2011 ISO Monitor

Operators Manual

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Introductory Information

Read this Manual!

READ AND UNDERSTAND THIS MANUAL BEFORE YOU OPERATE THIS MACHINE.

Learn how to operate and service your machine correctly. Failure to do so could result in personal injury or equipment damage. Amity Technology will not accept any responsibility for any damage or malfunctions resulting from failure to comply with the operator's manual.

If you do not understand the information in this manual, or if you have any questions, contact Amity Technology Customer Service.

This manual should be considered a permanent part of your machine and should remain with the machine when you sell it.

Amity Technology reserves the right to alter illustrations and technical data contained in this manual.

All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. Amity Technology reserves the right to make changes at any time without notice.

Safety is YOUR Responsibility!

Recognize Safety Information

This is a safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.

Understand Safety Symbols

A reminder of safety practices or attention to unsafe practices which could result in injury or death if proper precautions are not taken.

A hazard exists which could result in injury or death if proper precautions are not taken.

An extreme inherent hazard exists which could result in injury or death if proper precautions are not taken.

Follow safety Instructions

Carefully read all safety messages in this manual and on your machine safety decals. Keep safety decals in good condition. Replace missing or damaged safety decals. Be sure new equipment components and repair parts include the current safety decals.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition.

Unauthorized modifications to the machine may impair the function and/or safety and affect machine life and thus void the warranty.

Operate Safely

Do not make adjustments while the machine is in motion.

Do not enter the tank unless another person is present and hydraulic hoses are disconnected from the tractor.

Operate the machine from the tractor seat only.

Keep hands and fingers away from hinge area when positioning auger. Lock auger in storage position before operating in the field.

Clear the area around the machine before raising or lowering the machine or wings.

Stop the tractor on level ground when raising or lowering wings. Do not operate with wings raised. To improve stability, travel through the field with the wings unfolded. Fold wings to transport position just before leaving the field and entering a roadway.

Do not operate close to the edge of a ditch, creek, gully or steep embankment.

Avoid holes, ditches and obstructions which may cause tractor, cart or seeding tool to roll over, especially on hillsides.

Avoid sharp turns on hillsides.

Slow down when turning or traveling over rough ground, and when turning on inclines.

Shut off the tractor and shift to Park or set brakes when leaving the tractor. Remove the key when leaving the tractor unattended.

Warnings!

ATTENTION! Read this manual carefully and fully before operations.

WARNING! Take care if welding on the frame of cart of planting system. Ensure that no power is applied to the ECU. Unplug the main harness from the tractor and properly ground the welder. Connect the welder ground cable as close as possible to the weld area.

ATTENTION! Low battery or alternator voltage can cause system errors.

WARNING! Be careful when testing NH3 systems. Be sure to clear the area of people and pets. While testing, wear proper protective clothing and eyewear. Always position yourself up-wind while testing.

NOTICE! Depending on the processing speed of your virtual terminal, there may be a delay in function changes when a soft key is pressed. If you quickly press a soft key several times, you may initiate multiple functions on several pages. Allow time between pressing soft keys to ensure the virtual terminal has time to respond.

NOTICE! When operating product meters in test mode (Test Speed), be sure to open the access door under the meter, or run the fan, to prevent material from building up and stopping the meter.

ATTENTION! Ensure that your virtual terminal is updated with the latest version of its software from its manufacturer.

Section 1: General Information

About your ISO Monitor System

Your Amity ISO Monitor system is based on the ISO 11783 standard, sometimes also referred to as ISOBUS. Essentially, ISOBUS is a communications standard that enables a variety of agricultural electronics systems to talk to each other. Its purpose is to integrate all current and future farm functions by standardizing communication between tractor and implement. Tractor and implement are operated as a single unit, which reduces operator stress and increases efficiency. ISOBUS permits the use of the same tractor terminal on a number of different machines and hence control of a wide range of implements without the need to reprogram a system.

All of this means that your Amity ISO Monitor can be controlled from any tractor that is equipped with an ISOBUS-compatible terminal, regardless of the manufacturer.

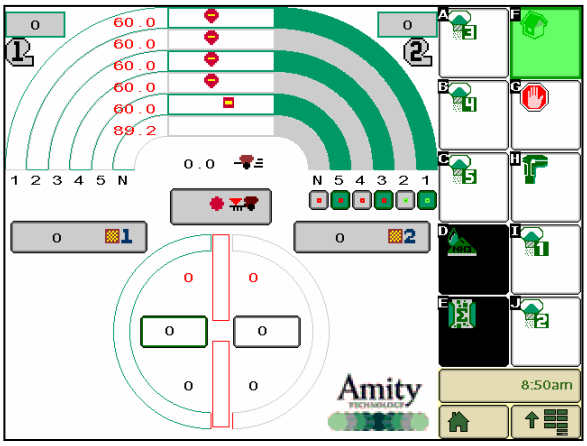
ISOBUS Virtual Terminals and Features

Several companies manufacture ISOBUS-compatible virtual terminals. Although the locations and types of controls may vary from manufacturer to manufacturer, all terminals use the same icons to represent the main functions. When an ISOBUS-compatible terminal is connected to an ISOBUS-compatible implement system, the "personality" (program, control screens, unique icons, etc) for that system are loaded into the terminal. The control screens, or pages, for that implement (which are displayed in the central area of the screen) are identical for any ISOBUS-compatible terminal.

Currently the following virtual terminals can be used with your ISO Monitor system:

- GTA Console 1 (AGCO)
- GTA Console 2 (AGCO)
- C-1000 (AGCO)
- AFS Pro 600 (Case IH)
- GreenStar2 (John Deere)
- IntelliView II (New Holland)
- IntelliView Plus II (New Holland)
- IntelliAg (DICKEY-john)
- LH6000 (TeeJet)

Using Virtual Terminals with Your ISO Monitor System



An example of an ISO Monitor page

Tip!

For detailed information on how to operate your virtual terminal, refer to its operation manual.

Any ISOBUS-compatible virtual terminal (VT) should be able to communicate with and control your ISO Monitor. When the VT in your tractor is connected to the ECU it downloads the information from the ECU and displays it on the VT's screen. The central part of the screen displays information pages identically, regardless of the VT you are using. Typically, icons representing other pages are located around, or to the side of the central part of the screen. Selecting these soft keys enables you to navigate to the pages they represent. The location of page icons may vary depending on the manufacturer of the VT. Also, some VTs have touch screens, whereas others use pushbuttons located around the outside of the screen, adjacent to on-screen icons.

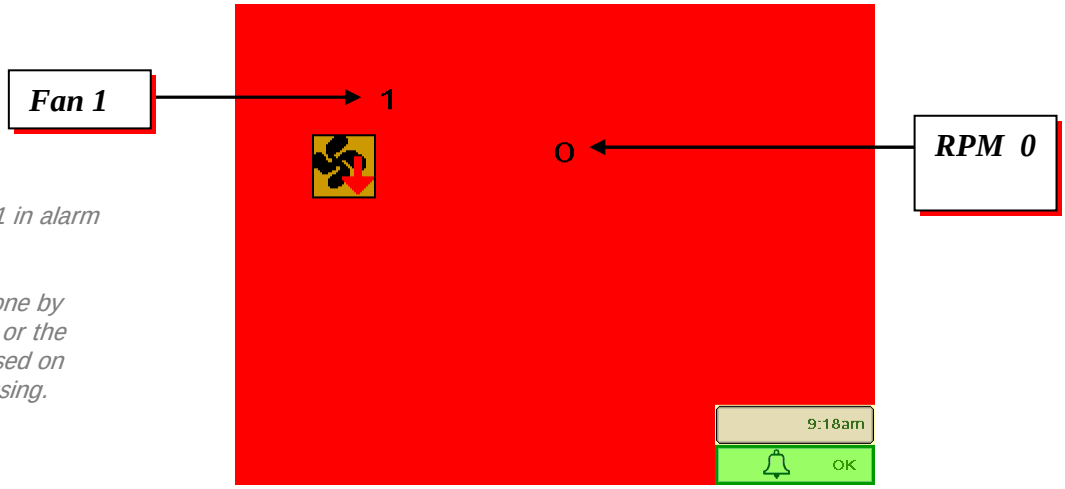
ISOBUS compatible VTs can be used to set up, operate and monitor your ISO Monitor but the exact details of how to access and change values and settings may vary from manufacturer to manufacturer. For example, when entering numerical values during system setup, some VTs may open a keypad-style page. Others may assign numbers to switches around the outside of the screen. For this reason, procedures in this manual simply state "Enter the numerical value for…". You will have to consult the manufacturer's operating manual for your specific VT to determine the details.

Alarm Icons

The following is a list of alarms that could occur during system operation. Alarms show up as separate screens and are aknowledged based on your Virtual Terminal type.

Icon	Alarm
	Meter Box Empty
	Bin Low
	Clutch Current Overload
	Fan RPM High
	Fan RPM Low
	Fan RPM Off
	Liquid Rate High
	Liquid Rate Low
	Liquid Valve Current Overload
	Liquid Rate Off
	High Rate – Dry Product
	Low Rate – Dry Product
	VR Current Overload
	Seed Flow Blockage

Icon	Alarm
	Seed Flow Communication Error
	Seed Flow High Rate
	Seed Flow Low Rate
	Seed Flow Current Overload
	Ground Speed High
	Ground Speed Low
	Internal Communication Error
	Low Battery Voltage



Note:

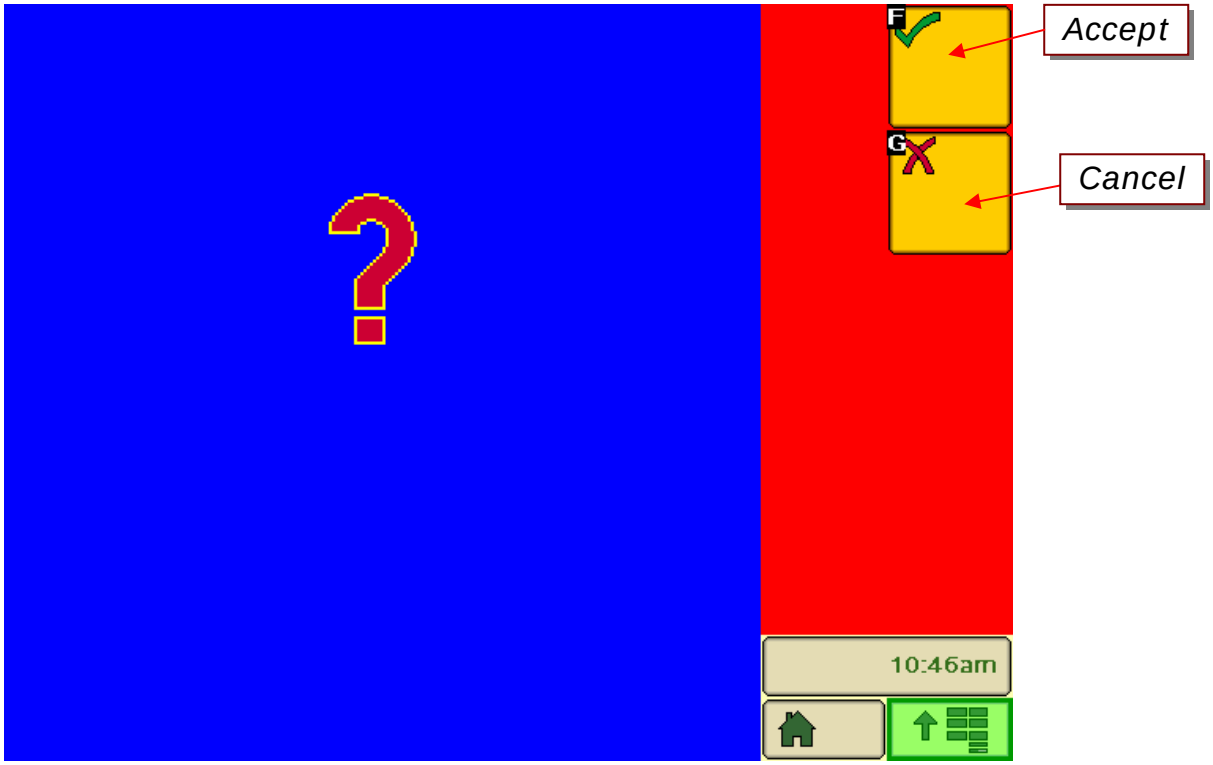
- This alarm screen shows Fan 1 in alarm with a RPM of 0.

- Acknowledging the alarm is done by either touching the OK" softkey or the "ESC" button. This will vary based on which virtual terminal you are using.

Confirmation Screen

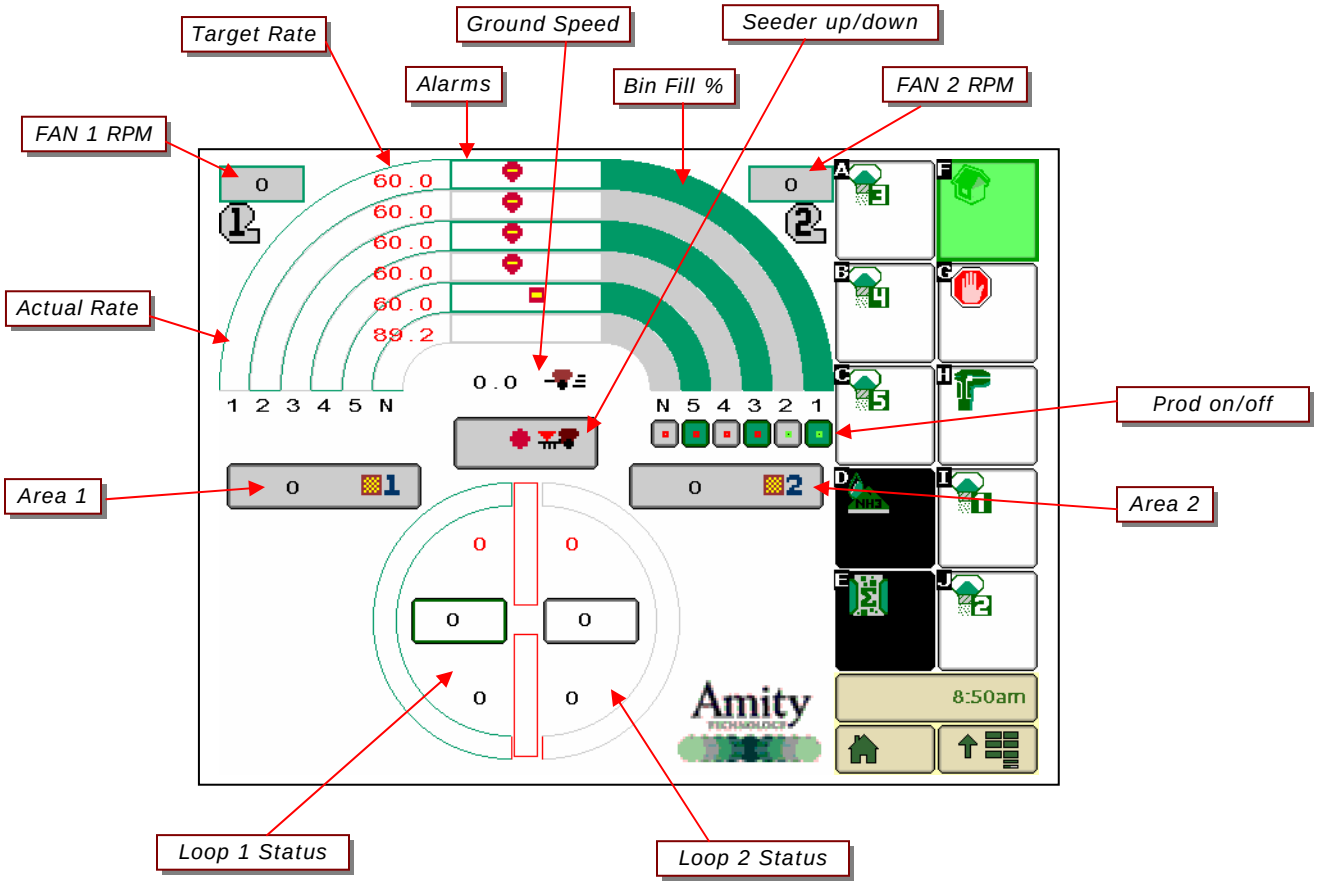
Changing of certain settings or values on your Amity ISO Monitor system may require confirmation, clearing an acre counter or setting the default system settings for example. When confirmation is needed, a blue confirmation screen will appear.

- To Confirm your selection and return to the previous screen, select the ✓ softkey.
- To Cancel your selection and return to the previous screen, select the ✗ softkey.



Main (Home) Screen

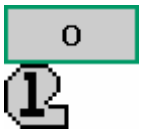
On the Main page of the ISO Monitor system you can view many critical machine functions. The following screen shot shows the key information provided on this page. Each function will be explained in greater detail following this diagram.



Home Screen Softkeys			
Icon	**Page**	**Icon**	**Page**
	Main (Home)		**On/Off (Manual Work Switch)**
	System Settings		**Product Bins Settings (1-5)**
	NH3 Settings		**ART (Blockage) Settings**

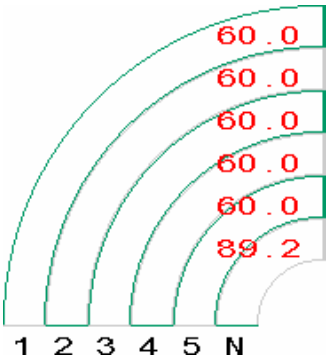
Note: *If the softkey is blacked out, it means either the feature is turned off or the feature is setup to be used with an External ECU (Blockage or NH3 for example).*

Fan RPM



Displays Fan speed in RPM. Min and Max alarms can be set in the ***System Settings*** screen. See System Setup for more information.

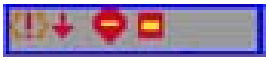
Actual (Live) Rate



Graphically displays the Actual Rate for Motors 1-5 and N (liquid NH3) as a percentage (0-200% of desired rate). When the indicator bar is in the center of the graph, the Actual Rate matches the Desired Rate. The Desired rate for each product is also numerically shown in red.

Only the products enabled during system setup will appear on the main page.

Product/Bin Alarms



The following symbols can be displayed in the alarm box for each product/bin.

Symbol	Alarm
	Rate High Alarm
	Rate Low Alarm
OA	Motor Overload Alarm
	Clutch Engaged Indicator (Ground Drive Only)
	Bin Low Alarm
	Meter Box Empty Alarm

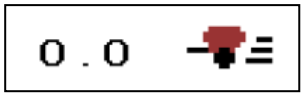
Bin Count & Product On/Off

Displays the status of the bin levels as a percentage. The Bin Count feature can be calibrated in the ***Product Calibration*** screen. These indicators are an approximation based on the calculated meter accumulation and must be properly calibrated in order to properly function.

Pressing the ***Product On/Off*** buttons will turn any particular product on or off. A **Green** indicator represents ***Product On*** and a **Red** indicator represents ***Product Off***.

The single clutch on Ground Drive units is tied to Product 1, individual bin control is not available.

Ground Speed



Displays ground speed of the cart in mph (kph). The speed source can be changed in the ***System Settings*** screen.

Area Counters

Displays total area in ***Acres*** or ***Hectares.***
Pressing the ***Area*** button will clear the area accumulation.

Seeder Up/Down

Important!
When work switch softkey turns green Master Work Switch is ON.

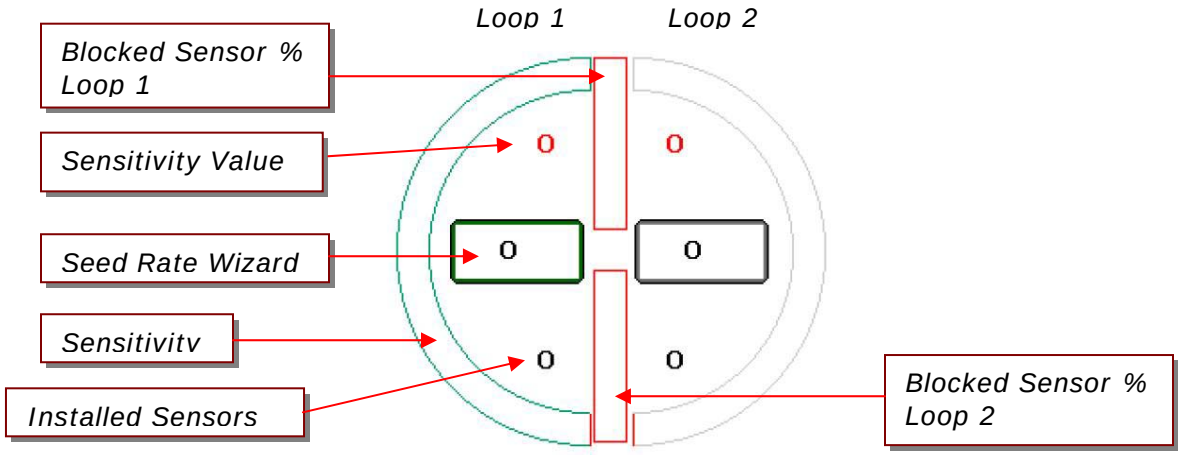
Pressing the ***Seeder Up/Down*** button will turn on the work switch.

Symbol	Alarm
	WS "Ready"
	WS "Hold"
	Seeder UP
	Seeder DOWN

The work switch softkey will only turn green when there is a speed present (either test speed or other input), the seeder is down, and the ***Seeder Up/Down*** button is in the WS "Ready" state.

Blockage/Rate Sensor Loop Status

Displays a quick snapshot of the status of each loop.



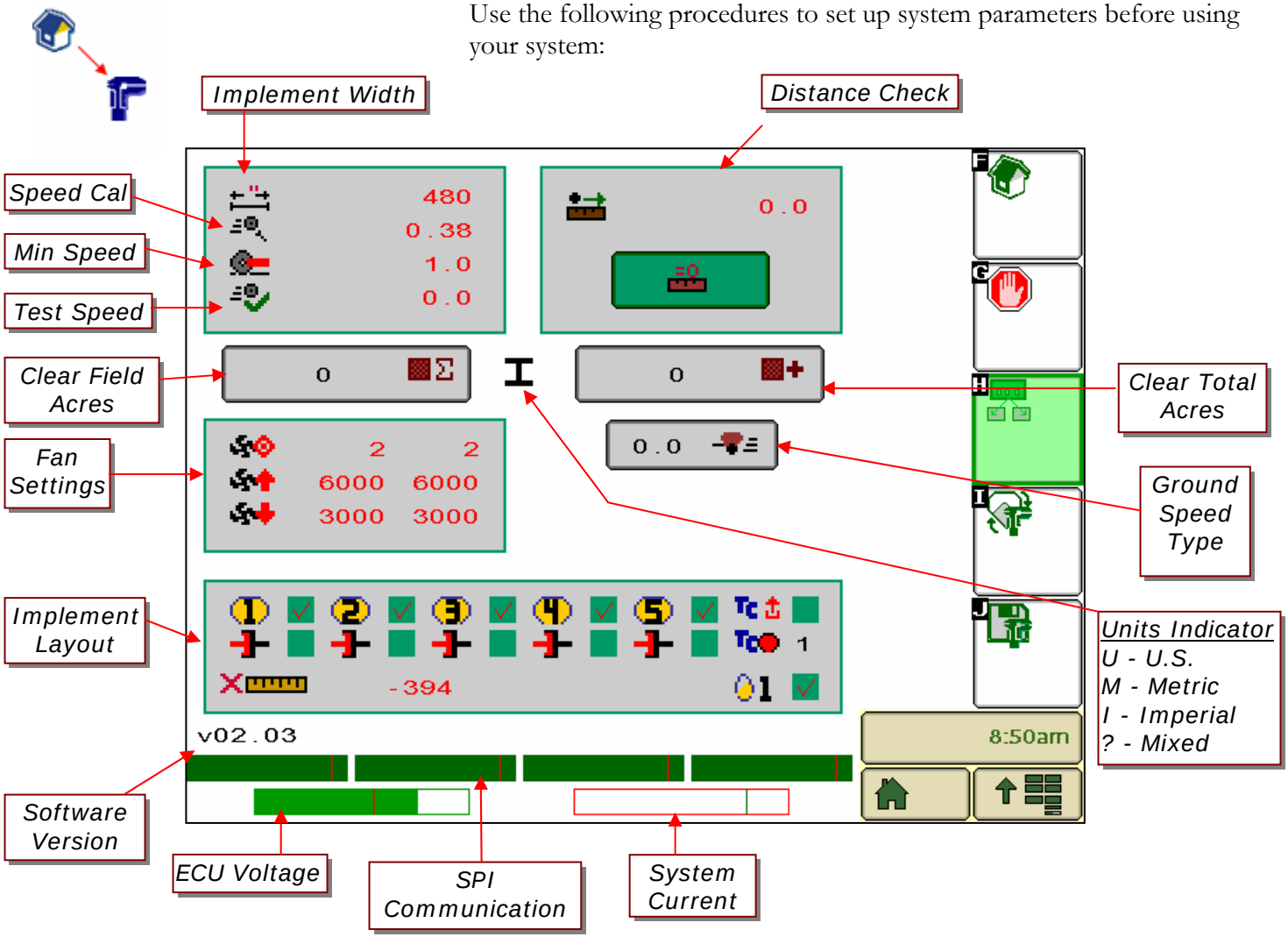
Section 2: System Setup

Important!
This system setup procedure MUST be completed or your system will not operate correctly. Complete all steps.

Before operation of your new Amity ISO Monitor system, there are several setup and calibration procedures that must be performed to ensure proper planting performance. If these operations are not completed, planting performance and accuracy will be affected.

System Settings Screen

Use the following procedures to set up system parameters before using your system:



System Setup Screen Softkeys

Icon	Page	Icon	Page
	Main (Home)		On/Off (Manual Work Switch)
	External ECU Setup		Sensor Calibration
	Default Settings		

Modifying Screen Values

The method of modifying the values on the screen varies depending on the model of Virtual Terminal you are using. Common methods are a touch-screen, scroll buttons, or a scroll wheel. Refer to your Virtual Terminal Operators Manual for more information on modifying values.

- Numbers in **RED** are input numbers that can be modified.
- Numbers in **BLUE** are output numbers that cannot be modified.

Note!
Select the number NOT the icon to enter the VT into edit mode.

Units

The Amity ISO Monitor system utilizes either SAE (US) or Metric units. Units are configured in the Virtual Terminal System Settings. Verify which system of units your VT is using before entering these values and operating your system. Refer to your VT Operators Manual for more information on checking the units. The ***Units Indicator*** on the ***System Setup Screen*** displays the units setting of the Virtual Terminal for your reference.

Implement Width

Tip!
If your machine is 60 feet wide, multiply 60 X 12 inches per foot = 720 inches. Enter "720".

Step 1. On the Calibration page, select ***Width*** by pressing the number next to the width icon. 

Step 2. Enter the width value in ***inches*** or ***millimeters***.

Step 3. Repeat this procedure to set the Width value for each individual product being used.

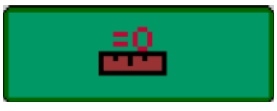
Speed Calibration and Distance Check

Use the following calibration procedure to set up the ground speed sensor on the commodity cart. This procedure only applies when the ***Speed Type*** is set to Cart Speed. 

Common Speed Cal Values

Tire Size	Drive	Speed Cal
18.4R26	Hyd	9.5" (241)
23.1R26	Hyd	10.5" (267)
18.4R26	Ground	13.6" (345)
23.1R26	Ground	15.0" (381)
5250-GPS	Hyd	0.38" (9.6)

Step 1. Measure a specific distance in front of the implement.

Step 2. Clear the accumulated distance value by pressing the ***Clear Distance*** button. 

Step 3. Drive the implement the measured distance and then stop.

Step 4. Enter the ***Distance*** value by pressing the number next to the Distance icon. 

Step 5. The ***Speed Cal*** number will automatically be calculated and appear. 

Minimum Ground Speed

Tip!
Set this value to match your lowest product minimum speed for optimal performance.

Step 1. Select the number next to the ***Min Speed icon*** 

Step 2. Enter the minimum seeding speed in ***mph*** or ***kph.***

Test Speed

Step 1. Select the number next to the ***Test Speed icon*** 

Step 2. Enter the desired test speed in ***mph*** or ***kph.***

A test speed will affect both dry products and NH3 operation.

Ground Speed Type

Pressing the ***Speed Button*** will toggle between the different ground speed input types. The ISO speeds are only available if the tractor is broadcasting these over the ISO-BUS.

Symbol	Speed Type
	Cart Speed (Default for Normal Operation)
	Test Speed (set in the Calibration Menu)
	ISO Ground Speed (Tractor GPS)
	ISO Wheel Speed (Tractor Wheel or Radar)
	External ECU Speed (from another Amity ECU)

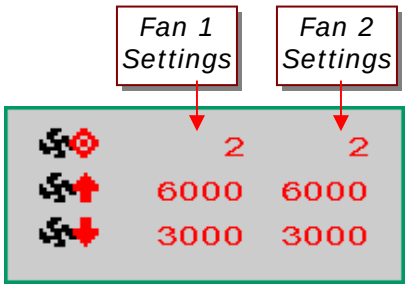
Field Acres and Total Acres

There are two tools to use when calculating planted acres: **Field Acres** and **Total Acres**. Use the following procedure to reset them in preparation for totalizing planted acres:

Step 1. Press the  button to reset the Field Acres total to zero.

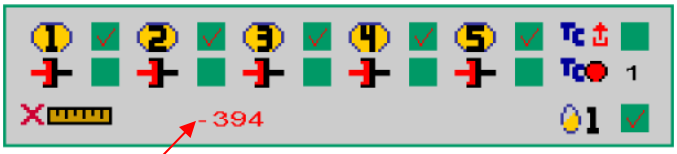
Step 2. Press the  button once to reset the Total Acres total to zero.

Fan Targets and High/Low Alarms



Fan target settings as well as fan high and low alarm settings are shown here. The default value for fan targets is 2-targets per revolution.

Implement Layout



X-Offset Dimension for Task Controller use. Represents distance from the tractor GPS reference point (typically the rear axle) to the seeding openers. Displayed in inches or millimeters.

Step 1. You can turn product 1-5 and liquid (NH3) on/off by selecting the corresponding blue box.

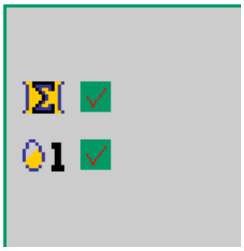
Step 2. You must select the task controller (TC) type you will be using for operation. The type of task controller selected may affect the available operational features

Symbol	Function
	Turns products 1-4 on or off. Checked is ON. Unchecked is OFF.
	Turns liquid (NH3) on or off Checked is ON. Unchecked is OFF.
	Checked enables a ground drive clutch on that product. Unchecked is hydraulic (variable) drive.
	Selects Task Controller type Checked is single product TC. Unchecked is multiple TC ***Note: JD GS2 can only use single product TC***
	Selects the Bin # that single product TC uses.

External Implement ECU Setup Screen

Your Amity ISO monitor system utilizes the ISO-Bus to communicate with various Amity Technology ECU's mounted on the implement in order to share common information. Use of separate implement ECU's means simpler wiring between the implement and cart, as well as the ability to use these ECU's independently when the cart is not connected. The current system can communicate with the ***Toolbar ECU*** and the ***NH3 ECU***. The following types of information are shared.

- Ground Speed
- Work Switch Position & State
- Toolbar ECU (Blockage) Status for Display on the Home Screen
- NH3 ECU Status for Display on the Home screen



Tip!

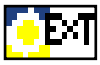
These boxes must be checked in order for the Toolbar ECU and NH3 ECU information to show up on the Home Screen of the Cart ECU.

Symbol	Function
	Enables sharing of Toolbar ECU (blockage) information Checked is ON. Unchecked is OFF.
	Enables sharing of NH3 ECU information Checked is ON. Unchecked is OFF.

Notes about External ECU's

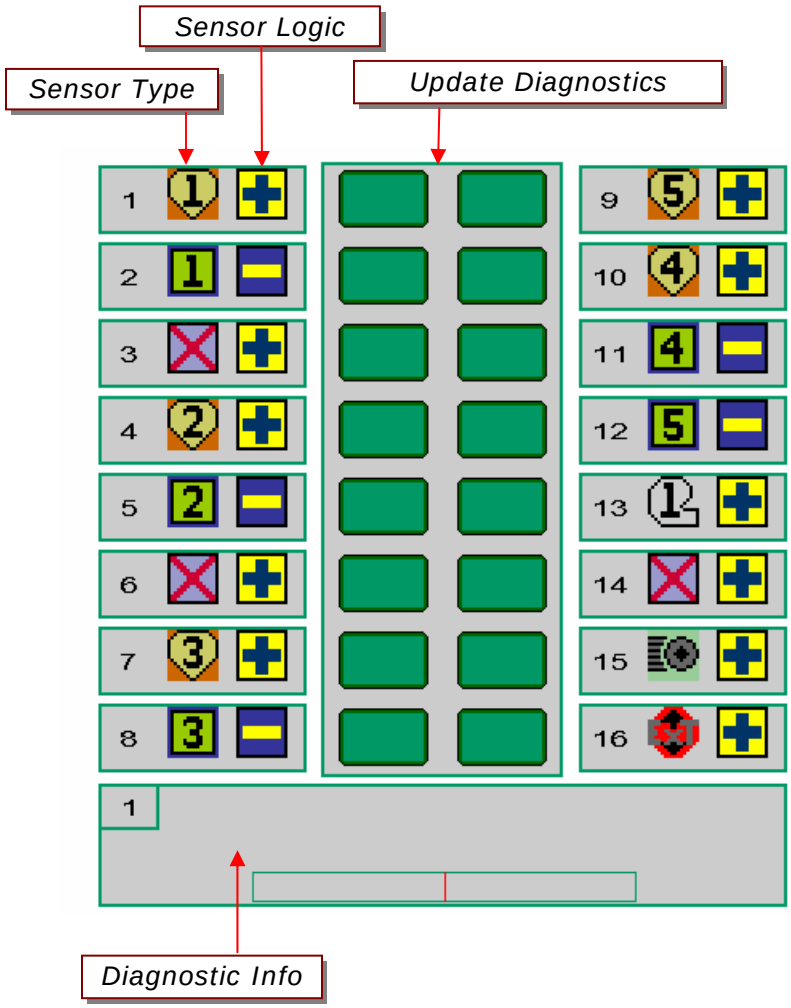
ECU Screen Identification

Softkey in Upper RH Corner of Display	ECU ID
	***Cart ECU***
	***Toolbar ECU (Blockage)***
	***NH3 ECU***

- Each ECU connected to the ISO-Bus will have its own set of menu's that can be accessed by your VT. These menus will provide more advanced operational and setup tools compared to what can be viewed on the home screen of the ***Cart ECU***. Refer to the manual for your VT for methods on toggling between the menus of different ECU's that are connected to the ISO-Bus.
- The ***Cart ECU*** is typically the input for ground speed. All other ECU's should have their speed type set to external. 
- The ***Toolbar ECU*** is typically the input for work switch position. All other ECU's should have their work switch channel set to external 
- Pressing the Manaul Workswitch Softkey  when viewing the screens for any of the ECU's will toggle the work switch state on all ECU's.
- When clearing alarms, VT will bring you back to the screen of the ECU that generated the alarm in case further action is needed.
- In order to know which ECU's screens you are viewing on your VT, look at the Softkey in the top-right corner of the screen. For example, all of the menus for the ***Cart ECU*** have the "house" icon in the upper right hand corner of the display screen. 

Sensor Calibration

On the Sensor Calibration page you can assign up to 16 sensor channels to specific sensors, configure the logic of each of these channels and view diagnostic information.



Cart ECU Sensor Channel Info

1 – Bin 1
2 – Meter Box 2
3 – N/A
4 – Bin 2
5 – Meter Box 2
6 – N/A
7 – Bin 3
8 – Meter Box 3
9 – N/A
10 – Bin 4
11 – Meter Box 4
12 – N/A
13 – Fan 1
14 – Fan 2 (Opt.)
15 – Ground Speed (ECU Input)
16 – External Automatic Work Switch

Sensor Types

The following symbols represent the sensor types that are available:

Symbol	Sensor Type
	Bin 1-4
	Meter Box 1-4
	Fan 1-2
	Ground Speed
	Automatic Work Switch
	External Automatic Work Switch (Toolbar ECU)
	None

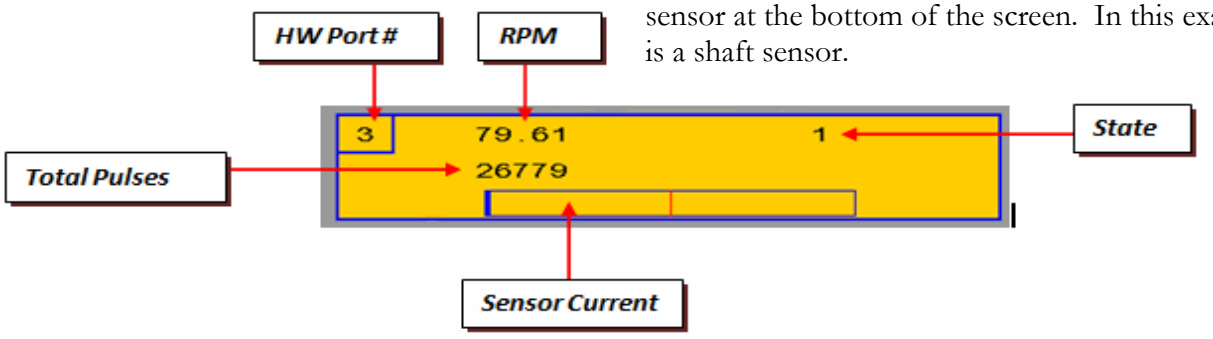
Sensor Logic

You can configure the logic of each sensor channel. Logic is the expected output when the sensor is activated. For example, logic determines whether an action is initiated when a switch closes or when it opens. This page enables you to invert the logic (action) of any sensor. Sensor logic is preset from the factory, but if you add a sensor for some purpose, you may have to configure its logic.

Step 1. Selecting the  or  will toggle between inverted or non-inverted signal.

Update Diagnostics

Step 1. Selecting the blue box  will update diagnostics for that sensor at the bottom of the screen. In this example sensor #3 is a shaft sensor.



Work Switch Operation

The ISO Monitor system is equipped with manual and automatic work switches. The manual work switch is a soft key, located on most screens. The automatic work switch is a sensor, located on toolbar. When the system is configured for automatic work switch operation, lifting the machine automatically turns off the meters and NH3 system. Lowering the machine automatically turns on the meters and NH3 system. In this mode you can also use the manual work switch soft key on the main VR screen to turn the meters and NH3 system off. If you prefer to operate the meters and NH3 system in manual only, you can configure the system to disable the automatic work switch.

Setting Up Manual Work Switch Operation

Use the following procedure to set up ***Manual Work*** Switch Operation:

Step 1. On the Sensor Calibration page, press the ***Sensor Assignment*** soft key.

The Sensor Types page appears.

Step 2. Select **Sensor 16**.

Step 3. Select ***None*** 

You can now use the On/Off (Work switch) soft key  **to turn products on or off.**

Setting Up Automatic Work Switch Operation

Note:
The Automatic Work Switch Signal is provided by the Toolbar ECU. Ensure the Automatic Work Switch is configured properly in the System Setup on the Toolbar ECU.

Use the following procedure to set up ***Automatic*** Work Switch operation:

Step 1. On the Sensor Calibration page Select **Sensor 16.**

Step 2. Change its setting to External work 

Step 3. Press the Home soft key to return to the Main VR page.

Step 4. Raise the planting system.

Step 5. On the Main VR page, press the On/Off (Work switch) soft key. 

Step 6. Verify that the ***Seeder Up/Down*** key indicates **Ready.**

Tip!
You can still use the On/Off (Work switch) soft key on the main VR page to turn the machine off in automatic mode.

Step 7. Start moving forward in the field with the tractor and planting system.

Step 8. Lower the planting system. The workswitch softkey should turn green. 

Note:
The following conditions must be met for the clutch to engage or for the hydraulic motors to turn:

- *Ground Speed must be above the minimum speed setting.*
- *The Seeder Up/Down key must have the "Green Dot" showing*
- *The Work Switch must show "Seeder Down"*

Default Calibration Menu

The Default Calibration feature can be used to reset all settings to their default values in case of system error.

Restoring User Calibration Values and Settings

Important Note!

If you use the Default Cal soft key to restore the factory default settings you will have to redo the entire System Setup procedure.

If for some reason you lose rates, cal numbers, etc due to system error:

Step 1. In the ***System Settings*** menu, press the **Default Calibration** soft key.

Step 2. Press the softkey corresponding to the type of commodity cart being used.

Symbol	Cart Type
	2-Tank Ground Drive (2800/3350)
	2-Tank Hydraulic Drive (2800/3350)
	3-Bin Hydraulic Drive (5250)

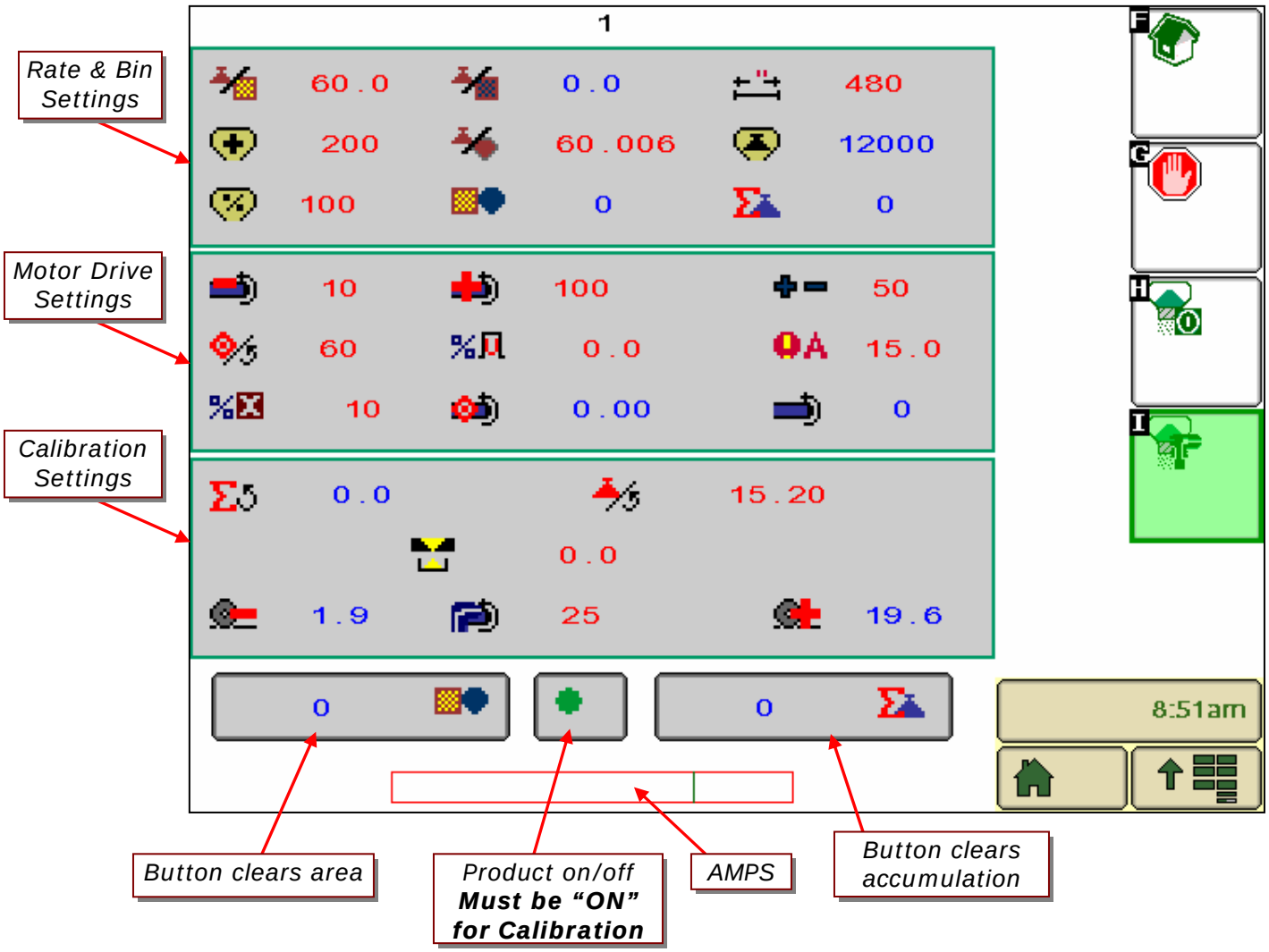
Step 3. Confirm selection and return to Home Screen.

Step 4. Perform initial system setup to verify all settings are configured properly.

Section 3: Dry Product/Bin Settings

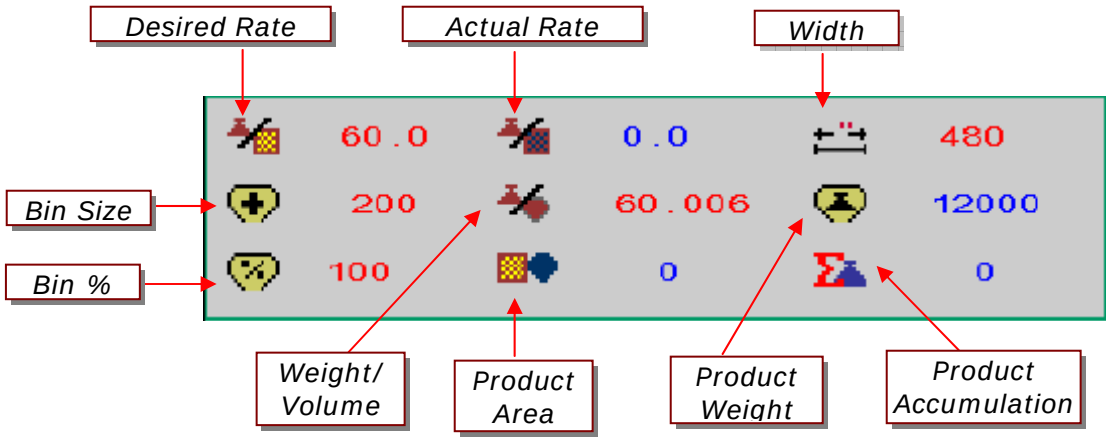
Each product has its own screen to set up and monitor application rates.

- There are up to 5 dry products.
- Numbers in **RED** are input numbers that can be modified.
- Numbers in **BLUE** are displayed output numbers that cannot be modified.



Dry Product Screen Softkeys			
Icon	**Page**	**Icon**	**Page**
	Main (Home)		**On/Off (Manual Work Switch)**
	Product On/OFF		**Enable/Disable Calibrate Mode** (Same function as ECU Buttons)

Dry Products Settings



Desired Rate

Enter your desired application rate in ***Pounds/Acre (Kg/Ha) .***

Actual Rate

Displays the actual rate in ***Pounds/Acre (Kg/Ha).***

Bin Size (Volume)

Enter the size of your tank in ***bushels (liters)***. This value is pre-set at the factory. This value is used for the "Bin Count" feature.

Bin Count %

Note:
Do not use the Bin Count feature if you are using Basic Monitoring with a Ground Drive type unit

Enter the percentage of estimated product in the bin each time the tank is filled. When calibrated properly, the Bin Count feature provides an estimated approximation of the product left in that bin. This percentage is displayed on the status bar on the Home Screen.

Product Weight/Volume (Density or Test Weight)

Enter the test weight of your product in ***Pounds/bushel (Kg/liter).*** This value is needed for proper operation of the "Bin Count" feature.

Product Width

Enter the width of your toolbar in ***inches (millimeters).*** Ensure the ***Width*** setting is the same for all products being used.

Product Weight

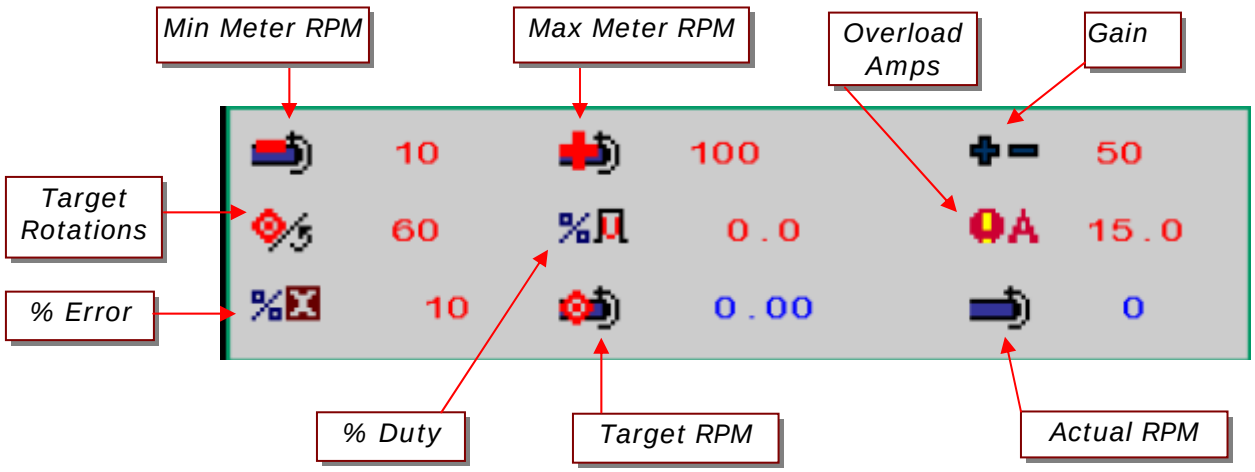
Displays estimated remaining product weight in the bin in ***Pounds (Kg).***

Product Area

Displays area covered while metering in ***Acres (Ha).***

Product Accumulation

Displays weight dispensed while metering in ***Pounds (Kg)***.



Note: The Motor Drive Settings are pre-set at the factory and should not be adjusted!

Min RPM

Lowest allowable meter RPM.

Max RPM

Highest allowable meter RPM.

Gain

Used to control reaction speed of the meters.

Target Rotations

Enter the number of targets per revolution of the meter. This value should be 60 for hydraulic drive and 1 for ground drive.

% Error

Enter the allowable % of error without alarming.

% Duty

Note!
Changing % Duty will override normal operation of the unit.

Diagnostic feature that overrides the control function and sets output drive at a fixed %.

Overload Amps

Enter the allowable current draw without alarming.

Target RPM

This value is the calculated desired RPM of meter based on current speed, calibration values, width and target rate.

Actual RPM

This value is the actual RPM of the meter.

Meter Calibration – Ground Drive

Meter Calibration and application rate settings for Ground Drive units are performed and set mechanically on the tank. For instructions on calibration with a Ground Drive type unit, please reference your ***"Air System Operating and Parts Manual"***. The only control aspect that the Amity ISO monitor system has on Ground Drive units is the operation of the meter drive clutch.

The Amity ISO monitor system also provides monitoring of critical cart functions on Ground Drive units. There are two levels of monitoring that are available to the operator. Both types of monitoring include fan speed, shaft speed, ground speed, empty meter box, and low bin level.

Basic Ground Drive Monitoring:

Basic monitoring requires very little interaction with the monitor, but the operator will not be able to use the "Bin Count" feature or the product accumulation counter. Fixed values are used for the "Target Rate" and "Meter Cal" in order to properly synchronize the meter shaft sensors with the implement width and drive train configuration. Use a Target Rate of ***100 lbs/acre***. Reference the following chart for the proper Meter Cal value to be used. These values only need to be set once for each product.

		Implement Width			
Tire Size	**Gearbox Sprocket**	**30 ft** *(9m)*	**40 ft** *(12m)*	**50' ft** *(15m)*	**60' ft** *(18m)*
18.4R26	17T	12.5 oz/rev *(354 g/rev)*	16.7 oz/rev *(473 g/rev)*	20.8 oz/rev *(590 g/rev)*	25 oz/rev *(709 g/rev)*
23.1R26	15T				
18.4R26	12T	18.8 oz/rev *(533 g/rev)*	25.0 oz/rev *(709 g/rev)*	31.3 oz/rev *(887 g/rev)*	37.5 oz/rev *(1063 g/rev)*
23.1R26	10T				

Advanced Ground Drive Monitoring:

$$MeterCalValue(oz/rev) = \frac{WeightInBag(oz)}{TurnsOfTheCrank(rev)}$$

Advanced monitoring requires more interaction with the monitor, but allows the operator to utilize the "Bin Count' feature and the product accumulation counter. To set the system for Advanced Monitoring, calculate the "Motor Cal' value for each bin when you calibrate by dividing your sample weight (oz) by the number of times the crank was turned. Set this value for each bin. You also need to set the "Target Rate" based on the target rate value used for calibration.

For example, if you want to apply 60 lbs/acre from Bin 1 and you were able to adjust your meter to get 96 oz from 9.5 turns, set the Meter Cal Value for Bin 1 to 10.1 oz/rev and set the Target Rate to 60 lbs/acre.

Meter Calibration –Hydraulic Drive

Calibration is performed in four parts. First, you must prepare the system for calibration. Second, you prime the meter. Third, you take a sample and weight it. Finally, you enter the sample, or Accumulated Weight into the Monitor. This process must be completed for each meter that needs to be calibrated.

Preparing to Calibrate the Meter

Note!

The meter must be calibrated if:

- *The gate setting has changed*
- *A different product is being used*
- *A different meter roll is being used*

Each meter must be calibrated individually, even if all the gates are set the same

Hydraulic Power is needed for calibration. The following procedure sets up the air system for the calibration procedure.

Step 1. Ensure that the air system's hydraulic lines are connected to a tractor..

Step 2. Verify that the tractor hydraulic remote for the blower is in neutral until hydraulic power is needed.

Step 3. Ensure that the monitor wire harness is properly connected to the tractor.

Step 4. Power up the monitor in the tractor.

Step 5. Verify that the VT in the cab is communicating with the Air System ECU.

Step 6. Ensure that the meter door is properly attached to the meter.

Step 7. Ensure that the bin is at least 25% full of the product that will be applied.

Step 8. Set the meter gate to the appropriate position for the rate being applied.

Step 9. Ensure the auger selector valve is directing oil to the fan/meter circuit.

Step 10. Close the blower ball valve.

Step 11. Actuate the tractor remote controlling the blower circuit.

Step 12. Make sure the blower is not spinning for the following steps. If the blower is spinning, check the ball valve to make sure that it is fully closed and blocking flow to the blower.

Step 13. Open the cleanout door below the meter you wish to calibrate

Step 14. Open the meter gate. Use the following chart as a guide when using the high capacity meter roll in normal conditions.

Auger Selector Valve

Adjusting the Meter Gate

Meter Gate Setting Guide – Hydraulic Drive				
Rate lbs/ac *(Kg/Ha)*	**30 ft** *(9m)*	**40 ft** *(12m)*	**50 ft** *(15m)*	**60 ft** *(18m)*
50 *(56)*	**3"** *(76 mm)*	**4"** *(102 mm)*	**5"** *(127 mm)*	**6"** *(152 mm)*
100 *(112)*	**4"** *(102 mm)*	**6"** *(152 mm)*	**8"** *(203 mm)*	**10"** *(254 mm)*
150 *(168)*	**6"** *(152 mm)*	**8"** (203 mm)	**10"** (254 mm)	**Max**
200 *(224)*	**8"** *(203 mm)*	**10"** (254 mm)	**Max**	**Max**

Priming the Meter

To ensure accurate calibration, the meter must be primed with product.

Step 1. On the ECU keypad, locate the button with the number corresponding to the meter you are calibrating. This is called the ECU Calibration button.

Step 2. Press the ECU Calibration button once.

The meter roll begins spinning

Step 3. Allow the meter to spin 2 to 3 revolutions to ensure that the meter is full of product.

Step 4. Press the same button again to stop the meter.

The meter is now primed

Note!
To calibrate a product meter that product must be enabled (active).

Taking a Sample for Calibration

Step 1. Using the weigh scale included with your system, hang the calibration bag (also included) on the scale and zero the reading on the scale.

Step 2. Place the calibration bag below the cleanout opening. Be careful to ensure all product will flow into the bag.

Step 3. Press the ECU Calibrate button to activate the meter.

Step 4. Allow the meter to spin until the bag is at least half full.

Step 5. Press the ECU calibrate button again to stop the meter.

Step 6. Weight the bag with the supplied scale.

Step 7. Convert the weight to ounces and record the value.

This value is the Accumulated Weight you will enter into the Virtual Terminal.

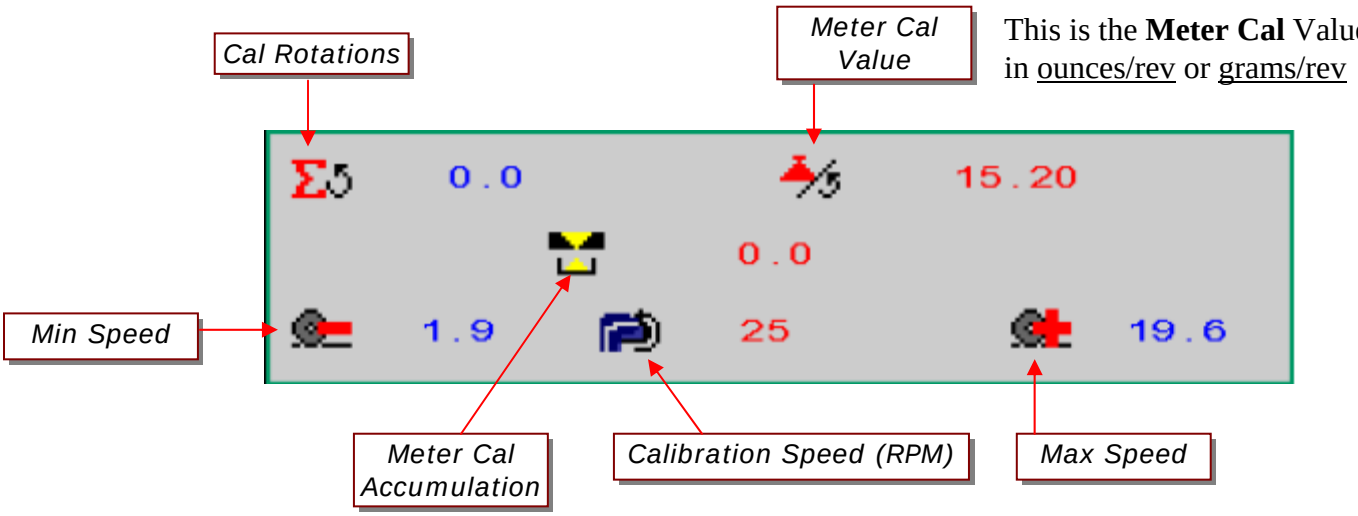
Note: ***Do not press the ECU Calibrate button again until the Accumulated weight is entered into the VT. Pressing the ECU Calibrate button before the weight is entered will clear the rotation counter and void the sample.***

Step 8. Repeat the previous steps to obtain sample weights for the rest of the meters.

Step 9. When all the weights have been found, go back to the tractor and enter the calibration weights into the Product page on the Virtual Terminal

Note!
Each time the ECU calibrate button is pressed to activate the meter the ECU counts the revolutions of the meter roll. This count is reset each time the ECU button is pressed. Once you stop the meter roll, the bag must be weighed. If you did not collect enough product in the bag to obtain a measureable weight, you must dump the bag and start over with an empty bag.

Entering Accumulated Weight into the Monitor



About Meter Cal

*Once you enter the **Accum** (oz) value (in Step 3) the ECU automatically calculates the **Meter Cal** value. The Meter Cal value is the number of ounces (oz) of product applied per revolution of the meter roller.*

E.g. If the Meter Cal value is 16.80, the meter will deliver 16.80 oz of material during each revolution of the meter roll.

Step 1. With accumulated weight in hand, return to the virtual terminal monitor.

Step 2. On the Main VR page , press the soft key for the desired product.

The Product page for the selected product appears.

Step 3. On the Product page, select the number next to **Meter Cal Accumulation.**

Step 4. Enter the accumulated weight value obtained in previous meter calibration procedure in ounces (grams).

Step 5. Press Home soft key to return to the Main VR page.

Repeat Steps 2 to 4 for each additional bin (if used)

Tip! (Variable Rate Application)

To verify your meter roller will apply prescription map high and low rates accurately:

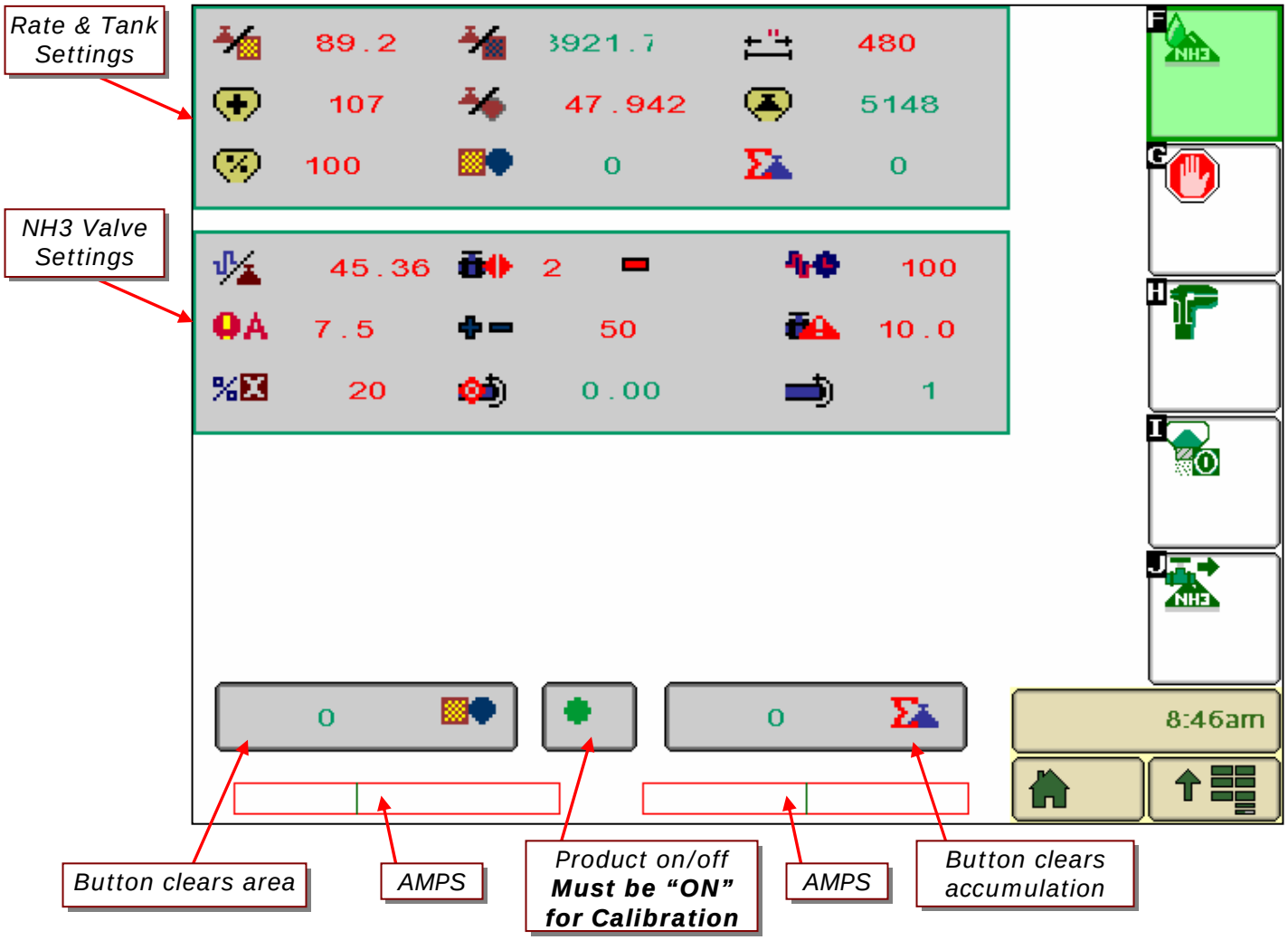
If you are doing variable rate application, you may have rate changes of 25 lbs/acre to 100 lbs/acre for a single product on a single field. To ensure you have the proper meter roller installed, perform the following test after calibrating the system and entering the Accum (oz) value:

1. *Change the application rate to a low value. (e.g. 25)*
2. *Note the Min and Max Speed values*
3. *Change the application rate to a high value. (e.g. 100)*
4. *Note the Min Speed and Max Speed values.*
5. *If your desired speed does not fall within the range of speed values, you must change meter rollers.*

Section 4: Liquid Product (NH3) Settings

Main NH3 ECU Screen

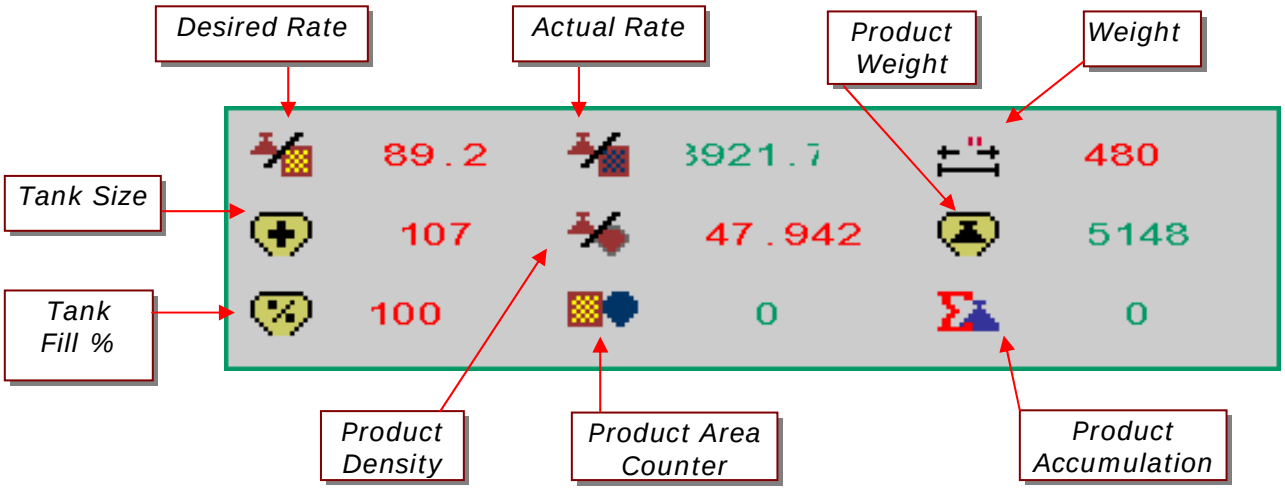
Before operating your ***NH3 ECU***, there are several setup and calibration procedures that must be performed to ensure proper fertilizer application. If these operations are not completed, performance and accuracy will be affected.



Main NH3 ECU Screen Softkeys

Icon	Page	Icon	Page
	Main NH3 ECU Screen		On/Off (Manual Work Switch)
	System Settings		Product On/OFF
	NH3 Purge		

Liquid (NH3) Rate and Tank Fill Settings



Desired Rate

Step 1. On the Liquid/NH3 page, select ***Desired Rate*** by pressing the number next to the rate icon.

Step 2. Enter the rate value in ***Kg/Ha*** or ***Lb/Ac.***

Actual Rate

Displays the actual rate in ***Kg/Ha*** or ***Lb/Ac.***

Width

Tip!

If your machine is 60 feet wide, multiply 60 X 12 inches per foot = 720 inches. Enter "720".

Step 1. On the Liquid/NH3 page, select ***Width*** by pressing the number next to the width icon. 

Step 2. Enter the width value in ***inches*** or ***millimeters***.

Tank Size

Step 1. On the Liquid/NH3 page, select ***Tank Size*** by pressing the number next to the bin icon.

Step 2. Enter the size of your tank in ***gallons (liters)***.

Tank Fill %

Step 1. On the Liquid/NH3 page, select ***Tank Fill %*** by pressing the number next to the bin % icon.

Step 2. Enter the percentage of product remaining in tank.

Product Weight/Volume

Step 1. On the Liquid/NH3 page, select ***Product Weight/Volume*** by pressing the number next to the product weight/volume icon.

Step 2. Enter the weight/volume of the product in tank.

Product Weight

Displays remaining weight in ***Kg*** or ***Lbs.***

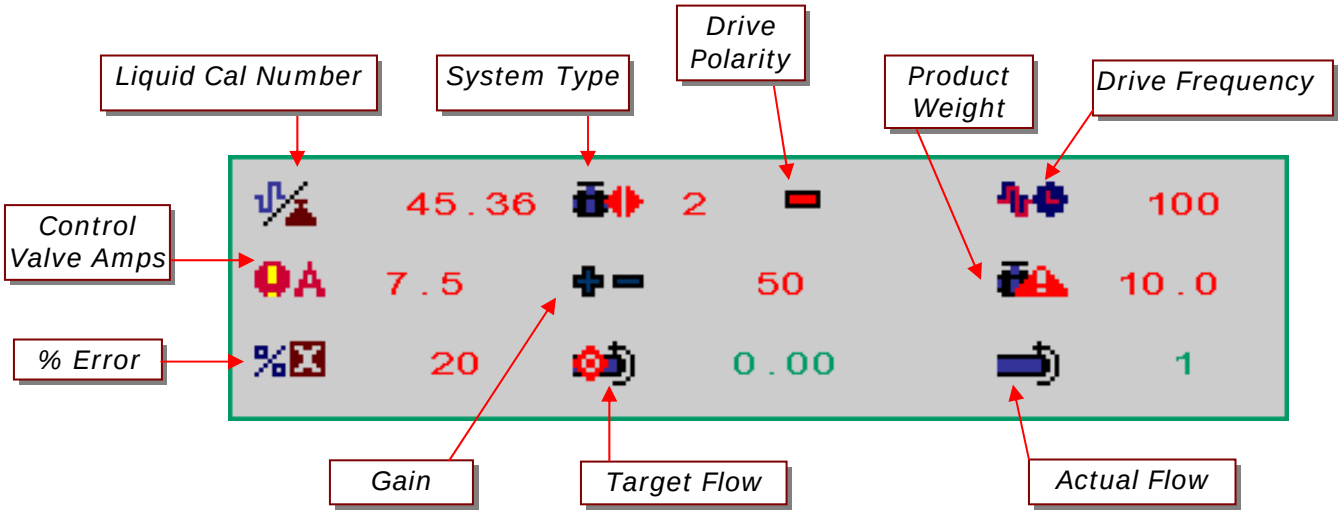
Product Area

Displays area covered while metering in ***Ha or Ac.***

Product Accumulation

Displays weight dispensed while metering in ***Kg*** or ***Lbs***.

Liquid (NH3) Valve Settings



Liquid Cal Number

Step 1. On the Liquid/NH3 page, select ***Liquid Cal Number*** by pressing the number next to the liquid cal icon. See the next section on the procedure to obtain the liquid cal number.

Step 2. Enter flow meter pulses in ***Kg*** or ***Lb***.

System Type (Number of Valves)

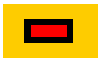
Step 1. On the Liquid/NH3 page, select ***System Type*** by pressing the number next to the number of valves icon.

Step 2. Enter number of valves used in the NH3 system.

The default setting for number of valves is **2**.

Note: When the ***System Type*** is set to **1,** the control valve is commanded to close when the Master Work Switch is off. When the ***System Type*** is set to **2**, the control valve does not change position when the Master Work Switch is off, but command the Shutoff Valve to close.

Drive Polarity



Step 1. On the Liquid/NH3 page, select ***Drive Polarity*** by pressing the number next to the drive polarity icon.

Step 2. Enter the drive direction of your valve, either positive or negative.

Note: The default polarity is  which will send a positive signal down the red wire to open the valve, and a positive signal down the green wire to close the valve..

Drive Frequency

Step 1. On the Liquid/NH3 page, select ***Drive Frequency*** by pressing the number next to the drive frequency icon.

Step 2. Enter the drive frequency of your valve.

Control Valve Amps

Step 1. On the Liquid/NH3 page, select ***Control Valve Amps*** by pressing the number next to the control valve amps icon.

Step 2. Enter allowable current draw for control valve.

Control Valve Gain

Step 1. On the Liquid/NH3 page, select ***Gain*** by pressing the number next to the gain icon.

Step 2. Enter valve reaction speed.

- Usually, you should start the gain value at approximately 50. Adjust this value higher for faster response, or lower for slower response.
- There is a maximum gain value at which the motors and actuators on your system valves cannot open or close any faster.

Shutoff Valve Amps

Step 1. On the Liquid/NH3 page, select ***Shutoff Valve Amps*** by pressing the number next to the shutoff valve amps icon.

Step 2. Enter allowable current draw for shutoff valve.

% Error

Step 1. On the Liquid/NH3 page, select ***% Error*** by pressing the number next to the % error icon.

Step 2. Enter allowable error without alarming.

Target Flow

This value is the target flow of the liquid flowmeter based on current speed, calibration values, width and target rate.

Actual Flow

This value is the actual flow of the liquid flowmeter.

Calculating Liquid Calibration Number

Remember

Anhydrous ammonia (NH3) contains 4.22 lbs. of actual N per gallon.

Your flow meter should have a tag that indicates the number of pulses per unit volume or weight of the liquid flowing through it.

Example

For this example a typical Raven flow meter will be used:

*The Raven flow meter tag indicates it generates **710 pulses per 10 gallons** of liquid.*

*If there are **4.22 lbs of actual N per gallon**:*

$$\frac{710 \text{ pulses}}{10 \text{ gallons}} \times \frac{1 \text{ gallon}}{4.22 \text{ lbs (N)}} = 16.82 \frac{\text{pulses}}{\text{lb(N)}}$$

To calculate Liquid Calibration Number:

Your liquid calibration number is very important for accurate application of anhydrous ammonia (NH3). When entering your NH3 rate, remember that you are applying NH3 in **actual pounds of N (nitrogen) per acre.** Your Liquid Cal number has to be calculated as **pulses per pound of actual N**.

Step 1. Locate the **Calibration Number Tag** on your flow meter.

Step 2. Note the units of your flow meter's Cal Number. Depending on the brand of flow meter, the units may be given in:

a. Pulses per pound of product.

b. Pulses per 10 gallons of liquid.

c. Pulses per gallon of liquid.

d. Other.

Step 3. Using the units used on your flow meter, create a formula to convert the value of Cal Number Tag to **pulses per pound of actual N**. (See Example)

The result is the Liquid Calibration Number.

Checking and Fine-Tuning NH3 Calibration

Tip!

When calculating the amount of product used per acre, be sure to remember that one pound of NH3 is 82% nitrogen. So, if you weigh your tank after use and a total of 1000 lbs has been applied, you applied 820lbs of actual N. If your rate per acre was 100 lbs of actual N, and you do 10 acres, and you know that 1220 lbs of NH3 were applied from tank, don't panic. 1220 lbs of NH3 is a total of 1000 lbs of actual N. At a desired rate of 100 lbs of N per acre, and a total of 10 acres, you are right on target.

To check the calibration of the NH3 controller:

Step 1. Once the liquid cal value has been entered, and other functions on the NH3 screen are set, apply one tank of NH3 in the field.

Step 2. Calculate the actual application rate per acres using the tare weight of the tank (NH3 used) and the total acres covered.

Step 3. Compare the actual application rate with your desired application rate.

Step 4. On the Main VR page, press the NH3 soft key. The NH3 page appears.

Step 5. Select Liquid Cal Number.

Tip!

When fine tuning the actual applied rate you will have to use trial and error, making slight changes to the Liquid Cal number after applying each of several tanks of NH3. Typically adjust the Liquid Cal number by only 0.1 or 0.2 each time.

If you are under applying, increase the LIQUID CAL value by 0.1 or 0.2 until actual applied rate is acceptable.

If you are over applying, decrease the LIQUID CAL value by 0.1 or 0.2 until actual applied rate is acceptable.

Adjust your Liquid Cal number as follows:

Step 1. If your actual application rate is **less than** your desired application rate, **increase** the Liquid Cal number.

Step 2. If your actual application rate is **greater than** your desired application rate, **decrease** the Liquid Cal number.

If further refinement of the calibration is needed, repeat the procedure.

Purging the NH3 System

The NH3 system can be purged using the Purge soft key.

Step 1. On the Main VR page, press the **NH3** soft key.

The NH3 page appears.

Step 2. On the NH3 page, press the **Purge** soft key three (3) times.

The NH3 valves open for six (6) seconds, allowing NH3 to flow.

Step 3. After six (6) seconds verify that the Purge indication on the NH3 page shows OFF and that flow has stopped.

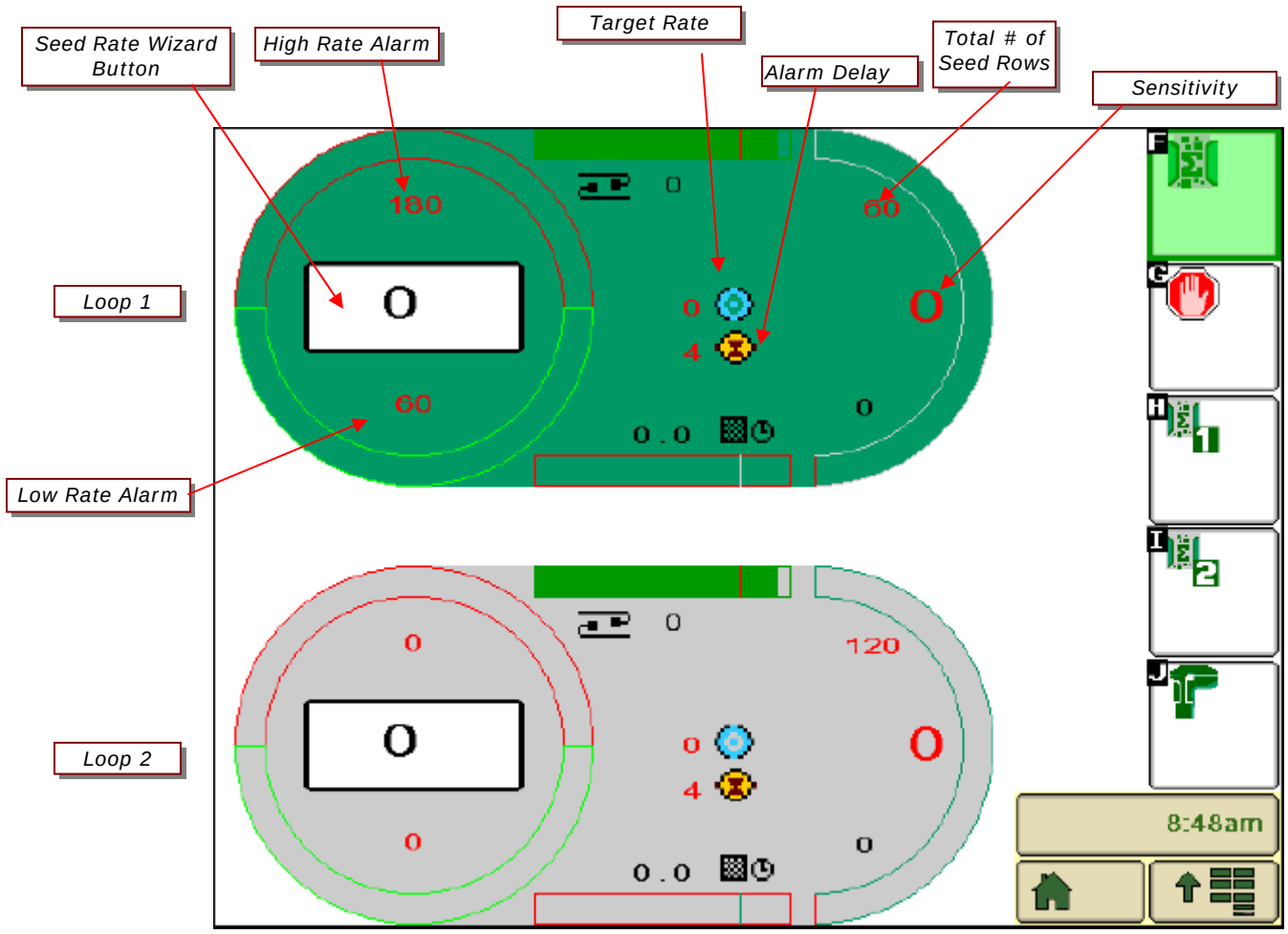
Caution!

Ensure no one is around the implement and that the tractor is upwind before using this function.

Section 5: ART Seed Monitoring (Blockage)

Main Toolbar ECU Screen

Before operating your ***Toolbar ECU***, there are several setup and calibration procedures that must be performed to ensure proper seed rate/blockage monitoring. If these operations are not completed, performance and accuracy will be affected.



Main Toolbar ECU Screen Softkeys

Icon	Page	Icon	Page
	Main Toolbar ECU Screen		On/Off (Manual Work Switch)
	Loop 1 Status		Loop 2 Status
	System Settings		

Sensitivity

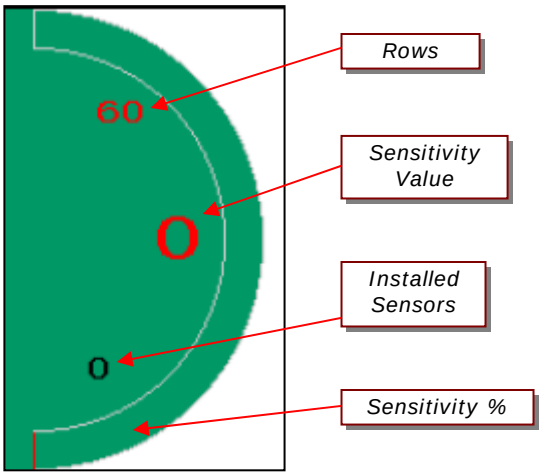
Tip!

A Blockage Sensitivity value of 0 will disable the power and alarms to the seed sensor loop. The default value is 15.

Sensitivity values less than 15 require the scanning loop to run slower giving the sensors longer than 1 sec periods to count seed. This allows for sensitivity ranges down to 1 sec/30sec.

The goal is to have the SENSITIVITY value as high as possible without giving constant alarms. If a seed sensor measures fewer seeds per second than the Blockage Sensitivity value indicates, a blockage alarm occurs.

1. From the main ART screen, select the ***Sensitivity*** number. Select a sensitivity between 0 and 125. See Appendix A for approximate values.
2. To select a sensitivity value, ensure that there are no blockages and begin seeding.
3. Increase the sensitivity until the monitor alarms. Then, decrease the sensitivity by 3 to 5 units at a time until the monitor no longer indicates blocked alarms.



Row count

Users should enter the total number of openers on the seeder.

1. From the main ART screen, press the ***Rows*** icon.
2. Enter a value between 1 and 120. The row value is the total number of openers on the seeder for each loop. This allows for accurate seed rate calculations.

High and Low Rate Alarms

The low and high alarm settings depend on your desired operational range.

1. From the main ART screen, press the ***High Rate Alarm***.
2. Set RATE HIGH value (0 disables the alarm.)
3. From the main ART screen, press the ***Low Rate Alarm***.
4. Set RATE LOW value (0 disables the alarm.)

Target Rate

Use the following procedure to set up the desired application rate in either mass per unit area (lbs/acre) or population per unit area (seeds/acre). Do not use more than 3 digits. If you are applying 100,000 seeds/acre, use a value of 100. The Target Rate value is used in the Seed Rate Wizard Calculation.

1. From the main ART screen, press the ***Target Rate*** icon.
2. Enter a desired application rate.

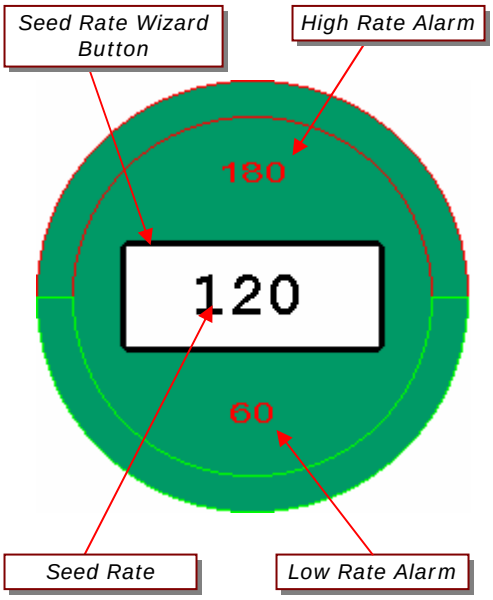
Alarm Delay

The Alarm Delay allows the user to give a delay in seconds from when the work switch is enabled in order to allow seed to fully fill the air system:

1. From the main ART screen, press the ***Seed Delay*** icon.
2. Enter a desired seed delay time in seconds.

Seed Rate Wizard

Tip!
In order for the Seed Rate Wizard to work no sensors can be blocked!



The Seed Rate Wizard is used to create a "smart" link between the desired application rate (Target Rate) and the blockage sensor readings. When the seed rate wizard is properly configured, it will display a real-time Seed Rate value which is in the same units as the Target Rate. For example, if the Seed Rate Wizard was configured with a target rate of 120 lbs/acre, the Seed Rate value will display the Real-Time output of the blockage sensors in units of lbs/acre.

The Seed Rate Wizard will also set the set High and Low alarms based on the Target Rate or Seed Rate. Use the following procedure for configuring the Seed Rate Wizard

1. Enter the desired value into the Target Rate. (Optional)
2. Begin seeding.
3. From the main ART screen, press the ***Seed Rate Wizard***.

If Target Rate is ***greater*** than zero:

- Low alarm will set to 50% of Target Rate
- High Alarm will set to 150% of Target rate

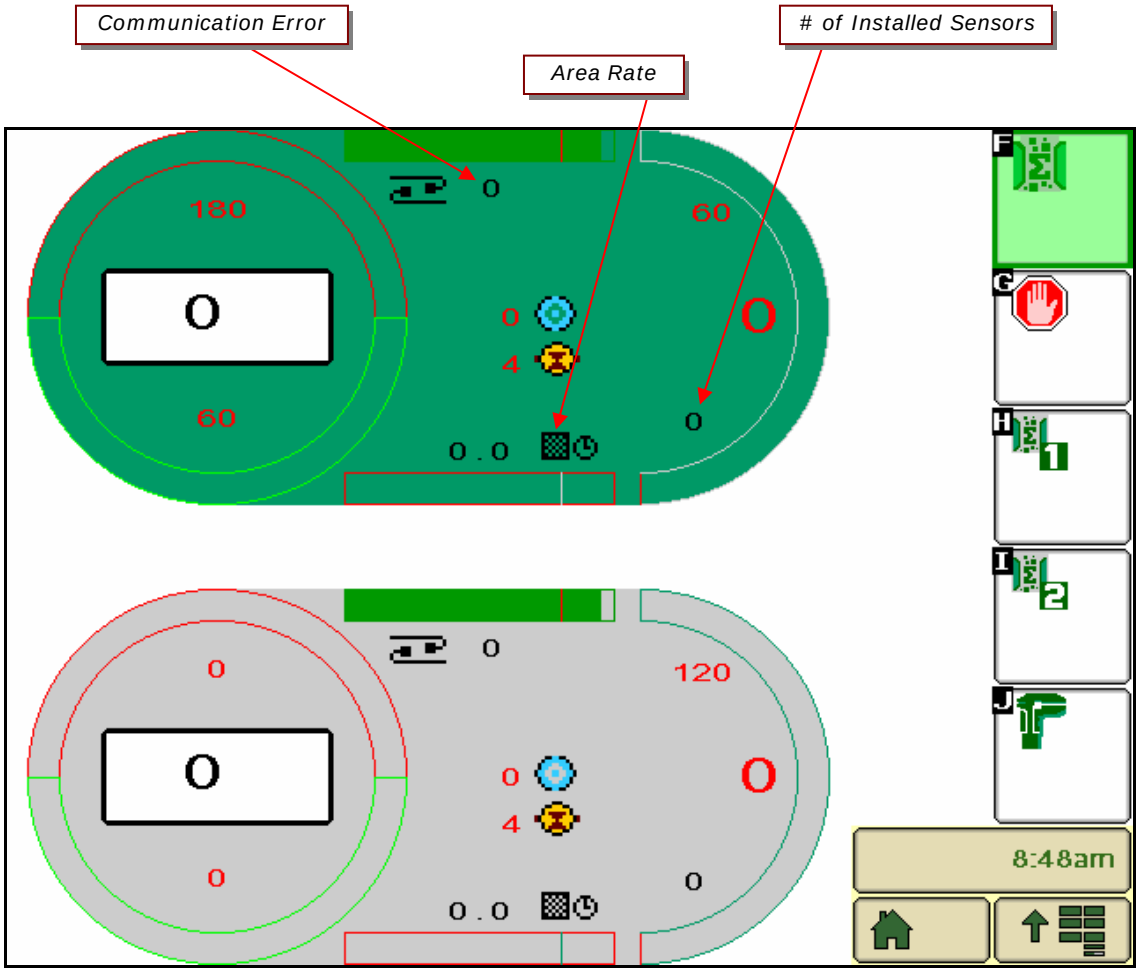
If Seed Rate is ***greater*** than zero:

- Will set Seed Rate = Target Rate

If Target Rate is ***equal*** to zero and Seed Rate ***greater*** than 0:

- Seed Rate will show actual readings form the blockage sensors in units of particles per square meter.
- Low alarm will set to 50% of Seed Rate
- High Alarm will set to 150% of Seed Rate

Seed Monitoring Operation



Work switch

Pressing the ***Work Switch***  will start seed monitoring operation.

1. Grey background indicates work switch OFF.
2. Green background indicates work switch ON.
3. When the work switch is off, all alarms will silence, and area totals will not accumulate.

Installed Sensors

The system will display the number of ***Installed Sensors*** on the Main Art screen.

1. Ensure the module is detecting all installed sensors.
2. If the number is incorrect, see System Troubleshooting.

Area Rate

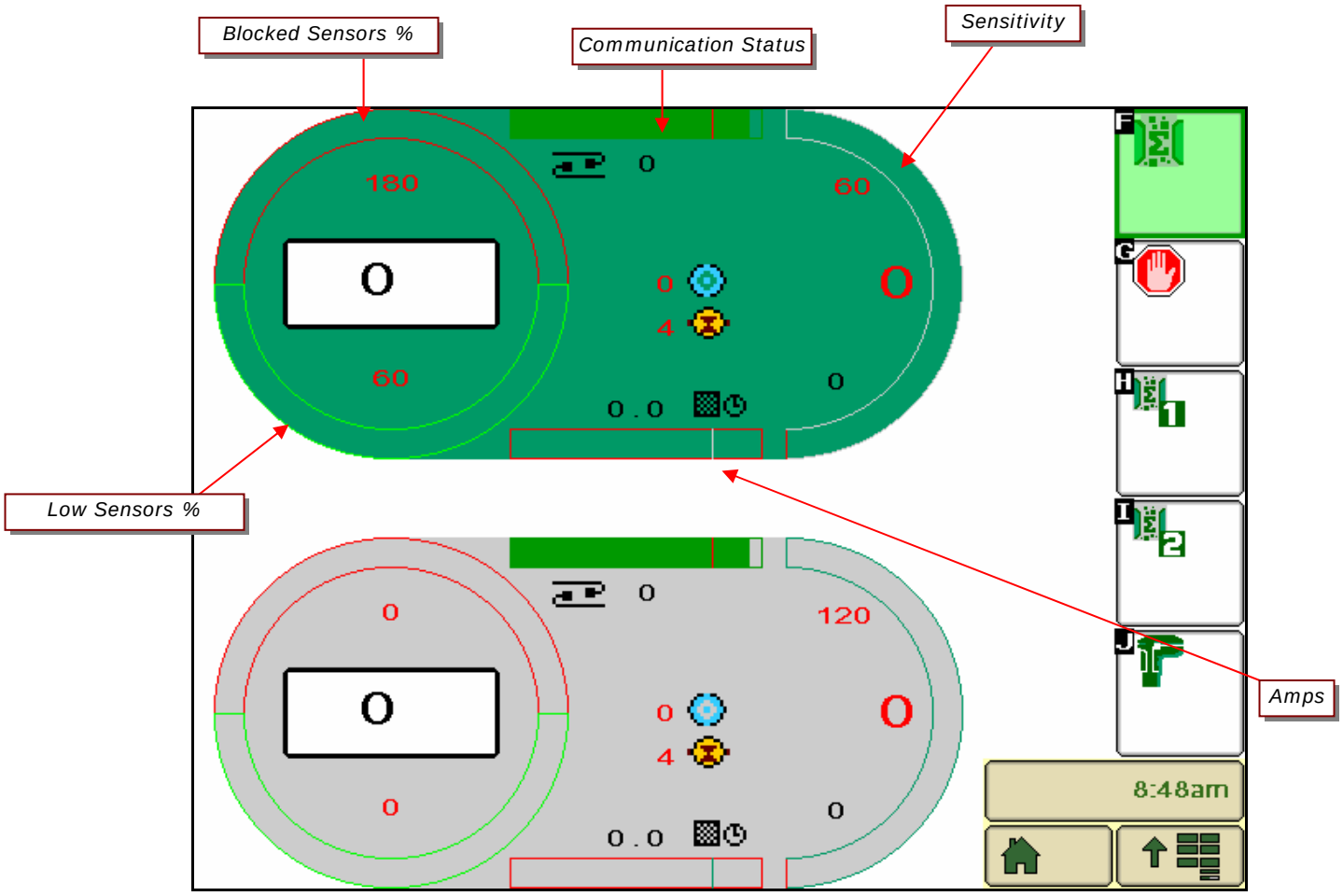
The system will display area coverage over time (in units selected by user).

Communication Error

The system will display any sensors with communication errors.

1. See System Troubleshooting for possible solutions.

System Information Bars

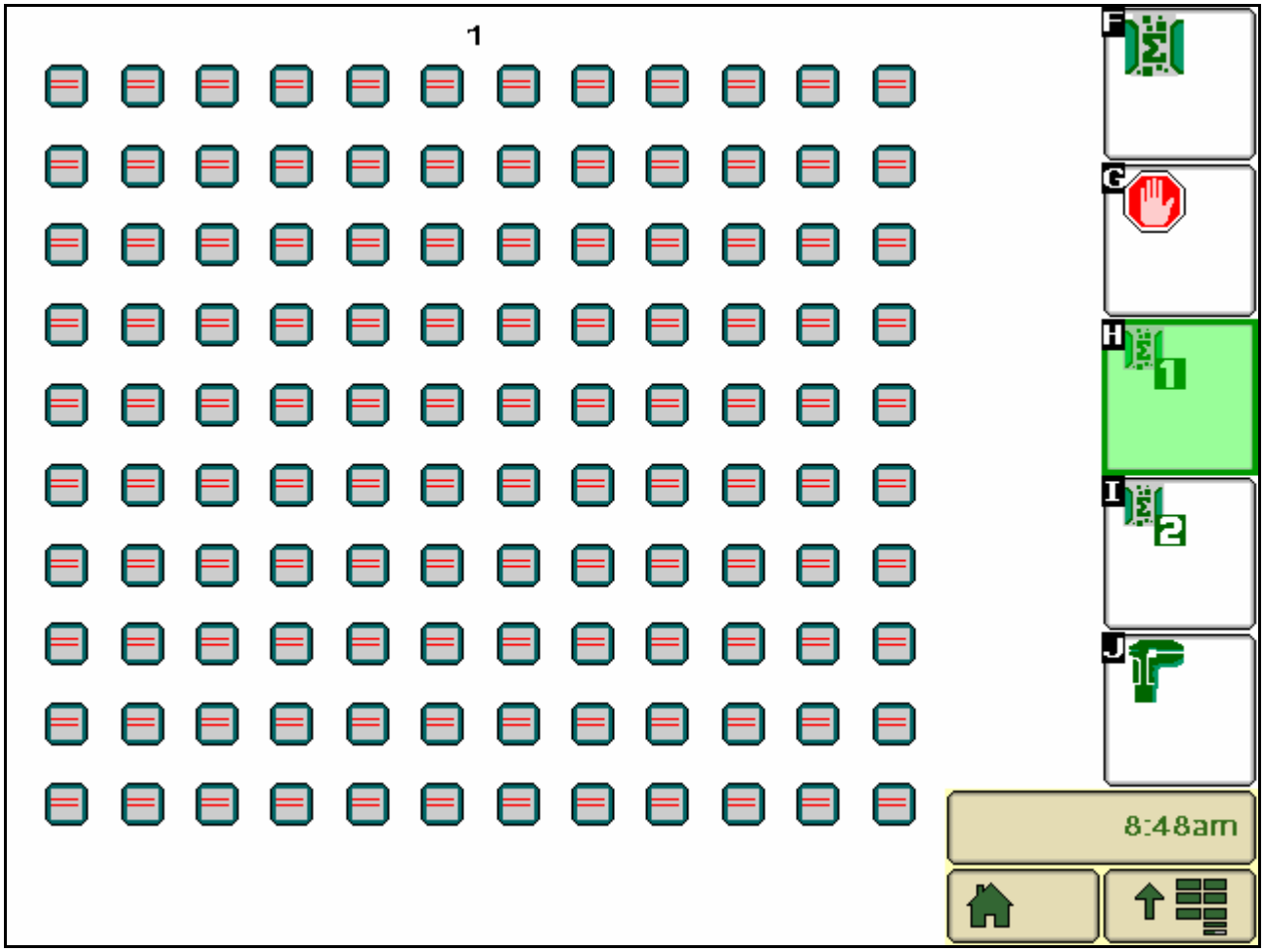


Status Bar	Function
Blocked Sensors	Shows % of blocked sensors
Low Sensors	Shows % of sensors with low seed count
Communication	Shows sensor communication status - should be past line
Amps	Shows current for that Loop– should be below line
Sensitivity	Shows sensitivity as %

Loop Status

You can monitor the status of each sensor in each Loop.

1. Press the (for Loop1) or key (for Loop 2) from the Main Screen



2. The status of each sensor will be shown as follows:

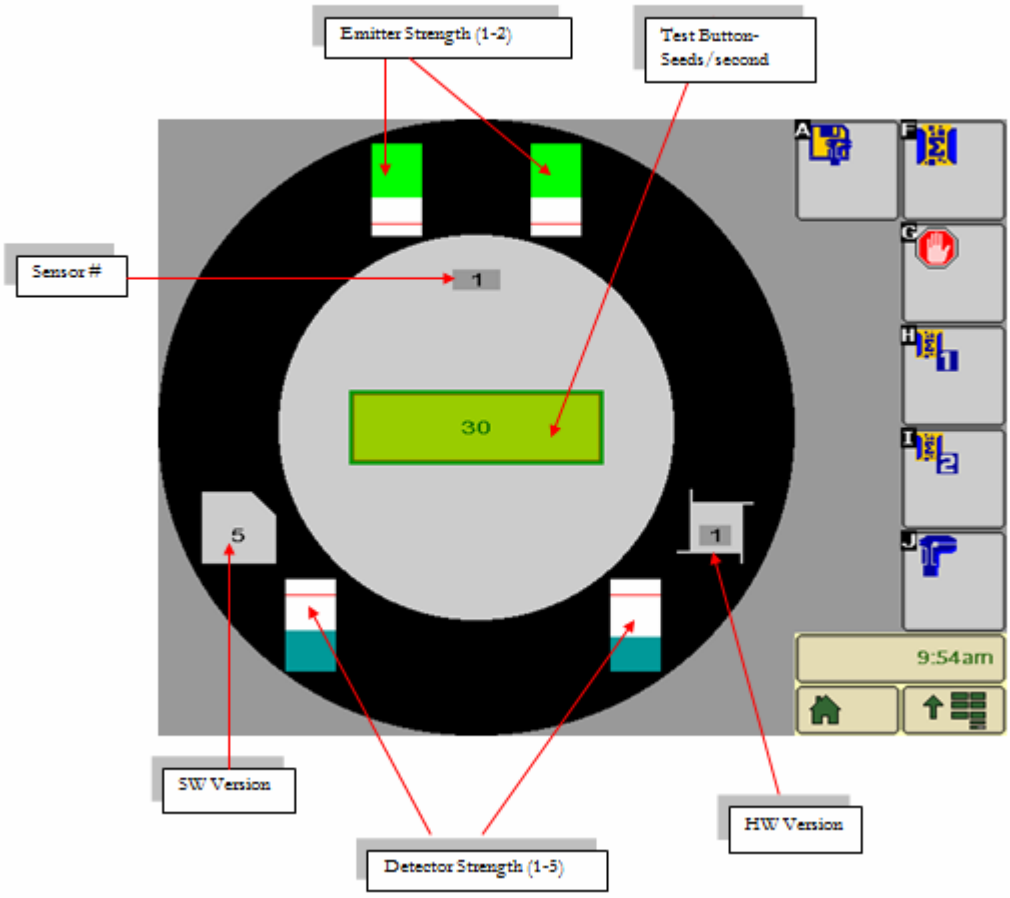
Symbol	Sensor Status
=	Not installed
O	Running
X	Blocked
+	High rate
-	Low rate
!	Clean

Tip!

Pressing the button of any sensor will display more information for that specific sensor.

Sensor Diagnostics

You can find out information about each individual sensor by pressing the button of the sensor you wish to see on the Loop 1 or Loop 2 screen. The following information will be displayed:



Emitter Strength	Shows emitter strength for all emitters
Detector Strength	Shows detector strength for all detectors
SW Version	Displays the software version of sensor
HW Version	Displays the hardware version of sensor
Sensor #	Sensor number of information
Test Button	Enters test mode to simulate test seeds/second

Seed Sensor Sensitivity Values

Sensitivity	Seeds/second
0	Loop is off
1	1 seed 30 seconds
5	1 seed 20 seconds
10	1 seed 10 seconds
15	1
20	7
30	17
40	27
50	44
60	80
70	148
80	281
90	539
100	1043
110	2019
120	4400
121	4800
122	5300
123	5800
124	6400
125	7000

Blockage System Troubleshooting

No loop information	The loop indicated is turned off.	**To turn loop on, increase sensitivity >1**
Communication error 	The monitor is not detecting any sensors.	**Check all the cables and connections.** **Bypass Sensor 1 by connecting Sensor 2 to the sensor loop cable from the main wiring harness.**
	If the message is no longer displayed...	**...replace Sensor 1.**
	If the problem persists...	**...connect a Seed Sensor directly to the main wiring harness' male Sensor Loop Cable.**
	If you get a SNR 2 ERR...	**...replace the Sensor Loop extension cable between the Main wiring harness and Seed Sensor 1.**
Monitor is showing less sensors than installed	The monitor is reading an incorrect number of sensors.	**Check all the cables and connections.** **Bypass the last sensor by connecting the second last sensor to the sensor loop cable to the main wiring harness.**
	If the message is no longer displayed...	**...replace the last sensor in the loop.**
	If the problem persists...	**...connect a Seed Sensor directly to the main wiring harness.**
	If you get an SNR 2 ERR...	**...replace the main wiring harness.**
	If you get an SNR 1 ERR...	**...replace the Sensor Loop extension cable between the main wiring harness and the last Seed Sensor.**
Blocked Sensor	The sensor indicated is blocked.	**Clean blockage from indicated run.**
	If the indicated run is not blocked...	**...verify the Sensitivity is not set too high.** **Check inside the distribution towers for any foreign material. This may cause blockages to move from sensor to sensor.**
	If it is always the same sensor giving the blocked message...	**...trade that sensor with one in another position.**
	If the blocked message moves with the sensor...	**...replace that sensor.**

	The sensor indicated is blocked.	**Clean blockage from indicated run.**
	If the indicated run is not blocked...	**...verify the Sensitivity is not set too high.** **Check inside the distribution towers for any foreign material. This may cause blockages to move from sensor to sensor.**
	If it is always the same sensor giving the blocked message...	**...trade that sensor with one in another position.**
Blocked runs are indicated but when checked and found to be clear.	The monitor is receiving incorrect blockage information.	**Verify that the Sensitivity is not set too high.** **Check inside the distribution towers for any foreign material. This may cause blockages to move from sensor to sensor.**
	If it is always the same sensor giving the blocked message...	**...trade that sensor with one in another position.**
	If the blocked message moves with the sensor...	**...replace that sensor.**
Amp Overload	This message indicates that there is too large a power draw on the indicated sensor loop. There is most likely a short in the Sensor Loop.	**Check all the cables and connections.**
Monitor displays ERROR alarms when one loop is disabled, but no alarms when both loops enabled.	Typically this means that loops are all connected but cables are crossed either going to sensor 1 or coming back from the last sensor.	**Trace sensor cables from the main wiring harness to the first and last sensor of one loop.** **Re-connect the cables correctly.**

Section 6: System Troubleshooting

Symptom	What it Means	Recommended Action
Amity ECU doesn't show up on Virtual Terminal in Cab	Hitch connector not connected	Check the 9-pin connector at the front of the cart and the front of the drill.
	VT Pool memory has been corrupted	Delete the Pool Memory from the VT and restart the system.
	Incorrect Power from Tractor	Ensure there is proper power being supplied by the 9-pin connector on the Tractor.
	Terminating Resistor not Installed	Ensure there is a terminating resistor installed at the both ends of the ISO-Bus.
Clutch Won't Engage	Work Switch Not Engaged	Ensure you are: - Moving faster than the minimum ground speed - Work switch is in the "Seeder Ready" state - Automatic Work Switch is in the "Down" position
	Product 1 not enabled	Product 1 needs to be enabled for the clutch to engage.
	Product Type not configured as "Clutch"	Ensure the product is configured as a "Clutch" on the System Settings menu.
	Clutch Out of Adjustment	Ensure the clutch is assembled properly to the Driveshaft.
Hydraulic Motors won't Turn	Work Switch Not Engaged	Ensure you are: - Moving faster than the minimum ground speed - Work switch is in the "Seeder Ready" state - Automatic Work Switch is in the "Down" position
	Product not Enabled	Ensure the product you are trying to apply is enabled.
	Blower Hydraulics not On	The blower hydraulics need to be On for the hydraulic drive system to function.
	Foreign Object in the Meter	Check the meter compartment and remove any foreign objects that may be jamming the meter roll.
Calibrate Buttons on the ECU don't work (Hyd Drive)	ECU not receiving Power	Ensure there is power to the ECU. The lights on the ECU should be blinking when the ECU has power.
	Product not Enabled	Ensure the product you are trying to apply is enabled.
	Blower Hydraulics not On	The blower hydraulics need to be On for the hydraulic drive system to function.
	Foreign Object in the Meter	Check the meter compartment and remove any foreign objects that may be jamming the meter roll.
	VT Pool memory has been corrupted	Delete the Pool Memory from the VT and restart the system.
Erratic Hydraulic Motor Operation	Product Configured as Clutch	Ensure the "clutch" box in the System Settings menu is unchecked.
	Improper Tachometer Value	Ensure the "Targets per Rev" value in the Product Screen for each Bin is set to 60.
	Improper Meter Door Setting for Desired Application Rate	Check the Min and Max speed range for each product. Your desired seeding speed should be in the middle of that range.
I finished my field and my meters put too much or too little product out.	Improper Width Setting	Ensure the Width Setting is correct in the System Setup menu as well as in each Product Screen for each bin that's being used.
	Erroneous Calibration Value	Re-calibrate your meter to ensure the calibration value being used is correct.
	Ground Speed Source not Accurate	Perform the Distance Check procedure to ensure the Ground Speed source is accurate.
	Meter Door Setting changed without re-calibrating meter.	Calibration must be performed whenever the meter door setting is changed.
	Changed to a different product type without re-calibrating meter	Calibration must be performed when you switch to a different product type.
	Bin Pressurization Problem	Ensure the Bin Door is fully closed and properly sealed and that the bin pressurization hose is properly installed.

Symptom	What it Means	Recommended Action
Ground/meter speed sensor not picking up speed or the speed reading is erratic	Improper Sensor Range Adjustment	The recommended gap setting is 1/16" (.063") from the face of the sensor to the tip of the sprocket teeth. If the gap is out of range, adjust to bring back within specifications.
	Missing or Damaged Target	Replace the target sprocket if it is missing or if the teeth have been damaged. Ensure the sprocket is in proper alignment with the sensor.
	Sensor Physically Damaged by Target	If the sensor was adjusted too close to the target, it will be hit and damaged. Replace the damaged sensor and check for proper range adjustment.
	Damaged Sensor Mount	The sensor mounting bracket holds the sensor in place so that the sensor is at the proper location and spacing from the sprocket teeth. Replace or Repair the sensor mount if it is damaged and/or if the sensor barrel does not line up with the targets.
	Defective Sensor	When the sensor is powered, the red light on the sensor will be on. The light will remain solid-on during operation. If the light is not on or if the light is on and the ground speed reading remains at "0" when the cart is moving, check the wiring. If the wiring is good, replace the sensor.
	Defective Wiring	Use a jumper wire to intermittently jump across the Signal and Ground wires (Pins 2 & 3, Orange & Blue) in the main harness to simulate the sensor in operation. If "0" speed is still shown on the display while simulating, the sensor's signal is not getting back to the ECU and there is a bad/loose connection or a problem with the wiring. Perform steps to diagnose the harness.
Fan speed sensor not picking up speed or the speed reading is erratic	Improper Sensor Range Adjustment	The face of the sensor should be between 2mm and 4mm away from the target. If out of range, adjust to bring back within specifications.
	Sensor Physically Damaged by Target	If the sensor was adjusted too close to the target, it will get hit and damaged. Replace the damaged sensor.
	Defective Sensor	When the sensor is powered, the red light on the sensor will be on. When the sensor senses the target, the red light will go off until the target leaves the range of the sensor. Replace sensor if defective.
	Defective Wiring	Use a jumper wire to intermittently jump across the Signal and Ground wires (Pins 2 & 3, Pink & Blue) in the main harness to simulate the sensor working. If "0" speed is still shown on the display while simulating, the display head is not reading the sensor and there is a problem with the wiring. Perform steps to diagnose the wire harness.
	Missing or Defective Target	Two 3/8" x 1/2" UNC bolts are fastened to the fan rotor and are used as targets for the speed pickup. Lock washers are used under the bolt head. Replace any missing or damaged bolts/washers.
	Damaged Sensor Mount	The sensor mounting bracket holds the sensor in place so that the sensor is at the proper location and spacing from the two bolts (targets) on the fan rotor. Replace or Repair the sensor mount if it is damaged and/or if the sensor barrel does not line up with the targets.

Symptom	What it Means	Recommended Action
Meter-Box Proximity Sensor Not Operating Correctly	Meter Empty	If the meter-empty alarm is active, check the meter to ensure the meter is empty before performing further troubleshooting.
	Sensor Face Dirty	If the face of the sensor has foreign material or product stuck to it, the sensor will give a false reading. Remove foreign material from the face of the sensor.
	Sensor Sensitivity out of Adjustment	The light on the end of this sensor should be OFF when the meter box is empty and ON when the meter box is full of product. To properly adjust the sensitivity, empty the meter box (need to close the gate & pull the doors off), and ensure the face of the sensor is clean. Put the door back on and open the seed gate to allow product back into the meter box. With the meter box full of product, perform the following sensor adjustment: o Find the calibration screw on the rear of the sensor (next to the yellow light). Turn the screw counter-clockwise until the light turns off. If the light is already off, go to the next step. o Turn the screw clockwise until the light just turns back on. Then turn the screw 2 more full turns in the clockwise direction.
	Defective Sensor	Test the sensor by placing an object in-front of the sensor face. The LED light on the sensor should light up when the object is present. The LED light should be off when there is nothing in front of the sensor. The sensor needs to be connected to the harness and the monitor needs to be turned on to perform this test. Replace sensor if defective.
	Defective Wiring	Use a jumper wire to jump across the Signal and Ground wires (Pins 2 & 3, Violet & Blue) in the main harness to simulate a full meter. The Low-Meter alarm should activate when the sensor is unhooked and the alarm should be off when the jump-wire is used. If these alarm conditions are not observed, begin troubleshooting the wire harness.
Low-Bin Level Sensor Not Operating Correctly	Bin Empty	If the low-bin alarm is active, check the bin to ensure the seed level is below the sensor before performing further troubleshooting.
	Defective Sensor	Test the sensor by blocking the path between the two sensor eyes. When the path is open, the low-bin alarm should be active. When the path is blocked, the low-bin alarm should be off. Replace sensor if defective.
	Improper Sensor Mounting	Ensure the sensor is mounted in a position where product cannot collect on the sensor.
	Defective Wiring	Use a jumper wire to jump across the Signal and Ground wires (Pins 2 & 3, Tan & Blue) in the main harness to simulate a low-bin level condition. If the bin alarm does not activate, begin troubleshooting the wire harness.

Section 7: Appendix

Appendix A: Connector Pinouts

ECU Signal Connectors

Left Connector (Black Body)		Center Connector (Grey Body)		Right Connector (Blue Body)	
Pin #	**Function**	**Pin #**		**Pin #**	**Function**
1	Motor 1 Power	1		1	Bin 3 Signal
2	Motor 4 Power	2		2	Meter 3 Signal
3	CAN Comm. High	3		3	
4	Bin 1 Signal	4		4	
5	Meter Box 1 Signal	5		5	
6		6		6	
7	Meter Box 2 Signal	7		7	
8	Motor 1 Ground	8		8	
9	Bin 2 Signal	9		9	
10	Motor 3 Ground	10	Sensor Power (12V)	10	
11	Speed Signal	11		11	
12	Motor 3 Power	12		12	
13	Fan 1 Signal	13		13	
14	Fan 2 Signal	14		14	
15	CAN Comm. Low	15		15	
16		16		16	
17	Tach 1 Ground	17		17	
18	Tach 2 Ground	18		18	
19	Tach 3 Ground	19		19	
20	Tach 2 Signal	20		20	
21	Tach 4 Ground	21	Sensor Ground	21	
22	ECU Ground	22		22	
23	ECU Power	23		23	
24	Tach 1 Signal	24		24	
25	Motor 2 Ground	25		25	
26	Motor 2 Power	26		26	
27	Tach 4 Signal	27		27	
28	Tach 1 Power	28		28	
29	Tach 2 Power	29		29	
30	Tach 3 Power	30		30	Bin 4 Signal
31	Tach 4 Power	31		31	
32	Work Signal	32		32	Meter 4 Signal
33	Motor 4 Ground	33		33	
34	Tach 3 Signal	34		34	
35		35		35	

Notes:

- *All connections terminated in Ampseal 35 pin plug, AMP 776164*
- *Each Ampseal connector has a different polarization (colour) to prevent incorrect connection*

ISO-BUS Extension Connector

Pin #	Function
1	Battery Negative
2	ECU Ground
3	Battery Positive
4	ECU Power
5	TBC_DIS
6	TBC_PWR
7	TBC_RTN
8	CAN H
9	CAN L

Notes:

- *Battery Positive and Negative on double 8AWG wiring to reduce voltage drop between battery and ECU power terminals in high current systems.*
- *Dust cap provided to protect connector when not in use*

CAN Terminator Connector

Pin #	Function
A	
B	TBC PWR
C	
D	TBC RTN
E	CAN H
F	CAN L

Notes:

- *Connector mates with Powell TBC. TBC (CANBUS terminating bias circuit) should only be installed at the physical end of the CANBUS system.*
- *Terminated in Metripack 12052848 connector (150 Series)*

ECU Power Contacts

Pin #	Function
N/A	Battery Positive (red)
N/A	Battery Negative (black)

Notes:

- *#10 (M5) ring terminal connects to ECU power terminals.*
- *Battery Positive and Negative on double 8AWG wiring to reduce voltage drop between battery and ECU power terminals in high current systems.*
- *Caution! – reverse polarity power connection will damage ECU*

Motor Control Connectors

Pin #	Function
1	Motor Power
2	Motor Ground

Notes:

- *Electric motor or electric over hydraulic control is possible*
- *Terminated in Deutsch DT06-2S connector, contacts rated to 13 amps, 16AWG wiring*
- *Mating connector is Deutsch DT04-2P*

Motor Speed (Tach) Connectors

Pin #	Function
1	Tach Power
2	Tach Signal
3	Tach Ground

Notes:

- *Independent feedback for up to 4 variable rate meters/motors*
- *Terminated in Deutsch DTM06-3S connector, contacts rated to 7 amps, 20AWG wiring*
- *Mating connector is Deutsch DTM04-3P*

Low-Bin Level Sensor Connectors

Pin #	Function
1	Bin Power
2	Bin Signal
3	Bin Ground

Notes:

- *Independent feedback for up to 4 bin level sensors (infrared, capacitive proximity)*
- *Mates directly to Agtron bin level sensors, 3rd party sensors may require additional wiring*
- *Terminated in Deutsch DTM06-3S connector, contacts rated to 7 amps, 20AWG wiring*
- *Mating connector is Deutsch DTM04-3P*

Meter Box Sensor Connectors

Pin #	Function
1	Meter Power
2	Meter Signal
3	Meter Ground

Notes:

- *Independent feedback for up to 4 additional bin level sensors (infrared, capacitive proximity)*
- *Mates directly to Agtron bin level sensors, 3rd party sensors may require additional wiring*
- *Terminated in Deutsch DTM06-3S connector, contacts rated to 7 amps, 20AWG wiring*
- *Mating connector is Deutsch DTM04-3P*

Ground Speed Sensor Connector

Pin #	Function
1	Speed Power
2	Speed Signal
3	Speed Ground

Notes:

- *Ground speed sensor feedback (hall effect, reed switch, inductive)*
- *Mates directly to Agtron inductive and reed switch sensors, 3rd party sensors may require additional wiring*
- *Wiring is common between the radar and speed sensor connections; only one speed source can be used.*
- *Terminated in Deutsch DTM06-3S connector, contacts rated to 7 amps, 20AWG wiring*
- *Mating connector is Deutsch DTM04-3P*

Fan Sensor Connectors

Pin #	Function
1	Fan Power
2	Fan Signal
3	Fan Ground

Notes:

- *Independent feedback for up to 2 fan RPM sensors (hall effect, reed switch, inductive)*
- *Mates directly to Agtron inductive and reed switch sensors, 3rd party sensors may require additional wiring*
- *Terminated in Deutsch DTM06-3S connector, contacts rated to 7 amps, 20AWG wiring*
- *Mating connector is Deutsch DTM04-3P*

Anhydrous Ammonia/Liquid Control Connector

Pin #	Function
A	Flowmeter Signal
B	Safety Battery Positive
C	Flowmeter Ground
D	N/A
E	Flowmeter Power
F	Shutoff Valve Ground
G	Rate Control Valve Negative
H	Rate Control Valve Positive
J	Shutoff Valve Power
K	Safety Battery Negative

Notes:

- *Terminated in Metripack 150 series 10 pin receptacle*
- *Mates directly to Micro-Trak harness part number 13273.*
- *Adaptors for the Raven Accu-Flow system available.*

Appendix B: Metric Conversion Factors

To convert from English to Metric measurements, multiply by the following factors.

To Convert	To	Multiply By
Inches	Millimeters	25.4
Feet	Meters	0.3048
Yards	Meters	0.9144
Miles	Kilometers	1.609
Square Foot	Square Meters	0.0929
Acres	Hectares	0.4047
Pounds	Kilograms	0.4536
Cubic foot	Cubic Meter	0.02832
Bushels	Cubic Meters	0.03524
Pounds/Square Inch	Kilopascals	6.8948
Pounds/Square Inch	Bar	0.06895
Pounds-Force-Foot	Newton-Meters	1.3568
Miles-Per-Hour	Kilometers-Per-Hour	1.609
Pounds-Per-Acre	Kilograms-Per-Hectare	1.1209
Acre-Per-Hour	Hectare-Per-Hour	0.405
Feet-Per-Minute	Meters-Per-Second	0.005
Feet-Per-Second	Meters-Per-Second	0.305
Horsepower	Kilowatt	0.746
27 in. of Water =1 psi		

Appendix C: Common Values and Equations

Approximate Tank Fill Percentages		
Ladder Rung (from top)	**Model 2800**	**Model 3350**
1st	90%	85%
2nd	75%	60%
3rd	45%	35%
4th	15%	15%
5th	5%	5%

These values are the same for the front and rear bin.

Common Commodity Densities	
Commodity	**Density (lbs/bu)**
Wheat/Durum	60
Soybeans	60
Barley	48
Oats	32
Canola	52
Corn	56
Dry Fertilizer	60-70

$$Rate(lbs/\min) = \frac{Width(ft) * Speed(mph) * FieldRate(lbs/acre)}{495}$$

$$Performance(acres/hr) = \frac{Width(ft) * Speed(mph)}{8.25}$$

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Appendix D: ICON Glossary

Alarms

	Aux low
	Bin low
	Clutch overload
	Fan high
	Fan low
	Fan off
	Ground Speed high
	Ground Speed low
	Low Battery Voltage
	RPM high
	RPM low
	RPM off
	RPM overload
	Seed flow block
	Seed flow clean
	Seed flow com
	Seed flow high
	Seed flow low
	Seed flow overload
	Internal communication error
	Liquid/nh3 high
	Liquid/nh3 low
	Liquid/nh3 off
	Liquid/nh3 overload

Soft Keys

	Home
	Work switch
	Products 1-5
	Default calibration
	Sensor calibration
	Seed flow
	Calibration
	Liquid/nh3 override
	Product calibration
	Liquid/nh3
	Product on/off
	Product override
	Seed flow loop 1
	Seed flow loop 2
	Liquid/nh3 purge
	2 product ground drive Default Cal
	2 product hydraulic drive Default Cal
	3 product hydraulic drive Default Cal

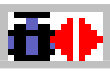
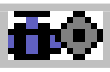
Home Screen ( )

	Fan 1
	Fan 2
	Work switch off
	Work switch on
	Seeder down
	Seeder up
	Low bin
	Low aux
	Variable rate low
	Variable rate high
	GPS speed
	Ground speed
	Radar speed
	Test speed
	Area 1
	Area 2

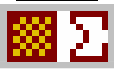
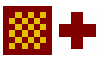
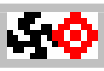
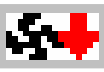
Product Screen ()

	Desired product rate
	Actual product rate
	Product Width
	Total bin volume
	Product weight/volume (Test Weight)
	Product weight remaining in bin
	Bin fill percentage
	Accumulated weight
	Accumulated product weight
	Minimum meter RPM
	Maximum meter RPM
	Meter calibration RPM
	Targets per revolution
	Duty cycle
	Overload
	Percent error
	Target meter RPM
	Actual meter RPM
	Accumulated revolutions
	Product weight per revolution
	Accumulated product weight
	Minimum speed
	Maximum speed
	Accumulated weight
	Accumulated product weight

Liquid/NH3 Screen ()

	Desired product rate
	Actual product rate
	Width
	Total bin volume
	Product weight/volume
	Product weight remaining in bin
	Bin fill percentage
	Accumulated weight
	Accumulated product weight
	Pulses per weight
	Valve purge direction
	Overload
	Liquid/nh3 gain
	Liquid/nh3 valve overload
	Percent error
	Target RPM
	Actual RPM
	Accumulated weight
	Product off
	Product on
	Accumulated product weight

System Setup Screen ( )

	Width
	Speed cal
	Minimum speed
	Test speed
	Distance check
	Distance zero
	Area total
	Area life
	Fan targets
	Fan high RPM
	Fan low RPM
	Product Enable
	Clutch drive enable
	Task controller type
	Task controller tank select
	Liquid/nh3 enable
	X offset

Sensor Calibration Screen ( )

	Low-Bin Sensor
	Empty Meter Box Sensor
	Fan Sensor
	Ground Speed Sensor
	No Sensor Installed
	Regular Sensor Logic
	Inverted Sensor Logic

Notes:

Notes: