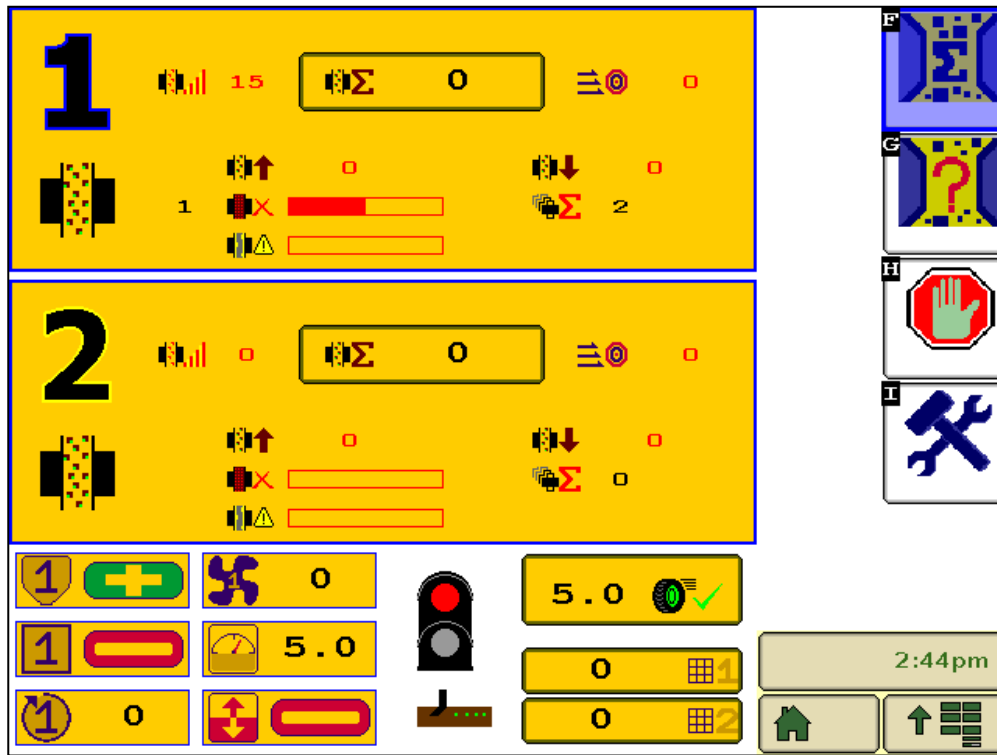# CAN ART
ISOBUS Compatible Rate and Blockage Monitoring System

Operator's Manual MND200703 for Software Revision 3.02

Quick Start Setup

Important! Must be seeding in order to perform a complete calibration

Work switch

Pressing the **Work Switch** enables all alarms.

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 Seed Sensors

The system displays the number of **Installed Seed Sensors** on the Main ART screen.

1. Ensure the correct number of sensors is shown to the right of the installed sensors icon.
2. If the number is incorrect, see Troubleshooting Table at back of manual.

Blockage Setup

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 indicated, a blockage alarm occurs.

Set Sensitivity

Important! Must Be Seeding to Set Sensitivity

From the Main ART screen

1. Press the red number to the right of the Sensitivity icon
2. Set the value to 15
3. Increase the sensitivity value by 10
4. Watch for blockage alarm
5. If blockage alarm does not occur repeat steps 3 & 4
6. If blockage alarm does occur, decrease sensitivity value by 3 to 5
7. Set Sensitivity to zero to turn loop power off

Rate Setup

Rate setup indicates how much product is being put into the ground. A speed value is required in order to use the Seed Rate Wizard.

Set Speed

1. Press the Calibration Softkey

2. Select the red number to the right of the **Test Speed** icon

   (The value should be the speed normally travelled in field.)

3. On the Main ART screen press the speed type button to select **Test Speed** type.

Speed Type Select

Perform Seed Rate Wizard

Tip:
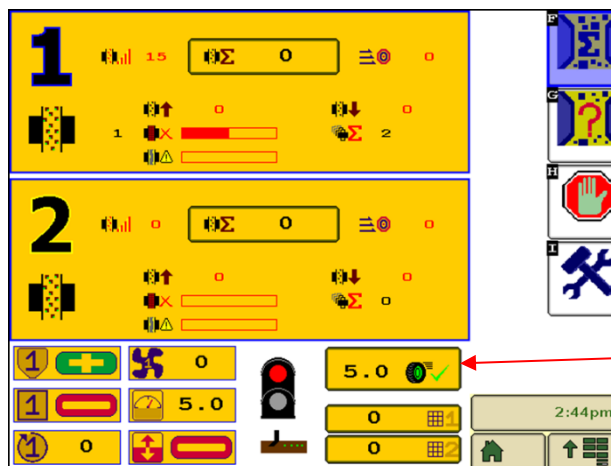
High and Low Seed Rate alarms will automatically be set when the Seed Rate Wizard button is pressed.

Important! Must Be Seeding to Perform Seed Rate Wizard

On the Main ART screen.

1. Press the red number to the right of the ***Target Rate*** icon

2. Enter the desired rate

3. Press the ***Seed Rate Wizard*** button

    The value should be close to selected Target Rate.

Follow safety Instructions

- Be sure to follow all safety instructions in your air seeder operator's manual.

Read and Understand This Manual Before Operating This Machine.

- Learn how to operate and service the machine correctly. Failure to do so could result in personal injury or equipment damage. Agtron Enterprises Inc. 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 Agtron Enterprises Inc. Customer Service.
- This manual should be considered a permanent part of your machine and should remain with the machine when you sell it.
- Agtron Enterprises Inc. reserves the right to alter illustrations and technical data contained in this manual.
- The contents of this manual are the intellectual property Agtron Enterprises Inc. All use and/or reproduction not specifically authorized by Agtron Enterprises Inc. is prohibited.
- All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. Agtron Enterprises Inc. reserves the right to make changes at any time without notice.
- ATTENTION! Low battery or alternator voltage can cause system errors.

Table of Contents

About the CAN ART Rate and Blockage System

CAN- 2.0b ISO 11783

The CAN ART is a Rate and Blockage ECU 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 CAN ART 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 ECU can communicate with two individually controlled Sensor Loops each capable of handling 120 seed sensors. The only required setup value is a sensitivity value that sets the minimum seeds/second limit to eliminate blockage alarms.

The ECU is also able to monitor up to six additional sensors (shaft, fan, bin, work, speed, etc.) connected through an optional Sensor Breakout Harness on each Loop.

Using Virtual Terminals with Your ISO Rate and Blockage System

Tip*:*

For detailed information on how to operate your Virtual Terminal, refer to its operation manual.

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.

Any ISOBUS compatible virtual terminal (VT) should be able to communicate with and control your CAN ART. When the VT in your tractor is connected to the CAN ART 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 ISOBUS Rate and Blockage system, 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.

Go to www.agtron.com to view the current Virtual Terminals that can be used with your Rate and Blockage system.

System Installation

CANBUS Harness

Figure 1.0

1. For Installation of CANBUS Harness on non-ISO Tow Between Air Cart setup or Tow Behind Air Cart setup plug the CANBUS Harness into ISO plug on the rear of the tractor. (See Figure 1.0)

2. For Installation of CANBUS Harness on ISO Tow Between Air Cart setup, you can plug the CANBUS Harnesss into the ISO plug on the rear of the Air Cart. (See Figure 1.1)

3. Select a mounting location to protect the ECU

4. Affix the ECU to the frame of the tank or toolbar.

5. Connect the CANBUS Harness Cable to the DSUB connector on the ECU with two (2) jackscrews. See Figure 1.2.

Figure 1.1
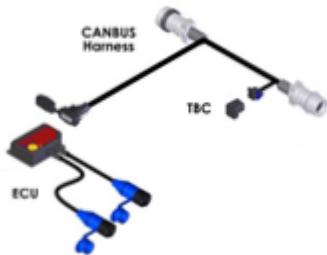
CAN Terminating Bias Circuit

Figure 1.2

A CAN Terminating Bias Circuit connector must be installed on the CANBUS Harness Cable if there is no other ECU installed at the end of the system or if the CAN ART is physically at the end of the system.

Cable Ties and Main Extension Cable Installation
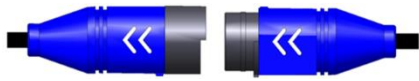
Figure 1.3

COLORED CABLE TIES

The coloured cable ties included in this kit are to assist in easy installation and to differentiate between the two loops of sensors.

1. Attach blue ties for all Loop 1 cables.

2. Attach yellow ties for all Loop 2 cables.

MAIN EXTENSION CABLES

Figure 1.4

ECU Female   Extension Cable Male

Figure 1.5

When making Extension Cable connections, make sure you align the molded arrows. If they are difficult to push together, check the condition of the pins. For each Loop (1 for Single; 2 for Dual):

1. Connect the cable from the ECU to a 10ft or 20ft Main Extension Cable.

2. Route the Main Harness Extension Cable to the implement hitch.

3. Secure the Main Harness Extension Cable to the equipment with cable ties, allowing enough slack for hitch movement.

Tip:

To help avoid electrical interference problems, create a figure eight shape with excess cable before securing.

Seed Sensor and Sensor Loop Cable Installation

Figure 1.6

Figure 1.7

Tip:

*If necessary, apply heat to the hose ends in order to fit the hose over the sensor.*

1. Select a mounting location near the distributor.

   Mount the Seed Sensors in the hose above the implement chassis to protect the Seed Sensors and cables from field debris damage.

   The Sensor Loop Cables should not be stretched tight when connected.

2. Secure the Seed Sensors in the hose using metal hose clamps on each side (Agtron Part# 400TRHS16 not included).

3. Select a seed sensor on the far left of the machine to be seed sensor #1. Leave the female plug of this sensor unplugged, but connect the male plug to the seed sensor beside it. This will be sensor #2.

4. Continue connecting seed sensor #2 to seed sensor #3 and so on, until the manifold is all connected. Attach a Sensor Loop cable to the male end of the last sensor on the first manifold.

5. Connect the male end of the Sensor Loop Cable to the female end of the first seed sensor on the 2nd manifold. Continue in this fashion until you reach the far right side of the implement, leaving the male end on the last sensor unplugged.

6. Using cable ties attach all cables to the frame of the implement. Avoid pinch points such as wing & opener lift points.

Y-Cable Installation

For the following installation procedures, refer to the Installation Diagrams. (Figure 1.11 & Figure 1.12)

Figure 1.8
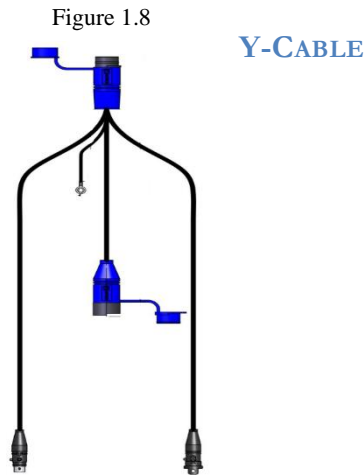
Y-CABLE

1. Select a mounting location for the Y-Cable in the center of the implement.
2. Secure the ring terminal of the Y-Cable to the chassis of the implement to ground the cable.
3. Connect the Y-Cable's male Sensor Loop Cable to Seed Sensor 1 (normally located on the far left side of the implement) using Sensor Loop Cables as required.
4. Connect the Y-Cable's male Sensor Loop Cable to the last Seed Sensor (normally located on the far right side of the implement) using Sensor Loop Cables as required.
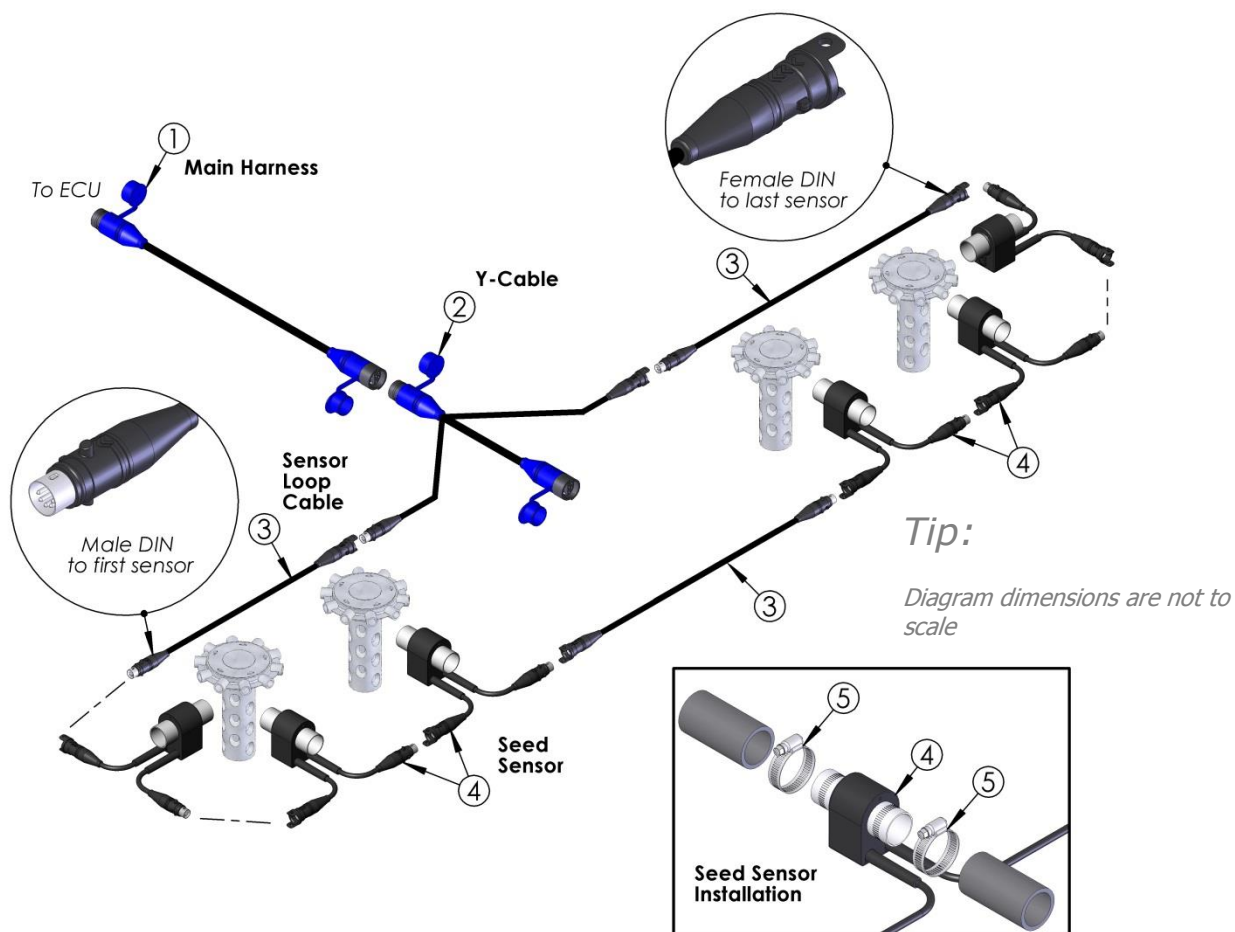
Y-CABLE (MORE THAN 60 SENSORS)

1. On systems with more than 60 Seed Sensors, an additional Y-Cable must be installed in the middle of the loop to improve power distribution.
2. When making Sensor Loop cable connections, make sure you align the molded arrows. If they are difficult to push together, check the condition of the pins.
3. To prevent cable damage, route the cables so they follow the hydraulic hoses whenever possible.
4. Connect the blue male end of the second Y-Cable to the blue female end of the first Y-Cable.
   1. Connect the second Y-Cable's male and female Sensor Loop cables into the middle of the seed sensor loop (Using in place of a Sensor Loop cable)
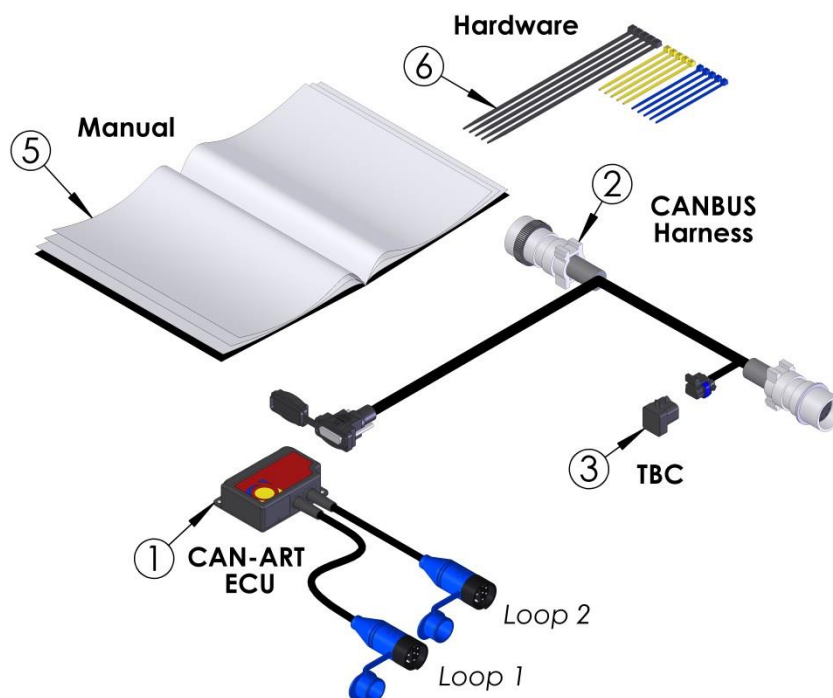
Item	Part Number	Description
1	AGD2210 AGD2110	ISOBUS Dual Loop Rate & Blockage ECU ISOBUS Single Loop Rate & Blockage ECU
2	AGD2003	CANBUS Harness
3	AGD3093	CAN Terminating Bias Circuit
5	MND2007	Manual
6	4TYWR14.0 850040001 850040002	Black Cable Ties (14.5") Blue Cable Ties (4") Yellow Cable Ties (4")

Figure 1.10: Installation (Less than 60 Seed Sensors)

Item	Part Number	Description
1	9ARTM10 9ARTM20	Main Extension Cable 10FT Main Extension Cable 20FT
2	9ARTY10	Y-Cable
3	9ARTX02 9ARTX04 9ARTX10 9ARTX20	Sensor Loop Cable 2ft (0.6m) Sensor Loop Cable 4ft (1m) Sensor Loop Cable 10ft (3m) Sensor Loop Cable 20ft (6m)
4	AGSS22 AGSS24 AGSS25 AGSS32	Seed Sensor 7/8" (22mm) Seed Sensor 15/16" (24mm) Seed Sensor 1" (25mm) Seed Sensor 1 1/4" (32mm)
5	400TRHS16	Hose clamp size 16

Figure 1.11: Installation Diagram (More than 60 Seed Sensors)

Tip:

Diagram dimensions are not to scale
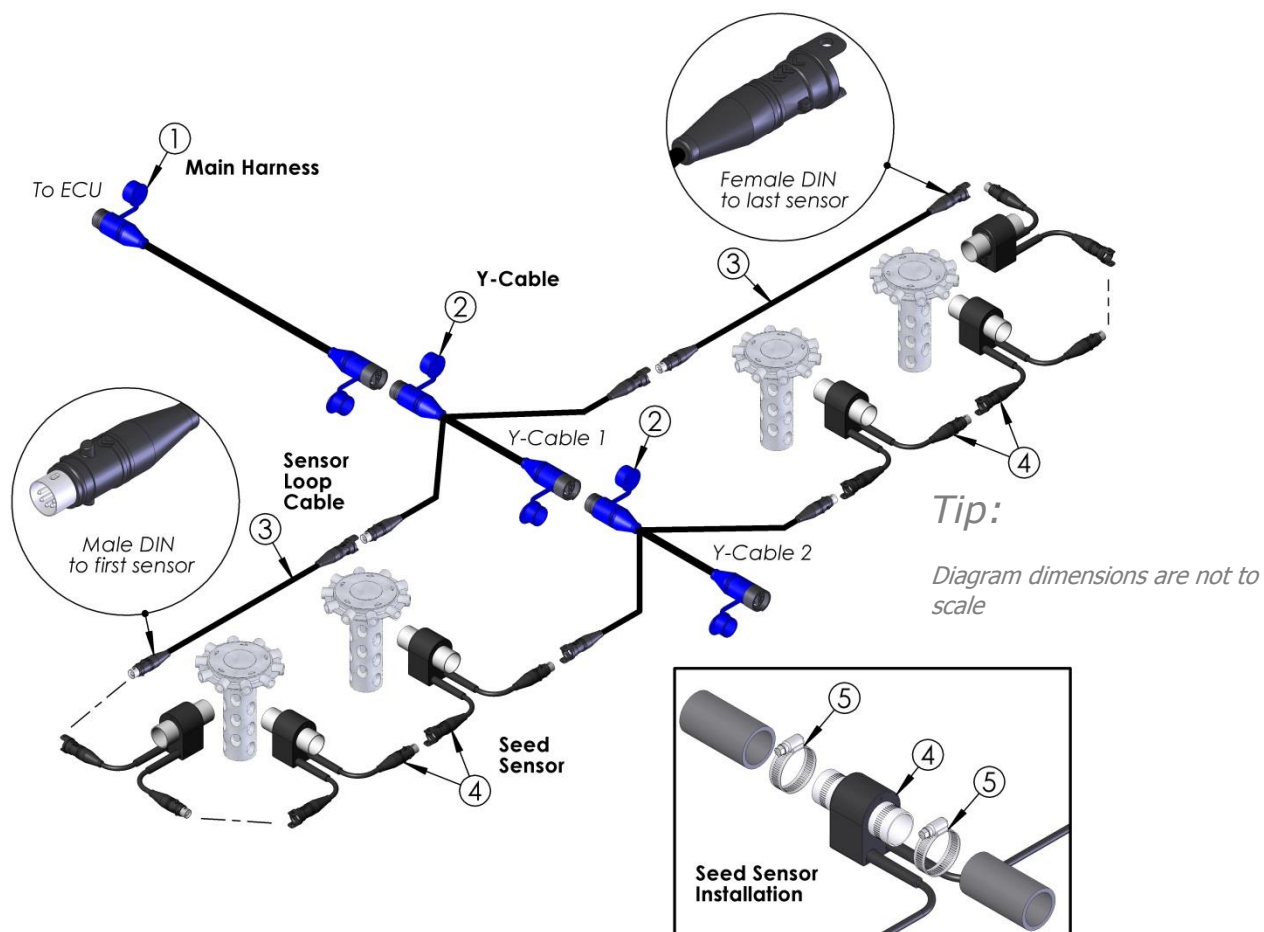
Tip:

Same parts for Figure 1.12 Installation Diagram with more than 60 sensors

Optional Sensor Installation

NOTE:

Sensor Breakout Harness connectors #4, 5, and 6 are for Loop 1;Connectors 7, 8, and 9 are for Loop 2 (See Figure 1.12)
Refer to Appendix B for more information

Automatic Work Switch

Requires Sensor Breakout Harness and Shaft/Work Switch Sensor.

1. Install the Work Switch Sensor and magnet on the toolbar in a place where the magnet and sensor are within ½" of each other in the working position and far from each other when not working (when the drill is up).

2. Connect the Work Switch Sensor to one of the connectors on the Sensor Breakout Harness. Make note of the channel # on the connector.

3. Connect the Sensor Breakout Harness in-line with the Y-Cable. (See Figure 1.13 & 1.14)

4. Turn to the Calibration portion of this manual for information on how to set up optional sensors in the system.

Shaft Sensor

Requires Sensor Breakout Harness and Shaft Sensor.

1. Attach the supplied magnet to a Shaft (rotation under 1000rpm).

2. Select a mounting location for the sensor within ½" (13mm) of the magnet.

3. Connect the Shaft Sensor to one of the connectors on the Sensor Breakout Harness. Make note of the channel # on the connector.

4. Connect the Sensor Breakout Harness in-line with the Y-Cable. (See Figure 1.13 & 1.14)

5. Turn to the Calibration portion of this manual for information on how to set up optional sensors in the system.

Fan Sensor

Requires Sensor Breakout Harness and Fan Sensor.

1. Mount the sensor within 1/16" (1mm) of a ferrous metal target such as a bolt head. (Over 500rpm).

2. Connect the Fan Sensor to one of the connectors on the Sensor Breakout Harness. Make note of the channel # on the connector.

3. Connect the Sensor Breakout Harness in-line with the Y-Cable. (See Figure 1.13 & 1.14)

4. Turn to the Calibration portion of this manual for information on how to set up optional sensors in the system.

Bin Sensor

Requires Sensor Breakout Harness and Bin Sensor.

1. Select a mounting location in the tank at the desired empty product level. The Bin Sensor alarms when product does not cover it.

2. In the selected mounting location, drill a 1/4" (6mm) hole. This is the hole for the bin sensor cable.

3. Drill a 1/8" hole, 1 5/8" on either side of the first hole. These are the holes for mounting the bin sensor.

4. Using needlenose pliers, take apart the Deutsch connector on the bin sensor cable.

5. Instructions on how to take apart the connector are included in the bin sensor kit.

6. Route the cable through the ¼" hole.

7. Put the Deutsch cable back together. (Pin 1:Red, Pin 2:Green, Pin 3:Black)

8. Secure the Bin Sensor to the mounting location with the #8 Philips Screws provided. Depending on the thickness of the tank, either ½" or 1" can be used.

9. Connect the Bin Sensor to one of the connectors on the Sensor Breakout Harness. Make note of the channel number you have selected.

10. Connect the Sensor Breakout Harness in-line with the Y-Cable. (See Figure 1.13 & 1.14)

11. Turn to the Calibration portion of this manual for information on how to set up optional sensors in the system.

Requires Sensor Breakout Harness and Speed Sensor.

1. Attach the supplied magnet to a wheel or shaft that turns when the seeder is in motion.

2. Select a mounting location for the sensor within ½" (13mm) of the magnet.

3. Connect the Speed Sensor to one of the connectors on the Sensor Breakout Cable. Make note of the channel # on the connector.

4. Connect the Sensor Breakout Harness in-line with the Y-Cable. (See Figure 1.13 & 1.14)

5. Turn to the Calibration portion of this manual for information on how to set up optional sensors in the system.

Figure 1.12: Installation Diagram (Sensor Breakout Cable)
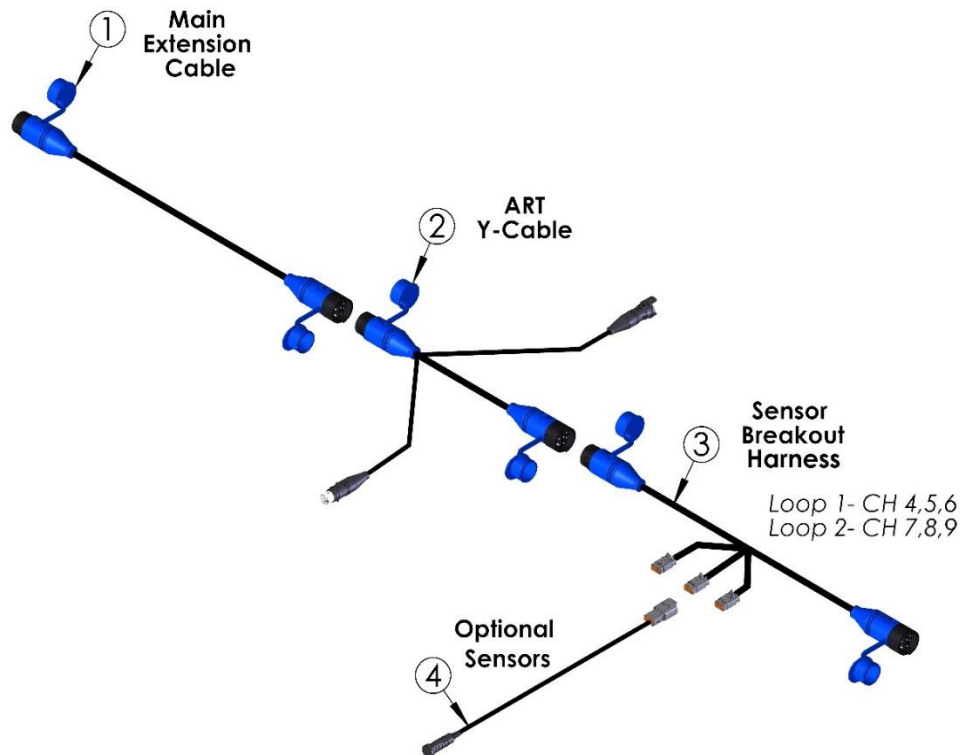
Item	Part Number	Description
1	9ARTM10 9ARTM20	ART Main Extension Cable 10FT (3M) ART Main Extension Cable 20FT (6M)
2	9ARTY10	ART Y-Cable
3	9ART036	Sensor Breakout Harness
		Optional Sensors
Item	**Part Number**	**Description**
4	9AGPS01 9AGPS02	GPS Speed Sensor (5Hz) GPS Speed Sensor (1Hz)
	AGBN007 AGBN008	Bin Sensor 20FT (6M) Bin Sensor 6FT (1.8M)
	9ART090	3P Deutsch to AMP CPC Radar Adapter
	9ART091	3P Deutsch to AMP CPC Radar Y-Cable
	AGCS001	Capacitive Proximity Sensor (Meter Sensor)
	AGIND01	Inductive Fan Sensor 20FT (6M)
	AGSH001	Low RPM Reed Switch Sensor 20FT (6M)
	9KRT069	3P Deutsch to Relay Kit
	9ART089	3P Deutsch With Bare Wire Ends

The Terminator will go at the end of the second loop Sensor Breakout cable if no Seed Sensors are installed, this is to get the monitor to provide constant power to the loop when other sensors are installed (i.e.: Fan, Shaft and Bin). The Monitor will recognize this as a loop with zero seed sensors. The terminator has a red LED to indicate power is ON.

Tip:

A Y-Cable with the Seed Sensor connections mated together can be substituted for the terminator
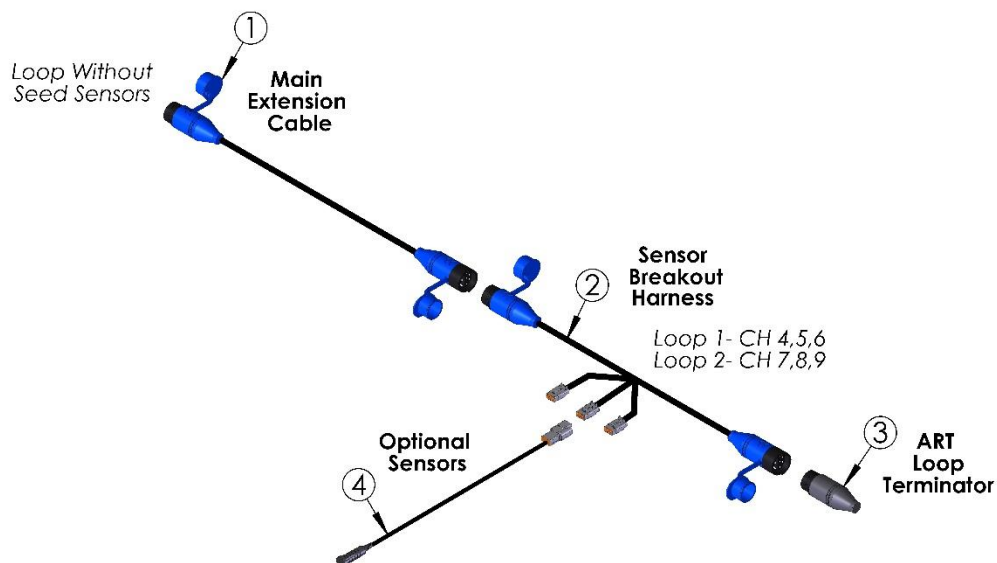
Item	Part Number	Description
1	9ARTM10	10 FT Main Extension Cable
	9ARTM20	20 FT Main Extension Cable
2	9ART036	Toolbar Sensor Breakout Harness
3	AGRT071	ART Loop Terminator
Optional Sensors		
Item	**Part Number**	**Description**
4	9AGPS01	GPS Speed Sensor (5Hz)
	9AGPS02	GPS Speed Sensor (1Hz)
	AGBN007	Bin Sensor 20FT (6M)
	AGBN008	Bin Sensor 6FT (1.8M)
	9ART090	3P Deutsch to AMP CPC Radar Adapter
	9ART091	3P Deutsch to AMP CPC Radar Y-Cable
	AGCS001	Capacitive Proximity Sensor (Meter Sensor)
	AGIND01	Inductive Fan Sensor 20FT (6M)
	AGSH001	Low RPM Reed Switch Sensor 20FT (6M)
	9KRT069	3P Deutsch to Relay Kit
	9ART089	3P Deutsch with Bare Wire Ends

Softkeys

| Icon	Function
	Agtron CAN ART
	Main ART (Rate/Blockage)
	Master Work Switch
	Calibration
	Default Calibration
	Unlock
	Sensor Shutoff
	Loop 1 and 2 Sensor Pattern
	Alarm Acknowledgment
	Seed Sensor Alarm Shut Off

Main ART Screen

Before operating your ISOBUS Rate and Blockage Monitoring System, 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.

The following settings can be configured for both loops on this screen:

- Sensitivity
- Seed Rate (using the Seed Rate Wizard)
- Target Rate
- High and Low Rate alarm values
- Speed Type (type of sensor providing speed information)

Figure 1.14
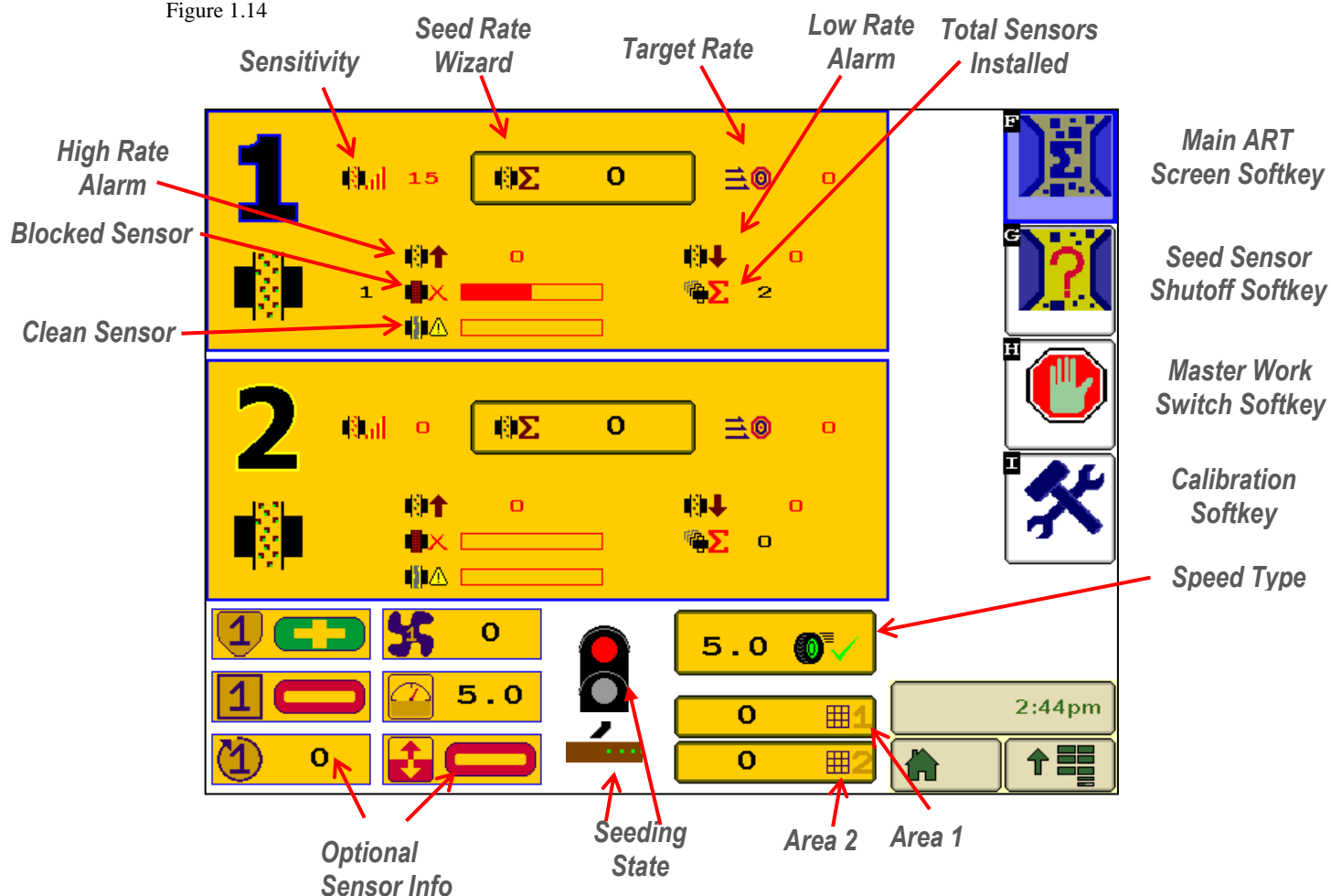
The Main ART screen provides information about the following:

- Number of Blocked Seed Sensors
- Number of Seed Sensors in need of cleaning
- Number of Installed Seed Sensors
- Seed Sensor Communication Errors
- Status of Optional Sensors
- Seeding State/Work Switch State
- Speed Type
- Area 1 and Area 2 Totals

Sensitivity

Tips:

A Blockage Sensitivity value of zero (0) disables 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 one (1) second periods to count seed. This allows for Sensitivity ranges down to 1 seed/30sec.

Values below 15 are usually not necessary and may be indicative of a faulty seed sensor.

The Sensitivity is a required calibration for blockage monitoring. It is the minimum seeds per second the seed sensors need to detect in order to stay out of blockage alarm. The goal is to have the Sensitivity value as high as possible without giving constant blockage 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 red number to the right of the Sensitivity icon.
2. Select a Sensitivity between zero (0) and 125. See Appendix A for approximate values.
3. To set a Sensitivity value, ensure that there are no blockages and begin seeding.
4. Increase the Sensitivity until the monitor alarms. Then, decrease the Sensitivity by three (3) to five (5) units at a time until the monitor no longer indicates blocked alarms.
5. Repeat for Loop 2.

Seed Rate Wizard

Tips:

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

Need a Speed set in order to set Seed Rate Wizard.

Must be seeding to set Seed Rate Wizard.

Seed Rate Wizard is a function that allows easy calibrations of the displayed seed rate.To set the Seed Rate Wizard:

1. Select the red number to the right of the target rate icon.
2. Enter your current seeding rate. As calibrated on your air cart.
3. Begin seeding.
4. On the Main ART screen, press the **Seed Rate Wizard** softkey.

   ➢ Repeat for Loop 2.

High and Low Rate Alarms

If the flow rate through a seed sensor increases above its High Rate alarm value a High Rate alarm occurs; if the rate decreases below the Low Rate alarm value a Low Rate alarm occurs. The number of the seed sensor in alarm is shown to the left of the applicable icon. The number to the right of the icon indicates the current alarm value.

If Seed Rate Wizard is used, alarm values are set automatically. Low alarm at 50% of target rate and high alarm at 150% of target rate. The alarm values can also be selected and changed manually.

The value that should be set for Low and High alarms depends on the desired range. To set an alarm value:

1. On the Main ART screen, select the red number to the right of the **High Rate Alarm** icon.

2. Set the High Rate value (zero (0) disables the alarm).

3. On the Main ART screen, select the red number to the right of the **Low Rate Alarm** icon.

4. Set the Low Rate value (zero (0) disables the alarm).

See Figures 1.23 and 1.24 for the alarm screens that would appear for Loop 1 and Loop 2 low rates.

See Figures 1.25 and 1.26 for the alarm screens that would appear for Loop 1 and Loop 2 high rates.

Blocked Seed Sensors

If a seed sensor becomes blocked the number of the seed sensor is displayed to the left of the Blocked Seed Sensors icon. If more than one sensor is blocked at the same time the display scrolls through the numbers of all blocked sensors. The bar graph to the right of the Blocked Sensors icon provides a graphical representation of the number of sensors currently blocked in percentage.

See Figure 1.21 for the alarm screen that would appear for loop 1, with 7 blocked sensors.

See Figure 1.22 for the alarm screen that would appear for loop 2, with 7 blocked sensors.

Installed Seed Sensors

The number to the right of the Installed Seed Sensors icon indicates the number of seed sensors that are currently installed on the system. Verify this number corresponds to the number of seed sensors that were installed on the drill. If the number is different, consult the troubleshooting table at the back of this manual.

Clean Seed Sensor

If a seed sensor detects that it requires cleaning the number of the seed sensor is displayed to the left of the Clean Seed Sensors icon. If more than one seed sensor requires cleaning at the same time the display scrolls through the numbers of all the seed sensors requiring cleaning. The bar graph to the right of the Clean Seed Sensors icon provides a graphical representation of the number of sensors currently needing cleaning.

To clean a sensor use a wet rag or bottle brush inside the metal tube.

Figure 1.15 - Communication Error

If a sensor detects a Communication Error, the number of the seed sensor where the error occurred is shown to the right of the Communication Error icon. (See Figure 1.15)

Communication Error at Seed Sensor 5. Loop unable to detect Seed Sensor 5.

Communication Error at Seed Sensor 1. Loop unable to detect Seed Sensor 1.
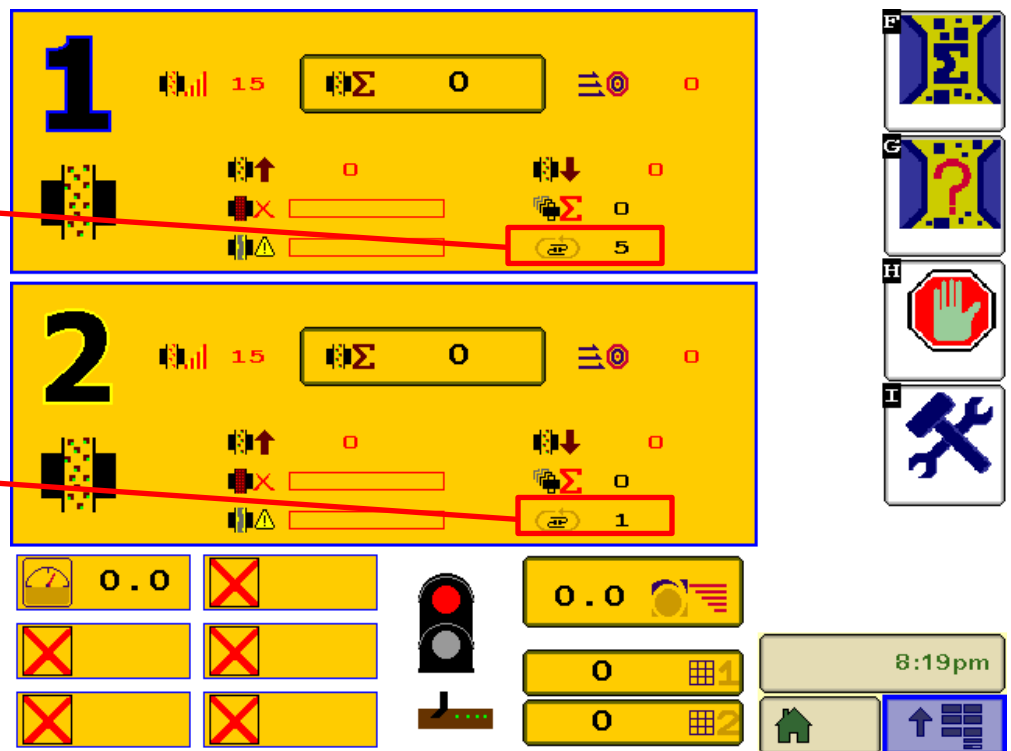
See Figures 1.19 and 1.20 for the alarm screens that would appear for the above example.

Figure 1.16:Calibration Screen

 Press the calibration softkey to access the following calibration menu.
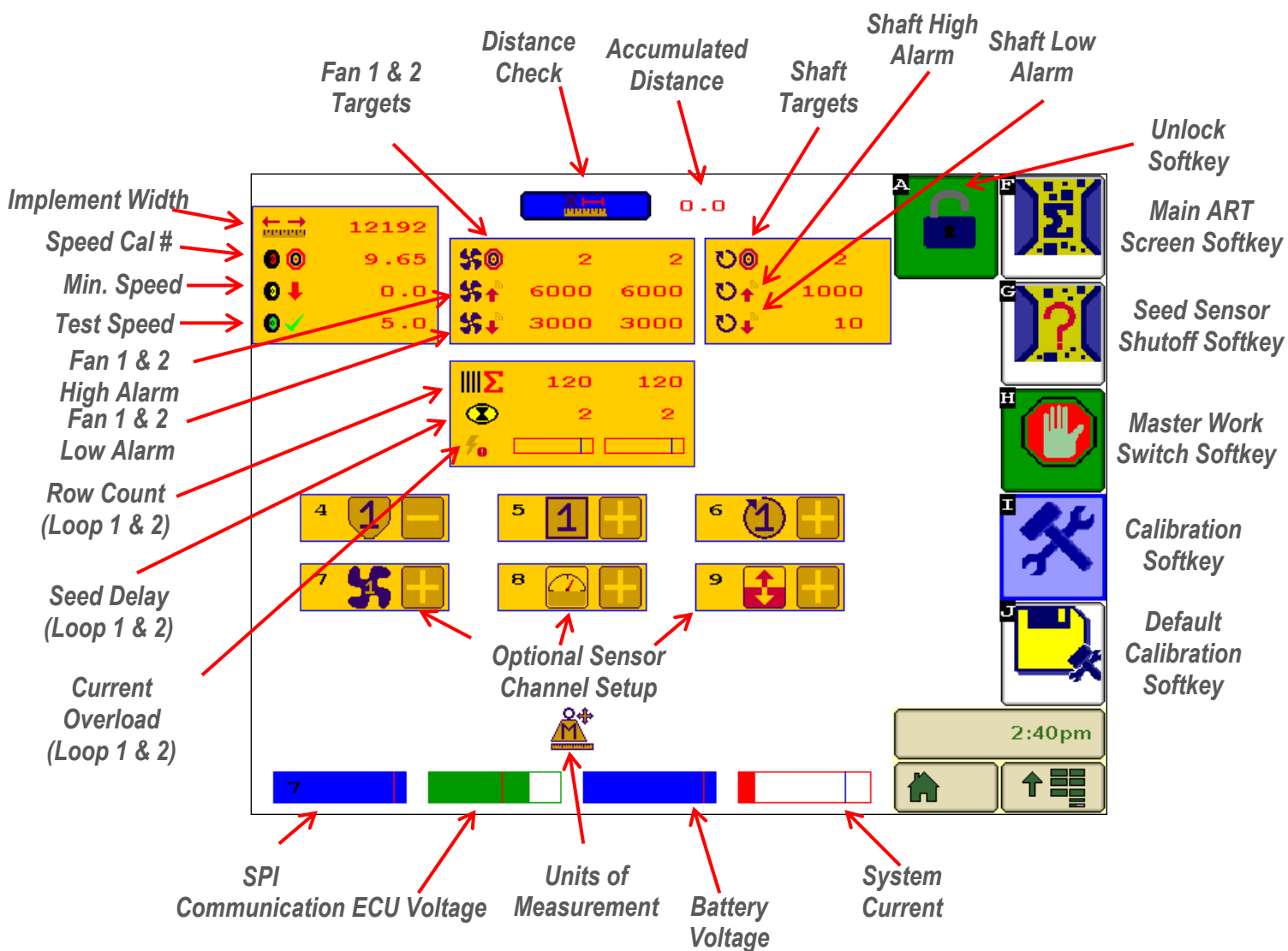
Unlock Softkey

Functions such as the Optional Sensor Channel Setup area and Default Calibration Softkey are locked by default to ensure they are not changed inadvertently. Pressing the Unlock softkey opens a password window that allows the operator to enter a password. The password is 11111.

Default Calibration softkey

Tip:

If ECU Voltage is too low (less than the line indicator) the ECU will not save calibrations.

Pressing the **Default Calibration** Softkey resets the system to factory default values and settings. The Default Cal Softkey only becomes available after the screen is unlocked using a password available from Agtron Service.

Master and External Toolbar Work Switches

The Master and External Toolbar Work Switches are used to enable operation of the CAN ART system as well as functions on other Agtron systems that may be in use (e.g. dry product and liquid product application systems). Depending on the requirements, either the Master Work Switch (operated from the VT screen), or an External Toolbar Work Switch (that detects when the implement is in the ground), or both, may be used.

Setting up the Master Work Switch
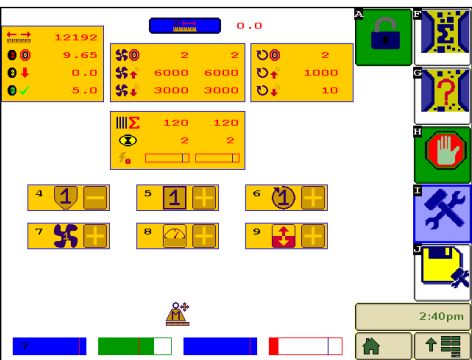
The Master Work Switch is a Softkey located on all screens. When the area of the Softkey surrounding the icon is white the Master Work Switch is disabled. In this mode the system is disabled—regardless of the position of the toolbar.

Softkey	System Condition
	Disabled
	Enabled

When the area of the Softkey surrounding the icon is green the system is enabled. If the system is NOT equipped with a toolbar Work Switch, alarms will be enabled as soon as the implement speed exceeds the minimum speed setting.

Setting up an External Work Switch

An External Toolbar Work Switch is a toolbar sensor that detects whether the toolbar is up (out of the ground) or down (in the ground). There are two different External Toolbar Work Switch icons: One indicates an External Toolbar Work Switch that connects to the CAN ART ECU; the other indicates an External Toolbar Work Switch that connects to another Agtron ECU (Aircart or NH3).

External Work Switch icon	Type
	Toolbar Work Switch sensor selected. (Used if the External Toolbar Work Switch is connected to the CAN ART ECU)
	External Agtron Toolbar Work Switch selected. (Used if the External Work Switch is connected to another Agtron ECU)

If the system is equipped with a Toolbar Work Switch (typical), alarms will be enabled as soon as:

- the External Toolbar Work Switch Sensor detects that the toolbar is in the ground (indicated by the Seeder Down icon on the Main screen)

Symbol	What it means…
	Seeder UP
	Seeder DOWN

AND

- A speed signal is present and minimum speed has been reached

Use the following procedure to setup an External Work Switch on the channel selected during installation:

1. Select the Calibration Softkey.

2. Select the Unlock Softkey.

3. Enter the password (11111) then the accept softkey.

4. At the bottom of the screen select the proper channel that the work switch sensor is installed on. (Loop 1 – 4,5,6 Loop 2 – 7,8,9)

5. Select the proper icon from the drop down menu.

Tip:

For an External Toolbar Work Switch to enable alarms the Master Work Switch must also be enabled.

Implement Width

Tip:

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

Displays, and enables setting of, the Implement Width:

1. Select the Calibration Icon.

2. On the Calibration screen, press the red number to the right of the **Width** icon.

3. Enter the width value in inches (or millimeters if the system is configured for METRIC units).

Row Count

Enter the total number of openers on the seeder.

1. Select the Calibration Icon.

2. On the Calibration screen, press the red number to the right of the **Row Count** icon.

3. Enter a value between one (1) and 120. The row value is the total number of openers on the seeder for each Loop. Loop 1 is the left column, Loop 2 is the right column. This allows for accurate seed rate calculations.

Seed Delay

The Seed Delay allows the user to setup a delay in seconds from when the system detects a blockage to when the system will alarm when the Work Switch is on:

1. Select the Calibration Icon.

2. On the Calibration screen, press the red number to the right of the **Seed Delay** icon.

3. Enter the desired seed delay time in seconds for each loop. Loop 1 is the left column, Loop 2 is the right column.

Minimum Speed

Tip:

Set this value slightly lower than your typical seeding speed to cancel blockage alarms when slowing down for turns.

The Min Speed setting disables seed rate and blockage alarms when the implement slows to a speed less than the Minimum Speed setting. A Low Cart speed alarm will still occur.

1. Select the Calibration icon.

2. On the Calibration screen, press the red number to the right of the **Minimum Speed** icon.

3. Enter the minimum seeding speed. (MPH or KPH depending on VT units selected.

Setting Up Speed Sensor

Whether you are using a wheel speed sensor or GPS speed, you will need to calibrate the speed sensor to ensure proper speed is being used by your CAN ART ECU.

Distance Check/Accumulated Distance

When a Speed Sensor is attached, distance travelled accumulates in feet (meters). Pressing the Distance Check button clears the Accumulated Distance.

1. On the Main ART screen, press the Calibration key, then the **Distance Check** icon.

2. Accumulated Distance changes to 0.0.

Speed Cal Number

The Speed Cal Number is used if Speed Sensor is installed. The Speed Cal number is the distance travelled per pulse received from the sensor. To calibrate the Speed Cal Number:

1. Select the Calibration Icon.

2. Press the **Distance Check** icon. Accumulated Distance should change to 0.0.

3. Measure and drive a known distance.

4. Enter the distance driven in feet (meters) in the Accumulated Distance field. This is the red number to the right of the Distance Check icon.

5. The Speed Cal number will automatically change.

6. Your speed sensor is now calibrated.

Test Speed

Test speed is a valuable tool you can use when performing diagnostics. It supplies a speed signal that simulates the forward motion of the tractor and implement.

1. Select the Calibration Softkey.

2. Press the red number to the right of the **Test Speed** icon.

3. Enter a value between 0 and 15.5 MPH. (0 and 25 KPH)

Speed Type

The Speed Type setting allows you to select and use any of the following speed inputs: A radar speed device on the commodity cart   (ECU), a GPS speed input or wheel speed sensor on the tractor, or a ground speed signal from the tractor computer system.

1. On the Main ART screen, select the **Speed Type** icon.

2. Select the appropriate Speed Type for your system.

Symbol	Speed Type	Description
	Test Speed	Speed you would normally drive while seeding
	Slave ECU Speed	Speed Sensor connected to CAN ART ECU
	External Agtron Speed	Speed Sensor connected to secondary ECU (NH3)
	ISO Ground Speed	Speed input from the VT
	ISO Wheel Speed	Speed input from the VT

Area 1 and Area 2

Note:

A speed sensor needs to be installed in order to use the Area Counting Functions.

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 1** softkey to reset the **Field Acres/Hectares** total to zero.

2. Press the **Area 2** softkey to reset the **Total Acres/Hectares** total to zero.

Setting Up Fan Sensor

Fan Sensor Channel Setup

Use the following procedure to setup a Fan Sensor on the channel selected during installation:

1. Select the Calibration Softkey.
2. Select the Unlock Softkey.
3. Enter the password (11111) then the accept softkey.
4. At the bottom of the screen select the proper channel that the fan sensor is installed on. (Loop 1 – 4,5,6 Loop 2 – 7,8,9)
5. Select either Fan1 or Fan2 icon from the drop down menu.

Fan Targets

Tip:

If the Fan RPM registers a lower or higher number than you expect, you may need to change the Fan Target value for correct RPM reading.

Use the following procedure to set Fan Targets to the total number of register points on the fan that pass in front of the fan sensor each revolution. The left column are the settings for Fan 1, the right column is for Fan 2.

1. Select the Calibration Softkey.
2. Press the red number to the right of the **Fan Targets** icon.
3. Enter the required number of Fan Targets.

Setting Fan High and Fan Low Alarms

The Low and High Fan alarm setting depends on the desired operational range.

1. Select the Calibration Softkey.
2. Press the red number to right of the **Fan High** icon.
3. Enter the alarm value in RPM.
4. Repeat the procedure to enter the **Fan Low** alarm value.
5. See Figures 1.40 & 1.41 for examples of Fan Low alarms.
6. See Figures 1.42 & 1.43 for examples of Fan High alarms.

Setting Up Shaft Sensor

Shaft Sensor Channel Setup

Use the following procedure to setup a Shaft Sensor on the channel selected during installation:

1. Select the Calibration Softkey.
2. Select the Unlock Softkey.
3. Enter the password (11111) then the accept softkey.
4. At the bottom of the screen select the proper channel that the shaft sensor is installed on. (Loop 1 – 4,5,6 Loop 2 – 7,8,9)
5. Select Shaft1 to Shaft4 icon from the drop down menu.

Shaft Targets

Use the following procedure to set **Shaft Targets** to the total number of register points that pass in front of the sensor each revolution.

1. Select the Calibration Icon.
2. Press the red number to the rigt of the **Shaft Targets** icon.
3. Enter the required number of Shaft Targets.

Shaft High and Shaft Low Settings

The Low and High end of the **Shaft Alarm** settings depends on your desired operational range.

1. Selct the Calibration Icon.
2. Press the red number to the righ of the **Shaft High** icon.
3. Enter the alarm value in RPM.
4. Repeat the procedure to enter the **Shaft Low** alarm value.
5. See Figures 1.32 – 1.35 for examples of Shaft Low alarms.
6. See Figures 1.36 – 1.39 for examples of Shaft High alarms.

Setting Up Bin Sensor

Use the following procedure to setup a Bin Sensor on the channel selected during installation:

1. Select the Calibration Softkey.

2. Select the Unlock Softkey.

3. Enter the password (11111) then the accept softkey.

4. At the bottom of the screen select the proper channel that the bin sensor is installed on. (Loop 1 – 4,5,6 Loop 2 – 7,8,9)

5. Select Bin1 to Bin4 icon from the drop down menu.

6. See Figures 1.28 – 1.31 for examples of Bin alarms.

Figure 1.18 - Sensor Assignments

Six Sensor Channels are shown on the Calibration screen. Sensor Channels 4, 5, and 6 are assigned to Loop 1; Sensor Channels 7, 8, and 9 are assigned to Loop 2. The following table shows the icons for sensors that can be assigned to these channels (the X icon indicates no sensor is assigned):

Symbol	Sensor Type
	Bin Level Sensor 1-4
	Auxiliary Sensor 1-4
	Fan Sensor 1 or 2
	Speed Sensor
	Shaft Sensor 1-4
	Work Switch
	None

Sensor Logic

The logic of each Sensor Channel is configurable as Normal or Inverted. 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. Sensor Logic is preset from the factory, but if a sensor is added for some purpose, the logic must be configured. Use this procedure to set sensor logic:

1. Select the Calibration Softkey.
2. Select the Unlock Softkey.
3. Enter the password (11111) then the accept softkey.
4. At the bottom of the screen, select the icon to the right of the channel number.
5. Select either normal (Closed Circuit) or Inverted (Open Circuit)

Units of Measurement

Set units to Metric, Imperial or US on the VT before entering Agtron software.

Icon	System
	Metric
	Imperial
	US

Current Overload

To the right of the Current Overload icon a bar graph provides an indication of the electrical current being drawn by each loop. If the current exceeds a preset value an alarm is initiated. Loop 1 is the left column, Loop 2 is the right column.

SPI Communication

The SPI Communication bar graph (located at the bottom left of the Calibration screen) indicates whether the CAN ART ECU is communicating properly. The bar graph should indicate higher than the red line.

ECU Voltage

ECU Voltage is the voltage measured at the CAN ART ECU itself. This indicates whether adequate voltage is being received by the ECU to operate properly. The bar graph should indicate a voltage that is greater than the red line.

Battery Voltage

Battery Voltage is the voltage measured by the ISOBUS system at the tractor. It indicates whether the Battery Voltage is high enough to operate the system properly. The bar graph should indicate a voltage that is greater than the red line.

Current
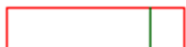
The Current bar graph indicates the total current being drawn by the system.

Note:

See Figure 1.16 for location of these bar graphs on the Calibration Screen.

Figure 1.17 - Seed Sensor Shutoff Screen

Press the Seed Sensor Shutoff softkey to access the following calibration screen.
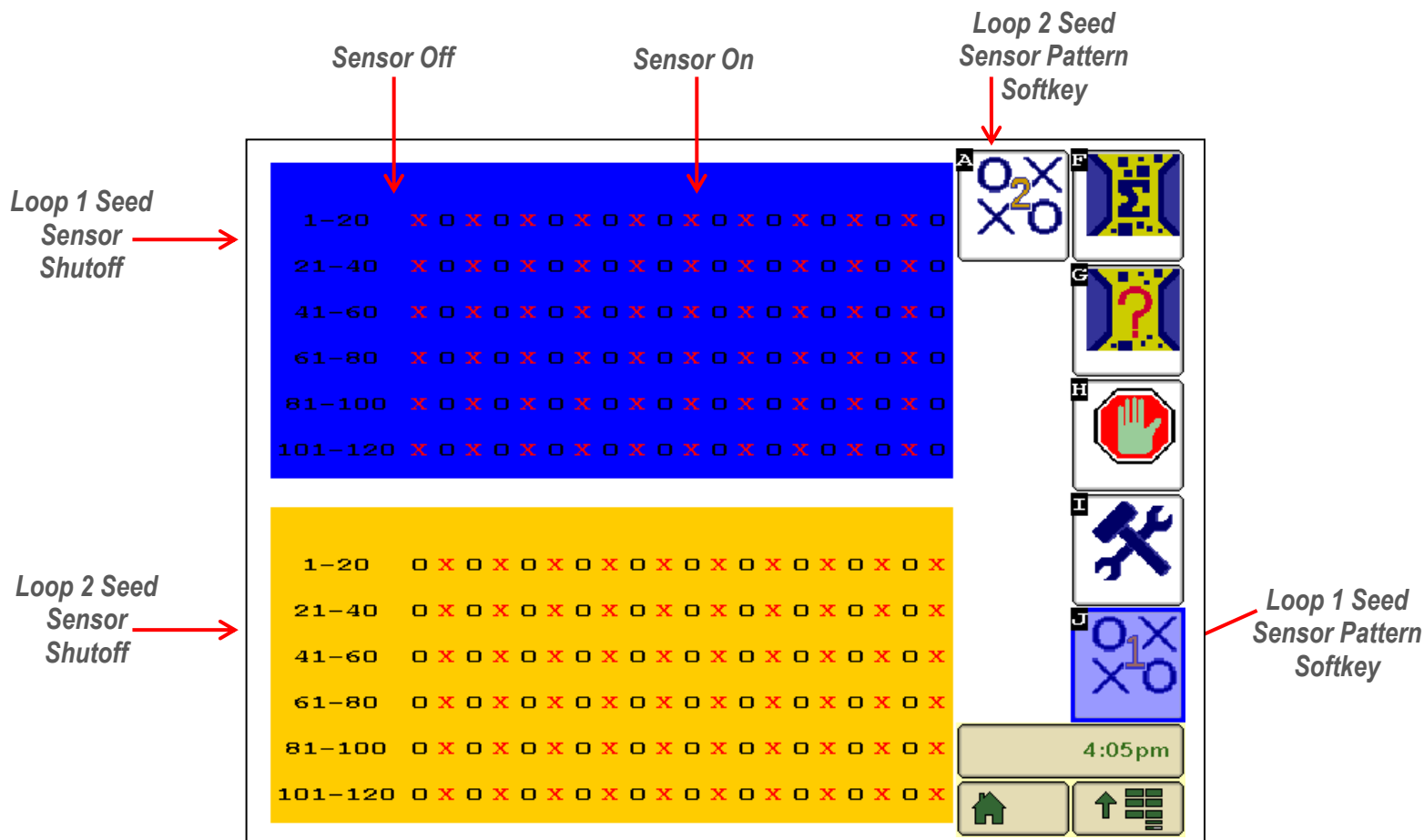
Seed Sensor Shutoff allows you to:

1. Shut off problematic seed sensors to continue seeding without interruption.
2. Shut off seed sensors that you don't want seed or fertilizer going through.
3. Shut off seed sensors for Tram lines

Loop 1 and 2 Seed Sensor Pattern

Loop 1 and Loop 2 Sensor Pattern Softkeys allow you to switch between patterns each time the Softkey is pressed. There are three different options:

1. All sensors on (showing all O pattern)
2. First Sensor off (showing XOXO pattern)
3. First Sensor on (showing OXOX pattern)

   OR

Manual Shutoff can be done when the sensor is pressed (O or X) and a drop down appears. There are three different options:

1. Tram Channel 1
2. Tram Channel 2
3. X to turn off

Figure 1.18 - System Alarms

ICON	ALARMS	ICON	ALARMS
	Fan Alarm		RPM Low Alarm
	Aux Alarm		RPM High Alarm
	Bin Alarm		Bin Low
	Battery Voltage Alarm		High Voltage Alarm
	Shaft Alarm		Low Voltage Alarm
	Low Cart Speed Alarm		Current Overload Alarm
	Art Loop Alarm		Blocked Seed Run Alarm
	Low Seed Rate Alarm		High Seed Rate Alarm
	Loop Communication Failure Alarm		SPI Communication Failure Alarm

Alarm Screens

Alarm screens appear when an alarm condition occurs. The alarm screen will override any screen you are currently viewing on your Virtual Terminal. (You do not have to be viewing the Agtron page for an alarm to alert you) On these screens:

- Determine which alarm has occurred
- Get additional information about the sensor or system in alarm
- Acknowledge the alarm condition
- Enable or disable the Master Work Switch
- Shutoff the alarm condition

Figure 1.19
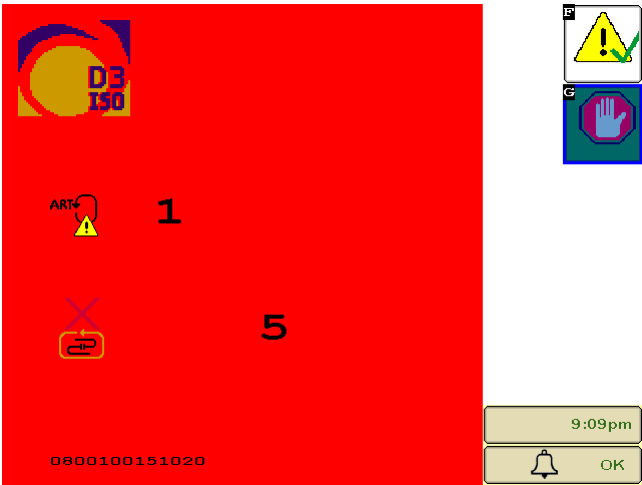
Alarm showing a communication error
at sensor 5 on loop 1.

Figure 1.20
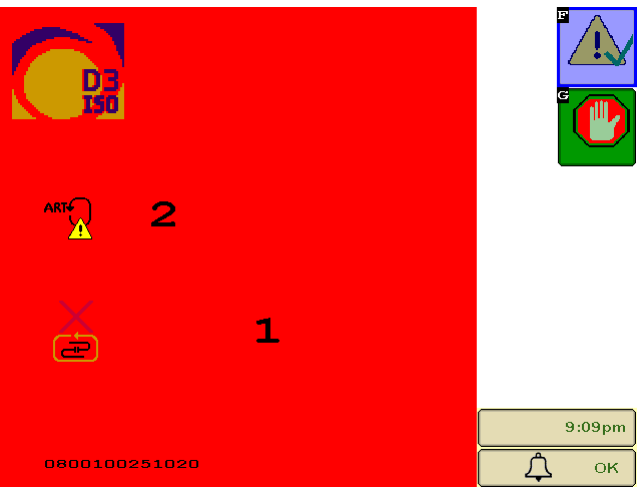
Alarm showing a communications error at Seed
Sensor 1 on Loop 2.

Figure 1.21
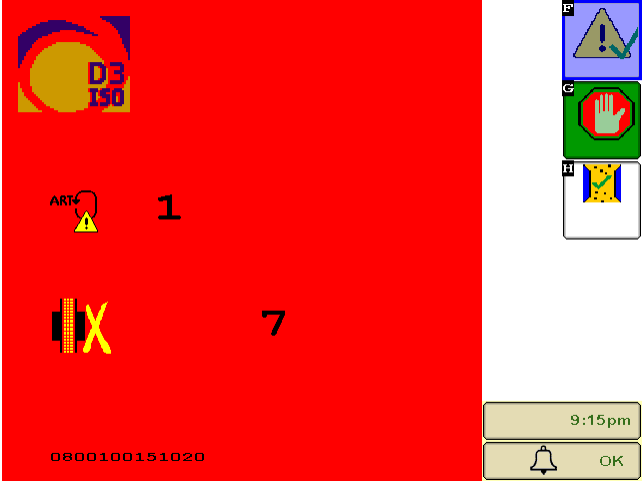
Alarm showing 7 blocked Seed Sensors on
Loop 1.

Figure 1.22
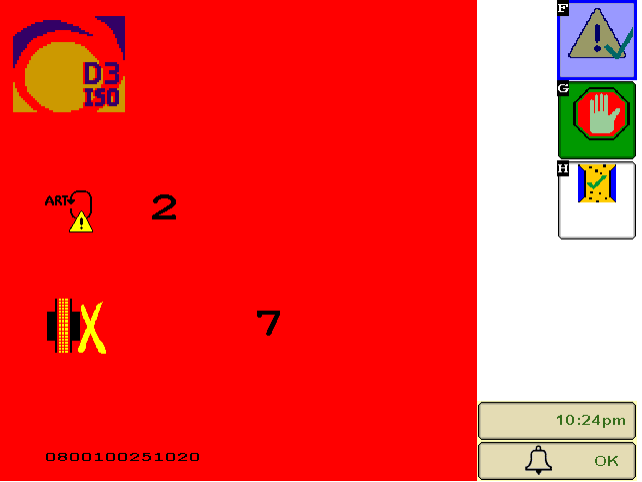
Alarm showing 7 blocked Seed Sensors on
Loop 2.

Figure 1.23
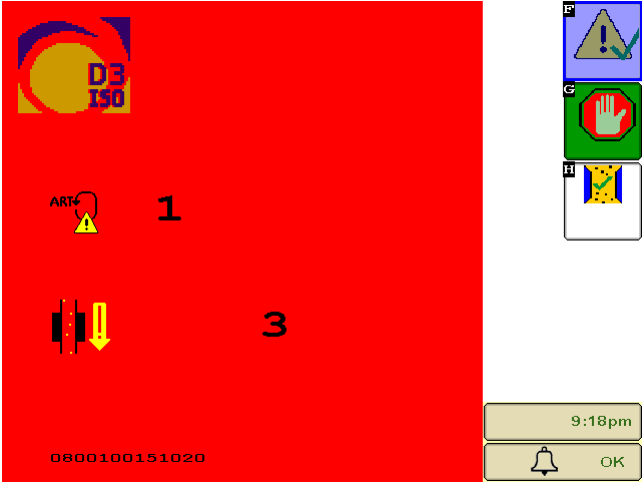
Alarm showing 3 Seed Sensors sensing a low seedrate
on Loop 1.

Figure 1.24
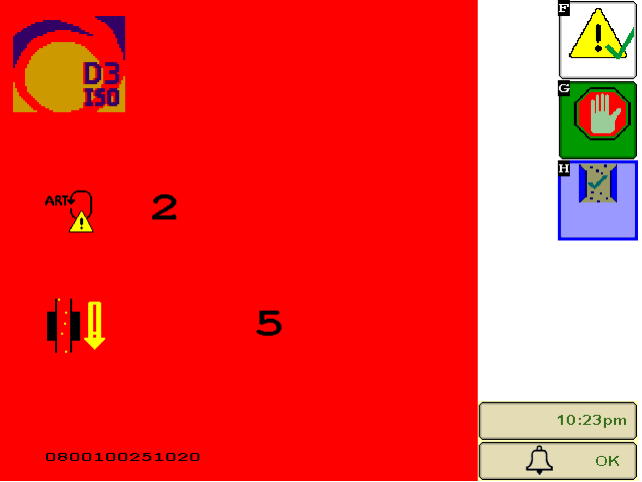
Alarm showing 5 Seed Sensors sensing a low seedrate
on Loop 2.

Figure 1.25
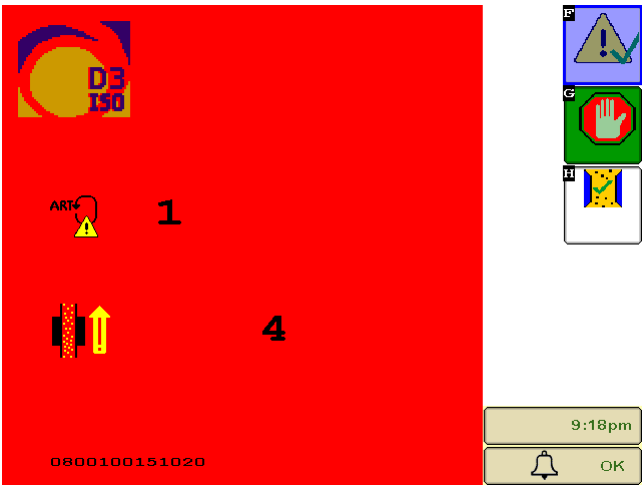
Alarm showing 4 Seed Sensors sensing a high seedrate on Loop 1.

Figure 1.26
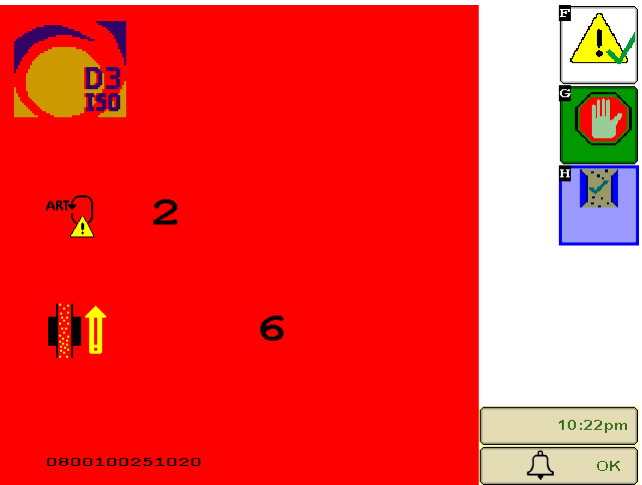
Alarm showing 6 Seed Sensors sensing a high seedrate on Loop 2.

Figure 1.27

Alarm showing the system has not reached minimum speed to enable alarms.

Figure 1.28
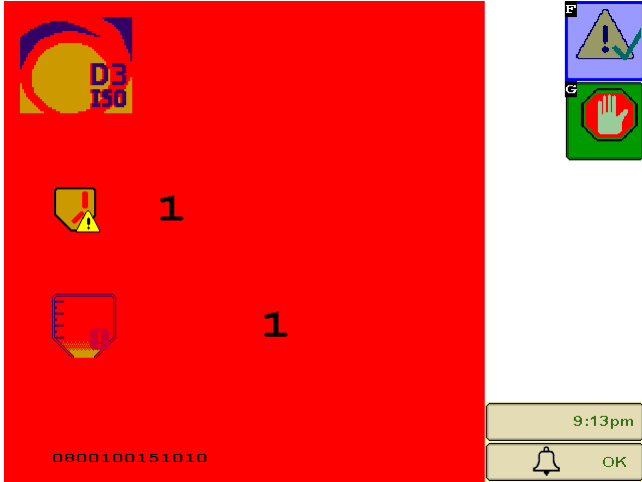
Alarm showing that Bin 1 is empty.

Figure 1.29
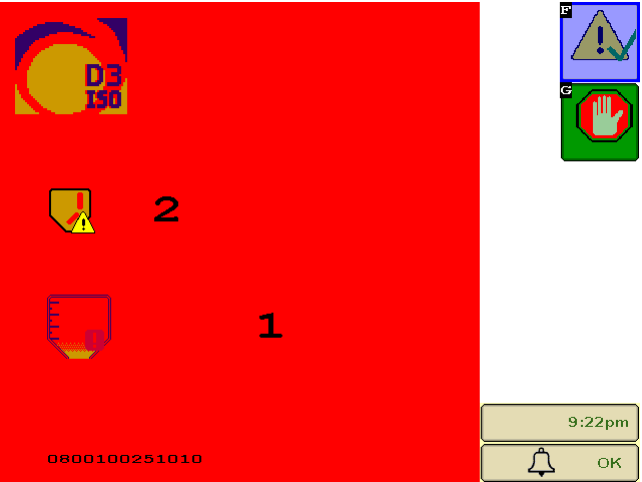
Alarm showing that Bin 2 is empty.

Figure 1.30
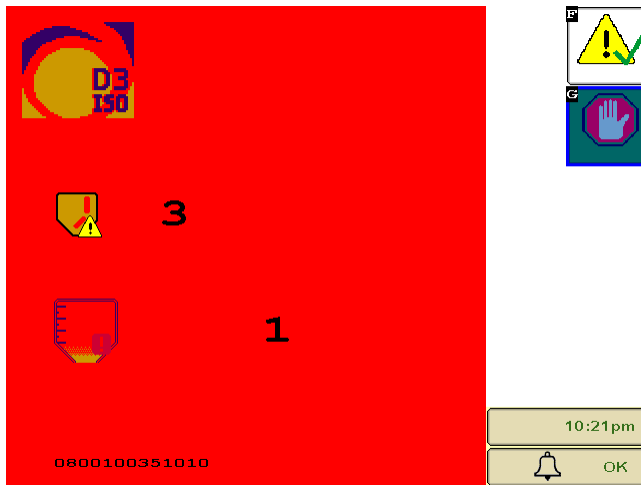
Alarm showing that Bin 3 is empty.

Figure 1.31
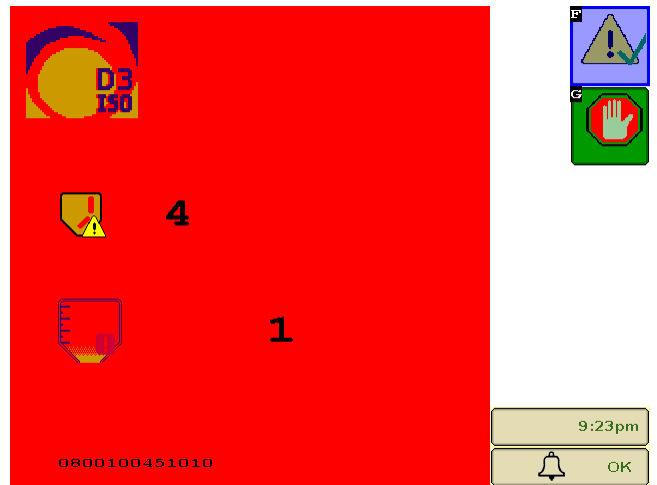
Alarm showing that Bin 4 is empty.

Figure 1.32
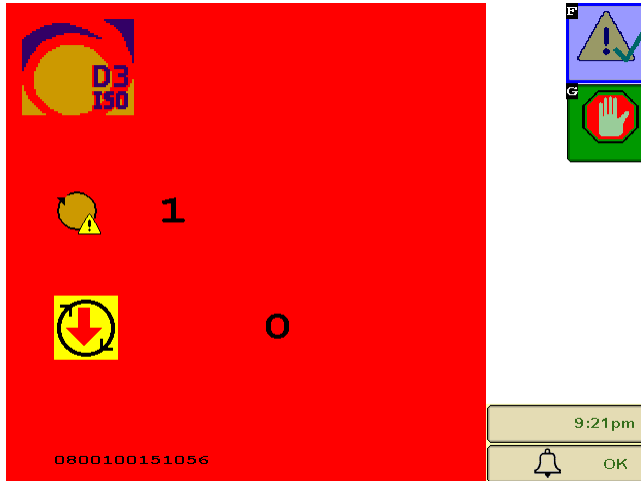
Alarm showing that Shaft 1 has low RPM.

Figure 1.33
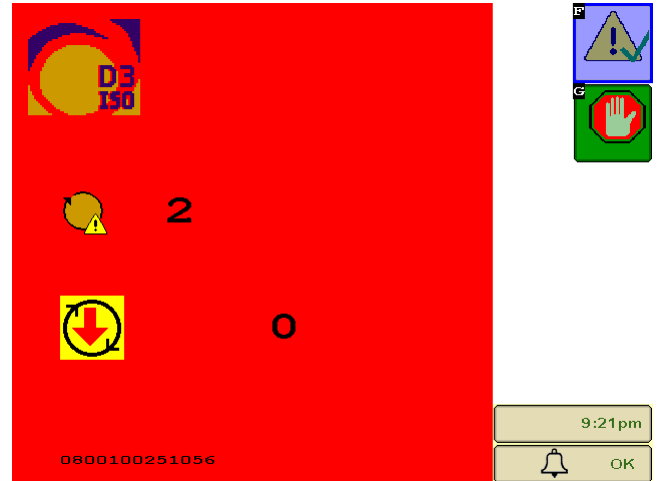
Alarm showing Shaft 2 has low RPM.

Figure 1.34
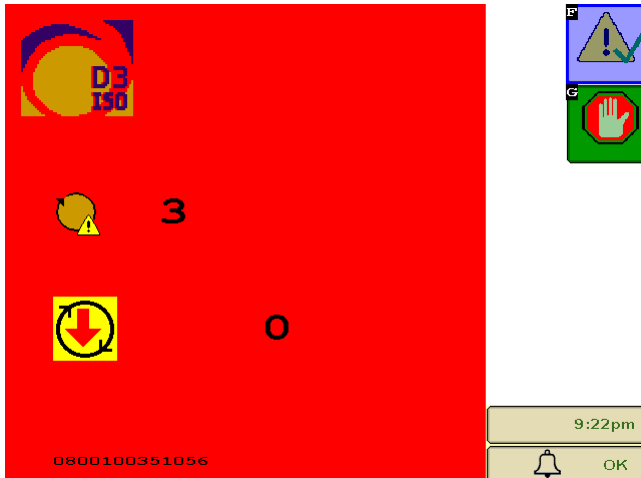
Alarm showing Shaft 3 has low RPM.

Figure 1.35
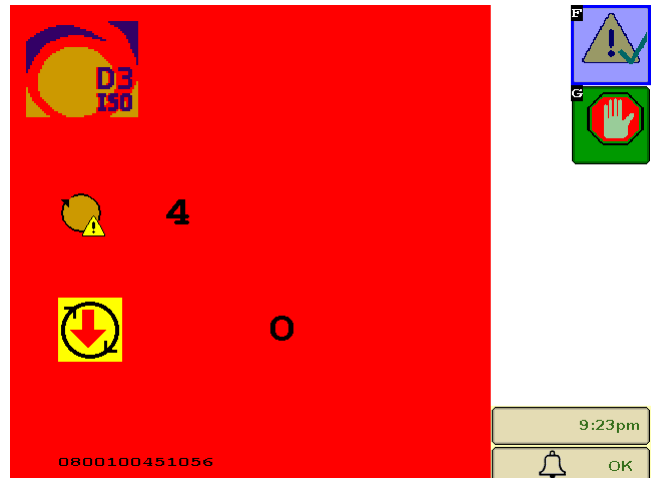
Alarm showing that Shaft 4 has low RPM.

Figure 1.36
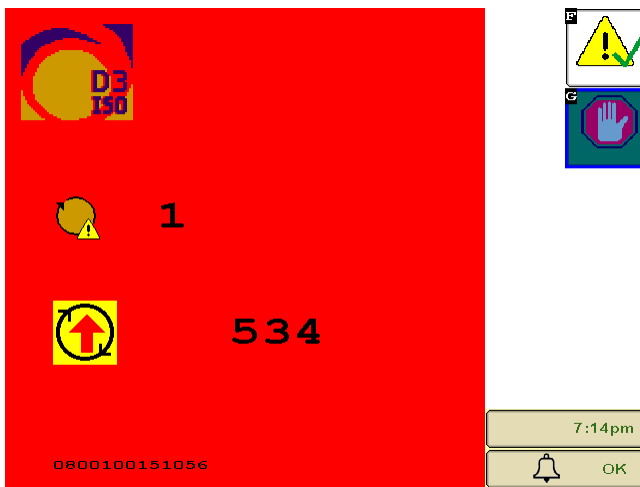
Alarm showing Shaft 1 has high RPM.

Figure 1.37
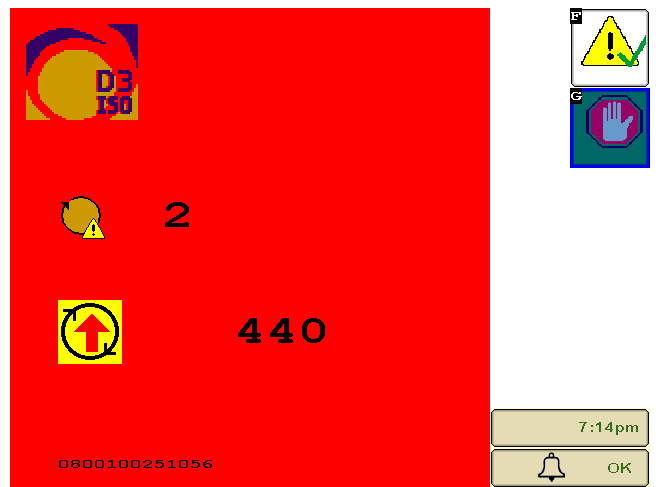
Alarm showing Shaft 2 has high RPM.

Figure 1.38
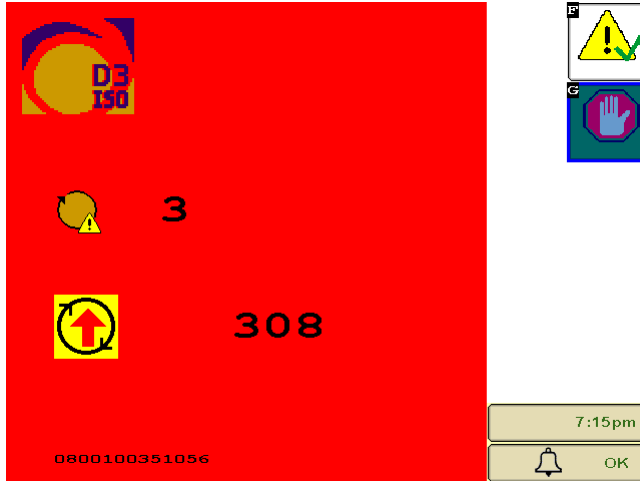
Alarm showing Shaft 3 has high RPM.

Figure 1.39
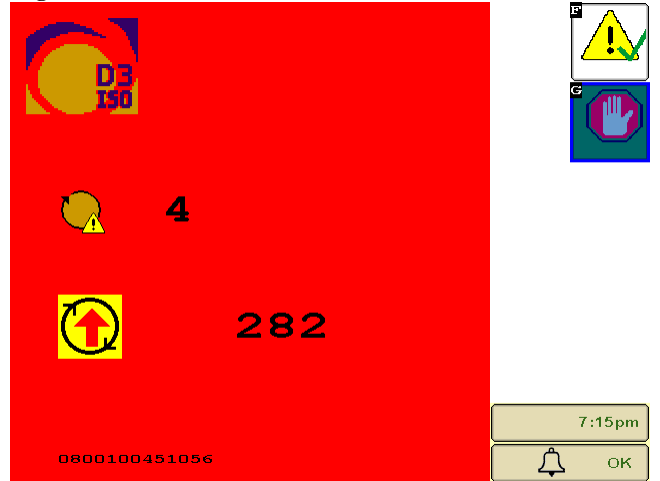
Alarm showing Shaft 4 has high RPM.

Figure 1.40
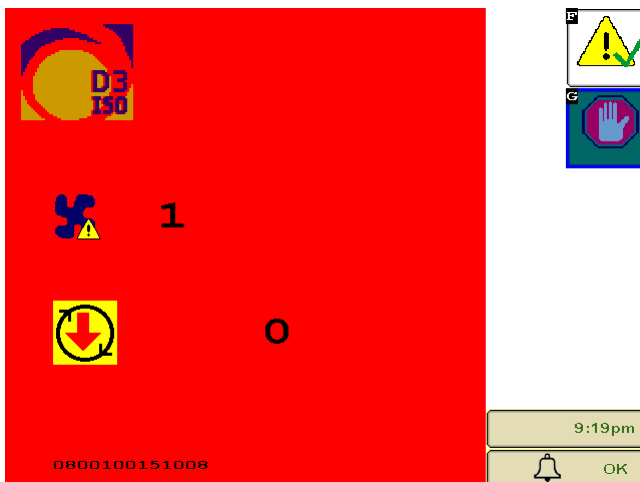
Alarm showing Fan 1 has low RPM.

Figure 1.41
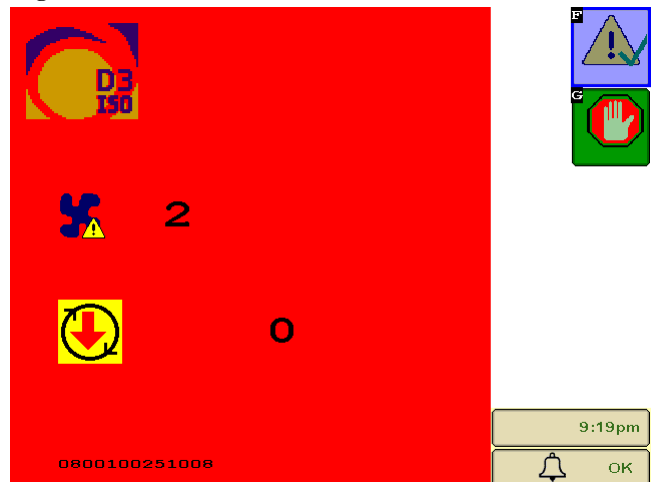
Alarm showing Fan 2 has low RPM.

Figure 1.42
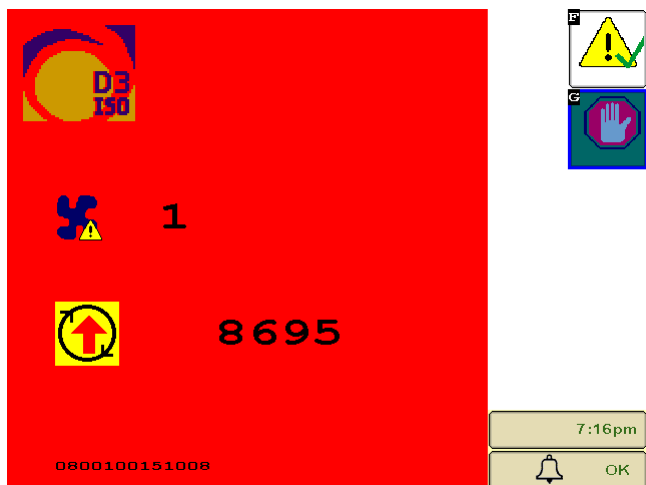
Alarm showing Fan 1 has high RPM.

Figure 1.43
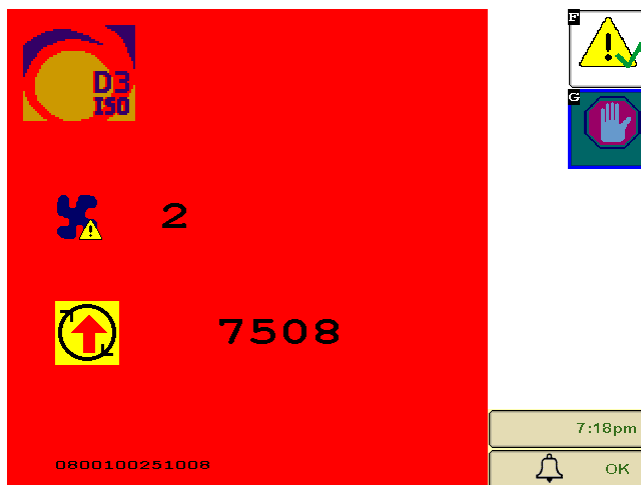
Alarm showing Fan 2 has high RPM.

Figure 1.20 - Troubleshooting Table

Type of Problem	Symptom/Diagnostic Step	Action/Information
No Loop Information	The Loop indicated is turned off.	Turn Loop on, increase sensitivity > 0.
VT Displays SNR 1 ERR	The ECU is not detecting any sensors.	Check all the cables and connections from the ECU to sensor 1. Bypass Sensor 1 by connecting Sensor 2 to the Sensor Loop cable from the Y-Cable.
	If the message is no longer displayed…	…replace Sensor 1.
	If the problem persists…	…connect a Seed Sensor directly to the Y-Cable male Sensor Loop Cable.
	If you get a SNR 2 ERR…	…replace the Sensor Loop Extension Cable between the Y-Cable and Seed Sensor 1.
	If the problem persists…	…connect the Y-Cable and a sensor directly to the ECU.
	If you get a SNR 2 ERR…	…replace the Main Extension Cable.
	If you get a SNR 1 ERR…	…replace the Y-Cable.
	If problem persists…	…contact Agtron Service.
VT displays SNR # ERR one number above total sensors installed	The ECU is reading an incorrect number of sensors.	Check all the cables and connections from the last sensor to the ECU. Bypass the last sensor by connecting the second last sensor to the Sensor Loop Cable to the Y-Cable.
	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 Y-Cable.
	If you get a SNR 2 ERR…	…replace the Y-Cable.
	If you get a SNR 1 ERR…	…replace the Sensor Loop Extension Cable between the Y-Cable and the last Seed Sensor.

Tip:

When bypassing a sensor, remember the seed sensor count will be one less than before.

Type of Problem	Symptom/Diagnostic Step	Action/Information
VT displays SNR # ERR	The ECU is detecting an error on the indicated sensor #.	Take note of the indicated sensor number. Inspect the Sensor Loop Cables in the indicated Seed Sensor number location for damage. Replace or bypass any damaged cables.
	If the problem persists…	Bypass the indicated Seed Sensor number. This is done by unplugging the seed sensor and plugging in the cables of the seed sensor before and after together. The seed sensor count will be one less than before.
	If the message is no longer displayed…	…replace the bypassed seed sensor.
	If the problem persists…	…bypass the seed sensor before the indicated sensor number error.
	If the message is no longer displayed…	…replace the bypassed seed sensor.
	If the problem persists…	…check the Sensor Loop Cable connecting the seed sensors together, swap the Sensor Loop Cable with another Sensor Loop Cable.
	If the message is no longer displayed…	…replace the Sensor Loop Cable.
Blocked Sensors	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.
VT displays SNR # CLN	This indicates that the optical detectors inside the sensor tube are dirty.	Take note of the indicated seed sensor number. Clean the indicated seed sensor with warm water and a bristle pipe brush.
	If the problem persists…	…bypass the indicated seed sensor.
	If the message is no longer displayed…	…replace the bypassed seed sensor.
VT displays AMP Overload	This indicates that there is too large of a power draw on the indicated sensor loop number.	Check all cables.
	This is most likely a short in the Sensor Loop indicated.	Remove one tower or cable at a time until the message disappears. Replace the last removed part.
Calibration settings are lost	The CAN ART system is not getting the proper voltage.	Check the voltage to the system is greater than 10 volts.
	Electrical surges due to faulty electrical system.	Check the tractor battery cables, connection to the starter and alternator.
	If the problem persists…	…send the ECU head to Agtron for repair.

Type of Problem	Symptom/Diagnostic Step	Action/Information
Speed sensor installed, but no speed showing	This indicates that the speed sensor is not on the proper sensor channel. OR… The magnet is too far from the sensor.	Channels 4, 5, and 6 are dedicated to Loop 1 using the Sensor Breakout Cable. Channels 7, 8, and 9 are dedicated to Loop 2 using the Sensor Breakout Cable. Make sure the sensor is within ½" of the magnet.
	If the problem persists…	…contact Agtron Service.
VT displays ERR alarms when one loop is disabled, but no alarms when both loops are enabled	This indicates Loops connected but cables are crossed either going to sensor 1 or coming back from the last sensor.	Carefully trace one Loop of sensors to determine where the cables are crossed. Switch the incorrect connections to make two independent loops.
Intermittent Communication Errors (Random Communication errors)	For stationary system testing.	Check all cables for stretching or pinching. Clean any connections that may have been left open and re-apply silicone grease (Agtron part number 850039001). Look for damaged cable jackets from over-tightened tie-straps. Spray sensors with water if indication that the system fails after rain. Try to spray the sensor body where the cables join. Disconnect the last Seed Sensor output cable from the extension. Disconnect tower #2 from tower #1 and check the diagnostic message. For example, if there are 10 sensors on tower #1, there should be an error showing no connection to sensor 11. Reconnect tower #2 to tower #1. Disconnect tower #3 from tower #2 and check the diagnostic message. Repeat for all towers. Reconnect the last sensor output cable to the extension. The loop should now be complete, with no errors. Set the blockage Sensitivity to mid-point. For example, if the range is 1 to 100, set it to 50. Make sure the fan is off. Verify that each sensor reads as blocked on the second cycle.
Intermittent Communication Errors (Random Communication errors)	Errors occur only when seeding (will need two 20ft Sensor Loop Extension Cables Agtron part# 9ARTX20).	Bypass all the towers except tower #1 and check for reliable operation while seeding. Bypass individual Seed Sensors until reliable operation is achieved. Add tower #2 and check for reliable operation. Bypass individual Seed Sensors until reliable operation is achieved. Repeat for all towers. If a reliable loop cannot be made with a single Seed Sensor, replace the main extensions, Y -Cable and Sensor Extensions.

Appendix

Appendix A: Parts List

Part Number	Description
AGD2210	CAN ART Dual Loop ECU
AGD2110	CAN ART Single Loop ECU
AGD2003	CANBUS Harness
AGD3093	CAN Terminating Bias Circuit
MND2007	Manual
4TYWR14.0	Black Cable Ties (14.5")
850040001	Blue Cable Ties (4")
850040002	Yellow Cable Ties (4")
9ARTM10	Main Extension cable 10FT (3M)
9ARTM20	Main Extension cable 20FT (6M)
9ARTY10	ART Y-Cable
9ARTX02	ART Sensor Loop Cable 2FT (0.6M)
9ARTX04	ART Sensor Loop Cable 4FT (1M)
9ARTX10	ART Sensor Loop Cable 10FT (3M)
9ARTX20	ART Sensor Loop Cable 20FT (6M)
AGSS22	ART Seed Sensor 7/8" (22mm)
AGSS24	ART Seed Sensor 15/16" (24mm)
AGSS25	ART Seed Sensor 1" (25mm)
AGSS32	ART Seed Sensor 1 1/4" (32mm)
400TRHS16	Hose clamp size 16
9ART036	Toolbar Sensor Breakout Harness

Optional Sensors	
Part Number	**Description**
9AGPS01	GPS Speed Sensor (5Hz)
9AGPS02	GPS Speed Sensor (1Hz)
AGBN007	Bin Sensor 20FT (3M)
AGBN008	Bin Sensor 6FT (1.8M)
9ART090	3P Deutsch to AMP CPC Radar Adapter
9ART091	3P Deutsch to AMP CPC Radar Y-Cable
AGCS001	Capacitive Proximity Sensor (Meter Sensor)
AGIND01	Inductive Fan Sensor 20FT (6M)
AGSH001	Low RPM Reed Switch Sensor 20FT (6M)
9KRT069	3P Deutsch to Relay Kit
9ART089	3P Deutsch with Bare Wire Ends
AGRT071	ART Loop Terminator

Appendix B: Optional Sensor

This section describes the optional sensors that can be added to the cart.

See installation diagrams on pages 18 and 19

Bin Sensor- AGBN007/AGBN008

Infrared bin level sensor 5 ½"x 1 ½" x 1 ¾", mounts using 2 x #8 Phillips screws – 32 x 1/2" or 32 x 1" (included), 2 x P-Clips and 2 x #10 self-tapping screws ¾" x 3/16" (included for cleaning up cable), 6FT or 20FT cable with 3 pin DTM series Deutsch connector.

Shaft/Speed/Work Switch Sensor – AGSH001

Low RPM Reed Switch Sensor ½" diameter, mounts using ½" P-clip and #10 self-tapping screw ¾" x 3/16" (included), 3/16" P-clip and #10 self-tapping screw ¾" x 3/16" (included for cleaning up cable), 2 x magnet .950" x .500" x .125" (included), 20FT cable with 3 pin DTM series Deutsch connector.

Fan Sensor- AGIND01

Inductive Proximity Sensor ½" diameter, mounts using ½" mounting bracket (not included), ½" P-clip and #10 self-tapping screw ¾" x 3/16" (included for cleaning up cable), 20FT cable with 3 pin DTM series Deutsch connector.

Meter Sensor- AGCS001

Capacitive Proximity Sensor 18mm, mounts using 18mm mounting bracket (not included), 6FT cable with 3 pin DTM series Deutsch connector.

GPS Speed Sensor- 9AGPS01/9AGPS02

GPS Speed Sensor 2 ½" diameter, bottom plate on the receiver provides a magnetic mount or 2 x dual lock Velcro (included), 10FT cable with 3 pin DTM Deutsch connector.

Signal Line Inverter/Adapter (Relay)- 9KRT069

Relay mounts using #10 self-tapping screw ¾" x 3/16" (included), 2 x Butt splices for connecting power and ground (included), 1FT cable with 3 pin DTM Deutsch connector.

Bare Wire Cable- 9ART089

Bare Wire cable allows connection of 3rd party sensors White wire power, Red wire signal and Black wire ground, 4FT cable with 3 pin DTM Deutsch connector.

Radar Cable- 9ART090

Radar cable uses a 4 pin CPC connector which connects to DICKEY-john's Radar II or equivalent. A mating cable is required from the maker of the radar to mate to the 4 pin CPC connector, the cable has a 2 position Deutsch DT series connector that allows you to select if the radar is powered from our system or not. Power would be removed if the radar signal is connected via a Y-Cable and is already powered by another device. To disconnect the 12V power, the customer would remove the connector with the jumper wire and install a connector with just sealing plugs (included), 4FT cable with DTM Deutsch connector.

Radar Y-Cable- 9ART091

Radar Y-Cable uses 4 pin CPC connectors which connects to DICKEY-john's Radar II or equivalent. A mating cable is required from the maker of the radar to mate to the 4 pin CPC connectors, This Y-Cable allows the radar to still be connected to a 2nd monitor. Only the signal and ground wires are spliced into the Legend system. In this configuration, the Agtron product does not power the radar, 4FT cable with DTM Deutsch connector.

Appendix C: Seed Sensor Sensitivity Values

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

Product	Sensitivity

Appendix D: Conversion Factors

To convert from Imperial 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 E: Seed Densities

Seed Type	Seeds/pound	Seeds/kilogram
Barley: 2 row	10,000	22,050
Barley: 6 row	12,500	27,563
Bean	1,800	3,969
Buckwheat	15,000	33,075
Canola: Campestris	189,000	416,745
Canola: Napus	132,000	291,060
Canola: Polish	190,000	418,950
Corn	1,200	2,646
Fababean	1,150	2,536
Fall Rye	14,000	30,870
Flax	76,000	167,580
Lentil	10,300	22,712
Mustard	245,000	540,225
Oats	12,500	27,563
Peas	2,550	5,623
Rice	18,500	40,793
Safflower	12,500	27,563
Soybean	3,400	7,497
Sunflower	3,100	6,836
Triticale	10,150	22,381
Wheat: Hard Red	13,300	29,327
Wheat: CPS	11,400	25,137
Wheat: Durum	10,500	23,153
Wheat: Extra Strong	10,500	23,153
Wheat: Soft White	13,400	29,547

Fertilizer		
Ammonium Nitrate	48,400	106,704
Ammonium Phosphate	29,600	65,257
Potash	18,300	40,345
Urea	37,800	83,335

Appendix F: Sensor Breakout Connector Pin-out
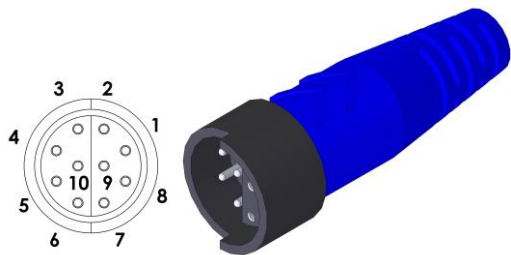
When looking at the cable arrows are at the top.

Pin #	Color	Use
1	Grey	Shield
2	Black	Ground
3	Yellow	Seed Sensors (do not use)
4	Green	Seed Sensors (do not use)
5	Brown	Loop 1 – Sensor Channel 4 Loop 2 – Sensor Channel 7
6	Red	Loop 1 – Sensor Channel 5 Loop 2 – Sensor Channel 8
7	White	12 Volt Power
8	Blue	Seed Sensors (Do Not Use)
9	Violet	Seed Sensors (Do Not Use)
10	Orange	Loop 1 – Sensor Channel 6 Loop 2 – Sensor Channel 9

Appendix G: DSUB Connector Pin-out
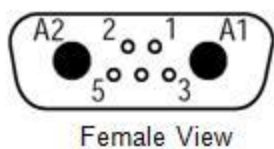
Female View

Pin #	Signal
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 H: DTM Connector Pin-out

Deutsch - DTM06-3S
Deutsch - DTM04-3P- Mating Connector

Pin #	Color	Signal
1	White	Power
2	Red	Signal
3	Black	Ground

Warranty

Warranty Guidelines

Warranty covers all defects in workmanship or materials in your Agtron Enterprises Inc. product under normal use .

1. This warranty coverage applies only to the original owner and is not transferrable.

2. To receive warranty, send the defective part and proof of date of purchase to your local dealer. The dealer will contact Agtron Enterprises Inc. for a return authorization number and supply the replacement warranty parts.

3. If replacement parts are sent by Agtron Enterprises Inc., the customer will have 30 days to return the original defective product. A credit card is required and after 30 days the customer will be charged if the defective product is not received by Agtron Enterprises Inc. Go to www.agtron.com for shipping details.

4. Any product failures during the warranty period may be repaired or replaced with new or rebuilt product by Agtron Enterprises Inc. discretion.

5. Troubleshooting, removal, installation labor and shipping to Agtron are the responsibility of the customer.

6. Damage from neglect, accidents, fire, liquids, chemicals, other substances, flooding, vibrations, excessive heat, power surges, excess supply voltage, incorrect supply voltage, radiation, electrostatic discharges including lightning, other external forces and impacts are not covered under warranty.

7. There are no customer serviceable parts. Removing a security screw will void the warranty.

8. Unauthorized modifications will void the warranty.

9. Any usage outside of the intended use will void the warranty.

Product Returns

1. If unsatisfied, a full refund is offered within 30 days from the date of purchase. To receive the refund, contact Agtron Enterprises Inc. for a return authorization number. Product returned after 30 days will be charged a 15% restocking fee. No refund is available on product returned 52 weeks after the date of purchase. Go to www.agtron.com for shipping details.

Conditions of Use

1. Agtron Enterprises Inc. takes no responsibility for injuries, damages, or losses due to the use, misuse, abuse, or failure of this equipment. It is the responsibility of the customer to understand the operation and to ensure that it is operating properly.

2. All products produced by Agtron Enterprises Inc. are intended for use with agricultural implements. Any other application has not been considered; therefore complying with regulations is the sole responsibility of the customer.