

20 | 20

**Operator's Guide — Air Seeders
For Gen3 20|20 Displays**

Precision Planting®

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20|20 Monitor Overview



The Precision Planting 20|20 display is a high-definition, easy-to-use monitoring and control system for planting, seeding, harvesting, and liquid application. Its high definition mapping features and metrics on single and dual displays allow you to see exactly what is going on in your fields. Navigate the easy-to-use touch screen for implement and system setup, health checks, diagnostics, and other helpful information. The 20|20 display provides complete monitoring, control, and diagnostics for all of Precision Planting's SRM-based control products for seed and liquid application, down force control, and in-field sensing in addition to basic planter and combine monitoring.

The 20|20 has complete control, monitoring, and diagnostics for: vDrive, DeltaForce, SpeedTube, SmartFirmer, vDrive Insecticide, vApplyHD, FlowSense, vSet Select, mSet, SeederForce, Smart Connector, and YieldSense.

Software Updates

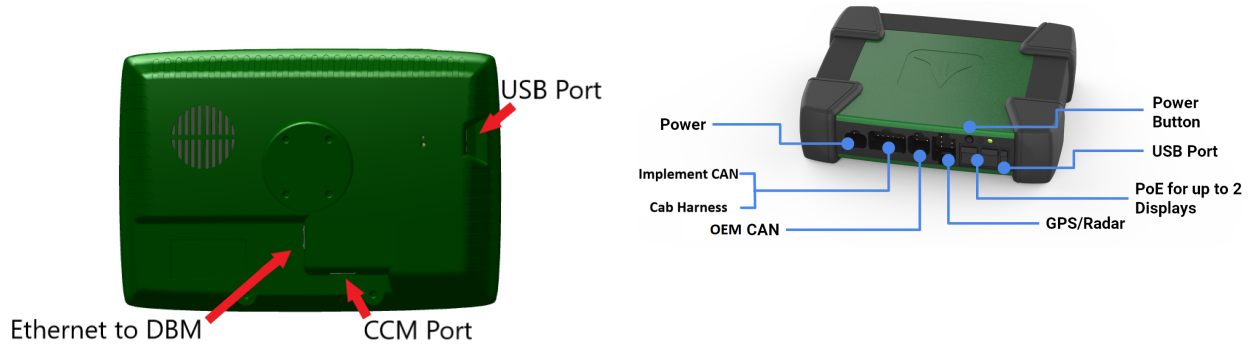
Precision Planting will continue to update and improve the 20|20. Software updates are free of charge and can be downloaded from www.2020.ag and installed on the display with a USB drive.

20|20 Hardware Overview

Either one or two displays can be connected to the Display Base Module at any time. One of these two displays can be an iPad running the Climate Corporation FieldView Cab app. Displays can be mounted in any location within the cab.



Display Base Module [DBM]



The Power over Ethernet [PoE] ports requires a Shielded Twisted Pair [STP] Ethernet Cable to connect to a display. If only one display is being used, use either port. Both ports will be used if connecting to two displays or one display and a FieldView Module [FVM]. The order by which two displays or a single display and FVM are plugged in does not matter.

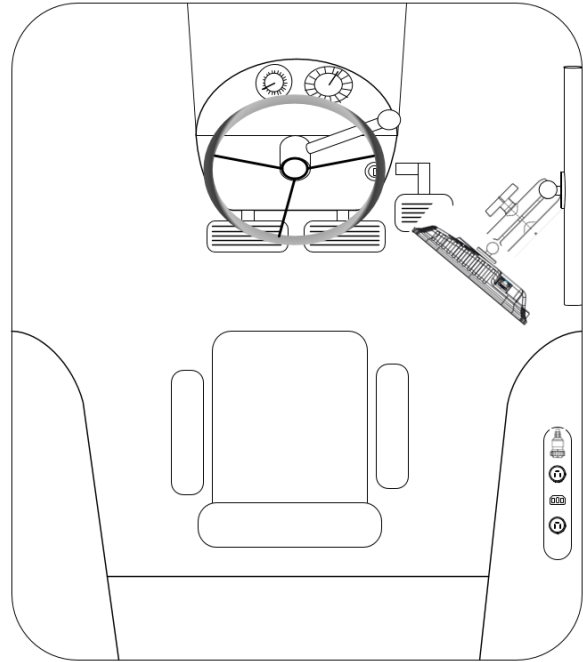
Indicator Light Overview

Color	Display Base Module	Display	FieldView Module
Green	Good Connectivity	Good Connectivity	Good Connectivity
White	Initializing	N/A	Downloading Software
Blinking White	Firmware Update in Process	N/A	N/A
Yellow	No Connection between Display and DBM	Initializing	Initializing
Blinking Yellow	Software Update in Process	Software Update in Process	Software Update In Progress
Blue	CCM Connectivity is Missing	N/A	Nothing Connected
Purple	Need to Power Cycle System	N/A	FieldView Not Connected
Red	N/A	Powering On	Powering Up
Blinking Red	Failure - Call Precision Support	N/A	N/A

Cab Installation

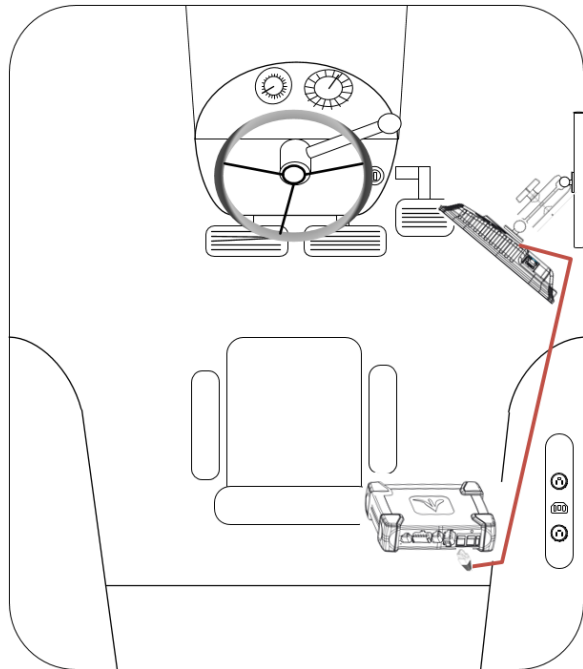
Step 1:

Mounting locations will vary from tractor to tractor. Mount the display or both displays for optimal visibility and interaction for the operator. There are several mounting options offered by Precision Planting available for the display. The diagram depicts the display with a RAM mount.



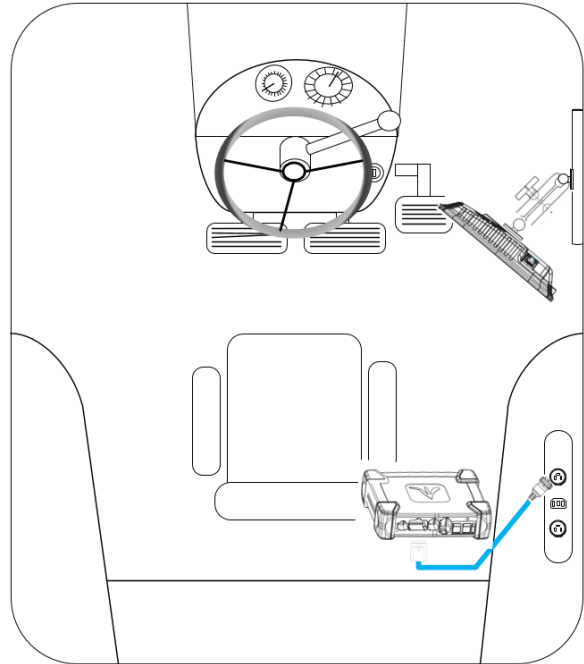
Step 2:

The Display Base Module [DBM] can be located in any convenient area of the cab. Ensure the DBM will not move around when operating the tractor. Plug one end of the provided Ethernet cord into either port on the front of the DBM and the other end into the back of the display. If using two displays connect the second display with the provided Ethernet cable to the other open port on the DBM.



Step 3:

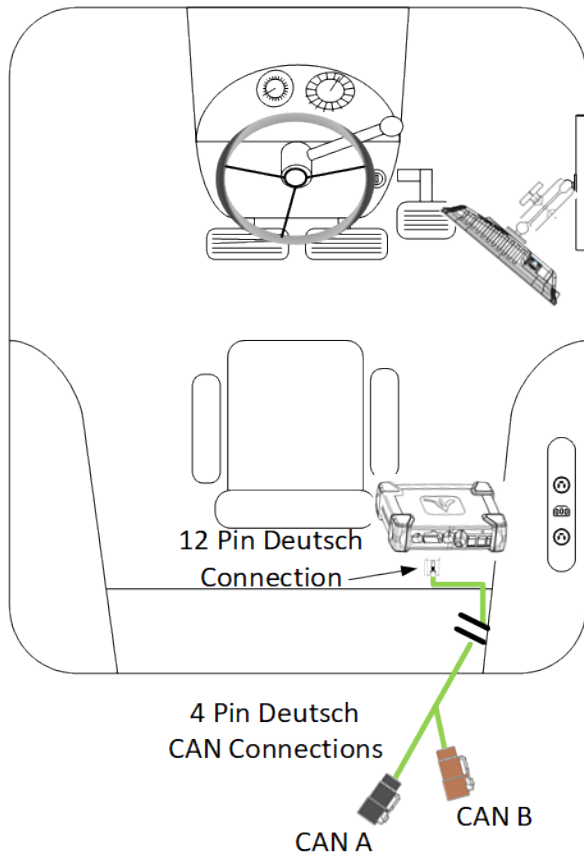
Connect the 725150 Power Harness to the DBM into the 4-pin Deutsch Connector on the DBM and then to the power source in the tractor cab. A three pin round convenience port connector is provided to plug directly into a standard convenience port. Various adapters are available to connect to different types of power ports.



Step 4:

Connect an Implement CAN Harness into the 12-pin Deutsch Connector on the DBM. Route the remaining length of the cable through the cab harness port in the back window. There will be two CAN connections on the harness, CAN A (black connector) and CAN B (brown connector). If a PDM is installed, CAN A must be used and routed to the PDM. If no PDM is installed, (i. e. Smart Connector only system) then CAN B must be used.

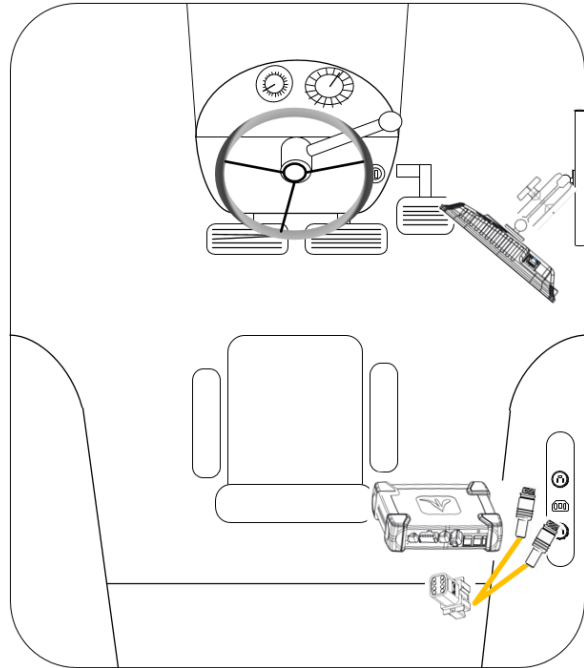
Note: The 725935 Sensor CAN harness will only have a CAN B connection present.



Step 5:

Connect the 725155 Speed Harness to the 8-pin Deutsch connector on the DBM. This will provide you with two 4-pin round connections. The male pin connector will connect to the GPS adapter, while the female pin connector will connect to the Radar adapter.

Note: If this system is being used for Sensing only with a 725939 5Hz GPS Hockey Puck, the 725155 adapter is not necessary. The 725939 harness will plug directly into the 8-pin Deutsch connector on the DBM.



Powering the 20|20 On and Off

The monitor must have 12 volts of both switched and constant power. With the power harness connected to the DBM and power supply, turn the key on the tractor to the On or Run position. Switch the power button on the DBM to the On position.

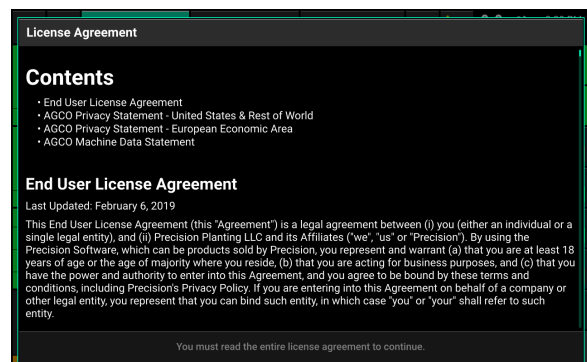
To power the system off, either switch the power button on the DBM to the Off position or key the tractor/combine off.

User License Agreement

Once the 20|20 has booted up, read and agree to the User License Agreement to use the display. This will occur on first boot up and when updates are required for the agreement.

Note: If this system is being set up for a third party, the agreement should be reset to appear on next power up for the end user to agree to the document. This can be done under Advanced Display settings. Refer to the Display section of this manual for more details.

Note: This will only appear on 2019.1 and newer software.



Cab Control Module [CCM]

The CCM is installed below the display. If two displays are being utilized only one CCM should be installed (it does not matter which display it is connected to). All planter control products being run through the 20|20 require a CCM to be installed as it has a Master Plant switch and swath control features.

The CCM configuration must be set to Present on the 20|20 display on the User Preference screen (Setup>Settings>User Preferences).



The switch on the left hand side is the Master Plant switch. For all control products to function the Master Plant switch must be in the up position. If it is in the down position, all control products will immediately be disabled.

The three switches in the middle are swath section switches. Toggle these to the down position to swath off a rate section. If all rows are assigned to the same rate section the planter will be divided into the three parts with each toggle switch controlling swath for one third of the planter. If these switches are in the down position, the rows assigned to the switch will be shut off.

Assign rows to rate sections in the vDrive/vSet Select setup screens.

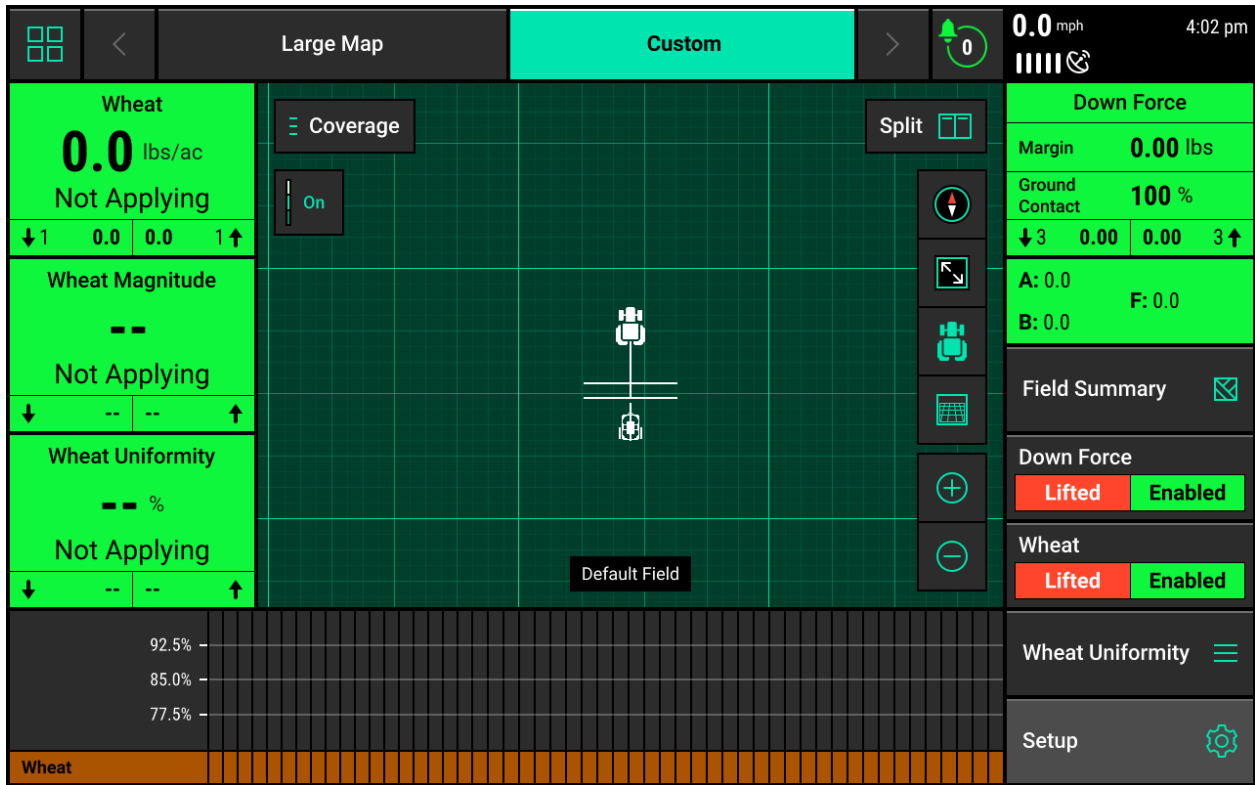
The outside two switches in the middle are also used to auto load the meters. Raise these two switches up together for one second to load the meters. Meters will spin and dispense some seed as seed is loaded to the disk. This allows seed to immediately be dispensed from the meter when beginning to plant.

To continue to spin the meters, lift and hold these two switches. Meters will continue to spin as long as they are held up.

The switch on the right side is the Master Swath switch. If this switch is in the down position, all rows will immediately be swathed off.

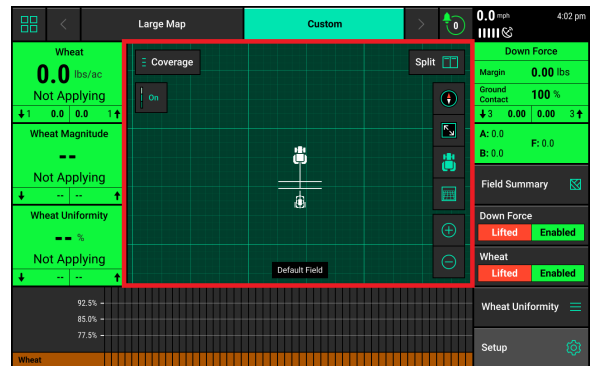
Home Screen Overview

The Home Screen displays seeding information in an easy to read, easy to navigate format. This information is presented as both metrics and high definition maps. There are three different home screen configurations that can be quickly selected to change the layout of the home screen. All three screens can be customized with different types of measurements, button sizes, map sizes, control buttons, and minichart. When upgrading from 2019.1.4 software, the only default screen setup will be the Large Map.



Maps

The 20|20 displays high definition maps while operating. Different map types can be selected and viewed during the planting process.

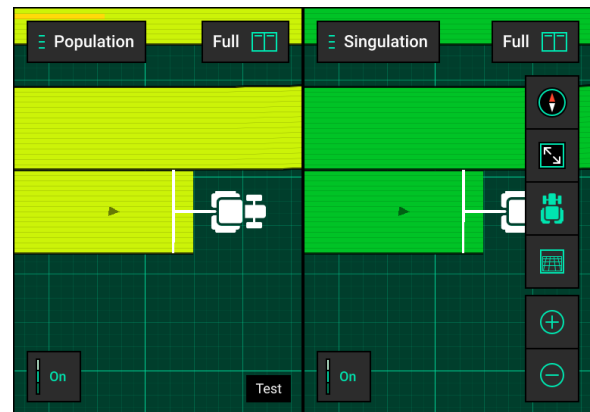


☰ Coverage

Selecting the Map Type name (e.g. Coverage) at the top of the map will display the Map Layer Selection screen. All map types are listed on this page (the systems installed and configured will determine which map types will build a map). Map types are categorized by General, Air Seeder, and Seed. For more information on what each map type is mapping see Appendix B.

Controlling the Map

The map will default to displaying the tractor/ seeder in the center of the screen at a preset zoom level. There are control buttons located around the map to adjust settings.



Split

To split the map viewing area into two maps at the same time press “Split” in the top right hand corner of the map screen. When viewing two maps simultaneous, any adjustments done to one map (other than adjusting the legend) are also applied to the other map. For example, zooming in on one map will apply the same zoom to the other map.

Full

To exit the split map view, press “Full” on either map type to view only that map.



Change the map orientation by pressing the compass button. Switch between two orientation modes:

- North Facing – The top of the map is always pointed towards north. The tractor icon will move around the screen in different directions. This is the default orientation mode. Indicated by the red compass arrow always pointing towards the top of the screen.
- Implement Facing – The implement icon is always pointed towards the top of the screen and the map itself moves around the implement. This is indicated by the red compass arrow moving to always show which direction north is.

- A third way to change the map orientation is to place two fingers on the map and rotate the map. Rotating the map in this style will lock the map into the orientation that it was rotated to. To switch back to North Facing press the compass button. Press it a second time to switch to Implement Facing.



Zooms to a view where the entire field is displayed.



Pressing this button will cause the tractor/planter icon to stay centered in the screen. Additionally, the zoom level will be reset and zoomed in on the tractor icon.



The Perspective View button will toggle the map view angle from 0, 65, and 75 degrees.

Note: The Perspective View button can only be used once WiFi and background imagery have been enabled. Refer to the Connectivity and Display sections of this manual for further details.



There are two ways to adjust the zoom level of the map.

1. Use the Zoom In (+) and Out (-) buttons to change the zoom level of the map.
2. Use the standard two finger pinch-in & pinch-out gestures.



Legends for each map can be toggled on by pressing the “On” button in the lower left hand corner of the map screen.



Toggle Legends off by pressing the “Off” button.

Most legends can be edited. There are two ways to edit legends:

1. Hold a finger on the legend and slide it up and down to adjust the high and low ends of the legend.
2. Tap on the legend to adjust the High & Low values, number of steps, and use the auto adjust feature.

Note: If a small map has been added to the home screen, none of the control buttons as described above will be available.

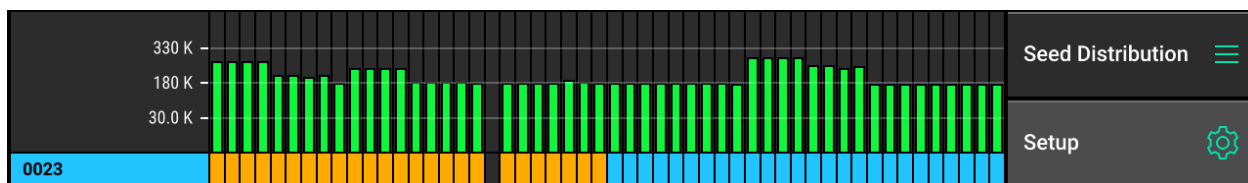
General Mapping Principles

- All maps except for SRI (2 Hz) are mapped at 5Hz, meaning there are 5 data points mapped for each second of time.
- Maps are mapped on a row by row basis.
- A dark line will be mapped on either side of the planter to distinguish planter passes.
- If the planter appears to be mapping incorrectly, ensure that the planter setup is correct.
- Rows that are inactive or are not collecting information on a row (for example, a row does not have load cell installed) will not map.
- Map types can be changed at any time by selecting a different type.
- Some map types require specific Precision Planting products to be installed on the planter to generate the information necessary to create a map.
- If the map has moved away from the tractor/seeder location, a white arrow will appear on the edge of the map pointing to the direction the tractor/seeder is in.

Dashboard Mini Chart

The DashBoard Mini Chart is located at the bottom of the Standard and Metric Home Screens by default. The Mini Chart shows a bar chart for one of the measurements of the 20|20 for each row. Rows that exceed alarm values will turn yellow while rows that exceed alert values will turn red. Alarm and Alert values can be set in the Alerts menu as described in the Alerts Menu section below.

Below the bar chart, the active hybrids are displayed. If multiple hybrids are active, the hybrid name and associated color will alternate among the active hybrids every five seconds. Any row marked in yellow instead of a hybrid color indicates a row that is currently Swathed Off.

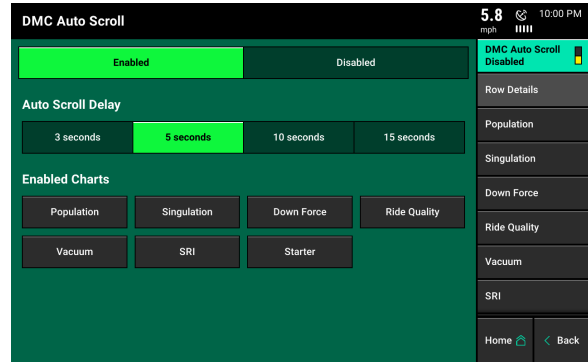


The metric type being displayed on the Mini Chart is located over the “Setup” button. To change the type of metric, select “Magnitude” (or the metric type displayed) above the Setup button. The same screen can also be accessed by selecting any of the metric boxes on the home screen or touching directly on the DashBoard Mini Chart itself.

On the selection page a larger Row by Row chart will be displayed. On the Navigation Pane on the right hand side of the screen, select a different metric type to be displayed. Additional metrics are available if you use a finger to scroll the Navigation Pane downward. Once a different metric has been selected, press “Home” to go back to the home page. The Mini Chart will now display the new metric.

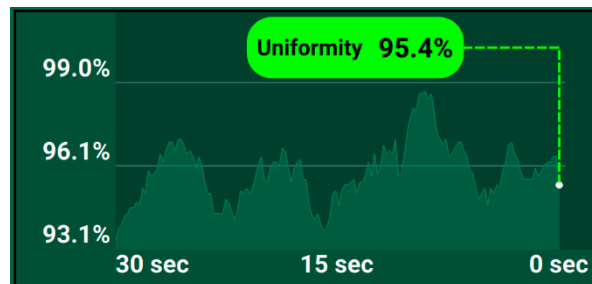
Additionally, the Mini Chart can be set to auto scroll through different metrics. On the selection page at the top of the Navigation Pane select the “DMC Auto Scroll” button.

When Auto Scroll is “Enabled”, select the speed at which the Mini Chart will scroll through different metrics. Finally, select the metrics/ charts that will be displayed on the home screen via the Auto Scroll.



Individual Row Details

Detailed information for each Air Seeder row can also be viewed. Access the Row Details screen by either selecting a metric box on the home screen, touching the Dashboard Mini Chart, or selecting the metric type that is being displayed on the mini chart. Select “Air Seeder Row Details” on the right side of the screen. Row Details shows available metrics displayed in a graph over the past 30 seconds of time. See example below.

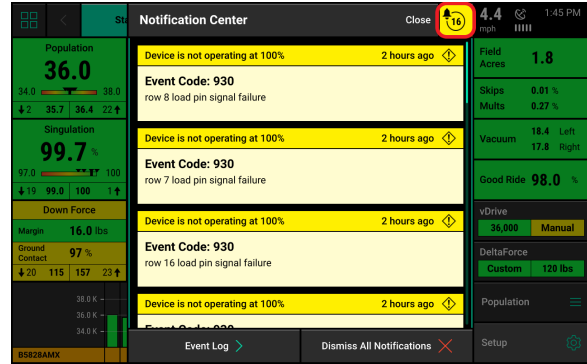


The buttons showing row numbers at the bottom of the screen allow the operator to navigate to other rows.

Notification Center



The Notification Center is designed to alert the operator of issues. The Notification Center button on the home page will give a number indicating the number of Event Codes that have taken place since the last reset. Press the button to display all event codes and a description of the issue.



Select an event code to view additional details about the event code and recommendations for fixing the issue.

Press “Dismiss All Notifications” to clear out all event codes in the Notification Center. Events will still be stored in the Event Log.

The “Event Log” button will display a list of all notifications from the entire system with the newest at the top. This list is permanent so that event codes can be referenced when needed. Select individual event codes to view additional details and recommendations for fixing the issue.

Event #	Start	End	Description	Product
902	November 21, 5:08:33 PM	November 21, 5:08:33 PM	Unexpected reset of SRM on row 16	SRM
902	November 21, 5:08:33 PM	November 21, 5:08:33 PM	Unexpected reset of SRM on row 7	SRM
902	November 21, 5:08:33 PM	November 21, 5:08:33 PM	Unexpected reset of SRM on row 4	SRM
902	November 21, 5:08:33 PM	November 21, 5:08:33 PM	Unexpected reset of SRM on row 5	SRM
1069	November 21, 5:39:30 PM	November 21, 5:39:30 PM	vDrive Voltage Current Health Check with no vacuum or seeds: Failed	vDrive
1071	November 21, 5:41:14 PM	November 21, 5:41:14 PM	vDrive Voltage Current Health Check with vacuum and seeds: Passed	vDrive
1007	December 31, 11:59:59 PM	November 21, 7:58:00 PM	No Acceleration Detected	vDrive
931	November 21, 7:59:39 PM	November 21, 7:59:39 PM	Row 2 load pin signal failure	SRM
931	November 21, 9:50:00 PM	November 21, 9:50:00 PM	Row 6 load pin signal failure	SRM

Summary Information

Summary information for the active field can be found by pressing any of the different acre counters on the home screen or the Field Summary button under Field Setup (Setup — Fields). When an acre counter is selected, the “Counter Details” page will be selected. On this page summary information will be provided for acres and seeds planted. Additionally, Liquids and Insecticides will be displayed with the number of acres planted and amount used for each type. At the bottom of the page there are two acre counters (A & B). These acre counters do not reset when a different field is made active. The operator has to press the reset button for these to reset back to 0.

Counter Details			
0.0 mph 1:46 PM			
Field Counters Test			
Acres	2.0	Hybrid	Acres
Units	0.89	1. B5828AMX	1.97 0.89
Date Started	Wed, November 07 13:41:41 2018	Liquid	Acres
Planting Time	00:04:06	1. Starter	2.22 17.79
		2. Nitrogen	2.22 33.26
		OM % Low	OM % Avg
		1.35%	2.18%
		OM % High	3.01%
Counter A		Counter B	
Acres	92.9	Acres	92.9
Units	4.96	Units	4.96
Date Reset		Date Reset	
Reset		Reset	

On the navigation menu on the right side of the screen there are two additional summary pages: Seeding Down Force Summary and Liquid Down Force Summary. Both the Seeding and Liquid Down Force summary pages can be displayed for the entire field or for the last pass through the field. Toggle between these modes at the right side of the page.

Seeder wide averages are available at the bottom of the screen. Colors for each metric will change according to the limit adjustments configured in the Alerts menu (Setup – Alerts – Seed or Air Seeder).

Down Force Summary displays row by row information for average Down Force value (as determined by the load cell), Margin, Ground Contact, and Ride Quality for each individual row. These values are averages for the entire field or the last pass through the field for each individual row. Seeder wide averages are available at the bottom of the screen.

Row	Down Force	Margin	Ground Contact
1	0.00	0.00	0.0%
2	0.00	0.00	0.0%
3	0.00	0.00	0.0%
4	0.00	0.00	0.0%
5	0.00	0.00	0.0%
6	0.00	0.00	0.0%
7	0.00	0.00	0.0%
8	0.00	0.00	0.0%
9	0.00	0.00	0.0%
10	0.00	0.00	0.0%
11	0.00	0.00	0.0%
12	0.00	0.00	0.0%
13	0.00	0.00	0.0%
Average	0.00	0.00	0.0%

Connectivity

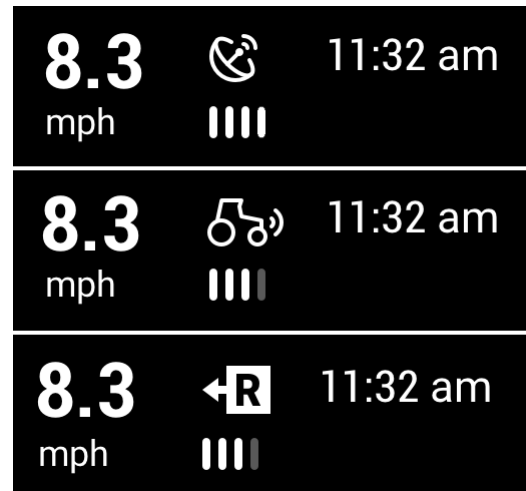
Speed & GPS

Speed

The top right hand corner of the home screen displays the current speed of the tractor. The bars under the speed source icon indicate signal strength. The icon itself will be white if the speed source state is good. It will turn yellow if communication is lost momentarily, there are errors in the signal, or the GPS fix is lost. The icon will turn red if the speed source becomes unusable.

There are three different icons that can be displayed:

1. GPS Receiver icon – indicates the speed source is coming from the GPS system.
2. Tractor/Radar icon – indicates the speed source is coming from the Radar system.
3. A capital R inside of a box – indicates the tractor is moving in Reverse.



Note: In 2022.10.0 software, pressing on the Speed button in the top right hand corner will NOT bring up the GPS Communications Details page.

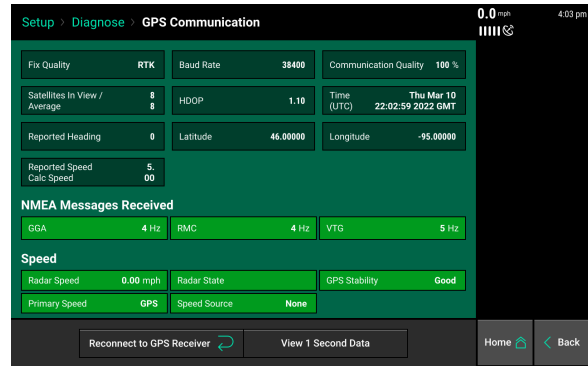
To access the GPS Communication Page, navigate to Setup > Diagnose > Tractor > GPS.

This page displays information about the GPS information that the 20|20 is receiving. For best GPS results:

- Set the Baud Rate to 19200 or 38400 in the system outputting the GPS.
- The communication Quality should be as close to 100% as possible.
- There should be at least three satellites within view
- The HDOP should be between 0 – 2.
- Set NMEA messages GGA, RMC (or ZDA), and VTG at 5 Hz in the system outputting the GPS.. (Additional NMEA messages may degrade the GPS information due to too much information being received).

GPS Communication

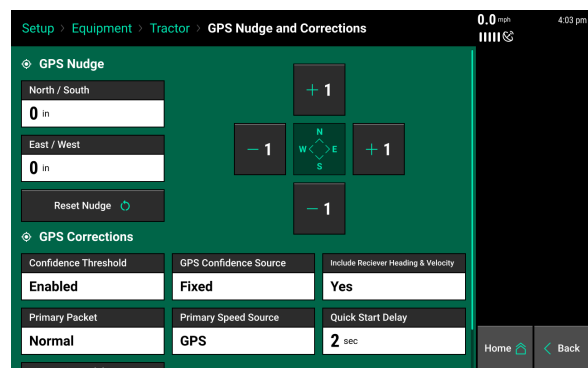
“Reconnect to GPS Receiver” button is located in the bottom left of this page. Press this button to force the system to try to reacquire the GPS signal.



GPS Nudge and Corrections

The GPS Corrections page can be used to configure how the system handles the GPS signal.

Navigate to Setup > Equipment > Edit Tractor > GPS Settings



Bad GPS Correction — This can be changed between Calculated and GPS speed. Use Calculated for lower grade GPS systems.

Heading Mode — This can be changed between Calculated and GPS. Use Calculated for lower grade GPS systems.

Correction Level — This setting can be changed from Normal to High. High correction level will raise the minimum GPS quality percentage for mapping to occur.

Primary Packet — This setting will allow for the user to switch between GGA and RMC for the primary NMEA packet.

Primary Speed Source — This setting will allow for the user to switch between GPS and Radar as the primary speed source.

Quick Start Delay — This setting will allow the user to set the amount of time for the Quick Start Delay function.

Note: Do not change any of the GPS correction settings unless instructed to do so by a Dealer or Product Support.

GPS Nudge

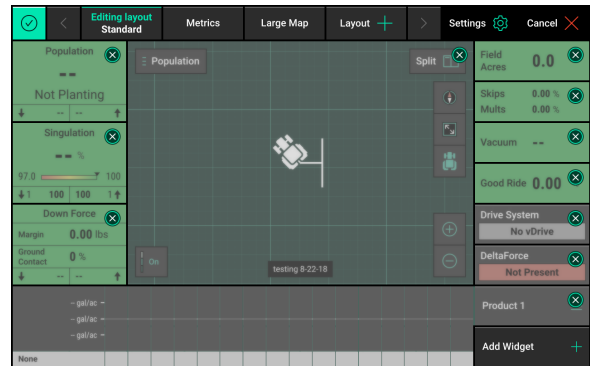
GPS nudge can be used to move the map data in situations where GPS shift has occurred. Use the '+1' buttons to nudge the map in that direction.

Customizing the Home Screen

Customizing the Home Screen

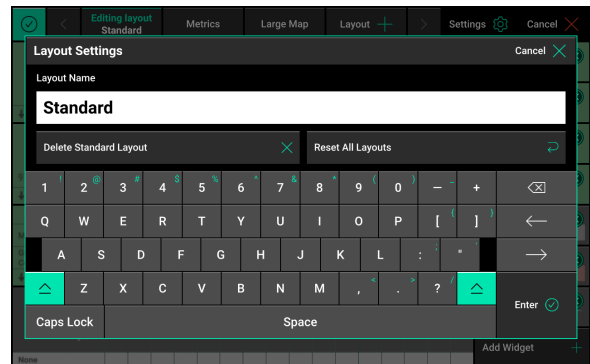


To begin the process of customizing the home screen, select the button in the top left hand corner of the screen. When pressing this button the home screen will be dimmed with a grid pattern laid on top. Each screen will be divided into grids, that the buttons will fit into.

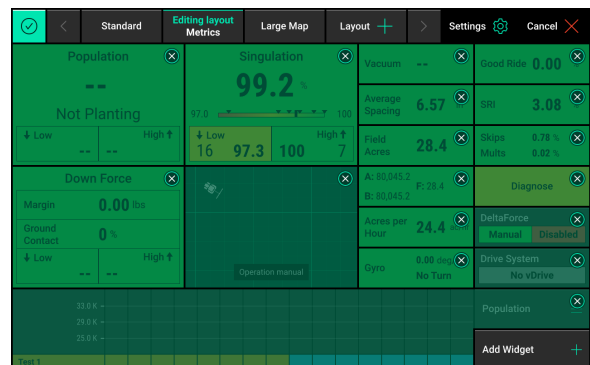


The grids overlaying the home screen are used to place buttons such as, Metrics, Maps, and the Dashboard Mini Chart (these are all referred to as widgets). Every widget takes up a certain amount of grid spaces. For example a 2 x 2 metric takes up four grid spaces (two columns and two rows). To remove a widget, press the 'X' at the top right corner. Press and drag a widget to move it to a new location.

At the top of the page is a "Settings" button that can be used to rename the layout and reset all screen layouts back to the factory default.



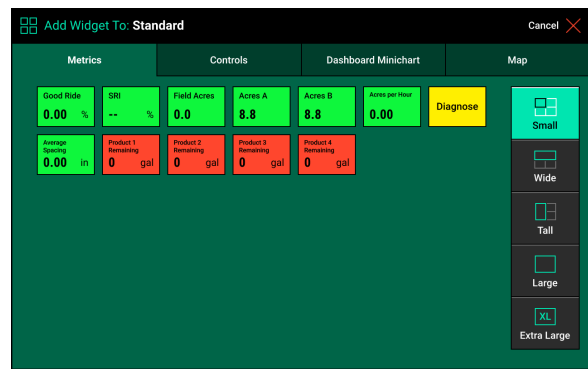
New Layouts can be added by pressing the 'Layout +' button at the top of the screen. Up to eight home screen layouts can be created for each implement type. Layout options can be moved by pressing and dragging them to the desired position.



To begin editing the home screen, select "Add Widget" from the bottom right corner.

There are four different types of widgets that can be added to the home screen:

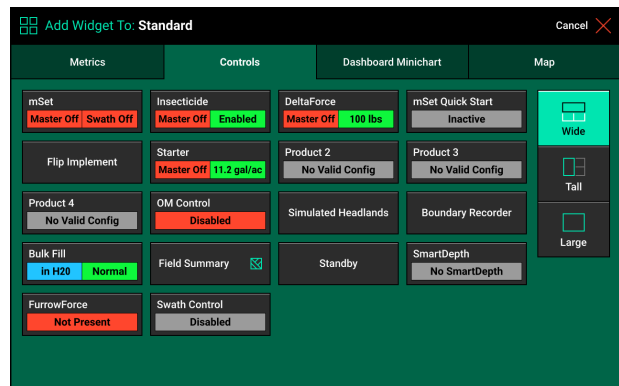
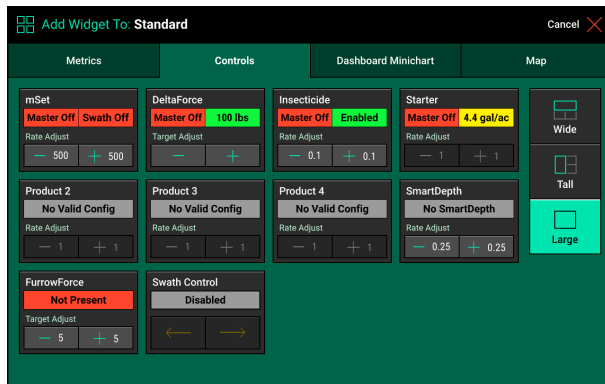
Metrics: The metrics are all of the buttons that display planter information on the home screen. Metrics can be displayed in five different sizes: Small (1x1), Wide (2x1), Tall (1x2), Large (2x2), and Extra Large (3x3). Not all metrics are available in Large and Extra Large. Press the size buttons on the right hand side of the screen to view the metrics available in each size.



Note: Definitions for the Metric and Control buttons can be found in Appendix A – Understanding the Home Screen Buttons.

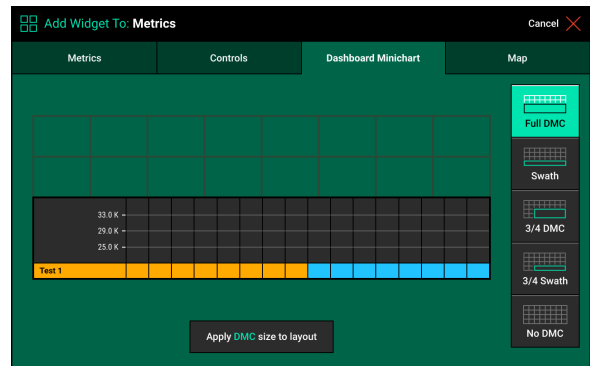
Controls: The control buttons are used to control the different systems that can be installed on the planter. Control buttons can be displayed in three different sizes: Wide (2x1), Tall (1x2), and Large (2x2). The vDrive/vSet Select and DeltaForce control buttons are set by default on the Standard and Metrics screens. Other control buttons must be added manually. (i.e. vApplyHD).

Note: The Large control buttons also add quick adjustment features for the control system. These quick control features can also be accessed by pressing and holding on the smaller control buttons.

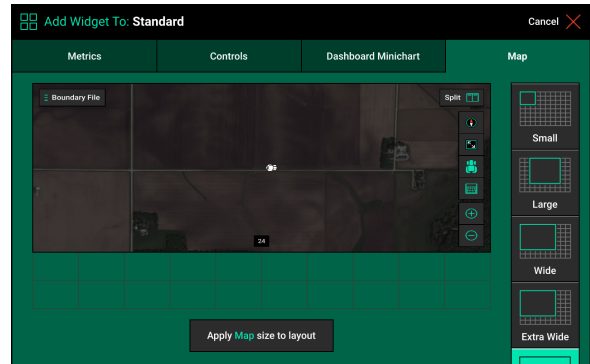


The same control button controls both vDrive and vSet Select. The button itself will switch modes depending on the drive system configured in the Equipment menu. The vApplyHD and FlowSense control buttons are the same and will switch according to which system(s) are configured. Additionally, the name of the vApplyHD and FlowSense control buttons will be Product 1 and Product 2 by default. Once the liquid system(s) are configured on the monitor, the name of these control buttons will change to reflect the product Nickname(s) that are set. The Product 2 control button will only be used if there are two liquid systems installed on the planter.

Dashboard Minichart: Add either a Dashboard Minichart to the home screen or a Swath Control bar. This page offers both in two different sizes: full and $\frac{3}{4}$. The Full size will stretch across the entire bottom of the display while the $\frac{3}{4}$ size, will leave a space on the left side where additional buttons can be added. The Dashboard Minichart can be removed by selecting “No DMC”. Once a selection has been made, press “Apply DMC Size to Layout”.

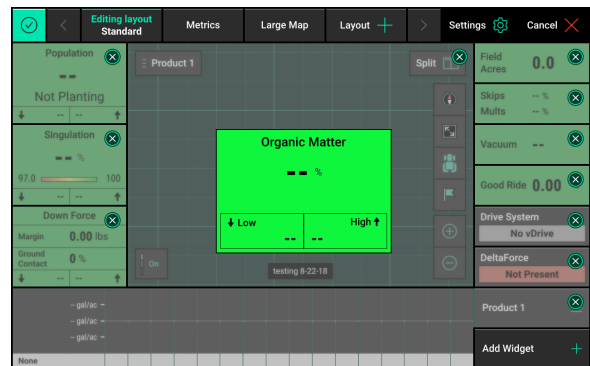


Map: Select the size of map to display on the home screen. There are four sizes of maps available: Large (6x6), Small (3x3), Wide (6x7), or Full (7x10). Additionally, there is a No Map option. Once the map type is selected press “Apply Map Size to Layout”.



Placing a Widget on the Home Screen

Once a widget has been selected from any of the four categories, it can be placed anywhere on the home screen. After selecting a widget, that widget will be placed directly in the center of the screen. To move the widget press – hold – drag the widget to the area of the screen for it to be placed at. Once the finger is removed from the screen the widget will be placed in that position.



Note: If the widget is placed on top or on top of part of another widget (e.g. the map) the entire widget that it was placed on top of will be removed and a blank green area will be left.

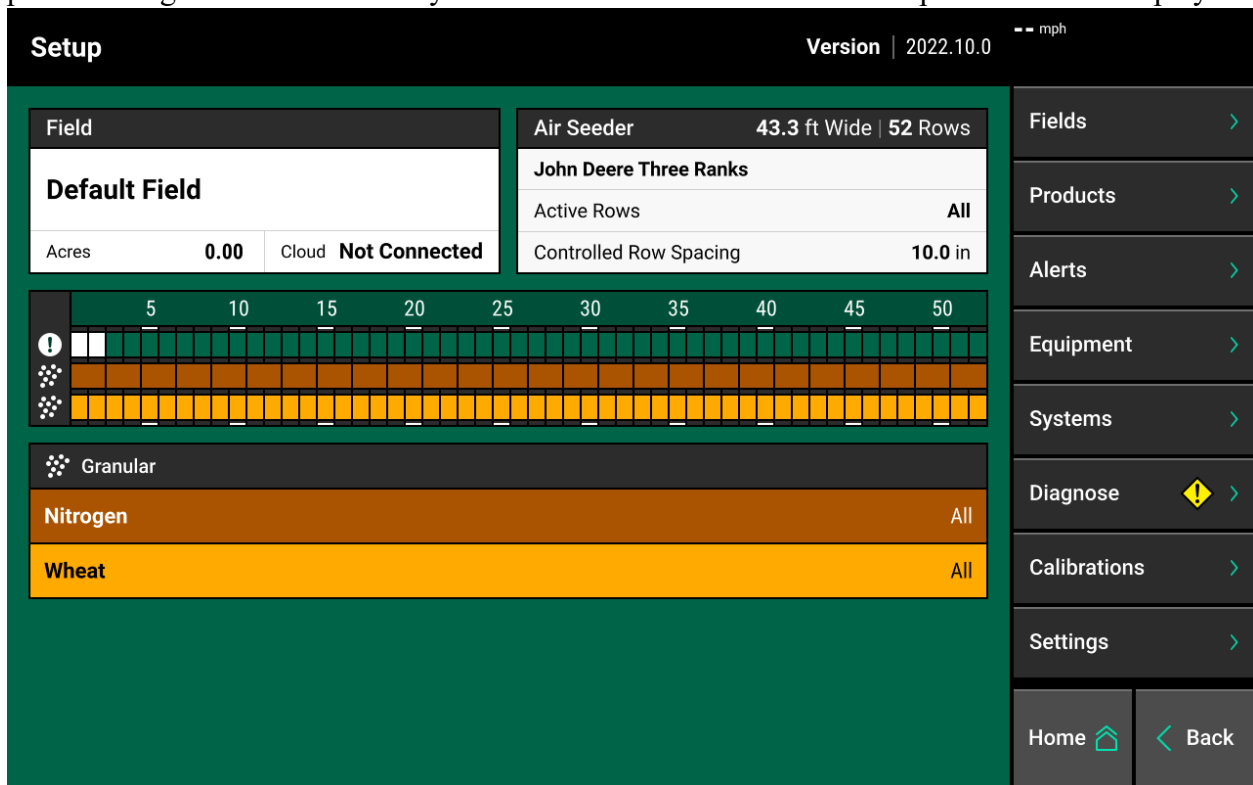
After the widget has been set, select “Add Widget” to continue customizing the home screen. Once finished press the check mark in the top left corner to save the current layout.

Note: When customizing the home screen, only the home screen for the selected tab at the top of the home screen will be changed.

Setup Button

Press the Setup button on the home screen to access the main navigation screen for equipment and control systems' setup, diagnostic, and data pages. This page is divided into information about the system including diagnostics, information about products being applied, and the main navigation pane.

The implement portion of the main setup page displays basic implement setup, diagnostic, and product assignments. Additionally the active field name and total acres planted will be displayed.

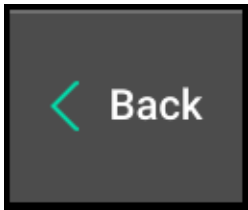


A - Displays the active field name as well as the total acres planted for the field in the current season. Press on the field name to select a different field name.

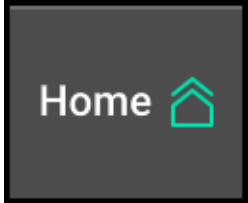
B - Row Diagnostic Information. Displays each rows diagnostic color from the diagnose page. Quickly see if all rows are green, or if there is an issue with a row or rows.

C - Row by Row Product Information. A color will be assigned to each row indicating the product name that is assigned. Colors correspond to the products listed underneath the row information.

On the right hand side of the Setup screen is the Navigation Pane. The Navigation Pane is used to access all other menus in the system.



When navigating through different screens, there will always be a “Back” button that will navigate the user to the previously viewed page.



The “Home” button will navigate the user to the main home screen.

Basic Overview of the Main Navigation Menu

Fields: Change the active field name, assign prescription/boundary to a field, and create or edit Client, Farm, & Field names.

Products: Assign active crop.

Alerts: Configure limits and settings for control and monitoring for each crop or implement wide.

Equipment: Configure the implement profile, implement measurements, and tractor measurements.

Systems: Setup and configure all products installed on the implement as well as the monitor.

Diagnose: The primary location for troubleshooting issues related to the operation of the display and products being controlled/monitored on the implement.

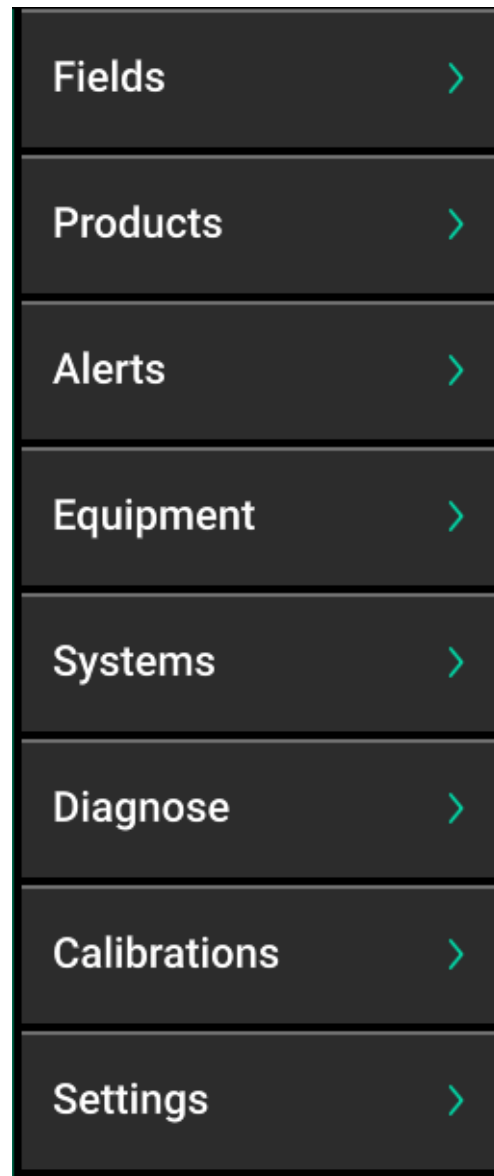
Calibrations: Run manual tests and granular calibrations.

Settings: Access data for management, software updates, and change user preferences associated with the monitor.

Note: More information for each of these menus can be found in the following pages.



If a button on the Navigation Pane has a warning icon on it, the system has recognized an issue with the setup and configuration that must be addressed.



When navigating through the 20|20 there will be a “bread crumb” trail at the top left hand side of the screen showing the navigation path that has been taken. Select any part of the bread-crumble to navigate directly to that screen.

Example of a bread crumb trail:

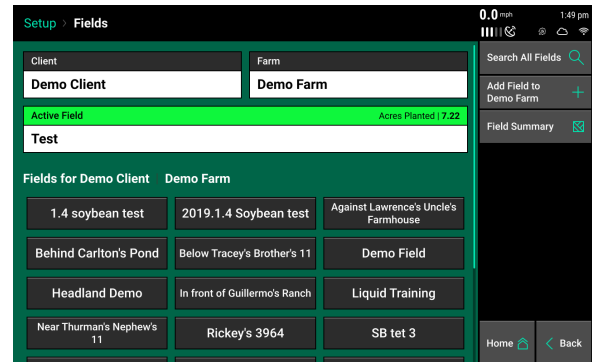


Fields

Precision Planting uses a three tiered naming structure for field names: Client, Farm, & Field. Each tier of the naming architecture becomes more specific. At all times there will be an active field. The active field (a field consists of a Client, Farm, and Field name) is the field in which all data and map is being created for and stored under.

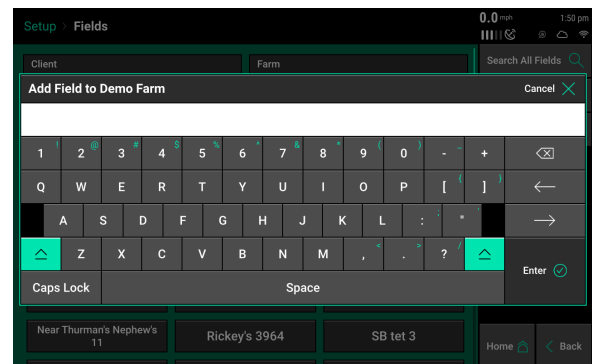
The Fields Menu is where the Client – Farm – Field structure can be created and edited. Select the Fields Menu from the Navigation Pane after pressing Setup on the home screen. (Selecting the active field name on the setup page will direct to the same page).

When the Fields menu is selected, the Active Field name will be displayed with a green heading. Also, the Client and Farm name of the Active field will be shown. At the bottom of the screen other fields for the same Client and Farm name will be shown. To access the Field Setup screen for the active field, press on the field name. To access the field setup screen for a different field or to make a different field active, select the field name from the bottom of the screen. If too many field names exist to fit on the page, either scroll down by using a single finger or use the “Search All Fields” function.



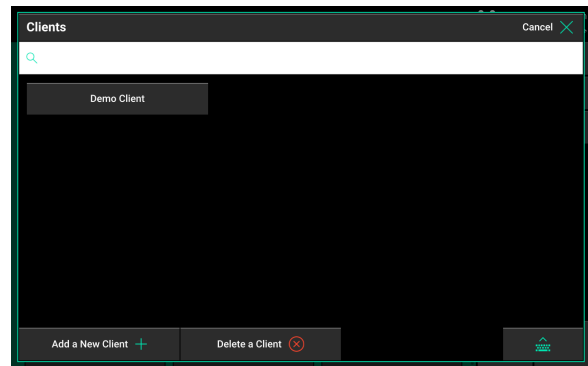
Additional field names can be added under the same Client and Farm name by selecting “Add Field to *current Farm name*”.

Use the keyboard on the screen to type in a new Field name. When finished, press the check mark on the bottom right side of the keyboard.



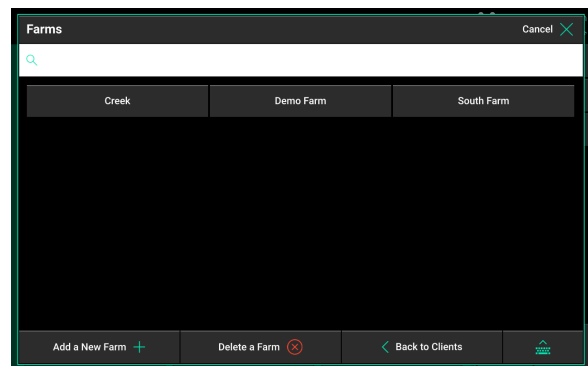
To view different field names, select a different Client or Farm name. Select either the Client or Farm name displayed towards the top of the page to select a different Client or Farm.

When the Client box is selected, a list of all Client names is displayed. Client names can be Added or Deleted by using the options at the bottom of the screen.

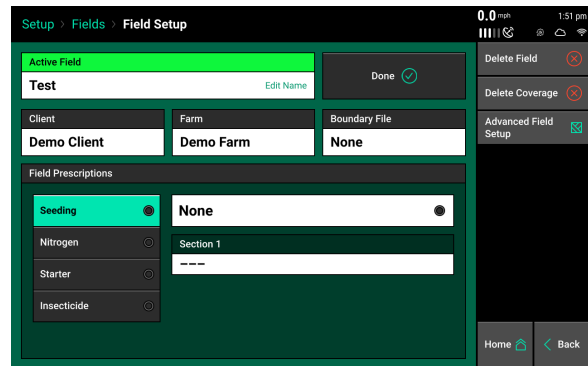


Select the keyboard icon in the bottom right to search for an existing Client name. Select a Client name listed on the screen to view the Farm names under the selected Client name.

Once a Client name is selected a Farm name must be selected. All Farm names under the selected Client name will be displayed. Farm names can be created and deleted. Select the appropriate Farm name to view all Field names under the selected Client & Farm name.



The Field Setup screen will appear when a Field name has been selected (including the active field name). Select “Make Active” to make the selected field active; so data and maps are stored under the field name. (If the large button says “Done” then the selected field is already the active field.



A field name can be deleted by selecting the Delete Field button. Data for the field will not be deleted and can still be exported off the display.

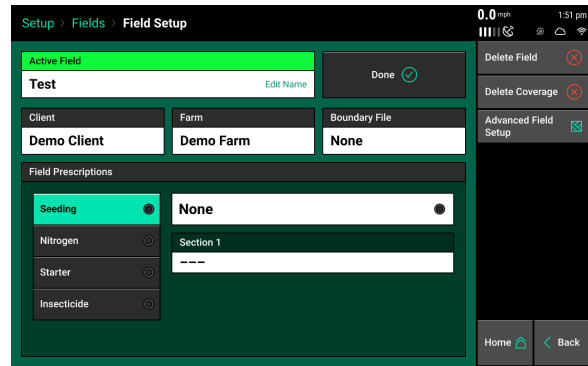
If coverage already exists for a field; so products such as vDrive remained swathed off, select “Delete Coverage” to clear all coverage from the selected field.

Boundary and Prescription files can also be assigned to fields on this page. Boundary and Prescription files must be in a Shape File format and include the .dbf, .shx, and .shp file extensions. (Shape files are imported in the Data menu.)

Select the Boundary File button to view a list of all imported shape files. Choose the appropriate boundary file for the selected field.

The 20|20 can use prescription files for Seeding (vDrive), Liquid application (vApplyHD), and Insecticide (vDrive Insecticide). The Field Setup page will change with the type of products configured. See following information in this document for importing and assigning prescriptions.

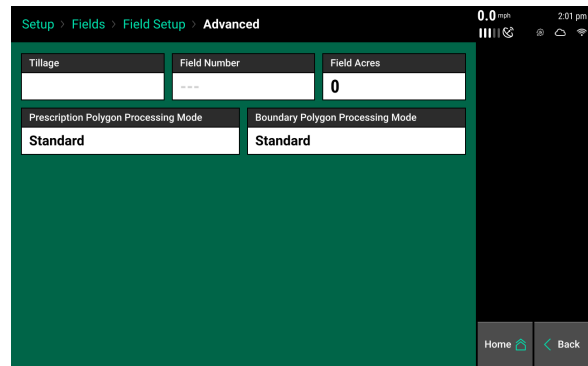
Note: The option to assign a prescription will not be available unless a Seeding/Liquid/ Insecticide system is setup on the display. Refer to the Product specific Operators Guide for how to configure each system.



Advanced Field Setup

On the right side of the Field Setup page is the Advanced Field Setup. This includes entries for Tillage, Field Number, and Field Acres. This is optional information that can be entered for record keeping.

Prescription & Boundary Polygon Processing Modes can be adjusted to make the display read imported shape files differently.

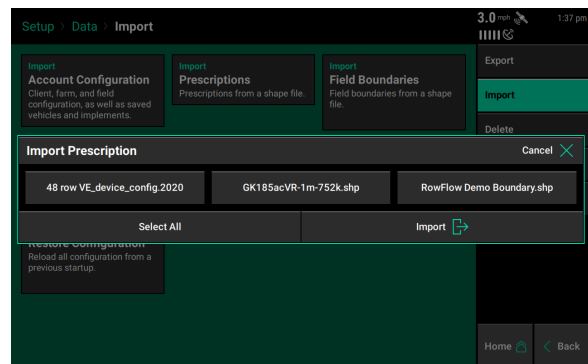


The standard mode works for the majority of shape files. Selecting “All Exterior” will cause the display to read all polygons within the shape file as an external boundary of the field. This mode can help the system read shape files that were not saved in the typical ESRI file format.

Importing Prescription Files

To begin using the prescriptions, they must be imported. Follow the below steps to import the prescription(s).

1. Navigate to Setup - Data
2. Insert the USB Drive into the display containing the prescription files
3. Tap on the 'Import Prescriptions' button.



Note: The 20|20 supports the import of .2020 file prescriptions or .shp file based prescriptions (.shp, .dbf, .shx)

Next, select what system type the Prescription file(s) will be used for. Options include

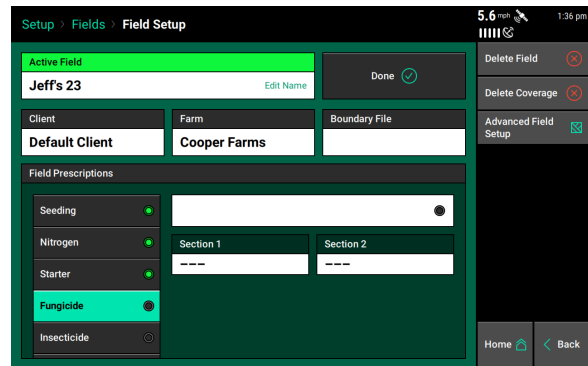
- Seeding
- Liquid
- Granular
- Depth

Finally, Select what prescription files need imported. If prescription files are being used for multiple systems, complete the above process for each system type.

Assigning Prescription Files

Once Prescription files have been imported into the 20|20, each file will need to be assigned to its intended field. This can be done on the Field Setup page.

1. Navigate to Setup - Fields
2. Select the Client, Farm, and Field that will be using a prescription

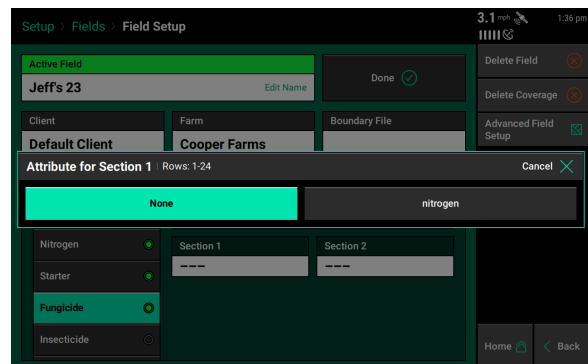


Next, select what system type the Prescription file(s) will be used for. Options may include

- Seeding
- Liquid
- Granular
- Depth

Once the system is selected, tap on the prescription file box to look through existing prescription files and select the one that will be used for this field. After the prescription is selected, confirm that this is the desired prescription file, and if necessary, adjust the target zones before making it active on this field.

An attribute selection box can be used on the top right corner of the screen, and either individual zones or the whole file can be adjusted by either a percent or number bump. Press 'Save' once you are ready to assign the prescription. Finally, select what attribute will be used for each drive section. Complete the above process for each field that will be using a prescription file.



Controlling to Prescription Files

After the active field has a prescription file assigned to it, the system can use a prescription file for control. This applies to the following systems:

- Seeding
- Liquid
- Granular
- Depth

To switch to prescription control, follow the below steps:

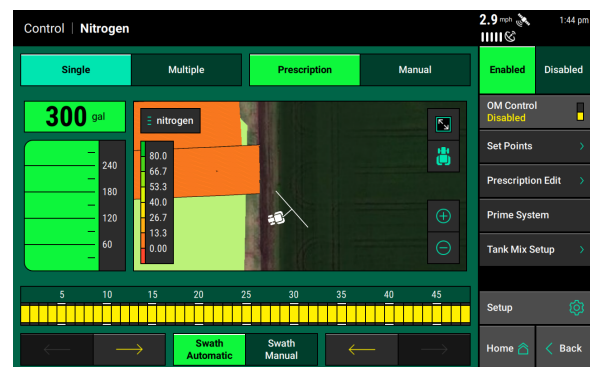
1. From the Home screen, tap on the control button for the system. Some examples may include vDrive, mSet, Nitrogen, Depth, and Granular.
2. Toggle the system from 'Manual' to 'Prescription' control at the top of the screen.

The system will now control to the assigned prescription file.

Editing Prescription Files

The Prescription file can be edited either during the assignment process to the field, or from the system control screen. To edit a prescription already assigned to the field:

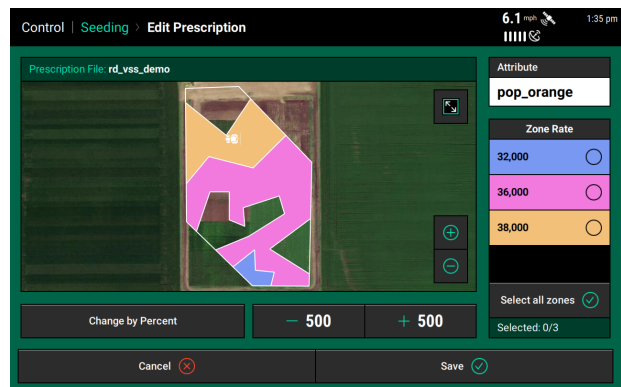
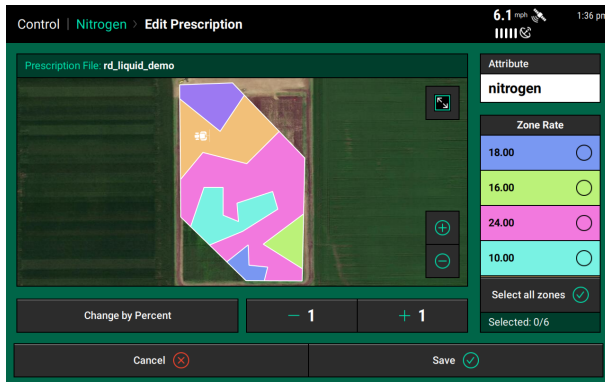
1. From the Home screen, tap on the control button for the system. Some examples may include vDrive, mSet, Nitrogen, Depth, and Granular.
2. Tap on the 'Prescription Edit' button on the right side of the screen.



Once within the Prescription edit page, The below options are available

- Switch between attributes on the top right corner of the screen.
- Select any combination of zones on the right side of the page, ranging from individual, multiple, to all.

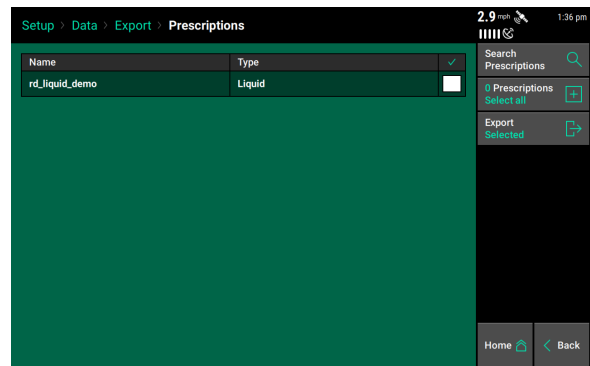
After the desired attribute and zones are selected, you can either adjust it by a percent, or bump the values up or down using the + or - buttons on the screen. Once the prescription has been edited, tap on 'Cancel' to discard any changes made, or tap on 'Save' to save the changes made to the prescription.



Exporting Prescription Files

Follow the below steps to export prescription file (s).

1. Navigate to Setup - Data - Export.
2. Insert a USB drive into the Display.
3. Tap on the 'Export Prescriptions' button.
4. Select the prescriptions to export, or tap on 'Select All'.
5. Export the files.

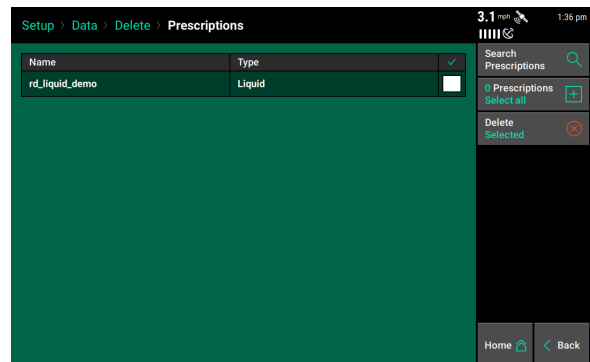


Note: The 20|20 exports a .2020 file format of prescription file.

Deleting Prescription Files

Follow the below steps to delete prescription file (s).

1. Navigate to Setup - Data - Delete.
2. Tap on the 'Delete Prescriptions' button.
3. Select the prescriptions to export, or tap on 'Select All'.
4. Delete the files.

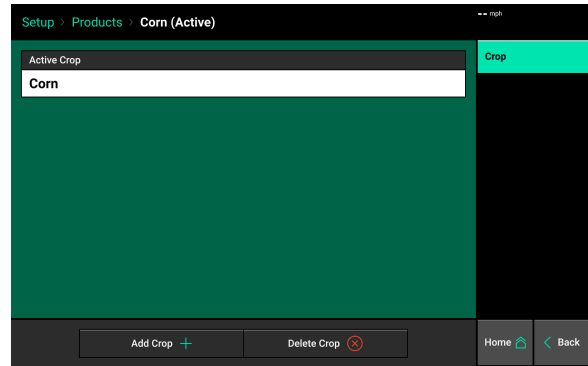


Note: Deleting files is an irreversible operation, and cannot be undone. Follow the above steps with caution, as deleted files cannot be restored.

Products (Crops)

To configure monitor settings for individual crop types, select the “Products” menu button from the navigation pane.

To change the active crop type, select the “Active Crop” button at the top of the page. If the desired crop type is not available, select the “Add Crop” button at the bottom of the main Crops page to view a list of all crop types that can be added to the list.



Alert and Alarm settings for the active crop are found under the Alerts tab under the respective granular system, not under the Products tab

Alerts

The Alerts menu is the navigation pane used for product and system specific configurations such as Alerts and Alarms.

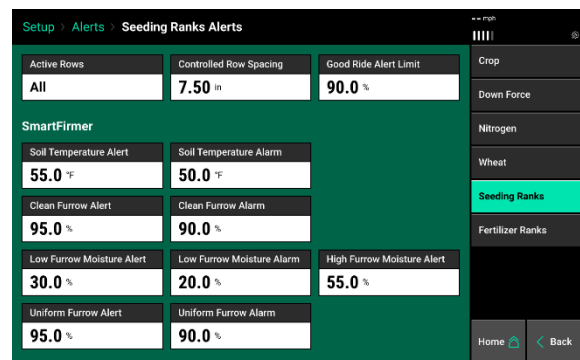
AIRSEEDER ALERTS

The Air Seeder Alerts (or Seeding and Fertilizer Ranks if applicable) screen allows for a number of user inputs:

Active Rows - User defines which rows are active.

Controlled Row Spacing - Automatically calculated based on row width and active rows; however, user can change this value if required.

Good Ride Alert Limit - This will set the point at which the Good Ride metric will turn yellow.



SmartFirmer Alerts and Alarms are also adjustable by the user. Please see SmartFirmer Operators Guide for more information.

DOWNFORCE ALERTS

The DownForce screen allow for the user to define the length of time, percentage, and action of DownForce alerts.

Ground Contact Alert Limit- This will set the point at which the Ground Contact metric will turn yellow, indicating that loss of Ground Contact may begin to have an agronomic affect..

Ground Contact Failure Limit- This will set the point at which the Ground Contact metric turns red.

Force Deviation Alert Limit- This will set the point at which the force average metric turns yellow. (Deviation from Target Force)

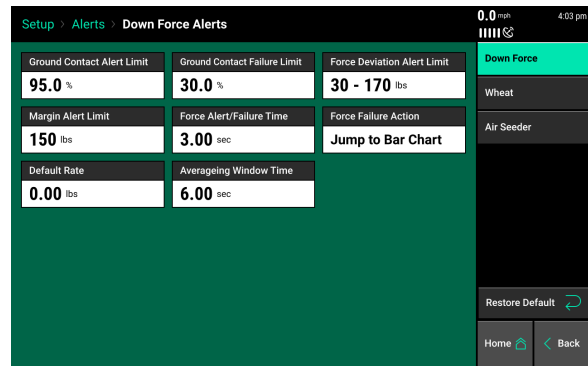
Margin Alert Limit- This will set the point at which the Margin metric will turn yellow.

Force Alert/Failure Time- The length of time the force alert/alarm must stay in that state before it triggers an alert/alarm.

Force Failure Action- Allows the user to select an action when a Force Failure occurs.

Default Rate- Currently not used/ does not need adjusted.

Averaging Window Time- The time that the system averages the force average, force minimum, and ground contact DMCs and widgets.



PRODUCT ALERTS

The product Alerts screen allows the user to adjust the rate limits for control and monitoring. If you find that you are constantly having a row alert or failure, you may need to change from the default settings.

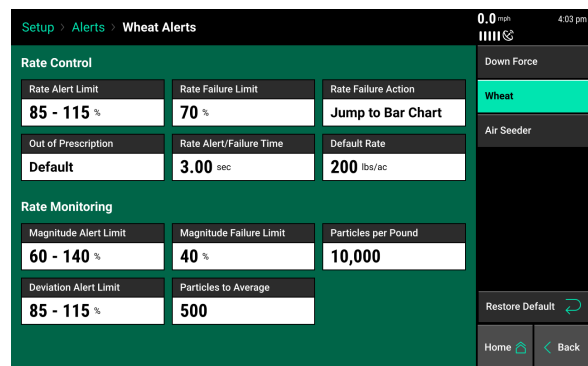
Rate Alert Limit - This will set the point at which the Lbs/Ac metric will turn yellow, indicating the hydraulic motor RPM is outside the set points.

Rate Failure Limit - This will set the point at which the Lbs/Ac metric turns red.

Rate Failure Action - Allows the user to select an action when a Rate Failure occurs.

Rate Alert/Failure Time - Length of time the system needs to detect a rate outside of the limit before it triggers an alert or failure.

Magnitude Alert Limit - This will set the point at which the Magnitude metric will turn yellow, indicating the seeding rate is outside the set points.



Magnitude Failure Limit - This will set the point at which the Magnitude metric turns red.

Particles per Pound - Metric used to calibrate the monitoring system according to seed size. Default is 10,000.

Deviation Alert Limit - This will set the point at which the Deviation metric will turn yellow.

Particles to Average - Defines the number of particles used in the rolling average of seed data to calculate Magnitude, Deviation and Uniformity.

Particles per Pound Calibration - required whenever changing to a new Granular Product (seed, fertilizer, insecticide, etc.)

Magnitude is a relative measurement comparing the amount of a product being applied in a given area. Because magnitude is a unitless measurement, we must define Particles per Pound based on the type of product being applied. Once this process is done, when application rates (lbs/AC) are changed the system can continue to monitor the Magnitude and provide feedback when the target rate is too far outside the limits.

How to calculate Particles per Pound

The calibration process begins with the Particles per Pound (Setup>Alerts>"Product Name") on the default setting of 10,000. Begin by going to the field and seeding until the Magnitude metric stabilizes. Once a Magnitude reading has been obtained, that number should be entered into the following equation:

$$\textit{Particles per Pound} = \frac{(\textit{Magnitude} \times 1000)}{\textit{lbs per Acre}}$$

Example:

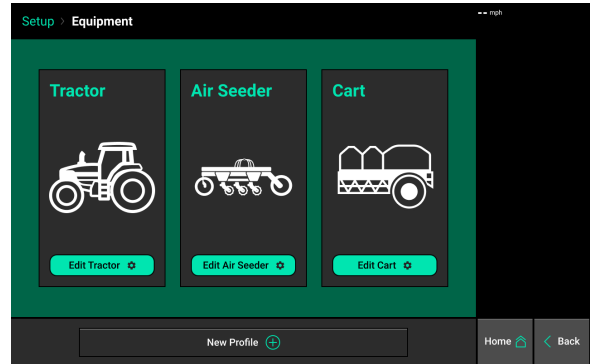
$$\textit{Particles per Pound} = \frac{(1350 \times 1000)}{300}$$

$$\textit{Particles per Pound} = 4500$$

In the above example the Magnitude reading taken during the infield test was 1350, the application rate was 300 lb/acre, and the resulting Particles per Pound is 4500. The resultant Particles per Pound should be entered on the Setup>Alerts>"Product Name" screen.

Equipment Menu

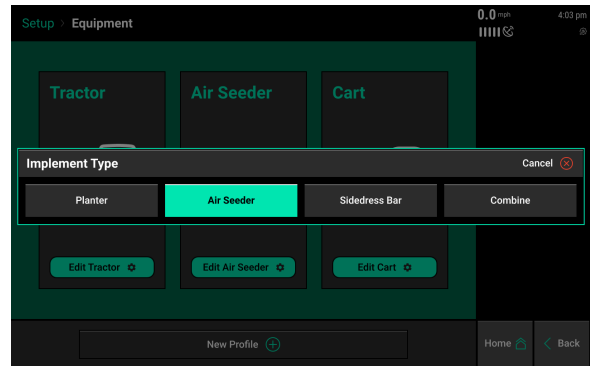
The Equipment menu is where the Air Seeder and tractor are configured.



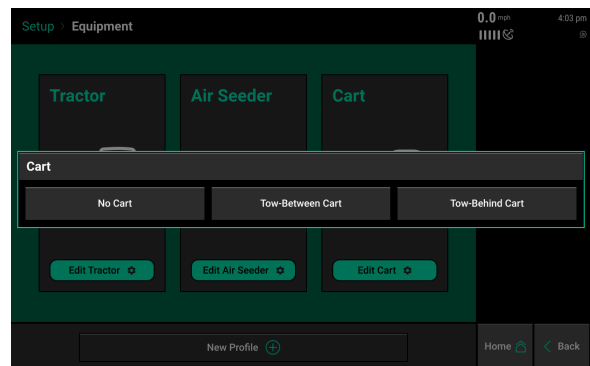
Adding a New profile will override existing setup. Save current configuration before changing implement type. See Save/Load for more details

Click “New Profile” to create a new tractor and air seeder profile. Select Air Seeder.

Note: 2022.10.x only supports air seeder configurations, and will not successfully control Planters, Sidedress Bars, or Combines

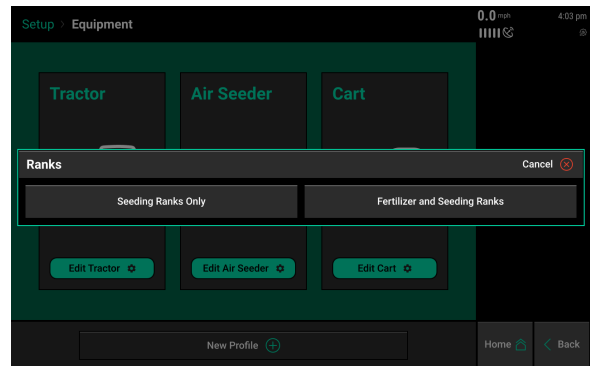


Indicate if an Air Cart is present and whether it is a pull behind or pull between.



Select whether the seeder only has seeding ranks or seeding and fertilizer ranks.

Note: 2022.10.0 does not support fertilizer ranks. Contact Product Support if a fertilizer rank is present and being monitored on the 2020.



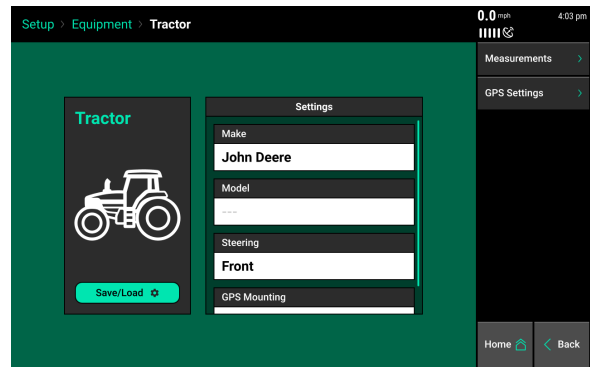
Tractor Equipment Setup

Tractor Information and Measurements are entered under the Tractor Profile Page.

From the home screen select Systems – Equipment – Edit Tractor.

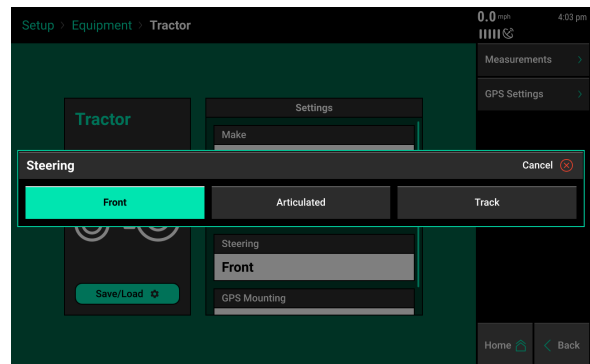
The first page shows general tractor settings, including:

- Make
- Model
- Steering — Front, Articulated, or Track.
- GPS Mounting — Select “Yes” if GPS globe is mounted on the Tractor



The options for Tractor Make and Tractor Model provide useful troubleshooting information, but are not necessary information to enter. The rest of the setup options must be correct for accurate modeling and control of the system.

A “Steering” type must be selected. There are three steering options: Front, Track, and Articulated. Each steering has different GPS measurements that must be entered.



MEASUREMENTS

Select the Measurements Tab to enter the Tractor GPS Measurements. These must be setup prior to planting in order for accurate modeling and control of the system.

Note: Some GPS systems do not output the location of the actual GPS globe. Verify the GPS output location with the GPS manufacturer.

Steering Type: Front

A - Hitch: Measure the distance from the center of the rear axle the hitch (or pivot point on a two point pivot planter hitch).

Note: If a 3 pt planter hitch is connected, enter 0.

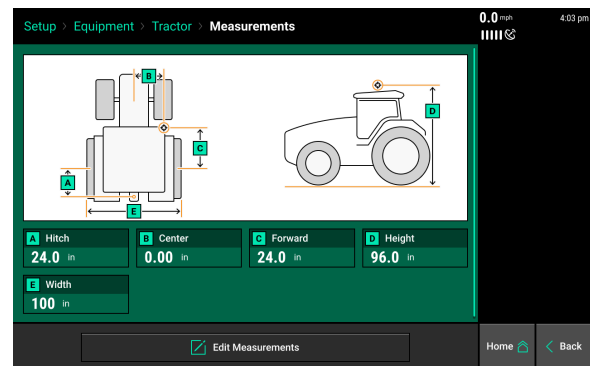
B - Center: Measure the distance from the center line of the tractor to the GPS output location.

Then select if the GPS output location is to the left or right side of the tractor's center line.

C - Forward: Measure the distance from the center of the rear axle to the center of the GPS antenna.

D - Height: Measure the distance from the ground to the base of the GPS output location.

E- Width: Measure the distance from outside of the left track to the outside of the right track.



Steering Type: Articulated

A - Hitch: Measure the distance from the pivot location at the hitch to the center of the rear fixed axle.

B - Center: Measure the distance from the center line of the tractor to the center of the GPS antenna. Then select if the GPS receiver is to the left or right side of the tractor's center line.

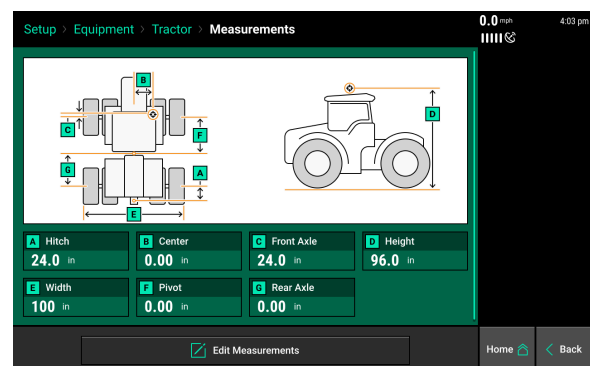
C- Front Axle: Measure the distance from the center of the front fixed axle to the GPS output location. Indicated if the GPS output location is in Front or Back of the front axle.

D- Height: Measure the distance from the ground to the GPS output location.

E- Width: Measure the distance from the hitch to the outside of the wheel.

F - Pivot: Measure the distance from the center of the front fixed axle to the articulation point.

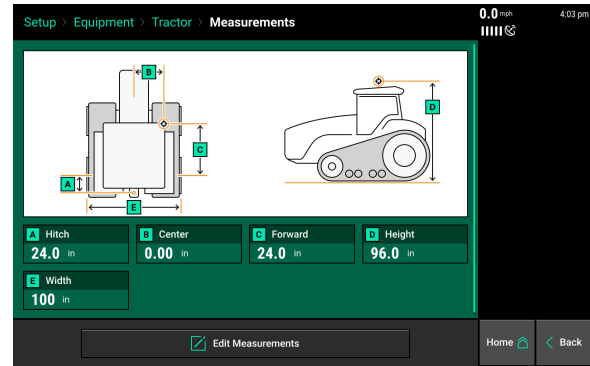
G - Rear Axle: Measure from the articulation point to the center of the rear fixed axle.



Steering Type: Tracked

A - Hitch: Measure the distance from the pivot location to the hitch (or pivot point on a two point pivot planter hitch).

B - Center: Measure the distance from the center line of the tractor to the GPS output location. Then select if the GPS output location is to the left or right side of the tractor's center line.



C - Forward: Measure from the track pivot to the GPS output location. Indicate if the GPS output location is in Front or Back of the pivot location.

D - Height: Measure the distance from the ground to the base of the GPS output location.

E- Width: Measure the distance from outside of the left track to the outside of the right track.

Air Seeder Equipment Setup

From the Equipment Setup page, press the “Edit Air Seeder” button to configure the monitor according to your air seeder. Setup > Equipment > Edit Air Seeder

AIR SEEDER DETAILS (Tab 1)

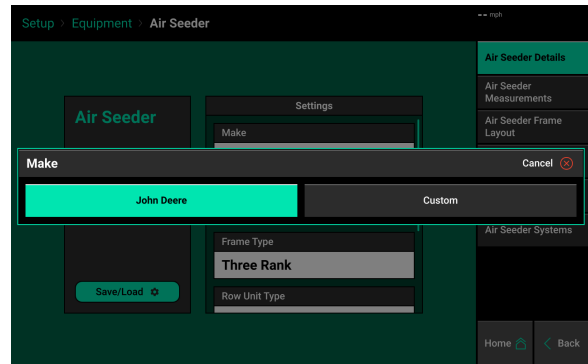
The first screen will be Air Seeder Details, or the general settings for the Air Seeder.

These settings include

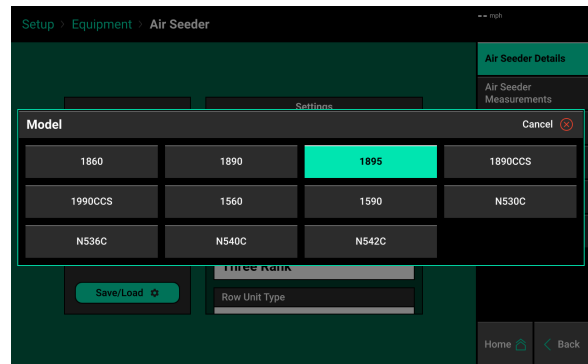
- Make
- Model
- Frame Type — Number of Ranks
- Row Unit Type — currently only option is John Deere Pro Series
- Hitch Type — Drawn, 2–Point Pivot, or 3–Point
- GPS Mounted — Select Yes if GPS globe is mounted on the AirSeeder

Note: Air Seeders with fertilizer ranks will have both Seeding Ranks and Fertilizer Ranks on the Equipment menu and will need to set up the equipment configuration and measurements on both.

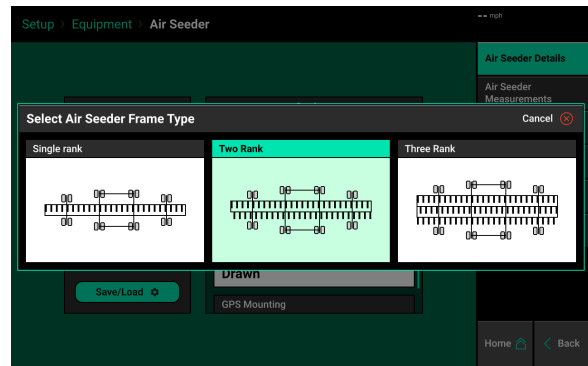
Select the appropriate make of the Air Seeder.



Select the appropriate model of Air Seeder.
Choosing the Air Seeder Model will define some of the choices available in later sections.



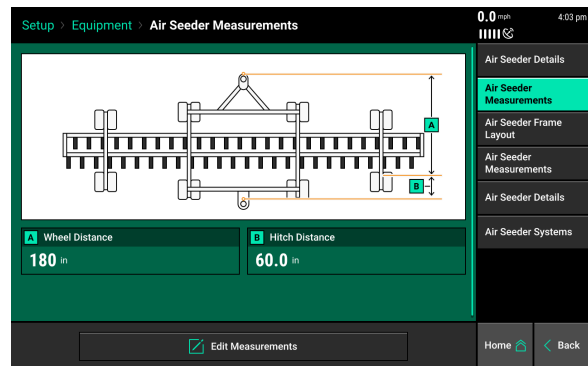
Select the appropriate number of ranks under the Frame Type. This defines what measurements can be entered in the Air Seeder Measurements tab.



The rest of the Air Seeder specs, such as row number and spacing, are under the Air Seeder Details (Tab 5).

AIR SEEDER MEASUREMENTS (Tab 2)

Select “Air Seeder Measurements” to set up the GPS measurements for the air seeder. GPS offset measurements must be set up prior to planting in order for the monitor to correctly control and model the air seeder.



The Air Seeder Measurements Tab 2 sets the measurements for the Air Seeder frame (wheel and hitch distance), and the Air Seeder Measurements Tab 4 sets the measurements for the Ranks (seed exit and offsets).

To edit the measurements, select the Edit Measurements option. Enter the appropriate wheel distance, and select next. Enter the appropriate Hitch distance and select Done.

A — Wheel Distance

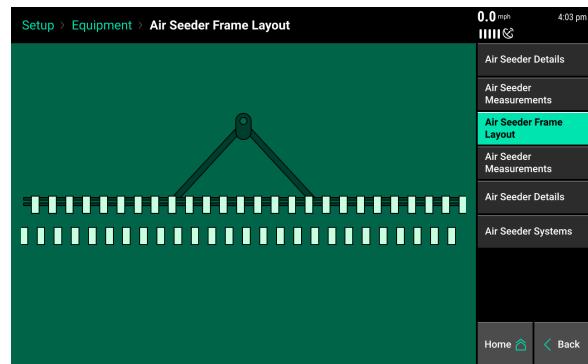
Enter the distance from the pivot point to the center of the rear frame wheel axle.

B — Hitch Distance (Tow-behind cart systems only)

Enter the distance from the center of the rear frame wheel axle to the center of the rear hitch

AIR SEEDER FRAME LAYOUT (Tab 3)

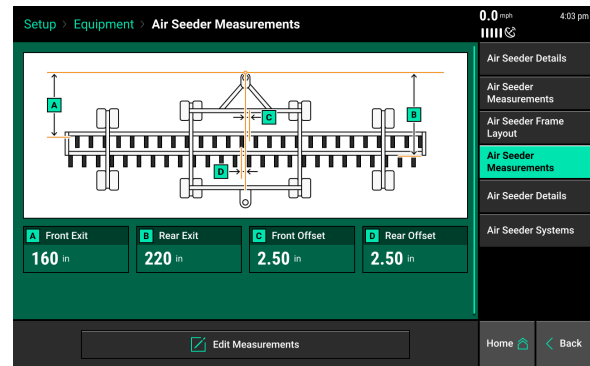
The frame layout page shows a visual representation of the measurements. This frame diagram should match how the air seeder physically looks. If this diagram does not match the seeder’s actual layout, adjust the air seeder measurements as needed.



AIR SEEDER MEASUREMENTS (Tab 4)

The Air Seeder Measurements Tab 2 sets the measurements for the Air Seeder frame (wheel and hitch distance), and the Air Seeder Measurements Tab 4 sets the measurements for the Ranks (seed exit and offsets).

Depending on how many seeding ranks are selected, two to four different measurements will need to be entered into the system.



A — Front Seeding Rank Seed Exit

Enter the distance from the pivot point to the seed tube exit for the front rows. Then select the active rows for the Front Seeding Rank.

B — Rear Seeding Rank Seed Exit

Enter the distance from the pivot point to the seed tube exit for the rear rows. Then select the active rows for the Rear Seeding Rank.

C — Front Seeding Rank Offset From Center

The left/right offset of the forward most seeding rank must be entered. This is the distance from the centerline of the tractor to the center of the front seeding rank. Enter this distance into Box D. Select “Measure from left” if the rows are offset to the left side of the centerline of the tractor and “Measure from right” if the rows are offset to the right side of the centerline of the tractor.

D — Rear Seeding Rank Offset From Center

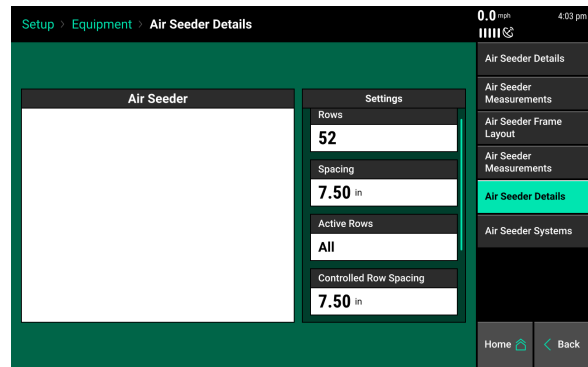
The left/right offset of the rear most seeding rank must be entered. This is the distance from the centerline of the tractor to the center of the rear seeding rank. Enter this distance into Box E. Select “Measure from left” if the rows are offset to the left side of the centerline of the tractor and “Measure from right” if the rows are offset to the right side of the centerline of the tractor.

If the Air Seeder Profile has Seeding Ranks and Fertilizer Ranks, repeat the same steps above for Fertilizer Rank Measurements.

AIR SEEDER DETAILS (Tab 5)

The Air Seeder Details Tab 5 page includes the following options:

- Rows
- Spacing
- Active Rows
- Controlled Row Spacing
- Controlled air Seeder Width
- PDM



Press the “Rows” button to enter the correct number of physical rows on the Air Seeder.

Press the “Spacing” button to select the spacing for the rows on the Air Seeder. If the correct spacing is not available, select “Other” to manually enter the row spacing.

Press the “Active Rows” button to define the Air Seeder rows that will actively be planting. The system defaults to all rows active. Preset row options for Odd, Even, Left, or Right rows can be selected. To define specific rows, select “List”. When listing out the active rows, rows marked by a green box are active rows.

Note: Active Rows are the rows that will be seeding. If a row does not have an SRM, but is a seeding row it is still considered an active row.

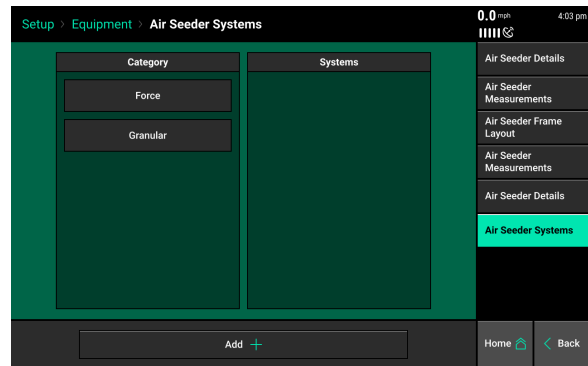
“Controlled Row Spacing” value is automatically calculated based on row width and active rows (formerly “Effective Row Spacing”). Additionally, the “Controlled Air Seeder Width” is used for acre calculations and is automatically calculated based on row width, number of rows, and active rows (formerly “Effective Air Seeder Width”). If either of these values is incorrect, select the button showing these values to manually enter a new value.

Press the “Controlled Air Seeder Width” button to edit the effective width of the Air Seeder. This value is used for acre calculations and is automatically calculated based on row width, number of rows, and active rows. If either of these values are incorrect, select the button showing these values to manually enter the correct one.

Press the PDM button to select whether or not a PDM is present.

AIR SEEDER SYSTEMS (Tab 6)

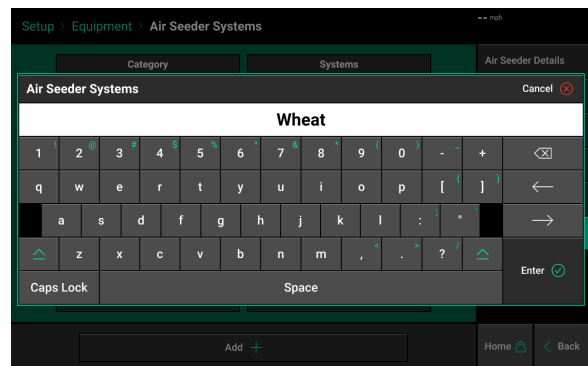
Air Seeder Systems must be added here before they can be further configured in Setup > Systems.



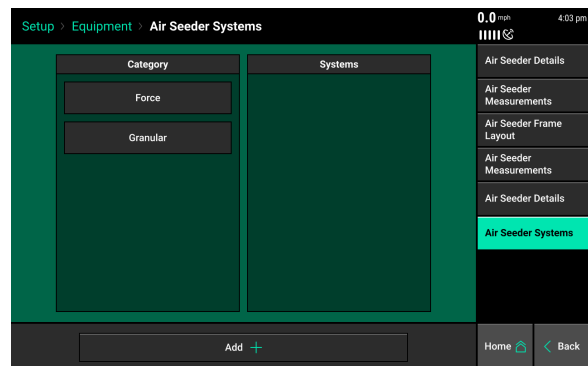
Systems include Seeding, Force, Liquid, and Granular (labeled “Categories” on this page). Each system can then have a Product or multiple Products assigned (labeled as “Systems” on this page). For example, “System” (Category) would be “Granular”, and the “Product (System) would be “Fertilizer” and/or “Wheat”.

Note: Granular should be selected for any product that is measured in lbs./acre (K/ha) such as seeding, fertilizer, fungicide, etc.

Press the “Add System” button at the bottom of the page and select desired system. Repeat this process until all of the systems present have been added



When a system has been added, a product or products need to be assigned within that system. A product name can be chosen from a preset list or a custom name can be assigned.

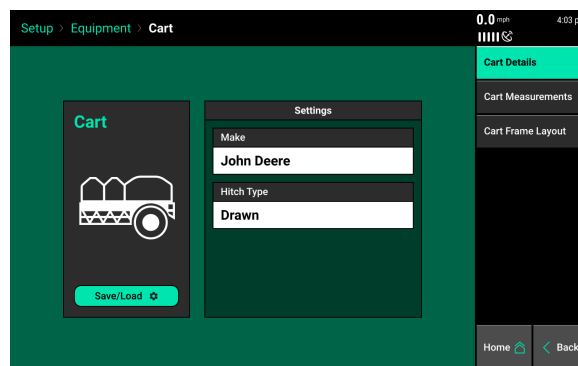


Air Seeder Cart Equipment Setup

From the Equipment Setup page, press the “Edit Cart” button to configure the air seeder cart. Setup > Equipment > Edit Cart

CART DETAILS

Select the appropriate make and Hitch Type.

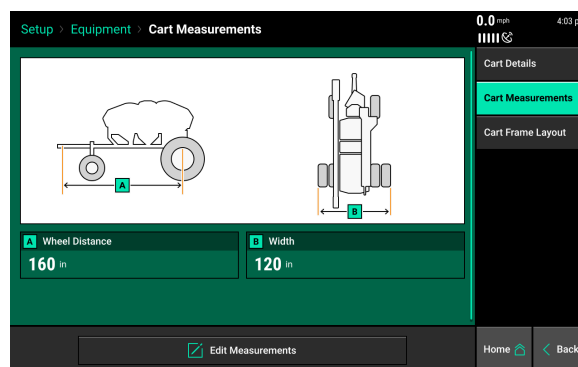


CART MEASUREMENTS

Wheel Distance— Enter the distance from the pivot point to the center of the rear frame wheel axle

Hitch Distance(In-between Carts Only) — Enter the distance from the rear axle to the rear hitch.

Width — Enter the distance from the outside of the left rear wheel to the outside of the right rear wheel.



CART FRAME LAYOUT

Currently the cart frame layout shows the same diagram as the Air Seeder Frame Layout.

Save/Load

Both Tractor and Seeder configurations can be saved in the 20|20. Once a tractor and or seeder has been configured press the Save/Load button to save these setup configurations. Press the “Save Current Vehicle (or Implement) Configuration” button to create a name for the current configuration on the 20|20. It will be saved under the entered name.

Both the seeder setup/GPS measurements and all the configurations for all products will be saved under the Air Seeder profile. Tractor setup and GPS measurements are saved under the Tractor profile.

Configurations can then be reloaded later by pressing the Save/Load button and then selecting the “Load” Button. This will reload a saved configuration. Saved configurations that no longer apply can be deleted by pressed the “Delete” button.

It is important to note that when changing the Implement Type, all configurations will be reset back to factory defaults. Using the Save/Load feature will allow the operator to quickly load a previously saved configuration after changing the implement type.

Systems Menu

The Systems menu contains setup for all Systems and Products installed. The available options in the System menu will change depending on what Systems (e.g. DownForce, Granular etc...) and Products (e.g. Nitrogen, Starter, Wheat) are configured in the equipment menu. Each control products' operation guide contains additional setup and configuration information that needs to be done in the systems menu (SeederForce, for example). Refer to these guides for more detailed instructions on control products.

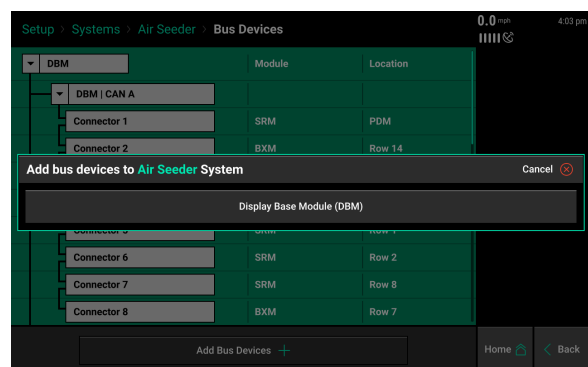
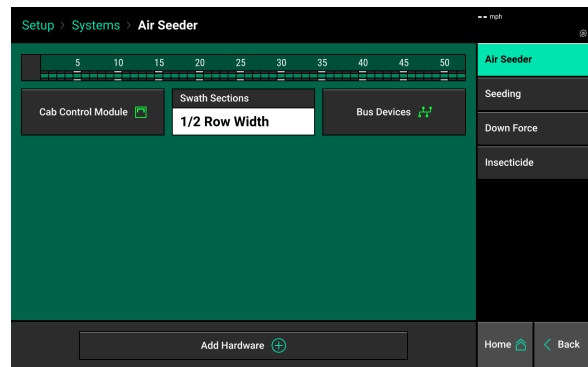
Systems Setup

Systems are added in the Equipment Profile and include Seeding, Force, Liquid and Granular.

Starting with the first screen in Systems, “Air Seeder”, click on “Bus Devices” (see details below). Once Bus Devices are setup other hardware will be added.

Bus Devices are any module (SRM, Blockage Expansion Module, etc.) that is connected to the CAN Bus system via a SRM Backbone Connector. It is critical that all Bus Devices, **in the order they are plugged into the CAN Bus**, are assigned under Bus Devices. See Appendix A for the Device Index Worksheet. Before proceeding to the monitor configuration, completely fill out the Device Index Worksheet (either Tower Style or CCS/Drill Style Seeder). See examples below for help in filling out the worksheets.

After clicking Bus Devices, click **Add Bus Devices** at the bottom of the screen. Select Display Base Module (DBM).



Bus Assignment - Select each CAN network and assign the total number of SRM backbone connectors that are being used on that network. Total SRM Backbone Connectors include all the connectors where an SRM or BXM is installed. Repeat this for each CAN Bus Network.

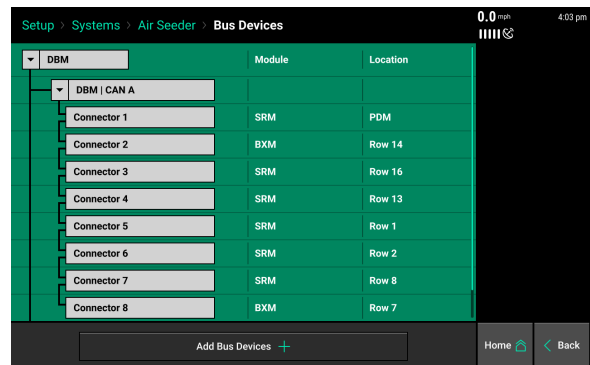
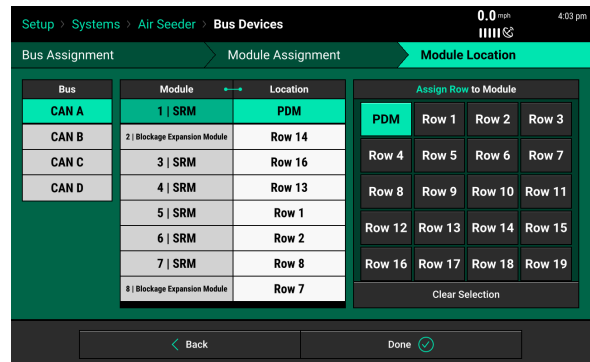
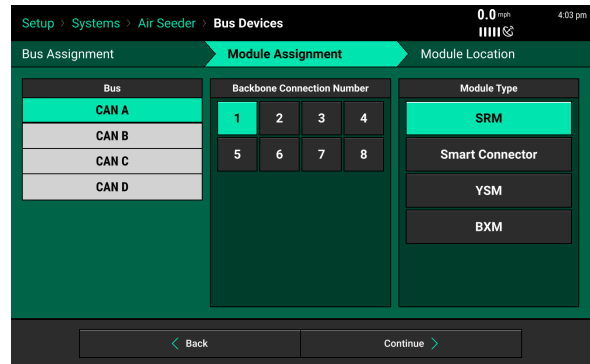
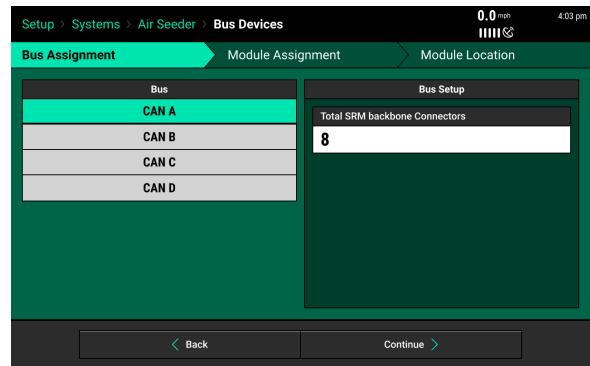
Refer to Appendix B (Tower Style) or Appendix C (CCS/Box Drill Style) for charting correct module assignments.

Module Assignment – For each backbone connection, select the module type present.

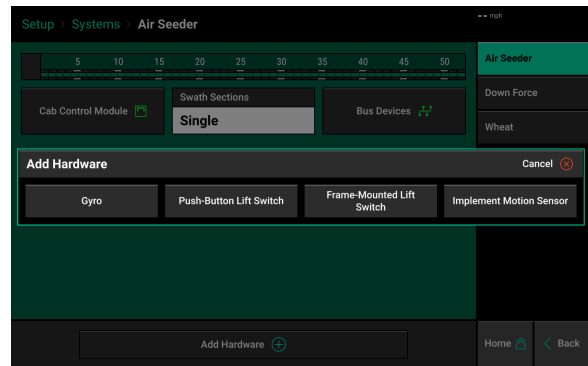
Module Location – Assign each module a location; for each CAN network, select each module and assign a row..

Note: The first module on CAN A must always be the PDM.

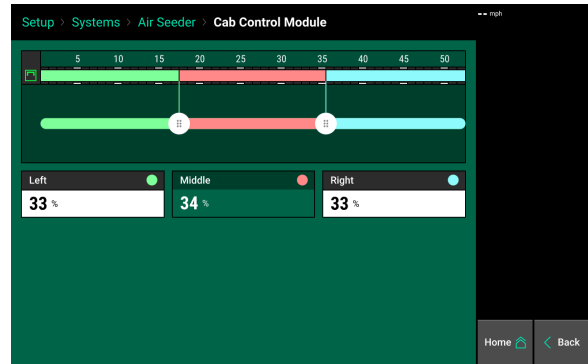
Bus Devices Overview — Once all the modules are assigned, the Bus Devices Overview page shows all of the assigned modules in order. This chart should match Appendix B or C when finished.



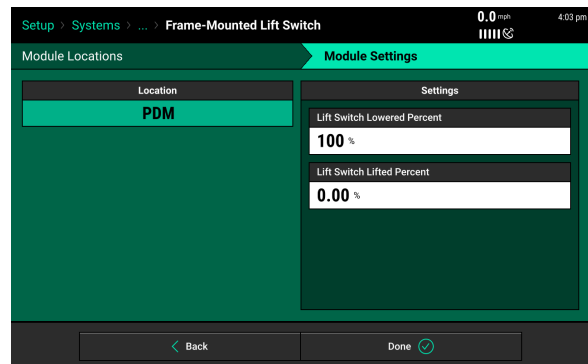
Add Hardware – Once Bus Devices have been set up, click “Add Hardware” to add other hardware such as Lift Switch.



Cab Control Module — The CCM section switches, or middle 3 switches, can be configured to control custom percentages of the implement. Adjust the sliders or tap the boxes to enter a custom percentage.

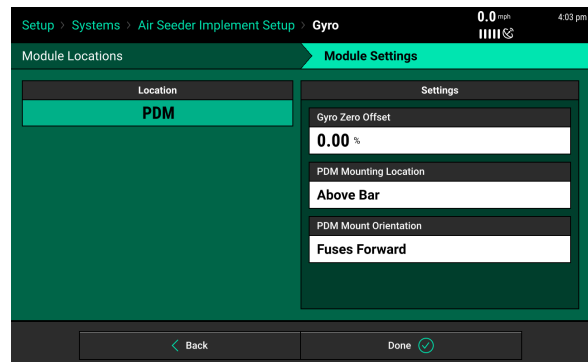


Lift Switch — Add the location and calibration for the lift switches installed. Current lift switch position can be viewed on the diagnose page once the Lift Switch is configured.



Note: if you are using a Frame-Mounted Lift Switch with an **adapter harness (725798)** plugged into an SRM, set up the lift switch as a Push-Button Lift Switch.

Gyro — A Gyro must be set up for any systems with a PDM installed. Check the physical mounting positioning of the PDM to set the PDM mounting location and Fuse orientation in the Gyro settings.



Bus Device Setup Examples

Tower Style Seeder

The sample below from the Module Index Worksheet – Tower Style Seeder (Appendix B) is from an Air Seeder with 5-row towers. Fill out the worksheet as follows:

Step 1:

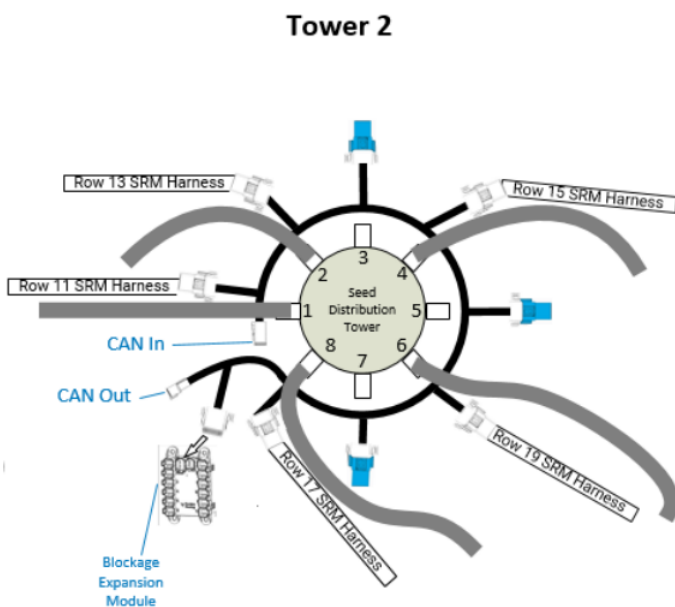
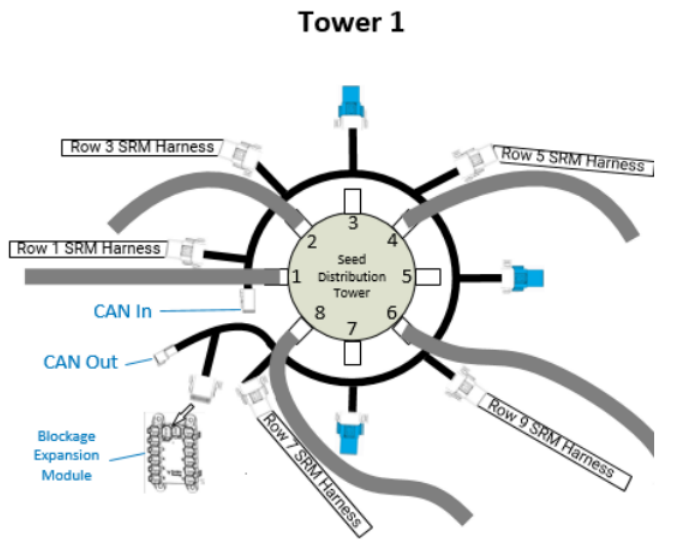
Indicate the Tower No. the backbone is installed on.

Step 2:

In “Module Type” column, mark an “X” for SRM or BXM.

Step 3:

Fill out “Row Assignment” according to what in-ground rows are connected to each backbone connector.



Step 4:

Starting at the 1st backbone, create an index of every module connected to each CAN network (“Module Number” column). If any connectors have row plugs, skip that row. Continue numbering sequentially through the end of the CAN network (note red arrow). Repeat same process for additional CAN networks.

CAN A								
SRM Backbone Connector	1st Backbone			1st Backbone				
	Tower No. _____			Tower No. _____				
	Module Number	Module Type		*Row Assignment	Module Number	Module Type		*Row Assignment
PDM	SRM	BXM			SRM	BXM		
	1							
1	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	11
2	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3	9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	13
3		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
4	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	15
5		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
6	5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9	11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	19
7		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
8	6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	17
9	7	<input type="checkbox"/>	<input checked="" type="checkbox"/>	*2	13	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
10		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
11		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
12		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
13		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	

Using this example, configure the Bus Devices on the 20|20 as follows:

CAN A Module Assignment:

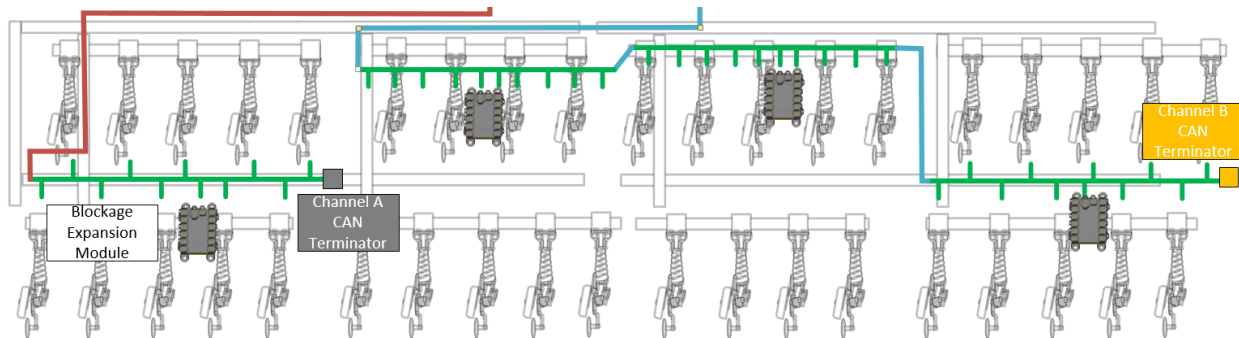
- Backbone Connector 1 – SRM
- Backbone Connector 2 – SRM
- Backbone Connector 3 – SRM
- Backbone Connector 4 – SRM
- Backbone Connector 5 – SRM
- Backbone Connector 6 – BXM

CAN A Module Location:

- SRM – PDM (only on CAN A)
- 1|SRM – Row 1
- 2|SRM – Row 3
- 3|SRM – Row 5
- 4|SRM – Row 9
- 5|SRM – Row 7
- 6|BXM – Tower 1

CCS/Drill Style Example

The sample below from the Module Index Worksheet – CCS/Box Drill Style Seeder (Appendix C) is from an Air Seeder with 38 rows split into 2 CAN networks, CAN A (red line) and CAN B (Blue line), with four Blockage Expansion Modules (BXMs).



In the above scenario, the Module Index Worksheet – CCS/Box Drill Style Seeder should be filled out as follows:

Step 1:

Make a note of the in-ground rows that each BXM is plugged in between (CAN A: rows 6&7; CAN B: rows 15&16, 24&25, and 33&34).

Step 2:

Mark the module present on each backbone connector (SRM or BXM)

Step 3:

For each network, label the Row # according to the SRM Backbone connection they are connected to. For BXMs, assign the BXM to the row number just before the location of the BXM, for consistency. (Ex: BXM plugged in between row 9 and row 8 — label it Row 8).

Step 4:

For each CAN network, number sequentially on the “Module Number” row for each backbone connection that has a module present.

SeederForce Row by Row Example - CCS/Box Drill

		CAN A																																									
SRM Backbone Connections	PDM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39			
Module Number		1	2	3	4	5	6	7	8	9	10	11	12																														
SRM Connected		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																														
BXM Connected																																											
Row #		1	2	3	4	5	6	7	8	*8	9	10																															

		CAN B																																											
SRM Backbone Connections		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40				
Module Number																																													
SRM Connected		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BXM Connected																																													
Row #		11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38															

**Note: In current software BXMs must be assigned a row, it is recommended on a CCS seeder the row just before the BXM is used.*

Using the above example, configure the Bus Devices on the 20|20 as follows:

CAN A Module Assignment:

- Backbone Connector 1 – SRM
- Backbone Connector 2 – SRM
- Backbone Connector 3 – SRM
- Backbone Connector 4 – SRM
- Backbone Connector 5 – SRM
- Backbone Connector 6 – SRM
- Backbone Connector 7 – SRM
- Backbone Connector 8 – BXM
- Backbone Connector 9 – SRM
- Backbone Connector 10 – SRM
- Backbone Connector 11 – SRM

CAN A Module Location:

- SRM – PDM (only on CAN A)
- 1|SRM – Row 1
- 2|SRM – Row 2
- 3|SRM – Row 3
- 4|SRM – Row 4
- 5|SRM – Row 5
- 6|SRM – Row 6
- 7|SRM – Row 7
- 8|SRM - Row 8
- 9|BXM - Row 8
- 10|SRM - Row 9
- 11|SRM - Row 10

Included below is another configuration example, for a Rockshaft controlled system rather than row by row SeederForce which would have a SRM on every row.

SeederForce Rockshaft Control Example - CCS/Box Drill

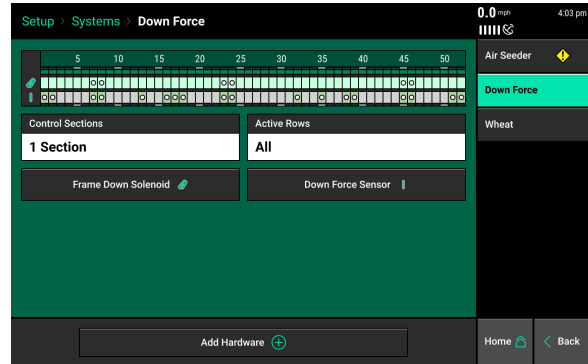
		CAN A																																								
SRM Backbone Connections	PDM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39		
SRM Backbone Connection Index																																										
SRM Connected	X	X	X							X	X											X	X																			
BXM Connected									X												X																					
Row #		1	2	3	4	5	6	7	8	*8	9	10	11	12	13	14	15	16	17	18	*18	19	20	21	22	23	24															

		CAN B																																									
SRM Backbone Connections		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40		
SRM Backbone Connection Index																																											
SRM Connected	X	X												X	X											X	X										X	X					
BXM Connected												X											X																				
Row #		25	26	27	28	29	30	31	32	33	34	35	36	*36	37	38	39	40	41	42	43	44	45	46	*46	47	48	49	50	51	52	53	54	55	56	57	58						

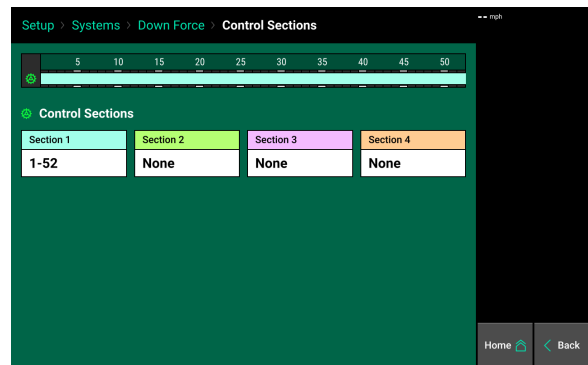
**Note: In current software BXMs must be assigned a row, it is recommended on a CCS seeder the row just before the BXM is used.*

Systems – Down Force

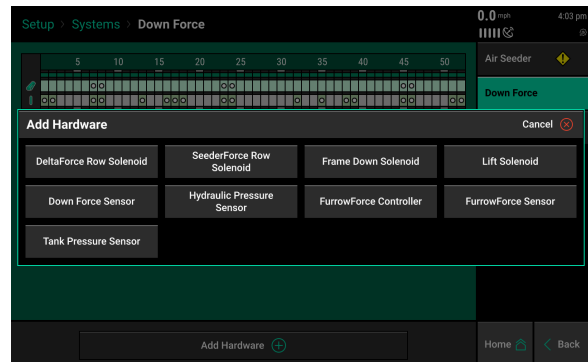
When a DownForce system has been added in Equipment it will appear on the Systems menu, select DownForce on the Systems screen to configure.



Select “Control Sections” and make sure all rows are assigned to a section (in most scenarios all rows can be assigned to one section.)



Click on “Add Hardware” at the bottom of the screen. There are multiple options to choose from, depending on the configuration of the system.

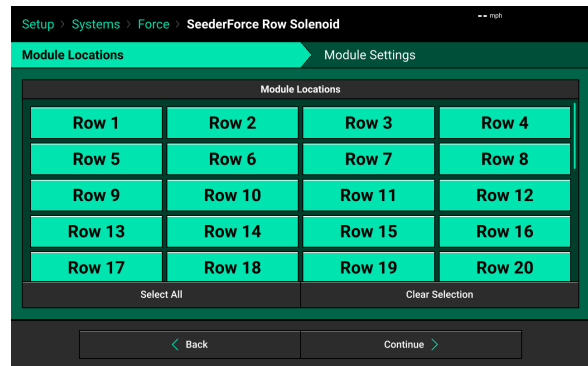


- DeltaForce Row Solenoid — Used on Planters only: Do not use for Seeders
- **SeederForce Row Solenoid — Select for row by row SeederForce Systems**
- **Frame Down Solenoid — Select for Rockshaft Frame Controlled Systems**
- Lift Solenoid — Used on Planters only: Do not use for Seeders
- **Down Force Sensor — Select to add all Down force Sensors (Load Cells)**
- **Hydraulic Pressure Sensor — Select for all most controlled Down Force Systems**
- FurrowForce Controller, FurrowForce Sensor, Tank Pressure Sensor — Not used on Seeders

SEEDERFORCE ROW SOLENOID- Row by row SeederForce Systems

Select Add Hardware and select SeederForce Row Solenoid.

Select the Rows that have a SeederForce Solenoid (Cylinder) on them, and then click Continue

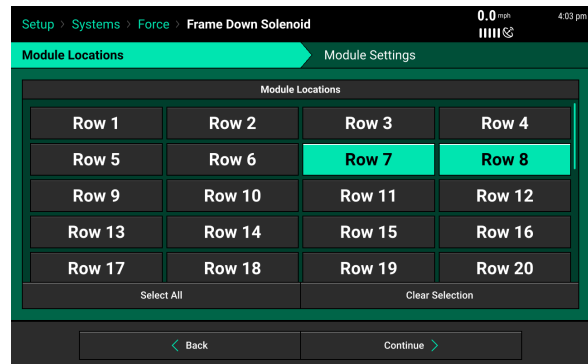


Cylinder Type and Max DownForce can be specified on each row. The only cylinder type available is “SeederForce Single Row”. If Rockshaft control is being used instead, it is configured in the Frame Down Solenoid option. Click Done when finished.

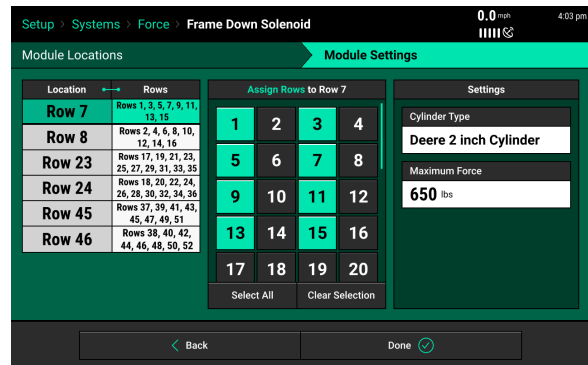
FRAME DOWN SOLENOID- Rockshaft Controlled Systems

Select “Add Hardware” and select “Frame Down Solenoid.”

Select the rows that have a Frame/Rockshaft control solenoid connected. Refer to Appendix E.



Assign the rows on the corresponding frame section that each solenoid are controlling. Refer to Appendix E.



Cylinder type must be selected for each row. Cylinder type may differ across the seeder.

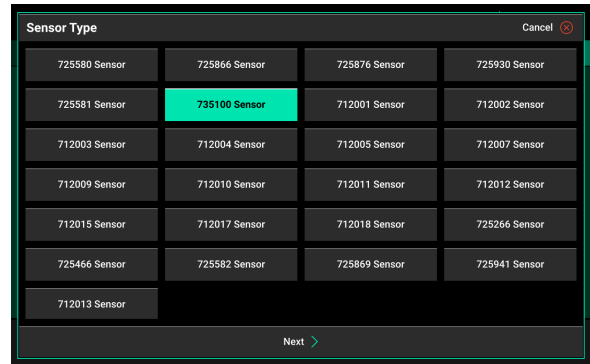
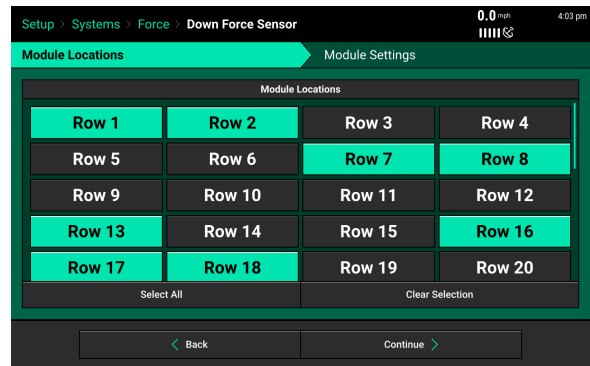
Note: The cylinder type, or dimension, refers to the piston head diameter. This measurement can be found on the data tag on JD cylinders.

DOWN FORCE SENSOR

Select “Add Hardware” and select “Down Force Sensor”.

Select the rows that have a down force sensor on them. Refer to Appendix E.

Change the Sensor Type to 735100 for all Seeder down force sensors.



Although the calibration offset can be manually adjusted, it should always be set through the Zero Down Force Sensors Calibration and not manually adjusted unless otherwise directed by Product Support.

To remove hardware, select the assigned hardware box (such as SeederForce Row Solenoid in Figure1) and then select “Clear All” on the row assignment page (figure2). Click Done.

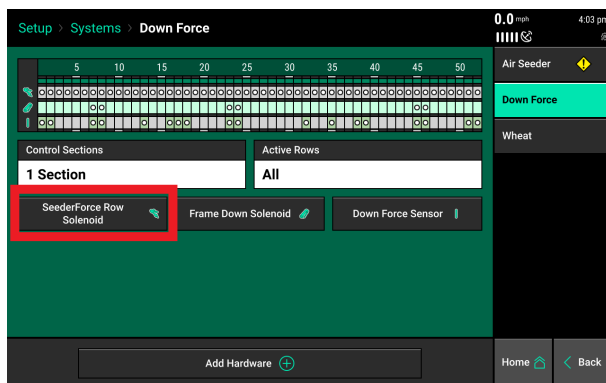


Figure 1.

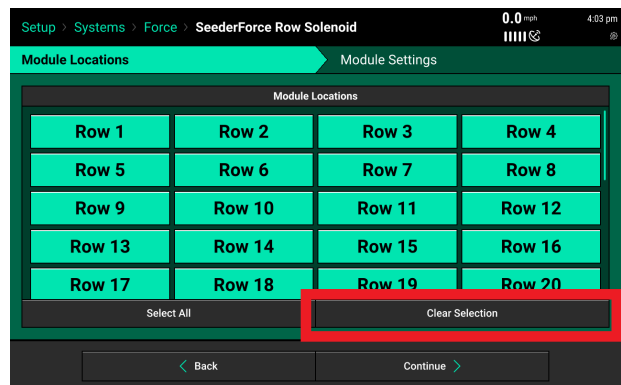
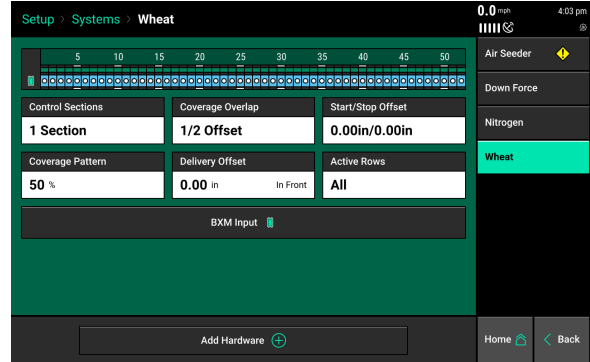


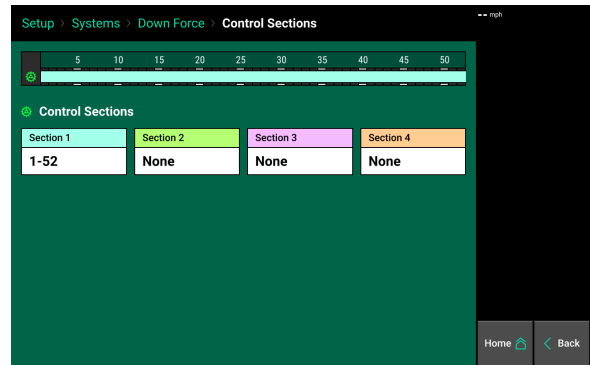
Figure 2.

Systems - Granular Products

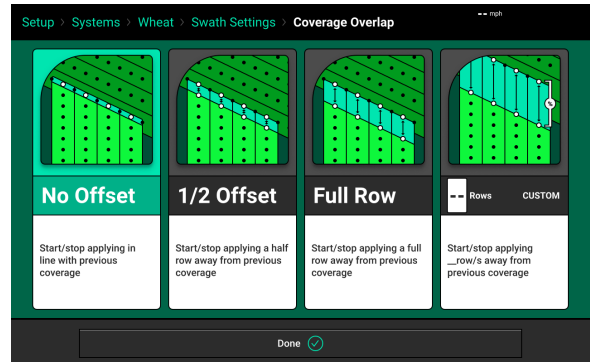
Click on products (Nitrogen and Wheat in example to the right).



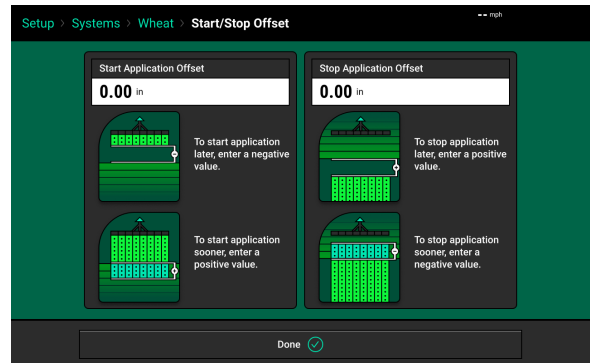
Control Sections - verify all rows are assigned to a section.



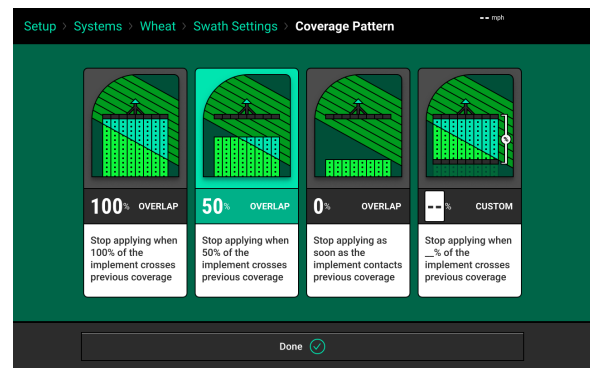
Coverage Overlap – select coverage overlap; Full Row, 1/2 Offset, No Offset



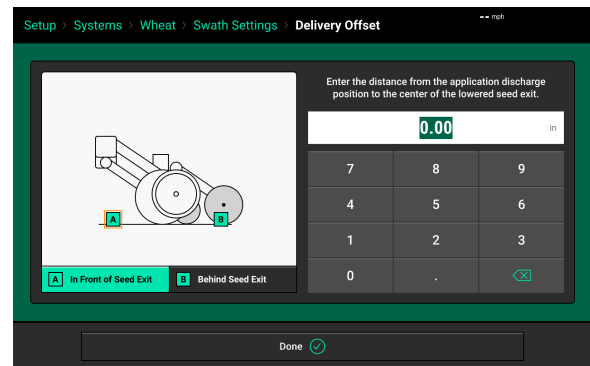
Start/Stop Offset – adjustment of application start and stop timing.



Coverage Pattern – setting for when application swaths off into diagonal coverage area.



Delivery Offset – adjustments for distance between application position and main discharge position.



Active Rows – allows user to activate only select rows.

ADDING HARDWARE

Click on “Add Hardware” to add any hardware associated with product.

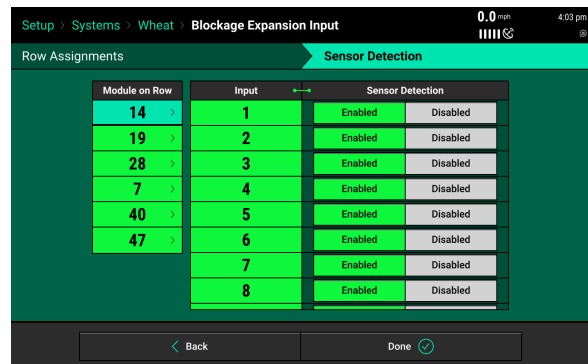
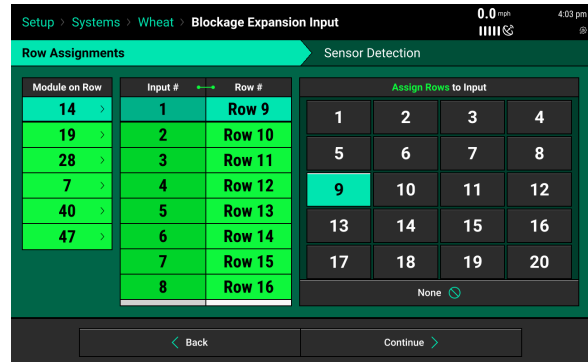
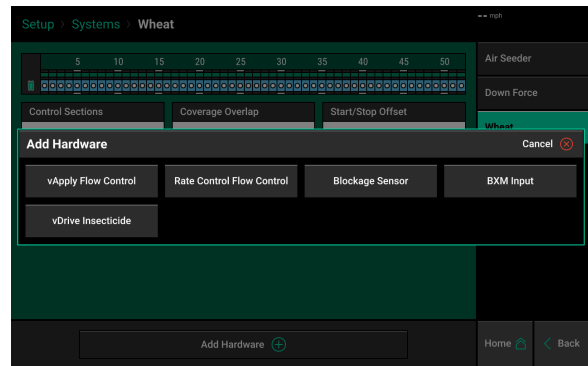
Any product monitoring blockage sensors will need the BXM hardware set up.

For each module (selected in “Module on Row” column) assign each Input a Row. (The BXM locations are pre-determined by the Bus Devices Configuration.)

Note: In some applications a BXM may have inputs assigned to two different products. (Ex— BXM connected to both Wheat and Fertilizer blockage sensors. In this case, you would only assign the inputs associated under the product currently being setup.

Sensor Detection should be left on Enabled when powered by the 20|20 system. In most applications Sensor Detection should be left enabled.

Repeat product setup for all products on the Systems screen.



BXM Setup Example

The sample below from the BXM Port Assignment Worksheet (Appendix D) is from an Air Seeder with 8-row towers. Fill out the worksheet as follows:

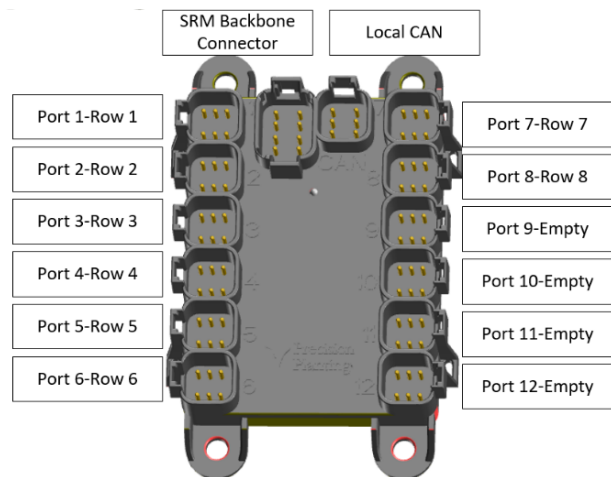
Step 1:

Assign a Tower # to each BXM; this numbering could be based on the manufacturer's numbering system, or a custom system. BXM numbering is based on the order the SRM backbones are connected in the CAN network, tower numbering refers to the physical location of the seed distribution towers. It is highly recommended that seed distribution towers are labeled with a number so the operator can quickly identify the proper tower.

Step 2:

Assign each Input a Row according to what blockage sensors are plugged in. Following a sequential order is recommended but not necessary.

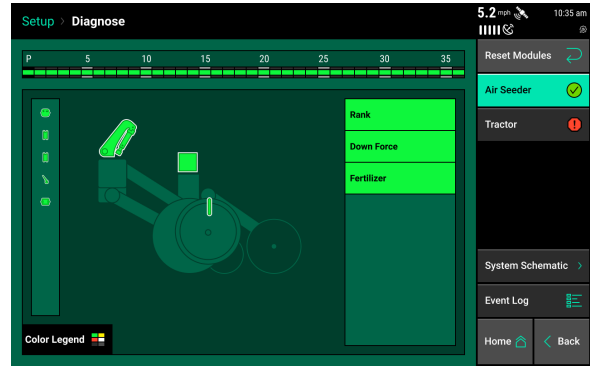
CAN A			
BXM #1		BXM #2	
Tower #_1		Tower #_3	
Input	*Row	Input	*Row
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9		9	
10		10	
11		11	
12		12	



Note: CCS/BOX DRILL STYLE SEEDERS: Fill out Appendix C similar to the example above, but disregard the Tower Number as there are none present.

Diagnose

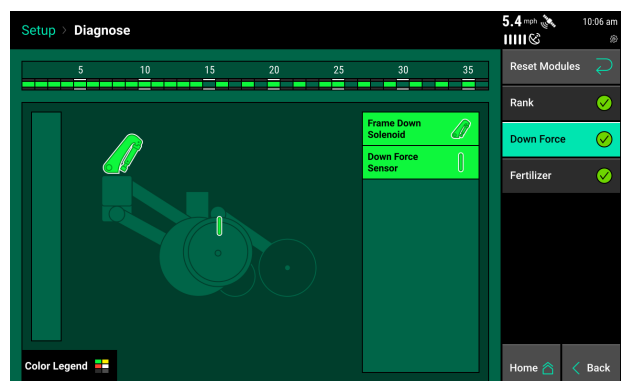
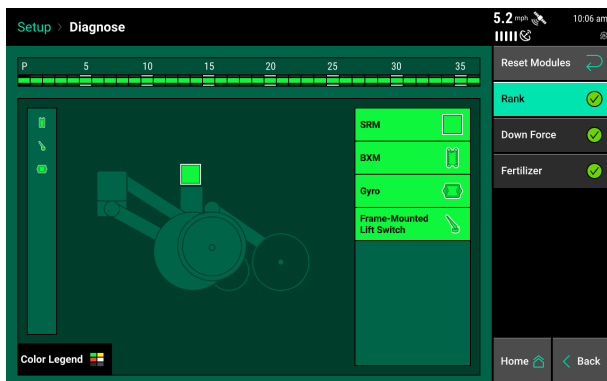
The Diagnose Menu is the primary location for trouble shooting issues related to the operation of the 20|20 system itself and all products configured on the monitor. This is the initial diagnose page. Each product or system that is configured is displayed along with a row unit showing a drawing of the product(s). Additionally, there is bar at the top of the screen displaying the health of each row.



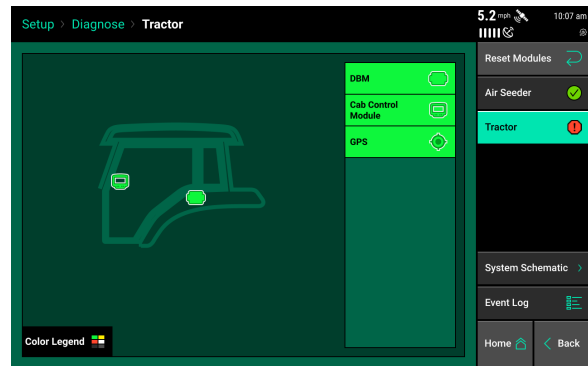
Each of the categories on the main (1st level) diagnose page can be selected to show further details about that system or product.

The following is a tree or list of where modules are generally listed on most Air Seeder systems. Location may change depending on configuration

- **Rank**
 - **SRM:** Voltage and Bus CAN errors of all SRMs
 - **Lift Switch:** current position and state
 - **Gyro:** current acceleration and turn rate
 - **BXM:** Voltage and Bus CAN errors of BXM modules (does not include state of BXM inputs)
- **Downforce**
 - **Frame Down Solenoid or SeederForce Row Solenoid:** Commanded psi and current duty cycle
 - **Down Force Sensor:** lbs- current measured weight on down force sensor
- **Fertilizer, Wheat, or other Product Name**
 - **BXM Input:** current state of Flow on each BXM input
 - **Rate Control (when applicable):** Rate, commanded Rate, Motor speed, Motor speed command, Duty cycle, Voltage
 - **Blockage Sensor (when applicable):** Flow state, supply voltage



When on the 1st level diagnose page, either Air Seeder or Tractor can be selected. All Air Seeder products (BXM, Downforce, etc) are under the Airseeder tab, while components that are in the Tractor cab are listed under “Tractor”. The tractor components include the DBM, Cab Control Module, and GPS



COLOR LEGEND

Select “Color Legend” to view an explanation of what each color indicates.

Green - the system is working correctly and communications are good.

Yellow - a Device or sub-component is not 100%.

Red - Device has failed, or is expected, but not detected.

White - Device is detected, but is not expected.

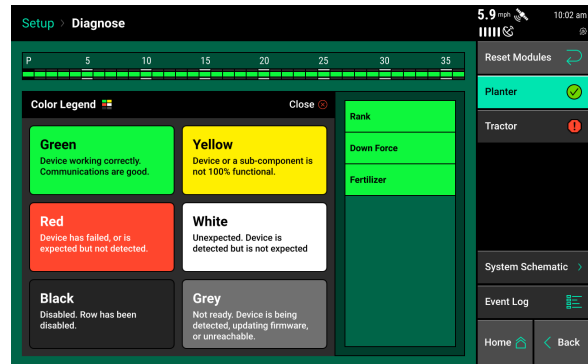
Black - Row has been disabled in the planter configuration.

Gray - Device is being detected, updating firmware, or unreachable.

All systems should be Green before using the system in the field. The color of each system on the top level diagnose page will be reflected by any issues within the system. For example if there is an issue on one row, that row number will be a color other than green at the top of the page and the system (e.g. vDrive, DeltaForce, etc....) will also be red. Touch on the system name to view the row by row level two details page. Anything on the level two detail pages that is working correctly (indicated by a green color) will be marked by a different color that fits the color legend. If a system is green on the top level page, then everything will also be green on the level two diagnose page for that system. For more information on product specific diagnose page information page, see the operation guide for that specific product.

The Navigation Menu on the right hand side of the screen offers additional options within the Diagnose Menu.

Reset Modules - Pressing this button breaks and reestablishes communication between the 20|20 components and is often used as a troubleshooting tool for communication issues.



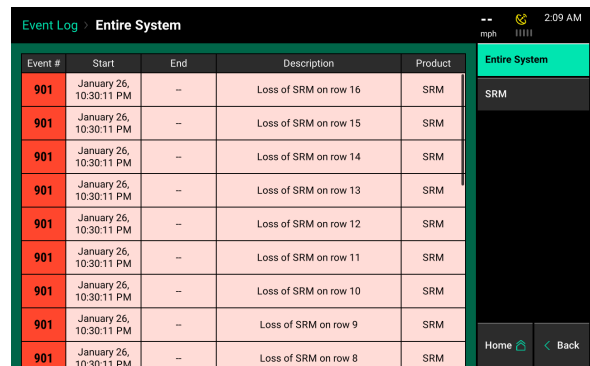
System Schematic - The system schematic is a tree-style overview of all products setup or communicating with the 2020. Select the arrow on each box to show or hide rows. The system schematic shows the location and Product name for each module, as well as the state — signified by color.



Event Log

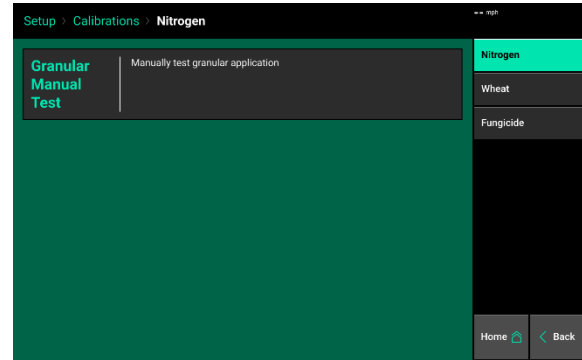
Select the Event Log button to view a list of all event codes/error codes that have happened on the system. The Event Log is in order from the most recent event to the oldest event with the newest event codes at the top of the list. All events will have a number and a date/time when the event happened along with a description of the event. Select any event code to view additional details for that specific code

Additionally, event codes can be sorted by a system type. Select the system type on the right hand of the screen (e.g. SRM). System types will only be available for selection if there are event codes for specific systems. Otherwise, select “Entire System” to view all event logs.



Calibration

Calibration on the Setup Menu will allow the user to perform tests and calibrations based on the products and systems installed. Tests and calibrations available may include GPS Offset Check, Lift Switch Calibration, Radar Calibration, see below for further descriptions of these tests.



GYRO CALIBRATION

Determines the correct Zero Offset percentage setting to meet the desired range.

Tractor must be STOPPED to perform test.

RESET FORCE DIAGNOSTICS

Manually reset event codes for Down Force systems; do not use unless directed to by Product Support.

ZERO LOAD SENSORS

Determines the correct zero offset for the Force Application's Load Sensors.

Implement must be RAISED to perform test.

GRANULAR MANUAL TEST

Manually test granular application- manually adjust rate and speed while monitoring system performance

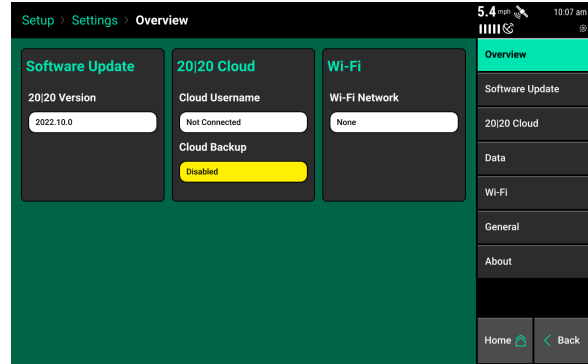
Tractor must be running and systems functional to perform test

Settings

Settings on the Setup Menu will allow the user to manage data, change display configurations as well connect to a wifi network for cloud syncing.

Overview

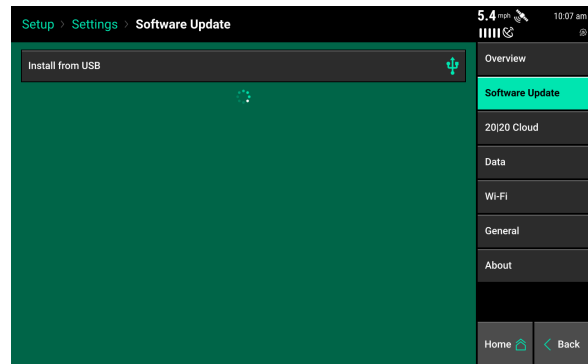
The Overview page shows the Software version, Cloud connection and Wifi Network at a glance. Clicking any of these will jump to the Software Update, 20|20 Cloud, or Wi-Fi page, respectively.



Software Update

Select the Software Update button on the navigation tab to change the software version on the Display Base Module and Display.

Install from USB – Software can be downloaded for free from the Precision Planting website and saved to a USB drive. Ensure the software file is on the root directory on the USB drive. Place the USB drive in the side of the display and then select “Install from USB”. All software versions that are correctly saved to the USB drive will be displayed. Select the software version to update the monitor too and wait for the monitor to reboot. This process will update both the Display Base Module and Display. If two displays are connected, an extra reboot may be necessary for the second display to update (or go through the update process a second time, with the USB stick plugged into the second display.)



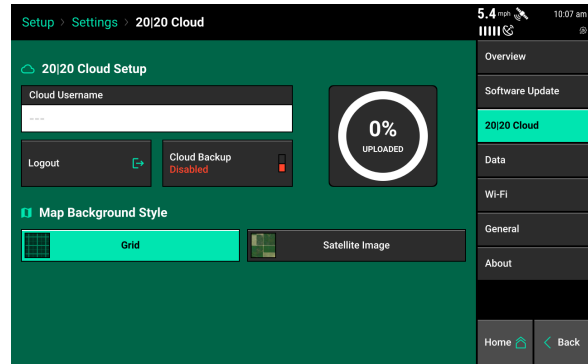
Install over WiFi – Software can be downloaded over WiFi once the system has been connected to WiFi. There will be a list of software versions below ‘Install from USB’ that the system can be upgraded/downgraded to.

20|20 Cloud

Allows the user to login into their 20|20 cloud account and visualize satellite background map.

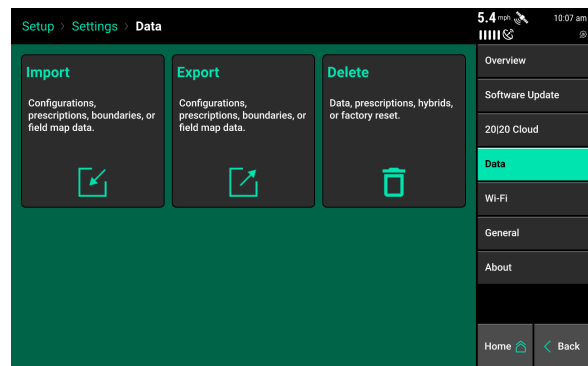
Registration is required before logging into the cloud from the Gen3. Once logged in, the user can backup data to the cloud by toggling on “Cloud Backup Enabled”.

Login, cloud backup, and satellite imagery requires a Wi-fi connection.



Data

Select Import, Export, or Delete to see further options on specific configurations or files to move.

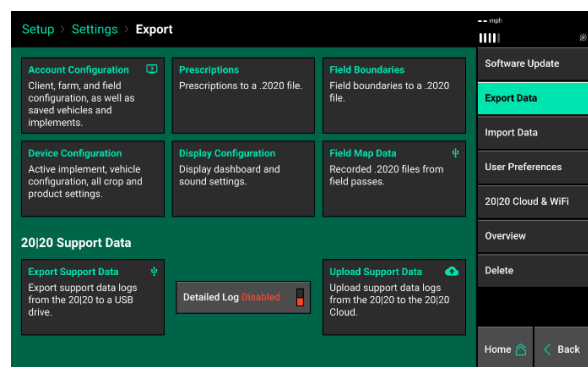


Export Data

Account Configuration – Exports all Client, Farm, Field configurations as well as saved vehicles and implements to a USB Drive. This data can be imported back into a display.

Prescription – Exports all prescription files to a USB drive in a .2020 file format.

Boundary – Exports all boundary files to a USB drive in a .2020 file format.



Device Configuration – Exports the active implement and vehicle configuration, as well as all crop and product settings.

Display Configuration – Exports all Display, Sound, and Layout Settings to a USB drive. After selecting “System Config” enter a name for the configuration. This is done to separate configurations if multiple configurations have been exported to the same USB Drive. This data can be imported back into a display. If dual displays are being used only the Display Config for

the display that the USB is connected to will export the Display Config. Each display will have its own config.

Field Map Data – Displays a list of all data for all implement types. Data is organized by Name, Data Size, Acres, Season, and Pass. Only fields that have data will be displayed. Select the column header to reorganize the list. Use the “Search Fields” button on the navigation pane to search for a specific field name.

Data can be filtered by Season or by the type of field pass at the top of the screen.

Note: Swath coverage is now exported as a part of the Field Map Data. This data can then be imported into another display so that the second implement swaths off to the original implement’s coverage map.

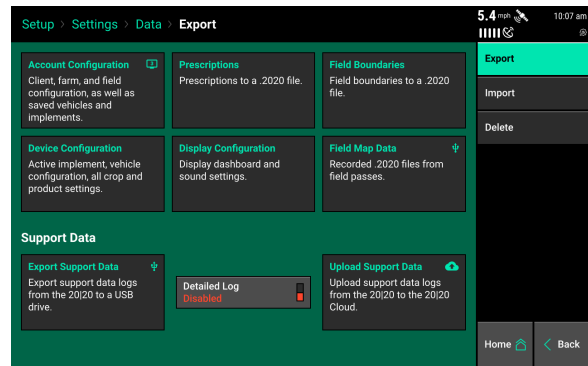
The “Transfer All Fields” will export all data for all fields to a USB drive. To export specific fields, select the field(s) to export by pressing on them (selected fields will be highlighted) and then press the “Transfer Selected Fields” button.

Support Data – Export and Upload Support Data allows diagnostic logs to be sent to Precision Planting Product Support for diagnostic purposes.

Note: Upload Support Data requires WiFi connectivity prior to uploading.

Import Data

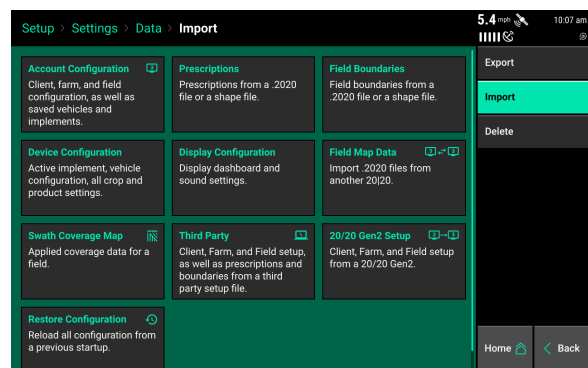
Select the Import button on the Data page to import files onto the display. Files to import into a display must either in a folder that was exported directly from another display or placed directly onto the root directory on the USB drive.



Account Configuration – Import Client, Farm, and Field names as well as saved vehicles and implements.

Prescription – Imports prescription files from a USB Drive. Files must be in the form of Shape Files and include the .shp, .shx, and .dbf file extensions or a .2020 file.

Field Boundary – Imports boundary files from a USB Drive. Files must be in the form of Shape Files and include the .shp, .shx, and .dbf file extensions or a .2020 file.



Device Configuration – Import configuration files to change the active implement (e.g. planter, tractor, combine, or seeder). Crop and system settings such as population, liquid, & insecticide setting will also be imported.

Display Configuration – Import a Display configuration to change the home screen layouts as well as all other settings that can be adjusted on the Display pages under Setup-Systems.

Field Map Data – Import Field data onto the display to view maps, and field information from previously exported data or from other Gen 3 20|20 displays.

Swath Coverage Map – Import a Swath Coverage Map from another implement, currently running in the same field. This allows the system that is importing the file to swath off in the areas of the field planted/applied/harvested by the other implement.

Third Party – Import files created from a third-party setup file, including Client, Farm, Field setup, and prescriptions and boundaries.

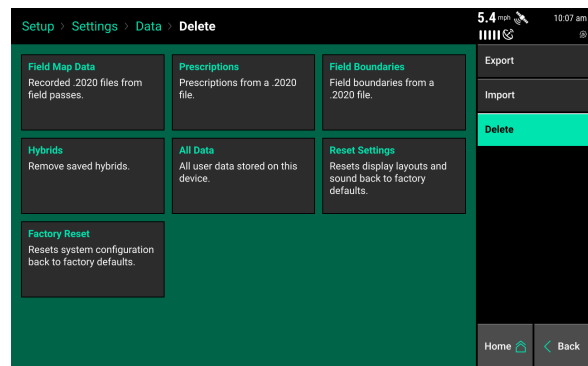
20/20 Gen2 Setup – Import, Client, Farm Field setup from a 20/20Gen 2.

Restore Configuration – Monitor Configurations are automatically backed up and saved by date. Select a date to restore the configuration settings that were saved on that date.

Delete

The Delete screen allows the user to delete data from the 20|20.

Field Map Data – Displays a list of fields that have data. Data can be filtered by Season or by the type of field pass at the top of the screen. Select an individual field, multiple fields, or all fields to delete the data. This does not delete the Client-Farm-Field name for the field.



Prescription and Boundary Files – Displays a list of all shape files imported into the display and recorded on the 20|20. Select either individual, multiple, or all files to be deleted.

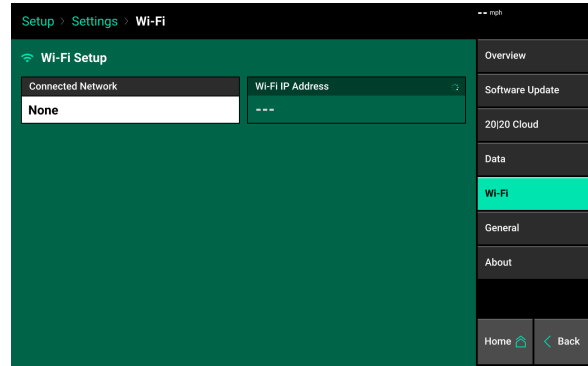
All Data – This deletes ALL user data from the 20|20. All settings, configurations, data, fields, and shapefiles will be deleted. This is a irreversible operation.

Note: Once data is deleted, it cannot be recovered.

Wi-Fi

Allows the user to connect to any password protected wifi network.

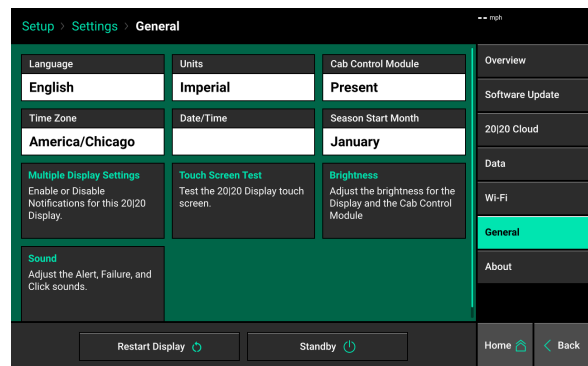
Note: Wifi network must be a secure network (password protected).



General

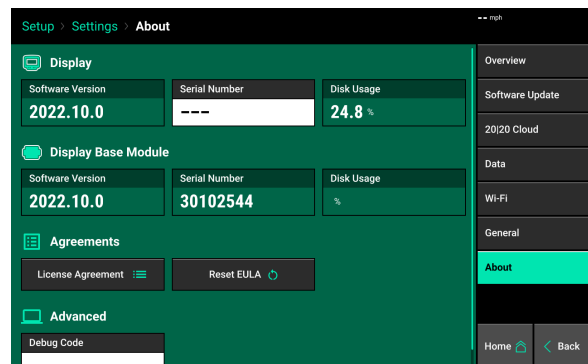
Allows the user to change display configurations.

- Language
- Units — Imperial or Metric
- Cab Control Module — Present or Not Present (Must be present for most control systems)
- Time Zone
- Date/Time
- Season Start Month
- Multiple Display Settings — Enable or Disable notifications for this 20|20 display
- Touch Screen Test — Test the 20|20 display touch screen
- Brightness — Adjust the brightness for the Display and CCM
- Sound — Adjust the Alert, Failure, and Click sounds.



About

Shows current information about the 20|20, including Software version, Serial Number, and Disk Usage.



Appendix Index

Appendix A -

Understanding Blockage Monitoring Metrics

Appendix B -

Module Index Worksheet — Tower Style Seeder

Appendix C -

Module Index Worksheet — CCS/Box Drill Style Seeder

Appendix D -

Blockage Expansion Module (BXM) Input Assignment

Appendix E -

SeederForce Rockshaft Worksheet

For Tower Style Seeders, use Appendix B and D

For CCS/ Box Drill Style Seeders, use Appendix C and D

Appendix E is used on box Tower and CCS/Box Seeders whenever SeederForce Rockshaft Control systems are present.

Appendix A — Understanding the Home Screen Metrics

Blockage Monitoring Metrics Defined

Note: “Product” will be replaced by system’s nickname as defined by the user.

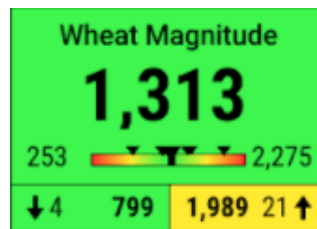
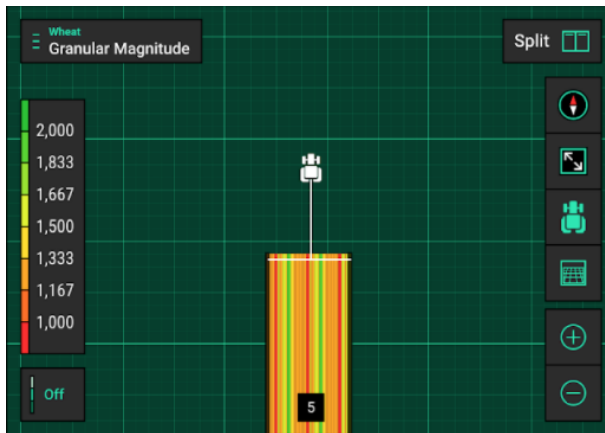
“Product” Magnitude

A relative measurement comparing the amount of a product being applied in a given area.

Value Range: 0-10,000 k

Use Case: A row by row comparison of the amount of product being applied.

Available Widgets:



User inputs: Set by grower inputting a target on the granular control page (i.e. 360 lb/acre), and alerts/alarm being driven by percentages; alerts options - 10%, 20%, 30%, 40%, Custom, Disabled.

“Product” Uniformity

A measure of how uniform the product magnitude is across the implement.

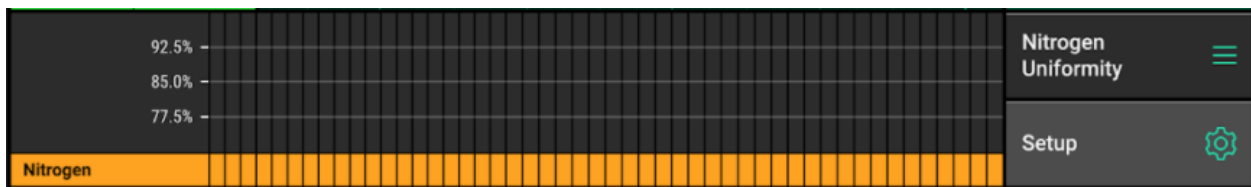
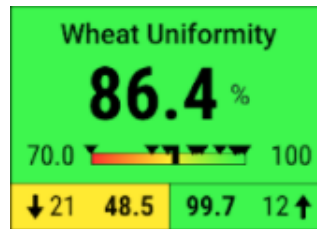
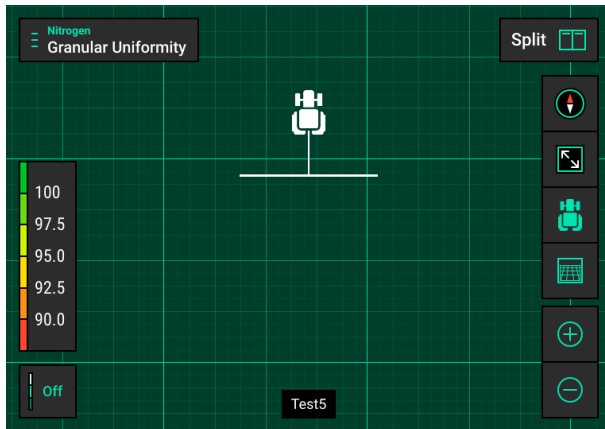
Row uniformity: % difference of that row compared to average magnitude across implement

Implement uniformity: average of all row uniformity percentages across the entire implement

Value range: 0-100%; 100% is perfect

Use Case: An overall measurement for uniformity, but also will pick up which rows are the worst.

Available Widgets:



User inputs: Set by grower selecting alerts/alarm percentages. Alert (Yellow) number and Alarm (Red) number.

Note: Alerts (will come later) - 10%, 20%, 30%, 40%, Custom, Disabled.

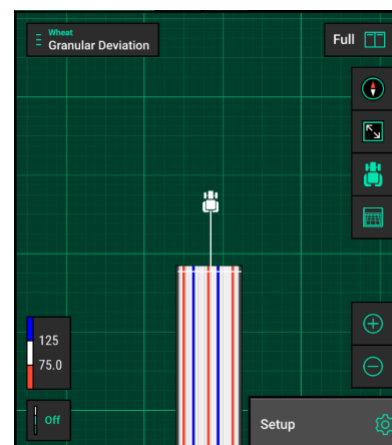
“Product” Deviation

A measure of how uniform the product magnitude is across the implement, showing both greater than and less than rates.

Use Case: Quick identification of which rows have lower and higher rates that acceptable to the grower.

User inputs: Set by adjusting legend; default Legend - 3 buckets: >125% (blue), 125%-75% (white), <75% (red).

Available Widgets:

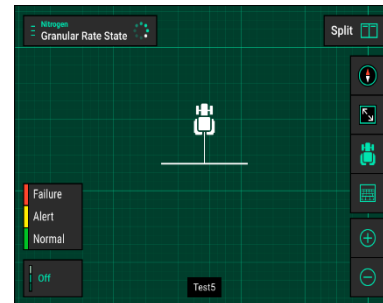


“Product” Rate State

Maps the “state” of each row; ie. healthy (green), alert (yellow), alarm (red).

Use Case: gives a historical and geographical reference of alerts and alarms while operating in the field.

Available Widgets:



Blockage

Simple status of particles being detected or not detected.

Green indicates a sensor pulse has been detected in the last “n” period of time.

Red indicates no sensor pulse has been detected in the last “n” period of time.

User defines what the “n” period is in seconds, so they can adjust the sensitivity of the metric (available only in future release).

Available Widgets: Map

Appendix B

Module Index Worksheet - Tower Style Seeder			
Make/Model:	# of Rows:	KEEP FOR FUTURE REFERENCE	
Owner:			
<p>Notes: The backbone sequence will be determined by the order in which they are plugged into the CAN network. *Row Assignment refers to the in-ground row. **BXM Location refers to the backbone connector that is plugged into the Blockage Expansion Module - mark with an "X"</p> <p>Steps:</p> <ol style="list-style-type: none"> 1. Label the Tower No. for each backbone. Tower numbering can follow the manufacture's numbering system or a custom numbering pattern, it is recommended that the towers are clearly labeled so the operator can quickly identify each tower. 2. In "Module Type" column, mark an "X" on SRM or BXM in each SRM Backbone connection that has a module present. 3. In "Row Assignment" column, assign in-ground row # for each backbone connection. Note: Assign BXM to first row on each backbone. 4. In "Module Number" column; number sequentially across the entire CAN network, for each row drop that has a device present. If PDM is present the SRM in the PDM is the first module on CAN A. Any backbone connectors without a module connected should not have a Module Number assigned. 			

CAN A																
SRM Backbone Connector	1st Backbone				2nd Backbone				3rd Backbone				4th Backbone			
	Tower No. _____				Tower No. _____				Tower No. _____				Tower No. _____			
	Module Number	Module Type		*Row Assignment	Module Number	Module Type		*Row Assignment	Module Number	Module Type		*Row Assignment	Module Number	Module Type		*Row Assignment
SRM		BXM	SRM			BXM	SRM			BXM	SRM			BXM		
PDM																
1		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
2		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
3		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
4		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
5		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
6		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
7		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
8		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
9		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
10		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
11		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
12		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
13		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	

CAN B																
SRM Backbone Connector	1st Backbone				2nd Backbone				3rd Backbone				4th Backbone			
	Tower No. _____				Tower No. _____				Tower No. _____				Tower No. _____			
	Module Number	Module Type		*Row Assignment	Module Number	Module Type		*Row Assignment	Module Number	Module Type		*Row Assignment	Module Number	Module Type		*Row Assignment
SRM		BXM	SRM			BXM	SRM			BXM	SRM			BXM		
PDM																
1		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
2		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
3		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
4		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
5		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
6		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
7		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
8		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
9		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
10		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
11		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
12		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
13		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	

CAN C																
SRM Backbone Connector	1st Backbone				2nd Backbone				3rd Backbone				4th Backbone			
	Tower No. _____															
	Module Number	Module Type		*Row Assignment	Module Number	Module Type		*Row Assignment	Module Number	Module Type		*Row Assignment	Module Number	Module Type		*Row Assignment
SRM		BXM	SRM			BXM	SRM			BXM	SRM			BXM		
PDM																
1		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
2		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
3		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
4		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
5		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
6		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
7		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
8		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
9		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
10		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
11		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
12		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
13		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	

Appendix C

Blockage Expansion Module (BXM) Input Assignment											
Make/Model:						# of Rows:			KEEP FOR FUTURE REFERENCE		
Customer:											
<p>Notes: The BXM numbering will be determined by the order in which they are plugged into the CAN network.</p> <p>*Row refers to the in-ground row.</p> <p>Steps:</p> <ol style="list-style-type: none"> 1. Record in-ground row # that is plugged into each BXM Input 2. Record the Tower # (may be manufacturer designation or custom numbering). 											
CAN A											
BXM #1		BXM #2		BXM #3		BXM #4		BXM #5		BXM #6	
Tower # _____		Tower # _____		Tower # _____		Tower # _____		Tower # _____		Tower # _____	
Input	*Row	Input	*Row	Input	*Row	Input	*Row	Input	*Row	Input	*Row
1		1		1		1		1		1	
2		2		2		2		2		2	
3		3		3		3		3		3	
4		4		4		4		4		4	
5		5		5		5		5		5	
6		6		6		6		6		6	
7		7		7		7		7		7	
8		8		8		8		8		8	
9		9		9		9		9		9	
10		10		10		10		10		10	
11		11		11		11		11		11	
12		12		12		12		12		12	

CAN B											
BXM #1		BXM #2		BXM #3		BXM #4		BXM #5		BXM #6	
Tower # _____		Tower # _____		Tower # _____		Tower # _____		Tower # _____		Tower # _____	
Input	*Row	Input	*Row	Input	*Row	Input	*Row	Input	*Row	Input	*Row
1		1		1		1		1		1	
2		2		2		2		2		2	
3		3		3		3		3		3	
4		4		4		4		4		4	
5		5		5		5		5		5	
6		6		6		6		6		6	
7		7		7		7		7		7	
8		8		8		8		8		8	
9		9		9		9		9		9	
10		10		10		10		10		10	
11		11		11		11		11		11	
12		12		12		12		12		12	

Appendix D

Module Index Worksheet - CCS/Box Drill Style Seeder

Make/Model:

of Rows:

KEEP FOR FUTURE REFERENCE

Owner:

1. Starting with the first backbone connection on each network, mark an X for each module present. On CAN A, if a PDM is present the first connection will be the SRM in the PDM.
2. Assign a row to each module, if a BXM is present, assign the previous SRM row number.
3. For each CAN network, number sequentially on the Module Number row for each backbone connection that has a module present.

		CAN A																																																
SRM Backbone Connections	PDM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39										
Module Number																																																		
SRM Connected		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
BXM Connected		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Row #																																																		

		CAN B																																																		
SRM Backbone Connections		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40											
Module Number																																																				
SRM Connected		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
BXM Connected		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Row #																																																				

		CAN C																																																			
SRM Backbone Connections		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36			
Module Number																																																					
SRM Connected		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
BXM Connected		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Row #																																																					

Appendix E

SeederForce Rockshaft Worksheet

1. Record each row with a solenoid plugged into an SRM. 2. Record the rows on the rockshaft that is being controlled by each solenoid	
Frame Down Solenoid	
Location	Rows
<i>Row</i>	
<i>Row</i>	
<i>Row</i>	
<i>Row</i>	
<i>Row</i>	
<i>Row</i>	
<i>Row</i>	
<i>Row</i>	
<i>Row</i>	
<i>Row</i>	
<i>Row</i>	
<i>Row</i>	