HarvestMaster™
BY JUNIPER SYSTEMS

casma™
Yield Monitor

USER'S GUIDE

Casma Yield Monitor User's Guide

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.

Contents

1 Casma System Overview

The Casma Yield Monitor enables yield mapping for crops harvested using conveyor belts.

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, truck load weights, and harvester logistics (location, run time, idle time, total tonnage harvested by date, etc.).

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 truck load 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

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

1.2 How the casma yield monitor works

The figure on page 8 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 CAN 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 VT.

9. Updates are sent to mycasma.com throughout the day. This includes yield data, truck load weights, and harvester logistics.

casma™
Yield Monitor

6 GPS
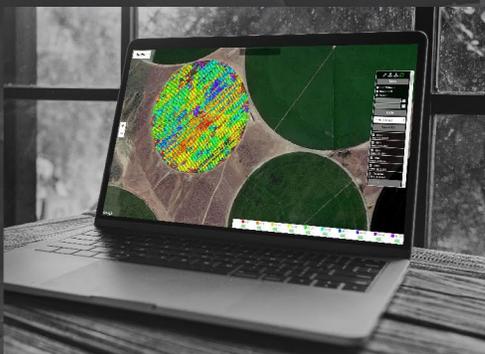
4 Speed Sensor

Tone Wheel

Load Cells **3**

2

8 ISOBUS Display

Cellular Data Transfer

2

Tractor Cab **7**

5

Conveyor

ISOBUS Communication Cable

Central Control Unit

HarvestMaster
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(Tractor)

9 myCasma Software

(Remote interface)

1 Run/Hold Sensor
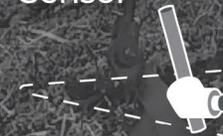
1.3 Data display and transfer

Data from your monitor is available in both the cab of the tractor and online at mycasma.com.

1.3.1 Virtual terminal data monitoring

In the cab, yield data is available in real time on the existing in-cab display via the Virtual Terminal (VT).
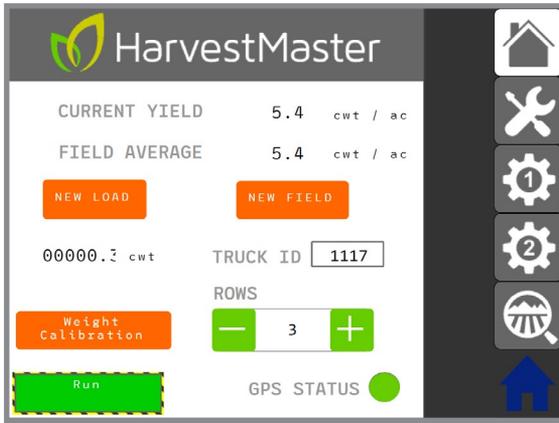
The field manager is able to make informed decisions during harvest without leaving the field.

1.3.2 Mycasma.com data evaluation and export

The yield monitor data is automatically transmitted to the *mycasma.com* website via cell modem.
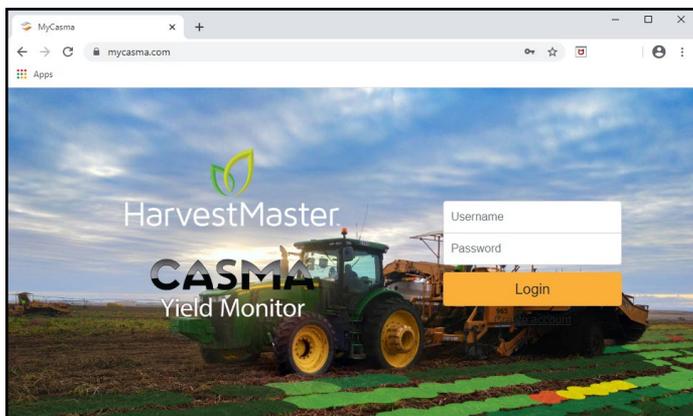
On *mycasma.com*, you can access yield maps for each field as well as reports for each field, harvester, and truck. You can also export data for evaluation in other data analysis and mapping apps.

2 Initial Setup

Some of the following tasks may have been completed when your Casma system was installed. However, most of these settings will be specific to your particular fields and machinery.

HarvestMaster recommends validating each of the following:

2.1 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 be different. Please refer to the display manufacturer's user manual for specific instructions.

2.1.1 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.

2.1.2 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.

2.1.3 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).

2.2 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.
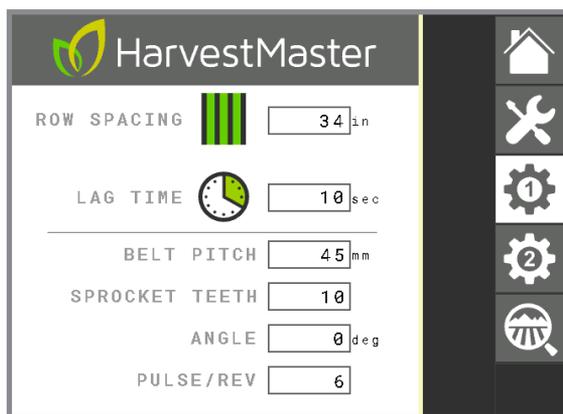
2.2.1 Input row spacing

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.

2.2.2 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 **both** 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.

2.2.3 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.

2.2.4 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.

2.2.5 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. Park the harvester on a level surface.

2. Measure the height of the weighing belt vertically from the base to the top.

3. Measure the length of the weighing belt horizontally from one end to the other.
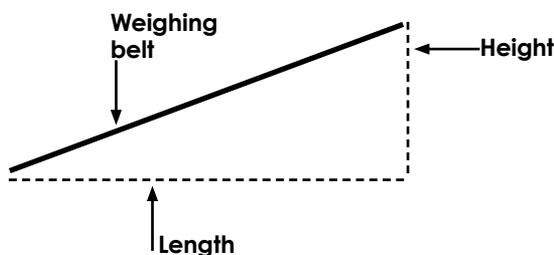
4. Use the following formula to calculate the slope (angle) of the weighing belt:

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

5. 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.

2.2.6 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 6 teeth. However, some harvesters already come equipped with tone wheels. In these cases, the number of teeth may vary.

This setting will not change.

Speed sensor **Tone wheel tooth**

2.3 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.
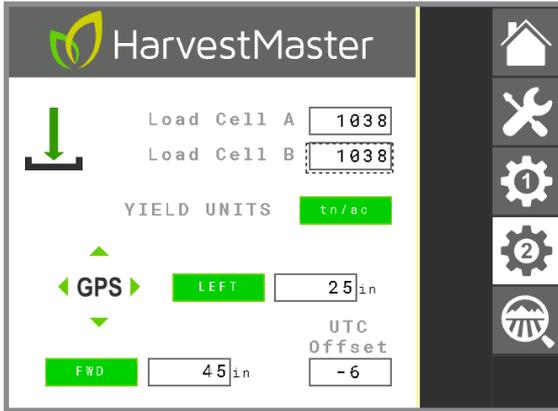
2.3.1 Verify Load Cell A and B factors

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.

2.3.2 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.

2.3.3 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.
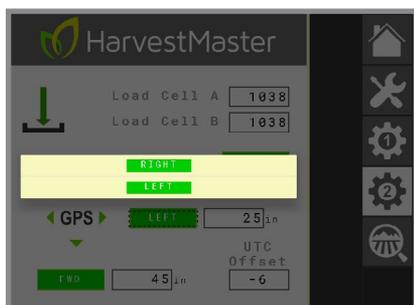
4. On Setup screen 2, tap the **LEFT** (or **RIGHT**) icon.

5. Select the appropriate direction.
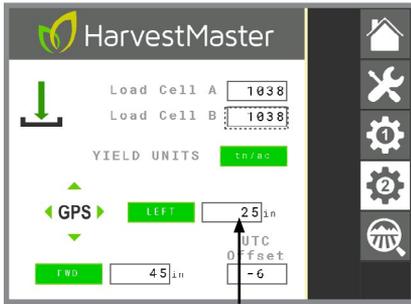
Enter difference

6. Enter the measured difference.

7. Tap the **FWD** (or **REV**) icon.
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).

2.3.4 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.

Time Zone	UTC Offset	
	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.

3 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.

3.1 Calibrate with a known weight

To calibrate the Casma system with a known weight, do the following:
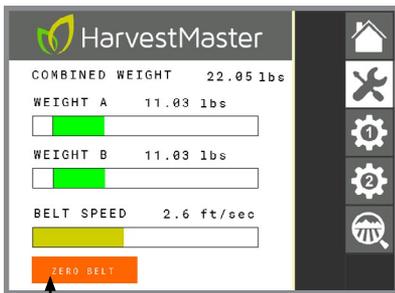
Press and hold

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.

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CURRENT YIELD   5.4 cwt / ac
FIELD AVERAGE   5.4 cwt / ac

NEW LOAD   NEW FIELD

00000.? cwt   TRUCK ID 1117
                ROWS
Weight
Calibration

Run   GPS STATUS ●
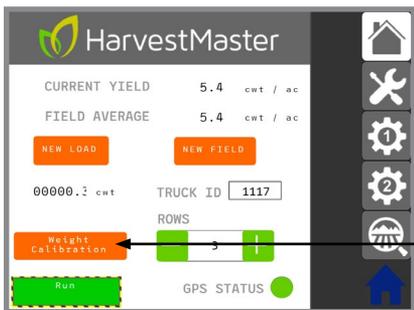
5. Go to **Home** > **Weight Calibration**.

Tap weight calibration

HarvestMaster

Weight Calibration
Zero the belt first!
Measured Weight   Known Weight
      1494 lbs   1500 lbs

Start   Stop

Prev FlowCal 2.098
New FlowCal   2.105

NOTE: ad245   OK   CANCEL
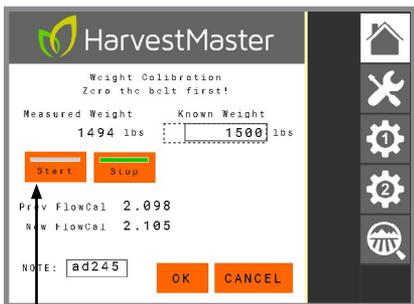
Tap start

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.

HarvestMaster

Weight Calibration
Zero the belt first!
Measured Weight   Known Weight
      1494 lbs   1500 lbs

Start   Stop

Prev FlowCal 2.098
New FlowCal   2.105

NOTE: ad245   OK   CANCEL
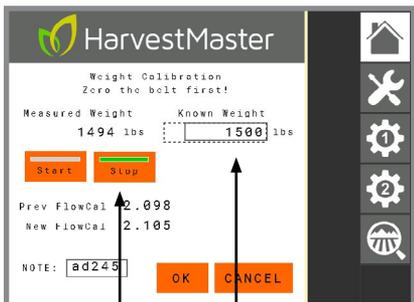
Tap stop   **Enter known weight**

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.

Note: The **OK** button does one of two things, 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.

3.2 Calibrate with a truck scale

To calibrate the Casma system with a truck scale, do the following:
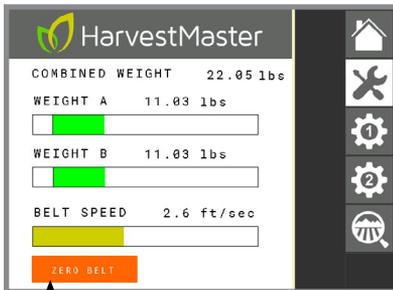
Press and hold

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.
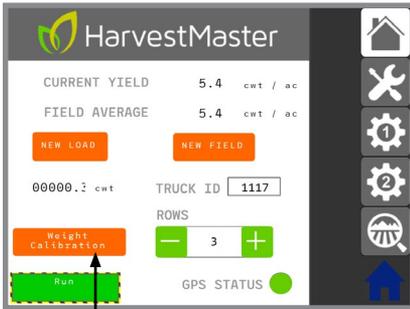
Tap weight calibration

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

Tap start

Enter truck ID

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.
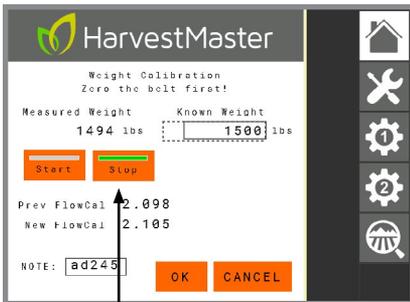
Tap stop

9. Once the truck is loaded, tap **Stop**.

10. If desired, you can now tap **OK**. Casma will leave the Calibration screen, but it 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.
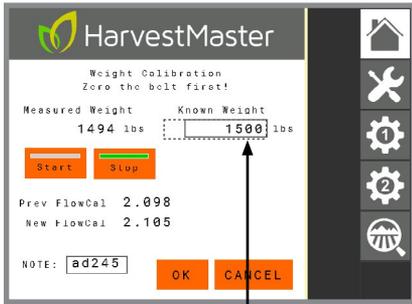
Enter known weight

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.

Note: The **OK** button does one of two things, 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.

4 Operation

Most of the Casma system's daily operational tasks are found on the Home and Diagnostics screens in the Casma user interface.

4.1 Zero the belt

For best results, zero the belt on first use and anytime outside temperature changes 10 or more degrees or anytime mud has been building up or falling off the belt. The Casma system will also prompt you to zero the belt if it detects a large enough shift in conditions.

To zero the belt:
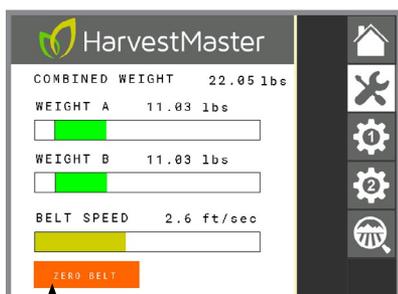
Press and hold

1. Park the harvester on a level surface (if possible), and empty the weighing belt.

2. Start the belt and run it at typical operating RPM.

3. On the Diagnostics screen, press and hold **ZERO BELT**.

The Casma system displays the following message:

4. Allow this process to complete.

5. Resume harvest or calibration.

4.2 Input the number of rows

Enter the number of rows you will be harvesting. This number constitutes all rows that the harvester will send over the weighing belt, including rows harvested by windrowers. For example:

Harvester (3 rows) + 2 Windrowers (6 rows each) = 15 rows

Enter number of rows
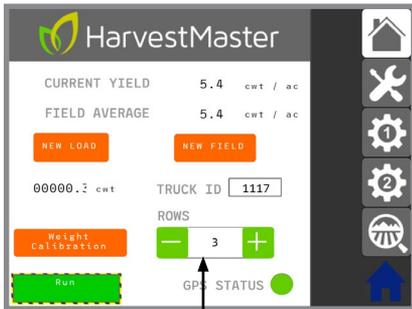
On the Home screen

1. Under **ROWS**, tap **+** or **-** until you have the correct number of rows.

2. Alternatively, you can also tap inside the box and type the number.

This setting needs to be set before harvest begins and then updated anytime the number of rows changes.

4.3 Open a field

If opening a field, you will need to set the number of rows to zero if the harvester will be piling crop on the ground.

1. On the Home screen under **ROWS**, set the value to zero.

2. After opening the field, enter the number of rows to be harvested, including the rows of crop on the ground that will be picked up when the harvester does a second pass.

Note: Be sure to account for all the rows of crops that the harvester left behind while opening the field and is now picking up off the ground (much like a windrower).

4.4 Track truck load data

The Casma system provides the option of tracking truck load data. To take advantage of this option, operators need to manually enter each truck ID .

While the truck is being loaded:
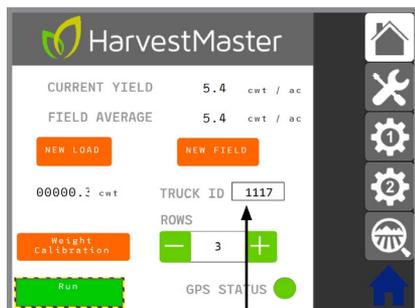
Enter truck ID

On the Home screen,

1. Tap inside the **TRUCK ID** box.

2. Enter the ID for the truck that is being loaded. The ID can be alphanumeric and up to four digits.
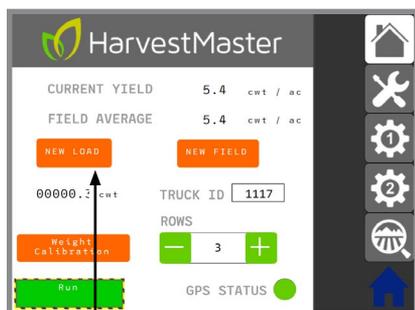
Press and hold NEW LOAD

3. After the truck is fully loaded, press and hold **NEW LOAD**.

4. Repeat for each truck.

This records the truck load data associated with the already entered truck ID. It also resets the system for the next truck.

4.5 Monitor field activity

The following field activity data is available in real time through the
Casma user interface on the VT.

4.5.1 Monitor current yield and field average
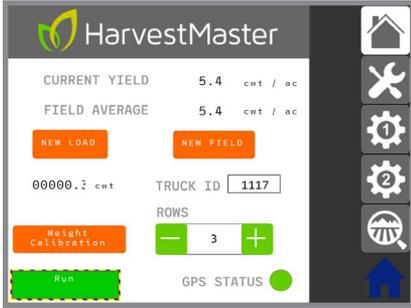
On the Home screen,

- **CURRENT YIELD** provides a live
  update of the per acre yield in
  the field being harvested.

- **FIELD AVERAGE** displays the
  average yield per acre since
  the last field reset (the operator
  pressed the **NEW FIELD** button).

4.5.2 Monitor field summary screen

The Field Summary screen displays the following real-time data:

- Total weight
- Area harvested
- Field average
- Truck or bin loads
- Run time
- Idle time

All of these values are accumulated and/or averaged since the last
time **NEW FIELD** was pressed.
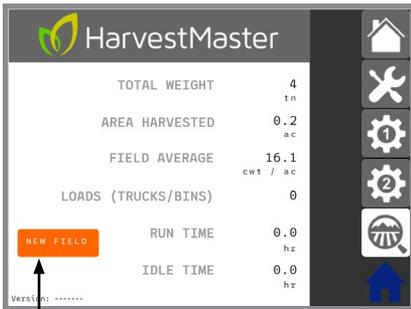
The **NEW FIELD** button is found on
both the Field Summary screen and
the Home screen.

Press and hold NEW FIELD to set all values back to zero

5 Diagnostics and Maintenance

5.1 System diagnostics

The Diagnostics screen allows the operator to monitor the Casma system and validate that it is working throughout harvest. If any of the following values do not seem right, check the load cell connections.

```
HarvestMaster
COMBINED WEIGHT      22.05 lbs
WEIGHT A      11.03 lbs
WEIGHT B      11.03 lbs
BELT SPEED      2.6 ft/sec
ZERO BELT
```
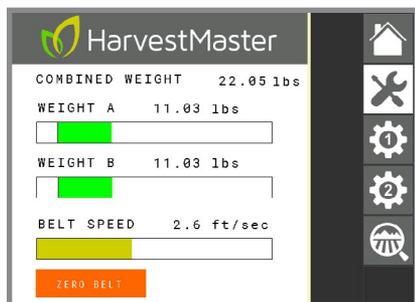
- **COMBINED WEIGHT** displays the total weight of the crop passing over both load cells.
- **WEIGHT A/B** displays the fluctuating weight of the crop as it crosses each load cell.
- **BELT SPEED** displays the belt speed in real time.

5.2 Warnings and alerts

The following table lists warnings and alerts for the Casma system. These alerts will appear in the Casma user interface in the VT.

Alert	Description	Recommended Action
Hold	Hold sensor is triggered. Casma is not logging.	No action needed.
Zero Belt Recommended	There has either been a significant change in temperature or the weight on the belt has not returned to zero for an extended length of time.	Zero the belt at your convenience.
Run/Hold Fault	Run/Hold sensor has experienced an electrical failure or disconnection.	Check for LED activity at the run/hold sensor. Inspect the cable for damage, and make sure the cable's connection to the CCU is firmly in place.

Alert	Description	Recommended Action
Settings Incomplete	Some required settings are missing in the Setup screens.	Enter values for the following required settings: • Belt Pitch • Sprocket Teeth • Row Spacing
Zeroing Belt	**ZERO BELT** has been pressed.	Keep belt empty until process completes.
Run Belts at Empty	**ZERO BELT** has been requested, but the belts aren't running.	Turn on the belt and press **ZERO BELT** again.
GPS Not Ready, Check Hardware	The GPS signal has been lost.	Check GPS receiver and connection.
Load Cell Fault	A load cell has experienced an electrical failure or disconnection.	Check the wires and connections on both load cells.
Belt Speed Fault	Belt speed sensor has experienced an electrical failure or disconnection.	Check for LED activity at the belt speed sensor. Inspect the cable for damage, and make sure the cable's connection to the CCU is firmly in place.
Open Field Mode Active, No Data Recording	Number of rows is set to 0.	Enter number of rows being harvested after opening the field.

5.3 Recommended maintenance

HarvestMaster recommends the following daily and seasonal checklists for maintaining your Casma system.

5.3.1 Daily checklist

Perform the following daily tasks to keep your Casma system running smoothly and to ensure the system is up and running at the beginning of each day's harvest.

☐ Make sure there is no debris or dirt built up around the load cells, the belt speed sensor, and the hold/run sensor.

☐ Verify that the main Casma cable is securely connected to the ISOBUS port on the tractor.

☐ Zero the belt (see page 25).

☐ Verify that you have a green GPS signal (Home screen).

☐ Verify that the **ROWS** setting is correct (see page 26).

☐ As soon as you start harvesting, verify that **WEIGHT A**, **WEIGHT B**, and **BELT SPEED** (Diagnostics screen) are all showing changes in data.

⚠ **CAUTION: Do not pressure wash the Central Control Unit of the Casma System.**

5.3.2 Seasonal (pre-harvest) checklist

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 inch. Also verify that the LED light turns on when a tone wheel tooth passes it.

    ☐ Run/hold sensor – Verify gap between is 1/4 inch. 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.

☐ 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 running, go to the Diagnostics screen, start the weighing belt, and verify that **WEIGHT A**, **WEIGHT B**, and **BELT SPEED** are all showing data.

☐ Zero the belt (see page 25).

☐ Calibrate the harvester (see page 20).

☐ Verify that you have a green GPS signal (Home screen).

☐ Verify that the **ROWS** setting is correct (see page 26).

☐ 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.

6 Casma VT Screens

All of the Casma screens are labeled with the HarvestMaster logo:

6.1 Home screen
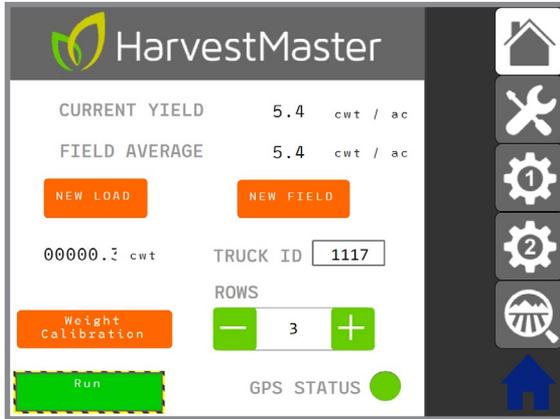
- **CURRENT YIELD:** Displays the per acre yield in real time.

- **FIELD AVERAGE**: The average yield per acre since the last field reset (the operator pressed the **NEW FIELD** button).

- **NEW LOAD:** Resets the weight accumulation of a truck load. The numbers next to this button display load weight as it accumulates.

  Tapping this button will reset the counter to zero. It will also record and transmit the following to the mycasma.com:

  - Truck load weight
  - Truck ID
  - Harvester ID
  - Date, time, and GPS coordinates of the harvester at the time the load was reset

  NEW LOAD *should be pressed after each truck is loaded.*

- **NEW FIELD:** Resets the **FIELD AVERAGE** on the Home screen and clears all values on the Field Summary screen. This allows operators to view accumulating data in a distinct time period (e.g., pressing **NEW FIELD** at the beginning of a field will allow the operator to monitor accumulated values for just the current field).

- **TRUCK ID:** Tap on this box to enter the ID for each truck as it is loading (supports alpha-numeric IDs). The truck ID should be updated before the load weight is reset.

- **WEIGHT CALIBRATION:** Opens the calibration screen.

- **ROWS:** Adjusts the number of rows currently being harvested. *This setting needs to be updated anytime the number of rows changes.* It should comprise all rows that the harvester will send over the weighing belt, including rows harvested by windrowers. For example:

    Harvester (3 rows) + 2 Windrowers (6 rows each) = 15 rows

- **GPS STATUS:** Indicates the quality of the GPS signal. Gray indicates no fix; yellow indicates a less accurate fix; green indicates an accurate GPS fix.

6.2 Diagnostics screen

The purpose of the Diagnostics screen is to keep the operator informed about the performance of the Casma system. As long as there is crop running across the weighing belt and the Casma load cells, all of the data displayed on this screen should be in continuous flux, indicating that the Casma system is actively measuring and recording crop yield.
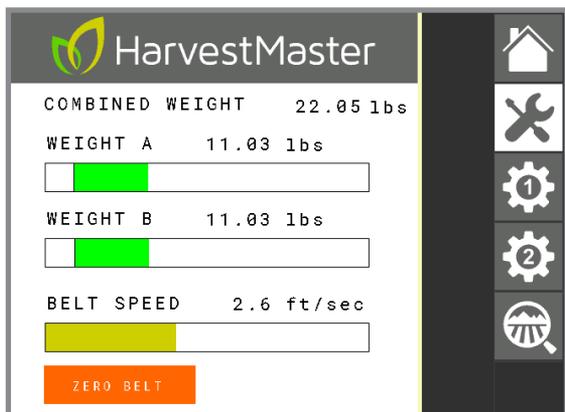
- **COMBINED WEIGHT:** The real time total crop weight as it is recorded by both load cells.

- **WEIGHT A:** The real time crop weight passing over one load cell. This will typically be the load cell closest to the cab of the tractor.

- **WEIGHT B:** The real time crop weight passing over one load cell. This will typically be the load cell farthest from the cab of the tractor.

- **BELT SPEED:** The real time speed of the belt as measured by the Casma system.

- **ZERO BELT:** Resets the weight of the weighing belt to zero. This needs to be done at install, every time a belt is taken off and put back on, anytime the outside temperature changes by more than 10 degrees, and anytime the belt collects or sheds a significant amount of mud while harvesting.

6.3 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.
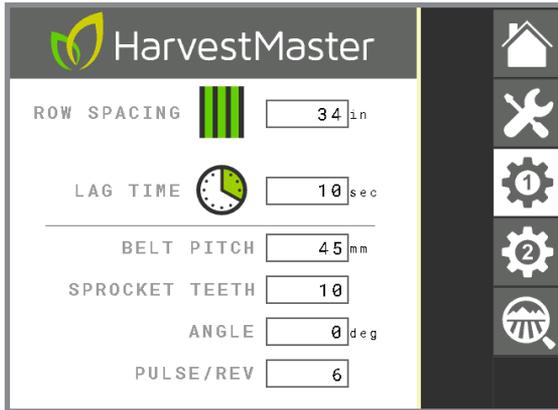
- **ROW SPACING:** The distance from the center of one row to the center of the next row.

- **LAG TIME:** The time difference between when the crop is lifted out of the ground and when it passes over the Casma load cells.

- **BELT PITCH:** The distance between links in the weighing belt, 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.

- **SPROCKET TEETH:** The number of teeth on the drive sprocket for the weighing belt.

- **ANGLE:** The angle of the weighing belt. This should be determined while the harvester is parked on a level surface. The Casma system uses this value when it corrects for the slope and motion of the harvester.

- **PULSE/REV:** Indicates the number of teeth on the speed sensor tone wheel.

6.4 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.

- **LOAD CELL A/B:** The multiplying factors for each load cell. The value for all standard Casma installations is 1038. If it is not 1038, contact your Casma sales representative to verify your system. Load cell A is the load cell closest to the cab of the tractor. Load cell B is the load cell farthest from the cab.

- **YIELD UNITS:** Adjusts the units for the recorded yield. If the VT is set to metric, this is automatically kilograms/hectare (kg/ha). If the VT is set to English, the options are tons/acre (tn/ac) or hundredweight/acre (cwt/ac).

- **GPS Offset (RIGHT or LEFT; FWD or REV):** Indicates where the GPS receiver is in relation to the point of harvest. When facing the harvester's direction of travel and standing at the center of the point of harvest, if the receiver is left of that point, select **LEFT**; if right, select **RIGHT**. If the receiver is forward of the point of harvest, select **FWD**; if reverse, select **REV**. The offset value should be measured horizontally using only right angles.

- **UTC Offset:** The difference in hours from Coordinated Universal Time (UTC). This value can be easily obtained via an online search. It allows the Casma system to record exactly when things happen in the field. A table of United States UTC offsets can be found on see page 19.

6.5 Field Summary screen

This screen accumulates and summarizes all displayed values since the last time the screen was reset (**NEW FIELD**). It is especially useful if the operator would like to follow only what is happening on a given day or in the present field.
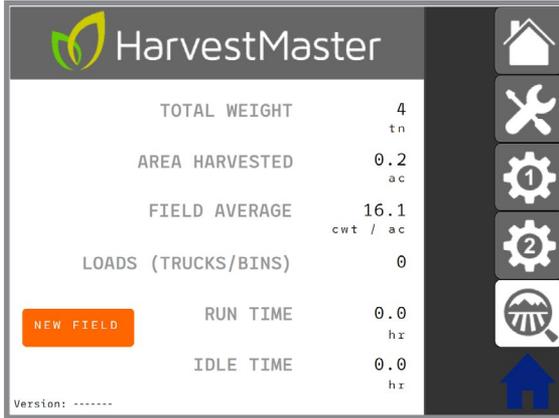
- **TOTAL WEIGHT:** Total weight of the harvested crop since the last screen reset.

- **AREA HARVESTED:** Total area harvested since the last screen reset.

- **FIELD AVERAGE:** The average yield per acre since the last field reset (the operator pressed the **NEW FIELD** button).

- **LOAD (TRUCKS/BINS):** The total number of truck loads recorded since the last screen reset.

- **RUN TIME:** Total time the harvester has been on with the belts moving since the last screen reset.

- **IDLE TIME:** Total time the harvester has been turned on with neither the harvester nor the weighing belt moving (since the last screen reset).

- **NEW FIELD:** Clears all values on this screen. This allows operators to view accumulating data in a distinct time period (e.g., pressing **NEW FIELD** at the beginning of a field will allow the operator to monitor accumulated values for just the current field).

6.6 Weight Calibration screen

The Weight Calibration screen is accessed via the Home screen. This screen is used to calibrate the weighing belt.
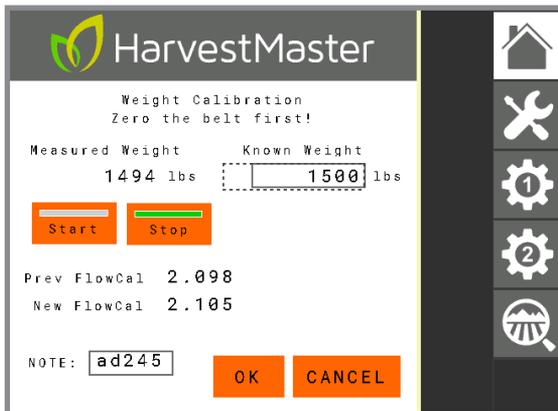
- **Measured Weight:** During calibration, this is the accumulated weight on the weighing belt.

- **Known Weight:** The value of the weight used to calibrate, or the total weight of the truck load during calibration. This is entered by the operator.

- **Start:** Tapping this tells the Casma system to begin recording weight on the weighing belt for calibration.

- **Stop:** Tapping this tells the Casma system to stop recording weight on the weighing belt.

- **Prev FlowCal:** The previous calibration coefficient.

- **New FlowCal:** The new calibration coefficient.

- **NOTE:** This field is primarily used to record the truck ID for the truck being used in the calibration.

- **OK:** If the calibration is in process OK exists the calibration screen while the calibration continues in the background. If the Measured Weight has been stopped and the Known Weight entered, OK records the New FlowCal.

- **CANCEL:** Cancels and exists the calibration.