X Family Displays

Horizon Operator's Manual

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TOPCON

X Family Displays

Horizon Operator Manual

Part Number: 1046492-01

Revision B

For use with Software Version 5.02

January 2022

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.

Technical documentation and utility software

On the myTopcon NOW! support website (mytopconnow.topconpositioning.com) or myTopcon NOW! app you can access the following support material:

- Firmware and software updates
- Product manuals
- Product quick guides
- Training videos
- System layouts

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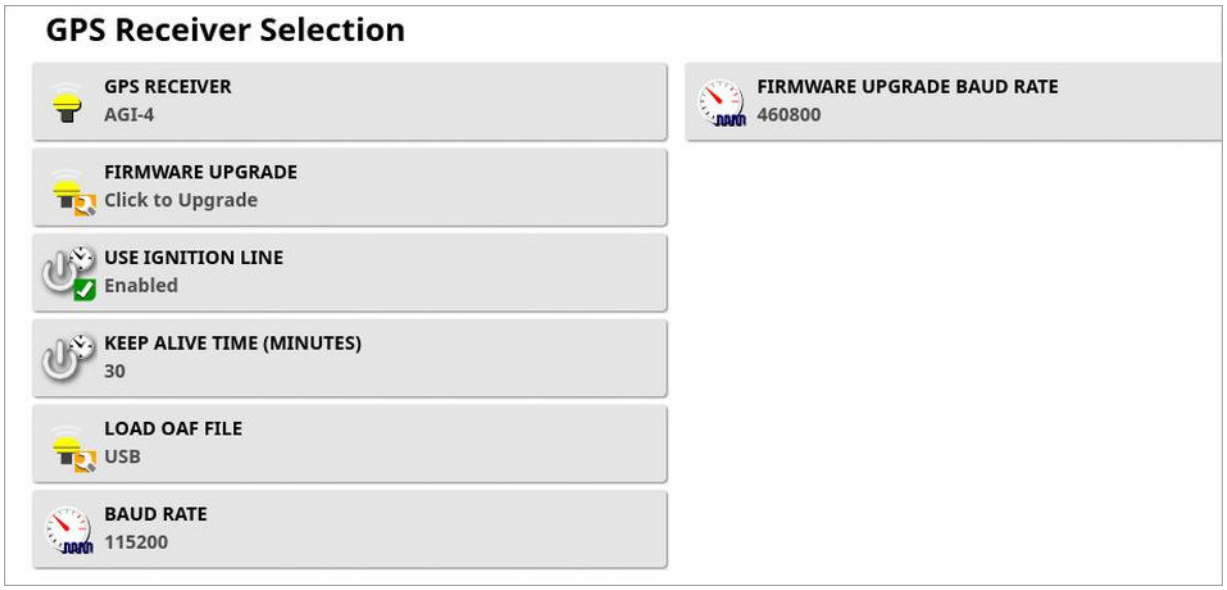
5.3. Setting up GPS

5.3.1. Receiver setup

Sets up GPS receiver capabilities.

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



- **GPS receiver**: Select the GPS receiver type from the selection list. The display 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 display requires the following input if **NMEA Source** is selected under **GPS RECEIVER**:

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

  RS-232 communications

  - 115200 baud rate (preferred) 8 data bits, No Parity, 1 Stop bit (115200, 8N1)

- **Firmware upgrade**: Initiates a GPS receiver firmware upgrade via the package that comes bundled internally with the display 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**: (AGI-4 and AGS-2) Separates the power supply to the GPS 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.

  Note: This feature should only be used **if the vehicle wiring and harnessing is compatible**.
- **Keep alive time**: (AGI-4 and AGS-2) 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.

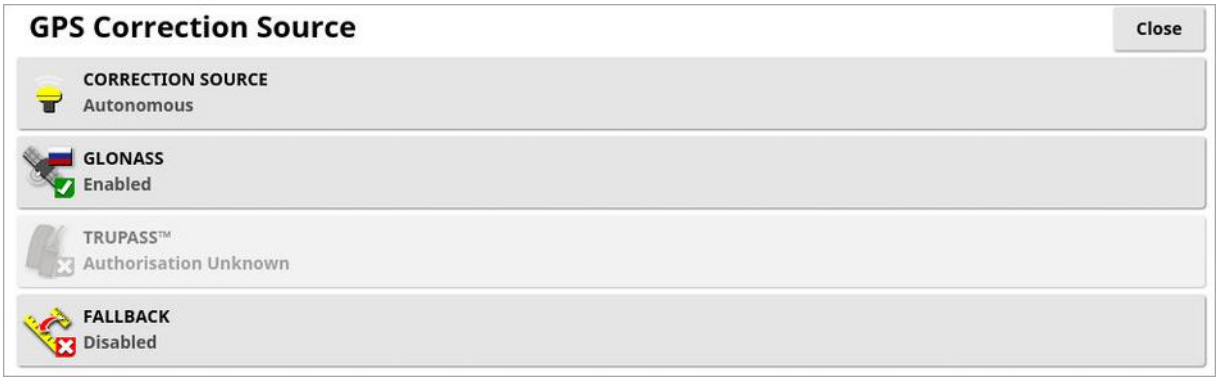
  Note: This feature is only available if **Use Ignition Line** is set to **Enabled**.
- **Load OAF file**: Loads an Options Authorization File to the GPS receiver. This is normally done prior to receiver installation, but the file can be updated in the field via USB (if required).
- **Baud rate**: The 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.
- **Firmware upgrade baud rate**: The data transmission rate during firmware upgrade. This setting should not normally be altered unless the firmware upgrade fails at the default rate.
- **Reverse control**: When using GPS receivers that don't support auto steer (e.g. SGR-1), this option is used to switch the direction of travel

shown on the map if it is initially incorrect due to not having a compass. Select in the bottom right of the operation screen to switch direction.

5.3.2. Correction setup

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

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, see Correction source options, page 63.

Correction sources

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

Correction Source	Description
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 G2	Use OmniSTAR G2 correction. Precision: 10 cm.
OmniSTAR HP	Use OmniSTAR HP correction. Precision: 10 cm.
OmniSTAR VBS	Use OmniSTAR Virtual Base Station (VBS) correction. Precision: sub-meter.
OmniSTAR XP	Use OmniSTAR XP correction. Precision: 10 cm.
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.
TopNET Global D	AGI-4: Precision: < 10 cm
Topnet Live Realpoint	Use a cellular delivered RTK correction source. Precision: 1 cm.

Correction Source	Description
Topnet Live Starpoint	Uses Starpoint correction and is available in the following subscription types: Starpoint. Precision: < 40 cm Starpoint Pro. Precision: < 5 cm
WAAS	Use Wide Area Augmentation System. North America only. 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.

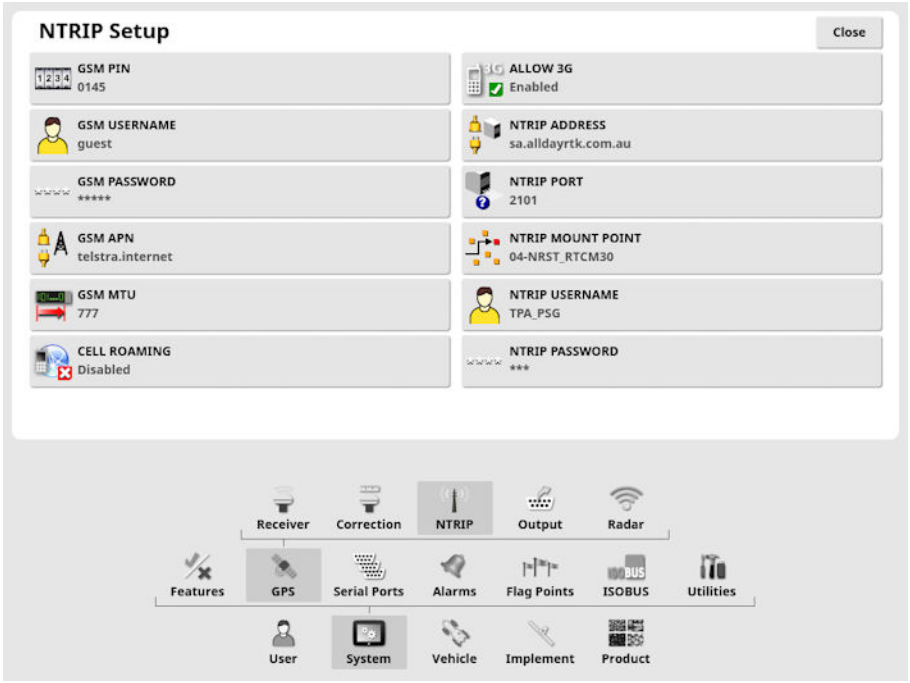
Option	Description
GLONASS	Allows the GPS receiver to use the Russian satellite navigation system GLONASS, in addition to GPS.
TRUPASS	Topcon's GPS drift compensation algorithm, used to provide better pass to pass performance. Available with the following correction sources: Autonomous, WAAS, EGNOS, MSAS and OmniSTAR VBS. Note: This option must be purchased separately.

Option	Description
NTRIP Source	Shown when either RTK (NTRIP) or DGPS (NTRIP) is selected. The **Receiver** option uses the NTRIP client within the AGI receiver. Selecting **Console** enables the display NTRIP client and configures the AGI to use the display as an external modem for correction data. Note: The NTRIP client serial port can be selected on the serial ports setup page. See Setting up serial ports (X25/X35 only), page 69.
Modem	Allows the selection of the modem used for receiving corrections (Other, Managed).
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
Skybridge	This is a mode that allows all RTK modes to fall back to PPP (Precise Point Positioning). It is used in the field to maintain sub-decimetre accuracy if RTK corrections are lost for any reason. This option is only available for use with the AGS-2 receiver. Note: It is recommended that Fallback is not enabled when using Skybridge to maintain higher accuracy.
Baud Rate	The data transmission rate for modems. Refer to documentation supplied with modem.
GGA Output	Some network providers require a GGA (position) to be sent to them to allow them to identify the location of the rover (tractor).

NTRIP setup options

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

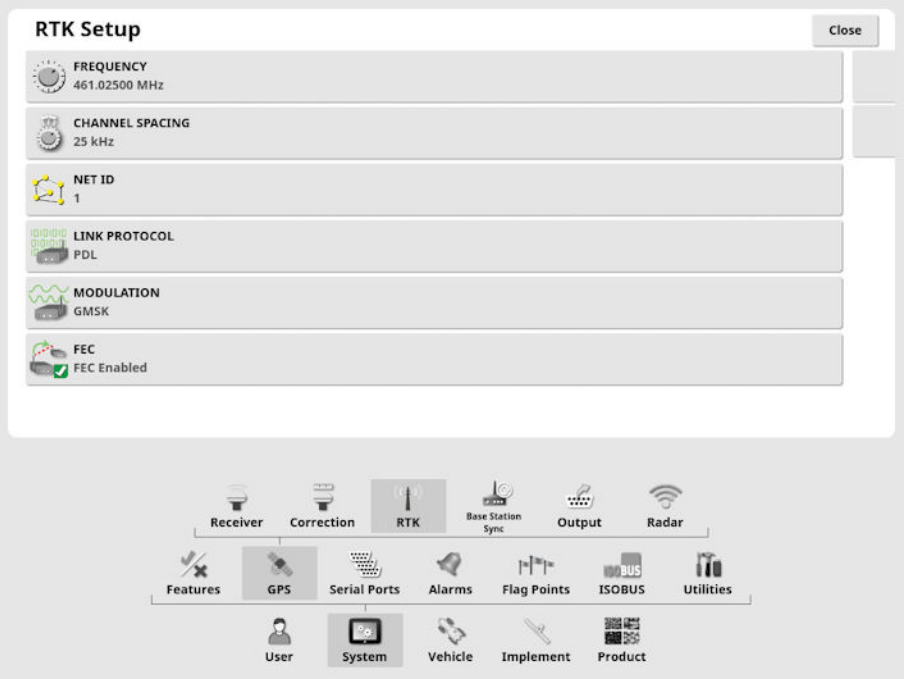


- **GSM APN**: The telecommunication provider's internet link.
- **GSM MTU** (Maximum Transmission Units): The largest protocol data unit that can be passed onwards.
- **Cell roaming**: This may be used to disable cell roaming to prevent accidental cross-border data charges (useful if working near the border of another country).
- **NTRIP Mount point**: The ID of the base station (either real or virtual).

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

RTK setup options

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



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

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

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

-  **Load settings from profile**: Load the RTK base station settings from a previously saved profile.
-  **Save settings to profile**: Save the current RTK base station settings to a named profile. Creates a new profile or overwrites an existing profile.

  Note: Modem settings are unique, so a profile created on one receiver cannot be loaded onto another receiver if the modem type is different. If you have multiple receivers that are going to be used with one console, we suggest naming them with the specific receiver in the profile name to make it easily identifiable.

  Profiles can be renamed or deleted in the Inventory Manager, **RTK base stations** category. They can also be imported from other displays or exported for use on other Topcon displays.

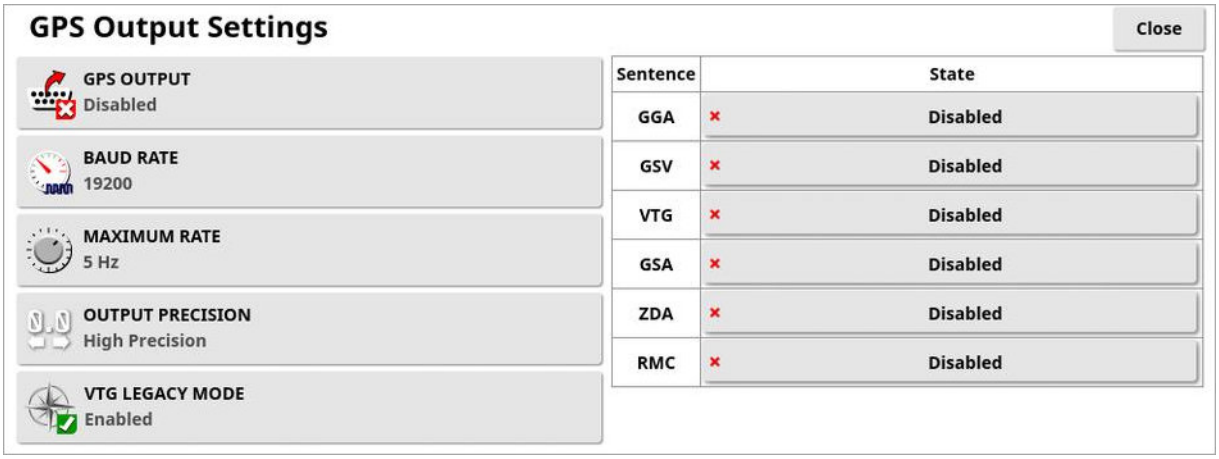
5.3.3. Output setup (X25/X35 only)

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

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

To set up the GPS output:

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



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

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

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

5.3.4. Radar setup (X25/X35 only)

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

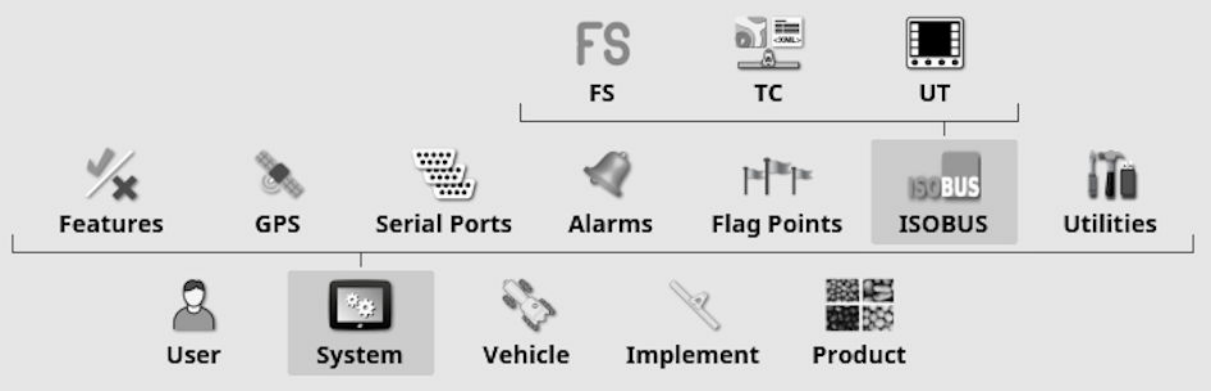
To set up radar output:

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

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

5.7. Setting up ISOBUS / universal terminal

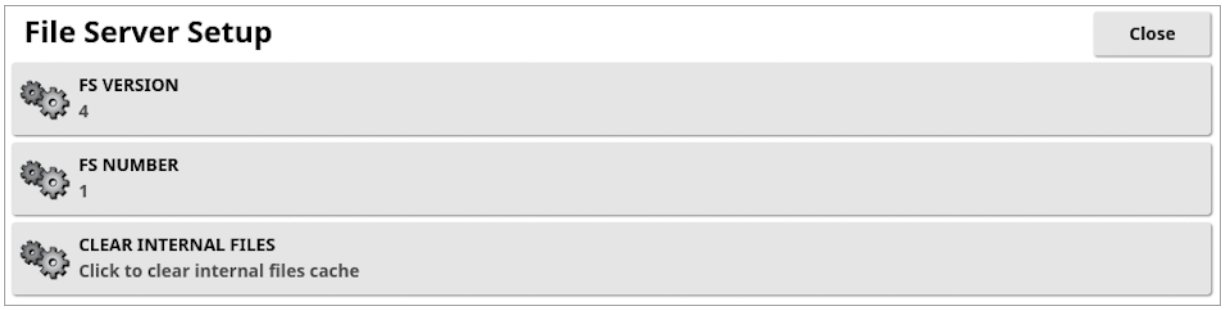
1. Select **System** / **ISOBUS**.



5.7.1. File server setup

To set up the file server:

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

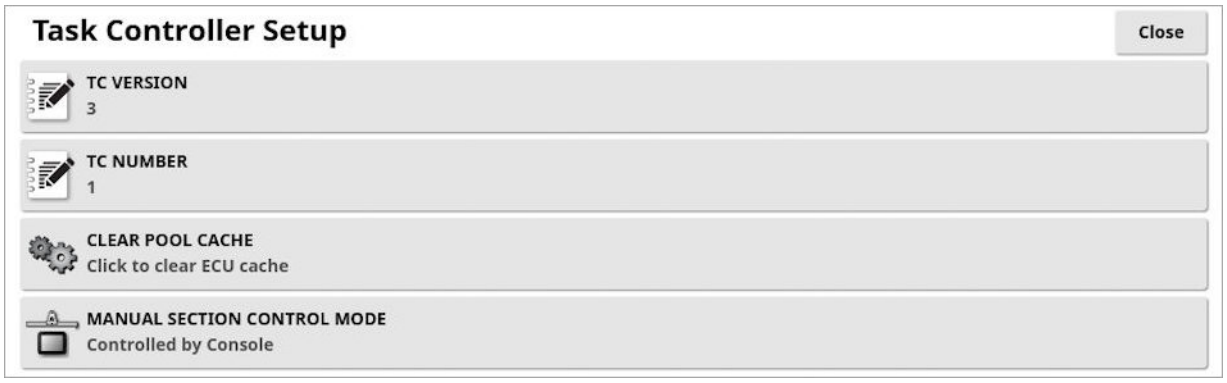


- **FS version**: Controls which version of the file server specification the UT server supports. It is recommended to leave it at latest unless problems are encountered in the UT
- **FS number**: The instance number of the file server. This enables clients to know which server(console) to connect to. Clients without a UI for this should default to lowest number.
- **Clear internal files**: The file server exposes two 'volumes'. One is USB, the other is an internal one inside the console that can only be read / written to by ISOBUS clients themselves. This option clears those files.

5.7.2. Task controller setup

To set up the task controller:

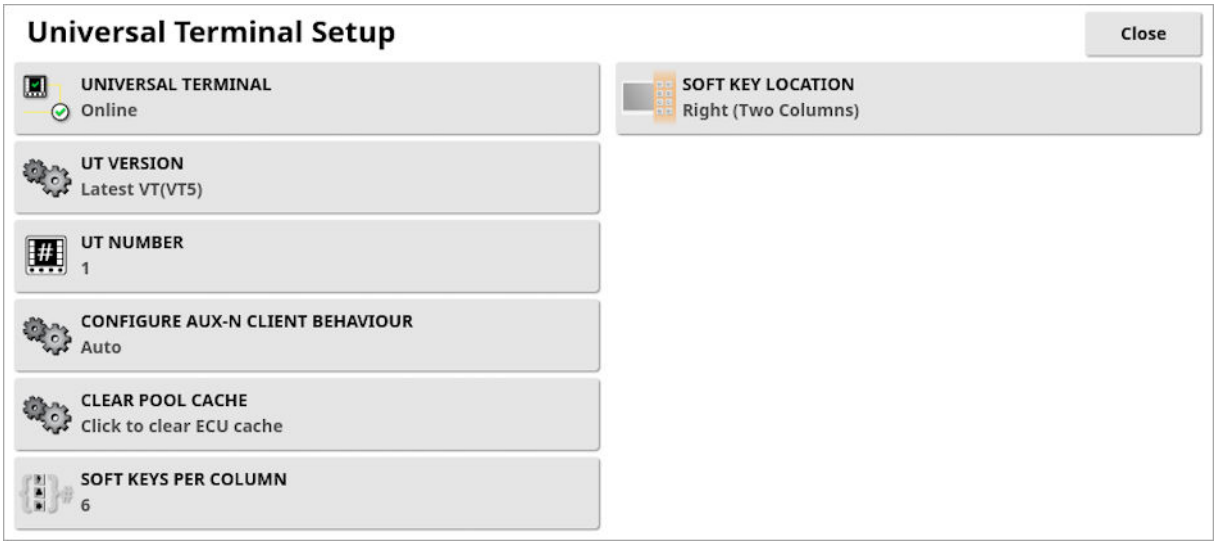
1. Select **System** / **ISOBUS** / **TC** .



- **TC Version**: Sets the task controller version. This should be left at the highest version, unless TC issues are encountered.
- **TC Number**: Sets the task controller instance number for the display. If there are multiple TCs on the bus, use this setting to assign a unique number to this TC to avoid conflicts. The TC with number 1 will be the default TC.
- **Clear pool cache**: Clears the contents of the TC pool cache. Should only be used if a TC error is displayed.
- **Manual section control mode**: Sets how section control will work in manual mode (ASC off):
  - **Controlled by console**: The display virtual section switchbox can be used to turn sections on and off.
  - **Controlled by ECU**: When ASC is turned off, sections will not be controlled by Horizon and will only be controlled by the ECU, either through its UT user interface or a physical switch connected to the ECU. Use this setting if you do not want to operate sections with the virtual switchbox when ASC is off.

5.7.3. Universal terminal setup

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



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

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

  'The UT Number of this UT conflicts with another UT on the bus, and this UT has been disabled. Please make sure that this UT has a unique UT Number.'
- **Configure Aux-N client behaviour**: Enable/disable Aux inputs on this console. This setting is only relevant if you have more than one UT connected to the system at the same time (for example an X display and the tractor's UT). If **Auto** is selected then AUX inputs will be

enabled if **Universal Terminal** is set to **online** and the **UT number** is set to **1**.

- **Clear pool cache**: Clears the contents of the UT pool cache. Should only be used if a UT error is displayed.
- **Soft keys per column**: Sets the number of available softkeys on the UT interface on the Operation screen.
- **Soft key location**: Sets the location of the softkeys on the UT interface and the number of columns (1 or 2).

See Using universal terminal (ISOBUS), page 237.

5.7.4. Auxiliary control setup

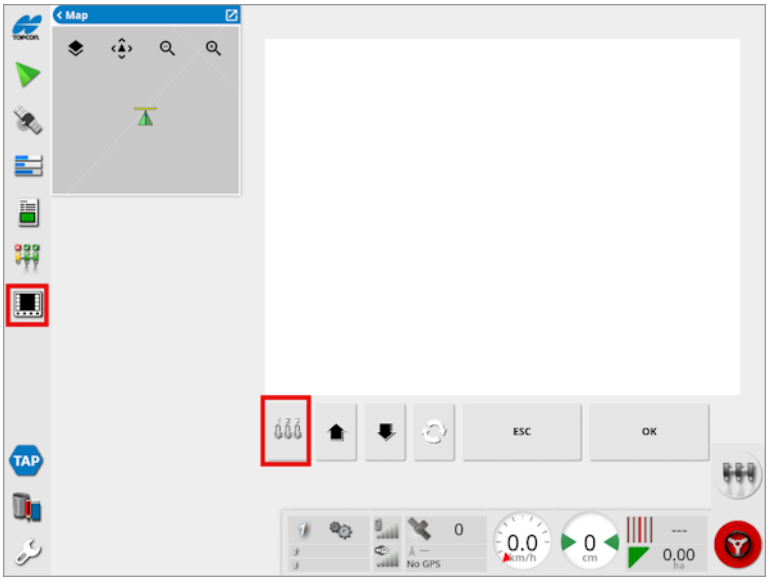
This option is available if **Universal Terminal** is enabled under **System** / **Features** / **Console**.

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

To assign AUX controls:

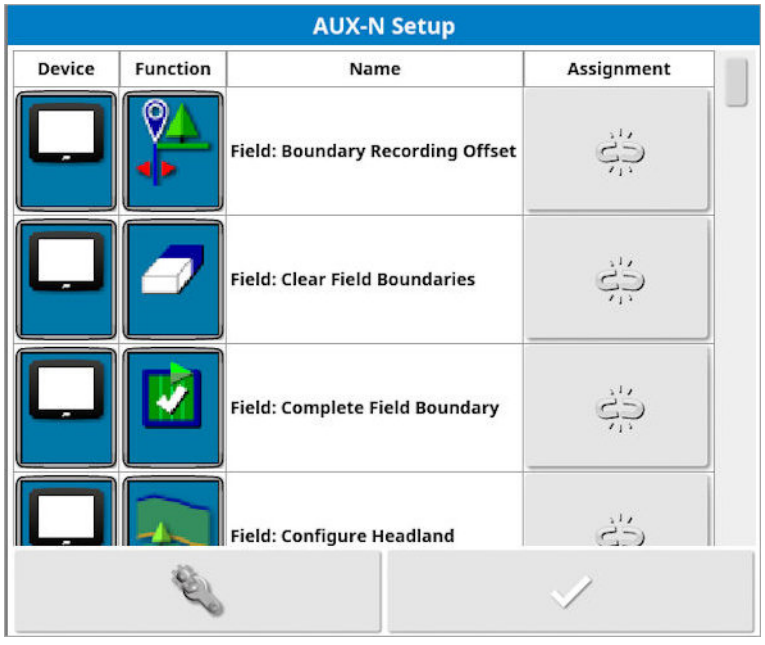
1. Select **Universal Terminal**  from the Navigation bar to open the mini-view.

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



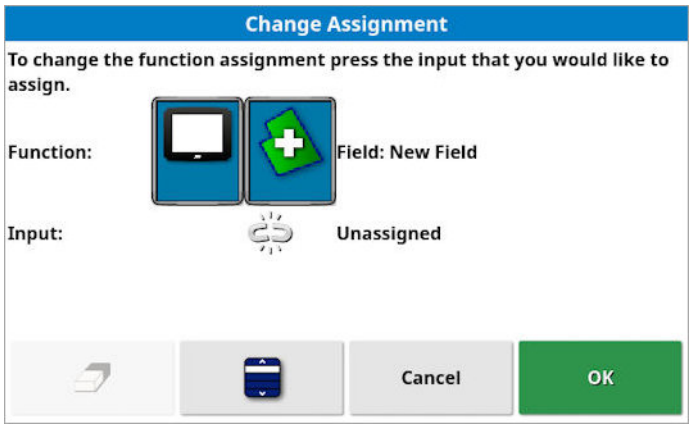
2. Expand the mini-view by selecting the arrow in the top right, or by swiping left to right across the mini-view.

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



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

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

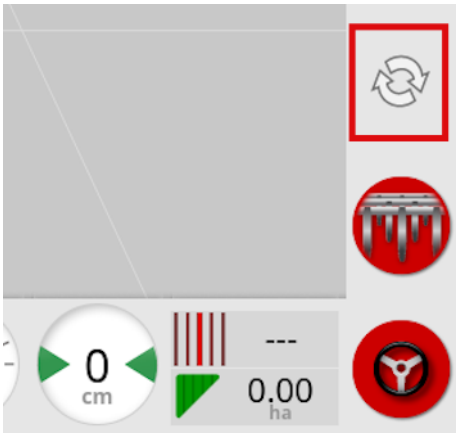


5. To assign the function, press the input button on the device (for example, external joystick) that will be used to perform the function, or press the manual assignment button  to select the input from a list.
6. To un-assign a function, open the Change Assignment screen and select the clear assignment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

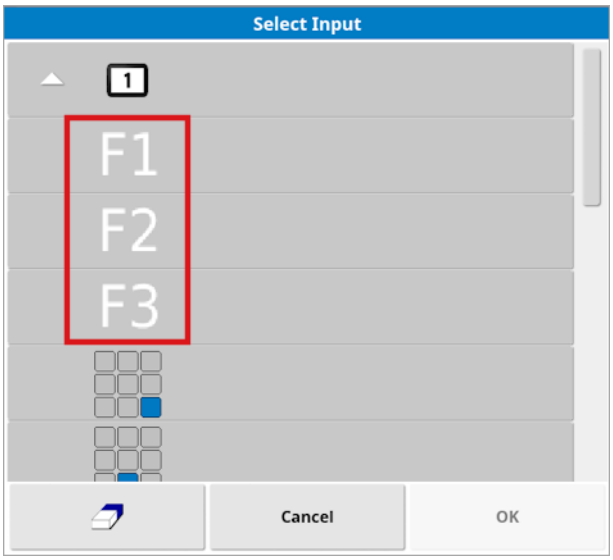
Once all the desired functions have been assigned and the AUX-N Setup screen has been closed, the assigned functions can be activated by pressing the assigned inputs. Please be aware that some functions will require the device or display to be in a ready state before the function can be activated.

F button aux assignment

The F button aux assignment adds up to three shortcut buttons for selected functions onto the operation screen, above the master switch.



1. To assign these buttons, follow the procedure above to step 5 and select  .
2. Select the F button from the **Select Input** list and press ok, then confirm.



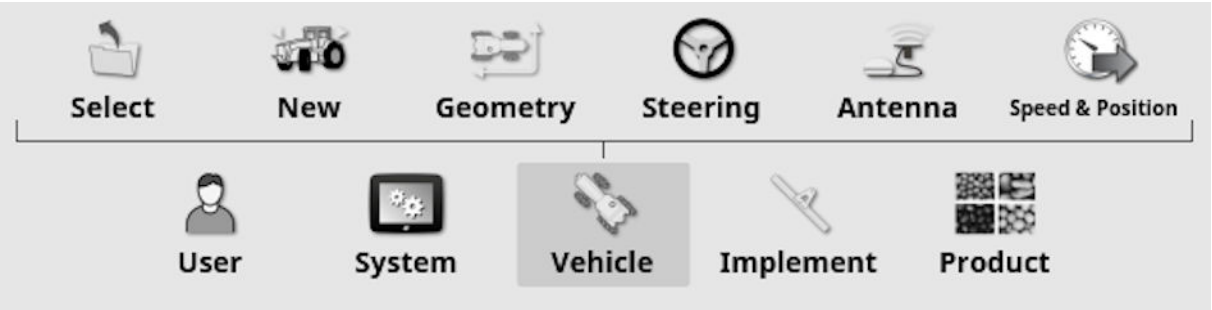
Chapter 6 – Vehicle Setup

This chapter explains how to set up and access profile information about the vehicle on which the display is mounted. If the display 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. See page 95.
- **New**: Create a new vehicle profile. See page 96.

  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. See page 99.
- **Steering**: Controls how the vehicle will respond to guidance. See page 101.
- **Antenna**: Sets whether the GPS receiver has an internal or external antenna. See page 103.
- **Speed & Position**: See Setting up GPS speed emulation, page 104.

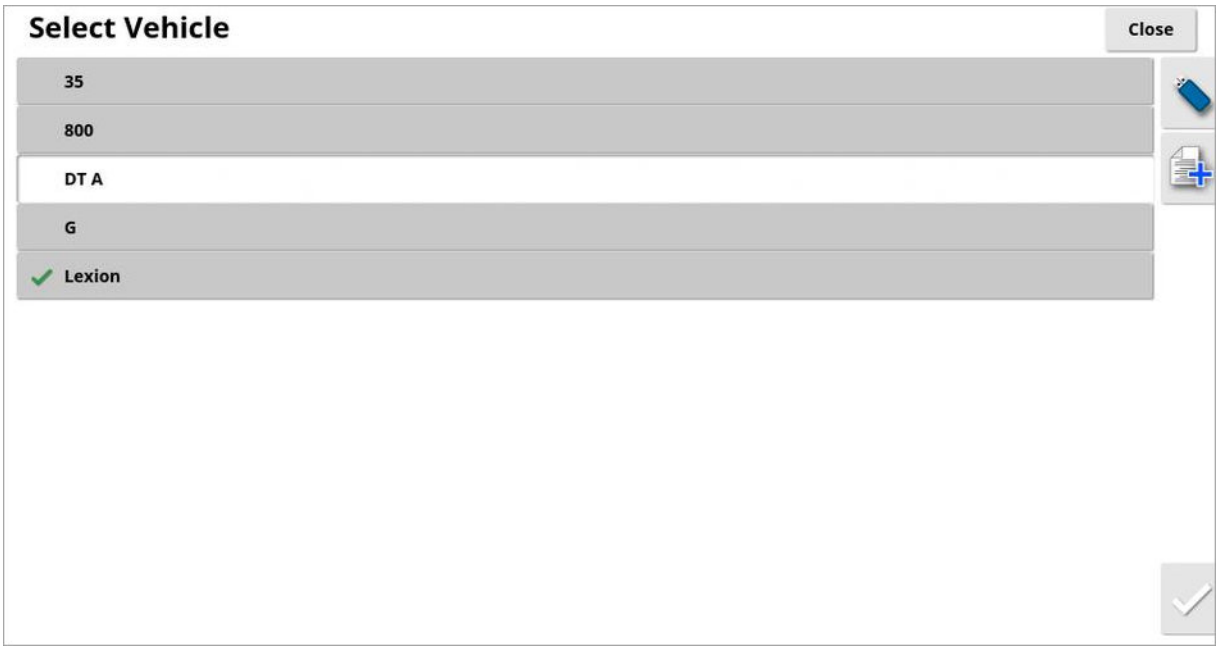


6.1. Selecting a vehicle

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

To select a vehicle:

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



2. Highlight the required vehicle and confirm, or:

Select to import a vehicle profile from a USB.

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

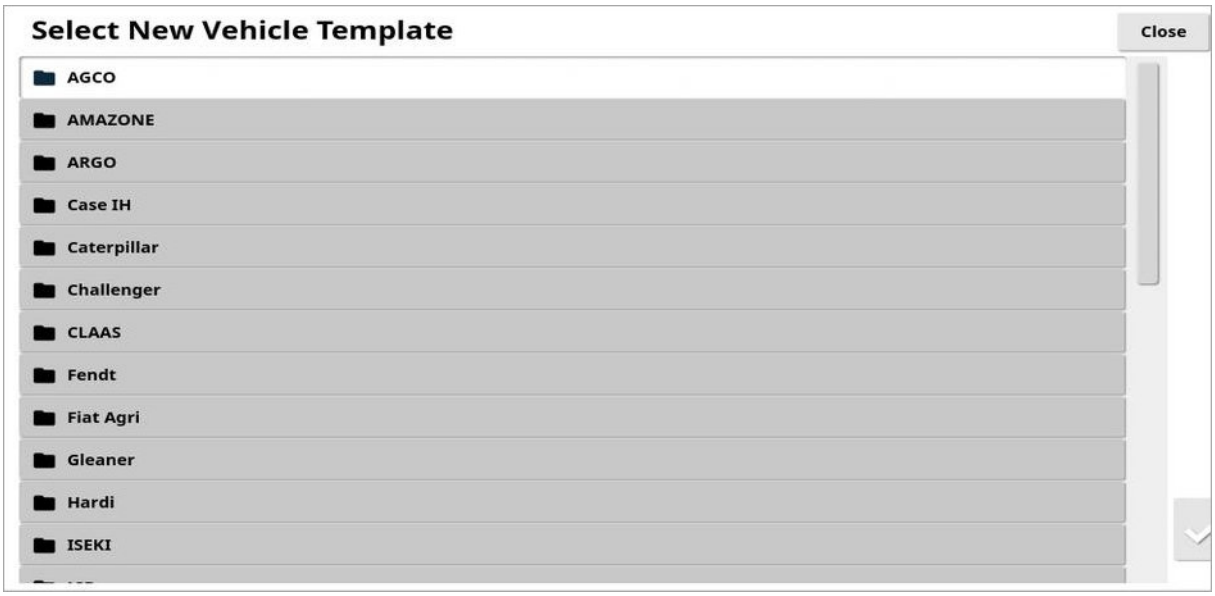
Note: If the Vehicle Profile Mismatch alarm displays, selecting the vehicle with a tick next to it, then pressing the tick button on the right, sends the vehicle profile to the GPS receiver and resolves the alarm.

6.2. Creating a new vehicle

Creates a new vehicle profile for the vehicle on which the display 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 219. 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 97.

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 99.

6.2.1. Customizing a vehicle

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

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

5. Confirm the new vehicle. The Vehicle Geometry screen displays.
6. Go to Setting the vehicle geometry, page 99.

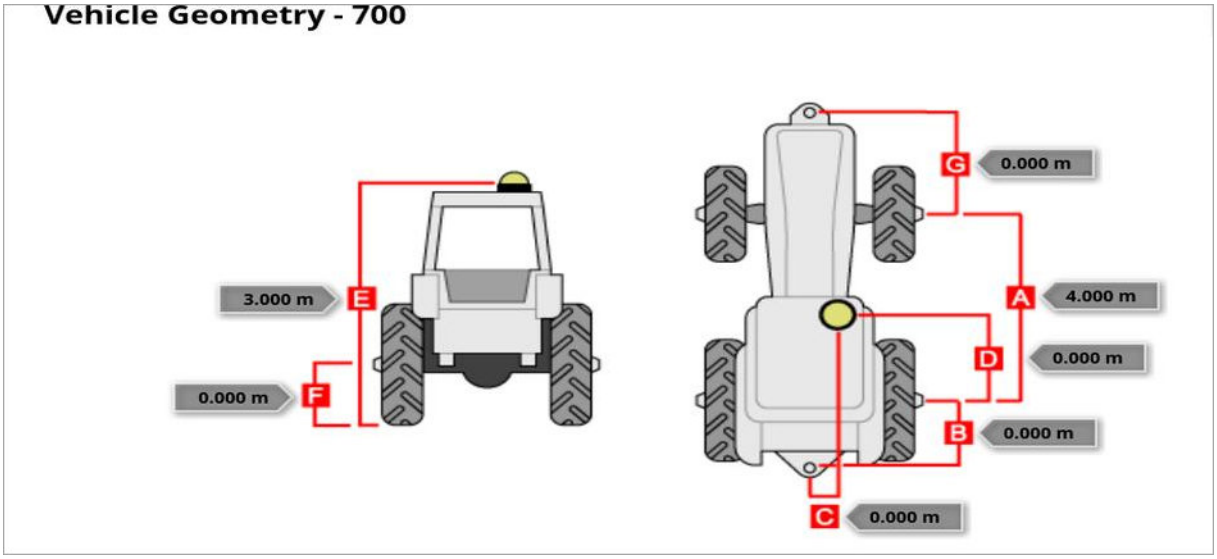
6.3. Setting the vehicle geometry

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.
- **GPS Height**: The height of the top of the GPS receiver above the ground.
- **Axle Height**: The height of the axle above 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.

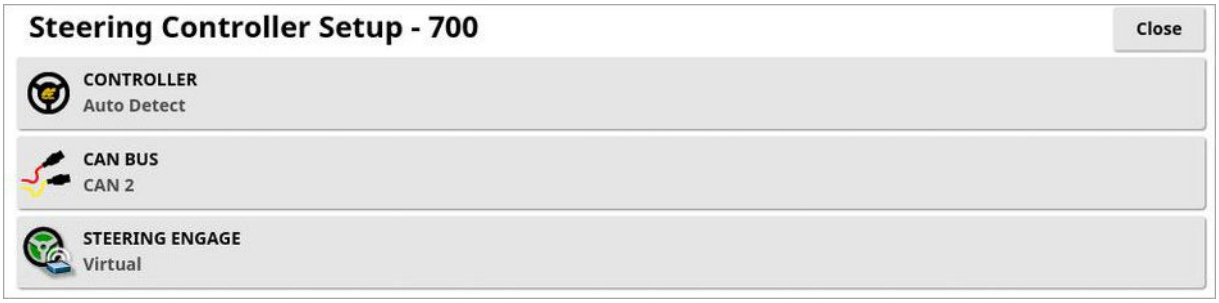
6.4. Setting up the steering controller

Controls how the vehicle will respond to guidance. See Auto Steering, page 219.

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

To set up the steering controller:

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



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

  Selecting AES as the controller adds extra options to the Steering Tuning screen, see Tuning auto steer, page 224.

- **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 display.

- **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 display.

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

- **Import authorisation key**: To control a Claas Series 2 or John Deere R machine, an authorization code must be purchased from your dealer and entered here.

Chapter 7 – Implement Setup

This chapter explains how to configure the implement(s) being used with the system.

Topcon displays now allow multiple implements to be connected at the same time. There can be any number of ISOBUS implement controllers and ONE specific implement controller in the list below active at one time.

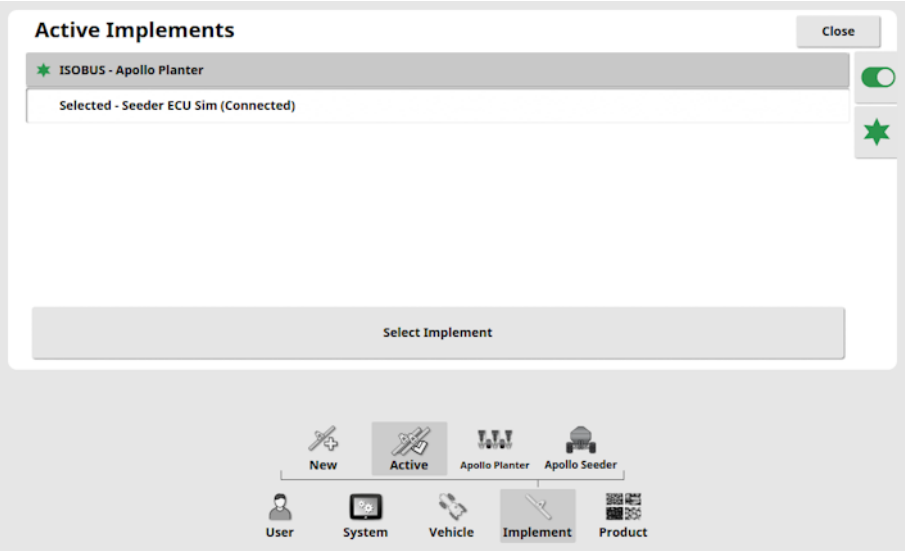
- ASC-10
- IB-2
- Apollo
- Scraper
- Yield Monitor
- Non-controlled (not controlling sections or rate e.g. a plow or mower)
- Raven Sprayer Xlink
- Hardi 5500 Xlink
- Hardi 6500 Xlink
- Bravo Sprayer Xlink
- Väderstad Seeder Xlink
- Flexicoil Seeder Xlink
- Amatron+ Xlink
- Bogballe Xlink
- Kverneland Xlink
- LH5000 Xlink
- Kuhn Spreader Xlink

Note: The listed implement controllers have customised user interfaces on the Horizon display, which allows only one to be active at a time. These implement profiles must be manually created (see Setting up a new implement, page 112). If the display is to be used with more than

one profile listed above, then more than one implement profile must be created. These profiles are shown with 'Selected' at the start of the profile name.

ISOBUS implement profiles (not listed above) are automatically generated and made active when an ISOBUS ECU is detected on the bus (if the ECU has an enabled Task Controller (TC)). These profiles are shown with 'ISOBUS' at the start of the profile name. The profile will disappear from the active list if the ECU is disconnected from the bus.

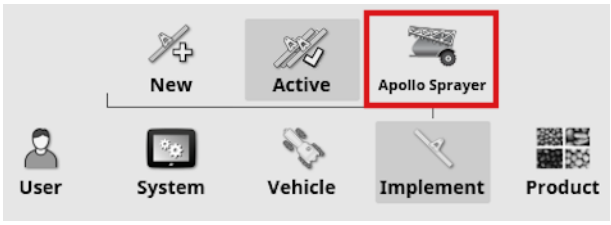
1. To display the active implement profiles, select **Implement** / **Active** .



- **ISOBUS**: Shown next to an automatically detected ISOBUS ECU present on the bus.
- **Selected**: Shown next to an implement profile that was manually created for a specific implement controller in the list above (see Setting up a new implement, page 112).
- **Select Implement**: Press to select a different implement profile from the list of manually created implement profiles (see Selecting an implement, page 110).

- **Disconnected**: Shown next to a manually created and selected profile if the physical implement has been disconnected from the vehicle.
-  : Shown next to the implement profile selected as the 'primary' implement. The 'primary' implement is used for guidance (line recording, swath width, guidelock, steering with offset implements), boundary recording, Machine Link shared coverage, headland actions, tramlines and flag point alarms. Highlight the required profile and select  to make it the 'primary' implement. This selection can not be performed if a task is active or paused, or the vehicle is currently steering.
-  : Can be used to unload a manually created implement profile if no longer required. Highlight the required profile and select  .

Note: The currently active implements are displayed on the **Implement** menu.



Selecting the profile on the **Implement** menu displays the **Default task name** option. This enables a default name to be entered for all tasks performed using the currently selected 'primary' implement. A number is added to the end of each task name if multiple tasks are performed in the same field. If a default name is not entered, the task name is derived from the implement type and current date.

If the selected implement is pivoted, the **Implement model** option displays. This is used to specify whether the 'primary' implement is actively steered. This setting ensures the ASC operates accurately and headland turn shapes are correctly generated.

ISOBUS implement connector type

It is possible that for automatically generated ISOBUS implement profiles, the ISOBUS ECUs may not specify the correct implement connector type:

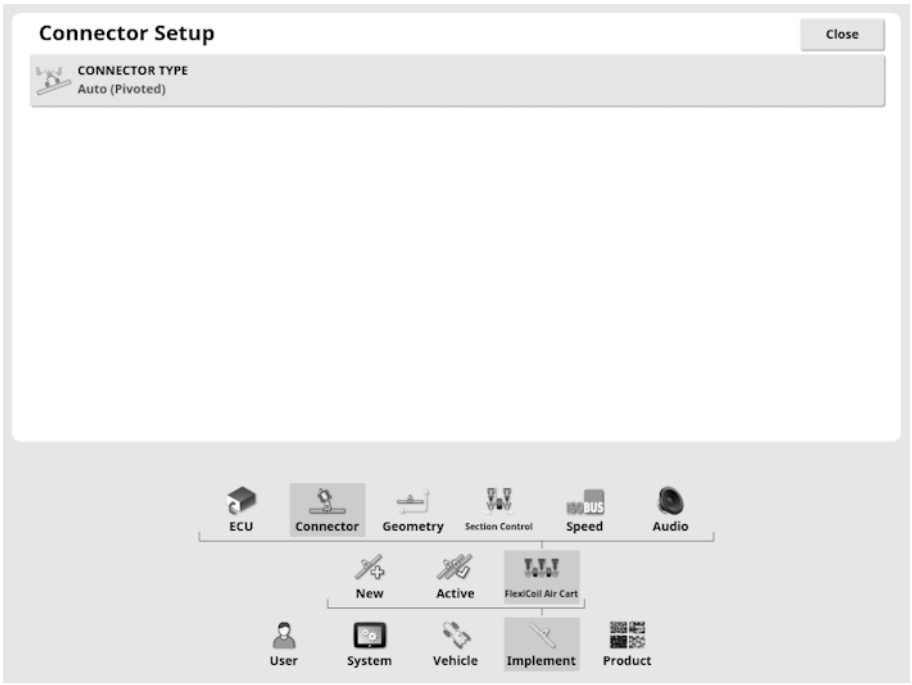

rigid


pivoted (tow behind)


front mount


double pivoted (tow between)

1. To change the selected **Connector type**, select **Implement** / profile and select from the **Connector type** drop down list.


Connector Setup
Close
CONNECTOR TYPE
Auto (Pivoted)
ECU
Connector
Geometry
Section Control
Speed
Audio
New
Active
FlexiCoil Air Cart
User
System
Vehicle
Implement
Product

7.1. Selecting an implement

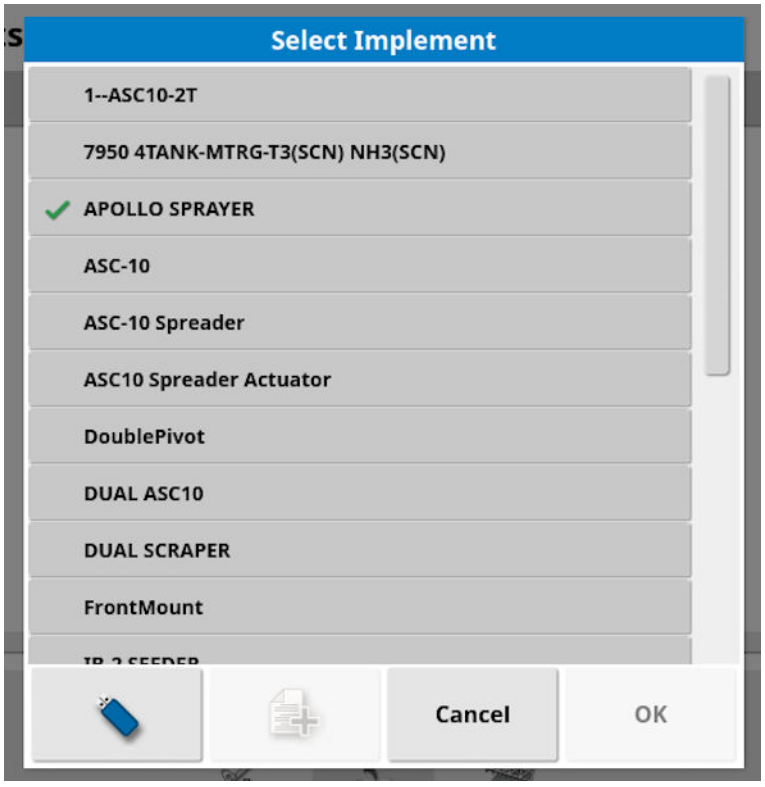
Selects an implement from a list of profiles previously created for the implement types listed in Implement Setup, page 105.

This list is blank when the display is first used.

Topcon displays allow one implement controller from this list and any number of automatically detected ISOBUS implements to be active at one time.

To select an existing manually created implement profile:

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

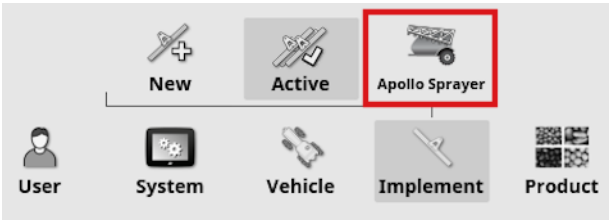


2. Highlight the required implement and confirm, or:

Select to import an implement profile from a USB. **Note**: The implement file must be in a folder on the USB with the following file structure: Implements / (folder matching the name of the .ini file) / .ini file. For example **Implements** / **ASC-10 Spreader** / **ASC-10 Spreader.ini**

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

Once an implement is selected, a profile for the selected implement displays on the **Implement** menu (e.g. Apollo Sprayer, Yield Monitor etc).



Note: If a manually created implement profile is active, this is the 'primary' profile by default. This means that this profile controls line recording, swath width, boundary recording, headland actions, flag point alarms etc. If there is an automatically generated ISOBUS implement profile that should be selected as the 'primary' profile, highlight the profile in the **Active** list and select  .

7.2. Setting up a new implement

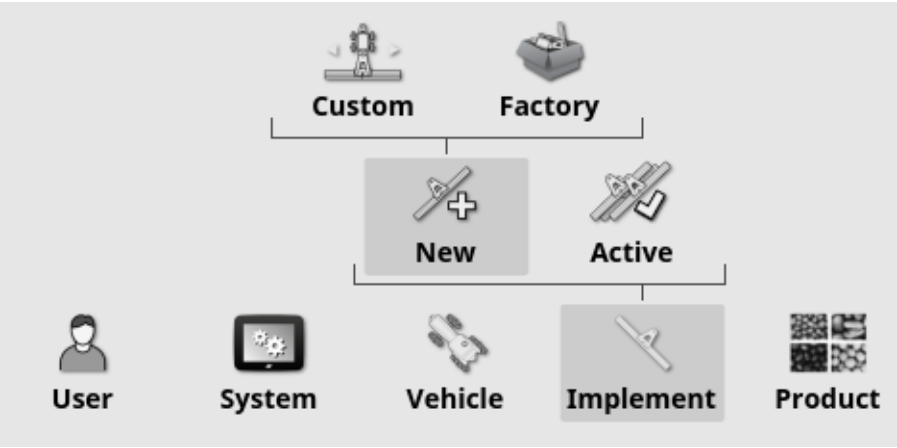
Creates a new implement profile for the specific implement controllers listed in Implement Setup, page 105.

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

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

To create a new implement:

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



- **Custom**: Create a new implement profile.
- **Factory**: Select an implement template from a pre-defined list. (X35/XD+ only)

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

 rigid

 pivoted (tow behind)

 front mount

 double pivoted (tow between)

A default name for the implement is displayed.

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

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

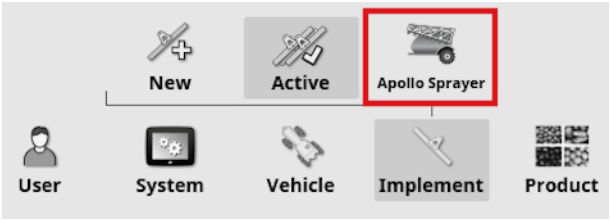
   The New Implement Setup wizard displays.

5. Select **ECU TYPE**, select **NONE**, then confirm and select next.
6. Select **IMPLEMENT CONTROL** and select the required option:
   - Section control only
   - Section control and rate control. (Select this if you require the option to load and view a VRC map.)
7. Select **IMPLEMENT FUNCTION** and select the most appropriate option from the selection list.

   Note: Select **Sprayer** for liquid tanks, **Spreader** for granular tanks or **Other** for a combination of liquid and granular tanks as you might have with a seeder.

8. When the screen shows that the setup is complete, confirm.

   Once created, the implement profile displays on the **Implement** menu. The profile name is derived from the implement type (e.g. Apollo Sprayer, Yield Monitor etc).



9. Select the implement profile to continue setup. See Setting the implement geometry, page 115.

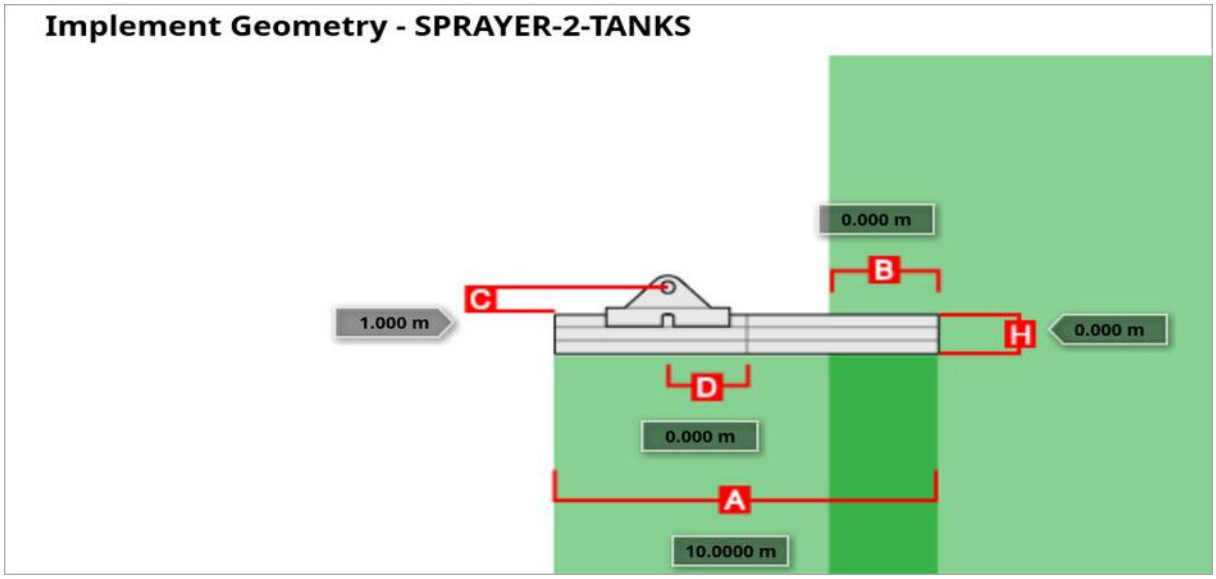
7.3. Setting the implement geometry

Sets the implement measurements so that guidance can work accurately.

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

To set the implement geometry:

1. Select **Implement** / profile / **Geometry** .



2. Select an implement dimension. The name of the dimension appears in the title bar.

   Dimensions requested vary according to the type of implement selected.

3. Add or adjust dimensions where needed and confirm.

The following lists measurements used in the system:

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

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

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

4. If the implement is pivoted and has active steering, select **Implement** / profile and select **Active steering** from the **Implement model** option. This setting ensures the ASC operates accurately and headland turn shapes are correctly generated.

Chapter 10 – Steering Calibrations

The display 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 OK.

Note: Some steering controllers may cause the display 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.

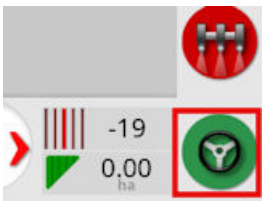
Mounting bias calibration is done in a clear area well away from obstacles. If the mounting of the receiver is not quite level, this calibration will adjust for the actual position.

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.

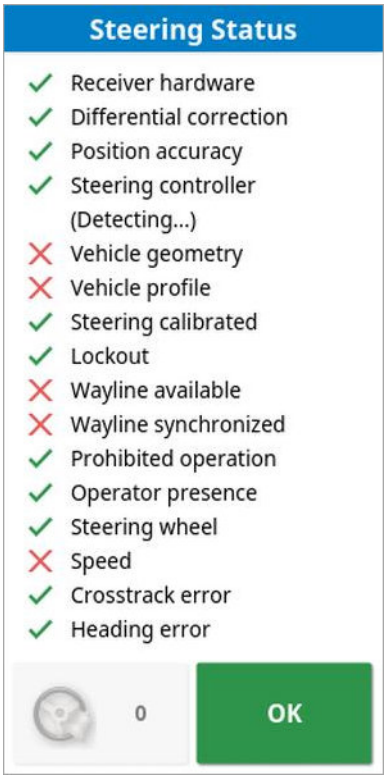
Note: To calibrate for mounting bias, ‘A’ and ‘B’ wayline points are plotted over 70 m/230 ft, driving the vehicle at 2 kph or 1.2 mph along the wayline. The operator turns the vehicle around at the end of the pass and repeats the procedure. It is important that the vehicle meets the ‘A’ and ‘B’ waypoints 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).

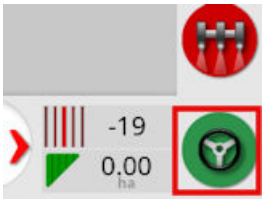


8. Drive the vehicle over the ‘B’ point previously created during the calibration procedure.
9. Set the vehicle speed to 2 kph or 1.2 mph.
10. Steer along the wayline back to the ‘A’ point previously created.

    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.

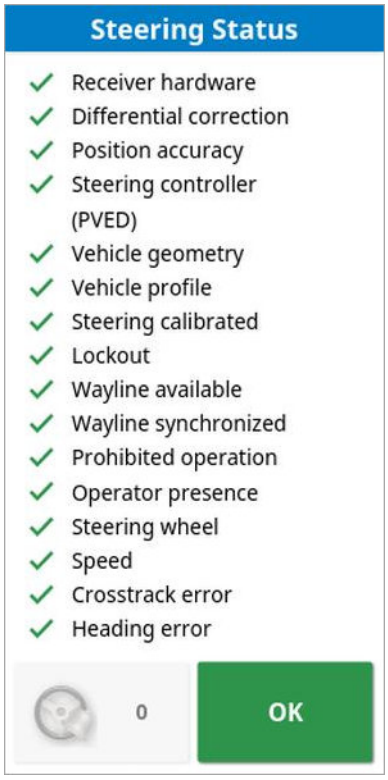


14. Cross over the ‘A’ waypoint again travelling in the opposite direction.
15. Set the vehicle speed to 2 kph or 1.2 mph.
16. Steer along the wayline back to the ‘B’ waypoint previously created.

    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 OK to return to the calibration screen.

    The Steering Calibration screen will display **Calibrated** for Compass, Wheel Angle Sensor and Mounting Bias.
20. Confirm OK to return.



Steering Status box indicators will now all be green.

Chapter 11 – Task Button

The task button at the top of the guidance toolbar  must be pressed to start a task.

Depending on what state the system is in, the appearance of the task button will vary:

 Preconditions to start a task are not satisfied. Press to display errors preventing a task from running.

 A task is ready to be started. (The task already exists.)

 A task can be started. Starting a task will first create a task (and possibly a field).

 A task is running and actively recording data.

 The task is paused. Press the button to resume the task.

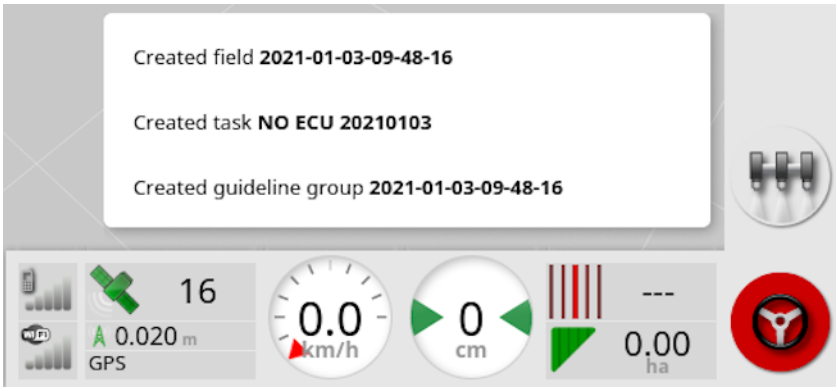
 The task is completed.

Note: If the task is not running, there will be no coverage on the map or in the task report and auto section control and rate control will not be available.

Pressing the task button also enables the user to quickly start work without having to set up a client, farm, field, task etc.

Note: If a field is already set up in the current GPS location, that field is automatically loaded.

Pressing the button starts a task, and may also create a field if one is not already loaded. A message pops up for five seconds that displays which functions have been performed automatically.



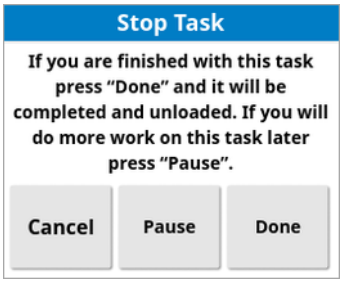
If a field is created by starting a task, the perimeter of the field is determined by the task boundary when the task is completed (created by coverage laid). Be aware that if the whole field is not covered by the task that the task boundary won't match the real physical perimeter of the field. This may also result in a second field being created if another task is started at the opposite end of the field as the system has no way of knowing the two fields are physically linked. The boundary from coverage function (see Creating a boundary from coverage, page 170) can be used to change the task boundary into a real boundary, if required. (The task that was used to lay the coverage must be selected.) Alternatively a new boundary can be recorded.

Note: Task boundaries cannot be used to display headlands or perform headland turns.

The Task Settings tab on the Task Information screen (see Viewing task information, page 140) displays the names of the automatically generated functions. These may be edited using the inventory manager (see Inventory Manager, page 248).

Pausing a task

The user should pause the task whenever they need to leave the field to do operations like refill the tank. Press  to display the following screen, then select **Pause**.



Press the button to resume the task after returning to the field.

Completing a task

Press , then select **Done**.

Once the task is completed, it is put into the stopped state and the task is archived along with its dependencies (e.g. field boundaries, products, guidelines that were used in the task). The task will be exported to TAP, if enabled.

If a task is stopped in error, it can be reloaded and restarted, see Selecting an existing task, page 178. A warning is displayed that must be accepted before the task can be restarted.

Chapter 12 – Field Menu

This chapter details how to set client, farm, field, boundaries, exclusion zones and flag points.

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

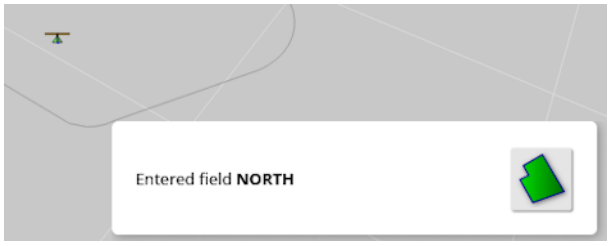
Drive to the field and follow the steps to set up a field and identify its features.

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

12.1. Selecting a field

Driving into a field (when there is no field selected or task in progress), or turning on the Topcon display while located within a field, automatically loads that field.

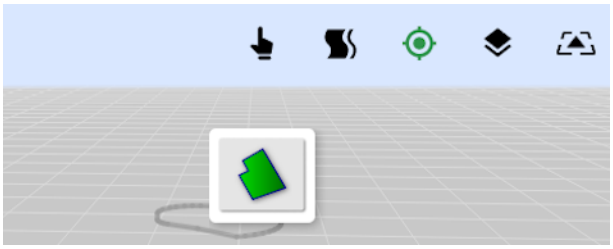
If a field has been previously selected or a task is in progress, a message displays when entering a new field, providing the option to select the field.



To manually select a field:

1. Press and hold on the screen and drag your finger over the required field boundary.

   The select field pop up displays.



2. Select the pop up to activate the field.

Alternatively:

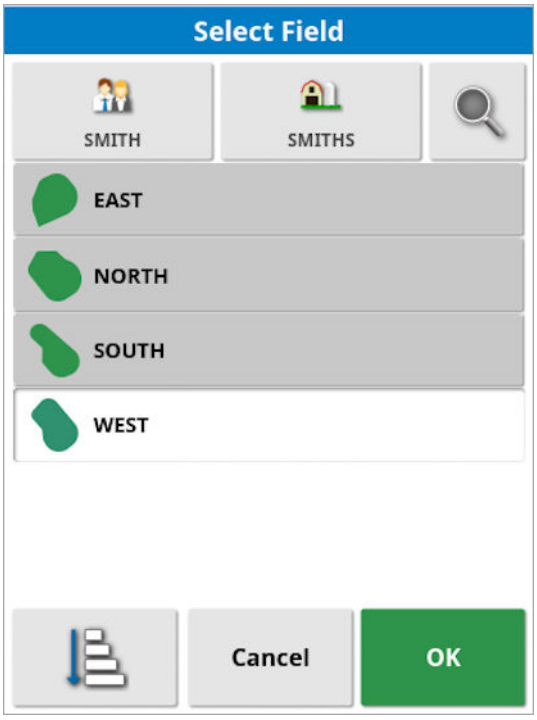
1. Select **Field Menu** / **Select Field** .

   The fields displayed can be filtered. A maximum of four filter criteria can be selected at one time.

2. Select to display the filter options.

   Press and hold on a field to display detailed information about that field.

   The displayed fields can be sorted by name or distance by selecting .



3. Select the required field and confirm.

12.2. Creating a 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.

   Note: A field can be created without associating it with a client or farm, if required. Once you create a client and /or farm, that will be associated with all the fields you create until you switch to a field that is in a different farm.

2. Select **CLIENT NAME**, select **New**, enter a name and confirm (or select an existing client if some have already been set up).

3. Select **FARM NAME**, enter a name and confirm (or select an existing farm name if some have already been set up).
4. Select **FIELD NAME**, enter a name and confirm.
5. Completing this section selects the new field, proceed to Setting a new boundary, page 168.

Note: To change any of these settings after they have been confirmed, see Inventory Manager, page 248.

12.5. Setting a new boundary

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

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 Creating a boundary from coverage, page 170) or created from shapefiles (see Creating a boundary from a shapefile, page 171).

Note: If a boundary is not recorded for a field by the operator, then when a task is completed a task boundary is created around the perimeter of the task. Task Boundaries are used to detect the field the next time the vehicle returns to the field and to group tasks and guidelines (if they've been created) by that GPS location, to allow easy access to that data in the future.

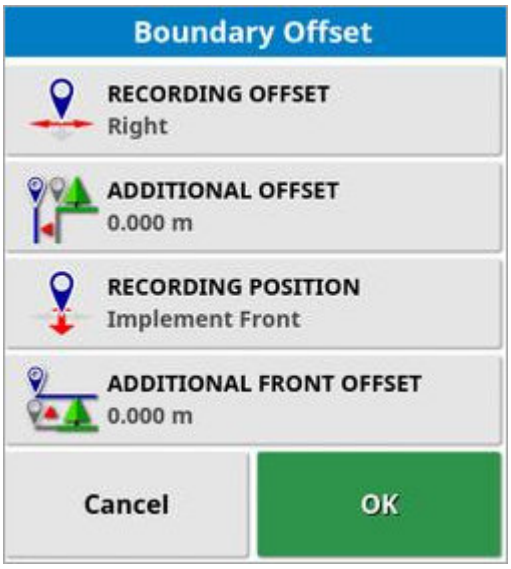
Be aware that if the whole field is not covered by the task that the task boundary won't match the real physical perimeter of the field. This may also result in a second field being created if another task is started at the opposite end of the field, as the system has no way of knowing the two fields are physically linked. The boundary from coverage function (see Creating a boundary from coverage, page 170) can be used to change the task boundary into a real boundary, if required. Alternatively a new boundary can be recorded.

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. See Editing a boundary, page 172.

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

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

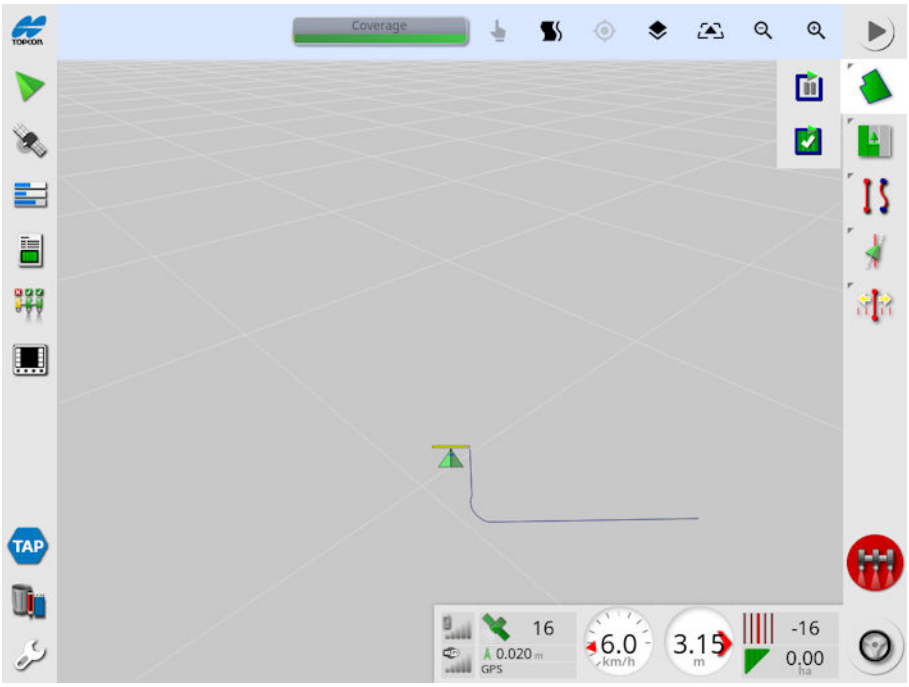
1. Drive the vehicle to the edge of the field.
2. Select **Field Menu** / **Boundary Offset** .



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

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

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



5. Select **Pause**  to pause recording. This is useful if an obstacle prevents driving on the boundary. The icon will change to show the record option. Select **Record**  to resume. The boundary will record a straight line between the point at which recording was paused and the point at which 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 35).
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.

12.5.1. 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.

12.5.2. Creating a boundary from a shapefile

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

1. Load the shapefile onto a USB (if using) and insert the USB into the display. (Alternatively, ensure the display is connected to TAP.)
2. Select **Field Menu**  / **Create Boundary from Shapefile**  .
3. Select the USB or TAP icon at the base of the screen.
4. Navigate to the location where the shapefile is stored and select it.
5. Confirm to import the shapefile boundary.

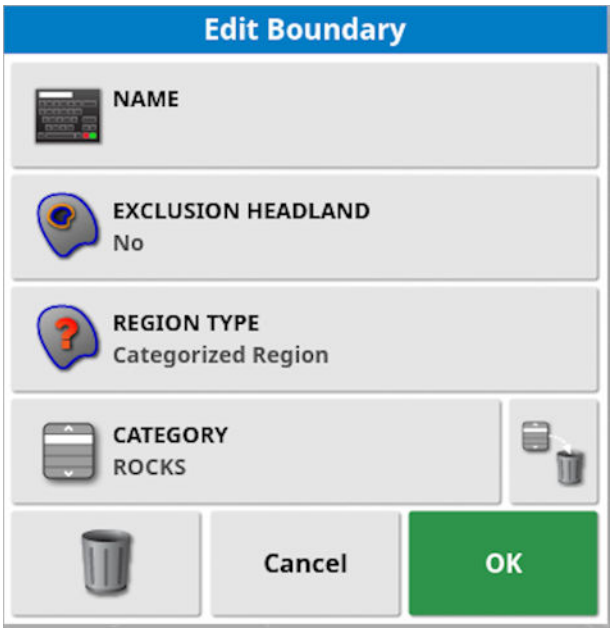
12.5.3. Editing a boundary

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

1. Press the screen for 0.5 seconds and slide your finger across the boundary. The boundary is highlighted and a pop up displays when the screen is released:

    Activate boundary steering. See Using boundary steering, page 196. Select **Guidelines Menu** / **Change Guidance Mode** if this option is selected by accident.

    Select to display the Edit Boundary screen.



- **Name**: Optional name used to identify the boundary.
- **Exclusion Headland**: Sets whether the exclusion zone boundary edges will be treated as a headland (see Setting up a working headland, page 174).
- **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 task (see Configuring task regions, page 180).
- **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.

12.5.4. 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.

12.6. Setting up a working headland

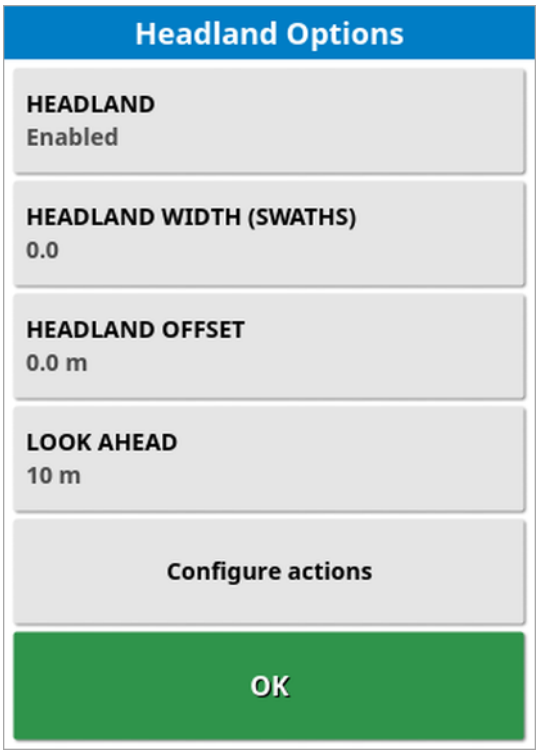
Implements often work around the boundary differently from the rest of the field. A headland creates a zone inside the line of the boundary that will be worked differently. The width will depend on the operator's method of working the field.

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

Note: A headland can only be created once a boundary has been recorded, see Setting a new boundary, page 168.

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

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



2. Ensure **Headland** is enabled.

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

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

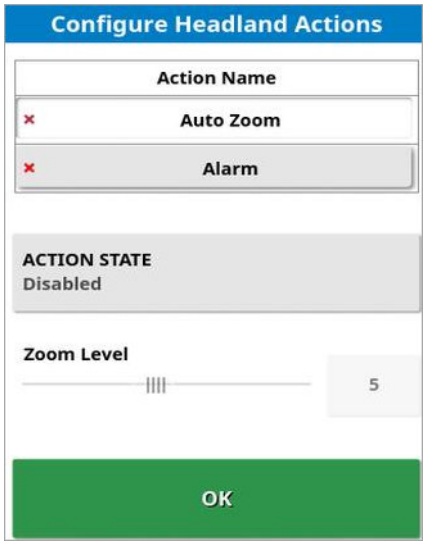
   Note: To set a headland width that is not related to the swath width, use **Headland Offset** to enter a value instead.

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

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

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

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



Action Name

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

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

Action state

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

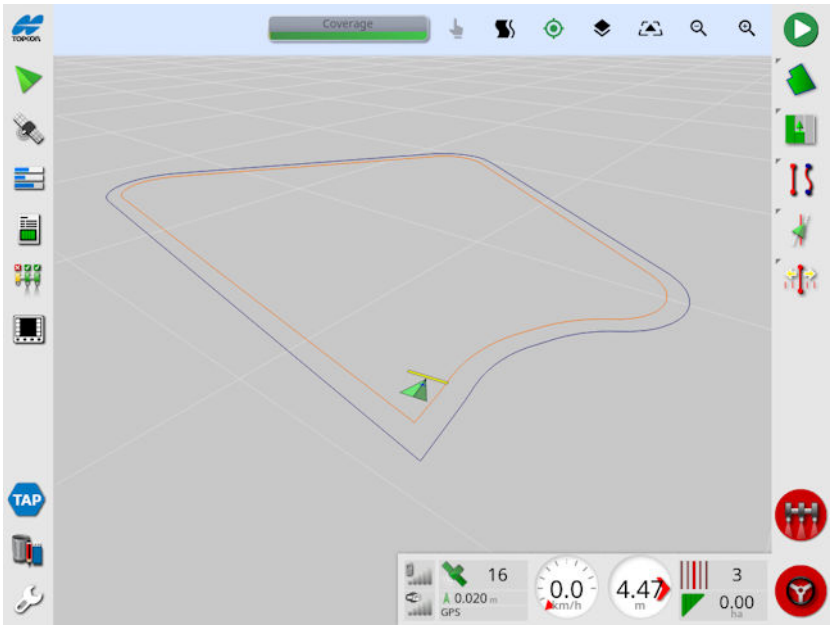
Message

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

Audio type

Sets an audible alarm. Choose the type and confirm.

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



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

Chapter 14 – 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.

The number of guidelines displayed per field is limited to 20, unless Controlled Traffic is enabled. See Guidance setup, page 50.

If some guideline functions are not required, they can be disabled. See Guidance setup, page 50.

Pressing to select a guideline from the map opens a popup window which allows you to:

Activate / deactivate this guideline for steering and wayline generation.

Edit guideline name.

Toggle propagation. Standard guidelines are propagated (repeated) across the entire field at spacing equivalent to the implement width, with the active wayline at any time being the one closest to the vehicle's current position. In certain special cases propagation is not desired and can be turned off when the loaded guideline should only be followed on swath zero (for example when importing a guideline that represents the complete path for traversing the whole field). If propagation is on, the icon changes  .

Delete guideline.

Note: Guidelines may be edited by selecting the **Guidelines** category in the inventory manager. See Inventory Manager, page 248.

Guideline types

 Parallel AB Line guidelines, page 190

 Identical Curve guidelines, page 193

 Manual AB lines, page 191

 Centre Pivot guidelines, page 194

 Project lines, page 198

 Guidelock Guidance mode, page 195

 Boundary Steering Guidance mode, page 196

Note: Use the Cycle guidance mode button  to cycle through guideline, guidelock and boundary steering modes (available if boundary steering is enabled).

14.1. Selecting an existing guideline

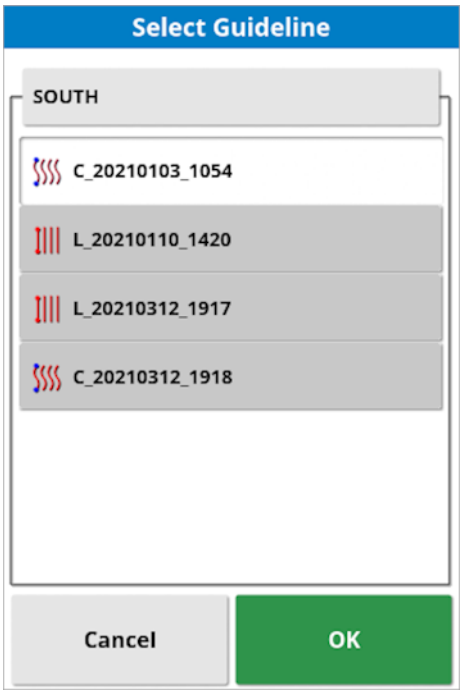
Once guidelines have been created within fields, these are stored and can be accessed on future tasks in the field.

To change between guidelines, press the guideline on the map and select  to activate the line. Alternatively, you can toggle the active line using the **Cycle Guidelines** button  , an AUX-N input device (see Auxiliary control setup, page 85) or a VDC (see VDC setup, page 57).

The **Select Guideline** option can also be used:

1. From the **Guidelines Menu**  , select the required guideline mode, then select **Select Guideline**  .

   All guidelines in the current field are displayed.



2. Select the required guideline and confirm.

14.2. Using straight lines guidelines

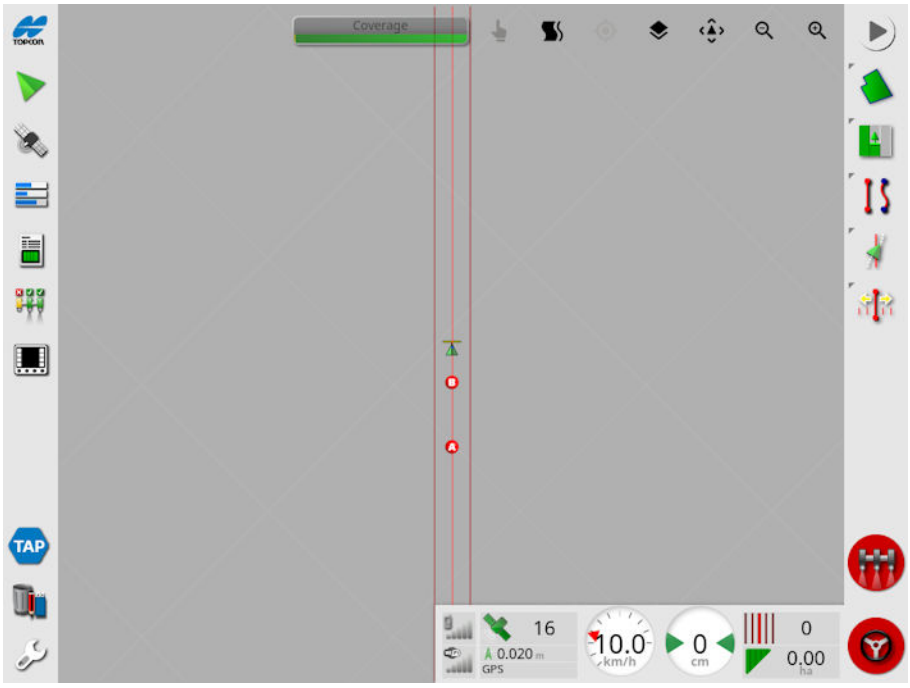
This option creates parallel lines for guidance, using the width of the implement to set the distance between guidelines.

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. Select **Guideline Menu** / **Create Guideline** / **Record AB Line** .
2. Position the vehicle at the start of the swath and select **Set A point** .
3. To set a 'B' point, drive along the required swath and select **Complete AB Line** .

An option to activate (select) the new guideline is shown, if another line has already been activated. The 'B' point appears and parallel guidelines for steering display on the screen.

An option to rename the new guideline is also displayed.



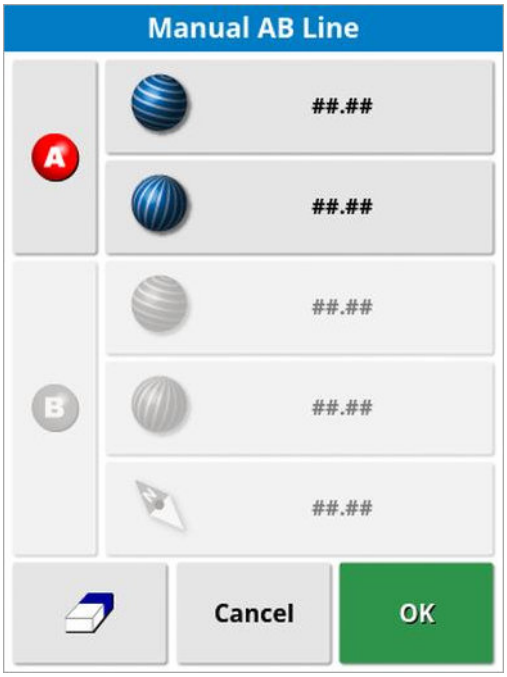
To view all AB lines across the field, select  from the top of the screen and choose **Line Numbers**. (This requires a field boundary, see Setting a new boundary, page 168.)

14.2.1. Setting AB lines manually

It is also possible to set AB lines using coordinates.

1. Select **Guidelines Menu**  / **Create Guideline**  / **Record AB Line**  / **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 A.
   - 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 B.
   - 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 .

14.3. 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. Select **Guideline Menu** / **Create Guideline** / **Record Identical Curve** .
2. Position the vehicle at the start point of the curve and select **Set A Point** .
3. Drive along the curved swath. A black line appears behind the vehicle on the map to indicate the curve that is being recorded.

   Note: If required, recording the guideline can be paused.
4. At the end of the curved swath, select **Complete Identical Curve** to indicate the end of the curve recording.

An option to activate (select) the new guideline is shown, if another line has already been activated.

An option to rename the new guideline is displayed.

14.5. 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 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 the guidelock option  in the view controls at the top of the guidance screen to switch in and out of guidelock mode. The black (or white) icon indicates that guidelock mode is off and the colored icon  indicates that it is on. See Using view controls, page 129.

   Alternatively, select the Cycle guidance mode button  from the guideline menu. It will change to  when guidelock is enabled (available if boundary steering is enabled).

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

14.6. Using boundary steering

This option generates a guideline inside the boundary. By default, the guideline is offset by half an implement width away from the boundary. This width can be adjusted using the nudge menu (see Nudge Menu, page 229).

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

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

To use this option, a boundary must exist. See Setting a new boundary, page 168.

1. Ensure **Boundary Steering** is enabled via the setup menu **System** / **Features** / **Guidance** .
2. Press and hold to select the boundary on the touchscreen. The boundary is highlighted.
3. Select the icon from the popup menu.

   Alternatively, select the Cycle guidance mode button from the guideline menu. It will change to when boundary steering is enabled.

This option can also be used to steer around the boundary of exclusion zones if **Exclusion Headland** is set to **Yes** (see Editing a boundary, page 172).

14.8. Setting up tramlines

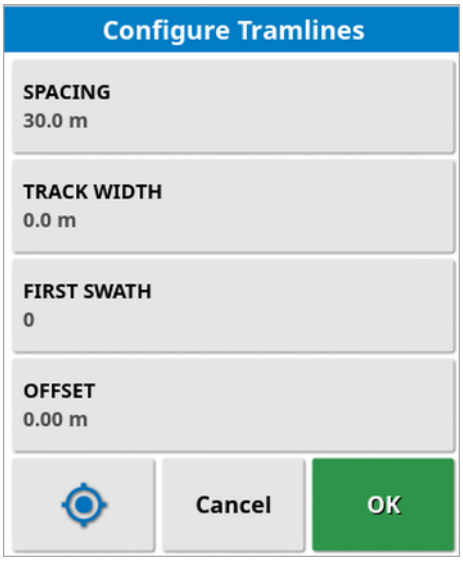
Horizon software can display a visualization of tramlines when using AB lines or identical curve guidelines. Tramlines display an indication of where the wheels of other farm equipment will travel that should not be seeded.

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

A boundary must be setup prior to setting up tramlines, see Setting a new boundary, page 168.

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

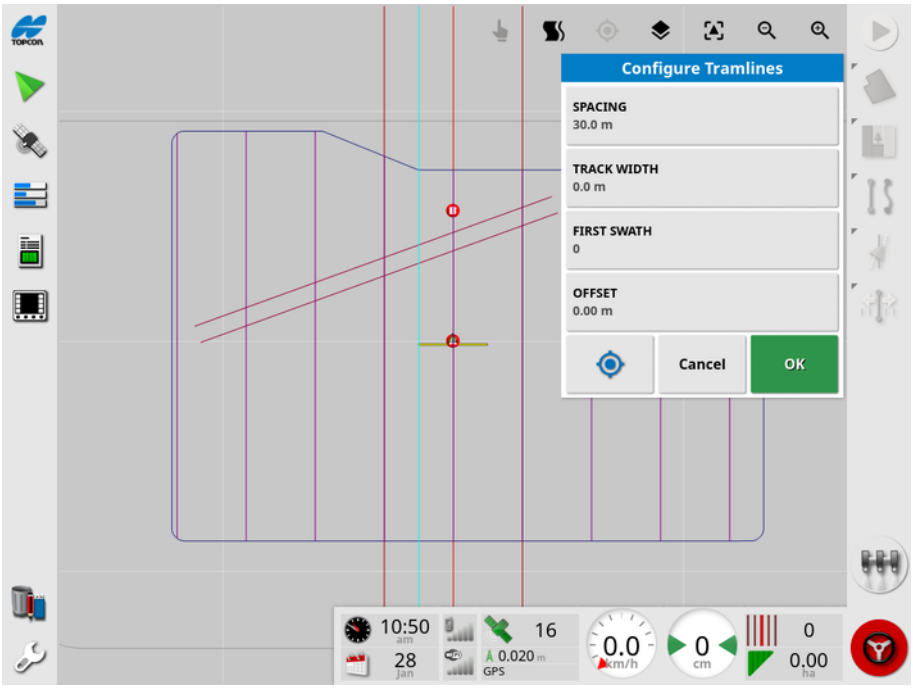
1. Ensure **Tramlines** are enabled via the setup menu **System** / **Features** / **Guidance** .
2. Select **Guidelines Menu** / **Configure Tramlines** .



- **Spacing**: The distance between the centers of the tramline passes. Usually this will be the width of the sprayer.

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

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



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

Tramlines may be displayed / hidden via an option in the map layers  . See Select visible map layers, page 132.

Configuring tramlines creates a new tramline guidance line with '_ Tramline' added to the current guidance pattern name. These tramlines can be exported via the Inventory Manager (found under Guidelines category) for use on other vehicles. See Inventory Manager, page 248.
Note: Imported tramlines cannot be reconfigured.

Note: If guideline groups are enabled, configuring tramlines creates a new tramline guideline group, rather than an individual line.

Chapter 16 – 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, see Guidance setup, page 50 to enable auto steering.

To calibrate the steering see Steering Calibrations, page 147.

16.1. 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 OK to return to the main screen and complete the necessary actions (work through issues displayed from the top to

the bottom of the screen).

16.1.1. 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 display matches the correction source requirements.	59

Error Display	Actions	Page
Position accuracy displays with red	Allow time for convergence to occur. What color is the satellite icon on the dashboard? How many satellites show next to the icon? You need at least four satellites available. Is the correction source correct? If not, select the appropriate correction source. Are you in an open space away from power lines? Drive to an open space and allow time for convergence. If on a subscription scheme, confirm current subscription. Confirm correct frequency has been set.	59
Steering controller displays with red	Confirm controller is connected and turned on. Confirm that the correct steering controller has been selected during setup. If using AES, power cycle the AES, then turn wheel a ¼ turn to enable steering.	101
Vehicle geometry displays with red	Return to Setting the Vehicle Geometry and reset dimensions correctly or re-select the vehicle profile.	99
Vehicle profile displays with red	Review which vehicle has been selected and review geometry.	96-99

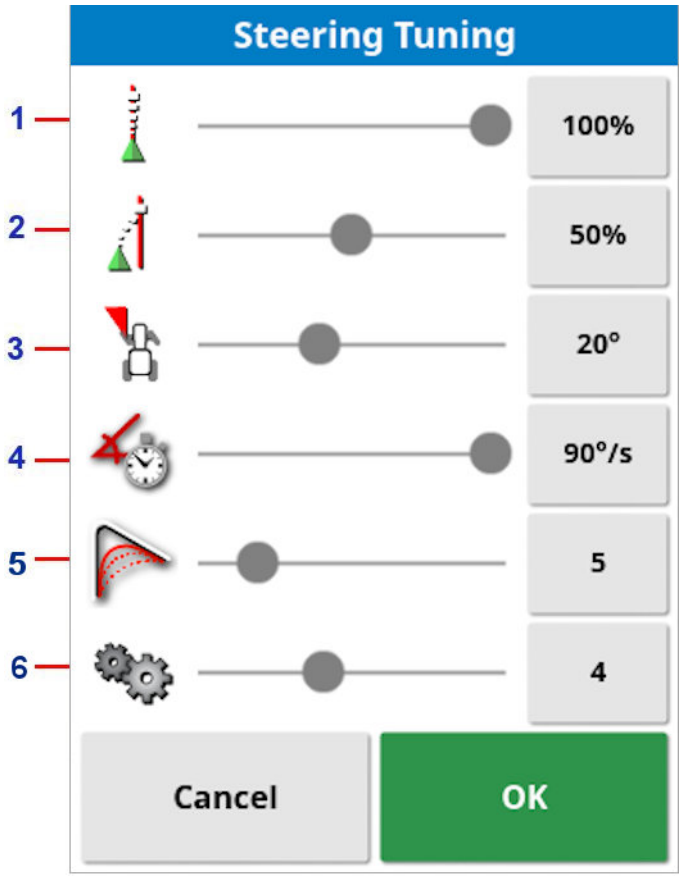
Error Display	Actions	Page
Steering calibrated displays with red	Confirm calibrations have been done for this vehicle. Drive to an open space away from power lines and obstacles, reboot and repeat calibrations.	148-151
Lockout	The steering system has been put into a transport mode (i.e. when driving on a highway) so that the steering cannot be inadvertently engaged. This error may also be triggered if there is a fault with the wheel angle sensor or the steering controller has reported an error using that message.	
Wayline available displays with red	Drive closer to the wayline (guideline). Confirm that guideline has been created and selected.	190-194
Wayline synchronized	Wayline (guideline) is not successfully loaded. Confirm connection with receiver and reload the wayline. Note that it may take some time for the wayline to be uploaded to the receiver, particularly for large curves.	
Prohibited operation	Steering cannot be engaged while certain actions are being performed. For example; steering calibration, changing GPS settings, exporting a task.	
Operator presence	The steering system will disengage if the driver leaves the control seat.	

Error Display	Actions	Page
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.	

16.2. Tuning auto steer

It is important to tune the auto steering to suit the conditions, the type of task 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. Set to suit the precision necessary for the task.

2 Approach Aggressiveness sets how aggressively the steering will approach the line. If too high, the vehicle may turn sharply. Set considering the accuracy for the task and safety for equipment users.

3 Maximum Steering Angle limits the angle of turn to stay within the limits of the vehicle's safe capability. Set to safe levels for the vehicle and any implement being towed.

4 Maximum Steering Rate limits how many degrees per second the wheels can turn. Lower values will decrease issues such as self propelled boom sprayers having the booms whip around too quickly or excessive cabin movement in articulated tractors.

5 Smoothing Radius for Curve Waylines sets how tight or loose the auto steering will adhere to curved waylines. Set to an appropriate level. Lower values will follow the curved waylines more closely.

6 Wayline Selection Aggressiveness uses the Maximum Steering Angle and the swath spacing to determine which wayline is selected next. If set at 10, the wayline closest to the vehicle is selected and if set at zero, the next selected wayline may be a few swaths away to ensure a gentle approach. The default value is 4.

AES

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

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

16.3. Engaging auto steer

To use auto steering, the operator must have:

- Established guidelines (page 187)
- Enabled auto steering on the display (page 50)
- Calibrated the steering (page 147)
- Confirmed that all Steering Status items are green (page 219)
- Set the auto steering tuning to suit the task and vehicle type (page 224)
- 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, see Setting up map options, page 35).

   Note: If an external auto steering engage switch is to be used, this needs to be enabled during setup for the vehicle. See Setting up the steering controller, page 101. If using an AES, turn on the AES and turn the steering wheel a quarter turn to enable auto steering.

2. Confirm that the Auto Steer Engage is showing white. This means it is ready to use.

Auto Steer is ready to use. Select **Auto Steer Engage** to begin.

Auto Steer is engaged and active. Select **Auto Steer Engage** to change back to manual control. Note that the button may briefly flash blue before turning green.

Auto steer cannot engage. Select **Auto Steer Engage** or return to the Steering Options Menu to see Steering Status for possible causes.

Auto steer is flashing in ‘Delayed Engage’ mode.

If Auto Steer is displaying red and the only condition displaying red on the Steering Status is easily resolved (for example speed), the operator may select **Auto Steer Engage** twice (double click) and flashing yellow will indicate that auto steer will engage if conditions are met within 15 seconds. If conditions are not met, it will return to red.

3. Correct any issue displaying red in the Steering Status Panel (work through issues displayed from the top to the bottom of the screen). When **Auto Steer Engage** is white, auto steer is ready to engage.

   For more information on Steering Status Errors see Auto steer troubleshooting, page 220.

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.

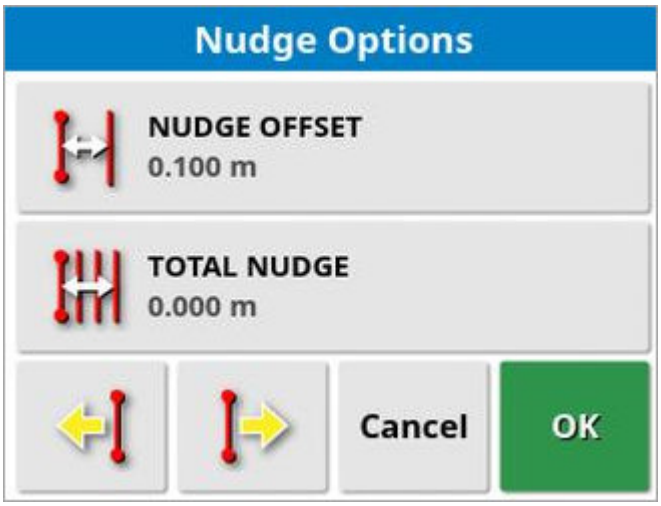
Chapter 17 – Nudge Menu

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.

17.1. 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.

If guideline groups are enabled, all lines in the group that have been nudged are saved in their new position. Lines that have not been nudged remain in their original position.

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**  .

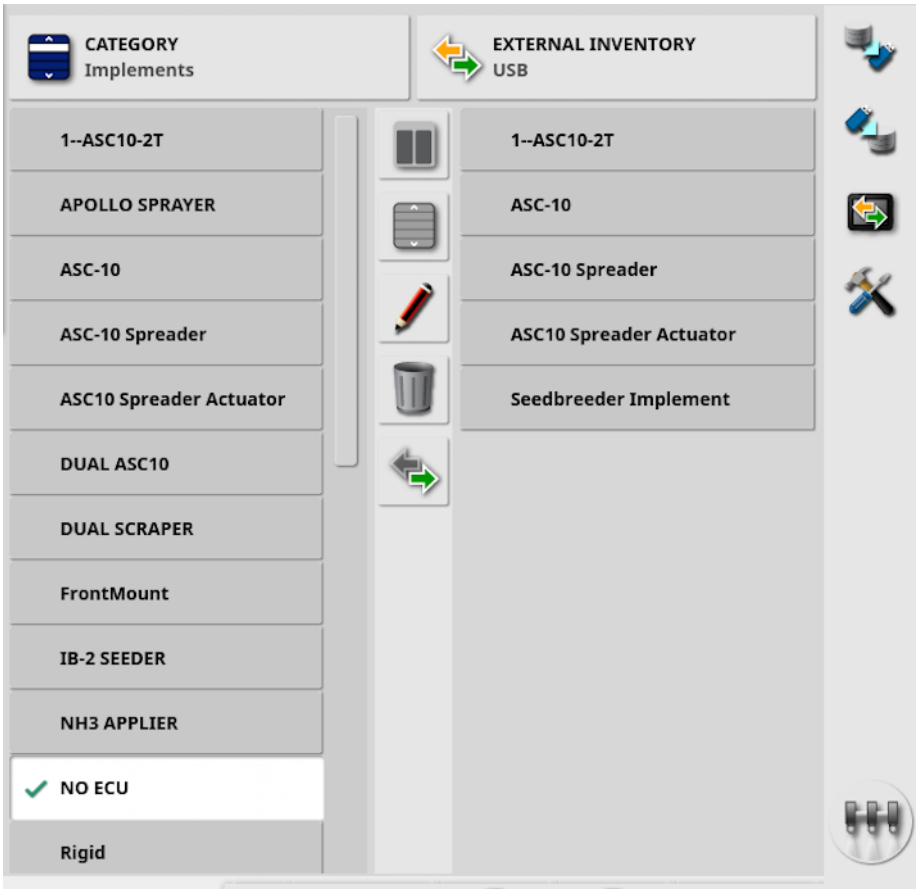
Note: When nudging a curve or pivot, the size of the curve (or radius of the pivot) will change.

Chapter 19 – Inventory Manager

The Inventory Manager allows the operator to search for and view details of information items on the console, and make changes to those items. Items can be deleted, renamed or copied to or from USB. Task data on a USB or TAP can also be browsed and imported onto the console.

1. Select **Inventory Manager** .

When opened, the screen shows a single list, which is the list of items corresponding to the selected **Category**. If a USB is inserted, or the display is connected to TAP, selecting an option from the **External Inventory** drop down list displays a split view.



When the split view is displayed, the list on the left shows data stored on the display. The list on the right shows data stored on the external device selected in the **External Inventory** drop down list, which corresponds to the selected **Category**.

- **USB**: Display items on the USB, previously displayed by selecting  . These items can be selected, renamed, deleted or copied to the console.
- **Select from USB**: Select a zip file (containing task data) or a TASKDATA.XML file directly, on the USB and import to the console. See Importing a task data selection from a USB, page 257.
- **Select from TAP**: Select a zip file containing task data from TAP and import to the console. See Importing a task data selection from TAP, page 258.

Note: If using an XD or X25 display and the split view is not displaying (the list on the right is not visible after a selection has been made from

the **External Inventory** drop down list), ensure that Inventory Manager is being displayed at full screen (no mini-views are open).

Note: Some items (such as Fields and Tasks) display additional filter options when selected from the **Category** drop down list. Select  to display the filter options. The filters are applied to both lists if split view is in use.

Note: When filtering by implement  , this displays a list of implements associated with the tasks on the system, not a list of the implement profiles on this console.

 Hide / show split view.

 Select all items from the list most recently selected.

 Rename selected item.

 Delete selected items.

 Copy to or from display. Action is performed in the direction of the highlighted arrow.

 Choose sort option to sort the lists (both lists will be sorted by the same criteria).

 Back up all inventory items or user settings onto a USB. Existing data on the USB will be deleted.

 Restore all inventory items or user settings. 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.

Exchange task data. Use to import from USB, export to USB and export to TAP. See Importing a task data set from a USB, page 258 and Exporting tasks / task data / task reports, page 252.

Save diagnostic information to the console. Use this when a dealer asks for it so the data can be assessed.

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