USER GUIDE

Trimble® TMX-2050™ Display

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Trimble

Agriculture Business Area

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Responsible Party:
Trimble Navigation
935 Stewart Drive
Sunnyvale CA 94085
Telephone: 1-408 481 8000

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Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.
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c/o Menlo Worldwide Logistics
Meerheide 45
5521 DZ Eersel, NL

Safety Information

Always follow the instructions that accompany a Warning or Caution. The information it provides is intended to minimize the risk of personal injury and/or damage to property. In particular, observe safety instructions that are presented in the following format:

WARNING – This alert warns of a potential hazard which, if not avoided, could result in severe injury or even death.

CAUTION – This alert warns of a potential hazard or unsafe practice which, if not avoided, could result in injury or property damage or irretrievable data loss.

Note – *An absence of specific alerts does not mean that there are no safety risks involved.*

Warnings

WARNING – During the Deadzone calibration, the system moves the vehicle's steering wheel. To avoid injury, be prepared for sudden vehicle movement.

WARNING – Material will be dispensed during calibration. Make sure that the implement is safe to operate.

WARNING – When the temperature of the display case reaches 65° C (149 ° F) the display shows the following: WARNING! HOT SURFACE, DO NOT TOUCH. The display will dim the screen until the temperature returns to normal. Use caution when touching the display when this warning is visible.

WARNING – Incorrect adjustment of *Manual Override Sensitivity* could cause this critical safety feature to fail, resulting in personal injury or damage to the vehicle. Do not to choose a setting that is either too sensitive or not sensitive enough. It is vital to avoid setting the sensitivity so low that the system will not detect any steering wheel motion.

WARNING – Many large and sudden changes in satellite geometry caused by blocked satellites can cause significant position shifts. If operating under these conditions, auto-guidance systems can react abruptly. To avoid possible personal injury or damage to property under these conditions, disable the auto-guidance system and take manual control of the vehicle until conditions have cleared.

WARNING – During flow calibration, the machine will become operational. Take all necessary precautions to ensure user safety. Failure to do so may result in serious injury or death.

WARNING –When you tap the fill disk **Start** button, the machine becomes operational. Take all necessary precautions to ensure user safety. Failure to do so may result in serious injury or death.

WARNING – When the implement is down and the master switch is in the On position, the machine is fully operational. Take all necessary precautions to ensure user safety. Failure to do so could result in injury or death.

WARNING – NH3 is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes, and is dangerous if not handled properly. It may cause severe burns to the eyes, lungs, and skin. Skin, and respiratory-related diseases could be aggravated by exposure. It is recommended that protective gloves, boots, slicker and/or pants and jacket, and chemical-splash goggles that are impervious to anhydrous ammonia are worn at all times. See Safety Information, page 9.

WARNING – Anhydrous valve and flow calibrations require the vehicle and implement to be moving and the implement must be in the ground (the implement lift switch must be down). Take all necessary precautions to ensure user safety. Failure to do so may result in serious injury or death.

Cautions

CAUTION – If you leave the display powered on after shutting off the vehicle's ignition, the display power can drain the battery.

CAUTION – Do not mount the DCM-300 modem in direct sunlight or in areas of high heat. This will cause degraded performance.

CAUTION – If you select a *Vehicle Profile* that is not suitable for your vehicle, you may experience degraded system performance.

CAUTION – Do not use a USB drive in each USB socket at thee same time. If you are attempting to upgrade firmware using a USB drive and another USB drive is already in one of the sockets, the firmware upgrade will fail.

CAUTION – If the vehicle has a master electrical disconnect, make sure the power cable ground connections are not directly attached to the battery terminal. Attach the ground connections of the power cable to the chassis side of the main disconnect so that it is as close as possible to the battery, but still gets disconnected when the master disconnect is turned off. Failure to connect the power cable ground will cause damage to the display.

CAUTION – Make sure the vehicle power is off when you are connecting system components.

CAUTION – Do not press on the screen with a sharp item, such as a pencil. You may damage the surface of the screen.

CAUTION – Wireless, cellular, radio and GNSS signals can interfere with each other. For best performance, mount antennas at least 1 meter away from each other.

CAUTION – Do not apply glass cleaner directly to the touchscreen.

CAUTION – The GNSS antenna may experience interference if you operate the vehicle within 100 m (300 ft) of any power line, radar dish, or cell phone tower.

CAUTION – Obstacles in the field can cause collisions, which may injure you and damage the vehicle. If an obstacle in the field makes it unsafe to continue the Automated Deadzone calibration, stop the vehicle and turn the steering wheel to disengage the system.

1) Wait until the display prompts you that the phase is ready to begin.
2) Look at the screen to determine whether the next phase will require a left or right turn.
3) Reposition the vehicle so that the turn will use the space that you have available.
4) Tap the button to begin the next phase.

CAUTION – The wheels can move abruptly during the Steering Proportional Gain procedure while the Autopilot system tests the hydraulic response to its steering commands. To avoid injury, be prepared for vehicle movement.

CAUTION – The Edit Setup / Diagnostics section is designed for advanced users only. To avoid injury, do not attempt to edit the settings unless you understand what you are doing.

Data Sheet

TMX-2050 display

Technical	
Power	24-28 volts, 3 amps (should be same as on labels)
Processor	1 GHz quad core
Storage	Primary embedded memory - 32 GByte

Mechanical	
Dimensions	312 mm x 214 mm x 45 mm (plus connectors)
Weight	2.5 kg (5.5 lb)
Mount	4 M6 screws on 75 mm centers (3 inch). VESA MIS-D 75

Housing	
Material	Magnesium
Environmental Rating	IP55

Temperature	
Operation	0 °C to 65 °C
Storage	-40 °C to 85 °C

LCD display	
Size	307 mm (12.1 inch)
Touch screen	Capacitive touch
Resolution	1280 x 800

Front-facing camera	
Type	Low light level, color
Resolution	1.3 M pixels

Connections	
USB	USB side (side of display), USB rear (back of display)
Ethernet	RJ45 connector. Power input for TMX-2050 display only.

TM-200 Module

Technical	
Power	9 to 16 volts, 25 amps
Storage	64 megabytes (Flash)

Mechanical	
Dimensions	209 mm x 184 mm x 57 mm (plus connectors)
Weight	2.54 kg (5.6 lb)
Mount	4 M6 (or #12) screws on 165 mm centers (6.5 inch).

Housing	
Material	Aluminum
Environmental Rating	IP55

Temperature	
Operation	-40 °C to 65 °C
Storage	-40 °C to 85 °C

GNSS
Internal 220 channel GNSS receiver, L1 / L2 / GLONASS capable

Connections	
Power (14-pin Ampseal connector)	Power input CAN 2x Digital In / Out 12 volt power output (non-regulated, fused) Ignition Sense
I / O (12-pin DEUTSCH connector)	CAN RS232 Digital In Digital Out Video In (640 x 480 resolution) NTSC & PAL 12 volt power output
Display Ethernet (White 8-pin Ampseal connector)	Display power 28 volt, 2 amp output Display Ethernet Communications Video Out Ignition Sense
Secondary Ethernet (Black 8-pin Ampseal connector)	Ethernet Communications 12 volt power output Video In
GPS / GNSS (TNC connector)	GPS / GNSS antenna 5 volt
Status LED (first from left)	Primary Ethernet connection.
Status LED (second from left)	Secondary Ethernet connection.
Status LED (third from left)	GNSS connection from receiver inside TM-200 module.
Status LED (fourth from left)	Connection from AG-815 radio (if attached).

AG-815 integrated radio

Technical	
Power	Via TM-200 module

Mechanical	
Dimensions	144 mm x 81 mm x 52.5 mm (plus connectors)
Weight	0.55 kg (1.22 lb)
Mount	The AG-815 module attaches directly to the TM-200 module with four M3 x 16 mm screws

Housing	
Material	Aluminum
Environmental rating	IP55

Temperature	
Operation	-40 °C to 65 °C
Storage	-40 °C to 85 °C

GNSS
Internal 220 channel GNSS receiver, L1/L2/GLONASS capable

Radio options	450 MHz radio	900 MHz radio
Frequency range	430 to 450 MHz, 450 to 470 MHz (region-dependent)	902 to 928 MHz
Networks	20 user-selectable channels	40 user-selectable channels
Wireless data rates	128 Kbps	128 Kbps
Modes	Rover (receive only)	Rover (receive only)

Connections	
Radio (TNC connector)	Radio antenna

Contents

CHAPTER 1

Introduction

In this chapter:

The Trimble® TMX-2050™ display is an in-cab touch screen display that provides affordable guidance, steering and precision agriculture functionality.

TMX-2050 display overview

The TMX-2050 display is an easy-to-use advanced field management system which consists of both software and hardware.

Hardware

The display's hardware consists of a 30 cm (12") touch-sensitive, color LCD screen.

Compatibility

TMX-2050 display is compatible with the following automated guidance and steering:

- Trimble Autopilot™ automated steering system
- Trimble EZ-Steer® assisted steering system
- Trimble EZ-Pilot® steering system

TMX-2050 display can use an array of additional products to maximize efficiency, including:

- Creating fields and guidance patterns
- Using guidance patterns for automatic guidance systems
- Logging coverage data
- Output of information for analysis in office-based software (for example Farm Works Software® solutions)
- Field-IQ™ Boom Height Control and Spraying
- Variable rate control

About this guide

This manual describes how to install, configure, and use the TMX-2050 display.

Availability of optional features

All available functions are covered in this manual, however, you may not see all of them on your display. The TMX-2050 display includes many optional features. Only the features you have unlocked will be available to you on the display.

Your comments

Your feedback about the supporting documentation helps us to improve it with each revision. Email your comments to ReaderFeedback@trimble.com.

Additional Trimble resources

Sources of related information include the following:

- **Product manuals and other publications** - Access various publications (including product manuals, release notes and quick reference guides) about Trimble products at http://www.trimble.com/Support/Support_AZ.aspx.
- **Trimble training courses** - Consider a training course to help you use the TMX-2050 display to its fullest potential. For more information, go to http://www.trimble.com/Support/Index_Training.aspx.

Technical assistance

If you cannot find the information you need in the product documentation, contact your local reseller.

Alternatively:

1. Go to http://www.trimble.com/support/index_support.aspx.
2. Select the type of support applicable to you.

If you need to contact Trimble technical support:

1. Go to http://www.trimble.com/global-services/support.aspx.
2. Click Request Technical Support and login to complete a support request.

CHAPTER 2

Display basics

In this chapter:

The TMX-2050 display is a touch screen that responds to common touch screen interactions. The ***Home*** and ***Run*** screens as well as the Field Manager are covered in this chapter.

Powering on or off

Note – *The display must be correctly installed* ***before*** *powering on. For more information, see* *Installation overview, page 73* *and TMX-2050 Display Cabling Guide.*

Automatic power on

If the display is connected to the ignition source, power on the vehicle. The TM-200 Module sends power to the display when the vehicle powers on.

Manual power on

To turn on the display manually, hold the power button down briefly (about half a second). For a photo of the rear view showing the power button, see TMX-2050 display, page 68.

The display powers on, and after a short pause the ***Home*** screen displays.

Automatic power off

If the display is connected to the ignition source, when you switch the ignition off, a shutdown/reboot dialog displays. If you do nothing the display shuts off in 60 seconds.

CAUTION – If you leave the display powered on after shutting off the vehicle's ignition, the display power can drain the battery.

Manual power off

There are two ways to power off the display:

- Hold the power down button for 5 seconds: The system shuts down.
- Hold the power down button for one to two sections: See the steps below.

1. Turn off the display manually by holding the power button down for about two seconds.
2. Chose one of the following options:
   - Shutdown: Powers down the display
   - Reboot: Restarts the display
   - Cancel: Cancels the power off process

Note – *Sometimes after you press the power button and tap* ***Shutdown****, the display does not immediately turnoff. This is because the display is saving settings. The display will power off after all settings are saved.*

Getting help

You can access helpful information about each screen and about the entire TMX-2050 display.

To access...	Tap...	Explanation
Help about a screen		Tap the question mark button. The User Guide displays at the appropriate section.
Help from the menu	 to launch the menu.	At the menu, tap  .The User Guide displays with navigation on the left-hand side.
Topic within the User Guide		Tap the name of the topic. If a topic contains sub-topics, they are displayed. Then tap the sub-topic.
Search		In the search box, you can enter: • One or more words. The search results will list information that contain that one or more of the words or variations of them, with the most relevant at the top. • An exact phrase with quotation marks (for example, "add a field"). The search results will list only the information that contain the exact phrase inside the quotation marks.

Help from the web

To obtain the User Guide from the web, go to http://www.trimble.com/Support/Support_AZ.aspx.

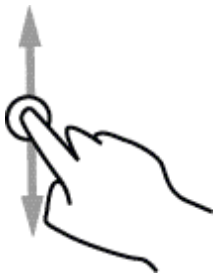
Touch screen basics

If you are unfamiliar with using a touch screen, this section contains the basics of using a touch screen and how to clean it.

Interactive controls

Use your fingers to interact with buttons, maps, lists and selectors.

CAUTION – Do not press on the screen with a sharp item, such as a pencil. You may damage the surface of the screen.

Item	Action	Explanation
Buttons and selectors	Tapping 	*Tap* means to touch a point on the screen and then remove your finger from the screen. A *tap* is a single touch. You do not move your finger while touching the screen. You tap buttons, items in lists, points on a range, and so on.
Lists	Scrolling 	When a list has more items than fit on a screen or in a box, you can move the list to see all items by scrolling up, down, or side to side. To scroll: 1. Touch anywhere in the list and hold your finger on the screen. 2. Move your finger in the direction that you want to move the list - left, right, up or down. 3. Remove your finger when you are satisfied with the position of the list. For examples of lists, see Lists, page 34.

Item	Action	Explanation
Home and ***Run*** screens, Field Manager	Zooming in and out 	You can enlarge the view to see more detail (zoom in) or reduce the view to see less detail but more area (zoom out).To zoom in: 1. Touch the screen where you want to see more detail with your thumb and a finger close together (or you can use two fingertips). 2. Move your fingers apart while still touching the screen. 3. Remove your fingers from the screen when you are satisfied with the zoom level. To zoom out: 1. Touch the screen where you want to reduce the level of detail with your thumb and a finger an inch or more apart (or you can use two fingertips) 2. Move your fingers together while still touching the screen. 3. Remove your fingers from the screen when you are satisfied with the zoom level.
On the ***Run*** screen	Panning 	Panning in a map on the ***Run*** screen moves the map left or right. Panning means you can shift the view to show information that is not in view on the screen. 1. Touch anywhere on the screen with your finger and hold it on the screen. 2. Move your finger in the direction that you want to move the map. 3. Remove your finger when you are satisfied with the position of the map.

Cleaning the touch screen

CAUTION – Do not press on the screen with a sharp item, such as a pencil. You may damage the surface of the screen.

Use the following supplies to clean the touch screen of the display:

- Ammonia-free glass cleaner
- Soft, lint-free cotton cloth
- 50% isopropyl alcohol

CAUTION – Do not apply glass cleaner directly to the touchscreen.

1. Apply a small amount of ammonia-free glass cleaner to the cloth.
2. Gently rub the touchscreen with the cloth.
3. To remove stains or smudges, use a cotton cloth dampened with 50% isopropyl alcohol.

Tip – Clean the touch screen while it is powered down. It is easier to see dirt and fingerprints when the touch screen is dark.

Common controls

Common controls provide a way for you to:

- Complete settings and configuration with Setup panels, page 37
- Enter information using an On-screen keyboard, page 38 and On-screen number pad, page 39
- Work with Lists, page 34
- Turn an option on or off with On / Off buttons, page 36
- Choose values within a range using Adjusters, page 36

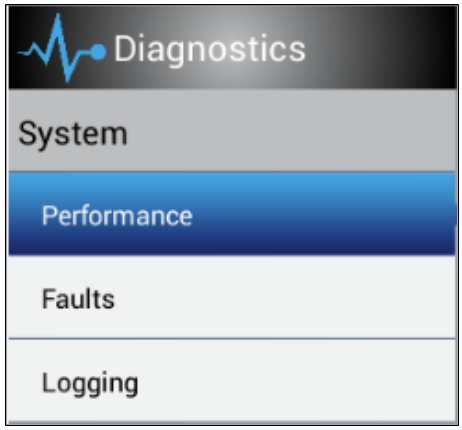
Lists

Lists vary depending on their function.

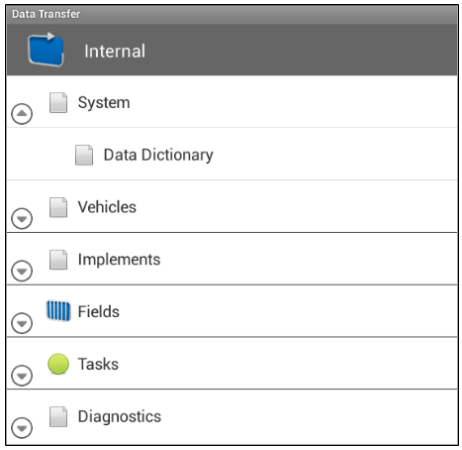
Menu lists

Menu lists contain a list of items that lead to additional information or areas.

Tap a list item to reveal additional information or choices to the right of the menu.



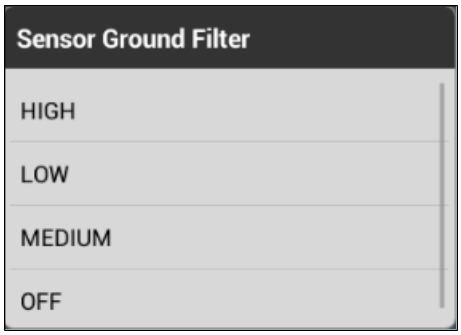
Some lists have expand/collapse capabilities. Tap the up or down arrow to expand and collapse sections.



Selection lists

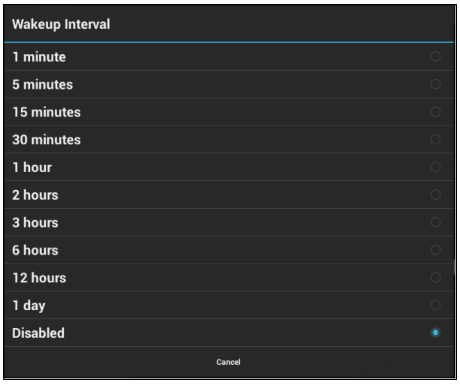
Some lists contain items for you to select. If the list is longer than what is in your view, a scroll bar displays to the right of list items. You can use this to scroll up and down the list.

After you tap your selection, the list closes.



The blue dot indicates which item is currently selected. Tap an item to select it.

If you do not want to change the selection, tap **Cancel**.



On / Off buttons

On/off buttons enable you to turn items on and off.

The red X indicates this item is turned off. Tap to turn the item on.

The green check mark indicates this item is turned on. Tap to turn the item off.

Adjusters

With adjusters, you can select a value from an available range.

Example: Slider bars

The pointer (rectangular button on the slider bar) indicates the value.

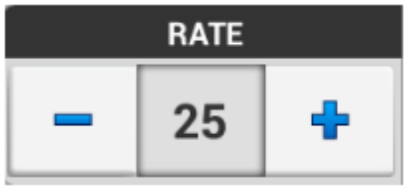
To use the slider bar, you can:

- Change the value by increments - Tap on the plus/minus signs at each end of the slider bar, in the direction that you want to move the pointer.
- Set the value to a number represented by a point on the line - Tap the line at the position where you want the pointer to be.
- Move to a value:
  a. Touch the pointer on the slider bar.
  b. Move the pointer toward the minus or plus sign.
  c. Remove your finger when you are satisfied with the position of the pointer.

- Enter an exact number - If the screen also has a button showing the value, tap it. Then use the on-screen number pad to enter the number.

Example: Increase/decrease adjusters

Adjusters with plus and minus buttons enable you to increase or decrease the number by tapping the plus/minus buttons. You can also tap on the number and enter the number using the on-screen keyboard/number pad.

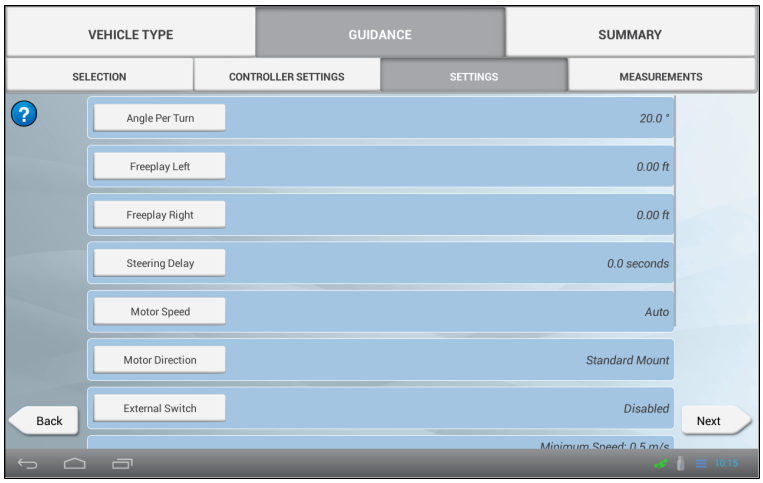


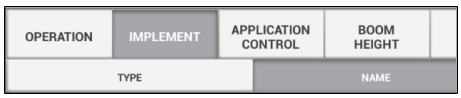
Setup panels

Panels display so that you can setup or configure items. Panels include a set of controls specifically for that setup or configuration.

Setup panel - example 1

Setup panel sections - example 2



Button	Explanation
Next	Tap to go to the next step. (Displayed within the setup panel.)
Back	Tap to go to the previous step. (Displayed within the settings panel.)
	Tap various buttons at the top of the panel to go to steps out of sequence.
	Within the setup panel at the Summary section, tap to save the settings you currently entered and end the setup process.
	Tap **Home** on the display bar at the bottom of the screen to exit the setup process without saving any currently entered settings. (See Display bar, page 40.)

On-screen keyboard

The on-screen keyboard displays when you tap a field for entering information. You can enter text or numbers.

To:	Tap...	Explanation
Enter number(s)	The number on the on-screen keyboard	N/A

To:	Tap...	Explanation
Enter letter(s)		Tap the **ABC** button and the numeric keyboard displays.
Enter number(s)		Tap **123** button and the numeric keyboard displays.
Delete letters or numbers		Tap the **Backspace** button for each number you want to remove.
Remove all the letters or numbers you have entered	 and hold down	Tap and hold the **Backspace** button until everything you entered is removed.
Cause the keyboard to no longer display	 	Tap the **Done** button on the keyboard or the **Down** button on the display bar.

On-screen number pad

The on-screen number pad displays when you tap a field for entering a number.

To:	Tap...	Explanation
Enter a number	The number	N/A
Delete number(s)		Tap the **Backspace** button for each letter or number you want to remove.
Remove all the numbers you have entered	 and hold down	Tap and hold the **Backspace** button until everything you entered is removed.
Cause the keyboard to no longer display	 	Tap the **Done** button on the keyboard or the **Down** button on the display bar.

Display bar

The display bar is always displayed at the bottom of the screen on the TMX-2050 display.

Emergency button

In the middle of the bar, the Emergency button is displayed at all times. To power down all equipment associated with the display, tap this button.

Left-side navigation

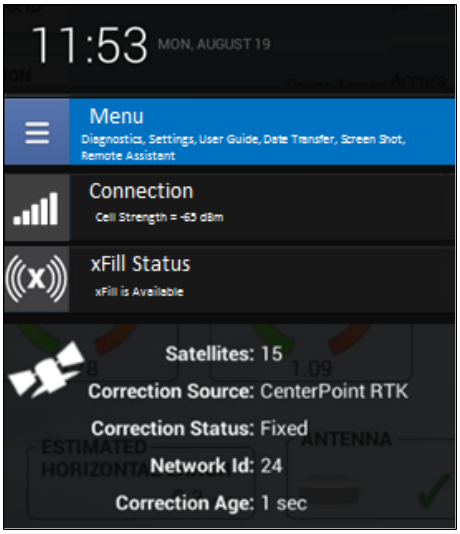
The left side of the bar contains navigation buttons.

Navigation Button	Tap to...
	Return to the previous screen.
	Go to the ***Home*** screen.
	View your most recent views and go to the one of your choice.

Right-side icons and notification list

The right side of the bar contains icons to indicate status, display the time of day, and features being used.

Tap on the right side of the bar to access a list that slides up containing notifications. To close this list, tap anywhere on the screen other than the list.



Tap specific buttons in the notification list to immediately access:

- The main menu
- Details about the status of GNSS, xFill technology, satellites and cellular connection
- Other status items

For more information, see:

- GNSS and xFill technology status, page 232
- Remote Assistant, page 234

Main menu

Tap on the ***Home*** and ***Run*** screens and on the notification list to access the main menu. A panel of buttons displays that you can tap to access the following areas.

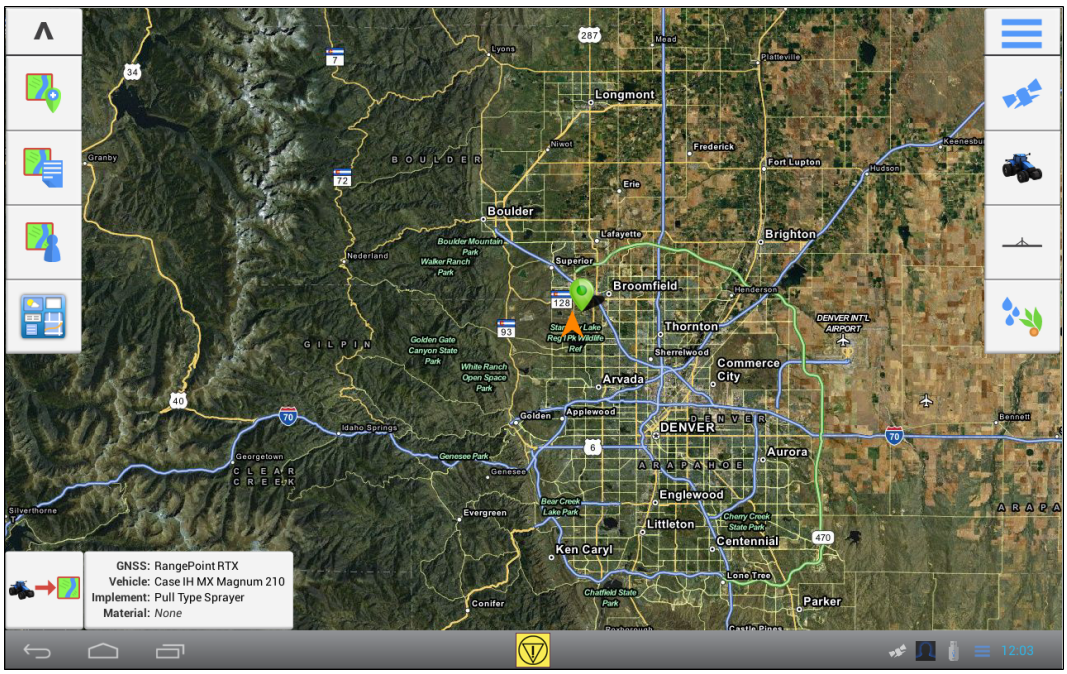
Button	Tap to...
	Display the Diagnostics screen. See Diagnostics, page 216.
	Open the display settings screen. See System, page 65
	Display the User Guide. See Getting help, page 31.

Button	Tap to...
	Display the Data Transfer panel. See Data transfer, page 50
	Take a screen shot. See Screen shots, page 51.
	Open the Remote Assistant. See Remote Assistant, page 234.

Home screen

When you turn on the TMX-2050 display, the ***Home*** screen displays, showing a background of one of the following:

- With a functioning DCM-300 modem and a GNSS/GPS fix - a satellite image of the area.
- Without a functioning DCM-300 modem - a blank screen.



Buttons on the ***Home*** screen include:

- Field management buttons on the left side of the screen
- Setup buttons on the right side of the screen

Field management buttons - left side

Buttons on the left side of the ***Home*** screen are for field management.

Button	Tap to...
Hide 	Hide field operation buttons on the left side of the screen.
Show 	Show field operation buttons on the left side of the screen
Add field 	Add a new field. See Add a field, page 137.
List fields 	Show a list of existing fields. Tap the name of the field to select it. Tap again to hide the list of fields.
Field Manager 	Open Field Manager for the selected field. See Field Manager, page 48.
Connected Farm 	Open the Connected Farm™ dashboard. (Requires a connected DCM-300 modem.)
Enter Field 	Begin field activities by entering the ***Run*** screen. (You must select a vehicle, implement, and field first.) The ***Run*** screen displays, where you can perform field activities, including: • Engage guidance • Log coverage for current operations • Create boundaries, guidance patterns, landmarks, and so on See Run screen, page 44.

Setup buttons - right side

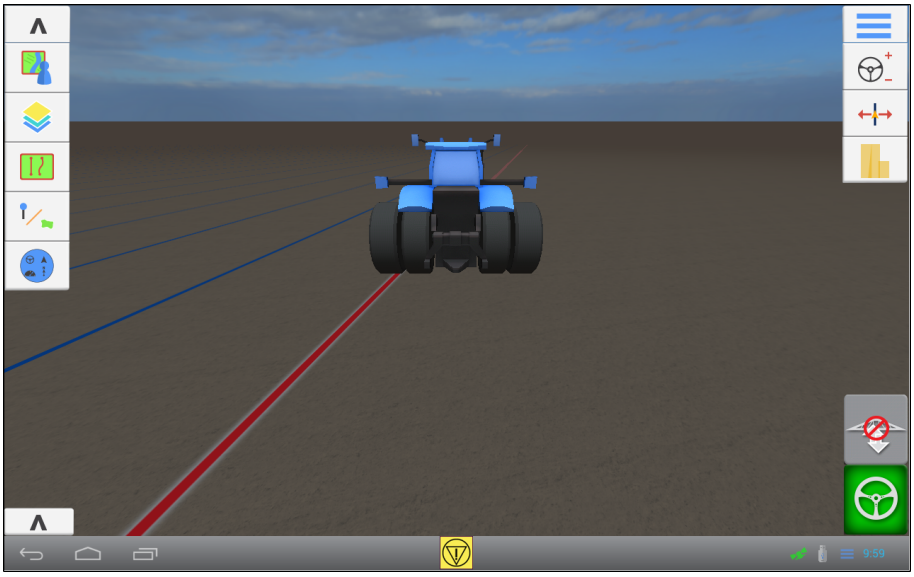
Buttons on the right side of the ***Home*** screen are primarily for setup.

Button	Tap to...
Menu 	Access the main menu. See Main menu, page 41.
GNSS 	Set up GNSS. See GNSS settings, page 88.
Vehicle 	Add, edit or select a vehicle, as well as set up and calibrate an assisted guidance system such as the Autopilot, EZ-Pilot, or EZ-Steer system. See Add a vehicle, page 100.
Implement 	Add, edit or select an implement. Set up and calibrate features for implements such as: • The Field-IQ system Rate and Section Control • The Field-IQ system Boom Height Control • Implement lift switches and sensors See Implement setup, page 144.
Material 	Add, edit, and select materials. See Managing materials, page 180.

Run screen

Before you can enter the ***Run*** screen to perform field activities, you must:

- Select a vehicle (see Introduction to vehicles, page 100)
- Select an implement (see Implement setup, page 144)
- Select a field (see Select a field, page 138)
- Have a GNSS connection (see GNSS settings, page 88)



Field operation buttons - left side

Buttons for field operation enable you to create guidance and landmark elements, view map layers, show or hide status widgets and access Field Manager.

Button	Tap to...
Hide 	Hide field operation buttons on the left side of the screen.
Show 	Show field operation buttons on the left side of the screen.
Field Manager 	Open Field Manager for the selected field. See Field Manager, page 48.
Layers 	View various map layers. Layers represent activities that have occurred. For example, a layer can show the coverage completed so far or the speed traveled over an area. See Layers, page 204.

Button	Tap to...
Guidance Lines and Patterns 	Open the guidance buttons to create: • Boundaries (see Boundary creation, page 190) • Guidance lines (see A+ guidance line creation, page 190, AB guidance line creation, page 189 and Curved line creation, page 193) • Pivot patterns (see Pivot pattern creation, page 194) • Headlands (see Headland and infill pattern creation, page 193) Also see Pattern activation/deactivation, page 192.
Landmarks 	View options to create: • Lines (see Landmark line creation, page 199) • Areas (see Landmark area creation, page 200) • Points (see Landmark point creation, page 199)
Status Widgets 	Open the status widget menu to add individual status widgets, add all widgets or remove all widgets. See On-screen status widgets, page 206.

Feature operation buttons - right side

Using feature operation buttons, you can make adjustments to various features while performing field activities. With the exception of the **Menu** button, these buttons are specific to applications and depend on which features you are using.

Button	Tap to...
Menu 	Access the main menu. See Run screen, page 44.
Adjust Steering 	View options to adjust: • Nudge • Re-mark • Implement Draft Correction See Guidance pattern adjustment shortcuts, page 196.

Button	Tap to...
Adjust Pattern 	View options to adjust boundaries, patterns and lines. (See Guidance pattern shifting, page 195.)
Adjust Rate Control 	View options to adjust: • Actual and Target Rate • Status of Rate Channel • Sensor Status
Adjust Boom Height 	View options to adjust the boom height: • Target Height • System Aggressiveness • Ground or Canopy • Sensors
Logging 	Begin logging your field activity, such as coverage. See Coverage logging, page 209.
Engage Auto Guidance 	Engage your auto guidance system. Also see Vehicle operations overview, page 210.
Engage Boom Height 	Engage your boom height system.

Field Manager

Use the Field Manager™ for the following:

- Edit a field, page 140
- Guidance pattern shifting, page 195
- Boundary editing, page 191
- Landmark editing, page 200
- Tasks, page 202

Note – *Add the field before entering Field Manager. See Add a field, page 137.*

Access Field Manager

You can access the Field Manager from either the ***Home*** or ***Run*** screen. The Field Manager also opens automatically when you enter a field after changing implements or configuration details.

- At the ***Home*** screen, select a field (see Select a field, page 138). Tap  .
- At the ***Run*** screen,tap  . The Field Manager opens the field you are currently in.

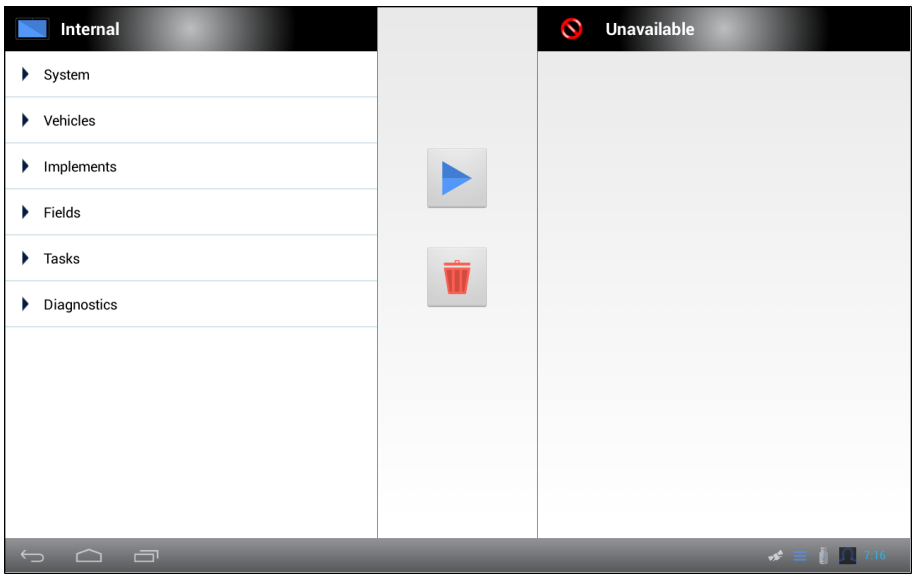
Button	Explanation
Deactivate 	Tap to deactivate a line.
Activate 	Tap to activate a line
Deactivate Shape 	Tap to deactivate a pattern (headland, boundary, pivot).

Button	Explanation
Activate Shape 	Tap to activate a pattern (headland, boundary, pivot).
Category 	Tap to assign a landmark point, line or area a category.
Continue Task 	Tap to continue the task you have selected in the list on the right-hand side.
Convert 	Tap to convert a selected: • Productive area to a non-productive one • Non-productive area to a productive one
Exit 	Tap to exit Field Manager.
	Tap to adjust the radius of a pivot shape.
	Tap to resize a shape other than a pivot shape.
	Tap to shift a line.
	Indicates the location of the vehicle in the field.

Data transfer

You can transfer data to a USB drive.

1. Insert the USB drive into one of the USB sockets on the display.
2. Tap on the ***Home*** or ***Run*** screen, or on the notification list. (For instructions on how to display the notification list, see Display bar, page 40.)
3. Tap . The Data Transfer panel displays.



4. Tap a category to expand an item on the Internal list.
5. Tap the item you want to transfer.
6. Tap to move the item to the USB drive.
7. To delete an item, tap the item in the either list and tap .

USB socket

You can use a USB drive to transfer data to and from your TMX-2050 display. For more information on data transfer, see Data transfer, page 50.

The display has two USB sockets: one on the side of the display and one on the back of the TMX-2050 display.

CAUTION – Do not use a USB drive in each USB socket at thee same time. If you are attempting to upgrade

firmware using a USB drive and another USB drive is already in one of the sockets, the firmware upgrade will fail.

For more information see:

- Components, page 68 for photo showing the locations of the two USB sockets
- Data transfer, page 50 for instructions on transferring data to a USB drive
- Screen shots, page 51 for instructions on saving screen shot s to a USB drive

Insert a USB drive

1. Move the display so you that can see the USB socket on the side or back of the display.
2. Pull the rubber cover off the USB socket.
3. Insert the USB drive into the USB socket. On the display bar, a USB icon is displayed.

Remove USB Drive

CAUTION – Do not remove the USB drive from the socket while the display is writing to or from the drive. This will corrupt the data.

1. Move the display so you that can see the USB socket.
2. Pull the USB drive out of the USB socket.
3. Press the rubber cover back onto the USB socket.

Screen shots

Occasionally, you may want to save a screen shot of the touch screen, for example to provide information for troubleshooting purposes. When you take a screen shot, the display saves a .png file to a *Pictures* folder on the USB drive.

To take a screen shot:

1. Insert a USB drive in one of the USB ports on the display. (See USB socket, page 50.) The display bar will show a USB icon.
2. Tap the right side of the bar at the bottom of the display. The notification list slides up. Tap  . The USB menu displays.
3. Tap  to take a capture of the screen.
4. The display stores your screen shot on the USB drive.

CAUTION – Do not remove the USB drive from the socket while the display is writing to or from the drive. This will corrupt the data.

CHAPTER 3

Display settings

In this chapter:

At the Settings panel, you can customize settings and add user profiles.

System settings

At the TMX-2050 display, you can customize and set up many options, including but not limited to:

- Changing the language and units of measure and set the time zone
- Setting preferences for:
  - Steering and guidance
  - The point at which to begin mapping and logging
- Creating, editing and deleting user profiles
- Viewing modem settings and resetting them
- Setting up Office Sync

Languages and units of measure

At this settings page, you can set:

- The language shown on the display
- The type of units of measure shown on the display
- Whether the password entry is always obscured or delayed from being obscured

Setting	Tap to view or choose...
Languages	The language for the display. Scroll the list and tap the language you want on the TMX-2050 display.
Display Units	The type of units you want on the display: English or Metric
Number Format	Either commas or periods.
Password Visibility	The visibility of the password entry: • Obscured: Never visible • Delayed Obscured: Initially visible

Access

To access the Language and Units settings:

1. Tap  .
2. Tap  .
3. Tap **Language and Units**.

Date and time

The display automatically obtains time and date from the GNSS receiver in the TM-200 Module.

Setting	Tap to...
Select time zone	Choose time zone. Scroll the list of time zones and tap the time zone that applies to you. You must set the time zone. The system does not automatically set this.
Use 24-hour format	Turn on or off.
Select date format	Choose the date format you want to see on the display. Options are: MM/dd/YYYY, dd/MM, YYYY/MM/dd.

Access

To access the Date and Time setup:

1. Tap  .
2. Tap  .
3. Tap **Date and Time**.

Users and passwords

Setting	Tap to...
Master Password	Turn this feature on or off. Change the master password. By entering the master password, an advanced user can access the display when their administrator does not remember the password.
Add User	Add a user
(Existing user name)	Edit the user profile

Add a User

1. Tap **Add User**.
2. Enter the Operator ID.
3. Enter and confirm the user's password.
4. Tap **Create User**.

Access

To access the Users and Passwords settings:

1. Tap  .
2. Tap  .
3. Tap **Users and Passwords**.

Firmware upgrades

To upgrade the firmware for the TMX-2050 display, you can use one of the methods in this section.

Settings for upgrades

You can control how the display checks for upgrades and when to download them.

1. Tap  .
2. Tap  .
3. Tap **Firmware Upgrades**.
4. Tap **Settings**.

Setting	Explanation
Auto check for new upgrades	If you activate this, the system will automatically check for new upgrades.
Auto download new upgrades when available	This choice is only available if you have chosen to have the system automatically check for new upgrades. The system will install the updates as they are available.

Setting	Explanation
Auto install firmware on power down	This choice is only available if you have chosen to have the system automatically check for new upgrades. The system will install the updates before the display powers off.
Only download via WiFi	This choice is only available if you have chosen to have the system automatically check for new upgrades. The system will download the updates only through a WiFi connection.
Show support beta releases in list	The system includes beta releases available for you to download.

Installed packages

1. Tap .
2. Tap .
3. Tap **Firmware Upgrades**.
4. Tap **Installed Packages**.

Check for updates

1. Tap .
2. Tap .
3. Tap **Firmware Upgrades**.
4. Tap **Check for Updates**. The system checks for updates and begins the upgrade process immediately unless you have altered when the upgrade occurs in Settings.

Feature unlocks

For some optional features, you must enter the unlock password. If you do not have an unlock password, contact your local reseller.

1. Tap .
2. Tap .

3. Tap **Feature Unlocks**. You can unlock features by manually entering the code, having the display read the QR code of the unlock, or checking for unlocks.

   At the bottom of the screen, the list of currently locked features displays.

Manual code entry

1. Tap the Code text box and enter the code.
2. If the system accepts the code, tap **Accept**.
3. If the system rejects the code, you can try again or contact your reseller for help.

QR code scan

1. Tap **Read QR**.
2. Hold your code image in front of the camera for it to be read.
3. If the system accepts the code, Tap **Accept**.
4. If the system rejects the code, you can try again or contact your reseller for help.

Check for unlocks

1. Tap **Check for Unlocks**.
2. The request will be sent for the display to check for any available service or licenses. It may take several minutes for the unlocks to be processed.

Display

These are basic settings for the display.

Setting	Tap to...
Manually Change Brightness	Adjust brightness of the TMX-2050 display's backlight.
Volume	Adjust the volume of the sound.
Touch Screen Sounds	Turn on or off sounds associated with using the display.

Access

To access the Display settings:

1. Tap  .
2. Tap  .
3. Tap **Display**.

Mapping

These settings control guidance mapping features available on the ***Run*** screen.

Day Mode

Setting	Tap to view or change...
Map Background Selection	The ground color for the ***Run*** screen.
Map Orientation	Which point of view displays on the ***Run*** screen when following the position of the vehicle. Orientation options: North Up or Vehicle Up.
Track Logging Time	Options to record the vehicle track at a set time or a set distance. Points along the track are logged at the greater of the two values (logging time or logging distance). To always log a point based on either of the two values, set the other value to zero. Setting both values to zero disables Track Logging. Options: 0, >1+
Track Logging Distance	Options to record the vehicle track at a set distance.
Record Line with Coverage	The on or off setting to record a line at the same time as logging coverage.

Mapping Location Features

Setting	Tap to view or change...
Point Mapping Location	The location of the point that you are setting in relation to the implement. Boom Center, Boom Left, Boom Right.
Line/Area Mapping Location	The location of the line or area that you are setting in relation to the implement. Boom Center, Boom Left, Boom Right.

Access

To access the Mapping settings:

1. Tap  .
2. Tap  .
3. Tap **Mapping**.

Patterns

At pattern settings, you can:

- Activate the auto close feature to use when you create boundaries and headlands
- Activate smoothing for curves and turn radius when traveling on guidance lines
- Customize the tight turn warning angle and look-ahead time

Curve Features

Setting	Tap to view or change...
Curve Smoothing	The feature on or off. When curve smoothing is on, the system smooths out the guidance curve, making it wider.
Smooth Turn Radius	The size of the circle that the system will guide to. The larger the circle (degrees), the wider the turn.
Tight Turn Warning Angle	The number of degrees that will trigger a warning about a tight turning angle.
Tight Turn Look Ahead Time	The number of seconds before you approach a tight turn angle that the warning will show on the display.

Headlands

Setting	Tap to view or change...
Align Infill	Where to align the infill: Nearest Edge or AB line.

Setting	Tap to view or change...
Auto Close	Automatically closes the beginning and end point when you create boundaries and headlands. See Headland and infill pattern creation, page 193.
Auto Close Distance	The distance between your beginning point and ending point for a headland.

Boundaries

Setting	Tap to view or change....
Auto Close	Automatically closes the beginning and end point when you create boundaries. See Boundary creation, page 190.
Auto Close Distance	The distance between your beginning point and ending point for a boundary.

Access

To access the Patterns settings:

1. Tap  .
2. Tap  .
3. Tap **Patterns**.

Steering and Guidance

The following settings enable you to customize controls related to steering and guidance.

Setting	Tap to view or change...
Operator Timeout	The amount of time before the display shuts down guidance and applications when there is no response to a shutdown message.

Setting	Tap to view or change...
Nudge Increment	The increment used to nudge the guidance system with each tap. You can incrementally nudge a pattern in a perpendicular direction relative to the pattern. Nudging a pattern helps adjust for satellite drift. See Guidance pattern adjustment shortcuts, page 196 and GNSS and xFill technology status, page 232.
Implement Draft Increment	The increment used to nudge the implement to the current guidance line.
Aggressiveness	The increment used to change aggressiveness.
Autosteering Lockout	Whether the feature is on or off. When lockout is on, the display does not offer an option to use auto guidance.
Re-mark Reset on Power Cycle	Remove all re-mark entrees on power cycle.
Re-mark Reset with Import	Remove all re-mark entrees on with an import.

Access

To access the Steering and Guidance settings:

1. Tap  .
2. Tap  .
3. Tap **Steering/Guidance**.

Modem services

When the DCM-300 modem connects to the network, it sends to the display information about the modem and the network.

Modem

Setting	Tap to view or change...
Device Name	The serial number of the TMX-2050 display.

Network (CDMA)

Setting	Tap to...
CDMA Reset	Reset the network connection. This will reset the connection between the modem and the service provider, and will remove all existing settings.

The following additional settings that are read only and are automatically completed with the DCM-300 modem connects to the network:

- Mobile Directory Name (MDN)
- Electronic Serial Number (ESN)
- Mobile Identification Number (MIN)
- Preferred Roaming List (PRL)

Network (GSM)

Setting	Tap to...
APN	View the access point name.
SIM PIN	The PIN for the SIM.
Advanced	Launch a popup to enter the GSM Username and GSM Password.

The following additional settings that are read only and are automatically completed with the DCM-300 modem connects to the network:

- IMEI: International Mobile Equipment Identity
- SIM ICCID: IMS Charging Identifier
- SIM Status: Status of SIM

Office Sync

Setting	Tap to...
Office Sync	Turn the feature on or off.
Check Server	Select how often you want the display to check the server to send data to the office.
Send Data	Select how often data is sent from the display to the office.

Setting	Tap to...
Auto-send without prompt	Turn the feature on or off. When on, the display will send data to the office without first asking for your confirmation. If this feature is on, data will be sent without notifying you. This can result in large files being transferred or the transfer of data you do not want transferred.

Access

To access Modem Services:

1. Tap  .
2. Tap  .
3. Tap **Modem services**.

Peripherals

These settings control the internal camera, which is used when scanning a QR code. (See Feature unlocks, page 57.)

To...	Tap to...
Enable Camera	Use the camera.
Camera Brightness	Set the brightness of the camera.
Camera Contrast	Set the contrast of the camera.
Cameras Mirrored	Flip the view of the camera.

Access

To access the Peripherals settings:

1. Tap  .
2. Tap  .
3. Tap **Peripherals**.

Restore defaults

During troubleshooting, you may be asked by Support to perform a reset.

Admin User Options

Setting	Tap to...
Restore Default user Preferences	Restore the default preferences for the user currently logged in.
Restore Preferences to Factory Defaults	Restore the display to default factory settings. Erases all custom settings for all user accounts.
Factory Reset	Erase all user accounts, system and application data, settings and downloaded applications.

Restricted User Options

Setting	Tap to...
Restore Default user Preferences	Restores the default user preferences.

Access

To access Restore Defaults:

1. Tap  .
2. Tap  .
3. Tap **Restore Defaults**.

System

Information	Tap to view...
Software Information	The list of software packets for diagnostics.

Information	Tap to view...
Current User Information	System information on the user currently logged in. See Users and passwords, page 55.
Current Preference Information	The current settings of the user that is currently logged in.
Device Information	Technical information about the display.
System Information	Details about the system.

Access

To access the System settings:

1. Tap  .
2. Tap  .
3. Tap **System**.

CHAPTER 4

Installation

In this chapter:

Installation includes the display mount and TMX-2050 display, the TM-200 Module, and other components as they apply to your system configuration.

Components

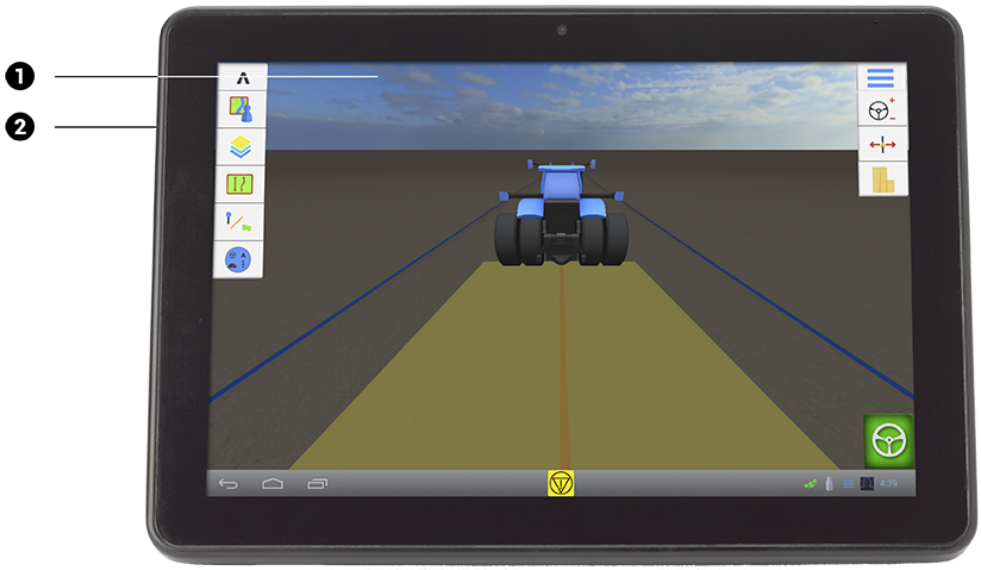
The following components are part of a recommended setup for the TMX-2050 display:

- TMX-2050 display, page 68
- Display mount - to mount the TMX-2050 display
- TM-200 Module, page 70 - to enable quick disconnection and reconnection of the TMX-2050 display. The TM-200 module contains a built-in GNSS receiver.
- DCM-300 modem, page 72 - provides access to correction services, wireless data transfer and cellular/WiFi signals where applicable
- AG-815 integrated radio, page 71 - for RTK correction services

TMX-2050 display

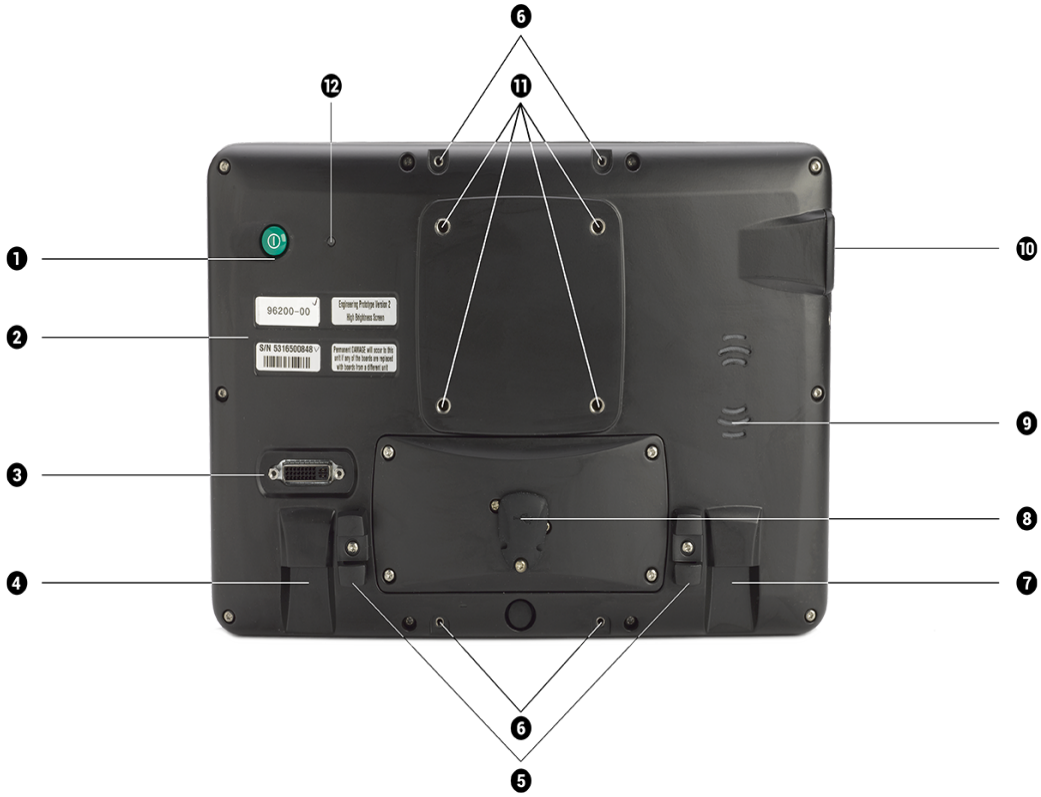
CAUTION – Do not press on the screen with a sharp item, such as a pencil. You may damage the surface of the screen.

Front view



Item	Description
1	12" touch-sensitive screen
2	Port: USB (side with cover). Socket for USB drive to transferring data to and from the TMX-2050 display. See Data transfer, page 50 and USB socket, page 50.

Rear view

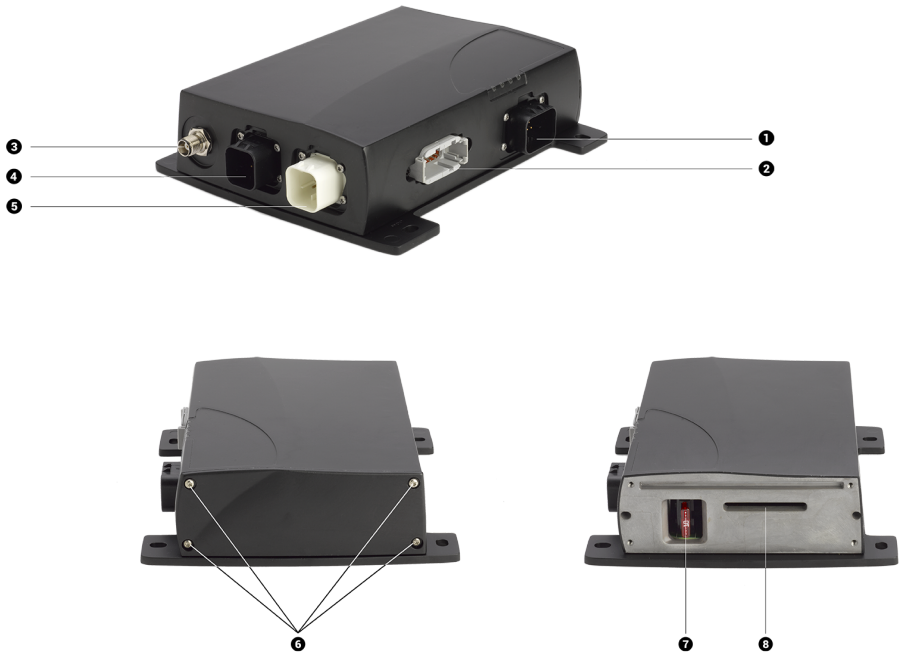


Item	Name	Explanation
1	Power button	Powers the TMX-2050 display on or off
2	Labels with part number and serial number	N/A
3	Port: DVI / HDMI	For future capability
4	Jack: TM-200 Module (RJ45)	Socket for connecting to the TM-200 Module
5	Cable brackets	Holds Trimble Ethernet cables to prevent cable strain
6	Interior bolts	Location for mounting Field IQ switch box
7	Jack: CAN (RJ11)	For future capability
8	Port: USB (rear) with cover	Socket for USB drive to transferring data to and from the TMX-2050 display

Item	Name	Explanation
❾	Speakers	For use if you have sound activated on the TMX-2050 display. See Display, page 58.
❿	Port: USB (side) with cover	Socket for USB drive to transferring data to and from the TMX-2050 display. See Data transfer, page 50 and USB socket, page 50.
⓫	Interior bolts in mounting plateplate	Receives screws for Zirkona display mount
⓬	Ambient light sensor	Senses lower ambient light and activates the backlight on the display.

TM-200 Module

The TM-200 Module connects to the TMX-2050 display with a single cable. All remaining components connect to the TM-200 Module. This enables you to quickly disconnect and reconnect the TMX-2050 display as needed.



Item	Name	Explanation
❶	14 pin AMPSEAL connector	Socket for power and inputs
❷	12 pin DEUTSCH connector	Socket for inputs
❸	8 pin AMPSEAL connector	Socket for connecting to the TMX-2050 display
❹	8 pin AMPSEAL connector	Socket for Ethernet cable to connect to DCM-300 modem or second TM-200 Module
❺	AG-25 GNSS antenna connector	Socket for connecting to the AG-25 GNSS antenna
❻	Screws and end cover plate	Unscrew and remove end cover plate to expose the AG-815 radio expansion slot.
❼	10 amp fuse	Protect components from power surges
❽	Radio expansion slot	Socket for AG-815 integrated radio connector

AG-815 integrated radio

The AG-815 integrated radio provides access to radio networks for real-time, high-precision CenterPoint™ RTK applications. The AG-815 is available for 450 MHz and 900 MHz.

Item	Name	Explanation
❶	Antenna connector	Connection for primary radio antenna
❷	Connector	For future use
❸	Radio blade connector	Connection to TM-200 Module

DCM-300 modem

The DCM-300 modem is available in two models for use on Global System for Mobile Communications (GSM) cellular networks, such as AT&T, or Code Division Multiple Access (CDMA) cellular networks, such as Verizon.

The DCM-300 modem enables you to use:

- Correction services CenterPoint RTX™ and CenterPoint VRS™ as well as third-party network RTK corrections
- Data transfer for Vehicle Sync, Office Sync for Connected Farm Office Sync setup for Connected Farm, page 98 and Vehicle Manager dispatch asset tracking
- Cellular data plans (USA only)
- Global GSM cellular networks
- WiFi signals as applicable

See the following for more information:

- Connect the DCM-300 modem, page 77
- DCM-300 modem status, page 224

Installation overview

The display mount attaches to a rail in the cab of the vehicle. The TMX-2050 display connects to the display mount.

The TM-200 Module connects to the display with a single cable.

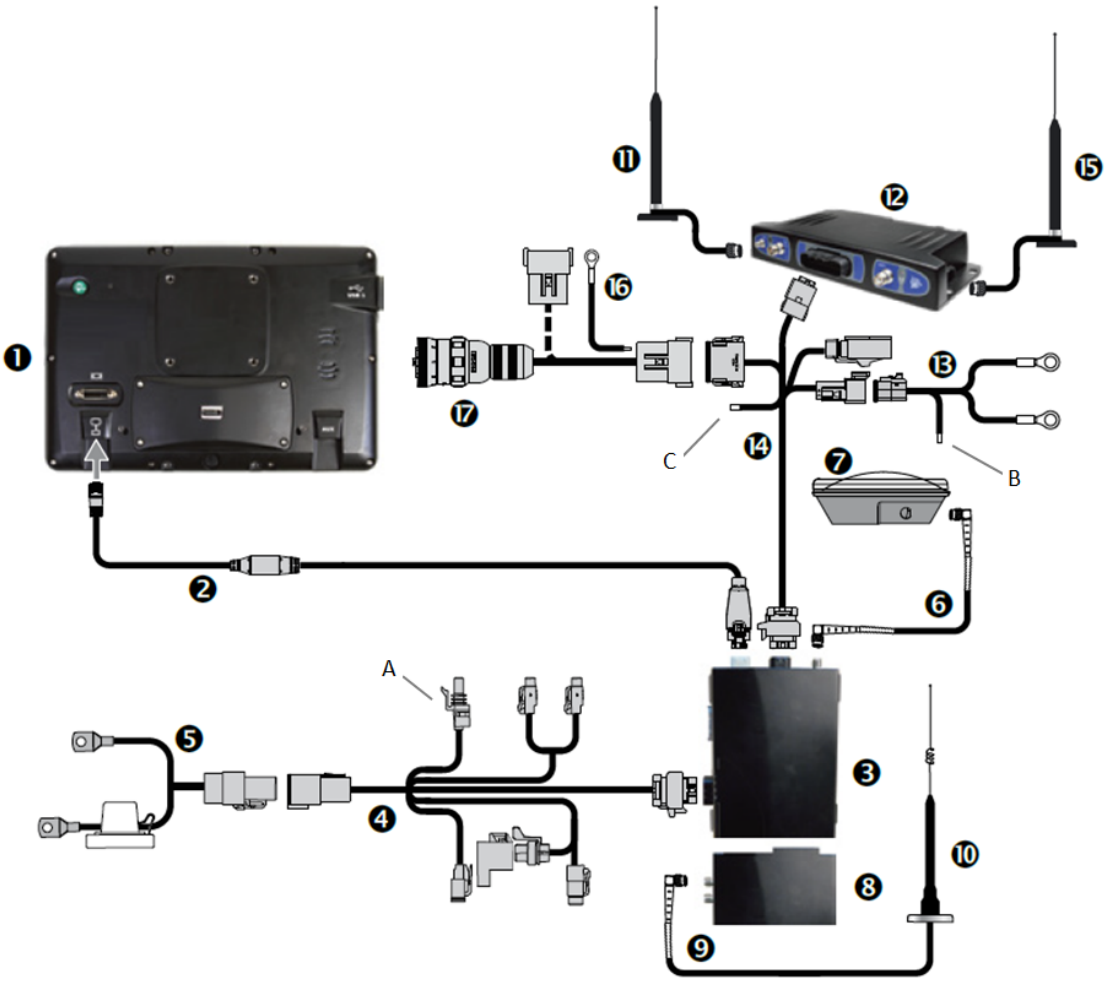
Additional components to install depend on your connection and correction services, and the features you are using.

Connection diagram

The connection diagram includes the TMX-2050 display hardware and additional components for enhanced connectivity (AG-815 integrated radio, DCM-300 modem). To purchase additional components and services, consult your local reseller.

Use Trimble cables only. Trimble cables use specific wire gauges not found in some off-the-shelf RJ1/RJ45/CAT 6 cables.

Note – *The steering system requires professional installation. If the steering system is not currently installed in your vehicle, consult your local reseller.*



Item	Description	Trimble Part Number
❶	TMX-2050 display and mounting hardware	96700-00
❷	TM-200 Module to TMX-2050 display cable	93843
❸	TM-200 Module	95060-00
❹	DTP to TM-200 Module cable **A**: To vehicle ignition.	92676
❺	Power to DTP cable	92905
❻	GNSS antenna to TM-200 Module cable	50449
❼	AG25 GNSS antenna and mounting hardware	77038-01
❽	AG-815 integrated radio	95080-xx

Item	Description	Trimble Part Number
❾	Radio antenna cable	62120
❿	RTK radio antenna	24253-44 / 24253-46 / 22882-10
⓫	Cellular antenna	72122 and 51227
⓬	DCM-300 modem	80632-xx
⓭	DCM-300 modem to power cable **B**: Connect to ignition source.	94267
⓮	DCM-300 modem to TM-200 Module cable **C**: Connect to chassis ground.	94267
⓯	WiFi antenna for DCM-300 modem	83700-05
⓰	Vehicle Manager CAN adapter, Fleet productivity work input, DCM-300 modem to R terminal on alternator (optional, use if CAN does not have engine hours)	86995 / 87754 / 90147

CAUTION – If the vehicle has a master electrical disconnect, make sure the power cable ground connections are not directly attached to the battery terminal. Attach the ground connections of the power cable to the chassis side of the main disconnect so that it is as close as possible to the battery, but still gets disconnected when the master disconnect is turned off. Failure to connect the power cable ground will cause damage to the display.

Install the display and mount

Use the mounting hardware supplied in the display kit to mount the display in the vehicle cab.

Refer to the Connection diagram, page 73 when following these instructions.

Before completing installation steps, select a position in the cab where the bar mount ❹ can be attached to a rail. Hold the display in the selected location and make sure that it is:

- Easy to see, but does not block the driver's view
- Within the driver's reach so that the USB drive is easy to remove and replace
- Does not interfere with the driver getting in or out of the cab, or any other activities

1. Use the provided bolts to attach the bar mount ❹ to a rail in the cab.
2. Use the supplied screws to firmly attach the mounting plate ❶ to the back of the TMX-2050 display.
3. Turn the tightening arm ❸ to loosen the Zirkona mount ❷.
4. Adjust the TMX-2050 display until it is positioned where you want it. Turn the tightening arm ❸ the other direction to tighten the Zirkona mount ❷.

Item	Description
❶	Mounting plate
❷	Zirkona mount
❸	Tightening arm
❹	Bar mount

Connect the AG-815 radio

The AG-815 integrated radio connects directly to the TM-200 Module. Refer to the Connection diagram, page 73 when following these instructions.

1. Remove the screws and face plate from the TM-200 Module (see ❻ TM-200 Module, page 70).
2. Insert the AG-815 radio's blade connector (see ❸) into the radio expansion slot of the TM-200 Module (see ❽ TM-200 Module, page 70).
3. Use the long screws provided with the AG-815 radio to fasten the radio to the TM-200 Module. The following shows a photograph of the two pieces of equipment attached.

Connect the TM-200 Module

The TM-200 Module connects to the antenna, auto-steering and other systems, such as the Field-IQ system's Rate and Section Control. Before installation, make sure the TM-200 Module is out of the way but accessible, and close enough to connect to the display with the supplied cable ❷.

Refer to the Connection diagram, page 73 when following these instructions.

1. Use the display cable ❷ to connect the TM-200 Module ❸ to theTMX-2050 display ❶. Ensure the cable is fastened into the cable clip next to the port on the rear of the display. This prevents the cable from being removed from the port and reduce stress on the cable.
2. See Connect the AG-815 radio, page 76 to connect the AG-815 integrated radio.
3. Use the GNSS antenna cable ❻ to connect the GNSS antenna ❼ to the TM-200 Module ❸.
4. Use the TM-200 Module ❹ to connect the TM-200 Module to the power cable ❺.
5. Connect the ignition sensing connector (R1) on the TM-200 Module cable ❹ to the ignition source on the vehicle.
6. Connect the power cable to the vehicle battery ❺.

   Note – *If the vehicle has a master electrical disconnect, make sure that the power cable ground connections are not directly attached to the battery terminal. Attach the ground connections of the power cable to the chassis side of the main disconnect so that it is as close as possible to the battery but still gets disconnected when the master disconnect is turned off.*

Connect the DCM-300 modem

Refer to the Connection diagram, page 73 when following these instructions.

1. Mount the modem inside the cab of the vehicle, in a shaded area with good ventilation. Mount the cellular antenna on the outside of the vehicle. If you are using Vehicle Sync or Office Sync to exchange data remotely, mount the WiFi antenna on the outside of the vehicle.
2. Connect either or both the cellular antenna ⓫ and/or the wireless antenna ⓯ to the DCM-300 modem ⓬.
3. Use the DCM-300 modem to TM-200 Module cable ⓮ to connect the DCM-300 modem to the expansion port on the TM-200 Module ❸.
4. Connect the DCM-300 modem to power cable ⓭ to the DCM-300 modem toTM-200 Module cable ⓮.
5. Connect the DCM-300 modem to power cable ⓭ to the vehicle's battery.

   Note – *The harness for connecting to machine power has leads for connecting to power, ground, and ignition. The ignition lead must be connected to a switched +12 V source for the DCM-300 modem to operate correctly.*

6. If you are using Vehicle Manager, connect the Vehicle Manager CAN adapter ⓱ to the vehicle's CAN bus.
7. Use the hardware supplied with the DCM-300 modem for installation.

CAUTION – Do not mount the DCM-300 modem in direct sunlight or in areas of high heat. This will cause degraded performance.

Connect the AG-25 GNSS antenna

The GNSS antenna is required for the GNSS receiver in the TM-200 Module to receive GPS / GNSS corrections. Refer to the Connection diagram, page 73 when following these instructions.

Install the AG-25 GNSS antenna

The AG-25 GNSS antenna has integrated magnets for easy installation. To attach the antenna to a non-metal surface, use the mounting plate.

1. Connect the antenna cable to the antenna.
2. Place the antenna on the roof of the vehicle, at the front and centered from left to right.
3. On the mounting plate, remove the protective covers from the adhesive strips.
4. Attach the mounting plate to the vehicle roof with the adhesive strips.
5. Place the antenna on top of the mounting plate.
6. Route the other end of the antenna cable into the cab.
7. Connect the GNSS antenna cable to the GNSS antenna installation.
8. Connect the GNSS antenna cable ❻ to the TM-200 Module.

Note – *To minimize any interference to the GNSS signal, make sure that the GNSS antenna is at least 1 m (3 ft) from any other antenna (including a radio antenna).*

CAUTION – The GNSS antenna may experience interference if you operate the vehicle within 100 m (300 ft) of any power line, radar dish, or cell phone tower.

Connect additional components

Note – *The steering system requires professional installation. If the steering system is not currently installed in your vehicle, consult your local reseller.*

Refer to the TMX-2050 *Display Cabling Guide* to connect the to:

- Automatic guidance system
- Flow and application control

- Boom height control
- Other components

CHAPTER 5

Connectivity

In this chapter:

In addition to GNSS, you can use optional correction services, the DCM-300 modem, and Office Sync to transfer files to your Connected Farm application.

Introduction to connectivity

Depending on your setup, connectivity settings can include:

- DCM setup
- GNSS settings, page 88
- Data transfer, page 50
- Office Sync setup for Connected Farm, page 98

For more information about concepts associated with GNSS, correction services, see:

- xFill technology, page 82
- VRS, page 86
- GNSS and drift, page 82
- Scintillation, page 87

GNSS and drift

GNSS satellites are in continuous motion as they orbit the earth twice per day in a repeated pattern. Satellites transmit signals that the GNSS receiver translates to determine its position.

While performing field activities, you may notice differences in:

- Where the crop row is
- Where the guidance line was established
- Where the display is indicating the guidance line is now located.

This happens because GNSS satellite constellation patterns change over time and can experience interference.

Local and atmospheric conditions can impact signals. Temperature and humidity can delay signals. Signals can also be reflected from surrounding objects such as trees, causing multiple copies of the signal or a delay in the signal reaching the receiver. Data errors from the satellite can also affect accuracy.

xFill technology

xFill™ technology uses Trimble RTX technology to "fill in" for RTK corrections when there are temporary radio or Internet connection outages. xFill technology is a standard feature and is compatible with the AG25 GNSS antenna. The xFill technology can function with corrections from single-baseline RTK, VRS and CORS systems.

When there is an interruption of the RTK correction signal (either from the radio base station or from the VRS cellular network), the xFill technology performs corrections. xFill technology uses the last-known RTK position combined with the RTX precision satellite data to maintain a high level of

horizontal positioning accuracy for up to 20 minutes. There is a smooth transition from RTK to xFill technology and back to RTK.

Automatic guidance systems

If an auto-steering system is engaged using RTK, the auto-steer system will stay engaged during the 20 minute xFill coverage. As soon as an RTK signal is available, the receiver will switch back to the RTK correction service and xFill will remain on standby in the background. If the system cannot resume an RTK Fixed status within 20 minutes the system will fall back to DGPS correction and the auto-steer system will disengage.

Accuracy

xFill technology can maintain a relatively high level of horizontal accuracy throughout the RTK outage period. However, accuracy is primarily dependent on three factors:

- GNSS satellite availability and obstructions between the satellite and receiver (trees, buildings, and so on)
- Exactness of the base station position
- Length of time since the last RTK position (maximum allowable time is 20 minutes)

If you are concerned with maintaining sub-inch precision, disable the xFill feature.

Estimated accuracy over time while the xFill function has been active (with base station accuracy <20cm) is as follows:

- xFill runtime – no RTK corrections Estimated error
- 1-5 minutes 1-5cm
- 6-10 minutes 5-9cm
- 11-20 minutes 10-15cm

Dependence on satellite

xFill technology requires correction data from at least 5 satellites higher than 10 degrees from the horizon. If GLONASS is unlocked at the RTK level, xFill technology will also be able to use GLONASS satellites. Additionally, large objects such as trees, buildings, and grain bins will significantly decrease or completely block signal reception from all satellite types, including GPS, GLONASS, and corrections satellites. If these same obstructions are between the receiver and the satellite, they may also block xFill signals.

WARNING – Many large and sudden changes in satellite geometry caused by blocked satellites can cause significant position shifts. If operating under these conditions, auto-guidance systems can react abruptly. To avoid possible personal injury or damage to property under these conditions, disable the auto-guidance system and take manual control of the vehicle until conditions have cleared.

Dependence on base station position

When the RTK correction signal is lost, the RTX satellite begins providing correction based on the last RTK position. When you setup xFill and select the datum in which you surveyed your base station, the firmware translates your position into the ITRF datum reference frame to minimize drift. Any other inaccuracies in the base station position can cause a drift in position over time.

As time elapses, correction data from the satellites causes drift from the RTK line. The larger the difference in surveyed base station position, the larger the drift as shown in following table.

The following table shows how the xFill drift over time is impacted by the accuracy of the base station survey coordinates.

xFill Elapsed Time	Survey Accuracy <20cm	Survey Accuracy <2m	Survey Accuracy <5m
0 to 5 min	0 to 5 cm	0 to 15 cm	0 to 25 cm
5 to 15 min	2 cm to 12 cm	10 cm to 0.3 m	15cm to 0.5 m
15 to 20 min	9 cm to 15 cm	15 cm to 0.4 m	0.3m to 0.8 m

If you discover that the surveyed location of your base station is not accurate, your options are:

- Turn off xFill (recommended by Trimble).
- Resurvey your base station. However, this will cause the movement of any stored AB lines that are reloaded/reused which is very undesirable to many RTK customers.

Base station survey

At initial base station installation, Trimble recommends surveying base stations by taking a 24-hour log and processing the data to receive position on your local datum. The accuracy of this position is stated in the report. Over time, primarily due to normal geological events, the base station position may change up to 7cm per year. Please refer to Trimble Support Note on this topic for further information.

When you select the datum used to survey your base station during the xFill technology setup, the receiver will automatically convert your position in the datum you select to the equivalent position in ITRF2008.

If your base station was properly surveyed within the last five years using one of the following coordinate systems, the xFill technology accuracy error will typically be less than 15cm over 20 minutes.

- WGS84/ITRF2008
- NAD83
- ETRS89
- GDA94

When working within an area with several RTK base stations, each base station should have a unique Base ID. When moving in range of another base station, go to the GPS setup on the display and enter the Base ID. This enables the receiver to recognize the new base station.

Base station survey with AutoBase™

If the Trimble Auto Base feature was used to survey the base, the accuracy can be >5m, which decreases the xFill technology accuracy. The datum used for this feature is WGS84. Trimble recommends testing xFill prior to using it in an application where the base station has only been surveyed with Auto Base.

VRS base station

If using VRS, the accuracy is typically <1cm . Contact your VRS network owner to determine the datum used for surveying and enter this datum during the xFill technology set-up. Trimble VRS Now™ network uses the following:

- VRS Now US: NAD83
- VRS Now Europe: ETRS89
- VRS Now TEC Europe: ETRS89
- OmniSTAR® CORS Tasmania: GDA94

Base station, survey unknown

If you do not know if your base station has been surveyed or the datum used for surveying, you should perform testing to approximate your base station errors or turn off xFill technology .

Estimating base station errors

To estimate the error in the position f the base station, options include:

- **Calculate Current Position and Compare to Set Position:** Collect two hours of position logs and submit them for post-processing (using the same coordinate system as previously used). Then enter the current set position and the newly calculated position into a GPS distance tool calculator.
- **xFill Accuracy Detection Using Cross Track Error**: Set-up your antenna and receiver in an open air environment (field or parking lot). Create an A+ line based on your parked position with RTK fixed. Unplug the radio or unplug the DCM-300 modem if using cellular signal. xFill technology will engage. Watch your cross track error (XTE) for a maximum of 20 minutes. Repeat several times. Keep in mind that this static test only tests the error in one direction (N/S or E/W).
- **xFill Accuracy During Passes in a Field:** To best see the drift of the xFill position over time:

  Note – *This procedure will only be accurate if you have already completed the Roll Calibration for auto-steering. (See* *Introduction to vehicles, page 100.**)*

a. Create an A/B line in your field (or use an existing line). (See AB guidance line creation, page 189.)

b. Drive the line and once your cross track error (XTE) is very small, stop and drop a flag in the center of your hitch.

c. Unplug the radio or unplug the DCM-300 modem if using cellular signal. xFill technology will engage.

d. Drive around the field for several minutes (to represent your typical outage time) and return to the A/B line.

e. Engage on the line and then when XTE is small and you're over you previous flag, stop and drop another flag. Compare the distance.

f. Make a pass in the other direction on the same A/B line and drop a third flag. Compare the distance.

When not to use xFill technology

xFill technology is not recommended for:

- Land leveling and water management applications where a high degree of vertical accuracy is required.
- Any operation where you need accuracy better than 1" (2.4cm).
- When the base station has not been properly surveyed, or has been surveyed only with the Auto Base functionality and no tests have been performed to assess the risk of using xFill technology with that base station.

VRS

VRS™, an integrated system available with a subscription, is complementary to RTK and provides RTK corrections over a large geographic area, where robust cellular data coverage is available. Network processing ensures high accuracy throughout the whole coverage area.

VRS consists of:

- GPS/GNSS reference stations spread out over a large area, typically 30-45 miles (50-70 km) apart.
- A central server that uses Trimble proprietary software to create a correction model for the region covered by the network. GPS rovers communicate using a cell modem with the VRS server and receive RTK type corrections. The data from the reference stations is used to model errors throughout your region. The model is used to:
  - Create a network of virtual reference stations near your current location.
  - Provide a localized set of standard format correction messages for your roving receiver. Since the error models are updated every second, all rovers receive an optimal correction

model after connecting on to the network. This ensures a high quality correction, and accuracy.

Network solution

All reference stations used in a VRS system can be interpreted as a network of continuously operated reference stations. The difference between VRS and CORS is that VRS provides a network solution. The position accuracy is maintained even if you move away from the single base but are still within the network.

Due to the longer range, fewer base stations can cover a greater region. Additionally, VRS networks may offer better signal coverage in rough terrain if the local cellular network is robust and provides good data coverage.

Scintillation

Scintillation causes extreme fluctuations in signals that are received. Scintillation can be caused by turbulence that creates air pockets with different temperatures and densities.

GNSS settings

1. After installing the AG25 GNSS antenna, power on the vehicle. This will power on the receiver.
2. Make sure all optional features are unlocked and all subscriptions are activated.
3. At the TMX-2050 display, begin setup, including selecting the correction source.
4. At the ***Home*** screen, tap  .
5. Tap **GNSS Setup**. The GNSS setup panel displays.
6. Tap **Antenna Type**, then select from the list:
   - AG25
   - Other
   - Zephyr™ II
   - Zephyr II (Ruggedized)
7. Tap **Correction Source** and select the correction source you will be using.

   Note – *You will not be able to select the correction sources that are locked.*

Correction Source	Description
Autonomous (None)	No GPS corrections. If this is your correction source, there are no additional settings for you to enter.
SBAS corrections	Satellite-based augmentation systems with free correction services: • WAAS (Wide Area Augmentation System) in North America • EGNOS (European Geostationary Navigation Overlay Service) in Europe • MSAS (Multi-functional Satellite Augmentation System) in Asia Pacific regions See SBAS corrections, page 89 for information about additional settings.
RangePoint RTX corrections	Satellite-based subscription service for corrections with pass-to-pass accuracy < 6" (15 cm) and GLONASS compatibility. See RangePoint RTX corrections, page 90 for more information about additional settings.
OmniSTAR G2/HP corrections	Satellite-based subscription service: • HP corrections have 2 - 4" (5 - 10 cm) accuracy • G2 corrections have 3 - 4" (8 - 10 cm) accuracy and is compatible with GLONASS See OmniSTAR G2/HP corrections, page 90 for information about additional settings.

Correction Source	Description
CenterPoint RTX (modem) corrections (Standard)	Cellular broadcast subscription service for corrections with < 1.5" (3.8 cm) accuracy and GLONASS compatibility. (Requires a DCM-300 modem.) See CenterPoint RTX (modem) corrections, page 91 for information about additional settings.
CenterPoint RTX (satellite) corrections (Standard or Fast Convergence)	Satellite broadcast subscription service for corrections with < 1.5" (3.8 cm) accuracy and GLONASS compatibility. (Requires a DCM-300 modem.) See CenterPoint RTX (modem) corrections, page 91 for information about additional settings.
CenterPoint VRS corrections	Cellular-broadcast RTK corrections from a ground-based reference station using the a modem. (Requires a DCM-300 modem.) See CenterPoint VRS corrections, page 94 for information about additional settings.
CenterPoint RTK corrections	Radio-broadcast corrections from a ground-based reference station. See CenterPoint RTK corrections, page 95 for information about additional settings.

8. Tap **Position Quality** to change from the default *Favor Accuracy*.

Setting	Description
Favor Accuracy (Default)	Use for operations needing highest accuracy.
Balanced Quality	Trades potential accuracy for longer production time.
Favor Availability	Expands production time further with potential for reduced accuracy.

9. After completing all settings, tap  to save your settings.

SBAS corrections

Complete the following settings for SBAS corrections.

Setting	Options
Correction Satellite Selection	Choose *Auto Select* for automatic satellite selection, or select a satellite from the list.

Setting	Options
Position Quality	Select the appropriate choice: • Favor Accuracy (Default) : Use for operations needing highest accuracy (such as row crop planting and strip-till). • Balanced Quality: Trades potential accuracy for longer production time. • Favor Availability: Expands production time further with potential for reduced accuracy.

RangePoint RTX corrections

Complete the following settings for RangePoint™ RTX corrections.

Setting	Options
Position Quality	Select the appropriate choice: • Favor Accuracy (Default) : Use for operations needing highest accuracy (such as row crop planting and strip-till). • Balanced Quality: Trades potential accuracy for longer production time. • Favor Availability: Expands production time further with potential for reduced accuracy.
Convergence Threshold	View the convergence level at which the system will allow you to start guidance operations.
Frequency	Choose the RTX frequency for your region or enter a custom frequency. Frequency options are: • Asia/ Pacific (1539.8325) (Baud Rate= 600) • Central North America (1557.8150) (Baud Rate= 2400) • Custom (Enter the Frequency and Baud Rate) • Eastern North America (1557.8590) (Baud Rate= 600) • Europe/ Africa (1539.9525) (Baud Rate= 600) • Latin America (1539.8325) (Baud Rate= 600) • Western North America (1557.8615) (Baud Rate= 600)

OmniSTAR G2/HP corrections

Complete the following settings for OmniSTAR (either G2 or HP) corrections.

Setting	Options
Fast Restart	Choose a *Fast Restart* option: • *On* (Default) - Reduces the time for position to converge so that the system is ready for operation faster. Choose *On* when the vehicle is parked in an area with a clear view of the sky, and will not be moved until next use. • *Off* - Does not use *Fast Restart*.
Convergence Threshold	Set the convergence level at which the system will allow you to start guidance operations. • Enter a convergence value closer to 12 inches for broad acre applications to begin working promptly. • Enter a convergence value closer to 4 inches for row crop applications to ensure desired accuracy is achieved before beginning work.
Correction Satellite Selection	Choose *Auto Select* for automatic satellite selection, or select a satellite from the list. If you choose *CUSTOM*, enter the Frequency and Baud Rate.
Position Quality	Select the appropriate choice: • Favor Accuracy (Default) : Use for operations needing highest accuracy (such as row crop planting and strip-till). • Balanced Quality: Trades potential accuracy for longer production time. • Favor Availability: Expands production time further with potential for reduced accuracy.

CenterPoint RTX (modem) corrections

Complete the following settings for CenterPoint RTX (modem) corrections.

Setting	Options
Modem	DCM-300 is the option available.
Convergence Threshold	Set the convergence level at which the system will allow you to start guidance operations. • Enter a convergence value closer to 12 inches for broad acre applications to begin working promptly. • Enter a convergence value closer to 4 inches for row crop applications to ensure desired accuracy is achieved before beginning work.

Setting	Options
Position Quality	Select the appropriate choice: • Favor Accuracy (Default) : Use for operations needing highest accuracy (such as row crop planting and strip-till). • Balanced Quality: Trades potential accuracy for longer production time. • Favor Availability: Expands production time further with potential for reduced accuracy.

To use CenterPoint RTX (modem) corrections:

1. Connect the DCM-300 modem to the display.
2. Power on the DCM-300 modem and display by turning on the vehicle ignition.
3. Unlock CenterPoint RTX. (See Feature unlocks, page 57.)
4. Reboot the DCM-300 modem. by turning off the vehicle ignition.

CenterPoint RTX (satellite) corrections

Complete the following settings for CenterPoint RTX (satellite) corrections.

Standard convergence

Setting	Options
Fast Restart	Turn on or off.
Convergence Threshold	Set the convergence level at which the system will allow you to start guidance operations. • Enter a convergence value closer to 12 inches for broad acre applications to begin working promptly. • Enter a convergence value closer to 4 inches for row crop applications to ensure desired accuracy is achieved before beginning work.

Setting	Options
Frequency	Choose the RTX frequency for your region or enter a custom frequency. Frequency options are: • Asia/ Pacific (1539.8325) (Baud Rate= 600) • Central North America (1557.8150) (Baud Rate= 2400) • Custom (Enter the Frequency and Baud Rate) • Eastern North America (1557.8590) (Baud Rate= 600) • Europe/ Africa (1539.9525) (Baud Rate= 600) • Latin America (1539.8325) (Baud Rate= 600) • Western North America (1557.8615) (Baud Rate= 600)
Position Quality	Select the appropriate choice: • Favor Accuracy (Default) : Use for operations needing highest accuracy (such as row crop planting and strip-till). • Balanced Quality: Trades potential accuracy for longer production time. • Favor Availability: Expands production time further with potential for reduced accuracy.

Fast convergence

Setting	Options
Fast Restart	Turn on or off.
Convergence Threshold	Set the convergence level at which the system will allow you to start guidance operations. • Enter a convergence value closer to 12 inches for broad acre applications to begin working promptly. • Enter a convergence value closer to 4 inches for row crop applications to ensure desired accuracy is achieved before beginning work.

Setting	Options
Frequency	Choose the RTX frequency for your region or enter a custom frequency. Frequency options are: • Asia/ Pacific (1539.8325) (Baud Rate= 600) • Central North America (1557.8150) (Baud Rate= 2400) • Custom (Enter the Frequency and Baud Rate) • Eastern North America (1557.8590) (Baud Rate= 600) • Europe/ Africa (1539.9525) (Baud Rate= 600) • Latin America (1539.8325) (Baud Rate= 600) • Western North America (1557.8615) (Baud Rate= 600)
Position Quality	Select the appropriate choice: • Favor Accuracy (Default) : Use for operations needing highest accuracy (such as row crop planting and strip-till). • Balanced Quality: Trades potential accuracy for longer production time. • Favor Availability: Expands production time further with potential for reduced accuracy.

CenterPoint VRS corrections

Complete the following settings for CenterPoint VRS corrections.

Setting	Options
Modem	DCM-300 is the option available.
xFill (See xFill technology, page 82.)	Turn on or off. (See Introduction to connectivity, page 82).
Position Quality	Select the appropriate choice: • Favor Accuracy (Default) : Use for operations needing highest accuracy (such as row crop planting and strip-till). • Balanced Quality: Trades potential accuracy for longer production time. • Favor Availability: Expands production time further with potential for reduced accuracy.
VRS Server Name/Address	Enter the value provided by your VRS Service provider.
Server Port Number	Enter the value provided by your VRS Service provider.

Setting	Options
xFill Runtime (Available if you have turned on xFill.)	20 minutes With xFill selected as a backup source, this is how long the display will use xFill technology after the correction service becomes unavailable.

To use CenterPoint VRS correction:

1. Connect the DCM-300 modem to the display.
2. Power on the DCM-300 modem and display by turning on the vehicle ignition.
3. Unlock RTK and VRS correction services. (See Feature unlocks, page 57.)
4. Reboot the DCM-300 modem by turning off the vehicle ignition and turning it on again.

CenterPoint RTK corrections

These settings are for use with the AG-815 integrated radio.

Setting	Options
Radio	Choose the frequency of the AG-815 integrated radio: 450 MHz or 900 MHz.
xFill (See xFill technology, page 82.)	Turn xFill technology on or off. (For more information, see xFill technology, page 82.)
Scintillation Mode	Turn mode on or off. (See Scintillation, page 87.)
Position Quality	Select the appropriate choice: • Favor Accuracy (Default) : Use for operations needing highest accuracy (such as row crop planting and strip-till). • Balanced Quality: Trades potential accuracy for longer production time. • Favor Availability: Expands production time further with potential for reduced accuracy.

Setting	Options
Channel/Radio Frequency	Tap to show a list of frequencies. If you have already entered frequencies, choose the appropriate one. Otherwise, tap in the row. A Modify button displays. Tap Modify. Enter a number from 403.0 MHz to 473.0 MHz for the frequency Add an optional description. You can enter up to 40 frequencies, numbers and symbols , using up to 9 characters including the decimal place (e.g., 450.00000).
Protocol	• PCCEOC 4800 • PCCEOC 9600 • PCCEOT 4800 • PCCEOT 9600 • PCCFST 19200 • PCCSATEL 19200 • TRIMMARK 2 4800 • TRIMMARK 3 19200 • TT450 4800 • TT450 9600 • TT450S 1600 • TT450S 8000
Secure RTK Keys	Enter up to 5 security keys , with an optional description for each.
xFill Runtime (Available only if you turned on xFill.)	20 minutes. With xFill selected as a backup source, this is how long the display will use xFill after the correction service becomes unavailable.
xFill RTK Base Datum	• WGS84/ ITRF2008 (Default) • NAD83 • ETRS89 • GDA94

To use CenterPoint RTK correction:

1. Connect the DCM-300 modem to the display.
2. Power on the DCM-300 modem and display by turning on the vehicle ignition.
3. Unlock RTK. (See Feature unlocks, page 57.)
4. Reboot the DCM-300 modem by turning off the vehicle ignition and turning it on again.

DCM-300 modem setup

The DCM-300 modem ships as a locked unit until it is installed with the display. See Connect the DCM-300 modem, page 77.

Unlock VRS or data transfer features

To use VRS correction or data transfer features, unlock and configure these services.

1. Connect the DCM-300 modem to the display.
2. Power on the DCM-300 modem and display.
3. Unlock required services on the display. See Feature unlocks, page 57.
   a. To use VRS corrections, unlock RTK and VRS.
   b. Vehicle Sync and Office Sync also require an unlock.
4. Reboot the DCM-300 modem by turning off the vehicle ignition.
5. On the ***Home*** screen, tap  , then tap **Settings**. The system settings panel displays.
6. Tap **Modem Service**.
7. At the MODEM section, the serial number of the modem you can enter an optional name for the DCM-300 modem.
8. At the NETWORK section, the DCM-300 modem automatically detects the type of network being used: GSM or CDMA. Enter any additional settings that apply.

Network Type	Setting
GSM	a. Tap **Advanced**. Enter the user name and password. b. Enter the APN provided by your service provider. c. Enter the SIM pin provided by your service provider.
CDMA	The DCM-300 modem automatically completes the following: • MDN • PSN • MIN • PRL

Office Sync setup for Connected Farm

To exchange data with the office remotely:

- The vehicle must have a configured DCM-300 modem. (See DCM-300 modem, page 72, Connect the DCM-300 modem, page 77, DCM-300 modem setup, page 97.)
- Set up a Connected Farm storage area.
- Configure Office Sync on the display to communicate with your Connected Farm storage area.

With Office Sync you can transfer information without needing a USB flash drive, including:

- Planned and completed jobs
- A/B guidance lines
- Soil sampling and scouting maps
- Application maps

1. At the ***Home*** screen, tap  , then tap **Settings**. The ***System Information*** panel displays.
2. Tap **Modem Services**. Activate the feature and configure the settings.

Setting	Tap to...
Feature Active	Turn the feature on or off.
Check Server	Set how often you want the display to attempt to retrieve data from the server: • Push (whenever a message is available it is sent to the display) • Pull - 5 minutes (every 5 minutes check the server to see if there are messages to receive) • Pull - 10 minutes (every 10 minutes check the server to see if there are messages to receive) • Pull - 30 minutes (every 30 minutes check the server to see if there are messages to receive)
Send Data	Choose when you want the display to send information to the office: • Hourly • On job completion • At the display power up • Prior to shutdown (delays the display's time for powering off)
Auto Send Without Prompt	Select whether or not you want the display to send information to the office automatically.

CHAPTER 6

Vehicles

In this chapter:

You can add, edit, save, delete and select vehicles. Part of vehicle setup includes entering settings for auto guidance systems, providing vehicle measurements and calibrating the vehicle with the guidance system.

Introduction to vehicles

On-screen vehicles in the TMX-2050 display represent actual vehicles, and include basic information about your vehicle as well as its type of guidance system and calibrations.

Note – *Prior to using a vehicle for field activities, you must complete all settings for a vehicle, including calibrations.*

Vehicles can be:

- Saved in a partial or complete state (see Save a vehicle, page 104)
- Removed (see Delete a vehicle, page 102)
- Changed (see Edit a vehicle, page 103)
- Viewed in a summary form (see Vehicle summary, page 104)
- Selected for use in field activities (see Select a vehicle, page 105)

Overview of setup

At a high-level, setting up a vehicle includes:

1. Selecting the vehicle type and entering basic vehicle information

   Guidance type - Manual, Autopilot, EZ-Pilot or EZ-Steer

   For the Autopilot and EZ-Steer systems, navigation controller orientation - How the controller is oriented in the vehicle

   For the EZ-Pilot system- How the label is facing on the IMD-600

   Settings for steering and speed

   Measurements - Measurements for the location of the antenna and other vehicle measurements
2. Calibrating the guidance system with the vehicle.

Add a vehicle

Note – *You must complete all vehicle setup and calibration steps before you can select and use the vehicle for field activities on the* ***Run*** *screen.*

1. At the ***Home*** screen, tap  . The Vehicle setup panel displays.

2. Tap **ADD VEHICLE**. A list of vehicle types displays.

3. Tap the type of vehicle to set up.
4. To enter information about the vehicle's make, model and so on, tap **Next** or **MAKE/MODEL** at the right-hand top of the setup panel.

Tap...	To enter or select...
Make	Vehicle manufacturer
Series	Vehicle series (when applicable)
Model	Vehicle model
Option	Vehicle options from the manufacturer (Examples: Super Steer, Non Super Steer,ILS, Non-ILS, or ISO CAN Ready)
Vehicle Name	The name of the vehicle is pre-filled from information in the vehicle profile. You can change the name by tapping the name and changing it with the on-screen keyboard.

5. Tap **Next** or **GUIDANCE**. The SELECTION section displays.
6. Tap **SELECTION**. A list of steering/guidance types displays. The choices will depend on the

vehicle:

- Autopilot
- EZ-Pilot
- EZ-Steer
- Manual Guidance

7. Tap the type of guidance system the vehicle uses.
8. Continue entering settings for the vehicle and guidance system. For instructions, see the section that applies to your guidance system:
   - Guidance system settings for Autopilot system, page 106
   - EZ-Pilot system setup, page 122
   - EZ-Steer system setup, page 129
   - Manual guidance setup, page 105

   For instructions on saving the vehicle, see Save a vehicle, page 104.

Delete a vehicle

CAUTION – If you delete a vehicle, all information about the vehicle will be erased.

1. At the ***Home*** screen, tap  . The Vehicle setup panel displays.

2. On the left-hand side in the list, tap the name of the vehicle you want to delete.
3. On the right-hand side, tap **Delete** . A confirmation message displays asking you to confirm removal of the vehicle.

4. To delete, tap  . You return to the Vehicle setup panel at the ***Home*** screen.
5. To cancel the deletion, tap  .

Edit a vehicle

1. At the ***Home*** screen, tap  . The Vehicle setup panel displays.

2. At the VEHICLES list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with white text.
3. On the right-hand side, tap **Edit**. The SUMMARY section displays.
4. Navigate to the section(s) where you want to make changes.
5. After you have completed your changes, tap **SUMMARY**.

   If you have not completed all the required information, you can save the edits you made. However, you cannot use the vehicle on the ***Run*** screen.
6. When you are finished, tap **SUMMARY**. Tap  to save your settings.
7. To discard the changes and leave the vehicle setup panel, tap  on the left-hand side of the display bar. You return to the Vehicle setup panel.

For details on the vehicle summary, see Vehicle summary, page 104.

For information on guidance system types, see the applicable section:

- Guidance system settings for Autopilot system, page 106
- EZ-Steer system setup, page 129
- EZ-Pilot system setup, page 122
- Manual guidance setup, page 105

Save a vehicle

You can save:

- Complete vehicle settings after reviewing the SUMMARY section. For details on the vehicle summary, see Vehicle summary, page 104.
- Unfinished vehicle settings, then complete the setup later.

  If you have not completed all the required information, you can save the edits you made. However, you cannot use the vehicle profile in field activities on the ***Run*** screen.

Save a complete vehicle profile

1. Complete all vehicle settings, including calibration.
2. At the SUMMARY section, tap  . The display saves the vehicle and returns to the Vehicle setup panel.

Save an incomplete vehicle profile

Note – *You must complete all vehicle setup and calibration steps before you can use the vehicle for field activities on the* ***Run*** *screen.*

1. At a minimum, enter some basic information: vehicle type, make and model.
2. At the SUMMARY section, tap  . The display saves the vehicle and returns to the Vehicle setup panel at the ***Home*** screen.

Vehicle summary

The SUMMARY section of a vehicle profile contains the vehicle information and configurations.

Incomplete information will be noted as "Incomplete".

To...	Tap...
Save the vehicle with any changes you have made.	
Exit the setup without saving changes. The display will ask you to either save the changes or exit without saving.	 (***Home*** on the left side of the display bar)
Quickly access any part of the setup.	The buttons at the top of the screen

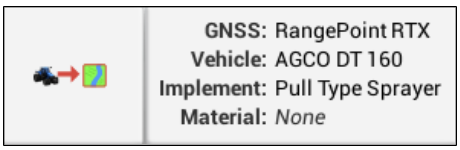
Select a vehicle

Before you can enter the ***Run*** screen, you must select the vehicle you want to use for field activities.

Note – *You can only enter the* ***Run*** *screen with a vehicle when all vehicle setup and calibration steps are complete.*

1. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
2. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to select. The display changes the list item to a blue background with white text.
3. To select the vehicle before performing field activities at the ***Run*** screen, tap **Select**. A  indicates which vehicle you chose.

4. The display indicates in the lower left-hand portion of the screen which vehicle is selected for field activities.



Manual guidance setup

1. Navigate to the GUIDANCE section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with white text.
   c. Tap **Edit**, then **GUIDANCE**.
2. Tap **Selection**, then tap **Manual Guidance**.

Autopilot system setup

Settings for the Autopilot system include:

- The type of platform for the Autopilot system
- The origin of the vehicle profile
- Controller and sensor settings
- Vehicle measurements
- Calibrations

Guidance system settings for Autopilot system

1. Navigate to the GUIDANCE section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with white text.
   c. Tap **Edit**, then **GUIDANCE**.
2. At the SELECTIONS section, complete the settings:

Tap...	Explanation
Selection	Autopilot
Autopilot Platform	The appropriate platform for your vehicle.
Vehicle Profile Origin	The source of the vehicle profile: • Vehicle Profiles Database - contained in the display • Import from Navigation controller- If your navigation controller has already been set up for a different Trimble display, the vehicle profile is stored in the controller. • Import from USB - profile stored on USB drive
GNSS Setup Selection	If you have not completed GNSS setup.
Configure GNSS	Setup GNSS if you have not already done so.

3. Tap **Next** to continue to Controller settings for Autopilot system, page 106.

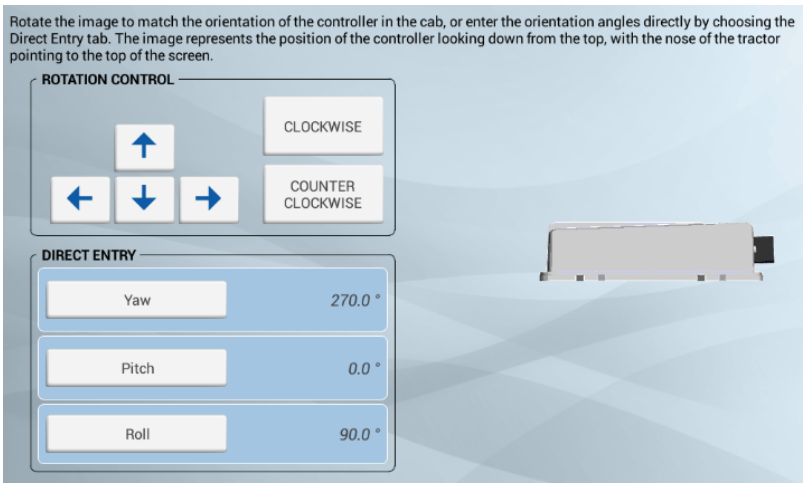
Controller settings for Autopilot system

The navigation controller indicates to the TMX-2050 display how your vehicle is positioned. To set up the controller, you must indicate the position/orientation of the controller as it is currently installed in the vehicle.

For example, if the controller is positioned with the input jacks of the controller facing to the left side of your vehicle, you indicate this in the TMX-2050 display.

The CONTROLLER SETTINGS section of the vehicle setup panel shows an image of the controller as though you are looking down on the vehicle from above, with the front of the vehicle at the top of the screen.

1. Navigate to the GUIDANCE section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. Tap **Edit**.
   c. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with white text.
   d. Tap **Edit**, then **GUIDANCE**.
2. Tap **CONTROLLER SETTINGS**.
3. Rotate the on-screen controller to match the position of the actual controller in the vehicle as you are looking down from the top, with the nose of the tractor point to the top of the screen. Tap the arrow buttons to move the on-screen navigation controller clockwise or counterclockwise.



4. Optionally you can directly enter the degrees of the position by tapping **Yaw**, **Pitch** and **Roll**.
5. When the controller position on the screen matches the controller installed in the vehicle, continue to the sensor settings. See Sensor settings for Autopilot system, page 107.

Sensor settings for Autopilot system

Note – *Adjust sensor settings only if necessary to improve steering performance.*

1. Navigate to the **GUIDANCE** section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. Tap **Edit**.
   c. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with white text.
   d. Tap **Edit**, then **GUIDANCE**.
2. Tap **SETTINGS**. Complete the information at the SETTINGS section:

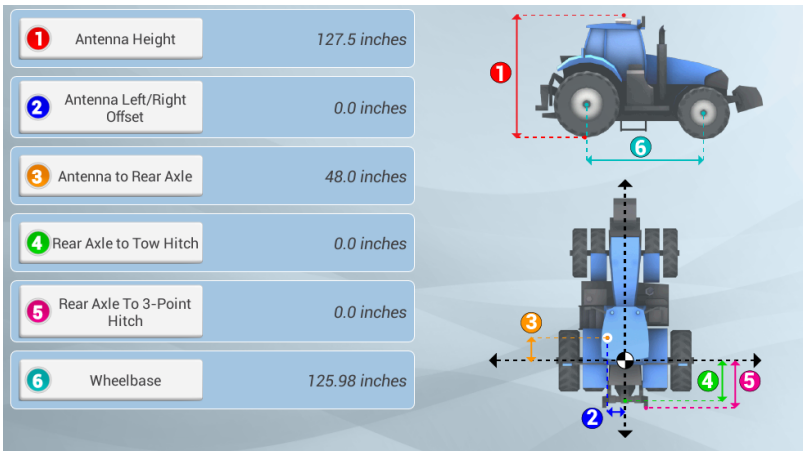
Tap...	To...
Steering Sensor	Select the type of angle sensor installed on the vehicle: • Potentiometer • AutoSense™ device
AutoSense Location	Select the location of the AutoSense device: • Left Wheel • Right Wheel
AutoSense Orientation	Indicate the direction the AutoSense label is facing: • Label Up • Label Down ***Note –*** *If the orientation is not accurate, assisted steering may be affected.*
Valve On Speed	Select speed. For vehicles operating at very slow speeds, select Low or Ultra Low. • Normal - 1.3 ft/s (0.4 m/s) • Low - 0.3 ft/s (0.1 m/s) • Ultra Low - 0.07 ft/s (0.02 m/s)

Vehicle measurements for Autopilot system

Note – *For Autopilot guidance with untracked or tracked vehicles,* ***do not*** *change vehicle measurements unless they are not correct.*

At MEASUREMENTS, you can enter and access the measurements that apply to the vehicle type you selected. In addition to measurements of the vehicle itself, measurements related to the antenna location are important for accuracy.

1. Before you take measurements:
   a. Park the vehicle on level ground.
   b. Make sure the vehicle is straight, with the center line of the body parallel to the wheels.
2. Navigate to the MEASUREMENTS section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. Tap **Edit**.
   c. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with white text.
   d. Tap **Edit**, then **GUIDANCE**.
3. Tap **MEASUREMENTS**. Based on your selections up to this point, some measurements will be pre-filled.



4. Confirm all pre-filled measurements and enter the others.

Autopilot system calibrations

The calibration process for the Autopilot system records additional details about your vehicle, which helps the system to steer the vehicle more accurately. For high accuracy systems, you must have all the correct calibrations.

Note – *If the system is installed on a Cat® MT 700/800 series equipped with the ISO option, no calibration is necessary.*

The CALIBRATION section lists only the calibrations required for the selected vehicle and steering system.

Note – *Calibration is only complete when all calibrations on the screen show results instead of Incomplete. Prior to performing calibrations ensure you completed the steps to* *Controller settings for Autopilot system, page 106**.*

1. Remove any implement from the vehicle. Drive the vehicle to a relatively flat field where you can make passes at least 402 m (1320 ft) long.
2. At the Vehicle setup panel, select the vehicle profile you want to work with. See Select a vehicle, page 105 for detailed instructions.
3. Tap **Calibrate**. The display shows ***only*** the calibrations required for the vehicle you have selected.
4. Make the appropriate adjustment for each control.
5. When you are finished, tap  to save the calibrations.

Calibration for non-tracked vehicles

Calibration	Explanation
Manual override sensitivity calibration, page 111 ***Note –*** *For vehicles that use a pressure transducer for the manual override.*	Adjusts how much force is required to disengage the system when the driver turns the steering wheel. ***Note –*** *The system detects whether the vehicle configuration includes this type of sensor. This option only appears if required.*
Sensor settings for Autopilot system, page 107 ***Note –*** *Only for front wheel steered and articulated vehicles, with a potentiometer.*	Tunes how the system converts steering angle sensor voltage into a steering angle measurement.
Automated steering deadzone calibration, page 113 ***Note –*** *Only for front wheel steered and articulated vehicles.*	For learning the vehicle's steering dead zones. Determines the minimum valve command required for steering movement.
Proportional steering gain calibration, page 115 ***Note –*** *Only for front wheel steered and articulated vehicles.*	Sets the proportional gain to control steering overshoot and responsiveness.

Calibration	Explanation
Steering sensor calibration, page 112	Sets the roll offset to compensate for variations in information about the position of the controller and the mounting of the GNSS receiver.
Line acquisition, page 120	Controls how fast the guidance system attempts to steer the vehicle onto the current guidance line (50% - 150%).
Engage aggressiveness, page 121	How aggressively the vehicle initially engages on the guidance line (50% - 150%).

Manual override sensitivity calibration

WARNING – Incorrect adjustment of *Manual Override Sensitivity* could cause this critical safety feature to fail, resulting in personal injury or damage to the vehicle. Do not to choose a setting that is either too sensitive or not sensitive enough. It is vital to avoid setting the sensitivity so low that the system will not detect any steering wheel motion.

Note – *This control is for platforms that use a pressure transducer or encoder for manual override. The software detects whether or not the system uses this type of sensor.*

One way to disengage the Autopilot system is to turn the steering wheel or manually override automatic steering. When you turn the steering wheel, there is a voltage spike that then tapers off. This spike and decline occurs at different levels for different models of tractor.

Manual Override Sensitivity sets the level that the voltage must reach before the guidance system disengages. The voltage must also drop below that level before automated steering can be engaged again.

A high level of sensitivity causes the system to disengage more quickly, and you must wait longer before you can re-engage. A low level of sensitivity causes the system to take longer to disengage, and you will be able to re-engage more quickly.

Note – *This calibration does not apply to tracked John Deere 8xxxT/9xxxT series tractors with the SIU200 Interface. For these, see .*

1. At the Vehicle setup panel, select the vehicle you want to work with. See Select a vehicle, page 105 for detailed instructions.
2. Tap **Calibrate**.
3. Tap **Manual Override Sensitivity**. The system displays the calibration tool.
4. Turn the steering wheel. If the threshold is crossed, the steering wheel will change color.
5. If the disengage response is acceptable, tap  and then perform the next calibration.

6. If the response is ***not*** acceptable, and:
   a. The system disengages too easily, move the slider bar to the right to increase the value and decrease the sensitivity.
   b. The system seems hard to disengage, move the slider bar to the left to decrease the value and increase the sensitivity.

      Note – *The default setting provides a balance between rapid activation of the override function and rejection of steering wheel motion due to incidental contact (for example, due to travel in a rough field).*
   c. Repeat steps 4 and 5 until the disengage response is acceptable.

Tip – Evaluate *Manual Override Sensitivity* under conditions which may affect the pressure of the hydraulic system. For example, turn on the auxiliary hydraulics while you evaluate the sensitivity.

7. Tap  to exit without saving. The display returns to the CALIBRATION section where you can perform another calibration or exit.

Steering sensor calibration

Steering sensor calibration converts the voltage output of the steering angle sensor into an equivalent steering angle measurement.

Note – *Steering sensor calibration is only for platforms with a rotary potentiometer installed.*

Note – *Complete this calibration before you attempt the steering deadzone (**Automated steering deadzone calibration, page 113**) or roll correction (**Roll correction calibration, page 117**) calibrations.*

1. Drive the vehicle to a field with a hard, level surface without obstructions.
2. At the Vehicle setup panel, select the vehicle you want to work with. See Select a vehicle, page 105 for detailed instructions.
3. Tap **Calibrate**.
4. Tap **Steering Sensor**. The calibration tool displays.
5. Read the instructions and tap the **Next**.
6. Steer straight ahead and drive forward slowly. Maintain a tractor speed above 1.6 kph (1 mph). Tap **Next**.
7. Turn the steering wheel all the way to the left and continue moving forward.
   a. Note the value of Sensor Volts.
   b. While the steering wheel is at the full left position, tap **Next**.

8. Turn the steering wheel all the way to the right.
   a. Note the value of Sensor Volts.
   b. While the steering wheel is at the full right position,tap **Next**.
9. Steer straight ahead for at least 30 seconds.
10. Check the value. The center should be approximately 2.5 volts. The calibration process attempts to map the values for a full left turn, a full right turn and center steering.
11. If the values are not symmetrical,tap  to discard the calibration and repeat step 6 through step 9. The steering sensor may require adjustment or replacement if:
    - The values for Sensor Volt are not symmetrical for full left and full right turns.
    - The value for Degrees is not near 0.
12. Tap  to accept the calibration.
13. To restart the calibration, tap **Steering Sensor**.

Automated steering deadzone calibration

The *Automated Deadzone* calibration runs a series of tests on the valve and steering hydraulics to determine the steering signal where steering movement occurs. It determines the minimum valve command required for steering movement when you direct the vehicle to turn to the right or left.

In this test, the system independently calibrates both sides of the steering system to determine the point at which wheel movement occurs for each direction.

Note – *Large obstacles or terrain variation may cause erratic steering position readings which may degrade the calibration done smooth, level surface recommended for this calibration.*

WARNING – Many large and sudden changes in satellite geometry caused by blocked satellites can cause significant position shifts. If operating under these conditions, auto-guidance systems can react abruptly. To avoid possible personal injury or damage to property under these conditions, disable the auto-guidance system and take manual control of the vehicle until conditions have cleared.

Pre-calibration steps

Complete these steps **before** you begin calibration:

1. Complete the vehicle profile steps for setup.
2. Warm up the vehicle. The hydraulic fluid must be at normal operating temperature for deadzone calibration.
3. ***Note –*** *On some vehicles with large reservoirs, it may take a longer amount of time for the fluid to reach operating level, especially if the implement circuit is lightly loaded. Consult the*

vehicle documentation to determine if the hydraulic fluid temperature can be shown on a vehicle console.

4. If you perform the deadzone calibration while the system is cold, repeat both the Automated Deadzone and Steering Gain (see Proportional steering gain calibration, page 115) calibrations again when the system is at operating temperature.
5. Prepare the steering sensor:
   a. If the vehicle has an AutoSense device, drive the vehicle in a straight line for at least one minute.
   b. If the vehicle has a Potentiometer, complete the *Steering Sensor* calibration first. See Sensor settings for Autopilot system, page 107.

Calibration steps

1. Drive the vehicle to a large field without hazards or obstructions. The field should have smooth soil that is loose but firm.

   CAUTION – Obstacles in the field can cause collisions, which may injure you and damage the vehicle. If an obstacle in the field makes it unsafe to continue the Automated Deadzone calibration, stop the vehicle and turn the steering wheel to disengage the system.
   1) Wait until the display prompts you that the phase is ready to begin.
   2) Look at the screen to determine whether the next phase will require a left or right turn.
   3) Reposition the vehicle so that the turn will use the space that you have available.
   4) Tap the button to begin the next phase.

2. At the Vehicle setup panel, select the vehicle profile you want to work with. See Select a vehicle, page 105 for detailed instructions.
3. On the left-hand side, tap **Calibrate**.
4. Tap **Automated Deadzone**. The calibration tool displays.
5. Tap **Next**.
6. Read each instruction and then tap **Next**.
7. Center the steering on the tractor and move forward in first gear at high RPM for at least five seconds.
8. Tap **Test Right** and continue moving forward while the system tests a right turn.
9. When the test is finished, center the steering again and drive forward for five seconds.
10. Tap **Test Left** and continue moving forward while the system tests a left turn.
11. Tap **Accept** to accept the calibration. The system displays the AutoPilot calibration panel again.
12. Perform step 4 through step 11 two more times, or until the average deadzone values change by less than approximately 0.5.

To minimize the total amount of space needed for the complete calibration, you can reposition the vehicle between each calibration process. If available flate, smooth space is extremely limited, re-align the vehicle after each calibration.

Note – *If you encounter any error messages during calibration, refer to the Automated Deadzone error messages in this section.*

Automated Deadzone error messages

Message	Explanation
Error - Manual Override Detected	Manual override was detected before the calibration cycle could be completed. Retry the calibration.
Error - Vehicle Moving Too Slow	The vehicle was moving too slowly for the calibration cycle to successfully finish. Make sure the vehicle is moving at least 0.8 kph (0.5 mph) during each calibration cycle.
Error - Steering Close To End Stops	Before the calibration cycle could be completed, the measured steering angle approached the end stops. Retry, and if the problem persists, instead of centering the steering at the start of each cycle, try turning the steering in the opposite direction to that which is being tested so that the calibration procedure has a greater range to test over.
Error - Valve Connectors Could Be Swapped	The calibration test sensed the steering turning in the opposite direction to what was expected. Retry. If the problem persists, either the valve connectors have been accidentally swapped or the steering sensor calibration was performed incorrectly.
Error - No GPS	A GNSS receiver must be connected and outputting positions before the software can run the calibration procedure.
Error - No Steering Response Detected	During the calibration cycle, there was not enough movement for the calibration to complete. If the problem persists, the hydraulic installation could be faulty.
Error - Unable To Determine DZ: Try Again	A problem occurred when trying to compute dead zone. Retry. If the problem persists, contact Technical Support.
Error - Software Problem Detected	The software was unable to complete the calibration due to insufficient movement of the vehicle. If the problem persists, contact Technical Support.

Proportional steering gain calibration

Note – *Adjust the steering gain only when the Autopilot system performance is less than satisfactory.*

Proportional steering gain (PGain) balances rapid steering response and stability. PGain affects the following:

- Slew Time: The amount of time that the front wheels take to move from the far left to the far right position and back.
- Overshoot: The percentage by which the front wheels exceed the commanded angle before they settle on the correct value.

High Gain	Low Gain
Decreases the slew time and increase the overshoot. This provides rapid responses, but can cause the steering to exhibit signs of instability (for example, a tendency to excessively overshoot).	Increases the slew time and decrease the overshoot. This improves the stability but can introduce delays in the steering response and can cause the vehicle to oscillate from side to side.

Pre-calibration steps

1. Complete the vehicle setup steps.
2. Perform calibration for the Automatic Deadzone (see Automated steering deadzone calibration, page 113) before you perform the calibration for Steering Gain.
3. Drive the vehicle to an open area with a smooth surface.

CAUTION – The wheels can move abruptly during the Steering Proportional Gain procedure while the Autopilot system tests the hydraulic response to its steering commands. To avoid injury, be prepared for vehicle movement.

Calibration steps

1. At the Vehicle setup panel, select the vehicle profile you want to work with. See Select a vehicle, page 105 for detailed instructions.
2. Tap **Calibrate**, then tap **Steering Gain**. The calibration tool displays.
3. Tap **Run Slew Test**. To proceed with the test, tap **Next**.
4. Drive forward at 1 mph (1.6 kph) or faster. Tap **Next**.
5. Turn the front wheels completely to the right and then tap **Turn Left**. Drive forward while the vehicle turns left, until the screen shows the test is complete.
6. Turn the front wheels completely to the left and then tap **Turn Right**. Drive forward while the vehicle turns right, until the screen shows the test is complete.

   Note – *With some vehicles, valve size and hydraulic capabilities of the machine will limit the capablity of slew time. In such cases, you will not see a change.*
7. Note the Slew Time and Overshoot values.
8. Adjust the New Gain.

9. Repeat step 3 through step 8 until the Gain is just below the level where any one of the following occurs:
   - Slew times no longer decrease (a low value is required some vehicles too high gain is possible - 1500-2000 miliseconds is ideal).
   - Overshoot exceeds 5 – 8% (depending on the vehicle).
   - Wheels noticeably shake near end stops.
10. When you find the optimum gain, tap  to accept the calibration or  to exit without saving. The display returns to the CALIBRATION section where you can perform another calibration or exit.

Roll correction calibration

Roll correction compensates for minor variations in the placement of the navigation controller and GNSS receiver.

Note – *If you use multiple GNSS technologies (for example, RTK and WAAS), then use the device with the highest accuracy when calibrating roll correction. For best results, use RTK, RTX or OmniSTAR HP with a signal that has been converged for at least 20 minutes. If you do a roll calibration with less accurate correction, repeat the steps below at least four times for greater accuracy.*

Pre-calibration steps

1. Set up a vehicle and perform all calibrations preceding this one.
2. Read and understand the instructions provided below for the calibration procedure.
3. Remove any implement from the vehicle and drive it to a flat, smooth area where you can complete passes of at least 400 ft (125 m) in length.
4. Create a field profile. See Add a field, page 137.

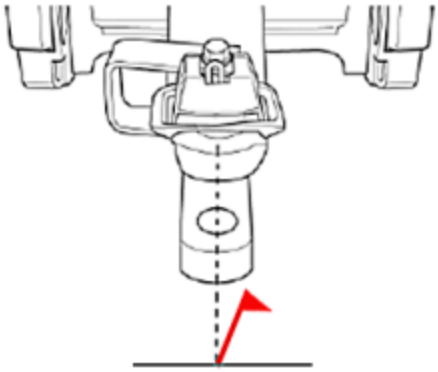
Calibration steps

1. At the Vehicle setup panel, select the vehicle and implement you want to work with.

   (See Select a vehicle, page 105 and Select an implement, page 148 for detailed instructions.)
2. Select a field and enter the ***Run*** screen. (See Select a field, page 138 and Enter a field, page 186.)
3. Create a new, straight guidance line.

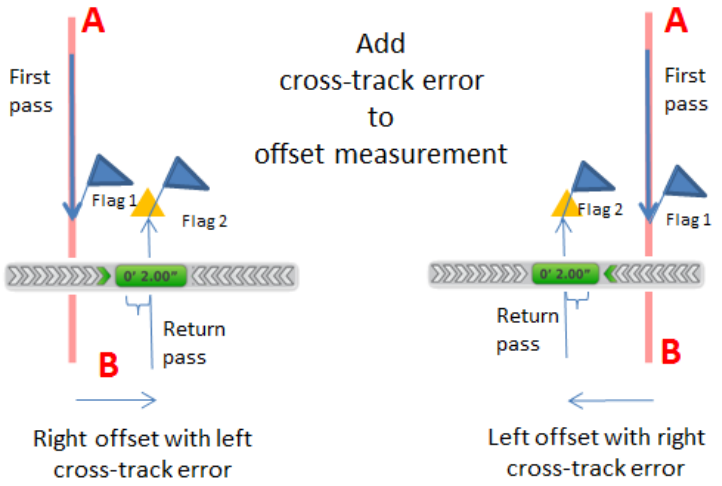
   (See AB guidance line creation, page 189 or A+ guidance line creation, page 190.)
4. Engage automatic steering on the line. Drive until the lightbar shows that the cross-track error value is as close to zero as possible, and then stop the vehicle.

5. Mark the vehicle's position:
    a. Place the vehicle in park and exit the cab.
    b. Place a flag in the ground to mark the vehicle center line. Use the drawbar pin hole or use another feature of the vehicle as a reference point.

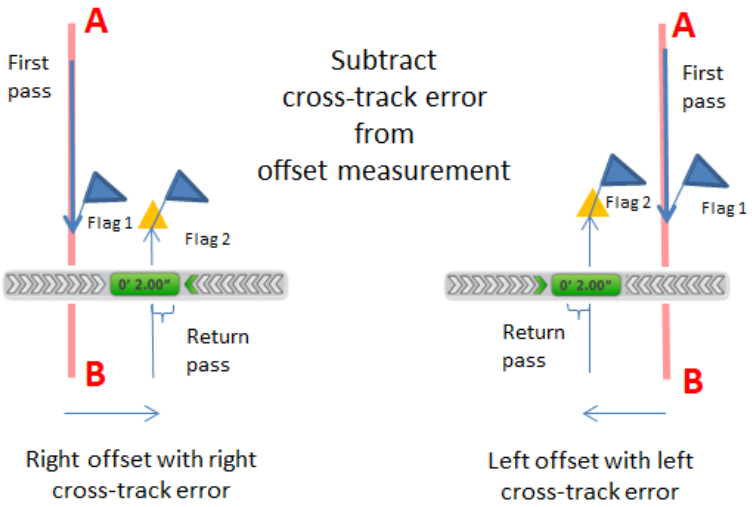


6. Re-enter the cab and continue to drive down the guidance line.
7. Turn the vehicle around and then re-engage on the same line in the opposite direction.
8. Stop the vehicle with the drawbar (or other feature used to mark the first position) as close to the first flag as possible. Read the current cross-track error value shown in diagnostics.
9. Mark the vehicle's position:
    a. Place the vehicle in park and exit the cab.
    b. Place a second flag in the ground to mark the vehicle center-line.
10. Measure the offset:
    a. Measure the distance between the flags.
    b. Look at the vehicle from behind to see if the second flag is to the left or to the right of the first flag. This is the offset direction.
11. Go to the ***Home*** screen and open the Vehicle setup panel.
12. Tap the vehicle you are calibrating and tap **Calibrate**.
13. Tap **Roll Correction** and then tap **Roll Offset**. The display shows the cross-track error
14. Under the Roll Correction section, update the Offset in the display:
    a. Enter the distance between the flags. For greater accuracy, add or subtract the cross-track error.
    b. Refer to the diagrams below to determine whether to add or subtract the cross-track error.

Add cross-track error



Subtract cross-track error



15. Enter where the second flag is compared to the first flag, looking at them from behind the vehicle.
16. Pull both flags out of the ground and continue driving down the line.
17. Turn the vehicle around again so that you are traveling in the same direction as you were when you originally set the line.
18. Repeat the steps starting at Step 4 until the two flags are under 1" (2.54 cm) apart.

Line acquisition

Line acquisition controls how fast the guidance system attempts to steer the vehicle onto the current guidance line (50% - 150%).

- With a high setting, the vehicle approaches the line quickly, but may overshoot the line.
- With a low setting, the vehicle steers onto the line more slowly, but is less likely to overshoot the line.

Note – *Exceeding the capability of the tractor will cause instability (such as oscillating back and forth up and down the line) during line acquisition.*

1. Go to Diagnostics:
   a. Tap the right side of the display bar. The notification list displays.
   b. Tap , then tap .
   c. Tap **Steering** at the top of the screen.
   d. Under the Autopilot heading in the left-hand list, tap **Performance**.
   e. The display shows the tool for calibrating line approach aggressiveness and the cross-track error diagram.

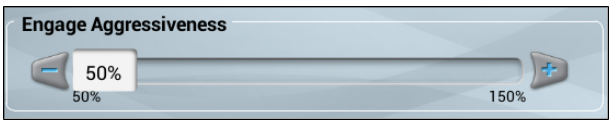
2. Enter the ***Run*** screen and engage automatic steering on a straight guidance line.
   a. At the Vehicle setup panel, select the vehicle and implement you want to work with. (See Select a vehicle, page 105 and Select an implement, page 148 for detailed instructions.)
   b. Select a field and enter the ***Run*** screen. (See Select a field, page 138 and Enter a field, page 186.)
   c. Create a new, straight guidance line. (See AB guidance line creation, page 189 or A+ guidance line creation, page 190.)
3. Drive until the lightbar shows that the cross-track error value is as close to zero as possible, and then stop the vehicle.
4. Open the Diagnostics section for Autopilot performance again.
5. Evaluate the current accuracy of the vehicle during line acquisition with the default setting.
6. Tap or to move the sliders to the left or right to adjust each setting. Drive forward and re-engage auto-steering if necessary to test the settings.

Engage aggressiveness

Engage aggressiveness controls how aggressively the vehicle initially engages on the guidance line (50% - 150%).

- With a high setting, the vehicle will initially respond quickly.
- With low setting, the vehicle will engage on the line slowly.

1. Enter the ***Run*** screen and engage automatic steering on a straight guidance line. (See Enter a field, page 186 for more instructions on entering the ***Run*** screen.)
2. Drive the vehicle approximately 10 seconds.
3. Open the Diagnostics section for the Autopilot system's performance.
   a. Tap the right side of the display bar. The notification list displays.
   b. Tap  , then tap  .
   c. Tap **Steering** at the top of the screen.
4. Evaluate the current accuracy of the vehicle during line acquisition with the default setting .



5. Tap  or  to move the sliders to the left or right to adjust the setting. Drive forward and re-engage auto-steering if necessary to test the settings.

EZ-Pilot system setup

The EZ-Pilot system turns the steering wheel for you with an electric motor drive. It uses GPS guidance from the TMX-2050 display.

Initial setup steps are:

- Guidance selection for the EZ-Pilot system, page 122
- Controller settings for EZ-Pilot system, page 122
- Vehicle measurements for EZ-Pilot system, page 123
- Steering speed settings for EZ-Pilot system, page 123

Guidance selection for the EZ-Pilot system

1. Navigate to the ***GUIDANCE*** section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with white text.
   c. Tap **Edit**, then **GUIDANCE**.
2. At the SELECTION section,tap EZ-Pilot.
3. Tap **Next** to set up the controller orientation. See Controller settings for EZ-Pilot system, page 122.

Controller settings for EZ-Pilot system

The EZ-Pilot system contains sensors that use technology to provide roll compensation when the vehicle is on a slope or drives over a bump. For roll compensation to work correctly, the IMD-600 must be calibrated. IMD stands for Inertial Measurement Device.

To set up the IMD-600 controller, you must indicate the position/orientation of the controller as it is currently installed in the vehicle.

For example, if the controller is positioned with the input jacks of the controller facing to the left side of your vehicle, you indicate this in the TMX-2050 display.

The CONTROLLER SETTINGS section of the vehicle setup panel shows an image of the controller as though you are looking down on the vehicle from above, with the front of the vehicle at the top of the screen.

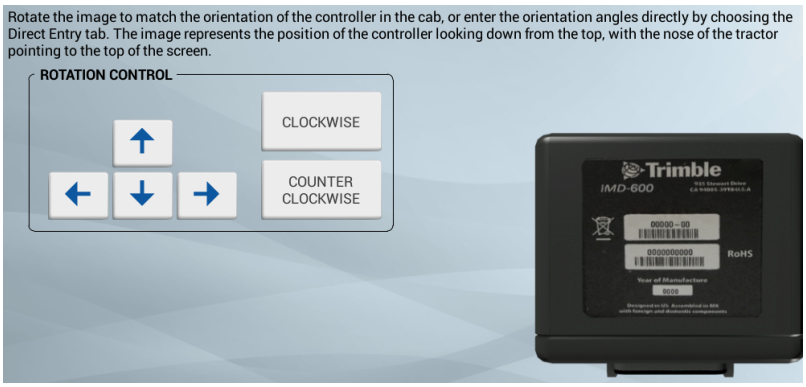
1. Navigate to the **GUIDANCE** section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. Tap **Edit**.

c. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with white text.

d. Tap **Edit**, then **GUIDANCE**.

2. Tap **CONTROLLER SETTINGS**.

3. Rotate the on-screen IMD-600 to match the position of the actual IMD-600 in the vehicle as you are looking down from the top, with the nose of the tractor point to the top of the screen. Tap the arrow buttons to move the on-screen IMD-600 clockwise or counterclockwise.



4. When the IMD-600 position on the screen matches the IMD-600 installed in the vehicle, continue to the sensor settings. See Sensor settings for Autopilot system, page 107.

Vehicle measurements for EZ-Pilot system

At MEASUREMENTS, the measurements that apply to the vehicle type you selected are shown in this section. In addition to measurements of the vehicle itself, measurements related to the antenna location are important for accuracy.

To edit measurements, tap each measurement button and enter the appropriate number.

Before you take measurements:

- Park the vehicle on level ground.
- Make sure the vehicle is straight, with the center line of the body parallel to the wheels.

Steering speed settings for EZ-Pilot system

Note – *Adjust settings only if necessary to improve steering performance.*

1. Navigate to the GUIDANCE section of the vehicle setup panel:

a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.

b. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to

edit. The display changes the list item to a blue background with white text.

c. Tap **Edit**, then **GUIDANCE**.

2. Tap **SETTINGS**. Complete the information at the SETTINGS section.

Setting	Explanation
Angle per Turn	The angle that the wheels turn during one full rotation of the steering wheel (1 - 150 degrees): • Too high - the system turns the wheel too little and the vehicle will not hold the line • Too low - results in small, fast oscillations in steering ***Note –*** *Angle per Turn may be adjusted during .*
Freeplay Left	The amount of free movement in the steering when starting a left turn (0 - 11.9 inches (0 - 30 cm))
Freeplay Right	The amount of free movement in the steering when starting a right turn (0 - 11.9 inches (0 - 30 cm))
Steering Delay	The amount of time between steering wheel movement and vehicle yaw rate change (0.1 - 2 seconds)
Motor Speed	The speed at which the motor will operate: *Low*, *Medium*, *High*, *Maximum* ***Note –*** *Default selection varies depending on vehicle type.*
External Switch	Select a switching option if an external engage switch is connected to the system: • *Disabled* (Default) • *Seat Disengage* • *Seat Engage Only* • *Remote Engage*
Engage Options	Maximum Speed Minimum Speed Maximum Angle Engage Offline Disengage Offline Override Sensors

Setting	Explanation
Advanced	***Note –*** *Do not adjust the* ***Advanced Settings****. Advance Settings are provided for support and advanced troubleshooting only.* Settings include: • Roll Offset Angle • Estimated Steering Angle Bias • Dynamic Approach Angle • Steering Acceleration Limit • Steering Slew Limit

EZ-Pilot system calibrations

Calibrations for the EZ-Pilot guidance system are:

- Angle per turn calibration for EZ-Pilot system, page 125
- Roll correction calibration, page 125

Angle per turn calibration for EZ-Pilot system

1. Navigate to the GUIDANCE section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to calibrate. The display changes the list item to a blue background with white text.
2. Tap **Calibrate**.
3. Tap **Angle Per Turn**. The calibration tool displays.
4. Follow the steps on the calibration tool.

Roll correction calibration

Roll Correction compensates for minor variations in the placement of the navigation controller and GNSS receiver.

Note – *If you use multiple GNSS technologies (for example, RTK and WAAS), then use the device with the highest accuracy when calibrating roll correction. For best results, use RTK, RTX or OmniSTAR HP with a signal that has been converged for at least 20 minutes. If you do a roll calibration with less accurate correction, repeat the steps below at least four times for greater accuracy.*

Pre-calibration steps

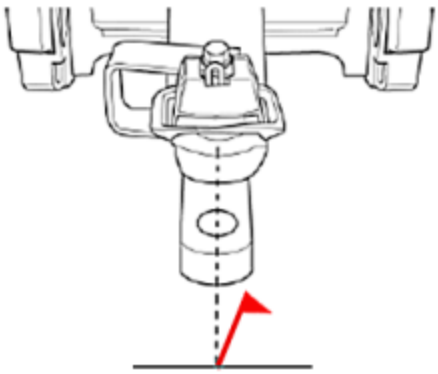
1. Set up a vehicle and perform all calibrations preceding this one.
2. Read and understand the instructions provided below for the calibration procedure.
3. Remove any implement from the vehicle and drive it to a flat, smooth area where you can complete passes of at least 400 ft (125 m) in length.
4. Create a field profile. See Add a field, page 137.

Calibration steps

1. At the Vehicle setup panel, select the vehicle and implement you want to work with.

   (See Select a vehicle, page 105 and Select an implement, page 148 for detailed instructions.)
2. Select a field and enter the ***Run*** screen. (See Select a field, page 138 and Enter a field, page 186.)
3. Create a new, straight guidance line.

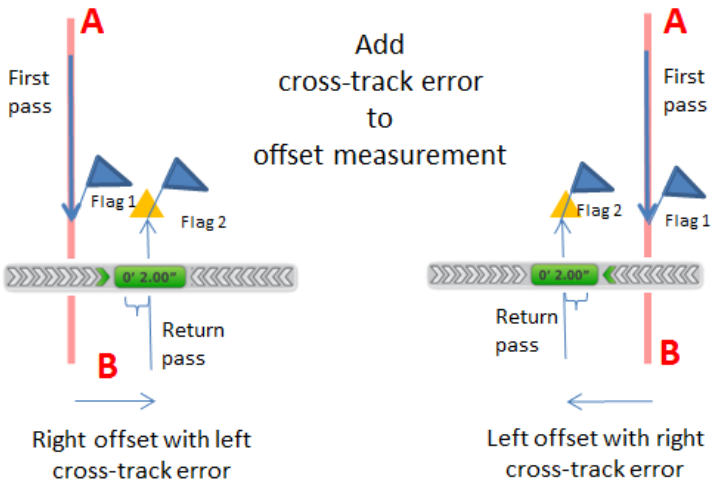
   (See AB guidance line creation, page 189 or A+ guidance line creation, page 190.)
4. Engage automatic steering on the line. Drive until the lightbar shows that the cross-track error value is as close to zero as possible, and then stop the vehicle.
5. Mark the vehicle's position:
   a. Place the vehicle in park and exit the cab.
   b. Place a flag in the ground to mark the vehicle center line. Use the drawbar pin hole or use another feature of the vehicle as a reference point.



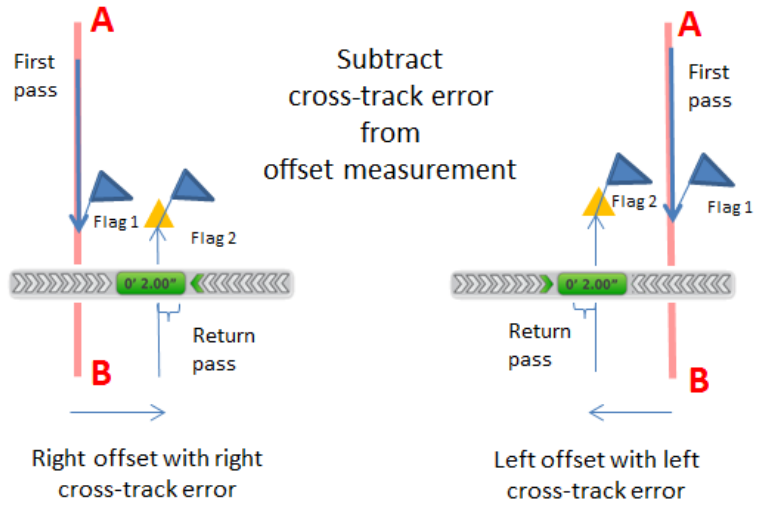
6. Re-enter the cab and continue to drive down the guidance line.
7. Turn the vehicle around and then re-engage on the same line in the opposite direction.
8. Stop the vehicle with the drawbar (or other feature used to mark the first position) as close to the first flag as possible. Read the current cross-track error value shown in diagnostics.

9. Mark the vehicle's position:
    a. Place the vehicle in park and exit the cab.
    b. Place a second flag in the ground to mark the vehicle center-line.
10. Measure the offset:
    a. Measure the distance between the flags.
    b. Look at the vehicle from behind to see if the second flag is to the left or to the right of the first flag. This is the offset direction.
11. Go to the ***Home*** screen and open the Vehicle setup panel.
12. Tap the vehicle you are calibrating and tap **Calibrate**.
13. Tap **Roll Correction** and then tap **Roll Offset**. The display shows the cross-track error
14. Under the Roll Correction section, update the Offset in the display:
    a. Enter the distance between the flags. For greater accuracy, add or subtract the cross-track error.
    b. Refer to the diagrams below to determine whether to add or subtract the cross-track error.

    Add cross-track error



Subtract cross-track error



15. Enter where the second flag is compared to the first flag, looking at them from behind the vehicle.
16. Pull both flags out of the ground and continue driving down the line.
17. Turn the vehicle around again so that you are traveling in the same direction as you were when you originally set the line.
18. Repeat the steps starting at Step 4 until the two flags are under 1" (2.54 cm) apart.

EZ-Steer system setup

The EZ-Steer system turns the steering wheel for you by combining a friction wheel and a motor with guidance from the TMX-2050 display.

Initial setup steps are:

- Guidance selection for EZ-Steer system, page 129
- Controller settings for EZ-Steer system, page 129
- Vehicle measurements for EZ-Steer system, page 129
- Steering and speed settings for EZ-Steer system, page 130

Guidance selection for EZ-Steer system

1. Navigate to the ***GUIDANCE*** section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with white text.
   c. Tap **Edit**, then **GUIDANCE**.
2. At the SELECTIONS section,tap **Selection** and then tap EZ-Steering.
3. Tap **Next** to set up the controller orientation. See Controller settings for EZ-Pilot system, page 122.

Controller settings for EZ-Steer system

Setting	Explanation
Connector Faces	Indicate how the connector on the navigation controller faces: Back, Floor, Front

Vehicle measurements for EZ-Steer system

At MEASUREMENTS, you can enter and access the measurements that apply to the vehicle type you selected. In addition to measurements of the vehicle itself, measurements related to the antenna location are important for accuracy.

To enter measurements, tap each measurement button and enter the appropriate number.

Before you take measurements:

- Park the vehicle on level ground.
- Make sure the vehicle is straight, with the center line of the body parallel to the wheels.

Steering and speed settings for EZ-Steer system

Note – *Adjust settings only if necessary to improve steering performance.*

1. Navigate to the GUIDANCE section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with white text
   c. Tap **Edit**, then **GUIDANCE**.
2. Tap **SETTINGS**. Complete the information at the SETTINGS section.

Steering Sensor Setting	Description
Angle per Turn	The angle that the wheels turn during one full rotation of the steering wheel (1 - 150 degrees): • Too high - the system turns the wheel too little and the vehicle will not hold the line • Too low - results in small, fast oscillations in steering ***Note –*** *Angle per Turn may be adjusted during .*
Freeplay Left	The amount of free movement in the steering when starting a left turn (0 - 11.9 inches (0 - 30 cm))
Freeplay Right	The amount of free movement in the steering when starting a right turn (0 - 11.9 inches (0 - 30 cm))
Steering Delay ***Note –*** *Only available if vehicle is sprayer or swather.*	The amount of time between steering wheel movement and vehicle yaw rate change (0.1-1.5 seconds)

Steering Sensor Setting	Description
Motor Speed	The speed at which the motor will operate: • *Auto*, *Auto Low*, *Auto Medium*, *Auto High*, or *Auto Maximum* • *Manual Low*, *Manual Medium* (Default), *Manual High*, or *Manual Maximum* ***Note –*** *Auto mode determines the proper speed for the steering action required.*
Motor Direction	The direction the EZ-Steer system motor is installed: • *Standard Mount* • *Reversed Mount*
External Switch	Select a switching option if an external engage switch is connected to the system: • *Disabled* (Default) • *Seat Disengage* • *Seat Engage Only* • *Remote Engage*
Advanced	*Advanced* settings include: • Steering Acceleration Limit • Steering Slew Limit ***Note –*** *Do not adjust the* ***Advanced Settings****. Advance Settings are provided for support and advanced troubleshooting only.*

EZ-Steer system calibrations

Calibrations for the EZ-Steer auto guidance system include:

- Angle per turn calibration for EZ-Steer system, page 132
- Roll correction calibration, page 132

Angle per turn calibration for EZ-Steer system

1. Navigate to the GUIDANCE section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to calibrate. The display changes the list item to a blue background with white text.
2. Tap **Calibrate**.
3. Tap **Angle Per Turn**. The calibration tool displays.
4. Follow the steps on the calibration tool.

Roll correction calibration

Roll Correction compensates for minor variations in the placement of the navigation controller and GNSS receiver.

Note – *If you use multiple GNSS technologies (for example, RTK and WAAS), then use the device with the highest accuracy when calibrating roll correction. For best results, use RTK, RTX or OmniSTAR HP with a signal that has been converged for at least 20 minutes. If you do a roll calibration with less accurate correction, repeat the steps below at least four times for greater accuracy.*

Pre-calibration steps

1. Set up a vehicle and perform all calibrations preceding this one.
2. Read and understand the instructions provided below for the calibration procedure.
3. Remove any implement from the vehicle and drive it to a flat, smooth area where you can complete passes of at least 400 ft (125 m) in length.
4. Create a field profile. See Add a field, page 137.

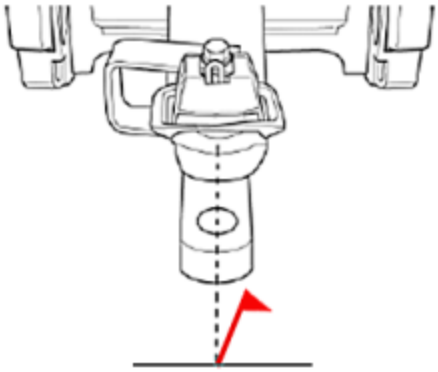
Calibration steps

1. At the Vehicle setup panel, select the vehicle and implement you want to work with.

   (See Select a vehicle, page 105 and Select an implement, page 148 for detailed instructions.)
2. Select a field and enter the ***Run*** screen. (See Select a field, page 138 and Enter a field, page 186.)
3. Create a new, straight guidance line.

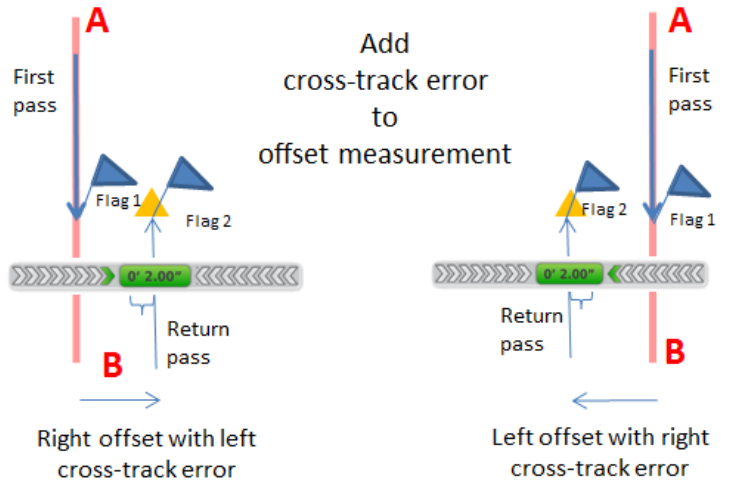
   (See AB guidance line creation, page 189 or A+ guidance line creation, page 190.)
4. Engage automatic steering on the line. Drive until the lightbar shows that the cross-track error value is as close to zero as possible, and then stop the vehicle.

5. Mark the vehicle's position:
   a. Place the vehicle in park and exit the cab.
   b. Place a flag in the ground to mark the vehicle center line. Use the drawbar pin hole or use another feature of the vehicle as a reference point.

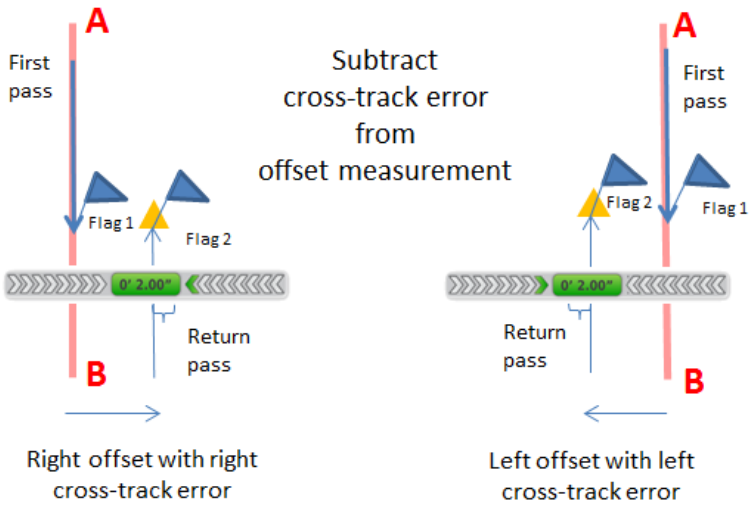


6. Re-enter the cab and continue to drive down the guidance line.
7. Turn the vehicle around and then re-engage on the same line in the opposite direction.
8. Stop the vehicle with the drawbar (or other feature used to mark the first position) as close to the first flag as possible. Read the current cross-track error value shown in diagnostics.
9. Mark the vehicle's position:
   a. Place the vehicle in park and exit the cab.
   b. Place a second flag in the ground to mark the vehicle center-line.
10. Measure the offset:
    a. Measure the distance between the flags.
    b. Look at the vehicle from behind to see if the second flag is to the left or to the right of the first flag. This is the offset direction.
11. Go to the ***Home*** screen and open the Vehicle setup panel.
12. Tap the vehicle you are calibrating and tap **Calibrate**.
13. Tap **Roll Correction** and then tap **Roll Offset**. The display shows the cross-track error
14. Under the Roll Correction section, update the Offset in the display:
    a. Enter the distance between the flags. For greater accuracy, add or subtract the cross-track error.
    b. Refer to the diagrams below to determine whether to add or subtract the cross-track error.

Add cross-track error



Subtract cross-track error



15. Enter where the second flag is compared to the first flag, looking at them from behind the vehicle.
16. Pull both flags out of the ground and continue driving down the line.
17. Turn the vehicle around again so that you are traveling in the same direction as you were when you originally set the line.
18. Repeat the steps starting at Step 4 until the two flags are under 1" (2.54 cm) apart.

CHAPTER 7

Fields

In this chapter:

You can create multiple fields and then select one to enter. Using the Field Manager, you can also edit and delete fields.

Field basics

A field is an item you create in the display that represents an area of land. A field can contain none, one or more boundaries (perimeters). Information associated with each field includes:

- Boundaries, guidance lines and patterns for steering assistance
- Landmarks such as points, lines and area features
- Coverage from precision farming applications (such as spraying area with Field IQ)
- Attributes such as Clients and Farms

Boundaries

The perimeter around your field is a boundary. A boundary line begins when you tap a button to record the start of your boundary. After driving the length of the boundary, you tap a button to stop recording the path of the boundary. For more information, see Boundary creation, page 190 and Boundary editing, page 191.

Guidance lines and patterns

With a steering assistance feature, your vehicle can be set to drive on guidance lines and patterns. This improves the accuracy of planting, applications and harvesting. The types of lines are:

- **AB line**: A straight line that begins at point A. After driving the direction of the line path, you end the line at point B. See Create AB lines, page 1.
- **A+ line**: A straight line that you begin with point A. After driving in the direction of the line's path, you indicate the direction of the line. See Create A+ lines, page 1.
- **Curve**: A curved line that is begins when you tap a button to start recording the line path and then drive in a curved direction. The line ends when you tap a button to stop recording the line path. See Curved line creation, page 193.

The types of patterns are:

- **Headlands**: An area you can create by recording your beginning point and stopping the recording when you are finished. You have the option to create an infill pattern of straight or curved lines. See Headland and infill pattern creation, page 193.
- **Pivots**: A circular area you create by recording your beginning point and stopping recording when you are finished. See Pivot pattern creation, page 194.

Landmarks

You create landmarks to indicate productive and non-productive areas, as well as items that you want the display to warn the driver about. Landmarks can be:

- Lines
- Points
- Areas

For more information, see

- Landmark line creation, page 199
- Landmark point creation, page 199
- Landmark area creation, page 200
- Landmark editing, page 200

Tasks, activities and coverage

A task is a set of information that includes:

- One or more activities being completed in a field (such as planting, spraying, and so on)
- A map layer showing the activity's coverage on the field

The TMX-2050 display stores field activities related to each unique operation and field combination together as a task. By using tasks, you do not have to continually configure fields that you frequently use.

For more information, see:

- Tasks, page 202
- Coverage logging, page 209

Add a field

1. At the ***Home*** screen, tap  .
2. Enter a name for the field and then tap  .

   The system saves the field name and its location.

To work with the field, see:

- Select a field, page 138
- Field Manager, page 48

Select a field

To work with a field to work within it, you select it. When you add a field, it is selected automatically.

If you have multiple fields, you can select a field from:

- The point on the map at the ***Home*** screen.
- The list of fields.

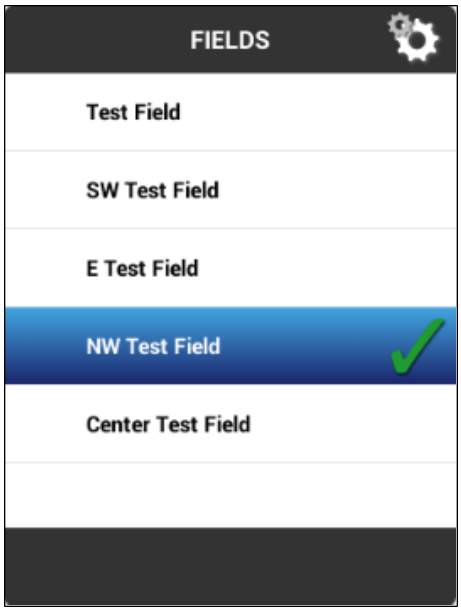
Select a field through the map

The points on the map ( )of the ***Home*** screen indicate fields you have created. Tap the point that represents the field.

Select a field from the list

The outlines on the map of the ***Home*** screen indicate fields you have created.

1. At the ***Home*** screen, tap . A list of fields you previously created displays.
2. Tap the name of the field to select it.



Enter a field

Before you can enter a field in the ***Run*** screen, you must:

- Set up a positioning service. See Introduction to connectivity, page 82.
- Set up a vehicle. See Introduction to vehicles, page 100.
- Select a vehicle. See Select a vehicle, page 105.
- Set up an implement. See Implement setup, page 144.
- Select an implement. See Select an implement, page 148.
- Add a field, page 137.
- Select a field, page 138.

Choose a field to enter

You can enter a field you currently have selected or one that is not currently selected.

Currently selected field

To enter a field that is currently selected, tap  . The ***Run*** screen displays.

Field not currently selected

To enter a field not currently selected:

1. At the ***Home*** screen, the map shows points () where your fields are located. Tap the  that represents the field you want to enter. (For a map to display on the ***Home*** screen, you must have a updated GNSS connection.).
2. A popup displays with the field name and two buttons.
3. To enter the field without beginning a new task, tap **Enter Field**.
4. To start a new task, tap **Start New Task and Enter Field**. The ***Run*** screen displays.

Run screen

The text and buttons displayed on your ***Run*** screen depend on:

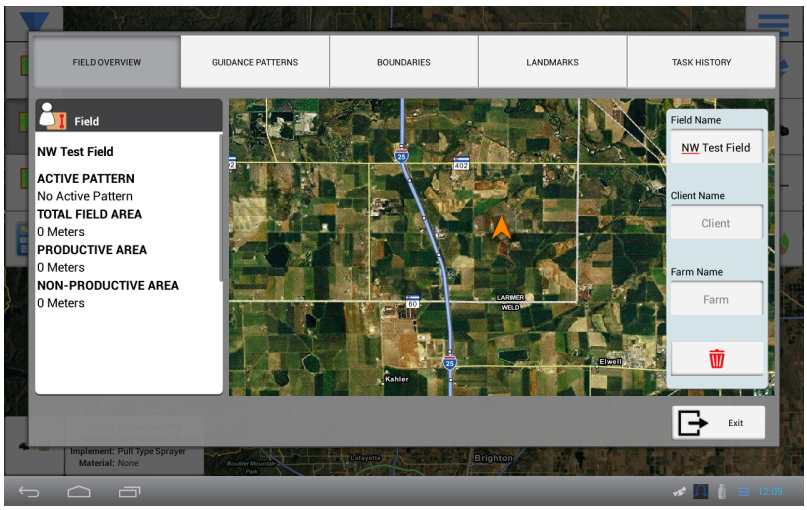
- Whether you are using a guidance / steering system or manual guidance
- Other features you are using
- How your TMX-2050 display is set up

Edit a field

1. Tap  to open the Field Manager. Field Manager opens to the Field Overview section.

The map in the Field Manager shows the selected field with details, including:

- Current vehicle position
- Active pattern
- Active boundary
- Inactive boundaries



Field Item	Explanation
Field Name	You can optionally change the field name. Tap in the text box.
Client Name (optional)	The client is the customer for whom the work is being done. Client name is blank unless you import it or manually enter it here.
Farm Name (optional)	The farm is a collection of fields. Farm name is blank unless you import it or manually enter it here.
	Removes the field and all related data from the TMX-2050 display.

Field Item	Explanation
ACTIVE PATTERN	The currently active pattern, and what implement type and width were used to create the pattern. to make a different pattern active, tap **GUIDANCE PATTERNS**.
TOTAL FIELD AREA	The calculated area of the selected field.
PRODUCTIVE AREA	Total field area minus the non-productive area
NON-PRODUCTIVE AREA	The calculated area of the Non-productive area landmark features in the selected field.

2. To edit the field name, tap in the Field Name text box and edit the name.
3. To associate the field to a client, tap the Client name text box and enter a name.
4. To associate the field to a farm, tap the Farm Name text box and enter the name of the farm.
5. To edit guidance patterns, boundaries, survey items, or landmarks, tap the buttons at the top of the Field Manager. See the following sections for details.
   - Guidance pattern shifting, page 195
   - Boundary editing, page 191
   - Landmark editing, page 200
6. Tap  to save the changes and close the Field Manager.

CHAPTER 8

Implements

In this chapter:

Implements can be added, edited and deleted at the Implement setup panel. You can also calibrate boom height and section and rate control.

Implement setup

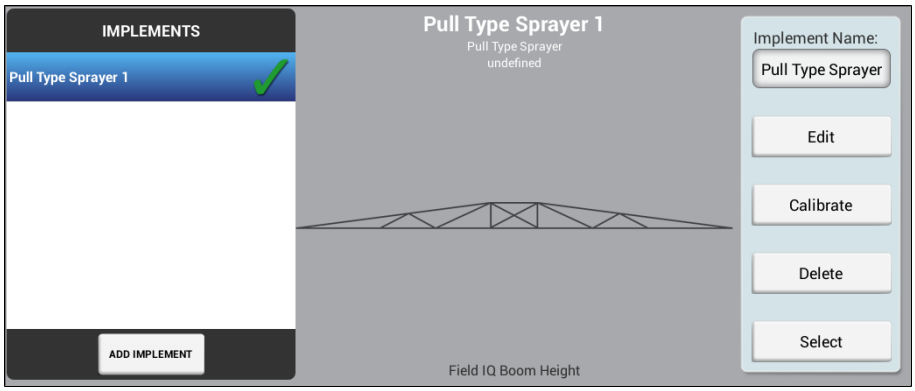
Use the Implement setup panel to select, add, edit, calibrate or delete an implement. Implements can be pull-type equipment or attachments for self-propelled equipment.

Before you set up an implement, create a vehicle. See Add a vehicle, page 100.

Add an implement

Note – *When you set up a vehicle that is a self-propelled implement, the vehicle setup wizard automatically takes you to the implement setup screens. In such a case, begin at Step 4.*

1. At the ***Home*** screen, tap . The Implement setup panel displays.



   Tap **ADD IMPLEMENT**. At the OPERATION section, tap the operation that you will use the implement to perform.
2. Tap **Next** to continue.
3. At the IMPLEMENT / Type section, tap the type of implement you will be using, and then tap **Next** to continue.
4. At the NAME section, you have the option to enter a different name for the implement.
5. Tap **Next** to continue to the MEASUREMENTS section. See Enter implement measurements, page 144 for further instructions.

Enter implement measurements

Before you take measurements:

- Park the vehicle on level ground.
- Make sure the implement's center is lined up with the vehicle's center.

The measurement sections show only the measurements required for the type of implement you selected.

1. Tap the button for each measurement.
2. Use the on-screen number pad to edit the measurement.

Pull-type implements

Measurement	Instructions
Hitch Type	Select how the implement connects to the vehicle: • Drawbar • 3 point mount
Application Width	Measure the width of the area where the implement applies material. The display calculates swath spacing using the *Application Width* and *Overlap/Skip* settings.
Hitch to Boom/Tool bar, and so on (the application point)	Measure the distance from the hitch pin to the boom, toolbar, and so on. ***Note –*** *If you are using the Field-IQ system's Section or Rate Control and the material is applied at a different point, you must enter an offset measurement on the material control channel. (See Application control, page 149.)*
Hitch to Ground Contact Point	Measure the distance from the hitch pin to the point where the implement makes contact with the ground. This is the point that the implement rotates about.
Left/Right Offset	Measure from the center of the vehicle to the center of the implement. Select *Left* or *Right* to indicate the direction the implement is offset, when looking at the vehicle from behind. This measurement adjusts the tractor's path so that the implement is centered on the line.
Overlap/Skip	Set the amount of overlap or skip between swaths: • Set *Overlap* to intentionally overlay the edges of each swath by this amount. • Set *Skip* to intentionally add this amount of space between swaths.
Swath Width (read only)	The display calculates swath width using the *Application Width* and *Overlap/Skip*. To change *Swath Width*, edit the *Application Width* or *Overlap/Skip*.

Self-propelled equipment

Measurement	Instructions
Application Width	Measure the width of the area where the implement applies material. The display calculates swath spacing using the *Application Width* and *Overlap/Skip* settings.
Antenna to Application Point (Boom/Tool bar)	Measure the distance from the center of the antenna to the point where the implement applies material.
Left/Right Offset	Measure from the center of the vehicle to the center of the implement. Select *Left* or *Right* to indicate the direction the implement is offset, when looking at the vehicle from behind. This measurement adjusts the tractor's path so that the implement is centered on the line.
Overlap/Skip	Set the amount of overlap or skip between swaths: • Set *Overlap* to intentionally overlay the edges of each swath by this amount. • Set *Skip* to intentionally add this amount of space between swaths.
Swath Width (read only)	The display calculates swath width using the *Application Width* and *Overlap/Skip*. To change *Swath Width*, edit the *Application Width* or *Overlap/Skip*.

3. Tap **Next** to continue. The display goes to one of the following, depending on your configuration:
   - If you have Field-IQ, set up Application control, page 149.
   - If you have boom height control, set up Boom Height Control, page 170.
   - If you have neither Field-IQ nor boom height control, tap Next to go to the SUMMARY section. (See Review implement summary, page 147.)

Save an implement

You can save complete or incomplete implement profiles.

Save complete implement settings

1. Complete all of the implement setup and calibration steps for your operation, based on the implement type and features/plugins you have unlocked on the device.

2. When you complete the implement setup, your last step is the SUMMARY section.
3. Tap  to save the implement profile and return to the ***Home*** screen.

Save incomplete implement settings

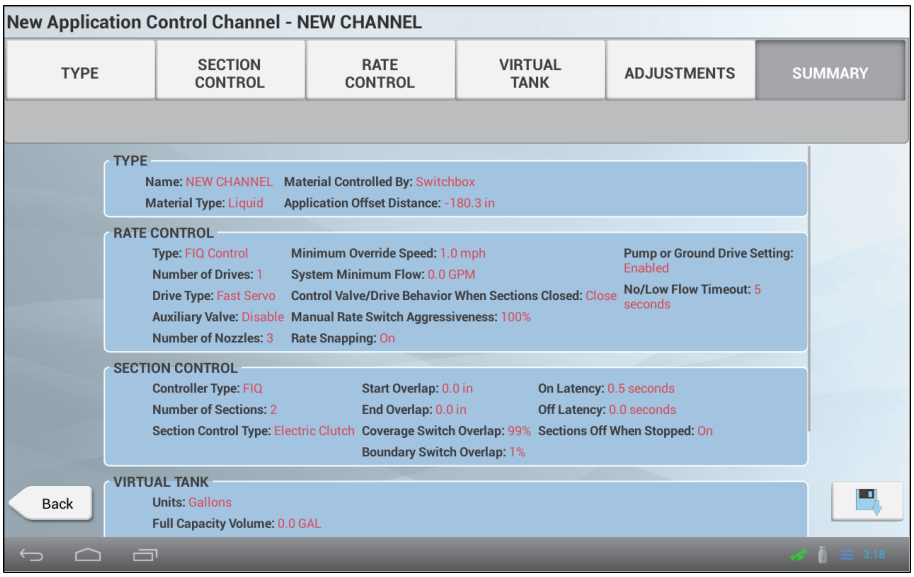
The display allows you to save an incomplete profile and return to it later to complete.

Note – *You cannot enter the run screen without a completed implement profile that you have selected.*

1. Select an operation type, make, model and name the implement. See Save an implement, page 146.
2. At any point after you complete the NAME section, tap **SUMMARY**, then tap  .

Review implement summary

The SUMMARY section displays when you complete all of the setup and configurations steps, or when you edit an implement.



To ...	Tap ...
Save the profile with any changes you have made.	
Exit the setup without saving changes. The display will let you choose to save the changes or exit without saving.	
Quickly access any part of the setup.	The buttons at the top of the screen

Select an implement

Note – *You can only enter the Run screen with an implement when the required implement setup and calibration steps are complete. When you change implements, make sure that all related configurations are accurate for the current operation.*

To select an implement that is already set up:

1. Tap at the ***Home*** screen.
2. To select an implement in the list, tap the implement.
3. Tap **Select**. A displays next to the name.

Edit an implement

1. Tap on the ***Home*** screen. The Implement setup panel displays.
2. In the list of implements, tap the implement that you want to edit.
3. Tap **Edit**.
4. Tap the section where you want to make edits.
5. When you are finished, tap **Summary** at the top right corner of the screen. For details, see Review implement summary, page 147.

   If any part of the setup is *Not Complete*, you can save the changes but you cannot use the implement on the ***Run*** screen.
6. To save your changes to the implement profile, tap . The ***Home*** screen displays.
7. To discard your edits and not change the existing profile, tap . The display returns you to the Implement setup panel.

Delete an implement

Delete this text and replace it with your own content.

1. Tap on the ***Home*** screen.
2. Tap the implement you want to delete.
3. Tap **Delete**. A confirmation message displays for you to confirm you want to remove the implement.
4. Tap to delete the implement.

Application control

Note – *For the correct connection of equipment, refer to the Connecting the Field-IQ system's Crop Input Control Systems chapter in the TMX-2050 Display Cabling Guide.*

Application Control includes settings for rate and section control. Before you can set up Field-IQ Rate and/or Section Control, you must complete the following:

- Install Field-IQ Rate and/or Section Control.
- Add, configure and calibrate a vehicle. See Add a vehicle, page 100.
- Set up an implement. See Implement setup, page 144.

To set up application control for the Field-IQ system, complete the following steps:

1. Application control, page 149.
2. For each control channel, complete the following settings:
   - Section control for a channel, page 150
   - Rate control for a channel, page 156
   - Virtual tank/bin, page 160
   - Adjustments for application control channel, page 161
3. Review the channel configuration, see Channel summary for application control, page 162.
4. To calibrate drives for Rate and Section Control, see Calibrate application control drives, page 163.

Add a control channel

To add an application control channel:

1. Tap on the ***Home*** screen. The Implement setup panel displays.
2. Tap the implement you want to work with.
3. Tap **APPLICATION CONTROL**.
4. At APPLICATION CONTROL, turn the feature on by tapping  .
5. Tap **Add**.
6. Enter a name for the channel and tap  .

Type of channel

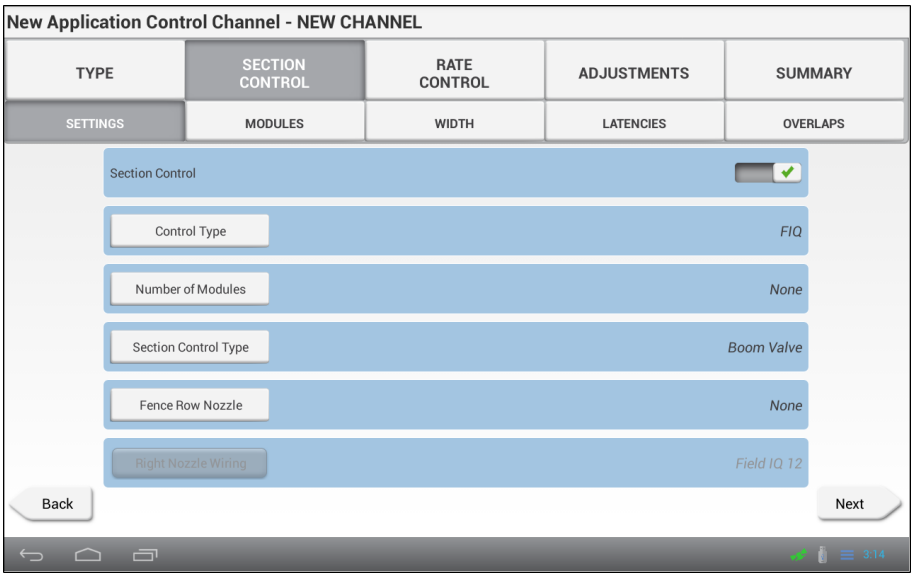
1. At the Type section, complete the settings for your material channel.

Tap...	To...
Material Controlled By	Select how you want to control material application. • Switchbox - requires an implement control switch box installed with the feature you are using for application control. • Touchscreen - use Run screen controls on the display to control material application rates and sections.
Boom to Application Point or Toolbar to Application Point	Enter this measurement only if the application point for this channel is not the same as the application point that you used for Enter implement measurements, page 144. • Measure from the application point used in the Implement Measurements section to the point where this material is applied. • If the new application point is further back, enter a positive value. If it is toward the front, enter a negative value.
Channel Name	Optionally change the name of the channel.

Section control for a channel

At the Settings section for Section Control setup:

1. Tap  next to Section Control. This toggles rate control on or off for the current channel.



2. Tap **Control Type** and choose an option.

Tap...	To...
Field-IQ	Use Field-IQ Rate Control modules for Section Control. Continue to the next step (3).
Rate as Section	If you choose Rate as Section, then: • As sections enter a non-productive or covered area, the display uses Rate Control to shut down the section. • Skip the steps below and go to Rate control for a channel, page 156.
Link to Channel	This option is only available if you already have at least one channel set up with Section Control. • When linked, the display uses the Section Control settings from the previously defined channel for the current channel. • If you use Link to Channel skip the steps below and go to Virtual tank/bin, page 160 or Adjustments for application control channel, page 161, depending on your configuration.

3. If you use Field-IQ for section control, tap each setting and choose an option.

Tap...	Tap to...
Number of Modules	Enter the number of Section Control modules you have installed. The maximum number of Section Control modules is 4.

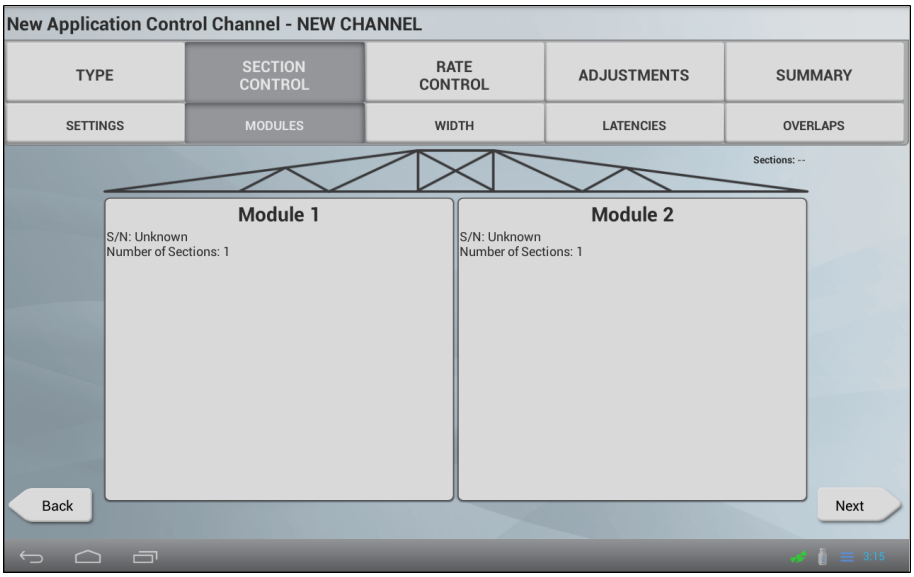
Tap...	Tap to...
Section Control Type	Select the type of section control hardware you have installed: • Boom Valve • Tru Count Liquid-Block Valve™ • Tru Count Air Clutch® • Tru Count Section Electric Clutch
Fence Row Nozzle	Identify the location of fence row nozzles on the implement, if any: • None (Default) • Left Only • Right Only • Both ***Note –*** *The display only controls the fence row if the sprayer configuration allows it. Refer to the Field-IQ installation guide for additional information.*
Right Nozzle Wiring	Select the wiring option used during installation: • If you are using an EZ-Boom® or Raven replacement harness, select the EZ-Boom setting. • Otherwise, choose the Field-IQ option.

4. Tap **Next** to continue to Module settings for section control, page 153.

Module settings for section control

1. At the Modules section for Section Control, complete the following settings.

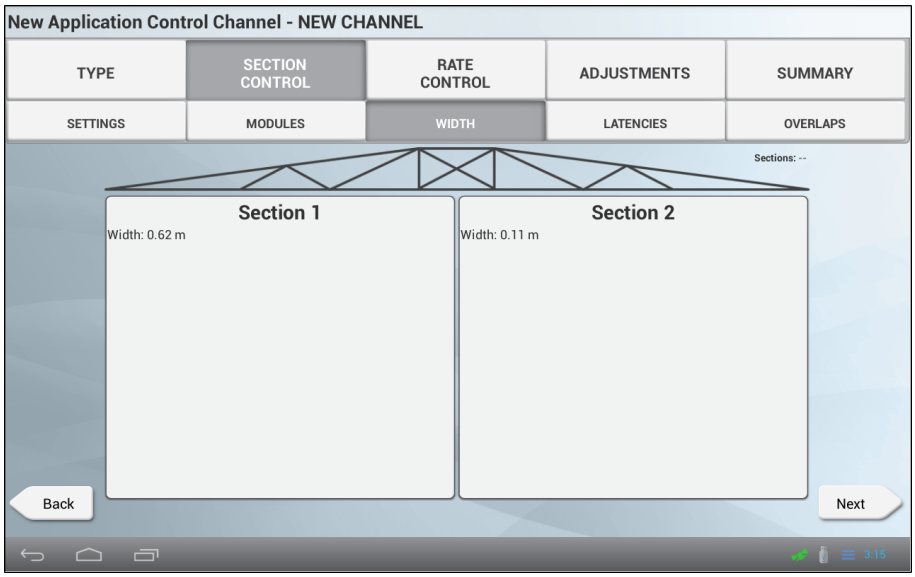
Setting	Options
Serial Number	Select the serial number of the Section Control Module installed at this location. The display reads the serial numbers from the installed modules.
Number of Sections	Enter the number of sections physically wired into this module (up to 12 sections per control module).



2. Tap **Next** to continue to Width settings for section control, page 153.

Width settings for section control

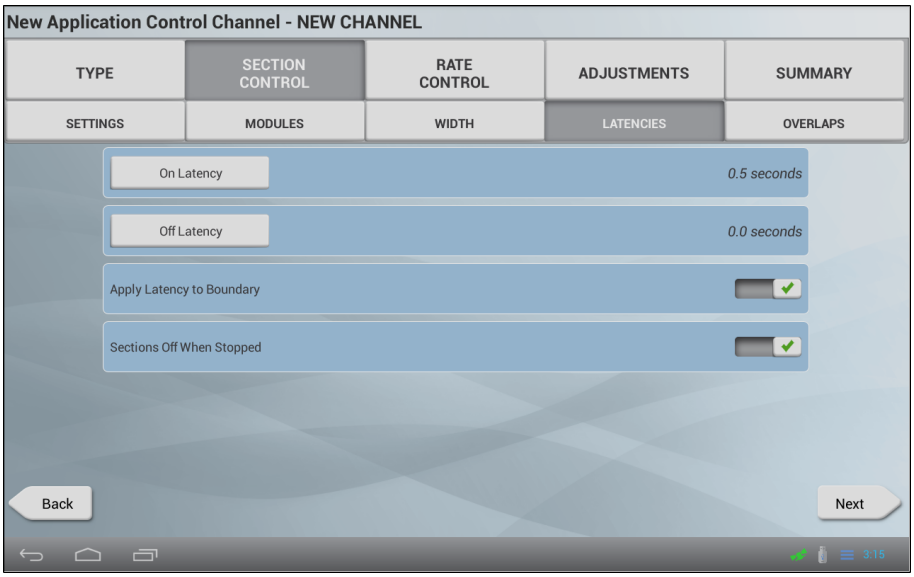
1. At the Width section for Section Control,review the width settings.
2. To change a width, tap the section.



3. If the total width is not equal to the implement width, the line below the image will show a gray segment for too short or a red segment for too long.
4. Tap **Next** to continue to Latencies for section control, page 154.

Latencies for section control

1. At the Latencies section for Section Control, review and make changes as necessary to the settings.

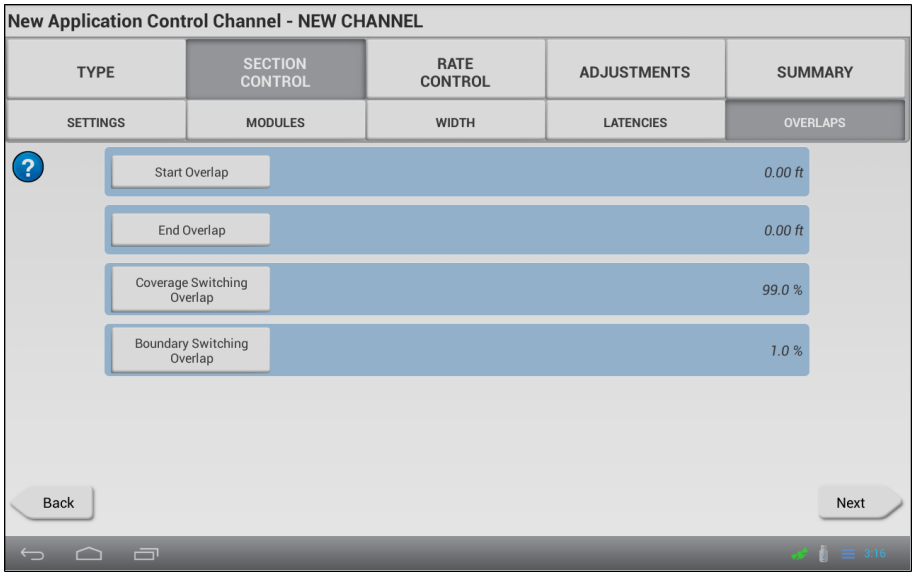


Tap...	To...
On Latency	Enter the length of time (seconds) from when a section is turned on to when the system begins to apply material.
Off Latency	Enter the length of time (seconds) from when a section is turned off to when the system stops applying material.
Apply Latency to Boundary	Turn setting on or off by tapping. This setting applies to fields that have a boundary and when you exit an exclusion zone and return to the workable area of the field. • On: The system starts when needed to begin applying immediately when crossing a boundary. • Off: The system starts when the boundary is reached and any mechanical delay could leave a gap between the boundary and where the product is applied. When GPS accuracy is low, this is the preferred selection.
Sections Off when Stopped	Turn setting on or off: • On: The sections shut down when the vehicle is stopped. • Off: The sections remain open (turned on) when the vehicle is stopped.

2. Tap **Next** to continue to Overlap settings for section control, page 155.

Overlap settings for section control

At the Overlaps section for Section Control, review and make any necessary changes to the settings.

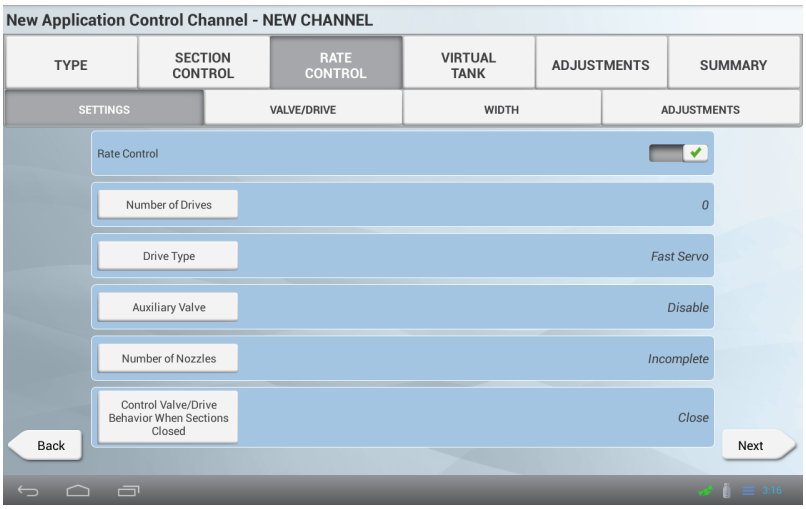


Tap...	To...
Start Overlap	Enter the amount of overlap (distance) you want when starting coverage. When you are in a previously covered area driving toward an non-covered area, the system will begin turning sections on at this distance before reaching the non-covered area.
End Overlap	Enter the amount of overlap (distance) you want when stopping coverage. When you are applying material and driving toward a previously covered area, the system will keep sections on until they are this far into the previously covered area.
Coverage Switching Overlap	Enter the percentage of a section's width that must be in a previously covered area before the system switches the section off. The higher the number, the greater the overlapped area before the section is turned off.
Boundary Switching Overlap	Enter the percentage of a section's width that must be past a boundary before the system switches the section off. The higher the number, the greater the overlapped area before the section is turned off.

Rate control for a channel

On the Settings screen for Rate Control:

1. Tap  next to Rate Control. This toggles rate control on or off for the current channel.
2. After you turn on rate control, tap each setting and choose an option.



Tap...	To...
Number of Valves/Drives	Select the number of control drives you have installed. The maximum number of drives is 4.
Control Valve/Drive Type	Choose the type of drive that you is installed. ***Note –*** *Bypass (for Servo and Hardi drives only) means that the controller is on the return-to-tank line. The valve closes to increase the application rate.*
Valve/Drive Behavior when Sections Closed	Set the behavior when sections are closed. • Close - When all sections are off, the control valve returns to the closed position. • Lock in Minimum Position - When all sections are off, the control valve remains at the minimum flow position. This option applies to PWM drives only. • Lock in Last Position - When all sections are off, the control valve remains in the last position. This setting allows the system to return to the target rate faster. This option applies to Servo drives only.

Tap...	To...
Auxiliary Valve (for inline liquid/anhydrous channels only)	Set the auxiliary valve: • Off - The equipment does not have an auxiliary control valve. • Master - Valve closes when the system is turned off. • Dump - Valve opens to dump flow-to-return line when the system is turned off.
Number of Nozzles	Enter the number of nozzles on the implement, between 1 and 500.
Control Valve/Drive Behavior When Sections Closed	Change settings: • Close: control valve/drive is closed • Lock in Minimum Position: Locked in the minimum position before thee sections closed

3. Tap **Next** to continue to Valve/Drive settings for rate control, page 158.

Valve/Drive settings for rate control

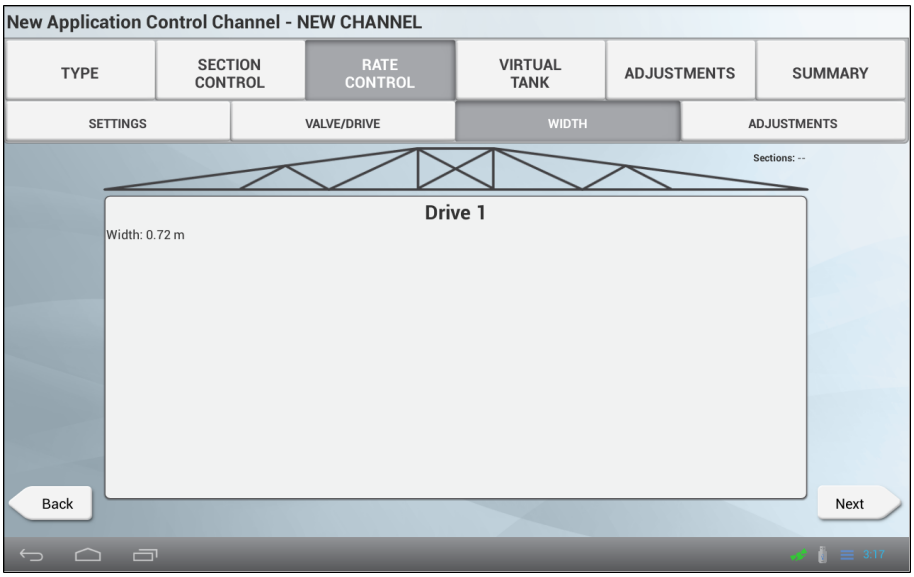
1. At the VALVE/DRIVE section for Rate Control, tap each drive and set the required values.

Tap...	To...
Serial Number	Choose the serial number of the Rate Control Module at this location. The display reads the serial numbers from the installed modules.
Flow Meter Type	Select the type of flow meter installed for this drive. (Raven, Trimble, or Other).
Flow Meter Calibration Number	Enter the calibration number from the tag on the flow meter. The display calculates the calibration pulses per unit of volume. • Raven - pulses per 10 gallons (liters) • Trimble - pulses per gallon (liter) • Other - pulses per gallon (liter)
Units (only if Flow Meter Type is Other)	Choose the unit of measurement used by the flow meter. • Pulses per gallon (liter) • Pulses per cubic inch (centimeter)

2. Tap **Next** to continue to Width of application drive for rate control, page 159.

Width of application drive for rate control

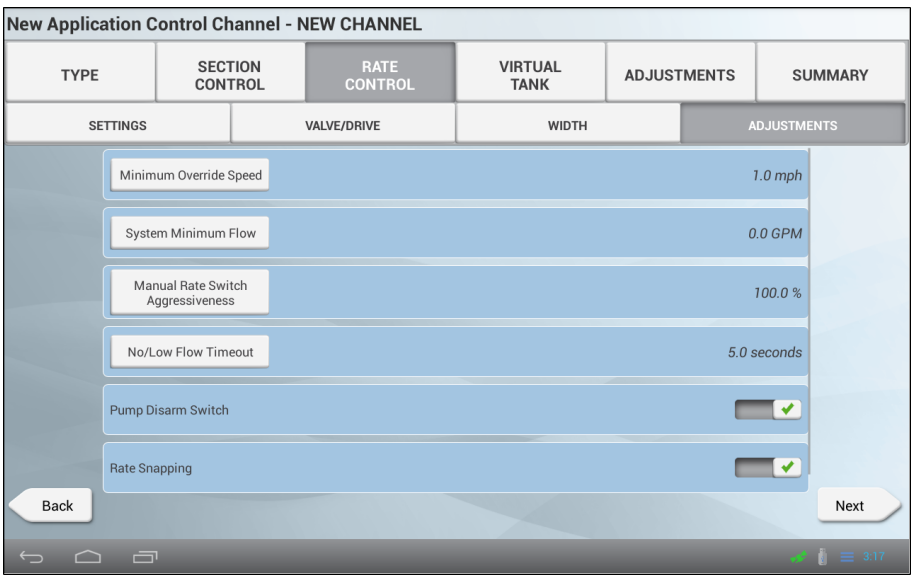
1. At the Width section for Rate Control setup, set the application width for each drive. If you only have one drive, the width is equal to the implement width and cannot be changed. If you have multiple drives, tap the drive to change it, if necessary.



2. Tap **Next** to continue to Adjustments for rate control, page 159.

Adjustments for rate control

At the Adjustments section for Rate Control setup, review and change settings as necessary.



Tap...	To...
Minimum Override Speed	Change this setting. When the vehicle drops below this speed, the system maintains the application rate for this speed. This ensures consistent material flow at low speeds.
System Minimum Flow	Enter the minimum flow rate required by the drive, control valve or flow meter. This setting keeps the flow above the minimum operating level required by the equipment.
Manual Rate Switch Aggressiveness	Increase or decrease aggressiveness of the manual rate switch. When the Rate switch is in the Manual position, this controls how quickly the valve opens/closes when you use the rate increment/decrement switch on the master switch box. ***Note –*** *This setting does not affect automatic rate control.*
No/Low Flow Timeout	Enter a value between 1 and 10 seconds. If the rate of application is not at least 25% of the target rate for this length of time, the display shows a critical fault message and the system shuts down.
Pump Disarm Switch	Turn setting on or off. If the implement has a pump disarming relay that is connected to the controller, this setting adds a button to the Run screen to arm and disarm the pump. • Enable: Select this option if you have a pump disarming switch installed. • Disable: Select this option if you do not have a pump disarming switch installed.
Rate Snapping	Turn setting on or off. This setting smooths out rate fluctuations seen on the screen. • Off: The display shows instant readings from the feedback sensor. This may show frequent minor rate fluctuations. • On: The display smoothes out the values. You will see the target rate as the applied rate whenever the applied rate is within 10% of the target rate.

Virtual tank/bin

If you have the Field-IQ system's Rate Control, you can use an on-screen or virtual tank to monitor tank or bin levels based on the amount of material applied.

On the *Virtual Tank* screen of the Application Control setup wizard, do the following:

1. At the *Virtual Tank* section, tap  next to *Virtual Tank*. This toggles the virtual tank On and Off for the current channel.
2. Tap each setting and then choose an option.

Tap...	To...
Units	Select the units to use for tank volume (gallons/liters).
Full Capacity Volume	Enter the tank's volume.
Warning Type	Choose how you want to trigger the low-volume alarm: • Volume: Alarm when volume dips below this level. • %: Alarm when volume is less than this percent of capacity.
Warning Level	Enter the volume (amount or percent) below which you want to see an alert.

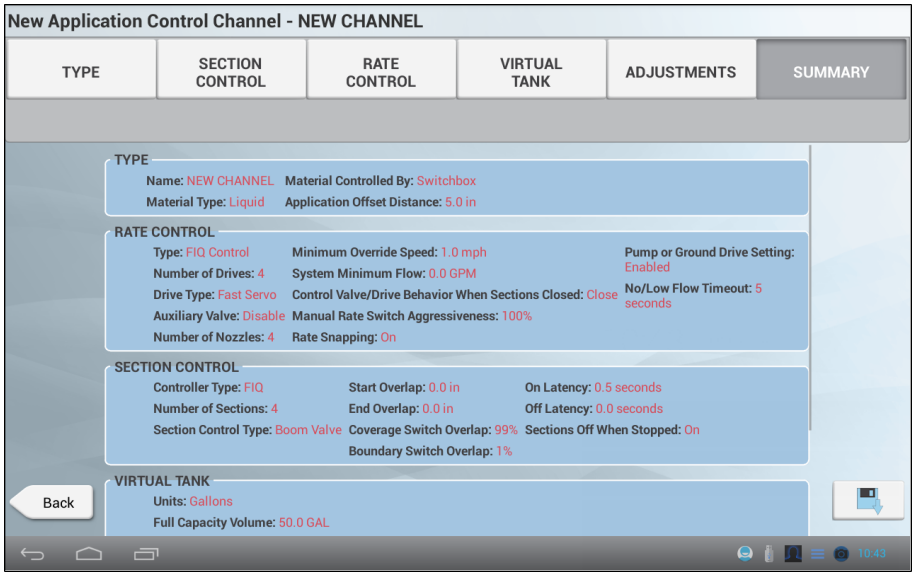
Adjustments for application control channel

At the Adjustments section for application control, review and change the settings for the current channel as required.

Tap...	To...
Jump Start Speed	Adjust the jump start speed. When the Field-IQ system's Master switch is in the jump start position, the system applies material at the rate for this speed instead of the vehicle's current speed. This manual override option can be used to operate the system when the vehicle is stationary, or when GPS is unavailable. ***Note –*** *Auto-control resumes if Jump Start Speed is exceeded by ground Speed.*
Jump Start Timeout	Adjust start timeout. This setting limits the length of time you can run the jump start.
Shut Off Speed	Adjust shut off speed. The system shuts down if the implement drops below this speed.

Channel summary for application control

The Summary section the rate control channel setup shows an overview of the settings for the channel.



1. Review the channel details.
2. To change channel settings, tap the button at the top of the screen for the feature that you want to modify.
3. Tap . The display saves the channel and returns to the Application Control section for implement setup.

Edit a control channel

To add an application control channel:

1. Tap on the ***Home*** screen. The Implement setup panel displays.
2. Tap the implement you want to work with.
3. Tap **APPLICATION CONTROL**.
4. Tap the control channel that you want to change, then tap **Edit**.
5. Tap the button at the top of the screen for the channel setting that you want to change.
6. When you finish making changes, tap **Summary** at the top right corner of the screen.
7. If any part of the setup is not complete, you can save the changes but you cannot use the

implement on the ***Run*** screen.

8. To save the channel and return to the Application Control section , tap  . The display returns you to the Implement setup panel.
9. To exit channel setup without saving, tap  . The display returns you to the Implement setup panel.

Delete a control channel

To delete an application control channel:

1. Tap on the ***Home*** screen. The Implement setup panel displays.
2. Tap the implement you want to work with.
3. Tap **APPLICATION CONTROL**.
4. Tap the control channel that you want to remove, then tap **Delete**. The system displays a confirmation message for you to confirm that you want to remove the channel.
5. Tap  to confirm the removal. Otherwise, tap  to cancel the deletion.
6. When you finish making changes, tap **Summary** at the top right corner of the screen.
7. If any part of the setup is *Not Complete*, you can save the changes but you cannot use the implement on the Run screen.
8. To save the channel and return to the Application Control section , tap  . The display returns you to the Implement setup panel.
9. To exit channel setup without saving, tap  . The display returns you to the Implement setup panel.

Calibrate application control drives

1. At the ***Home*** screen, tap . The Implement setup panel displays.
2. At the list on the left-hand side, tap the implement you want to calibrate, then tap **Select**.
3. Tap **Calibrate**. The calibration section opens at the summary.
4. Tap **Application Control** at the top of the screen.
5. Tap the channel you want to calibrate. A popup displays.
6. Tap **Calibrate**. The calibration tool displays, beginning at Drive Limits.

If *Maximum Flow* is unknown, use the default (0.00) to allow the system to determine maximum flow.

You can also use this formula to calculate Maximum Flow:
boom width x *ground speed* x *application rate* x *calculation factor*

For metric systems, use meters for width and kph for ground speed, with a calculation factor of 0.00167.

For standard systems, use feet for width and mph for ground speed, with a calculation factor of 0.00202.

7. Tap **Next** to continue to the Auto Tuning section.
8. At the Auto Tuning section, follow the instructions on the screen.
   a. Turn on the Field-IQ system's Master Switch.
   b. Wait for the progress bar to show that the calibration is complete. Make sure the Applied Rate changes.
   c. Turn off the Master Switch.

WARNING – Moving parts during this operation. Make sure that the implement is safe to operate.

9. Tap **Next** to continue to the Drive Tunings section. Adjust the settings as necessary.

Setting	Description
Target Speed	Enter the test speed to use during calibration. The system will apply material at the rate required to reach the Target Rate if the vehicle was traveling at this speed.
Target Rate	Set test rates to use for Rate 1 and Rate 2.
Applied Rate	This shows the applied rate for comparison to the *Target Rate*.
Master Switch Position	This shows the position of the Field-IQ Master Switch.
Integral Gain (for Servo drives only)	If the drive is slow to come up to rate, increase the *Integral Gain* and turn on *Boost (Feed Forward)*. If the applied rate is erratic, decrease the *Integral Gain*.
Proportional Gain (for PWM drives only)	If the drive is slow to come up to rate, increase the *Proportional Gain* and turn on *Boost (Feed Forward)*. If the applied rate is erratic, decrease the *Proportional Gain*.
Minimum Response	If the drive is not responding, increase the *Minimum Response*. If the system has large fluctuations in applied rate, decrease the minimum response.

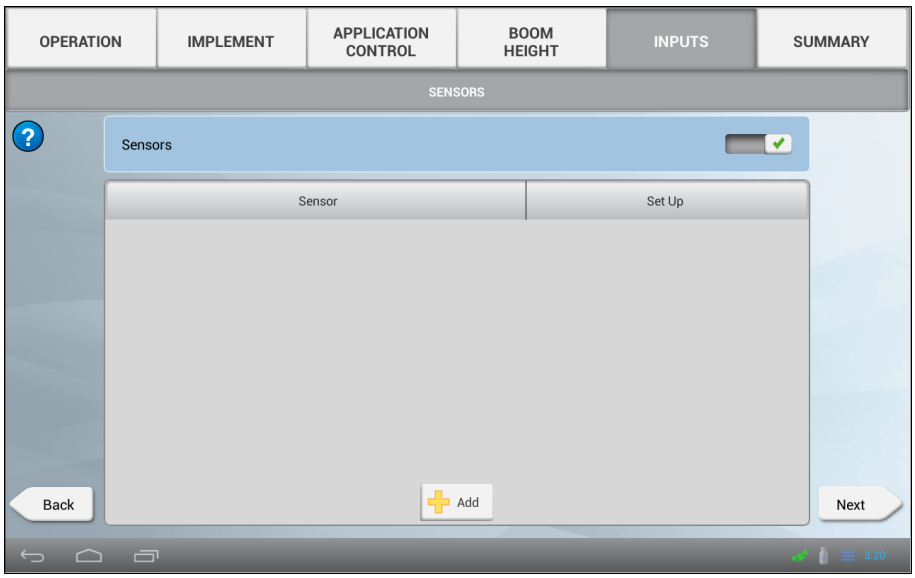
Setting	Description
Minimum Position (for PWM drives only)	*Minimum Position* is the duty cycle the system commands to when all sections are off and you are using *Lock in Minimum Position* (see Rate control for a channel, page 156).
Allowable Error	If the Applied Rate is less than this amount away from the target rate, the system will not send commands to adjust the rate.
Boost (Feed Forward)	If the drive is slow to come up to rate, increase the *Integral/Proportional Gain* and turn on *Boost (Feed Forward)*.

10. Tap **Next** to continue to the Information section.
11. Review the calibration results. The minimum and maximum values indicate the speed and flow ranges that will apply during operations.
12. To accept the calibration, tap  .

Inputs

At the INPUTS section, you can add sensors available on your implement.

1. Turn Sensors on by tapping  .



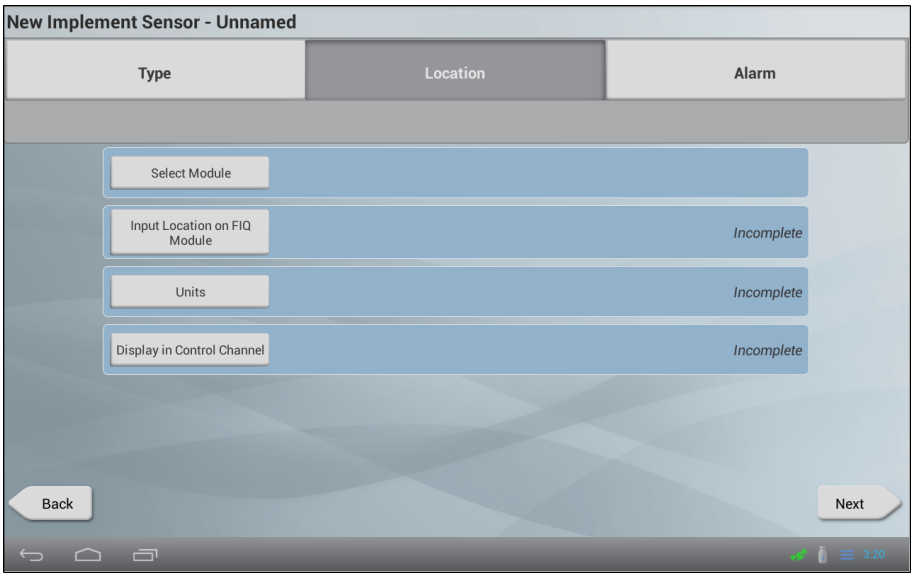
2. Tap **Add** to add a sensor. The TYPE section displays. See Type of sensor, page 166.

Type of sensor

1. At the TYPE section, choose the type of sensor you are using:
   - Air Pressure sensor
   - Liquid Pressure sensor
   - Vacuum Pressure sensor
2. Tap **Next** to go to the Location section (see Type of sensor, page 166).

Location of sensor

1. At the Location section of INPUTS, enter the settings for the sensor location.

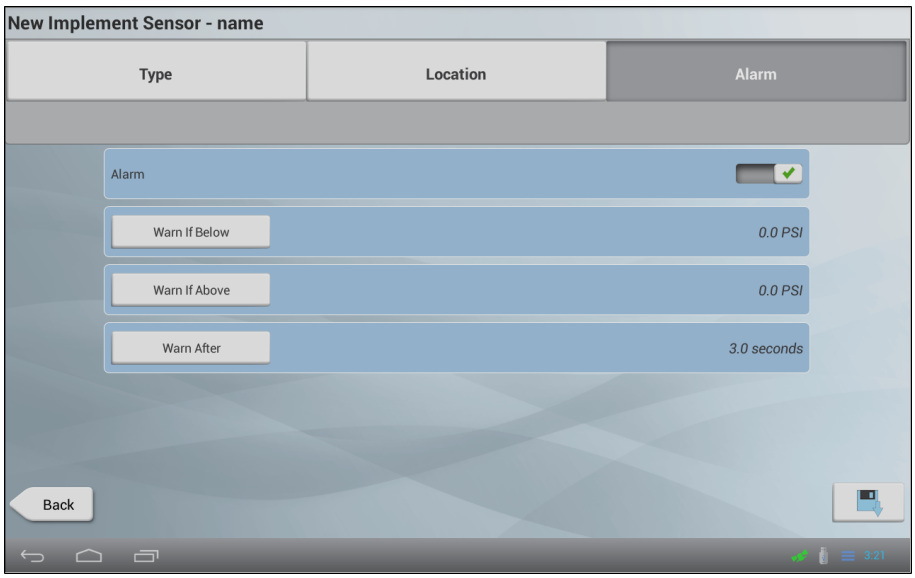


Tap...	To...
Select Module	Select serial number of the sensor. The display reads the serial numbers from the installed sensors.
Input Location on FIQ Module	Select the port on the the Field-IQ system control module where the sensor connects to the system. ***Note –*** *For bin level, RPM, and gate height sensors, this is set automatically and cannot be changed.*
Units	Select the measurement units used by the sensor. Does not apply to Bin Level sensors.
Pulses per Revolution (RPM sensors only)	Set the RPM sensor's number of pulses per revolution.
Display in Control Channel	Selected whether or not the sensor shows up in the *Sensors Area* of the Rate Control Widget for the channel. • No - if you do not want to see the sensor • Channel number (1-6) - the material control channel where you want to see the sensor

2. Tap **Next** to go to the Alarms section (see Type of sensor, page 166).

Alarms for sensors

At the Alarm section, you can set up alarms for sensors.



1. Change the settings as appropriate.

Tap...	To...
Alarm	Turn this feature on or off.
Warn If Below	Enter the value that will trigger the alarm when the sensor reading is below this value.
Warn if Above	Enter the value that will trigger the alarm when the sensor reading is above this value.
Warn After	Adjust the number of seconds before the alarm triggers.

2. Tap  . The display saves your settings and returns to the Inputs section (see Inputs, page 166).
3. Tap **Next** to go to the Summary section (see Type of sensor, page 166).

   Note – *All pressure sensors must be calibrated. When you are ready to perform the calibration, see Calibrate sensors, page 169.*

Calibrate sensors

1. At the Home screen, tap . The Implements panel displays.
2. Select the implement and then tap **Select**.
3. Tap **Calibrate**
4. Tap **INPUTS**.
5. For all pressure sensors (air, liquid, vacuum),tap the sensor name in the list.
6. Tap **Calibrate**.
7. Select the calibration type:
   a. *High/Low* - More accurate and requires a pressure gauge for reading the actual pressure.
   b. *Point/Slope* - Requires a slope value for the equipment from the manufacturer of the implement.
8. To complete calibration for the High/Low method:
   a. Tap **Run Calibration**.
   b. Read the instructions on the screen and then tap **Next** to begin.
   c. Without the system running, take a reading. Enter this value into the *Actual Pressure* field and then tap **Next**.
   d. Run the system at normal working pressure and take a reading. Enter this value into the *Actual Pressure* field.
   e. Tap **Next**.
   f. Run the system at normal working pressure and take a reading. Enter this value into the *Actual Pressure* field.
   g. Run the system from low to high levels to verify the change in sensor readings.
   h. Tap **Accept** or tap **Recalibrate** to repeat the process
9. To complete calibration for the Point/Slope Method:
   a. Enter the *Slope* value for the sensor from the manufacturer.
   b. Tap **Run Calibration**.
   c. For *Actual Pressure*, enter the current pressure. Tap **Next** to continue.
   d. Review the results. If the *Measured Pressure* is not accurate, tap **Recalibrate** and repeat the calibration with a new Slope value.
   e. Tap **Accept** when the *Measured Pressure* is accurate.
10. Repeat Step 5 through Step 7 for each sensor. When finished, tap .

Boom Height Control

Note – *For the correct connection of equipment, refer to the Connecting the Field-IQ system Crop Input Control Systems chapter in the TMX-2050 Display Cabling Guide.*

The implement setup wizard includes *Boom Height* if you have a boom height control feature unlocked on the device. Before setting up Field-IQ Boom Height Control, you must complete the following:

- Install Field-IQ Boom Height Control. The display reads the unlock status of control module and unlocks the required feature on the display.
- Add, configure and calibrate a vehicle. See Add a vehicle, page 100.
- Set up the implement. See Implement setup, page 144.

To set up Field-IQ Boom Height Control, complete the following settings:

1. Boom Height Control, page 170
2. Sensor location for boom height, page 171
3. Operation settings for boom height, page 172
4. Boom height manual control, page 175

When you are ready to calibrate the system, see Boom drive calibration, page 177.

Boom height control settings

1. At the Boom Height section, review and make changes to the settings as appropriate.

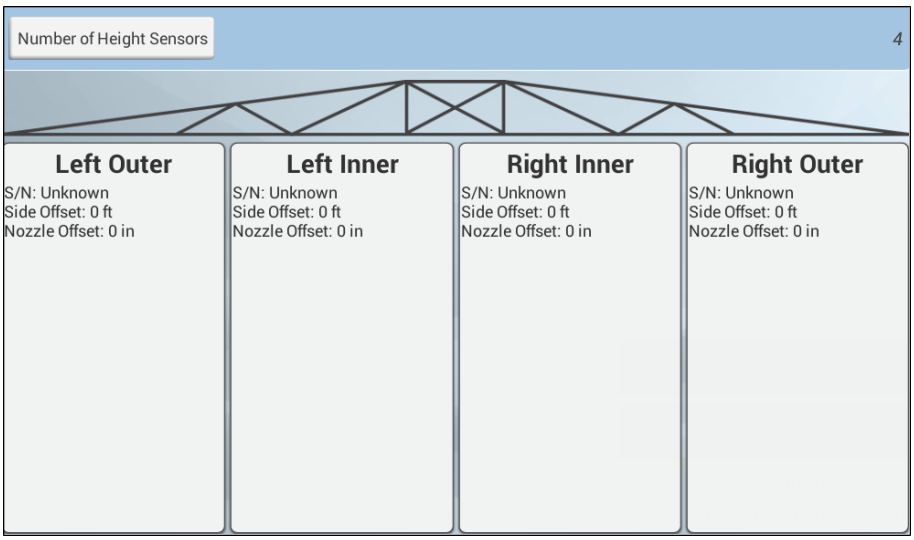
Tap....	To....
Boom Height	Turn the feature on or off.
TM-200 Module S/N	View or change the serial number of the TM-200 Module, if this is part of your configuration.
Boom Control Layout	Select the option you want for controlling the boom height: • Control Booms + Center Section • Control Booms + Monitor Center Section • Control Booms Only • Control Center Only • Monitor Only: Shows the boom height on the Run screen, without the option to automatically control boom heigh

2. Tap **Next** to continue to Sensor location for boom height, page 171.

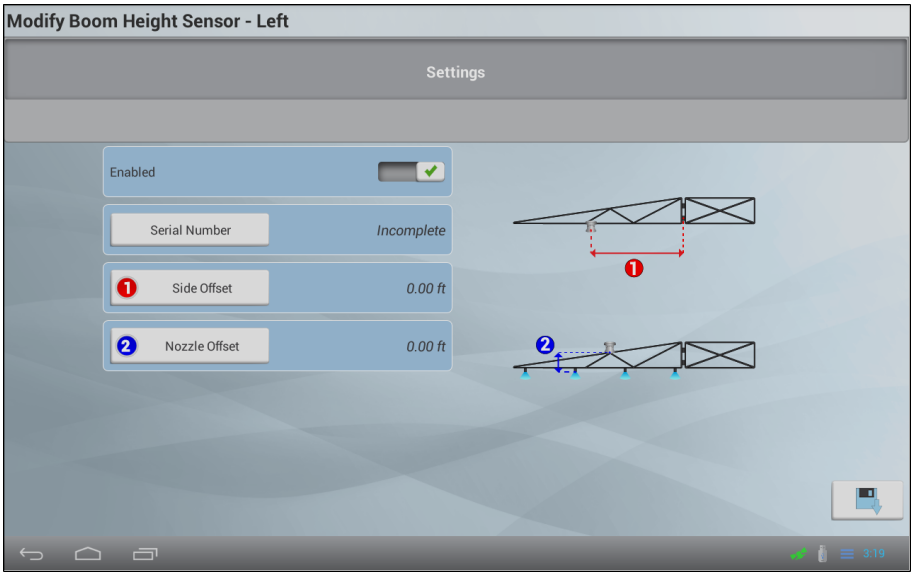
Sensor location for boom height

At the Sensor Location section of Boom Height settings:

1. Tap **Number of Height Sensors**. Select the number of height sensors installed on the system.



2. Tap each sensor to complete the Settings section.



Tap...	To....
Enabled	Turn the sensor on or off.

Tap...	To....
Sensor S/N	Select the serial number for the sensor. The display reads the serial numbers from the installed sensors.
Side Offset	Enter the distance from the center line of the sensor to the hinge point of the boom.
Nozzle Offset	Enter the distance from the bottom edge of the sensor cone to the outlet of the spray nozzle tip.

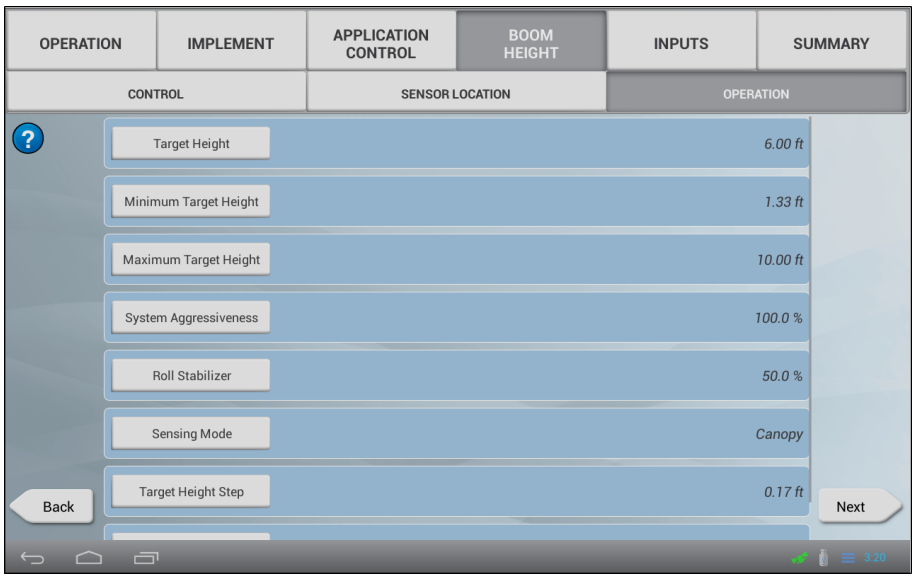
3. When finished, tap  . The display returns to the SENSOR LOCATION section.
4. Continue setting up each sensor.
5. Tap **Next** to go to Type of sensor, page 166.

Operation settings for boom height

At the OPERATION section Boom Height settings, review the existing settings. Make changes to the settings as required. Your options will depend on which option you chose for the Boom Control Layout in the Control section. See Boom height control settings, page 170 for more information.

WARNING – Working without a working SIM is dangerous.

Refer to the settings listed below to edit operation settings.



Note – *The settings that display on your screen depend on the type of Boom Control Layout you chose at the CONTROL section. (See Boom height control settings, page 170.)*

Tap...	To...
Target Height	Enter the distance above the ground or crop canopy (see Sensing Mode below) that you want the nozzles to be.
Minimum Target Height	Set the lowest value that the target height can be set to. If a height sensor on a multi-sensor zone is reporting a height lower than this value, the display will switch from using the average zone height to using just the lowest sensor.
Maximum Target Height	Set the maximum height that the target can be.
Target Height Step	Set the distance increment for increasing or decreasing the target height.
System Aggressiveness	Set the aggressiveness for the boom height control system. A higher value is more aggressive, and a lower value is less aggressive.
Roll Stabilizer	Raise this setting to increase the boom roll stability.
Sensing Mode	Select how the system will detect the boom height: • Ground: Boom height is based on the surface of the ground. Use Ground mode to sense the ground surface through low coverage vegetation, such as stubble or young crops. • Canopy (default): Boom height is based on the top of the crop canopy. Select Canopy mode to sense the closest object seen. This is used to sense bare ground or high-coverage broad leaf crop canopy. ***Note –*** *Ground mode is susceptible to unwanted reflectance on hard or wet surfaces, such as bare ground. If this is an issue, select Canopy mode.*

Tap...	To...
Advanced	Opens the advanced settings: **Minimum Safety Height**: Adjust this setting. When an individual sensor measures a height less than this setting below the current target height, the display will switch from using the average sensor zone height to using just the lowest sensor's height (and ignore the higher sensor). This setting only applies to multi-sensor zones. Lowering this threshold will make the system more aggressive at raising a zone when a individual sensor is low, especially when two sensors report different heights. Raising this threshold will improve the boom roll stability. Default is 4 inches / 0.1m . **Height Error Indicator Band**: Adjust this setting. If the boom is within this distance of the target height, the screen will indicate that the system is at the target height. ***Note –*** *This setting is for on-screen indication and does not impact performance. The system will still work to drive the boom closer to the target height.* **Boom Down Rate**: Reduce this setting to lower the maximum downward speed of the boom. **Roll Stabilizer**: Raise this setting to increase the boom roll stability. **Sensing Mode**: Select how the system will detect the boom height: • Ground: Boom height is based on the surface of the ground. Use Ground mode to sense the ground surface through low coverage vegetation, such as stubble or young crops. • Canopy (default): Boom height is based on the top of the crop canopy. Select Canopy mode to sense the closest object seen. This is used to sense bare ground or high-coverage broad leaf crop canopy. ***Note –*** *Ground mode is susceptible to unwanted reflectance on hard or wet surfaces, such as bare ground. If this is an issue, select Canopy mode.*

Calibrating boom height control

Each boom's hydraulic drive must be calibrated before you can use the Field-IQ system Boom Height Control on the ***Run*** screen. Before you calibrate boom height control:

- Complete the implement and boom height configuration.
- Take the equipment to a field with a firm, natural surface (not concrete, not freshly tilled).
- Make sure that the hydraulic fluid is at normal operating temperature.

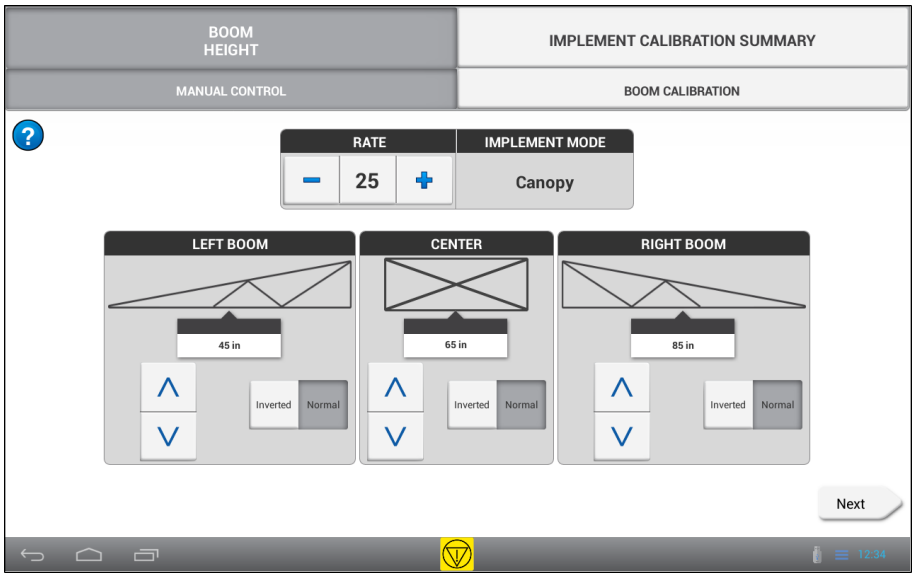
  Note – *On some vehicles with large reservoirs, it may take a longer amount of time for the fluid to reach operating level, especially if the implement circuit is lightly loaded. Consult the vehicle documentation to determine if the hydraulic fluid temperature can be shown on a vehicle console.*

Proceed to the calibration steps. See:

- Boom height manual control, page 175
- Boom drive calibration, page 177

Boom height manual control

1. Access the calibration for boom height control.
   a. At the ***Home*** screen, tap
   b. Tap the implement you want to calibrate, and then tap **Select**.
   c. Tap **Calibration**.
   d. Tap **Boom Height**. The boom height calibration panel displays.
2. Tap **Calibrate** for the boom you want to calibrate. The calibration panel displays at the MANUAL CONTROL section.



3. If you have a SIM module, for each boom:

   a. Set the switch in the cab to the *Raise* position. Make sure that the ^ button for the boom you are working with is lighted. If the wrong button is lighted up, check the wiring.

   b. Set the switch in the cab to the *Lower* position. Make sure that the v button for the boom you are working with is lighted. If the wrong button is lighted up, check the wiring.

4. If you do not have a SIM module:

   a. Tap v for the boom you are working with. Make sure that the boom goes up.

   b. Tap v for the boom you are working with. Make sure that the boom goes down.

   c. If the boom moves in the wrong direction, tap the **Inverted** button for the boom and then repeat steps 3a and 3b.

   d. Optionally, tap the + and − buttons to adjust the *Rate*, and then repeat Step 2. This raises and lowers the boom more quickly or more slowly for testing only. The Rate on this screen does not affect boom height functions on the Run screen.

5. Tap **Advanced** to access advanced calibrations for the boom.

   Change the settings as appropriate for the boom.

Tap...	To....
Enabled	Turn the sensor on or off.

Tap...	To....
Sensor S/N	Select the serial number for the sensor. The display reads the serial numbers from the installed sensors.
Side Offset	Enter the distance from the center line of the sensor to the hinge point of the boom.
Nozzle Offset	Enter the distance from the bottom edge of the sensor cone to the outlet of the spray nozzle tip.

6. Tap **Next** to continue to boom calibration. (See Boom drive calibration, page 177.)

Boom drive calibration

1. Access the calibration for boom height control.
   a. At the ***Home*** screen, tap .
   b. Tap the implement you want to calibrate, and then tap **Select**.
   c. Tap **Calibration**.
   d. Tap **Boom Height**. The boom height calibration panel displays.
   e. Tap **Calibrate** for the boom you want to calibrate. The calibration panel displays at the MANUAL CONTROL section.
2. Tap **BOOM CALIBRATION**.
3. Tap **Calibrate** for the boom you want to calibrate. The calibration tool displays.

WARNING – Moving parts during this operation. Make sure that the implement is safe to operate.

4. Tap **Calibrate**. The calibration process begins.
5. When the calibration process is complete, tap  .
6. If you want to view and edit advanced calibrations for the boom drive, tap **Advanced**. (The **Advanced** button is not available until basic calibration is complete.) The advanced calibration displays. Change the settings as appropriate.
7. Complete steps 2 through 6 for each boom drive.
8. Tap  to save the settings.

CHAPTER 9

Materials

In this chapter:

At the Materials setup panel, you can add and edit materials as well as calibrate material flow.

Managing materials

Assign materials to material control channels for the Field-IQ system Rate and Section Control, or select materials for basic tracking of field activities.

If you do not have the Field-IQ system Rate Control or Section Control, material setup steps include:

- Managing materials, page 180
- Managing materials, page 180

If you have the Field-IQ system Rate Control or Section Control, material setup requires:

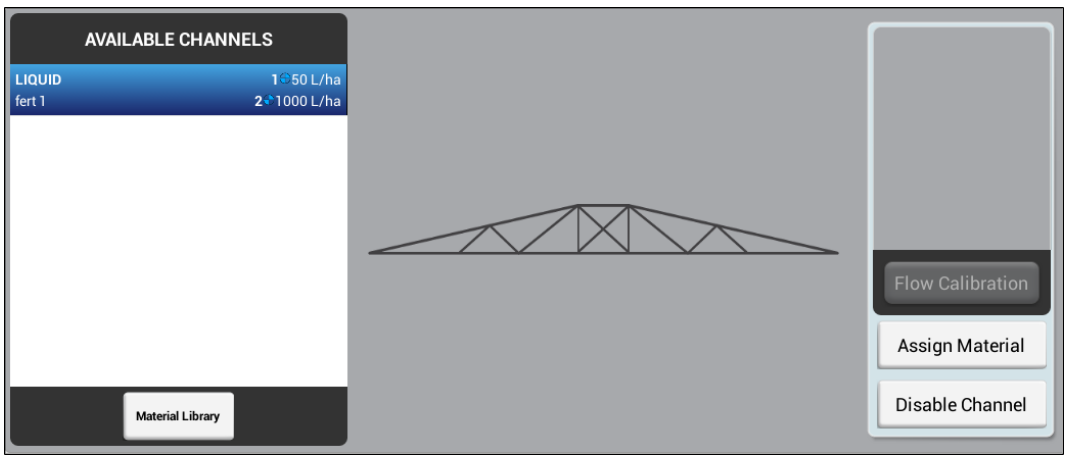
- Managing materials, page 180
- Assign a material to a channel, page 182

You must also calibrate the material flow. See Calibrate material flow, page 183.

Use the material setup panel to add, edit, assign, or delete materials.

Add a material

1. At the ***Home*** screen, tap  . The Material setup panel displays.
2. Tap **Material Library**.



3. Tap **Add**.

4. Tap each setting and then select or enter a value.

Tap...	To...
Material Type	Select the type of material being applied: • Liquid
Material Name	Tap the name and then use the on-screen keyboard to enter a name for the material.
Material Units	Select the units to use with the selected material.
Target 1	Control the volume that the implement supplies when Rate 1 is selected.
Target 2	Control the volume that the implement supplies when Rate 2 is selected.
Rate Increment	Set rate increment. When you increment/decrement Rate 1 or Rate 2 on the Run screen, the current application rate increases or decreases by this amount.
Minimum Rate	Set the minimum rate that will be applied.
Maximum Rate	Set the maximum rate that will be applied.
Details (optional)	Set additional details, if needed: • Material Classification: Select the Farm Works classification for the material • EPA Product Number: Enter the registration number for the material from the environmental protection agency for the area, if applicable. • Restricted Use: Tap **Yes** or **No** to record whether use of the material is restricted by local, regional, or national laws. • Manufacturer: Enter the material manufacturer's name. • Buffer Distance: Enter the buffer distance from the product label of the material. • Max Wind Speed: Enter the maximum wind speed from the product label of the material. • Notes: Enter any other notes that you want to record with the material.

5. Tap each setting and then select or enter a value.

Edit a material

1. At the ***Home*** screen, tap  . The Material setup panel displays.
2. Tap **Material Library**.

3. Select the material in the list on the left-hand side of the screen and then tap **Edit**.
4. Tap each setting to make the required changes. See the settings table under the section Add a material, page 180.
5. Tap  .

Select a material

Note – *If you have the Field-IQ system Rate Control, you must assign the material to a channel instead. See Assign a material to a channel, page 182.*

To select a material that you have already configured:

1. At the ***Home*** screen, tap  . The Material setup panel displays.
2. Tap the material name in the list on the left-hand side of the screen.

   Note – *If you do not have a material yet, see Select a material, page 182.*

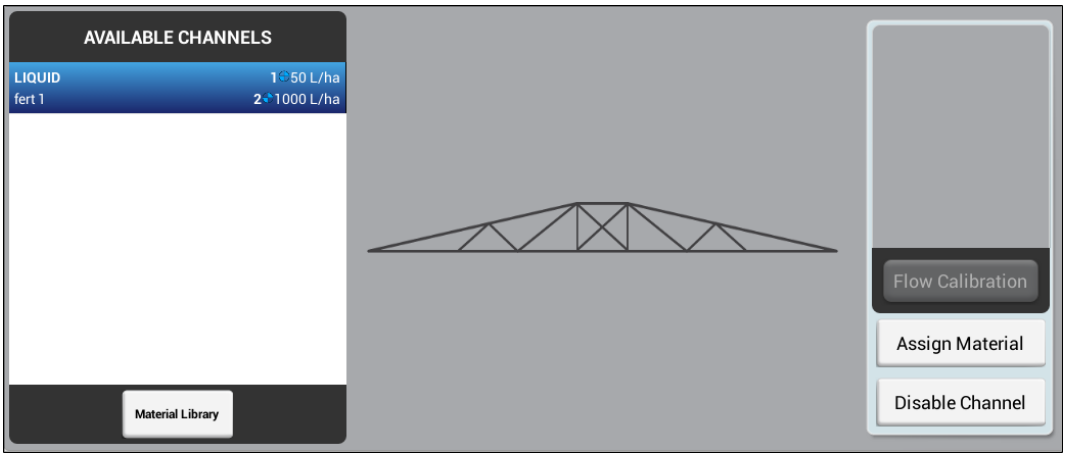
Delete a material

1. At the ***Home*** screen, tap  . The Material setup panel displays.
2. Tap **Material Library**.
3. Select the material in the list on the left-hand side of the screen and then tap **Delete**. The system displays a confirmation screen.
4. Tap  to remove the material and  to cancel the deletion.

Assign a material to a channel

Note – *If you do **not** have the Field-IQ system Rate Control, you cannot assign a material to a channel.*

1. At the ***Home*** screen, tap  . The Material setup panel displays.



2. Tap the channel in the list on the left-hand side of the screen.

   Note – *If you do not have a channel set up, see* *Add a control channel, page 149**.*

3. Tap **Assign Material** on the right-hand side of the screen.
4. Tap the material that you want to assign to the channel. The list shows only the materials that are the same type as the control channel's Material Type.

   If you have not set up the material that you want to assign, tap **Material Library**.

   If a material is already assigned to the channel, the item in the list has a  next to that material.

5. ***Note –*** *Before you can use Field-IQ Rate Control with a channel and material, you must calibrate the flow. See* *Calibrate material flow, page 183**.*

Calibrate material flow

Before you can use the Field-IQ system Rate Control with a channel and material, you must calibrate the flow.

Pre-calibration steps

Before you calibrate flow:

1. Complete the implement and rate control configuration and calibrations. See Implement setup, page 144.
2. Select a control channel and assign a material. See Managing materials, page 180.

Calibration steps

1. At the ***Home*** screen, tap  . The Material setup panel displays.
2. Tap the channel name in the list on the left-hand side of the screen.
3. Tap **Flow Calibration** on the right-hand side of the screen.
4. Tap the drive you want to calibrate. The calibration tool displays.
5. Review the settings and update if necessary.

   Note – *For information about the appropriate values for your sprayer, refer to the support note Field-IQ crop Input Control System: For Sprayers and Spreaders.*

Tap...	To...
Target Rate	Enter the rate to use for the calibration.
Speed	Enter the test speed to use during calibration. The system will apply material at the rate required to reach the Target Rate if the vehicle was traveling at this speed.

WARNING – Moving parts during this operation. Make sure that the implement is safe to operate.

6. Tap **Run Calibration**.
7. Follow the on-screen instructions to complete the flow calibration.
8. To accept the new values, tap  .
9. To use the new values but recalibrate with them, tap **Recalibrate**.
10. To discard the new values and begin again, tap 
11. Repeat the calibration steps for each drive.

CHAPTER 10

Operations

In this chapter:

As part of field operations, you can create and edit guidance patterns and use other precision agriculture solutions for field operations.

Enter a field

Before you can enter a field in the ***Run*** screen, you must:

- Set up a positioning service. See Introduction to connectivity, page 82.
- Set up a vehicle. See Introduction to vehicles, page 100.
- Set up an implement. See Implement setup, page 144.
- Add a field, page 137.
- Select a field, page 138.

Choose a field to enter

You can enter a field you currently have selected or one that is not currently selected.

Currently selected field

To enter a field that is currently selected, tap  . The ***Run*** screen displays.

Field not currently selected

To enter a field not currently selected:

1. At the ***Home*** screen, the map shows points () where your fields are located. Tap the  that represents the field you want to enter. (For a map to display on the ***Home*** screen, you must have a updated GNSS connection.).
2. A popup displays with the field name and two buttons.
3. To enter the field without beginning a new task, tap **Enter Field**.
4. To start a new task, tap **Start New Task and Enter Field**. The ***Run*** screen displays.

Run screen

The text and buttons displayed on your ***Run*** screen depend on:

- Whether you are using a guidance / steering system or manual guidance
- Other features you are using
- How your TMX-2050 display is set up

Guidance pattern overview

Guidance items you can place in the field include:

- Boundaries (see Boundary creation, page 190)
- Straight or curved lines, such as fences (see AB guidance line creation, page 189, A+ guidance line creation, page 190, Curved line creation, page 193)
- Headlands and pivots (see Headland and infill pattern creation, page 193 and Pivot pattern creation, page 194)

At the ***Run*** screen, tap  to access the buttons for creating boundaries, guidance lines and headlands and pivots.

Guidance buttons

Button	Tap to...
Boundary 	Record the perimeter of a field. You can use boundaries to: • Calculate area • Switch implement sections on and off at the edge of the field • Generate end of row warnings See Boundary creation, page 190.
Headland 	Record the exterior circuit of a field. Repeat the circuit for multiple headland passes and create an infill pattern. The display uses the implement width to generate the required number of headland circuits, a headland boundary outside of the exterior headland circuit, and an infill boundary inside of the interior headland boundary. See Headland and infill pattern creation, page 193.
Pivot 	Record the exterior curve of a circular field and repeat the pattern. The display uses the implement width to generate concentric circles. It also creates a pivot field boundary based on the specified distance to the pivot field edge. See Pivot pattern creation, page 194.
AB Line 	Record a straight line from point A to point B.Parallel guidance lines (or swaths) will be projected multiple times on either side of the AB line. See AB guidance line creation, page 189.

Button	Tap to...
A+ Line 	Set a straight directional line from point A toward the selected direction (compass direction, path of travel, or heading value). Parallel guidance lines will be projected multiple times on either side of the A+ line. See A+ guidance line creation, page 190.
Curve 	Record a line with curved and/or straight segments. Matching guidance lines will be projected multiple times on either side of the curved line. See Curved line creation, page 193.
Set Point A 	Set the starting point of a line.
Set Point B 	Set the end point of a line.
Pause 	Suspend recording while you continue to drive. The display will replace the path you travel while paused with a straight line or curve, based on the shape of the line you were recording.
Record 	Begin recording a path as you drive it.
Complete 	Finishes the guidance item you have created and saves it.
Cancel	Exits the process of creating a guidance item and does not save it.
Compass	Set the heading direction for an A+ line to a compass direction. See A+ guidance line creation, page 190.

Button	Tap to...
Use Current Heading 	Set the heading direction for an A+ line based on the vehicle's current position. See A+ guidance line creation, page 190.
	Lock the current angle of the vehicle. See A+ guidance line creation, page 190.

Field Manager

You can use Field Manager to:

- Edit guidance lines and patterns
- Edit boundaries
- Activate or deactivate boundaries, guidance lines and patterns

AB guidance line creation

With AB lines, you define the start and end points.

Note – *The display uses the implement width to project swaths for the master line. Active lines project swaths in either direction based in the width used to create the line.*

1. Enter the field where you want to create the line. (See Enter a field, page 186.)
2. Tap  . The pattern buttons display.
3. Tap  . A compass displays.
4. Tap  to set the beginning of the line. The display:
   - Marks on the map where you tapped  .
   - Shows a straight dashed line between the A point and the vehicle's current location.
5. To complete the line and close the controls, tap  . The distance between swath lines is based on the width of the implement that was used to create the line.
6. To cancel the AB line creation, tap  .

A+ guidance line creation

With A+ lines, you define a point on the line and the direction the line is heading.

1. Select a vehicle, implement and field. (See Select a field, page 138.)

   Note – *The display uses the implement width to project swaths for the master line.*

2. Enter the field where you want to create the line. (See Enter a field, page 186.)
3. Tap  . The pattern buttons display.
4. Tap  . The display changes to overhead view if you were in trailing view. The A point is set at the vehicle's current location. The A+ line controls appear in the center of the screen.
5. Select the direction you want for the A+ line.
6. To set the direction of the line, you can do any of the following:

   a. To use the direction that the vehicle is facing as the heading, tap  .

   b. To use the on-screen number pad to enter an exact heading, tap the number.

   c. To use a cardinal (N, S, E, W) or ordinal (NE, SE, SW, NW) direction, tap that direction on the compass ().

   The display saves the line. The distance between swath lines is based on the width of the implement that was used to create the line.

7. To accept the line and direction and close the controls, tap  . The display saves the line. The distance between swath lines is based on the width of the implement that was used to create the line.
8. To cancel the line creation, tap  .

Boundary creation

1. Enter the field where you want to create the boundary. (See Enter a field, page 186.)
2. Tap  . The pattern buttons display.
3. Tap  .
4. When you are ready to begin your boundary tap  and begin driving the perimeter of the field or area. The display:

- Marks the point where you began recording
- Shows the recorded path with a dashed line

5. Drive around the field until you are near your starting point.
   - If Auto-Close is on: When you reach auto-close distance , the display will connect the vehicle's current location to the starting point with a straight line and save the boundary.
   - If Auto-Close is off: Drive to the beginning point and tap  . The display will connect the vehicle's current location to the starting point with a straight line and save the boundary.

   To set the auto close feature, see Patterns, page 60.
6. When finished, the display makes the boundary you created active, and saves it with a unique name. The distance between swath lines is based on the width of the implement that was used to create the line.
7. To suspend recording while creating the boundary, tap  .The display will replace the path you travel while paused with a straight line, from the point where you tapped  to the point where you resume recording. To resume recording, tap  .
8. To cancel the boundary line creation, tap  .
9. To edit any boundary you have created, see Boundary editing, page 191.

Boundary editing

1. At the ***Home*** screen, select the field where you want to edit the boundary. Tap  to open the Field Manager.

   Or if you are at the ***Run*** screen, tap  to open the Field Manager for the field you are currently in.
2. At the Field Manager, tap **BOUNDARIES**.

   The map and the Boundaries list show the boundaries in the selected field(s).

   The display highlights the active pattern in blue on the map.

   For headland boundaries (inner and outer), the list shows the implement type and width used to create each pattern.
3. To select a boundary, tap it on the map or in the list on the left-hand side of the screen.
4. To edit the pattern, use the buttons on the right-hand side of the screen.

***Note** – The display shows only the options that are suitable for the selected item.*

Tap...	To...
Name	Use the on-screen keyboard to rename the selected item.
Resize  ***Note** – Not available on headland boundaries.*	To resize the boundary: a. Tap  . b. Tap the text box and use the on-screen number pad to enter the distance to move the boundary. c. To shift the boundary outward (making the area larger), tap **Expand**. d. To shift the boundary inward (making the area smaller), tap **Contract** to shift the boundary inward (making the area smaller). e. Tap  . The display saves a copy of the pattern with a new name at the new position.
Convert 	Tap to change a boundary to a headland boundary.
Delete 	Remove the selected pattern.

5. To save the changes and close the Field Manager, tap  .

Pattern activation/deactivation

You can activate or deactivate patterns in a selected field.

1. Tap  to open the Field Manager. Field Manager opens to the Field Overview section.
2. Tap **GUIDANCE PATTERNS**.
3. Tap on the line, headland or pivot area in the list on the right-hand side.
4. Tap  to activate an inactive pattern.
5. Tap  to activate an inactive guidance line.

6. Tap  to de-activate an active pattern.
7. Tap  to de-activate an active guidance line.

Curved line creation

1. Enter the field where you want to create the boundary. (See Enter a field, page 186.)
2. Tap  . The pattern buttons display.
3. Tap  .
4. When you are ready to begin the line tap  . The display:
   - Marks your starting point on the map, at the point where you tapped record.
   - Shows a dashed line between the starting point and the vehicle's current location.
5. When you are at the end of the line, tap  .
6. To cancel the line creation, tap  .

Headland and infill pattern creation

1. Select a vehicle ,implement and field. (See Select a field, page 138).

   Note – *The display uses the implement width to place the pivot boundary, space the circuits and project guidance lines for the pattern.*
2. Tap  to enter the field.
3. Tap  . The pattern buttons display.
4. Tap  . The headlands options display.
5. If the number of circuits is not correct, edit the number you want to create by tapping the number and entering the correct amount.
6. Select the type of infill pattern you want by tapping the correct button (AB, A+ or curve).
7. Tap  and begin driving the perimeter of the field.The display:
   - Marks where you were when you tapped record
   - Shows the recorded path with a dashed line.
   - The controls for the infill line (if any) appear below the headland recording controls.

8. If you are using an infill pattern, create the line for your infill pattern. See instructions for the type of line you are creating:
   - AB guidance line creation, page 189
   - A+ guidance line creation, page 190
   - Curved line creation, page 193
9. Continue driving around the field until you are near your starting point.
   - If Auto-Close is on: When you reach auto-close distance , the display will connect the vehicle's current location to the starting point with a straight line and save the pattern.
   - If Auto-Close is off: Drive to the beginning point and tap  . The display will connect the vehicle's current location to the starting point with a straight line and save the pattern.

   To set the auto close feature, see Patterns, page 60.
10. When finished, the display:
    a. Saves the headland pattern with a unique name (for example, H-1).
    b. Generates a headland boundary based on the recorded path and the width of the implement. The headland boundary is saved with a unique name related to the headland (for example, HB-1).
    c. Generates an infill boundary based on the number of circuits selected and the width of the implement (or vehicle if the implement is *None*). The headland boundary is saved with a unique name related to the headland (for example, IB-1).
11. To cancel the pattern creation, tap  .

Pivot pattern creation

1. Enter the field where you want to create the boundary. (See Enter a field, page 186.)
2. Tap  . The pattern buttons display.
3. Tap  .
4. Tap the record button  and begin driving the outer perimeter of the field. The display:
   - Marks your starting point on the map, at the vehicle's location when you tapped record.
   - Shows the recorded path with a dashed line.

5. When finished, the display:
   - Saves the pivot pattern with a unique name (for example, P-1).
   - Generates a pivot boundary based on the recorded path and the width of the implement. The pivot boundary is saved with a unique name related to the headland (for example, PB-1).
   - Makes the pivot boundary active.
6. To cancel the pivot creation, tap  .

Guidance pattern shifting

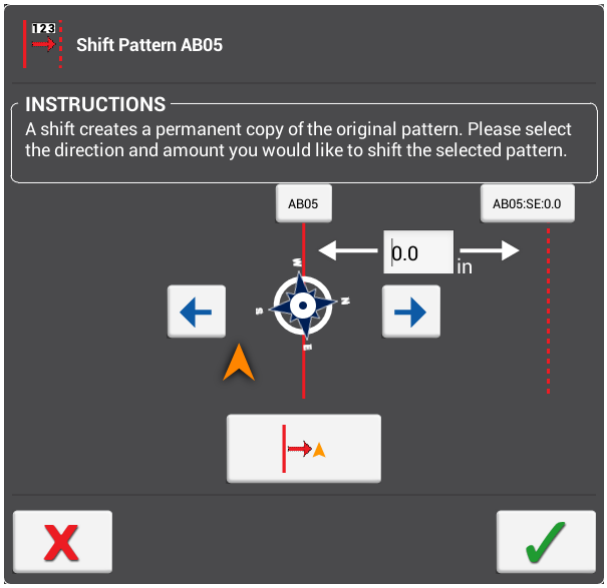
1. At the ***Home*** screen, select the field where you want to edit the boundary. Tap  to open the Field Manager.

   Or if you are at the ***Run*** screen, tap  to open the Field Manager for the field you are currently in.
2. Tap **GUIDANCE PATTERNS**.
3. Tap the pattern you want to edit. If the selected pattern is active, tap  to make it inactive.

   If the selected pattern is not active, tap  to make it active.

   Note – *If you activate a pattern that was created with a different implement width, the display will prompt you to shift the line for the new width or keep the original position.*
4. If you have chosen a headland, you can change the number of circuits in a headland.

5. Tap  . The Shift Pattern tool displays.

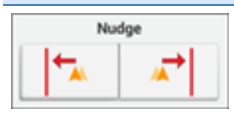


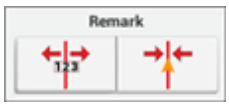
6. Tap the left or right arrow to indicate the direction you want to shift the pattern.
7. Tap  to shift the pattern to the vehicle's current position, or you can enter the amount you want to shift the pattern.
8. To make the change, tap  . The system creates a copy of the original pattern with the shift change.
9. To cancel the change, tap  .
10. To exit Field Manager, tap  .

Guidance pattern adjustment shortcuts

To adjust guidance while performing field activities, at the ***Run*** screen, tap  .

The system displays the guidance adjustment buttons.

Button	Use to...
	Nudge line or pattern in a perpendicular direction (left or right) relative to the pattern.

Button	Use to...
	Temporarily move the line or pattern to the vehicle's current location. Clears with a session change.
	Manually adjust value incrementally to the right or to the left by tapping the arrows. The value is reset when a new task is started or the display is powered off. The value in the middle indicates the amount the implement has been corrected. To adjust the size of the increments, see Steering and Guidance, page 61.

Landmarks overview

You can place field items in the field, including:

- Lines, such as fences
- Points, such as trees
- Areas, such as ponds

Tap  to access the controls for creating landmark points, lines and areas.

Landmark buttons

Control	Tap to...
Point	Place a point indicator on the field map marking a point. Landmark points can trigger warnings when you approach them. Available types: • Point (such as a gate, riser, tile inlet, water trough, well) • Rock • Pest (insects, weeds) • Obstruction (hole, tree, hazard)
Line	Record a line marking a landmark. Landmark lines can trigger warnings when you approach them. Available types: • Line (such as border, drip tape, gate, path, road) • Obstruction (cable, ditch, fence, hazard, pipe, river, stream, terrace, trees)
Area	Record a shape marking a landmark. Area landmarks are not used to switch sections on and off, but can trigger warnings when you approach them. Available types: • Area • Pest • Obstruction
Non-Productive Area	Record a shape marking a landmark. Non-productive area landmarks can be used to switch sections on and off. Available types: • Non-productive Area (such as clover, exclusion, grassed waterway, slough, waterway) • Obstruction (hazard, hole, lagoon, pond, rocks, tree) • Pest (disease, weed)

Landmark point creation

1. Select a vehicle ,implement and field. (See Select a field, page 138.)
2. Tap  to enter the field.
3. Tap  .
4. Tap  . The display places a marker at the vehicle's current location, based on the recording point.
5. Optionally, to change the type of point recorded (Point, Rock, Obstruction, Pest):
   a. Record the point.
   b. Tap the marker for the point.
   c. Tap the class you want to use. The color of the marker will change and the edit options will close.
6. To edit, rename, or set alarms for landmarks you have already created,tap **Edit/change**. For instructions, see Field Manager, page 48.
7. To record a different type of landmark by default, or to change the point on the vehicle/implement used to indicate the location of the landmark, tap **Change landmark settings**. For instructions, see Field Manager, page 48
8. To close the landmark buttons, tap  .

Landmark line creation

1. Select a vehicle ,implement and field. (See Select a field, page 138.)
2. Tap  to enter the field.
3. Tap  .
4. Tap the line button  .
5. Tap  . The display places a marker at the vehicle's current location, based on the recording point.
6. Drive to the end of the line you want to record and then tap  again.
7. To discard the recorded path and close the buttons, tap  . The path recorded so far is not saved.

8. To start over, tap the button for the feature again.
9. To edit, rename, or set alarms for landmarks you have already created, tap **Edit/change**. For more information, see Field Manager, page 48.
10. To record a different type of landmark by default, or to change the point on the vehicle/implement used to indicate the location of the landmark, tap **Change landmark settings**. For more information, see Field Manager, page 1.
11. To close the landmark buttons, tap  .

Landmark area creation

Follow the steps below to create a productive or non-productive area. Productive areas can generate alarms, but will not switch sections off if you use section control. Non-productive areas can be used to switch sections off when you use section control.

1. Select a vehicle ,implement and field. (See Select a field, page 138.)
2. Tap  to enter the field.
3. Tap  .
4. Tap  or  .
5. Tap the record button  . The display places a marker at the vehicle's current location, based on the recording point.
6. Drive around the area you want to record and then tap the record button again.
7. To close the landmark controls, tap  .
8. To discard the recorded path and close the controls, tap  . The path recorded so far is not saved.
9. To start over, tap the button for the feature again.
10. To edit, rename, or set alarms for landmarks you have already created, see Field Manager, page 48.
11. To record a different type of landmark by default, or to change the point on the vehicle/implement used to indicate the location of the landmark, see Field Manager, page 48.

Landmark editing

1. Open the Field Manager. (See Field Manager, page 48.)
2. Tap **GUIDANCE PATTERNS**.

1. Tap **Landmarks**. The map and the Landmarks list show recorded landmark items including:
   - Points
   - Lines
   - Areas
   - Non-productive areas
2. To select a landmark, tap it on the map or in the list on the left-hand side of the screen.
3. Use the buttons on the right-hand side of the screen to edit the landmark.

   Note – *The display shows only the options that are suitable for the selected item.*

Tap...	To...
Name	Rename the selected item.
Category  ***Note –*** *Applies to point landmarks only.*	Change the classification of a point landmark. Options are: • Point • Obstruction • Rock • Pest ***Note –*** *To identify a point more specifically, change the name of the point.*
Convert 	Tap to: • Change a landmark line to a guidance line. • Change an area to a non-productive area. • Change a non-productive area to an area.
Delete 	Remove the selected landmark from the display.

4. To exit Field Manager, tap  .

Tasks

The TMX-2050 display stores field activities related to each unique operation and field combination together as a task. By using tasks, you do not have to continually configure frequently used field profiles.

When you enter a field profile with the same operation and implement that you used previously, the display continues the previous task unless the *Max Task Time* has already passed.

When you change operation, implement, or field, the display automatically starts a new task.

Use the Task History section in Field Manager to:

- Open a previous task.

  This is helpful if you enter a field and do not see coverage that you want to see from an earlier activity. This shows the coverage from the previous task in the field, and adds the new activity to the previous task

- Start a new task.

  This is helpful if you enter a field and you see coverage from an earlier activity that you do not want to see for the current activity. When you start a new task the display removes the previous coverage from the Run screen and saves the current activity in a new task.

Create a task

There are three ways you can create a task:

- **Automatically**: If you enter a field with an implement with operation that does not match any current stored, a new task will be created automatically.
- At the **Field Manager Task History**: Tap to enter the Field Manager, select the task history and start a new operation. For this option, an implement must be selected. If not, the display pops up a message to tell you what is required to create the task.
- At the ***Home*** screen: Select  . The system displays the field name along with the option to go to the field and create a new task.

Review existing tasks

1. Select the field. (See Select a field, page 138.)
2. Tap  to open the Field Manager.
3. Tap **Task History**.
4. Tap the tasks on the left-hand side of the screen to review previous tasks:
   - Tap + or - to show or hide tasks for each operation.
   - Tap a specific task to select it. Each task is shown with its start and end date and time.

- The map shows the coverage layer(s) saved for the selected task

Add a task

Tap **Start New Task** to begin a new task. The display will not show previous related map coverage layers on the ***Run*** screen.

Edit a task

1. Add a task or select an existing task.
2. Tap **Continue Task** to add current coverage to the selected task. The display will show the previous related coverage on the Run screen.

   Note – *This option is only available if the implement you have selected is for the same type of operation.*
3. Make sure that the *Max Task Time* is suitable.
   a. If the implement and operation do not change, the display adds coverage to the current task until the task exceeds the *Max Task Time*.
   b. If the *Max Task Time* is not acceptable, tap the number of days to change it.
4. Tap **Exit** to save the changes and close the Field Manager.

Layers

The following map layers for coverage are recorded for each task:

- Coverage Overlap
- Speed
- Height
- GPS Quality
- Offline Distance
- Guidance Engaged

You can view and edit layers. See:

- Edit a coverage layer, page 204
- View coverage layers, page 204

Edit a coverage layer

To edit a coverage layer:

1. Tap  .
2. The current layer being shown slides out to the right.
3. Tap the current layer button. The list of Available Layers displays.
4. Tap the **Settings** button.
5. Change the settings of the layer.
    a. Auto scale
    b. Steps
    c. Color scheme
6. Tap  to save your changes or  to cancel your changes.

View coverage layers

To view a layer of coverage during field operations:

1. Tap  .
2. The current layer being shown slides out to the right.

3. To change the type of layer, tap the current layer button. The list of Available Layers displays.
4. Tap the layer you want to display.

On-screen status widgets

Status widgets are software gadget notify you of information and status that you can display on the ***Run*** screen during field activities. You can access the following widgets:

- Area status, page 207
- Position status, page 208, including position, compass and digital compass
- Speed status, page 208
- On-screen lightbar, page 208

Using status widgets

Status widgets are software gadget notify you of information and status that you can display on the ***Run*** screen during field activities.

You can choose to display or not display widgets as well as move them around on the ***Run*** screen.

Access widgets

To access the list of widgets available on your TMX-2050 display:

1. At the ***Run*** screen, tap  .
2. To display all status widgets, tap **Add All Widgets**.
3. To remove all status widgets, tap **Remove All Widgets**.

Resize

To make a status widget larger, tap the upper right corner of the widget. To make it smaller, tap the same upper right corner.

Move a widget

You can position status widgets on the screen where it makes sense for you. The position on the screen where you have chosen to display each widget is saved and associated with your user profile. That way, the next time you use the display, the widgets are where you previously placed them.

To move a status widget around on the screen:

1. Touch the widget and keep your finger on the screen.
2. Drag the widget with your finger. A grid displays on the screen.
3. After you have moved the widget where you want it, remove your finger.

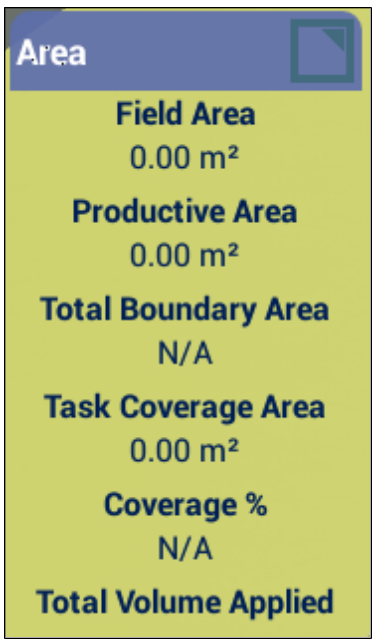
To close a widget

To remove a widget from the ***Run*** screen:

1. Touch the widget and keep your finger on the screen. A grid displays on the screen.
2. Drag the widget with your finger to the upper right corner. A trash can icon with the word "Remove" will display.

3. Drag the widget onto the trash can. It is removed from the display.

Area status



Area status:

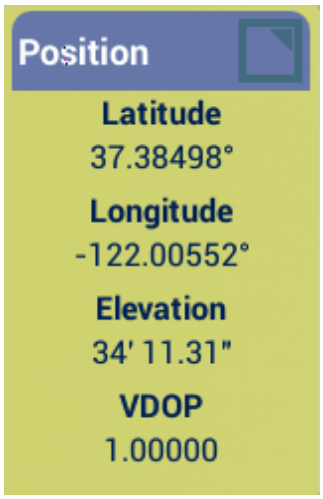
- Area of the field
- Productive area: Total field area minus the unproductive areas
- Total boundary area: Total of the area within the active boundaries of the field.
- Task coverage area: The amount of coverage in the field
- Percent of coverage: The amount of coverage over the productive area multiplied by 100.
- Total volume applied

On-screen lightbar

The on-screen lightbar provides vehicle guidance. When the vehicle is perfectly on the guidance line, the three center (green) LEDs are lighted up.

When the vehicle moves off the guidance line to the left or the right, the (red) LEDs that are lighted up drift to the side.

Position status



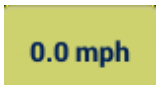
Position: your current position's:

- Latitude
- Longitude
- Elevation
- VDOP

Compass: The direction in which you are traveling.

Digital compass: The degrees of the angle you are traveling.

Speed status



Speed: The speed at which you are traveling.

Coverage logging

Coverage logging records the area that you have covered when you carry out an operation, for example applying fertilizer to a field.

To activate coverage logging, tap  .

You can set up varieties that make it easy to see the difference between different types of coverage. This enables you to:

- Change product part way through a field, so that you can later identify which parts of the field are covered in which product.
- Plant or apply two or more different products side-by-side and record the locations in your field. For example, you could put corn seed in the left side hoppers on your planter and clover seed in the right side hoppers and track where each set of seeds is planted.The varieties are assigned to rows on your implement. Specify the number of rows on your implement when you configure it.

Vehicle operations overview

At the ***Run*** screen, tap the screen to display the vehicle position buttons.

Vehicle position

Button	Tap to...
	Change point of view on the ***Run*** screen to an overhead view.
	Change the point of view on the ***Run*** screen to a view with the horizon.
	Recenter the point of view on the ***Run*** screen.

Engage status with auto guidance

Indicator/Button	Auto guidance system is...
	Disabled (gray). You do not have access to the auto guidance system.
	Not able to engage (red). The vehicle is not close enough to the guidance pattern or line to engage the auto guidance system.
	Ready to engage (yellow). Tap to engage the auto guidance system.

Indicator/Button	Auto guidance system is...
	Engaged (green). Indicates you are engaged on a pattern or line and are using auto guidance.

Steering adjustments

To adjust guidance while performing field activities, at the ***Run*** screen, tap  .

The system displays the guidance adjustment buttons.

Button	Use to...
	Adjust the vehicle aggressiveness.
	Enable or disable auto steering.

Field-IQ system operations

For the Field-IQ system, the following equipment and tools may be used:

- Field-IQ system switch boxes, page 212

Field-IQ system switch boxes

In addition to rate and section buttons on the ***Run*** screen, use the Master and 12-section switch boxes for the Field-IQ system.

Field-IQ system Master Switch Box

Note – *All Field-IQ systems must have a Field-IQ master switch box.*

Item	Description	Tap here to ...
1	Increase/decrease switch	Increases the applied amount by a set amount (the amount set in the implement setup *Rate Control Adjustments* screen). See Rate control for a channel, page 156.
2	Rate switch	Choose to use preset Rate 1, preset Rate 2, or Manual rate.
3	LED indicator	• Red: Unit is powered but not communicating with the display. • Green: Unit is powered and communicating with the display. • Yellow: Unit is initializing communications with the display.

Item	Description	Tap here to ...
❹	Automatic/Manual section switch	• Automatic mode: The display automatically opens and closes sections when entering areas of overlap, non-apply zones, or crossing boundaries. • Manual mode: The sections are controlled manually, bypassing the display. ***Note –*** *You can switch from Automatic to Manual mode while traveling.*
❺	Master switch	**A**: Jump start (top position) The sections and rate are ready to be commanded by the display, and the system is overridden to use a preset control speed (the speed is set in the implement setup). Use the jump start function if you lose a GNSS signal or you want to start applying before your implement is up to speed. **B**: On (middle position) The sections and rate are ready to be commanded by the display. **C**: Off (lower position) Sections are closed and rate is set to zero.

Field-IQ 12-section switch box

Note – *The 12-section switch box is required for section control. For rate control only, the switch box is optional.*

Only one section switch box can be used on each system. Each section switch is automatically assigned to the corresponding module. The modules are read from left to right. For example, switch 1 assigns to the module furthest on the left when standing behind the implement.

Relation to master switch box

The section switches have different functions, depending upon the status of the master Automatic/Manual section switch on the master switch box.

Automatic mode: When the Automatic/Manual section switch of the master switch box is in the automatic mode:

- If the section switch is in the on/up position the section(s) assigned to it are commanded automatically by the display.
- If the section switch is in the off/down position the section(s) assigned to it are commanded to be off.

Manual mode: When the Automatic/Manual section switch of the master switch box is in the manual mode:

- If the section switch is in the on/up position, the section(s) assigned to it are commanded to be on. This overrides the display and coverage logging is ignored.
- If the section switch is in the off/down position, the section(s) assigned to it are commanded to be off. This overrides the display and coverage logging is ignored.

LED status indicators

The LED has the following status indicators:

- Green: The unit is powered and is communicating with the display.
- Yellow: The unit is initializing communications with the display.
- Red: The unit is powered but not communicating with the display.

CHAPTER 11

Diagnostics, status, troubleshooting

In this chapter:

This chapter covers information about the status of equipment and services, as well as troubleshooting and diagnostics information.

Diagnostics

You can access Diagnostics in either of the following ways:

- Tap  at the Home or Run screen. The main menu displays. Tap  .
- Tap the right-hand side of the display bar. When the popup notification list displays, tap  . The main menu displays. Tap  .

Diagnostics has two sections:

- The left side menu lists products and services active on the display.
- The right side shows information about the item you selected on the menu.

Tap the menu items on the left-hand side of the screen to access the diagnostic sections you want to view.

System diagnostics

At system diagnostics, you can work with logs and view the system performance.

System performance

Performance lists devices and performance details for each product or service, including firmware versions.

At the Diagnostics panel, tap **Performance** under System.

Devices

Item	Explanation
Title	Title of the component
Firmware Version	Version of component's firmware
Hardware Version	Version of the component
Serial Number	Serial number of the component

Ports

Item	Explanation
Port	Title of the component
Signal	Type of signal for the port
Title	Name of the port
Communicating	Indicates whether or not the port is communicating
View Logs	Tap to view logs on the port

TMX-2050 display

This section describes some possible issues with the TMX-2050 display, possible causes, and how to solve them. Please read this section before you contact technical support.

The display does not turn on.

Possible cause	Solution
External power is too low.	Check: • The charge on the external power supply • The fuse if applicable If required, replace the battery.
Internal power is too low.	Check the charge on the internal batteries and replace if required. Ensure battery contacts are clean.
External power is not properly connected.	Check: • The Lemo connection to ensure it is seated properly • The connector for any broken or bent pins
There is a faulty external power cable.	Try a different cable. Check pinouts with a multimeter to ensure internal wiring is intact.

The display is not responsive.

1. Hold down the power button for 20 seconds.
2. After the display has shut down, press the power button again to power on the display.

Alerts and warnings overview

The TMX-2050 display will display warnings and alerts, depending on your features and the situation. For example, warnings and alerts will display regarding:

- Loss of GNSS coverage
- Using auto guidance and:
  - The vehicle is approaching a tight turns or the end of a row
  - The system detects the steering wheel is being used
- A lack of interaction with the display after a specific amount of time

This list is not comprehensive, rather a few examples of alerts and warnings.

End of row warning

If your auto guidance system is on and following a guidance line, when you begin approaching the end of a row, a End of Row warning displays.

Tight turn warning

If you are using an auto guidance system, when you are approaching a tight turn, the system displays a tight turn warning.

To customize your settings for tight turn warnings (including the angle of the turn and how soon the warning displays before the turn), see Patterns, page 60.

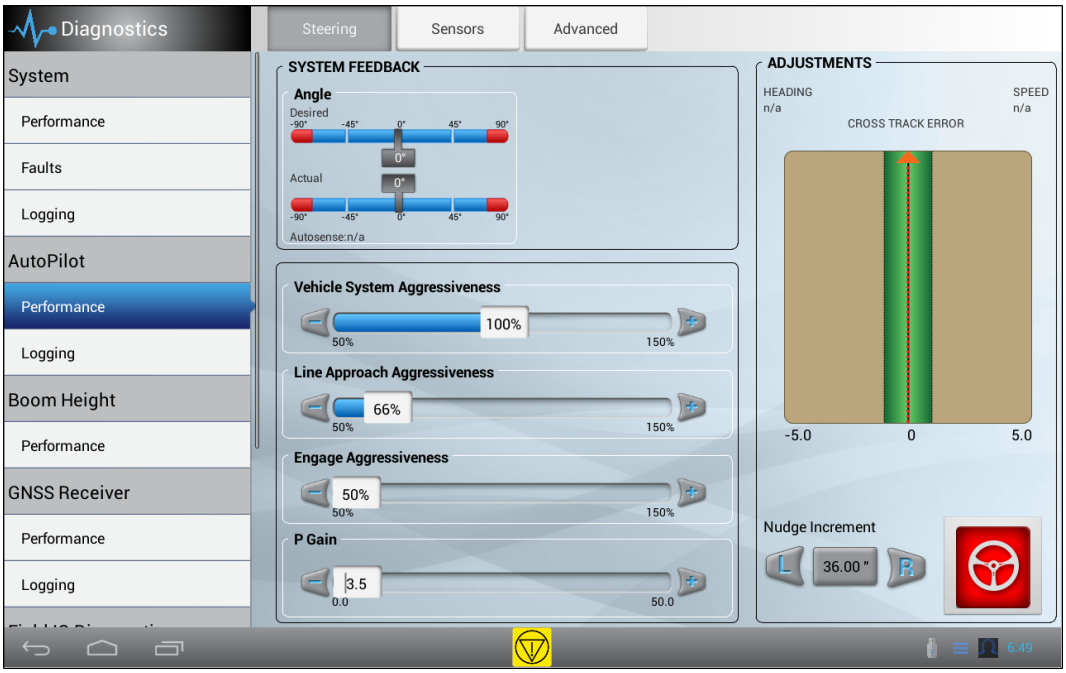
Autopilot system diagnostics

You can use diagnostics for AutoPilot to:

- View the degree of the steering angle being given by the navigation controller and the actual degree of angle.
- Calibrate:
  - Manual override sensitivity
  - Vehicle system aggressiveness
  - Line approach aggressiveness
  - Engage aggressiveness
  - Proportional steering gain (P gain)
  - Make incremental adjustments to a pattern using the nudge increment tool
- View:
  - Vehicle roll, pitch and yaw
  - Navigation controller orientation
  - IMU parameters
  - Sensor settings
- Record, save and remove logs
- Transfer logs to a USB drive

Steering performance for Autopilot system

1. At the Diagnostics panel, tap **Performance** under Autopilot.
2. Tap **Steering**.

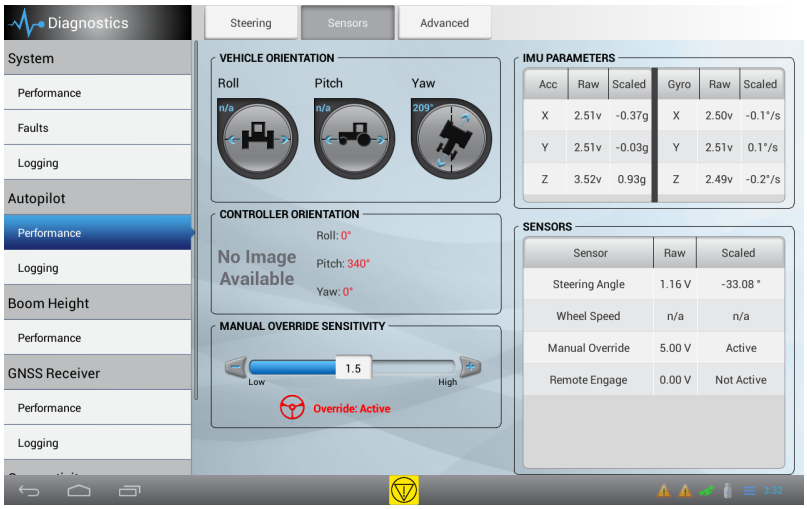


Button/Control	Explanation
System Feedback, Angle Desired	The degree of the steering angle being given by the navigation controller.
System Feedback, Angle Actual	The degree of the steering angle that is actually occurring.
Vehicle System Aggressiveness	How aggressively the vehicle initially engages on the guidance line. See Engage aggressiveness, page 121 for more information on calibrating.
Line Approach Aggressiveness	Controls how fast the guidance system attempts to steer the vehicle onto the current guidance line. See Line acquisition, page 120 for more information on calibrating.
Engage Aggressiveness	Controls how aggressively the vehicle initially engages the automatic guidance system.
P Gain	Balances rapid steering response and stability. See Proportional steering gain calibration, page 115 for more information on calibrating.

Button/Control	Explanation
Nudge Increment	The increment used to nudge the guidance system with each tap. You can incrementally nudge pattern in a perpendicular direction relative to the pattern. See Steering adjustments, page 211 for more information on adjusting nudge increment.
Engage 	Engage indicator.

Sensor performance for Autopilot system

1. At the Diagnostics panel, tap **Performance** under Autopilot.
2. Tap **Sensors**.



Button/Control	Explanation
VEHICLE ORIENTATION	Graphically indicates the roll, pitch and yaw settings.
CONTROLLER ORIENTATION	Actual steering angle.

Button/Control	Explanation
MANUAL OVERRIDE SENSITIVITY	Sets the level the voltage must reach before the guidance system disengages. The voltage must also drop below that level before automated steering can be engaged again. You can calibrate this control here or at the Vehicle setup panel. For instructions, see Manual override sensitivity calibration, page 111
IMU PARAMETERS	The raw voltage reading from the accelerometer and gyroscope in the navigation controller.
SENSORS	The raw voltage of all connected sensors.

DCM-300 modem status

The LED lights on the DCM-300 modem indicate the status of specific signals.

Light status	Green LED indicates:	Amber LED indicates:
Solid	Power on and booting	Cellular link
Fast blinking (200 milliseconds on/off)	Poor or no GPS signal	Poor or no wireless signal
Blinking (one second on/off)	GPS signal	Wi-Fi link
Slow blinking (three seconds on/off)	N/A	Wi-Fi and cellular link

For more information about the DCM-300 modem, see:

- Connect the DCM-300 modem, page 77
- DCM-300 modem setup, page 97

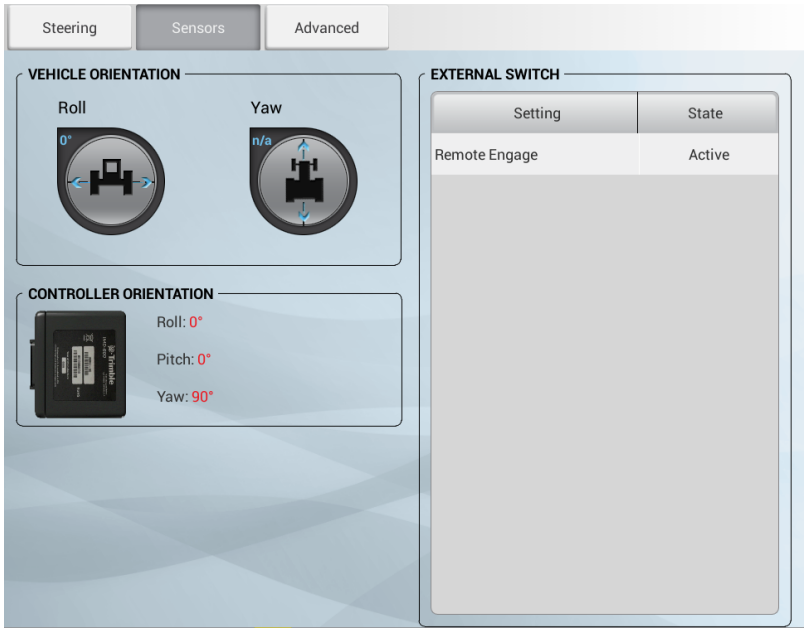
EZ-Pilot system diagnostics

You can use EZ-Pilot diagnostics to:

- Calibrate:
  - Vehicle system aggressiveness
  - Line approach aggressiveness
  - Angle per turn
  - Free play offset
  - Manual override sensitivity
- View:
  - Vehicle roll, pitch and yaw
  - Navigation controller orientation
  - IMU parameters
  - Sensor settings
- Record, save and remove logs
- Transfer logs to a USB drive

Sensor performance for EZ-Pilot system

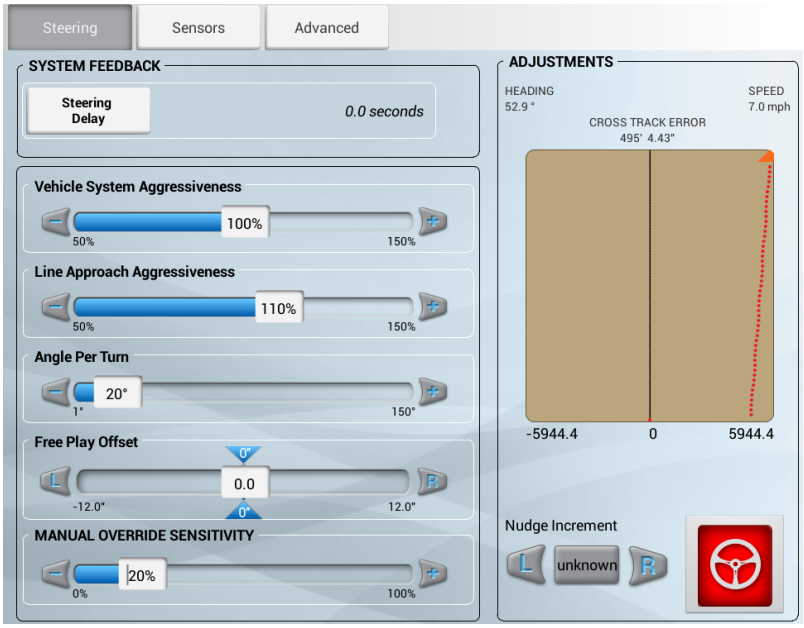
1. At the Diagnostics panel, tap **Performance** under EZ-Pilot.
2. Tap **Sensors**.



Button/Control	Explanation
VEHICLE ORIENTATION	Graphically indicates the roll and yaw settings.
CONTROLLER ORIENTATION	Actual steering angle.
EXTERNAL SWITCH	Setting and state of the external switch.

Steering performance for EZ-Pilot system

1. At the Diagnostics panel, tap **Performance** under EZ-Pilot.
2. Tap **Steering**.



Button/Control	Explanation
Vehicle System Aggressiveness	How aggressively the vehicle initially engages on the guidance line. See Engage aggressiveness, page 121 for more information on calibrating.
Line Approach Aggressiveness	Controls how fast the guidance system attempts to steer the vehicle onto the current guidance line. See Line acquisition, page 120 for more information on calibrating.
Free Play Offset	Used for adjusting the steering if the vehicle has greater free play offset steering in one direction than the other. It is to be used when the system constantly drives offset to the line and does not correct to “0”due to large tolerances(slop) in the steering components of the vehicle. Default= 0.0 inches (Range=0-11.9 inches to the Right or Left)
MANUAL OVERRIDE SENSITIVITY	Sets the level that the voltage must reach before the guidance system disengages. The voltage must also drop below that level before automated steering can be engaged again.
Nudge Increment	The increment used to nudge the guidance system with each tap. You can incrementally nudge pattern in a perpendicular direction relative to the pattern. See Steering adjustments, page 211 for more information on adjusting nudge increment.

Button/Control	Explanation
Engage 	Engage indicator.

EZ-Steer system diagnostics

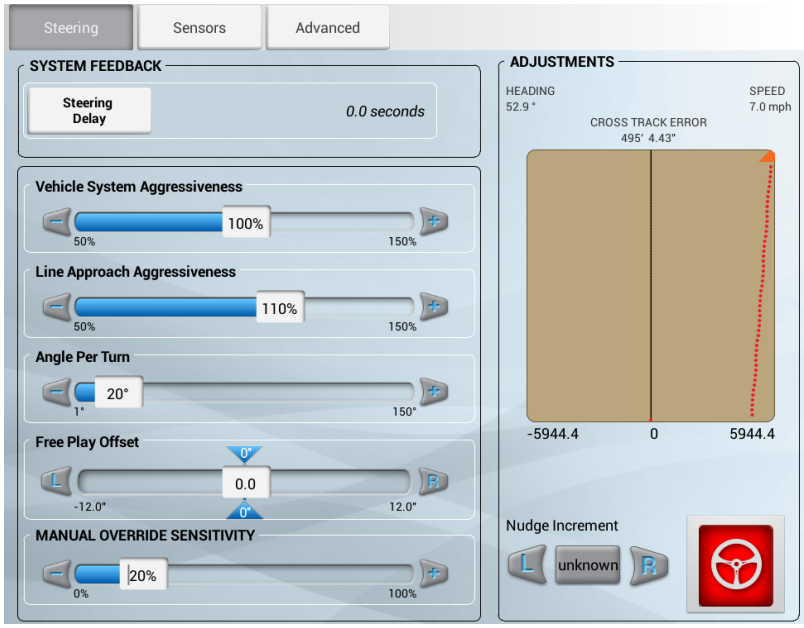
You can you EZ-Steer diagnostics to:

- Calibrate:
  - Manual override sensitivity
  - Vehicle system aggressiveness
  - Line approach aggressiveness
  - Angle per turn
  - Free play offset
  - Make incremental adjustments to a pattern using the nudge increment tool
- View:
  - Vehicle roll, pitch and yaw
  - Navigation controller orientation
  - IMU parameters
  - Sensor settings
- Record, save and remove logs
- Transfer logs to a USB drive

Steering performance for EZ-Steer system

To access:

1. At the Diagnostics panel, tap **Performance** under EZ-Steer.
2. Tap **Steering**.



Button/Control	Explanation
Vehicle System Aggressiveness	How aggressively the vehicle initially engages on the guidance line. See Engage aggressiveness, page 121 for more information on calibrating.
Line Approach Aggressiveness	Controls how fast the guidance system attempts to steer the vehicle onto the current guidance line. See Line acquisition, page 120 for more information on calibrating.
Free Play Offset	Used for adjusting the steering if the vehicle has greater free play offset steering in one direction than the other. It is to be used when the system constantly drives offset to the line and does not correct to “0”due to large tolerances(slop) in the steering components of the vehicle. Default= 0.0 inches (Range=0-11.9 inches to the Right or Left)
MANUAL OVERRIDE SENSITIVITY	Sets the level that the voltage must reach before the guidance system disengages. The voltage must also drop below that level before automated steering can be engaged again.
Nudge Increment	The increment used to nudge the guidance system with each tap. You can incrementally nudge pattern in a perpendicular direction relative to the pattern. See Steering adjustments, page 211 for more information on adjusting nudge increment.

Button/Control	Explanation
Engage 	Engage indicator.

GNSS and xFill technology status

GNSS status is available on the Display bar, page 40 and the popup notification menu accessed by tapping the right side of the display bar.

Notification Button	Indicates...
	GNSS connection is normal (green).
	GNSS connection is converging (yellow).
	No GNSS connection is available (red).

For more information on GNSS, see:

- DCM-300 modem setup, page 97
- GNSS settings, page 88

xFill technology status

In the event of an RTK or VRS signal interruption, the display switches to xFill mode, and the xFill icon changes to a blue color.

When 5 minutes of xFill technology time remains (15 minutes have elapsed), the xFill icon changes to a red color and a warning appears on the display.

if you lose corrections from the satellite, you will go into DGPS corrections. Even if you regain exposure to the satellites, the xFill technology will not resume. Anytime xFill degrades to DGPS, the receiver must receive RTK corrections before xFill can be ready in the background again.

Additionally, if you lose any of your satellites during xFill, they will not be able to be used for the entire xFill duration of 20 minutes.

Safety feature

xFill technology estimates the drift in position. If the distance back to the original path is too large, xFill technology discontinues Fixed position, which disengages auto-steering.In this case, you can manually steer until RTK corrections are available or switch your correction source to DGPS and engage on the lower accuracy correction source.

xFill technology status buttons

Notification Button	Indicates...
	xFill is on (blue).
	xFill is available (white).
	xFill has less than 5 minutes of corrections (red).

For more information, see xFill technology, page 82.

Remote Assistant

Remote Assistant provides real-time technical support at your display.

To connect with Remote Assistant:

1. Tap  at the ***Home*** or ***Run*** screen, or at the popup notification menu (accessed by tapping the right-hand side of the display bar). The main menu choices display.
2. Tap  .

Remote Assistant status

The status of Remote Assistant is shown on the display bar at the bottom right-hand side of the screen.

Notification Button	Indicates...
	The Remote Assistant is on and working (green).
	The Remote Assistant is connecting (yellow).
	Remote Assistant is not connected (red).