2011 Toolbar ECU

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.

Amity Technology cares about your safety! This machine is designed to provide maximum possible safety, but no machine design can prevent operator error or carelessness.

This Operator's Manual provides instructions for the safe operation and maintenance of this machine.

Make sure the machine is in good operating condition.

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.

The content of this manual is the intellectual property of Amity Technology. All use and/or reproduction not specifically authorized by Amity Technology is prohibited.

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.

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.

Section 1: General Information

About your Toolbar ECU

CAN- 2.0b ISO 11783

The ***Toolbar ECU*** is an Advanced Seed Rate/Blockage module to be used with a Virtual Terminal (VT) on a CAN 2.0b bus. The CAN protocol is based on the ISO 11783 standard. It operates with basic functionality which includes blockage detection and seed count of all sensors every second.

The ***Toolbar ECU*** uses infrared seed sensors to measure seed rate and check for blockages. The sensors operate on a similar principle to that of a motion detector in a security system.

2 Loops – 120 Sensors

The module can communicate to two individually controlled sensor loops each capable of handling 120 sensors. The only required setup value is a sensitivity value that sets the minimum seeds/second limit to eliminate blockage alarms.

Your CAN ART can be connected to any ISO 11783-compatible virtual terminal.

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 ***Toolbar ECU***:

- 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 Seed Rate System

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

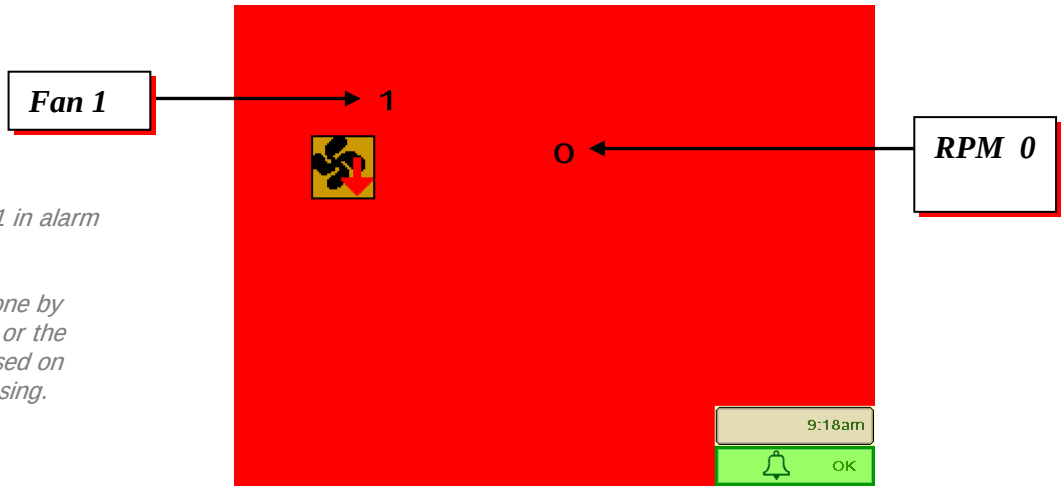
Any ISOBUS-compatible virtual terminal (VT) should be able to communicate with and control your ***Toolbar ECU***. When the VT in your tractor is connected to the ***Toolbar ECU*** it downloads the information from the ECU and displays it on the VT's screen. The central part of the screen displays information 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 Seed Rate, 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 buttons 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
	Seed Flow Blockage
	Seed Flow Communication Error
	Seed Flow High Rate
	Seed Flow Low Rate
	Seed Flow Current Overload
	Internal Communication Error
	Low Battery Voltage



Note:

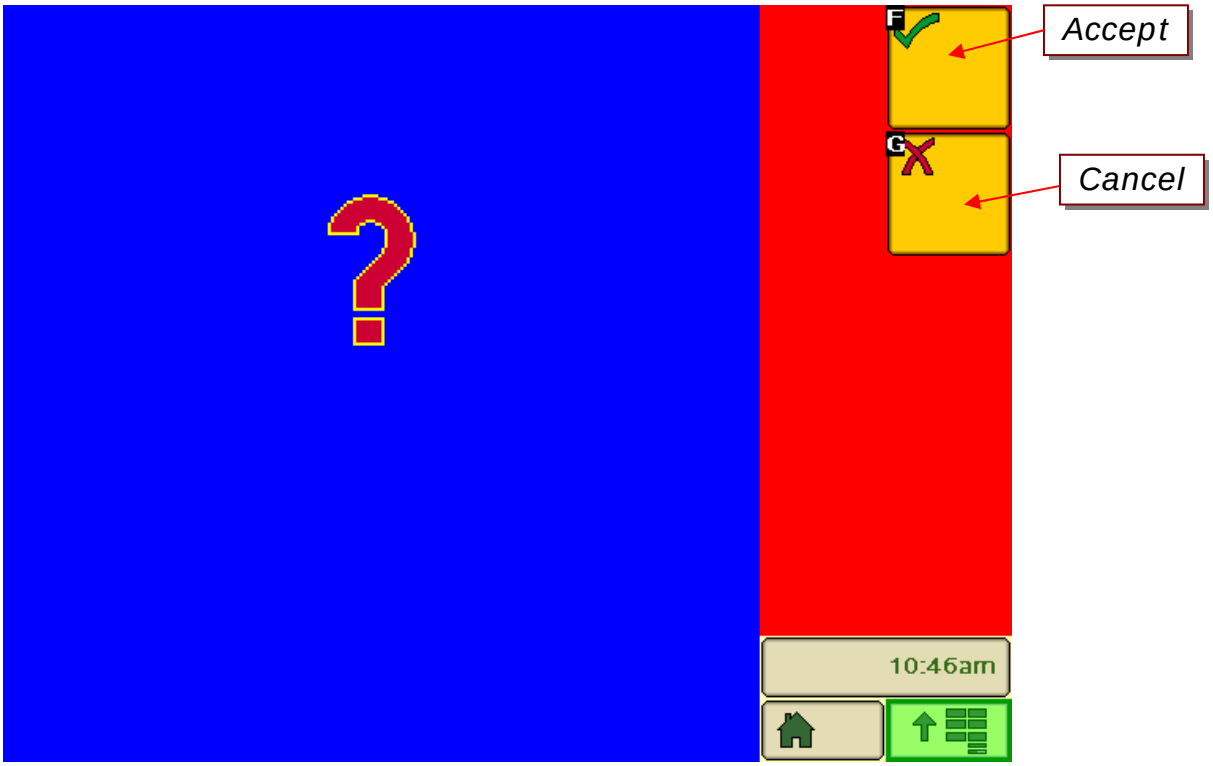
- This alarm screen shows Fan 1 in alarm with a RPM of 0.

- 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

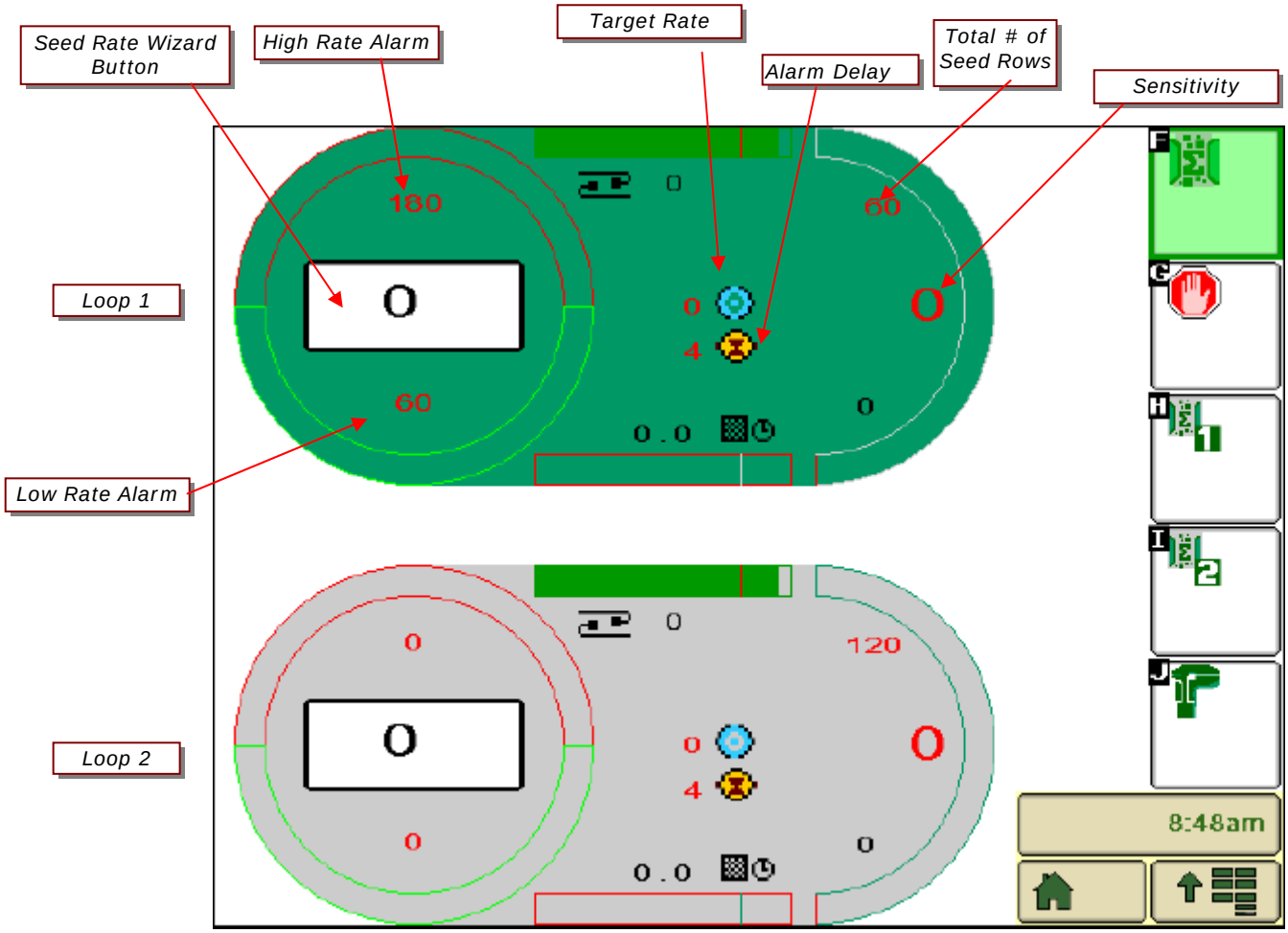
Changing of certain settings or values on your Amity ISO Monitor system may require confirmation, clearing an acre counter or setting the default system settings for example. When confirmation is needed, a blue confirmation screen will appear.

- 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 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

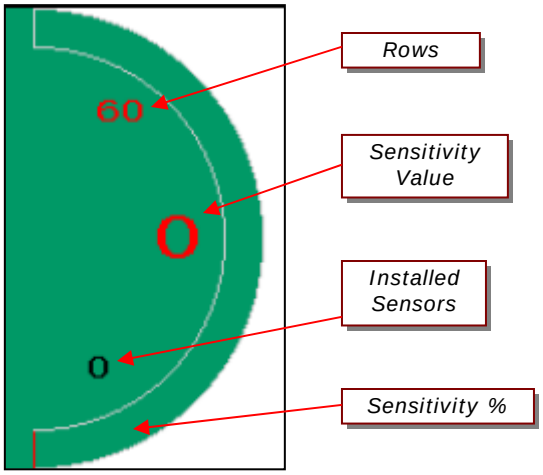
Tip!

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.

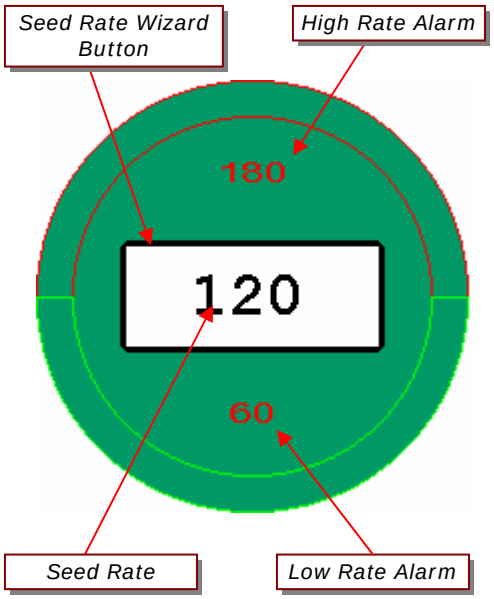
Alarm Delay

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:

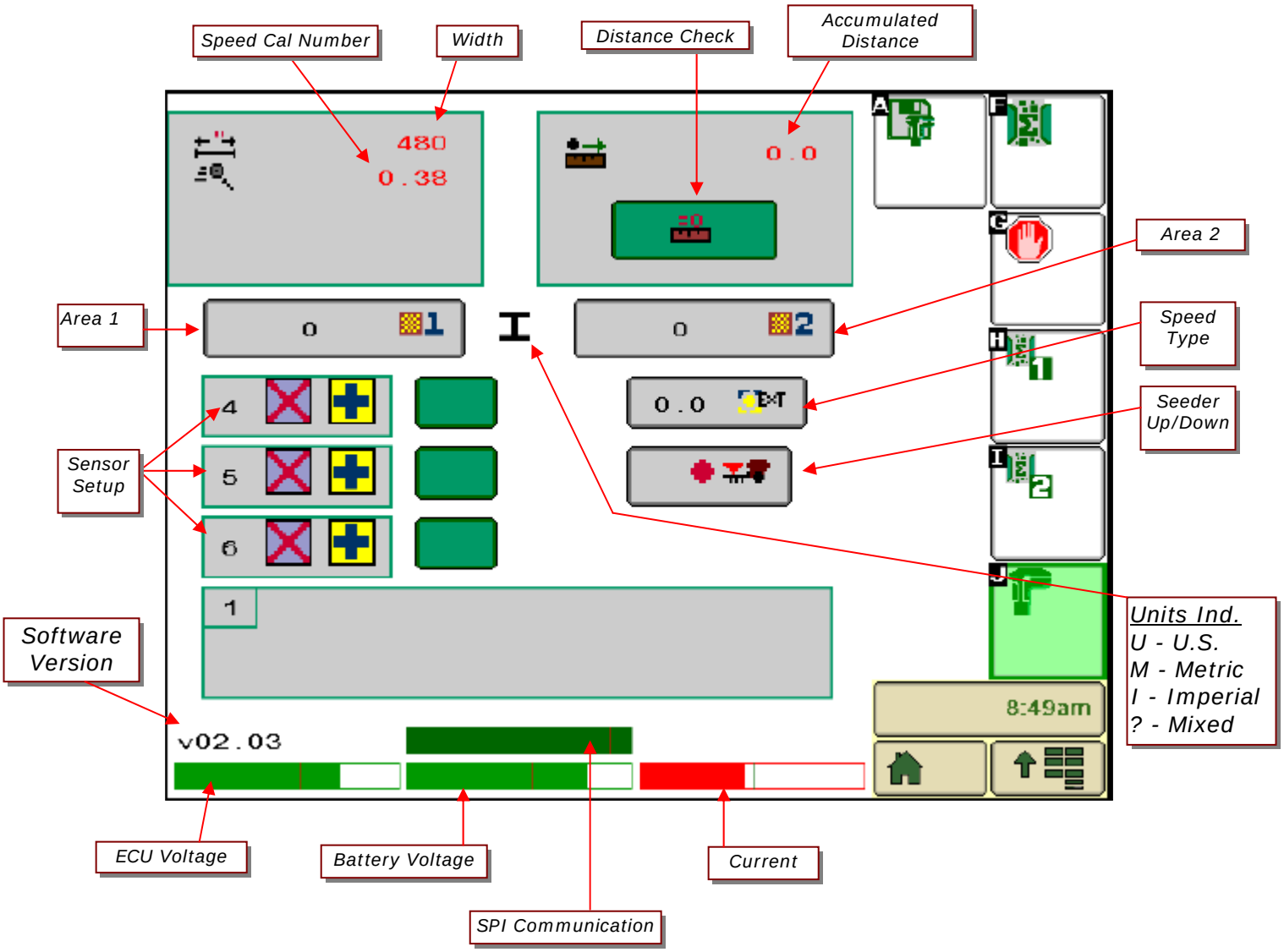
- Will set Seed Rate = Target Rate

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

Section 2: System Setup

Press the calibration key to access the following system settings menu.



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		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.

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.

Width

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

1. From the main ART screen, press the calibration key, then the ***Width*** icon.
2. Enter the width value in inches (mm).

Speed Cal Number

The Speed Cal is only used if there is a speed sensor installed.

1. From the main ART screen, press the calibration key, then the ***Distance Check*** icon. This will change Accumulated Distance to 0.0.
2. Measure and drive a known distance.
3. Enter the distance driven in feet (meters) in the Accumulated Distance.
4. The Speed Cal number will automatically change.

Distance Check

The Distance Check button will clear the Accumulated Distance.

1. From the main ART screen, press the calibration key, then the ***Distance Check*** icon.
2. Accumulated Distance will change to 0.0.

Accumulated Distance

When a speed sensor is attached, distance travelled will accumulate in feet (meters). Pressing the Distance Check button will clear the Accumulated Distance.

Area 1 and Area 2

There are two tools to use when calculating planted acres: **Area 1** and **Area 2**. Use the following procedure to reset them in preparation for totalizing planted acres:

1. Press the Area 1button to reset the Field Acres total to zero.
2. Press the Area 2 button once to reset the Total Acres total to zero.

Seeder Up/Down

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

Symbol	Alarm
	WS “Ready”
	WS “Hold”
	Seeder UP
	Seeder DOWN

Important!

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

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.

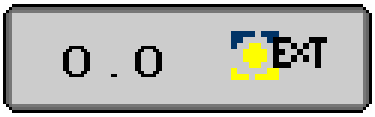
Default Calibration

Pressing the ***Default Calibration*** key will set ECU to factory defaults.

Important!

If Voltage is under the line indicator the ECU will not save calibrations.

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)

Note:
The Default Speed Type is External ECU speed. The Ground Speed is normally obtained over the ISO-Bus from the Cart ECU.

Sensor Types

The following symbols represent the sensor types that are available:

Symbol	Sensor Type
	Ground Speed
	Automatic Work Switch
	None

Note:
Loop 1 must be turned on (Sensitivity>0) in order to provide power for the ground speed sensor.

Note:
For proper operation, only one of the Amity Technology ECU's connected to the same ISO-Bus can have a channel set to Ground Speed or Automatic Work Switch.

Toolbar ECU Sensor Channel Info

4 – Ground speed 5 – Automatic Work Switch
6 – Spare

Sensor Logic

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

Work Switch Operation

The ISO in a Box 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 ART system. Lowering the machine automatically turns on the ART system. In this mode you can also use the manual work switch soft key on the main VR screen to turn the ART system on and off. If you prefer to operate the ART 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:

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

   The Sensor Types page appears.

1. Select the sensor number the work switch is connected to.

2. Select ***None***

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

Setting Up **Automatic** Work Switch Operation

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

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.

1. On the Sensor Calibration page Select the sensor number the work switch is connected to. (Channel 5 on Toolbar ECU)

2. Change its setting to work

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

4. Raise the planting system.

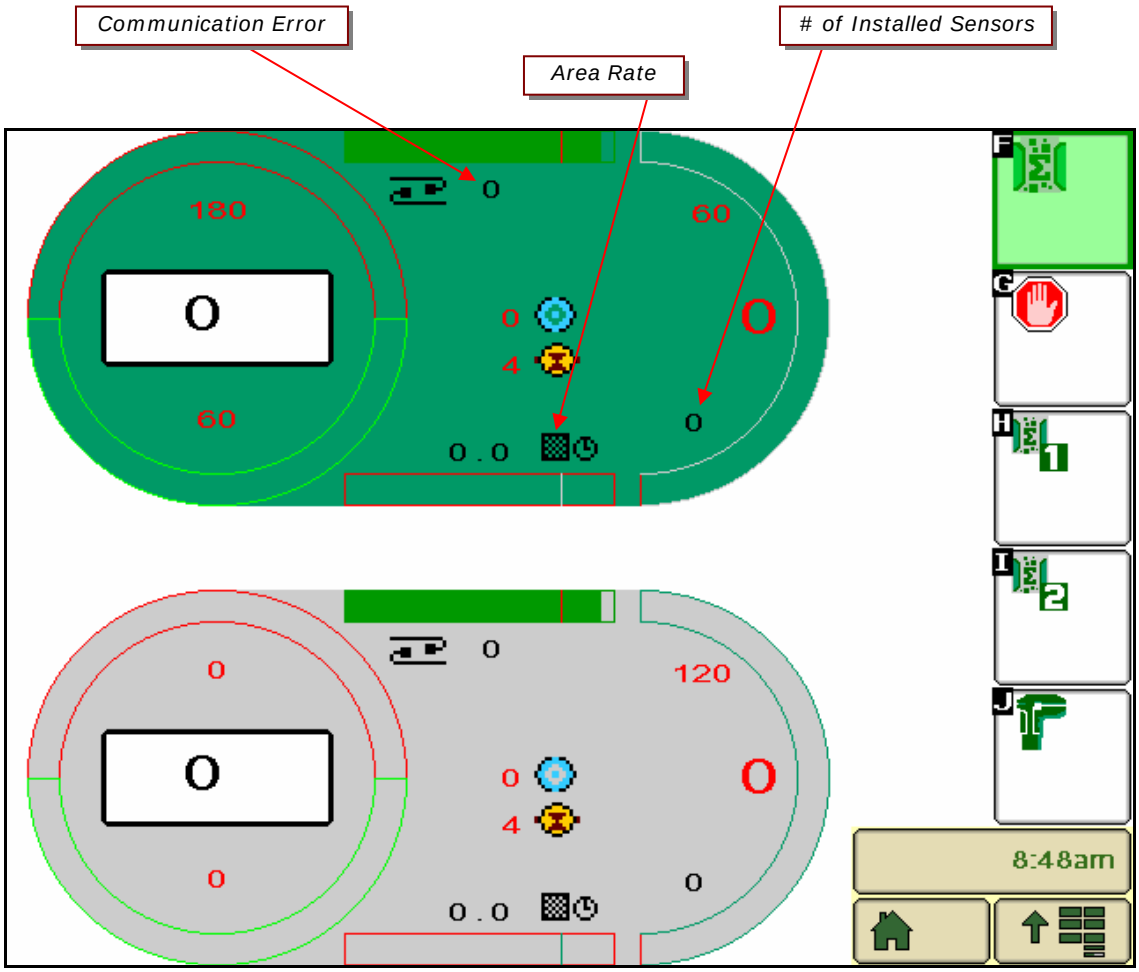
5. On the Main VR page, press the On/Off (Work switch) soft key.

Note:
The Automatic Work Switch should be configured to Channel 5.

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

7. Lower the planting system. The workswitch softkey should turn green.

Section 3: Seed Monitoring Operation



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

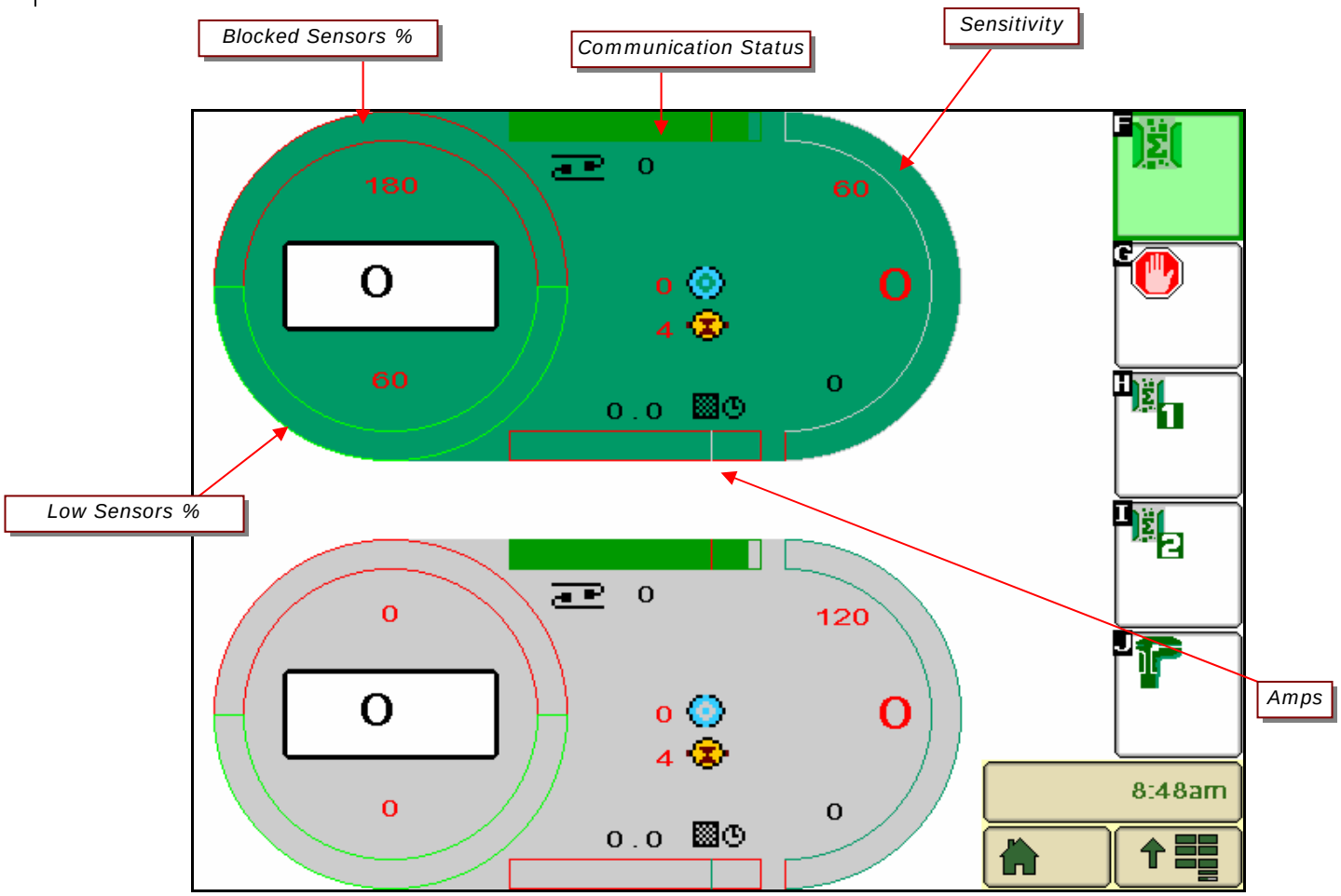
The system will display area coverage over time (in units selected by user).

Communication Error

The system will display any sensors with communication errors.

1. See System Troubleshooting for possible solutions.

System Information Bars

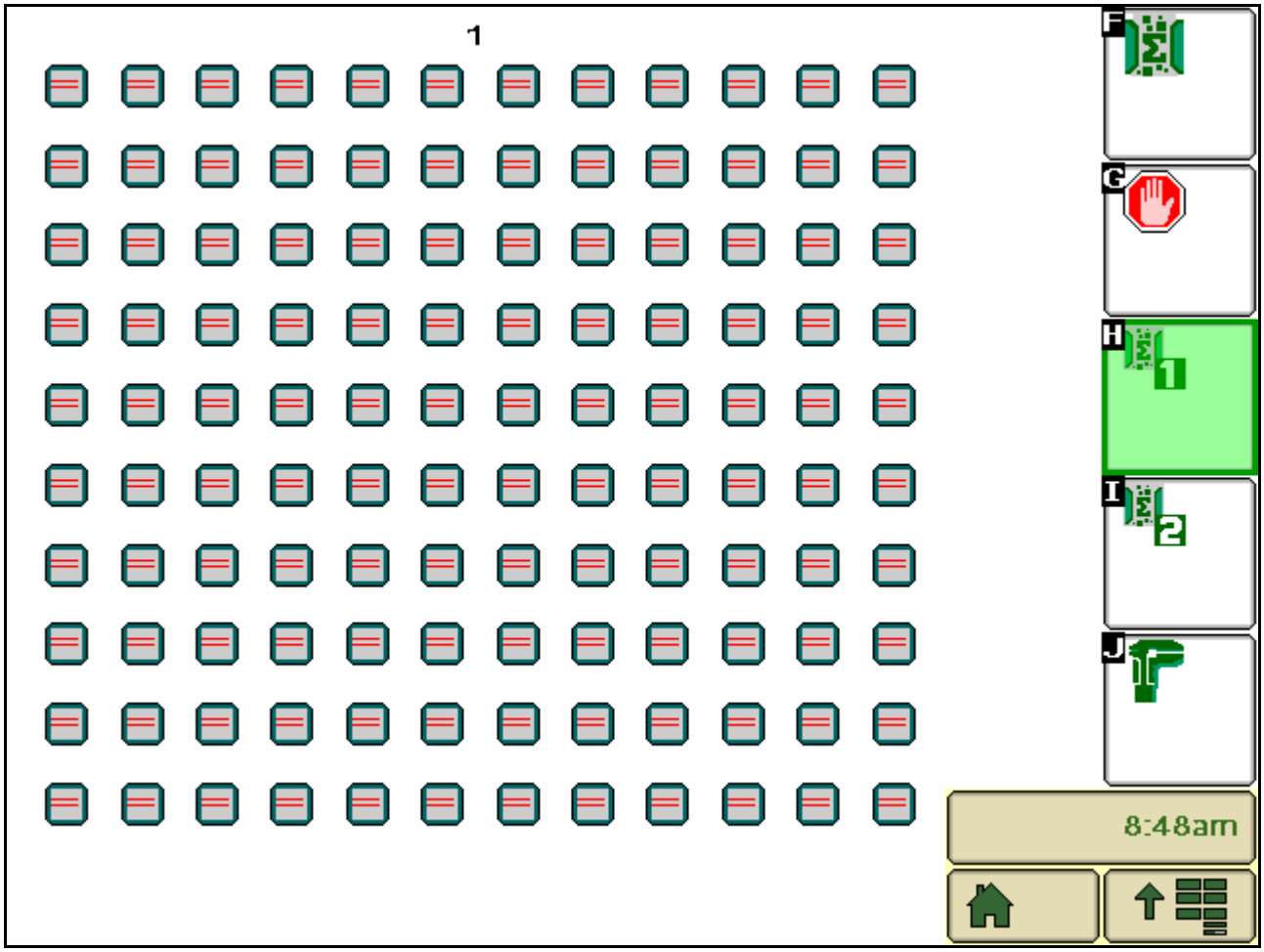


Status Bar	Function
Blocked Sensors	Shows % of blocked sensors
Low Sensors	Shows % of sensors with low seed count
Communication	Shows sensor communication status - should be past line
Amps	Shows current for that Loop– should be below line
Sensitivity	Shows sensitivity as %

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



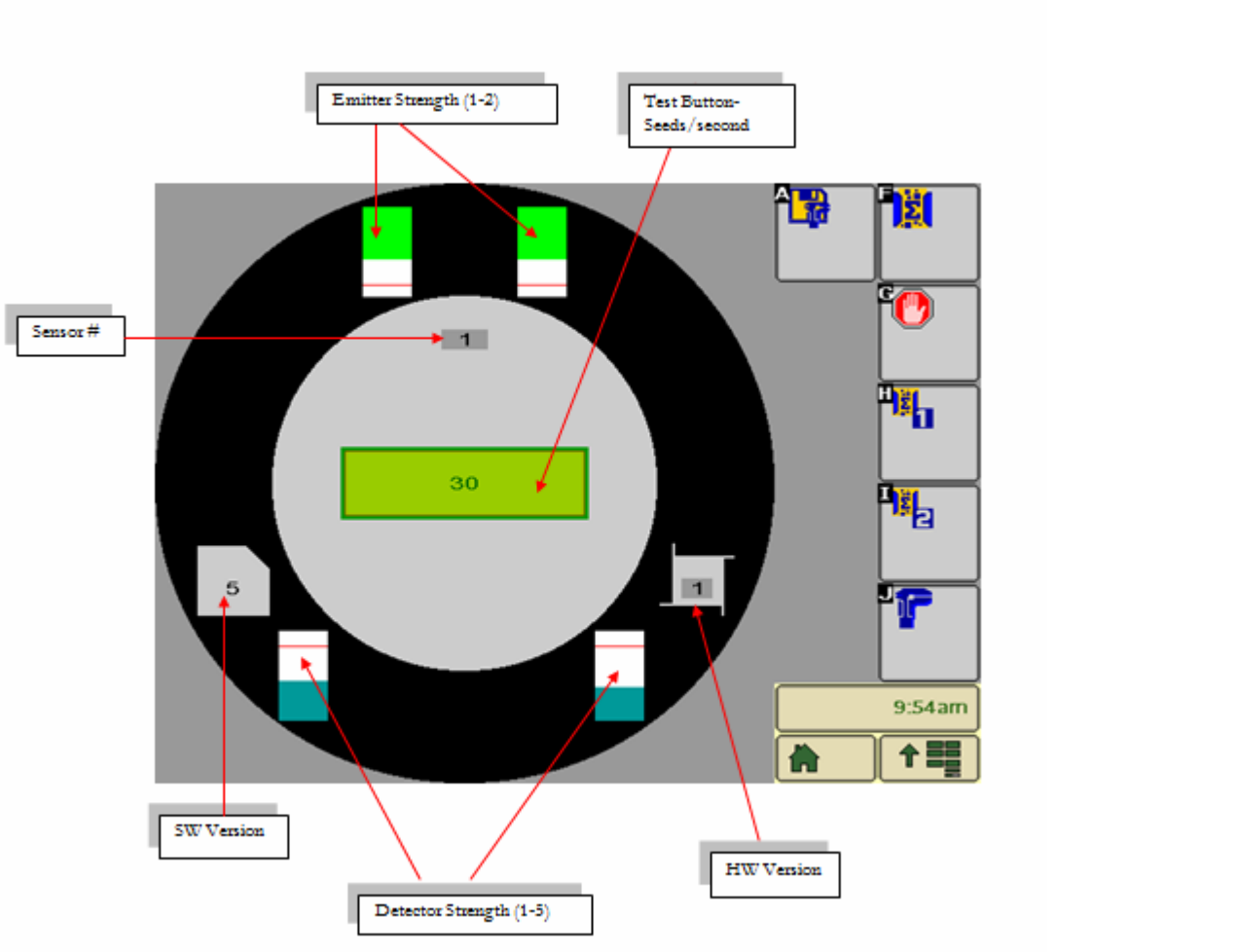
2. The status of each sensor will be shown as follows:

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

Section 4: Troubleshooting

System Alarms

Status Bar	Function	Status Bar	Function
	Blocked sensors		Low Battery voltage
	Communication error		Seed Flow High Rate
	Amp overload		Seed Flow Low Rate

Common Problem and Solutions

Symptom	What it means	Recommended action
No loop information	The loop indicated is turned off.	To turn loop on, increase sensitivity >0
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.

Symptom	What it means	Recommended action
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.

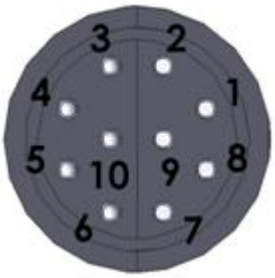
Section 5: Appendix

Appendix A: 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

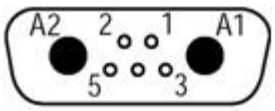
Appendix B: Connector Pin-outs

Sensor Breakout Connector Pin-out



Pin #	Color	Use
1	Grey	Shield
2	Black	Ground
3	Yellow	Sensor communications
4	Green	Sensor communications
5	Brown	Loop 1 – sensor ch 4 Loop 2 – sensor ch 7
6	Red	Loop 1 – sensor ch 5 Loop 2 – sensor ch 8
7	White	12 Volt power
8	Blue	Sensor communications
9	Violet	Sensor communications
10	Orange	Loop 1 – sensor ch 6 Loop 2 – sensor ch 9

DSUB Connector Pin out

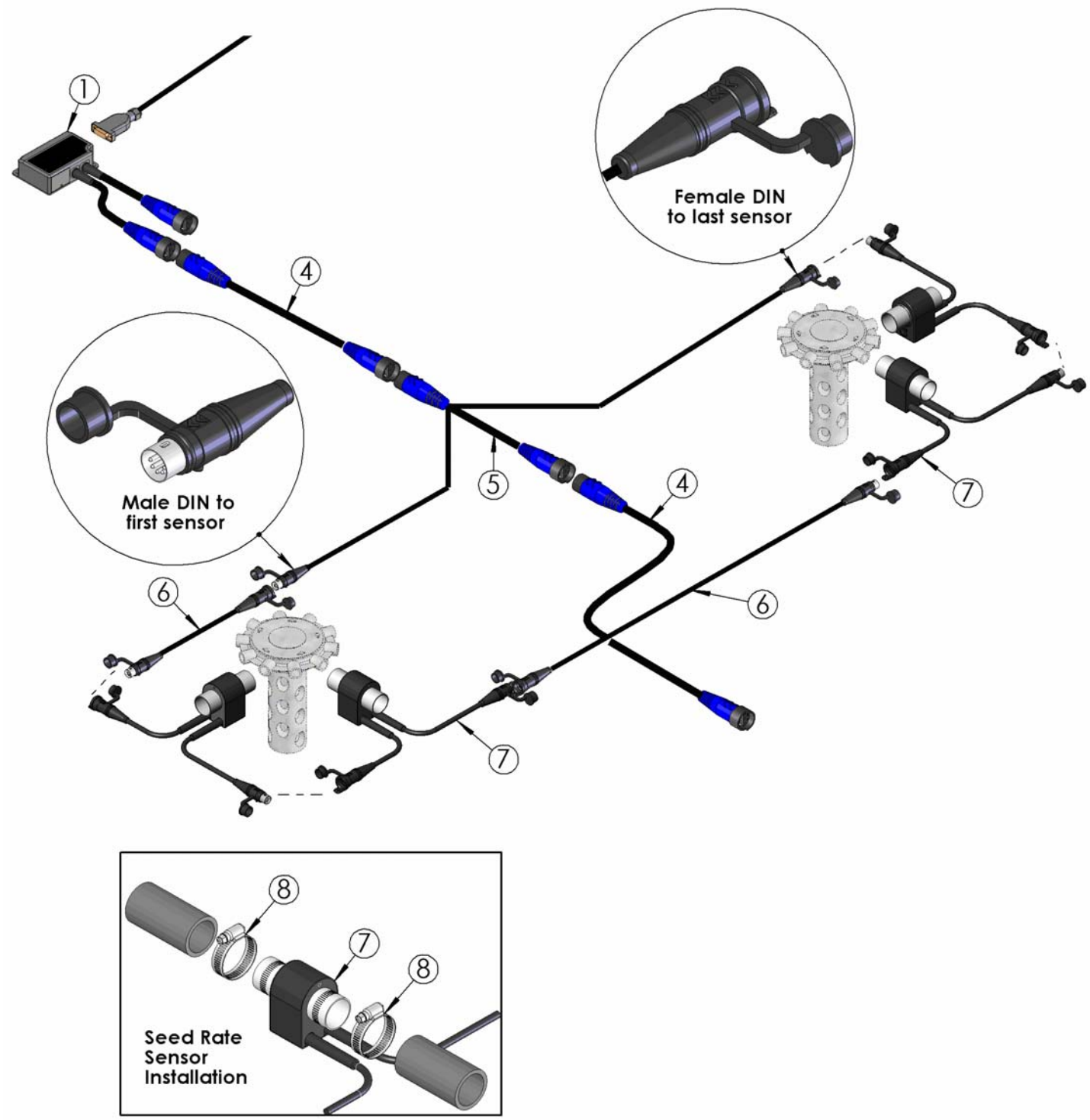
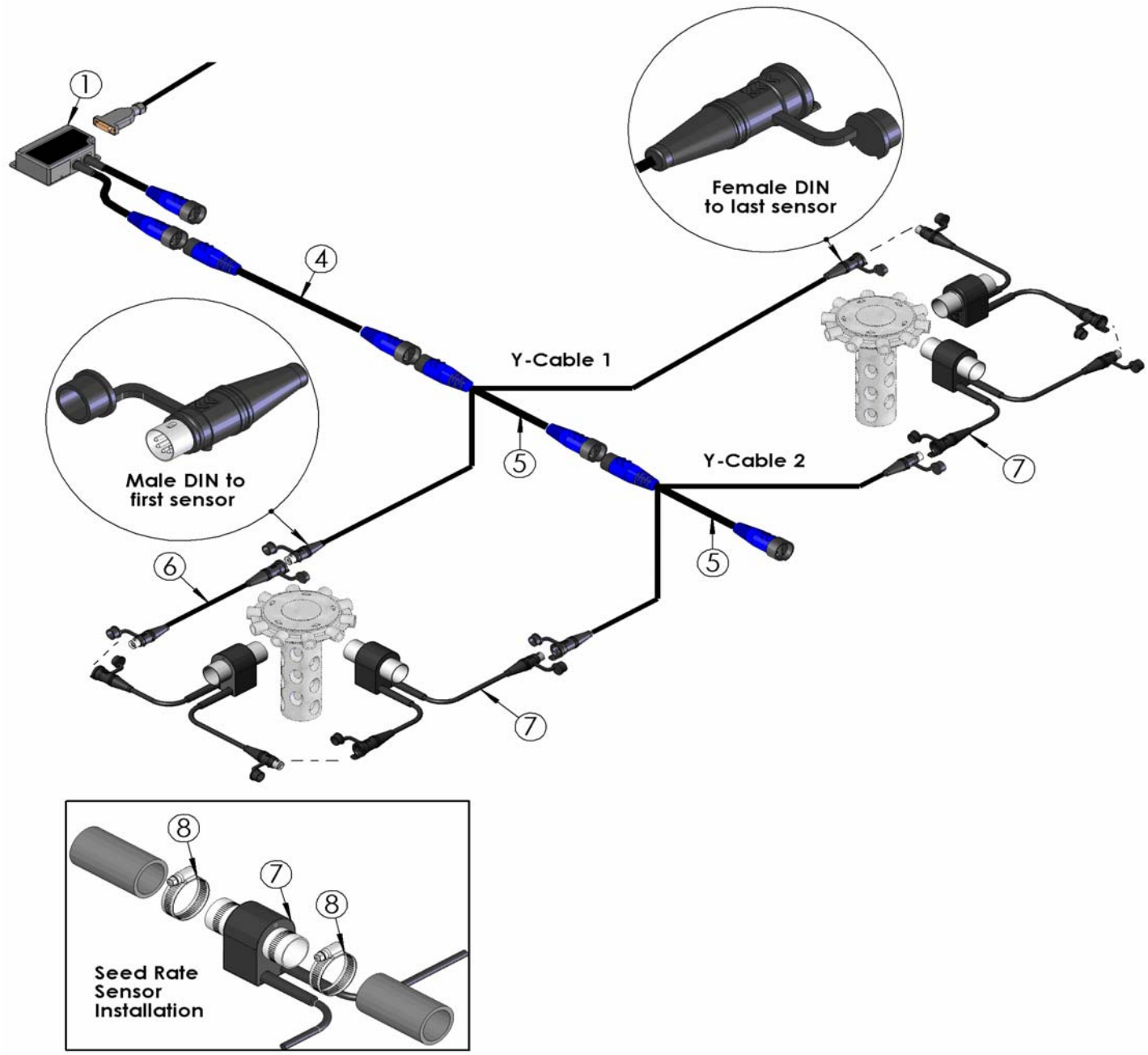


Female View

Pin #	Function
A1	Battery Negative
A2	Battery Positive
1	ECU GND
2	ECU PWR (12V)
3	CAN H
4	Not used-do not connect
5	CAN L

Appendix C: Assembly Diagram

Less than 60 sensors



More than 60 sensors