 - “Commodity Calibration”		Use 3 lbs (1.36 kg) Barley per cow. Method 1: Quick Reference Chart: - Grain Type: Barley - Intended rate: 3 lbs (1.36 kg) per cow - Closest match: 2.5 lbs (1.2 kg) per cow - Sprockets: 16 Driving, 56 Auger

Step 8
Determine the Number of Bales that can be processed with a full Grain Tank.

- The Grain Tank holds 30 bushels (1057 litres).

  Multiply average bushel weight of commodity by 30 bushels (1057 L) = lbs. commodity (kg commodity) (See Average Weight per Bushel chart below.)

  Divide lbs. of commodity in tank by closest match of grain output per cow (from Sprocket Selection) = number of cows fed by grain tank

  Multiply number of cows fed by 5 feet = travel distance possible while feeding with grain output

  Number of bales to empty tank = travel distance/tank divided by travel distance/bale

Note: There may be slight variations between the Imperial Units and the Metric units and the calculations because of the rounding of the decimal points.

Barley
Note: In this example the barley is slightly more dense than what is listed in the chart below.

51 lbs/bushel x 30 bushels = 1,530 lbs.
1,530 lbs. / 2.5 lbs/cow = 612 cows
612 cows x 5 ft/cow = 3,060 feet travel distance

$$\frac{3{,}060 \text{ feet/tank}}{194 \text{ ft}} = 15.7 \text{ bales}$$

0.656 kg/ l x 1057 l = 693.4 kg
693.4 kg / 1.2 kg/cow = 578 cows
578 cows x 1.5 m/cow = 867 m
867 m/tank / 58.3 m/bale = 14.9 bales

Commodity Average Weight per Bushel - It is recommended to test and adjust for the density of the commodity.

Commodity		
Barley	48 lbs / bushel	0.618 kg/l
Oats	32 lbs / bushel	0.412 kg/l
Peas	60 lbs / bushel	0.772 kg/l
Wheat	60 lbs / bushel	0.772kg/l
Corn	56 lbs / bushel	0.721 kg/l

Procedures for Selecting the Sprocket Set for Metering

There are 2 methods for determining the sprocket set to be installed.

Method 1 - Quick Reference Chart

- This method can be used for the commodities listed on the Sprocket Selection Chart.
- This method does not account for variables such as density of the commodity.

1. Refer to the Calibration Chart below and also located on the Grain Tank.

2. Find the column with the commodity that will be fed.

   Note: If the commodity being metered is not listed in the chart, use "Method 2 - Commodity Calibration"

3. Look down the column to find the closest match to the intended feed rate in lbs/head.

4. Look across the row to find the size of the 2 sprockets required:
   - the driving sprocket
   - the auger sprocket

Note: A Metric Chart is available. Contact the Highline Service Dept.

lbs / head (5 feet per cow)

Barley	Oats	Peas	Wheat	Corn	Driving Sprocket	Auger Sprocket	Calibration Ratio
2.5	2.3	3.2	3.3	3.4	16	56	0.53
4.0	3.7	5.0	5.1	5.4	16	36	0.83
4.5	4.1	5.6	5.8	6.0	16	32	0.93
5.1	4.7	6.4	6.6	6.9	32	56	1.06
5.7	5.2	7.1	7.4	7.7	36	56	1.19
7.9	7.3	9.9	10.2	10.7	32	36	1.65
10.0	9.2	12.5	13.0	13.6	36	32	2.09
13.9	12.7	17.3	17.9	18.8	56	36	2.89
15.6	14.3	19.5	20.2	21.1	56	32	3.25
17.8	16.3	22.3	23.0	24.1	32	16	3.71
20.1	18.4	25.1	25.9	27.2	36	16	4.18
31.2	28.6	39.0	40.3	42.3	56	16	6.50

Method 2 - Commodity Calibration

- Use this method if using commodities not listed in the Sprocket Selection chart.
- This method accounts for variables such as density of the commodity.

1. Remove the auger chain.
   - Loosen the chain tightener quick turn handle (3) and slide down.

2. Remove the auger sprocket (4).
   - Loosen the quick turn handle and remove the sprocket.

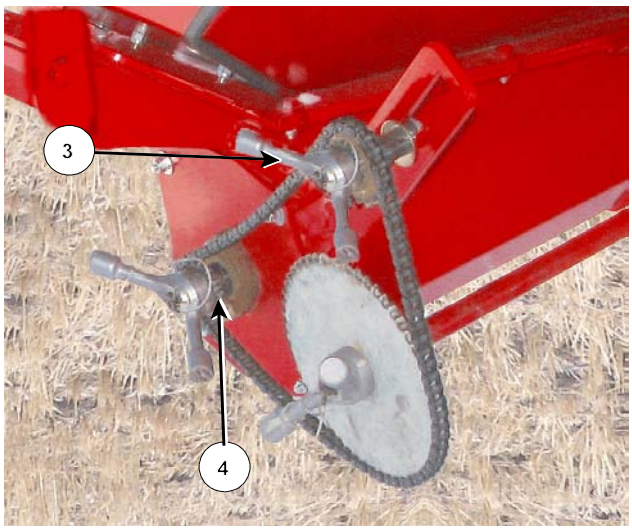
3. Install the auger crank handle.
   - Tighten with the quick turn handle.

4. Ensure the Grain Tank is full of commodity.

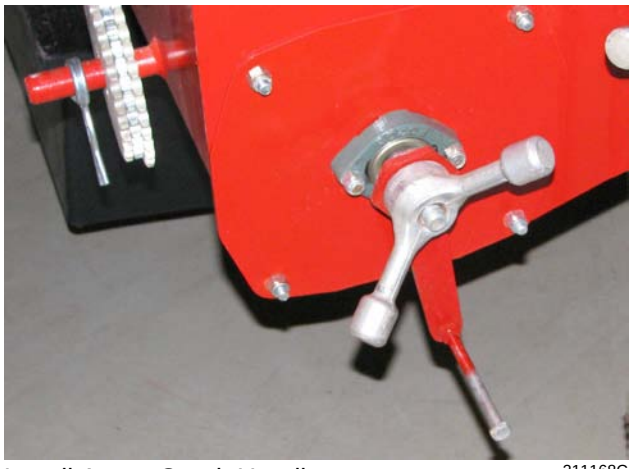
5. Ensure the auger is full and primed with commodity.

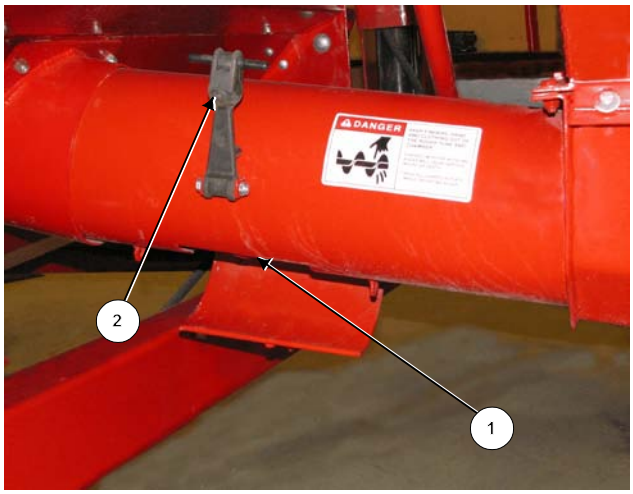
6. Open the calibration hole (1) located at the bottom of the auger by unlatching the keeper (2) and lowering the door.

7. Weigh and record the weight of the empty collection bucket.



Loosen the Chain. Remove Auger Sprocket 215145C


Install Auger Crank Handle 211168C



Open the Calibration Hole 215180C

8. Place the collection bucket under the calibration hole to collect the commodity.

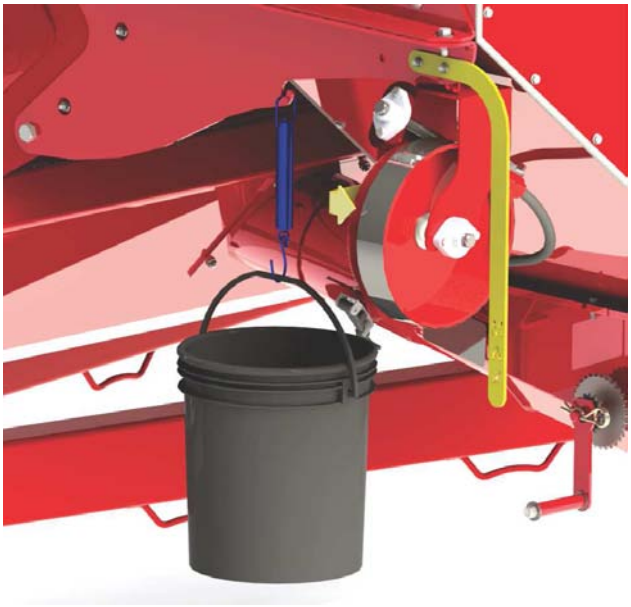
9. Turn the crank counter-clockwise 4 times.

Place Collection Bucket Under Calibration Hole 215153

10. Use the supplied scale to weigh the bucket with the collected sample. Record the weight.

11. Subtract the empty bucket weight to get the weight of the collected sample.

12. Divide the weight of the sample by 4 to determine the discharge weight per revolution of the auger.



Weigh Sample, Subtract Empty Bucket Weight 215175

13. Replace the cover of the calibration hole.

14. Determine the target calibration ratio by dividing the intended rate (lbs/head) by the discharge weight per revolution of auger.

Target Calibration Ratio = $\frac{\text{Intended Rate}}{\text{Weight/Revolution}}$

Replace the Cover on Calibration Hole 215176

15. Find the nearest calibration ratio from the Sprocket Selection chart.

16. Look across the row to find the Driving and Auger sprockets.

lbs / head (5 feet per cow)

Barley	Oats	Peas	Wheat	Corn
2.5	2.3	3.2	3.3	3.4
4.0	3.7	5.0	5.1	5.4
4.5	4.1	5.6	5.8	6.0
5.1	4.7	6.4	6.6	6.9
5.7	5.2	7.1	7.4	7.7
7.9	7.3	9.9	10.2	10.7
10.0	9.2	12.5	13.0	13.6
13.9	12.7	17.3	17.9	18.8
15.6	14.3	19.5	20.2	21.1
17.8	16.3	22.3	23.0	24.1
20.1	18.4	25.1	25.9	27.2
31.2	28.6	39.0	40.3	42.3

Driving Sprocket	Auger Sprocket	Calibration Ratio
16	56	0.53
16	36	0.83
16	32	0.93
32	56	1.06
36	56	1.19
32	36	1.65
36	32	2.09
56	36	2.89
56	32	3.25
32	16	3.71
36	16	4.18
56	16	6.50

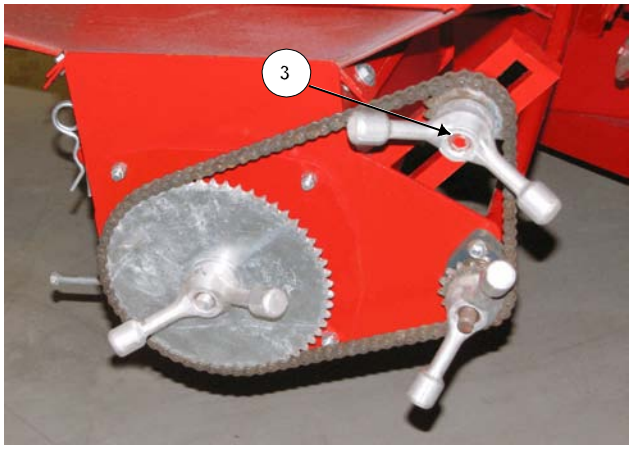
Example Using Method 2: Commodity Calibration

Grain Type:		Barley
Intended Rate:		6 lbs (2.72 kg)
Total weight of bucket + collected sample from 4 turns of auger		23 lbs (10.43 kg)
Subtract weight of collection bucket		2 .5 lbs (1.13 kg)
Weight of commodity		23 lbs (10.43 kg) - 2.5 lbs (1.13 kg) = 20.5 lbs (9.3 kg)
Weight per turn of auger = Weight/4 turns		20.5 lbs (10.43 kg)/4 turns = 5.13 lbs (2.32 kg)
Calculate Target Calibration Rate = Intended Rate / Weight per turn of auger		6 lbs (2.72 kg) / 5.13 lbs (2.32 kg) = 1.17
Nearest Calibration Ratio from Chart		1.19
Sprockets To Be Used		Driving Sprocket = 36 Auger Sprocket = 56

Install the Sprocket Set

1. Loosen the chain tightener sprocket carrier (3) by turning the quick turn handle.

   - Slide the sprocket carrier down the slide.

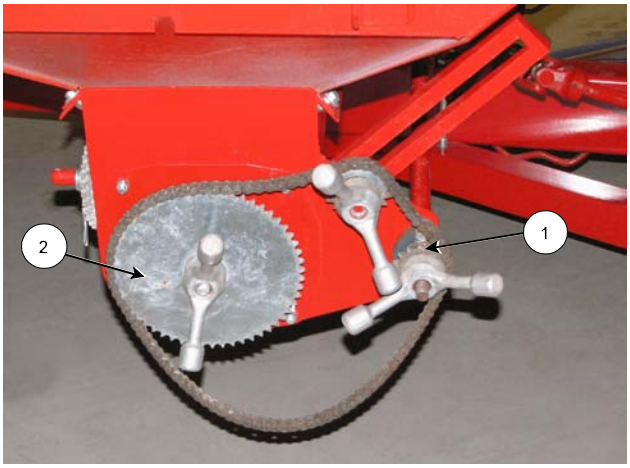


Loosen the Chain 215177C

2. Install the (1) driving sprocket onto the shaft from the gearbox. Tighten with the quick turn handle.

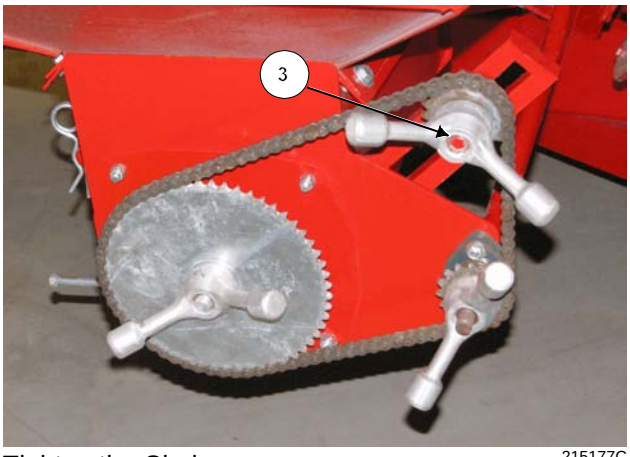
3. Install the auger sprocket (2) onto the end of the auger shaft. Tighten with the quick turn handle.

4. Place the drive chain over the sprockets and the chain tightener.



Install the Driving and Auger Sprocket 215178C

5. Slide the chain tightener (3) up the bar to tighten the chain. Tighten with the quick turn handle.



Tighten the Chain 215177C

Using the Distance Indicator

The installed Distance Indicator shows the distance traveled in feet.

1. The Distance Indicator located at the front of the tank is to give a measurement of the distance traveled forward while feeding livestock.
   - The one way clutch prevents the auger and distance indicator from turning while backing up.

2. When the Grain Tank clutch is engaged, the Distance Indicator will record the distance traveled in feet.

3. The metering from the Grain Tank is done in lbs/head based on an approximate animal spacing of 5 feet.

4. Example of using the Distance Indicator:

   40 cow x 5 ft (1.5 m) /cow = 200 feet (61 m) of travel.

   - For easy reference, there is a decal on the Grain Tank showing the Travel Distance in feet for the number of cows being feed.

5. Reset the Distance Indicator at the beginning of each feeding operation.
   - Turn the Distance Indicator by hand to zero.

6. For distances greater than 500 feet (152.4 m), the Distance Indicator will go past the zero point.
   - Add the amount past zero to 500 (152.4) for the total feet (meters) traveled.

Example:
- 1 revolution (500ft) + 50 ft = 550 feet
- 1 revolution (152.4m) + 15.2 m = 167.6 m

Note: A metric distance indicator label is available. Contact the Highline Service Department.

215174

Distance Indicator

Travel Distance in Feet (5 ft/cow)			
Number of cows	Travel Distance	Number of cows	Travel Distance
20	100	60	300
25	125	80	400
30	150	100	500
35	175	120	600
40	200	140	700
45	225	160	800
50	250	180	900

Metering With the Grain Tank

Note: Prior to metering, ensure the auger is not blocked. Do this through turning the auger sprockets by hand.
If the auger sprockets can be easily turned by hand, then the auger will turn when the clutch is engaged and forward travel begins.

1. When at the feeding site:

   - Set the Distance Indicator to zero
   - Turn on the Grain Tank clutch with the switch located in the tractor cab.

2. Engage the drive to the flail drum to begin processing the bale.

3. Begin driving forward.

4. As the processor moves forward the Grain Tank will meter out the commodity into the material from the processor.

   - The one way clutch prevents the auger and distance indicator from turning while backing up.

   - The rate of commodity metered will be according to the sprocket set installed.

   - The sprocket set is determined by the “Quick Reference Chart Method” or the “Commodity Calibration Method” (see above “Selecting the Sprocket Set for Metering”).

5. The maximum width of the machine is indicated by the yellow bar with “MAX”.

6. When the bale is finished, turn off the Grain Tank clutch to prevent metering into the processor tub.

Clutch Switch Box 211174

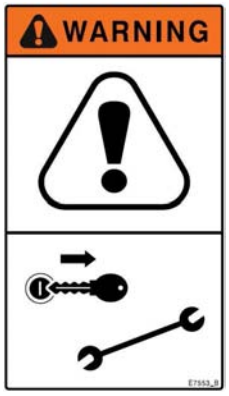

Metering 215179

Maximum Width of the Machine 215181

4.0 MAINTAINING THE GRAIN TANK

Shut down the tractor and remove the key before repairing, servicing, adjusting, lubricating or cleaning.

Wait for all parts to stop rotating. Disengage the PTO and driveline.

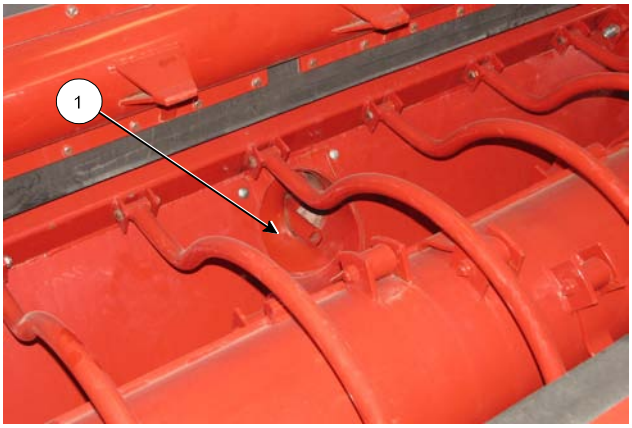


Do not enter the tank or allow anyone to enter the tank. The tank is a confined space not meant to be entered.

Do not contact the rotating auger. Keep fingers and hand out of the auger tube and chamber.

Clear The Auger Discharge In The Tub

1. Ensure the Grain Tank auger discharge (1) inside the processor tank is clear of any material that would block commodity from entering the processor.
2. Clear any blockages.
3. Check that the auger can rotate.



Clear Auger Discharge Inside Tub 211180C

Clearing Blocked Auger Flighting

Keep fingers and hand out of the auger tube and chamber.

Contact with the rotating auger will cause serious injury or death.

1. Loosen the clamp on the auger calibration door (2).
2. Lower the door (1) from the auger chamber to allow the commodity to be caught in a pail.
3. Rotate the auger clockwise and counter-clockwise to move commodity out of the auger flighting.
   - Clean out any commodity put into the tub by rotating the auger.
4. Use compressed air to blow out the auger.

Use appropriate personal safety equipment if using compressed air.

5. Raise the auger calibration door (1) and fasten in place with the clamp.
6. Fasten the clamp on the auger calibration door (2).

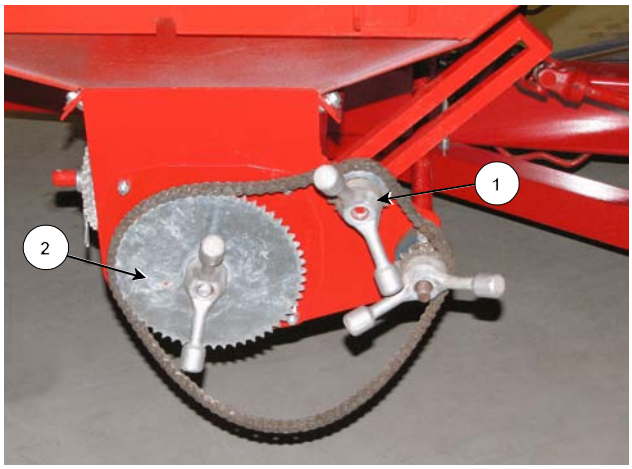
Auger Tube and Chamber Cleanout 215153C

Removing Commodity from the Tank

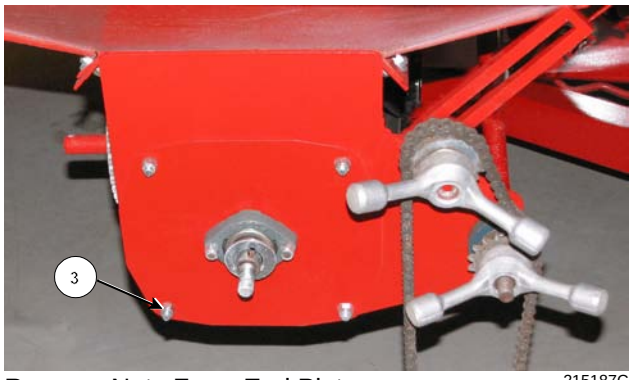
Commodity remaining in the tank can be removed through the auger end plate.

Do not enter the tank. The tank is a confined space not meant to be entered.

1. Loosen the chain tightener (1) by turning the quick turn handle.
2. Slide the tightener down the slide bar.
3. Remove the drive chain from the auger sprocket.
4. Remove the auger sprocket (2) by loosening the quick turn handle.
5. Remove the 4 nuts (3) holding the auger end plate.
6. Place a collection bucket or hopper under the auger end plate to collect commodity.
7. Pull the auger flighting out of the auger tube to allow the commodity to empty into the collection bucket or hopper.



Loosen and Remove the Drive Chain 215178C2



Remove Nuts From End Plate 215187C

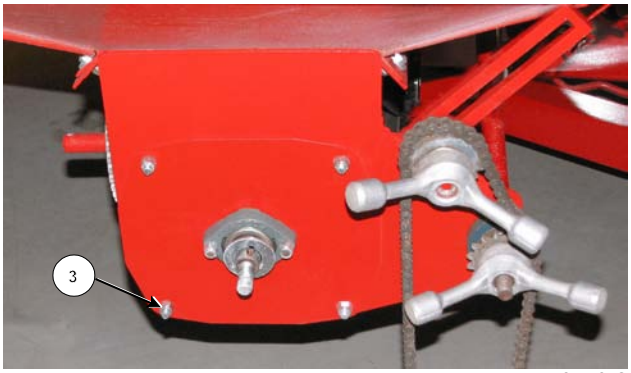
Pull Out Auger To Drain Tank 211178

8. A compressed air supply can be used to blow out commodity from the cavities.

Use appropriate personal safety equipment if using compressed air.

9. Slide the auger into the auger tube.

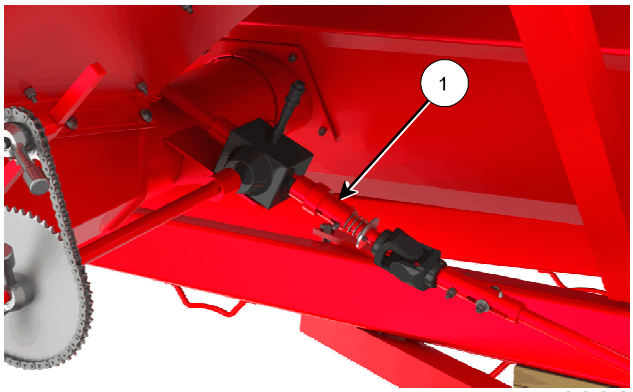
10. Fasten the auger end plate to the auger chamber with the 4 nuts (3).



Fasten the Auger End Plate 215187C

Check The One Way Clutch

- When the clutch (1) is rotated in one direction, the clutch spring should allow the engagement dogs to pass over each other.
- When rotated the other direction, the spring should push the engagement dogs together to drive the auger.
- Check that the engagement dog next to the spring can slide on the shaft.



Check The One Way Clutch 213187C

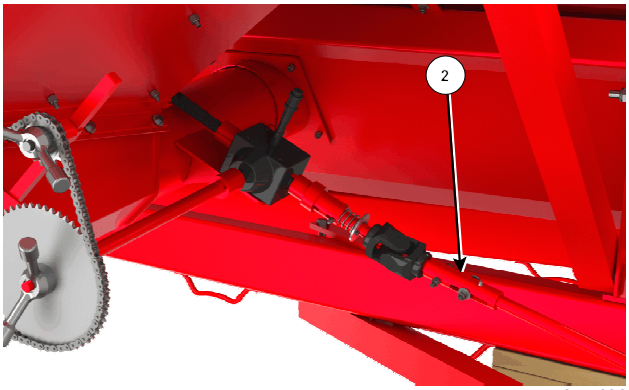
Electric Clutch

- Remove debris from the electric clutch.
- No other maintenance is required.
- If the friction disk wears out the clutch should be replaced.

Remove Debris from Electric Clutch 211188

Check The Slip Shaft

- Check that the slip shaft (2) near the upper gearbox will slip to accommodate for any movement of the axle.
    - Adjust the bolt to allow the shaft to slip.

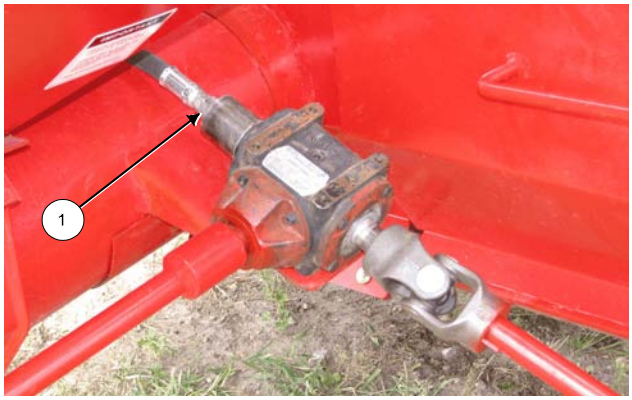


Check The Slip Shaft 215188C

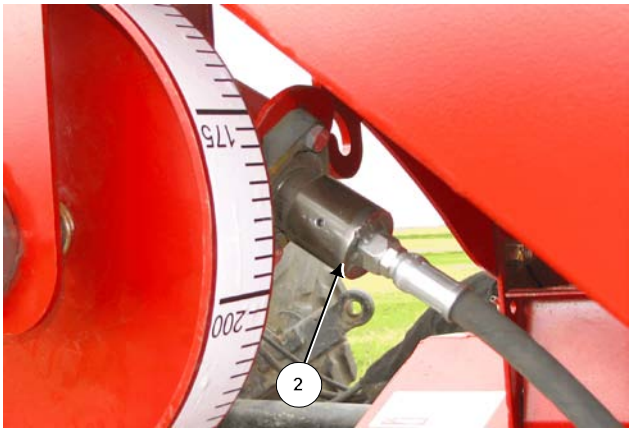
Check the Condition of the Distance Meter Flexible Drive

The flexible drive is a hydraulic hose. (It does not have any hydraulic oil in it.)
The hose is used to transfer the rotation from the upper gearbox to the distance meter drive.

- Check that the connection to the upper gearbox shaft (1) is tight.
- Check the condition of the hose.
- Check that the connection to the distance meter shaft (2) is tight.



Distance Meter Flexible Drive 212117C



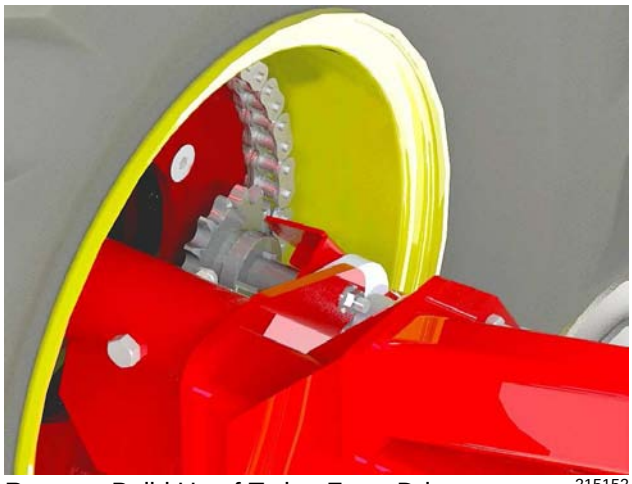
Distance Meter Flexible Drive Connection 212118C

Remove Twine Buildup

Remove twine that has built up around the spindle, shafts, gears or chains.

Twine build up can cause bearing failure. It can also interfere with the operation of the tank drive system.

- Use a sharp knife to cut the twine.
- Be careful to not damage the seals of the bearings.
- Remove the twine.



Remove Build Up of Twine From Drive 215152

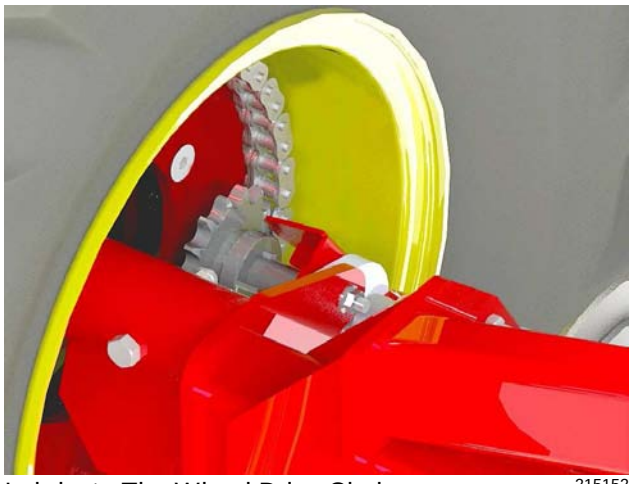
Lubrication - Oil

Every 10 Hours

- **Lubricate the Wheel Drive Chain**

Lubricate the double row wheel drive chain every 10 hours. Use a quality chain oil.

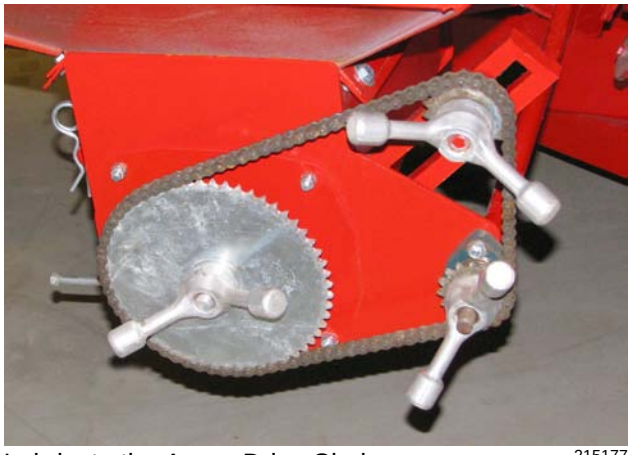
Note: Remove the chain from the large sprocket for long distance transport or high speed transport.



Lubricate The Wheel Drive Chain 215152

- **Lubricate the Auger Drive Chain**

Lubricate the auger drive chain every 10 hours. Use a quality chain oil.



Lubricate the Auger Drive Chain 215177

- **Visually Inspect the Upper and Lower Gearboxes**

  - Visually check for indications that the oil level may be low.

  - Look for oil leaks, leaking seals, damage to the gearbox or excessive noise from the gearbox.

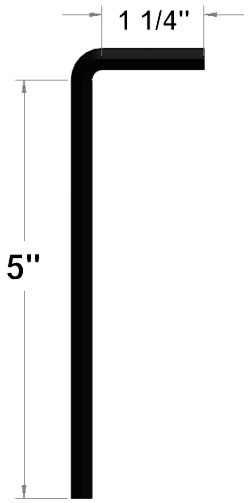
  - If there are indications of possible low oil levels, follow the instructions for “Check the Oil Levels In Gearboxes.”

Twice Yearly

- **Check the Oil Level in the Upper and Lower Gearboxes.**

There are 2 gearboxes on the Grain Tank drive. Check the oil level in both the upper and lower gearboxes.

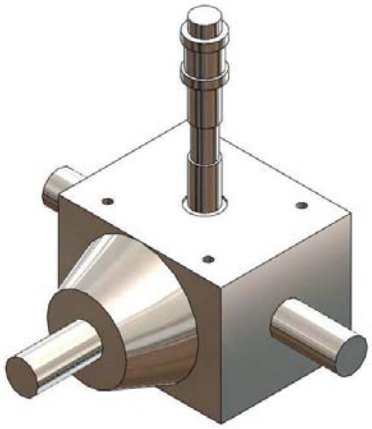
- Make an oil measuring device from clean stiff wire about 6 1/4" long.
  - Bend the wire as shown.



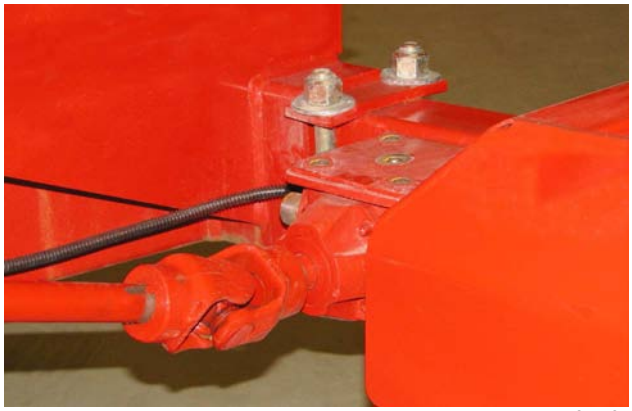
Measure Device 212056

- Remove all debris from the top of both gearboxes to prevent contamination.

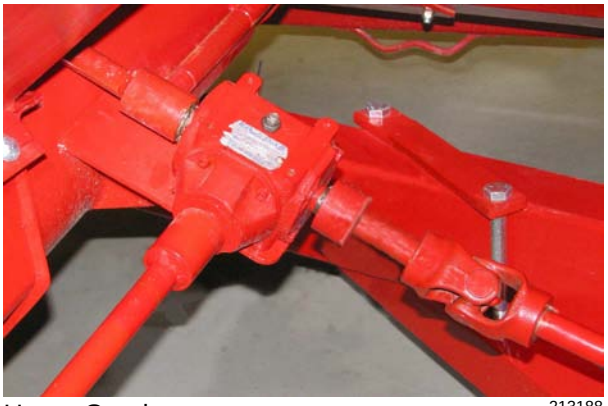
- Remove the breather tube from the top of both gearboxes.



Breather on Gearbox 212057

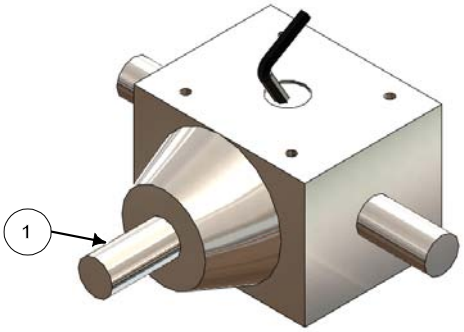


Lower Gearbox 211184



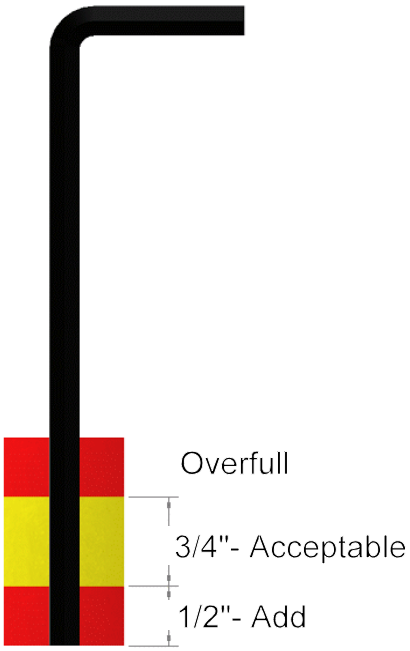
Upper Gearbox (Breather Tube Removed) 213188

- Insert the measuring device into the top opening at approximately a 30 ° angle in line with shaft 1.



Measure Oil Level 212058C

- Remove the measuring device from the gearbox.
- Measure the amount of oil from the end of the device.
- Compare to the Oil Level Guide.
- Add or remove oil as needed.
  - If oil needs to be removed, drain from the bottom plug of the gearbox.

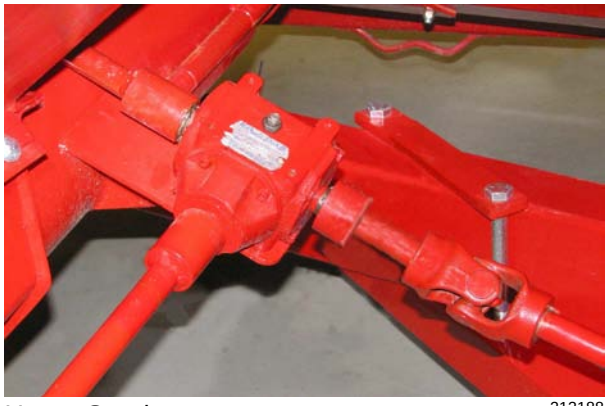


Oil Level Guide 212059

Every Second Year

- **Change the Oil in the Upper and Lower Gearboxes.**

  - Drain the oil by removing the bottom plug.
  - Fill through the top plug by removing the breather tube.
  - Use 80W90 gear oil.



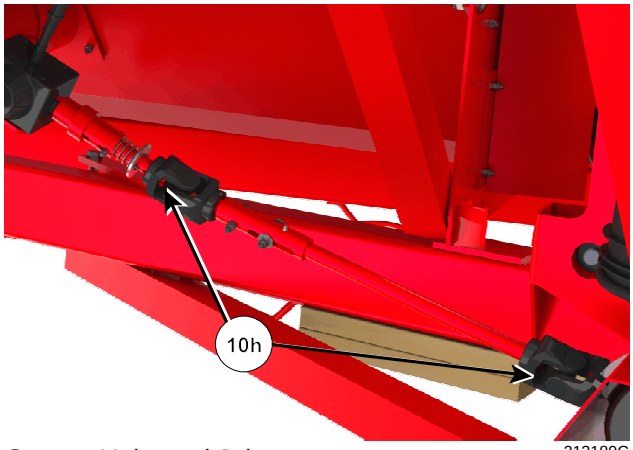
Upper Gearbox (Breather Tube Removed) 213188

Lubrication - Grease

Grease all fittings with a quality lithium complex, extreme pressure NLGI Grade 2 grease.

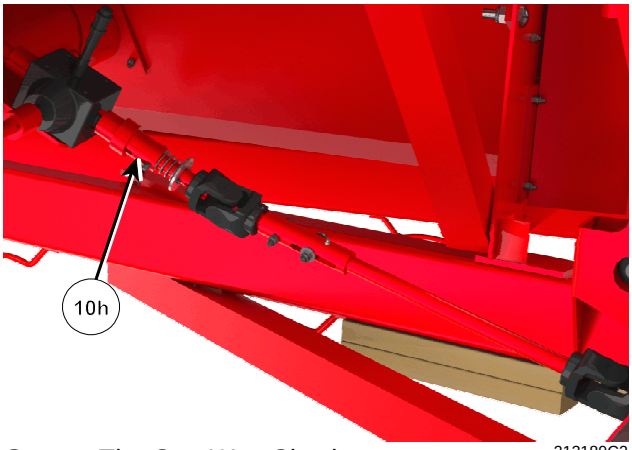
Every 10 Hours

- Grease the auger drive upper and lower universal joints.



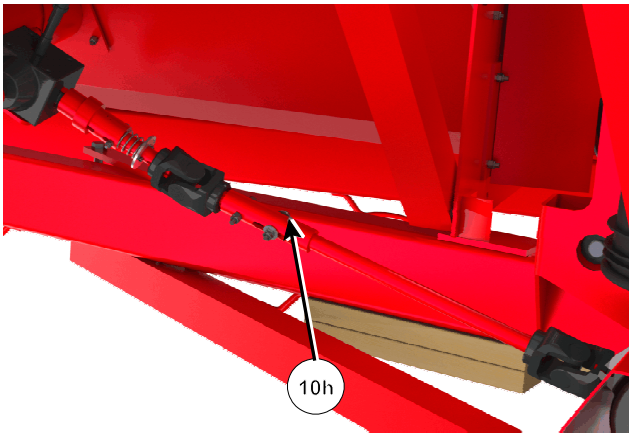
Grease Universal Joints 213189C

- Grease the auger drive one way clutch.



Grease The One Way Clutch 213189C2

- Grease the slip shaft near the upper gearbox.



Grease The Slip Shaft 213189C3

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Troubleshooting

Symptom	Problem	Solution
Not Metering	Drive wheel sprocket not engaged in drive wheel chain	Rotate the clutch bearings to move the sprocket into the drive wheel chain.
	Auger drive chain is loose or not engaging the sprockets	Tighten the auger chain. Move up the auger chain tightener and fasten.
	Electric clutch not turned on	Turn clutch on. Use switch in tractor cab.
	Electric clutch slipping	Replace the clutch.
	Electric clutch not activating	Check electrical connections to the clutch.
	Auger packed solid with commodity	Remove packed commodity from the tank and auger.
	Auger discharge in tub is blocked	Clear the auger discharge.
	One way clutch not engaging	Clean one way clutch. Grease the clutch.

Symptom	Problem	Solution
Auger chain falls off	Chain tightener not fastened securely	Slide the chain tensioner up and tighten with the quick turn handle.
	Driving with electric clutch turned on but not processing a bale. Auger meters into the processing tub against a bale until the auger tube becomes packed and not able to turn.	Turn electric clutch off while driving but not processing. Clear auger tube and auger discharge in tub.
	One way clutch operates auger when backing up	Clean one way clutch. Grease the clutch.

Symptom	Problem	Solution
Distance indicator not rotating while grain is being metered	Distance indicator drive sprocket is not engaging worm gear on the drive shaft	Loosen the bearings on the distance indicator and rotate around the bearing top bolt to engage the sprocket into the drive shaft worm gear.

Symptom	Problem	Solution
Commodity left over	Auger sprockets are incorrect for desired output	Check that the correct sprockets are mounted onto the auger and the auger drive.
		Check the Sprocket Selection. Use Method 2 “Commodity Calibration” to verify commodity metering.
	Low metering rates	Refer to Section 3 - “Feeding With The Processor and The Grain Tank. Calculate Step 8 “Determine the Number of Bales that can be processed with a full Grain Tank.”
		Use the Highline HAY (High Animal Yield) software on www.highlinemfg.com

Symptom	Problem	Solution
Commodity runs out before expected	Auger sprockets are incorrect for desired output	Check that the correct sprockets are mounted onto the auger and the auger drive.
		Check the Sprocket Selection. Use Method 2 “Commodity Calibration” to verify commodity metering.
	High metering rates	Refer to Section 3 - “Feeding With The Processor and The Grain Tank. Calculate Step 8 “Determine the Number of Bales that can be processed with a full Grain Tank.”
		Use the Highline HAY (High Animal Yield) software on www.highlinemfg.com

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Specifications

Total Width Mounted on CFR 960:	131 1/4" (3.33 m)
Maximum Capacity:	30 bushels (1058 liters)

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Highline New Equipment Limited Warranty Policy

One (1) Year / 12 Months - Parts and Labour

Highline Mfg. Ltd. (hereinafter "Highline") warrants this new product of Highline's manufacturer to be free from defects in material and workmanship, under normal use and service for one (1) full year after initial purchase/retail sale. Highline will warrant its product for one (1) year parts and labour, if performed by a qualified Dealer. This Limited Warranty shall apply only to complete machines of Highline's manufacture. Parts are covered by a separate Limited Warranty.

EQUIPMENT AND ACCESSORIES NOT OF HIGHLINE'S MANUFACTURE ARE WARRANTED ONLY TO THE EXTENT OF THE ORIGINAL MANUFACTURER'S WARRANTY AND SUBJECT TO THEIR ALLOWANCE TO HIGHLINE ONLY IF FOUND DEFECTIVE BY SUCH MANUFACTURER.

During the Limited Warranty period specified above, any defect in material or workmanship in any warranted item of Highline Equipment not excluded below shall be repaired or replaced at Highline's option without charge by any authorized independent Highline Dealer. An authorized Dealer must make the warranty repair or replacement. Labour in accordance with Highline's labour reimbursement policy. Highline reserves the right to supply remanufactured replacement parts as it deems appropriate.

RETAIL PURCHASER RESPONSIBILITY

This Limited Warranty requires proper maintenance and periodic inspections of the Equipment as indicated in the Operator's Manual furnished with each new Equipment. The cost of routine or required maintenance and services is the responsibility of the retail purchaser. The retail purchaser is required to keep documented evidence that these services were performed. This Highline New Equipment Limited Warranty may be subject to cancellation if the above requirements are not performed.

EXCLUSIONS AND LIMITATIONS

The warranties contained herein shall NOT APPLY TO:

1. Any defect which was caused (in Highline's sole judgement) by other than normal use and service of the Equipment, or by any of the following:
    a. accident
    b. misuse or negligence
    c. overloading
    d. of reasonable and proper maintenance
    e. improper repair or installation
    f. unsuitable storage
    g. non-Highline approved alteration or modification
    h. natural calamities
    i. vandalism
    j. parts or accessories installed on Equipment which were not manufactured or installed by Highline authorized Dealers
    k. the elements
    l. collision or other accident.
2. Any Equipment whose identification numbers or marks have been altered or removed.
3. Any Equipment which any of the required or recommended periodic inspection or services have been performed using parts not manufactured or supplied by Highline or meeting Highline Specifications including, but without limitation, lubricants (oil, grease), belt lacings, and hydraulic fluids.
4. Any Equipment used in demonstrations not performed by a Highline Dealer. Warranty will be at the discretion of Highline for all other demonstration warranty.
5. New Equipment delivered to the retail purchaser in which the warranty registration has not been completed and returned to Highline within thirty (30) days from the date of purchase.
6. Any defect that was caused (in Highline's sole judgement) by operation of the Equipment not abiding by standard operating procedures outlined in the Operator's Manual.
7. Tire Limited Warranties and support are the responsibility of the respective product's manufacturer.
8. Transportation costs, if any, of transporting to the Highline Dealer.
9. In no event shall Highline's liability exceed the purchase price of the product.
10. Highline shall not be liable to any person under any circumstances for any incidental or consequential damages (including but not limited to, loss of profits, out of service time and damage to equipment which this equipment may be attached) occurring for any reason at any time.
11. Diagnostic and overtime labour premiums are not covered under this Limited Warranty Policy.

12. Depreciation damage caused by normal wear, lack of reasonable and proper maintenance, failure to follow operating instructions, misuse, and/or lack of proper protection during storage.
13. Accessory systems and electronics not of Highline's manufacture are warranted only to the extent of such manufacturer's respective Limited Warranty if any.
14. Wear items which are listed by product group below:

COMMON WEAR ITEMS

Roller chain, sprockets, clutches, shear bolts, clutch components, chains, gearbox housings bolts/torqued parts, flails, feed roller belting, coupler chain, DRV couplers, bogie wheels, apron tines and hoses, blades and blade pans, blade bolts and nuts, skid shoes, chain guards, clutches and clutch components.

PARTS WARRANTY

Parts replaced in the warranty period will receive the balance of the one year New Equipment Limited Warranty. Replacement parts after the original machine warranty are warranted to be free from defects of material for ninety (90) days or the part will be repaired or replaced, without labour coverage for removal and reinstallation.

EXCLUSION OF WARRANTIES

UNLESS OTHERWISE REQUIRED BY LAW, AND EXCEPT FOR THE WARRANTIES EXPRESSLY AND SPECIFICALLY MADE HEREIN, HIGHLINE MAKES NO OTHER WARRANTIES, AND ANY POSSIBLE LIABILITY OF HIGHLINE HEREIN UNDER IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANT ABILITY OR FITNESS FOR A PARTICULAR PURPOSE. HIGHLINE RESERVES THE RIGHT TO MODIFY, ALTER AND IMPROVE ANY PRODUCT WITHOUT INCURRING ANY OBLIGATION TO REPLACE ANY PRODUCT PREVIOUSLY SOLD WITH SUCH MODIFICATION. NO PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY, OR TO ASSUME ANY ADDITIONAL OBLIGATION ON HIGHLINE'S BEHALF.