X35 Console

Guidance & Auto Steering Operator's Manual

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TOPCON

X35 Guidance and Auto Steering

Operator Manual

Part Number: 1007184-01

Rev Number: 1.2

For use with Software Version 4.02

April 2018

Preface

This manual provides information about operating and maintaining this Topcon Precision Agriculture product. Correct use and servicing is important for safe and reliable operation of the product.

It is very important that you take the time to read this manual before using the product.

Information in this manual is current at the time of publication. A system may vary slightly. The manufacturer reserves the right to redesign and change the system as necessary without notification.

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Note: Please read these Terms and Conditions carefully.

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ELECTRONIC AND MECHANICAL COMPONENTS -TPA warrants that the electronic components manufactured by TPA shall be free of defects in materials and workmanship for a period of one year from the original date of shipment to the dealer. TPA warrants that all valves, hoses, cables and mechanical parts manufactured by TPA shall be free of defects in materials and workmanship for a period of 90 days from the date of purchase.

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(iii) improper use and/or maintenance

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- the laws of South Australia if the product is sold and supplied to you in Australia (in which case the courts of South Australia or the Federal Court of Australia (Adelaide Registry) have exclusive jurisdiction in respect of any claim or dispute) or
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Service Information

Service assistance can be provided by contacting your local TPA Authorized Dealer.

Communications Regulation Information

FCC Compliance Statement (USA)

This equipment has been tested and found to comply with the limits for a Class 'A' digital device, pursuant to Part 15 of the FCC Rules. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's expense.

15.19

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.

15.21

Changes or modifications made to this equipment not expressly approved by Topcon may void the FCC authorization to operate this equipment.

15.105:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC Compliance Statement (Canada)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulation.

CE EMC Statement (European Community)

Warning: This is a class 'A' product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

EMC Statement (Australia & New Zealand)

This product meets the applicable requirements of the Australia and New Zealand EMC Framework.

Type Approval and Safety Regulations

Type approval may be required in some countries to license the use of transmitters on certain band frequencies. Check with local authorities and your dealer. Unauthorized modification of the equipment may void that approval, the warranty and the license to use the equipment.

The receiver contains an internal radio-modem. This can potentially send signals. Regulations vary between countries, so check with the dealer and local regulators for information on licensed and unlicensed frequencies. Some may involve subscriptions.

Radio and Television Interference

This computer equipment generates, uses, and can radiate radio-frequency energy. If it is not installed and used correctly in strict accordance with TOPCON Precision Agriculture instructions, it may cause interference with radio communication.

You can check if interference is being caused by this equipment by turning the Topcon equipment off to see if the interference stops. If the equipment is causing interference to a radio or other electronic device, try:

- Turning the radio antenna until the interference stops
- Moving the equipment to either side of the radio or other electronic device
- Moving the equipment farther away from the radio or other electronic device
- Connecting the equipment to another circuit that is not linked to the radio.

To reduce potential interference operate the equipment at the lowest gain level that will allow successful communication.

If necessary contact your nearest Topcon Precision Agriculture dealer for assistance.

Note: Changes or modifications to this product not authorized by TOPCON Precision Agriculture could void the EMC compliance and negate authority to operate the product.

This product was tested for EMC compliance using Topcon Precision Agriculture peripheral devices, shielded cables and connectors. It is important to use Topcon Precision Agriculture devices between system components to reduce the possibility of interference with other devices

General Safety

DANGER: It is essential that the following information and the product specific safety information is read and understood.

Most incidents arising during operation, maintenance and repair are caused by a failure to observe basic safety rules or precautions. Always be alert to potential hazards and hazardous situations.

Always follow the instructions that accompany a Warning or Caution. The information these provide aims to minimize risk of injury and/or damage to property.

In particular follow instructions presented as Safety Messages.

Safety Messages and Warnings

The safety symbol is used with the relevant word: DANGER, WARNING or CAUTION.

Messages marked in this way recommend safety precautions and practices. LEARN and apply them.

DANGER: Indicates an imminently hazardous situation that, if not avoided, could result in DEATH OR VERY SERIOUS INJURY.

WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in DEATH OR SERIOUS INJURY.

CAUTION: Indicates a potentially hazardous situation that, if not avoided, may result in MINOR INJURY.

Safety Signs

WARNING: DO NOT remove or obscure safety signs. Replace any safety signs that are not readable or are missing. Replacement signs are available from your dealer in the event of loss or damage.

If a used vehicle has been purchased, make sure all safety signs are in the correct location and can be read. Replace any safety signs that cannot be read or are missing. Replacement safety signs are available from your dealer.

Operator Safety

WARNING: It is YOUR responsibility to read and understand the safety sections in this book before operating this vehicle. Remember that YOU are the key to safety.

Good safety practices not only protect you, but also the people around you. Study this manual as part of your safety program. This safety information only relates to Topcon equipment and does not replace other usual safe work practices.

WARNING: Ensure power is removed from the Topcon equipment prior to maintenance or repair of the vehicle or implements.

WARNING: Ensure appropriate precautions are taken prior to handling any hazardous substances. Always read the Material Safety Data Sheet prior to commencing work.

WARNING: In some of the illustrations or photos used in this manual, panels or guards may have been removed for demonstration purposes. Never operate the vehicle with any panels or guards removed. If the removal of panels or guards is necessary to make a repair, these MUST be replaced before operation.

WARNING: Always check that any suspended vehicle attachments are lowered to the ground before beginning repair or maintenance work on a vehicle.

WARNING: Vehicle and implement parts can become hot during operation and may be under pressure. Refer to vehicle manuals.

WARNING: Wear appropriate protective clothing for the task being undertaken and conditions.

WARNING: Do not operate equipment around explosive equipment or supplies.

WARNING: Topcon is committed to good environmental performance and minimizes the use of any potentially harmful substances in its products. However, it is always advisable not to handle damaged electronic equipment. This Topcon product may contain a sealed lithium battery. Always dispose of any electronic equipment thoughtfully and responsibly.

Radio frequency radiation exposure Information:

This equipment complies with FCC and IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 30 cm between the radiator and your body.

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

WARNING: Products using cellular modem or an RTK base station can transmit radio frequency energy. Check with your dealer.

This device is designed to operate with TPA approved antennas. Discuss with your dealer.

Preparation for Operation

- Read and understand this manual and learn all of the controls before you use the equipment.
- Keep the manual with the equipment.
- If the equipment is moved to another vehicle, move the manual as well.

- Read the manual for the vehicle with which the equipment will be used and check that the vehicle has the correct equipment required by local regulations.
- Make sure you understand the speed, brakes, steering, stability, and load characteristics of the vehicle before you start.
- Check all controls in an area clear of people and obstacles before starting work.
- Identify possible hazards.

WARNING: Topcon equipment must not be used by an operator affected by alcohol or drugs. Seek medical advice if using prescription or over-the-counter medication.

Disclaimer

Topcon accepts no responsibility or liability for damages to property, personal injuries, or death resulting from the misuse or abuse of any of its products.

Further, Topcon accepts no responsibility for the use of Topcon equipment or the GNSS signal for any purpose other than the intended purpose.

Topcon cannot guarantee the accuracy, integrity, continuity, or availability of the GNSS signal.

The operator must ensure that the equipment is correctly turned off when not in use.

Before operating any vehicle equipped with Topcon products, read and understand the following product specific safety precautions.

Important Safety Information

Operator Alertness and Responsibility

The console helps the operator to steer the vehicle, but the operator remains in charge and must be alert and in complete control of the vehicle at all times. The operator is ultimately responsible for safe operation of this equipment.

It is essential that safety requirements are met when operating the console and any of its components. All operators and other relevant personnel must be advised of safety requirements.

Electrical Safety

WARNING: Incorrectly connected power can cause severe injury and damage to people or the equipment.

When working with electrical components, you must do the following:

- Make sure the negative terminal of the battery is disconnected before doing any welding on the vehicle.

- Check that all power cables to system components are connected to the correct polarity as marked. Please refer to the vehicle manual for safety information.
- Check that equipment is grounded in accordance with installation instructions.

Operation and Risk of Obstacles

The following list is not exhaustive or limited. To use the console for assisted steering along a defined wayline, the operator must ensure that it is used:

- Away from people and obstacles
- Away from high voltage power lines or other overhead obstructions (identify any clearance problems before activating the console)
- On private property without public access
- Within cleared fields
- Off public roads or access ways.

Note that:

- The operator needs to know the vehicle's position and the field conditions at all times.
- The operator will need to respond if the GNSS satellite or differential correction signal is lost momentarily.
- The console cannot detect obstacles (people, livestock or other).
- Only use the console in areas that are clear of obstacles and keep a proper distance.
- Steering needs to be disengaged for manual control if an obstacle appears in the path or the vehicle moves away from the wayline.

On/Off and Manual Control

WARNING: Ensure the steering switch is Off to prevent unintentional engagement of the assisted steering. When repairing or maintaining the vehicle/implement, ensure the vehicle CANNOT be moved. Disengage steering, apply brakes and remove keys.

The operator must ensure that the steering switch is Off (*all* LED indicators are off) when assisted steering is not being used.

The operator must disengage assisted steering and use manual control if an obstacle is in the line of travel or moves into the line of travel, or if the vehicle steers away from the desired wayline.

To disengage assisted steering:

- Turn the steering wheel a few degrees OR
- Select the Disengage Auto Steering button on the console AND/OR
- If using an external steering switch, disengage using the switch if the above actions do not disengage assisted steering.

Vehicle Shut Down Safety

Before leaving the vehicle, disengage assisted steering, disengage external steering switch if this is being used, and remove the key from the key switch.

Transporting the Vehicle

WARNING: When transporting the vehicle on a public roadway, the auto-guidance system must be switched OFF. Ensure the steering switch is Off to prevent unintentional engagement of the assisted steering.

Using a Reference (Base) Station

WARNING: Do not move a reference station while in operation. Moving an operating reference station can interfere with the controlled steering of a system using the reference station. This could result in personal injury or damage to property.

Operators and other affected personnel must be advised of the following safety precautions.

- Do not erect the reference station under or within the vicinity of high voltage power lines.
- When using the portable reference station, make sure that the tripod is securely mounted.

To Get the Best Out of the Product

Back up data regularly. The console has large, but limited storage capacity. Use the Diagnostics Mini-view to view capacity available. A warning screen displays if storage is reaching its limit.

Be aware of file format compatibility. Discuss compatible formats with the dealer.

Topcon Agricultural Products are hardy and designed to work in tough conditions. However, if equipment is unused for a length of time, store away from water and direct heat sources.

Alert Symbols

In this manual two alert symbols are used:

Note: This offers additional information.

WARNING: A warning signal appears on safety signs and in this manual to show that this information is very important to your safety. LEARN these and APPLY them.

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Chapter 1 – Console Overview

1.1. Introduction

The X35 is a vehicle-mounted electronic console with LCD display and touchscreen. The console allows operators to work with auto steering, guidance and other control functions from the console. The console is designed to interact with GPS and Electronic Control Units (ECUs), centralizing the ability to communicate, record, store and display data for agricultural uses.

Note: Before using guidance and auto steering, please read the safety instructions and learn about the controls by reading this manual carefully. Contact your dealer if assistance is required with setting up or operating the console.

The console is a touchscreen. To select something on the screen, touch the area with the tip of a finger.

The console serial number is located on a sticker on the rear of the console. Record the serial number below for future reference.

Serial Number: .....

1.1.1. What's new in 4.02

- Boundary steering enables a guideline to be generated from the boundary (see Using boundary steering, page 194)
- Headland turns provides the ability to autosteer around headlands (see Configure headland turns, page 199)

- Topcon Agriculture Platform (TAP) (see Using Topcon Agriculture Platform (TAP), page 226)

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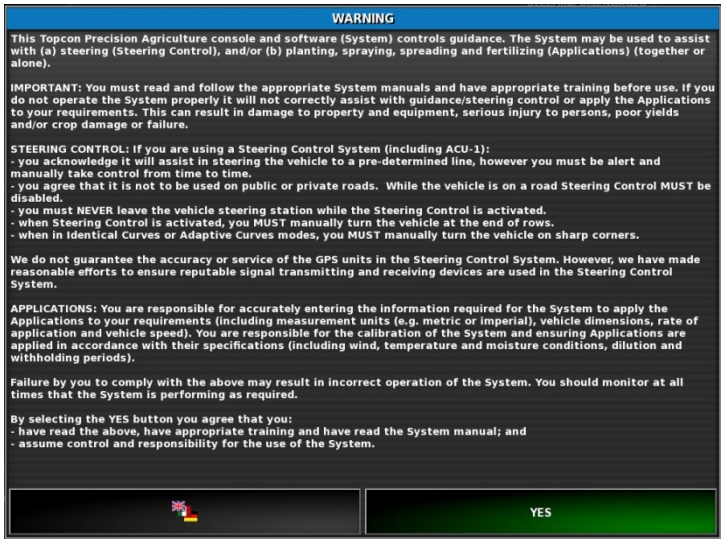
1.3. Starting the console

1. Connect the console to a power supply. Ensure associated devices (such as GPS (Global Positioning System) and ECU (Electronic Control Unit)) are connected.
2. Press and hold the green ON/OFF button on the rear of the console for a few seconds to start the console.

3. To change the language on the console, select  .



4. Use the scroll bar, or slide a finger down the list, to see more languages. Confirm the selection  .

   The Warning Screen displays in the chosen language.
5. Read the Warning Screen and if you agree select **YES**.

Note: Selecting Yes confirms your understanding and accepts your responsibility for liabilities described in the Warning Screen.

The console may display the following warning.

6. To acknowledge the alarm, press the center of the alarm window.

   Note that extra details may be displayed for some alarms by dragging the window downwards.

7. Confirm the GPS receiver is connected correctly and communicating.

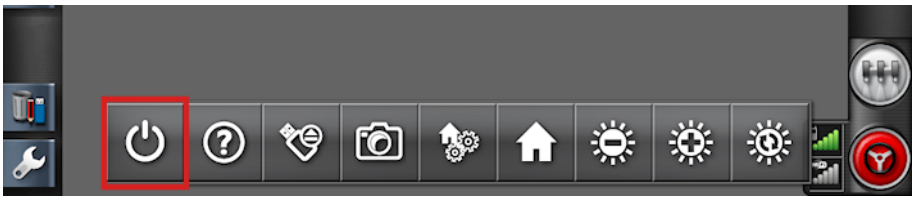
Note: If the warning appears again, this should be remedied during setup by referring to Setting up GPS, page 65.

1.3.1. Console power LED

The right hand side LED, located at the top of the console, turns green when the Horizon software starts up. If power is lost, the LED turns red until the console has successfully shutdown.

1.4. Shutting down the console

To shut down the console, swipe up from the base of the screen to display the console toolbar and select the off icon. The system will ask if you want to power down. Select **Yes** to turn off or **No** to continue working.

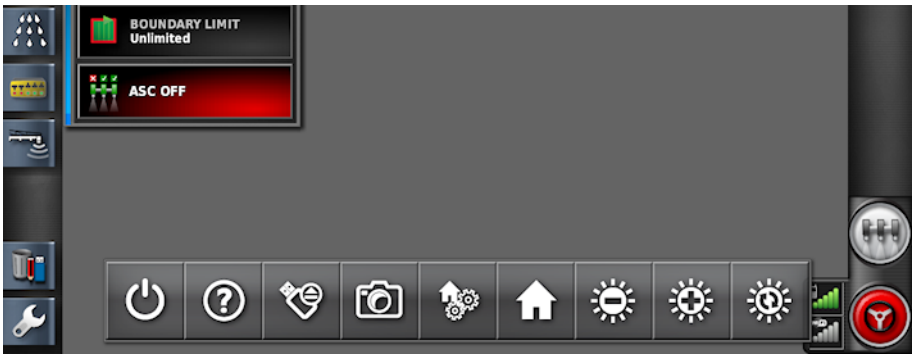


Alternatively, to shut down the console, briefly press the green ON/OFF button.

The system will ask if you want to power down. Select **Yes** to turn off or **No** to continue working.

Note: Pressing and holding the green ON/OFF button will also shut down the console, however data may be lost and this method is not recommended.

1.5. Using the console toolbar



The console toolbar is displayed by swiping upwards from the base of the screen.

Power off button

The power off button may be used to shut down the console.

Help

The **Help hint** feature displays the names of the user interface elements on the screen.

Touch the Help icon on the base of the screen. Question marks appear on the screen next to the icons. Select the screen element showing a question mark to view the names.

USB eject

The **USB port** is on the rear of the console. This can be used to import data to and export data from the console.

Before removing the USB, always disconnect first by touching the **USB eject** icon. A message will display that it is safe to remove the USB.

Screenshots

Use the **screenshot** icon to take screenshots (which are stored on the USB). Press the USB eject icon before unplugging the USB.

Manage global home screens

Enables Operation screen layouts to be saved. This may be useful to de-clutter the Operation screen or quickly return to displaying required information.

Display/hide the required views on the Operation screen and select **Save Home Screen** to save the layout.

Go to Home Screen

Displays a list of saved global home screens or toggles between saved screens. Refer to Global home screen mode, page 33.

Brightness control

Brightness control adjusts the brightness of the display. Use plus or minus to adjust display.

Day/night mode

Day/night mode changes the brightness of the display.

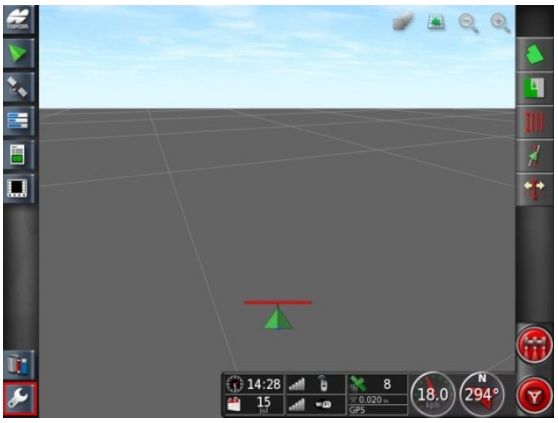
Settings are Day, Night and Auto. Auto light mode will set the brightness automatically, depending on light conditions.

1.5. Using the console toolbar

Chapter 2 – User Interface Description

2.1. Switching between setup and operation screen

The console has two main screens; the Setup screen and the Operation screen.



Use the highlighted buttons to switch between the screens.

2.2. Setup screen controls

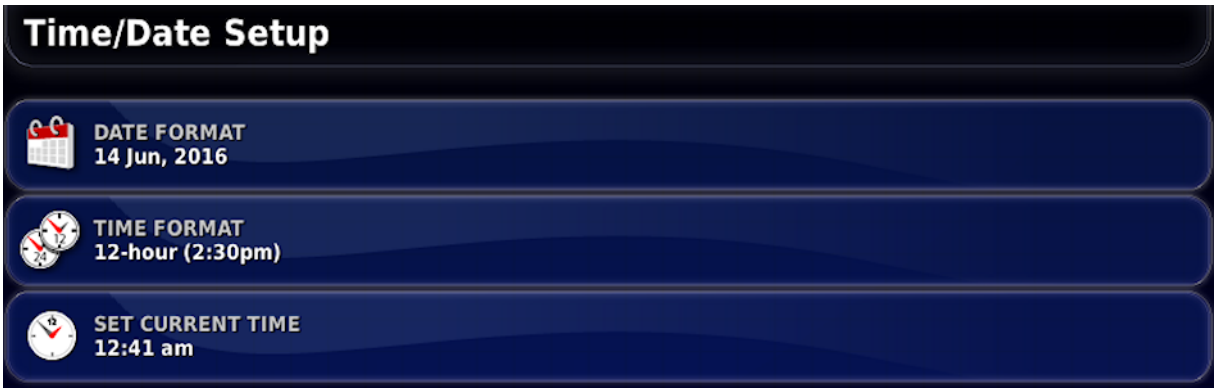
This section describes the Setup screen controls.

The Setup screen has the following types of controls:

Menus

Menu items are selected from the base of the screen to display the next level of sub-options. When features are enabled, more items may appear in the menus.

Option lists



Selecting menu items will typically display a list of options at the top of the screen. As features are enabled, more options may appear.

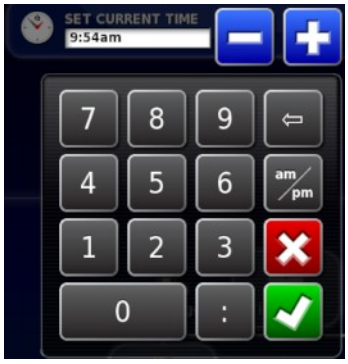
Selection lists

Selection lists are used to choose one or more items from a list. A message is displayed if too many items are selected in a multiple choice list. Selections must be confirmed using the tick button.

Cancel and confirm buttons

These buttons are used to cancel or confirm an entry or a selection. One of the buttons must be selected to progress from any screen displaying them.

Keyboard and number-pad

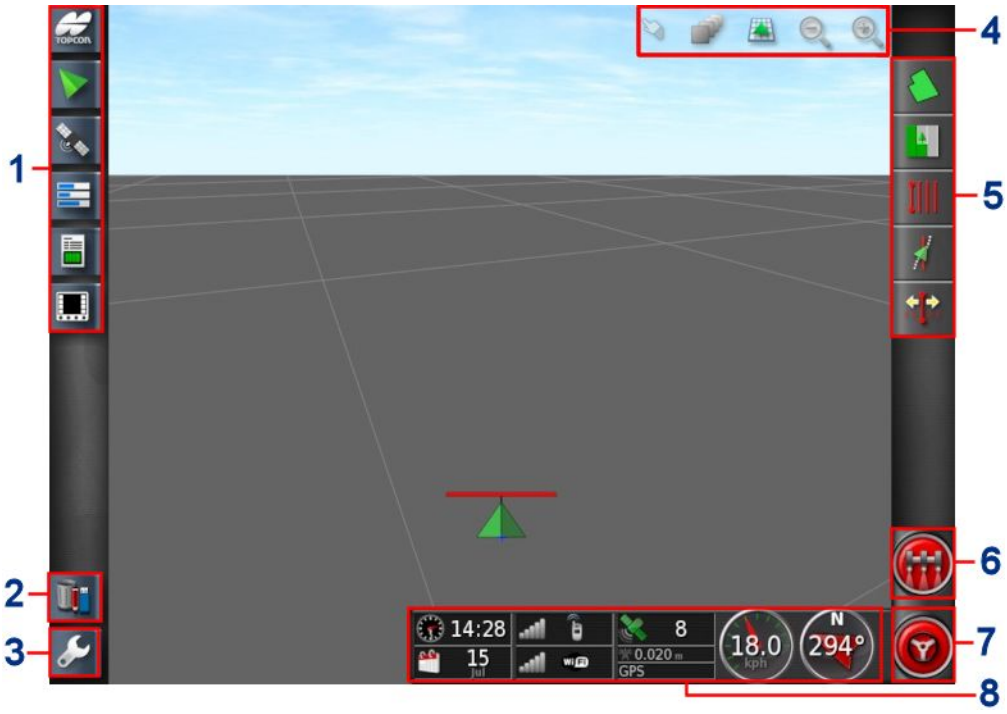


Letter and number keypads are used to enter alphanumeric characters or numeric characters. Entries must be confirmed.

Wizards

Wizards are used to guide the operator through a complex configuration of the system by answering a series of questions. The answers provided determine which questions will follow.

2.3. Operation screen controls



1 **Navigation bar**: Opens mini-views to access other parts of the system. Refer to Using mini-views, page 117.

2 **Inventory manager**: Enables management of vehicles, implements, fields, jobs, guidance lines and so on. Refer to Inventory Manager, page 231.

3 **Setup screen**: Switches to the Setup screen.

4 **View controls**: Allows the user to control what is displayed on the guidance map and how it displays. Refer to Using view controls, page 120.

5 **Guidance toolbar**: Provides tools used to control guidance.

6 **Master switch**: Turns product application on and off if 'virtual master switch' has been enabled during implement setup. Refer to Setting up the master switch, page 113.

7 **Auto steer engage**: Turns auto steer on and off.

8 **Dashboard**: Provides selected information from the system for monitoring. Refer to Monitoring on the dashboard, page 132.

2.3.1. Implement color indicators

 This indicates the position and direction of the vehicle and its implement. The implement color indicates product application status:

- **Red**: Section is off.
- **Blue**: Section is inhibited (on and not flowing, typically due to low speed or pressure).
- **Yellow**: Section is on and not flowing intentionally (typically due to auto-section control stopping the flow).
- **Green**: Section is on and flowing.
- **Orange**: Section is on and not flowing unintentionally or OFF but still flowing unintentionally (typically due to a delay in the time it takes for the flow to start up).

Chapter 3 – Quick Setup Guide

This chapter provides a quick overview to installing software onto the console, setting up the basics and operating the console.

WARNING: It is not recommended to operate the console for the first time without reading the complete manual to become familiar with all safety and operational issues.

3.1. Software update instructions

Note: This procedure should not be necessary when receiving a new console. It is only necessary if a software upgrade is required.

1. On a Windows machine, unzip the installation ZIP file into the root folder of a USB flash drive.
2. Safely eject the USB flash drive from the Windows machine.
3. Plug the USB flash drive into the powered-down console.
4. Power up the console by pressing and holding the green power button on the back of the console.
5. Go to the Setup screen (via the wrench button in lower left corner).
6. Select **System**  / **Utilities**  / **PROVISION USB FOR UPGRADE** and select **Yes**.
7. Power down the console by swiping up from the base of the screen to display the console toolbar and select the off icon.
8. The system will ask if you want to power down. Select **Yes** to turn off.
9. Leave the USB plugged into the console and restart by pressing and holding the green power button.
10. The installation procedure will start automatically and will take a few minutes.

11. The console will provide the option to restore all user data to the state it was before the upgrade. **WARNING**: Selecting **No** will delete all data saved on the console. The console will restart automatically.
12. After the console starts up, the software is ready for use.

3.2. Getting started

To configure the system:

1. Connect a GPS receiver to the console.
2. Go to the Setup screen (via the wrench button in lower left corner).
3. Select **System**  / **GPS**  and select:
   - The GPS receiver that is being used (see page 65).
   - The Correction Source required (see page 67).
4. Select **System**  / **Serial Ports**  and select the serial port on which the GPS receiver is connected (see page 74).
5. Once the system receives GPS data for the first time, it will prompt for configuration of the local time. Accept the current time or modify it to your local time.
6. Select **Vehicle**  / **New**  and create a new vehicle profile by selecting the appropriate model from the factory profile. Check and if needed modify the geometry of the vehicle (see page 95).
7. Select **Implement**  / **New**  and create a new implement profile by selecting the appropriate implement type. Check and if needed modify the geometry of the implement (see page 105).
8. If you select ASC-10 or Apollo as your ECU type, you will be guided through the steps to connect and configure all ECUs on your implement.

9. Go to the Operation screen (via the Exit button in the Setup screen).
10. Go to Select Field (via the top button on the guidance toolbar at the right hand side) and create new Client, Farm and Field (see page 157).
11. Go to New Job (via second button from the top on the guidance toolbar) and create a new job (see page 175). The system is now operational.
12. To enable Auto Steering, go to Setup screen, **System**  / **Features**  / **Guidance**  / **AUTO STEER** (see page 207).
13. To enable Auto Section Control, go to Setup screen and:
    - Create or load an implement.
    - In **Implement**  / **Section Control**  / **Sections**  configure the number of sections and their width (see page 110).
    - If required, change the section timing in **Implement**  / **Section Control**  / **Timing**  (see page 111).
    - If required, configure a physical or virtual switchbox in **Implement**  / **Section Control**  / **Section Switch**  (see page 111).
    - Enable the Auto Section Control feature in **System**  / **Features**  / **Implement**  / **AUTO SECTION CONTROL** (see page 52).
14. To control any of the enabled features from the Operation screen, use the buttons on the Navigation bar down the left hand side of the screen. Those will open 'mini-views' of the features (see page 117).
15. To expand a mini-view to full screen (if the feature supports that), drag the mini-view to the right onto the main screen area.

Chapter 4 – Regional and User Settings

On the Setup screen, the **User** menu option provides the following menu items:

- **Region**: Selects the language, time/date and units.
- **Lightbar**: Sets operation of the LED bar for guidance use.
- **Environment**: Sets up console interaction.
- **Map**: Sets how maps work on the Operation screen.
- **Access Level**: Selects access levels to determine which controls are accessible.
- **User controls**: Defines which controls are accessible for different users.
- **Remote support**: Allows support personnel to remotely access and control console functions.

4.1. Setting the region

4.1.1. Language setup

The language displayed on the console may be changed if required and decimal separators may be represented by a period or a comma.

To set the language or decimal point format:

1. Select **User** / **Region** / **Language** .

The following options are available:

Language

There is a choice of languages available.

Use the scroll bar, or slide a finger down the list, to see more languages. Confirm the selection. The console will restart.

Note: The language may also be changed on the warning screen at startup by selecting  .

Decimal point format

A decimal point may be represented by a period (.) or a comma (,).

4.1.2. Time/date setup

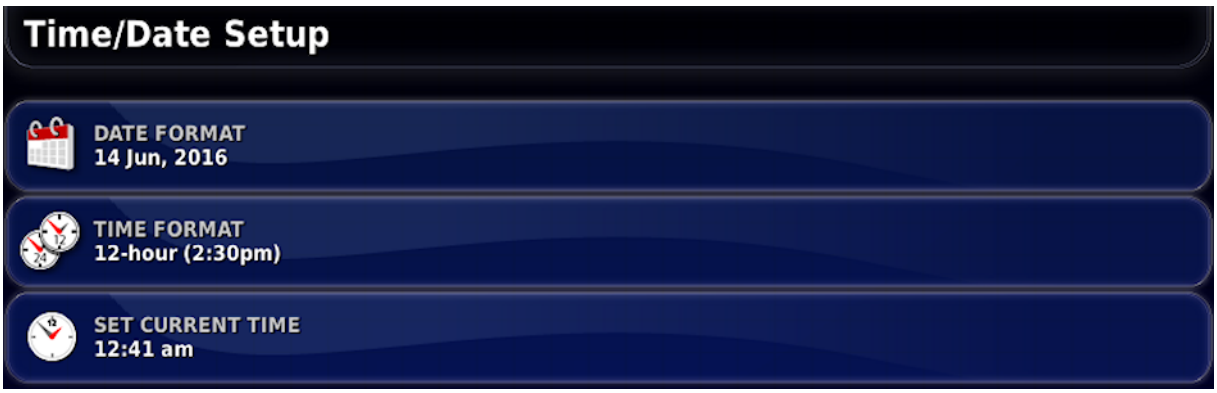
The date information is used on the console for job start and end dates, as shown on job reports. The current date is supplied from the GPS signal.

Note: Both time and date will not work if there is no GPS signal.

The current date and time can be displayed on the Operation screen by selecting the Topcon icon in the top left of the display (or shown on the dashboard).

To set date and time information:

1. Select **User** / **Region** / **Time/Date** .



The following options are available:

Date format

- Day of the month first (12 August 2015)
- Month first (August 12 2015)

Time format

- Twelve hour time (2:30pm)
- Twenty four hour time (14:30)

Set current time

Current time (does not change automatically for daylight saving).

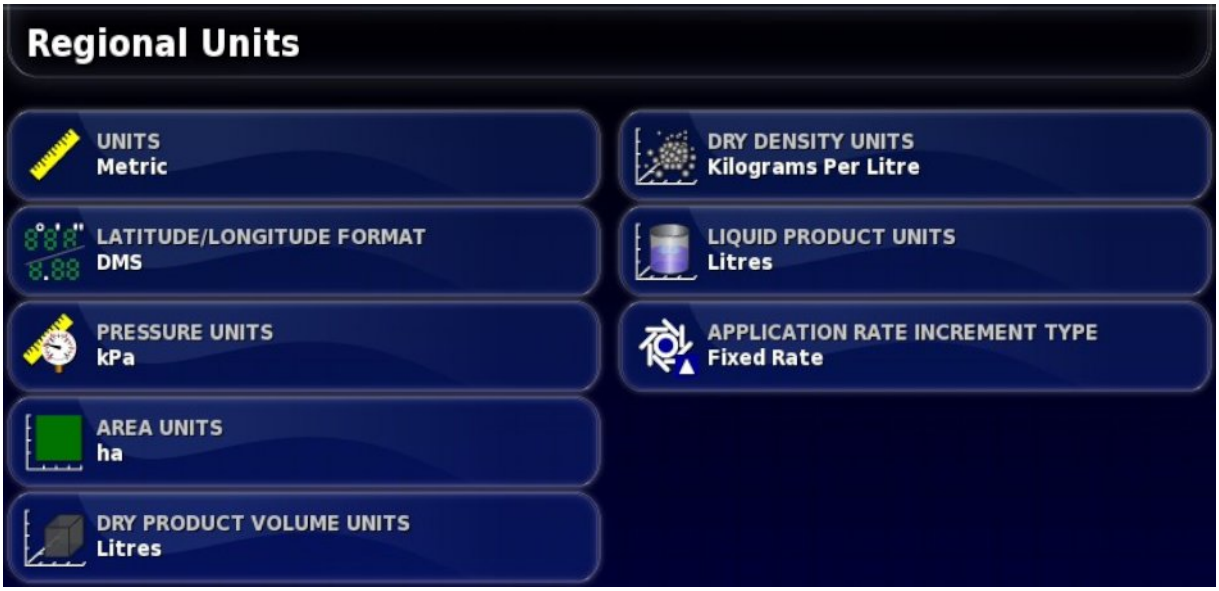
Note that -/+ will change time incrementally.

4.1.3. Units setup

The units options sets the displayed units of measurement (metric or imperial), units for pressure, area and products, the latitude/longitude format and the application rate increment type.

To set unit information:

1. Select **User** / **Region** / **Units** .



The following options are available:

Units

- Metric
- Imperial (US)
- Imperial (UK)

The United States (US) and United Kingdom (UK) imperial options are provided because gallons, fluid ounces and bushels have different measurements in the US and the UK.

Note: Changing this setting will not override the selection of individual units (Pressure, Area etc.) that have been changed.

Latitude/longitude format

- Standard (decimal degrees: 45.54)
- DMS (Degrees, Minutes, Seconds: 45º, 23’ 36”)

Pressure units

- kPa (kilopascal)
- psi (pounds per square inch)
- bar
- Default: Selects the default setting appropriate for the selected **Units**

Short distance units

- Meters
- Inches
- Feet
- Default: Selects the default setting appropriate for the selected **Units**

Area units

- ha (hectare)
- ac (acre)
- Default: Selects the default setting appropriate for the selected **Units**

Dry product volume units

- Litres
- Kilograms
- Cubic meters
- US bushels
- UK bushels
- Gallons
- Pounds
- Cubic feet
- Cubic yards
- Tonnes

Dry density units

- Kilograms per litre
- Kilograms per cubic meter
- Kilograms per US bushel
- Kilograms per UK bushel
- Pounds per gallon
- Pounds per cubic foot
- Pounds per US bushel
- Pounds per UK bushel

Liquid product volume units

- Litres
- Cubic meters
- Tonnes
- Gallons
- Cubic feet
- Pounds

Application rate increment type

- Fixed rate
- Percentage of Rate 1

This option changes the behavior when the operator presses the up/down buttons to change the requested product application rate. These can either change by a fixed rate or by a percentage of the rate set for **RATE PRESET1** (**SPRAY RATE** on an Apollo Sprayer).

Application rate units

- L/ha
- L/100m
- L/100m^2
- gal/ha
- gal/100yd
- gal/kft^2

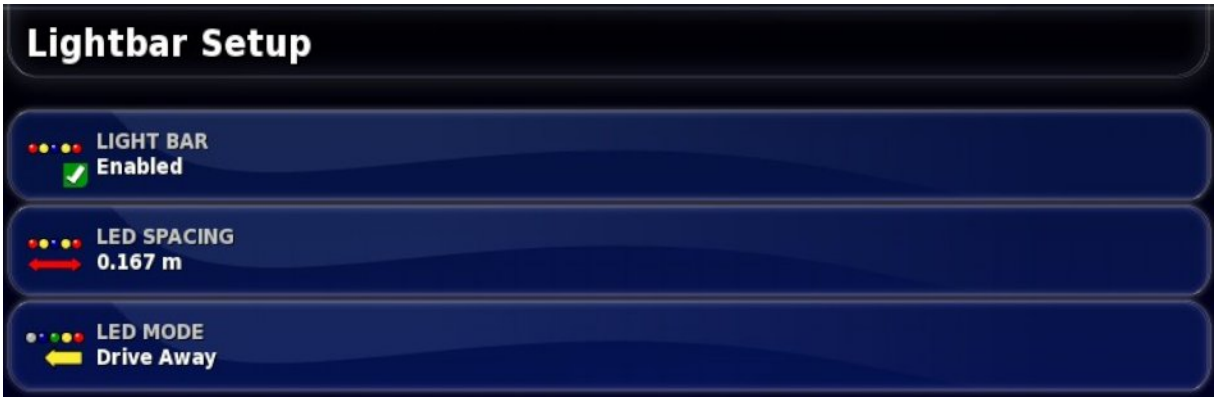
See the Spreader, Sprayer or Seeder operator manuals for more information.

4.2. Setting up the lightbar

During operations, the virtual lightbar on the top of the guidance screen can show how far the vehicle is deviating from the set guideline.

To set up the lightbar:

1. Select **User** / **Lightbar** .



The following options are available:

Light bar

Enabled or disabled.

LED spacing

Sets the ground distance from the wayline (guideline) that each LED represents.

If the LED spacing is set to 10 cm (0.1 m), the following behavior is observed:

- The center LED is blue and will be illuminated all the time (unless the cross track error is 100 cm or more). When on the wayline by less than 10 cm (+ or -) that is the only LED that is illuminated.
- Once you reach a cross track error of 10 cm, the next LED (green) will also illuminate.
- At 20 and 30 cm another green LED illuminates.
- Yellow LEDs illuminate at 40, 50 and 60 cm.
- Red LEDs illuminate at 70, 80 and 90 cm.

- Once the cross track reaches 100 cm or more, all LEDs turn off except for one red LED on the far side of the console.

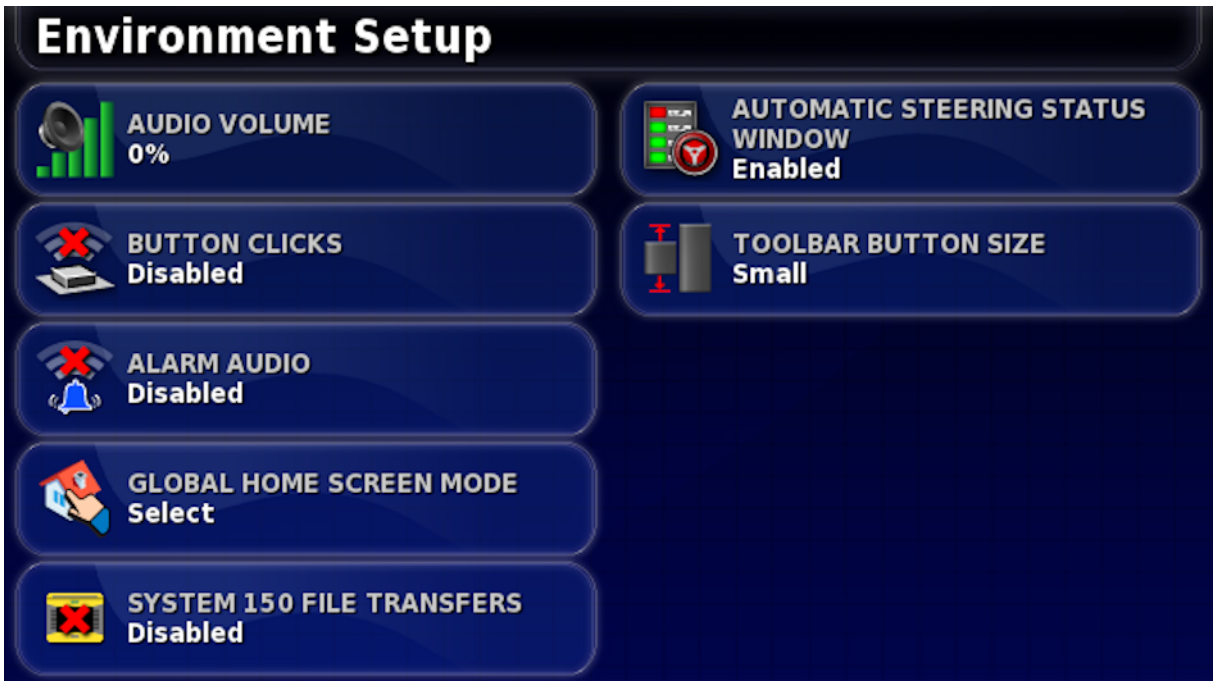
LED mode

- **Drive away**: Activates the LEDs on the side of the vehicle veering away from the guideline. Drive away from the lit LEDs to move back to the guideline.
- **Drive towards**: Activates the LEDs on the side of the vehicle veering towards the guideline. Drive toward the lit LEDs to move back to the guideline.

4.3. Setting up environment

Sets up console interactions.

1. Select **User** / **Environment** .



The following options are available:

Audio volume

Sets the volume of console sounds.

Button clicks

Enable or disable sounds when making a selection on the console.

Alarm audio

Enables sounds when an alarm is triggered.

Global home screen mode

Enables Operation screen layouts to be saved. This may be useful to de-clutter the Operation screen or quickly return to displaying required information.

- **Select**: Selecting the home icon displays a list of saved global home screens to select.

- **Toggle**: Selecting the home icon toggles between saved global home screens. Refer to Manage global home screens, page 13.

System 150 file transfers

Enables the following System 150 (GX-45) files to be imported and exported: AB lines, Pivots, Curves, Optimal lines, Project lines and Field boundaries.

System 150 file transfers allow the operator to export files in a format that matches Topcon's System 110/150 system and import files that were exported from System 110/150.

Enabling this option displays the System 150 icon  at the base of the Inventory Manager  on the Operation screen (refer to Inventory Manager, page 231).

Automatic steering status window

Displays a Steering Status window when the Auto Steer Engage button  is selected on the Operation screen if the steering is unable to engage. The Steering Status window displays issues that may be preventing the steering from engaging. If Auto Open and Close is selected, the Steering Status window will automatically close once any issues preventing the steering from engaging have been resolved.

Note: The Steering Status window may still be displayed via the **Steering Options Menu** / **Auto Steer Status** (see page 207) if this setting is disabled.

Toolbar button size

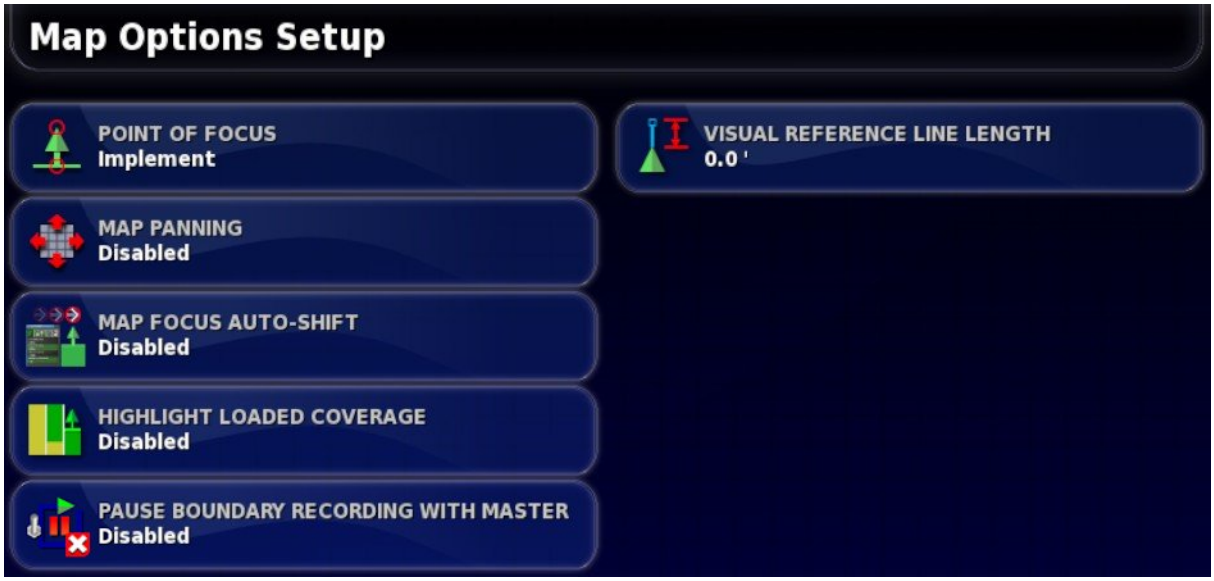
Changes the size of the buttons on the Operation screen.

4.4. Setting up map options

Sets how maps work on the Operation screen.

To set up the maps:

1. Select **User** / **Map** .



The following options are available:

Point of focus

- **Vehicle**: Places the vehicle at the center of the screen.
- **Implement**: Places the implement at the center of the screen.

Map panning

Allows the screen to move around in a map when the user slides a finger across the screen.

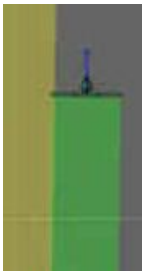
Enabling this option places the map panning icon beside the Toggle Map View and Map Layers at the top of the Operation screen. Touching this icon re-centers a panned map to the current location of the vehicle.

Map focus auto-shift

Sets the vehicle in the center of the available screen, when mini-views are open.

Highlight loaded coverage

After loading an existing job, shows previously completed and loaded coverage in a different color from the newly created coverage.



Previously covered areas are shaded yellow if this has been enabled and past job information has been recorded.

New coverage is shaded green. If this option is not enabled, both the previous coverage (from the loaded job) and the newly recorded coverage are shown in the same green color.

Pause boundary recording with master

If the master switch is turned off while a boundary is being recorded, the boundary recording is paused. Turning the master switch back on resumes the boundary recording.

This may be useful to automatically pause boundary recording if product application is paused to maneuver in a tight corner or deviate around an object.

Note that boundary recording may still be manually paused (refer to Setting a new boundary, page 160).

Visual reference line length

Provides a display marker at the user prescribed distance in front of the vehicle icon to help accurately acquire the wayline after a turn when using manual guidance.

4.5. Setting access level

Setting the access level determines which controls are accessible to the user. The accessibility of the controls can be configured on the user controls screen (only available when Expert is selected as the Access Level). Refer to Setting user controls, page 38.

To change the access level:

1. Select **User** / **Access Level** .

The Access Level may be set at Easy, Standard or Expert. A password may be set for the Standard and Expert levels to prevent inexperienced users from accessing higher levels.

The console will turn on in whichever level was set before turning it off.

4.6. Setting user controls

This screen is only available when Expert is selected as the Access Level. Refer to Setting access level, page 37.

Access to console controls can be configured by setting the user controls. There are three levels of access available: Easy, Standard and Expert.

- **Easy**: This mode is recommended for everyday operator use. It allows access to all basic controls and some status information. This provides an uncluttered and easy to learn user interface.
- **Standard**: This mode has extended functionality, intended for more experienced users who want more control of the functions they are using. This includes more advanced controls (for example; clearing coverage, deleting items).
- **Expert**: This mode has all the configuration options for setting up a vehicle, implement, GPS receiver, etc. It can also be used for normal farming by power users who want everything visible at once.

To define the user controls:

1. Select **User** / **User Controls** .

The accessible controls for the three levels are set by default. They may be edited as required by pressing the tick or cross for each option.

The **Reset** button enables settings to be returned to either the factory defaults or to the settings the console had when it was powered up.

The **Preview** buttons enable you to see how the settings will look in Easy or Standard mode, without leaving Expert mode.

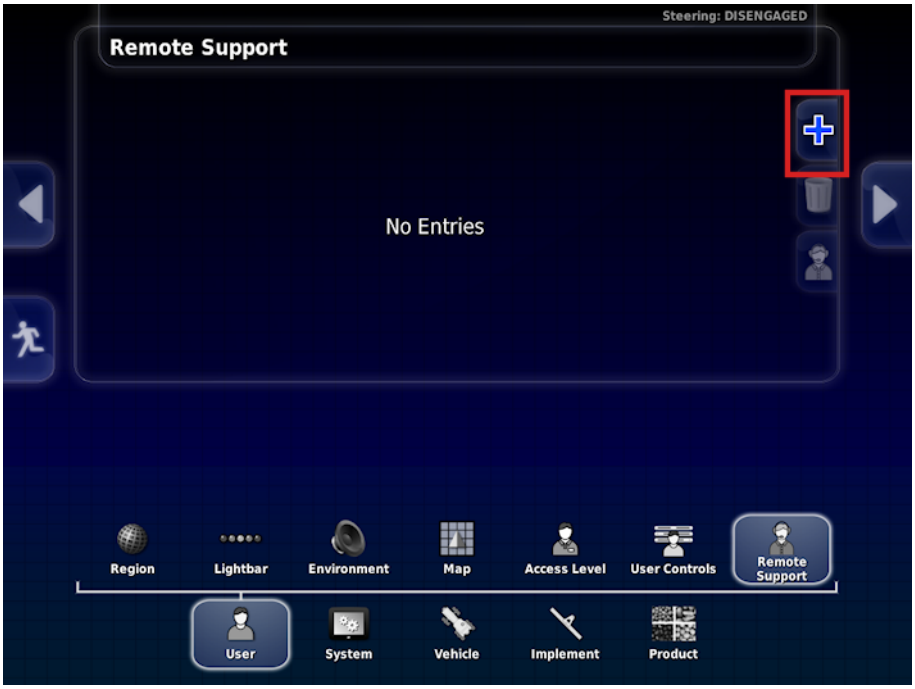
4.7. Setting up remote support

Remote support enables a support person to remotely access and control the console via the Topcon Support app. Internet access is required. See Wireless setup, page 61.

4.7.1. Setting up support

To configure remote support on the console, the support person must supply the PIN number that is displayed at the top of their Topcon support app. This will allow the console to connect remotely to the Topcon Support app.

1. Select **User** / **Remote Support** , then click on the plus symbol at the top right of the screen.

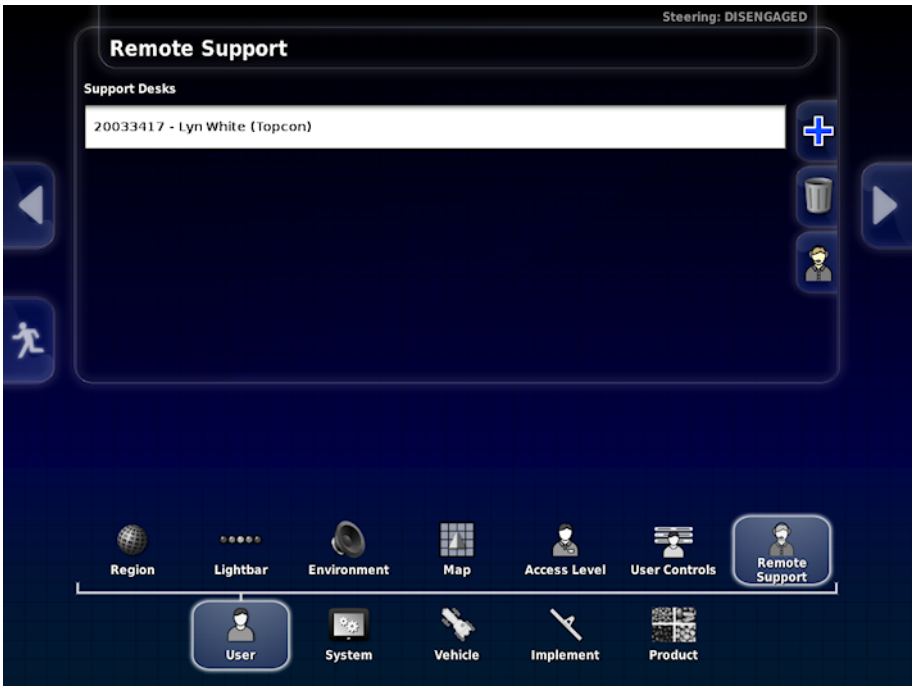


   The Add Support Desk window is displayed.

2. Enter the supplied PIN number in the **DESK PIN** field and press the tick button.

The console connects with the Support person's device and displays their name.

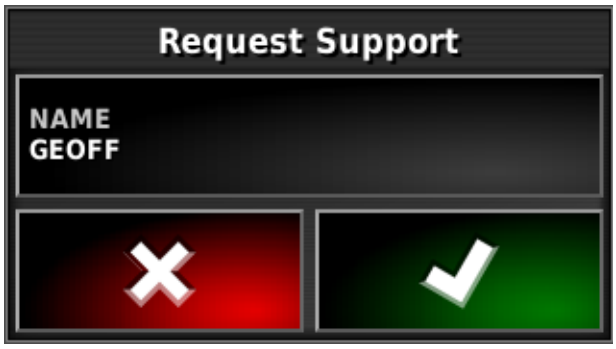
The configured support person is displayed in the list of Support Desks.



4.7.2. Requesting support

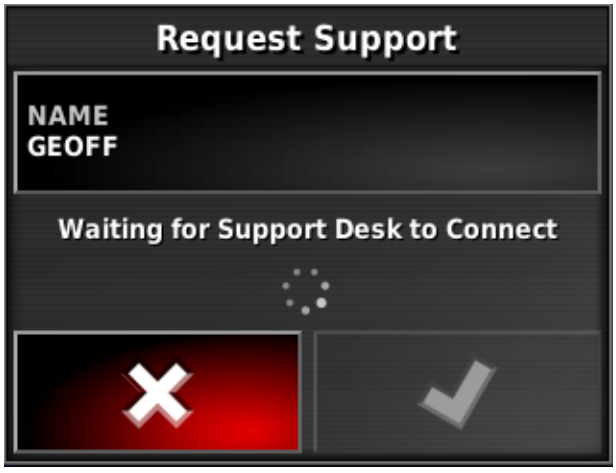
1. To request remote support, select **User**  / **Remote Support**  . A list of configured support desks is displayed.
2. Press the required support option from the list of support desks and then select the request support icon  .

The Request Support window is displayed.



3. Enter an identifying name and press the tick button.

   A support request is sent to the selected support desk.



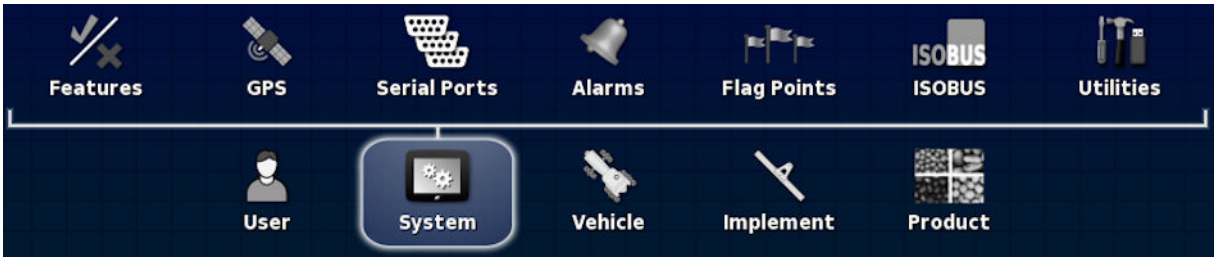
Once the support desk responds to the support request, they have access to and control of the console (excluding steering, master switch and Universal Terminal).

Chapter 5 – System Setup

This chapter explains how to set up system elements such as GPS connections, alarms and optional features.

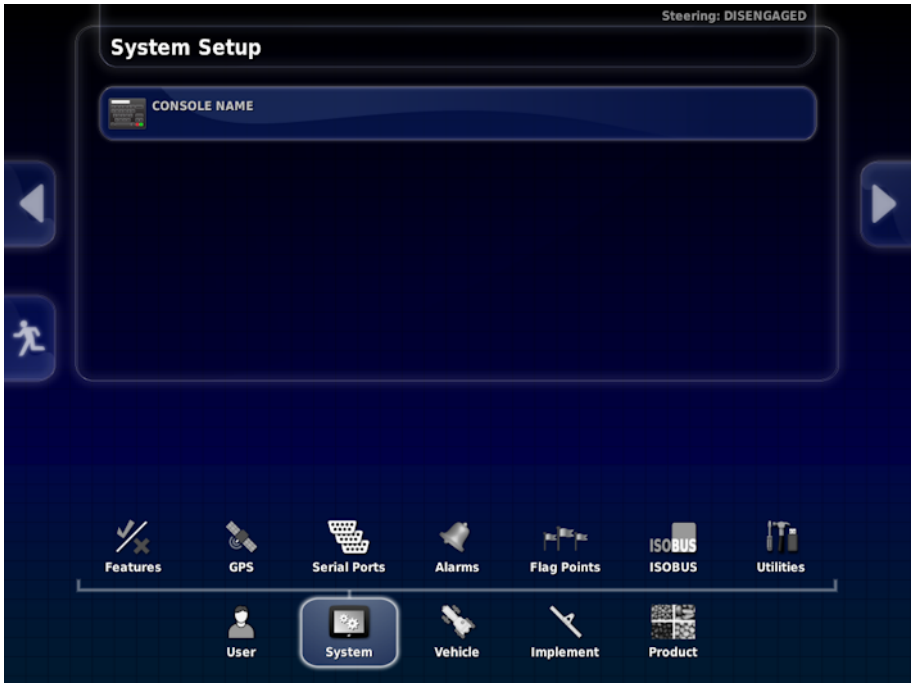
The **System** menu option provides the following menu items:

- **Console name**: Enter a name to identify the console.
- **Features**: Enables or disables optional features.
- **GPS**: Sets up the functionality of the connected GPS receiver.
- **Serial Ports**: Selects the console serial port assigned to a particular function.
- **Alarms**: Sets alarm functionality.
- **Flag Points**: Selects icons and labels for flag points. Flag points show obstacles or other land features on a guidance map.
- **ISOBUS**: Allows interaction with ISOBUS compliant ECUs via the ISOBUS Universal Terminal.
- **Utilities**: Allows a USB to be provisioned to upgrade software.



5.1. Setting up console name

The **Console Name** option enables a name to be entered to identify the console. This is used by XTEND and Topcon Agriculture Platform (TAP).

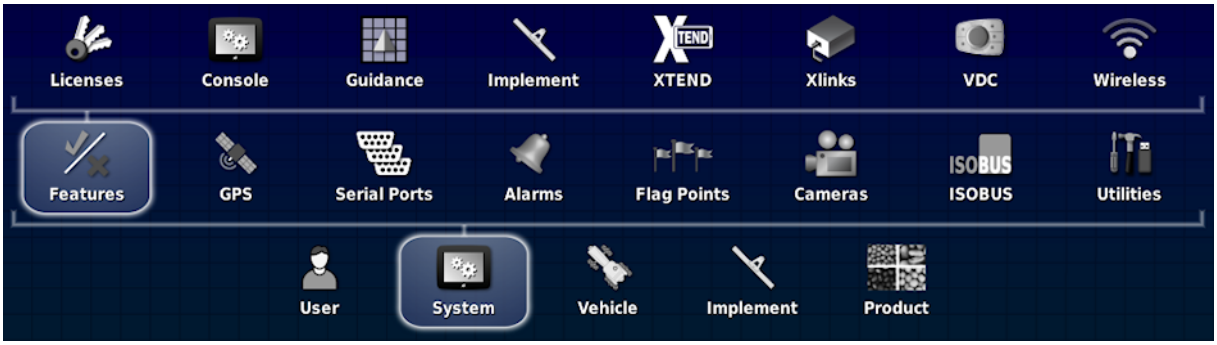


- **XTEND**: The name displayed on the XTEND app on the mobile device when choosing a console to view. See XTEND setup, page 56.

- **TAP**: Enables import of prescription maps and import / export of task data. See Cloud based services, page 47.

5.2. Setting features

The **Features** menu option provides the following menu items:



5.2.1. Licenses setup

Setup licenses for optional features.

To set up licenses:

1. Select **System** / **Features** / **Licenses** .

- **Export license data**: Selecting this option exports a folder to a USB with information about the console and, if applicable, any existing licenses. The folder must be sent to the dealer to generate a new license file.

- **Import license data**: The dealer must supply the required licences to be placed on a USB. Insert the USB into the console and select this option to update the current licenses. **Note**: The features must still be enabled on other setup screens before they will be available.

  Note: If a USB is not available to import the license codes, selecting **Unlicensed** in the **Status** column displays a screen where the codes may be entered manually.

- **Feature**: The complete list of optional features available for the console.
- **Status**: The current license status for each feature.
- **Expiry**: Shows the time until a licensed feature will expire.

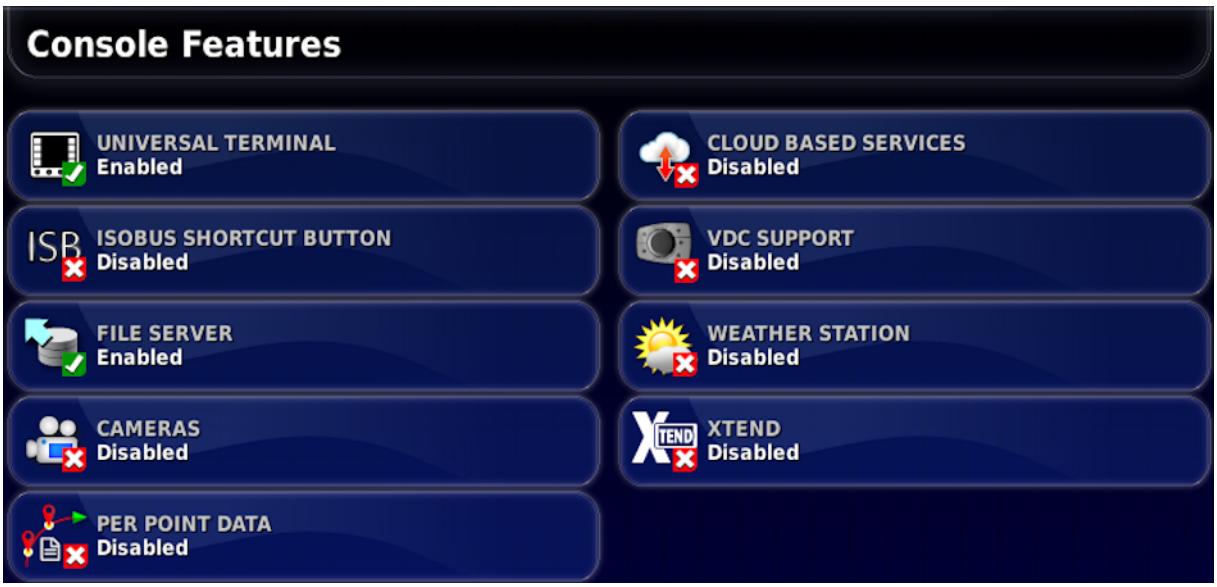
Note: Pressing a heading in the table will reorder the list by the contents of that column.

5.2.2. Console setup

Configure console features.

To set up features:

1. Select **System** / **Features** / **Console** .



Universal terminal

Enables the ISOBUS Universal Terminal server that allows interaction with ISOBUS compliant ECUs.

Refer to Setting up ISOBUS / universal terminal, page 87.

ISOBUS shortcut button

Adds a button on the operator screen above the master switch, which enables the operator to directly deactivate functions that were activated by an ISOBUS control. Pressing the button again will not restart the functions, but will permit them to be restarted manually via the standard mechanism for each function.

File server

Can store files for an ISOBUS ECU if the ECU has file server capability. It allows implement and other profiles to be moved between ECUs. Files can be exported and imported using the USB.

Cameras

Allows the operator to monitor connected digital cameras on the console. A license must be purchased to enable this functionality.

Per point data

Records each GPS data point during the job and a number of associated data fields such as elevation, heading, GPS quality, section states, CropSpec readings. These are exported as a .csv file (refer to Exporting a job report, page 180).

Cloud based services

Topcon Agriculture Platform - TAP

Enables file transfer via Topcon Agriculture Platform software. Refer to Using Topcon Agriculture Platform (TAP), page 226.

VDC support

The VDC (Vehicle Display Controller) is an optional device that may be used to perform a selection of console functions. Refer to VDC setup, page 61.

Weather station

Enables support for the AirMar 150WX Weather Station via the CAN NMEA2000 data output from the sensor. Select the CAN port to which the weather station is connected. An icon is added to the Navigation bar on the operation screen. Refer to Using weather station, page 227.

A license must be purchased to enable this functionality.

XTEND

Using the XTEND technology, you can extend the user interface of your display to the screen of your mobile device. Get access to many of the Horizon software features directly on your mobile device, both within and outside the cab of your vehicle. Use your mobile device to perform calibration, diagnostics, tank fill and many other activities anywhere around your machine via the Horizon user interface. A dedicated Wi-Fi connection keeps your mobile device always in sync with the main display in the cab. The XTEND app (available in Android or iOS) is used in conjunction with the XTEND feature on the console. See XTEND setup, page 56.

Note: If the console loses its connection with the mobile device, the system is placed into a safe state. All moving parts (pumps, drives etc) are stopped. ISOBUS ECUs are disconnected from the console UT and as a result will enter their own safe state. An alarm is displayed that must be acknowledged before the system will exit the safe state.

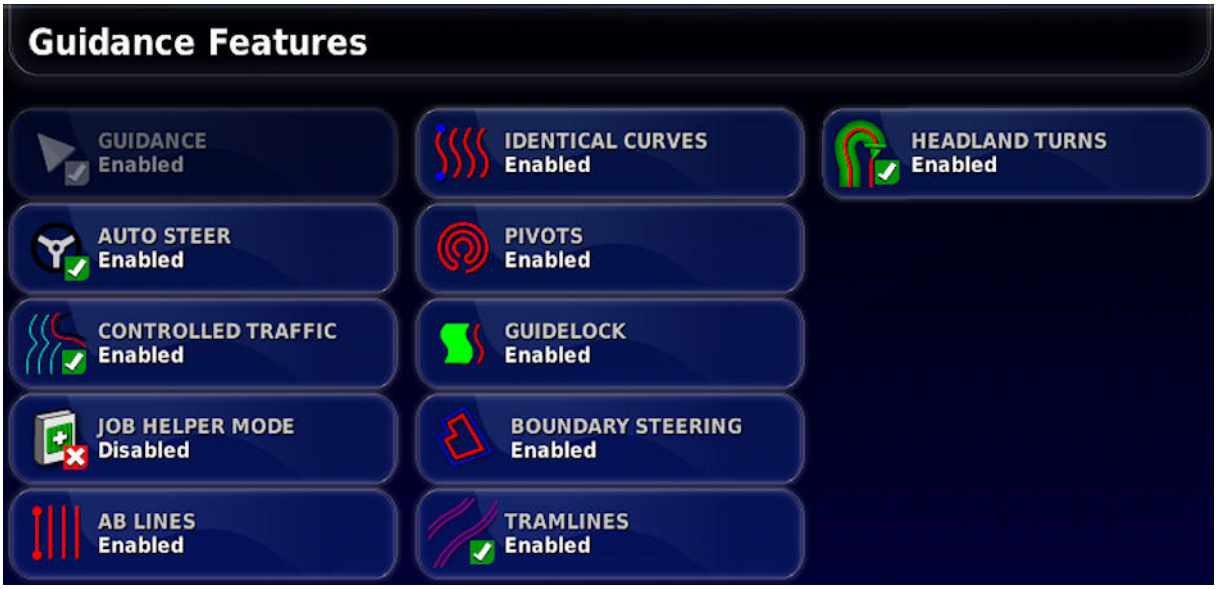
A license must be purchased to enable this functionality.

5.2.3. Guidance setup

Sets the guidance system functionality.

To set up guidance features:

1. Select **System** / **Features** / **Guidance** .



Guidance

This is a standard feature of the console and cannot be disabled.

Auto steer

Enables auto steering and can only be used on vehicles fitted with an auto steering system such as the AES-25.

Controlled traffic

The Controlled Traffic feature adds two new guidance modes; Optimal Lines and Project Lines. When the feature is enabled, the operator is able to select either of these modes to use for guidance or auto-steering.

Optimal Lines mode allows multiple lines or curves to be recorded in a single file and all recorded lines or curves can be viewed on the screen at the same time. Any of the lines or curves recorded in a set of optimal lines can be selected and used for guidance or auto-steering.

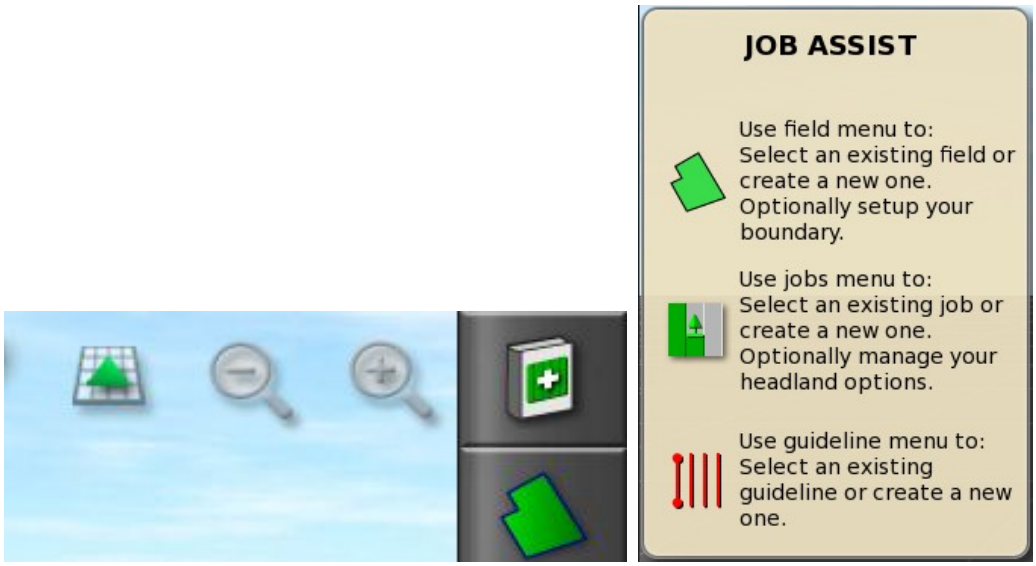
Project Lines mode is similar to Optimal Lines mode in that it allows multiple curves that can be used for guidance in the same file and to be viewed on the screen at the same time. The main difference between Project Lines and Optimal Lines is that waylines are not generated for Project Lines. Only the path that each Project Line follows can be used for guidance or auto steering.

A license must be purchased to enable this functionality.

Refer to AGA5196 Controlled Traffic Operator's Manual for more information.

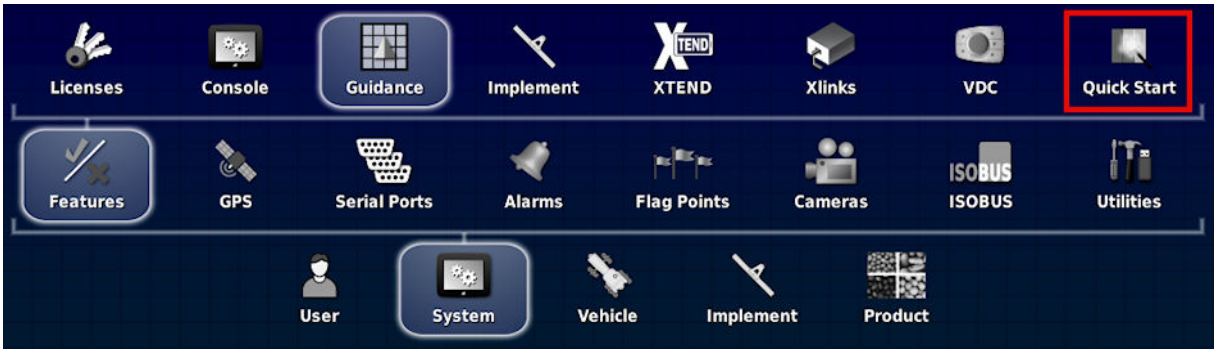
Job helper mode

- **Disabled**: No job helper modes are available.
- **Job Assist**: A help screen that may be used to step through the tasks in a typical job. This may be useful when learning to use the console. Enabling the option places a new icon at the top right of the Operation screen.



Selecting the icon displays the help screen. As options are selected, the Job Assist screen lists the next possible steps.

- **Quick Start**: Automatically steps through the tasks required to complete a typical job. This may be useful to speed up the performance of standard tasks. Enabling the option places a new menu item on the right hand side of the **Features** menu.



1. Select **System** / **Features** / **Quick Start**. The Quick Start Settings page is displayed. This page is used to select the tasks that quick start will automatically step through. Enable the required tasks.

- **Export job report for previous job**: Refer to page 180.
- **Change field**: Refer to page 157.
- **Record boundary**: Refer to page 160.
- **Change job**: Refer to page 175.
- **Configure job regions**: Refer to page 175.
- **Load VRC map**: Refer to page 183.
- **Set guidance mode**: Refer to page 187.
- **Change guideline**: Refer to page 187.
- **Auto-hide on success**: Closes the Quick Start window once all required tasks are completed.

2. To use Quick Start, select the button at the top right of the Operation screen.

Selecting the button opens the first task enabled in the Quick Start setup.

Guidelines (AB lines, identical curves...)

The four guideline types (AB lines, identical curves, pivots and guidelock) are all enabled by default. If some guideline types are not required, they can be disabled. It is not possible to disable all guideline types at the same time. Refer to Guideline Menu, page 187.

Boundary steering

Enables a guideline to be generated from the boundary. Refer to Using boundary steering, page 194.

Tramlines

Horizon software can display a visualization of tramlines. Tramlines display an indication of lines that the wheels travel along that should not be seeded. Tramlines are only a visual indicator, they do not control the implement operation. Refer to Setting up tramlines, page 196.

Headland turns

Provides the ability to autosteer around headland turns. Refer to Configure headland turns, page 199. A license must be purchased to enable this functionality.

5.2.4. Implement setup

Sets up the functionality for the attached implement.

To set up implement functionality:

1. Select **System**  / **Features**  / **Implement**  .

Auto section control

Permits the system to turn sections on for new areas to be covered and off for areas that have already been covered (refer to page 223).

Variable rate control

Works with a prescription map to vary application rates over the mapped areas (refer to page 183).

Task data

Task Data allows import/export and editing of ISOBUS task data XML files. Task Data mode allows you to select, configure and run a task from the imported task data. Shapefiles can be imported to automatically control the ECU. Enabling this feature will disable some field and job menu items during operations that are not relevant when using task data.

The Task Data Menu icon replaces the Job Menu icon on the Operation screen (refer to page 235).

Note: If task data is enabled, Job Helper mode (page 50) changes to Task Helper Mode.

Area counters

Area counters are used with spreaders, sprayers and seeders to record data such as treated area, product used, operating time, average rate and

productivity rate. Area counters are not available when using ISO implements or Xlinks.

- **Enabled (Stored per job)**: Area counters are stored separately for each job, (if a job is started and coverage laid, then another job is selected and coverage laid, going back to the first job displays the area counters from the first job).
- **Enabled (Stored per implement)**: Area counters continue across jobs, but loading a new implement displays new area counters. Reloading the first implement displays the area counters as they were when that implement was last used.

  Note: Area counters can be enabled for both jobs and implements at the same time.

Refer to the Spreader, Sprayer and Seeder operator manuals for more information.

Enabling area counters per job displays the **Reset job area counters** option:

- **Never**: The area counters must be reset manually, or they will continue to accumulate data.
- **Prompt**: When a job is erased you will be asked if area counters should be reset.
- **Auto**: Creating a new job or erasing a job will automatically reset the area counters.

Water conservation

Must be enabled to create and use a scraper implement.

A license must be purchased to enable this functionality.

Refer to 1004639-01 Water Conservation Operator Manual for more information.

Nitrogen sensing

Topcon CropSpec

A Topcon real-time integrated crop monitoring and application system. Used to monitor in-field variability, treat on-the-go, or keep data for future analysis or prescription applications.

CropSpec is displayed via the Universal Terminal (refer to page 224), using a map overlay.

Yield monitoring

A yield monitor is a console device that captures sensor data from a harvesting machine, combines that sensor data with geodetic data, and logs that information to its file system in real time.

A license must be purchased to enable this functionality.

NORAC boom height control

Automatically controls the height of the boom above the ground or the crop canopy. Requires NORAC sensors and Electronic Control Unit (ECU) to be installed. See Using NORAC Boom Height Control, page 229.

Lock setup menu when master switch is on

Disables access to the setup menu when the master switch is on.

Hypro Prostop-E

Allows connection to the Hypro Pentair CAN controlled nozzle system to provide individual nozzle control on the boom.

A license must be purchased to enable this functionality.

Weigh scales

Enables the Horizon seeder controller software to display measured weight readings from Scale Link ECUs.

LH5000 rate sensor

This option allows a third party device to provide a real time RS232 rate input to the console. This can then be used with both liquid and granular controllers as an alternative to a Variable Rate Control (VRC) map. The serial port that the sensor is connected to must be selected. See Setting up serial ports, page 74.

A license must be purchased to enable this functionality.

Digitroll blockage sensor

Enables the Horizon seeder controller software to interface to Digitroll blocked head systems to detect blockages in seed and/or fertilizer tubes.

5.2.5. XTEND setup

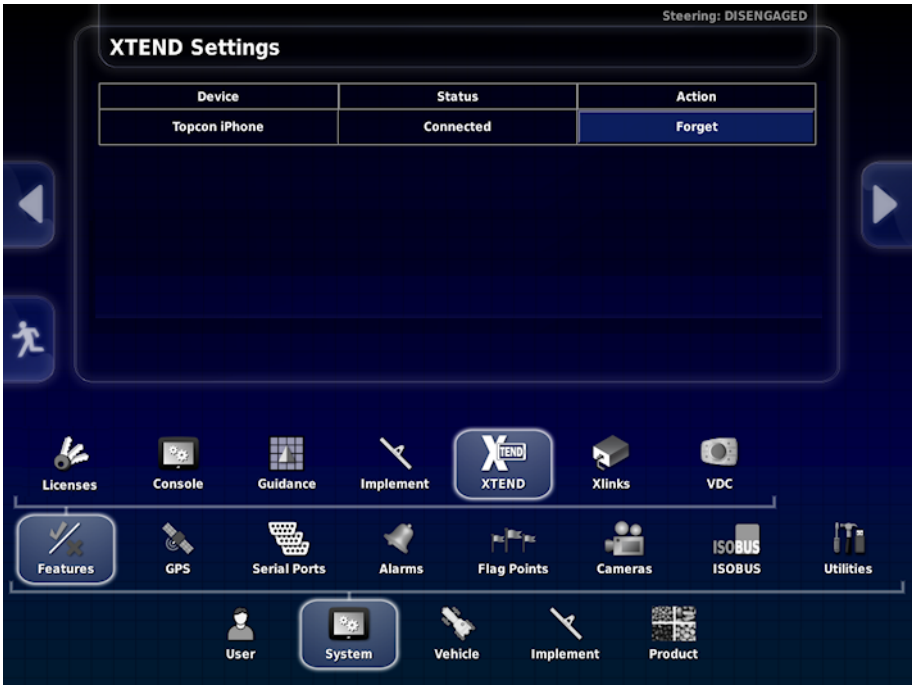
Setup on the console

Note: It is recommended that an EDIMAX AC 600 dongle is connected to the console for use with XTEND. Other dongles that do not have an external antenna may not provide adequate signal strength for operating outside the vehicle cabin. Configure the mobile device as a wireless hotspot and enable the wireless connection on the console. See Wireless setup, page 61.

1. Select **System**  / **Features**  / **XTEND**  .

This screen identifies any external device that is currently paired with this console.

Note: A console name must be entered. See page 44. This name is displayed on the XTEND app on the mobile device when choosing a console to view.



The **Forget** option prevents an external device from reconnecting to this console via XTEND, unless the console operator confirms the connection.

If an XTEND device pairs with another console, the console operator must confirm prior to reconnecting.

Setup on the mobile device

The XTEND app is available for iOS and Android devices from the Apple and Google app stores. Configure the mobile device as a hotspot for use with XTEND.

XTEND example use cases

Guidance / Universal Terminal:

- Display the guidance map at different zoom levels on the console and external device, or have one map layer displayed on the console and another displayed on an external device so you can see yield, applied rate for multiple tanks etc.
- Increase the viewable area of your console. Rather than display a mini view on the console, display that screen maximised and display the guidance view on an external device (or vice versa). Alternatively, two different screens related to one implement can be shown on the console and mobile device.
- When installing a wheel angle sensor, display the WAS position value on an external device when setting up the centre position for the sensor bearing shaft, to ensure the sensor is centered when the wheels are facing straight ahead.
- Enter boundary offset figures while measuring distances in the field.

Sprayer:

- Check sprayer nozzles to see if they are blocked. Turn on one section at a time (while standing at the back of the boom - at sufficient distance not to get sprayed) and make sure all nozzles are spraying correctly.
- Display Auto Fill Control for sprayers fitted with an Apollo ECU. With the auto fill window displayed on the mobile device, you can set the 'target volume', monitor the 'actual volume' and 'volume remaining to target', as well as start and stop the fill operation, without having to return to the cabin.
- View the valve balancing wizard for sprayers fitted with an ASC-10 ECU. Currently you have to be able to see the screen to know if you need to increase / decrease the return flow for each section, which can be difficult for a large sprayer. This is much easier to do with the wizard displayed on a mobile device.
- Display the recipe calculator on an external device, to display quantities of chemicals required to be mixed while standing at the sprayer. This removes the need to return to the cabin if you want

to check the values or change a recipe. With the recipe calculator running on your mobile device, you can remain at the mixing station while you make the adjustments.

- Perform sprayer flow meter calibration. With the wizard displayed on the mobile device, you can run through each step of the calibration (which is usually performed at the back of the machine) without having to return to the cabin.

Seeder:

- Perform seeder implement seed rate calibration. With the calibration window on the mobile device, you can perform the entire calibration, including entering weights, without needing to return to the cabin.
- Display the blocked head sensor setup on an air seeder. During the setup for the blocked head sensors, you need to connect the sensors in the order in which you want them to appear on the screen as you assign them to heads. Currently this either requires two people, or you have to return to the cabin each time you connect a sensor. With the setup window displayed on the mobile device, this process can easily be performed by one person.
- Perform down force calibration on an air seeder. This requires recording and then entering the load that is applied by the press wheel, so you need to return to the cabin to do this step. With the wizard on the mobile device, the process can be performed without needing to return to the cabin.
- Setup and replace ECUs for a seeder implement. This requires ECUs to be disconnected / reconnected while pressing 'Next' on the screen.

YieldTrakk:

- Enter the true weight of grain from the scales on the grain cart when calibrating YieldTrakk. The operator in the combine can use XTEND to view the screen on the console in the grain cart so they can instantly see the weight as they unload.

NORAC:

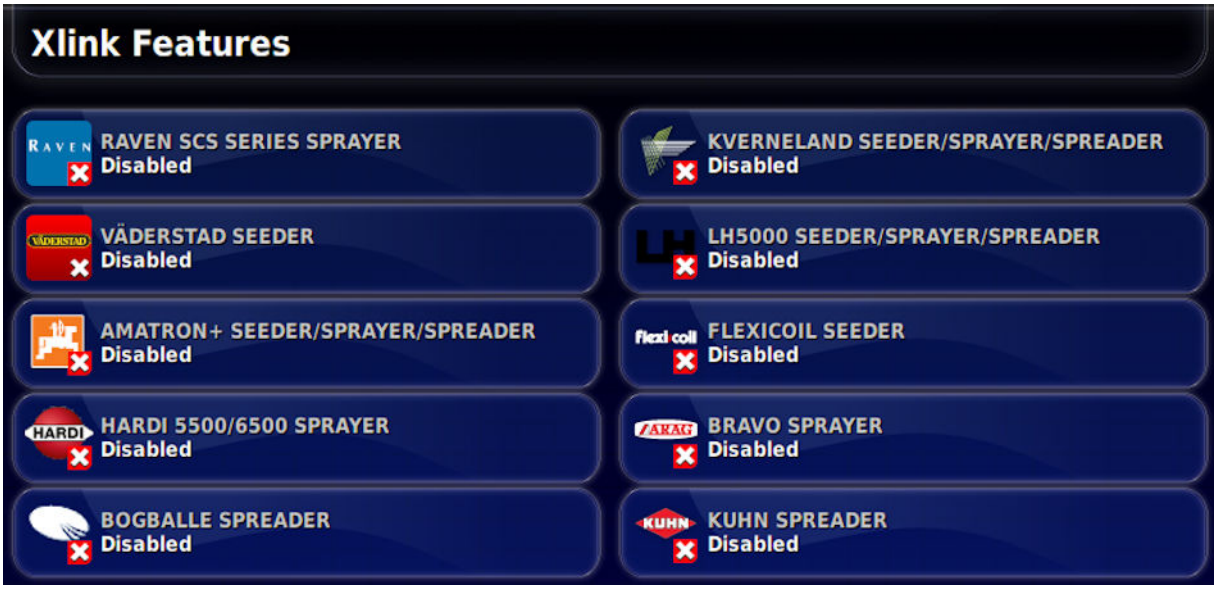
- Perform testing of the initial installation of Norac and set the proper target height for each field via the display on a mobile device.

5.2.6. Xlinks setup

An Xlink is a software interface that allows the console to communicate with a third party controller using a non-ISOBUS serial interface. The third party controller may have its own console that can be externally controlled via the Xlink.

To set up Xlink functionality:

1. Select **System** / **Features** / **Xlinks** .



Each third party controller has its own proprietary serial interface specification that details what functionality it provides to the console via the Xlink.

Xlink interfaces are not standard like ISOBUS. The available features depend upon the third party controller's manufacturer. They will also vary depending on the third party controller's version.

A license must be purchased to enable this functionality.

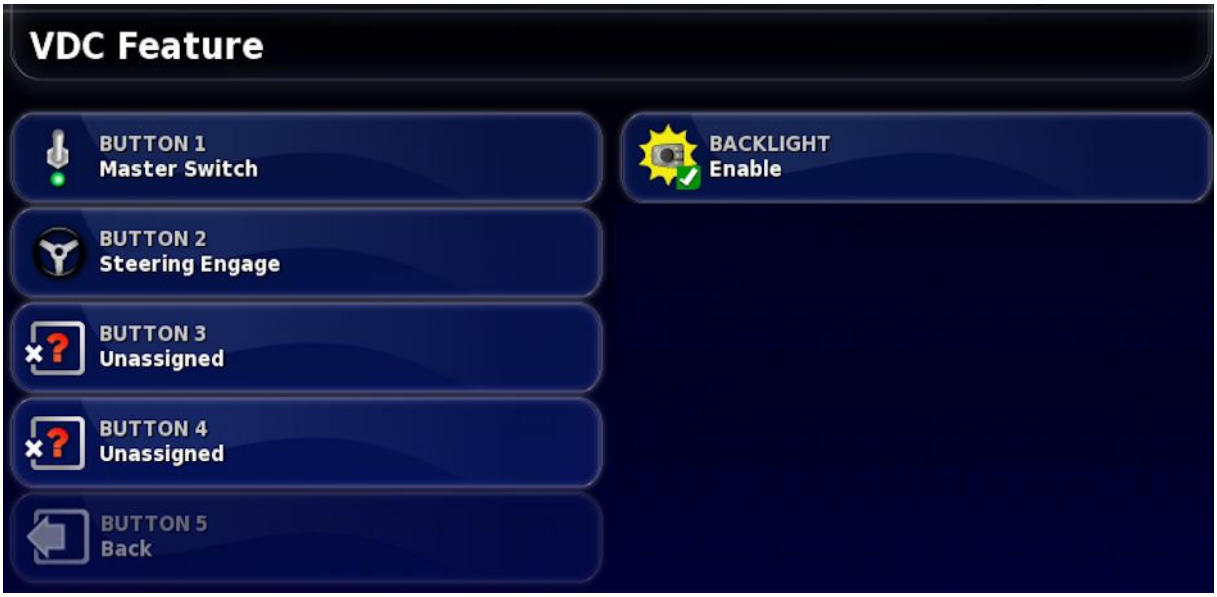
Refer to AGA5332 Xlinks Operator's Manual for more information.

5.2.7. VDC setup

The VDC (Vehicle Display Controller) is an optional device that may be used to remotely perform a selection of console functions.

To set up VDC functionality:

1. Select **System** / **Features** / **Console** .
2. Select **VDC SUPPORT** to enable the VDC functionality.
3. Select **System** / **Features** / **VDC** to assign functions.

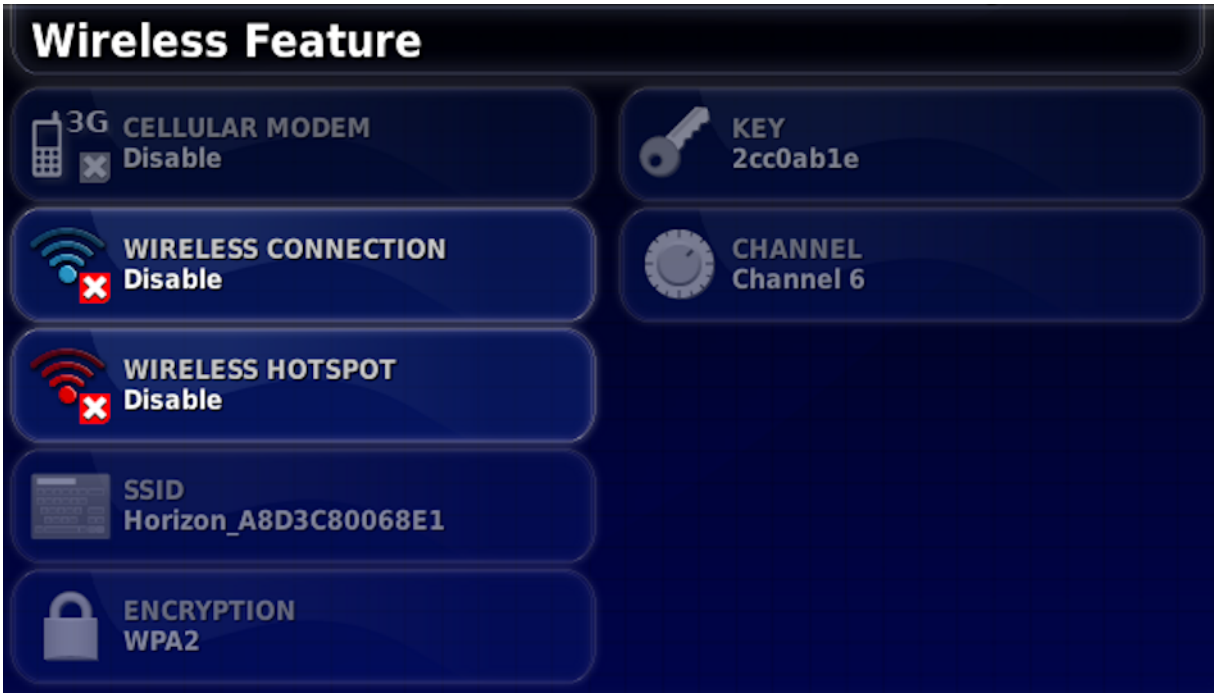


Button 5 is always set as the Back button.

Select Button 1 - 4 to assign a function.

5.2.8. Wireless setup

This is required for XTEND, transferring files between consoles (see Transferring files between consoles) and for the remote support feature (see Setting up remote support, page 40). A specific Wi-Fi dongle is required. The supported dongles are listed below.



Note: The options that are enabled on this screen are dependent on the type of dongle that is connected.

- **Cellular modem**: Enable this feature if the wireless device provides a 3G/LTE internet connection.
- **Wireless connection**: Connect to a wireless hotspot (a phone or router setup as a hotspot). Enabling this option displays a wizard.
- **Wireless hotspot**: Create a wireless hotspot for phones and tablets to connect to. When hotspot settings are changed, the changes are not applied until you leave the setup screen.
- **SSID**: Enter the console name that will be displayed on wireless devices to identify the hotspot.
- **Encryption**: Different levels of encryption are provided for the wireless connection. This may be necessary to prevent access to the console via the Wi-Fi connection or it can be switched off (open) if this is not a concern. If using encryption, either WPA or WPA2 is recommended, as these are widely supported by connecting devices and offer good security (compared to WEP).
- **Key**: Enter the password that must be entered into the wireless device when connecting to the network if encryption is in use.

The key length for WPA security must be between 8 and 63 ASCII characters (or 64 hexadecimal digits, 0123456789ABCDE).

The key length for WEP security must be 5 or 13 ASCII characters (or 10 or 26 hexadecimal digits for 64 bit / 128 bit security respectively).

- **Channel**: Select a channel from 1 to 7 for the wireless hotspot for 2.4 GHz.

Wi-Fi behavior:

- Wi-Fi signal strength is shown on the dashboard.
- Stores the last five access points and keys to simplify reconnecting to frequently used devices.
- Wi-Fi logo in dashboard panel will flash when reconnecting to access point if connection is lost (when access point becomes available again).

Supported Wi-Fi devices:

- EDIMAX AC 600 **Note**: This is the recommended Wi-Fi device for use with XTEND.

  Note: Installing the EDIMAX onto another device and operating it at 5 GHz may violate the allowed frequency spectrum for the region. This device should only be used in conjunction with the supplied Topcon console.
- TP-Link TL-WN821N (V3) (300Mbps Wireless N USB adaptor)
- TP-Link TL-WN821N (V4) (300Mbps Wireless N USB adaptor)
- Netgear WNA1100 (N150 Wireless USB adaptor)
- Netgear WNA1000M G54/N150 WiFi USB Micro adaptor
- Netgear WNA1000Mv2 N150 WiFi USB Micro adaptor
- Netis WF2120
- D-Link DWA-131 H/W Ver.:B1 F/W Ver.:2.01
- D-Link DWA-131 H/W Ver.:E1

5.2.9. Quick start setup

This option is available under **System** / **Features** / **Quick Start** if **Quick Start** is selected as the **Job Helper Mode** under **System** / **Features** / **Guidance** . Refer to Job helper mode, page 50.

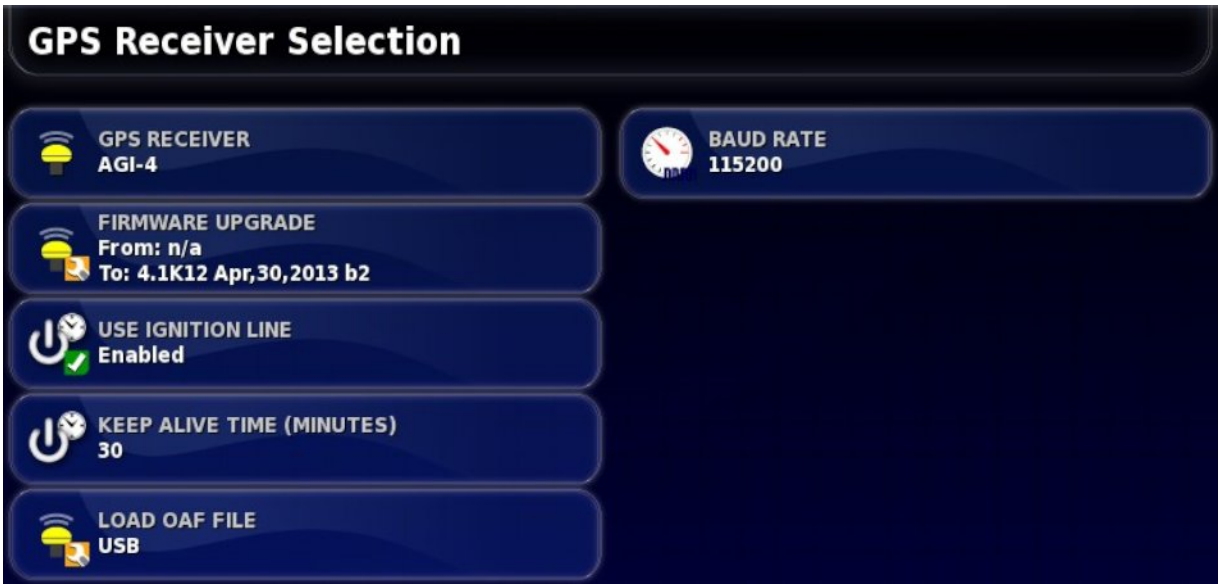
5.3. Setting up GPS

5.3.1. Receiver setup

Sets up GPS receiver capabilities.

To set up the GPS receiver:

1. Select **System** / **GPS** / **Receiver** .



GPS receiver

Select the GPS receiver type from the selection list.

The console can accept GPS input from a third party GPS receiver provided the receiver can be configured to output the data in the required correct format. Please consult the GPS receiver manufacturer to find out if your receiver can be set up in the correct way.

The console requires the following input if **Other** is selected under **GPS RECEIVER**:

- GGA 0.2 seconds (5Hz)
- VTG 0.2 sec (5Hz)
- ZDA 15 seconds

RS-232 communications

- 19200 baud rate (preferred) 8 data bits, No Parity, 1 Stop bit (19200, 8N1)

Firmware upgrade

Initiates a GPS receiver firmware upgrade via USB (if required) or via the package that comes bundled internally with the console software. The Firmware Upgrade button shows the version of the firmware that is currently in the GPS receiver and the version of the firmware to which it will be upgraded.

Use ignition line

Note: This feature should only be used **if the vehicle wiring and harnessing is compatible**.

(AGI-4 only) Separates the power supply to the AGI-4 receiver from the vehicle ignition. This enables the GPS receiver to remain powered after the vehicle is turned off. The **Keep Alive Time** determines how long the receiver remains powered.

Keep alive time

Note: This feature is only available if **Use Ignition Line** is set to **Enabled**.

(AGI-4 only) Keeps the GPS receiver active after the system has been shut down. This is useful to retain accurate positioning information (satellite convergence). For example: To keep the receiver on for 1 hour after the system is shut down, enter 60.

Load OAF file

Loads an Options Authorization File to the GPS receiver. This is normally done prior to receiver installation, but the file can be updated in the field via USB (if required).

Baud rate

The data transmission rate for modems. GPS receiver baud rate can be changed from the default value. This setting should not normally be

altered. If the setting does need to be changed, refer to the manual supplied with the modem.

5.3.2. Correction setup

GPS correction sources are used to increase the accuracy of the GPS position.

To set up the GPS correction source:

1. Select **System** / **GPS** / **Correction** .

2. Select the required **CORRECTION SOURCE**.

Note: The available correction sources are defined below. The extra options that must be defined vary depending on the correction source selected, refer to Correction source options, page 69.

Correction sources

Correction Source	Description
Autonomous	Let the receiver find any free available satellites. Will not use any correction. Precision: 2 - 5 m.
Automatic	Let the receiver select the best available correction source.

Correction Source	Description
WAAS	Use Wide Area Augmentation System. North America only. Precision: sub-meter.
EGNOS	Use the European Geostationary Navigation Overlay Service. Europe only. Precision: sub-meter.
MSAS	Use Multi-functional Satellite Augmentation System. East Asia only. Precision: sub-meter.
TopNET Global D	Uses TopNET Global D correction. Precision: 10 cm.
OmniSTAR VBS	Use OmniSTAR Virtual Base Station (VBS) correction. Precision: sub-meter.
RTK	Use Real Time Kinematic navigation. Precision: 2 cm.
RTK (External Modem)	Use external modem connected to GPS receiver for RTK corrections. Precision: 2 cm.
RTK (NTRIP)	Use a cellular delivered RTK correction source from a network provider. Precision: 2 cm.
DGPS (External Modem)	Use an external modem to import DGPS corrections from a network provider. Precision: sub-meter.
DGPS (NTRIP)	Use a cellular delivered DGPS correction source from a network provider. Precision: sub-meter.

Note: The source selected here will affect the functioning of guidance and auto steering. It is important to be aware of the needs of the GPS equipment. Refer to the manual supplied with the GPS equipment.

Note: Precision figures depend on many variables (number of satellites, distance from the correction source, ionospheric conditions, receiver, antenna) and cannot be guaranteed.

Correction source options

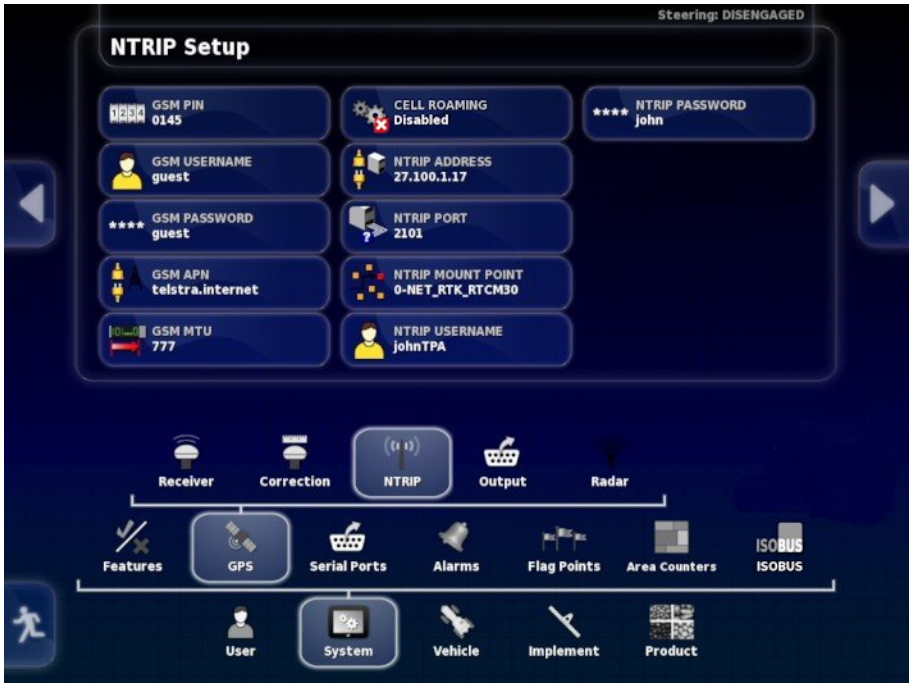
Note: The correction source options that must be defined vary depending on the correction source selected.

Option	Description
GLONASS	Allows the GPS receiver to use the Russian satellite navigation system GLONASS, in addition to GPS.
TRUPASS	Topcon's GPS drift compensation algorithm, used to provide better pass to pass performance. Available with the following correction sources: Autonomous, WAAS, EGNOS, MSAS, OmniSTAR VBS, TopNET Global D. **Note**: This option must be purchased separately.
NTRIP Source	Shown when either RTK (NTRIP) or DGPS (NTRIP) is selected. The **Receiver** option uses the NTRIP client within the AGI receiver. Selecting **Console (COM x)** enables the console NTRIP client and configures the AGI to use the console as an external modem for correction data. **Note**: **COM x** shows the serial port selected for NTRIP client on the serial ports setup page. See Setting up serial ports, page 74.
RTK Protocol	Communication protocol for data transfer between the RTK base station and the rover (tractor). Must be set to same protocol as base station. Refer to base station setup information.
Region	The Region must be selected to determine the frequency used by OmniSTAR. The frequency for the region is set automatically.

Option	Description
Fallback	If the system is not receiving enough data to compute the vehicle's position with the required accuracy, auto steering cannot be engaged. The fallback feature allows the system to reduce the position accuracy requirement so that auto steering can be engaged. This is useful in situations where a high degree of position accuracy is not required.
Baud Rate	The data transmission rate for modems. Refer to documentation supplied with modem.
GGA Output	Some network providers require a GGA (position) to be sent to them to allow them to identify the location of the rover (tractor).

NTRIP setup options

If DGPS NTRIP is selected, a wizard launches to detect the attached modem, then the following screen is displayed.



- **GSM APN**: The telecommunication provider's internet link.
- **GSM MTU** (Maximum Transmission Units): The largest protocol data unit that can be passed onwards.

- **Cell roaming**: This may be used to disable cell roaming to prevent accidental cross-border data charges (useful if working near the border of another country).
- **NTRIP Mount point**: The ID of the base station (either real or virtual).

The GSM and CELL ROAMING settings can be obtained from your cellular network provider. The remaining settings are provided by your NTRIP service provider.

RTK setup options

If RTK is selected, a wizard launches to detect the attached modem, then the following screen is displayed.

- **Frequency**: The frequency used.
- **Channel spacing**: The frequency difference between adjacent allocations in a frequency plan.
- **Net ID**: The setting for scrambling (1-255 = on, 0 = off).
- **Link protocol**: Radio data transmission protocol.
- **Modulation**: The type of modulation used.

- **FEC** (Forward Error Correction): A technique used for controlling errors in data transmission over unreliable or noisy communication channels.

Note: If RTK is selected and an AGI-3 or AGI-4 is connected, the base station settings can be automatically synced with the entered receiver settings. Select **System** / **GPS** / **Base Station Sync** and follow the instructions displayed on the wizard.

5.3.3. Output setup

GPS output refers to the console's ability to export various data strings in NMEA 0183 format. The most common of these is the GGA (Position) message and the VTG (Velocity and Heading) message.

This may be useful to connect to third party devices for position and speed outputs.

To set up the GPS output:

1. Select **System** / **GPS** / **Output** .

- **VTG legacy mode**: Supports VTG data output for NMEA standards below V4.00. Outputs VTG strings compatible with NMEA V3 and below.

Refer to documentation provided with third party device for more information.

Note: Devices using GPS and plugged into the console may need information from the console. The information is contained in sentences based on NMEA.

5.3.4. Radar setup

The console can provide radar output to external devices. This may be useful to connect to a third party device to provide a ground speed signal.

To set up radar output:

1. Select **System** / **GPS** / **Radar** .

- **Calibration Factor**: Refer to the third party device for this figure if the radar speed signal is not accurate.

5.4. Setting up serial ports

Sets the console serial port assigned to a particular function.

To set the serial ports:

1. Select **System** / **Serial Ports** .

2. Select the required function and from the selection list, select the console serial port to which the device is connected.

   For example: SGR-1, AGI-3 or AGI-4 GPS Receiver is connected to serial port 1 with all Topcon harnesses.

   NMEA GPS Output is generally on serial port 2 if in use.

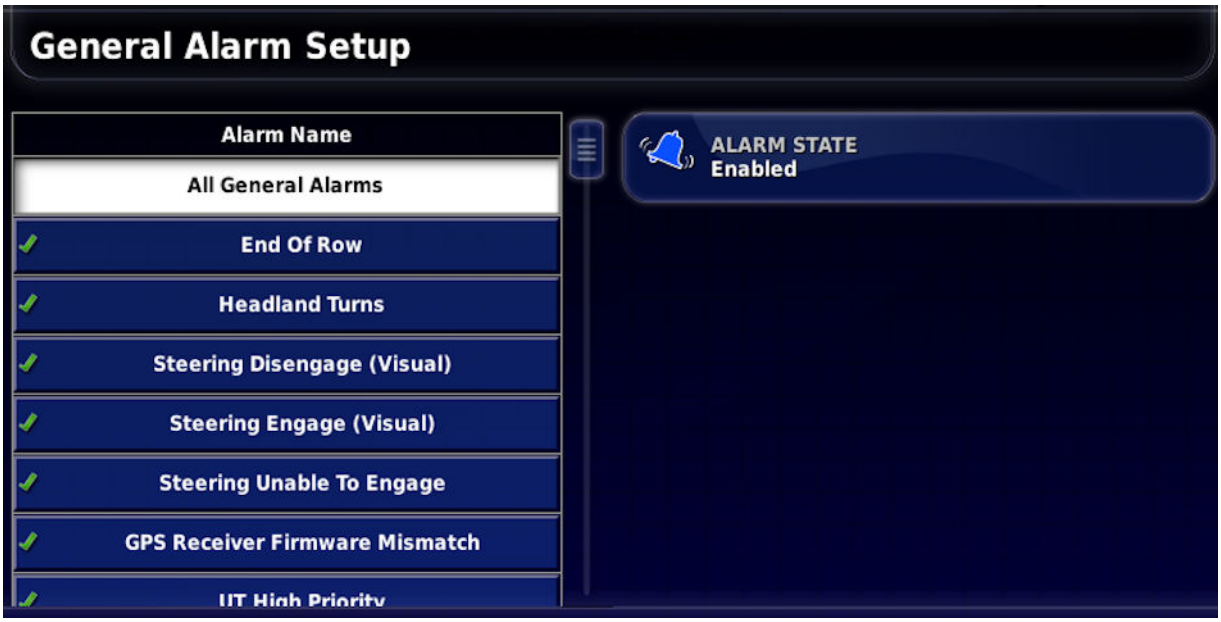
   Xlinks is on serial port 3 if in use, or on serial port 2 if NMEA GPS out is not in use.

5.5. Setting up alarms

If no implements have been set up in the system, only General alarms are available to set up. Implement specific alarms are available once an implement has been defined. Refer to the Spreader / Sprayer / Seeder Operator manuals for more information.

To set up general alarms:

1. Select **System** / **Alarms** / **General** .



The list of general alarms is displayed. All general alarms may be enabled or disabled by selecting **All General Alarms**.

Alternatively, each general alarm may be enabled or disabled independently.

Note that for safety reasons, the **Steering Engage/Disengage** audible alarm may not be disabled.

The **End of Row** and **Headland Turns** alarms require extra information.

End of row

This alarm sounds and displays when the vehicle is approaching the boundary and the operator should slow down to prepare for manual

control.

- **First Distance**: Distance from the boundary at which the alarm will first trigger. Distance is measured from the tractor to the boundary along the wayline (guideline).
- **Second Distance**: Distance from the boundary at which the second alarm will trigger, warning the operator to immediately take control of the vehicle.
- **Look Ahead Distance**: Sets how many meters in front of the vehicle that the system looks to respond with actions.

Headland turns

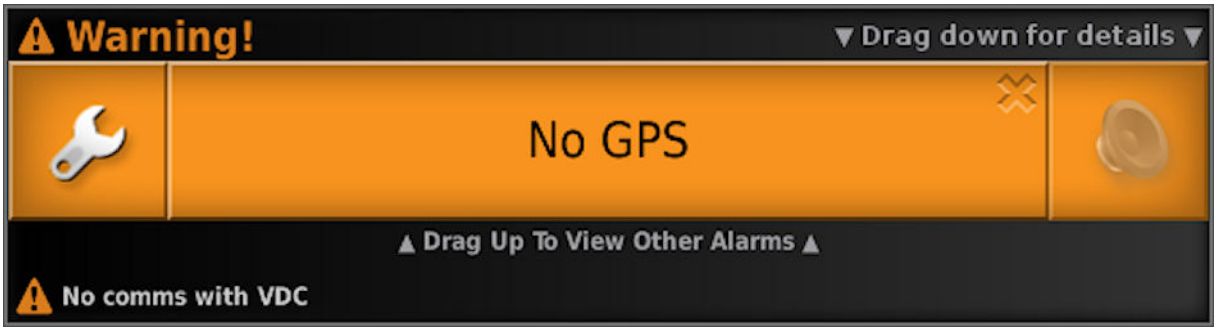
This alarm sounds and displays when the vehicle is approaching the headland for an autosteer headland turn and allows the turn to be adjusted or cancelled, if required.

Note: The headland alarm can be displayed manually if required. See Configure headland turns, page 199.

- **Distance to Headland**: Distance from the headland at which the headland alarm will display.
- **Turn Options**: Sets whether the edit headland turns options are displayed on the headland alarm by default.

5.5.1. Alarm window description

To acknowledge an alarm, press the center of the alarm window.



The alarm window may be dragged down to display additional details about the alarm if **Drag down for details** is displayed at the top of the alarm window.

If more than one alarm is active, you can swipe up to flip through the active alarms.

The speaker icon may be used to mute the alarm.

The spanner icon displays the appropriate alarm setup page to configure that alarm (or disable it if it's not relevant to your current setup). There are a few exceptions to this behavior:

- The GPS Receiver Firmware Mismatch spanner displays the setup screen to upgrade your GPS receiver firmware.
- The ASC-10 ECU Firmware Mismatch spanner displays the screen to upgrade your ASC-10 firmware.
- The No GPS Time alarm displays the time/date setup screen to enter the correct local time.

5.5.2. Alarms list

This is a list of the alarms on the console and their descriptions.

Alarm	Description
Active field far away	The active field is more than 8 km (5 miles) away. Ensure the correct field is loaded or create a new field.
Apollo hardware warnings	Provides information about Apollo hardware problems.
Applying guideline nudge offset	Notification that an existing nudge offset is being applied.
ASC10 ECU firmware mismatch	Select the spanner to display the screen required to update the applicable firmware.
Base station location mismatch	The location of the base station used to create a guidance pattern doesn't match the current base station position.

Alarm	Description
C24 modem activation failed	Triggered if the C24 modem activation process fails for any reason.
C24 modem activation in progress	A C24 modem must be activated the first time it is used. This involves an exchange of data with the carrier. The operator has to initiate this process. To provide feedback to the operator that the process has been initiated, this message is displayed.
COM port fail	Triggered if the specified COM port cannot be opened.
Conveyor speed high	Triggered when the conveyor speed high alarm indicates that the speed signal input has exceeded the alarm point setting.
Conveyor stopped	Triggered when the conveyor belt has stopped, the tank and master switch is on, ground speed indicates that there is movement and that the belt should be moving.
Conveyor stuck valve	If the tank is just turned off, the stuck valve alarm is inhibited for a period of time to give the belt time to stop moving, after which if it hasn’t stopped, the alarm will be triggered.
End of row	Triggered when the vehicle is approaching the boundary and the operator should soon take control.
Exclusion map distant	Triggered when the exclusion map is too far from the current GPS position. The exclusion map is unloaded automatically.
Fallback	Triggered when the selected GPS correction source is not available and the system must use a less accurate correction source temporarily.

Alarm	Description
Field unloaded	Triggered when a field has been exited due to current distance from the selected field.
Flow sensor failure	Triggered whenever the master switch is turned on, there is movement over the ground, at least one section is turned on, and there are no flow sensor pulses being received.
Firmware version mismatch / outdated	Select the spanner to display the screen required to update the applicable firmware.
GPS drift correction	Triggered on startup as an informational reminder that the GPS drift correct has been applied. Since GPS drift varies with time this is a reminder that GPS drift compensation may need to be recalculated.
GPS lost	Triggered when the GPS signal is lost but the receiver is still connected.
GPS receiver firmware mismatch	Select the spanner to display the screen required to update the applicable firmware.
Headland turns	Triggered when the vehicle is approaching the headland for an autosteer headland turn.
Incorrect gear ratio	There is an incorrect ratio between the channel shaft and motor encoders.
Incorrect rate	The implement is in auto mode and the target application rate is not achieved.
Invalid vehicle profile	The selected vehicle profile contains invalid parameters. Please create a new vehicle profile or contact your dealer for assistance.

Alarm	Description
Invalid / obsolete profile loaded	Triggered when an old implement or vehicle profile is active on the system. This can occur if upgrading from a very old version of the software to the latest version.
Liquid pressure high	Triggered if the tank pressure is greater than the maximum specified tank pressure.
Liquid pressure low	Triggered if the tank pressure is less than the minimum specified tank pressure.
Low resources	Triggered when the system resources (memory or space on the file system) are more than 90% full.
Master switch off	Triggered when the operator is driving over an area that is untreated on the coverage map with the master switch off. (To prevent operators from forgetting to engage the master switch at the start of a run.)
Max guideline length exceeded	Triggered when the length of the recorded line exceeds the maximum number of points (typically several kilometres, but will vary based on how complex the curve is).
No comms	Triggered if the console is unable to communicate with the implement ECU.
No comms with VDC	No communication with VDC. Occurs if VDC is enabled, but there is no physical VDC device or it hasn't been connected properly.
No GPS	Triggered if the GPS connection is lost.
No GPS time	Triggered if the GPS receiver is not configured to send time messages (ZDA NMEA messages).

Alarm	Description
No ground speed	Triggered if the auto steering is on and there is no ground speed present.
No SIM detected	Triggered if a modem is detected but it has no SIM card.
Not flowing	Triggered if no liquid/NH3 flow is detected by the flow confirmation sensor with the master switch and tank on.
NTRIP failure	GPS correction source failure.
Parameters mismatch	Vehicle geometry parameters do not match the geometry configuration in the steering system. Re-select the vehicle on the Setup screen or ensure the vehicle geometry in the vehicle geometry screen is correct.
Path too far away	Triggered if the active guideline (AB line, curve or pivot) is too far away from the current GPS position.
Prescription map distant	Triggered if the active VRC map is too far away from the current GPS position.
Prescription map / guidance shapefile load fail	Triggered if the file being loaded is invalid or corrupted.
Pressure high	The high pressure alarm indicates that the pressure signal input has exceeded the alarm point setting. If correctly set, this usually indicates a blockage, booms off when they should be on, or sprayer speed too high.
Pressure low	The most common cause is an empty tank. With minimum flows set for nozzles, flow meter and pressure, this alarm will only display with pump or plumbing failures or an empty tank.

Alarm	Description
Project line too far	Triggered if the active set of project lines is too far away from the current GPS position.
Pump speed low	Triggered if pump speed sensing is enabled and the pump speed drops below the minimum RPM threshold setting for the alarm.
Pump speed high	Triggered if pump speed sensing is enabled and the pump speed exceeds the maximum RPM threshold setting for the alarm.
Receiver disconnected	The GPS receiver is not responding. Check the receiver connections.
Registration expiring	Registered feature expires within the next <days until expiry> days. Please contact your dealer to renew registration.
Requested rate is zero	Triggered when auto rate control is enabled, tank is on, master switch is on and the requested rate is zero. If there is a switchbox, check that at least one switch is on.
Resources exhausted	Triggered if the system resources (memory or space on the file system) are more than 97% full.
Reverse station	Informational alarm triggered when the operator's seat is rotated by 180 degrees (only applicable for tractors with dual driving stations).
RTK base sync failure	Triggered if the console fails to synchronise with the RTK base station.
Shaft is moving tank off	Triggered if the shaft is moving but the tank or master is off.

Alarm	Description
Shaft stopped	Triggered if the tank is active but the shaft has stopped moving. 'tank active' means: tank on, master switch on, at least one section on, moving.
Spinner not active	Triggered if the main periodic processing timer has expired, the tank is on, master switch on and there are no active sections.
Steering disengage (visual)	Triggered when the steering has been disengaged. This may be due to losing satellites, losing the guideline or manually turning the steering wheel.
Steering engage (visual)	The Steering Engage/Disengage alarms cannot be silenced for safety reasons, however, the visual component of the alarm can be suppressed if desired.
Steering profile mismatch	The parameters in the selected vehicle profile do not match the vehicle configuration in the steering subsystem. Select the correct vehicle profile for this vehicle.
Steering restart needed	Triggered if the steering subsystem needs to be power cycled. Occurs for some types of steering subsystem after calibration.
Steering unable to engage	The steering status popup which appears when steering cannot be engaged as requested can be suppressed. If the engage button is pressed this auto clearing alarm is shown to indicate the requested could not be completed.
Tank active, no rate	Triggered if master switch is on, tank is enabled, tank is active, tank is not in manual, vehicle is moving and the set rate is zero.

Alarm	Description
Tank empty	This indicates that the calculated volume has reached zero. If there are still contents in the tank, the system will still operate showing the tank volume as a negative figure.
Tank low	This gives a warning that the tank is running low.
Tank off	Triggered if the tank is off while the master switch is on and the vehicle is moving with at least one section turned on.
Tramline accuracy degraded	Triggered during spraying if the system detects that the smoothing factor specified earlier during seeding differs from the one currently specified during spraying.
Tramline implement width mismatch	Triggered during spraying if the system detects that the sprayer implement width specified earlier during seeding differs from the one currently specified during spraying.
Tramline pass	Triggered during seeding if the system detects that the seeder wheels are following where the sprayer wheels will later be.
Unregistered feature	Triggered if there is an enabled feature that is no longer registered (registration has expired). This is to inform the operator that the feature has been disabled.
UT high priority	Universal Terminal high priority alert. There is an urgent issue the user should address on the UT immediately.
UT medium priority	Universal Terminal medium priority alert. There is an important issue the user should address on the UT when possible.
UT low priority	Universal Terminal low priority alert. There is an issue the user should address on the UT when possible.

Alarm	Description
VDC connection	Triggered when the connection to the VDC is lost or the VDC is missing.
Wireless connection	Triggered when the wireless network connection is no longer in range.

5.6. Setting up flag points

Flag points show obstacles or other land features for a field on the Operation screen. Flag points are set during operation by driving to the flag point location. Refer to Setting flag points, page 171.

Flag point symbols and names can be defined in the Setup screen.

To change flag point preset symbols and names:

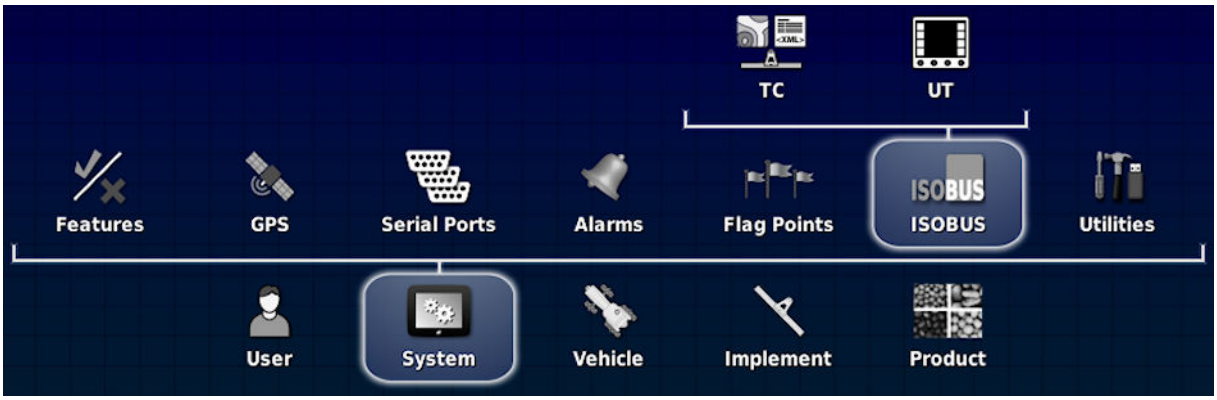
1. Select **System** / **Flag Points** .

2. Select the flag having its symbol or name changed.
3. Select the new symbol or select **FLAG POINT NAME** and type in the new name for the flag, then confirm.

   Note that flags can be changed but new preset flags cannot be created.

5.7. Setting up ISOBUS / universal terminal

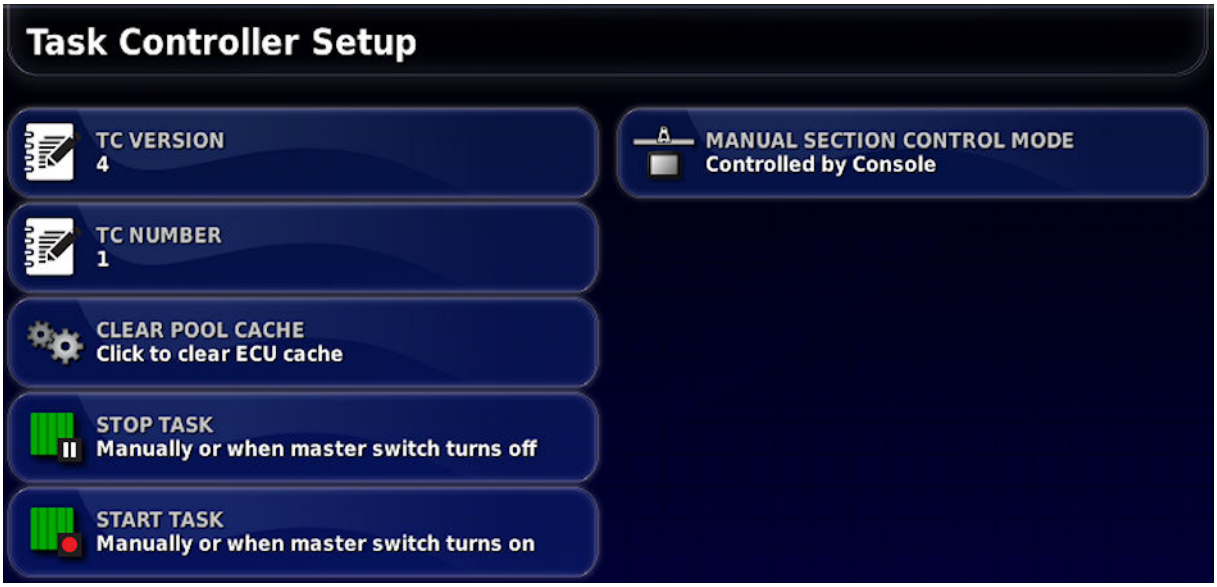
1. Select **System** / **ISOBUS** .



5.7.1. Task controller setup

To set up the task controller:

1. Select **System** / **ISOBUS** / **TC** .



- **TC Version**: Sets the task controller version. This should be left at the highest version, unless TC issues are encountered.
- **TC Number**: Sets the task controller instance number for the console. If there are multiple TCs on the bus, use this setting to assign a unique number to this TC to avoid conflicts. The TC with number 1 will be the default TC.

- **Clear pool cache**: Clears the contents of the TC pool cache. Should only be used if a TC error is displayed.
- **Manual section control mode**: Sets how section control will work in manual mode (ASC off):
  - **Controlled by console**: The console virtual section switchbox can be used to turn sections on and off.
  - **Controlled by ECU**: A physical switch connected to the ECU or the UT user interface can be used to turn sections on and off.

Tasks may be configured to start and stop:

- Manually or using the master switch, or
- Only manually (regardless of the master switch state). See Running a task, page 244.

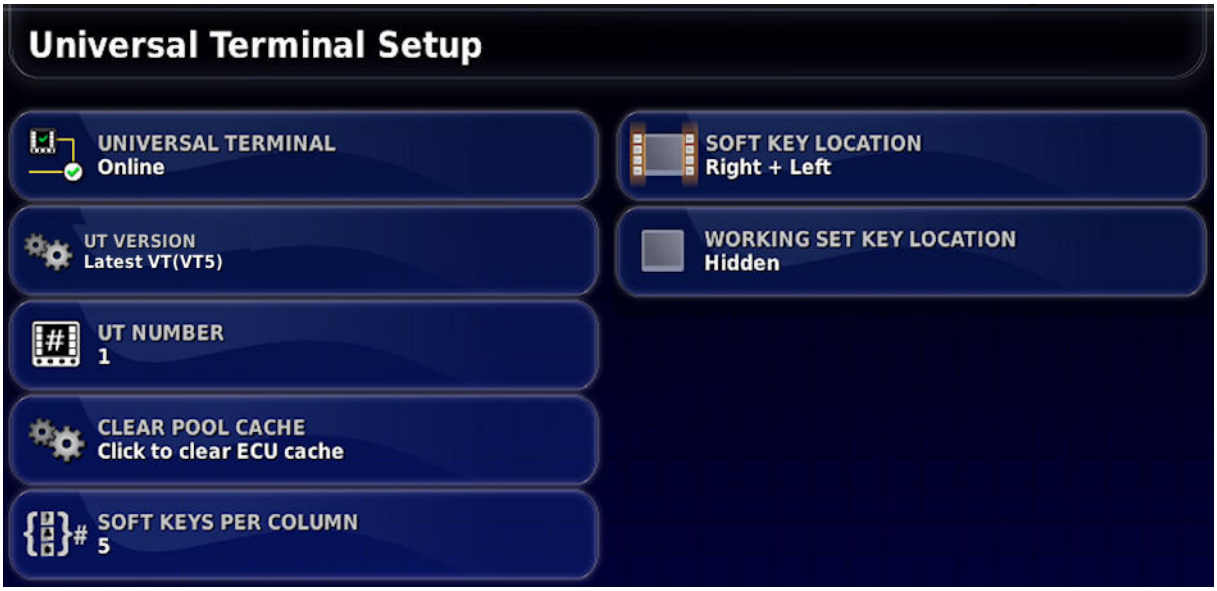
  Stop and Start task is available if **Task Data** is enabled under **System** / **Features** / **Implement**. Refer to Implement setup, page 52.

Refer to Setting up the master switch, page 113 for an explanation of master switch functionality.

5.7.2. Universal terminal setup

1. Select **System** / **ISOBUS** / **UT** .

   The Universal Terminal Setup page is displayed.



- **Universal terminal**: Controls whether the UT server is actively receiving connections from other devices.

  This may be useful if there are multiple UTs on the bus and multiple UTs claim to be the primary UT (in which case the UT will go offline automatically and require the **UT Number** to be changed before it will go online again), or to temporarily deactivate the UT on the console.
- **UT version**: Controls which version of the ISO-11783-6 UT specification the UT server supports. It is recommended to leave it at **Latest** unless problems are encountered in the UT.
- **UT number**: Sets the UT number for the console. If there are multiple UTs on the bus, use this setting to assign a unique number to this UT to avoid conflicts. The UT with number 1 will be the default UT. If the UT client doesn’t appear on the correct UT you may need to reconfigure its UT number appropriately. If there is a conflict, the following message will appear:

  'The UT Number of this UT conflicts with another UT on the bus, and this UT has been disabled. Please make sure that this UT has a unique UT Number.'
- **Clear pool cache**: Clears the contents of the UT pool cache. Should only be used if a UT error is displayed.
- **Soft keys per column**: Sets the number of available softkeys on the UT interface on the Operation screen.
- **Soft key location**: Sets the location of the softkeys on the UT interface and the number of columns (1 or 2).
- **Working set key location**: Sets the visibility and location of the keys that switch the interface between ECUs (if more than one ISOBUS compliant ECU is connected).

Refer to Using universal terminal (ISOBUS), page 224.

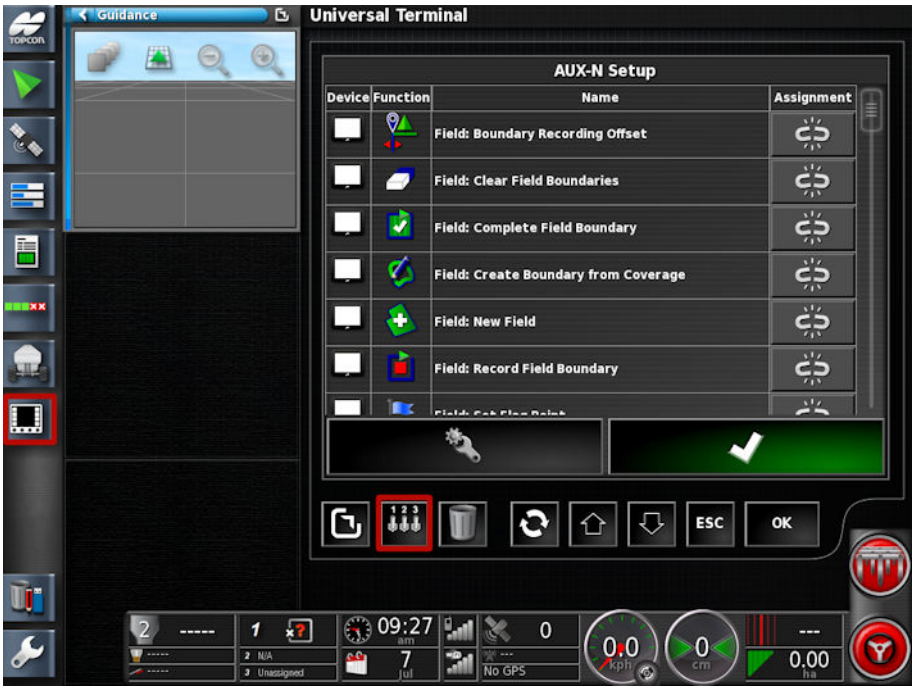
5.7.3. Auxiliary control setup

This option is available if **Universal Terminal** is enabled under **System** / **Features** / **Console**. Refer to Universal terminal, page 47.

The AUX controls allow for external ISO compatible devices and the console to provide a set of functions that can be assigned to inputs on ISO compatible joysticks or other input devices.

To assign AUX controls:

1. Select **Universal Terminal**  from the Navigation bar to open the mini-view.



Note: The icon/s displayed for the universal terminal vary depending on the attached ISOBUS compatible equipment. There may be more than one icon displayed. It does not matter which icon is selected.

2. Expand the mini-view by selecting the arrow in the top right, or by swiping left to right across the mini-view.

3. Select the auxiliary control setup button  to display the functions that can be assigned to an input.

   Note: If more than one device is providing functions, the functions that are displayed can be filtered by selecting the filter by device button  .

4. Scroll down the list to select the function to be assigned to an input and select the associated assignment button  . The Change Assignment screen displays.

5. To assign the function, press the input button on the device (for example, external joystick) that will be used to perform the function, or press the manual assignment button  to select the input from a list.
6. To un-assign a function, open the Change Assignment screen and select the clear assignment button  .

Once all the desired functions have been assigned and the AUX-N Setup screen has been closed, the assigned functions can be activated by pressing the assigned inputs. Please be aware that some functions will require the device or console to be in a ready state before the function can be activated.

5.8. Setting up utilities

1. Select **System** / **Utilities** .

Provision USB for upgrade

This option is used if the console software is being upgraded via a USB. Insert the USB and select this option to run a script that enables the USB to perform an upgrade the next time it is plugged into a console and the console is turned on. Refer to Quick Setup Guide, page 21.

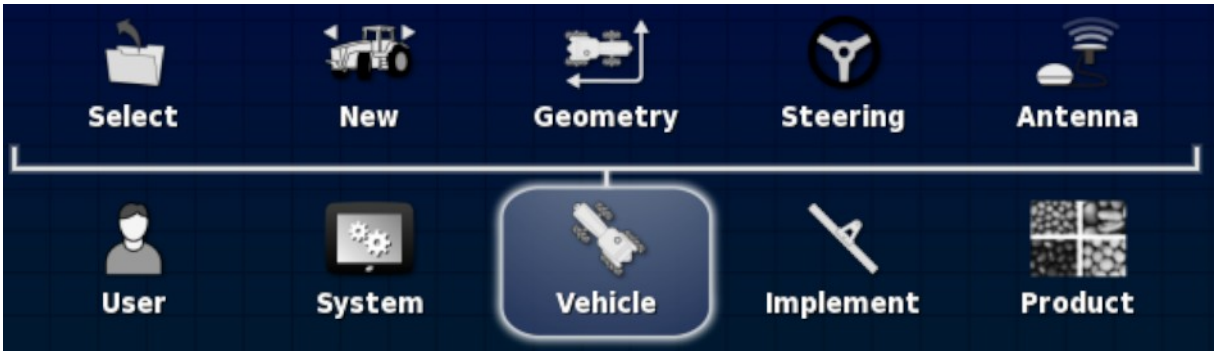
Chapter 6 – Vehicle Setup

This chapter explains how to set up and access profile information about the vehicle on which the console is mounted. If the console is to be used on more than one vehicle then more than one vehicle profile must be set.

The **Vehicle** menu option provides the following menu items:

- **Select**: Select a vehicle from the previously created profiles.
- **New**: Create a new vehicle profile.

  Note that **Select** and **New** are the only options available on this menu if no vehicles have been setup.
- **Geometry**: Sets the vehicle measurements so that guidance can work accurately.
- **Steering**: Controls how the vehicle will respond to guidance.
- **Antenna**: Sets whether the GPS receiver has an internal or external antenna.



6.1. Selecting a vehicle

Selects a vehicle from a previously defined list of vehicle profiles. This is blank when the console is first used.

To select a vehicle:

1. Select **Vehicle** / **Select** .

2. Highlight the required vehicle and confirm, or:

Select to import a vehicle profile from a USB.

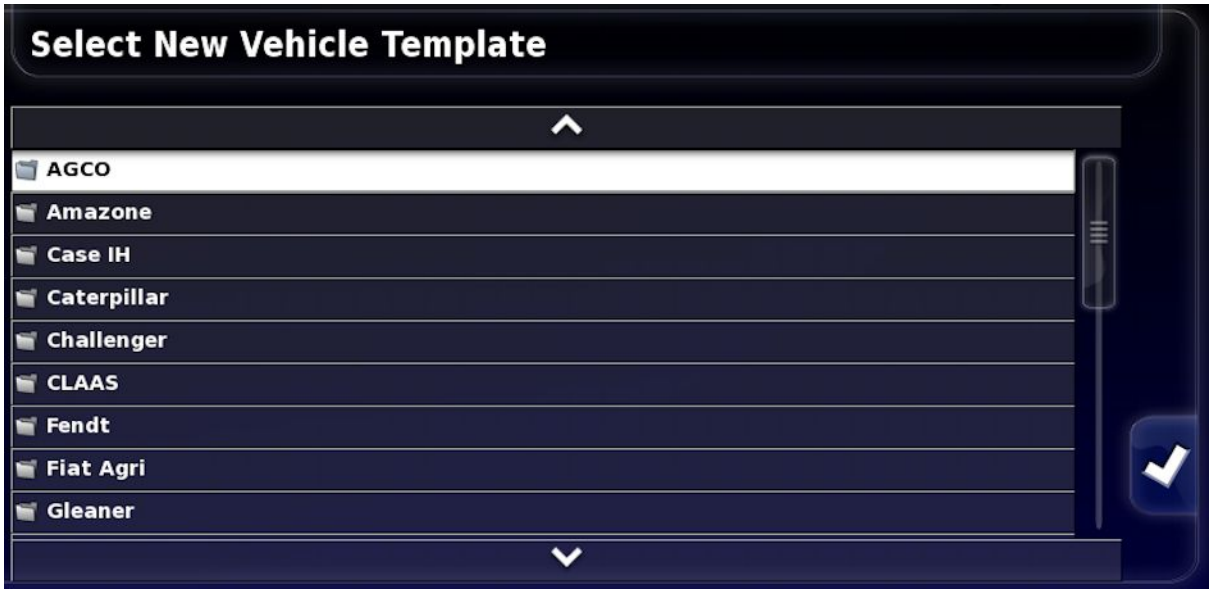
Select to create a copy of the highlighted vehicle. This profile may then be edited.

6.2. Creating a new vehicle

Creates a new vehicle profile for the vehicle on which the console is mounted.

To create a new vehicle profile:

1. Select **Vehicle** / **New** .



A list of pre-defined factory vehicle templates displays. Templates contain standard measurements and steering parameter information where this is available.

Measurements can be adjusted to correct for the particular vehicle, tire size and so on when geometry is confirmed in the following section.

Steering parameters control how the vehicle will respond to guidance and these can be fine-tuned later in the process in Auto Steering, page 207. If steering continues to be unsatisfactory once setup is complete and after tuning the auto steering, contact your dealer.

2. Select the vehicle manufacturer. Use the scroll bar to see the complete list. If the required manufacturer is not available, select one that is most like the vehicle being used. If none of the choices are appropriate, select **Other** and go to Customizing a vehicle, page 96.

Note: Select  to go up one level to the parent folder.

3. Select the vehicle model and confirm.
4. To change the name, select **VEHICLE NAME**, enter the name and confirm.

5. Confirm the new vehicle. The Vehicle Geometry screen displays.
6. Go to Setting the vehicle geometry, page 98.

6.2.1. Customizing a vehicle

When **Other** is chosen from the Vehicle Template screen, generic vehicle templates are displayed that hold basic vehicle information and steering parameters.

1. Select **Other**. A list of steering controllers displays:
   - **ACU-1**: Autosteering Control Unit
   - **AES**: Accurate Electric Steering
   - **AF**: AutoFarm® valve block
   - **RST**: Raven SmarTrax™ valve
   - **Other**: Any other steering controller
2. Select from the list and confirm. A range of generic vehicle templates displays.
3. Use the arrows to select the template shape most like your vehicle and confirm.
4. To change the name, select **VEHICLE NAME**, enter the name and confirm.

5. Confirm the new vehicle. The Vehicle Geometry screen displays.
6. Go to Setting the vehicle geometry, page 98.

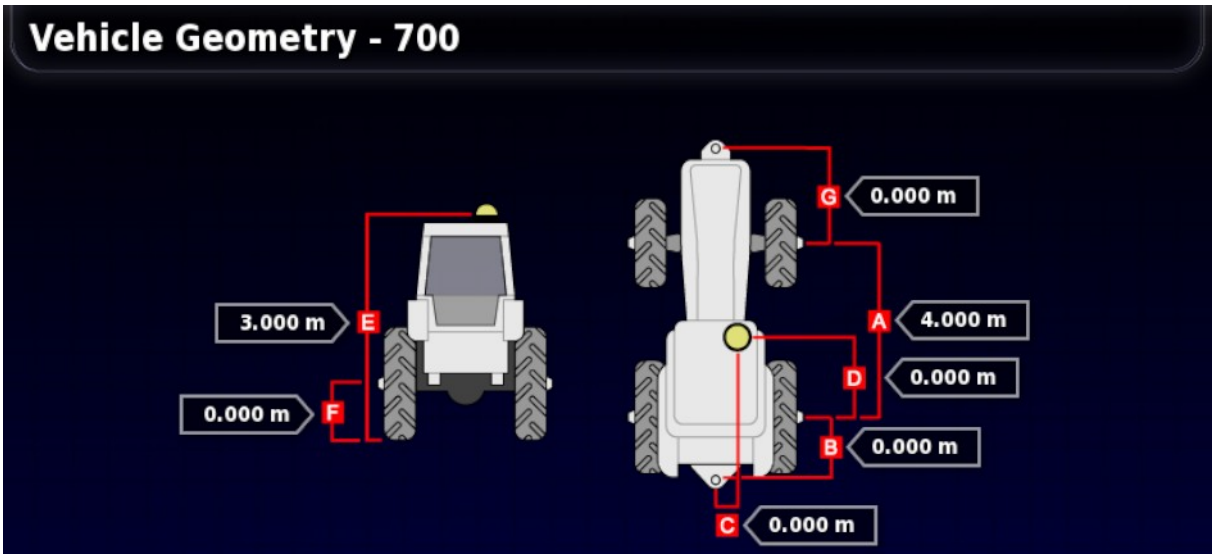
6.3. Setting the vehicle geometry

Sets the vehicle measurements so that guidance can work accurately.

Note: Measure the vehicle dimensions as accurately as possible. The recommended tolerance is +/- 5 cm.

To set the vehicle geometry:

1. Select **Vehicle** / **Geometry** . Alternatively, the Vehicle Geometry screen displays automatically when a vehicle is created or selected.



2. Select a vehicle dimension.

   Dimensions requested vary according to the type of vehicle selected.

3. Add or adjust dimensions where needed and confirm.

The following lists key measurements commonly used in the system:

- **Wheelbase** (A): The distance from the center of the front axle to the center of the rear axle.
- **Implement Tow Point** (B): The distance from the center of the rear axle to the tow point.
- **GPS Steer** (C): The offset left or right from the middle of the axles to the GPS receiver. This is a positive number if the receiver

is to the right of the middle of the axle and negative if the receiver is to the left.

- **GPS Antenna** (D): The horizontal distance of the receiver from the center of the rear axle. The number is positive when the receiver is in front of the rear axle and negative if it is behind the rear axle.
- **GPS Height** (E): The height of the top of the GPS receiver above the ground.
- **Axle Height** (F): The height of the axle above ground.
- **Front Hitch** (G): The distance from the center of the front axle to the front hitch position.
- **Track Spacing** (H): This only applies to tracked vehicles and is the distance between the tracks.
- **Articulation Point** (I): This only applies to articulated vehicles and is the distance from the rear axle to the articulation (pivot) point of the vehicle.

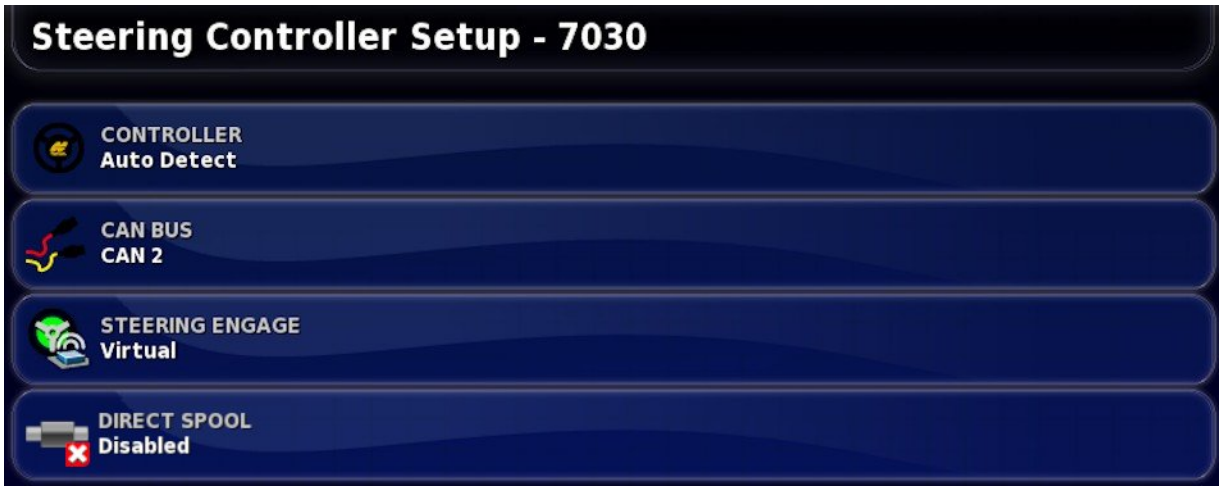
6.4. Setting up the steering controller

Controls how the vehicle will respond to guidance. Refer to Auto Steering, page 207.

This option is only visible if **AUTO STEER** is enabled on **System** / **Features** / **Guidance**.

To set up the steering controller:

1. Select **Vehicle** / **Steering** .



Controller

Note: It is important to select the specific steering controller, if it is listed, so that auto steering settings match the vehicle profile. Note that if the steering controller is changed later, it may be necessary to return to the vehicle geometry to confirm the dimensions (refresh them). Note that **Auto Detect** does not automatically detect the controller options that are available in the list, so the specific controller must be selected if it is an available option.

Selecting AES as the controller adds extra options to the Steering Tuning screen, refer to Tuning auto steer, page 211.

CAN bus

Controller Area Network. Select the CAN bus being used. If unsure, look at the labeling on the connections to the GPS receiver.

- **CAN 1**: ISOBUS

- **CAN 2**: Primary steering BUS

Steering engage

Allows the operator to engage auto steering from the console.

- **Virtual**: Select if only the on-screen **Auto Steer Engage** button will be used  .
- **Virtual and External Console Input**: Select if you have an external Engage button connected directly to the console.

If you have an external Engage button connected to the CAN bus, you can select either of these two options.

Direct spool

This option is only available if **Auto Detect** is the selected Controller.

Direct spool is a special mode where the ACU-1 will operate without a wheel angle sensor.

This is designed for use with tracked sugar cane harvesters.

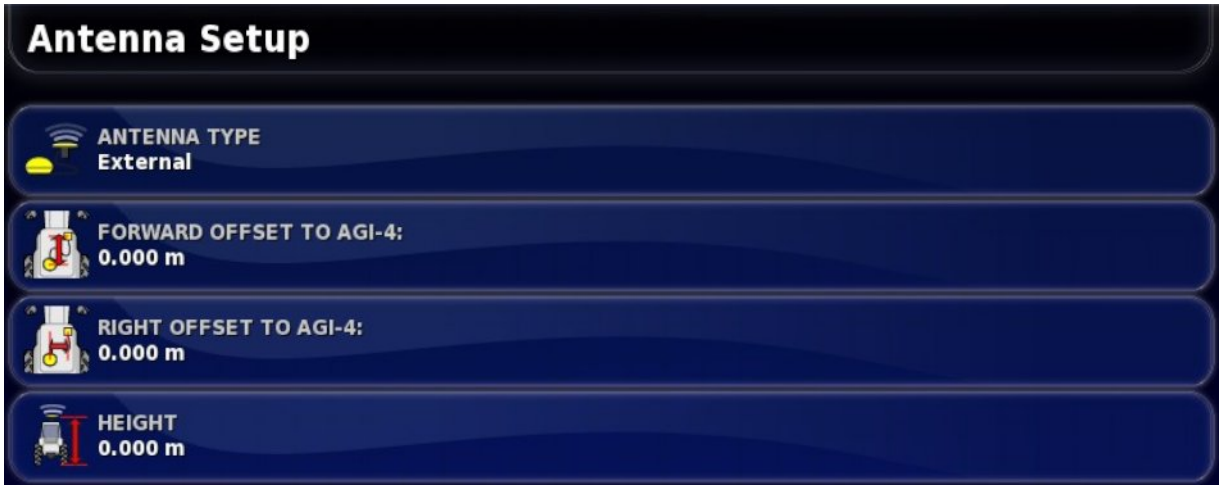
Enabling this adds two new options to the Steering Tuning screen, refer to Tuning auto steer, page 211.

6.5. Selecting the vehicle antenna

Sets whether the GPS receiver has an internal (built into the receiver) or external antenna. Internal antenna is set as default.

To set the antenna type:

1. Select **Vehicle** / **Antenna** .



If **External** is selected, the measurements for the location of this antenna must be entered:

Forward offset to AGI-4 (or AGI-3)

Enter the distance forward from the center of the AGI-4 to the center of the antenna (use a negative number if the antenna is behind).

Right offset to AGI-4 (or AGI-3)

Enter the distance to the right from center of AGI to center of antenna (use negative number if antenna is to the left of the AGI).

Height

Enter the height of the antenna above the ground.

Chapter 7 – Implement Setup

This chapter explains how to set up and access profile information about the implement being used. If the console is to be used with more than one implement, then more than one implement profile must be set up.

The following information details how to set up a non-controlled implement for correct swath paths or guidelines. This allows the creation of coverage maps and provides waylines for auto steering and guidance.

Refer to the Spreader / Sprayer / Seeder operator manuals for detailed implement information. The following information sets up the implement for auto guidance and steering only.

Note: The options displayed on the Implement menu will vary depending on the implements created/selected.

The **Implement** menu option provides the following menu items when no implements have yet been created:

- **Select**: Select an implement from previously created profiles. (This list is blank if no implements have been created.)
- **New**: Create a new implement profile.
- **Speed & Position**: Refer to Setting up GPS speed emulation, page 114.

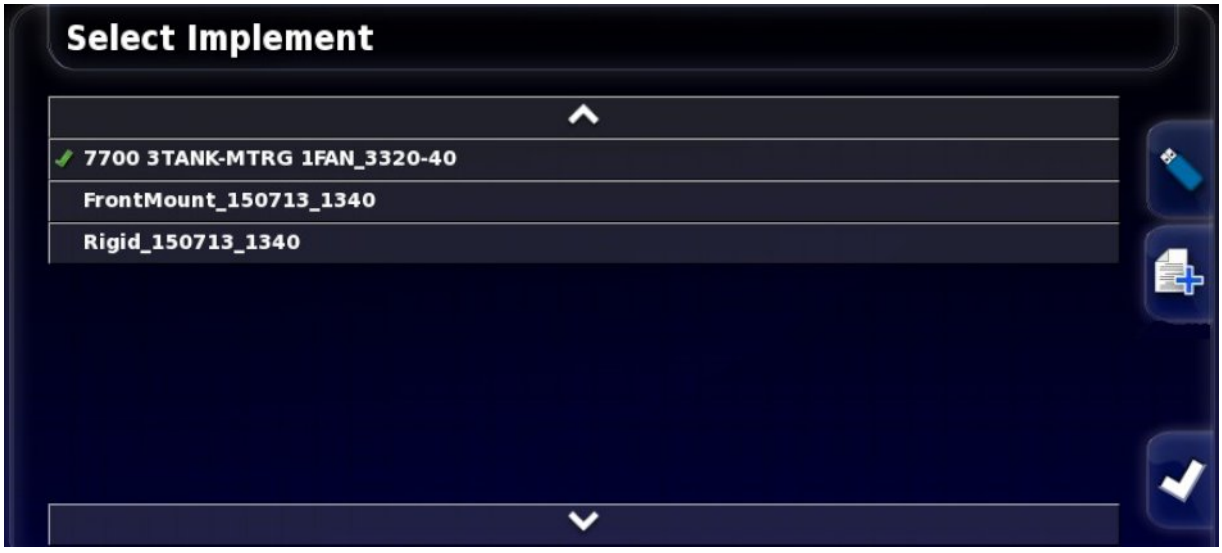
7.1. Selecting an implement

Selects an implement from a previously defined list of implement profiles. This is blank when the console is first used.

When changing implements the system will restart.

To select an existing implement:

1. Select **Implement** / **Select** .



2. Highlight the required implement and confirm, or:

Select to import an implement profile from a USB.

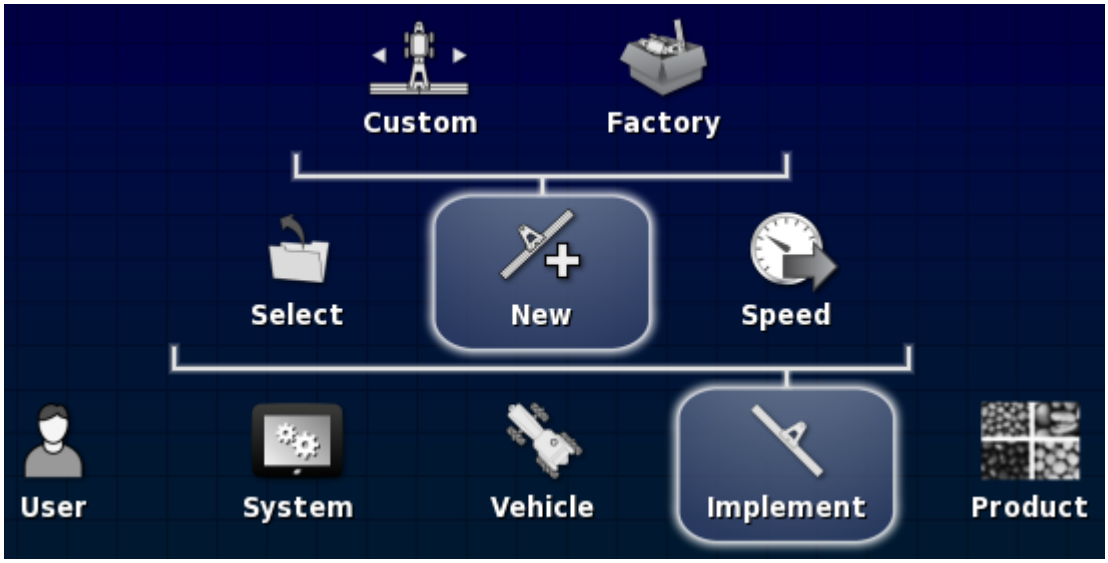
Select to create a copy of the highlighted implement. This profile may then be edited.

7.2. Setting up a new implement

Creates a new implement profile for the attached implement.

To create a new implement:

1. Select **Implement** / **New** .



- **Custom**: Create a new implement profile.
- **Factory**: Select an implement template from a pre-defined list.

2. If the required implement is not available in the **Factory** templates, select **Custom**.
3. Use the arrows to select the implement **Type** and confirm.


rigid


pivoted (tow behind)


front mount


double pivoted (tow between)

A message displays stating that the console will restart once the implement has been created.

A default name for the implement is displayed.

Note: It is highly recommended that items are named in a thoughtful and structured way to allow easy use in future seasons.

4. To change the default name, select **IMPLEMENT NAME** and enter the new name, then confirm.

   The New Implement Setup wizard displays.

   Note: The following instructions do not apply if the implement is controlled by an ISOBUS ECU, refer to Setting up an ISOBUS implement, page 106.

5. Select **IMPLEMENT CONTROL**, select **NONE**, then confirm and select next.
6. Select **IMPLEMENT FUNCTION** and select the most appropriate option from the selection list.
7. When the screen shows that the setup is complete, confirm.

   The Implement Geometry screen displays. Refer to Setting the implement geometry, page 108.

7.2.1. Setting up an ISOBUS implement

If an ISOBUS implement is required:

1. At step 5 above, select the required **IMPLEMENT CONTROL**:
   - Section control only
   - Section control and rate control, or
   - Rate control only
   - No control (logging only)
2. Confirm and select next.
3. Select **ECU TYPE**, select **ISOBUS**, then confirm and select next.
4. Select **IMPLEMENT FUNCTION** and select the most appropriate option from the selection list.

5. Ensure the implement ECU is connected, select **ECU ASSIGNMENT** and select the required ECU from the selection list. Select **Any ECU** if the specific ECU is not listed.
6. When the screen shows that the setup is complete, confirm.

   The console restarts and the ECU Setup screen displays.

Changing ECU settings (ISOBUS)

It is possible to change the implement controls from the **ECU Setup Screen** once implements are fully set up in the system.

1. Select **Implement** / **ECU** .

- To change the type of control, select **IMPLEMENT CONTROL**.
- To change the type of function, select **IMPLEMENT FUNCTION**.
- Select **REFRESH ECU SETTINGS** to synchronize information between the ISOBUS ECU and the console.

Refer to Using universal terminal (ISOBUS), page 224 for implement operation.

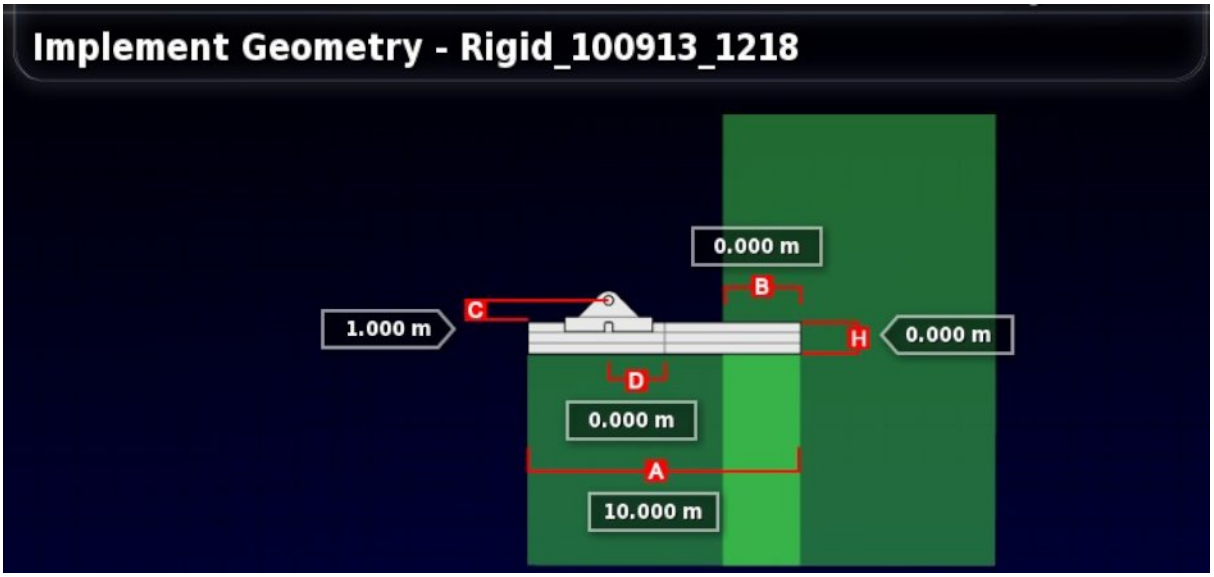
7.3. Setting the implement geometry

Sets the implement measurements so that guidance can work accurately.

Note: Measure the implement dimensions as accurately as possible. The recommended tolerance is +/- 5 cm. When an ISOBUS implement is connected, some of the geometry items are provided by the implement and cannot be altered on this screen. Any changes to these must be made in the implement ISOBUS UT control screen.

To set the implement geometry:

1. Select **Implement** / **Geometry** . Also, the Implement Geometry screen displays automatically when an implement is created or selected.



2. Select an implement dimension.

   Dimensions requested vary according to the type of implement selected.

3. Add or adjust dimensions where needed and confirm.

The following lists measurements used in the system:

- **Swath Width**: Measures the working width of the implement (that is, the width of the area that is treated during one pass of the

implement).

- **Working Length**: Length from the start to the finish of the working area of the boom. Together with swath width, it defines the 'Working Area', which is the region that product is applied over for that boom.
- **Overlap**: Measures the width of the overlap between two adjacent passes.
- **Implement Offset**: Measures the distance between the hitch point and the wheels of the implement.
- **Implement Wheels Offset**: Measures the distance between the wheels and the working area of the implement.
- **Inline Offset**: Measures the off-center offset of the implement relative to the hitch point. Enter a positive number if the implement is shifted to the right and a negative number if it is shifted to the left.
- **Trailer Offset**: Measures the distance between the trailer hitch point and the trailer wheels.
- **Trailer Wheels Offset**: Measures the distance between the implement hitch point and the trailer wheels.

Note: If the implement has multiple booms, the boom that is to be used for guidance must be selected from the **BOOM FOR GUIDANCE** selection list. This determines the swath width (spacing for the guidance lines). The implement geometry must be set for each boom on the numbered tabs.

7.4. Setting up section control

The console can support up to 30 sections if using three ASC-10 ECUs.

An ISOBUS ECU can identify up to 32 sections automatically. Make any necessary changes on the ISOBUS ECU.

The maximum width of a section is 100 m, divided by the number of sections.

To set up section control:

1. Select **Implement** / **Section Control** / **Sections** .

(Select **Implement** / **Boom** if there are multiple booms.)

2. Select **SECTIONS** and use plus or minus to set the number of sections, then confirm.
3. To set the section width for all sections, select **Width** next to **All**.

4. Enter the section width for all sections and confirm.
5. To set individual widths for sections, select the width next to a section, enter the width and confirm.
6. Repeat for each section.

Refer to the Spreader / Sprayer / Seeder operator manuals for more information.

7.4.1. Setting timing

These settings set the response times for the sections when switched on or off. It is important to accurately calculate the response times to avoid overlaps or gaps in product application.

To calculate the response times:

1. Ensure the implement is ready to begin product application and that the calibration factor for the product has been calculated (refer to Product Setup, page 115).
2. Use a stop watch to time the delay between switching a section on and the application of product. This is the **ON TIME**.
3. When the section is switched off, time the delay between switching it off and the product ceasing to flow. This is the **OFF TIME**.

To set the response times:

1. Select **Implement**  / **Section Control**  / **Timing**  .
2. Select **ON TIME** to set how many seconds delay there is between switching a section on and the application of product, then confirm.
3. Repeat for **OFF TIME** and confirm. This will set how many seconds delay there is between switching a section off and stopping product flow.

7.4.2. Setting up the section switch

The section switch can be either Virtual (on the console screen) or External (a physical switch connected to the ASC-10 ECU or console).

The type of switch cannot be selected with spreaders as the spinners' on/off action controls the two sections.

To configure the switches:

1. Select **Implement**  / **Section Control**  / **Section Switch**  .
2. Select **TYPE**.

3. Select **Virtual** or **External ECU Sense** and confirm.

7.5. Setting up the master switch

The master switch turns on the application control (spreader, sprayer, seeder) and also enables the coverage map on the guidance screen.

To set up the master switch:

1. Select **Implement** / **Master Switch** .

   Note: If an Apollo seeder or sprayer implement is connected, this option is under **Implement** / **Operator Inputs** / **Master Switch**. Refer to the implement Operator Manual for more information.

Virtual

Enables the master switch to be operated by selecting the virtual master switch on the console Operation screen.

Refer to the manual for the implement controller for information on setting up the switches for the implement.

External console input

Enables the master switch to be operated via an external switch (a physical switch box / master switch connected to the console).

Note: If an external switch is connected, this is usually done by the dealer during installation. The cable labeled ‘Remote Mapping’ connects to the console harness and provides power to activate / deactivate coverage map and master switch input.

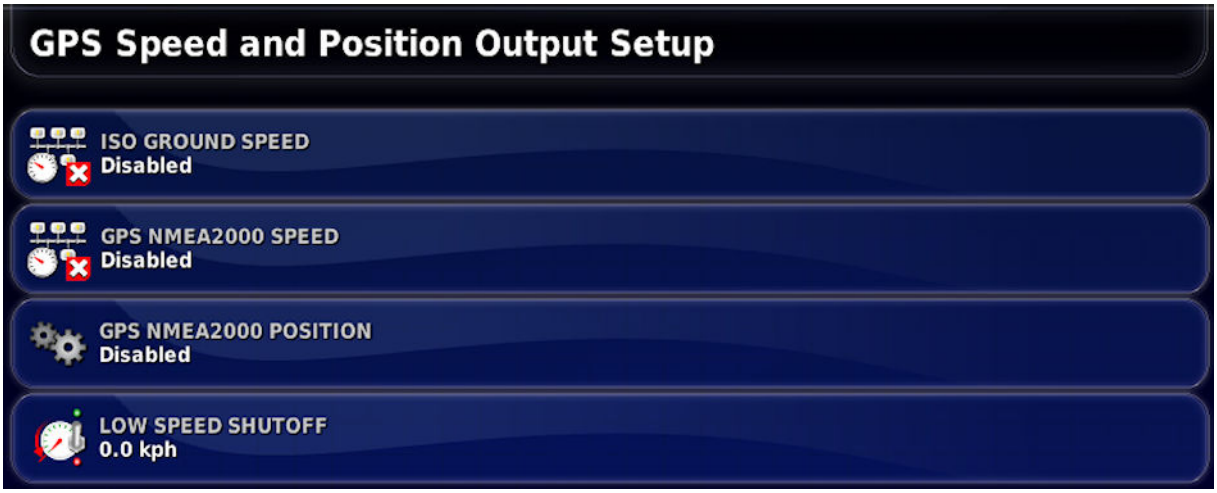
External ECU sense

Enables the master switch to be operated via an external switch (a physical switch box / master switch connected to the ASC-10 ECU).

7.6. Setting up GPS speed emulation

Sends vehicle speed information to the ISOBUS implement for performing rate control or other functions.

1. Select **Implement** / **Speed & Position** .



Outputs speed on ISO and/or NMEA2000 bus to the ECU.

Note: The GPS NMEA2000 setting specifies that the virtual TECU should emulate NMEA 2000 COG/SOG messages (129026) if they are not already present on the bus. It has no effect on the NMEA 2000 output sent from the receiver.

2. Select the required output/s.

Chapter 8 – Product Setup

8.1. Setting up the product database

Product definitions can be saved in one common area. This allows common products to be used across a range of rate controllers without having to enter each product name and rate repeatedly.

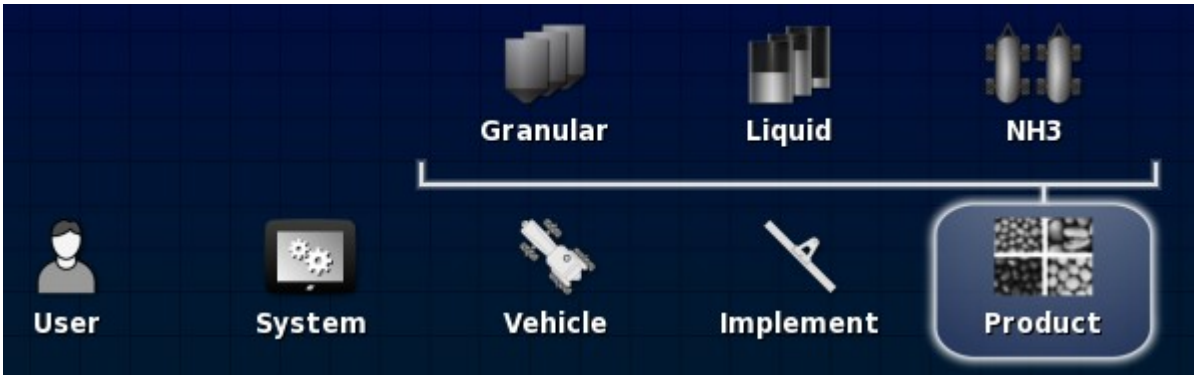
Note: When task data is enabled, this option is hidden, as products are defined in task data instead.

Pre-set rates, increments and product densities can be set up and saved to be recalled in the appropriate rate controller.

The calibration factor for each product is assigned to each implement tank or bin. This means, for example, that you could have urea saved once with different calibration figures for each bin.

Refer to the Spreader / Sprayer / Seeder operator manuals for detailed product information.

The **Product** menu option allows granular, liquid and NH3 (ammonia) product definitions to be created.



For each product, the following information must be defined:

- **Density** (granular only): Product density is used with tank volumes to determine tank capacities. Defined as kg/L or lb/gal.
- **Rate increment**: Defines how much the application rate will change when the operator presses the application rate up/down button. The rate can be changed by a fixed rate or by a percentage

of the rate set for **Rate Preset 1**. Refer to Application rate increment type, page 30.

- **Rate preset 1** / **Rate preset 2**: Defines preset application rates.
- **Calibration factor**: This is the amount of product dispersed per revolution of the product metering unit for granular products and the number of pulses from the flow meter per litre of liquid. This value can be viewed here but must be set for each implement and product. Refer to the Spreader / Sprayer / Seeder operator manuals for more information.

Chapter 9 – Operation Basics

9.1. Using mini-views

1 Navigation bar

Mini-views may be opened by selecting any feature on the Navigation bar.

Some mini-views have a maximize arrow. These may be expanded to display in full screen view by selecting the arrow or by swiping left to right across the mini-view (ending the swipe to the right of the mini-view screen).

To move the mini-view up or down, touch anywhere within the mini-view and slide it in the desired direction. The mini-view will start moving once your finger moves outside its area.

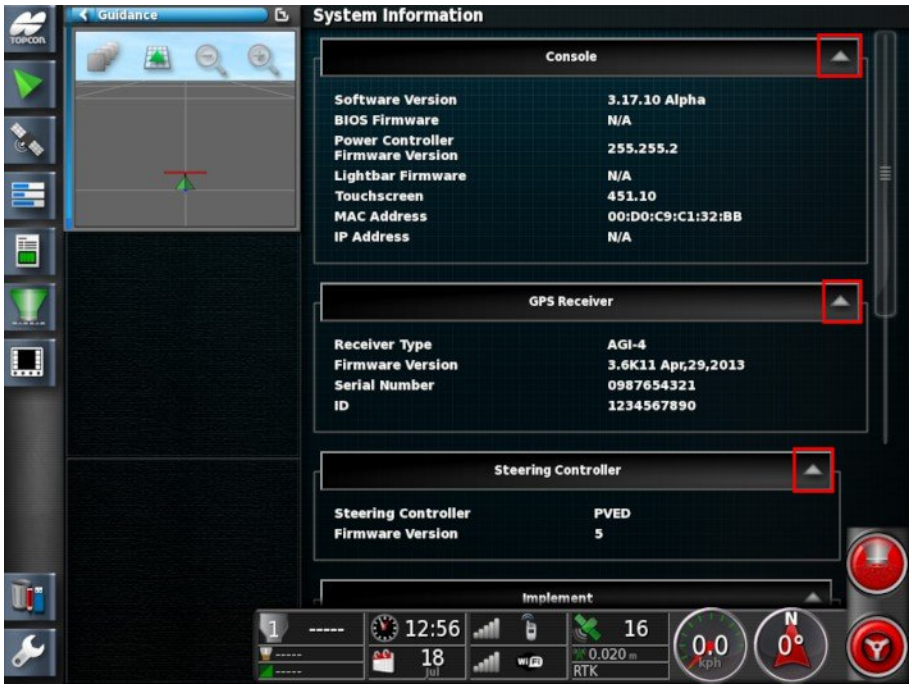
To close the mini-view, select the feature on the Navigation bar again, select the top left arrow or touch anywhere within the mini-view and slide it to the left into the navigation bar.

There is no minimize arrow on the full screen view. Expand another mini-view to replace the information on the main screen.

9.2. Viewing system information

The Topcon logo button on the Navigation bar is used to display software and system information summaries.

Maximize the mini-view to see the full **System Information** panel.



Use the arrows to expand or hide information. A scroll bar displays when needed.

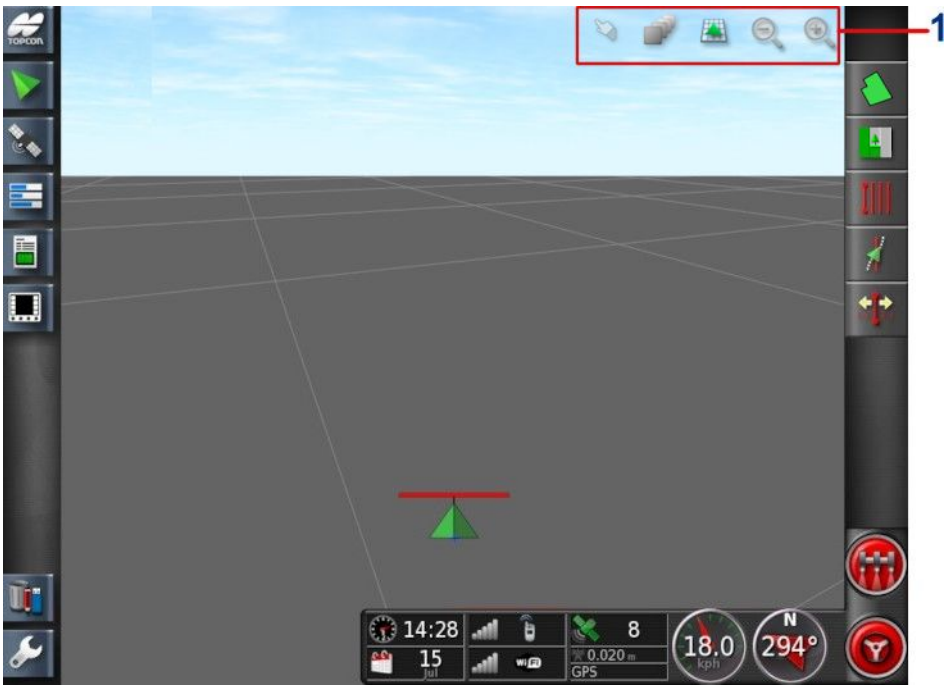
9.3. Viewing guidance

The full guidance screen opens by default when the Operation screen is accessed for the first time. It can also be viewed in a mini-view.

The view controls available on the mini-view may also be accessed on the guidance full screen view.

9.3.1. Using view controls

Note: An option for panning across the map is also available (refer to Map panning, page 35).



1 View controls

- Select mode, see below.
- Center map, see Map panning, page 35.
- Display headland turn alarm, see Edit headland turns via alarm, page 206.
- Select visible map layers, see below.
- Toggle map view mode, see Toggle map view mode, page 124.
- Zoom in / out, see Map zoom, page 125.

Select mode

There is a new touchscreen mode available. To use this mode, press and hold on the screen for half a second then drag your finger over the required object to select it. Once the mode is engaged, the select mode icon becomes visible and the object is highlighted.

This function is available for the following objects on the operation screen:

- boundaries (refer to Editing a boundary, page 165)
- flag points (refer to Removing or changing a flag point, page 172)
- controlled traffic guidelines
- water conservation benchmarks

Select visible map layers

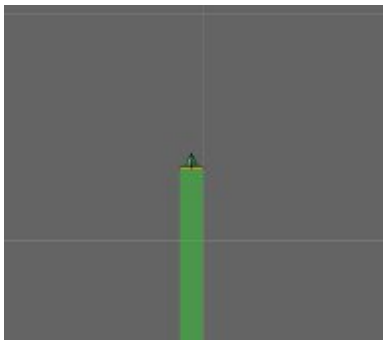
1. Select to choose which coverage and information layers will appear on the screen.

Map layers

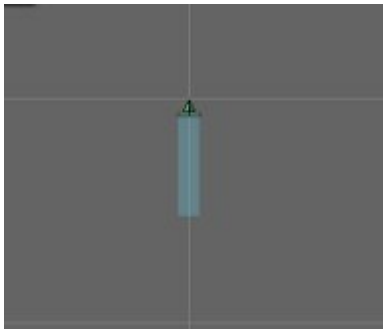
- **Grid lines**: Show grid lines on the guidance screen.
- **All fields**: Displays all defined fields in the current farm.
- **Flag points**: Refer to Setting flag points, page 171.
- **Line numbers**: Displays guidelines as a row of numbered lines across the field (applies only to AB Lines).
- **Tramlines**: Display tramlines. Refer to Setting up tramlines, page 196.

Coverage map

The coverage map selector enables one type of coverage map to be selected. This is done by pressing the center button and selecting from a list or by pressing the left/right arrows to scroll through the list with a live preview of that layer in the map in the background. The popup list has slightly longer descriptions of the layers, which may make selecting the correct map easier.

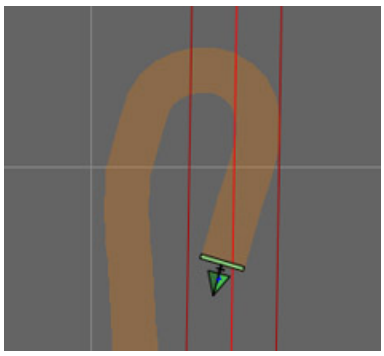


Coverage shows in green.



Applied rate shows in selectable colors.

Legend displays for applied rates.



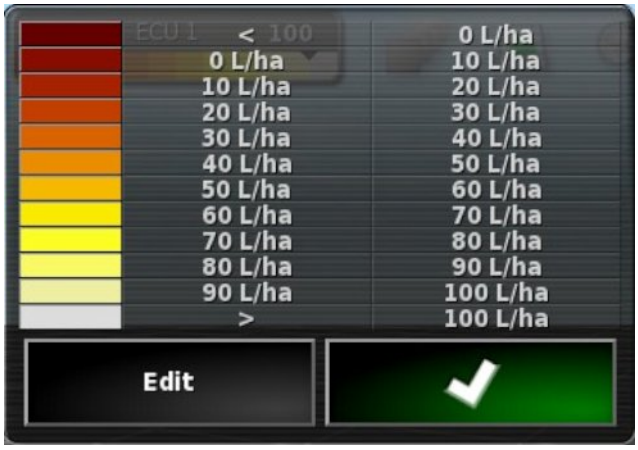
GPS quality shows in orange.

Legend displays for GPS quality.

Editing the legends

The legends that are displayed for Applied Rate and GPS Quality may be edited.

1. Click on the legend to display the legend color and range map.



2. Select **Edit** to change the colors and ranges used.

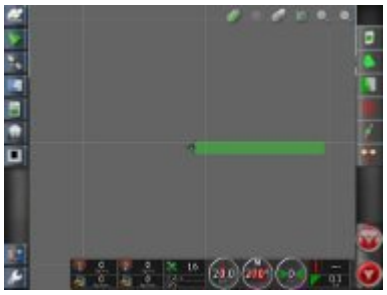
VRC map

If Variable Rate Control is enabled on the Setup screen (**System** / **Features** / **Implement**), the VRC Map option displays below the coverage map selector.

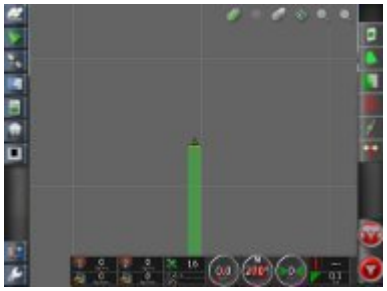
The VRC map selector enables a VRC map layer to be displayed (or hidden by selecting **None**).

Toggle map view mode

1. Select  to toggle views of the map (North Up, Overhead or Perspective).



In North Up View  the top of the screen represents North.



In Overhead View  the top of the screen represents the vehicle's current direction.

Perspective View  places the map into virtual perspective with a virtual horizon.

Map zoom

Select  to zoom in or out if needed. Press and hold to zoom quickly.

9.4. Viewing GPS details

To view and monitor GPS information:

1. Select **GPS Information** from the **Navigation bar**. Positioning information displays.

Latitude and Longitude show the positioning of the vehicle.

Easting and Northing shows the Universal Transverse Mercator (UTM) position and zone of the vehicle. They are measured in meters.

The grid numbers on the east-west (horizontal) axis are called Eastings, and the grid numbers on the north-south (vertical) axis are called Northings.

2. Select the **Vehicle Orientation**  tab.

This shows altitude, heading (degrees), actual speed of the vehicle and roll/pitch (degrees).

Roll is the left/right tipping of the vehicle.

Pitch is the forward/back tipping of the vehicle.

3. Select the **GPS Accuracy**  tab.

This displays the number of available satellites, the correction age (seconds) and the HDOP (lower value indicates better accuracy) and HRMS (lower value indicates better accuracy).

Note: The HDOP (Horizontal Dilution of Precision) indicates the effect on accuracy of a number of satellite sources and their geometry. Keep the antennae clear of obstructions to maintain accurate GPS readings.

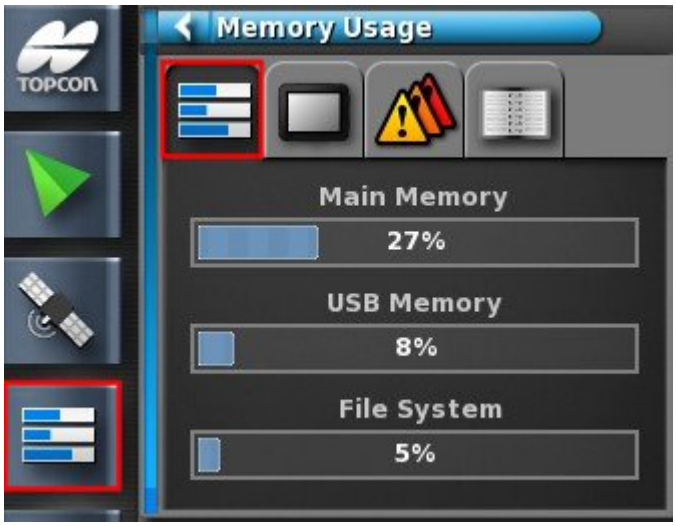
HDOP < 1.0	Good accuracy
HDOP between 1.0 and 4.0	Average accuracy
HDOP > 4	Poor accuracy
GPS invalid 0	No signal

The HRMS (Horizontal Root Means Squared) calculates an average horizontal position from the source information from the satellites.

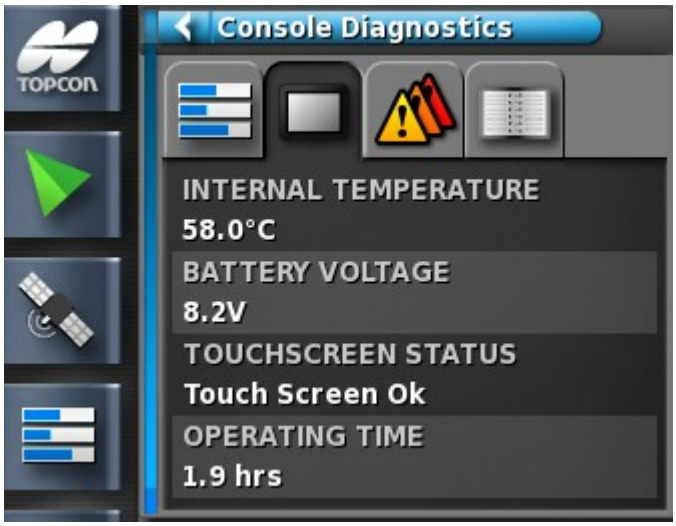
9.5. Viewing diagnostics

To view diagnostic information:

1. Select **System Diagnostics** from the **Navigation bar**. Memory usage displays.



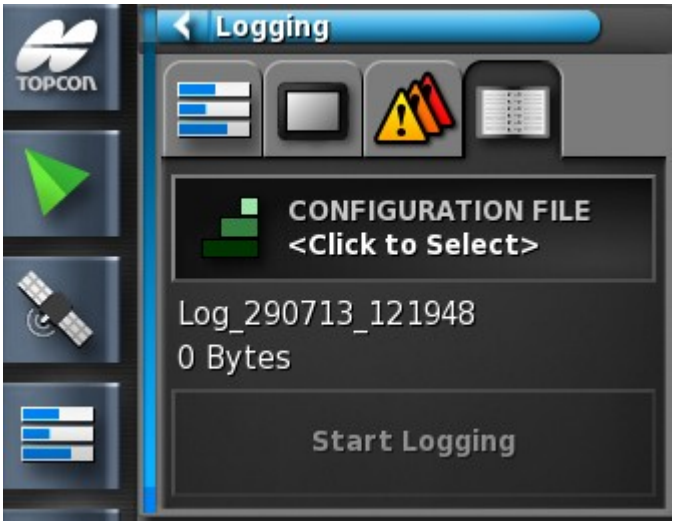
2. Select the **Console Diagnostics**  tab. Console status information displays.



3. Select the **Trouble Codes**  tab.

Error messages are listed. If problems do happen, take note of these for customer support personnel.

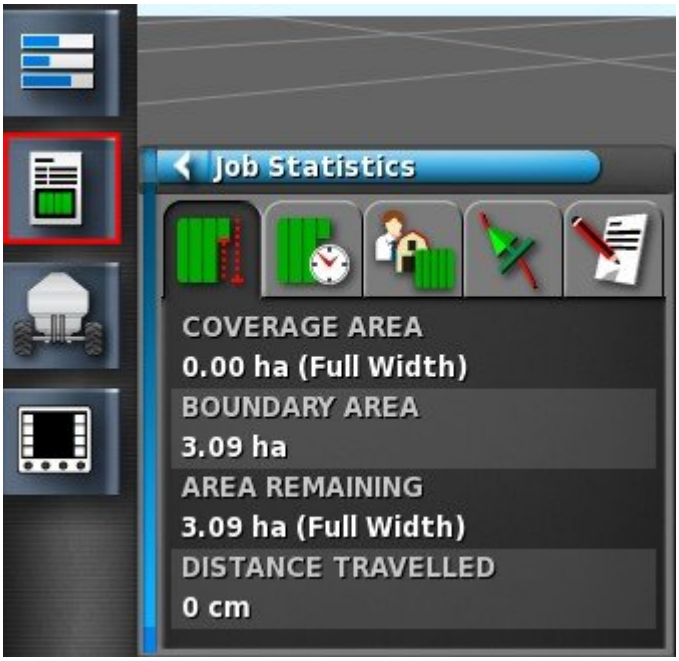
The **Logging** tab is used by customer support personnel. However, if Topcon support personnel send a logging configuration file, it can be loaded from USB and run using this screen.



9.6. Viewing job information

To view job information:

1. Select **Job Information** from the **Navigation bar**.



   This shows overall information on the job's progress.

2. To view other information or to take notes, select the following tabs.


Job Statistics


Job Settings


Guidance Settings


Job Notes - Select anywhere in the Job Notes screen to bring up a keyboard.

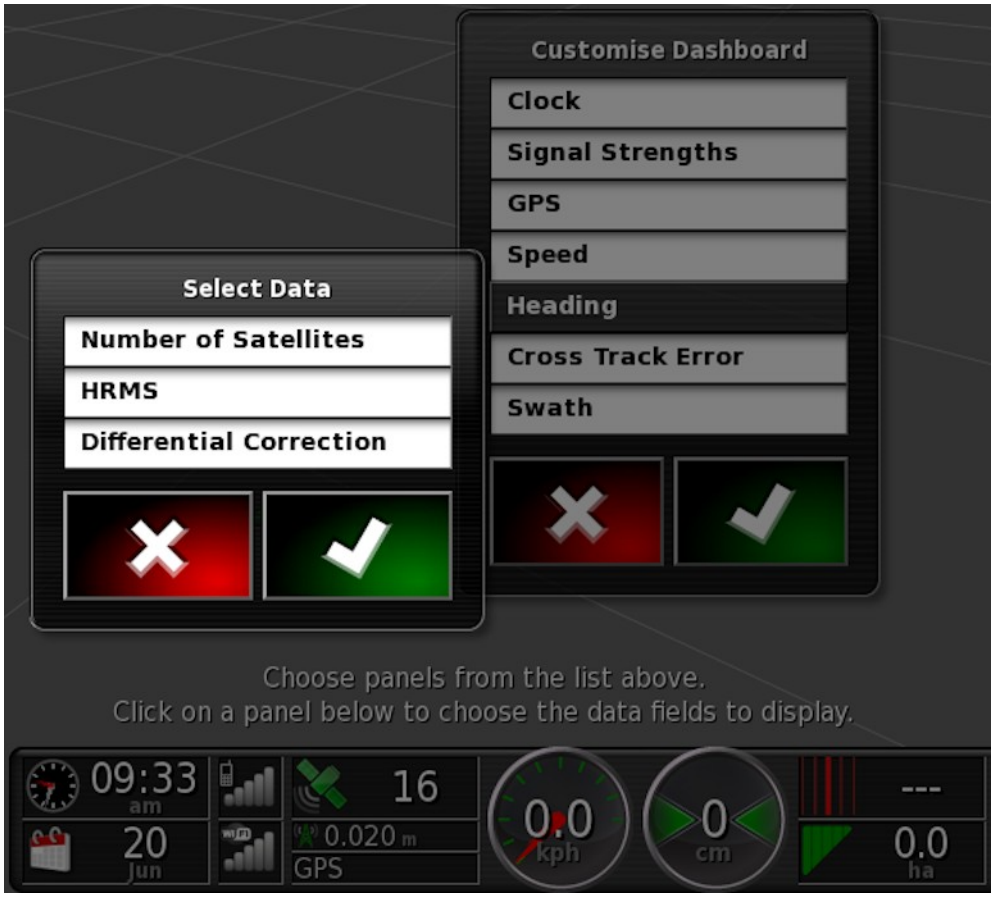
If an implement with more than one boom is selected, an icon is displayed to select the boom about which to view information.

9.7. Monitoring on the dashboard

The display on the dashboard can be adjusted.

9.7.1. Customizing the dashboard

1. Select anywhere on the dashboard to customize what is shown on the dashboard.
2. Press again on the particular panel to be customized and further options display.
3. Deselect and select options as required.



4. Confirm the new dashboard display. The chosen options appear on the dashboard.

Time and date

Time is set via the Setup screen, **User** / **Region** / **Time/Date**. Date is supplied via the GPS signal.

Signal strength

The signal strength panel shows the GPRS and Wireless signal strength.

GPS and correction source

The GPS panel shows:

- System readiness (satellite icon) and the number of satellite signals available
- Correction quality and position accuracy
- Correction source in use (DGPS, PPS, RTK, Float RTK, SBAS, OmniSTAR VBS, TopNET Global D, Invalid, Unknown, Estimated, GPS, Manual Input).

Accuracy to within 2 cm is high level accuracy.

Note: If correction source is set to **Autonomous**, the dashboard displays **GPS**.

Satellite icon

A green satellite icon shows that the GPS and correction source are converged and is based on HDOP. Other colors indicate that

information is not available:

Grey: No correction source, no signal

Red: Poor accuracy

Yellow: Average accuracy

Green: Good accuracy

Note: If **AUTOMATIC** was chosen during GPS setup, the colors may shift during operation as different correction sources are detected. If a specific source was chosen during GPS setup, then the system will seek to detect the chosen system. Refer to page 67 for more information on correction sources and to page 126 for more information on HDOP.

Correction icon

Green: Correction source has converged for auto steering. (Position accuracy on steering status panel page is green.)

Yellow: Correction source received but not accurate enough to engage auto-steering. Check differential correction and position accuracy on steering status.

Red: Correction source received is different from configuration.

Grey: No correction source received.

Guidance information

The guidance information panels may be configured to display four of six possible options: cross track error, speed, heading, swath, area worked or area remaining.

- **Cross track error**: Displays the distance of the vehicle from the nearest wayline.
- **Area worked**: Displays the total area of the coverage, per boom (including overlaps).
- **Area remaining**: Area that has not had coverage applied within boundaries that are not excluded from the current job.

The vehicle speed icon will change depending on the vehicle speed source selected in the Setup screen **Implement** / controller / **Speed Source**. If the vehicle speed is displaying incorrectly, calibration of the speed source may be required.

9.8. Storing information about jobs

The console allows operators to record and store features and working files for many fields and for each job on each field.

Under each field, additional information such as obstacles and boundaries can be stored.

Under each job, information about the job can be stored. It is important to create clear names for farms, fields and jobs so that the information can be accessed easily next season.

The operator can then select the field easily in the future and access the same boundaries, flag points and guidelines without having to recreate them.

9.9. Recognizing color and working status

The Operation screen uses colors to indicate the status of functions. The exact meanings will vary slightly with the implements, choices and features established during setup.

In general terms:

- Red indicates that the function cannot be used. Check that all necessary items have been enabled and set up correctly.
- White indicates that the function is ready to use.
- Yellow and/or green indicate that the function is currently working.

9.10. Understanding default file names

When new vehicles, implements, guidelines or jobs are created, the system displays a default name that can be changed by the operator.

Vehicles and implements are named as follows:

- <Vehicle Type/Implement Type>_XX

  The _XX is appended if an implement of that name already exists (for example: **Pivoted** and **Pivoted_01**).

Jobs are named as follows:

- <Implement Name>_YYYYMMDD_XX

  The <Implement Name> is that of the currently loaded implement, followed by the date in the format: Year, Month, Day. The _XX is appended if a job of that name already exists (for example: **Pivoted_20150311** and **Pivoted_20150311_01**).

Guidelines are named as follows:

- <Default_Prefix>_YYYYMMDD_HHMM_XX

  The _XX is appended if a file with the same name already exists (for example: **L_20150311_1505** and **L_20150311_1505_01**).

Note: Renaming items in a structured way is recommended. This allows items to be easily identified in later seasons.

Chapter 10 – Steering Calibrations

The console uses the satellite data it receives, through the receiver attached to the top of the vehicle, to identify the precise coordinates of the vehicle. Using this and other data, the system is able to estimate the vehicle's position and control the vehicle's steering system.

For this to work properly the system needs to be calibrated for the individual vehicle. If the system has not been calibrated for this vehicle, follow the steps in this chapter.

WARNING: Drive the vehicle to a suitable area with level ground, away from people and obstacles, with room to drive in complete circles. To ensure accurate calibration, the vehicle should have open sky visibility and be well away from trees, high voltage power wires and buildings.

It is recommended to remove the implement if it is a trailed, pivoted type implement to avoid implement draw bar interference.

Note: Calibration screens may vary depending on the vehicle selected. Some steering controllers may offer hydraulics calibration.

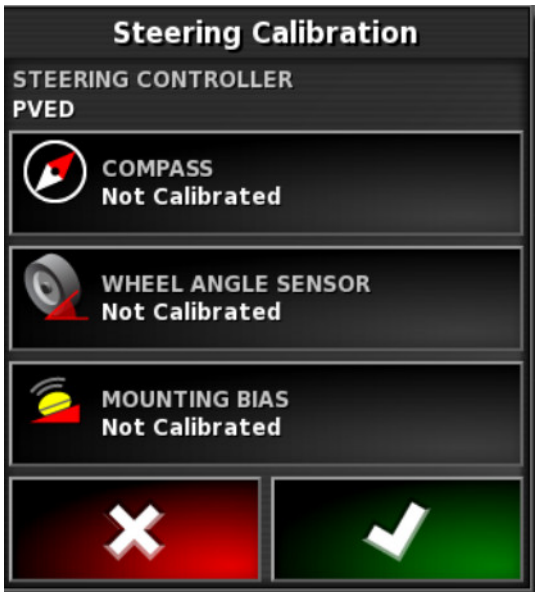
10.1. Calibrating the compass

Follow the steps to start the calibration wizard. Drive to a place that will not interfere with the calibration before beginning. This should be away from high voltage and large metal objects, with space to drive in complete circles.

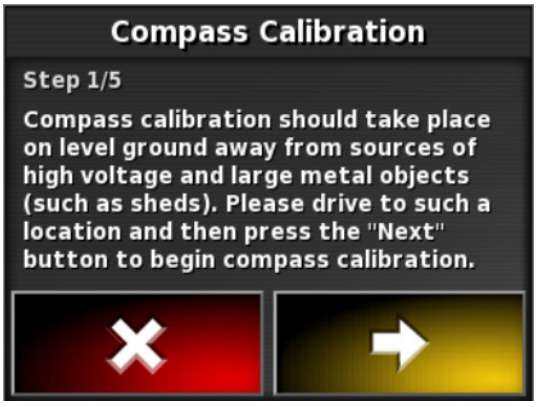
Note: Calibration screens may vary depending on the vehicle selected. **ALWAYS READ THE SCREEN PROMPTS CAREFULLY**.

1. Select **Steering Options Menu**  **/ Auto Steer Calibration**  .

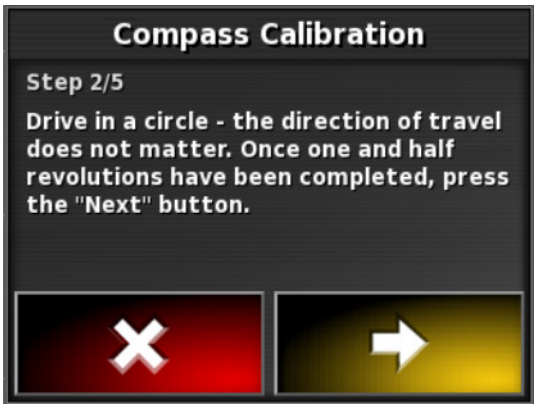
   The Steering Calibration screen displays.



2. Select **COMPASS**. If the component reports as calibrated, still complete the calibration procedure if the receiver has not been calibrated on this vehicle.
3. Read the screen and find an appropriate flat place away from high voltage and large metal objects. Then select next  .



4. Drive the vehicle in a circle at approximately 75% of full lock, the direction does not matter. Once 1 and ½ turns have been completed, stop and select next.



5. Drive the vehicle straight ahead for approximately 100 m then STOP the vehicle. Select next.

6. The system will begin to save calibration data. Wait until the screen states that the calibration is completed successfully and then confirm  .

10.1. Calibrating the compass

10.2. Calibrating the wheel angle sensor

Note: Wheel angle sensor calibration should be performed once every 6-12 months.

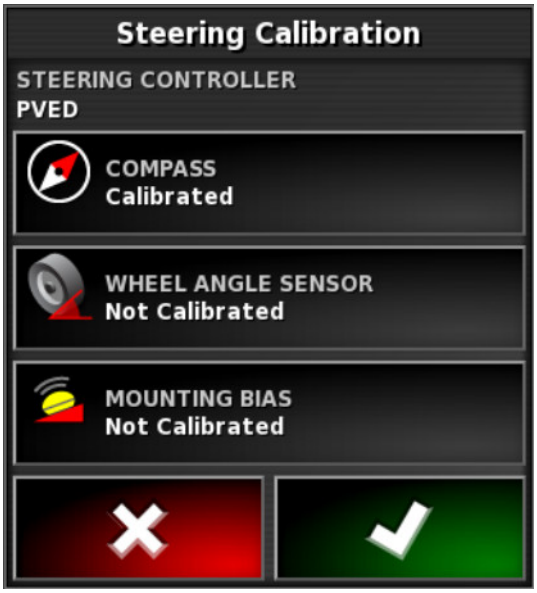
WARNING: Ensure there is sufficient space for the vehicle to complete the full maneuver before selecting Next. The calibration will take up to 60 seconds in each of these locked modes.

WARNING: Some vehicle models may automatically move the wheels to the required position.

1. Select **Steering Options Menu** / **Auto Steer Calibration** .

   The Steering Calibration screen displays.

2. Select **WHEEL ANGLE SENSOR**. If the component reports as calibrated, still complete the calibration procedure if the receiver has not been calibrated on this vehicle.



Note: The number of screens and contents of screens may vary depending on the vehicle and type of steering controller. If an error

displays, read the message and take the recommended action before proceeding.

3. Drive the vehicle forward to start the procedure. The wheel angle sensor calibration should be completed at 2 kph (1.2 mph).
4. Turn the steering wheel full lock to the left and select next  .

5. Turn the steering wheel full lock to the right and select next.

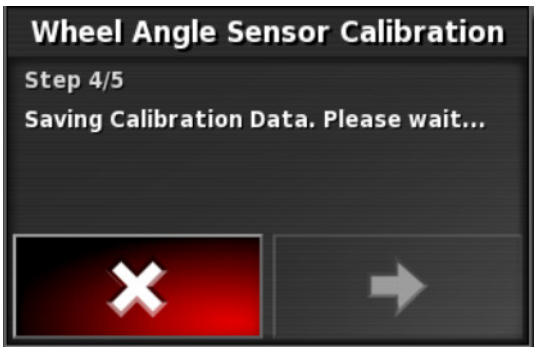
6. Ensure the vehicle is still moving at 2 kph (1.2 mph). Turn the steering wheel as close to the center position as possible.

   Note: Finding the center position and driving in a straight line, before selecting Next, is crucial for system performance.

WARNING: Ensure there is sufficient space for the tractor to drive forward in the center position before proceeding.

7. Select next.

8. The system will begin to save calibration data. Wait until the screen states that the calibration is completed successfully and then confirm  .



Note: Some steering controllers may cause the console to offer hydraulics calibration. If this is displayed, select hydraulics and follow the screen prompts.

10.3. Calibrating the mounting bias

Mounting bias refers to the initial offset from horizontal at which the GPS receiver is mounted on the roof of the vehicle. The following things can affect and change the mounting bias:

- Tire pressure
- Track tension
- Duals
- Tire sizing
- Cabin suspension
- Cabin repairs (suspension and mounts)
- Removing and refitting the receiver
- Mounting location has moved

Note: Mounting bias calibration should be performed if any of the above change or at a minimum once every 6-12 months.

It is advisable to still perform a mounting bias calibration when using **Autonomous** as the **Correction Source**, even though the screen reports that it is not required.

Mounting bias calibration is done in a clear area well away from obstacles. If the mounting of the receiver is not quite level, this calibration will adjust for the actual position.

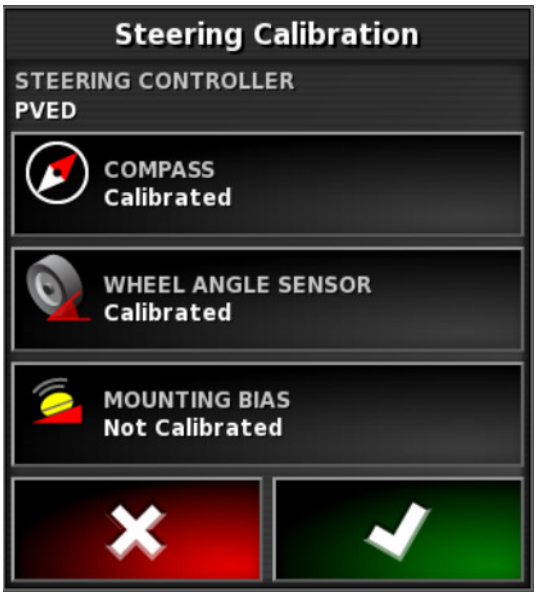
WARNING: Ensure the vehicle has sufficient space to travel in a straight line for at least 70 m/230 ft and then turn at each end of the wayline.

1. Select **Steering Options Menu**  / **Auto Steer Calibration**  .

   The Steering Calibration screen displays.

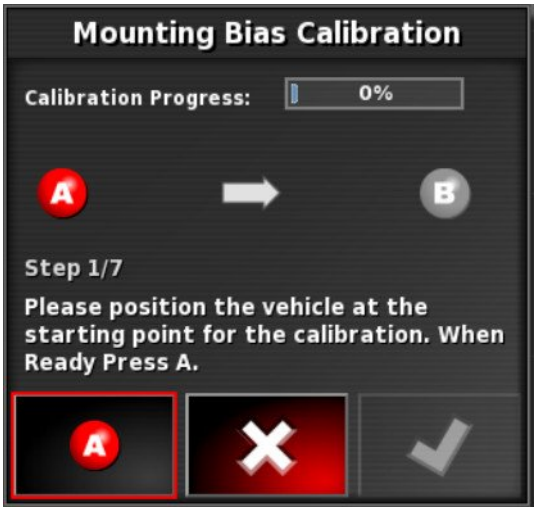
2. Select **MOUNTING BIAS**. If the component reports as calibrated, still complete the calibration procedure if the receiver

has not been calibrated on this vehicle.

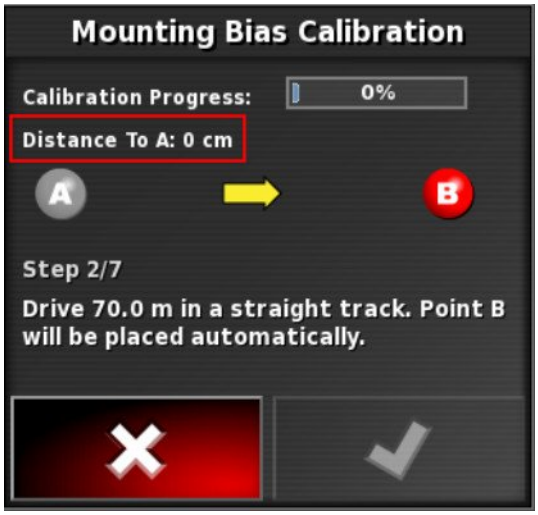


Note: To calibrate for mounting bias, 'A' and 'B' wayline points are plotted over 70 m/230 ft, driving the vehicle at 2 kph or 1.2 mph along the wayline. The operator turns the vehicle around at the end of the pass and repeats the procedure. It is important that the vehicle meets the 'A' and 'B' waypoints within approximately 30 cm, to initiate the next step in the calibration procedure.

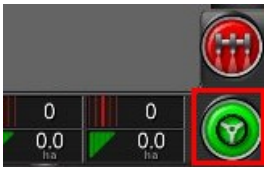
3. Reposition the vehicle in an open area. When ready to start the procedure, select A to mark the 'A' waypoint.



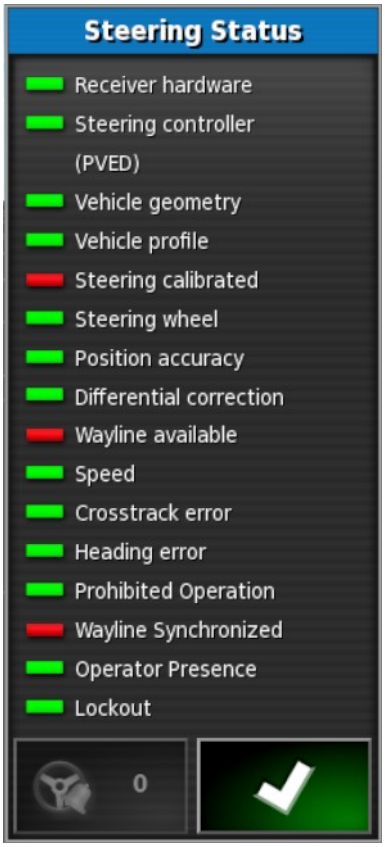
4. Drive forward in a straight line. The 'B' waypoint is created automatically when the **Distance To A** indicates 70 m/230 ft.



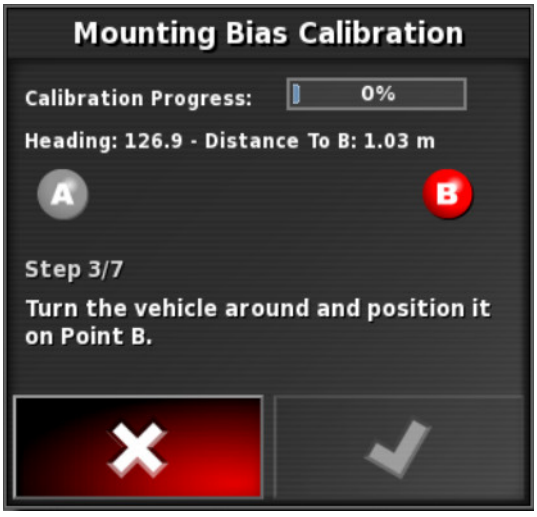
5. Turn the vehicle around and acquire the wayline just plotted, this track number should read ‘0’.
6. Select **Auto Steer Engage** on the operations screen to steer on the wayline. The color will turn green, an audible tone will sound and an ‘engage message’ will flash on screen to indicate the auto steering has engaged.



   If steering does not engage when **Auto Steer Engage** is selected, the steering status box will appear.
7. Address any of the issues with red indicators before proceeding with the mounting bias calibration procedure (work through issues displayed from the top to the bottom of the screen).

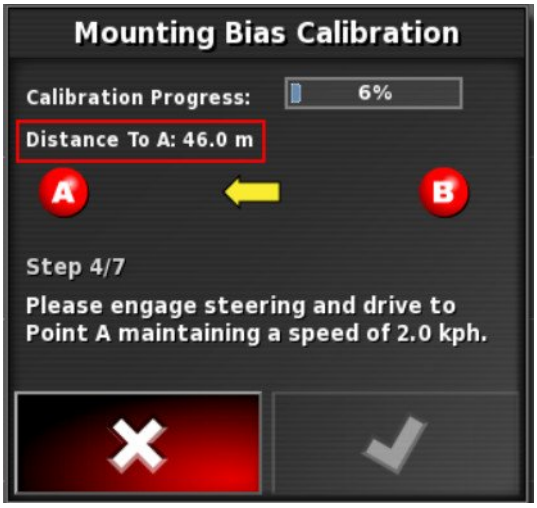


8. Drive the vehicle over the ‘B’ point previously created during the calibration procedure.



9. Set the vehicle speed to 2 kph or 1.2 mph.
10. Steer along the wayline back to the ‘A’ point previously created.

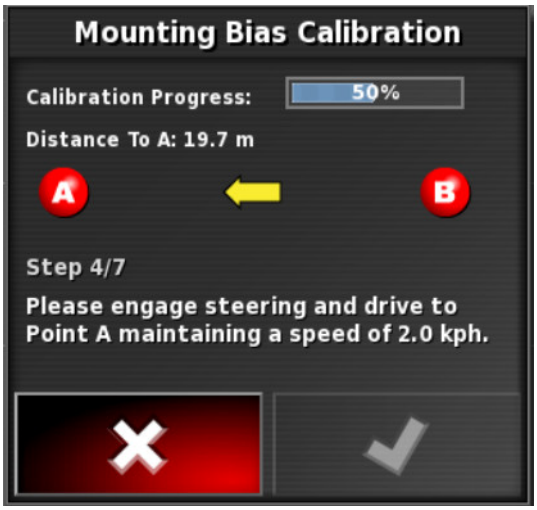
    When the **Distance To A** indicates 50 m the blue line on the Calibration Progress bar will start to move and the percentage will increase.



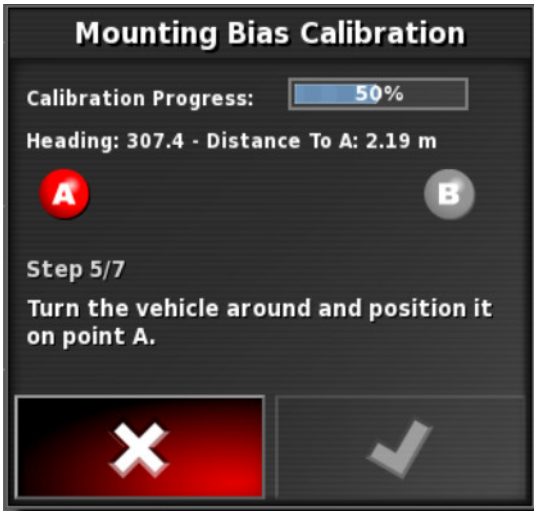
When the Calibration Progress bar reaches 50% the calibration bar will stop and the percentage will remain at 50%.

This indicates the system has enough data for the first stage of the calibration and the mounting bias calibration will be paused at this point.

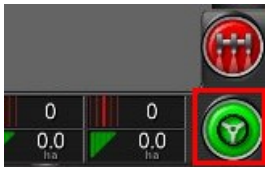
11. Proceed to cross the ‘A’ waypoint.



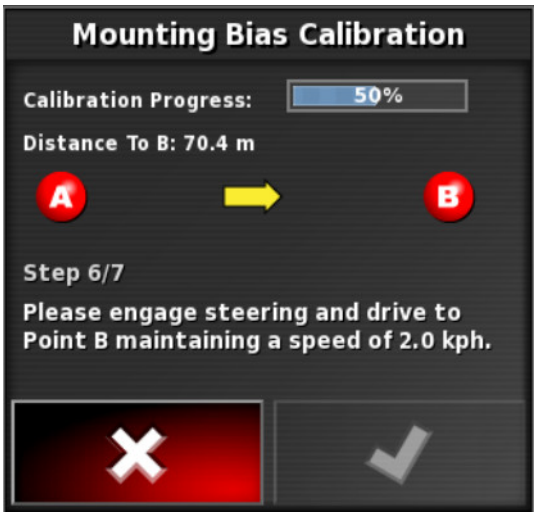
12. When the ‘A’ waypoint has been crossed, turn the vehicle around.



13. Acquire the track ‘0’ and engage the auto steering again.

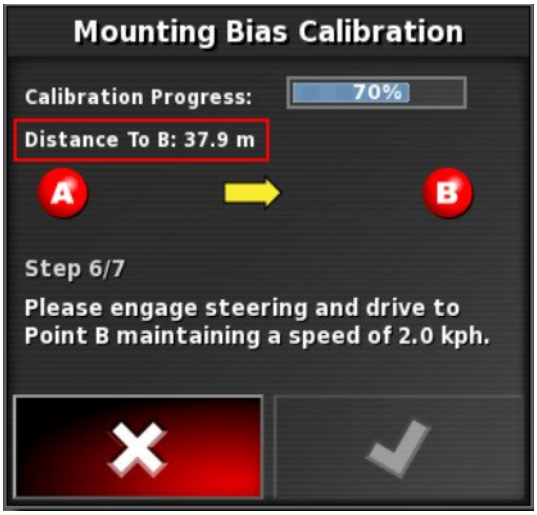


14. Cross over the ‘A’ waypoint again travelling in the opposite direction.



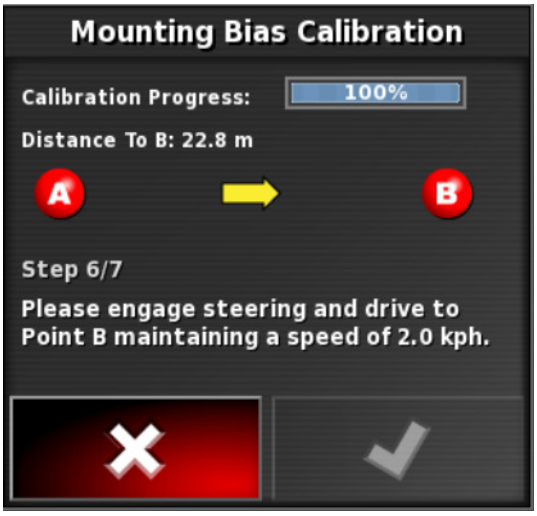
15. Set the vehicle speed to 2 kph or 1.2 mph.
16. Steer along the wayline back to the ‘B’ waypoint previously created.

    When the **Distance To B** is less than 50 m, the blue line on the Calibration Progress bar will move from 50% and the percentage will increase.

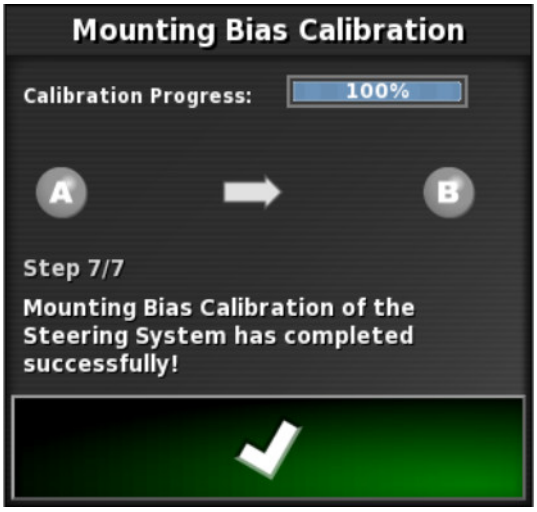


When the Calibration Progress bar reaches 100% this indicates the system has enough data for the second stage of the calibration and the mounting bias calibration is paused at this point.

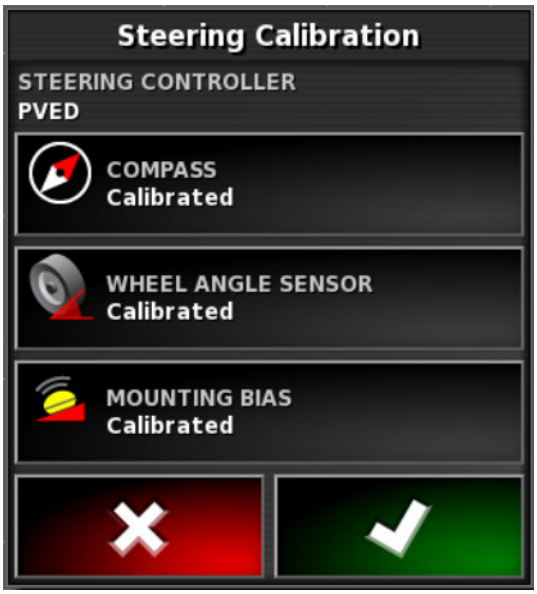
17. Proceed to cross the ‘B’ waypoint.



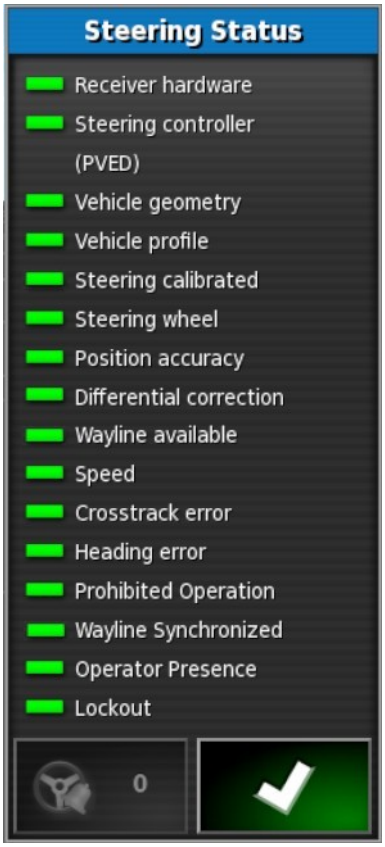
18. Stop the vehicle. Mounting Bias has been successfully calibrated.
19. Confirm  to return to the calibration screen.



The Steering Calibration screen will display **Calibrated** for Compass, Wheel Angle Sensor and Mounting Bias.



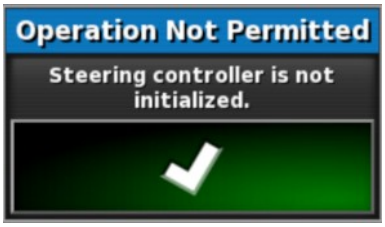
20. Confirm  to return.

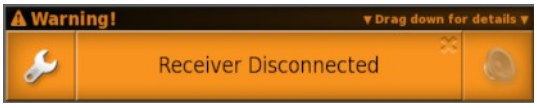
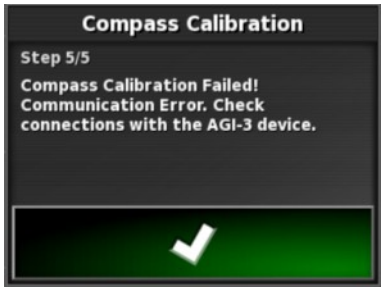


Steering Status box indicators will now all be green.

10.4. Dealing with calibration errors/alarms

The following errors/alarms can occur during calibrations. Perform the recommended procedures below to fix the errors.

View	Error
	**Steering controller not initialized** The steering subsystem is not turned on or is not ready for use. Check to see that the steering subsystem is powered on and ready for use.
	**Steering Profile Mismatch** The parameters in the selected vehicle profile do not match the vehicle configuration in the steering subsystem. Select the correct vehicle profile for this vehicle.
	**Parameters Mismatch** Vehicle geometry parameters do not match the geometry configuration in the steering system. Re-select the vehicle on the Setup screen or ensure the vehicle geometry in the vehicle geometry screen is correct.

View	Error
	**Receiver Disconnected** The AGI receiver has shutdown, lost power or the receiver – console serial connection has been broken. Check the power supply to the receiver and ensure the serial connection is good.
	**Compass Calibration Failed** Repeat compass calibration and ensure the vehicle completes 1½ turns. Ensure the vehicle is stopped when completing the procedure. Move the receiver away from magnetic sources.
	**Wheel Angle Sensor Calibration Failed** Repeat procedure and ensure the steering axle moves through the complete range. Confirm wheel angle sensor position information moves when steering axle is turned. Confirm wheel angle sensor harnesses and connections. Check wheel sensor condition. Failed wheel angle sensor.
	**Receiver firmware version is out of date** Update receiver firmware.

Chapter 11 – Field Menu

This chapter details how to set client, farm, field, boundaries, exclusion zones and flag points. These are the first steps when beginning a job.

The console will store the field information so that, once set up, the field details can be recalled for other jobs in the same field.

Drive to the field and follow the steps to set up a field and identify its features.

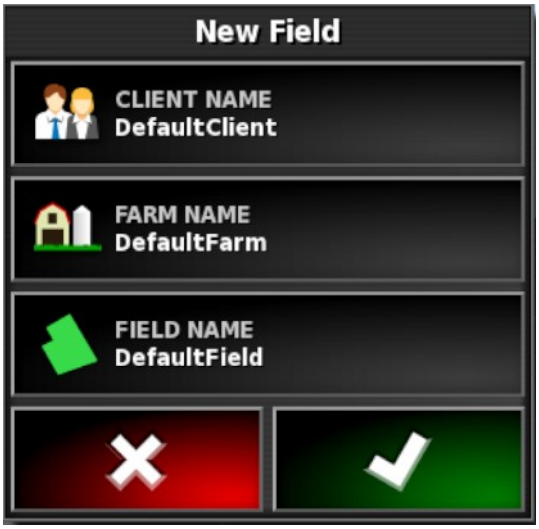
Note: The vehicle must be in or near the field for boundaries and related information to appear on the screen.

11.1. Creating a client / farm / field

1. Select **Field Menu** / **New Field** .

   Note: Default file names are provided when naming options appear. It is highly recommended that the operator names items in a thoughtful and structured way to allow easy use in future seasons.

2. Select **CLIENT NAME**, (or select an existing client if some have already been set up).



3. Select **New**, enter a name and confirm.

4. Select **FARM NAME**, (or select an existing farm name if some have already been set up).
5. Enter a name and confirm.
6. Select **FIELD NAME**, enter a name and confirm.
7. Completing this section selects the new field, proceed to Setting a new boundary, page 160.

Note: To change any of these settings after they have been confirmed, refer to Inventory Manager, page 231.

11.2. Selecting a client / farm / field

Note: The vehicle must be in or near the field for boundaries and related information to appear on the screen.

1. Select **Field Menu** / **Select Field** .
2. Select the required client, farm and field, then confirm.

3. To import field information from a USB, select USB .
4. To select the nearest field, select **Nearest Field** .

   The current GPS position is used. This will only work if the nearby fields have boundaries created.
5. Confirm field selections.

Note: To change any of these settings after they have been confirmed, refer to Inventory Manager, page 231.

11.3. Setting a new boundary

If required, it is possible to create multiple boundaries within a field. They may be created by driving around the boundary (see below), created from coverage (see page 162) or created from shapefiles (see page 163).

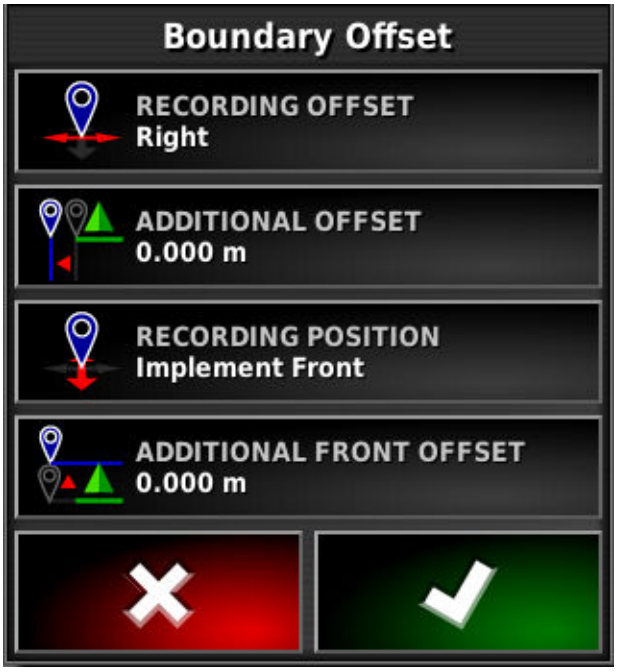
The interior of a created boundary defaults to a work region, however, any boundaries created within that boundary default to an excluded region (shown as greyed out). These properties may be edited. Refer to Editing a boundary, page 165.

Setting the boundary establishes the perimeter of the field (or a section of a field). Boundaries may overlap.

A boundary recording offset may be specified to control where the boundary is recorded in relation to the vehicle. This accounts for fences and other obstacles that do not allow the vehicle to drive exactly on the boundary.

Once the offset is entered, the vehicle must be driven around the boundary of the field.

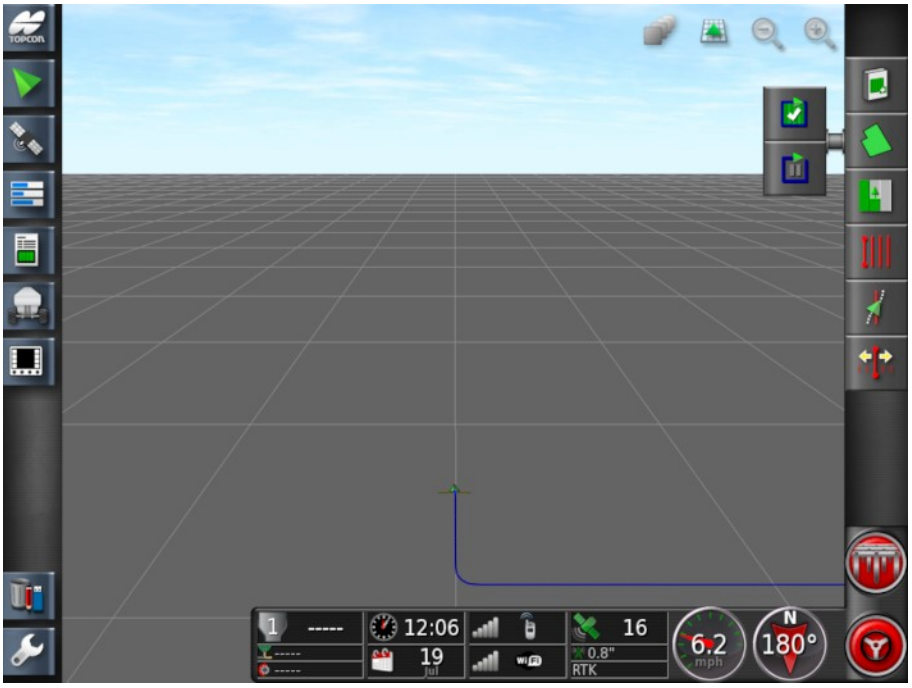
1. Drive the vehicle to the edge of the field.
2. Select **Field Menu**  / **Boundary Offset**  .



- **Recording Offset**: Positions the offset on the left or right side of the implement.
- **Additional Offset**: Enter a positive value to extend the offset beyond the edge of the implement. A negative value positions the offset within the implement extents.
- **Recording Position**: Select to record the boundary from the front or rear of the implement, or from the position of the vehicle.
- **Additional Front Offset**: Moves the recording position forward (or back if a negative value is entered).

  Note: An implement needs to have been established during setup, but the actual implement does not need to be physically attached to the vehicle.

3. Select **Record Field Boundary**  .
4. Drive the vehicle around the boundary of the field. A blue line will display the boundary being recorded, taking into account any offset.



5. Select **Pause**  to pause recording. This is useful if an obstacle prevents driving on the boundary. The icon will change to show the record option. Select **Record**  to resume. The boundary will record a straight line between the point recording was paused and the point recording was resumed. Note that boundary recording may be automatically paused if the master switch is turned off (see Pause boundary recording with master, page 36).
6. As the vehicle approaches the start point, select **Complete Field Boundary Recording**  to automatically complete the boundary.
7. Repeat the procedure for more boundaries, if required.

11.3.1. Creating a boundary from coverage

A boundary may be created from existing coverage.

1. Select **Field Menu**  **/ Create Boundary from Coverage**  to display the Boundary from coverage settings panel.

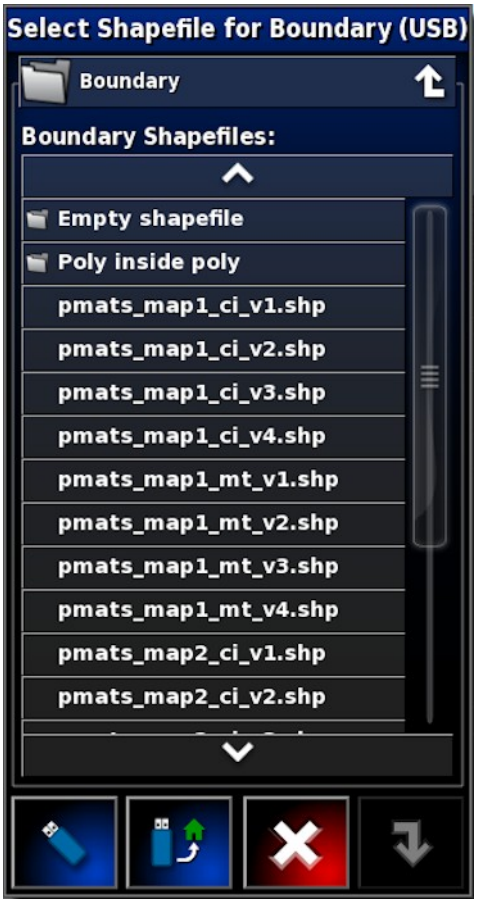
- **Smoothing**: The minimum gap size that will be automatically filled when creating a boundary from coverage.
- **Minimum coverage area**: Any coverage smaller than the area specified here will not automatically create a boundary.
- **Distance from coverage**: Expands the created boundary the specified distance from the coverage.
- **Excluded Regions** (on / off): Excluded regions are used to indicate areas that will not have product applied if section control is being used. Turning this on will automatically create excluded regions from any gaps in coverage that are within the total coverage area.
- **Minimum excluded area**: Any gap in coverage smaller than the area specified here will not automatically create an excluded region. This prevents very small gaps in coverage inside the boundary from automatically being created as excluded regions.

  A boundary (or multiple boundaries) is drawn around the outside edge of existing coverage. New boundaries are added to the current field.

11.3.2. Creating a boundary from a shapefile

A boundary may be imported from a shapefile stored on a USB.

1. Load the shapefile onto a USB.
2. Ensure the USB is inserted into the console.
3. Select **Field Menu**  / **Create Boundary from Shapefile**  .
4. Select the USB icon at base of the screen  . The data objects turn blue.
5. Select the USB home icon  to view the root of the USB file structure. Files and folders on the USB root are displayed.
6. Select a folder to open it. Find the required file and select it. It will display as white and next is now enabled.

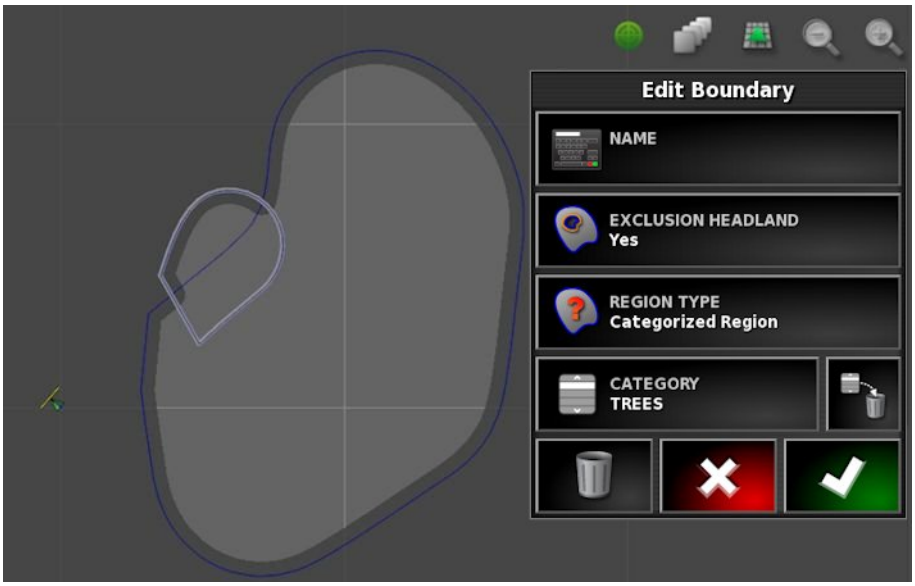


7. Confirm to import the shapefile boundary.

11.3.3. Editing a boundary

Once a boundary has been created, it can be edited.

1. Press and hold to select the boundary on the touchscreen. The boundary is highlighted. Release to display the Edit Boundary screen.



- **Name**: Optional name used to identify the boundary.
- **Exclusion Headland**: Sets whether the exclusion zone boundary edges will be treated as a headland (refer to Setting up a working headland, page 167).
- **Region Type**:
  - **Work Region**: Work regions are used to indicate areas that will have product applied if section control is being used.
  - **Excluded Region**: Excluded regions are used to indicate areas that will not have product applied if section control is being used.
  - **Disabled**: The existence of the boundary is ignored.
  - **Categorized Region**: Where there are a large number of boundaries, assigning each a category may be useful (for example, to include areas while spraying, but exclude those areas while seeding). Categories may then be used to define work regions and excluded regions for the current job (refer to Setting up job regions, page 175).

- **Category**: Used to assign or create region categories. Only shown if Categorized Region is selected for Region Type. (The bin button next to this field can be used to delete unused categories.)

The bin button at the base of the screen can be used to delete the selected boundary.

11.3.4. Removing a boundary

If a boundary must be changed, it can be erased and a new boundary can be set. To delete a single boundary, the bin button on the Edit Boundary screen can be used.

To delete all boundaries in a field:

1. Drive to the field.
2. Select **Field Menu**  / **Select Field**  to choose the client, farm and field names. The boundary will appear on the screen.
3. To remove the boundary, select **Clear Boundary**  . A message will ask for confirmation.

   Note: Erasing boundaries is a permanent action.

11.4. Setting up a working headland

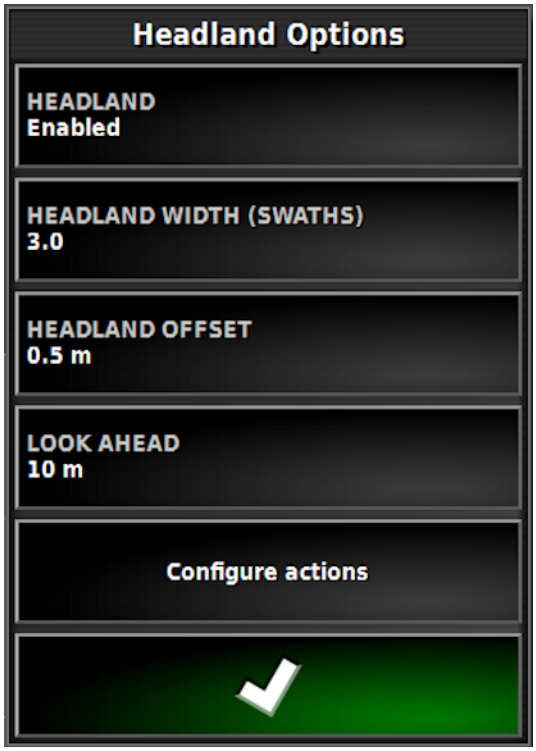
Implements often work around the boundary differently from the rest of the field. A headland creates a zone inside the line of the boundary that will be worked differently. The width will depend on the operator's method of working the field.

Note: Headland data is stored with the selected implement. This allows each implement to have different headland requirements.

Note: A headland can only be created once a boundary has been recorded, refer to Setting a new boundary, page 160.

Follow the steps to set up the working headland for this implement inside the field boundary.

1. Select **Field Menu** / **Configure headland for this implement** .



2. Ensure **Headland** is enabled.

The width of the headland can be defined using **Headland Width** or **Headland Offset**. If both are used, the two figures are added together for the total headland width.

3. Select **Headland Width (Swaths)** and enter the width of the headland in swaths from the inside of the boundary, then confirm. A swath is the working width of the implement.

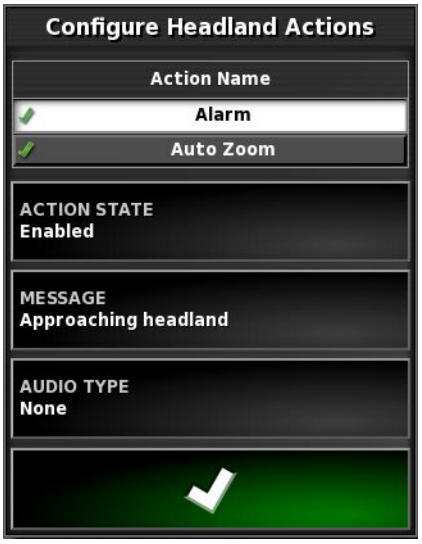
   Note: To set a headland width that is not related to the swath width, use **Headland Offset** to enter a value instead.

4. To increase the width of the headland, if needed, select **Headland Offset**.

   This may be useful to supply a buffer zone for steering if the headland width has been set so that the tip of the implement would be touching the fence.

   If you have recorded the field boundary so that the blue line is on top of the fence line (the actual physical boundary of the field), then set a headland of 1 swath, you would be required to drive with the tip of the implement touching the fence to fill this area with no overlap. Obviously this is not a particularly useful scenario. So in this situation you can add an offset of 1 meter (for example) to your headland, which will move the headland an extra 1 meter inside the boundary, allowing you to have a 1 meter gap between the implement and the fence.

5. Enter the offset measurement and confirm.
6. Select **Look Ahead**. This sets how many meters in front of the vehicle that the system looks to respond with actions.
7. Enter the distance in front of the vehicle for actions and confirm.
8. Select **Configure actions**.



Action Name

- **Alarm**: Sets an alarm to trigger when approaching the headland.
- **Auto Zoom**: If this is enabled, the map view will zoom in or out to the defined zoom level as the vehicle approaches the headland and return to the original defined zoom level as the vehicle leaves the headland. Select the preferred zoom level.

Note: When an action is enabled it is marked with a ✓. When an action is disabled it is marked with a ✖.

Action state

Allows the map view to zoom in when approaching the headland.

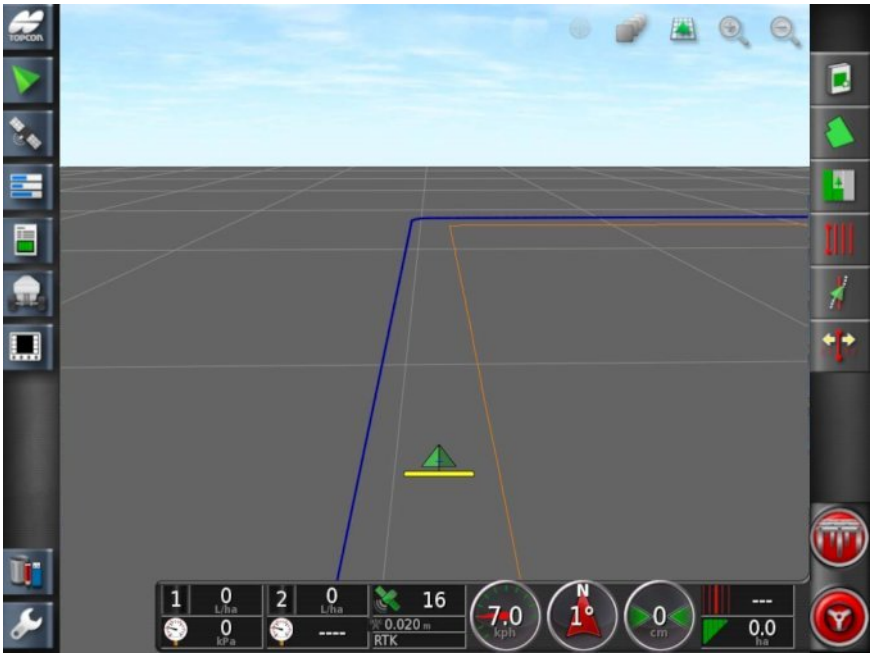
Message

Enter the words for a visual message (for example ‘Approaching headland’). Enter the text and confirm.

Audio type

Sets an audible alarm. Choose the type and confirm.

9. Confirm the alarm and zoom actions. The screen can now display a headland in orange inside the boundary line.



Approaching the headland will trigger the alarm and zoom that has been set.

11.5. Setting flag points

Flag points are used on the guidance map to indicate obstacles and noted items in the field.

Note: If required, flag points can be used with an exclusion zone around the obstacle (such as a large hole or electrical tower). If this is needed, read this section and read Editing a boundary, page 165.

1. Drive to the item to be flagged.
2. Select **Field Menu** / **Set Flag Point** .
3. To flag the obstacle, choose a flag symbol to be placed at that spot on the map.

Note: To change Flag Point presets, refer to Setting up flag points, page 86.

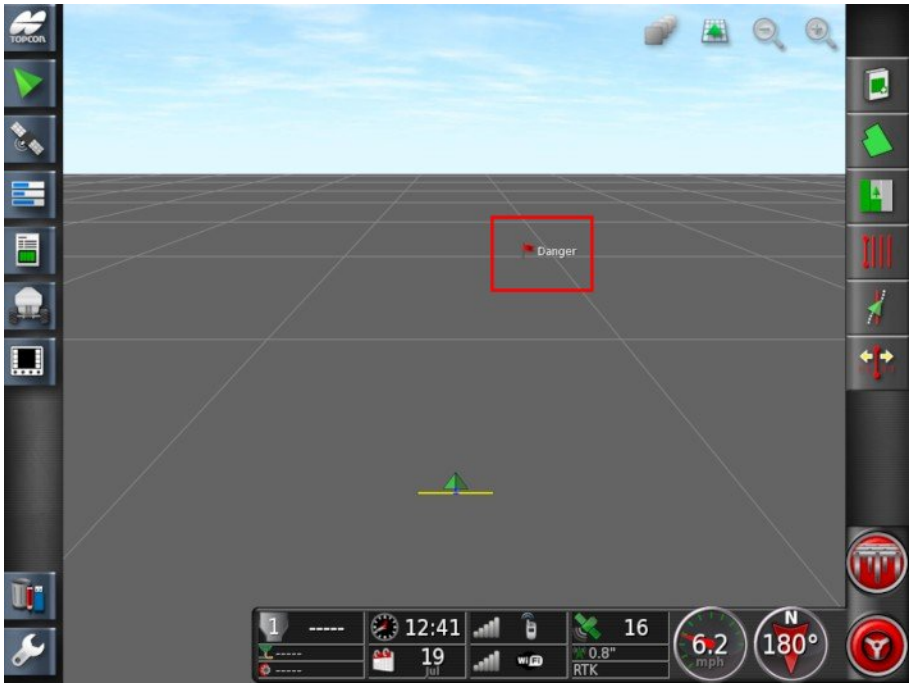
4. To customize flag points, select **Custom** to define a particular flag point.

5. Select the required symbol.
6. Select **FLAG POINT NAME** and enter the name. Confirm the name. Confirm to add the customized flag point.
7. If an exclusion zone is needed around the obstacle, go to Editing a boundary, page 165.
8. If an exclusion zone is not needed, drive to the next item in the field to be flagged and repeat.

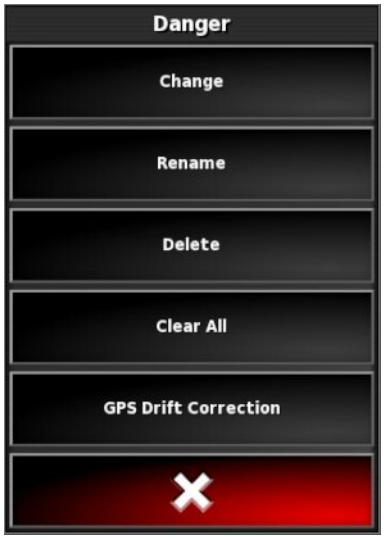
11.5.1. Removing or changing a flag point

To remove or change a flag point:

1. Press and hold on the flag point marker on the screen for 0.5 seconds.



2. Select:



- **Change** to choose a different flag point.
- **Rename** to change the name showing on the flag point.
- **Delete** to remove the selected flag point or **Clear All** to clear all flag points from the field.
- **GPS Drift Correction** to move the vehicle to the flag point location to compensate for GPS drift. Note, to remove applied GPS drift compensation, refer to Compensating for GPS drift, page 219.

11.6. Unloading a field

The Unload field option  may be used to exit from a field and its associated flag points, boundaries etc. This prevents new coverage being added to the field if the vehicle has been moved to a new field but the operator has neglected to create a new field / job.

If this option is not used, when the vehicle has moved more than 15 km away from the current field, the following message is displayed, and the field is unloaded automatically "The active field is more than 15 km away and has been deactivated and its data unloaded."

Note: The console will no longer restart when it has travelled too far from the current field.

Chapter 12 – Job Menu

The Job Menu selects or sets up specific job information associated with the chosen field. Using this menu, the job information is stored and activity can be recorded and reported.

12.1. Creating a new job

1. To set up a new job, select **Job Menu**  / **Create New Job**  .
2. Select **JOB NAME**.
3. Enter a name and confirm.

   Note: Default file names are provided when naming options appear. It is highly recommended that the operator names items in a thoughtful and structured way to allow easy use in future seasons.
4. Confirm the new job.

12.1.1. Setting up job regions

If one or more boundaries in the current field have a named Category (refer to Editing a boundary, page 165), and a job is active, region types for the current job can be selected.

Note: All categorized regions that are not specified in work regions or excluded regions are treated as though that boundary does not exist for this job.

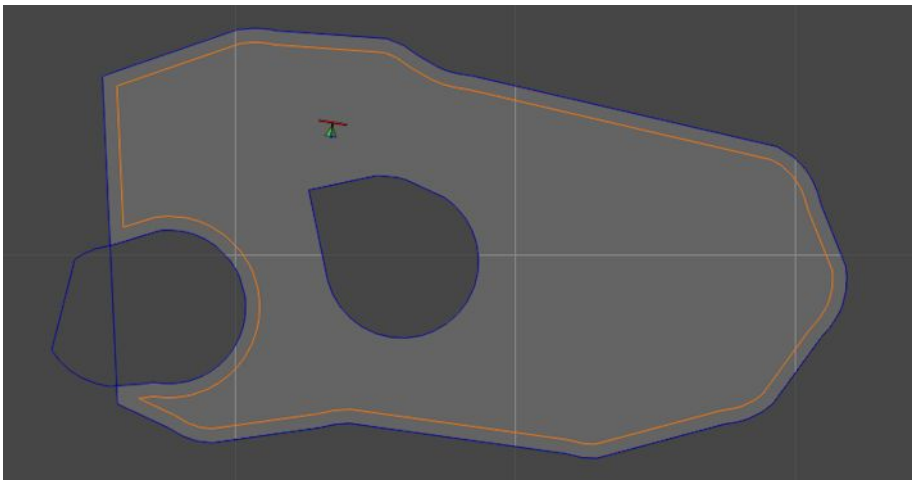
Note: Assigning region types to boundaries is not supported in Task Data mode.

1. To set up a job region, select **Job Menu**  / **Configure Job Regions**  .

- **Work Regions**: The boundary contents are included in the work area of this job.
- **Excluded Regions**: The boundary contents are excluded from the work area of this job.

2. Select the region types to be included and excluded for the current job.

Note: Areas that will be treated are shown as a lighter grey area on the map (if auto section control is enabled and the Boundary Limit is not set to Unlimited).



12.2. Selecting an existing job

Job information can be recorded, stored and transferred for later access.

Drive to the field and follow the steps to choose an existing job. To create a new job, refer to Creating a new job, page 175.

1. Before selecting an existing job, ensure the correct field is selected (refer to Selecting a client / farm / field, page 159).
2. To choose from a list of existing jobs, select **Job Menu** / **Select Job** .
3. Select the job and confirm.

Note: Changing the client, farm or field at the top of the Select Job window allows importing of a job from a neighboring field. This can be useful in order to reuse common information stored within the job, such as weather observations, crop information or product application notes. The coverage should be cleared manually before starting the new job. See Clearing a job, page 182.

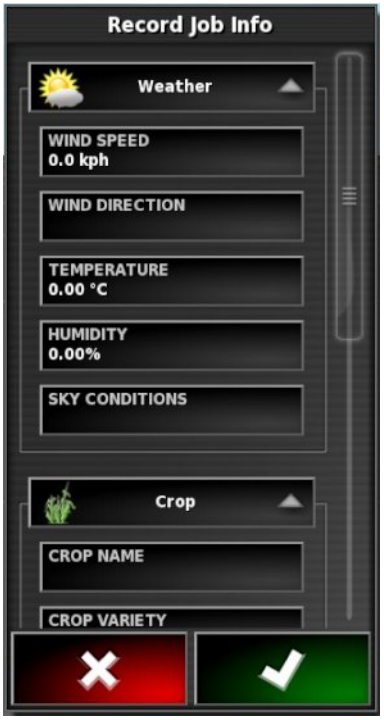
Note: The same implement that was used to create the job must be selected to load an existing job.

12.3. Recording job details

The console can record details of the job and store and export these.

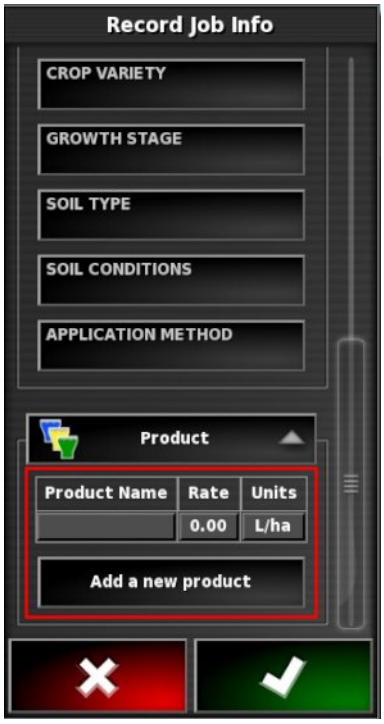
1. Select **Job Menu**  / **Record Job Details**  .

   Weather and site conditions are optional. Adding some crop and product information is recommended.



2. Select a category, enter the information and confirm.
3. Use the scroll bar or use the hide arrow to see crop and product options.
4. Select **CROP NAME**, enter the name and confirm.
5. Select categories as needed, enter the information and confirm.

   The **Product** section of this screen is intended to record the specific product mix that is being used for this job. This information is stored separately to the product definitions saved in the **Product** menu on the Setup screen.
6. Select **Product Name** from the list or select **Add a new product**.



7. Select **Rate** next to the product and enter the rate.
8. Select **Units** next to the product and choose the unit of measurement.

12.4. Exporting a job report

Job records can be exported in PDF format to a USB.

Exporting a job places the PDF report in D:/Reports and in D:/Client/Farm/Field/Reports.

Note: Job reports may also be exported as .csv files by enabling **PER-POINT DATA LOGGING** on the setup screen (**System** / **Features** / **Console**) before performing the job (refer to page 47).

1. Insert the USB into the console.
2. Select **Job Menu**  / **Data Exchange**  / **Export Job Report to USB**  (or Export Job Report to TAP  , see Using Topcon Agriculture Platform (TAP), page 226).

   The Job Report Options screen displays.
3. Select the required option/s:
   - **Auto adjust ranges**: If data exists that uses a color legend, the colors used in the report map shading are altered so that the maximum variation in colors is used to illustrate the yield rates.
   - **Create shape files**: Shape file data is exported to D:/Client/Farm/Field/ CoverageShapefiles and D:/Client/Farm/Field/ BoundaryShapefiles
   - **Task data**: Exporting a job report also exports XML based task data into a folder named TASKDATA.

The active or current job is exported to a folder named Reports on the USB.

Before removing the USB, always disconnect first by touching the **USB Eject** icon (refer to Using the console toolbar, page 12). A message will display that it is safe to remove the USB. If this is not done, the report may be missing or corrupt.

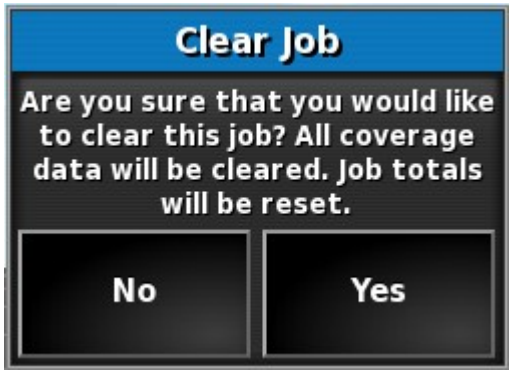
Note: It is also possible to batch export job reports (and jobs) for non-active jobs using the Inventory Manager. Refer to Inventory Manager, page 231.

12.5. Clearing a job

This action will remove any coverage information on the screen and delete job data that has been recorded on the current job. It does not affect field information or guidelines set for the field.

1. Select **Job Menu**  / **Clear Job Data**  .

   The following message appears.



2. Select **Yes** to clear the data or **No** to keep the data.

To delete farms or fields or previously created job data, refer to Inventory Manager, page 231.

12.6. Using variable rate control

Before use, Variable Rate Control (VRC) must be set up with a controller and must be enabled on the Setup screen (**System** / **Features** / **Implement**).

Select  to enable or disable the VRC Map display on the guidance screen.

12.6.1. If using VRC maps

There are three ways to perform VRC:

- Importing prescription maps (shapefiles and ISO XML files) into created jobs using the VRC import wizard.
- Using real-time sensor data from nitrogen sensors mounted on the tractor (for example: Topcon CropSpec).
- Using Task Data based prescription maps.

The following instructions describe the first two methods. If using task data, refer to Task Data Menu, page 235.

Both shapefiles (.shp) and ISO XML files (.xml) may be imported into created jobs. Note that only the prescription map portion of the data is used if .xml files are imported.

1. Select a client / farm / field, refer to page 159.
2. Create a new job, refer to page 175.
3. Select **Job Menu**  / **Configure Variable Rate Control**  .
4. Select next at step 1 of the VRC Configuration wizard.
5. Select the rate source(s) for the VRC and select next. The possible options are:
   - Shapefiles
   - ISO XML
   - CropSpec or LH5000 Rate Sensor (if enabled)

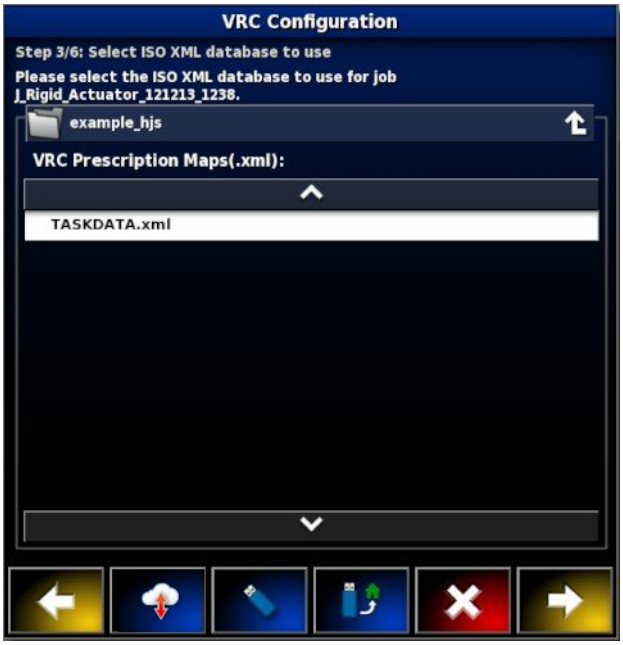
Note that shapefiles and ISO XML cannot be used at the same time. However CropSpec can be used in conjunction with shapefiles or ISO XML.

If **Shapefiles** or **ISO XML** are selected at step 2, all maps previously imported to the current field are displayed so that previously used maps can be recalled.

- If the desired maps are not already on the console, insert a USB with prescription maps.
- Select the USB icon at base of the screen  (or select  if importing via TAP, see Using Topcon Agriculture Platform (TAP), page 226).

The window background turns blue to indicate you are viewing the USB (or TAP) file list.

- Select the USB home icon  to view the root of the USB file structure. Files and folders on the USB root are displayed.
- Select a folder to open it. Find the required file and select it. It will display as white and next is now enabled. Note that multiple files may be selected.



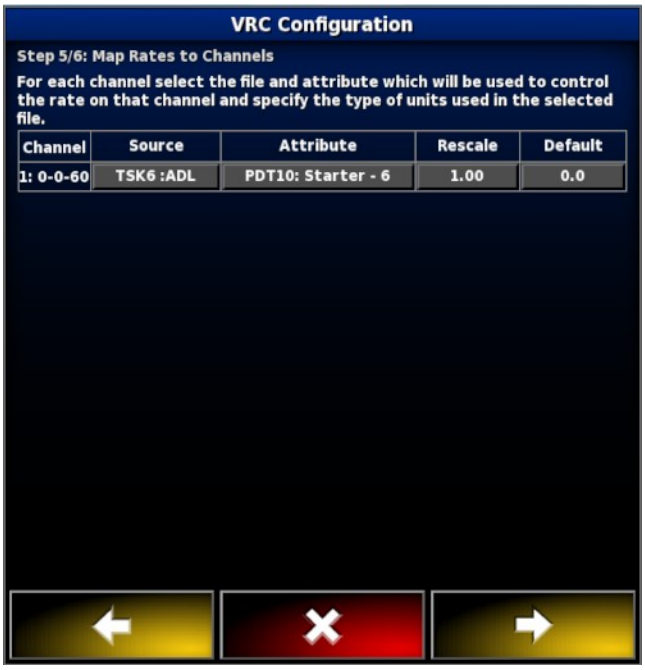
- Select next.

6. If ISO XML was selected in step 2, select the task that you wish to run. The file may have several tasks listed. Select the task that matches the implement that is hooked up.
7. Select next.

   Source and Attributes must now be assigned to channels.

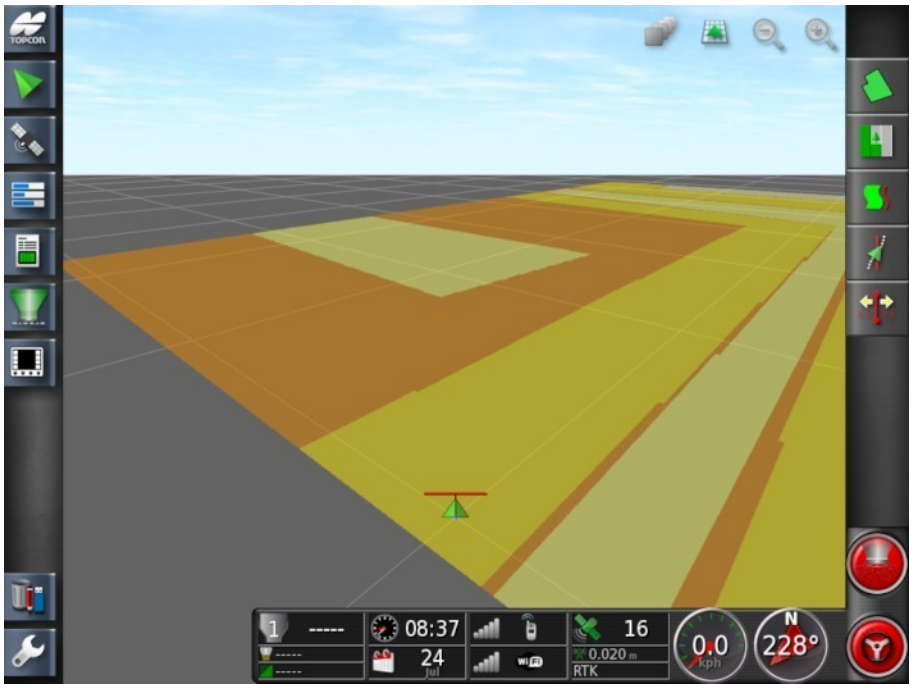
   - **Channel**: The tank or bin that is being controlled.
   - **Source**: The source of the prescription map for that channel. The list of files that were selected earlier will appear here or you can also select a live source like CropSpec.
   - **Attribute**: One of the properties in the shape file or ISOXML file or the sensor output from CropSpec. The same shape file may have multiple attributes to define the rates for more than one tank so this allows the operator to map the prescription to the appropriate tank.
   - **Rescale**: This column defaults to 1, which means that the prescription defined in the source will be used directly. However, depending on weather conditions, the operator may choose to increase or decrease the rate of application. This allows a uniform increase for all defined rates. For example, a rescale of 1.1 will apply 110 percent of the rate defined in the source.

- **Default**: Defines the rate to use if the source doesn't specify a rate for that region of the paddock.



8. Select next.
9. On the final step, you must confirm the setup. This cannot be changed for the job, so ensure it is correct before continuing. Select Back to change the configuration or OK to confirm.

The map is displayed. If it does not display, ensure you are in close proximity geographically to the map's location.



Chapter 13 – Guideline Menu

Guidelines are used to indicate the path that the vehicle should travel for optimum coverage. The system will use the implement width to set evenly spaced lines across the field.

If some guideline types are not required, they can be disabled. Refer to Guidance setup, page 49.

Guideline types supported are:


Parallel AB Line guidelines, page 188


Identical Curve guidelines, page 191


Centre Pivot guidelines, page 192


Guidelock Guidance mode, page 193


Boundary Steering Guidance mode, page 194

Note: To clear a guideline once it has been created, refer to Inventory Manager, page 231. Select the required **Category** then select the guideline to be deleted.

If required, guidelines can be transferred via Topcon Agriculture Platform (TAP) as part of a task data set. Refer to Exporting task data files, page 246.

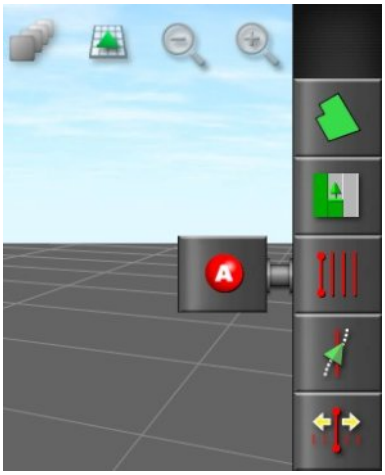
13.1. Using straight lines guidelines

This option creates parallel lines for guidance, using the width of the implement to set the distance between guidelines.

Where working is generally done in straight lines, the AB line should be set near the headland line. This allows the lines to evenly space across the working area.

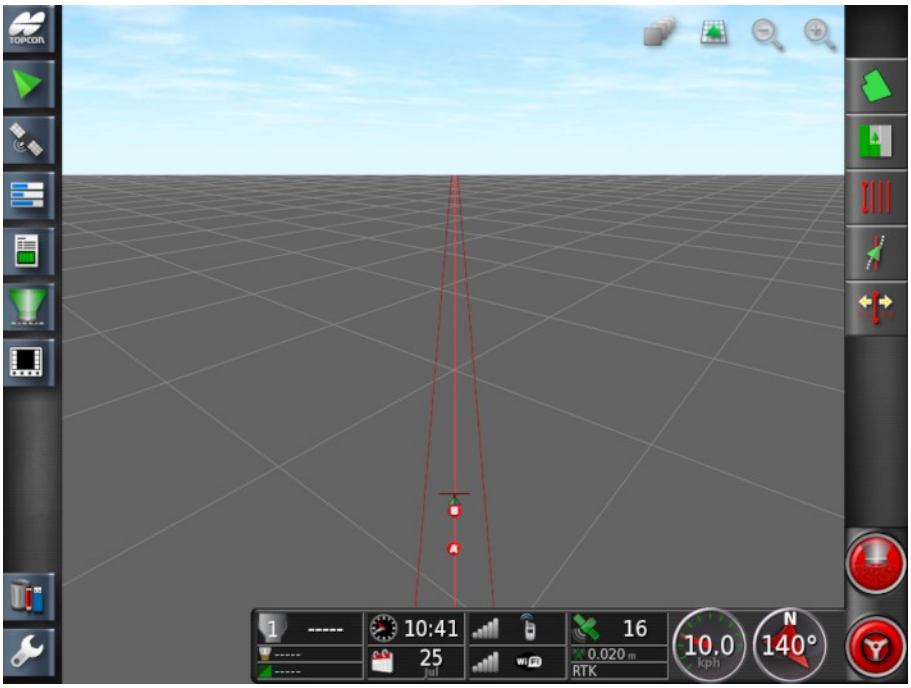
1. Position the vehicle.
2. Select **Guidelines Menu** / **Change Guidance Mode**, if necessary, to choose **AB Lines** .
3. To set the AB line, select **Create New AB line** .
4. To change the default name, select **GUIDELINE NAME**.

5. Enter a name and confirm. Confirm the new guideline.
6. Drive to the start of the swath. Select **Set A Point** .



7. To set a ‘B’ point, drive along the required swath and select  .

   The ‘B’ point appears and parallel guidelines for steering display on the screen.



In most cases the screen will display the line being travelled and the two adjacent lines.

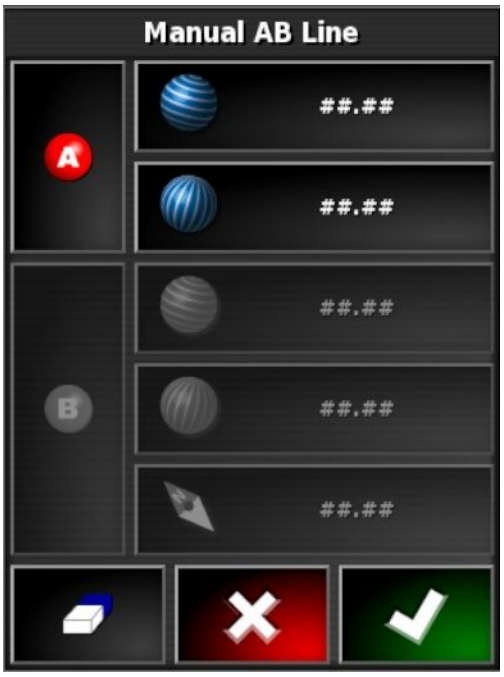
To view all guidelines across the field, select  from the top of the screen and choose **Line Numbers**. (This requires a field boundary, refer to Setting a new boundary, page 160.)

13.1.1. Setting AB lines manually

It is also possible to set AB lines using coordinates.

1. Select **Guidelines Menu** / **Manual AB Line** .

   The Manual AB Line screen displays.



2. Set the ‘A’ point using one of the following methods:
   - Drive to the desired location and select .
   - Enter the coordinates (latitude/longitude) of the ‘A’ point.
3. Set the B point using one of the following methods:
   - Drive to the desired location and select .
   - Enter the coordinates (latitude/longitude) of the B point.
   - Enter the Heading of the AB Line. The software will automatically place a ‘B’ point to create an AB line of the desired heading, relative to the ‘A’ point.

Note: To erase a guideline, select .

13.2. Using identical curve guidelines

Some fields are not rectangular and have a curved or shaped boundary. For these, identical curves may be the best option for guidelines. This can be useful for steering the boundary of a field and using this guideline for future operations.

Identical curves allows the operator to set a curved guideline and the system will create equidistant guidelines across the field, based on a swath width.

1. Position the vehicle.
2. Select **Guidelines Menu**  / **Change Guidance Mode**, if necessary, to choose **Identical Curves**  .
3. Select **Create New Identical Curve**  .
4. Select **GUIDELINE NAME**.
5. Enter a name, if desired, and confirm. Confirm the new guideline.
6. Drive to the start of the swath. Select Set ‘A’ Point  .
7. Drive along the curved swath. A black line will appear behind the vehicle on the map to indicate the curve that is being recorded.

   Note: If required, recording the guideline can be paused.
8. At the end of the curved swath, select  to indicate the end of the curve recording.

13.3. Using center pivot guidelines

Some fields are best worked in a circular shape. This setting allows the operator to create guidelines around a center pivot point.

1. Position the vehicle.
2. Select **Guidelines Menu**  / **Change Guidance Mode**, if necessary, to choose **Center Pivot Lines**  .
3. Select **Create New Center Pivot**  .
4. Select **GUIDELINE NAME**.
5. Enter a name and confirm. Confirm the new guideline.
6. Drive around the center of the field. A pivot accuracy bar is displayed to indicate the progress of guideline creation.

   Once the system detects the arc, circular guidelines are created, based on the width of the implement. Remember to consider the turning circle of the vehicle and implement when driving the first arc.

13.4. Using guidelock guidance mode

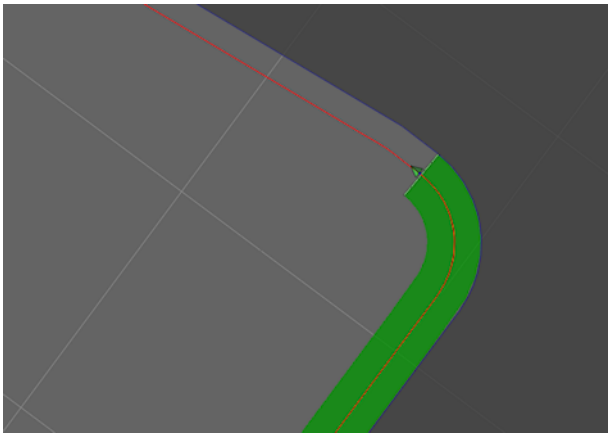
Guidelock is a coverage based guidance mode. It generates a curve based on existing coverage, regardless of when that coverage was laid. This is convenient if wanting to steer around a contour or field boundary but you don't want to create and save a curve, or if you want to continue steering alongside some coverage that was treated earlier that you did not save a curve for. This guideline method is sometimes referred to as 'free form'.

1. Select **Guidelines Menu**  / **Change Guidance Mode**, if necessary, to choose **Guidelock Guidance Mode**  .

A guideline is generated that follows whichever path the vehicle takes.

13.5. Using boundary steering

This option generates a guideline inside the boundary. By default, the guideline is offset by half an implement width away from the boundary. This width can be adjusted using the nudge menu (see Nudge Menu, page 217).



Note: Ensure the guideline is a sufficient distance away from the boundary to avoid colliding with fences etc.

As the vehicle moves towards the center of the field, more guidelines are created. Guidelines are spaced one implement width apart.

To use this option, a boundary must exist. Refer to Setting a new boundary, page 160.

1. Ensure **Boundary Steering** is enabled via the setup menu **System** / **Features** / **Guidance** .
2. Select **Guidelines Menu** / **Change Guidance Mode** / **Boundary Steering Guidance Mode** .

This option can also be used to steer around the boundary of exclusion zones if **Exclusion Headland** is set to **Yes** (see Editing a boundary, page 165).

13.6. Selecting an existing guideline

Once guidelines have been created within fields, these are stored and can be accessed on future jobs in the field.

1. From the **Guidelines Menu**  , select the required guideline mode, then select **Select Guideline**  .
2. Select client, select farm and select field. Existing guideline sets will display.

3. Choose the guideline set required and confirm.

13.7. Setting up tramlines

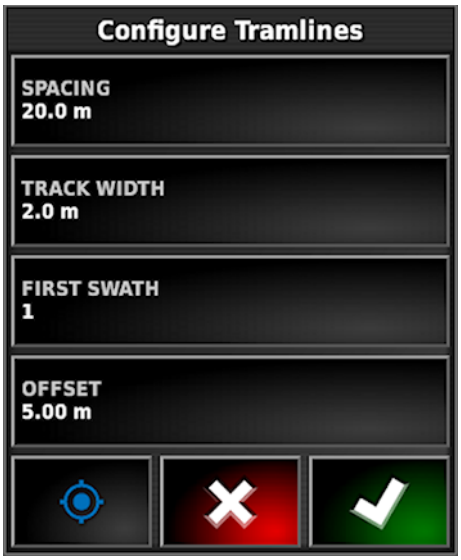
Horizon software can display a visualization of tramlines when using AB lines or identical curve guidelines. Tramlines display an indication of where the wheels of other farm equipment will travel that should not be seeded.

Note: Tramlines are only a visual indicator, they do not control the implement operation.

A boundary must be setup prior to setting up tramlines, see Setting a new boundary, page 160.

There must also be an active guideline, see Guideline Menu, page 187. This is displayed in red.

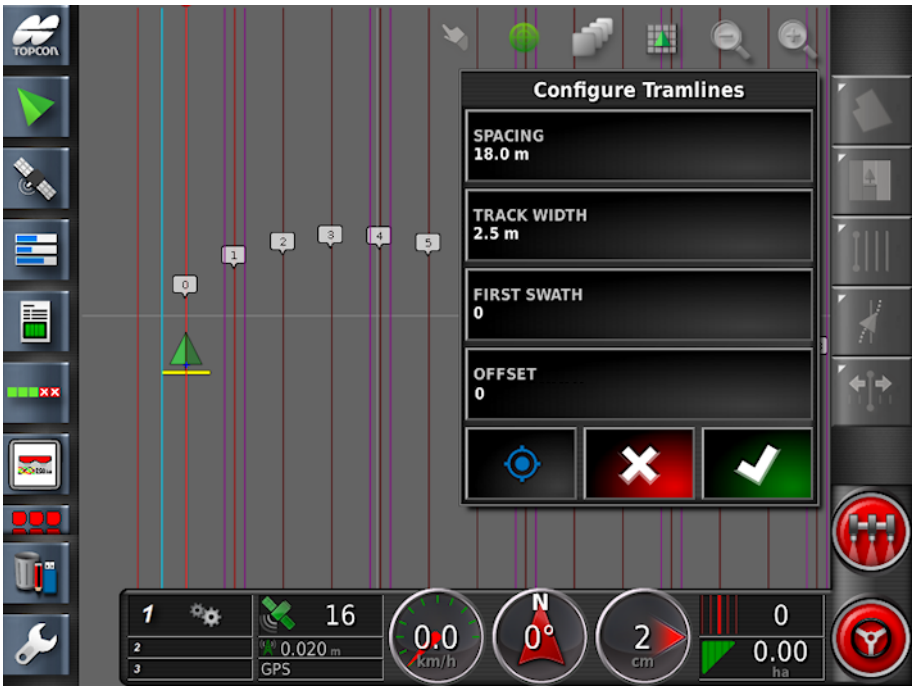
1. Ensure **Tramlines** are enabled via the setup menu **System** / **Features** / **Guidance** .
2. Select **Guidelines Menu** / **Configure Tramlines** .



- **Spacing**: The distance between the centers of the tramline passes. Usually this will be the width of the sprayer.
- **Track width**: The distance between the outsides of the wheels of the vehicle that will steer to the tramlines.

- **First swath**: The swath that the seeding run will start on. From here, the edge of the field is calculated and shown as a light blue line. By default this line is shown half an implement width away from the first swath. This can be changed by adding an additional offset (below).
- **Offset**: This is any additional offset to be applied. For example, if you won't be seeding a full pass on the first run.
- **Auto configuration** : Selects the first swath based on the current position and sets the offset to 0. It sets the edge of the field at half the current implement width from the current active guideline. For a 6 m implement, this would be 3 m from the active guideline. The system automatically detects on which side of the implement the field boundary is and sets the light blue edge line accordingly. **First Swath** and **Offset** can be adjusted manually.

For example, if the tramline spacing is a multiple of the current implement (6 m seeder and 18 m tramlines) and the first wayline is at the edge of the field, the configuration should be **First Swath** at 0 and **Offset** at 0.



The tramlines are shown in purple and an alarm is shown to advise a user they are on a tramline pass. The tramline pass alarm displays if the vehicle is driving across a tramline.

Tramlines may be displayed / hidden via an option in the map layers  . See Map layers, page 122.

Configuring tramlines creates a new tramline guidance line with '_ Tramline' added to the current guidance pattern name. These tramlines can be exported via the Inventory Manager (found under Curves or ABLines category) for use on other vehicles. See Inventory Manager, page 231. **Note**: Imported tramlines cannot be reconfigured.

13.8. Configure headland turns

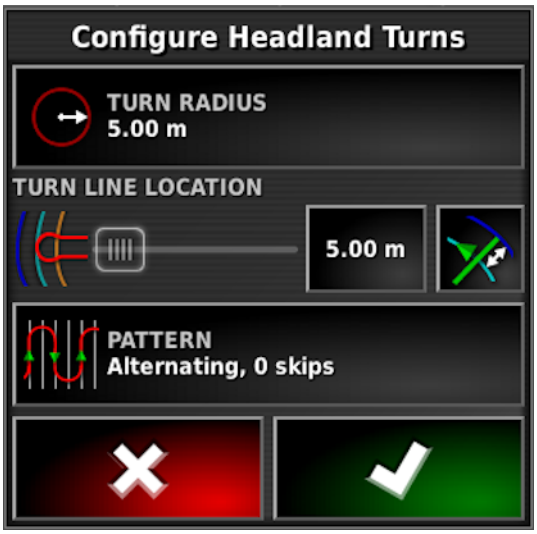
This option provides the ability to autosteer around headland turns when using AB lines or identical curve guidelines. A selection of patterns are available to provide coverage. A license must be purchased to enable this functionality.

Auto steering must be engaged to perform headland turns automatically. See Auto Steering, page 207.

Note: To use this option, **a boundary must exist** (see Setting a new boundary, page 160) and **a headland must be configured** (see Setting up a working headland, page 167).

1. Ensure **Headland Turns** are enabled via the setup menu **System**  **/ Features**  **/ Guidance**  .

2. Select **Guidelines Menu**  **/ Configure Headland Turns**  .



Note: The settings entered on this screen are saved per implement.

Tip: When the configure headland turns screen is displayed, a light blue line is displayed inside the boundary to show where the headland turns will be performed. Drive the vehicle to a location close to the headland to allow you to see the shape and position of the turn as you adjust the settings.

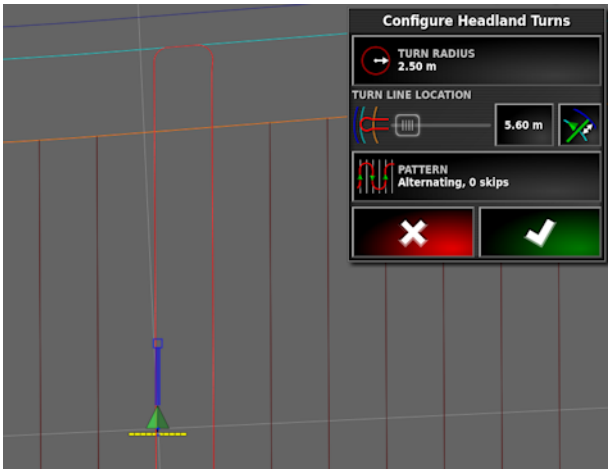
13.8.1. Turn radius

- **Turn radius**: The radius of the turn that is possible for the combined vehicle and implement to safely perform.

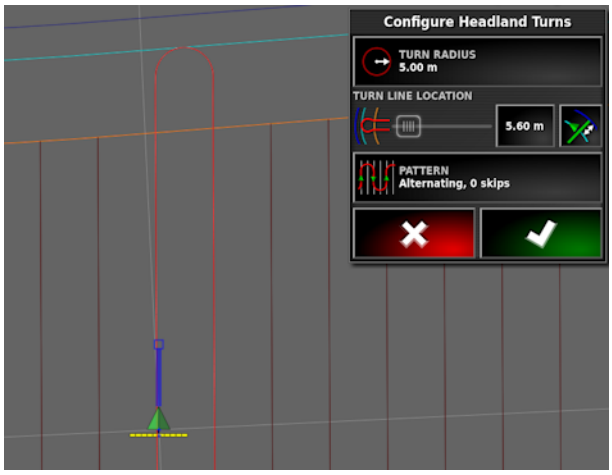
WARNING: The turn radius must be set high enough to allow the vehicle and implement to turn without jack knifing.

Tip: Start with the turn radius set to half of the implement's width, which will give you a smooth curve from one line to the next (unless doing skip rows.) Once you are comfortable with the way the turn is performed, you can try adjusting the turn radius to optimize the turn to suit your requirements. A smaller turn radius will result in the vehicle turning at the end to follow the boundary for a short distance before turning back onto the next line. A turn radius larger than half the implement width will result in a keyhole shaped turn.

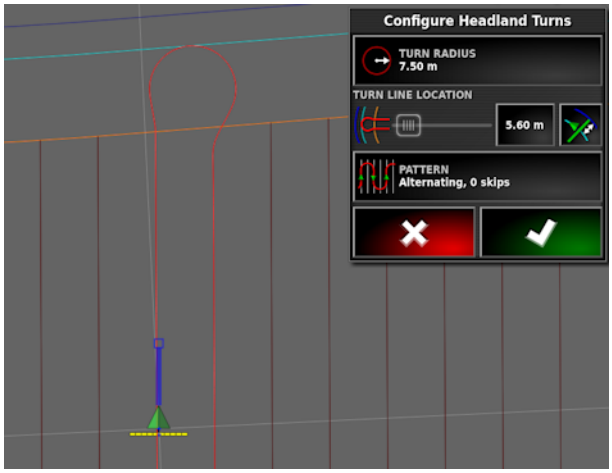
A small turn radius provides a rectangle shaped turn with rounded corners.



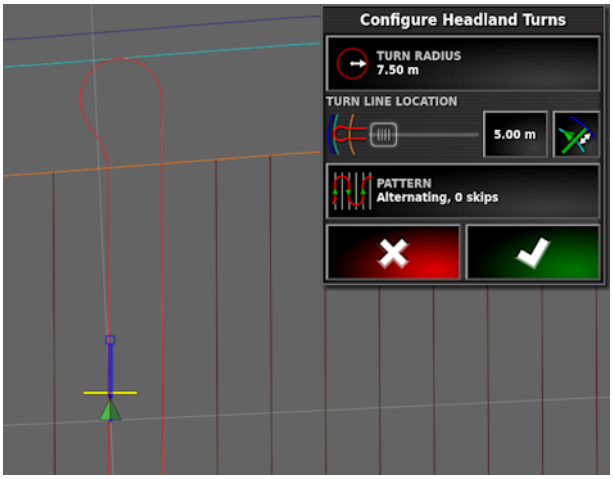
A turn radius of half the implement width provides a smooth, round turn.



A larger turn radius provides a keyhole shaped curve.



Note: To ensure that the implement is correctly on the line when exiting the headland (returning into the field) the shape of the curve may be such that the vehicle's initial movement is away from the next line, or the approach to the next line may have the vehicle overshoot the line. This is intentional and helps to ensure that the implement enters correctly without leaving gaps. See the following image.



13.8.2. Turn line location

- **Turn line location**: Moves the location at which the turns will be performed between the headland and the boundary. (The location is indicated by the light blue line.) The left of the slider is the boundary and the right side is the **Headland Width** (see Setting up a working headland, page 167).
- 

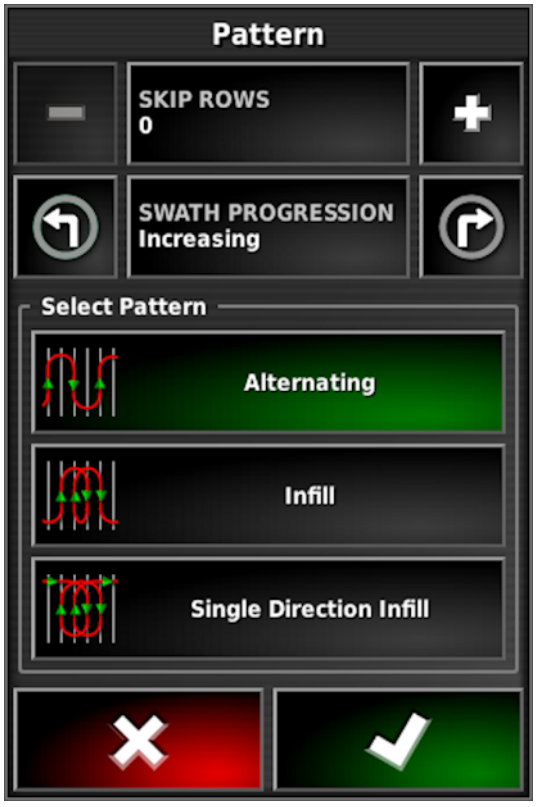
: Distance from the boundary at which the turn will be performed to prevent the implement from hitting the fence during turns. The margin is measured from the center of the vehicle to the boundary. This field displays the **Turn line location** slider position, or can be used to enter a specific distance.

  Note: If the implement geometry has an inline offset entered, this may move the position from which the margin is measured. See Setting the implement geometry, page 108.
- 
: Increase the boundary margin by half the implement width. This figure is added to the figure displayed in the previous field.

Tip: Start with the turn location set to the implement width to ensure sufficient clearance from the boundary. Once you are comfortable with how the turn is performed, you can reduce the turn location to be closer to the boundary to suit your requirements.

13.8.3. Pattern

- **Pattern**: Opens the Pattern screen:



This screen is used to define the pattern that will be used by the vehicle to travel through the field.

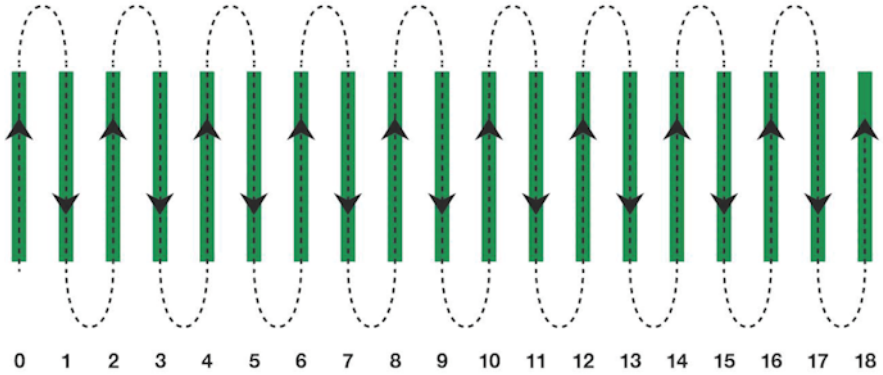
- **Skip rows**: Skip one or more rows at each turn.
- **Swath progression**: Travel progresses through increasing or decreasing swath numbers displayed on the guidelines. To view all guideline numbers across the field, select  from the top of the screen and choose **Line Numbers**.

13.8.4. Select pattern

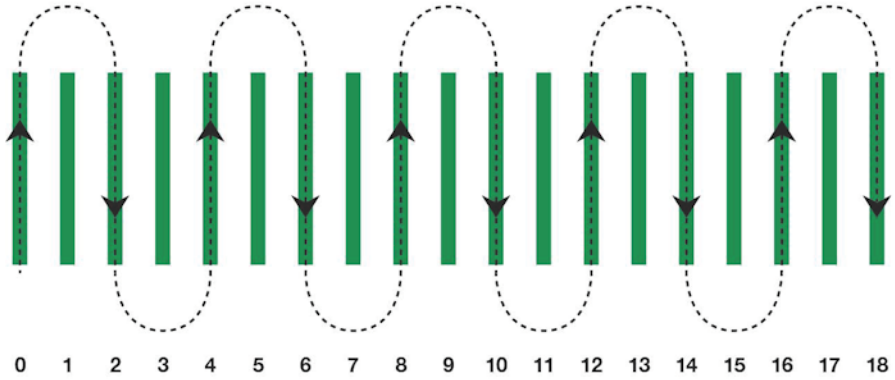
Alternating

Vehicle travels up one row and down the next. Skip rows can be used if the implement is too large to make the turn onto the adjacent row.

Zero rows skipped



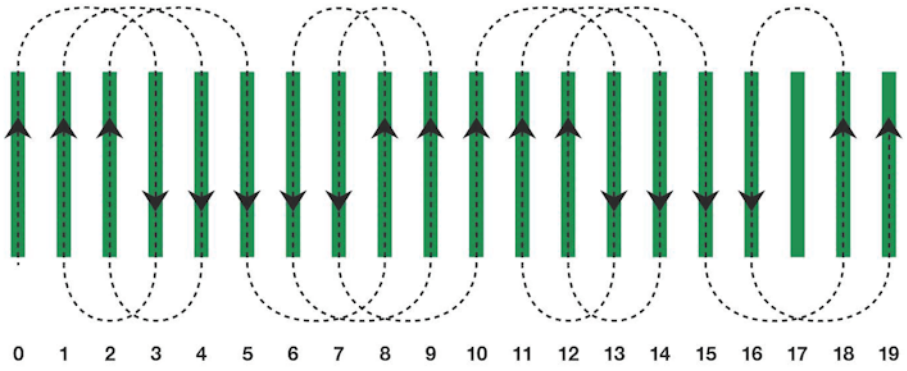
One row skipped



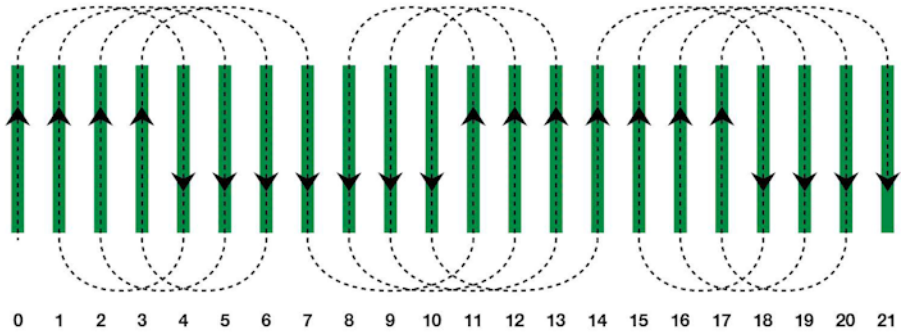
Infill

Vehicle skips a row and then turns back to fill in the skipped row. More than the defined number of rows may be skipped to complete the pattern.

One row skipped



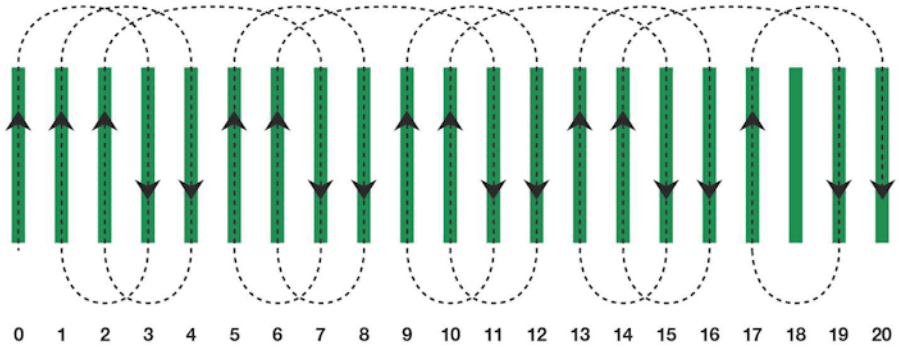
Two rows skipped



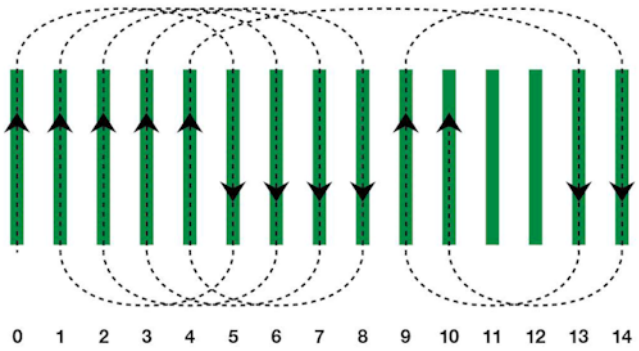
Single direction infill

Vehicle only turns in the same direction (left or right) at the end of each row. More than the defined number of rows may be skipped to complete the pattern.

One row skipped



Three rows skipped



13.8.5. Headland turn alarm

As the vehicle approaches the headland, an alarm is displayed. This alarm allows the turn to be edited or cancelled.

Configure headland turn alarm

1. On the setup menu, select **System** / **Alarms** / **General** / **Headland Turns** to configure the headland turn alarm.

- **Distance to Headland**: The distance from the headland at which the alarm displays.
- **Turn Options**: Sets whether the edit headland turns options are displayed on the headland alarm by default.

Edit headland turns via alarm

The alarm screen may be used to change the direction of the turn, change the number of rows to be skipped, or reject the turn. Pressing the alarm accepts the headland turn.

Note: This alarm can be displayed manually using the button at the top of the guidance screen if required. The displayed button changes between no turn , left turn and right turn to show the next action.

Chapter 14 – Auto Steering

The Steering Options Menu allows the operator to set options for the auto steering. To use this feature, it must be enabled. If it has not been enabled, refer to Guidance setup, page 49 to enable auto steering.

To calibrate the steering refer to Steering Calibrations, page 139.

14.1. Auto steer status

Auto Steer Status allows the operator to view the status of the conditions required for auto steering. Red indicates that the conditions are not met and therefore steering is not ready.

1. To review the status of the auto steering, select **Steering Options Menu** / **Auto Steer Status** .

   The Steering Status screen displays.

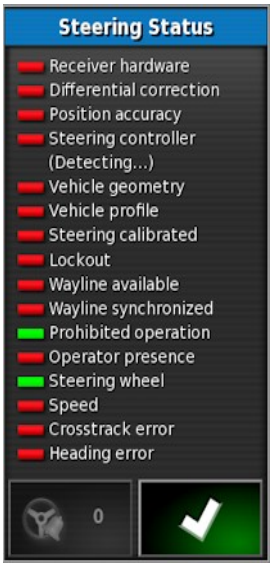
   Green indicates that the item is ready.

   Red indicates that the item is not ready.

   Steering alarms may be displayed by selecting the steering alarm button at the bottom left of the screen.

2. Select  to return to the main screen and complete the necessary actions (work through issues displayed from the top to the bottom of the screen).

14.1.1. Auto steer troubleshooting

Error Display	Actions	Page
 	Auto Steering Engage is showing red. Auto steering does not engage. Select Auto Steering Engage to bring up the Steering Status panel. Red on the panel indicates that the item is not working correctly.	
Receiver hardware displays with red	Is the receiver connected correctly, mounted securely and turned on?	
Differential correction displays with red	Confirm setup in console matches the correction source requirements.	65

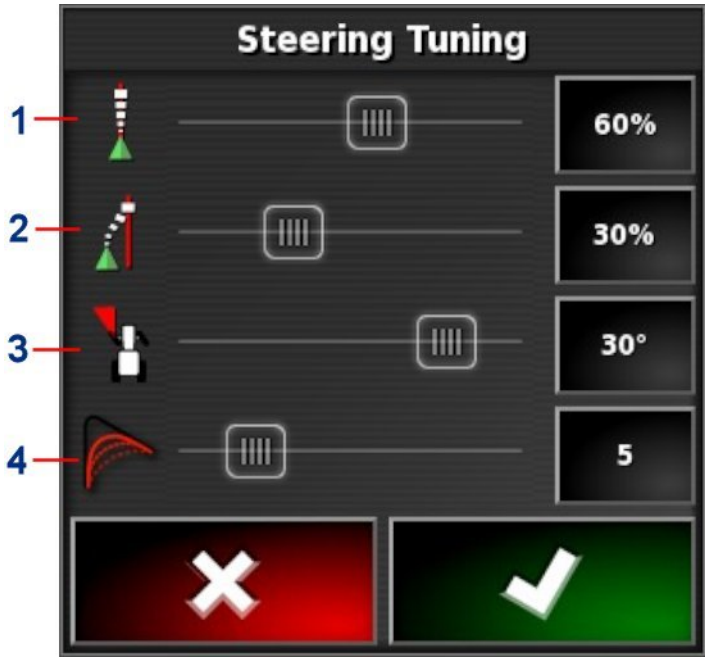
Error Display	Actions	Page
Position accuracy displays with red	Allow time for convergence to occur. What color is the satellite icon on the dashboard? How many satellites show next to the icon? You need at least four satellites available. Is the correction source correct? If not, select the appropriate correction source. Are you in an open space away from power lines? Drive to an open space and allow time for convergence. If on a subscription scheme, confirm current subscription. Confirm correct frequency has been set.	65
Steering controller displays with red	Confirm controller is connected and turned on. Confirm that the correct steering controller has been selected during setup. If using AES, power cycle the AES, then turn wheel a ¼ turn to enable steering.	100
Vehicle geometry displays with red	Return to Setting the Vehicle Geometry and reset dimensions correctly or re-select the vehicle profile.	98
Vehicle profile displays with red	Review which vehicle has been selected and review geometry.	95-98
Steering calibrated displays with red	Confirm calibrations have been done for this vehicle. Drive to an open space away from power lines and obstacles, reboot and repeat calibrations.	140-146

Error Display	Actions	Page
Lockout	The steering system has been put into a transport mode (i.e. when driving on a highway) so that the steering cannot be inadvertently engaged.	
Wayline available displays with red	Drive closer to the wayline (guideline). Confirm that guideline has been created and selected.	188-192
Wayline synchronized	Wayline (guideline) is not successfully loaded. Confirm connection with receiver and reload the wayline. Note that it may take some time for the wayline to be uploaded to the receiver, particularly for large curves.	
Prohibited operation	Steering cannot be engaged while certain actions are being performed. For example; steering calibration, changing GPS settings, exporting a job.	
Operator presence	The steering system will disengage if the driver leaves the control seat.	
Steering wheel	Let go of the steering wheel and try again.	
Speed displays with red	Adjust speed to between 1 and 25 kph (0.7-15 mph). The necessary speed may vary with the vehicle.	
Cross track error displays with red	Drive closer to the guideline before engaging auto steering.	
Heading error displays with red	Check the angle or reduce the speed of the vehicle’s approach to the guideline.	

14.2. Tuning auto steer

It is important to tune the auto steering to suit the conditions, the type of job and the type of vehicle/implement.

1. Select **Steering Options Menu** / **Auto Steer Tuning Parameters** .



1 Online Aggressiveness sets how aggressively the steering will try to follow the guideline.

2 Approach Aggressiveness sets how aggressively the steering will approach the line. If too high, the vehicle may turn sharply.

3 Maximum Steering Angle limits the angle of turn to stay within the limits of the vehicle's safe capability.

4 Smoothing Radius for Curve Waylines sets how tight or loose the auto steering will adhere to curved waylines.

2. Set **Online Aggressiveness** to suit the precision necessary for the task.

3. Set **Approach Aggressiveness** considering accuracy for the job and safety for the equipment users.
4. Set **Maximum Steering Angle** to the safe levels for the vehicle and any implement being towed.
5. Set **Smoothing Radius for Curve Waylines** to the appropriate level. Lower values will follow the curved waylines more closely.

AES

Note that if **AES** is selected in the setup screen (**Vehicle** / **Steering** / **CONTROLLER**), three new options are added to this screen:

- **AES Sensitivity Adjustment**: Adjusts the responsiveness of the steering when following guidelines.
- **AES Deadband Adjustment**: Adjusts the amount of movement the AES needs to make before the wheels respond.
- **AES Disengage Threshold**: Adjusts the amount of effort required to disengage the steering wheel.

Direct spool

Note that if **Direct Spool** is enabled in the Setup screen (**Vehicle** / **Steering** / **DIRECT SPOOL**), two new options are added to this screen:

- **Direct Spool Sensitivity Adjustment**: Adjusts the responsiveness of the steering when following guidelines.
- **Direct Spool Deadband Adjustment**: Adjusts the amount of movement the steering wheel can make before the wheels respond.

14.3. Engaging auto steer

To use auto steering, the operator must have:

- Established guidelines (page 187)
- Enabled auto steering on the console (page 49)
- Calibrated the steering (page 139)
- Confirmed that all Steering Status items are green (page 207)
- Set the auto steering tuning to suit the task and vehicle type (page 211)
- Positioned the vehicle at the desired starting point.

1. Zoom and pan on the screen until the vehicle is in the center of the screen and at a comfortable size for viewing (if panning is enabled, refer to Setting up map options, page 35).

   Note: If an external auto steering engage switch is to be used, this needs to be enabled during setup for the vehicle. Refer to Setting up the steering controller, page 100. If using an AES, turn on the AES and turn the steering wheel a quarter turn to enable auto steering.

2. Confirm that the Auto Steer Engage is showing white. This means it is ready to use.

Auto Steer is ready to use. Select **Auto Steer Engage** to begin.

Auto Steer is engaged and active. Select **Auto Steer Engage** to change back to manual control. Note that the button may briefly flash blue before turning green.

Auto steer cannot engage. Select **Auto Steer Engage** or return to the Steering Options Menu to see Steering Status for possible causes.

Auto steer is flashing in ‘Delayed Engage’ mode.

If Auto Steer is displaying red and the only condition displaying red on the Steering Status is easily resolved (for example speed), the operator may select **Auto Steer Engage** twice (double click) and flashing yellow will indicate that auto steer will engage if conditions are met within 15 seconds. If conditions are not met, it will return to red.

3. Correct any issue displaying red in the Steering Status Panel (work through issues displayed from the top to the bottom of the screen). When **Auto Steer Engage** is white, auto steer is ready to engage.

   For more information on Steering Status Errors refer to Auto Steering, page 207.

4. Drive slowly to meet a guideline, heading in the desired direction.
5. Select **Auto Steer Engage**. It will turn green. The vehicle will steer to the nearest guideline.
6. If it steers towards the line too aggressively, stop, disengage auto steering and adjust the Auto Steer Tuning Parameters from the Steering Options Menu.

14.4. Disengaging auto steer

Auto steer will automatically disengage when the necessary conditions (shown on the **Steering Status** screen) are no longer met.

To manually disengage auto steering:

- Turn the steering wheel a few degrees OR
- Select the **Auto Steer Engage** button on the console to disengage OR
- If using an external steering switch, disengage using the switch.

WARNING: Before leaving the vehicle, disengage auto steer, turn off the steering switch and remove the key.

Note: A visual and audible alarm will display and sound whenever auto steer is engaged or disengaged. The volume can be adjusted. Refer to Setting up alarms, page 75.

14.4. Disengaging auto steer

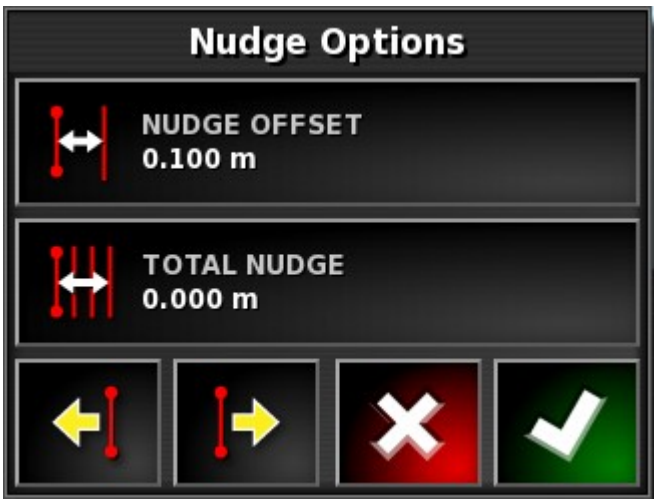
Chapter 15 – Nudge Menu

The Nudge menu allows for minor adjustments to the guidelines that have been set. This is useful for slightly realigning the guidelines to changing conditions or when returning to a field the next season. Guidelines can be nudged in a number of ways.

Nudge works with AB lines, center pivot guidelines and identical curves.

15.1. Using nudge options

1. Select **Nudge Menu** / **Open Nudge Options** .
2. To set how far a nudge will move a line, select **NUDGE OFFSET**.



3. Enter the required **NUDGE OFFSET**.
4. Use Nudge Left or Nudge Right on the Nudge Options screen or on the Nudge menu to nudge the lines.
5. **TOTAL NUDGE** calculates the total distance nudged. Select this to set a total nudge offset or to reset to 0.
6. Select **Save Nudged Guideline** to save the new guideline positions.

Nudging to the vehicle's position

To align the guidelines to the vehicle's current position:

1. Select **Nudge Guideline to the Vehicle's Position**  .

   Note: When nudging a curve or pivot, the size of the curve (or radius of the pivot) will change.

15.2. Compensating for GPS drift

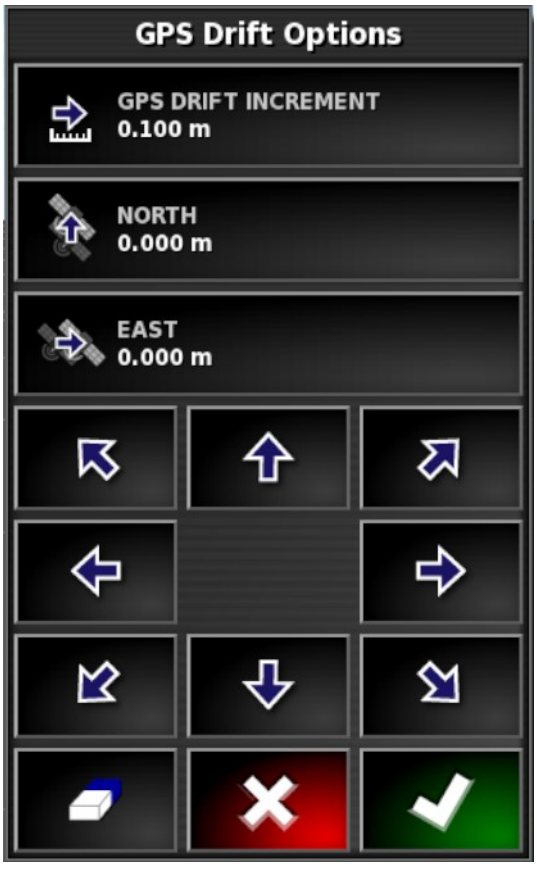
GPS Drift may occur over time (when using low accuracy correction sources). When the operator returns to a field, there may be a slight change in the reported vehicle position with respect to fixed objects such as the field boundary or guidelines. This is largely due to changes in the satellite constellation patterns.

Other factors such as having no clear access to the sky (operating near trees or other obstacles) and satellite data errors may also result in a drift.

Note: It is also possible to reposition the vehicle position to a selected flag point, refer to Removing or changing a flag point, page 172.

To compensate for GPS drift:

1. Select **Nudge Menu**  **/ GPS Drift Compensation**  .



The compensation value may be selected by:

Entering a positive or negative value in the **NORTH** and/or **EAST** field and confirming.

Or

Entering the required value in the **GPS DRIFT INCREMENT** field and then selecting the required direction button until the required compensation is achieved.

2. Select **Reset GPS drift**  to remove the selected GPS drift compensation.

15.2.1. Compensating correctly for GPS drift

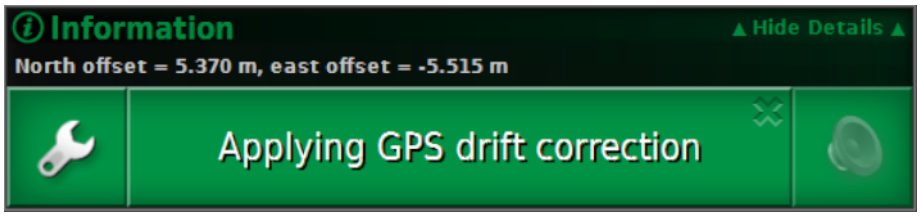
When correcting GPS drift, the vehicle on the map will be moved relative to the other objects on the map (for example, the field boundary, guidelines, flag points and any previous coverage). The easiest way to see this on the map is to switch to a North Up view  and pan the map so that the vehicle is visible next to the GPS Drift Options window.

To correctly compensate for GPS drift:

1. Drive the vehicle to an identifiable location within the field (for example, next to a gate, the corner of the field or in the previous year's wheel tracks).
2. Use the GPS Drift Options window to position the vehicle on the map relative to these fixed landmarks.

In order to do this more accurately and quickly, you may want to set a flag point at a marked location on the field. Then each time you return to the field, position the vehicle at that marked location, locate the flag point on the map and select it. This will open a window with the option for 'GPS Drift Correction'. Selecting that option will move the vehicle to the location of the flag point.

The GPS drift compensation that is applied is remembered when the console is restarted. However, this compensation may no longer be accurate if conditions have changed. An alarm will be shown shortly after the system starts that will advise the operator that GPS drift compensation is in effect. The operator must then decide if they want to continue using this compensation factor, clear it back to zero or perform the GPS drift compensation procedure again to get a more accurate result for that session.



15.2.2. High accuracy correction sources

GPS drift compensation should not be necessary with higher accuracy correction sources (for example, RTK). If a high accuracy source is being used, the GPS drift compensation should be reset back to zero in the GPS Drift Options window.

Chapter 16 – Enabled Additional Features

This section describes the use of features that may have been enabled in the Setup screen: **System** / **Features**.

The enabled features documented in this section appear on the navigation bar.

16.1. Using auto section control

Auto section control is available when an implement and ECU have been set up and Auto Section Control has been enabled. This feature can be configured through its mini-view. Refer to the Spreader / Sprayer / Seeder operator manual for more information.

16.2. Using universal terminal (ISOBUS)

This option allows the operator to interact with an ISOBUS ECU.

The universal terminal is similar to the idea of a web browser. It has no context about what is running on it. User interfaces are loaded from the connected clients.

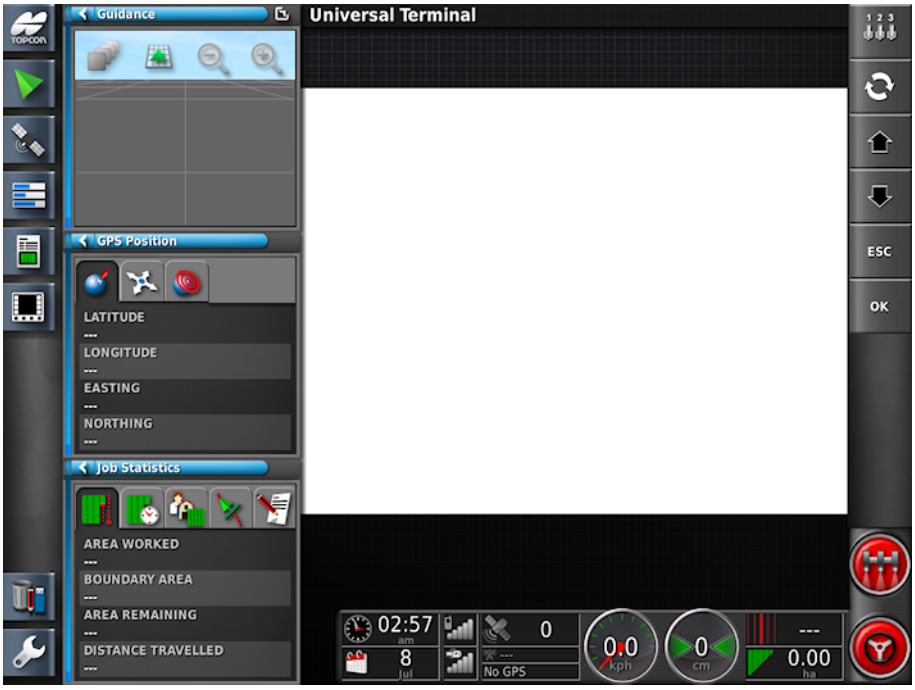
There is no practical limit to how many implements or clients can be accommodated by the universal terminal. Functionality is limited to the implement and controller design.

Universal terminal is enabled via **System** / **Features** / **Console**.

1. Select **Universal Terminal** from the Navigation bar to open the mini-view.

Note: The icon displayed for the universal terminal varies depending on the attached ISOBUS compatible equipment.

2. To open universal terminal in full screen, maximize the mini-view.



Screens will vary according to the ISOBUS equipment.

Opens the Aux-N Assignment window (see Auxiliary control setup, page 89).

Cycles through the connected UT Working Sets.

Moves to the previous input or button.

Moves to the next input or button.

ESC Escapes out of an editing operation or acknowledges a UT alarm if present.

OK Activates the highlighted input or button.

16.3. Using Topcon Agriculture Platform (TAP)

The Topcon Agriculture Platform (TAP) is a cloud based farm management service. From the console you can interact with TAP in the following ways:

- Import task data files. See Import task data from TAP, page 237.
- Export task data files. See Export task data to TAP, page 247.
- Import prescription map files using the variable rate control wizard. See Using variable rate control, page 183.
- Export job reports. See Exporting a job report, page 180.

1. To enable TAP, select **System** / **Features** / **Console** , select **Cloud Based Services** and select **TAP**.

   Once it is enabled, the TAP icon appears on the Navigation bar.

2. Select the TAP icon to open a mini-view.

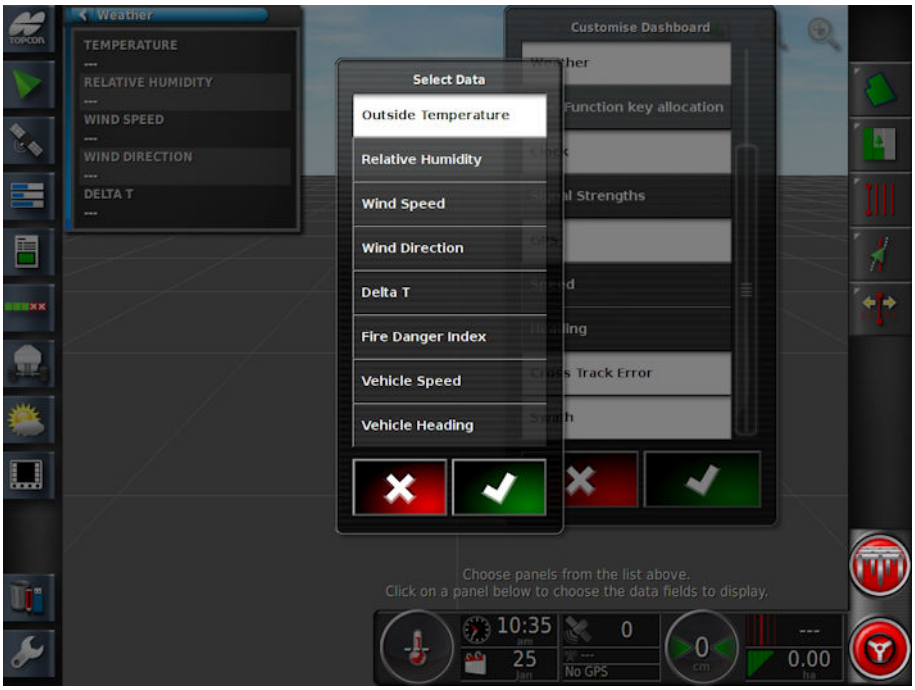
3. Enter your TAP username and password and select **Connect**.

16.4. Using weather station

The weather station port option is available under **System** / **Features** / **Console**. The CAN port to which the weather station is connected must be selected before use.

A license must be purchased to enable this functionality.

This option enables support for the AirMar 150WX Weather Station.



Once connected, both a mini-view and the dashboard can display temperature, relative humidity, wind speed, wind direction and Delta T.

Delta T is becoming one of the standard indicators for acceptable spray conditions. It is indicative of evaporation rate and droplet lifetime. Delta T is calculated by subtracting the wet bulb temperature from the dry bulb temperature.

Note: Weather station data will automatically populate job details. Refer to Recording job details, page 178.

16.4.1. Calibrating weather station

Once installed, the weather station requires calibration.

Note: The vehicle must be in an open area, away from obstructions, where it is possible to turn the vehicle in circles.

1. Turn the weather station off and then on again.
2. Within two minutes of cycling the power, turn the vehicle in a slow circle (7 - 11 kph).

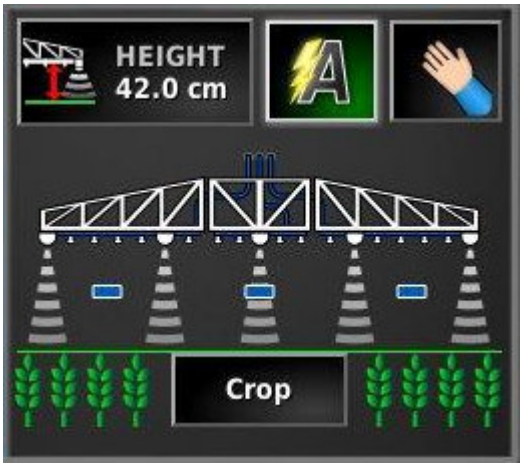
   Once the vehicle has completed 1 1/2 turns, the auto calibration will begin.
3. Continue to perform two or three more circles without changing the vehicle's speed.

For more information, refer to the user guide supplied by the weather station manufacturer.

16.5. Using NORAC Boom Height Control

This option automatically controls the height of the boom above the ground or the crop canopy. It requires NORAC sensors and Electronic Control Unit (ECU) to be installed.

The NORAC boom height control option is available under **System**  / **Features**  / **Implement**  . Once enabled, a NORAC mini-view is available  .



Note: Setup of the boom height control system must be performed via the UT screen. Refer to manuals supplied with the NORAC system.

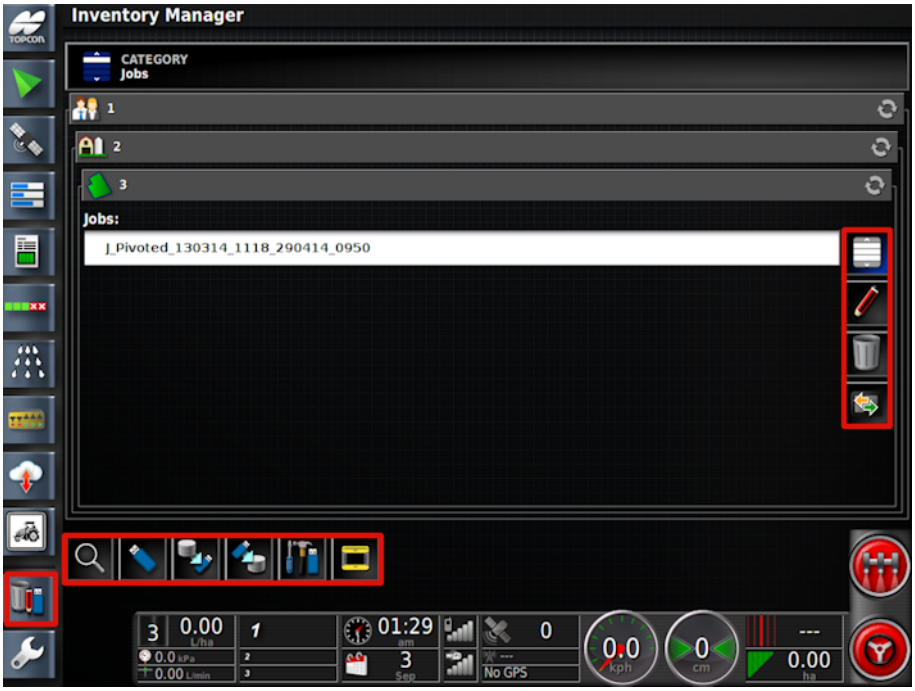
The following settings are available:

- **Target height**: The target height that the operator would like the boom to be set at when spraying in auto mode.
-  **Auto mode**: Boom height is automatically controlled.
-  **Manual mode**: Boom height is adjusted manually.
- **Mode**:
  - **Crop**: Reads the height from the spray nozzles to the top of the crop canopy.
  - **Soil**: Reads the height from the spray nozzles to the ground.
  - **Hybrid**: Uses a combination of the crop and soil readings. This is useful to avoid major boom movements for crops that are patchy.

Chapter 17 – Inventory Manager

The Inventory Manager allows the operator to search for and view details of information items on the system, and make changes to that information. Items can be deleted, renamed or copied to or from USB.

1. Select **Inventory Manager**  .
2. Select **CATEGORY** to choose the item type to manage.



 Search the selected category.

 Select to view internal file system  or USB file system  .

 Back up all system data onto a USB.

Restore All. **Note**: This overwrites any data on the system and is used to restore content from a backup USB. Normally this is used by service personnel.

Export diagnostic information. Use this when a dealer asks for it so the data can be assessed.

Use this to be compatible with System 150 files. (Must enable **User / Environment / System 150 file transfers**.)

Select all items.

Rename selected item.

Delete selected items.

Export selected items to USB.

17.1. Searching categories

The search function  allows categories to be searched using a keyword.

It is possible to search in multiple fields, farms or clients at once. Navigate up the file hierarchy before pressing the search button to search through all items below that level.

The search results display the full path to items found.

Note: Jobs may be searched using more detailed data, as shown below.

17.2. Searching and exporting jobs

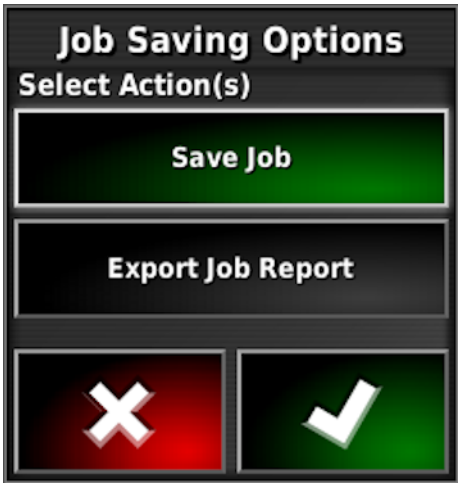
It is possible to export one or more jobs and/or job reports. It is also possible to search for and delete empty job items.

1. Select **Jobs** from the **CATEGORY** drop down list.
2. Select the Search button  .

   Jobs can be searched by keyword, a date range, whether the item is empty or not (useful for deleting empty jobs) and the implement used.

   The date is shown as DD/MM/YYYY or MM/DD/YYYY depending on the date format selected (see Time/date setup, page 26).

3. Once the required jobs are displayed, click to highlight the job/s required.
4. Select the **Save selected job items** button  .



The Job Saving Options screen enables the job/s and/or job report/s to be exported to USB.

Chapter 18 – Task Data Menu

Task Data allows import/export and editing of ISOBUS task data XML files. Task Data mode allows you to select, configure and run a task from the imported task data. Shapefiles can be imported to automatically control the ECU. Enabling this feature will disable some field and job menu items during operations that are not relevant when using task data.

1. To enable task data, select **System**  / **Features**  / **Implement**  , select **TASK DATA** and select **Enabled**.

The Task Data icon  replaces the Job Menu icon  once task data has been enabled.

Note: This feature changes the functionality of the **Job Menu** and prevents fields from being created or selected from the **Field Menu**, as the selected task determines the field location.

The task data file sets up communication with the ECU and contains all the data to complete the job.

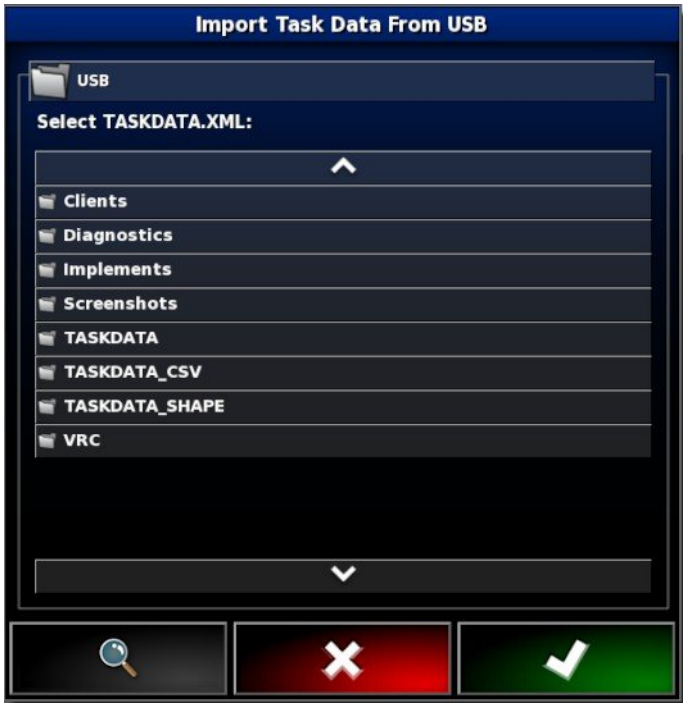
Note: All vehicle and implement geometry measurements should be checked for correctness before proceeding with task data (see page 98 and page 108).

18.1. Importing/selecting task data files

Import task data from USB

1. Place the USB containing the task data file into the USB port.
2. Select **Task Data Menu** / **Data Exchange** / **Import Task Data from USB** .

   The following screen displays.

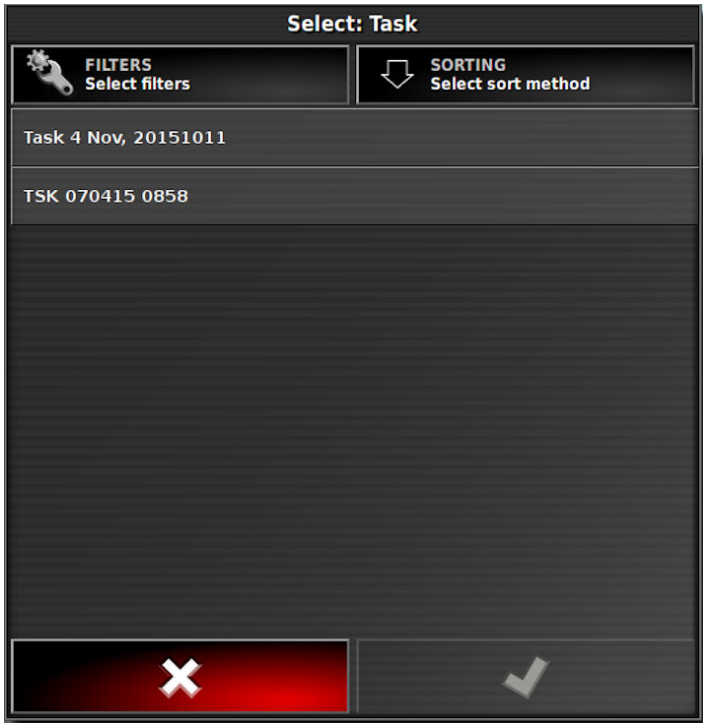


The toggle button  may be used to automatically search the top-level TASKDATA directory (if it exists), on the USB and list taskdata.xml files that are found. If this method is not successful, the USB may be browsed manually to select the required file.

3. Browse, choose the required .xml file and confirm.

   Note: Once a file is selected, it is possible to change the **Import Mode** to import all data, or import coding data only. Importing coding data only will import data such as customers, farms, fields, workers, products and implements, but will not import any tasks that may be present in the task data.

4. Drive to the starting position.
5. Select **Select Task** .



   Files can be filtered by task status, customer, farm, city, worker, cultural practice and connected devices if desired.
6. Choose the required task file from the list and confirm. If the task data requires editing, refer to Editing task data files, page 241.

Import task data from TAP

Task data files may be imported from Topcon Agriculture Platform (TAP). **Note**: The task data files must be zipped.

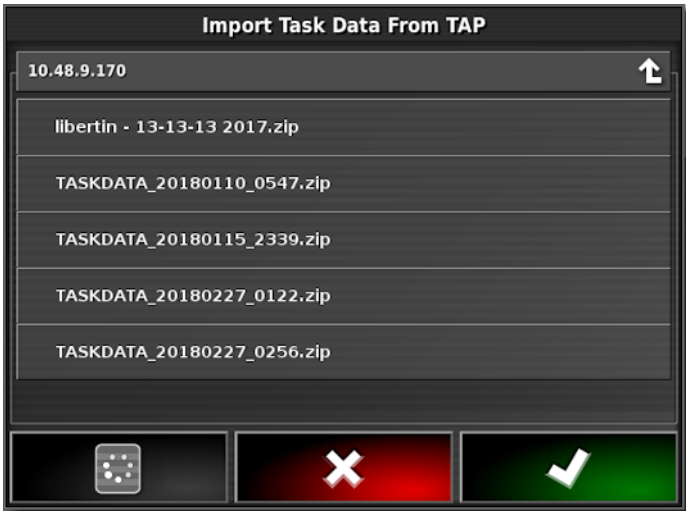
Before using this option, a console name should be entered. See Setting up console name, page 44.

1. To enable TAP, select **System** / **Features** / **Console** , select **Cloud Based Services** and select **TAP**.

   Once it is enabled, the TAP icon appears on the Navigation bar.
2. Select the TAP icon to open a mini-view.

3. Enter your TAP username and password and select **Connect**.

4. Select **Task Data Menu** / **Data Exchange** / **Import Task Data from TAP** .



5. Browse, choose the required .zip file and confirm. The zip file is automatically unzipped once it has been imported.

The refresh button can be used to update the list of files displayed from TAP, if required.

18.2. Create a new task

A new task may only be created if no current task is running. Once a task is created, it becomes the current task.

1. To create a new task, select **Task Data Menu**  / **Create New Task**  .

The Create Task panel is displayed.

The following information can be defined:

- Task designator (default: TSK_ddmm, yyyyhhmm)
- Customer
- Farm
- Worker
- Rate control assignment
- Partfield

The following controls are used when defining task information:

 View selected item

 Edit selected item

 Delete selected item

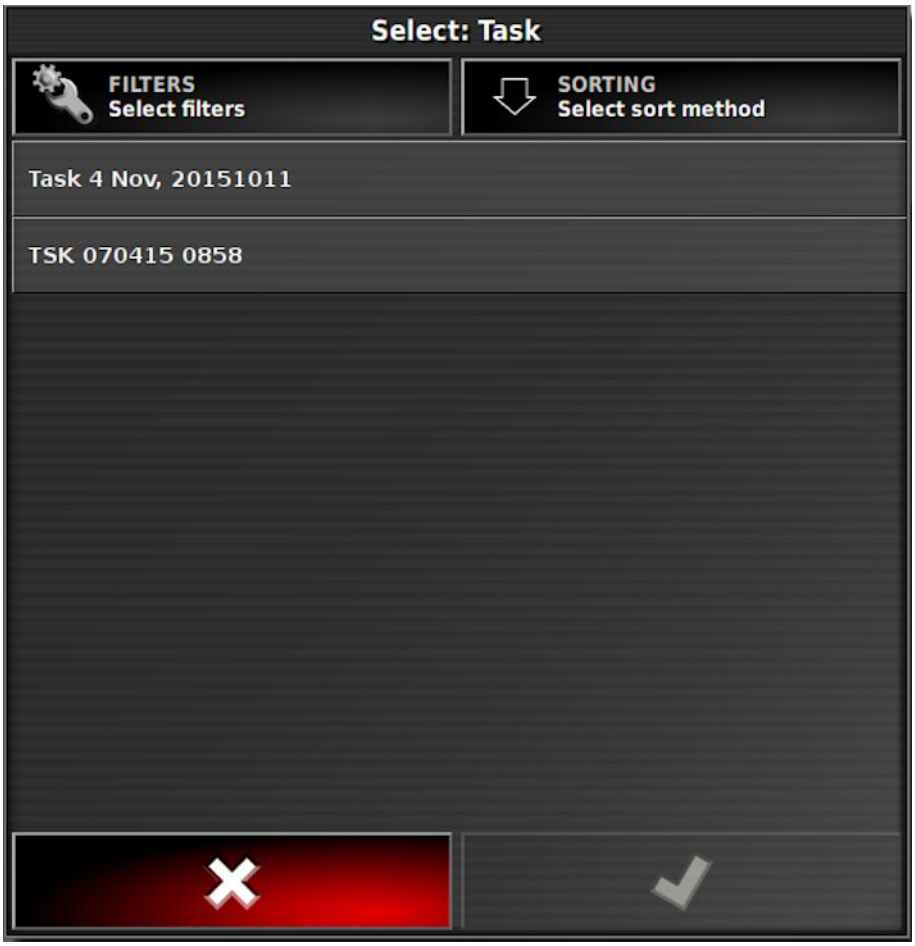
 Create a new item

 Copy selected item

18.3. Select an existing task

1. To select an existing task, select **Task Data Menu** / **Select Task** .

   The Select Task panel is displayed.



   Files can be filtered by task status and connected devices if desired.

2. Choose the required task file from the list and confirm.

18.4. Editing task data files

Once imported, task data files may be edited as required.

The Edit Task Data button is located on the left of the screen, above the inventory manager icon on the navigation bar.

All data defined for the task may be edited.

The following controls are used when editing task information:

 Edit selected item

 Delete selected item

 Create a new item

18.5. Define fixed / variable rate control

The ISO Task Controller Control Setup enables variable or fixed rate control configuration (or review of the existing configuration).

1. Select **Task Data Menu**  / **ISO Task Controller Control Setup**  .

Each row in the table represents a variable or fixed prescription for a control target on the implement. The names and number of control targets that can be selected depends on the ISOBUS implement (see documentation supplied with the ISOBUS implement for more information).

Set fixed prescription values

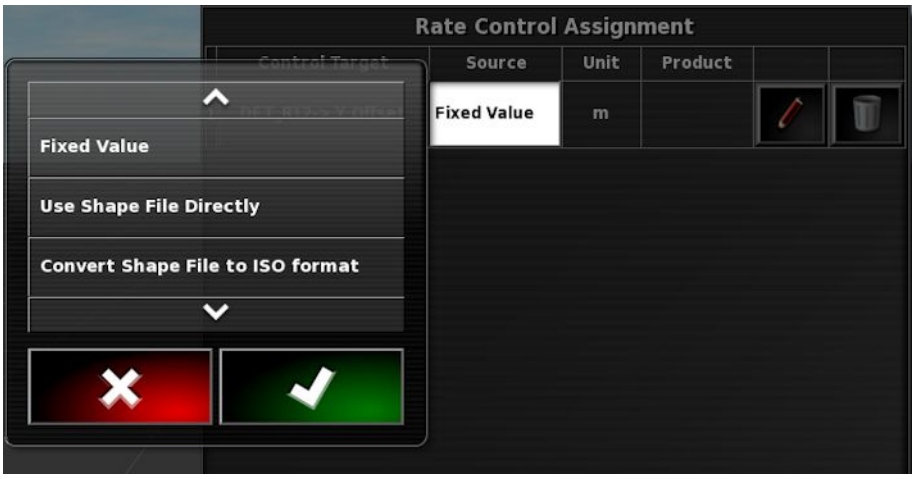
The Edit button  allows fixed values to be set for the prescription.

Create a new prescription

The new prescription button  allows the user to create a new prescription by either setting the fixed values or importing a shapefile

to allow variable rate control.

Once the prescription is created, select the **Default** button in the **Source** column.



- **Fixed value**: Set the fixed values and associate this prescription with a product.
- **Use shape file directly**: Apply based on shape file but do not convert into ISOXML format. This supplies better results than conversion but the FMIS can not see what the prescription was.
- **Convert shape file to ISO format**: Convert shape file into a 'Type 2' ISOXML grid. The size of the chosen grid cells will be 1m x 1m or larger, such that the total grid file size is less than 10 megabytes.

  When importing a shapefile it is possible to set the fixed values, associate the prescription with a product and also set a scaling factor that is applied to the values in the shapefile when it is converted to the task data format.

18.6. Running a task

18.6.1. Start/stop a task

Tasks may be manually started and stopped or linked to the master switch.

When in task data mode, an extra option is added to the Setup screen (**System** / **ISOBUS** / **TC**) to select how tasks can be started and stopped (manually or using the master switch, or manually only). Refer to Setting up ISOBUS / universal terminal, page 87.

Start and stop task manually

1. To start or stop a task manually, select **Task Data Menu**  / **Start and Stop Task**  .

18.6.2. Show task totals

The types of task totals stored is dictated by the connected ECU. A task must have been started at least once for any totals to be displayed.

1. To show task totals, select **Task Data Menu**  / **Show Task Totals**  .

The following image shows a sample of task totals.

18.6.3. Set the time type

When the task is running, the user can choose what type of time is currently being recorded.

1. To set the time type, select **Task Data Menu**  **/ Set the time type**  .

The following options are available:

- Preliminary
- Preparation
- Effective
- Ineffective
- Repair
- Clearing

The default time type is Effective. If a task is started or restarted the default type is used.

18.7. Exporting task data files

Export task data to USB

1. Once the job is completed, check a USB is inserted and select **Task Data Menu** / **Data Exchange** / **Export Task Data** to export the task data with collected task records.

   The following screen displays.

   By default, task data is exported as ISO XML (CSV and Shapefiles may be selected as additional formats). The export version may be changed to V3, if required.

2. Select any additional export formats (CSV and/or Shapefiles).
3. Select the required export mode:
   - **Delete all task data after export**: All task data is deleted from the console.
   - **Keep only coding data after export**: Tasks are deleted from the console but data such as customers, farms, fields, workers, products and implements is retained.

   Note that both options will export task data.
4. Confirm export.

Note: When exporting task data, a copy of the data is stored in the inventory manager. If a problem is encountered with the data exported to the USB, the backup data can be restored by exporting

the data again using the inventory manager, Task Data Backups category.

Export task data to TAP

Task data files may be exported to Topcon Agriculture Platform (TAP). The task data will include the client, farm, field (including boundaries, flag points, AB lines, curves and pivots) and task (including logged data if the job was done with an ISOBUS ECU).

Before using this option, a console name should be entered. See Setting up console name, page 44.

1. To enable TAP, select **System** / **Features** / **Console** , select **Cloud Based Services** and select **TAP**.

   Once it is enabled, the TAP icon appears on the Navigation bar.

2. Select the TAP icon to open a mini-view.

3. Enter your TAP username and password and select **Connect**.

4. Once the job is complete, select **Task Data Menu**  **/ Data Exchange**  **/ Export Task Data to TAP**  .

The task data is automatically zipped before upload. A confirmation screen is displayed once the upload is complete.

Chapter 19 – Troubleshooting Guide

19.1. Common error messages

For many errors an error code, or Trouble Code, will display. It is also possible to view errors via the Steering Status screen (see page 207), or the Diagnostics screen, Trouble Codes tab (see page 129).

The errors listed below are fairly common and may be corrected by the user. For other errors or if a problem persists, **always record the error message** to report to your dealer, including any code displayed.

Code	Fault	Action	Page
U1052	Steering subsystem firmware version is incorrect.	Upgrade the firmware.	65
U1054	Steering subsystem is in fault mode.	Please power cycle steering controller.	
U1055	Steering controller needs to be reset.	Please power cycle steering controller and the vehicle. Wait 20 seconds and restart.	
U1056	Steering controller configuration error.	Please repeat WAS calibration.	143
U1061	Tractor parameter settings not found in steering subsystem.	Return to main setup menu and confirm correct vehicle.	94
U1062	Mounting bias calibration required.	Calibrate mounting bias. This allows the system to compensate if the receiver is not level on the cab roof.	146

Code	Fault	Action	Page
U1065	Wheel angle sensor calibration required.	A change of tires is a common cause but is not the only possible cause. Confirm vehicle measurements and then recalibrate.	98 143
U1066	Compass calibration required.	Calibrate compass.	140
U1067	New vehicle or new steering controller has been detected.	Recalibrate compass.	140
U1068	Vehicle profile does not match steering subsystem settings.	Confirm steering subsystem is turned on. Return to main setup menu and reset vehicle and steering.	95 - 100
U1069	Steering subsystem steering wheel sensor is not configured.	Contact dealer.	
U1071	AES average power is greater than the power limit.	Confirm load on AES motor unit (for example the steering column is too heavy or the bushes or bearings are worn). Contact dealer.	
U1072	AES temperature greater than the temperature limit.	Turn off and allow to cool down. If problem persists contact the dealer.	

Code	Fault	Action	Page
U1074	AES steering controller not initialized.	Manually turn steering wheel by one quarter revolution.	
U1075-U1078	CAN receive or transmit errors.	Confirm connections. Power cycle the junction box. Contact dealer if the problem persists.	
U1079	Wheel angle sensor disconnected.	Check connection or replace faulty sensor. Contact dealer.	
U1080	Wheel angle sensor has short-circuited.	Contact dealer. Sensor may need to be replaced.	
U1082	Compact flash file system has less than 1% space remaining.	Confirm memory usage in the mini-view. It may be necessary to remove or transfer old files using inventory manager.	129 & 231
U3001	Transfer failed.	Try exporting or importing the file from USB again.	231
U4001	Wayline initialization error.	Recreate wayline.	188 - 193
U4006	Valid system calibrations do not exist.	Calibrate compass, wheel angle sensor and mounting bias.	140 - 146

Code	Fault	Action	Page
U5001	Steering subsystem not detected.	Confirm that steering subsystem is turned on. Confirm that 'road lock switch', which prevents engaging while on public roads, is off. Return to main setup menu to confirm correct steering system in setup.	100
U5002	Implement and wayline are not defined.	Confirm correct implement chosen and confirm correct field and job chosen. Create waylines if necessary.	104 159 & 177 188 - 195
U5003	Could not engage due to steering controller lockout.	Confirm road switch is OFF.	
U5004	Implement is not defined.	Confirm correct implement chosen.	104
U5007	Row spacing (implement overlap subtracted from implement width) is too small.	Overlap set is too large. Change overlap in auto section control mini-view. Refer to the controller's manual.	
U6904	Only one of the steering controller type and vehicle type is articulated.	Confirm settings in vehicle setup on the console match settings in the steering controller.	98 - 100

Code	Fault	Action	Page
U6905	Unknown machine type.	Return to main setup menu, and revise vehicle setup.	98
U8505	Factory calibration not present.	Calibrate compass, wheel angle sensor and mounting bias.	140 - 146
TC8	No 12V power supply to inertial sensor and modem.	Confirm connections.	

19.2. Wireless connection issues

If you are experiencing problems when trying to connect the console to the internet (with an Ethernet cable plugged into the rear of the console), check the following:

1. Open the system information panel (refer to Viewing system information, page 119).
2. Under **Console**, check whether the **IP Address** is displaying an address in the range 192.168.0.x (where x = 0 - 255).
3. If this is the case, disconnect the Ethernet connection from the rear of the console and restart the console. This will drop the default address and allow the console to connect to the wireless hotspot.

The issue is a conflict between the default address used by the Ethernet connection when no Ethernet DHCP server is available (192.168.0.10) and the address acquired when setting up a wireless connection.

Chapter 20 – Appendices

20.1. Appendix A – Glossary

Base Station	A GNSS receiver that supplies differential corrections to receivers equipped with GNSS. Also called a base or a reference station.
Baud Rate	This is the speed of data transfer, measured in bits per second.
Differential GPS	A method that uses correction data from satellite services or fixed reference stations to increase GPS accuracy. The satellites or local reference stations send correction data to vehicles equipped with GNSS receivers.
Easting/ Northing	Eastings and Northings show the Universal Transverse Mercator (UTM) position and zone of the vehicle. They are measured in meters. The grid numbers on the east-west (horizontal) axis are called Eastings, and the grid numbers on the north-south (vertical) axis are called Northings.
EGNOS	(European Geostationary Navigation Overlay Service) This is a European SBAS developed to supplement GPS, GLONASS and Galileo systems by reporting on the reliability and accuracy of the signals.
EMC	Electromagnetic Compatibility is the science that studies impact of electromagnetic interference. EMC aims to ensure that equipment items or systems will not interfere with each other or prevent correct operation through emissions.

Fallback	Satellites and correction sources require specific position accuracy when computing the position of the vehicle. If the system is not receiving enough data to compute the vehicle's position with the required accuracy, auto steering will not be enabled. The fallback feature allows the system to bypass the position accuracy requirement so that auto steering can be engaged. This is useful in situations where a high degree of position accuracy is not required.
Field	Defined working area of the tractor.
Field Boundary	The edge of the field.
Firmware	A computer program that is permanently embedded in the hardware of a device.
GDOP	(Geometric Dilution of Precision) GDOP is a metric used to quantify the accuracy of GNSS satellite geometry.
GLONASS	Global Navigation Satellite System (Russian GNSS)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System (US GNSS)
Guideline	The virtual line between two way points in a field. The guideline is used as reference for further field runs (also Wayline).
HDOP	(Horizontal Dilution of Precision) HDOP is a metric for quantifying the accuracy of the horizontal (latitude/longitude) position information received from the GNSS satellites.
HRMS	The HRMS (Horizontal Root Mean Squared) calculates an average horizontal position from the source information from the satellites

Latitude	The distance of a position north or south of the equator measured in degrees. One minute latitude is equal to one nautical mile (1852 m). The equator has a latitude of zero.
Longitude	The distance of a position east or west from the prime meridian measured in degrees. The prime meridian runs through Greenwich, England and is zero longitude.
Mobile Base Station	A base station that can be easily moved and can independently determine its new position so that it can then continue working with the DGPS system.
Mounting Bias	Mounting bias refers to whether the receiver is exactly level, when installed.
MSAS	(Multi-functional Satellite Augmentation System) This is a Japanese SBAS which supplements the GPS by reporting and improving on the reliability and accuracy of the GPS signals.
NMEA	(National Marine Electronics Association) This is a standard protocol used by electronic devices to receive and transmit data.
OmniSTAR	A commercial service (operated by Trimble Navigation Ltd) that broadcasts GNSS correction data from a global constellation of geostationary satellites.
Reference Station	A GNSS receiver that supplies differential corrections to receivers equipped with GNSS. Also called a base station.

RTK Network	Association of base stations that transmit their position data to a server via the internet (NTRIP). The vehicles in the RTK network (rovers) also transmit their position to the server via mobile radio. The server uses the position data from the base stations and vehicles to calculate the correction data for each vehicle and transmits it to the vehicle via mobile radio. This allows position determination to be carried out with an accuracy of 1-2 cm in real time.
SBAS	(Satellite-Based Augmentation System) This is a system which supports wide area or regional augmentation through the use of additional satellite broadcast messages. SBAS correction sources are commonly composed of multiple ground stations which take the measurements of one or more GNSS satellites, and the satellite signals and environmental factors that may impact the signal.
Shapefile	A shapefile stores non-topological geometry and attribute information for the spatial features in a data set. The geometry for a feature is stored as a shape comprising a set of vector coordinates. It is in the form: abcd.shp
TopNET Global D	A commercial service (operated by TerraStar GNSS Ltd) that broadcasts GNSS correction data from a global constellation of geostationary satellites.
WAAS	(Wide Area Augmentation System) This US SBAS was developed by the US Federal Aviation Administration to serve as an air navigation aid by improving the accuracy and availability of the GPS signals.

WAS	Wheel angle sensor
Wayline	The virtual line between two way points in a field. The wayline is used as reference for further field runs (also Guideline).

20.1. Appendix A – Glossary

Chapter 21 – Index

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