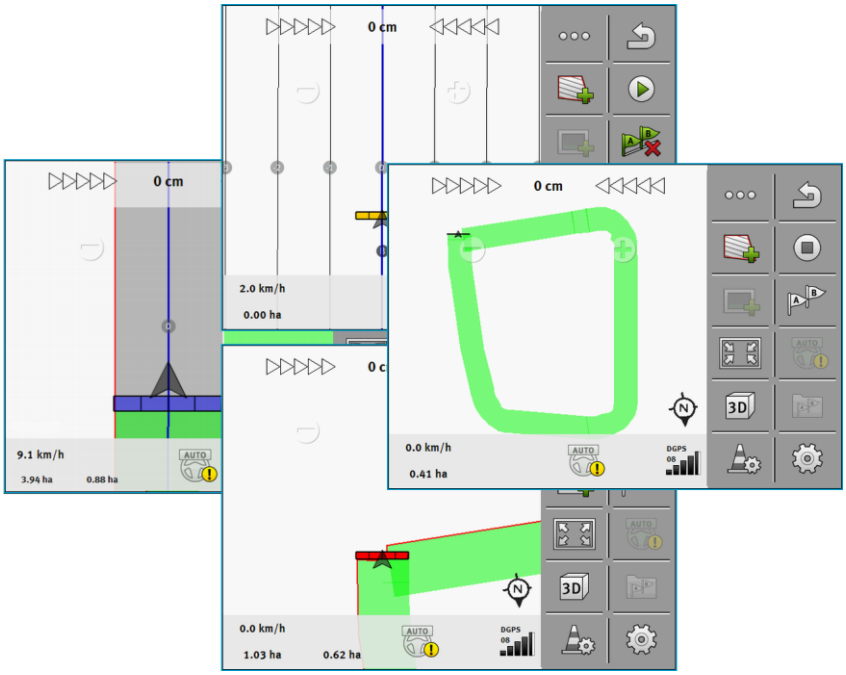
Operating Instructions

for Touch Terminals

TRACK-Leader



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Read and follow these operating instructions.

Keep these operating instructions in a safe place for later reference.

Company details

Document

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1 For your safety

1.1 Basic safety instructions

Please read the following safety instructions carefully before using the product for the first time.

- Read the operating instructions for the agricultural device which you want to control by using the application.

1.2 Intended use

The software may be only used in connection with agricultural equipment and machines. The software may only be used away from public roads, during field operations.

1.3 Layout and meaning of warnings

All safety instructions found in these Operating Instructions are composed in accordance with the following pattern:

⚠ WARNING

This signal word identifies medium-risk hazards, which could potentially cause death or serious physical injury, if not avoided.

⚠ CAUTION

This signal word identifies hazards that could potentially cause minor or moderate physical injury or damage to property, if not avoided.

NOTICE

This signal word identifies hazards that could potentially cause damage to property, if not avoided.

There are some actions that need to be performed in several steps. If there is a risk involved in carrying out any of these steps, a safety warning will appear in the instructions themselves.

Safety instructions always directly precede the step involving risk and can be identified by their bold font type and a signal word.

Example

1. **NOTICE! This is a notice.It warns that there is a risk involved in the next step.**
2. Step involving risk.

1.4 User requirements

- Learn how to operate the terminal correctly. The terminal may not be operated by anyone who has not read the Operating Instructions.
- Please read and carefully observe all safety instructions and warnings contained in these Operating Instructions and in the manuals of any connected vehicles and farm equipment.

2 Operating procedures

In this chapter, you will find several overviews of steps that help you to process a field using the TRACK-Leader application. These overviews show you the steps that can be performed sequentially and the sections in which they are explained in detail.

Before you begin, you have to configure the software. The configuration is described in the Configuration [→ 75] section and in the operating instructions for the terminal: If you are operating the terminal for the first time, configure the terminal and the TRACK-Leader application, and then return to this section.

The following operating scenarios are possible:

1. TRACK-Leader for simple parallel guidance. For example: TRACK-Guide without additional apps.
2. TRACK-Leader for parallel guidance and section control. For example: TOUCH1200 with SECTION-Control
3. TRACK-Leader for parallel guidance and simultaneous rate control using a prescription map in shape format.
4. Task management with tasks in ISO-XML format.

2.1 When using parallel guidance only

This section is of interest to you if you have a simple system without an ISOBUS job computer. For example, the TRACK-Guide III terminal without additional applications. You can also operate other terminals according to these instructions, as long as you do not connect an ISOBUS job computer and the ISOBUS-TC application remains in "Standard" operating mode.

1. Drive to the field.
2. If you have already worked on this field in the past, load its field data. [→ 69] If you want to work on a new field, you must ensure that no other field data is loaded. In this case, you must discard [→ 73] the opened record.
3. If you have a prescription map, you can import it now. See: If you are working with shape prescription maps [→ 9]
4. In the "Virtual ECU" app, activate the virtual job computer of the machine to be used. You can find more information on this in the instructions for the terminal.
5. Start a new navigation. [→ 20]
6. Check whether the terminal has properly detected the driving direction. [→ 23]
7. If you are using a GPS receiver that works with EGNOS or WAAS, set the reference point. [→ 26]
8. As a standard, the "Parallel" guidance mode is activated. If you do not want to work with straight, parallel tracks, change the guidance mode. [→ 41]
9. If you want to work with overlaps, adjust the desired distance between the guidance lines. [→ 39]
10. Start the recording. [→ 44]
11. Create the first AB line. [→ 33]
12. Mark the field boundary [→ 29] (optional).

13. If you want to work the headlands separately, activate it. [➙ 45]
14. Process the field on parallel tracks. To do so, you can use the lightbar [➙ 43] or a steering system [➙ 56].
15. If you are approaching an obstacle, you can mark its position. [➙ 48]
16. After finishing work, save the data. [➙ 69]
17. Copy the data to a USB memory device [➙ 71] to store it on a PC or view with TRACK-Guide Desktop. [➙ 73]

2.2 When using SECTION-Control

This chapter is of interest to you if you have an implement with an ISOBUS job computer and want SECTION-Control to control the sections of the implement.

1. Drive to the field.
2. If you have already worked on this field in the past, load its field data. [➙ 69] If you want to work on a new field, you must ensure that no other field data is loaded. In this case, you must discard [➙ 73] the opened record.
3. If you have a prescription map, you can import it now. See: If you are working with shape prescription maps [➙ 9]
4. If you have connected the job computer to the terminal for the first time, check the settings on the "Settings" screen | "SECTION-Control" [➙ 79]. Here, pay close attention to the "Machine type", "Delay on start" and "Delay on stop" parameters.
5. Start a new navigation. [➙ 20]
6. Check whether the terminal has properly detected the driving direction. [➙ 23]
7. If you are using a GPS receiver that works with EGNOS or WAAS, set the reference point. [➙ 26]
8. As a standard, the "Parallel" guidance mode is activated. If you do not want to work with straight, parallel tracks, change the guidance mode. [➙ 41]
9. If you want to work with overlaps, adjust the desired distance between the guidance lines. [➙ 39]
10. Activate the automatic mode [➙ 51] of SECTION-Control or operate the implement manually.
11. Create the first AB line. [➙ 33]
12. Mark the field boundary [➙ 29] (optional).
13. Mark the headlands [➙ 45] (optional).
14. Process the field on parallel tracks. To do so, you can use the lightbar [➙ 43] or a steering system [➙ 56].
15. If you are approaching an obstacle, you can mark its position. [➙ 48]
16. After finishing work, save the data. [➙ 69]
17. Copy the data to a USB memory device [➙ 71] to store it on a PC or view with TRACK-Guide Desktop. [➙ 73]

2.3 If you are also using ISOBUS-TC

2.3.1 If you are working with shape prescription maps

If you are working with prescriptions maps in shp format, you must proceed with the following steps:

1. You must create a field in the ISOBUS-TC application. You can find instructions for this in the main instructions for the terminal, in the ISOBUS-TC section.
2. Load the prescription map for the field in ISOBUS-TC.
3. Activate the field in ISOBUS-TC.
4. Then follow the descriptions in one of the following sections:
   a) When using parallel guidance only [→ 7]
   b) When using SECTION-Control [→ 8]

After finishing work, do not save the field. Instead, terminate working of the field in ISOBUS-TC.

2.3.2 If you are using ISOBUS-TC in standard mode

You can use ISOBUS-TC in standard mode to manage your fields.

To use ISOBUS-TC in standard mode, you must proceed with the following steps:

1. You must create a field in the ISOBUS-TC application. You can find instructions for this in the main instructions for the terminal, in the ISOBUS-TC section.
2. Activate the field in ISOBUS-TC.
3. Then follow the descriptions in one of the following sections:
   a) When using parallel guidance only [→ 7]
   b) When using SECTION-Control [→ 8]

2.3.3 If you are using ISOBUS-TC in extended mode

If you plan your ISO-XML tasks with the help of a Farm Management Information System (FMIS) on a PC and then want to work with the display, you will need to use the ISOBUS-TC application.

In this case, you must not save data in the TRACK-Leader application. All information generated while working will be transferred directly to ISOBUS-TC and saved in the “taskdata.xml” file.

The biggest difference compared to operation without ISOBUS-TC lies in the starting and termination of a navigation as well as the storage location of the data. Other functions are operated as described in these instructions.

1. Connect an ISOBUS job computer to the ISOBUS or activate a virtual job computer in the Virtual ECU application.
2. Open the ISOBUS-TC application.
3. Start a task. To do so, read the ISOBUS-TC operating instructions.
4. When the task has been started, open the TRACK-Leader application. The navigation should start automatically. If not, start it manually.

5. Then follow the descriptions in one of the following sections:
   a) When using parallel guidance only [→ 7]
   b) When using SECTION-Control [→ 8]

3 About these Operating Instructions

3.1 Applicability

These Operating Instructions apply to all ME modules of the TRACK-Leader application.

You can find the software version from which these Operating Instructions apply in the inner page of the cover of these instructions.

3.2 Target group of these Operating Instructions

These Operating Instructions apply to all users of the TRACK-Leader software and additional modules.

3.3 Layout of operating instructions

The operating instructions explain step by step how you can perform certain operations with the product.

We use the following symbols throughout these Operating Instructions to identify different operating instructions:

Type of depiction	Meaning
1. **2.**	Actions that must be performed in succession.
⇨	Result of the action. This will happen when you perform an action.
⇨	Result of an operating instruction. This will happen when you have completed all steps.
☑	Requirements. In the event that any requirements have been specified, these must be met before an action can be performed.

3.4 Layout of references

If any references are given in these Operating Instructions, they will appear as:

Example of a reference: [➙ 11]

References can be identified by their square brackets and an arrow. The number following the arrow shows you on what page the section starts where you can find further information.

4 Product description

TRACK-Leader is a modern system enabling drivers of agricultural vehicles to keep exact lanes in the field.

The system has a modular design, so that the user can add further functions.

4.1 Performance description

Available functions of the software are subject to a license purchased for the modules.

There are two module types:

- Basic module: Prerequisite for additional modules.
  - TRACK-Leader
- Additional modules: can be combined as required.
  - SECTION-Control
  - TRACK-Leader AUTO
  - TRACK-Leader TOP

4.1.1 TRACK-Leader

Module type: Basic module. This is the prerequisite for all additional modules mentioned above.

Preconditions

To use this module, you need to meet the following preconditions:

- Plug-in "TRACK-Leader" must be enabled.
- License of "TRACK-Leader" must be unlocked.

To learn how to activate plug-ins and licenses, read the installation and operating instructions to the terminal.

Functions

The following functions will be available after activation:

- Display of parallel guidance lines.
- Display of parallel guidance lines in the headland.
- Marking of obstacles located in the field.
- Warning of obstacles marked.
- Warning of reaching a field boundary.
- Saving of work results in two formats.
- SECTION-View – display of sections which the operator must switch on and off by hand to avoid overlaps.

4.1.2 SECTION-Control

Module type: Additional module.

With SECTION-Control you can specify for any connected job computer what parts of the agricultural equipment it shall switch off, so that you avoid overlaps. This can be for example sections when working with a sprayer.

Preconditions

To use this module, you need to meet the following preconditions:

- Plug-in "TRACK-Leader" must be enabled.
- License of "TRACK-Leader" must be unlocked.
- License of "SECTION-Control" must be unlocked.

- The terminal must be connected to an ISOBUS job computer supported by SECTION-Control or to a SC-Box available from Müller-Elektronik.
- The ISOBUS job computer must be configured.

Functions

The following functions will be available after activation:
- GPS-supported section-control.

4.1.3 TRACK-Leader TOP

Module type: Additional module.

With TRACK-Leader TOP you can specify how a Reichhardt steering job computer shall steer the vehicle, so that it follows the guidance lines set up through TRACK-Leader.

Preconditions

To use this module, you need to meet the following preconditions:
- Plug-in "TRACK-Leader" must be enabled.
- License of "TRACK-Leader" must be unlocked.
- License of "TRACK-Leader TOP" must be unlocked.
- A steering job computer must be fitted, installed and configured on the tractor.
  - TRACK-Leader TOP works with steering job computers of Reichhardt: Steering ECU PSR, starting from software version 02-148
- Support for TRACK-Leader TOP must be activated on the steering job computer.

Functions

The following functions will be available after activation:
- Automatic steering of vehicle along defined guidance lines.

4.1.4 TRACK-Leader AUTO®

Module type: Additional module.

TRACK-Leader AUTO [→ 56] enables communication between the TRACK-Leader application and a steering job computer from the following Müller-Elektronik systems:
- TRACK-Leader AUTO® eSteer
- TRACK-Leader AUTO® ISO
- TRACK-Leader AUTO® Pro

The module is only available with the following Müller-Elektronik terminals:
- TOUCH1200
- TOUCH800
- TRACK-Guide III

Preconditions

To use this module, you need to meet the following preconditions:
- Plug-in "TRACK-Leader" must be enabled.
- License of "TRACK-Leader" must be unlocked.
- The "TRACK-Leader AUTO" license must be activated.

Functions

The following functions will be available after activation:
- Automatic steering of vehicle along defined guidance lines.

4.2 Using test licenses

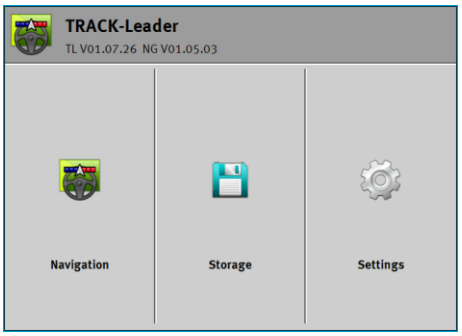
On new terminals, a 50-hour test license is activated on all modules that are not activated.

You can test each module for 50 hours. The time starts running only once you have activated a module.

After 50 hours have passed, all functions for which the test license has expired will be deactivated.

4.3 Start screen layout

The start screen appears when you open the TRACK-Leader application and no navigation has been started.



TRACK-Leader Start screen

The Start screen allows you to:

- Switch to other screens.
- View the software version (numbers beside "TL" and "NG")

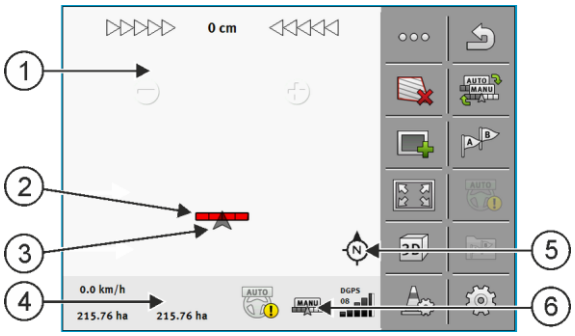
Controls

Function icon	Function
	Starts the navigation. [→ 20]
	Appears instead of the "Navigation" function icon if it is not possible to start a navigation. If you press this icon, a message [→ 94] explaining the cause will appear.
	Opens the "Storage" screen. [→ 69]
	Opens the "Settings" screen. [→ 75]

4.4 Information on the work screen

As soon as you start the navigation, the work screen appears. From here you can perform all other tasks which you will need during the field work.

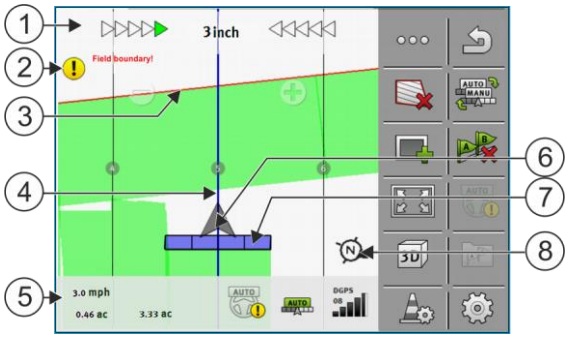
The information shown on the work screen varies depending on whether SECTION-Control is activated.



Work screen after the start, with SECTION-Control switched on

1	Navigation area	4	Current status information
2	Working bar	5	Compass
3	Icon of the vehicle	6	Status of SECTION-Control

The next illustration shows you the other information on the work screen which can appear during work.



Work screen while working

1	Screen lightbar	5	Counter and status information
2	Notification of reaching the field boundary	6	Arrow showing the position of the GPS receiver
3	Field boundary	7	Working bar
4	Guidance line	8	Compass

Guidance lines

Guidance lines are lines which help the operator keep parallel tracks.

There are three types of guidance line:

- AB line - This is the first guidance line. This is always marked on the terminal screen with the letters A and B.
- Activated guidance line – this is the guidance line which the vehicle just follows. It is marked in blue.
- Not activated guidance lines – guidance lines not activated.

Position of GPS receiver

The center of the gray arrow above the working bar corresponds to the position of the GPS receiver.

Working bar

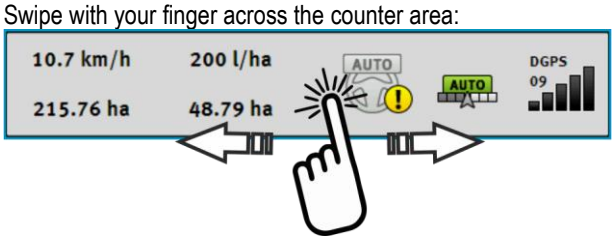
The working bar symbolizes the agricultural implement. This consists of multiple rectangles. Each rectangle corresponds to a section. The color of the rectangle can change while working.

See also: Using SECTION-View [➞ 43]

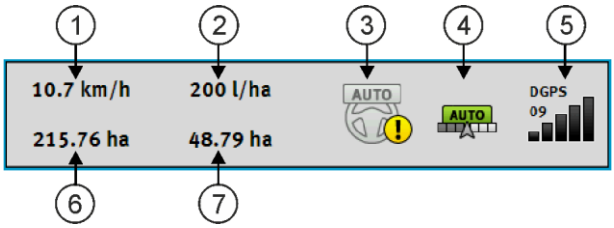
Counter and status information

In this area, you can see various information.

1. Swipe with your finger across the counter area:

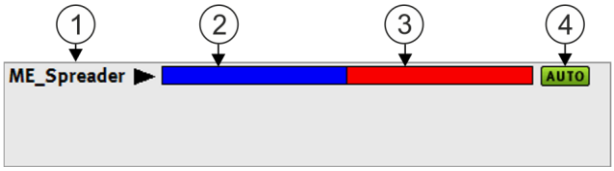


⇨ The next display appears.



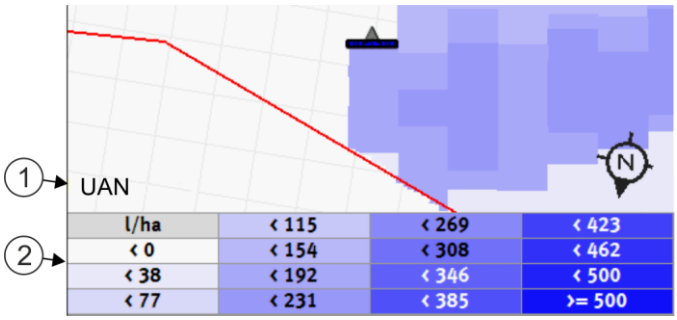
Counter

1	Speed	5	Quality of the GPS signal
2	Target rate from the prescription map	6	Area: - For a field with no field boundary: Already applied area. - For a field with field boundary: Total area of the field.
3	Status of the auto steer system	7	Only appears when you have marked the field boundary: - Area where the product still need to be applied.
4	Status of SECTION-Control: - AUTO - SECTION-Control regulates the section control of the ISOBUS job computer. - MANU - The ISOBUS job computer is operated manually.		



Display of the working width with the status of the sections, with connected ISOBUS job computers

1	Identification of the implement and its sections.	3	Deactivated section
2	Spreading section	4	Working mode of SECTION-Control on this implement



Legend for the visualized target rates

1	Name of the legend The name is given by the job computer or by an ISO-XML task.	2	Legend:

Field boundary

The Field boundary [➙ 29] tells the software the exact position of the field and is the base for calculating the total size of a field.

Traveled areas and areas where the product has been applied

The surfaces to the rear of the vehicle icon are marked in green. This green color can have any of the following meanings, depending on the configuration:

- Traveled areas
  If you are only using TRACK-Leader, the traveled surface is marked. This is marked regardless of whether or not the vehicle applied product during this travel.
- Areas where product has been applied
  If you are using SECTION-Control, the surfaces where the product has been applied are marked. Surfaces over which the vehicle travels but where no product has been applied are therefore not marked.

If you want the terminal only to mark surfaces where the product has been applied in green, proceed as follows:

- Activate SECTION-Control

or

- Mount and activate the tool operating position sensor
  The tool operating position sensor detects if an agricultural device is in operating position, and transmits this information to the terminal.

GPS connection status

Shows the status of the DGPS connection.

See also: Checking the DGPS signal quality [➙ 28]

4.5 Controls on the work screen

This section will provide you with an overview of most of the function icons that can appear on the application work screen, as well as their function.

First page

Function icon	Function / Section with more information	
	Shows the second page with function icons.	
	Exits the work screen and terminates the navigation.	
	Marking the field boundary [→ 29] A red line drawn around the field is now shown on the navigation screen. This is the field boundary.	
	Deleting the field boundary [→ 32] The field boundary will be deleted.	
	Starting track recording [→ 44] Function icons appear only when SECTION-Control is deactivated and you have no work position sensor.	
	Cancel the marking of the applied area	
	Changing the working mode of SECTION-Control [→ 51] SECTION-Control will change the working mode.	
	Working on headlands [→ 45]	Icon is deactivated because a field boundary is missing.
		Calls up a screen where the guidance lines can be defined on the headlands.
	Creating the AB line [→ 33] The exact appearance of the flags will depend on the guidance mode that has been activated. Point A of the AB line will be set.	
	Deleting guidance lines [→ 38] Press the function icon for three seconds. Guidance lines will be deleted.	
	Changing the display of the work screen The whole field will be displayed.	
	Vehicle surroundings will be displayed.	
	Two displays will alternate on the screen: "As applied map" and "Processed areas" [→ 51]	

Function icon	Function / Section with more information
	Selecting a guidance mode [→ 41] The screen for the configuration of the guidance lines appears.
	Detecting the direction [→ 23] The assumed driving direction is being changed.
	Several functions: ▪ Setting the distance between the guidance lines [→ 39] ▪ Setting the guidance line skip mode [→ 39] ▪ Setting the pattern mode [→ 40] ▪ Parameter for TRACK-Leader AUTO® [→ 92]

Second page

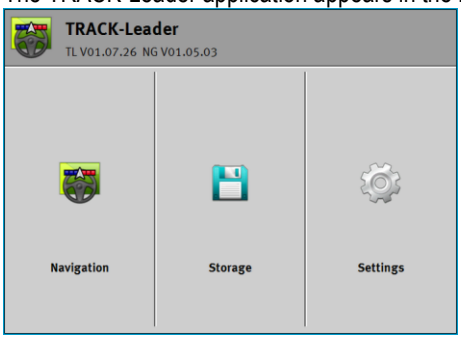
Function icon	Function / Section with more information
	Shows the first page with function icons.
	3D view will be activated
	2D view will be activated
	Marking obstacles [→ 48] Screen with obstacle marking appears.
	When this arrow appears, the system assumes that the vehicle is moving forward. [→ 23] When pressed, the assumed direction is changed.
	When this arrow appears, the system assumes that the vehicle is moving in reverse. [→ 23] When pressed, the assumed direction is changed.
	Moving guidance lines [→ 38] (Keep pressed for 3 sec.) Guidance lines will be shifted to the current position of the vehicle.
	Function icons to set the reference point [→ 26] and for calibrating the GPS signal [→ 27] appear:

5 Basic control principles

5.1 Initial start-up

Procedure

1. Start the terminal.
2. Tap the icon in the selection menu 
⇨ The TRACK-Leader application appears in the main window:



5.2 Starting navigation

There are two ways of starting a navigation:

- Using the TRACK-Leader application. [➙ 20]
- Using the ISOBUS-TC application, if you are working with ISO-XML tasks. [➙ 22]

Possible problems

If you are unable to start the navigation, and the grayed-out icon  appears on the start screen, this can be due to the following reasons:

- You have tried to start the navigation too soon. After restarting and after connecting a job computer, the terminal needs a few seconds to establish communication with all of the components. Afterwards, the "Navigation" button reappears.
- You are working without ISO-XML tasks, but the "Operating Mode" parameter is set to "Extended" in the ISOBUS-TC application.
- You are working with ISO-XML tasks and have not started a task.
- You have connected the terminal to a new ISOBUS job computer without re-starting the terminal.
- You have deactivated the "Connection with ISOBUS-TC?" parameter in the Tractor-ECU application. (Error message: Device allocation is not set.)
- One of the test licenses has expired: TRACK Leader or SECTION-Control

5.2.1 Starting in TRACK-Leader – Without ISOBUS-TC

Procedure

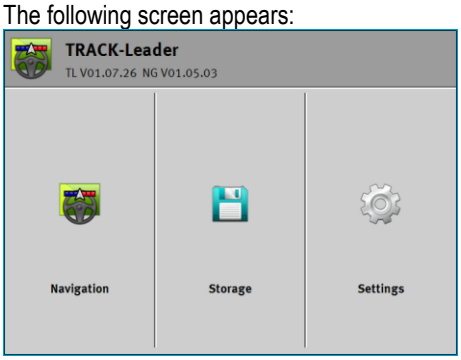
☑ If you are working with an ISOBUS job computer, it has to be connected to the ISOBUS.

☑ If you want to work without an ISOBUS job computer, you must activate the virtual job computer in the Virtual ECU application. You can find more information on this in the instructions of the terminal.

☑ You have set the "Operating Mode" parameter to "Standard" in the ISOBUS-TC application.

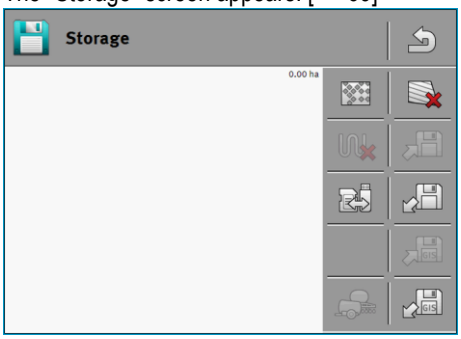
1.  - Open the TRACK-Leader application.

⇨ The following screen appears:



⇨ If the text "..." appears instead of "Navigation", you have not fulfilled one of the preconditions. To find out the precise cause, tap  :

2. Tap "Storage".
   ⇨ The "Storage" screen appears: [➙ 69]



3. You must now decide whether you want to work on a field for the first time, or if you want to work on a field whose field boundaries you have already saved. Decide which of the following options you want to use and continue to read at Step 8.
4. **Option a**: If you want to process a new field, you must ensure that there is no previous recording in the storage. Tap  to discard the opened recording. (The recording will not be deleted from the SD card.)
   ⇨ No field is displayed on the screen.
5. **Option b**: If you want to work on a field with field data you already have on the SD card, tap  to load the field data from the SD card.
   ⇨ The field that you have loaded appears on the screen.
   ⇨ You have two options with the loaded field:
6. **Option b1**: You want to continue working on this field - continue to read at Step 8.
7. **Option b2**: You want to perform a new task on this field, and only need the field boundary. Tap  to delete the tracks.
8.  - Exit the "Storage" screen.
   ⇨ The application start screen appears.
9.  - Start a new navigation.
   ⇨ The work screen appears. It will only contain the icon for the vehicle or also loaded field boundaries and applied areas - depending on which data was previously loaded.

⇨ If the icon  appears at the centre of the terminal screen, there is no connection to the GPS receiver, and you will not be able to continue work. Install and configure a GPS receiver.

10. To find out more about the information appearing on the work screen, read this section: Information on the work screen [→ 14]
11. To find out what you should do next, read this section: Operating procedures [→ 7]

5.2.2 With shape files from ISOBUS-TC

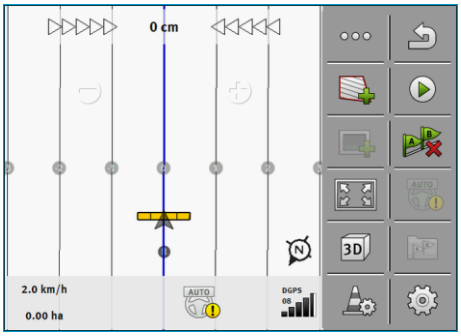
Use this method if you are using the "ISOBUS-TC" application in the standard mode.

Procedure

☑ If you are working with an ISOBUS job computer, it has to be connected to the ISOBUS.

☑ If you want to work without an ISOBUS job computer, you must activate the virtual job computer in the Virtual ECU application. You can find more information on this in the instructions of the terminal.

☑ You have set the "Operating Mode" parameter to "Standard" in the ISOBUS-TC application.

1. Activate a field in the "ISOBUS-TC" application. You can read how to do this in the terminal operating instructions.
2.  - Open the TRACK-Leader application.
   ⇨ The work screen with all of the field data saved in ISOBUS-TC appears:
   

   ⇨ If the work screen does not appear, this means that you have not fulfilled a number of the preconditions.
   ⇨ If applied areas marked in green appear on the work screen (from the previous operation), you must delete them on the "Storage" screen with the  button.
   ⇨ If the icon  appears at the centre of the terminal screen, there is no connection to the GPS receiver, and you will not be able to continue working. Install and configure a GPS receiver.
3. To find out more about the information appearing on the work screen, read this section: Information on the work screen [→ 14]
4. To find out what you should do next, read this section: Operating procedures [→ 7]

5.2.3 With an ISO-XML task

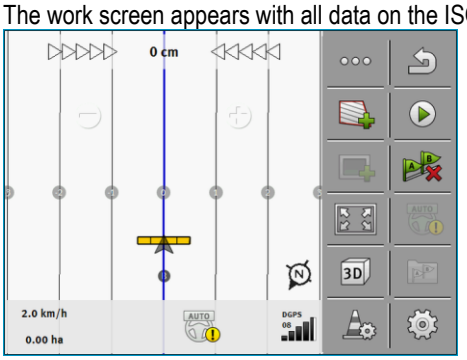
Use this method if you are using the "ISOBUS-TC" application in the extended mode.

Procedure

☑ If you are working with an ISOBUS job computer, it has to be connected to the ISOBUS.

☑ If you want to work without an ISOBUS job computer, you must activate the virtual job computer in the Virtual ECU application. You can find more information on this in the instructions of the terminal.

☑ You have set the "Operating Mode" parameter to "Extended" in the ISOBUS-TC application.

1. Start a task in the "ISOBUS-TC" application. You can read how to do this in the ISOBUS-TC operating instructions.
2.  - Open the TRACK-Leader application.
   ⇨ The work screen appears with all data on the ISO-XML task:
   

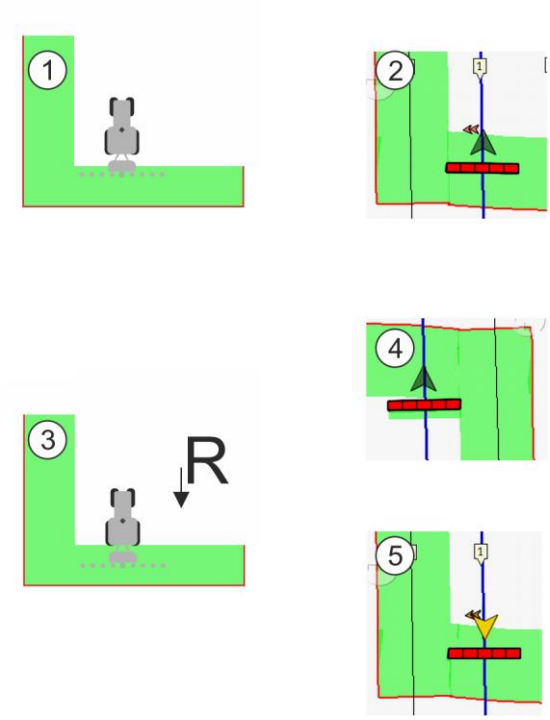
   ⇨ If the work screen does not appear, this means that you have not fulfilled a number of the preconditions.
   ⇨ If the icon  appears at the centre of the terminal screen, there is no connection to the GPS receiver, and you will not be able to continue work. Install and configure a GPS receiver.
3. To find out more about the information appearing on the work screen, read this section: Information on the work screen [→ 14]
4. To find out what you should do next, read this section: Operating procedures [→ 7]

5.3 Detecting the direction

For the system to be able to function properly when turning and driving in reverse, it is recommended to also take account of the driving direction.

As long as you are moving forwards on the field, the the implement will be properly displayed on the screen and the sections will be properly switched (1), (2). Two behaviours are possible when driving in reverse (3):

- When the driving direction is not taken into account, the terminal assumes that the vehicle is driving forwards even if the direction has changed. In this case, the vehicle is rotated by 180° on the screen. As a result, the location of the sections is wrong and there may be switching errors. (4)
- When the driving direction is taken into account, the colour and direction of the GPS arrow change. (5)



Advantages with the change in direction

The following options are available for taking account of the driving direction.

- Direction sensor in the tractor. The direction signal is transmitted through the ISOBUS and is detected by the terminal.
- Driving direction signal from the steering system.
- Semi-automatic driving direction detection using the GPS signal.

Semi-automatic driving direction detection

If the "Detect Driving Direction" [→ 76] parameter is activated, you must check if the assumed driving direction is correct after switching on the terminal.

With the first vehicle movement, the system assumes that the vehicle is driving forwards. Every subsequent change in direction will be adjusted according to this information.

For this reason, it is very important to check if the system has correctly detected the driving direction directly after starting the navigation. Especially if the vehicle was driving in reverse before or during the start of navigation, or does not yet have proper GPS reception.

The driving direction must be checked again at the latest when the system has been rebooted.

Procedure

1. Start a new navigation.
   ⇨ The arrow above the vehicle icon shows the currently assumed driving direction.
    - The vehicle is driving forwards;  - The vehicle is driving in reverse.
2. Tap  to change the assumed driving direction.
3. Every time the terminal detects a change in direction using the GPS signal, the displayed driving direction is changed.

5.4 Calibrating DGPS

DGPS means "Differential Global Positioning System".

This system is used to determine the position of the vehicle.

When should you calibrate?

If and when you calibrate the signal is dependent on the signal you use:

- If your GPS does not use a correction signal, you will need to calibrate the GPS signal every time before starting work.
  The more precisely you do this, the more precisely your system will operate. Conversely, the less precise the GPS calibration, the less precisely the system might be able to determine the position of the vehicle.
- When using an RTK correction signal, you need neither set a reference point nor calibrate the GPS signal. The position of the tractor is continuously corrected by the RTK provider by means of a correction signal.

Problem description

Throughout the course of the day, the Earth rotates and the satellites change their position in the sky. The calculated position of a point will as a result shift. This shift means that the position will, after a certain time, no longer be up-to-date.

This phenomenon is called a "drift", and can be minimized.

For your purposes, this means that all of the field boundaries and guidance lines which you create during a day will have shifted after a few hours.

Solution to the problem

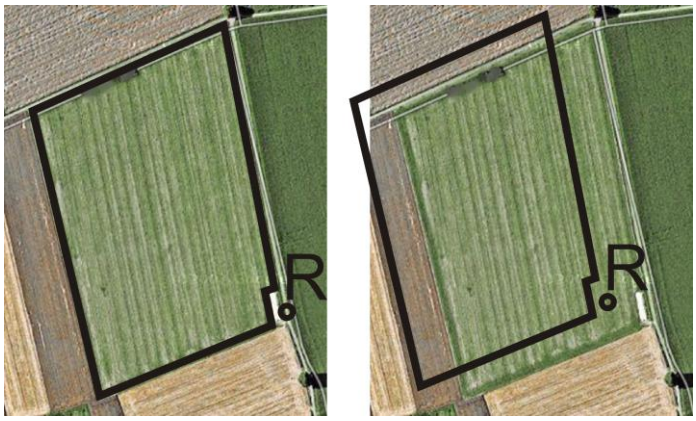
There are several ways to compensate for drift:

- By using an RTK system.
- Using the reference point – By setting the reference point and calibrating the GPS signal each time before starting work. A free option for farmers who work with EGNOS, WAAS or other DGPS signals that have a precision of approx. +/- 30cm.
- It also briefly helps to shift the guidance lines.
- By using a correction signal. A chargeable service provided by the GPS provider. Only for use in conjunction with a very accurate GPS receiver. The GPS signal must be re-calibrated automatically and at regular intervals.

5.4.1 What do you need a reference point for?

A reference point will enable you to compare your actual GPS coordinates with the saved GPS coordinates and compensate for any drift (displacement).

A fixed permanent point on the ground is needed for calibrating the GPS signal. This is the so-called reference point. When the GPS signal is calibrated, the stored coordinates of the Reference point are compared and matched with the current coordinates.



Left – field with calibrated GPS signal; Right – field with no calibrated GPS signal

If you do not set a reference point nor calibrate the GPS signal each time before starting work, the following will happen:

- The saved GPS coordinates for the field boundary, guidance lines, etc. will differ from the actual values.
- As a result, you may miss applying the product over areas in the field which are outside of the field boundaries according to the GPS.

In order to ensure maximum precision:

1. Set a reference point for each field at the first product application.
2. Before processing a field for which you have already set the reference point, calibrate the GPS signal.
3. If the field is large and you will process this over several hours, perform a calibration on the GPS signal.

5.4.2 Setting a reference point

The coordinates of the GPS receiver are crucial when setting the reference point. If you do not want to dismantle the GPS receiver each time, you must always set the vehicle in the same position. This means that the GPS receiver is also in the same position.

When setting the reference point, you will require a fixed permanent point whose position will not alter over time. For example, this can be a tree, a landmark or a manhole cover.

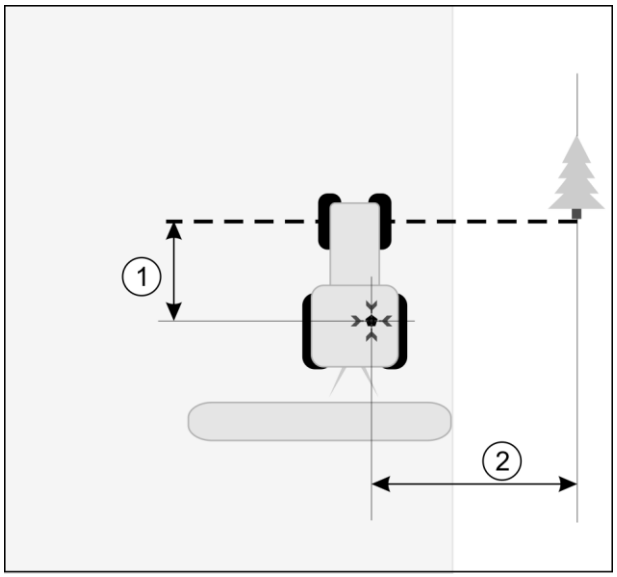
This point is required in order to position the tractor in exactly the same position for future GPS signal calibrations.

NOTICE

Data loss due to the lack of a reference point
If you are unable to locate the reference point in the future, the recorded data will be unusable.

- Always remember the precise position of the reference point for each field!

The illustration below shows a possible position of the tractor when setting the reference point:



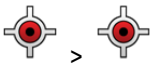
Tractor when setting the reference point

•	GPS receiver on the roof of the vehicle's cab	✳	Position of the reference point
(1)	Distance between the GPS receiver and the X-axis point on the roadside	(2)	Distance between the GPS receiver and the Y-axis point on the roadside
- - -	Line from a fixed permanent point over the road		

Procedure

☑ When you are working the field for the first time.

1. Find a fixed point at the entrance to the field. This can for example be a tree, a landmark or a manhole cover.
2. Draw a line from this point over the path on which the vehicle is standing.
3. Position the vehicle with its two front wheels on the line.
4. Write down the distance between the fixed point and the vehicle. You must also adhere to this distance when calibrating the GPS signal.
5. Start a new navigation.
6. Tap the following icons consecutively:

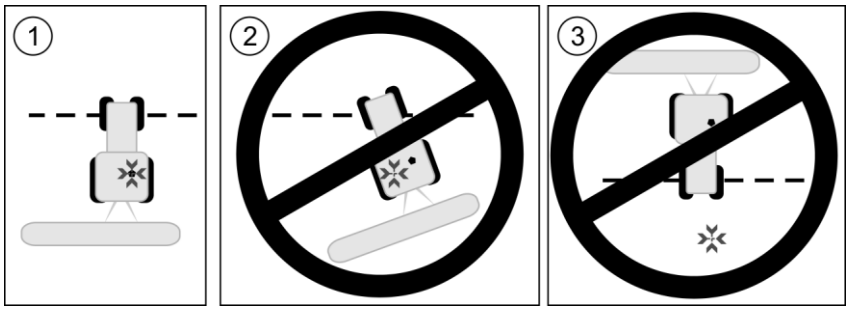
   ○○○ >  >

   ⇨ An "R" and a point will appear on the terminal screen, marking the reference point on the field. The point is located beneath the arrow.

⇨ You have now set the reference point.

5.4.3 Calibrating GPS signal

When calibrating the GPS signal, the GPS receiver must be in the exact same position as that when setting the Reference point.



Position of the GPS receiver in relation to the reference point when calibrating the GPS signal

	Position of the reference point
	GPS receiver on the roof of the tractor cab

When should you calibrate?

You will need to calibrate the GPS signal in the following instances:

- Each time before starting work
- When you find that a deviation is shown on the screen even when driving down a swath.

Procedure

☑ There is a reference point for the field.

1. Drive to the position at which you set the reference point.
2. Position the vehicle with both of its front wheels on the line which you drew when setting the reference point. The vehicle must be positioned at the same angle as when the reference point was set. The distance from the fixed permanent point on the roadside must be the same as when the reference point was set.
3. Tap the following icons consecutively:

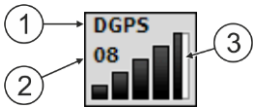
   ⇨ A window will appear showing you how many meters the signal has drifted since the last calibration.

⇨ You have calibrated the GPS signal.

5.5 Checking the quality of the GPS signal

The better the GPS signal, the more TRACK-Leader can work precisely and reliably. The quality of the GPS signal depends on several factors:

- On the model of the GPS receiver;
- On the geographical location (correction satellites are not available in some areas of the world);
- On local shadowing effects in the field (trees, mountains).



Information on the work screen

1	Current quality of the GPS signal	3	Bar chart Indicates the quality of the connection. The higher the number of blue bars, the better the connection.
2	Number of connected satellites		

Quality of the GPS signal

Quality	Description
RTK fix	Highest precision.
RTK float	Ca. 10 to 15 cm path to path accuracy, TerraStar-C.
DGPS	GPS with correction signal. Depending on the GPS receiver and configuration: WAAS, EGNOS, GLIDE or other.
GPS	Weak and imprecise signal.
INV	No GPS signal. Working is not possible.

5.6 Field boundary

You can mark the field boundary so that the system knows the outline of a field. The field boundary appears on the screen as a red line that is drawn around the field.

It is not mandatory to mark the field boundary. All modules of the application also work without field boundaries. However, their use offers several advantages:

- The total field area and applied area can be determined. It improves the filling and makes it more precise;
- The terminal warns you when you are approaching the field boundary;
- The headlands can only be shown on the screen if the field boundary is entered;
- With marked field boundaries, the sections can be automatically switched off when they leave the field. This is particularly practical for field sprayers with large working widths;

There are several options for marking the field boundary.

- Directly on the terminal: [→ 29]
  - While working with an implement;
  - When driving around the field with the tractor or another vehicle (quad bike);
- Importing the field boundary: [→ 32]
  - Import of survey data in shp format.
  - Import of older TRACK-Leader records;
  - Import of field boundaries drawn on the PC

5.6.1 Marking the field boundary by driving around the field

To be able to mark the field boundary directly on the terminal, you must drive around the field. The more precisely you drive around the field, the more precisely the sections can be switched afterwards in the boundary area.

The precision of the GPS signal is very important:

- If you can, use the most precise GPS signal possible, for example, RTK.
- If you are working with DGPS, calibrate the GPS signal every 15 minutes. To do this, interrupt the recording ( icon) and drive to the reference point. After calibration, drive back to the spot where you interrupted driving around the field.

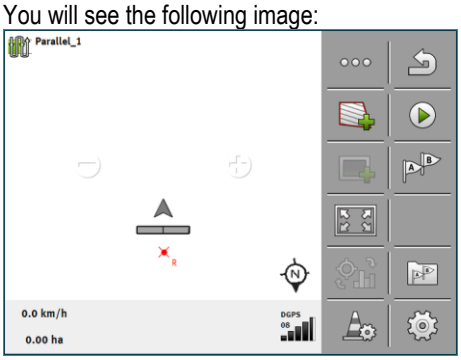
Basic procedure - without ISOBUS job computer and without SECTION-Control

Procedure

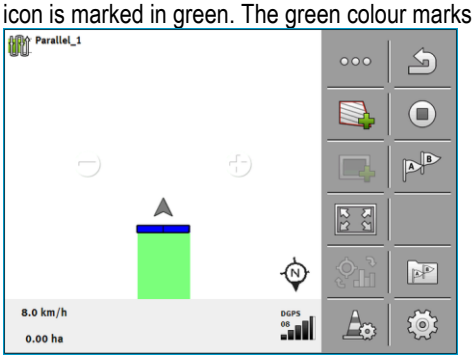
If you are working without an ISOBUS job computer and without SECTION-Control, here is how to drive around the field:

☑ In the "Virtual ECU" app, you have activated the virtual job computer for the implement to be used.

1. Start a new navigation.
2. If you are working without RTK, set the reference point or calibrate the GPS signal.
   ⇨ You will see the following image:

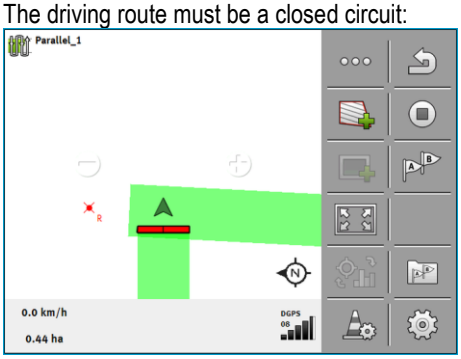


3.  - Press on this function icon to tell the terminal that the implement is working. If a work position sensor is installed on the implement (or tractor) and it is configured in the machine profile, this icon does not appear. In this case, the terminal automatically detects that the implement is working.
4. Switch on the implement and put it into working position.
5. Drive around the field. In doing so, try to drive directly at the field edge with the outer part of the implement. If you notice that the working width is different than the implement width, stop and correct the "Working width" parameter in the Virtual ECU. While driving around the field, you can even set this parameter a little higher and then drive with a constant distance to the field edge.
   ⇨ After the first few centimetres, you will see on the screen that the area behind the vehicle icon is marked in green. The green colour marks the applied area:



6. Drive around the entire field.
7. Stop when you have completed the route around the field.

⇨ The driving route must be a closed circuit:



8.  - Press this function icon to mark the field boundary surrounding the area marked in green.

⇨ A red line drawn around the field is now shown on the navigation screen. This is the field boundary.

⇨ The calculated field area now appears in the counter area.

⇨ Because you are positioned near the field boundary, the terminal starts to beep and the warning "Field boundary" appears on the screen.

You can save the marked field boundary.

Driving around the field with SECTION-Control

If you are working with SECTION-Control, proceed almost in the same way as described in the basic procedure.

Important:

- An ISOBUS job computer must be connected.
- The  and  function icons are replaced by this icon 

. In Step 3 of the basic procedure, you have to activate the automatic mode of SECTION-Control. The applied area will be automatically marked as soon as the implement is working.

Driving around the field perimeter with ISOBUS-TC

If you are using ISOBUS-TC in standard mode, you always have to create a field in ISOBUS-TC and activate it before you follow the basic procedure described here.

Driving around the field with a tractor, quad bike or a different vehicle without implement

In many cases, it is better to drive around the field with a vehicle that is not pulling an implement.

Important:

- You have to install the terminal and the GPS receiver on the vehicle.
- You must create a virtual job computer for the vehicle in the Virtual ECU application. In doing so, enter the position of the GPS receiver and the working width very precisely.
- Half of the working width corresponds to the distance from the centre of the vehicle to the field boundary. Maintain this constant distance while driving around the entire field.

5.6.2 Importing a field boundary

You can import the field boundary from an external program. This can be older field boundaries that you have created with a different terminal, or data from a survey company. The source is not important. It is only important that the boundary was drawn very accurately.

The file must have the following properties:

- File format: shp
- Standard: WGS84

You can find out how to work with shape files in section: If you are using ISOBUS-TC in standard mode [→ 9]

5.6.3 Deleting the field boundary

Procedure

1. Touch the following function icon for approx. 3 seconds: 
   ⇨ The following message will appear: "Do you want to delete the field boundary?"
2. "Yes" - to confirm.

⇨ The field boundary will be deleted.

6 TRACK-Leader parallel guidance

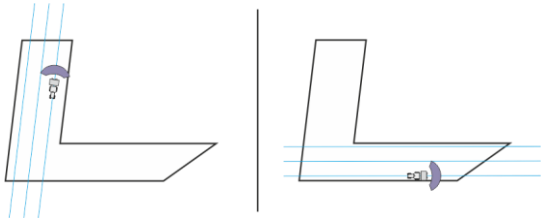
6.1 Using guidance lines for parallel guidance

Guidance lines are parallel lines which are displayed on the terminal screen. These help you to treat the field in parallel lines.

The first guidance line which you lay out on the terminal is called the AB line. On the terminal screen, these are usually marked with the letters A and B. All further guidance lines will be calculated and designated on the basis of the AB line.

The path of the AB line will be saved after the first drive-over, which you must perform manually. The operation of the terminal will depend on the guidance mode that you have chosen.

To be able to change the working direction on every field, you can create several guidance line sets. [→ 41] For every guidance line set, you can create the guidance lines in a different direction and in a different mode.

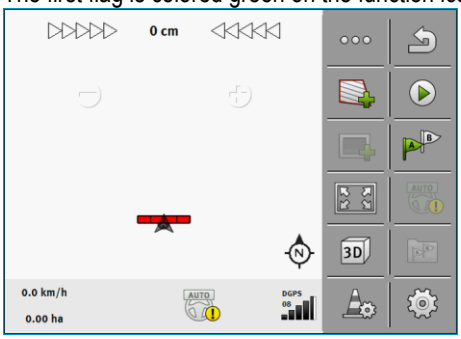


You can select a guidance line set for each direction.

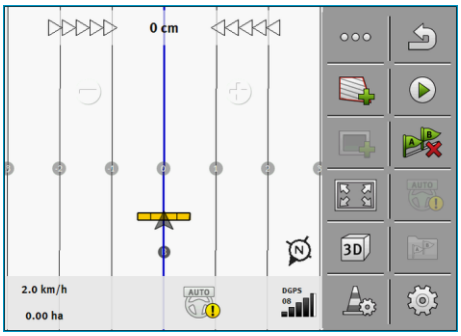
6.1.1 Straight guidance lines

Procedure

☑ "Parallel" guidance mode is activated. [→ 41]

1. Position the vehicle at the starting point of the desired AB line.
2.  - Set the first point.
   ⇨ Point A appears on the terminal screen.
   ⇨ The first flag is colored green on the function icon.
   ⇨ 

3. Drive to the other side of the field.
4.  - Set the second point.
   ⇨ Point B appears on the terminal screen.
   ⇨ The second flag is colored green on the function icon.
   ⇨ Points A and B are connected with a straight line. This is the AB line.
   ⇨ Further guidance lines are displayed to the left and right of the AB line.

⇨ 

6.1.2 Guidance lines as a curve

Procedure

☑ "Contour" guidance mode is activated. [→ 41]

1. Position the vehicle at the starting point of the desired AB line.
2.  - Set the first point.
   ⇨ Point A appears on the terminal screen.
3. Drive to the other side of the field. You do not need to drive in a straight line when you do this.
   ⇨ During the drive, a line will be drawn behind the vehicle on the terminal screen.
4.  - Set the second point.
   ⇨ Point B appears on the terminal screen.
   ⇨ Points A and B are connected with a line.
5. Further guidance lines are displayed to the left and right of the AB line.

6.1.3 Guidance lines using a compass

Procedure

☑ Guidance mode "A+" is activated. [→ 41]

1. Position the vehicle at the starting point of the desired AB line.
2. Tap the icon: 
   ⇨ A keyboard will appear.
3. Input the direction of the compass towards which you want the guidance lines to lead. You can input a value between 0° and 360°.
4.  - Confirm.
   ⇨ Multiple parallel guidance lines are drawn on the terminal screen, and these all run in the direction which you have entered.

6.1.4 Combined guidance line

In the "AB and contour" guidance mode, you can draw a guidance line consisting both of parallel straight lines and curves.

Function icon	Function	Result
	Sets point A.	
	Starts the recording of a contour line.	Sets a red point, which is connected to the last point with a straight line.
	Pauses the recording of the contour line.	Sets a red point, starting at which a straight line will be recorded.
	Sets the last point and terminates the recording of the AB line.	

Procedure

☑ "A-B and contour" guidance mode is activated. [→ 41]

1. Position the vehicle at the starting point of the desired AB line.
2.  - Set the first point.
   ⇨ Point A appears on the terminal screen.
3. Keep driving straight ahead as long as you need a straight guidance line.
   ⇨ While driving, a line will be drawn behind the vehicle on the terminal screen.
   ⇨ The line is dashed and straight.
4.  - Terminate the recording of the straight AB line.
   ⇨ The  icon is replaced by the  icon.
   ⇨ A small red point will be set on the screen.
   ⇨ Now you can record a curve as a guidance line.
   ⇨ While driving, a line will be drawn behind the vehicle on the terminal screen.
5. If you want to draw a new straight line again, you can tap the  icon again, and continue like in step 3.
6.  - Set the second point to terminate the recording.
   ⇨ Point B appears on the terminal screen.

⇨ Points A and B are connected with a line.

6.1.5 Using automatically created guidance lines

The system is capable of automatically creating guidance lines.

- On the headlands. [→ 45]
- On the inside of the field. This case is not described here.

By using this function, you can often omit creating the first AB line with manual steering. You can use your steering system right from the beginning instead.

Mode of operation

If a field boundary appears on the screen in TRACK-Leader, the system can automatically create the guidance lines. These guidance lines are always straight and run parallel to each other. The first AB

line is created as a connecting line between two points that are set beside the field boundary. The distance from the field boundary is half the working width.

Multiple guidance line sets are created at once. You can choose which lines you want to use. You should then delete the guidance line sets that are not required

In general terms, operation consists of the following phases:

1. Providing the field boundary: Drive around the field, load a shape field boundary in ISOBUS-TC, or load an old field boundary in TRACK-Leader.
2. Adding the headlands: [→ 45] To do so, mark the "Automatically create guidance lines" parameter.
3. Delete unnecessary guidance line sets.
4. Select the guidance line for the job.

Procedure

To use automatically created guidance lines:

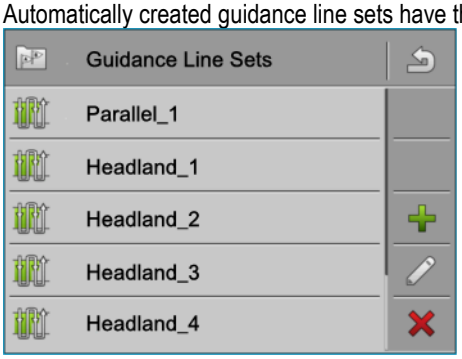
☑ You a positioned on the field that you want to work on.

☑ You have started a navigation.

☑ The field boundary appears on the screen:

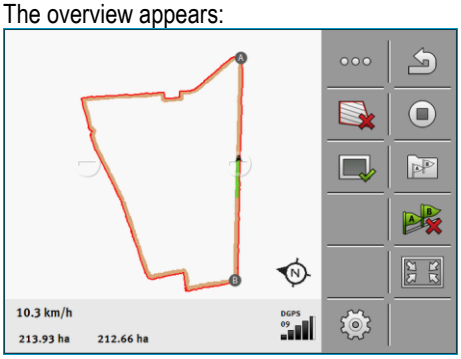
☑ There are no guidance lines.

1.  - Create the headland.
2. Set the "Minimum turning radius" parameter.
3. Set a check mark for the "Automatically create guidance lines" parameter.
4.  - Exit the screen.
5. Confirm that you want to create the headland. You can still delete it later.
6.  - Open the list with available guidance line sets.
   ⇨ Automatically created guidance line sets have the designation "Headland_(no.)".



7. You must now decide which guidance line sets you want to keep and which you want to delete.
8. Tap twice on one of the guidance line sets.
   ⇨ The work screen appears.
9.  - Enlarge the screen.

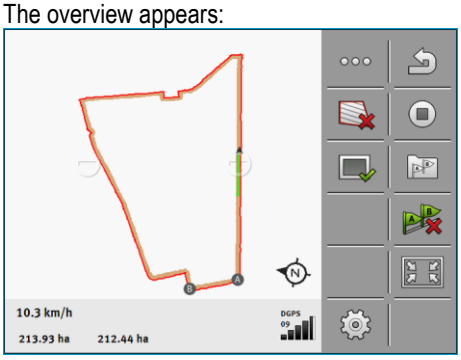
⇨ The overview appears:



⇨ You will see two points in the overview: A and B

10. Check if a line drawn between points A and B is suitable as an AB line.
11. You now have two options:
12. **Option a**: If the guidance line is not suitable for working the field, delete the guidance line set.
13.  - Open the list with available guidance line sets.
14.  - Delete the guidance line set. The marked line set is always the one that is deleted. You can mark a guidance line set by tapping it once.
15. **Option b**: If you want to keep the guidance line set, rename it.
16.  - Open the list with available guidance line sets.
17.  - Rename the marked guidance line set.
18. Tap twice on the next guidance line set.
19.  - Maximise the screen.

⇨ The overview appears:



20. Check if a line drawn between points A and B is suitable as an AB line.
21.  - Open the list with available guidance line sets.
22.  - Here, you can delete the guidance line set. The marked line set is always the one that is deleted. You can mark a guidance line set by tapping it once.
23. Repeat these steps for all automatically created guidance line sets.

6.1.6 Guidance lines as circles

Procedure

☑ "Circle" guidance mode is activated.

1. Position the vehicle at the outer edge of the field, next to the circular irrigation equipment.
2.  - Set the first point.
3. Drive at least halfway around the circumference of the field.
4.  - Set the second point.
   ⇨ Circular guidance lines appear on the terminal screen.

6.1.7 Adaptive guidance lines

Procedure

☑ "Adaptive contour(s) manual" or "Adaptive contour(s) auto" guidance mode is activated.

1. Position the vehicle at the starting point of the desired AB line.
2.  - Set the first point.
3. Drive to the other side of the field.
   ⇨ A line is drawn behind the arrow icon.
4.  - Mark the turn maneuver in "Adaptive contour(s) manual" guidance mode.
5. Make a turn in "Adaptive contour(s) auto" guidance mode. The system will automatically notice that you are turning.
   ⇨ New guidance lines appear to the left and right of the drawn line.
6. Follow the new guidance line.

6.1.8 Deleting guidance lines

You can delete guidance lines and create new ones at any time.

Procedure

1. Touch one of the following functions icon for approx. 3 seconds:  . The icons can appear different depending on the guidance mode.
   ⇨ The following message will appear: "Do you want to delete the guidance lines?"
2. "Yes" - to confirm.
   ⇨ The guidance lines will be deleted.

6.1.9 Moving guidance lines

Use this function if you are indeed on the desired line of travel but the position of the tractor is shown beside the track on the terminal.

This function only operates in the following guidance modes:

- Parallel
- Contour

Procedure

☑ Navigation is started.

1. - Call up the next page with function icons.
2.  - Move the guidance lines to the position of the GPS receiver.

⇨ The guidance lines, field boundaries and routes will be moved.

6.1.10 Setting the distance between the guidance lines

As standard, the distance between the guidance lines corresponds to the working width, but you can change this distance.

Example

Sprayer working width = 18m

You want to ensure that nothing is left out during field treatment.

Set the "Line spacing" parameter to 58.38 ft (17.80 m), for example. You will then work with a 0.67 ft (20 cm) overlap (0.33 ft (10 cm) on the left and 0.33 ft on the right).

Procedure

☑ Navigation is started.

1.  - Switch to the "Navigation Settings" screen.
   ⇨ The "Navigation Settings" screen appears.
2. Tap "Line spacing".
   ⇨ The keyboard appears.
3. Enter how many meters there should be between two guidance lines.
4.  - Confirm.
   ⇨ The "Navigation Settings" screen appears.
5. Exit the screen.

6.1.11 Setting the guidance line skip mode

When you want to drive in parallel and thus use every second or third guidance line, you can set these guidance lines to be marked more boldly than the others.

Example

If you input the number "2", every second guidance line will be displayed in bold, whereas inputting the number "3" will display every third guidance line in bold, etc.

Procedure

☑ Navigation is started.

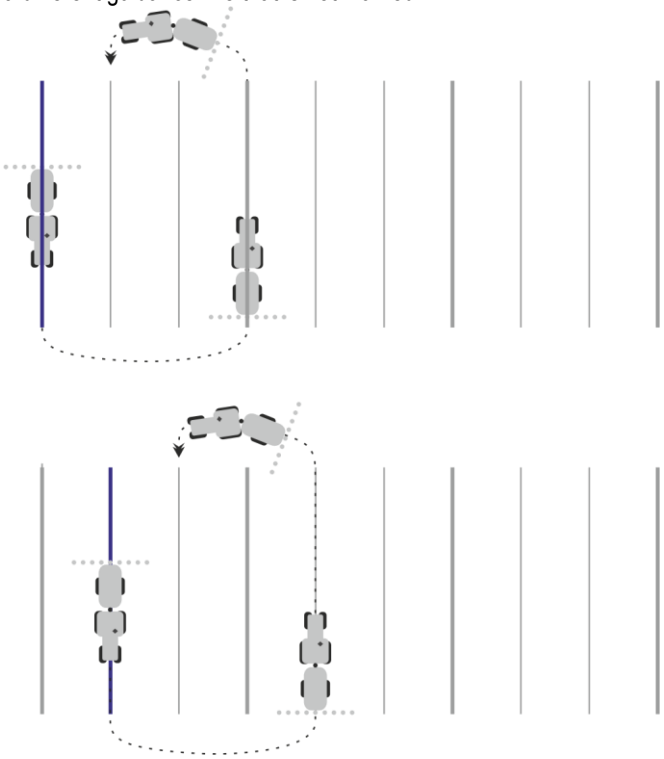
1.  - Switch to the "Navigation Settings" screen.
   ⇨ The "Navigation Settings" screen appears.
2. Tap "Pattern interval".
   ⇨ The keyboard appears.
3. Input the interval at which the guidance lines should be marked in bold.
4.  - Confirm.
   ⇨ The "Navigation Settings" screen appears.
5. Leave the screen.

Setting the pattern mode

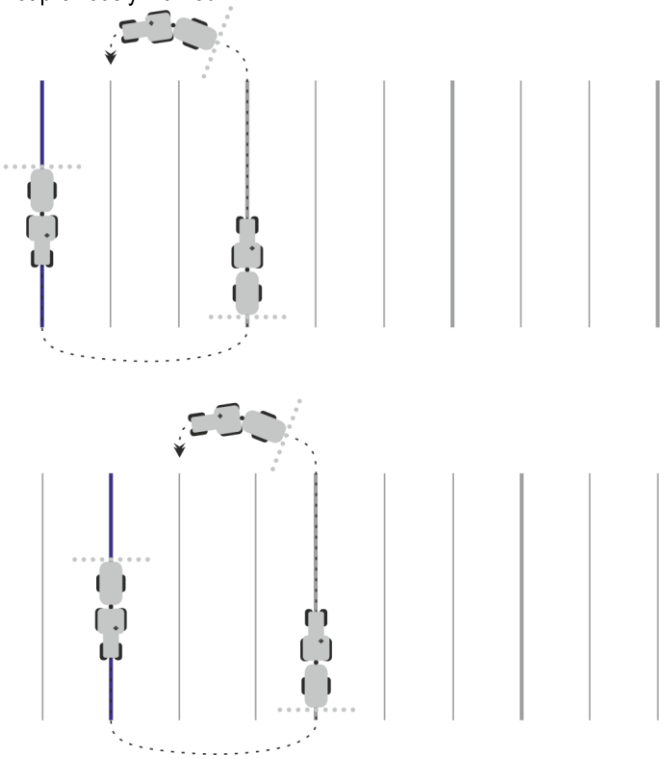
If you are using the "Pattern interval" function, you can set whether the marking of the guidance lines to be applied should change during work.

Possible settings

- "Absolute" – the initially marked guidance lines always remain marked, even if you are following a different guidance line that is not marked:



- "Relative" – with this setting, all of the markings are shifted as soon as you follow a line that was not previously marked:



6.1.12 Selecting a guidance mode

The guidance mode determines how the guidance lines are applied and how these run over the field.

Function icon	Function
	Exits the "Guidance line sets" screen without adopting a new guidance line set.
	Creates a new guidance line set.
	Enables the modification of a guidance line set.
	Deletes the marked guidance line set.

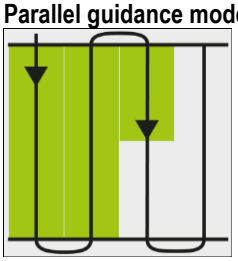
Procedure

☑ A navigation is started.

1.  - Switch to the "Guidance line sets" screen.
   ⇨ The "Guidance line sets" screen appears.
2.  - Create a new guidance line set.
   ⇨ The "Guidance line set" screen appears, with the lines: "Guidance mode" and "Name".
3. Tap the "Guidance mode" line.
   ⇨ A list appears.
4. Select the desired guidance mode.
5.  - Confirm your selection.
   ⇨ The "Guidance line set" screen appears.
6.  - Exit the screen.
   ⇨ The "Guidance line sets" screen appears.
7. Double-tap the desired guidance set to activate it on the navigation screen.
   ⇨ The guidance lines of the guidance line set used until now will be hidden.
   ⇨ You have changed the guidance mode and can now create a new guidance line.
   ⇨ You can change the guidance line set at any time.

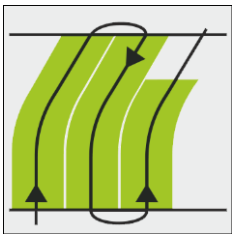
The following guidance modes are available:

- **Parallel guidance mode**



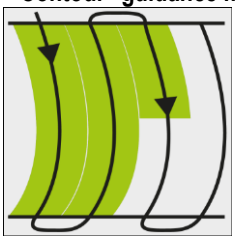
This guidance mode allows you to work the field in parallel, straight lines.

- **"A-B and contour" guidance mode**



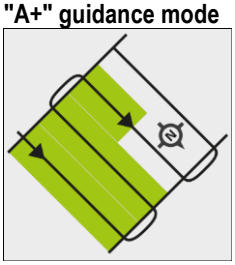
In this guidance mode, you can create a guidance line that first consists of a contour and then of a straight AB line.

- **"Contour" guidance mode**



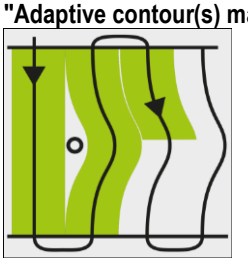
Use this guidance mode if your field has a field boundary that is continuously uneven.

- **"A+" guidance mode**



This guidance mode allows you to manually input the geographical direction in which the guidance lines should be laid. To do this, simply input the direction in degrees (between 0° and 360°), and the guidance lines are automatically laid, parallel to each other.

- **"Adaptive contour(s) manual" guidance mode**



In this guidance mode, the path of the vehicle is recorded during each crossing. The next guidance line is only laid out after a turn. This will be an exact copy of the last crossing.
You must press a button before each turn.

- **"Adaptive contour(s) auto" guidance mode**
  This mode functions in the same way as "Adaptive contour(s) manual", but the terminal automatically recognizes that you are turning.
- **"Circle" guidance mode**

This guidance mode allows you to lay out circular guidance lines in order to treat fields which are equipped with circular irrigation equipment.

- **Automatic guidance lines**

There is an alternative to the guidance modes: Automatic creation of the guidance lines when working with the headland. More about this in section: Working in headlands [→ 45]

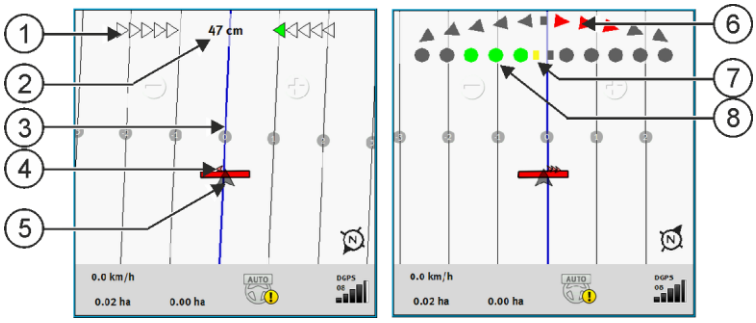
6.2 Parallel driving with the help of the lightbar and the guidance line

The display screen-lightbar helps you to follow the guidance line. This shows you when you have moved off the track and also once you have returned to the track.

The following types of screen lightbars are available:

- The screen lightbar in graphic mode
- The screen lightbar in text mode

In addition to the screen lightbar, a direction arrow appears on the screen, which indicates the correct steering direction.



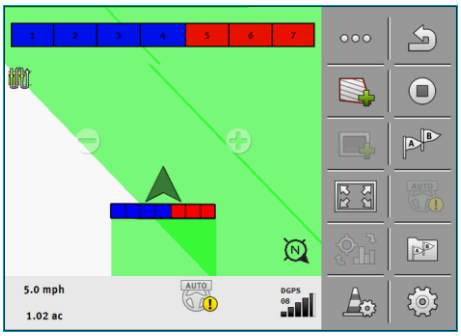
Display screen lightbar. Left: Text mode; right: Graphic Mode

1	Direction display of the lightbar in text mode.	6	Triangle This shows you how sharply and the direction in which you must turn in order to reach the ideal position at a certain distance. See also the "Preview" parameter [→ 78].
2	Current deviation from the guidance line.	7	Marking of the optimal position
3	Guidance line This shows the optimal position of the vehicle.	8	Current deviation from the guidance line Each point corresponds to a deviation of 30 cm.
4	Direction arrow		
5	Position of GPS receiver		

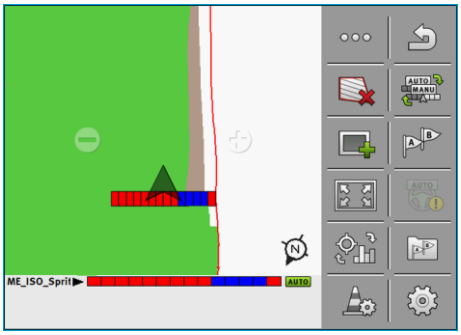
To change the lightbar type while working, tap with your finger on the upper area of the screen.

6.3 Using SECTION-View

SECTION-View is a schematic display of the working width and the sections. This displays the vehicle as an icon and can replace the screen lightbar.



Without an ISOBUS job computer: SECTION-View in the header and as a working bar



With an ISOBUS job computer: SECTION-View in the footer and as a working bar

If you are working without an ISOBUS job computer, you can use the display to help you when switching sections. If you are working with an ISOBUS job computer, the sections are actuated automatically. The colors tell you their current status.

Color	You have to do:
gray	The recording is deactivated. Beneath the section, the field has already been processed, or the vehicle is stopped.
yellow	The recording is deactivated. The ground beneath the section is unprocessed.
red	Switch off the section. The recording is activated.
blue	Switch on the section. The recording is activated.

6.4 Starting track recording

You do not need to read this chapter if:

- SECTION-Control is activated
- You have an operating position sensor

If you do not use SECTION-Control or have not mounted any tool operating position sensor, the terminal will not know when your equipment (e.g. sprayer) is working and when it is not. You will therefore need to tell the system when you begin the task.

Recording the tracks enables you to see the parts of the field which you have already traveled through on the screen.

Procedure

☑ You have started a navigation.

1.  - Start the recording as soon as you start working.

⇨ The function icon changes its appearance: 

⇨ The processed area behind the vehicle icon is marked in green.

6.5 Working in headlands

In the headland you can lay out guidance lines which will guide you around the field.

Advantages:

- You can apply product in the headland after applying the product in the center of the field. In this way, no spray residue remains on the tires after product application in the headland.
- SECTION-Control switches off the boom sections which are in the headland area when the product is being applied onto the field.
- You can use the TRACK-Leader AUTO steering system on the headland.

Restrictions:

- When working with headlands, the TRACK-Leader TOP automatic steering system cannot be used. The operator must steer the vehicle himself, manually.

Function icon	The system is in this state when the icon appears	This happens when you press the function key next to the icon
	Headland is deactivated and has never been activated for this field before. The field boundary has not been recorded.	Cannot be pressed.
	Headland is not activated. First appears when the field boundary has been marked.	Calls up a window in which the guidance lines can be defined in the headland.
	You can now apply the product inside the field. SECTION-Control only applies product in the interior of the field. Sections will be switched off when passing over to a headland. Parallel navigation within the field is activated.	Parallel navigation in headlands will be activated.
	Now you can apply the product to the headland.	Parallel navigation within the field will be activated.

Procedure

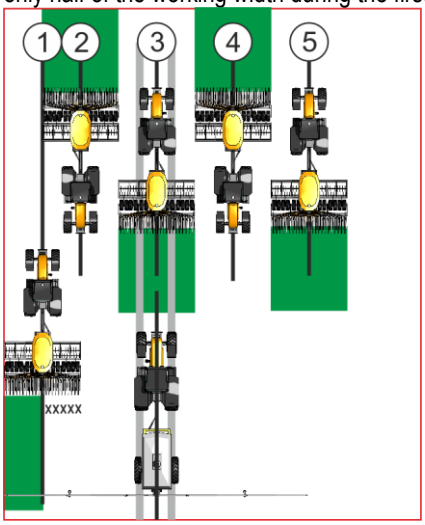
The parameters only appear once: when creating the headlands. Therefore, if you load a field boundary that also contains headlands, you can only change the headland settings as follows:

1.  (press and hold) - Delete the headland.
2.  - Create it once again.

Parameter

You can configure the following parameters:

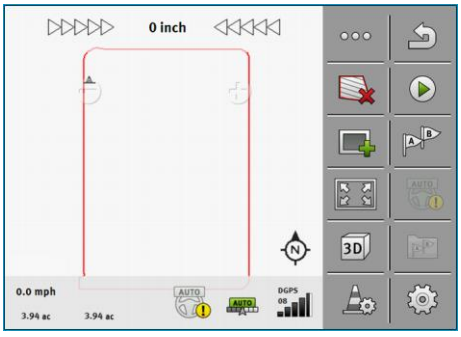
- "**Headland width**"
  Input here how wide the headland should be. You can input the working width of the widest machine as a basis, for example the sprayer.
- "**Guidance line distance**"
  Here, input how widely separated from each other the guidance lines should be. This normally corresponds to the working width of the used working equipment.
- **"Minimal turning radius"**
  To prevent the lines on the headland from crossing at an angle less than 90°, you can enter a radius here that can be driven by your vehicle with the mounted implement.
- **"Automatically create guidance lines"**
  If you activate this option, the terminal automatically creates guidance lines for the inside of the field. The guidance lines will be drawn as straight parallel lines.
  In doing so, three guidance line sets will be created in the folder with the guidance line sets, so that you can choose the direction in which you want to work the field. The guidance line sets are names "Headland" 1 to 3.
  Here, you can continue reading about how to select a guidance line set: Selecting a guidance mode [→ 41]
- "**Half width mode**"
  Parameter for seeders only.
  Set the parameter to "yes" when you want to lay out guidance lines for the sprayer with the seeder and thus lay out both guidance lines in a single drive-over.
  In this mode, the guidance lines are laid out in such a way that the seeder can only work with only half of the working width during the first or second driver.



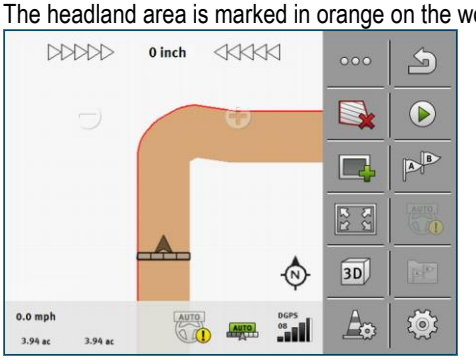
Procedure

☑ A field with field boundaries is loaded.

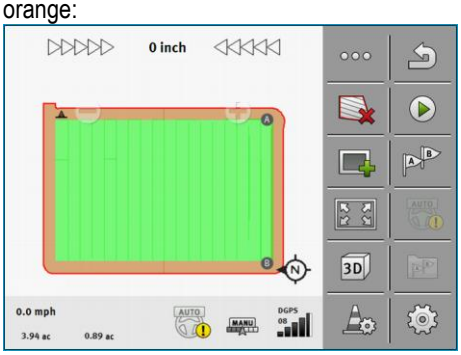
1. Start a new navigation.
   ⇨ A field with field boundaries and an unmarked headland is displayed.



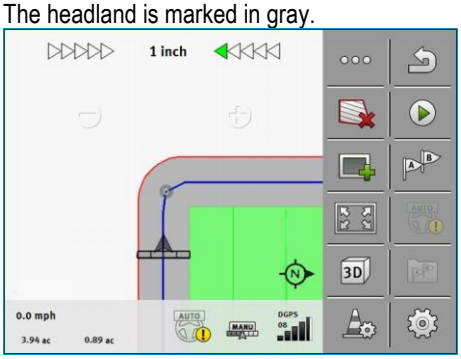
2.  - Call up the parameters for the headland.
   ⇨ The parameters are displayed.
3. Enter the parameters.
4.  - Exit the screen.
   ⇨ The headland area is marked in orange on the work screen.



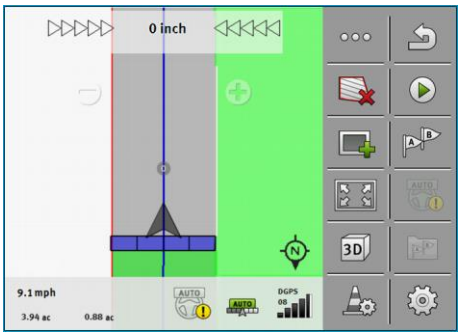
5. Apply product in the interior of the field.
   ⇨ Once the product has been applied, the interior of the field is green and the headland orange:



6.  - Activate parallel guidance in the headland.
   ⇨  - is displayed in the work screen.
   ⇨ The headland is marked in gray.



   ⇨ Guidance lines are displayed in the headland.
7. Apply product on the headland.



6.6 Marking obstacles

When there are obstacles in your field, you can mark their position. In this way, you will always receive a warning before any collision can occur.

You can mark obstacles while working in a field.

You will be warned of an obstacle in the following cases:

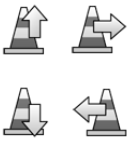
- If the obstacle will be reached in 20 seconds or earlier.
- If the distance between the obstacle and the vehicle is smaller than the working width of the agricultural device.

The warning always consists of two elements:

- A graphical warning in the upper left-hand corner of the work screen
  - "Field boundary"
  - "Obstacle"
- Acoustic signal

⚠ CAUTION

Obstacles
The terminal can warn you about obstacles. It cannot brake nor avoid the obstacles.

Function icon	Meaning
	Calls up additional function symbols.
	Creates a new obstacle.
	Deletes all obstacles.
	Deletes the selected obstacle.
	Moves the obstacle.

Function icon	Meaning
	Saves the obstacle.

Procedure

☑ You have started a navigation.

1.  - Call up new function icons.
2.  - Add an obstacle.
   ⇨ The keyboard appears.
3. Give a name to the obstacle.
4.  - Confirm.
   ⇨ A flashing red point will appear on the terminal screen. This marks the point at which the obstacle can be found. The distance between the obstacle and the GPS receiver will then be displayed.
5. Use the arrow to move the point so that the distances on the terminal screen correspond to those on the field.
6.  - Save the position of the obstacles in the field.

⇨ The obstacle now appears on the work screen.

6.6.1 Deleting obstacle markers

Procedure

1.  - Press down for three seconds.
   ⇨ All obstacles will be deleted.

6.7 Changing tractors

You have the option of aborting the navigation at any time and to continue working with a different tractor and touch terminal at a later time.

Procedure

To change the tractor:

☑ A navigation is activated, the inside of the field is partially worked.

☑ A touch terminal from ME is used in both tractor cabs.

1. Come to a stop with tractor 1.
2.  - Exit the navigation.
3. Save the field. [→ 70]
4. Synchronise the data between the SD card and USB memory device. [→ 71]
5. Remove the USB memory device.
6. Insert the USB memory device into the terminal of the second tractor.
7. Synchronise the data between the SD card and USB memory device.

8. Load the field.
9. Start a navigation.

7 Switching sections with SECTION-Control

7.1 Activating SECTION-Control

Procedure

To be able to automatically switch the sections of a connected ISOBUS job computer, you must proceed as follows:

1. Connect an ISOBUS job computer to the ISOBUS.
2. Configure the settings for this job computer. [→ 79]
3. Start a navigation. [→ 20]
4. Set the working mode: [→ 51]

7.2 Changing the working mode of SECTION-Control

If SECTION-Control is activated, you can work in two modes:

- Automatic mode
  In the automatic mode, the system switches the sections on and off automatically.
- Manual mode
  In the manual mode, you always have to switch the sections on and off manually.

Controls

Switching between the manual and automatic mode

To see which mode is activated, look at the work screen:

	Automatic mode is activated.
	Manual mode is activated.

7.3 Displaying the As applied map

While working, you can visualise the applied quantities in an as applied map.

Procedure

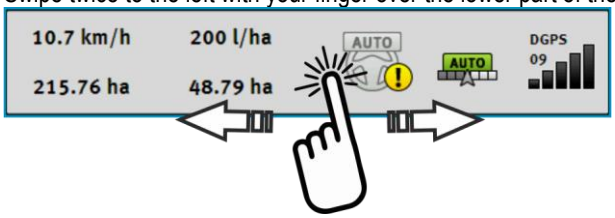
☑ An ISOBUS job computer is connected to the vehicle's ISOBUS.

☑ SECTION-Control is activated.

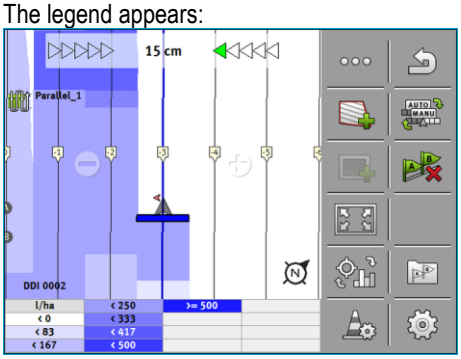
☑ A navigation is started.

☑ While working, the navigation marks the applied area in green.

1.  - Activate the visualisation of the applied quantities.
   ⇨ On the main screen, areas with similar applied quantities will be marked in blue.
2. Swipe twice to the left with your finger over the lower part of the screen:



⇨ The legend appears:



3. Double-tap the legend.
   ⇨ Adjustable parameters appear.
4. Configure the parameters. Their explanation can be found in these instructions.

"DDI 2" parameter or designation of the applied product

Activates and deactivates the display of the as applied map.

"Minimum Value" parameter

Enter the lowest value here.

"Maximum Value" parameter

Enter the highest value here.

"Number of Stages" parameter

Enter the number of stages.

7.4 Operating implements with several application lines

If you are using a job computer in which several application lines are configured, SECTION-Control can recognize these automatically.

For example, this could be the case for the following implements:

- Sprayer with two booms
- Seeders that spread fertilizer in addition to seed

SECTION-Control enables individual configuration of the switching behaviour for each application line. For this reason, there is a profile for each application line on the "Settings" | SECTION-Control" screen. [→ 79]

On the navigation screen, the results for all of the application lines cannot be displayed simultaneously. This would make the display unclear. You must therefore activate a application line manually. The area it processed is marked in green on the screen.

All areas that are processed by the other application lines are recorded in the background. As soon as you activate a different application line, you will also see its work results.

Procedure

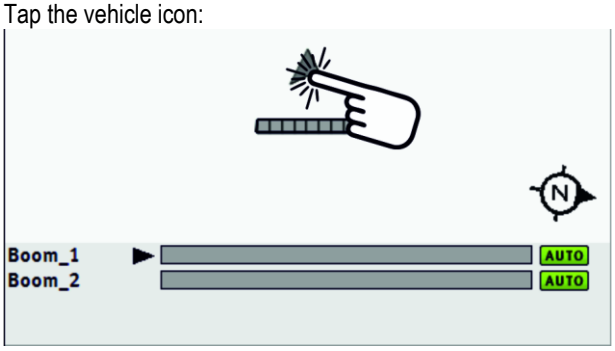
This is how to activate a application line:

☑ The implement has two application lines.

☑ SECTION-Control is activated.

☑ A navigation is started.

1. To see an overview of the available application line, swipe over the counters to the left until the icons for the working width appear. (optional)
   ⇨ The activated application line is marked with an arrow.
2. Tap the vehicle icon:



⇨ The next application line is activated.

8 Working with prescription maps

A prescription map is a detailed map of a field. In this map the field is split up into areas. The prescription map contains information on how the product(s) are to be applied in each area of the field.

When the prescription map has been loaded, the terminal checks via GPS coordinates of the vehicle what application rates are needed according to the prescription map and transfers this information to the appropriate ISOBUS job computer.

The terminal can open prescription maps in two formats:

- ISO-XML format
  - The prescription map must be added to an ISO-XML task on a PC.
  - The prescription map can only be used in combination with an ISO-XML task through the ISOBUS-TC application.
  - Up to four prescription maps can be used simultaneously in one task. This way, for implements that have more than one metering system, you can use a prescription map for each system.
- Shape format (shp)
  - The prescription map is imported in ISOBUS-TC. [→ 9]
  - Only one prescription map can be used at a time.

8.1 Prescription map from an ISO-XML task

Procedure

1. In the Farm Management Information System (FMIS), create an ISO-XML task with one or several prescription maps.
2. Transmit the task to the terminal. You can find more information in the ISOBUS-TC instructions.
3. Open the task in the "ISOBUS-TC" application. Depending on the configuration, you may have to verify whether the target rate has be properly set.
4. Start the task in the "ISOBUS-TC" application.
5. Open TRACK-Leader.
6. Drive to the field.
7. Open the TRACK-Leader application.
   ⇨ You can see the coloured prescription map on the screen.

8.1.1 Several prescription maps simultaneously

With TRACK-Leader, several prescription maps can be used simultaneously for several metering systems.

Requirements:

- License "MULTI-Control" must be unlocked.
- Both prescription maps must be part of an ISO-XML task.
- The ISOBUS job computer of the implement must support this function.

The following scenarios are possible for the simultaneous use of several prescription maps:

- Implements with several metering systems and several working widths
- Implements with several metering systems and one working width

In any case, you have the option of choosing which prescription map should be shown on the screen while working. Depending on the scenario, the controls in TRACK-Leader may be somewhat different.

Several metering systems and several working widths

The implement has several metering systems and each metering system has its own working width. For example, a field sprayer with two manifolds and two booms, a seeder that applies both seed and fertiliser. The working widths can then be mounted behind each other.

Procedure

To switch the displayed prescription map:

☑ The navigation with prescription maps is started.

1. On the work screen, tap the vehicle icon:
   ⇨ The next prescription map from the task will be displayed.

Several metering systems with one working width

The implement has several metering systems, however, they share one working width. For example, a fertilizer spreader with more than one hopper and with several metering systems but with only one working width. With such a fertilizer spreader, a fertiliser mixture is made from several hoppers, which is then applied using a spread device.

Procedure

To switch the displayed prescription map:

☑ The navigation with prescription maps is started.

1. At the bottom left, above the counter area, the designation of the applied product is shown. Tap this text.
   ⇨ The next prescription map from the task will be displayed.

8.2 Shape prescription maps

Shape prescription maps must be imported in the ISOBUS-TC app. [➞ 9]

9 Automatic steering

You can use the TRACK-Leader app to provide guidance lines for the following steering systems:

- TRACK-Leader AUTO in the following variations:
  - TRACK-Leader AUTO® eSteer
  - TRACK-Leader AUTO® Pro
  - TRACK-Leader AUTO® ISO
- TRACK-Leader TOP

9.1 Basic safety instructions

Always pay attention to the following safety instructions when you are using automatic steering:

- As the driver, you are responsible for the safe use of the steering system. The system is not used to replace the driver. To avoid lethal accidents, or dangerous injuries by rolling vehicles, never leave the driver's seat when the steering job computer is switched on.
- The steering system cannot drive around obstacles. The driver must always observe the driven route and must manually steer around obstacles.
- The steering system does NOT control the driving speed of the vehicle. The driver must always control the forward speed himself, so that he works at a safe speed and the vehicle does not get out of control or roll over.
- The steering system takes control of the vehicle steering if it is activated when testing, calibrating, and working. If it is activated, the steering parts of the vehicle (wheels, axles, articulation points) can behave unpredictably. Before you activate the steering system, make sure that there are no people or obstacles near the vehicle. This prevents death, injuries or material damage.
- The steering system may not be used on public roads or in other public areas. Make sure that the steering job computer is switched off before driving onto a road or in a public area.

9.2 TRACK-Leader AUTO steering system

TRACK-Leader AUTO is an additional module for TRACK-Leader.

It provides guidance lines that can be used to steer a vehicle using the following steering systems:

- TRACK-Leader AUTO® eSteer
- TRACK-Leader AUTO® ISO
- TRACK-Leader AUTO® Pro

The module is only available with the following Müller-Elektronik terminals:

- TOUCH1200
- TOUCH800
- TRACK-Guide III

The following licenses must be activated:

- TRACK-Leader
- TRACK-Leader AUTO

9.2.1 Preparing the terminal for work with TRACK-Leader AUTO

Procedure

Before you use TRACK-Leader AUTO for the first time, you must make a few settings in the terminal:

1. Activate the "TRACK-Leader AUTO" license in the "Service" application of the terminal. You can read how to activate the licenses in the operating instructions for the terminal.
2. Activate the "TRACK-Leader AUTO" GPS driver. You can read how to activate the GPS driver in the operating instructions for the terminal.
3. In TRACK-Leader: In the "Settings" > "General" menu, activate the "TRACK-Leader AUTO" parameter.
4. Connect a job computer or activate a virtual job computer in the Virtual ECU application.
5. Make sure that the proper Vehicle profile [→ 92] is selected in the TRACK-Leader AUTO settings.
6. If you are using TRACK-Leader AUTO eSteer, you must also import the initial value for the "Manual Steering Override" parameter. [→ 92]

9.2.2 Switching on the steering job computer

It is only possible to activate the automatic steering when the steering job computer has been switched on and booted.

In this section and in the subsections, steering job computer refers to the ECU-S1 steering job computer.

Procedure

To switch on the steering job computer:

1. 

- Press the "AUTO" switch to the middle position.
   ⇨ The "OFF" icon lights up.

⇨ The steering job computer boots up. This can take up to two minutes.

To see whether the steering job computer is ready for operation:

1. By the LEDs on the casing. See the steering job computer instructions.

or

1. Open the TRACK-Leader application.
2. Tap "Settings".
3. Wait until the "TRACK-Leader AUTO" button appears. It is greyed out until the steering job computer has booted up.

9.2.3 Switching off the steering job computer

Switch off the steering job computer as soon as you are no longer using automatic steering, before you leave the tractor cab, and before you switch off the vehicle engine:

- This is to ensure that nobody can accidentally activate the steering system.
- The steering job computer is not disturbed by changes in voltage that may occur when igniting and switching off the vehicle motor.

There are several ways to switch off the steering job computer:

- Switch off the steering job computer using the remote switch;
- On several vehicles, the steering job computer can be switched off by switching off the engine. However, it is not possible with every type of connection.

Procedure

To switch off the steering job computer using the remote switch:

1. - Press on the "OFF" switch.
   ⇨ The "OFF" icon is no longer lit up.

9.2.4 Activating and operating the automatic steering

When automatic steering is activated, the steering system takes control of the steering mechanisms as soon as it has detected a guidance line in the TRACK-Leader application.

WARNING

Ignorance of the dangers
Death or serious injuries

- Before installing and using the system, read the entire documentation and familiarise yourself with the possible risks and dangers.

WARNING

Driving vehicle
Death or serious injuries

- Never leave the vehicle when the ECU-S1 steering job computer is switched on.
- Before the initial start-up, calibration, or use of the steering system, make sure that there are no people or objects in the area surrounding the vehicle.

WARNING

Accidents due to unintentional activation of the system
Death or serious injuries

- Switch the steering job computer off before driving onto a road.
- Never switch on the steering job computer on a road.

WARNING

The system cannot avoid obstacles
Impact with an obstacle

- Observe the field while driving and manually drive around all obstacles. Stop the vehicle if necessary.

Icon	Function
	Automatic steering is not possible. This may be due to the following reasons: ▪ The steering job computer has blocked the function due to an error message. ▪ You have not defined a guidance line. Results: Nothing happens because the icon is deactivated.
	Activate and deactivate the steering system. You can see the current status in the status area:  - Automatic steering is activated The system is steering towards a guidance line.  - Automatic steering is activated The vehicle is following a guidance line.  - Automatic steering is deactivated.
	Steers the vehicle to the left. Until the next guidance line change, the vehicle will be guided parallel to the guidance line.
	Steers the vehicle to the right. Until the next guidance line change, the vehicle will be guided parallel to the guidance line.

Procedure

☑ You have fulfilled all of the requirements. See section: Preparing the terminal for work with TRACK-Leader AUTO [→ 56]

☑ You are on the field.

1. Start the vehicle engine.
2. Switch on the terminal.
3. Switch on the steering job computer. [→ 57]
4. Open the TRACK-Leader application.
5. Tap "Navigation".
   ⇨ The work screen appears.
6. Wait until the steering job computer has booted up.
   ⇨ The following message appears:
   "TRACK-Leader AUTO and ECU-S1:
   Before initial operation of the system, read and observe the documentation, particularly the safety instructions."
   ⇨ The steering job computer has been booted up.
7. Confirm.

8. Tap  .
9. Check whether the proper vehicle profile has been set on the "Parameter set" [→ 62] line.
10. When the vehicle profile has been correctly set, tap  . If not, select the correct vehicle and machine profile in the Virtual ECU.
    ⇨ On the right of the work screen, you will see the  function icon. The system cannot be activated until you have created an AB line.
11. Select a guidance mode. [→ 41]
12. Make sure that you have a good GPS signal.
13. Create an AB line. [→ 33] When creating the AB line, you will need to steer the vehicle manually.
14. As soon as you have created Point B, you can activate the steering system. It is important to drive the vehicle slowly in the direction of work so that the direction is properly detected.
15. There are several ways of activating the steering system:
16. **Possibility 1**: Tap  .
17. **Possibility 2**:  - Press on the "AUTO" button for approx. one second.
18. **Possibility 3**: Actuate the optional foot switch.
19. **Possibility 4:** For TRACK-Leader AUTO Iso with some vehicle models, there is also an activation key in the vehicle or activate through headland management. Please observe the operating instructions for the vehicle.
    ⇨ The  icon is replaced with the following icon:  .
    ⇨ The steering system will be activated. It takes control of the steering.
20. Drive up to the headlands.
21. When you have reached the headlands, deactivate the steering system. The next section describes how to do this. [→ 61]
22. Turn around manually.
23. After turning, steer the vehicle until the next AB line has been recorded, i.e., marked in blue.
24. Activate the steering system.
    ⇨ The steering system will be reactivated.
25. Your job now mainly consists of regulating the speed and to stop when required.

9.2.5 Deactivating the automatic steering

When the automatic steering is deactivated, the steering job computer is switched on but does not steer the vehicle.

Deactivate the automatic steering in the following situations:

- Before you turn around;
- Before you switch off the steering job computer, the terminal or the vehicle;
- If you want to take control of the vehicle.

Procedure

To deactivate the automatic steering:

1. **Possibility 1:** 

- Briefly press on the "AUTO" button.
2. **Possibility 2:** On the TRACK-Leader work screen, tap the 

icon.
3. **Possibility 3:** Turn the steering wheel. When you turn the steering wheel sharply, or if you stop its turning, the installed sensor recognises that you are taking control. The automatic steering will be disabled.
4. **Possibility 4:** Actuate the optional foot switch.
5. **Possibility 5:** For TRACK-Leader AUTO Iso with some vehicle models, there is also an activation key in the vehicle or activate through headland management. Please observe the operating instructions for the vehicle.

⇨ In the counter area of the work screen, you see that the 

icon is replaced by the following: 

.

9.2.6 Fine adjustment of the steering system

Because the steering system was already calibrated, it works smoothly in almost all situations. However, it may be necessary to adjust the values under special circumstances. For example, for special field conditions, implements, forward speed etc.

Ruling out causes

When the system is not steering satisfactorily:

1. Check the quality of the GPS signal.
2. Ensure that the steering job computer is installed at a vibration-free position with its intended bracket.
3. Ensure that the GPS receiver is installed at its intended position.
4. Ensure that you have selected the correct vehicle profile and machine profile.

Fine adjustment

When you have ruled out other causes, you can perform fine adjustment on the steering system.

After calibration, every parameter displays a value of 10. These represent the optimal settings for the selected vehicle without mounted implement. You can adjust the values for the current field conditions and for the mounted implement by increasing or reducing the parameters incrementally.

NOTICE

Sudden strong deviation of the vehicle
All of the parameter changes are immediately adopted without rebooting.
If you increase the value for a parameter too much, the vehicle might react by steering strongly to one side.

- Increase the values in small increments.

Change the following parameters individually and consecutively such that the steering system reacts optimally. Check the effects after each change:

1. "Motor aggressivity" - Only for systems with a steering wheel motor.
2. "Steering response"
3. "Heading Aggressiveness"
4. "Cross Track Error"
5. "Line Acquisition"
6. "Reverse response"

If the system works better afterwards, but still not optimally, repeat the settings in this sequence.

Procedure

To see the parameters:

1. Switch on the steering job computer. [→ 57]
2. Open the TRACK-Leader application.
3. Ensure that the proper Vehicle profile [→ 92] is activated for the vehicle.
4. Start a new navigation.
5. On the work screen, tap  .

Parameter set

This parameter shows you the combinations of vehicle and mounted implement for which parameters have been configured and saved.

The parameter set gets the parameters from two sources:

- From the vehicle profile in the TRACK-Leader AUTO menu.
- From the mounted implement through the job computer or a virtual job computer from the Virtual ECU.

When you connect a known vehicle combination, the previously used steering parameters for this vehicle combination are always loaded.

Line Acquisition

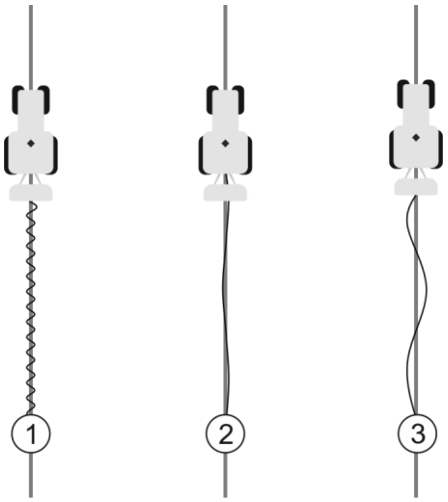
With this parameter, you can determine how fast the system steers in the direction of a newly created guidance line.

The goal of this setting must be that the vehicle takes the shortest path without having to steer sharply or suddenly.

Corresponding parameter in the steering job computer: "Line Acquisition" Line Acquisition)

Steering response (when driving forwards)

With this parameter, you can determine how fast the system reacts to steering commands when driving forwards.



1	Value is too high. The system reacts too rapidly. This causes the wheels to be very jerky.	3	The value is too low. The system reacts too slowly. The corrections are rare.
2	Ideal value		

Corresponding parameter in the steering job computer: "Steering response" Steering Response).

Reverse response

With the parameter, you can determine how fast the system reacts to steering commands when driving in reverse.

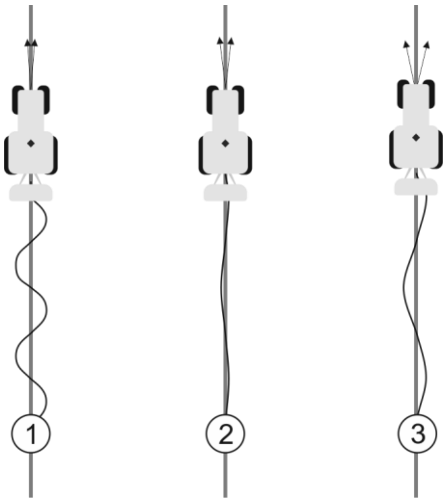
Corresponding parameter in the steering job computer: "Reverse response" Reverse Response)

Heading Aggressiveness

With this parameter, you can determine how strongly the wheels should be steered back by the system to correct the route.

- If the system corrects the wheel too early, the vehicle becomes unsteady. The entered value is too high.
- If the system steers the wheels back too weakly and slowly, the vehicle often leaves the guidance line. The entered value is too low.

To check this, you can observe the movements of the tip of the vehicle:



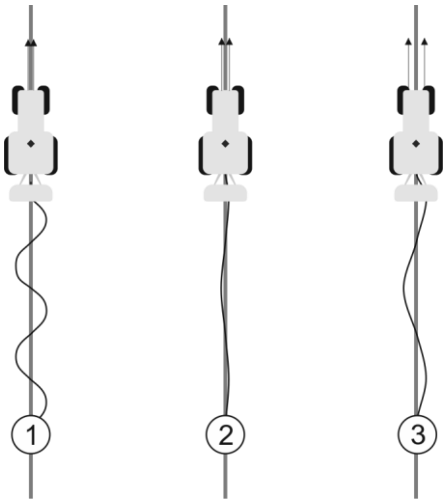
The more often the tip of the vehicle changes direction, the more often the vehicle meanders

1	Value is too high. The tip of the vehicle changes the direction too often.	3	The value is too low. The tip of the vehicle does not change the direction often enough.
2	Ideal value		

Corresponding parameter in the steering job computer: "Heading Aggressiveness" (Heading Aggressiveness)

Cross Track Error

With this parameter, you can determine the deviation from the ideal guidance line at which the system starts to correct the driving direction. In other words, you can set the number of centimetres with which the vehicle is allowed to drive beside the guidance line.



The more often the system detects an error, the more often it corrects the route

1	Value is too low The allowable deviation is too low. The vehicle changes the route too often.	3	Value is too high The allowable deviation is too high. The vehicle does not change the route often enough.
2	Ideal value		

Corresponding parameter in the steering job computer: "Cross Track Error" Cross Track Error)

Motor aggressivity

With the parameter, you can determine how fast the steering wheel motor reacts to steering commands. The parameter works like "Steering response", however, it only works with systems with a steering wheel motor.

Manual Steering Override

With this parameter, you can set the effort required to take over control of the steering wheel.

With the initial operation of the system, an initial value will be determined for the vehicle. This value must then be imported one time from the steering job computer, to enable fine-tuning at a later time. [→ 92]

When the set value is low, it is sufficient to hold the steering wheel to deactivate the steering system. When the set value is higher, more effort is required. When the set value is too low, it is possible that the system is deactivated when the effort required to move the wheels increases.

Examples:

- With low-pressure tyres, on heavy soils or with an implement mounted on the front hydraulic system, the value may have to be increased for the system to be able to steer properly.
- With narrow tyres and good conditions, the value must be reduced to ensure safety.

NOTICE

Accident resulting from the system not being switched off
If the manual steering override is not properly set, it is possible that the steering system is not deactivated when the driver intervenes, so that the avoidance manoeuvre fails and a risk of accident arises. Vehicles with an ECU-S1 system may only be operated when the manual steering override is properly set and functioning.

- Import the initial value of the parameter from the job computer ECU-S1. [→ 92] Without this import, the parameter cannot be adjusted.
- Configure the parameter for each new vehicle-implement configuration (parameter set).

See also

Importing the initial parameter for manual steering override [→ 92]

9.2.7 Completing work

Procedure

When you have applied product on the field:

1. Deactivate the automatic steering.
2. Switch off the steering job computer.

9.3 TRACK-Leader TOP automatic steering

WARNING

- Read the enclosed "PSR ISO TOP" directions for use before beginning to use the system. Pay particular attention to the information in the Chapter "Safety".
- Proceed with extreme care, particularly when using the automatic steering!
- Disable the automatic steering whenever anyone comes within 50 meters of the vehicle or farming equipment while it is operating.

Icon	Function	This is what happens after tapping
	Automatic steering is not possible. This may be due to the following reasons: ▪ No steering job computer is connected. In this case, the icon is grayed out. ▪ The steering job computer has blocked the function due to an error message. ▪ You have not defined a guidance line.	Nothing
	Changes the work mode of the automatic steering	You can see the current status in the counters area:  - Automatic steering is activated  - Automatic steering is deactivated.
	Steers the vehicle to the left.	
	Steers the vehicle to the right.	

9.3.1 Operator tasks

The operator must perform the following tasks:

- The operator must pay attention to safety. The automatic system cannot identify if anything is approaching the vehicle. It cannot tell if anyone is approaching the vehicle. It cannot stop or take evasive action.
- The operator must brake and accelerate.
- The operator must perform turning.

9.3.2 Activating and deactivating automatic steering

WARNING

Risk of traffic accident
If automatic steering is ON, the vehicle may drive off the road and cause an accident. This may lead to human injury, or even fatalities.

- Disable the automatic steering before traveling on public roads.
- Move the steering motor away from the steering wheel (if it is the system installed.)

The automatic steering does not operate in the following cases:

- In "Circle" guidance mode;
- In the headland.

You will need to steer the vehicle manually in these situations.

Procedure

You can activate automatic steering as follows:

☑ You must have configured the steering job computer and TRACK-Leader TOP.

☑ You must have defined the guidance lines.

☑ You must have positioned the vehicle on a line of travel, and enabled a guidance line.

☑ The automatic steering is deactivated. The work screen displays the icon 

1. Move the steering wheel motor to the steering wheel. (Only for systems with a steering wheel motor.)
2. Tap: 

   ⇨ The icon 

   is replaced with the following icon: 

   ⇨ The automatic steering is enabled.
3. When driving the vehicle, the steering system controls the vehicle in such a way that it proceeds along the active guidance line.

Procedure

To deactivate the automatic steering:

1. Tap 

   .
   ⇨ The work screen displays the following icon:
   

   ⇨ The automatic steering will be disabled.

9.3.3 Moving guidance lines

The automatic steering drives the vehicle along the active guidance line.

If the guidance line activated no longer matches the real position of the vehicle due to a GPS signal drift, you can manually move the guidance line.

You have two options:

- You can move the guidance line for one drive over the field. After turning, the old position will be restored.
- You can move the guidance line permanently.

Procedure This is how you move the guidance line for one drive:

☑ The automatic steering is enabled.

1. On the work screen, tap: ○○○
   ⇨ New function symbols appear.
2. Tap  or  to steer the vehicle.
   ⇨ Information is displayed below the header row about how far and in which direction the guidance line will be moved: For example, ">4cm" means that the vehicle will be steered 4cm to the right of the guidance line.
   ⇨ The vehicle will drive parallel to the guidance line until another guidance line is activated.

Procedure This is how you will move the guidance line permanently:

See section: Moving guidance lines [→ 38]

9.3.4 Turning

When turning, the operator must take control of the steering and steer him-/ herself.

Procedure You can make a turn as follows when automatic steering is enabled:

1.  - Deactivate the automatic steering.
   ⇨ The work screen displays the icon  . The automatic steering is deactivated.
2. Take control and perform the turn yourself.
   ⇨ The next guidance line is then activated if the angle between itself and the vehicle is smaller than the set "Line acquisition angle" parameter.
3.  - Activate automatic steering as soon as the next guidance line is activated.

10 Storage

Every time you work on a field, a large amount of data is produced. We call it "Field data" here. The field data must be saved so you can use it in the future.

Data type

Field data consists of the following information:

- Field boundaries
- Reference point
- Guidance lines
- Areas where product has been applied
- Marked obstacles

Formats

The terminal saves the field data in two formats simultaneously:

- ngstore format - This is the terminal's internal data format. It is used as a standard and contains all of the field data.
  - The ngstore format is different on non-touch terminals and on touch terminals. You cannot exchange data between a touch terminal and a non-touch terminal. An alternative is described in the following section: Data exchange between touch and non-touch terminals [→ 72]
  - The files are located in the "ngstore" folder.
  - On a PC, you can only open ngstore data with the TRACK-Guide Desktop application. [→ 73]
- shp format or kml format - These are standardised formats that are used by many GIS programs.
  - The files are located in the "SHP" folder.
  - To find out how to open files in shp format, read the ISOBUS-TC section in the terminal operating instructions.

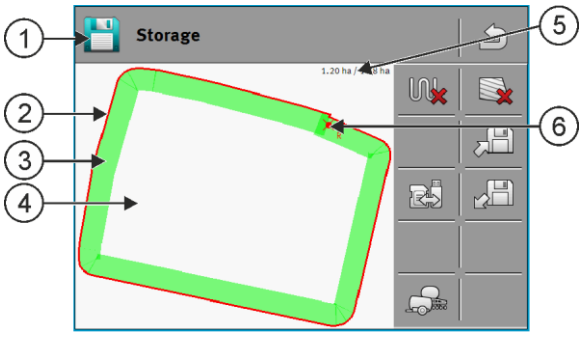
Data media

The ngstore data is saved on the SD card. To transfer it to the USB memory device, you have to use the Import/export function [→ 71]. During export, the shp and kml files are saved to the "SHP" folder on the USB memory device.

ISOBUS-TC

If you process tasks with the ISOBUS-TC application, you must not save the field data in TRACK-Leader. The data will be automatically saved together with the task in the Taskdata.xml file.

10.1 "Storage" screen



Information on the "Storage" screen

1	Name of the loaded recording	4	Unworked area
2	Field boundary	5	Counters: Unworked areas / entire area
3	Recorded tracks Areas which have been worked.	6	Reference point

Function icons on the "Storage" screen

Function icon	Function
	Deletes the tracks in the opened recording.
	Deletes the opened recording.
	Saves the opened recording in the "ngstore" folder. Storage location: SD card. If a USB memory device is inserted when saving the recording, the field data will also be saved as shape files in the SHP folder.
	Loads a stored recording from the "ngstore" folder. Storage location: SD card
	Synchronises data between the USB memory device and the SD card.
	If the connected ISOBUS job computer works with several working widths, this button serves to switch the display between the work results of both working widths.

10.2 Saving field data

Procedure

1. On the start screen of the TRACK-Leader application, tap on "Storage".
2. Insert an USB memory device into the terminal. The files will be saved directly to the USB memory device.
3. Tap  .
   ⇨ The keyboard appears.
4. Enter the name under which the field data should be saved.
5.  - Confirm.
   ⇨ The data is saved on the SD card.
   ⇨ The field will be deleted from the Overview.
6. If you want to continue to treat the field directly, you will need to load this.

shp files

When saving, the loaded field will be converted to shp format. The files are saved in the "**SHP**" folder on the USB memory device.

When converting into shp format, files with field data are created. The terminal inserts a corresponding name addition:

- _boundary = File with the field boundary.
- _obstacles = File with the obstacle points.
- _workareas = File with the applied areas. The applied areas can only be converted into shp format. However, they cannot be opened again.
- _condensedworkareas = In this file, the total applied area is divided into zones. If the terminal was working with an ISOBUS job computer, the used target rate is saved for each zone. This type of data can be used to create an as applied map with the GIS program. This, in turn, can be converted into a prescription map.
- _guidancepath = File with the guidance lines.
- _headland = Area of the headland.

10.3 Loading field data

Procedure

1. On the start screen of the TRACK-Leader application, tap on "Storage".
2. Tap  .
   ⇨ The "Load record" screen appears.
   ⇨ You will see a list with recordings that you have saved in the "ngstore" folder. Under each name, you will see the distance from your current position.
3. Tap on  to sort the files alphabetically, or on  to sort them according to the distance from your position.
   ⇨ The file names are being sorted.
4. Tap on the name of the recording that you want to load.

The loaded field contains all of the field data that was created during the previous task. If you want to continue the task, you can leave all data as is. However, you can also delete some of the displayed data: for example, the applied areas, the field boundary or the guidance lines.

You can find out how to delete field data here:

- Applied areas [→ 73];
- Field boundary [→ 32];
- Guidance lines [→ 38]

10.4 Synchronising ngstore data

To exchange data saved with the TRACK-Leader between the SD card and a PC or another Müller-Elektronik touch terminal, you can synchronise the storage media.

During synchronisation, the contents of the ngstore database on both storage media are compared and synchronised. After synchronisation, the data on both storage media is up-to-date.

NOTICE

Data formats on touch and non-touch terminals are not compatible
You can only exchange files from the "ngstore" folder between terminals of the same type.

Procedure

To synchronise the storage media:

1. On the start screen of the TRACK-Leader application, tap on "Storage".
2. Tap  .
   ⇨ The following message appears: "Should the data be synchronised between the USB memory device and the SD card? This can take up to several minutes."
3. Confirm to synchronise the storage media.

10.5 Data exchange between touch and non-touch terminals

If you want to transfer field data between a non-touch terminal (e.g.: TRACK-Guide II) and the touch terminal (or vice-versa), please observe the following:

- Data from the "ngstore" folder is not compatible with both terminal types. You cannot open the ngstore files from a non-touch terminal directly with the touch terminal.
- However, you can convert field boundaries, guidance lines, and obstacles that were saved on a terminal into shp format and then import them onto a different terminal. To do this, use the "ISOBUS-TC" app. For instructions on how to do so, please refer to the operating instructions for the terminal.

Procedure

To import field data from a non-touch terminal:

1. On the non-touch terminal, open the "Storage" screen in TRACK-Leader.
2.  - Load the recording for a field from which you want to transfer field data.
3.  - Press. (The procedure can differ for older software versions.)
   ⇨ The field data is converted into several formats (*.shp, *.kml) and saved to the "**SHP**" folder on the USB memory device.
4. Repeat this procedure for all the fields from which you want to transfer the field data.
5. Insert the USB memory device into the touch terminal.
6. Open the ISOBUS-TC application.
7. Tap "Fields".
8. Create a dataset for each field. Then you can load multiple field data for each field. You can find more information on this in the instructions of the terminal.

Procedure

To transfer field data from a touch terminal:

1. On the touch terminal, open the "Storage" screen in TRACK-Leader.
2.  - Load the recording for a field from which you want to transfer field data.
3. Insert an USB memory device into the terminal. The files will be saved directly to the USB memory device.

4. Tap  .
5. Repeat this procedure for all the fields from which you want to transfer the field data.
6. Insert the USB memory device into the non-touch terminal.
7. Open the ISOBUS-TC application.
8. Tap "Fields".
9. Create a dataset for each field. Then you can load multiple field data for each field. You can find more information on this in the instructions for the terminal.

In this way, you can also transfer data from touch terminals to the non-touch terminal.

10.6 Discarding field data

When discarding field data, all information in the temporary memory of the terminal is deleted.

You must delete the field data after work is completed to be able to work on a new field.

NOTICE

Data loss
Once field data is discarded, it cannot be retrieved.

- Save all important field data before discarding this.

Procedure

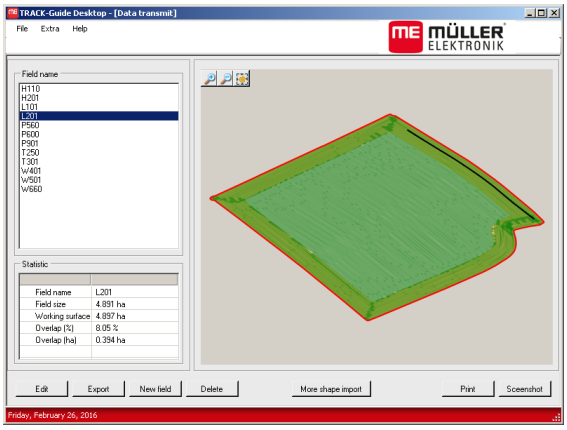
1. On the start screen of the TRACK-Leader application, tap on "Storage".
   ⇨ If no field is loaded, you do not need to delete anything.
   ⇨ If a field is loaded, check if you want to delete the entire field or only the application marks.
2. Tap  if you want to delete the green application marks, in order to work on this field again with the field boundary.
   ⇨ The application marks will be discarded and the field boundary is maintained.
3. Tap  if you want to discard the recording in order to work on a new field.
   ⇨ The field data for the currently loaded field will be discarded.

10.7 Cooperation with TRACK-Guide Desktop

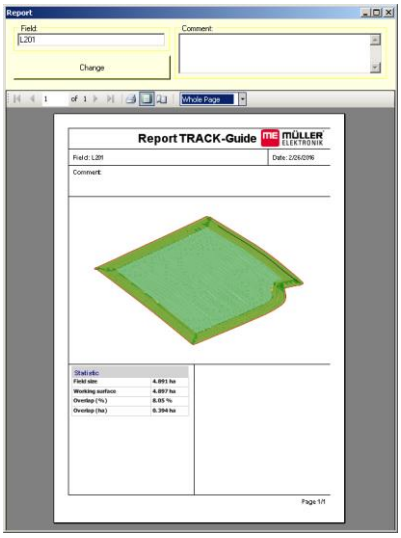
TRACK-Guide Desktop is a free program for PCs.

This allows you to:

- View work results
- Print reports for your customers
- Document your work



Program window



Report

You can find TRACK-Guide Desktop in the "Download" section of the website below:
http://www.mueller-elektronik.de/produkte/track-guide-desktop/

There, you will also find a link for the operating instructions.

11 Configuration

This chapter clarifies all settings which you have to configure.

All configuration parameters can be found in the "Settings" screen. They are grouped as follows:

- General - Parameters that affect all of the TRACK-Leader modules.
- TRACK-Leader - Parameters that are used to configure the parallel guidance and for the light bar. The parameters are therefore required for all modules.
- SECTION-Control - Job computer-specific settings that are required for automatic section control.
- TRACK-Leader TOP - Parameters for TRACK-Leader TOP automatic steering
- TRACK-Leader AUTO - Parameters for TRACK-Leader AUTO automatic steering
- Demo - A demonstration video.

The number of appearing parameter groups depends on which module was activated in the "General" menu.

You have to configure the following

Module	Section
TRACK-Leader	Configuring "General" settings [→ 76] Configuring TRACK-Leader [→ 78]
SECTION-Control	Configuring "General" settings [→ 76] Configuring TRACK-Leader [→ 78] Configuring SECTION-Control [→ 79]
TRACK-Leader TOP	Configuring "General" settings [→ 76] Configuring TRACK-Leader [→ 78] Configuring TRACK-Leader TOP [→ 91]
TRACK-Leader AUTO	Configuring "General" settings [→ 76] Configuring TRACK-Leader [→ 78] Parameter for TRACK-Leader AUTO® [→ 92]

Icon for the configuration

Icon	Meaning
	Yes
	No

Procedure

This is how you open the configuration screens:

1.  - Open the TRACK-Leader application.
2. Tap "Settings".
   ⇨ The "Settings" screen appears.

3. Tap the buttons to configure the application.

11.1 Configuring "General" settings

In this menu you can set the display on the screen and activate some functions.

TRACK-Leader AUTO

With this parameter, you can activate and deactivate the support of all variations of the TRACK-Leader AUTO steering system.

TRACK-Leader TOP

With this parameter, you can activate the support of the Reichhardt TRACK-Leader TOP automatic steering.

Possible values:

- "Yes"
  Automatic steering is activated.
- "No"
  Automatic steering is deactivated.

Smoothen course

If the GPS receiver mounted on the roof of the tractor cab swings sharply, the tracks displayed on the screen can appear very jagged.

The "Smoothen course" option smoothens out the displayed tracks.

The requirements differ depending on the GPS receiver.

Possible values:

- "Yes"
  - DPGS receiver A100 or A101

    If you are using TRACK-Leader TOP and the receiver is connected to the steering job computer.
  - DGPS/GLONASS receiver AG-STAR or SMART-6L

    Always.
- "No"
  - DGPS receiver A100 or A101

    If you are not using TRACK-Leader TOP and the receiver is connected to the terminal.

Detect Driving Direction

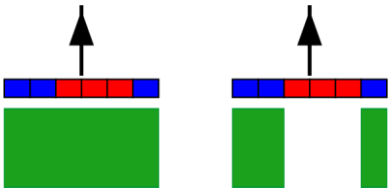
This parameter activates or deactivates the automatic detection of the driving direction. See: Detecting the direction [➙ 23].

In the following cases, the parameter is greyed-out and cannot be changed:

- When a TRACK-Leader AUTO or TRACK-Leader TOP steering system is connected.
- When a direction signal is received from the ISOBUS tractor.

Selective marking

With this parameter, you can define whether the untreated area should be shown in green on the screen and marked as worked when one of the inner sections is deactivated. This function is only applicable in cases where the outer sections are applying while the inner sections are deactivated. If the sections are switched inwards from the outermost sections, this parameter is not taken into account. This makes the display of section control on wedge-shaped areas realistic.



Left: the area behind the deactivated sections is marked in green.

Possible values:

- "Yes"
  If one of the inner sections is deactivated, the area behind it is not marked in green.
- "No"
  The area behind inner sections is marked in green regardless of whether they are applying or not.
  Use this function e.g. for plant protection in crops planted on ridges. In this way, the field sprayer is not needlessly activated when turning at the headlands.

Acoustic warnings

This parameter determines whether a warning tone sounds when in the vicinity of field boundaries and recorded obstacles.

Possible values:

- "Yes"
- "No"

Acoustic warnings at field boundaries (Ac.Warning at field boundaries)

With this parameter, you can deactivate the acoustic warning when approaching the field boundaries, for example, in order to be able to work the headlands without distracting sounds. For work outside of the headlands, reactivate this parameter.

Possible values:

- "Yes" - Acoustic warnings are activated
- "No" - Acoustic warnings are deactivated

Show grid

Displays a grid on the navigation screen.

The distances between the grid lines will differ according to the input working width. The grid lines are aligned along the North-South and East-West axes.

Map orientation

This parameter defines what should be rotated when steering is applied: the background map or the vehicle icon.

Possible values:

- "Vehicle fixed"
  The vehicle icon on the terminal screen remains immobile.
- "Field fixed"
  The vehicle icon on the terminal screen moves. The background map remains immobile.

11.2 Configuring TRACK-Leader

Sensitivity

Sets the sensitivity of the lightbar.

How many centimeters of deviation are required for a LED to light on the lightbar?

- Default value: 30cm
  This value means a sensitivity of 15cm to the left and 15 cm to the right.

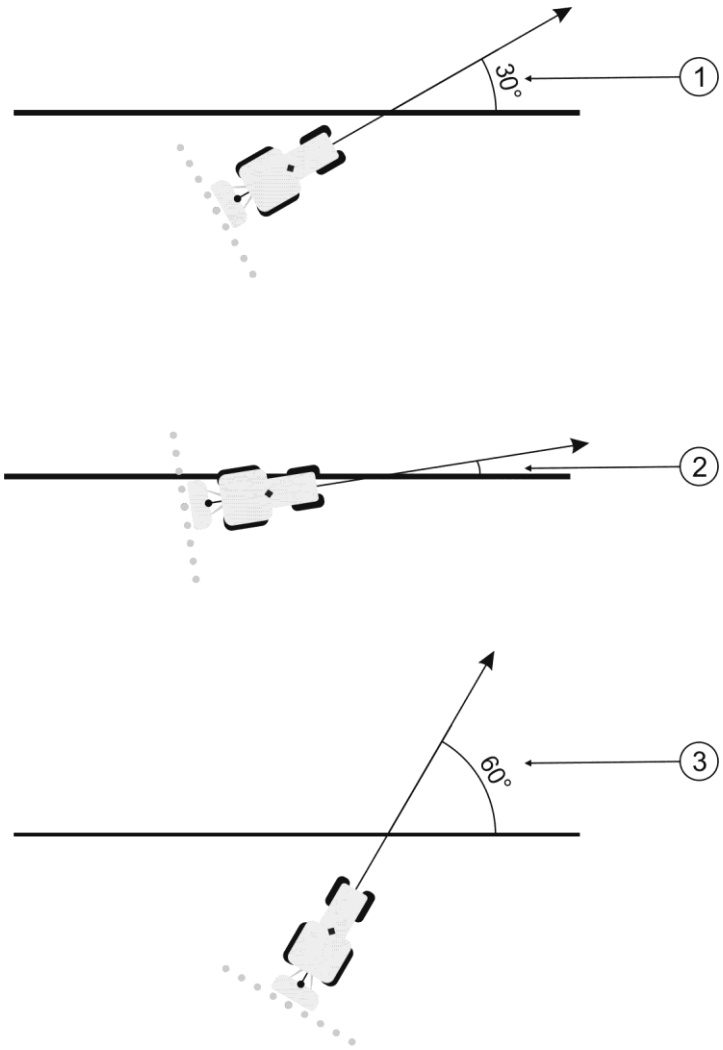
Preview

This parameter determines the number of meter in front of the vehicle at which the preview display of the screen lightbar will calculate the future position of the vehicle.

- Default value: 8m

Line acquisition angle

With this parameter, you can determine the angle up to which the system activates a guidance line. If the angle between the vehicle and the guidance line is smaller than the set value, the guidance line will be activated. If the angle is larger, the guidance line will be ignored.



Terminal response for a set line acquisition angle of 30°

1	Angle between the vehicle and the guidance line = 30° The guidance line will be activated.	3	Angle between the vehicle and the guidance line = 60° The guidance line will not be activated.
2	Angle between the vehicle and the guidance line smaller than 30° The guidance line will be activated.		

- Default value: 30 degrees
- Value for TRACK-Leader TOP: 85 degrees
- Value for TRACK-Leader AUTO: 65 degrees

11.3 Configuring SECTION-Control

In this configuration step, you will configure the section switching for your ISOBUS job computer.

The application recognizes every ISOBUS job computer by means of its ISO-ID and sets up an individual profile for each of these. You can therefore configure different parameters for your fertilizer applicator and for your seeder or sprayer.

Procedure

1.  - Open the TRACK-Leader application.
2. Tap "Settings".

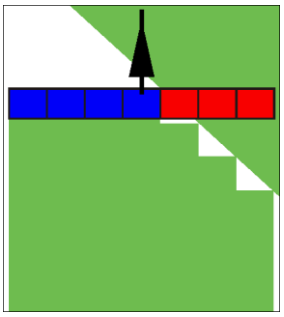
3. Tap "SECTION-Control".
   ⇨ A list of the profiles for all ISOBUS job computers that have been connected to the terminal is shown. A new profile will be created whenever you connect a new ISOBUS job computer to the terminal.
   ⇨ Virtual job computers from the Virtual ECU application also appear in this list.
4. Tap the name of the ISOBUS job computer for which you want to configure SECTION-Control. The connected job computer is marked with a green point.
5.  - Open the list of parameters.
   ⇨ A lists with the set parameters appears.
6. Change the parameters. You will find explanations of these in the following pages.

Parameters for SECTION-Control

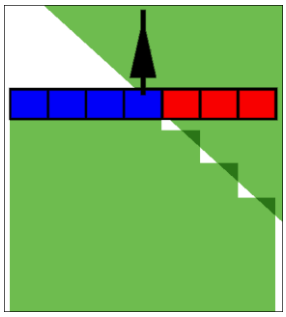
Degree of overlap

The degree of overlap when applying the product in a wedge-shaped area.

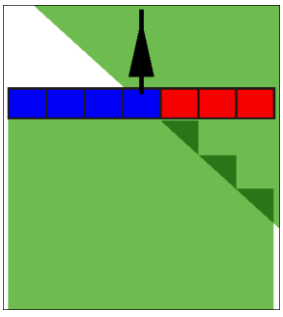
The set "Degree of overlap" is influenced at the outer sections by means of the "Tolerance of overlap" parameter.



0% degree of overlap



50% degree of overlap



100% degree of overlap

Possible values:

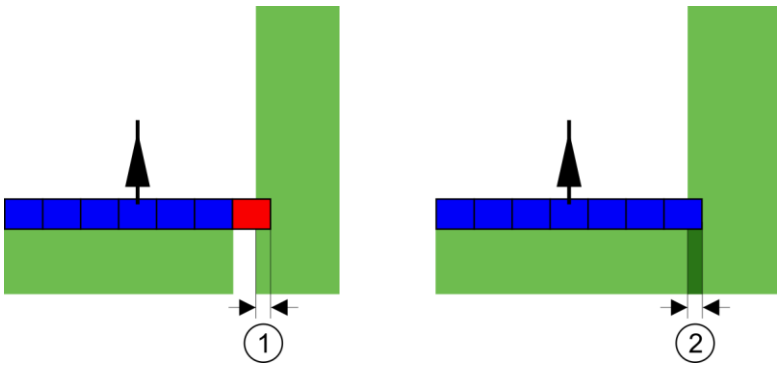
- 0% – When exiting a processed area, each section is only switched on when the vehicle has completely exited the area. When traveling onto a processed area, the section is only switched off when the section extends up to 1% over the processed area.
- 50% – When exiting a processed area, each section is only switched on when 50% of the vehicle has exited the area. When traveling onto a processed area, the section is only switched off when the section extends up to 50% over the processed area. At a "Degree of overlap" of 50%, the "Tolerance of overlap" function has no effect.
- 100% – When exiting a processed area, each section is only switched on when 1% of the vehicle has exited the area. When traveling onto a processed area, the section is only switched off when the section extends up to 100% over the processed area.

Tolerance of overlap

Use this parameter to define a permissible overlap. The outer sections are only activated when the overlap is greater than the value of this parameter.

The "Tolerance of overlap" only applies to the outermost left and right sections. The other sections are not affected by this parameter.

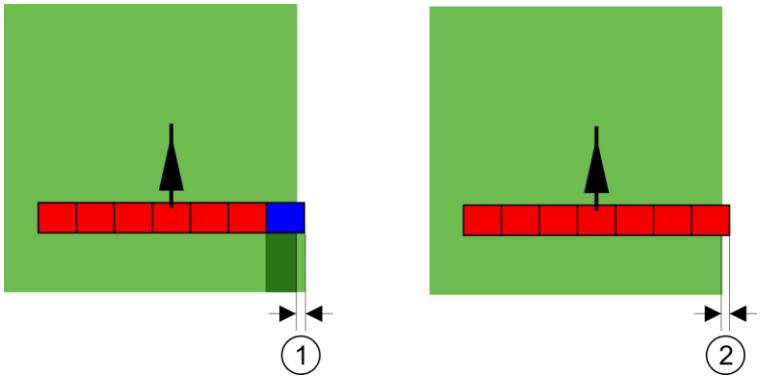
The following illustrations show how the "Tolerance of overlap" parameter acts with a "Degree of overlap" of 0%. The set tolerance of overlap can be seen underneath the illustrations.



Tolerance of overlap for 0% degree of overlap – in both cases the work was done with a 25 cm overlap.

1	Tolerance of overlap 0cm In this case, the section is immediately switched off.	2	Tolerance of overlap 30 cm In this case, the section is not switched off, as the current overlap is lower than 30cm.

If you have set the "Degree of overlap" parameter to 100%, the "Tolerance of overlap" parameter plays a vital role when leaving an area already processed. This is relevant for example when turning in a headland which has already been processed.



Tolerance of overlap for 100% degree of overlap – in both cases the processed area was exited by 25 cm.

1	Tolerance of overlap 0 If only 1% of the section exits the area that has already been processed, the entire section will be switched on.	2	Tolerance of overlap 30 cm The tolerance of overlap enables the prevention of unnecessary overlaps. The right section is only switched on when the processed area is exited by more than 30cm.

Possible values:

Recommendation: If you are working with DGPS, the tolerance of overlap should not be less than 30 cm. For implements with wide sections, e g. with fertilizer spreaders, set the value accordingly high:

- Tolerance 0 cm
  The outer section is switched off when it is located only minimally over an applied area. If it leaves this area only minimally, it is switched on again.
- Other value
  The outermost section is switched on or off when the overlap exceeds the value.
- Maximum value
  Half of the section width of the outermost section.

Field boundary overlap tolerance

Use this parameter to prevent sections from being activated at the field boundary in the event of a minimum overlap.

This parameter functions in the same way as "Tolerance of overlap", but is only applied when the field boundary is exceeded.

Before making any change to this distance, make sure that this is safe for the environment and the surroundings under current circumstances.

Overlapping nozzles

This parameter is only applicable to sprayers with an individual nozzle switching function. This is not displayed on other systems.

Use the parameter to set the number of nozzles which should operate in overlapping mode.

Delay

Delay is the period of time that elapses between the transmission of an order by the terminal and the implementation of the order by the implement.

This time can differ for each implement.

There are two parameters for the configuration:
- "Delay on start" (when switching on)
- "Delay on stop" (when switching off)

If you have an ISOBUS job computer which transfers delay times to SECTION-Control, you must not change these parameters. In this case, the text "ISO" will appear a value.

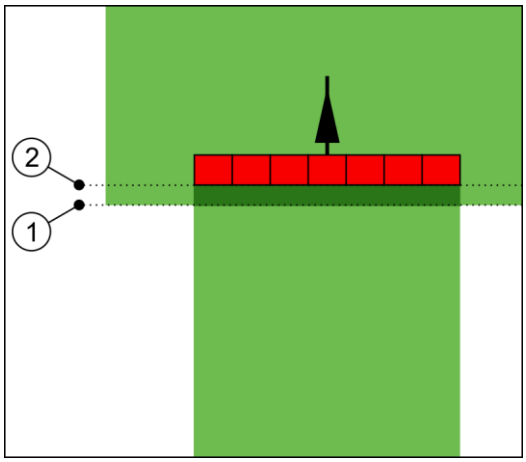
Example

If a section of a sprayer passes over an area that was already processed, it must be immediately switched off. To do this, the job computer sends a signal to the section valve to switch off. This causes the valve to be shut off and the pressure in the hose drops. This lasts until there is no further flow from the nozzles. The duration is approx. 400 milliseconds.

As a result, the section applies an overlap for a period of 400 milliseconds.

In order to prevent this, the "Delay on stop" parameter must be set to 400 ms. Now, the signal is sent to the section valve 400 milliseconds earlier. As a result, the application can be interrupted or restarted at exactly the right moment.

The illustration below shows how the delay function works. The illustration shows actual behavior, not the indication on the screen.



Delay on stop is set to 0. If the set delay time is too brief, it results in overlapping application.

1	At this point, the section valve has received a signal to shut off.	2	At this point, the sprayer stopped application.

Possible values:

- "Delay on start"
  Enter the delay when switching a section on. If the section reacts too late to the switch-on signal, increase the value.
  e.g.
  - 400 ms solenoid valve
  - 1200 ms electrically actuated valve
- "Delay on stop"
  Enter the delay when switching a section off. If the section reacts too late to the switch-off signal, increase the value.
  e.g.
  - 300 ms solenoid valve
  - 1200 ms electrically actuated valve

Machine model

This parameter determines the way and means in which the working bar should track the GPS receiver.

Possible values:

- "mounted"
  Settings for mounted implements.
- "self propelled"
  Settings for self-propelled implements.
- "trailed"
  Settings for implements trailed by a tractor.
- "Trailed and steered"
  Settings for trailed implements with drawbar or stub axle steering. E.g. for trailed sprayers with TRAIL-Control.

Screen light bar

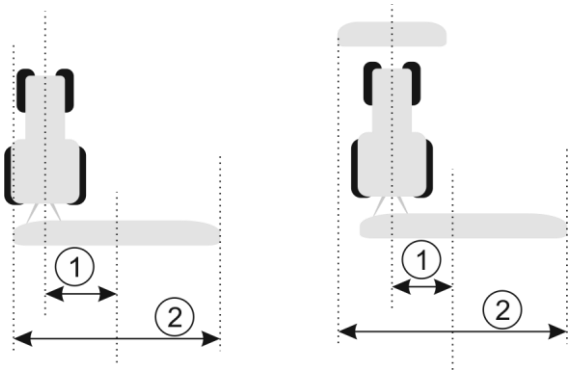
Screen lightbar type.

Possible values:

- "Deactivated"
  Deactivates the screen lightbar
- "Graphic Mode"
  Activates screen lightbar in graphic mode
- "Text mode"
  Activates screen lightbar in text mode
- "SECTION-View"
  Activates SECTION-View

Implement offset

You can use this parameter to adjust the offset of the working width towards the left or the right. Enter the number of cm by which the center of the working width is shifted from the center of the tractor.



Left: Tractor with an implement; Right: Tractor with two implements

1	Implement offset: Distance between the center of the tractor and the center of the total working width.	2	Total working width

Possible values:

- Enter a positive value, e.g.: **90cm**
  If the equipment is offset to the right.
- Enter a negative value, e.g.: **-90cm**
  If the equipment is offset to the left.

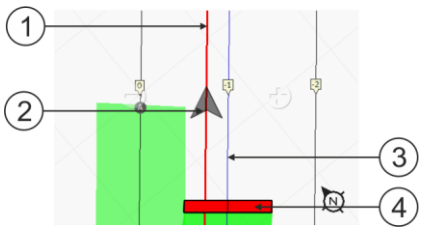
Mode of operation

If this parameter is allocated any value other than 0, the following occurs:

- A red guidance line appears on the work screen, which is drawn at a distance from the blue guidance line.
- The working bar is shifted to one side. The blue guidance line runs exactly in the middle.

After setting the implement offset, you have to operate the TRACK-Leader slightly differently:

1. Steer the vehicle such that the arrow is always following the red line. The center of the working bar then follows the blue guidance line.

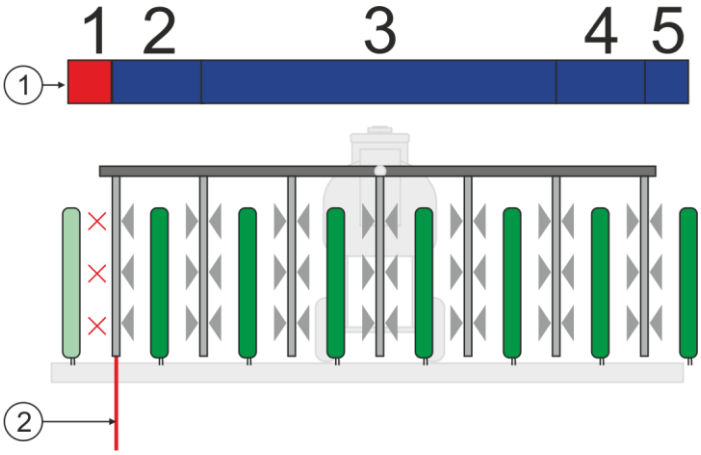


Guidance lines for implements with offset

1	Red guidance line - marks the center of the tractor	3	Blue guidance line - marks the center of the working width
2	Arrow - marks the position of the GPS receiver	4	Working bar

Area of application

This parameter serves to adapt the behaviour of SECTION-Control for use with viticulture sprayers.



Section control on

1	sections The outer sections (1, 2, 4, 5) can be used for treating the outer rows.	2	Field boundary. Vine rows outside of the field boundary will not be sprayed.

Possible values:

- "Standard" – Function is deactivated.
- "Viticulture" – Function is activated.

Effects

When the viticulture mode is activated, the behaviour of SECTION-Control changes:

- If the angle between the guidance line and the vehicle is greater than 30°, the system assumes that the vehicle is turning. In this case, the application is terminated on all sections.
- The "Field boundary overlap tolerance" parameter will be applied on all of the sections.

11.3.1 Calibrating Delay on start and Delay on stop

This chapter is intended for advanced users.

Before reading the chapter:

- Learn how to operate the terminal.
- Learn how to operate the SECTION-Control.

The standard values of parameters "Delay on start" and "Delay on stop" are set for work with most sprayers.

When should you calibrate?

These parameters must be calibrated in the following cases:

- If using a different agricultural equipment with SECTION-Control.
- If the agricultural device switches too late or too early when driving on an area where the product has been already applied.
- If the agricultural device switches too late or too early when leaving an area already where the product has been already applied.

In the chapters below you will learn how to calibrate the parameters.

The chapters and examples are given for sprayers. For different agricultural devices, please proceed accordingly.

Calibration phases

Calibration consists of several phases:

1. Calibration preparations
2. Drive through the field for the first time
3. Drive through the field for the second time
4. Marking the application boundaries.
5. Calculating correction values
6. Correcting the "Delay on start" and "Delay on stop" parameters

The phases are explained in detail in the following sections.

Calibration preparations

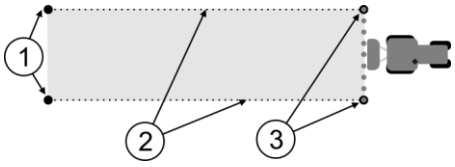
You will need the following equipment and personnel in order to perform the calibration:

- Two observers – two people who will mark the area where the product has been already applied with stakes.
- Tools for marking the area where the product has been applied:
  - Barrier tape, approx. 200 - 300m
  - 8 stakes for marking on the field
- Sprayer with tank loaded with clean water.

Drive through the field for the first time

In this phase of the calibration, you will need to travel across the field along a single track.

The illustration below shows the points which must be marked before and after the travel. Instructions on how to do this are given below the illustration.



Results of the first drive through

1	**Stakes** To mark the outer ends of the sections prior to travel	3	**Stakes** To mark the outer ends of the sections after travel
2	**Barrier tape between the stakes** Marks the borders of travel		

Procedure

To prepare the field for delay calibration:

1. Start a new navigation with SECTION-Control.
2. Position the sprayer at the start of the travel. The travel must not be positioned close to the field boundary, in order to give you sufficient space for the second travel.
3. Extend the boom.
4. Mark the ends of the outer sections with stakes.

5. Travel 100 to 200 meter in a straight line before beginning to apply the clean water.
6. After 100 to 200 meter, stop and switch off the sprayer.
7. Save the travel in the TRACK-Leader. This will enable the calibration to be repeated.
8. Mark the ends of the outer sections with stakes.
9. Connect the stakes with barrier tape. This marks the borders of travel across the field.
10. Fix the barrier tape to the ground with stones or earth.

⇨ You have now performed the first travel, and marked the application borders.

Drive through the field for the second time

In this phase, you will need to apply the product over the area where you applied with the first track at a 90° angle. You then have to check if the sprayer is switching on too early or too late. In doing so, it is important that you drive at a constant speed and remember this speed.

CAUTION

Injury from the driving sprayer

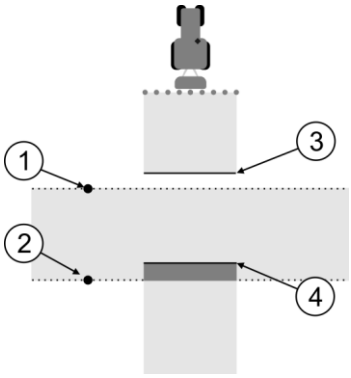
Observers who are assisting with the calibration are at risk of being struck by the boom.

- The observers should be made properly aware of this risk. Such hazards should be explained to them.
- Ensure that the observers maintain a sufficient distance from the spray boom at all times.
- Stop the sprayer immediately if an observer is too close to the sprayer.

In this phase, you will require the help of one or two people. These people will observe the driving and behaviour of the sprayer, and mark out the application borders.

They should be appropriately trained and warned of the potential dangers.

The illustration below shows where the observers must stand and the objectives that they must achieve.



Travel 2

1	Position of Observer 1	3	This line marks the position at which the nozzles should begin spraying when the vehicle exits the area where the product has been applied.
2	Position of Observer 2	4	This line marks the position at which the nozzles should stop spraying when the vehicle enters the area where the product has been applied.

Procedure

☑ The tank is filled with clear water.

☑ The observers should stand at a safe distance from the boom of the sprayer.

☑ Navigation is started. The first drive record is loaded.

☑ SECTION-Control should be in automatic mode.

1. Position the sprayer at a distance of approx. 100 meter from, and an angle of 90° to the applied area.
2. Drive at a constant speed (e.g.: 8 km/h) over the area that has already been applied. Remember the speed at which you were driving. Apply the water as you do so.
3. The observers must stand on the previously marked boundaries of the applied area at a safe distance from the boom.
4. The observers must observe the points at which the sprayer stops and starts spraying, as it passes along the already applied points.

⇨ You will now know how the sprayer behaves when travelling along an area where the product has been already applied.

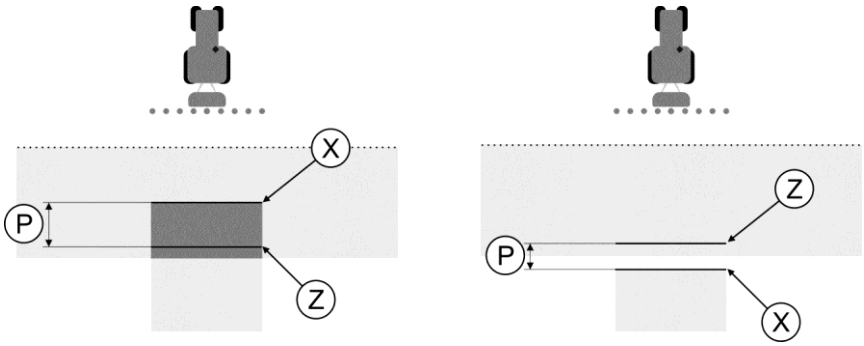
You may wish to repeat this process several times in order to ensure better accuracy of the results.

Marking the application borders – for Delay on stop

In this phase, you will need to mark where your sprayer stops application when you enter an area where the product has been already applied. You must also determine where application should stop in the future.

This will tell you whether the sprayer is switching off too early, or too late.

The illustrations below show the lines which you will need to mark in the field in order to be able to calculate the "Delay on stop" parameter.



Lines for the "Delay on stop" parameter. Left: Sprayer switches off too late. Right: Sprayer switches off too early.

P	Distance between desired application line Z and actual application line X	X	Actual application line This is where the sprayer stops application.
		Z	Desired application line This is where the sprayer should stop application. A slight overlap of 10cm should be planned due to the pressure release time.

In both cases (left and right), the "Delay on stop" parameter is incorrectly set:

- Left: Sprayer switches off too late. The delay period must be extended.
- Right: Sprayer switches off too early. The delay period must be reduced.

Procedure

1. Compare the markings in the field with the calculations.

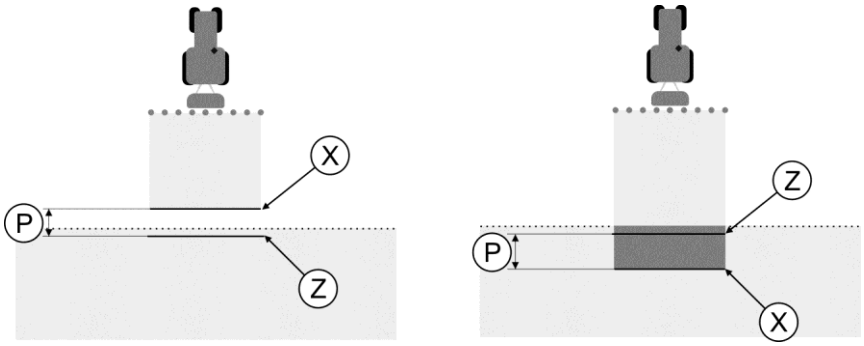
⇨ You now know whether the sprayer is switching off too early, or too late.

Marking the application borders – for Delay on start

In this phase, you will need to mark where your sprayer begins application when you exit and where the product has been already applied. You must also determine where application should begin in the future.

This will tell you whether the sprayer is switching on too early, or too late.

The illustrations below show the lines which you will need to mark in the field in order to be able to calculate the "Delay on start" parameter.



Lines for the "Delay on start" parameter. Left: Sprayer switches on too late. Right: Sprayer switches on too early.

P	Distance between desired application line Z and actual application line X	X	Actual application line This is where the sprayer begins application.
		Z	Desired application line This is where the sprayer should begin application. A slight overlap of 10cm should be planned due to the pressure build-up time.

In both cases (left and right), the "Delay on start" parameter is incorrectly set:

- Left: Sprayer switches on too late. The delay period must be extended.
- Right: Sprayer switches on too early. The delay period must be reduced.

Procedure

1. Compare the markings in the field with the calculations.

⇨ You now know whether the sprayer is switching on too early, or too late.

Calculating correction values

In the final phase, you have determined:

- Which parameters must be altered.
- Whether the current delay must be increased or reduced.

You must now calculate the number of milliseconds by which to adjust the incorrectly set parameter.

To do this, you will need to calculate a so-called correction value.

In order to be able to calculate the correction value, you need to find out how fast the sprayer was travelling. This speed must be entered in cm/milliseconds.

The following table lists a number of speeds and their conversion into cm/ms:

Speed in km/h	Speed in cm/ms
6 km/h	0,16 cm/ms

Speed in km/h	Speed in cm/ms
8 km/h	0,22 cm/ms
10 km/ h	0.28 cm/ms

Procedure

The correction value should be calculated as follows:

1. **[Distance P] : [Speed of sprayer] = Correction value**
2. The currently set "Delay on start" or "Delay on stop" parameter must then be corrected by this value.

Changing the delay parameter

You must now adjust the "Delay on start" and 'Delay on stop" parameters.

Procedure

1. Alter the parameters using the following rule of thumb:
   - If the sprayer switches on too late, it needs more time. The delay period must be extended.
   - If the sprayer switches on too soon, it needs less time. The delay period must be reduced.
2. Calculate a new value for the delay parameter.
   Perform this step separately for the "Delay on start" or "Delay on stop"
   If the sprayer switches on or off too late:
   Extend the current delay period by the correction value
   If the sprayer switches on or off too early:
   Reduce the current delay period by the correction value

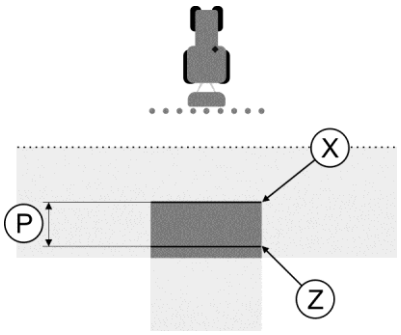
Example

A sprayer traveled at a speed of 8 km/h. This corresponds to 0.22 cm/ms.

After the second travel, the distance P was measured. The distance was 80cm.

The "Delay on stop" parameter is currently set to 450ms.

The sprayer was switched off too late when traveling over an area where the product has been already applied. Point Z lied in front of Point X along the direction of travel. The lines were marked as in the illustration below:



When travelling over the area where the product has been already applied, the sprayer switched off too late

1. Calculate the correction value:
   [Distance P]: [Speed of sprayer] = Correction value
   80 : 0,22 = 364
2. Calculate a new value for the delay parameter.
   As the sprayer switches off too late, "Delay on stop" must be increased by the correction value:
   364 (correction value) + 450 (set "Delay on stop") = 814 (new "Delay on stop")
3. Insert value 814 for the "Delay on stop" parameter.

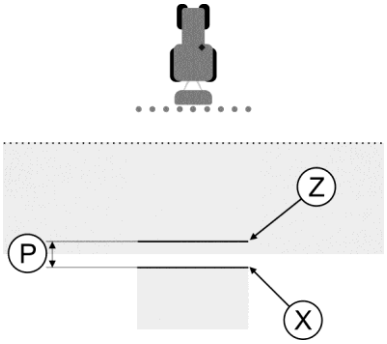
Example

A sprayer traveled at a speed of 8 km/h. This corresponds to 0.22 cm/ms.

After the second travel, the distance P was measured. The distance was 80cm.

The "Delay on stop" parameter is currently set to 450ms.

The sprayer switched off too early when traveling over an are where the product has been already applied. Point Z lied in front of Point X along the direction of travel. The lines were marked as in the illustration below:



When traveling over an area where the product has been already applied, the sprayer switched off too early.

1. Calculate the correction value:
   [Distance P]: [Speed of sprayer] = Correction value
   80 : 0,22 = 364
2. Calculate a new value for the delay on stop parameter.
   As the sprayer switches on or off too early, "Delay on stop" must be decreased by the correction value:
   450 (set "Delay on stop") - 364 (correction value) = 86 (new "Delay on stop")
3. Insert value 86 for the "Delay on stop" parameter.

11.4 Configuring TRACK-Leader TOP

The following parameters must be set in order to use TRACK-Leader TOP:

GPS receiver height

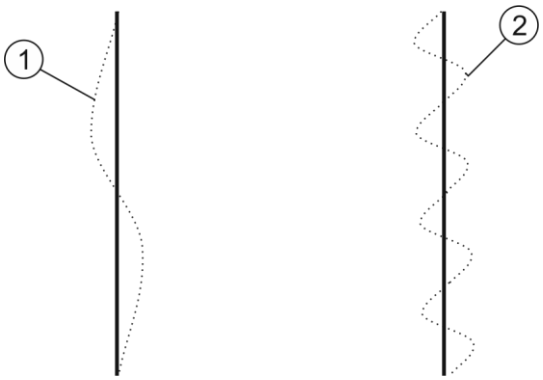
Distance between GPS receiver and the ground.

Required for: TRACK-Leader TOP

PSR reaction speed

PSR reaction speed and aggressiveness of the automatic steering. The higher the value, the sharper the steering movements.

The aim of these settings is to ensure that the vehicle finds the track fast enough, but still drives stable and smooth and does not over-steer constantly.



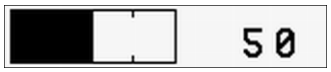
Examples of different PSR reaction speeds

1	The steering responds too slowly	2	The steering responds too rapidly

You can adjust the value to specific local conditions prior to work commencement:

- When the ground is wet and makes steering more difficult, increase the value.
- When the ground is dry and makes steering easy, reduce the value.

The value set here will also appear in the start screen of the PSR application (steering job computer):



11.5 Parameter for TRACK-Leader AUTO®

TRACK-Leader AUTO can only be configured after starting a navigation [→ 61]. In this menu, you can only select the vehicle profile and switch on the WiFi.

Vehicle profile

The name of the set vehicle profile appears on the topmost line. The vehicle profiles are configured using a tablet PC in the steering job computer. At this point, you must select the appropriate profile for the vehicle.

WiFi

WiFi activates and deactivates the wireless communication between the steering job computer and the configuration computer (tablet, PC, notebook etc.) that you are using to configure the steering job computer. You can find more information in the operating instructions of the "ECU-S1" steering job computer.

The WiFi is also deactivated when you switch off the terminal.

Information on the ECU-S1

Software version and serial number of the steering job computer.

11.5.1 Importing the initial parameter for manual steering override

During the initial operation of the steering system, a value is determined for the "Manual Steering Override" [→ 61] parameter for each vehicle. This value must often be adjusted depending on the working conditions.

To enable adjustments, you must import the value from the steering job computer.

Procedure

To import the initial value:

1.  - Open the TRACK-Leader application.
2. Tap "Settings".
3. Tap "TRACK-Leader AUTO".
4. On the "Vehicle profile" line, select a vehicle profile for which you want to import the parameter.
5.  - Import the parameter.
6. The following message appears: "Value readout successful."
7. Confirm.
   ⇨ The "Manual Steering Override" parameter is now updated for every vehicle profile.
8. Repeat this import for each vehicle profile in the list.

11.5.2 Minimum quality of the GPS signal

You can set the quality of the GPS signal at which the steering system should work and at which it should be deactivated.

GPS Quality	Accuracy
NMEA quality 1 GPS	> 25 cm (path to path)
NMEA quality 2 DGPS	< 25 cm (path to path)
NMEA quality 4 RTK fix	2.5 cm (absolute)
NMEA quality 5 RTK float, TerraStar	< 10 cm (absolute)
NMEA quality 9 Third party GPS receiver For GPS receivers that emit NMEA Quality 9.	Unknown

Per default, the following NMEA quality levels are marked: 2, 4, 5

Procedure

To set the GPS quality:

1.  - Open the TRACK-Leader application.
2. Tap "Settings".
3. Tap "TRACK-Leader AUTO".
4.  - Open the list with NMEA qualities.
5. Set the check mark for the NMEA qualities at which the steering system should work.

12 Procedure for dealing with error messages

Error message text	Possible cause	How to fix the problem
Caution! The storage could not be initialized. If the problem still persists after a restart, please contact the service.	The database could not be created on the storage medium.	Restart the terminal.
Active profile cannot be removed!	An attempt was made to delete the currently selected machine profile.	Select another machine profile and then delete the desired machine profile.
Could not find DGPS configuration file!	The internal file containing the DGPS settings could not be found.	Contact our Service team in order to reinstall the software.
Test phase is expired. Please contact your dealer.	Test phase is expired.	Request a license. Unlock the software.
Error!		Contact Customer service.
GPS signal has been lost!	The serial connection to the GPS receiver has been interrupted. The position can no longer be determined.	Check and re-connect the cable connections to the GPS receiver.
GPS signal too weak!	The GPS signal quality is too weak, most likely due to obstructions.	Check the mounting of the GPS receiver and your current position. The receiver must be in open view to the sky.
No DGPS available!	No DGPS is available due to receiver shadowing.	Check the mounting of the GPS receiver and your current position. The receiver must be in open view to the sky.
	No DGPS is available due to a failure of the correction data service, e.g. EGNOS.	Check the general availability of the service. For EGNOS/WAAS, check and set the proper correction satellites.
Could not read DGPS configuration from GPS receiver!	The serial connection to the GPS receiver has been interrupted.	Check and re-connect the cable connections to the GPS receiver.
Could not read e-Dif configuration from GPS receiver!	The serial connection to the GPS receiver has been interrupted.	Check and re-connect the cable connections to the GPS receiver.
Saving failed!	The storage medium was removed before or during saving.	Re-insert the storage medium and re-start the save process.
	Writing is not allowed on the storage medium.	Disable write protection on the storage medium.
	The storage medium is full or damaged.	Delete unnecessary data from the storage medium and try again.
Invalid status!		Contact Customer service.

Error message text	Possible cause	How to fix the problem
No sections have been recognized!	No sections are configured in the ISOBUS job computer. Or the connected ISOBUS job computer does not support SECTION-Control.	If possible, configure the sections on the job computer. If the job computer does not support SECTION-Control, you cannot use it.
The implement does not have a working width!	The working width or geometry have not been configured in the ISOBUS job computer.	Configure the ISOBUS job computer. Correctly set the working width in the job computer; contact the implement manufacturer.
No task started!	The ISOBUS-TC operating mode is configured to "Extended". Therefore, TRACK-Leader expects a task. No task was started in ISOBUS-TC.	Start a task in ISOBUS-TC or set the operating mode to "Standard" in ISOBUS-TC.
No valid device data recognized!	The working width or geometry have not been configured in the ISOBUS job computer.	Configure the ISOBUS job computer.
RTK signal lost!	No RTK signal is available due to signal obstruction.	The GPS receiver and base station must be in open view to the sky.
	No mobile network reception.	
	You are too far away from the base station (or from a different signal source).	
Device allocation is not set.	The connection between the Tractor-ECU and ISOBUS-TC has been deactivated.	Activate the connection between the Tractor-ECU and ISOBUS-TC in the Tractor-ECU application.
The device data is still loading.	If this message appears for a long time, the terminal is connected to a job computer that is not responding.	It is possible that you cannot use SECTION-Control with this job computer, because the job computer does not support SECTION-Control. Connect a different job computer to the terminal.
No connected job computer. Connect the job computer or select a machine profile in the Virtual ECU.	TRACK-Leader has not received any information through the connected job computer or there is no connected job computer.	

13 History

13.1 V8.20170221

New section

- If you are working with shape prescription maps [→ 9]
- If you are using ISOBUS-TC in standard mode [→ 9]
- If you are using ISOBUS-TC in extended mode [→ 9]
- Combined guidance line [→ 34]
- Using automatically created guidance lines [→ 35]
- Changing tractors [→ 49]
- Shape prescription maps [→ 55]
- Completing work [→ 65]
- Importing the initial parameter for manual steering override [→ 92]
- Minimum quality of the GPS signal [→ 93]

Updated sections

- Operating procedures [→ 7]
- Starting navigation [→ 20]
- Field boundary [→ 29]
- Selecting a guidance mode [→ 41]
- Working in headlands [→ 45]
- Working with prescription maps [→ 54]
- Preparing the terminal for work with TRACK-Leader AUTO [→ 56]
- Fine adjustment of the steering system [→ 61]
- "Storage" screen [→ 69]
- Cooperation with TRACK-Guide Desktop [→ 73]
- Configuring "General" settings [→ 76]
- Configuring SECTION-Control [→ 79]
- Procedure for dealing with error messages [→ 94]

Deleted sections

- VARIABLE RATE-Control
- Cooperation with other applications
- Editing shp prescription maps with VARIABLE RATE-Control
- Field data in shp format (shape)
- Machine profiles