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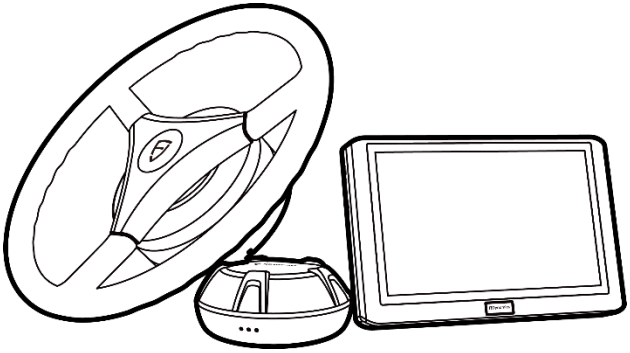

FJDynamics AT2
Auto Steer System
Software User Manual

July 1, 2023 | V 4.1.3

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Revisions:

Version	Date	Description
V4.1.2	2023.06.01	First release
V4.1.3	2023.7.28	2.3 No need to select vehicle information for installation information 2.5 Add PPP correction signal source 4.2.12 Switching the Operation Mode removed 5.3 Slope moved to 6.3.4 Autopilot setting 5.9 Ultra low speed moved to 6.3.4 Autopilot setting 6.3.4 Add autopilot setting 6.4.4 Add a task-to-line group button

Read Before Use:

Operate in strict accordance with this manual.
If you have any questions during use, contact our customer service.

Disclaimer:

- The purchased products, services, and features are stipulated by the contract. All or part of the products, services, and features described in this manual may not be within the scope of your purchase or usage. Unless otherwise specified in the contract, all the content in this manual is provided "AS IS" without warranties of any kind, express or implied.
- The content of this manual is subject to change due to product upgrades and other reasons. FJDynamics reserves the right to modify the content of this manual without notice.

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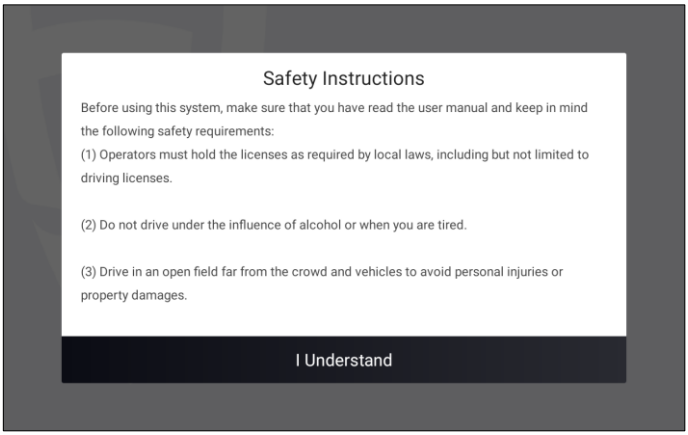
Safety Instructions

Before using this product, ensure that you have read and understood all the operation instructions and precautions in this *FJDynamics AT2 Auto Steer System Software User Manual*.

Safety Instructions

Once the control terminal is started, the following popup appears, informing you of safety risks to which you must pay more attention.



Operator

1. People under eighteen or not meeting the age requirement of local laws and regulations are not allowed to operate this product.
2. Do not drive under the influence of medicines, alcohol, and drugs.
3. Do not drive when feeling tired.
4. Operators must hold the driving licenses as required by local laws and regulations.

Operating Environment

1. Drive in an open field far from the crowd and ensure that there are no irrelevant personnel or vehicles in the operation area.
2. Stay away from people, livestock, obstacles, wires, tall buildings, airports, and signal towers to avoid interference with signals.
3. Do not operate in extreme weathers such as heavy rain, thick fog, snow, lightning, and strong wind.
4. Ensure that there is no human or obstacle around the vehicle's path during testing,

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calibration, adjustment, or automatic turning to prevent personal injury or property damage.

Operation

1. Do not get on or off the vehicle during operation.
2. Monitor the operation condition in real time during operation to ensure timely intervention when necessary.
3. Drive the vehicle in the manual mode on public roads or in public places.

Inspection

1. Ensure that there is sufficient oil in the fuel tank of the vehicle.
2. Ensure that the parameter calibration is complete on the control terminal before operation.
3. Ensure that the antennas and the angle sensor are properly installed. If any is moved, calibrate it again before use.
4. Ensure that all cables are intact. If any damage is found, stop the operation and replace the cable.

Others

1. Disassembling the product housing without authorization may invalidate the warranty.
2. Damage caused by force majeure events, such as lightning strikes, overvoltage, and collision, is not covered by the warranty.
3. Connect the devices strictly in accordance with this manual. When connecting cables such as data cables, hold the end of the plug and gently plug or unplug it. Do not pull the plug by force or twist it, which may break the pins.
4. Follow the power supply requirements for this product (system). The supply voltage for the control terminal and the electric steering wheel is 9 V–36 V.

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FCC Warning

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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

(1) this device may not cause harmful interference

(2) this device must accept any interference received, including interference that may cause undesired operation.

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

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Preface

Use of Manual

This manual describes how to use FJDynamics AT2 Auto Steer System in concise, simple, and clear language, so that users can master each operation procedure easily, quickly, and accurately.

Technical Support

Starting from the date of purchase, users will be provided with the technical support and upgrade services from FJDynamics.
Contact FJDynamics by any of the following methods:

- Tel: +1 833-330-6660 (US)
- Tel: +496 931 090 130 (Europe)
- Official website: https://www.fjdynamics.com

Applicable standard: Q/320411 AQR 004-2019

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Chapter 1 Product Overview

1 Main Components

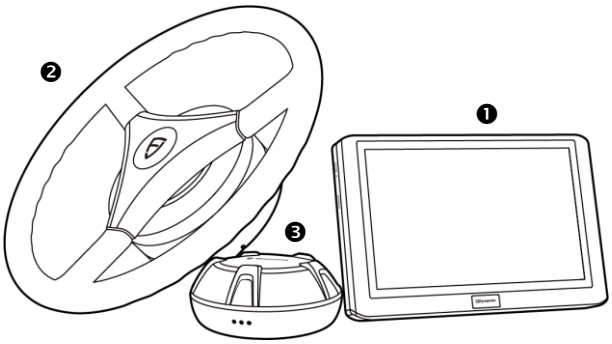

Figure 1. Main components

1	Control terminal	Serves as the human-machine interface, and vehicle control and communication terminal.
2	Electric steering wheel	Consists of a steering motor and a steering wheel, and controls the vehicle steering.
3	GNSS receiver	Receives satellite signals to obtain the vehicle location.

2 Control Terminal Ports

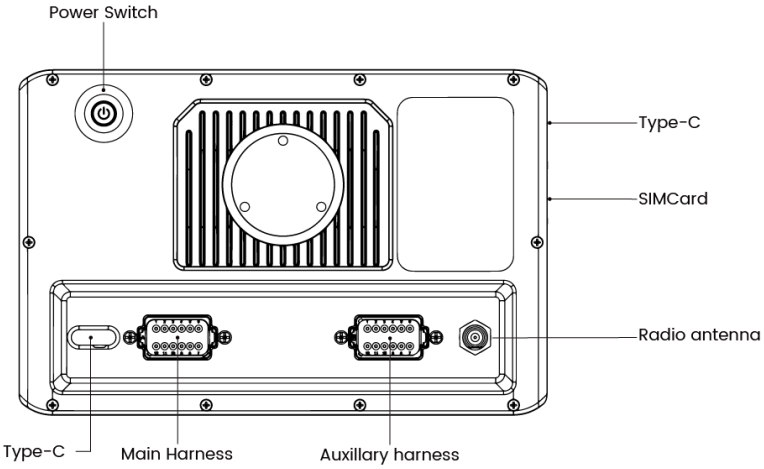

Figure 2. Control terminal ports

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Chapter 2 Software Operation Instructions

1 Workflow Overview

This chapter describes the main operation processes and related functions of FJDynamics AT2 Auto Steer System. Before using the system for the first time, you need to complete the installation, commissioning, and preparations to start the autosteering operation successfully.

2 Installation and Commissioning

Use the following workflow to install and commission the system for the first time:
Select a language → Sign up and log in → Enter installation information → Connect to a signal source →Obtain heading* →Set the vehicle parameters → Calibrate the angle sensor → Calibrate the vehicle → Calibrate the implement → Complete
* Drive the vehicle straight ahead for a while, and the heading is obtained automatically. If not, choose **MENU** > **SYSTEM** > **Heading calibration**.

2.1 Selecting a Language

Power on the control terminal, select a language, and tap **Next** to open the sign-up/login screen.

Figure 3. Select a language

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2.2 Sign-up/Login

The sign-up/login screen is displayed in the language you selected.

Sign up: For the first time use, you need to sign up. Tap **Register** to open the sign-up screen, enter your email address, verification code, and password, and then read and agree to the User Privacy Agreement.

Log in: If you have an account already, you can log in directly by entering your username (email address) and password.

Forgot password: If you forgot your password, tap **Forgot Password** to reset the password. Enter your email address, verification code, and new password, and then tap **Login** to enter the home screen of the system.

Select country/region: The system automatically selects the country or region based on your location, or you can tap in the lower left corner and select your country or region. Ensure that the country or region you selected is true, and we bear no responsibility for any consequences arising from your wrong selection.

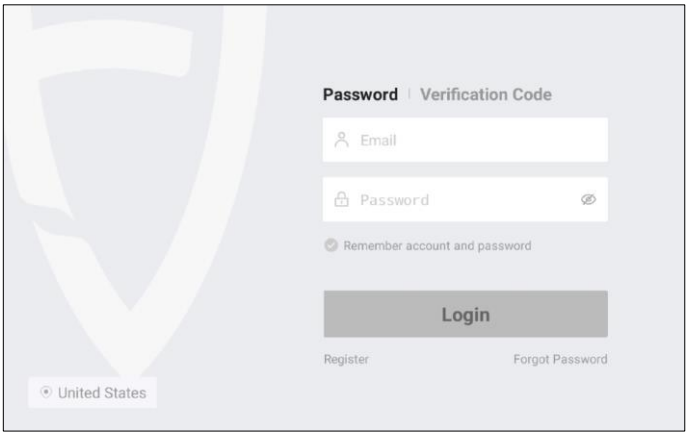

Figure 4. Sign-up or login screen

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2.3 Entering Installation Information

For the first time use, you need to enter the user information, installation information, and machine information. Note that the information you entered may have an impact on your aftersales service, so strictly follow the following procedure:

Step 1: Enter the user information, and tap **Next**.

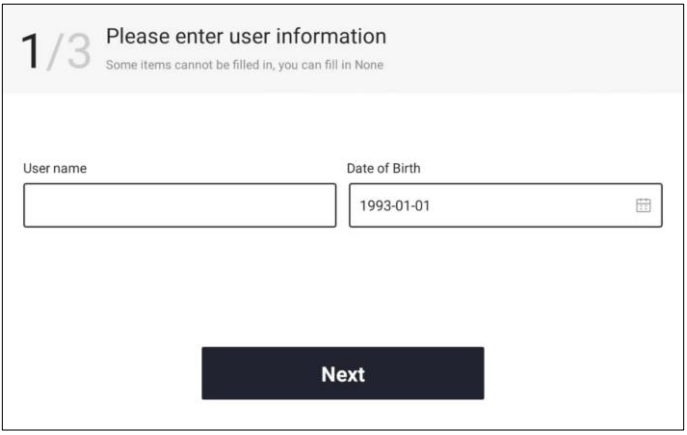

Figure 5. Enter the user information

Step 2: Enter the installation information, and tap **Confirm**.

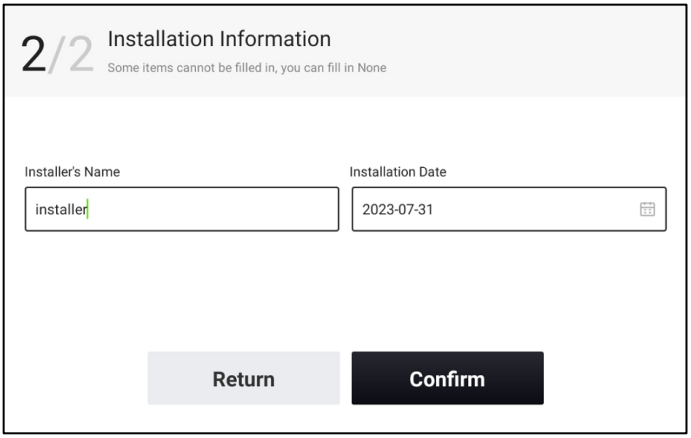

Figure 6. Enter the installation information

2.4 Home Screen

The home screen is displayed upon login. You can view the network connection and operation status in real time. For convenience, your account information is automatically saved locally, so that you are logged in automatically to open the home screen every time

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the system is powered on. Refer to section 4.1 "Home Screen Elements" for details.

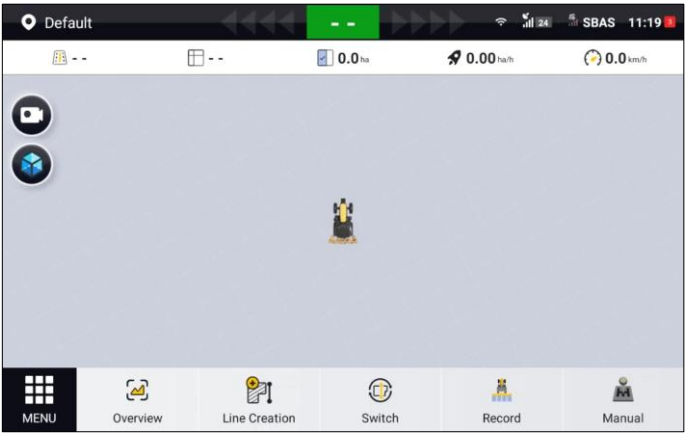

Figure 7. Home screen

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2.5 Connecting to a Signal Source

After the home screen is opened, connect to a correction signal source.

Step 1: Choose **MENU** > **DEVICE SETTINGS** > **Correction Source**.

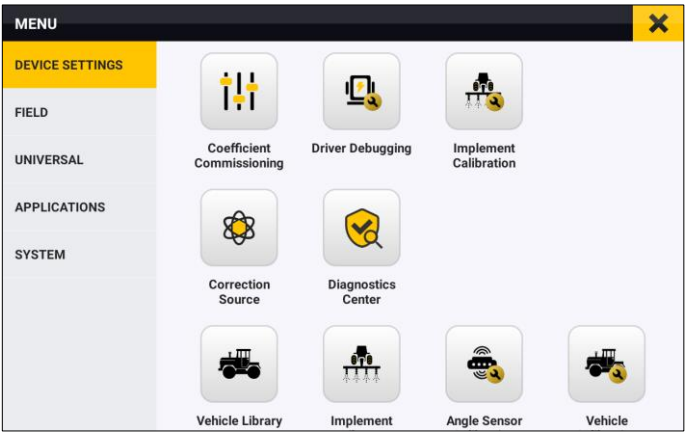

Figure 8. Select Correction Source

Step 2: Tap **Network RTK**, **Mobile Base Station RTK**, **SBAS**, **PPP**, **Bluetooth RTK**, or **External Bluetooth RTK**, to initiate a connection request or set connection parameters. The connection mode you enabled is selected automatically the next time you log in.

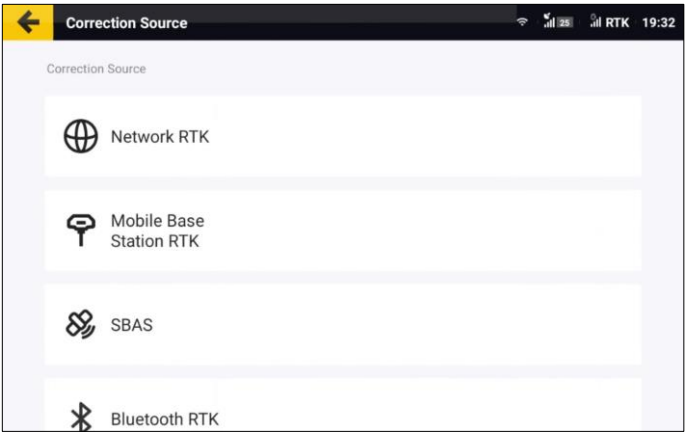

Figure 9. Connect to a signal source

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2.5.1 Network RTK

To enable the network RTK mode, tap **Network RTK**, and the **NTRIP** and **NRTK** options are displayed.

NTRIP

Tap **NTRIP**, and enter information in the popup dialog.

NTRIP host: Enter the host and port, and tap **Get Source**. The node with the strongest signal strength is displayed automatically in the **Source Node** box.

NTRIP account: Enter your account and password, and tap **OK** to complete the connection.

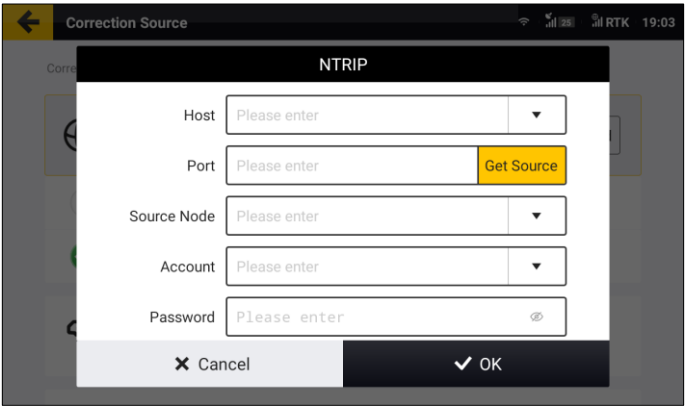

Figure 10. Enter NTRIP information

NRTK

Tap **NRTK**, and the NRTK account bound is automatically logged in.

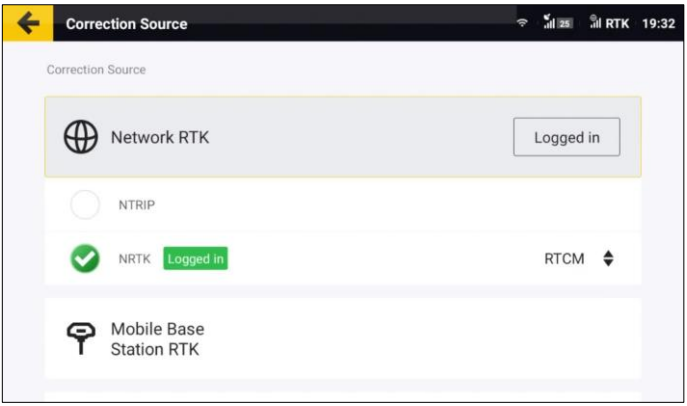

Figure 11. Select NRTK

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Note:

Check whether the mode is available in your region by contacting us as described in section "Technical Support" or contacting the local dealer.

2.5.2 Mobile Base Station RTK

For the mobile base station RTK mode, the connection method is selected depending on the base station type.

Pairing via Code

Tap **Mobile Base Station RTK**, and select **Pairing via Code**. In the popup dialog, enter the frequency code of the base station and tap **OK**. For details about the base station's frequency code, refer to its user manual.

Applicable base stations: FJDynamics mobile base stations whose service codes start with BS or BSA.

You can also set public frequencies in the popup dialog. The frequencies must be 410 MHz to 470 MHz with a maximum of five decimal places. If the base station's service code starts with BSA, public frequency settings are not supported.

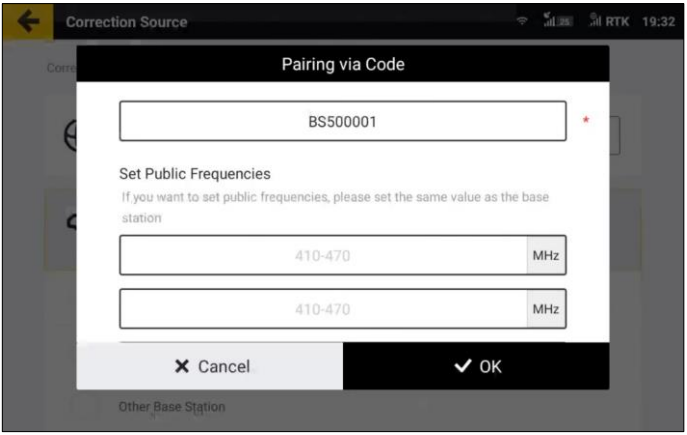

Figure 12. Pair via code

Pairing via Frequency

Tap **Mobile Base Station RTK**, and select **Pairing via Frequency**. In the popup dialog, enter the frequency of the base station and tap **OK**. The frequency must be 410 MHz to 470 MHz with a maximum of five decimal places. For details about the base station's frequency, refer to its user manual.

Applicable base stations: FJDynamics high-power base stations whose service codes start with FQ.

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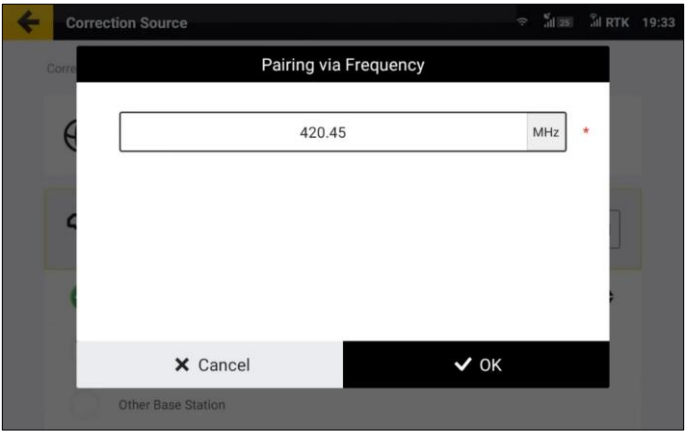

Figure 13. Pair via frequency

Pairing with Base Stations of Other Brands

Power on the base station, and set its frequency, over-the-air baud rate, and radio communication protocol on the base station. Tap **Mobile Base Station RTK**, and select **Other Base Station**. In the popup dialog, set the same frequency, over-the-air baud rate, and radio communication protocol, and then tap **OK**. For details about the parameter settings of the base station, refer to its user manual.

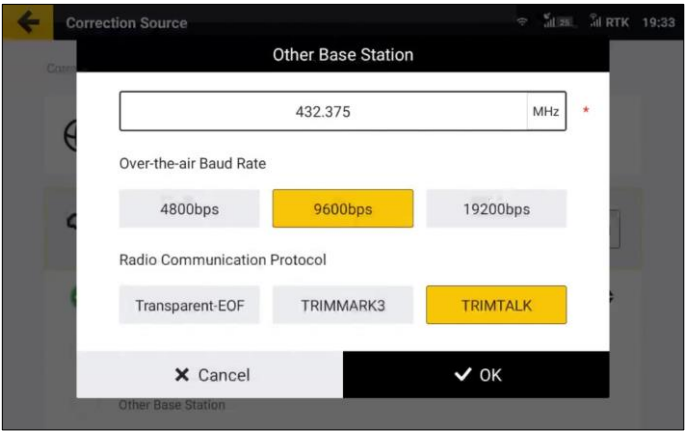

Figure 14. Pair with base stations of other brands

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Base stations of other brands must support the following features:

Frequency: 410–470 MHz

Baud rate: 4,800 bps/ 9,600 bps/ 19,200 bps

Radio communication protocol: Transparent-EOT/ TRIMMARK3/ TRIMTALK

Differential data format: RTCM 2.X / 3.X

Note:

1. Base station pairing may take up to 3 minutes.
2. If RTK connection keeps failing, try switching the RTK connection mode a few times.

2.5.3 SBAS

Tap **SBAS**, and select **WAAS**, **MSAS**, **EGNOS**, **GAGAN**, or **SDCM**. The operation cannot be started until **connected** is displayed at the right of **SBAS**. To switch to a different signal source, tap the source, and then tap **OK** in the popup dialog.

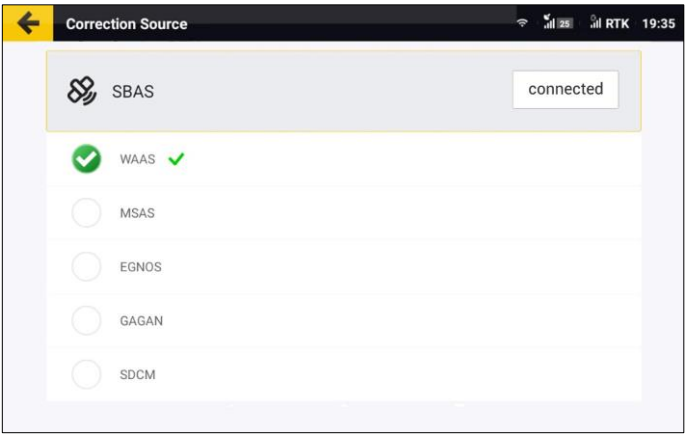

Figure 15. SBAS connection established

Note: The operation cannot be started when **RTK Status** is 1 in **Diagnostics Center** > **Scenario**. Once the connection is established, **RTK Status** becomes 2 and the signal source icon in the upper right corner becomes "S00-S20".

2.5.4 PPP

Tap the PPP option. The operation cannot be started until the PPP has completed configuration and convergence.

PPP 连接状态

Phase	Correction Source	Status bar	Prompt
Configuring	PPP	PPP	

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Configured	PPP Configured	PPP	Configuration completed
Converging	PPP Configured	PPP	
Converged		PPP	Convergence completed

2.5.5 Bluetooth RTK

Note: This mode is only available in Japan.

2.5.6 External Bluetooth RTK

Note: This mode is only available in Japan.

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2.6 Setting Vehicle Parameters

To add, delete, modify, check, upload, synchronize, and calibrate the vehicle information, choose **MENU** > **DEVICE SETTINGS** > **Vehicle Library**.

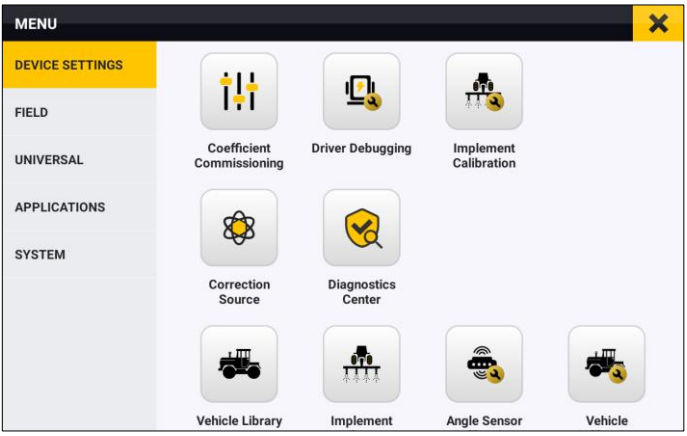

Figure 16. Select Vehicle Library

2.6.1 Parameter Settings

To enter the vehicle settings screen, tap **New** or **Edit**. Enter the basic information on the **Information** tab, and then tap **Next**. Measure and enter the vehicle parameters on the **Parameters** tab, and then tap **Next**. Check the vehicle information on the **Summary** tab, and then tap **Save**.

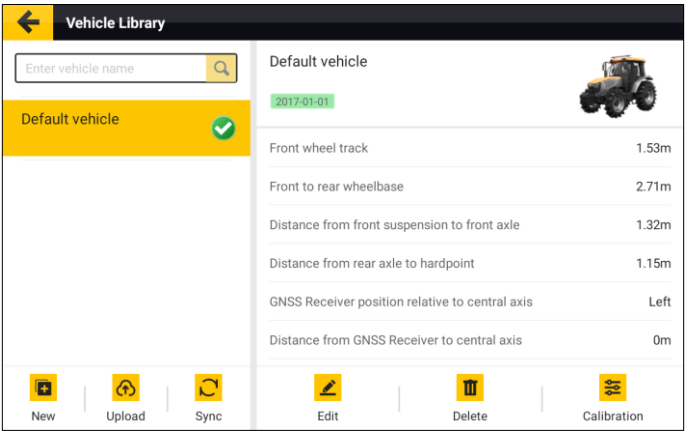

Figure 17. Vehicle library

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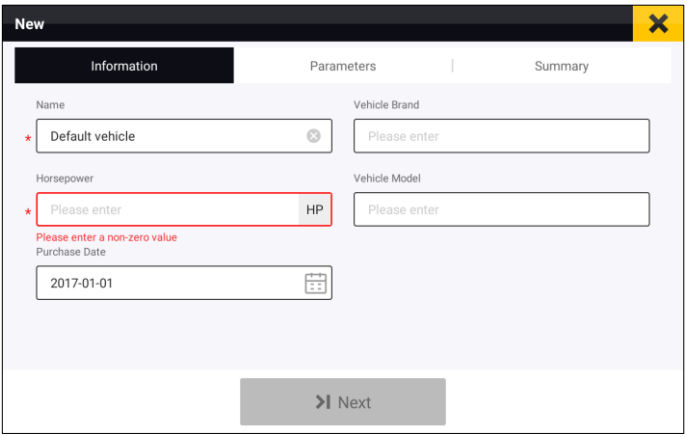

Figure 18. Information tab

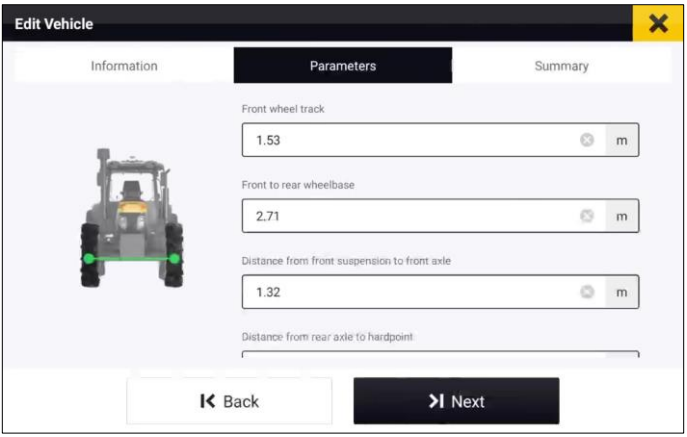

Figure 19. Parameters tab

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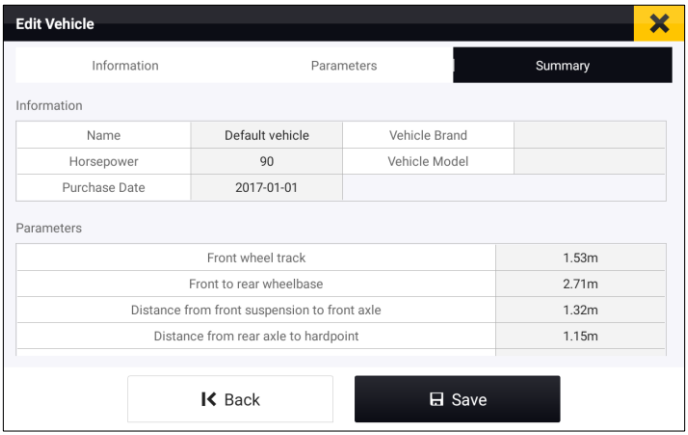

Figure 20. Summary tab

2.6.2 Calibration

Tap **Calibration**, and **Angle Sensor Calibration** and **Vehicle Calibration** are displayed on the screen. Refer to section 2.7 "Calibrating the Angle Sensor" and section 2.8 "Calibrating the Vehicle" for details.

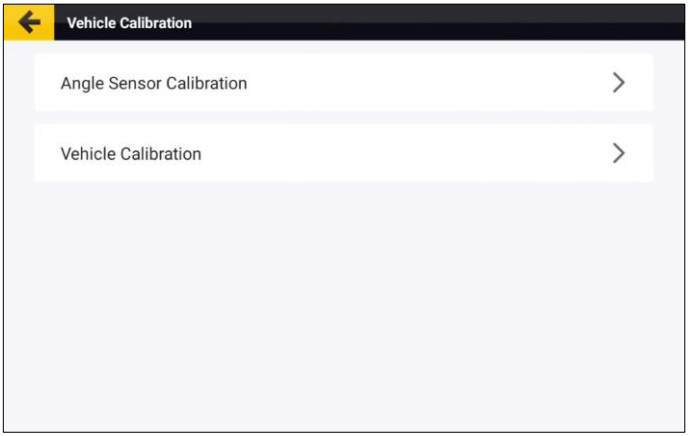

Figure 21. Calibration

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2.6.3 Other Actions

Delete

To delete the vehicle information, tap a vehicle, and then tap **Delete**. The deleted information cannot be restored. This action is unavailable when there is only one vehicle in the vehicle library.

Upload

To upload the vehicle information from the control terminal to the cloud, tap **Upload**.

Synchronize

To download the vehicle information from the cloud to the control terminal, tap **Sync**.

2.7 Calibrating the Angle Sensor

After setting the vehicle parameters, calibrate the angle sensor to ensure the steering control accuracy. Choose **MENU** > **DEVICE SETTINGS** > **Angle Sensor Calibration**. Select the sensor type, and the corresponding settings screen appears.

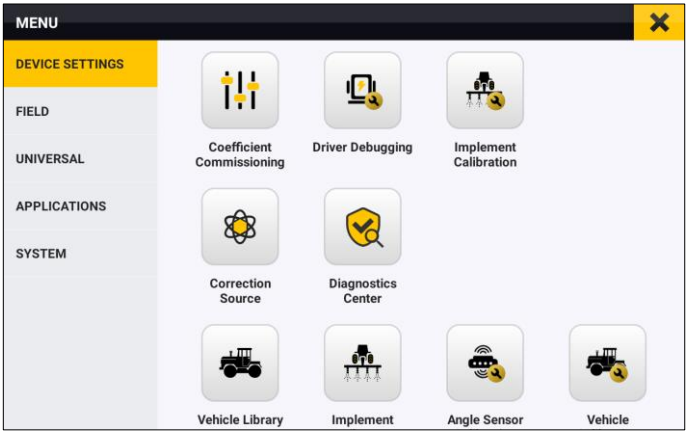

Figure 22. Select Angle Sensor Calibration

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2.7.1 No Angle Sensor

When no angle sensor is installed, select **No Angle Sensor** for the sensor type, and the corresponding settings screen appears.

Vehicle steering speed ratio

Turn the steering wheel from the left limit position to the right limit position, and record the number of turns. The vehicle steering speed ratio is the value multiplied by 6.

Maximum turning angle

The maximum angle that the wheels can turn to the left or right from the aligned position.

Compensation coefficient

After setting the vehicle steering speed ratio and maximum turning angle, you need to adjust the compensation coefficient, if the straight line performance is less than satisfactory in the autosteering mode. The default value is 0. When the steering wheel responds too slowly, increase the value, which cannot exceed 10. If the steering wheel responds too fast, decrease the value moderately.

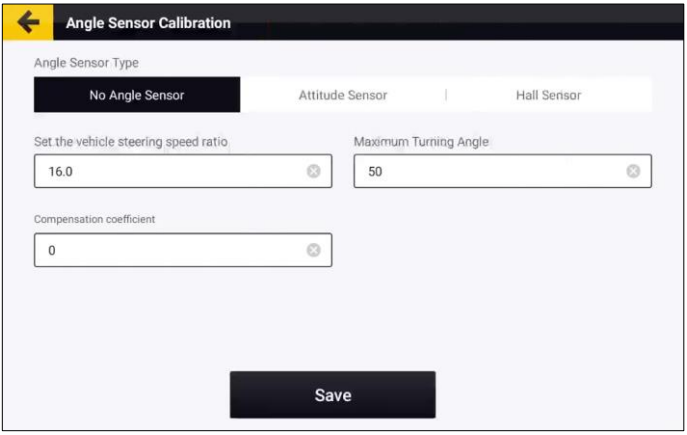

Figure 23. Calibration for no angle sensor installed

2.7.2 Attitude Sensor

If an attitude sensor is installed, select **Attitude Sensor** for the sensor type, and the corresponding settings screen appears.

Maximum turning angle

The maximum angle that the wheels can turn to the left or right from the aligned position.

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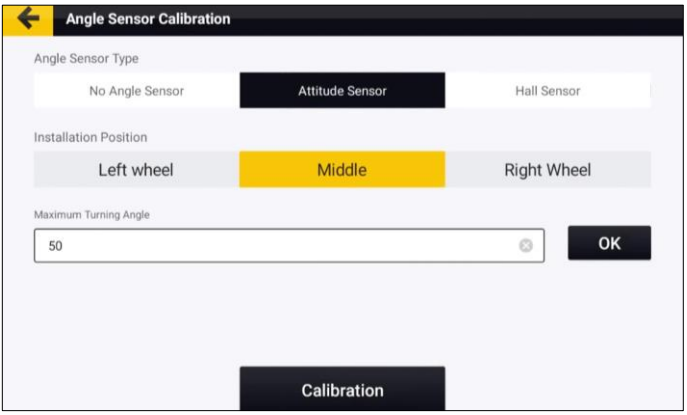

Figure 24. Calibrate the attitude sensor

2.7.3 Hall Sensor

If a Hall sensor is installed, select **Hall Sensor** for the sensor type, and the corresponding settings screen appears. You can check the calibration parameters and real-time parameters on the screen. Select the installation position, tap **Calibration** at the bottom, and turn the steering wheel to the leftmost, rightmost, and center positions as prompted.

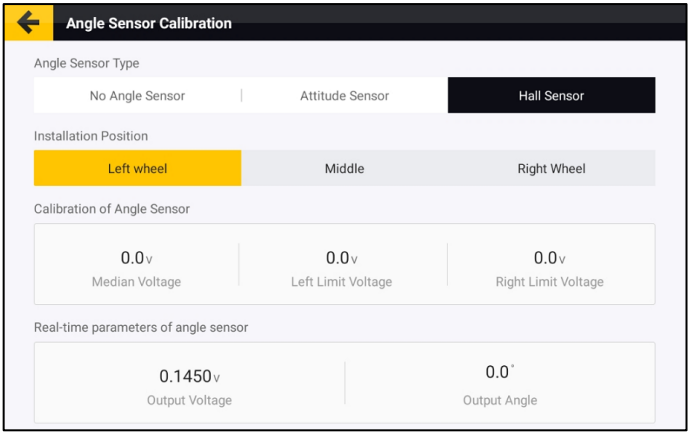

Figure 25. Calibrate the Hall sensor

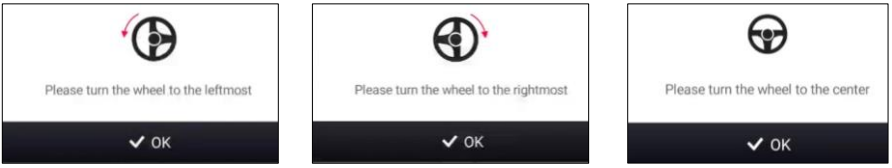

Figure 26. Hall sensor calibration process

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2.8 Calibrating the Vehicle

After calibrating the angle sensor, calibrate the vehicle for offset correction. Choose **MENU** > **DEVICE SETTINGS** > **Vehicle Calibration**, and then tap **Start Calibration**.

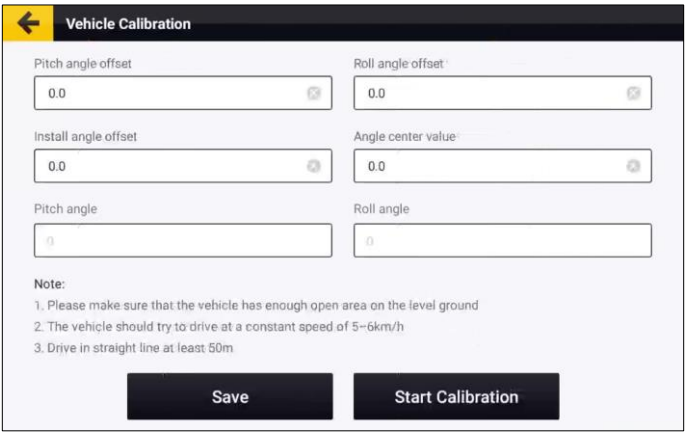

Figure 27. Calibrate the vehicle

Read and follow the instructions on the right of the calibration screen.

Step 1: Drive the vehicle to the start point on a level and wide-open ground, and tap A in the lower right corner to mark point A.

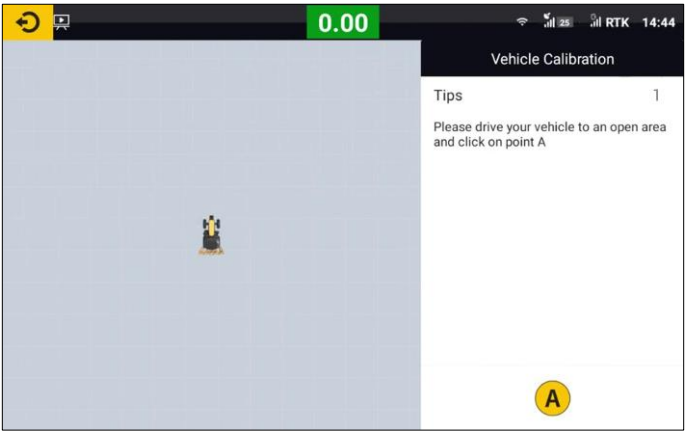

Figure 28. Mark point A

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Step 2: Manually drive the vehicle straight ahead for at least 50 m, and mark point B. The driving distance from point A is shown in real time in the lower right corner.

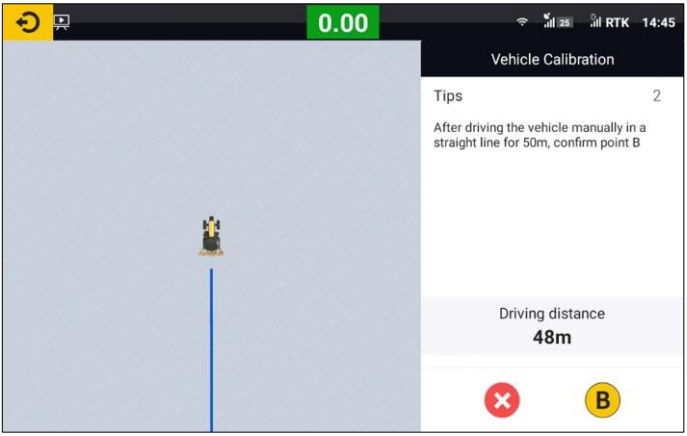

Figure 29. Mark point B

Step 3: Manually turn the vehicle around, and return to point B with the vehicle heading towards point A.

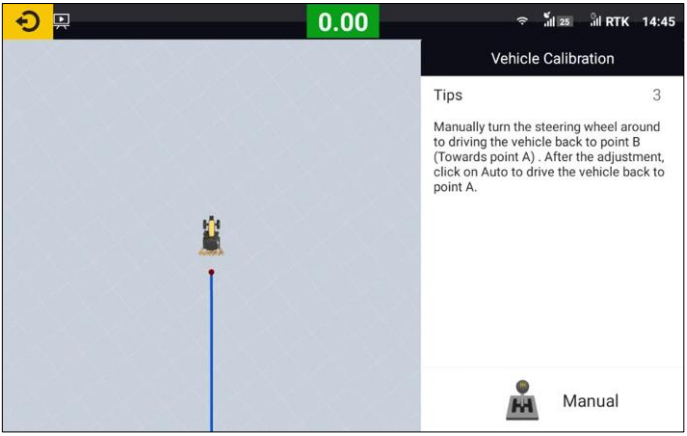

Figure 30. Return to point B after turning around

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Step 4: Tap **Manual** to switch to the autosteering mode, and the vehicle returns to point A along the guidance line you have just created. The vehicle switches to the manual mode automatically once point A is reached.

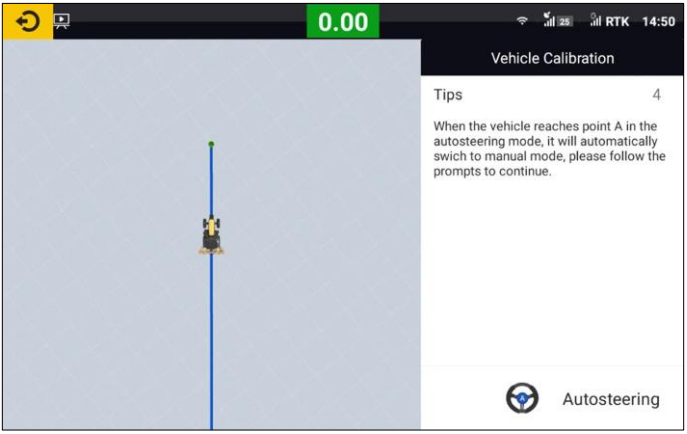

Figure 31. Return to point A

Step 5: Manually turn the vehicle around, and return to point A with the vehicle heading towards point B.

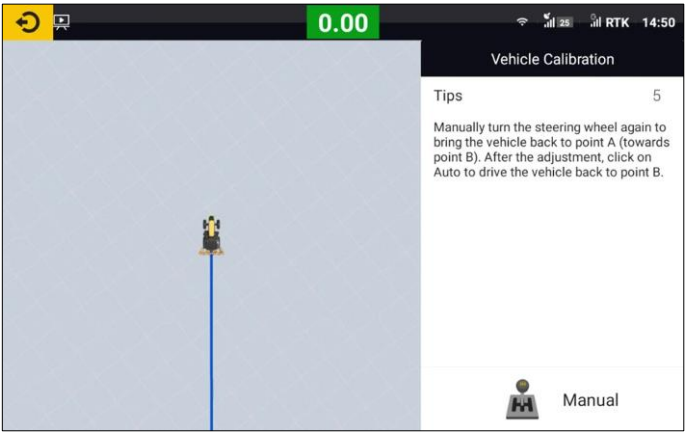

Figure 32. Return to point A after turning around

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Step 6: Tap **Manual** to switch to the autosteering mode, and the vehicle returns to point B along the guidance line you have just created.

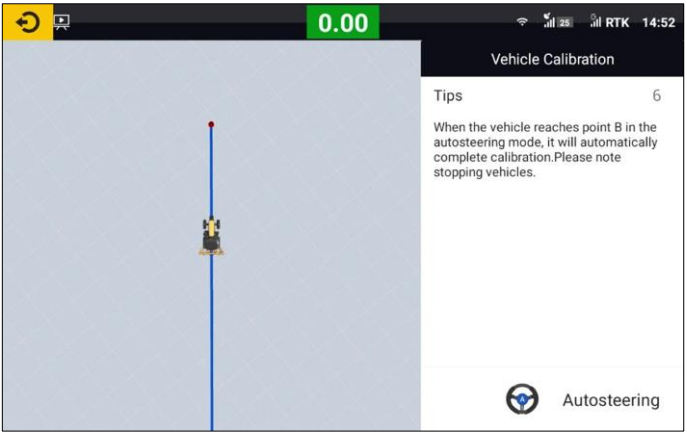

Figure 33. Return to point B

Step 7: The calibration result is displayed automatically after point B is reached. Tap in the lower right corner to complete the calibration.

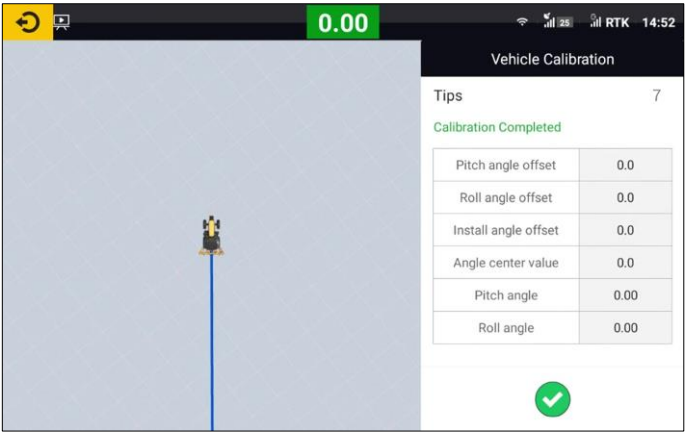

Figure 34. Confirm the calibration result

Note:

Complete the angle sensor calibration before the vehicle calibration.

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2.9 Setting Implement Parameters

To add, delete, modify, check, upload, synchronize, and calibrate the implement information, choose **MENU** > **DEVICE SETTINGS** > **Implement Library**.

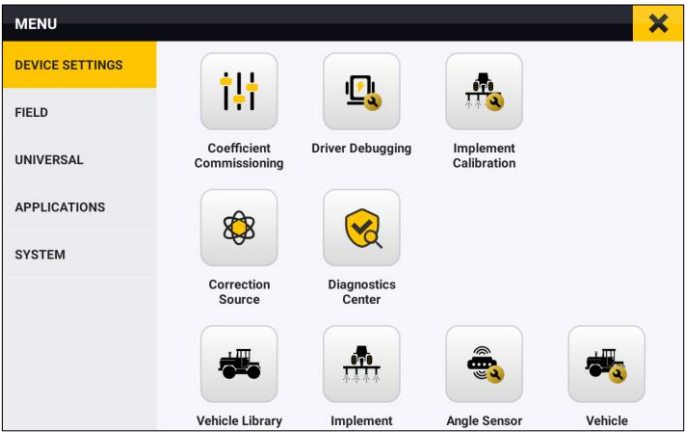

Figure 35. Select Implement Library

2.9.1 Parameter Settings

To enter the implement settings screen, tap **New** or **Edit**. Select the implement type on the **Type** tab, and then tap **Next**. Enter the basic information on the **Information** tab, and then tap **Next**. Measure and enter the implement parameters on the **Parameters** tab, and then tap **Next**. Check the implement information on the **Summary** tab, and then tap **Save**.

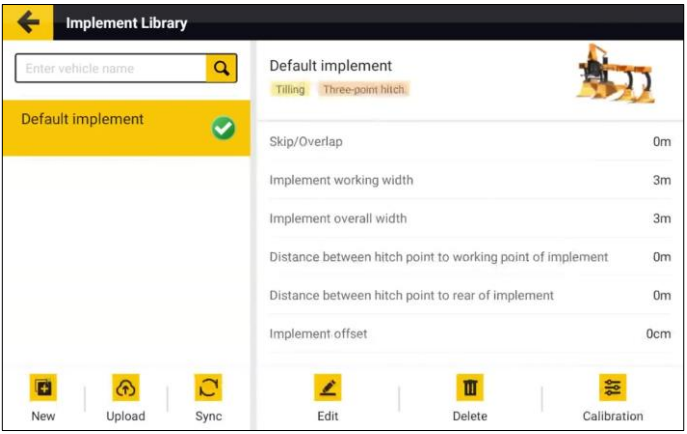

Figure 36. Implement library

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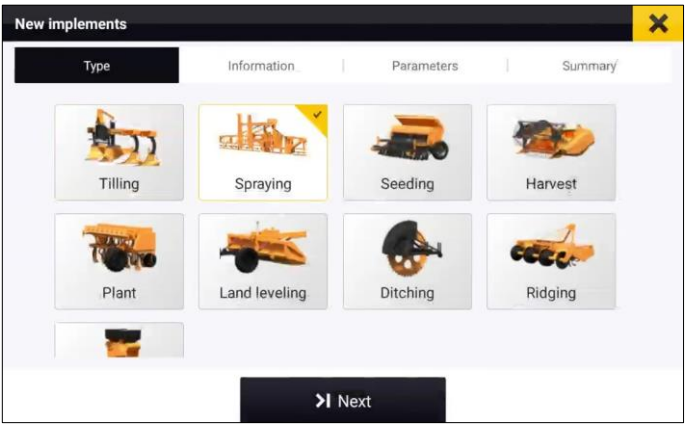

Figure 37. Type tab

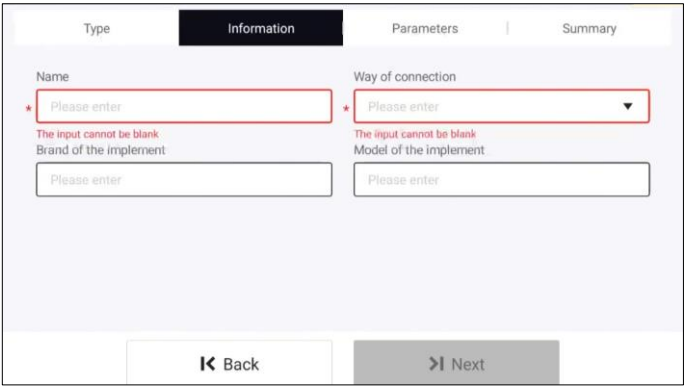

Figure 38. Information tab

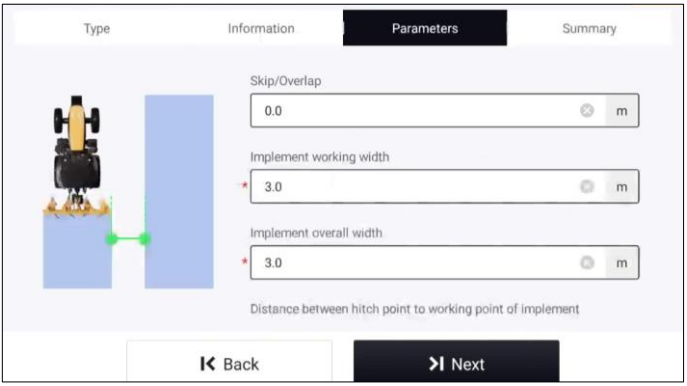

Figure 39. Parameters tab

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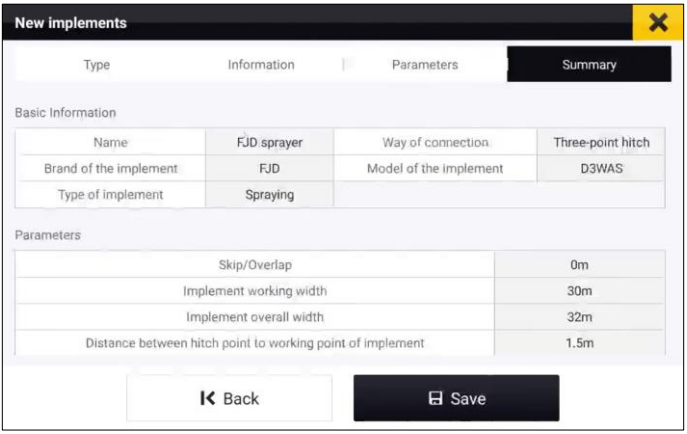

Figure 40. Summary tab

2.9.2 Calibration

To enter the implement calibration screen, tap **Calibration**. Refer to section 2.10 "Calibrating the Implement" for details.

2.9.3 Other Actions

Delete

To delete the implement information, tap an implement, and then tap **Delete**. The deleted information cannot be restored. This action is unavailable when there is only one implement in the implement library.

Upload

To upload the implement information from the control terminal to the cloud, tap **Upload**.

Synchronize

To download the implement information from the cloud to the control terminal, tap **Sync**.

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2.10 Calibrating the Implement

After calibrating the vehicle, calibrate the implement if there is any skip or overlap between adjacent trajectories. Choose **MENU** > **DEVICE SETTINGS** > **Implement Calibration**.

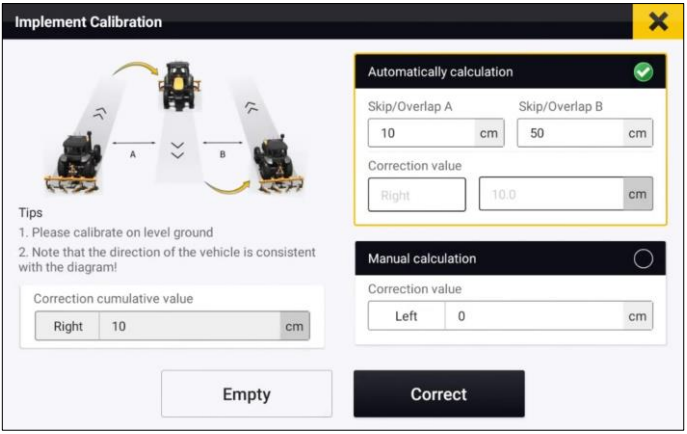

Figure 41. Calibrate the implement

Automatic calculation of correction value

The system works out the correction value automatically based on the skip or overlap values you entered.

Manual calculation of correction value

Alternatively, you can calculate and enter the correction value based on your experience or demand.

Correct

Tap **Correct**, and the correction value is added to the cumulative correction value. You can tap **Correct** repeatedly.

Empty

To clear the automatic or manual correction value, as well as the cumulative correction value, tap **Empty**.

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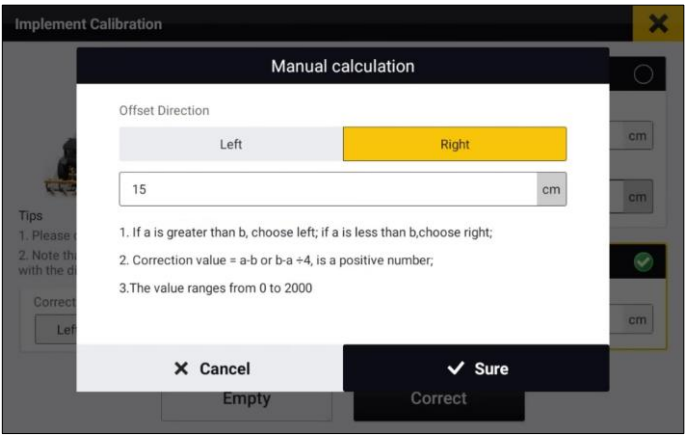

Figure 42. Manual calculation

The above installation and commissioning aims to ensure high-accuracy navigation. Before any operation, you still need to make the following preparations.

3 Preparations

Make the following preparations before any operation:

Check the signal source connection → check the task configuration (create or select a field → create or select a task → create or select a boundary → create or select a guidance line) → check the implement configuration → obtain heading → start the operation.

3.1 Checking the Signal Source Connection

Before any operation, check the signal source connection. Refer to section 2.5 "Connecting to a Signal Source" for details.

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3.2 Checking the Task Configuration

To preview and switch the fields, tasks, boundaries, guidance lines, and implements, tap **Overview** on the home screen. Refer to section 6.4 "Field" for details on how to add, delete, modify, check, and manage the fields, tasks, boundaries, and guidance lines.

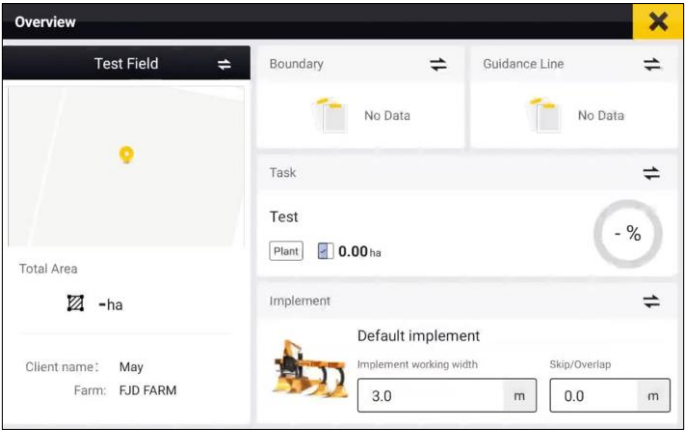

Figure 43. Overview

3.2.1 Creating or Selecting a Field

The field name, field map, field area, client name, and farm name are displayed on the left of the **Overview** screen. Tap ⇌ to switch to another field or create a field.

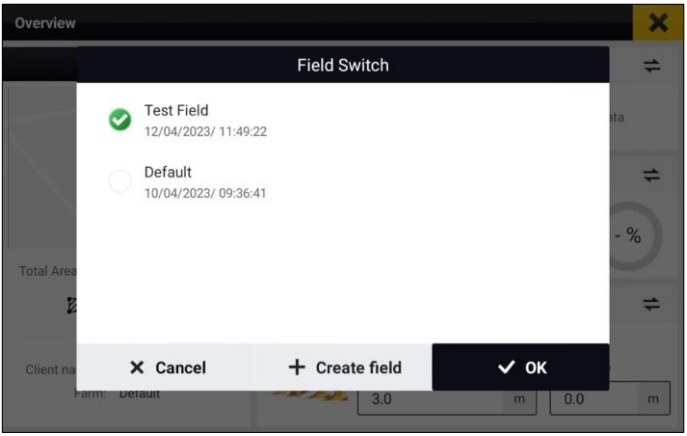

Figure 44. Switch the field

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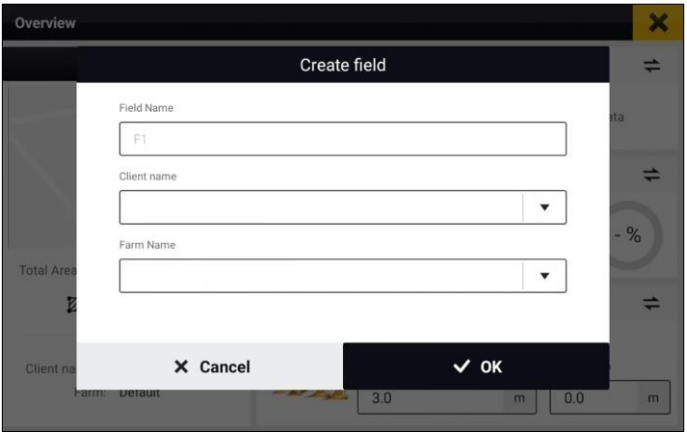

Figure 45. Create a field

3.2.2 Creating or Selecting a Task

The task name, task type, operation area, and completion rate are displayed in the **Task** section on the right of the **Overview** screen. Tap ⇌ to switch to another task bound to the same field or create a task.

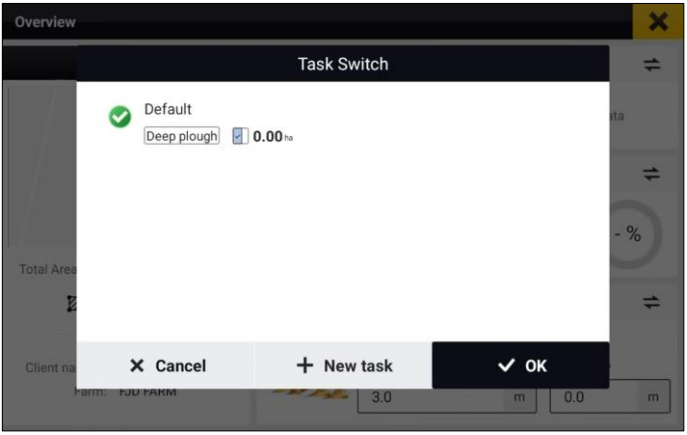

Figure 46. Switch the task

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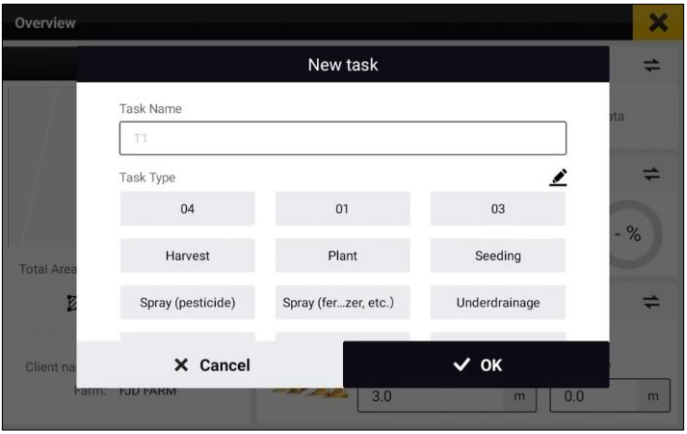

Figure 47. Create a task

3.2.3 Selecting a Boundary

The boundary name, signal source used, and creation time are displayed in the **Boundary** section on the right of the **Overview** screen. Tap ⇌ to switch to another boundary bound to the same field. If no boundary is required for the operation, keep the boundary part empty. Refer to section 3.3 "Creating a Boundary and Guidance Line" for details on boundary creation.

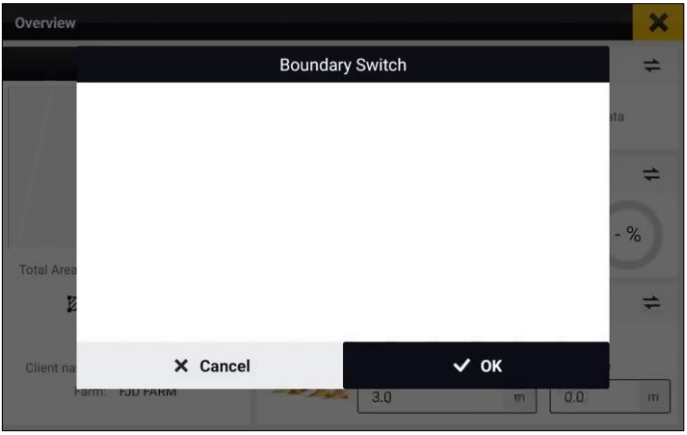

Figure 48. Switch the boundary

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3.2.4 Selecting a Guidance Line

The guidance line name and type, signal source used, and creation time are displayed in the **Guidance Line** section on the right of the **Overview** screen. Tap ⇌ to switch to another guidance line bound to the same field. If no guidance line is required for the operation, keep the guidance line part empty. Refer to section 3.3 "Creating a Boundary and Guidance Line" for details on guidance line creation.

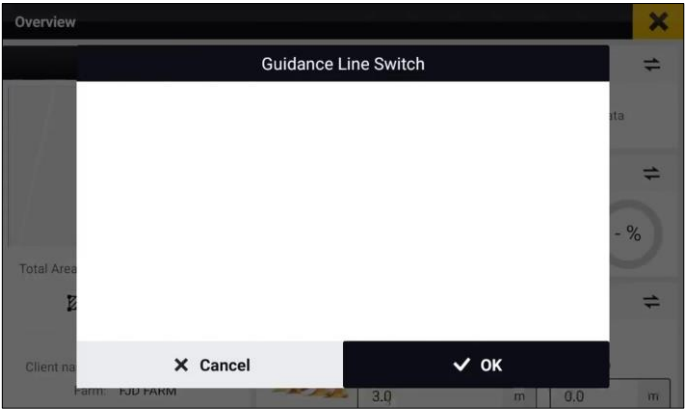

Figure 49. Switch the guidance line

3.2.5 Checking the Implement Configuration

The implement name, working width, and skip/overlap are displayed in the **Implement** section on the right of the **Overview** screen. Tap ⇌ to switch to another implement. Refer to section 2.9 "Setting Implement Parameters" for details on implement creation.

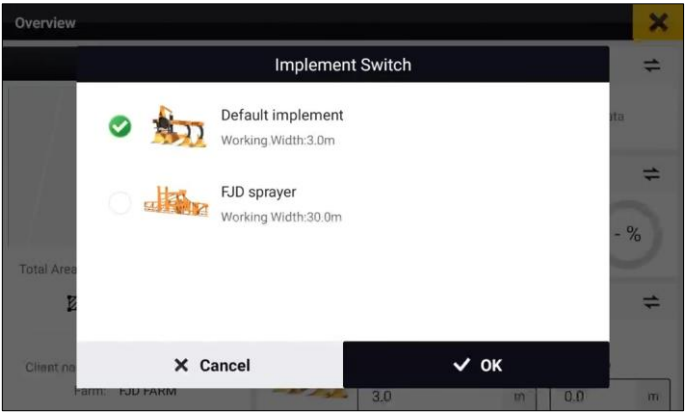

Figure 50. Switch the implement

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3.3 Creating a Boundary and Guidance Line

To record the boundary or create four types of guidance lines, tap **Line Creation** on the home screen. Tap in the lower left corner to record the operation while the boundary and guidance line are created.

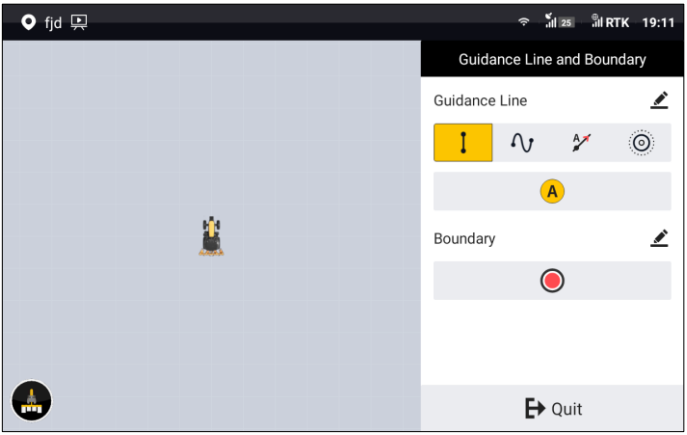

Figure 51. Create a guidance line

3.3.1 Creating a Boundary

Tap on the right, and select the leftmost, center, or rightmost position as the reference based on the boundary and implement position relation.

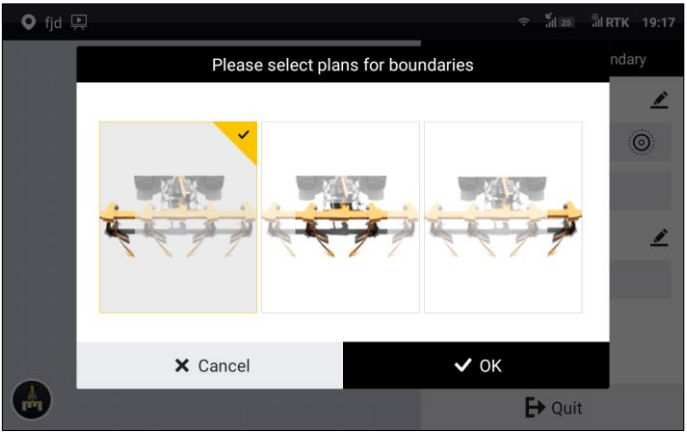

Figure 52. Select the boundary recording reference

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Drive around the field and return to the start point to record a complete boundary.

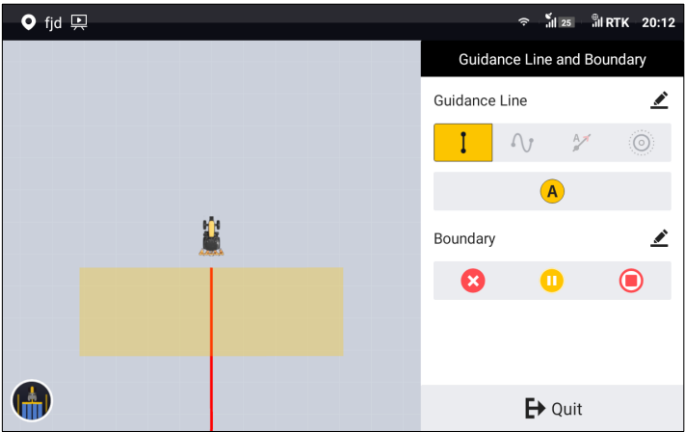

Figure 53. Record the boundary

When recording the boundary, you can tap in the upper right corner of the **Boundary** section to edit the boundary name, headland distance and offset direction.

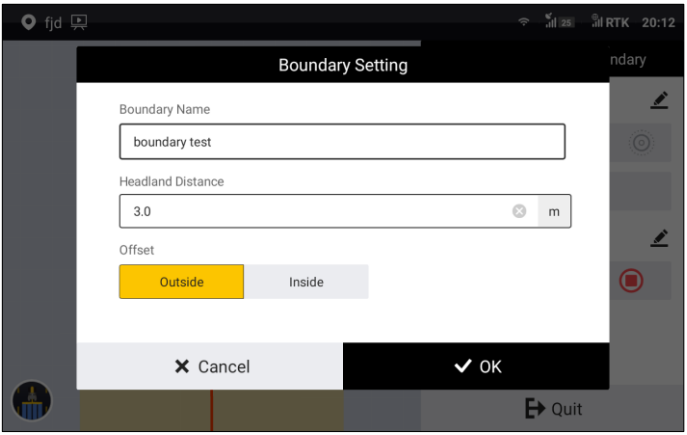

Figure 54. Set the boundary

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The system determines whether the boundary recorded can be used. If the boundary cannot be used directly, the system processes it as follows.

Boundary		System Processing	Illustration
Distance x from the start point to the end point	x ≤50 m	Connect the start point and the end point with a straight line.	
	50 m < x	Resume the recording.	
	Boundary length < 80 m	Resume the recording.	
Special boundary	Boundary too narrow	Record the boundary again.	
	Multiple sub-areas within the boundary		

3.3.2 Creating a Guidance Line

The process to create a guidance line depends on the guidance line mode you select. Four modes are the straight line mode, the A+ line mode, the curve mode, and the pivot mode.

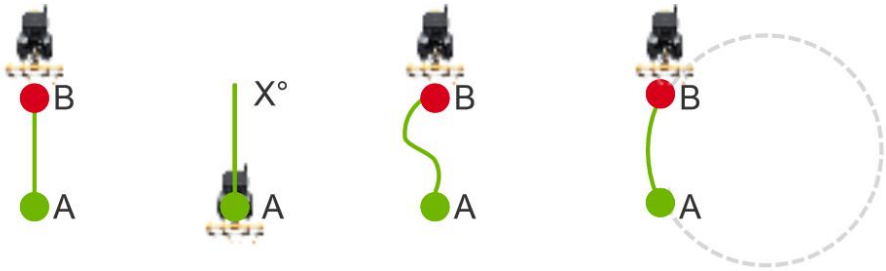

Figure 55. Four guidance line modes

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AB straight line mode

Set point A and point B to create a straight line. This mode is applicable to regularly shaped fields.

Access the boundary and guidance line creation screen, and tap to select the AB straight line mode. Drive the vehicle to the start point, and tap to set the current position as point A.

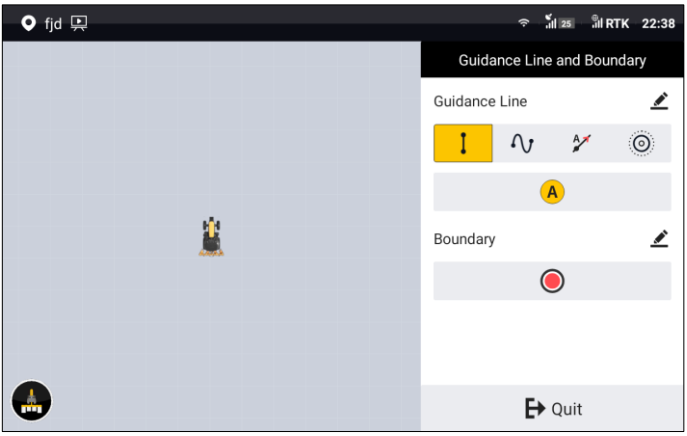

Figure 56. Set point A

Stay in the manual mode, and drive the vehicle for at least 10 m. Tap to set the current position as point B, or tap to cancel point A.

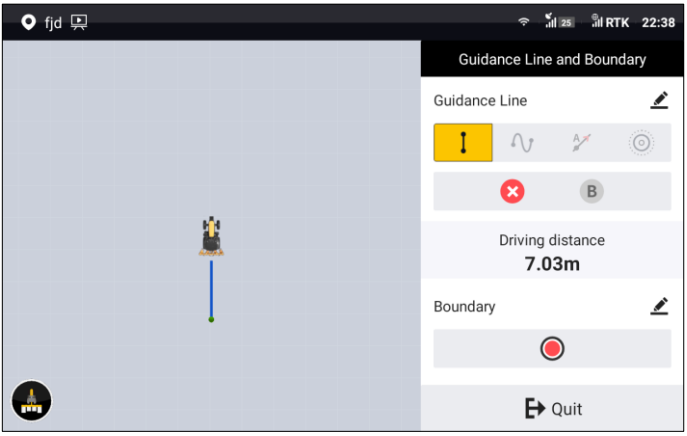

Figure 57. Set point B

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Tap to generate and import the AB line, and the system goes to the home screen and uses the AB line automatically. You can also keep driving the vehicle to another point and tap to change point B to the new position, or tap to cancel the guidance line creation.

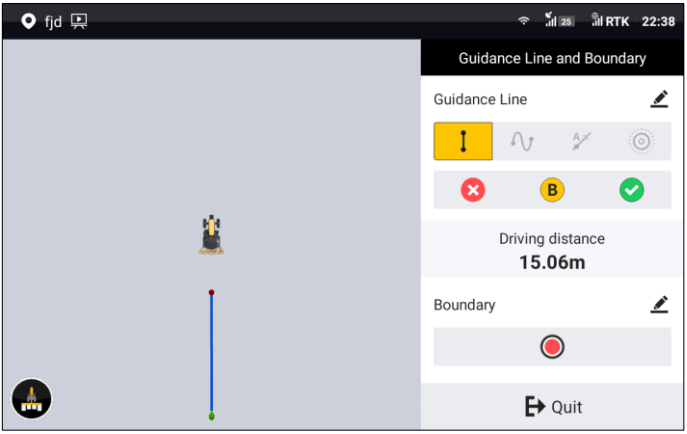

Figure 58. Import the guidance line

When creating a guidance line, you can tap in the upper right corner of the **Guidance Line** section to set the guidance line name.

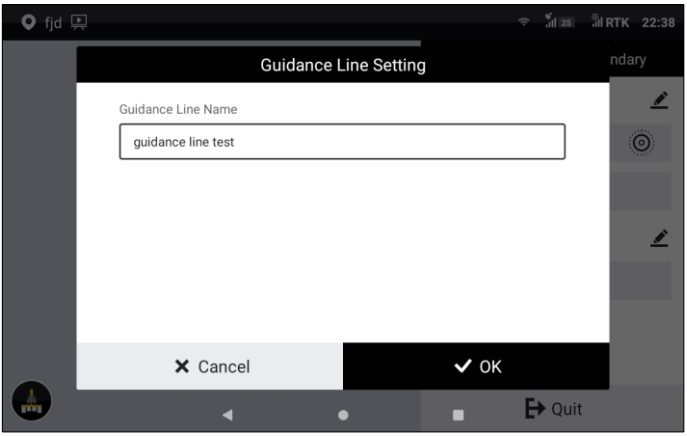

Figure 59. Change the guidance line name

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Creating guidance lines while recording the boundary

While recording the boundary, you can create AB straight guidance lines by following the same process mentioned above.

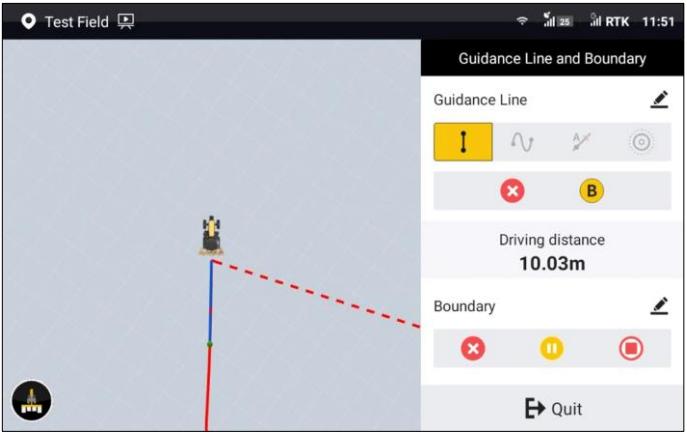

Figure 60. Create a guidance line while recording the boundary

After a guidance line is imported successfully, you can tap + in the **Guidance Line** section to create a new guidance line. All AB lines created during the boundary recording are saved under the current field, and can be switched during a task operation. Refer to section 4.2.4 "Switching Boundaries or Guidance Lines" for details. After the boundary is recorded, the system goes to the home screen and uses the last AB line imported automatically.

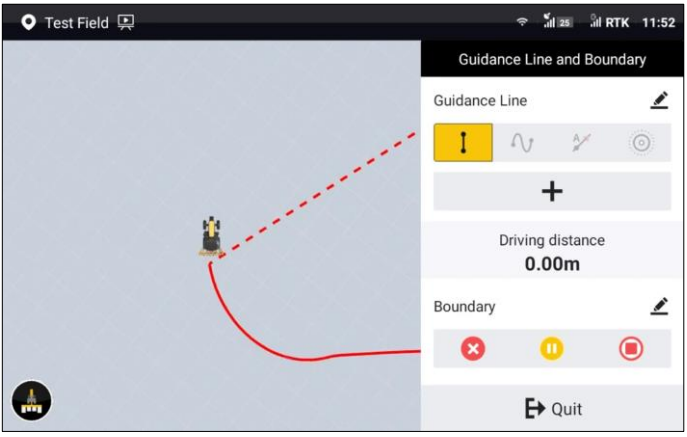

Figure 61. Record boundary edges as the guidance lines

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A+ line mode

Set point A and the heading of the vehicle to create a straight guidance line. This mode is applicable to large fields and operations by multiple operators.

Access the guidance line creation screen, and tap to select the A+ line mode. Drive the vehicle to the start point, and tap to set the current position as point A.

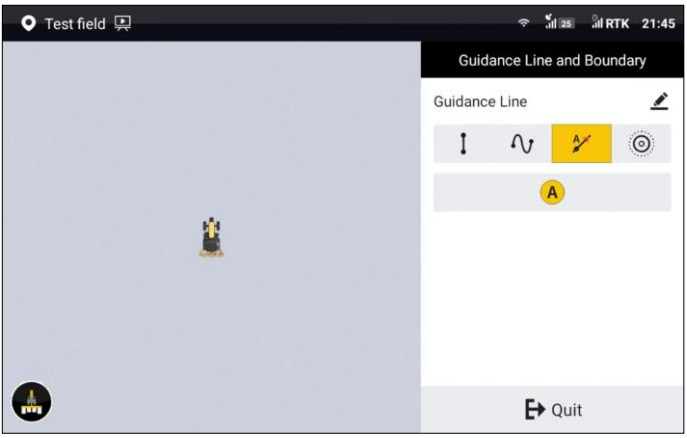

Figure 62. Set point A

You can use your current heading as the heading for creating an A+ line, or enter the heading manually.

a. Tap on the map to set the current heading as the heading of the A+ line.

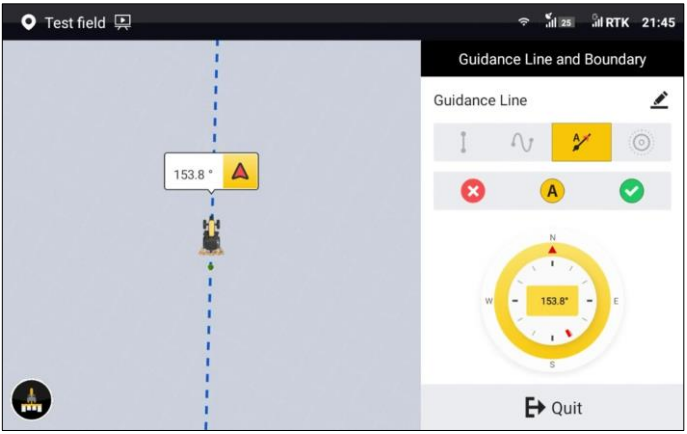

Figure 63. Use the current heading

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b. To enter a heading manually, tap on the right panel, and a popup window appears. Enter a heading relative to the true north in a clockwise direction. The heading must be in the range of 0–360°, with a maximum of four decimal places.

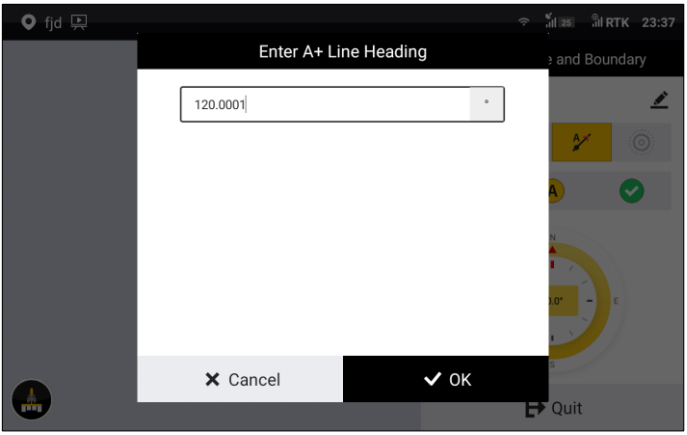

Figure 64. Enter the heading manually

Tap to generate and import the A+ line, and the system goes to the home screen and uses the A+ line automatically. You can also keep driving the vehicle to another point and tap to change point A to the new position, or tap to cancel the line creation.

When creating a guidance line, you can tap in the upper right corner to change the guidance line name.

Curve mode

Use the curved trajectory between point A and point B to generate a guidance line. This mode is applicable to irregularly shaped fields or special fields.

Access the guidance line creation screen, and tap to select the curve mode. Drive the vehicle to the start point, and tap to set the current position as point A.

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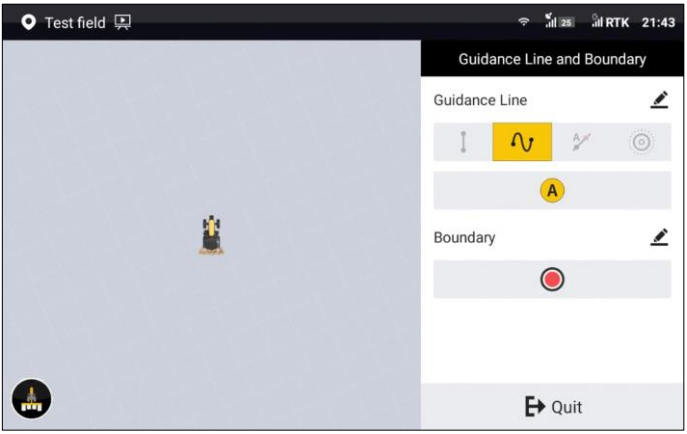

Figure 65. Set point A

Stay in the manual mode, and drive along a curve for at least 50 m. Tap B to set the current position as point B, or tap to cancel point A.

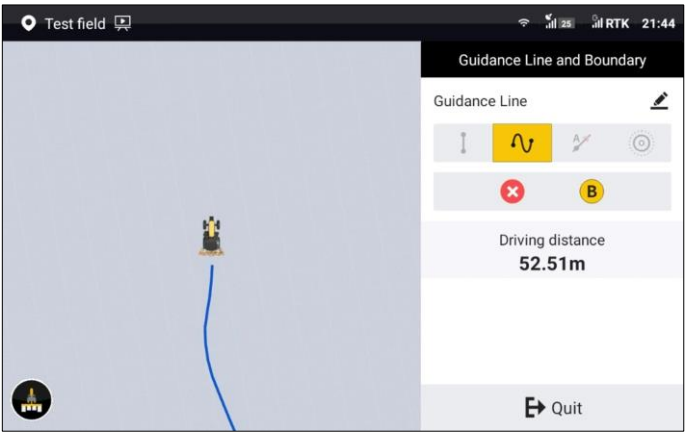

Figure 66. Set point B

When creating a guidance line, you can tap in the upper right corner to change the guidance line name.

Tap to import the curve line, and the system goes to the home screen and uses the curve line automatically. You can also tap to cancel the line creation.

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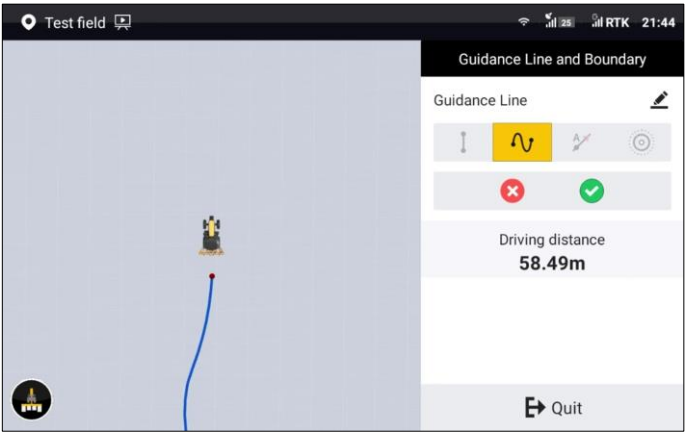

Figure 67. Confirm the curve line

Note:

1. Point A is the start point and point B is recommended to be a point on the headland at the other side of the field.
2. The system automatically extends the line segments beyond the two end points along the tangent directions of the two end points, so the line segments beyond the end points are straight lines.

Pivot mode

Record an arc AB to determine the pivot point and radius. This mode is applicable to fields using the center-pivot irrigation method.

Access the guidance line creation screen, and tap to select the pivot mode. Drive the vehicle to the start point, and tap to set the current position as point A.

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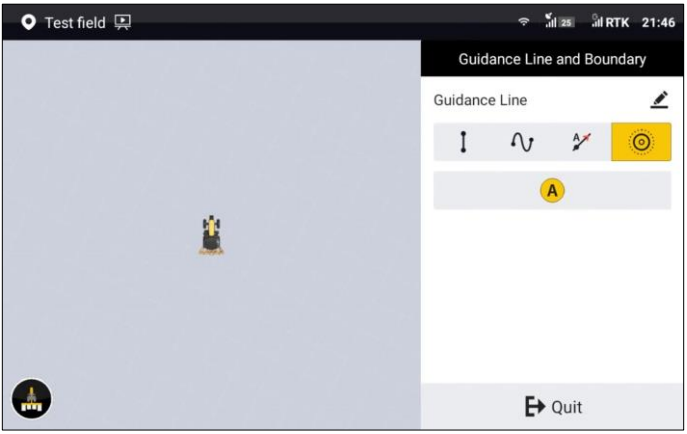

Figure 68. Set point A

Stay in the manual mode, drive along the circular field edge for at least 20 m, and then tap B to set the current positon as point B.

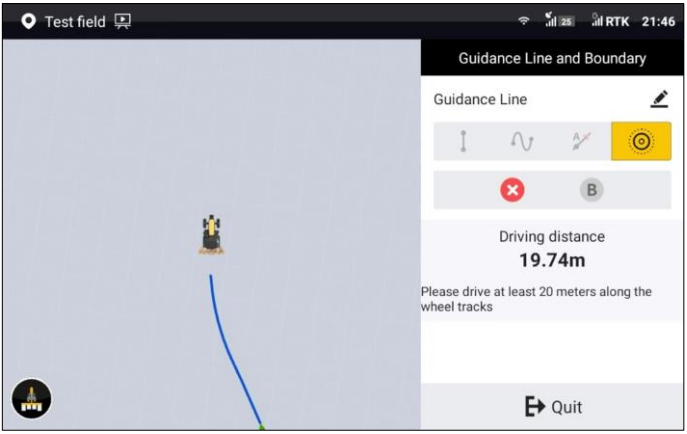

Figure 69. Set point B

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Tap to generate the pivot circle, or tap to cancel the guidance line creation.

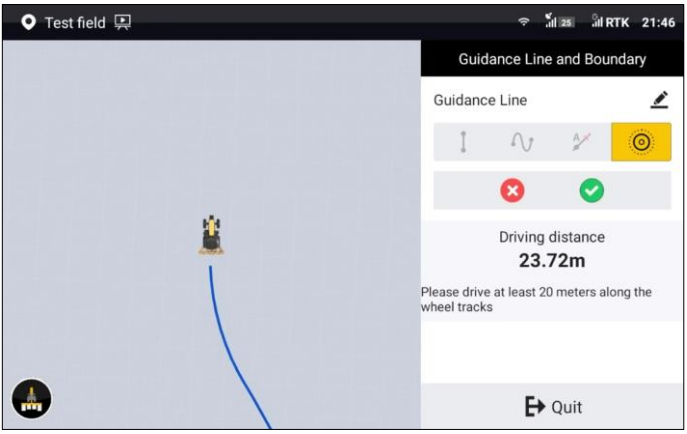

Figure 70. Generate the pivot circle

After you tap , a popup window appears. Enter the distance from the implement edge to the field edge in the popup window, and tap **OK** to import the pivot circle. The system goes to the home screen and uses the pivot circle automatically. When creating a guidance line, you can tap in the upper right corner to change the guidance line name and the distance to the field edge.

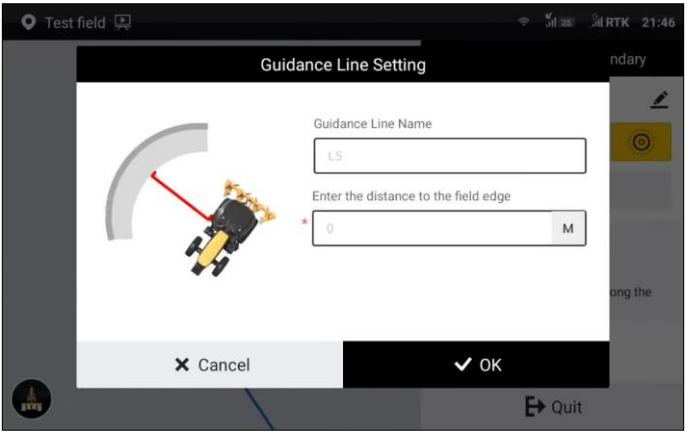

Figure 71. Enter the distance to the field edge

Note: During a task operation with a pivot pattern, when you are returning to the start point after finishing one circular path, stop the autosteering operation according to the on-screen instructions 20 m away from the start point, drive the vehicle manually to the next circular path, and repeat the above steps until operations along all circular paths are

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completed.

4 Starting the Task

4.1 Home Screen Elements

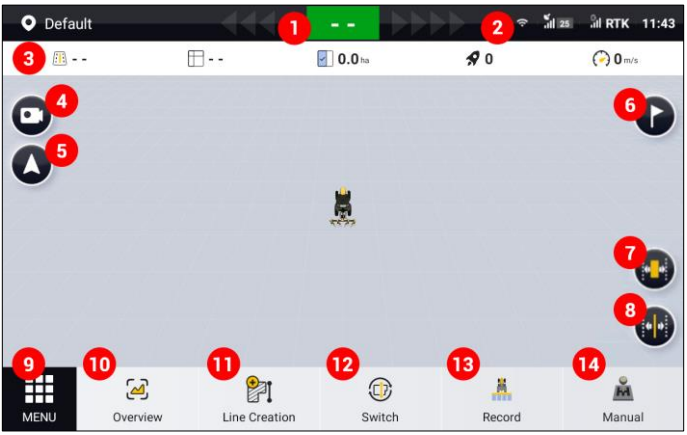

Figure 72. Home screen elements

1. **Offset value:** Displays the offset of the current path relative to the guidance line.
2. **Signal strength icons:** Shows the strength of the satellite signal (satellite tracking), RTK correction signal, or other correction source signals.
3. **Real-time task operation data:** Shows the current task operation data, including, from left to right, the guidance line number, the total field area, the operated area, the completion ratio, the operation efficiency, and the current speed.
4. **Camera button:** Tap to turn on the Wi-Fi camera. Refer to section 4.2.14 "Turning on the Wi-Fi Camera" for details.
5. **View switch button:** Tap to switch between the 2D view and the 3D view. Refer to section 4.2.13 "Switching Views" for details.
6. **Headland marking button:** Marks the headlands at both ends of a field when the boundary is not set. The two headlands must be at least 50 m away. The system warns you when you are approaching the headland. Refer to section 4.2.11 "Marking Headlands" for details.
7. **Trim button:** Tap to move the vehicle slightly to the left or right. This feature is only available in the autosteering mode. Refer to section 4.2.10 "Trim" for details.
8. **Guidance line translation button:** Tap to move the guidance line to the vehicle position or to the left or right by the set distance. This feature is only available in the manual mode. Refer to section 4.2.6 "Translating a Guidance Line" for details.
9. **MENU**: Tap to access the device settings, the field management, the general settings,

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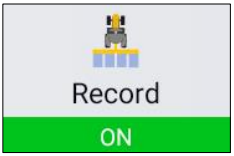
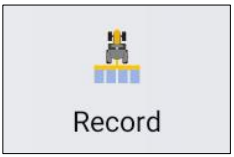
the applications, and the system settings.

10. **Overview**: Tap to access or change the task configuration, such as the field, boundary, guidance line, task, or implement.
11. **Boundary/guidance line creation button:** Tap to create a boundary or guidance line.
12. **Boundary/guidance line switch button:** Tap to switch the boundary or guidance line. Refer to section 4.2.4 "Switching Boundaries or Guidance Lines " for details.
13. **Operation recording button:** Tap to turn on or off the operation recording. Refer to section 4.2.2 "Turning On or Off Operation Recording" for details.



The task operation is being recorded.



The task operation is not being recorded.

14. **Driving mode button:** Tap to switch to the autosteering or manual mode. Refer to section 4.2.1 "Switching the Driving Mode" for details.

You are driving in the autosteering mode.

You are driving in the manual mode.

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4.2 Task Operations

An autosteering operation can be started after the installation, commissioning, and task preparation processes. During a task operation, you can switch the driving mode, turn on or off the operation recording, switch the boundary or guidance line, enable an advanced feature, translate the guidance line or boundary, scale up or down a pivot guidance line or boundary, trim the vehicle position, mark the headlands, switch the view, and turn on the Wi-Fi camera.

4.2.1 Switching the Driving Mode

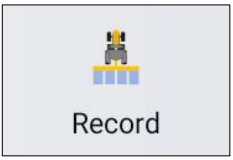
Tap the driving mode button in the lower right corner to switch between the autosteering and manual mode.

Manual: This is the default mode when the system is powered on. In this mode, you must control the steering wheel manually for a task operation, and can switch the boundary or the guidance line, translate the boundary or the guidance line, or mark the headlands.

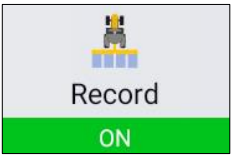
Autosteering: This mode can only be enabled when a guidance line is imported. In this mode, the steering wheel is controlled by the system for an autosteering operation, and you can turn on or off the task recording, trim the vehicle position, mark the headlands, switch the view, and turn on the Wi-Fi camera. To perform other operations, switch to the manual mode first.

4.2.2 Turning On or Off Operation Recording

Tap **Record** in the lower right corner of the home screen to turn on or off the operation recording.



Operation recording off: In this status, the task operation data is not recorded and the operated area is not shown on both the home screen and the task records screen.



Operation recording on: In this status, the task operation data is recorded and the operated area is shown on both the home screen and the task records screen. On the home screen, the operated area is rendered in blue in the autosteering mode and in yellow in the manual mode.

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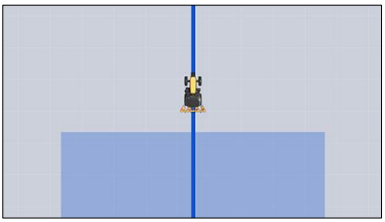

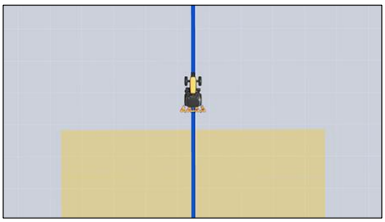

4.2.3 Guiding Line for Resuming a Task Operation

You can start the same task for several times, and the task operation data recorded each time is saved under the task. In case that a task has historical operation data, when the system is powered on or when you resume the task, the system loads the last operation data of that task, and in addition to the operated areas rendered in colors, the mapping guidance panel shows a red dash line to guide you to the end point of the last operation. This line is only for guidance, and you can resume the operation anywhere.

Note: The red guiding line disappears after the operation recording is turned on.

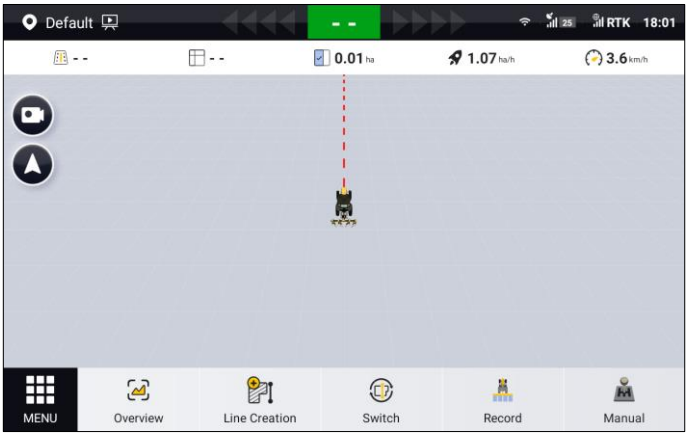

Figure 73. Guiding line for resuming a task operation

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4.2.4 Switching Boundaries or Guidance Lines

In the manual mode, tap **Switch** at the bottom of the home screen, and change the current boundary or guidance line to another boundary or guidance line under the same field.

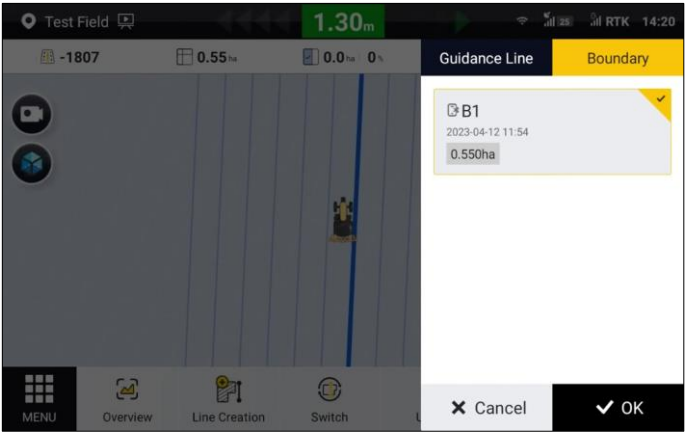

Figure 74. Switch the boundary

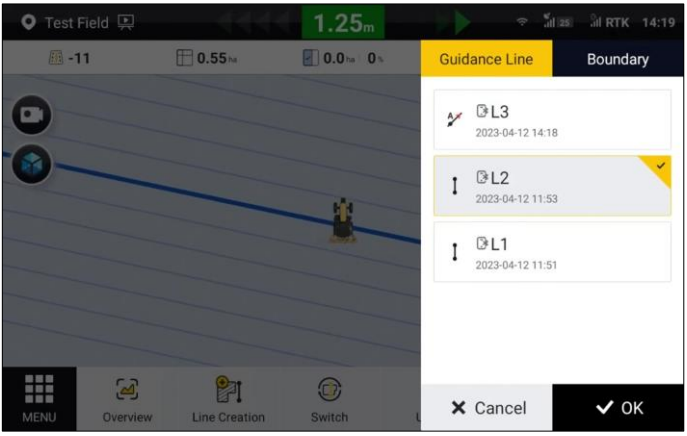

Figure 75. Switch the guidance line

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4.2.5 Enabling an Advanced Feature

Once an advanced feature such as Smart U-turn or Basic U-turn is enabled, you can access the feature directly from the home screen.

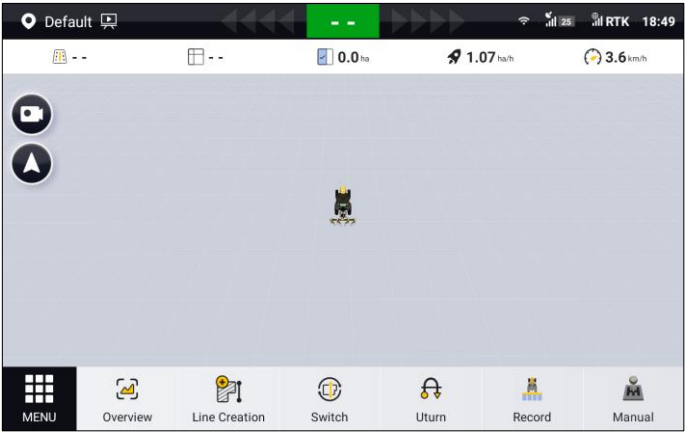

Figure 76. Access an advanced feature from the home screen

4.2.6 Translating a Guidance Line

For a straight guidance line, such as an AB line or A+ line, you can translate the guidance line to the left or right in a perpendicular direction to the guidance line you are currently engaging. For a curved guidance line, such as the curve line or pivot circle, you can translate the guidance line to the front, back, left or right relative to your current heading.

Note: This feature is only supported in the manual mode.

Figure 77. Translate a guidance line

Translating an AB line or A+ line

When you are using a straight guidance line, tap in the lower right corner of the mapping guidance panel in the manual mode, and select **Translate to the current position** or **Guidance Line Translation** as required.

- **Translate to the current position**: Drive the vehicle to an appropriate position, select **Translate to the current position**, and tap **OK** to translate the guidance line to the vehicle position.
- **Guidance Line Translation**: Select **Guidance Line Translation**, set the moving direction and distance, and then tap **OK** to translate the current guidance line to an appropriate

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position.

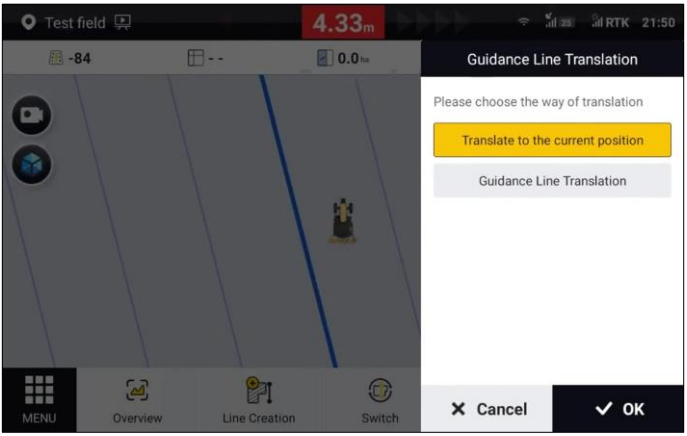

Figure 78. Translate to the current position

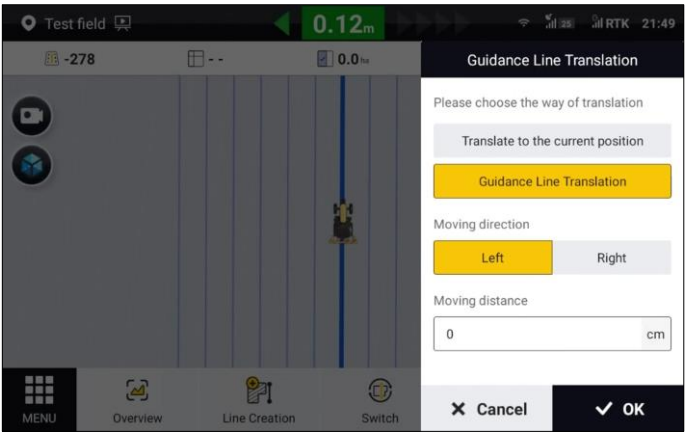

Figure 79. Translate a straight line

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Translating a curve line or pivot circle

When you are using a curved guidance line, such as a curve line or pivot circle, tap in the lower right corner of the mapping guidance panel in the manual mode, enter the translation distance, and tap a direction button to move the guidance line to an appropriate position. You can use different direction buttons to translate the guidance line for multiple times. Tap **Close** to end the guidance line translation.

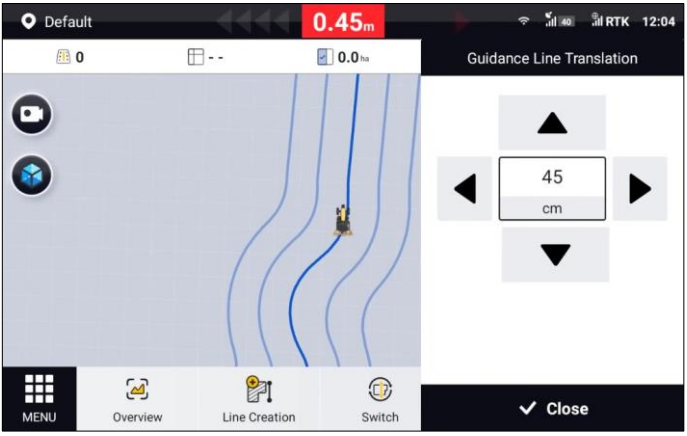

Figure 80. Translate a curve line

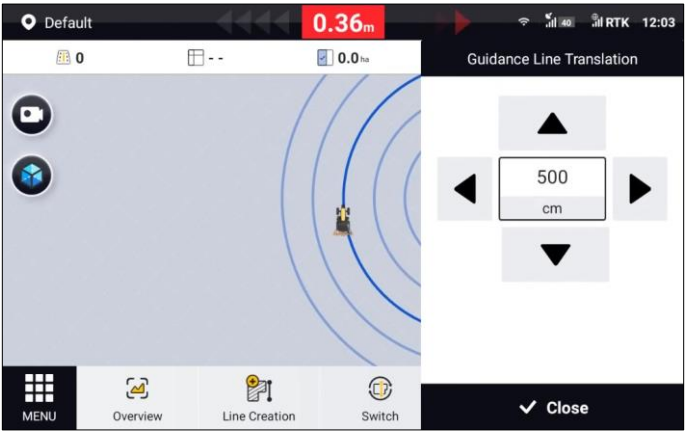

Figure 81. Translate a pivot circle

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4.2.7 Shifting the Boundary

To shift the boundary during a task operation, choose **MENU** > **FIELD** > **Field** > **Boundary**, tap at the bottom, and the system goes to the home screen and displays the boundary shift panel automatically.

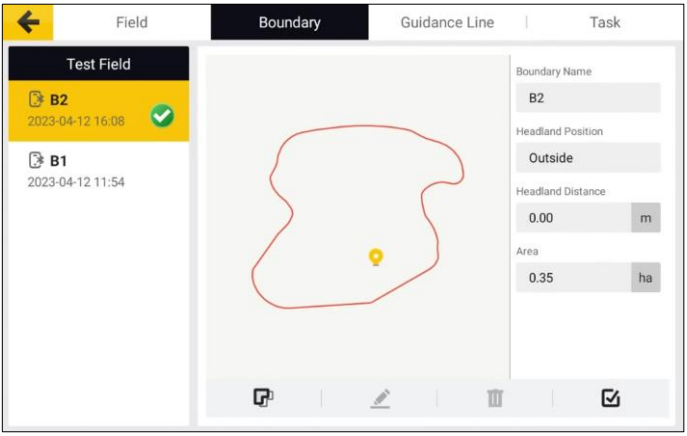

Figure 82. Boundary

Enter the boundary shift distance, and tap a direction button to shift the boundary by the set distance. You can shift the boundary in different directions for multiple times to an appropriate position. Tap **Close** to end the boundary shift.

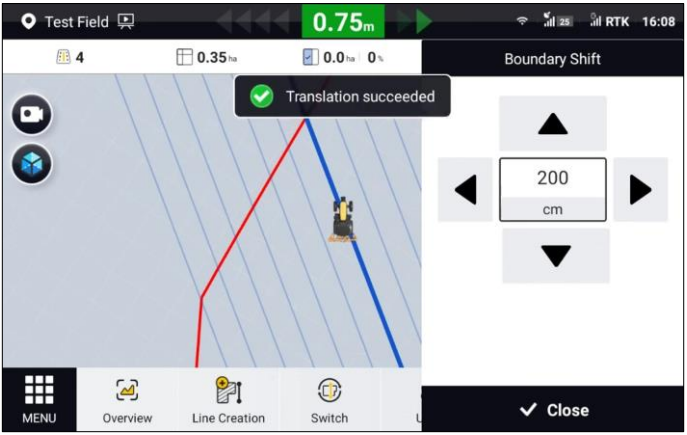

Figure 83. Shift the boundary

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4.2.8 Scaling Up or Down a Pivot Circle

When you are using a pivot circle, you can use the scaling feature to adjust the radius. In the manual mode, tap in the lower right corner of the mapping guidance panel, and select **Scale to current position** or **Scale by specified distance** as required.

Figure 84. Scaling button

- **Scale to current position**: Drive the vehicle to the target point, select **Scale to current position**, and tap **OK** to scale the pivot circle to the vehicle position.
- **Scale by specified distance**: Select **Scale by specified distance**, set the scaling direction and distance, and then tap **OK** to scale the pivot circle to an appropriate position.

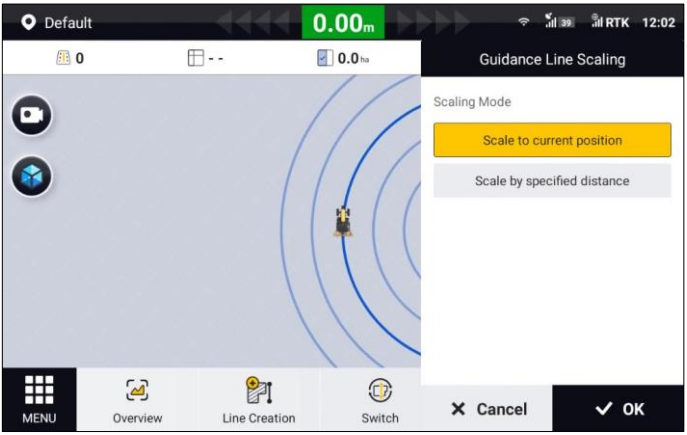

Figure 85. Scale to current position

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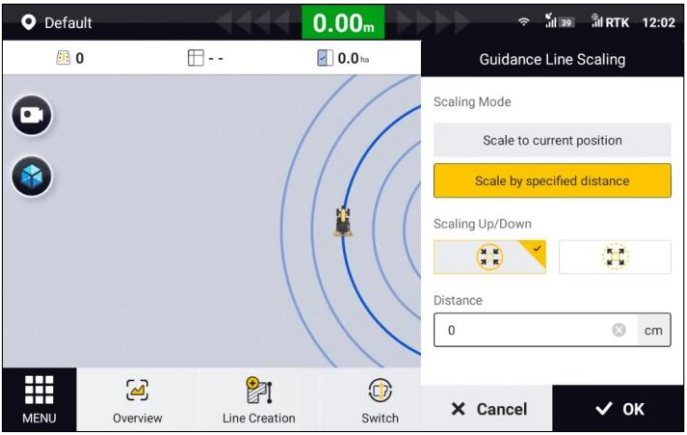

Figure 86. Scale by specified distance

4.2.9 Scaling Up or Down the Boundary

During a task operation, to scale up or down the boundary according to the actual headland positions, choose **MENU** > **FIELD** > **Field** > **Boundary**, tap at the bottom, and set the scaling direction and distance in the popup window.

Note: To edit the current applied boundary, tap in the lower right corner to cancel the application, edit the boundary as required, and apply this boundary again.

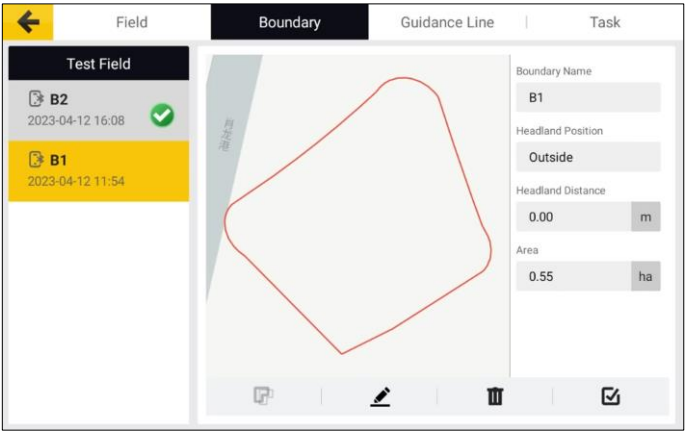

Figure 87. Boundary

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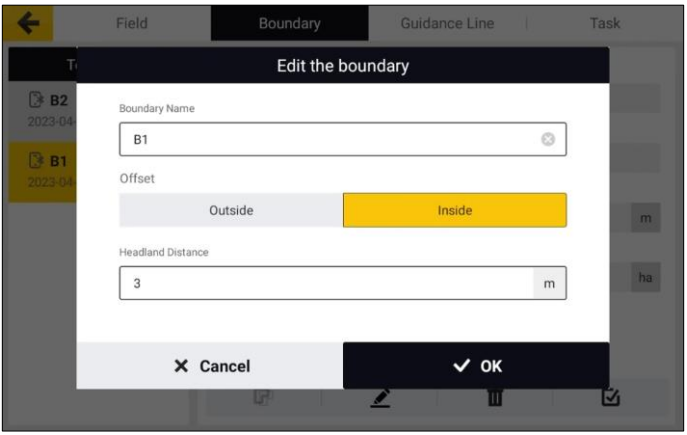

Figure 88. Edit the boundary

A new black boundary appears on the map on both the boundary information screen and the home screen, and the system plans the operation path and records the operation data based on the new boundary. The original red boundary is displayed only for reference.

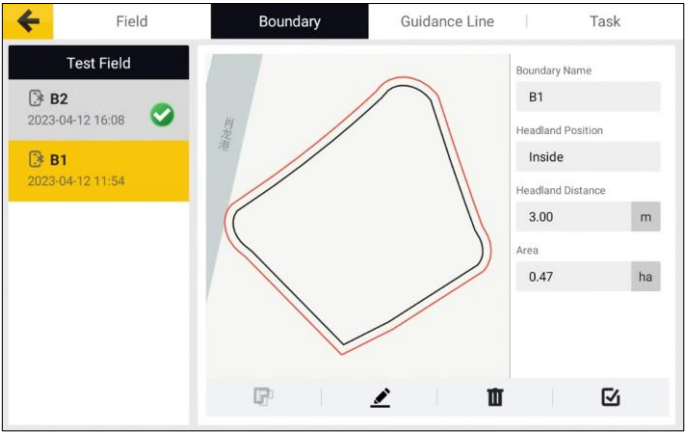

Figure 89. New boundary

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4.2.10 Trim

During the autosteering operation, the vehicle can steer offline as a result of the unstable satellite signal. In this case, you can use the trim feature to move the vehicle. Tap in the lower right corner of the mapping guidance panel, set the increment value in the right panel, and tap the left or right direction button to move the vehicle. You can move the vehicle in different directions for multiple times to an appropriate position. Tap **Close** to end the trim operation.

Note: This only changes the vehicle position temporarily, and the previous settings resume when the vehicle moves to the next guidance line or the manual mode is enabled.

Figure 90. Trim button

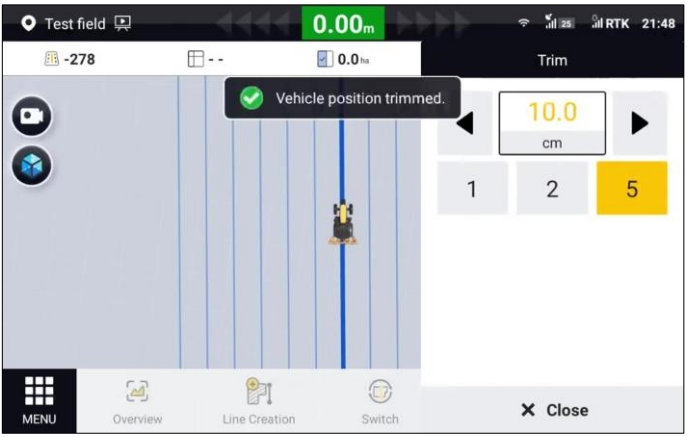

Figure 91. Trim

4.2.11 Marking Headlands

With the headlands marked, the system is able to give warnings about the headland positions, to avoid accidents in the autosteering mode, especially when operating at night.

Figure 92. Headland marking button

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When a guidance line is imported, drive the vehicle to the headland position, tap in the upper right corner of the mapping guidance panel to mark the current position as the headland. The headland line appears as a line perpendicular to the current guidance line.

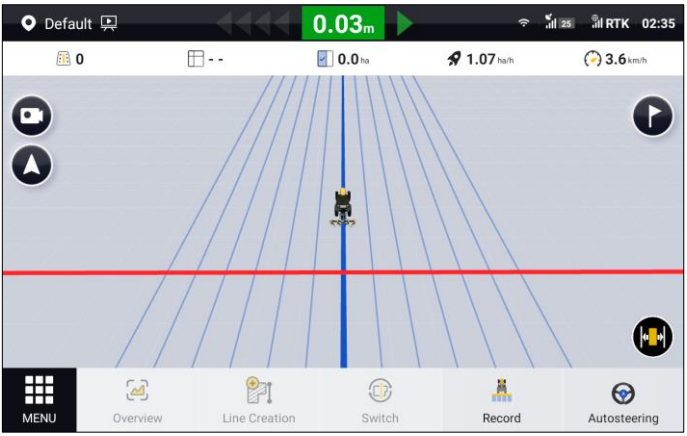

Figure 93. Headland 1

To mark the next headland, tap again, and appears.

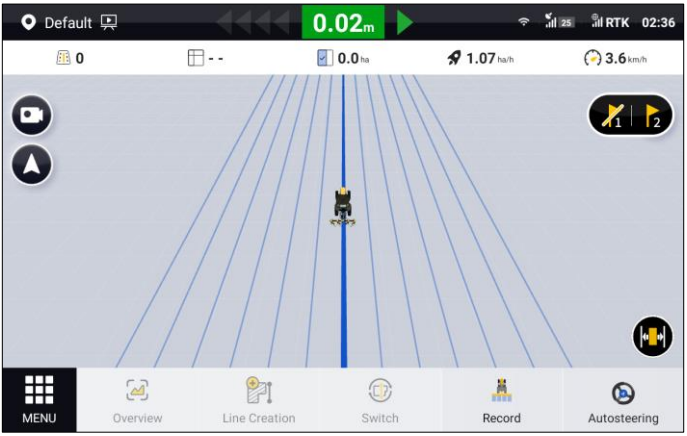

Figure 94. Mark the next headland

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Drive the vehicle along the current guidance line for at least 50 m, and tap to mark the current position as headland 2.

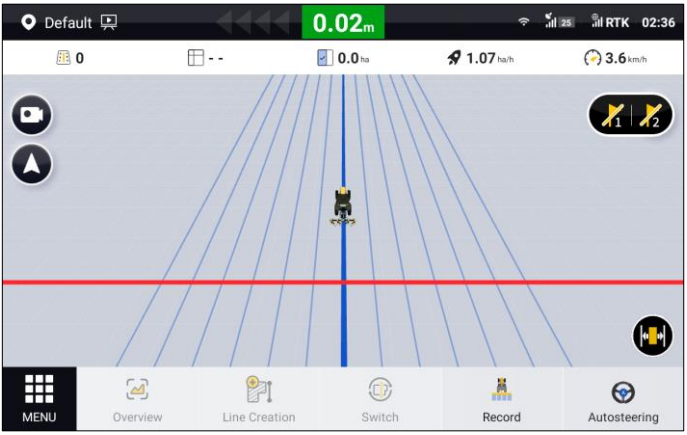

Figure 95. Headland 2

After the headlands are marked, the system gives sound and message alarms at the alarm distance from the headland. If you switch to the manual mode, the alarm sound and message disappear. The alarm distance can be adjusted in **SYSTEM** > **Alert**.

Note:

1. A maximum of two headlands are allowed.
2. When no guidance lines are imported, headland marking is not supported.
3. The marked headlands are canceled when a new guidance line is used.

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4.2.12 Switching Views

To switch to the 2D view or 3D view, tap the view switch button in the upper left corner of the mapping guidance panel.

Figure 96. View switch button

The 2D view shows a top view of the planned paths and operation trajectories.

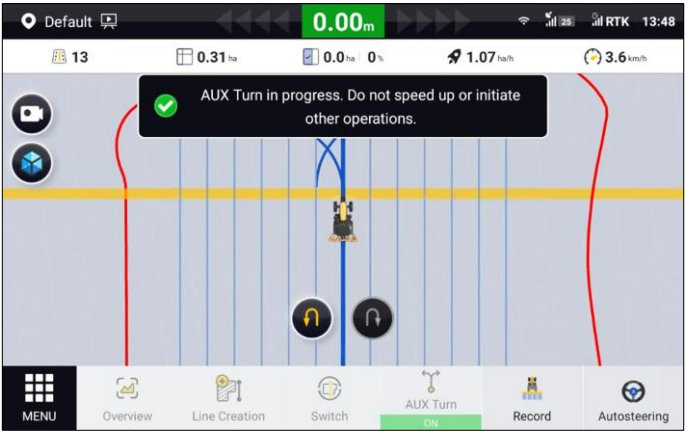

Figure 97. 2D view

The 3D view shows a perspective top view of the current operation.

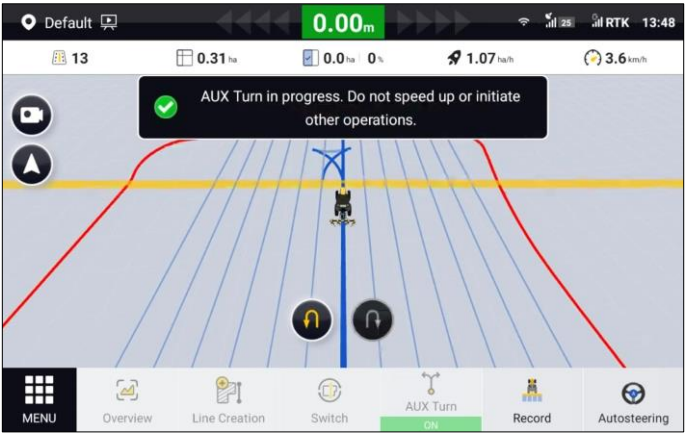

Figure 98. 3D view

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4.2.13 Turning on the Wi-Fi Camera

A Wi-Fi camera installed on the vehicle body helps to monitor the real view of the operation site, and assists with reversing if installed on the back of the vehicle. When a Wi-Fi camera is turned on, the system splits the screen to show the mapping guidance panel and the camera image.

Figure 99. Wi-Fi camera button

When no Wi-Fi cameras are connected, tap **Add a camera** on the camera panel, and follow the instructions in section 5.8 "Wi-Fi Camera (Optional)" to connect the camera.

When two Wi-Fi cameras are connected, you can tap the number at the bottom of the camera image panel to switch to another camera image.

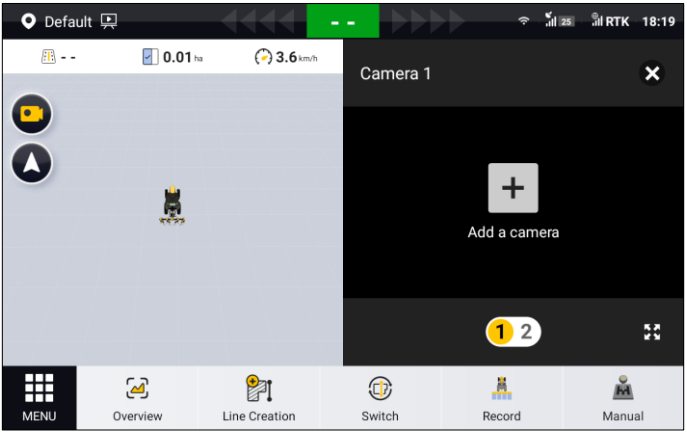

Figure 100. Screen splitting

Tap ⛶ at the bottom to expand the camera image to full screen. Tap ⛶ to restore the screen splitting.

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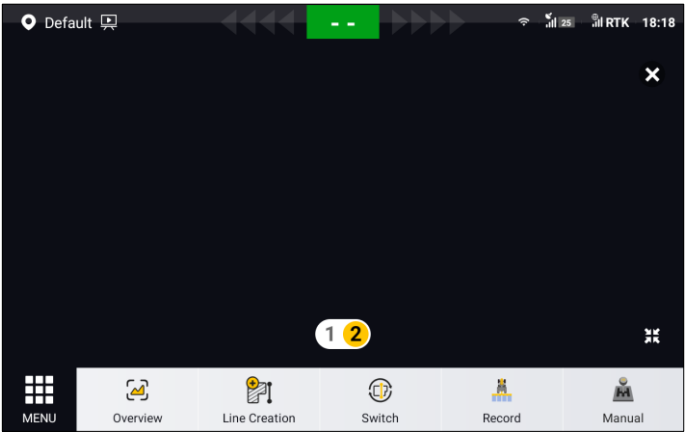

Figure 101. Full screen

Tap ✕ in the upper right corner or in the upper left corner of the mapping guidance screen to close the camera image.

5 Applications

Choose **MENU** > **APPLICATIONS** to access all the application features.

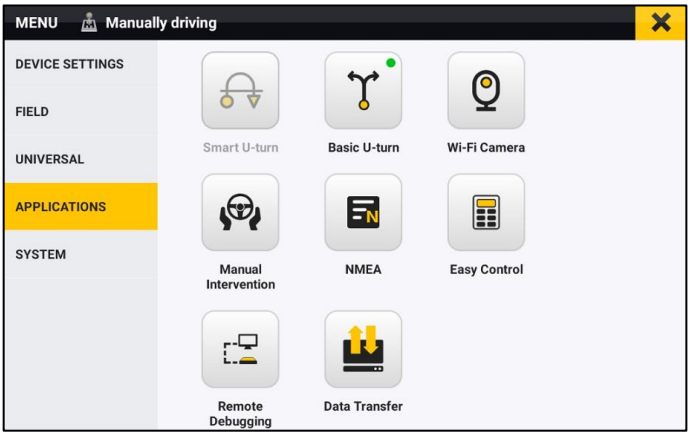

Figure 102. Applications

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5.1 Smart U-turn (Activation Needed)

Smart U-turn can plan the whole-process operation paths (including the turning-around at the headlands) automatically and autosteer the vehicle throughout the whole task operation. It can plan the headland operation appropriately, reduce the turning-around distance by 30%, and improve the operation efficiency.

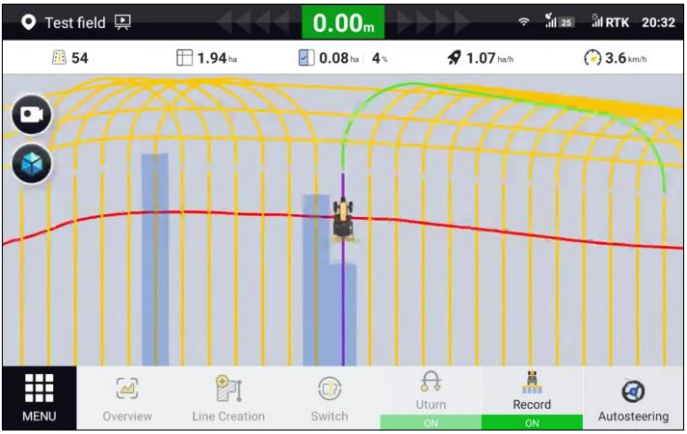

Figure 103. Smart U-turn

Note: As an advanced feature, Smart U-turn must be activated with an activation code. To obtain the activation code, contact us as described in section "Technical Support", or contact the local dealer.

5.1.1 Activating Smart U-turn

Tap **Smart U-turn** in the application list, enter the 24-digit activation code in the popup window, and tap **OK**.

Note:

1. You need to access the Internet when verifying your activation code.
2. Each activation code can only be used for one terminal.
3. The activation code is case insensitive.

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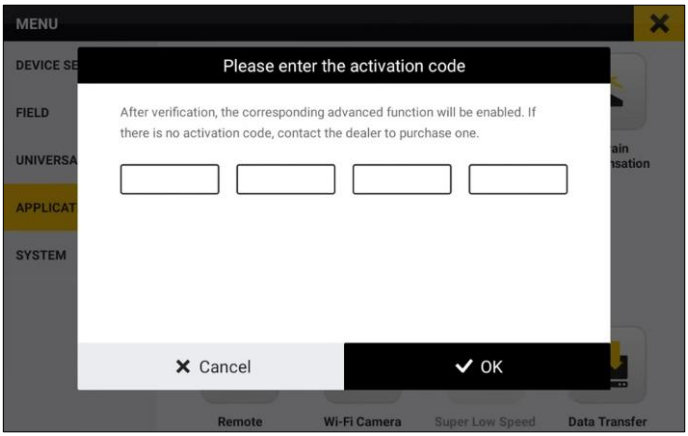

Figure 104. Enter the activation code

A popup appears. Check the activation information, and tap **OK** to complete the activation.

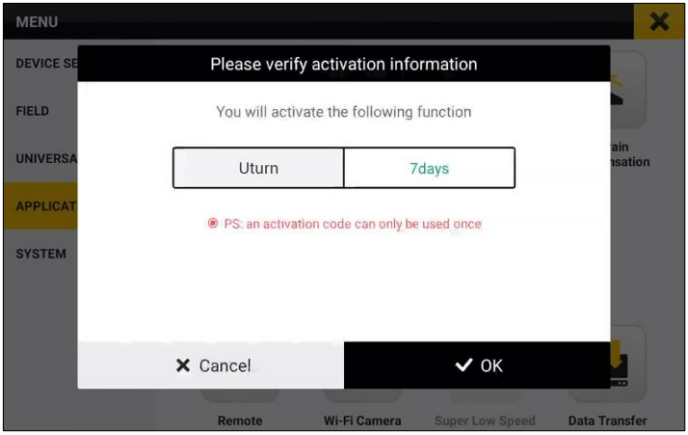

Figure 105. Activate Smart U-turn

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Access the **Smart U-turn** screen, and enable **Smart U-turn** in the upper left corner. When Smart U-turn is activated, a green dot is shown on the Smart U-turn icon in the application list, and also the Smart U-turn icon is shown at the bottom of the home screen.

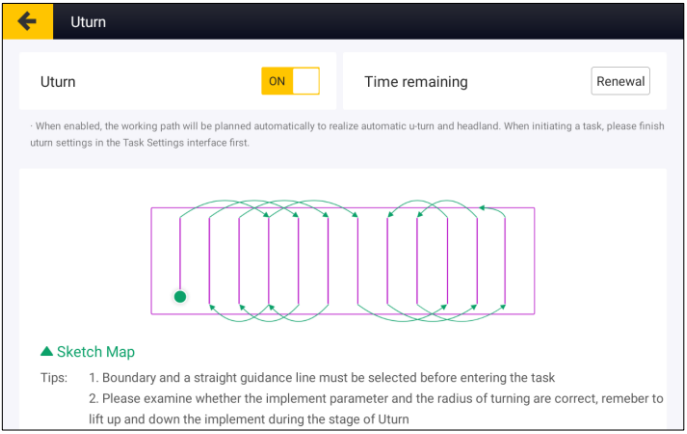

Figure 106. Enable Smart U-turn

5.1.2 Renewing Smart U-turn

All paid advanced features have a period of validity. When Smart U-turn will expire in 15 days, each time you turn on it, a popup appears on the home screen, showing the time remaining until the expiration date.

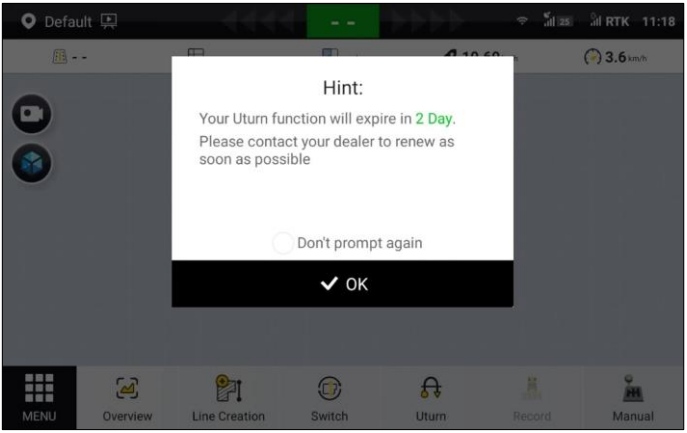

Figure 107. Reminder for renewing Smart U-turn

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To renew Smart U-turn, tap **Renewal** on the **Smart U-turn** screen, and repeat the activation process described in section 5.1.1.

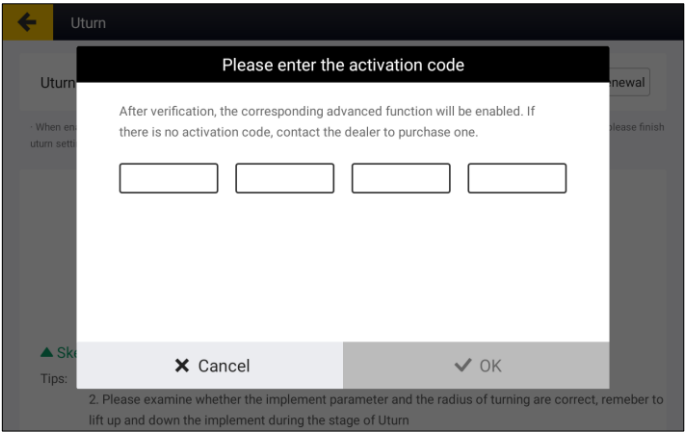

Figure 108. Renew Smart U-turn with an activation code

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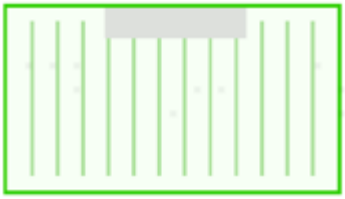
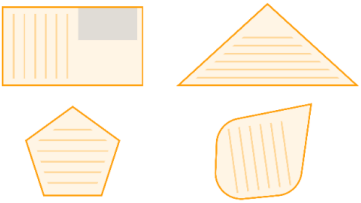
5.1.3 Applicable Fields

Field	Planning	Illustration
Rectangular fields or close-to-rectangular fields	Whole area planning	
Quadrilateral fields with the four angles close to the right angle	Whole area planning	
Close-to-rectangular fields with small gaps	Whole area planning	
Quadrilateral fields with large gaps; or fields with large triangular spaces, such as the polygonal fields, triangular fields, and droplet-shaped fields	Partial planning	
Too narrow fields or too small fields	Planning not available	

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5.1.4 Using Smart U-turn

Follow the procedure below to use Smart U-turn.

Set the vehicle parameters and the implement parameters as described in section 6.3.6 "Vehicle Library" and section 6.3.7 "Implement Library". Note that the **Turning Radius** (the radius measured by the outer wheels of the vehicle while making a complete turn), **Implement overall width** (width of the implement), and **Distance between hitch point to rear of implement** (length of the implement) must be accurate.

Configure the field, boundary, guidance line, and task as described in section 3.2 "Checking the Task Configuration". Note that a guidance line is required for Smart U-turn operation. If you have already applied a guidance line, the system uses that guidance line to plan paths. If you have not applied any guidance lines, the system shows a popup window, asking whether you need the system to generate a guidance line for you, and generates a guidance line and plans operation paths that best suit the current boundary automatically if you confirm that system operation.

Drive the vehicle to any appropriate positon within the field. You are not required to drive the vehicle to the headland, as Smart U-turn is able to plan the paths at any point within the field. Tap the Smart U-turn button at the bottom of the home screen, and set the Smart U-turn direction and the headland operation mode in the popup window.

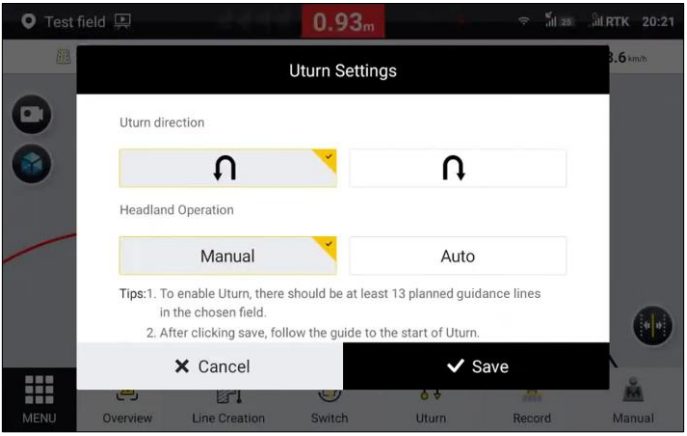

Figure 109. Set the Smart U-turn parameters

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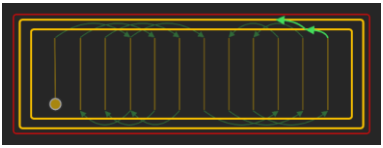
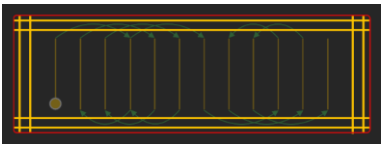
Smart U-turn Headland Operation Modes

Headland Operation	Description	Illustration
Auto	The system generates the headland operation paths automatically according to the boundary, and the vehicle follows the paths automatically to complete the headland operation.	
Manual	After the straight-line autosteering operations are completed, the system generates the recommended headland paths for you. You need to drive the vehicle and operate along the paths manually.	

A popup appears for confirmation. Check the information in the popup window, and tap **OK** to apply your settings. Note that when the coverage rate is greater than 95%, the system applies the Smart U-turn settings automatically without the confirmation popup.

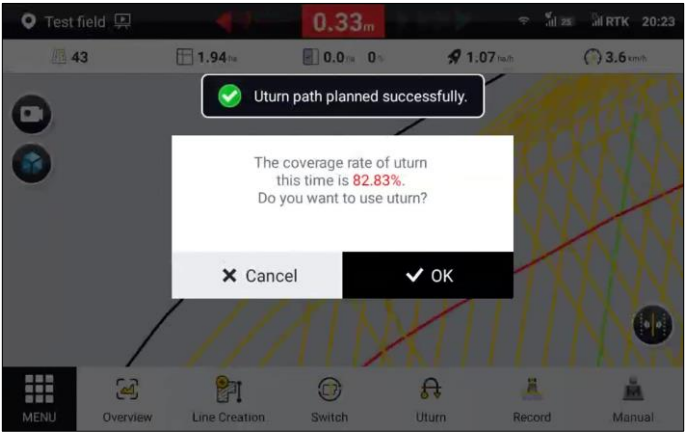


Figure 110. Smart U-turn confirmation popup

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Follow the green line to the start point and start the operation.

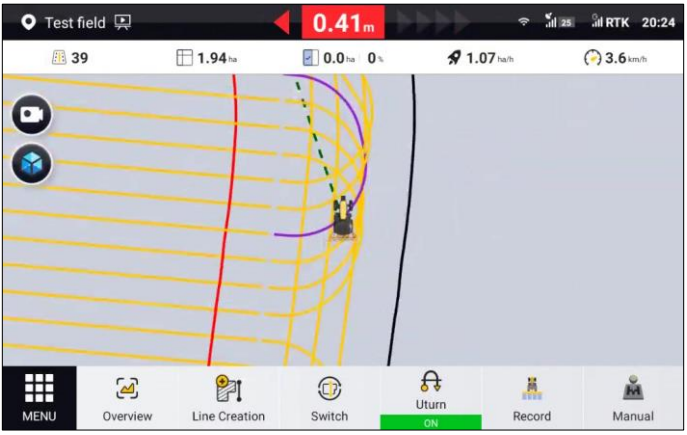

Figure 111. Follow the guiding line to the start point

Note:

- Before Smart U-turn planning, ensure that the vehicle is close to the start point, and heads to the same direction as the planned path.
- When the angle of the vehicle heading relative to the guidance line is large, the vehicle may fail to engage the guidance line.
- When the vehicle fails to engage the guidance line even though the vehicle heading line is parallel with the guidance line, check whether the vehicle heads to the opposite direction as the planned path.

Error prevention scheme:

Scenario 1: When you have changed settings of the task, boundary, guidance line, vehicle, implement, headland operation or U-turn direction, the system cancels the Smart U-turn planning automatically, and you need to set the Smart U-turn parameters again so that the system can generate the new paths.

Scenario 2: When no settings have been changed, the system uses the same Smart U-turn plan next time you enable Smart U-turn.

Scenario 3: Before generating a Smart U-turn plan, if operation data for part of the field already exists, the system plans the paths only for the remaining area of the field to avoid repeated operation.

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5.2 Basic U-turn (Activation Needed)

This feature plans the turning-around paths for two adjacent guidance lines and autosteers the vehicle to turn around, so that the vehicle can turn around at the headland easily and flexibly.

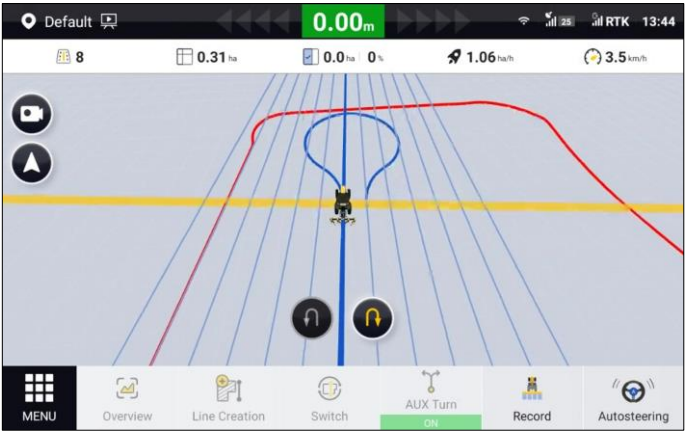

Figure 112. Basic U-turn

Note: As an advanced feature, Basic U-turn must be activated with an activation code. To obtain the activation code, contact us as described in section "Technical Support", or contact the local dealer.

5.2.1 Activating and Renewing Basic U-turn

Refer to section 5.1.1 "Activating Smart U-turn" and section 5.1.2 "Renewing Smart U-turn" for activating and renewing Basic U-turn.

Access the **Basic U-turn** screen, and enable **Basic U-turn** in the upper left corner.

When Basic U-turn is activated, a green dot is shown on the Basic U-turn icon in the application list, and also the Basic U-turn icon is shown at the bottom of the home screen.

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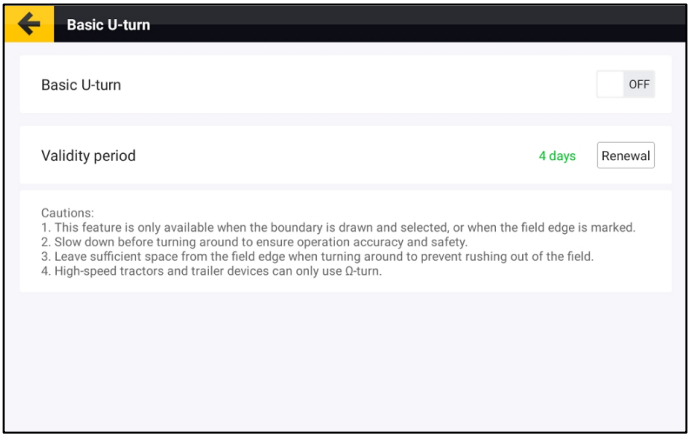

Figure 113. Enable Basic U-turn

5.2.2 Using Basic U-turn

Follow the procedure below to use Basic U-turn.

Set the vehicle parameters and the implement parameters as described in section 6.3.6 "Vehicle Library" and section 6.3.7 "Implement Library". Note that the **Turning Radius** (the radius measured by the outer wheels of the vehicle while making a complete turn), **Implement overall width** (width of the implement), and **Distance between hitch point to rear of implement** (length of the implement) must be accurate. If no space needs to be reserved for the implement to turn around, the **Implement overall width**, and **Distance between hitch point to rear of implement** can be omitted.

Configure the field, boundary, guidance line, and task as described in section 3.2 "Checking the Task Configuration ". Note that a guidance line (except for a pivot circle) is required for Basic U-turn operation. If you have already applied the boundary, the system plans the turnaround paths automatically. If you have not applied a boundary, you need to mark the headlands as described in section 4.2.11 "Marking Headlands", and the system plans the turnaround paths accordingly.

Drive the vehicle to any appropriate positon within the field. Tap the Basic U-turn button at the bottom of the home screen, and set the Basic U-turn parameters in the popup window. Select the turnaround mode, and the required distance for turning around is shown.

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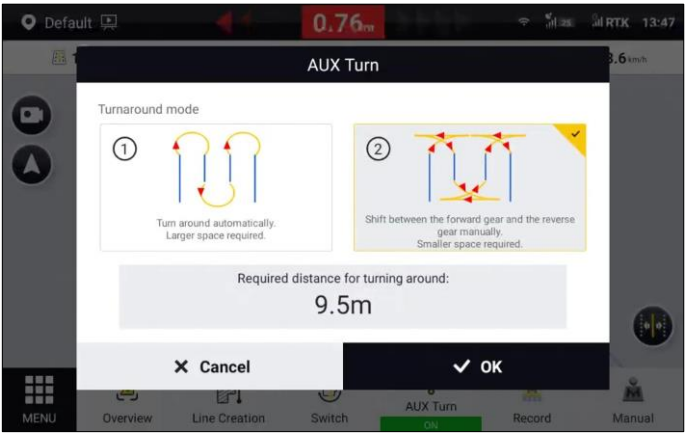
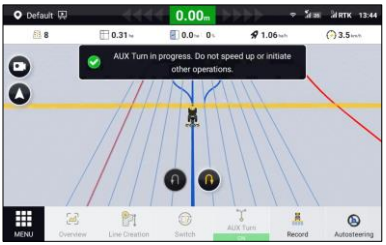


Figure 114. Set the turnaround mode

Basic U-turn Turnaround Mode

Turnaround Mode	Description	Illustration
Turnaround mode ①	The turnaround path is Ω-shaped. The turnaround is easy and simple, and applies to scenarios with sufficient space for turning around.	
Turnaround mode ②	The turnaround path is fish tail shaped. It saves the turnaround space, and is applicable to scenarios with limited turnaround space.	

Note:

1. When the working width is greater than twice of the turning radius, the final turnaround path is U shaped.
2. As reversing is required for turnaround mode ②, this mode is only applicable when mounted implements are used, or the implements might be damaged.
3. To adjust the safety distance for turning around, change the **Reserved Safety Distance**

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in accordance with section 6.3.1 "Coefficient Commissioning ".

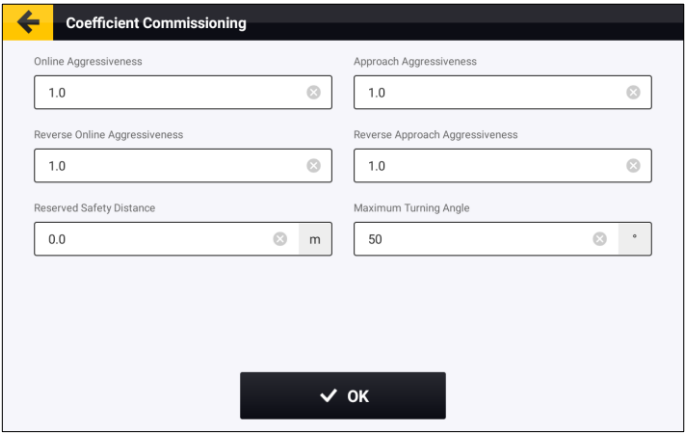
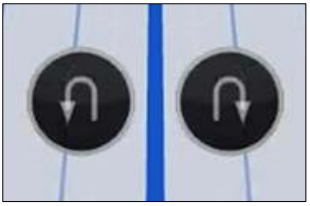


Figure 115. Reserved safety distance

In the autosteering mode, the left and right buttons are displayed at the bottom of the mapping guidance panel. Tap any button to activate the path planning. The different button status is shown below.

Basic U-turn Button Status

Status	Description	Illustration
Turnaround not available	The autosteering operation is not started, and the turnaround direction buttons are not displayed.	
Turnaround not available	Scenario 1: The vehicle is too close to the boundary or headland, leading to insufficient space for turning around. Scenario 2: The guidance line that the vehicle currently engages is too close to the boundary edge. Scenario 3: The vehicle is outside the boundary.	

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Status	Description	Illustration
Turnaround direction not selected	The turnaround direction is to be selected.	
Turnaround direction selected	The turnaround direction is selected, but the turnaround is not started. The turnaround direction can be changed at this time.	
Turnaround in progress	The turnaround direction is selected, and the turnaround is in process. The turnaround direction cannot be changed at this time.	

Before the vehicle turns around, follow the instructions on the screen to reduce the speed and raise the implement. During the turnaround, follow the instructions on the screen to keep a constant speed and avoid other operations.

Note:

1. When you are using the turnaround mode ①, you only need to keep a low speed during the turnaround.
2. When you are using the turnaround mode ②, you need to engage the forward or reverse gear manually as instructed, and keep a low speed during the turnaround.
3. To change distance for the system to instruct you to reduce the speed and raise the implement for turning around, ensure that Basic U-turn is enabled, choose **MENU** > **SYSTEM** > **Alert**, and change distance 1 and distance 2 for **Turn Alarm**.

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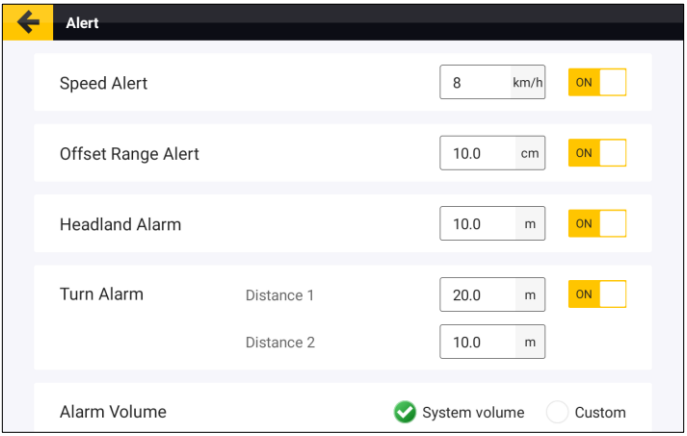

Figure 116. Basic U-turn and Smart U-turn alarm

5.3 Manual Intervention

This feature is useful when you are unable to tap on the screen in time during the autosteering operation due to limited space or environmental interferences. When the manual intervention is enabled, hold the steering wheel still, and the system disables the autosteering mode automatically.

To enable **Manual Intervention**, tap **Manual Intervention** in the application list, and turn on the switch. The sensitivity can be changed via a slider bar. With a higher sensitivity, the system disables the autosteering mode more easily.

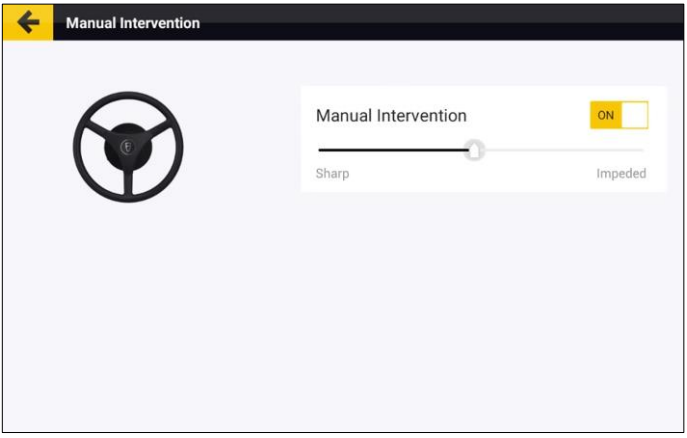

Figure 117. Manual intervention

5.4 NMEA

When **NMEA** is enabled, the GPS information, such as GST, HDT, GGA, RMC, VTG, and ZDA,

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received by the system can be shared with an external device.

To enable **NMEA**, tap **NMEA** in the application list, and turn on the switch. Then, you can set the baud rate, the data type, and the transfer frequency.

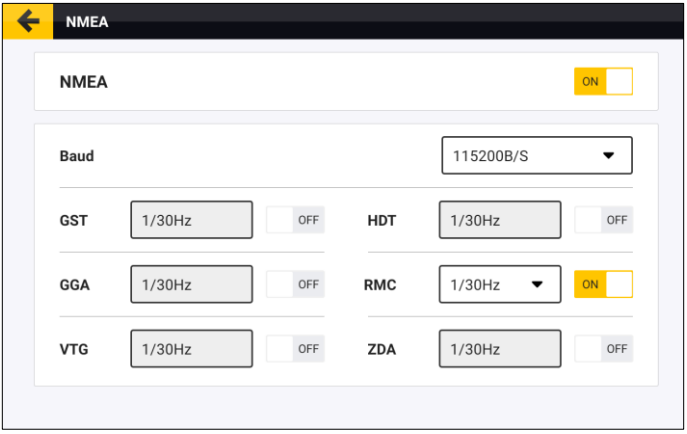

Figure 118. NMEA

Content of Different NMEA Data Types

Data Type	Content
GST (GPGST)	GPS pseudorange noise statistics, including the standard deviation information of three-dimensional coordinates.
HDT (GPHDT)	Heading angle, with true north as reference.
GGA (GPGGA)	Position information.
RMC (GPRMC)	Recommended positioning information.
VTG (GPVTG)	Ground speed information.
ZDA (GPZDA)	Time and date information.

Note:

1. To use the NMEA feature, you need to purchase the dedicated NMEA wires separately.
2. Ensure that the baud rate setting is consistent with the external device.
3. Check the data types needed by the external device and set the appropriate transfer frequency. During the operation, ensure that the data types are enabled.

5.5 Easy Control (Optional)

Easy Control is a wireless remote control that works with FJDynamics AT2 Auto Steer System. You can use this remote control to enable or disable the autosteering operation, and control the common features, such as marking point A and point B for guidance line

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creation, turning on or off the operation data recording, and controlling the Basic U-turn.

5.5.1 Pairing

Install two AAA batteries, press and hold the two buttons at the bottom until the indicator in the upper left corner turns solid for 3 seconds and then blinks rapidly for 60 seconds, indicating that the remote control is ready for pairing. Go to the system settings on the control terminal to turn on Bluetooth connection and pair with the remote control. After the successful pairing, the system remembers the remote control and connects to it automatically in future operations.

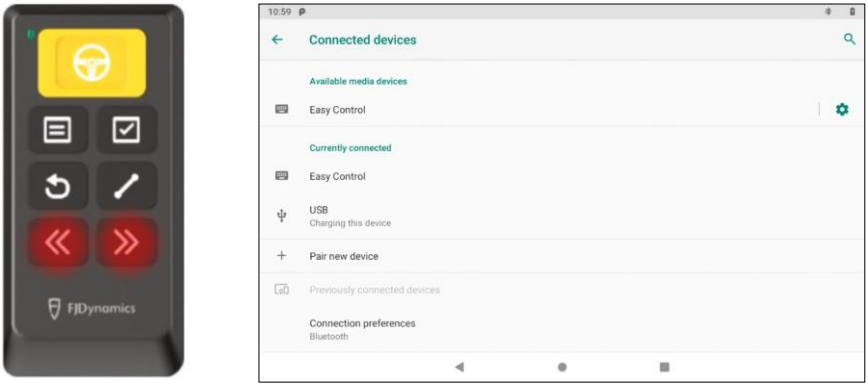
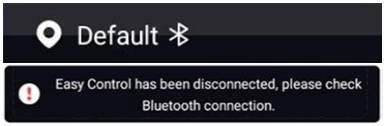


Figure 119. Pair with Easy Control

You can check whether Easy Control is connected through the icons in the upper left corner. See the following for details.

Easy Control Connection Status

Status	Description	Illustration
Not connected	The Bluetooth is turned off, and the remote control is not connected.	
Not connected	The Bluetooth is turned on, and the remote control is not connected or disconnected. When the remote control is disconnected, a message appears on the mapping guidance panel. To connect again, press any button on	

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	the remote control.	
Connected	The Bluetooth is turned on, and the remote control is connected.	

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5.5.2 Function Settings

When the remote control is connected, tap **Easy Control** in the application list, check the Easy Control device information and function settings, and configure the optional function II as **Trim** or **Basic U-turn**.

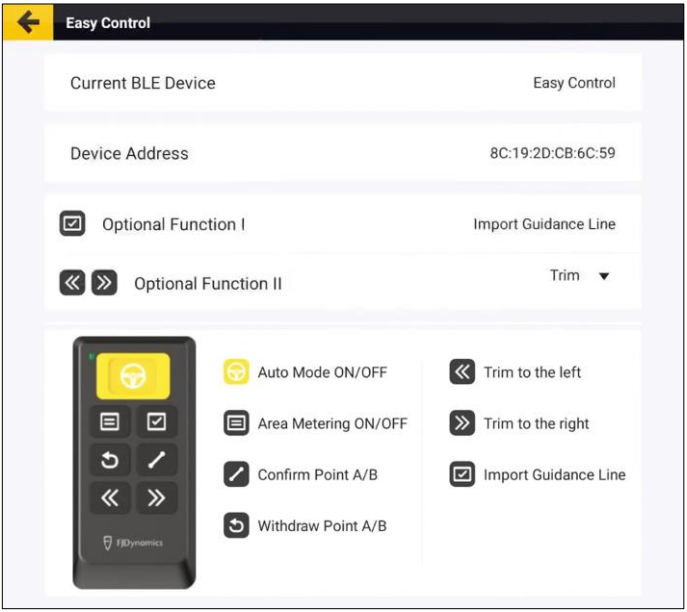
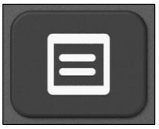


Figure 120. Function settings

5.5.3 Easy Control Buttons

Button	Description	Illustration
Auto Mode ON/OFF	Press the button to turn on or off the autosteering mode.	
Area Metering ON/OFF	Press the button to turn on or off the **Record** switch on the home screen.	
Confirm Point A/B	Press the button to mark a point when creating a guidance line.	

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Button	Description	Illustration
Withdraw Point A/B	Press the button to cancel a point when creating a guidance line.	
Import Guidance Line	Press the button to complete the guidance line creation.	
Trim to the left; Trim to the right	In the autosteering mode, tap the trim button on the home screen, set the trim distance, and then you can press the button to trim the vehicle to the left or right.	
Turn left and right when the **Basic U-turn** switch is turned on	In the autosteering mode, turn on the **Basic U-turn** switch, and then you can press the button to turn left or right.	

Note: Wait for at least 1 second before you press the button again

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5.6 Remote Debugging

Remote debugging, supported by the background control program, enables the service personnel to remotely control the screen to perform debugging.

Turn on the **Remote Debugging** switch, and the following popup appears when the service person initiates a debugging request remotely. Tap **Agree** before the countdown ends, and then tap **START NOW** to start remote debugging.

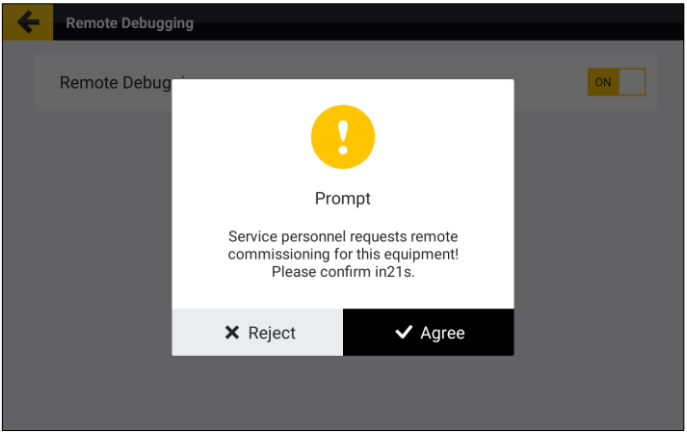

Figure 121. Remote debugging request

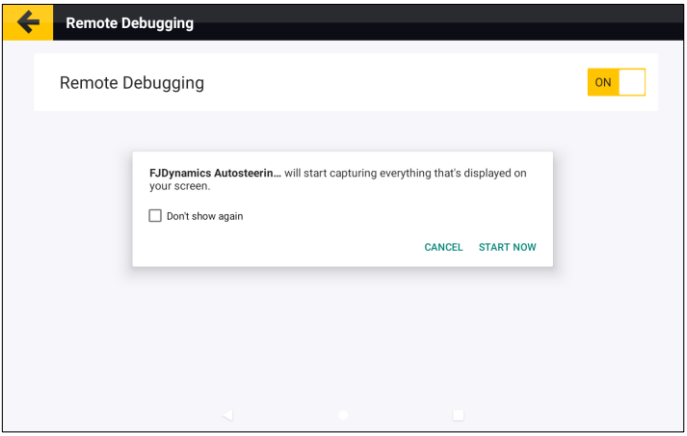

Figure 122. Remote debugging authorization

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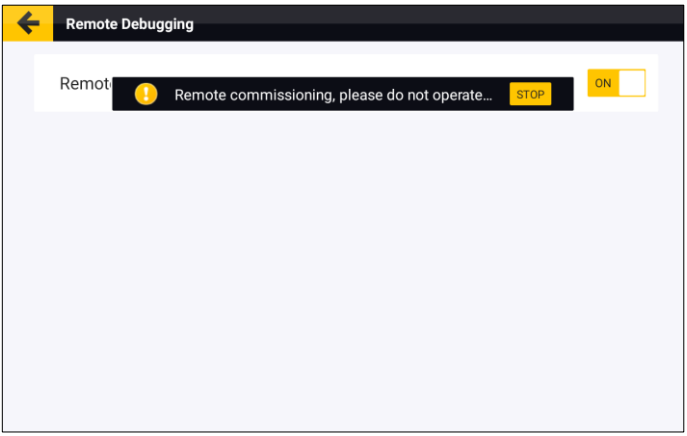

Figure 123. Remote debugging in progress

5.7 Wi-Fi Camera (Optional)

Complete the hardware connection of the Wi-Fi camera and power it on. Tap **WiFi Camera** on the **APPLICATIONS** screen to open the camera binding screen, and the hotspot is turned on automatically. Use the camera to scan the QR code to identify and bind the camera (refer to the instructions on the screen for details). The bound camera is displayed on the right side of the screen. You can tap the delete icon to unbind the camera.

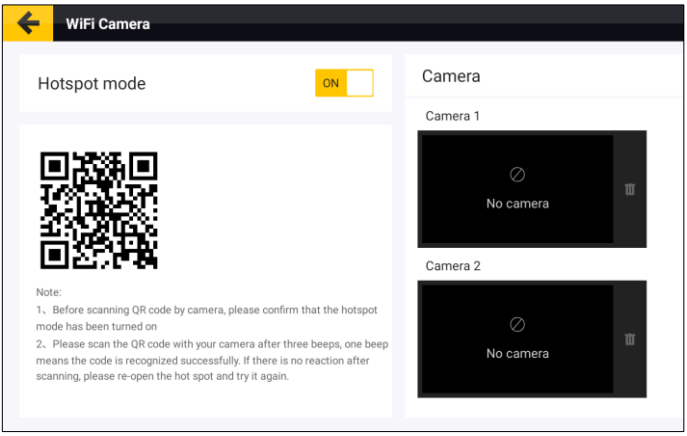

Figure 124. Bind Wi-Fi cameras

After the camera is bound, tap the back arrow to return to the home screen to turn on the camera. Refer to section 4.2.14 "Turning on the Wi-Fi Camera" for details.

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Note:

1. The Wi-Fi camera is an optional accessory and must be purchased separately.
2. A maximum of two Wi-Fi cameras can be bound.

5.8 Data Transfer

Through the Internet or USB, the task files can be exported and shared with other control terminals, and the task files from other control terminals can be imported into the system. The current version supports the sharing of boundary files and guidance line files.

5.8.1 Via the Internet

You can transfer data to other users of AT2 Auto Steer Systems via the Internet.

Tap **Data Transfer** on the **APPLICATIONS** screen, and then select the files to be transferred.

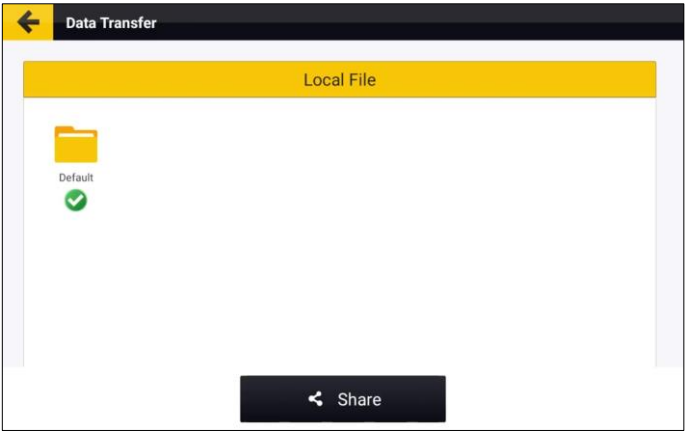

Figure 125. Select the files

Note:

1. Each field folder represents a field and contains all the task information of the field. Tap the circle below the folder to select all the boundary files and guidance line files in the folder.
2. Tap the field folder to open it, and then tap the circle below either the boundary folder or the guidance line folder to select all the files in the folder.
3. Tap the boundary folder or the guidance line folder to open it, and then select one or multiple files in the folder.
4. Task data cannot be shared online.
   Tap **Share**, and a popup appears. Enter the user account of the recipient, select the SN of the target device, and tap **OK**.

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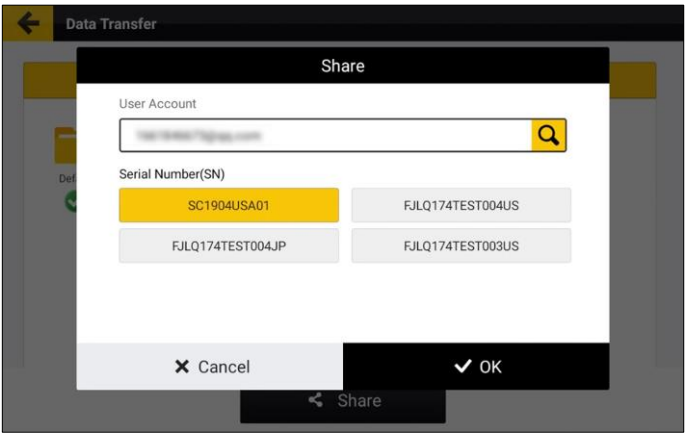

Figure 126. Enter the user account and select the SN

A confirmation popup appears on the screen of the target device.

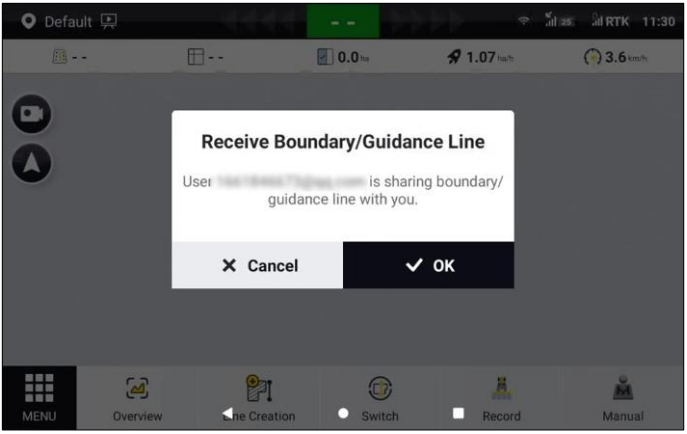

Figure 127. Confirmation popup

The recipient may tap **OK** to receive the files, and after the files are received successfully, choose **MENU** > **FIELD** > **Field** > **Boundary** or **Guidance Line** to check the boundaries or guidance lines received. Boundaries and guidance lines shared via the Internet are marked with in front of the name.

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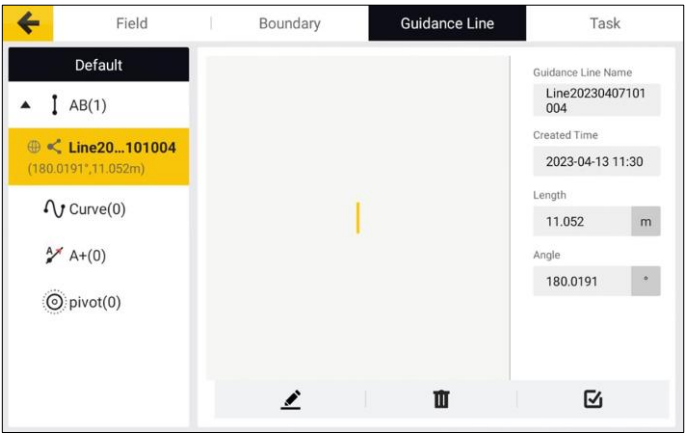

Figure 128. Check received boundaries and guidance lines

5.8.2 Via USB

You can import and export task files via USB. The current version only supports the transfer of SHPFILE ,ISOXML,KML and KMZ files.

Transmittable content includes datums (AB straight lines, curves and line groups; ISOXML format can also transmit A+ straight lines,pivots), boundaries and task data.

Connect the USB flash drive to the Type-C port of the control terminal. An adapter is required if the USB flash drive uses a Type-A connector.

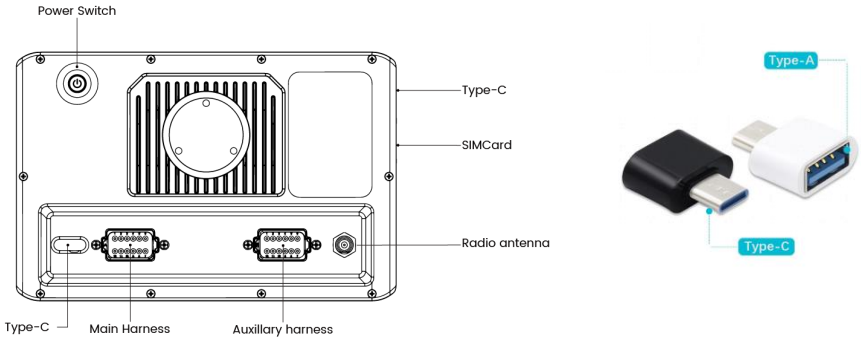

Figure 129. Connect the USB flash drive to the control terminal

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Export files

Select the local files to be exported on the left, tap **Export**, select the format, and tap **OK**. Then, the selected files are exported to the folder named "Output_DATA" on the right.

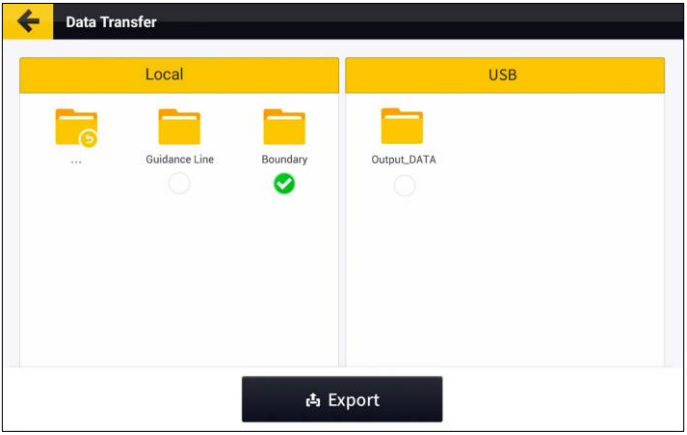

Figure 130. Export files

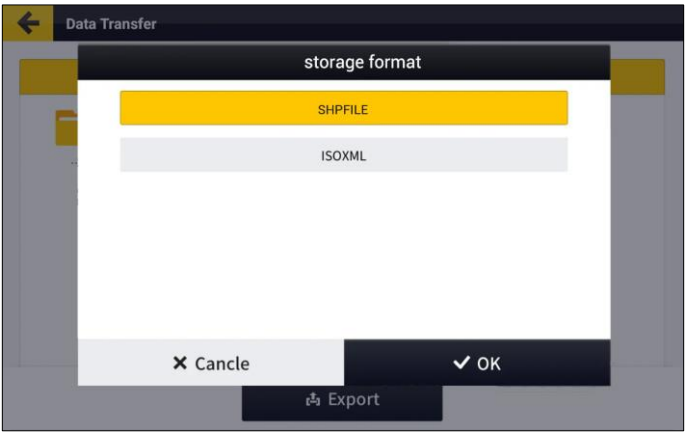

Figure 131. Select the format

Import files

Select the external files to be imported on the right, tap **Import**, and tap **OK**. Then, the selected files are imported into the local field folder with the same name as that of the original field folder. If such local field folder cannot be found, the system automatically creates one.

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Note:

1. After the USB flash drive is connected to the control terminal, you can only transfer files via USB.
2. When Shapefile imports a line group, you need to make sure that the line group objects have been synthesised into one object.

6 Others

6.1 Device Status

6.1.1 Error Messages

On the home screen, tap the red square with a number in the upper right corner to view the error messages.

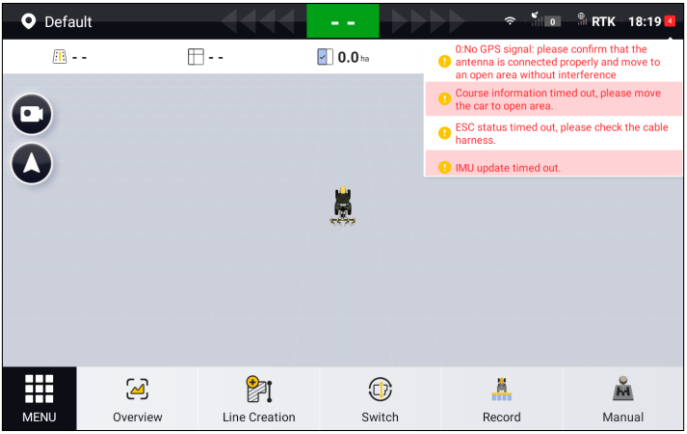

Figure 132. Error messages

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6.1.2 Diagnostics Center

Choose **MENU** > **DEVICE SETTINGS** > **Diagnostics Center** to check the version information, scenario information, hardware status, and parameter information.

Version information

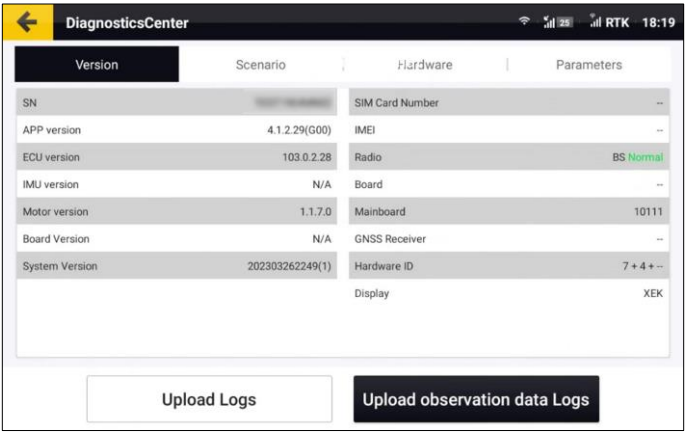

Figure 133. Version tab

Scenario information

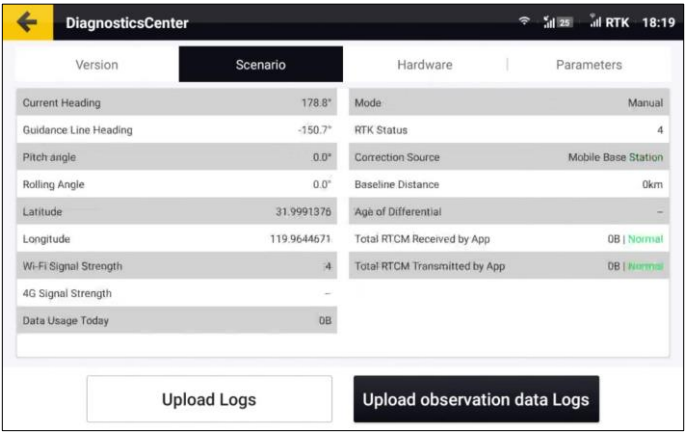

Figure 134. Scenario tab

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Hardware status

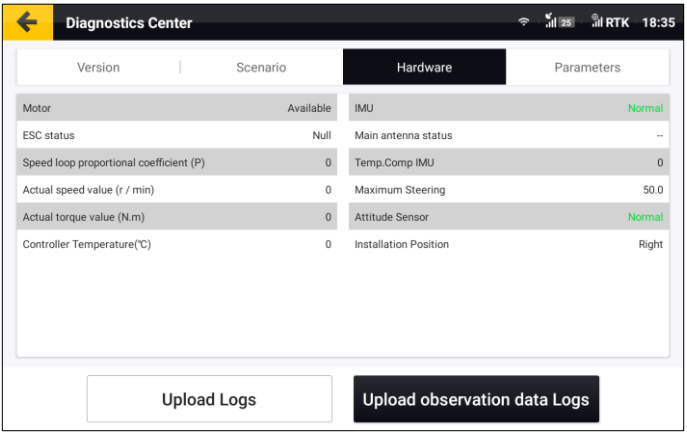

Figure 135. Hardware tab

Parameter information

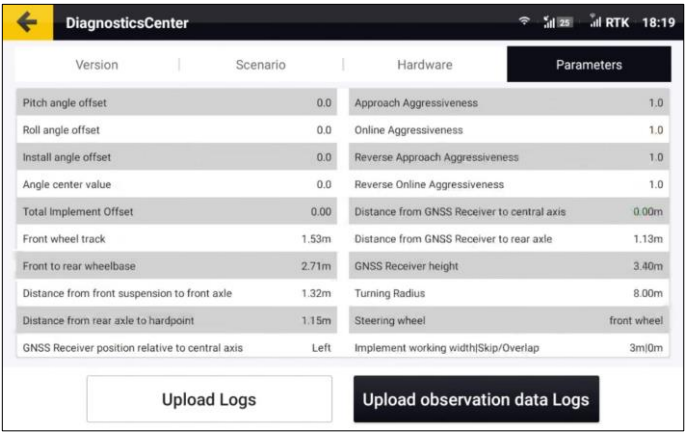

Figure 136. Parameters tab

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Upload logs

When a software or system fault occurs, upload the logs immediately to facilitate the troubleshooting of the service personnel.

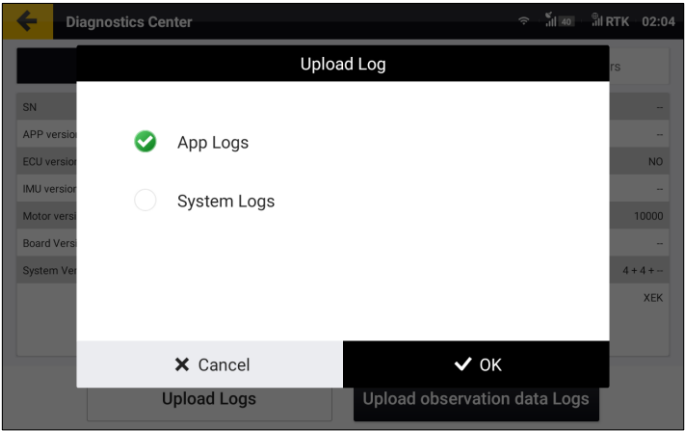

Figure 137. Upload logs

Upload observation data logs

At the request of the service personnel, upload observation data logs to facilitate the analysis of technical problems regarding satellite positioning.

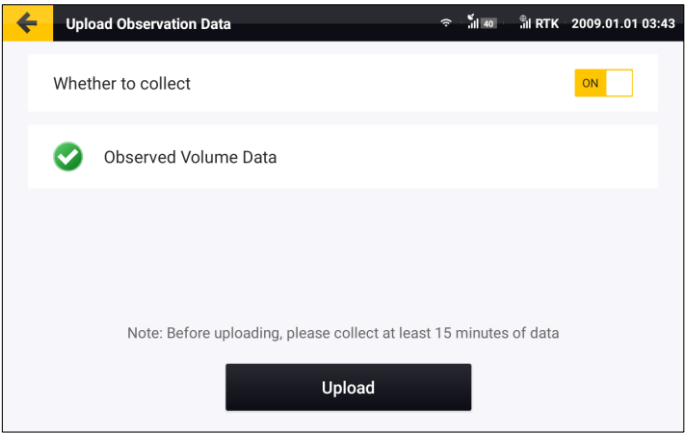

Figure 138. Upload observation data logs

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6.2 Task Data

6.2.1 Real-time Task Data

During operation, check the status bar above the mapping guidance panel to view the real-time task data, including the current guidance line number, field area, operated area, operation efficiency, and current speed.

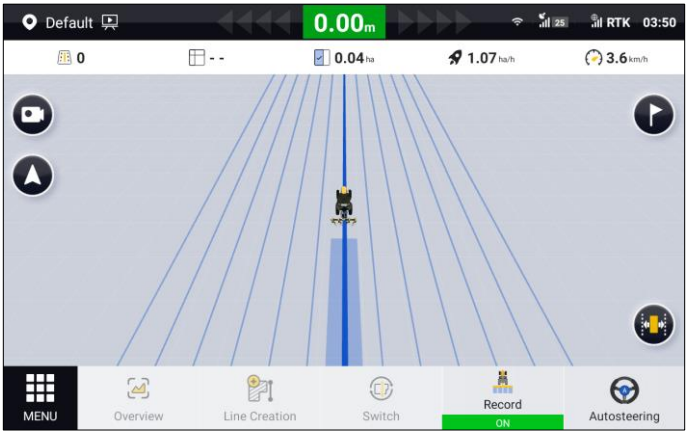

Figure 139. Real-time task data

6.2.2 Historical Task Data

Choose **MENU** > **FIELD** > **Field** > **Task** to view the historical task data and operation trajectories. Select a task in the left column, and its cumulative operation data is displayed on the right, including the cumulative operation time, total area (the area enclosed by the applied boundary), operation area, effective operation area (the operation area inside the applied boundary), creation time, start time, and end time. To view the historical operation data under the task, tap in the lower right corner of the map.

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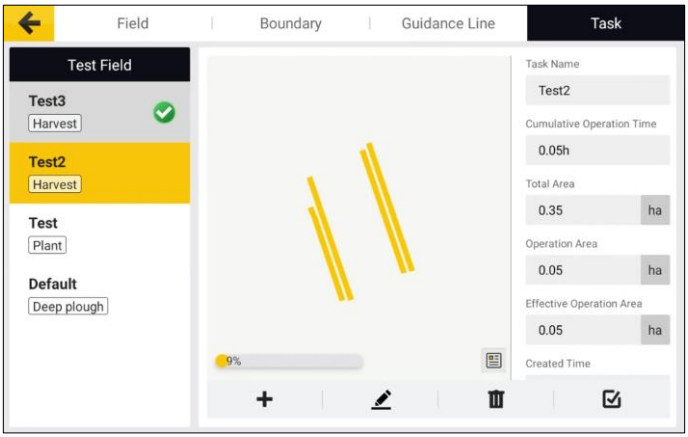

Figure 140. Historical task data

The historical operation data includes the task number, total driving distance, total operation time, autosteering operation area, manual operation area, and total operation area.

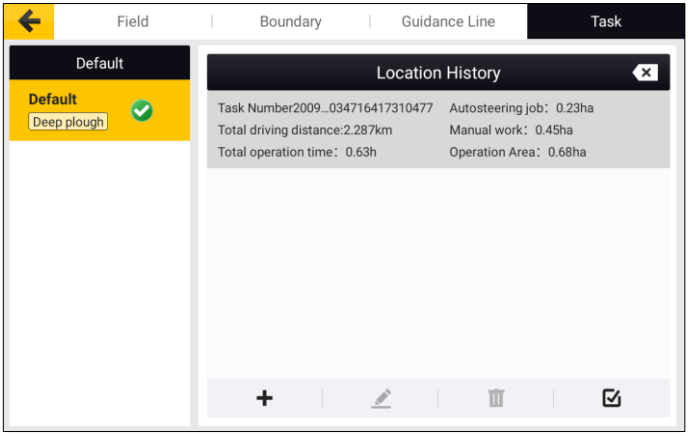

Figure 141. Historical operation data

Note:

1. The cumulative operation time and operation area of a task are calculated based on all the historical operations under the task.
2. Historical operations are sorted by time in descending order.

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6.3 Device Settings

Choose **MENU** > **DEVICE SETTINGS** to access features regarding parameter adjustment, calibration, and diagnosis, as shown below.

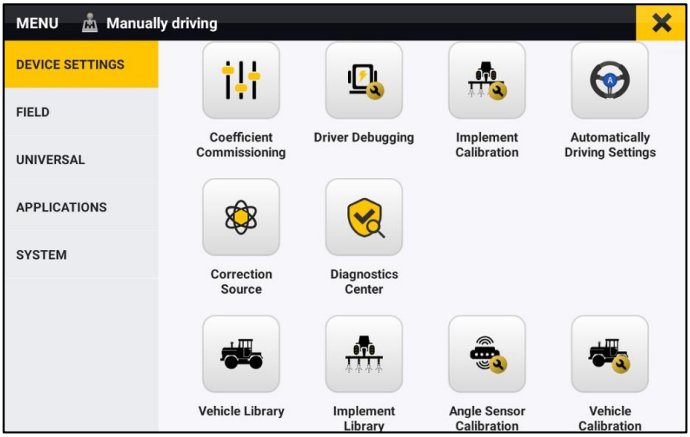

Figure 142. DEVICE SETTINGS screen

6.3.1 Coefficient Commissioning

Tap **Coefficient Commissioning** on the **DEVICE SETTINGS** screen to adjust the online aggressiveness, reverse online aggressiveness, approach aggressiveness, reverse approach aggressiveness, reversed safety distance, and maximum turning angle.

Note: The greater the approach aggressiveness (reverse approach aggressiveness), the faster the vehicle will approach the target guidance line, but the stability may be impaired. The greater the online aggressiveness (reverse online aggressiveness), the faster the direction adjustment along the guidance line.

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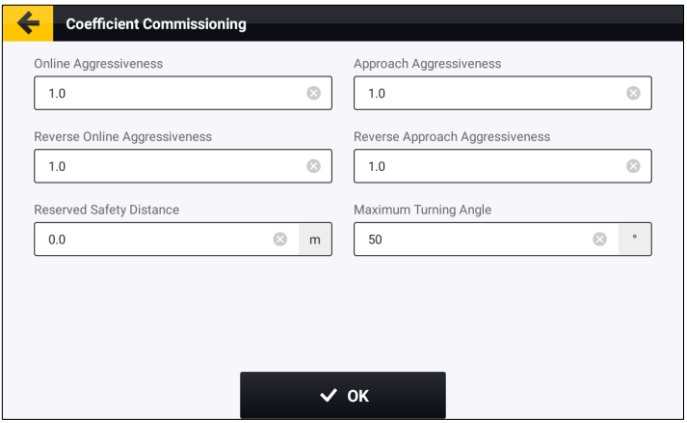

Figure 143. Coefficient commissioning

6.3.2 Driver Debugging

Tap **Driver Debugging** on the **DEVICE SETTINGS** screen to adjust the P value, check the motor status, and adjust the steering gain parameters. The P value must be in the range of 4–125, and is 25 by default.

Adjust the steering gain parameters:

In the autosteering mode, if the steering wheel turns left and right continuously, decrease the value of parameter 1, and if the steering wheel turns too slow, increase the value of parameter 1.

For the versions V1.1.8 and below motor, set parameter 1 to 400 and parameter 2 to 0. For small tractors of 70 horsepower or below, set parameter 1 to 200 and parameter 2 to 0.

For the version V1.1.9 motor, set parameter 1 to 200 and parameter 2 to 0.

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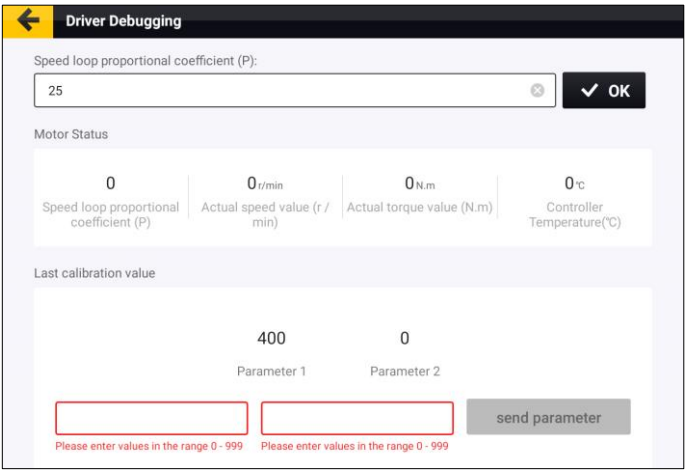

Figure 144. Driver debugging

6.3.3 Implement Calibration

Tap **Implement Calibration** on the **DEVICE SETTINGS** screen to calibrate the implement. Refer to section 2.10 "Calibrating the Implement" for details.

6.3.4 Automatically Driving Settings

Click the **Automatically Driving Settings** button on the **DEVICE SETTINGS** screen to set the autopilot mode.

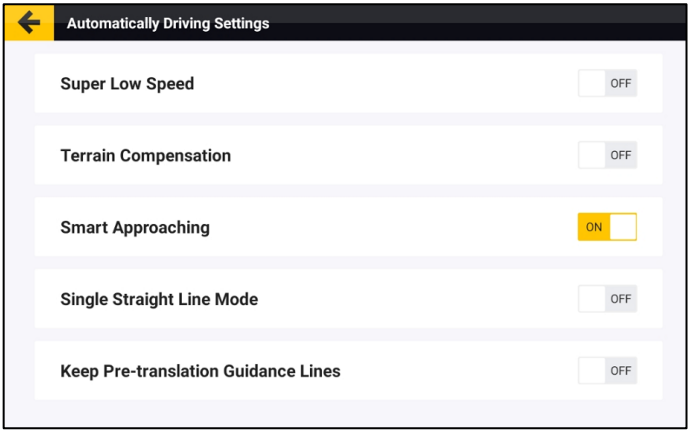

Figure 145. Automatically Driving Settings

Super Low Speed: If the vehicle needs to drive at a speed below 1 km/h for a long time, enable the Super Low Speed mode to ensure the operation accuracy and stability. Tap Super Low Speed on the APPLICATIONS screen, and turn on the Super Low Speed switch.

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Note: Before using the Super Low Speed mode, ensure that you have installed and calibrated the Hall sensor. Refer to section 2.7 "Calibrating the Angle Sensor" for details.

Terrain Compensation: Tap Terrain Compensation in the application list, and turn on the switch to enable this feature.

Smart Approaching: Enable the Smart Approaching function , that the vehicle can travel to the guidance line even when the vehicle's heading is at 90° to the direction of the guidance line.

Single Straight Line Mode: Enable the Single Straight Line Mode, the straight line will be moved under the vehicle immediately when autopilot is clicked.

Keep Pre-translation Guidance Lines: Enable this function, the guidance line after translating will be used as a new guidance line, and the original guidance line will be retained; Disable this function, the original guidance line will be directly replaced after translating.

6.3.5 Correction Source

Tap **Correction Source** on the **DEVICE SETTINGS** screen to configure the correction source. Refer to section 2.5 "Connecting to a Signal Source" for details.

6.3.6 Diagnostics Center

Tap **Diagnostics Center** on the **DEVICE SETTINGS** screen to view the device information. Refer to section 6.1.2 "Diagnostics Center" for details.

6.3.7 Vehicle Library

Tap **Vehicle Library** on the **DEVICE SETTINGS** screen to configure vehicle parameters. Refer to section 2.6 "Setting Vehicle Parameters" for details.

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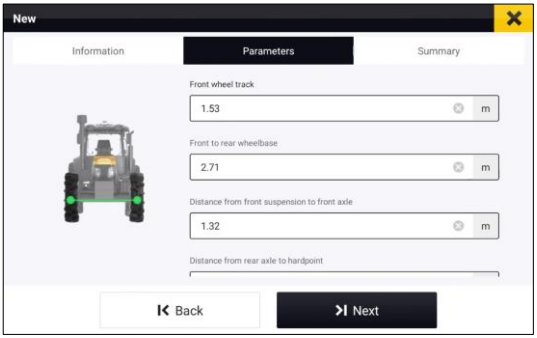
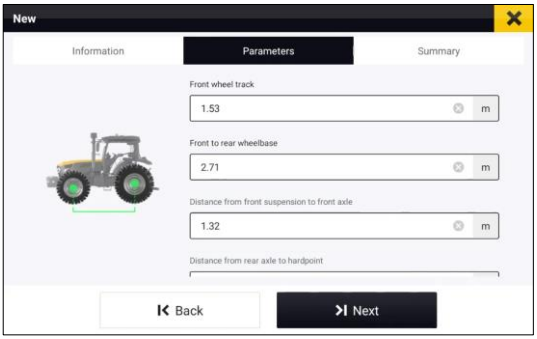
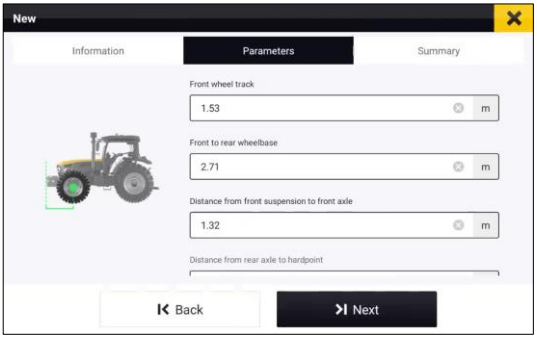
Vehicle Parameters

Parameter	Illustration
Front wheel track	
Front to rear wheelbase	
Distance from front suspension to front axle	

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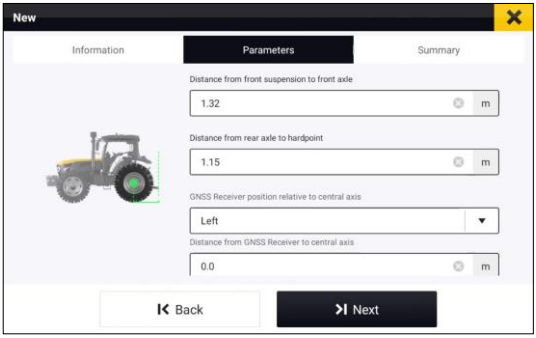
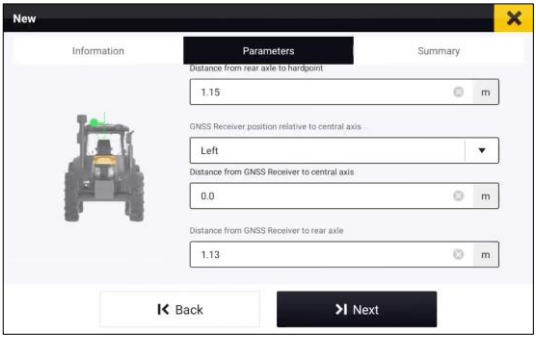
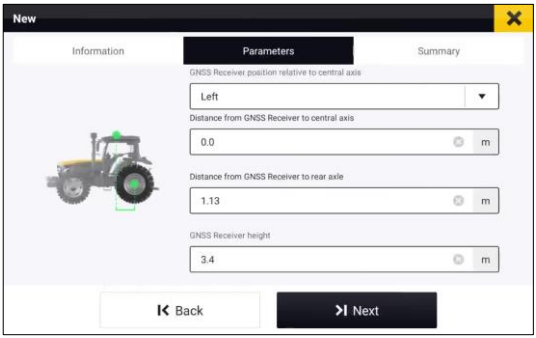
Parameter	Illustration
Distance from rear axle to hardpoint	
GNSS receiver position relative to central axis; Distance from GNSS receiver to central axis	
Distance from GNSS receiver to rear axle	

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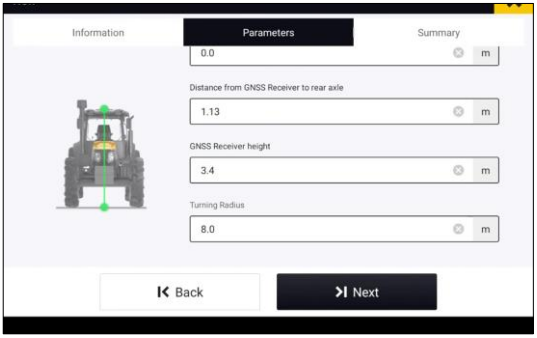
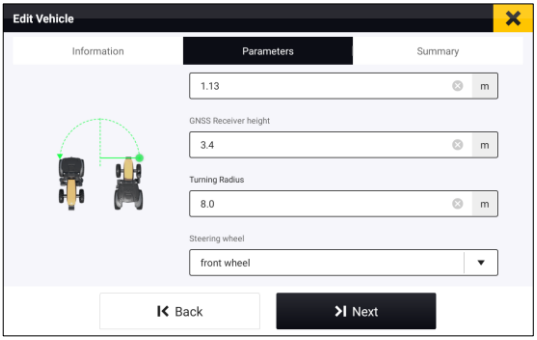
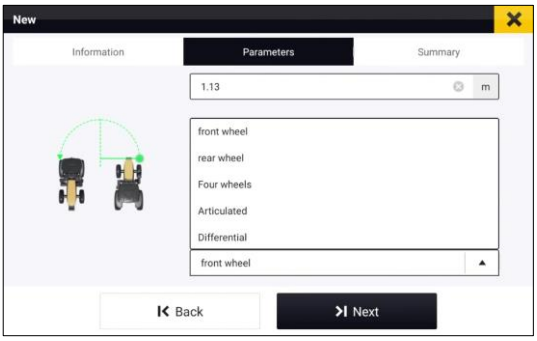
Parameter	Illustration
GNSS receiver height	
Turning radius	
Steering wheel	

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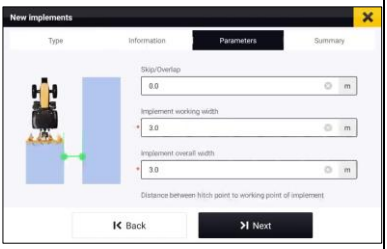
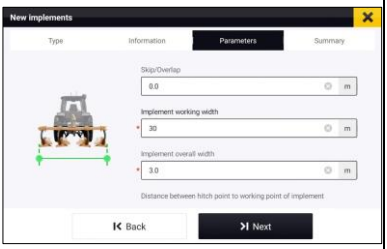
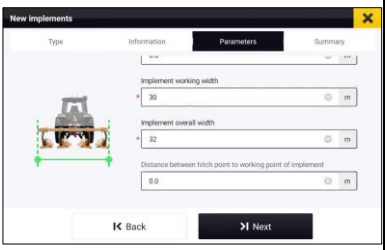
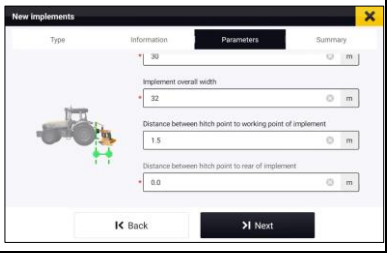
6.3.8 Implement Library

Tap **Implement Library** on the **DEVICE SETTINGS** screen to configure implement parameters. Refer to section 2.9 "Setting Implement Parameters" for details.

Implement Parameters

Parameter	Description	Illustration
Skip/Overlap	The spacing between two adjacent rows.	
Implement working width	The actual working width of the implement. It is used to plan the guidance line spacing.	
Implement overall width	The total width of the implement. It is used to reserve the safety distance during automatic path planning.	
Distance between hitch point to working point of implement	The vertical distance between the working point of the implement and the hitch point of the tractor. It is used to determine the accurate position of the working point.	

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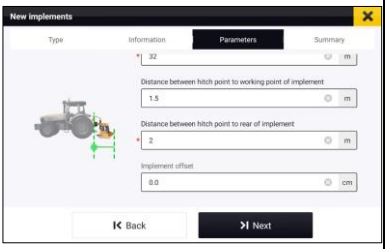
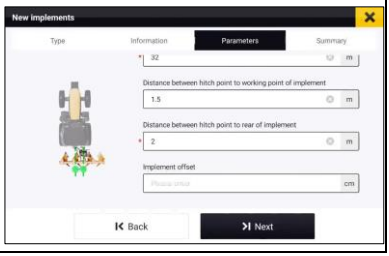
Parameter	Description	Illustration
Distance between hitch point to rear of implement	The total length of the implement. It is used to reserve the safety distance during automatic path planning.	
Implement offset	Offset from the implement centerline to the tractor centerline. It is used to determine the accurate position of the working point.	

6.3.9 Angle Sensor Calibration

Tap **Angle Sensor Calibration** on the **DEVICE SETTINGS** screen to calibrate the angle sensor. Refer to section 2.7 "Calibrating the Angle Sensor" for details.

6.3.10 Vehicle Calibration

Tap **Vehicle Calibration** on the **DEVICE SETTINGS** screen to calibrate the vehicle. Refer to section 2.8 "Calibrating the Vehicle" for details.

6.4 Field

Choose **MENU** > **FIELD** > **Field** to view and manage fields, boundaries, guidance lines, and tasks.

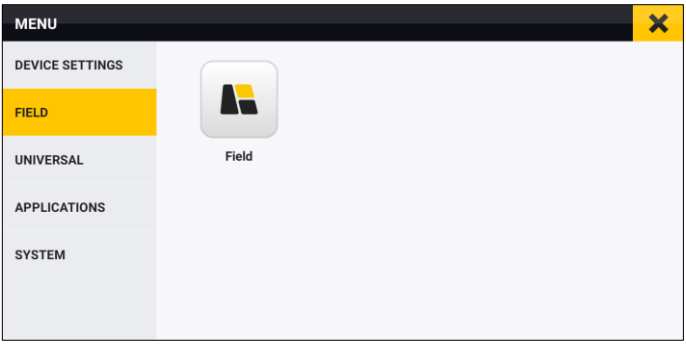


Figure 146. Select Field

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6.4.1 Field

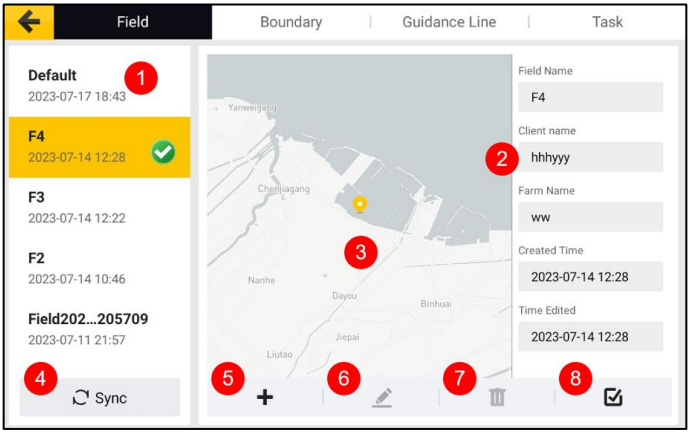

Figure 147. Field tab

Boundaries, guidance lines, and tasks are bound with fields. On the **Field** tab, you can view, create, modify, delete, and apply a field, and synchronize field information.

1. **Field list:** Shows all the fields, including the name and the creation time.
2. **Basic information of field:** Shows the field name, client name, and farm name.
3. **Field map:** Shows the locations of the vehicle and the applied boundary and guidance line.
4. **Synchronize field information:** Tap **Sync** to synchronize field information in the cloud to the control terminal.
5. **Create a field:** Tap +, and enter the field name, client name, and farm name.
6. **Modify field information:** Tap to modify the field name, client name, and farm name.
7. **Delete a field:** Tap to delete the field and all the associated boundaries, guidance lines, and task data, and they **cannot be restored**.
8. **Apply a field:** Tap to apply the field to the operation.

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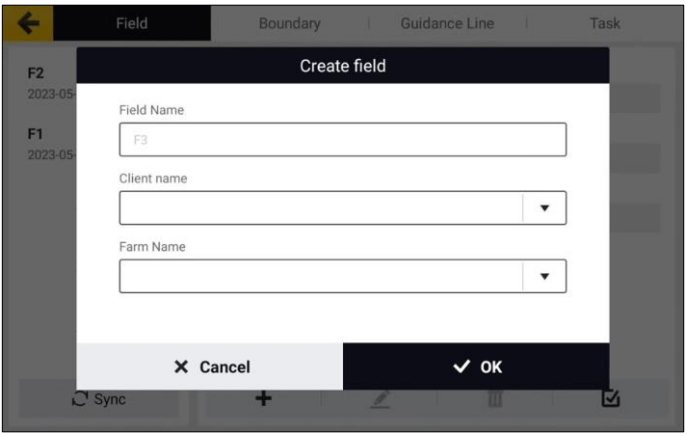

Figure 148. Create a field

6.4.2 Boundary

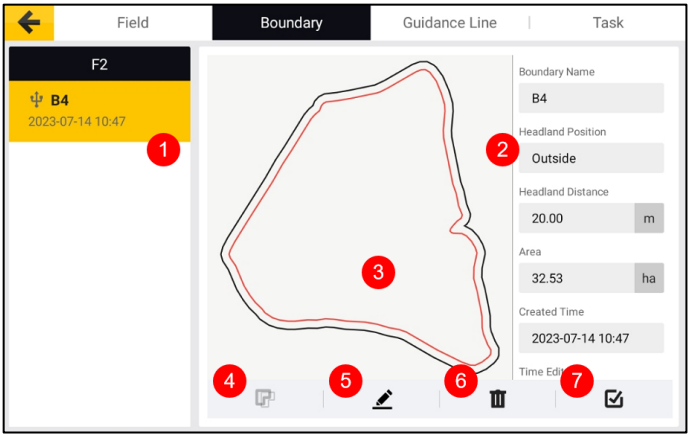

Figure 149. Boundary tab

1. **Boundary list:** Shows all the boundaries, including the name and the creation time.
2. **Basic information of boundary:** Shows the boundary name, headland position, headland distance, and area.
3. **Boundary map:** Shows the boundary location.
4. **Shift the boundary:** Refer to section 4.2.7 "Shifting the Boundary" for details.
5. **Modify boundary information:** Tap to modify the boundary name, and move the boundary inside or outside by the set distance to mark the position to turn around or the real position of the headland. Refer to section 4.2.9 "Scaling Up or Down the Boundary" for details

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6. **Delete a boundary:** Tap to delete the boundary. Deleted boundaries can be restored in the recycle bin within 30 days. Refer to section 6.6 "System" for details about the recycle bin.
7. **Apply a boundary:** Tap to apply the boundary to the operation.

Note: To create a boundary, tap **Line Creation** on the home screen.

6.4.3 Guidance Line

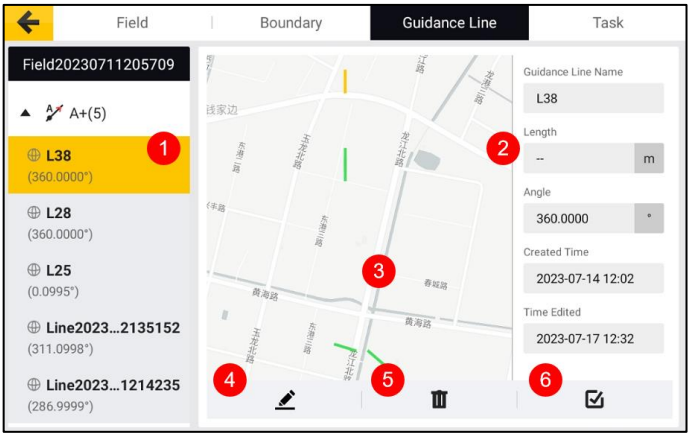

Figure 150. Guidance Line tab

1. **Guidance line list:** Shows all the guidance lines of different types, including the name, angle, and length.
2. **Basic information of guidance line:** Shows the guidance line name, creation time, length, and angle.
3. **Guidance line map:** Shows the guidance line location.
4. **Modify guidance line information:** Tap to modify the guidance line name.
5. **Delete a guidance line:** Tap to delete the guidance line. Deleted guidance lines can be restored in the recycle bin within 30 days. Refer to section 6.6 "System" for details about the recycle bin.
6. **Apply a guidance line:** Tap to apply the guidance line to the operation.

Note: To create a guidance line, tap **Line Creation** on the home screen.

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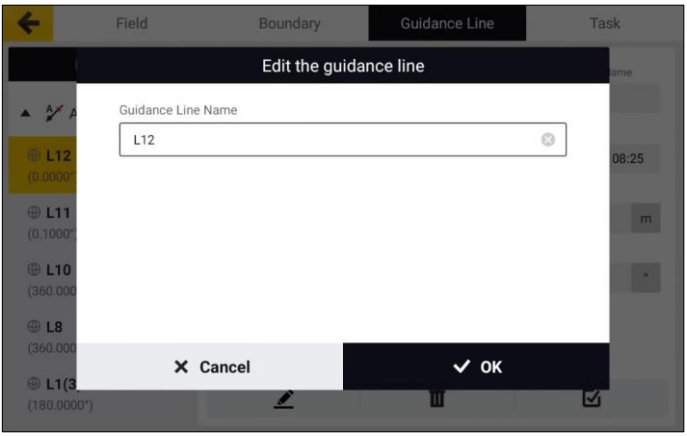

Figure 151. Modify the guidance line name

6.4.4 Task

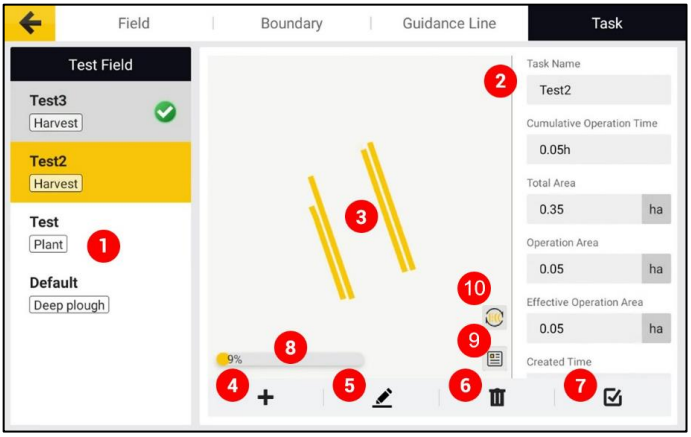

Figure 152. Task tab

1. **Task list:** Shows all the tasks, including the name and type.
2. **Basic information of task:** Shows the task name, cumulative operation time, total area, operation area, effective operation area, creation time, start time, and end time.
3. **Task map:** Shows the operation trajectories.
4. **Create a task:** Tap +, and then enter the task name and select a task type.
5. **Modify task information:** Tap to modify the task name and type.
6. **Delete a task:** Tap to delete the task. Deleted tasks can be restored in the recycle bin within 30 days. Refer to section 6.6 "System" for details about the recycle bin.
7. **Apply a task:** Tap to apply the task to the operation.

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8. **Task progress:** Shows the percentage of operated area to the total area enclosed by the applied boundary.
9. **Operation data:** Tap to view the historical data of each operation. Refer to section 6.2.2 "Historical Task Data" for details.
10. **Tasks into Line Groups:** Tap to convert a task track into a line group for use. After successful conversion, it can be found in the list of line groups of guidance lines.

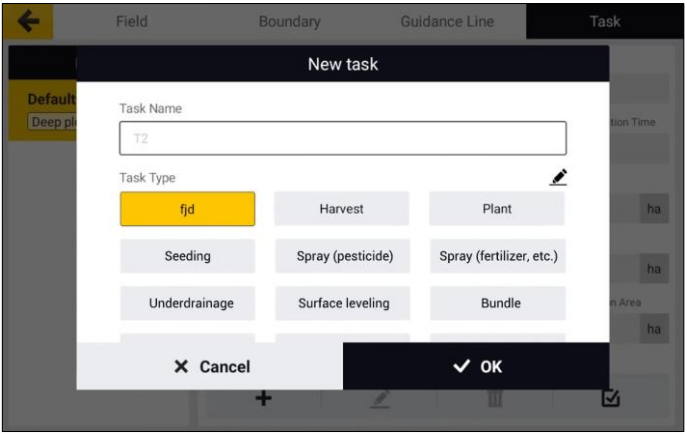

Figure 153. Create a task

6.5 Universal

Choose **MENU** > **UNIVERSAL** to access the **User Information**, **System Upgrade**, **Board Upgrade**, and **Add to Farm Management System** features.

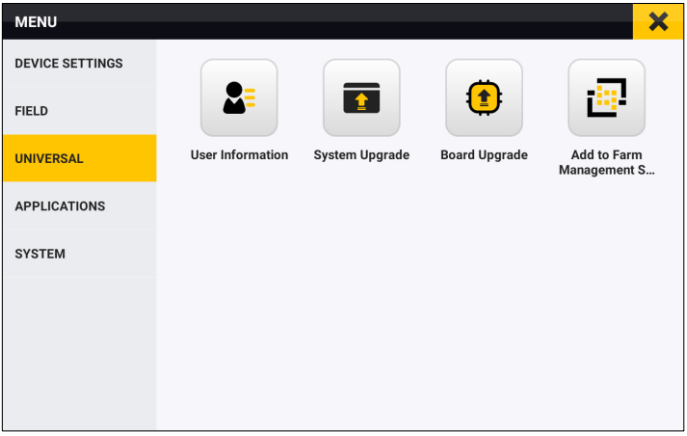

Figure 154. UNIVERSAL screen

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6.5.1 User Information

Tap **User Information** on the **UNIVERSAL** screen to view the user information, installation information, and account and security information. Tap **Sign Out** to log out.

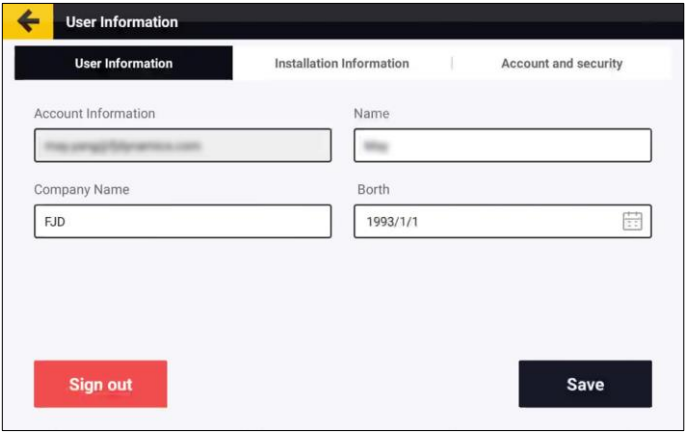

Figure 155. User Information tab

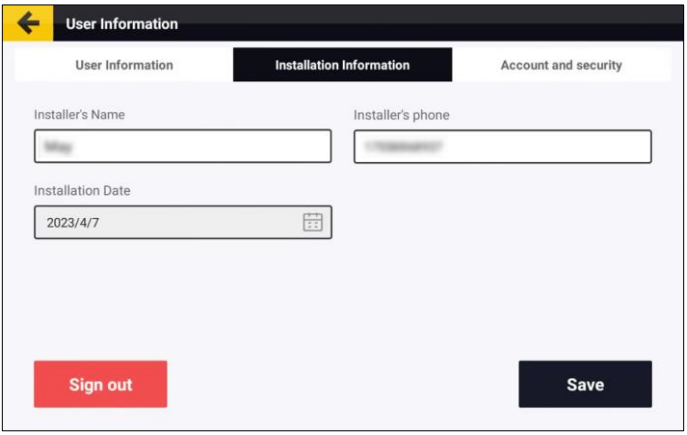

Figure 156. Installation Information tab

You can change the password on the **Account and security** tab. Tap **Send**, and the system will send a verification code to your email address. Enter the verification code you received, and tap **Next** to change the password.

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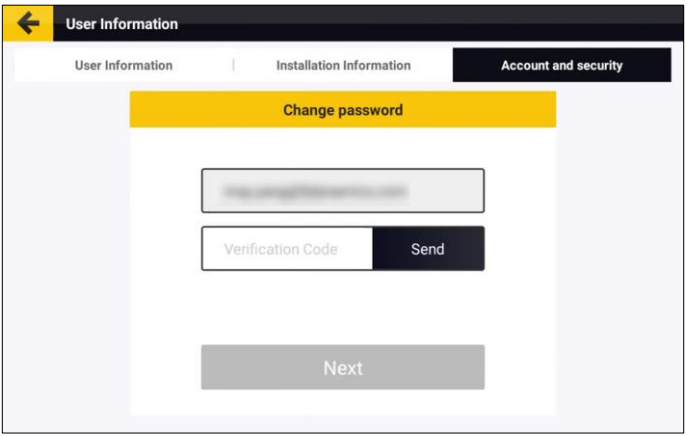

Figure 157. Change the password

6.5.2 System Upgrade

Tap **System Upgrade** on the **UNIVERSAL** screen. When a new version is available and the control terminal is connected to the Internet, the system automatically displays a popup for upgrade. If no popup is displayed, tap **Check** behind **Upgrade via Network** to check whether a new version is available. You can also upgrade the system via USB.

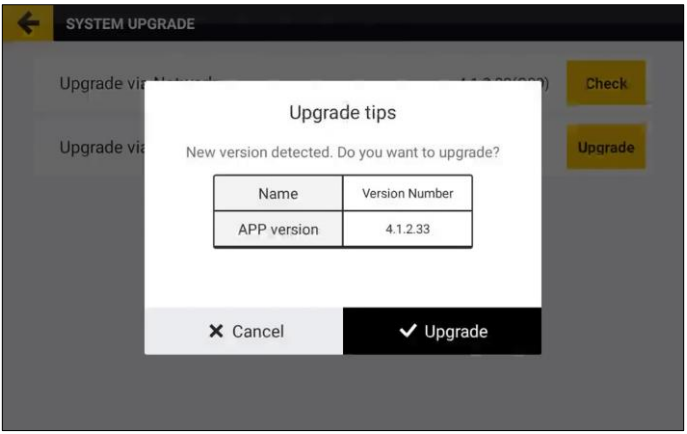

Figure 158. Popup for upgrade

The upgrade progress is displayed on the screen, and no operation can be done during the upgrade.

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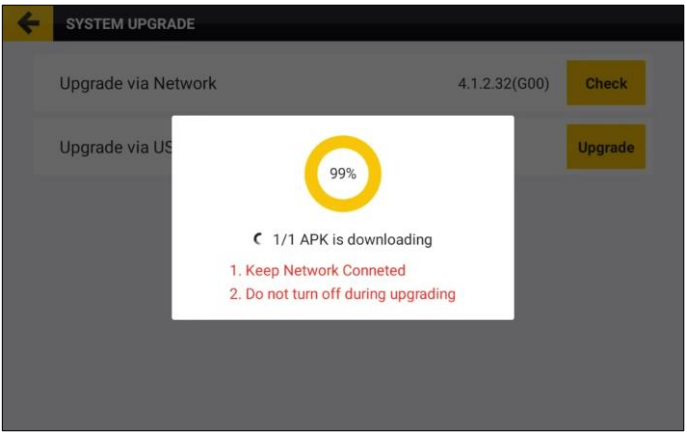

Figure 159. Upgrade in progress

If the upgrade is successful, the system displays an upgrade success message, and automatically runs the new version.

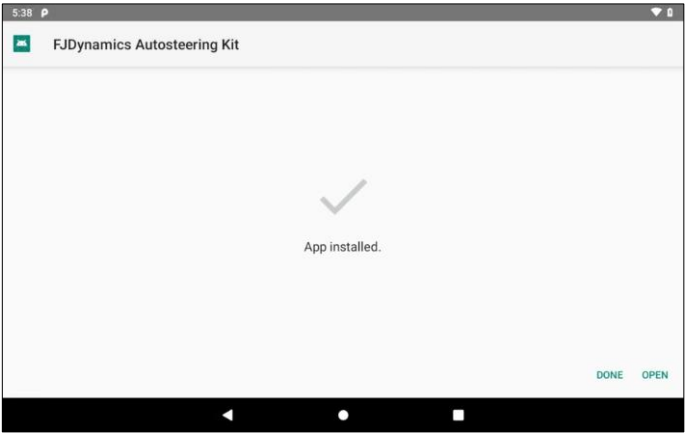

Figure 160. Upgrade completed

Note:

1. Ensure stable network connection throughout the upgrade process.
2. Before the upgrade, ensure that all the components are connected properly and there is stabilized voltage supply throughout the upgrade process.
3. If any problem occurs during the upgrade process, contact us as described in section "Technical Support", or contact the local dealer.

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6.5.3 Board Upgrade

Tap **Board Upgrade** on the **UNIVERSAL** screen, and the system automatically checks whether a new version is available for the GNSS receiver board.

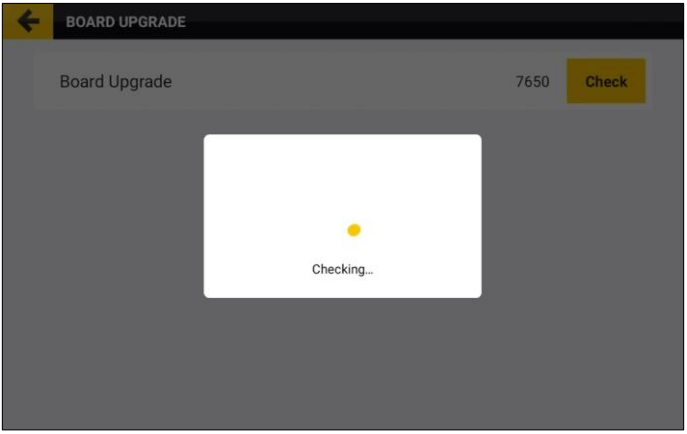

Figure 161. Check for new versions

When a new version is available and the control terminal is connected to the Internet, the system automatically displays a popup for upgrade. If no popup is displayed, tap **Check** to check whether a new version is available.

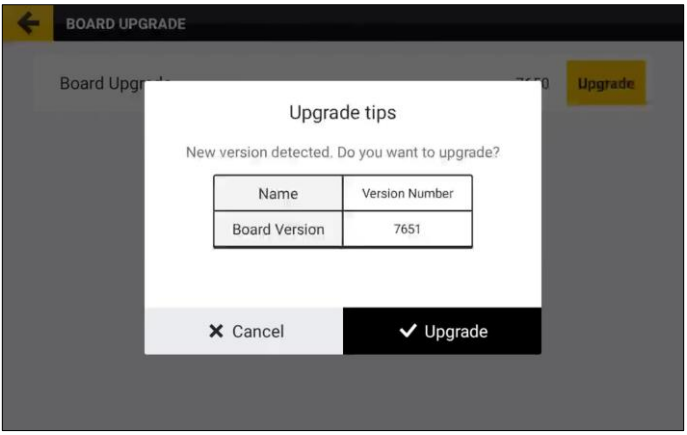

Figure 162. Popup for upgrade

The upgrade progress is displayed on the screen, and no operation can be done during the upgrade.

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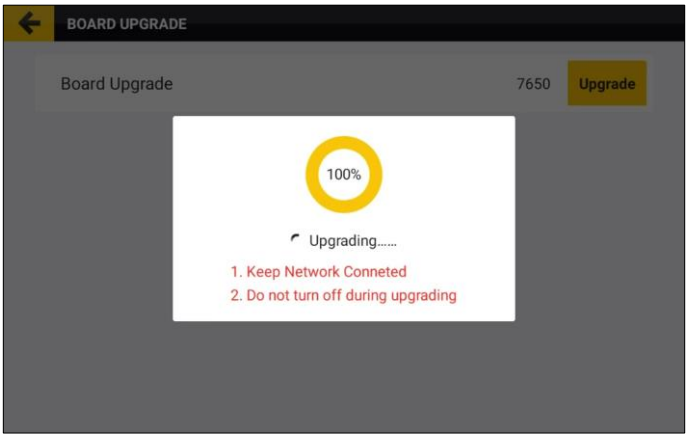

Figure 163. Upgrade in progress

If the upgrade is successful, the system displays an upgrade success message.

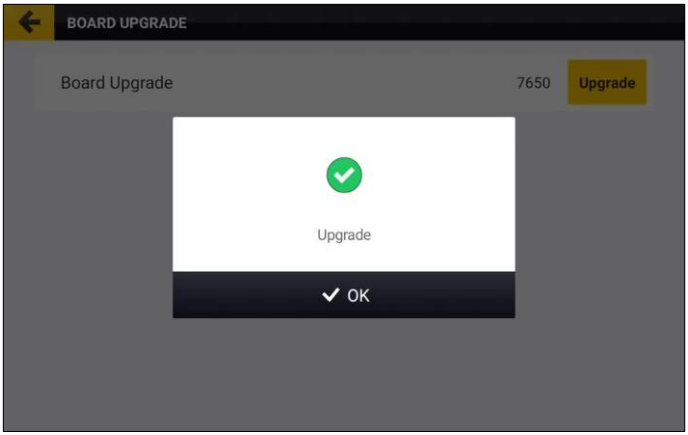

Figure 164. Upgrade completed

Note:

1. Ensure stable network connection throughout the upgrade process.
2. Before the upgrade, ensure that all the components (especially the GNSS receiver) are connected properly and there is stabilized voltage supply throughout the upgrade process.
3. If any problem occurs during the upgrade process, contact us as described in section "Technical Support", or contact the local dealer.

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6.5.4 Add to Farm Management System

Tap **Add to Farm Management System** on the **UNIVERSAL** screen, tap **Farm Management System**, enter the check code generated on the Farm Management System, and tap **OK**.

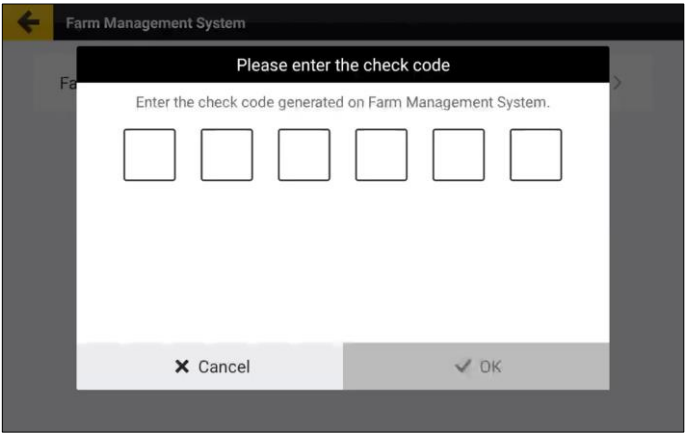

Figure 165. Enter the check code

Tap **YES** on the popup to bind the control terminal with the designated farm on the Farm Management System.

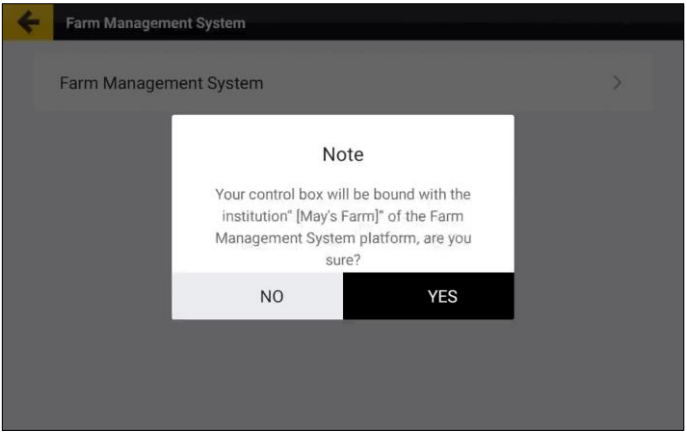

Figure 166. Bind the control terminal

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6.6 System

Choose **MENU** > **SYSTEM** to access features regarding system settings, as shown below.

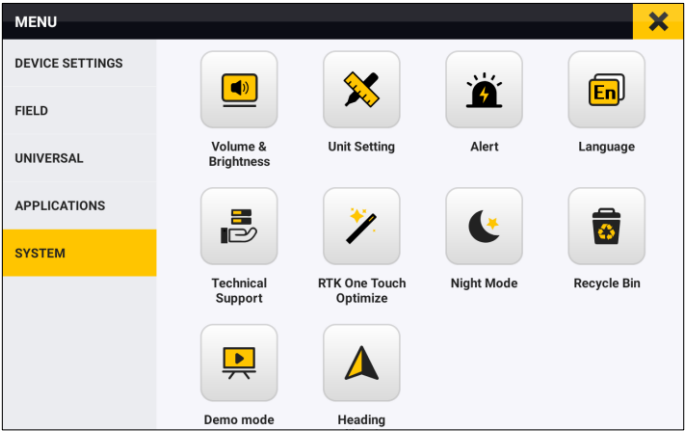
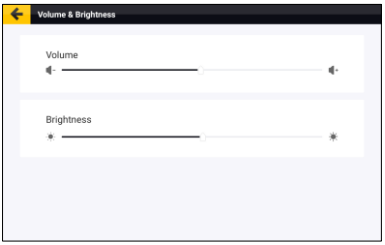
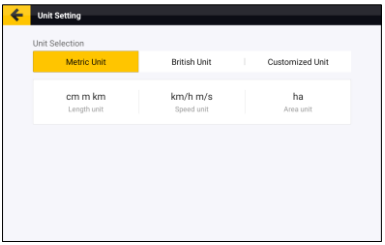


Figure 167. SYSTEM screen

System Settings

Feature	Description	Screen
Volume & Brightness	Adjust the system volume and brightness.	
Unit Setting	Select **Metric Unit** or **British Unit**, or customize according to your preferences.	

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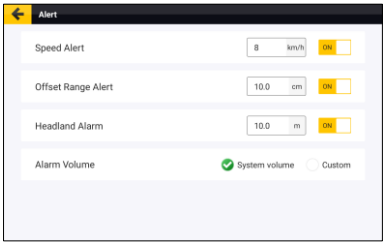
Feature	Description	Screen
Alert	1. **Speed Alert**: In the autosteering mode, if the driving speed exceeds the set value, the system issues an alert. 2. **Offset Range Alert**: In the autosteering mode, if the vehicle offset exceeds the set value, the system issues an alert. 3. **Headland Alarm**: In the autosteering mode, if the distance between the vehicle and the headland is below the set value, the system issues an alert. 4. **Turn Alarm:** The system will warn when ues the Smart U-turn and Basic U-turn when the distance from the turnaround position is equal to this value. 5. **Alarm Volume**: Select **System volume** or customize according to your preferences.	

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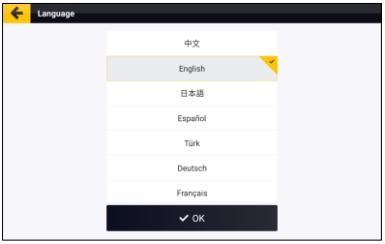
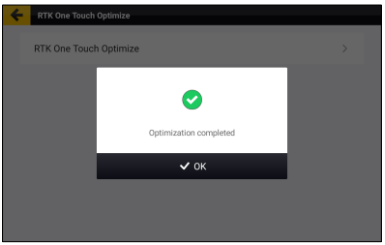
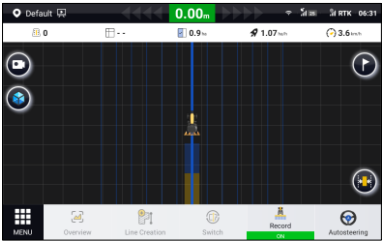
Feature	Description	Screen
Language	Change the system language. Over twenty languages are available, such as Chinese, English, and Japanese.	
Technical Support	Use this feature under the guidance of the service personnel.	
RTK One Touch Optimize	Use this feature if the RTK signal is poor during the operation.	
Night Mode	Use this feature when working at night.	
Recycle Bin	Deleted boundaries, guidance lines, and task data can be restored in the recycle bin within 30 days.	

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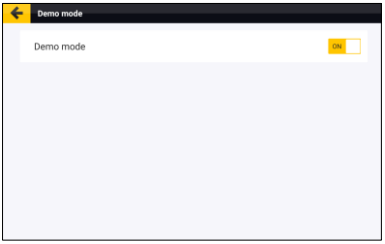
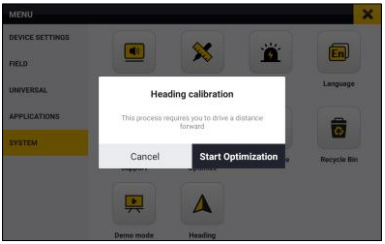
Feature	Description	Screen
Demo Mode	This mode is used for demonstration without the electric steering wheel and the GNSS receiver. Turn on the switch, and the demo mode icon appears in the upper left corner of the home screen.	
Heading calibration	Tap **Start Optimization**, and then drive forward at a relatively high speed until it prompts that the heading is calibrated.	

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Chapter 3 Common Faults and Solutions

No.	Fault	Solution
1	S turn in autosteering operations	Check whether the roll angle and pitch angle change in real time.
		Calibrate the angle sensor if it is installed.
		Check whether the GNSS receiver is installed and connected properly.
2	Steering wheel malfunction during autosteering operations	Check the brake.
		Test the motor.
		Power off and restart the vehicle.
		Check whether the GNSS receiver is installed and connected properly.
3	No 4G signal	Check whether the SIM card is inserted.
4	No RTK signal	When the mobile base station is connected, check whether the base station is powered on and operating normally.
		When the Network RTK is enabled, check whether the 4G signals are normal.
		When the Network RTK is enabled, check whether the Ntrip account is valid.
5	Inconsistent working width in multi-line mode	Check whether the vehicle parameters entered are correct.
		Check whether the vehicle calibration is completed.
		Calibrate the implement again.
6	Slight offset in straight line mode	Check whether the roll angle changes in real time.

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Chapter 4 Main Hardware Specifications

No.	Assembly	Component	Specifications
1	Control terminal	Control terminal	Size: 275×180×40 mm Screen: 10.1-inch capacitive touch screen, LED backlight Resolution: 1280×800 pixels, brightness >700 nits RAM: 2 GB ROM: 8 GB Ports: one SIM card slot, two Type-C ports Supply voltage: 9 V–36 V DC Signals received: radio, satellite, and 4G signals Operating temperature: -20℃ to +70℃ Storage temperature: -40℃ to +85℃ IP rating: IP66 Relative humidity: 0%–95%, at 40℃ (non-condensing) Wireless communication: 2.4 GHz Wi-Fi, BT 5.0 Frequency range: 2,412–2,484 MHz Radio communication: 400 M, 900 M, N/A
2	GNSS receiver	GNSS receiver	Frequency bands: GPS L1/L2, GLONASS L1/L2, BDS B1/B2/B3, Galileo E1/E5b Operating voltage: 9 V–36 V DC Operating current: <300 mA Size: 162×78 mm Operating temperature: -20℃ to +70℃ Storage temperature: -40℃ to +85℃ IP rating: IP66 Ports: one TNC port, one Type-C port
3	Electric steering	Steering wheel	Diameter: 410 mm

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No.	Assembly	Component	Specifications
4	wheel	Steering motor	Supply voltage: 12 V/24 V DC Peak torque: 20 Nm (12 V); 30 Nm (24 V) IP rating: IP65
5		Splined sleeve	Multiple sizes

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