

## **Combine Yield Monitor Calibration**

Harvest for South Carolina growers will soon be in full swing. Growers who anticipate on collecting yield data this season should take the time to check yield monitor components to ensure accurate data collection.

Yield monitors are the second most common precision agriculture technology used today. They are, for the most part, standard equipment on new grain combines. Proper calibration is key if management decisions, prescriptions, or profit maps are to be generated from yield data. A few things to consider prior to calibration are to make sure the combine is properly working. If the combine is not working properly during calibration and the problem is fixed during harvest, the yield monitor may need to be recalibrated.

Varying the flow of grain into the machine will provide a range of mass flow rates, helping account for variation in the field, and providing greater confidence in yield data. Imposing different mass flow rates can be accomplished by harvesting loads of irrigated vs. non-irrigated crop, or by simply varying the travel speed between calibration loads; try to maintain a constant mass flow rate within a calibration load and change it between loads. When calibrating a yield monitor, more loads collected and larger load sizes will generally provide a more representative calibration.

Prior to calibrating, a few things to keep in mind are to make sure the combine is setup properly, read the operator's manual for the yield monitor, check and properly setup the GPS offset and header swath width, and ensure the grain tank and off-loading auger is empty. In addition, the following yield monitor components should be inspected and calibrated.

### **A short pre-season checklist follows:**

***Clean Grain Elevator Chain*** – Check the tension of the elevator chain and inspect for excessive wear to paddles, links, and sprockets. Mass flow rate is measured at the clean grain elevator; excessive wear or erratic grain delivery may result in instances of mass flow sensor response not representative of actual mass flow rate.

***Moisture Sensor*** – Check and clean the moisture sensor. If serviceable, remove any previous crop residues from the moisture sensor channel and plant resin from the sensor itself. The calibration provides a wet yield, which is corrected to a dry yield using the moisture sensor data. Proper moisture sensor operation is critical because assessment of crop performance should generally be conducted on the basis of dry yield.

***Header Height Sensor*** – Check that the sensor itself is intact and wiring to the sensor has not been damaged. While it may not seem important, if this sensor is not accurately reading when the header is lowered into the crop, data collection may be incomplete; most yield monitors use header height position as a recording trigger.

***Distance Calibration*** – Verify that the distance you are traveling is the distance that is being recorded. It is not a bad idea to re-calibrate to make sure acreage or field capacity recordings are accurate. Field capacity is calculated as speed times width, the speed being determined by distance per unit time. Yield monitors calculate crop yield as a function of mass flow rate and field capacity (lb/hr divided by ac/hr equals lb/ac). Thus, if your distance (i.e. field capacity) is off by 20%, then your yield estimate may also be off by 20%. Accurate distance measurement is just as important on a yield monitor as accurate mass flow measurement.

***Vibration Calibration*** – Calibrate for the vibration of the harvester with the header engaged and at engine operating speed, but not harvesting crop. This is done so that the vibration of the machine is not altering the data that is being recorded. Manufacturer recommendations suggest that this calibration be done each time a different header is used on the harvester. Vibration calibration is important because it identifies a threshold impact force caused by machine vibration alone. If more vibration actually occurs than that which was present during calibration, then vibration may be erroneously counted as crop flow.

***Elevator Shaft Speed Sensor*** – Verify that the elevator shaft speed sensor on the clean grain elevator is working properly and that it is not damaged. The elevator shaft speed sensor is generally used as a recording trigger in addition to the header height sensor.

### **In-field calibration:**

***Calibrating the Mass Flow Sensor*** – Depending on yield monitor manufacturer, you likely need to flag loads as calibration before they are harvested. Then harvest separate calibration loads with each load containing at least 50 bushels or 3,000 lb. Most manufacturers allow for only one calibration load, but we recommend at least three loads, each at a different mass flow rate. Limited research is available on identifying a specific number of loads required for calibration, but calibration accuracy will generally increase with each additional calibration load. Make sure that the grain tank and off-loading auger is completely empty after each load is harvested. Weigh each individual load with a weigh wagon or truck scale that you know is accurate and record the weight. After each of the calibration loads have been harvested and weighed, the weights can be entered in the yield monitor display. Most yield monitors allow you to enter all load weights at once, following the calibration. If scales are not available, consider contacting your local Extension agent, Clemson Precision Agriculture, or a local weighmaster. The S.C. Department of Agriculture maintains a list of licensed public weighmasters; be sure to call ahead to make arrangements (see link below).

S.C. Licensed Public Weighmasters: <http://www.kellysolutions.com/sc/weighmaster/showall.asp>

***Calibrating the Moisture Sensor*** – While harvesting your loads to calibrate the mass flow sensor, collect a representative sample from each load to determine grain moisture. Grain moisture can either be determined via a trustworthy handheld moisture tester or at most local grain elevators. Depending on the yield monitor, only one moisture reading may be required; however, we would suggest taking one or more readings from each of the five loads harvested and using the average moisture reading. Specific procedures for moisture calibration vary by manufacturer and platform; consult your yield monitor operator's manual or contact us for details.

After completing these few steps, the yield monitor should be calibrated and ready for harvest. It is also important to note that as harvest continues throughout the remainder of the season, a separate calibration needs to be completed when harvest switches to another crop.

Examples of various yield monitor components are provided on the following pages. These pictures are for example only and do not represent every make and model of harvester or yield monitor component. By way of providing these illustrations, Clemson University is not endorsing specific manufacturers of harvesters or yield monitor components in this bulletin. If you need assistance with yield monitor calibration, please contact us via the information provided below.

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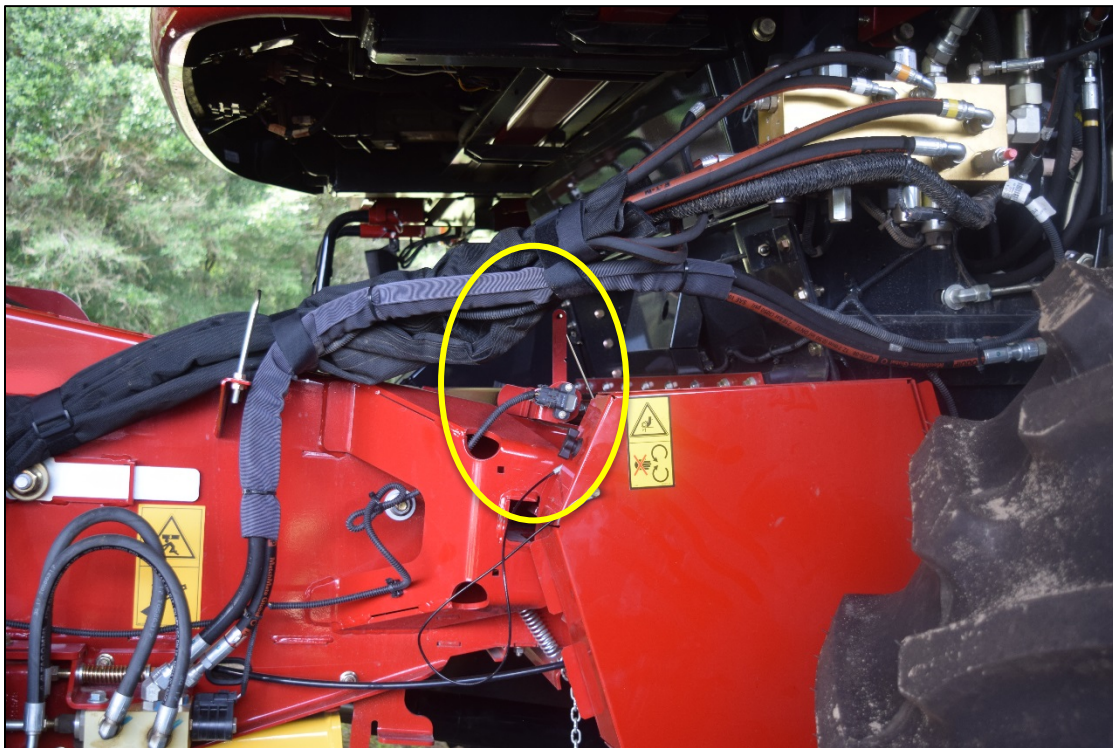


Figure 1. Header Height Sensor Case IH Combine

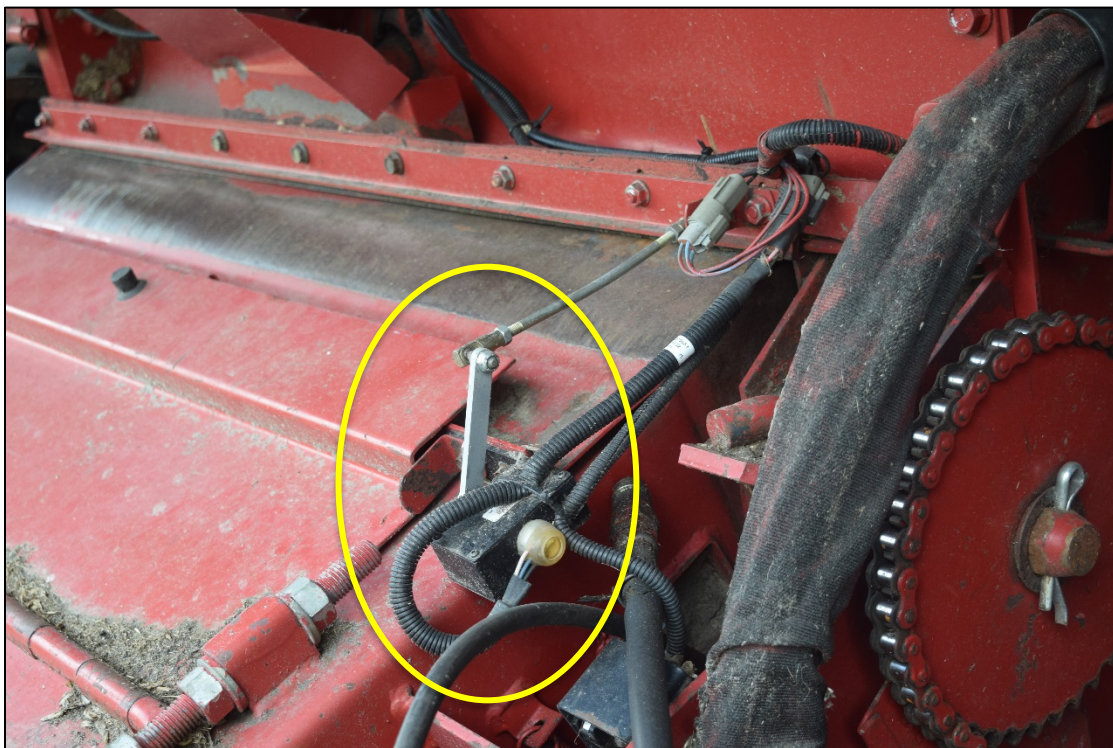


Figure 2. Header Height Sensor Case IH Combine





Figure 3. Location of Header Height Sensor John Deere Combine



Figure 4. Header Height Sensor John Deere Combine





Figure 5. Moisture Sensor Case IH Combine

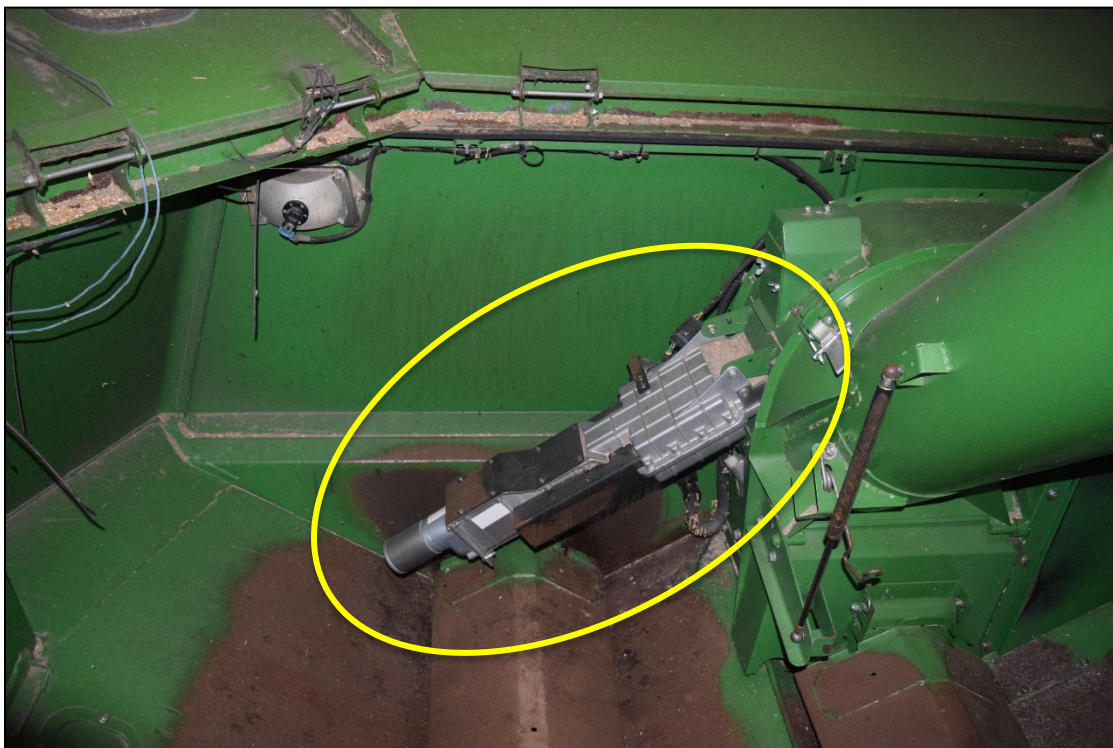


Figure 6. Moisture Sensor John Deere Combine

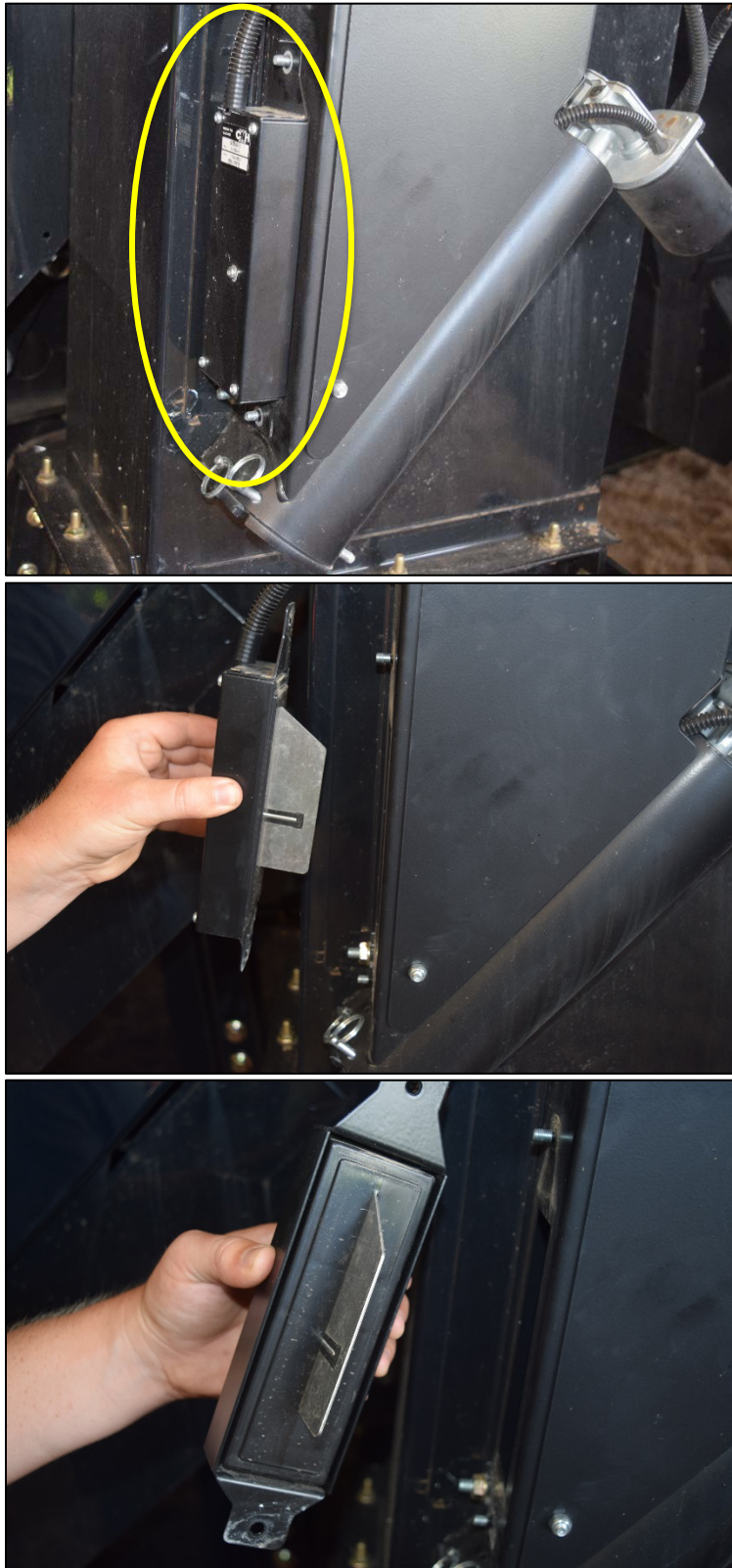


Figure 7. Moisture Sensor Case IH Combine





Figure 8. Shaft Speed Sensor Case IH Combine



Figure 9. Location of Elevator Shaft Speed Sensor John Deere Combine





Figure 10. Shaft Speed Sensor John Deere Combine



Figure 11. Clean Grain Elevator – Chain and Paddle Case IH Combine