

**X9 SERIES**



# Quick Start Harvest Guide

**FAROL** 



# COMMAND PRO HYDRO HANDLE

- A** Hydrostatic lever
- B** Header resume buttons
- C** Emergency stop
- D** Unloading auger in/out, on/off
- E** Reel and header controls
- F** Autotrac resume switch
- G** Engine speed/gears/diff lock/4WD/park brake
- H** Separator & feederhouse engage
- I** Internal combine settings
- J** Infotainment/lights/air-conditioning



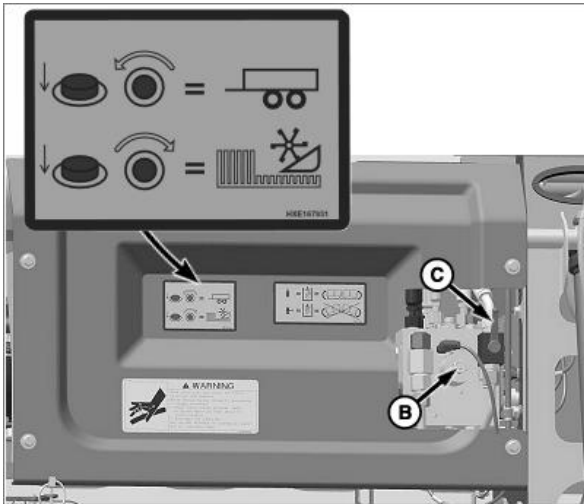
- K** Display quick keys
- L** Programmable buttons

# CORNER POST DISPLAY

- A** Isochronous governor power meter
- B** Engine temperature
- C** Fuel/AdBlue levels
- D** Engine rpm & Ground speed
- E** Header resume modes
- F** Returns level
- G** Sieve loss/total loss/separator loss
- H** Header height
- I** Park brake
- J** Gear selection



## **HDX Header Attachment – Harvesting**



When the header is loaded on the trailer, with driveshafts and multi-coupler removed. Attach the header to the combine. **Push in the left-hand and right-hand wing manual override valves (B) and turn clockwise to lock the wings**, ensure the tap (C) is in the unlocked position. Attach the multi-coupler and driveshafts. Remove Header latching pins.

## **HDX Header Removal – Transport**

Make Sure very firm ground conditions are selected then, Press and Hold, the header transport button to activate transport position

When the header is in the transport position it will display accordingly, check reel is lowered and back, gauge wheels are raised and header is level when lifted off the ground (not hinged)



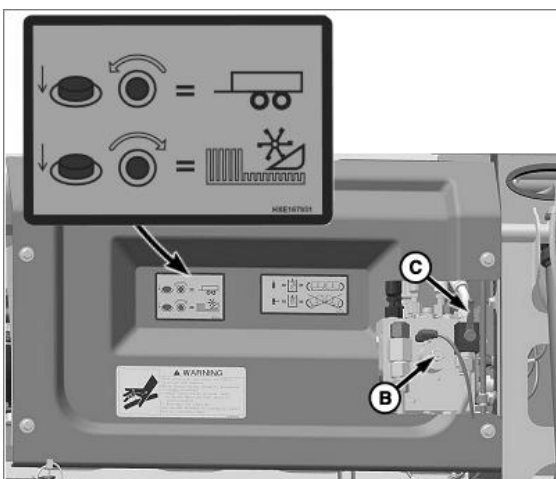
**Not In Transport Position**



**Moving To Transport Position**



**In Transport Position**



When the header is loaded on the trailer, with driveshafts and multi-coupler removed. **Push in the left-hand and right-hand wing manual override valves (B) and turn counter-clockwise to unlock the wings**, ensure the tap (C) is in the unlocked position. Engage header latch pins to trailer, remove header from combine.





Hinged Drapers

Flexible Drapers

Corn Heads

Belt Pickups

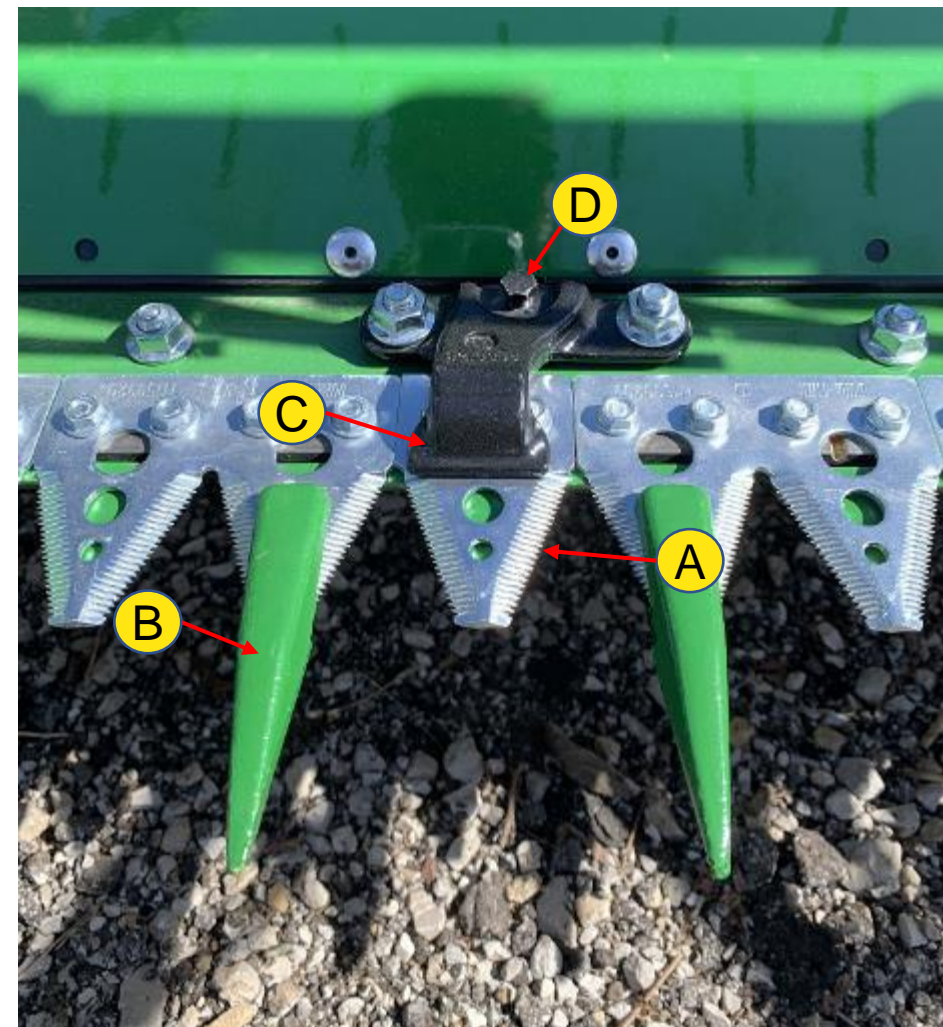
## HD Hold Down Clearance

Hold down clearance is one of the **most important factors** in cutting tough straw. Keeping the knife tight to the guard enables efficient cutting with low power

**To adjust hold downs, see below procedure:**

1. Position knife sections (A) so they are centered on rock guards (B).
2. Slide a 0.50 mm (0.020 in) feeler gauge (business card works well too) under knife hold-down (C).
3. Apply light down pressure on the knife section adjacent to adjustment screw (10mm bolt head) (D).
4. Tighten the adjustment screw until light pressure is applied to the feeler gauge or business card.
5. After hold downs have been adjusted, engage header for 2-3 minutes. Shut header off and check hold downs with your hand for excessive heat. If a hold down is hot to the touch than the hold down is too tight and needs readjusted.

*NOTE: In tough conditions, reduce clearance to optimize cutting performance. To prevent reduction in knife life, only tighten as needed. Minimum hold-down to section clearance is 0.3 mm (0.012 in).*





Hinged Drapers

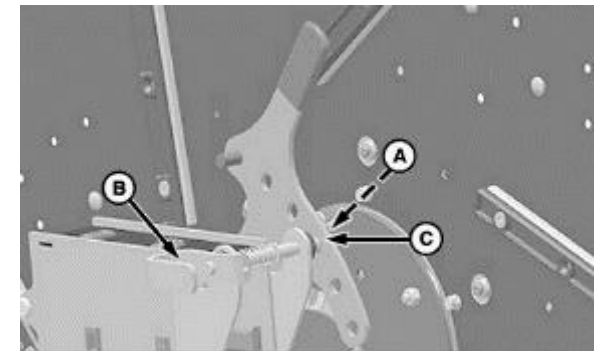
Flexible Drapers

Corn Heads

Belt Pickups

## HD Reel Pitch

- Reel Fingers should be adjusted for crop condition:
  - Most aggressive position (pulled back) for down or tangled crop.
    - May have more crop carry over, “Plant Tossing”
    - If cutting soybeans, lentils, flax, more aggressive and higher reel speed may be needed to clear the cutterbar
  - Middle position for normal crop conditions.
    - Recommended starting position
  - Least aggressive position for tall standing crop.
    - May not be able to dig down crop
- If on ground cutting and adjusting reel pitch, the reel to cutterbar clearance will need to be re-set



Reel Pitch

Reel to Cutterbar

Reel Type



Hinged Drapers

Flexible Drapers

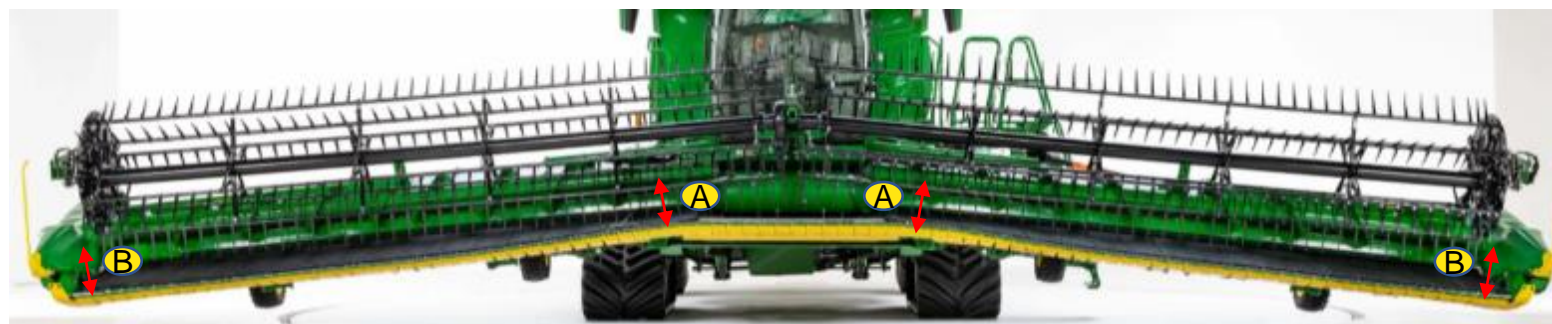
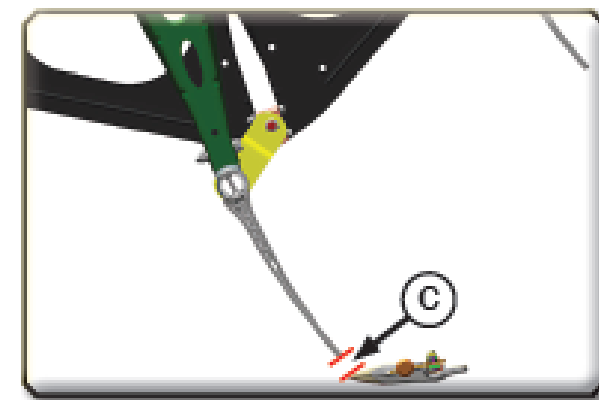
Corn Heads

Belt Pickups

## Setting HD Reel to Cutterbar Gap

- *Please refer to the operator's manual for full procedure on Reel setting*
- Adjust the reel finger pitch so it is in the position used when harvesting. (Most commonly the middle position).
  - Adjusting the pitch changes the reel to cutterbar position slightly, if in crops where this is critical, the reel to cutterbar may need to be adjusted slightly to minimize gap
- Header should be in a frown and cutterbar locked (HDF) when measuring
  - Distance at hinge point (A) should be 15mm (19/32 in)
  - Distance at outer float arms (B) should be 45mm (1 -3/4 in)

Note: It is acceptable if reel fingers to contact the crop ramps (A) during a full frown state. This setting will allow for reel fingers to perform best in the flat position.



Reel Pitch

Reel to Cutterbar

Reel Type





Hinged Drapers

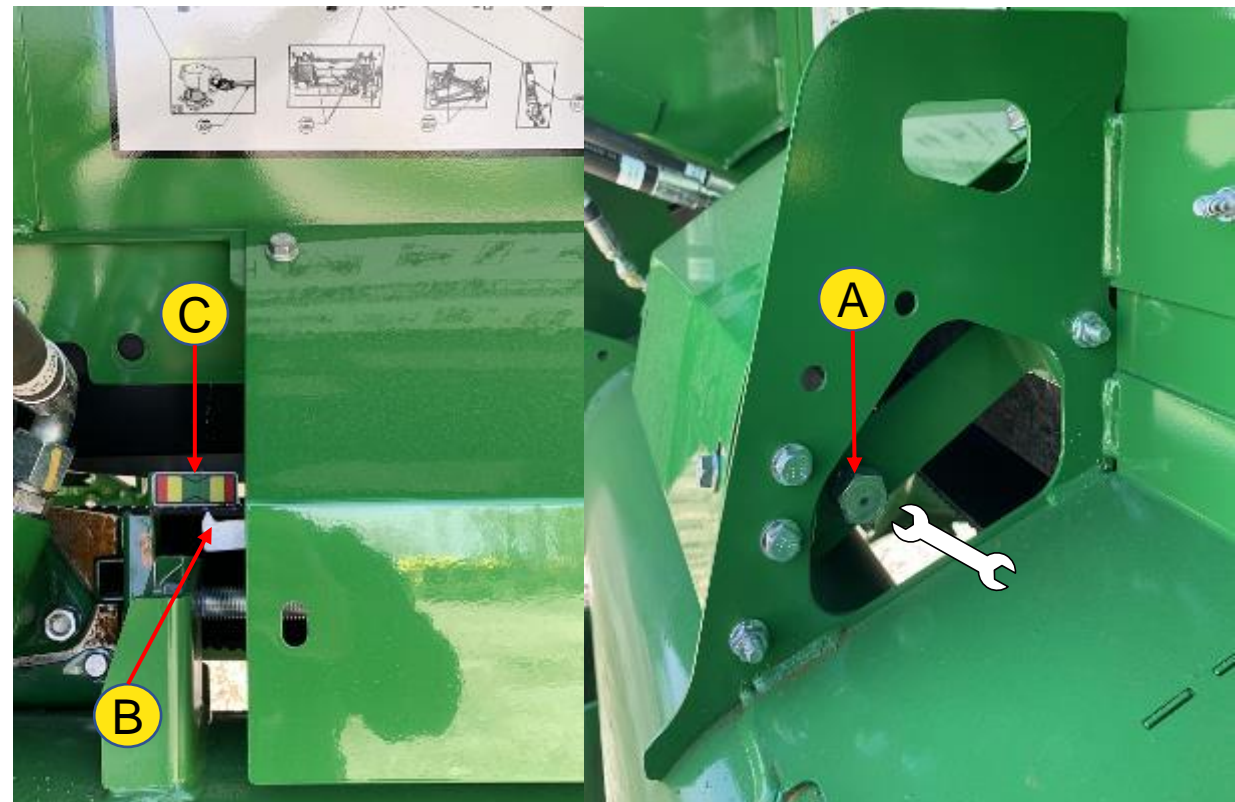
Flexible Drapers

Corn Heads

Belt Pickups

## HD Side Belt Tensioning

1. Side belt tension should be checked each day prior to harvest
  2. Use tension nut (A) to increase or decrease belt tension. Use tension indicator (B) to reference the amount of belt tension applied. Indicator should be at the center of the tension gauge (C).
  3. Repeat the tension adjustment on the opposite side of the draper, if necessary.
- If de-tensioning completely for belt or header service, it is recommended to re-check belt tension after the first ~10mins of operation







Hinged Drapers

Flexible Drapers

Corn Heads

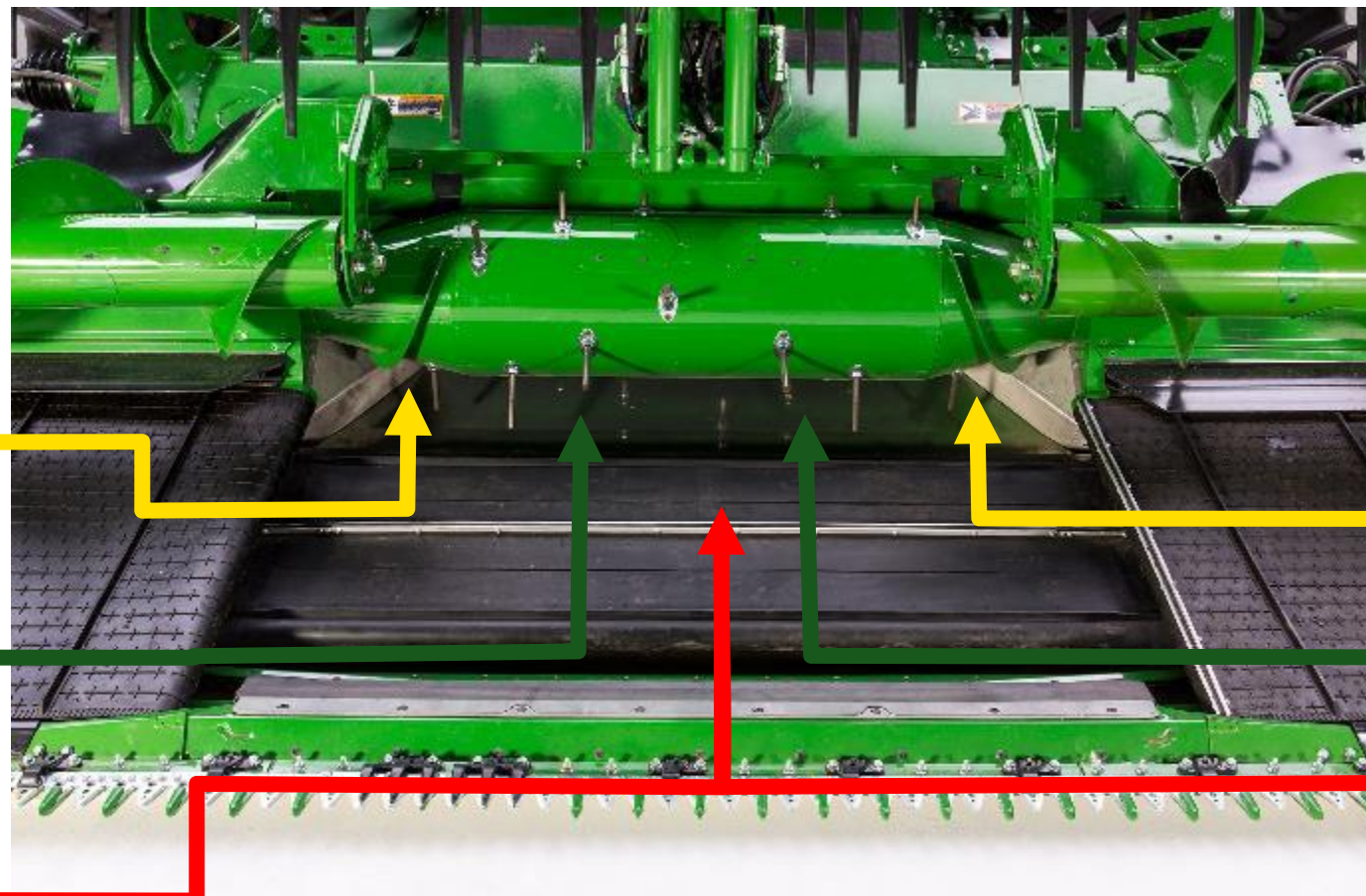
Belt Pickups

## Setting Draper Belt Speed

**Too Slow:** Crop is feed too far on outsides, can cause crop wrapping under belts, and bunching in feed drum

**Optimal:** 2 streams from belts just barely come together making a smooth wide stream of crop entering drum. This ensures each rotor is fed evenly

**Too Fast:** Both belt streams come to together in the center intermixing the crop, creates 1 stream which is difficult to utilize the full width of the separator. Can create slug feeding and drum plugging





Hinged Drapers

Flexible Drapers

Corn Heads

Belt Pickups

## HD Feed Drum Timing

- With the center feed section in neutral, spin drum until the middle finger is as close to the feed floor as it gets, gap should be 40mm (1.57in). Use handle on RH side of drum to adjust.
- This is best for most conditions and adjustment isn't commonly needed
- If backfeeding, ensure feederchain is in high speed to pull crop away



Rotate handle clockwise to make the fingers more aggressive. More aggressive finger timing is recommended for low volume crops such as dryland wheat, lentils, and flax.

Rotate handle counter-clockwise to make the fingers less aggressive. Less aggressive finger timing recommended for bulky, high-volume crops such as canola







Hinged Drapers

Flexible Drapers

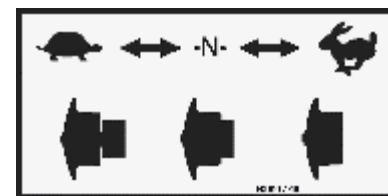
Corn Heads

Belt Pickups

## HD Two Speed Gearbox

	Low Speed	High Speed
Feed Drum	200 RPM	240 RPM
Center Feed Belt	1000 RPM	1200 RPM

- Low speed crops
  - Soybeans
  - Pulses
  - Edible Beans
  - Dry, low volume canola/rapeseed prone to shatter loss
- High speed crops
  - Wheat
  - Barley
  - Oats
  - Linseed/Flax
  - Green straw or tough conditions in rapeseed/canola



Center Feed Driveshaft





Hinged Drapers

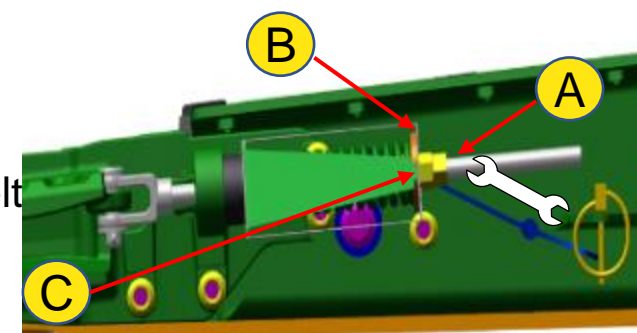
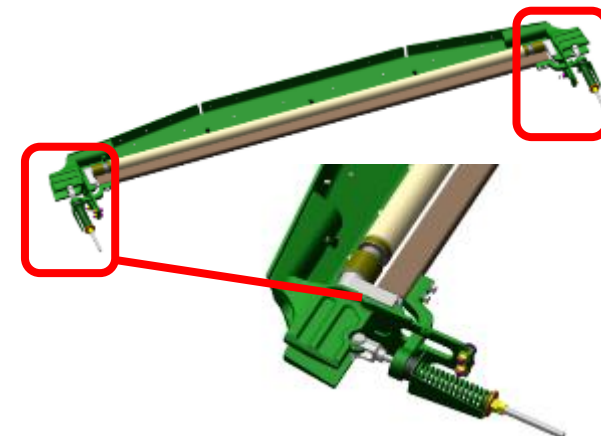
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Belt Pickups

## HD Center Belt Tensioning

1. Locate nuts (A) under the draper on the right-hand side of the center draper belt.
2. Clean all crop residue, debris, and material from the area around the tensioning spring
3. Verify that the nuts and washer (B) are positioned between the end of gauge (C) and the bottom of the step. Repeat on the left-hand side of the center draper belt.
4. If the belt tension is not correct, adjust the center draper belt tension using nuts (A) located under the draper.
  1. Tighten the nuts so the washer (B) is positioned between the end of gauge (C) and the bottom of the step. Repeat on the left-hand side of the center draper belt.
  2. Start the engine, engage the draper, and run at high idle for 1—2 minutes.
  3. Check the operation of the center draper belt.
  4. Verify that the nuts are still tight and readjust as necessary.
5. After operating the draper for 10 hours, recheck the belt tension.







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Corn Heads

Belt Pickups

## HD Top Augers

- Top Augers should run 10% faster than side draper belts. With header engaged watch the flighting of the top augers, the flighting should overtake the 1 belt cleat (see video)
  - If augers are spinning slower than the belts, it can create bunches and slug feed the combine
- Top auger fingers should point at the cutterbar at their most extended position
  - Ensure fingers fully retracted when they cross the stripper to prevent wrapping
  - Refer to operators manual for more details



### Top auger speed control valve



### Fingered top augers





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Belt Pickups

## In Cab adjustability

- Most functions of the HD drapers are controlled from the cab of the combine and can be set from the auto header height page
- Gauge wheels can be configured to the Command Arm
- Ensure header is in auto header height mode when harvesting -- *Raising the head with feeder house up button while navigating terrain will take head out of auto mode and will greatly decrease performance.*
- To navigate aggressive terrain and keep the header in AHHC mode, adjust height temporarily by raising/lowering gauge wheels with AHHC control knob, HFAT position, or lower feeder house by pressing and holding the down button on command arm.
  - When the operator commands feeder house to lower, the head will stay in Auto mode and will resume it's set point once operator releases the down button.

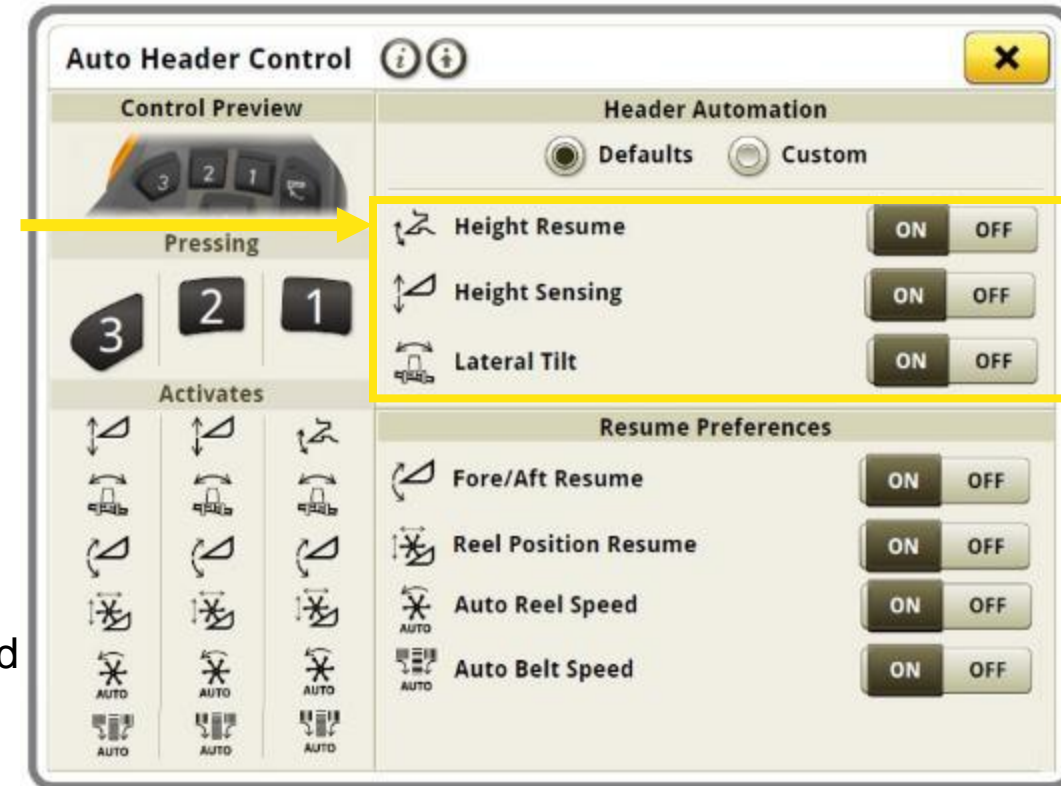




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[Corn Heads](#)
[Belt Pickups](#)

## HD Height Sensing/AHHC Mode

- To get the best performance from an HD-Series draper the following AHHC controls need to be enabled: Height Sensing, Height Resume, and Lateral Tilt. To achieve optimal performance, **ALL** of the header automation should be enabled on the HD Draper
- Hinged operation of HD requires Auto Header Height Sensing mode to be **ON at all times**, but for best performance all automated features should be ON.*
- The HD Series drapers use gauge wheels as the sole input for ground following, the distance between the wheels and cutterbar is fixed meaning if the if wheels go up, the cutterbar will go with it.
  - While the 700D drapers have gauge wheels, the HD uses a completely different AHHC system for improved ground following


[In-Cab Adjust](#)
[Auto Header Height](#)
[Down Crop](#)
[Down Force](#)



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## HD Height Sensing/AHHC Mode

- When Cutting off ground and transitioning to down crop, the HD headers can transition to cutting on the ground by a push of a button
  - Similar 700FD/RDF has “Hybrid” mode with the flexible cutterbar
- Configure button “3” on the Command Arm to the following settings to better get down crop:
  - Header on ground with gauge wheels retracted
  - Adjust fore/aft tilt to make cutterbar angle slightly more aggressive
  - Position reel down and fore of cutterbar to gather down crop



In-Cab Adjust

Auto Header Height

Down Crop

Down Force

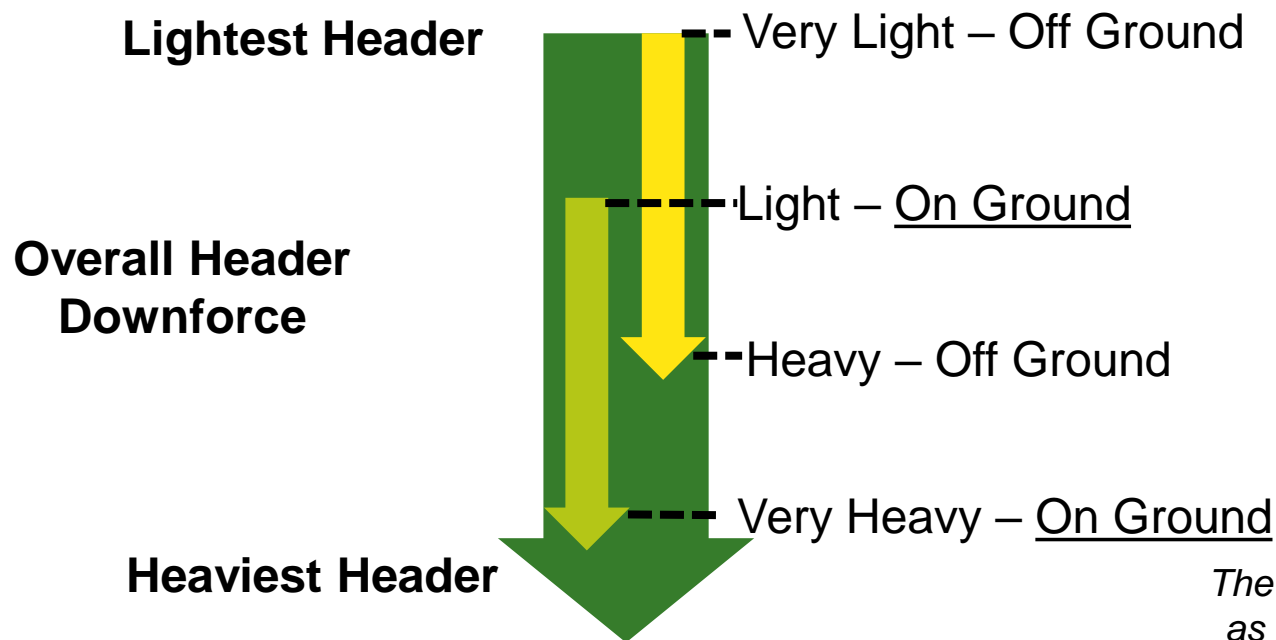




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## HD Header Down Force Page

- Header down force controls how much weight is carried by the combine vs the gauge wheels/cutterbar. The more weight that is being put on the ground the more reactive the draper will be for terrain following. The Lighter the setting, the machine will carry more of the weight, less reactive to terrain, and aids in preventing pushing in soft or damp on ground field conditions.
- Start at “Typical” and adjust from there to current field conditions.



*The advanced tuning page should only be used in extreme conditions as you can over adjust the head and cause it to perform very poorly*

[In-Cab Adjust](#)
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## Hinged Drapers

## Flexible Drapers

## Corn Heads

## Belt Pickups

## Hinge Draper (HD) Gauge Wheels

- Gauge wheels are a factory installed option, but **required** for cutting off ground (cereals, canola, etc.)
  - They are not required for cutting on the ground only. (Soybeans, Lentils, etc)
  - The Wing Leveling feature can help cutting off ground without gauge wheels
- Gauge wheels set your cut height for off ground cutting. The distance from the bottom to the gauge wheel to the cutterbar is the cut height and is fixed until adjusted from the cab. The hydraulic cylinder does not actively control the height.
  - When lowering cut height to cut on ground, the wheels will automatically retract
- Cutting on the ground can be done with a push of a button from the Command Arm by pushing “3”
- Mud Scrapers are recommended for operation in wet or sticky conditions



Wheels retracted for on ground cutting







Hinged Drapers

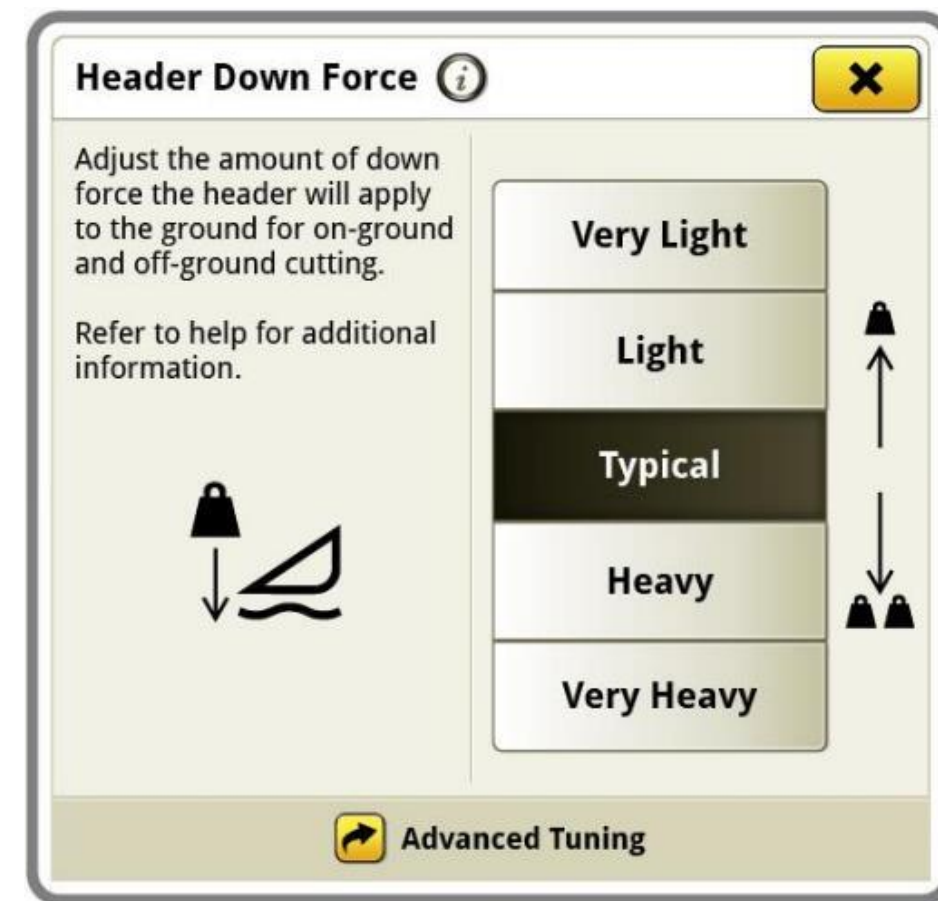
Flexible Drapers

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## HD Header Down Force Page—Off Ground

- Header down force controls how much weight is carried by the combine vs the gauge wheels/cutterbar. The more weight that is being put on the ground the more reactive the draper will be for terrain following. The Lighter the setting, the machine will carry more of the weight, less reactive to terrain, and aids in preventing pushing in soft or damp on ground field conditions.
- **Starting Point:** Typical
- **Off ground cutting:**
  - **Increase Down Force: (Heavy/ V. Heavy)**
    - Aggressive rolling terrain
    - Desire to make the header “move” faster
    - High ground speeds
  - **Decrease Down Force: (Light/ V. Light)**
    - Wet Conditions (Less weight on gauge wheels)
    - Rocks



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Hinged Drapers

Flexible Drapers

Corn Heads

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## Cutterbar Settings

- In most conditions cutter bar angle should measure  $\sim 11^\circ$ . If “pushing” decrease ground force of the cutterbar to make it lighter first.
  - $11^\circ$  is Optimal setting for largest surface area on skid.
  - Use an angle finder phone app or angle finder on the knife .
- If calibration is done improperly and cutterbar angle is flattened to less than  $5^\circ$ , excessive wear on the center sump door can occur as well as debris accumulation on rear of header.
  - When header is this flat, the gauge wheels may contact the ground even when fully retracted.
- For conditions with rocks and debris, raised height skid shoes will allow for cutterbar to be higher and provide more rock/cutterbar protection in conditions with rocks/debris.
- To allow the knife to flex on the HDF, the flexible cutterbar will need to be “unlocked” manually. The turnbuckles are found on the outside of each wing.



Cutterbar Settings

Header Down Force





Hinged Drapers

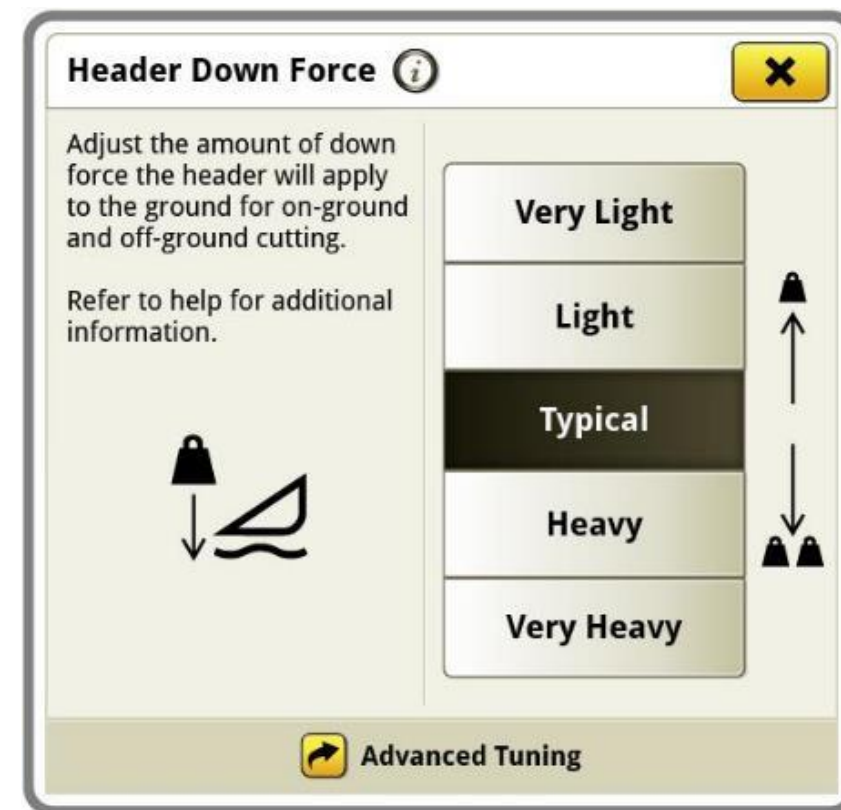
Flexible Drapers

Corn Heads

Belt Pickups

## Down Force -- On ground

- **Starting Point:** Typical – Even for hard soil
  - **Increase Down Force (Heavy/ V. Heavy):**  
Increasing header downforce on hard, dry terrain **can lead to excessive skid shoe wear**  
Aggressive rolling terrain where desire to make the header “move” faster  
Only make cutterbar as “heavy” as needed
  - **Decrease Down Force (Light/ V. Light):**  
Wet Conditions (Make cutterbar lighter)
    - Decrease when cutterbar is “pushing” or in soft terrain
- Adding any aftermarket items that change the weight balance of the header (ie. Air Reel), a custom setting in “Advanced Tuning” may be required
  - If doing so, it is recommended to work with your John Deere Dealer to ensure optimized properly.



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Hinged Drapers

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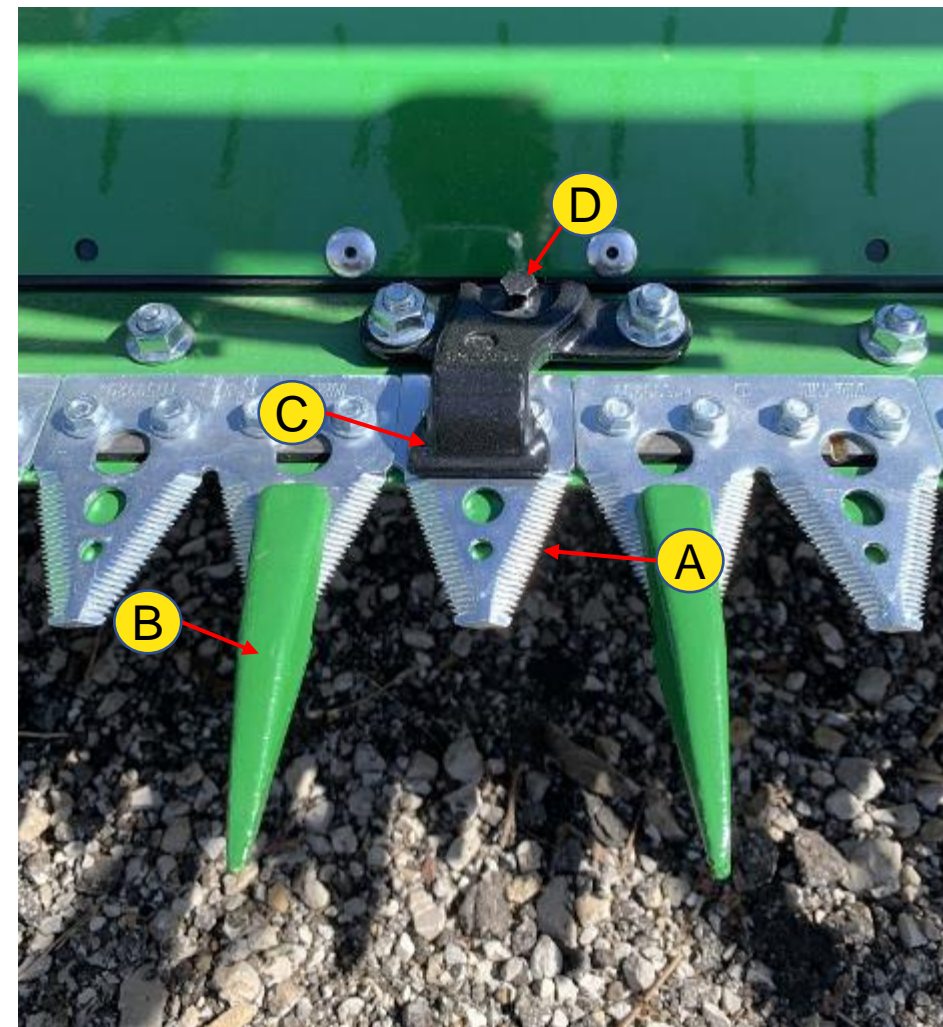
## RDF Hold Down Clearance

Hold down clearance is one of the **most important factors** in cutting tough straw. Keeping the knife tight to the guard enables efficient cutting with low power

### To adjust hold downs, see below procedure:

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Hinged Drapers

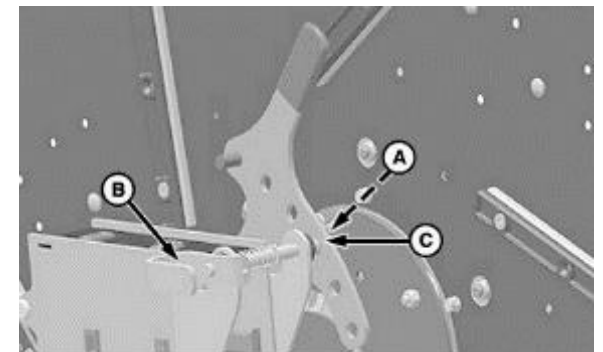
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    - May not be able to dig down crop



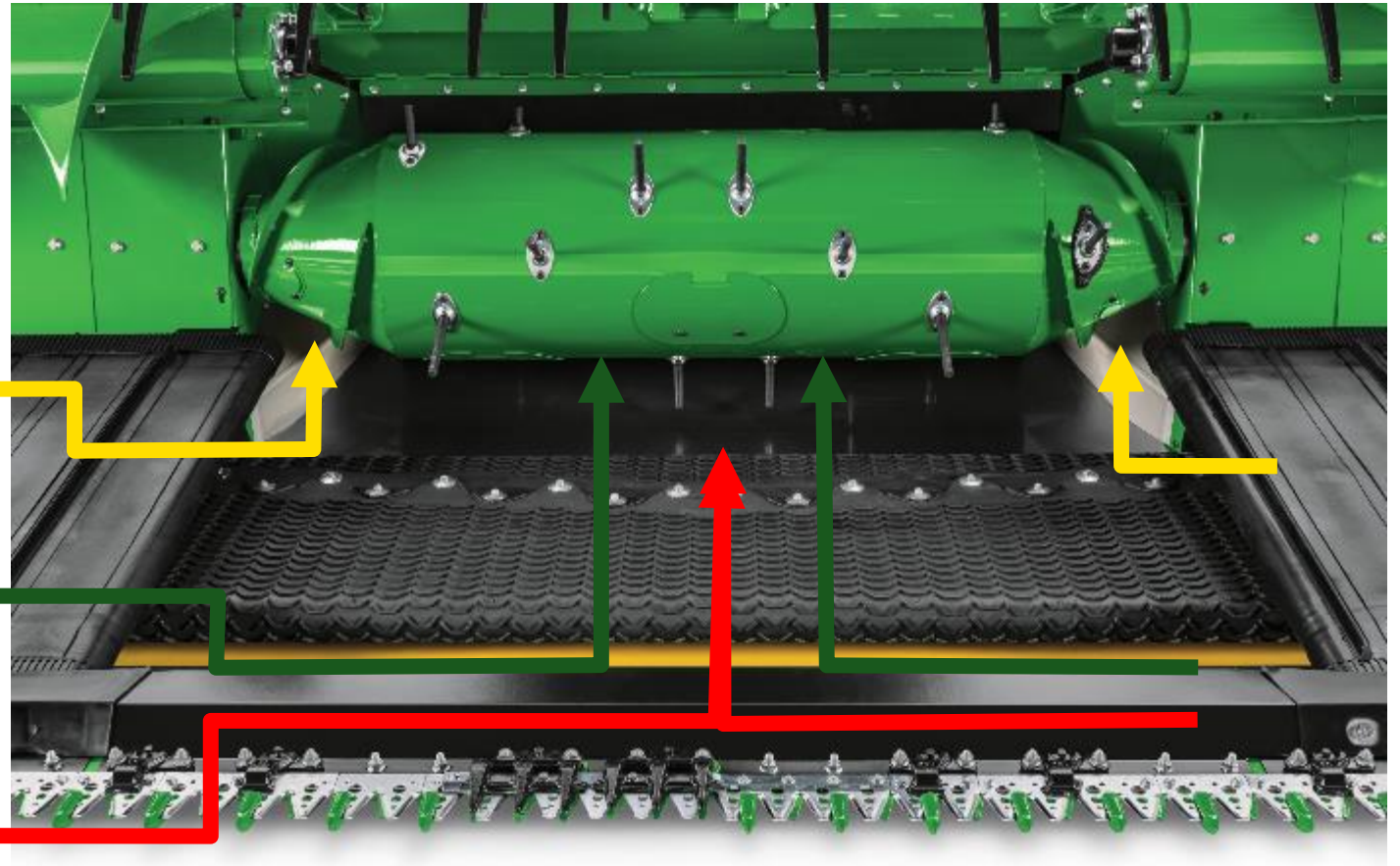
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## RDF Setting Side Belts

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## RDF Feed Section

	Low Speed	High Speed
Feed Drum	200 RPM	240 RPM
Center Feed Belt	1000 RPM	1200 RPM

- Low speed crops
  - Soybeans
  - Pulses
  - Edible Beans
  - Dry, low volume canola/rapeseed prone to shatter loss
- High speed crops
  - Wheat
  - Barley
  - Oats
  - Linseed/Flax
  - Green straw or tough conditions in Rapeseed/Canola







Hinged Drapers

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## RDF Feed Belt

- **Cleated Belt:**
  - Recommended for Canola and tough cereals. Large cleats grab crop better for positive feeding
  - In pulses, may need to run center section in slow speed to reduce shatter losses
  - Cleated belt cleans out mud better from sump
- **Standard Center belt**
  - Recommended for soybeans
  - Can work in lower volume canola
    - Risk of feeding issues in tough conditions
- **Center Section seal kit**
  - Recommended for canola
  - Can leave installed for cereals, but may experience side belt stalling





Hinged Drapers

Flexible Drapers

Corn Heads

Belt Pickups

## Rigid Draper Top Augers

- Large 18" augers for feeding high volume crops like canola/rapeseed and field peas
- Ensure auger speed is faster than side belts
  - Auger flighting should pass the belt cleats
  - Faster augers keeps pulling the crop headfirst into the center section
  - If augers are slower than belts, the crop can twist on the belts and cause poor feeding





Hinged Drapers

Flexible Drapers

Corn Heads

Belt Pickups

## RDF In Cab Adjustments

- Most settings on the RDF can be set from the cab and have customized settings with the 1,2,3 buttons on the control arm
- Belt speed
- Cutterbar pressure
- Reel speed
- Reel position
- Header fore/aft







Hinged Drapers

Flexible Drapers

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Belt Pickups

## RDF On Ground Cutting

- **Hydraflex Pressure:** Recommend starting at 1700psi
  - **Higher Pressure:**
    - Makes cutter bar rigid
    - Max pressure for off ground cutting
    - Increase pressure in soft ground conditions
    - Less weight on skid shoes
  - **Lower Pressure**
    - Makes cutterbar more flexible
    - More weight on skid shoes
- Cutterbar angle should start at 11° (measured on knife with phone or angle finder)
  - Optimal setting for largest surface area on skid
  - Running header at 5° or flatter can lead to debris build up and accelerated cleanout door wear
  - If running to raise knife, consider raised height skid shoes.





Hinged Drapers

Flexible Drapers

Corn Heads

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## RDF Off Ground Cutting

- If desired, Cutterbar can be mechanically locked rigid
  - Install float arm Lockout/shipping brackets
- If header height becomes unstable (bouncing/pivoting) decrease tilt or height sensitivity until it stops



**Header** ⓘ ⓘ

**Flexible Draper**  
Header Type

224.5 h 30.0 ft

Raise / Lower Speed	Tilt Speed	Height Sensitivity	Tilt Sensitivity
 24	 20	 74	 30

Auto Control	Belt Speed	HydraFlex Pressure
 3 2 1	 55	 650





Feeder House

Platform Tilt

Speed

FAST

Attachments

## Feeder House Reversal

- When operator reverses the header engage switch, a reversing page will appear on the CommandCenter™ display. **Keep the switch in the reverse detent position** and use the on-screen commands until the plug is resolved and the operator is ready to resume forward harvest.
- On the reversing page the operator will:
  - Reverse the plug or object
  - Push the Feed button to advance the material into the separator
  - If unable to get the material to advance into the separator the operator can work the plug back and forth until the plug is resolved
- When reverse modulation is engaged the feed accelerator and separator will continue to operate at 100% speed. The feeder house and head will only operate at 10% speed.
  - This allows the plug to be slowly fed and processed by the separator.







Feeder House

Platform Tilt

Speed

FAST

Attachments

## Feeder House Tilt

- The faceplate of the feeder house can be adjusted from the cab
- Angle can also be pre-set with auto header functions on the command arm

### Pivoted Forward:

- Knife closer to ground at aggressive angle for low podding crops
- Can get under downed crop
- Increased chance of stone intake

### Pivoted Rearward:

- Less “pushing” in soft ground
- Easier for crop to fall on the belts
- Knife out of debris/stones

*On ground cutting starting knife angle – 11°*

*Corn Head starting deckplate angle – 20°*

*\*found with phone app or angle finder*





Feeder House

Platform Tilt

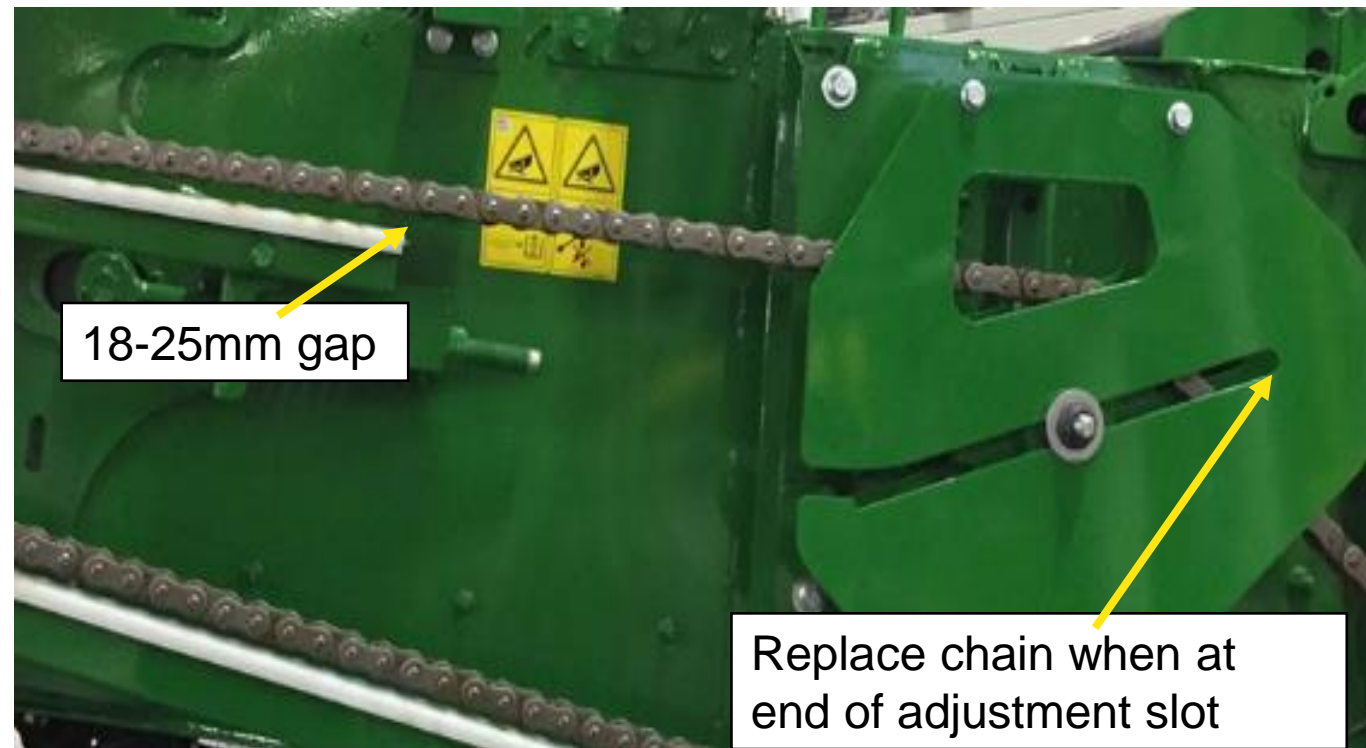
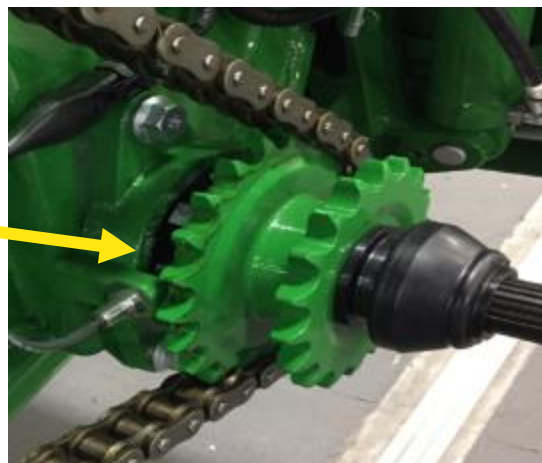
Speed

FAST

Attachments

## Conveyor Chain Speed

- Conveyor chain speed can be changed with 22t or 18t sprocket on the right side of the feeder house
  - 22T** - Faster Sprocket Speed for Tough Feeding straw condition
    - \* Dry Barley straw is “Slippery” and high speed is recommended
  - 18T** – Slower Sprocket speed for all other conditions
- Running faster speed when not needed can accelerate chain wear and increase grain damage.





Feeder House

Platform Tilt

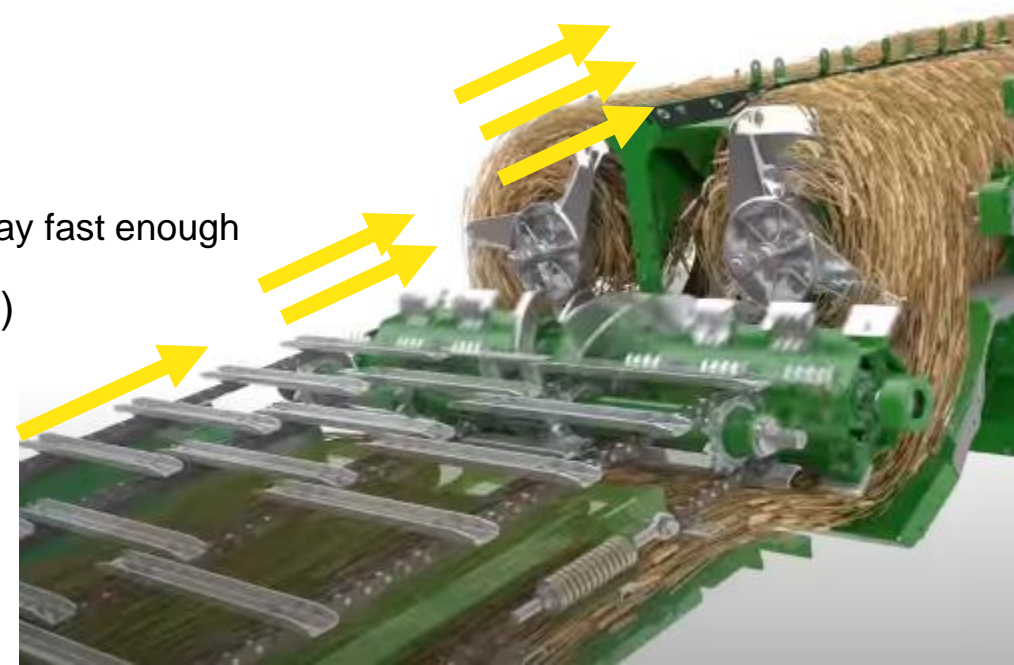
Speed

FAST

Attachments

## Feed Accelerator Stone Trap

- The FAST helps reject foreign debris and feeds material in the rotors .
- As material is conveyed into the machine, the crop should be slowly accelerated at each step from the header, feeder house, FAST, rotor. This helps to slowly thin the straw mat out as it goes through the machine and reduce slugs and improves threshing.
- If there is a significant change in speed, it can damage straw and grain.
  - 22t FH → 1000rpm FAST needs faster rotor (600-700rpm+)
    - Crop Continually pulled crop apart as enters machine
  - 22t FH → 440rpm FAST = FAST plugging
    - High Speed feeder house sprocket and slow FAST cannot take crop away fast enough
- Slow speed drive is available for edible beans, popcorn, etc (320-780rpm)
  - BXE11137







Concave types

Small Grains  
ConcavesCoarse Grains  
Concaves

Concave Adjust

Threshing Speed

Threshing Attachments

## Concave adjustment

### Active Concave Isolation (ACI)

- The concaves are suspended by hydraulic cylinders, keeping consistent concave clearance in tough conditions forcing the crop mat to always be threshed, and reduces the amount of rotor noise that is heard by the operator.
- Ensure concaves are Zeroed, leveled and calibrated properly

### Tighter Concave

- + Increased threshing
- Increased Power and fuel consumption
- Increased chaff load/straw damage
- Increased grain damage

### Open Concave

- Reduced threshing
- + Reduced Power
- + Longer straw
- + Reduced grain damage

1300rpm and 0 concave with no covers can thresh as good as 1000rpm 12 concave and 3 covers but will have higher capacity, less fuel and more throughput in wheat due to less power and less straw damage.





Concave types

Small Grains  
ConcavesCoarse Grains  
Concaves

Concave Adjust

Threshing Speed

Threshing Attachments

## Threshing Speed

- **Faster Rotor Speed**

- + Increased separation
- Increased Power and fuel consumption
- Increased chaff load/straw damage
- Increased grain damage

- **Slower Rotor Speed**

- Reduced Separation
- + Reduced Power
- + Longer straw
- + Reduced grain damage
- Slower material flow in tough conditions
  - Need rotor speed to convey crop into top cover vanes

Rotor speed range: 300-1300 rpm

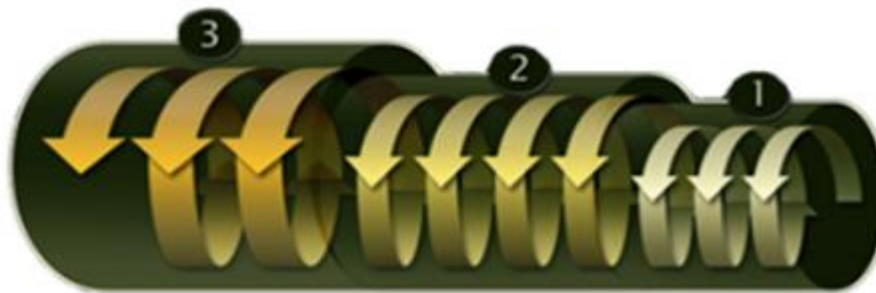
- 1<sup>st</sup> gear = 300-520 rpm  
Corn, Edible Beans, Pulses
- 2<sup>nd</sup> gear = 420-800 rpm  
Soybeans, Canola, Pulses
- 3<sup>rd</sup> gear = 720-1300 rpm  
Small Grains



[Tine Separation](#)
[Separator Grates](#)
[Chaff Distribution](#)
[Chaff Reduction](#)
[Separator Attachments](#)


## Tine Separation

- John Deere Rotary combines use tine separation to separate material after it has been threshing
- Tines comb through material to release entrapped grain
- The separation tines are the largest diameter of the separator cage and crop speed is the fastest
- The expanded separator volume allows for the crop mat to de-compress and release entrapped grain



Three-stage rotor chamber expansion



Crop rotation





Tine Separation

Separator Grates

Chaff Distribution

Chaff Reduction

Separator Attachments

X

## Separator Grate Blanks

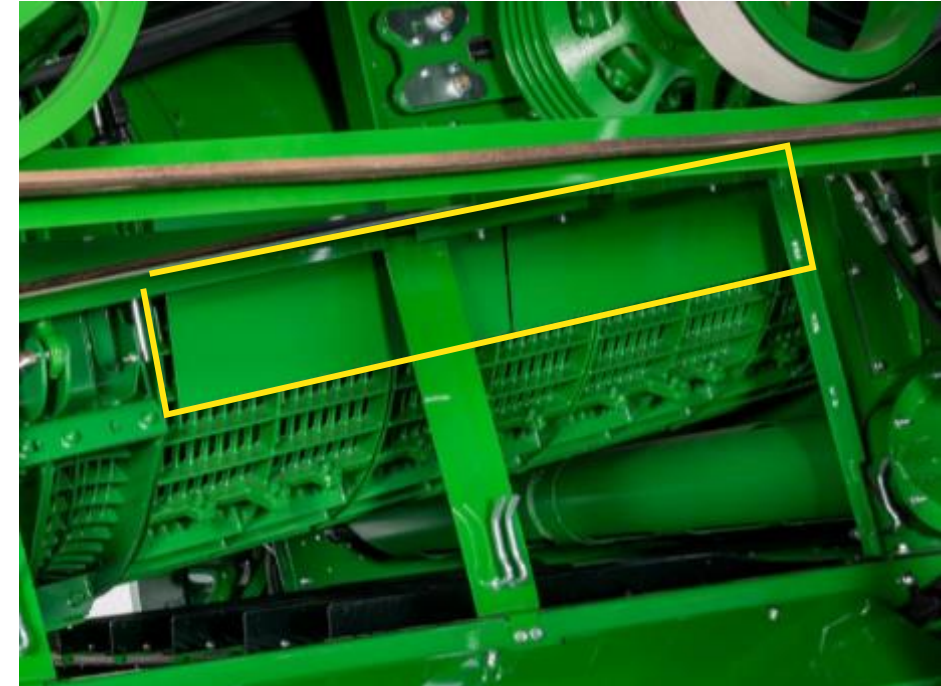
- Separator grate blanks come installed on machines from factory to manage chaff distribution to the cleaning system
- In dryer conditions, higher chaff loading can be seen on the outside of the cleaning system.
- Center Dividers are available to be installed on the middle of the grates if struggling with shoe distribution in corner conditions

### Removal:

- Corn – Remove when spacing down grates
- Tough to separate straw
- Heavy oats and green barley are common conditions that require blanks to be removed

### Install:

- Dry small grains/cereals if cleaning system limited
- Struggling with cleaning system losses or grain quality
- Power shutdown shows high outside loading





Front Step pan

Cleaning Fan

Front Chaffer

Chaffer

Sieve

Tailings

## Cleaning Fan

Setting the cleaning fan is essential for machine optimization. The blast of air from the fan is designed to clean the debris from the grain and use the turbulence of the air to stratify and separate the material on the cleaning system.

X Series utilizes four turbine fans to ensure even air flow across the width of the machine.

### Fan Speed too high:

- Increased Losses
- Increased tailings
- Very clean grain tank sample

### Fan Speed too low:

- Increased light chaff in sample
- Decreased separation of grain from chaff mat

### Fan Speed Range:

- 570-1430rpm Fan Speed
- Cleaning fan slow-down kit for grass seed and other micro seed crops is available
  - BXE11130





Front Step pan

Cleaning Fan

Front Chaffer

Chaffer

Sieve

Tailings

## Active Tailings

- The active tailings return system increases harvesting capacity by re-threshing the tailings taking additional load off the rotors, increasing rotor capacity and optimally delivering it back onto the cleaning shoe return pan for cleaning.

### Corn Position:

- Large grains that need gentle material handling (pulses, corn, etc). Also, dry/brittle canola to avoid grain damage and/or over processing of dry pods.

### Small grains Positions:

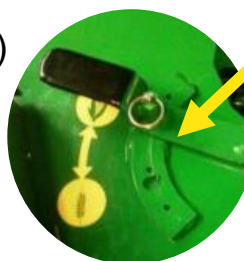
- Crops that need to be re-threshed (wheat, shatter resistant Canola)
- Ensure concave is “zeroed” to beater

### High Tailings (5+bars):

- Decreased cleaning capacity (more grain in circulation)
  - Right side shoe loss may increase
- Higher damage in large grains

### Low Tailings (<3 Bars):

- Could close sieve, or open chaffer for more capacity and/or improved grain quality.



Active Tailings Return System







Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

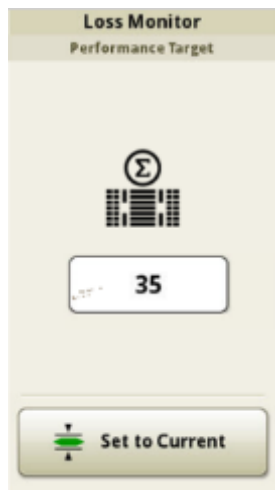
Harvest Smart

Active Terrain

Machine Sync

## Setting VisonTrak

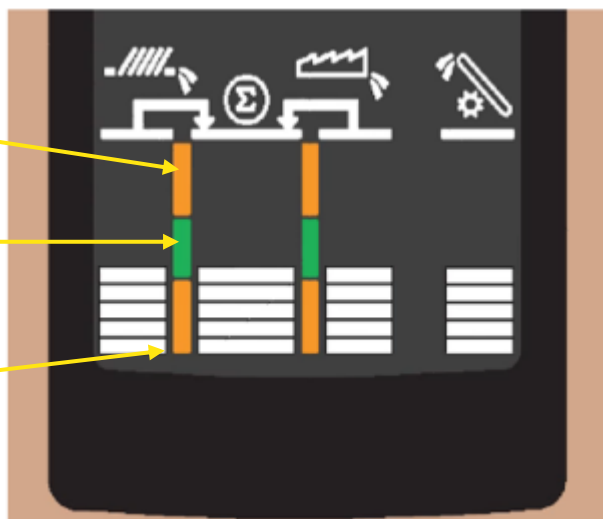
- When harvesting, once the machine is optimized, push “Set to current” when at an acceptable loss level.
- What ever the loss rate is set to, it will be displayed as 2 times that when the display is full.
- If the condition you are currently in cannot get to your acceptable loss, the number will need to be adjusted to reflect what is coming out the back.
  - Example:** If knowing the limit is 1bu/ac but combine is only throwing over 0.5bu/ac, the number will need to be changed to show 1-2bars loss



~2x loss limit

Set loss limit

~1/2 loss limit



**ONLY** the center bar responds to relative loss on the ground

The Shoe/Sep bars provide guidance on where that loss is coming from

If “Set to current” was pushed at 0.5bu/ac loss on the ground, there would be ~1bu/ac loss displayed



Setting VisonTrak

Reading Vison Trak

Grain Loss display

Relative Grain Loss Mapping



Grain Loss

Yield/Moisture

Optimize Performance

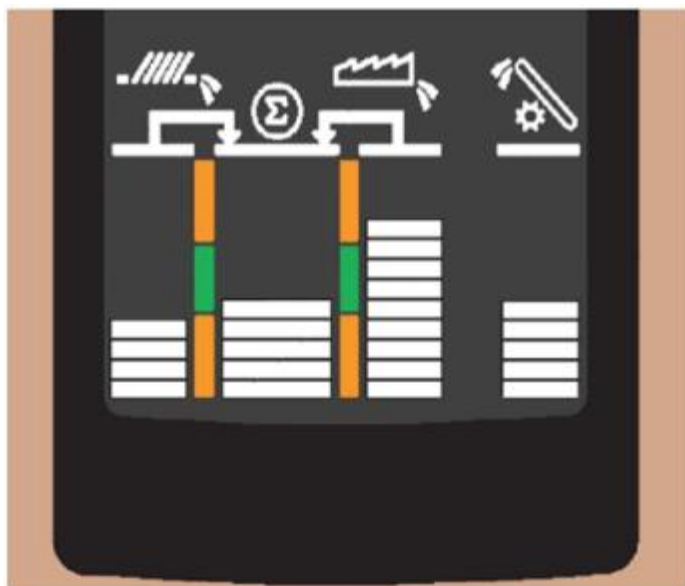
Auto Maintain

Harvest Smart

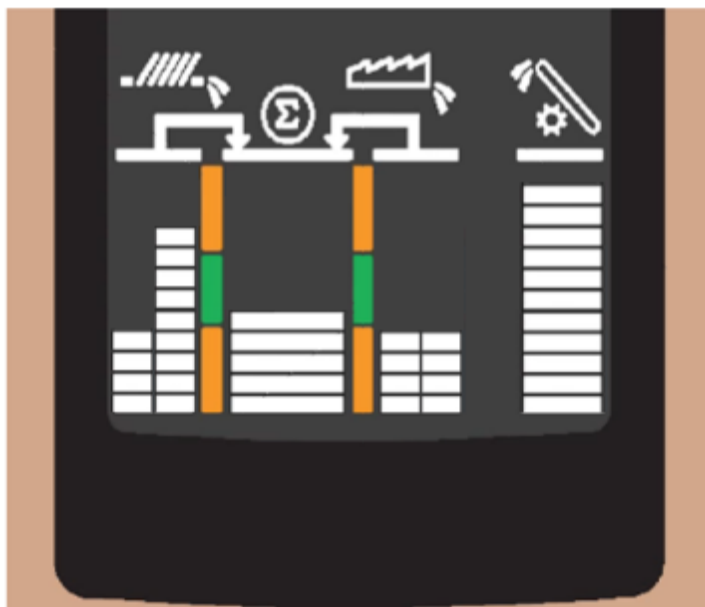
Active Terrain

Machine Sync

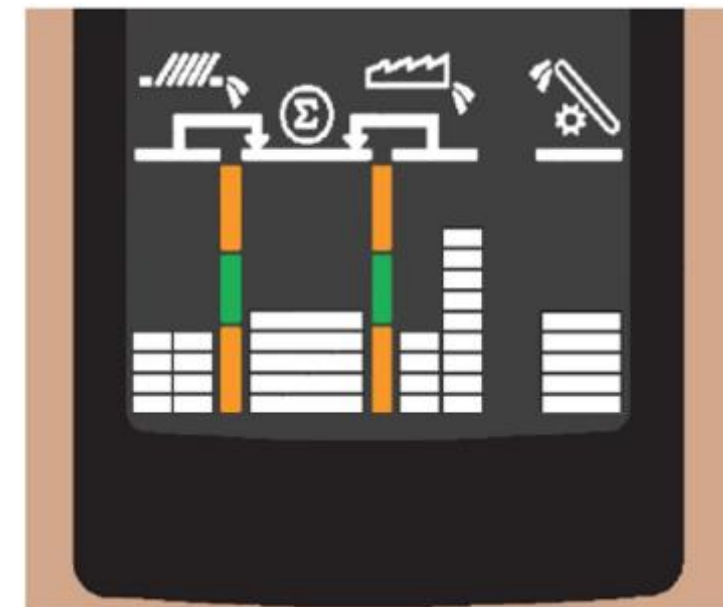
## Reading VisonTrak



- Assuming loss target was set with 1bu/ac loss, of that 1bu/ac ~25% of that is coming from the shoe and ~75% from the rotor



- Right 3 sensors of shoe have ~50% higher loss than left 3. with high tailings, this is most likely the cause. Reduce tailings would reduce shoe losses
- Total losses are still acceptable



- Right side separator sensor is reading ~50% more loss than right side
- Total losses are still acceptable





Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

Harvest Smart

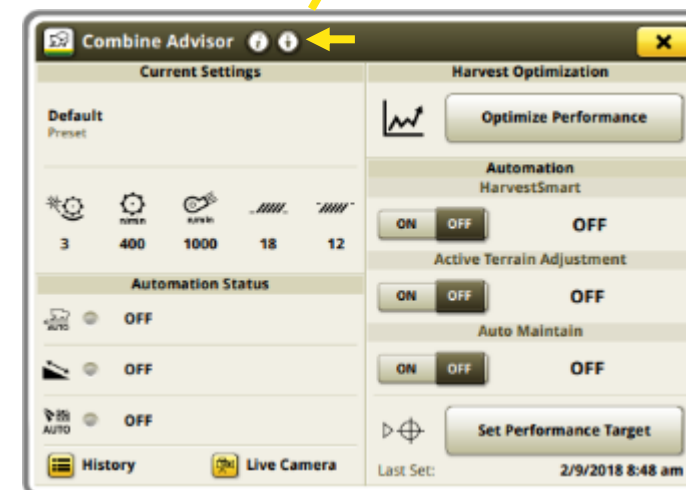
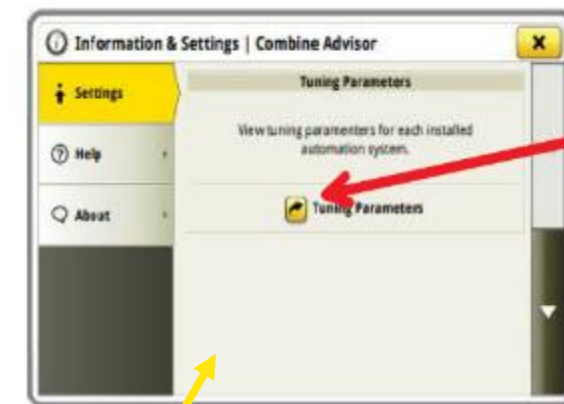
Active Terrain

Machine Sync

## Grain Loss Display Algorithm

3 different modes of grain loss display are available from the monitor

- Area-based grain loss **\*Recommended setting\* (Default on X9)**
  - Displays Strikes per area
  - Grain loss is calculated using header width and ground speed as inputs.
  - Correlates well with customers who measure loss as “Bu/Ac”
- Other Modes (Area based is still recommended)
  - Time-based grain loss
    - Displays strikes per unit of time (Seed strikes per second)
  - Mass Flow
    - Displays strikes relative to mass flow
      - Can be erratic due to changes in mass flow at headlands and low yielding







Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

Harvest Smart

Active Terrain

Machine Sync

## Yield Monitoring

On X Series combines the user has the choice to use Active Yield or Manual yield calibrations depending on their preference.

For All yield monitoring, it is important to do the following prior to calibration:

### Mass flow vibration calibration:

- Grain tank empty
- Machine at settings near operating speed.
- **Every** header type
  - If harvesting windrow and straight cut canola, for the best accuracy it will need a mass flow calibration for both headers.

### Moisture correction and calibration:

- With the bypass empty, ensure the calibration for the moisture sensor is done.
- If needed, an offset can be applied in the grain handling pages.





Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

Harvest Smart

Active Terrain

Machine Sync

## Yield Monitoring Choices

Active yield delivers automatic yield calibrations to every time the grain tank begins to fill to save time when performing yield calibrations.

### When Should Active Yield be Used:

- Active yield is a **field totals solution**, and recommended for customers looking for field totals without minimum time spent calibrating
- Customers who do not have the ability/time to calibrate yield monitor manually, but want improved field total accuracy

### When should Manual Calibration be used:

- Seeking Pass-to-Pass yield accuracy
- Have the ability to manually calibrate or
- Crops where moisture is changing a lot
  - Wet to dry corn where pile shape changes
- Terrain where AY cannot collect loads.



*ActiveYield force sensors within the grain tank.*

[Yield Harvest Guide Link](#)[Yield Video](#)[Yield Accuracy Guide](#)[Yield Accuracy Video](#)

Yield Monitoring

Active Yield Tips 1

Active Yield Tips 2

Manual Yield  
Calibraion

Moisture Sensor



Grain Loss

Yield/Moisture

Optimize Performance

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## Active Yield Tips

Reduced accuracy is caused by the grain pile shifting in the grain tank when collecting a sample. Drive consistently when collecting sample (ground speed and terrain). After load is accepted, end rows, crop flow variability, and terrain slope will not affect ActiveYield™ performance.

The system will reject the load if the machine pitch/roll is more than 4 degrees, a grain tank pile shift occurs, harvesting with inconsistent crop flow (washouts, waterways, stop/go), or turning on end rows at any point in time during load collection. Stored calibration loads are replaced by new loads as the system continues to collect data.

For optimal performance when harvesting a new field, reset to the default calibration. This will promote higher yield accuracy and retain the yield calibration curve but will clear all previously accepted loads from ActiveYield. All new loads will be based on the % moisture in the field being harvested, not as an average based on loads previous harvested in previous fields.

Performing manual yield calibrations prior to turning on ActiveYield will not improve initial ActiveYield performance as calibration loads are saved as separate calibration curves.



Yield Monitoring

Active Yield Tips 1

Active Yield Tips 2

Manual Yield  
Calibraion

Moisture Sensor





Grain Loss

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## Active Yield Tips 2

### What can operators do if no loads are accepted?

- *Avoid flow interruptions when collecting load.* Start a long harvest run with an empty grain tank. Do not unload on the go during sample collection.
- *Reduce flow variation when collecting load.* Target constant flow rate areas first. Maximize ground speed & cut width.
- *Avoid load collection calibration time out.* There is built in logic that will reject a load that takes 400 total seconds to collect. Increase ground speed and maximize cut width to decrease time to collect load.
- *Increase opportunities to get sample accepted.* Unload grain tank soon after sample has completed to start another load collection.
- *Target harvesting any flat or near flat terrain available.* Unload the grain tank just before harvesting flatter terrain.

### Can ActiveYield be used when harvesting high moisture and variable crop?

When harvesting in adverse crop conditions, more variation can occur on the force sensors as the grain piles differently across the 3 force sensors and could have an affect on the yield calculation. For customers that experience variations in yield accuracy with Active Yield, specifically harvesting High Moisture corn (22% or above), they have the option to perform a 2-point manual calibration.



Yield Monitoring

Active Yield Tips 1

Active Yield Tips 2

Manual Yield  
Calibraion

Moisture Sensor



Grain Loss

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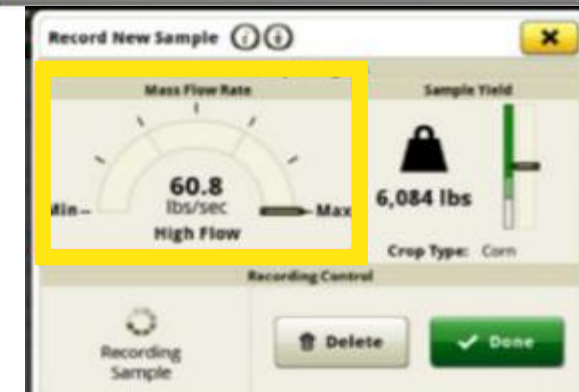
## Manual Yield Calibration

Before performing a manual yield calibration, ensure Active Yield is turned off and ensure Moisture sensor, Temp and Mass Flow vibration (with header attached) is done



### 2+ Point Calibration:

- For best pass to pass accuracy, at least two points are recommended. This is a sample size of at least 5000lbs and a **consistent flow** rate for the calibration (NO headlands).
- The 2 calibration points should be at DIFFERENT flow rates
  - Point 1 at your normal productivity ie. 2000bu/hr
  - Point 2 at 50% of that ~1000bu/hr
- These 2 points create a curve accounting for yield and productivity changes throughout the field.
- If more accuracy is desired can do more calibrations at different feedrate





Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

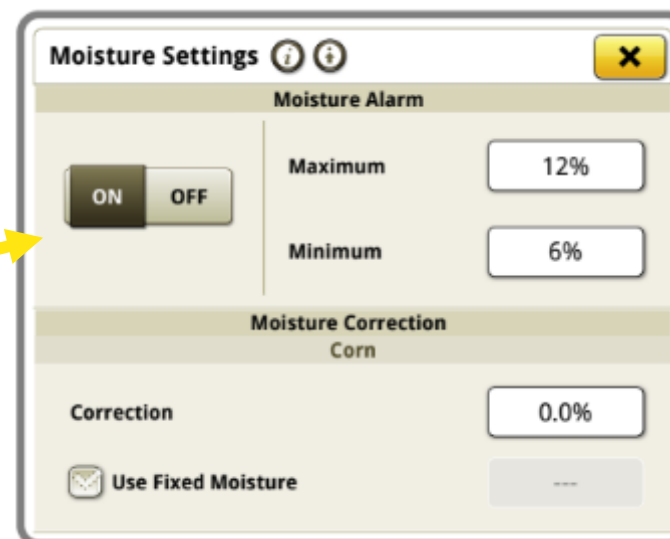
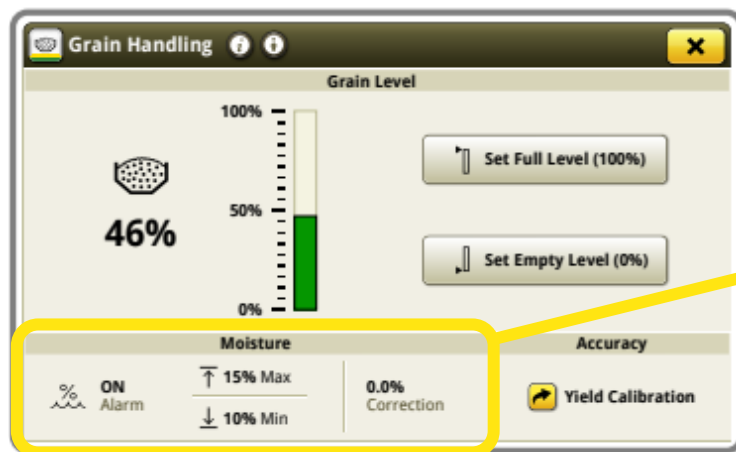
Harvest Smart

Active Terrain

Machine Sync

## Moisture Sensor

- The Moisture sensor is mounted on the clean grain elevator.
- If Calibration is needed, that is in the calibration menu. Ensure the sensor is clean and bypass is empty before calibrating
- For Correction, offset and alarms, this all can be found in the Grain Handling App on the display







Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

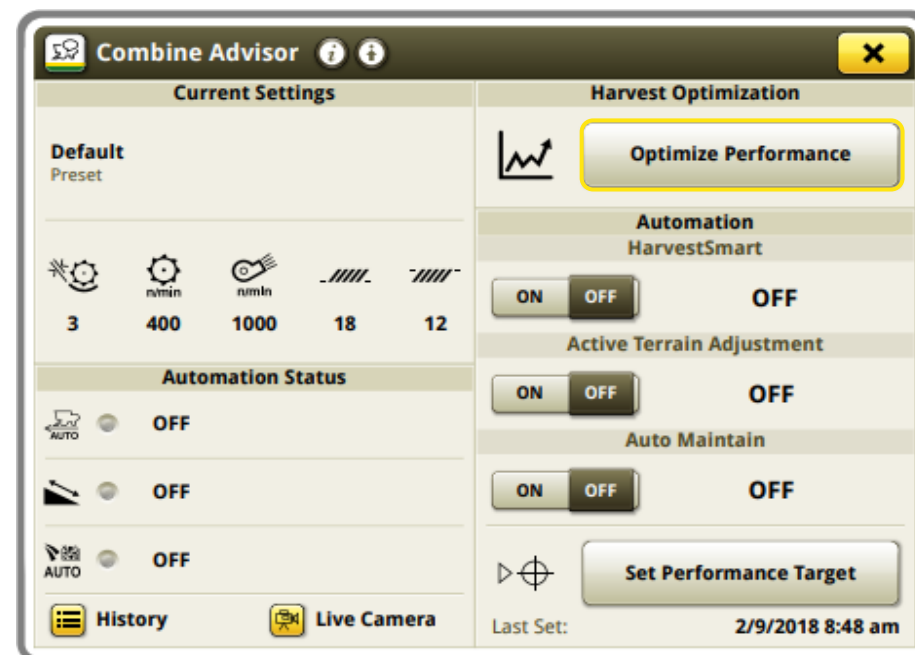
Harvest Smart

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Machine Sync

## Optimize Performance

- Optimize Performance helps the user optimize the machine by providing recommendations for settings adjustments based on the user reported issues
- Optimize Performance works in all crop types
- To use, press “Optimize Performance” on the Combine Advisor Page and follow the prompts

**Combine  
Advisor**

Reporting Issue

Solving an Issue





Grain Loss

Yield/Moisture

Optimize Performance


Auto Maintain

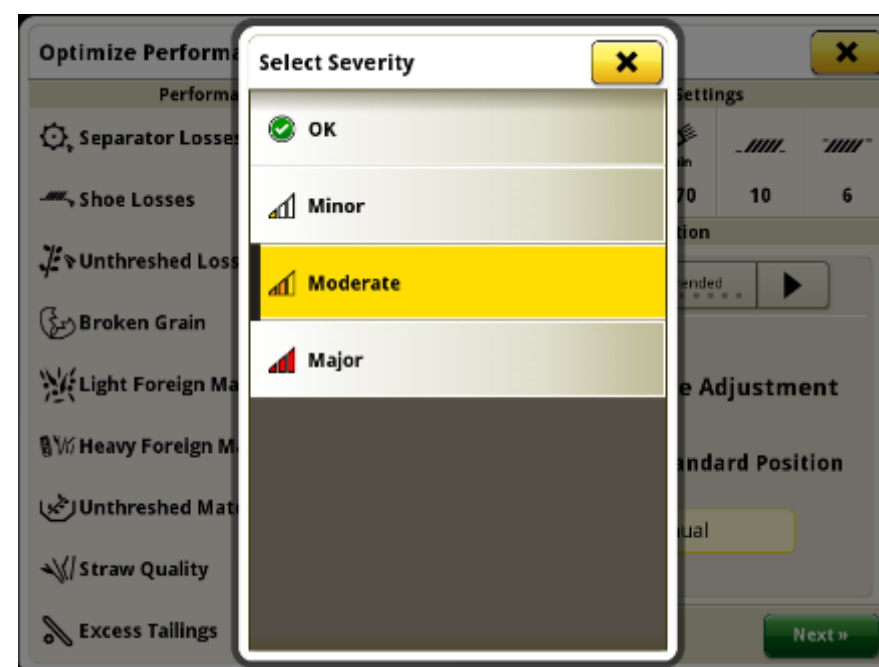
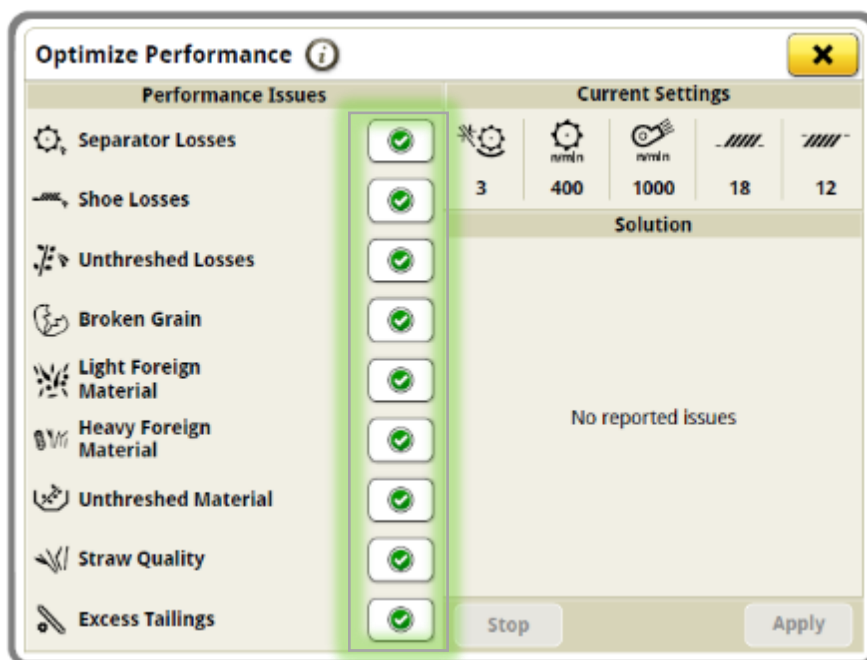
Harvest Smart

Active Terrain

Machine Sync

## Reporting an issue

- To begin, select any of the  to report the issue severity
- Multiple issues can be reported at once
- Once the issue(s) have been reported, Optimize Performance will generate recommendations based on the current settings and the crop being harvested



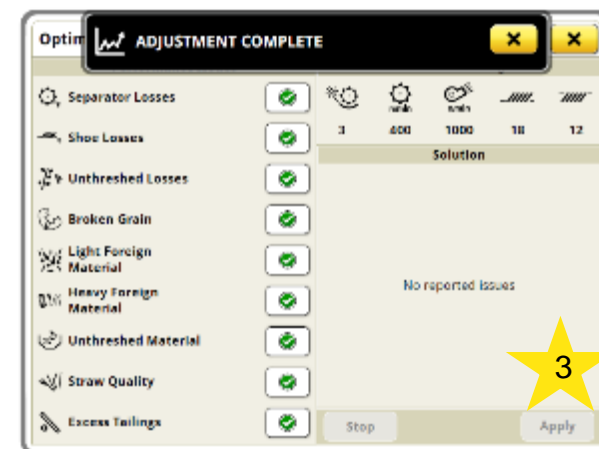
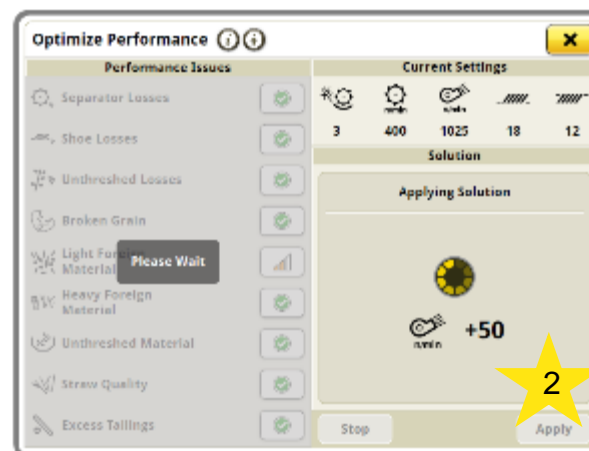
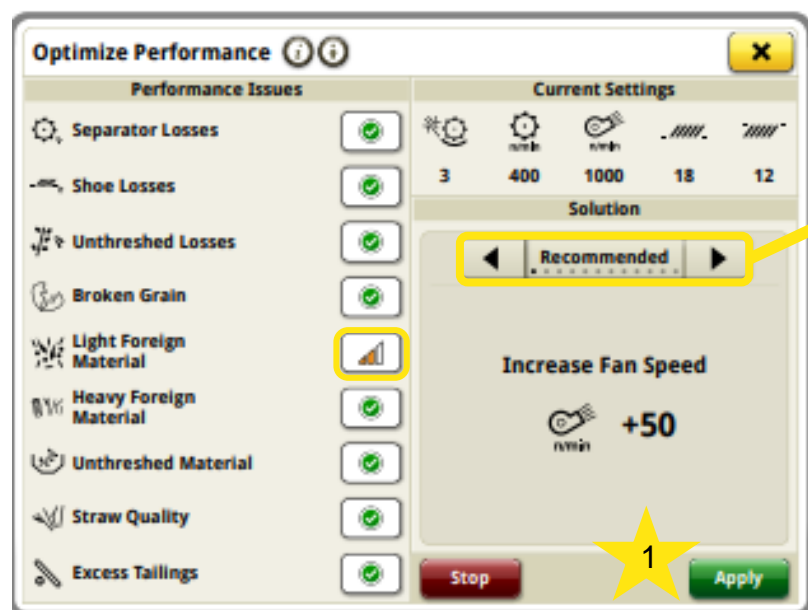
Reporting Issue

Solving an Issue

[Grain Loss](#)
[Yield/Moisture](#)
[Optimize Performance](#)
[Auto Maintain](#)
[Harvest Smart](#)
[Active Terrain](#)
[Machine Sync](#)

## Solving an issue

- Once an issue is selected, Optimize Performance will develop a list of recommendations to solve them
- Use the arrows to cycle through suggested recommendations, or press recommended to see all
- Press “Apply” to 1 or all suggestions until issue is resolved
- If another issue arises, Optimize Performance can be used at any time







Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

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## Auto Maintain

- Auto Maintain is a system use to maintain combine performance across the day through changing conditions, where in the past these settings would need to be changed manually
- Auto Maintain is designed to function in Corn, Soybeans, Wheat, Barley, and Canola
- The Crop modifiers matter for Auto Maintain
- Canola and Corn have Wet/Dry presets
- Threshing and straw conditions modify the algorithm for their conditions



Combine Advisor



**Combine Advisor**

**Current Settings**

Dry Preset

8 880 1170 10 6

**Automation Status**

Ready

Monitoring

Monitoring

**Harvest Optimization**

Optimize Performance

**Automation HarvestSmart**

ON OFF 4.0 mph

**Active Terrain Adjustment**

ON OFF 0.4°

**Auto Maintain**

ON OFF ✓

Set Performance Target

History Live Camera

Last Set: 3/21/2019 5:10 pm

Load Harvest Settings

**Preset**

Wet

**Threshing Conditions**

Difficult

**Straw Conditions**

Brittle

**Settings Preview**

	Current	New
14	14	---
n/min	750	---
n/min	750	---
12	12	---
4	4	---

Save Preset Cancel OK

Setting Target

Acquiring Target

Automated  
Adjustments

Sensitivities

Performance History

ActiveVision



Grain Loss

Yield/Moisture

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Auto Maintain

Harvest Smart

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Machine Sync

## Setting Performance Target

### What is a Performance Target?

- A Performance Target tells the system what the user defines as acceptable grain loss and grain quality

### A Performance Target will set or save:

- HarvestSmart™ targets and calibration
- Auto Maintain Grain Loss and Grain Quality targets

### When Should You Set Performance Targets?

- Changing to a new field that has different conditions
  - I.e. change in Yield, Moisture, Variety, Crop Type
- Once optimized, press “Set Performance Target”
- This will take 5-15min depending on productivity, to speed up process harvest on level ground and minimize starting/stopping
- One target saved/crop

### Bad Target = Bad Performance

- Setting a poor performance target on a non-optimized machine will result in poor system performance.





Grain Loss

Yield/Moisture

Optimize Performance

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## Acquiring Performance Target

### How Long does it take?

Dependent on Mass flow rate and how many images the camera sees - -the higher bu/hr the faster it will acquire

### The combine must be in “Steady State” to acquire targets:

- High Idle
- >0.25km/h or >0.15mph
- Header below recording height
- A settings change is not being commanded
- Ground speed, Rotor Pressure and Mass flow not erratic
  - Acquiring a target in lodged crop may take a while

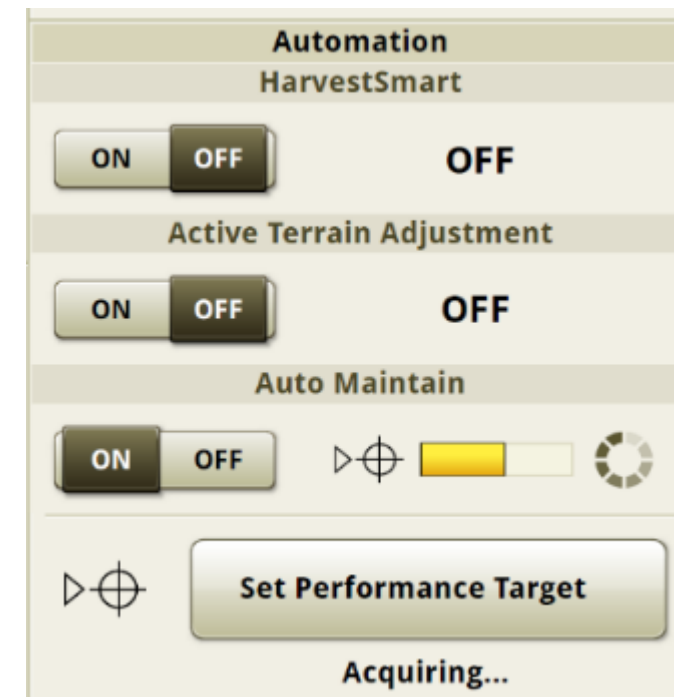
### Time Harvesting in “Steady State” is important

More time in “Steady State” = Faster Target Acquisition

Frequenting stopping or adjusting ground speed slows down acquisition time

If ATA is on and commanding settings changes it can slow down acquisition time

Temporarily turn off until target is acquired







Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

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Machine Sync

## Automated Adjustments

When Auto Maintain makes settings changes, there are 2 types of issues it identifies in the background:

### Long Term Issues:

- Permanent changes accounting for large condition shifts
- Less frequent
- Ex. Afternoon to evening

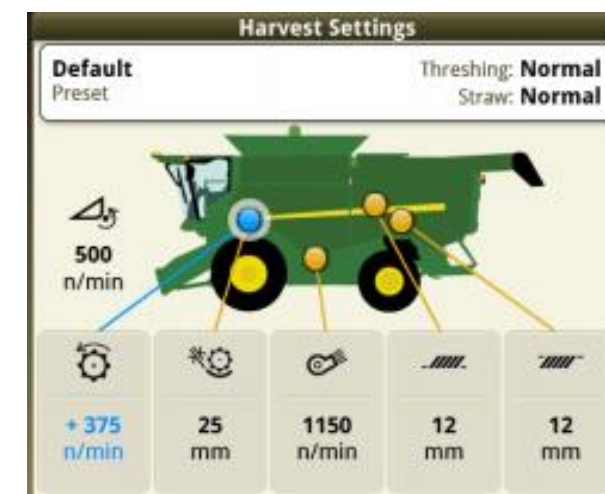
### Short Term Issues – Auto Maintain Offset

- Temporary adjustments to account for short term condition changes
  - Ex. Spot on field was tougher threshing and needed to close concaves
- These are more frequent, and settings changes may revert as conditions change across the field
- If the system finds itself repeating many of the same settings changes, it will make the change permanent

- Settings in **Blue** indicate an offset is being applied

History ⓘ ⓘ

Performance Active Completed			
Feature	Reason	Completed	
AUTO Auto Maintain	Foreign Material Light	10 mins ago	
AUTO Auto Maintain Offset	Grain Loss	11 mins ago	
Active Terrain Adjustment Offset	4.2°	26 mins ago	
AUTO Auto Maintain Offset	Grain Quality	3 hrs ago	
AUTO Auto Maintain Offset	Grain Loss	3 hrs ago	
Active Terrain Adjustment Offset	2.3°	3 hrs ago	





Grain Loss

Yield/Moisture

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## Sensitivities

**Response Aggressiveness:** Based on Bu/Hr – controls the time between adjustments

**When to Lower:** High Bu/Hr crops like corn if making too many adjustments

**When to Raise:** Low Bu/Hr crops like Canola, to speed up adjustments

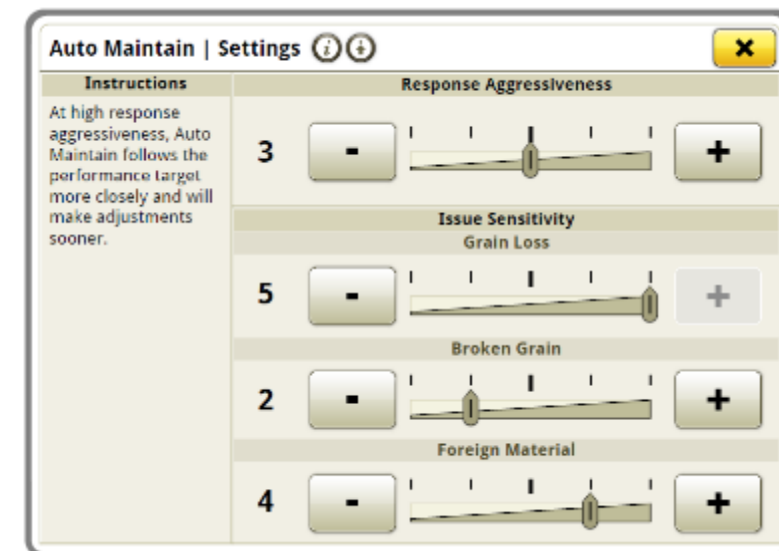
**Issue Sensitivity:** Sliders change the threshold of when a settings change will be made to resolve an issue “How severe should the issue be before it needs to be fixed”

**When to Lower:** User wants system to react slower to issues

Makes deadband wider – A larger change is needed before a setting is changed

**When to Raise:** User wants system to react sooner to issues

Makes deadband tighter – A smaller change is needed before a setting is changed



As a rule of thumb, increase sensitivities for issues that matter most to user and decrease less important issues.

If in Canola and only care about grain loss, increase grain loss and lower broken/FM

If user is questioning system changes like opening concave due to broken grain, and sample is fine, decrease sensitivity



Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

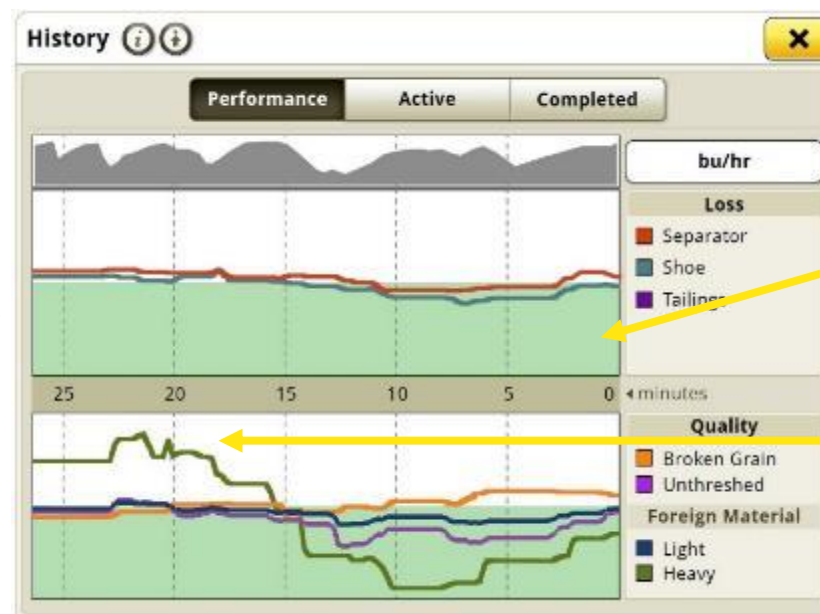
Harvest Smart

Active Terrain

Machine Sync

## Performance History

- The Performance History provides a graphical view of three performance metrics over the last half hour
  - Throughput/Productivity/Yield (user can choose one of these three options)
  - Grain Loss
  - Grain Quality (not all grain quality metrics recorded in every crop)



Green is good- machine is at or below performance target

If sensitivity is set to 1, line will need to be high for system to begin solving issue





Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

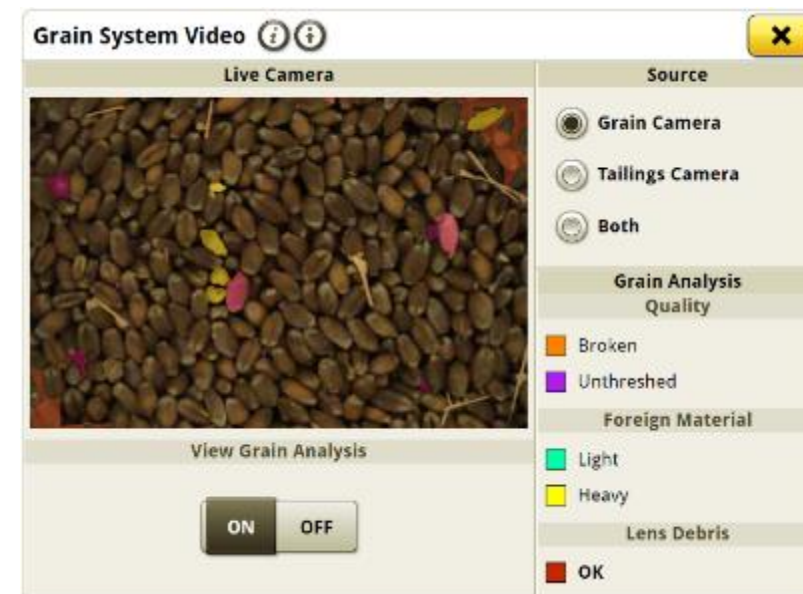
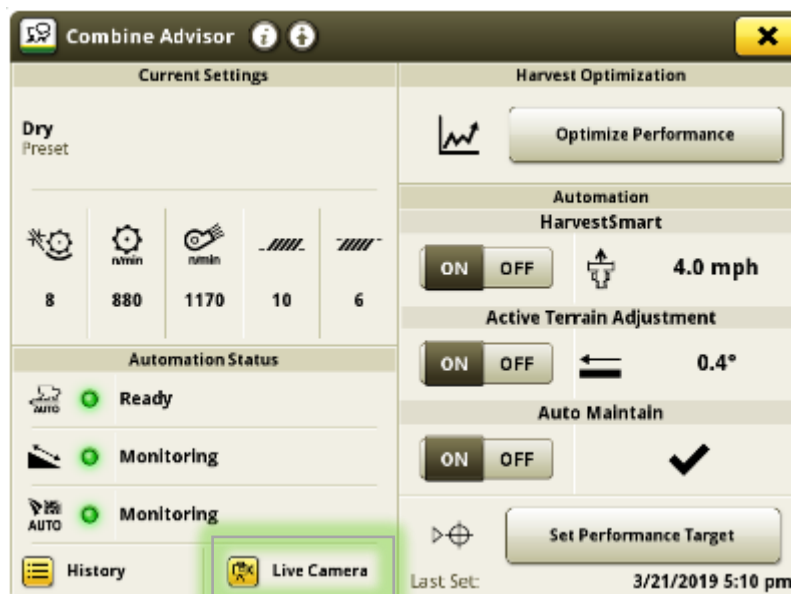
Harvest Smart

Active Terrain

Machine Sync

## ActiveVision Cameras

- The clean grain and tailings cameras can be accessed to show live images of material flowing through the elevators
- For the 5 supported crop types, grain analysis may be turned on to identify the grain quality parameters
- Lens debris has 3 stages; OK, Moderate, or Severe





Grain Loss

Yield/Moisture

Optimize Performance

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Machine Sync

## HarvestSmart™

- HarvestSmart™ is a “cruise control” system for the combine
  - Helps keep combine full and operating at loss or engine power limit.
  - When used, it can increase productivity and reduce operator stress over a long harvest.
- HarvestSmart™ uses a combination of engine power, rotor load, and loss sensors for its speed control inputs.





Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

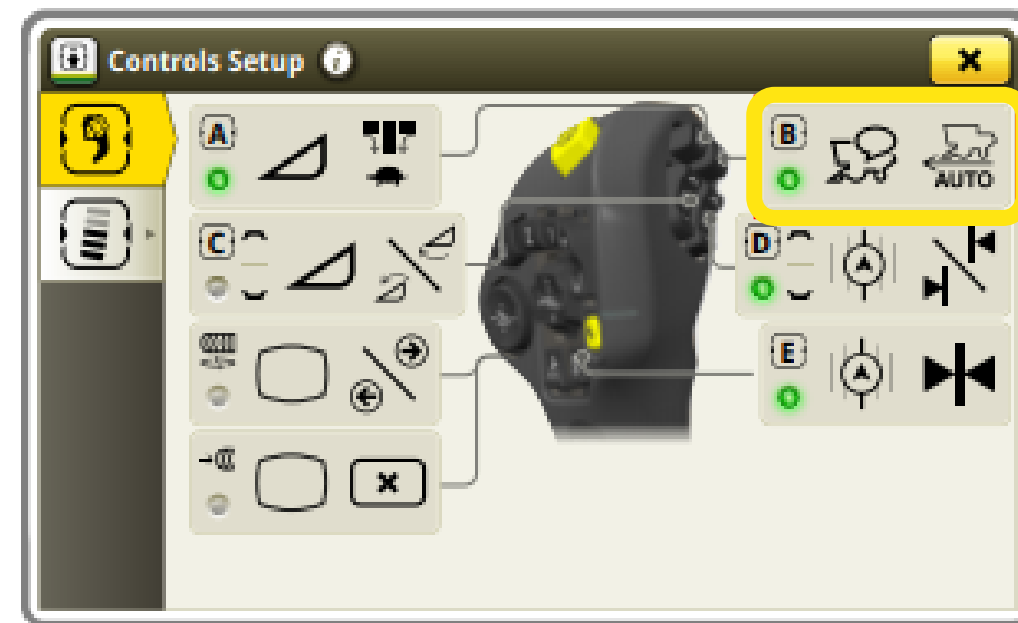
Harvest Smart

Active Terrain

Machine Sync

## HarvestSmart Engage

- HarvestSmart™ is engaged using the re-configurable buttons on the Multifunction Lever
- The reconfigurable comes pre-associated to the Multifunction Lever Button B, or can be configured to your liking on another button
- To Engage the system, pull into crop and when the combine gets up to speed and the rotor loaded, engage the system (~100ft).
  - Similar to engaging cruise control on your car when you get up to speed on the highway



\* If an operator prefers the legacy mode of engagement of using the 2/3 buttons, there is an option to enable that in the Combine Advisor tuning parameters screen but erratic behavior during entering crop can occur.



Engagement

Setting Target

Ground Speed

Power Settings

Aggressiveness

SmartMode

Unloading





Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

Harvest Smart

Active Terrain

Machine Sync

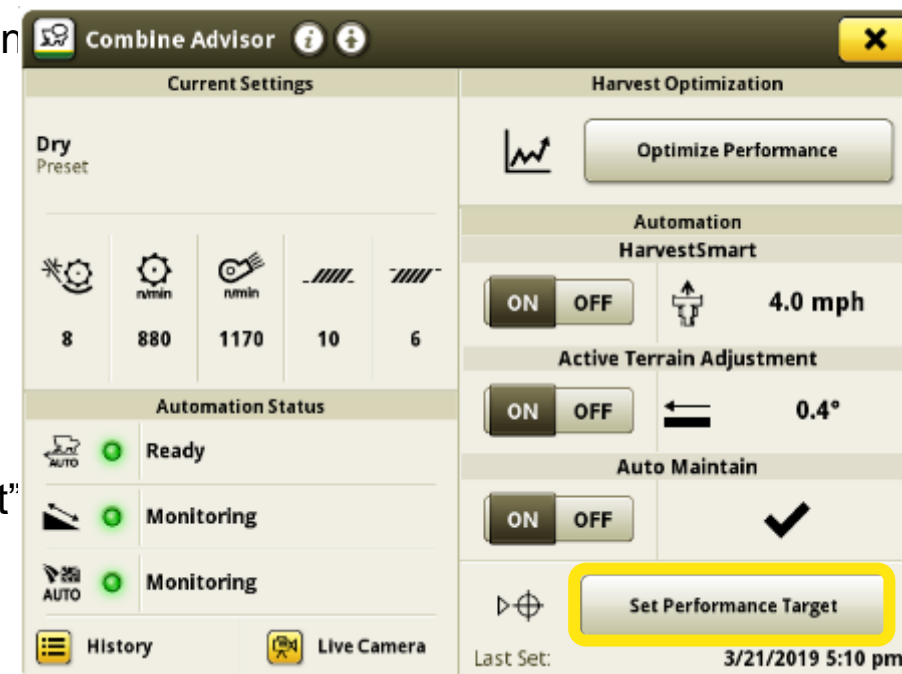
## Setting Target

HarvestSmart™ requires the user to set a performance target

- This lets the system learn the crop conditions to understand the balance between rotor and engine power.
- While harvesting, if the load at the rotor or engine become excessive, the machine will slow down
- The target for HarvestSmart™ is acquired relatively quickly and the target for Auto Maintain will continue to acquire
- For *Smart Mode*, the grain loss targets are acquired here as they are the same targets Auto Maintain uses for grain loss

To set target, get combine up to harvesting speed and push “Set Performance Target”

- If running at the top end of each rotor gear range (1<sup>st</sup> -520, 2<sup>nd</sup> - 800, 3<sup>rd</sup> 1300rpm) and experiencing issues with HarvestSmart Control, the rotor sheave gap may need to be re-set to 10mm
  - If running near 520 or 800 Rpm on rotor, it is best to be in the next highest gear to allow more movement in the rotor drive variable.





Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

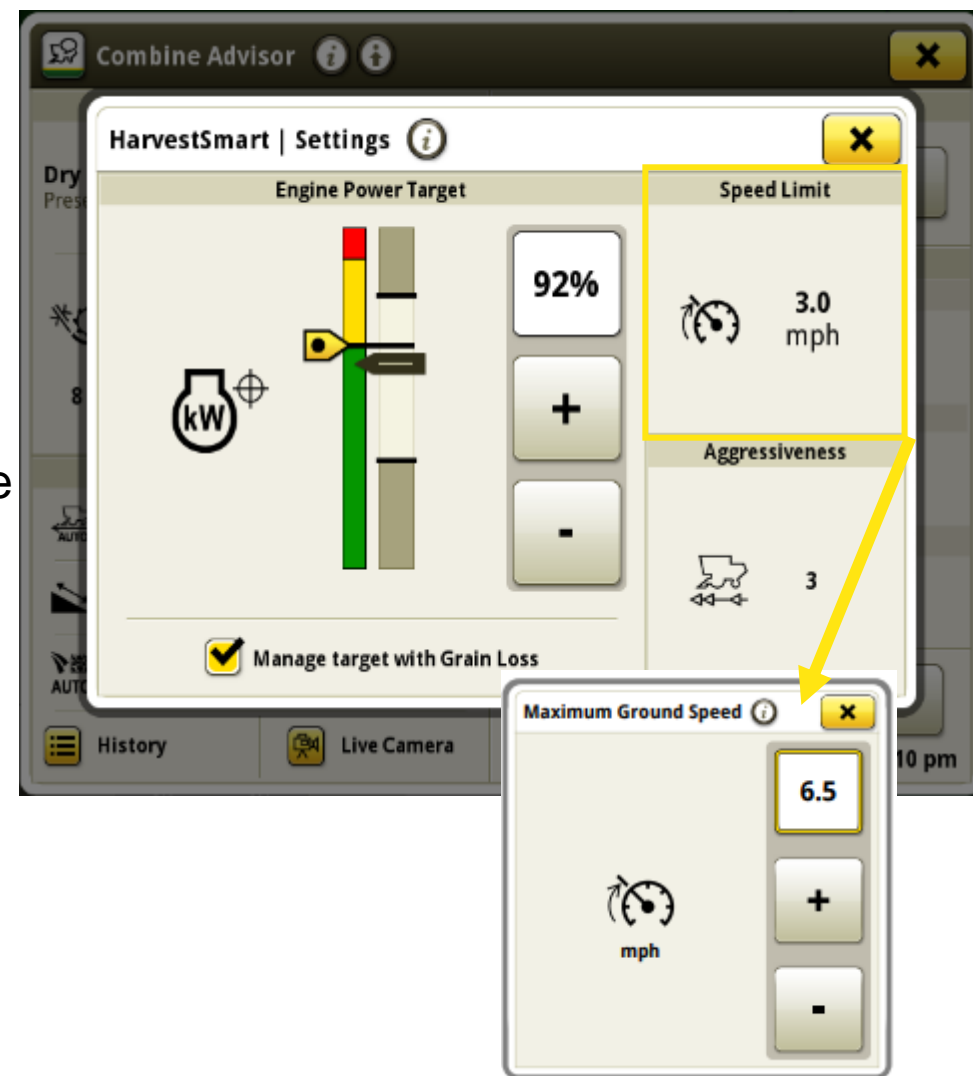
Harvest Smart

Active Terrain

Machine Sync

## Ground Speed Settings

- The Ground speed limit of the system can be adjusted from 1.2mph and 8.7mph
- It is recommended to keep this 0.5-1.5mph above your average harvesting speed
- This value should always be above average harvesting speed to improve operator comfort as machine transitions from heavy to light crop.
- If running at speed limit continually, increase your speed limit and lower power target to achieve desired speed
  - HarvestSmart is designed to maintain the engine power target and system will perform better that way.
  - Speed Limit is designed for when machine temporarily encounters low yielding conditions or crop gaps
  - Lower engine % power to run at desired ground speed



Engagement

Setting Target

Ground Speed

Power Settings

Aggressiveness

SmartMode

Unloading



Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

Harvest Smart

Active Terrain

Machine Sync

## Engine Power Settings

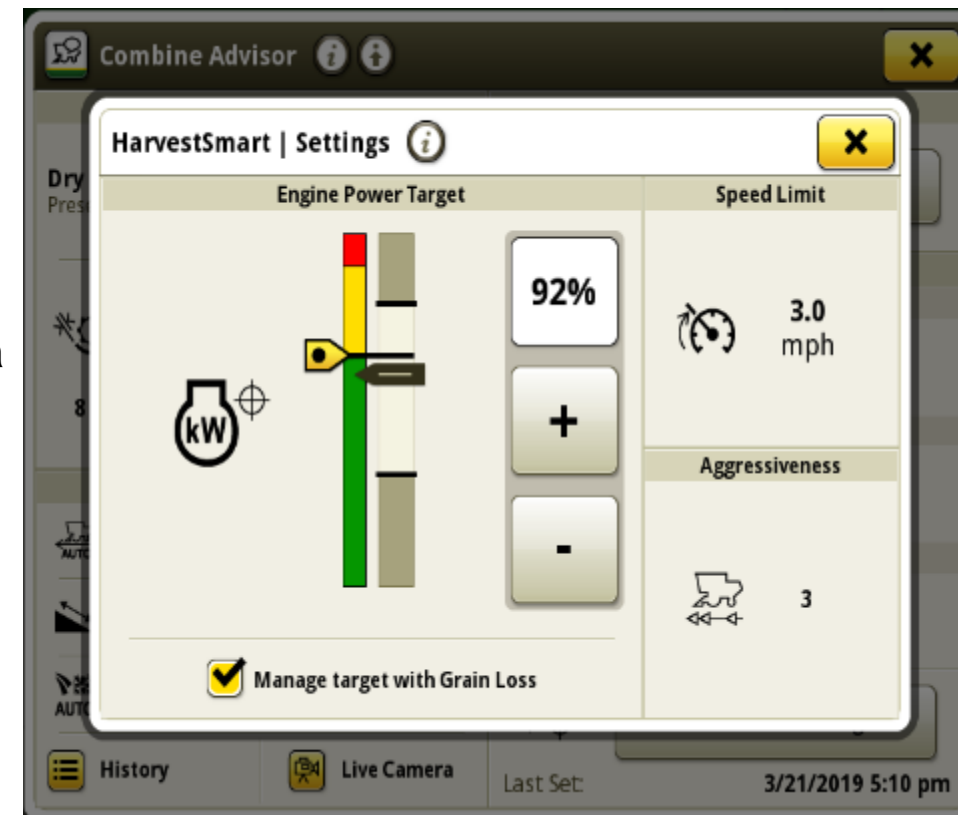
For best performance set Engine Power target to: (assuming not loss limited)

- 90% - 100% in consistent conditions
- 85% - 95% in variable, high straw yield conditions
- 75% - 85% in tough feeding conditions / down crop

With changing straw conditions, down crop or rolling terrain, HarvestSmart™ can find itself going over 100% power. If this occurs, lower 1% at a time until a point is found where the system is stable and performs as desired.

Like cruise control on a car has limitation in the city/traffic, HarvestSmart™ has limitations in:

- Steep Slopes
- Wet/Muddy ground
- In tough, down crop and erratic conditions
- While there are some limitations, in many conditions HarvestSmart works well and can provide less fatigue and higher productivity over long harvest days



Engagement

Setting Target

Ground Speed

Power Settings

Aggressiveness

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Unloading





Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

Harvest Smart

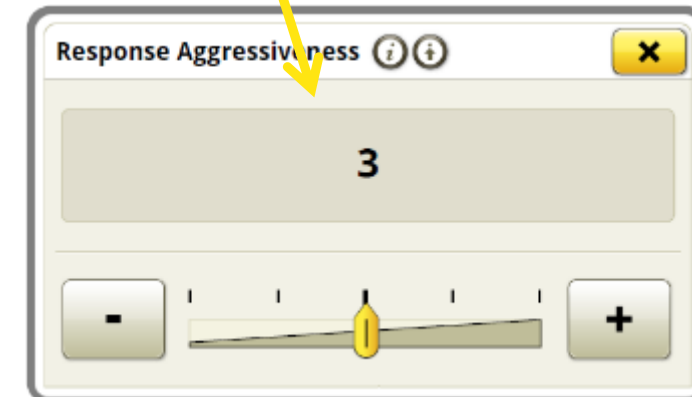
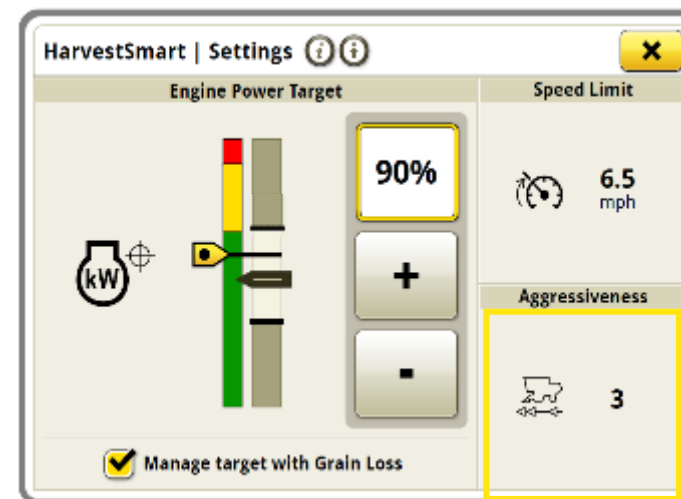
Active Terrain

Machine Sync

## Aggressiveness Settings

HarvestSmart™ system aggressiveness can be used to adjust how aggressive it changes speed when holding power targets.

- Aggressiveness can be set from 1 to 5 and is defaulted to 3
- **Higher aggressiveness (5)** - The system will maintain the Engine Power Target better but could be less comfortable to the operator.
- **Lower aggressiveness (1)** – The system will provide a smoother ride but have worse target tracking. Not recommended to decrease aggressiveness with a high Engine Power target.



Engagement

Setting Target

Ground Speed

Power Settings

Aggressiveness

SmartMode

Unloading



Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

Harvest Smart

Active Terrain

Machine Sync

## Manage with Grain Loss “Smart Mode”

This feature can be used with or without Auto Maintain.

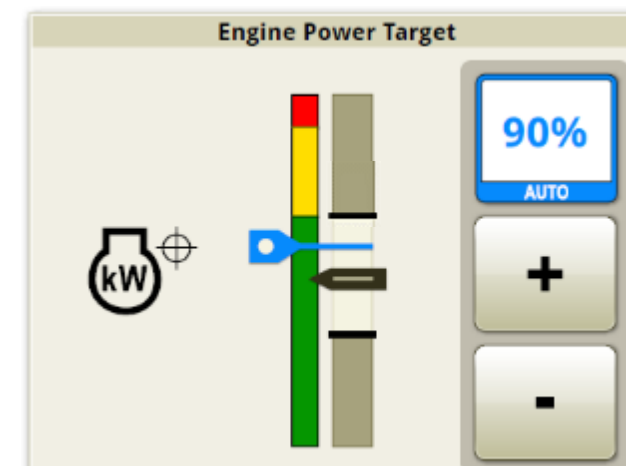
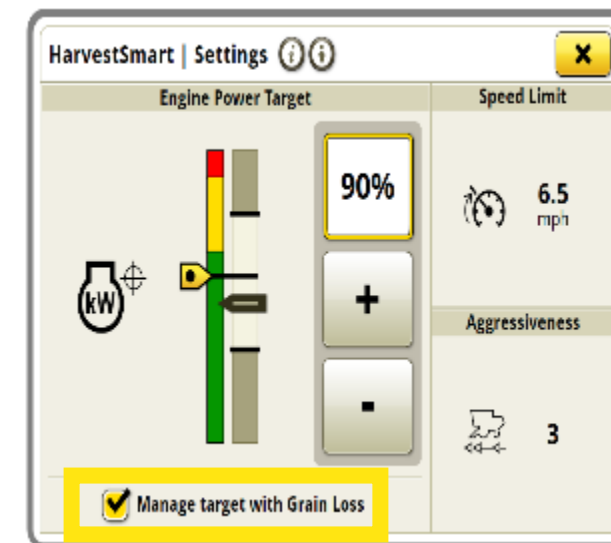
- When paired with Auto Maintain, the system will adjust combine settings first to not decrease ground speed and reduce productivity. In some severe cases when settings adjustments are not be enough to address rising losses, the engine power target may start to decrease sooner than machine settings.
- When managed without Auto Maintain, the Engine Power will be adjusted for all grain loss issues.
- The engine percentage will turn **Blue** indicating that the machine is automatically adjusting the engine power target to maintain loss levels
- If losses are high, the %Power target will lower, slowing the machine down. If losses are reduced, the %Power target will increase, speeding the machine up.

Manually adjusting the Engine Power Target will automatically disable “Manage target with Grain Loss” as the operator is manually overriding the automatic management. The option can be re-selected after adjustment

### All MY18+ machines no longer use grain loss targets from the VisonTrak

These targets are obtained from the Auto Maintain Performance Target, which is a more filtered/stable representation of grain loss.

Smart Mode will work in crops not supported by Auto Maintain (peas/lentils/etc.)



Engagement

Setting Target

Ground Speed

Power Settings

Aggressiveness

SmartMode

Unloading



Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

Harvest Smart

Active Terrain

Machine Sync

## Unloading with HarvestSmart

- When unloading with HarvestSmart engaged, the system will pause and maintain its current ground speed.
  - If the engine load becomes too excessive the system will slow the machine down at that point.
  - Once the unloading auger is shut off, the system will resume control.
- 
- If the Multifunction control lever position is moved, the system will dis-engage and once done unloading, the system will need to be re-engaged.
    - Due to being focused unloading the operator may not notice this or may have accidentally moved the control lever
    - Pushing the button again after the unloader is shut off ensures the system is re-engaged.



Engagement

Setting Target

Ground Speed

Power Settings

Aggressiveness

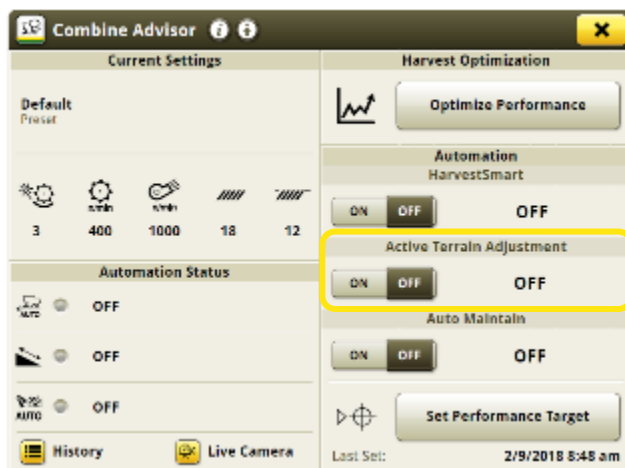
SmartMode

Unloading

[Grain Loss](#)
[Yield/Moisture](#)
[Optimize Performance](#)
[Auto Maintain](#)
[Harvest Smart](#)
[Active Terrain](#)
[Machine Sync](#)

## Active Terrain Adjustment

- Active Terrain Adjustment (ATA) is a system to automatically control the chaffer, sieve and cleaning fan as the combine harvests up and down hills.
- Active Terrain is available to use in all crops
- Automatic adjustment of these settings allows for the combine to maintain shoe losses, grain quality, and tailings as it traverses hills.







Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

HarvestSmart™

Active Terrain

## Sensitivities

Active Terrain allows the operator to customize how the system responds to terrain

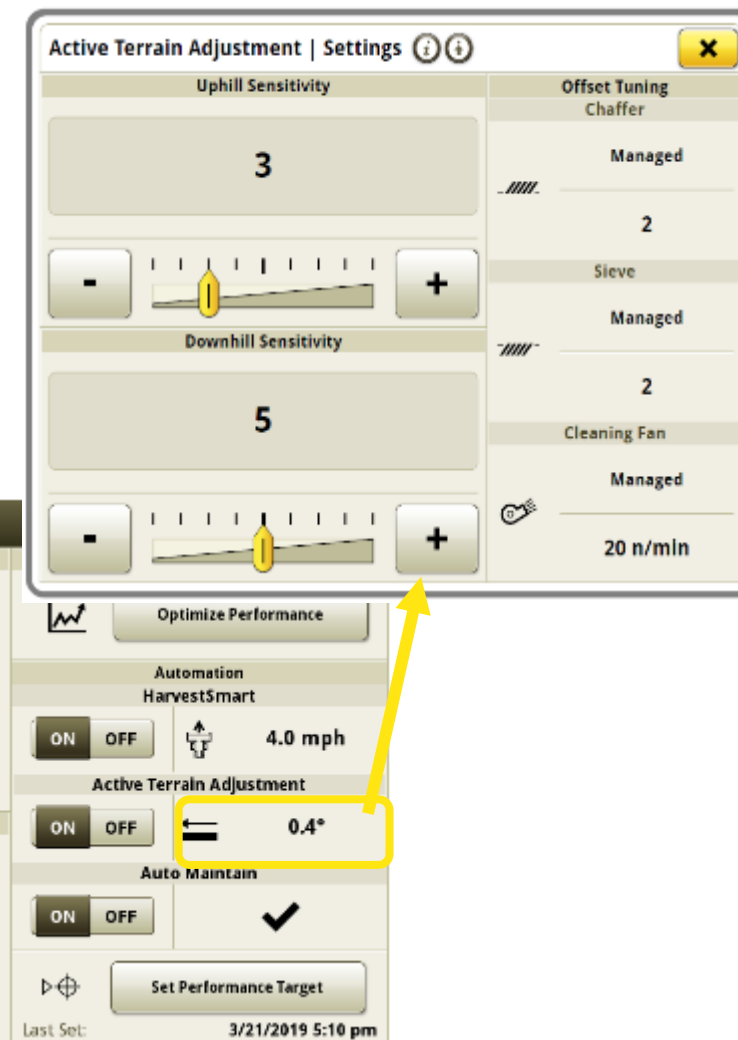
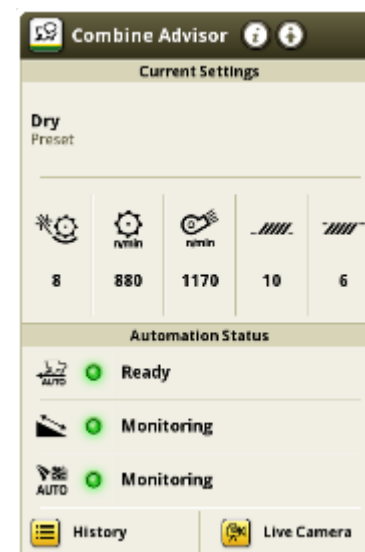
- In the Active Terrain settings menu is where the adjustments can be found
- If not satisfied with the changes Active Terrain is making at slopes 8° and lower, adjusting sensitivities can usually solve these issues

### Increase Sensitivity:

- Operator feels the system should begin making settings changes at 2° instead of 4°
- Going downhill, user wants fan speed to be higher at 8° would increase downhill sensitivity to get fan at desired level

### Decrease Sensitivity:

- Operator feels the system should begin making settings changes at 6° instead of 4°,
  - In Canola, going uphill, the tank gets too dirty, can decrease sensitivity to not slow fan down as fast



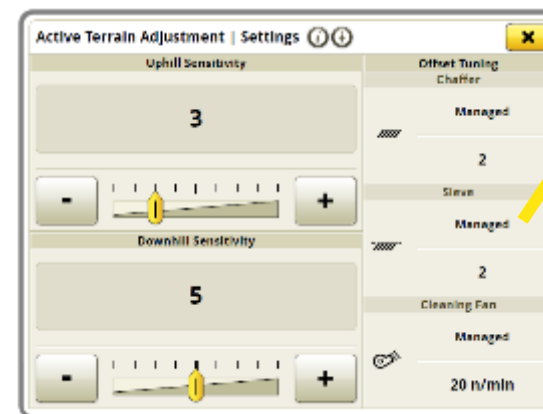
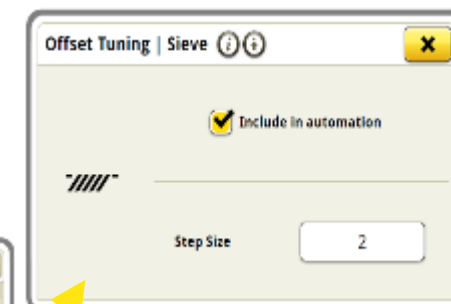
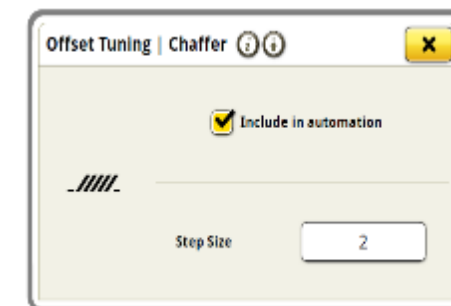
[Grain Loss](#)
[Yield/Moisture](#)
[Optimize Performance](#)
[Auto Maintain](#)
[HarvestSmart™](#)
[Active Terrain](#)

## Tuning

- Chaffer, Sieve, Fan can all be tuned to the customer liking.
- Chaffer and Sieve can be turned off and have Fan only adjustment
  - In Small grains, the chaffer can be turned off if the user finds that there are too many stems getting in the tank when going down hill

## Step Size

- If finding the offset of a setting is too high/low this can be adjusted
  - I.e. If going down hill and fan not going fast enough
- If the setting offset is too high or low above 8° changing the step size is usually the way to solve it.
  - $50\text{rpm} * 4 \text{ offsets} = 200\text{rpm}$
  - $20\text{rpm} * 4 \text{ offsets} = 80\text{rpm}$
  - For these large changes in speed, the sensitivities cannot be changed to accomplish this (if needed)





Grain Loss

Yield/Moisture

Optimize Performance

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Machine Sync

## Machine Sync Best Practices

### Attachment – BPF12005

Additionally, H119187 x2 (foam seal) and HXE157904 (bracket)

**Adjust AutoTrac Line sensitivity** – On Tractor, Set Heading on to 50 to reduce “s-ing”

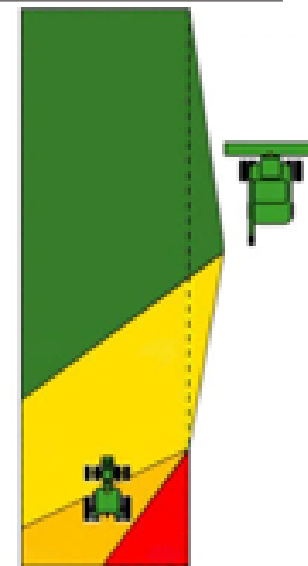
**IVT Transmission** -- Set maximum speed to ~2x harvesting speed

### Engagement:

When approaching the combine, enter the operational zone from behind the Leader, at a higher rate of speed than the combine. Make sure the tractor's set speed is set higher than the combine's travel speed (1+mph), and throttle is in the full throttle position. This ensures that the tractor can effectively acquire the combine.

- The tractor coming in faster reduces need for tractor to shift up during unloading
- To avoid an “Increase set speed” message, it is recommended to have Follower machines running full throttle and set the maximum speed to approximately double the expected harvest speed

**Home Point Suggestions-** On 1000bu carts and smaller setting the home point to dump in the front first  
On 1500-2500bu carts, set the home point to the center and nudge front or back depending on how full the cart is





Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

HarvestSmart™

Active Terrain

Machine Sync

## Machine Sync Best Practices – PowerShift

Machine Sync on PowerShift transmission will not perform like an IVT transmission. This is due to the transmission shifting gears in order to acquire the home point while maintaining low engine RPMs

**6-8 Series** – Machine Sync Speed sensitivity adjusted to 1 to reduce speed surging

**9 Series** – Machine Sync Speed sensitivity for steering and speed set to 50% to reduce acquisition time

Machine Sync Speed Sensitivity settings may need to be adjusted to account for tractors that experience transmission surging while trying to maintain the home point. Adjust Speed Sensitivity value higher until machine surging occurs, then reduce by values of 10 until ride quality is acceptable. Lowering the speed sensitivity value too low will cause the machine to be less responsive to nudge and Leader speed changes.

### Transmission settings

Transmission Set to full AUTO

In the tractor Transmission Settings, make sure there are no maximum RPMs restrictions set.

ECO mode off

Hand Throttle at 100%

***Minimum speed requirement for 9xxx series articulated tractors is 2 km/h (1.2 mph) in acquiring, tracking, and setting Home Point.***







Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

HarvestSmart™

Active Terrain

Machine Sync

## Machine Sync Best Practices – Dis-Engagement

When disengaging Machine Sync after actively tracking, the tractor will override the set speed to the last known speed of the combine when disengaged by manually turning the steering wheel. This requires the operator to manually adjust the set speed for transport across the field. Instead of frequent adjustments to set speed, Machine Sync can also be disengaged through the following methods:

**In a PowerShift transmission** equipped tractor, bump the shift lever up or down, or select Set Speed 1 or Set Speed 2 buttons to disengage Machine Sync.

When disengaging Machine Sync from Leader, it is recommended for the tractor to speed up or shift, out and away from the combine. Otherwise, the set speed will automatically change to the speed of the combine when the disengagement occurs

**In an IVT equipped tractor**, manually move the speed control lever from the F1 position to F2 or use set speed adjuster to increase the set speed.





Grain Loss

Yield/Moisture

Optimize Performance

Auto Maintain

HarvestSmart™

Active Terrain

Machine Sync

## Nudging

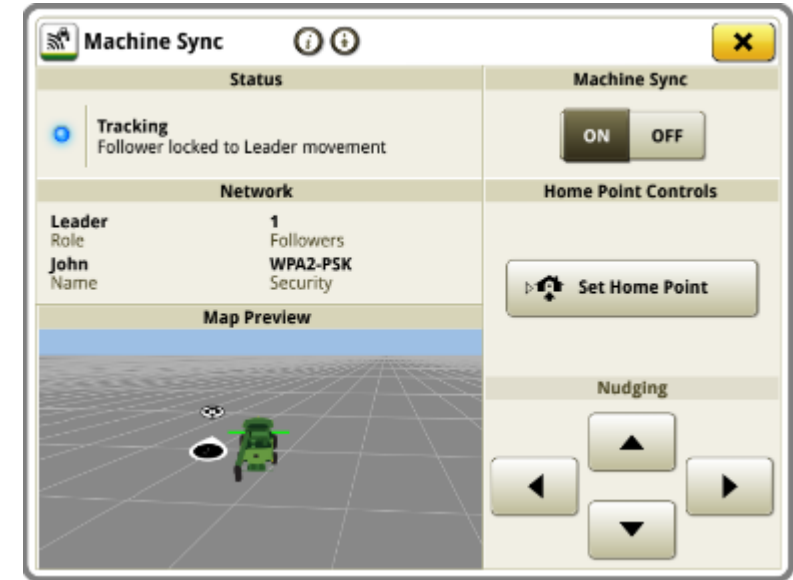
Nudging is a feature to move the tractor left/right forward back relative to the combine.

Set the home point with the pivoting spout in its middle position to ensure grain falls where desired

If Home point is set to the middle of the cart, when the cart approaches, it can be nudged quickly before unloading forward or backwards for proper cart fill

While nudging left/right can be done, it is best to let the pivoting spout move the pile and limit left/right nudging, especially on articulated tractors

3ft is a good starting number for front/back nudging distance



## Select the crop type you are harvesting



**Canola**



**Wheat**



**Corn**



**Oats**



**Rye**



**Soybeans**



**Barley**



**Lentils**



**Peas**



**Rice**



**Flax**

## Wheat

	Setting
Feeder House Sprocket	18t
Feed Accelerator gear	2nd
Concaves	Small Wire, or Large wire in 3 <sup>rd</sup> position
Separator Grates	No-spacer Remove blanks if tough conditions and have rotor loss
Shoe Elements	General Purpose or FTC chaffer
Front Chaffer	25mm
Active Tailings	Small Grains

- As conditions get tougher in the evening, counter knife may need to be engaged more to maintain chop and spread quality
- In hard threshing wheat, ensure Active Tailings concave is zeroed properly
- In hard to thresh conditions, 4 concave covers at 10-15mm concave can net better performance than 0-2 covers with a tight concave and high rotor speed.
  - Closing the concave with high rotor speeds increases rotor power significantly and can reduce throughput
- If setting grain loss target during the day and losses are low (ex. 0.2bu/ac) when losses double, the grain loss bars will be full range.





## Wheat - NA

	<10%	15%	20%
<b>Rotor (RPM)</b>	1100-1200	1000-1200	1000-1100
<b>Concave (mm)</b>	10-15	10-15	15-25
<b>Fan (RPM)</b>	950*	950*	1050*
<b>Chaffer (mm)</b>	15*	15	18
<b>Sieve (mm)</b>	6*	7*	7-12

*\*Suggested starting setting*

- With FTC Chaffer, Settings should be 18-20 (as much open as possible)
- In hard to thresh wheat, if needing to run 1300rpm and <5 concave to thresh, consider adding more concave covers to for threshing to allow more open concave and lower rotor speeds. Fast Rotor + Tight concave = More power. Especially as straw gets tough in evening
  - Longer/less processed straw is easier to separate grain than highly processed straw
- If cleaning shoe limited in dry conditions, consider adding 1 separator grate cover
- Running a tight sieve to clean white caps can limit chaffer air flow and increase grain in tailings (lowering capacity)
- If wheat hulls are experienced in the grain tank, and increased fan speed does not remove them, decrease threshing clearance to increase threshing as they are most likely unthreshed white caps.



## Header

### Cutterbar:

Fine tooth sections are best

Coarse tooth sections can cut wheat but may notice flagging at higher ground speeds in dry conditions not leaving as clean of a cut as the fines.

Ensure hold downs are adjusted properly

If top augers are installed, ensure spinning faster than belts to prevent slug feeding

### Reel:

With flip over kit installed, may see some crop carry over at higher ground speeds in dry wheat

Adjust reel pitch to less aggressive setting to prevent carry over

For down/lodged crop set “3” on the multifunction lever to position head to easily get down crop



## OSR

	Setting
Feeder House Sprocket	18t
Feed Accelerator	2 <sup>nd</sup> (1 <sup>st</sup> if dry stem)
Concaves	Small Wire
Separator Grates	No spacer 1 cover
Sieves	General Purpose/ FTC chaffer
Front Chaffer	25mm
Active Tailings	Small Grains (Closed)

### • **MAKE SURE OSR IS READY TO BE HARVESTED**

- Seeds should pop and fall out of the pod
- In each field, evaluate how hard the pods are to thresh by squeezing in hand to see how easy the pod is open. Expect this to change field to field or day to day
- Loss sensors may not pickup unthreshed losses, the chopper knives will thresh all pods when checking losses in spread
  - Raise chopper and ensure threshing fully
- OSR can be very difficult to harvest due to how different the plant can be across varieties and timing during the harvest season
  - Expect settings changes with variety and maturity changes
- It is recommended to start out with 1 separator grate cover installed for all conditions and add a seconded as needed, especially if dryer conditions.
  - Can leave 1 in for wheat, Many times separator performance in wheat won't be limited by 1 separator cover unless 100+bu or green straw.
- With the high speed of the loading auger in the grain tank, chaff will be concentrated to the edge of the graintank/glass
- All chaffer cettings are for GP If running FTC Chaffer, fan may need 50rpm more and open chaffer ~3mm



**Straight cut/  
Conventional  
Settings**

**Pod Shatter  
resistant  
Settings**

**Windrow  
Settings**

## Conventional

	<6%	8%	12%
<b>Rotor (RPM)</b>	500+*	500+*	550*
<b>Concave (mm)</b>	25-35	20-25	20-25
<b>Fan (RPM)</b>	650-750	650-750	650-750
<b>Chaffer (mm)</b>	14*	14*	14*
<b>Sieve (mm)</b>	5*	5*	5*

*\*Suggested starting setting*

- Settings are for GP Chaffer If running FTC Chaffer, fan may need 50rpm more and open chaffer ~3mm
- If stalks are very green, may need to run slow/open settings to prevent breakage and release moisture in the stalk which causes the seed to stick to the stalks in the separator
- Grab pods to determine how difficult they are to thresh, if very easy to open and can shatter in wind 30+ is correct concave if need to squeeze in hand to thresh 20 is a good starting point



**Straight cut/  
Conventional  
Settings**

**Pod Shatter  
resistant  
Settings**

**Windrow  
Settings**



## Pod Shatter Resistant

Rotor (RPM)

Concave (mm)

Fan (RPM)

Chaffer (mm)

Sieve (mm)

<6%

650\*

10-20

650-750

14\*

5\*

8%

750\*

10-20

650-750

14\*

5\*

12%

750\*

10-20

650-750

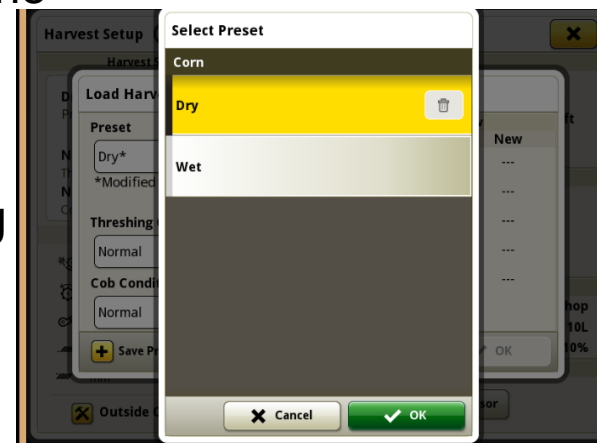
14\*

5\*

*\*Suggested starting setting*



- If stalks are very green and wet on the inside, may need to run slow/open settings to prevent breakage and release moisture in the stalk which causes the seed to stick to the stalks in the separator
- In general, the higher the grain moisture and greener the stalk the harder to thresh the pods will be, this is especially the case with “rubbery” canola stalks later in October
  - Fungicide application holds the plant alive longer and can lead to harder threshing as the plan dries down
- For AutoMaintain, set crop type to “Wet” canola in pod shatter to thresh more aggressively



Straight cut/  
Conventional  
Settings

Pod Shatter  
resistant  
Settings

Windrow  
Settings

## Draper Header

### Cutterbar:

Fine tooth sections are best

Ensure hold downs are adjusted properly, especially in green stalk conditions

Coarse sections can help in green stalks, but may cause more flagging in cereals

### Center feed Drum

High speed (if very dry and throughput not a concern, put in low to reduce possible shatter in the header)

### Top Auger

Ensure the speed of the flighting is slightly faster than the belt speed to have the augers pull the canola headfirst into center feed drum

### Reel

Depending on the Canola the way you run the reel might be vastly different. If canola is a taller hybrid, very dry and/or not shatter resistant Canola the reel needs to be up and back, so the reel fingers just very light brush Canola onto belts. Also, you will want to run reel at a slower speed, so you don't pre thrash the pods. If Canola is shatter resistant and wet, you may need to run the reel a lot more aggressive. Very similar to how you should run your reel in wheat. A higher reel speed would be needed to keep even feeding with the heavier cop mat.



**Straight cut/  
Conventional  
Settings**

**Pod Shatter  
resistant  
Settings**

**Windrow  
Settings**

## Barley

	Setting
Feeder House Sprocket	18t (may need 22T in dry conditions)
Feed Accelerator gear	2nd
Concaves	Small Wire or Small, Small Large
Separator Grates	No-spacer
Shoe Elements	General Purpose or FTC chaffer
Front Chaffer	25mm
Active Tailings	Small Grains

Dry barley straw can be very slick and feeder house conveyor chain may need to be in high speed to pull crop away from header

Ensure awns are properly threshed, if seeing partial awns in tank it could be breaking off in elevator

Remove separator grate blanks in tough conditions to separate more material if needed

Open active tailings if needed for grain quality



## Barley

**<10%**
**15%**
**20%+**
**Rotor (RPM)**

900\*

1000-1200

1100-1200

**Concave (mm)**

12-16

12-16

15-25

**Fan (RPM)**

850\*

850\*

850\*

**Chaffer (mm)**

15\*

15\*

18\*

**Sieve (mm)**

9\*

9\*

10-15

*\*Suggested starting setting*

- With FTC Chaffer, Settings should be 18-20 (as much open as possible)
- If cleaning shoe limited in dry conditions, consider adding separator grate cover
  - Maybe more cleaning limited if running large wire concaves
  - Barley awns can create “Carpet” over the chaffer when separator is creating too much chaff resulting in shoe loss.
- For Straw quality, Mini-Round bars or round bars could be added starting in 3<sup>rd</sup> position


**Barley  
Settings**



## Header

### Cutterbar:

Fine tooth sections are best

Ensure hold downs are adjusted properly

### Feed Drum:

Ensure in high speed,

In dry conditions, ensure drum is in lower position, cone flighting strippers set and timing correct for proper feeding

## BP15

Ensure feeding windrows evenly to combine

Consider double windrows if operation allows

Spreading full 70ft can be a challenge, but recommend installing wide shrouds for best opportunity



# Peas/Beans

	Setting
Feeder House Sprocket	18t
Feed Accelerator gear	2 <sup>nd</sup> (1 <sup>st</sup> for dry/low yielding)
Concaves	Roundbar/Large wire
Separator Grates	No-spacer
Shoe Elements	General Purpose or FTC chaffer
Front Chaffer	25mm
Active Tailings	Corn (open) position

For larger peas/beans, Roundbar or Large wires maybe needed to separate without damage

Many times, small wire with a large wire concave in the 3<sup>rd</sup> position is sufficient for separation and grain quality  
 If not, suggest putting Large Wire/Round bar in middle as well to minimize concave.

Minimize grain in tailings with a more open sieve to reduce grain recirculation and possible damage.

If green straw recommend Feed Accelerator to be in high speed

Check hold downs and knife daily in tough cutting conditions



## Peas/Beans

	<8%	11%	13+%
<b>Rotor (RPM)</b>	450*	450*	500+
<b>Concave (mm)</b>	30*	30*	25*
<b>Fan (RPM)</b>	950-1050	950-1050	950-1050
<b>Chaffer (mm)</b>	15*	15	18
<b>Sieve (mm)</b>	12*	12*	12*

*\*Suggested starting setting*

- With FTC Chaffer, Settings should be 18-20 (as much open as possible)
  - Pea vines may hairpin on louver tails in greener conditions
- If cleaning shoe limited in dry conditions, consider adding separator grate cover



## Header

### Cutterbar:

Fine tooth sections are best

Ensure hold downs are adjusted properly daily– Especially important in green straw

If desire is to leave some stubble can run with HDR on the gauge wheels with header tilted forwards

Raised skid shoes an option as well to leave longer stubble and keep knife out of rocks/debris

### Top Augers:

Ensure the speed of the flighting is slightly faster than the belt speed to have the augers pull the peas headfirst into center feed drum

### Center feed Drum:

High Speed in tough conditions,

Consider low speed in most conditions to limit pod shatter and header loss

### Reel

Start with reel fingers vertical over the cutterbar

Ensure reel-to-cutterbar position is set correctly





## Oats

	Setting
Feeder House Sprocket	18t (22t for tough conditions)
Feed Accelerator gear	2nd
Concaves	Small Wire, Small/Small/Large
Separator Grates	No-spacer
Shoe Elements	General Purpose or FTC chaffer
Front Chaffer	25mm
Active Tailings	Small Grains

Remove all separator covers for improved separation.



## Oats

	Straw Toughness		
	900	1000	1100
<b>Rotor (RPM)</b>	900	1000	1100
<b>Concave (mm)</b>	20	20	20
<b>Fan (RPM)</b>	750	750	750
<b>Chaffer (mm)</b>	15	15	18
<b>Sieve (mm)</b>	8	9	10

- With FTC Chaffer, Settings should be 18-20 (as much open as possible)
- With the lighter test weight of Oats, minimize shoe loading in dry conditions.



## Header

### Cutterbar:

Fine tooth sections are best

Ensure hold downs are adjusted properly

### Center feed Drum

High Speed



**Oats  
Settings**

# Linseed

	Setting
Feeder House Sprocket	18t
Feed Accelerator gear	2 <sup>nd</sup> (1 <sup>st</sup> for dry/low yielding)
Concaves	Small wire
Separator Grates	No-spacer If down for corn, ok to leave down
Shoe Elements	General Purpose or FTC chaffer
Front Chaffer	25mm
Active Tailings	Small grains (Closed) position

Ensure concaves are zero and leveled before start  
 Ensure re-thresher concave is zeroed to beater head

Minimize grain in tailings with a more open sieve to reduce grain recirculation

If green straw recommend Feed Accelerator to be in high speed

Up to 4 concave covers maybe needed

Inspect chopper knives before flax harvest, if wore, may need be flipped or replaced





## Linseed



**Rotor (RPM)**

1100+

1100+

1100+

**Concave (mm)**

0-10

0-10

0-10

**Fan (RPM)**

1050

1050

1050

**Chaffer (mm)**

15

15

15

**Sieve (mm)**

5

5

5

- With FTC Chaffer, Settings may need to be 3-5mm more open and 50rpm more fan speed
- Up to 4 concave covers maybe needed to get all the bolls threshed.
- With the aggressive rotor speed/concave 1 separator cover maybe needed to limit shoe loading



## Header

### Cutterbar:

Fine tooth sections are best

**Ensure hold downs are adjusted properly**– Especially important in green straw

These need to be checked each day to ensure no cutting issues happen

Raised/highwear skid shoes an option as well to leave longer stubble and keep knife out of rocks/debris

### Top Augers:

Ensure the speed of the flighting is slightly faster than the belt speed to have the augers pull the crop headfirst into center feed drum

### Center feed Drum:

High Speed

### Reel

Start with reel fingers vertical over the cutterbar

Ensure reel is spinning faster than ground speed to “Pull” on Flax before they are cut, this is especially important in green straw

Ensure reel to cutterbar clearance is set correctly

