



FJDynamics AT2 Auto Steer System

Software User Manual

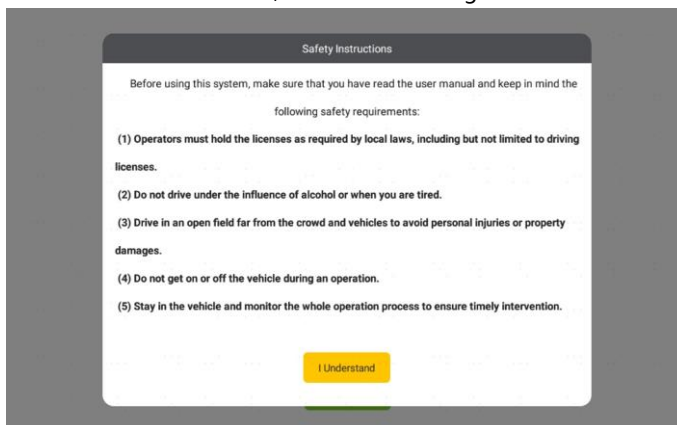


Safety Instructions

Before using this FJDynamics Autosteering Kit (shorten as the kit), please read the entire contents of the “FJDynamics AT2 Auto Steer System Software User Manual” carefully, and keep in mind when operate it.

Safety Symbols

After the control terminal is powered on, safety warnings are displayed on the home screen for 3 seconds, as shown in the figure below.



Operator Requirements

1. Do not drive under the age of 18.
2. Do not drive after drinking.
3. Do not drive when tired.
4. Drivers must obtain the relevant driving license required by the local laws.

Operation Environment

1. Please drive in an open area far from the crowd and ensure that there are no irrelevant personnel and vehicles in the operation area.
2. Please stay away from people, livestock, obstacles, electric wires, tall buildings, airports, signal towers, etc. So as not to interfere with the signal and affect the operation.
3. Please work in good weather (not extreme weather such as heavy rain, heavy fog, snow, lightning, strong wind, etc.).

4. When the kit is under the testing, calibration, adjustment, or automatic steering, please ensure that there are no people or obstacles near the running track to prevent personal injuries or property damages.

Operation Rules

1. During driving or operating, it is strictly prohibited to get on or off the vehicle during driving.
2. The vehicle must be kept under monitoring by the driver to ensure timely intervention.
3. When a vehicle equipped with this kit is driving on public roads or public areas, please ensure that the kit is powered off.

Checking

1. Make sure to have enough fuel in the driving vehicle.
2. Ensure that the parameters in the kit are calibrated before the automatic driving operation.
3. Make sure the antenna and angle sensor are installed properly. If there is any movement, please calibrate it again before using.
4. Do not use worn or damaged cables. Please purchase and replace new cables in time.

Others

1. Do not disassemble the product yourself, or it will affect the warranty service.
2. The equipment damages caused by force majeure (lightning strike, high voltage, collision), are not included in the free maintenance service.
3. Please strictly follow the manual to connect the device. For connecting cables such as data cables, you need to pinch the root of the plug and insert it gently. Do not pull it hard or even rotate it, which may cause needle breakage.
4. Please follow the supply requirement to power the device. Note that the power rating for controller and electric steering wheel is 10-30V.

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Chapter I About This Document

1 Purpose

This document provides a brief description on how to use the FJDynamics autosteering kit for agricultural vehicles in a simple and clear way. Users can learn to perform each operation easily, quickly and accurately.

2 Technical Support

Users can find the technical support and upgrade services provided by FJ Dynamics Technology Co., Ltd., once they purchased the product.

Chapter II Product Overview

1 Introduction

For details, refer to FJDynamics AT2 Auto Steer System on the FJDynamics official website:

<https://www.fjdynamics.cn/>



Product standard: Q/320411 AQR 004-2019

2 Main Components of the FJDynamics AT2 Auto Steer System



Figure 2.2.1 Main components

1. **Control Terminal:** To provide human-computer interaction and machine control.
2. **Electric Steering Wheel:** Consists of a steering motor and a steering wheel, to automatic steer the vehicle.
3. **GNSS Receiver:** To receive satellite and RTK signals to locate the vehicle and gain attitude information.

Precautions for installing the GNSS receiver:

1. Do not disassemble the radio antenna or plug/unplug connecting cables such as the serial cable while the system is powered on.
2. When installing antennas outdoors, please take appropriate lightning protection measures to prevent lightning strikes.
3. When installing the GNSS receiver outdoors, please take appropriate water protection.
4. Place the GNSS receiver outdoors when using or testing the system.

5. The radio may generate heat during use, so watch out to avoid burns.
6. Avoid unnecessary coverings on the GNSS receiver to maintain good ventilation.

3 Hardware Interfaces of Control Terminal

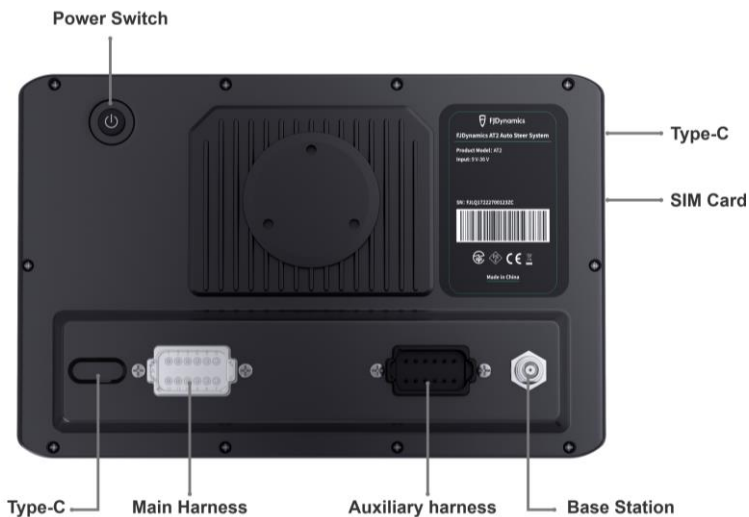


Figure 2.3.1 Hardware interfaces of the control terminal

Chapter III Software Operation

Instructions of Control Terminal

1 Workflow Overview

In order to facilitate the user's understanding of the operation and use of this kit, this manual will introduce the mainline use process of this product and related auxiliary functions from the perspective of a new user. New users are required to complete the installation and configuration and preparation operations when using the system for the first time, so that they can enter the auto steering operation smoothly.

2 Commissioning

The initial commissioning process of FJDynamics Autosteering kit is as follows:

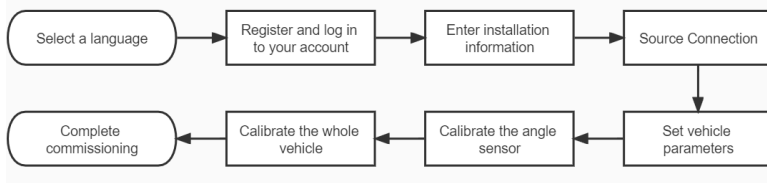


Figure 3.2.1 Initial commissioning workflow

2.1 Selecting a Language

Turn on the control terminal and select a language for this kit. click **Next step**. The screen for registration and login is displayed.

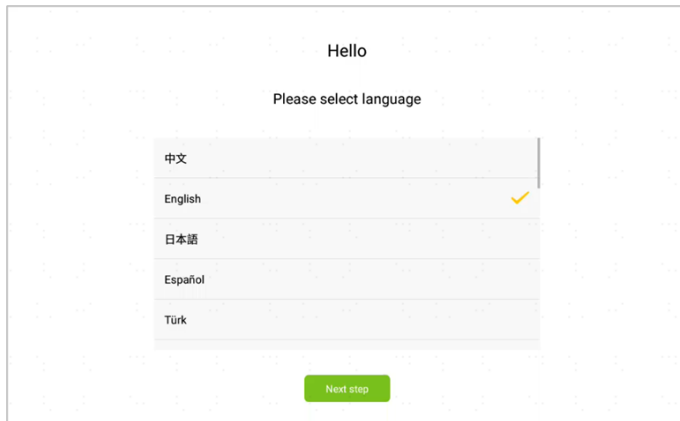


Figure 3.2.2 Selecting a language

2.2 Register/Login

After completing the language settings, you will enter the registration and login screen.

Account Registration: You are required to register an account for the initial use of the kit. Click **Register immediately**. On the displayed screen, enter your email address, verification code, and password, and click **I agree** in User Privacy Policy.

Account Login: If you have an account registered, you can log in directly by entering your user name (email address) and password to enter the home screen.

Forgot Password: Allows you to enter the password resetting screen when you forgot your password. Enter your email address, verification code, and new password. Then, click **Login** to enter the home screen.

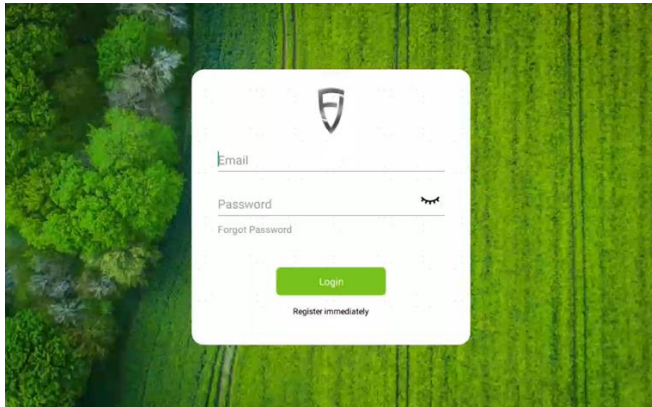


Figure 3.2.3 Home screen of login and registration

2.3 Entering Installation Information

After successfully registering and logging in for the first time, you need to enter related installation information, user information and Auto Steer System information. Please note that the initial information you have entered will directly or indirectly affect your after-sales service. Therefore, please strictly follow the following procedure:

Step 1 : Enter user information after the user registration and click **Next step**.

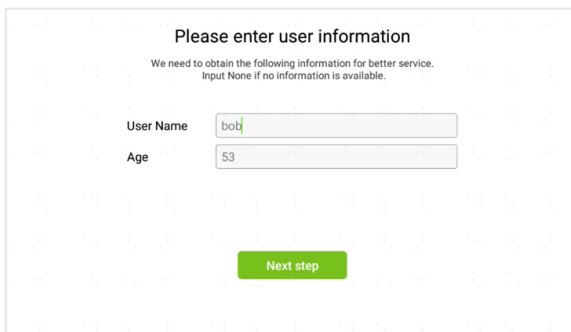
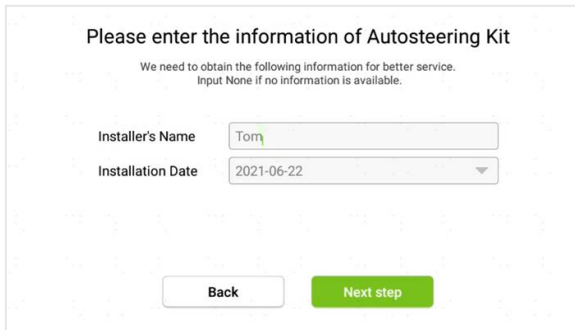
The image shows a form titled 'Please enter user information'. Below the title is a subtitle: 'We need to obtain the following information for better service. Input None if no information is available.' There are two input fields: 'User Name' with the text 'bob' and 'Age' with the text '53'. At the bottom of the form is a green button labeled 'Next step'.

Figure 3.2.4 Entering user information

Step 2 : Enter your autosteering kit's information and click **Next step**.

The screen for entering agricultural vehicle information is displayed.



Please enter the information of Autosteering Kit

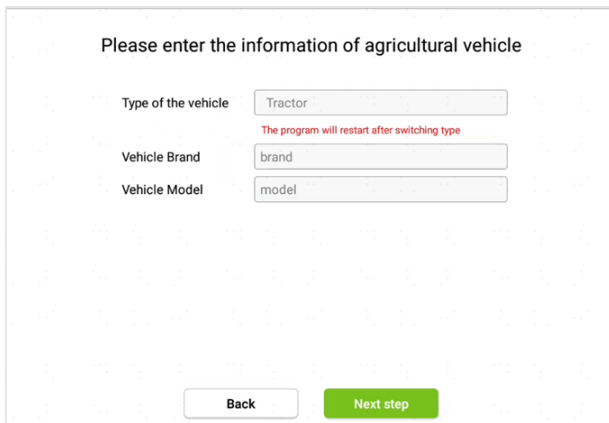
We need to obtain the following information for better service.
Input None if no information is available.

Installer's Name

Installation Date

Figure 3.2.5 Entering Auto-kit information

Step 3 : Specify all parameters about the agricultural vehicle and click **Next step**.



Please enter the information of agricultural vehicle

Type of the vehicle

Vehicle Brand

Vehicle Model

The program will restart after switching type

Figure 3.2.6 Entering agricultural vehicle information

After you select a type of the vehicle, the kit will directly enter the corresponding agricultural vehicle kit. Please select the type of the vehicle you will actually use.

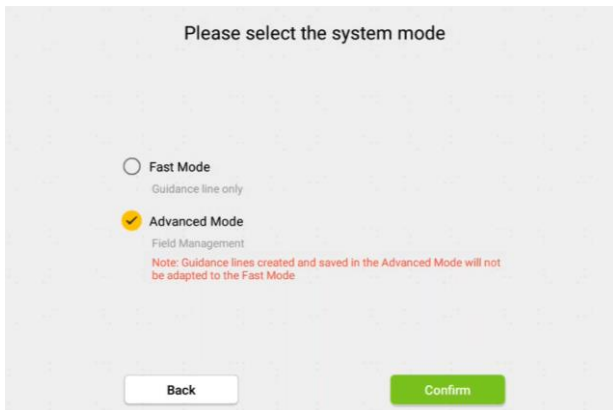


Figure 3.2.7 Selecting system mode

Step 4: In terms of system mode, select the corresponding one. Please choose carefully according to the actual usage and click **Save**. The home screen is displayed.

Fast mode

The operation is simpler. The task can be started directly after importing the guidance line.

Advanced mode

Upgrade the field management function, start the operation after completing the task configuration, and have a more systematic management of the field data.

Note: The guidance line used in the advanced mode cannot be adapted to the extreme Fast Mode.

2.4 Home Screen

After successfully logging in to the system, you will enter the home screen. You can view the network connection status and operation status in real time. Your account login record will be automatically saved locally. Therefore, you can directly enter the home screen of the kit every time you open it.

2.4.1 Main Interface of Fast Mode

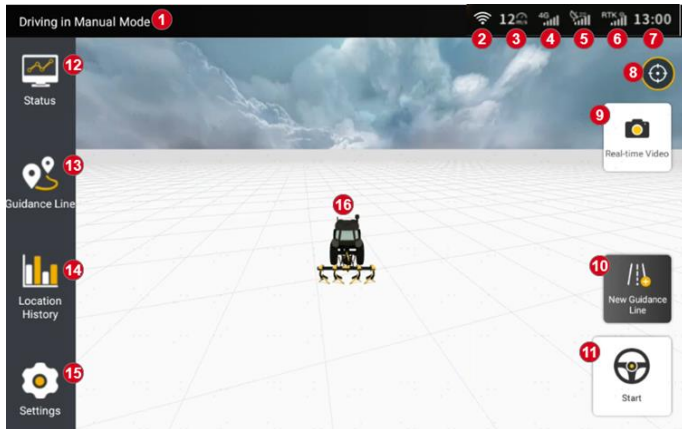


Figure 3.2.8 The main interface of Fast Mode

1. Current driving mode : Shows the current driving mode, including manual driving mode and autosteering driving.

2. Wi-Fi signal: Show that the current device is connected to the wireless network.

3.Real-time speed: Displays the running speed of the current agricultural machine, and the speed unit can be changed in the setting.

4. 4G signal: The mobile network signals, shows the real-time cellular data communication of the autonomous driving system.

5. GNSS signal: The satellite signal, shows the connection status of the system.

6. Correction Source: The correction source can be connected in the Mobile Base Station, Network RTK, or SBAS mode. The icon shows the signal strength of the correction source.

7.Time: Android system time, users can manually change the time zone in Android system.

8. Perspective switch: Fix the perspective of three-dimensional view by clicking the button.

9. Real-time video: Real-time monitoring of machine tool operation status through Wi-Fi camera, real-time feedback of operation status. (Note: Wi-Fi camera needs to be purchased separately.)

10.New Guidance line: Set new guidance line by clicking this shortcut button.

11. Autosteering Start / Stop button: Click to start or stop the vehicle.

12. Status: Click to access the real-time information and current status of agricultural machines.

13. Guidance line: Click to access the Guidance line detailed page for checking, adding, selecting and deleting guidance line.

14. Location history: Click to expand the historical operation data information, and view the operation time, operation area, operation width, operation efficiency, historical operation trajectory etc.

15. Settings: Click to access Parameter Settings, Source Connection, Trouble Checking, System Upgrade, and Version.

16. Vehicle: Shows the movement of vehicles in real-time.

2.4.2 Main Interface of Advanced Mode

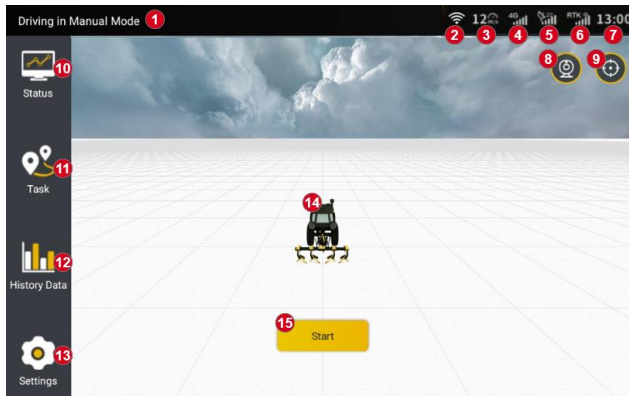


Figure 3.2.9 Main interface of advanced mode

1. Current driving mode : Shows the current driving mode, including manual driving mode and autosteering driving.

2. Wi-Fi signal: Show that the current device is connected to the wireless network.

3. Real-time speed: Displays the running speed of the current agricultural machine, and the speed unit can be changed in the setting.

4. 4G signal: The mobile network signals, shows the real-time cellular data communication of the autonomous driving system.

5. GNSS signal: The satellite signal, shows the connection status of the system.

6. Correction Source: The correction source can be connected in the Mobile Base Station, Network RTK, or SBAS mode. The icon shows the signal strength of the correction source.

7. Time: Android system time, users can manually change the time zone in Android system.

8. Real-time video: Real-time monitoring of machine tool operation status through Wi-Fi camera, real-time feedback of operation status. (Note: Wi-Fi camera needs to be purchased separately.)

9. Perspective switch: Fix the perspective of three-dimensional view by clicking the button.

10. Status: Click to access the real-time information and current status of agricultural machines.

11. Task configuration: Click to configure the field, boundary, guidance line and task setting information of each task.

12. History data: Click to expand the historical operation data information, and view the operation time, operation area, operation width, operation efficiency, historical operation trajectory etc.

13. Settings: Click to access Parameter Settings, Source Connection, Trouble Checking, System Upgrade, and Version.

14. Vehicle: Shows the movement of vehicles in real-time.

15. Start task: After clicking, if the task configuration has been completed, it will enter the operation status; otherwise, it will enter the task configuration interface.

2.5 Select Correction Source

You can connect to three correction sources: Mobile Base Station, Network RTK and SBAS.

1) Mobile Base Station: You need to select and power on a radio station, and pair with it.

2) Network RTK: You can set up an RTK connection through the network, when a CORS base station nearby and you have a local Ntrip account or FJ CORS account. To enable this mode, you need to connect to the network first.

3) SBAS: In this mode, instead of using a radio station or the network, the autosteering kit receives differential data from the SBAS system to provide differential positioning. Note that in this mode, the positioning precision is lower, with a straight-line operation offset of about 5cm and a row spacing offset of about 40 cm. Select this mode with caution based on your demand.

Step 1: Click **Settings** > **Correction Source** to open the selection screen.

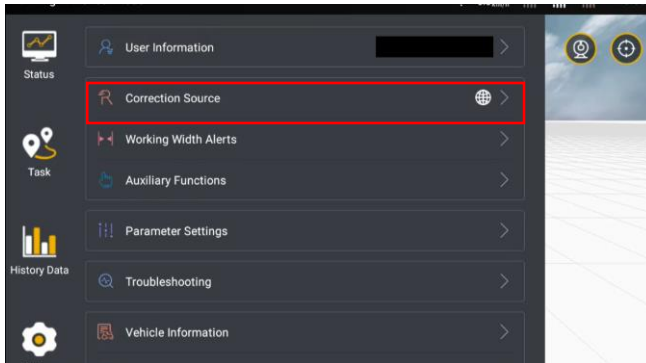


Figure 3.2.10 Settings list

Step 2: Select a correction source you want to use.

On this screen, you can select to connect to a mobile base station, a network RTK, or SBAS. The kit connects to a mobile base station by default. You can change it through the toggle on the right. If you select Network RTK, this becomes the default mode next time you log in.

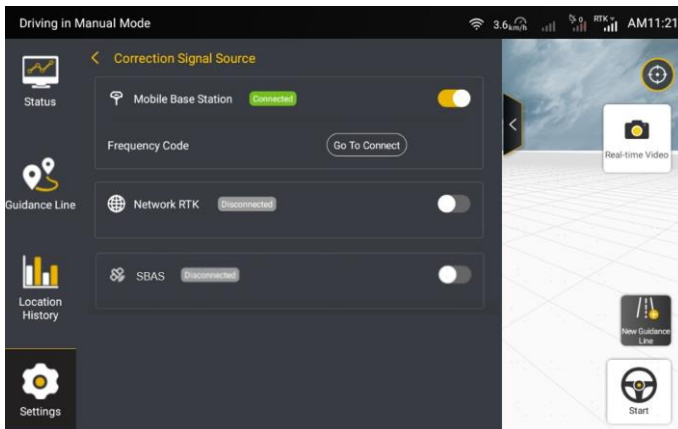


Figure 3.2.11 Correction source change

- **Mobile base station:** If you choose to connect to a mobile base station, select one of the following connection modes based on the base station type.

After switching on base station, go to **Settings – Correction Signal Sources**, and choose **Mobile base station - Pairing via Code**, and input the BS code in the prompt. Click **OK** after confirming the information is correct.

- **Network RTK** : To connect to the Network RTK, enable Network RTK and click **Connect**. In the displayed dialog box, enter your Ntrip domain name and account information.

Ntrip domain: Enter the host and port, and click **Get Source**. The source node field automatically shows the port having the strongest signal strength, indicating that the NTRIP domain information is completed.

Ntrip account: After entering the NTRIP domain information, enter the account and password, and click **Connect** to connect to the network RTK.

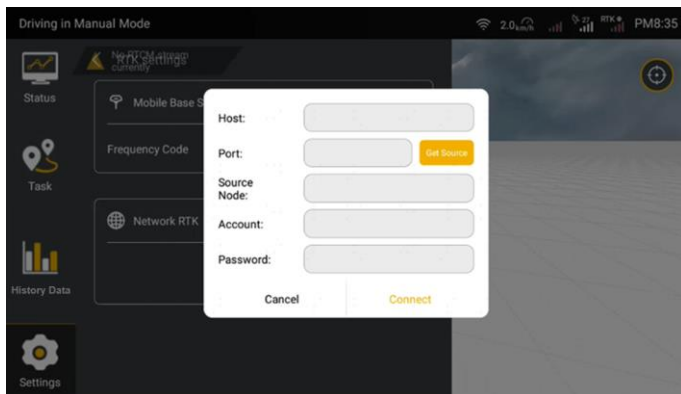


Figure 3.2.15 Connect Network RTK

- **SBAS**: To connect to SBAS, enable SBAS. WAAS is selected by default, and the status becomes Connected after convergence. If you want to use a different source, select a source and click **OK**, and then simply wait for successful connection.

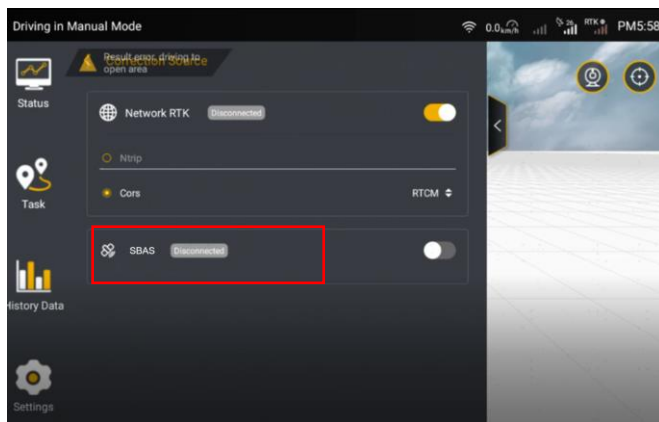


Figure 3.2.16 Connect to SBAS

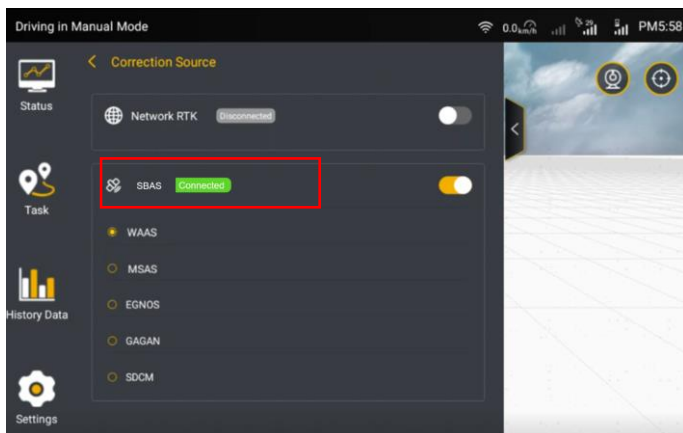


Figure 3.2.17 SBAS connected

During SBAS connection, the **Status** is **1**, and the operation cannot be started. After the connection is established, the **Status** becomes **2**, and the source icon in the upper right corner changes to SXX. XX is the age of differential, which is a number from 0 to 20.

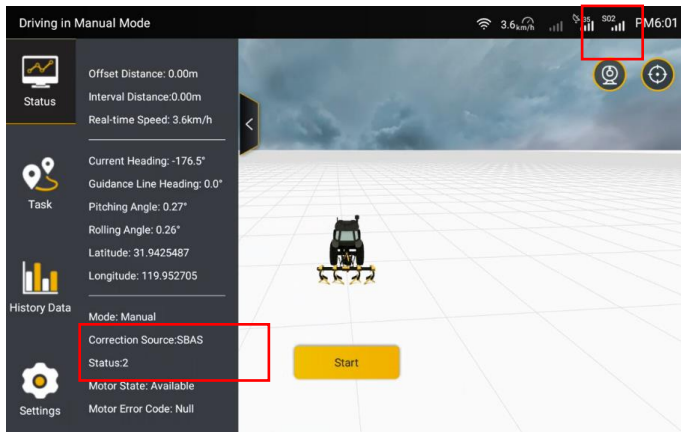


Figure 3.2.18 Status after SBAS connection

Note:

1. It takes up to 3 minutes to connect to a mobile base station or network RTK, and up to 5 minutes to connect to SBAS.
2. If connection to a correction source fails, try connecting to another correction source. If the fault persists, check the correction source in **Settings > Troubleshooting**, as shown below.

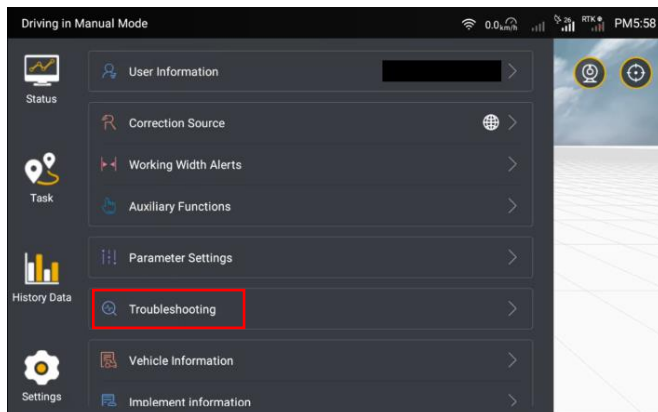


Figure 3.2.19 Setting list

The troubleshooting shows two results. The check mark indicates that the test is passed, and the cross mark indicates test failure.

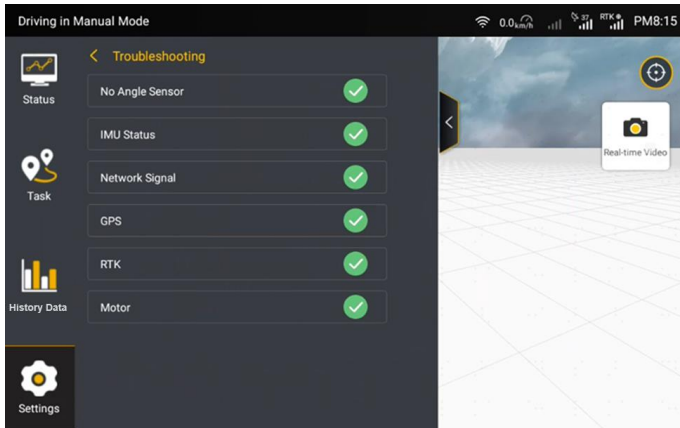


Figure 3.2.20 Troubleshooting

2.6 Setting Vehicle Parameters

After entering the home screen of the kit, perform the following operations to set vehicle parameters:

From the sidebar, choose **Settings** -> **Vehicle Information**.

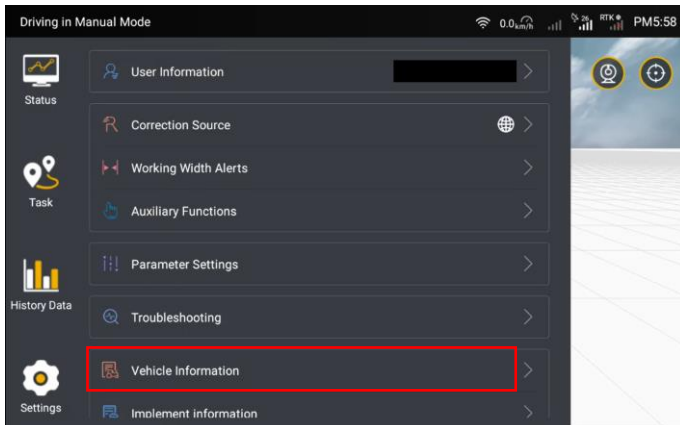


Figure 3.2.21 Setting List

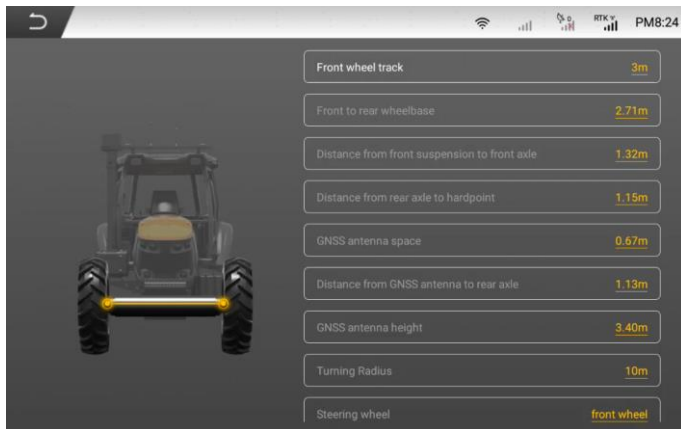


Figure 3.2.22 Vehicle information

*For details about the measurement operations, please check the corresponding commissioning instruction video.

2.7 Calibrating Angle Sensor

After completing vehicle parameter settings, you need to calibrate the angle sensor. Perform the following operations to calibrate the angle sensor:

Step 1: **Choose Settings -> Parameter Settings.**

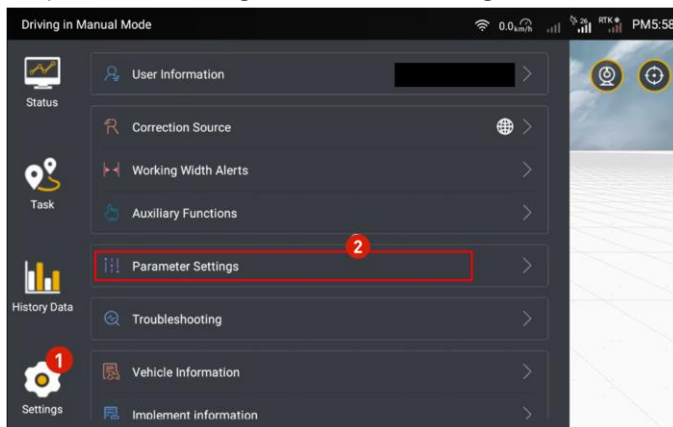


Figure 3.2.23 Setting list

Step 2: Click **Angle Sensor Calibration** in the detailed page of **Parameter settings**.

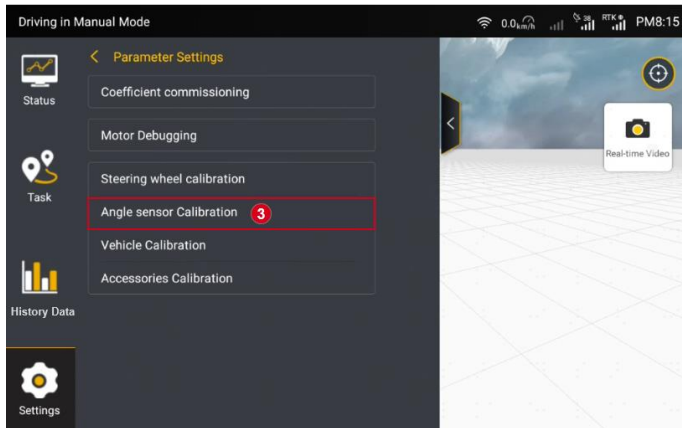


Figure 3.2.24 angle sensor calibration

Step 3: User needs to select the sensor type after getting into the angle sensor setting page.

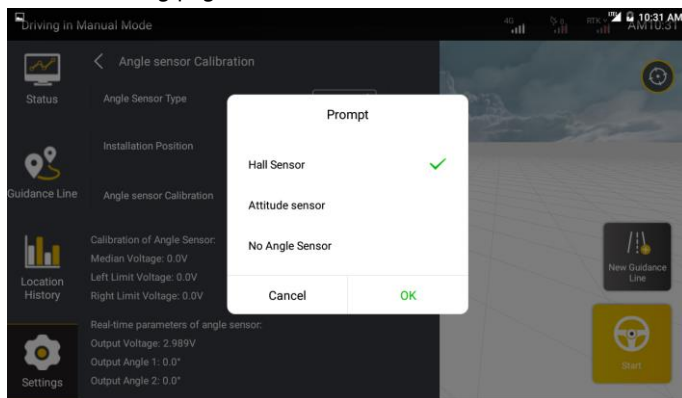


Figure 3.2.25 Select angle sensor type

- If the selected type is "Hall Sensor", then the user needs to select the installation position of the angle sensor. After selecting the installation location, click "Calibrate" to directly enter the calibration process. Please

follow the prompts in the following interface to calibrate. Rotate the steering wheel according to the process **leftmost-rightmost-center** and click **OK** after each action finished.

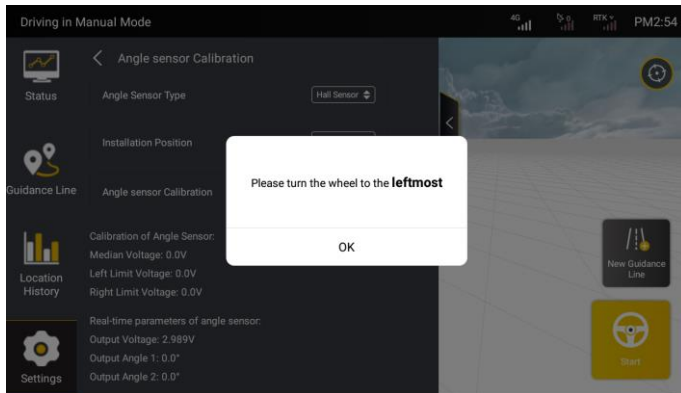


Figure 3.2.26 Turning the wheel to the leftmost

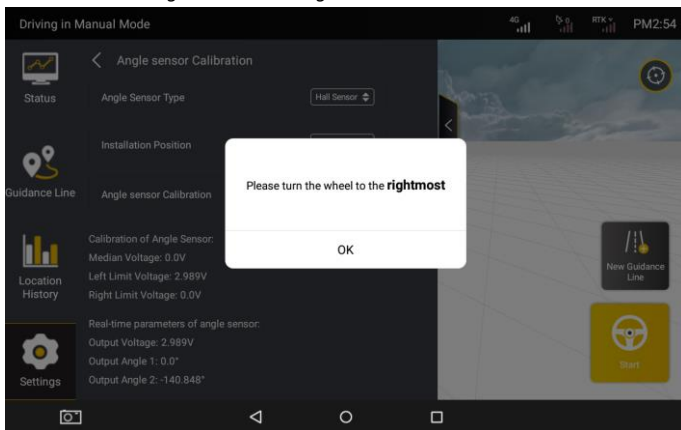


Figure 3.2.27 Turning the wheel to the rightmost

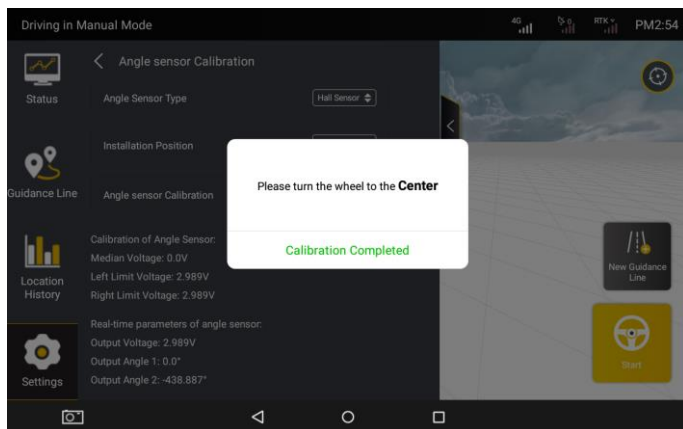


Figure 3.2.28 Turning the wheel to the center

- If the angle sensor type is selected as **Attitude sensor**, please then select the installation position of your angle sensor.

Note: when you choose **Attitude sensor**, you should drive straight for 15-20m in manual mode to complete data convergence every time you open the system.

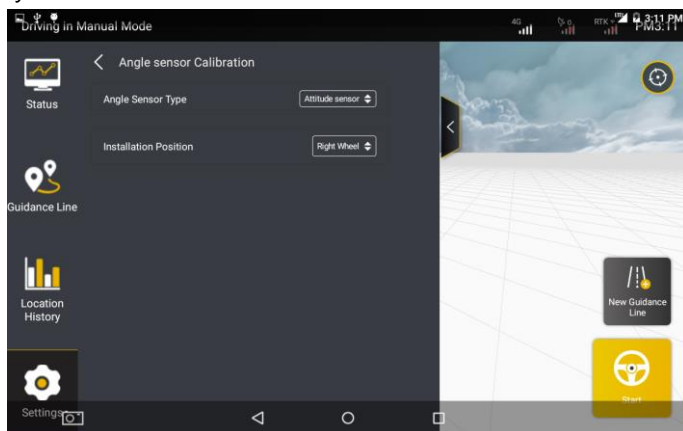


Figure 3.2.29 attitude sensor

- If the angle sensor type is selected as **No angle sensor**, after selecting **No angle sensor**, enter its interface as shown below.

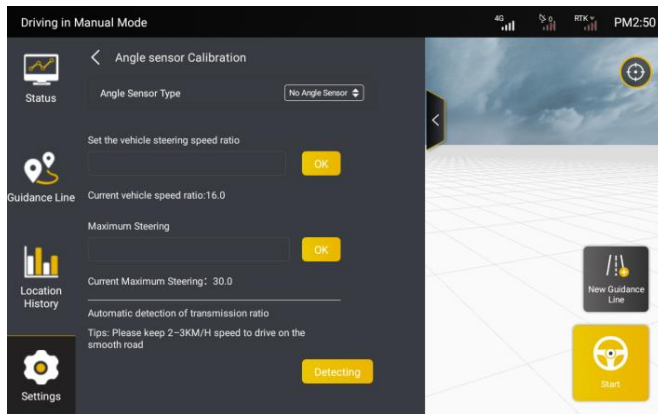


Figure 3.2.30 No angle sensor

After entering the setting screen for no angle sensor, put the vehicle's gear into the low gear first. Then, click **Detect** and step on the accelerator to make the agricultural vehicle run straight for about 20 m on a **flat ground** freely at a low speed (2–3 km/h) until the **Detection Done** prompt box is displayed. Then, the vehicle steering speed ratio is automatically detected and the setting of no angle sensor is completed.

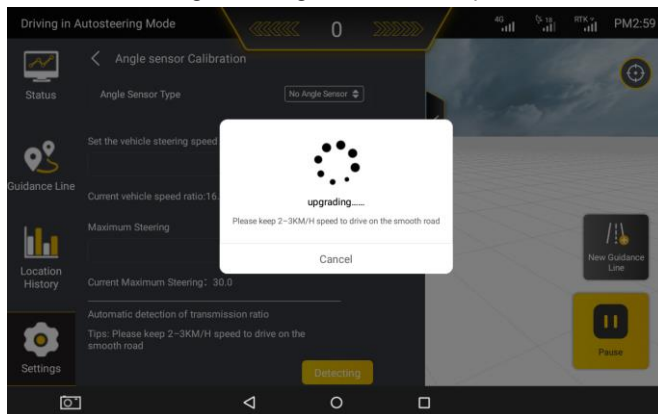


Figure 3.2.31 Detecting the speed ratio

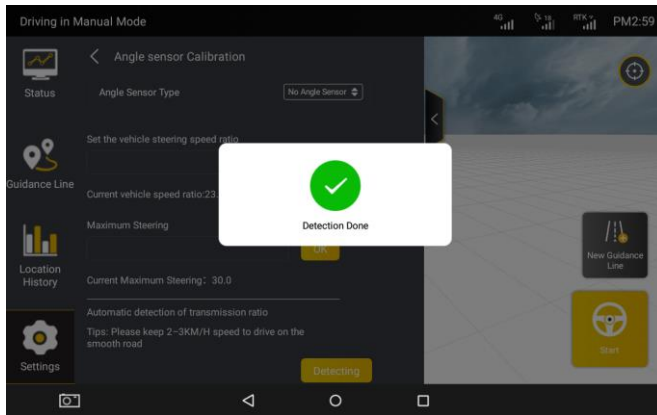


Figure 3.2.32 Detect finished

If the sensor type is switched, the device needs to be restarted after the sensor is switched to take effect.

2.8 Vehicle Calibration

After angle sensor calibration finished, you need to calibrate vehicle to correct working offset. Perform the following operations to calibrate vehicle:

Step 1: On the displayed **Settings** screen, click the **Parameter Settings**.

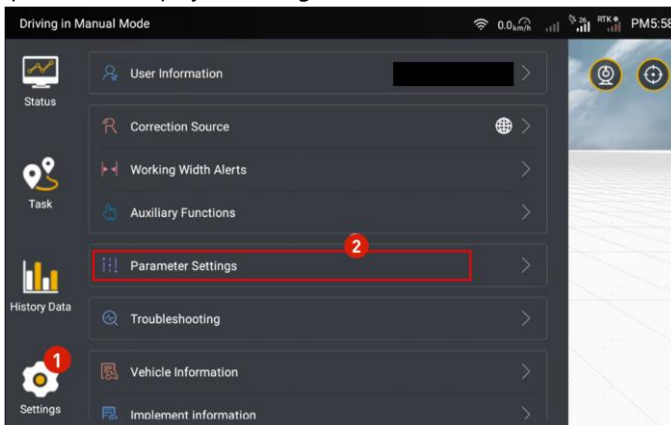


Figure 3.2.33 Setting List

Step 2: Click into **Vehicle Calibration** in the parameter page.

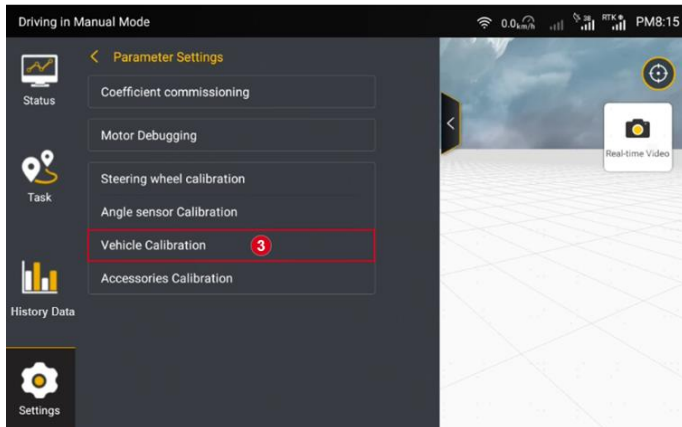


Figure 3.2.34 Vehicle Calibration

Step 3: Click **Start Calibration** in the vehicle calibration page, and then getting into the calibrating process.

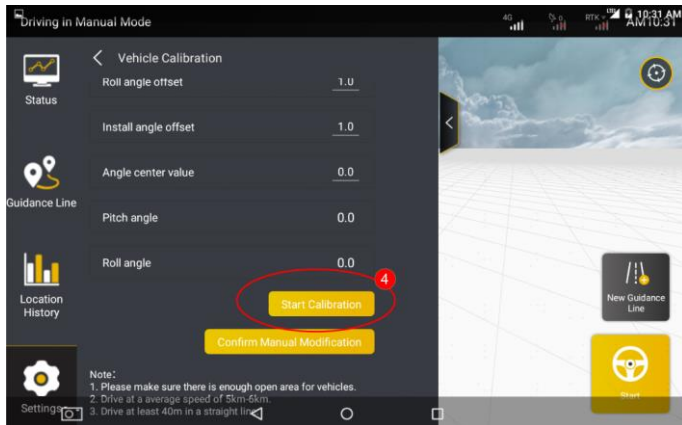


Figure 3.2.35 Start Calibration

Step 4: On the calibration screen, carefully read the current calibration step displayed. Then, determine Points A and B exactly as prompted on the screen. Move the agricultural vehicle to the starting point and click **Confirm Point A** on the screen.

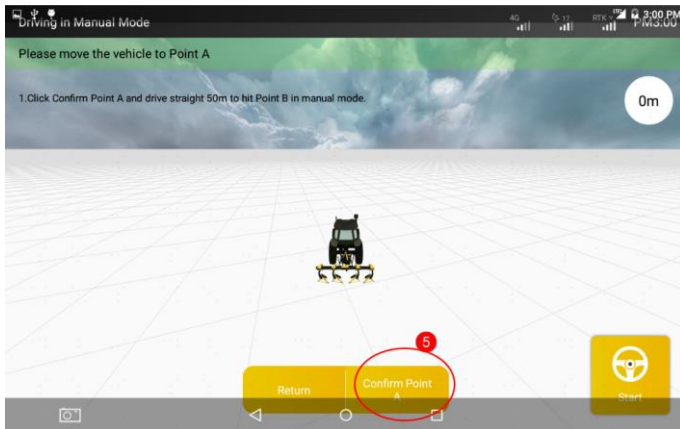


Figure 3.2.36 Confirm Point A

Step 5: After confirming Point A, manually drive the vehicle straight for 50m and **Confirm Point B**.

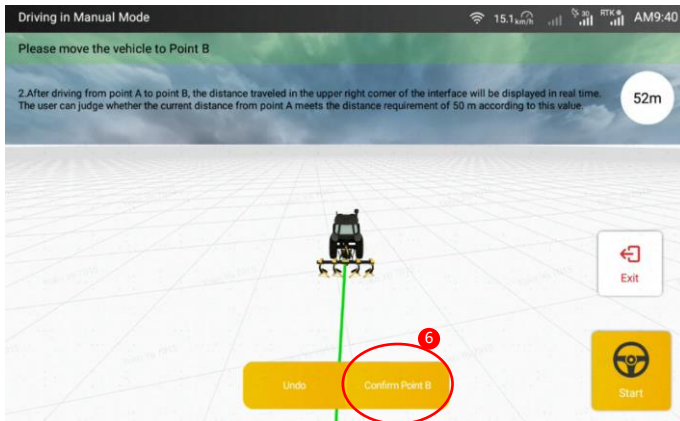


Figure 3.2.37 Confirm Point B

During the driving towards Point B, the distance traveled will be displayed on the upper right corner of the screen in real time. You can check whether the current distance from Point A meets the distance requirement of 50m based on this value.

Step 6: After confirming Point B, please follow the instructions in Step

3 on the screen to manually turn the vehicle around and make it return to Point B on the guidance line just confirmed (with the front end of the vehicle facing Point A). After the adjustment is completed, click **Start** to make the vehicle run to Point A in the auto steering driving mode according to the guidance line just confirmed.

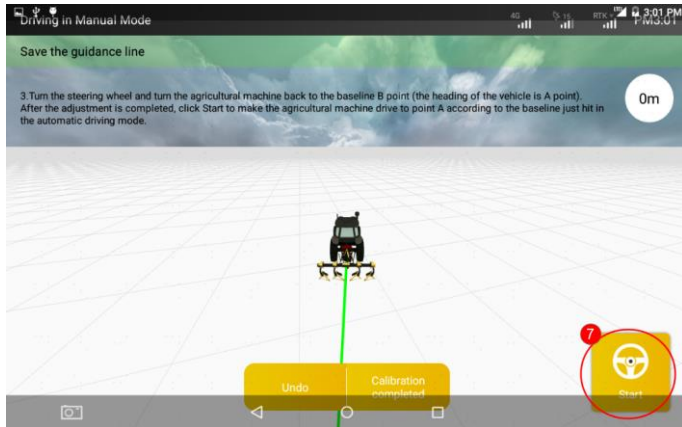


Figure 3.2.38 Starting auto steering driving after turning around

Step 7: Click **Stop** after the vehicle arrives at Point A in the autosteering driving mode.

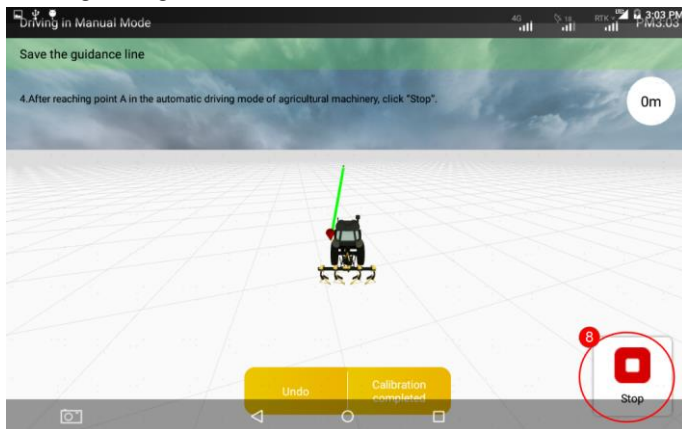


Figure 3.2.39 Stopping auto steering driving

Step 8: Manually turn the vehicle around to make it return to Point A on the guidance line (with the front end of the vehicle facing Point B). Then, click **Start** to make the vehicle run from Point A to Point B in the auto steering driving mode.

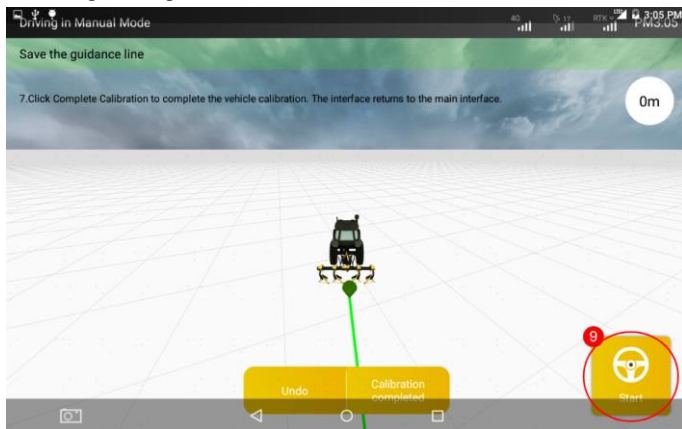


Figure 3.2.40 Manually turning around and start the auto-working

Step 9: After the vehicle reaches Point B in the auto steering driving mode, click **Stop** to stop the current auto steering driving operation.

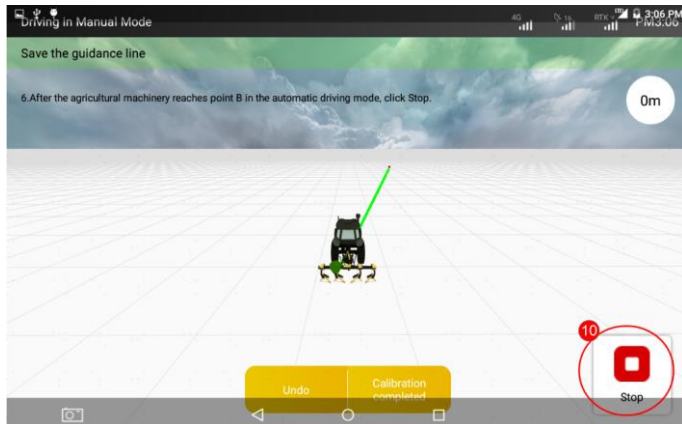


Figure 3.2.41 Stop autosteering driving after reaching the point A

Step 10: Click **Calibrating completed** to complete the vehicle

calibration and return to the home screen.

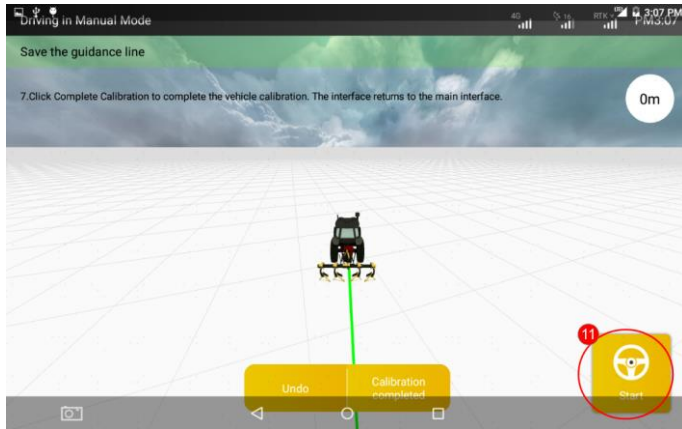


Figure 3.2.42 Calibration finished

After completing the above steps of commissioning, you can start to use control terminal for intelligent operations.

3 Preparatory Operations

3.1 Preparatory Operation in Fast Mode

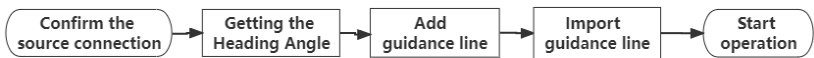


Figure 3.3.1 Preparatory operation procedure

3.1.1 Confirm the Source Connection

Confirm the source connection before operation preparation:

- (1) Check whether the source connection mode is correct.

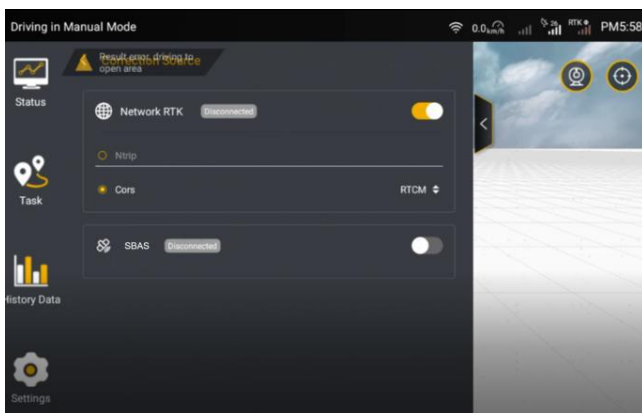


Figure 3.3.2 Confirm the source connection mode

(2) Check whether the connection is normal. If the Network RTK mode is used, **RTK** is displayed in the upper right corner; if the SBAS mode is used, **SXX** is displayed. Then, check whether you have full signal bars in the status bar.

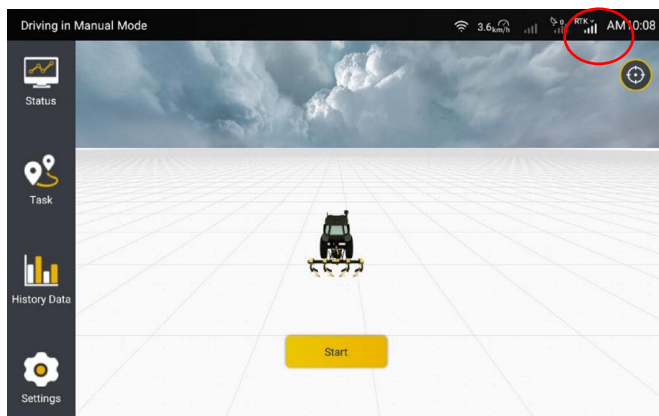


Figure 3.3.3 "RTK" displayed in the upper right corner when the RTK mode is used

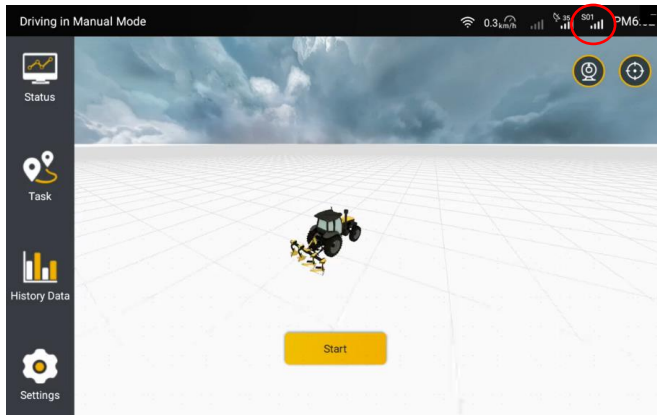


Figure 3.3.4 "SXX" displayed in the upper right corner when the SBAS mode is used

3.1.2 Getting the Heading Angle

If the RTK connection is normal, drive ahead and accelerate the vehicle for more than 5s (Only one operation is required for each startup) .

3.1.3 Adding New Guidance Line

After confirming the connection to the RTK, you can start setting points. You can follow the prompts to complete setting points A and B to save a new guidance line, and import the new guidance line to the current operation. For more specific instructions on creating guidance lines, please refer to Chapter 4 to create a baseline.

3.1.4 Import Guidance Line

You can directly import the required guidance line from the list of guidance lines to the current operation as follows:

Step 1: If you have already saved the guidance line before, please find out the line you want to import in the list of guidance lines. And then click **Import** button in the required guidance line tab to import the line to the current operation.

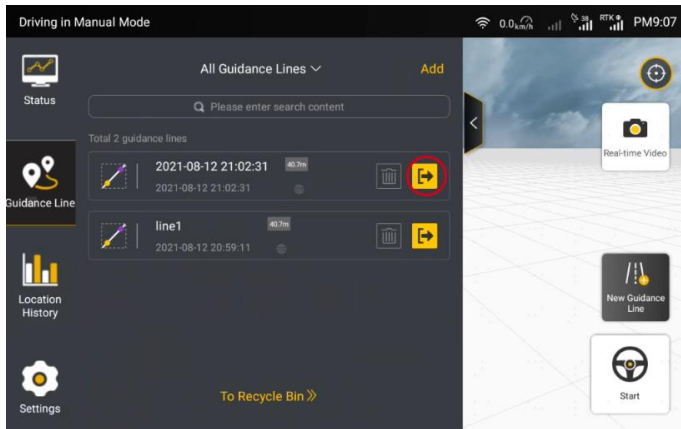


Figure 3.3.5 Guidance line list

If Multi Line Mode is needed, please enter into **Settings -> Parameter Settings -> Working width Alerts** to set the working width for the preparatory operation in multi line mode, as shown in the following figure.

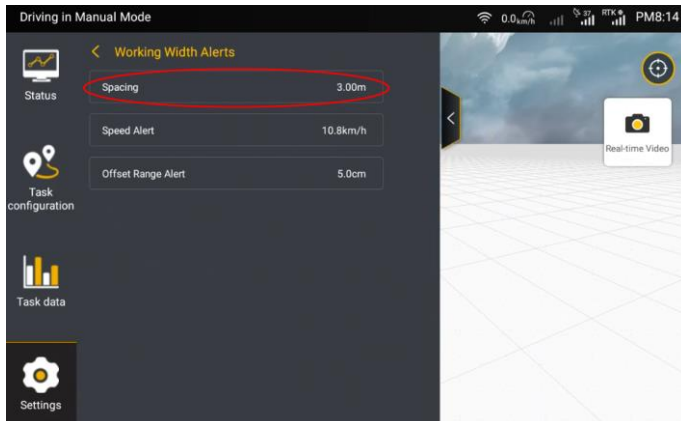


Figure 3.3.6 Setting the operating space

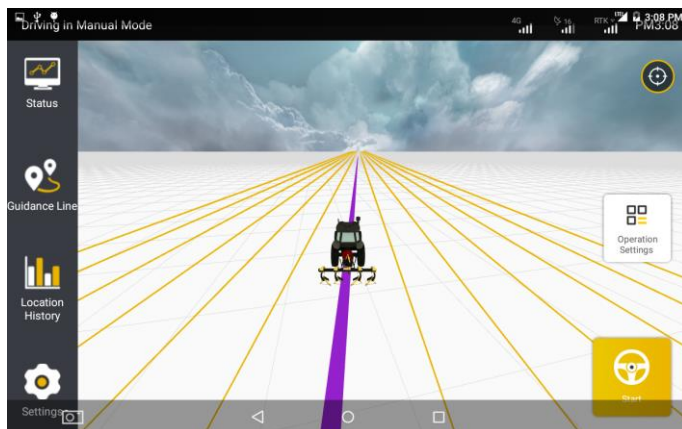


Figure 3.3.7 Guidance line imported

3.2 Preparatory Operation for Advanced Mode

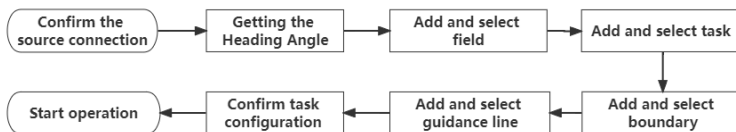


Figure 3.3.8 Preparatory operation flow chart

3.2.1 Confirm the Source Connection

Before preparing the operation, please confirm the current source connection. For the specific operation steps, see 2.5 Select Correction Source.

If the RTK connection is normal, drive ahead and accelerate the vehicle for more than 5s (Only one operation is required for each startup) .

3.2.2 Add and Select Fields

Click **Task** button on the left to enter the task configuration interface. First, add and select an operation field.

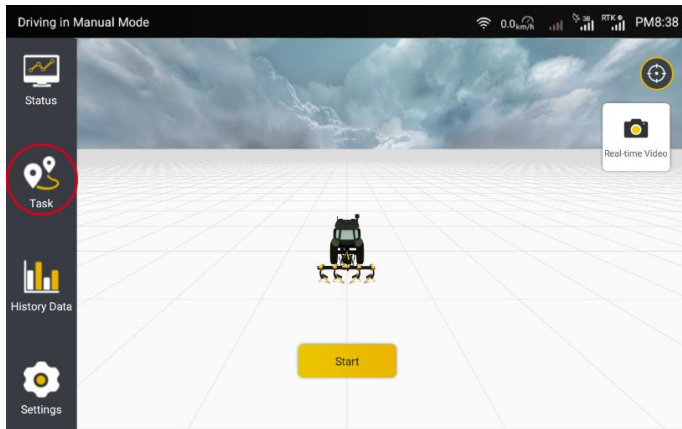


Figure 3.3.9 Task configuration entry

The configuration field interface is shown in the figure below:

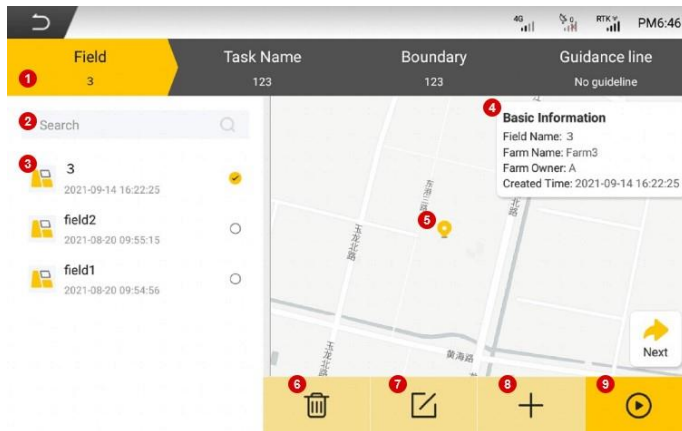


Figure 3.3.10 Configure field interface

1. Task configuration items: Select the fields, boundaries, guidance lines and task settings required for the operation. Yellow represents the current configuration items. Under each item, it will display current selection. If it has not been selected, it will display **not selected**. Otherwise, the corresponding option is displayed below.

2. Search box: Find the target field by searching the field name.

3. **Field list:** Display existing fields, including field name and creation time. Click to select the field to be operated.

4. **Field basic information:** Including field name, farm name, farm owner and creation time.

5. **Field map:** Display the current position and selected boundary and guidance line position.

6. **Delete field:** Click to delete the field, and the associated boundary, guidance line and history data will be simultaneously deleted and cannot be restored and cannot be restored.

7. **Modify field information:** Click to modify the field name, farm name and farm owner information.

8. **Add field:** Click to add a new field, fill in field name, farm owner and farm name.

9. **Run configuration:** If the task configuration is not completed, it is impossible to click; after the configuration is completed, Click pop-up task information configuration confirmation box to confirm the information and start the operation.

Note: If the field and task are not selected, the boundary and guidance line cannot be selected.

Add field

After filling in the corresponding field name, farm owner and farm name, click **Save**.

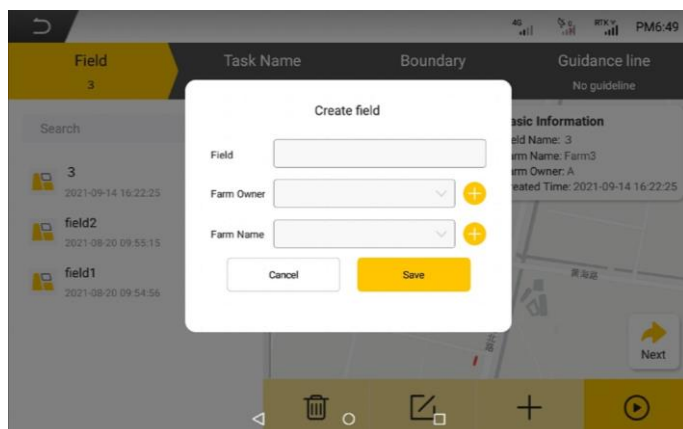


Figure 3.3.11 Interface for adding field

3.2.3 Add and Select Task

Click **Task Name** to add or select from the list the intended task.

The task selection interface is as follows:

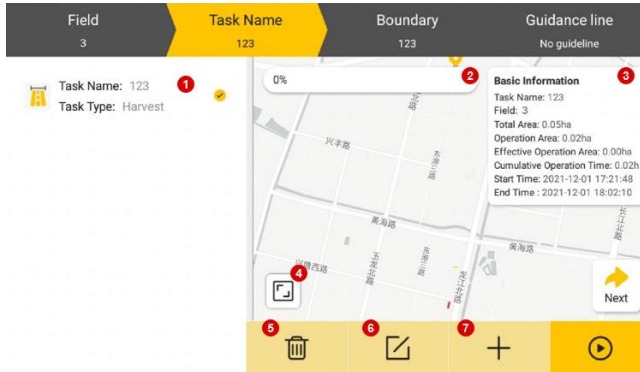


Figure 3.3.12 Setting Interface for Task Name

1. Task settings list: Task settings that has been created.

2. Task progress: Check the task progress.

3. Basic information: In the basic information column, you can view the total area, the area that has been worked, the effective worked area (the area that has been worked within the boundary), the accumulated operation time, and the start and end time of the task.

4. Full-screen display: Click the "Full-screen" icon to view the task in full screen.

5. Delete task settings: Delete the selected task setting, which cannot be restored after deletion.

6. Modify task settings: Modify the operation type and operation width of the selected task setting.

7. Add task settings: Add new task setting, which requires filling in the operation type and operation width.

3.2.4 Add and select boundary

Click **Boundary** to add or select from the list the intended. If the operation does not require an boundary, select the **No boundary** option.

The configuration boundary interface is shown in the figure below:

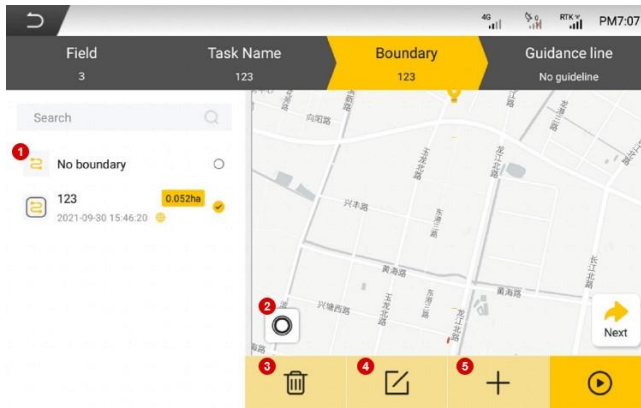


Figure 3.3.13 Interface for configuring boundary

1. Boundary list: Display the existing boundary, including name of boundary, the operatable area enclosed and the creation time.

2. Change the distance to the edge of the field: Modify the margin of the boundary offset inward or outward, is zoomed in or out, remind users of the position of the edge of the field or the place where to turn around.

3. Delete boundary: After selecting the boundary, click "Delete" icon, and the deleted items can be restored in the recycle bin within 30 days after deletion. For details about the recycle bin, please refer to the introduction of the recycle bin in 6.3.7 System Settings.

4. Modify boundary name: Click to modify the selected boundary name.

5. Add boundary: Click to enter the interface of adding boundary and guidance line.

Add boundary

Press the **Start** button on the “Add boundary” interface.

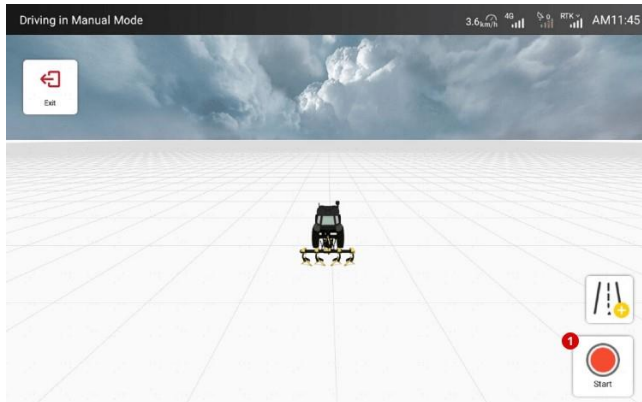


Figure 3.3.14 Interface of “Add Boundary”

After pressing the **Start** button, you need to select the position of the implement to determine the position of the boundary, then click **Confirm**.

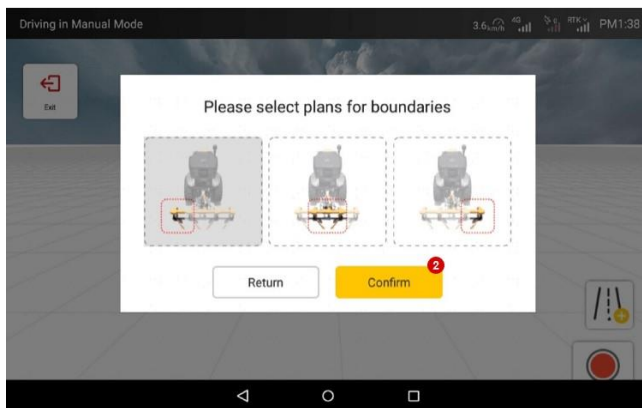


Figure 3.3.15 Interface of boundary plan

When finished, press the **Pause** button and choose **Save**.

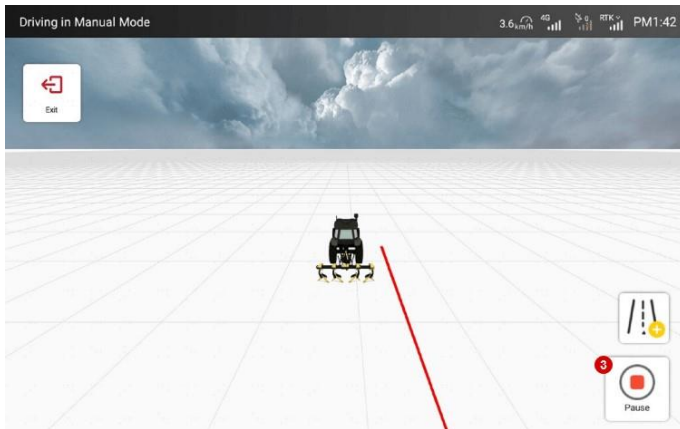


Figure 3.3.16 Interface when finished recording the boundary

When saving, you need to fill in the boundary name, margin and the offset. During operation, a pop-up window will prompt when the distance from the field edge is 30m.

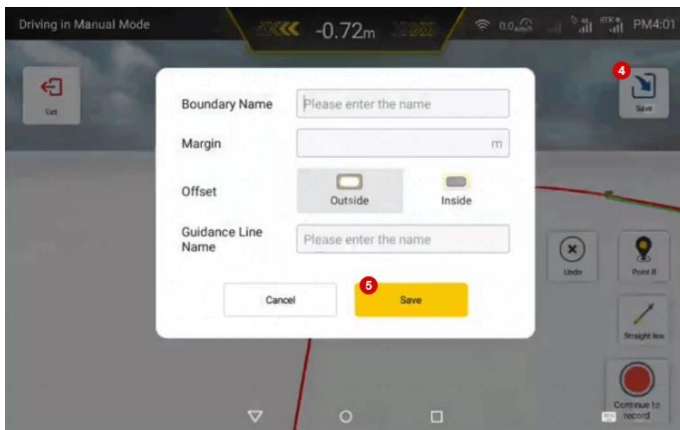







Figure 3.3.17 Interface of saving the boundary

When saving the boundary, if the boundary does not meet certain

requirements, the following adjustments will be given for different situations:

Table 3.3.1 Adjustments for irregular boundaries

Boundary situation		Adjustments	Example
x - Distance between two ends	$x < 10\text{m}$	Auto-completion of boundary	
	$10\text{m} < x < 50\text{m}$	Connect with a straight line	
	$50\text{m} < x$	Continue recording	
Special boundary	Length of boundary $< 80\text{m}$		
	Crossed boundary	Auto-optimization	
	Boundary too narrow	Re-recording	
	Boundary contains multiple sub-area		

3.2.5 Add and Select Guidance Line

Click **Guidance Line** to add or select from the list the intended guidance line. If there is no need for a guidance line, you may choose the

No guideline.

The guidance line configuration interface is shown in the figure below:

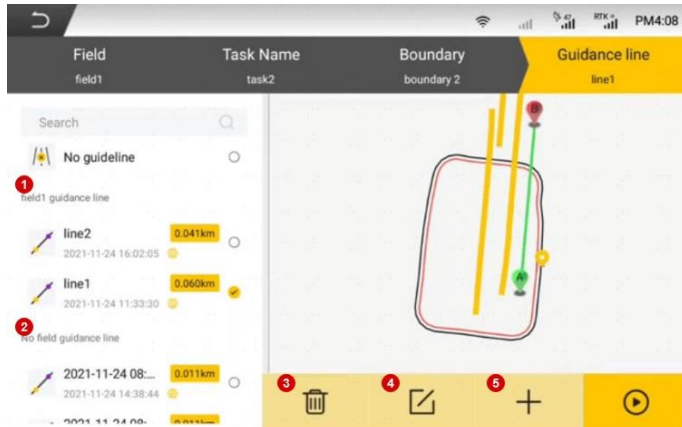


Figure 3.3.18 Interface for configuring guidance line

- 1. The guidance line list of the field:** Display the existing guidance lines, including the name, length and creation time of the guidance line.
- 2. List of guidance lines without attribution:** Display the guidance lines generated in the extreme Fast Mode.
- 3. Delete the guidance line:** Click “Delete” to select the guidance line, and deleted item can be restored in the recycle bin after deletion. For details about the recycle bin, please refer to the introduction of the recycle bin in 5.3.7 System Settings.
- 4. Modify the name of the guidance line:** Click to modify the selected guidance line name
- 5. Add guidance line:** Click to enter the interface of adding boundary and guidance line. For more specific instructions on creating guidance lines, please refer to Chapter 4 to create a baseline.

3.2.6 Confirm Task Configuration

After all the information are selected, Click confirm button, and an information confirmation window will pop up. After confirming that the configuration information is correct, click **OK**.

Click **Start** button on the homepage to enter the operation interface.

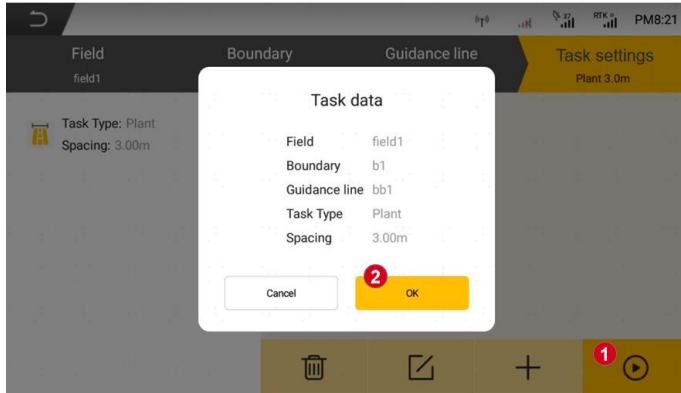


Figure 3.3.19 Interface for confirming configuration

4 Create Guidance Lines

The guidance line includes straight line mode (AB line mode), curve mode and pivot mode. Users can create certain guidance lines according to their actual needs.

In Fast Mode, you can click **New Guidance Line** in the main interface or the **Add** button in the guidance line list to create new guidance lines.

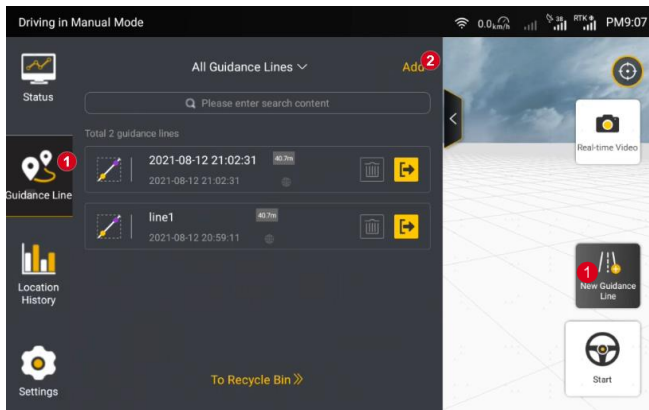


Figure 3.4.1 Adding new guidance lines in Fast Mode

In Advanced Mode, click the **Task** in the sidebar column to expand the full interface for task settings. You may create new guidance lines on the interface of guidance line settings by clicking the **Add** button in the bottom column.

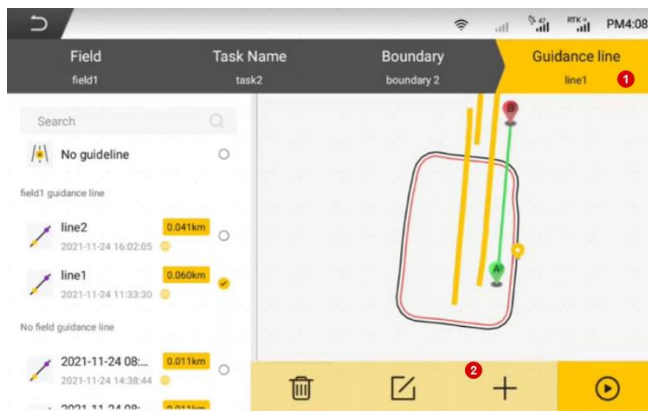


Figure 3.4.2 Adding guidance lines in Advanced Mode

Detailed steps for creating different guidance lines are shown below.

- Linear Mode

Step 1: Move the vehicle to the starting point of the operation, and click **Confirm Point A** on the screen of control terminal to determine the current position as Point A of the new guidance line. After confirming Point A, manually drive the vehicle straight for 15–20m.

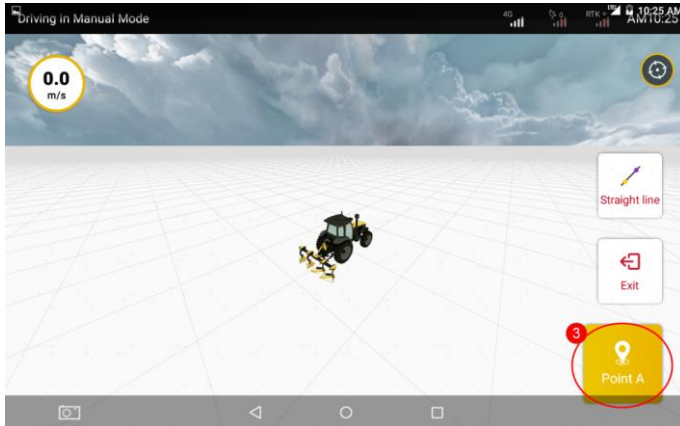


Figure 3.4.3 Confirming Point A

Step 2: Brake the vehicle and click **Confirm Point B** on the screen of the in-vehicle control terminal to determine the current position as Point B on the guidance line.

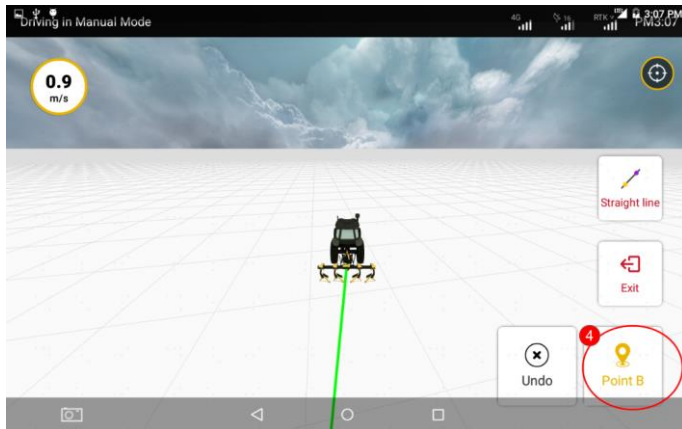


Figure 3.4.4 Confirming Point B

Step 3: After confirming Point B, please click **Import** and enter the guidance line name in the prompt. Then go back to the list of guidance lines after naming the new line. And the newly added guidance line will be displayed on the top of the list.

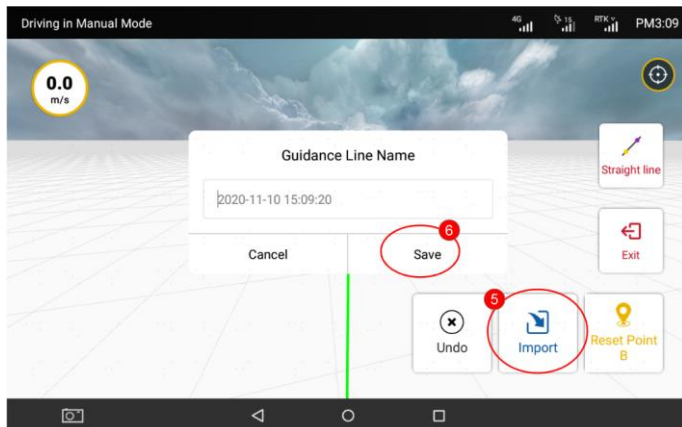


Figure 3.4.5 Import Guidance Line

- Curve Mode :

Step 1: On the displayed Guidance Line setting page, click Straight Line to switch the plotting mode to the curve.

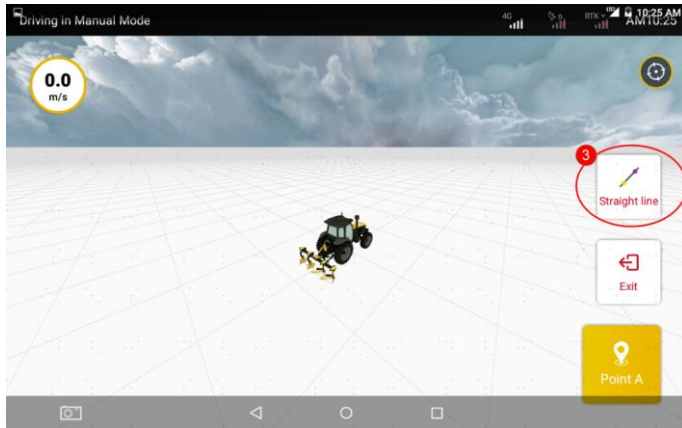


Figure 3.4.6 Switch plotting mode to the curve

Step 2: After switching to the curve mode, please move the vehicle to the starting point of the operation, and click **Confirm Point A** on the screen to confirm the current position as Point A on the curve guidance line.

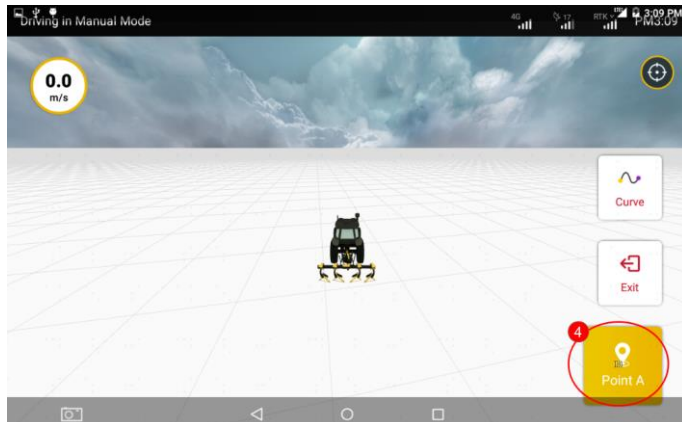


Figure 3.4.7 Confirming Point A

Step 3: After confirming Point A, please directly curve the vehicle's

path to the ending point of another side you want to determine (for example, from the starting point to the other field edge) in manual mode and click **Confirm Point B**.

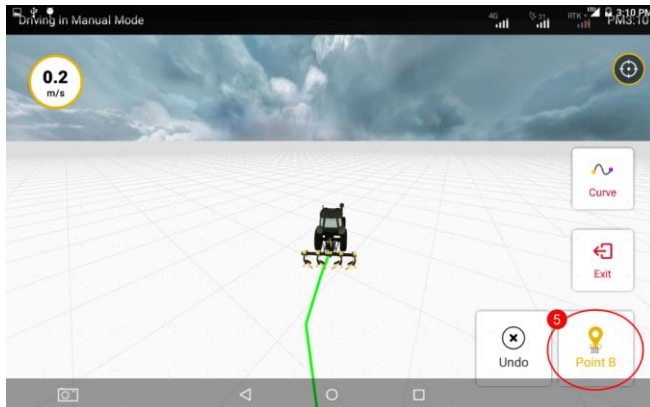


Figure 3.4.8 Confirming Point B

Step 4: After confirming point B, please click **Import** and enter a new line's name, and then you can get into the curve mode working page.

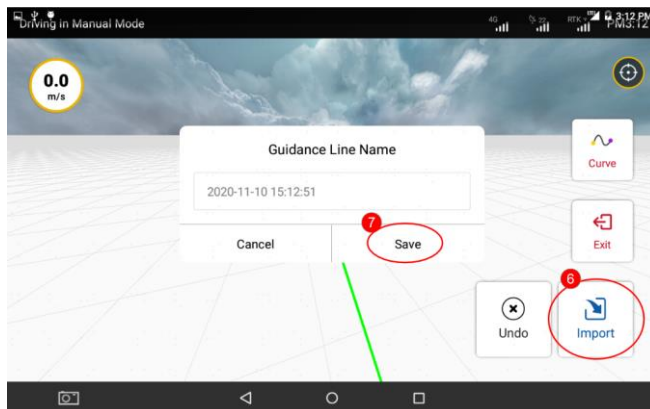


Figure 3.4.9 Import new guidance line

Notes for the curve mode:

1. In the curve mode, Point A is the starting point and Point B should be a

point on on the edge of the opposite side.

2. In multi-line mode, make sure to travel in the same line lengths as the curve guidance line, or the route beyond the curve guidance line will gradually tend to a straight line.

3. In curve mode, after confirming Point A, you cannot directly click Linear to switch to Straight line mode. Please cancel the point A before switching the mode.

●Pivot mode :

Pivot mode is only supported under Advanced Mode, the steps are as follows:

Step 1: Choose **Pivot Mode** when entering the process of creating new guidance lines.

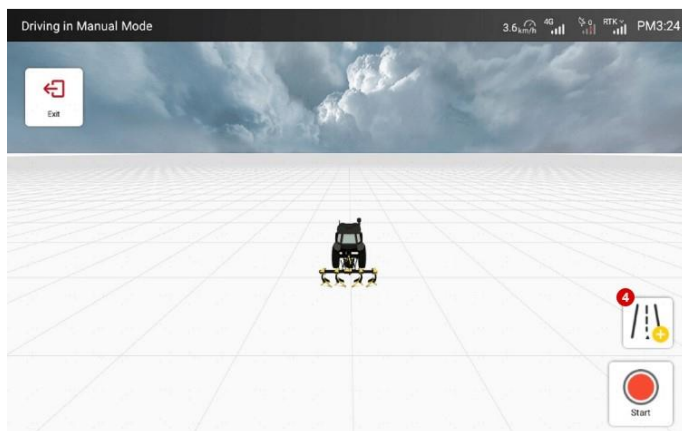


Figure 3.4.10 Create a guidance line

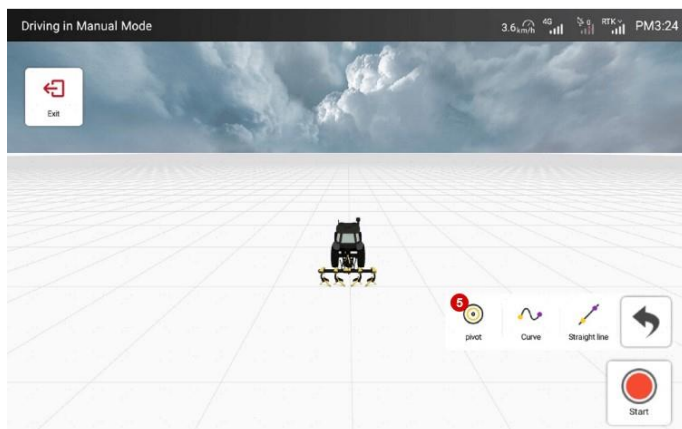


Figure 3.4.11 Switch to Pivot Mode

Step 2: Set point A at the starting point, drive the vehicle along the outer edge of the circular field for at least 20m, set point B and click **Save**.

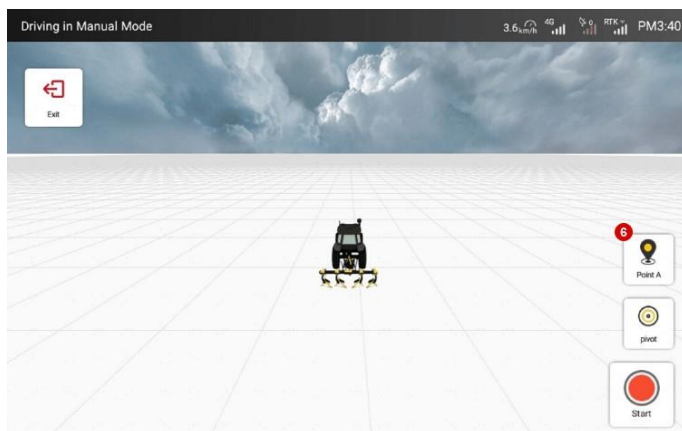


Figure 3.4.12 Set point A

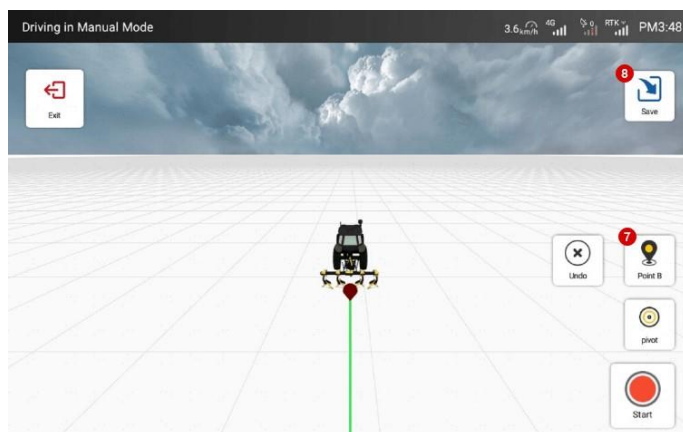


Figure 3.4.13 Set point B

Step 4: Enter the distance from the edge of the implement to the edge of the field, click **Confirm**, enter the name of the guidance line and then save.

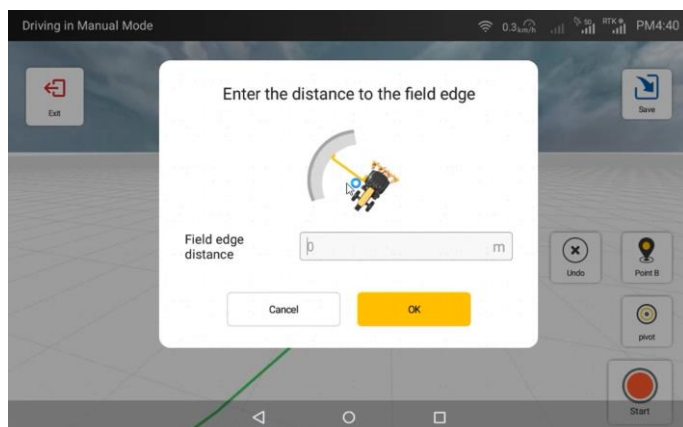


Figure 3.4.14 Set field edge distance

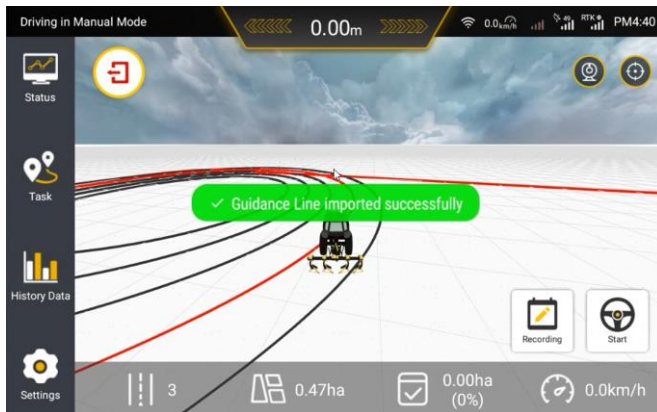


Figure 3.4.15 Interface of working with Pivot Mode

Note: When working with Pivot Mode, and the vehicle is 20m away from the starting point, please follow the instructions in the notification to get prepared to disengage from auto mode and enter the next work path. Then, repeat the above operations until all paths are completed.

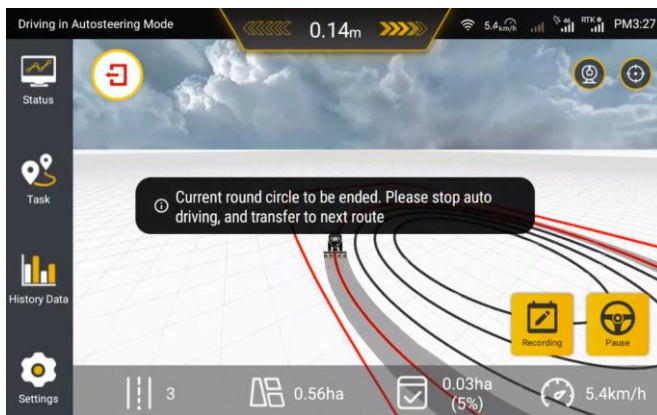


Figure 3.4.16 Interface of auto-steering

5 Start Operation

5.1 Operation Interface

●The interface of Fast Mode

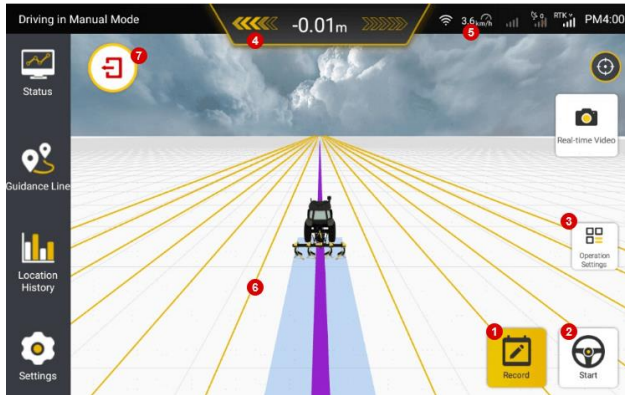


Figure 3.5.1 Operation interface

1. **Operation record button:** Yellow means that the current operation data is recording. And white means that the current operation data is not recorded. Click to switch the recording status.

2. **Auto-driving button:** Yellow means it is in auto-driving status. White means it is not in auto-driving status. Click to switch driving status.

3. **Operation setting:** Including marking field, multi-line/single-line mode, translate guidance line to a fixed distance, translation guidance line to the current position, offset adjustment and other functions.

4. **Offset distance:** The offset distance of the current operation relative to the guidance line is displayed in a real time manner, and the offset unit can be changed in the settings.

5. **Real-time speed:** Display the current driving speed of the agricultural machinery, the speed unit can be changed in the settings.

6. **Guidance line for operation:** The navigation line during operation.

7. **End task:** Click to end the task. And users can view the details of this operation in the History data.

● **The interface of Advanced Mode**

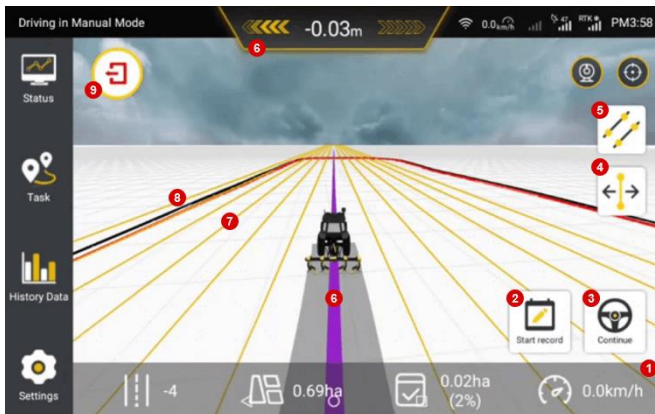


Figure 3.5.2 Interface of Advanced Mode

1. **Real-time task information:** On the bottom column you can see the serial number of the guidance line where the vehicle is currently located, the total area of the field, the area that has been worked, the proportion of the area that has been worked, and the real-time speed.

2. **Task record:** If it is in yellow, it indicates that the current task data is being recorded, and if in white, it indicates that the current job data is not recorded. Click to switch it on and off.

3. **Auto mode:** It means auto-steering state in yellow while non auto-steering state in white. Click to switch between two driving modes.

4. **Translate guidance line:** Translate guidance line according to users' needs during operation.

5. **Switch multi-single line mode:** Click to switch between multi line

mode and single line mode of guidance line.

6. **Offset distance:** The offset distance between the current path and the guidance line is displayed in real time, and the unit can be changed in the settings.

7. **Guidance line:** Guidance line for auto-steering

8. **Boundary:** The red one is the recorded boundary, and the black is the scaled boundary. A prompt will pop up when the distance to the black border is 30m, and the black border can be set as the position where to turn around (Uturn position) or the real edge of the field.

9. **End task:** Click to end the task, and you can view the details of this task in the task data.



If the guidance line has not been imported before starting the task, an icon for creating a new baseline will appear in the operation interface.

Create a new guidance line/boundary: If the guidance line and boundary are not chosen during task configuration, when entering the operation interface, you can directly create a new guidance line and boundary in the operation interface, and the task data of this creation would also be recorded.

5.2 Operation Setting

After completing the installation and commissioning and task configuration procedures in sequence according to the above operations, it will start automatic driving operation. During the operation, according to

the user's actual operation needs, six operations can be carried out: switching operation record status, switching driving mode, shifting the guidance line, switching operation mode, marking the field and switching guidance lines and boundaries. The specific operation process is as follows:

(1) Switch operation record status

Click **Record** button in the lower left corner of the main interface to switch the status of the operation record.



Non-recording operation status: The operation data and operation traces during the non-recording time are not recorded in this operation.



Record operation status: operation data and operation traces during the recording time are recorded in this operation.

(2) Switch driving mode

Click **Start/Stop** at the bottom right corner of the main interface to switch the driving mode.



Manual driving status: The user manually controls the steering wheel to assist straight line operations. When driving manually, user can perform operations such as shifting the guidance line, switching operation modes, and marking the boundary.



Autosteering status: Navigation automatically controls the steering wheel to assist straight line operations. The operation of marking the field can be carried out during automatic driving, and other operation setting operations should be switched to manual mode.

(3) Guidance Line Translation

In the manual mode after starting the task, the user adjusts the guidance line in the current multi-line mode to the left and right according to the needs of the actual operation, and drives according to the adjusted guidance line.

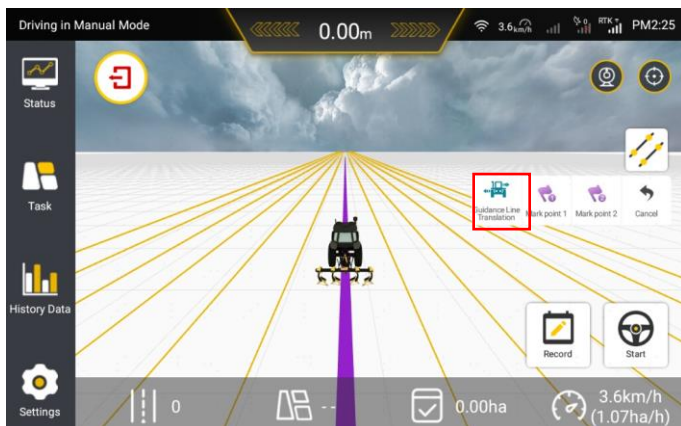


Figure 3.5.3 Selecting Guidance Line Translation

1 . Guidance Line Translation: Click **Guidance Line Translation**, and click **Translate to the Current Position** or **Translate to the Fixed Position** based on the operation.

- **Translate to the Current Position:** Click **Translate to the Current Position** and then click **OK** to translate the guidance line to the position of the agricultural machinery.

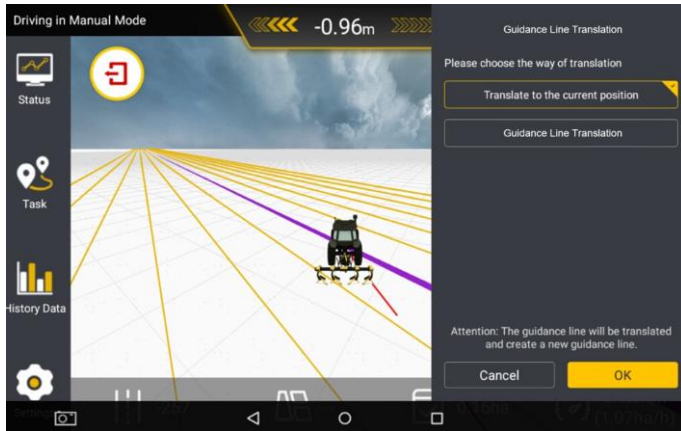


Figure 3.5.4 Translate to the current position

● **Translate to the Fixed Position:** Click **Guidance Line Translation**, select the moving direction, enter the moving distance, and then click **OK**.

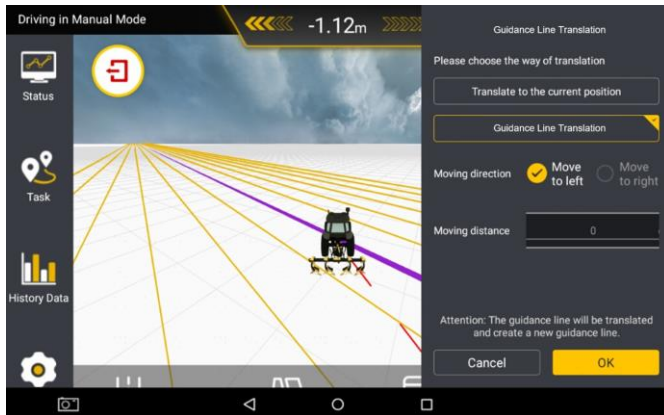


Figure 3.5.5 Translate to the fixed position

Note for The Use of Translating Guidance Line:

Shift guidance line function is available only in the manual driving status in the multi-line mode.

(4) Switch operation mode

The operation mode is divided into single line mode and multi-line mode. The user can click **multi line mode/single line mode** in the operation setting to switch the current operation mode. If the specific operation mode is easy to be confused, please judge the current operation mode status based on the **multi line /single line** interface background of the operation

Multi line mode: Auxiliary straight line operation under equidistant conditions;

Single line operation: Auxiliary straight line operation under free spacing;

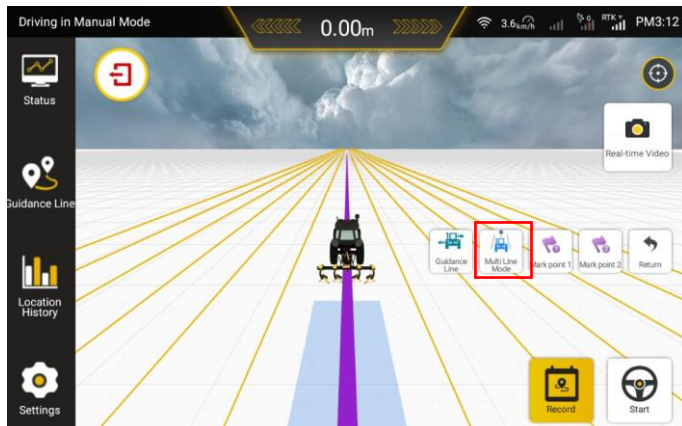


Figure 3.5.7 Multi line mode



Figure 3.5.8 Single line mode

(5) Mark the Edge

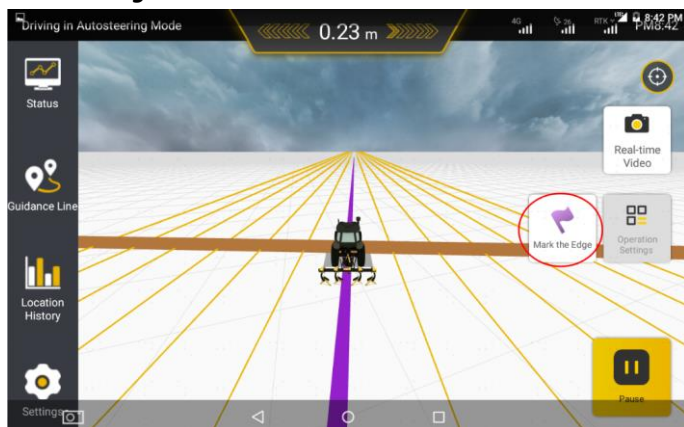


Figure 3.5.9 Marking the field edge

After importing guidance line or during the intelligent operation, you can enable the function of marking the field edge according to the actual needs. This function can alert the user when the vehicle is about to reach the field edge of another side, thereby effectively avoiding safety accidents especially in dark environment.

1. After importing the guidance line or during an intelligent operation,

if you want to use this function, drive the vehicle to the field edge and click **Mark the Edge** to mark the current position of the vehicle as the field edge.

2. The system will provide an alert sound and alert message for careful driving when the vehicle travels 30m away from the marked field edge.

3. When the system warns driver, you can click **Pause** to suspend the current autosteering driving and resume the manual driving mode. Then, the alert sound and alert message will disappear immediately.

Notes for marking the field edge:

Only one field edge is allowed in the same direction.

In addition to completing commissioning and autosteering operations, you also can check the real-time status of the operating vehicle and undertake other system settings on the in-vehicle control terminal.

(6) Switch guidance lines

When not in the work state, you could enter the **Task** to switch guidance lines and boundaries.

(7) Continue the task

In advanced mode, you may call the same task to continue if it is not completed, and the task data will be cumulated and shown in history data. The previous task settings will be implemented by default this time, otherwise you need to change it manually.

When resuming the task, history task traces of the last task will appear, with a red dotted line guiding the vehicle to the position where the last task ended. After clicking the **Start** button, the red guide line will disappear.

The red guide line is only for instruction and you can continue to work at any position.

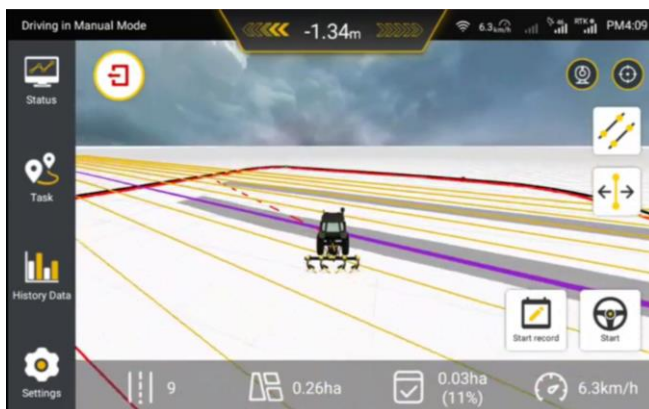


Figure 3.5.10 A red dashed line that guides the tractor

5.3 Operation of Physical Key Module (Optional)

The physical key module is an independent button panel module used in conjunction with FJDynamics autosteering system for agricultural vehicles. Some software functions can be controlled through the physical buttons to achieve more efficient system control in the autosteering mode. The software functions that can be controlled by the physical key module currently include turning on/off autosteering, turning on/off acreage counting, guidance line marking and undo marking, AUX Turn-Left/Right and turning around (in software function development). For the specific operation flow of hardware and software, please refer to the Instructions for Physical Key Modules.

If you want to use it, please purchase relevant modules separately.

6 Advanced Functions

The existing advanced function is Uturn. You need to purchase the activation code from the dealer and perform the following steps to activate the function:

1. Click **Enter activation code** in **Settings > Advanced Functions**.

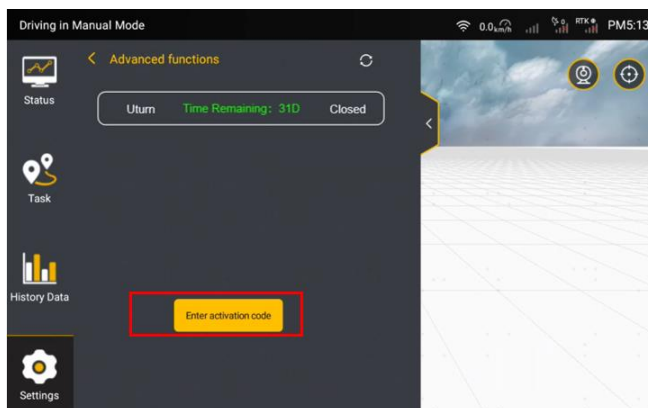


Figure 3.6.1 Advanced functions

2. Enter the activation code in the pop-up dialog, and click **OK**.

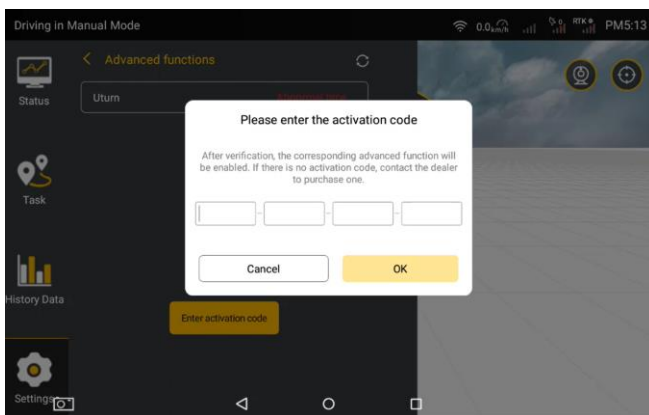


Figure 3.6.2 Enter the activation code

3. After the activation code is verified, an **Information Confirmation** dialog pops up. Click **Activate** to activate the function.

4. After the function is activated, you can view its status and remaining valid time on the Advanced Functions screen. Click the function to enter the screen of function details to enable or disable the function.

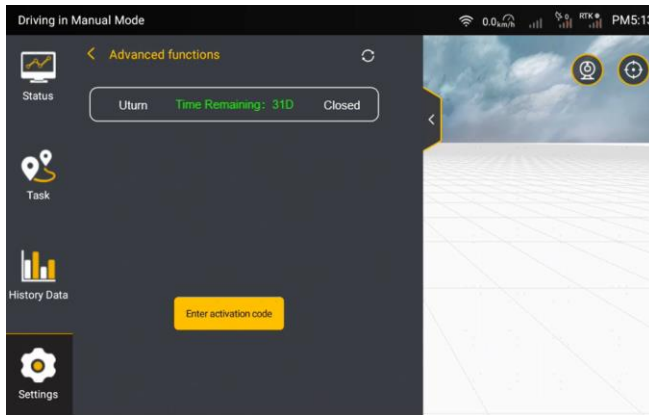


Figure 3.6.3 Advanced functions

●**Uturn:** Automatically plans paths at any position in the field for automatic Uturns and headland operations.

Applicable field types:

1. Rectangle or approximate rectangle fields



Figure 3.6.4 Rectangle or approximate rectangle fields

2. Quadrilateral fields with large included angles

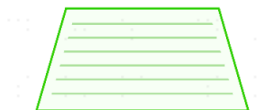


Figure 3.6.5 Quadrilateral fields with large included angles

3. Approximate quadrilateral fields with small missing parts

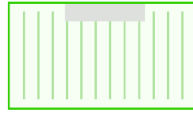


Figure 3.6.6 Approximate quadrilateral fields with small missing parts

Shapes of fields that can be partially planned: 1. Quadrilaterals with large missing parts 2. Polygons, triangles, teardrops, and other shapes with large triangular space

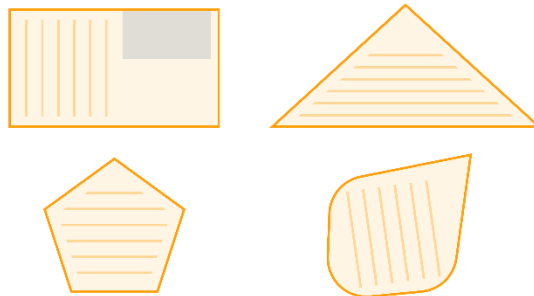


Figure 3.6.7 Shapes of fields that can be partially planned

Fields that cannot be planned: 1. Overly narrow fields 2. Overly small fields



Figure 3.6.8 Fields that cannot be planned

The operation procedure is as follows:

1. Set the vehicle and implement parameters in **Settings > Vehicle**

Information. Ensure that the turning radius is correct. To get the turning radius, drive the vehicle to make a circle by turning the steering wheel to full lock and measure the radius of the outer ring that the vehicle leaves on the ground.

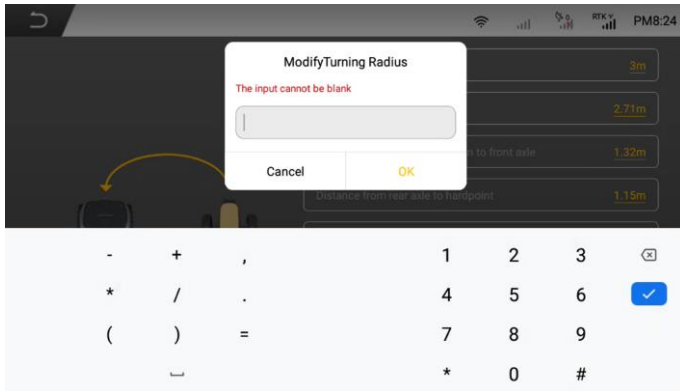


Figure 3.6.9 Set the turning radius

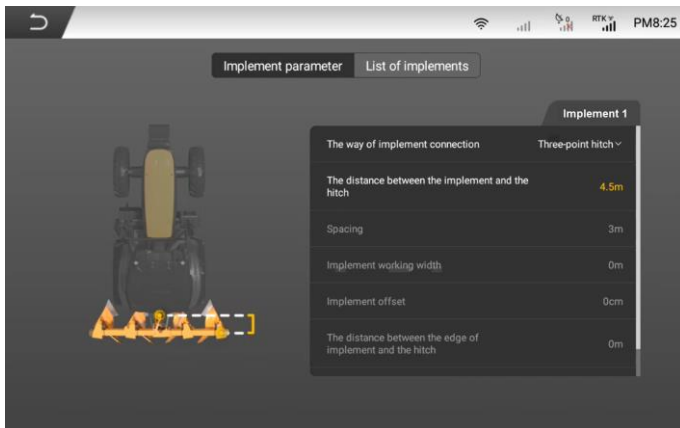


Figure 3.6.10 Set the implement parameters

2.Choose **Settings** > **Advanced functions** > **Uturn**, and enable or

disable the function.

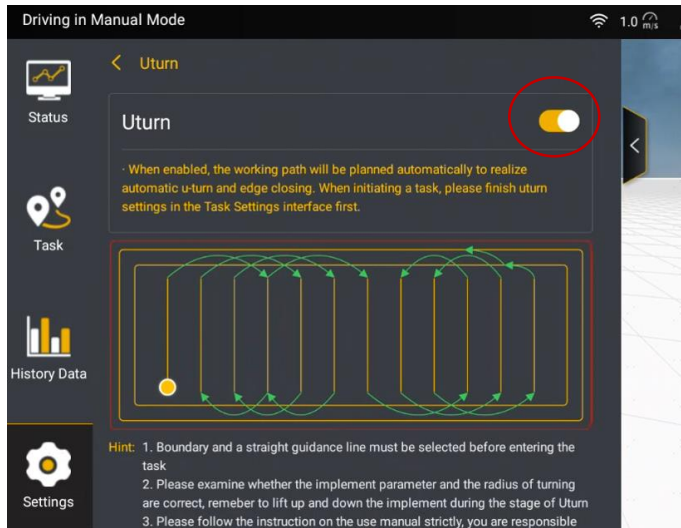


Figure 3.6.11 Utturn details

3. Click **Task** and choose the field, boundary, and guidance line. If you select **No guideline**, the guidance line will be generated automatically when the Utturn function is enabled.

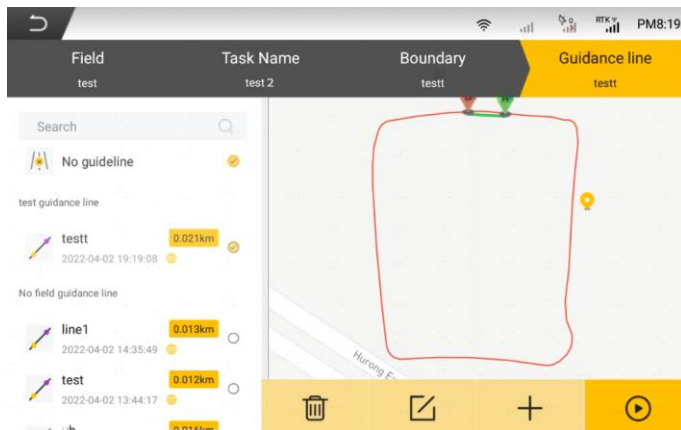


Figure 3.6.12 Choose the boundary and the guidance line when creating an operation

4. Click **Start**, drive the vehicle to the Uturn start point, and click the Uturn icon on the right.

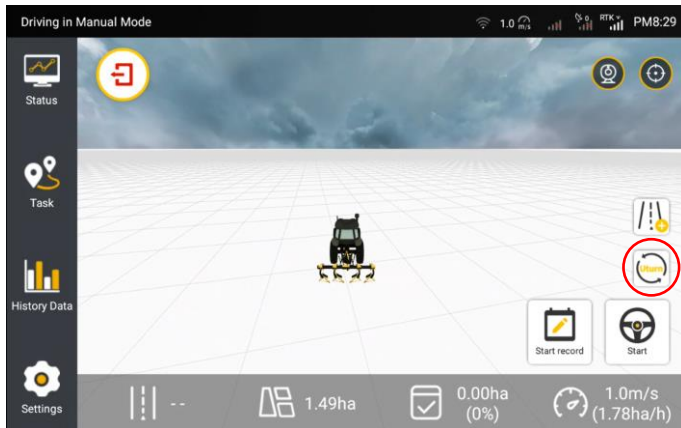
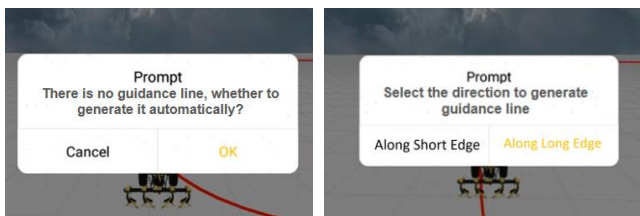


Figure 3.6.13 Operation screen

Note: If **No guideline** is selected, the pop-up dialog "There is no guidance line, whether to generate it automatically?" appears. Click **OK** and select the direction to generate the guidance line.

Figure 3.6.14 Pop-up dialog displayed when **No guideline** is selected

5. Choose the Uturn direction and whether to perform the headland operation and click **Save**. Then, the system plans the working path and displays a pop-up prompt.

- If you choose to perform the headland operation, the vehicle

performs it based on the boundary shape.

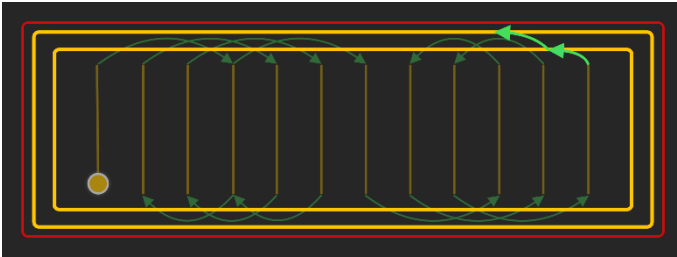


Figure 3.6.15 Automatic headland operation when you choose to perform it

- If you choose not to perform the headland operation, the system recommends the optimal headland path when autosteering is completed. You need to manually drive the vehicle to the start point of the recommended headland path.

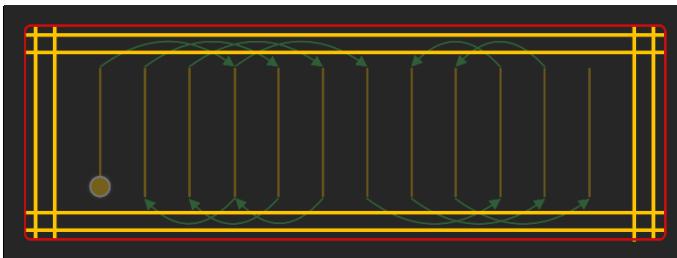


Figure 3.6.16 Optimal headland path recommended when you choose not to perform the headland operation

6.The Uturn coverage is displayed if it is not higher than 95%. Click **OK** to return to the operation screen.

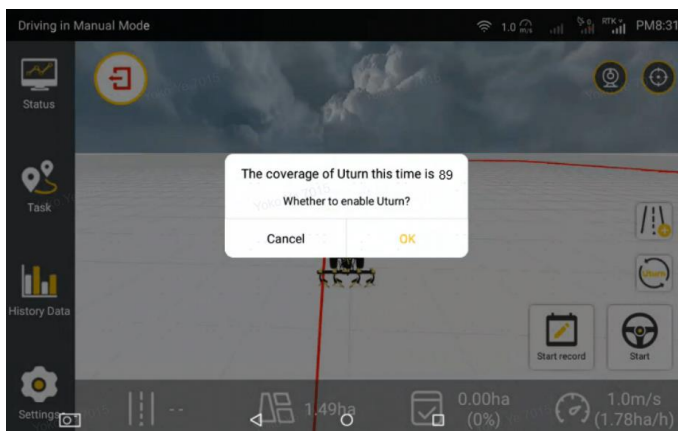


Figure 3.6.17 Uturn coverage

7. Follow the green line to drive to the start point, and click **Start**.

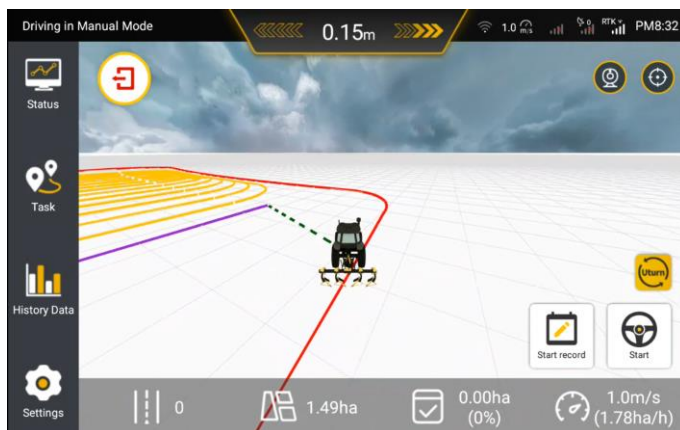


Figure 3.6.18 Start the Uturn task

Note:

- Before confirming the Uturn settings, ensure that your vehicle is close to the start point, and heading to the working direction of a guidance line.
- If the vehicle deviates from the guidance line with a large angle, the

Uturn operation cannot be started. If the Uturn operation cannot be started when the vehicle is aligned to the guidance line, the vehicle might be heading to the opposite direction.

●**Fault prevention:**

Scenario 1 When the user exits the task and enters it again without changing any parameters:

The original paths will be kept.

Scenario 2 When any of task, boundary, guidance line, vehicle parameters, implement parameters, whether to perform the headland operation, or turning direction is changed:

The original Uturn paths will be canceled. You need to set the parameters and plan the Uturn paths again.

Scenario 3 Before Uturn planning, part of the task is already completed:

Uturn planning is effective only on the remaining part to avoid repeated operation.

7 Other Functions

7.1 Status

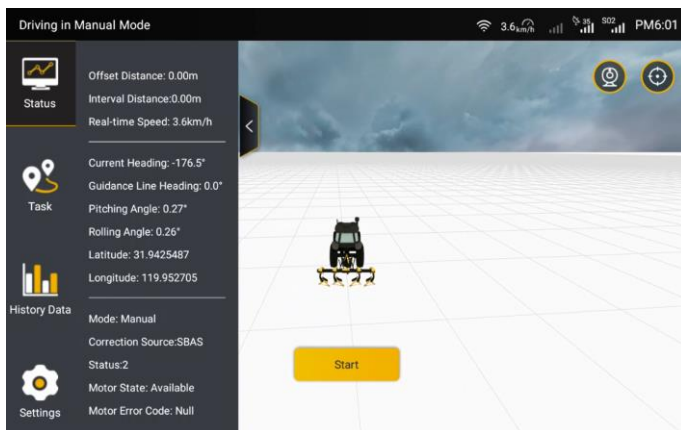


Figure 3.7.1 Status

Users click the **Status** to access the working status and operation of the vehicle.

Offset distance: Offset distance of the vehicle;

Real-time speed: Real-time speed of the vehicle;

Current heading: Current heading angle of the vehicle;

Guidance line heading: The heading angle of the AB line;

Pitching angle: the overall pitching angle of the vehicle;

Rolling angle: the overall rolling angle of the vehicle;

Longitude and latitude: The real-time latitude and longitude of the vehicle;

Mode: Manual, automatic interval such as AB line, misalignment of heading, the distance of AB point is too small, heading update timeout, position update timeout, and heartbeat timeout;

Park brake: Emergency braking;

Correction Source: Connection mode of the correction source;

Status: Connection status of the correction source. The value 2 indicates connection succeeds.

Motor status: The status of the motor;

Motor error code: the error number when an error occurs;

7.2 Location History

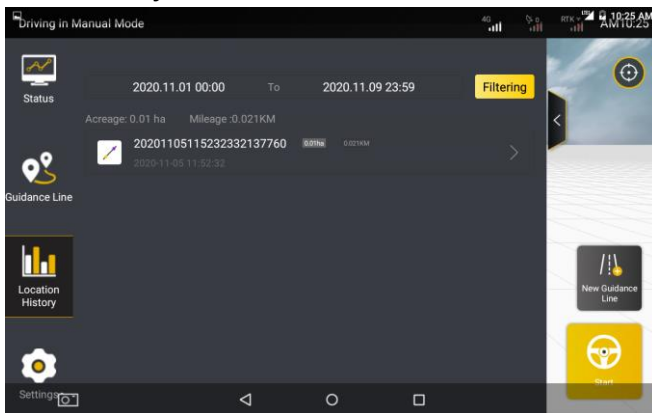


Figure 3.7.2 Operation Data

1. **Check the operation list.** After expanding the operation data details page, users can view the single information of historical operations here, including: operation time, operation width, operation area, operation efficiency etc.

2. **Filter the job list.** Users can filter the operation information by month. After the data is filled in, click **Filtering** to refresh the list.

3. **Filter the operation list.** In the Fast Mode, users can filter the operation data by the operation time; in the advanced mode, users can filter the historical operation information by date, field and operation type. After the filter data is filled in, click **Filtering** to refresh the operation data list.

Precautions of operation data:

1. Historical operation data is the operation data accumulation of each Guidance line.
2. The latest operation is placed on the top of the list, sorted by date.
3. The date on the list is the date on which the field was saved, not the

date of the last job operation.

4. The acre and time are cumulative items of historical operations instead of a single data of the latest operation.

7.3 Settings

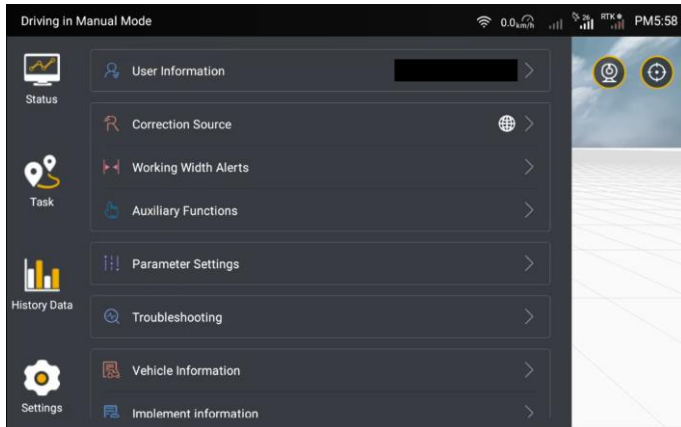


Figure 3.7.3 Setting list

The user clicks **Setting** to expand the setting details page and display the setting items.

7.3.1 Working Width Alerts

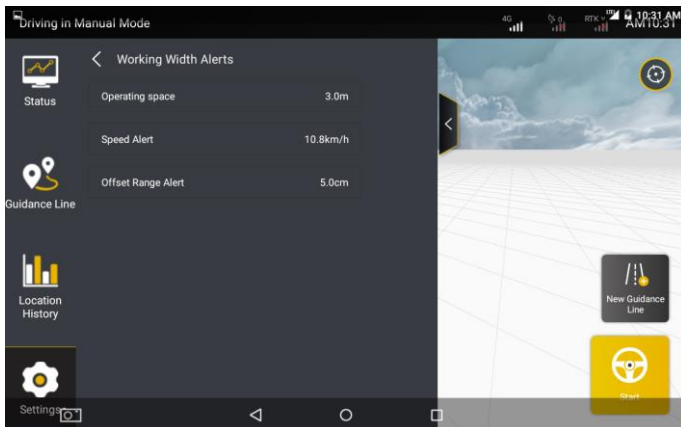


Figure 3.7.4 Working width alerts

On the displayed **Parameter Settings** screen, click the **Working Width Alerts** tab. The displayed details screen allows setting **Operating space**, **Speed Alert** and **Offset Range Alert**. Click the item that needs to be set and enter the corresponding value.

Operating spacing: indicates the distance between adjacent guidance lines in multi line mode.

Speed alert: indicates the warning speed preset. It allows the system to prompt the driver to manually slow down the vehicle in auto steering driving mode in the case of speeding.

Offset range alert: indicates the warning offset preset for the vehicle in autosteering driving.

7.3.2 Accessibility

● NMEA

Turn on the NMEA function to transmit the GPS information received by the automatic navigation device to other electronic devices. User should enable it in **Settings->Accessibility** and set the intended format and transmission frequency.

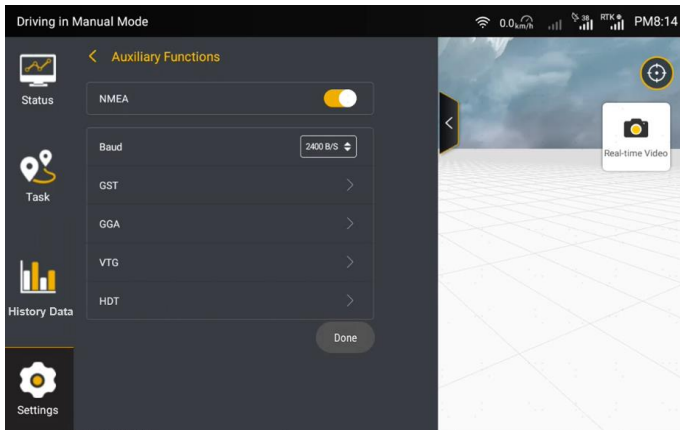


Figure 3.7.5 NMEA settings

● Data Transfer

Map information, including field, boundary, guidance line, and task data, can be exported out of or into the FJD autosteering kit through online sharing or USB flash drive.

Online Sharing:

Before the USB flash drive is inserted, data can be transferred to the designated user through online sharing. The steps are as follows:

Step 1: Go to **Settings > Auxiliary Functions > Data Transfer**, select the data to be shared, and click the sharing button at the top right.

Note: Only field, boundary, and guidance line information can be shared online.

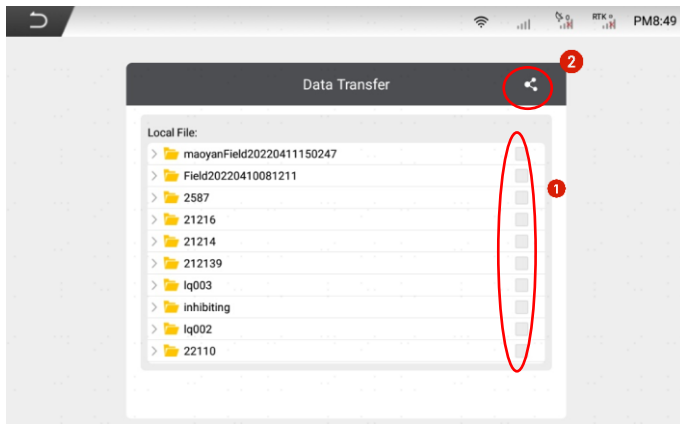


Figure 3.7.6 Data transfer

Step 2: Enter the user account, and click **Confirm**.

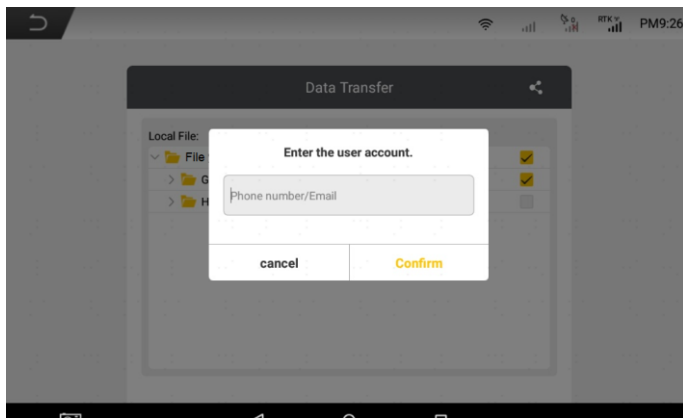


Figure 3.7.7 Enter the account of designated user

Step 3: Select the current device SN and click **OK**. A window pops up if the sharing is successful.

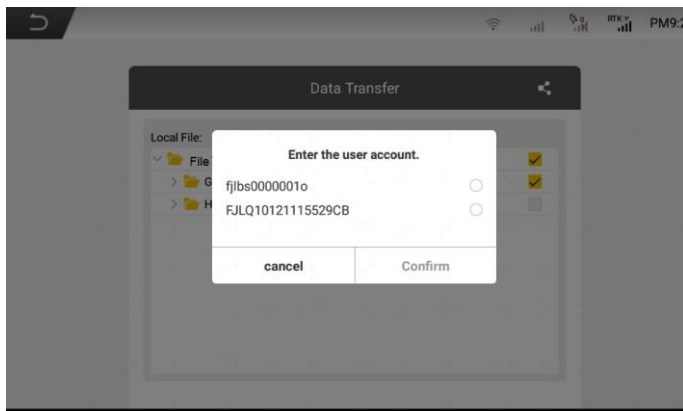


Figure 3.7.8 Select the device SN

USB flash drive:

Step 1: Insert the mobile storage device into the T1 port above the vehicle display control terminal (the T1 port is a USB Type-C port, if the mobile storage device is a Type-A port, it is required to purchase a

connector converter).



Figure 3.7.9 Connection diagram of mobile storage device

Step 2: Enter the data transfer interface, user can export map information via USB, such as: fields, boundary, guidance line, mission data etc..For use by other terminals, and users can also import map information from other devices to FJDynamics Autosteering kit. Data information in some formats may not be imported. For details, refer to the description of the importable format displayed in the interface.

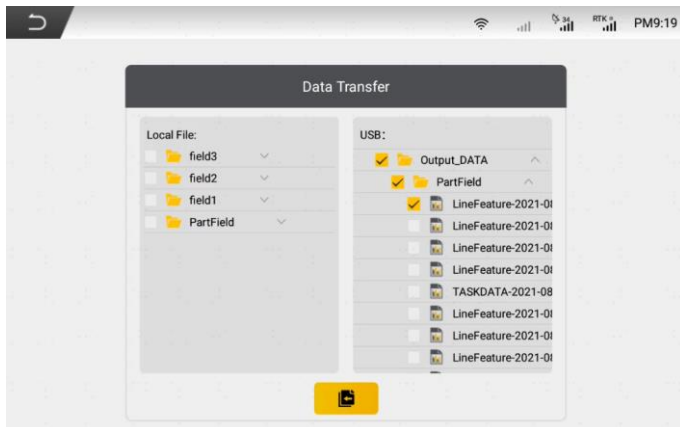


Figure 3.7.10 Data transfer interface

Notes:

1. Only data in the formats specified on the screen can be imported.

2. Before inserting the USB flash drive, you can share the boundary and guidance line online. After the USB flash drive is inserted, online sharing is not supported.

3. Task data cannot be shared online.

● **Terrain Compensation**

If the operation field contains more slopes, the terrain compensation can be turned on to achieve a more precise navigation effect.

● **Super Low Speed**

When using the Hall angle sensor, the ultra-low speed mode can be turned on to ensure the accuracy and stability of the operation at ultra-low speeds below 0.3km/h.

● **Manual Intervention**

You can get disengaged of the automatic driving mode manually when this function is turned on. The sensitivity of manual intervention can be adjusted.

● **Radar Output Module (Optional)**

Radar Output Module transmits the speed information obtained by the autosteering kit to the implement through a signal conversion box. Users can check the current speed, the current square wave frequency, and the current ratio of square wave frequency to speed on the control terminal of the autosteering kit. For details about the operations, refer to the Radar Output Module Usage Instruction Manual.

Radar Output Module is also applicable to old version implements that support radar speed input, such as sprayers, spreaders, and seeders.

You can purchase Radar Output Module separately according to your needs.

7.3.3 Vehicle Parameters

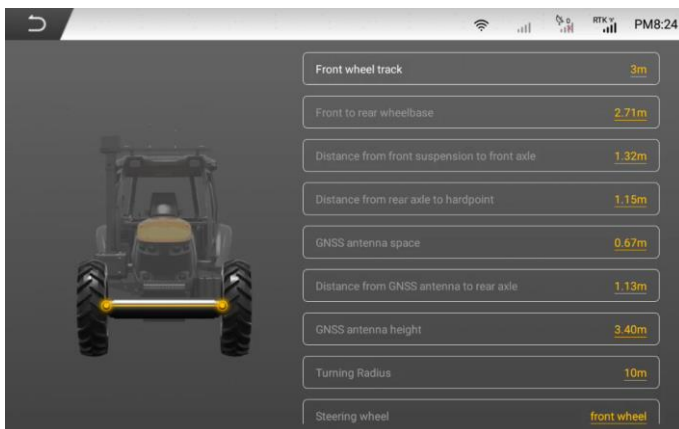


Figure 3.7.11 Vehicle parameter settings

Click the **Vehicle Parameters** tab. On the displayed details screen, click the required items and enter the corresponding vehicle data to complete vehicle parameter settings. For specific measurement details, please refer to the instruction video.

GNSS Receiver Offset Calibration

If there is a problem of large and small lines in the multi line mode during the operation, the user is required to calibrate the positioning antenna spacing according to the following diagram.

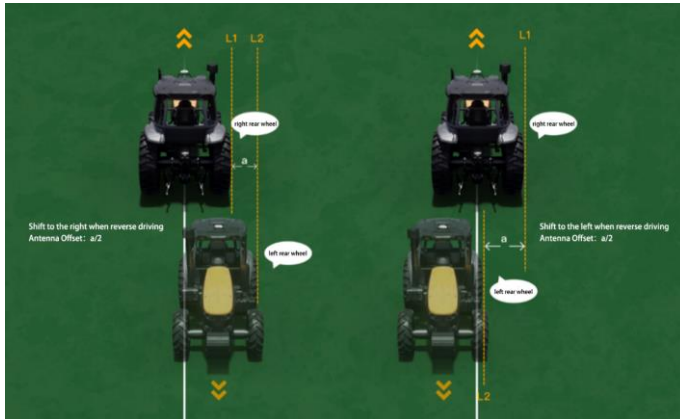


Figure 3.7.12 GNSS Receiver Offset Calibration

Step 1: Create a guidance line: create and import a guidance line. (The starting point is point A, the end point is point B)

Step 2: Set the line spacing and select the operation mode: set the operation spacing in the **Parameter Setting** to 10 meters, and select the operation mode as multi line mode.

Step 3: Drive two times.

First driving: Drive the vehicle at a low speed from point A to point B. If the vehicle is stable (the offset error displayed on the screen is less than 2 cm), stop after the driving distance is not less than 10 meters, and mark at the right rear tire position of vehicle, confirming the marking line L1.

Second driving: After marking the marking line L1, turn the vehicle around and continue driving in the reverse direction along the driving route just now. When driving to the vicinity of the marking line L1 in the second step (note: ensure that the driving status is stable at this time, that is, the offset distance displayed on the screen is less than 2 cm), stop and draw the marking line L2 at the left rear wheel position.

Step 4: Measuring error: use a clicke measure to measure the distance between the two marking lines, and record the value a (unit: m)

Step 5: Please enter a value in the interface of **Positioning Antenna-Central Axis Distance**, and click **OK** to complete the corresponding GNSS Receiver Offset Calibration.

7.3.4 Parameter Setting

Choose **Settings** -> **Parameter Settings**. On the displayed screen, you can set **Angle Sensor**, **Vehicle Calibration** and **Calibration of Accessories** to ensure operational accuracy.

● Angle Sensor

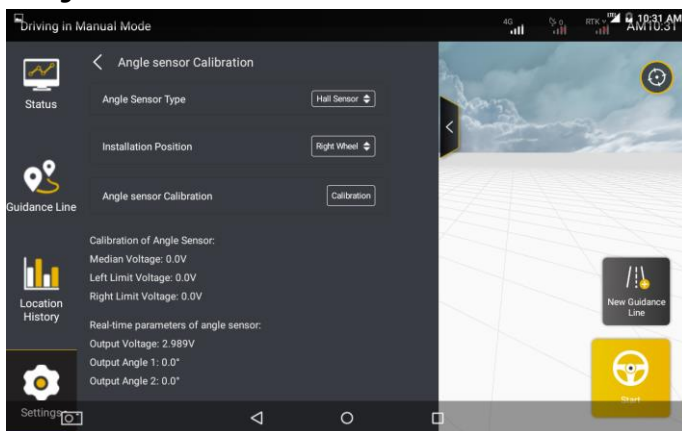


Figure 3.7.13 Angle sensor settings

Click the **Angle Sensor Calibration** tab in **Parameter Calibration** page. On the displayed details screen, set **Angle Sensor Type**, **Installation Position** and click **Calibration** to calibrate the angle sensor in this position. For details, see section **2.7 Calibrate Angle Sensor** in **Chapter III Software Operation Instructions of Control Terminal**.

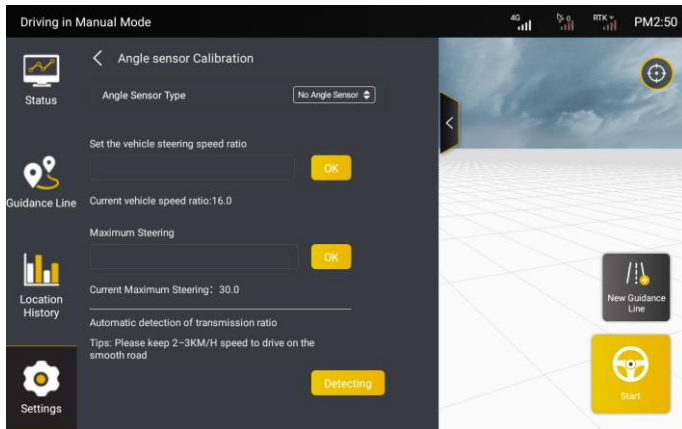


Figure 3.7.14 Settings for no angle sensor

● Calibration of Accessories

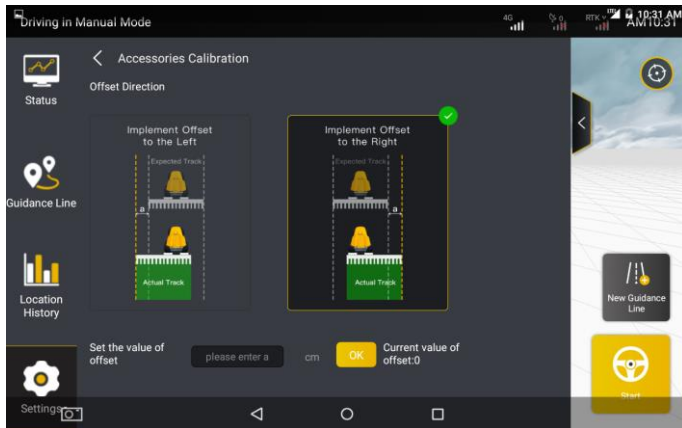


Figure 3.7.15 Settings for calibration of accessories

When auto-driving path has a offset within 3 cm after the implement is equipped, please measure the value. If the auto-driving path tends to the left comparing to the pre-set guidance line, please select **implement offset to the left** and enter the deviation value "a", and then click **OK** to save the setting; if the auto-driving path tends to the right, select **implement offset to the right** and enter the deviation value a, and click

OK.

● Parameters Commissioning (for FAE Only)

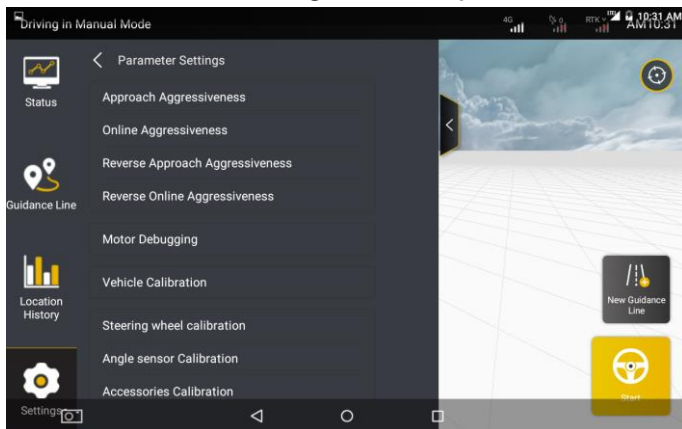


Figure 3.7.16 Parameter settings

Approach Aggressiveness: affects the time for the vehicle to enter the next guidance line when making a turn. The larger the value is, the shorter adjustment time the process needs. However, the driving instability is higher.

Online Aggressiveness: affects the Straight line driving accuracy of the vehicle. The smaller the value is, the higher the control degree, but the instability will increase accordingly. For example, the possibility of an “S” turn is greater.

Vehicle Calibration

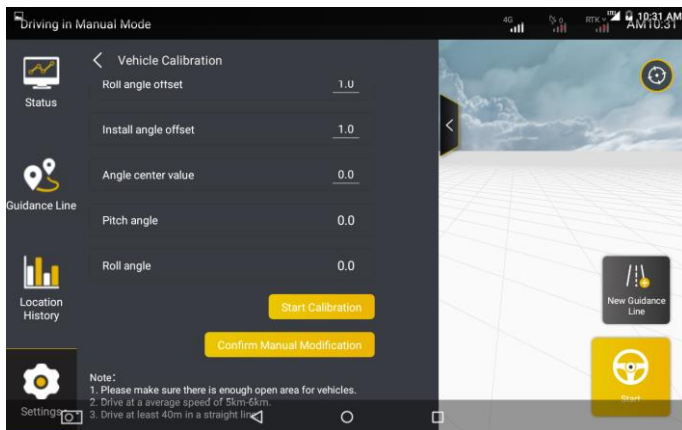


Figure 3.7.17 Vehicle calibration

For detailed operations, see section 2.8 Vehicle Calibration in Chapter IV Software Operation Instructions of In-vehicle Control Terminal.

7.3.5 Implement Information

Click **Implement Information** in **Settings** to view the implement parameters and list of implements.

Click **Implement Parameters** to view the way of implement connection, the distance between the implement and the hitch, and implement working parameters.

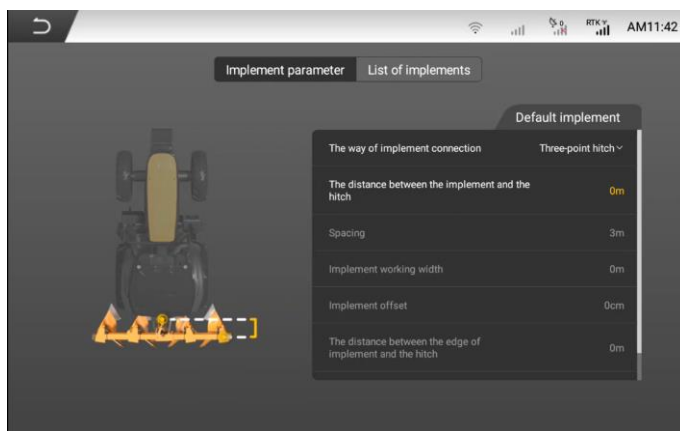


Figure 3.7.18 Implement parameter

Click **List of Implements** and delete, edit, create, upload, and synchronize implements to create and manage the implement library. Note: The implement library can contain a maximum of 10 implements.

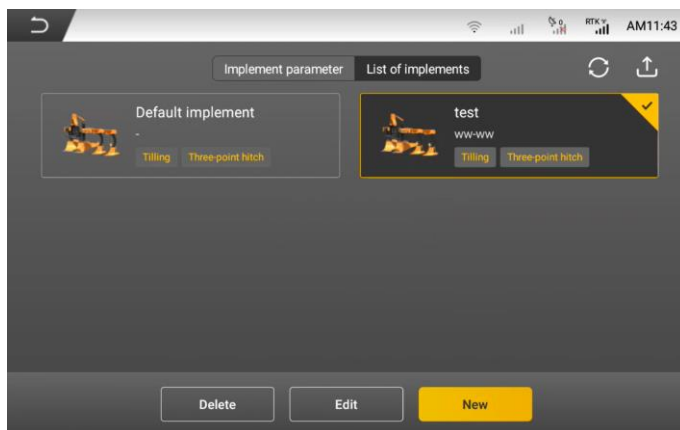


Figure 3.7.19 List of implements

- **Delete the Implement:** Select an implement and click **Delete** to delete the implement information.

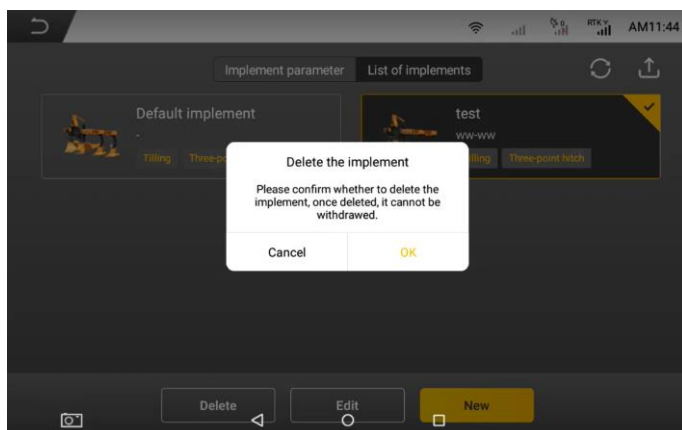


Figure 3.7.20 Delete an implement

- **Edit the Implement:** Select an implement and click **Edit** to modify the implement information.

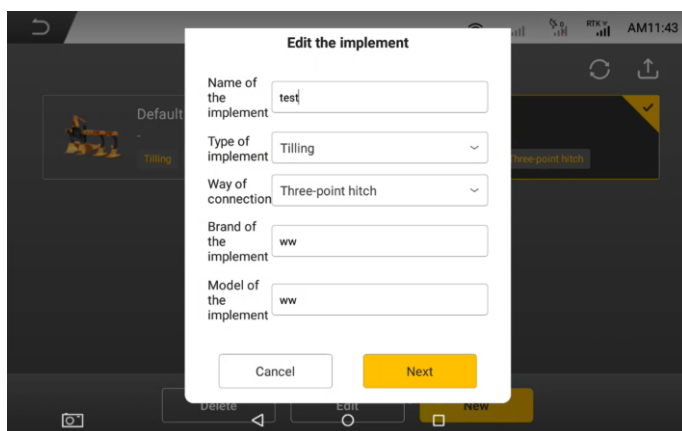
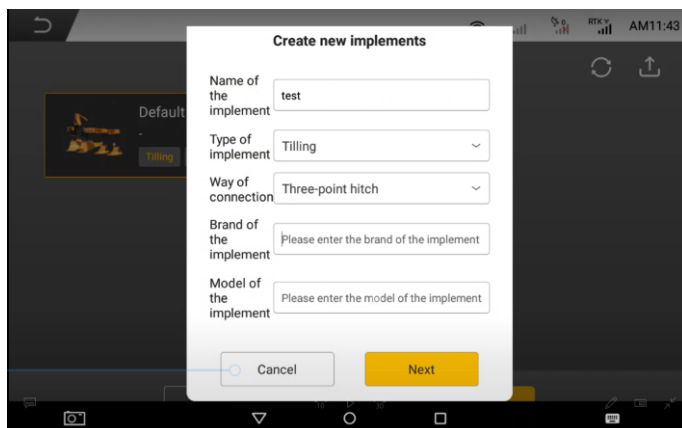


Figure 3.7.21 Edit an implement

- **Create New Implements:** Click **New** and then perform the following steps:

Step 1: Fill in the basic information of the new implement and click **Next**.



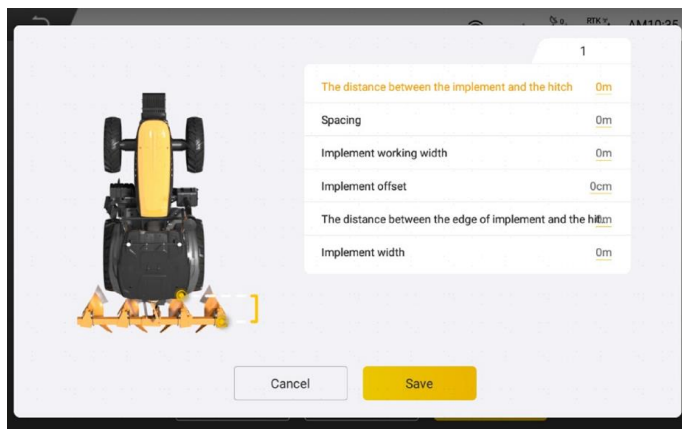
The screenshot shows a mobile application interface with a dialog box titled "Create new implements". The dialog box contains the following fields:

- Name of the implement:
- Type of implement:
- Way of connection:
- Brand of the implement:
- Model of the implement:

At the bottom of the dialog box, there are two buttons: "Cancel" and "Next".

Figure 3.7.22 Create new implements - basic information

Step 2: Fill in the working information of the new implement, and click **Save**. If any item is not set, the information cannot be saved.



The screenshot shows a mobile application interface with a dialog box titled "Create new implements". The dialog box contains the following fields:

- The distance between the implement and the hitch:
- Spacing:
- Implement working width:
- Implement offset:
- The distance between the edge of implement and the hitch:
- Implement width:

At the bottom of the dialog box, there are two buttons: "Cancel" and "Save".

Figure 3.7.23 Create new implements - work information

- Upload the Implement: Click the upload icon to upload implement information.

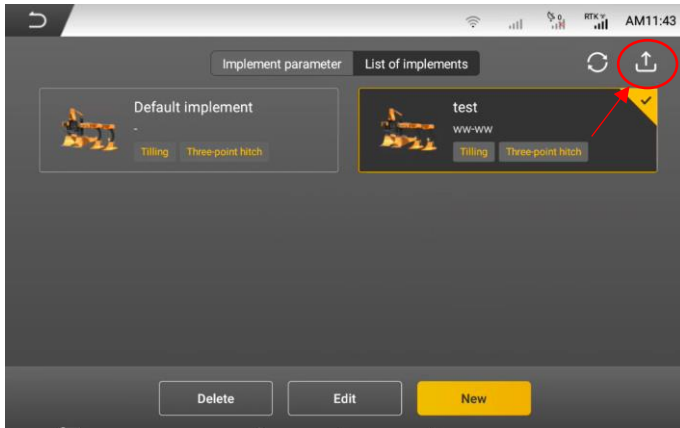


Figure 3.7.24 Upload implements

- Synchronize the Implement: Click the synchronize icon to synchronize the previously uploaded implement information.

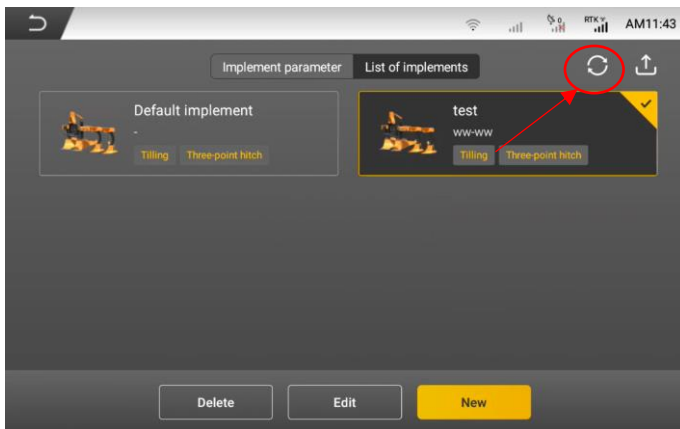


Figure 3.7.25 Synchronize implement

7.3.6 System Settings

● System version (OTA upgrade)

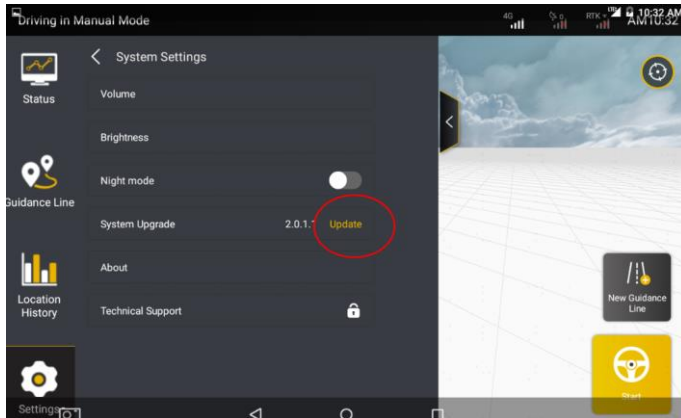


Figure 3.7.26 OTA Upgrade

When there is an update to the software version, you can perform the following operations to achieve a one-click upgrade of the auto steering kit:

1. Turn on the in-vehicle control terminal of the autosteering kit. Make sure that the control terminal can access the Internet through network SIM card/Wi-Fi network and that the network status is stable (please make sure the 4G antenna is connected properly).
2. If there is a new version, the system will automatically display a prompt for upgrade.
3. Click **Confirm Update** in the prompt box to enter into the upgrade process.
4. Do not take any operation during the upgrade. You can check the upgrade progress through the displayed information and wait for its completion.
5. After the upgrade is successful, the system will display a prompt that the upgrade is successful and then automatically enter the new

version.

6. If the upgrade fails, the system will prompt you to retry. Click **Retry** to re-upgrade the system.

Notes for OTA upgrade:

1. Ensure that the network status is stable throughout the upgrade process.
2. Do not power off the terminal during the upgrade process.
3. If you encounter any problems during the upgrade, please contact your local dealer for help or call the technical service hotline.

● **Mode selection**

User can switch between Fast Mode and Advanced Mode here.

● **Recycle bin**

Boundary, guidance line and History data deleted within 30 days can be restored in the recycle bin.

● **Unit settings**

User can choose the unit to display as metric or imperial units, or define own unit combination based on unit usage habits.

● **Language Settings**

You can select a system language from more than 20 languages, such as Chinese, English, Spanish, and Russian. Note: Language switching is not supported during operation.

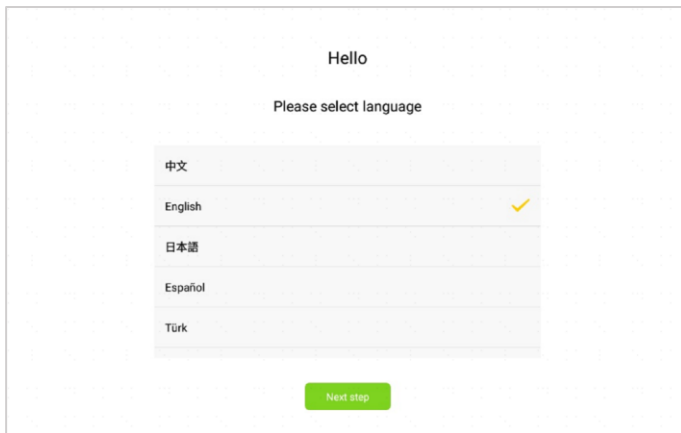


Figure 3.7.27 Language selection

7.3.7 Wi-Fi Camera (Optional)

Two Wi-Fi cameras can be connected via hotspot. The operation is as follows:

1. For the first use, please turn on the Wi-Fi camera in the **Settings**.
2. Turn on the hotspot mode before binding, and scan the code via camera to identify and bind the camera. Up to two cameras can be bound via scanning the code. The scanned camera is displayed on the right side. Click **OK** to enter the camera view page.
3. The current video stream can be viewed on the camera list page. If it is required to bind other cameras, click **Delete** and repeat the binding steps to bind.

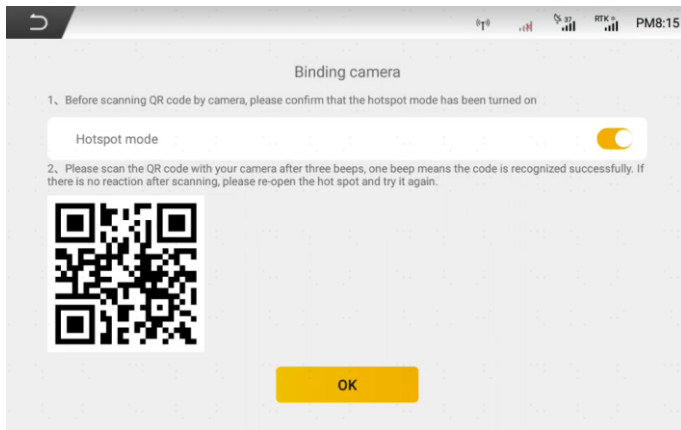


Figure 3.7.28 Wi-Fi camera configuration

4. After the binding is completed, user can click return button in the upper left corner to enter the working interface, and Click real-time video button to open the main interface display.

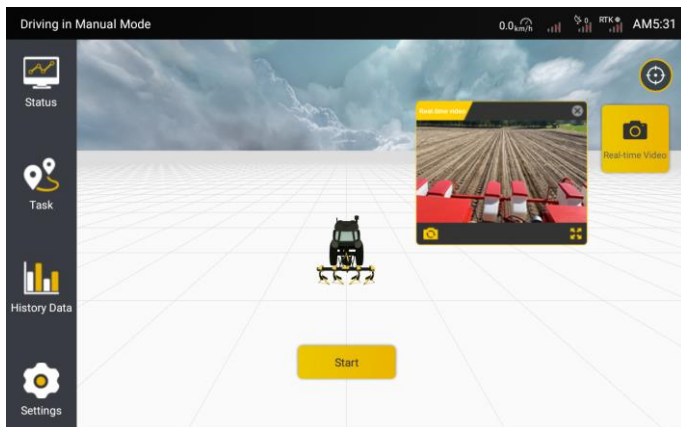


Figure 3.7.29 Real-time video

5. Click "Switch" button to switch the camera. Click "Full Screen" button to maximize the camera interface, and click again to restore. Click "Close" to close the camera window in a real time manner.

7.3.8 Remote Commissioning

Turn on the remote commissioning function, which should use with the background control program to realize the remote control screen function; user should turn on the **Remote Debugging** switch in the **Settings**.

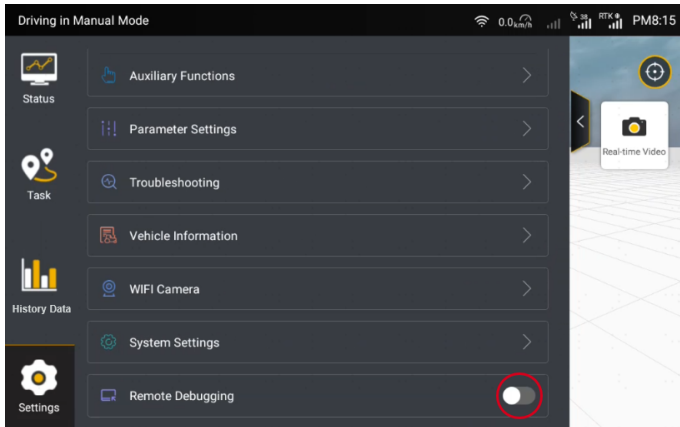


Figure 3.7.30 Remote commissioning

7.3.9 Changing the Password

In **Settings > User Information > Account and security**, you can perform the following steps to change the password.

1. Choose **User Information > Account and security > Change Password** and change the password.

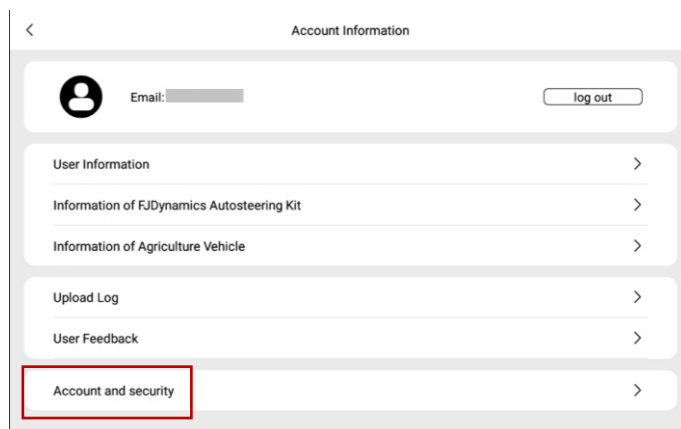


Figure 3.7.31 User information

2. You will be logged out after the password is changed. You may log in again on the login screen displayed.

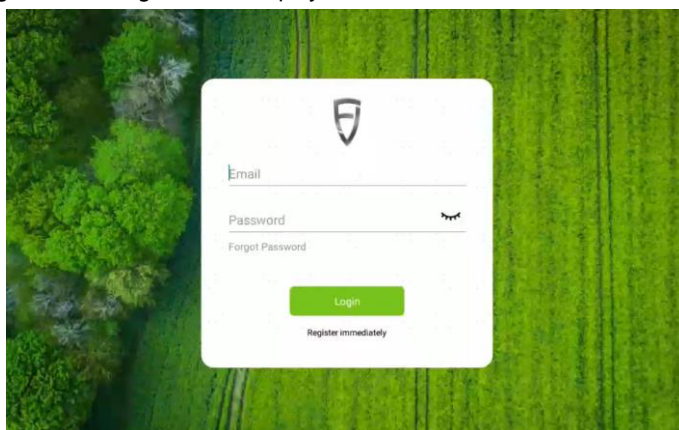


Figure 3.7.32 Login

7.3.10 Other Settings

In addition to **Parameter Settings**, **Correction Source**, and **Troubleshooting**, the **Settings** screen allows setting and querying other general information such as Volume, Brightness, and device information.

Chapter IV 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.

Chapter V FAQs

No.	Fault	Troubleshooting
1	S turn in autosteering operations	Check whether the rolling angle and pitching angle change in real time.
		Calibrate the angle sensor (optional).
		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 or operating normally.
		When the Network RTK is connected, verify whether 4G signals are normal.
		When the Network RTK is connected, verify whether the Ntrip account is valid.
5	Inconsistent working width in multi-line mode	Verify whether the vehicle parameters are entered correctly.
		Verify whether the vehicle calibration in Settings is completed.
		Calibrate the implement again.
6	“Service not enabled, power off	Power off and restart the vehicle.

	and restart the vehicle” appeared during start-up	
7	Slight offset in straight line mode	Check whether the rolling angle changes.

Chapter VI Main Hardware and its Specifications

1 Specification Table 1

No.	Assembly	Component	Specifications
1	Control Terminal	Control Terminal	<p>Size: 275×180×40 mm;</p> <p>Basic configuration: 10.1-inch capacitive touch screen, LED backlight, 1280x800 pixels, LCD=700 nits</p> <p>RAM: 2G; ROM: 8G</p> <p>Signals: RF signal, positioning satellite signal, and 4G signal;</p> <p>External interface: SIM card slot*1, Type-C port*2;</p> <p>Power supply: 9 V - 36 V;</p> <p>Operating temperature: -20°C~+70°C;</p> <p>Storage temperature: -40°C~+85°C;</p> <p>IP rating: IP66;</p>

			<p>Relative humidity: 0% - 95%, 40°C (non-condensation);</p> <p>Wi-Fi specifications: 2.4 GHz frequency band, BT 5.0</p> <p>Frequency range: 2,412 – 2,462 MHz</p> <p>Radio communication: 900M/None</p>
2	GNSS Receiver	GNSS Receiver	<p>Frequency range: GPS L1C/A, L1C, L2P(W), L2C, L5 ; GLONASS L1, L2 ; BDS B1I, B2I, B3I, B1C, B2a ; Galileo E1, E5a, E5b;SBAS;</p> <p>Operating voltage: 9 V – 36 V;</p> <p>Operating current: < 300 mA;</p> <p>Size: 162x64.5 mm;</p> <p>Operating temperature: -20°C - +70°C;</p> <p>Storage temperature: -40°C - +85°C;</p> <p>IP rating: IP66</p>
3	Electric Steering Wheel	Steering Wheel	Steering wheel diameter: 410 mm;
4		Steering Motor	<p>Power supply: 12 V or 24 V;</p> <p>Peak torque: 20 Nm (12 V); 30 Nm (24 V);</p> <p>IP rating: IP65</p>
5		Splined Sleeve	Multiple models

