



# PRECISION-IQ

Application Reference Manual  
For Supported Displays

Version A  
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# Precision-IQ Application

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# Safety and Compliance Information

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



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



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

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

## Warnings

### 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.

### Articulated Tractors



**WARNING** - Articulated tractors pivot in the middle. Avoid putting yourself in a position where you could be injured by the pivoting rear section of the vehicle.

### Satellite Geometry



**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.

## 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.

 **WARNING** - The display may contain a single-use, lithium-sulfide LiSO<sub>2</sub> battery. Do not expose the battery to temperatures greater than 85° C (185° F) as the battery may vent poisonous gases.

## NH<sub>3</sub>, Anhydrous Ammonia

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

 **WARNING** - NH<sub>3</sub> is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes, and is dangerous if not handled properly. It may cause severe burns to the eyes, lungs, and skin. Skin, and respiratory-related diseases could be aggravated by exposure. It is recommended that protective gloves, boots, slicker and/or pants and jacket, and chemical-splash goggles that are impervious to anhydrous ammonia are worn at all times. See [Working with Anhydrous Ammonia \(NH<sub>3</sub>\)](#).

## Implement Master Switch

 **WARNING** - When the implement is down and the master switch or section master 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.

## 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 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 Implement Automatic Deadzone calibration, the system moves the vehicle's steering wheel. To avoid injury, be prepared for sudden vehicle movement.

## Steering

 **WARNING** - The automated assisted steering system is solely intended for Agricultural use in an open field environment with agricultural vehicles approved by the manufacturer for use with the automated system, and should not be used with any other type of vehicle or

for any other purpose.

Contact your local Trimble-authorized dealer or check [www.trimble.com](http://www.trimble.com) to confirm that the automated steering system has been tested and approved by the manufacturer for use with your vehicle make and model.

The automated steering system should not be installed on a vehicle not approved by the manufacturer for such use. Installation of the automated steering system on an unapproved vehicle will invalidate the product warranty.

-  **WARNING** - The steering coulters can move abruptly during the Proportional Steering Gain procedure while the TrueTracker system tests the hydraulic response to the steering commands. These sudden movements can cause collisions with nearby obstacles or cause injury. Be prepared for sudden steering coulters movements.
-  **WARNING** - When you tap the liquid flow, control valve, or fill disk calibration Start button, 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.

## Vehicle Safety

-  **WARNING** - When you are working on the vehicle's hydraulic systems, vehicle attachments that are suspended can drop. If you are working around the vehicle, you could suffer serious injury if an attachment dropped on you. To avoid this risk, lower all vehicle attachments to the ground before you begin work.
-  **WARNING** - The operator must remain in the driver's seat at all times when the vehicle is in motion and the auto-steering system is engaged.
-  **WARNING** - If someone else attempts to drive the vehicle while you are working on or under it, you can suffer serious or fatal injuries. To avoid this possibility, install a lockout box on the battery terminal to prevent the battery from being reconnected, remove the key from the vehicle's ignition switch, and attach a "Do not operate" tag in the cab.
-  **WARNING** - Vehicle cabs can be quite high in the air. To avoid potentially serious injury through falling from this height, always use the steps and handrails, and face the vehicle, when you enter or exit it.
-  **WARNING** - Agricultural chemicals can pose serious health risks. If the vehicle has been used to apply agricultural chemicals, steam clean the vehicle to remove any chemical residue from the areas of the vehicle where you will be working.
-  **WARNING** - The vehicle will need to move during the Hydraulic Tracked Pump Knees calibration procedure. To avoid injury, be prepared for vehicle movement.

 **WARNING** -The wheels can move abruptly during the Deadzone calibration or Proportional Steering Gain procedure while the Autopilot system tests the hydraulic response to the steering commands. These sudden movements can cause collisions with nearby obstacles or cause injury to occupants of the vehicle. To avoid injury, be prepared for sudden vehicle movement.

## Cautions

### Batteries

 **CAUTION** - Battery posts, terminals, and related accessories contain lead and lead compounds, which can cause serious illness. To avoid ingesting lead, wash your hands thoroughly after touching the battery.

Also take care not to short circuit battery with tools and/or by the incorrect fitting of cables as fire, burns, and damage can occur.

### 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 Precision-IQ 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.

### Chemical Safety

 **CAUTION** - The system installation may bring you into contact with chemical substances, such as oil, which can cause poisoning. Wash your hands thoroughly after you finish working on the system.

### Antennas

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

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

## Display

 **CAUTION** - Take the following precautions to preserve the integrity of the display.

- If you leave the display powered on after shutting off the vehicle's ignition, the display power can drain the battery.
- Do not attempt to power the display without an appropriate guidance controller module.
- Do not press on the screen with a sharp item, such as a pencil. You may damage the surface of the screen.
- Do not apply glass cleaner directly to the touchscreen.

## Cabling

 **CAUTION** - Connecting the Port Replicator of the NavController cable to the P4 or P12 connector of the NavController harness will result in damage to the equipment, and will void the warranty.

## Pressurized Water

 **CAUTION** - Do not direct pressurized water at:

- Electronic or electrical components or connectors.
- Bearings.
- Hydraulic seals.
- Fuel injection pumps.
- Any other sensitive parts or components.



Set the hose pressure as low as practicable, and spray at a 45° to 90° angle. Keep the nozzle of the power washer away from the machine at the distance recommended by the manufacturer.

## Modems

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

## Protective Gear

-  **CAUTION** - Always wear protective equipment appropriate to the job conditions and the nature of the vehicle. This includes wearing protective glasses when you use pressurized air or water, and correct protective welder's clothing when welding. Avoid wearing loose clothing or jewelry that can catch on machine parts or tools.

## USB Drive

-  **CAUTION** - Take the following precautions to protect your USB drive:
  - Do not remove the USB drive while the display is writing to or from the drive. This will corrupt the data.
  - 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.

## Vehicle Setup

-  **CAUTION** - Take the following precautions when setting up your vehicle:
  - If you select a Vehicle Profile that is not suitable for your vehicle, you may experience degraded system performance.
  - If you delete a vehicle, all information about the vehicle will be erased.
-  **CAUTION** - When the vehicle has been running, parts of the vehicle, including the engine and exhaust, can become extremely hot and can cause serious burns. To avoid burns, allow hot machine parts to cool before you begin working on them.
-  **CAUTION** - Always hold the steering wheel while you adjust the column tilt. Otherwise, the weight of the motor may cause the steering wheel to drop suddenly and cause damage to the steering column or dash.
-  **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 connects 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** - Parts of the vehicle may be under pressure. To avoid injury from pressurized parts, relieve all pressure in oil, air, and water systems before you disconnect any lines, fittings, or related items. To avoid being sprayed by pressurized liquids, hold a rag over fill caps, breathers, or hose connections when you remove them. Do not use your bare hands to check for hydraulic leaks. Use a board or cardboard instead.

 **CAUTION** - To prevent damage to the system, make sure that no wires or hoses interfere with or catch on any mechanical linkages, or contact any machine parts that get hot.

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

## Working with Anhydrous Ammonia (NH<sub>3</sub>)

Contact your NH<sub>3</sub> supplier to review all safety requirements associated with anhydrous ammonia (NH<sub>3</sub>).

Always wear correct personal protective equipment. This includes, but is not limited to:

- Goggles or face shield
- Protective suit and gloves
- Respirator

Do not allow anyone to operate the system without proper instruction and training.

Stand up-wind when working around NH<sub>3</sub> and related equipment.

Always keep NH<sub>3</sub> equipment away from buildings, livestock, and other people.

Never work on NH<sub>3</sub> equipment in confined spaces.

Before you attempt to transport the implement, discharge the system of all NH<sub>3</sub> and completely shut down the system. See [Discharging the System](#).

If symptoms of illness occur during or shortly after use of NH<sub>3</sub> products, seek immediate medical attention.

Keep a source of clean water (at least five gallons) readily available. In case of exposure, flush exposed skin or eyes immediately with large quantities of water and seek immediate medical attention.

NH<sub>3</sub> can be harmful to the environment if not used correctly. Follow all local, state, and federal regulations regarding proper handling of this chemical.

## Servicing the Equipment

1. Remove the system from operation before performing any maintenance.
2. Thoroughly bleed all system lines and disconnect the nurse tank hose. See [Discharging the System](#).
3. Make sure that the gauge pressure is at zero before you open the system.
4. Use extreme caution when opening a previously pressurized system.

## Discharging the System

1. Turn off the console or vehicle master switch.
2. Completely close the main shut-off valve on the supply or nurse tank.
3. Resume field application until the pressure gauge shows zero pressure.
4. Check again that the console and/or vehicle master switch, and all section switches, are turned off.
5. Completely close the emergency shut-off valve the cooling tower.
6. Bleed and disconnect the nurse tank supply hose from the system.
7. Turn on the console master switch and all section switches.
8. Stand up-wind from the implement and then slowly open the bleed valve(s) until fully open.
9. Allow at least one (1) hour for the system to fully discharge.
10. Before you open the system, make sure that the pressure gauge on the manifold reads zero and that the cooling tower is not cold to the touch. This ensures that all liquid  $\text{NH}_3$  has evaporated and that the pressure is discharged.

***NOTE** – Frost on any component is a positive indication of trapped  $\text{NH}_3$  at low pressure. Lack of frost does not always indicate a lack of  $\text{NH}_3$ .*

## COMPLIANCE INFORMATION

### Federal Communications Commission (FCC) Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the

receiver is connected.

- Consult the dealer or service provider for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Contains FCC ID: TLZ-NM230NF and Z642564N

### ***Radiation Exposure Statement***

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

### **Industry Canada Interference Statement**

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme aux CNR exemptes de licence d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes:

1. Ce dispositif ne peut causer d'interférences; et
2. Ce dispositif doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

### ***Radiation Exposure Statement***

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

### ***Déclaration d'Exposition aux Radiations***

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un

minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Contains IC: 6100A-NM230NF and 451I-2564N

## INTERNATIONAL COMPLIANCE

### Australia and New Zealand

This product conforms with the regulatory requirements of the Australian Communications and Media Authority (ACMA) EMC framework, thus satisfying the requirements for RCM Marking and sale within Australia and New Zealand.

### Canada

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme ICES-003 du Canada.

This apparatus complies with Canadian RSS-GEN.

Cet appareil est conforme à la norme CNR-GEN du Canada.

### Europe

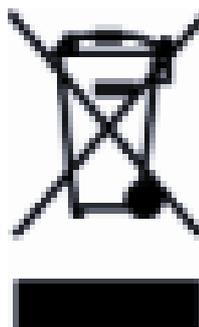
This product has been tested and found to comply with the requirements for Class B device according to Radio Equipment Directive 2014/53/EU, thereby satisfying the requirements for CE Marking and sale within the European Economic Area (EEA). Contains a radio module. These requirements are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential or commercial environment.

## RECYCLING WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

For product recycling instructions and more information, please go to [www.trimble.com/Corporate/Environmental\\_Compliance](http://www.trimble.com/Corporate/Environmental_Compliance).

Recycling in Europe: To recycle Trimble WEEE (Waste Electrical and Electronic Equipment, products that run on electrical power.), call +31 497 53 24 30, and ask for the “WEEE Associate”. Or, mail a request for recycling instructions to:

Trimble Europe B.V. WEEE Recycling  
C/O Menlo Logistics  
Gate 19 to 26  
Meerheide 43  
5521 DZ  
Eersel  
The Netherlands



# Introduction to Precision-IQ for Supported Displays

- ▶ Display Power On/Off
- ▶ Touch Screen Basics and Maintenance
- ▶ Set Preferences for Precision-IQ and the Display
- ▶ USB Port
- ▶ Compatibility with Automated Guidance and Steering
- ▶ About This Precision-IQ Reference Manual
- ▶ View Installed Licenses
- ▶ Upgrade or Apply a License for a New Feature

The Precision-IQ field application for the supported displays is an easy-to-use advanced field management system.



This reference manual is intended for those people responsible for setting up the Precision-IQ application and for those who will be in the cab accessing the application through a supported display.

**NOTE** – Depending on your display, the screen shot examples in this document may vary.

## Display Power On/Off

**NOTE** – The display must be correctly installed *before* powering on.

### Display - Power On

#### Automatic

If the display is connected to the ignition source, power on the vehicle. The NAV-900 guidance controller sends power to the display when the vehicle powers on.

#### Manual

To turn on the display manually, hold the power button down briefly (about half a second). The power button is on the rear of the display.

The display powers on. After a short pause, the Launcher screen opens.

To open the Precision-IQ application, tap the **Precision-IQ** widget icon:



**NOTE** – After you have initially powered on the display, the Precision-IQ application may not open until the NAV-900 has initialized or finished booting.

### Display - Power Off

To power off the display **automatically**: If the display is connected to the ignition source, when you switch the ignition off, a shutdown/reboot dialog displays. If you do nothing, then 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.

To **manually** turn the power off, follow the steps below:

1. Hold 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 turn off. This is because the Precision-IQ application 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 five seconds.

## Touch Screen Basics and Maintenance

To interact with the Precision-IQ application on a supported display, use your fingers to tap buttons, pan through maps, select items from lists, and adjust values of selectors. Precision-IQ will automatically display a keyboard or number pad as needed.

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

For details on how to tap, swipe, pan, etc., refer to your favorite Android user guide.

## Cleaning the Touch Screen

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

- Ammonia-free glass cleaner.
- Soft, lint-free cotton cloth such as a microfiber towel.
- 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.

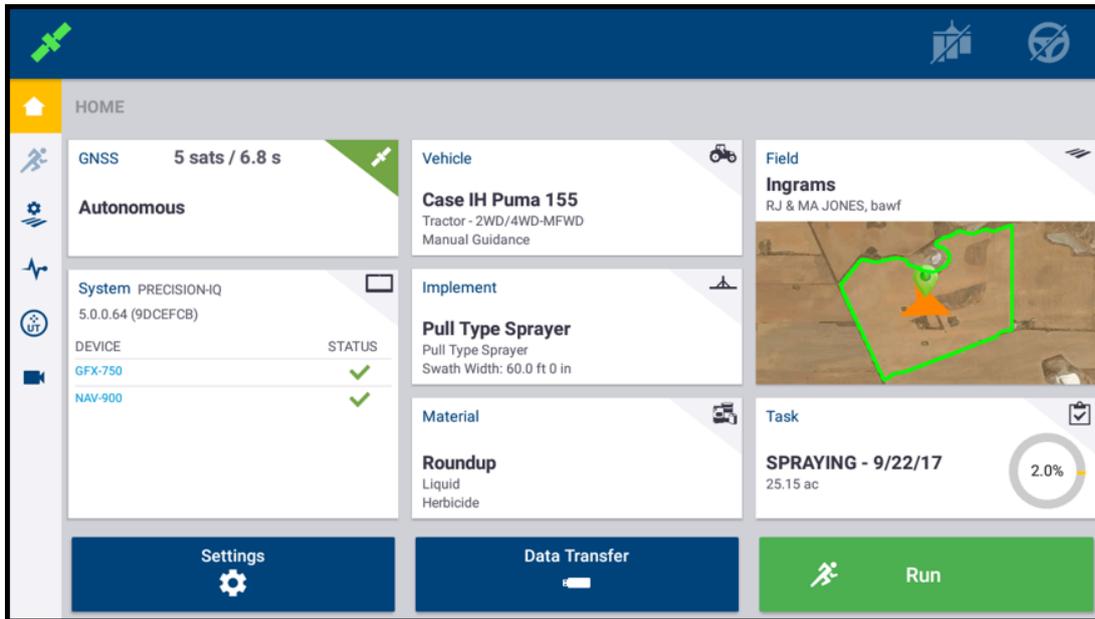
**TIP** - Clean the touch screen while it is powered down. It is easier to see dirt and fingerprints with the touch screen is dark.

## Precision-IQ Home Screen Tour

This section provides an overview of the Precision-IQ Home screen. From the Launcher screen, tap the **Precision-IQ** icon to launch the application:



By default, the Precision-IQ Home screen displays:



The Precision-IQ Home screen provides a variety of status and equipment details. There are three main regions with which you will be working:

- [Activity Bar](#)
- [Productivity Tiles](#)
- [Settings, Data Transfer, and Run/Stop Buttons](#)

## Activity Bar

The activity bar appears on the left side of the Home screen:

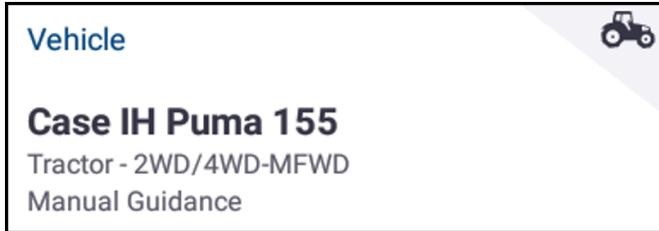


Icons with the yellow background show your current screen location. Tap an icon to enter the:

- Run screen (you can only enter this screen after all equipment is correctly set up, selected, and the Run screen button has been tapped)
- Field Manager
- Diagnostics
- Universal Terminal
- External Camera

## Productivity Tiles

This region shows the connectivity, equipment, field, and task details. Each tile includes information specific to its area. For example:



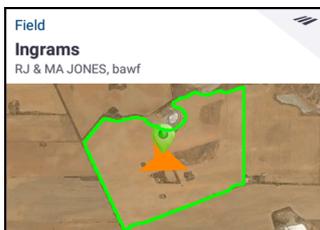
The example vehicle tile shows the make and model as well as the guidance method selected.

The productivity tiles shown include:

- **GNSS:** This tile shows the number of satellites connected and the type of corrections service selected. For more details about this tile, see [GNSS Connectivity and Supported Correction Services](#).
- **Vehicle:** This tile shows the make and model of the vehicle along with the guidance functionality selected. For more details about this tile, see [Vehicles](#).
- **Implement:** The Implement tile shows the type of implement selected and any appropriate measurements associated with it. Because there are a variety of implements supported by Precision-IQ, this tile will update to show the information relevant to the selected implement. For more details about this tile, see [Implements](#).
- **Material:** The material tile shows the name and type of material selected. For more details about this tile, see [Materials](#).

*NOTE – The availability of material types available depend on the implement selected.*

- **Field:** In addition to the field, farm, and client name details, this tile includes a thumbnail image of the selected field:



For more details about this tile, see [Fields](#).

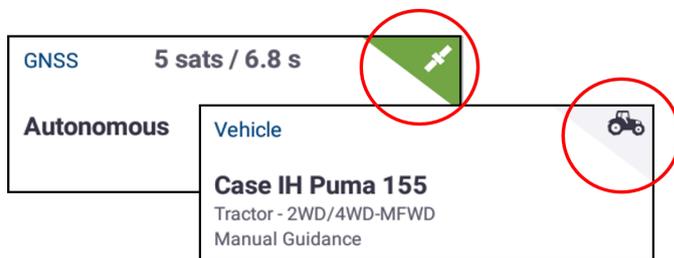
- **Task:** Once you have selected a material and a field, you can select the appropriate task for the work to be done in the field and then tap the Run button to enter the Run screen.

- **System:** The system tile provides information about the Precision-IQ system, including the current firmware version and devices connected and managed through the system. See also:
  - [GFX-750/XCN-1050 Display Data Sheet](#)
  - [NAV-900 Data Sheet](#)

## Productivity Tile Status

Each productivity tile provides a color-coded, at-a-glance status in the upper-right corner of the tile:

- **Grey/Green:** If the color is grey (or green for GNSS), then the all details have been correctly set and the item selected. With this color, you can tap **Run** to enter the Run screen to begin your task.



- **Red:** This color indicates that there is a problem that must be corrected before you can enter the Run screen:



The details of the tile will show the problem and provide an action for you to complete. For example, in the sample image above, the problem is that "no implement is selected" and the action is to "tap to select."

- **Yellow** (Material and GNSS tiles only): The yellow status indicates:
  - GNSS: The GNSS connection is converging.
  - Material: A generic or default material is selected. You can still enter the Run screen,

but Precision-IQ may not record the applied material.



## Settings, Data Transfer, and Run/Stop Buttons

These buttons appear below the productivity tiles:

- **Settings:** Tap this button to set up preferences for using Precision-IQ. See [Set Preferences for Precision-IQ and the Display](#).
- **Data Transfer:** Tap this button to manually transfer data files from the display to a USB drive. Also, you can manually download and install updated software and licenses. See also:
  - [Data Transfer](#).
  - [Upgrade or Apply a License for a New Feature](#).
- **Run:** Tap this button to enter the Run screen:



You can only enter the Run screen after you have successfully set up and selected a vehicle, implement, material, field, and task.

While you are in a Run operation, this button will update to show Stop:



Tap this button to stop the run. All data recorded by Precision-IQ can be transferred to your back office.

## Set Preferences for Precision-IQ and the Display

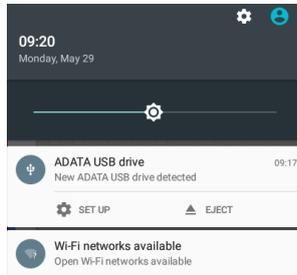
To interact with the Precision-IQ application on a supported display, use your fingers to tap buttons, pan through maps, select items from lists, and adjust values of selectors. Precision-IQ will automatically display a keyboard or number pad as needed.

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

For details on how to tap, swipe, pan, etc., refer to your favorite Android user guide.

Swipe down from the top of the screen as quick access to:

- Brightness
- Wi-Fi settings
- USB settings
- Android settings
- USB drive details

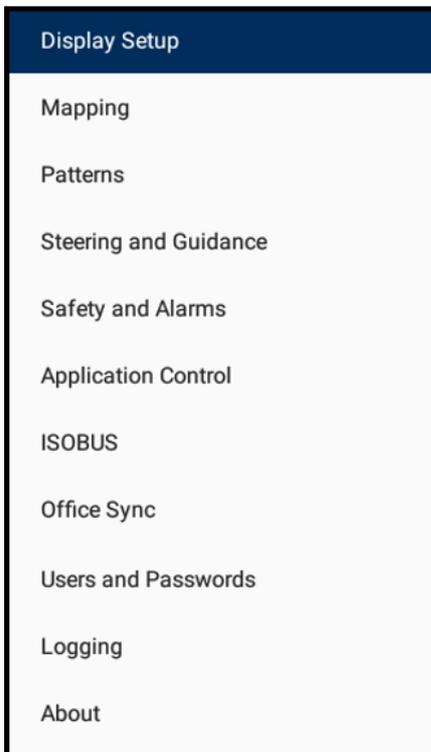


Configuration of Precision-IQ application settings is managed on the Settings screen. To access this screen:

1. From the Launcher screen, tap the **Precision-IQ** icon to open the Precision-IQ application:



2. From the Precision-IQ Home screen, tap the **Settings** button to open the Settings screen:

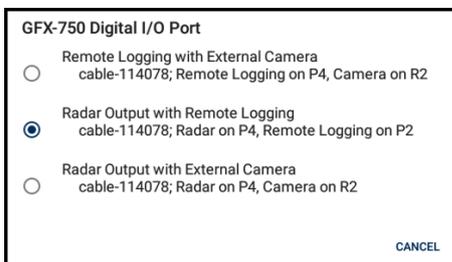


From the Settings screen, tap a setting option to set your preferences for Precision-IQ as described in the sections below.

## Display Setup

Tap **Display Setup** to configure:

- **Display Units:** toggle between US (feet and inches) and Metric (meters and centimeters) measurement values.
- **Number Format:** toggle between using a period (for example, 100.0) or comma (for example (100,0)).
- **Digital I/O Port Setup:** This setting is used enable the ports on the display for connecting a peripheral. Tap Digital I/O Port Setup to make your selection from the following pop-up window:



Select from the following choices:

- Remote Logging with External Camera
- Radar Output with Remote Logging
- Radar Output with External Camera

## Mapping

With the mapping setting, you can set options for how you want maps to be displayed in Precision-IQ. For details, see [Run Screen](#).

## Patterns

As you work within a field, Precision-IQ provides a variety of guidance pattern mapping icons you use to identify elements within your field. This setting allows you to adjust how these icons display. For details, see [Run Screen](#).

## Steering and Guidance

This setting provides options you can set to adjust the steering and guidance functions of your vehicle. For details, see [Auto Guidance Setup](#).

## Safety and Alarms

This setting allows you to set a timeout for when you want Precision-IQ to automatically disengage auto steering or application control operations.

- **Auto Steering Operator Timeout:** The amount of time before Precision-IQ disengages auto guidance and stops applications when there is no response to a shutdown message. For details, see [Autopilot Automated Steering System](#).
- **Application Control Operator Timeout:** The amount of time before Precision-IQ disengages automatic application control when there is no response to a shutdown message. For details, see [Application Control](#).

## Application Control

Use this setting to:

- Allow access to advanced implement setup and calibration.
- Switch on/off coverage logging based on applied flow rate when using application control.
- Automatically calculate the manual boundary increment based on the section widths of the primary channel.

For details, see [Application Control](#).

## ISOBUS

If you are using an ISOBUS implement, then use this setting to:

- Enable Universal Terminal.
- Enable Task Controller support.
- Enable automatic ISO configuration updates.

For details, see [Add an ISOBUS Implement](#).

## Office Sync

This setting enables or disables Office Sync, which allows Precision-IQ to send collected data files to your back office automatically.

Trimble Ag Software includes the licenses and support for Precision-IQ's Office Sync feature. For details about Trimble Ag Software, see:

<https://agriculture.trimble.com/software/farmers/>

See also: [Data Transfer](#).

## Users and Passwords

This setting allows you to manage and maintain users and passwords for the Precision-IQ application. When enabled, Precision-IQ allows for multiple user/operators to login and perform a variety of tasks, as needed. For details, see [Users and Passwords](#).

## Logging

Use this setting to:

- Enable GNSS data logging at startup.
- Enable verbose Application Control data logging.

For details about how to transfer these data files, see [Data Transfer](#).

## About

Tap **About** for a summary of:

- **Software information:** Shows a list of all installed software packages. Details include the name of the software, the version of the software, and when it was installed onto the display.
- **Current user information:** This option is available when a user is logged into Precision-IQ. For more information, see [Users and Passwords](#).
- **Current preference information:** Shows a summary list of all preferences you have set.
- **Device information:** Shows a summary of hardware information about the display and any available network information.

## USB Port

The display has two USB ports: one on the side of the display and one on the back. You can use a USB drive to transfer data to and from your display.



**CAUTION** - Take the following precautions to protect your USB drive:

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

## Insert a USB Drive

1. Move the display so you can see the USB port on the side or back of the display.
2. Pull the rubber cover off the USB port.

3. Insert the USB drive into the USB port. On the status bar, a USB icon  displays.

**NOTE** – The display automatically senses when a USB drive is inserted into either the side or rear port.

## Remove a USB Drive

1. Move the display so you can see the USB port.
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 port.
4. Press the rubber cover back onto the USB port.

## Compatibility with Automated Guidance and Steering

The Precision-IQ application is compatible with the following automated guidance and steering:

- Trimble Autopilot™ automated steering system.

Precision-IQ 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).
- Variable rate control.

## About This Precision-IQ Reference Manual

This manual describes how to install, configure, troubleshoot, and use the Precision-IQ application for the display.

## Accessing the Precision-IQ Reference Manual

To access this Precision-IQ Reference Manual:

- On the Launcher screen, tap .
- Tap  on the Home or Run screen, and select **User Guide**. To open the interactive table of contents, swipe right on the left side of the screen.
- Visit the Trimble web site at: [http://www.trimble.com/Support/Support\\_AZ.aspx](http://www.trimble.com/Support/Support_AZ.aspx).

## Availability of Optional Features

All available functions are covered in this manual, however, you may not see all of them on your screen. The Precision-IQ application includes many optional features. Only the features you have purchased and unlocked will be available to you. See [Upgrade or Apply a License for a New Feature](#).

## 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](http://www.trimble.com/Support/Support_AZ.aspx).
- **Trimble training courses** - Consider a training course to help you use the Precision-IQ application to its fullest potential. For more information, visit [http://www.trimble.com/Support/Index\\_Training.aspx](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. Visit [http://www.trimble.com/support/index\\_support.aspx](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. Visit <http://www.trimble.com/global-services/support.aspx>.
2. Click **Request Technical Support** and login to complete a support request.

## View Installed Licenses

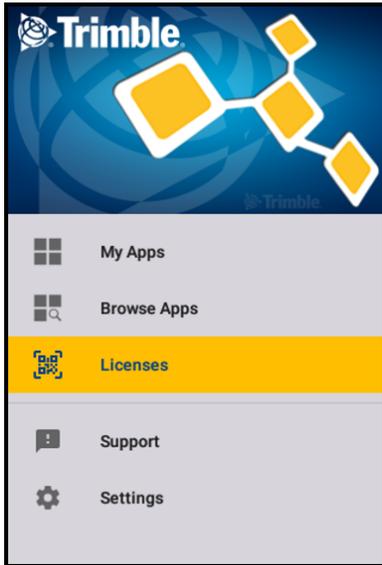
Your display includes several licenses already enable for you to begin using. Depending on the functionality you need to use in Precision-IQ, you may need to install and unlock the associated license.

Follow the steps below to view the installed licenses for your display:

1. From the Launcher screen, tap the **App Central** icon:



2. On the App Central screen, tap the menu icon in the upper left-hand corner to display the App Central menu:



3. Tap **Licenses** for a list of active licenses for the display. You can also tap the NAV-900 Module button for a list of active licenses for the NAV-900 Module module.

See [Upgrade or Apply a License for a New Feature](#) for details on how to add a license for your display, NAV-900 Module module, or any other device managed through the display.

## Upgrade or Apply a License for a New Feature

To apply a license you have purchased for an upgrade or to unlock a new feature:

1. If the display is not on, power on the display. See [Display Power On/Off](#)
2. Insert a USB drive into a USB port of the display. See [USB Port](#).
3. On the Launcher screen, tap  to open App Central.
4. Tap  to open the menu.
5. Tap **License**. The License screen displays, showing any licenses you have already applied.
6. Tap .

7. To scan the QR code:

- a. Tap . Aim the camera of the display at the QR code.
- b. To scan more than one QR code, tap .
- c. When you are finished scanning, tap .

8. To download a license from a USB drive:

- a. Insert the USB drive into a USB port of the display.
- b. Tap .
- c. Tap on the file explorer. Within the file explorer, go to the USB drive and find the license file you want.
- d. Tap on the license file. The system applies the license you selected and returns to the App Central Licenses screen.

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

9. To enter the license code, tap  and enter the code with the on-screen keyboard.

# Precision-IQ Quick Start: Setup and Select

## Setup Steps

- ▶ Add GNSS Connection
- ▶ Add a Field
- ▶ Add a Vehicle
- ▶ Add an Implement
- ▶ Add a Material

## Selection Steps

- ▶ Select a Vehicle
- ▶ Select an Implement
- ▶ Select a Field
- ▶ Select a Material
- ▶ Select a Task
- ▶ Enter the Run Screen

This chapter provides a quick start overview of the setup and selection steps to follow in order to enter the Run screen of the Precision-IQ application. Complete details and optional settings are described in their respective chapters.

## Add GNSS Connection

Precision-IQ accesses the Global Navigation Satellite System (GNSS), which provides information about geo-spatial positioning. The NAV-900 module is a GNSS receiver that determines its longitude, latitude, and altitude.

To set up the receiver, you choose:

- The correction source you will be using, if any.
- The types of messages you want the receiver to send out (such as to an ISO-certified implement).

**NOTE** – GNSS status will not show a converging or normal status until a vehicle has been configured and selected.

1. After installing the AG25 GNSS antenna, power on the vehicle. This will power on the receiver.
2. Verify your installed and activated licenses as described in [View Installed Licenses](#).

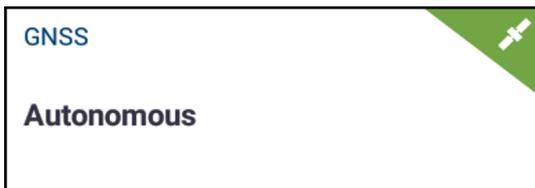
Verify that the **Basic Positioning** license is installed for the NAV-900 module.

**NOTE** – See [Upgrade or Apply a License for a New Feature](#) for details on adding a license to the display, NAV-900, or any other device managed by the display.

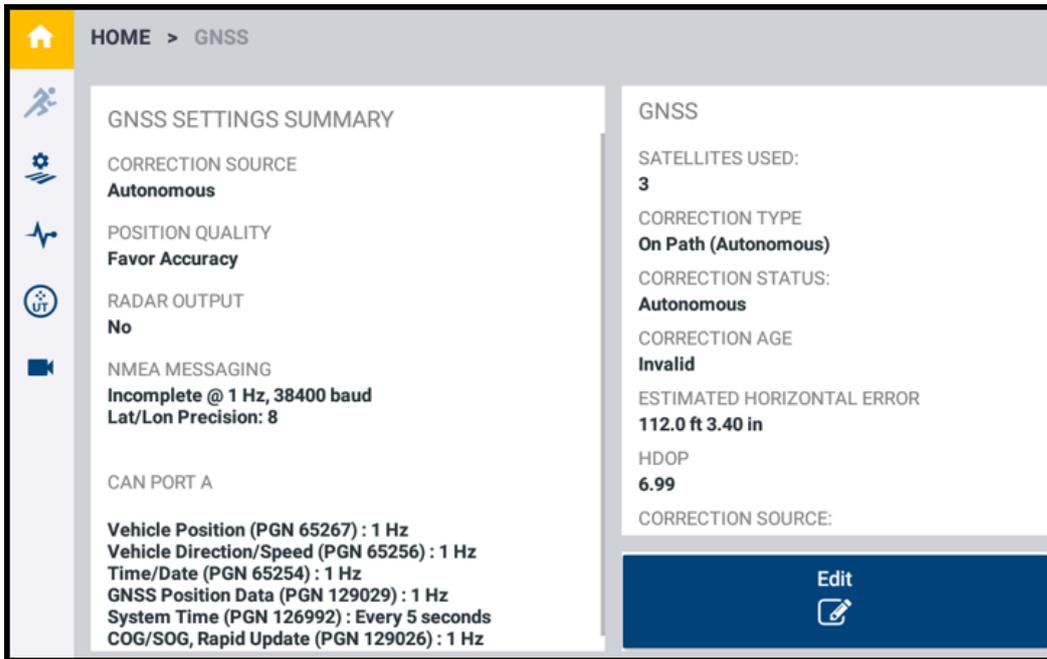
3. From the Launcher screen, tap the **Precision-IQ** icon to open the application:



4. On the Home screen, tap the **GNSS** tile:



5. The GNSS details page displays:



6. Review the GNSS details. By default, the correction source is set to **Autonomous**. If you need to make any changes, tap the **Edit** button.

For details on the various settings you can make for GNSS, see [GNSS Connectivity and Supported Correction Services](#).

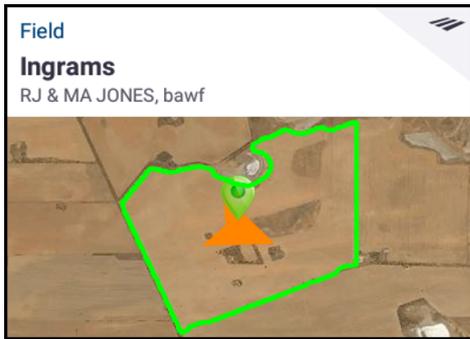
7. Tap **Home** to return to the Home screen.

## Add a Field

A *field* is the area where you will do a particular task (such as seeding, tilling, etc.). For Precision-IQ to collect details about the work being done in a field, you must identify and add a field to the application.

Follow the steps below to add a field:

1. On the Home screen, tap the **Field** tile:



2. On the Create New Field pop-up window, enter the following information with the Android keyboard:

- **Field Name** (*required*): Enter a unique field name for the field.
- **Client Name** (*optional*): Enter a client name for the field.
- **Farm Name** (*optional*): Enter the farm name.

When you have entered the information, tap **Done**.

3. Tap the **Home** icon to return to the Home screen.

Alternatively, you can transfer existing field configurations directly to the display:

1. Insert a USB drive into the USB port of the display.
2. On the Home screen, tap the **Data Transfer** button:



3. On the Data Transfer screen:
  - The left side of the screen (labeled **Internal**) shows the configuration files currently available on the display.
  - The right side of the screen (labeled **USB**) shows the configuration files of the USB drive.
4. From the USB region, tap **Fields** to expand the menu and display all available fields.
5. Tap the select box for each field you want to transfer. Then tap the left transfer icon in the center of the screen to complete the transfer:



6. Tap the Android **Back** button to return to the Home screen.

For complete details of configuring a field including how to use guidance mappings, refer to [Fields](#).

## Add a Vehicle

A *vehicle* is the machine that drives a particular task (such as seeding, tilling, etc.). For Precision-IQ to collect performance details and to manage auto guidance features for the vehicle, you must identify and add a vehicle to the application.

Follow the steps below to add a vehicle:

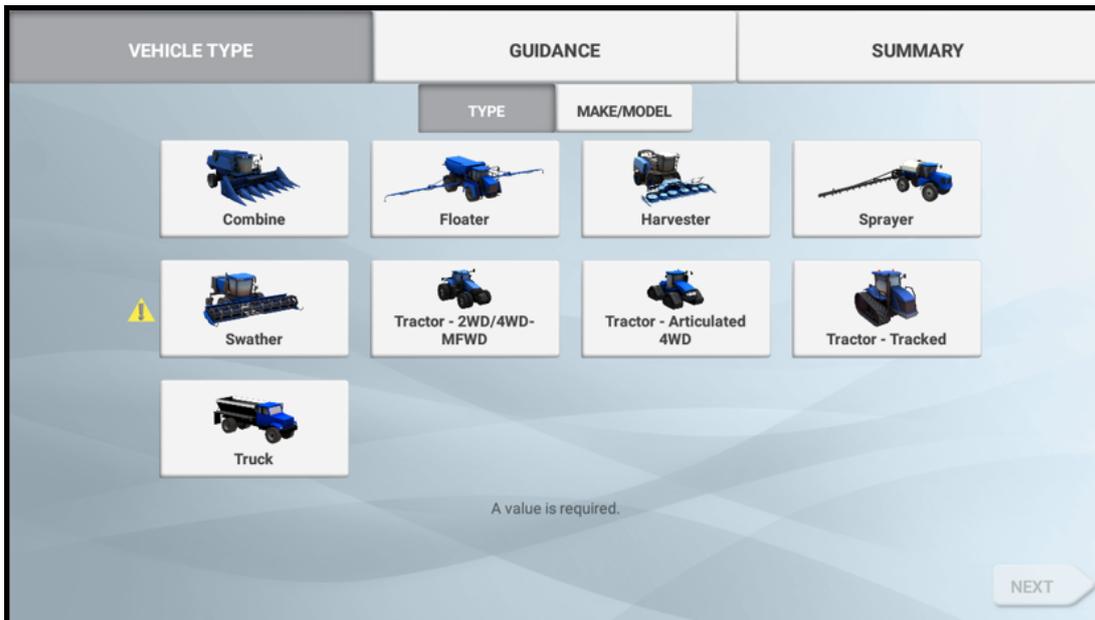
1. On the Home screen, tap the **Vehicle** tile:



2. On the Vehicle screen, tap the **New** button:



3. The Vehicle Creation wizard launches:



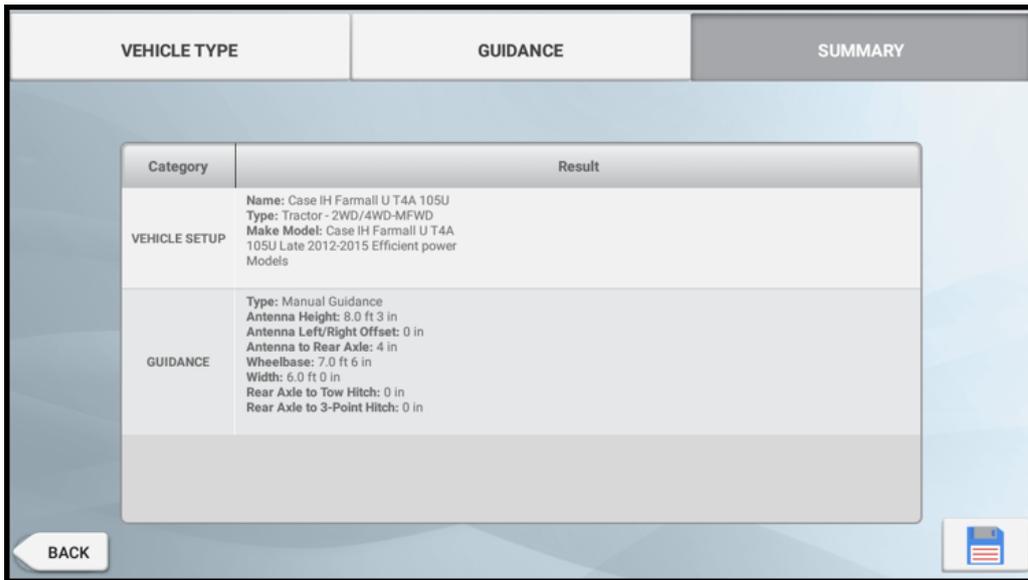
From here, you can select a vehicle type, the vehicle make and model, and a variety of available guidance options.

For complete details about vehicle configurations, see [Vehicles](#). For details about available auto guidance systems for your selected vehicle, see [Auto Guidance Setup](#).

- As you continue through the Vehicle Creation wizard, tap **Next** to continue through each step:



- When you have completed the vehicle configuration, the vehicle's Summary screen displays showing details about your selected vehicle:



- Tap the **Save** icon to save your vehicle and return to the Home screen:



## Add an Implement

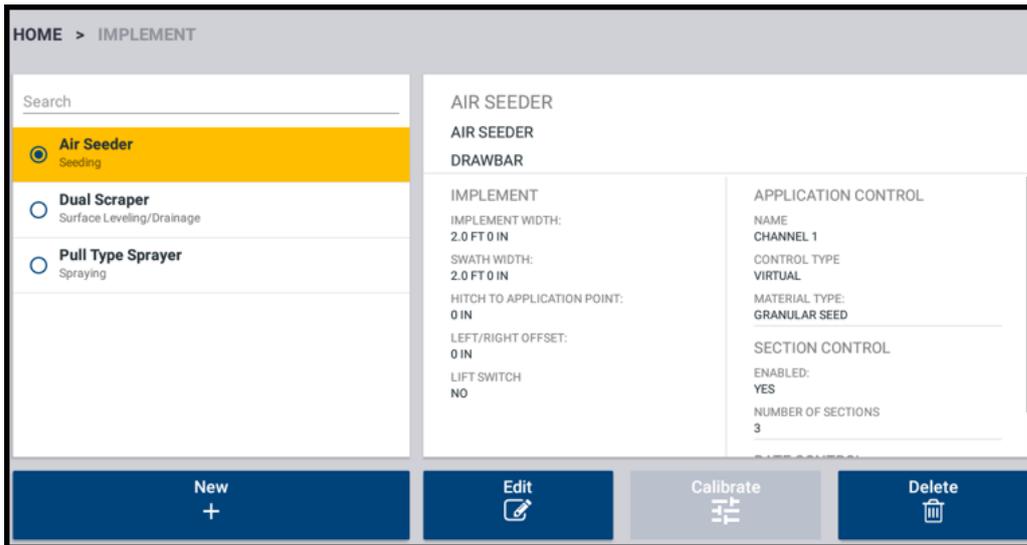
Once connected to a vehicle, an *implement* is the specialized equipment use to perform a particular task (such as seeding, tilling, etc.). For Precision-IQ to collect details about the work being done in a field or about the materials being applied to a field through and implement, you must identify and add an implement to the application.

Follow the steps below to add an implement:

1. On the Home screen, tap the **Implement** tile:



2. The Implement screen displays:



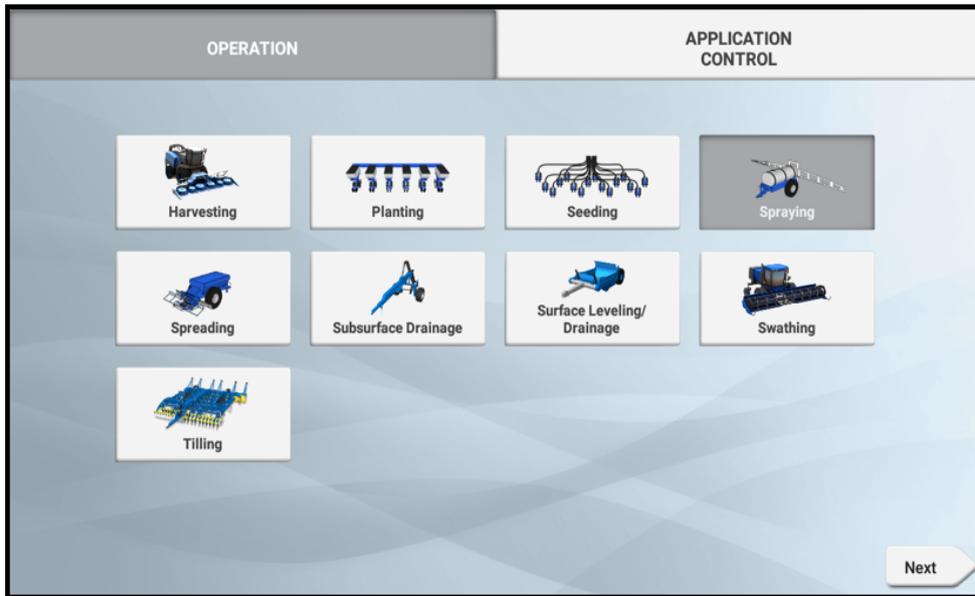
This screen shows a list of available implements. Tap an implement to view details about the selected implement.

3. Tap **New**:



The Implement Setup wizard launches.

4. The first screen of the Implement Setup wizard prompts you to select a type of operation you expect your implement to perform:



Tap the tile for the operation that applies for your implement. Tap **Save** to continue with the implement setup:



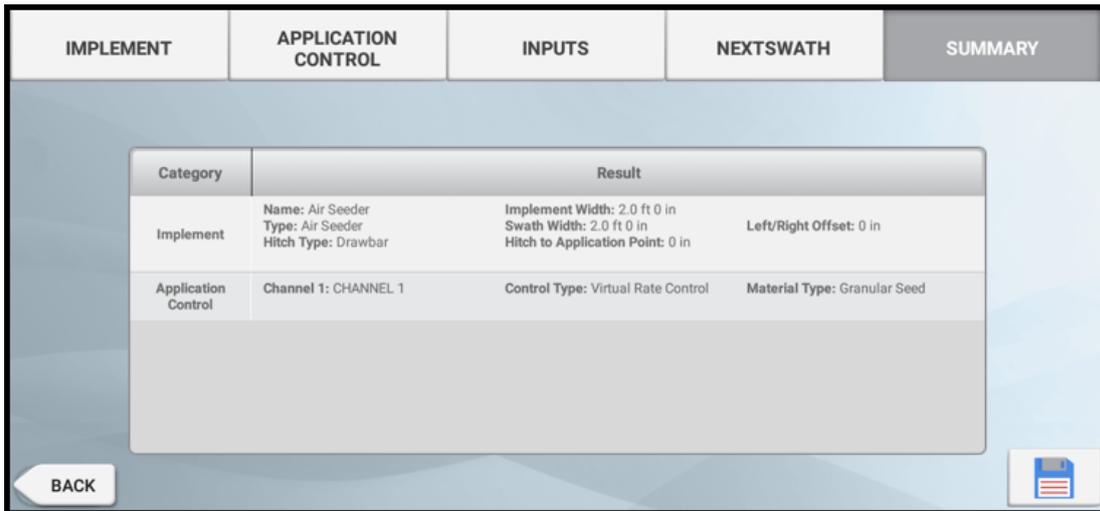
- Depending on the operation you select for your implement, the Implement Setup wizard will step you through the details to configure the implement's profile. As you complete each step, tap **Next** to continue to the next one:



Some implements require a license or unlock to configure. See also:

- [Upgrade or Apply a License for a New Feature](#)
- [Add a Field-IQ Basic Implement](#)
- [Add an ISOBUS Implement](#)
- [Add a Trimble Universal Variable Rate \(TUV\) Protocol Implement](#)
- [Add a Custom-Setup Implement](#)

- When you have completed the implement configuration, the implement's Summary screen displays showing details about your selected implement:



Tap **Save** to complete the process and exit the Implement Setup wizard:



***NOTE** – Once your implement is set up, you can return to the Implement Setup wizard to make any changes. See [Edit an Implement](#) for details.*

## Add a Material

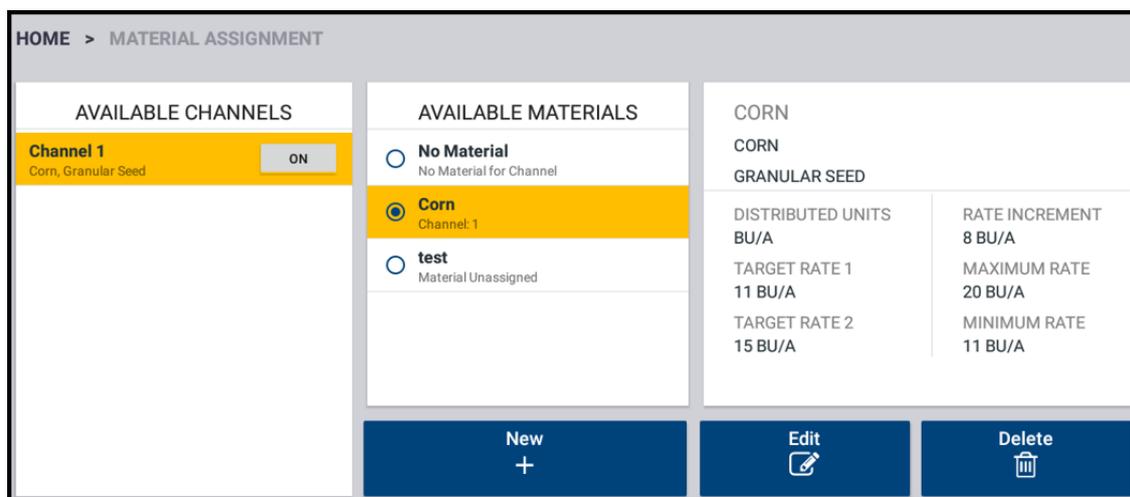
A *material* is applied to a field through a specialized implement. For Precision-IQ to collect details and to manage material application effectively, you must identify and add a material type to the application.

Follow the steps below to add a material:

1. From the Home screen, tap the **Material** tile:



2. The Material Assignment screen displays:



This screen shows the following information:

**Available Channels:** This section shows the number of channels available to the selected implement. Some implements can deliver more than one material (for example, fertilizer *and* herbicide). Implements deliver a particular material through *channel*. Tap the **On** button to enable or disable a channel.

**Available Materials:** This section shows the material profiles that have already been created. Tap a material from this list to select it and review its details. Materials will only be listed that have the same category as the application channel.

**Material Detail:** This section shows details about the selected material.

3. Tap **New** to launch the Material Creation wizard.

**NOTE** – Any material you create must correspond to the appropriate implement. A material will only be available for selection only for those implements that can apply it.

4. Tap each field to enter material details and complete the form:

- Create a unique name for the material.
- Select a category (Anhydrous, Granular Seed, etc.).
- Depending on the category, select the material type associated with the category. For example, if you select Granular Seed as the category, then select a seed type, such as Barley, Corn, Oats, Peanuts, etc.
- Select the distribution type for the material. For example, the amount of a material (pound, liters, gallons) per area (acre, hectare).
- Set values for the distribution rates.

- (Optional) Tap Material Details to enter values for the material's product number and manufacture.

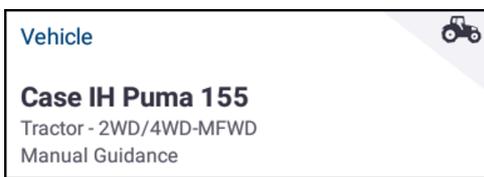
5. Tap **Save** to complete the material creation and return to the Materials screen.

For complete details on configuring a material, refer to [Adding a Material](#).

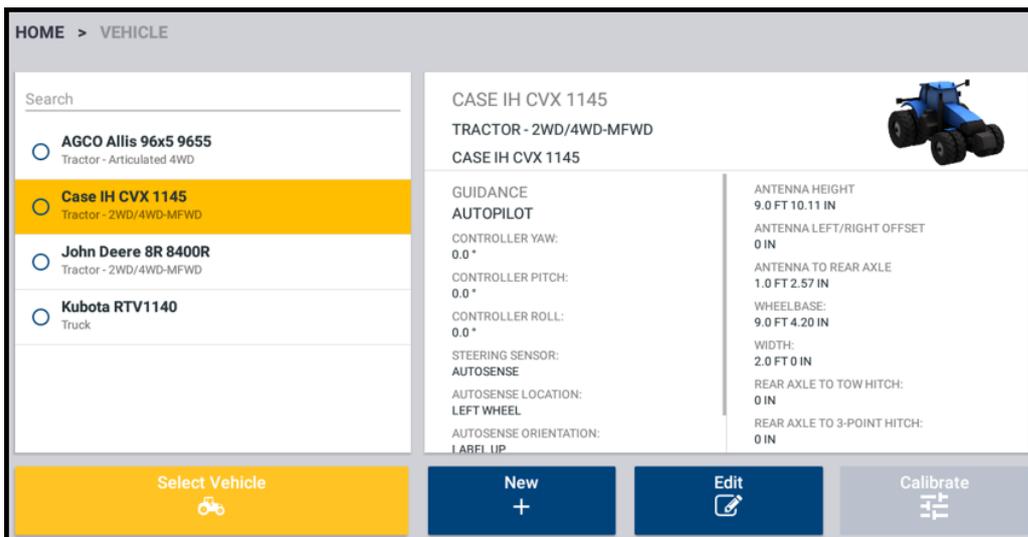
## Select a Vehicle

By default, the first vehicle set up is selected, regardless of how many others are added. If you need to select a different vehicle:

1. On the Home screen, tap the **Vehicle** tile:



2. The Vehicle screen displays:

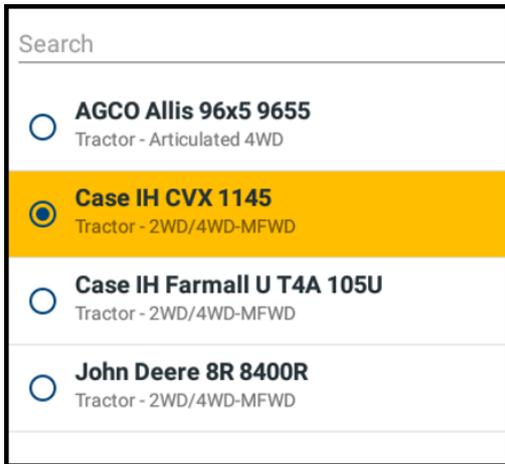


This screen shows a list of available vehicles. Tap a vehicle to view details about the selected vehicle.

3. Tap a vehicle to select it, then tap **Select Vehicle**:



- The list of available vehicles will update to show the vehicle as selected:



- Tap **Home** to return to the Home screen.

For complete details about vehicle configurations, see [Vehicles](#). For details about available auto guidance systems for your selected vehicle, see [Auto Guidance Setup](#).

## Select an Implement

**NOTE** – You *must* select an implement before you can select a material or task.

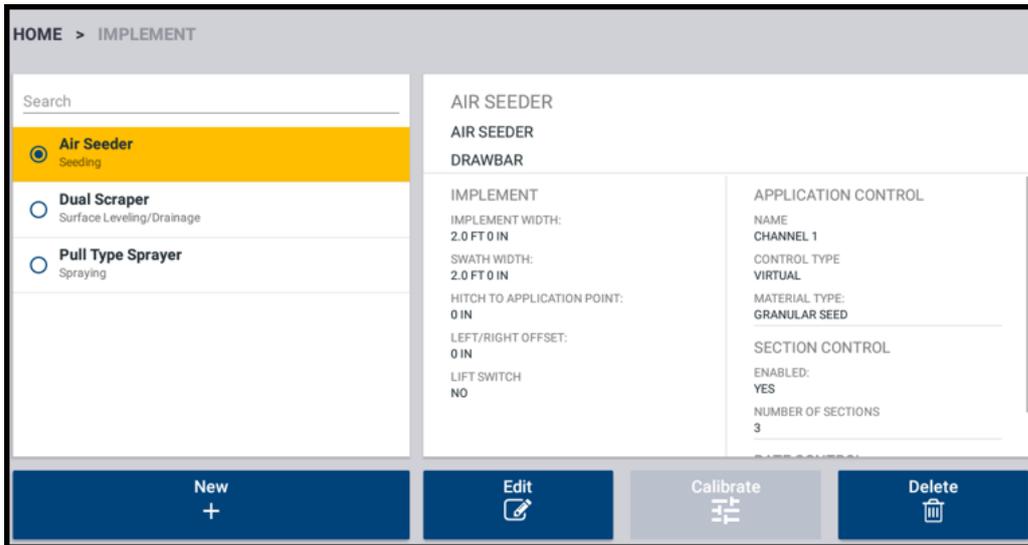
For complete details about supported implements types and configuration, see [Implements](#).

Follow the steps below to select an implement:

- From the Home screen, tap the **Implement** tile:



2. The Implement screen displays:



This screen shows a list of available implements. Tap an implement to view details about the selected implement.

3. Tap an implement to select it.
4. Tap **Home** to return to the Home screen.

## Select a Material

**NOTE** – If the selected implement does not apply a material (for example, tilling or subsurface drainage implements), then no material will appear on the Materials screen. For these types of implements, you can skip this section.

To select a material:

1. From the Home screen, tap the **Material** tile:



2. From the list of available channels, **Channel 1** is selected by default.
3. From the list of available materials, tap a material to select it. The Materials screen will update to show details about the selected material.
4. Tap the **Home** icon to return to the Home screen.

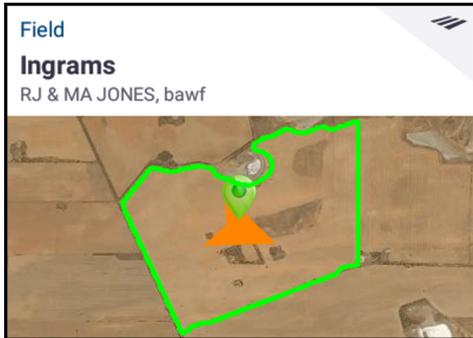
For complete details about materials, see [Materials](#).

## Select a Field

To work with a field to work within it, you select it.

Follow the steps below to select a field:

1. From the Home screen, tap the **Field** tile:



2. From the list of available fields, tap a field to select it.
3. Tap the **Home** icon to return to the Home screen.

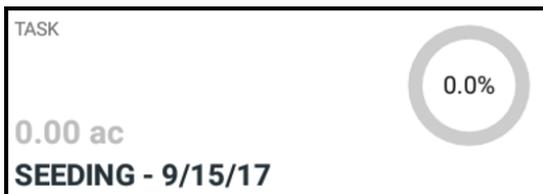
For complete details of configuring a field including how to use guidance mappings, refer to [Fields](#).

## Select a Task

A valid task will depend on which implement and material you have selected.

Follow the steps below to select a task:

1. From the Home screen, tap the **Task** tile:



2. Tap **New**. A Create New Task pop-up window will display with a valid task with the current date (for example, *SEEDING- 9/15/2017*).
3. If necessary, you can edit the task name and date. Tap **OK**.
4. Tap the **Home** icon to return to the Home screen.

## Enter the Run Screen

Once all items have been set up and selected, review your selections on the Home screen. Tap the green **Run** button to enter the Run screen, where you perform all field activities:

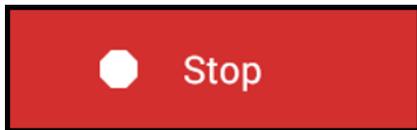


The Run screen will display:



Refer to other chapters in the document for advanced settings you can set for useful features of Precision-IQ.

Once you have completed your field run, tap the **Stop** button on the Home screen:



All performance and statistic data collected by Precision-IQ can be transferred to Trimble Ag Software. See [Data Transfer](#) for details.

# Users and Passwords

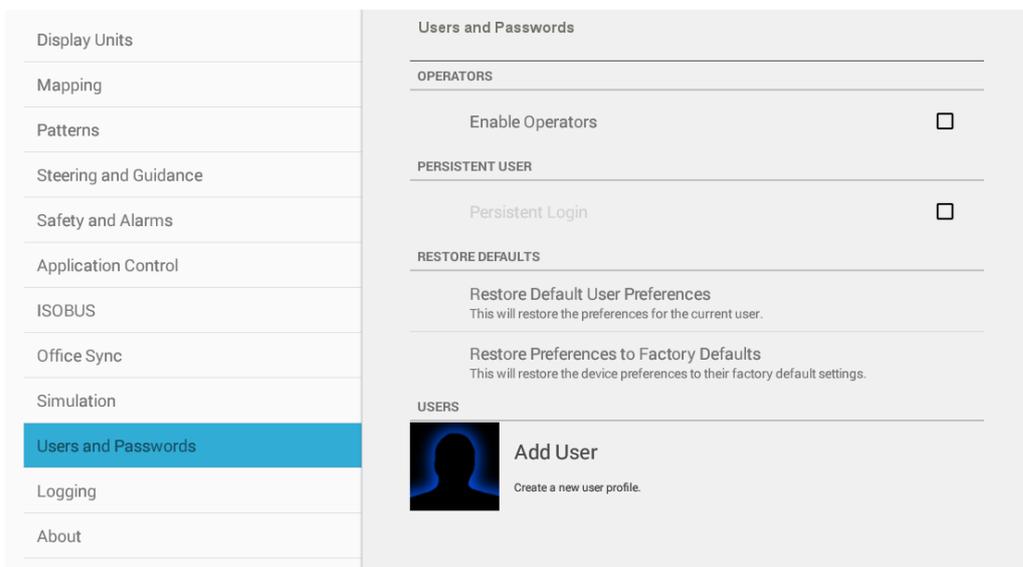
- ▶ [Add a User/Operator](#)
- ▶ [User/Operator Login](#)
- ▶ [Edit a User/Operator Profile](#)
- ▶ [Delete a User/Operator Profile](#)
- ▶ [Restore Default Preferences](#)

This chapter provides the detailed instructions for management and maintenance of users and passwords for the Precision-IQ application. When enabled, Precision-IQ allows for multiple user/operators to login and perform a variety of tasks, as needed.

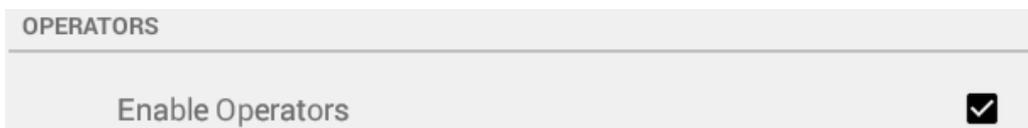
## Add a User/Operator

Follow the steps below to add a user/operator for the Precision-IQ application:

1. From the Home screen of Precision-IQ, tap **Settings**.
2. On the Settings screen, tap **Users and Passwords**:

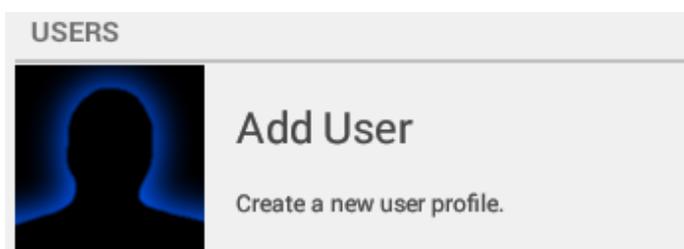


3. In the Operators section, tap the option to **Enable Operators**:



*NOTE – By default, the Enable Operators option is not selected.*

4. In the Users section, tap **Add User**:



5. A pop-up will appear for you to add a **New User Profile**:

**New user profile**

Operator Id

Password

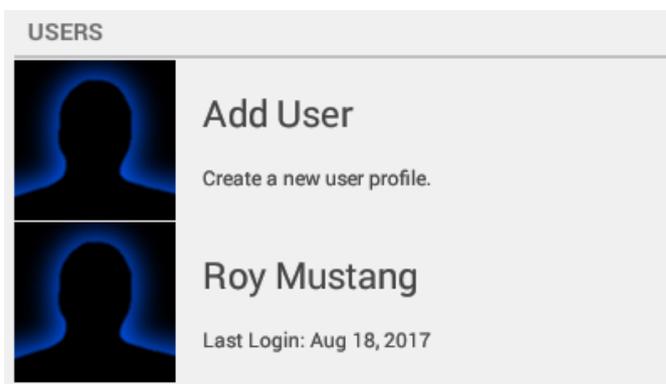
Confirm Password

1 2 ABC 3 DEF

4 GHI 5 JKL 6 MNO

7 PQRS 8 TUV 9 WXYZ

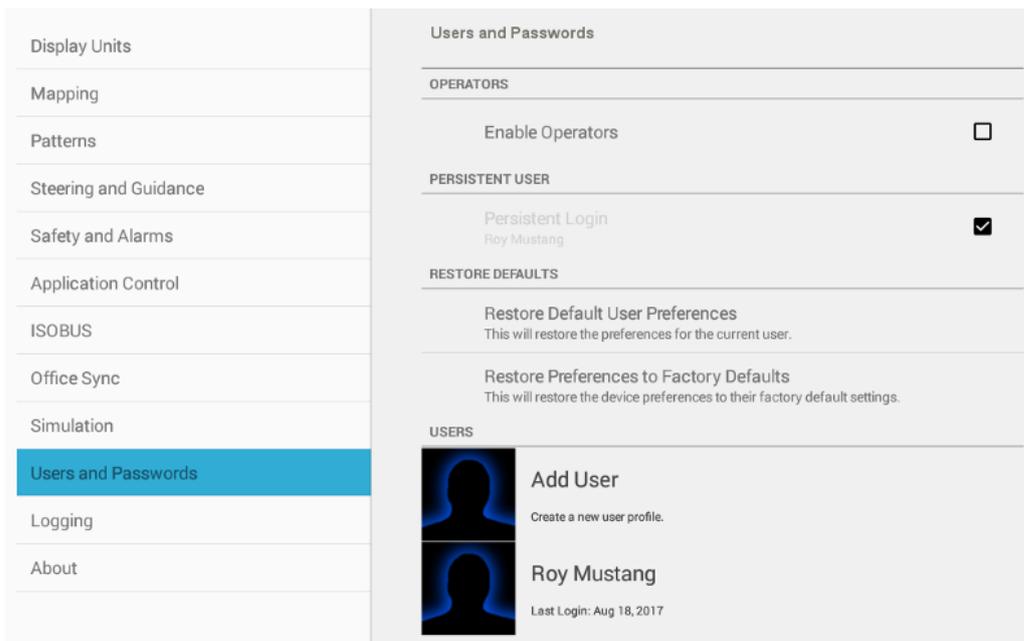
6. Enter the following information:
- Operator ID: Create a unique user name for the operator.
  - Password: Enter a unique password.
  - Confirm Password: Reenter the password. Passwords must match.
  - Picture (*optional*): Tap the silhouette to activate the forward camera of the display. You can take a photo of the operator to associate with the profile. Tap **Capture** to take the picture, then tap **Done** to save it to the profile.
7. Tap **Create User**.
8. Once created, the user will be added to the Users section:



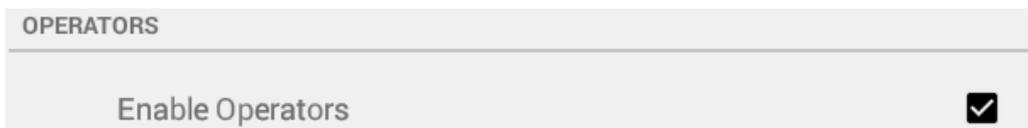
## User/Operator Login

Once you have created a user/operator profile, then you can set Precision-IQ to require a login. Follow the steps below to enable Precision-IQ login option and for instructions to login to the application:

1. From the Home screen of Precision-IQ, tap **Settings**.
2. On the Settings screen, tap **Users and Passwords**:

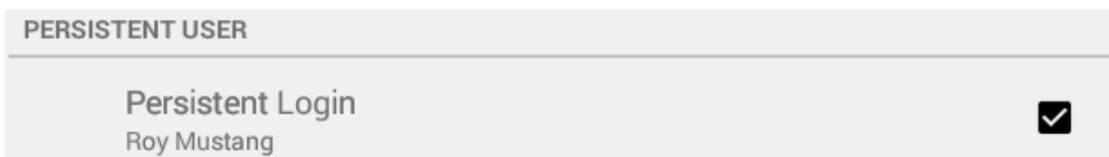


3. In the Operators section, tap the option to **Enable Operators**, if it's not already selected:



**NOTE** – By default, the *Enable Operators* option is not selected.

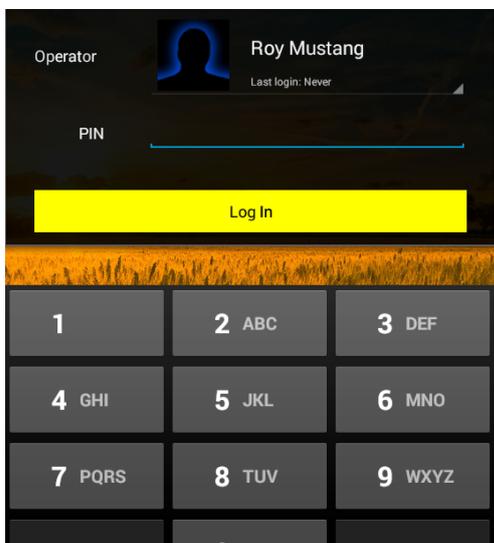
4. (Optional) In the Persistent User section, tap the **Persistent Login** option to set a user/operator to login by default:



**NOTE** – By default, the *Persistent Login* option is not selected.

5. Exit the Precision-IQ application.

6. Tap  to launch Precision-IQ. Instead of the Home screen, a login window appears:

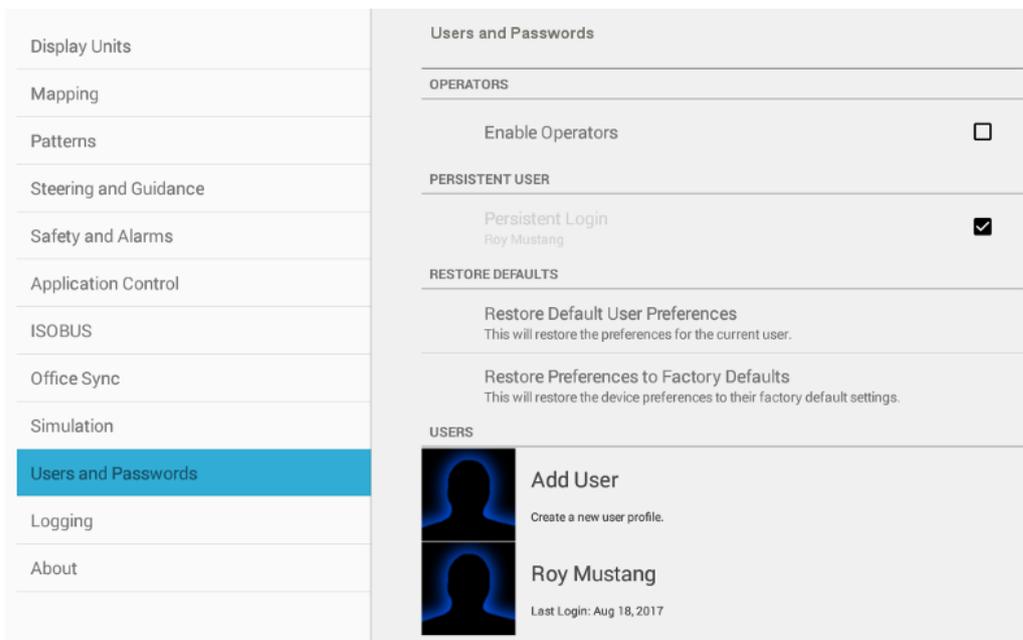


7. Enter the password/PIN and tap Log In.

## Edit a User/Operator Profile

Follow the steps below to edit a user/operator profile:

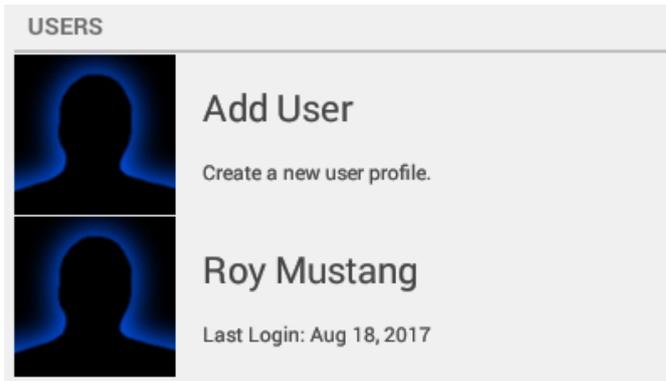
1. From the Home screen of Precision-IQ, tap **Settings**.
2. On the Settings screen, tap **Users and Passwords**:



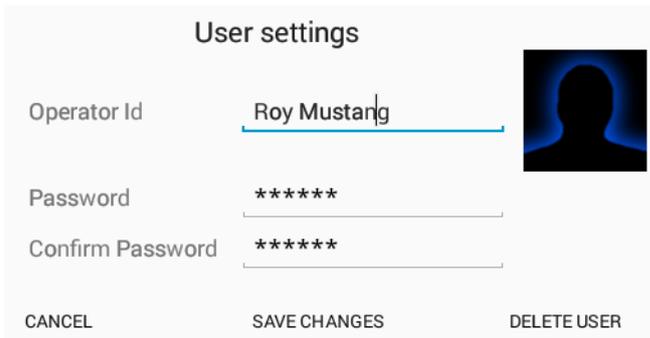
- In the Operators section, tap the option to **Enable Operators**, if it's not already selected:



- In the Users section, tap the user that you want to edit:



- A pop-up will appear for you to edit the User Settings:

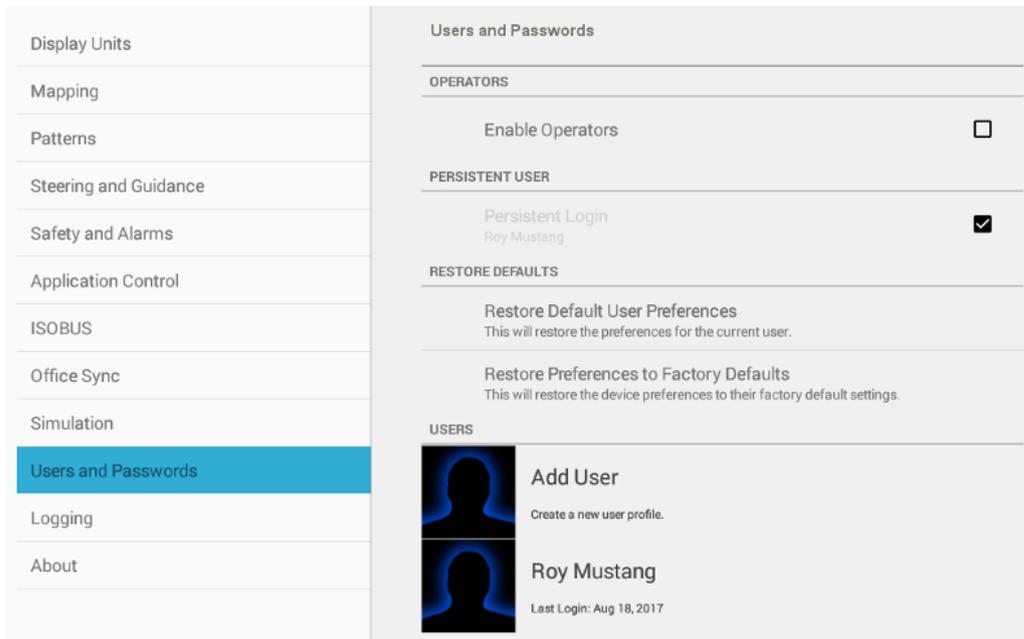


- From here, you can edit the following information:
  - Operator ID: Modify user name for the operator.
  - Password: Change the password.
  - Confirm Password: Reenter the new password. Passwords must match.
  - Picture (*optional*): Tap the silhouette to activate the forward camera of the display. You can take a new photo of the operator to associate with the profile. Tap **Capture** to take the picture, then tap **Done** to save it to the profile.
- Tap **Save Changes**.

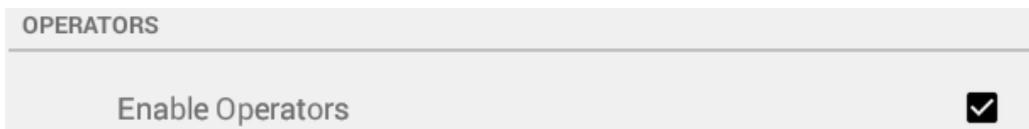
## Delete a User/Operator Profile

Follow the steps below to delete a user/operator profile:

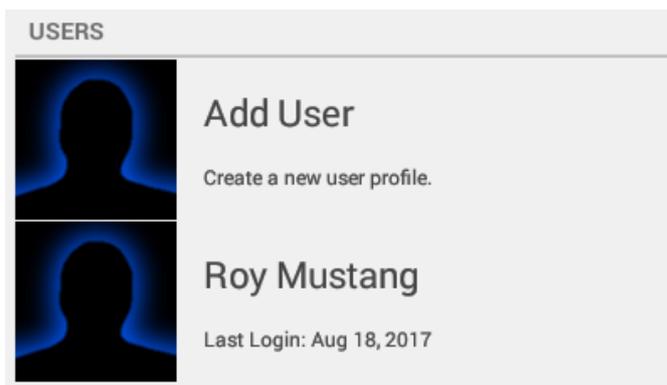
1. From the Home screen of Precision-IQ, tap **Settings**.
2. On the Settings screen, tap **Users and Passwords**:



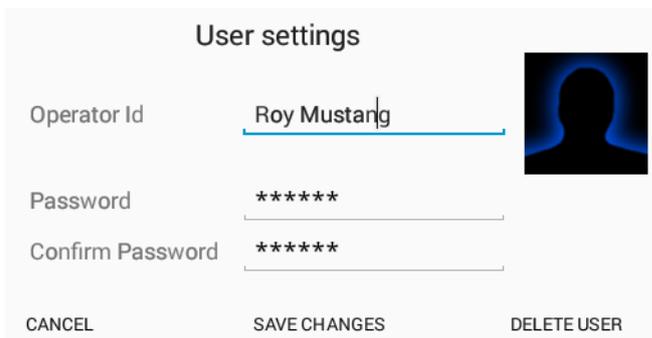
3. In the Operators section, tap the option to **Enable Operators**, if it's not already selected:



4. In the Users section, tap the user that you want to delete:



- A pop-up will appear for you to edit the **User Settings**:



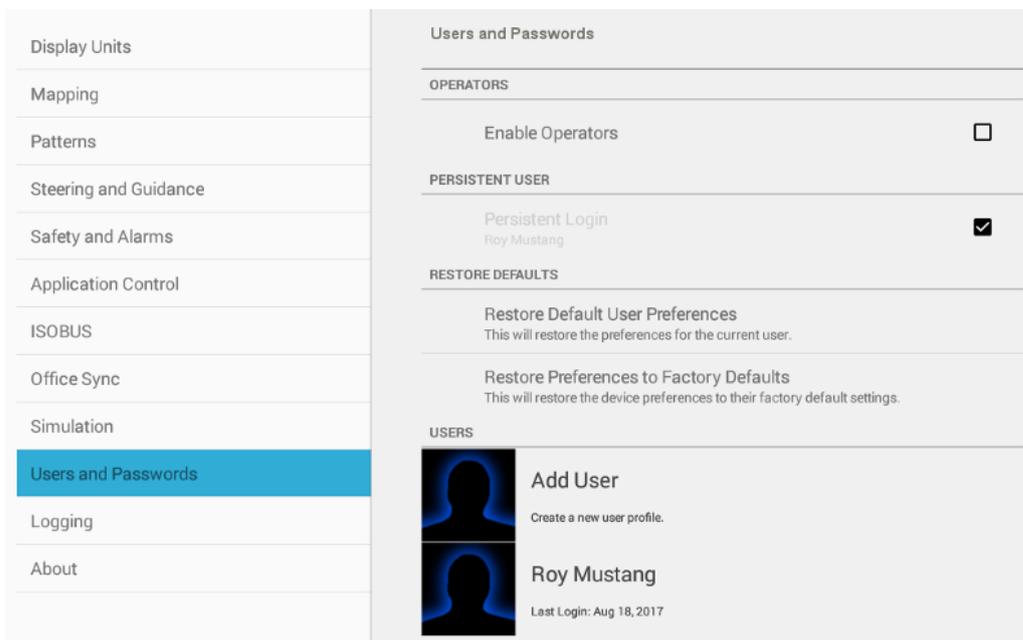
The image shows a 'User settings' dialog box. It has three input fields: 'Operator Id' with the text 'Roy Mustang', 'Password' with six asterisks, and 'Confirm Password' with six asterisks. To the right of the 'Operator Id' field is a silhouette icon. At the bottom, there are three buttons: 'CANCEL', 'SAVE CHANGES', and 'DELETE USER'.

- Tap **Delete User**. The user profile is deleted immediately.

## Restore Default Preferences

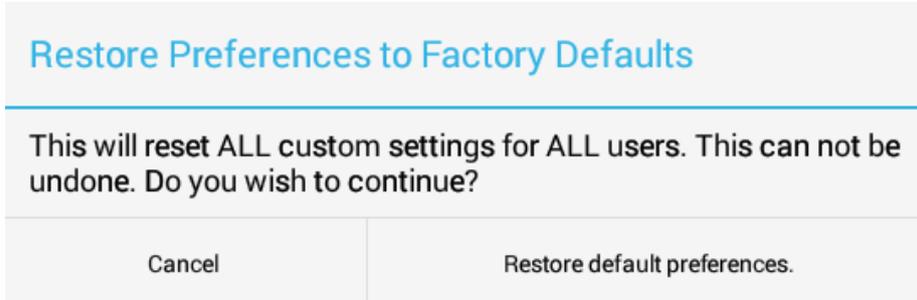
As part of the day-to-day operation of Precision-IQ, a user/operator has a variety of preferences that can be set. Over time, you may wish to reset preferences for a user or for the entire device. Follow the steps below to restore default preferences:

- From the Home screen of Precision-IQ, tap **Settings**.
- On the Settings screen, tap **Users and Passwords**:



- In the Restore Default section, tap one of the following options:
  - Restore Default User Preferences**: Tap this option to restore the preferences of the currently logged in user.

- **Restore Preferences to Factory Defaults:** Tap this option to restore the display to its factory default settings.
4. A confirmation pop-up will display. For example, if you select to restore preferences to factory defaults, the following pop-up will display:



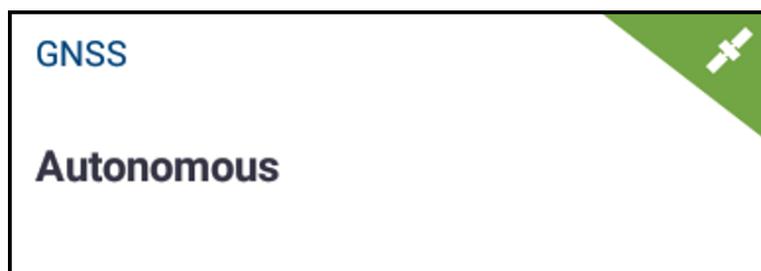
Tap **Restore Default Preferences** to continue or tap **Cancel** to cancel the restore operation.

# GNSS Connectivity and Supported Correction Services

- ▶ GNSS Overview
- ▶ Frequency and Baud Rates
- ▶ Correction Services
- ▶ CAN Messaging
- ▶ NMEA Messaging
- ▶ Connectivity Concepts

GNSS (**Global Navigation Satellite System**) is a satellite system that is used to pinpoint the geographic location of a user's receiver anywhere in the world.

This chapter contains information regarding setting up connectivity and corrections and provides some basic concepts for selecting the best connectivity for your configuration. Tap the **GNSS** tile on the Home screen to begin:



## GNSS Overview

GNSS (Global Navigation Satellite System) is a satellite system that is used to pinpoint the geographic location of a user's receiver anywhere in the world. The display connects to and manages a NAV-900 navigation controller to connect to the various GNSS constellations.



See also: [NAV-900 Data Sheet](#)

## Supported GNSS Constellations and Correction Services

The NAV-900 navigation controller supports the following constellations:

- GPS
- GLONASS
- SBAS
- Galileo
- BeiDou (COMPASS)

The following correction satellites are supported:

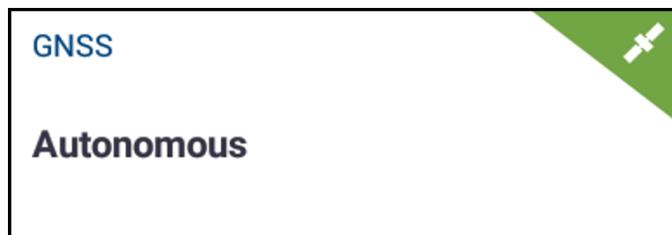
- CenterPoint® RTX
- WAAS
- EGNOS
- MSAS

Finally, the following corrections streams are supported:

- CMR+
- sCMR+
- sCMR+ with SecureRTK
- CMRx

## GNSS Details in Precision-IQ

From the Precision-IQ Home screen, the GNSS tile provides a high-level, "at-a-glance" overview of the status of your GNSS connection:



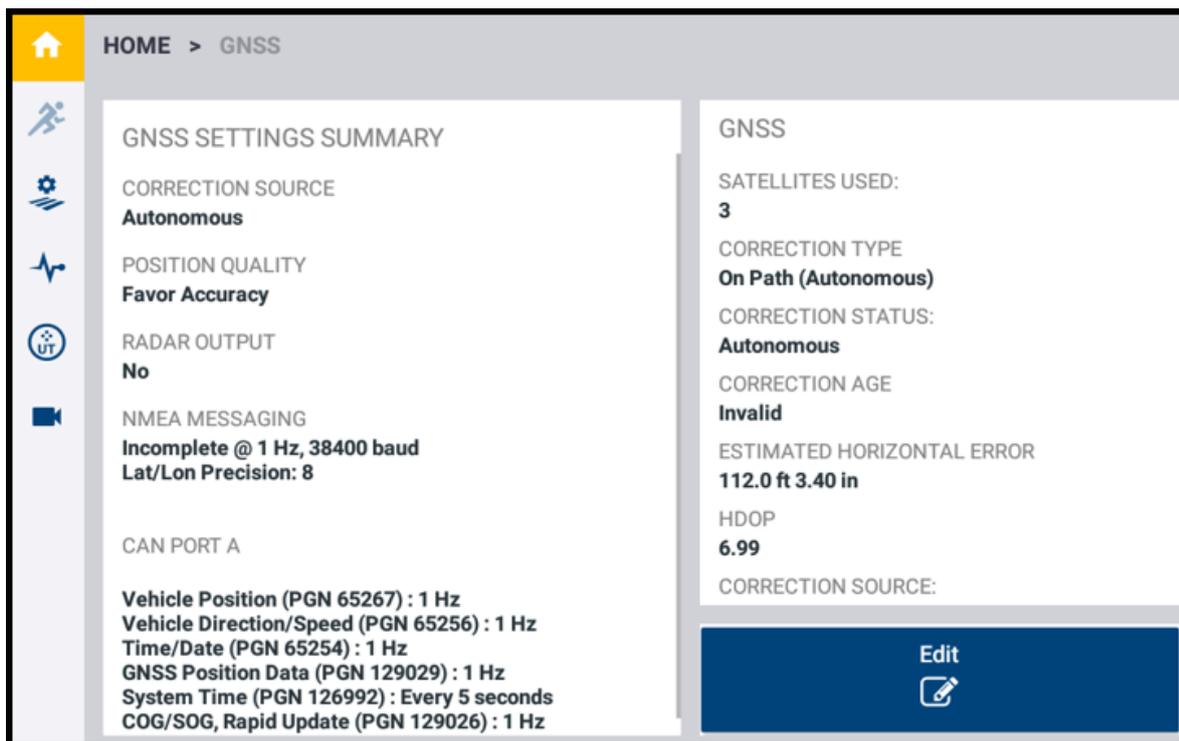
These details are:

**Selected correction service:** By default, **Autonomous** is selected as your correction service.

**Satellites connection status:** In the upper-right corner of the tile, the following colors indicate the GNSS status:

- **Green:** This status indicates a strong satellite connection, with enough connected satellites in a constellation for the correction service to respond accurately.
- **Yellow:** This status indicates a weak satellite connection, with fewer connected satellites in a constellation. Because there are fewer connected satellites, the correction service accuracy will be reduced.
- **Red:** A red status indicates that there are no satellites connected. You cannot enter the Run screen when the GNSS status is red.

Tap the **GNSS** tile for a full summary of the configuration:



From the GNSS screen, you can review all details about the GNSS settings and configuration. Tap the **Edit** button if you need to adjust the:

- [Correction Services](#)
  - [SBAS Corrections](#)
  - [RangePoint RTX Correction Service](#)
  - [CenterPoint RTX Corrections](#)
  - [CenterPoint VRS Corrections](#)
  - [RTK Corrections](#)
- [CAN Messaging](#)
- [NMEA Messaging](#)

## Frequency and Baud Rates

The frequencies and baud rates for regions are:

Region	Frequency	Baud Rate
Asia/ Pacific	1539.8325 MHz	600
Central North America	1557.8150 MHz	2400

Region	Frequency	Baud Rate
Eastern North America	1557.8590 MHz	600
Europe/ Africa	1539.9525 MHz	600
Europe (RTX EU)	1529.7250 MHz	2400
Latin America	1539.8325 MHz	600
Western North America	1557.8615 MHz	600

## Correction Services

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 located.
- 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, such as local and atmospheric conditions, temperature and humidity, etc.

Precision-IQ supports a variety of correction services that are available to compensate for deviations in GNSS constellation patterns as well as interference with the satellite signal.

Tap the **Edit** button on the GNSS details screen to display the GNSS Edit screen. By default, the Corrections option is selected. With this option, you can change the:

**Correction Service:** Tap this item for a pop-up list of all available correction services:

Correction Source
Autonomous
SBAS
RangePoint RTX
OmniSTAR HP/XP/G2
CenterPoint RTX Modem (Standard Convergence)
CenterPoint RTX Satellite (Standard Convergence)

By default, **Autonomous** is selected as the correction source. Tap a different correction source to select it.

**NOTE** – Most correction services require an unlock. See [Upgrade or Apply a License for a New Feature](#) for details.

If you change the correction service, then you may need to adjust additional settings, depending on your selection. Available correction services include, but are not limited to:

- [SBAS Corrections](#)
- [RangePoint RTX Correction Service](#)
- [CenterPoint RTX Corrections](#)
- [CenterPoint VRS Corrections](#)
- [RTK Corrections](#)

**Position Quality:** Tap this item to allow Precision-IQ to give preference to:

- Favor Accuracy: Use for operations needing highest accuracy (such as row crop planting and strip-till). This option is selected by default.
- Favor Availability: Expands production time further with potential for reduced accuracy.
- Balanced Quality: Trades potential accuracy for longer production time.



**Radar Output:** Tap to enable radar output. If enabled, then tap **Radar Output Frequency** to enter a specific radar frequency. You can choose between **27.36** and **96.56** Hz/mph.

## 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

From the GNSS Edit screen, tap **Correction Services** and then tap **SBAS** from the pop-up list to select it. Tap **Setup** to:

- **Correction Satellite Select:** By default, **Automatically selected from current location** is selected. Tap this item to select a specific correction satellite from a pop-up list:

Correction Satellite Selection
Automatically selected from current location
EGNOS 120 AIR-G
EGNOS 124 ARTEMIS
EGNOS 126
MSAS 129 MTSAT-1
MSAS 137 MTSAT-2
WAAS 133
WAAS 135
WAAS 138

- **SBAS+**: Tap to enable. This feature uses uncorrected satellites in addition to SBAS.

## RangePoint RTX Correction Service

 This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

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 NAV-900 Module receives these signals.

From the GNSS Edit screen, tap **Correction Services** and then tap **RangePoint RTX** from the pop-up list to select it. Update the appropriate specific RangePoint RTX options, then tap **Home** to return to the Home screen.

## CenterPoint RTX Corrections

 This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

The types of CenterPoint® RTX correction are:

- [Centerpoint RTX Modem Corrections](#)
- [Centerpoint RTX Modem Corrections](#): Standard convergence, fast convergence for US, fast convergence for EU.

### *Centerpoint RTX Modem Corrections*

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

From the GNSS Edit screen, tap **Correction Services** and then tap **CenterPoint RTX Modem (Standard Convergence)** from the pop-up list to select it. Update the appropriate specific CenterPoint RTX Modem options, then tap **Home** to return to the Home screen.

## CenterPoint RTX Satellite Corrections

CenterPoint RTX satellite broadcast subscription services for corrections have a < 1.5" (3.8 cm) accuracy and GLONASS compatibility. The RTX satellite corrections available are:

- CenterPoint RTX Satellite Standard.
- CenterPoint RTX Satellite Standard Fast for US.
- CenterPoint RTX Satellite Standard Fast for EU.

The GNSS receiver in the NAV-900 receives these signals.

From the GNSS Edit screen, tap **Correction Services** and then tap **CenterPoint RTX Satellite (Standard Convergence)** from the pop-up list to select it. Update the appropriate specific CenterPoint RTX Satellite options, then tap **Home** to return to the Home screen.

## CenterPoint VRS Corrections



This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

CenterPoint® VRS™ is a cellular-broadcast RTK correction service from a ground-based reference station using the a modem. (Requires a connected wireless modem.)

From the GNSS Edit screen, tap **Correction Services** and then tap **CenterPoint VRS** from the pop-up list to select it. Update the appropriate specific CenterPoint VRS options, then tap **Home** to return to the Home screen.

## 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.

1. From the GNSS Edit screen, tap **Correction Services**.
2. Tap **RTK** from the pop-up list to select it.
3. Update the appropriate specific RTK options.
4. Tap **Home** to return to the Home screen.

## CAN Messaging

If you wish to send messages from the GNSS receiver in the NAV-900, 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 send information to the implement such as speed.

1. From the GNSS Edit screen, tap **CAN Messaging**.
2. Tap the CAN port that you want to change settings for. Choose the messages for the GNSS receiver in the NAV-900 to send to ISO-certified equipment.

The list that displays for each CAN port shows the messages and their parameter group number (PGN):

CAN Port A	
Message	Enable/Disable
Vehicle Position (PGN 65267)	1 Hz
Vehicle Direction/Speed (PGN 65256)	1 Hz
Time/Date (PGN 65254)	1 Hz
Position, Rapid Update (PGN 129025)	OFF
GNSS Position Data (PGN 129029)	1 Hz
GNSS Pseudorange Noise Statistics (PGN 129542)	OFF
Time/Date (PGN 129033)	OFF
System Time (PGN 126992)	Every 5 seconds
Product Information (PGN 126996)	OFF

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

Enable/Disable
OFF
10 Hz
5 Hz
1 Hz
Every 5 seconds
Every 10 seconds
Every 30 seconds
Every 60 seconds

3. When you are finished, tap .

To use ISO-certified equipment, set up what messages will be sent from the GNSS receiver to the implement, such as speed:

1. From the Activity bar on the Home screen, tap  to open the Universal Terminal.
2. In the upper right corner, tap , then tap **Messaging**.

3. Turn on the settings appropriate for your setup:

- GNSS Vehicle Position (PGN 65267)
- GNSS Vehicle Direction/Speed (PGN 65256)
- Wheel-based Speed (PGN 65096)
- Ground-based Speed (PGN 65097)

4. When you are finished, tap .

See also: [Add an ISOBUS Implement](#).

## NMEA Messaging

For the location of this position based on configuration, see [NMEA Message Calculation](#).

Setting	Explanation
Message Rate	How often the message is sent. Options are: <ul style="list-style-type: none"> <li>• Off</li> <li>• 1 min</li> <li>• 30 sec</li> <li>• 10 sec</li> <li>• 1 Hz</li> <li>• 3 Hz</li> <li>• 5 Hz</li> <li>• 10 Hz</li> </ul>
Output Port	Use the NMEA port on your cable harness.
Baud Rate	Baud rate. Options are: <ul style="list-style-type: none"> <li>• 2400</li> <li>• 4800</li> <li>• 9600</li> <li>• 19200</li> <li>• 38400</li> <li>• 57600</li> </ul>
Maximum CGA Quality	How high the quality of the message should be

Setting	Explanation
Lat / Lon Precision	Options are 1 through 10.
Messaging	Choose which messages are on or off.

### *NMEA Message Calculation*

The calculation of the GPS position depends on your configuration.

Type of Steering	Source / Port
Manual guidance	N/A
Autopilot system	Cable harness
Autopilot system	NavController

### *Supported NMEA Messages*

Message	Description	Information Contained
GGA	Fix information	<ul style="list-style-type: none"> <li>UTC date and time</li> <li>Position</li> </ul>
GSA	Overall satellite data	<ul style="list-style-type: none"> <li>UTC date and time</li> <li>Position</li> </ul>
GST	GPS Pseudorange Noise Statistics	
RMC	Recommended minimum data for GPS	<ul style="list-style-type: none"> <li>UTC date and time</li> <li>Position</li> <li>Course</li> <li>Speed</li> </ul>
VTG	Vector track and Speed over the Ground	<ul style="list-style-type: none"> <li>Course</li> <li>Speed</li> </ul>
ZDA	Date and time	

## Connectivity Concepts

Precision-IQ uses the following concepts associated with GNSS, correction services:

- [xFill Technology](#)
- [VRS](#)

## 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).
- 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, it is recommended that you survey 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.

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 AutoBase 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 AutoBase.

### ***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

### **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 of 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 the 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 [Vehicles](#).*

  1. Create an A/B line in your field (or use an existing line). See [Guidance Patterns: AB Line](#).
  2. Drive the line and once your cross track error (XTE) is very small, stop and drop a flag in the center of your hitch.
  3. Turn off RTK by changing the network ID or frequency.
  4. Drive around the field for several minutes (to represent your typical outage time) and return to the A/B line.
  5. Engage on the line and then when XTE is small and you're over your previous flag, stop and drop another flag. Compare the distance.
  6. 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 AutoBase 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

- ▶ Add a Vehicle
- ▶ Edit a Vehicle
- ▶ Select a Vehicle
- ▶ Delete a Vehicle

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

This chapter describes how you can add, edit, delete, and select vehicles. A vehicle profile must be set up so that Precision-IQ can collect activity data for the vehicle.

To get started, tap the **Vehicle** tile on the Home screen:



For details about calibrating a vehicle for auto guidance, see [Auto Guidance Setup](#).

Before you can enter a field, you must select a vehicle. For details about fields, see [Fields](#).

## Add a Vehicle

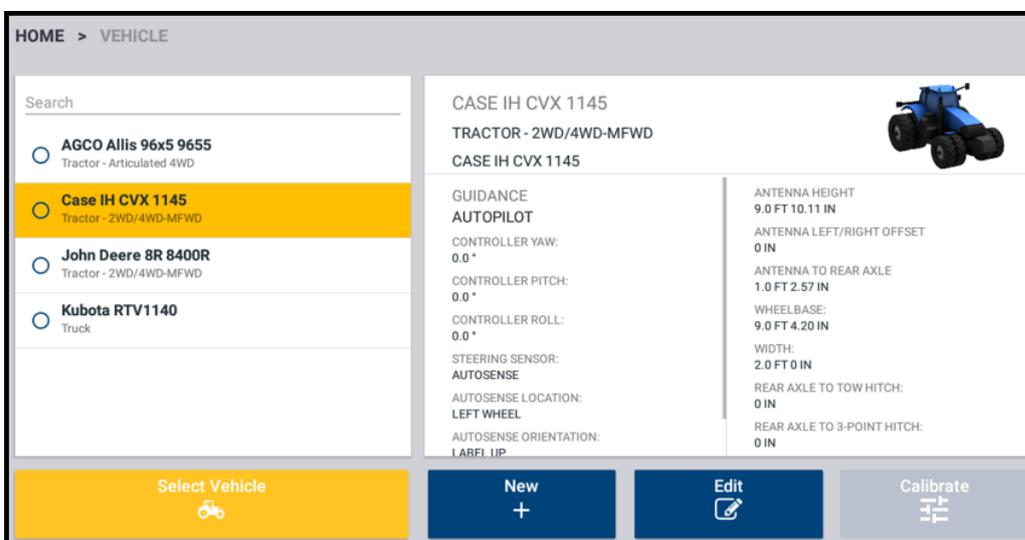
This section describes how to create a vehicle profile in Precision-IQ.

**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. On the Home screen, tap the **Vehicle** tile:



2. The Vehicle screen displays:



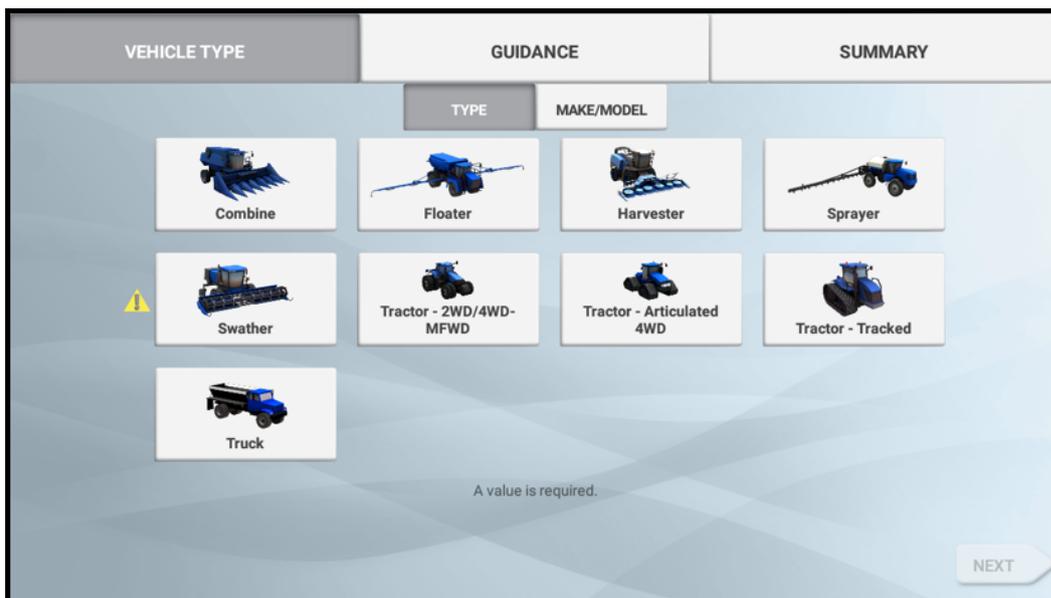
This screen shows a list of available vehicles. Tap a vehicle to view details about the selected vehicle.

3. Tap **New**:



The Vehicle Setup wizard launches.

4. The first screen of the Vehicle Setup wizard prompts you to select a type of vehicle you expect to use in a field run:



Available vehicle types are:

- Combine
- Floater
- Harvester
- Sprayer
- Swather
- Tractor - 2WD/4WD-MFWD
- Tractor - Articulated 4WD
- Tractor - Tracked
- Truck

Tap the tile for vehicle you want to configure. Tap **Next** to continue with the vehicle setup:



5. The next screen prompts you to select the make and model details for the vehicle. Tap each field to select the appropriate vehicle details. Depending on the vehicle type you select, a pop-up window appears for you to select from a list of make and model details. A variety of these details are already included in Precision-IQ.

Vehicle Detail	Description
Make	Vehicle manufacturer
Series	Vehicle series (when applicable)
Model	Vehicle model
Option	Vehicle options from the manufacturer (for example: Super Steer, Non Super Steer, ILS, Non-ILS, or ISO CAN Ready)

## Vehicle Detail Description

**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.

Once you enter the make and model details, the screen should look like this:

The screenshot shows a mobile application interface for vehicle configuration. At the top, there are three tabs: 'VEHICLE TYPE', 'GUIDANCE', and 'SUMMARY'. The 'GUIDANCE' tab is active and contains two sub-tabs: 'TYPE' and 'MAKE/MODEL'. The 'MAKE/MODEL' sub-tab is selected and displays the following information:

- MAKE: Case IH
- SERIES: Farmall U T4A
- MODEL: 105U
- OPTION: Late 2012-2015 Efficient power Models

Below the option field is a 'Name' field with the text 'Case IH Farmall U T4A 105U'. At the bottom left is a 'BACK' button and at the bottom right is a 'NEXT' button.

Tap **Next** to continue.

6. For the Guidance step:
  - a. **Selection:** By default, *Manual Guidance* is selected. Tap the field to choose a different guidance option (for example, Autopilot).

**NOTE** – Auto guidance options may require an unlock before you can select it.

When you select an available auto guidance option, the screen will update for you to enter the appropriate details to enable the selected guidance option. See [Auto Guidance Setup](#) for complete details.

**⚠ 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.

Tap **Next**.

- b. **Antenna:** Tap each field to enter antenna measurement details:
    - Antenna height.
    - Antenna left/right offset.

- Antenna to rear axle.

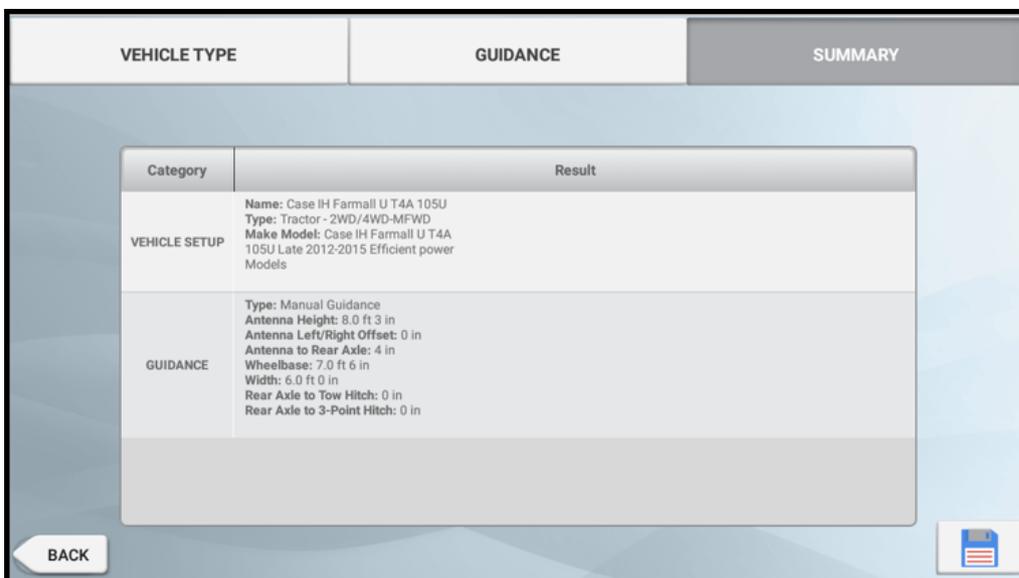
Tap **Next**.

c. **Measurements:** The measurement fields that display depend on the vehicle type you select. Tap each field to enter vehicle measurement details. For example:

- Rear axle to tow hitch.
- Rear axle to 3-point hitch.
- Wheelbase.
- Width.

Tap **Next**.

7. On the Summary screen, review the details about the vehicle:



8. Tap **Save** to complete the process and exit the Vehicle Setup wizard:



To exit the Vehicle Setup wizard without saving, tap the Android **Back** button (tap **No** on the confirmation pop-up window):



9. Tap **Home** to return to the Home screen.

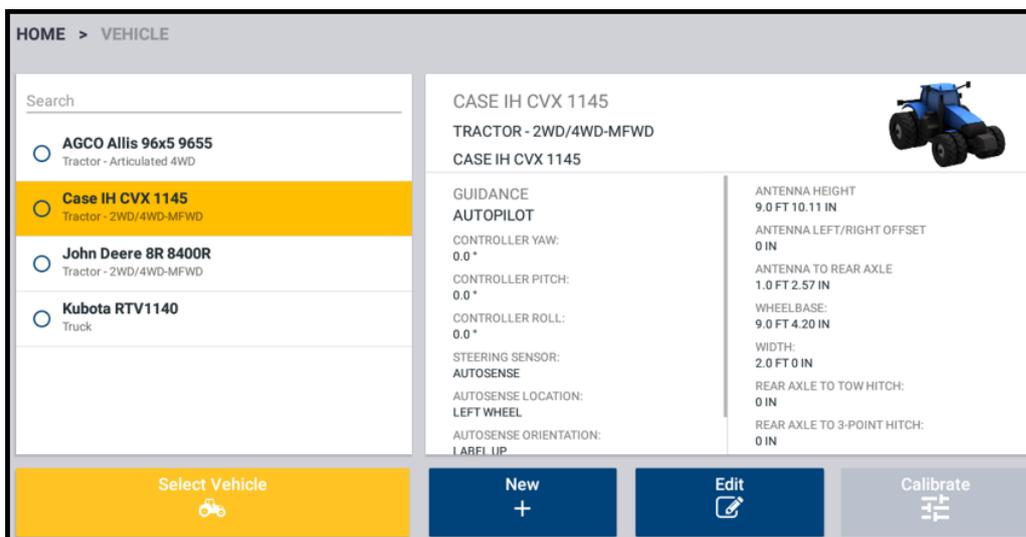
## Edit a Vehicle

Follow the steps below to edit your selected vehicle's details:

1. On the Home screen, tap the **Vehicle** tile:



2. The Vehicle screen displays:

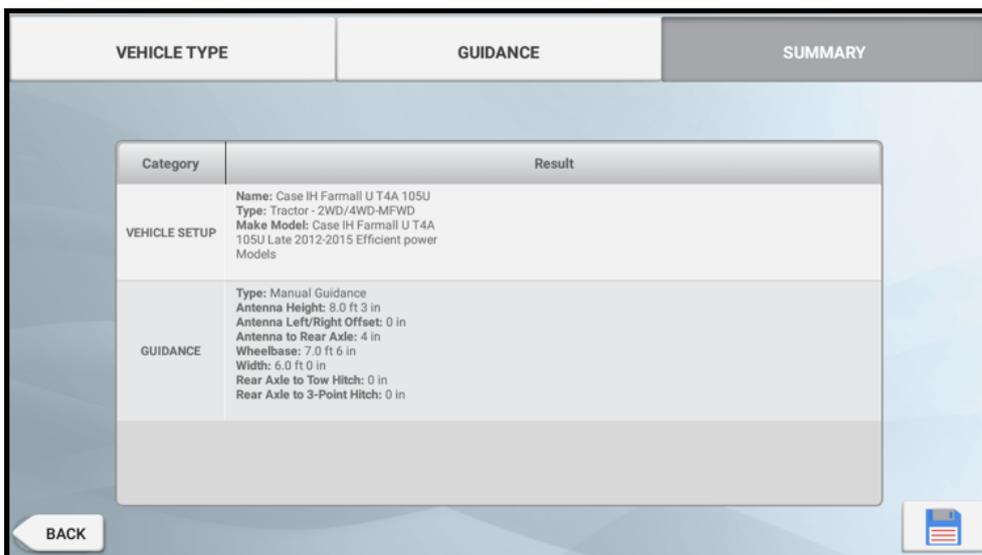


This screen shows a list of available vehicles. Tap a vehicle to view details about the selected vehicle.

3. Tap a vehicle to select it. Tap **Edit**:



The Vehicle Summary screen displays:



4. Navigate to the section(s) where you want to make changes. Tap **Vehicle Type** or **Guidance**.

***NOTE** – If you are changing the Guidance from Manual Guidance to an auto guidance option, see [Auto Guidance Setup](#) for complete details.*

5. After you have completed your changes, tap **Summary**.

***NOTE** – 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. Tap **Save** to save your changes:



To exit without saving, tap the Android **Back** button (tap **No** on the confirmation pop-up window):



7. Tap **Home** to return to the Home screen.

## Select a Vehicle

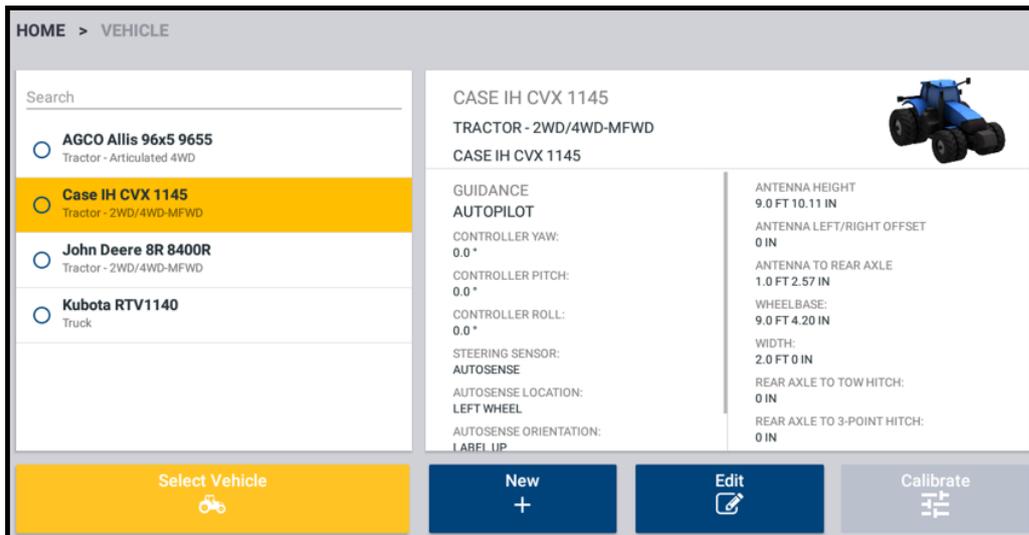
Before you can calibrate a vehicle or enter the Run screen, you must select the vehicle you want to use for field activities.

***NOTE** – You can only enter the Run screen with a vehicle that has had vehicle setup and calibration steps completed.*

1. On the Home screen, tap the **Vehicle** tile:



2. The Vehicle screen displays:

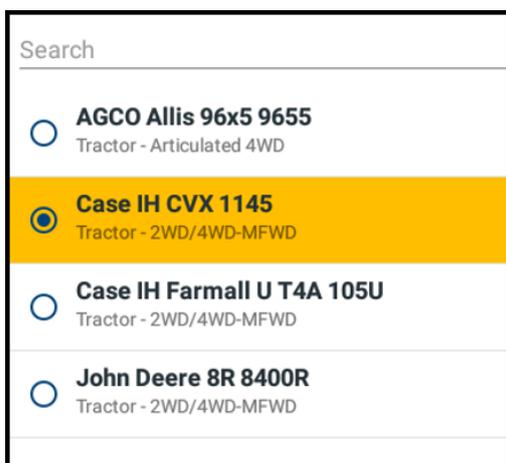


This screen shows a list of available vehicles. Tap a vehicle to view details about the selected vehicle.

3. Tap a vehicle to select it. Tap **Select Vehicle**:



- The list of available vehicles will update to show the vehicle as selected:



- Tap **Home** to return to the Home screen.

See also:

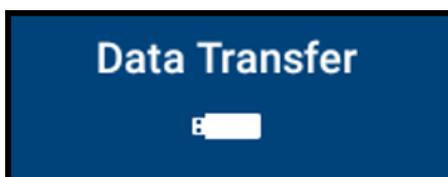
- [Auto Guidance Setup](#)
- [Implements](#)
- [Materials](#)
- [Fields](#)

## Delete a Vehicle

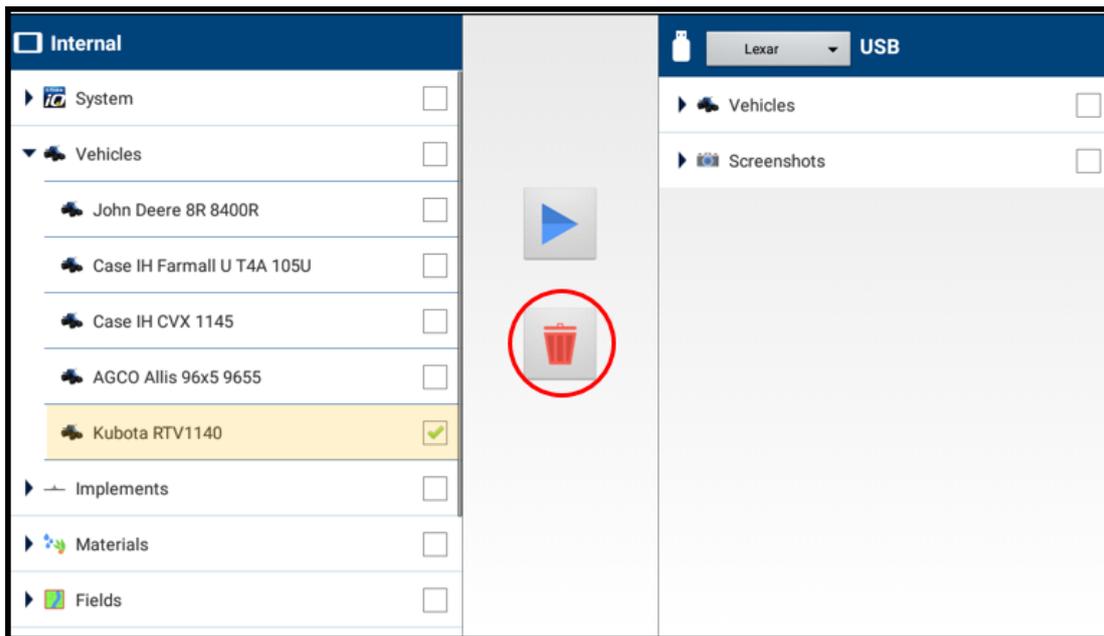
On some occasions, you may need to delete a vehicle's profile. Follow the steps below to delete a vehicle from Precision-IQ.

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

- On the Home screen, tap **Data Transfer**:



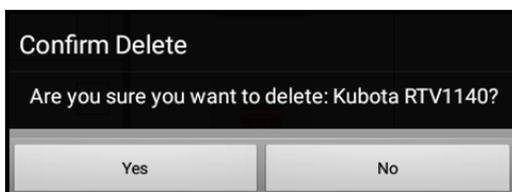
- On the Data Transfer screen, expand the Vehicles list and select a vehicle you want to delete. For example:



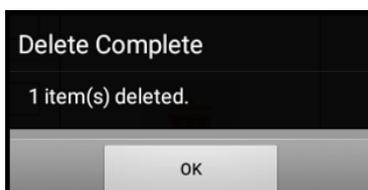
3. With a vehicle selected, tap the **Delete** icon:



4. A confirmation pop-up identifying the vehicle you want to delete appears. Tap **Yes** to continue. For example:



5. Tap **OK** to acknowledge the deletion:



6. Tap **Home** to return to the Home screen.

# Auto Guidance Setup

- ▶ [Steering and Guidance Settings](#)
- ▶ [OnSwath Overview](#)
- ▶ [Autopilot Automated Steering System](#)
- ▶ [NextSwath](#)
- ▶ [Autopilot™ Motor Drive](#)

Trimble offers assisted and automated steering options to help keep your farming vehicles on line-so you can focus on other farming tasks. With the added benefit of terrain compensation technology, you can operate in difficult terrain conditions while minimizing skips, overlaps, and guess rows.

This chapter describes how to set up a variety of supported auto guidance systems.

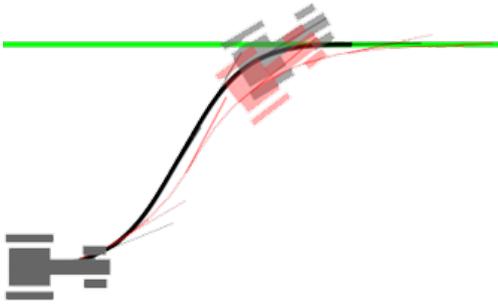
## Steering and Guidance Settings

From the Home screen, tap the **Settings** button. Then on the Settings screen, tap **Steering and Guidance** to configure the following settings:

Setting	Tap to view or change...
Lightbar	Chevron (LED) spacing.
Display Mode	Options are: <ul style="list-style-type: none"> <li>• Show Correction ("Chase")</li> <li>• Show Error ("Pull")</li> </ul>
Adjustments	<p><b>Nudge Increment:</b> 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.</p> <p><b>Implement Draft Increment:</b> The increment used to nudge the implement to the current guidance line.</p> <p><b>Remark Reset with Import:</b> Remove all re-mark entrees with an import.</p>
Guidance	<p><b>End of Row Distance:</b> Distance for the end of row warning to display.</p> <p><b>Vehicle Direction Detection:</b> Turn on or off</p>
Autoguidance	<p><b>Autosteering Lockout:</b> Whether the feature is on or off. When lockout is on, the Precision-IQ application does not offer an option to use auto guidance.</p> <p><b>Aggressiveness Increment:</b> The increment used to change aggressiveness.</p>

## OnSwath Overview

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 acquires the line faster.

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 Automated Steering System



This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

The following sections describe how to setup and calibrate Autopilot:

- [Safety and Alarm Settings for Autopilot](#).
- [Guidance System Settings for Autopilot](#).
- [Controller Settings for Autopilot](#).
- [Sensor Settings for Autopilot](#).
- [Vehicle Measurement Settings for Autopilot](#).
- [Autopilot System Calibration](#).

## Safety and Alarm Settings for Autopilot

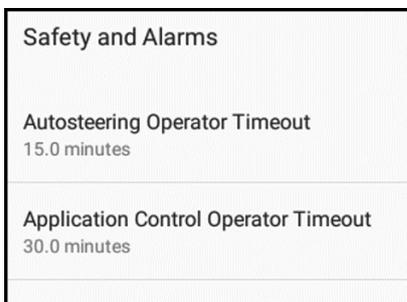
Precision-IQ provides a safety feature where you can set a timeout for when you want Precision-IQ to automatically disengage auto steering operation.

To set the timeout option:

1. From the Home screen, tap the **Settings** button:

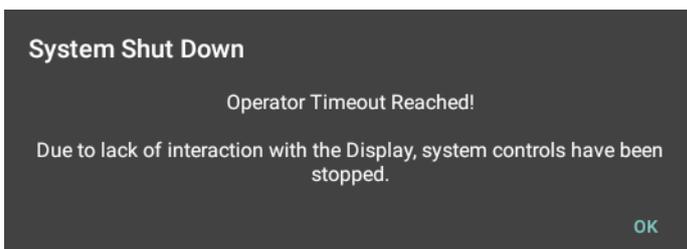


2. On the Settings screen, tap **Safety and Alarms**. The Safety and Alarms options will display:



3. Tap **Autosteering Operator Timeout** and set a time (in minutes). By default, **5.0 minutes** is entered.

The value you enter is the amount of time before Precision-IQ disengages auto guidance and stops applications when there is no response to a shutdown message:



4. Tap **OK** to save your changes.
5. Tap the Android **Back** button to return to the Home screen.

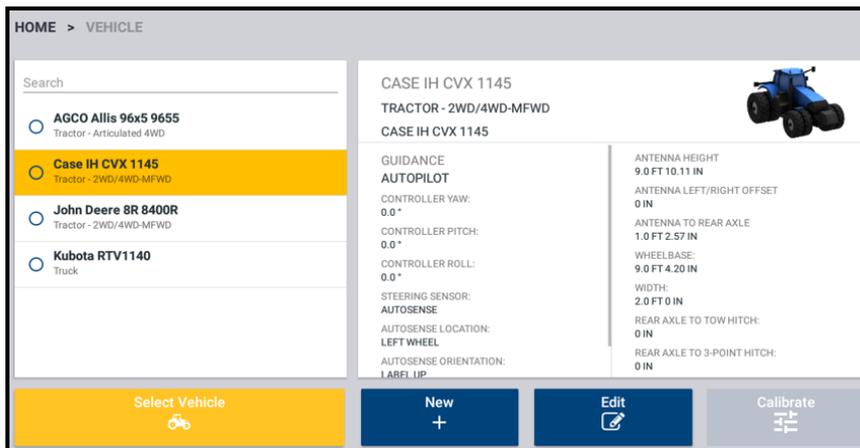
## Guidance System Settings for Autopilot

**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. On the Home screen, tap the **Vehicle** icon:



The Vehicle setup panel displays:



- b. From the list of available vehicles, tap the name of the vehicle you want to edit.
  - c. Tap **Edit**, then **GUIDANCE**.
2. At the SELECTION section, complete the settings:

Tap...	Explanation
Selection	Autopilot
Autopilot Platform	The appropriate platform for your vehicle.
External Guidance Device	
Vehicle Profile Origin	The source of the vehicle profile:

Tap...	Explanation
--------	-------------

Vehicle Profile Origin
From Vehicle Profiles
Import From NavController
Import From USB

- From Vehicle Profiles: contained in the display
- Import from NavController: If your navigation controller has already been set up for a different 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.)

If you select to import a profile, tap **Retrieve Vehicle Profile** to import the vehicle profile from either the NavController or USB device.

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

**⚠ 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](#).

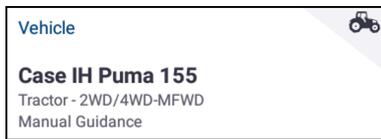
## Controller Settings for Autopilot

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

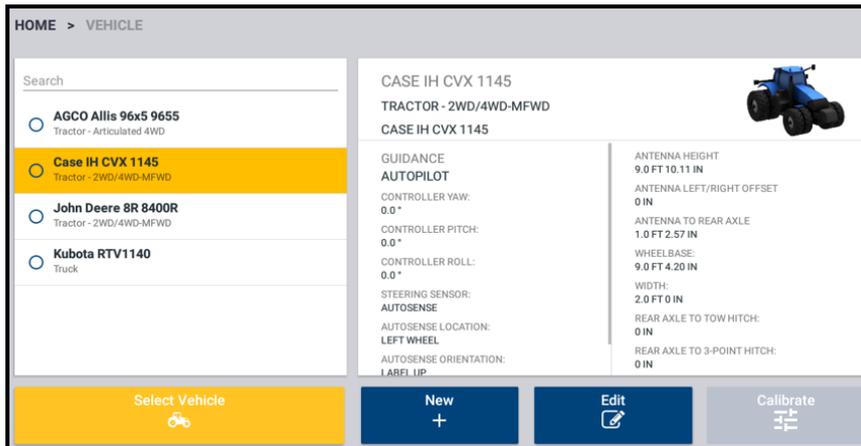
For example, if the controller is positioned with the connectors of the controller facing to the left side of your vehicle, you indicate this in Precision-IQ.

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.

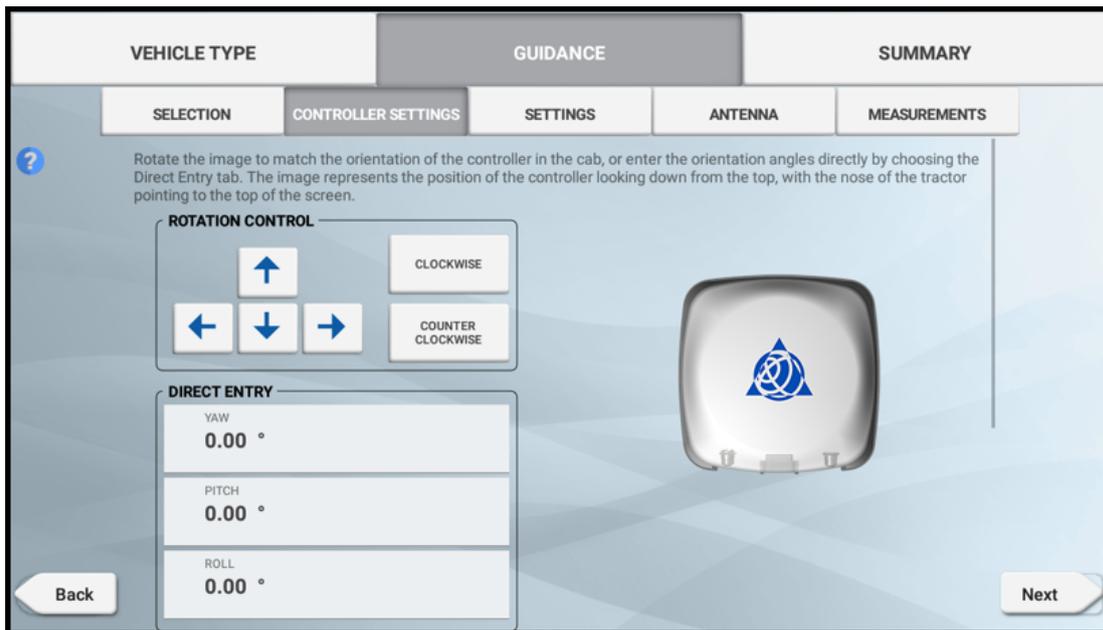
1. Navigate to the GUIDANCE section of the vehicle setup panel:
  - a. On the Home screen, tap the **Vehicle** icon:



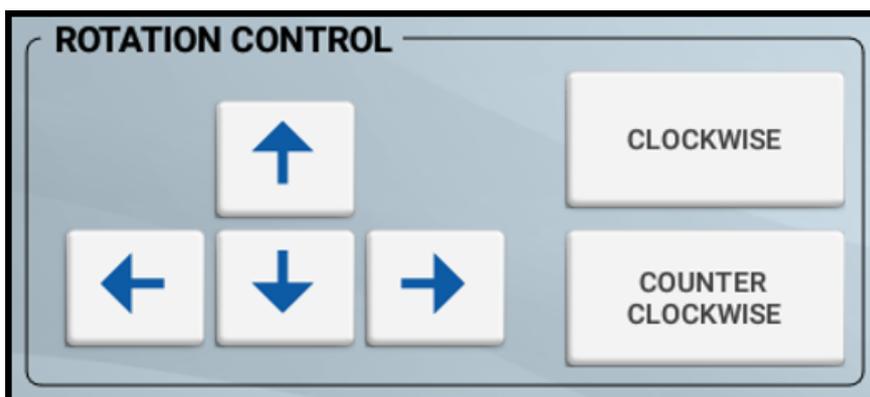
The Vehicle setup panel displays:



- b. From the list of available vehicles, tap the name of the vehicle you want to edit.
  - c. 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:

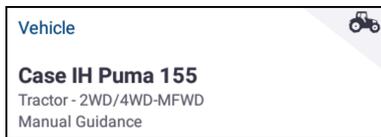


4. Optionally, you can directly enter the degrees of the position by tapping **Yaw**, **Pitch** and **Roll**. By default, the values for the NAV-900 navigation controller module is 0°. Enter a value between **0** and **360** to manually set the position.
5. When the controller position on the screen matches the controller installed in the vehicle, continue to the sensor settings. See [Sensor Settings for Autopilot](#).

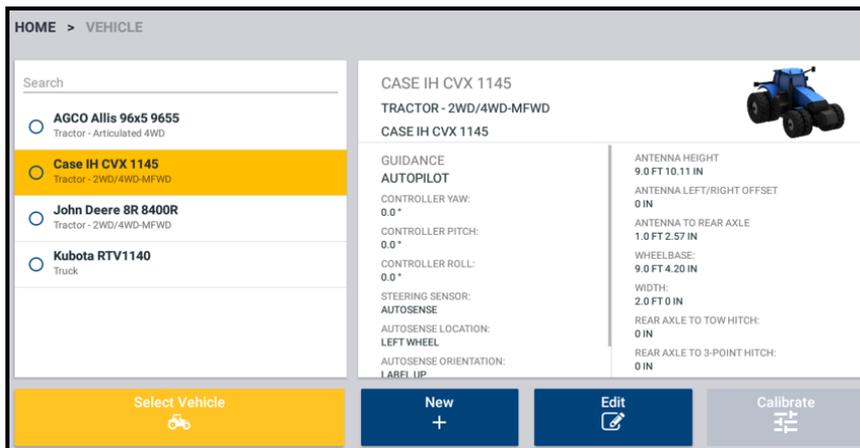
## Sensor Settings for Autopilot

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

1. Navigate to the **GUIDANCE** section of the vehicle setup panel:
  - a. On the Home screen, tap the **Vehicle** icon:



The Vehicle setup panel displays:



- b. From the list of available vehicles, tap the name of the vehicle you want to edit.
  - c. 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: <ul style="list-style-type: none"> <li>• Potentiometer</li> <li>• AutoSense™ device</li> <li>• None</li> </ul>
AutoSense Location	Select the location of the AutoSense device: <ul style="list-style-type: none"> <li>• Left Wheel</li> <li>• Right Wheel</li> </ul>
AutoSense Orientation	Indicate the direction the AutoSense label is facing: <ul style="list-style-type: none"> <li>• Label Up</li> </ul>

Tap...	To...
	<ul style="list-style-type: none"> <li>Label Down</li> </ul> <p><i>NOTE – If the orientation is not accurate, assisted steering may be affected.</i></p>
Valve On Speed	<p>Select speed. For vehicles operating at very slow speeds, select <b>Low</b> or <b>Ultra Low</b>.</p> <ul style="list-style-type: none"> <li>Normal - 0.89 mph (0.4 kph)</li> <li>Low - 0.2 mph (0.09 kph)</li> <li>Ultra Low - 0.05 mph (0.02 kph)</li> </ul>

## Vehicle Measurement Settings for Autopilot

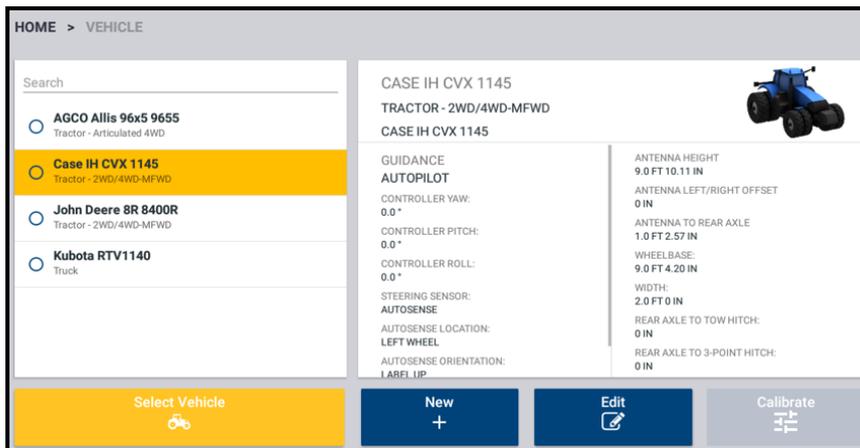
*NOTE – For Autopilot guidance with untracked or tracked vehicles, **do not** change vehicle measurements unless they are not correct.*

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.

- 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.
- Navigate to the MEASUREMENTS section of the vehicle setup panel:
  - On the Home screen, tap the **Vehicle** icon:



The Vehicle setup panel displays:

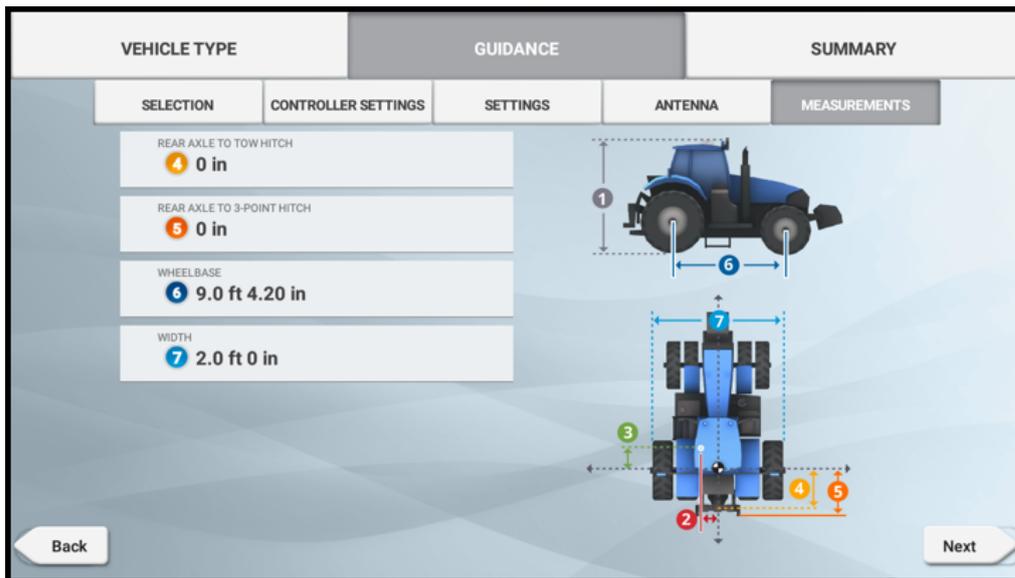


- From the list of available vehicles, tap the name of the vehicle you want to edit.
- Tap **Edit**, then **GUIDANCE**.
- Tap **Antenna**. Based on your selections up to this point, some measurements will be pre-filled:



Set a value for the following antenna measurements:

- Antenna height:** The distance from the top of the antenna to the ground.
  - Antenna left/right offset:** The distance from the antenna to the middle of the vehicle.
  - Antenna to rear axle:** If the antenna is forward of the axle, then the value should be a positive number. If the antenna is behind the axle, then the value should be a negative number (for example, -1.0 ft 3.0 in).
- Tap **MEASUREMENTS** (or **Next**). Based on your selections up to this point, some measurements will be pre-filled:



Confirm all pre-filled measurements and enter the others.

## 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 Precision-IQ application.

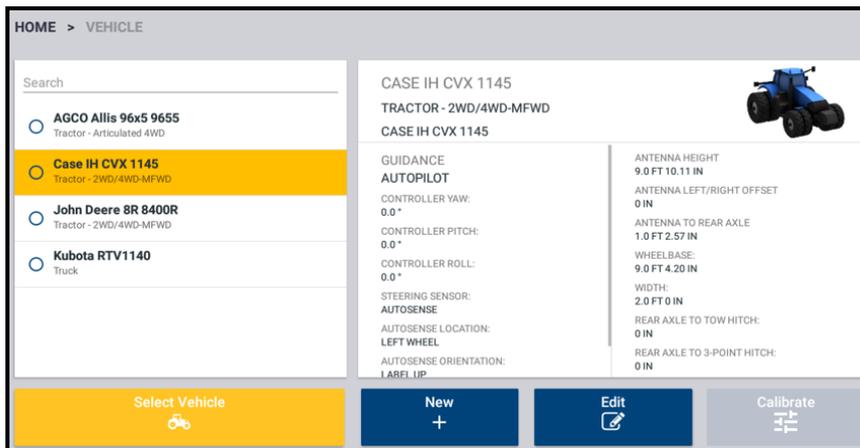
The CALIBRATION section lists only the calibrations required for the selected vehicle and steering system.

**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](#).

1. Remove any implement and excessive front ballast 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:
  - a. On the Home screen, tap the **Vehicle** icon:



The Vehicle setup panel displays:



- b. From the list of available vehicles, tap the name of the vehicle you want to edit.
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 the **Save** icon to save the calibrations:



### Calibration for Nontracked Vehicles

Calibration	Explanation
Manual Override Sensitivity Calibration <i>NOTE – For vehicles that use a pressure transducer or column encoder for the manual override.</i>	Adjusts how much force is required to disengage the system when the driver turns the steering wheel. <i>NOTE – The system detects whether the vehicle configuration includes this type of sensor. This option only appears if required.</i>
Steering Sensor Calibration <i>NOTE – Only for front wheel steered and articulated vehicles.</i>	Converts the voltage output of the steering angle sensor into an equivalent steering angle measurement
Automated Steering Deadzone Calibration	For learning the vehicle's steering dead zones. Determines the minimum valve command required for steering movement.

Calibration	Explanation
Proportional Steering Gain Calibration	Sets the proportional gain to control steering overshoot and responsiveness.
Roll Correction Calibration	Compensates for minor variations in the placement of the navigation controller and GNSS antenna.
Line Acquisition Setting	Controls how fast the guidance system attempts to steer the vehicle onto the current guidance line (50% - 150%).
Engage Aggressiveness Setting	How aggressively the vehicle initially engages on the guidance line (50% - 150%).
Auto Cal Setting	Performs deadzone and A/T calibration.

## Calibration for Tracked Vehicles

Calibration	Explanation
	Verifies the RPM sensor output is correct.
	Determines the center voltage necessary for controlling the electronic steering interface. (Earlier John Deere)
	Enables the controller to calibrate the sensor threshold for detecting when the user steers manually.
	Determines the compensation for the deadband in the steering pumps.
	Maps the steering potentiometers (three sensors used in the steering column in later John Deere vehicles).

See also [Autopilot System Diagnostics](#).

### 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 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 signal or encoder change.

Manual Override Sensitivity sets the level that the voltage or encoder change must reach before the guidance system disengages. The voltage must also drop below that level or ease to move 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](#) 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. If the angle sensor is an AutoSense device, this calibration is not available.*

**NOTE** – *Complete this calibration before you attempt the [Automated Steering Deadzone Calibration](#) or [Roll Correction Calibration](#).*

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](#) for 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  to discard the calibration and repeat step 6 through step 9. The steering sensor may require adjustment or replacement if:

The value...	Outcome
Sensor voltage	Not equidistant for full left and full right from center.
Center steering position	Not near 0
Sensor voltage	Stops changing before the articulation of the steering is to the full left or full right position (that is, does not saturate).

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 wheels. To avoid injury, be prepared for sudden vehicle movement.

## Precalibration Steps

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

1. Complete the vehicle profile steps for setup.
2. Warm up the vehicle. The hydraulic fluid must be at normal operating temperature for deadzone calibration.
3. 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](#).

## 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.
    - a. Wait until Precision-IQ prompts you that the phase is ready to begin.
    - b. Look at the screen to determine whether the next phase will require a left or right turn.
    - c. Reposition the vehicle so that the turn will use the space that you have available.
    - d. Tap the button to begin the next phase.
2. Tap **Calibrate**.
3. Tap **Automated Steering Dead Zone**. The calibration panel displays.
4. Center the steering and tap **Next**.
5. Read each instruction and then tap **Next**.
6. Center the steering on the tractor and move forward in first gear at high RPM for at least five seconds.
7. Tap **Test Right** and continue moving forward while the system performs a coarse right side test.
8. When the test is finished, center the steering again and drive forward for five seconds.

9. Tap **Test Left** and continue moving forward while the system performs a coarse left side test.
10. Tap **Accept** to accept the calibration. The system displays the AutoPilot calibration panel again.
11. Continue driving ahead slowly and tap **Test Right**. The system will perform the first right hand fine calibration.
12. Repeat the right and left hand fine calibrations a minimum of three (3) times until there is a change of less than 0.5 in each of the deadzone values

***NOTE** – If you encounter any error messages during calibration, refer to [Automated Deadzone Error Messages](#).*

### Automated Deadzone Error Messages

Error Message	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	The calibration test sensed the steering turning in the opposite direction to what was expected. Retry. If the problem persists, then either the valve connectors need to be changed or the steering sensor calibration was

Error Message	Explanation
Swapped	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 Calibration

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

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

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

Type	Description
High 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).
Low Gain	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.

### Precalibration Steps

1. Complete the vehicle setup steps.
2. Perform calibration for the Automated Deadzone. See [Automated Steering Deadzone Calibration](#) 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 calibration 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](#).
  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 milliseconds is ideal).
    - Overshoot exceeds 5 – 8% (depending on the vehicle).
    - Wheels noticeably shake near end stops.
  10. When you find the optimum gain, tap  to accept the calibration or  to exit without saving. The display returns to the CALIBRATION section where you can perform another calibration or exit.

## Roll Correction Calibration

Roll correction compensates for minor variations in the placement of the navigation controller and GNSS 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 or RTX with a signal that has been converged for at least 10 minutes. If you complete roll calibration with less accurate correction, repeat the steps below at least four times for greater accuracy.*

## Precalibration 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.

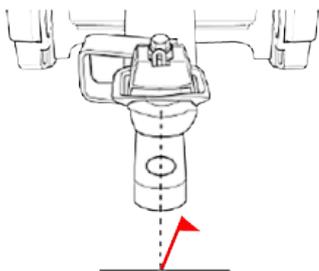
3. Remove any implement from the vehicle and drive it to a flat, smooth area where you can complete passes of at least 400 ft (125 m) in length.
4. Create a field. See [Add a Field](#).

### Calibration Steps

1. Select the vehicle and implement you want to work with.  
See [Select a Vehicle](#) and [Select an Implement](#) for detailed instructions.
2. Select a field and enter the Run screen.
3. Create a new, straight guidance line.  
See [Guidance Patterns: AB Line](#) or [Guidance Patterns: A+ Line](#).
4. Make sure the on-screen lightbar is displayed on the screen.  
See [Using Onscreen Widgets](#).
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).



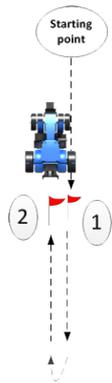
7. Re-enter the cab and continue to drive down the guidance line.
8. Turn the vehicle around and then re-engage *on the same line* in the opposite direction.
9. Stop the vehicle with the drawbar (or other feature used to mark the center line of the

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):

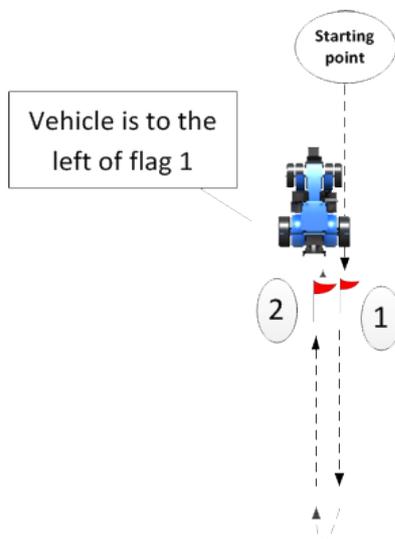
---



- 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. On the Menu bar, 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 Setting*

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. Stock values are recommended since excessive values will cause oscillation, the number 1 cause of poor performance.*

1. Go to Diagnostics:
  - a. On the Menu bar, tap  and then tap **Diagnostics**.
  - b. Under the Autopilot heading in the left-hand list, tap **Performance**.
  - c. Tap **Steering** at the top of the screen.
  - d. 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](#) and [Select an Implement](#) for detailed instructions.
  - b. Select a field and enter the Run screen.
  - c. Create a new, straight guidance line. See [Guidance Patterns: AB Line](#) or [Guidance Patterns: A+ Line](#).
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 Setting

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

- With a high setting, the vehicle will initially respond quickly.
  - With a 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.
  2. Determine if the initial response is appropriate and adjust accordingly.

## Auto Cal Setting

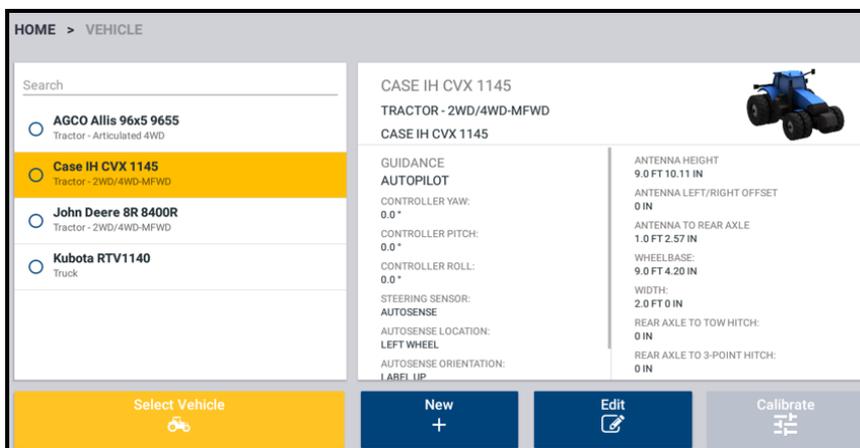
The Auto Cal feature allows vehicles to be calibrated through an automated wizard. The process sends steering commands to the guidance system and adjusts the steering system for best performance based on the feedback.

Follow the steps below for instructions on how to use Auto Cal:

1. On the Home screen, tap the **Vehicle** icon:

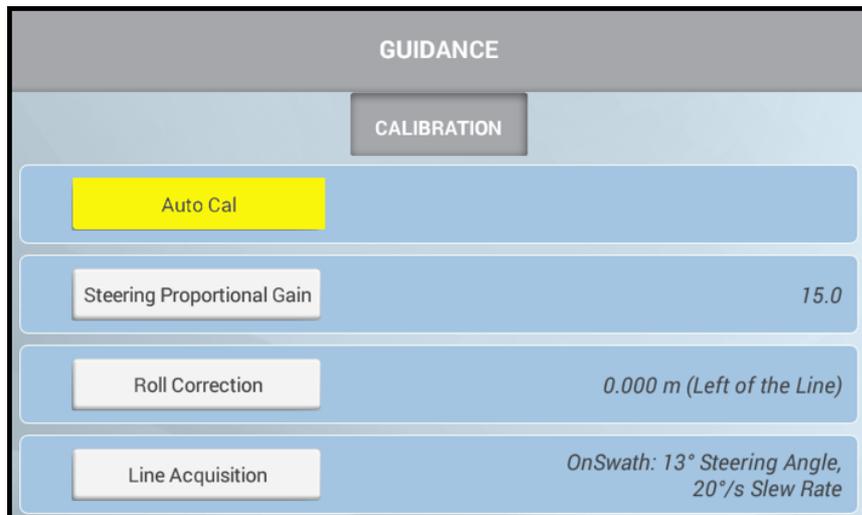


The Vehicle setup panel displays:

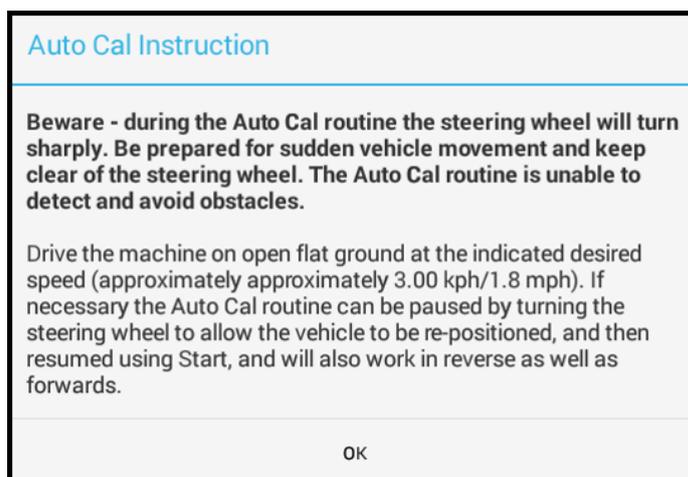


2. From the list of available vehicles, tap the name of the vehicle you want to edit.

3. Tap **Calibrate**, then tap **Auto Cal**:



4. Read the instructions and tap **OK**:



5. The AutoPilot will then run through the automated process as long as the GPS quality and forward speed are sufficient.



If you need to pause the calibration, simply turn the steering wheel to stop the process. Tap to continue the process.

- Once complete, the results will be shown. Tap the green check to save the calibration. At this point it is important to create an AB line at test the performance.

## NextSwath

 This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

The NextSwath feature is used to automatically turn the vehicle at the end of a straight line guidance pattern to align with the next selected swath. Vehicle functions on some specific vehicles can also be used for more efficient operation.

Even if you have used other guidance systems before, Trimble recommends that you spend some time reading this manual to learn about the special features of this product.

The following sections describe how to set up and operate the Trimble® NextSwath™ end-of-row turn technology:

- [NextSwath Requirements](#).
- [OnSwath Line-Acquisition Mode Setup](#).
- [Implement Setup for NextSwath](#).
- [Vehicle Controller Setup for NextSwath](#).
- [Configuring NextSwath](#).
- [Running NextSwath](#).

## NextSwath Requirements

The NextSwath feature consists of two parts:

- NextSwath end-of-row technology, which enables both end-of-row turning and simple event timing commands.
- NextSwath Connect, which uses the vehicle's end-of-row operational controls to trigger the interface, is only available with SITO.

## Entering a Passcode

*(TMX-2050/XCN-2050 only)* Contact your reseller to purchase the NextSwath license for the Precision-IQ field application. On the TMX-2050/XCN-2050 display, versions 4.6 or earlier:

1. Run the Precision-IQ application.
2. Go to **Display Settings**.
3. In the Feature Unlocks section, use the front camera to scan the NextSwath QR code or enter the passcode to unlock the functionality.

On the TMX-2050/XCN-2050 display, versions 4.01 and later:

1. Open App Central.
2. Tap Menu (upper left corner) and then select Licenses.
3. Tap the + button in the lower corner and select the method that you want to use to enter the passcode

 **CAUTION** – The NextSwath technology cannot be used with Autonomous, SBAS, or OmniSTAR® VBS correction sources. [RangePoint RTX Correction Service](#) is the minimum supported correction service.

 **CAUTION** – NextSwath technology within Precision-IQ within TMX-2050/XCN-2050 version 4.6 does not support the RG-100 row guidance system or True Traker.

The following technologies are required before configuring and using NextSwath:

- NextSwath technology requires the Autopilot steering system to be installed.
- NextSwath technology can be used only with vehicles defined as capable in the supported platforms list.
- NextSwath requires the use of internal vehicle profiles found within the Precision-IQ application.
- OnSwath™ advanced line acquisition is a requirement for using NextSwath technology. For more information, see [OnSwath Line-Acquisition Mode Setup](#). You can also refer to the support note *Autopilot System: OnSwath Advanced Line Acquisition Settings* or the *Autopilot Toolbox User Guide, version 3.3*.

- NextSwath technology requires one of the following GNSS correction sources:
  - OmniSTAR® XP
  - OmniSTAR HP
  - RangePoint® RTX
  - CenterPoint® RTX (SS, FS, SC)
  - CenterPoint RTK
  - Trimble® VRS Now™

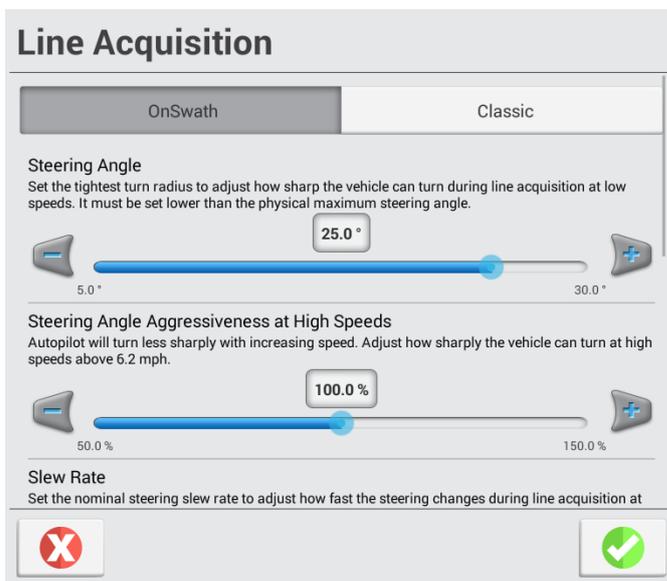
## OnSwath Line-Acquisition Mode Setup

**NOTE** – The OnSwath line-acquisition mode is required to run the NextSwath technology.

### Line Acquisition Screen

In the Autopilot / Calibration / Line Acquisition screen, set the line acquisition mode to OnSwath and then make changes in the Steering Angle, Slew Rate, and Approach Angle sections.

1. On the Steering Angle section, select **OnSwath** and set the Steering Angle:

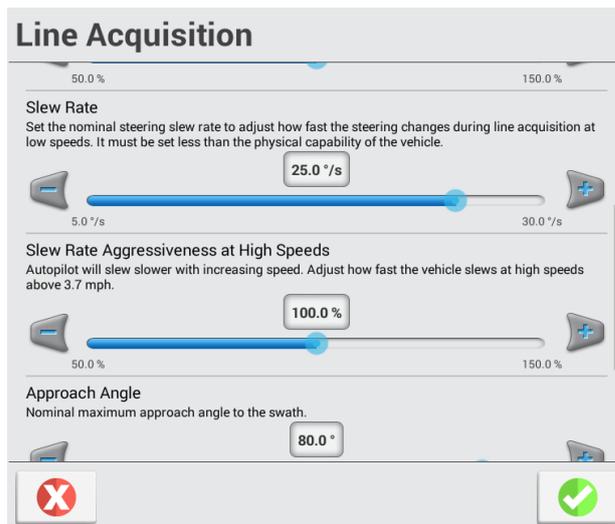


The following table describes the option you can set:

Field	Description
Steering Angle (normal maximum)	Set the desired maximum steering angle (turn radius) for the system to use during line acquisition and end-of-row turns. This is not a hard limit, but the value the system plans for.

Field	Description
Steering Angle Aggressiveness at High Speeds	Set the speed at which the maximum steering angle starts to reduce.

- Set the Slew Rate section:



The following table describes the options you can set:

Field	Description
Slew Rate (normal maximum)	Set the slew rate that the Autopilot system will plan for during line acquisition and end- of-row turns. A higher slew rate increases the rate at which the steering angle (turn radius) changes, up to the vehicle's physical capabilities.
Steering Slew Rate Aggressiveness for High Speeds	Set the slew rate for high speeds at which the Autopilot system will begin to reduce the slew rate. A lower aggressiveness will reduce the slew rate more at high speeds. This results in a smoother and more stable operation.

## 3. Set the Approach Angle:

**Line Acquisition**

Autopilot will slew slower with increasing speed. Adjust how fast the vehicle slews at high speeds above 3.7 mph.

100.0 %

50.0 % 150.0 %

**Approach Angle**

Nominal maximum approach angle to the swath.

80.0 °

20.0 ° 90.0 °

**Initial Turn Aggressiveness**

Line acquisition can consist of an initial turn towards the line followed by a turn onto the line. Adjust their relative aggressiveness. It is recommended to adjust the turn onto the line first using the other settings, then increase or decrease the aggressiveness of the initial turn as desired.

100.0 %

50.0 % 150.0 %

X ✓

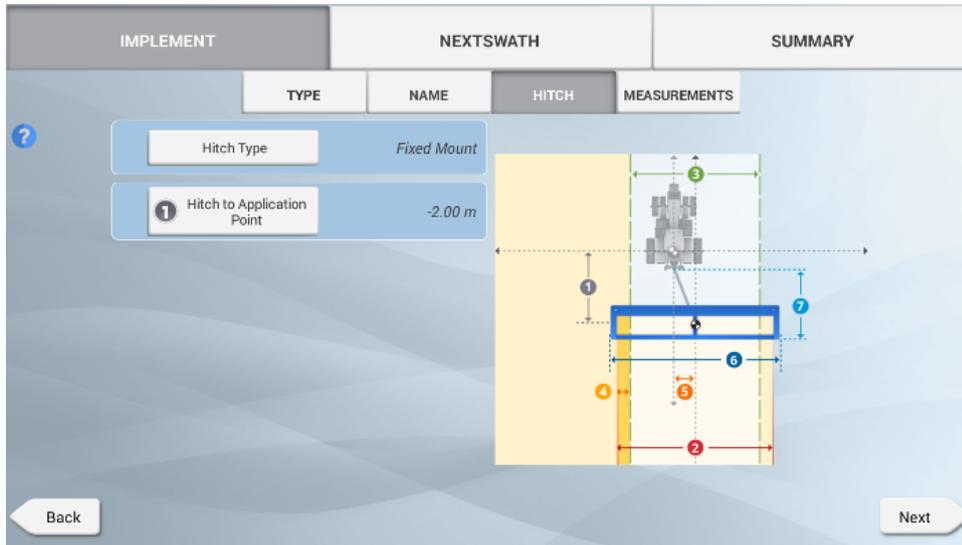
The following table describes the options that you can set:

Field	Description
Approach Angle	The desired approach angle that the Autopilot system will drive to the line if adequate space is available. If space is not available, the angle may not be achievable.
Initial Turn Aggressiveness	Adjusts how sharp or smooth the initial turn toward to the line will be in comparison to the final turn onto the line. This affects only the initial turn towards, while the final turn onto the line is not affected. If the value is: <ul style="list-style-type: none"> <li>• <b>Lower:</b> The initial turn will be smoother and more gradual.</li> <li>• <b>Higher:</b> The initial turn will be harder and sharper toward the line.</li> </ul>

4. Once you have completed and checked the entries in all sections, tap to save the settings.

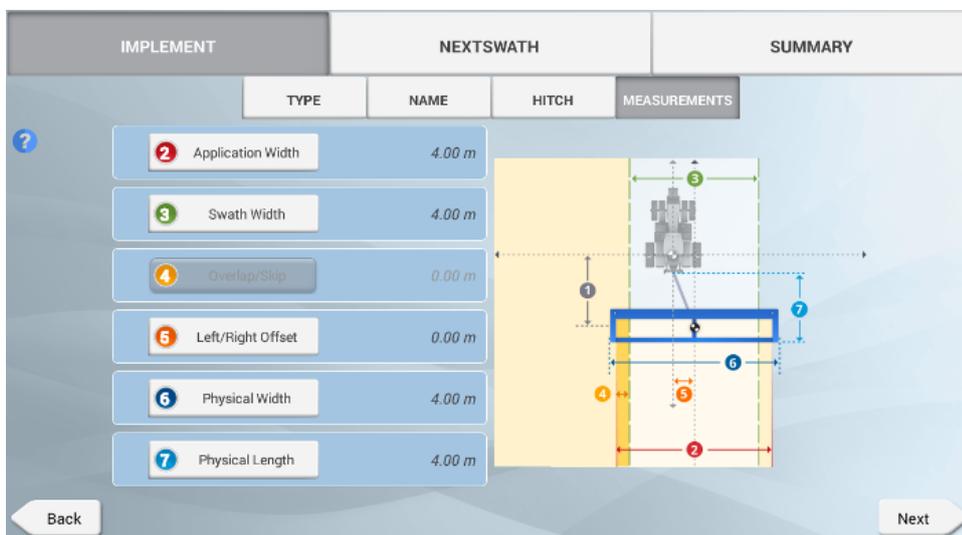
## Implement Setup for NextSwath

Having selected an implement type and given the implement a name, the **Hitch Type** and **Hitch to Application Point** are required:



In the Implement Setup screen, you must enter the required values to the Measurement and hitch tabs. Once you have completed / checked the entries in both tabs, click **Next**.

The Measurement tab shows the current measurements that are available for the NextSwath technology:



The following table describes the options you can configure:

Field	Description
Application Width	Enter the width of the operation that is actually performed by the machine or implement. This width is used for determining area covered.

Field	Description
Swath Width	Enter the width that is required for guidance line separation and turn planning.
Left / Right Offset	Enter the left or right offset of the center line of the implement from the center line of the vehicle.
Left / Right Offset	Enter the left or right offset of the center line of the implement from the center line of the vehicle.
Physical width	Enter the physical width of the implement.
Physical Length	Enter the physical length from the front to the rear of the implement.

## Vehicle Controller Setup for NextSwath

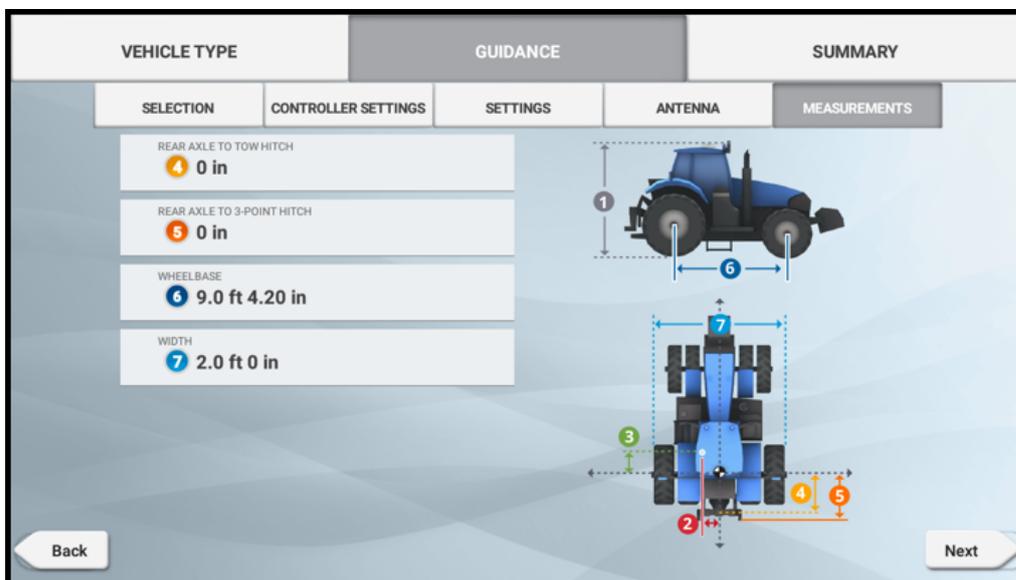
As part of the Autopilot setup, enter additional measurements that are used for modeling purposes for the NextSwath technology and, as required, for the TrueSwath technology. Once you have completed / checked the entries in the *Vehicle / Edit / Guidance - Antenna and Measurements* screen, tap **Next**, and then tap **Save**.

1. In the Vehicle Guidance - Antenna screen, enter values for the following antenna attributes:
  - Antenna Height
  - Antenna Left/Right Offset
  - Antenna to Rear Axle: If the antenna is forward of the axle, then the value is positive (+). If the antenna is behind the axle, then the value is negative (-), for example, **-1.0 ft 3.0 in.**



2. In the Vehicle Guidance - Measurements screen, enter values for the following measurements:

- Rear axle to tow hitch
- Rear axle to 3-point hitch
- Wheelbase
- Width



3. Enter the following values:

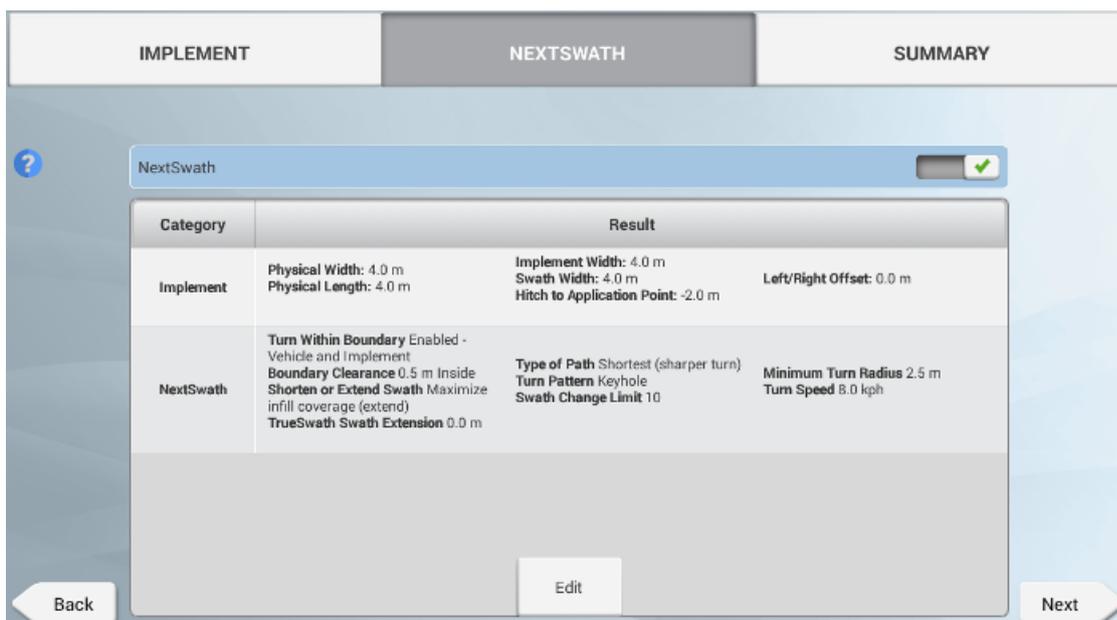
Measurement	Description
Fixed Axle to Tow	Measure the distance from the control point of the vehicle to the

Measurement	Description
Hitch	<p>center point of the drawbar hitch pin. The control point depends on the vehicle type:</p> <ul style="list-style-type: none"> <li>• MFWD: Rear axle</li> <li>• Tracked tractor: Center of rotation</li> <li>• Sprayers: Rear axle</li> <li>• Combine/Harvesters: Front axle</li> <li>• 4WD/Articulated: Rear axle</li> </ul> <p><i><b>NOTE</b> – If you are using a two-point hitch, measure the distance from the fixed axle to the pivot point on the apparatus.</i></p>
Fixed Axle to 3-Point Hitch	<p>Measure the distance from the control point to the location where the three-point fixture, feeder, house, or boom attaches. This measurement is also used for fixed applications such as harvesting and spraying with a self-propelled sprayer. For front-mounted implements such as swathers, combines, and front-boom sprayers, you must make sure to set the offset to front.</p>
Vehicle Width	Enter the physical width of the widest part of the vehicle.

## Configuring NextSwath

When enabled, NextSwath is part of the implement setup in Precision-IQ.

Tap the on/off slider to enable  NextSwath. Tap **Edit** to begin NextSwath configuration:



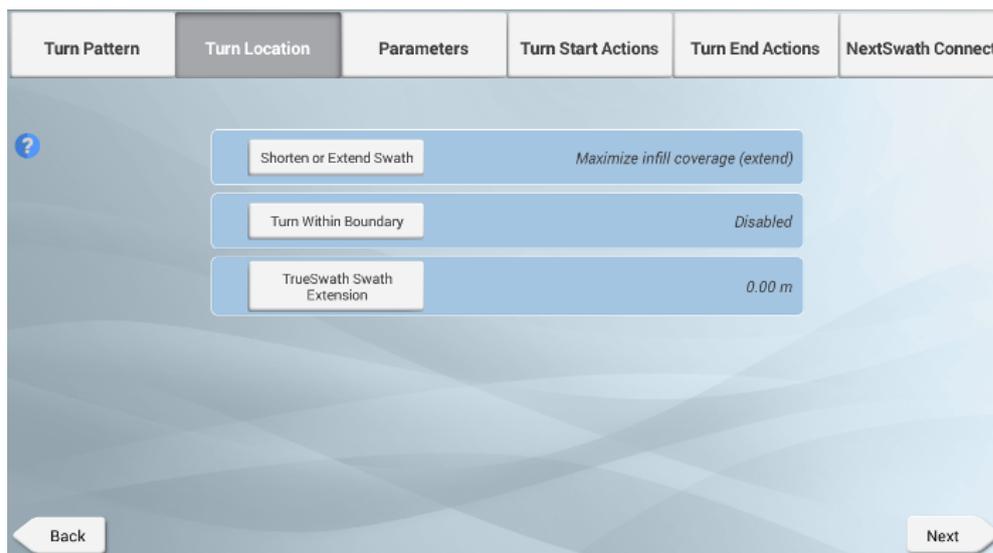
## 1. Set the Turn Pattern:

Field	Description
Type of path	<p>There are two options to define the required turn trajectory:</p> <ul style="list-style-type: none"> <li>• <b>Shortest (sharper turn):</b> This is based on the swath width, the steering angle settings for the OnSwath technology, and the minimum turn radius (see below). This setting will turn as short as possible—generally the default.</li> <li>• <b>Smoothest (rounder turn):</b> This is used for large applications (wide spraying, some tillage, and so on) in which a smooth, gentle turn is required. This setting uses the smallest constant radius to make the desired turn. For larger numbers of swaths changed in a turn, the radius expands.</li> </ul>
Turn Pattern	<p>When the steering system limitations and swath width do not allow a turn to be completed within the distance between swaths, the system must go outside the swath lines. There are three options for how the system will do this:</p> <ul style="list-style-type: none"> <li>• <b>Turn wide at start:</b> All turning outside of the swaths is done at the start of the turn.</li> <li>• <b>Keyhole:</b> An equal amount of turning outside of the swath region is done on each side of the turn.</li> <li>• <b>Turn wide at end:</b> All turning outside of the swath region is done at</li> </ul>

Field	Description
	<p>the end of the turn.</p> <p><i>NOTE – When TrueSwath technology is used with this setting, the path the vehicle must take to bring the pull-type implement online affects the shape of the turn.</i></p>
Swath change limit	<p>This defines the largest number of swaths that can be changed during a turn left or right. The value can be set to the smaller of 10 swath widths or a distance of 500 ft (150 m).</p> <p>NextSwath technology makes a turn perpendicular to the swath direction so that when changing multiple swaths where the swaths intersect the boundary at a sharp angle, the path between the selected swaths will be extended to accommodate the furthest swath end point.</p>

Tap **Next** to continue.

2. Set the Turn Location:



Field	Description
Shorten or Extend Swath	<p>When using a headland pattern or turn points determined by a boundary offset, you can select one of the following options to define how the system should make the turn:</p> <ul style="list-style-type: none"> <li>Minimize headland usage (shorten): This potentially starts the turn inside the infill area to allow for the full turn to be completed while minimizing use of the headland area.</li> </ul>

Field	Description
	<p>When using NextSwath technology for operations in which the swath lines do not intersect the boundary at a square angle, the point for the line that is closer in will be used.</p> <ul style="list-style-type: none"> <li>Maximize infill coverage (extend): This starts the turn at the boundary between the headland and the infill so that all of the turn happens outside the infill, provided there is space to do so within the headland area/outer boundary. When using NextSwath technology for operations in which the swath lines do not intersect the boundary at a square angle, the point for the line that is further out will be used.</li> </ul> <p><i><b>NOTE</b> – The ability of the vehicle to stay within the headland depends on the number of circuits or offset distances defined by the user.</i></p>
Turn Within Boundary	<p>This parameter can be enabled for the vehicle, the vehicle and implement, or disabled. When set to:</p> <ul style="list-style-type: none"> <li>Vehicle: A turn will be planned so that the outside of the vehicle (based on the width entered in vehicle measurements) clears the edge of the boundary by the value entered in the Boundary Clearance field.</li> <li>Vehicle and Implement: A turn will be planned so that the outside edge of the vehicle/implement combination (based on the physical dimensions of the vehicle and implement that have been entered) clears the edge of the boundary by the value entered in the Boundary Clearance field.</li> <li>Disabled: The turn location will be set by the active swath A and B points.</li> </ul> <p><i><b>NOTE</b> – For boundary clearance to be used the field must have a mapped boundary. If no boundary is available for the field; turn locations will be based on the A and B points of the swath. It is the operator's responsibility to ensure that the mapped boundary is accurate for the field.</i></p> <p><b>⚠ WARNING</b> – Obstacle avoidance is solely the responsibility of the Operator. A trained and qualified operator must be present in the vehicle at all times.</p>

Field	Description
	<p><b>⚠ CAUTION</b> – NextSwath boundary clearance relies on accurate vehicle steering settings and boundary mapping. Inaccurate boundaries will cause inaccurate clearance.</p>
Boundary Clearance	<p>Set the distance (inside or outside) by which you want the boundary to be avoided.</p> <p><i><b>NOTE</b> – Due to geometry limits of field shapes and shrinking/expanding boundary clearance distances; the NextSwath technology may not be able to generate auto-turns based on the clearance distances entered.</i></p>
TrueSwath Swath Extension	<p>When using TrueSwath technology, a distance offset to delay the vehicle turning into the end rows/headland circuit may be required to allow for proper coverage.</p> <p>Adjust this value to alter the distance as required.</p>

***NOTE** – The Autopilot system’s end-of-row warning distance/end-of-row time dictates when the prompt for acknowledging the automated end-of-row turns appears when approaching the turn point.*

Tap **Next** to continue.

3. Set the Parameters:

The screenshot displays the 'Parameters' configuration screen. At the top, there are six tabs: 'Turn Pattern', 'Turn Location', 'Parameters' (selected), 'Turn Start Actions', 'Turn End Actions', and 'NextSwath Connect'. Below the tabs, a blue question mark icon is on the left. Three parameter rows are shown: 'Turn Speed' with a value of 8.00 kph, 'Minimum Turn Radius' with a value of 0.00 m, and 'Remote Engage Confirms Auto Turn' with a checked toggle switch. At the bottom, there are 'Back' and 'Next' navigation buttons.

Field	Description
Turn Speed	The speed designated for auto turns and the speed for which

Field	Description
	<p>the turn will be optimized.</p> <p>If the vehicle travels at a speed that is more than 1.1 mph (0.5 m/s) faster than the entered turn speed value, the NextSwath technology will not start the turn. Any speed that is slower than the turn speed is allowed. If, during the turn, the set speed is exceeded by 1.1 mph (0.5 m/s), the system will disengage and the turn will be abandoned.</p> <p>It is recommended that you set this value to the highest speed for which turns will be made.</p> <p><b>NOTE</b> – OnSwath settings for the maximum nominal steering angle, maximum nominal steering slew rate, and aggressiveness affect the path of the planned turn.</p>
Minimum Turn Radius	<p>This is the minimum turn radius for which the turn will be planned. Determine the radius by driving the vehicle and implement combination in the tightest turn required and then measuring the radius (half of the diameter) of the path of the control point of the vehicle (that is, the path of the center of the rear axle for MFWD or center of front axle for combines, and so on).</p> <p>If the turn speed and OnSwath settings dictate a larger turn radius than the radius entered, the larger radius will be used.</p> <p>These settings apply to both regular and TrueSwath-enabled turns. This setting will not affect line acquisition.</p>
Remote Engage Confirms Auto Turn	<p>Enable this feature to allow the use of the remote engage button to accept the NextSwath turn as an alternative to touching the Run screen when the end-of-row automated turn notice appears.</p> <p><b>NOTE</b> – Remote engage systems wired directly into the NavController will work with this functionality. CAN-based remote engage systems may or may not work depending on the vehicle manufacturer's message protocol.</p>

Tap **Next** to continue.

## 4. Set Turn Start Actions:

Turn Pattern	Turn Location	Parameters	Turn Start Actions	Turn End Actions	NextSwath Connect										
			<table border="1"> <thead> <tr> <th>Action</th> <th>When</th> <th>Reference</th> <th>Sound alert</th> <th>Text alert</th> </tr> </thead> <tbody> <tr> <td>Raise Implement</td> <td>1.0 m Before</td> <td>Vehicle</td> <td>On</td> <td>On</td> </tr> </tbody> </table>	Action	When	Reference	Sound alert	Text alert	Raise Implement	1.0 m Before	Vehicle	On	On		
Action	When	Reference	Sound alert	Text alert											
Raise Implement	1.0 m Before	Vehicle	On	On											

Tap **Add** or a previously configured action row to edit the following event parameters:

Field	Description
Action	Select the operation for which you want to set reminders or sequencing.
Distance or Time	Select whether to use a Time or Distance offset for the action.
Distance Before or After Turn	When <i>Time or Distance</i> is selected, enter the action offset value:

When *When* is selected, enter the required offset and whether it should happen before or after the turn is complete, when entering the swath:

Field	Description
Reference	<p>Sets the reference point the action will coordinate with. Choose one of the following:</p> <ul style="list-style-type: none"> <li>• Vehicle, which uses the control point of the vehicle.</li> <li>• Implement Application Point, defined in Implement/Measurements.</li> <li>• Implement ground contact point, defined in Implement/Measurements.</li> </ul>
Sound alert	Enable or disable an audible alert from the sonalert and display.
Text alert	Determines if the action appears in the list of user prompts during turning activity.

**NOTE** – When using "Log when engaged" for managing coverage logging; to stop logging after turning, you must set up a Stop application action. Adjust the "When" value to obtain the proper coverage. It is recommended that you use distance rather than time, as time is affected by travel speed.

Tap **Next** to continue.

## 5. Set Turn End Actions:

Turn Pattern	Turn Location	Parameters	Turn Start Actions	Turn End Actions	NextSwath Connect										
<table border="1"> <thead> <tr> <th>Action</th> <th>When</th> <th>Reference</th> <th>Sound alert</th> <th>Text alert</th> </tr> </thead> <tbody> <tr> <td>Lower Implement</td> <td>1.0 m Before</td> <td>Vehicle</td> <td>On</td> <td>On</td> </tr> </tbody> </table> <p style="text-align: center;">+ Add</p>						Action	When	Reference	Sound alert	Text alert	Lower Implement	1.0 m Before	Vehicle	On	On
Action	When	Reference	Sound alert	Text alert											
Lower Implement	1.0 m Before	Vehicle	On	On											
<p>Back <span style="float: right;">Next</span></p>															

Field	Description
Action	Select the operation for which you want to set reminders or sequencing.
Distance or Time	Select whether to use a Time or Distance offset for the action.
Distance Before or After Turn	When <i>Time or Distance</i> is selected, enter the action offset value:

**Edit Start of Turn Action**

Action	Raise Implement
Time or Distance	DISTANCE
Distance Before or After Turn	0.00 m
Reference	Vehicle
Sound alert	OFF

When *When* is selected, enter the required offset and whether it should happen before or after the turn is complete, when entering the swath:

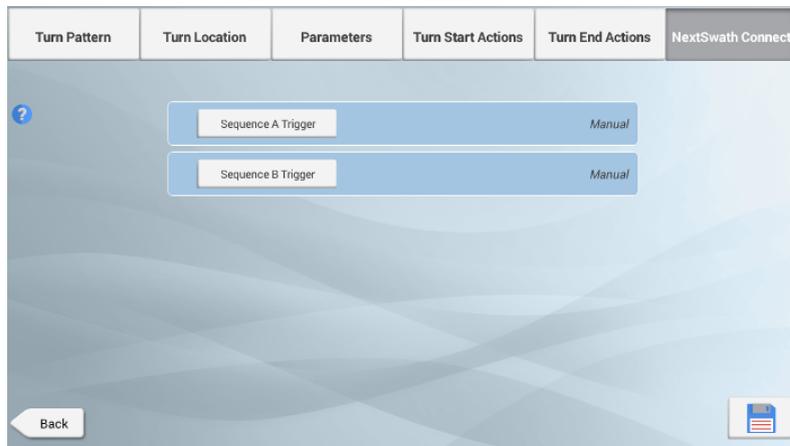
Field	Description
<b>Edit Start of Turn Action</b>	
Action	Raise Implement
Time or Distance	TIME
When	0 seconds
Reference	Vehicle
Sound alert	OFF
 	

Reference	<p>Sets the reference point the action will coordinate with. Choose one of the following:</p> <ul style="list-style-type: none"> <li>• Vehicle, which uses the control point of the vehicle.</li> <li>• Implement Application Point, defined in Implement/Measurements.</li> <li>• Implement ground contact point, defined in Implement/Measurements.</li> </ul>
Sound alert	Enable or disable an audible alert from the sonalert and display.
Text alert	Determines if the action appears in the list of user prompts during turning activity.

**NOTE** – When using "Log when engaged" for managing coverage logging; to start logging after turning, you must set up a Start application action. Adjust the "When" value to ensure the proper coverage. It is recommended that you use distance rather than time, as time offsets change with speed.

Tap **Next** to continue.

## 6. Set NextSwath Connect:



For implementation, you must purchase the NextSwath Connect unlock and use a NavController III to output the signal from the third solenoid. As there is only one solenoid output on the NavController III, only one button can be triggered.

You can use this output to initiate a recorded sequence on the vehicle only. You must set up the timing for the sequences using the interface on the tractor. Refer to the tractor operator's manual for recording methods. You can adjust the timing for the start of the sequences by changing the Occurs Before/After value in the Swath Start Events/Swath End Events tabs for the Sequence A and/or Sequence B event.

**NOTE** – You cannot use Vehicle Integration on vehicles that use the third solenoid output for the "On when engaged" function.

7. Tap  to save the settings.

With the configuration settings saved, you are now ready to use NextSwath.

## Running NextSwath

This section describes how to run the NextSwath technology.

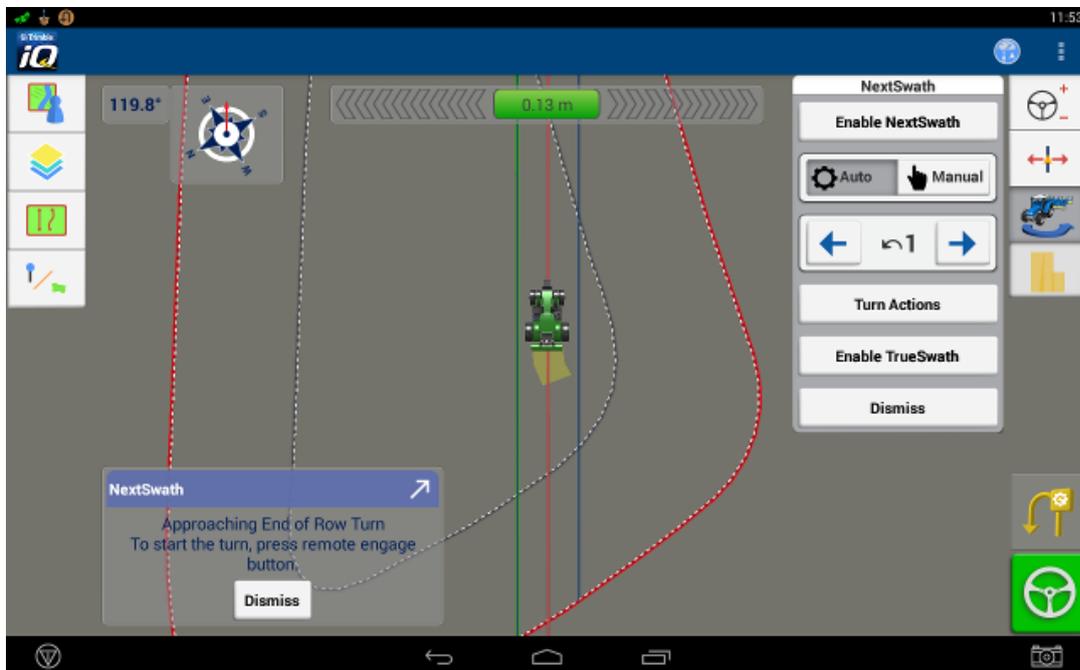
**CAUTION** – The NextSwath technology is designed to only be used with straight AB, A+, and headland infill patterns. It does not work with curve patterns, pivot patterns, freeform, or feature line guidance.

The following topics are provided for running NextSwath:

- [Engaging NextSwath](#)
- [Using NextSwath End-of-Row Auto Turns](#)
- [Setting the End-of-Row Point](#)
- [NextSwath Operating Tips](#)

## Engaging NextSwath

NextSwath is accessed and used from the Precision-IQ Run screen:



The NextSwath slide-out menu provides the interface for you to select an action:



The following table describes the available actions you can take:

NextSwath Action	Description
Enable	Tap to enable NextSwath technology. Each time you enter a field or

NextSwath Action	Description
NextSwath	<p>create / load a new swath, you must enable the NextSwath technology and accept the liability warning. Within the same session you can disable / re-enable the NextSwath technology without needing to accept the liability warning.</p>
	<p>Tap to select between an auto-initiated turn or a manually-initiated turn. The system defaults to auto-initiation and will prompt you at the end-of-row warning location if you would like to turn the selected direction.</p> <p><b>NOTE</b> – A direction that remains within the field boundary must first be selected. To carry out a manually-initiated turn, select the manual button and then set the turn direction. If the speed requirements are met for a NextSwath turn and you are engaged on a swath, you can tap the manual turn start button.</p>
	<p>Tap to select the turn direction and number of swaths to change.</p> <p>To create an automatic turn, you must select a swath to turn onto. To do this, tap the left or right arrow button to select the direction and by how many swaths the turn will be made. The number of swaths allowed each way is entered in the Swath Change Limit field when you set up the system, see <a href="#">Configuring NextSwath</a>.</p> <p>The selected swath appears in yellow with green borders on the Run screen, and the direction and number away from the current swath appear on the panel.</p> <p><b>NOTE</b> – The direction refers to the forward travel direction of the vehicle. The system does not turn around back onto the same swath. Once the first automatic turn is complete, the next automatic turn that is prompted by an end-of-row location will be auto-populated with a turn in the opposite direction but with the same number of swaths changed as the previous turn.</p> <p>If no swath is selected, this is indicated by a dash on the swath number indicator.</p> <p><b>NOTE</b> – The NextSwath System will not make an Automated turn to a guidance line outside of a boundary.</p>
Turn Actions	<p>Tap to enable or disable the Turn Actions as configured in <a href="#">Implement Setup for NextSwath</a>. When performing a manually initiated automated turn, and with the Turn Action button enabled, the earliest programmed event will start when you tap the Turn Now button and work toward the turn.</p>

NextSwath Action	Description
<b>Enable TrueSwath</b>	<p>Tap to enable TrueSwath implement turn compensation. Use the TrueSwath implement turn swath button in association with, or independently of, automated turns.</p> <p>Either when performing an automated turn or during line acquisition, a yellow path for the implement is plotted for drawn implement types in addition to the green path for the vehicle.</p> <p>When used in an automated turn, the TrueSwath swath extension offset is added to the turn point to allow the implement to reach the turn point before the turn is started.</p> <p><i>NOTE – The parameters entered in the setup for vehicle control point-to-hitch offset and hitch-to-ground contact point dictate the path planned for the implement. Adjust these values to change performance.</i></p> <p><i>NOTE – Rigid mounted implements (those using the three-point hitch) cannot use the TrueSwath technology.</i></p>

The Turn Now button shows the status of automated turns. The direction of the turn is indicated by the arrow direction. There are three states available for the Turn Now button:

Icon	State	Description
	Ready (yellow)	Automated turns are ready. Tap to start a turn.
	Turning (green)	The system is counting down to a turn or turning. Tap to cancel the automated turn.
	Disabled/error (red)	Automated turns are not available. Turns must be enabled, with a valid direction selected. The vehicle speed must be at or below the turn speed.

### Using NextSwath End-of-Row Auto Turns

When the vehicle arrives at the end-of-row location and if the NextSwath technology is enabled, you are prompted to auto turn at the end-of-row point.

The first occurrence requires the operator to indicate the swath to turn to as well as enabling the Turn End/Start events and TrueSwath technology.

Each following turn will auto-populate with the settings of the previous turn except that it will be in the opposite direction (to keep the operation moving in the same cardinal direction).

If it can be generated (based on field geometry and entered offset distances, see Turn Location tab in [Configuring NextSwath](#)), the proposed path appears on the Run screen. The NextSwath technology will not propose paths that turn a vehicle outside of a field boundary.

You can:

- Dismiss the auto turn and either initiate an auto turn at the required location or drive the vehicle manually.
- Adjust the auto turn. Open the NextSwath control panel to adjust the turn settings and/or manually initiate an auto turn.
- Accept the auto turn as presented by pressing the Auto Turn button above the Engage button. The system then proceeds to count down to the auto turn (you can also initiate this function by tapping the remote engage button, if the function has been enabled on the Parameters page).

If the auto turn is accepted, you are notified if your speed is above the defined turn speed. If the speed is not reduced before the auto turn is started, the system will disengage.

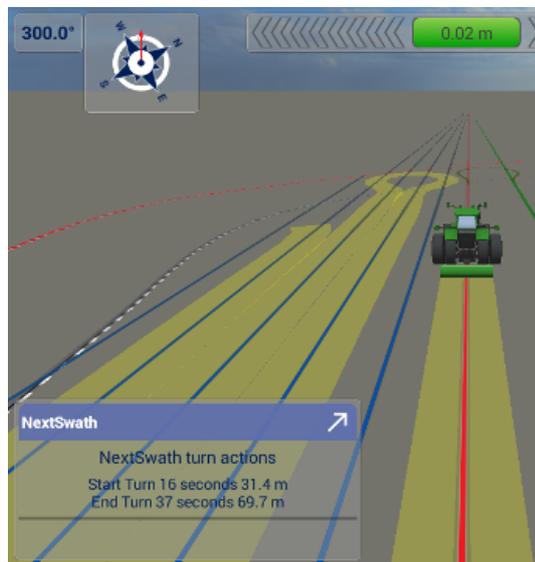
If the vehicle speed increases above the defined turn speed during the turn, you are given a two second warning to slow down. If no action is taken, the system disengages.

### *Setting the End-of-Row Point*

In order for the NextSwath technology to suggest automated end-of-row turns, the end-of-row point must be known. This point is determined by three methods in the following order:

1. Headland pattern infill line intersection with inner boundary. When a headland pattern is used, the intersection of the infill and the inner boundary sets the end-of-row point.
2. Productive area field boundary. If the field has a productive area boundary and the headland pattern is not in use, the end-of-row point is determined by the user-defined distance offset from the boundary along the swath or by the offset distance and clearance options selected. See Turn Location tab in [Configuring NextSwath](#).
3. A and B points for the line. If there is no boundary and a headland pattern is not in use, the A and B points of the line set the end-of-row point. These points adjust every time the Autopilot system is disengaged or when a manually-initiated automatic turn is performed. When this happens, all of the following will have the A or B point updated in accordance to the length of the swath that the vehicle is currently on:
  - The guidance line the vehicle is on.
  - The swath on either side of the guidance line that the vehicle is on.
  - The swath being turned to for an automatic turn will have the A or B point updated (if more than one swath is changed).

During the turn, the NextSwath widget shows the status of the turn. Start Turn and End Turn values are continuously updated based on your vehicle's speed.



### NextSwath Operating Tips

Before using the NextSwath technology, OnSwath settings must be properly set up and calibrated. Excessively aggressive OnSwath settings that function well for line acquisition may be too aggressive for the NextSwath technology due to the increased heading change in the maneuvers (up to 90° for line acquisition; generally 180° for the NextSwath technology).

For best results, it is recommended that you use field boundaries or headland patterns as this will make adjustments for the shape of the field.

For AB operation without boundaries, the turn location is based on the end-of-row points that are adjusted to the vehicle's current location by either disengaging or performing a manually-initiated automatic turn. When this happens, the length of the swath you are currently engaged on, the swaths to either side, and the swath being turned to for automatic turns (if different than the swaths adjacent to the current swath) are adjusted.

The smallest radius that the system will turn in is determined by the largest value of:

- Minimum turn radius setting
- Path size determined by OnSwath maximum nominal steering angle and maximum nominal slew rate adjusted by the speed aggressiveness for each.

To decrease a turn radius try the following:

**NOTE** – After adjusting the OnSwath Settings, make sure that line acquisition performance is still safe.

**NOTE** – Always verify that the smaller radius turn will not damage equipment.

1. Decrease the minimum turn radius.
2. Increase the OnSwath Steering Angle.
3. Increase the OnSwath Slew Rate.
4. Decrease the speed at which the turn is performed.

**NOTE** – The highest the OnSwath steering angle can be is 80% of the vehicle profile's maximum steering angle. If you set it higher than this value, the steering angle used to plan the turn will not increase.

**NOTE** – Different vehicle types may have different turn paths due to platform stability and capability.

When using boundaries, the adjustment of the boundary offset and TrueSwath offset is important to obtain a correct turn point location. This has to be determined empirically by experimentation.

When using boundaries that are not perpendicular to the general swath operation of the field, allow more space for the turns.

When using end rows, a boundary offset around the width of the end rows is a good starting point. For example, using three end rows with a 30 ft planter would use a boundary offset of 90 ft to start with.

When using a three-point/rigid mounted implement, setting the turn pattern to Turn Wide at End for rear-mounted implements and Turn Wide at Start for front-mounted implements is suggested for best results. Also, make sure to set the implement offset direction correctly.

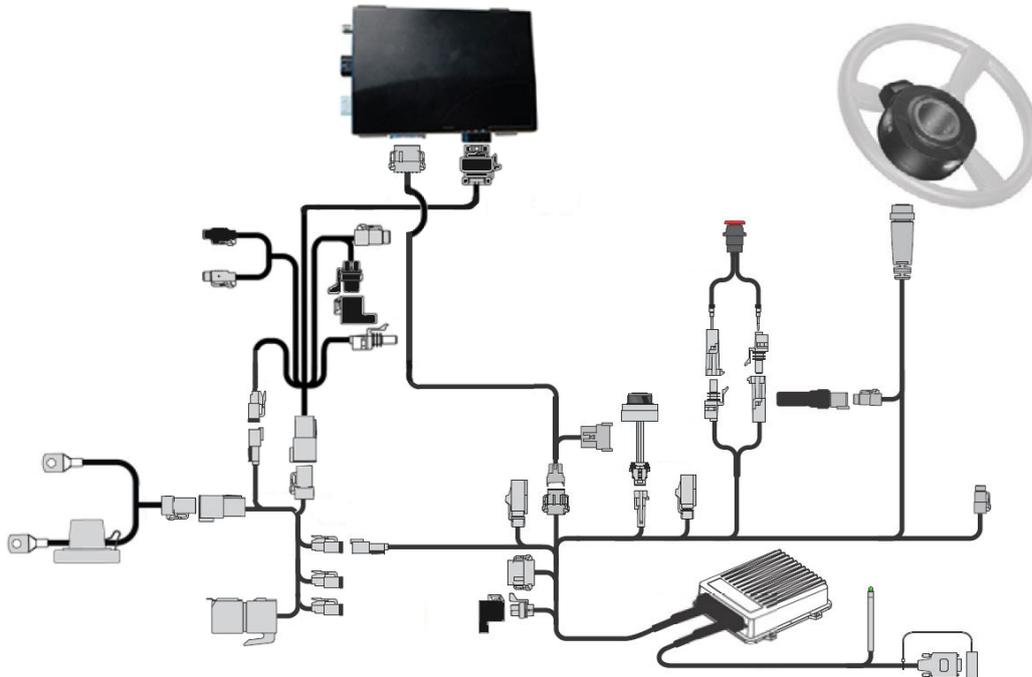
## Autopilot™ Motor Drive

Combining the accuracy of the NAV-III controller with the ease of installation of EZ pilot brings high levels of performance.

### Benefits

- Sub-inch accuracy inertias from the NAV-III Controller.
- Slow speed and reverse operation as opposed to EZ-Pilot.
- Eliminates the requirement for Autosense or a steering angle sensor.
- Autopilot performance without the requirement for hose installation or the need for special tools.
- Simple installation as found with EZ-Pilot.

## Installation



### AutoPilot Motor Drive Setup

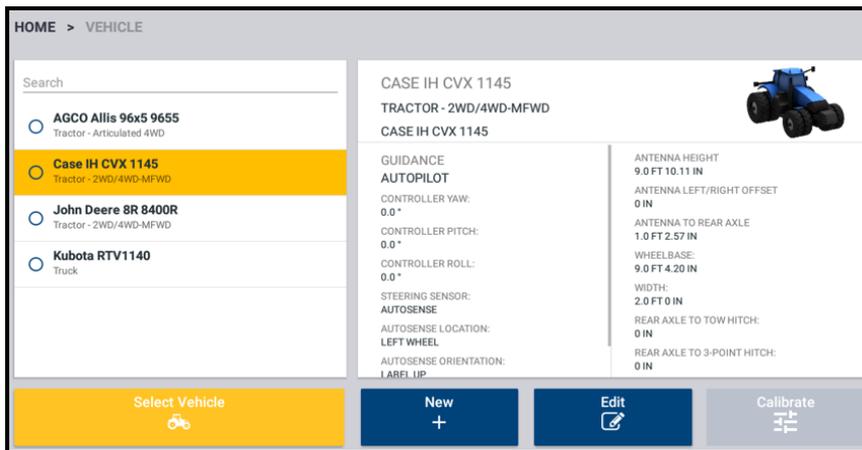
Setting up an AutoPilot motor drive system is done through the normal AutoPilot configuration screen to add a vehicle

**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. On the Home screen, tap the **Vehicle** icon:



The Vehicle setup panel displays:

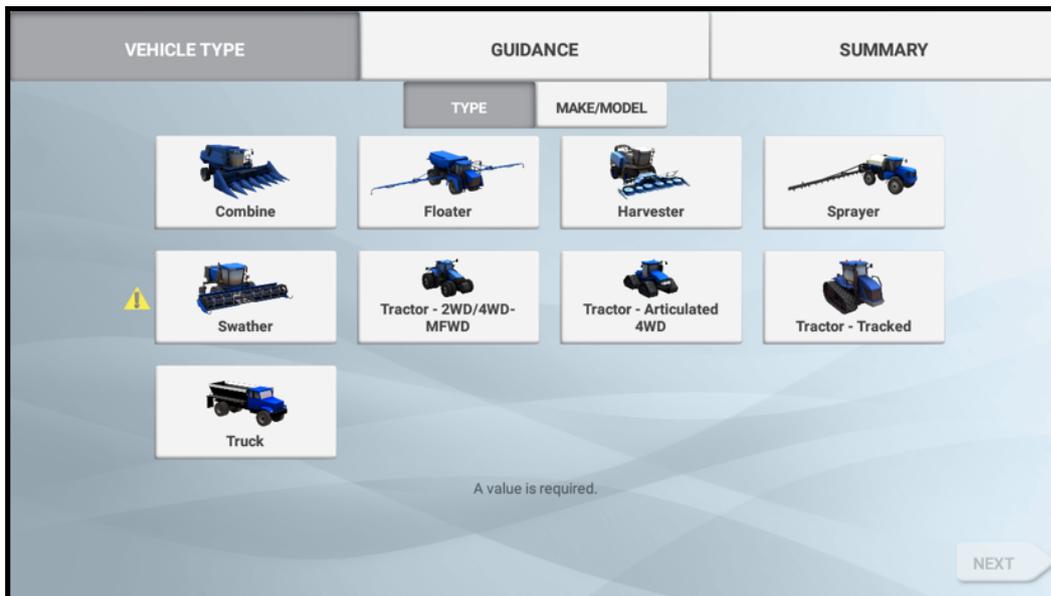


2. Tap New:



The Vehicle Setup wizard launches.

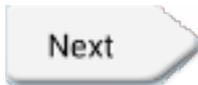
3. The first screen of the Vehicle Setup wizard prompts you to select a type of vehicle you expect to use in a field run:



Available vehicle types are:

- |           |                        |                           |
|-----------|------------------------|---------------------------|
| Combine   | Sprayer                | Tractor - Articulated 4WD |
| Floater   | Swather                | Tractor - Tracked         |
| Harvester | Tractor - 2WD/4WD-MFWD | Truck                     |

Tap the tile for vehicle you want to configure. Tap **Next** to continue with the vehicle setup:



4. Tap the type of vehicle to set up.
5. 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 Motor Drive are in the database.

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 options from the manufacturer (Examples: Super Steer, Non Super Steer, ILS, Non-ILS, or ISO CAN Ready)	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.

6. 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 correct serial number for the TM-200 Module attached to the Precision-IQ field application. When moving displays between vehicles, this is not automatically updated.
7. Once the vehicle model and series has been selected the Autopilot options will be shown:

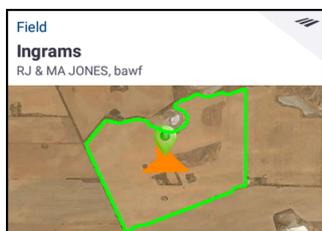
<b>Autopilot Platform</b>
Autopilot Motor Drive
Hydraulic

# Fields

- ▶ Field Basics
- ▶ Add a Field
- ▶ Edit a Field with Field Manager
- ▶ Delete a Field
- ▶ Select a Field

A *field* is an area of land on a farm where you perform a series of tasks. When you provide more information about a field, then Precision-IQ can generate detailed reports about the field, which are then used to efficiently manage the entire farm. The information you provide includes field boundaries, landmarks, materials applied, tasks performed, etc.

To get started with a field, tap the **Field** icon on the Home screen:



Once a field is created, you can use Field Manager to fine tune the profile information. On the Home screen activity bar, tap the Field Manager icon to begin:



## Field Basics

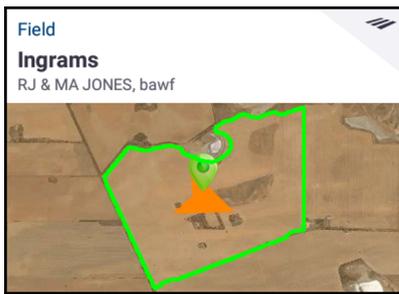
A field is an item you create that represents an area of land. A field can contain one or more boundaries (perimeters) or no boundaries. Information associated with each field includes:

- 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 client and farm names.

## Add a Field

Follow the steps below to add a field:

1. On the Home screen, tap the **Field** tile:



2. On the Field screen, tap **New**:



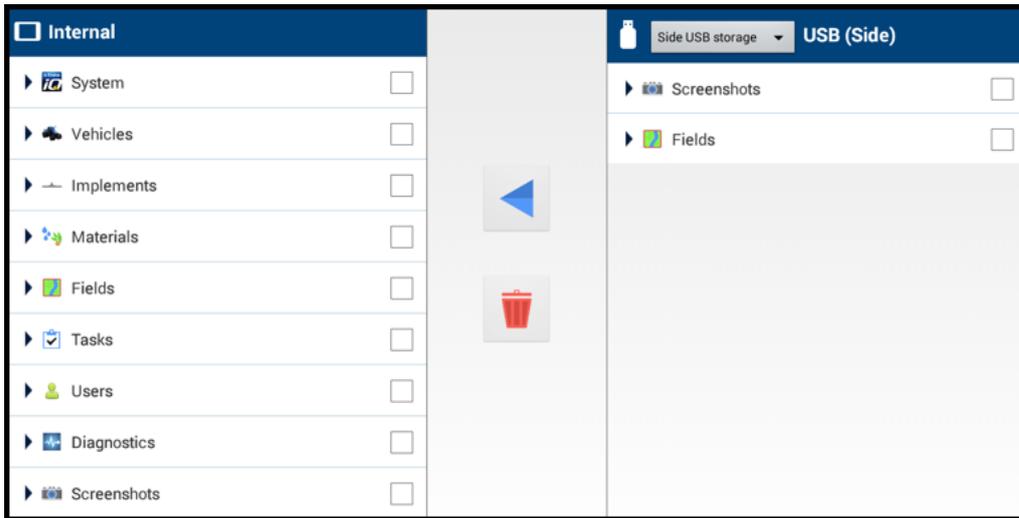
3. In the Create New Field pop-up window, enter a unique Field Name and tap **OK**. The new field is added to the list of fields and is selected.

Alternatively, you can transfer existing field data files directly to the display using a USB drive:

1. Insert a USB drive into the USB port of the display.
2. On the Home screen, tap **Data Transfer**:



The Data Transfer screen appears:



3. On the Data Transfer screen
  - a. The left side of the screen (labeled **Internal**) shows the data files currently available on the display.
  - b. The right side of the screen (labeled **USB**) shows the data files of the USB drive.
  - c. From the USB region, tap **Fields** to expand the menu and display all available fields.
  - d. Tap the select box for the Fields category to transfer all fields or tap the select box for each field to transfer individually. Then tap the left transfer icon in the center of the screen to complete the transfer:

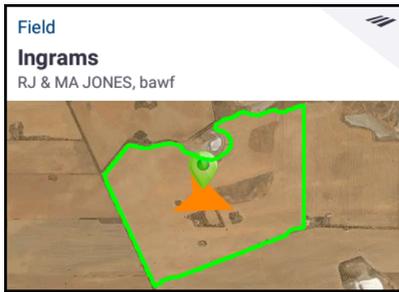


4. Tap the Android **Back** button to return to the Home screen.

## Edit a Field with Field Manager

Use Precision-IQ's Field Manager to edit and refine elements in and associated with each field. To access Field Manager:

1. On the Home screen, tap the **Field** tile:



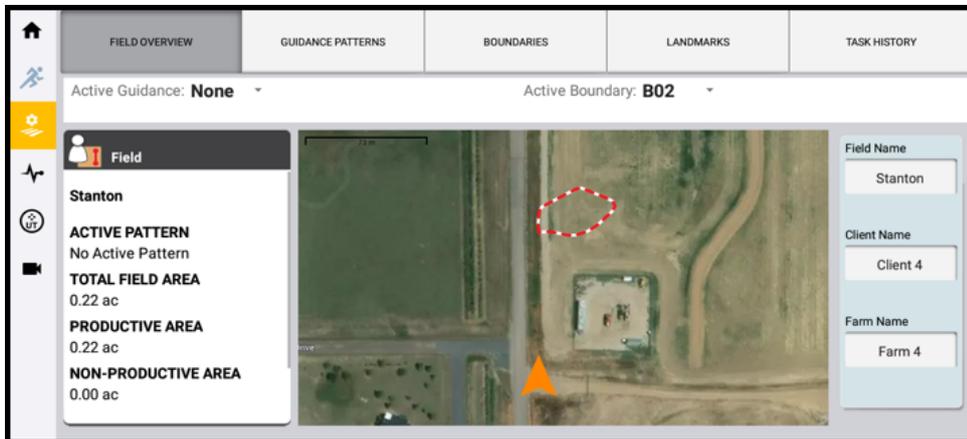
2. On the Field screen, [Select a Field](#).
3. With a field selected, tap **Manage**:



Alternatively, tap the **Field Manager** icon from the Activity bar:



The Field Manager's Field Overview screen displays by default:



The Field Overview screen provides:

- Overview details such as the total field area, total productive area, and total nonproductive area. See [Set Preferences for Precision-IQ and the Display](#) to set the display units.
- Map view, including relative vehicle and field location.
- Name details. Tap the fields to edit Field Name, Client Name, and Farm Name.

The Field Manager screen provides the following functionality:

- [Field Manager Guidance Patterns](#)
- [Field Manager Boundaries](#)
- [Field Manager Landmarks](#)
- [Field Manager Task History](#)

Tap the **Home** icon to return to the Home screen.

## Field Manager Guidance Patterns

On the Field Manager screen, tap **Guidance Patterns** for a view of guidance patterns that have been assigned the field.

The following buttons and icons are available:

Button or Entry Box	Tap to...
	<b>Deactivate</b> (black). Deactivate a line.
	<b>Activate</b> (red). Activate a line.
	<b>Deactivate Shape</b> (black). Deactivate a pattern (headland, boundary, pivot).
	<b>Activate Shape</b> (red). Activate a pattern (headland, boundary, pivot).
	<b>Pivot Adjust</b> . Adjust the radius of a pivot shape.
	<b>Resize Shape</b> . Resize a shape other than a pivot shape.
	<b>Line Shift</b> . Shift a line.
	Delete a selected line, pattern, or boundary.
<b>Name of Pattern</b>	Change the name of the line or pattern.

## Editing a Guidance Pattern with Field Manager

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



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

The pattern must be active before you can edit it. If the pattern is not active, tap **Activate** button (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.*

5. The application highlights the active pattern in blue on the map.
6. If you have chosen a headland, you can change the number of circuits in a headland.
7. Tap the **Resize** button to resize the pattern you have chosen:



Or for a pivot pattern, tap the Pivot button:



8. Edit the size of the pattern and tap the green check:



To cancel the change, tap the **Cancel** button:



## Shifting a Guidance Pattern with Field Manager

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



3. Tap **GUIDANCE PATTERNS**.
4. Tap the pattern you want to edit. If the selected pattern is active, tap the **Deactivate** (black) button to make it inactive:



If the selected pattern is not active, tap the **Activate** (red) button to make it active:

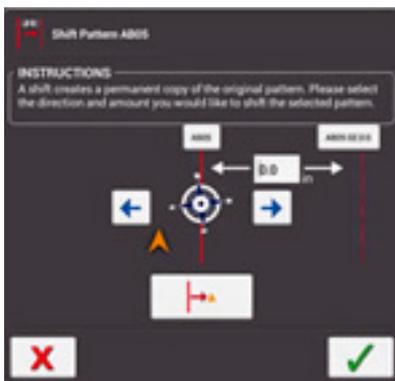


***NOTE** – If you activate a pattern that was created with a different implement width, the application will prompt you to shift the line for the new width or keep the original position.*

5. If you have chosen a headland, you can change the number of circuits in a headland.
6. Tap the **Shift** button:



The Shift Pattern tool displays.



7. Tap the left or right arrow to indicate the direction you want to shift the pattern.
8. Tap the **Shift Current Position** button to shift the pattern to the vehicle's current position, or you can enter the amount you want to shift the pattern:



9. Edit the size of the pattern and tap the green check:



To cancel the change, tap the **Cancel** button:



### *Activating and Deactivating a Guidance Pattern with 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 the **Field Manager** button in the Activity bar to open the Field Manager.



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 the Activate (red) button:

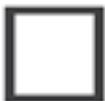


- An inactive guidance line, tap Activate Line (red) button:



5. To de-activate:

- An active pattern, tap the Deactivate (black) button:

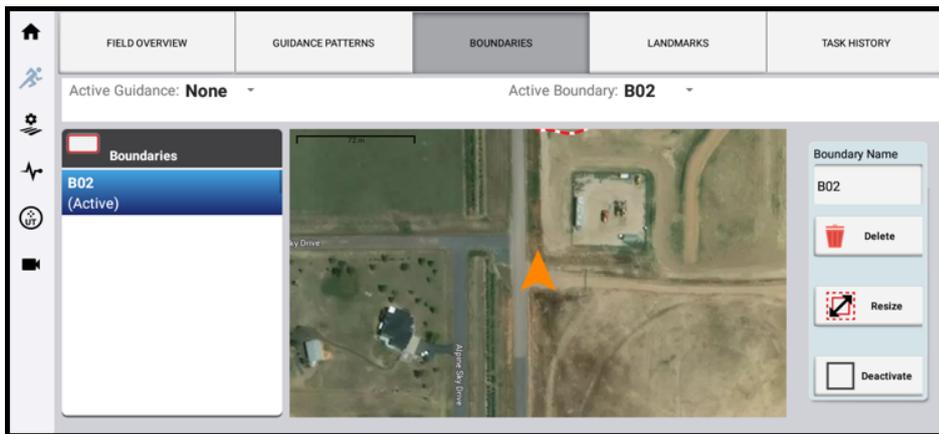


- An active guidance line, tap Deactivate Line (black) button:



## Field Manager Boundaries

On the Field Manager screen, tap **Boundaries** for a view of boundaries that have been assigned to the field:



On the left side of the screen, tap a boundary item to select it. Once selected, you can modify the boundary details:

**Boundary Name:** Tap in the Boundary Name field to edit the name of the boundary.

**Delete:** Tap the **Delete** button to delete the boundary.

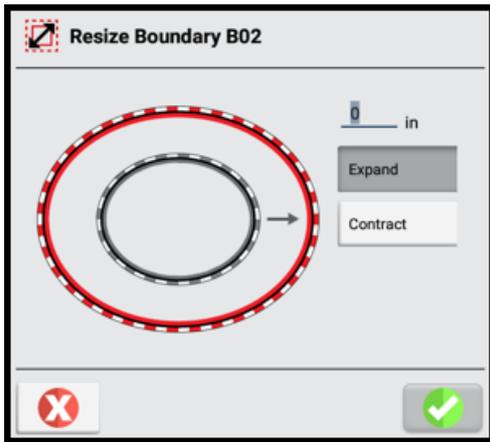
**NOTE** – This action cannot be undone.

**Resize:** To expand or contract the boundary:

1. Tap the Resize button:



2. Tap the text box and use the on-screen number pad to enter the distance to move the boundary:



To shift the boundary outward (making the area larger), tap **Expand**.

To shift the boundary inward (making the area smaller), tap **Contract** to shift the boundary inward (making the area smaller).

3. Tap the green check. The application saves a copy of the pattern with a new name at the new position.

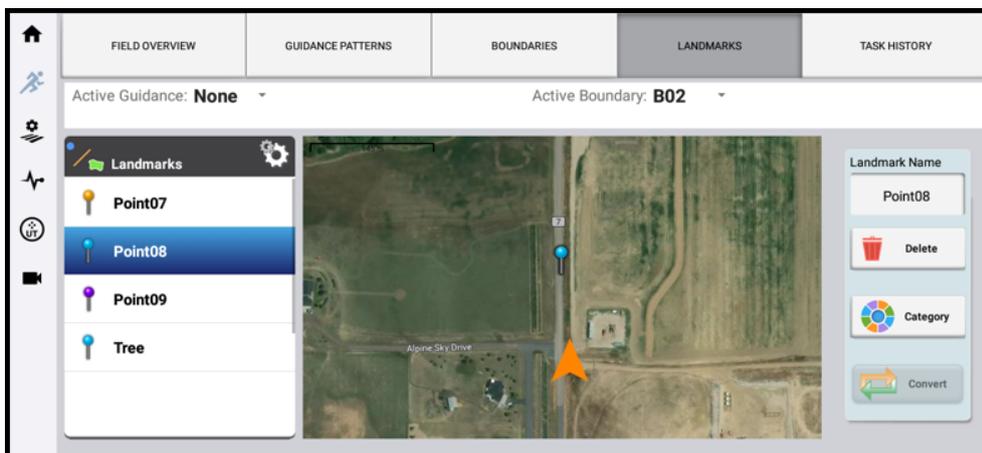
**Activate/Deactivate:** Once created, a boundary is active by default.

- Tap **Deactivate** to deactivate the boundary. The map will update to show the boundary with a black line.
- Tap **Activate** to activate the boundary. An active boundary shows on the map with a red line.

Tap the **Home** icon to return to the Home screen.

## Field Manager Landmarks

On the Field Manager screen, tap **Landmarks** for a view of landmarks that have been assigned to the field from the Run screen:



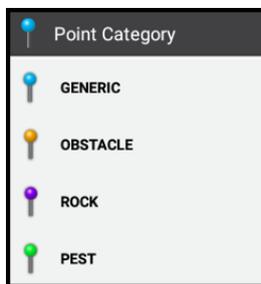
A landmark (such as a tree, rock, etc.) is set on the Run screen and appears as pin icon on the map. Use Field Manager to refine the information about the landmark. On the left side of the screen is a list of all landmark points assigned. Tap a landmark item to select it. On the right side of the screen, you can make the following modifications:

**Landmark Name:** Tap in the Landmark Name field to edit the name of the landmark. For example, you can change **Point08** to something more meaningful such as **Tree**.

**Delete:** Tap the **Delete** button to delete the landmark.

**NOTE** – This action cannot be undone.

**Category:** Precision-IQ includes some predefined, color-coded category types. Tap the **Category** button and choose from the following options from the pop-up Point Category window:

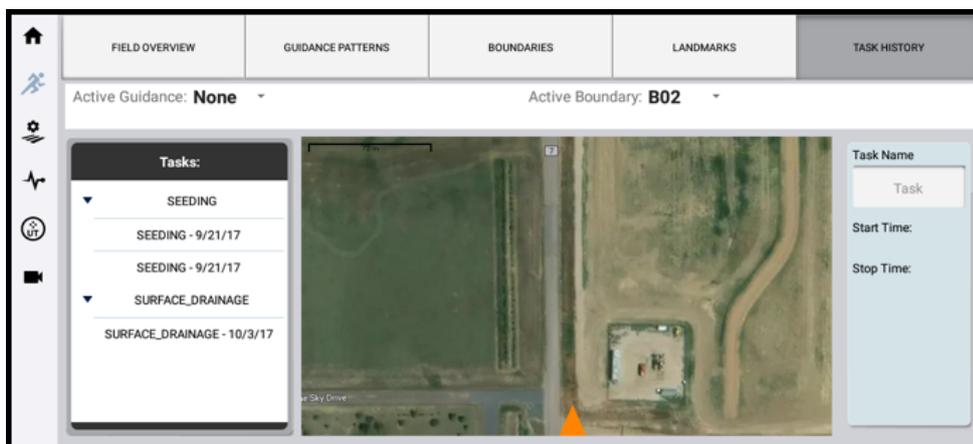


**Convert:** Tap the **Convert** button to toggle between identifying a productive area and a non-productive area.

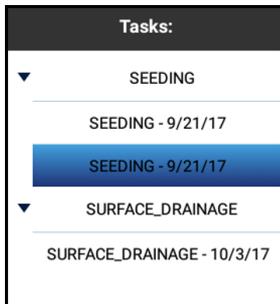


## Field Manager Task History

On the Field Manager screen, tap **Task History** for a view of tasks that have been performed on the field:



The left side of the screen shows all of the tasks that have been recorded for the selected field. Tap a task to expand the list:



Tap a task from the list to select it. Once selected, the Task Name on the right side of the screen updates to show the start and stop times recorded for the task:



If needed, you can tap in the Task Name field to edit it.

Tap **Home** to return to the Home screen.

## Change the Infill Pattern

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

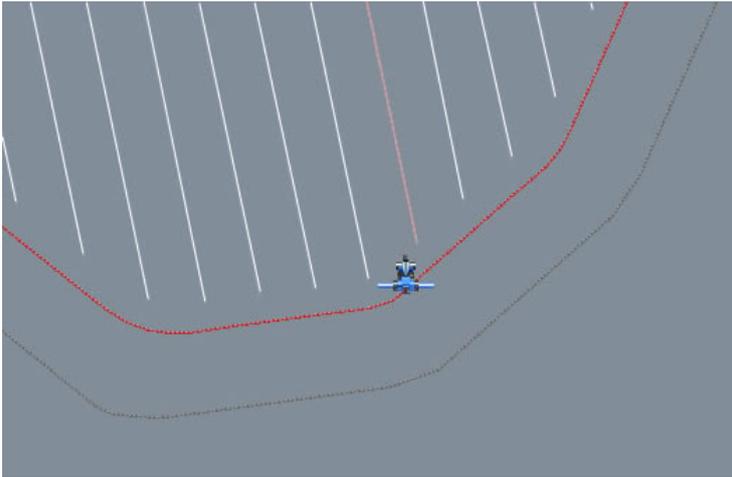
- To create a new infill pattern to change to, go to step 3
  - At the Run screen, create a new guidance line to use as the infill pattern. See [Guidance Patterns: AB Line](#) or [Guidance Patterns: A+ Line](#).

**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.

To edit an existing infill pattern you want to change to:

- Tap the Field Manager button in the Activity bar to open Field Manager:





**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.

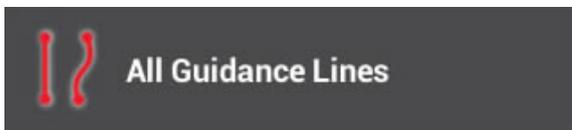
2. At the Guidance Patterns tab:
  - a. Highlight the headland circuit pattern you want to work with and tap **Activate**. (This is not necessary if you want to change to an existing line and did not need to create a new one in step 3.)
  - b. Tap **Infill**. The Infill Selection list displays. This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



- c. Tap the **Settings** icon:



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



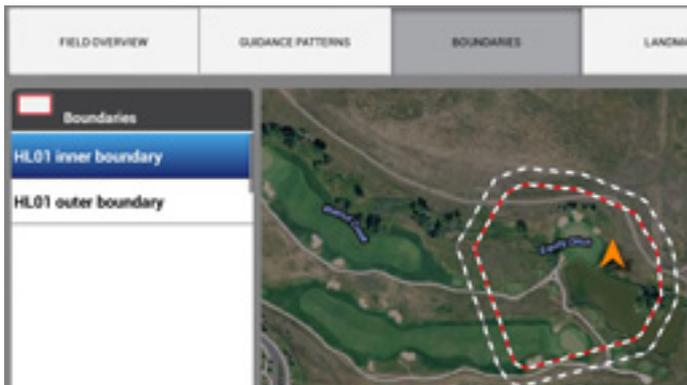
- d. Tap to highlight the guidance lines you want to associate with the headland (including the new guidance line you created above).

Tap the green check:



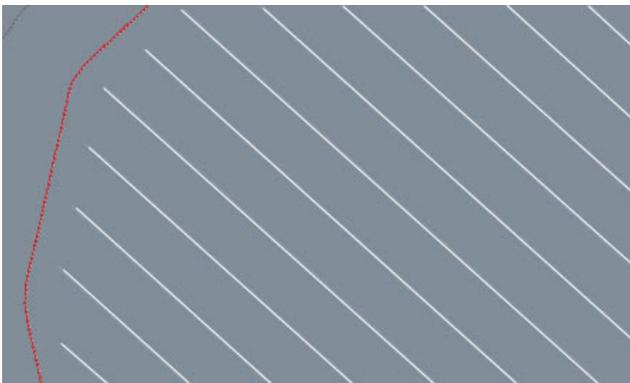
The Infill Selection list displays again.

- e. At the Infill Selection list, highlight the guidance line you want to change to and tap the green check. This assigns the guidance line to the headland.
3. Tap **Boundaries**. In the Boundaries list on the left-hand side, tap the inner boundary of the headland, then tap **Activate**.



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

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



## Shift the Infill Pattern

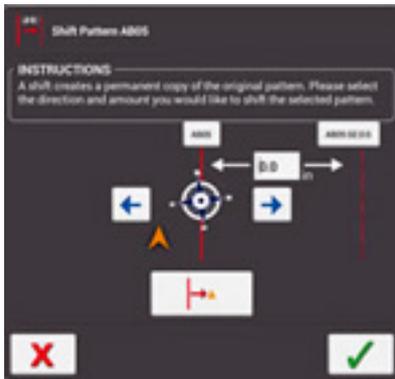
To shift the infill pattern, complete the following steps:

1. Tap the **Field Manager** button on the Activity bar:



2. On the Field Manager screen, 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 the green check to save the shift:



The shifted pattern is saved with a new name.

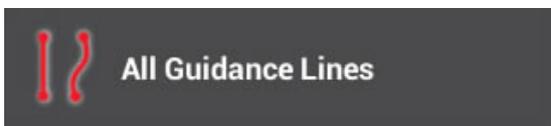
8. Tap the headland circuit pattern to select it, and tap **Activate**.
9. Tap **Infill**. The Infill Selection list displays.



10. Tap the Settings icon:



The All Guidance Lines list displays.



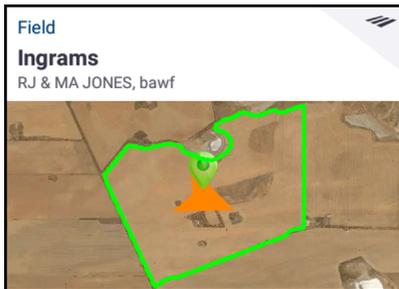
11. Tap to highlight all the infill patterns (including the shifted pattern you just created) you want to associate with the headland pattern you activated.
12. Tap the green check. The Infill Selection list displays again.
13. Highlight the shifted swath and tap the green check.
14. The shifted infill is now activated along with the headland swath.
15. Tap **Boundaries**. Activate the inner headlands boundary.

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

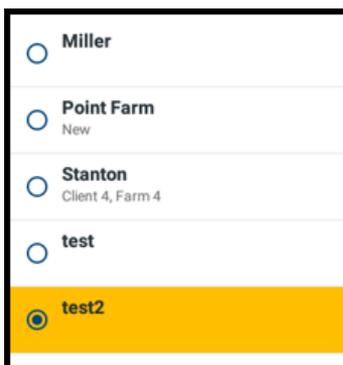
## Delete a Field

Follow the steps below to delete a field:

1. On the Home screen, tap the **Field** tile:



2. On the Field screen, tap the field you want to delete to select it:



3. With the field selected, tap **Delete**:



4. On the Delete File confirmation pop-up, tap **OK**.
5. The Field screen updates with the field deleted. After the deletion, no field will be selected. Tap a different field to select it or [Add a Field](#).
6. Tap **Home** to return to the Home screen.

## 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 Using a Map Point.
- Select a Field from the Field List.
- Select a Field from a Field Search.

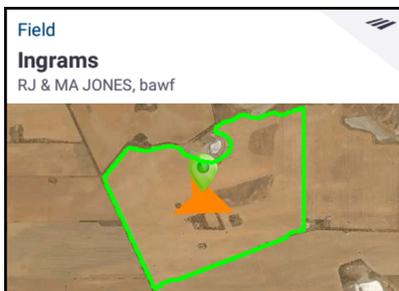
## Select a Field Using a Map Point

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

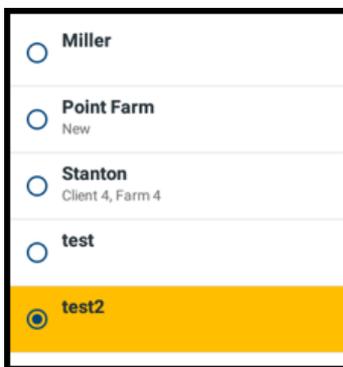
## Select a Field from the Field List

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

1. On the Home screen, tap the **Field** tile:



2. On the Field screen, tap a field name to select it:



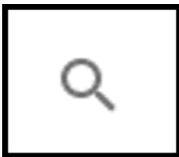
3. Tap **Home** to return to the Home screen.

## Select a Field from a Field Search

1. On the Home screen, tap the **Field** tile:



2. On the Field screen, tap the search icon above the list of fields:

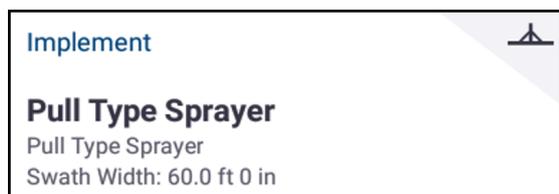


3. Using the Android on-screen keyboard, type part of the field name. Then tap the name of the field to select it.
4. Tap **Home** to return to the Home screen.

# Implements

- ▶ Overview of Implement Setup
- ▶ Taking Implement Measurements
- ▶ Application Control Settings
- ▶ Add a Field-IQ Basic Implement
- ▶ Add an ISOBUS Implement
- ▶ Edit an ISOBUS Implement
- ▶ Add a Trimble Universal Variable Rate (TUVR) Protocol Implement
- ▶ Edit a TUVR Implement
- ▶ Add a Custom-Setup Implement
- ▶ Implement Summary: Review and Save
- ▶ Select an Implement
- ▶ Edit an Implement
- ▶ Delete an Implement
- ▶ Application Control
- ▶ Section Control

On the Implements screen, you can add, edit, and delete an implement as well as calibrate one for application or section control. From the Home screen, tap the **Implement** tile to get started:



For details about using Field-IQ, see [Field-IQ Basic Rate and Section Control System](#).

## Overview of 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, you must first set up a vehicle. See [Add a Vehicle](#).

## Taking Implement Measurements

This section describes how to take measurements for your implement. This information is used to complete an implement's profile as shown in [Add a Field-IQ Basic Implement](#).

Before you take measurements:

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

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

1. Tap the button for each measurement.
2. Use the on-screen number pad to edit the measurements for:
  - [Pull-Type Implements](#)
  - [Self-Propelled Equipment](#)

### Pull-Type Implements

Measurement	Instructions
Hitch Type	Select how the implement connects to the vehicle: <ul style="list-style-type: none"> <li>• Drawbar</li> <li>• Fixed mount</li> </ul>
Application Width	Measure the width of the area where the implement applies material (working width). The application calculates swath spacing using the <i>Application Width</i> and <i>Overlap/Skip</i> settings.
Hitch to Application Point	Measure the distance from the hitch pin to the boom, toolbar, and so on. <i>NOTE – If you are using the Field-IQ system's Section or Rate Control and the material is applied at a different point, you must enter an offset measurement on the material control channel.</i>
Hitch to Ground	Measure the distance from the hitch pin to the point where the implement makes contact with the ground. This is the point that the

## Measurement Instructions

Contact Point	implement rotates about.
Left/Right Offset	<p>Measure from the center of the vehicle to the center of the implement. Select <i>Left</i> or <i>Right</i> to indicate the direction the implement is offset, when looking at the vehicle from behind.</p> <p>This measurement adjusts the tractor's path so that the implement is centered on the line.</p>
Overlap/Skip	<p>Set the amount of overlap or skip between swaths:</p> <ul style="list-style-type: none"> <li>• Set <b>Overlap</b> to intentionally overlay the edges of each swath by this amount.</li> <li>• Set <b>Skip</b> to intentionally add this amount of space between swaths.</li> </ul>
Swath Width	The application calculates swath width using the <i>Application Width</i> and <i>Overlap/Skip</i> . To change <i>Swath Width</i> , edit the <i>Application Width</i> or <i>Overlap/Skip</i> .

## Self-Propelled Equipment

### Measurement Instructions

Application Width	Measure the width of the area where the implement applies material. The display calculates swath spacing using the <i>Application Width</i> and <i>Overlap/Skip</i> settings.
Rear Axle to Application Point	Measure the distance from the rear axle to the point where the implement applies material.
Left/Right Offset	<p>Measure from the center of the vehicle to the center of the implement. Select <b>Left</b> or <b>Right</b> to indicate the direction the implement is offset, when looking at the vehicle from behind.</p> <p>This measurement adjusts the tractor's path so that the implement is centered on the line.</p>
Overlap/Skip	<p>Set the amount of overlap or skip between swaths:</p> <ul style="list-style-type: none"> <li>• Set <i>Overlap</i> to intentionally overlay the edges of each swath by this amount.</li> <li>• Set <i>Skip</i> to intentionally add this amount of space between swaths.</li> </ul>
Swath Width	The application calculates swath width using the <i>Application Width</i> and

## Measurement Instructions

*Overlap/Skip.* To change *Swath Width*, edit the *Application Width* or *Overlap/Skip*.

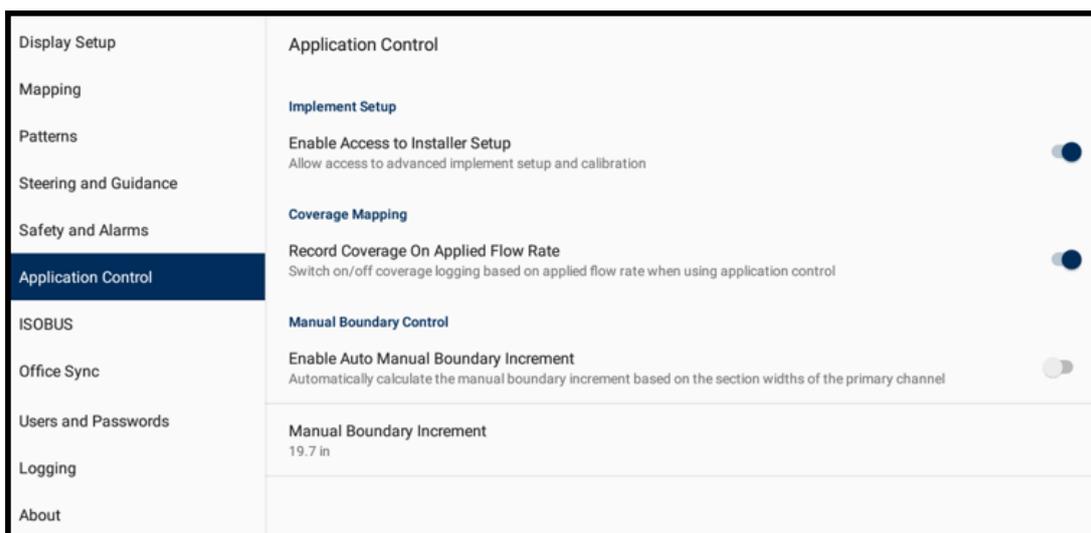
## Application Control Settings

For implements that include [Application Control](#) functionality, update the preference settings in Precision-IQ to enable access to the Application Control feature for ISOBUS, Trimble Universal Variable Rate (TUVR), Field-IQ, and multiproduct implements:

1. From the Home screen, tap **Settings**:



2. On the Settings screen, tap **Application Control**:



Tap the **ON/OFF** switch to enable or disable the Application Control options as described below.

3. **Implement Setup - Enable Access to Installer Setup.** Enable this option to allow access to advanced implement setup and calibration. When disabled, the implement setup will limit access to many of the implement configuration parameters.

**NOTE** – This setting only needs to be enabled when editing a previously configured implement.

4. **Coverage Mapping - Record Coverage on Applied Flow Rate.** When enabled, coverage logging will not begin until the section(s) are open and the *as applied* rate value is

greater than **0.0 (>0.0)**. When disabled, coverage logging will start or stop strictly based on whether the sections are opened or closed.

#### 5. Manual Boundary Control.

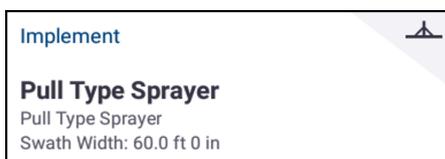
- **Enable Auto Manual Boundary Increment.** When enabled, each tap of the Manual Boundary left/right arrow buttons will cause the boundary to snap to the next section based on the section width. This feature is useful when section widths of a boom are not uniform.
- **Manual Boundary Increment.** If the Enable Auto Manual Boundary Increment setting is not enabled, then each tap of the Manual Boundary left/right arrow buttons will cause the boundary to snap to the user-defined width.

6. Tap **Home** to return to the Home screen.

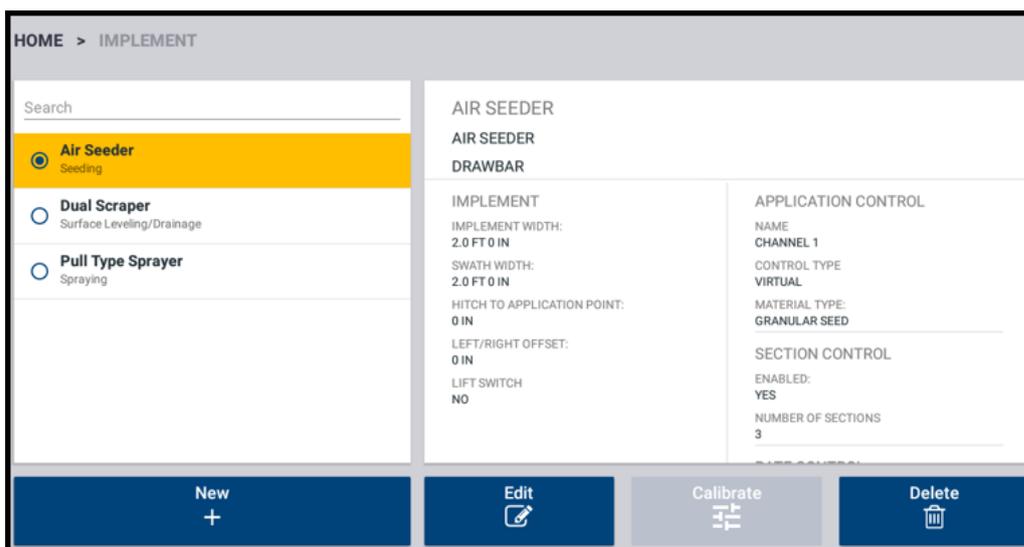
## Add a Field-IQ Basic Implement

Follow the steps below to add a Field-IQ basic implement:

1. Take accurate measurements of your implement as described in [Taking Implement Measurements](#).
2. From the Home screen, tap the **Implement** tile:



3. The Implement screen displays:



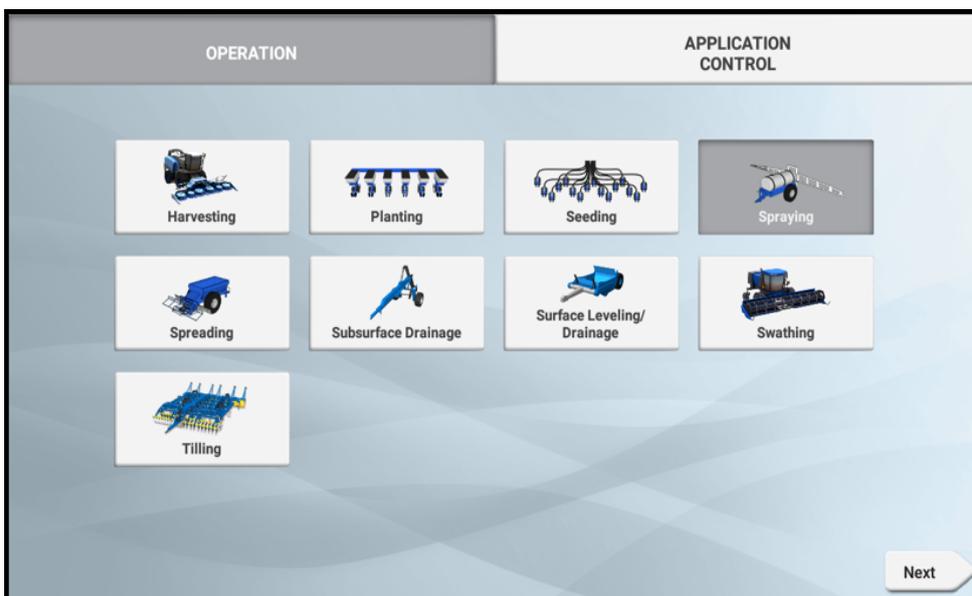
This screen shows a list of available implements. Tap an implement to view details about the selected implement.

4. Tap **New**:



The Implement Setup wizard launches.

5. The first screen of the Implement Setup wizard prompts you to select a type of operation you expect your implement to perform:



Available operations for your implement are:

- |            |                     |                           |
|------------|---------------------|---------------------------|
| Harvesting | Spraying            | Surface Leveling/Drainage |
| Planting   | Spreading           | Swathing                  |
| Seeding    | Subsurface Drainage | Tilling                   |

Tap the tile for the operation that applies for your implement. Tap **Next** to continue with the implement setup:



Depending on the operation you select for your implement, the Implement Setup wizard will step you through the details to configure the implement's profile. As you complete each step, tap **Next** to continue to the next one.

**NOTE** – Once your implement is set up, you can return to the *Implement Setup wizard* to make any changes. See [Edit an Implement](#) for details.

6. **Implement:** The first set is to provide implement type and measurement details. See [Taking Implement Measurements](#) for details about each data point. Tap **Next** to continue.

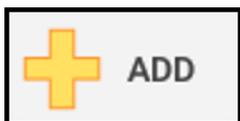
7. **Application Control:** For implements to be used to apply a material (such as seed, fertilizer, etc.), then details about the application control will need to be set:

**NOTE** – If your implement does not support *Application Control*, then this option will not appear.

- a. On the Application Control screen, tap the on/off slider to enable Application Control:



- b. By default, one application control channel is enabled. If your implement supports more than one channel, then tap **Add** to add another channel:



Adding additional channels only applies to custom implements until MEMP. See [Add a Custom-Setup Implement](#).

- c. See [Application Control Calibration](#) for details about the various Application Control settings.

Tap **Next** to continue.

8. **Inputs:** Depending on your implement, enter the following information:

- **Auxillary Master Switch.** The auxillary master switch must always be connected via the "primary" module. When enabled, the external master is used to start/stop the rate control drive calibration. The soft master button will not appear on the calibration screen when enabled. When enabled, the external master must be ON to operate the system. It is used in conjunction with the section master on the run-screen.
- **Pressure Sensors.** These can only be connected via one of the two analog sensor inputs on the "primary" module. Secondary modules will be ignored. To configure the pressure sensors:

- a. Select the sensor type.
  - b. Select the input it is connected to. Sensors are calibrated via the calibration screens.
- **Implement Lift.** The implement lift switch input must always be connected to the “primary” module. Specify whether the lift switch working state is *active high* (open circuit) or *active low* (closed circuit).

Tap **Next** to continue.

9. **NextSwath:** The NextSwath feature is used to automatically turn the vehicle at the end of a straight line guidance pattern to align with the next selected swath. See [Implement Setup for NextSwath](#) for details.

***NOTE** – If your implement does not support NextSwath, then this option will not appear.*

Tap **Next** to continue.

10. **Summary:** On the Summary screen, review the details about the implement:

IMPLEMENT	APPLICATION CONTROL	INPUTS	NEXTSWATH	SUMMARY												
<table border="1"> <thead> <tr> <th>Category</th> <th colspan="3">Result</th> </tr> </thead> <tbody> <tr> <td>Implement</td> <td>Name: Air Seeder Type: Air Seeder Hitch Type: Drawbar</td> <td>Implement Width: 2.0 ft 0 in Swath Width: 2.0 ft 0 in Hitch to Application Point: 0 in</td> <td>Left/Right Offset: 0 in</td> </tr> <tr> <td>Application Control</td> <td>Channel 1: CHANNEL 1</td> <td>Control Type: Virtual Rate Control</td> <td>Material Type: Granular Seed</td> </tr> </tbody> </table>		Category	Result			Implement	Name: Air Seeder Type: Air Seeder Hitch Type: Drawbar	Implement Width: 2.0 ft 0 in Swath Width: 2.0 ft 0 in Hitch to Application Point: 0 in	Left/Right Offset: 0 in	Application Control	Channel 1: CHANNEL 1	Control Type: Virtual Rate Control	Material Type: Granular Seed			
Category	Result															
Implement	Name: Air Seeder Type: Air Seeder Hitch Type: Drawbar	Implement Width: 2.0 ft 0 in Swath Width: 2.0 ft 0 in Hitch to Application Point: 0 in	Left/Right Offset: 0 in													
Application Control	Channel 1: CHANNEL 1	Control Type: Virtual Rate Control	Material Type: Granular Seed													

11. Tap **Save** to complete the process and exit the Implement Setup wizard:



## Add an ISOBUS Implement

- 🔒 This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

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 Precision-IQ application to control an ISO-certified implement without an additional display.

- With Precision-IQ, using task controller functionality (an optional feature)
  - With Universal Terminal, an on-screen window that opens on the Precision-IQ application to access directly the functions provided by the electronic control units (ECUs).
1. Unlock Task Controller. See [Upgrade or Apply a License for a New Feature](#).
  2. Turn on the Task Controller feature as described in [ISOBUS Settings](#) below.
  3. Ensure that ISO UT and/ or ISO Task Controller (TC) are enabled. These settings are found in the Precision-IQ settings.
  4. ECU Settings should be verified via the UT before creating implement in Precision-IQ.
  5. Connect the display to the ISO-certified implement with ISO cabling.
  6. Set up the GNSS receiver to send the required speed messages to the implement. (Refer to the ECU ISO manual for the required speed messages.) See [CAN Messaging](#).

Prior to setting up the ISOBUS implement and Precision-IQ for task controller functionality:

**NOTE** – You must have unlocked and activated the ISOBUS Task Controller feature to set up an implement for ISOBUS. See [Upgrade or Apply a License for a New Feature](#) and [ISOBUS Settings](#).

## ISOBUS Settings

From the Home screen, tap the **Settings** button. Then on the Settings screen, tap **ISOBUS** to configure the following settings:

Information	Tap to view...
Enable Universal Terminal	To use Universal Terminal when using ISO-certified equipment, tap <b>OFF</b> to <b>ON</b> to activate this feature.
Enable Task Controller Support	<b>NOTE</b> – This feature is optional and requires an unlock. See <a href="#">Upgrade or Apply a License for a New Feature</a> . To use Task Controller for automatic section control when using ISO-certified equipment, tap <b>OFF</b> to <b>ON</b> to activate this feature. Task Controller is used for rate and section control.
Enable Automatic ISO Configuration Updates	Enable this setting to automatically update the implement configuration when changes are made to the ISOBUS ECU via the Universal Terminal.

## Supported ISO Configurations

- Single ECU capable of controlling multiple products.
- GFX-750/XCN-1050 display up to 2 channels:
  - One material/ rate per channel.
  - 256 sections per channel.

Application channels must be stacked front to rear.

## ISOBUS Equipment Setup

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

1. Make sure the ISO-certified implement is connected and Universal Terminal is turned on in [ISOBUS Settings](#) above.
2. On the activity bar, tap the **Universal Terminal** (UT) icon:



3. Follow the instructions for the equipment you are using to set the implement for using Task Controller/automatic section or rate control.

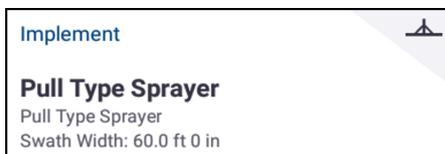
See also:

- [Section Control for ISOBUS or Serial Rate](#)
- [Rate Control](#)

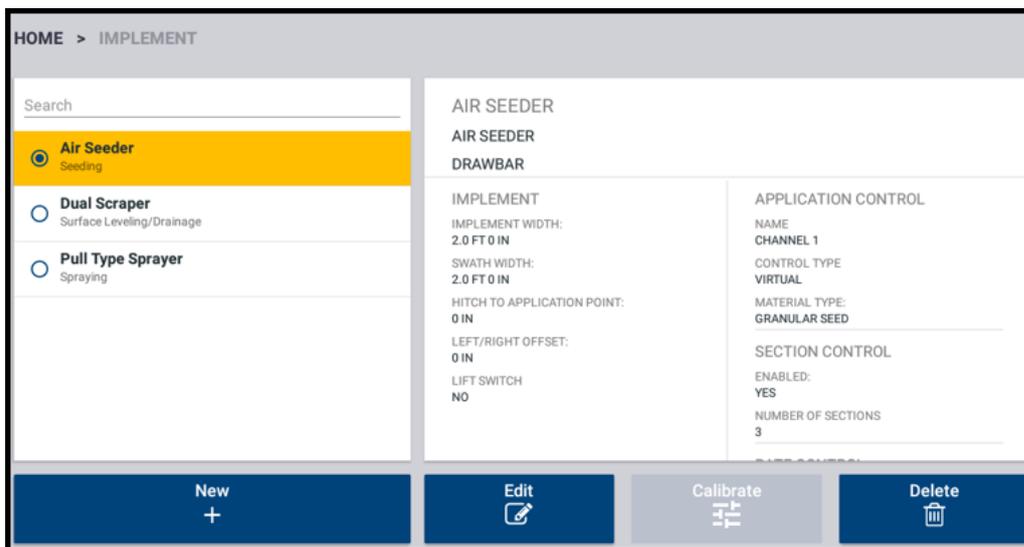
## ISOBUS Implement Setup Steps

Follow the steps below to add and set up an ISOBUS implement:

1. From the Home screen, tap the **Implement** tile:



The Implement screen displays:



This screen shows a list of available implements. Tap an implement to view details about the selected implement.

Tap **New**:

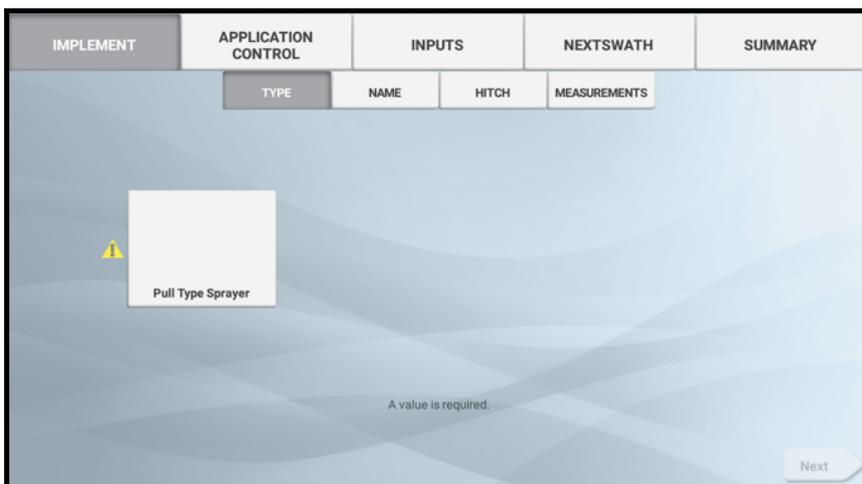


The Implement Setup wizard launches.

2. Tap an operation to select it.
3. Tap **Application Control Type**.
4. Tap **ISOBUS**. The system retrieves the information from all connected ECUs and lists them.
5. Tap **Select ISOBUS ECU**. The system displays a list of the ECUs available.
6. Tap the ECU you want to set up.
7. Tap the **Save** icon:



The system begins communicating with the ECU to collect information. When data transfer is complete, the Implement Type selection screen will be shown, for example:

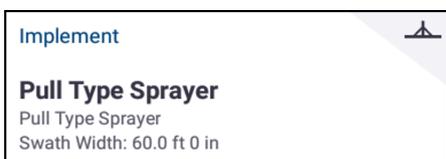


8. After you save the information you have added, the system will begin communicating again with the ECU. When the configuration is complete, the system displays a message that the device is now ready to use.

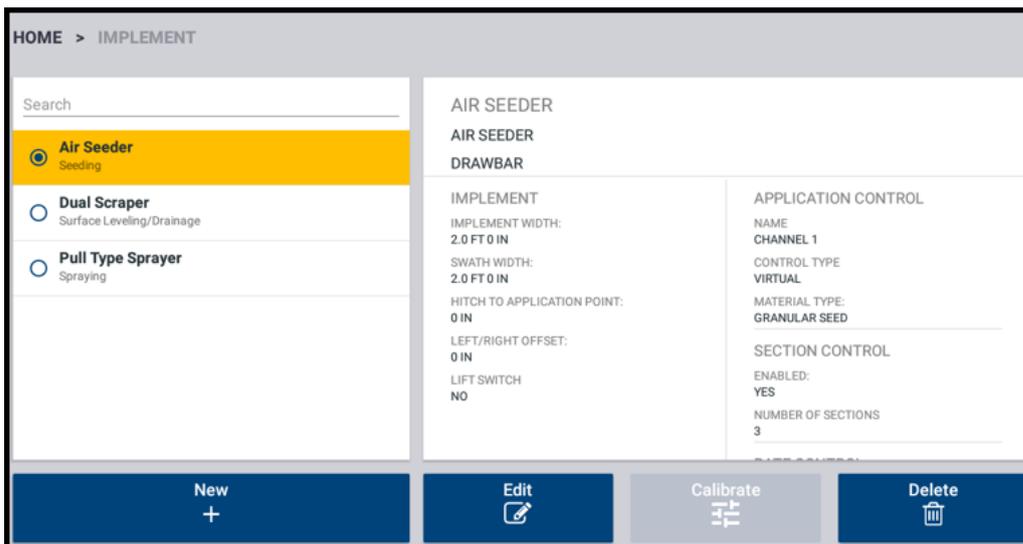
## Edit an ISOBUS Implement

Follow the steps below to edit an ISOBUS implement:

1. From the Home screen, tap the **Implement** tile:



The Implement screen displays:



This screen shows a list of available implements. Tap an ISO implement to view details about the selected implement.

Tap **Edit**:



The *Summary* screen displays, showing the information obtained from the ECU.

- Any incomplete information shows red error text. Complete the settings listed in the following table for each tab and section as needed:

**NOTE** – Where the settings are provided by the ECU, they will not be editable from Precision-IQ while the *Enable Automatic ISO Configuration Updates* setting is enabled (for example, on/off valve latencies).

Tab / Section	Description
OPERATION	The system chooses the operation based on information from the ECU.
IMPLEMENT / TYPE	Choose the type of implement you are setting up.
NAME	The system enters a name that you can edit if you wish.
MEASUREMENTS	The ECU sends some measurements to the system. Enter any missing measurements.
APPLICATION CONTROL	The system creates an application channel from information sent by the ECU. To edit channel information, press and hold the channel name and then tap <b>Modify</b> .
APPLICATION CONTROL CHANNEL / TYPE	<ul style="list-style-type: none"> <li>Name: To edit the name, tap in the entry box.</li> <li>Control Type: This information is sent from the ECU, so there is no need to edit it.</li> <li>ISO Implement Data: This information is sent from the ECU, so there is no need to edit it.</li> <li>Material Type: Choose the type of material.</li> </ul>
APPLICATION CONTROL CHANNEL / SETTINGS	<p><b>NOTE</b> – The number of sections is not editable while the <i>Enable Automatic ISO Configuration Updates</i> setting is enabled.</p> <ul style="list-style-type: none"> <li>Rate Control: Tap  to toggle rate control on or off.</li> </ul>

Tab / Section	Description
	<ul style="list-style-type: none"> <li>Rate Snapping: Tap  to toggle on or off. <i>NOTE – The flow will fluctuate due to pump/valve constraints. Enable this option for a steadier reading of the applied rate. This option is available if Rate Control is on.</i></li> <li>Section Control: Tap  to toggle section control on or off. This option is available if Section Control is on.</li> <li>Number of Sections: The ECU has sent the system the number of sections. This option is available if Section Control is on.</li> </ul>
APPLICATION CONTROL CHANNEL / CHANNEL WIDTH	The ECU has sent the system the width of each section.
APPLICATION CONTROL CHANNEL / LATENCIES	<ul style="list-style-type: none"> <li>On Latency: The number of seconds it takes for the system to turn on and begin applying. This accounts for hardware delays such as the time it takes for a valve to open.</li> <li>Off Latency: The number of seconds it takes for the system to turn off.</li> <li>Apply On Latency to Boundary: Tap  to toggle on or off. When on, compensates for hardware delays. On = The system determines when to switch on so that application can begin as soon as the boundary is crossed. Off = The system switches on when the boundary is reached. Any mechanical delay could leave a gap between the boundary and where the product is applied.</li> <li>Sections Off When Stopped: Tap  to toggle on or off. On = Sections close when you are not moving. Off = Sections stay on/open, even you are not moving.</li> </ul>
APPLICATION CONTROL	<ul style="list-style-type: none"> <li>Start (<b>on</b>) Overlap: The distance of intentional overlap</li> </ul>

Tab / Section	Description
L CHANNEL / OVERLAPS	<p>when you exit a previously applied area. The higher the number, the greater the overlapped area.</p> <ul style="list-style-type: none"> <li>• End (<i>off</i>) Overlap: The distance of intentional swath overlap when you enter a previously applied area. The higher the number, the greater the overlapped area.</li> <li>• Coverage Switching Overlap: The percentage of the section width for intentional overlap of a swath. The higher the number, the greater the overlapped area before the section is turned off.</li> <li>• Boundary Switching Overlap: The percentage of the section width for intentional overlap of a boundary. The higher the number, the greater the overlapped area before the section is turned off.</li> </ul>
SUMMARY	<p>When you are finished with your edits, tap the <b>Save</b> icon to save all information:</p> 

3. After you save the information you have added or edited, the system will begin communicating again with the ECU. When the configuration is complete, the system displays a message that the device is now ready to use.

## Add a Trimble Universal Variable Rate (TUV) Protocol Implement

 This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

Precision-IQ supports these rate controllers for automatic rate and section control using serial communication. For specific capabilities on each model, please see its respective documentation.

Prior to setting up the implement and Precision-IQ for Task Controller:

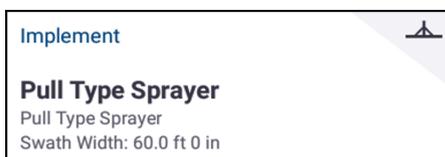
1. Connect the display using the serial connection on the back of the display.
2. Set up the GNSS receiver to send messages to the implement. Generally, radar is sent to these controllers.

**NOTE** – To set up and use any of these implements, you must have purchased and unlocked the variable rate control feature. See [Upgrade or Apply a License for a New Feature](#).

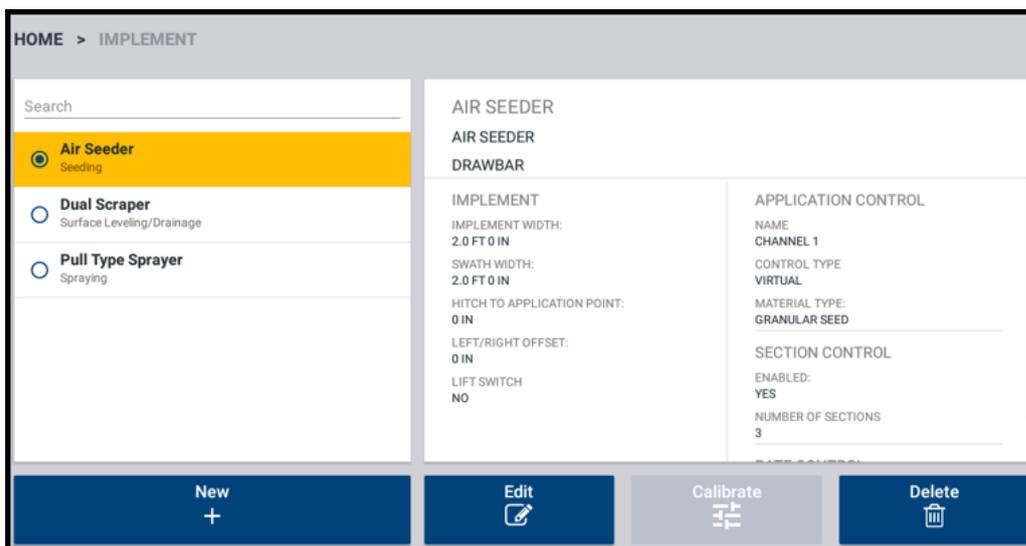
Manufacturer	Supported Models
Berthoud	EC Tronic
Hardi / Evrard	Regulor 6
Kuhn / Blanchard	REB
Rauch / Kuhn	Quantron A, Quantron E2
Sulky	Vision
Vaderstad	Control Station (with and without remote control)

Follow the steps below to add and set up a serial variable rate implement:

1. From the Home screen, tap the **Implement** tile:



The Implement screen displays:



This screen shows a list of available implements. Tap an implement to view details about the selected implement.

Tap **New**:

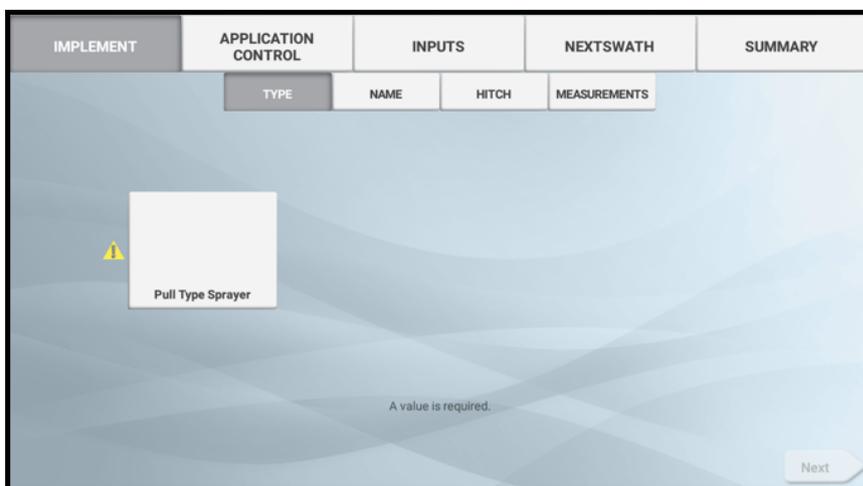


The Implement Setup wizard launches.

2. Tap **Trimble Serial VR**. The system uses the Trimble Serial Variable Rate protocol to retrieve the information from all connected serial port devices and lists them.
3. Tap **Select Serial Port Device**. The system displays a list of the serial numbers of all devices available.
4. Tap the serial number of the device you want to set up.
5. Tap the **Save** icon:



The system begins communicating with the ECU to collect information. When data transfer is complete, the Implement Type selection screen will be shown, for example:



6. After you save the information you have added, the system will begin communicating again with the device again. When the configuration is complete, the system displays a message that the device is now ready to use.

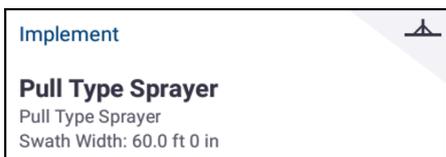
See also:

- [Section Control for ISOBUS or Serial Rate](#)
- [Rate Control](#)

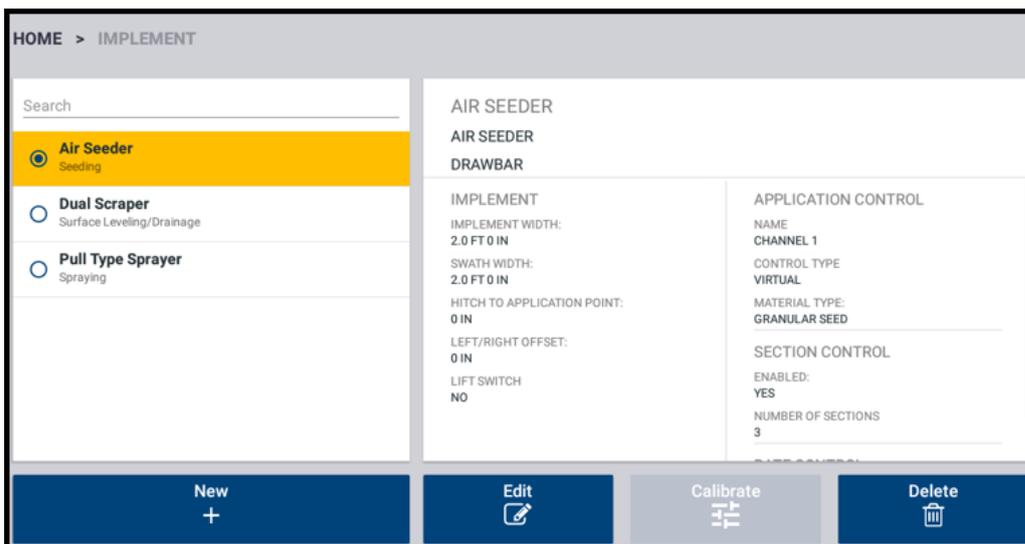
## Edit a TUVR Implement

Follow the steps below to edit a TUVR implement.

1. From the Home screen, tap the **Implement** tile:



The Implement screen displays:



This screen shows a list of available implements. Tap an ISO implement to view details about the selected implement.

Tap **Edit**:



The *Summary* screen displays, showing the information obtained from the ECU.

2. Any incomplete information shows red error text. Complete the settings listed in the following table for each tab and section as needed:

**NOTE** – Where the settings are provided by the ECU, they will not be editable from Precision-IQ while the *Enable Automatic ISO Configuration Updates* setting is enabled (for example, on/off valve latencies).

Tab / Section	Description
OPERATION	The system chooses the operation based on information from the device.

Tab / Section	Description
IMPLEMENT / TYPE	Choose the type of implement you are setting up.
NAME	The system enters a name that you can edit if you wish.
MEASUREMENTS	The device sends some of the measurements to the system. Enter any missing measurements. See <a href="#">Taking Implement Measurements</a> .
APPLICATION CONTROL	The system creates an application channel from information sent by the device. To edit channel information, press and hold the channel name and then tap <b>Modify</b> .
OPERATION	The type of operation is received from the device.
APPLICATION CONTROL CHANNEL / TYPE	<ul style="list-style-type: none"> <li>• Name: To edit the name, tap in the entry box.</li> <li>• Control Type: This information is sent from the device, so there is no need to edit it.</li> <li>• Serial Port Device: The serial number sent from the device.</li> <li>• Material Type: Choose the type of material.</li> </ul>
APPLICATION CONTROL CHANNEL / SETTINGS	<ul style="list-style-type: none"> <li>• Rate Control: Tap  to toggle rate control on or off.</li> <li>• Rate Snapping: Tap  to toggle on or off. Due to pump constraints, liquid flow is generally inconsistent with the information of the Precision-IQ. By enabling this option, you will have a steadier reading of the applied rate. If you are within the allowable error, you will see the applied rate just show your target rate. This option is available if Rate Control is on.</li> <li>• Section Control: Tap  to toggle section control on or off.</li> <li>• Number of Sections: The device has sent the system the number of sections. This option is available if Section Control is on.</li> </ul>

Tab / Section	Description
	<ul style="list-style-type: none"> <li>Fence Row Nozzle: The device has sent information about the fence row nozzle. This option is available if Section Control is on.</li> </ul>
APPLICATION CONTROL CHANNEL / WIDTH	The device has sent the system the width of each section.
APPLICATION CONTROL CHANNEL / LATENCIES	<ul style="list-style-type: none"> <li>On Latency: The number of seconds it takes for the system to reach the correct rate after it has switched on.</li> <li>Off Latency: The number of seconds it takes for the system to turn off after it has switched off.</li> <li>Apply On Latency to Boundary: Tap  to toggle on or off. When on, compensates for hardware delays. On = The system determines when to switch on so that application can begin as soon as the boundary is crossed. Off = The system switches on when the boundary is reached. Any mechanical delay could leave a gap between the boundary and where the product is applied. When GPS accuracy is low, this option is recommended.</li> <li>to toggle on or off.  On = Application stops when you are not moving. Off = Application continues, even you are not moving.</li> </ul>
APPLICATION CONTROL CHANNEL / OVERLAPS	<ul style="list-style-type: none"> <li>Start Overlap: The distance of intentional overlap when you enter a previously applied area. The higher the number, the greater the overlapped area.</li> <li>End Overlap: The distance of intentional swath overlap when you exit a previously applied area. The higher the number, the greater the overlapped area.</li> </ul>

Tab / Section	Description
	<ul style="list-style-type: none"> <li>• Coverage Switching Overlap: The percentage of the section width for intentional overlap of a swath. The higher the number, the greater the overlapped area before the section is turned off.</li> <li>• Boundary Switching Overlap: The percentage of the section width for intentional overlap of a boundary. The higher the number, the greater the overlapped area before the section is turned off.</li> </ul>
SUMMARY	<p>When you are finished with your edits, tap the <b>Save</b> icon to save all information:</p> 

3. After you save the information you have added or edited, the system will begin communicating again with the ECU. When the configuration is complete, the system displays a message that the device is now ready to use.

## Add a Custom-Setup Implement

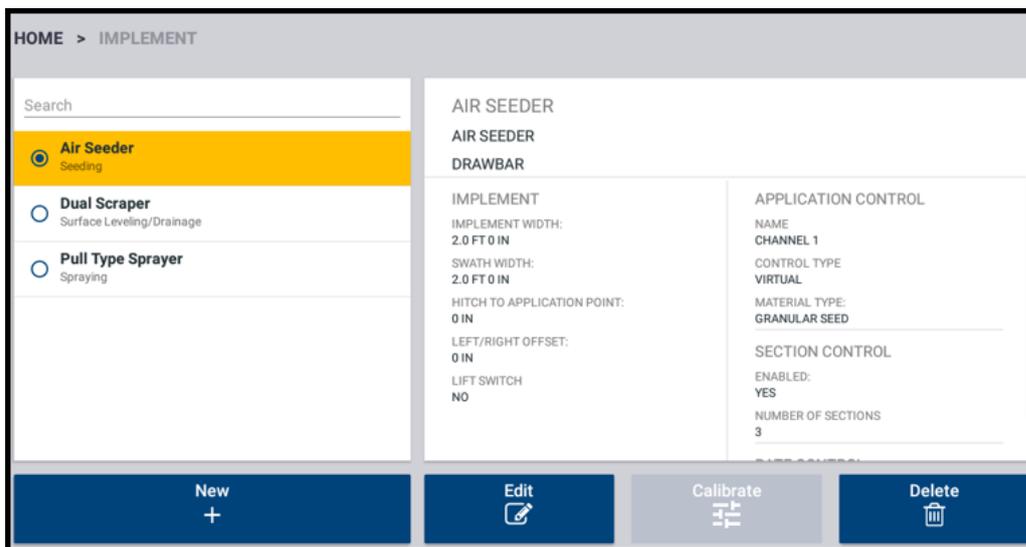
Add an implement that is a custom setup if:

- You do not have application control
- You want to use virtual rate/section control
- You are using a display in addition to the display
- You want to use Precision-IQ to guide you as you use the physical section/rate controls on the implement

1. From the Home screen, tap the **Implement** tile:



The Implement screen displays:



This screen shows a list of available implements. Tap an implement to view details about the selected implement.

Tap **New**:



The Implement Setup wizard launches.

2. Tap **Custom** and then tap .
3. The first setup screen displays. With each screen, complete the settings.

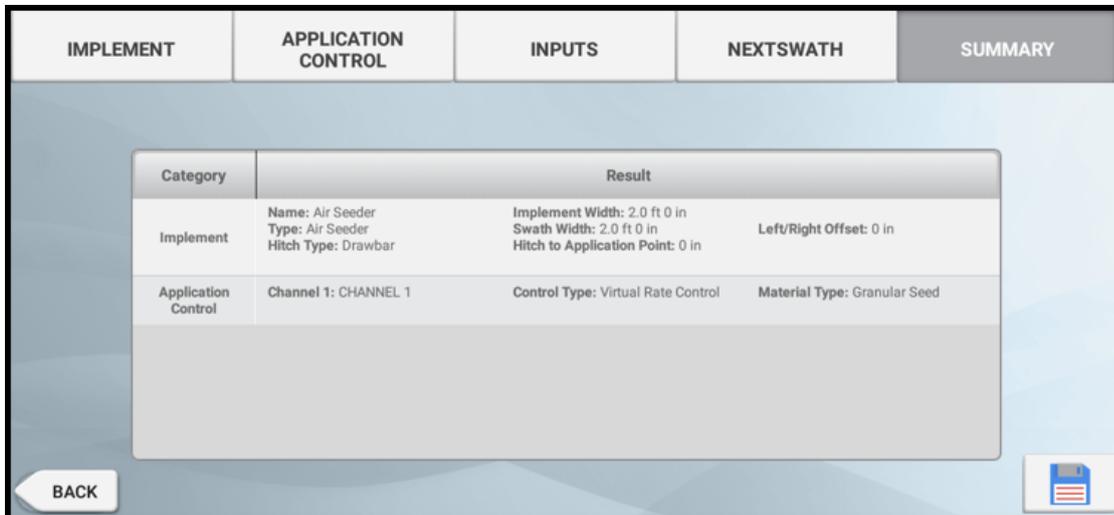
Tab / Section	Action
OPERATION	Choose the type of operation you want to setup.
IMPLEMENT/TYPE	Choose the type of implement you are setting up.
NAME	The system enters a name that you can edit if you wish.
MEASUREMENTS	Enter all measurements. See <a href="#">Taking Implement Measurements</a> .
APPLICATION CONTROL	Tap + to add a channel.
OPERATION	The type of operation is received from the device.
APPLICATION CONTROL	<ul style="list-style-type: none"> <li>• Name: To edit the name, tap in the entry box.</li> </ul>

Tab / Section	Action
CHANNEL/TYPE	<ul style="list-style-type: none"> <li>Control Type: Select Virtual Rate Control.</li> <li>Material Type: Choose the type of material.</li> </ul>
APPLICATION CONTROL CHANNEL/SETTINGS	<ul style="list-style-type: none"> <li>Rate Control: Tap  to toggle rate control on or off.</li> <li>Rate Snapping: Tap  to toggle rate snapping on or off. Duse to pump constraints, liquid flow is generally inconsistent with the information of Precision-IQ. By enabling this option, you will have a steadier reading of the applied rate. If you are within the allowable error, you will see the applied rate just show your target rate. This option is available if Rate Control is on.</li> <li>Section Control: Tap  to toggle section control on or off.</li> <li>Number of Sections: Choose the number of sections. This option is available if Section Control is on.</li> <li>Fence Row Nozzle: Choose the correct option: None, Left Only, Right Only, Both. This option is available if Section Control is on.</li> </ul>
APPLICATION CONTROL CHANNEL/WIDTH	Tap each section to enter the width.
APPLICATION CONTROL CHANNEL/LATENCIES	<ul style="list-style-type: none"> <li>On Latency: The number of seconds it takes for the system to turn on and begin applying. This accounts for hardware delays such as the time it takes for a valve to open..</li> <li>Off Latency: The number of seconds it takes for the system to turn off.</li> <li>Apply On Latency to Boundary: Tap  to toggle on or off. When on, compensates for hardware delays. On = The system determines when to switch on</li> </ul>

Tab / Section	Action
	<p>so that application can begin as soon as the boundary is crossed.</p> <p>Off = The system switches on when the boundary is reached. Any mechanical delay could leave a gap between the boundary and where the product is applied. When GPS accuracy is low, this option is recommended.</p> <ul style="list-style-type: none"> <li>Sections Off When Stopped: Tap  to toggle on or off.</li> </ul> <p>On = Application stops when you are not moving.</p> <p>Off = Application continues, even you are not moving.</p>
APPLICATION CONTROL CHANNEL/OVERLAPS	<ul style="list-style-type: none"> <li>Start Overlap: The distance of intentional overlap when you enter a previously applied area. The higher the number, the greater the overlapped area.</li> <li>End Overlap: The distance of intentional swath overlap when you exit a previously applied area. The higher the number, the greater the overlapped area.</li> <li>Coverage Switching Overlap: The percentage of the section width for intentional overlap of a swath. The higher the number, the greater the overlapped area before the section is turned off.</li> <li>Boundary Switching Overlap: The percentage of the section width for intentional overlap of a boundary. The higher the number, the greater the overlapped area before the section is turned off.</li> </ul>
SUMMARY	<p>When you are finished with your edits, tap  to save all information.</p>

## Implement Summary: Review and Save

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



Tap the **Save** icon to save the implement with any changes you have made:



To cancel / remove your edits and not change the existing profile, tap the Android **Back** button  on the display. A message displays, asking if you want to save your changes. Tap **No**.

### Save Incomplete Implement Settings

Precision-IQ allows you to save an incomplete implement and return to it later to complete.

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

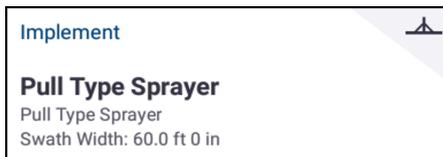
1. Select an operation type, make, model and name the implement.
2. At any point after you complete the NAME section, tap the Android **Back** button  on the display. A message displays, asking if you want to save your changes. Tap **Yes**.

### Select an Implement

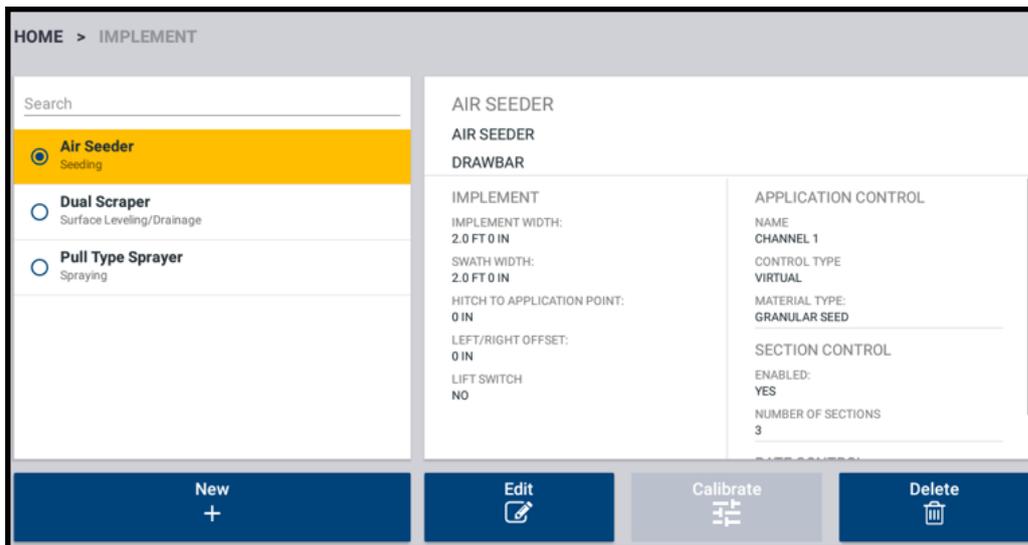
**NOTE** – You can only enter the Run screen with an implement when the required implement setup and calibration steps are complete. When you change implements, make sure that all related configurations are accurate for the current operation.

To select an implement that is properly set up:

1. From the Home screen, tap the **Implement** tile:



2. The Implement screen displays:

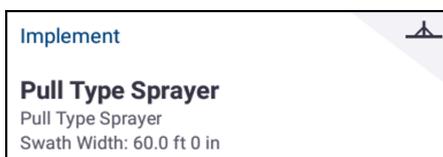


This screen shows a list of available implements. Tap an implement to view details about the selected implement.

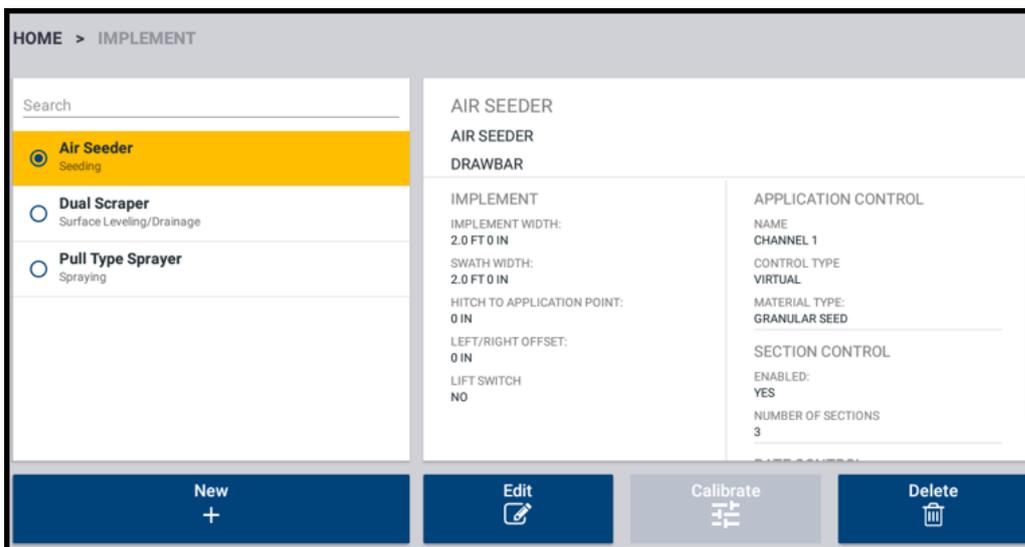
3. Tap an implement to select it.
4. Tap **Home** to return to the Home screen.

## Edit an Implement

1. From the Home screen, tap the **Implement** tile:



2. The Implement screen displays:

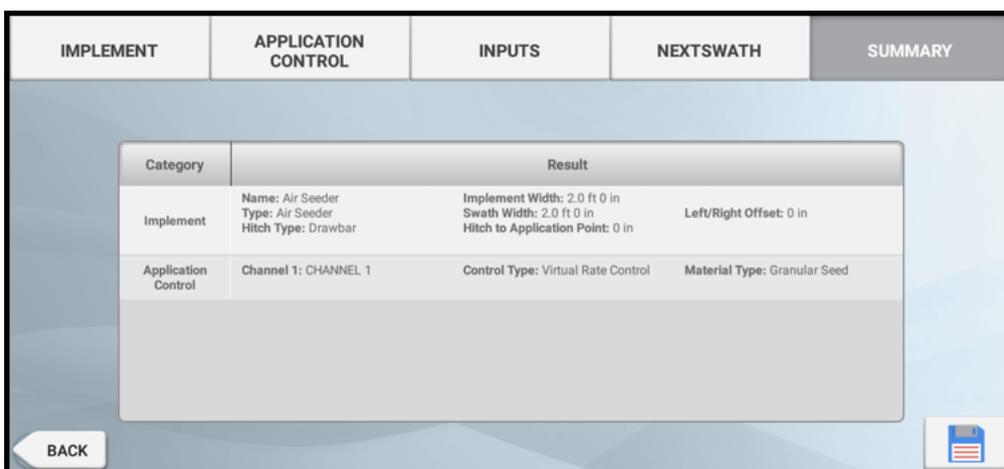


This screen shows a list of available implements. Tap an implement to view details about the selected implement.

3. Tap an implement to select it. Then tap the **Edit** button:



4. The Summary screen of the implement displays:



5. Tap the section where you want to make edits and enter the appropriate changes. For example, if you need to update an implements measurements (as described in [Taking Implement Measurements](#)), tap **Inputs** to enter the appropriate measurement values.

- When you are finished, tap **Summary** at the top right corner of the screen. For details, see [Implement Summary: Review and Save](#).

If any part of the setup is *Not Complete*, you can save the changes but you cannot use the implement on the Run screen.

- To save your changes to the implement, tap . The Home screen displays.

To cancel / remove your edits and not change the existing profile, tap the Android **Back** button  on the display. A message displays, asking if you want to save your changes. Tap **No**.

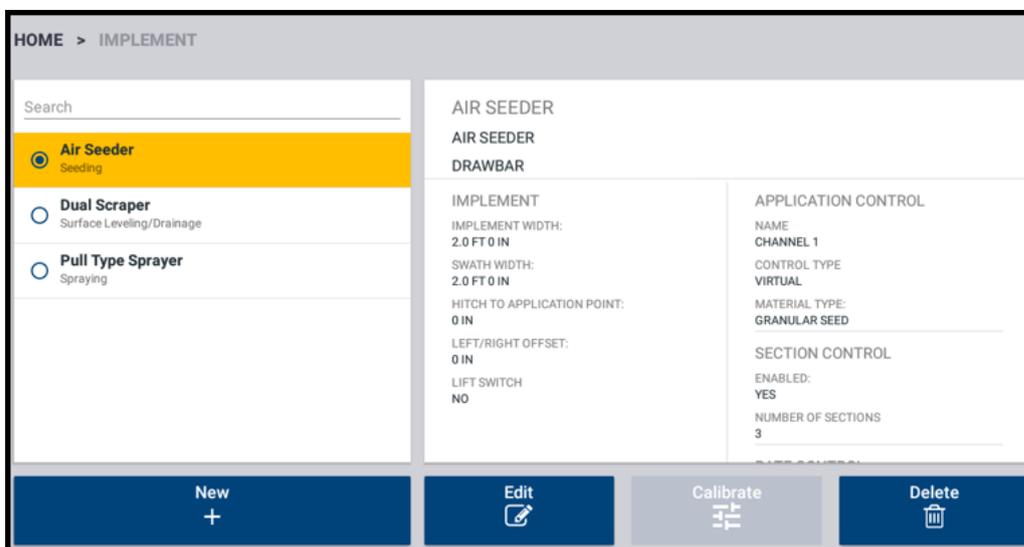
## Delete an Implement

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

- From the Home screen, tap the **Implement** tile:



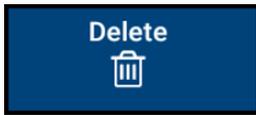
- The Implement screen displays:



This screen shows a list of available implements. Tap an implement to view details about the selected implement.

- Tap the implement you want to delete to select it.

4. Tap **Delete**:



5. A confirmation message displays for you to confirm you want to remove the implement. Tap  to delete the implement.

## Application Control

For implements that apply any type of material (such as seed, fertilizer, etc.), the material is delivered to your field through the *application control* of your selected implement. Some implements can apply more than one type of material to your field. Each material will need its own application control profile setting configured on the selected implement.

The following sections describe how to set up and configure the application control of an implement:

- [Safety and Alarms for Application Control](#)
- [Application Control Settings](#)
- [Application Control Calibration](#)
- [Application Control Setup for Multiproduct Control](#)
- [Add an Application Control Channel](#)
- [Edit an Application Control Channel](#)
- [Delete an Application Control Channel](#)

## Safety and Alarms for Application Control

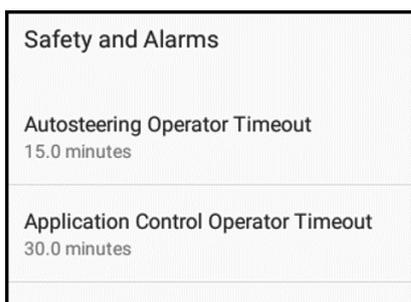
Precision-IQ provides a safety feature where you can set a timeout for when you want Precision-IQ to automatically disengage application control operations.

To set the timeout option:

1. From the Home screen, tap the **Settings** button:



2. On the Settings screen, tap **Safety and Alarms**. The Safety and Alarms options will display:



3. Tap **Application Control Operator Timeout** and set a time (in minutes). By default, **30.0 minutes** is entered.

The value you enter is the amount of time before Precision-IQ disengages automatic application control after the last user interaction with the system.

4. Tap **OK** to save your changes.
5. Tap the Android **Back** button to return to the Home screen.

If the application timer is not reset, application control shuts off.

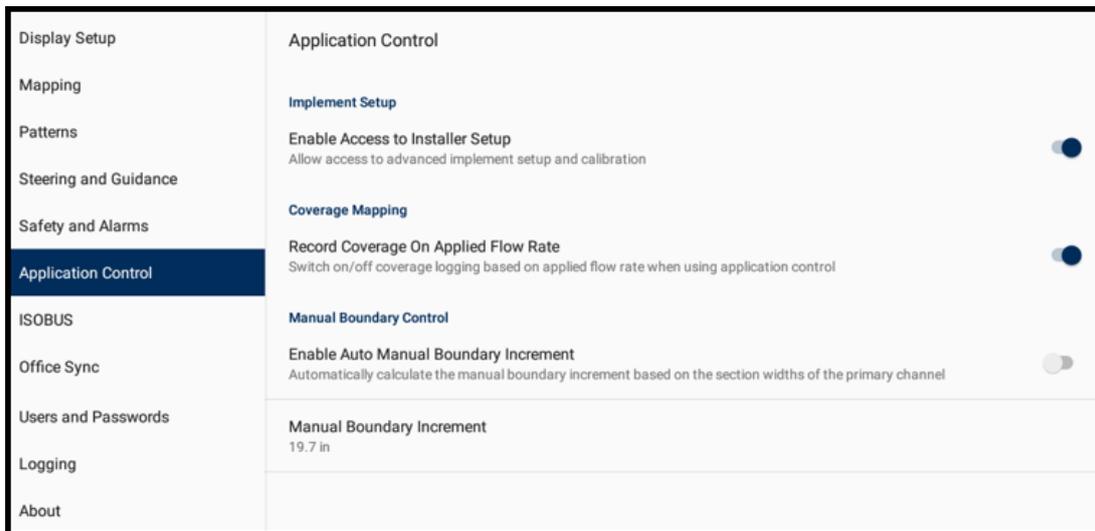
## Application Control Settings

For implements that include [Application Control](#) functionality, update the preference settings in Precision-IQ to enable access to the Application Control feature for ISOBUS, Trimble Universal Variable Rate (TUVr), Field-IQ, and multiproduct implements:

1. From the Home screen, tap **Settings**:



- On the Settings screen, tap **Application Control**:



Tap the **ON/OFF** switch to enable or disable the Application Control options as described below.

- Implement Setup - Enable Access to Installer Setup.** Enable this option to allow access to advanced implement setup and calibration. When disabled, the implement setup will limit access to many of the implement configuration parameters.

***NOTE** – This setting only needs to be enabled when editing a previously configured implement.*

- Coverage Mapping - Record Coverage on Applied Flow Rate.** When enabled, coverage logging will not begin until the section(s) are open and the *as applied* rate value is greater than **0.0 (> 0.0)**. When disabled, coverage logging will start or stop strictly based on whether the sections are opened or closed.
- Manual Boundary Control.**
  - Enable Auto Manual Boundary Increment.** When enabled, each tap of the Manual Boundary left/right arrow buttons will cause the boundary to snap to the next section based on the section width. This feature is useful when section widths of a boom are not uniform.
  - Manual Boundary Increment.** If the Enable Auto Manual Boundary Increment setting is not enabled, then each tap of the Manual Boundary left/right arrow buttons will cause the boundary to snap to the user-defined width.

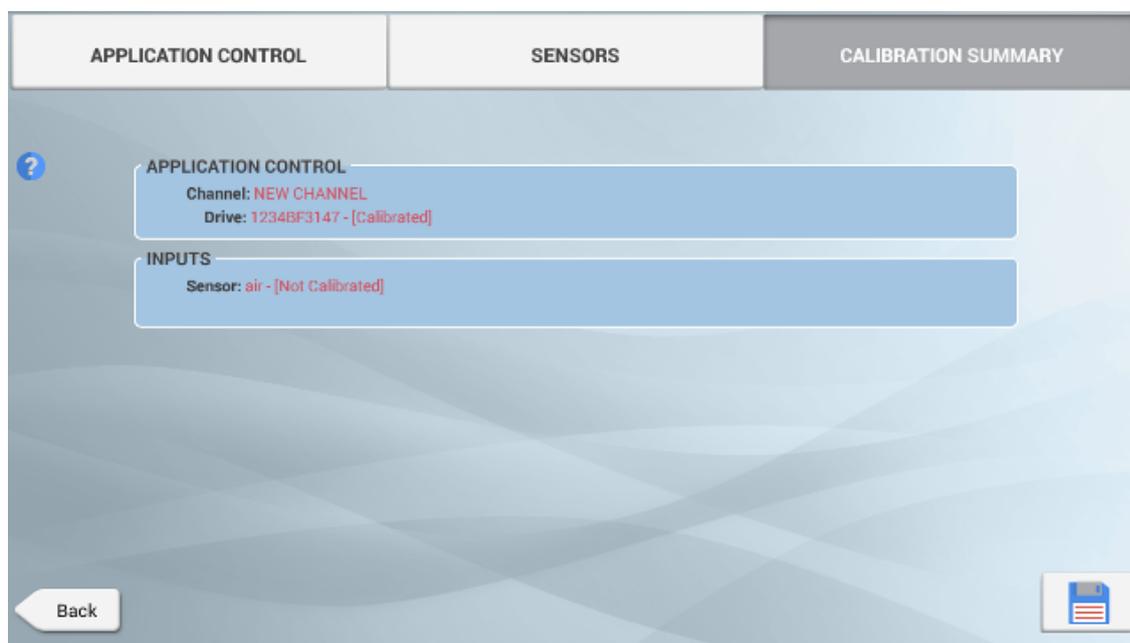
- Tap **Home** to return to the Home screen.

## Application Control Calibration

Access to the calibration for a implement requires that the installer UI be enabled.

When opening the calibration screen you will be presented with the calibration summary status. Follow the calibration instructions in the following sections:

- [Drive/ Valve Calibration](#)
- [Sensors](#)
- [Calibration Types](#)
- [Flow Calibration](#)
- [Run Screen](#)
- [Rate Widget](#)



### *Drive/ Valve Calibration*

1. Select **Application Control**.
2. Select the module that you want to calibrate. For Field IQ Basic, this will be the “primary” module. Follow the steps on the screen to set the following values:
  - a. Drive limits - Maximum Flow. This should be calculated with one of the following:
    - Nozzles/ Orifice. Multiply the maximum rate flow of the nozzles by the number of nozzles on the sprayer. If using multiple tips install the largest tip that will be used.
    - Maximum Flow rating of the pump or flow meter, whichever is lowest
  - b. Auto Tuning - The system will automatically tune the valve.

- c. Drive Settings - Edible calibration values. Most valve can be tuned with the settings described in the table. The system can also be turned on in this screen to check the valve performance.

Value	Description
<b>Gain</b>	Adjusts the speed response of the control valve. Increasing the value will increase the speed at which the valve adjusts.
<b>Minimum Response</b>	<p>Minimum Command applied the the valve to initially open the valve.</p> <ul style="list-style-type: none"> <li>Setting this to high can cause the valve to overshoot when making rate changes.</li> <li>Large adjustments to this value may affect the Gain setting.</li> </ul>
<b>Allowable Error</b>	<p>Sets the % of target rate error that the control system accepts. For Servos, this is usually left at 3% as most valves aren't quick enough to keep up with small flow fluctuations.</p> <ul style="list-style-type: none"> <li>Setting this to low or can cause excessive valve oscillation.</li> <li>Setting this to high can cause the valve not to respond to as applied rate errors.</li> </ul>

### Sensors

Select **Sensors** and select the module to calibrate. For Field-IQ Basic, this module will be the "primary" module. Follow the steps on the screen.

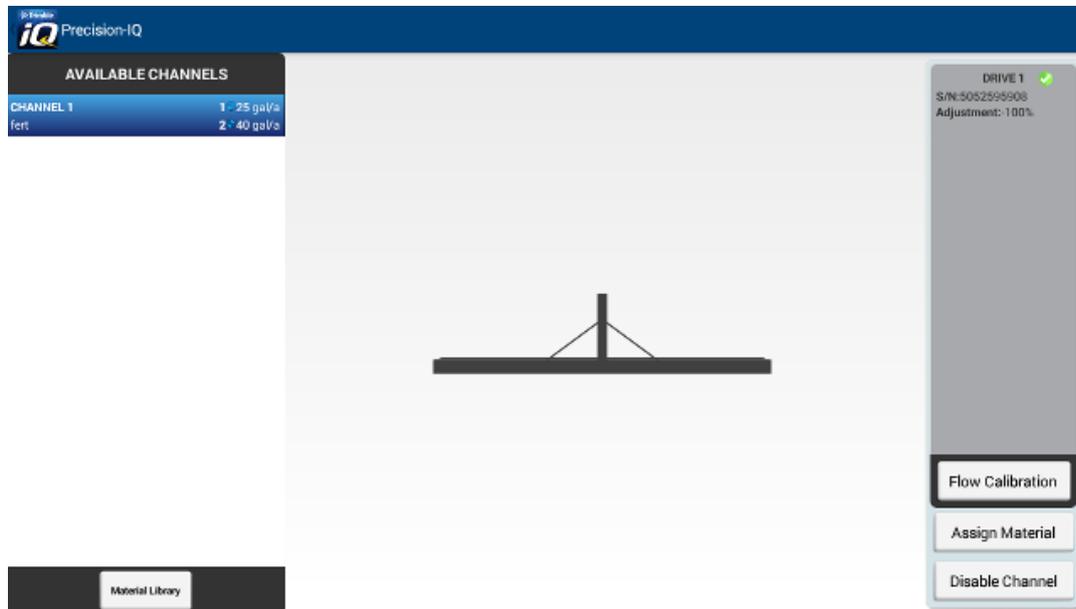
### Calibration Types

Select **Calibration Types**, and select **Air/Liquid/Vacuum** sensors. The following table describes the calibration types:

Type	Description
<b>Point/Slope</b>	Uses the slope value of the sensor and a set point. The set point must be known, it can be 0. The slope value will be provided by the sensor manufacturer.
<b>High/Low</b>	Also known as two-point calibration. The sensor must reference two separate known pressures. The display will calculate the slope between these two values (0 is acceptable as the low pressure). This method is generally considered more accurate as it is tuned to the specific sensor.

## Flow Calibration

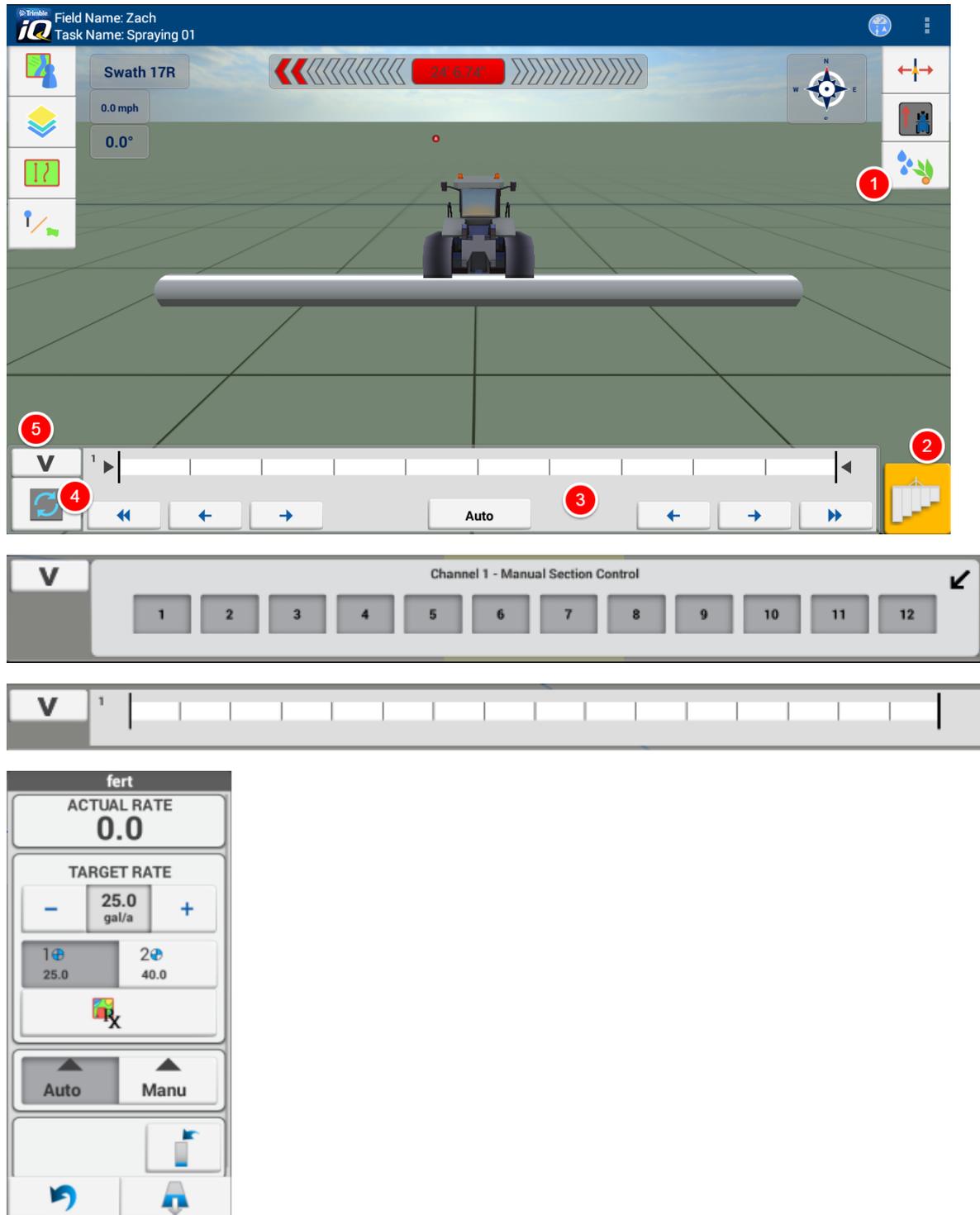
The flow calibration is linked to the material. To access the calibration screens, open the **Material Setup** screen, a material must be assigned to a channel. Once assigned, select Flow Calibration.



Follow the steps in the Calibration menus and enter the following information:

1. Enter or Modify the meter cal
2. Calculate the system minimum flow.
  - Nozzle/ orifices- Multiply the minimum flow of the tip by the number of tips on the smallest section of the sprayer.
  - Minimum flow rating of flow meter or pump, what ever is higher.
3. Enter a target rate and speed appropriate for the applicator.
4. To start the calibration, select **start flow**, then turn on the master switch.
5. Using a measuring container, catch 1-minute samples from at least 3 sections across the boom. Average the results.
6. Enter the results. If the corrected cal number is acceptable, tap **OK**.

## Run Screen



### Basic Rate and Section Interface

1 Rate Widget

## Basic Rate and Section Interface

2	Section Master
3	<ul style="list-style-type: none"> <li>• Boom manual boundary mode</li> <li>• Boom manual section control mode</li> <li>• Boom Section status mode</li> </ul>
4	Boom Mode Cycle key
5	Boom screen collapse/ expand (status to control)

### Rate Widget

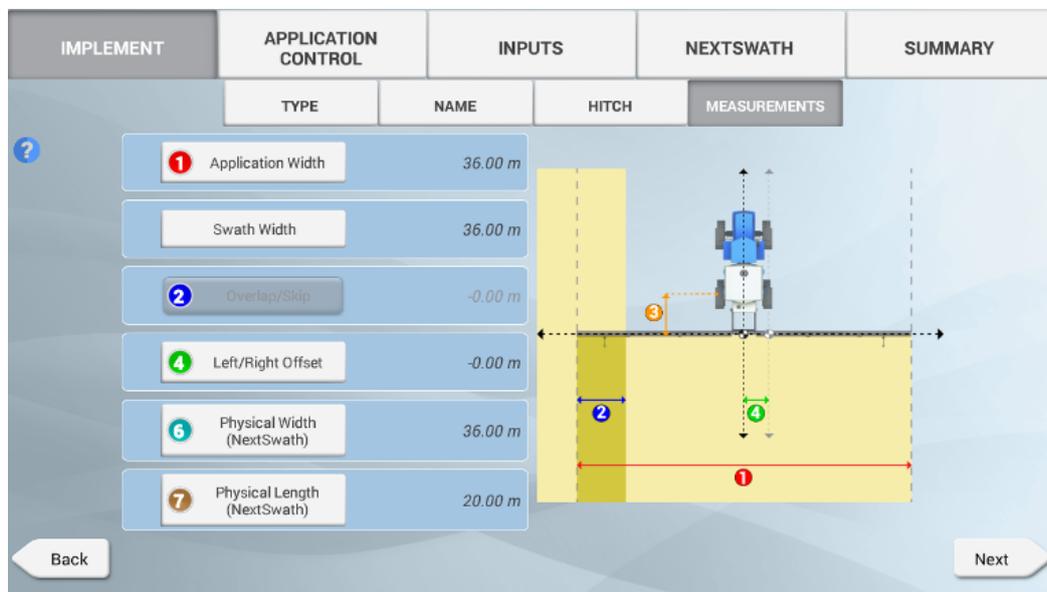
The Rate widget is used to perform the following tasks:

1. View the as applied rate (this widget is always visible when rate widget is collapsed).
2. Change the Target Rate:
  - Two predefined rates
  - Use + and - to adjust the target rate by the manual rate increment value.
  - When a prescription is available, follow the prescription rate. Target rate must also be set to rate 1.
3. Auto / Manual Section mode.
  - Auto mode.
    - If either “off when stopped” is enabled or the implement if over covered ground the sections will remain closed and no application will occur.
    - If “off when stopped” is disabled and the implement is over clear ground the section will open and application will occur at a rate corresponding to the jump start speed.
  - Manual mode. The sections will open and application will occur at a rate corresponding to the jump start speed.
4. View the virtual tank controls.
5. Widget collapse icon.
6. Flush controls.

### Implement and Application Control Details

When setting up a new Field IQ Basic implement, you are launched into the “installer” menus.

The installer version allows the editing of various parameters, not allowed in the “user” version of the setup workflow. For example, the installer may change the application width or the number of sections in the configuration. In the user workflow these parameters are read-only. For more detail regarding installer menus see page---XX



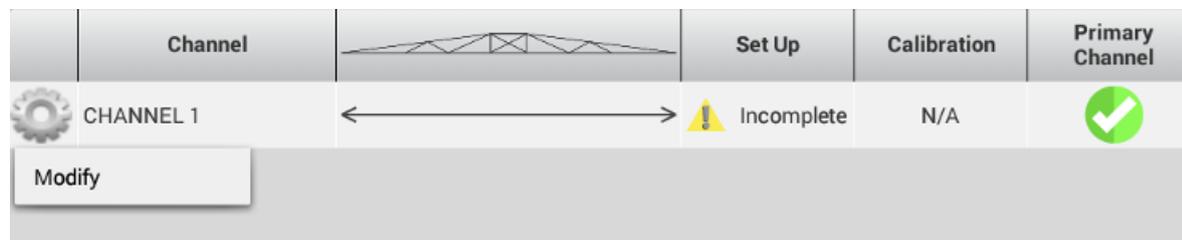
Configure the Implement details with the following information:

- Implement layout
- Implement name
- Hitch type/measurements
- Implement measurements

Option	Description
Application Width	Total application width of implement
Swath Width	Working Width of implement. Sets the distance between swaths. (does not have to match application width)
Left/right Offset	Distance between center of applicator and center of the implement hitch/vehicle
Physical Width	Physical width of the implement
Physical Length	Physical length from hitch to the rear of the implement

## Modify/Edit the Application Control Channel

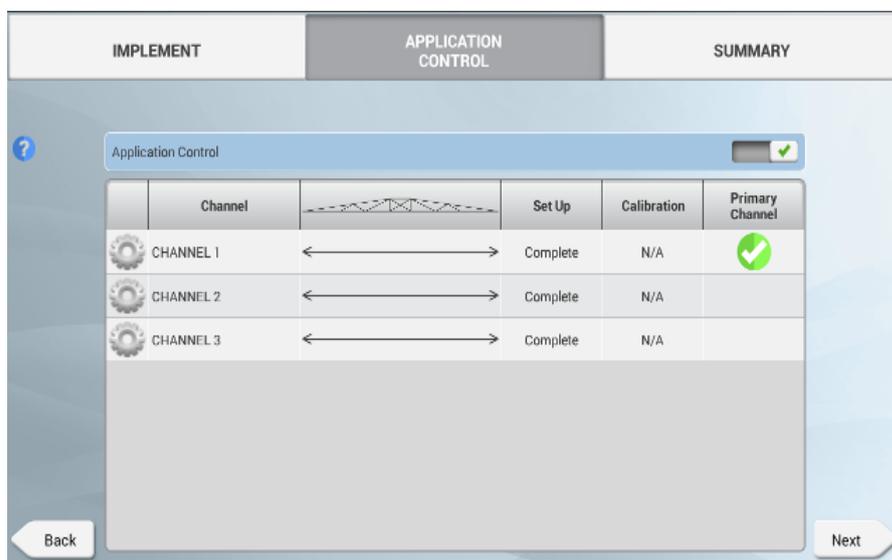
Select the channel to edit and select **Modify**.



**Type** - Select the layout that best fits your implement

## Application Control Setup for Multiproduct Control

1. Select **Application options - Add ISO**.



2. Select the attached ECU.

Precision-IQ will pull the configuration details from the ECU and populate them into the implement setup screens.

If Precision-IQ successfully pulls the settings from the ECU all channels should be completely set up.

It may be necessary to switch the primary channel, which is what will be used for coverage logging.

### Type

- Channel Name: Use to identify the Channel
- Material Type: Selection based on TC capability.

## Settings

- Rate Control : On or off (Task Controller)
- Rate Snapping:
  - ON: When the product flow is within 10% of the Target rate, the as applied rate will snap to the target rate.
  - Off: The as applied rate will report the true system flow.
- Section Control: On or off (Task Controller)

## Width

Used to set the section widths.

## Latencies

If not defined by the ECU, these will be editable.

Option	Description
<b>On Latency</b>	Time delay between when a command is sent to turn a section on to when it is fully open or applying.
<b>Off Latency</b>	Time delay between when a command is sent to turn a section off to when it is fully closed.

Apply latency to boundary (on off).

## Overlaps

Option	Description
<b>Start Overlap</b>	Sets the amount of intentional application overlap when exiting a previously applied area.
<b>End Overlap</b>	Sets the amount of intentional application overlap when entering a previously applied area.
<b>Coverage Switching overlap</b>	Based on the section width. Sets the % of the section that needs to be over a previously applied area to turn on or off. Increasing this value increases section overlap.
<b>Boundary Switching overlap</b>	Based on the section width. Sets the % of the section that needs to be over a boundary area to turn on or off. Increasing this value increases boundary overlap.

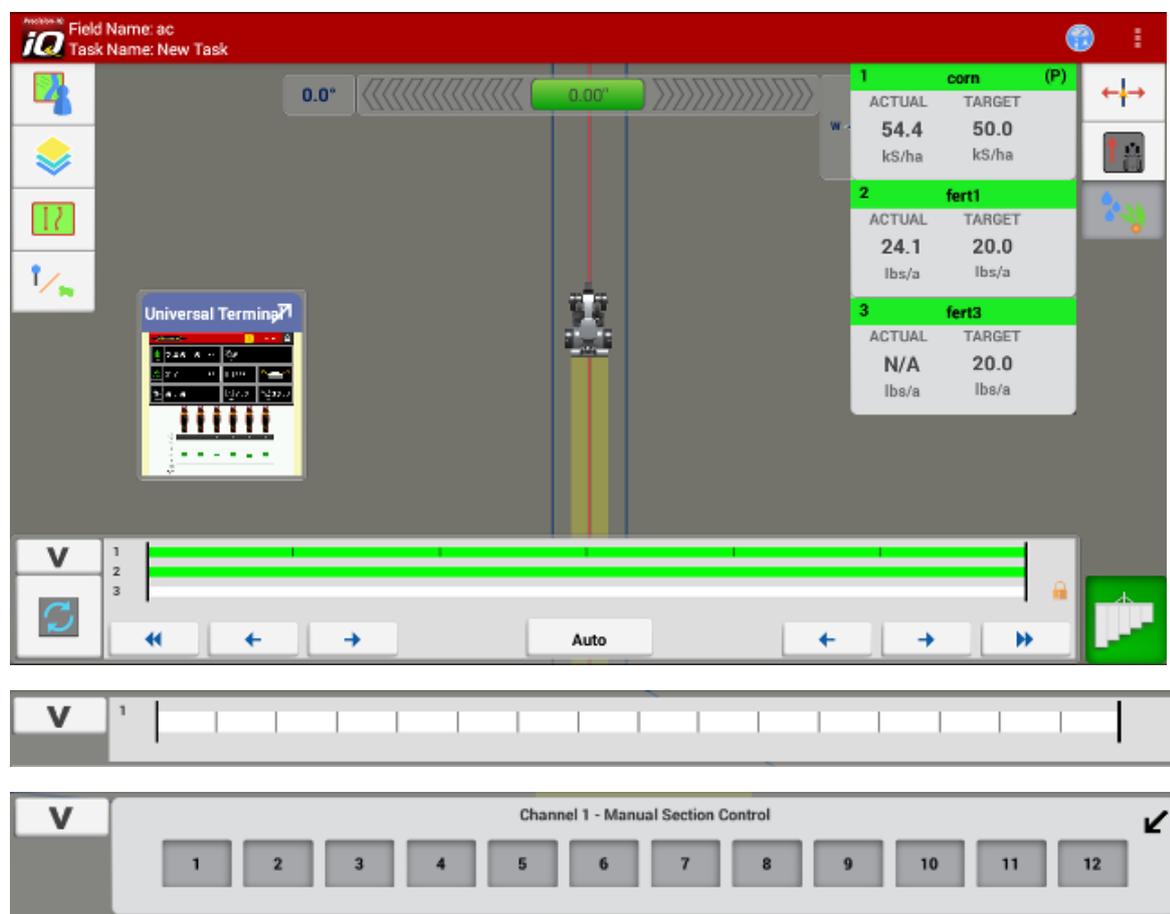
The secondary channel/switching can be influenced by changing its coverage overlap. For example, if boom 2 has the coverage overlap set to 50%, then it switches off when half of boom 1 (primary channel) are off.

## Material Setup

**NOTE** – Only the material type for the channel is pulled from the ECU. You must explicitly assign a material for a new implement.

To assign materials:

1. From the run screen navigate to the **Material** screen.
2. Material details will likely be pulled from the ISO ECU, Verify the material details and channel assignments.



### Multi Material Rate and Section Interface

- |   |                              |
|---|------------------------------|
| 1 | Rate Widget                  |
| 2 | Section Master               |
| 3 | 1. Boom manual boundary mode |

## Multi Material Rate and Section Interface

	2. Boom manual section control mode
	3. Boom Section status mode
4	Boom Mode Cycle key
5	Boom screen collapse/ expand (status to control)

## Add an Application Control Channel

**NOTE** – This function currently only applies to custom implements, not Field-IQ Basic, ISO, or TUVR.

Add an implement as described in [Add a Custom-Setup Implement](#). As you progress through the Implement Setup wizard, follow the steps below to add an application control channel:

**NOTE** – If your implement does not support Application Control, then this option will not appear.

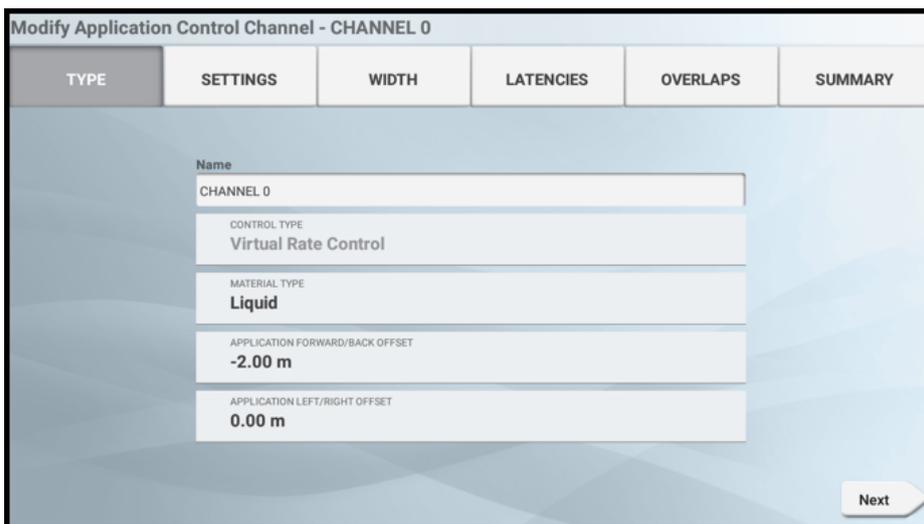
1. On the Application Control screen, tap the on/off slider to enable Application Control:



By default, one application control channel is enabled. If your implement supports more than one channel, then tap **Add** to add another channel:



2. Tap **Next**.
3. The application takes you to a set of screens to set up the channel, beginning with the TYPE section, for example:



Tap... To...

Application Forward/Back and Application left/Right Offset	<p>Enter this measurement only if the application point for this channel is not the same as the application point that you used for.</p> <ul style="list-style-type: none"> <li>Measure from the application point used in the Implement Measurements section to the point where this material is applied.</li> <li>If the new application point is further back, enter a positive value. If it is toward the front, enter a negative value.</li> </ul>
Channel Name	The system names the channel. You can optionally change the name of the channel.

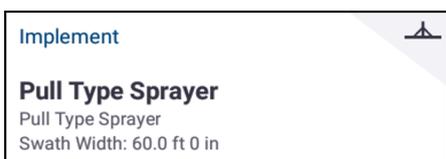
4. Tap **Next** to continue with the Implement Setup wizard:



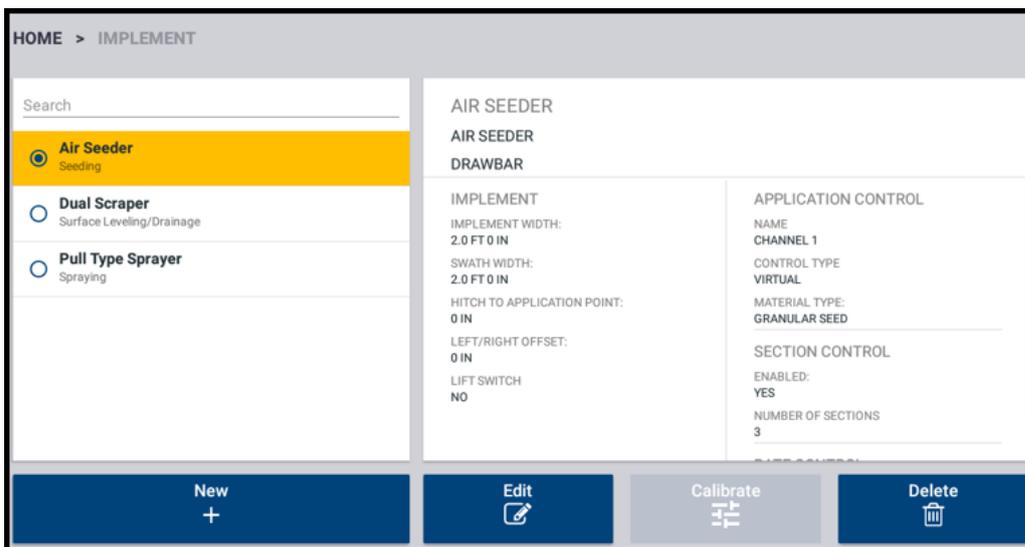
## Edit an Application Control Channel

To edit an application control channel for an existing implement:

1. From the Home screen, tap the **Implement** tile:



The Implement screen displays:

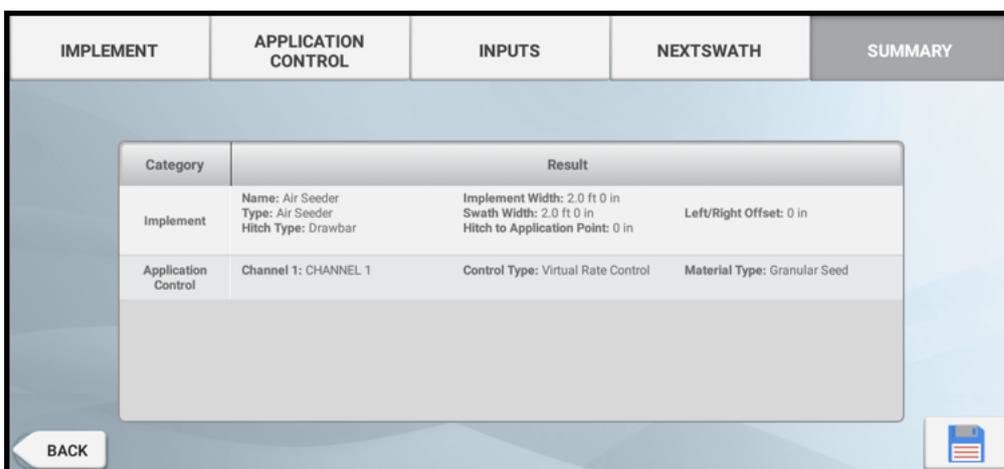


This screen shows a list of available implements. Tap an implement to view details about the selected implement.

2. Tap an implement to select it. Then tap the **Edit** button:



3. The Summary screen of the implement displays:



4. Tap **APPLICATION CONTROL**.
5. Tap the control channel that you want to change, then tap **Modify**.
6. Tap the button at the top of the screen for the channel setting that you want to

change.

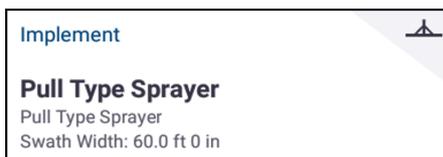
- When you finish making changes, tap **Summary** at the top right corner of the screen.  
If any part of the setup is not complete, you can save the changes but you cannot use the implement on the Run screen.
- To save the channel and return to the Application Control section, tap . The application returns you to the Implement setup panel.

To exit channel setup without saving, tap . A message displays, asking if you want to cancel without saving your changes. Tap **Cancel**.

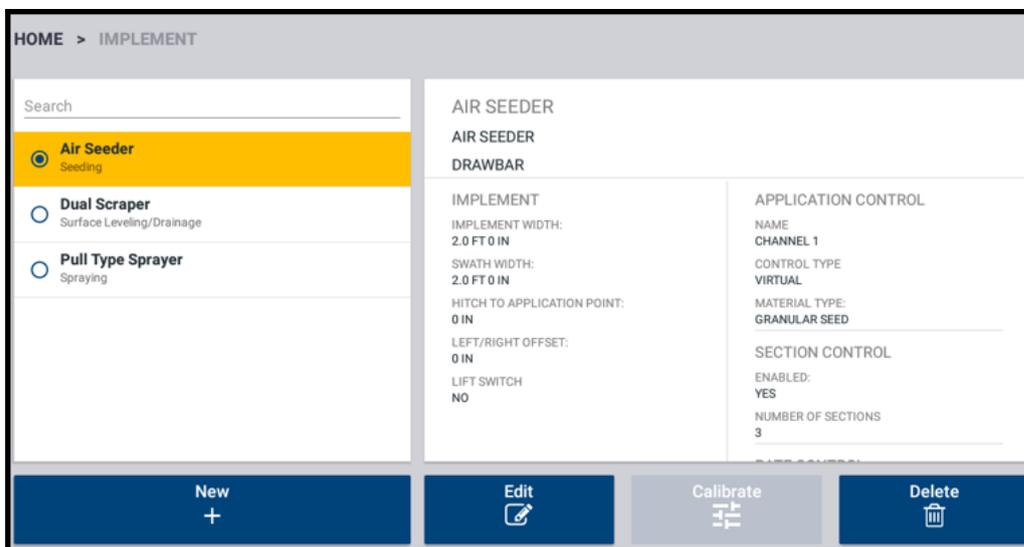
## Delete an Application Control Channel

To remove an application control channel:

- From the Home screen, tap the **Implement** tile:



The Implement screen displays:

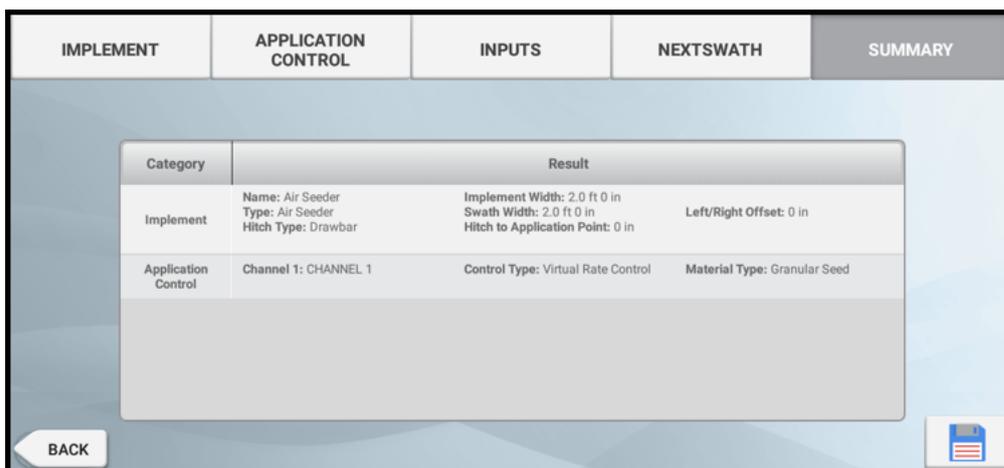


This screen shows a list of available implements. Tap an implement to view details about the selected implement.

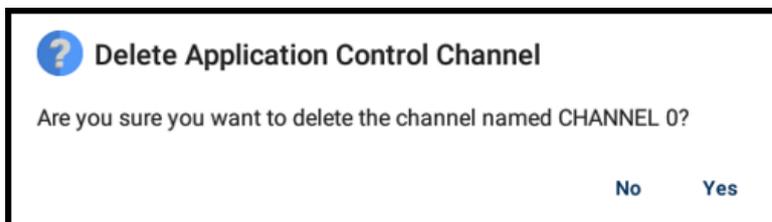
2. Tap an implement to select it. Then tap the **Edit** button:



3. The Summary screen of the implement displays:



4. Tap **APPLICATION CONTROL**.
5. 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:



6. Tap **Yes** to confirm the removal. Otherwise, tap **No** to cancel the removal.
7. When you finish making changes, tap **Summary** at the top right corner of the screen.
8. If any part of the setup is *Not Complete*, you can save the changes but you cannot use the implement on the Run screen.
9. To save the channel and return to the Application Control section, tap . The application returns you to the Implement setup panel.

To exit channel setup without saving, tap . A message displays, asking if you want to cancel without saving your changes. Tap **Cancel**.

## Section Control

The following sections describe the section control feature for basic, ISOBUS, and serial rate implements:

- [Section Control Subtabs](#)
- [Section Control for ISOBUS or Serial Rate](#)
- [Section Control Operation](#)
- [Flush](#)
- [Section Station](#)

### Section Control Subtabs

Under **Section Control**, enter details for the following subtabs:

- [Settings Subtab](#)
- [Modules Subtab](#)
- [Width Subtab](#)
- [Latencies Subtab](#)
- [Overlaps Subtab](#)

#### *Settings Subtab*

Select to enable or disable Section Control. A green check indicates that Section Control is enabled. Tap the following buttons and enter the appropriate information:

1. Control Type. Select one of the following control types:
  - Section Control: This mode results in the control of individual sections, as defined for the section control modules.
  - Rate as Section: This mode results in the entire boom being treated as a single section.
2. Section Control Type. This option sets the section switching logic.
3. Fence Row Nozzle. Use this option to enable the fence row nozzle. Select **Left**, **Right** or **Both**.
4. Fence Row Wiring. This option sets the output used for the R/H fence row.
  - Adds the output 1 section after the last section.
  - +12 sets the output to the 12th section wire.

### Modules Subtab

Tap **Modules** to enter the edit menu. From there, you can define the number of sections connected to the module/s.

### Width Subtab

Tap **Width** to edit the width of each section. Tap the section to edit the measurement.

### Latencies Subtab

Tap **Latencies** to enable or disable latency. Select from:

- **On Latency.** Time delay between when a command is sent to turn a section on to when it is fully open or applying.
- **Off Latency.** Time delay between when a command is sent to turn a section off to when it is fully closed.

### Overlaps Subtab

Tap **Overlaps** to set the overlap details. The following table describes the available options:

Option	Description
<b>Start Overlap</b>	Sets the amount of intentional application overlap when exiting a previously applied area.
<b>End Overlap</b>	Sets the amount of intentional application overlap when entering a previously applied area.
<b>Coverage Switching overlap</b>	Based on the section width. Sets the % of the section that needs to be over a previously applied area to turn on or off. Increasing this value increases section overlap.
<b>Boundary Switching overlap</b>	Based on the section width. Sets the % of the section that needs to be over a boundary area to turn on or off. Increasing this value increases boundary overlap.

### Section Control for ISOBUS or Serial Rate



This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

Automatic section control can be used with supported ISOBUS-certified or serial rate controlled implements. With automatic section control, Precision-IQ turns sections on or off based on boundaries, exclusion zones, and overlaps.

**NOTE** – To use Task Controller section control, you must have unlocked the feature with a valid passcode, turned on the feature in the settings. See [Upgrade or Apply a License for a New Feature](#).

**NOTE** – For ISOBUS, you must be connected to an ISO-certified implement that has been set up. See [Add an ISOBUS Implement](#).

**NOTE** – To use the Trimble protocol for serial rate, you must be connected to a supported implement that has been set up. See [Add a Trimble Universal Variable Rate \(TUV\) Protocol Implement](#).

## Buttons for Section Control

At the Run screen, the on-screen master switch button is available for controlling sections.

Button	Explanation
--------	-------------



(Gray with "No" graphic) When the implement's master switch is off, the on-screen master switch is gray and not active. Precision-IQ's task controller cannot control sections.



(Yellow) The implement's master switch is on and the task controller is ready to control sections. All sections are off.



(Green) The implement's master switch is on. The task controller is controlling sections.

When the on-screen master switch button is green, you also have the option in the Rate Control widget to turn sections from automatic mode (based on boundaries and so on) to manual mode, with all sections on.

Button	Explanation
--------	-------------



**Auto**

(Auto) When activated, the task controller controls sections based on boundaries, exclusion zones and overlaps.



**Man**

(Manual) When activated, all sections are on regardless of boundaries, exclusion zones and overlaps.

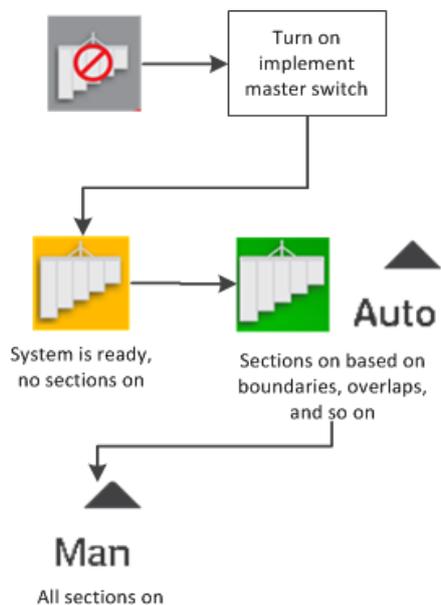
See also:

- [Add an ISOBUS Implement](#)
- [Add a Trimble Universal Variable Rate \(TUV\) Protocol Implement](#)

## Section Control Operation

To operate section control for a supported implement that is either ISO-certified or can be controlled by Trimble's serial rate protocol, use the on-screen master switch button and

auto/manual buttons.



1. Turn on the implement's master switch. The on-screen master switch button changes from gray  to yellow . Sections are still off.

2. Tap the yellow on-screen master switch button . The button changes to green .

The system is now automatic mode, and sections will turn on and off based on boundaries, exclusion zones and overlaps. At the bottom of the screen, the status of sections being open or closed are shown.



3. To turn all sections on, tap the manual control button **Man** in the Rate Control widget. 
4. To change back to the automatic mode, tap the automatic control button **Auto** in the Rate Control widget. 

See also:

- [Add an ISOBUS Implement](#)
- [Add a Trimble Universal Variable Rate \(TUV\) Protocol Implement](#)

## Flush

To start the flush:

1. Expand the rate widget to reveal the flush button at the bottom right.
2. Press the flush button. The “stay clear” notification will be displayed.
3. Tap the screen to dismiss the notification.
4. Press the section master (and/or enable the remote master switch) to start the flush process.

To stop the flush:

1. Press the section master and/or disable the remote master switch.
2. Note that the system flow will show non-zero on the rate widget while flush is in progress.

This feature can be tested with the BRASS module simulators.

## Section Station

The Section Station mode shows the status of sections. When collapsed, the boom cycle key is no longer visible.

There are 3 section views.

1. **View only.** Can only be viewed when the section bar is collapsed (to expand tap on the section bar)
2. **Manual Boundary Mode.** Incremental section switching from the outside of the boom into the center, This mode controls all channels
3. **Manual Section Control Mode.** Allows individual section switching of all sections and (one per channel)

Automatic Section Switching Behavior - Coverage Section switching behavior of channel the secondary channels is dependent on the primary channel.

# Materials

- ▶ Categories and Types of Materials
- ▶ Adding a Material
- ▶ Editing a Material
- ▶ Deleting a Material

As part of a field run, a *material* is that which you apply to a field through an implement. Precision-IQ records the amount and coverage of each material applied to your field. This data is then sent to your farm office and is used to effectively and efficiently manage the farm.

On the Materials screen, you can add and edit materials as well as calibrate material flow. From the Home screen, tap the **Material** tile to get started:



## Categories and Types of Materials

This section lists the categories and types of material supported by Precision-IQ.

### Anhydrous

Anhydrous

Other

### Granular Fertilizer

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

### Liquid

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

### Granular Seed

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

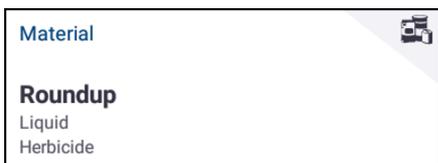
### Row Crop Seed

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

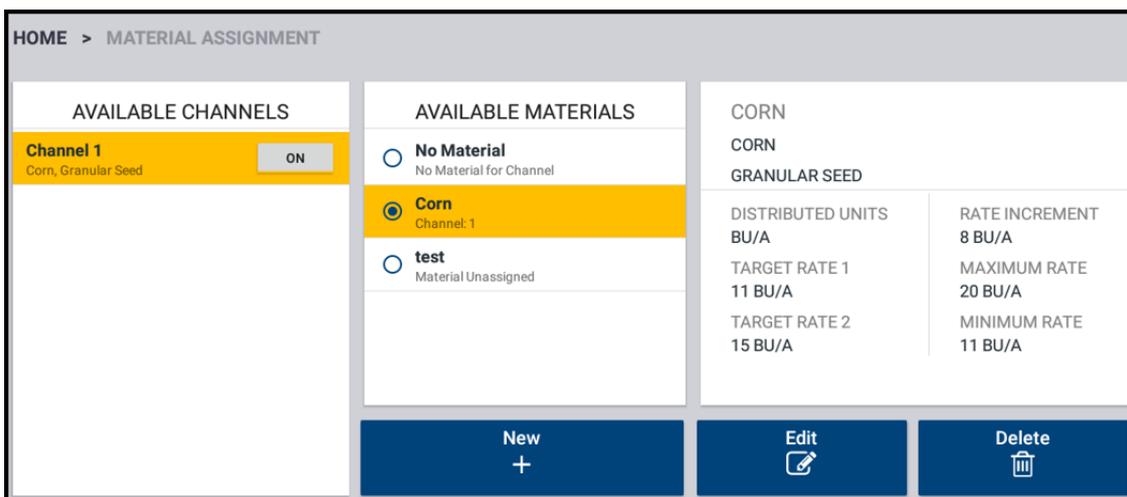
## Adding a Material

A material must be assigned to an application channel before it can be applied to a field. This section describes how to add a material.

1. From the Home screen, tap the **Material** tile:



2. The Material Assignment screen displays:



This screen shows the following information:

**Available Channels:** This section shows the number of channels available to the selected implement. Some implements can deliver more than one material (for example, fertilizer *and* herbicide). Implements deliver a particular material through *channel*. Tap the **On** button to enable or disable a channel.

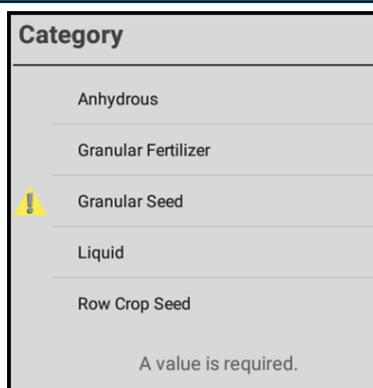
**Available Materials:** This section shows the material profiles that have already been created. Tap a material from this list to select it and review its details. Materials will only be listed that have the same category as the application channel.

**Material Detail:** This section shows details about the selected material.

3. Tap **New**.
4. A form appears for you to enter details about the material. Tap each field to update it:

Field	Action
Material Name	Enter a name for the material.
Category	Select the category of material to be applied from the pop-up list:

Field	Action
-------	--------

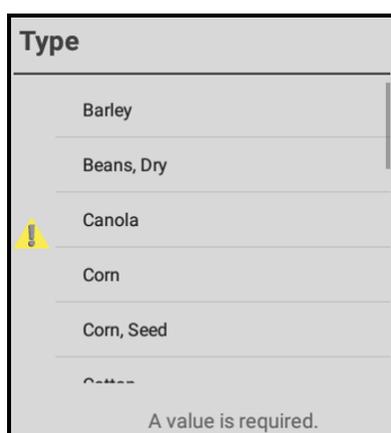


**Category**

- Anhydrous
- Granular Fertilizer
- Granular Seed
- Liquid
- Row Crop Seed

A value is required.

**Type** Select the type of material to be applied from the pop-up list. The items from the list depends on the category you select. For example, if you select **Row Crop Seed** as the category, then the Type options show only those items that apply:



**Type**

- Barley
- Beans, Dry
- Canola
- Corn
- Corn, Seed
- Cotton

A value is required.

**Distributed Units** Select the units to use with the selected material.

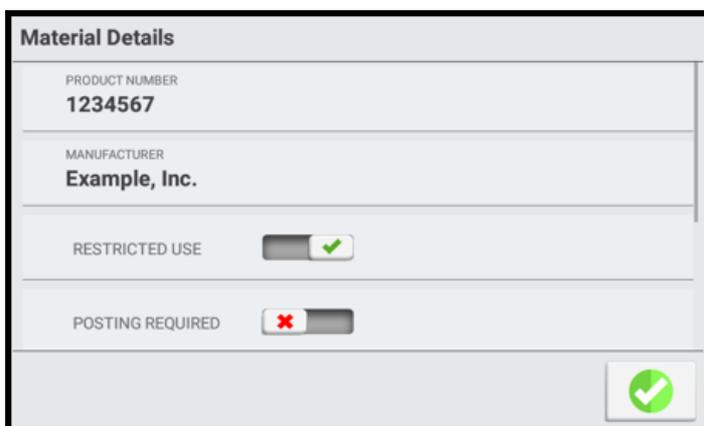
**Target Rate 1** Control the volume that the implement supplies when Rate 1 is selected.

**Target Rate 2** Control the volume that the implement supplies when Rate 2 is selected.

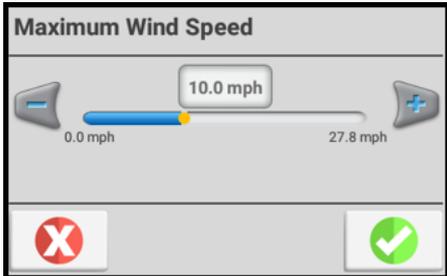
**Rate Increment** Set rate increment. When you increment/decrement Rate 1 or Rate 2 on the Run screen, the current application rate increases or decreases by this amount.

Field	Action
Minimum Rate	Set the minimum rate that will be applied.
Maximum Rate	Set the maximum rate that will be applied.

5. Tap **Material Details** (*optional*). You can also add additional details about the material. These details are not required to start a field run, but can be useful for tracking in the farm office. In the Material Details pop-up, tap each field to update it:



Field	Action
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 to enable Precision-IQ 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. For example:

Field	Action
	

**Notes** Enter any other notes that you want to record with the material.

When you have entered the optional material details, tap the green check to save the changes:



6. Tap **Save** to complete the process. Once you have saved the material profile, it will appear in the Available Materials list depending on the implement you have selected.

See also:

- [Categories and Types of Materials](#)
- [Implements](#)

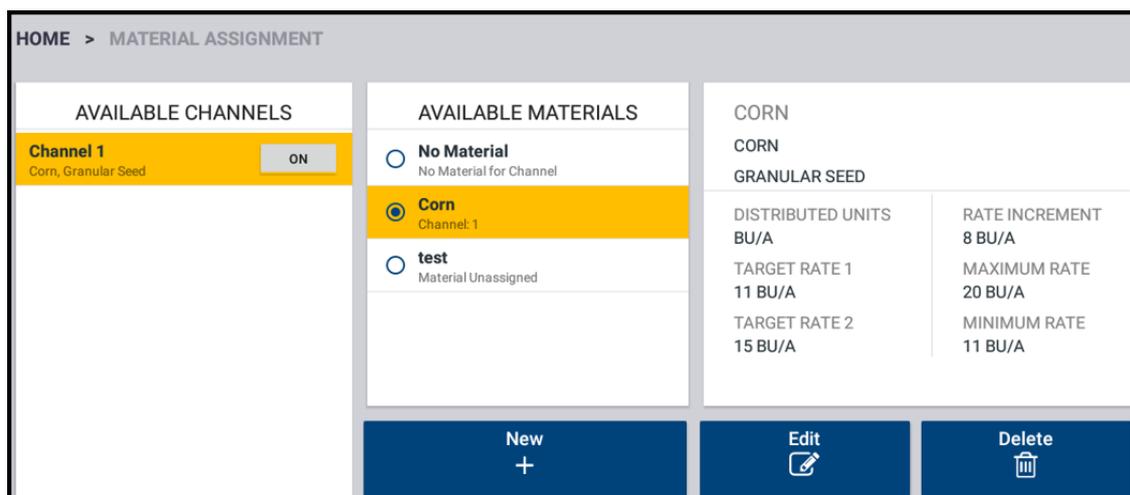
## Editing a Material

As you apply a material to a field, you may find that some details need to be modified. Precision-IQ allows you to modify some options of the selected material:

1. At the Home screen, tap the **Material** tile:



2. The Material Assignment screen displays:



3. Tap a material from the Available Materials list that you want to edit to select it.
4. Tap the **Edit** button:



5. On the Material Assignment screen, tap the field(s) you want to update and make your changes.
6. When you are satisfied with your changes, tap **Save**.

## Deleting a Material

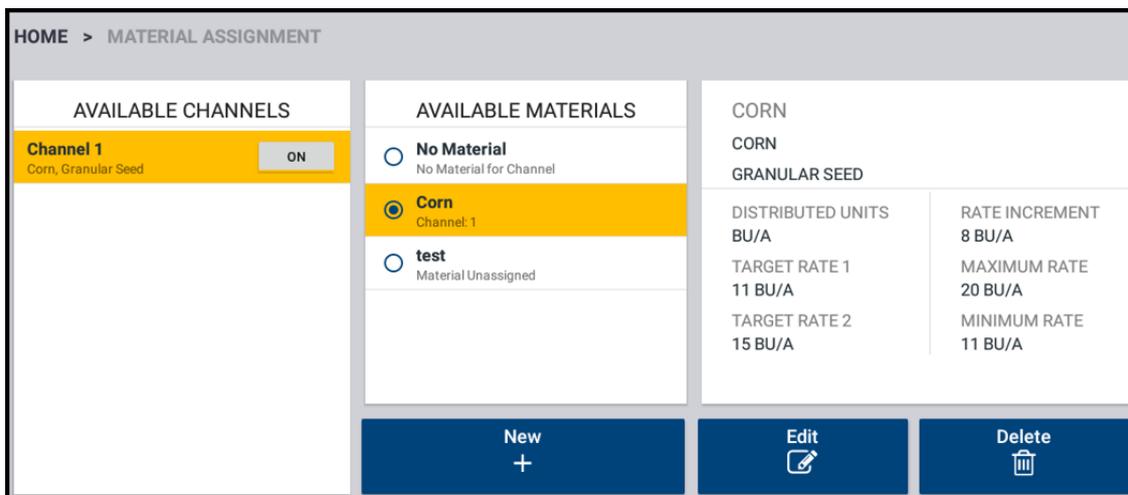
If you no longer need to use a material, you can delete it from the list of Available Materials.

**NOTE** – There is no "undo" for deleting a material. However, you can always add it again. See [Adding a Material](#).

1. From the Home screen, tap the **Material** tile:



The Material Assignment screen displays:



2. Tap a material from the list of Available Materials that you want to delete to select it.
3. Tap the **Delete** button:



4. A confirmation pop-up window will display. Tap the green check to complete the material deletion.

# Run Screen

- ▶ Run Screen Settings
- ▶ Alerts and Warnings
- ▶ Coverage Layers
- ▶ Coverage Logging
- ▶ Landmarks
- ▶ Guidance Patterns
- ▶ Prescriptions
- ▶ Rate Control
- ▶ Operating a Vehicle
- ▶ Using Onscreen Widgets
- ▶ The Onscreen Lightbar
- ▶ Universal Terminal
- ▶ Tasks

Once you have successfully set up and selected the equipment and field details, tap the **Run** button on the Home screen to enter the Run screen:



From the Run screen, Precision-IQ records data for all work and materials for your selected field.

This chapter describes the settings and selections you can make on the Run screen, including fine tuning a field configuration with guidance mappings and landmarks.

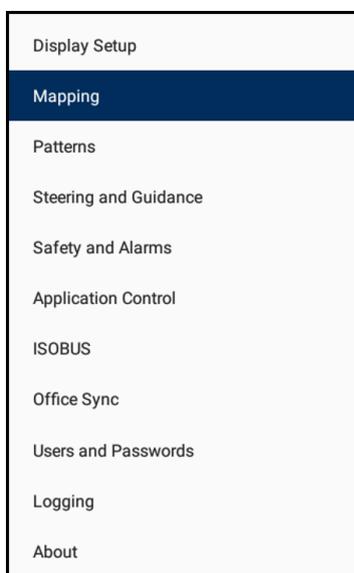
## Run Screen Settings

Precision-IQ offers a variety of settings you can use to customize the look of the Run screen. To get started, tap the **Settings** button at the bottom of the Home screen:



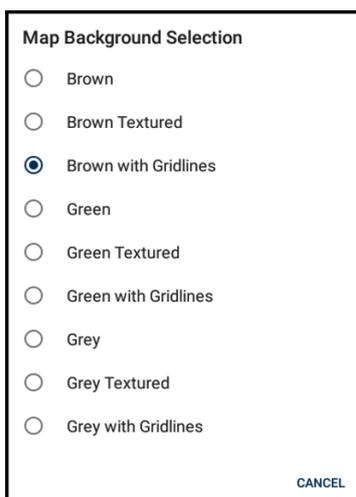
## Mapping Settings

The Precision-IQ mapping settings allow you to change the look and feel of the map as it appears on the Run screen. You can also select when application coverage is recorded. From the Settings screen, tap **Mapping**:



## Map Features

- **Map Background Selection** - Tap this option to change the background color values for the Run screen. You can also select whether or not to include a textured background or a background with grid lines:



- **Map Color Scheme** - Tap this option to toggle between day mode or night mode.
- **Map Orientation** - Tap this option to set the point of view for how you want the Run screen to follow the position of your vehicle. The orientation options are:
  - **North Up** where the map always shows north at the top. The vehicle icon on the Run screen will change depending on the direction.
  - **Vehicle Up** where the map always shows the vehicle pointing up. The vehicle icon remains stationary and the map rotates around it depending on the direction.

### *Record Coverage*

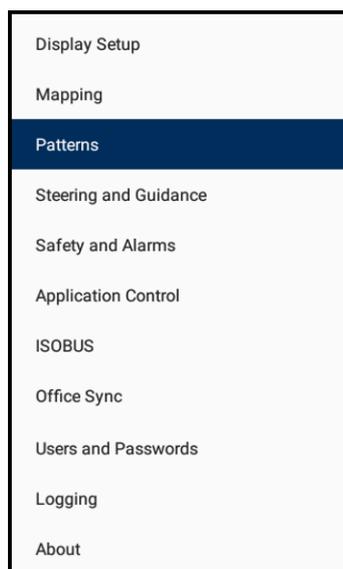
When Application Control is not enabled, you can set Precision-IQ to begin coverage logging :

- **When Engaged** - Tap to enable or disable coverage logging with Autosteering engaged or disengaged.
- or
- **With Active Remote Switch** - Tap to enable or disable coverage logging with a remote logging switch. When enabled, you can set the Remote Switch Working State to be **Active High** or **Active Low**.

### **Patterns Settings**

From the Run screen, you can fine tune the details of a field with a variety of markers for such things as landmarks, curves, borders, etc. The more details you provide about a field greatly improves the reporting of work done to that field.

The Precision-IQ patterns settings allow you to change the look and feel of these markers as they appears on the Run screen. From the Settings screen, tap **Patterns**:



## Curve Features

- **Curve Smoothing** - Tap to enable or disable this feature. When enabled, Precision-IQ smooths out the guidance curve, making it wider.
- **Smooth Turn Radius** - Tap to enter the size of the circle that Precision-IQ will guide to. The larger the circle (degrees), the wider the turn.
- **Tight Turn Warning Angle** - Tap to enter the number of degrees that will trigger a warning about a tight turning angle. See [Alerts and Warnings](#).
- **Tight Turn Look Ahead Time** - Tap to enter the number of seconds before you approach a tight turn angle when the tight-turn warning will show on the screen. See [Alerts and Warnings](#).

## Headlands

- **Auto Close** - Tap to enable or disable Precision-IQ to automatically close the beginning and end point when you create headlands.
- **Auto Close Distance** - Tap to enter the distance between your beginning point and ending point for a headland.

## Boundaries/Area Features

- **Auto Close** - Tap to enable or disable Precision-IQ to automatically close the beginning and end point when you create boundaries.
- **Auto Close Distance** - Tap to enter the distance between your beginning point and ending point for a boundary.
- **Boundary Smoothing** - Tap to enable or disable.

## Alerts and Warnings

The Precision-IQ application will display warnings and alerts, depending on your features and the situation. For example, warnings or alerts that display include, but are not limited to:

- Loss of GNSS coverage.
- 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.

### End of row warning

If you are following a guidance line, when you begin approaching the end of a row, an End of Row warning displays:



### Tight Turn Warning

When you are approaching a tight turn, the system displays a tight turn warning:

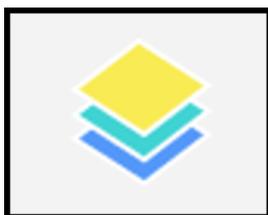


To customize your settings for tight turn warnings (including the angle of the turn and how soon the warning displays before the turn), see [Patterns Settings](#)

## Coverage Layers

From the Run screen, you can view a variety of map layers for coverage, which are then recorded for each task. To view the available coverage layers:

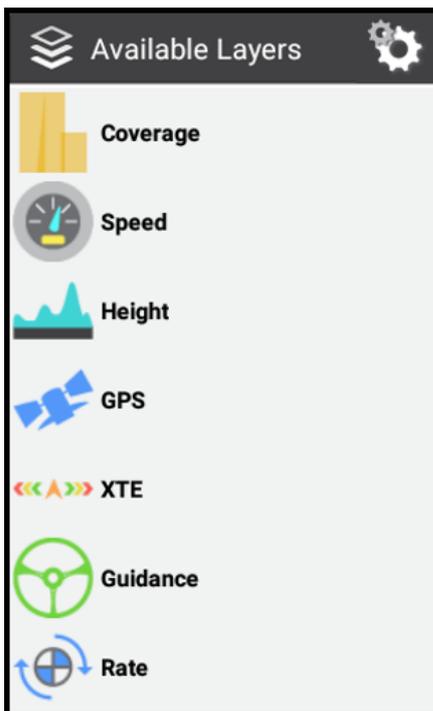
1. From the Run screen, tap the **Coverage Layer** button:



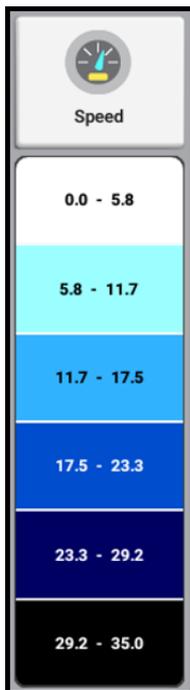
- By default, the Coverage Layers widget appears:



- Tap anywhere in this widget to display the Available Layers pop-up window:



- Tap any of the items on this window to update the Coverage Layer widget. For example, if you tap **Speed** in the Available Layers pop-up window, the Coverage Layer widget updates to show you the speed ranges:



5. Tap the **Coverage Layer** button again to hide the Coverage Layer widget.

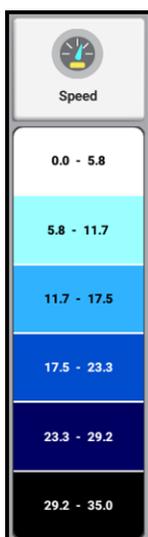
## Edit Coverage Layers

Precision-IQ allows you to customize the coverage layer. To edit a coverage layer:

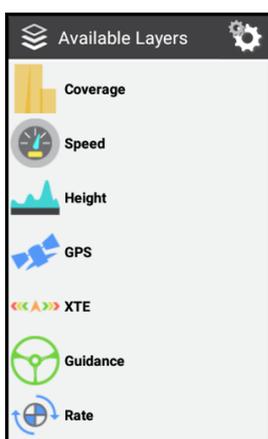
1. Tap the Coverage Layer button:



2. The last layer you selected will display. In this example, the Speed coverage layer was selected:



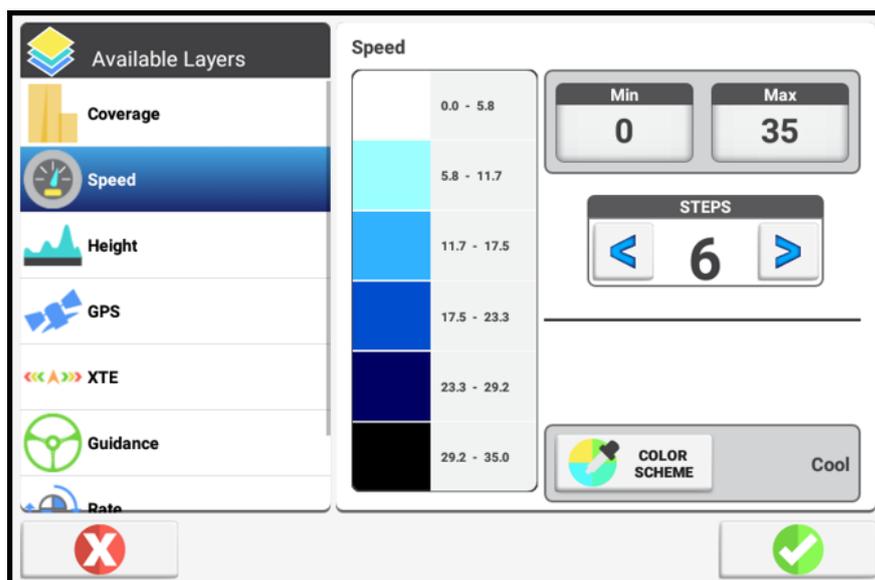
3. Tap anywhere in this coverage layer widget to display the Available Layers pop-up window:



4. Tap the **Settings** icon:



5. In the Settings pop-up window, tap the coverage layer you want to edit. In this example, select **Speed** from the list of Available Layers:



6. From this view, you can change:

- **Minimum and Maximum values** - For the speed values, tap **Min** to enter a minimum value (default is 0). Tap **Max** to enter a maximum value. If a coverage layer does not require a minimum or maximum value, these buttons are greyed out.
- **Steps** - Tap to adjust the number of ranges in the Coverage Layer widget.
- **Color scheme** - Tap to change the color family of the Coverage Layer widget. Choose from **Cool**, **Hot**, **Grey Scale**, or **Rainbow**.

7. When you have completed your selections, tap the green check to save your changes:



## Coverage Logging

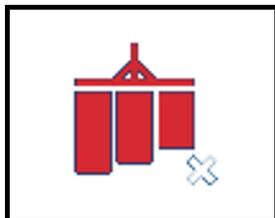
The Precision-IQ application's Coverage Logging records the area that you have covered when you carry out an operation, for example applying fertilizer to a field. It also allows you to view different map layers of your coverage as you are working in the field.

You can set up varieties that make it easy to see the difference between different types of coverage. This enables you to:

- Change product part way through a field, so that you can later identify which parts of the field are covered in which product.
- Plant or apply two or more different products side-by-side and record the locations in your field. For example, you could put corn seed in the left side hoppers on your planter and clover seed in the right side hoppers and track where each set of seeds is

planted. The varieties are assigned to rows on your implement. Specify the number of rows on your implement when you configure it.

Once you enter the Run screen, coverage logging is not engaged by default, which is indicated by the following icon:



Tap this icon to engage coverage logging. The icon changes to:



## Automatic Logging with Engage

If your system has been configured to do so, coverage will start when your auto guidance system is engaged in the Run screen. Coverage will stop when auto guidance is disengaged.

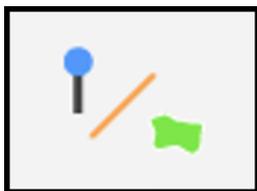
If automatic logging is activated, you can still turn logging on or off when engaged or when disengaged by tapping the coverage logging icon:



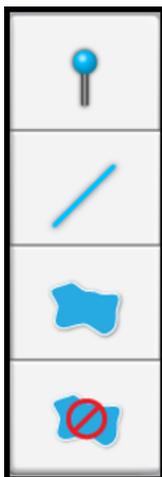
## Landmarks

As you perform work within a field, you can fine-tune the details about the field by using landmark markers. These markers allow you to identify specific areas or points that can affect how Precision-IQ records the work done.

1. From the Run screen, tap the **Landmarks** button:



2. A selection of landmark buttons appears:



3. Tap the **Landmarks** button to hide the landmark selection buttons.

After you have created landmarks, you can edit them and assign them to categories using Field Manager. See [Field Manager Landmarks](#).

## Landmarks: Points

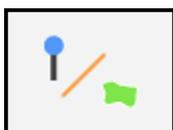
Use the landmark point marker on the field map to identify landmarks such as:

- Generic (such as a gate, riser, tile inlet, water trough, well)
- Rock
- Pest or crop damage (such as from insects, weeds, etc.)
- Obstacle (hole, tree, hazard)

Landmark points can trigger warnings when you approach them.

To set a landmark point:

1. From the Run screen, tap the **Landmarks** button:



- From the list of available landmark buttons, tap the Point button:



Precision-IQ places the marker at the vehicle's current location, based on the recording point.

- Use Field Manager to edit, rename, or set alarms for a landmark point. See [Field Manager Landmarks](#).
- Tap the **Landmarks** button to close the list of available landmark buttons.

## Landmarks: Lines

Use the landmark line marker to record a line such as:

- Generic (such as border, drip tape, gate, path, road)
- Obstacle (cable, ditch, fence, hazard, pipe, river, stream, terrace, trees)

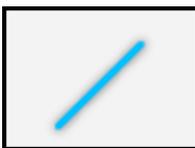
Landmark points can trigger warnings when you approach them.

To record a landmark line:

- From the Run screen, tap the **Landmarks** button:



- In the list of available landmark buttons, tap the **Line** button:



- Position your vehicle where you want the landmark line to begin.
- Tap the **Record** button:



Precision-IQ draws a dashed line beginning at the vehicle's current location, based on the recording point.

Tap the **Cancel** button if you need to discard the line path that is being recorded.

5. Drive to the end of the line you want to record and tap the **Record** button again to save the line.
6. Use Field Manager to edit, rename, or set alarms for a landmark line. See [Field Manager Landmarks](#).
7. Tap the **Landmarks** button to close the list of available landmark buttons.

## Landmarks: Areas

Use the landmark areas marker to record a shape marking a productive landmark area such as:

- Generic
- Pest or crop damage (such as from insects, weeds, etc.)
- Obstacle

***NOTE** – Productive-area landmarks are not used to switch sections on and off, but they can trigger warnings when you approach them.*

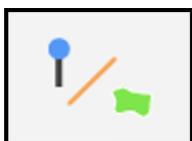
Or a nonproductive landmark area such as:

- Generic (such as clover, exclusion, grassed waterway, slough, waterway).
- Obstacle (hazard, hole, lagoon, pond, rocks, tree).
- Pest or crop damage (such as from disease, weeds, etc.).

***NOTE** – Nonproductive area landmarks can be used to switch sections on and off.*

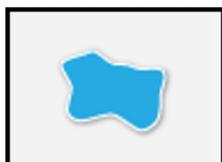
To record a productive or nonproductive area:

1. From the Run screen, tap the **Landmarks** button:



2. In the list of available landmark buttons, tap the area button you want to record:

- **Productive Area**



- Nonproductive Area



3. Position your vehicle where you want the landmark area to begin.

Tap the **Record** button:



Precision-IQ places a marker beginning at the vehicle's current location, based on the recording point.

Tap the **Cancel** button if you need to discard the area path that is being recorded.

4. Drive around the area you want to record and tap the **Record** button again to save the area.
5. Use Field Manager to edit, rename, or set alarms for a landmark area. See [Field Manager Landmarks](#).
6. Tap the **Landmarks** button to close the list of available landmark buttons.

## Guidance Patterns

To take full advantage of the auto guidance and auto steering capabilities of Precision-IQ, you must define the appropriate guidance patterns for your field.

From the Run screen, use the guidance pattern to define:

- Boundary of the field, including the headland area to incorporate an inner and outer boundary.
- Pivots for implements that generate concentric circles.
- Straight lines to identify parallel guidance lines.
- Curved lines to identify guidance lines with both straight and curved segments.

Once you have created a guidance pattern, you can use Field Manager to edit, activate, and deactivate the pattern. See [Edit a Field with Field Manager](#).

A variety of guidance patterns are provided by Precision-IQ.

1. To begin, tap the **Guidance Patterns** button on the Run screen:



2. A selection of available guidance pattern buttons appears:



3. Tap the **Guidance Patterns** button to dismiss the buttons.

For details about setting a guidance pattern, refer to the following sections:

- [Guidance Patterns: Boundaries](#)
- [Guidance Patterns: Headlands](#)
- [Guidance Patterns: Pivots](#)
- [Guidance Patterns: AB Line](#)
- [Guidance Patterns: A+ Line](#)
- [Guidance Patterns: Curves](#)

## Guidance Patterns: Boundaries

A boundary defines the outer edge of your field. To set a boundary:

1. From the Run screen, tap the **Guidance Patterns** button:



2. From the list of available guidance pattern buttons, tap the **Boundary** button:



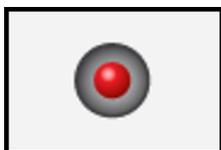
3. Position your vehicle where you want to begin recording the field boundary. You can change the point on the implement's swath where you wish to record the boundary's edge:

Tap the **Recording Point** button, then select a recording point location for your implement. Choose from **Right**, **Center**, or **Left**:



Tap the green check to save your recording point selection.

4. Tap the **Record** button to start the recording:



As you begin driving around the perimeter of the field, Precision-IQ marks the point where you began recording and shows the recorded path with a dashed line.

To suspend recording while creating the boundary, tap the **Pause** button:



Precision-IQ will replace the path you travel while paused with a straight line, from the point where you tapped the Pause button to the point where you resume recording. To resume recording, tap either the **Pause** button or the **Record** button.

To cancel the boundary line creation, tap .

5. Drive around the field until you are near your starting point.
  - If Auto-Close is **on**: When you reach auto-close distance, Precision-IQ 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 application 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 setting, see [Patterns Settings](#).

6. When you have completed the boundary creation, tap the **Guidance Patterns** button to hide the selection of guidance pattern buttons.

To edit any boundary you have created, see [Field Manager Boundaries](#).

## Guidance Patterns: Headlands

A headland is a strip of land within the boundary of your field to allow space for the vehicle to turn around to continue the work within the field.

To set a headland:

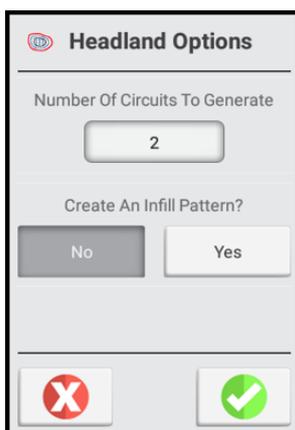
1. From the Run screen, tap the **Guidance Patterns** button:



2. From the selection of available guidance pattern buttons, tap the **Headlands** button:



Tap the **Circuits/Infill** button to modify the Headlands Options:



If the number of circuits is not correct, tap the number and enter the correct amount.

If you want to specify an Infill Pattern (the default is **No**), tap **Yes** and then tap to select an **AB Line** or an **A+ Line**. See [Guidance Patterns: AB Line](#) or [Guidance Patterns: A+ Line](#).

Tap the green check to save the headland options you have selected.

3. Position your vehicle where you want to begin recording.
4. Tap the **Record** button:



As you begin driving around the perimeter of the field, Precision-IQ marks the point where you began recording and shows the recorded path with a dashed line. The controls for the infill line (if any) appear below the headland recording controls.

To suspend recording while creating the headland, tap the **Pause** button:



Precision-IQ will replace the path you travel while paused with a straight line, from the point where you tapped the Pause button to the point where you resume recording. To resume recording, tap either the **Pause** button or the **Record** button.

To cancel the boundary line creation, tap the **Cancel** button:



5. Drive around the field until you are near your starting point.
  - If Auto-Close is **on**: When you reach auto-close distance, Precision-IQ will connect the vehicle's current location to the starting point with a straight line and save the headland pattern.
  - If Auto-Close is **off**: Drive to the beginning point and tap the **Record** button. The application 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 setting, see [Patterns Settings](#).

6. When finished, Precision-IQ saves the headland pattern with a unique name (for example, *HL01*).

Also, an inner boundary and an outer boundary is generated 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*).

An infill swath is generated 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*).

7. Tap the **Guidance Patterns** button to dismiss the selection of guidance pattern buttons.

**NOTE** – To edit the infill line, see [Field Manager Guidance Patterns](#).

## Guidance Patterns: Pivots

Use the Pivot guidance pattern to record the exterior curve of a circular field and repeat the pattern. Precision-IQ 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.

To create a pivot guidance pattern:

1. From the Run screen, tap the **Guidance Pattern** button:



2. From the selection of guidance pattern buttons, tap the **Pivot** button:

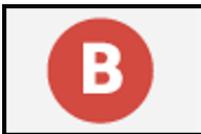


3. Position the vehicle where you want to be recording the pivot pattern.
4. Tap the **A** button:

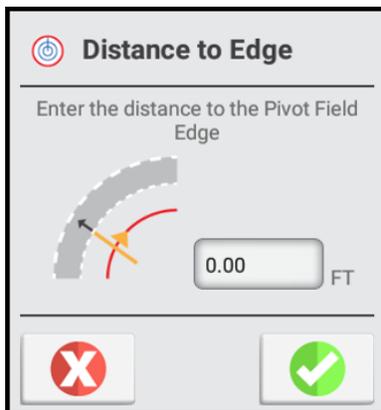


Precision-IQ marks your starting point on the map, at the vehicle's location when you tapped the record button. It shows the recorded path with a dashed line.

5. Drive at least 50 feet on an outer tower rut and then tap the **B** button:



Enter the distance to the pivot field edge in the Distance to Edge pop-up window:



Tap the green check to save the distance-to-edge value.

6. To cancel the pivot creation, tap the **Cancel** button:



7. When finished, Precision-IQ:
  - 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. Tap the **Guidance Patterns** button to dismiss the selection of guidance pattern buttons.

## Guidance Patterns: AB Line

With AB lines, you define the start and end points. Precision-IQ records 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.

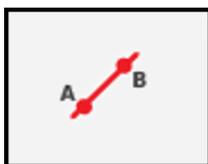
**NOTE** – Precision-IQ uses the implement width to project swaths for the master line. Active lines project swaths in either direction based in the width used to create the line.

To create an AB line:

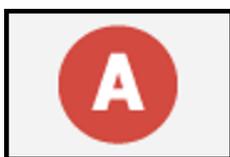
1. From the Run screen, tap the **Guidance Pattern** button:



2. From the selected list of available guidance pattern buttons, tap the **AB Line** button:

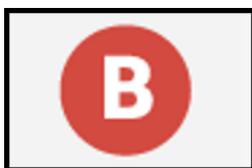


3. Position the vehicle where you want to begin recording the AB line.
4. To set the beginning of the AB line, tap the **A** button:



Precision-IQ marks on the map where you tapped the A button. It shows a straight dashed line between the A point and the vehicle's current location.

5. To complete the line and close the controls, tap the **B** button:



6. To save the line, tap the green check:



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

**NOTE** – To cancel the AB line creation, tap the **Cancel** button:



## Guidance Patterns: A+ Line

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

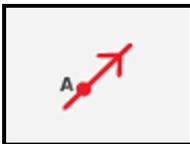
Precision-IQ sets a straight directional line from point A toward the selected direction (compass direction, path of travel, or heading value). Parallel guidance lines will be projected multiple times on either side of the A+ line.

To create an A+ line:

1. From the Run screen, tap the **Guidance Pattern** button:

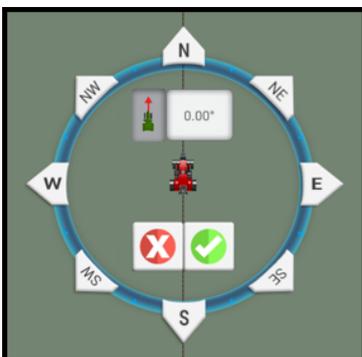


2. From the selected list of guidance pattern buttons, tap the **A+** button:



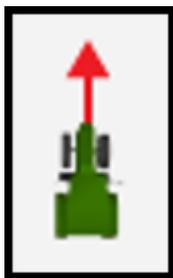
Precision-IQ changes to an overhead view if you were in trailing view. The A point is set at the vehicle's current location. The A+ line controls appear in the center of the screen.

3. Select the direction you want for the A+ line from the compass:



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

direction:



This option is selected by default.

- To enter a specific, exact heading, use the on-screen number pad.
- To use a cardinal (N, S, E, W) or ordinal (NE, SE, SW, NW) direction, tap that direction on the compass.

Precision-IQ saves the line direction.

4. To accept the line and direction and close the controls, tap the green check:



Precision-IQ saves the A+ line. The distance between swath lines is based on the width of the implement that was used to create the line.

**NOTE** – To cancel the A+ line creation, tap the **Cancel** button:



## Guidance Patterns: Curves

You can record a line with curved and/or straight segments. Matching guidance lines will be projected multiple times on either side of the curved line.

To create a curved guidance pattern:

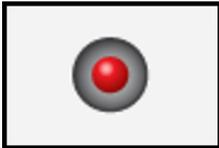
1. From the Run screen, tap the **Guidance Patterns** button:



- From the list of available guidance pattern buttons, tap the **Curve** button:



- Position the vehicle where you want to begin recording the curve.
- Tap the **Record** button to start the recording:



As you begin driving, Precision-IQ marks your starting point on the map, at the point where you tapped the record button. It shows the recorded path with a dashed line between the starting point and the vehicle's current location.

To create a straight line as part of your curved line, tap the **Pause** button:



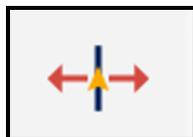
To resume recording the curve, tap either the **Pause** button or the **Record** button.

To cancel the curve line creation, tap .

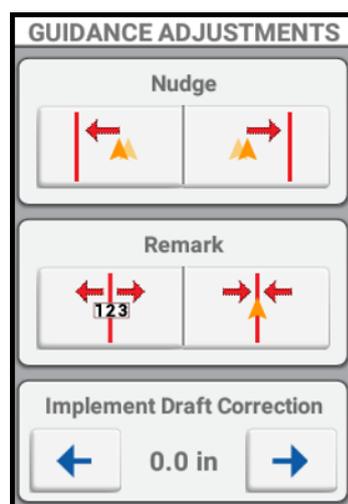
- When you are at the end of the curve line, tap the **Record** button.
- Tap the **Guidance Pattern** button to dismiss the selection of guidance pattern buttons.

## Guidance Pattern Adjustments

To adjust guidance while performing field activities, at the Run screen, tap the **Guidance Pattern Adjust** button:



The guidance adjustments 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 Settings](#) 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 <a href="#">Steering and Guidance Settings</a> .
Remark	Temporarily move the pattern to the vehicle's current location. For information on re-mark settings, see <a href="#">Operating a Vehicle</a>
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 <a href="#">Steering and Guidance Settings</a> .

## Prescriptions

 This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

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 Precision-IQ application (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.

On the Run screen, tap the **Prescriptions** icon to open the Prescriptions Manager:



You can use the Prescriptions Manager to assign a prescription to a channel.

### Prescription Format

The following ESRI shape-file formats are supported:

```
<prescription_name>.shp
<prescription_name>.dbf
<prescription_name>.shx
```

See also:

- [Importing Prescriptions](#)
- [Exporting Prescriptions](#)
- [Assigning a Prescription](#)
- [Using a Prescription](#)

### Importing Prescriptions

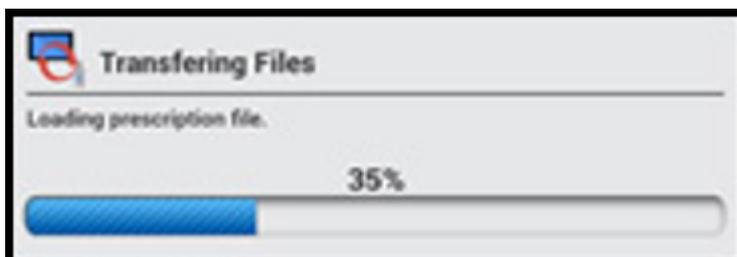
**NOTE** – If you are using USB to import, make sure your USB drive has the AgGPS folder on the root, and the prescription files are in this folder.

You can import prescription files using a USB drive or through Office Sync. See [Data Transfer](#).

1. 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.

The prescription on a USB drive should be stored in the \AgData\Prescriptions\ folder.

2. During the transfer, the Precision-IQ application shows the progress of the transfer:



3. If the amount of polygons exceeds the limit that can be stored by the Precision-IQ application, a message displays:



## 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 Precision-IQ application using a USB drive. See [Data Transfer](#).

## Assigning a Prescription

Before you can assign a prescription, you must:

- Have a field selected. See [Select a Field](#).
- Have a channel set up. See [Add an ISOBUS Implement](#), [Add a Trimble Universal Variable Rate \(TUV\) Protocol Implement](#), or [Add a Custom-Setup Implement](#).

To assign a prescription:

1. Make sure you have a field selected.
2. At the Run screen, tap the **Prescriptions** icon:



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 Precision-IQ application 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
  - 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 .
 

To discard your entries, tap .

## Using 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** button:



The rate control adjustment buttons display.

3. To begin using the prescription, tap the **Prescriptions** icon:



The other buttons will become gray and cannot be tapped unless you stop using the prescription. Follow the onscreen wizard to assign prescription rate columns to the individual channels.

4. Verify the following details:
  - Rate column assignments
  - Units
  - Lead Time
  - "When Outside Prescription" behavior
5. Navigate to the **Rate Widget, Expand** individual channels in the rate control widget of the run screen and switch the Rx button to **On**.
6. View the prescription on the Run screen:
  - a. Click the **Layer** button.
  - b. Click the gear wheel icon (top right) of the "Available Layers" dialog and select "Applied Rate" layer:
    - Adjust the Min and Max values to match the values stored in prescription map
    - Enter an appropriate number of "Steps"

7. To stop using the prescription, tap the **Prescriptions** icon:



## Rate Control

 This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

Precision-IQ provides automatic rate control for a supported implements that are either ISO-certified or can be controlled by Trimble's serial rate protocol.

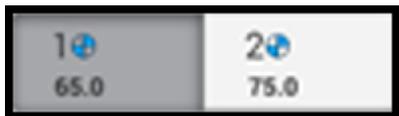
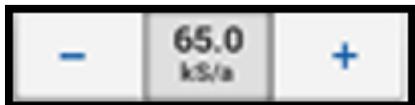
**NOTE** – For ISOBUS, you must be connected to an ISO-certified implement that has been set up. See [Add an ISOBUS Implement](#).

**NOTE** – To use the Trimble protocol for serial rate, you must be connected to a supported implement that has been set up. See [Add a Trimble Universal Variable Rate \(TUV\) Protocol Implement](#).

At the Run screen, tap the **Rate Control Adjust** button to open the Rate Control widget:



Tap the widget again to maximize it.

Button	Explanation
	Tap either the target rate 1 or target rate 2 to set the rate for application.
	To change the rate for either target rate, tap the - or + buttons. Optionally, tap the middle where the rate value is. Use the on-screen keyboard to enter the rate you want.

Under Rate Control, enter details for the following subtabs:

- [Settings subtab](#)
- [Modules subtab](#)

- [Width subtab](#)
- [Adjustments subtab](#)

## Settings subtab

Select to enable or disable Rate Control. A green check indicates that Rate Control is enabled. Tap the following buttons and enter the appropriate information:

**Drive Type.** This option sets the control type for the rate control valve, motor, or pump. The following table describes the available drive types:

Drive Type	Description
Servo Standard	For two-wire servo's plumed inline
Fast Servo	For four-wire servo's plumed inline. These valves generally react quicker than two-wire servos.
PWM	For Pulse Width Modulated coils. These are typically used to control the flow of hydraulic oil to a motor.
Pump Servo	For hydraulic servos. These are used to control the flow of hydraulic oil to a motor.
Hardi % Bypass	Used on Hardi Sprayers equipped with three-way section valves that return flow to the tank when the boom section is closed.
Standard Bypass Servo	For two-wire servo's plumed to bypass excess flow to the tank.
Fast Bypass Servo	For four-wire servo's plumed to bypass excess flow to the tank.

**Auxiliary Valve type.** Use this option to set the auxiliary valve type. Choose from:

- Master - Valve opens when sections are open.
- Dump - Valve opens when sections are closed.

**Number of Nozzles.** Enter the number of outlets on the implement. This value may be nozzles or shanks depending on the implement.

**Control Valve behavior on Sections close.** The following table describes the available options:

Behavior	Description
Close	Control valve closes when all sections are off.

Behavior	Description
<b>Lock in Last Position</b>	When the section/s close, the valve locks in its current position.
<b>Lock at Minimum</b>	<i>(PWM only)</i> When sections close the valve locks in this set position. This position is set via the calibration menu.

## Modules subtab

Tap **Modules** to enter the edit menu. Enter details for the following modules:

- Flow Meter Type
- Flow Meter Units
- Calibration number from encoder tag.

## Width subtab

This will default to the application width.

## Adjustments subtab

Tap **Adjustments** to enter the edit menu. Enter details for the following adjustments:

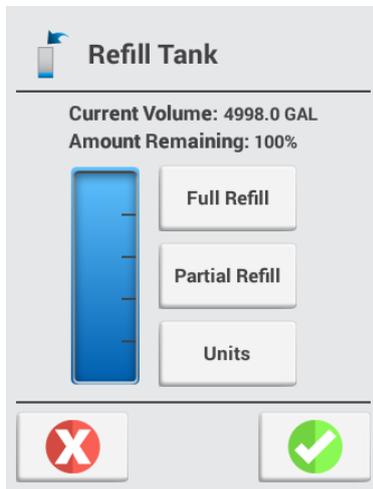
- No/ Low flow timeout. If the system receives no feedback in the specified time, the system will shut off.
- Pump Disarm Switch. This adjustment is for platform kits with an arming relay. Typically, it is found on self-propelled sprayers. This adjustment allows the control of the valve to be transferred from the OEM to Field-IQ Basic.
- Rate Snapping:
  - **ON**: When the product flow is within 10% of the Target rate, the as applied rate will snap to the target rate.
  - **OFF**: The as applied rate will report the true system flow.

## Virtual Tank

Under **Virtual Tank**, enter the following details:

1. Select to enable or disable **Virtual Tank**. A green check indicates that the virtual tank is enabled.
2. Show units as. This option sets the displayed tank units.
3. Full Capacity Volume. You can use this option to set to match the capacity of the system

4. Warning type.
  - Volume
5. Warning Level. This option sets the level at which a low tank warning will be displayed.



Expand the rate widget to reveal the virtual button at the bottom right. Enter the appropriate detail for the following options:

- Full Refill - Sets the Volume to the “full volume” of the tank
- Partial Refill - Allows the user to enter the volume of the tank.

## Operating a Vehicle

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** - 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.

## Vehicle Position

Tap the vehicle in the center of the Run screen to display the perspective change buttons:



#### 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.

### Auto Guidance Status

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.

#### Indicator/Button Auto Guidance System is...



**Gray - Engage Disabled.** Enable it in the steering control panel. This is an indicator only.



**Yellow - Ready to Engage.** Tap to engage the auto guidance system.



**Green - Engaged.** Indicates you are engaged on a pattern or line and are using auto guidance. Tap to disengage.



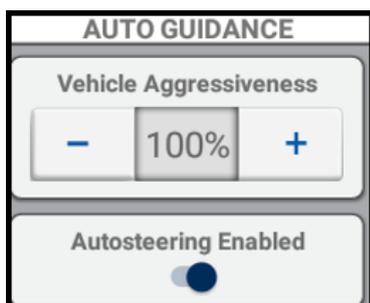
**Red - Cannot Engage.** Does not have the proper conditions met to engage. Tap to determine the reason.

## Steering Adjustments

To adjust steering while performing field activities, at the Run screen, tap Steering Adjust button:



The system displays the steering adjustment buttons:



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

## Using Onscreen 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. On the Run screen, tap the **Widgets** button:



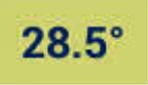
A pop-up window displays showing the available widgets you can use:

Compass	<input type="checkbox"/>
Digital Compass	<input type="checkbox"/>
Manual Controls	<input type="checkbox"/>
Position	<input type="checkbox"/>
Steering	<input type="checkbox"/>
Area	<input type="checkbox"/>

Tap the select box for a widget you want to display. Tap the select box again to dismiss an enabled widget.

## Status Widgets

The following table describes the available status widgets:

Status Widget	Description
	<p><b>Compass</b></p> <p>The direction in which you are traveling.</p>
	<p><b>Digital Compass</b></p> <p>The degrees of the angle you are traveling.</p>
	<p><b>Position Status</b></p> <p>Your current position's:</p> <ul style="list-style-type: none"> <li>• Latitude</li> <li>• Longitude</li> <li>• Elevation</li> <li>• VDOP</li> </ul>

Status Widget	Description
 <p>The widget shows 'Steering' with an upward arrow icon. Below it, 'Roll' is 0.00°, 'Yaw' is N/A, and 'Steering Angle' is N/A.</p>	<p><b>Steering Status</b></p> <p>Your current steering options:</p> <ul style="list-style-type: none"> <li>• Roll</li> <li>• Yaw</li> <li>• Steering Angle</li> </ul>
 <p>The widget shows 'Area' with a toggle switch. It displays: Total: 0.22 ac, Productive: 0.22 ac, Coverage: 0.00 ac, and Coverage %: 0.0%.</p>	<p><b>Area Status</b></p> <ul style="list-style-type: none"> <li>• Total Area of the field</li> <li>• Productive area: Total field area minus the unproductive areas</li> <li>• Task coverage area: The amount of coverage in the field</li> <li>• Percent of coverage: The amount of coverage over the productive area multiplied by 100</li> </ul>

## The Onscreen Lightbar

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.



## Universal Terminal

 This feature is optional and requires an unlock. See [Upgrade or Apply a License for a New Feature](#).

To use Universal Terminal, make sure:

- An ISO-certified implement is connected. See [Add an ISOBUS Implement](#)
- You have a Universal Terminal unlock that has been applied. See [Upgrade or Apply a License for a New Feature](#).
- You have turned on the Universal Terminal feature in the ISOBUS settings. See [Add an ISOBUS Implement](#).

To launch the Universal Terminal, tap the **Universal Terminal** button on the Activity bar:



You can also tap the **Universal Terminal** icon on the Launcher screen:

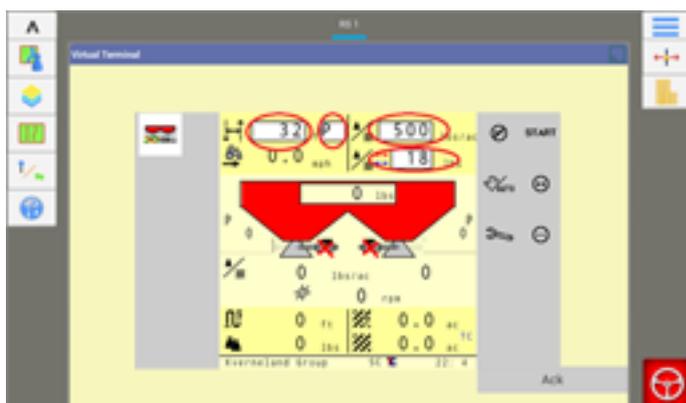


The Universal Terminal widget displays in a smaller version which only shows data and does not allow you to control the implement.



To increase the size of the minimized Universal 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.

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



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

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

## Delete Previous ISO Data

Data loaded from previously used ECUs will take up storage space. To remove this data from the Precision-IQ application:

1. At the maximized Universal Terminal, tap .
2. Next to Delete ISO Data, tap **Delete**.
3. Tap the green check to confirm:



The system removes all previous data.

## Tasks

A task consists of the combination of implement type and the selected field. The Precision-IQ application 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 application continues the previous task unless the *Max Task Time* has already passed.

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

Use [Field Manager Task History](#) 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 application removes the previous coverage from the Run screen and saves the current activity in a new task.

- Review the task history.

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

## Data Stored in Each Task

The data stored in each task includes:

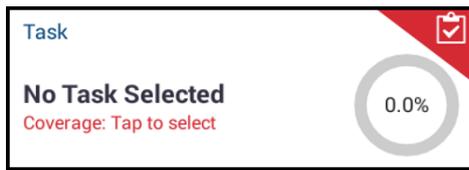
- The field you are working in.
- Date and time for starting and stopping task.
- Coverage list: The list of task coverages for the field.
- Coverage overlap: The area of coverage overlap.
- Height: Mean height above sea level.
- Speed: The speed of the vehicle.
- Material: The material being applied, 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

To create a valid task, you must select an implement and, if applicable, an appropriate material. On the Home screen, the task tile will update to show the associated task:



Tap this tile to modify the name and date of the task. If the implement and material selected are not appropriate or if no task is selected, the Task tile will show a red status:



You cannot enter the Run screen without selecting a task.

# Data Transfer

- ▶ [Data Transfer Overview](#)
- ▶ [Data Transfer Setup and Configuration](#)
- ▶ [Using Data Transfer](#)
- ▶ [Diagnosing and Troubleshooting Data Transfer](#)

This chapter describes how to transfer data to and from your display and your office.

## Data Transfer Overview

Precision-IQ provides support for the wireless transfer of data between a field and the office or between the office and a field. Your data can be transferred via cell or wi-fi networks (depending on your modem choice). When communication is established, all jobs that are completed in the field (using required hardware) are sent to the web server.

The display looks for updated information to download from your Trimble Ag Software storage area. If you lose communication with the web server, then your completed jobs are sent once communication is reestablished. All data is safe and secure.

## Data Transfer Benefits

With the wireless capabilities enabled for data transfer, the following benefits are available to you:

- Send and receive data files wirelessly using Trimble Ag software (cloud-based solution) and Farmer Basic (desktop-based solution) with an online account.
- Take advantage of using Trimble Ag software:
  - Data can be accessed from a web browser.
  - Data can be shared with other third-party agricultural software.
- Provides added flexibility for you and your trusted advisor for data management.

## Data Transfer Requirements

The following in-field hardware is required for data transfer:

- Trimble supported modem, such as a Sierra Wireless GX450 modem.
- Roof-mounted, high-gain cellular antenna with large magnetic base.
- Display modem cable assembly.
- Cellular data plan for modem internet connection.
- Wi-Fi antenna for a modem if transmitting data via wi-fi.
- Farmer Pro or Farmer Pro Plus license plus active vehicle connection service for each machine sending data.
- Farmer Basic desktop software license (for desktop access).
- Trimble Ag Software login/account (for cloud access).

## Types of Data

You can wirelessly exchange the following data between your field and office:

- Client/farm/field.
- Boundaries.
- Resources:
  - Materials.
  - Vehicles.
  - Operators.
  - Implements.
- Feature lines, points and areas.
- A/B guidance lines.
- Prescription maps.
- Planned and completed drainage designs.
- Soil sampling and scouting maps (Farm Works Mobile).

### *Data Available to Third-Party Software*

As needed, you can also exchange the following data with other third-party agriculture software:

- Boundaries.
- Coverage.
- Guidance Lines.
- Features.
- Yield (polygon coverage maps).

*NOTE – Yield point data is provided in an ISOXML file format.*

## Data Transfer Setup and Configuration

This section describes how to set up and configure your display for Office Sync and FarmStream data transfer.

### Office Sync Settings

From the Settings screen, tap **Office Sync** to configure the following settings:

Setting	Explanation
Office Sync	Turn the feature on or off.
Check Server	Set how often you want the display to attempt to retrieve data from

Setting	Explanation
	the server.
Send Data	Choose when you want the display to send information to the office: <ul style="list-style-type: none"> <li>• Hourly.</li> <li>• On job completion.</li> <li>• When display powers up.</li> <li>• Prior to shutdown: delays the display's time for powering off.</li> </ul>
Auto Send Without Prompt	Select whether or not you want the display to send information to the office automatically.
Auto Import Box	Turns this feature on or off.

## Set Up Data Transfer in the Cloud

Follow the steps below to set up data transfer in the cloud for access using Trimble Ag software:

1. Log in to <https://agriculture.trimble.com/software>.
2. In the navigation bar, click **Fleet**.
3. On the Fleet page, click **Create a New Vehicle**. The Vehicle Properties page displays:

Vehicle Properties



Change Icon

Name \*

Manufacturer \*

Vehicle Type \*

Vehicle Group  [Manage Groups](#)

Unit Cost  / hr

**Attached Devices**

Display Device  [Add Display Device](#)

Telematics Device  [Add Telematics Device](#)

(Available Licenses)

**NOTE** – A vehicle must be created for Trimble Ag software to know how to organize incoming data.

4. Complete the following fields to set up a Vehicle:
  - a. **Name:** Create a name for your vehicle.
  - b. **Manufacturer:** From the drop-down menu, select a manufacturer for your vehicle.
  - c. **Vehicle Type:** From the drop-down menu, select a type for your vehicle.
  - d. **Vehicle Group:** (*optional*) From the drop-down menu, select a group that you want to include your vehicle.

If you do not have a group to assign your vehicle, click **Manage Groups** to create one.

- e. **Unit Cost:** (*optional*) Enter the hourly unit cost of your vehicle.
- f. **Display Device:** From the drop-down menu, select a display device.  
If you do not have a display device to assign to your vehicle, click **Add Display Device**. In the Add Device pop-up window, enter the device serial number and click **Get Device Type**. Click **Add**.
- g. **Telematics Device:**(*Modem only*) From the drop-down menu, select a telematics device.

If you do not have a telematics devices to assign to your vehicle, click **Add Telematics Device**. In the Add Device pop-up window, enter the device serial number and click **Get Device Type**. Click **Add**.

**NOTE** – *If you are using FarmStream, then you should not choose a telematics device.*

- h. Click **Assign Vehicle License** to associate a valid license to your vehicle. Select an available license and click **Assign**.

A license includes data transfer and telematics for a vehicle.

**NOTE** – *Once assigned and saved, the selected license cannot be moved to another vehicle. Displays and modems can be transferred.*

**NOTE** – *If no Vehicle Connection License is available, then you can purchase one or more from the Marketplace (on the Navigation bar, click **Farm** and then click **Marketplace**).*

- i. Click **Save**.
5. In the navigation bar, click **Field**.
  6. If you have no fields configured, then click the **Manage** drop-down menu and select **Add New Field**.

Field Name\*

Client  +

Farm  +

Boundary Area 0.00 Acres

Legal Description

Tillable Area 0.00 Acres  ↻

2017 Crop  + Add Crops

SAVE CANCEL

7. Complete the following fields to add a field:
  - a. **Field Name:** Enter a name for your field.
  - b. **Client:** From the drop-down menu, select a client.  
If no client is available, click  + and enter a client name in the pop-up.
  - c. **Farm:** From the drop-down menu, select a farm.  
If no farm is available, click  + to add a new farm. Complete the details on the Create Farm pop-up and click **Save**.
  - d. **Boundary Area:** The value of the boundary area is created from the map on the right-hand part of the form. Use the polygon tool or freehand tool to specify a boundary. Once a boundary is created on the map, the Boundary Area field will automatically update with the number of acres.
  - e. **Legal Description:** Enter a legal description for your field.
  - f. **Tillable Area:** Enter the number of acres of tillable area for your field.
  - g. **Crop:** From the drop-down menu, enter a crop for the year.  
If no applicable crop is available in the drop-down menu, click **Add Crops**. Complete the details on the Create Crop Season pop-up and click **Save**.
  - h. Click **Save** to save your field profile.

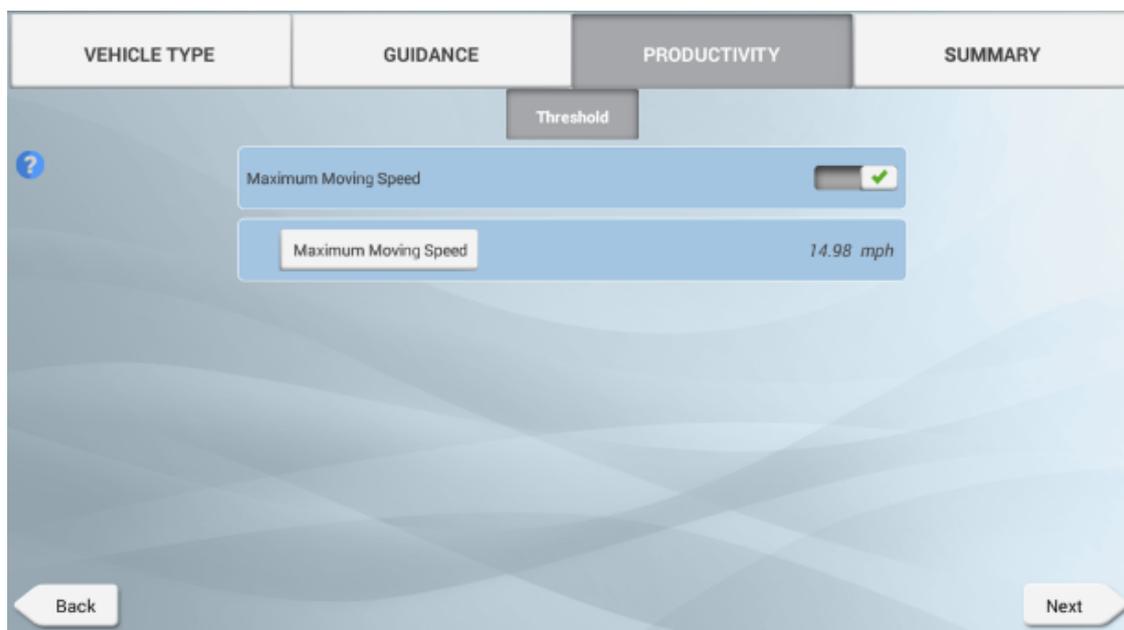
Once you have created and saved a vehicle and field, as data is sent from the field, it will populate automatically and appear on your dashboard.

The `AgData.zip` file will appear under each machine listed on the Fleet dashboard.

## FarmStream Settings

To use the Utilization app and FarmStream Fleet Manager reporting on the display with Precision-IQ field application, you must first set up the thresholds in the Precision-IQ application.

1. In the Home screen, tap the Precision-IQ icon to open the application.  
After opening Precision-iQ, you can set up the Implement and Vehicle settings for the Utilization app, so the utilization data shows up as you want it to in FarmStream Fleet Manager.
2. Tap **Vehicle** on the Home screen to set the vehicle settings.
3. In the Productivity tab, set a threshold for the vehicle maximum moving speed for the Utilization app. Any time that the vehicle travels over this maximum moving speed, it is reported as speeding. If you turn the Maximum Moving Speed off this means that the “speeding” state will not be used for the vehicle in FarmStream Fleet Manager.



**NOTE** – The Productivity tab is only visible if the Enable Operators feature is turned on. This feature is accessed by tapping **Settings** on the Home screen and selecting **Users and Passwords**.

4. To set the maximum moving speed option, tap **Maximum Moving Speed**. Choose a maximum moving speed for the vehicle and then tap the green check button. There is also an option to display the speed in US or Metric units. The range of the allowed moving speed that can be selected is noted in the dialog:

5. On the Home screen, tap **Implement** to set the Implement thresholds for the Utilization application.

If an operator exceeds the functional speed for an implement, possible damage can occur to the implement, the vehicle, the crop or the field. The display can send information about the implement status to FarmStream Fleet Manager in the Trimble Ag Software solution.

6. On the Implement settings screen, go the **Productivity** tab:

**NOTE** – The *Productivity* tab is only visible if the **Enable Operators** feature is turned on. This feature is accessed by tapping **Settings** on the Home screen and selecting **Users and Passwords**.

These settings determine what information is sent about the implement from the Utilization application to FarmStream Fleet Manager.

The table below describes the different settings options:

Setting	Description
Maximum Transport Speed	<p>The functional speed limit for transporting the implement. The options are <b>On</b> or <b>Off</b> and a numerical value for the speed.</p> <p><i>Maximum Transport Speed</i> is used to determine when a vehicle enters the “speeding” state. The minimum of Maximum Transport and Maximum Moving speed will be used in this determination; Maximum moving speed is configured under the vehicle setup (Productivity tab).</p> <p>If Maximum Transport Speed is turned off, then the Maximum Moving Speed for the vehicle is used to determine the “speeding” threshold (if Maximum Moving Speed is turned on).</p>
Maximum Operating Speed	<p>The functional speed limit for the implement when coverage logging is on. The options are <b>On</b> or <b>Off</b> and a numerical value for the speed.</p> <p><i>Maximum Operating Speed</i> is used to determine when the vehicle enters a “rushing” state.</p>
Stopped to Delayed Timeout	<p>The length of time the vehicle can be paused before the vehicle is considered delayed. The options are <b>On</b> or <b>Off</b>.</p> <p><i>Stopped To Delayed Timeout</i> is the amount of time that will pass after the vehicle has entered a “stopped” state before it’s considered to be in a “delayed” state (and the operator may be prompted to select a reason for the delay).</p>

To set the Maximum Transport speed, tap **Maximum Transport Speed** and enter a value in the range indicated. Select the Units, if required. Tap on green check to save.

Tap **Maximum Operating Speed** and **Stopped To Delayed Timeout** to set the values and/or select units for these two parameters:

**Maximum Operating Speed**

---

Enter a value between 0.00 and 90.00 mph  
mph

Units

**Stopped To Delayed Timeout**

---

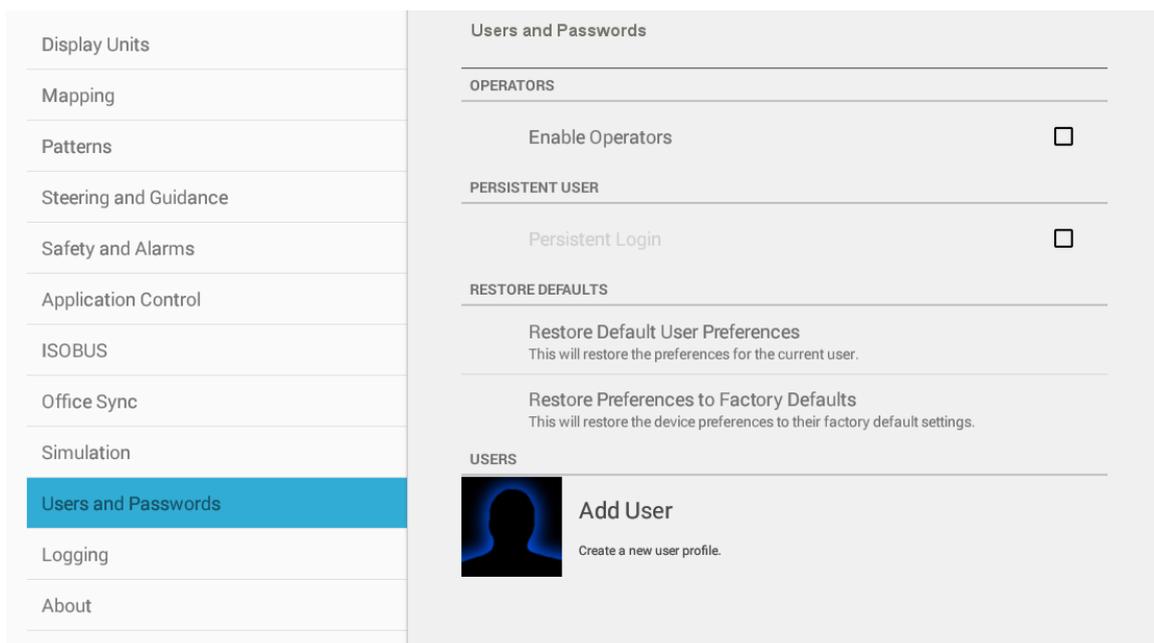
Enter a value between 180.00 and 7200.00 seconds  
seconds

## Setting up the Operator for FarmStream Reporting

Signing in as an operator is not required for Utilization or FarmStream to run, but if you want to see operator information in the application, you must sign in. In order to use operator login with Precision-IQ, the **Enable Operators** feature must be turned on. This feature is accessed by tapping **Settings** on the Home screen and selecting **Users and Passwords**.

For additional details, see [Users and Passwords](#).

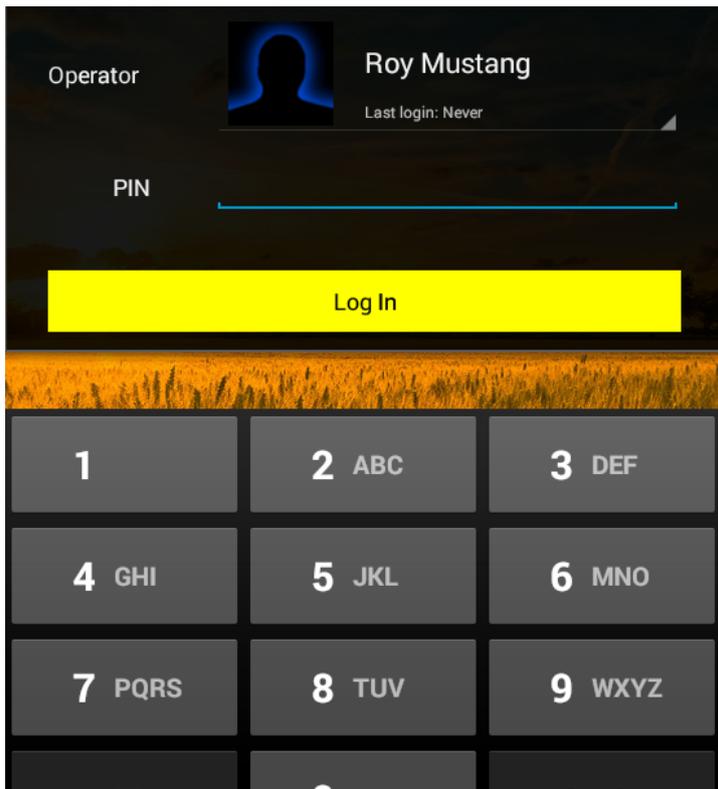


To set up operator information, turn on your display. You should see the Operator app. Tap on the Operator app icon to launch it.

Operators can be created in the Fleet page of the Trimble Ag Software. All operators in the display's organization are automatically sent to the display when it has connectivity. These operators can be seen under the Connected Farm menu in the Operator app. If operators in the Fleet page are changed, any changes will be visible in the Operator app after the app has been killed and restarted, or when the display has rebooted.

Operators can also be created locally on the display, but they will not be sent to the Trimble Ag Software to be seen on the Fleet page. These local operators will not show in the Connected Farm menu in the Operator app.

1. Login to the Operator app in order to track who is using the vehicle, for reporting in the Utilization app and FarmStream:



2. Enter or scan your operator PIN to login.

Once logged in, the operator information will be recorded along with any utilization data.

## Using Data Transfer

As all vehicles operate as normal performing steering and field activities, data will be *sent* to the office based on your user settings in display:

- Automatically when a field is closed.  
OR
- Manually based on user exports actions.

Likewise, data will be *received* from the office based on your user settings:

- Automatically when inbox files are received.  
OR
- Manually based on user import actions.

## Viewing Transferred Data

The transferred data is available through:

- Desktop access.  
Direct access in Farmer Basic Software with a Farmer Pro or Pro Plus account.
- Cloud access.
  - Trimble Ag Software Dashboard: View all data from all machines.
  - Trimble Ag Software Field: View data by field from all machines.
  - Trimble Ag Software Fleet: View data by machine from all fields. You can download and upload raw data files by machine for use in third-party mapping software

## Data on the Dashboard

To access the dashboard:

1. Log in to <https://agriculture.trimble.com/software>.
2. By default, the dashboard should display. Otherwise, on the navigation bar, click **Farm**.
3. From the dashboard, you can:
  - View Field Task History.
  - View all data from all machines.
  - Select a task and view it in map window.



## Data Transfer Files in Fleet

Log in to <https://agriculture.trimble.com/software>. On the navigation bar, click **Fleet**. From the Fleet page, you can view, download, and upload data files to/from a vehicle:

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## Upload Files to a Vehicle Online

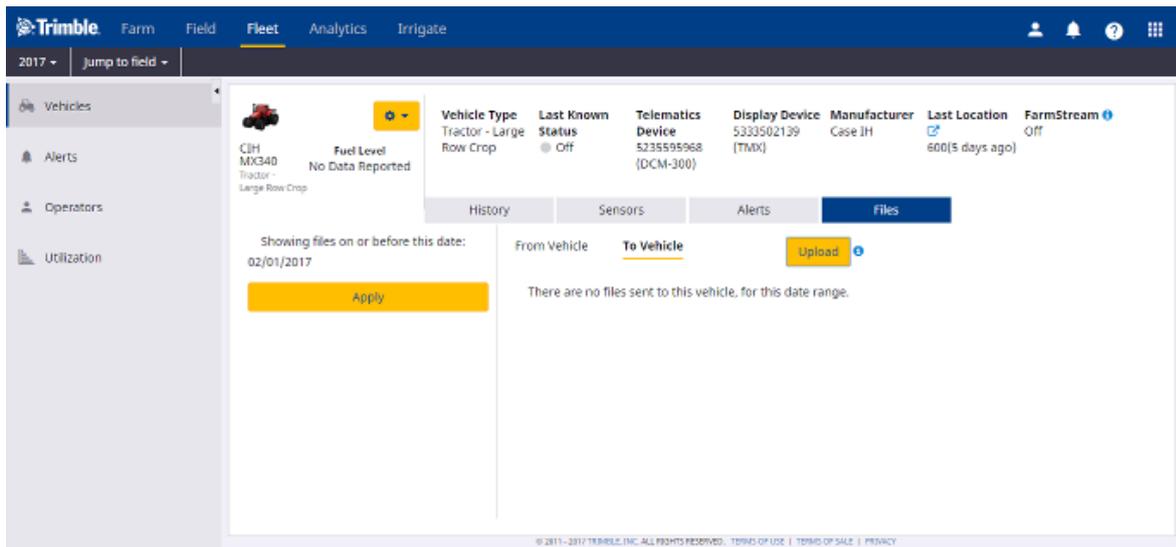
Follow the steps below to upload files from Trimble Ag software to your selected vehicle:

1. Gather files and create a directory structure based on your display.
 

***NOTE** – The directory structure must be in the AgData format for your display.*
2. Create the zip to be uploaded.
3. Select a vehicle to upload the zip file to.
4. Upload file in Fleet per vehicle.

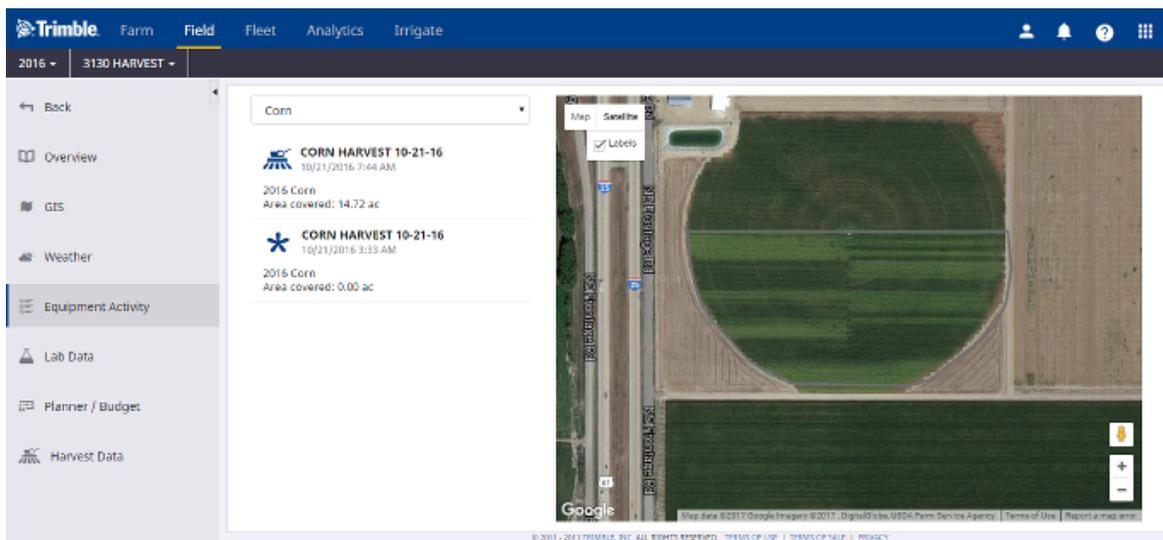
## Upload Data Files to Vehicle

1. Select “To Vehicle” and click **Upload**.
2. Attach zip file of directory structure to upload.



## View Data in the Field

1. View all tasks for the field.
2. On the navigation bar, click **Field** and then select **Equipment Activity**:



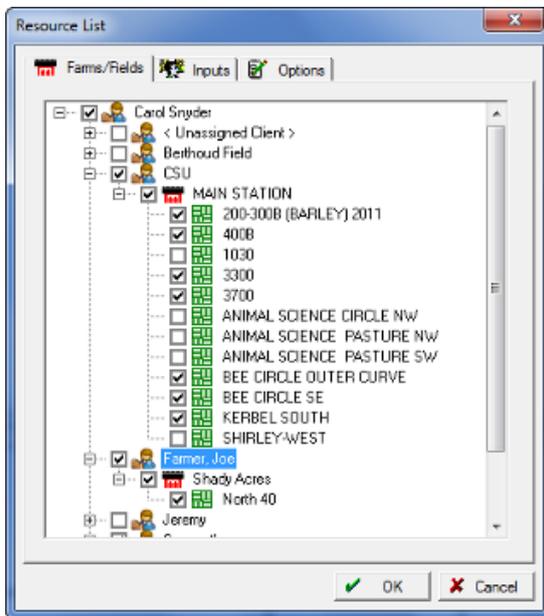
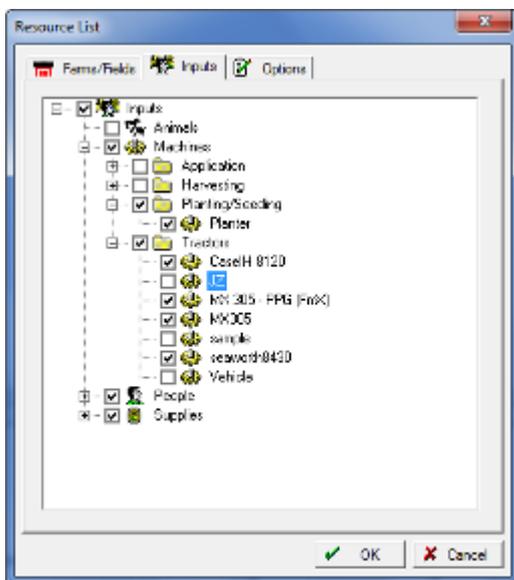
## Upload Data to the Display using Trimble Ag Desktop Software

Follow the steps below to upload data to the display using desktop software:

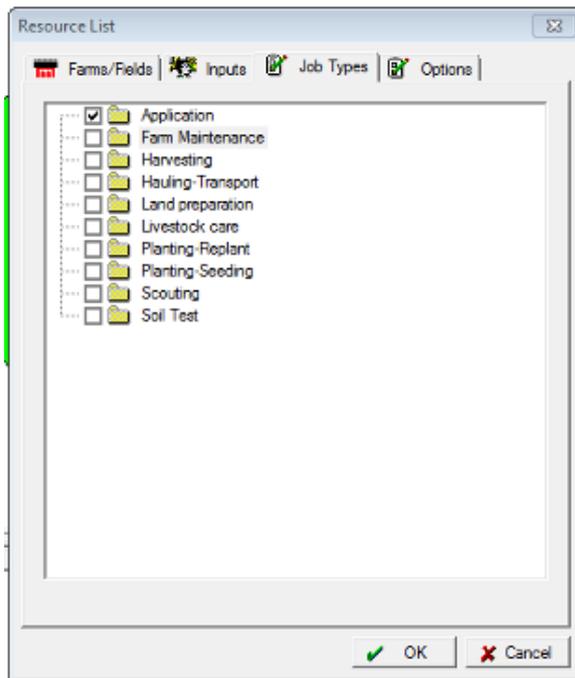
1. Go to the **Online** tab in the desktop software and logon with your Trimble Ag Software username and password. If applicable, select the organization you are working with.

2. Click **Send Resources**.

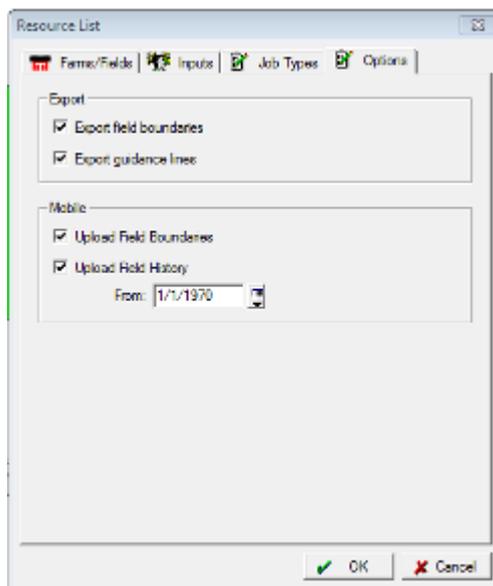
Use the **Send Resources** button to specify data you want uploaded to Trimble Ag Software server so it can be downloaded to your display.

3. In the Farms/Fields tab, select the **Clients/Farms/Fields** to upload.4. In the Inputs tab, select the **Machines/People/Supplies** to upload.

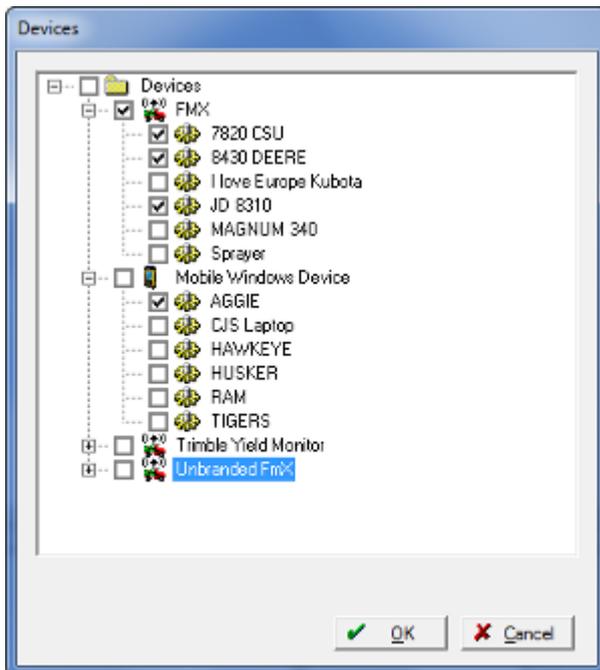
5. Select **Job Types** to be sent



6. Select the **Options** tab to send field boundaries and/or guidance lines
7. Click OK.



8. Select Trimble Display(s) to upload resources to and click **OK**.



9. Selected resources are added to Outbox for mobile devices that you chose.

As soon as software communicates with Trimble Ag Software server, data is uploaded and moved to the Device Inbox where it stays until the mobile device downloads the resources.

## Data Transfer Using a USB

If you do not have a reliable wireless connection or the required wireless modems, you can still transfer files using a USB device (for example, a "thumb drive"):

- [USB VDB Transfer](#)
- [Transferring Data to/from the Display Using a USB](#)

### *USB VDB Transfer*

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

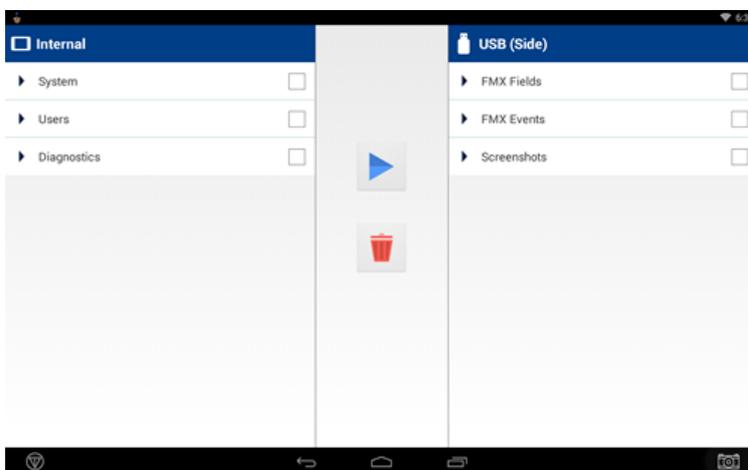
1. Connect a laptop that has the Autopilot Toolbox software to the serial port of the NavController that contains the vehicle config file you want.
2. Using Autopilot Toolbox, save the config (.cfg) file to the laptop.
3. Transfer the saved config file from the laptop to a USB drive in the folder AgData/Profiles.
4. Make sure you have the Precision-IQ application open.
5. Insert the USB drive containing the config file in the USB socket of the display.

6. Insert the USB drive containing the config file in the micro USB adapter cable. Continue with [Transferring Data to/from the Display Using a USB](#)

### *Transferring Data to/from the Display Using a USB*

Follow the steps below to transfer data to and from your display:

1. If not powered on, turn on the display. See [Display Power On/Off](#).
2. From the launcher screen, tap  to open the Precision-IQ application.
3. Insert the USB drive into one of the USB ports on the display. See [USB Port](#).
4. Tap  and then tap **Data Transfer**. The Data Transfer screen displays:



5. To expand an item on either list, tap a category name.
6. To select all files in a category, tap the box beside the category name. A check mark displays.
7. To deselect all files in a category, tap the box beside the name.
8. To select an individual file, tap the box beside the file name.
9. Tap  to move the item from the display to the USB drive.
10. 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.*

## Diagnosing and Troubleshooting Data Transfer

This section provides details for diagnosing and troubleshooting common data transfer issues not related to FarmStream.

## Office Sync Diagnostics

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

Office Sync wirelessly transfers files between the display and Trimble Ag Software 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	<p>The state of sending or receiving files using Office Sync. Options include:</p> <ul style="list-style-type: none"> <li>• Disconnected: Display is not authorized for Office Sync</li> <li>• Authenticating: Display is checking for permission to use Office Sync</li> <li>• Ready for file transfer: Display is connected to the Internet and Office Sync is enabled</li> <li>• Checking for files: Display is checking for updates to be transferred</li> <li>• Receiving files (and percentage): Display is receiving files from the office. Percentage indicates the progress of the download.</li> <li>• Sending files (and percentage): Display is sending files to the office. Percentage indicates the progress of the send.</li> </ul>
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.

# Diagnostics and Troubleshooting

- ▶ System Diagnostics
- ▶ GNSS Diagnostics
- ▶ ISOBUS Diagnostics
- ▶ GNSS Troubleshooting
- ▶ Display Troubleshooting
- ▶ Autopilot System Diagnostics

Precision-IQ offers a wide variety of diagnostic and performance data that you can review and analyze to improve the efficiency of your field operations. This chapter covers information about the status of equipment and services, as well as troubleshooting and diagnostics information.

To get started, tap the **Diagnostics** icon on the Precision-IQ activity bar:



## System Diagnostics

From the Precision-IQ activity bar, tap the **Diagnostics** icon:



## Performance

By default, the System's *Devices* Performance screen displays:

The screenshot shows the Precision-IQ application interface. On the left is a navigation menu with options: System, Performance (selected), Logging, GNSS Receiver, Performance, ISOBUS, and Task Controller/Universal Terminal. The main area is titled 'DISPLAY' and shows 'Precision-IQ Version 5.0.0.44 (78528c8)'. Below this is a table with the following data:

Title	Firmware Version	Serial Number	Connected
GFX-750	1.00.00.0067	1234567890	Yes
NAV-900	1.01.015.2	0987654321	Yes

This screen shows you the following information:

**Title:** This column lists all devices managed by Precision-IQ.

**Firmware Version:** This column shows the installed firmware version for each connected device.

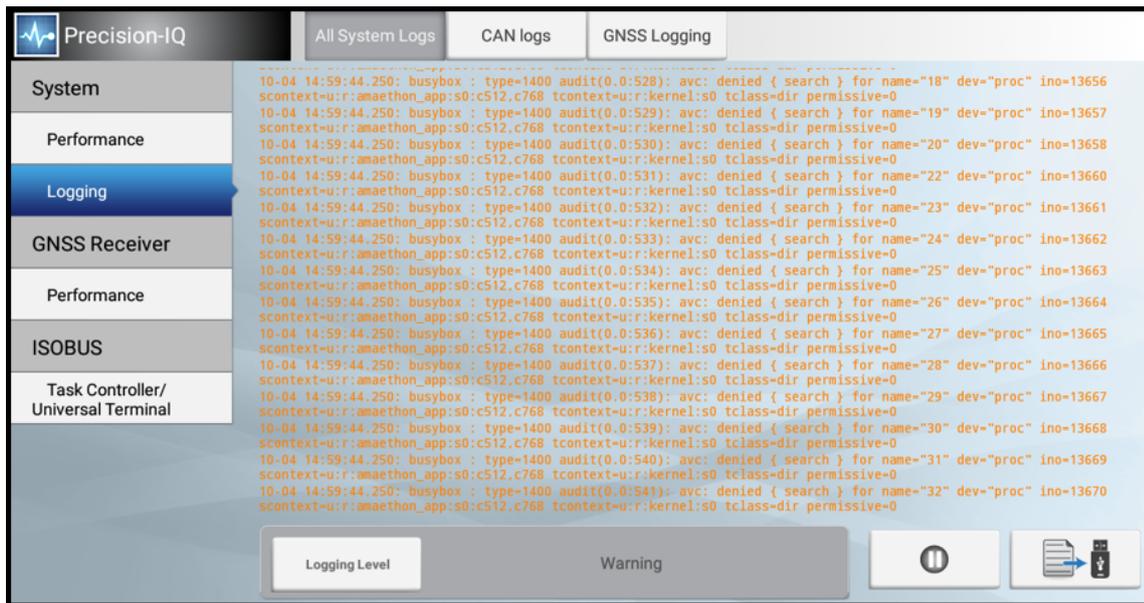
**Serial Number:** This column shows the serial number for each connected device.

**Connected:** This column shows whether or not a device which is managed by Precision-IQ is actually connected to the display.

This reference information is useful should you need to submit a support request.

## Logging

Tap **Logging** for a summary of logging details. By default, the screen shows all system logs:



Tap **Logging Level** to filter the system log report:



You can filter the report by:

**Info:** Show only informational details.

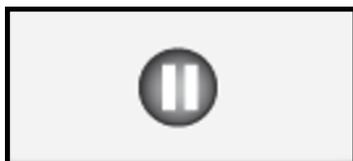
**Warning:** Show only warning details.

**Error:** Show only error details.

**Assert:** Show only assert details.

**Fault:** Show only fault details.

Tap the **Pause** button to suspend logging:



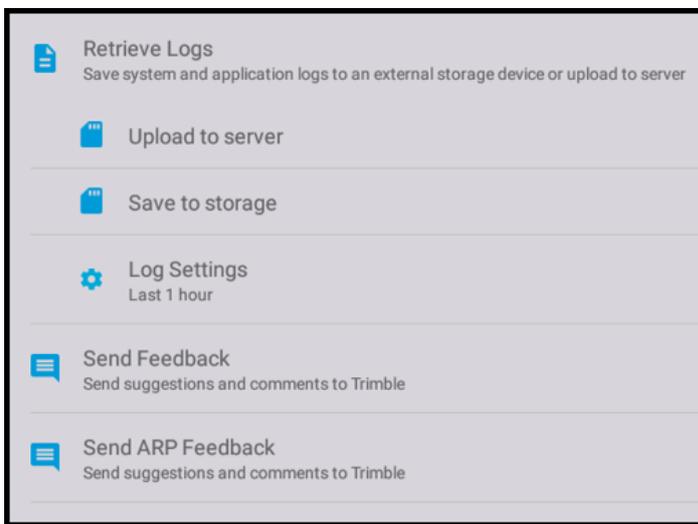
While paused, the Pause button will slowly blink. Tap the **Pause** button again to resume logging.

If needed, you can save a log report to an external USB device:

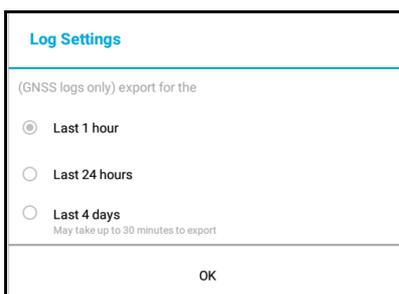
1. Insert a USB drive into the USB port of the display.
2. Tap **Logging Level** to filter the report.
3. Tap the **Pause** button to suspend logging.
4. Tap the **Save to USB** button to save the log report to your USB device:



5. The Support screen displays:

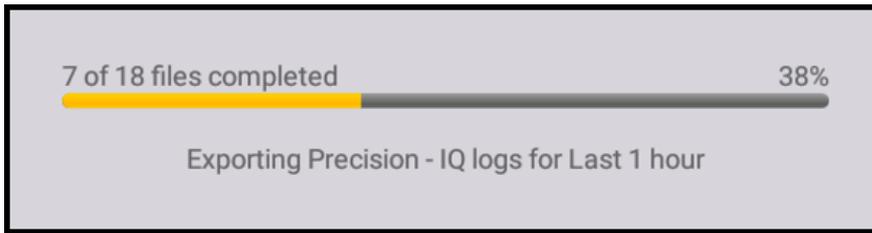


By default, the **last 1 hour** of logging data is exported. Tap Log Settings to change the value:



If you select the **last 4 days** of log data, then allow for at least 30 minutes for the log file to be exported.

6. Tap **Save to storage** to save the log file to your USB device. Select a location on your USB device, then tap **Save**. The display shows a save status as the log file is exported:



7. When the exported log files are saved to your USB device, the display shows:



8. Tap the Android **Back** button to return to the Diagnostics screen.

9. Tap the **Pause** button to resume logging.

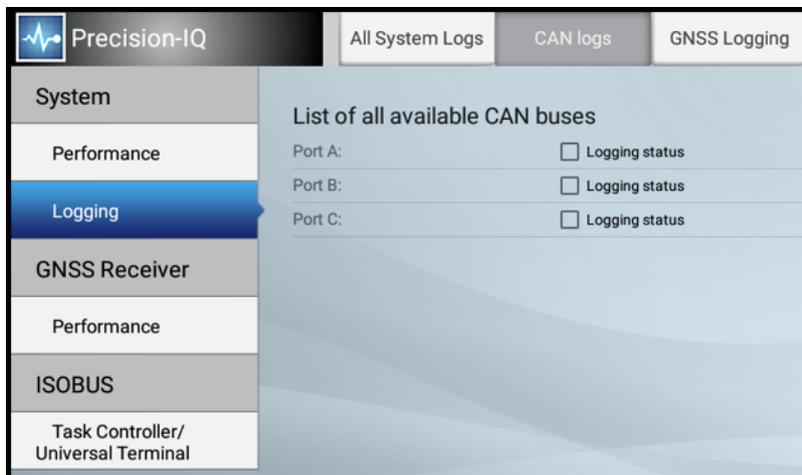
10. Remove the USB device from the USB port.

The log files are compressed into a zip file on the USB device. The file name is structured:

PIQ\_<display's serial number>\_<file save date>.zip

For example: PIQ\_1234567890\_201711106.zip

Tap **CAN Logs** for a list of all available CAN busses:



To save the CAN logs:

1. Insert a USB device into the USB port of the display.
2. On the CAN Logs screen, the Save to USB button will turn green when the USB device is recognized by the display. Once it turns green, tap the **Save to USB** button:



3. Once complete, the display will return the following message:

*The export was successful. Please check your media drive.*

4. Remove the USB device from the USB port.

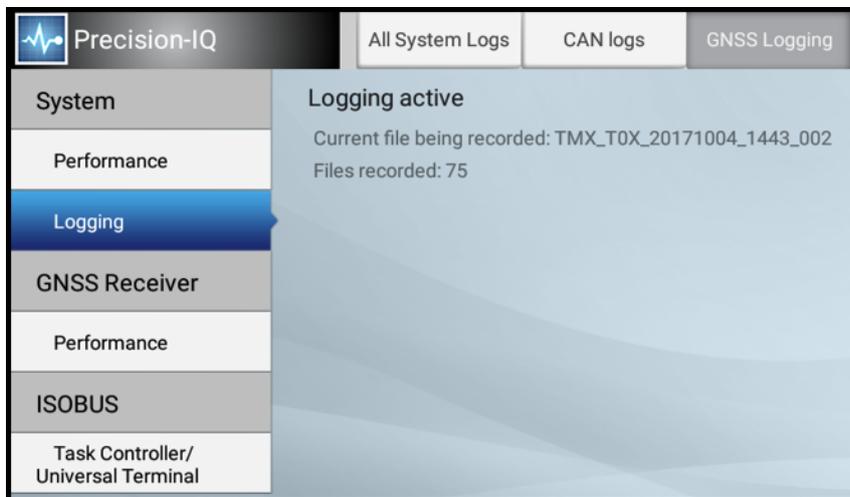
At the root level of your USB device, the CAN log files are stored under a new **can\_logs** directory.

**NOTE** – Any existing CAN log files will be overwritten.

Once you have saved the CAN log files, tap the **Delete** button to clear them from the display:



Tap **GNSS Logging** for status of GNSS logging:



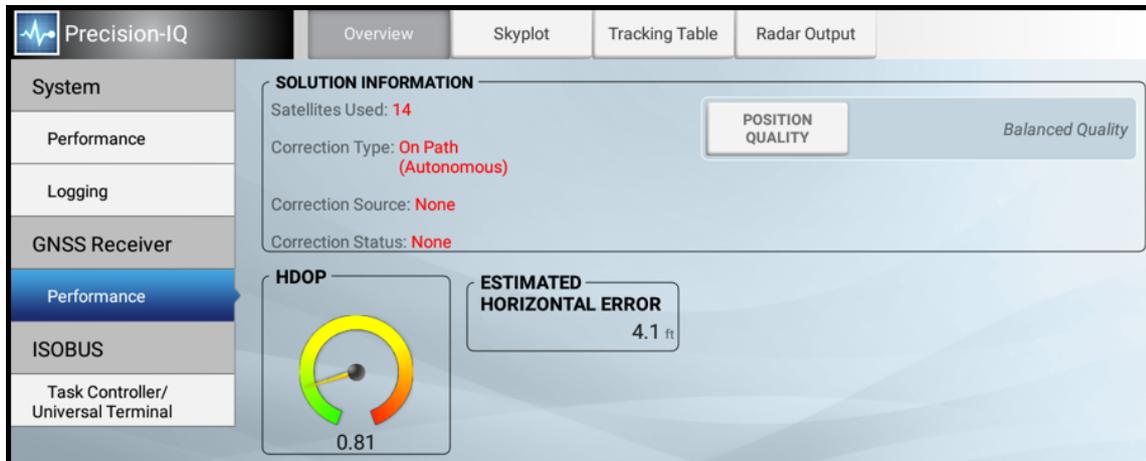
This screen shows the file name and the number of files being recorded.

## GNSS Diagnostics

From the Precision-IQ activity bar, tap the **Diagnostics** icon:



On the Diagnostics screen, tap **Performance** under GNSS Receiver to display overview details about the GNSS connection:



For information on GNSS connectivity, see [GNSS Connectivity and Supported Correction Services](#).

**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.

On the Overview tab, the following GNSS details are provided:

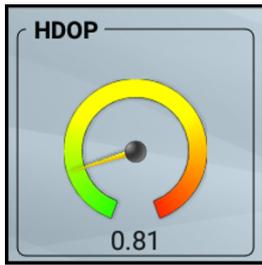
#### Solution information

- Satellites used: Indicates number of satellites currently being used.
- Correction Type: The correction service indicated at setup. See also: [Correction Services](#).
- Correction Source: Modem, satellite / fast, satellite /SBAS.
- Correction Status: Fixed, Float or xFill.
- Position Quality: Tap to change. Favor accuracy, balance quality or favor availability.

#### HDOP (Horizontal Dilution of Precision)

This image indicates:

- Good (green): <1
- Moderate (yellow): 1 - 3
- Poor (red): >3



## Estimated Horizontal Error

Current value in feet/inches or meters/centimeters

Additional Diagnostics	Explanation
Correction Age	Green / , <5 = good; yellow / 5 - 10 = moderate; Red / >10 = poor
Iono Scintillation	Amount of scintillation in the ionosphere: <ul style="list-style-type: none"> <li>• Good (green): &lt;2</li> <li>• Moderate (yellow): 2.0 - 4.0</li> <li>• Poor (red): &gt;4.0</li> </ul>
Max Correction Age	Shows highest value over the last 100 seconds
Cell Signal Strength	Strength of cell signal
CMR %	Shows current CMR percentage
Cell Data Packets Send/Received	Shows the amount of packets sent and received
VDOP	Vertical Dilution of Precision: <ul style="list-style-type: none"> <li>• Good (green): &lt;2</li> <li>• Moderate (yellow): 2- 6</li> <li>• Poor (red): &gt;6</li> </ul>
ANTENNA	Connection is on (green checkmark) or off (red X).
Correction Status	Status of the correction
Subscription Status	Shows date the subscription ends

## Skyplot

Tap **Skyplot** to view the number of satellites nearest to your position:



This screen shows satellites used and unused from all supported GNSS constellations.

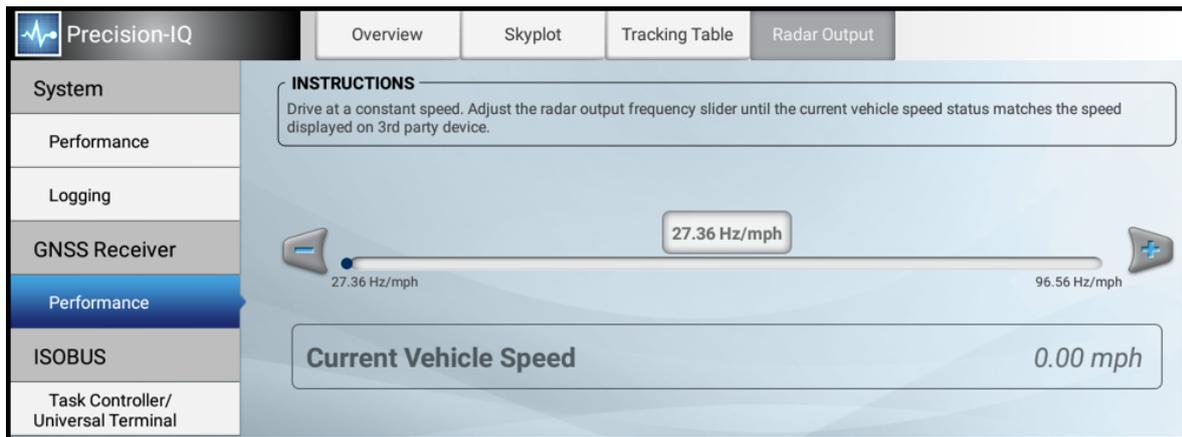
## Tracking Table

Tap **Tracking Table** for location and connection details for all used and unused satellites from supported GNSS constellations:

System	Sat Id	Elev. Pos.	Azm. Pos.	L1 SNR	L2 SNR	
Performance	2	77°	242°	41	0	
Logging	6	59°	46°	39	0	
GNSS Receiver	11	66°	26°	39	0	
	12	63°	308°	43	0	
ISOBUS	15	51°	226°	32	0	
	17	18°	84°	32	0	
	18	40°	79°	39	0	
	19	41°	286°	33	0	
	22	36°	73°	35	0	
	24	54°	46°	40	0	
	25					
	30					

## Radar Output

Tap **Radar Output** for details on adjusting the radar output frequency:



## ISOBUS Diagnostics

From the Precision-IQ activity bar, tap the **Diagnostics** icon:



On the Diagnostics screen, tap **Task Controller/Universal Terminal** under ISOBUS to display details about ISO devices:



The following details are provided:

**Device Name:** The name of the ISO device.

**Device S/N:** The serial number of the ISO device.

**CAN Connection:** The status of the CAN connection.

**VT Pool Loaded:** Indicates (Yes or No) whether or not Virtual (Universal) Terminal data from the ECU is loaded.

**TC Pool Loaded:** Indicates (Yes or No) whether or not Task Controller data from the ECU is loaded.

ISO-VT: Virtual (Universal) Terminal data is available.

ISO-TC: Task Controller 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.

## GNSS Troubleshooting

Refer to the following troubleshooting details:

- [Conditions Affecting GNSS Accuracy](#)
- [Poor Accuracy \(Multipath\)](#)
- [Intermittent Loss of Lock on Satellite](#)
- [Loss of Initialization](#)
- [Not Tracking RTK Corrections](#)
- [Poor Signal/Not Receiving a Clear Signal](#)
- [The Receiver is Not Tracking Any Satellites](#)

### Conditions Affecting GNSS Accuracy

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.

Condition	Explanation
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.
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 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. This clock enables the receiver to get an initial 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.

## Display Troubleshooting

This section describes some possible issues with the display, possible causes, and how to solve them:

- [The Display Does Not Turn On](#)
- [The Display is Not Responsive](#)
- [The Map is Not Visible on the Home Screen](#)

Read this section before you contact technical support.

## The Display Does Not Turn On

Possible Cause	Solution
External power is too low.	Check: <ul style="list-style-type: none"> <li>• The charge on the external power supply</li> <li>• The fuse if applicable</li> </ul> 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: <ul style="list-style-type: none"> <li>• That all power connections are seated properly</li> <li>• For any broken or bent pins</li> </ul>
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 no map on the Home screen, check for:

- Possible cable disconnection
- Weak signal bars.
- All cables are connected securely.
- Poor GNSS connection. See [GNSS Troubleshooting](#).

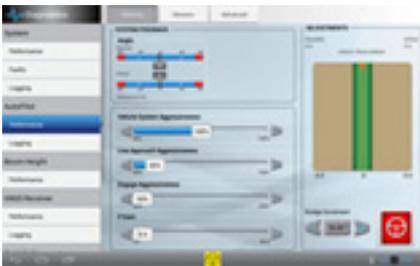
## Autopilot System Diagnostics

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 NavController 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,	The degree of the steering angle command being given by the navigation controller.

Button/Control	Explanation
Angle Desired	
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 <a href="#">Line Acquisition Setting</a> for more information on calibrating.
Engage Aggressiveness	Controls how aggressively the vehicle initially engages the automatic guidance system. See <a href="#">Engage Aggressiveness Setting</a> for more information on calibrating.
P Gain	Balances rapid steering response and stability. See <a href="#">Proportional Steering Gain Calibration</a> for more information on calibrating.  <i><b>NOTE</b> – This setting is not available for certain vehicle types.</i>
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.
	<b>Engage.</b> Use to engage the system in the diagnostics screen. For more information on the engage button, see <a href="#">Operating a Vehicle</a> .

## 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.

Button/Control	Explanation
MANUAL OVERRIDE SENSITIVITY	Sets the level the voltage must reach before the guidance system disengages. The voltage must also drop below that level before automated steering can be engaged again. You can calibrate this control here or at the Vehicle setup panel. For instructions, see <a href="#">Manual Override Sensitivity Calibration</a> .
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](#).

To set the NavController 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 how often you want the NMEA message to be output by the NavController and tap **GET**. Enter the value in milliseconds. 1000 milliseconds equals 1 Hz.

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 that is required by the external device.
  - c. Tap **SET**.

# A

## Data Sheets

- ▶ [GFX-750/XCN-1050 Display Data Sheet](#)
- ▶ [NAV-900 Data Sheet](#)
- ▶ [Ag-820 Integrated Radio Data Sheet](#)

This appendix provides hardware specifications listed in the available data sheets.

## GFX-750/XCN-1050 Display Data Sheet

### Technical

Power	Input voltage/current: 9 - 16 Vdc, 5A max Output voltage/current: 12v nominal, 2.5A max
Processor (CPU)	Quad-Core iMx6 PLUS @ 1 GHz
Storage (eMMC/RAM)	16 GB/1 GB
Operating system	Android™ 6.0
Wi-Fi	Integrated 802.11b/g/n (2.4 GHz)
Bluetooth	Bluetooth® 4.1
BroadR-Reach (Ethernet)	Transmit and receive 100Mb/s

### Mechanical

Dimensions	L 263 mm x W 182 mm x D 45 mm (at connector belt)
Weight	2.00 kgs (4.4 lbs)
Mount	RAM – 1.5" Ball
Hard Buttons	Power Button Only
Speaker	Integrated Multitone Speaker

### Shock and Vibration

Drop	ISO 16750-3
Shock	ISO 15003
Vibration	ISO 15003

### Housing

Material	Cast aluminum
Environmental Rating	IP66

### Temperature

Operation	-20 °C to 60 °C (-4 °F to 140 °F)
Storage	-40 °C to 85 °C (-40 °F to 185 °F)

### LCD Display

Size	10.1" Color display
Touch screen	Projected Capacitive (optically bonded)
Resolution	1280 x 800
Brightness	900 nits max
Backlight	Dimmable

### Front-facing camera

Type	Low light level, color
Resolution	1.0 M pixels, 720 p

### Connections

Power/CAN	Deutsch DT15-6p
USB (2 side facing)	USB 2.0 Type A (1 Host, 1 OTG)
BroadR-Reach/Power (GNSS)	M12 D-code Female 4 pin
Expansion (RS-232, 2 I/O (Imp Lift, Remote Out, or Video In (PAL/NTSC))	M12 B-code Female 5 pin

## TMX-2050/XCN-2050 Display Data Sheet

### Technical

Power	27 volts, 3.5 amps (supplied by the TM-200 Module)
Processor	1 GHz quad core
Storage	Primary embedded memory - 32 GB

### 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 Precision-IQ only.

## NAV-900 Data Sheet

### Physical

Dimensions	213 mm (length) x 213 mm (width) x 80 mm (height) 83.9 in (length) x 83.9 in (width) x 31.5 in (height)
Weight	1.2 kilograms (2.6 lbs)
Housing Material	Low-profile, chemical-resistant plastic casing with UV-resistant paint

### Electrical

Power	9 VDC to 16 VDC external power with over-voltage protection on input ports
Power Consumption	5.5 watts 17.5 watts with external accessories connected
Power Out	12 VDC (nominal), 1 amp limit for external radio = 12 watts

### Connectors

To Display	M12 4-pin connector
To External Radio	M12 5-pin connector
For I/O	Deutsch 12-pin connector

### Operational Range

Operating Temperature	-40 °C to 70 °C (-40 °F to 158 °F)
Storage Temperature	-40 °C to 85 °C (-40 °F to 185 °F)
Humidity	up to 100%, condensing
Ingress Protection	IP66, dustproof, waterproof, IPx9K

## Communication and I/O

Bluetooth®	Version 4.1, enabled
Serial Ports	1 Tx/Rx, 1 Tx only
CAN Ports	2
BroadR-Reach® Port	1
Digital Out	Sonalert
Analog In	Remote engage
NMEA Output	1, 5, 10, Hz

## Inertial Measurement Unit (IMU)

Gyroscope	3-axis, 200 Hz
Accelerometer	3-axis, 200 Hz

## GNSS Receiver Specifications

Satellite Signals	<ul style="list-style-type: none"> <li>• GPS: L1 C/A, L2C, L2E, L5</li> <li>• GLONASS: L1 C/A, L1P, L2 C/A, L2P, L3 CDMA</li> <li>• Gallileo: E1, E5AltBOC</li> <li>• BeiDou (COMPASS): B1, B2</li> </ul>
Satellite Corrections	CenterPoint® RTX Fast, CenterPoint RTX, RangePoint® RTX, SBAS (WAAS, EGNOS, MSAS), xFill
Land-Based Corrections	CenterPoint RTK, CenterPoint VRS
Correction Formats	CMR+, sCMR+, sCMR+ with SecureRTK, CMRx, RTCM 3.0, RTCM 3.1, RTCM 3.2

## Guidance

Electric	Autopilot™ Motor Drive (APMD)
Guidance Ready	CANBus J1939
Hydraulic	External NAV III Autopilot

## Ag-820 Integrated Radio Data Sheet

### Technical

**Power** Via NAV-900 via a 5-pin M12 connector

**Power Consumption** 450 MHz radio: 3.6 Watts  
900 MHz radio: 3.6 Watts

### Mechanical

**Dimensions** 121.9 mm (diameter) x 50.8 mm (height) (4.8 in (diameter) x 2 in (height))

**Weight** 0.91 kg (2.0 lb)

**Mount** The AG-820 integrated radio is designed to be mounted either:

- Magnetically via the four (4) built-in magnets.
- Bolt-on after the built-in magnets are removed.

### Housing

**Material** Die-cast aluminum

**Environmental rating** IP55

### Environmental

**Operating Temperature** -30 °C to 65 °C (-22 °F to 149 °F)

**Storage Temperature** -40 °C to 85 °C (-40 °F to 185 °F)

**Operating Humidity** 5% to 100% (condensing)

**Altitude** -400 m to 18,000 m (-1312 ft to 59,055 ft)

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 band	403 MHz to 470 MHz	902 MHz to 928 MHz
Networks	20 user-selectable networks	40 user-selectable networks
Wireless data rates	128 Kbps	128 Kbps

Radio options	450 MHz radio	900 MHz radio
---------------	---------------	---------------

Modes	Rover (receive only)	Rover (receive only)
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### Connections

Radio (NMO connector) Radio whip antenna

# Field-IQ Basic Rate and Section Control System

- ▶ [Field-IQ Supported Features](#)
- ▶ [Field-IQ Supported Configurations](#)
- ▶ [Field-IQ Implement Setup](#)
- ▶ [Field-IQ Implement and Application Control Details](#)
- ▶ [Field-IQ Section Control](#)
- ▶ [Field-IQ Rate Control](#)
- ▶ [Field-IQ Adjustments](#)
- ▶ [Field-IQ Virtual Tank](#)
- ▶ [Field-IQ Inputs](#)
- ▶ [Field-IQ Editing Implement/Installer Menus](#)
- ▶ [Field-IQ Calibration](#)
- ▶ [Field-IQ Section Station](#)
- ▶ [Field-IQ Auto Jump Start](#)
- ▶ [Field-IQ Flush](#)
- ▶ [Field-IQ Prescriptions](#)

This appendix provides instructions for using Field-IQ's basic rate and section control system.

## Field-IQ Supported Features

The following features are supported by Field-IQ:

- Section Control up to 24 sections including up to two fence rows
- Rate Control of one liquid material.
- Prescriptions supported with 96553-07 unlock.
- Two pressure sensors (Air, Liquid, Vacuum)
- External Master Switch input
- One lift switch

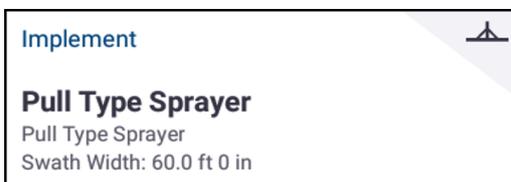
## Field-IQ Supported Configurations

- 1 Rate and Section Control Module - rate and section control, max 12 sections
- 1 Rate and Section Control Module + 1 Section only module - rate and section control, max 24 sections
- 1 Section only module- section control only, max 12 sections
- 2 Rate and Section Modules. Rate control of 1 drive and control of 24 sections
- Pressure Sensors, Lift Switch, External Module and Rate control valves can only be connected to the “primary module”. When a RSCM and an SCM are attached the RSCM will default as the primary module. If two RSCM's are attached the user must identify the primary module.

**NOTE** – No switch boxes are required for Field-IQ Basic operation. Switch boxes should not be connected during Field-IQ Basic operation.

## Field-IQ Implement Setup

1. From the Home screen, tap the **Implement** tile:



2. Select **Add Implement** and select the operation type that best fits your application.
3. Select **Next**.

4. Select the Application options and control module/s.

Application Control Type
None
Trimble Serial VR
Basic Rate and Section Switching
ISOBUS
Virtual

When creating an implement, the a list of connected devices is automatically generated.

- If more than one device is detected, then it is assumed that two devices should be included in the implement.
- If an SCM is selected as the “primary” device, then the implement will only be configurable for section control only, even if the “secondary” device is an RSC.

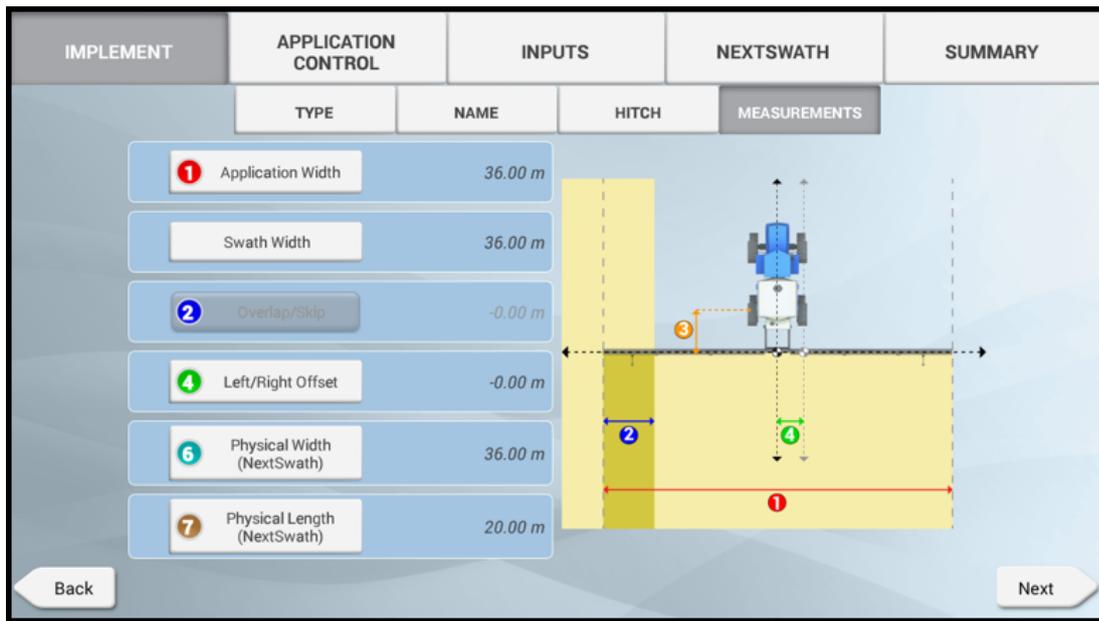
Primary Device
12342324CF (RSCM)
 123456789A (RSCM)
A value is required.

5. Tap **Save** to move to the next menu.

## Field-IQ Implement and Application Control Details

When setting up a new Field IQ Basic implement the user is launched into the “installer” menus.

The installer version allows the editing of various parameters, not allowed in the “user” version of the setup workflow. For example, the installer may change the application width or the number of sections in the configuration. In the user workflow these parameters are read-only.



Configure the Implement details with the following information:

- Implement layout
- Implement name
- Hitch type/measurements
- Implement measurements

Option	Description
Application Width	Total application width of implement
Swath Width	Working Width of implement. Sets the distance between swaths. (does not have to match application width)
Left/right Offset	Distance between center of applicator and center of the implement hitch/vehicle
Physical Width	Physical width of the implement
Physical Length	Physical length from hitch to the rear of the implement

## Modify/Edit the Application Control Channel

Select the channel to edit and select **Modify**.

	Channel		Set Up	Calibration	Primary Channel
	CHANNEL 1		 Incomplete	N/A	
	<input type="button" value="Modify"/>				

Type - Select the layout that best fits your implement

## Field-IQ Section Control

Under **Section Control**, enter details for the following subtabs:

- [Settings subtab](#)
- [Modules subtab](#)
- [Width subtab](#)
- [Latencies subtab](#)
- [Overlaps subtab](#)

**Modify Application Control Channel - CHANNEL 1**

TYPE	SECTION CONTROL	RATE CONTROL	ADJUSTMENTS	SUMMARY
	<input type="button" value="SETTINGS"/> <input type="button" value="MODULES"/>	<input type="button" value="WIDTH"/>	<input type="button" value="LATENCIES"/> <input type="button" value="OVERLAPS"/>	
	Section Control <span style="float: right;"><input checked="" type="checkbox"/></span>			
	<input type="button" value="Control Type"/> <span style="float: right;">Trimble BRASS</span>			
	<input type="button" value="Number of Modules"/> <span style="float: right;">1</span>			
	<input type="button" value="Section Control Type"/> <span style="float: right;">Boom Valve</span>			
	<input type="button" value="Fence Row Nozzle"/> <span style="float: right;">None</span>			
	<input type="button" value="Right Nozzle Wiring"/> <span style="float: right;">Field IQ 12</span>			
<input type="button" value="Back"/>		<input type="button" value="Next"/>		

### Settings subtab

Select to enable or disable Section Control. A green check indicates that Section Control is enabled. Tap the following buttons and enter the appropriate information:

1. Control Type. Select one of the following control types:
  - Section Control: This mode results in the control of individual sections, as defined for the section control modules.
  - Rate as Section: This mode results in the entire boom being treated as a single section.
2. Section Control Type. This option sets the section switching logic.
3. Fence Row Nozzle. Use this option to enable the fence row nozzle. Select **Left**, **Right** or **Both**.
4. Fence Row Wiring. This option sets the output used for the R/H fence row.
  - Adds the output 1 section after the last section.
  - +12 sets the output to the 12th section wire.

## Modules subtab

Tap **Modules** to enter the edit menu. From there, you can define the number of sections connected to the module/s.

## Width subtab

Tap **Width** to edit the width of each section. Tap the section to edit the measurement.

## Latencies subtab

Tap **Latencies** to enable or disable latency. Select from:

- **On Latency.** Time delay between when a command is sent to turn a section on to when it is fully open or applying.
- **Off Latency.** Time delay between when a command is sent to turn a section off to when it is fully closed.

## Overlaps subtab

Tap **Overlaps** to set the overlap details. The following table describes the available options:

Option	Description
<b>Start Overlap</b>	Sets the amount of intentional application overlap when exiting a previously applied area.
<b>End Overlap</b>	Sets the amount of intentional application overlap when entering a previously applied area.
<b>Coverage</b>	Based on the section width. Sets the % of the section that needs to be over

Option	Description
Switching overlap	a previously applied area to turn on or off. Increasing this value increases section overlap.
Boundary Switching overlap	Based on the section width. Sets the % of the section that needs to be over a boundary area to turn on or off. Increasing this value increases boundary overlap.

## Field-IQ Rate Control

Under Rate Control, enter details for the following subtabs:

- [Settings subtab](#)
- [Modules subtab](#)
- [Width subtab](#)
- [Adjustments subtab](#)

### Settings subtab

Select to enable or disable Rate Control. A green check indicates that Rate Control is enabled. Tap the following buttons and enter the appropriate information:

**Drive Type.** This option sets the control type for the rate control valve, motor, or pump. The following table describes the available drive types:

Drive Type	Description
Servo Standard	For two-wire servo's plumed inline
Fast Servo	For four-wire servo's plumed inline. These valves generally react quicker than two-wire servos.
PWM	For Pulse Width Modulated coils. These are typically used to control the flow of hydraulic oil to a motor.
Pump Servo	For hydraulic servos. These are used to control the flow of hydraulic oil to a motor.
Hardi % Bypass	Used on Hardi Sprayers equipped with three-way section valves that return flow to the tank when the boom section is closed.
Standard Bypass Servo	For two-wire servo's plumed to bypass excess flow to the tank.

Drive Type	Description
------------	-------------

**Fast Bypass Servo** For four-wire servo's plumed to bypass excess flow to the tank.

**Auxiliary Valve type.** Use this option to set the auxiliary valve type. Choose from:

- Master - Valve opens when sections are open.
- Dump - Valve opens when sections are closed.

**Number of Nozzles.** Enter the number of outlets on the implement. This value may be nozzles or shanks depending on the implement.

**Control Valve behavior on Sections close.** The following table describes the available options:

Behavior	Description
Close	Control valve closes when all sections are off.
Lock in Last Position	When the section/s close, the valve locks in its current position.
Lock at Minimum	<i>(PWM only)</i> When sections close the valve locks in this set position. This position is set via the calibration menu.

## Modules subtab

Tap **Modules** to enter the edit menu. Enter details for the following modules:

- Flow Meter Type
- Flow Meter Units
- Calibration number from encoder tag.

## Width subtab

This will default to the application width.

## Adjustments subtab

Tap **Adjustments** to enter the edit menu. Enter details for the following adjustments:

- No/ Low flow timeout. If the system receives no feedback in the specified time, the system will shut off.
- Pump Disarm Switch. This adjustment is for platform kits with an arming relay. Typically, it is found on self-propelled sprayers. This adjustment allows the control of the valve to be transferred from the OEM to Field-IQ Basic.

- Rate Snapping:
  - **ON:** When the product flow is within 10% of the Target rate, the as applied rate will snap to the target rate.
  - **OFF:** The as applied rate will report the true system flow.

## Field-IQ Adjustments

Under **Adjustments**, select to enable or disable [Field-IQ Auto Jump Start](#). Auto Jump Start is a feature specific to Field-IQ Basic, it provides a simple way to “jump start” the system when stopped.

- **Enabled.** The Jump Start speed value is the speed at which the system will apply at when Jump start is on. Once the vehicle has exceeded this speed Jump Start will stop automatically.
- **Disabled.** When disabled, a shut off speed can be entered manually. Shut off speed sets the speed that the system will close all sections. The sections will not reopen until the vehicle speed exceeds the shut off speed.

## Field-IQ Virtual Tank

Under **Virtual Tank**, enter the following details:

1. Select to enable or disable **Virtual Tank**. A green check indicates that the virtual tank is enabled.
2. Show units as. This option sets the displayed tank units.
3. Full Capacity Volume. You can use this option to set to match the capacity of the system
4. Warning type.
  - Volume
5. Warning Level. This option sets the level at which a low tank warning will be displayed.

## Field-IQ Inputs

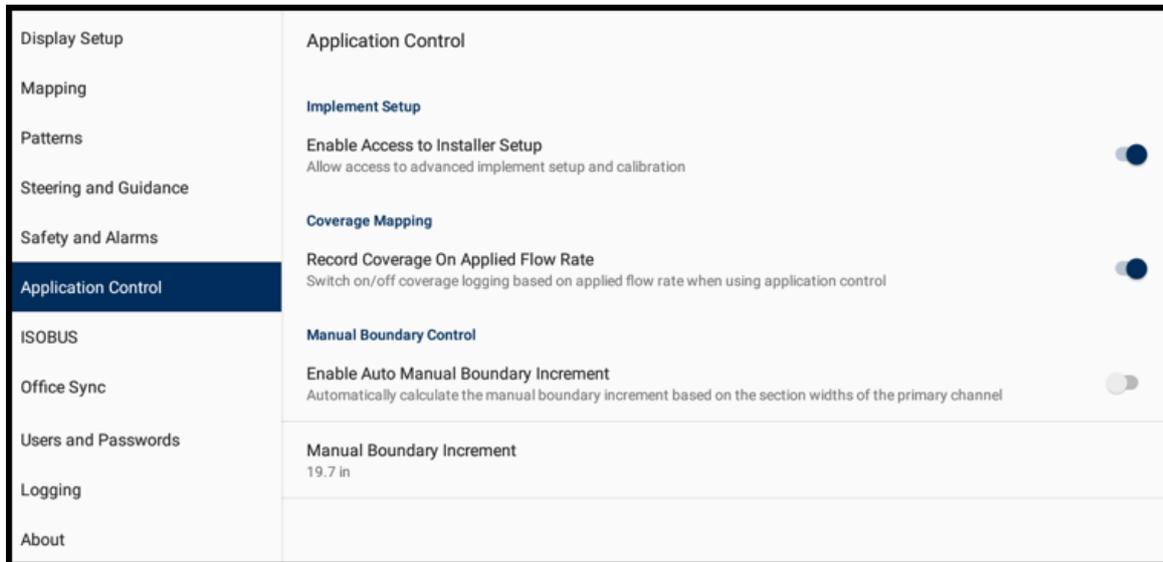
Under **Inputs**, enter the following details:

- **External Master Switch.** The external master switch must always be connected via the “primary” module. When enabled, the external master is used to start/stop the rate control drive calibration. The soft master button will not appear on the calibration screen when enabled. When enabled, the external master must be ON to operate the system. It is used in conjunction with the section master on the run-screen.

- **Pressure Sensors.** These can only be connected via one of the two analog sensor inputs on the “primary” module. Secondary modules will be ignored. To configure the pressure sensors:
  1. Select the sensor type.
  2. Select the input it is connected to. Sensors are calibrated via the calibration screens. See page XX
- **Implement Lift.** The implement lift switch input must always be connected to the “primary” module. Specify whether the lift switch is “active high” (open circuit) or “active low” (closed circuit).

## Field-IQ Editing Implement/Installer Menus

From the Precision-IQ menu, tap **Application Control**. Tap the ON/OFF switch to enable or disable the Application Control options as described below.



### Enable access to Installer Menu

Once the implement is initially created and saved, re-entering the edit workflow will show the simplified version of the workflow that will only display settings that are commonly adjusted. In order to gain access to the “installer” workflow again, you must enable access via a user preference under the Application Control category.

### Record coverage on applied flow rate

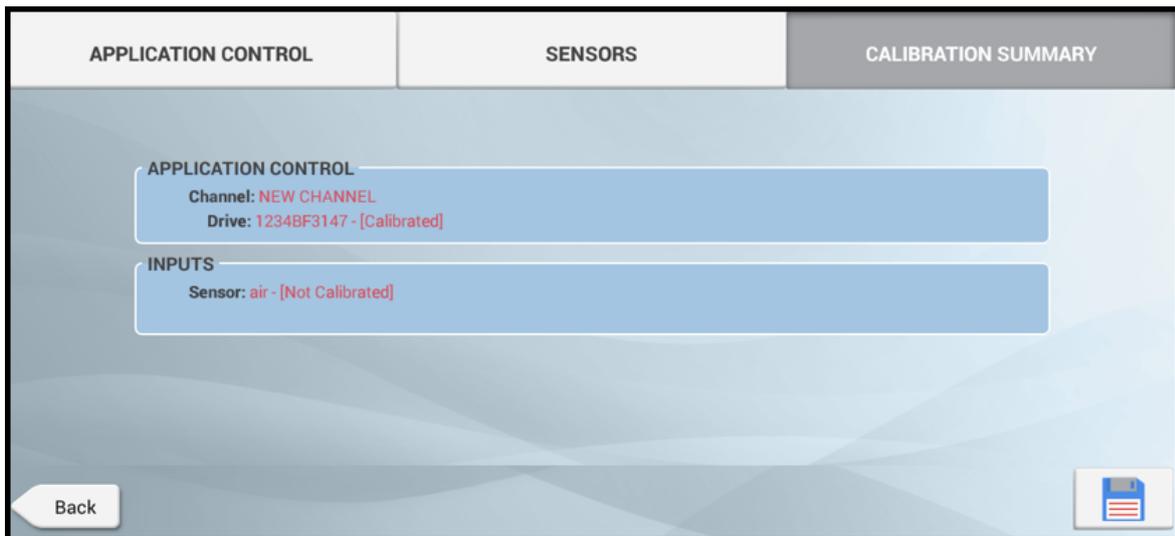
When enabled coverage logging will not begin until the section(s) are open and the applied rate is greater than 0 (>0). When disabled the system will ignore the as applied rate, logging will start when the sections open.

## Enable Auto Manual Boundary Increment

When enabled, this sets the Left/Right arrow buttons to snap to the next section. This is useful when sections widths are variable widths. If off the system will snap to the user defined width.

## Field-IQ Calibration

Access to the calibration for a implement requires that the installer UI be enabled.



When opening the calibration screen you will be presented with the calibration summary status. Follow the calibration instructions in the following sections:

- [Drive/ Valve Calibration](#)
- [Sensors](#)
- [Calibration Types](#)
- [Run Screen](#)
- [Rate Widget](#)

## Drive/ Valve Calibration

1. Select **Application Control**.
2. Select the module that you want to calibrate. For Field IQ Basic, this will be the “primary” module. Follow the steps on the screen to set the following values:
  1. Drive limits - Maximum Flow. This should be calculated with one of the following:
    - Nozzles/ Orifice. Multiply the maximum rate flow of the nozzles by the number of nozzles on the sprayer. If using multiple tips install the largest tip that will be

used.

- Maximum Flow rating of the pump or flow meter, whichever is lowest
2. Auto Tuning - The system will automatically tune the valve.
  3. Drive Settings - Edible calibration values. Most valve can be tuned with the settings described in the table. The system can also be turned on in this screen to check the valve performance.

Value	Description
<b>Gain</b>	Adjusts the speed response of the control valve. Increasing the value will increase the speed at which the valve adjusts.
<b>Minimum Response</b>	<p>Minimum Command applied the the valve to initially open the valve.</p> <ul style="list-style-type: none"> <li>• Setting this to high can cause the valve to overshoot when making rate changes.</li> <li>• Large adjustments to this value may affect the Gain setting.</li> </ul>
<b>Allowable Error</b>	<p>Sets the % of target rate error that the control system accepts. For Servos, this is usually left at 3% as most valves aren't quick enough to keep up with small flow fluctuations.</p> <ul style="list-style-type: none"> <li>• Setting this to low or can cause excessive valve oscillation.</li> <li>• Setting this to high can cause the valve not to respond to as applied rate errors.</li> </ul>

## Sensors

Select **Sensors** and select the module to calibrate. For Field-IQ Basic, this module will be the “primary” module. Follow the steps on the screen.

## Calibration Types

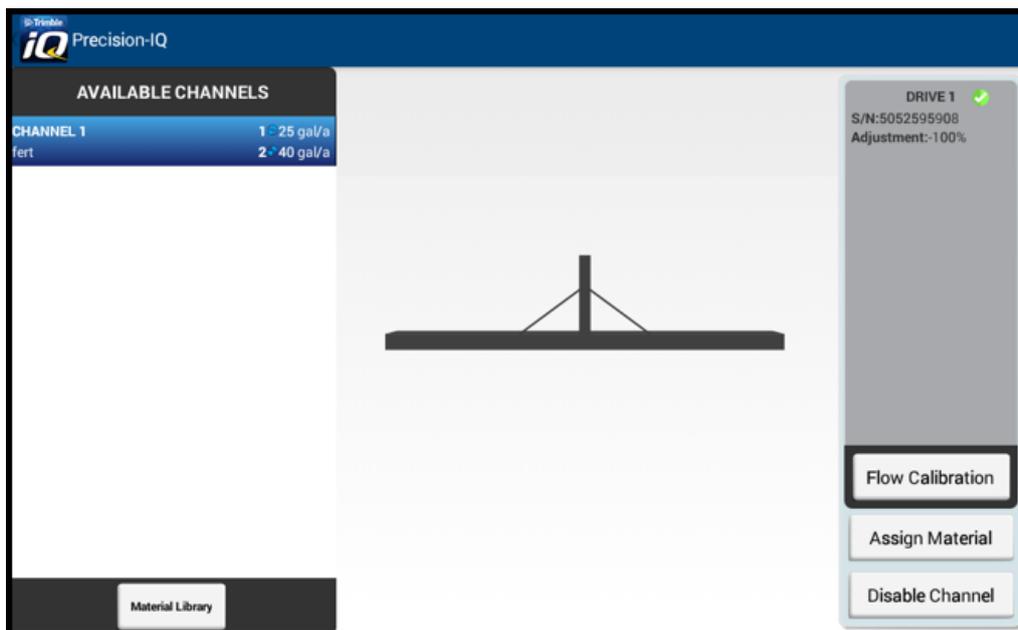
Select **Calibration Types**, and select **Air/Liquid/Vacuum** sensors. The following table describes the calibration types:

Type	Description
<b>Point/Slope</b>	Uses the slope value of the sensor and a set point. The set point must be known, it can be 0. The slope value will be provided by the sensor manufacturer.
<b>High/Low</b>	Also known as two-point calibration. The sensor must reference two separate known pressures. The display will calculate the slope between

Type	Description
	these two values (0 is acceptable as the low pressure). This method is generally considered more accurate as it is tuned to the specific sensor.

## Flow Calibration

The flow calibration is linked to the material. To access the calibration screens, open the **Material Setup** screen, a material must be assigned to a channel. Once assigned, select **Flow Calibration**.

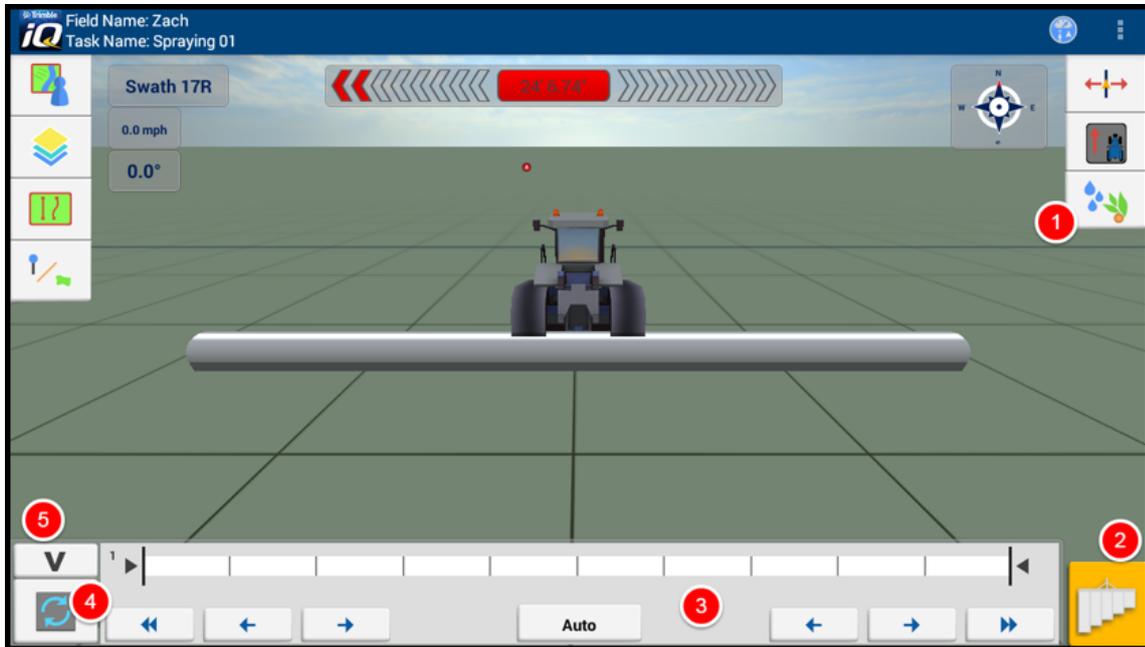


Follow the steps in the Calibration menus and enter the following information:

1. Enter or Modify the meter cal
2. Calculate the system minimum flow.
  - Nozzle/ orifices- Multiply the minimum flow of the tip by the number of tips on the smallest section of the sprayer.
  - Minimum flow rating of flow meter or pump, what ever is higher.
3. Enter a target rate and speed appropriate for the applicator.
4. To start the calibration, select **start flow**, then turn on the master switch.
5. Using a measuring container, catch 1-minute samples from at least 3 sections across the boom. Average the results.
6. Enter the results. If the corrected cal number is acceptable, tap **OK**.

## Run Screen

[Placeholder - add the Run Screen images here.]



### Basic Rate and Section Interface

1 Rate Widget

## Basic Rate and Section Interface

2	Section Master
3	<ul style="list-style-type: none"> <li>• Boom manual boundary mode</li> <li>• Boom manual section control mode</li> <li>• Boom Section status mode</li> </ul>
4	Boom Mode Cycle key
5	Boom screen collapse/ expand (status to control)

## Rate Widget

The Rate widget is used to perform the following tasks:

1. View the as applied rate (this widget is always visible when rate widget is collapsed).
2. Change the Target Rate:
  - Two predefined rates
  - Use + and - to adjust the target rate by the manual rate increment value.
  - When a prescription is available, follow the prescription rate. Target rate must also be set to rate 1.
3. Auto / Manual Section mode.
  - Auto mode.
    - If either “off when stopped” is enabled or the implement is over covered ground the sections will remain closed and no application will occur.
    - If “off when stopped” is disabled and the implement is over clear ground the section will open and application will occur at a rate corresponding to the jump start speed.
  - Manual mode. The sections will open and application will occur at a rate corresponding to the jump start speed.
4. View the virtual tank controls.
5. Widget collapse icon.
6. Flush controls.

## Field-IQ Section Station

The Section Station mode shows the status of sections. When collapsed, the boom cycle key is no longer visible.

There are 3 section views.

1. **View only.** Can only be viewed when the section bar is collapsed (to expand tap on the section bar)
2. **Manual Boundary Mode.** Incremental section switching from the outside of the boom into the center, This mode controls all channels
3. **Manual Section Control Mode.** Allows individual section switching of all sections and (one per channel)

## Field-IQ Auto Jump Start

Jump start speed is used when the vehicle is stopped or not at nominal operating speed. When enabled, the system will use the predetermined jump start speed.

When the section master button is enabled (and the auxiliary master, if using), the jump start speed will immediately be applied.

When using the auto jump start feature:

- Once the vehicle speed exceeds the jump start speed, the vehicle speed will be used to determine the applied rate.
- If the vehicle's speed drops back below the jump start speed, the jump start speed will once again be used to determine the applied rate.
- There is a delay built into this feature of 0.5 m/s around the jump start speed to prevent a rapid activation/deactivation of the jump start speed feature.
- When jump start is active, an indicator (yellow triangle with the jump start speed icon) will appear at the lower left hand side of the run-screen just above the section widget hide/show button.
- The following can occur at zero vehicle speed depending on the section control mode:
  - Auto mode.
    - If either "off when stopped" is enabled or the implement is over covered ground the sections will remain closed and no application will occur.
    - If "off when stopped" is disabled and the implement is over clear ground the section will open and application will occur at a rate corresponding to the jump start speed.
  - Manual mode. The sections will open and application will occur at a rate corresponding to the jump start speed.

## Field-IQ Flush

To start the flush:

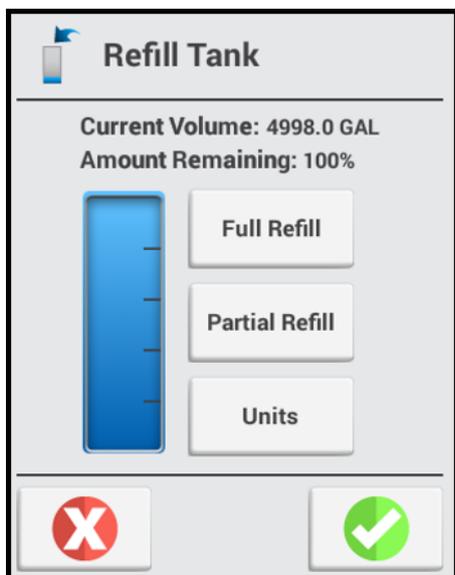
1. Expand the rate widget to reveal the flush button at the bottom right.
2. Press the flush button. The “stay clear” notification will be displayed.
3. Tap the screen to dismiss the notification.
4. Press the section master (and/or enable the remote master switch) to start the flush process.

To stop the flush:

1. Press the section master and/or disable the remote master switch.
2. Note that the system flow will show non-zero on the rate widget while flush is in progress.

This feature can be tested with the BRASS module simulators.

## Virtual Tank



Expand the rate widget to reveal the virtual button at the bottom right. Enter the appropriate detail for the following options:

- Full Refill - Sets the Volume to the “full volume” of the tank
- Partial Refill - Allows the user to enter the volume of the tank.

## Field-IQ Prescriptions

The following topics are described:

- [Prescription Format](#)
- [Copying Prescription to the Display](#)

- [Activating Prescription](#)

## Prescription Format

The following ESRI shape-file formats are supported:

<prescription\_name>.shp

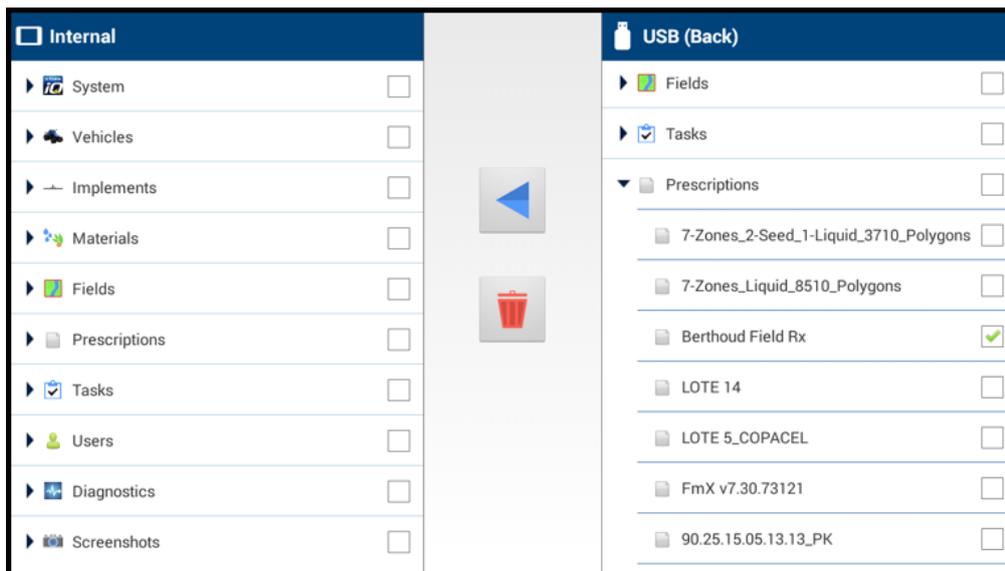
<prescription\_name>.dbf

<prescription\_name>.shx

## Copying Prescription to the Display

From a USB device:

1. Store the prescription to a USB drive in the \AgData\Prescriptions\ folder.
2. Open Precision-IQ and use the Data Transfer menu to import into the display. The prescriptions should show under "Internal" of the PIQ Data Transfer menu.



## Activating Prescription

1. Open the Run screen and make sure the Rx button is available on the left hand side of the screen.
2. Tap the **Rx** button and follow the onscreen wizard to assign prescription rate columns to the individual channels.

Assign Prescription

**Enabled Channels**

CHANNEL 0

CHANNEL 1

**Prescription Assignment: CHANNEL 0**

Select the Name of the Column and Units for that column which you would like to assign to the selected channel and hit Next.

Column Name: Pioneer\_32

Column Units: gal/a

Back Next

X ✓

3. Verify the following values:
  - Rate column assignments
  - Units
  - Lead Time
  - "When Outside Prescription" behavior
4. Navigate to the Rate Widget and expand individual channels in the rate control widget of the run screen.
5. Switch the Rx button to **ON**.
6. To view the Rx on the Run screen:
  - a. Click **Layer**.
  - b. Click the gear wheel icon (top right) of the "Available Layers" dialog and select "Applied Rate" layer.
    - Adjust the Min and Max values to match the values stored in prescription map.
    - Enter an appropriate number of steps.

# Glossary

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## A

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### **A+ line**

A guidance line you define on your field. The A+ line is defined fixing a point, then heading in a direction.

### **AB line**

A guidance line you define on your field. You set a beginning point (A) and an end point (B).

### **Accelerometer**

A device that measures non-gravitational acceleration.

### **Access path**

A space between your guidance lines. They can be useful if there is road (or other field feature that breaks the consistent flow of swaths) through the middle of your field.

### **Aggressiveness**

The measure of how strongly the system makes steering changes.

### **Application Type**

Type of material to be applied: - Liquid - Granular fertilizer - Granular seed - Anhydrous

### **Auto DGPS**

The receiver automatically switches between GPS and DGPS mode, depending on the availability of differential correction data.

### **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

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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

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### Boom Switching

When controlling boom sections, select **\*ON\***. This enables you to adjust settings in the Boom and Section tab. When not controlling boom sections, select **\*OFF\***.

### Boundary

A line indicating the border surrounding a field.

### Bypass Servo

A servo that adjusts the flow of material back to the tank.

## C

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### 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

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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 Ag3000. Relies on CORS.

### **Client**

The customer for whom the work is being done.

### **composite slope**

Combination of primary and cross slopes. When both Primary and Cross slopes are defined, the Composite Slope direction shows the actual heading where water will fall. If you have 0.000% slope on the Cross axis, the Composite Heading will be the same as the Primary Heading.

### **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.

### **Current Volume**

Quantity of product in the tank/ bin.

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## 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.

## cut

The volume of dirt that must be cut for the current design.

## Cut/Fill Ratio

When you move dirt, compaction or expansion can change the volume that it covers. The Cut/Fill Ratio is the amount of cut dirt that equals one volume of fill dirt. For example, the default Cut/Fill Ratio is 1.20. This means you lose 20% of your cut yards to compaction when you put the cut yards back down in the fill areas.

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## D

### Density (granular and granulated material only)

Used in system setup and calibration to ensure accuracy in applying a product. When changing material, this setting must be updated.

### design height

The height at the current location determined by the design plane.

### 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).

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## E

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### **EGNOS**

European Geostationary Navigation Overlay Service. An SBAS operated by the European Space Agency.

### **Electric over Hydraulic**

A valve that uses electric current to control the hydraulic valve output.

### **Elevation mask**

Establishes the minimum elevation angle for satellites to be used. Satellites located near the horizon are more difficult to track due to signal attenuation, and are less accurate. When there are no obstructions, the receiver can track a satellite down to near the horizon. If the Elevation Mask is set too low, the receiver can experience frequent constellation switching due to low elevation satellites being obscured. Frequent constellation switching is undesirable because position jumps may occur. The benefit of a low elevation mask is that more satellites are available for use in a solution and a better PDOP may result. High accuracy users may prefer a higher mask angle.

### **Event**

A precision agriculture activity on a particular field. For example: planting seed, applying fertilizer or lime, or spraying with fungicide, herbicide or insecticide.

### **Ez-Boom (+1)**

This setting will be appropriate when either a full installation or a Raven Replacement kit is installed on the implement.

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## F

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### **Farm**

A collection of fields.

### **Field**

Settings created in the Precision-IQ application to represent an actual field, one or more parts of an actual field, or a group of two or more fields. Field

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profiles include guidance lines for steering, pivot patterns and landmarks.

### **Field-IQ (12th)**

This setting will be appropriate when a platform kit has been installed on a self-propelled sprayer.

### **fill**

The volume of dirt that must be added for the current design.

### **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**

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### **GLONASS**

A Russian space-based satellite navigation system.

### **GNSS**

Global Navigation Satellite System. A system of satellites that provide information about geo-spatial positioning. A GNSS receiver can determine its longitude, latitude and altitude.

### **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  $\pm 100$  meters.

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## H

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### **Hardi % Bypass**

Used on Hardi Sprayers equipped with three-way section valves that return flow to the tank when the boom sections are off.

### **HDOP**

The horizontal component of PDOP.

### **Headland**

A guidance pattern that contains straight lines within a boundary.

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## I

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### **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.

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## J

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### **Jump start speed**

A manual override option that can be used to operate the system when the vehicle is stationary. Jump start is also used in times when GPS has become

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unavailable.

### **Jump start timeout**

Time that jump start speed will be active.

## **L**

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### **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.

### **Linear Actuator**

A valve that creates a linear motion (as opposed to a rotary motion).

### **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.

## **M**

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### **Manual DGPS**

The receiver only computes solutions if corrections are available for the selected satellites. Manual DGPS is the most accurate mode but, it is also the most selective since the fix density is dependent on the availability of corrections. Use the manual DGPS mode if accuracy is critical.

### **Manual GPS**

Differential correction processing is disabled and position fix solutions are determined without DGPS corrections.

### **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.

**Manual Rate increment**

Sets the aggressiveness of the increase/decrease switch when in manual rate.

**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.

**Minimum Override Speed**

A setting used to hold the operating speed at a preset minimum to prevent the control system from operating out of a controllable range.

**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**

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**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.

**No/Low Flow Timeout**

This setting adjusts how long the system waits before displaying an error related to No/Low product flow. (Available in Field-IQ Version 7.0 firmware and newer. Modules must be on V3.05.)

**O**

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**Office Sync**

Optional software that enables you to transfer data between the TMX-2050 display and office software.

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## **ON/OFF Latency**

Setting used to adjust for hardware delays.

## **overshoot**

The percentage by which the front wheels exceed the commanded angle before they settle on the correct value.

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## **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.

### **pivot benchmark**

The single benchmark where the plane is defined. All slopes will pivot around this point.

### **Pump Arming Switch**

If the applicator is equipped with a pump disarming switch that is connected to the controller, then this enables a tab on the run screen ( 09 and newer SPX, 07 and up RoGator, and JD 4XXX).

### **Pump Servo**

A servo that is used to control the hydraulic flow to a hydraulic motor.

### **PWM (valve)**

An electronic solenoid valve that controls the hydraulic flow to a hydraulic motor.

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## R

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### **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 1, Rate 2**

Preset rates to be applied.

### **Rate Adjustment**

When in Rate 1 or 2, the current application rate increases or decreases by this amount. Also referred to as Rate Increment.

### **Rate Control**

Select **\*ON\*** to have the system operate a rate control component. Select **\*OFF\*** for no rate control.

### **Rate Snapping**

Due to pump constraints, liquid flow generally is inconsistent with the information on your display. Enabling this setting gives you a more steady reading of the applied rate.

### **Rate switch for Field-IQ**

Used to select Preset Rate 1, Preset Rate 2, or Manual Rate Control.

### **roll correction**

Compensates for antenna height and static roll caused by minor variations in the navigation controller and the mounting of the GPS receiver.

### **Row**

The individual row unit which seed comes from on the planter. This can be controlled individually as a single row section, or as a group with other rows in a multiple row section.

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**RTK**

Real Time Kinematic. A navigation technique to improve the information received from satellite-based positioning systems. Used with GPS, GLONASS and Galileo.

**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.

**RTX™ ViewPoint™**

Corrections for satellite communication systems.

**Run screen**

The screen where you perform field activities.

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**S**

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**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.

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## Section Control Module

Controls 12 sections/rows per module with up to 4 modules (48 module sections / rows).

## Section Control Type

Setting to select type of sections control hardware (for example, air clutch, electric clutch, boom valve, liquiblock).

## Sections Off When Stopped

Select "YES" to turn all sections off when vehicle is stopped. Select "NO" to keep sections on when vehicle is stopped.

## 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.

## Servo

An electric motor that turns a valve to increase or decrease flow of the product. The servo can be plumbed inline or as a bypass.

## Shutoff Speed

This setting will shut the control system down when the vehicle reaches a minimum speed.

## Signal Input Module

The signal input module (SIM) can interface with existing equipment inputs to control on-screen buttons and features.

## Singulation

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.

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**slope heading**

The heading direction of the slope, when the two slopes are combined.

**SNR mask**

Defines the minimum signal strength for a satellite to be used. The SNR mask should only be lowered cautiously since this mask is also used to minimize the effects of jammers on the receiver. High accuracy users should use a mask set to 5.0 or 6.0 since weaker measurements can contain slightly more noise.

**Spinner Pulses per Revolution**

Enter the number of magnetic pick up points per revolution of the spinner.

**steering deadzone**

The amount of pressure that the system must apply to the hydraulics before the wheels begin to turn.

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**T**

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**Tank/Bin Capacity**

Amount of product that the tank or bin holds when full.

**TAP**

Tuning parameter for guidance algorithms.

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**U**

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**Unlock**

A passcode that unlocks access to a feature or upgrade.

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**V**

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**Valve calibration for Field-IQ**

The process for adjusting the valve performance parameters to get the best performance out of a valve.

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**VDOP**

A measurement of the vertical PDOP.

**W**

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**WAAS**

Wide Area Augmentation System. An SBAS operated by the US Federal Aviation Administration.

**Warning Level**

Setting that triggers a low bin warning.

**wheelbase**

The distance between the front and rear axles. On tracked vehicles, the wheelbase is exactly half the length of the track.