X14 Console

Guidance & Auto Steering Operator's Manual

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TOPCON

X14 Guidance and Auto Steering

Operator Manual

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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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(iii) improper use and/or maintenance

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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.

FCC 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.

RCM 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.

Exposure to Radio Frequency

Exposure to energy from radio frequencies is an important safety issue. Keep a distance of at least 20 cm (7.8 inches) between people and any radiating antenna. Keep a distance of at least 20 cm between transmitting antennas.

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.

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 X14 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.

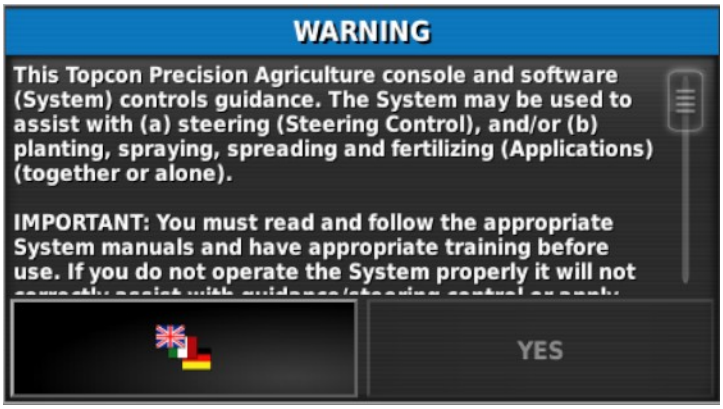
Note: Before using guidance and auto steering, please read the safety instructions and learn about the controls by reading this manual carefully.

The console is a touchscreen. To select something on the screen, touch the area with the tip of a finger, fingernail or stylus (not supplied).

1.2. Starting the console

1. Connect the console to a power supply. Ensure associated devices (such as GPS (Global Positioning System)) are connected. The console starts automatically and the warning screen displays.
2. Scroll to the base of the warning screen and select **YES**.

   Note: To change the language on the console, select .



3. 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.

4. Use the scroll bar to display the complete 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.

5. 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.

6. 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 29.

1.3. 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, turn off the tractor.

1.4. 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 harness. 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.

Brightness control

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

Day/night mode

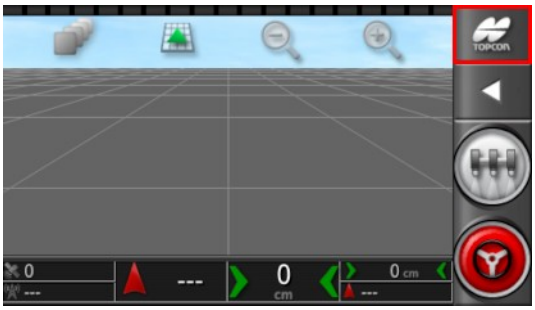
Day/night mode changes the brightness of the display.

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

Chapter 2 – User Interface Description

2.1. Switching between setup and operation screen

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

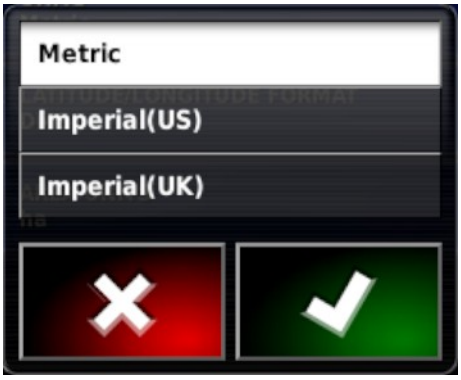
Menus

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.

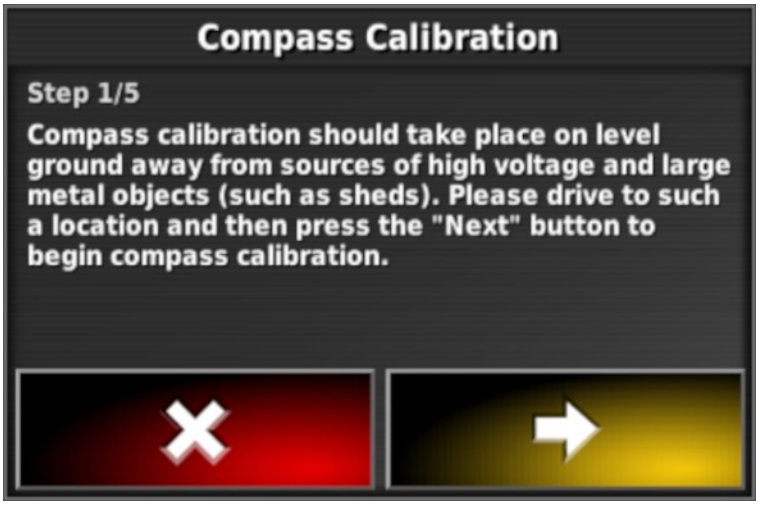
Cancel and confirm buttons

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 **Lightbar**: Used for manual guidance to the set waylines (guidelines). Refer to Setting up the lightbar, page 22.

2 **View controls**: Allows the user to control what is displayed on the guidance map and how it displays. Refer to Using view controls, page 56.

3 **Dashboard**: Provides selected information from the system for monitoring. Refer to Monitoring on the dashboard, page 62.

4 **Navigation window**: Displays a list of selectable views (information screens), the setup screen and the inventory manager. Refer to Using the navigation window, page 55.

5 **Window toolbar**: Provides access to 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 51.

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

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).

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2.4. Icon descriptions

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. Insert the USB containing the upgraded software.
2. Go to the Setup screen and select **System** / **Utilities** .
3. Select **CONSOLE SOFTWARE UPGRADE**.

   Selecting this option displays a message that the console will restart.
4. Confirm the message. The console will restart and load the upgraded software.

   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.

3.2. Getting started

To configure the system:

1. Connect a GPS receiver to the console.
2. Go to the Setup screen.
3. Select **System** / **GPS** and select:
   - The GPS receiver that is being used (see page 29).
   - The Correction Source required (see page 31).

4. 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.

5. 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 42).

6. 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 48).
7. Go to the Operation screen.
8. Go to Select Field and create new Client, Farm and Field (see page 77).
9. Go to New Job and create a new job (see page 85). The system is now operational.

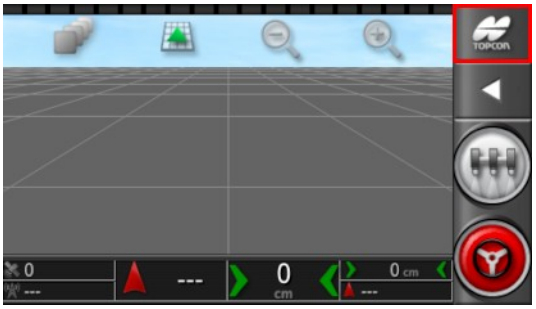
10. To enable Auto Steering, go to Setup screen, **System** / **Features** / **Guidance** / **AUTO STEER** (see page 95).
11. To enable Auto Section Control, go to Setup screen and:
    - Create or load an implement.
    - In **Implement** / **Section Control** / **Sections** configure the number of sections and their width (see page 50).
    - If required, change the section timing in **Implement** / **Section Control** / **Timing** (see page 50).
    - If required, configure a physical or virtual switchbox in **Implement** / **Section Control** / **Section Switch** (see page 51).

- Enable the Auto Section Control feature in **System** / **Features** / **Implement** / **AUTO SECTION CONTROL** (see page 28).

12. To control any of the enabled features from the Operation screen, use the buttons on the Navigation window (see page 55).

Chapter 4 – Regional and User Settings

To access the Setup screen, select the following icons:



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.

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.

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), area and the latitude/longitude format.

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: 45°, 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**

Liquid product volume units

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

Application rate increment type

- Fixed rate
- Percentage of Preset 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**.

Application rate units

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

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.

Alarm audio

Enables sounds when an alarm is triggered.

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 107).

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 95) if this setting is disabled.

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.

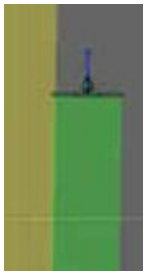
Map panning

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.

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 78).

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.

To change the access level:

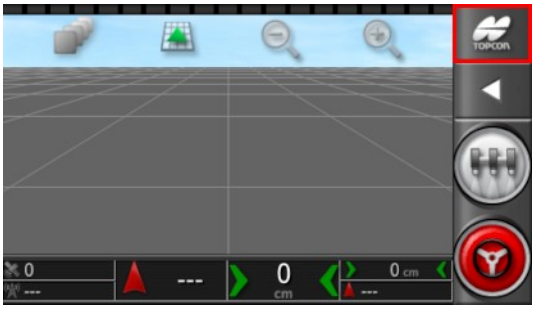
1. Select **User** / **Access Level** .

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.

Chapter 5 – System Setup

To access the Setup screen, select the following icons:



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:

- **Features**: Enables or disables optional features.
- **GPS**: Sets up the functionality of the connected GPS receiver.
- **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.
- **Utilities**: Allows a USB to be provisioned to upgrade software.

5.1. Setting features

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

5.1.1. 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.

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 89.

5.1.2. 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 AGA4372 Sprayer operator manual for more information.

Lock setup menu when master switch is on

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

5.2. Setting up GPS

5.2.1. 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.

5.2.2. 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 32.

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.
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.
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. Note: This option must be purchased separately.
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.
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.

Option	Description
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.

- **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.

- **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.

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

5.3. Setting up alarms

If no implements have been set up in the system, only General alarms are available to set up.

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** alarm requires extra information. 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.

5.3.1. 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.

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.

5.3.2. Alarms list

This is a list of all 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.
Base station location mismatch	The location of the base station used to create a guidance pattern doesn't match the current base station position.
COM port fail	Triggered if the specified COM port cannot be opened.
End of row	Triggered when the vehicle is approaching the boundary and the operator should soon take control.
Fallback	Triggered when the selected GPS correction source is not available and the system must use a less accurate correction source temporarily.

Alarm	Description
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.
Invalid vehicle profile	The selected vehicle profile contains invalid parameters. Please create a new vehicle profile or contact your dealer for assistance.
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.)

Alarm	Description
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 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).
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.
Project line too far	Triggered if the active set of project lines is too far away from the current GPS position.
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.
Resources exhausted	Triggered if the system resources (memory or space on the file system) are more than 97% full.

Alarm	Description
Reverse station	Informational alarm triggered when the operator's seat is rotated by 180 degrees (only applicable for tractors with dual driving stations).
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.

5.4. 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 83.

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.

5.5. Setting up utilities

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

Console software upgrade

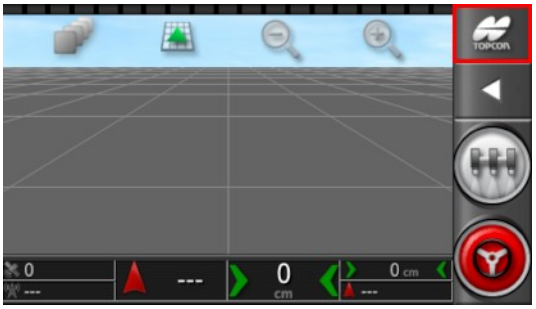
This option is used if the console software is being upgraded via a USB.

Insert the USB containing the upgraded software. Selecting this option displays a message that the console will restart. Confirm the message. The console will restart and load the upgraded software.

The console will provide the option to restore all user data to the state it was before the upgrade. **Note**: Selecting **No** will delete all data saved on the console.

Chapter 6 – Vehicle Setup

To access the Setup screen, select the following icons:



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.

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 95. 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 43.

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 43.

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-25**: 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 43.

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**: The distance from the center of the front axle to the center of the rear axle.
- **Implement Tow Point**: The distance from the center of the rear axle to the tow point.
- **GPS Steer**: 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**: 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.
- **Axle Height**: The height of the axle above ground.
- **GPS Height**: The height of the top of the GPS receiver above the ground.
- **Front Hitch**: The distance from the center of the front axle to the front hitch position.
- **Track Spacing**: This only applies to tracked vehicles and is the distance between the tracks.
- **Articulation Point**: 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 95.

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-25 as the controller adds extra options to the Steering Tuning screen, refer to Tuning auto steer, page 98.

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.

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)

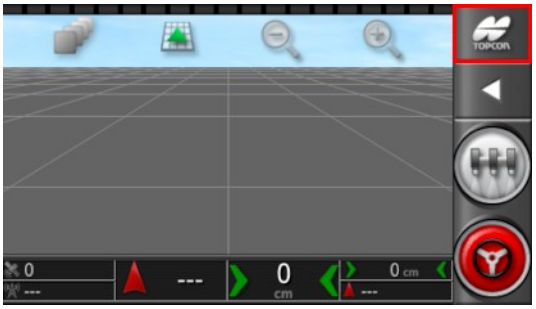
Enter the distance to the right from center of AGI to center of antenna (use negative number if antenna is to the left of the AGI).

Height

Enter the height of the antenna above the ground.

Chapter 7 – Implement Setup

To access the Setup screen, select the following icons:



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 Sprayer operator manual 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**: Refer to Setting up GPS speed emulation, page 52.

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.

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.

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** .
2. Use the arrows to select the implement **Type** and confirm.

rigid

pivoted (tow behind)

front mount

double pivoted (tow between)

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.

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

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.

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.

7.4. Setting up section control

To set up section control:

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

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.
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).

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) and also enables the coverage map on the guidance screen.

To set up the master switch:

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

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.

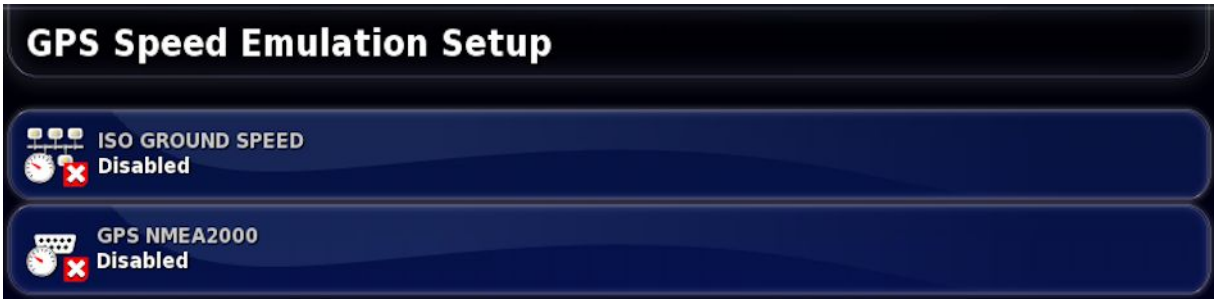
External ECU sense

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** .



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.

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.

1. Select **Product** . The Liquid Product Setup wizard is displayed.

For each product, the following information must be defined:

- **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 22.
- **Rate preset 1** / **Rate preset 2**: Defines preset application rates.
- **Calibration factor**: This is 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.

Chapter 9 – Operation Basics

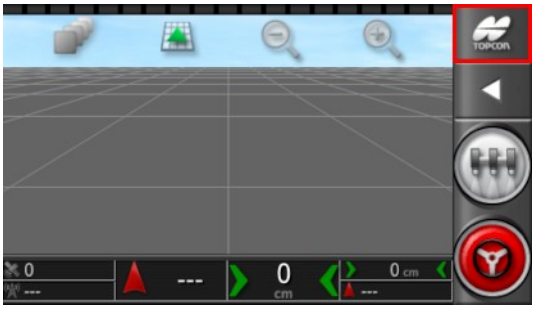
9.1. Using the window toolbar

The Window Toolbar is used to access the tools used to control guidance.

Selecting a tool displays the sub-menu options.

9.2. Using the navigation window

The Navigation Window is used to display information screens, the guidance screen and the inventory manager.



The following options are available:

System information. Displays software and system information summaries. Use the arrows and scroll bar to expand and display information.

Guidance. Displays the guidance screen. Refer to Viewing guidance, page 56.

GPS information. Displays GPS position, vehicle orientation and GPS accuracy information. Refer to Viewing GPS information, page 60.

System diagnostics. Displays memory usage, console diagnostics and trouble codes. Refer to Viewing system diagnostics, page 61.

Job information. Displays job statistics, duration, settings, notes and guidance settings. Refer to Viewing job information, page 61.

Auto section control configuration. Refer to Implement setup, page 28 for setup. Refer to the sprayer manual for operation.

Virtual switchbox. Refer to Setting up the section switch, page 51.

Setup. Opens the setup screen.

Inventory manager. Refer to Inventory Manager, page 107.

9.3. Viewing guidance

The full guidance screen opens by default when the Operation screen is accessed for the first time.

9.3.1. Using view controls

Note: An option for panning across the map is also available (refer to Map panning, page 25).

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 82)
- flag points (refer to Removing or changing a flag point, page 83)

Select visible map layers

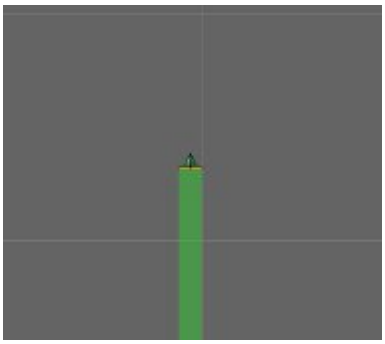
1. Select to choose which coverage and information layers will appear on the screen.

Map layers

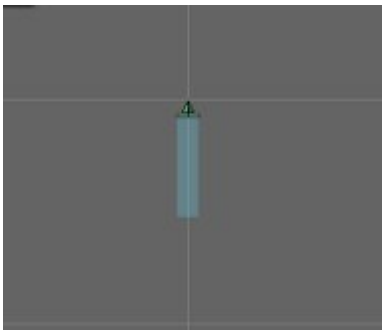
- **Grid lines**: Show grid lines on the guidance screen.
- **All fields**: Displays all defined fields in the current farm.
- **Flag points**: Refer to Setting flag points, page 83.
- **Line numbers**: Displays guidelines as a row of numbered lines across the field (applies only to AB Lines).

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.

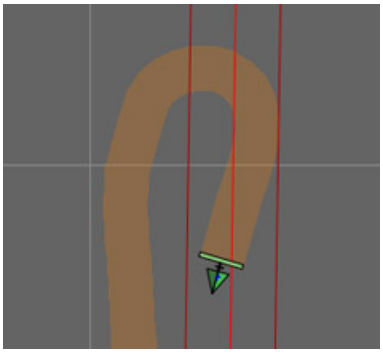


Coverage shows in green.



Applied rate shows in selectable colors.

Legend displays for applied rates.



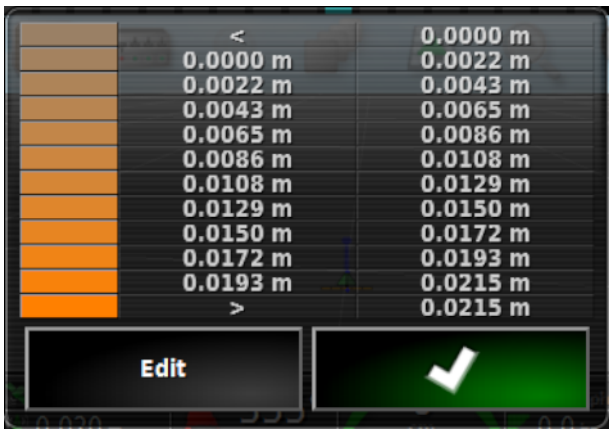
GPS quality shows in orange.

Legend displays for GPS quality.

Editing the legends

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

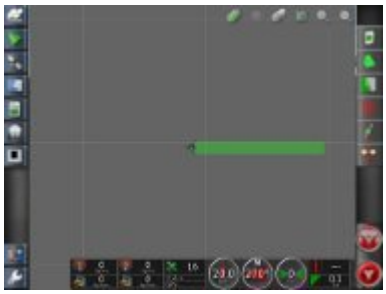
1. Click on the legend to display the legend color and range map.



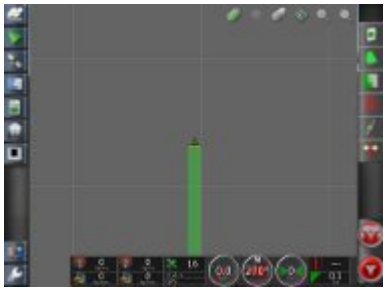
2. Select **Edit** to change the colors and ranges used.

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 information

To view and monitor GPS information:

1. Select **GPS Information** from the **Navigation window** . 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 system diagnostics

To view diagnostic information:

1. Select **System Diagnostics** from the **Navigation window** . Memory usage and trouble codes display.

9.6. Viewing job information

To view job information:

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

   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.

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, 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 31 for more information on correction sources and to page 60 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 one or two 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.

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 .

10.2. Calibrating the wheel angle sensor

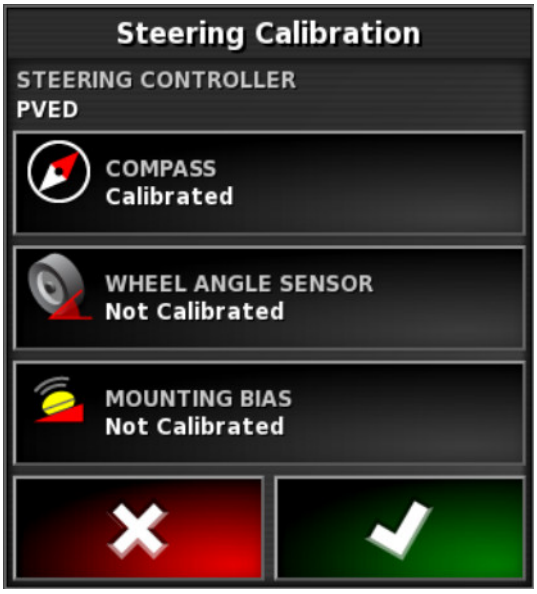
Note: Wheel angle sensor calibration should be performed once every 6-12 months.

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.

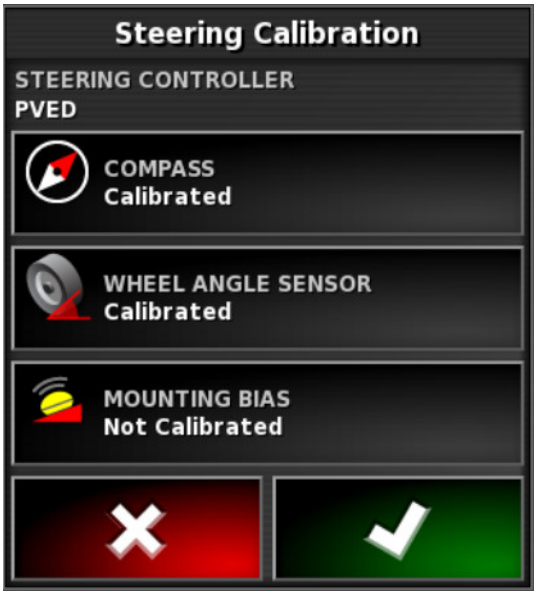
Mounting bias calibration is done in a clear area well away from obstacles. If the mounting of the receiver is not quite level, this calibration will adjust for the actual position.

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 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.

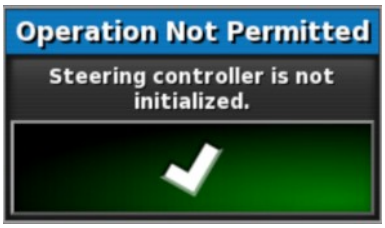
    The Steering Calibration screen will display **Calibrated** for Compass, Wheel Angle Sensor and Mounting Bias.

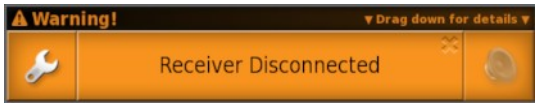
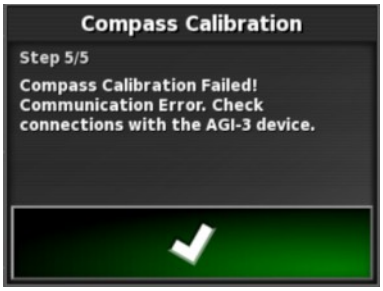
20. Confirm to return.

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.

View	Error
	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.
	**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.

View	Error
	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.
	Wheel Angle Sensor Not Detected Wheel angle sensor value is 0, check wheel angle sensor harnesses and sensor condition. Vehicle profile error. Guidance controller is not configured for wheel angle sensor use.
	Receiver firmware version is out of date Update receiver firmware.

Chapter 11 – Field Menu

This chapter details how to set client, farm, field, boundaries 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 78.

Note: To change any of these settings after they have been confirmed, refer to Inventory Manager, page 107.

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 107.

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 79) or created from shapefiles (see page 80).

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 82.

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.

  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 25).
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.
- **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 85).
- **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 flag points

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

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.

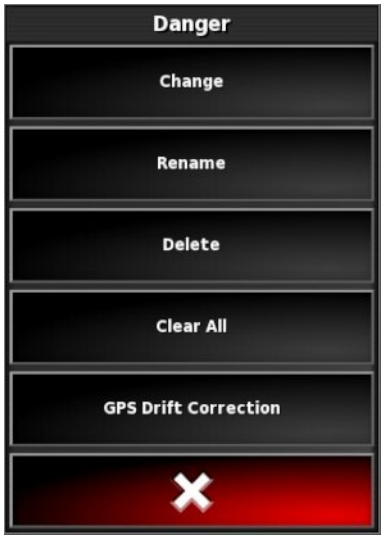
   Note: To change Flag Point presets, refer to Setting up flag points, page 38.
4. To customize flag points, select **Custom** to define a particular flag point.
5. Select the required symbol.
6. Select **FLAG POINT NAME** and enter the name. Confirm the name. Confirm to add the customized flag point.

11.4.1. 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 103.

11.5. 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 82), 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.

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 85.

1. Before selecting an existing job, ensure the correct field is selected (refer to Selecting a client / farm / field, page 77).
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 88.

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.

1. Insert the USB into the console.
2. Select / **Job Menu** / **Data Exchange** / **Export Job Report to USB** .

   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

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

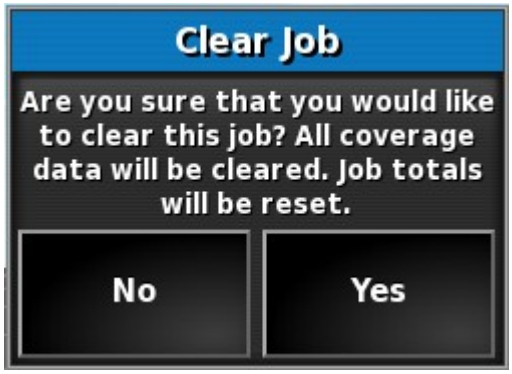
Before removing the USB, always disconnect first by touching the **USB Eject** icon (refer to Using the console toolbar, page 3). A message will display that it is safe to remove the USB. If this is not done, the report may be missing or corrupt.

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.

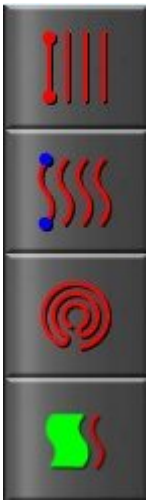
To delete farms or fields or previously created job data, refer to Inventory Manager, page 107.

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 28.

Guideline types supported are:



Parallel AB Line guidelines, page 89

Identical Curve guidelines, page 91

Centre Pivot guidelines, page 91

Guidelock Guidance mode, page 92

Note: To clear a guideline once it has been created, refer to Inventory Manager, page 107. Select the required **Category** then select the guideline to be deleted.

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 78.)

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. 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.

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 28 to enable auto steering.

To calibrate the steering refer to Steering Calibrations, page 67.

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.

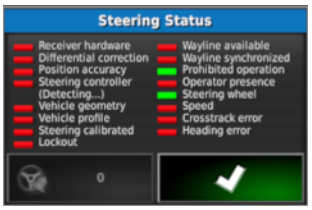
   Green indicates that the item is ready.

   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.	29
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.	29

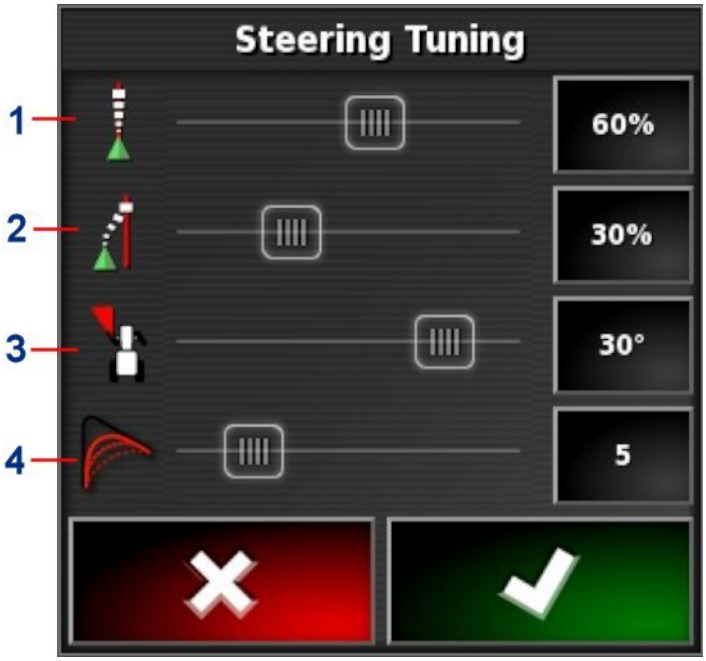
Error Display	Actions	Page
Steering controller displays with red	Confirm controller is connected and turned on. Confirm that the correct steering controller has been selected during setup. If using AES-25, power cycle the AES-25, then turn wheel a ¼ turn to enable steering.	45
Vehicle geometry displays with red	Return to Setting the Vehicle Geometry and reset dimensions correctly or re-select the vehicle profile.	43
Vehicle profile displays with red	Review which vehicle has been selected and review geometry.	42-43
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.	67-70
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.	89-91
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.	

Error Display	Actions	Page
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-25

Note that if **AES-25** is selected in the setup screen (**Vehicle** / **Steering** / **CONTROLLER**), three new options are added to this screen:

- **AES-25 Sensitivity Adjustment**: Adjusts the responsiveness of the steering when following guidelines.
- **AES-25 Deadband Adjustment**: Adjusts the amount of movement the AES-25 needs to make before the wheels respond.
- **AES-25 Disengage Threshold**: Adjusts the amount of effort required to disengage the steering wheel.

14.3. Engaging auto steer

To use auto steering, the operator must have:

- Established guidelines (page 89)
- Enabled auto steering on the console (page 28)
- Calibrated the steering (page 67)
- Confirmed that all Steering Status items are green (page 95)
- Set the auto steering tuning to suit the task and vehicle type (page 98)
- 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 24).

   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 45. If using an AES-25, turn on the AES-25 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 95.
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 34.

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 83.

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

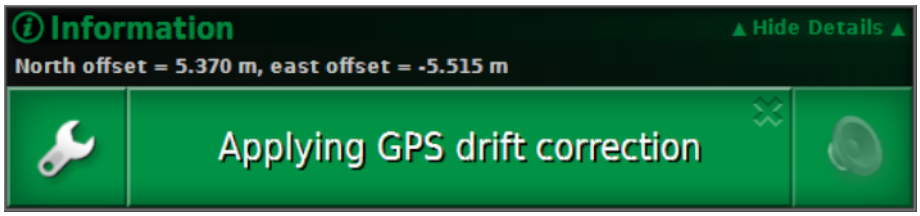
When correcting GPS drift, the vehicle on the map will be moved relative to the other objects on the map (for example, the field boundary, guidelines, flag points and any previous coverage). The easiest way to see this on the map is to switch to a North Up view and pan the map so that the vehicle is 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 – 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, transferred to USB or imported from USB.

1. Select **Inventory Manager** from the **Navigation window** .

2. Select the item category to manage .

Search the selected category.

Access items from a USB. When browsing for USB items, the display is blue instead of grey.

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.

16.1. 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.

16.2. Searching exporting jobs

It is possible to export one or more jobs and/or job reports. If is also possible to search for and delete empty job items.

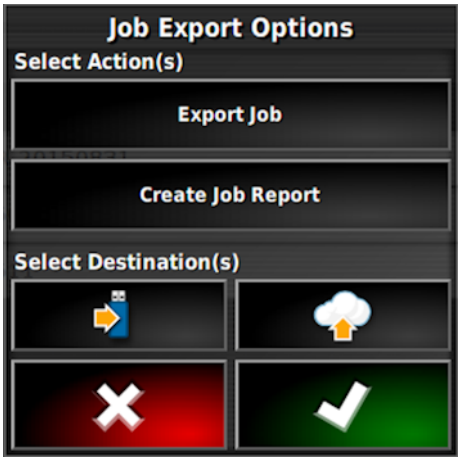
1. Select **Jobs** from the **CATEGORY** drop down list.
2. Select the Search button .

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 20).

3. Once the required jobs are displayed, click to highlight the job/s required.

4. Select the **Export selected items** button .



The Job Export Options screen enables the job/s and/or job report/s to be exported to USB.

Chapter 17 – Troubleshooting Guide

17.1. 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 95), or the Diagnostics screen, Trouble Codes tab (see page 61).

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.	29
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.	68
U1061	Tractor parameter settings not found in steering subsystem.	Return to main setup menu and confirm correct vehicle.	42
U1062	Mounting bias calibration required.	Calibrate mounting bias. This allows the system to compensate if the receiver is not level on the cab roof.	70

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.	43 68
U1066	Compass calibration required.	Calibrate compass.	67
U1067	New vehicle or new steering controller has been detected.	Recalibrate compass.	67
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.	42 - 45
U1069	Steering subsystem steering wheel sensor is not configured.	Contact dealer.	
U1071	AES-25 average power is greater than the power limit.	Confirm load on AES-25 motor unit (for example the steering column is too heavy or the bushes or bearings are worn). Contact dealer.	
U1072	AES-25 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-25 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.	61 & 107
U3001	Transfer failed.	Try exporting or importing the file from USB again.	107
U4001	Wayline initialization error.	Recreate wayline.	89 - 92
U4006	Valid system calibrations do not exist.	Calibrate compass, wheel angle sensor and mounting bias.	67 - 70

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.	45
U5002	Implement and wayline are not defined.	Confirm correct implement chosen and confirm correct field and job chosen. Create waylines if necessary.	48 77 & 86 89 - 92
U5003	Could not engage due to steering controller lockout.	Confirm road switch is OFF.	
U5004	Implement is not defined.	Confirm correct implement chosen.	48
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.	43 - 45

Code	Fault	Action	Page
U6905	Unknown machine type.	Return to main setup menu, and revise vehicle setup.	43
U8505	Factory calibration not present.	Calibrate compass, wheel angle sensor and mounting bias.	67 - 70
TC8	No 12V power supply to inertial sensor and modem.	Confirm connections.	

17.1. Common error messages

Chapter 18 – Appendices

18.1. 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 that receives GPS signals from NAVSTAR, checks them for errors and then uploads the error correction data to the OmniSTAR 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
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).

18.2. Appendix B – Technical Information

Console specifications

Operating voltage:

- 9 to 36 V DC

Operating temperature:

- -30 to +65°C

Storage temperature:

- -40 to +85°C

Power consumption:

- current at 13.5 V DC: 0.5 A
- current at 27 V DC: 0.25 A

18.2. Appendix B – Technical Information

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