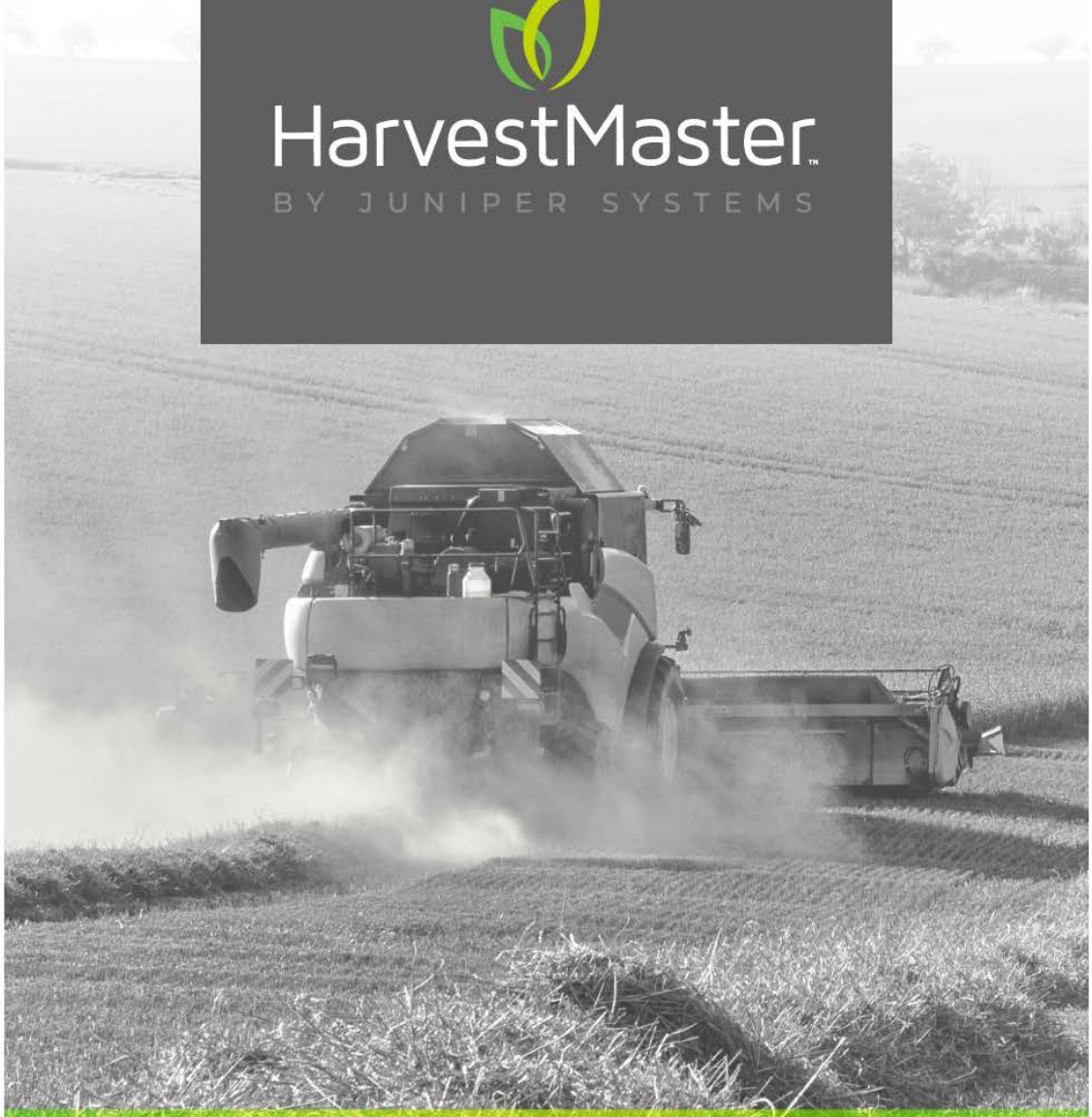
HarvestMaster™

BY JUNIPER SYSTEMS



mirus™

Straw Weight

USER'S GUIDE

Mirus Straw Weight User's Guide

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Part Number: 28526-01

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Cautions

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

HARVESTMASTER | 1132 W 1700 N | Logan, UT 84321

Tel. 435.753.1881

email: sales@junipersys.com

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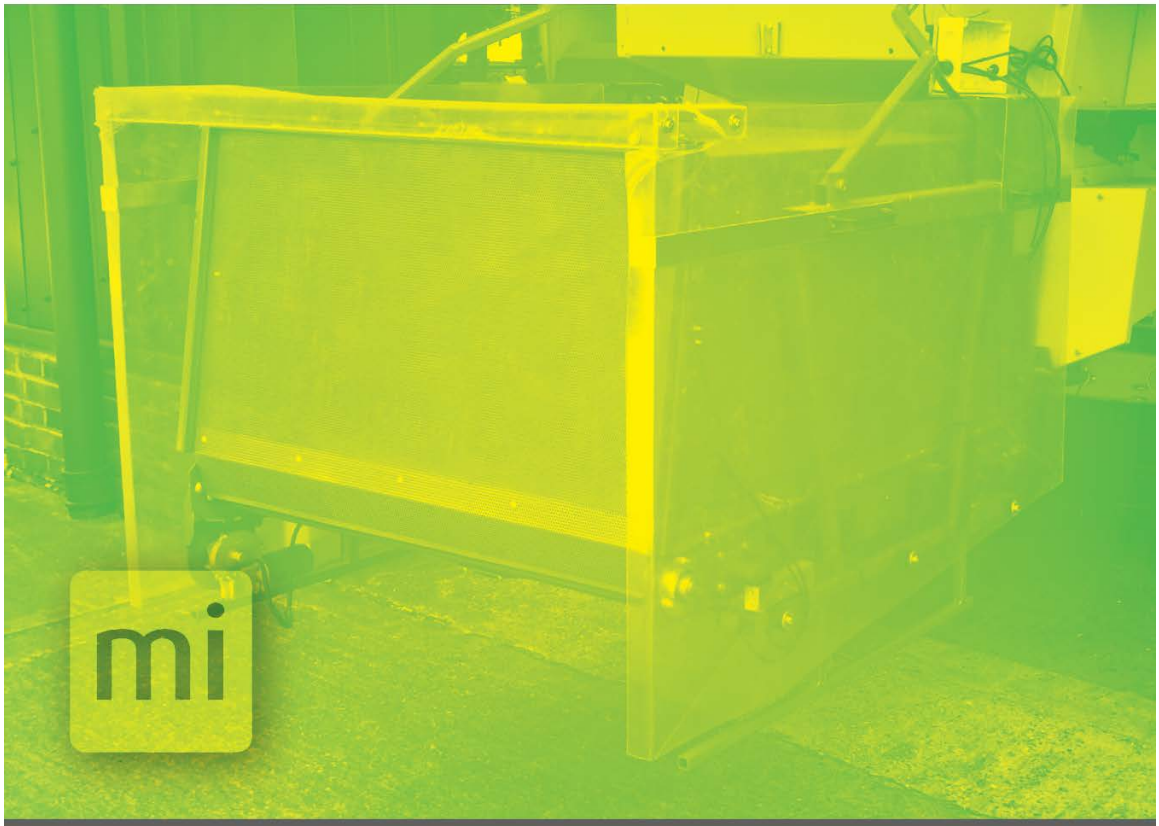
Straw Weight



Chapter One

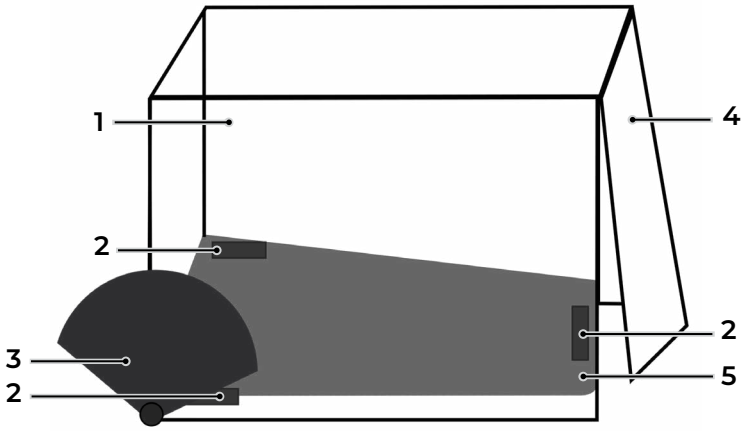
Introduction

1 Introduction

The Straw Weight System helps field researchers and agricultural scientists collect and weigh straw from wheat, barley, and other cereals during harvest. The Straw Weigh System works in combination with a harvest system, such as the HarvestMaster H2/H3 GrainGage or a Generic Harvest System (GHS), and HarvestMaster's Mirus Data Collection Software.

1.1 System Diagram

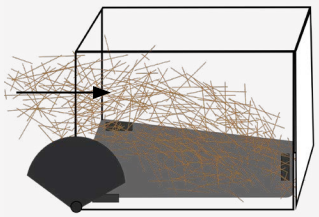
A straw weigh basket connects to the back of the combine and collects straw during harvest. When the harvest system finishes measuring and recording grain data, the Straw Weight System weighs the straw and then unloads it. This illustration shows the basic features of the straw weigh basket.



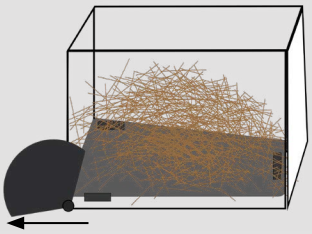
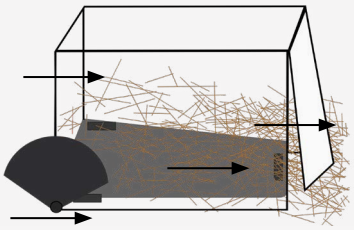
1	Straw weigh basket frame	4	Straw release gate
2	Load cell	5	Conveyor belt
3	Air diversion panel (pivot showing)		

The following table details each stage in the process.

The Straw Weight System Process

Harvest System	Straw Weight System	Diagram
▪ During harvest, the grain is routed to the GrainGage or GHS. ▪ Once the entire plot is harvested, the combine operator taps the Cycle button in Mirus. ▪ The GrainGage or GHS collects weight, test weight, and moisture data.	▪ The straw is blown from the combine into the weigh basket.	

The Straw Weight System Process

Harvest System	Straw Weight System	Diagram
▪ The GrainGage or GHS cycle finishes. ▪ The combine operator keeps the combine in place while the Straw Weight System weighs the straw.	▪ The air diversion panel diverts the air blowing from the combine away from the weigh basket. ▪ The basket weighs the straw. ▪ Mirus records and displays straw weight in real time.	
	▪ The air diversion panel releases, allowing the combine to blow into the basket again. ▪ The straw release gate opens. ▪ The combine blower and the conveyor belt push the straw out of the basket.	
▪ In Mirus, the Cycle button turns from yellow to green. ▪ The combine operator proceeds to harvest the next plot.	▪ The weigh basket begins to collect straw from the next plot.	

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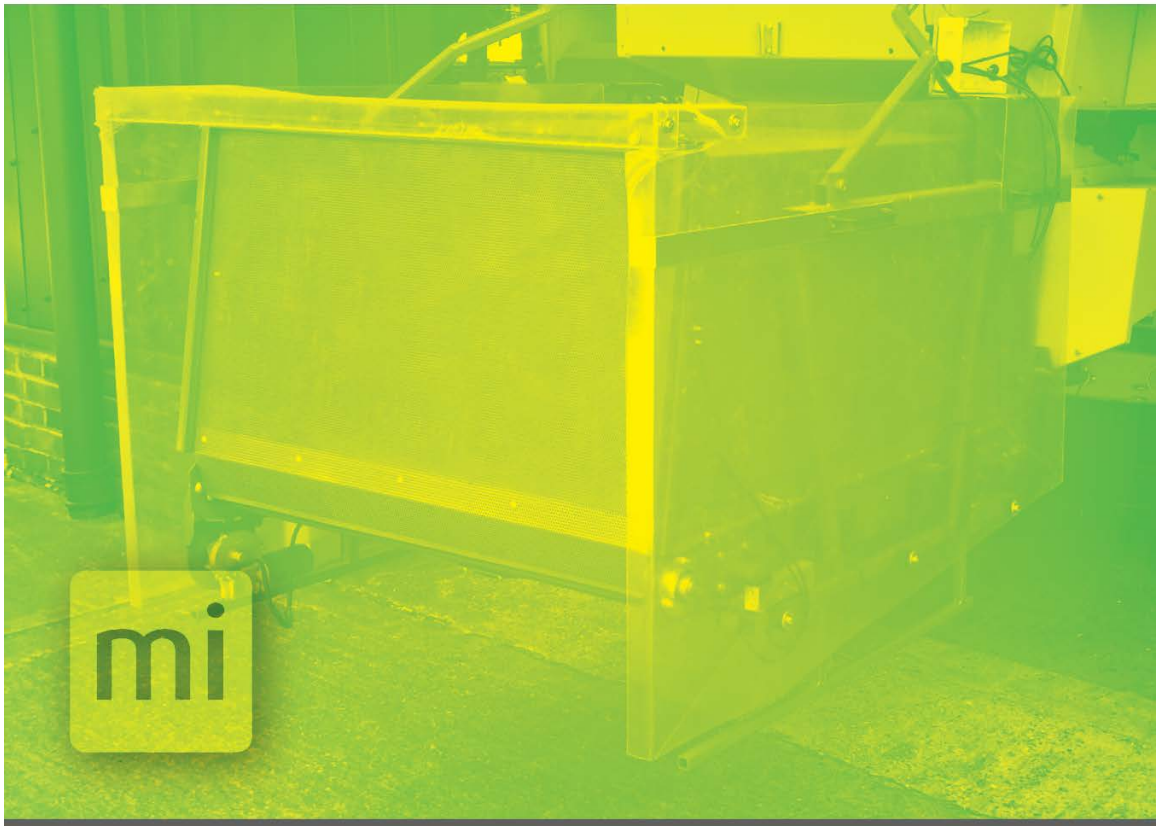
Straw Weight



Chapter two

Install Mirus

2 Install Mirus

Mirus provides the user interface and software control for the Straw Weight System. It is designed to run on a rugged tablet.

2.1 Mirus System Requirements

- Operating System: Windows® 10 or higher; 32 or 64-bit OS
- Processor Speed: 2.0 GHz Quad Core
- Memory: 8 GB or higher recommended
- Data Storage: 500 MB available disk space
- Display Resolution: 1280 x 800 or higher
- Mirus Version: 4.5.0 or higher

2.2 Download and Install Mirus

After you have purchased a license for Mirus,

1. Go to *https://www.harvestmaster.com/support/article/14646*.
2. Tap the down arrow for Mirus Harvest Software.
3. Select and download the most recent Mirus release.
4. Follow the installation instructions.
5. Complete the form at *http://www.harvestmaster.com/activate*.
6. After submitting the activation form, the unlock code displays on your screen and is sent to the email that was provided.
7. Return to the Mirus activation screen and input the unlock code.

Check *https://www.harvestmaster.com/support/article/14646* annually for updated software.

2.3 Add the Generic Attachment

With the Mirus Generic Attachment, you can configure a second DSP module to add more load cell inputs for the Straw Weight System.

To add the Generic Attachment, register the Generic Attachment, change the Node ID for the Generic Attachment DSP module, install the system script, and add the Generic Attachment within Mirus.

2.3.1 Register the Generic Attachment

To register the Generic Attachment with HarvestMaster,

1. In the Windows search box, search for Mirus Plugin Manager.

Enable plugin

2. Open the **Mirus Plugin Manager** app.
3. In the plugin manager, tap **Generic Attachment**.
4. Tap **Enable plugin**.
5. Follow the installation instructions.

6. On the Mirus Plugin Manager Activate Generic Attachment Plugin screen, tap **Activate online**.

   Note: When you purchased the Generic Attachment, you were sent a registration card, which includes the serial number for the plugin.

7. After submitting the activation form, the unlock code displays on your screen and is sent to the email that was provided.
8. Return to the activation screen and enter the serial number and unlock code.

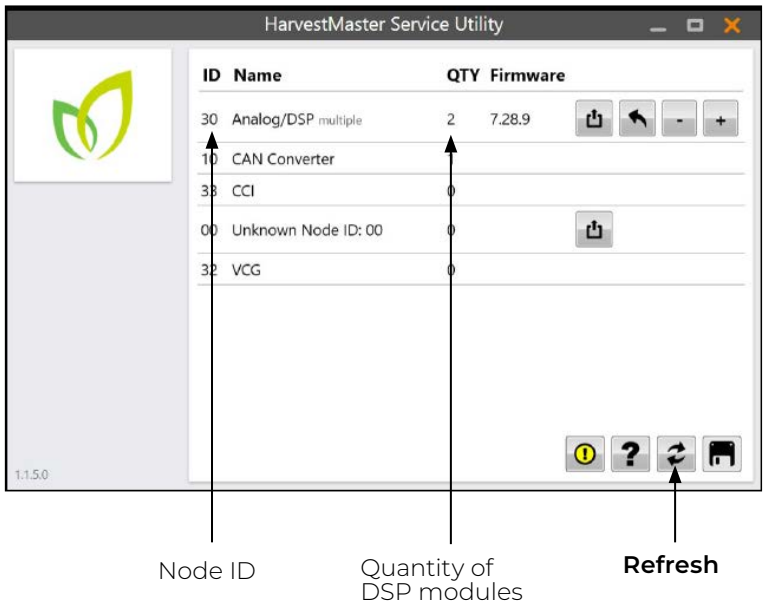
2.3.2 Change the Node ID

The GrainGage or Generic Harvest System and the Generic Attachment each have their own DSP module. To differentiate the DSP modules in Mirus, change the Node ID for the Generic Attachment.

To change the Node ID for the Generic Attachment,

1. Open the HarvestMaster Service Utility from C:\HarvestMaster\Mirus\Devices\HM800\Tools\Firmware\HM.Service.

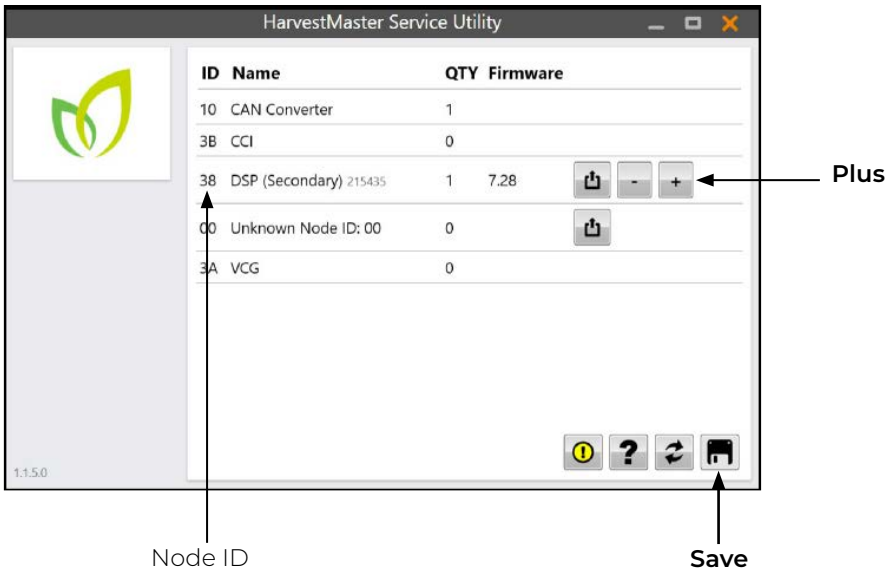
   The HarvestMaster Utility opens and shows two DSP modules with the Node ID of 30.



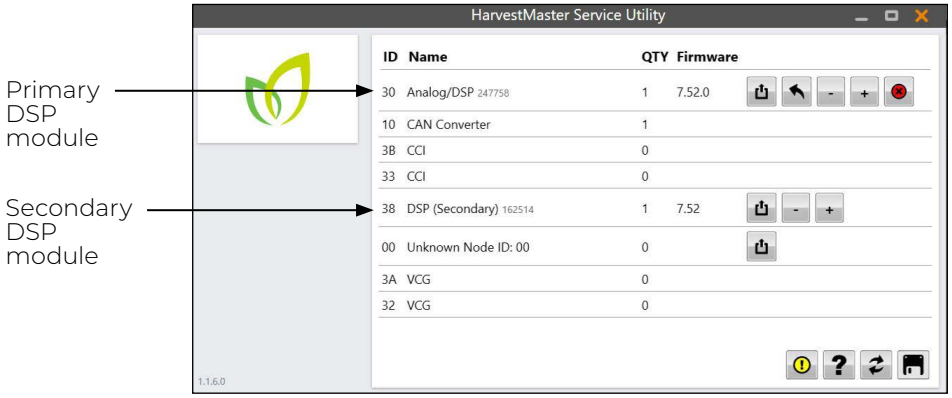
2. Unplug the CAN cable that connects the GrainGage or Generic Harvest System DSP module.
3. Tap **Refresh**.

   Now the only DSP module listed in the service utility is the secondary DSP module for Generic Attachment.

4. Tap **Plus** until the ID is 38.



5. Tap **Save**.
6. Plug in the CAN cable that connects the GrainGage or Generic Harvest System DSP module.
7. Tap **Refresh** to view both DSP modules.

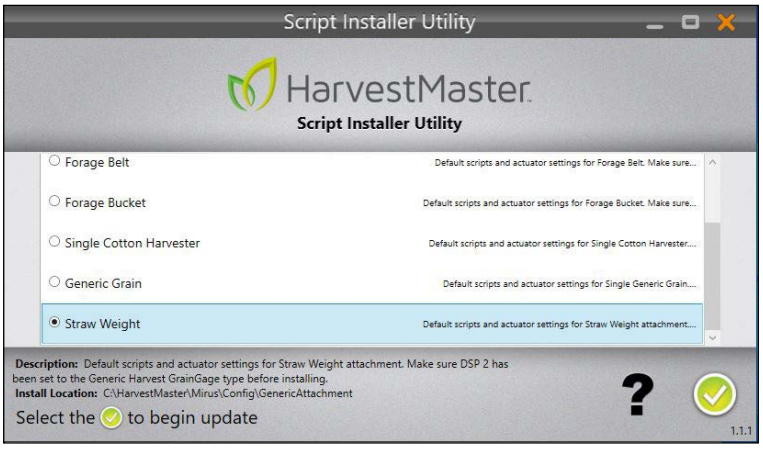


8. Close the HarvestMaster Service Utility.

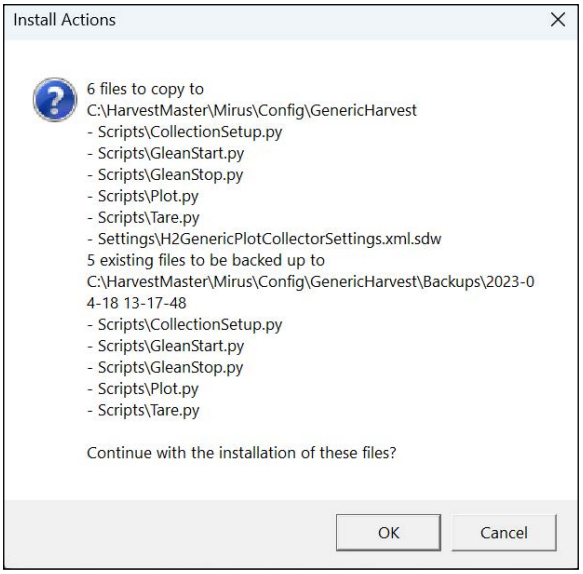
2.3.3 Run the Straw Weight Script

To run the Straw Weight script,

1. Close Mirus if it is open.
2. Open the Script Installer Utility from C:\HarvestMaster\Mirus\Plugins\GenericHarvest\Scripts\ScriptInstaller\ScriptInstaller.exe.
3. Tap **Straw Weight**.



4. Tap the check icon .



The Install Actions message appears.

5. Tap **OK**.

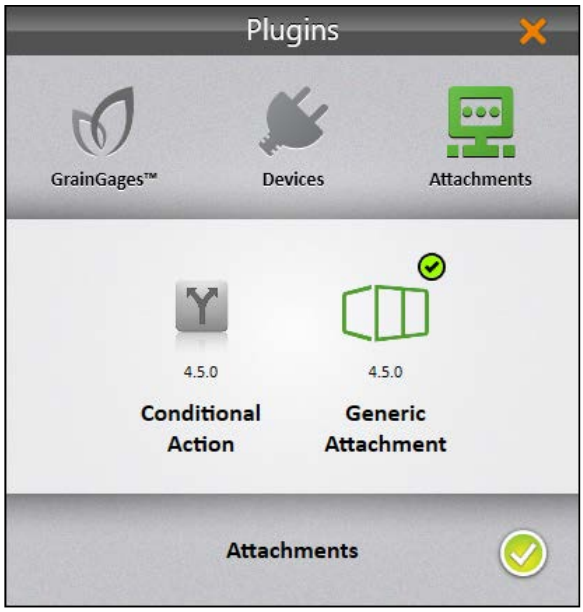
Mirus marks the installed script(s).

6. Close the Script Installer Utility.

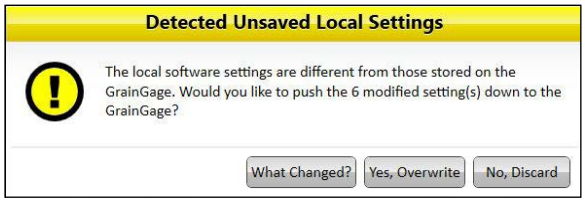
2.3.4 Add the Generic Attachment Plugin

To add the Generic Attachment plugin,

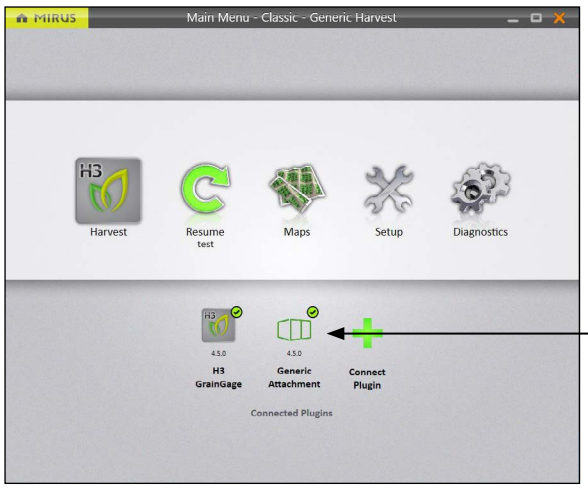
1. Open Mirus.
2. From the Main Menu, tap **Connect Plugin**.



3. Tap **Attachments**.
4. Tap **Generic Attachment**. A check mark appears in the top right corner of the icon.
5. Tap the check icon ✓.



6. If the Detect Unsaved Local Settings caution appears, tap **Yes, Overwrite**.



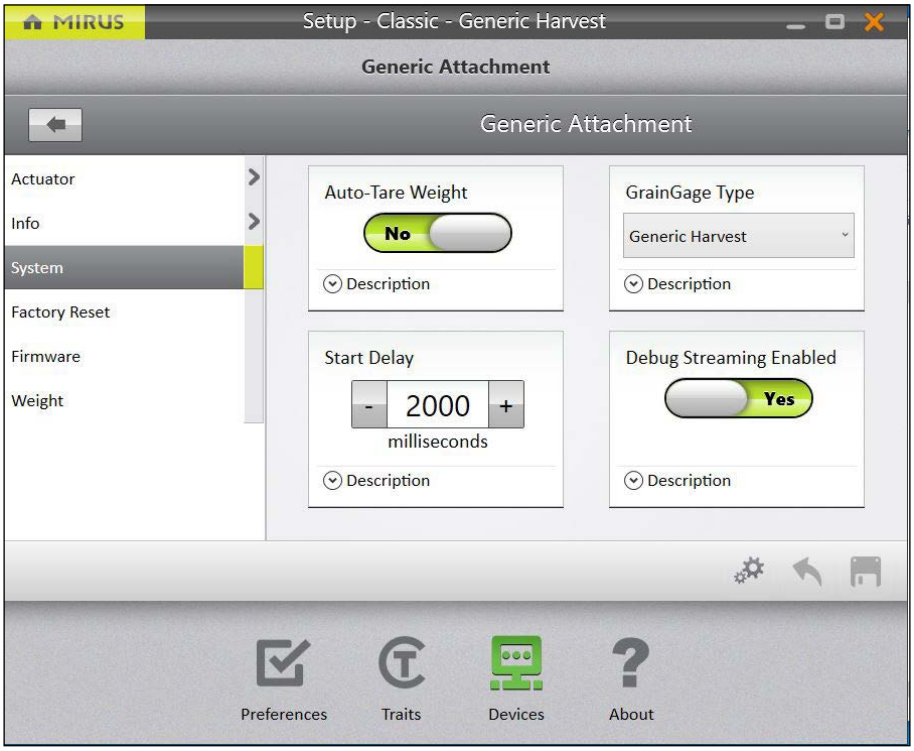
Mirus adds the Generic Attachment plugin to the Main Menu.

2.4 Define System Settings

To define the system settings for the Generic Attachment,

1. From the Setup > Generic Attachment screen, tap **System**.

Mirus opens the System screen where you can define system settings for the Generic Attachment.



Generic Attachment System Settings		
Item	**Default Value**	**Description**
Auto-Tare Weight	No	Enables or disables the taring (or setting to zero) of the load cells after each plot. Set to Yes if you want Mirus to tare the load cells after each plot and plan to empty the basket or belt at another time.
GrainGage Type	Generic Harvest	Specifies the type of harvest system connected to Mirus. Do not change this setting.
Start Delay	0 milliseconds	Determines the amount of time (in milliseconds) that the harvest system waits before running the attachment script.
Debug Streaming Enabled	Yes	Enables or disables the debug streaming messages for the DSP module. HarvestMaster recommends setting to Yes.

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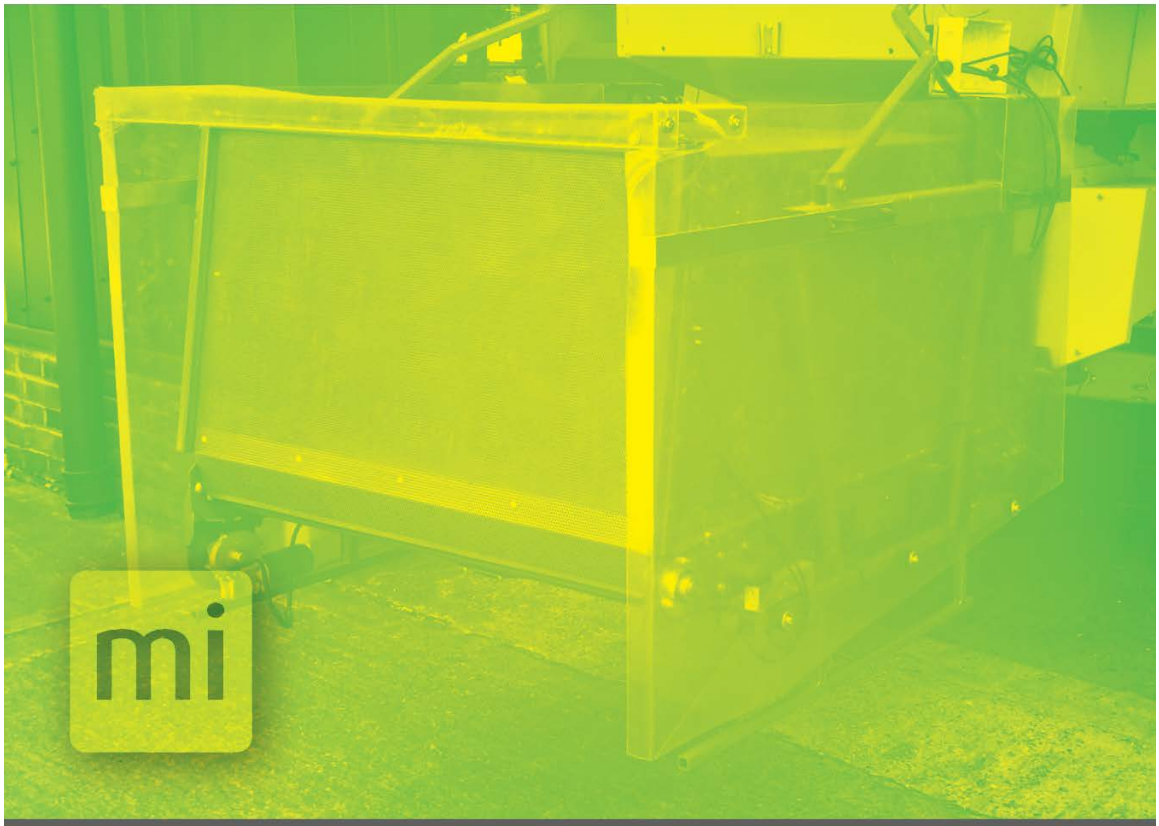
Straw Weight



Chapter Three

Set Up and Calibrate the System

3 Set Up and Calibrate the System

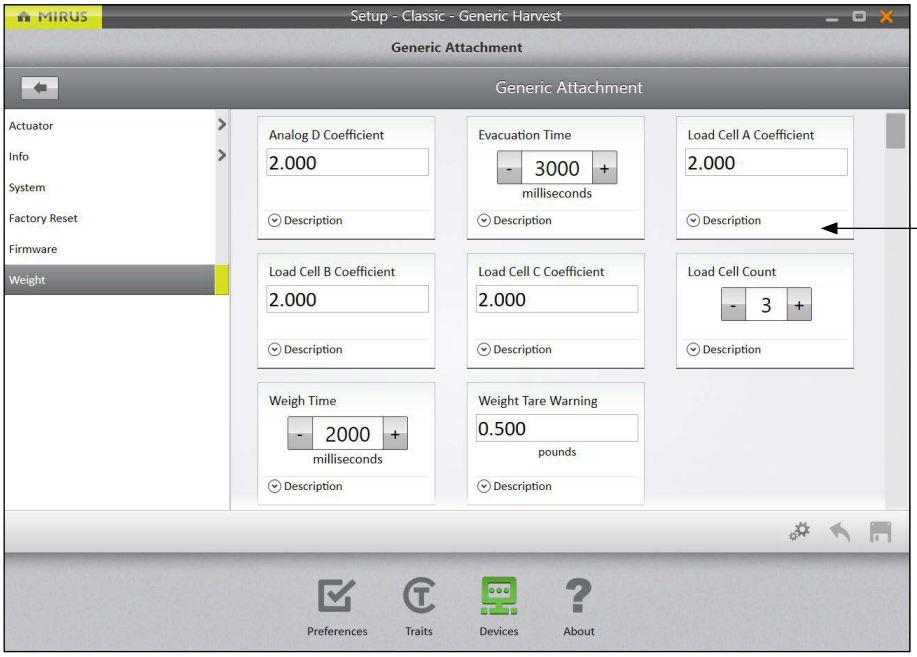
3.1 Configure the Weigh Basket Settings

From the Weight screen, you can configure the weigh basket settings and calibrate the load cells.

To open the Weight screen,

1. From the Setup > Generic Attachment screen, tap **Weight**.

   Mirus opens the Weight screen.



Tap **Description** for more information about each option.

2. Adjust the settings as needed.

Weight Sensors Settings		
Setup Parameter	**Default Value**	**Description**
Load Cell A, B, C, & Analog D Coefficients	2.000	The calibrated weight for each active load cell on your system. (See 3.2.1 Calibrate the Weigh Basket on page 18.)
Evacuation Time	2000 msec	The amount of time the gate remains open to allow for the evacuation of straw from the basket.
Load Cell Count	3	The number of load cells being used by the Straw Weight System.

Weight Sensors Settings		
Setup Parameter	**Default Value**	**Description**
Weigh Time	2000 msec	The amount of time Mirus averages the load cell readings while the basket is weighing the straw. Increasing the weigh time improves the accuracy but can slow the cycle process. HarvestMaster does not recommend setting this time to less than the default setting.
Weight Tare Warning	.500 lb	The threshold above which a tare warning is generated after weigh basket evacuation.

3.2 Calibrate the Weigh Basket

Calibrating the Straw Weight load cells ensures accurate weight reading. Calibrate the load cells after the initial system setup, and then, check the calibration daily using a calibration weight (or another known weight). HarvestMaster recommends that the calibration weight is at least 50–80% of the maximum capacity of the load cell being calibrated.

Use the following formula to calculate each load cell coefficient.

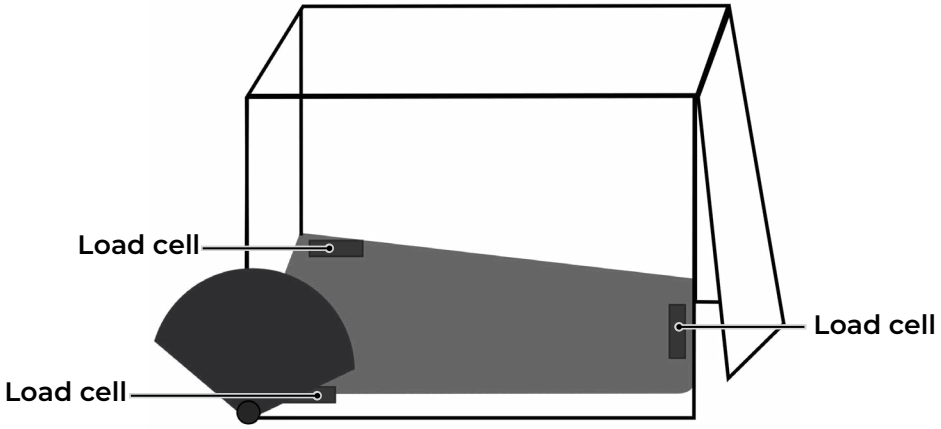
$$load\ cell\ coefficient = actual\ weight\ /\ measured\ weight\ (current\ coefficient)$$

3.2.1 Calibrate the Weigh Basket

To calibrate the weigh basket,

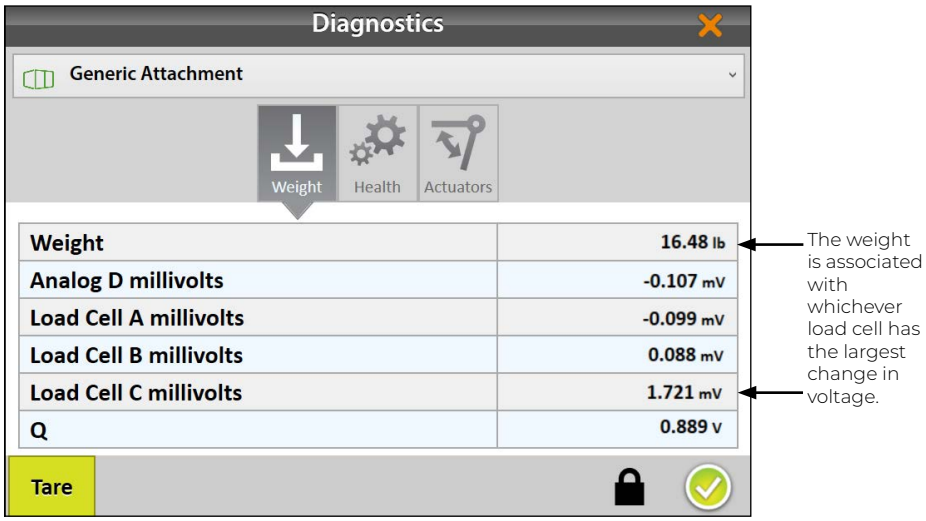
1. Park the combine and Straw Weight System on a level surface.
2. Place the calibration weight next to (or hanging from) one of the load cells.

   The following diagram shows the location of the load cells in the basket.

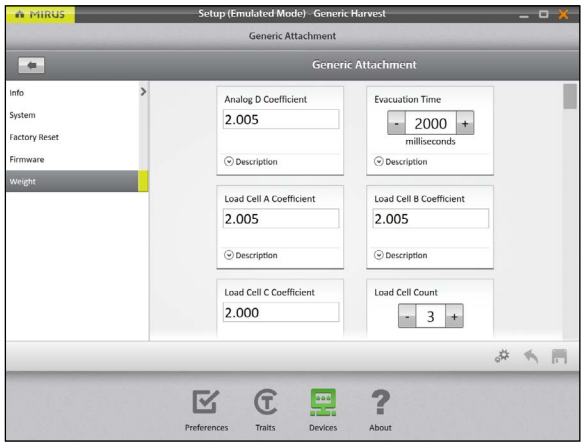


3. From the Mirus Main Menu, make sure the Generic Attachment is activated.
4. Tap **Diagnostics**.
5. From the Diagnostics screen, select **Generic Attachment** from the drop-down menu.

   The calibration weight is on (or hanging from) whichever load cell has the largest change in voltage. For example, if the voltage for Load Cell C changed more than the voltage for the other load cells, the calibration weight is near Load Cell C.



6. Write down the measured weight shown on the Diagnostics screen.



7. Open Setup > Generic Attachment > Weight.
8. Note the current load cell coefficient for the load cell that you are calibrating.
9. Calculate the new load cell coefficient, using this formula.

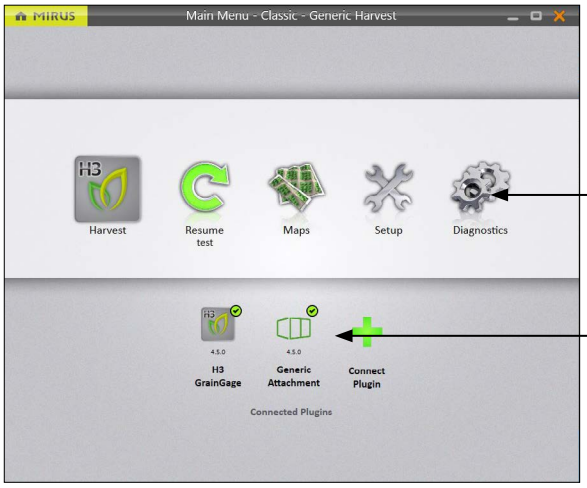
   load cell coefficient = actual weight / measured weight (*current coefficient*)

10. Enter the new load cell coefficient in the corresponding Load Cell Coefficient box.
11. Tap **Save**.
12. Repeat steps 2–11 for each load cell.
13. Check the weight calibration. (See 3.2.2 Check the Weight Calibration on page 20.)

3.2.2 Check the Weight Calibration

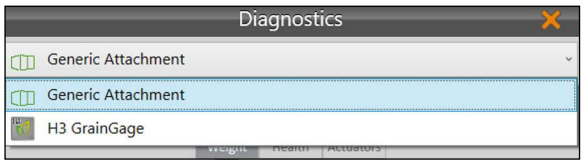
To check the weight calibration,

1. Park the combine and Straw Weight System on a level surface.
2. Make sure the weigh basket is empty.
3. From the Mirus Main Menu, make sure the Generic Attachment is activated.
4. Tap **Diagnostics**. The Diagnostics screen opens.



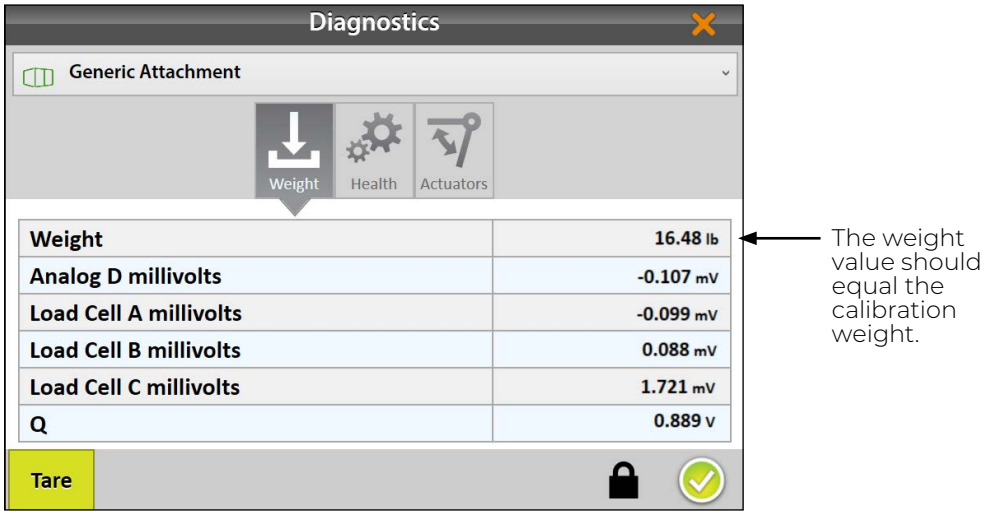
Diagnostics

The Generic Attachment is activated if it appears on the Main Menu.



5. Select **Generic Attachment** from the drop-down menu.
6. On the Weight tab, tap **Tare** Tare and ensure the weight shows 0.0.
7. Place the calibration weight in different areas of the weigh basket. The value in Weight should equal the calibration weight.

If the values are different, refine the calibration. (See 3.2.1 Calibrate the Weigh Basket on page 18.) For example, in the image below, the weight value is 16.48 lb. The calibration weight is 11.44 lb. The weigh basket needs to be calibrated because the two weight values are different.



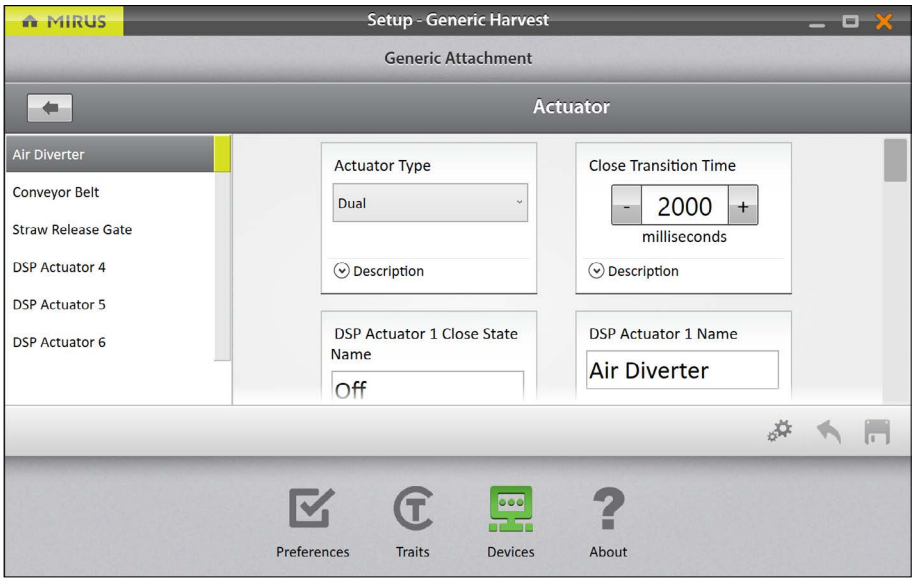
3.3 Configure the Actuators

The Straw Weight System uses actuators to automate the collecting, weighing, and unloading of the straw.

To configure the actuators,

1. From the Mirus Main Menu, check that the Generic Attachment is activated.
2. From the Setup > Generic Attachment screen, tap **Actuator**.

Mirus opens the Actuator screen on which you can customize the settings for each actuator. The Straw Weight System can support up to six actuators, but the default configuration uses only three: Air Diverter, Conveyor Belt, and Straw Release Gate. You can change the name of the actuators from this screen.



The following table describes the settings on the Actuator screen and shows the default values for DSP actuators not predefined by the installed system script.

Actuator Settings			
Setup Parameter	**Default Value**	**Min/Max Value**	**Action**
Actuator Type	None		Set to Dual if the actuator is being used. Set to None if the actuator is unused.
Close Transition Time	200 msec	0/20000 msec	Enter the amount of time it takes the actuator to perform its function. (See *3.3.2 Set the Actuator Transition Times* on page 25.)
DSP Actuator Close State Name	Close		Change the close state name of this actuator.
DSP Actuator Name	DSP Actuator		Change the name of this actuator.
DSP Actuator Open State Name	Open		Change the open state name of this actuator.
Limit Switch on Close	No		Set to No to disable the limit switch when the gate closes. Set to Yes to enable the limit switch when the gate closes.
Limit Switch on Open	No		Set to No to disable the limit switch when the gate opens. Set to Yes to enable the limit switch when the gate opens.
Open State Time	0 msec	0/30000 msec	Enter the amount of time the basket door remains open before beginning the close process.
Open Transition Time	200 msec	0/20000 msec	Enter the amount of time it takes the actuator to perform its function. (See *3.3.2 Set the Actuator Transition Times* on page 25.)

Note: The default values are based on generalized harvest conditions. They may not reflect the optimum settings for the harvest conditions for your particular climate, field, or crop. Changing the default values requires experience. Please contact a HarvestMaster Field Service Engineer when adjusting these settings.

3.3.1 Default Settings for Straw Weight

The default configuration for the Straw Weight system script uses three actuators.

- **Actuator 1**–Air Diverter
  Moves the air diversion panel to stop air from blowing into the weigh basket while the straw is being weighed.
- **Actuator 2**–Conveyor Belt
  Moves the conveyor belt to push the straw out of the weigh basket after it has been weighed.
- **Actuator 3**–Straw Release Gate
  Lifts the straw release gate (back door to the basket) and holds it open while the conveyor belt pushes the straw out of the basket.

The following tables show the default settings for actuators 1–3.

DSP Actuator 1: Air Diverter	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	2000 msec
DSP Actuator 1 Close State Name	Off
DSP Actuator 1 Name	Air Diverter
DSP Actuator 1 Open State Name	On
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	0 msec
Open Transition Time	200 msec

DSP Actuator 2: Conveyor Belt	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	8000 msec
DSP Actuator 2 Close State Name	On
DSP Actuator 2 Name	Conveyor Belt
DSP Actuator 2 Open State Name	Off
Limit Switch on Close	No
Limit Switch on Open	No
Open State Time	0 msec
Open Transition Time	200 msec

DSP Actuator 3: Straw Release Gate	
Setup Parameter	**Default Value**
Actuator Type	Dual
Close Transition Time	200 msec
DSP Actuator 3 Close State Name	Open
DSP Actuator 3 Name	Straw Release Gate
DSP Actuator 3 Open State Name	Close
Limit Switch on Close	No

DSP Actuator 3: Straw Release Gate	
Setup Parameter	**Default Value**
Limit Switch on Open	No
Open State Time	5000 msec
Open Transition Time	200 msec

3.3.2 Set the Actuator Transition Times

You can adjust the transition times for each actuator, as described in the following table.

Description of Actuator Transition Times			
Actuator	**Open Transition Time**	**Close Transition Time**	**Tips for Calculating**
Actuator 1 Air Diverter	Length of time the actuator needs to move the diversion panel into place to prevent the air from blowing into the weigh basket.	Length of time the actuator needs to open the diversion panel so that the combine blows air into the weigh basket again.	Length of time the actuator needs to move the air diversion panel into place.
Actuator 2 Conveyor Belt	N/A	Length of time the conveyor belt needs to completely empty the weigh basket. This time may change depending on the type and amount of straw.	Harvest a test plot with a representative volume of straw, and time how long the conveyor belt takes to push the straw out of the basket.
Actuator 3 Straw Release Gate	Length of time the actuator needs to open the back release gate for the weigh basket.	Length of time the actuator needs to close the back release gate for the weigh basket.	Length of time the actuator needs to open or close the release gate.

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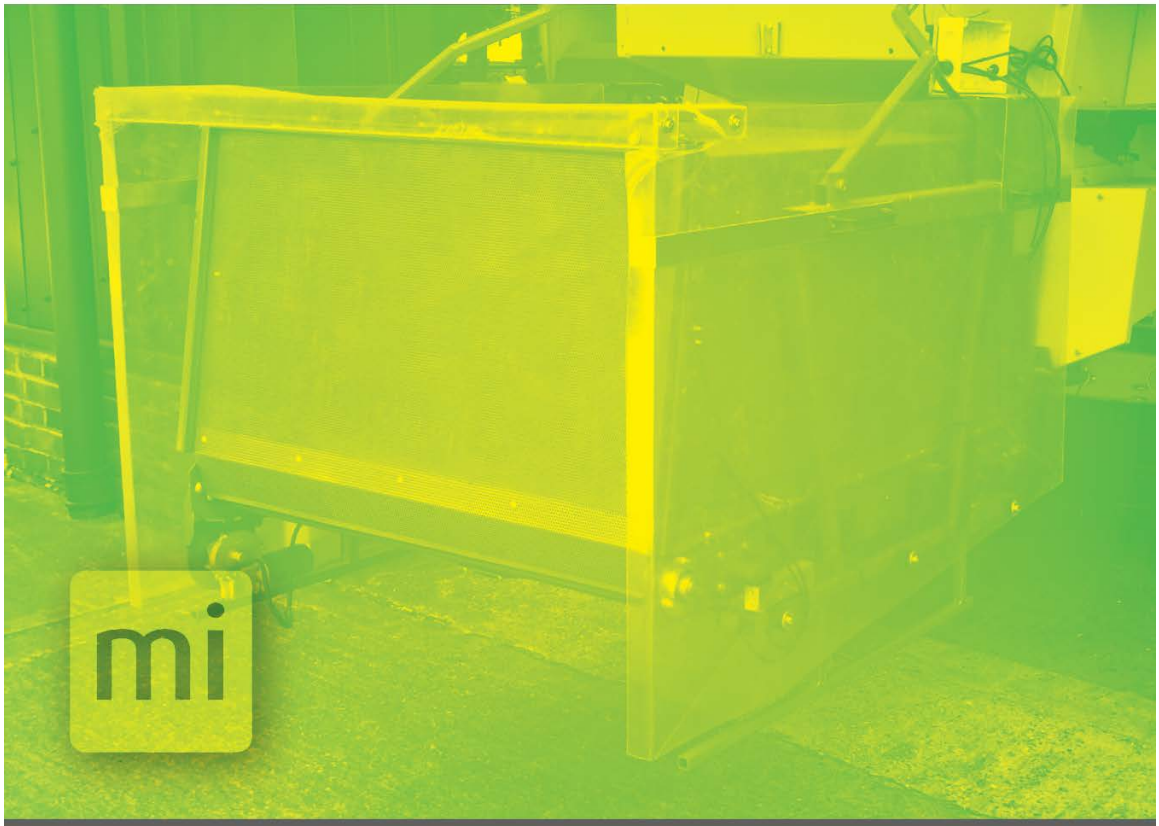
Straw Weight



Chapter four

Manage the System

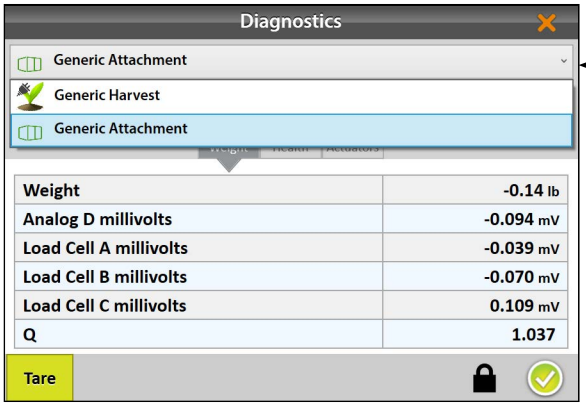
4 Manage the System

4.1 Use Diagnostics

From the Diagnostics screen, you can monitor the weight, health, and actuators for the Straw Weight System.

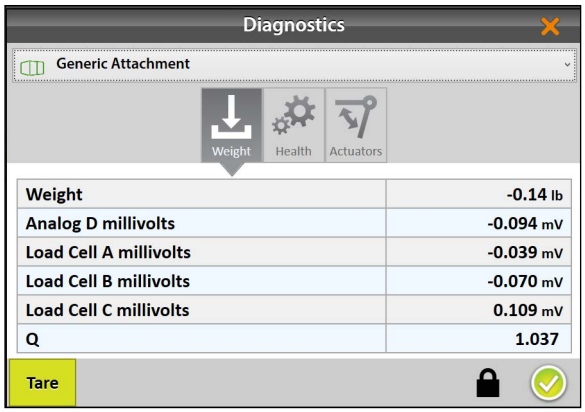
To open the Diagnostics screen,

1. From the Main Menu, check that the Generic Attachment is activated.
2. Tap **Diagnostics**.
3. Tap the drop-down menu and select **Generic Attachment**.



Tap the drop-down menu and select **Generic Attachment**.

4.1.1 Use the Weight Diagnostics

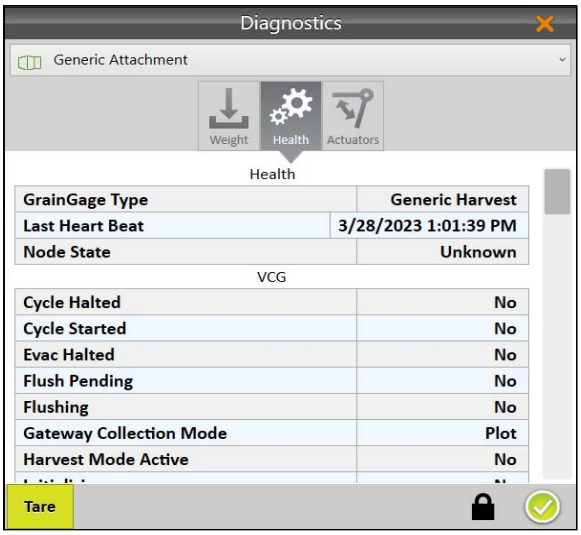


On the Weight Diagnostics screen, Mirus displays live values and other data for the load cells.

Weight Diagnostics	
Item	**Description**
Weight	Displays the weight of the contents in the weigh basket.

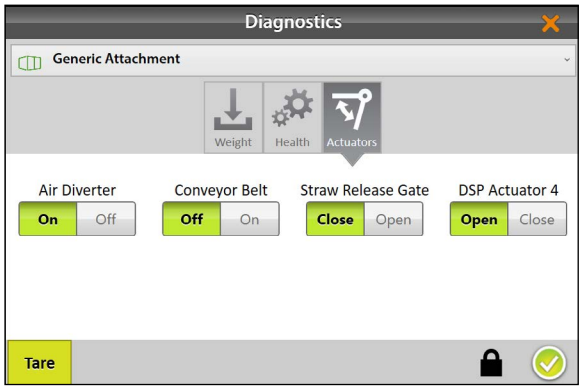
Weight Diagnostics	
Item	**Description**
Load Cell A, B, C, & Analog D, millivolts	Shows the mV reading for the four load cells. The load cells measure the weight of straw collected from a plot.
Q	Slope and motion is not used in Generic Attachment weight calculations and cannot be enabled.

4.1.2 View Health Diagnostics



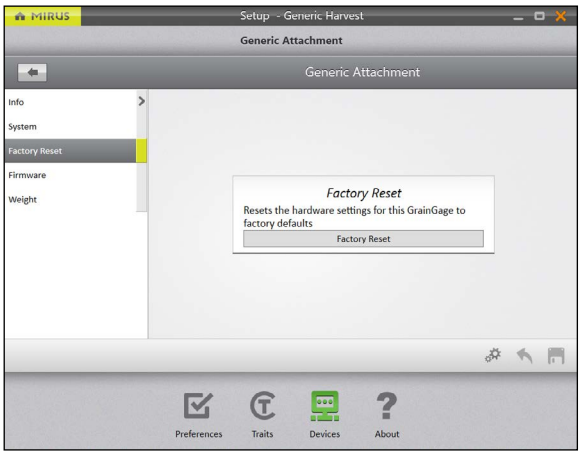
The Health Diagnostics screen is used by HarvestMaster Field Service Engineers.

4.1.3 Use Actuator Diagnostics



Use the Actuators Diagnostics screen to manually test the actuators controlling all gates connected to the Generic Attachment.

4.2 Reset Generic Attachment to Factory Settings



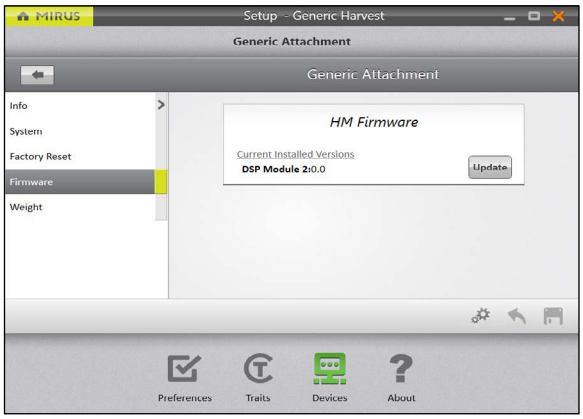
You can reset the Generic Attachment to factory settings from the Factory Reset screen.

To perform a factory reset for the Generic Attachment,

1. Check that the Generic Attachment is activated.
2. From the Setup > Generic Attachment screen, tap **Factory Reset**.

CAUTION: This action cannot be undone! Resetting to factory defaults clears all your settings, including actuator timers and weight calibrations. This should only be done in consultation with a HarvestMaster Field Service Engineer.

4.3 Update Generic Attachment Firmware

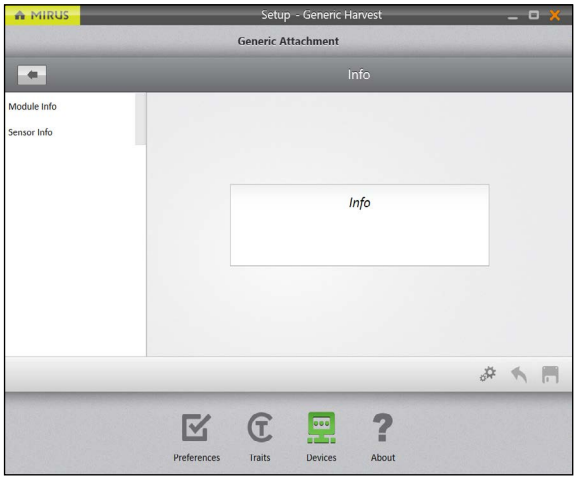


As an operator, you are not likely to need the Firmware screen. When you install or update Mirus, the program will check for the latest firmware and update it automatically. The purpose of this screen is to help HarvestMaster Field Service Engineers during troubleshooting procedures.

To update the firmware for the Generic Attachment,

1. Check that the Generic Attachment is activated.
2. From the Setup > Generic Attachment > Firmware screen, tap **Update**.

4.4 View Generic Attachment Info



To open the Info screen,

1. Check that the Generic Attachment is activated.
2. From the Setup > Generic Attachment screen, tap **Info**.

From the Info screen, view specifications for each connected component, such as serial number, module ID, and build date.

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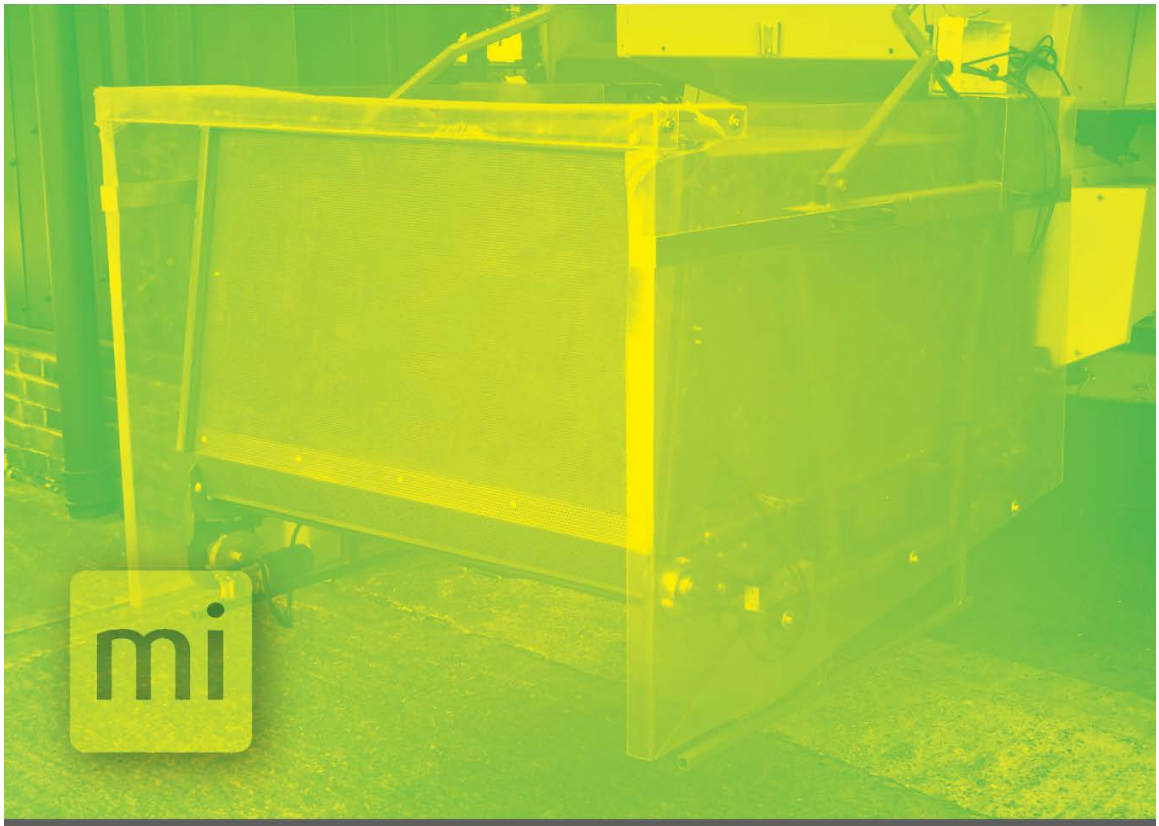
Straw Weight



Appendix A

Install the Hardware

5 Appendix A: Install the Hardware

The Straw Weight System uses a rugged tablet computer running Mirus. A system controller ties together the tablet, the Straw Weight System, and the GrainGage or GHS. The Straw Weight System has its own dedicated DSP module, which allows Mirus (and the operator) to control and automate the system.

5.1 Straw Weight System Parts

The Straw Weight System uses the following parts.

Straw Weight System Parts		
PN	**Description**	**Image**
15332	Power Cable	
15335	CAN Patch Cable, Short	
15336	CAN Long Cable	
15337	CAN Breakout Strip	
15374	HM8 HMA-400_RE 9P Remote SubAsy	

Straw Weight System Parts		
PN	**Description**	**Image**
23237	HM 9-Pin Serial Cable (optional)	
24980	Tablet Dock Power Supply	
27092	HMS USB-CAN, Right Angle Connector (optional)	
28465	Straw Weight DSP Module	
31558	Actuator cable	
31561	H2, GHM Load Cell Cable (optional)	
	HM Fuse Kit	
31793	Mirus Generic Attachment Plugin SubAsy Kit	No image available

5.2 Actuator Connections

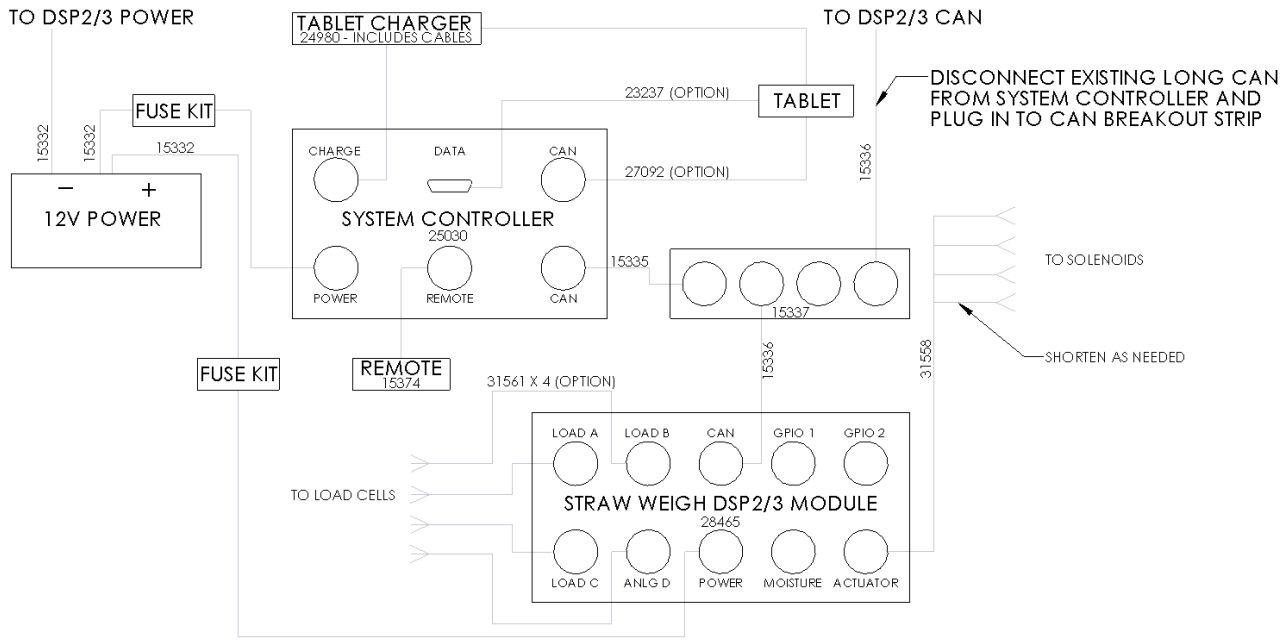
The Straw Weight System can support up to four load cells for the basket. However, HarvestMaster recommends using three load cells in a triangular pattern. Mount the Straw Weight DSP module and the CAN breakout strip on flat, vertical surfaces.

Connect the actuator cables as shown in the following table.

Connection and Wiring	
Actuator	**Connects to**
Actuator 1	Air Diverter
Actuator 2	Conveyor Belt
Actuator 3	Straw Release Gate on the back of the basket

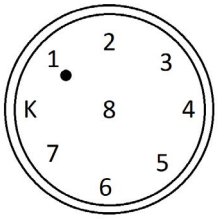
5.3 Wiring Diagram

Use the following diagram to connect a Straw Weight System to an existing H2/H3 GrainGage or GHS. This diagram assumes certain hardware components are available with the existing harvest system, such as, the tablet, system controller, DSP module, and various cables. For a description of the parts shown in the diagram, see 5.1 Straw Weight System Parts on page 31.



5.4 Wiring for DSP Module Ports

5.4.1 Actuator Port (Cable PN 31558)

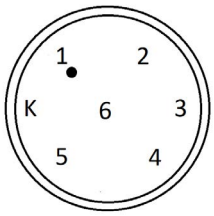


Wire Side

Up to Four Actuator Controls			
Pin	**Wire Color**	**Signal**	**Notes**
1	Black	Ground	- Act 1
2	Black	Ground	- Act 2
3	Black	Ground	- Act 3
4	Black	Ground	- Act 4
5	Red	H-Bridge 1 FWD	+Act 1, Dual actuator
6	Red	H-Bridge 1 RVRS	+Act 2, Dual control
7	Red	H-Bridge 2 RVRS	+Act 3, Dual control
8	Red	H-Bridge 2 FWD	+Act 4, Dual control

5.4.2 Load A, B, C, and D Ports

The harvest system supports Load A, Load B, Load C, and ANLG D ports. When applicable, Load C port is used for sub-samples.

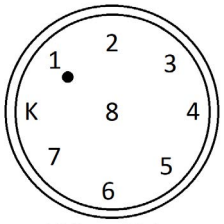


Wire Side

Load A, B, C and D Ports			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	5 V excitation	5.000 V +/- 0.005 mV
2	N/C	No connection	
3	White	Load signal out -	Millivolt level output from load cell
4	Green	Load signal out +	Approx. 15 mV full scale
5	Black	Load cell ground	
6	Shield	Cable shield connection	Chassis ground

5.4.3 CAN Port (Cable PN 15336)

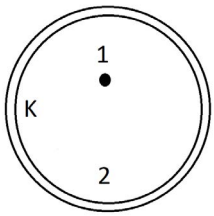
The Control Area Network (CAN) port is 250 Kbit/second ISOBUS compatible.



Wire Side

Can Cable			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	Excite power	
2	Yellow	CAN+	CAN differential signal (high)
3	Black	CAN ground	Relative ground for the CAN
4	Green	CAN-	CAN differential signal (low)
5	N/C	N/C	
6	N/A	RS-232 debug TX	Product diagnostics, special cable
7	N/A	RS-232 debug RX	Product diagnostics, special cable
8	N/A	RS-232 ground	Product diagnostics, special cable

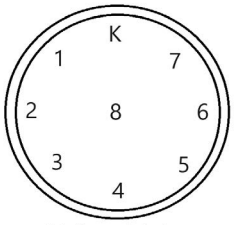
5.4.4 Power Port (Cable PN 15332)



Wire Side

12 V Power Cable			
Pin	**Wire Color**	**Signal**	**Notes**
1	Black	Power ground	Connect to combine battery (chassis ground)
2	Red	+12 V DC automotive power	9 to 18 V operating range Connect, fused, to combine battery, +12 V terminal

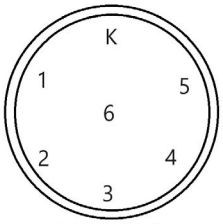
5.5 Wiring for Actuator Cable



Wire Side

Actuator Cable (PN 31558)			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	Act 1 -	
2	Orange	Act 2 -	
3	Yellow	Act 3 -	
4	Green	Act 4 -	
5	Blue	Act 1 +	
6	Brown	Act 2 +	
7	Black	Act 3 +	
8	White	Act 4 +	

5.6 Wiring for Load Cell Cable



Wire Side

Load Cell Cable (PN 31561)			
Pin	**Wire Color**	**Signal**	**Notes**
1	Red	Excite	
2	N/A		
3	Green	Signal +	
4	White	Signal -	
5	Black	Ground	
6	Shield	Cable shield connection	

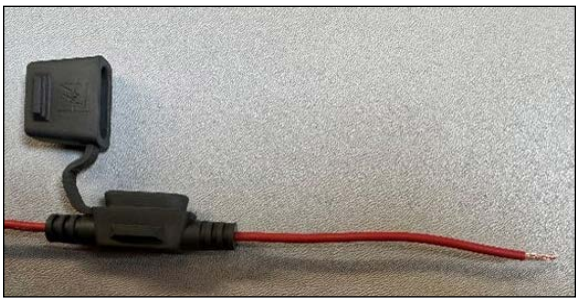
5.7 Install Fuse on HarvestMaster Power Cable

HarvestMaster products require an ATC fuse (20 A) on all power supply cables.

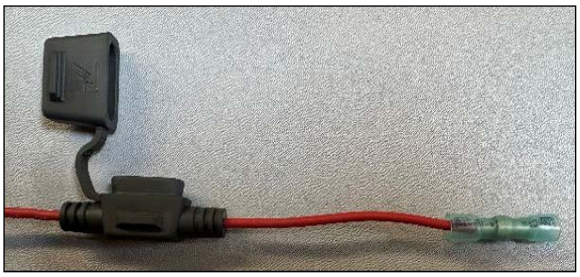
To install an ATC fuse,

1. Locate the positive red wire in the power cable (PN 15332) at the battery. Disconnect the red power wire from the battery if necessary.
2. Cut off 10 in. from the end of the red power wire.
   Note: If the wire was connected to the battery with a ring terminal, cut off the ring terminal.

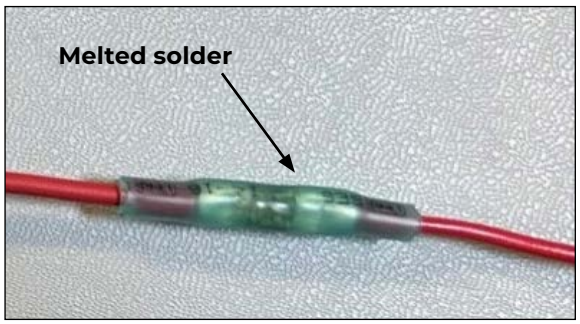
3. Strip 3/8–1/2 in. from the end of the red power wire.
4. Crimp a butt connector onto the stripped end of the red power wire.



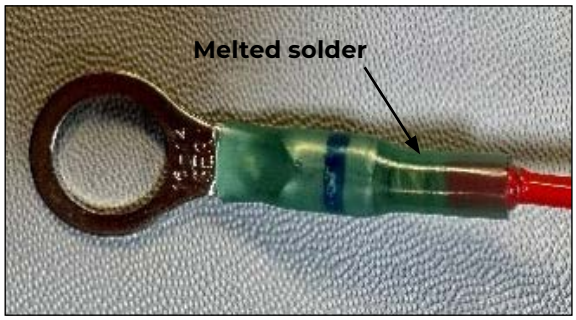
5. Strip 3/8–1/2 in. from both wire leads coming from the fuse holder.



6. Insert one of the wire leads into the butt connector attached to the red power wire and crimp the connection.



7. Heat the butt connection until the plastic forms around the wires and the solder in the center is melted.



8. Crimp a ring terminal to the other stripped wire lead coming from the fuse holder.
9. Heat the connection until the plastic forms around the wire and the solder is melted.

10. Place the ATC fuse (20 A) in the fuse holder and close the cap.

11. Connect the ring terminal to the battery.
12. Repeat these steps for each power cable (PN 15332).