



GLEANER[®]

2016 Quick Reference Guide

S67/S68/S96 • S77/S78/S97 • S88/S98 Models

It is YOUR responsibility to read and understand the safety section in your Operator's Manual and the manual for all attachments before operating your machine. Remember YOU are the key to safety. Good safety practices not only protect you, but also the people around you.

Study the features in your Operator's Manual and make them a working part of your safety program. Keep in mind that the safety section in your Operator's Manual is written only for this type of machine. Practice all other usual and customary safe working precautions, and above all REMEMBER - SAFETY IS YOUR RESPONSIBILITY. YOU CAN PREVENT SERIOUS INJURY OR DEATH.



Contents

Combine Setup	1
Cereal Grain - Wheat, Oats, Barley	1
Milo - Grain Sorghum	2
Dry Corn (< 20% moisture)	2
High Moisture Corn (> 24% moisture)	3
Soybeans	4
Canola/Rapeseed	5
Millet	5
Edible Beans	6
Sunflowers	7
Flax	7
Grass Seed (Bluegrass, Bentgrass)	8
Alfalfa	9
Clover	10
Rye	10
Troubleshooting	11
Header	11
Feed conveyor	16
Processor	17
Grain quality	19
Grain loss	23
Loss Calculation	25
“Quick check” for combine grain loss	25
<i>Spreading discharge</i>	25
“Next step” for combine grain loss	25
<i>Rotor loss</i>	26
<i>Shoe loss</i>	26
“Advanced” grain loss calculation procedure	27
<i>Advanced rotor loss</i>	27
<i>Advanced shoe loss</i>	27
Standard Payable Moisture & Density Chart	28

Combine Setup

Cereal Grain - Wheat, Oats, Barley

Initial Combine Setup

Crop	Rotor RPM	Concave Setting *	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
Wheat	750	0.1" - 0.2"	3 - 6	0.75" (19 mm)	0.375" (10 mm)	Fast	Solid
Oats	600	0.1" - 0.2"	3 - 6	0.75" (19 mm)	0.375" (10 mm)	Fast	Solid
Barley	400 - 600	0.1" - 0.2"	3 - 6	0.75" (19 mm)	0.375" (10 mm)	Fast	Solid

* - As read on the Tyton™ terminal on the S9 Series or EIP on S8 and S7 Series.

Initial Header & Header Drive Setup

- Cutterbar locked up on flex headers.
- Variable speed header drive in slowest position.
- Right-hand pivot drive belt positioned on large countershaft drive sheave.
- Left separator cage cover should be required for all cereal crops.

Straw Chopper

- Position chopper drive belt so chopper is operating at fast speed.

Tips

- Filler bars may be required for hard threshing cereals to eliminate white caps. Order **Concave Filler Kit #700958588** from your dealer.
- If white caps persist, dealer should contact Technical Service Support for additional kits required.
- A narrow wire-4 section concave option may be ordered from the factory in lieu of the All Crop concave or from AGCO Parts for areas predominately harvesting harder threshing cereals such as spring wheat and canola. Order **Narrow Wire Concave #71469348** from your dealer.

Milo - Grain Sorghum

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
450-600	0.2" - 0.4"	3 - 6	0.625" (16 mm)	0.313" (8 mm)	Fast	Solid

- Set concave to stem thickness just below head for starting point.
- Run in low range of rotor gearbox for greater torque if possible (S8 Series has greater range to provide ability to run on low side of gearbox).

Initial Header & Header Drive Setup

- Lock up cutterbar on flex headers.
- Variable speed header drive in slowest position.
- Right-hand pivot drive belt positioned on large countershaft drive sheave.
- Left separator cage cover should be required for all cereal crops.

Straw Chopper

- Position chopper drive belt so chopper is operating at fast speed.

Dry Corn (< 20% moisture)

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
250-300	0.6" - 0.8"	5 - 7	0.625" (16 mm)	0.4" (11 mm)	Slow	Solid

- Feed chains at slow speed for corn

Initial Header & Header Drive Setup

- Variable speed header drive hose and coupler should be connected.
- Right-hand pivot drive belt positioned on small countershaft drive sheave.

Tips

- Use round end corn chaffer for higher moisture corn.
- A grain chaffer is optional, but corn chaffer is recommended.
- Removal of lower sieve will increase capacity in higher yielding corn.

High Moisture Corn (> 24% moisture)

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
250-300	0.6" - 0.8"	5 - 7	0.625" (16 mm) *	Remove lower sieve	Slow	Solid

- * IMPORTANT: Set chaffer to achieve acceptable grain bin sample. Opening chaffer can be done anytime. However, due to the nature of the electronics, closing the chaffer should be done at the end of the field after cleanout by completely opening and then closing to the lower number that you desire and then adjusting up to the desired chaffer setting.
- Feed chains at slow speed for corn.

Initial Header & Header Drive Setup

- Variable speed header drive hose and coupler should be connected.
- Right-hand pivot drive belt positioned on small countershaft drive sheave.

Tips

- Use round end corn chaffer for higher moisture corn.
- Use grain chaffer for drier corn.
- Removal of lower sieve will increase capacity in higher yielding, high moisture corn.
- In high moisture corn with wet green leaves, start at 350 RPM to optimize performance and eliminate any chance for plugging of processor with crop residue which could result in rotor loss. Increase in 20 RPM increments up to a maximum of 400 RPM in these wet green leaves for desired performance.

Soybeans

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
400	0.2" - 0.4"	5 - 7	0.75" (19 mm)	0.375" (16 mm)	Fast	Perf.

Initial Header & Header Drive Setup

- Release and adjust cutterbar on flex headers. Adjust header height control.
- Variable speed header drive in slowest position.
- Right-hand pivot drive belt positioned on large countershaft drive sheave.

Tips

- Round-end corn chaffer can remain in combine for soybeans however, if grain quality needs to be improved, standard chaffer is available.
- Left-hand separator cage cover and chopper floor cover are required for soybeans.
- Retractable stationary knives should be left in the lower position in soybeans. If additional chop of residue is required, the stationary knives should be partially raised up in small increments to avoid excessive power requirements. The new 24-knife chopper available on S7 Series, standard on all S8 Series and S9 Series, will provide adequate chop in most cases.

Canola/Rapeseed

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
400-600	0.2" - 0.4"	3 - 5	0.75" (19 mm)	0.375" (9 mm)	Fast	Solid

Initial Header & Header Drive Setup

- Variable speed header drive (if equipped) in slowest position for draper headers and direct cut headers.
- Right-hand pivot drive belt positioned on large countershaft drive sheave.
- Feed chains (front and rear) should be in high position and fast speed.
- Angle pickup header down so pickup attachment and pickup header auger can breakup clumps of crop material and more evenly feed the feed chains. Lower wind board accordingly.

Tips

- During day in dry conditions, slow the rotor down; at night when conditions are damp speed rotor up.
- For pickup headers, speed up variable-speed header drive (if equipped) by 50%.
- Feeder house optimization instructions for R Series, S7 and S8 Series are available at your Gleaner dealer to increase capacity in canola.

Millet

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
525	0.2" - 0.3"	2 - 4	0.625" (16 mm)	0.1875" (5 mm)	Fast	Solid

- While you can harvest millet with the All Crop concave, settings are ideal with Narrow wire concave installed. Order **Narrow Wire Concave #71469348** from you dealer.

Initial Header & Header Drive Setup

- Variable speed header drive (if equipped) in slowest position for draper headers and direct cut headers.
- Right-hand pivot drive belt positioned on large countershaft drive sheave.
- Feed chains (front and rear) should be in high position and fast speed.
- Angle pickup header down so pickup attachment and pickup header auger can breakup clumps of crop material and more evenly feed the feed chains and lower wind board accordingly.

Tips

- During day in dry conditions, slow the rotor down; at night when conditions are damp speed rotor up.

Edible Beans

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
190 - 230	0.3" - 0.4"	5 - 7	0.75" (19 mm)	0.375" (10 mm)	Fast	Solid

- Remove all reverse bars and replace with forward bars and remove separator knives if installed.

Initial Header & Header Drive Setup

- Cutter Bar - In some crops, the material is direct cut so the header should be set-up accordingly. In many cases, the crop is windrowed and the material is harvested from the windrow.
- Variable speed header drive in slowest position.
- Right-hand pivot drive belt positioned on large countershaft drive sheave and small driven pivot sheave.

Tips

- Optional perforated boot covers on clean grain and tailings elevators may be used if desired but, can cause cracking in certain conditions.
- Optional slow speed elevator kit may be used if desired. Order **Slow Speed Elevator Kit #71394759** from your dealer.

Additional Combine Setup

- If cracking of beans still occurs, remove all lugs on front accelerator roll and leave lugs on rear accelerator roll to move crop. Lugs should be reinstalled immediately for all other crops.

Sunflowers

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
350	0.4"	3 - 6	0.625" (16 mm)	0.25" (6 mm)	Fast	Solid

Initial Header & Header Drive Setup

- Header must be equipped with sunflower attachment to minimize head and seed loss at the header.
- Variable speed header drive in slowest position.
- Right hand pivot drive belt positioned on large countershaft drive sheave.

Tips

- Unplug SmartCooling™ hydraulic valve for sunflowers.

Additional Combine Setup

- May require additional **Separator Blanking Kit #700961967** (3 blanks) will block off separator grates and level out shoe distribution. Please have your dealer contact Technical Service Support.

Flax

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
800	0.0" - 0.4"	3 - 5	0.625" (16 mm)	0.125" (3.18 mm)	Fast	Solid

Initial Header & Header Drive Setup

- Flax is generally windrowed and a pickup attachment is used on header.
- Variable speed header drive in slowest position.
- Right-hand pivot drive belt positioned on large countershaft drive sheave and small driven pivot sheave.

Grass Seed (Bluegrass, Bentgrass)

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
400	0.0" - 0.1"	0 - 1 **	0.75" (19 mm)*	0.1" (2.5 mm)	Fast*	Solid

* - If baling straw is preferred, set chopper to low speed.

** - The **Light Seed Kit #700959206** can be installed and used for grass seed harvest but should be removed for any other crop.

Initial Header & Header Drive Setup

- Variable speed header drive in slowest position.
- Right hand pivot drive belt positioned on large countershaft drive sheave.

Additional Combine Setup

- Completely block leaf screen door underneath combine with plastic or cardboard. This will restrict incoming air to the shoe. Also block vertical area on front side of frame x brace located in front of fan. This will restrict incoming air to the shoe.
- May require additional **Separator Blanking Kit #700961967**. This will block off separator grates and level out shoe distribution.
- If separator blanking kit is used, use the standard reverse bar configuration on the rotor from the factory: (3) short reverse bars and (1) long reverse bar.
- If baling straw, move chopper speed to small sheave to slow chopper speed down and to reduce severe chopping of straw.
- If feeder chain plugging occurs move feeder chain speed to corn speed.
- Have your dealer contact Technical Service Support for additional adjustments required.

Alfalfa

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
400 - 600	0.0" - 0.3"	3 - 6 **	0.25" - 0.925" (6 mm - 16 mm)	0.1" (2.5 mm)	Fast*	Solid

* - If baling straw is preferred, order impeller if needed.

** - The **Light Seed Kit #700959206** can be installed and used for alfalfa seed harvest but should be removed for any other crop.

Initial Header & Header Drive Setup

- Variable speed header drive in slowest position.
- Right hand pivot drive belt positioned on large countershaft drive sheave

Tips

- If seed is light, refer to the combine settings for Grass Seed (Bluegrass, Bent Grass).

Additional Combine Setup

- May require additional **Separator Blanking Kit #700961967**. This will block off separator grates and level out shoe distribution. Please have your dealer contact Technical Service Support.

Clover

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
400 - 600	0.0" - 0.3"	2 - 6 **	0.25" - 0.925" (6 mm - 16 mm)	0.1" (2.5 mm)	Fast*	Solid

* - If baling straw is preferred, order impeller if needed.

** - The **Light Seed Kit #700959206** can be installed and used for clover seed harvest but should be removed for any other crop.

Initial Header & Header Drive Setup

- Variable speed header drive in slowest position.
- Right hand pivot drive belt positioned on large countershaft drive sheave.

Additional Combine Setup

- May require additional **Separator Blanking Kit #700961967**. This will block off separator grates and level out shoe distribution. Please have your dealer contact Technical Service Support.

Rye

Initial Combine Setup

Rotor RPM	Concave Setting	Fan Opening	Chaffer Opening	Sieve Opening	Chopper Speed	Elevator Boots
700	0.2"	4 - 6	0.75" (19 mm)	0.2" (5 mm)	Fast	Solid

Initial Header & Header Drive Setup

- Variable speed header drive in slowest position.
- Right hand pivot drive belt positioned on large countershaft drive sheave.

Troubleshooting

Header

Ragged and uneven cutting of crop

Possible Cause	Correction
Cutting mechanism not operating at recommended speed.	Check basic speed of combine and check header drives.
Reel speed too slow for ground speed.	Increase reel speed.
Reel height too high.	Lower reel.
Reel position is either too far forward or too far back on reel arms.	Adjust reel position so reel bats hold grain leaning slightly into sickle.
Header not level.	Level header.
Guards are bent or broken.	Straighten or replace guards.
Upper lips of guards bent causing poor shearing action.	Adjust upper lips of guards so they are parallel to lower shear edge of guard.
Sickle not contacting guards.	Adjust sickle so tips of sickle sections rest lightly on guards.
Sickle hold down clips worn or not adjusted properly.	Replace worn hold down clips and adjust clips.
Too much fore and aft looseness between sickle back and guards.	Adjust wear plates.
Bent or twisted sickle.	Straighten or replace sickle assembly.
Ground speed too fast.	Reduce ground speed.
Flex cutter bar hanging up.	Check flex arms, filler panels (at ends of headers) and stabilizers for freedom of movement and correct any binding.
Flex header height sensor on rockshaft not set the same.	Readjust sensor as outlined in header Operator Manual.
Rockshaft binding (flex header)	Free rockshaft.
Insufficient ground pressure from flex cutter bar.	Increase ground pressure by decreasing spring tension on flex arms.
Flex cutter bar tilted up too much at the front.	Tilt cutter bar down so skid pads are parallel to the ground.
Intermittent signal for automatic header height control flex header.	Clean corrosion and paint from contacts on switches. Check for good connection at harness disconnects. Check for broken wires in harness.

Header

Shattering of grain ahead of cutter bar

Possible Cause	Correction
Reel speed not coordinated with ground speed.	Change reel speed to coordinate with ground speed.
Ground speed too fast for condition of crop.	Decrease ground speed.
Reel height too low.	Raise reel.

Loss of grain heads and cut crop at cutter bar

Possible Cause	Correction
Reel not low enough.	Lower reel.
Conveyor clearance too high from header bottom.	Lower conveyor.
Conveyor fingers retracting too early.	Adjust fingers close to header bottom.
Cutting with header too high, cutting stalks too short for proper delivery.	Lower header.
Reel speed too low.	Increase speed of reel.
Reel incorrectly positioned on reel arms.	Position reel closer to header conveyor.
Conveyor flights worn.	Replace conveyor flighting.

Guards plugging

Possible Cause	Correction
Sickle sections not contacting guards.	Adjust sickle so tips of sickle section rest lightly on guards.
Missing or worn sickle sections.	Replace sickle sections.
Reel not adjusted to provide smooth flow of material into header conveyor.	Refer to Operator Manual for best starting position and adjust reel height, reel speed and reel fore and aft position for even flow. Straighten or replace guards.
Guards bent or broken.	Straighten or replace guards.
Cutter bar tilted down too much.	Tilt cutter bar up.
Bent or twisted sickle.	Straighten or replace sickle assembly.
Ground speed too fast.	Reduce ground speed.
Skid pads binding (flex header).	Check that skid pad splice brackets are not binding skid pads.
Flex cutter bar too heavy.	Decrease ground pressure by increasing spring tension on flex arms where plugging is occurring.
Flex header height too low.	Move selection to higher cutting position.
Dirt on skid pads (flex header).	Clean dirt off skid pads.

Header

Crop bunching on cutter bar

Possible Cause	Correction
Reel too high.	Lower reel.
Reel too far forward.	Set reel back.
Reel speed too slow.	Increase reel speed.
Sticky header pan.	Remove dirt, gum or rust.
Conveyor too high.	Lower header conveyor.
Worn conveyor flighting.	Replace flighting.
Conveyor fingers retracting too early.	Adjust fingers as close to header bottom as possible.
Conveyor not operating at recommended speed.	Check header drive. Check basic speed of combine and conveyor.

Excessive vibration of cutting parts

Possible Cause	Correction
Cutting mechanism not at recommended speed.	Check basic speed of combine.
Excessive looseness of cutting parts and sickle drive.	Remove all excessive play from cutter bar and sickle drive to eliminate vibration.
Drive idler shock absorber worn.	Replace shock absorber.
Pickup reel tines entering sickle.	Raise reel with fine height adjustment.
Drive tires improperly inflated.	Inflate tires to recommended tire pressure.
Header not secured to feeder house.	Check lower header hooks are secure and spring latch is properly seated in hooks.
Stabilizers loose at anchors (flex header).	Tighten bolts holding the stabilizer anchors to the header guard angle and to the cutter bar assembly. Tighten wobble box stabilizer attaching bolts.
Loose or broken cutter bar or flex arm attaching bolts (flex header).	Tighten or replace all bolts attaching cutter bar to header and flex arms.

Header

Reel wrapping in tangled and weedy crops

Possible Cause	Correction
Incorrect location of pickup reel.	Place reel ahead and down. Make sure reel tines clear the sickle with reel in lowest position.
Reel speed too fast.	Reduce speed of reel.
Pickup reel tines pitched too much to rear.	Adjust tine pitch.
Pickup reel tines bent.	Replace or straighten tines.
Crop not divided at header ends.	Install or adjust long dividers.
Reel ends wrapping.	Install reel end shields (Flex header). Install Reel Divider Kit #700957021 (Dynaflex) Raise reel to reduce amount of straw gathered by reel.

Crop wrapping on header conveyor (Flex Header)

Possible Cause	Correction
Conveyor too high or too low.	Adjust conveyor height.
Uneven feed to conveyor.	Adjust reel speed and/or location.
Conveyor finger retracting too early or conveyor fingers too late	Adjust position of conveyor fingers.

Header

Header conveyor plugging or material not moving from center of conveyor into front feed chain (Flex Header)

Possible Cause	Correction
Straw retarder clearance from conveyor flight too great.	Adjust straw retarder.
Reel not adjusted to provide smooth flow of material into header conveyor.	Adjust reel height. Adjust reel speed and flow of material into header conveyor reel fore and aft position for even flow.
Conveyor fingers retracting too early or too late.	Adjust position of conveyor fingers for best material flow.
Insufficient lean in header conveyor flighting.	Conveyor flighting should have slight lean toward center of conveyor. Using carpenter's square against conveyor tube. Flighting should lean approximately 0.5" (12.7 mm) toward center of conveyor.
Straw retarder clearance from conveyor flight too great.	Adjust straw retarder closer to flight.
Conveyor too far forward or too far to rear.	Adjust conveyor fore and aft position.
Conveyor too high or too low.	Adjust conveyor height.
Feeder chains not moving material.	Move front feed chain drum forward away from header consistently.

Crop wrapping on Dynaflex header center conveyor auger

Possible Cause	Correction
Wrapping in damp, green-stem soybeans.	Install Auger Filler Kit .

Feed Conveyor

Feeder chains plugging or wrapping

Possible Cause	Correction
Uneven feed from header.	Refer to previous section on HEADER or CONVEYOR PLUGGING (PG. 15) condition for header performance checks.
Improper feed chain speed.	Check feed chain drive sheave installation with grain header belts driving off larger sheave diameter. With corn header, belts driving off smaller sheave diameter.
Feeder chain drum stops set too low.	Adjust feeder drum stops.
Dirt between front and rear feed chains.	Clean out dirt.
Front feeder chain drive slip clutch set too loose.	Check clutch assembly for worn or broken parts.
Worn or damaged cylinder bars.	Replace thresher cylinder bars.
Concave clearance too wide.	Reduce concave clearance and then speed if cracking occurs.
Feeder chain slats bowed or missing.	Straighten or replace bent or missing slats.
Material entering into the outer ends of front chain slats.	Adjust straw retarders toward center of header, then install fairing extensions.

Front feeder chains plugging in extreme conditions

Possible Cause	Correction
Front feed chain grabbing crop, but not releasing to the rear feed chain.	Remove every other center slat.

Too much material entering combine

Possible Cause	Correction
Cutting too low in order to get all down and tangled crops.	Use lifting guards or pickup reel in down and tangled conditions.

Uneven or bunched feeding of crop to cylinder

Possible Cause	Correction
Uneven feed to cylinder.	Refer to previous listed feeding problems.

Processor

Slugging or overloading of cylinder

Possible Cause	Correction
Engine not up to correct speed.	Adjust engine high idle to proper speed.
Cylinder drive belt slipping.	Check condition of belt and replace or clean if it becomes worn or oily. Check and lubricate gearbox input torque sensor mechanism.
Too much material entering cylinder.	Reduce ground travel speed.
Cylinder bars worn or damaged.	Replace cylinder bars.
Concave twisted, worn excessively or damaged.	Repair concave.
Concave plugged with mud or dirt, etc.	Clean concave.
Cage helical bars worn or damaged.	Repair helical bars and be sure they are properly aligned.
Cage door assembly not aligned.	Align door assembly by adjusting alignment bolts to form a smooth inner surface in the cage.
Cylinder discharge paddles worn or damaged.	Replace discharge paddles.
Discharge impeller or straw chopper drives slipping.	Repair by checking and replacing worn belts and damaged sheaves. Adjust belt tensions.
Uneven feed to cylinder.	Refer to section on UNEVEN OR BUNCHED FEEDING (PG. 16) .
Crop too damp or green.	Wait for crop conditions to improve.
Crop extremely difficult to convey.	Install edible bean kit across the cage. (Such as edible beans and sunflowers).

Processor

Cylinder vibration

Possible Cause	Correction
Dirt and material stuck to inside of cylinder bars.	Clean material from inside of cylinder bars.
Vibration caused by cylinder drive.	<p>Place cylinder drive gearbox in neutral and operate cylinder drive through its variable speed range to determine if vibration is still present. If so, check the following:</p> <ol style="list-style-type: none">1. V/S drive and driven sheaves for condition and balance.2. V/S cylinder drive belt.3. Cylinder drive torque sensor, and cylinder drive gearbox bearings and gears. <p>Make sure to place gearbox back in High or Low gear.</p>

Grain loss from cylinder

Possible Cause	Correction
Engine not up to correct speed.	Adjust engine high idle to proper speed.
Insufficient material entering cylinder.	Increase ground speed for more intake of material (corn only).
Uneven feed to cylinder.	Refer to section on UNEVEN OR BUNCHED FEEDING (PG. 16) .
Cylinder speed too high or too low.	Try various cylinder speeds to determine optimal speed for threshing and separating.
Insufficient threshing at concave.	Decrease concave clearance.
Grain not coming out of cage.	Install two extra reverse cylinder bars.
Excessive loss out of discharge	Remove helicals bolted to rear separator door (milo & high moisture corn).

Grain quality

Excessive cracked grain in grain tank

Possible Cause	Correction
Crop too damp or green.	Wait for crop conditions to improve.
Cylinder speed too fast for crop grain cracking but still do a good job.	Decrease cylinder speed just enough to stop threshing.
Uneven feeding or slugs entering cylinder.	Refer to section on UNEVEN OR BUNCHED FEEDING (PG. 16) .
Engine not up to correct speed.	See your dealer.
Concave not level.	Level concave to cylinder.
Insufficient material entering cylinder.	Increase ground speed for more intake of material.
Dented conveyor housings, bent conveyor shafts or worn conveyor flighting.	Check each conveyor in the combine and header and correct. Remove dents from conveyor housings to achieve adequate clearance with auger. Straighten or replace bent conveyors. Repair or replace conveyors with worn or damaged conveyor flighting.
Concave clearance too close.	Increase concave clearance.
Excessive tailings return.	Adjust the cleaning shoe to reduce tailings. On combines equipped with optional tailings return, adjust handle to return tailings to distribution augers.
Grain remains in cage too long.	Remove concave filler bars.
Excessive feed chain speed.	Check feed chain drive sheave installation on right-hand end of feeder countershaft. With grain header, belts driving off larger sheave diameter. With corn header, belts driving off smaller sheave diameter. V/S header drive must be locked into low speed position when operating grain header.
Worn cylinder bars.	Replace cylinder bars.
Kernel moisture too high.	Wait for crop to mature.

Grain quality

Grain not threshed from heads or shelled from cob or pod

Possible Cause	Correction
Concave clearance too great.	Decrease concave clearance and adjust cylinder speed to prevent cracking.
Cylinder speed too slow.	Increase cylinder speed enough to do good job of threshing. Do not increase speed to point where grain cracking is excessive.
Concave not level.	Level concave to cylinder.
Uneven feed to cylinder.	Refer to section on UNEVEN OR BUNCHED FEEDING (PG. 16) .
Insufficient material entering cylinder.	Increase ground speed for more intake of material.
Cylinder bars worn or damaged.	Replace cylinder bars.
Cylinder not aggressive enough.	Replace cylinder bars.
Concave extremely worn or damaged.	Replace concave.
Crop very difficult to thresh.	Install concave fillers. On combines equipped with optional tailings return, adjust handle to return tailings to cylinder.

Material lodging outside of cage

Possible Cause	Correction
Crop condition.	Plugging only on front top of cage normal in some conditions.
Material not being delivered by distribution auger.	Check and repair drive for belt slippage.
Cylinder speed too high.	Decrease cylinder speed.
Cylinder bars or helical bars worn.	Replace cylinder bars or helical bars.
Concave plugged with mud or dirt, etc.	Clean concave.
Cylinder discharge metal paddles worn or missing.	Repair discharge.
Discharge impeller or straw chopper drives slipping.	Repair by checking and replacing worn belts and damaged sheaves. Adjust belt tensions.
Concave clearance too close.	Increase clearance (maximum recommended clearance 0.75" (19 mm)).
Separator grate cover needed.	Install the separator grate cover on the separator grate.
Vertical helical bar closest to chopper.	Remove vertical helical bar closest to chopper (soybeans & wheat in some conditions).

Grain quality

Foreign material in clean grain

Possible Cause	Correction
Engine not up to correct speed.	Adjust engine high idle to proper speed.
Separator drive belt, fan drive belt, or cleaning shoe drive belt slipping.	Inspect drives, replace any damaged belts and adjust idlers as required.
Missing or plugged fan inlet screen.	Clean or reinstall fan inlet screen.
Uneven feed to cylinder.	Refer to section on UNEVEN OR BUNCHED FEEDING (PG. 16) .
Insufficient material entering cylinder.	Increase ground speed for more intake of material.
Incorrect chaffer for crop being harvested.	Round end, shallow tooth 1.125" (28.6 mm) spacing - generally used in corn but has also been found to provide desired cleaning in some crops such as soybeans and high moisture cereal grains where more air volume is desired.
	Square end, deep tooth 1.625" (41.3 mm) spacing - generally used in high moisture corn to remove pieces of cob from the tank sample.
Insufficient air blast from cleaning fan.	Increase fan choke setting.
Sieve opening too wide.	Consider increasing air, then decrease sieve opening in 0.06" (1.6 mm) increments.
Uneven opening of sieve or chaffer louvers.	Straighten louvers or replace sieve or chaffer.
Chaffer opening too wide.	Consider increasing air, then decrease sieve opening in 0.06" (1.6 mm) increments.
Finishing sieve required for crop and crop conditions.	A number of finishing sieves are available and can be used to provide best clean in crops such as soybeans and small or light seeds.
Excessive tailings allowing uneven distribution of material on the cleaning shoe.	Refer to EXCESSIVE TAILINGS (PG. 23) condition section.
Cleaning shoe overloaded due to over threshing.	Refer to remedies listed under MATERIAL LODGING OUTSIDE OF CAGE (PG. 20) .
Excessive cob breakage from cage.	Optimize concave setting and cylinder speeds.

Grain quality

Sieves plugging with straw and chaff

Possible Cause	Correction
Insufficient air blast from cleaning fan.	Increase fan choke setting.
Sieve opening too wide.	Consider increasing air, then decrease sieve opening in 0.06" (1.6 mm) increments.
Chaffer opening too wide.	Decrease chaffer opening in 0.06" (1.6 mm) increments.
Missing or improperly installed fan inlet screen.	Properly install all fan inlet screens.
Shutting down machine before it has cleaned out.	Allow crop to pass through and clear machine before disengaging separator.
Incorrect chaffer for crop being harvested.	Round end, shallow tooth 1.125" (28.6 mm) spacing - used in all crops except corn. Round end, deep tooth 1.625" (41.3 mm) spacing - generally used in corn but has also been found to provide desired cleaning in some crops such as soybeans and high moisture cereal grains where more air volume is desired. Square end, deep tooth 1.625" (41.3 mm) spacing - generally used in high moisture corn to remove pieces of cob from the grain tank sample.
Incorrect air pattern.	Inspect fan, fan choke, shoe air duct and splitter location.

Grain loss

Excessive tailings

Possible Cause	Correction
Insufficient sieve opening.	Increase sieve opening in 0.06" (1.6 mm) increments.
Insufficient air blast from cleaning fan.	Increase fan choke setting.
Chaffer opening too wide.	Consider increasing air, then decrease chaffer opening in 0.06" (1.6 mm) increments.
Cleaning shoe overloaded due to over threshing.	Refer to remedies listed under MATERIAL LODGING OUTSIDE OF CAGE (PG. 20) condition.

Grain loss over cleaning shoe

Possible Cause	Correction
Engine not up to correct speed.	Adjust engine high idle to proper speed.
Separator drive belt, fan drive belt or cleaning shoe drive belt slipping.	Inspect drives, replace any damaged belts as required and adjust idlers.
Plugged fan inlet screen.	Clean screen.
Uneven feed to cylinder.	Refer to section on UNEVEN or BUNCHED FEEDING (PG. 16) .
Insufficient material entering cylinder.	Increase ground speed for more intake of material.
Material plugging fan choke and/or fan.	Clean fan choke and fan. Be sure fan inlet screens are installed.
Insufficient chaffer opening.	Increase chaffer opening in 0.06" (1.6 mm) increments.
Incorrect fan choke setting.	Grain loss can be caused by too little or too much air volume. If grain and material is falling off rear edge of chaffer in piles or bunches, air volume is too low and fan choke setting should be increased. If grain is being blow out and can be caught approximately 12" (30.5 mm) behind end of chaffer, fan choke setting should be decreased.
Harvesting in damp freezing weather. Improper distribution of material on cleaning shoe - excessive tailings.	Wait for suitable harvest conditions. Refer to EXCESSIVE TAILINGS (ABOVE) condition section.
Cleaning shoe overloaded due to over threshing.	Refer to remedies listed under MATERIAL LODGING OUTSIDE OF CAGE (PG. 20) condition. Adjust separator grate to #9 condition.

Grain loss

Grain loss over cleaning shoe (cont.)

Possible Cause	Correction
Incorrect chaffer for crop being harvested.	Round end, shallow tooth 1.125" (28.6 mm) shoe spacing - used in all crops except corn.
	Round end, deep tooth 1.625" (41.3 mm) spacing - generally used in corn but has also been found to provide desired cleaning in some crops such as soybeans and high moisture cereal grains where more air volume is desired.
	Square end, deep tooth 1.625" (41.3 mm) spacing - generally used in high moisture corn to remove pieces of cob from the grain tank sample.
Incorrect air pattern.	Inspect fan, fan choke, shoe air duct and splitter location.
Grain loss present when entering and/or leaving the crop.	This situation is usually normal because the cleaning system should be adjusted to provide min. grain loss when in a fully loaded condition.

Loss Calculation

“Quick check” for combine grain loss

Spreading discharge

Grain loss calculated per square foot across the entire field.

To perform a quick estimate for total grain loss from the combine, count the number of seeds found in a square foot behind the combine. Determine the quantity of loss in at least three places throughout the field to arrive at an average.

- Remember to subtract any pre-harvest loss, grain loss caused by the header, or loss due to combine leaks in the field!

Use **TABLE 1** below to determine grain loss in bushels per acre.

TABLE 1 - SEED COUNT PER SQUARE FOOT

	15 ft.	20 ft.	25 ft.	30 ft.	35 ft.	40 ft.
Wheat	19	19	19	19	19	19
Corn	2	2	2	2	2	2
Soybeans	5	5	5	5	5	5
Canola	111	111	111	111	111	111

“Next step” for combine grain loss

If it is determined in the “quick check” that combine harvest loss is unacceptable, it is critical to determine the quantity of loss due to the rotor and the quantity due to the shoe.

Follow the steps below to estimate grain loss from the rotor and the shoe.

TABLE 2 - CALCULATED LOSS IN TOTAL GRAIN PER SWATH

	15 ft.	20 ft.	25 ft.	30 ft.	35 ft.	40 ft.
Wheat	285	380	475	570	665	760
Corn	30	40	50	60	70	80
Soybeans	75	100	125	150	175	200
Canola †	1665	2230	2775	3330	3885	4440
Canola by Weight (g)	7.8	10.4	13.0	15.6	18.2	20.8
Canola by Volume (mL)	18	24	30	36	42	48

† Canola shown in weight and volume due to the large quantity of seeds required to equal 1 bushel of loss.

Rotor loss

1. Remove the straw spreader, the chaff spreader and raise the shoe tailboard so that shoe and rotor discharge remain separate.
2. Count the grain in a one-foot run of the rotor discharge path, which is 24 inches wide to ensure that all grain is counted.
 - Remember to subtract any pre-harvest loss, grain loss caused by the header, or loss due to combine leaks in the field!
 - Use **TABLE 2** on the previous page to determine total grain loss from the rotor.

ROTOR LOSS EXAMPLE: a wheat farmer has a **40-foot** wide header. He removes the straw spreader, the chaff spreader, and raises the shoe tailboard. He counts a total of **120** kernels of wheat in the rotor discharge path (2 feet wide and 1 foot long). With a **40-foot** header, it takes **760** kernels counted to equal one bushel loss, so $120 \div 760 = 0.16$ bushels lost per acre from the rotor.

Shoe loss

1. Remove the straw spreader, the chaff spreader and raise the shoe tailboard so that shoe and rotor discharge remain separate.
2. Count or weigh the grain in a one-foot run of the shoe discharge path, which is effectively five feet, to ensure that all grain is counted.
 - Remember to subtract any pre-harvest loss, grain loss caused by the header, or loss due to combine leaks in the field!
 - Use **TABLE 2** on the previous page to determine total grain loss from the shoe.

SHOE LOSS EXAMPLE: a corn farmer has a 12-row, 30-inch corn head, which equals a **30** foot swath. He removes the straw spreader, the chaff spreader, and raises the shoe tailboard. He counts a total of **28** kernels of corn in the path behind the shoe (5 feet wide and 1 foot long). With a **30-foot** header, it takes **60** kernels of corn to equal one bushel loss, so $28 \div 60 = 0.47$ bushels lost per acre from the shoe.

If time does not allow for quantifying the grain over the full width of the shoe, individual square foot quantities can be averaged, and **multiplied by 5** to compare with **TABLE 2** on the previous page.

“Advanced” grain loss calculation procedure

For the most accurate determination of grain lost through the combine harvester, grain must be “caught” directly from the rotor discharge separately from grain “caught” from the shoe discharge, and weighed.

TABLE 3 - CALCULATED LOSS IN TOTAL WEIGHT OF GRAIN PER SWATH

	15 ft.	20 ft.	25 ft.	30 ft.	35 ft.	40 ft.
Wheat (g)	9.3	12.4	15.5	18.6	21.7	24.8
Corn (g)	8.4	11.2	14.0	16.8	19.6	22.4
Soybeans (g)	9.3	12.4	15.5	18.6	21.7	24.8
Canola (g)	7.8	10.4	13.0	15.6	18.2	20.8
Canola by Volume (mL)	18	24	30	36	42	48

Advanced rotor loss

1. Remove the straw spreader, the chaff spreader and raise the shoe tailboard so that shoe and rotor discharge remain separate.
2. Use a pan, measuring one foot long and six feet wide to “drop” directly in front of the rotor discharge
 - Make sure that the pan dropped does not include any grain lost from the shoe discharge
3. Sort out the grain from the rest of the material, and weigh the grain.
 - Remember to subtract any pre-harvest loss, grain loss caused by the header, or loss due to combine leaks in the field!
 - Use **TABLE 3** above to determine total grain loss from the rotor.

ADVANCED ROTOR LOSS EXAMPLE: a canola farmer has a **30-foot** wide header. He removes the straw spreader, the chaff spreader, and raises the shoe tailboard. He measures a total of **6** grams in the rotor discharge path (from the “drop” pan). With a **30-foot** header, it takes **15.6** grams weighed to equal one bushel loss, so $6 \div 15.6 = 0.38$ bushels lost per acre from the rotor.

Advanced shoe loss

1. Remove the straw spreader, the chaff spreader, and raise the shoe tailboard so that shoe and rotor discharge remain separate.
2. Use a pan, measuring one foot long and six feet wide to “drop” directly in front of the shoe discharge.
 - Make sure that the pan dropped does not include any grain lost from the rotor discharge.
 - Sort out the grain from the rest of the material, and weigh the grain.
3. Remember to subtract any pre-harvest loss, grain loss caused by the header, or loss due to combine leaks in the field!
 - Use **TABLE 3** above to determine total grain loss from the rotor.

ADVANCED SHOE LOSS EXAMPLE: a soybean farmer has a **35-foot** header. He removes the straw spreader, the chaff spreader, and raises the shoe tailboard. He measures a total of **10** grams in the path behind the shoe (from the “drop” pan). With a **35-foot** header, it takes **21.7** grams to equal one bushel loss, so $10 \div 21.7 = 0.46$ bushels lost per acre from the shoe.

Standard Payable Moisture & Density Chart

Crop	Standard Moisture (%)	Crop Density (lbs./bu.)	Crop Density (kg/bu.)
Alfalfa	12.0	60	27
Barley	14.0	48	22
Canola	10.0	52	24
Corn	15.5	56	25
Edible Beans	14.5	60	27
Flax	7.0	56	25
Grass Seeds	12.0	22	10
Lentils	10.5	60	27
Millet	11.0	50	23
Mustard	8.0	60	27
Navy Beans	14.5	62	28
Oats	14.0	32	15
Peas (Black-Eyed)	12.0	60	27
Peas (Field)	10.5	60	27
Popcorn (Yellow)	14.0	60	27
Popcorn (White)	14.0	60	27
Rape Seed	10.0	52	24
Rice (Long)	14.0	45	20
Rice (Medium)	14.0	45	20
Rye	14.0	56	25
Safflower	6.0	45	20
Sorghum	13.0	56	25
Soybeans	13.0	60	27
Sunflower (Oil)	14.0	25	11
Sunflower (Stripe)	14.0	28	13
Wheat (Durham)	13.0	60	27
Wheat (HrdRdSpr)	13.0	60	27
Wheat (HrdRdWtr)	13.0	60	27
Wheat (SftRdWtr)	13.0	60	27
Wheat (White)	13.0	60	27







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