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SAFETY NOTICES

Safety notices are one of the primary ways to call attention to potential hazards.



This Safety Alert Symbol identifies important safety messages in this manual. When you see this symbol, carefully read the message that follows. Be alert to the possibility of personal injury or death.

WARNING

Use of the word **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Use of the word **CAUTION** with the Safety Alert Symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Use of the word **CAUTION** without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in equipment damage.

OPERATOR'S MANUAL





SYSTEM OVERVIEW

The DICKEY-john IntelliAg Air Cart Control system controls granular seeding, liquid, flow, and granular fertilizer applications. The IntelliAg is designed to ISO 11783 CAN communications providing the capability of communicating with other manufacturer's ISO 11783-compatible equipment.

The IntelliAg consists of:

- 5" Virtual Terminal or a 10" Virtual Terminal
- Master Switch
- Working Set Master Module
- Up to 11 Working Set Member modules (monitors up to a total of 198 rows of seed input) (optional)
- Implement Lift Switch (optional)
- CAN Terminators

All of the devices communicate using the ISO 11783 CAN communications standard. System components are described in the following section.

VIRTUAL TERMINAL (VT)

A 5" or 10" Virtual Terminal provides user interface with the IntelliAg system used for output and input of data. Reference the VT operator's manual for setup and configuration instructions.

NOTE: Examples shown throughout this manual depict display screens of the 5" Virtual Terminal display.

Figure 1

5" or 10" Virtual Terminal



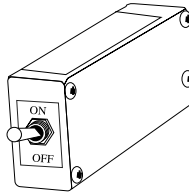
NOTE: The VT also consists of a data port for data retrieval, but this feature is not supported in this software release.



MASTER SWITCH

Figure 2

Master Switch

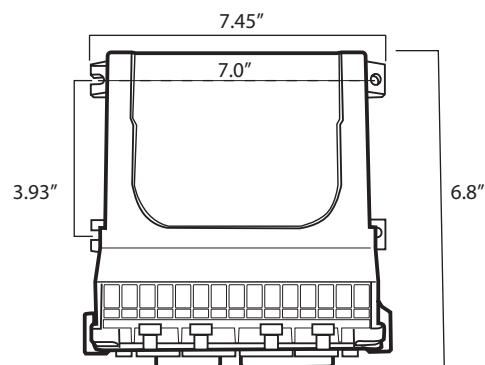


The Master Switch allows the user to start and stop product application through a single switch. The two switch positions are ON and OFF. The normal operating position for field application is ON. In this position, ground speed controls the application rate. When ground speed is reduced to zero, all application ceases. The OFF position inhibits all product flow. When set to the OFF position, the system shuts off for safety and travel purposes. Setup and configuration of the system is accomplished when the Master Switch is in the OFF position. The Master Switch is also housed inside the cab of the tractor.

WORKING SET MASTER (WSMT) MODULE ACC (AIR CART CONTROL)

Figure 3

Working Set Master Module



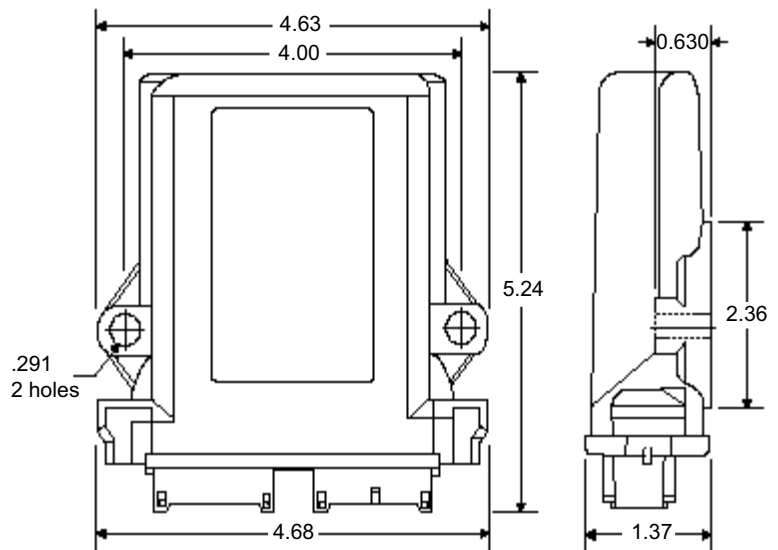
The Working Set Master (WSMT) module houses the system's primary interface device. All system parameters, constants and memory are stored in the WSMT. The WSMT has four channels for granular seeding, granular fertilizer or liquid control. In addition, the WSMT can accept inputs from 5 hopper levels, 3 RPM shaft sensors, 4 air pressure sensors, 1 lift switch and 1 ground speed sensor. The WSMT module uses a 30 and 18 pin connector with a jackscrew to secure the connector to the module. The WSMT is typically mounted on the implement.



WORKING SET MEMBER (WSMB) MODULE (OPTIONAL)

Figure 4

Working Set Member Module



Each Working Set Member (WSMB) module is an auxiliary to the Working Set Master (WSMT). Each WSMB can accept up to 18 rows of seed sensors. The WSMB passes information directly to the WSMT. Up to 11 WSMB's may be installed to monitor up to 198 rows. The flexible design of the WSMB allows for installation virtually anywhere on the implement.

IMPLEMENT LIFT SWITCH (OPTIONAL)

The Implement Lift Switch detects the position of the implement. When using an Implement Lift Switch, the Master Switch can be left in the ON position during operation, and the system will be turned OFF and ON as the implement is raised and lowered. The Master Switch should be turned OFF when in transport, when stationary, or when the operator has left the cab.



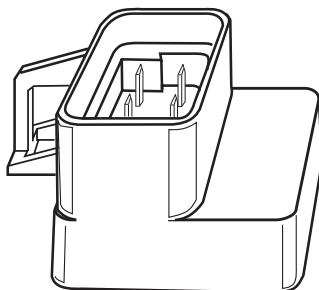
CAN TERMINATORS

CAN Terminators are necessary for proper communication between each component of the system.

- One terminator is located on the cab harness, approximately 30 inches from the Virtual Terminal connector.
- One terminator plugs into the implement harness of the last module connected to the CAN bus.

Figure 5

Can Terminator





SYSTEM REQUIREMENTS

The minimum requirements to operate the IntelliAg Air Cart Control system consists of:

- Virtual Terminal
- Master Switch
- Working Set Master
- Two CAN terminators

Optional and not required for system operation:

- Working Set Member(s)

PERFORMANCE FEATURES

- Monitoring of up to 198 rows, 1 ground speed sensor, 5 hopper levels, 3 shaft RPM sensors, 4 pressure sensors, one lift switch
- Easy and flexible configuration
- User-definable view of functions including:
 - control actual rates
 - control target rates
 - control rate
 - control scan
 - population row scan
 - population min/max scan
 - population min/max row
 - population average
 - spacing row scan
 - spacing min/max row
 - spacing min/max scan
 - spacing average
 - seeds per distance row scan
 - seeds per distance min/max row
 - seeds per distance min/max scan
 - seeds per distance average
 - singulation average
 - singulation row scan
 - singulation min/max scan
 - ground speed
 - total area
 - field area - 1 and 2
 - channel areas



User-definable functions continued-

- area scan
- control RPM scan
- system active time
- control channel material accumulation
- accessory input scan (RPM and Pressure)
- channel product level
- area per hour
- seed count accumulator
- hopper level status scan
- Distance Accumulator

COMPATIBILITY

- Compatible with DICKEY-john sensors



INSTALLATION

VIRTUAL TERMINAL

Reference the Virtual Terminal (VT) operator's manual for installing the VT to the tractor cab. Once the Virtual Terminal has been mounted, connect the tractor (cab) harness as illustrated in (Figure 13) or (Figure 14).

Figure 6

Dj 5" and 10" Virtual Terminals



MASTER SWITCH

1. Install the Master Switch within easy reach of the operator. The switch can be attached to any convenient location using tie wraps, tape, Velcro stripping, etc..
2. Once mounted, connect the Master Switch to the Tractor (Cab) Harness as illustrated in (Figure 13) or (Figure 14).

Figure 7

Master Switch

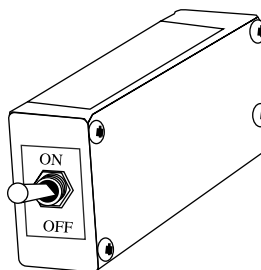
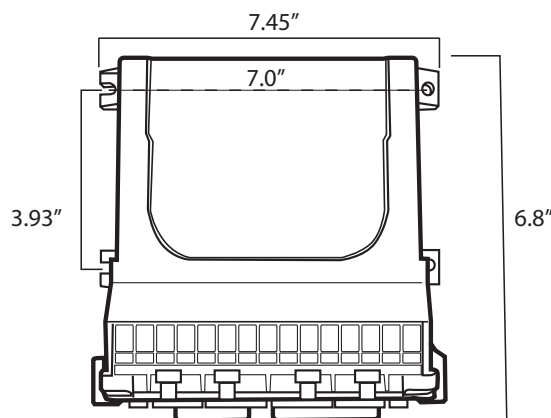




Figure 8

Working Set Master Module



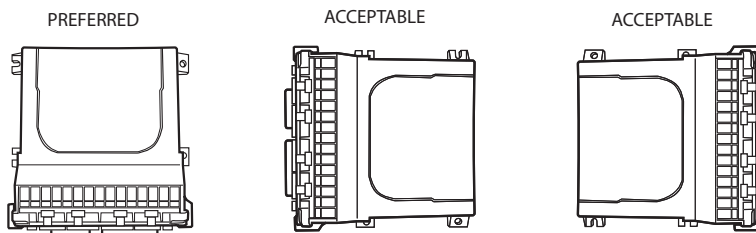
WORKING SET MASTER (WSMT) MODULE

1. Select an area on the implement to mount the WSMT that allows for easy hookup and access. Use the enclosure as a template to mark the location of the mounting holes.
2. Mount with the label side of module facing out. The WSMT may be mounted in any of the orientations illustrated in (Figure 9).
3. Drill four 9/32 inch diameter holes where marked.

IMPORTANT: Do not use the enclosure as a guide when drilling. Do not overtighten nuts as this could damage the mounting tabs of the enclosure.

Figure 9

Acceptable Orientation



Do not install the module in any orientation other than shown in (Figure 9). The connection wires must not be mounted upward, as moisture can collect inside the unit and damage the circuits.

4. Once mounted, connect the WSMT to the Working Set Master module harness and connect the WSMT harness to the Power/CAN backbone.



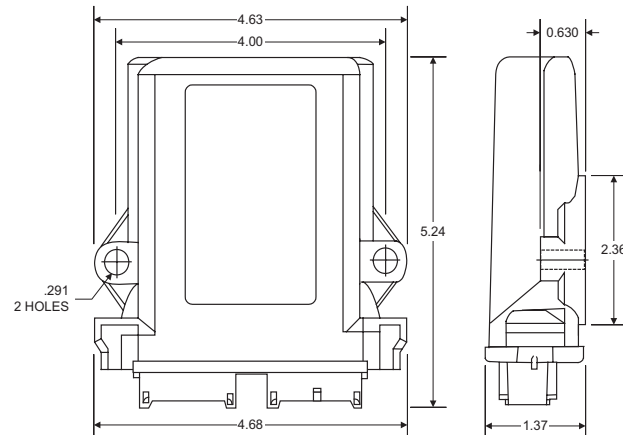
5. Connect any additional adapter harnesses to the module harness. The WSMT Module harness can accept the following adapter harnesses:
 - **Actuator Harness:** This harness allows for 4 output control channels, a hopper level sensor input, an RPM sensor input, a ground speed input, an implement switch input and test switch. In addition, a pair of 6-pin connectors are available for Servo connection. Install sensors, valves, etc. per the instructions included with the items. Install the PWM valve assembly and feedback sensor for each control loop and connect the devices to their respective inputs on the harness, making certain to match PWM 1 with FB1, PWM 2 with FB 2, etc. Secure any unused and excess cable lengths where necessary. Refer to [\(Figure 15\)](#) for additional information.
 - **Auxiliary Sensor Input Harness:** This harness accommodates (4) Hopper Sensor inputs; (2) Fan/Shaft RPM Sensor inputs; and (4) Air Pressure Sensor inputs. No seed sensors can be connected directly to the Air Cart Control WSMT.



WORKING SET MEMBER (WSMB) MODULE

Figure 10

Working Set Member Module



1. Select an area on the implement to mount the member that allows for easy hookup and access. Extensions may be used to reach members installed on remote areas of the implement.
2. Mount with the label side of the module facing out. The module can be mounted in the same orientations as the Working Set Master (WSMT) as illustrated in (Figure 9).

CAUTION

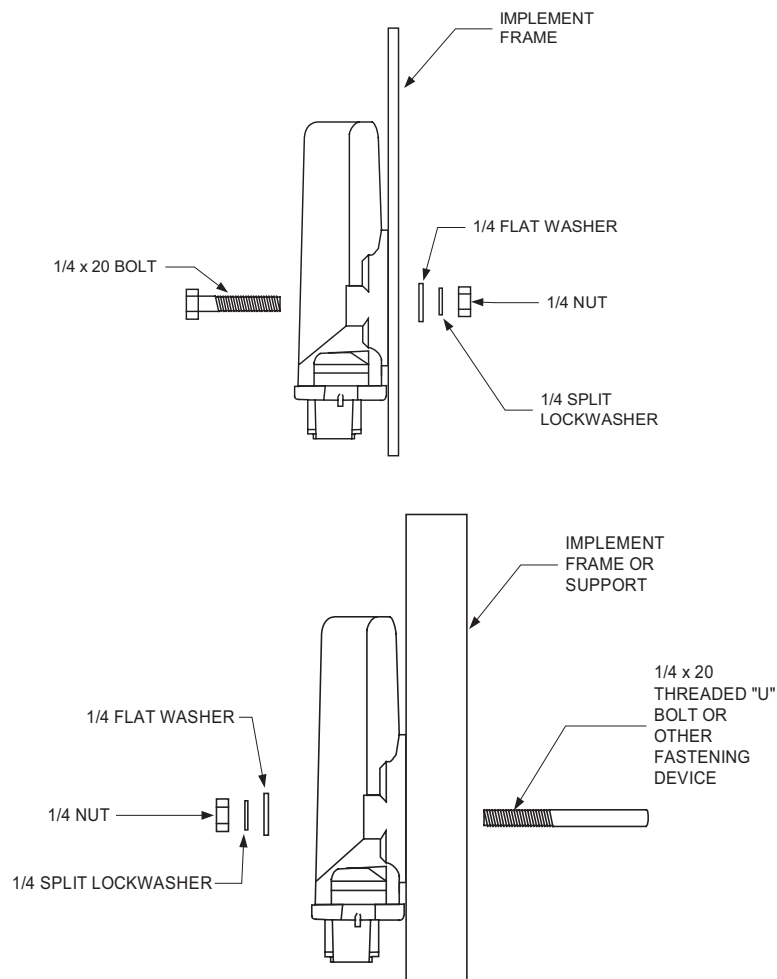
Do not install the module in any orientation other than illustrated in (Figure 9). The connection wires must not be mounted upward as moisture can collect inside the unit and damage the circuits.

3. To bolt the member to a frame:
 - Use the enclosure as a template to mark the location of the mounting holes.
 - Drill two 9/32 inch diameter holes where marked.
 - Attach to frame using 1/4 x 20 bolts or other fastening devices as illustrated in (Figure 11).

IMPORTANT: Do not use the enclosure as a guide when drilling. Do not overtighten nuts as this may damage the mounting tabs on the enclosure.



Figure 11
Working Set Member Installation (Bolted)

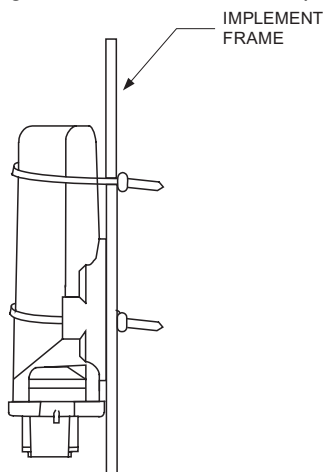




4. To tie-strap the member to a frame:
 - Use one long tie-strap to loop around the member body and through both mounting holes as illustrated in (Figure 12).
 - If necessary, drill mounting holes following the procedure described above.
 - Securely tighten tie-strap.
 - Install a second tie-strap toward the label end of the enclosure for additional support.

Figure 12

Working Set Member Installation (Tie-Strap)



5. Connect a WSMB harness to the WSMB module and connect the WSMB harness to the Power/CAN backbone.
6. Connect each module harness to its module, inserting both connectors until the connector locking tabs engage.
7. Lay out the planter harness along the frame of the implement to each of the seed sensors. For Seed Sensors, extensions will most likely not be necessary. Route sensor wires in locations where they will not be damaged by chains, drive shafts, sprockets, etc. Secure the harness to the toolbar with tie-straps. Coil and secure any unused sensor connections. The WSMB Module harness can accept:
 - A standard DICKY-john style PM planter harness or an SE style planter harness depending on the WSMB harness used. Harnesses are available for a number of row configurations.
 - Route the planter harness on the implement, securing as necessary.
 - Install seed sensors per the instructions included with the sensors. Refer to the Implement Harness diagram (Figure 16) for additional information.

NOTE: The last module harness in the system must have a CAN Terminator installed for proper system operation. Refer to Implement Harness (Figure 13) or (Figure 14) for additional information.

IMPORTANT:

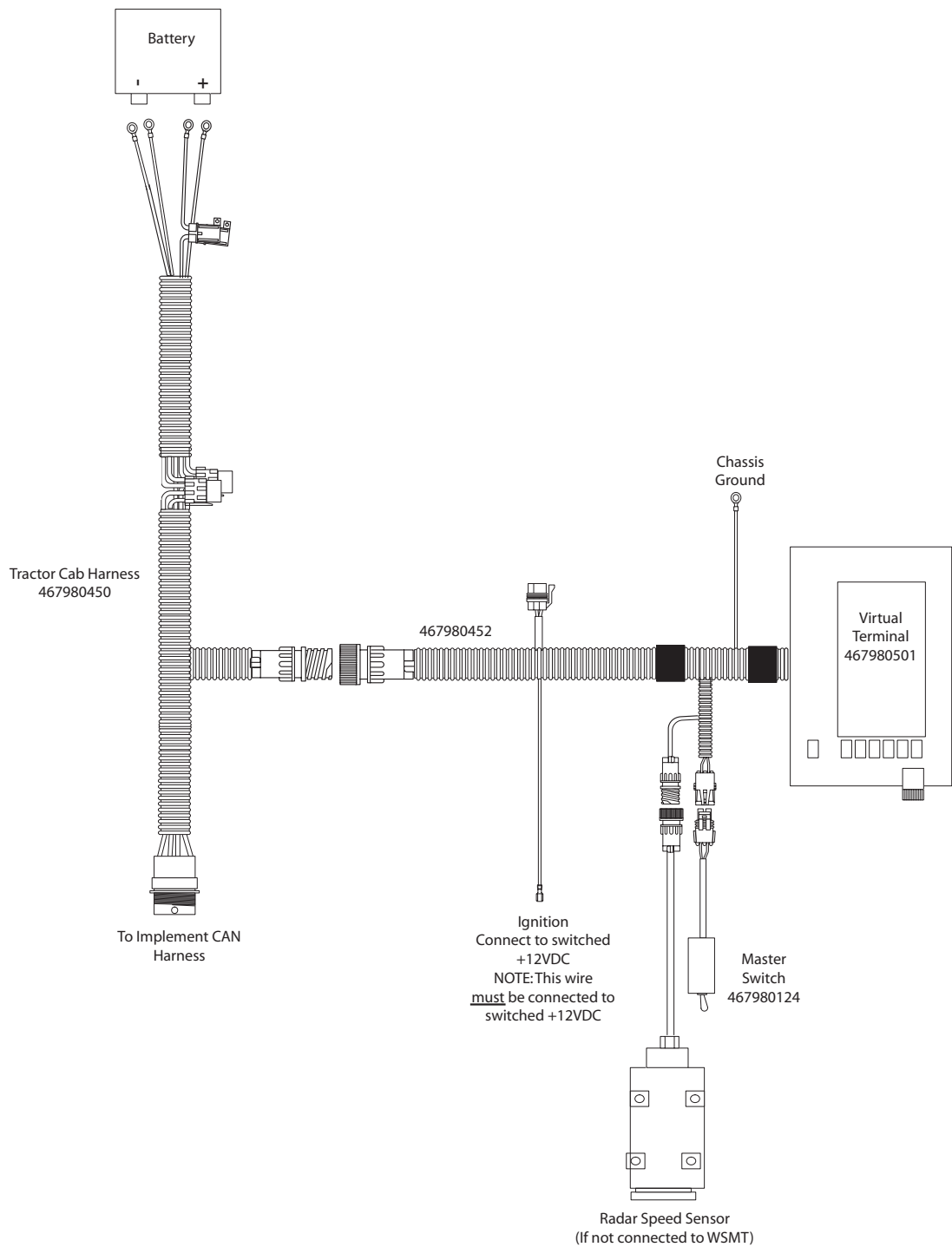
Be sure the locking tabs engage when inserting the connectors. The connection is sealed only when the locking tabs have fully engaged.



CAB HARNESS CONNECTIONS

The following diagrams illustrate cab harness layout and connections for DICKY-john 5” and 10” Virtual Terminals.

Figure 13
Cab Harness Layout and Connections (5” Virtual Terminal)





NOTE: *The ignition lead must be connected to switched +12VDC for the system to power properly.*

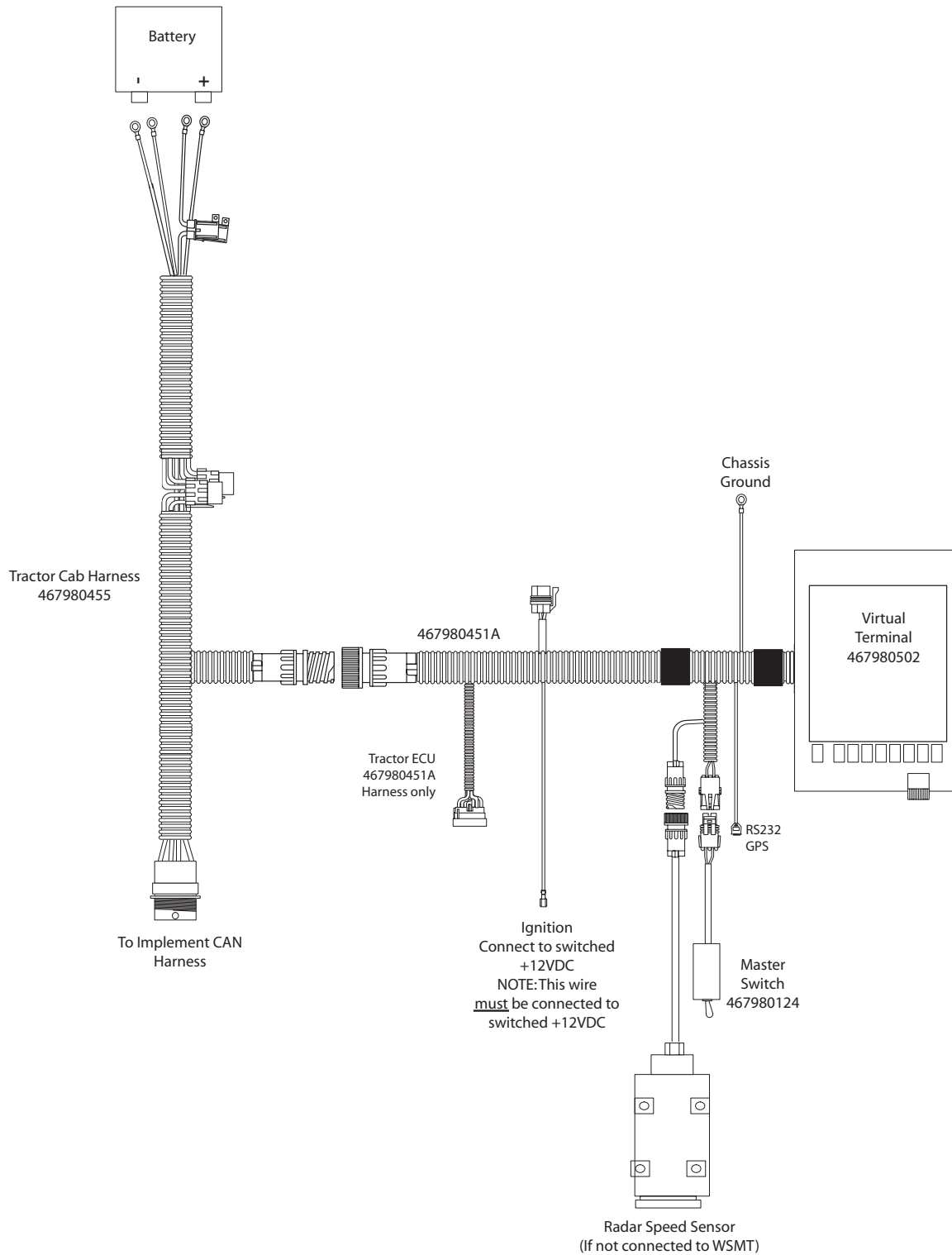
5" VIRTUAL TERMINAL CAB HARNESS CONNECTIONS

1. Connect the power leads directly to the battery.
2. Connect the two pieces of the tractor harness together.
3. Connect the ignition wire to a switched +12VDC.
4. Connect the Chassis Ground lead to a bare point of the cab frame that offers a good chassis ground connection.
5. Connect the Master Switch, CAN Terminator and Radar Speed Sensor to their respective connectors on the cab harness. If the Speed Sensor is to be connected to the WSMT, do not connect anything to the Speed Sensor connector on the Cab Harness.



Figure 14

Implement Harness Connection (10" Virtual Terminal)





10" VIRTUAL TERMINAL CAB HARNESS CONNECTIONS

NOTE: *The ignition lead must be connected to switched +12VDC for the system to power properly.*

1. Connect the power leads direct to the battery.
2. Connect the ignition wire to a switched +12 VDC.
3. Connect the chassis ground lead to a bare point of the cab frame that offers a good chassis ground connection.
4. Connect the Master Switch, CAN Terminator, Radar Speed Sensor, GPS, Tractor ECU to their respective connectors on the cab harness. If the speed sensor is to be connected to the WSMT do not connect anything to the speed sensor connector on the cab harness.



IMPLEMENT HARNESS CONNECTIONS

Refer to the following diagrams for implement harness layout and connections. The diagrams provide an example system using two modules and a CAN extension.

Figure 15

Implement Harness

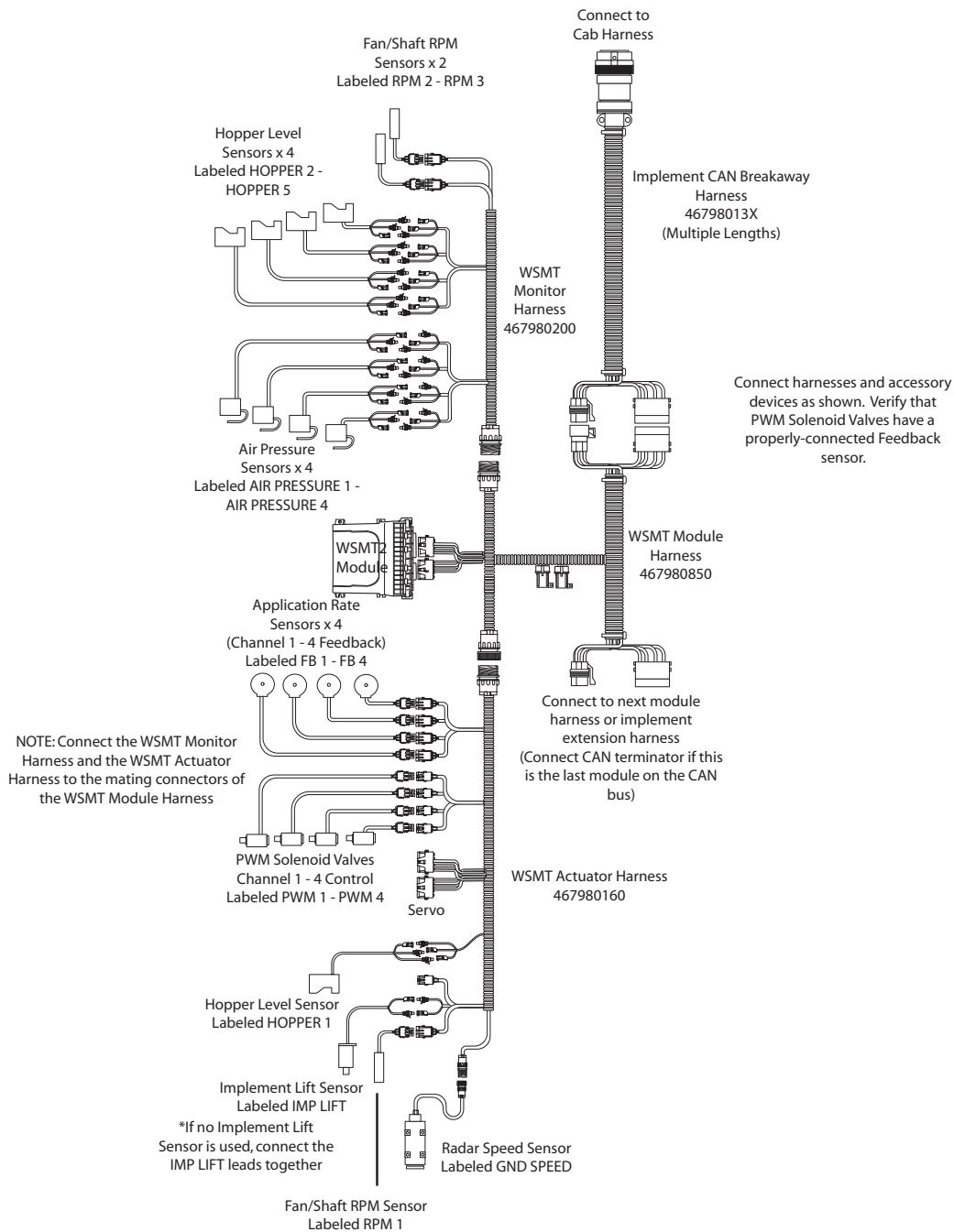
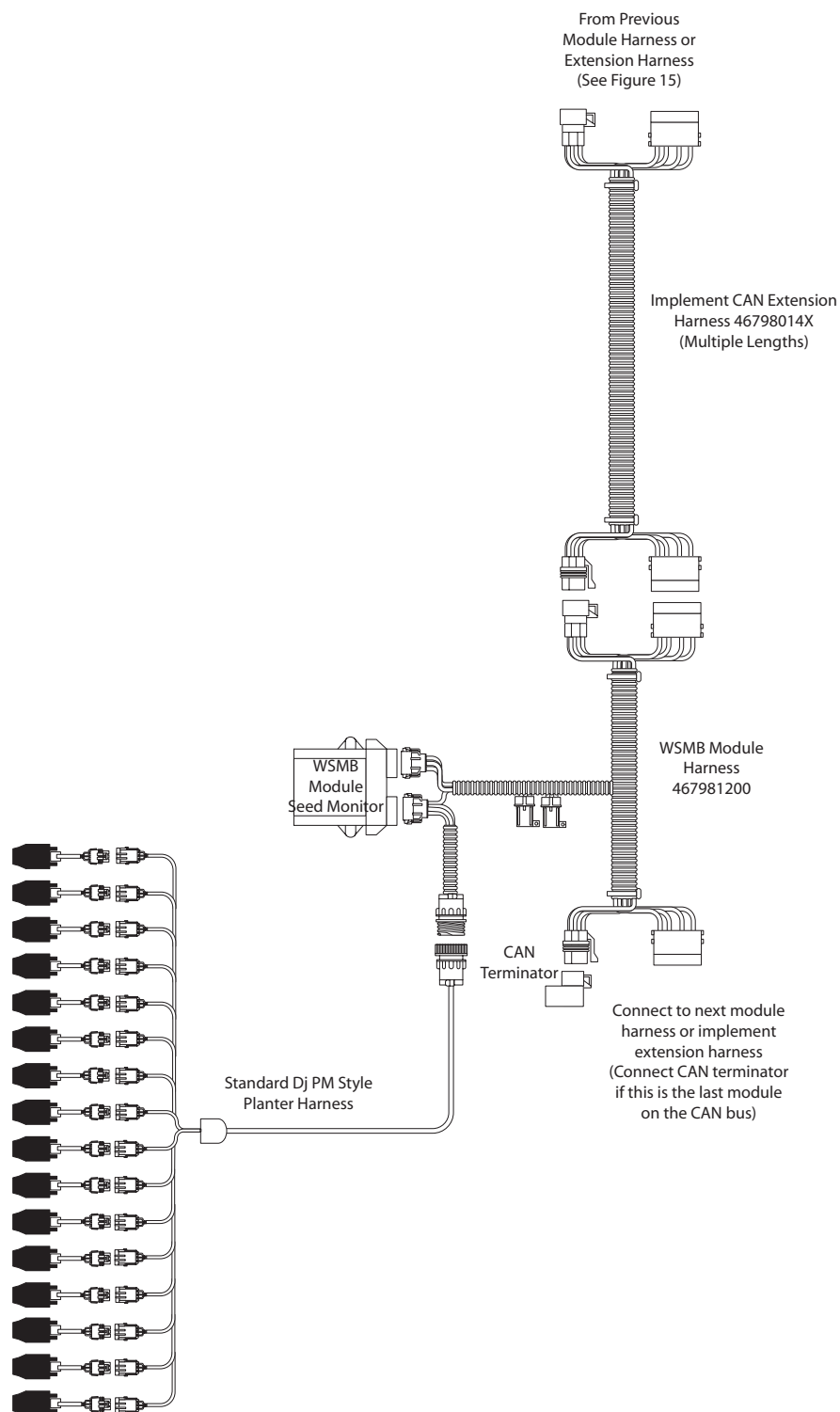




Figure 16

Implement Harness (Continued)





1. Connect the Implement CAN Breakaway extension to the mating connector of the Cab Harness. Route the harness along the implement hitch to the next extension or module harness (use an Implement Extension Harness if additional length is needed). Secure harness as needed.
2. Connect the harnessing to the mating connectors of the Implement CAN harness, and then connect the module to the harness. The WSMT module uses a 30 and 18-way connector with a jackscrew to secure the connector to the module. The WSMB uses a pair of 12-pin connectors. Secure module harness as needed.

SENSOR INSTALLATION

For proper system operation, all sensors used with the system must be connected properly as described in the following sections. Sensors that are incorrectly installed will not be properly identified by the system and will result in incorrect numbering of the sensors.

SEED SENSORS

The system is compatible with all existing DICKEY-john seed sensors. Seed sensors may be connected to the WSMB Modules. Any number of sensors up to the maximum capacity of the module may be connected. A maximum of 198 seed sensors can be connected to the system.

IMPORTANT: Seed sensors must be connected to a WSMB only and cannot be connected to an accessory harness of the WSMT.



When connecting seed sensors to the modules, the following requirements must be observed:

All seed sensors installed must be connected to the seed sensor harness SEQUENTIALLY, starting with the Row 1 input. In the event that not all row inputs on the module will be used, the unused inputs must be the last inputs on that module.

Figure 17

Correct Seed Sensor Module Connection

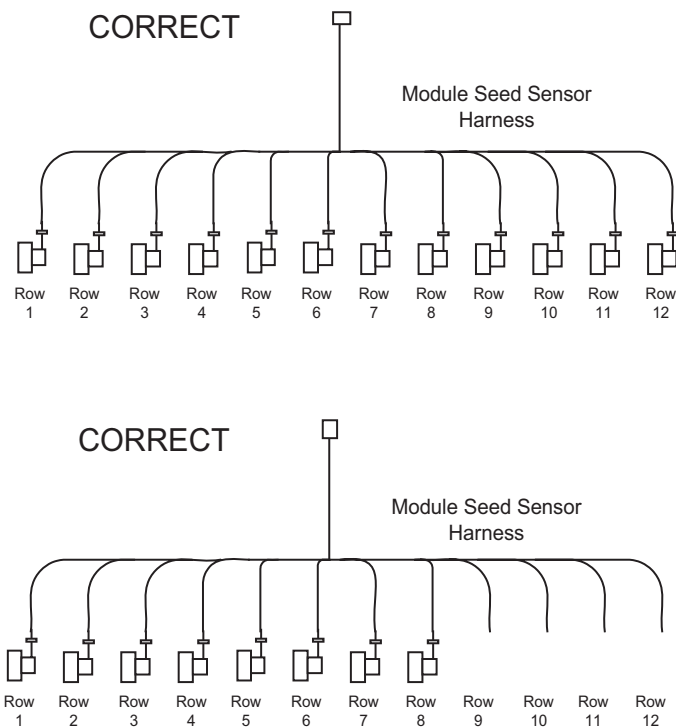
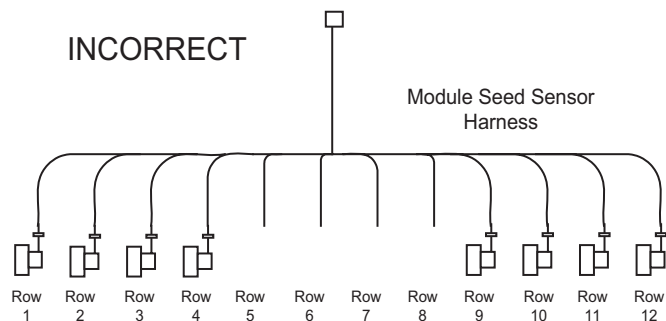


Figure 18

Incorrect Seed Sensor Module Connection



Failure to correctly install seed sensors will result in incorrect row assignment on the planter monitor display functions.



HOPPER LEVEL SENSORS

The system is compatible with the DICKEY-john Planter hopper level sensors. Five Hopper level sensors can be connected to the WSMT module. One Hopper sensor can be connected to the WSMT Actuator harness and 4 additional hopper sensors can be connected to the Auxiliary harness. The Hopper level connections are labeled HOPPER 1 through HOPPER 5.

RPM/FAN SENSORS

The system is compatible with all existing DICKEY-john digital fan/RPM sensors. Three Fan/RPM sensors can be connected to the WSMT module. One sensor can be connected to the WSMT Actuator harness and two additional RPM sensors can be connected to the Auxiliary harness. The Fan/RPM sensor connections are labeled RPM 1 through RPM 3.

AIR PRESSURE SENSORS

The system is compatible with DICKEY-john air pressure sensors. Four Air Pressure Sensors can be connected to the Auxiliary harness (labeled AIR PRESSURE 1 through 4) and adapter harness connects to the RPM adapter harness.





SYSTEM MODES

The Virtual Terminal has two modes of operation:

- OPERATE
- SETUP/CONFIGURATION

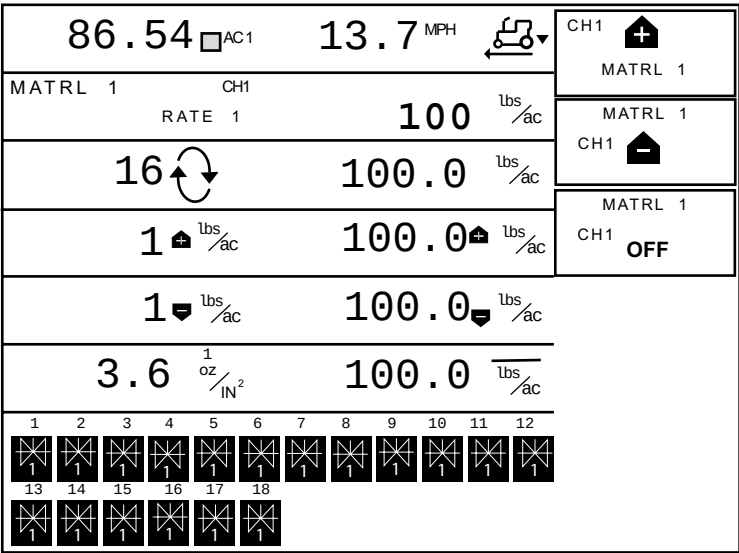
The position of the Master Switch determines which mode is selected.

OPERATE MODE

When the Master Switch is in the ON position, the Virtual Terminal (VT) is in OPERATE mode. In this mode, all enabled system components and control channels are operational, as well as all monitoring functions and system accumulators.

Figure 19

Operate Mode Default Display





Next Channel softkey



Next Work Screen softkey



Increment softkey



Decrement softkey



Inc/Dec Reset To Target



Turn On Channel softkey



Turn Off Channel softkey

NEXT CHANNEL

The Next Channel softkey selects the next available channel to be active and viewable, as illustrated in [Figure 20](#), "Channel 1". The active channel may be set to ON or OFF by selecting the Turn On/Off Channel softkey. The active channel is displayed in reverse video display in a multiple channel configured system. *This key is visible only when multiple channels have been configured.*

The Target Rate can be adjusted by using the Inc/Dec softkeys. The Next Channel softkey displays the next available channel information. The channel's Inc/Dec softkeys, as well as the ON/OFF softkeys, display the current channel label.

NEXT WORK SCREEN

The Next Work Screen softkey displays the next configured screen. The number to the left of the graphic identifies the current screen. The number on the right identifies the next screen to display. The Next Work Screen only displays if multiple screens are configured.

INCREMENT

The Increment softkey increases the active channel's target rate by the amount specified in the Inc/Dec % or rate table setup for that channel. Increment can be pressed several times to increase the target rate by the specified amount for every actuation, until the Max Rate value is reached. The active channel/material is displayed in the softkey text. For additional information on the process, refer to CONTROL CHANNEL CALIBRATION.

DECREMENT

The **Decrement** softkey decreases the active channel's target rate by the amount specified in the Inc/Dec% or rate table setup for that channel. Decrement can be pressed several times to reduce the target rate by the specified amount for every actuation, until the Min Rate value is reached. The active channel/material is displayed in the softkey text. For additional information on the process, refer to CONTROL CHANNEL CALIBRATION.

INC/DEC RESET TO TARGET

The Inc/Dec Reset to Target softkey is used to return the active channel to the original target rate. This softkey is only available for channels that are active and have had the target rate adjusted using the Increment or Decrement softkeys in % mode. The active channel displays in the softkey text.

TURN ON/OFF CHANNEL

The Turn On/Off Channel softkeys turn the active channel(s) ON and OFF, respectively. Channels that are set to OFF will not operate when the Master Switch is set to the ON position. Note that turning a channel OFF is not the same as disabling a channel in the Channel Setup mode. The active channel is displayed in the softkey text. If the key is OFF, this is the action that will be performed if the key is pressed.



NOTE: The **Next Page** softkey is available only when there are 6 or more softkeys on the active window.

SETUP/CONFIGURATION MODE

When the Master Switch is in the OFF position, the VT is in SETUP/CONFIGURATION mode. In this mode, all control and monitoring functions cease. System configuration and parameter setup functions are enabled.

Figure 20
Setup/Configuration Mode Example Display

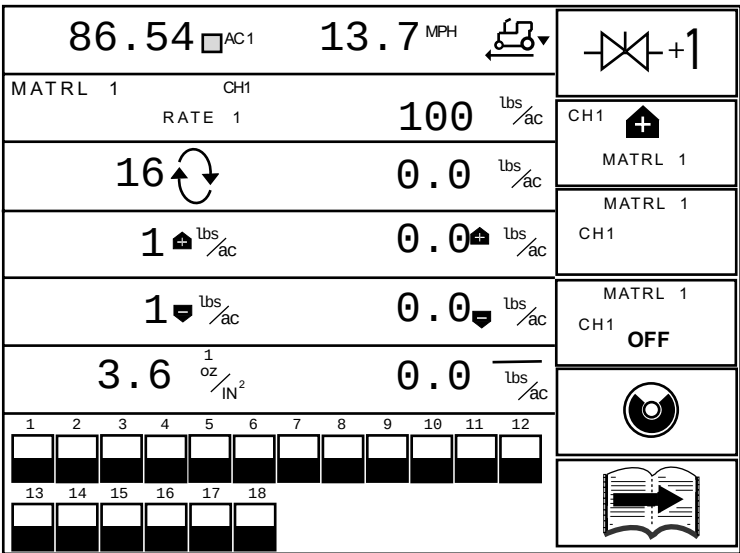
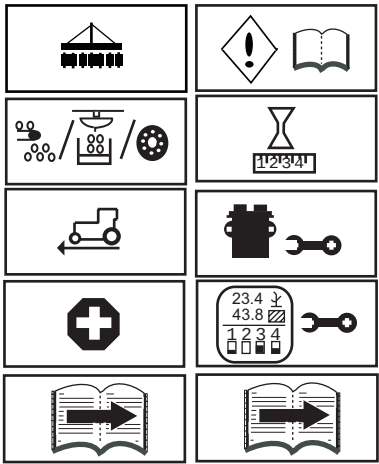


Figure 21
Additional Softkeys Available in Setup/Configuration Mode



The same functions are available as in the OPERATE mode, along with the additional softkeys as illustrated.



Next Channel softkey



Next Work Screen softkey



Increment softkey



Decrement softkey



Inc/Dec Reset To Target



Turn On Channel softkey



Turn Off Channel softkey

NEXT CHANNEL

The Next Channel softkey selects the next available channel to be active and viewable. The active channel may be set to ON or OFF by selecting the Turn On/Off Channel softkey. The Target Rate can be adjusted by using the Inc/Dec softkeys. The Next Channel softkey displays the next available channel information. *This key is visible only when multiple channels have been configured.*

NEXT WORK SCREEN

The Next Work Screen softkey displays the next configured screen. The number to the left of the graphic identifies the current screen. The number on the right identifies the next screen to be displayed. *This key is visible only when multiple work screens have been configured.*

INCREMENT

The Increment softkey increases the active channel's target rate by the amount specified in the Inc/Dec% or rate table setup for that channel. Increment can be pressed several times to increase the target rate by the specified amount for every actuation, until the Max Rate value is reached. The active channel/material is displayed in the softkey text. For additional information, refer to CONTROL CHANNEL CALIBRATION.

DECREMENT

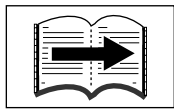
The Decrement softkey decreases the active channel's target rate by the amount specified in the Inc/Dec% or rate table setup for that channel. Decrement can be pressed several times to reduce the target rate by the specified amount for every actuation, until the Min Rate value is reached. The active channel/material is displayed in the softkey text. For additional information, refer to CONTROL CHANNEL CALIBRATION.

INC/DEC RESET TO TARGET

The Inc/Dec Reset to Target softkey is used to return the active channel to the original target rate. This softkey is only available for channels that are active and have had the target rate adjusted using the Increment or Decrement softkeys. The active channel/material is displayed in the softkey text. *This key is visible only when a change has been made to the target rate in % mode.*

TURN ON/OFF CHANNEL

The Turn On/Off Channel softkeys turn the active channel(s) ON and OFF, respectively. Channels that are set to OFF will not operate when the Master Switch is set to the ON position. Note that turning a channel OFF is not the same as disabling a channel in the Channel Setup mode. The active channel is displayed in the softkey text. If the key is OFF, this is the action that will be performed if the key is pressed.



Next Page softkey



Fill Disk softkey



Seed Monitor Setup softkey



Ground Speed Setup softkey



Diagnostics softkey



Alarm Log softkey



System Accumulators softkey

NEXT PAGE

The Next Page softkey only displays when there are 6 or more softkeys on the active window and may look different depending on the Virtual Terminal attached.

FILL DISK

The Fill Disk softkey is used to fill meters with seed to allow instant seed flow when the control is turned ON. Pressing the Fill Disk softkey will rotate the seed meters on ALL ACTIVE control channels one revolution, then stop. For additional information, refer to FILL DISK.

SEED MONITOR SETUP

The Seed Monitor softkey accesses the Seed Monitor Setup screen. All user-entered constants pertaining to planter monitor functions are accessed on this screen. For additional information, refer to SEED MONITOR SETUP.

GROUND SPEED SETUP

The Ground Speed Setup softkey accesses the Ground Speed Setup screen. Ground speed is the rate in MPH (Km/h) as measured by the ground speed sensor. For additional information, refer to GROUND SPEED CALIBRATION.

DIAGNOSTICS

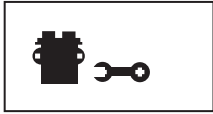
The Diagnostics softkey accesses the Diagnostics screen. Various system operating parameters are displayed on this screen. There is no user-entered data on this screen. For additional information, refer to DIAGNOSTICS.

ALARM LOG

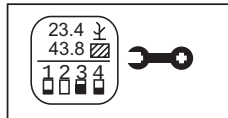
The Alarm Log softkey accesses the Alarm Log screen. An account of the previous alarms issued is stored here. There is no user-entered data on this screen. For additional information, refer to ACKNOWLEDGING ALARM CONDITIONS.

SYSTEM ACCUMULATORS

The System Accumulators softkey accesses the System Accumulators screen. All of the system accumulators for time, product application and distance are on this screen. There is no user-entered data on this screen. For additional information, refer to ACCUMULATORS/SEED COUNT/DISTANCE SCREEN.



Module Configuration softkey



Work Screen Configuration softkey



Material Configuration softkey

MODULE CONFIGURATION

The Module Configuration softkey accesses the Module Configuration Setup screen. All user-entered data pertaining to module configuration is established on this screen. For additional information, refer to MODULE CONFIGURATION.

WORK SCREEN CONFIGURATION

The Work Screen Configuration softkey accesses the Work Screen Configuration Setup screen. Users have the option to customize the Virtual Terminal to display any combination of data items available. The system allows for up to three individual display screens to be customized. All work screen configuration is established on this screen. For additional information, refer to WORK SCREEN CONFIGURATION.

MATERIAL CONFIGURATION SOFTKEY

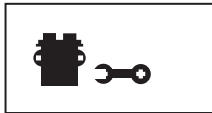
The Material Configuration softkey accesses the Material Setup screen. Up to 16 different materials can be configured and stored in a library for planter, liquid, and fertilizer control. For additional information, refer to MATERIAL AND CONTROL CHANNEL setup.

NOTE: Refer to individual installation instructions to ensure system component installation is achieved accurately.

IMPORTANT: Place the Master Switch in the OFF position to input data into the SETUP/CONFIGURATION mode.

⚠ CAUTION

Please note that if the current installation does not use a specific component (e.g., pressure sensors, hoppers, seed sensors) or if the module is not connected in the system, the module will not display on the screen.



Module Configuration softkey

The purpose of the Module Configuration screen is to identify modules on the CAN bus and to identify the sensors connected to each module. This configuration is necessary for proper sensor monitoring and self-test operation.

From the Main Operate screen, press the **Module Configuration** softkey to access the Module Configuration screen.

Figure 22

Module Configuration Screen

			
	SERIAL NUMBER	MODULE TYPE	MODULE ADDR.
☒	10245	WSMT-ACC	1
☒	10077	WSMB-18R	2



AUTO CONFIG











SERIAL NUMBER AND MODULE TYPE

Each module present on the CAN bus will be identified by Serial Number and Module Type. The module type corresponds to the identification on the Serial Number label attached to that module. A check mark to the left of each module's Serial Number identifies that module is active and communicating on the bus.

MODULE ADDR

The Module Address column is a critical parameter used to identify modules on the CAN bus and to identify the number of rows connected to the Working Set Members (WSMB) (optional). Accurate placement of the modules is required for correct console operation.

- Working Set Members can be added to monitor more seed rows
- One Working Set Member can accept up to 18 Seed rows
- Up to 11 Working Set Members can be installed to monitor up to a total 198 rows

The following requirements must be observed when connecting seed sensors to the WSMB:

1. Each Module Address is determined by the order in which the WSMT or WSMB are installed on the implement.
2. The Module Address should always start at the number 1 position.
3. Seed sensors must be connected to the WSMB continuously and consecutively. Any skipped rows will cause a break in the connection and activate an alarm.

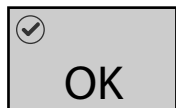
Example: Module Address 1 should be assigned to the module connected to Row 1. Module Address 2 should be assigned to the module connected to the next set of rows. The assigned numbering continues until all rows have been numbered.

To Edit Module Address Data:

1. Use the rotary knob to scroll through the settings until the desired data element is selected.
2. Once the outline box is located on the data item, press the rotary knob in to edit the data.
3. Press the **OK** softkey to save the desired setting or **Cancel** to return to previous setting.



Cancel softkey



OK softkey

(Figure 23) depicts an 18 row installation connected to the Working Set Member and assigned to Module Address 2.

18 Row Installation Example (WSMT only)

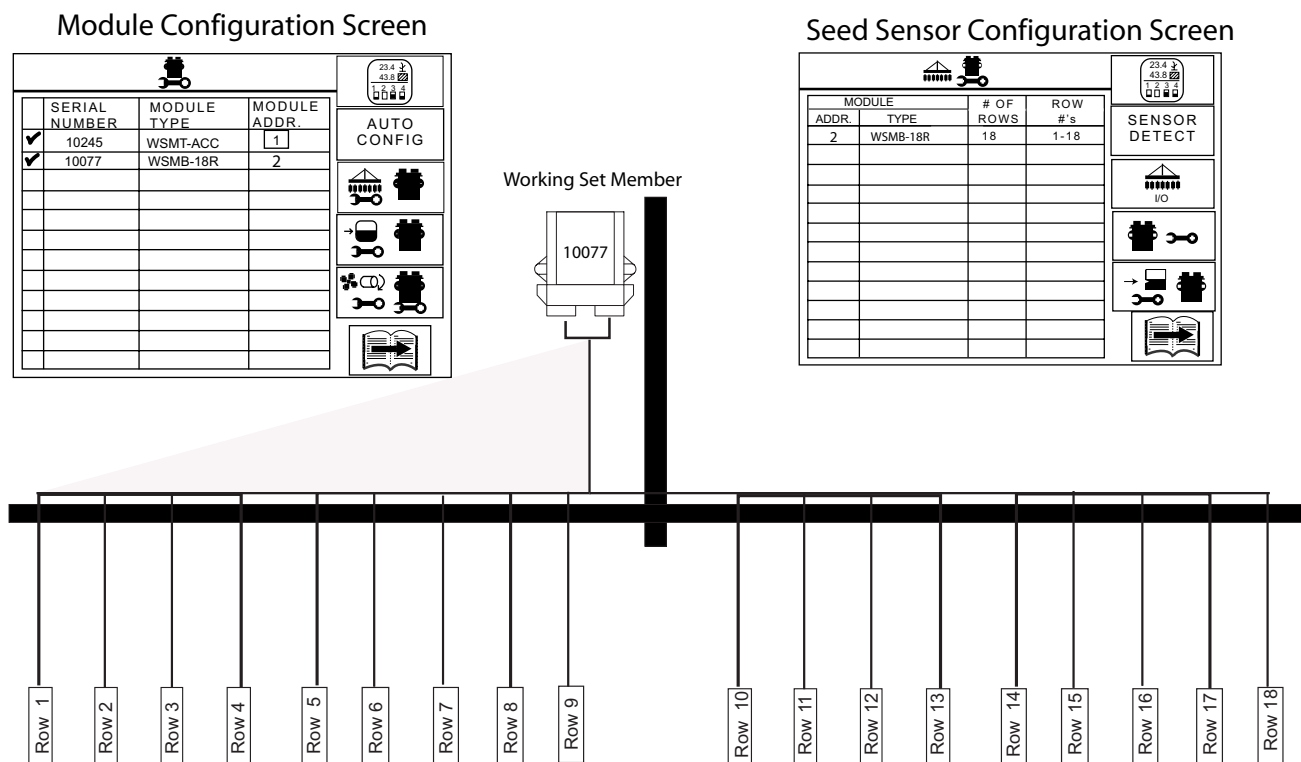
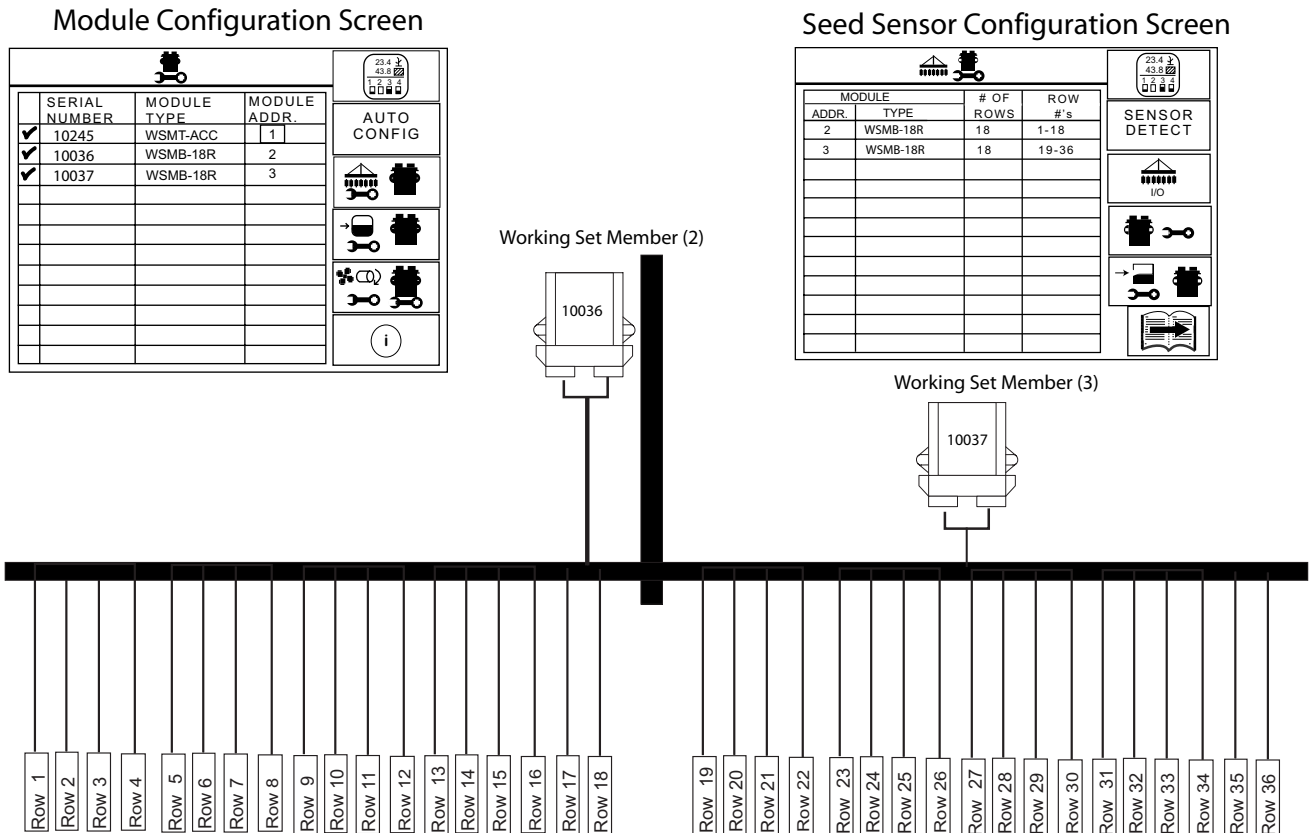


Figure 24

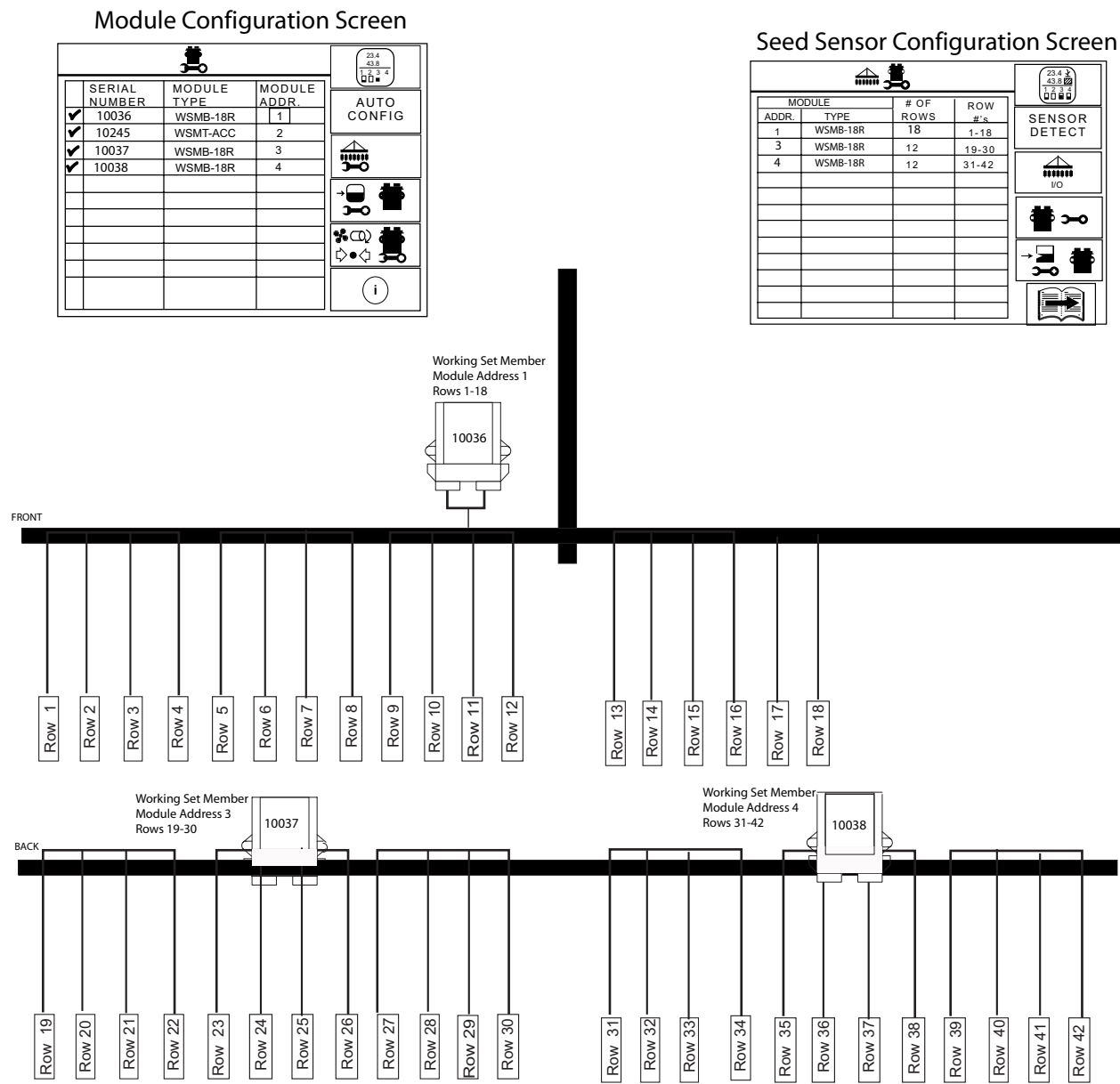
36 Rows Installation Example





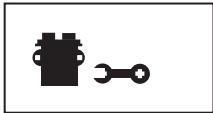
(Figure 25) depicts a 42 row installation with the Working Set Master assigned to Module Address 2 and rows 13-24. Three Working Set Members are assigned to the additional rows.

Figure 25
42 Row Installation Example





Auto Configuration softkey



Module Configuration softkey

AUTO CONFIG

The **Auto Config** softkey allows for an automated method of configuring the attached seed sensors and hopper sensors.

To utilize the Auto Configuration function and all sensors connected to the appropriate modules, in correct sequence.

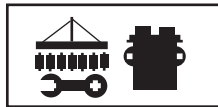
Press the **Module Configuration** softkey to access the Module Configuration screen.

IMPORTANT: Double check each sensor configuration to verify correct numbering. RPM sensors must be configured manually.

IMPORTANT: All sensors must be connected to the harnessing in the correct sequence for AUTO CONFIG to operate properly. Refer to the Installation Instructions accompanying each module for correct installation.

To Run Auto Config:

1. Press the **Auto Config** softkey. An hourglass will appear in the upper right corner while the system is being configured.
 - The system will detect the presence of seed sensors, hopper and pressure sensors connected to each module. The detected number of seed sensors for each module will automatically appear in the # of Rows data items on the Seed Sensor Configuration screen.
 - The detected number of hopper sensors will automatically be entered in the # of Hopp data items on the Hopper Sensor Configuration screen.
 - The detected number of pressure sensors will automatically be entered in the # of ACC data items on the Accessory Sensor Configuration screen.
 - Rows and hoppers will then be automatically assigned based on the module address of each module.



Seed Sensor Configuration softkey

SEED SENSOR CONFIGURATION

The **Seed Sensor Configuration** screen displays

- Module address
- Type
- Number of rows
- Row numbers for the system

Press the **Seed Sensor Configuration** softkey to access the Seed Sensor Configuration screen.

Figure 26
Seed Sensor Configuration Screen

				23.4 ↓ 43.8 ▢ 1 2 3 4
MODULE		# OF	ROW	SENSOR DETECT
ADDR.	TYPE	ROWS	#'s	
2	WSMB-18R	18	1-18	

The following data items may be edited:

IMPORTANT: The # or Row data items for each listed module and the Row #'s value will automatically populate if the Auto Config softkey is used to configure installed sensors.

OF ROWS

The # of Rows column displays the total number of seed sensors that are connected to each module. The Row #'s value is automatically configured for proper row numbering for each module based upon the Module Address value and # of rows.

NOTE: Only modules that support seed sensors are displayed on the **Seed Sensor Configuration** screen.

To Edit # OF ROWS data:

1. Use the rotary knob to scroll through the settings until the desired data element is selected.
2. Once the outline box is located on the data item, press the rotary knob to edit the data.
3. Press the **OK** softkey to save the desired setting or **Cancel** to return to previous setting.



Sensor Detect softkey

4. When data has been successfully entered for each module, the **Sensor Detect** softkey can be pressed to detect and test the entered modules. An hourglass will appear in the upper right corner while the system is being configured.
5. If the number of sensors detected on each module is not in agreement with the # of Rows value entered, an alarm will activate.

– Verify that the # of sensors entered on the Seed Sensor Configuration screen match the actual number of sensors connected.

– Confirm that all harnessing is connected properly.

Refer to the TROUBLESHOOTING section for further information.

HOPPER SENSOR CONFIGURATION

The **Hopper Sensor Configuration** screen displays

- Module address
- Type
- Number of hoppers
- Hopper numbers for the system

Press the **Hopper Sensor Configuration** softkey to access the Hopper Sensor Configuration screen.

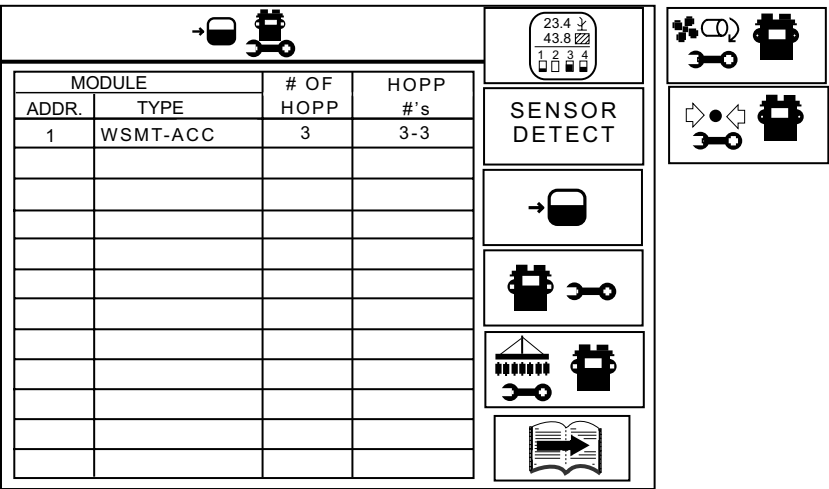


Hopper Sensor Configuration softkey

NOTE: Only modules than can support hopper sensors are displayed on the Hopper Sensor Configuration screen.

Figure 27

Hopper Sensor Configuration Screen



The following data items can be edited:

IMPORTANT: The # of Hopp data items for each listed module and the Hopp #'s value will automatically populate if Auto Config is used to configure the installed sensors.



NOTE: Only modules that support hopper sensors are displayed on the **Hopper Sensor Configuration** screen.



Sensor Detect softkey

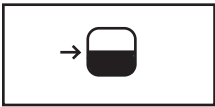
OF HOPPERS

The # of Hopp column displays the total number of hopper sensors that are connected to each module. The HOPP #'s value is automatically configured for proper numbering sequence for each module based upon the Module Address value.

To Edit # of Hoppers:

1. Use the rotary knob to scroll through the settings until the desired data element is selected.
2. Once the outline box is located on the data item, press the rotary knob to edit the data.
3. Press the **OK** softkey to accept the selection or **Cancel** to return to the previous setting.
4. When data has been successfully entered for each module, the **Sensor Detect** softkey can be pressed to detect and test the entered modules. An hourglass will appear in the upper right corner while the system is being configured.
5. If the number of sensors detected on each module is not in agreement with the # of Hopper values entered, an alarm will activate.
 - Verify that the # of sensors entered on the Hopper Sensor Configuration screen match the actual number of sensors connected.
 - Confirm that all harnessing is connected properly.

Refer to the TROUBLESHOOTING section for further information.



Hopper Sensor Setup softkey

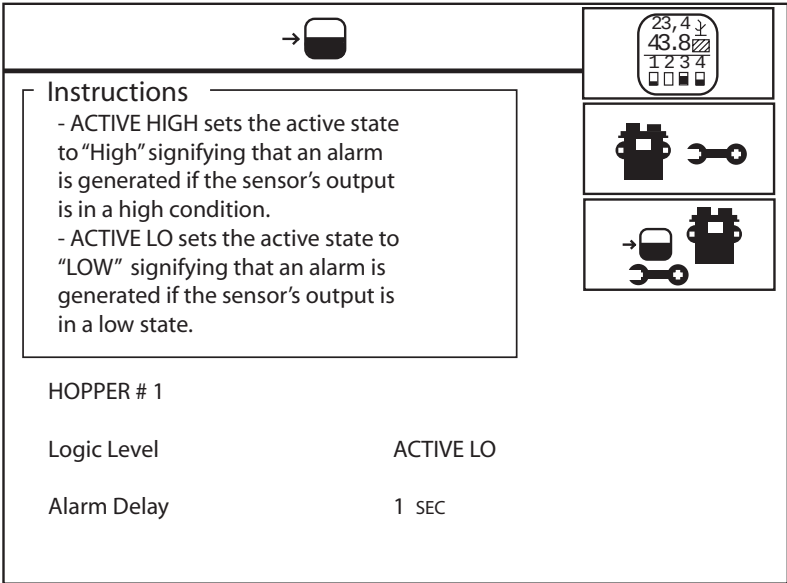
HOPPER SENSOR SETUP

The **Hopper Setup** screen controls the active state of the hopper sensor, as well as the alarm delay time. The Hopper Sensor Setup softkey appears only when hoppers have been entered at the Hopper Configuration Setup screen.

Press the **Hopper Setup** softkey to access the Hopper Setup screen.

Figure 28

Hopper Setup Screen



To Edit Hopper Setup:

- 1. Use the rotary knob to scroll through the settings until the desired data element is selected.
- 2. Once the outline box is located on the data item, press the rotary knob to edit the data.
- 3. Press the **OK** softkey to save the selection or **Cancel** to return to the previous setting.

The following data items may be edited:

LOGIC LEVEL

Logic Level sets the active state of the sensor. This allows flexibility to connect sensors that have different active outputs. There are two settings available:

ACTIVE HIGH

- Sets the active state to “High”, signifying that an alarm is generated if the sensor’s output is in a high state. Use this setting if the connected sensor outputs a high condition when active.

NOTE: For a Dj Hopper Level sensor, this value should be set to ACTIVE LO.

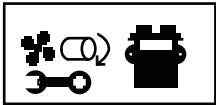


ACTIVE LO

- Sets the active state to “Low”, signifying that an alarm is generated if the sensor’s output is in a low state. Use this setting if the connected sensor outputs a low condition when active.

ALARM DELAY

Alarm Delay controls the delay time between the detection of a Hopper Alarm condition and the generation of the resulting alarm. The value is entered in seconds.



RPM Configuration softkey

RPM SENSOR CONFIGURATION

The RPM Sensor Configuration screen identifies sensors connected to the CAN bus that monitors a shaft or fan. Up to 3 Shaft/Fan RPM sensors can be connected.

The **RPM Configuration** screen displays:

- Module address
- Type
- Number of RPM sensors
- RPM numbers for the system

From the Module Configuration screen, press the **RPM Sensors Configuration** softkey to access the RPM Sensors Configuration screen.

NOTE: Only modules than can support RPM sensors are displayed on the RPM Sensor Configuration screen.

Figure 29
RPM Sensors Configuration Screen

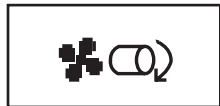
				23.4 43.8 1 2 3 4	
MODULE		# OF RPMS	RPM #'s		
ADDR.	TYPE				
1	WSMT-ACC	1	1-1		

NOTE: RPM sensors are not detected during an Auto Configuration and must be configured manually.

- To Edit RPM Sensors Data:**
1. Use the rotary knob to scroll through the settings until the desired data element is selected.
 2. Once the outline box is located on the data item, press the rotary knob to edit the data.
 3. Press the **OK** softkey to accept the selection or **Cancel** to return to the previous setting.

OF RPM SENSORS

Enter the # of RPM Sensors that will be connected to each module. The RPM #'s value column is automatically established for the proper sensor numbering sequence for each module based upon the Module Address value.



RPM Sensor Setup softkey

RPM SENSOR SETUP

The **RPM Sensor Setup** screen controls the parameters for:

- High alarm
- Low alarm
- High alarm delay
- Low alarm delay
- RPM constant
- RPM filter
- Disable control on low alarm

The RPM Sensor Setup softkey appears only when RPM sensors have been entered at the Hopper Configuration Setup screen.

Press the **RPM Sensors Setup** softkey to access the RPM Sensor setup screen.

Figure 30
RPM Sensor Setup Screen

		23.4 43.8 1 2 3 4
RPM Sensor #1		
High Alarm	0.0 RPM	
Low Alarm	0.0 RPM	
High Alarm Delay	1 SEC	
Low Alarm Delay	1 SEC	
RPM Constant	21 PUL/REV	
RPM Filter	0.0 %	
Disable Control On Low Alarm	Disabled	

To Edit RPM Sensor Setup Data:

1. Use the rotary knob to scroll through the settings until the desired data element is selected.
2. Once the outline box is located on the data item, press the rotary knob to edit the data.
3. Press the **OK** softkey to accept the selection or press **Cancel** to return to the previous setting.



The following data items may be edited:

HIGH ALARM

The High Alarm option sets the RPM value at which a High RPM warning error is generated. The value is entered in RPM.

LOW ALARM

The Low Alarm option sets the RPM value at which a Low RPM warning error is generated. The value is entered in RPM.

HIGH ALARM DELAY

The High Alarm Delay establishes the delay between the detection of a High RPM Alarm condition and the resulting alarm display. The value is entered in seconds.

LOW ALARM DELAY

The Low Alarm Delay establishes the delay between the detection of a Low RPM Alarm condition and the resulting alarm display. The value is entered in seconds.

RPM CONSTANT

The RPM Constant is the number of pulses per shaft revolution. If the sensor is mounted directly to the shaft, the value will be the number of pulses generated by the sensor per revolution of the shaft itself. If the sensor is mounted elsewhere, a gear or sprocket ratio must be calculated and entered as the RPM Constant.

RPM FILTER

The RPM filter value is used to filter the signal out of the RPM sensor. Typically no filtering is required so the standard value is set at 0%. If the RPM readout on the Main Operate screen is oscillating in excess of 10%, increasing the filter value will filter the signal to reduce the oscillation. For a true RPM value this number should be set to 0%.

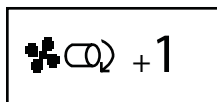
DISABLE CONTROL ON LOW ALARM

The setting for Disable Control on Low Alarm allows for disabling of ALL of the control channels if the RPM value of the selected sensor falls below the low alarm level setting.

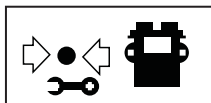
The two settings include:

- **ENABLED** allows the control channels to be shut down when the RPM value falls below the Low Warning setting.
- **DISABLED** will disable the function. The control channels will continue to operate normally regardless of the RPM value.

IMPORTANT: The Additional RPM Sensor softkey only displays when more than one RPM sensor is identified at the RPM Sensor Configuration screen.



Additional RPM Sensor softkey



Pressure Sensor Configuration softkey

PRESSURE SENSOR CONFIGURATION

The Pressure Sensor Configuration screen allows configuration of air pressure sensors connected to the CAN bus. Up to 4 air pressure sensors can be connected.

The **Pressure Configuration** screen displays:

- Module address
- Type
- Number of pressure sensors
- Pressure sensor numbers for the system

From the Module Configuration screen, press the **Pressure Sensor Configuration** softkey to access the Pressure Sensor Configuration screen.

NOTE: Only modules than can support pressure sensors are displayed on the Pressure Sensor Configuration screen.

Figure 31

Pressure Sensor Configuration Screen

MODULE				# OF PRES	PRES #s
ADDR.	TYPE				
1	WSMT-ACC			4	1-4

23.4 1/2
43.8 2/2
1 2 3 4

SENSOR DETECT

→ ● ←

● ● ● ●

● ● ● ●

● ● ● ●

● ● ● ●

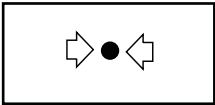
NOTE: The Auto Config softkey will detect the presence of a pressure sensor and will automatically configure and populate into the Pressure Sensor Configuration screen.

To Edit RPM Sensors Data:

1. Use the rotary knob to scroll through the settings until the desired data element is selected.
2. Once the outline box is located on the data item, press the rotary knob to edit the data.
3. Press the **OK** softkey to accept the selection or **Cancel** to return to the previous setting.

OF PRESSURE SENSORS

Enter the # of Pressure Sensors that will be connected to each module. The Pressure #s value column is automatically established for the proper sensor numbering sequence for each module based upon the Module Address value.



Pressure Sensor Setup softkey

PRESSURE SENSOR SETUP

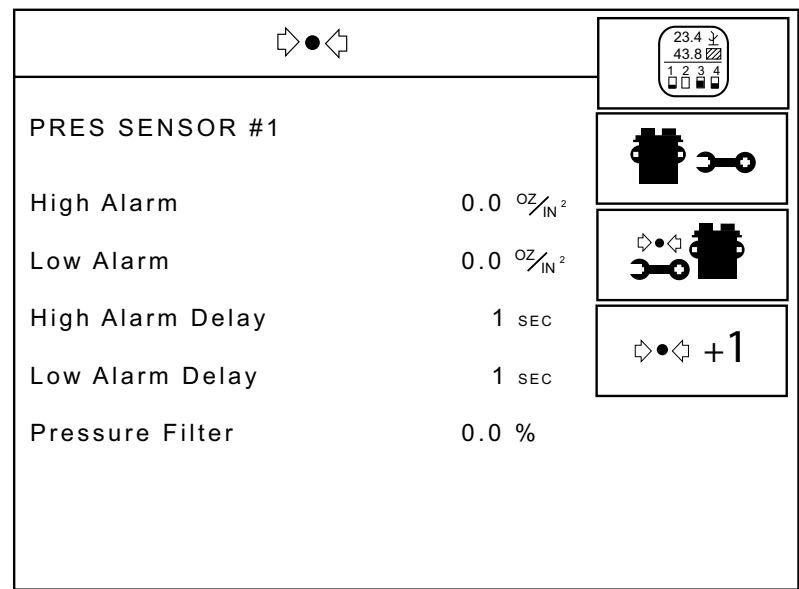
The **Pressure Sensor Setup** screen controls the parameters for:

- High alarm
- Low alarm
- High alarm delay
- Low alarm delay
- Pressure filter

Press the **Pressure Sensors Setup** softkey to access the **Pressure Sensors Setup** screen.

Figure 32

Pressure Sensor Setup Screen



To Edit Pressure Sensor Setup Data:

1. Use the rotary knob to scroll through the settings until the desired data element is selected.
2. Once the outline box is located on the data item, press the rotary knob to edit the data.
3. Press the **OK** softkey to accept the selection or press Cancel to return to the previous setting.



The following data items may be edited:

HIGH ALARM

The High Alarm option sets the pressure value at which a high pressure warning error is generated. The value is entered in seconds.

LOW ALARM

The Low Alarm option sets the pressure value at which a low pressure warning error is generated. The value is entered in seconds.

HIGH ALARM DELAY

The High Alarm Delay establishes the delay between the detection of a high pressure alarm condition and the resulting alarm display. The value is entered in seconds.

LOW ALARM DELAY

The Low Alarm Delay establishes the delay between the detection of a low pressure alarm condition and the resulting alarm display. The value is entered in seconds.

PRESSURE FILTER

The Pressure Filter value is used to filter the signal out of the Pressure sensor. Typically no filtering is required so the standard value is set at 0%. If the pressure readout on the Main Operate screen is oscillating in excess of 10%, increasing the filter value will filter the signal to reduce the oscillation. For a true pressure value this number should be set to 0%



MATERIAL & CHANNEL SETUP

Materials can be established and stored in a Material Library that relates to granular seeding, liquid, and/or fertilizer control channels. When materials are stored in the library, the user can quickly select those materials from the Material Summary Screen.

Creating a Material Library eliminates the task of re-configuring materials for different seeds, liquid and fertilizers that will be applied on the field.

When a material is established, it is important that it is assigned to a Channel Type in order to select and change the material at the Material Summary screen.

RECOMMENDED CHANNEL AND MATERIAL SETUP ORDER

For operator convenience, it is recommended that Materials and Channels be established in the following order, refer to [\(Figure 33\)](#).

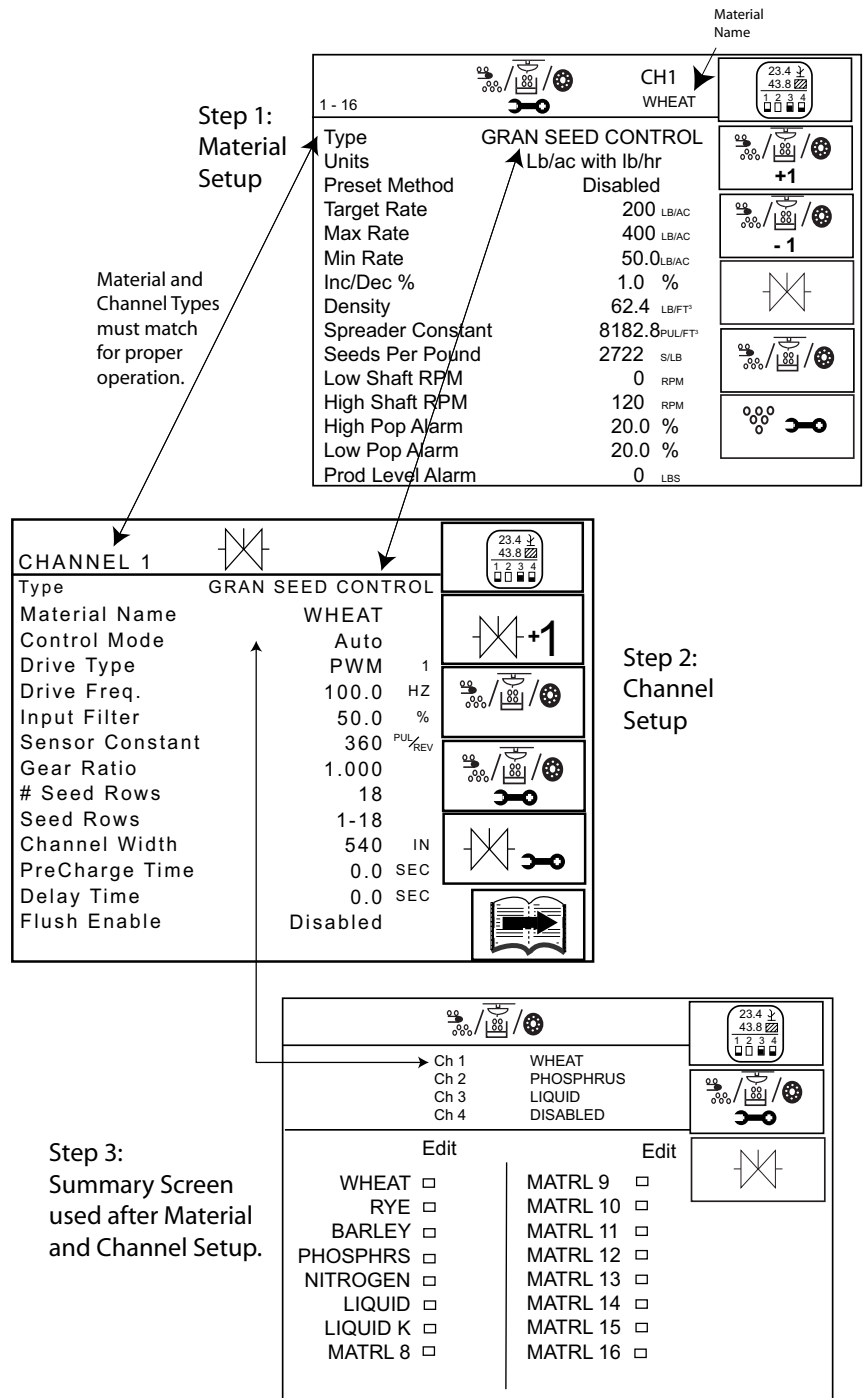
1. Material Configuration Setup--Create all Material Types that will be assigned to the corresponding Control Channel.
2. Control Channel Setup--Configure the Control Channels for Liquid, Granular Seeding and/or Granular Fertilizer control.
3. Material Configuration Summary Screen--To select materials assigned to a channel after channels and materials have been configured.

Reference the CONTROL CHANNEL and MATERIAL CONFIGURATION SETUP sections for additional information.



Figure 33

Recommended Channel and Material Setup Order





MATERIAL CONFIGURATION SETUP

Up to 16 different materials can be configured for use as seeding, liquid or fertilizer controls.

Material Configuration establishes:

- Material application type
- Target rate of application
- Maximum and minimum target rates
- Percentage of increment or decrement or preset table
- Spreader constant/K Factor
- Application rate
- Low and high RPM
- High and low population alarms (seeding only)
- Prod level alarm

MATERIAL SETUP

It is recommended that all materials be established first, then proceed to the Control Channel setup screens for proper channel assignment.

From the Material Summary screen:

1. Use the rotary knob to scroll to the Material Name to edit; the chosen Material check box will be highlighted.
2. With the desired check box highlighted, press the rotary knob in.
3. Scroll the rotary knob to enter a check mark in the highlighted box. Continuing to turn the rotary knob will toggle the checkmark on and off in the box.
4. Press the **OK** softkey to accept selection or press **Cancel** to return to the previous setting.



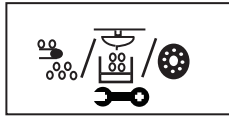
Material Summary Setup softkey

Figure 34

Material Summary Screen (Selecting a Material)

Select Material

		23.4 3 43.8 22 1 2 3 4
Ch 1	DISABLED	
Ch 2	DISABLED	
Ch 3	DISABLED	
Ch 4	DISABLED	
Edit MATRL 1 ☒ MATRL 2 ☐ MATRL 3 ☐ MATRL 4 ☐ MATRL 5 ☐ MATRL 6 ☐ MATRL 7 ☐ MATRL 8 ☐ Edit		
MATRL 9 ☐ MATRL 10 ☐ MATRL 11 ☐ MATRL 12 ☐ MATRL 13 ☐ MATRL 14 ☐ MATRL 15 ☐ MATRL 16 ☐		



Material Configuration Setup softkey

5. After accepting the Material to edit, the Material Configuration Setup screen will display.
6. Use the Rotary Knob to highlight the Material Name Label to create a new name.

Figure 35

Material Configuration Setup Screen

Create a Material Name

1 - 16			MATRL 1	23.4 ↓ 43.8 1 2 3 4
Type	GRANULAR SEED CONTROL			
Units	Lbs/Ac			+1
Preset Method	Disabled			
Target Rate	100 LBS/AC			-1
Max Rate	150 LBS/AC			
Min Rate	50.0 LBS/AC			
Inc/Dec %	1.0 %			
Density	62.4 LBS/FT ³			
Spreader Constant	8182.8 PUL/FT ³			
Seeds per Pound	2722 S/LB			
Low Shaft RPM	0 RPM			
High Shaft RPM	120 RPM			
High Pop Alarm	50.0 %			
Low Pop Alarm	50.0 %			
Prod Level Alarm	0 LBS			

EDITING THE MATERIAL LABEL

Each Material Name can be customized to accurately define the material's type. Creating a name allows for quick identification at the Material Summary screen and will display throughout the various screens to identify the active material assigned to a channel.

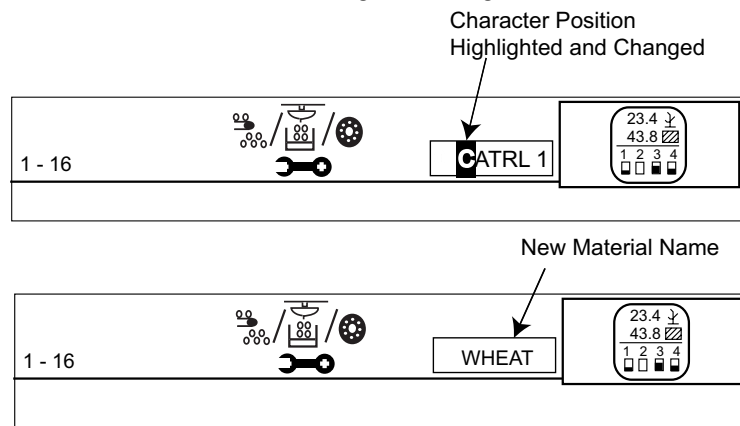
To Edit the Material Name:

1. Use the rotary knob to scroll and highlight the Material Name listed at the top of the display.
2. Press the rotary knob once to select the text string for editing. Up to 9 characters are available to create a Material Name.
3. Press the rotary knob again and rotate the knob to sequence through the character positions in the text string. The character position to be edited is highlighted in black.
 - Available characters are a combination of upper case, numbers, letters, symbols and spaces.
4. Rotating the knob clockwise sequences through the character list in ascending order. Rotating the knob counter-clockwise sequences through the character list in descending order.



Figure 36

Material Name Character Text String for Editing



TYPE

Type establishes the desired type of application control channel being used for the specific material. **This step is very important.** The Material Type must correctly match the Control Type to be able to select material from the Material Summary screen and operate properly.

Choices include GRANULAR SEEDING, GRANULAR FERT, LIQUID FLOW or MONITOR ONLY

- If the material is used for seeding control on a drill or air cart, select GRANULAR SEEDING for the type.
- If the material is used for granular application control (e.g. granular fertilizer), select GRANULAR FERT for the type.
- If the material is used for liquid application control, select LIQUID FLOW for the type.
- If the material is used for population monitoring, select MONITOR ONLY.

UNITS

Automatically changes with the type of material application being used.



PRESET METHOD ENABLED

The Preset Method Table allows user-defined target rates to be entered. When enabled, the Target Rates can be adjusted from the Main Operate screen using the Increment and Decrement softkeys.

Up to 10 preset Target Rates can be configured.

Figure 37

Material Configuration Setup Screen-Preset Method Enabled

1 - 16

CH1

WHEAT

Type **GRANULAR SEED CONTROL**

Units **lbs/ac with lb/hr**

Preset Method **Enabled**

PRESET	RATE	PRESET	RATE
1	98.1	6	143
2	107	7	152
3	116	8	161
4	125	9	170
5	134	10	178

Density **62.4 LBS/FT³**

Spreader Constant **5547.8 PUL/FT³**

Seeds per Pound **2722S/LB**

Low Shaft RPM **10 RPM**

High Shaft RPM **120 RPM**

High Pop Alarm **20.0 %**

Low Pop Alarm **20.0 %**

Prod Level Alarm **0 LBS**

23.4
43.8
1 2 3 4

+1

-1

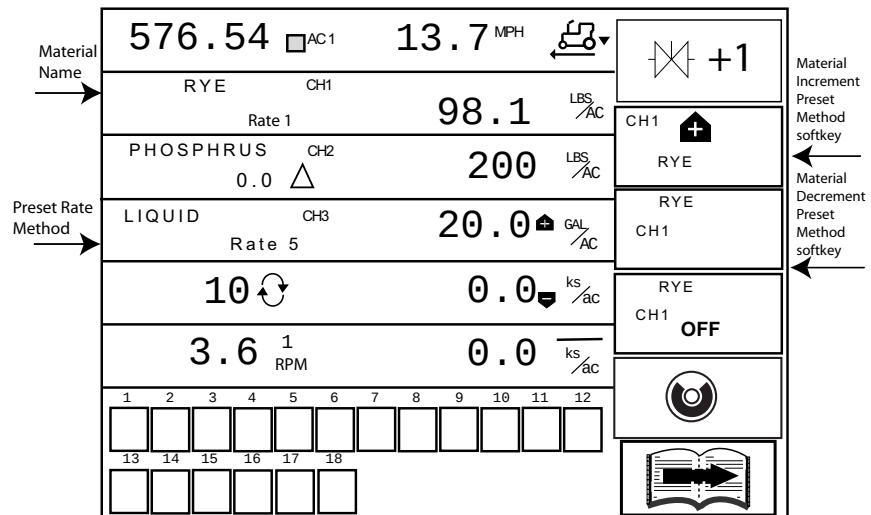
To Edit Preset Method Rates:

1. Use the scroll knob to highlight the rate to edit.
2. Press the rotary knob once and rotate the knob clockwise to increase the value and counter-clockwise to decrease the value.
3. Press the **OK** softkey to save the selection or **Cancel** to return to the previous setting.



Figure 38

Main Operate Screen with Preset Method Enabled

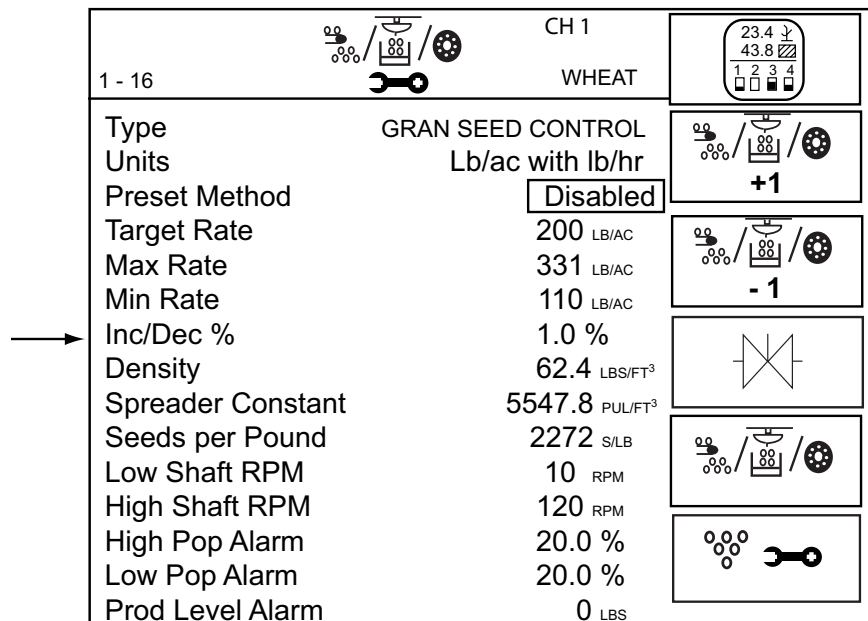


PRESET METHOD DISABLED

When the Preset Method is disabled, the Target Rate on the Main Operate screen will increase/decrease using the Material Increment/Decrement softkeys based on the value set by the Increasing/Decreasing % on the Material Configuration Setup screen.

Figure 39

Material Configuration Setup Screen-Preset Method Disabled





MATERIAL SETUP CONSTANTS-GRANULAR SEEDING

Material Setup parameters for Granular Seeding.

Figure 40
Granular Seeding Material Setup Example

1 - 16		CH 1	
		WHEAT	
Type	GRAN SEED CONTROL		
Units	Lb/ac with lb/hr		
Preset Method	Disabled		
Target Rate	200	LBS/AC	
Max Rate	331	LBS/AC	
Min Rate	110	LBS/AC	
Inc/Dec %	1.0	%	
Density	62.4	LBS/FT ³	
Spreader Constant	5547.8	PUL/FT ³	
Seeds Per Pound	2722	S/LB	
Low Shaft RPM	10	RPM	
High Shaft RPM	120	RPM	
High Pop Alarm	20.0	%	
Low Pop Alarm	20.0	%	
Prod Level Alarm	0	LBS	

TARGET RATE

Target Rate establishes the desired rate of application in pounds per acre (kg/Ha).

MAX RATE

Maximum Rate establishes the maximum dispensing rate in pounds per acre (kg/Ha) that the control will allow. Target Rate cannot be incremented to a value greater than this established Max Rate.

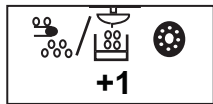
MIN RATE

Minimum Rate establishes the minimum dispensing rate in pounds per acre (kg/Ha) that the control will allow. Target Rate cannot be decremented to a value lower than this established Min Rate.

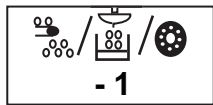
INC/DEC %

The Increment/Decrement Percent rate establishes the percentage of change that will be applied each time the **Increment/Decrement** softkey is pressed on the Main Work Screen.

IMPORTANT: The Maximum or Minimum Rates may not be reached if the % increase or decrease, based off the Target Rate, exceeds the maximum or minimum rate limits set.



Material Increment softkey



Material Decrement softkey



EXAMPLE:

Maximum Rate is set for 101

Target Rate is set for 100

If the % increase is set at 2%, the maximum rate of 101 will not be met because the % increase of 2% would exceed the 101 Maximum Rate limit.

DENSITY

Density is the weight per volume of material to be dispensed and is required to convert the spreader constant. If density is unknown, a value of 1 must be entered to perform a spreader constant.

SPREADER CONSTANT

Spreader Constant establishes the value for the amount of material dispensed through the application rate sensor. The value entered defines the pulses from the feedback sensor per ft³ of material discharged. Each material (and gate setting as applicable) has its own spreader constant. For best results, the value must be as accurate as possible.

This value may be set manually, however, using the Spreader Constant Calibration is recommended for the most accurate results.

SEEDS PER POUND

The # of Seeds per Pound is the value used to convert the current application rate to Ks/Ac to determine population and alarms.

LOW SHAFT AND HIGH SHAFT RPM

Low Shaft RPM is the lowest RPM speed that the Control Channel will operate. High Shaft RPM is the highest RPM speed that the Control Channel will operate.

HIGH AND LOW POPULATION ALARM

The High and Low Alarm option sets the high and low population limit values. The limit can be set to 0.0 to disable the Population Alarms. The entered value is dependent on the Target Rate.

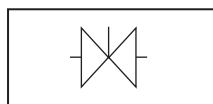
- The High and Low Alarms are entered as a percentage. The percentage value is referenced in relation to the Target Rate settings if the rows are configured to a channel. Otherwise the high and low alarms will trigger from the average implement population.

High Alarm

Example: If the Target Rate is 100.0 and the High Alarm is 5.0%, multiply 100.0 x 1.05 (a 5% increase) = 105.0. The alarm will activate at this rate.

Low Alarm

Example: If the Target Rate is 100.0 and the Low Alarm is 5.0%, multiply 100.0 x .95 (a 5% decrease) = 95.0. The alarm will activate at this rate.



Control Channel softkey

PROD LEVEL ALARM

The product level alarm sets the weight (lbs/Kg) to trigger the alarm alerting of low seed levels. The entered value is an estimate in lbs.

INITIAL CONTROL CHANNEL SETUP-GRANULAR SEEDING

To initially setup a Control Channel as Granular Seeding, select the **Control Channel** softkey from the Material Configuration setup screen. Refer to the CONTROL CHANNEL section for additional information.

IMPORTANT: Once a Control Channel has been established as Granular Seeding, any new materials identified as Granular Seeding on the Material Configuration setup screen will automatically link to the Granular Seeding channel on the Material Summary screen.



MATERIAL SETUP CONSTANTS-GRANULAR FERTILIZER

Material Setup for Granular Fertilizer Control.

Figure 41

Granular Fertilizer Material Setup Example

4 - 16				CH 2	 23.4 ↓ 43.8 1 2 3 4
				PHOSPHRUS	
Type	GRAN FERT CONTROL				 +1
Units	Lb/ac with lb/hr				 -1
Preset Method	Disabled				
Target Rate	200 LB/AC				
Max Rate	1000 LB/AC				
Min Rate	110 LBS/AC				
Inc/Dec %	1.0 %				
Density	62.4 LBS/FT ³				
Spreader Constant	9361.7 PUL/FT ³				
Low RPM Limit	10 RPM				
High RPM Limit	120 RPM				
Prod Level Alarm	0 LBS				

TARGET RATE

Target Rate establishes the desired rate of application in pounds per acre (Kg/ha).

MAX RATE

Maximum Rate establishes the maximum dispensing rate in pounds per acre (Kg/Ha) that the control will allow. Target Rate cannot be incremented to a value greater than this established Max Rate.

MIN RATE

Minimum Rate establishes the minimum dispensing rate in pounds per acre (Kg/Ha) that the control will allow. Target Rate cannot be decremented to a value lower than this established Min Rate.

INC/DEC %

The Increment/Decrement Percent rate establishes the percentage of change that will be applied each time the **Increment/Decrement** softkey is pressed on the Main Work Screen.



IMPORTANT: The Maximum or Minimum Rates may not be reached if the % increase or decrease, based off the Target Rate, exceeds the maximum or minimum rate limits set.

EXAMPLE:

Maximum Rate is set for 101

Target Rate is set for 100

If the % increase is set at 2%, the maximum rate of 101 will not be met because the % increase of 2% would exceed the 101 Maximum Rate limit.

DENSITY

Density is the weight per volume of material to be dispensed and is required to convert the spreader constant. If density is unknown, a value of 1 must be entered to perform a spreader constant.

SPREADER CONSTANT

NOTE: Refer to Spreader Constant Calibration for additional information performing spreader constants.

Spreader Constant establishes the value for the amount of material dispensed through the application rate sensor. The value entered defines the pulses from the feedback sensor per ft³ of material discharged. Each material (and gate setting as applicable) has its own spreader constant. For best results, the value must be as accurate as possible.

This value may be set manually. However, for the most accurate result, use the Spreader Constant Calibration.

LOW AND HIGH RPM LIMIT

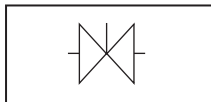
Low RPM Limit is the lowest RPM speed that the Control Channel will operate. High RPM Limit is the highest RPM speed that the Control Channel will operate.

PROD LEVEL ALARM

The product level alarm sets the weight (lbs/Kg) to trigger an alarm alerting of low fertilizer levels. The entered value is an estimate in lbs.

INITIAL CONTROL CHANNEL SETUP-GRANULAR FERTILIZER

To initially setup a Control Channel as Granular Fertilizer, select the **Control Channel** softkey from the Material Configuration setup screen. Refer to the CONTROL CHANNEL section for additional information.



Control Channel softkey

IMPORTANT: Once a Control Channel has been established as Granular Fertilizer, any new materials identified as Granular Fertilizer on the Material Configuration setup screen will automatically link to the Granular Fertilizer channel on the Material Summary screen.



MATERIAL SETUP CONSTANTS-LIQUID FLOW

Use this section if the Type has been set for Liquid Flow Control.

Figure 42

Liquid Flow Material Setup Example

6 - 16			CH 3	
			LIQUID	
Type	LIQUID FLOW CONTROL			
Units	Gal/ac with gal/min			
Preset Method	Disabled			
Target Rate	23.0 GAL/AC			
Max Rate	39.0 GAL/AC			
Min Rate	13.0 GAL/AC			
Inc/Dec %	1.0 %			
Low Flow Limit	3 GAL/MN			
High Flow Limit	456 GAL/MN			
Prod Level Alarm	0 GAL			

TARGET RATE

Target Rate establishes the desired rate of application in gallons per acre (Liter/Ha).

MAX RATE

Maximum Rate establishes the maximum dispensing rate in gallons per acre (Liter/Ha) that the control will allow. Target Rate cannot be incremented to a value greater than this established Max Rate.

MIN RATE

Minimum Rate establishes the minimum dispensing rate in gallons per acre (Liter/Ha) that the control will allow. Target Rate cannot be decremented to a value lower than this established Min Rate.

INC/DEC %

The Increment/Decrement Percent rate establishes the percentage of change that will be applied each time the **Increment/Decrement** softkey is pressed on the Main Work Screen.

IMPORTANT: The Maximum or Minimum Rates may not be reached if the % increase or decrease, based off the Target Rate, exceeds the maximum or minimum rate limits set.



EXAMPLE:

Maximum Rate is set for 101

Target Rate is set for 100

If the % increase is set at 2%, the maximum rate of 101 will not be met because the % increase of 2% would exceed the 101 Maximum Rate limit.

LOW FLOW LIMIT

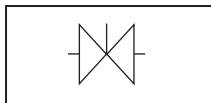
The Low Flow Limit sets the lowest gallon per minute flow rate which the Control Channel will operate.

HIGH FLOW LIMIT

The High Flow Limit set the highest gallon per minute flow rate which the Control Channel will operate.

PRODUCT LEVEL ALARM

The product level alarm sets the gallons left in the tank to trigger an alarm alerting of low liquid levels. The entered value is an estimate in lbs.



Control Channel softkey

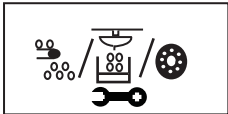
INITIAL CONTROL CHANNEL SETUP-LIQUID FLOW

To initially setup a Control Channel as Liquid Flow, select the **Control Channel** softkey from the Material Configuration setup screen. Refer to the CONTROL CHANNEL section.

IMPORTANT: Once a Control Channel has been established as Liquid Flow, any new materials identified as Liquid Flow on the Material Configuration setup screen will automatically link to the Liquid Flow channel on the Material Summary screen.



Material Summary softkey



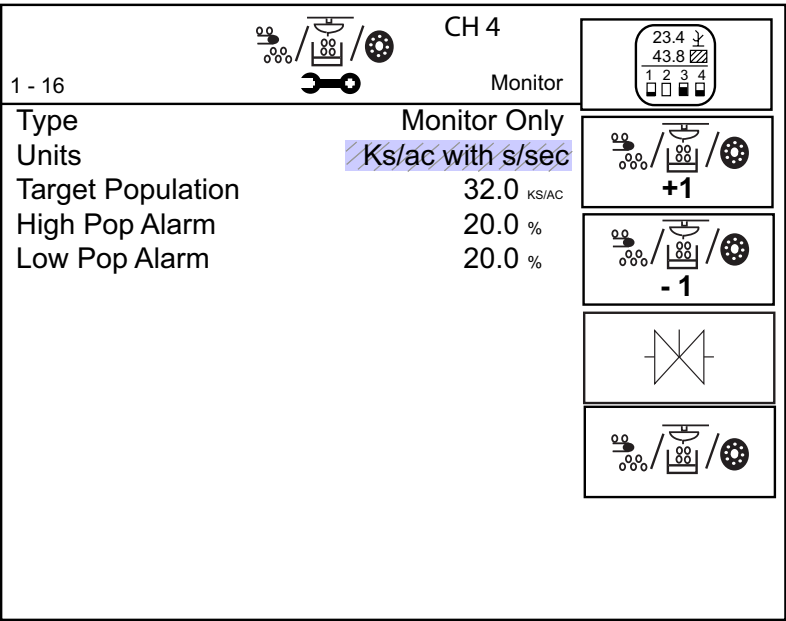
Material Configuration Setup softkey

MATERIAL SETUP-MONITOR ONLY

The Monitor Only selection is typically used for ground drive/nonhydraulic applications to monitor population with high and low alarms. All Control Channels MUST be disabled in this configuration.

IMPORTANT: A Material Name must be selected at the Seed Monitor Setup screen to activate high and low population alarms.

Figure 43
Monitor Only Screen



TYPE

Select Monitor Only as the Channel Type.

TARGET POPULATION

Target population is defined in 1000s of seeds per acre or hectare.

HIGH AND LOW POP ALARMS

The High Population and Low Population values determine when an alarm or row indicator displays to warn of a population problem. The values are % based. The over population and under population values are independent of each other and do not have to be the same percentage value.



CONTROL CHANNEL SETUP

Control Channel Setup allows configuration of 3 independent control channels. Control channel choices consist of:

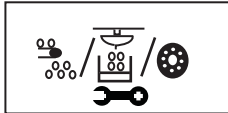
1. Granular Fertilizer
2. Granular Seeding
3. Liquid Flow

A Control Channel identified as Disabled indicates the channel is not in use.

The Control Channel parameters that can be configured include:

- Drive Type
- Drive Frequency
- Input Filter
- Gear Ratio (except Liquid Flow)
- Sensor Constant
- # Seed Rows (except Liquid Flow)
- Channel Width
- PreCharge Time
- Delay time
- Flush Time

Once a material has been created and linked to a Channel type, that material created with the same channel type will be added to a list of possible materials for that channel type.



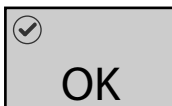
Material Config Setup softkey



Control Channel softkey



Next Channel softkey



OK softkey



Cancel softkey

To Establish a Control Channel:

1. From the Material Configuration setup screen, press the **Control Channel Setup** softkey to access the Control Channel Setup screen.
2. To configure more than one control channel, press the **Next Channel** softkey.
3. Use the rotary knob to scroll to the channel type.
4. Once the outline box is located on the channel type, press the rotary knob to scroll and select the desired channel setting (Granular Fertilizer, Granular Seeding, or Liquid Flow).
5. Press the **OK** softkey to accept the selection and **Cancel** to return to the previous setting.

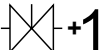
IMPORTANT: It is recommended that Materials are established before configuring the Channels on the Channel Setup screen.



CONTROL CHANNEL SETUP CONSTANTS -
GRANULAR FERT AND GRANULAR SEEDING

Use this section for setting a control channel to control the application of a granular spreader.

Figure 44
Control Channel Setup-GRANULAR SEEDING Example

CHANNEL 1				
Type	GRAN SEED CONTROL			CALIB PARAM
Material Name	WHEAT			
Control Mode	AUTO			
Drive Type	PWM 1			
Drive Freq.	100	Hz		
Input Filter	50.0	%		
Sensor Constant	360.0	PUL/REV		
Gear Ratio	1.000			
# Seed Rows	18			
Seed Rows	1-18			
Channel Width	540.0	IN		
PreCharge Time	0	SEC		
Delay Time	0.0	SEC		
Flush Enable	Disabled			

TYPE

Select Granular Fertilizer or Granular Seeding as Control Type.

MATERIAL NAME

The Material Name displays only when a material is configured for the channel.

CONTROL MODE

AUTO-Control Channel is calculating application rates under normal operating conditions.

MANUAL W/FEEDBACK-Overrides the current system when not operating properly. Using the **Increase/Decrease** softkeys from the Main Operate screen will set the rate for the Control Channel. Manual Mode with Feedback will show the actual application rate being applied based on actual ground speed and constants.

MANUAL W/O FEEDBACK-Overrides the current system when not operating properly. Using the **Increase/Decrease** softkeys from the Main Operate screen will set the rate for the Control Channel. No application rate feedback will be displayed.



DRIVE TYPE

PWM (Pulse Width Modulation)

A valve, usually hydraulic, which varies the oil flow to a hydraulic motor proportioned to electric current supplied. This type of valve consists of a flow cartridge and coil assembly.

DRIVE FREQ.

Drive Frequency specifies the frequency for the proportional valve that is being used. The recommended setting for this option should be specified from the specific valve manufacturer.

INPUT FILTER

The Input Filter provides a setting for the amount of filtering applied to the feedback frequency feedback of the Control Channel.

IMPORTANT: It is NOT recommended that the Input Filter be altered. Any adjustments could result in the channel not operating properly. If adjustments are made a valve calibration must be performed.

NOTE: If a sensor other than DICKEY-john's is used, the correct number of pulses generated for one revolution must be determined.

SENSOR CONSTANT

Sensor Constant establishes the number of pulses for one revolution of the metering unit. If a DICKEY-john application rate sensor is used, the value should be set to 360.0.

GEAR RATIO

Gear Ratio specifies the actual ratio from the **application rate** sensor to the **output shaft**. This specifies the number of revolutions the application rate sensor turns in relation to one revolution the seed meter turns.

OF SEED ROWS

Allows entry of a specific number of seed rows to the Control Channel. Row assignment is given a priority based on the Channel and will be assigned sequentially thereafter. Channel 1 will always be assigned to the first set of rows, Channel 2 the next set of rows, and so on.

CHANNEL WIDTH

Granular Seeding

Channel Width requires a manual entry of the implement width for rows assigned to a specific channel. Width calculation can be determined by number of planter rows assigned to the channel multiplied by the row spacing.

Granular Fertilizer

Channel Width requires a manual entry of the fertilizer spread.



PRECHARGE TIME

PreCharge Time is a specified length of time a control channel will operate or be active with a minimum Precharge ground speed greater than 0. (Refer to the Ground Speed Setup section for Precharge Ground Speed setup information). This feature will activate the control when the Master Switch is turned ON even without ground speed.

The Precharge feature is typically used in applications that have significant distance between the implement row unit and storage bulk tank where seed placement takes several seconds due to the travel time of the seed/fertilizer from the bulk tank to the ground.

To Activate the Precharge Feature:

1. Enter a PreCharge time. A PreCharge Time must be entered before the Precharge Ground Speed feature displays on the Ground Speed Setup screen (Refer to Ground Speed Setup section).
2. Enter a Precharge Ground Speed greater than 0 at the Ground Speed Setup screen.

NOTE: The Master Switch must be ON to activate the Precharge feature.

DELAY TIME

With an Implement Lift Switch

Delay Time determines the length of time before the control channel will start after the Master Switch has been turned ON and the implement switch is in a lowered position.

- The system will **immediately** shutdown the channel when the implement lift switch is in the raised position.
- The system will delay the channel shutdown if the Master Switch is turned OFF and the implement is in the down position.

Without an Implement Lift Switch

When the Delay Time feature is utilized without an implement lift switch:

- The control channel will delay after the Master Switch has been turned ON.
- A delay will also occur and shutdown the control channel when the Master Switch is turned OFF.

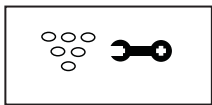
NOTE: Delay Time functionality may work differently than described above if the system has been purchased direct from the original equipment manufacturer. Refer to the manufacturer's operator manual for further instruction.

FLUSH ENABLE

Flush Enable is a manual override mode that opens the valve and dispenses granular fertilizer, granular seed, or liquid material for a period of time in relation to a user-defined flush speed. The Flush Enable feature can only be activated when the tractor is stopped.

To Activate Flush Enable:

1. Change Flush Disable to Enable. Flush Enable must be activated before the Flush Ground Speed feature displays on the Ground Speed Setup screen.
2. A Flush Ground Speed greater than 0 must be entered at the Ground Speed setup screen for this feature to operate.



Spreader Constant Calibration softkey

SPREADER CONSTANT CALIBRATION-
GRANULAR SEED AND FERTILIZER

The Spreader Constant Calibration screen performs a catch test to determine the spreader constant. This softkey is only available for Granular Seed and Fertilizer applications.

Press the **Spreader Constant Calibration** softkey to access the **Spreader Constant Calibration** screen.

Figure 45
Spreader Constant Calibration Screen

CHANNEL# 1 WHEAT			
Instructions - Press Output Shaft key until system is charged - Prepare to catch material - Setup RPM and # of revolutions - Verify density is correct - Press START to begin calibration			
Density	62.4	LBS/FT ³	
Spreader Const	5547.5	PUL/FT ³	
Target Meter rpm	20	RPM	
# Meter Revs	5	REV	
Pulse Count	0	PUL	
New Spread Const	0.0	PUL/FT ³	
Amount Dispensed	0.000	LBS	

WARNING

When the **START** key is engaged, the machine will become operational. All necessary precautions must be taken to ensure user safety. Failure to practice all necessary caution may result in serious injury or death.

CAUTION

Hoppers must contain material. Be prepared to catch the material in a container so it can be weighed at the end of the calibration.

DENSITY

Relative granular density as represented by the weight of one pound of product. If not known, enter a value of 1.



SPREADER CONSTANT

Determines how many pulses the application rate sensor produces per volume of material the spreader discharges.

TARGET METER RPM

Target Meter RPM is the speed at which the meter shaft turns while the calibration is performed.

METER REVS

Number of Meter Revolutions is the number of revolutions the meter will turn during the calibration. This will constitute the length of the test. The higher the number, the more accurate the calibration.

NOTE: *If performing a Spreader Calibration on a box type drill, catch the output of a few seed meters, average the weight measured from these meters, and multiply this average weight by the total number of meters on the drill. Enter this weight for the AMNT DISPENSED value.*

To Perform the Spreader Constant Calibration:

1. Move the implement to the "raised" position.
2. Apply the tractor brakes and lock in the applied position.
3. Put the transmission in "park" or in a locked, neutral position.
4. Start the tractor and engage PTO if used to drive the hydraulic system.
5. Run the engine at normal operating speed until the hydraulic fluid is at normal operating temperature.
6. Perform a fill disk until seeds are continuously dispensed.
7. Place a container to catch the dispensed material.
8. Press the **Start** softkey.
9. Turn the Master Switch to the ON position.
10. The control will run the dispensing unit (meter/conveyor) at the specified RPM for the specified number of meter revolutions and then shut down automatically.
11. Weigh the material dispensed and enter the value into the AMT DISPENSED field.
12. The new spreader constant value will automatically be calculated.



Start softkey

AMOUNT DISPENSED

Enter the amount (Lbs/Kg) dispensed after performing the Spreader Constant calibration. The Amount Dispensed number will be used with pulse count and density to calculate New Spreader Constant.

PULSE COUNT

A pulse count produced from the feedback sensor. This number is informational only.

NEW SPREADER CONSTANT

After the Spreader Calibration is performed and amount is entered, press the **Save** softkey to accept the new constant.



Save softkey



CONTROL CHANNEL SETUP CONSTANTS - LIQUID FLOW

Use this section for setting a control channel to control the application of a liquid sprayer.

Figure 46
Control Channel Setup-Liquid Flow Control Setup Example

CHANNEL 3				
Type	LIQUID FLOW CONTROL			CALIB PARAM
Material Name	LIQUID			
Control Mode	Auto			
Drive Type	PWM	3		
Drive Freq.	100	HZ		
Input Filter	50.0	%		
K-Factor	2655.6	PUL/GAL		
Valve Locking	Disabled			
Channel Width	360.0	IN		
PreCharge Time	0	SEC		
Delay Time	0.0	SEC		
Flush Enable	Disabled			

TYPE

Select Liquid Flow as the Channel Type.

MATERIAL NAME

The Material Name displays only when a material is configured for the channel.

CONTROL MODE

AUTO-Control Channel is calculating application rates under normal operating conditions.

MANUAL W/FEEDBACK-Overrides the current system when not operating properly. Using the **Increase/Decrease** softkeys from the Main Operate screen will set the rate for the Control Channel. Manual Mode with Feedback will show the actual application rate being applied based on actual ground speed and constants.

MANUAL W/O FEEDBACK-verrides the current system when not operating properly. Using the **Increase/Decrease** softkeys from the Main Operate screen will set the rate for the Control Channel. No application rate feedback will be displayed.



Increment softkey



Decrement softkey



DRIVE TYPE

Three drive type selections are available based on the following:

SERVO

A ball valve or butterfly valve is driven by an electric motor gearbox and the valve is installed in the main product delivery line.

SERVO RETURN

A ball valve or butterfly valve is driven by an electric motor gearbox and the valve is installed in the tank return line.

PWM (Pulse Width Modulation)

A proportional valve regulating hydraulics and varies the oil flow to a hydraulic motor proportioned to electric current supplied. This type of valve consists of a flow cartridge and coil assembly.

DRIVE FREQ.

Drive Frequency specifies the frequency for the proportional or servo valve that is being used. The recommended setting for this option should be specified from the specific valve manufacturer. When using a DICKY-john servo valve use 40 Hz, if using a Hydraforce proportional valve, use 100 Hz.

INPUT FILTER

The Input Filter provides a setting for the amount of filtering applied to the flow meter feedback frequency of the Control Channel.

IMPORTANT: It is NOT recommended that the Input Filter be altered. Any adjustments could result in the channel not operating properly. If adjustments are made a valve calibration must be performed.

K FACTOR

K Factor specifies how many pulses are produced by the sensor per gallon/ liter of liquid through the flowmeter. If known, the K-Factor can be entered manually. If not, a flowmeter calibration is required. Refer to the LIQUID FLOW CALIBRATION section for additional information.

VALVE LOCKING

When enabled, locks the valve into the last operating position whenever the booms are turned off. This maintains system pressure while turning so a quick spray pattern may resume after turning is complete. Valve locking is also used for tank agitation.

CHANNEL WIDTH

Channel Width requires a manual entry of the width of the liquid sprayed.



PRECHARGE TIME

PreCharge Time is a specified length of time a control channel will operate or be active with a minimum Precharge ground speed greater than 1. (Refer to the Ground Speed Setup section for Precharge Ground Speed setup information). This feature will activate the control when the Master Switch is turned ON even without ground speed.

The Precharge feature is typically used in applications that have significant distance between the implement row unit and storage bulk tank where seed placement takes several seconds due to the travel time of the seed/fertilizer from the bulk tank to the ground.

To Activate the Precharge Feature:

1. Enter a PreCharge time. A PreCharge Time must be entered before the Precharge Ground Speed feature displays on the Ground Speed Setup screen (Refer to Ground Speed Setup section).
2. Enter a Precharge Ground Speed greater than 0 at the Ground Speed Setup screen.

NOTE: The Master Switch must be ON to activate the Precharge feature.

DELAY TIME

With an Implement Lift Switch

Delay Time determines the length of time before the control channel will start after the Master Switch has been turned ON and the implement switch is in a lowered position.

- The system will **immediately** shutdown the channel when the implement lift switch is in the raised position.
- The system will delay the channel shutdown if the Master Switch is turned OFF and the implement is in the down position.

Without an Implement Lift Switch

When the Delay Time feature is utilized without an implement lift switch:

- The control channel will delay after the Master Switch has been turned ON.
- A delay will also occur and shutdown the control channel when the Master Switch is turned OFF.

NOTE: Delay Time functionality may work differently than described above if the system has been purchased direct from the original equipment manufacturer. Refer to the manufacturer's operator manual for further instruction.

FLUSH ENABLE

Flush Enable is a manual override mode that opens the valve and dispenses granular fertilizer, granular seed, or liquid material for a period of time in relation to a user-defined flush speed. The Flush Enable feature can only be activated when the tractor is stopped.

To Activate Flush Enable:

1. Change Flush Disable to Enable. Flush Enable must be activated before the Flush Ground Speed feature displays on the Ground Speed Setup screen.
2. A Flush Ground Speed greater than 0 must be entered at the Ground Speed setup screen for this feature to operate.



LIQUID FLOW CALIBRATION

To determine how many pulses are flowing through the flow meter a few gallons of water are dispensed through the system and weighed (or measured) while automatically counting flow meter pulses. By dividing the gallons of liquid into the pulse count, the pulses/gallon are determined. This number becomes the actual K-Factor instead of the one stamped on the flow meter body.

One of two methods can be used to measure the gallons of liquid flowing through the sprayer system. The more liquid passing through the system during calibration increases the degree of K-Factor accuracy.

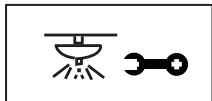
Method 1:

1. Use a container such as a bucket or barrel to catch all liquid.
2. Weigh the amount of liquid.
3. Calculate gallons dispensed.

Method 2:

This is the recommended method because a larger volume of liquid passes through the entire sprayer system making errors in weighing a smaller factor.

1. Fill the tank and weigh the load.
2. Activate the calibration routine.
3. After spraying a few hundred gallons but before the load is empty, stop the calibration.
4. Weigh the load again.
5. Calculate gallons dropped.



Liquid Flow Configuration softkey



Start softkey



Stop softkey



Save softkey

INITIATING A LIQUID FLOW CALIBRATION PROCEDURE

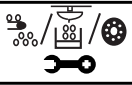
1. From the Control Channel screen, press the **Liquid Flow** softkey.
2. Set the Target Flow Rate and Target Ground Speed which will calculate the operation rate.
3. Press the **Start** softkey to initiate flow calibration procedure.
4. Press **Stop** when container is full.
5. Enter amount (gallons) dispensed in the **Amount Dispensed** field.
6. Press **Save** softkey to accept the selection.



Figure 47
Liquid Flow Calibration Screen

CHANNEL #3
LIQUID



Instructions

- Press Output Shaft key until system is charged
- Prepare to catch material
- Setup RPM and # of revolutions
- Verify density is correct
- Press START to begin calibration

100% Catch Test		
Target Rate	11.8	GAL AC
Target Gnd Speed	5.0	MPH
Target Flow Rate	3.6	GAL MN
K-Factor	741.6	PUL GAL
Pulse Count	0	PUL
Amount Dispensed	0.0	GAL
New K-Factor	0.0	PUL GAL

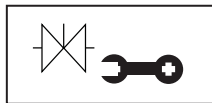

START

⚠ WARNING

When the START key is engaged, the machine will become operational. All necessary precautions must be taken to ensure user safety. Failure to practice all necessary caution may result in serious injury or death.

⚠ CAUTION

Tanks must contain material. Be prepared to catch the material in a container so it can be weighed at the end of the calibration.



Control Channel Calibration softkey

CONTROL CHANNEL VALVE CALIBRATION

The **Control Channel Valve Calibration** screen sets the machine hydraulic system parameters and should be performed for best results. Each Control Channel that is enabled requires a valve calibration.

Press the **Control Channel Calibration** softkey to access the Control Channel Calibration screen.

Figure 48

Control Channel Calibration Screen

CHANNEL# 3		 	23,4 43.8 1 2 3 4
LIQUID			
- Ensure implement is raised - With brakes locked and transmission in PARK position, start tractor engine - Engage hydraulics and run engine at normal speed until hydraulic fluid is at operating temperature - Press START key and turn master switch on			▶ START LIMIT OUTPUT
CH PWM	0%		
CH FREQ FILT	0 HZ		
Current Flow Rate	0.0 GAL/MN		
PRESS START			

⚠ WARNING

When the START key is engaged, the machine will become operational. All necessary precautions must be taken to ensure user safety. Failure to practice all necessary caution may result in serious injury or death.

⚠ CAUTION

Hoppers are assumed to be empty for this calibration. If they are loaded, material will be dispensed onto the ground.



Start softkey

To Perform the Control Channel Valve Calibration:

1. Move the implement to the "raised" position.
2. Apply the tractor brakes and lock in the applied position.
3. Put the transmission in "park" or in a locked, neutral position.
4. Start the tractor and engage PTO if used to drive the hydraulic system.
5. Run the engine at normal operating speed until the hydraulic fluid is at normal operating temperature.
6. Press the **Start** softkey.



- 7. Turn the Master Switch to the ON position.
- 8. The valve calibration will immediately start.
- 9. Keep the hydraulics engaged until the calibration is complete. The calibration may take a few seconds up to several minutes. Each calibration step is monitored on the lower left corner of the display.
- 10. When the calibration is complete, the control shuts down automatically. All calibration data is automatically stored.

LIMIT OUTPUT SCREEN

In certain instances, it is necessary to limit the output of the Control Channel.

Press the **Limit Output** softkey to access the **Limit Output** screen.



Limit Output softkey



Increment softkey



Decrement softkey

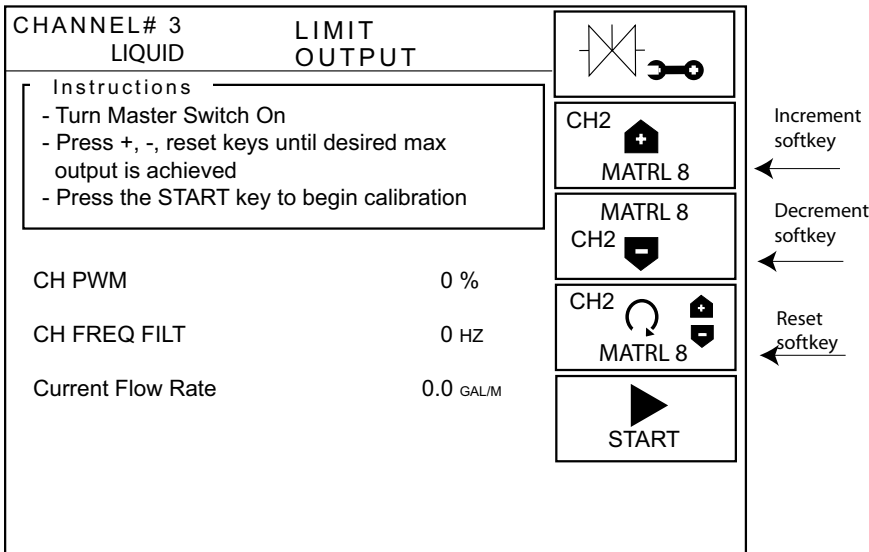
NOTE: If the Channel is turned OFF, the Increment, Decrement, and reset softkeys will not function. Return to the Main Work screen to turn ON.



Start softkey

Figure 49

Limit OutLimit Output Screen



To Limit Max Output:

- 1. Move the implement to the “raised” position.
- 2. Apply the tractor brakes and lock in the applied position.
- 3. Put the transmission in “park” or in a locked, neutral position.
- 4. Start the tractor and engage PTO if used to drive the hydraulic system.
- 5. Run the engine at normal operating speed until the hydraulic fluid is at normal operating temperature.
- 6. Place the Master Switch in the ON position.
- 7. To change the Channel Pulse Width Modulation (CH PWM) value, press the **Increment** or **Decrement** softkeys repeatedly until the desired minimum or maximum output value is reached.
- 8. Press the **Start** softkey and the valve calibration will immediately begin. The calibration will run using the new PWM value.





MATERIAL SUMMARY SCREEN

The Material Summary Screen allows for quick selection of material type if more than one material type is configured for a Control Channel.

The Control Channel will only display and allow selection of the materials setup in the Material Configuration screen that correspond with the specific channel type.

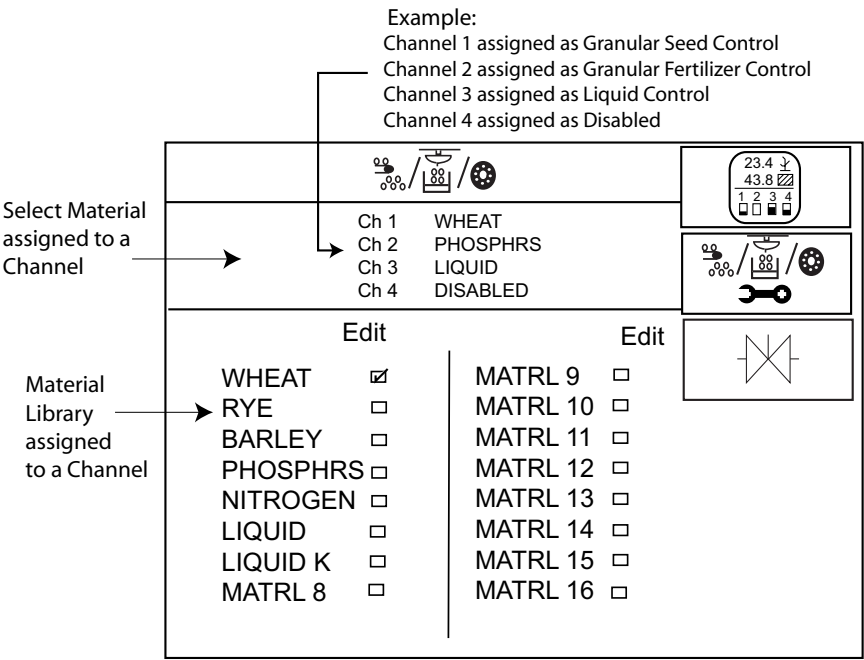
Example: If a Control Channel is configured for granular seeding, only those materials that were established for granular seeding will display for that channel.



Material Summary softkey

Press the **Material Summary** softkey to access the Material Summary Screen.

Figure 50
Material Library Screen



CHANNEL/MATERIAL SELECTION

Channels 1 through 4 located at the top of the Material Summary screen will identify material selected for a specific channel after assignment at the Material and Channel Configuration Setup screens. Refer to Material Configuration Setup and Control Channel Setup sections for additional information.

From this screen, a channel's material can be changed if more than one material is configured for a channel and the material type matches the channel type. A channel's material status will be identified with either the Active Material Name, None for no material, or Disabled for Control Channel disabled.



ACTIVE CHANNEL/MATERIAL

- Material Name-The active material for a channel will display.

To Change a Material for a Channel:

1. Use the rotary knob to highlight the channel to change.
2. Press the knob in and rotate knob to scroll through the configured material types configured for that channel.
3. Press the **OK** softkey to accept selection or press **Cancel** to return to the previous setting.

NO MATERIAL SELECTED

If no material matches the channel type and has no target rate for the Control Channel to operate, the channel will display on the Material Summary screen as None. A material can be configured for the channel by selecting an available material at the bottom of the Summary Screen.

DISABLED

If a channel is disabled from the Control Channel Setup, the channel will display as Disabled. The channel is turned off and is not configured for operation. To establish a new channel, select the Control Channel setup key.



Fill Disk softkey



Start softkey



Stop softkey

FILL DISK FOR SEEDING CHANNELS

1. From the Main Operate screen, press the **Fill Disk** softkey.
2. Raise the implement.
3. With brakes locked and transmission in the Park position, start the engine.
4. Engage hydraulics and run engine at normal speed until hydraulic fluid is at operating temperature.

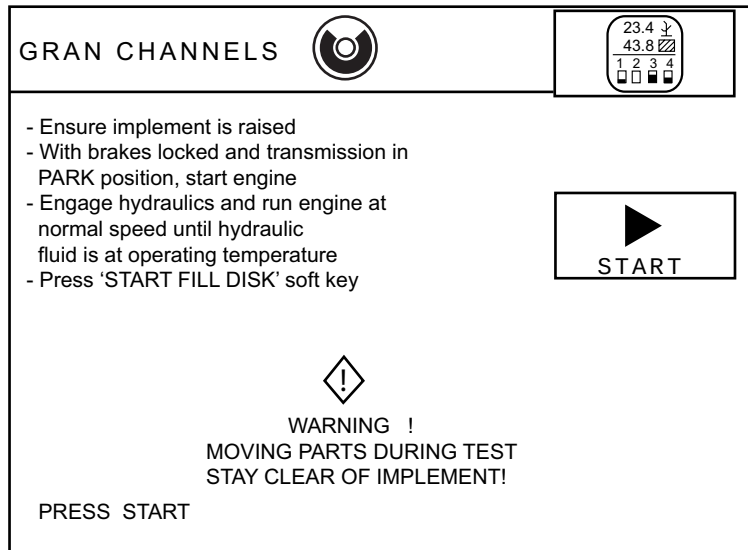
CAUTION

Implement will begin to operate after pressing the Start softkey. Ensure that all persons and objects are away from the implement to avoid personal injury.

5. Press the **Start** softkey. The seed meters will turn for 1 revolution, then stop.
6. Pressing the **Stop** softkey will also terminate the test.

Figure 51

Fill Disk Screen for All Planter Controls





Seed Monitor Setup softkey

SEED MONITOR SETUP

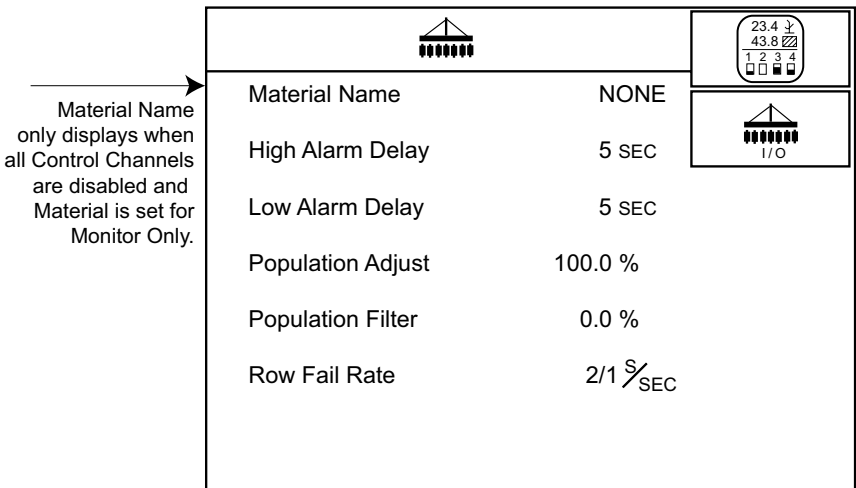
The **Seed Monitor Setup** screen controls the parameters for:

- High alarm delay
- Low alarm delay
- Population adjustment
- Population filter
- Row fail rate

From the Main Operate screen, press the **Seed Monitor Setup** softkey to access the Seed Monitor Setup screen.

Figure 52

Seed Monitor Setup Screen



IMPORTANT: For ground drive/nonhydraulic applications using the planter monitor only feature, all Control Channels must be disabled and a Material Name selected at the Seed Monitor Setup screen. Reference the Material Setup-Monitor Only section for additional information.

To Edit Seed Monitor Setup Data:

1. Use the rotary knob to scroll through the settings until the desired data element is selected.
2. Once the outline box is located on the data item, press the rotary knob to edit the data.
3. Press the **OK** softkey to accept the selection and **Cancel** to return to the previous setting.



The following data items may be edited:

MATERIAL NAME

Material Name only displays if there are NO seeding channels enabled with materials. The Monitor Only selection must be selected at the Material Configuration Setup screen.

HIGH ALARM DELAY

The High Alarm Delay establishes the delay between the detection of a High Population Alarm condition and the resulting alarm display. The value is entered in seconds. If the value is set to 10, a row must be in a High Population Alarm condition continuously for 10 seconds before the alarm will be issued.

LOW ALARM DELAY

The Low Alarm Delay establishes the delay between the detection of a Low Population Alarm condition and the resulting alarm display. The value is entered in seconds. If the value is set to 10, a row must be in a Low Population Alarm condition continuously for 10 seconds before the alarm will be issued.

POPULATION ADJUST

The Population Adjustment percentage scales the displayed population value to allow for inaccuracies with seed sensors in certain applications. This is a multiplier of the monitored population value. For true calculated results, the value should be set to 100.0%. If the monitored value is reading low, the value can be increased above 100.0% to achieve the desired population display. The displayed value is calculated by the monitored value x population scalar. For example, the monitored value is 100.0, and the scalar is 105%, so $100.0 \times 1.05 = 105.0$.

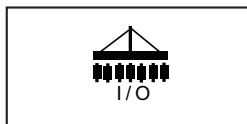
POPULATION FILTER

The Population Filter value is used to stabilize the monitored population display. For a true population value, this number should be set to 0.0%. 0.0 is no filtering at all. 99 is the highest level of filtering available. Set the filter to meet the appropriate level of filtering for your specific use.

ROW FAIL RATE

The Row Fail Rate value sets the threshold for Row Failure alarms. The value is entered in seeds per second. Both values are adjustable, allowing for numerous combinations. The default value is 2/1, which indicates a Row Failure threshold of 2 seeds in 1 second.

NOTE: Population is updated every 5 seconds. Setting the Alarm Delay for under 5 second intervals does not provide any delay at all.



Row Status/Row Width Setup softkey

NOTE: The Next Rows softkey is only present if more than 24 rows are configured.

ROW STATUS/ROW WIDTH SETUP

The **Row Status/Row Width Setup** screen controls which rows can be monitored, as well as the distance between rows and implement width.

Individual rows may be set to ON or OFF. Any detected row can be set to OFF. Rows set to OFF will remain OFF until they are turned ON again or are set to ON through Pattern Select. Rows set to OFF are ignored by the system and will not report seed data or react to row failures.

Press the **Row Status/Row Width Setup** softkey to access the Row Status/Row Width Setup screen.

Figure 53

Row Status/Row Width Setup Screen

 I/O		☐ - OFF ☒ - POPULATION ☐ - BLOCKAGE	23.4 ↓ 43.8 ▢ 1 2 3 4 ▢ ▢ ▢ ▢								
ROW WIDTH 30.0 IN											
AUTO UPDATE WIDTH Enabled											
IMP WIDTH 540 IN											
ON(-)/OFF(X) PATTERN EVERY ROW ON.....											
POP(_)/BLOCK(B) PATTERN EVERY ROW POPULATION _____											
1	2	3	4	5	6	7	8	9	10	11	12
											
13	14	15	16	17	18						
											

To Edit Data:

1. Use the rotary knob to scroll through the settings until the desired data element is selected.
2. Once the outline box is located on the data item, press the rotary knob to edit the data.
3. Press the **OK** softkey to accept the selection and **Cancel** to return to the previous setting.

The following data items may be edited:

ROW WIDTH

Row Width is used for seed rate data calculations and is the distance in inches (centimeters) between rows, with a resolution of 0.1. This value will update automatically with changes in the On/Off Pattern Setting option if the Auto Update Width option is set to ENABLED.



NOTE: Depending on the configured number of rows, some On/Off pattern settings may result in erroneous Row Width or Implement Width updates if the Auto Update Width is enabled. Always check the calculated values for accuracy when the Auto Update Width is enabled. If the adjusted values are not correct, disable the Auto Update Width feature and manually enter a Row Width and Implement Width.

AUTO UPDATE WIDTH

Auto Update Width automatically updates the Row Width and Implement Width settings when changes are made to the Pattern Setting option.

There are two choices available for this option:

ENABLED

The Row Width and Implement Width settings automatically adjust with ON/OFF Pattern Setting changes.

The following two examples use a 16 row planter set for 15.0 inch row width. Implement width is automatically calculated as 240.0 inches.

Example 1: The On/Off Pattern Setting is changed to every other row (even rows) OFF. The Row Width parameter adjusts to 30.0 automatically. The Implement Width calculated value remains unaffected at 240.0 inches.

Example 2: The On/Off Pattern Setting is changed to every 3rd row off. The Row Width parameter adjusts to 22.5 inches automatically. The Implement Width value adjusts to 247.5 inches to accommodate the new pattern.

DISABLED

The Row Width and Implement Width values will not be adjusted with changes to the ON/OFF Pattern Setting. Implement Width will not be automatically calculated and must be manually entered by the operator.

IMP WIDTH

Implement Width is the seeding width of the implement in inches (centimeters) with a resolution of 0.1. This value is used for area accumulators only and does not affect seed rate data. The Implement Width will automatically calculate as described in Auto Update Width if the feature is enabled. If Auto Update Width is disabled, manually enter the implement width.

ON/OFF PATTERN

For users that utilize split, twin, or skip row type seeding implements, there are 21 predefined patterns that will allow easy configuration for setting up the correct row pattern that is used. When a row pattern is selected, all of the rows are automatically turned ON or OFF according to the pattern. Individual rows in the Row Configuration Screen can still be edited to Population, Blockage or Off before or after a pattern is selected. The pattern setting, when selected, will override individual existing row settings.



Figure 54

Pre-Defined On/Off Patterns

ON/OFF Pattern Symbols

Rows turned ON = —

Rows turned OFF = X

PATTERN	Description/Example
.....	Every Row On
-X-X-X	Every 2nd Row Off
X-X-X-	Every 2nd Row On
--X--X-	Every 3rd Row Off
-X--X-X-	Every 3rd Row Off
X--X--X-	Every 3rd Row Off
XX-XX-XX-	Every 3rd Row On
X-XX-XX-X	Every 3rd Row On
-XX-XX-XX	Every 3rd Row On
---X--X	Every 4th Row Off
--X--X-	Every 4th Row Off
-X--X--	Every 4th Row Off
X--X---	Every 4th Row Off
XXX-XXX-	Every 4th Row On
XX-XXX-X	Every 4th Row On
X-XXX-XX	Every 4th Row On
-XXX-XXX	Every 4th Row On
--XX--XX--XX	Tw in Row s
-XX--XX--XX-	Tw in Row s
XX--XX--XX--	Tw in Row s
X--XX--XX--X	Tw in Row s
XX--XX--XX--	Tw in Row s
X--XX--XX--X	Tw in Row s

BLOCKAGE PATTERN

Blockage Pattern is used to determine which sensors are used to calculate population and those used only for the detection of blockage. Depending on the customer’s preference at the time of purchase, either all Hi Rate sensors, all Recon Flow sensors, or a combination of the two could have been chosen.

The System can be configured for:

- Every Row Population (_ _ _ _ _)
Using all Hi Rate sensors
- Every Row Blockage (BBBBBB)
Using all Recon Flow sensors
- Every 2nd Row Block (_ B _ B _)
Even rows use Recon and odd rows use Hi Rate
- Every 2nd Row Pop (B _ B _)
Even rows use Hi Rate and odd rows use Recon

Population =

Blockage =

OFF = X



Ground Speed Setup softkey

GROUND SPEED SETUP

Ground Speed Setup determines:

- The input source and type of ground speed sensor being used
- The manual default ground speed (only displays when manual is selected as source)
- Shut off speed
- Minimum override
- Ground speed constant
- Master Switch timeout
- Alarm delay

From the Main Operate screen, press the **Ground Speed Setup** softkey to access the Ground Speed Setup screen.

Figure 55

Ground Speed Setup Screen

		23.4 ↓ 43.8 ▨ 1 2 3 4 
Source	Digital Freq	
Gspd Constant	12192 PUL	
Shutoff Speed	0.01 MPH	
Minimum Override	0.0 MPH	
Master Sw Timeout	10 SEC	
Alarm Delay	5 SEC	

To Edit Ground Speed Setup Data:

1. Use the rotary knob to scroll through the settings until the desired data element is selected.
2. Once the outline box is located on the data item, press the rotary knob to edit the data.
3. Press the **OK** softkey to accept the selection and **Cancel** to return to the previous setting.



The following data items may be edited:

SOURCE

Source selects the type of ground speed sensor being used and where the sensor's input is on the system.

MANUAL

- Sets the system to operate using an internally generated ground speed. No ground speed sensor is required when using the Manual setting.

RELUCT FREQ

- Used when ground speed is provided by a reluctance (2-wire) type sensor connected to the actuator harness.

DIGITAL FREQ

- Used when ground speed is provided by a radar/digital (3-wire) type sensor connected to the actuator harness.

CAN GROUND

- Used when ground speed is provided by a radar/digital (3-wire) type sensor connected to the cab harness or if radar/forward ground speed is available on the CAN bus.

CAN WHEEL

- Used when wheel speed data is available on the CAN bus.

MANUAL GROUND SPEED

NOTE: Manual ground speed can only be entered if the source is changed to MANUAL.

Manual Ground Speed can be used in the event of a failure of the ground speed sensor being used. This is an internally generated ground speed that will cause the system to operate when the Master Switch is ON at the speed that has been programmed. This value can be set to any speed within the delivery capabilities of the system.

GSPD CONSTANT

GSPD Constant is the value representing the pulse count produced by the ground speed sensor over a 400' distance. Refer to GROUND SPEED CALIBRATION and Figure 70 for additional information.

SHUT OFF SPEED

Shut Off Speed indicates the minimum ground speed allowed before the system ceases total operation.

MINIMUM OVERRIDE

Minimum Override takes over when actual ground speed is below the designated value. The control will operate at this speed until actual ground speed rises above the minimum override speed, or the actual speed drops below the shutoff speed.



MASTER SW TIMEOUT

Master Switch Timeout determines the length of time before the system disables the operate function after ground speed is 0 (zero) if the Master Switch remains in the ON position. After the delay time elapses, an alarm is issued stating that the Master Switch must be toggled OFF/ON before the system will restart.

ALARM DELAY

Alarm Delay determines the length of time, after the ground speed goes to zero and seed flow continues before the alarm sounds. This alarm only applies when all control channels are disabled and the system is running in a planter monitor only mode.

PRECHARGE GROUND SPEED

Precharge ground speed is the speed the system will use when precharge has been enabled for a control channel and precharge ground speed greater than 0 must be entered to operate.

FLUSH ENABLE SPEED

Flush Enable Speed is the speed the system will use when Flush Enable is pressed to open the valve and dispense material. The Flush Enable feature can only be activated when the implement is stopped.



NOTE: Older ground speed calibrations had a default value of 6096, which is the nominal pulse count for the radar speed sensor. Newer ground speed equipment has a default value of 12,192. To convert older ground speed constants, multiply the recorded value by two for an approximate conversion.

GROUND SPEED CALIBRATION

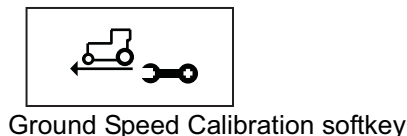
Ground speed is the rate in MPH (Km/h) as measured by the ground speed sensor. The number reflects the number of pulses generated by the ground speed sensor while traveling a distance of 400 feet (100 meters).

IMPORTANT: It is imperative to get an accurate ground speed reading, as this reading directly impacts the accuracy of Population, Area Accumulation, and Application Rate Control.

Press the **Ground Speed Calibration** softkey to access the Ground Speed Calibration screen.

Figure 56

Ground Speed Calibration Screen



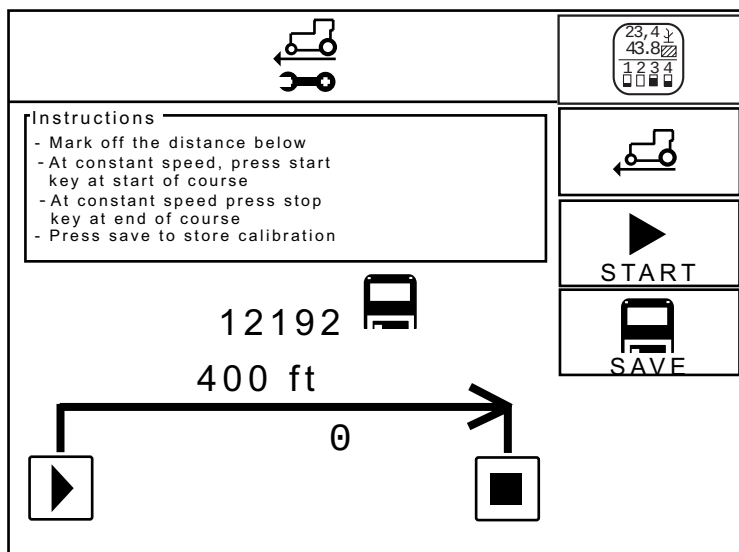
Start softkey



Stop softkey

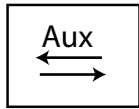


Save softkey



To Perform the Initial Ground Speed Calibration:

1. Carefully measure an exact 400 foot (100 meter) course, clearly marking the start and finish points.
2. With the tractor moving between 2 and 5 MPH (3.2 and 8 Km/h), press the **Start** softkey when the tractor is even with the designated start point. The display showing the ground speed calibration will zero and begin counting ground speed pulses.
3. When the tractor is even with the designated finish point, press the **Stop** softkey. The new calibration number will be displayed on the center of the screen.
4. To ensure accuracy, record the number and repeat this process two additional times. Average the three numbers recorded.
5. Edit the calibration number by using the rotary knob and scrolling through the settings until the desired data element is selected. Once the outline box is located on the data item, press the rotary knob to edit.
6. Press the **Save** softkey to save the desired settings.



Aux Input/Function Assignment button

10" VT AUX INPUT/FUNCTION ASSIGNMENT

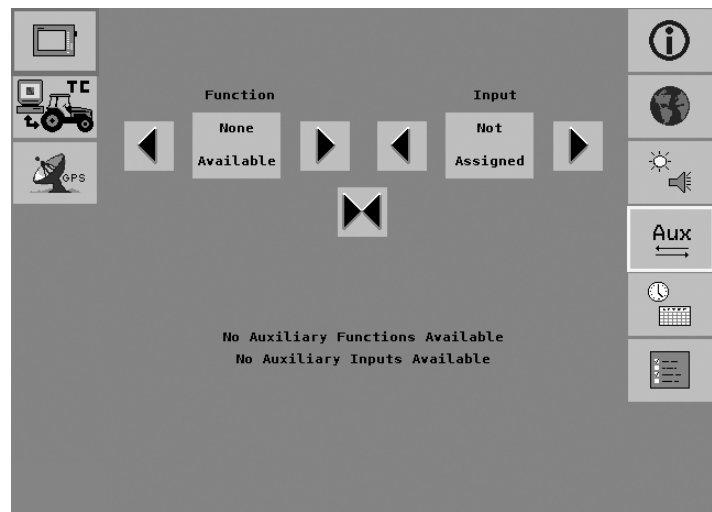
The Auxiliary Input/Function Assignment screen configures the system's Master Switch input to the TECU so that it will work with the IntelliAg control function.

IMPORTANT: On initial powerup, a **Master Switch Assignment** alarm activates requiring a switch assignment. If the **Master Switch** is not configured, the **Master Switch Assignment** alarm will activate at each power cycle until an auxiliary assignment is made and will default to the **Master Switch** button to activate auxiliary inputs.

An installed Master Switch located in the tractor cab is the preferred method for auxiliary input; however, a Master Switch button will be assigned and appear on the Work Screen if no assignment is made.

Figure 57

Master Switch Assignment Alarm



NOTE: For Virtual Terminals, other than DICKEY-john, refer to the manufacturer's VT operator's manual for auxiliary assignment.



Enter button

To Assign the Master Switch to the IntelliAg:

1. Press the **Auxiliary Assignment** button.
2. At the Function box, use the right or left arrows to select the desired function (Control Channel icon).
3. At the Input box, use the right or left arrows to select the desired input (Tractor ECU Master Switch).
4. Press the **Enter** button to accept.

No Auxiliary Inputs Available appears on the screen if the Tractor ECU is not connected. When assigned, this line will disappear.

No Auxiliary Functions Available appears on the screen if the IntelliAg system is not connected. When assigned, this line will disappear.



5" VT AUX INPUT/FUNCTION ASSIGNMENT

The Auxiliary Input/Function Setup screen configures the location of the system's Master Switch. For proper assignment, the Master Switch must be configured correctly.

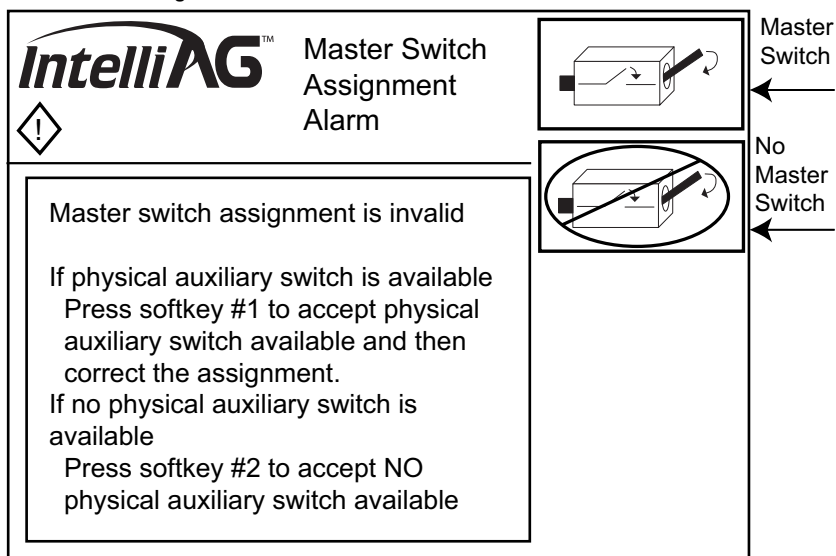
An installed Master Switch located in the tractor cab is the preferred method for auxiliary input; however a **Master Switch** softkey on the Virtual Terminal is available if there is no Master Switch installed in the cab.

On initial powerup, a Master Switch Assignment alarm activates requiring action.

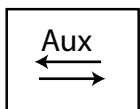
- Press either the **Master Switch** softkey or
- Press the **No Master Switch** softkey

Figure 58

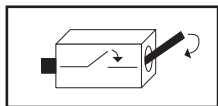
Master Switch Assignment Alarm



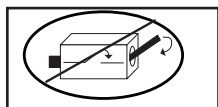
Escape key



Aux Input/Function Setup softkey



Master Switch softkey



No Master Switch softkey

IMPORTANT: If the Master Switch is not configured, the Master Switch Assignment Alarm will activate at each power cycle until an auxiliary assignment is made and will default to the Master Switch softkey to activate auxiliary inputs.

MASTER SWITCH ASSIGNED

If assigning a Master Switch, the Virtual Terminal must be configured to acknowledge the assignment.

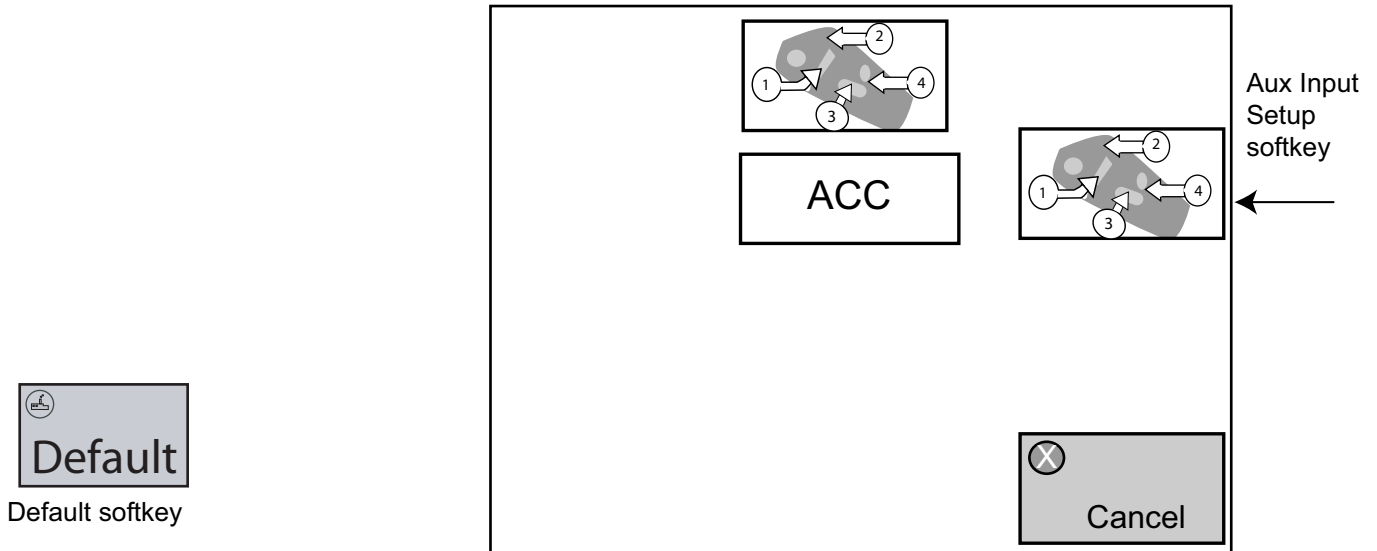
To Configure an Installed Master Switch:

1. Press the **ESC** key 2 times to activate the Virtual Terminal Setup screen.
2. Press the **Auxiliary Input/Function Setup** softkey to access the Auxiliary Input/ Function Setup screen.



Figure 59

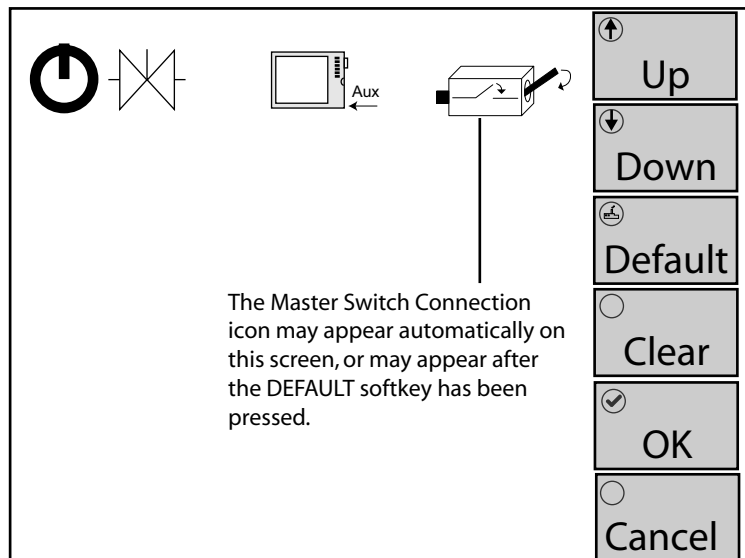
Auxiliary Input/Function Setup Screen

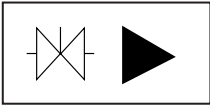


3. Navigate to the configuration screen by pressing the **Auxiliary Input Setup** softkey.
4. Press the **Default** softkey. A Master Switch Connection icon will appear on the screen indicating that the Master Switch is to be connected to the tractor cab harnesses' Master Switch connector (refer to Figure 28).
5. Press the **OK** softkey to save the configuration and return to the Aux Input/Function Setup screen.
6. Press and hold the **ESC** softkey for one or more seconds to return to the Virtual Terminal Setup screen.

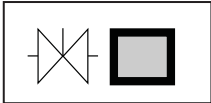
Figure 60

Aux Input Configuration Screen





Master Switch ON softkey



Master Switch OFF softkey

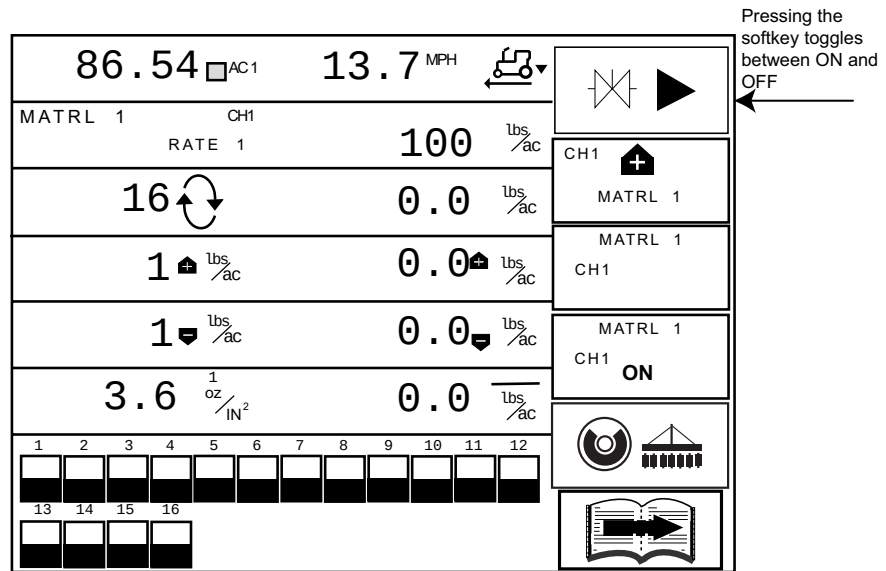
NO MASTER SWITCH ASSIGNED

When the No Master Switch icon is pressed, the Virtual Terminal assigns a Master Switch softkey to function as the Auxiliary ON and OFF keys.

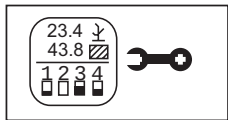
The Main Operate screen will display with a **Master Switch ON** softkey at the top of the screen.

Toggleing between the Master Switch ON and OFF softkeys cycles the system control ON and OFF.

Figure 61
Main Operate Screen with VT Master Switch Configured



IMPORTANT: As a safeguard, when the Master Switch ON softkey is pressed, a Master Switch Softkey Activation alarm must be acknowledged before equipment operates (refer to Figure 30). This alarm occurs the first time the Master Switch softkey is pressed after power up.



Work Screen Configuration softkey

WORK SCREEN CONFIGURATION

The user has the ability to place any data item in any position on the **Main Work** screen. The display is functionally divided into 2 columns and 6 rows. From the Main Operate screen, press the **Work Screen Configuration** softkey to access the **Work Screen Configuration** screen.

Figure 62

Work Screen Configuration Screen

FIELD 1 AREA	GROUND SPEED	
CONTROL INC/DEC 1	CONTROL ACTUAL CH 1	
CONTROL INC/DEC 2	CONTROL ACTUAL CH 2	
CONTROL INC/DEC 3	CONTROL ACTUAL CH 3	
CONTROL INC/DEC 4	CONTROL ACTUAL CH 4	
RPM SCAN	POP AVG	
Large Bargraphs Disabled		

NOTE: Some items selected for the work screen will display on an entire row.

NOTE: After these values have been saved, the new settings will display at the startup screen until modified.

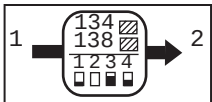
To Edit Work Screen Configuration Data:

1. Use the rotary knob to scroll through the settings until the desired data element is selected.
2. Once the outline box is located on the data item, press the rotary knob to edit the data.
3. Press the **OK** softkey to accept the selection and **Cancel** to return to the previous setting.

- Any data item may be placed in any position.
- Duplicate data items can be configured on a single display if desired.
- Up to three display screens can be configured.

Refer to DATA ITEMS for a detailed description of each item and the associated display images.

In order to configure the second and third display screens, select the **Next Work Screen** softkey.



Next Work Screen softkey





DATA ITEMS

NOTE: *Data Items on the Main Operate screen with a check box allows the number to be reset to zero.*

0.00 ☒ ACT

Reset box



OK softkey



Cancel softkey

The following section illustrates available display parameters and respective functions. Display parameter placement can be moved to display on the Main Operate screen to individual preferences. Refer to SYSTEM CONFIGURATION for additional information on setting parameters.

RESETTING DATA ITEM VALUES

Some Data Items values can be reset to zero from the Main Operate screen.

To Reset Values:

1. Use the rotary knob to scroll to the Data Item to edit; the chosen check box will be highlighted.
2. With the desired check box highlighted, push in the rotary knob.
3. Scroll the rotary knob to enter a check mark in the highlighted box. Continuing to turn the rotary knob will toggle the checkmark on and off in the box.
4. Press the **OK** softkey to accept selection or press **Cancel** to return to the previous setting.

CONTROL ACTUAL CHANNELS 1-4

WHEAT CH1
Rate 1 98.1 ^{LBS}/_{AC}

Control Actual Channels 1 - 4 display the channel actual application rates in its respective units depending on channel setup. The channel increment/decrement or preset table rate value is also displayed. When the Master Switch is OFF, the rate is displayed in a small font and the value displayed is the Target Rate for the channel. When the Master Switch is ON, the rate is displayed in a large font and the value displayed is the actual application rate. When the channel's target rate is adjusted with the Inc/Dec function or rate table, the Target Rate is displayed for 5 seconds, followed by the actual rate. **This Data Item will be displayed on an entire row of the work screen.**

CONTROL TARGET CHANNELS 1-4

WHEAT CH1
Rate 1 98.1 * ^{LBS}/_{AC}

Control Target Channels 1 - 4 display the channel target set rates in its respective units depending on channel setup. The channel Inc/Dec or preset table rate value is also displayed. When the Master Switch is OFF, the rate is displayed in a small font. When the Master Switch is ON, the rate is displayed in a large font. **This Data Item will be displayed on an entire row of the work screen.**



CONTROL RATE CHANNELS 1-4

W H E A T CH1
 0.0 $\frac{\text{LBS}}{\text{HR}}$ 98.1 $\frac{\text{LBS}}{\text{AC}}$

Control Rate Channels 1-4 display the channel actual application rates in its respective units depending on channel setup. The channels calculated flow rate will be displayed. When the Master Switch is OFF, the rate is displayed in a small font. When the Master Switch is ON, the rate is displayed in a large font. **This Data Item will be displayed on an entire row of the work screen.**

CONTROL SCAN

P H O S P H R S CH2
 Rate 1 98.1 $\frac{\text{LBS}}{\text{AC}}$

Control Scan displays all active control channels sequentially, showing the actual rate in its respective units depending on channel setup, and the Inc/Dec value or preset table rate for each channel in five-second intervals. **This Data item will be displayed on an entire row of the work screen.**

POP ROW SCAN

5  0.0 $\frac{\text{KS}}{\text{AC}}$

Pop Row Scan displays all active seed rows population in seeds per acre (or seeds/Ha) for each detected seed sensor. The value to the left side displays the current row number being scanned. The value on the right is the population data. The scans continue sequentially in four-second intervals unless the rotary knob is used to select a particular row number for continuous view. **This Data Item will be displayed on an entire row of the work screen.**

POP MIN MAX ROW SCAN

3  $\frac{\text{KS}}{\text{AC}}$ 0.0  $\frac{\text{KS}}{\text{AC}}$

Pop Min Max Scan alternately displays the seeding row with the minimum population and the seeding row with the maximum population in seeds per acre (or seeds/Ha). The value to the left side displays the current row number. The value to the right is the population data. Dwell time for each display is four seconds. **This Data Item will be displayed on an entire row of the work screen.**



POP MIN ROW

4 $\frac{\text{KS}}{\text{AC}}$ 0.0 $\frac{\text{KS}}{\text{AC}}$

Pop Min Row displays the seeding row with the minimum population in seeds per acre (or seeds/Ha). The value to the left side displays the current row number. The value on the right is the population data. **This Data Item will be displayed on an entire row of the work screen.**

POP MAX ROW

1 $\frac{\text{KS}}{\text{AC}}$ 0.0 $\frac{\text{KS}}{\text{AC}}$

Pop Max Row displays the seeding row with the maximum population in seeds per acre (or seeds/Ha). The value to the left side displays the current row number. The value on the right is the population data. **This Data Item will be displayed on an entire row of the work screen.**

POP AVG

0.0 $\frac{\text{KS}}{\text{AC}}$

Pop Avg displays the average population in seeds per acre (or seeds/Ha) of all active seeding rows per channel.

SPACING ROW SCAN

1 $\frac{\text{IN}}{\text{S}}$ 0.00 $\frac{\text{IN}}{\text{S}}$

Spacing Row Scan scans all active seed rows and displays the spacing in inches (cm) for each row as detected by the sensors. The value to the left side displays the current row number. The value on the right is the population data. The scans continue sequentially in four-second intervals unless the rotary knob is used to select a particular row number for continuous view. **This Data Item will be displayed on an entire row of the work screen.**

SPACING MIN MAX ROW SCAN

1 $\frac{\text{IN}}{\text{S}}$ 0.0 $\frac{\text{IN}}{\text{S}}$

Spacing Min Max Row Scan alternately displays the seeding rows with the minimum and maximum spacing in inches (cm). The value to the left side is the current row number. The value on the right is the spacing. Dwell time for each display is four seconds. **This Data Item will be displayed on an entire row of the work screen.**



SPACING MIN ROW

1 IN/S 0.0 IN/S

Spacing Min Row displays the seeding row with the minimum spacing in inches (cm). The value to the left side displays the current row number. The value on the right is the spacing. **This Data Item will be displayed on an entire row of the work screen.**

SPACING MAX ROW

1 IN/S 0.0 IN/S

Spacing Max Row displays the seeding row with the maximum spacing in inches (cm). The value to the left side displays the current row number. The value on the right is the spacing. **This Data Item will be displayed on an entire row of the work screen.**

SPACING AVG

0.0 IN/S

Spacing Avg displays the average spacing in inches (cm) of all active seeding rows.

SEED/DISTANCE ROW SCAN

1 0.0 S/FT

Seed/Distance Row Scan displays all active seed rows and the number of seeds per foot (seeds/meter) for each row detected by the sensors. The value to the left side displays the current row number. The value on the right is the seeds per distance data. The scan continues sequentially in four-second intervals unless the rotary knob is used to select a particular row number for continuous view. **This Data Item will be displayed on an entire row of the work screen.**

SEED/DISTANCE MIN MAX ROW SCAN

1 S/FT 0.0 S/FT

Seed/Distance Min Max Row Scan alternately displays the seed row with the minimum number of seeds per foot (seeds/meter) and the seeding row with the maximum number of seeds per foot (seeds/meter). The value to the left side displays the current row number. The value on the right is the seeds per distance data. Dwell time for each display is four seconds. **This Data Item will be displayed on an entire row of the work screen.**



SEED/DISTANCE MIN ROW

1 S/ft 0.0 S/ft

Seed/Distance Min Row displays the seeding row with the minimum number of seeds per foot (meter). The value to the left side displays the current row number. The value on the right is the seeds per distance data. **This Data Item will be displayed on an entire row of the work screen.**

SEED/DISTANCE MAX ROW

1 S/ft 0.0 S/ft

Seed/Distance Max Row displays the seeding row with the maximum number of seeds per foot (meter). The value to the left side displays the current row number. The value on the right is the seeds per distance data. **This Data Item will be displayed on an entire row of the work screen.**

SEED/DISTANCE AVERAGE

0.0 S/ft

Seed/Distance Average displays the average number of seeds per foot (meter) of all active seeding rows.

SINGULATION AVERAGE

0 %

NOTE: Singulation information is only operable when using a Smart Harness system and Seed Smart sensors. Contact DICKEY-john Technical Support at 1-800-637-3302 for additional information.

Singulation Average displays the average percent seed singulation of the planter's rows that are configured for population. Singulation refers to the portion of seeds planted individually, rather than in groups.

SINGULATION ROW SCAN

1 0 %

Singulation Row Scan displays the percent singulation of each of the planter's rows. The displayed row increments every four seconds. After the last row is displayed, the scan will re-sequence beginning with the first active row.

SINGULATION MIN MAX SCAN

1 0 %

Singulation Min Max Scan alternates the display of the minimum row, singulation, and maximum row singulation every four seconds. When a minimum row is displayed, the corresponding symbol is shown with the row number.



GROUND SPEED

7.7 MPH

Ground Speed displays the current ground speed of the tractor in miles per hour (Kph). The ground speed source is defined during the GROUND SPEED CALIBRATION setup. This data item also displays the implement status by the up/down arrow behind the tractor.

TOTAL AREA

0.00 ACT

NOTE: Data Items on the Main Operate screen with a check box allows the number to be reset to zero.

0.00 ACT

Total Area displays the area covered by the implement in acres (Ha). Total Area is calculated using the Implement Width parameter entered on the **Row Status/Row Width Setup** screen. Area accumulates for seeding when seeds are detected on a least one seeding row and the ground speed is above the Shutoff Speed parameter entered on the **Ground Speed Calibration** screen. This accumulator is independent of any other area accumulator and may be reset to 0.0 at any time. Current area is retained after power down. If no rows are configured, the total area accumulator will use the largest channel width.

FIELD 1 AREA

0.00 AC1

Field 1 Area displays the area covered by the implement in acres (Ha). Field 1 Area is calculated in the same manner as Total Area. This accumulator is independent of any other area accumulator and may be reset to 0.0 at any time. Current area is retained after power down.

FIELD 2 AREA

0.00 AC2

Field 2 Area displays the area covered by the implement in acres (Ha). Field 2 Area is calculated in the same manner as Total Area. This accumulator is independent of any other area accumulator and may be reset to 0.0 at any time. Current area is retained after power down.



CHANNELS 1 - 4 AREA

10.95  1AC

Channels 1 - 4 Area displays the area covered by Control Channels 1 - 4. Area is calculated using the Channel Width parameter that is entered on the **Control Channel setup** screen. Area accumulates when the Master Switch is ON and the ground speed is above the Shutoff Speed parameter entered on the **Ground Speed Calibration** screen. This accumulator is independent of any other area accumulator and may be reset to 0.0 at any time. Current area is retained after power down.

AREA SCAN

0.00 AC1

Area Scan scans through all area accumulators sequentially, displaying the area for each accumulator in four-second intervals.

CONTROL RPM SCAN

0.0 ^{CH2}
RPM

RPM Scan scans through all active Control Channel feedback sensors sequentially displaying the actual RPM measured in four-second intervals. The current sensor is identified by the number displayed above the RPM symbol.

AREA PER HOUR

0.00 ^{AC}
HR

Area Per Hour displays the current area per hour in acres (Ha). The value is continuously calculated based on the current ground speed and the Implement Width parameter as entered on the **Row Status/Row Width Setup** screen.

SYSTEM ACTIVE TIME

0.00  HR

System Active Time records the amount of time the Master Switch is in the ON position indicating the actual number of hours equipment has been operating.

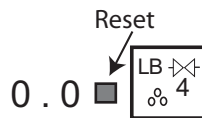


SEED COUNT ACCUM ROW



Seed Count Accum Row scans through all of the active seed rows and displays the seed count for each row as detected by the seed sensors. The value to the left side displays the current row number. The value to the right is the seed count. The scan continues sequentially in four-second intervals unless the rotary knob is used to select a particular row number for continuous view. The Seed Count function is enabled/disabled on the Accumulators/Seed Count/Distance Count screen. **This Data Item will be displayed on an entire row of the work screen.**

CHANNELS 1 - 4 MATERIAL ACCUM



Channels 1 - 4 Material Accum displays the current accumulated material for Channels 1 - 4. Material is accumulated according to the applied rate.

PRESSURE SCAN



Pressure Scan scans through all active pressure sensors sequentially, displaying the actual pressure measured in oz/in² (kPa) in four-second intervals. The current sensor is identified by the number above the pressure symbol.

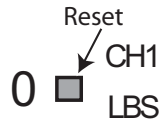
RPM SCAN



RPM Scan scans through all active shaft/fan sensors sequentially, displaying the actual RPM measured in four-second intervals. The current sensor is identified by the number displayed above the RPM symbol.



CHANNEL 1-4 PRODUCT LEVEL



Channels 1-4 Product Levels indicates how much product remains in the hopper or tank. The reset button is unique in that it does not reset the value to zero but allows the user to set the known amount of product added. Selecting the reset button thereafter will default to the original amount entered. To enter the starting product level select the value and changed to the desired level.

HOPPER LEVEL STATUS SCAN



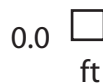
Hopper Level Status Scan scans through all the hopper level sensors in the system and indicates an empty or non-empty status.

BOOM STATUS



Boom Status indicates the status of each boom section. The Boom Status feature is only operational with Liquid Control Channels when a DICKEY-john boom switch module and boom output module are installed for boom control. This Data Item will scan through 12 sections at a time on an entire row.

DISTANCE ACCUMULATOR



Distance Accumulator displays the distance the tractor has traveled in feet (meters). The Distance Accumulator function is enabled/disabled on the Accumulators/Seed Count/Distance Count screen.





SYSTEM OPERATION

When all parameters have been established, the system is ready for operation.



When the implement is down and the Master Switch in the ON position, the machine is fully operational. All necessary precautions must be taken to ensure user safety. Failure to practice all necessary caution may result in serious injury or death.

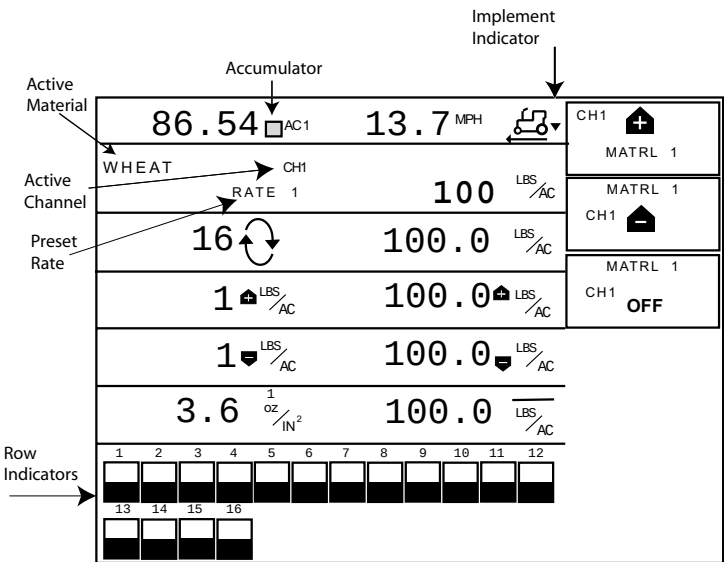
Use the following procedures to start operation:

- 1. Lower the implement to operating position, engaging the implement switch.
- 2. With the hydraulic system engaged and the tractor at its normal operating RPM, set the Master Switch to the ON position. All enabled Control Channels will begin controlling at the current ground speed. All accumulators will begin recording data.

To stop operation:

- 1. Set the Master Switch to the OFF position. All control channels will cease operation and all data accumulation will halt.
- 2. Operation will immediately stop when ground speed is 0.

Figure 63
Main Operate Screen Functions

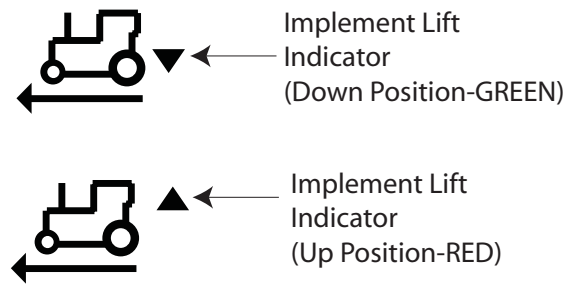




IMPLEMENT LIFT SWITCH

When an implement lift switch is installed, the Main Operate screen will identify if the implement is in the up or down position. Using an implement lift switch automatically turns the Control Channels on and off without turning the Master Switch off. The Implement Lift Indicator must be in the Down position for the Control Channels to operate.

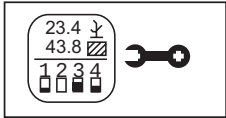
Figure 64
Implement Lift Indicators



Refer to the Implement Lift Sensor instructions for installation location.

ROW INDICATORS

Row Indicators in bar graph format on the bottom of the Operate screen indicate seed rate for each row. The size of the bar graphic is set on the Work Configuration screen by pressing the **Work Screen Configuration** softkey. The following symbols illuminate in the bar graph area:



Work Screen Configuration softkey

Figure 65
Row Indicator Symbols

	Row assignment to channel		Row Failure
	Not planting Master Switch off		Row off manually or pattern
	Planting at desired rate		Blockage
	High Population		Not assigned to channel
	Low Population		Row off by control and seeds detected



PRECHARGE FEATURE

The Precharge feature is typically used in applications that have significant distance between the implement row unit and the storage bulk tank where seed placement takes several seconds due to the travel time of the seed/ fertilizer from the bulk tank to the ground. When the Precharge feature is activated, material will dispense at the rate at which the Precharge Ground Speed is set.

The Precharge feature will operate until the PreCharge time lapses or the PreCharge ground speed has been exceeded. If ground speed stops while in PreCharge mode, the Precharge feature will abort.

A PreCharge Alarm will display any time the Preset feature is established or changed and the Master Switch is turned ON.

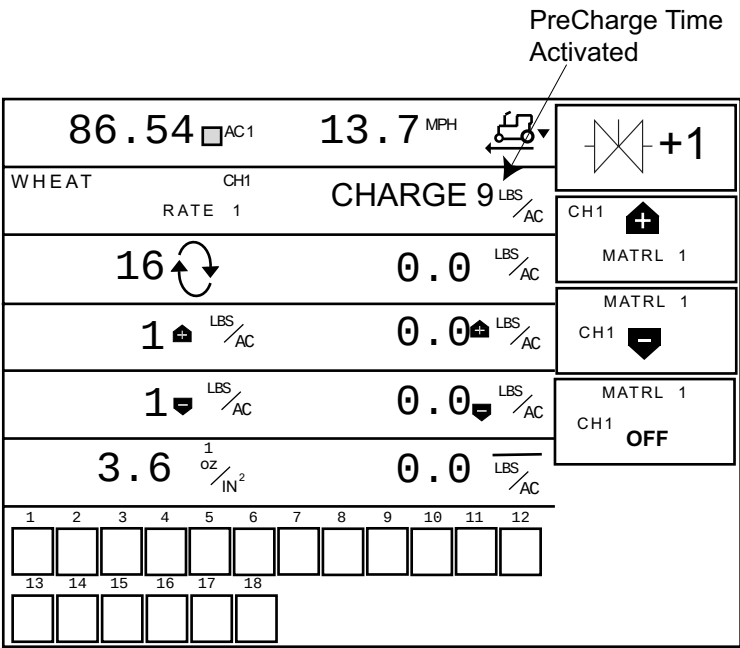
The Precharge feature is applicable to Granular Seeding, Fertilizer and Liquid Control Channels.

NOTE: Master Switch must be turned ON to activate a Precharge state.

Reference SYSTEM CONFIGURATION for Channel Control and Ground Speed setup instructions.

Figure 66

PreCharge Time and Ground Speed (Main Operate Screen)



Operating the Precharge function:

- 1. Turn the Master Switch ON.
- 2. Precharge feature will automatically initiate when the Master Switch is turned on and the Ground Speed is less than the PreCharge Ground Speed.



FLUSH ENABLE

NOTE: Flush Enable will abort if the softkey is pressed during a Precharge state.



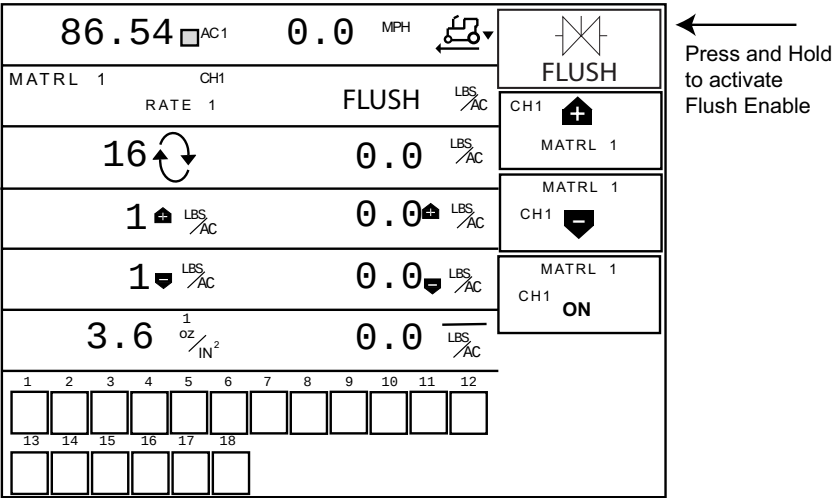
Flush Enable softkey

The Flush Enable feature is typically used to begin dispensing material at a higher rate when the tractor is operating at a slow speed, i.e. during startup or turn around conditions. Material will dispense at the rate set at the Ground Speed setup screen.

Flush Enable is applicable to Granular Seeding, Fertilizer, or Liquid Control Channels.

Reference System Configuration for Control Channel and Ground Speed setup instructions.

Figure 67
Flush Enable (Main Operate Screen)



Operating the Flush Enable function:

- 1. Ensure the Master Switch is turned ON.
- 2. Press and hold the **Flush Enable** softkey to dispense material.
- 3. Release the **Flush Enable** softkey to stop dispensing material.

SYSTEM INFORMATION AND DIAGNOSTICS

In order to view the following information and diagnostics screens, the Master Switch must be set to the OFF position.



Accumulators softkey

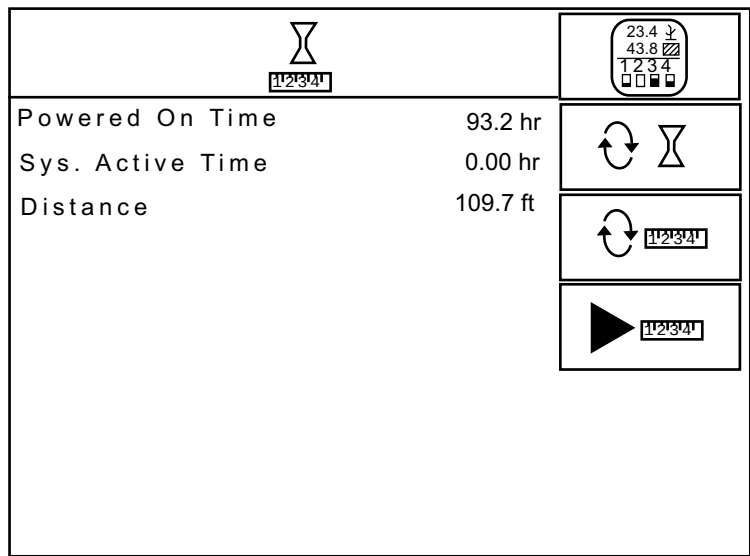
ACCUMULATORS/SEED COUNT/DISTANCE SCREEN

The Accumulators/Seed Count/Distance screen displays the amount of time the system has been on, the amount of time application control has occurred, and the distance travelled. Data on this screen is for display purposes only - it cannot be edited.

Press the **Accumulators** softkey to access the Accumulators/Seed Count/Distance screen.

Figure 68

Accumulators/Seed Count/Distance Screen



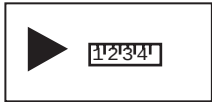
NOTE: The Master Switch must be set to the OFF position to display the **Accumulators/Seed Count/Distance** screen.

POWERED ON TIME

Powered On Time is the accumulated time, in hours, that the system has been powered ON. Powered On Time accumulates regardless of the mode of operation - whether it is in SETUP/CONFIGURATION mode or OPERATE mode. Powered On Time cannot be reset.

SYS. ACTIVE TIME

System Active Time is the accumulated time, in hours, that the machine has actively been controlling. System Active Time accumulates whenever seeds are detected on at least one sensor. Planting time does not accumulate during an ALL ROWS FAILED condition. System Active Time cannot be reset.



Accumulators Start Distance softkey



Accumulators Stop Distance softkey



Accumulators Reset Distance softkey

DISTANCE

Distance is the accumulated distance in feet (meters) that the implement has travelled. The Distance Accumulator function can be controlled by using the following procedures:

1. Press the **Start Distance Accumulator** softkey to begin accumulating distance. This occurs whenever there is ground speed.
2. Press the **Stop Distance Accumulator** softkey to stop distance accumulation.
3. Press the **Reset Distance Accumulator** softkey to reset the value back to 0.0.



Diagnostics softkey

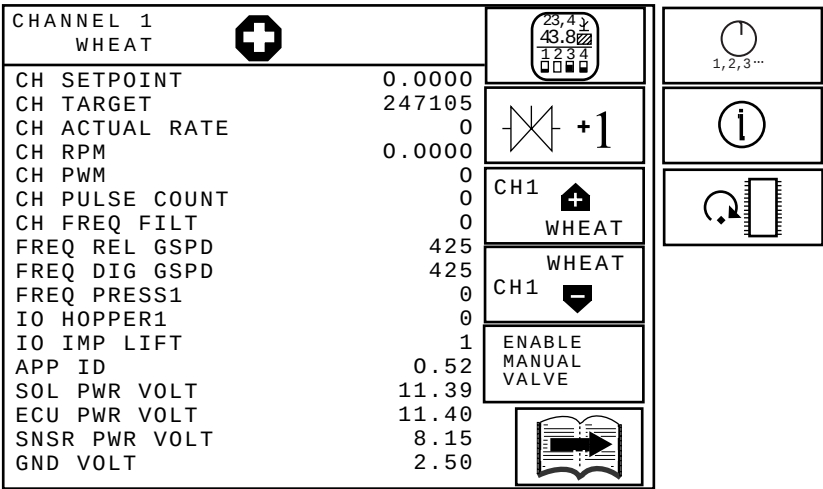
DIAGNOSTICS

The Diagnostics screen provides various information from feedback sensors, valve output, and system voltages connected to the WSMT module. The control valve can be manually opened on this screen when necessary. Refer to VALVE CALIBRATION for additional information.

Each channel has its own Diagnostics screen. None of the items on the screen may be edited. However the Channel Pulse Count data can be reset. The system can be active while the Diagnostic screen is displayed.

Figure 69

Diagnostics Screen



Next Channel softkey

To View Diagnostics:

- 1. Press the **Diagnostics** softkey to access the Diagnostics screen.
- 2. The Diagnostics screen will show Channel 1 as a default.
- 3. If a channel other than Channel 1 needs to be selected, press the **Next Channel** softkey until the appropriate channel is displayed. The **Next Channel** softkey only displays when more than 1 Channel is configured.

CH SETPOINT

The Channel Setpoint value is calculated by the system. It displays the feedback frequency of the application rate sensor or flowmeter used for that channel's feedback.

CH TARGET

The Channel Target value is the current channel's population rate as entered into the Target Rate constant on the Channel Configuration screen.

CH ACTUAL RATE

The Channel Actual Rate value is the current channel's actual controlled rate with the system active.



CH RPM

The Channel RPM value is the current planter disk RPM. The sensor constant and gear ratio parameters entered on the Channel Configuration screen allow the Disk RPM to be calculated.

CH PWM

The Channel PWM value is the current pulse width modulation (PWM) output drive signal to the solenoid valve. The higher the number, the further the valve opens.

CH PULSE COUNT

The Channel Pulse Count value is the accumulated pulse count detected from the channel feedback sensor. This value may be reset by the operator by pressing the Reset Channel Pulse Count softkey.

CH FREQ FILT

The Channel Frequency's Filtered value is the filtered frequency output from the channel feedback sensor.

FREQ REL GSPD

The Frequency Reluctance Ground Speed value is the reluctance sensor output signal in hertz (hz). This value is present when ground speed is provided by a reluctance sensor.

FREQ DIG GSPD

The Frequency Digital Ground Speed value is the digital sensor output signal in hertz (hz). This value is present when ground speed is provided by a radar sensor or other digital speed sensor.

FREQ PRESS 1

The Frequency Pressure value is the output frequency signal of the air pressure sensor in hertz (hz). This value will typically fall between 200 hz and 1100 hz.

IO HOPPER 1

The IO Hopper 1 value is the current state of the hopper sensor. If the sensor is unblocked, the value will be "0". A blocked sensor's value will be

I/O IMP LIFT

The IO Implement Lift value displays the current state of the implement status switch. This value will be "1" when the implement is down. The value will be "0" when the implement is raised.

APP ID

Hardware identification only. Not applicable to the end user.

NOTE: *In some instances, FREQ REL GSPD and FREQ DIG GSPD read the same values simultaneously depending upon the sensor used. This is normal and does not impact operation.*

NOTE: *If the values are reversed and the value displays a "1" when the implement is raised, the wiring for the implement switch will need to be reversed so that an accurate readout is achieved.*



SOL PWR VOLT

The Solenoid Power Volt value displays the detected solenoid power voltage. This voltage level is the high current voltage leg of the system which is used to power high current solenoids and valve actuators. This value will generally be equal or nearly equal to the tractor battery voltage.

ECU PWR VOLT

The Electrical Control Unit (ECU) Power Volt value is the detected ECU voltage. This voltage level is the low current voltage leg of the system and is used to power modules and sensors. This value will generally be equal or nearly equal to the tractor battery voltage.

SNSR PWR VOLT

The Sensor Power Volt value is the detected output voltage to the seed sensor on the Working Set Master (WSMT) module. This value is typically +8 VDC.

GND VOLT

If the system is properly grounded, this value is typically 2.50.



Diagnostics key

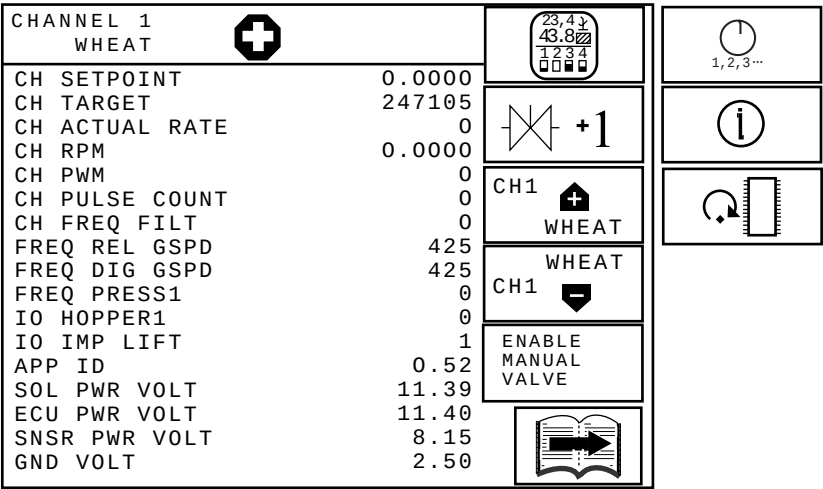
DIAGNOSTICS MANUAL VALVE POSITION

The Diagnostics screen allows for manual opening of the selected channel's valve. This is used for calibration or troubleshooting purposes in the case of system failure.

Press the **Diagnostics** softkey to access the Diagnostics screen.

Figure 70

Diagnostics screen



Enable Manual Valve softkey

MANUAL OPEN OF CHANNEL

1. Press the **Enable Manual Valve** softkey to run the current selected channel. This allows for manual open and close of valve position.

IMPORTANT: The Enable feature will only operate on the Diagnostics screen.

2. If the **Disable Manual Valve** softkey is displayed, the selected channel has already been enabled for manual valve position operation.
3. Set the Master Switch to the ON position.
4. Press the **Increment** softkey to open the channel's valve. The Channel Pulse Width Modulation (PWM) data item displays the current PWM signal that is being output to the valve.
5. The **Increment** softkey must be pressed repeatedly to increase the PWM signal to the valve. Each press will increase the signal by 2 hertz (hz). The Channel Pulse Count and Channel Frequency Filter values will display the current output of the feedback sensor.
6. Press the **Decrement** softkey to decrease the PWM signal and close the valve. The **Decrement** softkey must be pressed repeatedly to decrease the PWM signal to the valve. Each press will decrease the signal by 2 hertz (hz).

The active channel is displayed in the softkey text.



Increment key



Decrement softkey



Inc/Dec Reset to Target softkey



Seed Count softkey



Start softkey



Next Rows softkey



Stop softkey



Reset Seed Count softkey



Main Work Screen softkey



Accumulators softkey

SEED COUNT SCREEN

The Seed Count screen displays the number of seeds detected by each sensor. Individual seed rows can be assessed and seed counts for those rows may be accumulated. Up to 15 row numbers can display at one time.

Press the **Seed Count** softkey to display the Seed Count screen.

Figure 71

Seed Count Screen

 1, 2, 3...				
1	2	3		
0	0	0	0	
4	5	6		
0	0	0	0	
7	8	9		
0	0	0	0	
10	11	12		
0	0	0	0	
13	14	15		
0	0	0	0	

Operating the Seed Count function:

1. Press the **Start** softkey. Seed count data for each sensor will accumulate when seeds drop through the sensor.
2. Press the **Next Rows** softkey to view additional rows.
3. Press the **Stop** softkey to stop the seed count function.
4. To reset the seed count on all rows, press the **Reset Seed Count** softkey.
5. Press the **Main Work Screen** softkey to exit the Accumulators/Seed Count screen or press the **Accumulators** softkey to return to the Accumulator screen.



Information softkey

INFORMATION SCREEN

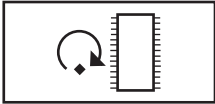
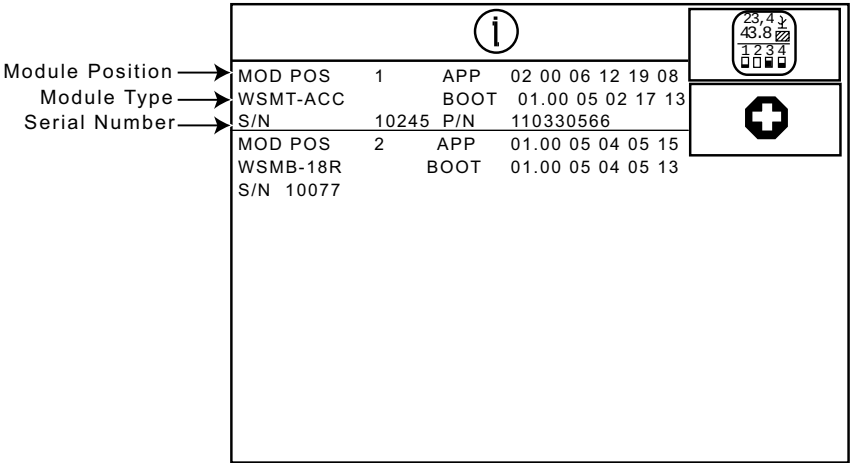
The Information screen displays the software versions of the modules connected to the system and is typically used for troubleshooting. No information on the screen can be edited.

Each module connected is identified by module type, module position, and Serial Number. Module position cannot be altered on this screen and can only be established on the Module Configuration screen.

From the Diagnostics screen, press the **Information** softkey to access the Information screen.

Figure 72

Information Screen



Reset NOVRAM softkey

RESETTING NOVRAM VALUES

NOVRAM refers to the memory location of the Working Set Master (WSMT) module where all configuration and setup data for the system are stored. Resetting the NOVRAM will reset all data to factory default constants.

- 1. Press the **NOVRAM Reset** softkey to access the Novram Reset Confirmation screen.
- 2. Press the **Reset Novram** softkey to reset to factory standard defaults.
- 3. Press the **Diagnostics** softkey to return to the Diagnostics screen.



Diagnostics softkey

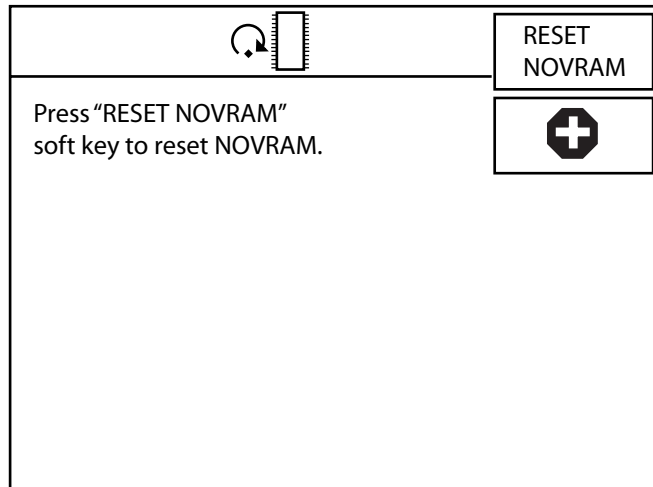


DO NOT press the **NOVRAM Reset** softkey unless you want **ALL** system data settings to be reset to factory standard defaults. It is recommended that **NOVRAM** not be reset unless instructed by **DICKY-john** Technical Support.



Figure 73

Reset Novram Screen



ACKNOWLEDGING ALARM CONDITIONS

Various alarm conditions may be presented to the operator whenever the system encounters an abnormal condition or detects a specific alarm. Alarms are typically in a full screen display describing the alarm and, dependent upon the alarm type, may give the operator instructions on how to fix the alarm. Each alarm type has an associated alarm number, which can be cross-referenced in the TROUBLESHOOTING AND ALARMS section.

Some alarms (such as the Master Switch alarm) require a specific action by the operator before the alarm condition will cease. In these cases, instructions are indicated on the alarm display.

Other alarms can be acknowledged by pressing the **Alarm Cancel** softkey or the ESC key. Detailed information about the alarm can be accessed by pressing the **Alarm Information** softkey.



Alarm Cancel softkey



Alarm Information softkey



Alarm Log softkey

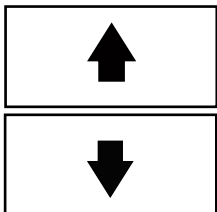
ALARM HISTORY

The Alarm Log screen provides a list of each alarm that has been issued during system operation. Information displayed on the Alarm Log screen is informational only and cannot be edited.

Each time an alarm condition is detected, it is logged and communicated to the WSMT.

To View Alarm History:

1. Press the **Alarm Log** softkey to access the Alarm Log screen.
 - The number of the alarm, along with the alarm description displays.
 - Up to 20 alarms may be recalled.
 - Each alarm occurrence can have up to 5 instances of the alarm tagged with a date and time stamp.



Alarm Up or Down softkeys

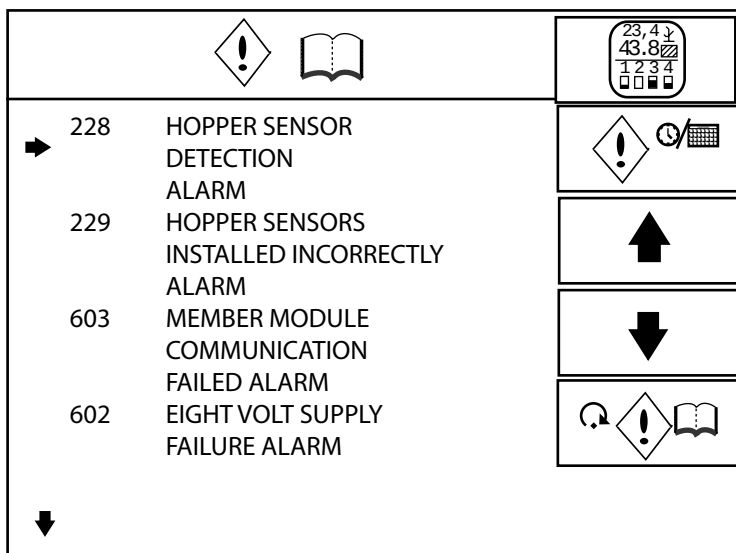


Alarm Log Detail softkey

2. To select specific Alarm details, press the **Alarm Up** or **Alarm Down** softkeys to move the small display arrow next to the desired alarm number.
3. Press the **Alarm Log Detail** softkey to view all of the occurrences of the selected alarm.
 - The down arrow signifies that more alarms are present and accessible by pressing the **Alarm Up** or **Alarm Down** softkeys.

Figure 74

Alarm Log Screen

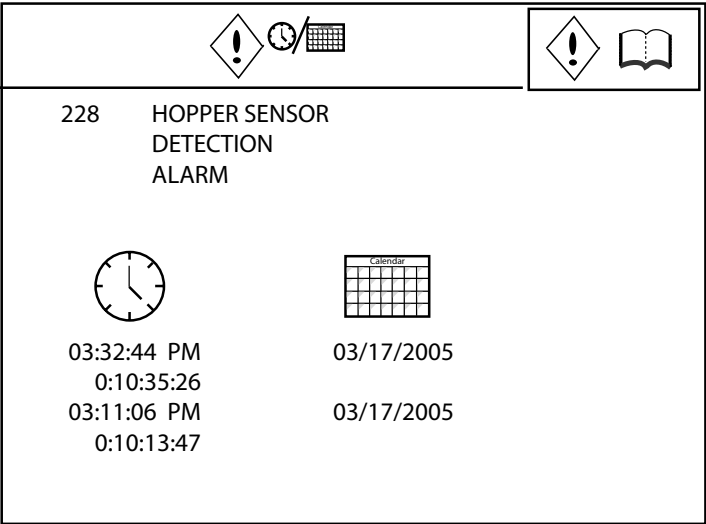


ALARM LOG DETAIL

1. To view specific alarm details, press the **Alarm Log Detail** softkey.
 - The time and date of the selected alarm displays for each occurred instance.
 - The Alarm Log will save up to 5 instances of the selected alarm.



Figure 75
Alarm Log Detail Screen



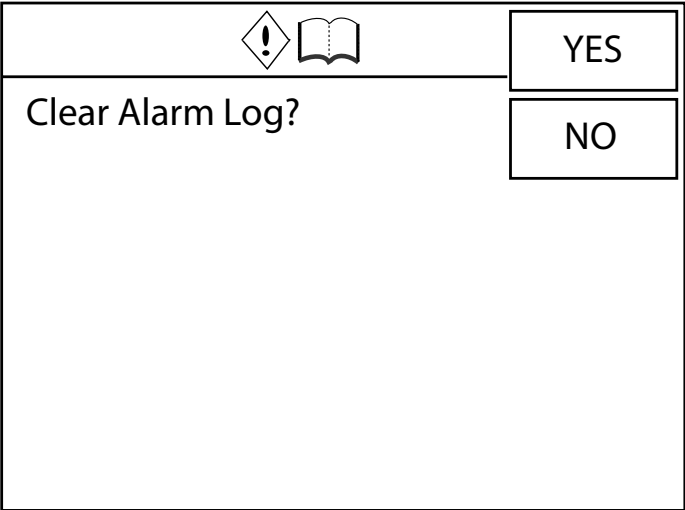
Reset Alarm Log softkey

RESET ALARM LOG

To reset the Alarm Log, press the **Reset Alarm Log** softkey.

- 1. Press **YES** softkey to clear.
- 2. Press **NO** softkey to return to Alarm Log Detail screen.

Figure 76
Reset Alarm Log Screen







Alarm Cancel softkey



Alarm Information softkey

TROUBLESHOOTING & ALARMS

Alarms are indicated on the Virtual Terminal with the following graphic, as well as with a continuous, audible alarm. The audible alarm is terminated by pressing the **Alarm Cancel** softkey or ESC key. In addition, detailed descriptions of the current alarm can be viewed by pressing the **Alarm Information** softkey. Some of the alarm conditions display instructions on correcting the situation.

IntelliAG



Alarms are presented in a full screen display that will describe the alarm and, depending upon the alarm, may give instructions on how to fix the alarm. Each alarm type has an associated alarm number that can be cross-referenced in this section.

Some alarms (for instance a Master Switch alarm) will require a specific action before the alarm condition will cease. In these cases, the instructions to proceed are indicated in the alarm display.

The following table describes the possible alarm conditions, causes, and remedies.



OPERATOR'S MANUAL



ALARM #	ALARM	PROBABLE CAUSE	CORRECTIVE ACTION
1	Software Task Stack Overflow Alarm	1. Internal system software error.	1. Cycle system power OFF/ON. If condition persists, contact DICKEY-john Technical Support (1-800-637-3302) or DICKEY-john Europe (011-33-141-192189).
2	Software System Stack Overflow Alarm	1. Internal system software error.	1. Cycle system power OFF/ON. If condition persists, contact DICKEY-john Technical Support (1-800-637-3302) or DICKEY-john Europe (011-33-141-192189).
3	VT Out of Memory Alarm	THE ECU MEMORY REQUIREMENTS ARE GREATER THAN THE VIRTUAL TERMINAL CAN HANDLE.	1. Remove any unnecessary ECU's 2. Contact DICKEY-john Technical Support (1-800-637-3302) or DICKEY-john Europe (011-33-141-192189) for updated hardware.
200	Master Switch Timeout Alarm	1. Master Switch ON at power up. 2. Master Switch ON after leaving a setup screen. 3. Shorted or damaged tractor harness. 4. Defective Master Switch.	1. Move Master Switch to the OFF position 2. Move Master Switch to the OFF position. 3. Check for damage on the tractor harness at the master Switch connector. 4. Inspect Master Switch for damage or replace.
201	Master Switch Assignment Alarm	1. External Master switch is not assigned to the Auxiliary Input.	1. Assign Master Switch to the Auxiliary Input. Refer to Auxiliary Input/Function Assignment. 2. Decline use of Auxiliary Input Switch.
202	Ground Speed Failure Alarm	ONLY ACTIVE IN PLANTER MONITOR MODE. SEEDS ARE DETECTED WHEN THERE IS NO GROUND SPEED. 1. Incorrect speed source setting or calibration. 2. Defective speed sensor or harness. 3. Defective module or virtual terminal.	1. Verify correct speed source setting and speed calibration on the Ground Speed Calibration screen. 2. Inspect speed sensor/harness for damage or replace speed sensor. 3. Replace module or virtual terminal.
203	Continuous Test Failure Alarm	CONTROL CONDITIONS EXCEED THE DISK RPM LIMITS. 1. Test speed setting is set too high or low. 2. Disk Hi and/or Disk Low settings are incorrect.	1. Enter an appropriate Test Speed. 2. Verify or enter appropriate Disk Hi and/or Disk Low values.
204	5 Revolution Test Failure Alarm	CONTROL CONDITIONS EXCEED THE DISK RPM LIMITS. 1. Test Speed setting is set too high or low. 2. Disk Hi and/or Disk Low settings are incorrect.	1. Enter an appropriate test speed. 2. Verify or enter appropriate Disk Hi and/or Disk Low values.
205	Control Channel Failure Alarm	1. Defective control valve. 2. Defective feedback sensor. 3. Defective module harness or module harness fuse. 4. Defective module.	1. Inspect control valve for damage or replace. 2. Inspect feedback sensor for damage or replace. 3. Inspect module harness for damage. Replace harness fuse. 4. Inspect module for damage or replace.

OPERATOR'S MANUAL



ALARM #	ALARM	PROBABLE CAUSE	CORRECTIVE ACTION
206	Control Channel Unable to Control Alarm	1. Incorrect control channel settings. 2. Incorrect feedback sensor installation. 3. Defective feedback sensor.	1. Verify correct setup constants on the Channel Configuration screen. Perform a valve calibration. 2. Verify correct installation of the feedback sensor. 3. Inspect feedback sensor for damage or replace.
207	Control Channel Unstable Alarm	1. Incorrect control channel settings. 2. Incorrect feedback sensor installation. 3. Defective feedback sensor.	1. Verify correct setup constants on the Channel Configuration screen. Perform a valve calibration. 2. Verify correct installation of the feedback sensor. 3. Inspect feedback sensor for damage or replace.
208	Control Channel Saturation Exceeded Alarm	1. Excessive speed. 2. Incorrect control channel settings. Desired rate too high for implement. 3. Target rate too high	1. Reduce speed. 2. Verify correct setup constants on the Channel Configuration screen. Perform a valve calibration and a spreader constant calibration. 3. Reduce target rate.
209	Control Channel High Limit Exceeded Alarm	CONTROL LIMITED BY HIGH LIMIT. UNDER APPLICATION IS OCCURRING. NOTE: System will not run faster than High Limit Value.	1. Check and/or reduce speed. 2. Verify Control Channel setup (high RPM) 3. Perform new valve calibration. 4. Check and/or reduce target rate. 5. Inspect feedback sensor for damage. 6. Inspect control valve for damage. 7. Inspect harness/module for damage. 8. Decrease target rate.
210	Control Channel Low Limit Exceeded Alarm	CONTROL RATE LIMITED BY LOW LIMIT. OVER APPLICATION IS OCCURRING.	1. Increase speed. 2. Verify correct setup constants (low RPM) 3. Perform valve calibration 4. Increase target rate.
211	All Rows Failed Alarm	1. Seed meter drive malfunction. 2. Rows are not assigned to channel and channels are turned off.	1. Check seeding drive(s). 2. Assign rows to channel.
212	Row Failure Alarm	SEED RATE HAS FALLEN BELOW THE ROW FAIL RATE SETTING ON THE SEED MONITOR SETUP SCREEN. 1. Seed meter malfunction. 2. Dirty or defective seed sensor. 3. Damaged planter harness. 4. Defective module harness or module 5. Out of seed	1. Verify proper planter operation. 2. Inspect seed sensor for dirt or damage. Replace if necessary. 3. Inspect planter harness for damage. Repair or replace. 4. Inspect harness and module for damage. Replace if necessary. 5. Fill with seed
213	High Population Limit Exceeded Alarm	SEED RATE HAS EXCEEDED THE HIGH ALARM SETTING ON THE SEED MONITOR SETUP SCREEN. 1. Seed meter malfunction or incorrect setup. 2. Defective seed sensor. 3. Defective module.	1. Verify proper planter options/setup. 2. Inspect seed sensor for damage. Replace if necessary. 3. Inspect module for damage. Replace if necessary.



ALARM #	ALARM	PROBABLE CAUSE	CORRECTIVE ACTION
214	Low Population Limit Exceeded Alarm	SEED RATE HAS DROPPED BELOW THE LOW ALARM SETTING ON THE SEED MONITOR SETUP SCREEN. 1. Seed meter malfunction or incorrect setup. 2. Defective seed sensor. 3. Defective module. 4. Running out of seed.	1. Verify proper planter operation/setup. 2. Inspect seed sensor for damage. Replace if necessary. 3. Inspect module for damage. Replace if necessary. 4. Fill with seed.
215	High Pressure Limit Exceeded Alarm	SENSED PRESSURE EXCEEDS THE HIGH ALARM SETTING ON THE PRESSURE SETUP SCREEN. 1. Implement malfunction or incorrect setup. 2. Defective pressure sensor. 3. Defective module.	1. Verify proper implement operation/setup. 2. Inspect pressure sensor for damage. Replace if necessary. 3. Inspect module for damage. Replace if necessary.
216	Low Pressure Limit Exceeded Alarm	SENSED PRESSURE BELOW THE LOW ALARM SETTING ON THE PRESSURE SETUP SCREEN. 1. Implement malfunction or incorrect setup. 2. Defective pressure sensor. 3. Defective module harness or module.	1. Verify proper implement operation/setup. 2. Inspect pressure sensor for damage. Replace if necessary. 3. Inspect module and/or module harness for damage. Replace if necessary.
217	Member module Detection Alarm	NUMBER OF MEMBER MODULES DOES NOT MATCH THE SYSTEM CONFIGURATION. 1. Too few modules connect to system. 2. Too many modules connected to system. 3. Defective CAN/module harness. 4. Blown module harness fuse. 5. Defective module. 6. New module has been added to system.	1. Verify correct module configuration setup on the Module Configuration screen. 2. Verify correct module configuration setup on the Module Configuration screen. 3. Identify missing module in the Module Configuration list. Inspect CAN/module harness of the missing module for damage. Repair or replace harness. 4. Inspect module harness fuse of the identified module. Replace if necessary. 5. Identify missing module in the Module Configuration list. Inspect missing module for damage or replace. 6. Verify correct module configuration setup on the Module Configuration screen.
218	Pressure Sensor Detection Alarm	NUMBER OF PRESSURE SENSORS CONNECTED DOES NOT AGREE WITH THE NUMBER OF SENSORS CONFIGURED ON THE PRESSURE SENSOR CONFIGURATION SCREEN. 1. Defective Sensor. 2. Defective module or damaged module harness. 3. Additional pressure sensor detected.	1. Inspect pressure sensor for damage or replace. 2. Inspect module and/or module harness for damage. Replace if necessary. 3. Verify correct# ACC setting for each module.



ALARM #	ALARM	PROBABLE CAUSE	CORRECTIVE ACTION
219	Row Sensor Detection Alarm	NUMBER OF SEED SENSOR CONNECTED DOES NOT AGREE WITH THE NUMBER OF SENSORS CONFIGURED ON THE SEED SENSOR CONFIGURATION SCREEN. 1. Defective seed sensor. 2. Defective module or damaged module harness. 3. Additional seed sensor detected.	1. Inspect seed sensor for damage or replace. 2. Inspect module and/or module harness for damage. Replace if necessary. 3. Verify correct # ROWS setting for each module.
220	Row Sensors Installed Incorrectly Alarm	ROWS ARE NOT DETECTED SEQUENTIALLY ON A MODULE. 1. Incorrect seed row connections. 2. Defective seed sensor. 3. Defective module or damaged module harness.	1. Verify seed sensors are connected sequentially on all modules as instructed in installation. 2. Inspect seed sensor for damage or replace. 3. Inspect module and/or module harness for damage. Replace if necessary.
221	Control Channel Invalid State Alarm	1. Internal system software error.	1. Cycle system power Off/On. If condition persists, contact DICKEY-john Technical Support (1-800-637-3302) or DICKEY-john Europe (011-22-141-192189).
222	Control Channel Setup Height Error Alarm	1. Implement hydraulic system malfunction. 2. Defective control valve. 3. Incorrect feedback sensor installation. 4. Defective feedback sensor. 5. Limit Max Output set too low.	1. Verify implement hydraulic system operation. 2. Inspect control valve for damage. Replace if necessary. 3. Verify correct installation of the feedback sensor. 4. Inspect feedback sensor for damage or replace. 5. Set Limit Max Output to a higher PWM% on the Valve Calibration screen. Perform a new valve calibration.
223	Control Channel Max Feedback Unreachable Alarm	1. Limit Max Output set too low. 2. Incorrect feedback sensor installation. 3. Defective feedback sensor.	1. Set Limit Max Output to a higher level on the Valve Calibration screen. Perform a new valve calibration. 2. Verify correct installation of the feedback sensor. 3. Inspect feedback sensor for damage or replace.
224	No Control Channel Gain Steps Calculated Alarm	1. Implement hydraulic system malfunction. 2. Defective control valve. 3. Incorrect feedback sensor installation. 4. Defective feedback sensor.	1. Verify implement hydraulic system operation. 2. Inspect control valve for damage. Replace if necessary. 3. Verify correct installation of the feedback sensor. 4. Inspect feedback sensor for damage or replace.
225	Hopper Sensor Low Alarm	1. Incorrect logic level setting on the Hopper Setup screen. 2. Dirty or defective hopper sensor. 3. Defective module harness or module 4. Hopper empty	1. Verify correct logic level setting on the Hopper Setup screen. 2. Clean/inspect hopper sensor. Replace if necessary. 3. Inspect harness and module for damage. Replace if necessary. 4. Fill hopper.



ALARM #	ALARM	PROBABLE CAUSE	CORRECTIVE ACTION
226	RPM Sensor High Limit Exceeded Alarm	SENSED RPM EXCEEDS THE HIGH ALARM SETTING ON THE RPM SETUP SCREEN. 1. Implement malfunction or incorrect setup. 2. Defective RPM sensor. 3. Defective module.	1. Verify proper implement operation/setup. 2. Inspect RPM sensor for damage. Replace if necessary. 3. Inspect module for damage. Replace if necessary.
227	RPM Sensor Low Limit Exceeded Alarm	SENSED RPM BELOW THE LOW ALARM SETTING ON THE RPM SETUP SCREEN. 1. Implement malfunction or incorrect setup. 2. Defective RPM sensor. 3. Defective module harness or module.	1. Verify proper implement operation/setup. 2. Inspect RPM sensor for damage. Replace if necessary. 3. Inspect module for damage. Replace if necessary.
228	Hopper Sensor Detection Alarm	NUMBER OF HOPPER SENSORS CONNECTED DOES NOT AGREE WITH THE NUMBER OF SENSORS CONFIGURED ON THE HOPPER SENSOR CONFIGURATION SCREEN. 1. Defective hopper sensor. 2. Defective module or damaged module harness. 3. Additional hopper sensors detected.	1. Inspect hopper sensor for damage or replace. 2. Inspect module and/or module harness for damage. Replace if necessary. 3. Verify correct # HOPP setting for each module.
229	Hopper Sensors Installed Incorrectly Alarm	HOPPER SENSORS ARE NOT INSTALLED SEQUENTIALLY ON A MODULE. 1. Incorrect hopper sensor connections. 2. Defective hopper sensor. 3. Defective module or damaged module harness.	1. Verify hopper sensors are connected sequentially on all modules as instructed in INSTALLATION. 2. Inspect hopper sensor for damage or replace. 3. Inspect module and/or module harness for damage. Replace if necessary.
230	Pressure Sensors Installed Incorrectly Alarm	PRESSURE SENSORS ARE NOT INSTALLED SEQUENTIALLY ON A MODULE. 1. Incorrect pressure sensor connections. 2. Defective pressure sensor. 3. Defective module or damaged module harness.	1. Verify pressure sensors are connected sequentially on all modules as instructed in INSTALLATION. 2. Inspect pressure sensor for damage or replace. 3. Inspect module and/or module harness for damage. Replace if necessary.

OPERATOR'S MANUAL



ALARM #	ALARM	PROBABLE CAUSE	CORRECTIVE ACTION
232	RPM Sensor Low Limit Exceeded With Control Channel Shutdown Alarm	RPM HAS DROPPED BELOW THE DISABLE CONTROL ON LOW ALARM SETTING ON THE ACCESSORY SETUP SCREEN. 1. Defective RPM sensor. 2. Damaged module harness. 3. Defective module. 4. Low RPM	1. Inspect RPM sensor for damage. Replace if necessary. 2. Inspect module harness for damage. Repair or replace. 3. Inspect module for damage. Replace if necessary. 4. Increase RPM.
233	Control Channel Activation Alarm	CHANNEL DELAY OR PRECHARGE IS ENABLED. DURING THIS THE CONTROL WILL RUN WITHOUT GROUND SPEED OR WITHOUT THE IMPLEMENT DOWN.	1. Acknowledge alarm to activate control channels. 2. Acknowledge alarm and disable Delay or Precharge to stop control.
234	Control Channel Precharge Activation Timeout Alarm	CONTROL CHANNEL PRECHARGE TIME HAS EXPIRED WHILE THE SYSTEM IS STATIONARY. CONTROL CHANNEL HAS STOPPED. 1. Ground speed is at zero. 2. Ground speed is less than Precharge Speed after precharge time is expired.	1. Acknowledge alarm and increase ground speed.
235	New Member Module Detected Alarm	1. New member module has been found.	1. Assign sensors to the new module at the Module Configuration Setup screen and its position.
236	Intermittent Member Module Detected Alarm	1. A member module that had previously failed communication has come online.	1. Inspect harness connections to this module.
237	Product Level Low Alarm	1. Calculated product level has dropped below alarm level.	1. Fill product bin and reset level
240	Seeding Detected on a Control Off Row Alarm	1. Control Channel turned off and seed continues to be detected.	1. Check seed dispensing unit for proper shut off.
241	Control Not Active With Implement Lowered and Speed	1. Control will not operate while on a setup screen.	1. Navigate to the Work Screen to activate the control. 2. Raise implement and stop forward speed to clear alarm.
246	Master Switch Softkey Press Alarm	Warning of action associated with keypress	1. Press Control Start key to activate control.
602	8 Volt Supply Failure Alarm	8V SUPPLY VOLTAGE IS BELOW 7.2V OR HIGHER THAN 16V. 1. Damaged module harness. 2. Defective seed or hopper sensor. 3. Defective module.	1. Inspect module harness for damage. Repair or replace harness. 2. Inspect seed or hopper sensors connected to the identified module for damage. Replace sensors if necessary. 3. Replace identified module.



ALARM #	ALARM	PROBABLE CAUSE	CORRECTIVE ACTION
603	Member Module Communication Failed Alarm	COMMUNICATION WITH AN ACTIVE MODULE HAS FAILED 1. Damaged CAN or module harness. 2. Blown module harness fuse. 3. Defective module.	1. Identify missing module in the Module Configuration list. Inspect CAN/module harness of the missing module for damage. Repair or replace harness. 2. Inspect module harness fuse, replace if necessary. 3. Identify missing module in the Module Configuration list. Inspect missing module for damage or replace.
604	ECU Voltage Out of Range Alarm	ECU VOLTAGE IS BELOW 11V OR HIGHER THAN 16V. 1. Damaged CAN or module harness. 2. Defective module	1. Inspect CAN/module harness of the identified module for damage. 2. Inspect identified module for damage or replace.
605	Solenoid Voltage Out of Range Alarm	SOLENOID VOLTAGE IS BELOW 11V OR HIGHER THAN 16V. 1. Damaged CAN or module harness. 2. Blown module harness fuse. 3. Defective module.	1. Inspect CAN/module harness of the identified module for damage. Repair or replace harness. 2. Inspect module harness fuse or replace. 3. Inspect identified module for damage or replace.
606	Ground Offset Voltage Out of Range Alarm	1. Damaged/shorted Actuator Harness. 2. Defective PWM valve driver or Servo valve driver. 3. Defective module.	1. Inspect Actuator Harness for damage around the WPM and Servo valve connections. Repair or replace harness. 2. Inspect PWM or Servo valve drivers for damage and replace if necessary. 3. Inspect identified module for damage and replace if necessary.





APPENDIX

SYSTEM CONFIGURATION WORKSHEET - MODULE SETUP

Module Type	Module Address	# of Rows	Row #	# of Hoppers	Hopper #	# of RPM	RPM #
Hopper Configuration		RPM Configuration		Pressure Configuration			
		High Alarm		High Alarm			
		Low Alarm		Low Alarm			
		High Alarm Delay		High Alarm Delay			
		Low Alarm Delay		Low Alarm Delay			
		RPM Constant		Pressure Filter			
		RPM Filter					
		Disable Control Low Alarm					
Channel Configuration	1	2	3	4			
Type							
Material Name							
Control Mode							
Drive Type							
Drive Frequency							
Input Filter							
Gear Ratio							
Sensor Constant							
# Seed Rows							
Channel Width							
PreCharge Time							
Delay Time							
Flush Enable							
K Factor							
Valve Lock							
Seed Monitor Configuration		Row Configuration		Ground Speed Configuration			
		Row Width		Source			
High Alarm		Auto Update Width		Ground Speed Constant			
Low Alarm		Imp Width		Shutoff Speed			
Population Adjust		On/Off Pattern		Minimum Override			
Population Filter		Pop/Block Pattern		Alarm Delay			
Row Fail Rate				PreCharge Ground Speed			
				Flush Ground Speed			

OPERATOR'S MANUAL



SYSTEM CONFIGURATION WORKSHEET - MATERIAL SETUP (INC/DEC)

Material Setup	1	2	3	4	5	6	7	8
Type								
Target Rate								
Max Rate								
Min Rate								
Inc/Dec %								
Seeds Per Rev								
Disc Low Limit								
Disc High Limit								
High Population Alarm								
Low Population Alarm								
Density								
Spreader Constant								
Seeds Per Pound								
Low Shaft RPM								
High Shaft RPM								
High Pop Alarm								
Low Pop Alarm								
Prod Level Alarm								

Material Setup	9	10	11	12	13	14	15	16
Type								
Target Rate								
Max Rate								
Min Rate								
Inc/Dec %								
Seeds Per Rev								
Disc Low Limit								
Disc High Limit								
High Population Alarm								
Low Population Alarm								
Density								
Spreader Constant								
Seeds Per Pound								
Low Shaft RPM								
High Shaft RPM								
High Pop Alarm								
Low Pop Alarm								
Prod Level Alarm								



SYSTEM CONFIGURATION WORKSHEET - MATERIAL SETUP (PRESET)

Material Setup	1	2	3	4	5
Type					
Units					
Target Rate					
Density					
Total # of Towers					
Calibration Constant					
Seeds Per Pound					
Low Shaft RPM/Limit					
High Shaft RPM/Limit					
High Pop Alarm					
Low Pop Alarm					
Prod Level Alarm					

Material Setup	6	7	8	9	10
Type					
Units					
Target Rate					
Density					
Total # of Towers					
Calibration Constant					
Seeds Per Pound					
Low Shaft RPM/Limit					
High Shaft RPM/Limit					
High Pop Alarm					
Low Pop Alarm					
Prod Level Alarm					



WORK SCREEN WORKSHEET

Work Screen 1

Large Bargraphs	

Work Screen 2

Work Screen 3

Dealers have the responsibility of calling to the attention of their customers the following warranty prior to acceptance of an order from their customer for any DICKEY-john product.

DICKEY-john® WARRANTY

DICKEY-john warrants to the original purchaser for use that, if any part of the product proves to be defective in material or workmanship within one year from date of original installation, and is returned to DICKEY-john within 30 days after such defect is discovered, DICKEY-john will (at our option) either replace or repair said part. This warranty does not apply to damage resulting from misuse, neglect, accident, or improper installation or maintenance. Said part will not be considered defective if it substantially fulfills the performance expectations. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, AND OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. DICKEY-john neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said part and will not be liable for consequential damages. Purchaser accepts these terms and warranty limitations unless the product is returned within fifteen days for full refund of purchase price.

**For DICKEY-john Service Department, call
1-800-637-3302 in either the U.S.A. or Canada**



Headquarters:

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