HarvestMaster™

BY JUNIPER SYSTEMS

casma™

Yield Monitor

INSTALLATION MANUAL

Casma Yield Monitor Installation Guide

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Trademarks

Disclaimer

Information is subject to change without notice.

Cautions

CAUTION: This symbol indicates that failure to follow directions could result in damage to equipment or loss of information.

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1 Casma System Overview

The Casma Yield Monitor measures harvest data on specialty harvesters. It enables yield mapping for crops harvested using conveyor belts. This includes root crops (potatoes, carrots, onions, sugar beets, horseradish, caladium bulbs, etc.), as well as other crops that travel over a conveyor during the harvesting process (tomatoes, juicing oranges, canning cherries, etc.).

During harvest, the Casma system creates a yield map of your fields. It does this by simultaneously tracking belt speed, crop weight, and harvester movement. All this data is then sent to *mycasma.com* and the cab of the harvester in the form of immediately actionable yield data, truckload weights, and harvester logistics (such as, location, run time, idle time, and total tonnage harvested by date).

Note: The Casma system works on a variety of specialty harvesters. Please refer to **2 Harvester Considerations for Casma Installation on page 9** *to determine whether your harvester will work. You may also contact HarvestMaster directly to discuss the details of any harvester you are considering for a Casma installation.*

1.1 Casma Features

- Creates yield maps in near real time.*
- Installs easily on many existing harvesters.
- Displays data in simple reports and maps, allowing for easy delineation of high and low yield zones.
- Tracks, records, and syncs all truckload weight for immediate, in-cab accessibility by harvester operators and field managers.
- Automatically transmits harvest data to *mycasma.com* via cell modem.
- Exports data in SHP or KML formats for use with other precision ag software.
- Integrates with ISOBUS virtual terminal (VT) displays.

- For John Deere equipment, displays the live yield map on a John Deere display and transmits harvest data to the John Deere operations center. (See **10 Appendix C: Integrate John Deere Specialty Crop Controller (UCC2)** on page 55.)

*Update rate is subject to cell signal strength and harvest rate.

casma™

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1.2 How the Casma Yield Monitor Works

The figure on page 7 illustrates the Casma system.

1. When the harvester lowers its digger blades, the digger switch sensor sends a message to initiate the Casma system.
2. Harvested crop material flows onto the belted chain.
3. Casma load cells sample the crop weight fifty times per second.
4. The belt speed sensor measures the speed of the weighing belt.
5. An internal gyroscope monitors the harvester's vertical acceleration and slope, correcting for both.
6. The GPS/GNSS receiver on the tractor or harvester continuously samples positioning data.
7. The central control unit (CCU) collects all the above data and sends it via ISOBUS cable to the VT in the cab of the tractor and via cell modem to *mycasma.com*.
8. The data is immediately available in the cab on the virtual terminal (VT) or Universal Terminal (UT) of your ISOBUS-compatible display.
9. Updates are sent to *mycasma.com* throughout the day. This includes yield data, truckload weights, and harvester logistics.

1.3 Casma System Components

- **Load cells:** The load cells are mounted to two of the harvester's conveyor belt idler wheels. They weigh the crop as it passes over on the conveyor belt.
- **Belt speed sensor:** This sensor consists of a tone wheel and a proximity sensor for tracking the speed of the weighing belt.
- **Run/hold sensor:** This proximity sensor notifies the Casma system when the digger blades have been lowered into the ground. When the blades have lowered and the belts are running, the system assumes that the harvest has commenced.
- **GPS receiver:** Tracks the harvester's location, speed, and direction of travel at least once per second.
- **Central control unit:** This is the brain of the Casma Yield Monitor. This box processes all the information coming from the load cells, sensors, and GPS receiver. It sends the data to the display in the cab and to *mycasma.com*.

2 Harvester Considerations for Casma Installation

The Casma system works with a harvester's belted-chain style conveyor belt. Below are considerations for deciding whether the Casma system will work well on a particular harvester. If a harvester does not conform to the following criteria, please consult with a HarvestMaster field engineer to discuss a workable solution.

2.1 Conveyor Belt Suitability

In order for Casma to work on a harvester, it must have a suitable conveyor belt from which the crop can be weighed. Below is a list of guidelines for determining if a conveyor belt will work. This list will also help you choose which conveyor belt to use when planning a custom Casma installation for each harvester (See **3.1 Make a Plan for Component Placement** on page 10).

Note: If a harvester does not meet these conditions, please contact HarvestMaster. There may be some additional steps that can be taken to make the system compatible.

- There should be at least one section of the conveyor belt that does not change its angle relative to the rest of the harvester. In the Casma system, this becomes the weighing belt.
- The weighing belt should be a belted-chain style belt with a consistent, known pitch.
- The angle of the weighing belt should not exceed 30°.
- The weighing belt should not be prone to excessive mechanical vibration or bounce.
  - The crop needs to be able to flow smoothly across the belt's weighing section.
  - The Casma system compensates for machine vibration and harvester motion, but excessive vibrations or jarring may deteriorate accuracy.
  - A bumpy, uneven field is OK. A bumpy, uneven belt is not OK.
- The weighing belt needs to have a straight section where the tops of three idler wheels on each side are aligned.
- The conveyor belt must have continuous contact with all three idler wheels on each side.
  - The middle wheels will be equipped with load cells, converting them into weighing idler wheels.
- The weighing belt needs to have at least five idler wheels on each side. The weighing idler wheels will need to be at least two positions from either end of the belt as well as two positions from the crop entry point.
- 100% of the crop must pass over the weighing belt.

2.2 Crop Minimums

- In general, any harvester gathering potatoes, carrots, sugar beets, onions, horseradishes, carrots, or tomatoes will have sufficient weight passing over the weighing belt to ensure accuracy.
- Weights of at least 20 lb per foot (10 kg per 30cm) of belt will yield more accurate results.

2.3 Other Considerations

- There must be room on the drive shaft of the weighing belt to install a tone wheel and proximity sensor.
- Harvesters equipped with onboard storage bins may be suitable for the Casma system but will be limited to either providing accurate yield maps or accurate truckload data but not both.
- Contact HarvestMaster if you are unsure about a particular harvester. HarvestMaster personnel can validate the suitability of a harvester and may be able to develop a custom solution for exceptional harvesters.

3 Installation Planning

With the variety of belted-chain harvesters available for so many different crops, most Casma installations will be unique for each harvester. This section identifies and describes certain best practices for planning an installation that is secure, accessible, and durable. (See **2 Harvester Considerations for Casma Installation** on page 9.)

All the instructions in this section assume that the installer has already determined that the harvester will work with the Casma system.

CAUTION: Do not begin installation without first planning the layout of the Casma system for each specific type of harvester. Skipping this step may cause the installation to fail or for Casma to be less accurate or serviceable.

3.1 Make a Plan for Component Placement

Before you install any part of the Casma system, inspect the harvester and identify locations for each of the components listed below. As you identify those locations, consider the following:

- Is the location accessible if the part ever needed maintenance?
- What cables or wiring will need to access this part? Is there a clear, secure path for the wiring?
- How convenient will it be to replace this part if it were damaged?

The following are guidelines for determining the optimal placement for each part in the Casma Yield Monitor installation.

3.1.1 Wiring and Cable Runs

As you place each component of the Casma system (such as, sensors, load cells, and GPS receiver), wiring will be your main concern. HarvestMaster recommends using existing wiring runs as much as possible.

For each system component, consider the following:

- Are there existing wiring runs between this component and the CCU?
- If not, is there another route for this wire that is safe, secure, and serviceable?
- Will this wiring route create a tripping or interference hazard?
- Are there any potential pinch points in this wiring route?
- Can this wire be reached and changed?
- Is this wire long enough to reach the CCU via the chosen route?
- If it isn't long enough, is there a more efficient option?
- Does the wire avoid being caught by any moving parts?
- If the wire is too long, is there a convenient, safe place to coil and tie up the slack?

Note: Wires that are too long should always be coiled and tied up out of the way. Never cut long wires.

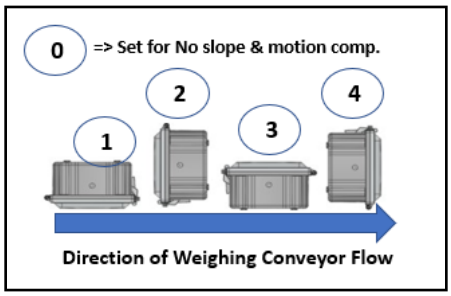
3.1.2 Central Control Unit and Cell Modem Placement

The central control unit (CCU) operates as the hub of the Casma system. It needs to be able to connect—via wires and cables—with all other components of the system, including the ISOBUS display in the cab of the tractor.

Guidelines for placing the CCU:

- The CCU should be central to all parts of the Casma system and the tractor. It should be close to the midpoint between the load cells and speed sensor on one side and the tractor or cab on the other.
- All cables need to be able to reach the CCU while following the guidelines for cable runs outlined in **Section 3.1.1 Wiring and Cable Runs on page 11**. The cable lengths are the following:
  - ISOBUS cable: 30 ft (typically connected to the back of the tractor cab)
  - Load cell cables: 20 ft
  - Speed sensor cable: 32.8 ft
  - Run/hold sensor cable: 32.8 ft
  - GPS cable: 32.8 ft
- The CCU should also be within 25’ (7.5m) of the tractor’s ISOBUS connection. However, a longer ISOBUS cable can be purchased if necessary.
- The CCU must be mounted vertically in relation to the harvester’s horizontal plane.

- The face of the CCU must be either parallel or at a right angle with the weighing belt. This is necessary for accurate slope and motion compensation.



- The CCU will usually be mounted to the harvester's square tubing, but it is possible to mount it to a flat surface.
- The space beneath the CCU should be clear of any obstructions, allowing plenty of space for the sensor wiring runs and bulk head connectors to plug into the bottom of the CCU.

3.1.3 Weighing Idler Wheels/Load Cell Placement

Before deciding which idler wheels to convert into weighing idler wheels, you will need to decide which conveyor belt will be used to weigh the crop. As stated earlier, this is the weighing belt in the Casma system. Refer to *Section 2.1 Conveyor Belt Suitability on page 9* for a detailed list of requirements for a suitable weighing belt.

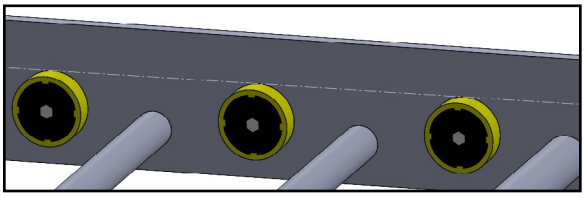
Once you have decided which conveyor belt will become the weighing belt, you will need to decide which idler wheels will be the weighing idler wheels.

Below is a list of criteria for selecting the weighing idler wheels. Both of them must be:

- Directly across from each other.
- At least two idler wheel positions from either end of the conveyor belt.
- At least two idler wheel positions from the crop entry point.
- In good condition. HarvestMaster recommends replacing the designated idler wheels if there are signs of excessive wear.
- On a straight section of the conveyor belt. That is, they must sit between two other idler wheels, and all three wheels must be in perfect vertical alignment. The conveyor belt must have continuous contact with all three idler wheels.

Additionally, the longer the distance from adjacent idler wheels, the better. And the closer the measuring point is to the end of the harvester's discharge, the cleaner the crop will likely be, rendering a more accurate weight measurement.

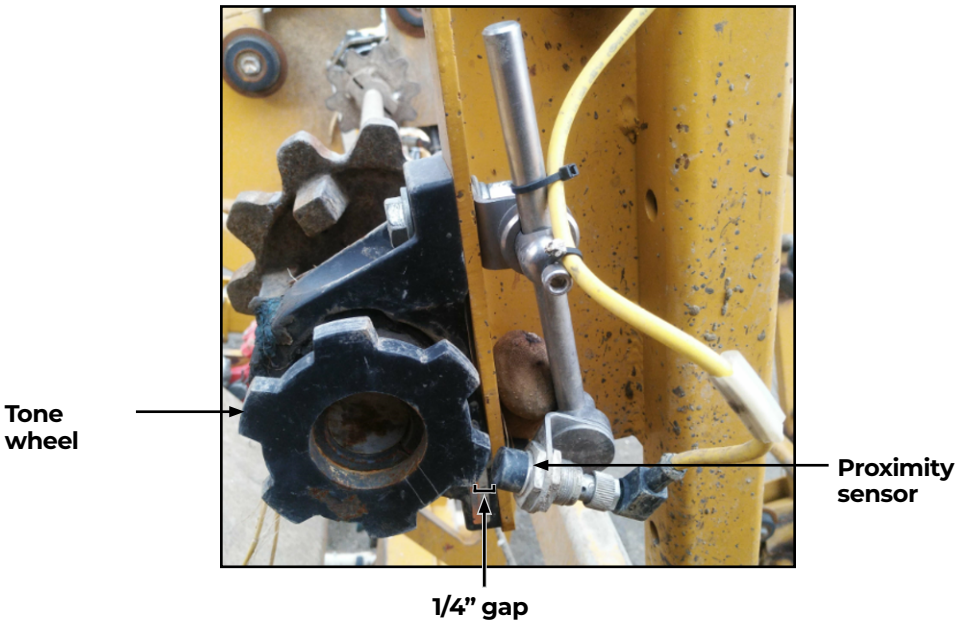
To determine the vertical alignment of adjacent idler wheels,



- Remove or lift the belted chain off the idler wheels, and lay a straight edge across three wheels.
- The straight edge should easily make contact with all three idler wheels simultaneously.

3.1.4 Belt Speed Sensor Placement

The belt speed sensor consists of a tone wheel and a proximity sensor. The tone wheel is installed on the weighing conveyor belt's drive shaft, and the proximity sensor is mounted 1/4" from the teeth of the tone wheel as seen below.

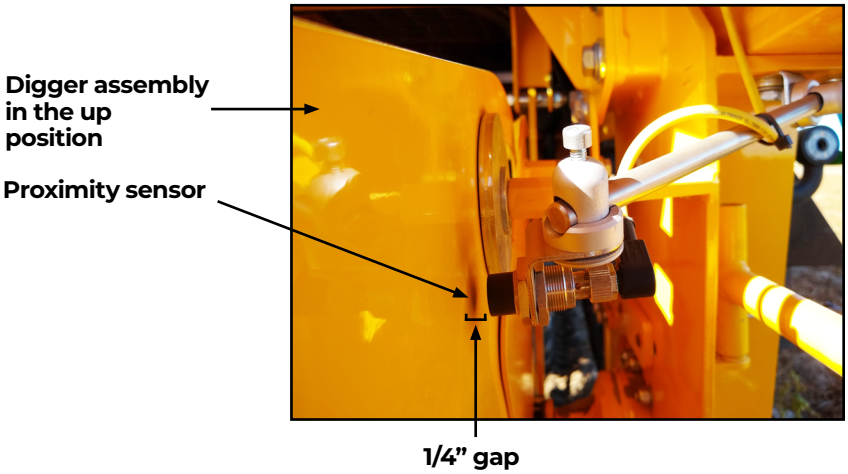


CAUTION: The tone wheel spins anytime the belt is moving. It could catch on loose clothing, hair, etc. Place the tone wheel in a safe location or build a safety shield to prevent injury.

3.1.5 Run/Hold Sensor Placement

The run/hold sensor is a proximity sensor, identical to the proximity sensor monitoring belt speed. It is placed in relation to the digger assembly on the harvester. Its placement will vary by harvester.

The Casma system only records data when the run/hold sensor does not sense the steel of the digger assembly. The sensor must be placed such that it is within 1/4" of the digger assembly when it is up and greater than 1/2" away from the digger assembly when it is harvesting.



3.1.6 GPS Receiver Placement

In most cases, the Casma system will use the tractor's existing GPS receiver.

In the event that a new GPS receiver is needed for the Casma system, it should be mounted on the harvester with an unobstructed view of the sky.

Juniper Systems' Geode Real-time Sub-meter Receiver is an affordable option that has been tested and proven to work with the Casma system.

Note: If you are using the John Deere Specialty Crop Controller, connection to the GPS receiver is not required. (See **10 Appendix C: Integrate John Deere Specialty Crop Controller (UCC2)** *on page 55.)*

3.2 Required Tools and Supplies

3.2.1 Required Tools

- Standard wrench set
- Standard socket wrench set
- Drill
- Set of standard drill bits, including a 5/8" bit and 1.25" hole saw
- Allen key/hex wrench set, metric and Imperial
- 3'–4' level
- Connectors and crimping tool for electrical connections
- Center punch
- Hammer
- Wire cutters
- Arc welder (for miscellaneous mounting brackets and attaching the tone wheel)

3.2.2 Other Installation Supplies

- UV resistant zip ties
- Blue 243 Loctite or equivalent
- Weld hub for the tone wheel, appropriately sized (see page 28)

3.2.3 Helpful Tools and Materials

- Standard set of screw drivers
- Magnetic drill press (small, portable, for side holes in the conveyor)
- Come-a-long to lift chain off of rollers
- Work lights

4 Installation

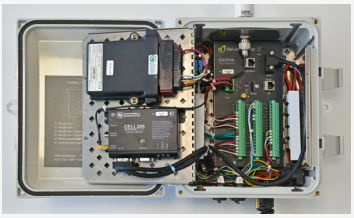
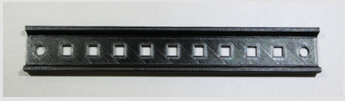
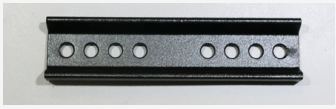
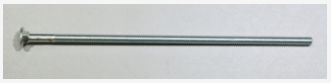
Once you have planned the installation, it is time to begin mounting each part. The planning/installation phases can be fluid. You may find that you need to make adjustments to your plan as you go.

Note: Most of the installation can be done in the shop or the field. **Section 4.3.3 Belt Speed Sensor Installation Steps** *on page 29 includes a step for welding the tone wheel to a weld hub. This may be better accomplished in the shop and can be done before the rest of the installation.*

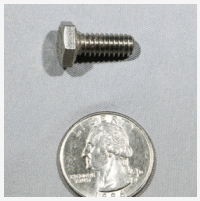
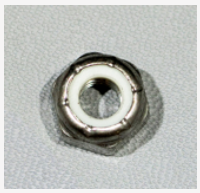
4.1 Install the Central Control Unit

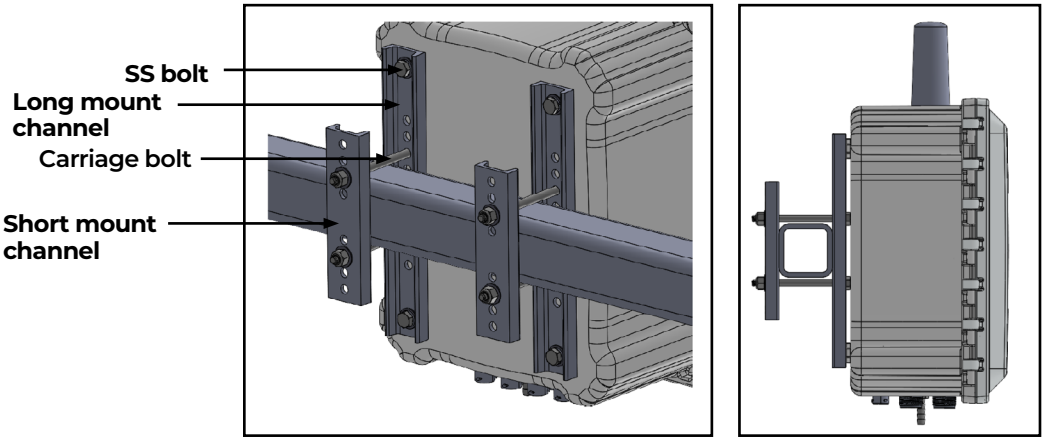
4.1.1 CCU Mount Kit and Parts List

The following table lists the parts included with each CCU (Verizon PN 29358 or AT&T PN 28620) and CCU Mount Kit (PN 24854).

CCU Mount Kit			
Description	**PN**	**Quantity**	
Central control unit	Verizon 29358 or AT&T 28620	1	
Junction box long mount channel	29176	2	
Junction box short mount channel	29177	2	
Fasteners			
1/4”–20-7, Grade 2 zinc carriage bolt	29546	4	
HRD 1/4” washer, flat	5428	4	

CCU Mount Kit

Description	PN	Quantity	
1/4"–20 x 5/8" SS bolt (bars to CCU box)	23132	4	
1/4" Lock washer, split (bars to CCU box)	29147	4	
1/4"–20 Nylock nut	795	4	



Back and side views of CCU with mounting kit

4.1.2 CCU Installation Steps

1. Select a location for mounting the CCU box, based on the criteria on page 12.

2. Determine which holes on the long mount channels (PN 29176) will best suit the CCU installation location and the size of tubing you are attaching the CCU to.

3. Insert the four carriage bolts through the appropriate holes in the long mount channels (two bolts per channel). The head of the bolt should be flush with the *flat* side of each mount channel.

4. Use the four 1/4”–20 x 5/8” SS bolts (PN 23132) and the appropriate washers to attach the long mount channels to the back of the CCU. The flat side of the channel will face the back side of the CCU box. The holes in the CCU box are already threaded.

5. Hold the box in place so that the carriage bolts are above and below the square tubing you are mounting the box to.

6. Slide the short mount channels onto the carriage bolts so that the tubing you are attaching to is sandwiched between the long mount channels and the short mount channels.

7. Add the appropriate nuts and washers to the end of the bolts. Make sure the CCU is level, and then tighten into place.

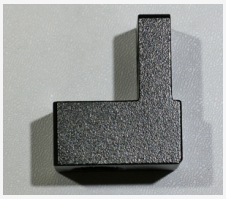
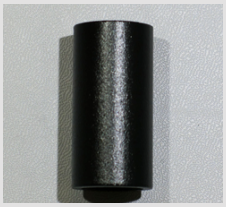
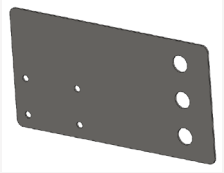
8. Cut off any excess bolt length.

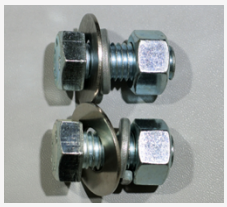
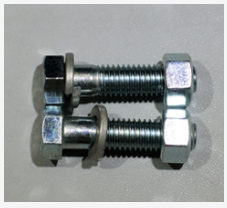
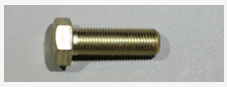
Reminder: The CCU must be vertical. Its face must be either parallel or at a right angle with the weighing belt.

4.2 Install the Load Cells

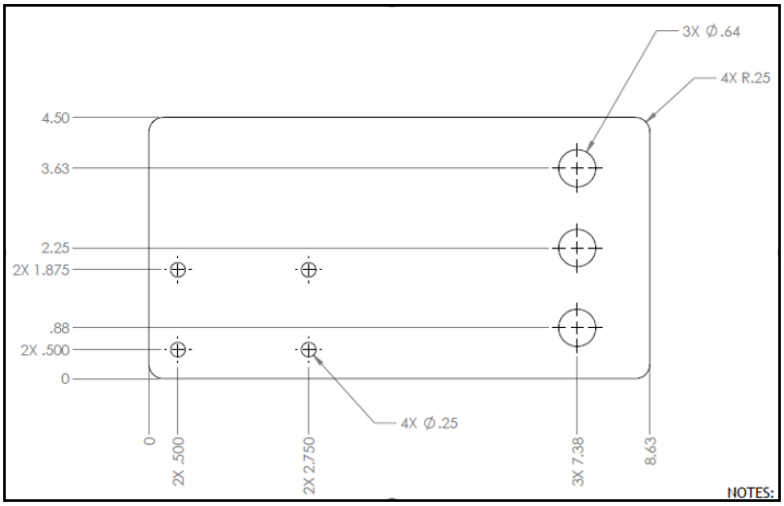
4.2.1 Load Cell Mount Kit and Parts List

The following table lists the parts included for mounting both load cells.

Belt Sensor Mount Kit			
Description	**PN**	**Quantity**	
Load cell	24875	2	
Load cell angle mount	24857	2	
Idler mount to load cell	24858	2	
Idler wheel spacer	24859	2	
Load cell angle mount drill	29417	1	

Belt Sensor Mount Kit			
Description	**PN**	**Quantity**	
Fasteners			
5/8"–11 x 1.5" Bolt to hold angle mount to side rail	29151	4	
5/8" Washer for harvester side	29153	4	
5/8" Lock washer for bracket side	29148	4	
5/8"–11 Nut	29154	4	
1/2"–13 x 2" Bolt to hold load cell to angle mount	29155	4	
1/2" Lock washer next to nut	29149	4	
1/2"–13 Nut	29157	4	
5/8"–11 x 3.5" Bolt through idler spacer	29150	2	
1/2"–20 x 1.5" Bolt to hold idler mount to load cell	29156	2	

The load cell drill template is designed to help the installer explore a variety of options for mounting the load cells, making it possible to accommodate a wide variety of harvesters.



Load cell angle mount drill template diagram

4.2.2 Load Cell Installation Instructions

The following instructions describe how to mount a load cell on one idler wheel. You will need to repeat the process for each weighing idler wheel in the Casma installation (two idler wheels).

1. If you haven't already, select the idler wheels on which you will mount the load cells for this installation of the Casma system. If necessary, refer back to the criteria on page 13.

2. Either remove the belted chain or lift it off the idler wheels from above with a come-a-long. Leave sufficient working room to reach under the chain to the position of the idler wheel being replaced.

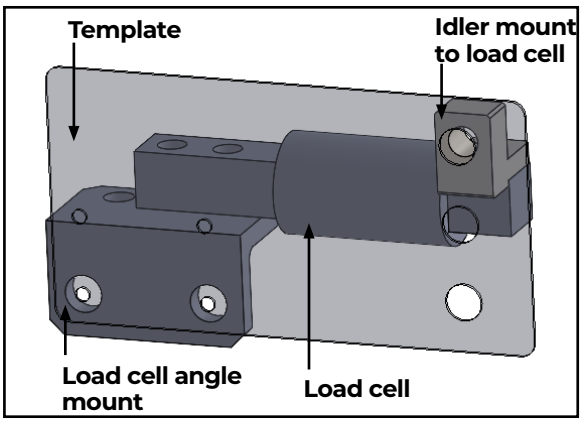
3. Inspect the designated idler wheel. Make sure it still turns and performs properly. If there is any question as to its quality, replace it with a new one.

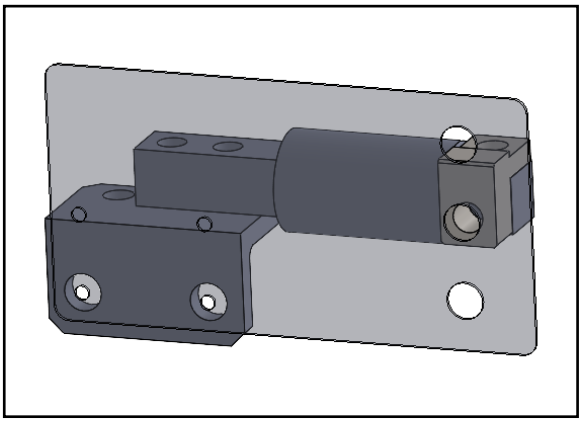
4. Remove the designated idler wheel.

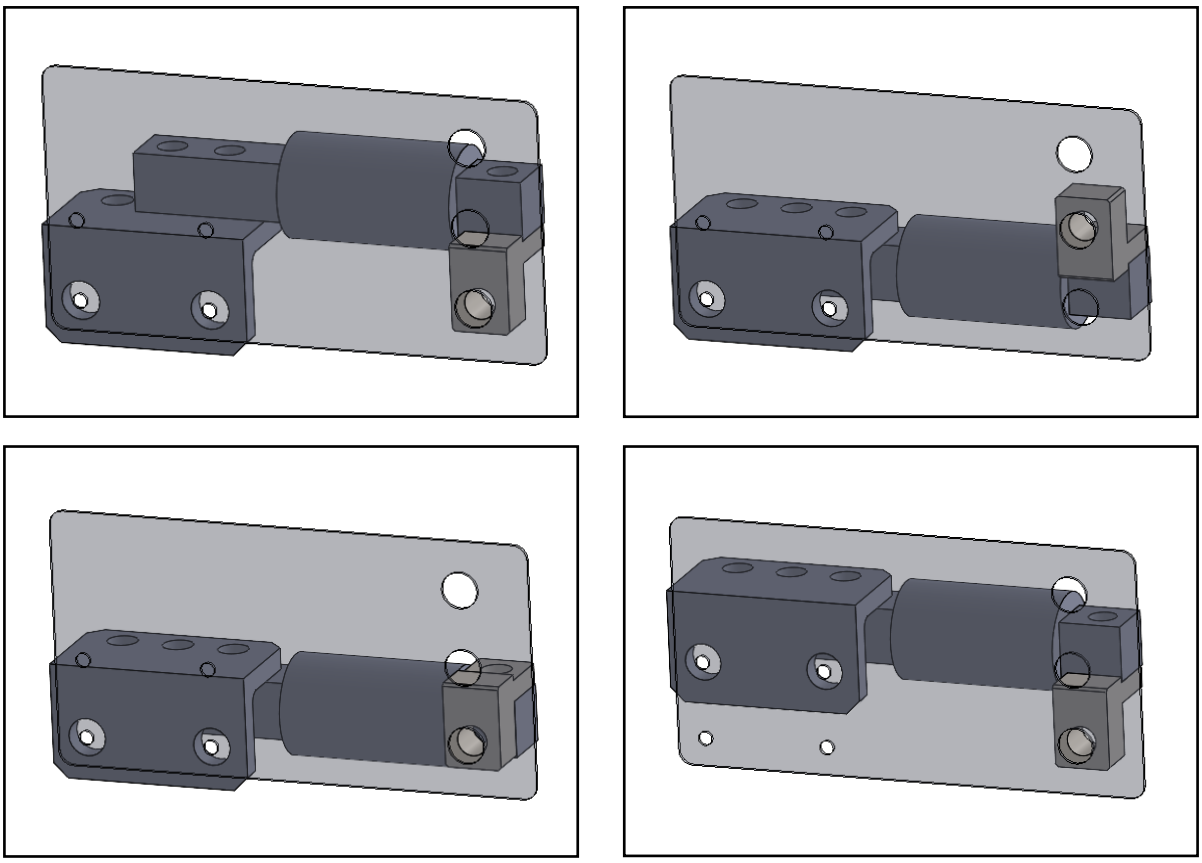
5. Use the drill template, load cell, and the angle and idler mounts to experiment with different load cell configurations, as seen in the drawings on the next page.

   One of the three large holes fits over the vacated idler wheel axle hole, and two of the smaller holes serve as stencils for marking the bolt holes for the load cell angle mount.

   Below are examples of the six possibilities for load cell mount configuration. In the images, the drill template is the semi-transparent plane in the foreground with the other parts oriented on the opposite side of the template.







Load cell mount configurations

CAUTION: The weighing conveyor belt will pass very close to the bolts holding the load cells in place. Choose a mount configuration that won't interfere with the movement of the conveyor belt.

6. Fasten the template in place with the 5/8" x 1.5" bolt. Pass the bolt through the chosen hole in the template and the vacated idler wheel axle hole of the conveyor. Fasten loosely with the 5/8" nut on the side opposite the template.

   Important: Ensure that the long edge of the template is parallel with the angle of the two adjacent idler wheels of the conveyor belt.

7. With the template carefully positioned for the mounting configuration that best fits this particular harvester—and doesn't interfere with the movement of the belt—tighten the template anchor bolt.

8. Perform one last check to ensure that the load cell mount will be parallel with the conveyor belt. This is critical to the accuracy of the system.

9. Mark the centers of the chosen pair of small holes with a center punch.

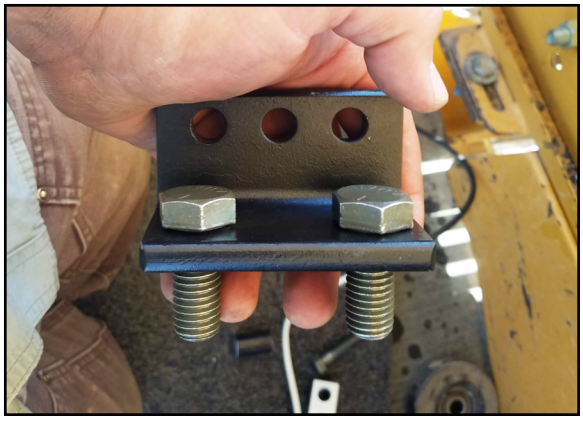
10. Remove the drill template, and drill the marked holes out to at least 0.640" (5/8" plus 0.015").

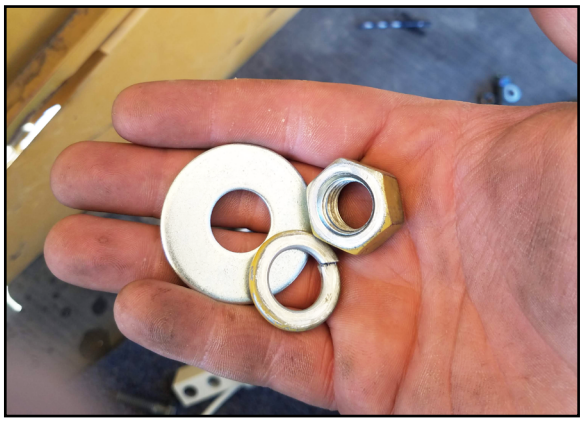
11. Expand the size of the original idler wheel axle hole to 1.25" to accommodate the weighing idler wheel axle and spacer. Center the new hole over the old hole.

Important: The idler wheel spacer needs to be able to float in this hole. It is critical that it doesn't touch the sides of the hole.

12. Using the two 5/8"–11 x 1.5" bolts, firmly bolt the load cell mount angle (the side with two holes) to the outside of the conveyor wall and secure with two each of the 5/8" lock washer, 5/8" washer, and 5/8" nut, as seen in the bottom left image below.

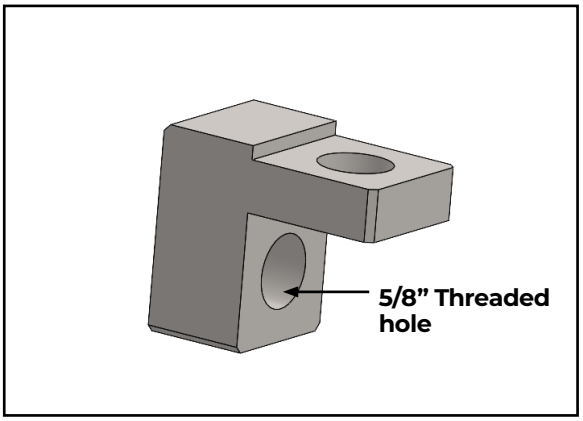
    The configuration of the washers and nuts may be different than those shown in the bottom right image below. It will depend on what fits best on each harvester. The weighing conveyor belt will pass very close to the bolts holding the load cells in place. Choose a configuration that won't interfere with the movement of the conveyor belt.





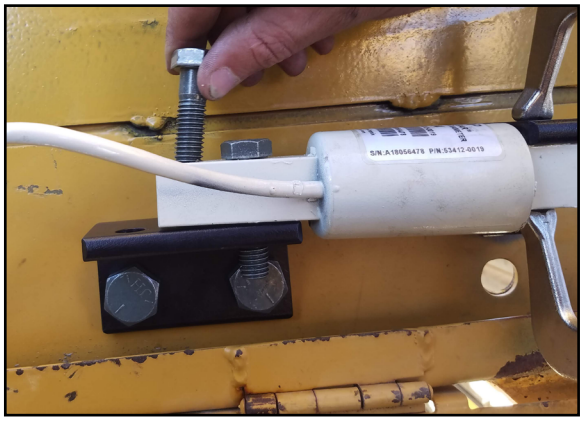
13. The threaded hole in the Idler Mount is used to attach the idler wheel to the load cell, while the non-threaded hole is used to attach the idler mount to the load cell. With the threaded hole towards the inside of the conveyor, fasten the Idler Mount (PN 24858) onto the weight-bearing end of the load cell using the hex bolt, 1/2”–20 x 1 1/2”. The threaded hole in the Idler Mount lines up with the weighing idler wheel axle hole.

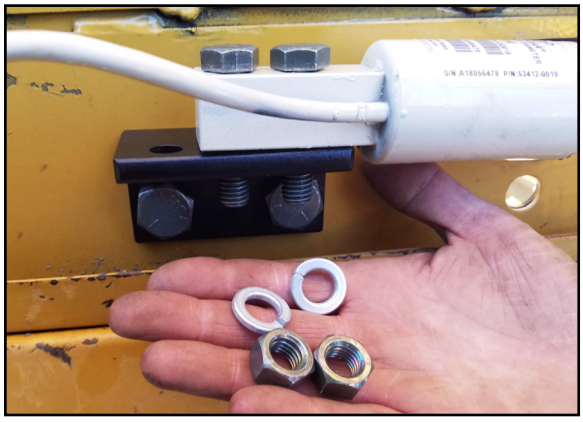
    The configuration of the Idler Mount may be different from the configuration in the image below. As shown on page 22, the Idler Mount supports multiple configurations. Choose the configuration that works best with the harvester you are working on.

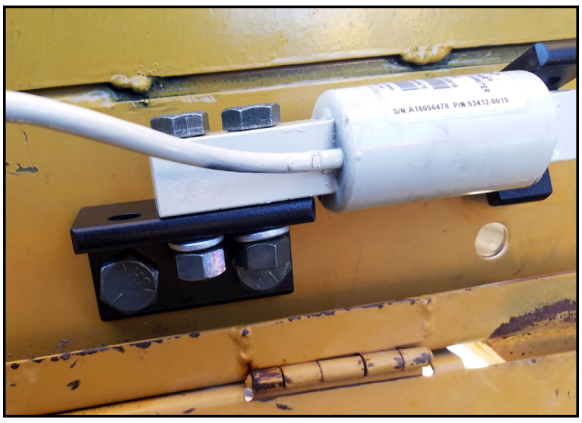


Idler mount to load cell

14. Mount the load cell to the load cell mount angle using the two 5/8”–11 x 1 1/2” hex bolts, washers, and nuts.

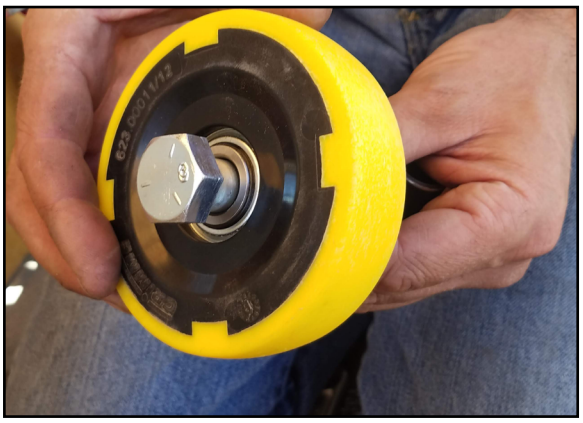


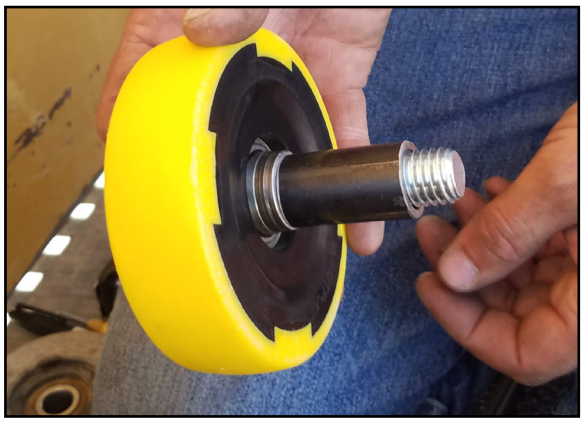




15. Slide the idler wheel onto the axle bolt, 5/8”–11 x 3 1/2” long (PN 29150).

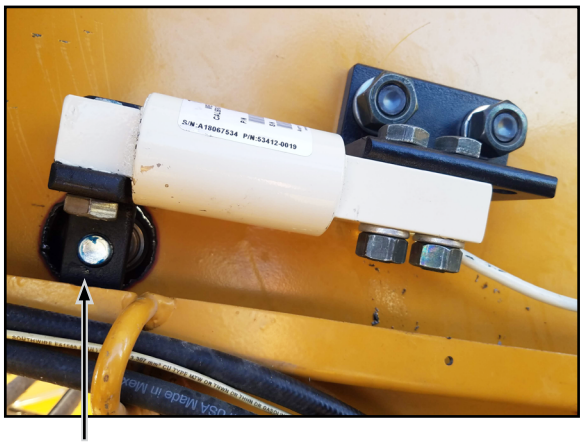
16. Slide the 1.71” long idler wheel spacer (PN 24859) onto the bolt.





17. Apply Loctite 243 to the idler wheel axle hex bolt.

18. Screw the idler wheel axle hex bolt into the threaded hole of the load cell idler mount.



Idler wheel axle hex bolt in the load cell idler mount

19. Using UV resistant wire ties, carefully tie the sensor wires from the weighing idler wheel load cells to an anchor position within one to three inches of the load cell, so as to apply zero force up or down on the load cell.

20. Route the load cell wire to the CCU, tying it with UV resistant wire ties at appropriate intervals to protect the cable and keep it safely out of the way.

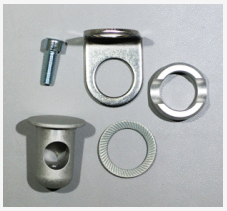
21. Repeat steps 3–19 for the second idler wheel.

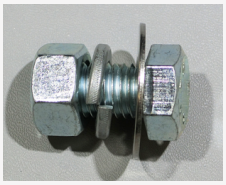
22. When looking directly at the conveyor with the crop flowing away from you, the load cells are right and left of the conveyor. Plug the right load cell cable into the CCU using load cell **Connector B**. Plug the left load cell cable into **Connector A**. It's important to keep this uniform across a fleet of harvesters.

4.3 Install the Belt Speed/RPM Sensor

4.3.1 Belt Speed Sensor Mount Kit and Parts List

The following table lists the parts included for mounting the belt speed sensor.

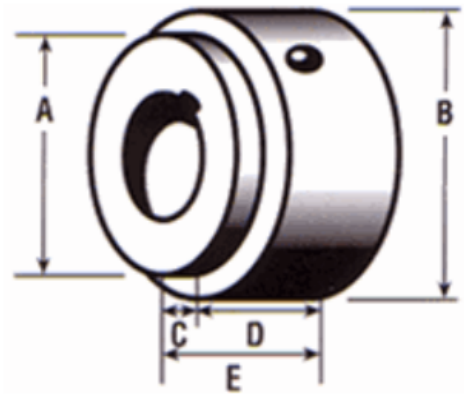
Belt Sensor Mount Kit			
Description	**PN**	**Quantity**	
Mounting system (one for each end of the rod)	24871	2	
Rod, 12mm x 200mm	24872	1	

Belt Sensor Mount Kit			
Description	**PN**	**Quantity**	
Tone wheel	24855	1	
Proximity sensor	24881	1	
Proximity sensor cable (10m)	24825	1	
Fasteners			
5/8” Lock washer for nut side	29148	1	
5/8”–11 x 1” Hex bolt	29152	1	
5/8” Washer for harvester side	29153	1	
5/8”–11 Nut	29154	1	

4.3.2 Additional Part for the Belt Speed Sensor

As seen in the list above, the belt speed sensor includes a tone wheel (PN 24855). The tone wheel is mounted to the drive shaft of the harvester’s weighing belt. This requires a weld hub with an appropriately sized bore hole to fit the diameter of the drive shaft. For this reason, the weld hub does not come with the Casma system. The installer needs to measure the drive shaft and purchase the appropriate bore size.

It should be a standard W-Series weld hub:



A–1 5/8” (the tone wheel ID drops over this shoulder to be welded)

B–1 13/16”

C–7/16”

D–1”

E–1 7/16”

An industry-standard W-series weld hub can be purchased at most parts stores.

4.3.3 Belt Speed Sensor Installation Steps

The belt speed sensor consists of a proximity sensor that is mounted using two 360° mounting systems (PN 24853) and a 200mm rod. This allows for a highly flexible installation. You may want to familiarize yourself with the mounting systems before deciding exactly how you will install the belt speed sensor.

The following instructions describe how to install the belt speed sensor:

1. If you haven’t already, identify an appropriate placement for the tone wheel and proximity sensor. The tone wheel must be installed on the drive shaft of the weighing belt.

   The orientation of the proximity sensor must be within 1/4” of the tone wheel teeth, but will otherwise vary between harvesters. See **3.1.4 Belt Speed Sensor Placement** on page 14 for more information about placing the belt speed sensor and tone wheel.

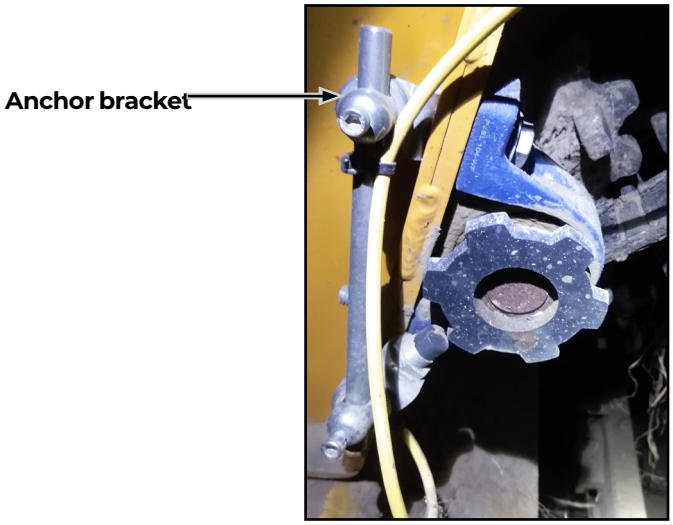
CAUTION: The tone wheel spins anytime the belt is moving. It could catch on loose clothing, hair, etc. Install the tone wheel in a safe location or build a safety shield to prevent injury.

2. Weld together the tone wheel and the weld hub.

3. Slide the tone wheel/weld hub assembly onto the weighing belt drive shaft. Turn the set screw on the hub to secure it in place.

4. Lay out the parts of the speed sensor mounting systems (PN 24853). The image on the packaging illustrates how these mounting systems are to be assembled.

5. Locate a position for the L-shaped anchor bracket of the mounting system. Make sure that the proximity sensor will be able to be within 1/4" of the tone wheel teeth. (Adding the anchor bracket to an existing bolt on the harvester is also OK.)



Anchor bracket placement

6. Mark and drill a 5/8" hole in the side of the harvester for the anchor bracket.

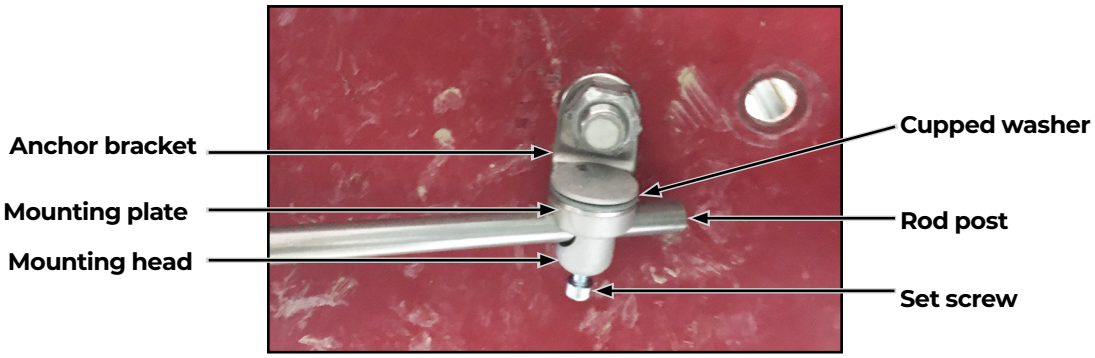
7. Assemble one of the mounting systems. Slide the mounting head through the cupped washer and the anchor bracket, from the inside to the outside. (The cupped washer rests between the mounting head and the anchor bracket.)

8. Secure the assembly to the side of the harvester using the bolt hole you just drilled and a 5/8" bolt, lock washer, and nut. Snug down the bolt, but leave it loose enough to rotate for final positioning of the rod and sensor.

9. Slide the mounting plate onto the mounting head, rotating them so that the plate grooves line up with the holes in the head.

10. Insert the 12 mm rod with one end reaching towards the tone wheel. Insert the set screw into the mounting head. Tighten it to hold the rod in place.

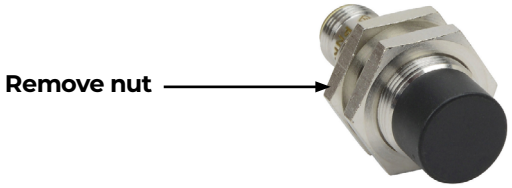
    The assembly should appear similar to the picture below:



11. Assemble the second mounting system. Slide the mounting head through the cupped washer and the anchor bracket, from the inside to the outside. (This must be done before the sensor is mounted to the bracket.)

12. Slide the mounting plate onto the mounting head, rotating them so that the plate grooves line up with the holes in the head. Affix the head and plate assembly onto the rod post. Insert and tighten the set screw.

13. Remove one of the nuts on the proximity sensor.



14. Insert the proximity sensor through the second hole of the anchor bracket with the sensor's face pointing out and away from the bracket. Replace the nut to secure the proximity sensor to the anchor bracket.

15. Rotate the rod until the face of the proximity sensor is perpendicular to and 1/4" from the teeth of the tone wheel. If necessary, you can adjust the proximity sensor's distance from the tone wheel by either moving the rod or adjusting the lock nuts on the proximity sensor.

16. Tighten the set screws at either end of the rod as well as the nut anchoring the mount.

17. Connect the right-angle connector end of the proximity sensor cable to the proximity sensor. Tighten the threaded collar of the connector.

18. Route the sensor cable such that it will be safe from harm. Tie it with UV resistant zip ties to relieve stress on the cable as it exits the sensor connector back shell and is routed to the CCU. The final installation will be similar to the images below.

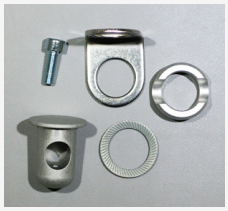
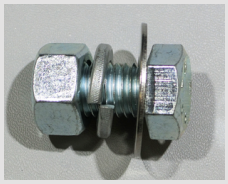
19. Route the sensor cable to the CCU. Find an out-of-the-way location to neatly coil and zip tie any extra cable.

20. Plug the bulkhead end of the cable into Position 10 of the CCU, and inspect the sensor cable run one last time to be sure it is secure and protected.

4.4 Install the Run/Hold Sensor

4.4.1 Run/Hold Sensor Mount Kit and Parts List

The following table lists the parts included for mounting the run/hold sensor. It is nearly identical to the belt speed sensor.

Run/Hold Sensor Mount Kit			
Description	**PN**	**Quantity**	
Mounting system (One for each end of the rod)	24871	2	
Rod, 12mm x 200mm	24872	1	
Proximity sensor	24881	1	
Proximity sensor cable (10m)	24825	1	
Fasteners			
5/8” Lock washer for nut side	29148	1	
5/8”–11 x 1” Hex bolt	29152	1	
5/8” Washer for harvester side	29153	1	
5/8”–11 Nut	29154	1	

4.4.2 Run/Hold Sensor Installation Steps

Like the belt speed sensor, the run/hold sensor consists of a proximity sensor that is mounted using two 360° mounting systems (PN 24853) and a 200mm rod. This allows for a highly flexible installation. If you haven’t already, you may want to familiarize yourself with the mounting systems before deciding exactly how you will install the run/hold sensor.

The following instructions describe how to install the run/hold sensor.

1. If you haven't already, identify an appropriate placement for the run/hold proximity sensor.

   It needs to be installed close to the digger assembly so that the sensor is within 1/4" of the assembly when it is lifted out of the ground and more than 1/2" away from it when it is in harvest position. See **3.1.5 Run/Hold Sensor Placement** on page 14 for more information about placing the run/hold sensor.

2. Lay out the parts of the run/hold sensor mounting systems (PN 24853). The image on the packaging illustrates how these mounting systems are to be assembled.

3. Locate a position for the L-shaped anchor bracket of the mounting system. Make sure that the proximity sensor will be able to be within 1/4" of the digger assembly when the assembly is up. (Adding the anchor bracket to an existing bolt on the harvester is also OK.)

4. Mark and drill a 5/8" hole for the anchor bracket.

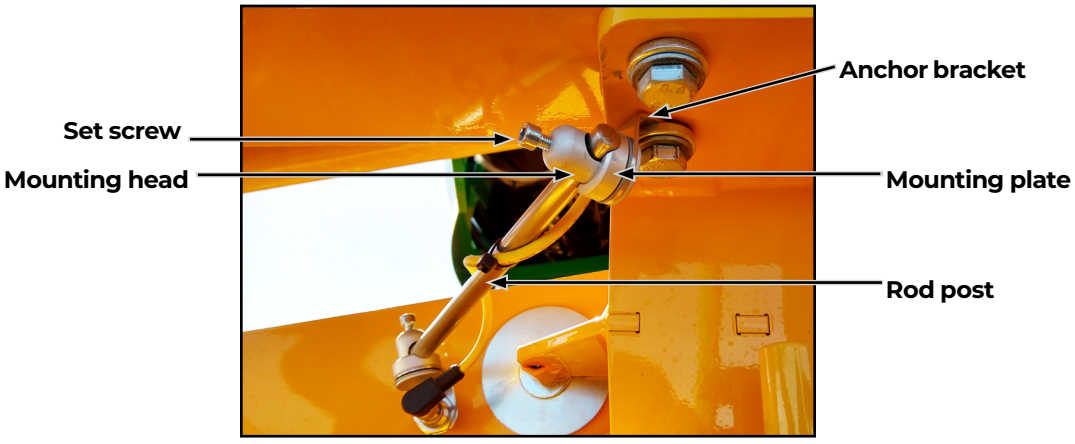
5. Assemble one of the mounting systems. Slide the mounting head through the cupped washer and the anchor bracket, from the inside to the outside. (The cupped washer rests between the mounting head and the anchor bracket.)

6. Secure the assembly to the side of the harvester using the bolt hole you just drilled and a 5/8" bolt, lock washer, and nut. Snug down the bolt, but leave it loose enough to rotate for final positioning of the rod and sensor.

7. Slide the mounting plate onto the mounting head, rotating them so that the plate grooves line up with the holes in the head.

8. Insert the 12 mm rod so that one end reaches towards the digger assembly. Insert the set screw into the mounting head. Tighten it to hold the rod in place.

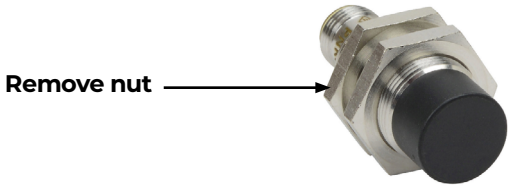
   The mounting assembly should appear similar to the picture below.



9. Assemble the second mounting system. Slide the mounting head through the cupped washer and the anchor bracket, from the inside to the outside. (This must be done before the sensor is mounted to the bracket.)

10. Slide the mounting plate onto the mounting head, rotating them so that the plate grooves line up with the holes in the head. Affix the head and plate assembly onto the rod post. Insert and tighten the set screw.

11. Remove one of the nuts on the proximity sensor.



12. Insert the proximity sensor through the second hole of the anchor bracket with the sensor's face pointing out and away from the bracket. Replace the nut to secure the proximity sensor to the anchor bracket.

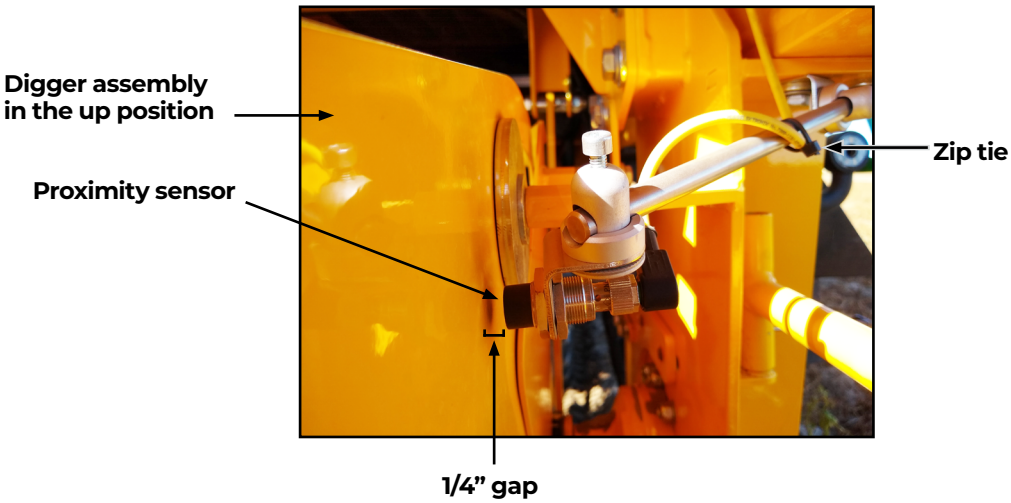
13. Move the proximity sensor, sliding it on the rod and rotating the mounts such that the face of the sensor is within 1/4" of the digger assembly steel when the digger head is up. The sensor face should be parallel with the steel it is sensing.

14. Tighten the set screws and anchor bolt.

15. Run the digger assembly up and down, ensuring a clearance of at least 1/2" away from the sensor when down and a consistent proximity of 1/4" when up.

16. Connect the right-angle connector end of the second proximity sensor cable to the proximity sensor. Tighten the threaded collar of the connector.

17. Route the sensor cable such that it will be safe from harm. Tie it with UV resistant zip ties to relieve stress on the cable as it exits the sensor connector back shell and is routed to the CCU. The final installation will look something like this.



18. Route the sensor cable to the CCU. Find an out-of-the-way location to neatly coil and zip tie any extra cable.

19. Plug the bulkhead end of the cable into Position 9 of the CCU. Inspect the sensor cable run one last time to be sure it is secure and protected.

4.5 Connect the GPS

The Casma system will usually attach to the tractor's existing GPS receiver. As GPS receivers vary widely in their connections, detailed instructions for every receiver are beyond the scope of this manual. Refer to your GPS receiver's manufacturer for specifics on how to connect to a third party system.

You can also go to *www.harvestmaster.com/casma_documentation* and search for your specific receiver.

Note: If you are using the John Deere Specialty Crop Controller, connection to the GPS receiver is not required. (See **10 Appendix C: Integrate John Deere Specialty Crop Controller (UCC2)** *on page 55.)*

Below are instructions for prepping the GPS cable (PN 24825) and a description of the pinouts for connecting with a receiver:

1. Cut the right angle connector off the included GPS cable (PN 24825).

2. Strip off 3/4" of the yellow jacket.

3. Dead end the black wire at the edge of the stripped yellow jacket. Black will not be used.

4. Cut back the nylon string and strip 5/16" of insulation from the rest of the wires.

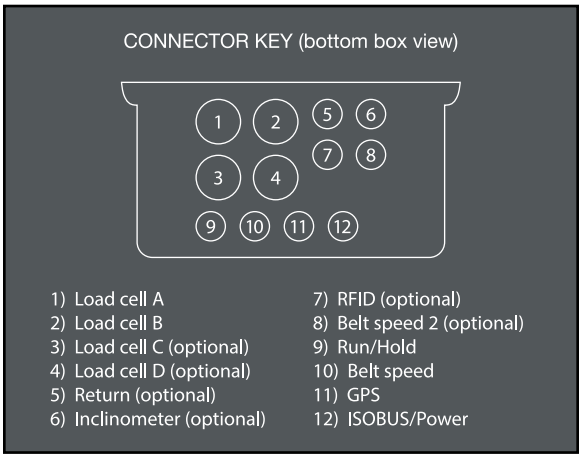
5. Use the following information to connect to the GPS receiver:

   - Brown: 12V
   - Blue: Ground
   - White: RS-232-Tx of Casma CCU pairs with Rx of the GPS receiver
   - Green: RS-232-Rx of Casma CCU pairs with Tx of the GPS receiver

6. Connect the GPS cable to the CCU box, Position 11.

4.6 Install the ISOBUS Cable

1. Connect the ISOBUS cable (PN 29275) to the CCU box, Position 12.



2. Route the cable to the ISOBUS breakaway connector on the tractor or at the cab of a self-propelled harvester. Be sure to position the cable where it will remain safe from mechanical damage while the machine operates.

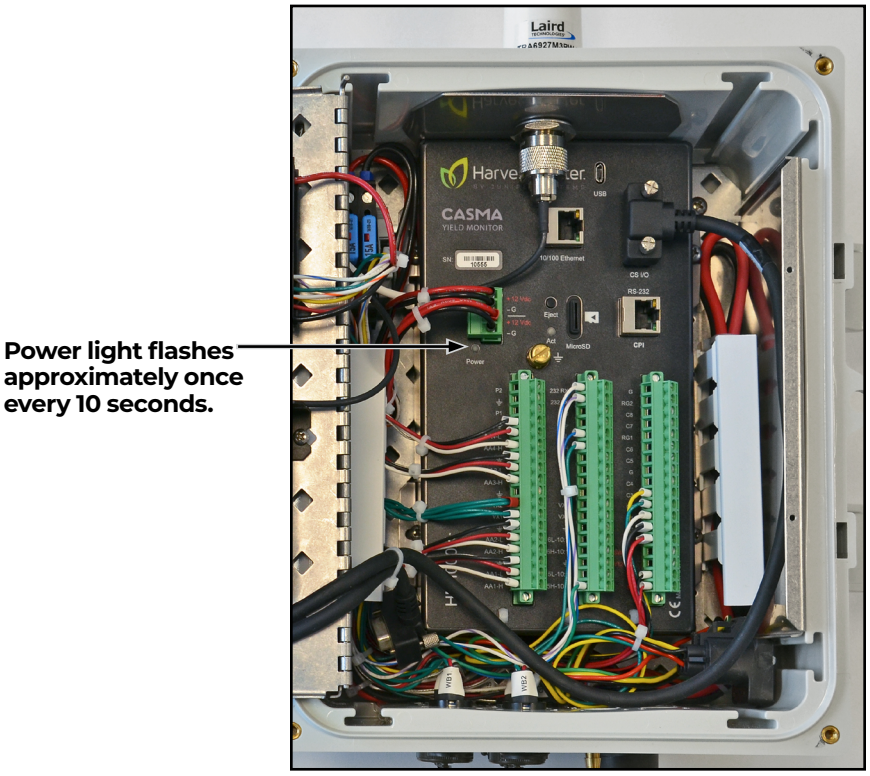
3. Plug the cable into the tractor's/harvester's ISOBUS Breakaway Connector.

ISOBUS connector (tractor side)

Tractor's ISOBUS breakaway connector

4. Tie the cable in place with UV resistant wire ties.

5. Power up the tractor to turn on the ISOBUS system and power the CCU. Open the front of the CCU and verify that the HM 1000X Data Logger is activated. (It should have lights slowly flashing.)



5 Initial Startup and Programming

Many of the following tasks can be completed in the shop immediately after installation. However, some of these settings will be specific to a particular harvester and field and may need to be completed or updated by the customer.

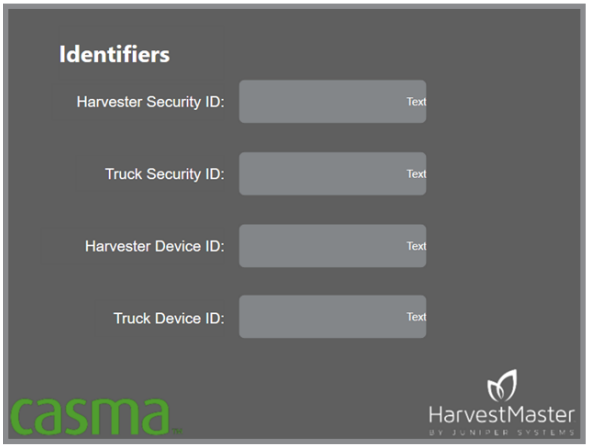
5.1 Activate the HM 1000X Data Logger

1. Open the front of the CCU.

2. Connect the HM 1000X Data Logger to a tablet or laptop via the Micro USB port in the top of the panel (USB 2.0 A-Male to Micro B Cable).

3. Open a web browser on the tablet or laptop.

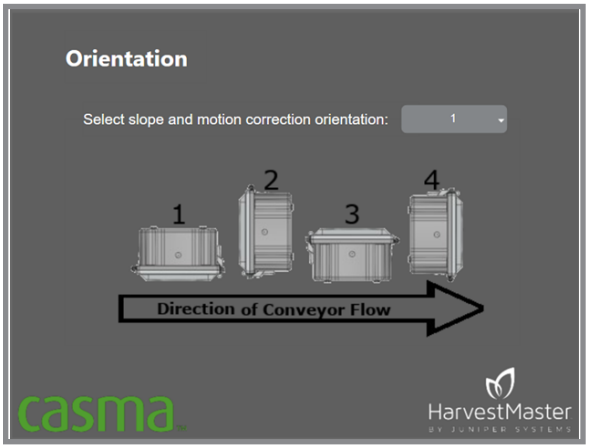
4. In a new tab, type the following IP address: 192.168.66.1/index.html



5. On the Settings for Install tab, enter a security ID provided by HarvestMaster. This number will be unique for each harvester and links the harvester to the correct account on mycasma.com.

6. Enter a Truck Security ID provided by HarvestMaster. This number is shared by all systems within a mycasma.com account and is necessary for associating all truckload data with that account.

Note: If you are only transferring files to the John Deere operations center, leave the fields on this screen blank.



7. Select the Orientation tab.

8. Enter the appropriate CCU orientation in relation to the direction of flow on the weighing belt. This setting must be correct for the slope and motion compensation to work, which will improve system accuracy.

9. The following table explains what each setting indicates.

CCU Orientation

Setting	Orientation
0	No slope and motion corrections. If this is selected, expect errors of as much as 10 to 15%.
1	CCU is facing to the right of the direction of flow (of the weighing conveyor belt).
2	CCU is facing opposite the direction of flow.
3	CCU is facing to the left of the direction of flow.
4	CCU is facing the same as, or in the direction of flow.

11. Exit the browser.

12. Disconnect the Micro USB cable.

5.2 Validate the Sensors are Working

With the ISOBUS cable plugged in to the tractor/harvester and the CCU, perform the following checks.

With the system display open to the Home screen,

1. Verify that you have a green GPS signal.

2. Validate that the run/hold sensor is working by raising or lowering the digger assembly. With the digger assembly up, the indicator in the bottom left corner of the screen should say “HOLD” in red. With the digger assembly down, it should say “RUN” in green.

With the system display open to the Diagnostics screen:

3. Place a weight on the load cell idler wheels. Validate that **WEIGHT A** and **WEIGHT B** on the screen are showing data.

4. Start the weighing belt. Verify that **BELT SPEED** changes.

5.3 Virtual Terminal Settings

The user interface for the Casma system integrates seamlessly with the tractor's existing ISOBUS-compatible display via the virtual terminal (VT). As such, some of the general settings for the display impact how the Casma user interface works.

The ISOBUS protocol works across a variety of displays. Depending on which display you are using, how you access the VT and change things like units of measure will vary. Please refer to the display manufacturer's user manual for specific instructions.

5.3.1 Setup VT Access

In order for Casma to integrate with the existing systems on your tractor/harvester, you may need to enable virtual terminal access. Refer to the manufacturer of your display for help enabling this feature.

5.3.2 Select a Preferred System of Measurement

The Casma interface adopts whatever system of measurement (metric vs. English) is already set to be preferred in the display. If you would like to change this for Casma, you will need to change it for the entire display. The one exception to this is belt pitch, which is always measured in millimeters.

5.3.3 Configure GPS Settings in the Display

The following GPS settings will be located on the GPS screens in your VT—not on a Casma screen. Locations will vary by system.

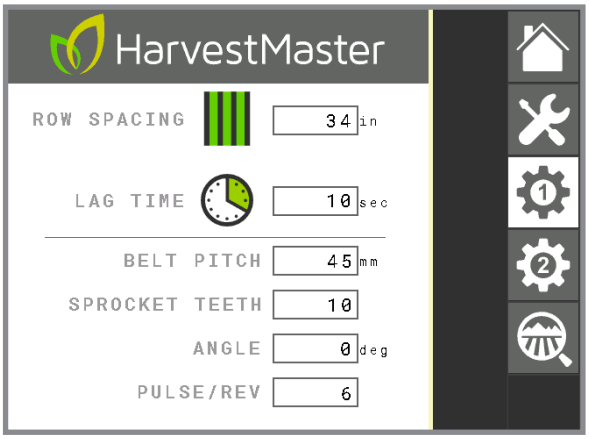
- **Baud rate:** Set to 38400. This is the speed at which the GPS communicates with the VT system through a serial connection.
- **Update rate:** Set to 1 Hz. For optimal performance, only the RMC and GGA strings should be enabled.

These settings are not likely to change once they are set. However, they will need to be revisited if you replace the GPS receiver or switch tractors (a different tractor may mean a different GPS receiver).

5.4 Setup Screen 1

The following settings can be found on Setup screen 1.

Note: Setup screens 1 and 2 are password protected as a precautionary reminder that these settings will usually remain constant once entered. The password is 8306.



5.4.1 Input Row Spacing

Input the row spacing for your field(s). This is the distance from the center of one row to the center of the next row. The Casma system uses this value when calculating area.

This setting would only change if any of your fields are planted with varied row spacing.

5.4.2 Calculate and Input Lag Time

Lag time is the time difference between when the crop is lifted out of the ground and when it passes over the Casma load cells.

An accurate lag time is critical for precise placement of yield values. Because the Casma system is plotting crop yields via a moving harvester, the harvester's GPS position at the time the crop is weighed by the load cells is different from its GPS position at the time the crop is lifted out of the ground. Lag time compensates for this difference.

Calculate lag time

The first time the harvester opens a field,

1. Run the belts at typical harvest RPM.
2. Use a stopwatch to track how long it takes the crop to be lifted out of the ground and pass over the load cells on the weighing belt.
3. Enter the lag time into Setup screen 1.
4. Repeat for each harvester with a different Casma configuration (e.g., load cells may be positioned differently on different harvesters).

This setting is not likely to change once it is set, but it may vary between harvesters and crops.

5.4.3 Input Belt Pitch

Enter the belt pitch for the weighing belt. This is the distance between the belt links, as measured from the center of the roller pin on one link to the center of the roller pin on the next link. It is measured in millimeters.

This setting will only change if you change the belt pitch on a harvester. It may vary from harvester to harvester.

5.4.4 Input Sprocket Teeth Count

Input the number of teeth on the drive sprocket for the weighing belt.

This setting will not change once it is set, but it may vary between harvesters.

5.4.5 Calculate and Enter Weighing Belt Angle

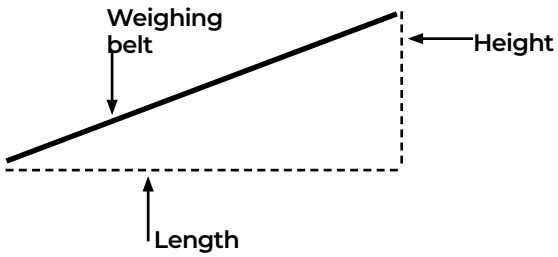
The Casma system needs to know the angle of the weighing belt in relation to the ground.

Calculate weighing belt angle with an angle finder:

1. Park the harvester on a level surface.
2. Use an angle finder to measure the angle of the weighing belt.

Calculate weighing belt angle manually:

1. Measure the height of the weighing belt vertically from the base to the top.
2. Measure the length of the weighing belt horizontally from one end to the other.



3. Use the following formula to calculate the slope (angle) of the weighing belt:

$$Angle = \text{TAN}^{-1}(Height/Length)$$

4. Enter the angle into the field labeled **ANGLE** on Setup screen 1.

This setting will not change once it is set, but it may vary between harvesters.

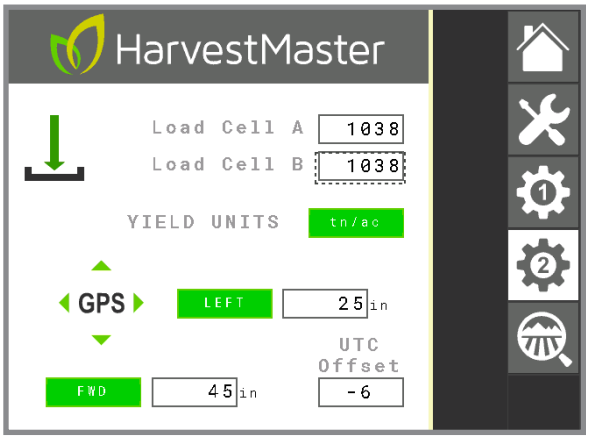
5.4.6 Input Pulse/Rev Count (Speed Sensor)

Pulse/Rev refers to the number of teeth on the tone wheel speed sensor, which is usually an add-on of the Casma system. When the tone wheel comes as part of Casma, it always has six teeth. However, some harvesters already come equipped with tone wheels. In these cases, the number of teeth may vary. This setting will not change.

5.5 Setup Screen 2

The following settings can be found on Setup screen 2.

Note: Setup screens 1 and 2 are password protected as a precautionary reminder that these settings will usually remain constant once entered. The password is 8306.



5.5.1 Verify Load Cell A and B Factors

The values labeled Load Cell A and Load Cell B are the multiplying factors for each load cell. For all standard Casma installations, this value should be set to 1038. If this value is something other than 1038, you can contact your Casma sales representative to verify your system installation.

This value will not change.

5.5.2 Specify Preferred Yield Units

Specify the preferred units for the recorded yield. This setting is affected by the system of measurement specified in the display.

If the display is set to metric, yield units in the Casma system are automatically displayed as kilograms/hectare (kg/ha). If the display is set to English, yield unit options are tons/acre (tn/ac) or hundredweight/acre (cwt/ac).

This setting can be changed at any time.

5.5.3 Calculate and Enter GPS Offsets

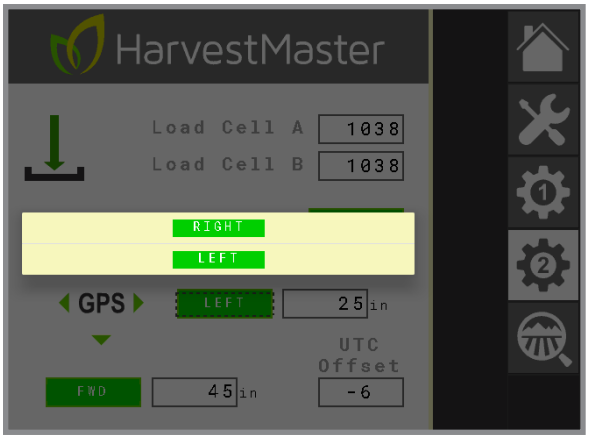
The purpose of GPS offsets is to compensate for the fact that the GPS receiver does not sit right above the crops as they are being harvested. The GPS offset helps the Casma system calculate and map the precise location of crop yields.

Left/Right and Forward/Reverse refer to the location of the GPS receiver in relation to the point of harvest when facing the harvester's direction of travel. For example, if the GPS receiver is left of and behind the point of harvest, select **LEFT** and **REVERSE**, and then enter the difference for each (in inches or centimeters—depending on the preferences in your VT).

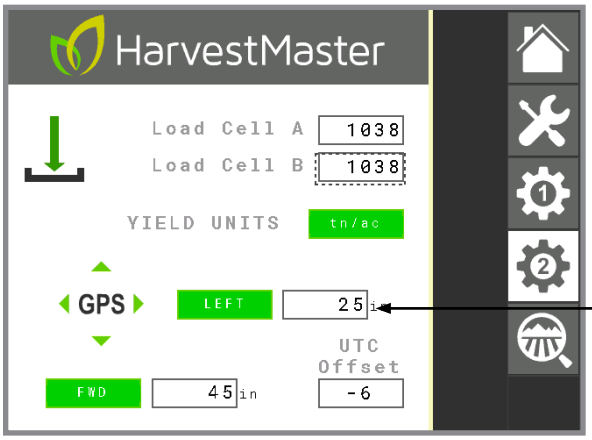
These offsets should be measured in right angles, level with the point of harvest. If the GPS receiver is vertically higher than the point of harvest, choose the position directly below the GPS receiver on the same horizontal plane as the point of harvest. Measure the distance from that position.

Calculate GPS offsets:

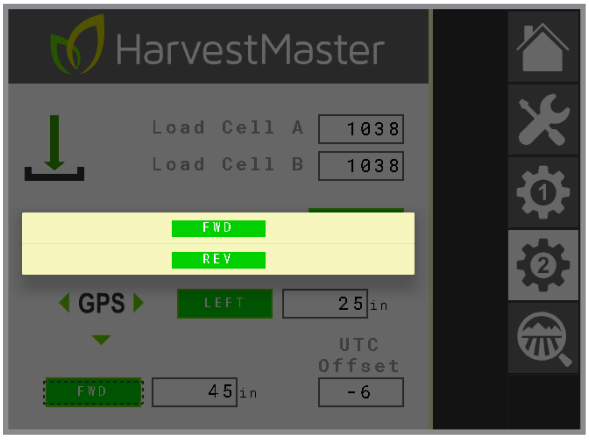
1. Stand at the point of harvest, facing the direction of harvest.
2. Measure the left/right difference between your position and the GPS receiver.
3. Measure the forward/reverse difference between your position and the GPS receiver.



4. On Setup screen 2, tap the **LEFT** (or **RIGHT**) button.
5. Select the appropriate direction.



6. Enter the measured difference.



7. Tap the **FWD** (or **REV**) button.
8. Select the appropriate direction.
9. Enter the measured difference.

This setting will only change if the GPS receiver is moved. It may also need to be revisited if the GPS receiver is mounted on the tractor and you switch tractors (possibly also changing the placement of the GPS receiver).

5.5.4 Input UTC Offset

UTC refers to Coordinated Universal Time, the time standard from which our system of time zones originates. The following chart gives a simplified summary of the UTC offsets for the United States.

UTC Offset

Time Zone	Standard	Daylight
Eastern	-5	-4
Central	-6	-5
Mountain	-7	-6
Pacific	-8	-7
Alaska	-9	-8
Hawaii	-10	-10

You can also find this by searching online for “my current UTC offset.”

UTC offset allows mycasma.com to display location-specific, real-time data. Without this, all your data will be displayed in Greenwich Mean Time (GMT).

This setting will change when switching between standard and daylight savings times.

6 Calibration

Calibrating the Casma system on *each* harvester is important because each installation is different. Weight measurements will vary depending on the spacing of the load cells, which varies from harvester to harvester. Calibration compensates for those differences to produce accurate and consistent yield data.

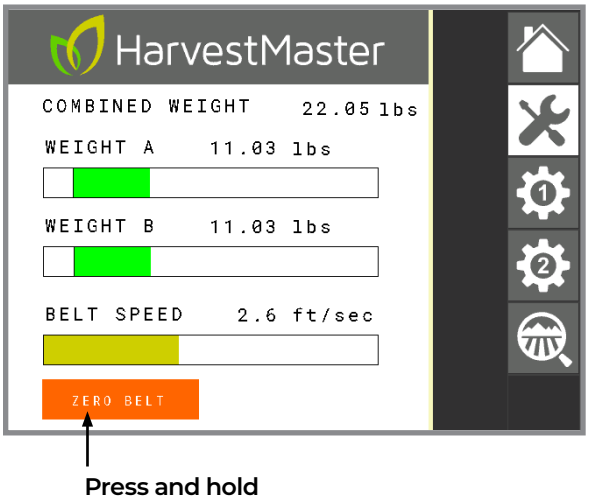
Calibration is also important for making your data comparable across harvesters. By calibrating all your yield monitors to a single reference (either a truck scale or one known weight), you standardize your data. This allows you to compare data with confidence, even if the data was collected by different Casma systems on different harvesters.

Each Casma system includes a calibration wizard. There are two ways to calibrate your Casma system using the wizard:

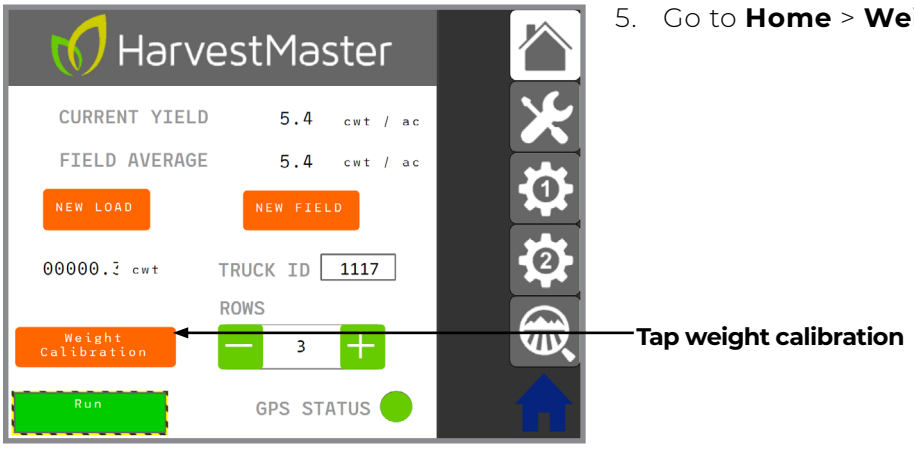
- Run the same known weight across each harvester's weighing belt.
- Compare each harvester's yield monitor results to a truck scale.

6.1 Calibrate with a Known Weight

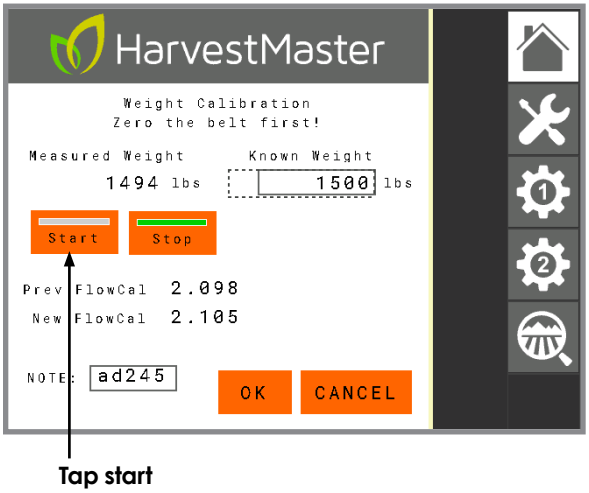
To calibrate the Casma system with a known weight,



1. Park the harvester on a level surface (if possible).
2. On the VT monitor, go to the Diagnostics screen.
3. With the belts empty and running at a typical RPM, press and hold **ZERO BELT**.
4. Allow the process to complete.



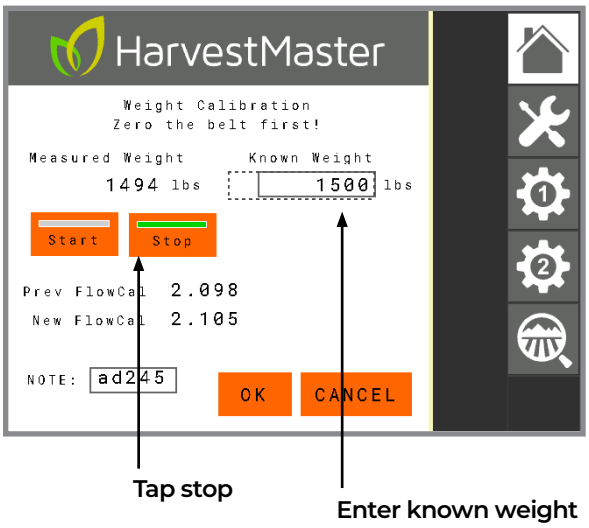
5. Go to **Home** > **Weight Calibration**.



6. With belts still running at a typical harvest RPM, tap **Start**.

7. Place a weight (minimum 20 lb or 10 kg) on the weighing belt and allow it to pass both load cells.

8. For improved accuracy, pass the weight over the belt 5-10 times. Keep track of how many times you do this.



9. Tap **Stop**.

10. Multiply the value of the weight by the number of passes (e.g., 20 lb x 10 passes = 200 lb). This is the known weight.

11. Enter the **Known Weight** on the Calibration screen.

Casma displays the **New FlowCal** (the new calibration coefficient).

12. Verify that the **New FlowCal** is acceptable.

13. Tap **OK**.

The Casma system is now calibrated to the known weight.

The **OK** button does one of the following actions, depending on where the system is in the calibration process.

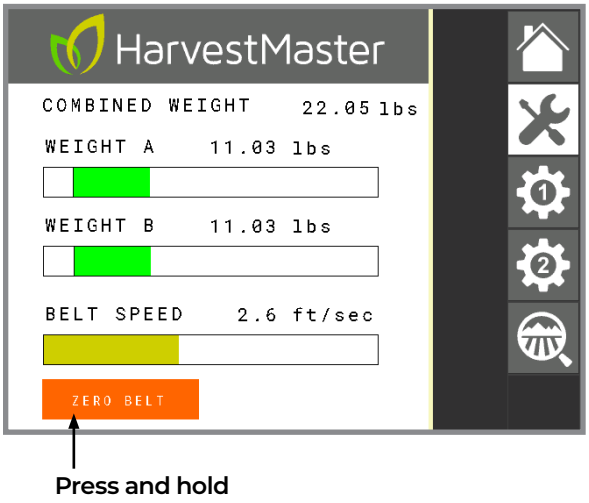
- After tapping **Start**, if you tap **OK**, Casma will exit the calibration screen, but the calibration will continue in the background. If **Stop** has not been pressed, the Measured Weight will continue to accumulate. This allows you to resume using other portions of the Casma user interface while the calibration continues to run in the background. You can return to the Calibration screen and complete this same calibration later.

- After tapping **Start**, **Stop**, *and* entering the **Known Weight**, Casma calculates a **New FlowCal**. After a New FlowCal has been calculated, tapping **OK** saves the New FlowCal, and the calibration is complete.

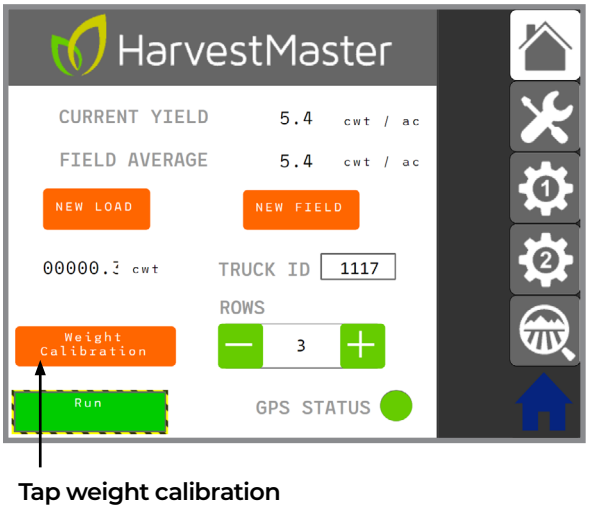
HarvestMaster highly recommends using the same known weight to calibrate all your Casma systems. This improves the consistency and accuracy of your data from system to system.

6.2 Calibrate with a Truck Scale

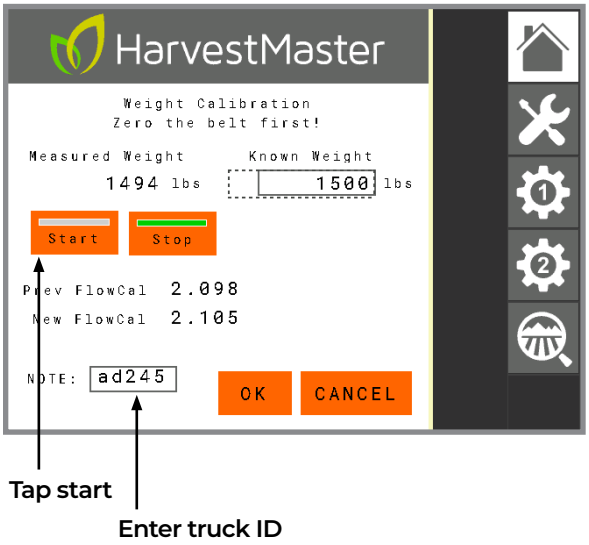
To calibrate the Casma system with a truck scale,



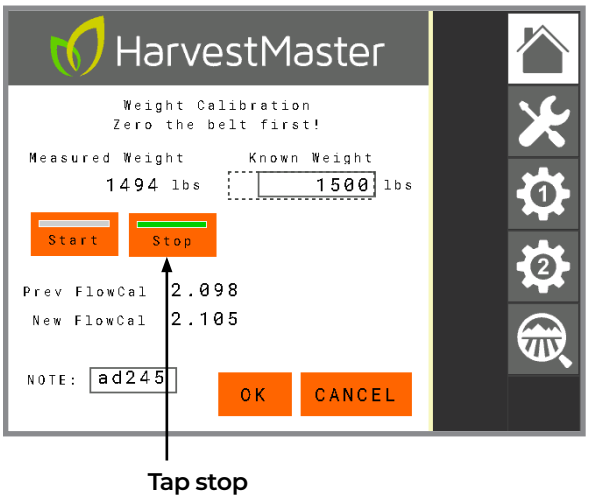
1. Park the harvester on a level surface (if possible).
2. On the VT monitor, go to the Diagnostics screen.
3. With the belts empty and running at a typical RPM, press and hold **ZERO BELT**.
4. Allow the process to complete.



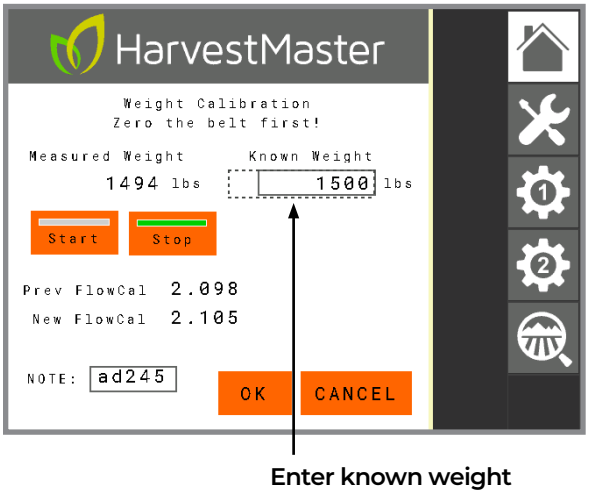
5. Go to **Home** > **Weight Calibration**.



6. Tap **Start**.
7. Begin harvesting your crop and loading it into an empty truck.
8. If desired, enter the truck ID in the **NOTE** field. This will help you remember which load was used for calibration.



9. Once the truck is loaded, tap **Stop**.
10. If desired, tap **OK** to close the Calibration screen. Casma will retain the **Measured Weight** until you resume calibration.
11. Weigh the loaded truck.
12. Empty the truck and weigh it again as soon as possible.
13. Subtract the empty weight from the loaded weight. This is the known weight.



14. Re-open the Calibration screen if necessary.

15. Enter the **Known Weight**.

Casma displays the **New FlowCal** (the new calibration coefficient).

16. Verify that the **New FlowCal** is acceptable.

17. Tap **OK**.

The Casma system is now calibrated consistent with the truck scale.

The **OK** button does one of the following actions, depending on where the system is in the calibration process.

- After tapping **Start**, if you tap **OK**, Casma will exit the calibration screen, but the calibration will continue in the background. If **Stop** has not been pressed, the Measured Weight will continue to accumulate. This allows you to resume using other portions of the Casma user interface while the calibration continues to run in the background. You can return to the Calibration screen and complete this same calibration later.
- After tapping **Start**, **Stop**, *and* entering the **Known Weight**, Casma calculates a **New FlowCal**. After a New FlowCal has been calculated, tapping **OK** saves the New FlowCal, and the calibration is complete.

HarvestMaster highly recommends using the same truck scale to calibrate all your Casma systems. This improves the consistency and accuracy of your data.

If desired, re-run the calibration from time to time, particularly if you have any concerns about accuracy.

7 Annual Service Visits

Perform the following tasks at the beginning of each harvest season.

- Verify the following are securely in place and free from debris:
  - Load cells
  - Speed sensor and tone wheel – Verify gap between is 1/4". Also verify that the LED light turns on when a tone wheel tooth passes it.
  - Run/hold sensor – Verify gap between is 1/4" with digger assembly up. Also verify that the LED light turns on when it senses the steel of the digger assembly.
- Verify that idler wheels on the weighing belt are not bent and are spinning smoothly.
- Make sure all cables are securely tied down, clear of any moving parts with no cracks or exposed conductors.
- Verify that the central control unit box is securely attached to the harvester and is not showing any signs of damage that might allow water or dust to enter the box.
- Verify that the cellular antenna is securely in place.
- Confirm that all the wire connections on the bottom of the CCU are securely in place.
- Connect the ISOBUS cable to the tractor's/harvester's ISOBUS port.
- Verify the Casma user interface is available on the virtual terminal. The Casma screens say HarvestMaster on them.
- With the tractor connected to the harvester and the display running, open the Diagnostics screen, start the weighing belt, and verify that **WEIGHT A**, **WEIGHT B**, and **BELT SPEED** are all showing data.
- Park the harvester on a level surface and open the Diagnostics screen. With the belts empty and running at a typical RPM, press and hold **ZERO BELT**.
- Calibrate the harvester (page 47).
- Verify that you have a green GPS signal (Home screen).
- If there have been significant changes since the last season, review all settings.

CAUTION: Do not pressure wash the central control unit of the Casma system.

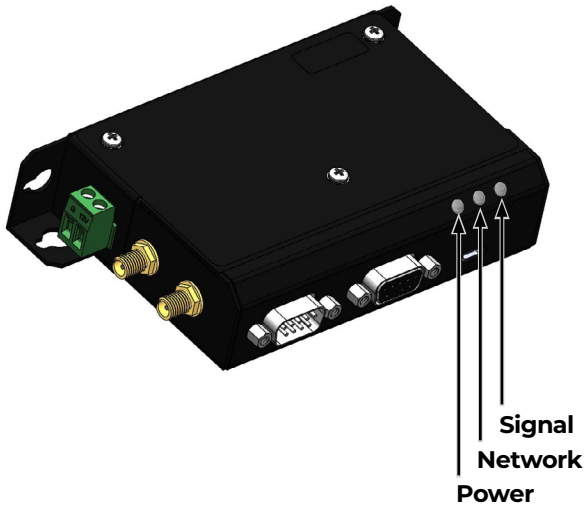
8 Appendix A: Cell Modem LED Indicators

The following table describes the patterns in the LED indicator lights for the Casma system's cell module.

LED indicator lights

Setting	Green	Blue	Red
Network	Flashes every 8 seconds when the Casma system is in coverage and the cellular account is active*	Flashes with traffic to/ from the internal cell modem	Flashes every 8 seconds when there is an issue with network/settings
Signal	Flashes every 8 seconds to indicate a good signal strength	Flashes every 8 seconds to indicate fair signal strength	Flashes every 8 seconds to indicate marginal or no signal strength
Power/Traffic	Flashes every 8 seconds to indicate all is good in the network	Flashes with traffic on RS-232 or CS I/O	Used to let user know it is in low power state (only LED flashing)

*To keep customer costs to a minimum, the cellular account is only active during harvest. HarvestMaster activates and deactivates the account according to the harvest schedule provided by the customer.



9 Appendix B: Save System Settings before CCU Firmware Updates

All updates to the firmware in the Casma data logger come wirelessly from HarvestMaster. These updates wipe out Casma system settings. For this reason, the CCU utility program allows you to save your settings before an update and then restore them after an update.

HarvestMaster coordinates all firmware updates with customers so that you won't lose your settings in the process.

To save and then restore Casma system settings,

1. Open the front of the CCU.

2. Connect the HM 1000X Data Logger to a tablet or laptop via the Micro USB port in the top of the panel (USB 2.0 A-Male to Micro B Cable).

3. Open a web browser on the tablet or laptop.

4. In a new tab, type the following IP address: 192.168.66.1/index.html.

5. Select the Save/Restore tab.

6. Tap **Save**.

7. Notify HarvestMaster that you have saved your settings.

8. Wait for HarvestMaster to notify you that the update is complete.

9. Tap **Restore**.

10 Appendix C: Integrate John Deere Specialty Crop Controller (UCC2)

The Casma Yield Monitor uses the virtual terminal to connect to the tractor's existing ISOBUS-compatible display. You can link Casma to the John Deere Specialty Crop Controller (UCC2) and GPS receiver, allowing you to view the Casma live yield map on the John Deere display as you harvest and transfer yield data to John Deere's operation center.

Required equipment

- John Deere Specialty Crop Controller (UCC2) with Yield Doc Specialty Crop Activation
- John Deere GPS receiver
- Casma UCC2 serial cable (PN 31568)

10.1 Connect Casma and John Deere Specialty Crop Controller

To connect Casma and John Deere Specialty Crop Controller,

1. Install the Specialty Crop Controller as instructed by John Deere.

2. Plug the round connector on the Casma UCC2 serial cable into the CCU box, Position 8, labeled John Deere UCC2.

3. Route the Casma UCC2 serial cable to the John Deere UCC2 Specialty Crop Controller.

4. Plug the AMPSEAL 12 pin rectangular connector on the Casma UCC2 serial cable into the John Deere simple wire harness. Any of the three possible connection points are acceptable. When properly connected, the serial cable and connector click into place.

10.2 Modify Settings in Specialty Crop Controller

After physically connecting Casma and the John Deere Specialty Crop Controller, modify the settings in the John Deere Specialty Crop Controller.

Note: The procedure you follow to modify settings in the Specialty Crop Controller varies depending on your version of the product. Refer to your John Deere documentation for detailed information.

In the Specialty Crop Controller, enter the following values.

Settings in the Specialty Crop Controller

Setting		Value	Notes
Profile name		Casma	
Required feature for the task		Yield Doc Specialty Crop	
Serial port		1	
	Baud rate	38400 Yield Doc Specialty Crop	
	NMEA	On	
	NMEA message type	Must include GGA, GSA, and RMC	
	NMEA rate	1 Hz	
Documentation		Calibrated Flow + Trash	
Load tracking only		Off	
Machine type		Pull-behind implement	
Crop delay		Amount of time in seconds	See **10.2.1 Calculate Crop Delay** on page 57.
Rows and spacing		Number of rows Space between rows	See **10.2.2 Calculate Rows and Spacing** on page 57.

Settings in the Specialty Crop Controller		
Setting	**Value**	**Notes**
Area	Acres or hectare	
Mass	English or metric	
GPS work point offset	Select Forward or Back and enter the distance. Select Left or Right and enter the distance.	The work point offset measures the center of the digger blade in relation to the GPS receiver. It ensures the yield values are placed correctly on the yield map. The work point offset is found in the Implement Profile on the John Deere display.

10.2.1 Calculate Crop Delay

Crop delay is the amount of time it takes for the crop to leave the ground and pass over the Casma load cells. An accurate crop delay is critical for precise placement of yield values. Because the Casma system is plotting crop yields with a moving harvester, the harvester's GPS position at the time the crop is weighed by the load cells is different from its GPS position at the time the crop is lifted out of the ground. The crop delay value compensates for this difference.

Note: Calculate a crop delay value for each harvester that you use. This value is specific to a harvester due to differences in equipment and load cell placement.

To calculate the crop delay,

1. The first time the harvester opens a field, run the belts at typical harvest RPM.

2. Press start on a stopwatch when the crop is lifted out of the ground. Press stop on the stopwatch when the crop passes over the load cells on the weighing belt. The number on your stopwatch is the crop delay time.

3. Note this value in seconds.

10.2.2 Calculate Rows and Spacing

Casma calculates the harvested area based on a rows and spacing configuration.

- The rows value is the number of rows that passes over the weighing belt, including rows harvested by windrowers. For example:

  Harvester (4 rows) + 2 windrowers (6 rows each) = 16 rows
- The spacing value is the distance from the center of one row to the center of the next row.

You can enter several possible configurations in the Specialty Crop Controller. For example, if you have a four-row harvester with two four-row windrowers, you have the following possible configurations:

- Harvester only: 4 rows, 34 in. spacing
- Harvester and one windrower: 8 rows, 34 in. spacing
- Harvester and two windrowers: 12 rows, 34 in. spacing

CAUTION: Correct row and spacing values are imperative for accurate yield measurements.

10.3 Find Casma in the Virtual Terminal

You can usually find Casma in the virtual terminal under Universal CAN Controller > Application Controller.

Some settings in the Casma virtual terminal may be the same as those entered in the Specialty Crop Controller. However, setting the values in two places allows the data to be used outside the John Deere operations center and prevents concerns about missing settings. For more information on entering settings in the Casma virtual terminal, see **5.3 Virtual Terminal Settings on page 41**.

10.4 Capture Truckload Data in Specialty Crop Controller

The Specialty Crop Controller can capture the total truckload weight as well as smaller loads within the truck, such as a pallet box. This added complexity is unnecessary for most crops harvested with Casma. To work efficiently, add a module built for tracking truckloads to a run page, using the layout manager. Refer to your John Deere documentation for instructions on adding this module.

After you add the module, you will have Load 1 (L1) and Load 2 (L2). For most crops harvested with Casma, use Load 2 to watch the weight accumulation, enter a Load ID, and take notes associated with the current truckload. After you empty the truck, tap **Reset** to save the data and clear the weight value.