Field Research Software™

Generic Harvest Module

Reference Guide

P/N 15307-01

Contents

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CHAPTER 1

INTRODUCTION TO FRS *HARVEST*

Getting Started: How to install FRS *Harvest*

Introduction to FRS *Harvest*

The Generic Harvest Module of the Field Research Software can be configured to work with a wide range of applications. It can be configured for standard forage type applications where no holding hopper is present and up to 3 load cells may be used. It is also used in two bucket grain systems with a holding hopper, a weight or plot bucket and a test chamber. With any of these applications, the number of load cells in use for the plot or weight bucket must be determined.

Designed by seed researchers, the Windows CE based Field Research Software™ (FRS) helps seed researchers and agriculture scientists perform data collection tasks on research plots.

The Generic Harvest Module is employed on combines to record weight, moisture and test weight on grains or forages. It interfaces to a wide variety of buckets or measurement devices that make it adaptable to most any research combine or application. It aids research scientists by automating data collection. This Field Reference Guide helps you through the setup, calibration, and harvest with the FRS Generic Harvest Module.

This guide also outlines the operation of the Field Research Software Harvest module. The FRS Harvest module is a component of the FRS Note Taking™ application. This Field Reference Guide assumes the user is familiar with the operation of FRS Note Taking. For more information, see the FRS Note Taking Field Reference Guide.

FRS software is designed so you can either tap on the touch screen with a stylus or use the keyboard. Function keys, arrow keys, the Enter key, and the Tab key are designed to help you move the cursor through the software and make selections.

Getting Started: How to install FRS Harvest

For instructions on installing the latest FRS Harvest software onto your handheld, follow these steps:

1. Visit our website at ***www.junipersys.com.***
2. Select ***Support,*** then select ***Downloads*** under the HarvestMaster menu.
3. Choose the version of software from the appropriate menu.
4. If downloading a .CAB file, copy this file to the desktop of the handheld.
5. Click on the .CAB and follow the prompts for installation.

CHAPTER 2

SETTING UP FRS *HARVEST*™

Setting Up FRS *Harvest*™

Follow these steps to enable your Generic Harvest Module to work with FRS ***Harvest.***

1. Make sure the cables between the control device and the handheld are set up properly so the software and hardware can communicate. For details about cable placement, see ***Appendix C: Cable Wiring for the HM400*** and ***Appendix D: Cable Wiring for the HM800.***
2. From the Main FRS Screen, select Setup (F3).

Figure 2-1: Choose* Setup *on the Main FRS Screen

3. The setup menu appears. Tap on the plus sign [+] next to ***System*** or use the right arrow to expand the System option.

Figure 2-2: Setup menu

4. Select ***Manage Devices*** either by double-tapping it or by using the up or down arrow keys and pressing the Enter key.

Figure 2-3: Setup menu with Manage Devices selected

5. In the Devices screen shown below, enable the Generic Harvest Module by tapping on the appropriate check box.

   Note: Only one device can be enabled at a time.

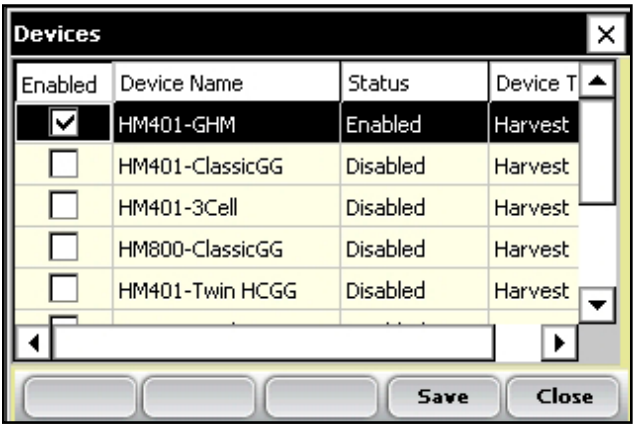


Figure 2-4: Devices screen showing the Classic as enabled

6. Press ***Save*** (F4). The software begins to load and checks to see if hardware devices are connected. Wait until the software has finished loading before proceeding to the next chapter.

   FRS software has an emulation mode to allow software familiarization without being connected to a hardware device.

CHAPTER 3

CALIBRATING AND PREPARING FOR HARVEST

Weight Calibration

Moisture Sensor

GHM Config

Timers

Actuators

Setup File

Calibrating and Preparing the System for Harvest

This chapter explains how to calibrate and set up your Generic Harvest Module to work with FRS Harvest. The sections below describe the first- and second-level menu options in the Setup menu under Generic Harvest Setup.

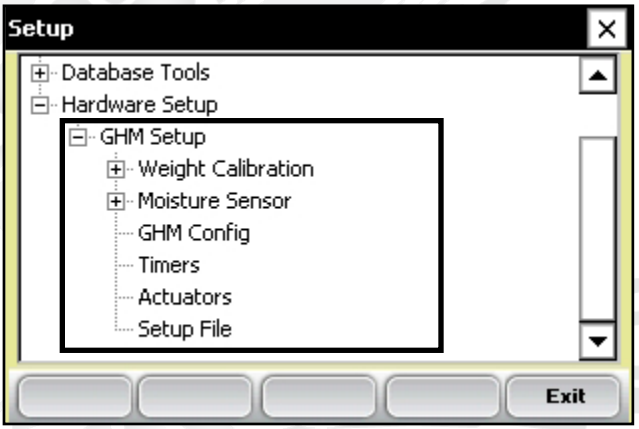


Figure 3-1: This chapter explains the options under GHM Setup in the Setup menu

Verify Weight Calibrations

In diagnostics select Load cell. Place known weight of approximately 5 lbs in the weigh bucket. Record weigh reading and if different from known weight follow the following steps to recalibrate weight reading.

Load Cell Calibration–Different Size and Single Load Cells

Before you can begin load cell calibration you must first determine the number of weigh or plot load cells being used by your system. Go to ***Hardware Setup*** > ***GHM Setup*** > ***GHM Config.***

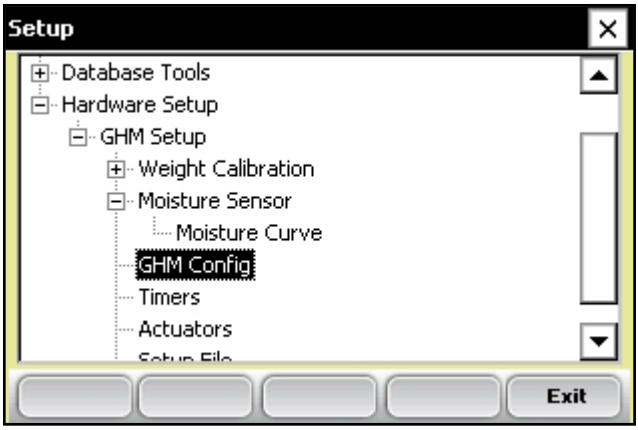


Figure 3-2: GHM Config

In the Generic Harvest Module Config screen, the user must specify the number of weigh or plot load cells in use.

In typical forage applications up to 3 load cells are installed. For standard grain buckets 1 plot load cell is used. A hopper and test chamber may be used as well. If a separate load cell is used to measure test weight, the test chamber should be selected and a valid chamber volume determined.

The AutoTare feature is also used in forage applications.

With AutoTare enabled, the software will zero out the weight readings after each plot is harvested rather than emptying the bucket of belt.

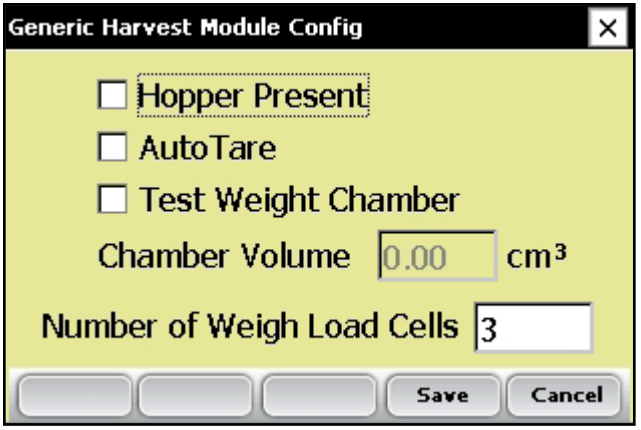


Figure 3-3: Generic Harvest Module Config screen

Manual calibration of multiple load cells can be accomplished by using one of two different methods. If you are using multiple load cells that are of the same size, skip to the section Load Cell Calibrating—Matching Load Cells. Single Load cells calibration should follow the procedure outlined below:

1. **Load Cell Calibration—Different Load Cells.** After you have determined the number of load cells go to Diagnostics Load Cell screen on the main menu.

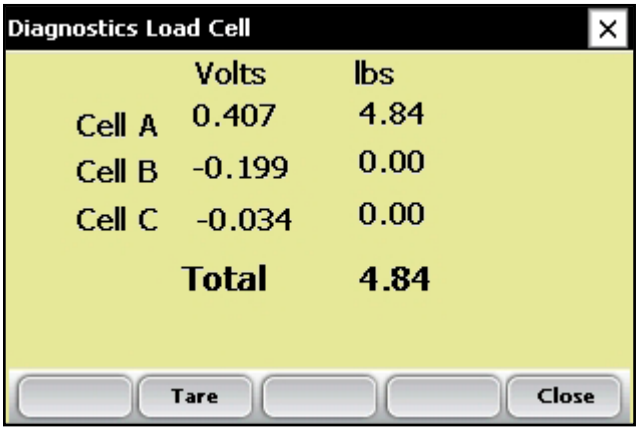


Figure 3-4: Diagnostics Load Cell screen

2. From Diagnostics screen, place a known weight near load cell A. Write down the measured weight. Do the same for other load cells used in the system. Using the formula, below calculate the Cal Coef for each Load Cell

Cal Weight Ratio =
Actual Weight / Measured Weight from Diagnostics
Example: 5.11 Actual / 4.80lbs measured = 1.0645833

Load Cell Cal Coef =
Current Load Cell Cal Coef * Cal Weight Ratio
1.0645933 * 11.35 Load Cell Cal Coef for Load A = 12.08

Repeat this same step for Load B and Load C

3. To adjust load cell calibration, go to ***Setup > GHM Setup > Weight Calibration > Edit Weight Calibration***. Up to 3 load cells can be calibrated and installed.

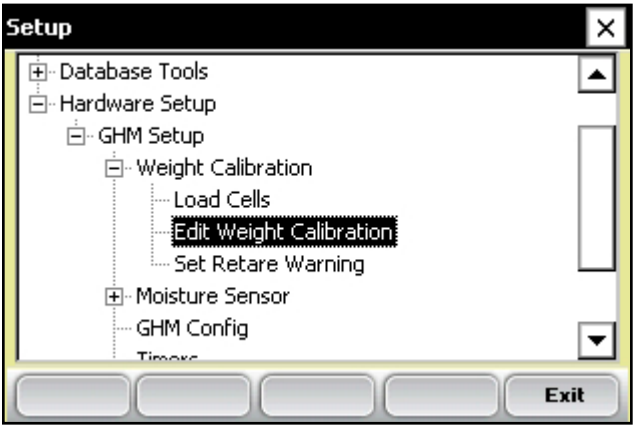


Figure 3-5: Edit Weight Calibration menu option

4. Type this New Cal Coef for all load cells into the correct text box and check in diagnostics.

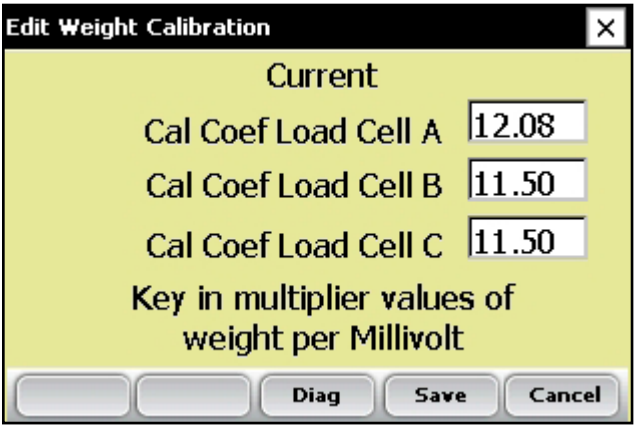


Figure 3-6: Edit Weight Calibration screen

Load Cell Calibration–Matching Load Cells

If all three load cells are of the same size, follow these steps for calibration. For load cells of different sizes, please refer to Load Cell Calibration—Different Load Cells

1. Make sure all Load Cell Cal Coefficients are set to the same value.
2. Go to the Diagnostics-Load Cell Screen.
3. Tare the bucket if it is not zero.
4. Place a known weight in the center of the weigh bucket
5. Write down the measured Total Weight
6. Use the formula below to calculate the Load Cell Cal Coefficients

Cal Weight Ratio =
Actual Weight / Measured Weight from Diagnostics
Example: 5.11 Actual / 4.80lbs measured = 1.0645833

Load Cell Cal Coef =
Current Load Cell Cal Coef * Cal Weight Ration
1.0645933 * 11.40 Load Cell Cal Coef for Load A = 12.14

Type the New Cal Coef value into all 3 Load Cell Cal Coef in the Edit Weight Calibration Screen.

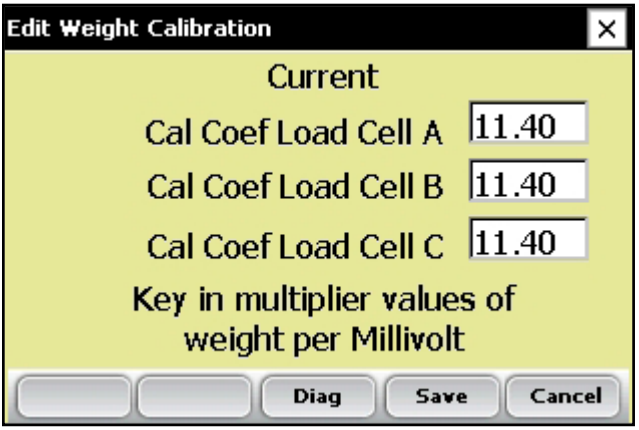


Figure 3-7: Edit Weight Calibration screen

Holding Hopper Function

The Generic Harvest Module of FRS can be used in multiple applications. If a holding hopper or cyclone is installed it acts as a holding area for grain being harvested while grain already harvested is in the weigh bucket.

If no hopper is present in the system as is the case with forage machines, the product drops directly into the weigh bucket. AutoTare can also be enabled for forage type applications. For details on configuring the hopper or

AutoTare refer to the ***Setup > GHM Setup > GHM Config screen***.

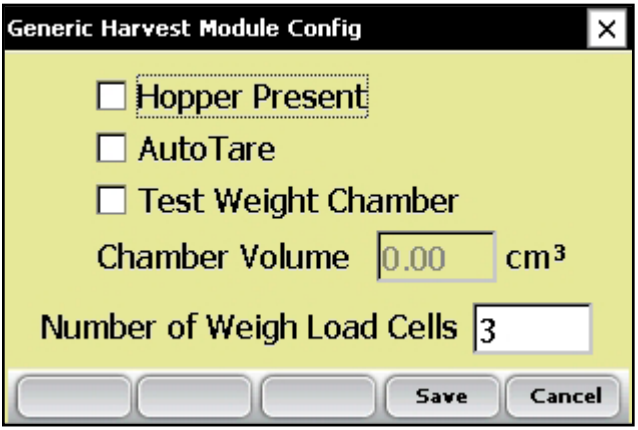


Figure 3-8: Generic Harvest Module Config screen

Moisture Sensor

The Generic Harvest system uses the EM Grain Moisture sensor for moisture. To view or modify the moisture curves select ***Moisture Sensor: Moisture Curve.***

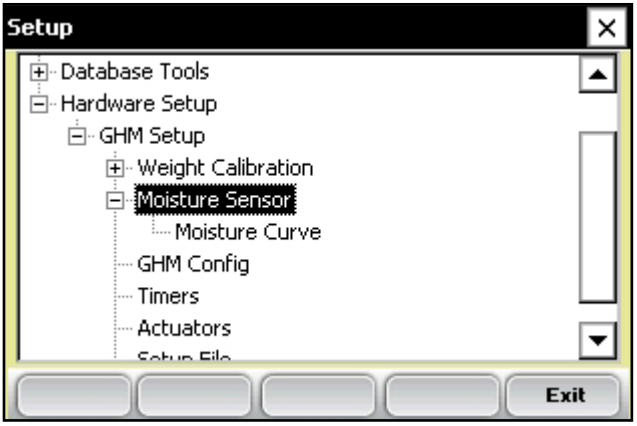


Figure 3-9: Setup screen with EM Sensor option selected

Moisture Curve

Editing a moisture curve

To edit a moisture curve, follow these steps.

1. Select ***Setup*** (F3), then choose ***Hardware Setup*** > ***GHM Setup*** > ***Moisture Sensor*** > ***Moisture curve.***

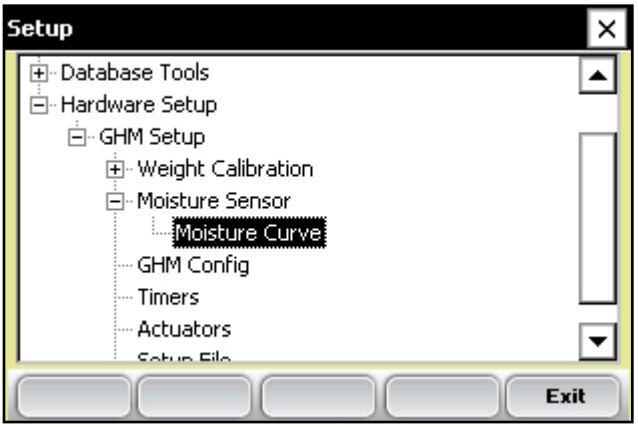


Figure 3-10: Setup screen with Moisture Curve screen selected

The Moisture Curve screen appears, listing any existing moisture curves and giving you the option to edit, delete, or copy moisture curves. Each of these actions is described in more detail below.

Note: The check mark next to one of the curves indicates the curve most recently used.

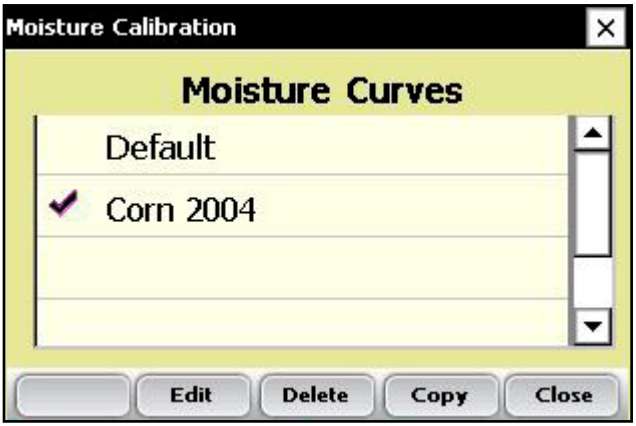


Figure 3-11: Moisture Calibration main screen

The Moisture Calibration screen lists all moisture curves that have been created. One of the curves is a ***Default*** grain moisture sensor curve that comes with FRS. It can be copied but not modified. The default curve consists of a set of known data points, which the system uses when making the moisture measurement on a sample of grain. When plotted in a spreadsheet, the default curve appears like the graph (see Figure 3-12).

Default Moisture Curve for EM Sensor

Moist %	MV
0.00%	0.00
10.00%	1.22
13.00%	1.61
16.00%	1.93

19.00%	2.19
22.00%	2.41
25.00%	2.60
28.00%	2.77
31.00%	2.93
34.00%	3.07
37.00%	3.19
40.00%	3.30

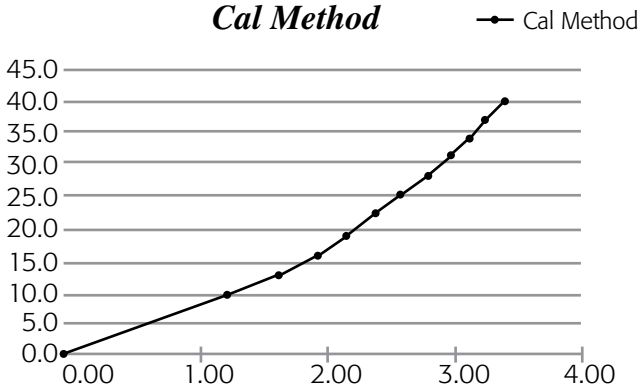


Figure 3-12: Default moisture curve as it appears in a spreadsheet (top) and as it appears in a graph (bottom)

To check moisture choose ***Diags*** (F4) on the main FRS screen then select ***Moisture.*** Record the Rel Vlts and the Moisture (%) from each sample that has been cycled through the grain gage. Compare the Moisture (%) reading with a known percent moisture from a standard.

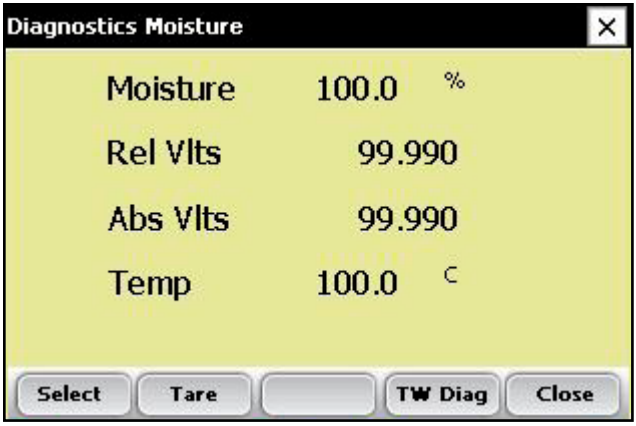


Figure 3-13: Diagnostics Moisture screen

2. Adjust the moisture curve by adjusting individual points in the curve or by adjusting the value of the Calibration Temperature. The following sections explain how to make adjustments to individual points, how to adjust the moisture grain temperature, how to delete a curve, and how to copy a curve.

   Note: We recommend creating a different moisture curve for each different grain type. A custom spreadsheet to aid in adjusting your moisture calibration can be found on the Juniper Systems web site. This spreadsheet helps you adjust the points on the moisture curve to match your system.

   To access the spreadsheet, go to ***www.junipersys.com*** and choose ***Support*** > ***HarvestMaster*** > ***FAQs*** > ***Moisture Sensor (EM, High Capacity GrainGage, Classic GrainGage).*** Choose the link called ***EM Moisture Sensor Calibration*** to view the spreadsheet.

Adjusting Individual Points

To adjust individual points, follow these steps:

1. Select the moisture curve you want to edit and press ***Edit*** (F2).

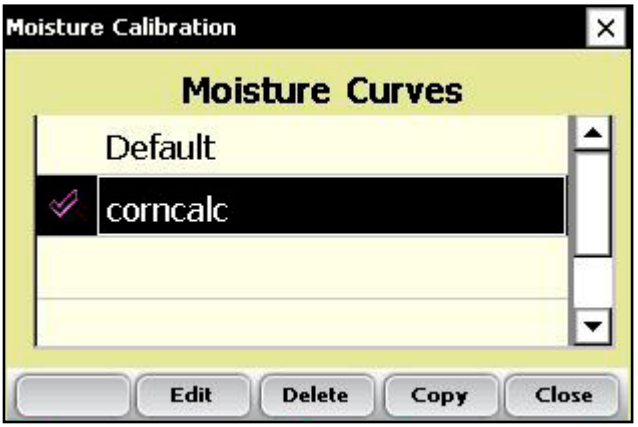


Figure 3-14: Moisture Calibration main screen

2. Select the percent or volts you want to adjust, and enter the new values.

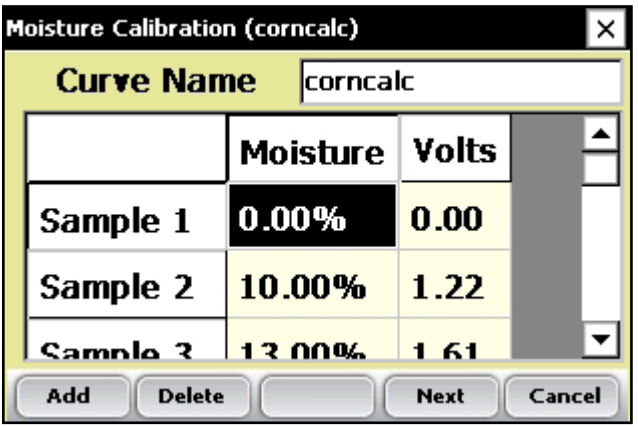


Figure 3-15: You can edit Moisture or Volts for a sample

3. Press ***Next*** (F4) to save your changes to the moisture curve and advance to the Moisture Correction and Temperature screen.

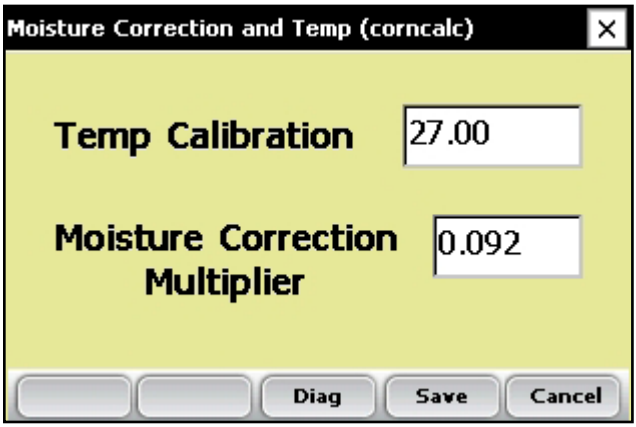


Figure 3-16: Moisture Calibration Correction and Temperature screen

We recommend setting Temp Calibration to the current temp reading found in the diagnostics menu.

Note: When grain moisture readings are harvested at a different temperature than the temperature during the original calibration, the grain moisture measurement needs to be corrected to adjust for this difference. The Generic Harvest Module automatically makes this moisture correction based on the Temp Calibration and Moisture Correction Multiplier found in the screen above.

4. When you are finished editing your moisture curve, press ***Save*** (F4) to exit and save your changes.

Adjusting the Grain Moisture Temperature

You can also use the temperature calibration to make small adjustments to moisture readings taken by the system. To change the temperature calibration to match your grain samples, follow these steps:

1. From the Main FRS screen, Select ***Setup*** (F3), then ***Hardware Setup*** > ***GHM Setup*** > ***Moisture Sensor*** > ***Moisture Curve.***
2. Select a moisture curve then select ***Edit*** (F2) or ***Copy*** (F4).
3. Tap ***Next*** (F4). The Moisture Correction and Temperature screen appears.

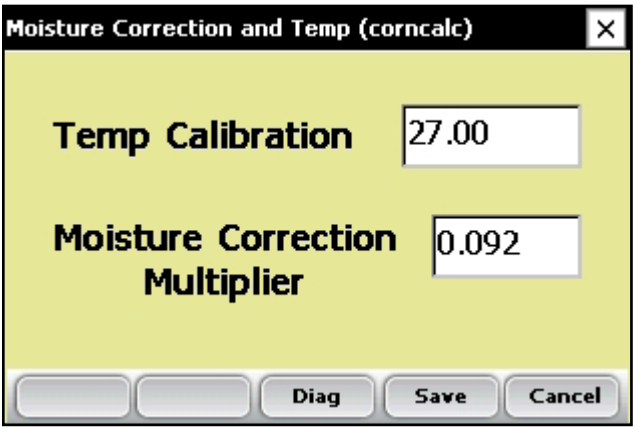


Figure 3-17: Moisture Correction and Temperature screen for the "corncalc" curve

Even though the moisture correction is automatic, changing the Temp Calibration shifts all moisture readings up or down, depending on if the temperature was increased or decreased. If you find that your new moisture reading is consistently high over the whole range, you can lower the calibration temperature to

decrease all moisture readings. You can also raise the calibration temperature if your moisture is consistently too low. This is an easy way to fine-tune the moisture curve after calibration.

Follow these steps to calculate the proper temperature adjustment:

1. If the system provides a different moisture value than your actual moisture value (e.g., 19.5% instead of 18.5%) and you'd like to adjust it, use this formula to figure out the calibration value:

   (Actual Moisture – HDS Moisture)/
   Moisture Correction Multiplier =
   Mstr. Temperature Calibration

   Example: 18.5%–19.5%/0.092 = –10.87 C

2. Next, add this value to your existing temperature.

   Note: If the calibration value you calculated in Step 1 is negative as in the example above, keep the negative sign.

   In this example, assume the existing temperature calibration is 27 C:

   Temp Calibration + Mstr Temp Cal =
   New Temp Calibration

   Example: 27.0 + (–10.87) = 16.13

3. Save any changes you made to the settings on the Moisture Correction and Temperature screen by pressing ***Save*** (F4). You can check the moisture calibration by pressing ***Diag*** (F3) before saving your changes.

Deleting a Curve

The ***Delete*** option in the Moisture Curve menu allows you to remove unwanted moisture curves. To delete an unwanted moisture curve, follow these steps:

1. Select the curve you want to delete and press ***Delete*** (F3).

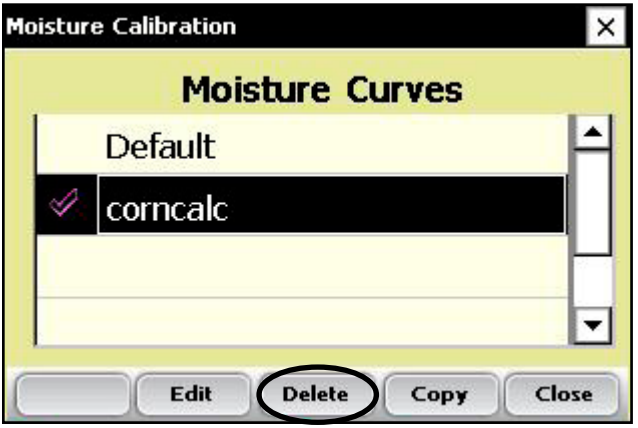


Figure 3-18: Delete a moisture curve by selecting it and tapping* Delete *(F3)

2. Confirm the delete by tapping Yes or No.

Figure 3-19: Warning screen

Copying a Curve

The Default Moisture cannot be modified. To make changes to this curve you must first make a copy of it. Follow these steps to copy a curve:

1. Select the moisture curve you want to copy or rename and then press ***Copy*** (F4).
2. Type in the new name of the moisture curve, make any desired changes, then press ***Next*** (F4).
3. Press ***Save*** (F4) to save the file and exit the screen.

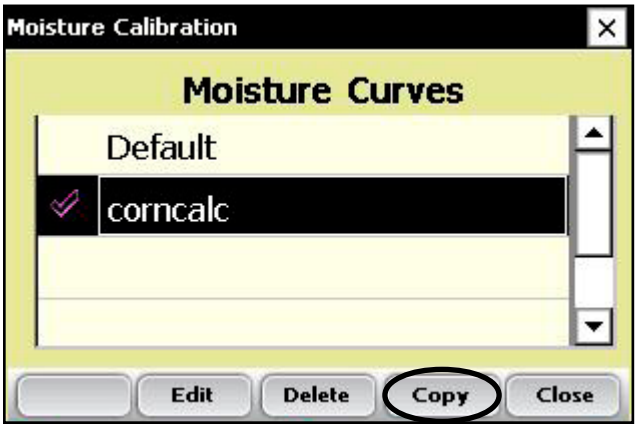


Figure 3-20: Copy a moisture curve by selecting it and tapping Copy (F4)

GHM Config Screen

The GHM Config screen has settings that distinguish the Generic Harvest Module from standard bucket applications and forage or multiple load cell applications.

Choose Setup (F3) on the main FRS screen, then select Hardware ***Setup > GHM Setup > GHM Config.***

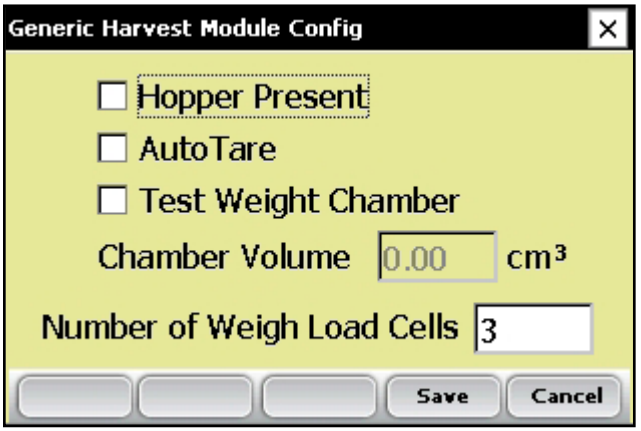


Figure 3-21: Generic Harvest Module Config screen

Check Hopper when a hopper or cyclone is present. This changes the sequencing of buckets in harvest.

Check the AutoTare box in forage applications where the bucket will be tared or set to zero after each plot instead of emptying the bucket.

Test Weight Chamber Volume

In a standard two bucket system, a chamber or bucket may be used to determine test weight. To view or change the test weight chamber volume follow these steps:

1. Choose Setup (F3) on the main FRS screen, then select Hardware ***Setup > GHM Setup > GHM Config.***
2. The test weight volume can vary from bucket to bucket. It is important to determine the volume in Cubic Inches or Cubic Centimeters of the test chamber in order to have accurate test weight.

3. To verify test weight accuracy take a grain sample and verify test weight from a known test weight measurement device. Cycle the grain sample through the system to get a measured test weight. If the test weight measured by the bucket does not match the test weight from a standard the chamber volume can be adjusted.
4. To adjust the test weight reading from the system use the following formula

New Chamber Volume =
measure test weight/actual test weight * chamber volume

Example: 56.2 lbs/bu / 58.8 * 89 = 85 cu inches.

Type the new test weight chamber volume into the text box. For metric conversion the test chamber and test weight should be in cu cm and kg/hl.

Timers

The Timer screen is used to adjust various timers used with the system. Each of these timers can be adjusted using the Timer Setup screen, which is available by choosing Setup (F3) from

the main FRS screen then tapping ***Hardware System*** > ***GHM Setup*** > ***Timers.***

Figure 3-22: Timer Setup screen

- **Hopper Open.** The amount of time the hopper door remains open before beginning the close process. Note: 1.00 = 1 second.
- **Plot Open.** The amount of time the plot door stays open before starting the close process.

  Note: We recommend that you do not set the open times less than 1 second.
- **Settle time.** The amount of time that the grain is allowed to settle in the plot bucket after the preceding gate close before it starts weighing the grain.
- **Weight time.** The amount of time data is collected and averaged to determine the actual weight reading

- **CountDown timer.** The amount of time from when the enter key is pressed until the system starts to cycle. Usually equal to the time it takes for the combine to clean out or the time it takes for the grain to travel from the head of the combine to the hoppers. Note: 1.00 = 1 second.

Actuators

The Actuator Setup screen is used to select the appropriate type of actuator and transition times for your system. To access the screen, choose ***Setup*** (F3) on the main FRS screen then tap ***Hardware Setup*** > ***GHM Setup*** > ***Actuators.***

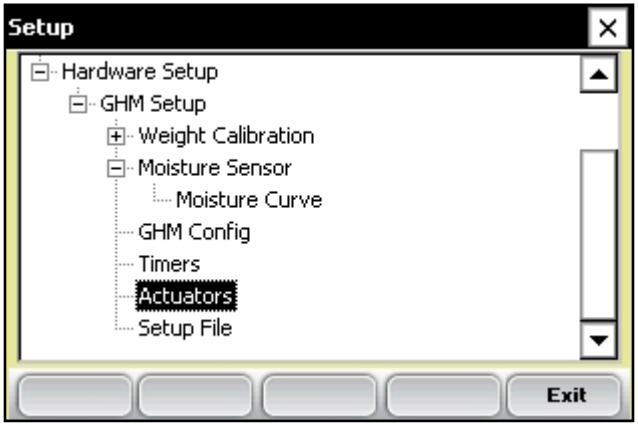


Figure 3-23: Double-tap Actuators from the Setup menu to access the Actuator Setup screen

Once you see the Actuator Setup screen, select the appropriate actuator type from the drop-down menu for each actuator.

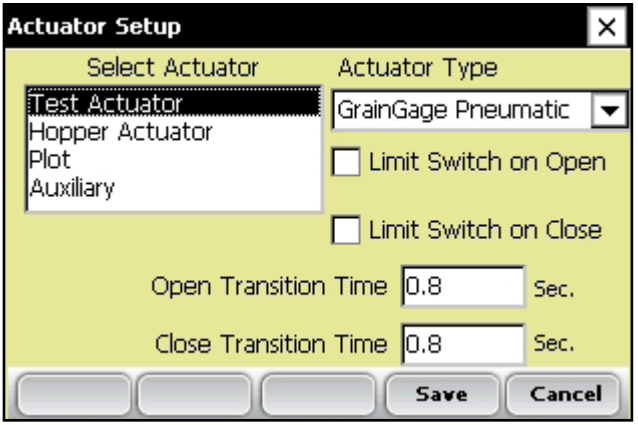


Figure 3-24: Actuator Setup screen

If limit switches are being used check the boxes accordingly. If limit switches are not being used, enter the time in seconds needed for the stroke of the actuator to fully extend or retract. In the example above, the limit switch is enabled for the Hopper (top) on the closing transition only. On the opening transition, a time of 0.8 seconds controls the actuator.

Setup File

The ***Setup File*** option on the Setup menu is a way to establish specific settings for a specific machine. This is helpful if you want to use your handheld with more than one combine. The steps below explain how to establish setup files for two combines.

1. Set up and calibrate one combine.

2. Enter the Setup File screen by double-tapping ***Setup File*** in the Setup menu. A list of existing setup files appears.

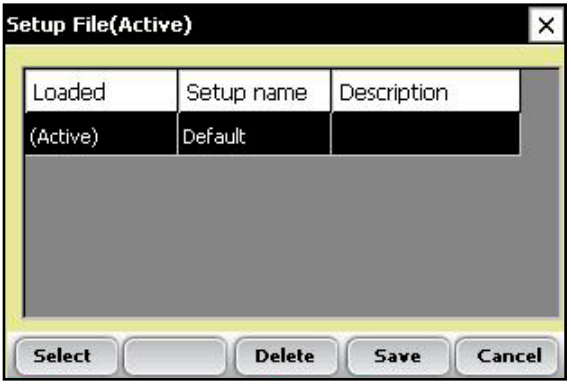


Figure 3-25: Setup files that appear by default

By default, the settings you created when you set up and calibrated the handheld were saved to the Default setup file.

3. To create a setup file for a second combine, tap ***Save*** (F4).

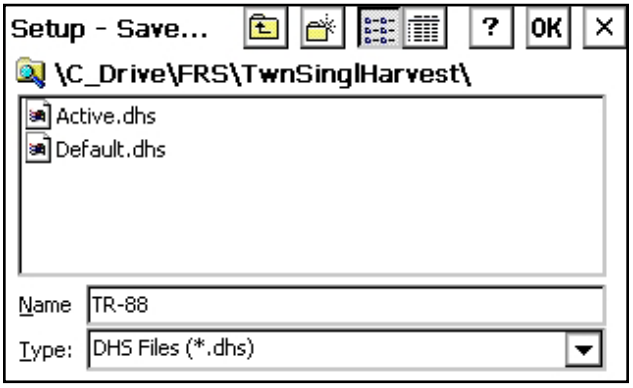


Figure 3-26: Naming a new setup file

4. Create a name for the second setup file.
5. Repeat steps 1–2. The new setup file appears.

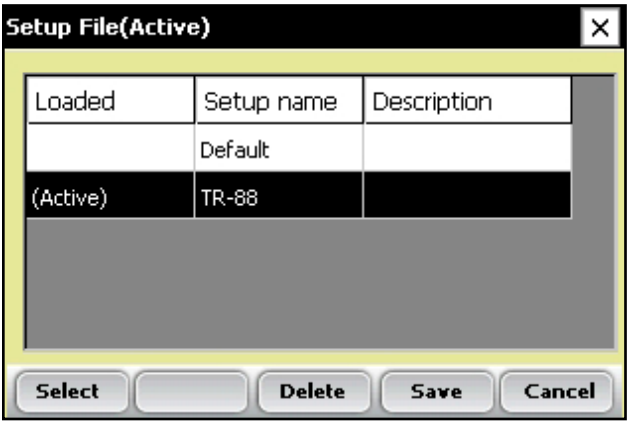


Figure 3-27: The new setup file appears

6. As you can see in the first column, this second setup file is now the active file, which means that any setting and calibrations changes you make are automatically saved to that file. To make another setup file active, select it then tap ***Select.***

   To create setup files for additional machines, repeat the process.

CHAPTER 4

DIAGNOSTICS MENU

Load Cell

Moisture

Actuators

Print Calibrations

Diagnostics Menu

The Diagnostics menu is designed to help you troubleshoot and test your hardware. To access this option, select ***Diag.*** (F4) from the main FRS screen. Four submenu options appear on the Diagnostics Menu page, shown in the following image. Each option is described below.

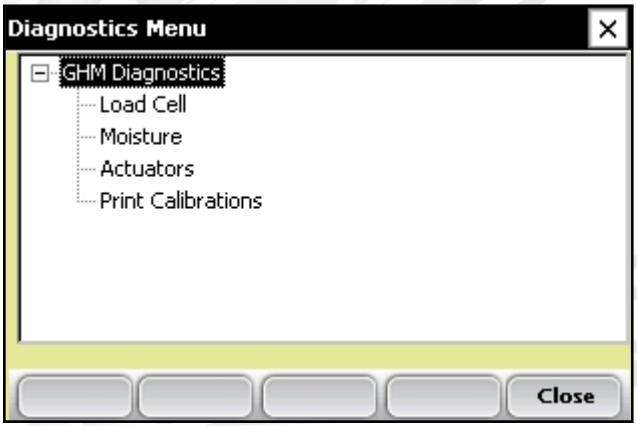


Figure 4-1: Diagnostics Menu screen

Load Cell

Checking the calibration

You can check the calibration of the load cell using the options on the Diagnostics Menu screen. Before you do that, however, first check the accuracy of your calibrations by ensuring that—

- the combine is on level ground and out of the wind,
- the weigh bucket is empty, and
- the calibration weight is close to harvest weight.

Follow these steps to check your load cell calibration:

1. From the Diagnostics Menu, double-tap ***Load Cell.*** The Diagnostics Load Cell screen appears, shown here.

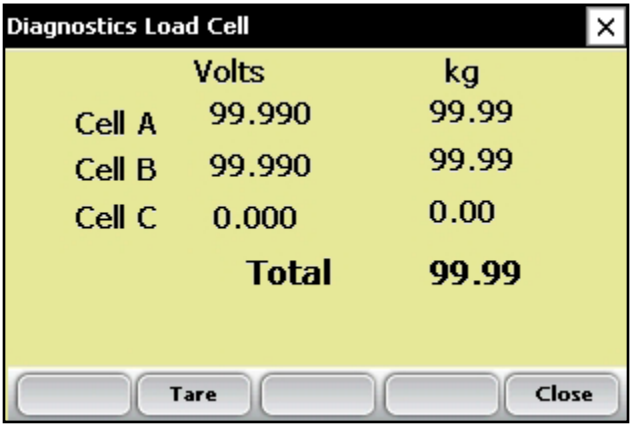


Figure 4-2: Diagnostics Load Cell screen

2. Make sure the weight values for Cell A, Cell B, Cell C and the total weight all equal close to zero. If not, tare the system by selecting ***Tare*** (F2).

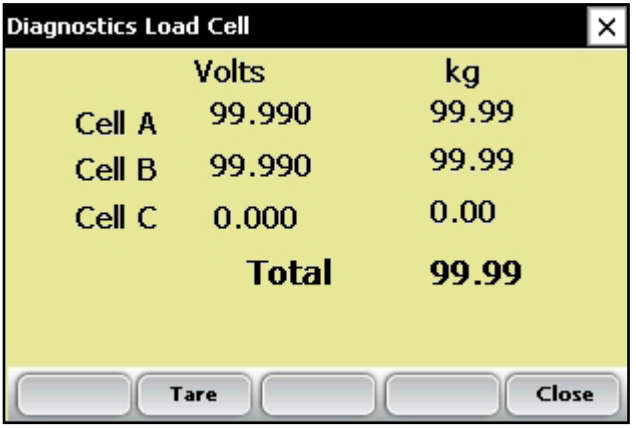


Figure 4-3: Weight values for Cell A, Cell B, Cell C and Total change after a tare

3. Place your known weight into weigh bucket.
4. The weight shown in the Total line should match your known weight. If the weight is incorrect, recalibrate the load cells by returning to the main FRS page and selecting ***Setup*** > ***Hardware Setup*** > ***GHM Setup*** > ***Weight Calibration.***

Moisture

The Moisture option allows you to view readings associated with the EM Grain Moisture sensor.

To view the Diagnostics Moisture screen, select ***Moisture*** from the Diagnostics menu. The following information is displayed.

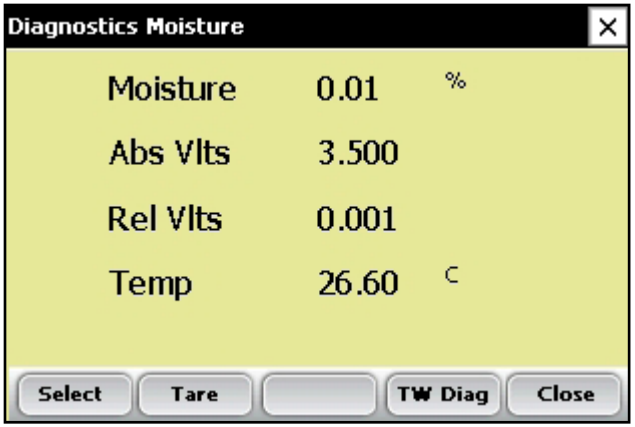


Figure 4-5: Diagnostics Moisture screen

Moisture
The percentage of moisture read by the moisture sensor.

Abs Vlts (Absolute Volts)
The raw voltage reading from the moisture sensor.

Rel Vlts (Relative Volts)
The tared-out voltage reading of the moisture sensor.

Temp (Temperature)
The temperature read from the moisture sensor.

Tare (F2)
To retare the moisture reading, select ***Tare*** (F2).

Select (F1)
Tapping this soft key opens the moisture curve menu screen, allowing you to select a moisture curve to be used for checking calibration. Select the curve and then tap ***Select*** (F1) again to return to the previous screen.

LED Codes on the EM Grain Moisture Sensor

Green, yellow, and red LED's (light emitting diode) are designed into the sensor for service and diagnostics purposes. These LED's can be viewed by looking at the right side of the white plastic housing of the sensor. The function of the LED's are described as follows.

Green: On solid when +12 VDC is applied to the sensor

Yellow: Blinks whenever a message is transmitted from the sensor such as when the application software is in the moisture diagnostics menu.

Red: Indicates sensor error conditions. With no error codes, the red alternates one second on, then one second off.

Any error codes are represented by pairs of 'rapid blinking', the number of blinks corresponding to the first and second digit of an error code from the list below:

11. Watchdog reset has occurred

12. Timed Task Buffer overflow detected

13. Low memory alert (M < 50 bytes)

21. Input buffer overrun

22. Checksum error detected
23. Unrecognized command received by sensor
24. RS-485 busy encountered
25. Sensor response message aborted
32. Frequency measurement zero error (no oscillation counts)
33. Frequency measurement range error (over 3 Mhz)
41. Blade voltage range error
42. Temperature sensor zero error (reading at or below –15 C (5 F)
43. Temperature sensor range error (reading above +60 C)
44. System supply voltage below +10.0 Volts
45. System voltage above +18.0 Volts
55. Invalid error code reported

When the sensor is operating normally, no error codes should show. There should just be a steady one second on, one second off blink of the red. Otherwise, general interpretation would be:

11, 12, 13, 55:	Software system problems. Report to customer service and design engineering with description of circumstances.
21, 22, 23, 24, 25:	Faulty sensor wires, or faulty SCCU. These could be caused by some fault within the EMGS, but it is not likely.

32, 33, 41:	Likely cause would be a bad connection from the sensor to the ground plane around the blade, or from the sensor board to the blade.
42, 43:	Assuming the temperature is in a normal ambient range from -10 C to +40 C, these codes would indicate a failed temperature sensor, or board solder connection.
44,45:	These are more likely caused by a problem in the power supplied to the EMGS.

Actuators

This Actuator Controls screen allows you to open, close, or cycle any or all of the actuators. To access this screen, select Diag. (F4) from the main FRS screen, then select ***Actuator.*** The Actuator Controls screen appears.

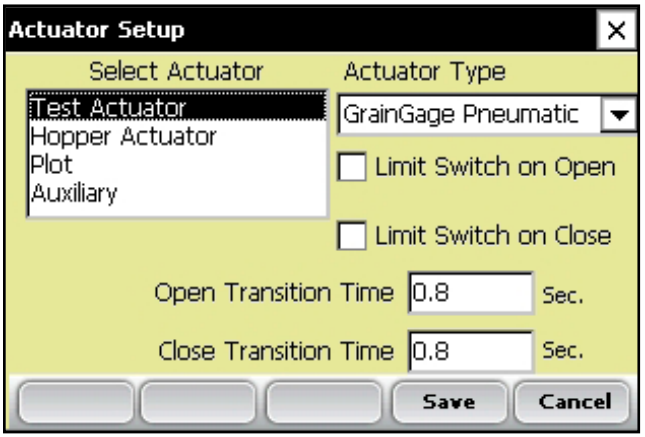


Figure 4-8: Actuator Controls screen

Print Calibrations

The Print Calibrations menu allows you to print your calibration settings. To print, simply select one of the calibration options and tap ***Print*** (F1).

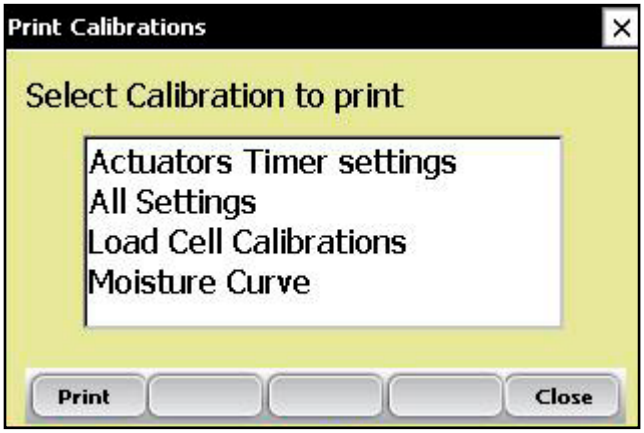


Figure 4-9: Print Calibrations screen

CHAPTER 5

CREATING TRAITS AND TEMPLATES FOR HARVEST

Create harvest traits

Create a Harvest Template

Creating Traits and Templates for Harvest

Create harvest traits

Before you can collect harvest data, you first need to add or select harvest traits from the Master Traits List and then create a harvest trait template for these new traits. FRS includes sample harvest traits and templates. You can create your own traits or modify the traits that are included with FRS.

Note: It is especially important that traits that reflect data from the Generic Harvest Module, such as moisture and weight, are set up correctly in order for the software to register data from the hardware. If these traits are not set up correctly, data will not be recorded from these devices.

Adding a trait to the Master Traits List

Follow these steps to add a trait to the Master Trait List:

1. Open the Master Traits List screen by choosing ***Setup*** (F3) and double-tapping ***Traits Management.***

2. Select ***Add*** (F1) from the Master Traits List screen.

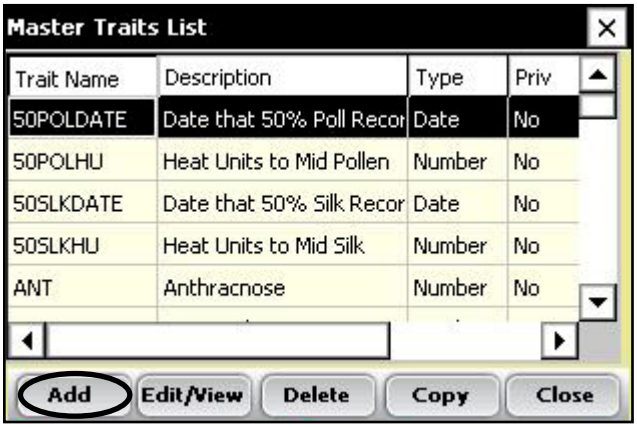


Figure 5-1: Create a new trait list by tapping Add on the Master Traits List screen

3. Type in a name you would like to use for harvest traits. Common names used are ***Moisture*** for grain moisture, ***Weight*** for plot weight, and ***Test*** for the grain test weight.

   Important: If you are collecting harvest data, you need to create a trait for weight. Creating traits for moisture and test weight is optional.

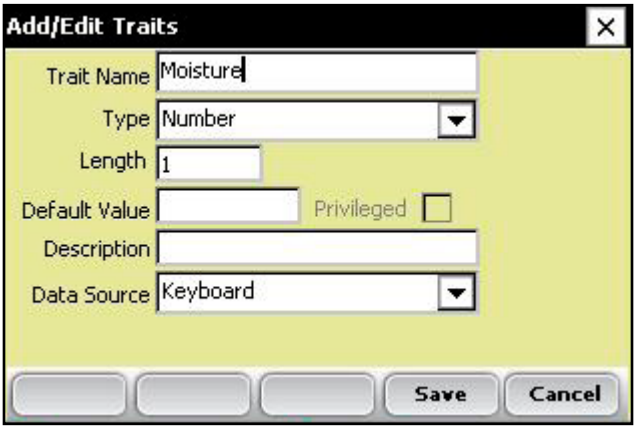


Figure 5-2: Entering a Trait Name for a new trait

4. Skip down to Data Source on the screen and select ***HM-Moisture, HM-Weight or HM-Test Weight*** from the drop-down box. In order for the trait data to be recorded from the System, the correct data source must be selected. The Type and Length information is automatic.

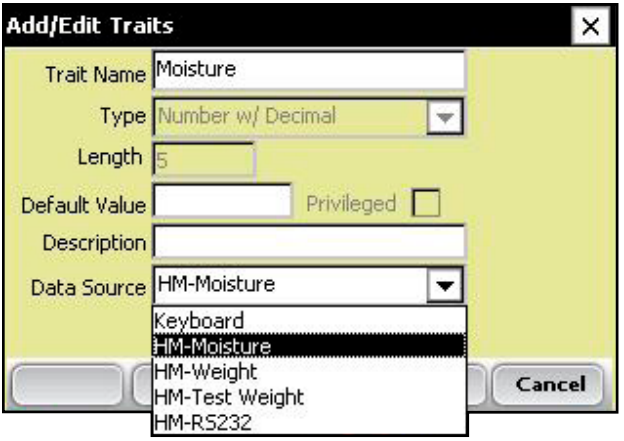


Figure 5-3: Selecting a Data Source

5. ***(Optional)*** Add a trait description to clarify the type of trait that has been created. Example: ***Moisture of grain at harvest.***

6. Save the new trait by pressing Save (F4).

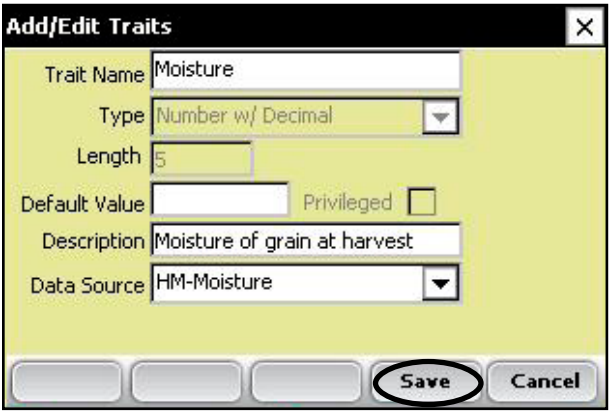


Figure 5-4: Saving a new harvest trait

Create a Harvest Template

After you have added harvest traits to the Master Trait List, create a trait template that contains these new traits.

To create a trait template, follow these steps:

1. From the Setup Menu, expand the Traits Management option and double-tap ***Trait Templates.***

Figure 5-5: Double-tap* Trait Templates *to open the Trait Templates screen

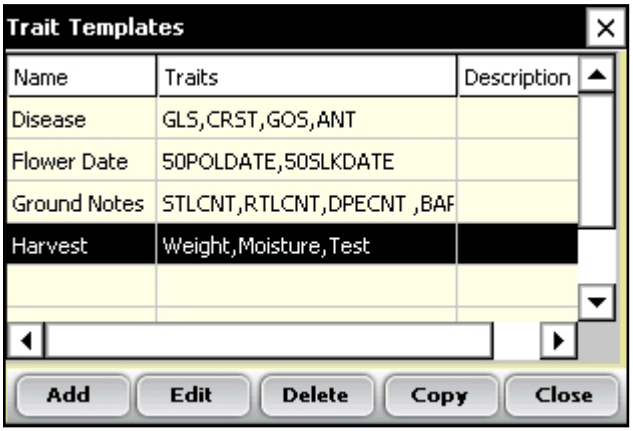


Figure 5-6: Trait Templates screen

2. Select ***Add*** (F1) to create a blank template. The Add/Edit Trait Templates screen appears.

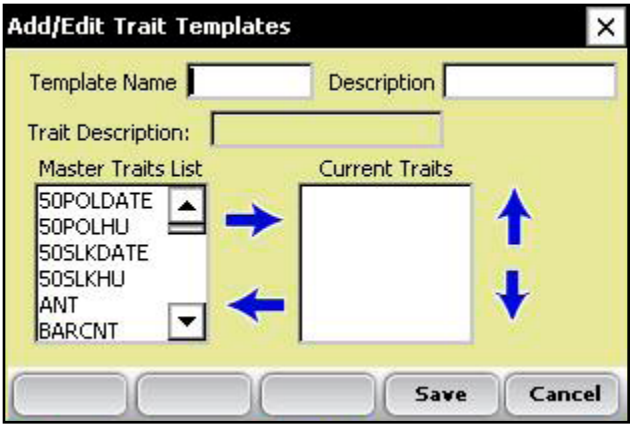


Figure 5-7: Add/Edit Trait Templates screen

3. Type a Template Name and Description to help identify the template. ***(Harvest or Harvest Data are suggested template names.)***

4. Scroll down through the Master Traits List to find the Weight, Moisture and Test Weight traits you created. Highlight one of the traits, then tap on the Right Arrow in the middle of the screen to move it to the Current Traits window. In the example below, Weight, Moisture, and Test traits have been added as Current Traits.

Note: You can change the trait order by tapping on the up or down arrows on the screen.

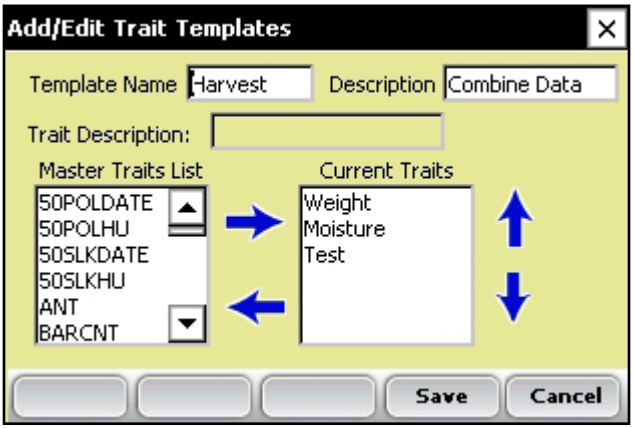


Figure 5-8: New template called Harvest

Note: In some applications moisture or test weight may NOT be required. Do not include these traits into the template if they are not to be collected.

5. Press ***Save*** (F4) to save the new template.

CHAPTER 6

HARVEST DATA COLLECTION

Preparing to collect harvest data

Harvesting and collecting data

Viewing your harvest data using the List Screen

Harvest Data Collection

After you have calibrated the Generic Harvest Module, created harvest traits, and created a new harvest trait template, you are now ready to collect data. This chapter explains how to prepare for, collect, and view harvest data using FRS. For addition information, refer to the ***FRS Field Reference Guide (Note Taking).***

Preparing to collect harvest data

Follow these steps to prepare FRS to collect harvest data:

1. On the FRS Main Screen, make sure the Active Devices box shows GHM in the Setup menu under ***System*** > ***Manage Devices.***

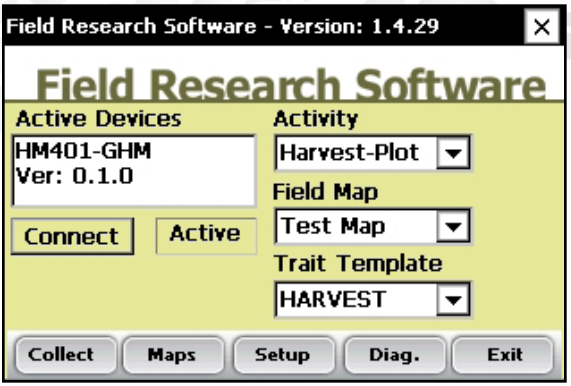


Figure 6-1: The Generic Harvest Module appears in the Active Devices box

2. Select the appropriate activity from the Activity drop-down menu on the FRS Main Screen. For example, if you plan to use FRS for harvesting, select the ***Harvest*** Activity. For standard plot lengths, set the activity to Harvest-Plot.

3. On this same screen, select the correct field map name from the pull down menu.

   Note: If you need a new field map for harvest, create one before proceeding to the next step. Refer to the FRS Note Taking Field Reference Guide (Note Taking) manual for instructions on creating a new field map.

4. Select the trait template you want to use from the Trait Template drop-down box. Options include the harvest traits you created such as Weight, Moisture or Test Weight.

5. Select ***Collect*** (F1) to enter data collection mode. The Moisture Calibration screen appears.

   Note: If a moisture is not included in the Trait Template or is being recorded, this screen does not appear.

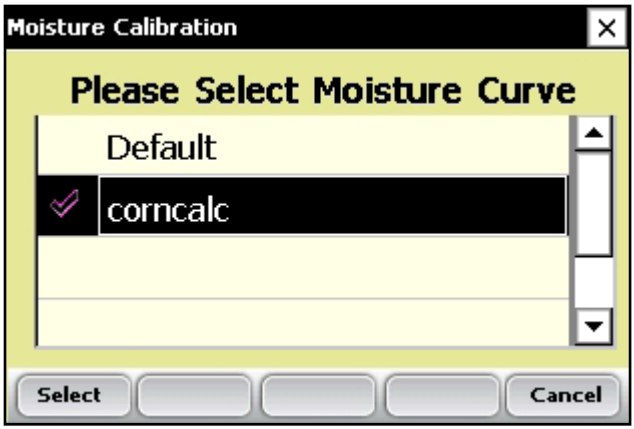


Figure 6-2: Moisture Calibration screen

6. Select a moisture curve from the list, then tap ***Select*** (F1). Wait while harvest set ups are loaded.

7. The Collect Data Spatial screen appears, shown below.

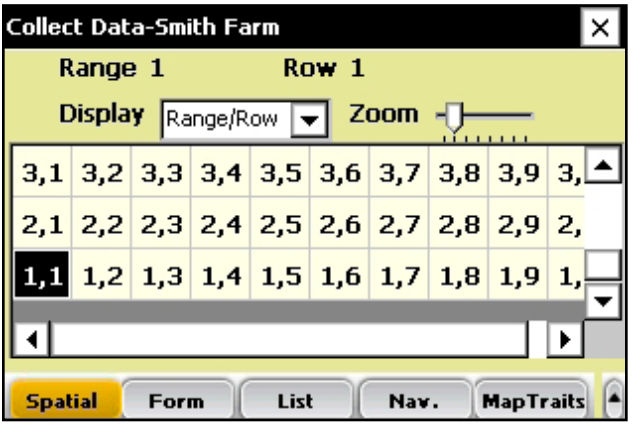


Figure 6-3: Row 1, Range 5 is selected in the Collect Data Spatial screen

8. Choose the starting plot location by tapping on the cell. In Figure 6-3, the selected cell is Range 1, Row 1. After you tap on the starting plot cell, the screen shows the combine's current location in the field and which plots have already been harvested.

9. Establish your navigation type by selecting ***Nav.*** (F4). The Select Navigation screen appears.

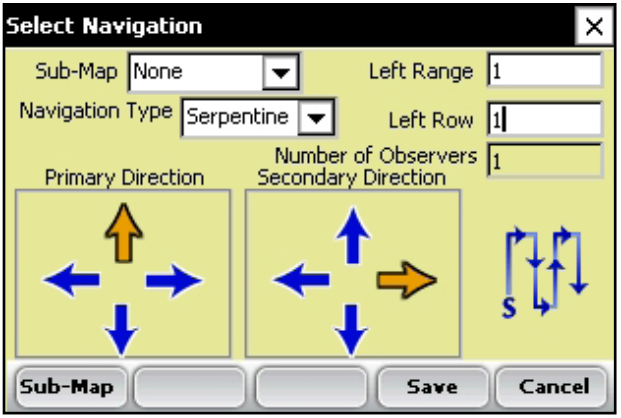


Figure 6-4: Select Navigation screen for a single plot combine

Navigation Type

The navigation type is the harvest route through a field. Select a navigation type from the pull down menu. Examples of Navigation patterns for harvest are shown below.

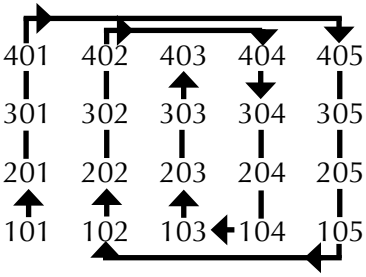


Figure 6-5: Circular navigation type

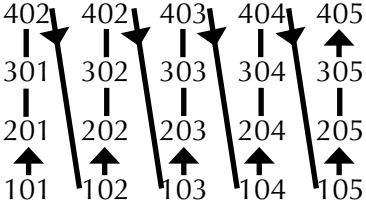


Figure 6-6: Sequential navigation type

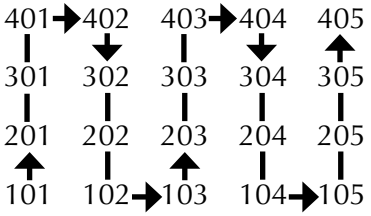


Figure 6-7: Serpentine navigation type

Tap ***Save*** (F4) to save your settings.

Harvest Sequence—with Hopper

From the main FRS menu, make sure the Activity selected in the drop down menu is Plot Harvest. Select the desired harvest map and select the Trait Template from the drop down menu.

Figure 6-8: Main screen

To start harvest, press the Collect button on the main screen and wait for the harvest sequence to be initialized. Select the starting range and row from the Spatial screen.

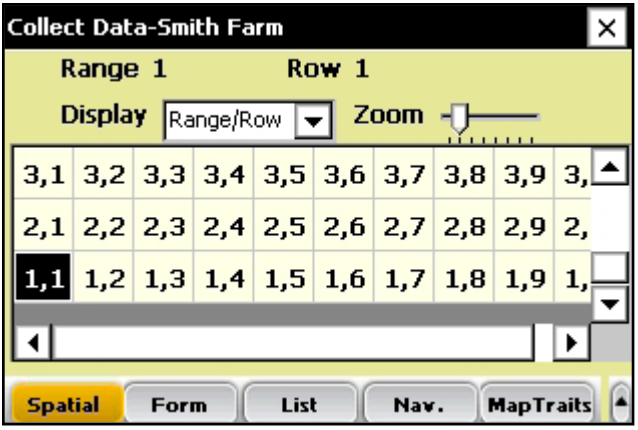


Figure 6-9: Collect data screen on spatial tab

1. To begin harvest, line up starting plot with the combine and harvest the first plot.
2. As soon as the head has cleared through the first plot, press the Enter Key. If a countdown timer is used it begins counting down. (The Countdown timer can be adjusted in ***Setup > GHM Setup > Timers***)

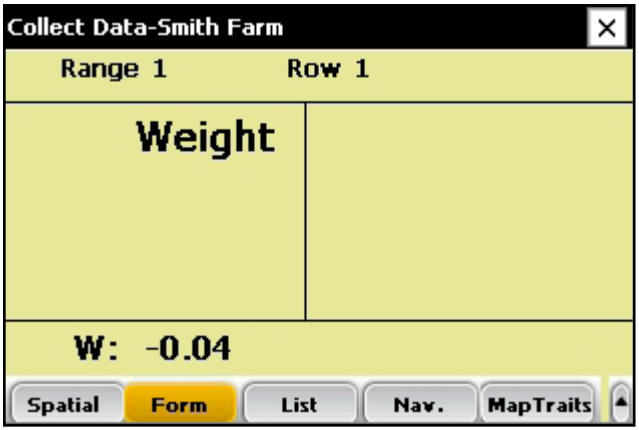


Figure 6-10: Countdown timer

3. If a hopper or cyclone door present and enabled the sequence is difference on the first plot harvested.
4. The Hopper door will open when the Enter key is pressed emptying its contents into the weigh bucket.
5. The driver should harvest the second plot letting it fill up the holding hopper. As soon as all grain is in the holding hopper the Enter key is pressed again.
6. The traits that have been enabled will be taken on the grain in the weigh bucket.

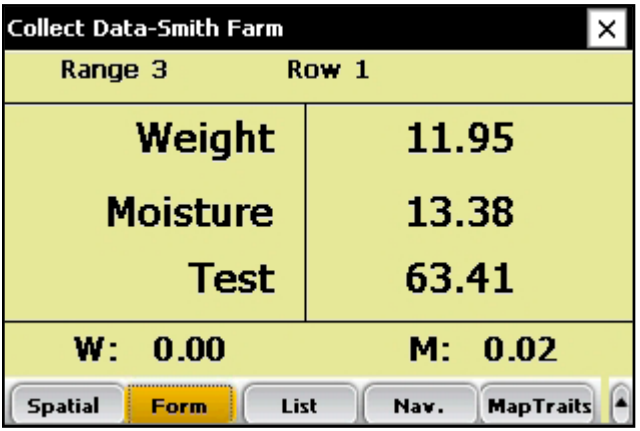


Figure 6-11: All three traits collected

7. After the plot bucket door empties out, the hopper will open emptying its contents into the weight bucket.
8. The driver can start into the next plot and the sequence starts again.

Harvest Sequence—with No Hopper

If a hopper is not enabled product is taken directly to the plot or weigh bucket. Data are recorded in the plot bucket

after the Enter key is pressed rather than filling into the hopper.

In applications where no hopper is present such as on forage machines.

AutoTare feature may be enabled. To set the AutoTare feature go ***Setup > Hardware Setup > GHM Setup > GHM Config.***

Viewing your harvest data using the List Screen

By selecting ***List*** (F3), you can view your harvest data. Note: You CANNOT collect harvest data while you are in this screen. To harvest, you must be in the Form screen. See the section above called ***Plot Harvest Sequence*** for details.

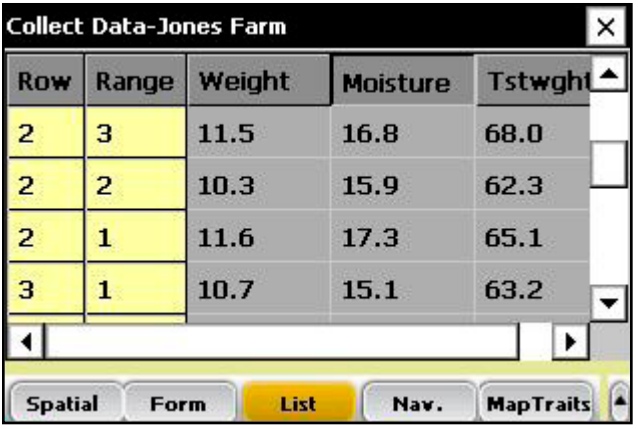


Figure 6-12: List screen showing moisture, test weight, and weight values for each plot

CHAPTER 7

EXPORTING DATA

Extracting collected data

Backup Log for Harvest Modules

Exporting Data

Extracting collected data

The first step in exporting data is to extract collected data from the FRS database to the Export folder on the handheld. To extract data, follow these steps:

1. Tap ***Setup*** on the main FRS screen to enter the Setup screen.

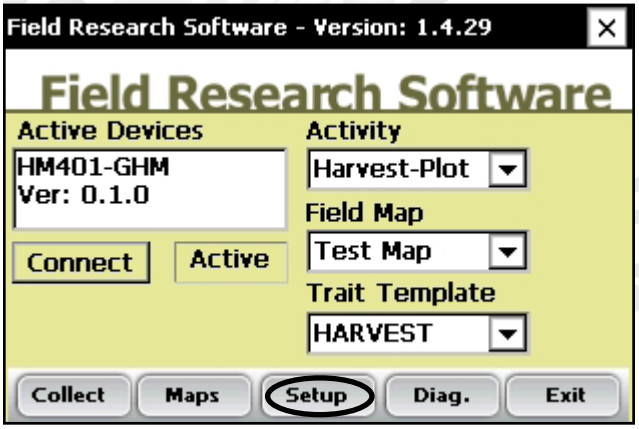


Figure 7-1: Select **Setup** *from the main FRS screen*

2. Choose ***Database Tools*** > ***Export data*** to CSV from the Setup menu.

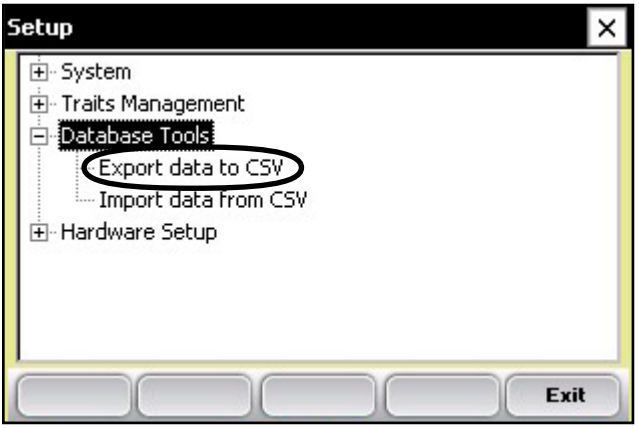


Figure 7-2: Choose* Export data to CSV *from the Setup menu

3. The Import/Export Utility screen appears. Select ***Export from FRS Database.***

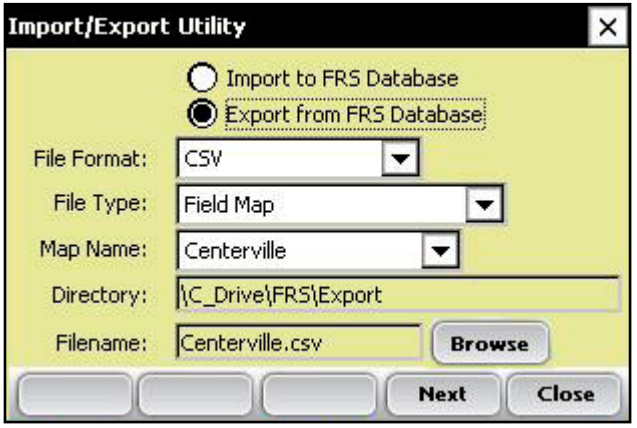


Figure 7-3: Import/Export Utility screen

4. Fill in the information on the Import/Export Utility screen. For more information about the elements on the screen, see the ***FRS Note Taking Field Reference Guide.*** To find the map file you want to export, choose ***Browse.***
5. Tap ***Next*** (F4).

If you extracted a field map, the Export Map Data screen appears, showing the target path where the file will be saved. Select the option to ***Include previously exported data*** if you plan to export all data associated with this map. If you only want to export new data associated with the map, leave the option unselected.

After data has been exported to the handheld, it can be copied to the desktop using ActiveSync.

Refer to the ***FRS Note Taking Field Reference Guide*** for more details on exporting data.

Backup Log for Harvest Modules

FRS software creates a backup log of data that has been collected from the harvester. This log file contains the date, time, range, row, plot weight, moisture, and test weight for each plot harvested. It also contains values used for moisture and test weight calibration, and Slope and Motion compensation, or Q value. The backup log file is found on the Allegro, see Figure 7-4.

Path: C_Drive\FRS\HarvestBackup

Each backup log references the same name as the field map used for harvest. For example, if the name of the field being harvested is Smith Farm, the name of the backup log would be Smith Farm_GHM.csv.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Date	Time	RangeID	Row(ID2)	ID3	Weight	Moisture	Test Weig	ZeroF	ZeroV	CurrentF	CurrentV	Temp
2	15/04/2008	16:20:42	1	1		2.49	6.72	0	3.9325	0	0	0	0
3	15/04/2008	16:20:56	2	1		2.52	6.82	0	3.9486	1.666	3.3274	1.334	29
4	15/04/2008	16:21:07	3	1		2.5	6.92	0	3.9486	1.666	3.318	1.329	28.9
5	15/04/2008	16:21:23	4	1		2.49	6.86	0	3.9486	1.666	3.323	1.333	28.5
6	15/04/2008	16:21:34	5	1		2.52	6.92	0	3.9486	1.666	3.323	1.331	28.5
7	15/04/2008	16:22:59	6	1		2.5	6.9	0	3.9486	1.666	3.3242	1.332	28.3
8	15/04/2008	16:23:38	7	1		2.49	6.92	0	3.9486	1.666	3.3239	1.333	28.3
9	15/04/2008	16:24:08	8	1		2.5	6.94	0	3.9486	1.666	3.3218	1.331	28.2
10	15/04/2008	16:24:22	9	1		2.52	6.92	0	3.9486	1.666	3.318	1.329	28.9
11	15/04/2008	16:28:08	10	1		2.49	6.86	0	3.9486	1.666	3.323	1.333	28.5
12	15/04/2008	16:28:26	10	2		2.49	6.92	0	3.9486	1.666	3.323	1.331	28.5
13	15/04/2008	16:28:40	9	2		2.5	6.9	0	3.9486	1.666	3.3242	1.332	28.3
14	15/04/2008	16:28:55	8	2		2.52	6.92	0	3.9486	1.666	3.3239	1.333	28.3
15	15/04/2008	16:30:01	7	2		2.5	6.94	0	3.9486	1.666	3.3218	1.331	28.2

Figure 7-4: Example of backup log file.

CHAPTER 8

GENERAL CARE AND MAINTENANCE

Regular Maintenance

Return for Repair Procedure

General Care and Maintenance

Generic Harvest Module Regular Maintenance

HarvestMaster products are built to be robust and will withstand most weather conditions. All of our products are environmentally sealed and built for outdoor use. However, there are some steps you can take that will increase the operational life of the system. The following tips will help you to have fewer problems and will ensure the maximum life out of your system.

Recommended Pre-Harvest Maintenance

We recommend starting your pre-harvest checklist at least two weeks before you plan to be in the field. In addition, we also recommend that when you are checking calibrations that you run several samples of grain with known weights and moistures through the system to assure accurate moisture and weight calibrations.

All Systems

- Clean the combine battery terminals to assure a good power and good connection.
- Inspect all cables for mice damage.

- Make sure all cables are secure ("click" lock into place) and are not touching or interfering with the weigh bucket assembly.
- If equipped with a pneumatic air system, check the filters and lubricator for contamination. Replace as necessary. Close the petcock valve on the air tank and charge the system up to 120 PSI. Check for air leaks. Operating pressure should be regulated to 50PSI.
- Check the limit switches for proper function (adjust if needed).
- Check the actuator operation for each door assembly for normal operation. Replace or clean as needed.
- Ensure the weigh bucket or pan moves freely. Verify air hoses and cables are not interfering with the weigh pan.
- Check the actuators and slides for proper function and adjustment.
- Run “DIAGNOSTIC” menu checks on the load cells, and moisture sensor as outlined in the Diagnostics section of this reference guide.
- Check weight and moisture calibrations.

Recommended Post-Harvest Maintenance

- Print setups and moisture curves. Save and file this information in an area where it can be found in future years if needed.

- With about 120 PSI forced air, blow all chaff and broken kernels out of and from around the weigh bucket.
- Avoid using water to clean in and around the weigh systems. If you use a sprayer washer to clean the combine, be sure to keep the water away from all sensors and cabling.
- If the system has pneumatic actuators (e.g. GrainGages), retract all the cylinder rams into the housing.
- If mice have been a problem in the past, place mouse poison or traps in areas where mice might appear. Moth balls tend to help as well.
- If your Harvest Data System console is mounted outside of the cab (e.g. exposed to the elements), we recommend removing or covering the control box. It is best to store your system in a warm and dry environment.
- If the combine is not protected from the weather, cover any exposed cable ends (connectors) with plastic bags and secure tightly with twist-ties or rubber bands.

Installation and Maintenance Tips

We suggest the following tips when installing and/or maintaining the Harvest Data System:

When using pneumatics:

- Install a 3 to 5 gallon reservoir air-tank. This tank must have a petcock type drain valve or an electronically

controlled drain valve to allow any water that accumulates inside the tank to be drained.

- Install the Bosch Combo filter/regulator as close to the Generic Harvest Module as possible
- If areas of high humidity or when using a lubricated compressor it is recommended to install a Kaeser Model KOR-20.

Return for Repair Procedure

In the event that your Harvest Data System needs repairs, contact a Juniper Systems Technical Service Representative for a Returned Materials Authorization (RMA) number. Please have the following information ready when you call:

- Serial Number
- Model Number
- Name and Company/University/Agency
- Phone and Fax Numbers
- Clear description of problem
- Purchase Order Number and Billing Address

Under the Premium Support Agreement, HarvestMaster will ship you a replacement loaner Next Day Federal Express or UPS Red. To avoid any problems in the return procedure, complete the following steps:

1. Once you receive the loaner unit, package your equipment (if the existing box is still good) in the same box and ship it Federal Express, Next Day Air Mail, or UPS Red.

2. Fill out the shipping and RMA forms that were included with your loaner equipment and include a description of the failure. The more information you can supply concerning the malfunction and the circumstances under which it occurred, the quicker our technicians can complete the repair.
3. Package the unit properly to avoid shipping damage.
4. Write the RMA # on the package you ship.

Your equipment will be repaired and returned to you. After receiving your repaired equipment, you will be authorized a period in which to return the loaner unit before you will be billed for it. There is an annual service and support fee that allows you to have this service. Please call for detailed information and pricing.

APPENDIX

Appendix A: Warranty

Appendix B: Mounting Diagrams

Appendix C: Cable Wiring Diagrams for the HM-401

Appendix D: Cable Wiring Diagrams for the HM-800

Appendix A
Warranty

Limited Warranty

Hardware

All products manufactured by Juniper Systems, Inc. (Juniper Systems) when properly installed, calibrated, and operated in accordance with instruction manuals accompanying the hardware and used for the purpose for which the hardware was designed shall be free from defects in materials and workmanship for a period of one (1) year from the date of shipment.

In the event a defect in materials or workmanship is discovered and reported to Juniper Systems within the one-year period, Juniper Systems will, at its option, repair the defect or replace the defective product. Juniper Systems' obligation hereunder will be limited to such repair or replacement.

The customer shall have the responsibility to ship the defective equipment to Juniper Systems with all cost of shipment prepaid. After repair or replacement Juniper Systems will, at their own expense, ship the replacement or repaired item back to the customer using the same type of carrier.

Software

Software products that are designed by Juniper Systems for use with a hardware product and that are properly installed on that hardware product are warranted to the end user not to fail to execute their programming instructions due to defects in materials or workmanship for a period of one year from date of delivery.

If Juniper Systems receives notice of such defects during the one year warranty period, Juniper Systems shall, at its option, repair or replace the defective software media. Warranty is limited to repair or replacement of software media.

The warranties provided herein do not apply in the case of improper or inadequate maintenance or in the case of repair by any person not previously authorized in writing by Juniper Systems to do such maintenance or make such repairs.

These warranties likewise do not apply where the products have been operated outside the environmental specification of the product, where software products other than those specified by Juniper Systems have been used, or where attempts at software interface have been made by any person not previously authorized by HarvestMaster to perform such interfacing operations.

Disclaimer of Warranties

The warranties set forth herein are in lieu of all other warranties of Juniper Systems, whether written, oral or implied. Juniper Systems makes no warranties regarding its products (hardware or software), including without limitation warranties as to merchantability, fitness for a particular purpose, any warranty arising from course of performance, course of dealing, or usage of trade whether any of the foregoing warranties are either expressed or implied.

Juniper Systems specifically makes no warranties as to the suitability of its products for any particular application. Juniper Systems shall in no event be liable for special, incidental, or consequential damages in connection with or arising out of the furnishing, performance or use of any product covered by this agreement whether such claim is based upon warranty (express or implied), contract, strict liability, negligence or otherwise.

Updates or Modifications

Juniper Systems shall be under no obligation to update or modify its products except as herein noted to correct program errors. Furthermore, the customer agrees that all representations and warranties contained herein shall be immediately null and void in the event of any modification, alteration or change in or to any product affected by or on behalf of the customer except for a change made by Juniper Systems.

Removal of Serial Number

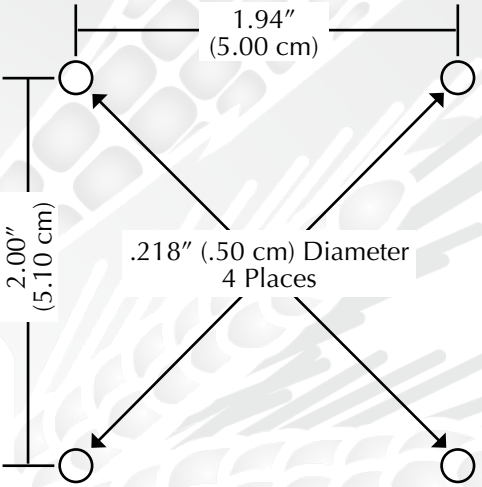
Removal of the Juniper Systems serial number label from an instrument will void any warranty on the said instrument. Juniper Systems will not repair or update an instrument and return it to an individual if the instrument is without the said serial number label.

Extended Warranties

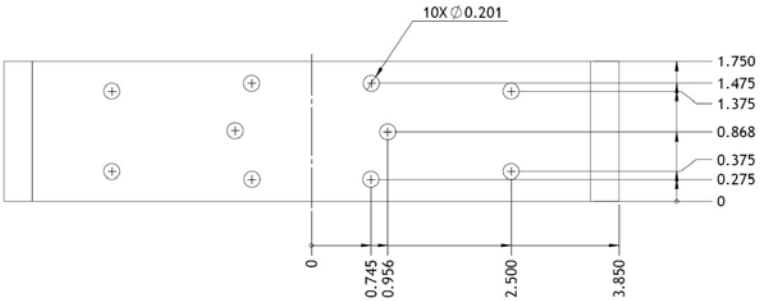
Juniper Systems offers a variety of warranty options to extend coverage beyond the standard warranty. You can contact Juniper Systems Customer Service Department for details at (435) 753-1881 (6 am - 5 pm MST, Mon-Fri).

Appendix B
Mounting Diagrams

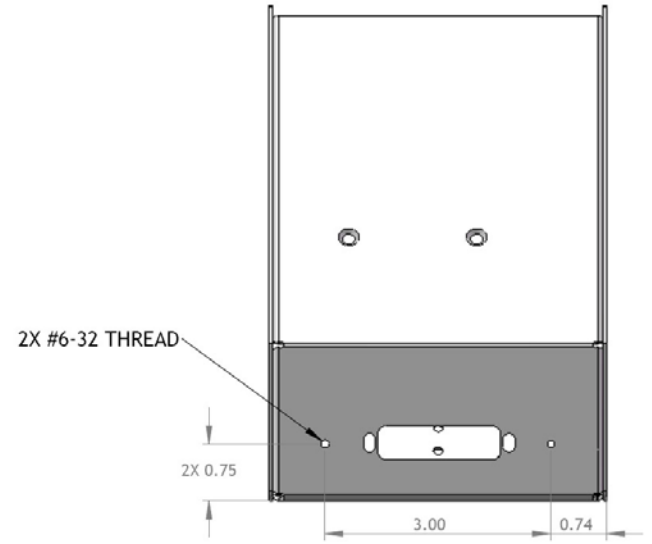
This diagram shows placement for mounting the Field Computer cradle.

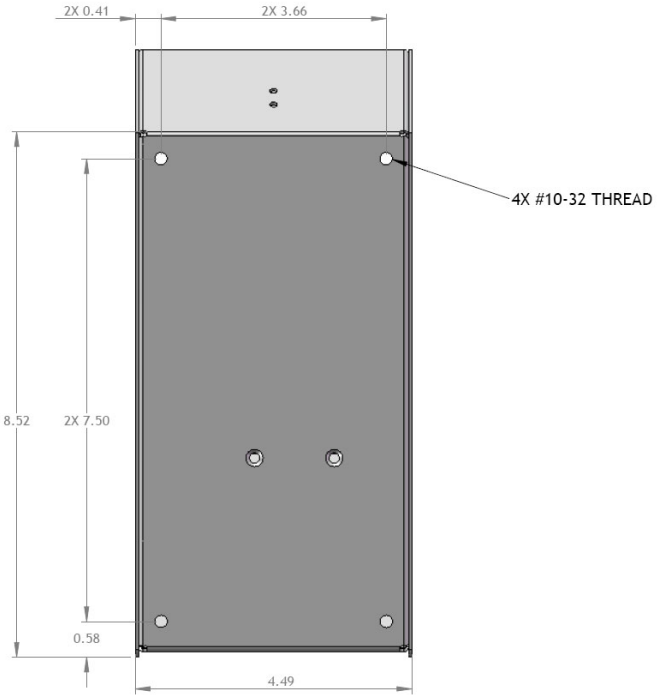


Below is pictured the system console mounting diagram.



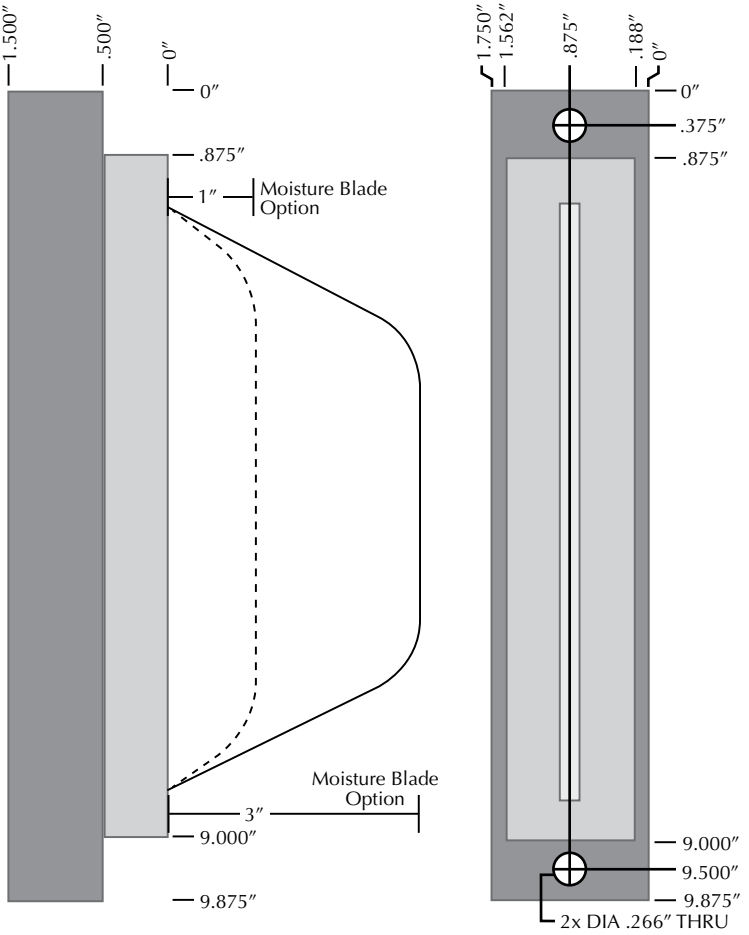
The next two diagrams are for mounting the printer.





Moisture Sensor Installation

There are three styles of moisture sensors: one inch, three inch, and four inch mini blade. After checking to see which moisture blade you have, refer to the following installation procedure that applies.



1″ or 3″ Moisture Blade

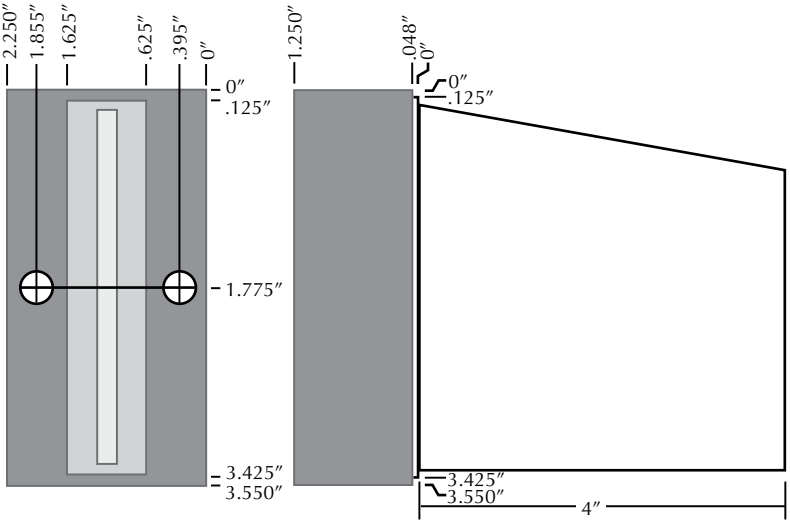
The one inch blade configuration is identical to the three-inch blade configuration, only with the outer two inches of the blade cut off.

To install the one inch or three inch moisture sensor blade:

Place the sensor into the precut hole on the weigh bucket.

If your bucket manufacturer did not provide a pre-cut slot for the moisture sensor blade, you will need to take the weigh bucket to a machine shop to have the slot cut. The moisture blade should be mounted in a moisture test chamber.

Align the sensor's position and tighten the two screws in the holes.



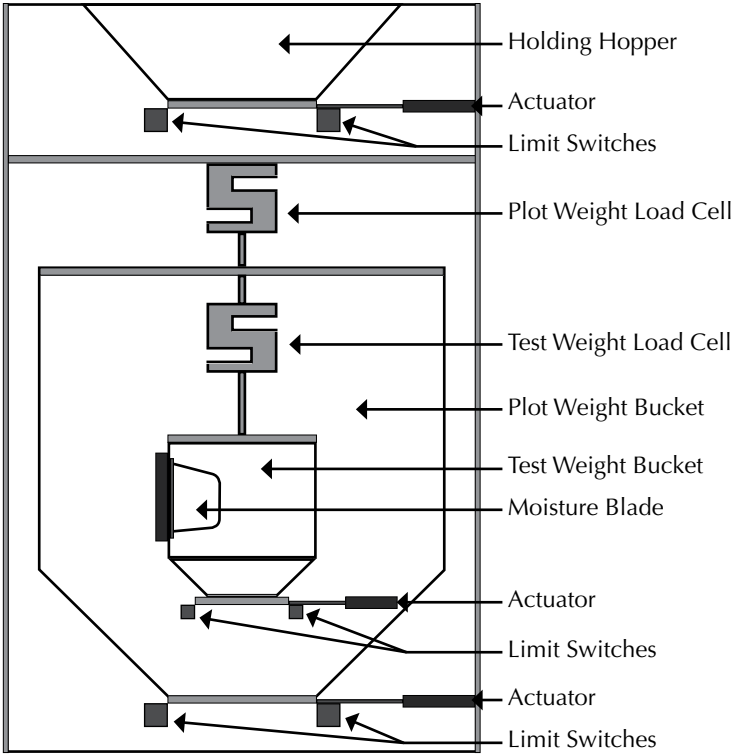
4″ Mini-Moisture Blade

To install the four in style mini moisture sensor:

Cut a rectangle slow in the side of the test chamber. The .048″ shoulder of the moisture sensor fit snug against the cut edges.

Drill two .165″ DIA mounting holes in the appropriate positions. Insert the supplied clinch nuts.

A basic Test-Harvest System. This installation includes a test-chamber load cell as well as a plot-weight load cell; therefore, the assembly includes a test chamber. A moisture sensor is installed in the test chamber in this example.



Appendix C
Cable wiring diagrams for the HM-401

The Harvest Data System Console

Sensor Control and Conditiong Unit (SCCU)

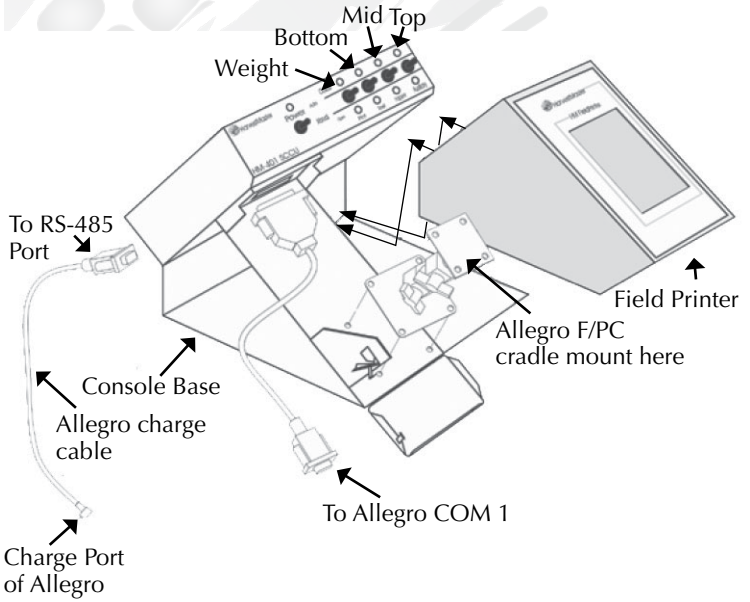


Figure C-2: Cables connecting SCCU

The Allegro and Harvest Data System Field Printer fit into the Harvest Data System console base.

The Field Printer is an optional component for convenient field use.

Power Cable Connection

To connect the power cable, complete the following steps:

1. Attach the pigtail end of the power cable to the combine battery (12V power supply). It is recommended to connect the negative side of the power cable to the end of the ground cable furthest away from the battery (connected to the chassis—refer to figure on the next page). If your system is equipped with a lockout system, this eliminates any potential problems.
2. Plug the power supply cable into the SCCU, and twist the locking ring to secure the connector to the SCCU.
3. If you haven't done so already, attach the Allegro DC power plug to the Allegro's charge port.

You need to make sure the polarity of the positive and negative battery terminal are wired correctly. Reversing the polarity could cause possible hardware damage. Also, the 12V power supply wire is red or white (+). The ground wire is black (–).

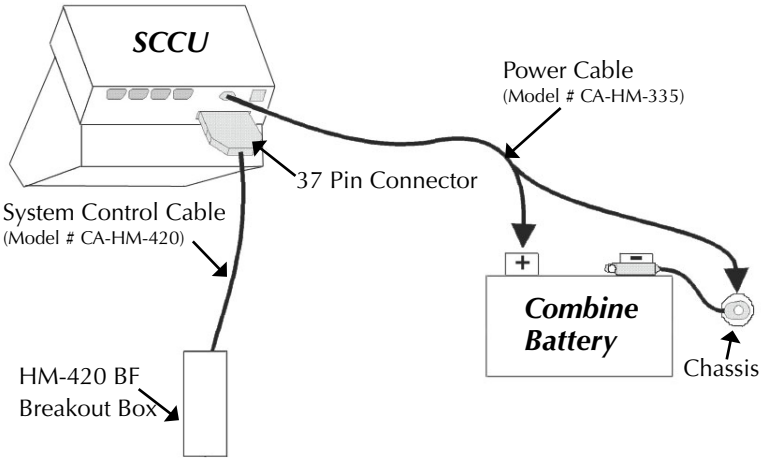
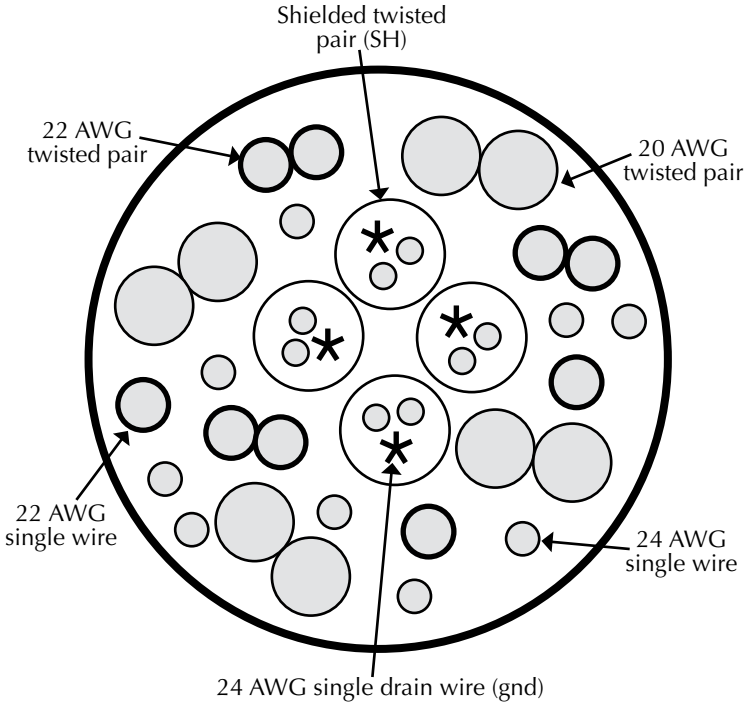


Figure:C-4: Cable Connectors for the SCCU.

HM-420 37-pin System Control Cable

In a standard system control cable there are:
Four pairs of shielded cables

- Four pairs of shielded cables,
- Four 20 AWG twisted pairs,
- Nine 24 AWG single wires,
- Three 22 AWG twisted pairs,
- Two 22 AWG single wires,
- Four 24 AWG single drain wires for the shielded twisted pairs.



Connector Wire Codes - Standard

Pin	*Wire Name*
1	plot weight bucket door actuator (+)
2	plot weight bucket door actuator (–)
3	test chamber door actuator (+)
4	test chamber door actuator (–)
5	holding hopper door actuator (+)
6	holding hopper door actuator (–)
7	plot weight bucket door “open” sense
8	plot weight bucket door “closed” sense
9	test chamber door “open” sense
10	test chamber door “closed” sense
11	moisture sensor excitation (12V reg.)
12	moisture sensor control
13	moisture sensor shield
14	test chamber load cell signal (+)
15	test chamber load cell signal (–)
16	test chamber load cell shield
17	test chamber load cell excitation (+)
18	plot weight load cell shield
19	plot weight load cell excitation (+)
20	auxiliary actuator “open” sense
21	auxiliary actuator “closed” sense
22	bucket door sense gnd
23	auxiliary actuator (+)

24	auxiliary actuator (–)
25	auxiliary load cell excitation (–)
26	auxiliary load cell excitation (+)
27	holding hopper door “open” sense
28	holding hopper door “closed” sense
29	auxiliary load cell signal (+)
30	auxiliary load cell shield
31	auxiliary load cell signal (–)
32	moisture sensor signal (+)
33	moisture sensor signal (–)
34	test chamber load cell excitation (–)
35	plot weight load cell signal (+)
36	plot weight load cell signal (–)
37	plot weight load cell excitation

Helps

- Pins 1-6 and 23-24 are 20-gauge outer wires for actuator drivers.
- Shielded pairs for sensors are on pins 14 and 15, 32 and 33, 35 and 36, and 29 and 31.

Load Cell Connector Wiring

These cables come pre-wired. The following information on wiring configurations is included for reference only.

Plot Weight Load Cell

System Control Cable Pin #	*Signal Name*	*Break-Out Box Pin #*
35	plot weight load cell signal (+)	3
36	plot weight load cell signal (–)	4
19	plot weight load cell excitation (+)	1
37	plot weight load cell excitation (–)	5
18	plot weight load cell shield	6
	no connection	2

Test Chamber Load Cell

System Control Cable Pin #	*Signal Name*	*Break-Out Box Pin #*
14	test chamber load cell signal (+)	3
15	test chamber load cell signal (–)	4
17	test chamber load cell excitation (+)	1
34	test chamber load cell excitation (–)	5
16	test chamber load cell shield	6
	no connection	2

Auxiliary Load Cell

System Control Cable Pin #	*Signal Name*	*Break-Out Box Pin #*
29	aux load cell signal (+)	3
31	aux load cell signal (–)	4

26	aux load cell excitation (+)	1
25	aux load cell excitation (–)	5
30	aux load cell shield	6
	no connection	2

Moisture Sensor Connector Wiring

System Control Cable Pin #	*Signal Name*	*Break-Out Box Pin #*
32	moisture sensor signal (+)	3
33	moisture sensor signal(–)	4
12	moisture sensor control	5
11	moisture sensor excitiation (12V reg.)	1
13	moisture sensor shield and ground	6
	no connection	2

25-pin Host Port

This cable comes pre-wired. The following information on wiring configurations are included for reference only.

9-pin Socket	*Signal Name*	*25-pin socket*
1	N/C	
2	RXD (red)	2
3	TXD (green)	3
4	DTR	20
5	GND	7
6	DSR	6
7	RTS	
8	CTS	
9	N/C	

RS-232 Expansion Ports

These cables come pre-wired. The following information on wiring configurations is included for reference only.

Barcode Wand

SCCU 9-pin Socket	*Signal Name*
1	External Switch Input
2	Wand RXD
3	TXD
4	DTR
5	GRD
6	N/C
7	Wand RTS
8	Wand CTS
9	+5VM

Printer

SCCU 9-pin Socket	*Signal Name*	*25-pin Socket*
1	N/C	1
2	RXD	3
3	TXD	2
4	12 VSB	9
4	12 VSB	25
5	Printer Ground	7
5	Printer Ground	12
6	Printer Take-up	10
7	RTS	4
8	CTS	5
9	N/C	

HVD

SCCU 9-pin Socket	*Signal Name*
1	N/C
2	RXD
3	TXD
4	+12 VBSP
5	Ground
6	N/C
7	N/C
8	CTS
9	+5VM

RS-485

SCCU 9-pin Socket	*Signal Name*
1	N/C
2	RS485 Low
3	RS 485 High
4	+12 VBSP
5	Ground
6	N/C
7	N/C
8	N/C
9	N/C

Appendix D
Cable Wiring Diagrams for the HM-800

Cable Connections for HM-800

Within the HM-800 there are several components. Figure D-1 shows the components wired on the stand.

Figure D-1: Front view of HM-800 components

Figure D-2 shows the cable connections from the HM-800 System Console and modules to other components.

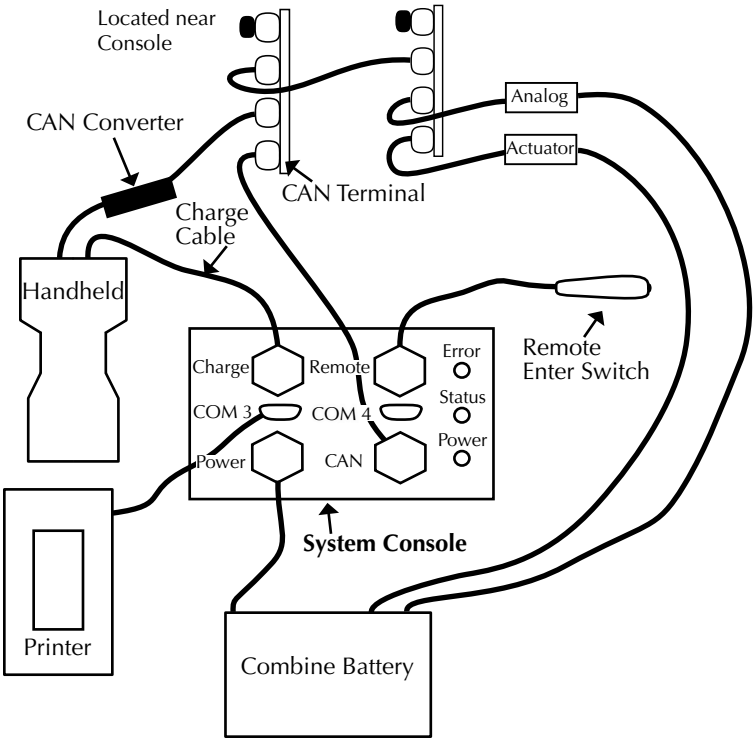


Figure D-2: Cable connections for the HM-800

HM-800 Limit Switch Wire Diagram

Limit Switches must be wired correctly in order to notify the FRS application when a bucket or door as completed its function.

In the HM-800 system the signal wire must be wired to the “normally open” terminal of the limit switch. The limit switch signal is pulled high until a switch is closed. When a

limit switch closes the input is grounded.

Refer to the following chart for proper connection of the limit switch and the corresponding wire.

Actuator Module	*Wire Color*	*Limit Switch Connection*
LS1	White	Plot Open (Normally Open)
	Green	Common
	Red	Plot Closed (Normally Open)
	Black	Common
LS2	White	Test Open (Normally Open)
	Green	Common
	Red	Test Closed (Normally Open)
	Black	Common
LS3	White	Hopper Open (Normally Open)
	Green	Common
	Red	Hopper Closed (Normally Open)
	Black	Common
LS4	White	Aux Open
	Green	Common
	Red	Aux Closed
	Black	Common

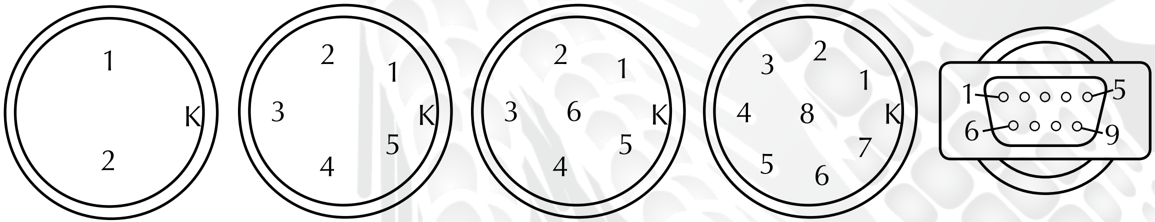
For all Pnuematic, Electric, and Hydralic Actuators

Actuator Connection	Red	Bucket Open
	Black	Bucket Close

Windshield Wiper

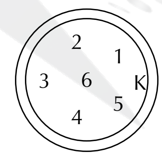
Actuator Connectionn	Red	Low Terminal
	Black	Park Terminal

Connector Wiring Diagrams for the HM800

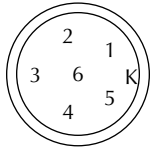


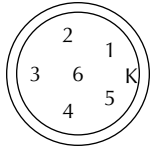
2 pin | 5 pin | 6 pin | 8 pin | 9 pin

Analog Module	*GHM*	*Pin*	*Connection*	*Description*
Load A *6 pin*	Plot Load Cell	1	Green	Excite
		2	N/C	N/C
		3	Red	Signal +
		4	White	Signal –
		5	Black	Excite Gnd
		6	Shield	Chassis Gnd
		N/C	Brown	N/C
		N/C	Blue	N/C

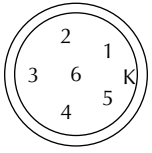


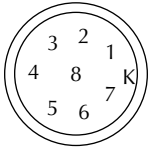
Analog Module	*GHM*	*Pin*	*Connection*	*Description*
Load B *6 pin*	Test Load Cell	1 2 3 4 5 6 N/C N/C	Green N/C Red White Black Shield Brown Blue	Excite N/C Signal + Signal – Excite Gnd Chassis Gnd N/C N/C
Load C *6 pin*	Load Cell (Third load cell in multiple load cell applications)	1 2 3 4 5 6 N/C N/C	Green N/C Red White Black Shield Brown Blue	Excite N/C Signal + Signal – Excite Gnd Chassis Gnd N/C N/C



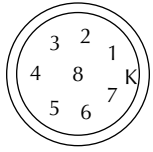


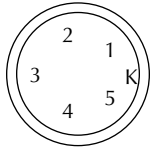
Analog Module	*GHM*	*Pin*	*Connection*	*Description*
Load D *6 pin*		1	Green	Excite
		2	N/C	N/C
		3	Red	Signal +
		4	White	Signal –
		5	Black	Excite Gnd
		6	Shield	Chassis Gnd
		N/C	Brown	N/C
		N/C	Blue	N/C
CAN *8 pin*		1	Red	CAN Power
		2	Yellow	CAN +
		3	Black	CAN Gnd
		4	Green	CAN –
		5	N/C	N/C
		6	N/C	N/C
		7	N/C	N/C
		8	N/C	N/C

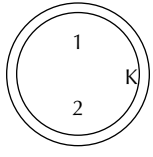




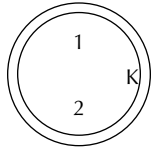
Analog Module	*GHM*	*Pin*	*Connection*	*Description*
CAN-DIAG *8 pin*	CAN	1 2 3 4 5 6 7 8	Red Yellow Black Green N/C N/C N/C N/C	CAN Power CAN + CAN Gnd CAN – N/C N/C N/C N/C
Moisture *5 pin*	Moisture EM Sens	1 2 3 4 5	Red Black Green White Shield	Excite Ground Signal + Signal – Ground
Power *2 pin*	Power	1 2	Black Red	Ground +12 V

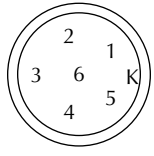




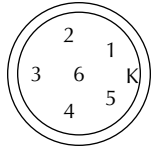


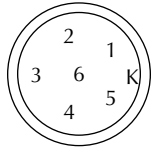
Actuator Module	*GHM*	*Pin*	*Connection*	*Description*
Act 1 *2 pin*	Plot Act	1 2	Red Black	Power Ground
Act 2 *2 pin*	Test Act	1 2	Red Black	Power Ground
ACT 3 *2 pin*	Hopper Act	1 2	Red Black	Power Ground
Act 4 *2 pin*	Aux Act	1 2	Red Black	Power Ground
LSW 1 *6 pin*	Plot LSW	1 2 3 4 5 6	N/C Green White N/C Black Red	N/C Ground Plot Open (Normally Open) N/C Ground Plot Closed (Normally Open)



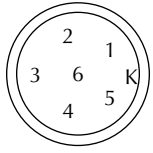


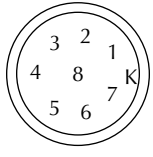
Actuator Module	*GHM*	*Pin*	*Connection*	*Description*
LSW 2 *6 pin*	Test LSW	1 2 3 4 5 6	N/C Green White N/C Black Red	N/C Ground Test Open (Normally Open) N/C Ground Test Closed (Normally Open)
LSW 3 *6 pin*	Hopper LSW	1 2 3 4 5 6	N/C Green White N/C Black Red	N/C Ground Hopper Open (Normally Open) N/C Ground Hopper Closed (Normally Open)

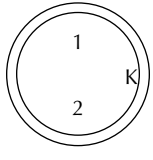




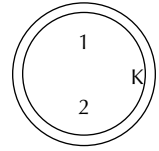
Actuator Module	*GHM*	*Pin*	*Connection*	*Description*
LSW 4 *6 pin*	N/A	1	N/C	N/C
		2	Green	Ground
		3	White	Aux Open
		4	N/C	N/C
		5	Black	Ground
		6	Red	Aux Open
CAN *8 pin*	CAN (patch Cable)	1	Red	CAN Power
		2	Yellow	CAN +
		3	Black	CAN Gnd
		4	Green	CAN –
		5	N/C	N/C
		6	N/C	N/C
		7	N/C	N/C
		8	N/C	N/C
Power *2 pin*	Power	1	Black	Ground
		2	Red	+12 V

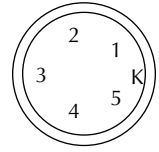


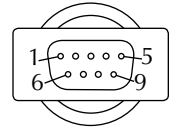




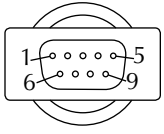
System Console	*GHM*	*Pin*	*Connection*	*Description*
Allegro Power *2 pin*		1 2	Stria Black	+12 V Ground
Remote *5 pin*		1 2 3 4 5	Black Green Red N/C N/C	Input Ground Power N/C N/C
Com 3	Printer	1 2 3 4 5 6 7 8 9	N/C RXD TXD DTR GND DSR RTS CTS N/C	N/C Receive Data Transmit Data Data Terminal Ready Ground Data Set Ready Request to Send Clear to Send N/C

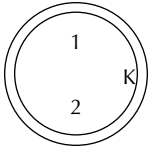


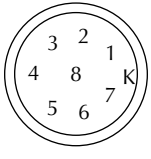




System Console	*GHM*	*Pin*	*Connection*	*Description*
Com 4		1	N/C	N/C
		2	RXD	Receive Data
		3	TXD	Transmit Data
		4	DTR	Data Terminal Ready
		5	GND	Ground
		6	N/C	N/C
		7	RTS	Request to Send
		8	CTS	Clear to Send
		9	RI	Ringing In
Power *2 pin*	Power	1	Black	Ground
		2	Red	+12 V
CAN *8 pin*	CAN	1	Red	CAN Power
		2	Yellow	CAN +
		3	Black	CAN Gnd
		4	Green	CAN –
		5	N/C	N/C
		6	N/C	N/C
		7	N/C	N/C
		8	N/C	N/C







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