USER GUIDE

Trimble® TMX-2050™ Display

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Trimble

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Sunnyvale CA 94085
Telephone: 1-408 481 8000

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c/o Menlo Worldwide Logistics
Meerheide 45
5521 DZ Eersel, NL

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⚠ **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

Auto guidance

⚠ **WARNING –** Auto guidance systems cannot avoid items in the field such as obstacles. Make sure you are adequately trained to operate the auto guidance system.

⚠ **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.

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.

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

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

Display

⚠ **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.

Implement master switch

⚠ **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.

Cautions

Calibration

⚠ **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.

Display

⚠ **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 press on the screen with a sharp item, such as a pencil. You may damage the surface of the screen.

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

GNSS interference

⚠ **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.

Installation

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

⚠ **CAUTION –** Do not attempt to power the display without the TM-200 Module.

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

Vehicle setup

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

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

USB socket

⚠ **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.

⚠ **CAUTION –** Do not use a USB drive in each USB socket at the 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.

Data Sheet

TMX-2050 display

Technical	
Power	27 volts, 3.5 amps (supplied by the TM-200 Module) ⚠ **CAUTION –** Do not attempt to power the display without the TM-200 Module.
Processor	1 GHz quad core
Storage	Primary embedded memory - 32 GByte

Mechanical	
Dimensions	312 mm x 214 mm x 45 mm (plus connectors) (1 ft 8/32 in x 8 1/4 in x 1 49/64 in)
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 (32 °F to 149 °F)
Storage	-40 °C to 85 °C (-40 °F to 185 °F)

LCD display	
Size	307 mm (1 ft 3/32 in)
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) (8 15/64 in x 7 1/4 in x 2 1/4 in)
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 (-40 °F to 149 °F)
Storage	-40 °C to 85 °C (-40 °F to 185 °F)

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

AG-815 integrated radio

Technical	
Power	Via TM-200 module

Mechanical	
Dimensions	144 mm x 81 mm x 52.5 mm (plus connectors) (5 43/64 in x 3 3/16 in x 2 1/16in)

Mechanical	
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 (5/8 in) screws

Housing	
Material	Aluminum
Environmental rating	IP55

Temperature	
Operation	-40 °C to 65 °C (-40 °F to 149 °F)
Storage	-40 °C to 85 °C (-40 °F to 185 °F)

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

Radio options	450 MHz radio	900 MHz radio
Range	13 km (8 miles); varies with terrain and operating conditions	13 km (8 miles); varies with terrain and operating conditions
Frequency range	430 to 450 MHz, 450 to 470 MHz (region-dependent)	902 to 928 MHz
Networks	20 user-selectable networks	40 user-selectable networks
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, troubleshoot 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.

Purchase and activation process

To "activate" the TMX-2050 display, after you purchase the display, services and any licenses, you:

- Assign services to the display
- Assign licenses to the display
- Deliver services and licenses to the display

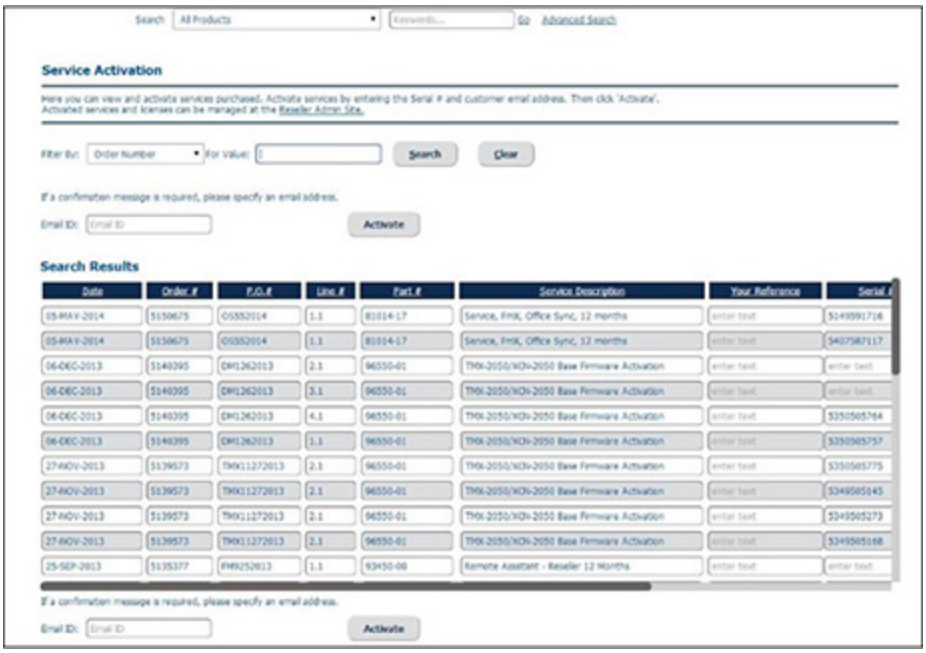
Purchase in the store

Use the login you received from Trimble to log in to the ***store*** and purchase:

- The TMX-2050 display system
- Licenses (such as Base to High Accuracy positioning)
- Services (such as Office Sync)

Assign a service to the display in the store

1. After you receive the display, find the serial number on the back of the display and make a note of it. Log into the ***store*** and click the Service Activation tab.



2. Find the sales order number of the service you have ordered (for example, the base firmware for the TMX-2050 display).
3. Enter the serial number of the display in the Serial Number column.
4. Enter the email address of the customer who will be receiving the service. This email address must be associated with an active Connected Farm account.
5. Click the **Activate** button. This causes the service (such as the base firmware) to be assigned to the display.

Assign a license to the display in the reseller portal

1. Log in to the ***reseller portal***.
2. At the Activations tab, go to the Available Licenses list. These are the licenses that have not yet been assigned to a display.

3. Find the license you want to assign and click the **Assign** button. A list of display serial numbers opens.
4. Select the display serial number that you want to assign the license to and click **Assign**.

Deliver services and licenses to the display in the reseller portal

1. If you are not already logged in, log in to the ***reseller portal***.
2. At the Activations tab, find the reseller reference number or customer name (depending on how the customer account was set up) and click it. This expands to show the display serial numbers this customer has.
3. Click the display serial number you want. This expands to show all services and licenses assigned to this display.

4. Click **Deliver**. A popup displays.

5. In the popup, choose to either deliver the services/licenses through:
   - Download to a computer. Then you can copy the file to a USB drive and transfer it to the TMX-2050 display.
   - Email containing QR codes to the customer email you enter. The customer can then scan the QR codes into the TMX-2050 display.


ConnectedFarm RESELLER

Activation Delivery

Your BoomHeightControl License activation has arrived.

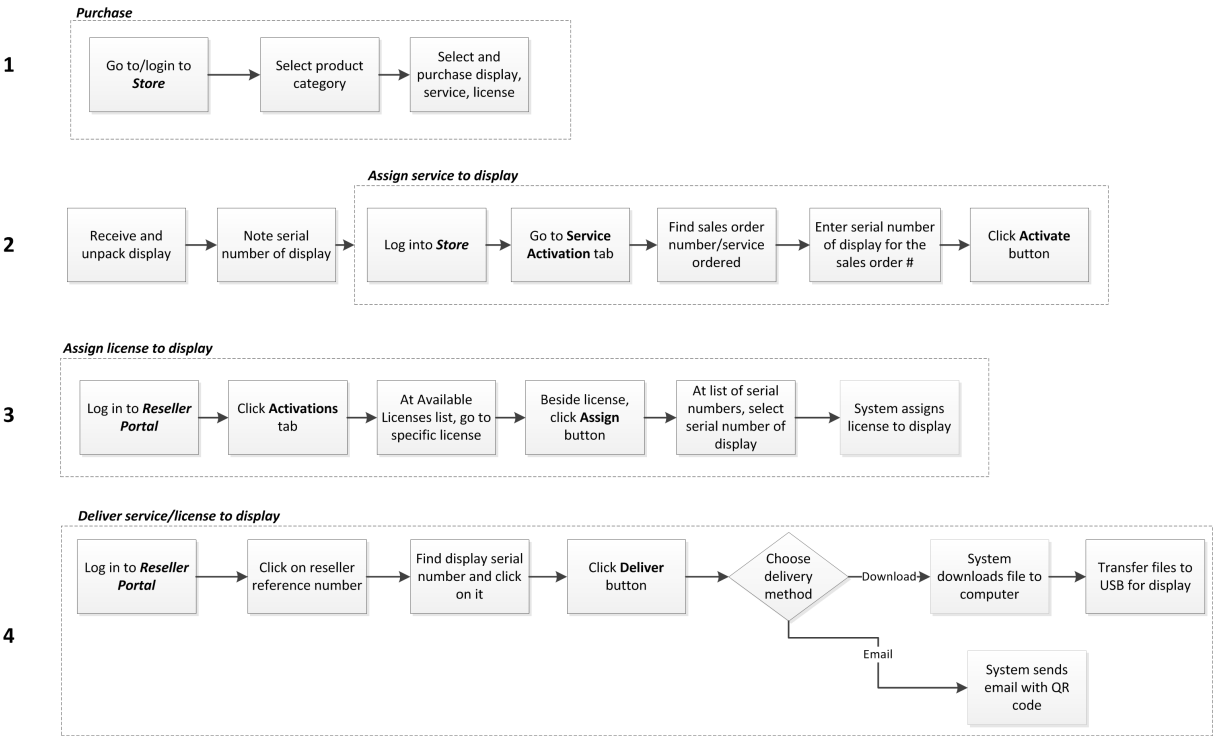
Activate your TmX-2050 display SN 57489375967498 by following the directions below.

1. Turn on the TmX-2050 display and access Settings from the Menu.
2. Select Feature Upgrades in the Settings list and tap "Read QR".
3. Hold the QR code/barcode picture up to the device when prompted. This can be done using a mobile device or a piece of paper.
4. Continue setting up your display (refer to product documentation as needed).

For your records, or for manual entry, the activation code is UqRUCe9Xlx8fxCa7XWBJrTPKo4F5iNGTr68Cpi3iuc8=.

Note – *Be sure to inform your customers that the email will send all QR codes - existing ones and new ones - in the emails. They only need to scan QR codes for newly purchased services/licenses.*

Purchase / Activation Flow Diagram



Troubleshooting activation

I am logged into the store and cannot find the sales order number/service/license.

When an item is purchased from the store, it is linked to the login of the person who placed the order. If another person in your company placed the order and you cannot see it, contact technical support and ask them to associate the appropriate logins with your company. Then those employees in your company can see all the orders placed, regardless of who placed the order.

I am logged into the reseller portal and cannot find the licenses and services that I want to activate.

You will not be able to see licenses or services in the reseller portal if your current login:

- Was not the login used to purchase the license and/or service
- Is not linked to the login used to purchase the license and/or service

To have appropriate logins linked, contact technical support.

I ordered a new license/service, but I got all my QR codes again as well as the QR code for the new license/service.

When you receive an email with a QR code for a new license or service, the system sends all the codes related to your display. You only need to scan the QR code for the license/service that has ***not*** been activated yet.

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, 100 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, 95.

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. If you choose not to shutdown the display, it will remain powered on indefinitely.

⚠ **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

To manually turn the power off, hold the power down button for one to two seconds. See the steps below.

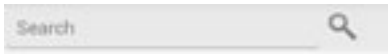
1. Turn off the display manually by holding the power button down for about two seconds.
2. Choose one of the following options:
   - Shutdown: Powers down the display
   - Reboot: Restarts the display
   - Cancel: Cancels the power off process

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.*

If these steps do not cause the power to go off, you can force a shut down of the display by holding the power button for 5 seconds.

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.
Search	Search box 	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

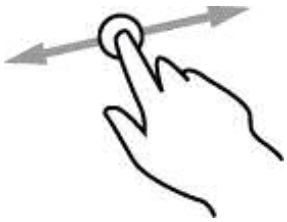
If you are unfamiliar with using a touch screen, this section contains the basics of using a touch screen and how to clean it.

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, 44.

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 ***Home*** 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, 46
- Enter information using an On-screen keyboard, 47 and On-screen number pad, 48
- Work with Lists, 44
- Turn an option on or off with On / Off buttons, 45
- Choose values within a range using Adjusters, 46

Lists

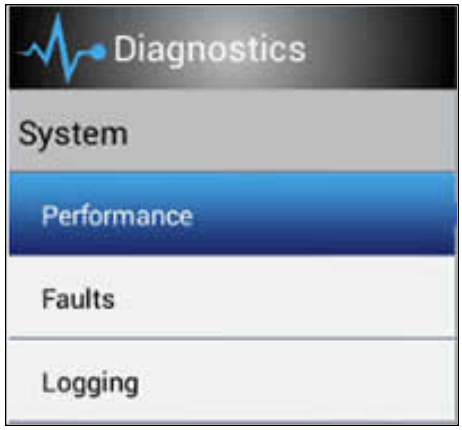
Lists vary depending on their function.

Menu lists

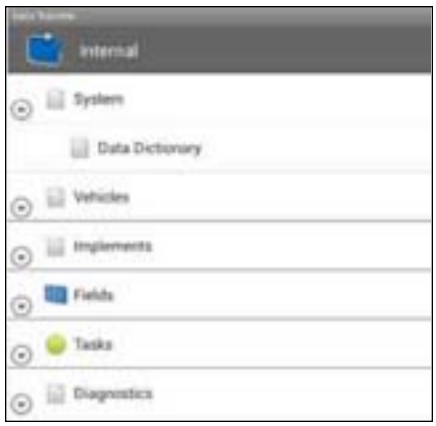
Menu lists contain a list of items that lead to additional information or areas.

- 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.

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 on the list, the list closes.

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

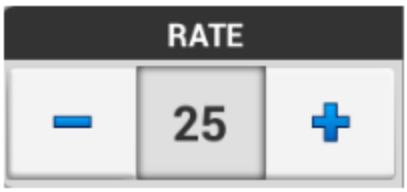
The pointer (rectangular button on the slider bar) indicates the value.

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.
- 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.

Button	Explanation
Next	Tap to go to the next section. (Displayed within the setup panel.)
Back	Tap to go to the previous section. (Displayed within the settings panel.)
Sections of setup	Tap various buttons at the top of the panel to go to section out of sequence after initial setup.
	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, 51.)

On-screen keyboard

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

To:	Tap...
Enter number(s)	The number on the on-screen keyboard
Enter letter(s)	The letter on the on-screen keyboard
Delete letters or numbers	
Remove all the letters or numbers you have entered	 and hold down

To:	Tap...
Cause the keyboard to no longer display	 

On-screen number pad

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

To:	Tap...
Enter a number	The number
Delete number(s)	
Remove all the numbers you have entered	 and hold down
Cause the keyboard to no longer display	 

Main views

The TMX-2050 display has different screens for your work.

Home screen

The Home screen, 54 is primarily for setting up, including:

- Adding fields
- Creating, setting up and calibrating vehicles, implements and materials

Run screen

At the Run screen, 56, you:

- Perform field activities
- Create guidance mapping elements (boundaries, guidance patterns, and landmarks)
- Make adjustments to steering guidance, and rate and section control
- Log coverage

Field Manager

At the Field Manager™ (Field Manager, 61), you:

- Activate the guidance mapping elements you want to follow
- Edit and refine guidance mapping elements

- Associate fields to clients and farms
- Continue a task or begin a new task

Connected Farm Dashboard

The Connected Farm Dashboard, 66 allows you access your fields and data with an Internet connection (including wireless). (Requires subscriptions and DCM-300 modem.)

Display bar

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

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 cancel all functions controlled by the display, tap  .

Note – *Tapping this button does not turn the vehicle off. It only cancels display-controlled functions such as automatic steering systems.*

Left-side navigation

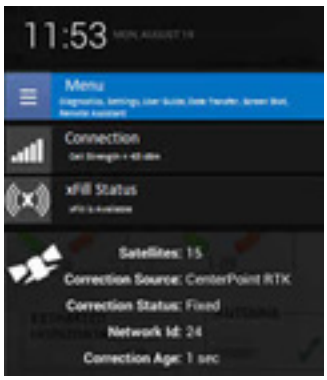
The left side of the bar contains navigation buttons.

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

Also see GNSS notification button, 52.

GNSS notification button

A GNSS notification button displays on the display bar to indicate the status of your GNSS connection. When you tap the button, the system takes you to the Diagnostics screen for any troubleshooting you want to do.

Notification Button	Indicates...
 Green	GNSS connection is normal.
Yellow	GNSS connection is converging.
 Red	No GNSS connection is available.

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, 294.
	Open the display settings screen. See System information, 92.
	Display the User Guide. See Getting help, 41.
	Display the Data Transfer panel. See Data transfer, 67.
	Open the Remote Assistant. See Remote Assistant, 325.
	Open the Virtual Terminal to set up ISO-certified equipment for Task Controller. This button does not display on the main menu unless you have turned on Virtual Terminal in Settings (see ISOBUS settings, 87). See Equipment setup, 195.

Home screen

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

At the ***Home*** screen, you can complete tasks for setup and for managing fields, including:

- Set up and select vehicles, implements and materials
- Set up GNSS
- View the Connected Farm dashboard
- Create fields
- Enter the Field Manager to edit and refine fields and guidance boundaries and patterns
- Enter the ***Run*** screen to perform field activities

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

- Field management buttons - left side, 54 on the left side of the screen
- Setup buttons - right side, 55 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.

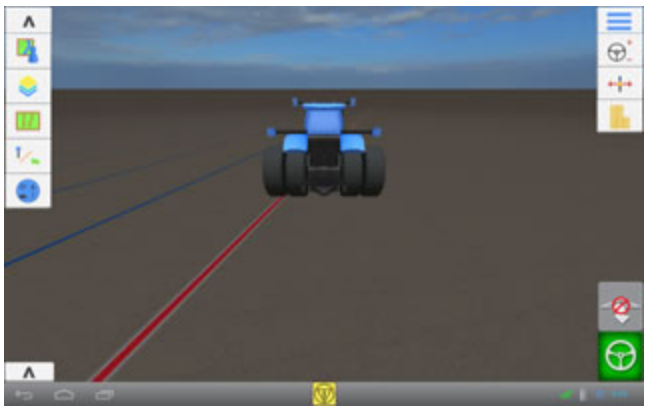
Button	Tap to...
Hide 	Hide field operation buttons on the left side of the screen.
Show 	Show field operation buttons on the left side of the screen
Add field 	Add a new field. See Add a field, 181.
List fields 	Show a list of existing fields. Tap the name of the field to select it. Tap again to hide the list of fields. See Select a field, 182.
Field Manager 	Open Field Manager for the selected field. See Field Manager, 61.
Connected Farm 	Open the Connected Farm™ dashboard. (Requires a connected DCM-300 modem.) See Connected Farm Dashboard, 66.
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, 56.

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, 53.
GNSS 	Set up GNSS. See GNSS receiver settings, 116.
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, 140.
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, 188.
Material 	Add, edit, and select materials. See Managing materials, 226.

Run screen



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

The ***Run*** screen enables you to perform field operations such as:

- Creating guidance boundaries and patterns
- Accessing Field Manager to edit and refine guidance boundaries and patterns
- Using auto guidance (with Autopilot, EZ-Pilot or EZ-Steer)
- Controlling sections automatically or manually (with Field-IQ)
- Controlling rate application for liquids (with Field-IQ)
- Controlling boom height automatically (with Field-IQ)
- Planting and nutrient pest management (in a future release)
- Harvesting (in a future release)
- Monitoring seeding (in a future release)
- Row guidance and implement control (in a future release)
- Water management (in a future release)

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

- Select a vehicle (see Select a vehicle, 145)
- Select an implement (see Select an implement, 189)
- Select a field (see Select a field, 182)
- Have a GNSS connection(see GNSS receiver settings, 116)

For more information on selecting a vehicle, field and implement, see Preparing for operation, 234.

Buttons on the ***Run*** screen include:

- Field operation buttons - left side, 57 on the left side of the screen
- Feature operation buttons - right side, 59 on the right side of the screen

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, 61.
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, 267.

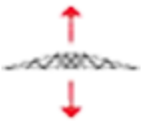
Guidance Lines and Patterns 	Open the guidance buttons to create:
	• Boundaries
	See Boundary creation (Run screen), 248.
	• Guidance lines. See:
	  • A+ guidance line creation (Run screen), 252
	  • AB guidance line creation (Run screen), 251
	  • Curved line creation (Run screen), 252
	• Pivot patterns
	See Pivot pattern creation (Run screen), 258.
	• Headlands
	See Headland and infill pattern creation (Run screen), 253.
	Also see Pattern activation/deactivation (Field Manager), 259.

Button	Tap to...
Landmarks 	View options to create: • Line See Landmark line creation (Run screen), 264. • Areas See Landmark area creation (Run screen), 265. • Points See Landmark point creation (Run screen), 264.
Prescriptions 	Open the Prescriptions Manager. See: • Prescriptions Manager, 66 • Prescriptions, 223 • Assign a prescription, 280
Widgets 	Open the widget menu to add individual widgets, add all widgets or remove all widgets. See On-screen widgets, 286.

Feature operation buttons - right side

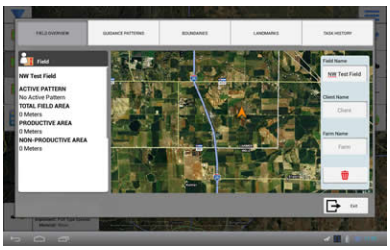
Using feature operation buttons, you can make adjustments to various features while performing field activities. With the exception of the **Menu** button, these buttons are specific to applications and depend on which features you are using.

Button	Tap to...
Menu 	Access the main menu. See Main menu, 53.
Adjust Steering 	View options: • Adjust vehicle aggressiveness • Enable or disable autosteering See Steering and guidance settings, 85.

Button	Tap to...
Adjust Guidance 	View options to adjust: • Nudge • Re-mark • Implement Draft Correction See Guidance pattern adjustment (Run screen), 260.
Adjust Rate Control 	View options to adjust: • Actual and Target Rate • Status of Rate Channel • Sensor Status See Rate control adjustments, 274.
Adjust Boom Height 	View options to adjust the boom height: • Target Height • System Aggressiveness • Ground or Canopy • Sensors See Boom height adjustments, 278.
Logging 	Begin logging your field activity, such as coverage. See and Mapping settings, 83.
Engage Auto Guidance 	Engage your auto guidance system. See Vehicle operation, 242.
Engage Boom Height 	Engage your boom height system. See Boom height control operation, 276.

Field Manager

At the Field Manager, you edit and refine elements in and associated with each field.



The Field Manager shows information directly associated with the field you have selected and enables you to perform functions listed in the following table.

Note – *Add and select a field before entering Field Manager. See Add a field, 181 and Select a field, 182.*

Section	Functions Available
Field Overview See Field overview buttons, 62.	• Rename the field, client and farm. • Delete the field. See Edit a field (Field Manager), 184.
Guidance Patterns See Guidance pattern buttons, 62.	• Activate or deactivate lines and patterns. • Shift a line. • Adjust the radius of a pattern. • Resize a shape (other than pivot shape). See Guidance patterns, 246.
Boundaries See Boundary buttons, 63.	• Activate or deactivate a boundary. • Resize a boundary. • Rename a boundary. See Boundary editing (Field Manager), 249.
Landmarks See Landmark buttons, 64.	• Edit, delete or rename a landmark. • Change the category that a landmark is assigned to. • See Landmark editing (Field Manager), 265.
Task History See Task history buttons, 65.	• Start a new task. • Rename a task. • See Tasks, 238.

Access Field Manager

You can access the Field Manager from either the ***Home*** or ***Run*** screen.

- At the ***Home*** screen, select a field (see Select a field, 182). Tap  .
- At the ***Run*** screen,tap  . The Field Manager opens the field you are currently in.

Field overview buttons

Button or Entry Box	Tap to...
Exit 	Exit Field Manager.
	Delete an item
Field name	Edit the field name.
Client name	Enter the name of the client (optional).
Farm name	Enter the name of the farm (optional).

Guidance pattern buttons

Button or Entry Box	Tap to...
Deactivate  (Black)	Deactivate a line. For more information, see Pattern activation/deactivation (Field Manager), 259.
Activate  (Red)	Activate a line. See Pattern activation/deactivation (Field Manager), 259.

Button or Entry Box	Tap to...
Deactivate Shape  (Black)	Deactivate a pattern (headland, boundary, pivot). See Pattern activation/deactivation (Field Manager), 259.
Activate Shape  (Red)	Activate a pattern (headland, boundary, pivot). For more information, see Pattern activation/deactivation (Field Manager), 259.
	Adjust the radius of a pivot shape. For more information, see Guidance pattern editing (Field Manager), 259.
	Resize a shape other than a pivot shape. See Guidance pattern editing (Field Manager), 259.
	Shift a line. See Guidance pattern editing (Field Manager), 259.
	Delete a selected line or pattern.
Name of Pattern	Change the name of the line or pattern.

Boundary buttons

Button or Entry Box	Tap to...
Deactivate Shape  (Black)	Deactivate a pattern (headland, boundary, pivot). See Pattern activation/deactivation (Field Manager), 259.

Button or Entry Box	Tap to...
Activate Shape  (Red)	Activate a pattern (headland, boundary, pivot). See Pattern activation/deactivation (Field Manager), 259.
	Adjust the radius of a pivot shape. For more information, see Guidance pattern editing (Field Manager), 259.
	Resize a shape other than a pivot shape. See Guidance pattern editing (Field Manager), 259.
	Shift a line. See Guidance pattern editing (Field Manager), 259.
	Delete a selected boundary.
Boundary Name	Change the name of the highlighted boundary.

Landmark buttons

Button or Entry Box	Tap to...
Category 	Assign a category to a landmark point, line or area. For more information, see Pattern activation/deactivation (Field Manager), 259.
Convert 	Convert a selected: • Productive area to a non-productive one • Non-productive area to a productive one See Pattern activation/deactivation (Field Manager), 259.

Button or Entry Box	Tap to...
	Delete a selected landmark.
Landmark Name	Change the name of the highlighted landmark.

Task history buttons

Button or Entry Box	Tap to...
Continue Task 	Continue the task you have selected in the list on the right-hand side. See Tasks, 238.
Start New Task	Begin a new task.
Task Name	Change the name of the highlighted task.

Prescriptions Manager

At the Prescriptions Manager, you assign a prescription to a channel and determine additional settings related to the prescription. You can access the Prescriptions Manager from the ***Run*** screen, tap  . The Prescriptions Manager displays.

Item	Tap to...
Enabled Channels list	Select the channel you want to assign a prescription to.
Prescription File Name	Show a list of prescription files associated with the field you have selected.
Column Name	Show the columns that are a part of the prescription file.
Column Units	Show the unit type you will be using for the prescription.
Lead Time	Enter the lead time before the application begins.
When Outside Prescription	Choose what happens when you are outside of the prescription boundary. Close (default), Default Rate or Last Rate.
Finish	Let the system know your entries are complete.
Next	Go to the next settings for prescription assignment.
Back	Go to the previous settings for prescription assignment.
	Save your settings and exit the Prescriptions Manager.
	Remove any edits to the settings and exit the Prescription Manager.

Connected Farm Dashboard

The Connected Farm dashboard enables you to access your fields from a wired connection, or wireless Internet connection using a DCM-300 modem.

Feature	Description	Requirements and Restrictions
Rainfall	Check rainfall totals for a location for the past 24 hours without the use of physical rain gauges. Updates every 10 minutes.	Requires subscription to RainWave.
Weather	• Add a single or multiple locations to view current temperature, wind speed, wind direction, humidity, and chance of precipitation. • View the weather forecast for each location. • Set up a Doppler radar map to show upcoming weather patterns.	Doppler radar map available in the United States and Canada only
Commodities	• Create your own commodity list and rearrange it to your preference. • View the previous day's closing price for each commodity.	US only

Data transfer

You can transfer data:

- Using a USB drive
- Wirelessly with Office Sync
- To another display

USB upgrades

To upgrade firmware with a USB drive, follow the next steps.

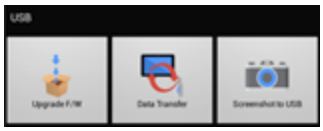
1. Turn off the display manually by holding the power button down for about two seconds.
2. Tap **Shutdown**. The display powers off and saves a backup of the database.
3. Power on the display by holding down the power button briefly (about one half of a second).
4. Insert the USB drive into one of the USB sockets on the display.
5. Tap on the ***Home*** or ***Run*** screen.
6. Tap .
7. The display notifies you that an upgrade is available.
8. Choose the version you want to upgrade to.
9. Tap the checkmark to continue the firmware upgrade.

USB data transfer

The following steps explain how to transfer your data from a TMX-2050 display to a USB drive.

Note – *Make sure your USB drive has the AgGPS folder on the root.*

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, 51.) The USB menu displays:



3. Tap . The Data Transfer panel displays.
4. To expand an item on either list, tap a category name.
5. To select all files in a category, tap the box beside the category name. A check mark displays.
6. To deselect all files in a category, tap the box beside the name.
7. To select an individual file, tap the box beside the file name.
8. Tap to move the item to the USB drive.
9. To delete an item, tap the box next to the item in either list and tap .

   Note – *You cannot delete an item that is actively selected or currently being transferred.*

For information on:	See also:
USB socket	USB socket, 74

USB VDB transfer

When you transfer data, saved vehicles do not include the vehicle configuration file (.vdb)for Autopilot. To transfer this configuration data:

1. Connect a laptop that has AP Toolbox software to the serial port of the Nav Controller II that contains the vehicle config file you want.
2. Using AP Toolbox, save the config (.cfg) file to the laptop.
3. Transfer the saved config file from the laptop to a USB drive in the folder AgData/Profiles.
4. Insert the USB drive containing the config file in the USB socket of the TMX-2050 display.

Office Sync data transfer

With a DCM-300 modem, and a subscription to Office Sync, information can wirelessly transfer from the display to the office or Connected Farm, including wireless upgrades. This requires:

- A Connected Farm account
- Unlock for Office Sync
- DCM-300 modem
- A data plan or access to WiFi

As part of Office Sync setup, you decide:

- How often you want the display to check the server for data transfer
- How often data is sent from the display to the office
- Whether to send the data automatically or after you have confirmed to send data

When Office Sync is transferring data,  displays in the display bar.

For information on:	See:
Settings for Office Sync	Modem services settings, 88
Diagnostics	Data transfer, 67

From CFX-750 display or FmX display to TMX-2050 display

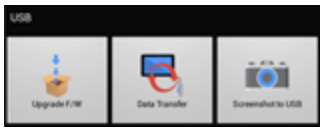
To move files from the CFX-750 display or FmX display to the TMX-2050 display, follow the steps below.

Note – *Make sure your USB drive has the AgGPS folder on the root.*

1. Insert the USB drive into the CFX-750 display or FmX display.

   If files were created on the CFX-750 display, change the file extension from .CFG to .cfg before transferring them to the TMX-2050 display.
2. Transfer the files from the display to the USB drive.
3. Remove the USB drive from the CFX-750 display or FmX display.
4. Insert the USB drive into one of the USB sockets on the TMX-2050 display.

   (See USB socket, 74.
5. Tap  on the ***Home*** or ***Run*** screen, or on the notification list launched from the display bar. The USB menu displays.

   
6. Tap  . The Data Transfer panel displays.

   Note – *Whether you are transferring data from the CFX-750 display or FmX display, the item in the USB list will show the data as FmX displaydata.*
7. Tap an item to expand it on the USB list.
8. Tap the item(s) you want to transfer.
9. Tap  to move the item(s) to the internal list.
10. To delete an item, tap the item in either list and tap  .

From TMX-2050 display to CFX-750 display or FmX display

To transfer from TMX-2050 display to the CFX-750 display or FmX display using USB or Office Sync, the same steps as the previous examples apply, except: All data transferred from the TMX-2050 display must be "decoded" by Farm Works software before it can be used by these legacy displays.

Data can then be transferred by USB drive from the desktop (using Farm Works) to the CFX-750 display or FmX display.

Note – *Make sure your USB drive has the AgGPS folder on the root.*

From TMX-2050 display to CFX-750 display or FmX display

To transfer from TMX-2050 display to the CFX-750 display or FmX display using USB or Office Sync, the same steps as the previous examples apply, except: All data transferred from the TMX-2050 display must be "decoded" by Farm Works software before it can be used by these legacy displays.

Data can then be transferred by USB drive from the desktop (using Farm Works) to the CFX-750 display or FmX display.

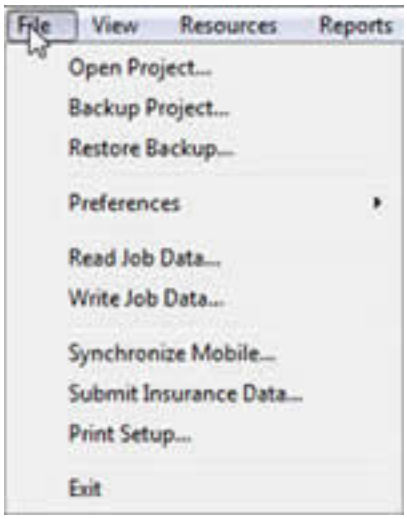
Note – *Make sure your USB drive has the AgGPS folder on the root.*

From TMX-2050 display to Farm Works

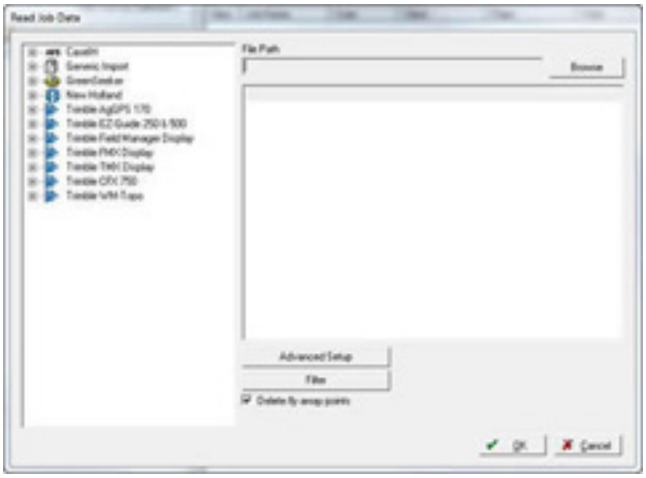
To transfer files from the TMX-2050 display to Farm Works, follow the steps below.

Note – *Make sure your USB drive has the AgGPS folder on the root.*

1. If you are transferring using a USB drive, insert the drive into your computer and open Farm Works. If you have transferred the data using Office Sync, open Farm Works.
2. Open the ***Read Job Data*** dialog by clicking either of these:
   -  (Read Job Data icon)
   - File menu and select **Read Job Data** from the menu

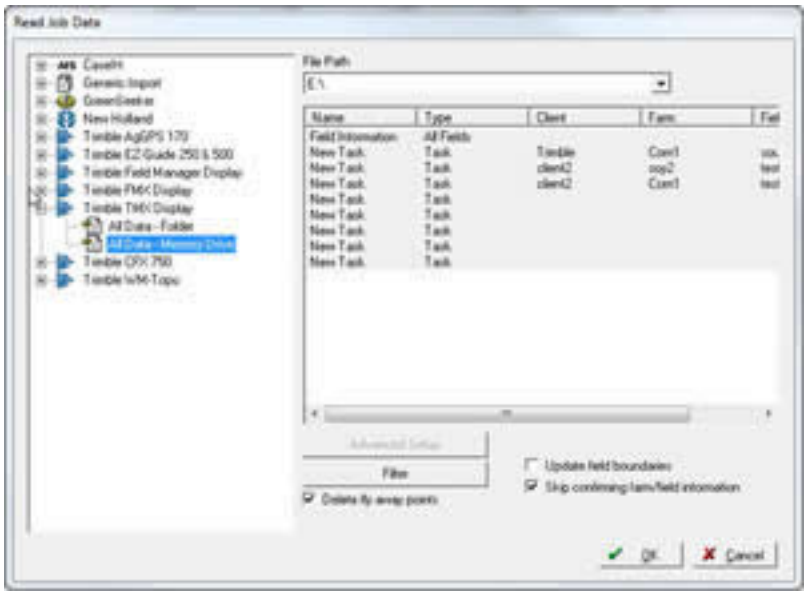


The system displays the ***Read Job Data*** window.



3. In the left column of the ***Read Job Data*** window, click **+** next to **Trimble TMX Display**.
4. Under **Trimble TMX Display**, select where the data is stored that you want to transfer.
   - For data transferred into Farm Works using a USB drive, select **All Data - Memory Drive**.

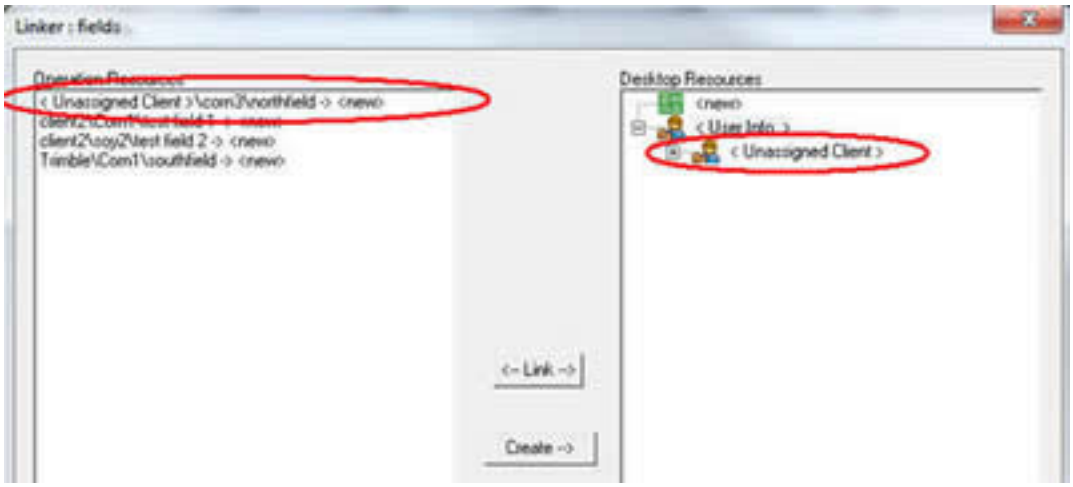
   - For data transferred into Farm Works using Office Sync, select **All Data - Folder**.
5. Under ***File Path***, click **Browse** to find the drive or folder where the data is located. After this is complete, your data will be listed in the right-hand column.



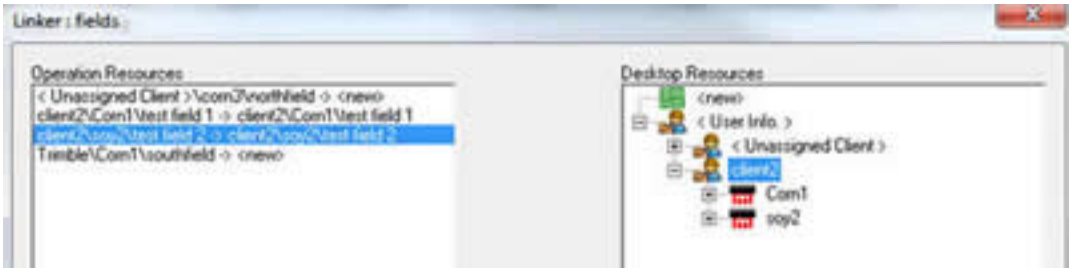
Note – *If you wish to filter the files before transfer, see the online help for Farm Works for filtering instructions*

6. In the left-hand column, select the job(s) to import.
7. Click **OK**. The import progress shows as files are importing. After import is complete, the system ***Linker*** window displays.

   The left-hand column titled ***Operation Resources*** shows the files created on the TMX-2050 display. The right-hand column titled ***Desktop Resources*** shows files currently in Farm Works.
8. Select an item from the ***Operation Resources*** list.
   a. If there is no counterpart to the item you selected in the ***Desktop Resources*** list, click the checkbox ***Show Retired***. The system displays any additional files that were marked as *Retired*. If there is still no counterpart to this item in the ***Desktop Resources*** list, click Create -->. The system creates a new container on the desktop for the item and links it.



   b. If there is a counterpart to this item in the ***Desktop Resources*** list, highlight the item and click <-- Link -->. The information is now moved to that location on the desktop.
9. After all items have been linked or created, click **OK**. All files are stored in Farm Works at the correct location.



From TMX-2050 display to TMX-2050 display

From TMX-2050 display to the office or another TMX-2050 display, use the following table:

Type of transfer (without Farm Works)	Instructions
USB	To transfer data through a USB drive, see From TMX-2050 display to TMX-2050 display, 73 in this section.
Wireless (Office Sync)	To transfer data using Office Sync: • Ensure you meet the requirements for transferring using Office Sync. See From TMX-2050 display to TMX-2050 display, 73 in this section. • Set up Office Sync. See Modem services settings, 88.

USB socket

The display has two USB sockets: one on the side of the display and one on the back of the TMX-2050 display. (See TMX-2050 display, 95 for photo showing the locations of the two USB sockets.)

You can use a USB drive to transfer data to and from your TMX-2050 display.

⚠ **CAUTION –** Do not use a USB drive in each USB socket at the 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.

The display senses when a USB drive is inserted into either the side or rear socket, and shows the icon  on the display bar.

To use the USB drive:

1. Tap the bottom right corner of the display bar.
2. When the notification list displays, tap  . The USB menu displays.
3. At the USB menu, you can:
   - Tap  to display the data transfer panel. See Data transfer, 67.)
   - Tap  to take a screen shot and store it on the USB drive. See Screen shots, 75.
   - Tap  to upgrade firmware from the USB drive. See Firmware upgrades - wireless, 80.

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.

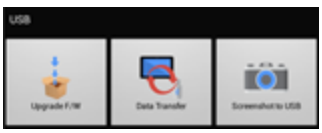
1. Move the display so you that can see the USB socket.
2. Make sure the LED light of the USB drive is not blinking (indicating data transfer is occurring).
3. Pull the USB drive out of the USB socket.
4. Press the rubber cover back onto the USB socket.

Screen shots

Occasionally, you may want to save an image of the touch screen, for example to provide information for troubleshooting purposes. When you take a screen shot, the display saves a .jpg 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, 74.) 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.
3. Tap  . The USB menu displays.



4. Tap  to take a capture of the screen.
5. 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.

Display settings

In this chapter:

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

Display 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 settings

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.

Access

To access the Language and Units settings:

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

Date and time settings

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...
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**.

Take a photo of a user

You can capture a photo of the user, which will display:

- Next to the user's information in the Users and passwords section of Settings
- On the display bar when the user is logged in

1. At the Users and passwords section, Tap the user icon on the right of the user information.
2. The camera activates and displays a frame on the screen. Make sure the user's face is contained within this frame.
3. To capture the photo, tap **Capture**. The photo displays on the lower right. You can continue to tap **Capture** until you are satisfied with the photo.
4. When you are ready to save the photo, tap **Done**.

Access

To access the Users and Passwords settings:

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

Firmware upgrades - wireless

For upgrading firmware using a USB drive, see Data transfer, 67.

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

Note – *Wireless upgrades require a DCM-300 modem, a subscription to Office Sync and a data plan or access to WiFi.*

For information on:	See:
Upgrading through USB	Data transfer, 67
WiFi settings	Wi-Fi settings, 87

Settings for wireless upgrades

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

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 settings

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 settings

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

Setting	Tap to view or change...
Map Background Selection	The ground color for the ***Run*** screen. Options are: • Color: Brown, green or grey • Color with texture • Color with gridlines
Map Color Scheme	Day or night mode.
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.
Record Coverage When Engaged	The system can switch on coverage when auto guidance is engaged, and switch off coverage when it is not engaged. Option for this setting is on or off.

To access the Mapping settings:

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

Patterns settings

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.

Setting	Tap to view or change...
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. See Tight turn warning, 292.
Tight Turn Look Ahead Time	The number of seconds before you approach a tight turn angle that the warning will show on the display. See Tight turn warning, 292.

Headlands

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 (Run screen), 253.
Auto Close Distance	The distance between your beginning point and ending point for a headland. See Headland and infill pattern creation (Run screen), 253.

Boundaries

Setting	Tap to view or change....
Auto Close	Automatically closes the beginning and end point when you create boundaries. See Boundary creation (Run screen), 248.
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 settings

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 disengages auto guidance and stop applications when there is no response to a shutdown message.
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 (Run screen), 260 and GNSS and xFill technology status, 315.
Implement Draft Increment	The increment used to nudge the implement to the current guidance line. See Guidance pattern adjustment (Run screen), 260.
Aggressiveness Increment	The increment used to change aggressiveness. See Steering adjustments, 244.
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 with Import	Remove all re-mark entrees on with an import. See Guidance pattern adjustment (Run screen), 260.
End of Row Distance	Distance for the end of row warning to display. See End of row warning, 292.
NMEA from Autopilot Diagnostics Port	On: NMEA messages can be sent from the Nav Controller II Off: No messages are sent See NMEA messages, 298.

Access

To access the Steering and Guidance settings:

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

ISOBUS settings

Task Controller

To use Task Controller when using ISO-certified equipment, tap  to activate this feature.

Note – *This feature is optional and requires an unlock.*

For information on:	See:
Task Controller implement setup	Implement setup for Task Controller, 191
Setting up equipment for task controller	Equipment setup, 195
Using Task Controller	Task Controller operation, 282 and ISOBUS Task Controller widget, 288

Virtual Terminal

To use Virtual Terminal when using ISO-certified equipment, tap  to activate this feature.

For information on:	See:
Using Virtual Terminal	Virtual Terminal operation, 284 and Virtual Terminal widget, 290

Access

To access the ISOBUS settings:

1. Tap  .
2. Tap  .
3. Tap **ISOBUS Settings**.

Wi-Fi settings

With a DCM-300 modem and additional subscription services, WiFi enables you to transfer data wirelessly from vehicle to office. You can use WiFi in addition to or instead of the cellular network.

At Wi-Fi network settings, turn on Wi-Fi.

At Available Networks, tap **Refresh** to scan for additional networks you can connect to.

For content on:	See:
Diagnostics	DCM-300 modem diagnostics, 305
Modem status	DCM-300 modem status, 302

Access

To access settings for WiFi:

1. Tap  .
2. Tap  .
3. Tap **WiFi**.

Modem services settings

Modem settings include:

- Modem settings, 88
- Network settings, 89
- Office Sync settings, 90

Access

To access Modem Services:

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

Modem settings

Setting	Tap to view or change...
Device Name	The serial number of the DCM-300 modem.

Network settings

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)

For content on:	See:
Diagnostics	Office Sync Diagnostics, 321
Data transfer with Office Sync	Data transfer, 67

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 settings

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.
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.

For information on:	See:
Initial setup	DCM-300 modem initial setup, 130
Diagnostics	Office Sync Diagnostics, 321
Data transfer with Office Sync	Office Sync data transfer, 69

Remote Assistant settings

The Remote Assistant feature enables a support person to view your display as you are viewing it. To set up Remote Assistant:

1. Tap **Enroll**.
2. At the Enroll screen, tap  in the display bar.
3. At the Status screen, tap  in the display bar.

For information on:	See:
Diagnostics	Remote Assistant, 325

Access

To access Remote Assistant:

1. Tap  .
2. Tap  .
3. Tap **Remote Assistant**.

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, coverage, configurations, feature unlocks, minor firmware updates and downloaded applications. ***Note –*** *Only perform a factory reset on the advice of technical support.*

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

Information	Tap to view...
Software Information	The list of software packets for diagnostics.
Current User Information	System information on the user currently logged in. See Users and passwords, 79.
Current Preference Information	The current settings of the user that is currently logged in.
Device Information	Technical information about the display.

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

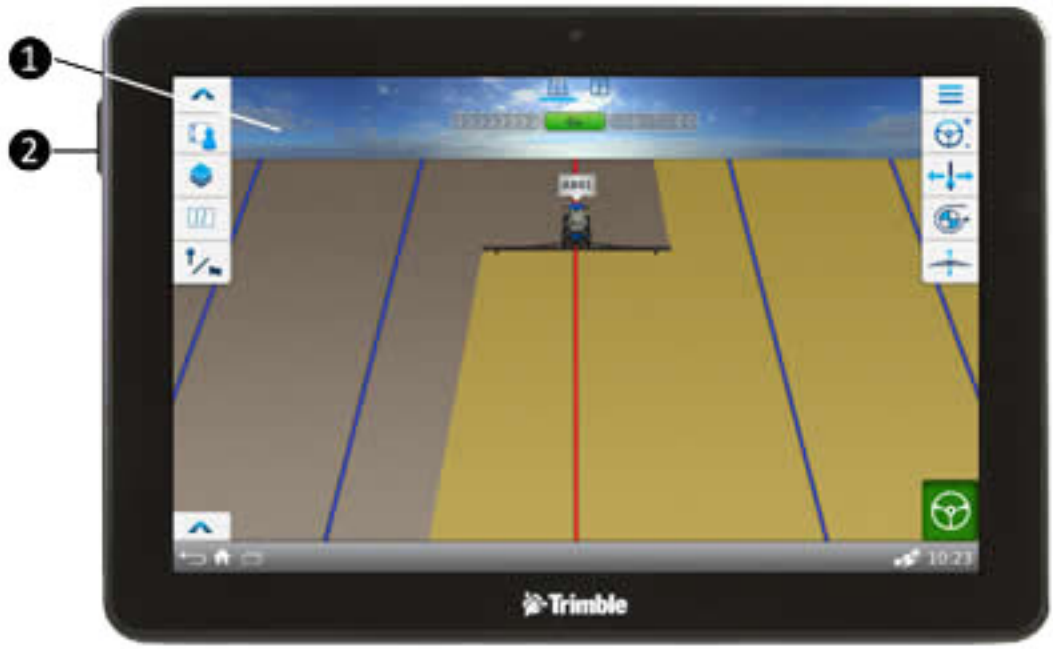
The following components are part of a recommended setup for the TMX-2050 display:

- TMX-2050 display, 95
- Display mount: To mount the TMX-2050 display
- TM-200 Module, 97: To enable quick disconnection and reconnection of the TMX-2050 display. The TM-200 module contains a built-in GNSS receiver.
- AG-815 integrated radio, 99: For RTK correction services
- DCM-300 modem, 98: Provides access to correction services, wireless data transfer and cellular/WiFi signals where applicable

TMX-2050 display

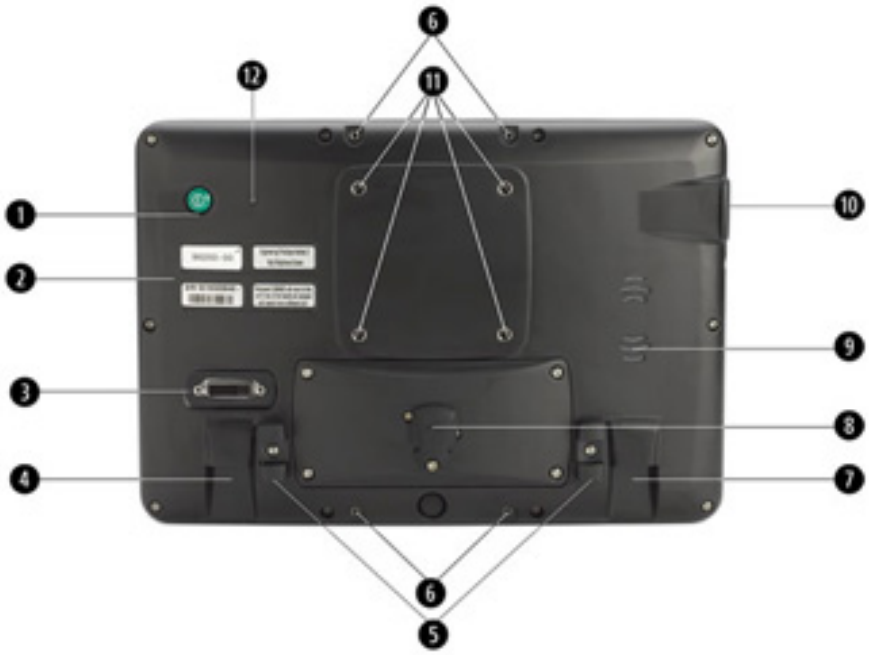
⚠ **CAUTION –** Do not press on the screen with a sharp item, such as a pencil. You may damage the surface of the screen.

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, 67 and USB socket, 74.

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
9	Speakers	For use if you have sound activated on the TMX-2050 display. See Display settings, 82.
10	Port: USB (side) with cover	Socket for USB drive to transferring data to and from the TMX-2050 display. See Data transfer, 67 and USB socket, 74.
11	Interior bolts in mounting plateplate	Receives screws for Zirkona display mount
12	Ambient light sensor	Senses lower ambient light and activates the backlight on the display.

TM-200 Module

The TM-200 Module is a hub for connectivity and high-performance GNSS positioning. It 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
1	14 pin AMPSEAL connector	Socket for power and inputs (Port B)
2	12 pin DEUTSCH connector	Socket for inputs (Port A)
3	AG-25 GNSS antenna connector 	Socket for connecting to the AG-25 GNSS antenna
4	8 pin AMPSEAL connector 	Socket for Ethernet cable to connect to DCM-300 modem.
5	8 pin AMPSEAL connector 	Socket for connecting to the TMX-2050 display
6	Screws and end cover plate	Unscrew and remove end cover plate to expose the AG-815 radio expansion slot.
7	10 amp fuse	Protect components from power surges
8	Radio expansion slot	Socket for AG-815 integrated radio connector. (See AG-815 integrated radio, 99.)

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 Office Sync / Connected Farm Office Sync setup, 130
- Cellular data plans (USA only)
- Global GSM cellular networks
- WiFi signals as applicable

For information on:	See:
Connecting the modem	Connect the DCM-300 modem, 111
Modem status	DCM-300 modem status, 302

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 in both the 450 MHz and 900 MHz versions.

Item	Name	Explanation
1	Radio blade connector	Connection to TM-200 Module. See TM-200 Module, 97, number 8.
2	Antenna connector	Radio antenna connector
3	Antenna connector	Optional GNSS connector for future use

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.

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

Install the display and mount

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

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

Before completing installation steps, select a position in the cab where the bar mount (4) 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 (4) to a rail in the cab.

2. Use the supplied screws to firmly attach the mounting plate (1) to the back of the TMX-2050 display.
3. Turn the tightening arm (3) to loosen the Zirkona mount (2).
4. Adjust the TMX-2050 display until it is positioned where you want it. Turn the tightening arm (3) the other direction to tighten the Zirkona mount (2).

Item	Description
1	Mounting plate
2	Zirkona mount
3	Tightening arm
4	Bar mount

Installation and GNSS set up

1. Install the equipment required for the type of correction service you will be using.

Correction type	Install...
Autonomous	GNSS antenna
CenterPoint RTK	Ag-815 Radio antenna GNSS antenna
CenterPoint RTX Satellite	GNSS antenna
CenterPoint RTX Modem	DCM-300 modem Cellular antenna GNSS antenna
OmniSTAR G2/HP	GNSS antenna
RangePoint RTX	GNSS antenna
SBAS	GNSS antenna
VRS	DCM-300 modem Cellular antenna GNSS antenna

2. Set up at least one vehicle. See Vehicle setup, 140.

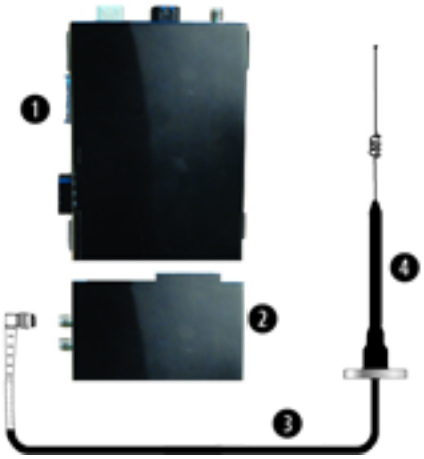
   You will not be able to receive a normal GNSS signal until you set up a vehicle.

3. Set up GNSS. See GNSS receiver settings, 116

Connect the AG-815 radio to the TM-200 Module

The AG-815 integrated radio connects directly to the TM-200 Module.

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



Item	Description
1	TM-200 Module
2	AG-815 integrated radio
3	Radio antenna cable
4	Radio antenna

1. Use a T10 Torx screwdriver to remove the screws (1) and face plate from the TM-200 Module.

2. Insert the AG-815 radio's blade connector (2) into the radio expansion slot of the TM-200 Module.
3. Use the long screws provided with the AG-815 radio to fasten the radio to the TM-200 Module.

The following image shows the AG-815 radio attached to the TM-200 Module.

Connect the display and 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 display cable.

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

⚠ **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.

1. Mae sure you have connected the AG-815 integrated radio to the TM-200 Module. See Connect the AG-815 radio to the TM-200 Module, 103.
2. Use the display cable to connect the TM-200 Module to the TMX-2050 display.

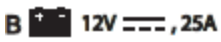
⚠ **CAUTION –** Do not attempt to power the display without the TM-200 Module.

Connector icon:

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.

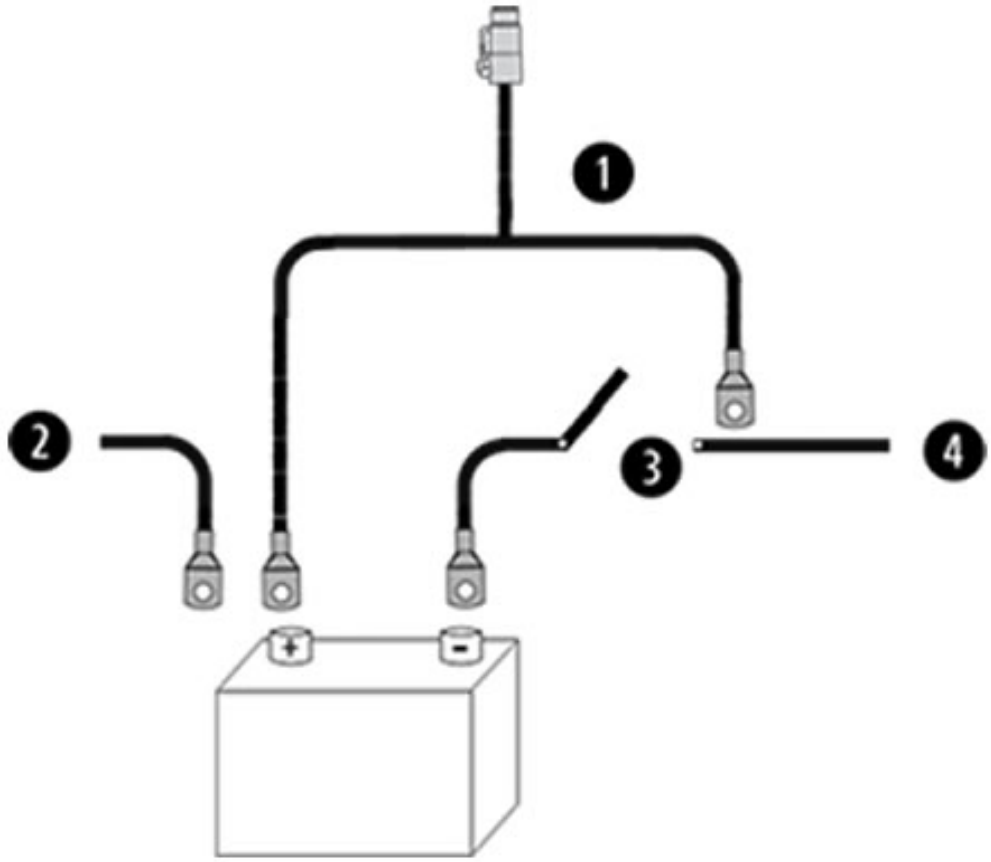
3. To connect the AG-25 GNSS antenna to the TM-200 Module, see Connect the AG-25 GNSS antenna , 111.
4. Insert the TM-200 Module power and I/O cable into Port B of the TM-200 Module. Port icon:



Master disconnect

1. Before proceeding further with the installation, make sure you know whether the vehicle has a master disconnect.
2. If the vehicle has a master electrical disconnect, make sure that the power cable ground connections are ***not*** directly attached to the battery terminal, shown as the negative pole in the graphic below.
3. 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.

   Note – *If a Master disconnect is installed on either the positive or ground path of the battery, the ring terminals of the Trimble power cable should always be connected behind the master disconnect device.*



Item	Description
1	Trimble power cable
2	To tractor +ve
3	Master electrical disconnect
4	To tractor -ve

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

7. For vehicles without an OEM connection, see Regular after-market installation, 107.
8. For vehicles with an OEM connection, see Connection for existing OEM harness, 109.

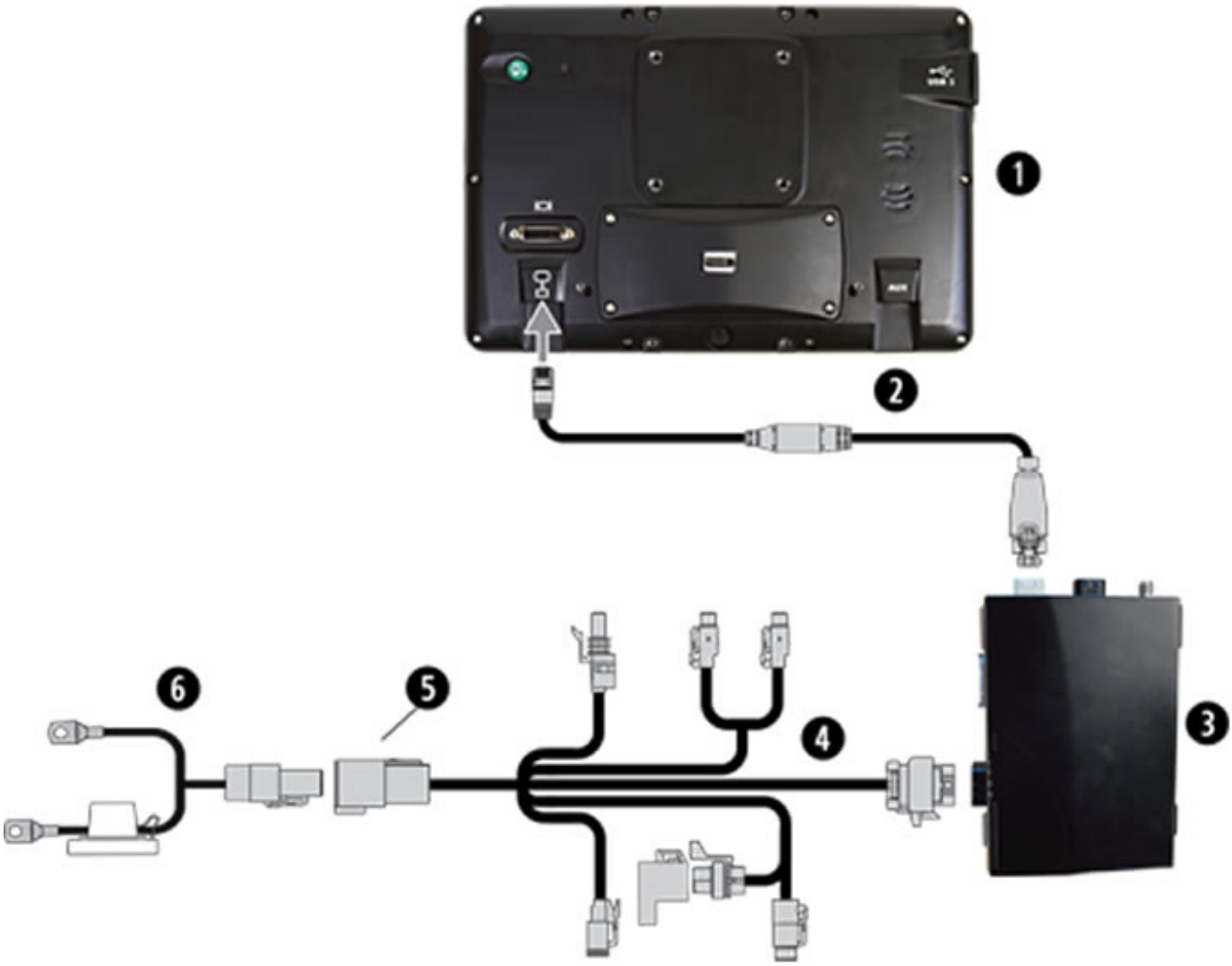
Regular after-market installation

Tip – Proper connection depends on your configuration. Reference the TMX-2050 Display Cabling Guide for appropriate information.

The following graphic shows how to connect the TMX-2050 display and TM-200 Module to a vehicle that does not have an OEM connection. See the *TMX-2050 display Cabling Guide* for connection instructions on specific configurations.

⚠ **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.



Item	Description	Part Number
1	TMX-2050 display	96700-00
2	TM-200 Module to display cable	93843
3	TM-200 Module	95060-00
4	TM-200 Module power and I/O cable connected to port B	92676

Item	Description	Part Number
5	R3 connector of power and I/O cable	
6	TM-200 Module battery cable	92905

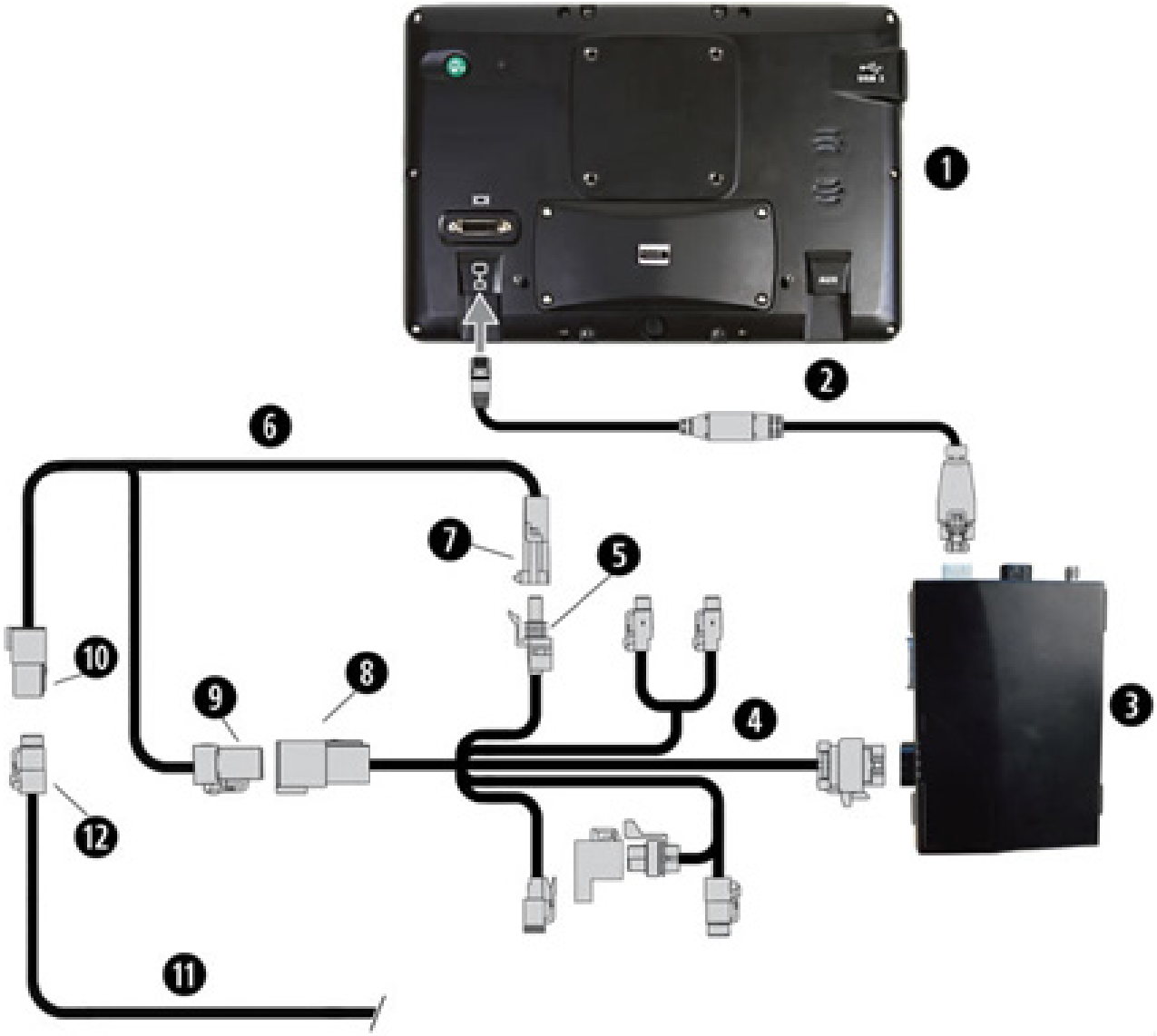
Connection for existing OEM harness

Tip – Proper connection depends on your configuration. Reference the TMX-2050 Display Cabling Guide for appropriate information.

The following graphic shows how to connect the TMX-2050 display and TM-200 Module to a vehicle with an OEM connection. See the *TMX-2050 display Cabling Guide* for connection instructions on specific configurations.

⚠ **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.



Item	Description	Part Number
1	TMX-2050 display	96700-00
2	TM-200 Module to display cable	93843
3	TM-200 Module	95060-00
4	TM-200 Module power and I/O cable connected to port B	92676
5	R1 connector	N/A
6	Power adapter cable	95918

Item	Description	Part Number
7	P2 connector of power adapter cable	
8	R3 connector	
9	P1 connector	
10	R1 connector	
11	OEM harness	
12	4-pin DTP connector	

Connect the DCM-300 modem

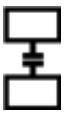
Use the hardware supplied with the DCM-300 modem for installation.

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

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

Tip – Proper connection depends on your configuration. Reference the TMX-2050 Display Cabling Guide for appropriate information.

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. Use the DCM-300 modem to TM-200 Module cable to connect the DCM-300 modem to the Ethernet port on the TM-200 Module. The connector icon for the port on the TM-200 Module is:

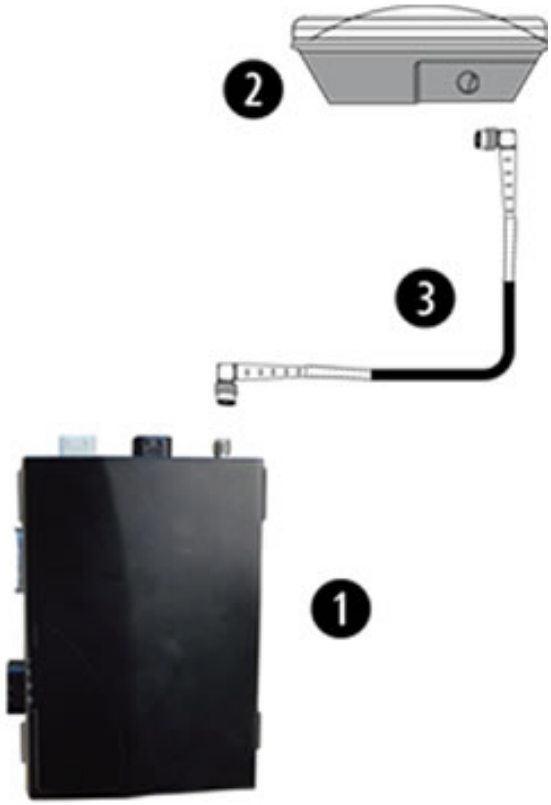


3. Continue with installation using the specific steps of the TMX-2050 Display Cabling Guide.

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.

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



Item	Description
1	TM-200 Module
2	AG-25 GNSS antenna
3	AG-25 antenna to TM-200 Module cable

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

Note – *If you are using the AG-25 GNSS antenna with a steering system, see the installation instructions for the steering system to determine the proper location for mounting the antenna.*

1. Connect the antenna cable (3) to the AG-25 GNSS antenna (1).

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 (3) to the TM-200 Module. Connector icon:  (Also see TM-200 Module, 97.)

Note – *To minimize any interference to the GNSS signal, make sure that any other antenna (including a radio antenna is at least 1 m (3 ft) from the AG-25 GNSS 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 to:

- Flow and application control
- Boom height control
- Other components

Tip – Proper connection depends on your configuration. Reference the TMX-2050 Display Cabling Guide for appropriate information.

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.

GNSS receiver settings

The TM-200 Module contains a built-in GNSS receiver. To set up the receiver, you choose:

- The type of antenna you are using
- The correction source you will be using, if any

Note – *GNSS status will not show a converging or normal status until a vehicle has been configured and selected. See* *GNSS notification button, 52**.*

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 ***Home*** screen, tap  .
4. Tap **GNSS Setup**.

   The GNSS setup panel displays.
5. At the SELECTION section:
   a. Tap **Antenna Type**, then select the antenna you are using from the list. Choices are AG25, Other, ZephyrTM II, Zephyr II (Ruggedized).
   b. Tap **Correction Source** and select the correction source you will be using.

      Note – *You will not be able to select any correction source that is 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	Satellite-based augmentation systems (SBAS) with free correction services
RangePoint RTX corrections	Satellite-based subscription service for corrections with pass-to-pass accuracy < 6" (15 cm) and GLONASS compatibility
OmniSTAR G2/HP/GR corrections setup	Satellite-based subscription service
CenterPoint RTX setup (Modem)	Cellular broadcast subscription service for corrections with < 1.5" (3.8 cm) accuracy and GLONASS compatibility.

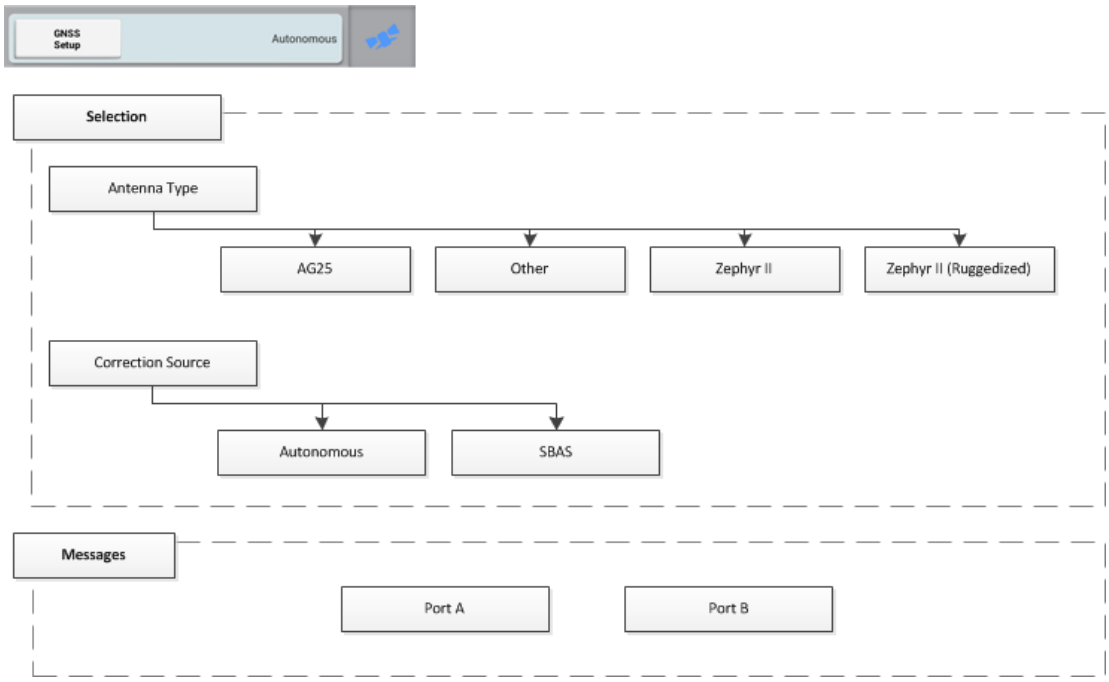
Correction Source	Description
CenterPoint RTX(Satellite)	Satellite broadcast subscription service for corrections with < 1.5" (3.8 cm) accuracy and GLONASS compatibility.
VRS	Cellular-broadcast RTK corrections from a ground-based reference station using the a modem. (Requires a DCM-300 modem.)
RTK corrections	Radio-broadcast corrections from a ground-based reference station. (Requires the AG-815 integrated radio.)

c. 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.

6. Tap  to save your settings.

SBAS corrections



The satellite-based augmentation systems (SBAS) with free correction services are:

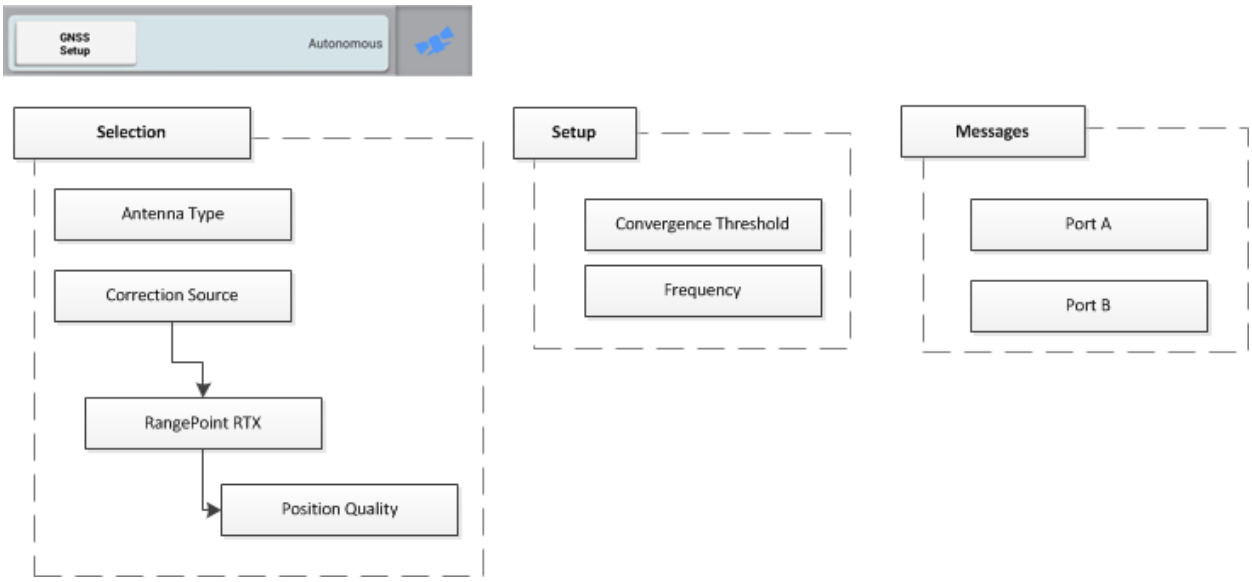
- WAAS (Wide Area Augmentation System) in North America
- EGNOS (European Geostationary Navigation Overlay Service) in Europe
- MSAS (Multi-functional Satellite Augmentation System) in Asia Pacific regions

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

RangePoint RTX is a satellite-based subscription service for corrections with pass-to-pass accuracy < 6" (15 cm) and GLONASS compatibility.

The GNSS receiver in the TM-200 Module receives these signals.



To set up this correction service:

1. Unlock RangePoint RTX. (See Feature unlocks, 81.)
2. At the ***Home*** screen, tap .
3. Tap **GNSS Setup** to display the setup panel.

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.

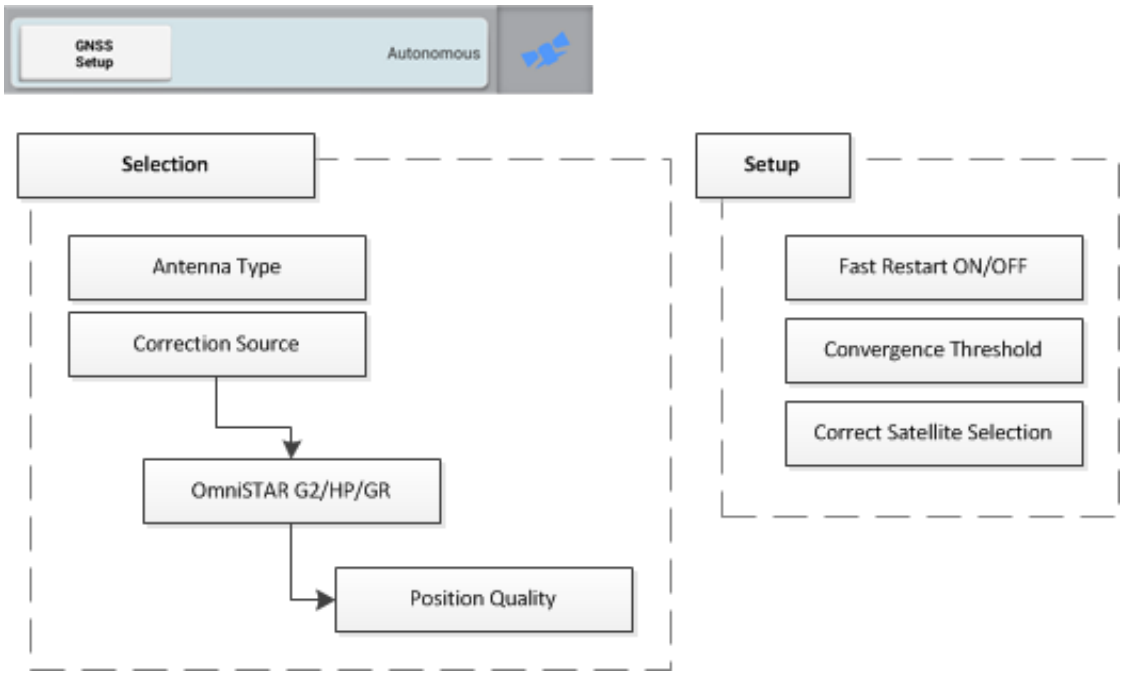
Setting	Options
Frequency	Choose the RTX frequency for your region or enter a custom frequency. Frequency options are: • Asia/ Pacific (1539.8325) (Baud Rate= 600) • Central North America (1557.8150) (Baud Rate= 2400) • Custom (Enter the Frequency and Baud Rate) • Eastern North America (1557.8590) (Baud Rate= 600) • Europe/ Africa (1539.9525) (Baud Rate= 600) • Latin America (1539.8325) (Baud Rate= 600) • Western North America (1557.8615) (Baud Rate= 600)

OmniSTAR G2/HP/GR corrections setup

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

The GNSS receiver in the TM-200 Module receives these signals.



To set up this correction service:

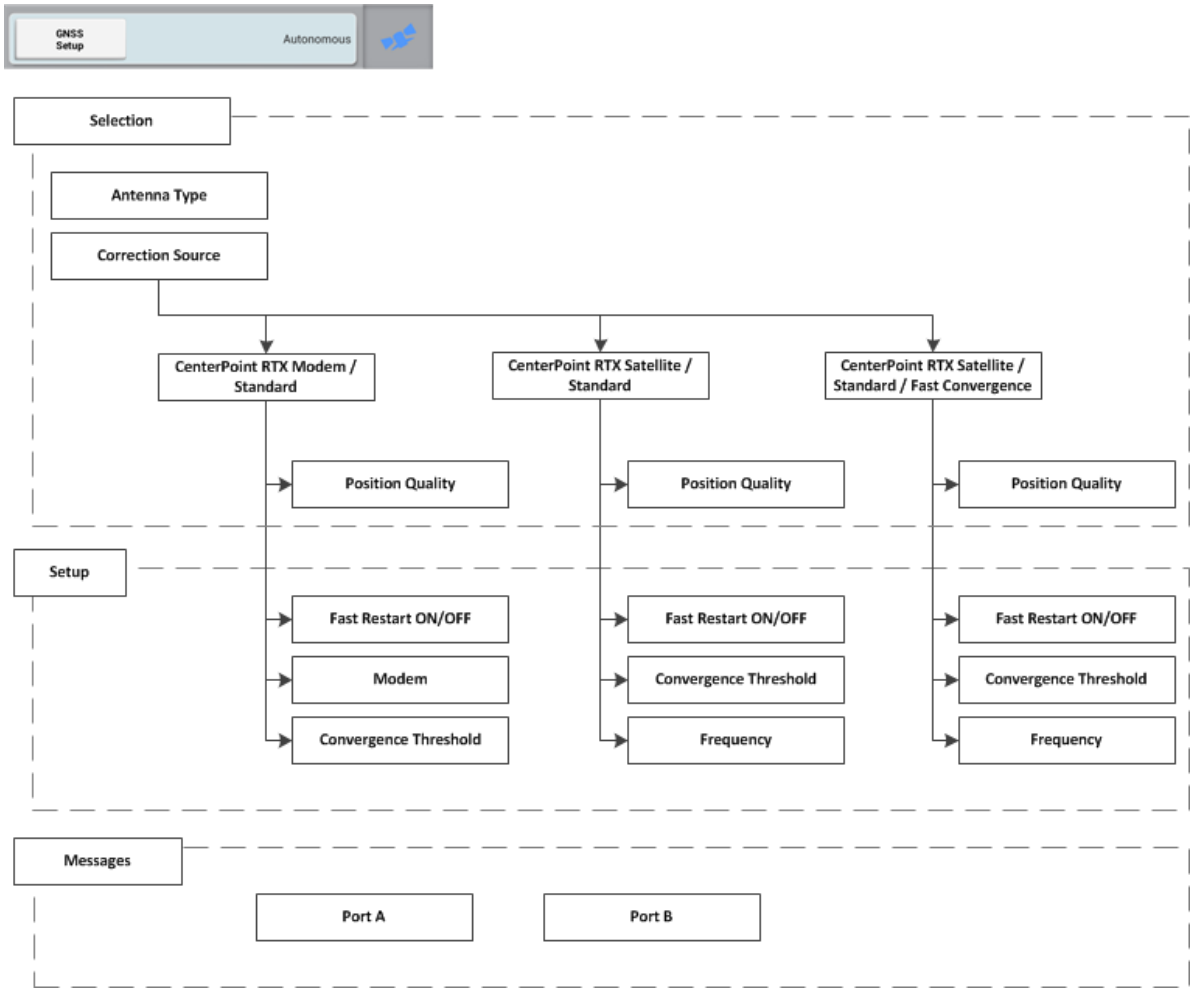
1. Unlock OmniSTAR G2/HP/GR. (See Feature unlocks, 81.)
2. At the ***Home*** screen, tap  .
3. Tap **GNSS Setup** to display the setup panel.

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.
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. Tap **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	Tap *Auto Select* for automatic satellite selection, or select a satellite from the list. If you choose *CUSTOM*, enter the Frequency and Baud Rate.

CenterPoint RTX setup

There are three types of CenterPoint RTX corrections:

- Modem
- Satellite Standard
- Satellite Fast Convergence



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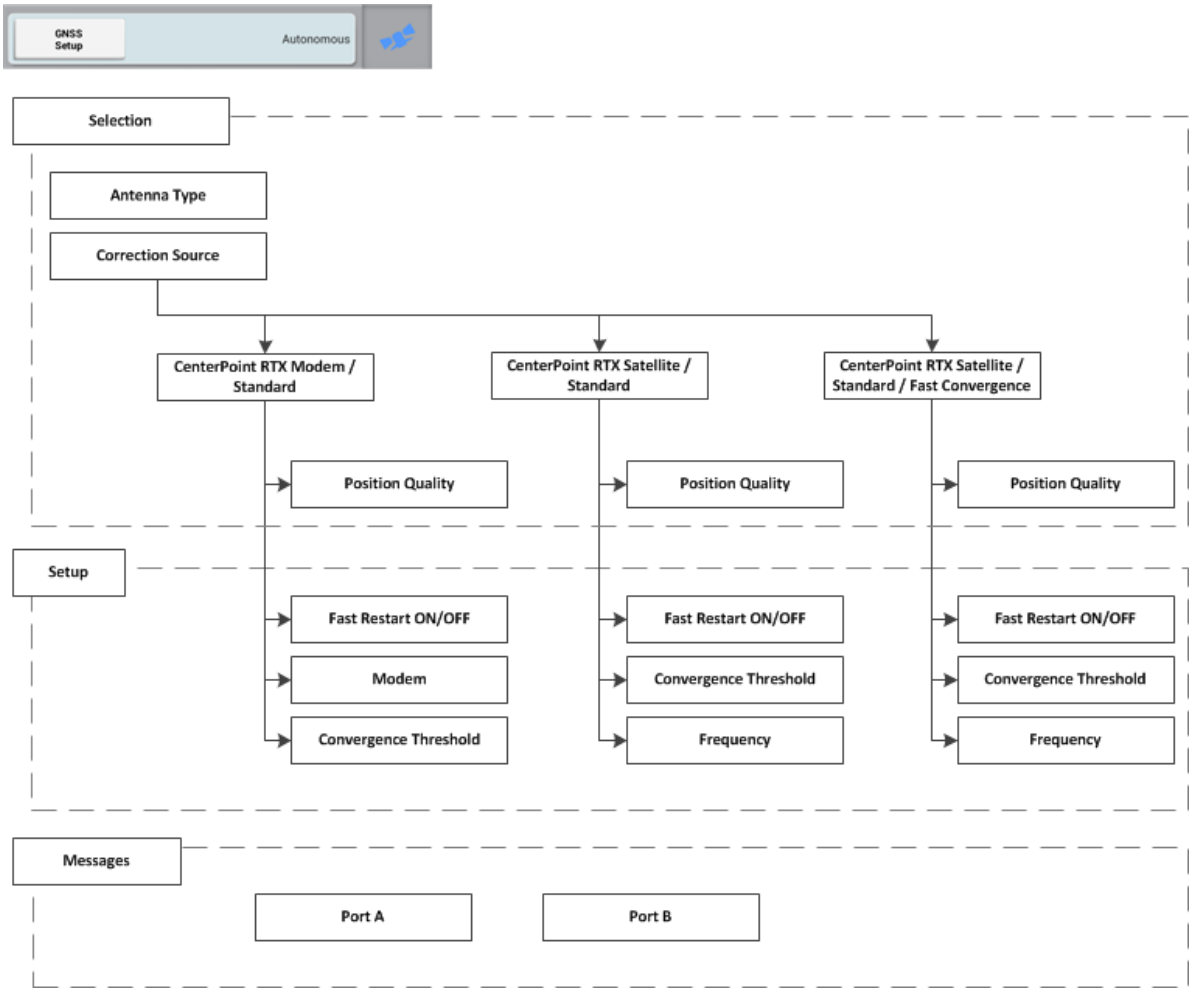


Modem corrections

CenterPoint RTX Modem / Standard is a cellular broadcast subscription service for corrections with < 1.5" (3.8 cm) accuracy and GLONASS compatibility. The DCM-300 modem receives these signals.

To set up this correction service:

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, 81.)
4. Reboot the DCM-300 modem by turning off the vehicle ignition.
5. Turn the vehicle ignition back on.
6. At the ***Home*** screen, tap  .
7. Tap **GNSS Setup** to display the setup panel.

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.
Fast Restart	Turn on or off.
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.

Satellite corrections

CenterPoint RTX Satellite Standard and CenterPoint RTX Satellite Standard Fast are satellite broadcast subscription services for corrections with < 1.5" (3.8 cm) accuracy and GLONASS compatibility.

The GNSS receiver in the TM-200 Module receives these signals.

To set up either of these correction services:

1. Unlock CenterPoint RTX Satellite for standard or fast convergence. (See Feature unlocks, 81.)
2. At the ***Home*** screen, tap  .
3. Tap **GNSS Setup** to display the setup panel.

Standard convergence

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.
Fast Restart	Turn on or off.
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)
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.

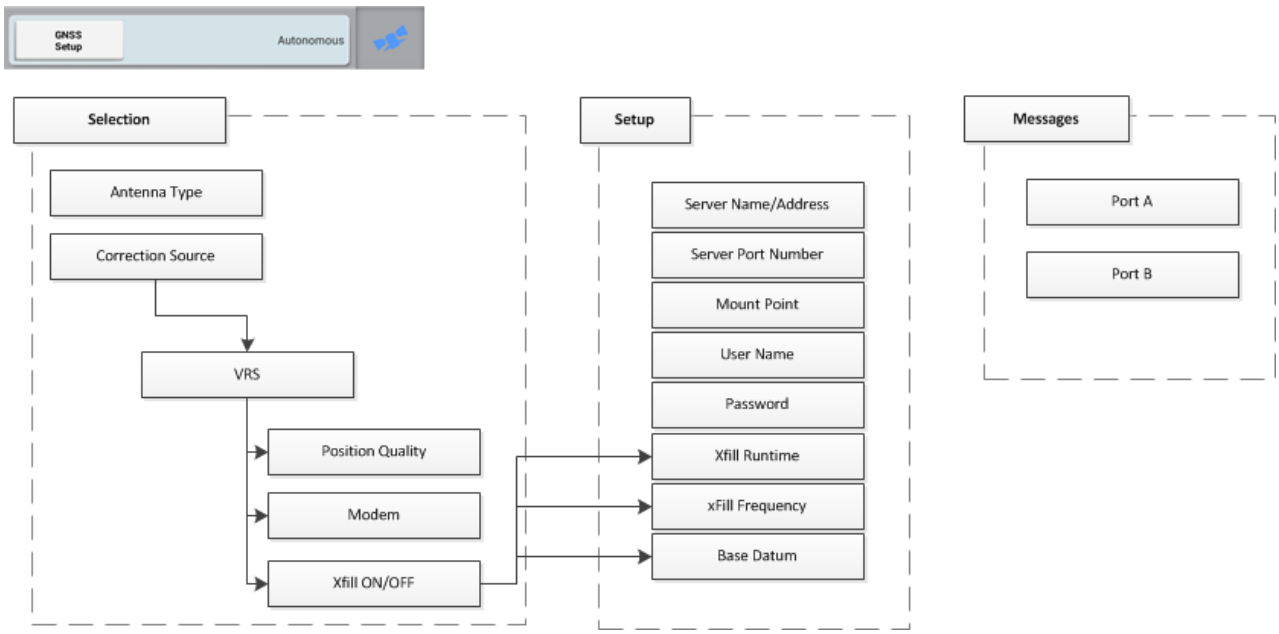
Fast convergence

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.
Fast Restart	Turn on or off.

Setting	Options
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.
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)

VRS corrections

VRS is a cellular-broadcast RTK correction service from a ground-based reference station using the a modem. (Requires a DCM-300 modem.)



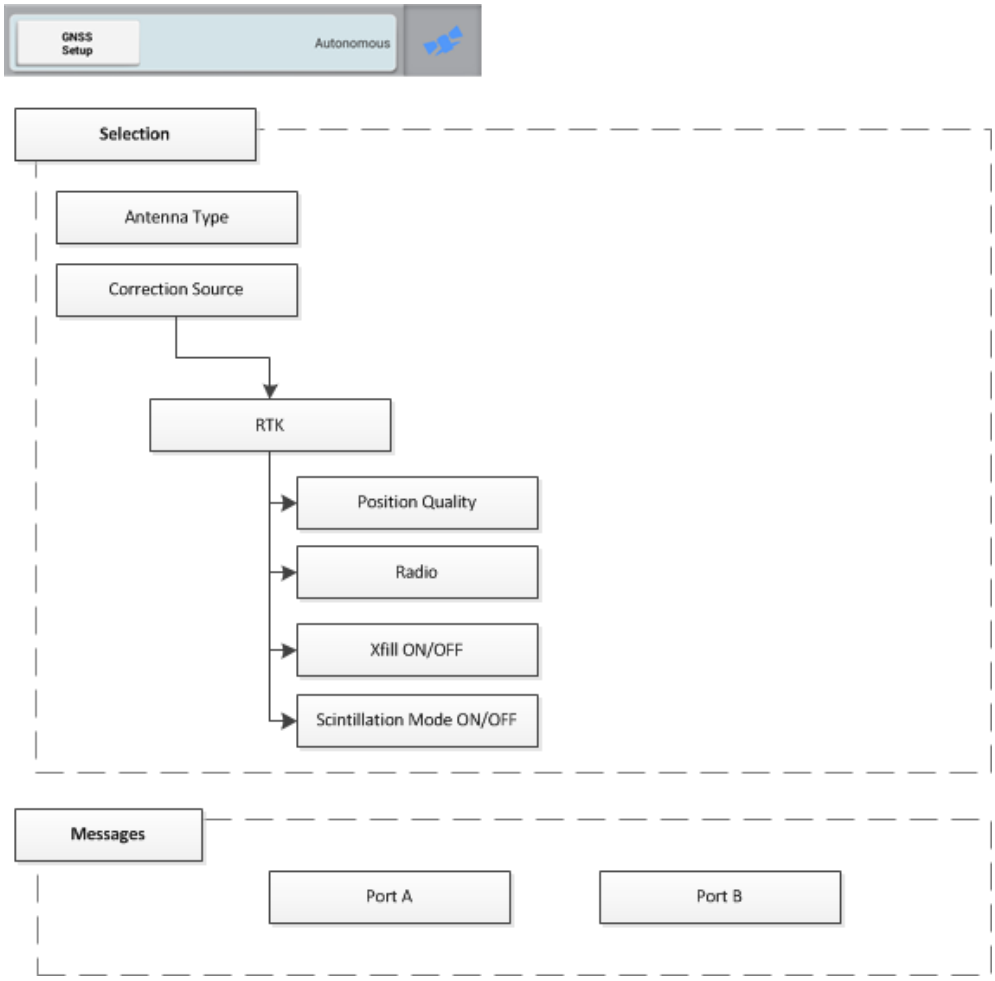
To set up this correction service:

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 VRS. (See Feature unlocks, 81.)
4. Reboot the DCM-300 modem by turning off the vehicle ignition.
5. Turn the vehicle ignition back on.
6. At the ***Home*** screen, tap  .
7. Tap **GNSS Setup** to display the setup panel.

Setting	Options
Modem	• DCM-300 • Third Party NTRIP Modem (Cannot be used with Autopilot guidance)
xFill (See xFill technology, 133.)	Turn on or off.
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.
xFill Runtime ***Note –*** *Available if you have turned on xFill.*	20 minutes. How long the display will use xFill technology after the correction service becomes unavailable.

RTK corrections

RTK is a radio-broadcast correction service originating from a ground-based reference station, and received by radio signal. The AG-815 integrated radio receives these signals.



To set up this correction service:

1. Unlock RTK. (See Feature unlocks, 81.)
2. Make sure the AG-815 integrated radio is installed. (See Connect the AG-815 radio to the TM-200 Module, 103.)
3. At the ***Home*** screen, tap .
4. Tap **GNSS Setup** to display the setup panel.

Setting	Options
Radio	Choose the frequency of the AG-815 integrated radio: 450 MHz or 900 MHz.
xFill (See xFill technology, 133.)	Turn xFill technology on or off.

Setting	Options
Scintillation Mode	Turn mode on or off.
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.
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 (Available only if you turned on xFill.)	• WGS84/ ITRF2008 (Default) • NAD83 • ETRS89 • GDA94

CAN message settings

If you wish to send messages from the GNSS receiver in the TM-200 Module, you can set up what messages will be sent from CAN port A or B. If you are using an ISO-certified implement, use this setting to sent information to the implement such as speed. (See ISOBUS for implements, 191.)

1. Tap the CAN port that you want to change settings for. Choose the messages for the GNSS receiver in the TM-200 Module to send to ISO-certified equipment.

   The list that displays for each CAN port shows the messages and their parameter group number (PGN). For each message, you can choose how often the message is sent:

   - Off (never sent)
   - 10 Hz, 5 Hz or 1 Hz
   - Every 5, 10, 30 or 60 seconds

2. Tap  to save your settings.

DCM-300 modem initial setup

The DCM-300 modem ships as a locked unit until it is installed with the display. See Connect the DCM-300 modem, 111.

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

1. Connect the DCM-300 modem to the display.
2. Power on the DCM-300 modem and display.
3. Activate the required services on the display. See Feature unlocks, 81.
   a. To use VRS corrections, activate RTK and VRS.
   b. Vehicle Sync and Office Sync also require activation.
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. Continue the instructions for setup at Modem services settings, 88.

Office Sync setup

With the Office Sync service, you can electronically transfer data from the display to the office and to Connected Farm dashboard. Data will be:

- Sent to the office based on user settings.
- Received from the office based on user settings, with no inbox needed.

Requirements

Requirements for exchanging data electronically include the following:

- A configured DCM-300 modem.

  See:

  - DCM-300 modem, 98
  - Connect the DCM-300 modem, 111
  - DCM-300 modem initial setup, 130
- A Connected Farm account.
- A data plan or access to WiFi.
- Office Sync configured on the display to communicate with your Connected Farm storage area.

  See Modem services settings, 88.

Settings

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

Setting	Tap to...
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.

For information on:	See:
Diagnostics	Office Sync Diagnostics, 321
Data transfer	Data transfer, 67

Connectivity concepts

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

- xFill technology, 133
- GNSS and drift, 133
- VRS, 137

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 Vehicle setup, 140.)*

  a. Create an A/B line in your field (or use an existing line). (See AB guidance line creation (Run screen), 251.)

  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. Turn off RTK by changing the network ID or frequency.

  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.

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.

Vehicle setup

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. Then you must select the vehicle.*

Vehicles can be:

- Added (see Add a vehicle, 140)
- Saved in a partial or complete state (see Save a vehicle, 143)
- Removed (see Delete a vehicle, 142)
- Changed (see Edit a vehicle, 143)
- Viewed in a summary form (see Vehicle summary, 144)
- Selected for use in field activities (see Select a vehicle, 145)

Overview of setup

An overview of the steps for 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**.

   Note – *Only vehicles on the current Trimble supported platforms for Autopilot, EZ-Pilot, and EZ-Steer list are in the database. Generic vehicles are selectable for each vehicle type for manual guidance.*

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 the options you chose for Make, Series, and Model. You can optionally change this name if you wish.

5. Tap **Next**. The SELECTION section displays. The receiver serial number is displayed, indicating the GNSS receiver in the TM-200 Module is receiving signals.

   Confirm that this is the proper serial number for the TM-200 Module attached to the TMX-2050 display. When moving displays between vehicles, this is not automatically updated.
6. Tap **Next**. 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:
   - Autopilot system setup, 146
   - EZ-Pilot system setup, 167
   - EZ-Steer system setup, 173
   - Manual guidance setup, 145

⚠ **WARNING –** Auto guidance systems cannot avoid items in the field such as obstacles. Make sure you are adequately trained to operate the auto guidance system.

For instructions on saving the vehicle, see Save a vehicle, 143.

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 X.

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  or  on the left-hand side of the display bar. A message displays, asking if you want to leave the setup panel without saving your changes. After tapping **No**, you return to the Vehicle setup panel.

For details on the vehicle summary, see Vehicle summary, 144.

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

- Autopilot system setup, 146
- EZ-Steer system setup, 173
- EZ-Pilot system setup, 167
- Manual guidance setup, 145

Save a vehicle

You can save:

- Complete vehicle settings after reviewing the SUMMARY section. For details on the vehicle summary, see Vehicle summary, 144.
- 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)  (**Return** 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 calibrate a vehicle or 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 that has had vehicle setup and calibration steps completed.*

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**. The name of the vehicle highlights in blue and the ✓ indicates which vehicle you chose.

Note – *Without a blue highlight, the ✓ indicates a vehicle that was selected previously.*

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

⚠ **WARNING –** Auto guidance systems cannot avoid items in the field such as obstacles. Make sure you are adequately trained to operate the auto guidance 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.

Tap...	Explanation
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 (These configuration /.cfg files are located in the AgData/Profiles folder on the USB drive.) (See *USB transfer of vehicle configuration for Autopilot* in Data transfer, 67.) ⚠ **CAUTION –** If you select a *Vehicle Profile* that is not suitable for your vehicle, you may experience degraded system performance.
GNSS Setup Selection	If you have not completed GNSS setup. See GNSS receiver settings, 116.
Configure GNSS	Setup GNSS if you have not already done so.

⚠ **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.

3. Tap **Next** to continue to Controller settings for Autopilot system, 147.

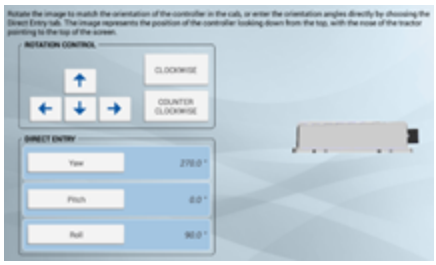
Controller settings for Autopilot system

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**. Non-orthogonal entries will not show the orientation on the display.
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, 148.

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.

   Note – *Not all setting items will be available for all vehicles. Setting items are only available to the applicable vehicle types.*

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)

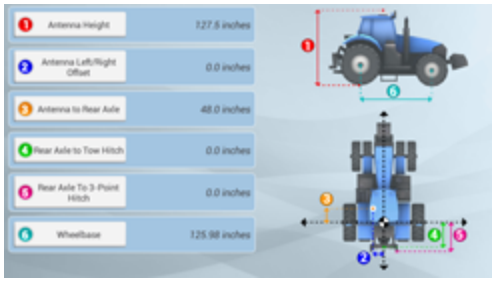
Vehicle measurements for Autopilot system

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.

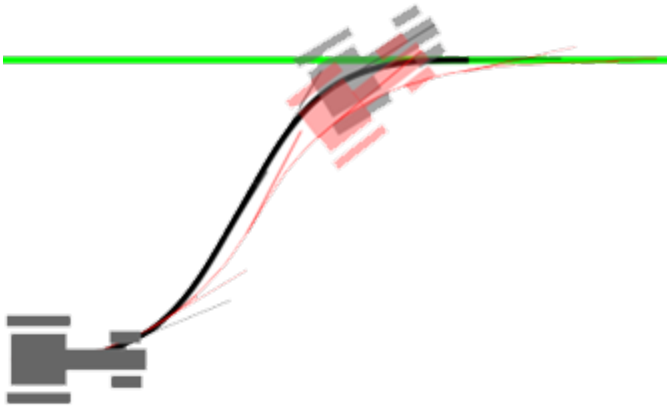


4. Confirm all pre-filled measurements and enter the others.

   For the Antenna Height, measure the distance from the ground to the base of the GPS receiver (or antenna).

OnSwath

With OnSwath™, you can customize line acquisition to the vehicle, operation and operator preference. Vehicle behavior during line acquisition is more controlled, more predictable, and more repeatable.



The benefits of OnSwath include:

- Up to 50% faster line acquisition
- Separate tuning for online and line acquisition
- More repeatable performance
- Consistent performance over entire speed range.
- Cab shake eliminated on articulated machines
- Limited turn rates reduce impact on field for tracked machines
- Front axle/nose overshoots more, so that the
- Rear axle on the guidance line faster due to front axle/nose overshooting more

To set up and use OnSwath, see the *Autopilot Toolbox II Guide* and complete calibrations.

OnSwath requires:

- Autopilot firmware 6 and higher
- Autopilot Toolbox II version 3 or higher

Autopilot system calibration

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 – *Currently CAT hydraulic installation Challenger vehicles and John Deere Tracked vehicles using the SIU-200 Interface box cannot be calibrated with the TMX-2050 display.*

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, 147**.*

1. Remove any implement from the vehicle. Drive the vehicle to an open area free of obstacles in which the vehicle can make long passes (400m/.25 mile).
2. At the Vehicle setup panel, select the vehicle you want to work with. See Select a vehicle, 145 for detailed instructions.
3. Tap **Calibrate**. The display shows ***only*** the calibrations required for the vehicle you have selected.
4. Perform each of the calibration procedure selections presented. Following the on-screen instructions when applicable. More detailed information on each calibration follows.
5. When you are finished, tap  to save the calibrations.

Calibration for non-tracked vehicles

Calibration	Explanation
Manual override sensitivity calibration, 153 ***Note –*** *For vehicles that use a pressure transducer or column encoder 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, 148 ***Note –*** *Only for vehicles with a potentiometer style steering sensor.*	Maps the steering angle sensor voltage into a steering angle measurement.

Calibration	Explanation
Automated steering deadzone calibration, 156 ***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, 160	Sets the proportional gain to control steering overshoot and responsiveness.
Steering sensor calibration, 154	Converts the voltage output of the steering angle sensor into an equivalent steering angle measurement.
Line acquisition, 165	Controls how fast the guidance system attempts to steer the vehicle onto the current guidance line (50% - 150%).
Engage aggressiveness, 166	How aggressively the vehicle initially engages on the guidance line (50% - 150%).
Roll correction calibration, 162	Compensates for minor variations in the placement of the navigation controller and GNSS antenna.

For information on:	See:
Diagnostics	Autopilot system diagnostics, 296

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.

1. At the Vehicle setup panel, select the vehicle you want to work with. See Select a vehicle, 145 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, 156) or roll correction (Roll correction calibration, 162) 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, 145 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 sensor voltage value.
   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 sensor voltage value.
   b. While the steering wheel is at the full right position,tap **Next**.
9. Steer straight ahead and drive for a while to ensure you are traveling straight.
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.
    a. Note the sensor voltage value.
    b. When the vehicle is going straight, press **Next**.
11. Turn the steering wheel to full left and full right.
    a. Check that the voltage value and degree value does not stop changing before the steering articulation hits the end stops.
    b. Ensure that the full left turn and the full right turn are at approximately the same value.
    c. If the values are not approximately symmetrical, tap X to discard the calibration and repeat step 6 through step 9. The steering sensor may require adjustment or replacement if:

The value...	Outcome
For sensor volt	Not symmetrical for full left and full right turns
For degrees	Not near 0
For voltage	Stops changing before the articulation of the steering is to the full left or full right position

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

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.

   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.*
3. If you perform the deadzone calibration while the system is cold, repeat both the Automated Deadzone and Steering Gain (see Proportional steering gain, 160) calibrations again when the system is at operating temperature.
4. 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 Steering sensor calibration, 154.

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, 145 for detailed instructions.
3. On the left-hand side, tap **Calibrate**.
4. Tap **Automated Steering Dead Zone**. The calibration panel displays.
5. Center The steering and 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 performs a coarse right side test.
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 performs a coarse left side test.
11. Tap **Accept** to accept the calibration. The system displays the AutoPilot calibration panel again.
12. Continue driving ahead slowly and tap **Test Right**. The system will perform the first right hand fine calibration.
13. Repeat the right and left hand fine calibrations until there is a change of less than .5 in each of the deadzone values

    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: Error -	Explanation
Manual Override Detected	Manual override was detected before the calibration cycle could be completed. Retry the calibration.
No GPS	A GNSS receiver must be connected and outputting positions before the software can run the calibration procedure.
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.
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.
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.
Unable To Determine DZ: Try Again	A problem occurred when trying to compute dead zone. Retry. If the problem persists, contact Technical Support.
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.
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.

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, 145 for detailed instructions.
3. On the left-hand side, tap **Calibrate**.
4. Tap **Automated Steering Dead Zone**. The calibration panel displays.
5. Center The steering and 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 performs a coarse right side test.
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 performs a coarse left side test.
11. Tap **Accept** to accept the calibration. The system displays the AutoPilot calibration panel again.
12. Continue driving ahead slowly and tap **Test Right**. The system will perform the first right hand fine calibration.
13. Repeat the right and left hand fine calibrations until there is a change of less than .5 in each of the deadzone values

    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: Error -	Explanation
Manual Override Detected	Manual override was detected before the calibration cycle could be completed. Retry the calibration.
No GPS	A GNSS receiver must be connected and outputting positions before the software can run the calibration procedure.
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.

Message: Error -	Explanation
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.
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.
Unable To Determine DZ: Try Again	A problem occurred when trying to compute dead zone. Retry. If the problem persists, contact Technical Support.
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.
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.

Proportional steering gain

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 Automated Deadzone. See Automated steering deadzone calibration, 156. 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 you want to work with. See Select a vehicle, 145.
2. Tap **Calibrate**, then tap **Steering Proportional 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 slew time. In such cases, optimizing the P-gain value will be difficult..*
7. Note the Slew Time and Overshoot values.
8. Adjust the gain value.
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 X 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 antenna.

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. See Add a field, 181.

Calibration steps

1. Select the vehicle and implement you want to work with.

   (See Select a vehicle, 145 and Select an implement, 189 for detailed instructions.)
2. Select a field and enter the ***Run*** screen.

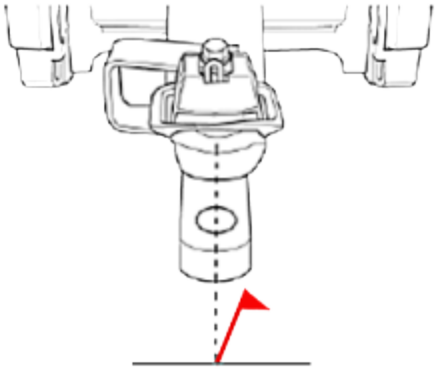
   (See Select a field, 182 and Preparing for operation, 234.)
3. Create a new, straight guidance line.

   (See AB guidance line creation (Run screen), 251 or A+ guidance line creation (Run screen), 252.)
4. Make sure the on-screen lightbar is displayed on the screen.

   (See On-screen widgets, 286.)
5. Engage automatic steering on the line. Drive until the on-screen lightbar number is as close to zero as possible, and then stop the vehicle.
6. Mark the vehicle's position:
   a. Place the vehicle in park and exit the cab.
   b. Place a flag in the ground that will mark the vehicle's center line. Use the drawbar pin hole or use another feature of the vehicle as a reference point.

      On vehicles such as sprayers, swathers, or combines, determine a reference point in the center of the vehicle to mark (preferably near to the reference location for the antenna

such as front axle, rear axle, or center of track rotation).



7. Re-enter the cab and continue to drive down the guidance line.
8. Turn the vehicle around and then re-engage ***on the same line*** in the opposite direction.
9. Stop the vehicle with the drawbar (or other feature used to mark the center line of the vehicle) as close to the first flag as possible.
10. Mark the vehicle's position.

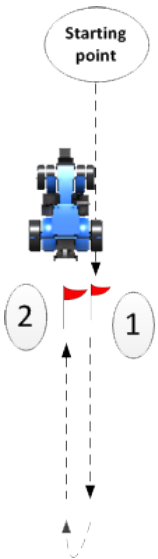
a. Place the vehicle in park and exit the cab.

b. Place a second flag in the ground to mark the vehicle's center line.

c. Measure the distance between flag 1 and flag 2 and note it.

Distance between flag 1 and flag 2 (step c):

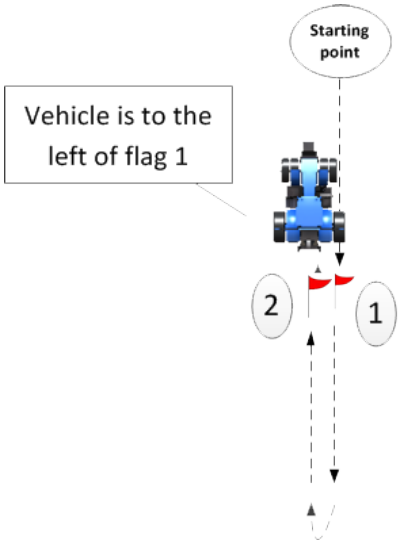
_____



d. Also note where the vehicle's current position is in relation to flag 1 (in other words, the vehicle is either to the right or left of flag 1). The diagram, this example shows the vehicle is to the left of flag 1.

Vehicle is to right or left of flag 2 (step d):

_____



e. Return to the cab and in the ***Run*** screen note the cross-track error (the number on the on-screen lightbar).

Cross-track error (number on Run screen) (step e):

_____

f. Note the direction highlighted on the lightbar (left or right).

Direction highlighted on lightbar (left or right) (step f):

_____

11. Tap  and then tap **Diagnostics**.
12. Tap Autopilot performance and tap the Advanced tab.
13. At the Roll Offset entry box and Vehicle Position selection box:
    - Calculate the roll offset and enter it in the display.

      Refer to your notes and compare them to the following table to determine how to calculate roll offset.
    - Determine the direction of the Vehicle Position and enter it on the display.

      Refer to your notes and compare them with the following table to find which Vehicle Position to select.

Current vehicle position is to the _____ of flag 1	Lightbar highlight is on the:	Calculate Roll Offset value:	Lightbar (cross-track) value is ___ ____ than flag distance value	Vehicle Position selection
Right	Right	Flag distance minus Cross-track value	Less	Right
Right	Right	Flag distance minus Cross-track value	Greater	Left
Left	Left	Flag distance minus Cross-track value	Less	Left
Left	Left	Flag distance minus Cross-track value	Greater	Right
Right	Left	Flag distance plus Cross-track value	N/A	Right
Left	Right	Flag distance plus Cross-track value	N/A	Left

14. Pull both flags out of the ground and continue driving down the line.
15. Turn the vehicle around again so that you are traveling in the same direction as you were when you originally set the line.
16. 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 and drive into instability.
- 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. Under the Autopilot heading in the left-hand list, tap **Performance**.

d. Tap **Steering** at the top of the screen.

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, 145 and Select an implement, 189 for detailed instructions.)

b. Select a field and enter the ***Run*** screen. (See Select a field, 182 and Preparing for operation, 234.)

c. Create a new, straight guidance line. (See AB guidance line creation (Run screen), 251 or A+ guidance line creation (Run screen), 252.)

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. Touch and move the button with the percentage to move the slider to the left or right. Drive forward and re-engage auto-steering if necessary to test the setting.

Engage aggressiveness

Engage aggressiveness controls how aggressively the vehicle initially turns towards the guidance line.

- With a high setting, the vehicle will initially respond quickly.
- With low setting, the vehicle will respond more smoothly when initially engaged.

1. Enter the ***Run*** screen and engage automatic steering on a straight guidance line. (See Preparing for operation, 234 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. Touch and move the button with the percentage to move the slider to the left or right. Drive forward and re-engage auto-steering if necessary to test the setting.

EZ-Pilot system setup

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

Initial setup steps are:

- Guidance selection for the EZ-Pilot system, 167
- Controller settings for EZ-Pilot system, 167
- Vehicle measurements for EZ-Pilot system, 169
- Steering speed settings for EZ-Pilot system, 168

Guidance selection for the EZ-Pilot system

⚠ **WARNING –** Auto guidance systems cannot avoid items in the field such as obstacles. Make sure you are adequately trained to operate the auto guidance 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.

   ⚠ **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.

3. Tap **Next** to set up the controller orientation. See Controller settings for EZ-Pilot system, 167.

Controller settings for EZ-Pilot system

The EZ-Pilot system ueses the IMD-600 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.

Steering speed settings for EZ-Pilot system

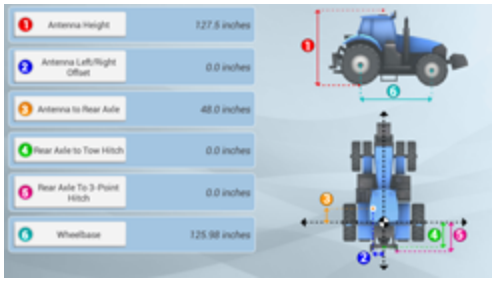
Note – *Adjust settings only if necessary to improve steering performance.*

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 should be determined by running the automated calibration. The value can then be adjusted here.*
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). ***Note –*** *This setting should only be used for swathers and sprayers.*
Motor Speed	The speed at which the motor will operate: Auto, Auto High, Auto Low, Auto Maximum, Auto Medium, High, Low, Maximum, Medium ***Note –*** *Default selection varies depending on vehicle type.*
Motor Direction	Reverse mount, standard mount
External Switch	Select a switching option if an external switch is connected to the system: Disabled (Default), Remote Engage, Seat Disengage, Seat Engage Only
Engage Options	Maximum Speed, Minimum Speed, Maximum Angle, Engage Offline, Disengage Offline Override Sensors
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

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.

EZ-Pilot system calibrations

Calibrations for the EZ-Pilot guidance system are:

- Angle per turn calibration for EZ-Pilot system, 171
- Roll correction for EZ-Pilot system, 170
- Online aggressiveness calibration for EZ-Pilot system, 171
- Line acquisition calibration for EZ-Pilot system, 172

For information on:	See:
Diagnostics	EZ-Pilot system diagnostics, 303

Roll correction for EZ-Pilot system

1. Park the vehicle and mark the center lines of both the front and rear wheelbases on the ground.
2. 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.
3. Tap **Calibrate**.
4. Tap **Roll Calibration**. The calibration tool displays.
5. Follow the instructions on the calibration tool.

6. To accept the calibration, tap ✓.
7. To discard the calibration and start it again, tap X.

Angle per turn calibration for EZ-Pilot system

Note – *Complete the roll correction calibration before performing this calibration.*

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.

Online aggressiveness calibration for EZ-Pilot system

Online aggressiveness controls how aggressively the vehicle reacts to cross track error while operating on the guidance line (50% - 150%).

- With a high setting, the vehicle will be more reactive to cross track error. A high setting may cause the system to overreact and become unstable.
- With low setting, the vehicle will make less of a steering correction to the online cross track error.

1. Enter the ***Run*** screen and engage automatic steering on a straight guidance line. (See Enter a field (Run screen), 183 for more instructions on entering the ***Run*** screen.)
2. Drive the vehicle approximately 10 seconds.
3. Open the Diagnostics section for the EZ-Pilot 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 online operation with the default setting .
5. Touch and move the button with the percentage to move the slider to the left or right. Drive forward and re-engage auto-steering if necessary to test the setting.

Line acquisition calibration for EZ-Pilot system

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 and drive itself to instability.
- 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. Under the EZ-Pilot heading in the left-hand list, tap **Performance**.
   d. Tap **Steering** at the top of the screen.
   e. The display shows the adjustments 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, 145 and Select an implement, 189 for detailed instructions.)
   b. Select a field and enter the ***Run*** screen. (See Select a vehicle, 145 and Preparing for operation, 234.)
   c. Create a new, straight guidance line. (See AB guidance line creation (Run screen), 251 or A+ guidance line creation (Run screen), 252.)
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 EZ-Pilot performance again.
5. Evaluate the current accuracy of the vehicle during line acquisition with the default setting.
6. Touch and move the button with the percentage to move the slider to the left or right. Drive forward and re-engage auto-steering if necessary to test the setting.

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, 173
- Controller settings for EZ-Steer system, 173
- Steering and speed settings for EZ-Steer system, 175
- Vehicle measurements for EZ-Steer system, 175

Guidance selection for EZ-Steer system

⚠ **WARNING –** Auto guidance systems cannot avoid items in the field such as obstacles. Make sure you are adequately trained to operate the auto guidance 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.

   ⚠ **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.

3. Tap **Next** to set up the controller orientation. See Controller settings for EZ-Steer system, 173.

Controller settings for EZ-Steer system

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

Steering and speed settings for EZ-Steer system

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

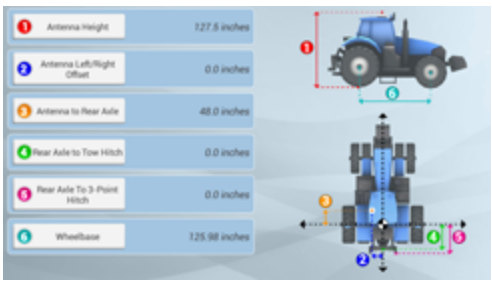
1. Navigate to the GUIDANCE section of the vehicle setup panel:
   a. At the ***Home*** screen, tap  . The Vehicle setup panel displays.
   b. At the list on the left-hand side of the setup panel, tap the name of the vehicle you want to edit. The display changes the list item to a blue background with 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 Angle per turn values should be calibrated first using EZ-Steer calibration and then adjusted here if necessary.
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) ***Note –*** *This value should only be used for swathers and sprayers.*
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.*

Steering Sensor Setting	Description
Motor Direction	The direction the EZ-Steer system motor is installed: • *Standard Mount* • *Reversed Mount*
External Switch	Select a switching option if an external switch is connected to the system: • *Disabled* (Default) • *Seat Disengage* • *Seat Engage Only* • *Remote Engage*
Advanced	*Advanced* settings include: • Roll OffsetAngle • Estimated Steering Angle Bias • Dynamic Approach Angle • Steering acceleration limit • Steering slew limit ***Note –*** *Do not adjust the* ***Advanced Settings****. Advance Settings are provided for support and advanced troubleshooting only.*

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.

For the Antenna Height, measure the distance from the ground to the base of the GPS receiver (or antenna).

EZ-Steer system calibrations

Calibrations for the EZ-Steer auto guidance system include:

- Angle per turn calibration for EZ-Steer system, 176
- Roll correction for EZ-Steer system, 176

For information on:	See:
Diagnostics	EZ-Steer system diagnostics, 307

Roll correction for EZ-Steer system

1. Park the vehicle and mark the center lines of both the front and rear wheelbases on the ground.
2. 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.
3. Tap **Calibrate**.
4. Tap **Roll Calibration**. The calibration tool displays.
5. Follow the instructions on the calibration tool.
6. To accept the calibration, tap  .
7. To discard the calibration and start it again, tap  .

Angle per turn calibration for EZ-Steer system

Perform the Roll calibration before performing the angle per turn calibration.

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 wizard displays.
4. Begin the steps on the calibration procedure by driving the vehicle between 2 and 4 mph.

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 ***Run*** screen that represents an area of land. A field can contain one or more boundaries (perimeters) (or no boundaries). Information associated with each field includes:

- Boundaries, guidance lines and patterns for steering assistance
- Landmarks such as points, lines and area features
- Tasks
- Coverage information recorded during field activities when logging is activated
- Attributes such as Clients and Farms

To edit and refine boundaries, guidance lines and patterns, and landmarks, open the Field Manager (see Field Manager, 61).

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 (Run screen), 248 and Boundary editing (Field Manager), 249.

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 AB guidance line creation (Run screen), 251.
- **A+ line**: A straight line that you begin with point A and choose the direction you want the line to draw.
- **Curve**: A curved line 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 (Run screen), 252.

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 (Run screen), 253.
- **Pivots**: A circular area you create by recording your beginning point and stopping recording when you are finished. See Pivot pattern creation (Run screen), 258.

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 (Run screen), 264
- Landmark point creation (Run screen), 264
- Landmark area creation (Run screen), 265
- Landmark editing (Field Manager), 265

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, 238
- Coverage logging, 241

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 Preparing for operation, 234.

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

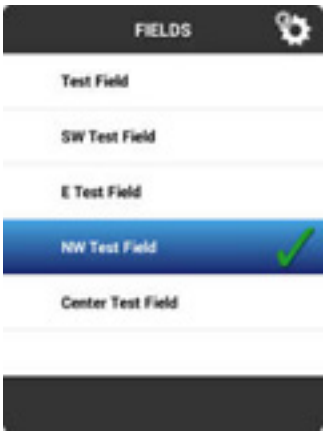
The points on the map ( )of the ***Home*** screen indicate fields you have created. Tap the point that represents the field.

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. To reduce the number of fields in the list, tap . A filter tool displays, showing the client name and the farms associated with the client.

3. Deselect (uncheck) the options you do not want to see and tap **Accept**. The Fields list now shows fields associated with the client and/or farm that you left checked.
4. Tap the name of the field to select it.



Note – *A field that has a check mark but is NOT highlighted is a previously selected field.*

Enter a field (*Run* screen)

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

- Set up a positioning service that is working. See GNSS receiver settings, 116.
- Set up a vehicle. See Vehicle setup, 140.
- Select a vehicle, 145
- Implement setup, 188.
- Select an implement, 189.
- Add a field, 181.
- Select a field, 182.

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 (Field Manager)

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.
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.

   Note – *To ensure your changes are saved, tap the Done key on the on-screen keyboard.*

3. To associate the field to a client, tap the Client name text box and enter a name.

   Note – *To ensure your changes are saved, tap the Done key on the on-screen keyboard.*

4. To associate the field to a farm, tap the Farm Name text box and enter the name of the farm.

   Note – *To ensure your changes are saved, tap the Done key on the on-screen keyboard.*

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 (Field Manager), 261
- Boundary editing (Field Manager), 249
- Landmark editing (Field Manager), 265

6. Tap  to save the changes and close the Field Manager.

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.

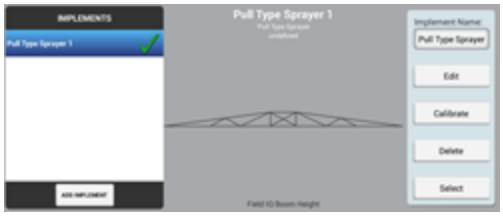
Implement setup

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, 140.

Add an implement

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



   Tap **ADD IMPLEMENT**.

2. At the OPERATION section, tap the type of operation that you will use the implement to perform.
3. At the IMPLEMENT / Type section, tap the type of implement you will be using. Then tap **Next** to continue.
4. At the NAME section, the system has pre-named the implement by giving it the name of the type. You have the option to enter a different name if you want to change it.
5. Tap **Next** to continue to the MEASUREMENTS section. See for further instructions.

Save an implement

You can save complete or incomplete implements.

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 and return to the ***Home*** screen.

Save incomplete implement settings

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

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

1. Select an operation type, make, model and name the implement. (See Implement setup, 188.)
2. At any point after you complete the NAME section, tap **SUMMARY**, then tap  .

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**. The name of the implement highlights in blue and a  displays next to the name.

   Note – *Without a blue highlight, the*  *indicates an implement that was selected previously.*

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, 222.

   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, 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

You can delete an implement. However, when you do so, all settings associated with that implement will also be deleted.

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.

ISOBUS for implements

ISOBUS is a set of software and hardware standards that makes possible the communication between equipment made by different manufacturers.

With ISOBUS, you can use the TMX-2050 display to control an ISO-certified implement without an additional display. An ISO-certified implement has small computers called electronic control units (ECUs) which send signals to the TMX-2050 display. An ISO-certified tractor has a tractor ECU (TECU) installed on it. ECUs on implements enable you to control the operation:

- With the TMX-2050 display, using Task Controller (an optional feature)
- With Virtual Terminal, an on-screen window that opens on the TMX-2050 display to access directly the functions provided by the ECUs

Task Controller setup

To set up the implement and TMX-2050 display for Task Controller:

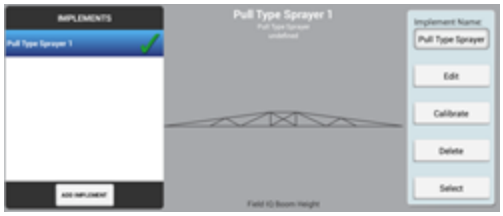
1. Connect the display to the ISO-certified implement with ISO cabling. See the *Getting Started Guide for ISOBUS on the TMX-2050 display*.
2. Set up the GNSS receiver to send messages to the implement. See CAN message settings, 130.
3. Unlock Task Controller. See Feature unlocks, 81.
4. Turn on the Task Controller feature. See ISOBUS settings, 87.
5. Set up the implement for Task Controller. See Implement setup for Task Controller, 191.

For information on:	See:
Using Task Controller	Task Controller operation, 282
Using Virtual Terminal	Virtual Terminal operation, 284

Implement setup for Task Controller

Note – *Before you set up Task Controller, you must unlock the feature (see Feature unlocks, 81) and have turned Task Controller on in the display settings (see ISOBUS settings, 87).*

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



   Tap **ADD IMPLEMENT**.

2. At the OPERATION section, tap the type of operation you will be performing with the implement.
3. At the IMPLEMENT / Type section, tap the type of implement you will be using. Then tap **Next** to continue.
4. At the NAME section, tap **ISO Implement Data**. A list of ECUs that are connected to the TMX-2050 display displays. Optionally, choose the ECU of the implement you will be using.
5. In the Name entry box, the system has pre-named the implement by giving it the name of the type. You have the option to enter a different name if you want to change it.
6. Tap **Next** to continue to the MEASUREMENTS section.
7. At the MEASUREMENTS section:
   a. If the implement is connected during setup, the system completes the measurements by getting this information from the ECU you chose in step 4. Verify this information and make any necessary corrections.
   b. If the implement is not connected during setup, enter the measurements manually. See .

   Tap **Next** to continue to APPLICATION CONTROL.
8. Tap  to turn on the application control feature for the channel.
9. Tap  .
10. Tap **Next**.
11. The display takes you to a set of screens to set up the channel, beginning with the TYPE section. Complete the settings at the TYPE screen and tap **Next**.

Tap...	To...
Material Type	Select the material you will be applying: • Anhydrous • Granular Fertilizer • Granular Seed • Liquid • Row Crop Seed
ISO Implement Data	Select the ECU of the implement you are using to assign this ECU to this channel. ***Note –*** *This is required before you can use this channel.*

12. At the SETTINGS screen, tap  to turn on:
    a. Rate Control to use rate control. There is no need to complete any other settings because the ECU provides this information.
    b. Rate Snapping to use rate snapping.This setting smooths out rate fluctuations seen on the screen.

Setting	Explanation
Off	The display shows instant readings from the feedback sensor. This may show frequent minor rate fluctuations.
On	The display smooths out the values. You will see the target rate as the applied rate whenever the applied rate is within 10% of the target rate.

    c. Section Control if you want to use section control.
13. If you chose to use section control:
    a. While still at the SETTINGS screen, tap **Number of Sections**. The ECU sends this information to the system. Verify the number of sections and tap **Next**.
    b. At the WIDTH screen the system shows the number of sections you indicated in the previous screen and the width of each section. This information is obtained from the ECU.
    c. Tap **Next** to continue to LATENCIES.
    d. At LATENCIES, enter the applicable settings for section control and tap **Next**.

    Latency refers to the delay between when the command occurs (to turn a section on or

off) and when application of the material actually starts or stops.

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 uses on latency to begin applying material 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.

e. At OVERLAPS enter the appropriate settings for section control and tap **Next**.

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.

Tap...	To...
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.

14. At the SUMMARY screen, review the settings and tap  to save the settings for this channel.
15. For each additional channel, complete steps 9 through 14.
16. Complete the implement setupand save the Implement Summary. For instructions on Boom Height, Inputs and Summary, see:
    - Boom height control, 210
    - Inputs, 219
    - Review implement summary, 222
17. If you have not already done so, complete the setup for sending GNSS signals to the implement (see CAN message settings, 130).
18. Set up the ISO-certified equipment to use Task Controller. See Equipment setup, 195.

To operate the Task Controller, see Task Controller operation, 282.

Equipment setup

As part of getting the implement ready to be controlled by Task Controller, you use Virtual Terminal to set the configuration for the implement.

1. Make sure the ISO-certified implement is connected and Virtual Terminal is turned on in Settings (see ISOBUS settings, 87).
2. At any screen access the main menu by tapping  . The main menu displays.
3. Tap  . The Virtual Terminal displays.
4. Follow the instructions for the equipment you are using to set the implement for using Task Controller. See the *ISOBUS Getting Started Guide for the TMX-2050 Display*.

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. When the Field-IQ feature is installed, the TMX-2050 display can control spraying.

Prior to setup

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, 140.
- Set up an implement. See Implement setup, 188.

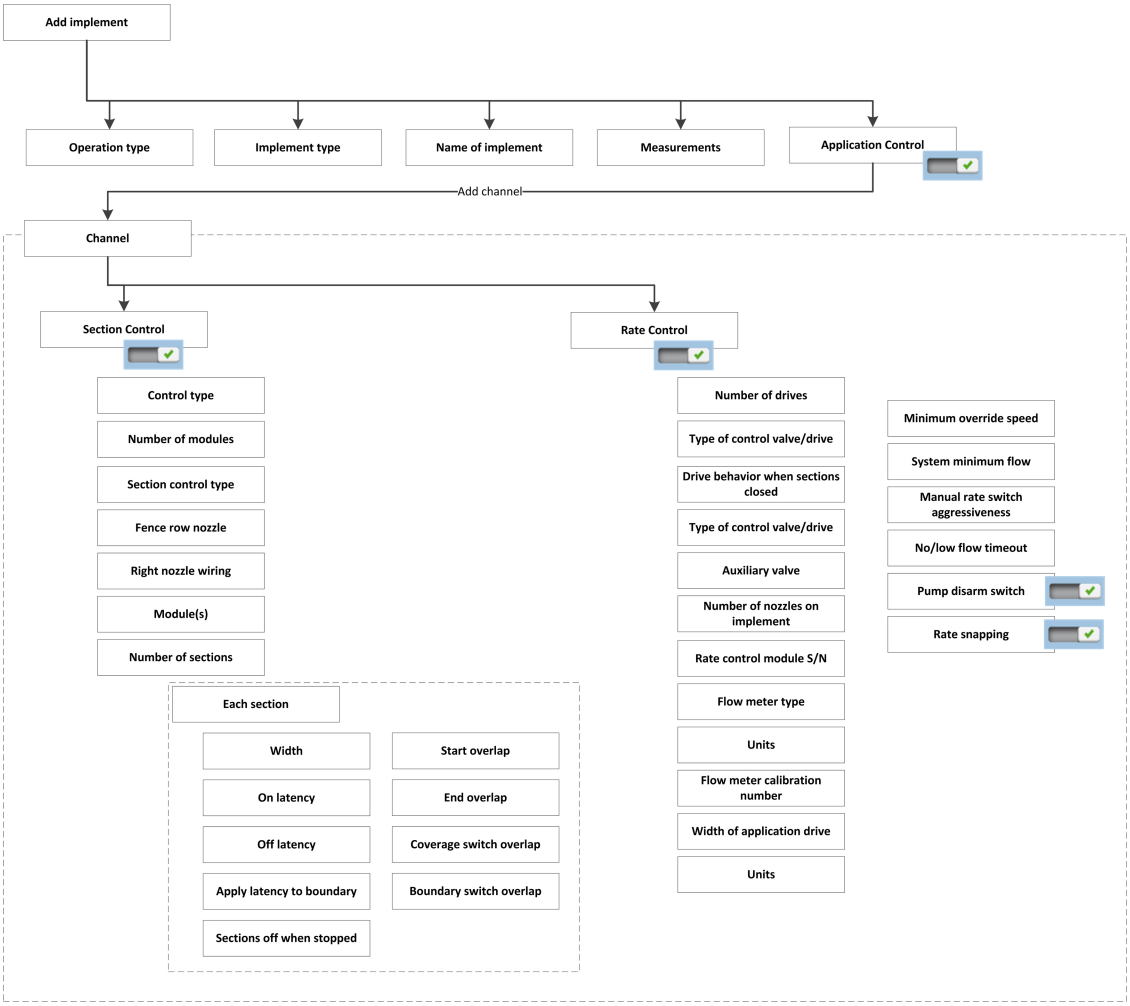
Channel setup

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

1. Turn on application control and Add a control channel, 197.
2. For each control channel, complete the following settings as they apply to your equipment:
   - Section control, 198
   - Rate control, 202
   - Adjustments, 207
3. Review the channel configuration, see Summary, 207.
4. To calibrate drives for Rate and Section Control, see Calibrate application control drives, 205.

Setup diagram

The following diagram shows the setup sequence for a sprayer with Rate and Section Control.



Add a control channel

To add an application control channel (such as Field-IQ):

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  .
6. Tap **Next**.
7. The display takes you to a set of screens to set up the channel, beginning with the TYPE section.

Tap...	To...
Material Controlled By	View the current option (control the material using a switch box).
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 . • 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	The system names the channel. You can optionally change the name of the channel.

8. Tap **Next** to continue. The display goes to one of the following, depending on your configuration:
   a. Section control, 198.
   b. Rate control, 202.

Section control

At the Settings section for section control setup:

1. Tap  next to Section Control to turn on this feature. This toggles section control on or off for the current channel.
2. Tap **Control Type**.

Tap...	To...
Field-IQ individual sections	Use Field-IQ Rate Control modules for Section Control. Continue to the next step (3).

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.
Section Control Type	Select the type of section control hardware you have installed: • Boom Valve : The section control module sends power to the section valve to turn on the clutch off. • Tru Count Liquid-Block Valve™ : The section control module sends power to the section valve to turn on the clutch on. • Tru Count Air Clutch®: The section control module sends power to the section valve to turn on the clutch on. • Tru Count Section Electric Clutch: The section control module sends power to the section valve to turn on the clutch off.
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 Modules, 199.

Modules

1. At the Modules section for Section Control, tap the box for the module and 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  when you have completed the settings for each module. Then tap **Next** to continue to Width, 200.

Note – *When you upgrade the TMX-2050 display firmware, the firmware for Field-IQ modules are also upgraded. There are no additional steps required to upgrade modules.*

Width

1. At the WIDTH section for Section Control, review the width of each section per module.
2. To change a width of a the section, tap it. Begin with the first one on the left, and work from left to right.
3. The system will not allow you to change the width of the sections to be more or less than the total width of the implement.
4. Tap **Next** to continue to Latencies, 200.

Latencies

Latency refers to the delay between when the command occurs (to turn a section on or off) and when application of the material actually starts or stops.

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.

Tap...	To...
Apply ON 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 uses on latency to begin applying material 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 Overlaps, 201.

Overlaps

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

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	The maximum number of drives is 1.
Control Valve/Drive Type	Choose the type of drive that you is installed: • Fast Bypass Servo • Fast Servo: 4-wire servo valve • Hardi % Bypass • PWM: 2-wire PWM valve (commonly used to control hydraulic flow) • Pump Servo • Standard Bypass Servo • Standard Servo: 2-wire standard servo valve ***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.*
Auxiliary Valve (for inline liquid/anhydrous channels only)	Set the auxiliary valve: • Disable- The equipment does not have an auxiliary control valve. • Dump - Valve opens to dump flow-to-return line when the system is turned off. • Master - Valve closes when the system is turned off.
Number of Nozzles	Enter the number of nozzles on the implement, between 1 and 999.

Tap...	To...
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.

3. Tap **Next** to continue to Valve/Drive, 203.

Valve/Drive

1. At the VALVE/DRIVE section for Rate Control, tap the box that represents 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 shows 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  . Then tap **Next** to continue to Width, 204.

Width

1. At the Width section for Rate Control setup, the width is equal to the implement width and cannot be changed.
2. Tap **Next** to continue to Adjustments, 204.

Adjustments

At the Adjustments section for Rate Control setup, review and change settings as necessary. When you are finished with all the settings, tap **Next**.

⚠ **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.

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.

Tap...	To...
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.

Calibrate application control drives

⚠ **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.

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 section.
4. Tap **Application Control**.
5. Tap the channel to calibrate it. A popup displays.
6. Tap **Calibrate**. The calibration tool displays, beginning at the Drive Limits section.
   - 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 Drive Settings section.

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 travels at this speed.

Setting	Description
Target Rate	Set test rates to use for Rate 1 and Rate 2.
Master Switch	Indicates whether the Field-IQ Master Switch is on or off.
Applied Rate	The applied rate for comparison to the *Target Rate*.
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.
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, 202).
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)*.

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

For information on:	See:
Diagnostics	Boom Height Diagnostics, 300
Control and adjustments during operation	Boom height control operation, 276

Virtual tank/bin

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

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 capacity.
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.

3. Tap **Next** to continue to Adjustments, 207.

Adjustments

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.
Jump Start Timeout	Adjust start timeout. This setting limits the length of time you can run the jump start. ***Note –*** *Auto-control resumes if Jump Start Speed is exceeded by ground Speed.*
Shut Off Speed	Adjust shut off speed. The system shuts down if the implement drops below this speed.

When you have completed these settings, tap **Next** to continue to Summary, 207.

Summary

The Summary section shows an overview of all the settings for the channel.

1. Review the channel details.
2. To change channel settings, tap **Back** until you reach the section you wish to edit..
3. Tap  . The display saves the channel and returns to the Application Control section for implement setup.
4. Tap **Next** to continue to:
   a. Boom height control, 210, if applicable
   b. Inputs, 219, if applicable

Modify a control channel

To edit 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 **Modify**.
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.

Remove a control channel

To remove 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 **Remove**. 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 X to cancel the removal.

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.

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.*

Implement setup 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:

- Unlock and install Field-IQ Boom Height Control.
- Add, configure and calibrate a vehicle. See Add a vehicle, 140.
- Set up the implement. See Implement setup, 188.

Note – *A SIM must be present before you can use Boom Height Control.*

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

1. Boom height control setup, 210
2. Sensor location, 211
3. Operation settings, 212

For information on:	See:
Calibrating boom height	Calibrate boom height control, 215
Diagnostics	Boom Height Diagnostics, 300
Control during operation	Boom height control operation, 276
Adjustment during operation	Boom height adjustments, 278

Boom height control setup

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

Tap....	To....
Boom Height	Turn the feature on or off.
TM-200 Module S/N	Choose the appropriate serial number of the TM-200 Module.

Tap....	To....
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 height
Valve/Drive Module S/N	Choose the serial number of the valve/drive module.

2. Tap **Next** to continue to Sensor location, 211.

For information on:	See:
Control during operation	Boom height control operation, 276
Adjustment during operation	Boom height adjustments, 278

Sensor location

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 box to complete the settings for the sensor.

   Note – *The current display shows the center section of the boom as a side view and the right boom as the left boom. This does not hinder functionality or settings.*

Tap...	To....
Enabled	Turn the sensor on or off.
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. (Does not apply to the center section.)
Nozzle Offset	Enter the distance from the transducer surface to 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 Operation settings, 212.

For information on:	See:
Control during operation	Boom height control operation, 276
Adjustment during operation	Boom height adjustments, 278

Operation settings

At the OPERATION section of 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 setup, 210 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 setup, 210.)*

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.
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.

Tap...	To...
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.*
Target Height Step	The distance the target height will increase.

Tap...	To...
Advanced	Opens the advanced settings: *Boom Down Rate:* Reduce this setting to lower the maximum downward speed of the boom. *Sensor Sensitivity:* Low, normal or high. *Sensor Canopy Filter:* Off or on *Sensor Ground Filter:* Off, low, medium or high *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 the 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 the threshold: will improve the boom roll stability. Default is 4 inches (0.1m). Minimum = 0 (aggressive ground avoidance. Maximum = 1.0 (effectively disabled). *Auto Disable Timeout*: Sets the "Timeout" time frame if the system "Enable" button was selected and the system was not "Engaged", after this period of time the system will disable itself. 30 or 60 seconds. *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.* *Roll Dampening Threshold:* Use this height error threshold to help dampen underdamped wins and improve roll stability. 4-8 inches (0.1-0.2m) is typical. A value of 0 (default) disables this additional dampening.

Tap **Next** to continue to Inputs, 219.

For information on:	See:
Control during operation	Boom height control operation, 276

For information on:	See:
Adjustment during operation	Boom height adjustments, 278

Calibrate 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.*
- Use the manual control panel to test the system prior to calibration. See Boom height manual control test, 216.

For information on:	See:
Diagnostics	Boom Height Diagnostics, 300
Control during operation	Boom height control operation, 276
Adjustment during operation	Boom height adjustments, 278

Boom height calibration steps

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.
2. Tap **BOOM CALIBRATION**.

3. Tap **Calibrate** for the boom you want to calibrate. The calibration tool displays.

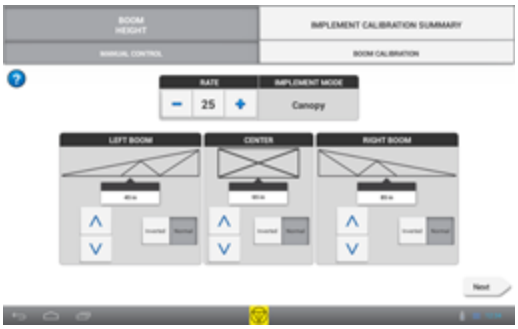
> ⚠ **WARNING –** Moving parts during this operation. Make sure that the implement is safe to operate.

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. For these settings, see Operation settings, 212, under the Advanced setting.
7. Complete steps 2 through 6 for each boom drive.
8. Tap **Next** to continue to the Calibration Summary.
9. At the Calibration Summary, tap 💾 to save the settings.

Boom height manual control test

Before you calibrate boom height, make sure the booms are reacting as you would expect to raise and lower commands.

1. Access the manual control panel 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 panel displays.
2. Tap **Manual Control**. The MANUAL CONTROL section displays.



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 lights 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 lights up, check the wiring.
4. If you do not have a SIM module:
   a. Tap v for each boom you are working with. Make sure that the boom goes up.
   b. Tap v for each 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. Each control has an up and down button for manual control. Use Rate to adjust the actuator output speed. If the boom moves too quickly, adjust the rate value down and vice versa. Each zone has:
   - A canopy height readout for each sensor associated with that zone
   - A status indicator for the manual height control switches associated with the zone (if enabled)

   Refer to the installation guide for troubleshooting assistance.
6. For each boom section:
   a. Press and hold the up button.
   b. Verify that the appropriate section of boom moved up.
   c. Verify that the height readings for each sensor on that boom increased.
   d. Press and hold the down button.

e. Verify that the appropriate section of boom moved down.

f. Verify that the height readings for each sensor on that boom decreased.

g. Verify external switches are connected correctly by pressing each vehicle manual boom control switch. The switch status corresponding to each input should turn green while the switch is pressed.

7. If the booms operate as you expect, tap **Next** to continue to boom calibration. (See Boom height calibration steps, 215.)

8. If the booms are not operating as you expect, you will not be able to calibrate and you will have to troubleshoot the system.

Inputs

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

Add a sensor

1. Turn Sensors on by tapping  .
2. Tap  to add a sensor. The TYPE section displays.

Type of sensor

1. Choose the type of sensor you are using:
   a. Air pressure
   b. Liquid pressure
   c. Vacuum pressure
2. Turn the sensors feature on by tapping  .
3. Tap  .
4. Tap the name entry box to edit the name of the sensor.
5. Tap **Next** to continue to the Location section.

Location of sensor

At this section, complete the following settings.

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.
Display in Control Channel	Shows name of 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

Tap **Next** to continue to Alarms.

Alarms

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

1. Turn on Alarms by tapping  .
2. 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.

3. Tap  . The display saves your settings and returns to the Inputs section (see Inputs, 219).
4. Tap  to add another sensor.
5. Tap **Next** to go to the SIM section (see .

   Note – *All pressure sensors must be calibrated. When you are ready to perform the calibration, see Inputs / Sensors calibration, 221.*

SIM

Note – *If you are using Boom Height Control, a SIM is required.*

If your system has a SIM, at the SIM section choose the type of sprayer. If your system does not have a SIM, tap **Next**.

You may also choose to enable or disable boom height here.

1. For some self propelled sprayers that are using the SIM to control sections for Field-IQ on the factory joystick or console, tap **Application Control FIQ** and select the sprayer you are using.
2. If you need to disable the override feature on the booms, tap **Boom Height** and choose disable. This will cause the joystick controls to no longer disengage automatic boom height control.
3. Tap **Next** to continue to the Summary section.

Inputs / Sensors calibration

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. Tap the sensor you want to calibrate. A popup displays.
6. Tap **Calibrate**.
7. Tap **Enabled**.
8. Tap **Calibration Type** and select the type of calibration you wish to perform:
    a. *High/Low* - More accurate and requires a pressure gauge for reading the actual pressure. (If you chose this type, continue to step 9.)
    b. *Point/Slope* - Requires a slope value for the equipment from the manufacturer of the implement. (If you chose this type, continue to step 10.)
9. To complete calibration for the High/Low method:
    a. Tap **Start 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
10. To complete calibration for the Point/Slope Method:
    a. Enter the *Slope* value for the sensor from the manufacturer.
    b. Tap **Start 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.

11. Repeat Step 5 through Step 10 for each sensor. When finished, 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 implement 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.	

Prescriptions

The information in a prescription is used to send target rates to the variable rate controller. Applied rates are received from the controller, and both target and applied rates appear on the screen. With prescriptions functionality, you can:

- Transfer one or more prescription files to or from the TMX-2050 display (import or export)
- Assign a prescription to a channel
- Use a prescription to determine the rates to be applied in different areas of a field

For information on:	See:
Prescriptions Manager	Prescriptions Manager, 66
Import prescriptions	Importing prescriptions, 223
Export prescriptions	Exporting prescriptions, 223
Assign a prescription	Assign a prescription, 280
Use a prescription	Use a prescription, 281

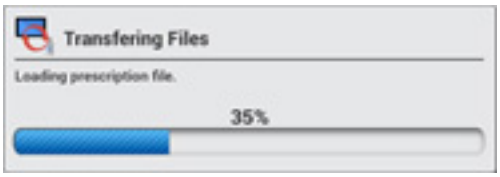
Importing prescriptions

Note – *If you are using USB to import, make sure your USB drive has the AgGPS folder on the root, and the prescription files are in this folder.*

You can import prescription files using:

- USB
- Office Sync

1. To transfer one or more prescriptions to the TMX-2050 display, follow the steps at Data transfer, 67.
2. When transferring using USB, at the USB list on the left side of the data transfer panel, you can select the entire prescriptions folder or individual files within the folder.
3. During the transfer, the TMX-2050 display shows the progress of the transfer.



Exporting prescriptions

Note – *If you are using USB to export, make sure your USB drive has the AgGPS folder on the root.*

You can export prescription files from the TMX-2050 display using a USB drive. See Data transfer, 67.

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

You assign materials to material control channels for the Field-IQ system Rate and Section Control.

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

- Add a material, 227
- Assign a material to a channel, 229

You must also calibrate the material flow. See Calibrate material flow, 230.

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

Material list

The categories and types of materials in the Materials library are listed below.

Anhydrous

The materials in this category are Anhydrous and Other.

Granular fertilizer

- Adjuvant
- Fertilizer/Lime
- Fungicide
- Growth Regulator
- Herbicide
- Insecticide
- Manure
- Nematacide
- Other
- Rodenticide

Liquid

- Adjuvant
- Fertilizer/Lime
- Fungicide
- Growth Regulator
- Herbicide
- Insecticide
- Manure
- Nematacide
- Other
- Rodenticide
- Water

Granular seed

- Barley
- Beans, Dry
- Millet
- Oats
- Rice
- Rye

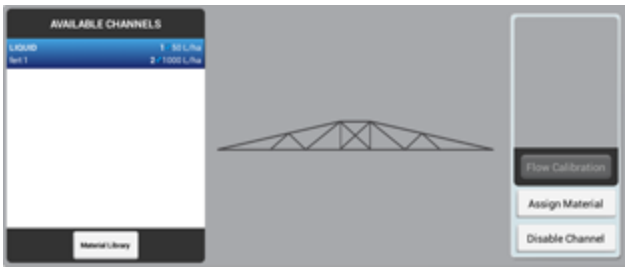
- Canola
- Corn
- Corn, seed
- Cotton
- Other
- Peanuts
- Popcorn
- Potatoes
- Sorghum Grain
- Sugar Beets
- Sunflowers
- Wheat

Row crop seed

- Barley
- Beans, Dry
- Canola
- Corn
- Corn, seed
- Cotton
- Millet
- Oats
- Other
- Peanuts
- Popcorn
- Potatoes
- Rice
- Rye
- Sorghum Grain
- Sugar Beets
- Sunflowers
- Wheat

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 Name	Tap the text entry box and then use the on-screen keyboard to enter a name for the material.
Material Category	Select the type of material being applied: • Anhydrous • Granular fertilizer • Granular seed • Liquid • Row crop seed
Type	Type of material (see Material list, 226)
Distributed 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.
Material Details (optional)	Set additional details, if needed: • EPA Product Number: Enter the registration number for the material from the environmental protection agency for the area, if applicable. • Manufacturer: Enter the material manufacturer's name. • Restricted Use: Tap **Yes** or **No** to record whether use of the material is restricted by local, regional, or national laws. • Posting required • 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, 227.
5. Tap  .

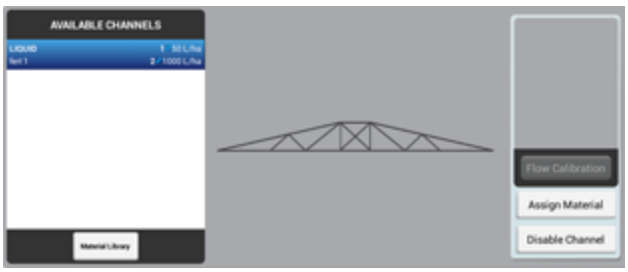
Delete a material

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, 197.*

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.

   Note – *For the most accurate application, calibrate the flow. See Calibrate material flow, 230.*

Calibrate material flow

For the most accurate application, calibrate the flow.

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

⚠ **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.

Pre-calibration steps

Before you calibrate flow:

1. Complete the implement and rate control configuration and calibrations.
2. Select a control channel and assign a material. See Managing materials, 226.

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 ✗.

Chapter 10

Operations

In this chapter:

During operations while working in the ***Run*** screen, you can create and adjust guidance patterns, engage or disengage the steering system, start a new task, include status widgets on the screen and make adjustments to steering, guidance, rate and section control and boom height control.

Preparing for operation

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

- Set up a positioning service. See Connectivity concepts, 133 and ensure GNSS is functioning correctly.
- Add a field, 181.
- Preparing for operation, 234.
- Set up a vehicle. See Vehicle setup, 140.
- Select a vehicle:

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

  c. To select the vehicle before performing field activities at the ***Run*** screen, tap **Select**. A ✓ and the blue highlight indicates which vehicle you chose.

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

- Set up an implement. See Implement setup, 188.
- Select an implement. See Select an implement, 189.

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

Fields and guidance

When you enter a field, you can create boundaries, guidance patterns and landmarks within that field. To edit any of these elements, open the Field Manager. Here you can rename your field, and include the name of your client and the name of the farm where the field is located.

For information on:	See:
Fields	Field Basics, 180
Field Manager	Field Manager, 61

Tasks

While in the ***Run*** screen, you can log coverage of the activity you are performing in the field. As your activity is logged, applicable information is saved in a task. The information related to each task

includes (but is not limited to):

- The field in which the task took place
- Time and date
- The type of operation performed

When you pause during a field activity, you can continue the same task or you can begin a new task (if you will be performing a different type of operation). At the Field Manager, you can view the history of tasks completed for each field.

For information on:	See:
Field Manager	Field Manager, 61
Tasks	Tasks, 238

Layers

While the system is logging your field activity, you have the option to view one layer of activity at a time. For example, you can view overlaps in coverage or the speed of your vehicle throughout the operation. You must have logging on to see layers of coverage.

For information on:	See:
Layers	Layers, 267

Adjustments during operation

While you are performing field activities, you can make adjustments to:

- Steering (see Steering adjustments, 244)
- Guidance patterns (see Guidance adjustments, 244)
- Boom height (see Boom height adjustments, 278)
- Field IQ operations (see Field-IQ system operations, 270)

Automatic transfer of data

The TMX-2050 display can wirelessly transfer information recorded during your field activities to Connected Farm and the office. This requires:

- A DCM-300 modem
- A subscription to Office Sync

- A data plan or access to WiFi
- A Connected Farm account

For information on:	See:
DCM-300 modem	DCM-300 modem, 98, Modem services settings, 88 and DCM-300 modem initial setup, 130
Office Sync	Office Sync setup, 130 and Office Sync data transfer, 69

Tasks

A task consists of the combination of implement type and the selected field. The TMX-2050 display stores field activities related to each task. By using tasks, you do not have to continually configure frequently used field profiles.

When you enter a field 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.

Data stored in each task

The data stored in each task includes:

- The field you are working in
- Date and time for starting and stopping task
- Coverage list: The list of task coverages for the field
- Coverage overlap: The area of coverage overlap
- Height: Mean height above sea level
- Speed: The speed of the vehicle
- Material: The material being applied, if applicable
- Guidance engaged: When the automatic guidance system was and was not engaged
- Applied rate: The rate material is applied
- GPS Quality: The quality of GPS

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 currently stored task, 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.

Add a task (Run screen)

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

Review existing tasks (Field Manager)

1. Select the field. See Select a field, 182.
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

Review existing tasks (Field Manager)

1. Select the field. See Select a field, 182.
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

Edit a task (Field Manager)

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.

Coverage logging

Coverage logging:

- Records the area that you have covered when you carry out an operation, for example applying fertilizer to a field
- Allows you to see different map layers of your coverage as you are working in the field.

Manual coverage logging

To activate coverage logging, tap  .

Automatic logging with engage

If your system has been configured to do so, coverage will start when your auto guidance system is engaged. Coverage will stop when auto guidance is disengaged. To turn on this capability, see Patterns settings, 83.

If automatic logging is activated, you can still turn logging on or off when engaged or when disengaged.

Editing layers

To edit settings for layers, see Edit a coverage layer, 268.

Vehicle operation

At the ***Run*** screen, tap the screen to display the vehicle position buttons. The **Engage** button shows the status of your auto guidance system as well as enables you to tap on the button to engage the system.

⚠ **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.

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.
	Zooms view in or out on the ***Run*** screen.

Engage status with auto guidance

When the **Engage** button turns yellow, you can tap it to engage the auto guidance. After your guidance system is engaged, the button changes to green.

⚠ **WARNING –** Auto guidance systems cannot avoid items in the field such as obstacles. Make sure you are adequately trained to operate the auto guidance system.

Indicator/Button	Auto guidance system is...
 Gray Engage Disabled	Disabled. Enable it in the steering control panel. This is an indicator only.
 Red Cannot Engage	Does not have the proper conditions met to engage. Tap to determine the reason.
 Yellow Ready to Engage	Ready to engage (yellow). Tap to engage the auto guidance system.
 Green Engaged	Engaged (green). Indicates you are engaged on a pattern or line and are using auto guidance. Tap to disengage.

Steering adjustments

To adjust steering while performing field activities, at the ***Run*** screen, tap  . The system displays the steering adjustment buttons.

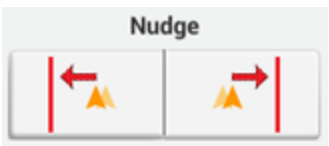
Button	Use to...
Vehicle Aggressiveness 	Adjust the vehicle aggressiveness.
Autosteering Enabled 	Enable or disable auto steering.

For information on:	See:
Vehicle aggressiveness	• For Autopilot: Engage aggressiveness, 166 • For EZ-Pilot: Online aggressiveness calibration for EZ-Pilot system, 171
Diagnostics	Autopilot system diagnostics, 296, EZ-Pilot system diagnostics, 303, EZ-Steer system diagnostics, 307

Guidance adjustments

To adjust guidance while performing field activities, at the ***Run*** screen, tap  . The guidance adjustment buttons display.

Note – *These adjustments are removed if you enter a new task. Your system may also be set up to remove these adjustments with a power cycle. See Steering and guidance, page 1 for these settings.*

Buttons	Use to...
Nudge 	Temporarily move the vehicle left or right depending on the direction you chose. . To set the increment that nudge moves, see Steering and guidance settings, 85.

Buttons	Use to...
Remark 	Temporarily move the pattern to the vehicle's current location. For information on re-mark settings, see Steering adjustments, 244.
Implement Draft Correction 	Move the implement back on the guidance line if the implement is physically drifting offline in the field. The value between the arrow buttons indicates the amount of distance for the correction. To set the increment that implement draft correction moves, see Steering and guidance settings, 85.

Guidance patterns

Guidance items you can place in the field from the ***Run*** screen include:

- Boundaries
- Straight or curved lines
- Headlands
- Pivots

After you have created guidance items, you use Field Manager to:

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

To create:	To edit:	Settings/adjustments:
Go to the ***Run*** screen. See: • AB guidance line creation (Run screen), 251, A+ guidance line creation (Run screen), 252, Curved line creation (Run screen), 252 • Boundary creation (Run screen), 248 • Headland and infill pattern creation (Run screen), 253, Pivot pattern creation (Run screen), 258	Open Field Manager. See: • Guidance pattern editing (Field Manager), 259 • Boundary editing (Field Manager), 249	At the ***Run*** screen: Adjust during field activities: Guidance pattern adjustment (Run screen), 260 At Settings: Set where the beginning of the guidance line begins in relation to the equipment. See Patterns settings, 83

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

Guidance creation 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 (Run screen), 248.

Button	Tap to...
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 (Run screen), 253.
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 (Run screen), 258.
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 (Run screen), 251.
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 (Run screen), 252.
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 (Run screen), 252.
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.

Button	Tap to...
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 Point 	Set the heading direction for an A+ line to a compass direction. See A+ guidance line creation (Run screen), 252.
Use Current Heading 	Set the heading direction for an A+ line based on the vehicle's current position. See A+ guidance line creation (Run screen), 252.
	Lock the current angle of the vehicle. See A+ guidance line creation (Run screen), 252.

Boundary creation (*Run* screen)

You can change the point on the implement's swath where you wish to record the boundary's edge: Right, Center, or Left. To make this change, tap  before you begin driving.

1. Enter the field where you want to create the boundary. (See Preparing for operation, 234.)
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 settings, 83.
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 or .
8. To cancel the boundary line creation, tap .
9. To edit any boundary you have created, see Boundary editing (Field Manager), 249.

Boundary editing (Field Manager)

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.
Delete 	Remove the selected pattern.

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

For information on:	See:
Field Manager	Field Manager, 61

Boundary activation/deactivation (Field Manager)

You can activate or deactivate boundaries in a selected field.

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 **BOUNDARIES**.
3. Tap on the boundary in the list on the right-hand side.
4. Tap  (red) to activate an inactive boundary.
5. Tap  (black) to de-activate an active boundary.

For information on:	See:
Field Manager	Field Manager, 61

AB guidance line creation (*Run* screen)

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 Preparing for operation, 234.)
2. Tap  . The pattern buttons display.
3. Tap  .
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  .
6. To save the line, tap  . The distance between swath lines is based on the width of the

implement that was used to create the line.

7. To cancel the AB line creation, tap  .

A+ guidance line creation (*Run* screen)

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, 182.)

   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 Preparing for operation, 234.)
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:

   - To use the direction that the vehicle is facing as the heading, tap  .
   - To use the on-screen number pad to enter an exact heading, tap the number.
   - 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  .

Curved line creation (*Run* screen)

1. Enter the field where you want to create the boundary. (See Preparing for operation, 234.)
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 the recorded path with a dashed line between the starting point and the vehicle's current location.
5. To create a straight line as part of your curved line, tap  and then tap  again.
6. When you are at the end of the line, tap  .
7. To cancel the line creation, tap  .

Headland and infill pattern creation (*Run* screen)

1. Select a vehicle, implement and field. (See Select a field, 182).

   Note – *The display uses the implement width to place the headland 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. Optionally, 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 the position you were at when you tapped record. You can tap  and then  again, as required.
   - 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 (Run screen), 251
- A+ guidance line creation (Run screen), 252
- Curved line creation (Run screen), 252

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 settings, 83.
10. When finished, the display:
    a. Saves the headland pattern with a unique name (for example, HL01).
    b. Generates an inner boundary and an outer boundary based on the recorded path and the width of the implement. The headland boundaries are saved with a unique name related to the headland (for example, HL01 inner boundary and HL01 outer boundary).
    c. Generates an infill swath based on the number of circuits selected and the width of the implement. The infill swath is saved with a unique name related to the headland (for example, DefaultInfillSwath).
11. To cancel the pattern creation, tap  .

Infill pattern shift

To shift the infill pattern, complete the following steps.

1. At the ***Run*** screen, open the Field Manager by tapping  .
2. Tap **GUIDANCE PATTERNS**.
3. In the list of patterns, tap to select the infill pattern you want to shift, and tap **Activate**.
4. Tap **Shift**. The Shift Pattern tool displays.

5. Tap ← to shift the pattern left or tap → to shift the pattern right.
6. In the entry box, enter the distance you want to shift the pattern.
7. Tap ✓ to save the shift.
8. The shifted pattern is saved with a new name.
9. Tap the headland circuit pattern to select it, and tap **Activate**.
10. Tap **Infill**. The Infill Selection list displays.

11. Tap ⚙. The All Guidance Lines list displays.

12. Tap to highlight all the infill patterns (including the shifted pattern you just created) you want to associate with the headland pattern you activated.
13. Tap ✓. The Infill Selection list displays again.

14. Highlight the shifted swath and tap ✓.
15. The shifted infill is now activated along with the headland swath.
16. Tap **Boundaries**. Activate the inner headlands boundary.

17. Tap **Exit** to closes the Field Manager.
18. Verify that the shifted infills are now shown and can be used for guidance.

Change the infill pattern

Note – *This process assumes you have an existing headland and an infill pattern has been created.*

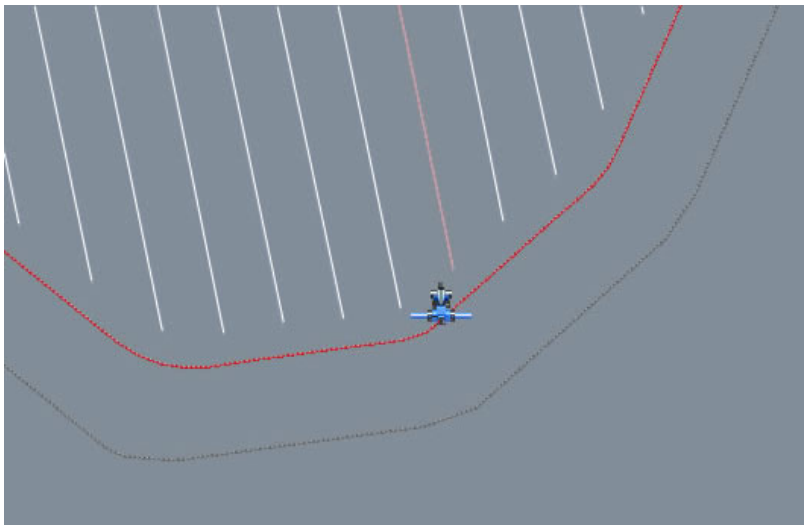
1. Select a vehicle, implement and field. (See Select a field, 182).

   Note – *The display uses the implement width to place the headland boundary, space the circuits and project guidance lines for the pattern.*

2. Tap  to enter the field.

   If you need to create a new infill pattern to change to, go to step 3.

   If you have an existing infill pattern you want to change to, go to step 4.

   Note – *If the system has been turned off, when you enter the field you will only see the headland on the **Run** screen and not the infill pattern.*

3. At the ***Run*** screen, create a new guidance line to use as the infill pattern. (See AB guidance line creation (Run screen), 251 or A+ guidance line creation (Run screen), 252).

   Note – *This new guidance line is automatically made active by the system, which deactivates all other guidance patterns, including the headland you are working with.*

4. Open the Field Manager by tapping  .

5. At the **Guidance Patterns** tab:
   a. Highlight the headland circuit pattern you want to work with and tap **Activate**. (This is not necessary if you want to change to an existing line and did not need to create a new one in step 3.)
   b. Tap **Infill**. The Infill Selection list displays. This lists the infill pattern that is currently assigned to use with the headland.

   c. Tap  .

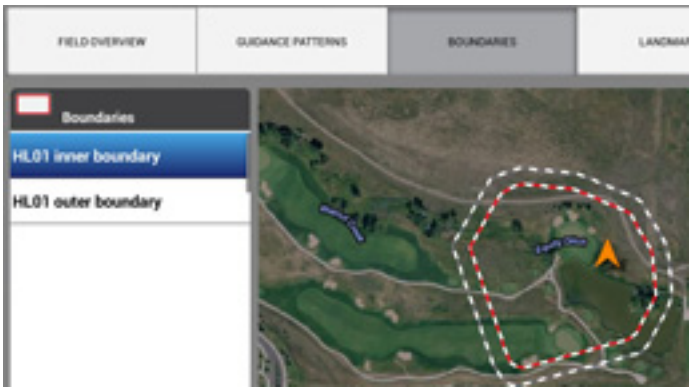
      The All Guidance Lines list displays. This lists all guidance lines that have been created for this field that are within the headland boundary.

   d. Tap to highlight the guidance lines you want to associate with the headland (including the new guidance line you created in step 3).

      Tap ✓. The Infill Selection list displays again.

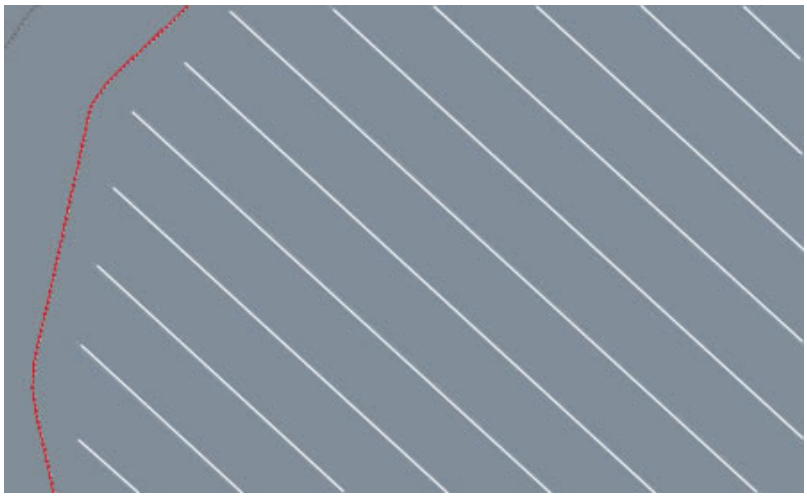
   e. At the Infill Selection list, highlight the guidance line you want to change to and tap ✓. This assigns the guidance line to the headland.

6. Tap **Boundaries**. In the Boundaries list on the left-hand side, tap the inner boundary of the headland, then tap **Activate**.



7. Exit the Field Manager by tapping **Exit**.

   The new infill pattern will show in the inner boundary of the headland.



Pivot pattern creation (*Run* screen)

1. Enter the field where you want to create the pivot. (See Preparing for operation, 234.)
2. Tap  . The pattern buttons display.
3. Tap  .
4. Tap  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. Drive at least 50 feet on an outer tower rut and then tap  .
6. Enter the distance to the Pivot Field Edge and tap  .
7. When finished, the display:
   - Saves the pivot pattern with a unique name (for example, P01).
   - 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, P01 Boundary).
   - Makes the pivot boundary active.

8. To cancel the pivot creation, tap  .

Guidance pattern editing (Field Manager)

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**. The map and the Patterns list show the patterns in the selected field.
3. Tap the pattern you want to edit.

   The pattern must be active before you can edit it. If the pattern is not active, tap  (red) to make it active.
4. The display highlights the active pattern in blue on the map.
5. If you have chosen a headland, you can change the number of circuits in a headland.
6. Tap  to resize the pattern you have chosen.

   Or for a pivot pattern, tap  .
7. Edit the size of the pattern and tap  .
8. To cancel the change, tap  .
9. To exit Field Manager, tap  .

For information on:	See:
Field Manager	Field Manager, 61

Pattern activation/deactivation (Field Manager)

You can activate or deactivate patterns in a selected field. To engage your auto guidance system on a line, pattern or headland, it must be active.

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. To activate:
   - An inactive pattern, tap  (red).
   - An inactive guidance line, tap  (red).
5. To de-activate:
   - An active pattern, tap  (black).
   - An active guidance line, tap  (black).

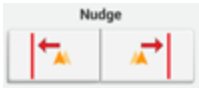
For information on:	See:
Field Manager	Field Manager, 61

Guidance pattern adjustment (*Run* screen)

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

The system displays the guidance adjustment buttons.

Note – *These adjustments are called "temporary" because they are not stored in the system. After reboot or power off, the system returns to the original settings.*

Button	Use to...
Nudge 	Moves the position of the vehicle in a perpendicular direction (left or right) to the line you are engaged on currently. To adjust the size of the increments, see Steering and guidance settings, 85.
Remark 	Temporarily move the line or pattern to the vehicle's current location or the value entered by you.

Button	Use to...
Implement Draft Correction 	Temporarily adjust the implement 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 settings, 85.

Guidance pattern shifting (Field Manager)

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  (black) to make it inactive. If the selected pattern is not active, tap  (red) 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 X.
10. To exit Field Manager, tap  .

Landmarks

When you are in the ***Run*** screen, you can place field items in the field, including:

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

After you have created landmarks, you can edit them and assign them to categories using Field Manager. See Landmark editing (Field Manager), 265.

At the ***Run*** screen, tap  to access the controls for creating landmark points, lines and areas.

Landmark buttons

Button	Tap to...
Point 	Place a point indicator on the field map marking a point. Available types: • Generic (such as a gate, riser, tile inlet, water trough, well) • Rock • Pest (insects, weeds) • Obstacle (hole, tree, hazard)
Line 	Record a line marking a landmark. Available types: • Generic (such as border, drip tape, gate, path, road) • Obstacle (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. Available types: • Generic • Pest • Obstacle
Non-Productive Area 	Record a shape marking a landmark. Non-productive area landmarks can be used to switch sections on and off. Available types: • Generic (such as clover, exclusion, grassed waterway, slough, waterway) • Obstacle (hazard, hole, lagoon, pond, rocks, tree) • Pest (disease, weed)

Landmark point creation (*Run* screen)

1. Select a vehicle, implement and field. (See Select a field, 182.)
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. To edit or rename landmarks you have already created, go to Field Manager. For instructions, see Field Manager, 61.
6. 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
7. To close the landmark buttons, tap  .

Landmark line creation (*Run* screen)

1. Select a vehicle, implement and field. (See Select a field, 182.)
2. Tap  to enter the field.
3. Tap  .
4. Tap the line button  .
5. Tap  . The display draws a dashed line beginning 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 a path that is being recorded but has not been saved, tap  . The path recorded so far is not saved.
8. To start over, tap the button for the feature again.
9. To edit or rename landmarks you have already created, go to the Field Manager. For more information, see Field Manager, 61.

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 .
11. To close the landmark buttons, tap  .

Landmark area creation (*Run* screen)

Follow the steps below to create a productive or non-productive area. 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, 182.)
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 or rename landmarks you have already created, see Landmark editing (Field Manager), 265.
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 .

Landmark editing (Field Manager)

At the Field Manager, you can edit any landmarks you have created in the ***Run*** screen.

1. Open the Field Manager. (See Field Manager, 61.)
2. Tap **Landmarks**. The map and the Landmarks list show recorded landmark items including:
   - Points
   - Lines
   - Areas
   - Non-productive areas
3. To select a landmark, tap it on the map or in the list on the left-hand side of the screen.
4. 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 	Change the classification of a point, line or area landmark. Options are: • Generic • Obstacle ***Note –*** *To identify a point more specifically, change the name of the point.*
Convert 	Tap to: • Change an area to a non-productive area. • Change a non-productive area to an area.
Delete 	Remove the selected landmark from the display.

5. To exit Field Manager, tap  .

Layers

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

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

You can view and edit layers. See:

- View coverage layers, 267
- Edit a coverage layer, 268

View coverage layers

To view a layer of coverage during field operations:

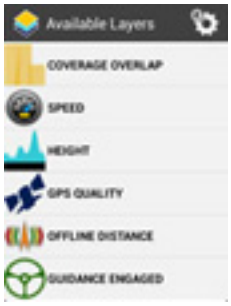
1. Make sure you are logging coverage. You will see the coverage in the ***Run*** screen behind your implement if coverage logging is on.

   To turn on coverage logging, tap  . Or, if you already have automatic coverage logging when you engage, tap the engage button.

   See Mapping settings, 83 to set automatic coverage logging.

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

4. To change the type of layer, tap the current layer button (at the top). The list of Available Layers displays.



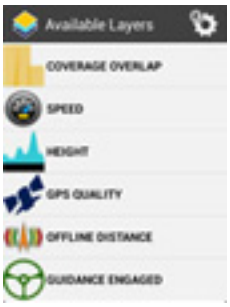
5. Tap the layer you want to see on screen.

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 (at the top). The list of Available Layers displays.



4. Tap  button. The edit panel for available layers displays.

5. Change the settings of the layer to better meet your needs:
   - Auto scale
   - Steps
   - Color scheme
6. Tap ✓ to save your changes or X to cancel your changes.

Field-IQ system operations

For the Field-IQ system, the following equipment and tools may be used:

- Field-IQ system Master Switch Box, 270
- Section control, 273
- Rate control adjustments, 274
- Boom height control operation, 276
- Boom height adjustments, 278

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 when you add a material). See Add a material, 227.
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 ...
4	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.*
5	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

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.

Section control

When you are spraying, you can view an on-screen representation (widget) of the output at the bottom of the ***Run*** screen. This indicates the sections you have turned on using a switch box.

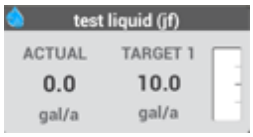
Buttons and indicators

Button or indicator	Explanation
	Collapse the display of the widget.
	Switch to the boom height widget, if applicable.
▲	Shows spray section. Color indicates status: • Grey: Section was automatically shut off as a result of coverage overlap, existing a boundary or entering a non-productive area. • White: Section was shut off manually with the switch box. • Green: Section is on. • Yellow: Section is on but is not sending feedback to the system or is not meeting some requirements (such as a liquid channel not seeing adequate flow or speed).. • Red: Section has a failure or warning.

For information on:	See:
Using switch boxes	Field-IQ system Master Switch Box, 270
Diagnostics	Field-IQ diagnostics, 311
Settings	Boom height control, 210, Section control, 198

Rate control adjustments

To adjust rate control while performing field activities, at the ***Run*** screen, tap  . The rate control adjustment buttons display.

Button/Indicator	Description
	Heading: Contains the name you assigned to the control channel. The background color of the heading indicates the state of the channel: • Green: Channel is functioning. Field-IQ master switch is on. • Red: Channel is not functioning due to fault or failure. • Grey: Channel is shut off or disabled. Field-IQ master switch is off. Actual: Indicates the actual rate being applied and the units. Target 1: Indicates the target rate and the units. ***Note –*** *When you tap this widget, it displays more detail.*
Actual Rate 	Indicates the actual units (gallons or liters) being applied.
Target Rate 	Indicates the target number of units per acre. The bold indicator is the rate that is active. • 1: Target for rate 1. • 2: Target for rate 2. • M: Manual target rate • Rx: Use a prescription (does not display unless a prescription is loaded)
Sensors 	Indicates the amount of flow through the system in gallons or liters per minute.
Material Control 	Tap this button to shut down the channel. If valve locking is enabled, tapping this button will shut the section and valve together.

Button/Indicator	Description
Virtual Tank 	Visually indicates the amount of material remaining. Tap the refill tank button to launch the Refill Tank tool. Area to empty: The number of acres or hectares left before there is no more material to apply.
Refill tank tool	Tap the appropriate button based on the amount you have refilled the tank.

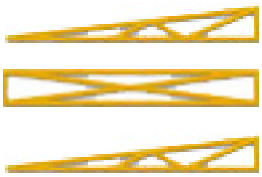
For information on:	See:
Using switch boxes	Field-IQ system Master Switch Box, 270
Diagnostics	Field-IQ diagnostics, 311
Settings	Rate control, 202, Virtual tank/bin, 206
Prescriptions	Prescriptions Manager, 66, Importing prescriptions, 223

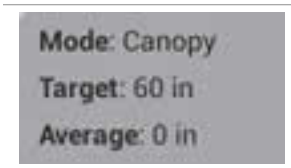
Boom height control operation

If you have boom height control set up, you can view, enable and engage sections of the boom. The boom height widget includes indicators and indicator/controls. The process of using the boom height control is:

1. Enable the boom section(s). This readies the section(s) to be engaged.
2. Engage the boom section(s). The boom height control is engaged.

Buttons and indicators

Button/Indicator	Explanation
	Tap to collapse the display of the widget.
	Tap to switch to the rate control widget, if applicable.
	Tap to select the section to engage or disengage. Color indicates state of system: • Grey: The boom section cannot be enabled or engaged. Indicator only. • Red: System failure or warning/cannot enable or engage the boom section. Indicator only. • Yellow: The boom section is ready to engage. Indicator and button. Can be tapped to engage. • Green: The boom section is enabled and engaged. Indicator and button. Can be tapped to disengage and return the state to enabled.
Enable All	Tap to select all boom sections to enable or disable them.

Button/Indicator	Explanation
 (red) Cannot Engage	Red background: Indicator only. Cannot engage the boom(s) to adjust boom height of the enabled sections.
 (yellow) Ready to Engage	Yellow background: Ready to engage the boom(s) adjust the sections of the boom you have selected. Tap to engage the boom.
 (green) Engaged	Green background: Indicates the sections of the boom you have selected are engaged. Tap to disengage the boom.
 (gray) Disabled	Grey background: Indicator only. Boom(s) cannot be engaged because the boom system is disabled.
	Shows the number of inches the boom is above or below the target height using arrows and color: • One green arrow: Slightly above/below target height • Two yellow arrows: Somewhat above/below target height • Three red arrows: Significantly above/below target height
	Shows the: • Mode • Target height • Average height of all boom sections

Boom height adjustments

To adjust boom height while performing field activities, at the ***Run*** screen, tap  . The boom height adjustment buttons display.

Button/Indicator	Description
Target Height 	Increase or decrease height of boom by using plus or minus signs. Or enter the value by tapping on the number Tap **Set Target to Average** to set the target height to an average.
System Aggressiveness 	Increase or decrease the aggressiveness of lowering or raising the boom by tapping the plus or minus signs. Or enter the value by tapping on the number and entering a different number.
Mode 	Tap either **Ground** or **Canopy** to change the mode.
	Tap to see more detail on boom height control.

Button/Indicator	Description
Boom Height Controls 	Sensors: Indicates all sensors and their status (enabled, disabled). (Display only) Valve Command: Indicates the percentage of command used for each valve. Should a boom section fail, begin troubleshooting here.
	Tap to return to main boom height adjustment controls.

For information on:	See:
Setting up boom height	Boom height control, 210
Diagnostics	Boom Height Diagnostics, 300

Prescriptions

At the ***Run*** screen, tap  to open the Prescriptions Manager. You can use the Prescriptions Manager to assign a prescription to a channel.

For information on:	See:
Prescriptions Manager	Prescriptions Manager, 66
Import prescriptions	Importing prescriptions, 223
Export prescriptions	Exporting prescriptions, 223
Assign a prescription	Assign a prescription, 280
Use a prescription	Use a prescription, 281

Assign a prescription

Before you can assign a prescription, you must:

- Have a field selected
- Have a channel set up

To assign a prescription:

1. Make sure you have a field selected.
2. At the ***Run*** screen, tap  . The Prescriptions Manager displays.
3. In the Enabled Channels list on the left, tap the channel you want to assign the prescription to.
4. On the right, tap Prescription File Name. The TMX-2050 display displays a list of prescription files that are available for the field you selected.
5. Tap the prescription file you want and tap ✓.
6. Tap **Next**.
7. Tap Column Name. The list of column names displays.
8. Tap the column you want to use, then tap ✓.
9. Tap Column Units, then tap either gal/a or L/ha. Tap ✓.
10. Tap **Next**.
11. Optionally, tap Lead Time and enter the number of seconds (0 - 10). Tap ✓.

12. Tap When outside Prescription and tap one of the following: Close, Last Rate or Default Rate. Tap ✓.
13. Tap Default Rate and enter the rate. Tap ✓.
14. If you have completed the information, tap **Finish**.
15. If you need to change previous information, tap **Back**.
16. To save your entries, tap ✓.
17. To discard your entries, tap ✗.

For information on:	See:
Prescriptions Manager	Prescriptions Manager, 66
Importing prescriptions	Importing prescriptions, 223
Exporting prescriptions	Exporting prescriptions, 223
Use a prescription	Use a prescription, 281

Use a prescription

Before you can use a prescription, you must:

- Have a field selected
- Assign the prescription to a channel

To use a prescription, complete the following steps.

1. Make sure you have a field selected.
2. At the ***Run*** screen, tap  . The rate control adjustment buttons display.
3. To begin using the prescription, tap  . The other (buttons?) will become gray and cannot be tapped unless you stop using the prescription.
4. To stop using the prescription, tap  .

For information on:	See:
Prescriptions Manager	Prescriptions Manager, 66
Import prescriptions	Importing prescriptions, 223
Export prescriptions	Exporting prescriptions, 223
Assign a prescription	Assign a prescription, 280

ISOBUS

To control ISO-certified implements, you can use:

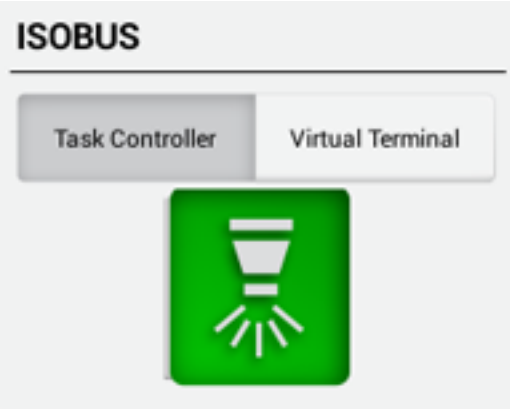
- Task Controller: An optional feature that enables the TMX-2050 display to control the implement and log data. See Task Controller operation, 282.
- Virtual Terminal: A means of controlling the implement through the Virtual Terminal. No data is logged. See Virtual Terminal operation, 284.

Task Controller operation

Note – *To use Task Controller, you must have unlocked the feature with a valid password, turned on the feature in the display settings, and be connected to an ISO-certified implement that is set up. (See Feature unlocks, 81 and ISOBUS settings, 87.)*

At the ***Run*** screen, the ISOBUS widget displays when the following steps are completed:

1. Task Controller is turned on in the display settings (see ISOBUS settings, 87).
2. The ISO-certified implement is connected and you have set it up with an application channel that is controlled by Task Controller (see ISOBUS for implements, 191).

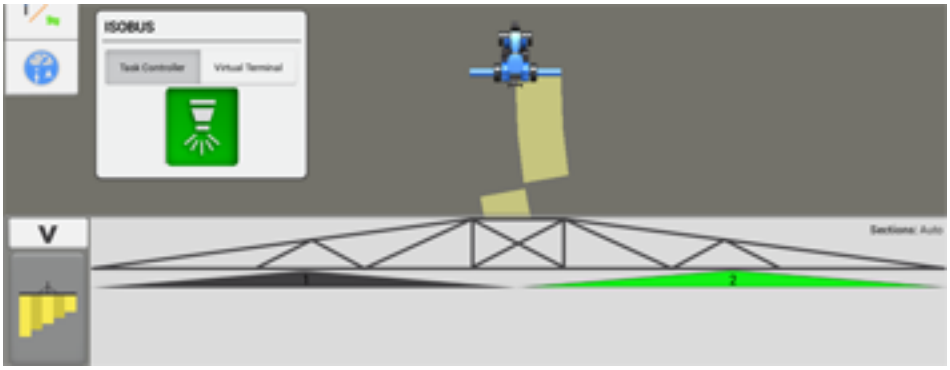


You can use the ISOBUS widget to switch between using Task Controller and Virtual Terminal.

- When you tap **Task Controller**:
  - The TMX-2050 display can receive Task Controller information from the implement's ECU. This enables you to control the implement's operation with the TMX-2050 display.
  - You can use the Rate Control and Section Control feature on the TMX-2050 display (see Field-IQ system operations, 270).
  -  acts as an on-screen master switch button.
- When you tap **Virtual Terminal**, Task Controller signals are not sent to the TMX-2050 display. To access Virtual Terminal, access the Virtual Terminal window. See Virtual Terminal operation, 284.

On-screen Task Controller switch

To begin operation with Task Controller, tap  (yellow). The button changes to  (green), indicating the TMX-2050 display is controlling the application.



Button status	Explanation
 (Gray)	The TMX-2050 display is not able to start application control with the Task Controller because of an issue with the setup. You cannot tap this button. It is a status indicator only. To troubleshoot, verify: • Task Controller is on in the display settings (See ISOBUS settings, 87). • The implement setup includes the correct ECU which has been assigned to the channel (see ISOBUS for implements, 191). • The implement is selected (see Select an implement, 189). • Task Controller is selected in the ISOBUS widget.

Button status	Explanation
 (Red)	The TMX-2050 display is not able to begin operation with the Task Controller. You cannot tap this button. It is a status indicator only. To troubleshoot: • Check the physical connections from the implement to the display. • Check that all settings are correct in the Virtual Terminal of the implement, including an "on" or "stand by command." (For more information, see the *Getting Started Guide for ISO for the TMX-2050 display*.) ***Note –*** *If you have a master switch box or joystick and its master switch is off, no application will occur. To use Task Controller with one of these, make sure the physical master switch or stand by command is on.*
 (Yellow)	The connection is secure and the TMX-2050 display can receive information for Task Controller. Tap the button to use the Task Controller and have the TMX-2050 display control the application.
 (Green)	Indicates the TMX-2050 display is currently controlling the application. If you have Field-IQ Section Control for spraying, this feature will control the application of the material (see Field-IQ system operations, 270). Tap to stop using the Task Controller and stop the TMX-2050 display from controlling the application. ***Note –*** *Currently, the Prescriptions feature is not available for use with Task Controller.* The task data recorded will be the same as if you were using Field-IQ to control the application (see Tasks, 238).

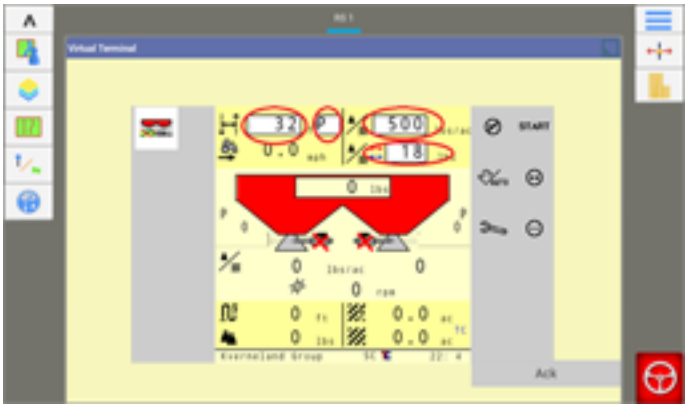
Virtual Terminal operation

To use Virtual Terminal:

1. Make sure an ISO-certified implement is connected and that you have turned on the Virtual Terminal feature in settings (see ISOBUS settings, 87).
2. At the ***Run*** screen on the ISOBUS widget, tap **VT**. The widget displays in a smaller version which only shows data and does not allow you to control the implement.

To increase the size of the minimized Virtual Terminal widget, touch the upper right corner of the widget and hold. Arrows display on all sides of the widget. Touch and drag an arrow to increase the widget's size.

3. Tap the upper right corner of the Virtual Terminal widget to maximize it. The Virtual Terminal expands to full screen.



At the full-screen view, you can control the implement using Virtual Terminal.

4. To minimize Virtual Terminal to only show data, tap the upper right corner.

Delete previous data

Data loaded from previously used ECUs will take up storage space. To remove this data from the TMX-2050 display:

1. At the maximized Virtual Terminal, tap  .
2. Tap **Delete**.
3. All previous data is removed.

On-screen widgets

Widgets are software gadgets on the screen that can provide functionality control, information and status on the ***Run*** screen during field activities.

There are two types of widgets:

- Status widgets: Provide information only and do not control any function
- Control widgets: Enable you to control a function, and may include status information

For some widgets, you can choose to display or not display them.

Other widgets display when you are performing a specific task, such as operating with the Task Controller (see Task Controller operation, 282.)

Access widgets

To access the list of widgets available on your TMX-2050 display:

1. At the ***Run*** screen, tap  .
2. To display all widgets, tap **Add All Widgets**.
3. To remove all widgets, tap **Remove All Widgets**.

Minimize/maximize, resize

Some widgets can be maximized from their normal minimized size. To maximize a widget, tap the upper right corner of the widget. To make it smaller, tap the same upper right corner.

Other widgets can be re-sized to a customized size. To make a widget larger, touch the upper right corner of the widget and hold. Arrows display on all sides of the widget. Touch and drag one of the arrows to resize. When you are satisfied with the size, remove your finger. The following widgets can be re-sized:

- Position status, 289: On-screen lightbar, compass, digital compass and swath number
- Speed status, 290
- Virtual Terminal widget, 290

Move a widget

You can position some 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.

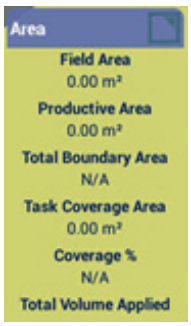
Remove a widget

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. You will no longer see the widget on the screen.

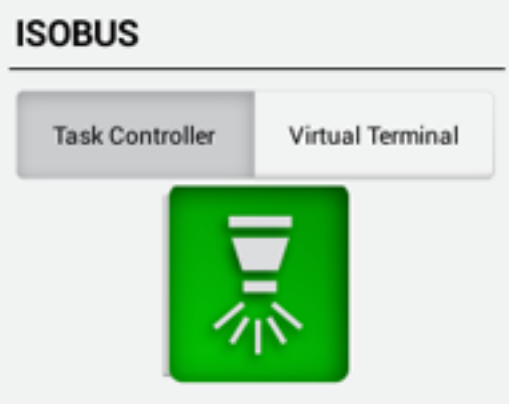
Area status



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

ISOBUS Task Controller widget



You can move this widget around on the screen.

Button	Explanation
Task Controller	Switches to Task Controller. See Task Controller operation, 282.
Virtual Terminal	Switches off access to Task Controller. See Virtual Terminal operation, 284 and Virtual Terminal widget, 290.
 (Gray)	The TMX-2050 display is not able to start application control with the Task Controller because of an issue with the setup.
 (Red)	The TMX-2050 display is not able to begin operation with the Task Controller.
 (Yellow)	The connection is secure and the TMX-2050 display can receive information for Task Controller.

Button	Explanation
 (Green)	If you have Field-IQ Section Control for spraying, Task Controller will control the application of the material (see Field-IQ system operations, 270).

Position status

The following status widgets on the ***Run*** screen indicate your position.

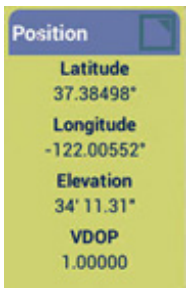
On-screen lightbar for auto guidance

The on-screen lightbar provides the status of where the vehicle is in relation to the guidance line. When the vehicle is perfectly on the guidance line, the value in the center is 0 and the background color is green.

The center of the lightbar represents your position. As your vehicle's position moves farther from the line, the farther the highlighted arrows will be from the center of the light bar.

As the vehicle moves farther from the guidance line, the numerical indicator shows the distance from the guidance line and the highlight color changes from green, to yellow, to red.

Position



Your current position's:

- Latitude
- Longitude
- Elevation
- VDOP

Compass

The direction in which you are traveling.

Digital compass

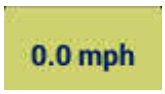
The degrees of the angle you are traveling.

Swath number

The number of the swath guidance line you are currently following.

Speed status

The speed status widget indicates the speed at which you are traveling.



The speed at which you are traveling.

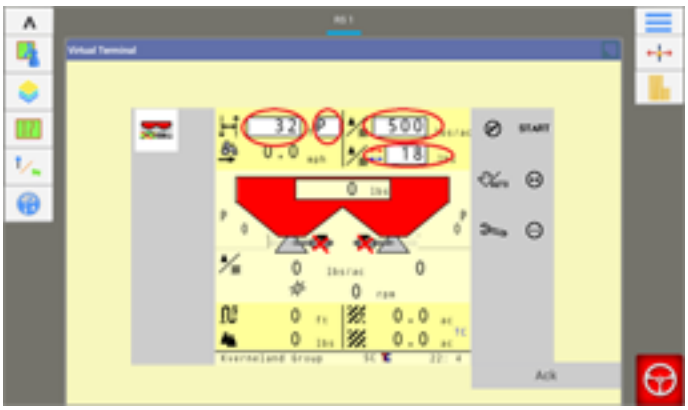
Virtual Terminal widget

When using Virtual Terminal, initially the minimized version displays on the ***Run*** screen.

You can move this widget around on the screen.

To increase the size of the minimized VT widget, touch the upper right corner of the widget and hold. Arrows display on all sides of the widget. Touch and drag an arrow to increase the widget's size.

At the full-screen view of Virtual Terminal, you can control the implement using Virtual Terminal.



Alerts and warnings

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 Autopilot system is on and following a guidance line, when you begin approaching the end of a row, an End of Row warning displays.

For information on:	See:
Settings	Steering and guidance settings, 85

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 settings, 83.

Chapter 11

Diagnostics / 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.

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: • That all power connections are seated properly • For any broken or bent pins
There is a faulty external power cable.	Try a different cable. Check pin outs 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.

The map is not visible on the *Home* screen.

If your system has a DCM-300 modem and has no map on the ***Home*** screen, check for:

- Possible cable disconnection
- Weak signal bars (see DCM-300 modem diagnostics, 305)
- All cables are connected securely
- The status of GNSS (see GNSS notification button, 52 and GNSS diagnostics, 317)

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)
  - Roll calibration
  - Make incremental adjustments to a pattern using the nudge increment tool
- View:
  - Vehicle roll and yaw
  - Navigation controller orientation
  - IMU parameters
  - Sensor settings
- Set the Nav Controller II to output NMEA messages.

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 command 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 responds to cross track error.
Line Approach Aggressiveness	Controls how fast the guidance system attempts to steer the vehicle onto the current guidance line. See Line acquisition, 165 for more information on calibrating.
Engage Aggressiveness	Controls how aggressively the vehicle initially engages the automatic guidance system. See Engage aggressiveness, 166 for more information on calibrating.
P Gain	Balances rapid steering response and stability. See Proportional steering gain, 160 for more information on calibrating. ***Note –*** *This setting is not available for certain vehicle types.*
Nudge Increment	This function is for advanced users to test the systems response to cross track error. While driving the vehicle online, tap the left or right button to move the line. Observe the response of the guidance system and adjust as necessary.
Engage 	Use to engage the system in the diagnostics screen. For more information on the engage button, see Vehicle operation, 242.

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 and yaw settings. The yaw value is the heading error for the system in reference to the heading of the guidance swath.
CONTROLLER ORIENTATION	Orientation of the controller as entered by the user.
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, 153.
IMU PARAMETERS	The raw voltage reading from the accelerometer and gyroscopes in the navigation controller.
SENSORS	The raw voltage of all connected sensors.

NMEA messages

Before you can setup NMEA output, you must turn on NMEA capability in settings. See Steering and guidance settings, 85.

To set the NAV Controller II to output NMEA messages:

1. At the Autopilot Diagnostics screen, tap **Performance** under Autopilot.
2. Tap the **Advanced** tab.
3. In the TAP SETTINGS section, tap in the TAP entry box.
4. Enter the appropriate text for the NMEA message you want the Nav Controller II to output and tap **GET**.

NMEA Message	Message Information
RawNMEAOutputIntervalGGA	Fix data including 3D location and accuracy data
RawNMEAOutputIntervalGSA	GPS dilution of precision (DOP) and active satellites
RawNMEAOutputIntervalGST	GPS pseudorange noise statistics
RawNMEAOutputIntervalVTG	Velocity made good
RawNMEAOutputIntervalZDA	Date and time

5. To configure the baud rate:

a. Enter “RawNMEAOutputBaudRate” in the TAP entry box, then tap **GET**.
b. Enter the baud rate (how often the message should be sent) into the entry box. (1hz is equal to 1000 seconds.)
c. Tap **SET**.

Boom Height Diagnostics

At the Diagnostics panel, tap **Performance** under Boom Height.

Sensors

This information is display only.

Item	Explanation
Status	The sensor's status: connected or disconnected
S/N	The serial number for the sensor. The display reads the serial numbers from the installed sensors.
Version	Firmware version of the sensor
Sensor Height	Current height of sensor
Side Offset	The distance from the center line of the sensor to the hinge point of the boom. (Does not apply to the center section.)
Nozzle Offset	The distance from the bottom edge of the sensor cone to the outlet of the spray nozzle tip.

Boom Status

Valve Module

This information is display only.

Item	Explanation
Module	Type of module
Status	Connected, disconnected
S/N	Serial number of valve module
Version	Version of firmware

Boom Control Status

This information is display only.

Item	Explanation
Control	Left, right or center
Valve Command	Normal, inverted

Item	Explanation
Output	The output command to the actuator
Positive Dead Band	Value obtained by calibration
Negative Dead Band	Value obtained by calibration
Positive Slope	Value obtained by calibration
Negative Slope	Value obtained by calibration

Manual Control

For information on manual control, see Boom height manual control test, 216.

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 content on:	See also:
Diagnostics	DCM-300 modem diagnostics, 305
Connecting the modem	Connect the DCM-300 modem, 111
Setting up the modem	DCM-300 modem initial setup, 130

EZ-Pilot system diagnostics

You can use EZ-Pilot diagnostics to:

- Adjust:
  - Vehicle system aggressiveness
  - Line approach aggressiveness
  - Angle per turn
  - Free play offset
  - Manual override sensitivity
- View:
  - Vehicle roll and pitch
  - Navigation controller orientation
  - IMU parameters
  - Sensor settings

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 responds to cross track error while operating on the guidance line. See Engage aggressiveness, 166 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, 165 for more information on calibrating.

Button/Control	Explanation
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 of resistance on the steering wheel before the system will disengage.
Nudge Increment	This function is for advanced users to test the systems response to cross track error. While driving the vehicle online, press the left or right button to move the line. Observe the response of the guidance system and adjust as necessary.
Engage 	Use to engage the system in the diagnostics screen. For more information on the engage button, see Vehicle operation, 242.

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	Orientation of the controller as entered by the user.
EXTERNAL SWITCH	Setting and state of the external switch.

DCM-300 modem diagnostics

At the Diagnostics panel, tap **DCM-300** under Connectivity.

The Network diagnostics information notifies you of the status of the network, device, cellular network and WiFi network.

Network Status

Item	Explanation
Modem	Connecting, Connected, Disconnected
Cellular	• Network Name: The name of the network you are connected to • Signal Strength: Strength of signal to DCM-300 modem • Roaming Status: Whether you are roaming or not. Yes, No.
Internet	• Status: Disconnected, Connected • CF.com: Off, On (Connected Farm status)

Device Info

Item	Explanation
Serial #	Serial number of DCM-300 modem
Firmware version	Firmware version of DCM-300 modem
IMEI	Equipment number of mobile device (International Mobile Station Equipment Identity)
SIM ICCID	Subscriber Identity Module, Integrated Circuit Card Identifier
WiFi Mac Address	Hardware address of DCM-300 modem

Cellular

Item	Explanation
Modem Type	GSM, CDMA
Sim Status	Ready,
Speed	Speed of cellular network

WiFi Network

Item	Explanation
SSID	ID of WiFi network
Speed	Speed of signal
Signal	Strength of signal
Channel	Channel of network
Security	Type of security

For content on:	See:
Modem/WiFi settings	Modem services settings, 88
Correction settings	GNSS receiver settings, 116
Connected Farm	Connected Farm Dashboard, 66

EZ-Steer system diagnostics

You can use EZ-Steer diagnostics to:

- Adjust:
  - Manual override sensitivity
  - Vehicle system aggressiveness
  - Line approach aggressiveness
  - Angle per turn
  - Free play offset
- View:
  - Vehicle roll and yaw
  - Navigation controller orientation
  - Sensor settings

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 system responds to cross track error while engaged on the guidance line.
Line Approach Aggressiveness	Controls how fast the guidance system attempts to steer the vehicle onto the current guidance line. See Line acquisition, 165 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 of resistance on the steering wheel before the system will disengage.

Button/Control	Explanation
Nudge Increment	This function is for advanced users to test the systems response to cross track error. While driving the vehicle online, press the left or right button to move the line. Observe the response of the guidance system and adjust as necessary.
Engage 	Use to engage the system in the diagnostics screen. For more information on the engage button, see Vehicle operation, 242.

Messages and fault codes

The following are warning messages that display when the EZ-Steer system becomes disengaged or there are system faults.

Disengaged warning messages

DISENGAGED!...	EZ-Steer system...
Too fast	Disengaged because the vehicle is traveling above the maximum speed.
Too slow	Disengaged because the vehicle is traveling below the minimum speed.
Too far offline	Disengaged because the vehicle has gone offline beyond the Disengage Offline value.
Manual override	Was manually disengaged when the steering wheel was turned.
Manual disengage	Was manually disengaged when the engage button was tapped, or the external foot switch or remote switch was engaged.
No GPS	Disengaged because the GPS positions have been lost.
No Corrections	Disengaged because of old or no corrections. This occurs only if Low Accuracy Warning is set to High Accuracy Only.
Unexpected Error	Disengaged due to an unexpected error with the system.
Control fault	Disengaged due to a control fault.
Controller Comms Lost	Disengaged due to a poor cable connection or a damaged cable.

System faults

Fault code:	Possible cause	Solution
01: Excessive manual override	Large number of manual overrides on one swath.	Decrease the Override Sensitivity value
02: Hardware fault	General hardware fault	Check all equipment and cables for damage.
03: Controller reset	Momentary loss of power, such as a power brownout. Controller reset unexpectedly.	Ensure no power cables are damaged and that the connectors are tight. Connect the power directly to the battery. Download the error log and send it to your local reseller.
04: Communication error	Controller failed to receive CAN messages from the EZ-Guide Plus lightbar.	Ensure the cable connection is secure and not damaged.
05: Bridge fault	Manual override sensitivity is too low. Controller is faulty.	Increase the override sensitivity value. Obtain a repair or replacement from your local EZ-Steer system reseller.
07: Broken motor cable	Motor cable is broken.	Obtain a replacement cable from your local EZ-Steer system reseller.
08: EEPROM fault	Memory error in the controller.	Contact your local reseller and request they download the error log.
09: No motor connected	The motor or motor cable is not connected to the controller.	Ensure the motor cable is connected to the EZ-Steer system motor and the system controller. Ensure all cable connections are secure and not damaged.
10: Unknown fault	Unknown fault in the system.	Contact your local reseller and request they download the error log.
11: System fault	Lightbar failed to receive messages from the controller.	Ensure none of the cables are damaged. Ensure all connectors are tight.

Fault code:	Possible cause	Solution
12: Temperature too high	Controller temperature has exceeded the maximum internal operating temperature of 83 C (181F).	Move the controller out of direct sunlight. Ensure the controller is well ventilated. Turn on the air conditioner and direct cool air to the controller. ***Note –*** *The internal temperature of the controller should be only 12C (22F) warmer than the external temperature.*
13: Over voltage	Power supply to the controller has exceeded 12.5 V.	Ensure the EZ-Steer system is connected to a 12 V power supply. ***Note –*** *If you jump start a vehicle with a flat battery, unplug the EZ-Steer system powere plug first.*
15: T2 Fault	The steering control module (SCM) is loaded with an incompatible version of firmware.	Check with your local reseller to obtain the latest version of firmware and update it.
	There are low voltage or intermittant problems with the system's power supply.	Check that there are no loose or corrodedpower connections, especially in the accessory plug area.
	There is a hardware fault in the EZ-Steer controller.	1. If necessary, modify the power cable with an in-line fuse and hardware to a reliable power connection. 2. Ensure the vehicle electrical system is in working order and supplies enough voltage to the system. 3. If the above solutions do not work, return the EZ-Steer controller to your local reseller for service.

Field-IQ diagnostics

Operations

Item	Explanation
Master Switch	On or off
Control Mode	On or off
Arm Pump	Tap to enable Field-IQ to control the pump.
Speed	Speed you are currently traveling, or speed you have set for speed simulator
Speed Simulator	Enter a value to simulate traveling speed
Current Flow	Current flow rate of the channel
Actual Rate	Actual rate of flow
Virtual Tank	Tap to access the virtual tank tool
Target Rate	Indicates the target rate 1, target rate 2, and the manually set rate
Sensors	Name and pressure of sensor
Aggressiveness	Aggressiveness of the control valve

Adjustments

Item	Explanation
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.
Jump Start Timeout	Adjust start timeout. This setting limits the length of time you can run the jump start. ***Note –*** *Auto-control resumes if Jump Start Speed is exceeded by ground Speed.*
Shut Off Speed	Adjust shut off speed. The system shuts down if the implement drops below this speed.

Rate Control

Item	Explanation
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.*

Overlaps

Item	Explanation
Start Overlap	The amount of overlap (distance) you want when starting coverage. When you are in a previously covered area driving toward a non-covered area, the system will begin turning sections on at this distance before reaching the non-covered area.
Stop Overlap	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	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	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.

Latencies

Item	Explanation
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 uses on latency to begin applying material 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.
On Latency	The length of time (seconds) from when a section is turned on to when the system begins to apply material.
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.
Off Latency	The length of time (seconds) from when a section is turned off to when the system stops applying material.

Hardware

Item	Explanation
Controller	Module type (such as master switchbox, section control module, and so on)
Module S/N	Serial number of module
Position	Position of module on channel
Version	Firmware version of Field IQ module
Status	Connected, disconnected

Sensor

Item	Explanation
Channel Name: Material	Name of channel
Module S/N	Serial number of module

Item	Explanation
Sensor	Name of sensor
Feedback	Sensor information

GNSS and xFill technology status

GNSS status is available on the Display bar, 51 and the popup notification menu accessed by tapping the right side of the display bar.

Notification Button	Indicates...
 Green	GNSS connection is converged (green).
Yellow	GNSS connection is converging (yellow).
 Red	No GNSS connection is available (red).

For more information on GNSS, see:

- DCM-300 modem initial setup, 130
- GNSS receiver settings, 116
- GNSS diagnostics, 317
- DCM-300 modem diagnostics, 305

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...
 (blue)	xFill is on (blue).
(white)	xFill is available (white).
 (red)	xFill has less than 5 minutes of corrections (red).

For more information, see xFill technology, 133.

GNSS diagnostics

At the Diagnostics panel, tap **Performance** under GNSS.

For information on GNSS settings, see GNSS receiver settings, 116.

⚠ **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.

Solution Information

Solution Information	Explanation
Number of Satellites	Indicates number of satellites currently being used.
Correction Type	The correction service indicated at setup.
Correction Source	Modem, satellite / fast, satellite /SBAS, OmniStar HP/G2
Correction Status	Fixed, Float or x-Fill
Position Quality	Tap to change. Favor accuracy, balance quality or favor availability.

Skyplot

At the Skyplot screen, you can view the number of satellites nearest to your position.

Troubleshooting

The GNSS positioning method influences the accuracy of the GNSS position reflected in your GNSS receiver. Additionally, the following conditions can affect GNSS accuracy.

Condition	Explanation
Atmospheric effects	GNSS signals are degraded as they travel through the ionosphere. The error introduced is in the range of 10 meters. The error is removed by using a differential or RTK positioning method.
Number of satellites used	To calculate a 3D position (latitude and longitude, altitude, and time), four or more satellites must be visible. To calculate a 2D position (latitude and longitude, and time), three or more satellites must be visible. For RTK positioning, five satellites are needed for initialization. Once initialized, four or more satellites provide RTK positions. The number of visible satellites constantly changes and is typically in the range 5 through 9. The receiver can track up to 44 satellites simultaneously.
Maximum PDOP	Position Dilution of Precision (PDOP) is a unitless, computed measurement of the geometry of satellites above the current location of the receiver. A low PDOP means that the positioning of satellites in the sky is good, and therefore good positional accuracy is obtained.
Signal-to-noise ratio	Signal-to-noise ratio (SNR) is a measure of the signal strength against electrical background noise. A high SNR gives better accuracy. SNR can be degraded by other electronic equipment operating nearby, including transmitters, cell phones, or data modems. It may also be degraded by solar flares and changing atmospheric conditions.
Minimum elevation	Satellites that are low on the horizon typically produce weak and noisy signals and are more difficult for the receiver to track. Satellites below the minimum elevation angle are not tracked.

Condition	Explanation
Multipath environment	Multipath errors are caused when GNSS signals are reflected off nearby objects and reach the receiver by two or more different paths.
RTK Base station coordinate accuracy	For RTK positioning, it is important to know the base station coordinates accurately. Any error in the position of the base station affects the position of the rover; every 10 m of error in a base station coordinate can introduce up to 1 ppm scale error on every measured baseline. For example, an error of 10 m in the base station position produces an error of 10 mm over a 10 km baseline to the rover. For more information about how to make sure the position of your base station is accurate, refer to the manual for your base station receiver.
Multiple RTK base stations	If you are using several base stations to provide RTK corrections to a large site area, all base stations must be coordinated relative to one another. If they are not, the absolute positions at the rover will be in error. For more information about how to use several base stations to cover your site, contact your local Trimble Reseller.

Poor accuracy (multipath)

Poor accuracy can be due to GNSS signals reflecting off nearby trees and/or metal buildings and horizontal surfaces. (Reflection is also called multipath.)

To reduce multipath noise, mount the GNSS receiver so that it has a clear view of the sky. The receiver must be away from trees and large metal objects.

Intermittent loss of lock on satellite

- The receiver loses the satellite signal from time to time: Make sure that the receiver is mounted on the highest point of the vehicle and is clear of metal surfaces.
- Signal takes a long time to initialize
  - In RTK mode, longer baselines require longer initialization times. (The baseline is the distance between the base receiver and the rover receivers.)
  - Wait for the receiver to initialize or consider repositioning the base receiver to shorten the baseline. Make sure the rover receiver is in a clear area.

Loss of initialization

In RTK mode initialization can be lost when the rover receiver is close to trees or buildings and the number of satellites falls below four. Additionally, initialization may be lost if the receiver has not

been tracking RTK corrections for some time.

- Move away from trees and obstructions to initialize. Once initialized, approach the obstructed area again. If the obstructions are severe, GNSS positioning may not work in that area.
- Because the GNSS satellites move, there may be times of the day when you are working in an area with obstructions.

Not tracking RTK corrections

The radio link is down or intermittent. Ensure that:

- The line-of-sight between the base and rover receivers is not obstructed.
- The rover receiver is within range of the radio.
- The radio power supply is on.

Poor signal / not receiving a clear signal

- Interference from 2-way radios

  Transmitting FM 2-way radios can interfere with OmniSTAR, WAAS, and GNSS signal reception. Make sure that there is at least 1 m (3 ft) between the FM 2-way radio antenna and the receiver.

- Vehicle issues

  An unshielded ignition system can cause enough noise to block reception of a differential signal. Use resistor spark plug wires on the vehicle ignition system.

  An alternator can cause noise that interferes with a differential signal.

  Note – *Before replacing engine parts in an attempt to solve this problem, make sure that the problem is not caused by a computer or power source near the receiver. Some computers and their power sources cause noise that disrupts GNSS and satellite DGNSS signals.*

  Possible solutions include:

  - Use bypass capacitors, commonly available in automotive stores for cleaning up interference to CB and other radios. If the problem persists, shield engine components with aluminum foil.
  - Relocate the antenna on the machine. Determine the optimal antenna location.

- GNSS receiver issues:

  - Mounting location: The receiver may not be picking up a clear signal due to mounting location. Mount the receiver on the centerline of the vehicle, away from any sources of interference and with a clear view of the sky.
  - Cable problems: Use an ohmmeter to check the cable. The resistance of a good cable between connector pins at each end of the cable is zero. If the cable is sound, but the

problem persists, try exchanging the cable with one that you know is working. If the cable is defective, contact your local Trimble Reseller for an RMA number (if the Trimble product is still under warranty), or to purchase a replacement cable.

- Battery: A Lithium-ion battery in the receiver powers the internal real-time clock and so enables the receiver to get a first fix faster. The battery has a life of 7.5 years. When the battery fails, the internal clock cannot keep accurate time and the receiver may take longer to output GNSS positions. Please contact your local Trimble Reseller to get the batteries replaced. You cannot replace the battery yourself.

The receiver is not tracking any satellites.

Possible cause	Solution
The GNSS antenna does not have clear line of sight to the sky.	Ensure the antenna has a clear line of sight.
The cable between the receiver and the GNSS antenna is damaged.	Replace the cable.
The cable connections at receiver or antenna are not tightly seated, or are connected incorrectly.	Check all cable connections.

Office Sync Diagnostics

At the Diagnostics panel, tap **Office Sync** under Connectivity.

Office Sync wirelessly transfers files between the display and Connected Farm and the office. As files are created from field activities, Office Sync places these in an outbox. At the time you have specified for transfers to occur, Office Sync sends the files from the outbox in the display to the office.

At Office Sync diagnostics, the following information displays:

Section	Explanation
Current State	The state of sending or receiving files using Office Sync. Options include: • Disconnected: Display is not authorized for Office Sync • Authenticating: Display is checking for permission to use Office Sync • Ready for file transfer: Display is connected to the Internet and Office Sync is enabled • Checking for files: Display is checking for updates to be transferred • Receiving files (and percentage): Display is receiving files from the office. Percentage indicates the progress of the download. • Sending files (and percentage): Display is sending files to the office. Percentage indicates the progress of the send.
Outbox	A list of files waiting to be sent.
Sent	A list of files that have been transferred.
Received	The list of files that have been received from the office.

For information on:	See also:
Settings for Office Sync	Modem services settings, 88
Data transfer with Office Sync	Data transfer, 67

ISOBUS diagnostics

At the Diagnostics panel, tap **Task Controller/Virtual Terminal** under ISOBUS.

Device tab

Display Information	Explanation
Device Name	Name of device
Device S/N	Device's serial number
Software Version	Version of ISO firmware
CAN Connection	Status of CAN connection
Pool Loaded	Yes or No. Indicates data from ECU is loaded.
ISO-TC	Task Controller data is available.
ISO-VT	Virtual Terminal data is available.

Note – *If ECU data does not auto-populate, it may be necessary to cycle power to the ECU.*

Note – *If the implement's ECU is power cycled while still in the Run screen, it is necessary to exit and re-enter the Run screen before being able to resume Task Controller.*

Recording and saving CAN logs

1. At the Diagnostics panel under System, tap **Logging/CAN Logs**.
2. For the appropriate port, tap  to begin the recording.
3. Tap  again to stop recording.
4. Insert a USB drive into a USB socket of the TMX-2050 display.
5. Tap  to transfer the logs to the USB drive.

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.

Display

Item	Explanation
Internal	Capacity of internal memory
USB	Capacity of USB currently plugged into the USB socket

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

Remote Assistant

Remote Assistant enables you to receive real-time technical support. Your support representative can see your display during the support session.

To complete settings for Remote Assistant, see Remote Assistant settings, 90.

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 Icon	Indicates...
 (Green)	The Remote Assistant is on and working (green).
 (Yellow)	The Remote Assistant is connecting (yellow).
 (Red)	Remote Assistant is not connected (red).

TM-200 Module diagnostics

The TM-200 Module has LED lights that shows the status of connections to it.

Note – *Fast LED flash is approximately 3 flashes per second. Slow LED flash is approximately 1 flash per second.*

LED 1

Indicates the status of the link and traffic between the TM-200 Module port marked with  and the DCM-300 modem.

LED 2

Indicates the status of the link and traffic between the TM-200 Module port and the display.

LED 3

For future use.

LED 3 and 4 combination

Blinking between red and green indicates the TM-200 Module is either starting up or loading new firmware.

LED 4

Orange fast flash = no position

LED Indicator	Autonomous	SBAS	RangePoint RTX	OmniSTAR HP/G2
Orange solid	N/A	Autonomous, has SBAS signal	Autonomous/ DGPS, has RTX signal	Autonomous/ DGPS, has OmniSTAR signal
Orange slow flash	N/A	Autonomous, no SBAS signal	Autonomous/ DGPS, no RTX signal	Autonomous/ DGPS, no OmniSTAR signal
Green solid	Autonomous position	DGPS, has SBAS signal	Converged	Converged
Green slow flash	N/A	DGPS, no SBAS signal, using recent corrections	Unconverged	Unconverged
Green fast flash	N/A	Converged/ unconverged, using old corrections	Subscription expired or other error	Converged/unconverged, using old corrections

LED Indicator	CenterPoint RTX (satellite)	CenterPoint RTX (modem)	CenterPoint VRS/RTK
Orange solid	Autonomous/DGPS, has RTX signal	Autonomous/ DGPS, connected to RTX server	Autonomous/DGPS, no CMR or RTCM3 corrections
Orange slow flash	N/A	Autonomous, no SBAS signal	Autonomous/DGPS, no RTX signal
Green solid	Converged	Converged	Fixed
Green slow flash	Not converged	Not converged	Float
Green fast flash	Converged/unconverged, using old corrections	Converged/unconverged, using old corrections	Fixed/float, using old corrections

Chapter 12

Glossary

A

A+ line

A guidance line you define on your field. The A+ line is defined fixing a point, then heading in a direction. Guidance lines are for use with automated steering.

AB line

A guidance line you define on your field. You set a beginning point (A) and an end point (B). You use guidance lines for use with automated steering.

Accelerometer

A device that measures non-gravitational acceleration.

Aggressiveness

The measure of how strongly the system makes steering changes.

Autonomous GNSS positioning

Autonomous GNSS positioning uses no corrections. The rover receiver calculates its position using only the GNSS signals it receives. This method does not have high absolute accuracy, but the relative accuracy is comparable to the other methods.

RTK GNSS positioning uses the RTK positioning method to achieve centimeter-level accuracy. To use the RTK method, you must first set up a base station. The base station uses a radio link to broadcast RTK corrections to one or more rover receivers.

B

Boundary

A line indicating the border surrounding a field.

C

CenterPoint™ RTK for radio

Positioning correction service for radio communication systems. Requires access to a base station located within a eight-mile radius (approximately) from your farm. An RTK base station sends corrections via a radio transmitter to a mobile receiver attached to your vehicle. Works well for farms within 8 miles of an established RTK base station or base station network, without line-of-sight obstructions such hilly terrain or an abundance of trees.

CenterPoint™ RTX™

Positioning correction service for satellite communication systems. Delivers GPS or GNSS enabled corrections via satellite directly to your receiver. Does not require a base station or cellular data plan. CenterPoint RTX corrections are provided on as subscription basis.

CenterPoint™ RTX™ for cellular

Positioning correction service for cellular communications. Delivers corrections via cellular network directly to your receiver. Requires a cellular data plan.

CenterPoint™ VRS™

Virtual reference station. Positioning correction service for cellular communication systems. Enables RTK (Real-Time Kinetic) corrections over a large geographic area where robust cellular data coverage is available. Provides high accuracy for guidance applications throughout the whole coverage area. Requires a cellular data plan. Uses a cellular communication modem, such as the DCM-300 or Ag3000. Relies on CORS.

Client

The customer for whom the work is being done.

Controller orientation

Correctly associate the outputs of the Autopilot controller sensors with the direction of the vehicle.

Correction service

A service which provides corrections to create a higher GPS accuracy.

CORS (Continuously Operating Reference Station) network

A network of GPS/GNSS reference stations situated within the coverage area to transmit RTK (Real-Time Kinetic) corrections to the cellular modem. The distance between the reference stations and the modem on the vehicle does not affect accuracy. CORS works well in areas with spotty RTK radio tower coverage.

Curved line

A guidance line you define on your field. You begin recording and drive until you are at the end of the curved line or segment, then stop recording. Guidance lines are for use with automated steering.

D

DGNSS

Differential GNSS positioning. The GNSS receiver uses corrections from WAAS/EGNOS satellites or from OmniSTAR HP, XP, G2, or VBS satellites. These differential systems use special algorithms to provide differential corrections that allow the rover receiver to calculate its position more accurately. Not all corrections services support the use of GLONASS satellites in their solution.

DGPS

Differentially corrected Global Positioning System (GPS).

E

EGNOS

European Geostationary Navigation Overlay Service. An SBAS operated by the European Space Agency.

Event

A precision agriculture activity on a particular field. For example: planting seed, applying fertilizer or lime, or spraying with fungicide, herbicide or insecticide.

F

Farm

A collection of fields.

Field

Settings created in the TMX-2050 display to represent an actual field, one or more parts of an actual field, or a group of two or more fields. Field profiles include guidance lines for steering, pivot patterns and landmarks.

Freeplay

Movement in the steering linkage through which a movement of the steering wheel will cause no change in wheel angle.

Freeplay offset

A value entered to give the control system a way to account for freeplay during guidance.

G

GLONASS

A Russian space-based satellite navigation system.

GNSS

Global Navigation Satellite System. A system of GPS US and Russian satellites that provide information about geo-spatial positioning. A GNSS receiver can determine its longitude, latitude and altitude. In the future, GNSS will also use Chinese GPS satellites.

GPS

Global Positioning System. A space-based satellite navigation system. A GPS receiver can determine its position by using GPS satellites.

GPS autonomous positioning

A mode of operation in which a GPS receiver computes position fixes in real time from satellite data alone, without reference to data supplied by a base station. Autonomous positioning is the least precise positioning procedure a GPS receiver can perform, yielding position fixes that are precise to ±100 meters.

H

HDOP

The horizontal component of PDOP.

Headland

A guidance pattern that contains straight lines within a boundary. Guidance patterns are for use with automated steering.

I

IMD

Inertial Measurement Device.

IMEI

International Mobile Station Equipment Identity. A number to identify mobile equipment. The GSM network uses this number to identify valid devices. The IMEI number has no relationship to the subscriber.

IMU

Inertial Measurement Unit. An electronic device that measures and reports on a vehicle's velocity, orientation, and gravitational forces, using a combination of accelerometers and gyroscopes.

Integrated radio

Trimble integrated radios contain a radio antenna integrated with the GNSS receiver or display in a single unit. These integrated radios receive corrections transmitted by Trimble GNSS RTK base stations.

L

Logging

Also called coverage logging. Logging records the area that you have covered when you carry out an operation, for example applying fertilizer to a field.

License

A license enables a software feature, and is valid for an unlimited duration. A license does not need to be activated, but does need to be assigned to and delivered to a specific display. Assignment and delivery of a license occurs on the reseller portal.

M

Manual override

Required for platforms that employ a pressure transducer for the manual override function. Change the default only if the operation of the manual override function is unacceptable.

Material

A product that is controlled by a PWM valve, Servo valve, or Rawson drive. You can use a planter (seed), liquid, granular seed and granular fertilizer, all of which have different setup parameters.

Multipath error

An error caused by the interference of the same signal reaching the receiver by two different paths: once via the direct path, and once via a reflection. A major cause of GPS errors.

N

NMEA standard

An electrical, hardware and data standard designed by the National Marine Electronics Association that dictates the content and format of communication between GPS receivers and other devices. NMEA messages include data that provides location and accuracy, the number of satellites being used, the dilution of precision and signal strength.

P

PDOP

Position Dilution of Precision. A calculation that takes into account the satellites that can be seen, how high they are and their bearing. The outcome of the calculation is an estimation of how prone to error your GPS position is. The lower the value, the more accurate your position. You may wish to plan your field work for periods of low PDOP. Generally, the more satellites in view, the better (lower) the PDOP.

Pivot

A guidance pattern you define for your field by recording the outer circular boundary of the pivot area and then entering a value to compute the rows within the pivot. Guidance patterns are for use with automated steering.

R

RangePoint™ RTX™

Positioning service for satellite communication systems. RangePoint RTX works with a built-in GNSS receiver. Does not require a base station or cellular data plan.

Rate switch for Field IQ

Used to select Preset Rate 1, Preset Rate 2, or Manual Rate Control.

Real Time Kinematic (RTK)

A navigation technique to improve the information received from satellite-based positioning systems. Used with GPS, GLONASS and Galileo.

Roll correction

Compensates for antenna height and static roll caused by minor variations in the navigation controller and the mounting of the GPS receiver.

Run screen

The screen where you perform field activities.

S

SBAS

Space Based Augmentation System. A system of Earth-based systems at points surveyed for location accuracy that measure satellites, signals and factors that can impact the signals. The SBAS then broadcasts corrections to satellite signals to improve accuracy.

Scintillation

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

Section

A number of rows or spray nozzles that are controlled by existing shut-off valve, Tru Count air clutches, or Tru Count LiquiBlock valves. A section can have either a single row/nozzle or multiple rows/nozzles depending on how the system is set up.

Section Control Module

Controls 12 sections/rows per module with up to 4 modules (48 module sections / rows).

Service

A service is a subscription to an application that lasts for a specific amount of time, such as one or two years. You associate a service with a specific display that can be delivered wirelessly, through a QR code included in an email or through download to a computer.

Signal Input Module

The percentage of time an individual seed is placed for every intended drop.

Slew time

The amount of time that the front wheels take to move from the far left to the far right position and back.

Steering deadzone

The amount of pressure that the system must apply to the hydraulics before the wheels begin to turn.

T

TAP

Tuning parameter for guidance algorithms.

V

VDOP

A measurement of the vertical PDOP.

Valve calibration for Field-IQ

The process for adjusting the valve performance parameters to get the best performance out of a valve.

W

WAAS

Wide Area Augmentation System. An SBAS operated by the US Federal Aviation Administration.

Wheelbase

The distance between the front and rear axles. On tracked vehicles, the wheelbase is exactly half the length of the track.