

S-Series Combine and Front End Equipment Optimization

“Ready To Harvest” Yield Accuracy



John Deere Harvester Works

Preface

This information is intended to help you understand how the Yield Monitor /Mapping System works on an S-Series combine. Included are inspections and troubleshooting of critical parts and calibrations.

Contents

Theory of Operation.....	3
Component Inspection Checklist.....	5
Clean Grain Elevator Inspection.....	6
Paddle Tip Clearance.....	8
Clean Grain Elevator Speed.....	9
Impact Plate and Mass Flow Sensor.....	10
Header Width Check.....	11
Header Type Check.....	11
Wheel Speed Check.....	11
Recording Stop Height Check.....	11
Yield Volume Units Check.....	11
Moisture Sensor Maintenance.....	12
Proximity Sensor Check.....	13
Adjust Proximity Sensor.....	14
Harness and Connectors Check.....	16
Calibration.....	17
Troubleshooting.....	19

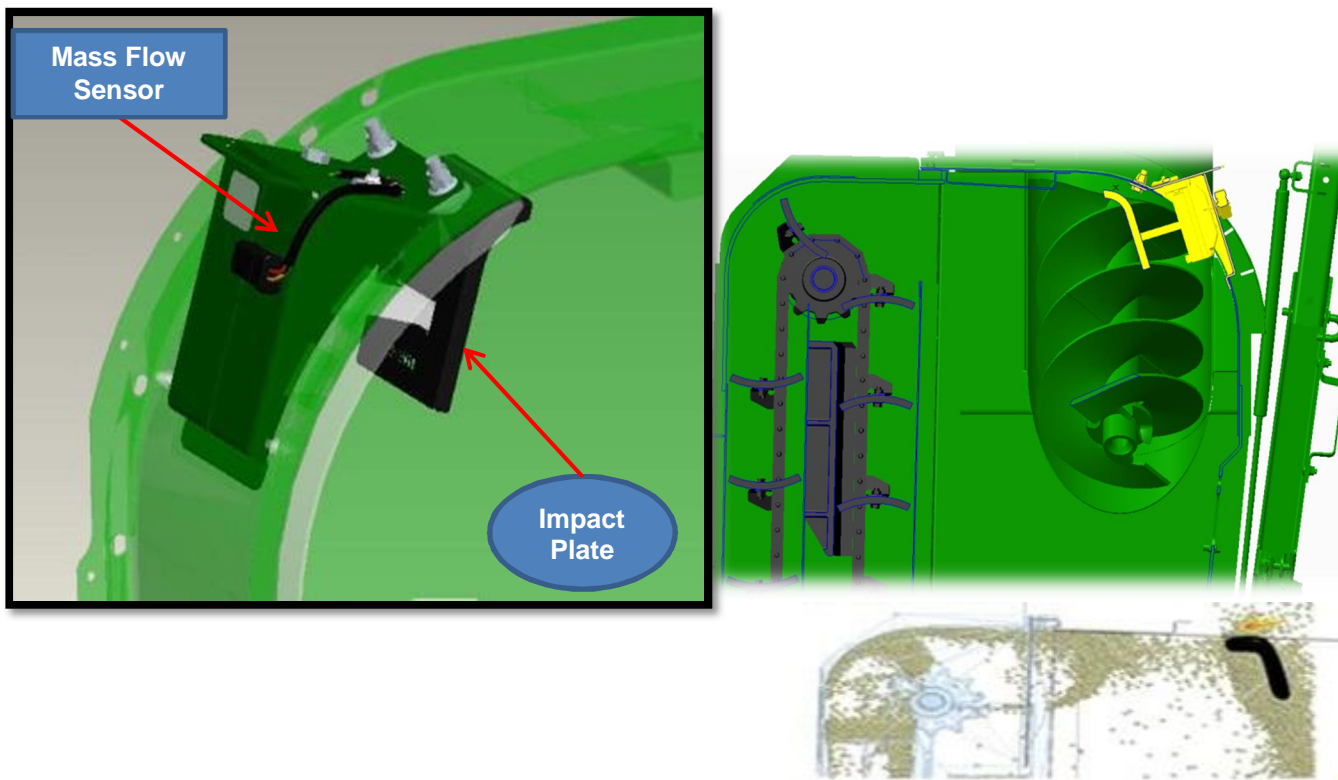
Theory of Operation

First, Clean grain is conveyed up the Clean Grain Elevator by a paddle chain. The paddle chain delivers a small volume of grain to the Moisture Sensor.



The Moisture Sensor housing mounts on the side of the clean grain elevator. The grain falls into the sensor off of the paddles on the "up side" of the elevator. The grain fills the sensor chamber past the Moisture Sensor, a moisture reading is taken and the grain is then augered into the return side of the elevator.

A Grain Proximity Sensor is located under the electrical access panel on the Moisture Sensor Housing. When grain covers the proximity sensor it will activate the motor and auger to keep a continuous flow of grain across the moisture sensor.



Second, the grain is then delivered to the top of the elevator and the force of the grain is measured by the impact plate on the mass flow sensor. It is mounted in the path of the grain.

The volume of the grain moving through the clean grain elevator is measured by the amount of force the grain applies as it hits the sensor impact plate. The force on the impact plate is related to the amount of grain flowing through the clean grain elevator by calibrations.

The clean grain elevator chain speed is measured by the Low Shaft Speed Monitor. With the chain RPM and the force of the grain on the impact plate, the grain flow rate (lb./sec. or kg./sec.) is calculated.

This measurement is recorded by the controller software in the combine. Once every second the grain flow rate, moisture value, and GPS data are recorded. These are used to generate a data point on the yield map.

Component Inspection Checklist

The following inspections are critical to insure that the system performs correctly and accurately:

- Clean Grain Elevator Chain Paddles
- Clean Grain Elevator Chain Housing Paddle Tip Clearance
- Clean Grain Elevator Speed Sensor
- Elevator Mass Flow Sensor
- Wheel Speed
- Elevator Moisture Sensor
- Harness and Connectors
- Calibrations

Clean Grain Elevator Chain Inspection



1. Loosen the Clean Grain Elevator drive belt idler.



2. Open the Clean Grain Elevator lower boot door.
3. Slowly pull on the drive belt or elevator chain and rotate the elevator chain.
4. While rotating the chain, closely inspect every elevator paddle and chain links.



Fig.1



Fig.2

Look for any interference or rubbing of paddles on the housing or bearing flanges (Fig.1)

Check for cracked or broken chain link side bars or paddle attaching ears. (Fig.2)

Be sure rubber paddles are not missing or the paddles are loose. Worn or frayed paddles can affect accuracy.

Check chain tension weekly. A chain running too loose will cause the paddles to double over backward and not effectively convey grain away from the clean grain auger boot.

A loose chain also causes the mass flow sensor to be inaccurate.

Paddle Tip Clearance



1. Rotate clean grain elevator chain until a chain paddle is vertical at the top of the elevator housing in the grain tank.
2. Measure the distance from the tip of the paddle to the elevator housing on every paddle. Always measure at the same location for each paddle.
3. If the distance between the paddle and the housing is consistently more than 13mm (1/2") on multiple paddles, install KXE10374 Paddle Tip Clearance Kit.

Clean Grain Elevator Speed

1. Engage the separator and go to Diagnostic Addresses by controller.
Go to AYM Controller address 117 and check elevator speed at high idle.
S660 = 417rpm S670 = 417rpm
S680 = 417rpm S690 = 460rpm
2. If speeds are low, intermittent, or Zero, check the Clean Grain Elevator Low Shaft Speed Sensor on the LH Side of the combine, and the bearings on the auger shaft.



Impact Plate and Mass- Flow Sensor



1. Visually inspect and clean around the Mass Flow Sensor and Impact Plate.
2. While harvesting in crop, look at AYM controller address 95.
3. AYM 95 = Flow Rate.
4. This number should be > 0 and the higher the grain flow, the higher the flow rate number.
5. If the Flow Rate is 0 or does not change, go to Mass Flow Sensor Tech Manual Diagnostics

Header Width	Recording Stop Height
Header Type	Yield Units
Wheel Speed	

Go to Diagnostic Addresses by controller on the display to verify that the addresses are setup correctly:

1. Check AYM Controller address 67 and be sure correct header width is displayed.
2. Check AYM Controller address 60 and be sure correct header type is installed.
3. Check AYM Controller address 114 and be sure the correct wheel speed is displayed and correct unit. (MPH or KPH)
4. Check AYM Controller address 115 and be sure the GPS ground speed matches the AYM 114 wheel speed. If 114 and 115 are not equal, the tire size selection may need to be changed.
5. Check CAB Controller address 130 for correct drive tire size and rolling radius.
6. With header and Separator engaged, raise and lower the feederhouse to Check Recording ON/OFF Stop Height for correct setting adjustment. Be sure recording turns off, when button enabled for lift height.
7. Check AYM Controller address 66 for correct yield units selected. (Bushels or Kilograms)

Moisture Sensor Maintenance



Clean the sensor seasonally or as necessary especially if moisture readings are erratic.

Remove the housing wing nut and remove the sensor assembly from the housing.

Clean the sensor plate with glass cleaner and a damp cloth.

Proximity Sensor



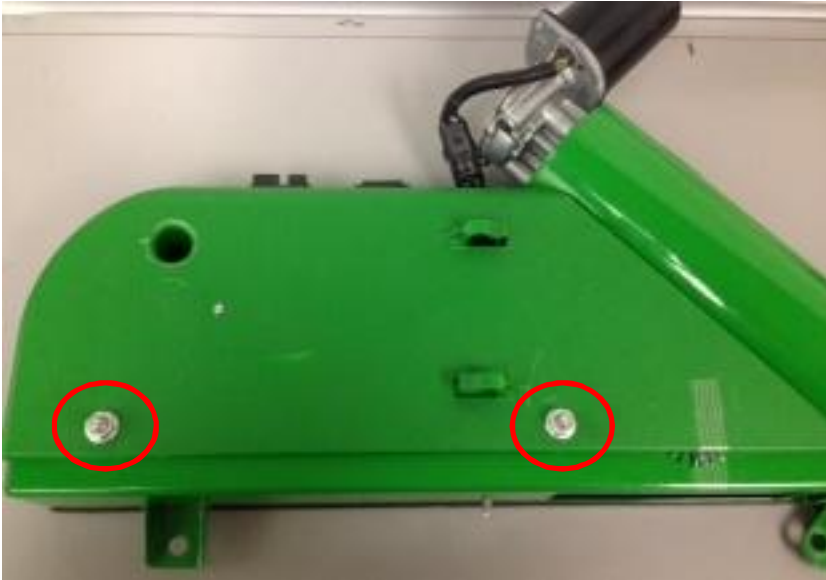
The proximity sensor ensures that the housing is full of grain and the Moisture Sensor fin is completely covered by grain. When grain touches the switch it will activate the auger motor. This activates the auger motor to move grain across the moisture sensor allowing new grain and continually testing moisture.

If any of the sensor plate is exposed and not in the grain, the moisture reading will not be accurate.

Clean the proximity sensor seasonally with glass cleaner and a damp cloth. If moisture readings are erratic clean as necessary.

Proximity Sensor Adjustment

If moisture value is always Zero or the value does not change at all, adjust the proximity sensor.



Remove two nuts attaching the housing cover.



Locate the Proximity Sensor



1. Turn on Ignition key
2. If there is a seal covering this adjustment screw, STOP HERE.
No adjustment is necessary.
3. If no seal, use the small screwdriver and turn the adjustment screw COUNTER CLOCKWISE until the adjustment screw turns freely.
4. Next, turn the adjustment screw CLOCKWISE until the auger motor comes ON with no grain in elevator mount.
5. Turn the adjustment screw back COUNTER CLOCKWISE three full turns and leave it set there.
6. Proper adjustment is critical for moisture sensor accuracy.

Harness and Electrical Connectors



With intermittent or no Yield data, disconnect harness connectors and inspect both ends of the connector for water intrusion or corroded pins and sockets.

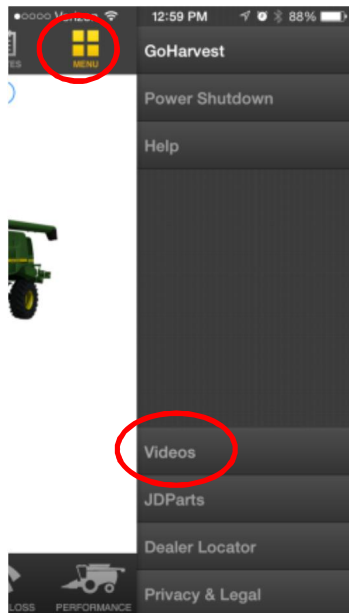
Look closely at the harness connector and see if there are any pins or sockets pushed back out of the plastic connector body or making bad contact.

Calibration

Go to your "Go Harvest" phone app.



Press the "MENU" icon at the top of the page.



Select the "VIDEOS" Icon,
Scroll through the selections to find the "Yield Calibration" video.



This video will direct you the correct procedures to successfully complete calibrations.

For the best accuracy and consistency, always perform a Multi-Point Calibration once per crop, at the beginning of each season.

Multi-point yield calibration provides the best performance when the harvested field is expected to have varying yields or machine is operated at varying speeds with varying grain flows.

This type of calibration collects each calibration load at each expected flow condition.

For each calibration load, harvest one full grain tank.

Perform a Multi-Point calibration with a minimum of four different loads at four different ground speeds.

- No Calibration - Limited Accuracy. Calibration procedure has not been performed. Not Recommended. System defaults to a fixed internal calibration value which may not be adequate for machine and field conditions. Accuracy decreases with combine component wear.
- Single Point Calibration - Calibration procedure collecting one calibration load at a fixed speed. Not Recommended. Usually adequate for checking accuracy, as conditions change.
- Multi-Point Calibration – Four or more loads are required. Multi-Point is best for fields where there is yield variability conditions, where grain flow rate is not consistent.

Troubleshooting

Inaccurate maps or field total weights

- Check elevator chain tension

- Check Chain Paddle Tip Clearance

- Check Elevator Speed Sensor

- Check for missing elevator paddles

- Perform Four Point Calibration

 - If using Grain Cart Scale, be sure the grain cart is calibrated, the combine grain tank is completely empty before starting.

Inaccurate maps or field total weights with Multiple Combines in same field

- Calibrate each combine separately. Do not use the same C11 value for each combine.

- Inconsistency can be caused by machine to machine variability and wear

- Inconsistent cut width between combine operators

Maps look striped

- Ground speed different pass to pass

- Slope terrain (uphill vs. downhill or side hills)

- Different cut widths in each direction

- Poor GPS Signal in one direction vs other

 - Some grain tank extensions can shade the GPS receiver and limit the number of satellites being received.

System working well, then accuracy changes

- Ground Speed different from calibrated speeds

- Crop flow rate different from calibrated

- Moisture has changed considerably since last calibration

- Foreign material build up on Mass Flow Sensor or Moisture Plate

Poor accuracy in Low Yielding Crop

- Check Paddle Tip Clearance

- Check for missing elevator chain paddles

Combine Display Instantaneous Yield Number is erratic by more than 15%

- Check elevator speed sensor

- Check for missing elevator chain paddles

Notes

