



FJDynamics Autosteering Kit

Software User Manual

FJNBD-2.5SD



Safety Instructions

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

Operator Requirements

1. Persons under the age of 18 are prohibited from operating.
2. Drunk driving is prohibited.
3. Fatigued driving is prohibited.
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 injury or property damage.

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 the 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 it.
4. Please 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 connect the device strictly according to the instructions in the manual. For 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. When supplying power to this product (the kit), please pay attention to the power supply requirements of the device (controller and electric steering wheel power rating is 10-30V).

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Chapter I About This Document

1 Purpose

This document describes how to use the FJDynamics autosteering kit for agricultural vehicles. The language used in the document is concise, and the operation process is simple and clear, so that the user can learn to perform each operation easily, quickly and accurately.

2 Technical Support

Users will be provided with the technical support and upgrade services by FJ Dynamics Technology Co., Ltd. for a long time from the date of purchase of this product.

Official website of FJ Dynamics: <https://www.fjdynamics.com>

Chapter II Product Overview

1 Introduction

Launched by FJ Dynamics, FJDynamics Autosteering Kit for agricultural vehicles supports assistant straight driving and fully unmanned transformation. The kit can not only control the steering to provide driving assistance for the vehicle, but also realize the fully unmanned transformation of agricultural vehicles through the control of the vehicle's accelerator, brake, clutch, gearbox, and operation components. The kit is composed of the in-vehicle display and control terminal, GNSS high-precision positioning equipment, steering motor, angle sensor, attitude sensor, communication antenna, cable harness and so on. Among them,

the in-vehicle control terminal is equipped with the auto steering driving software independently developed by FJ Dynamics.

2 Main Components

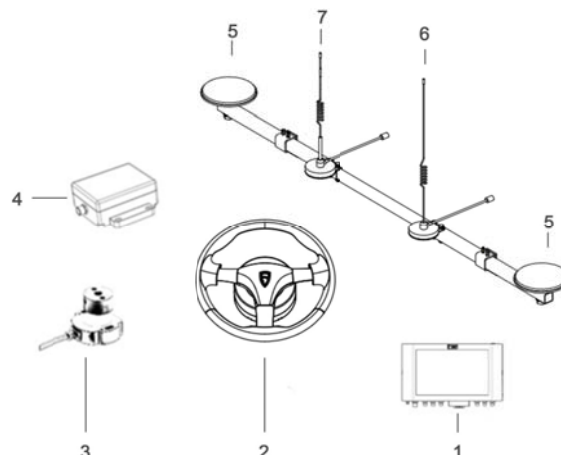


Figure 2.2.1 Main components

1. **Control Terminal** :An interface of human-computer interaction, acting as vehicle control and communication terminal.
2. **Steering Wheel**:It provides steering control in vehicles.
3. **Angle Sensor** :It monitors the wheel rotation angle to determine the direction of the vehicle in real-time.
4. **IMU** :All-terrain data compensation is achieved to ensure the accuracy of agri-robots in sloping fields and high-speed operating environments.
5. **GNSS Antenna** :It receives satellite data to obtain vehicle latitude and longitude.
6. **4G Antenna** :It realizes communication with cellular data (4G). (Item ⑥ is the 4G antenna and it is shorter than item ⑦)
7. **Radio Antenna** :It realizes communication with Portable Base

Station (RTK).

Precaution for the Installation of Antenna

1. Do not disassemble the antenna or plugin/out the cable when the power is on.
2. When installing antennas outdoors, proper lightning protection should be taken to prevent lightning strikes.
3. During the outdoor installation of the base station equipment, the base station host should be waterproofed.
4. When using or testing, the base station radio antenna must be placed in the outdoor open environment.
5. The transmitting station may generate heat during use. Please be careful to avoid burns.
6. Avoid or reduce unnecessary coverings on the surface of the station and maintain a good ventilation environment.

3 Hardware Interface Description of Control Terminal

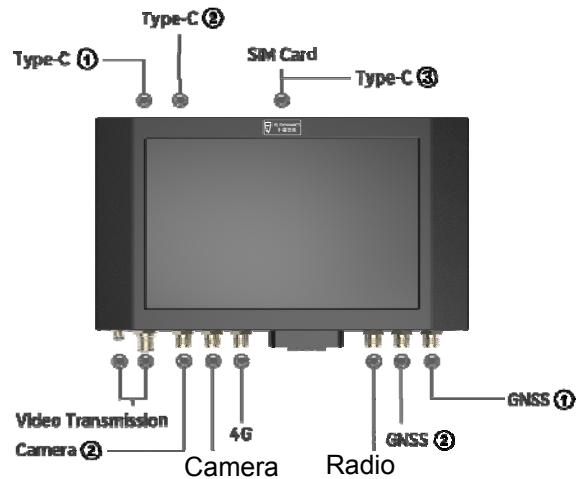


Figure 2.3.1 Hardware interface description of control terminal

Chapter III Software Operation

Instructions of Control Terminal

1 Workflow Overview

In order to make it easier for users to understand the operation and use of the software, this document describes the operation procedure and related auxiliary functions of the operating workflow of the kit from a new user's perspective. A new user needs to complete the installation, configuration and preparatory operations before using the kit for the first time and smoothly entering the auto steering driving

2 Commissioning

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

Select a language → Register and log in to your account → Enter installation information → Source Connection → Set vehicle parameters → Calibrate the angle sensor → Calibrate the whole vehicle → Complete commissioning

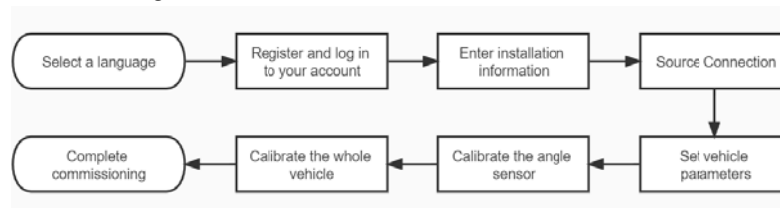


Figure 3.2.1 Initial commissioning workflow

2.1 Selecting a Language

Turn on the in-vehicle control terminal and select a language for this kit. tap Next step. The screen for registration and login is displayed.

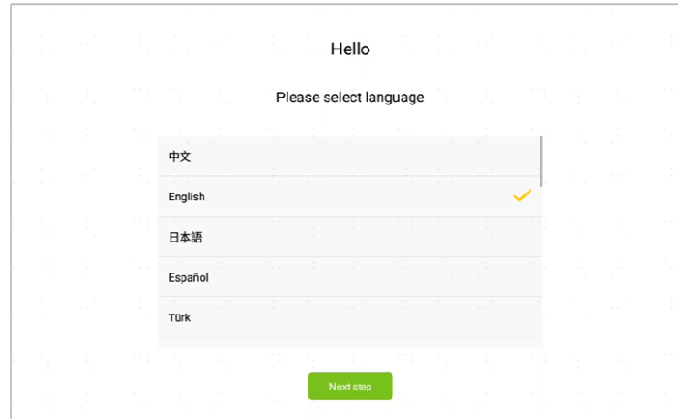


Figure 3.2.2 Selecting a language

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. tap Register immediately. On the displayed screen, enter your email address, verification code, and password, and tap 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 of the kit.

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, tap Login to enter the home screen of the kit.

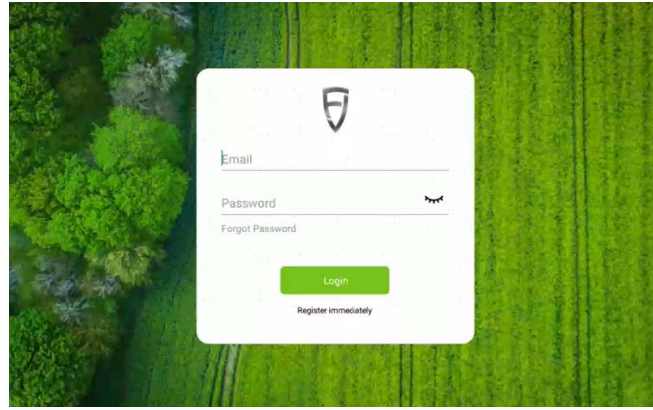


Figure 3.2.3 Home screen of login and registration

2.3 Entering Installation Information

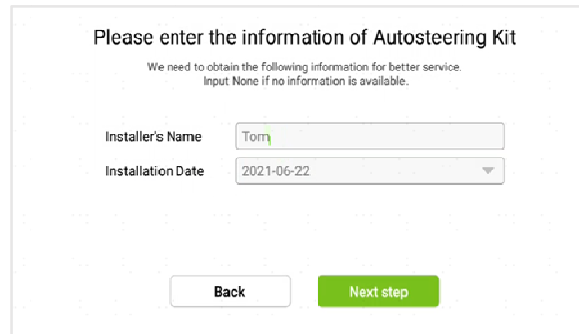
After successfully registering and logging in for the first time, you need to enter related installation information, user information and Auto-kit information. Please note that the initial information you have entered will directly or indirectly affect your after-sales service. Therefore, please strictly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

Step 1 : Enter user information after the successful user registration and tap Next step.

Figure 3.2.4 Entering user information

Step 2 : Enter this information and tap Next step. The screen for

entering agricultural vehicle information is displayed.



Please enter the information of Autosteering Kit

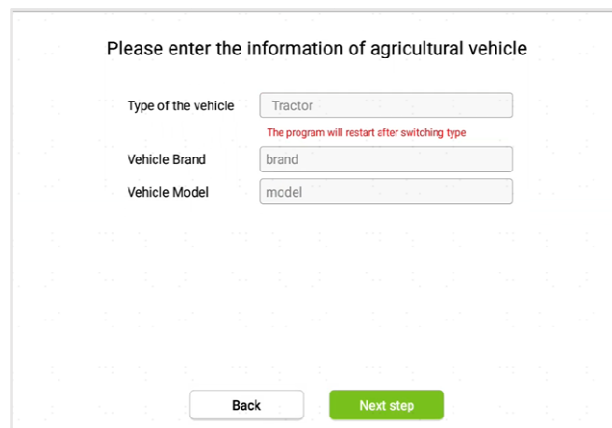
We need to obtain the following information for better service.
Input None if no information is available.

Installer's Name:

Installation Date:

Figure 3.2.5 Entering Auto-kit information

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



Please enter the information of agricultural vehicle

Type of the vehicle:

Vehicle Brand:

Vehicle Model:

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.

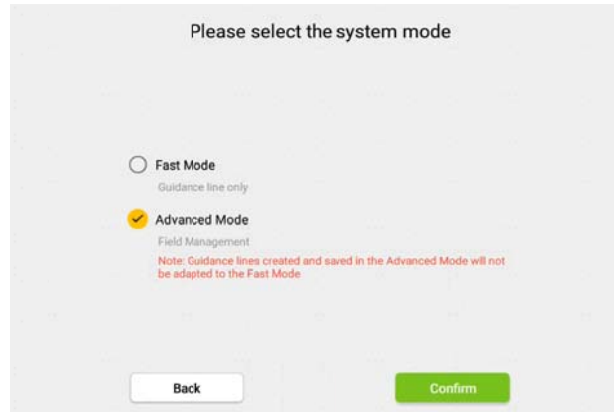


Figure 3.2.7 Selecting system mode

Step 4: In terms of system mode, select the corresponding one. Please choose carefully according to the actual usage and tap 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 the kit.

2.4.1 Main Interface of Fast Mode

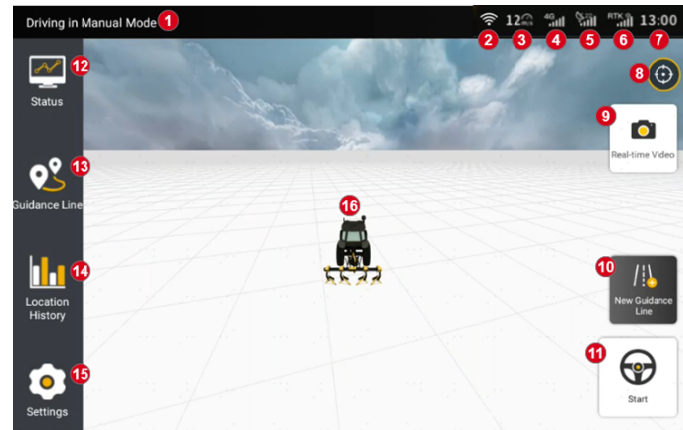


Figure 3.2.8 The main interface of Fast Mode

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 changed the time zone in Android system.

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

by tapping 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 tapping this shortcut button.

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

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

13. Guidance line: Tap 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: Tap 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

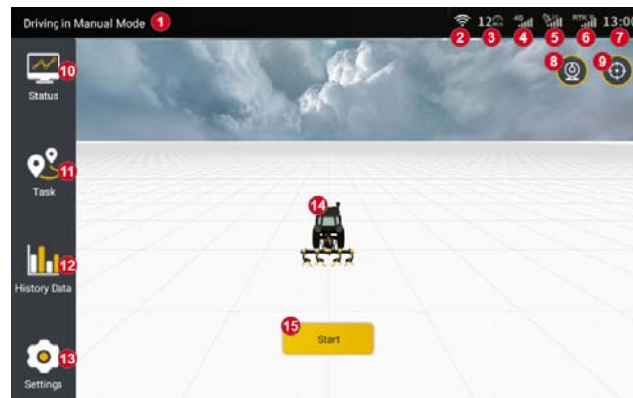


Figure 3.2.9 Main interface of advanced mode

- 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 changed 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 tapping the button.
- 10. Status:** Tap 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:** Tap 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.

Note: If you need to use SBAS, you need to purchase the hardware version containing SBAS.

Step 1: Tap **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.

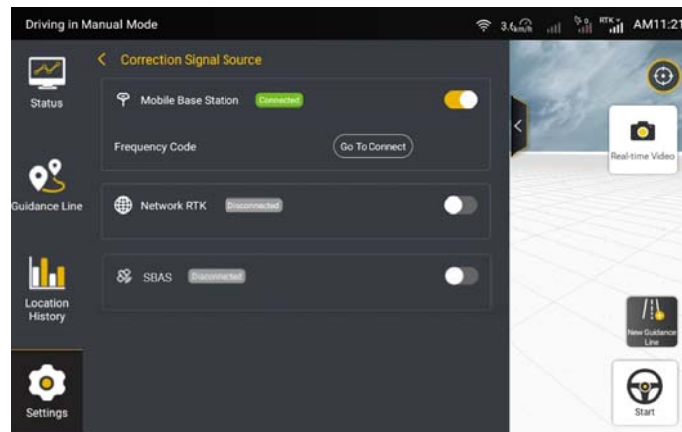


Figure 3.2.11 Correction source change

- **Mobile base station RTK** : To connect to a mobile base station, enable **Mobile Base Station**, and tap **Frequency Connecting**. In the popup dialog, enter the frequency code. (For frequency codes, refer to *Base Station User Manual*.)

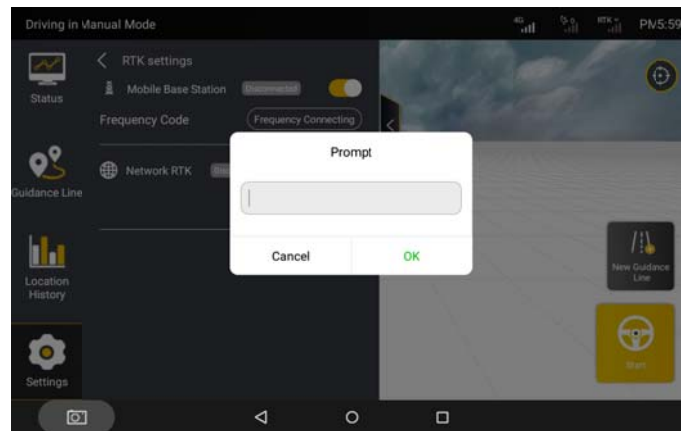


Figure 3.2.12 Entering the frequency code

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

Ntrip domain: Enter the host and port, and tap **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 tap **Connect** to connect to the network RTK.

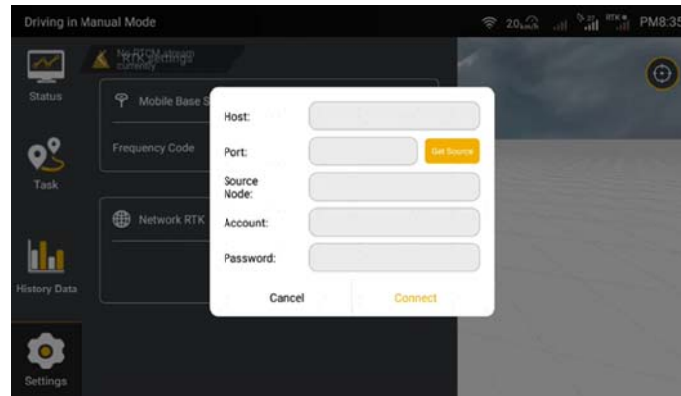


Figure 3.2.13 Connect Network RTK

● **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 tap **OK**, and then simply wait for successful connection.

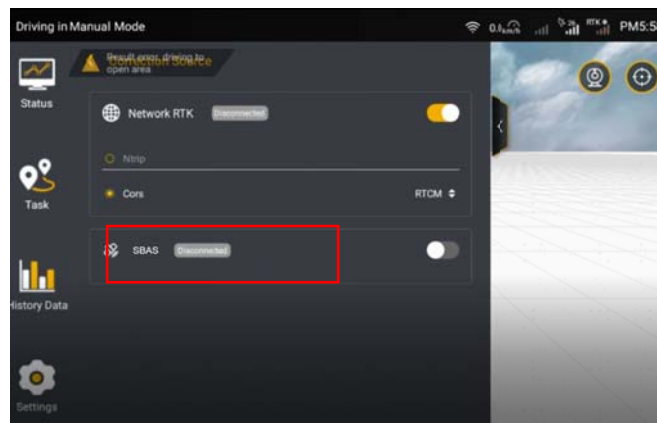


Figure 3.2.14 Connect to SBAS

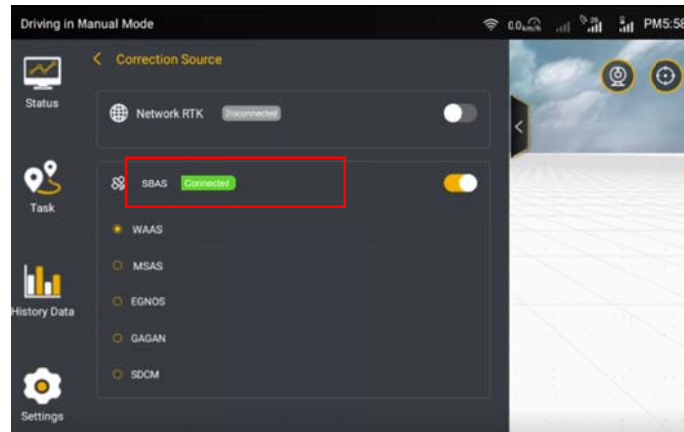


Figure 3.2.15 SBAS connected

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.

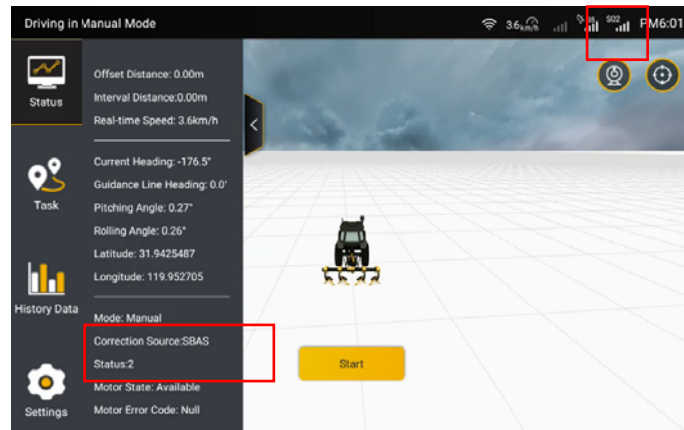


Figure 3.2.16 Status after SBAS connection

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.

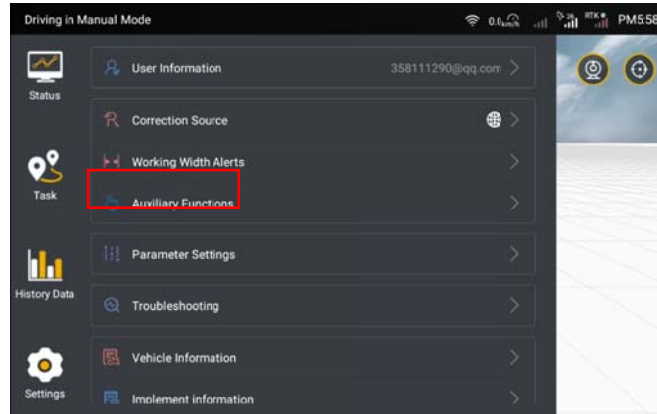


Figure 3.2.17 Setting list

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

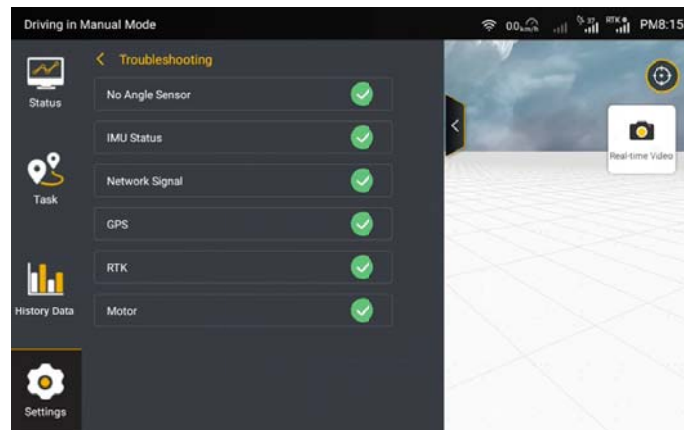


Figure 3.2.18 Troubleshooting

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.

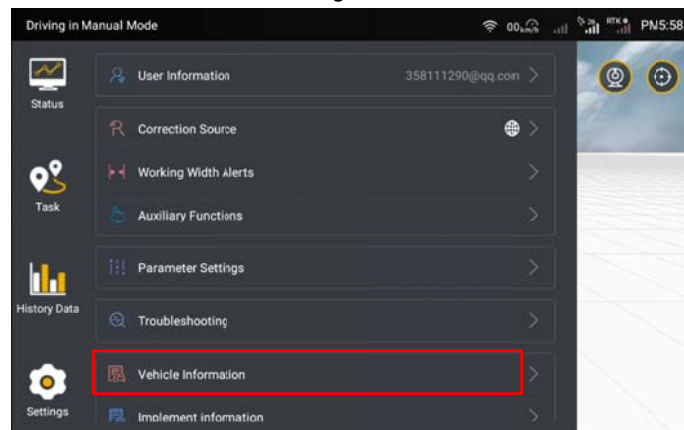


Figure 3.2.19 Setting List

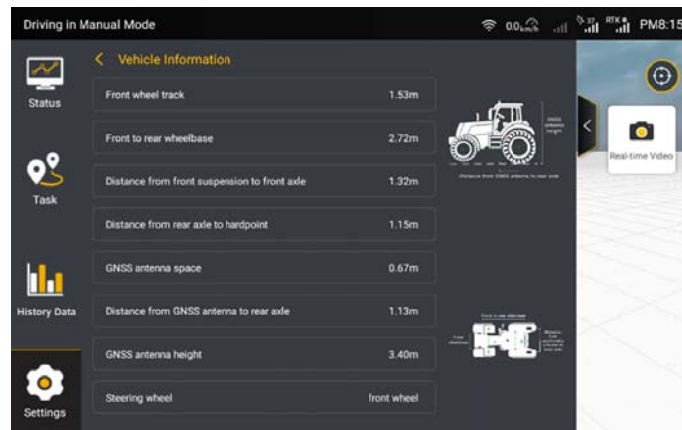


Figure 3.2.20 Vehicle information

*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.

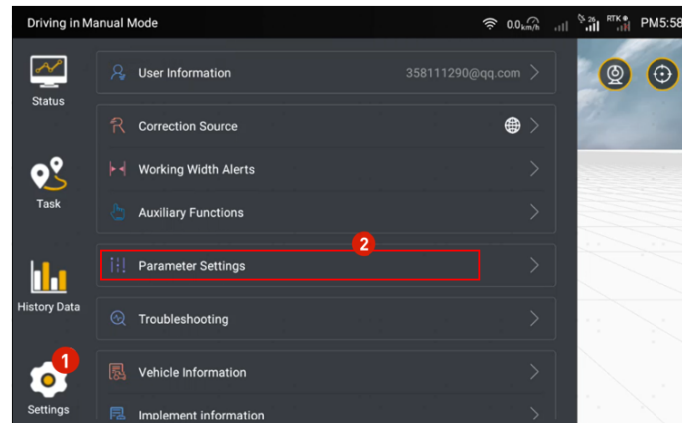


Figure 3.2.21 Setting list

Step 2: Tap "Angle Sensor Calibration" in the detailed page of parameter settings.

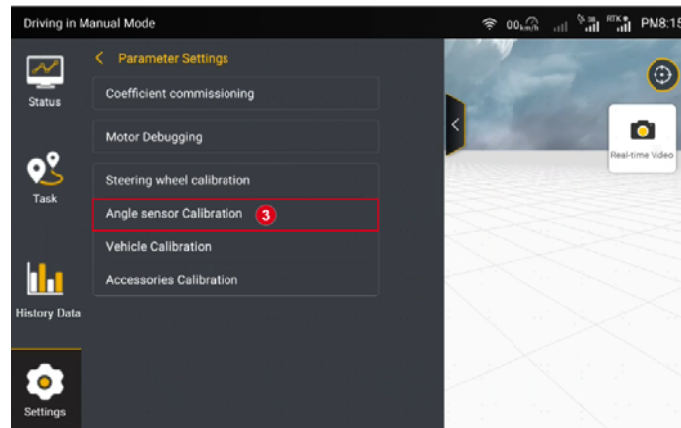


Figure 3.2.22 angle sensor calibration

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

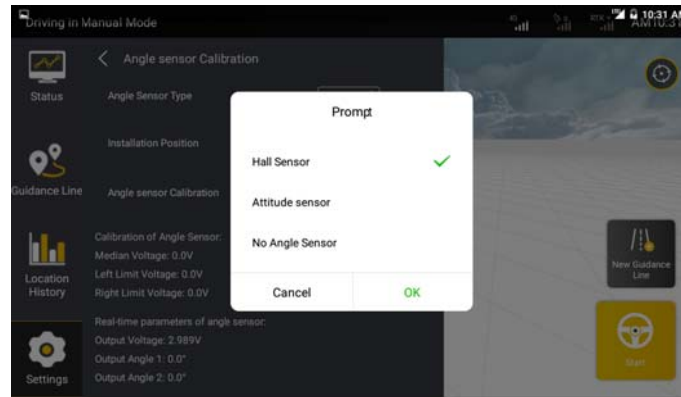


Figure 3.2.23 Select angle sensor type

- 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 tap "OK" after each action finished.

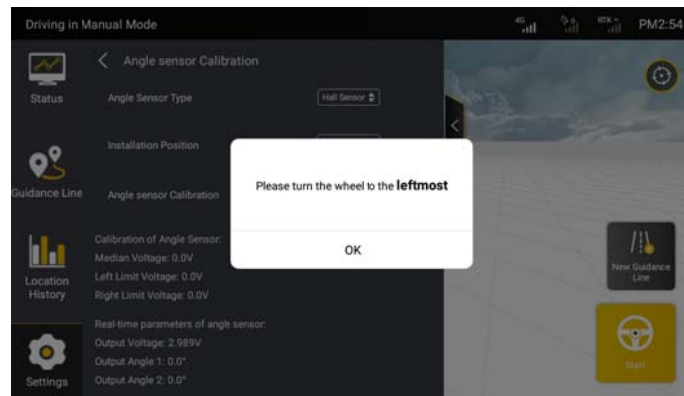


Figure 3.2.24 Turning the wheel to the leftmost

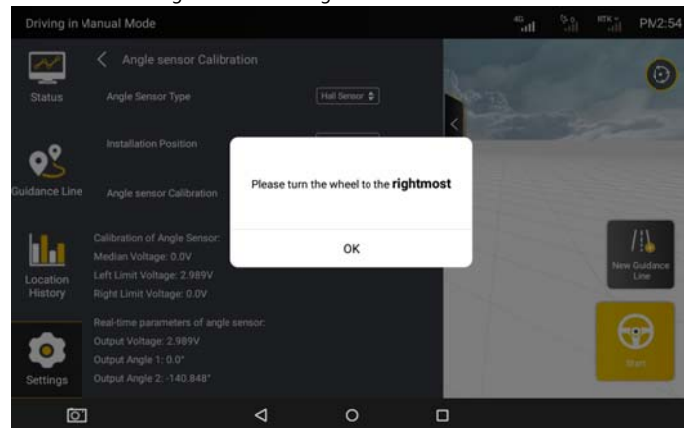


Figure 3.2.25 Turning the wheel to the rightmost

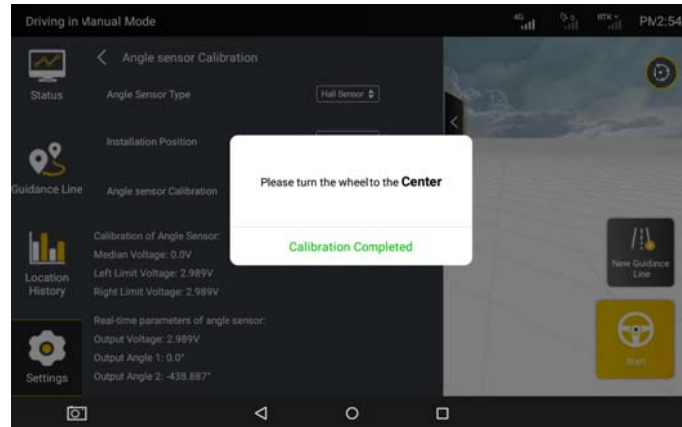


Figure 3.2.26 Turning the wheel to the center

- 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.

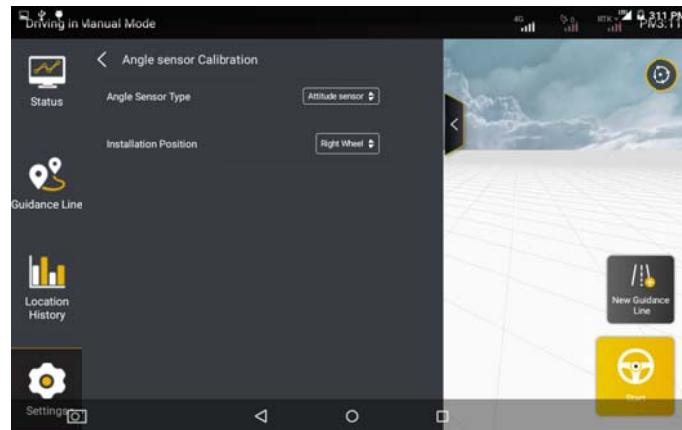


Figure 3.2.27 attitude sensor

- If the angle sensor type is selected as "no angle sensor", after

selecting "no angle sensor", enter its interface as shown below.

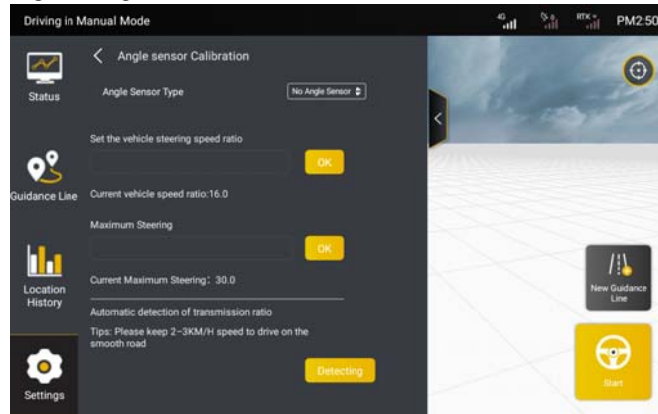


Figure 3.2.28 No angle sensor

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

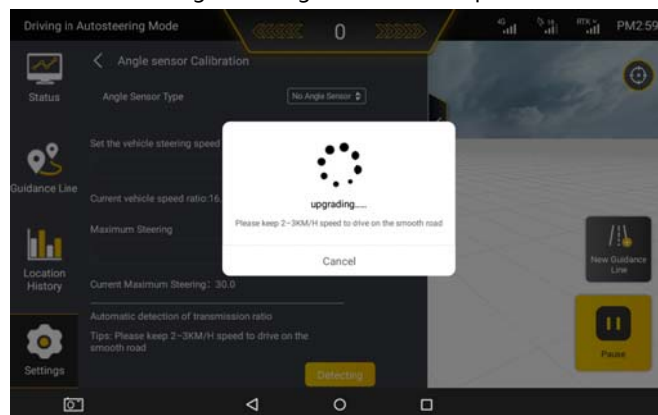


Figure 3.2.29 Detecting the speed ratio

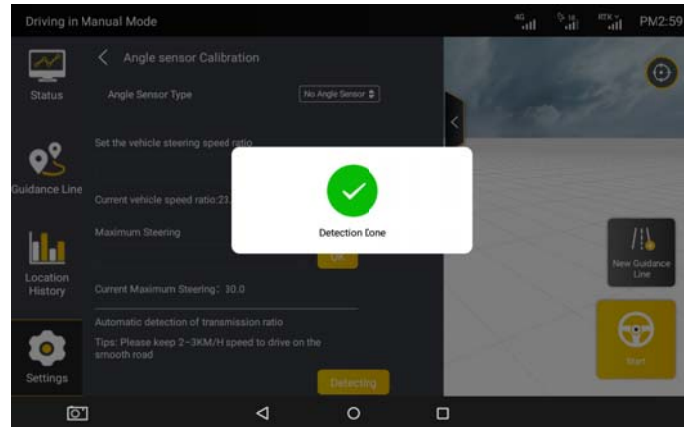


Figure 3.2.30 Detect finished

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, tap the Parameter Settings.

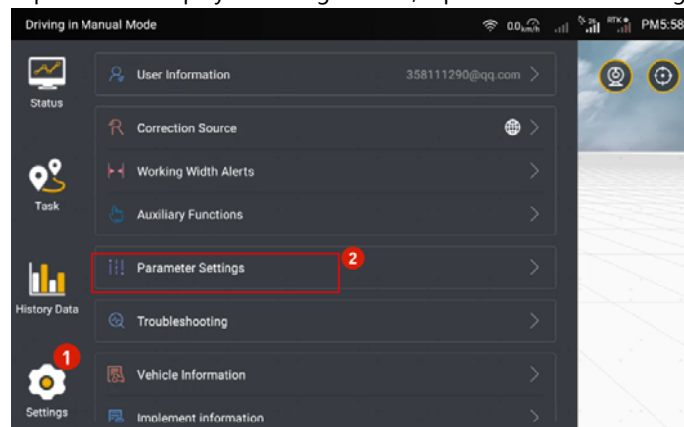


Figure 3.2.31 Setting List

Step 2: Tap into “Vehicle Calibration” in the parameter page.

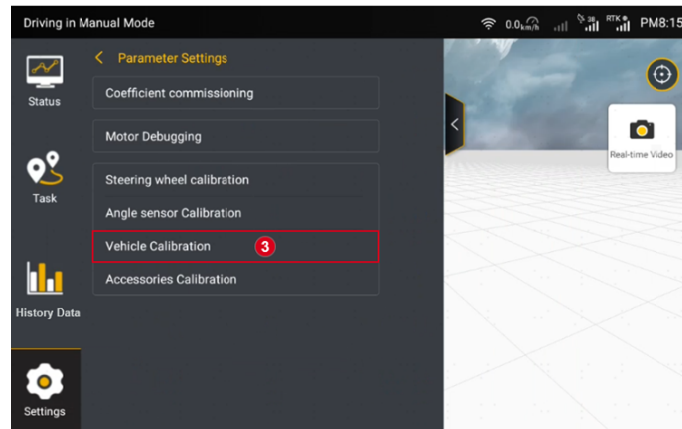


Figure 3.2.32 Vehicle Calibration

Step 3: Tap “Start Calibration” in the vehicle calibration page, and then getting into the calibrating process.

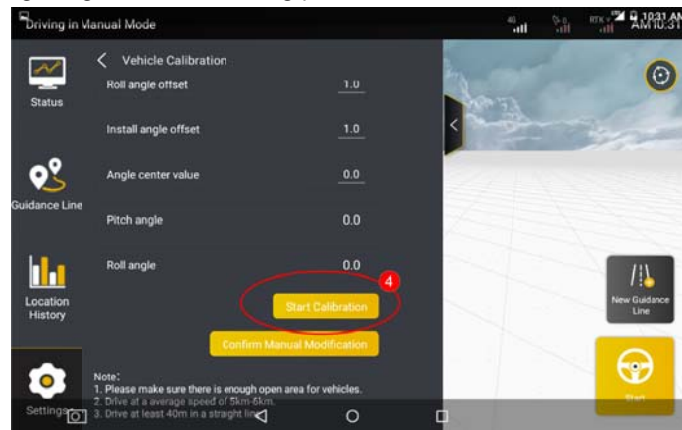


Figure 3.2.33 Start Calibration

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 tap Confirm Point A on the screen.

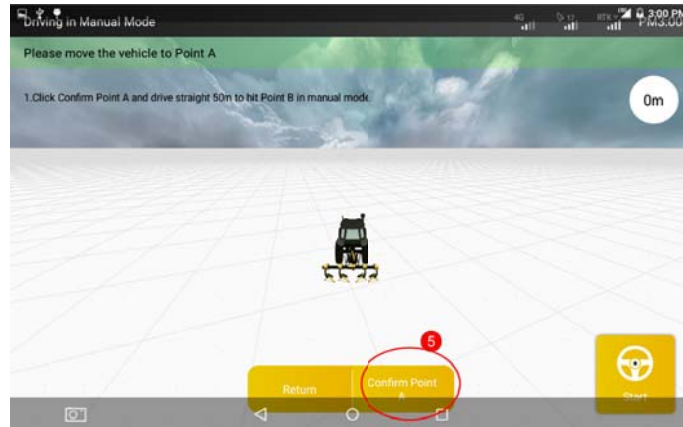


Figure 3.2.34 Confirm Point A

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

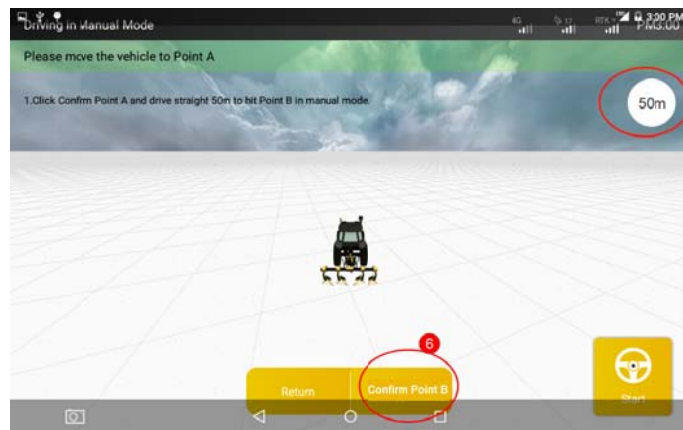


Figure 3.2.35 Confirm Point B

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, tap Start to make the vehicle run to Point A in the auto steering driving mode according to the guidance line just confirmed.

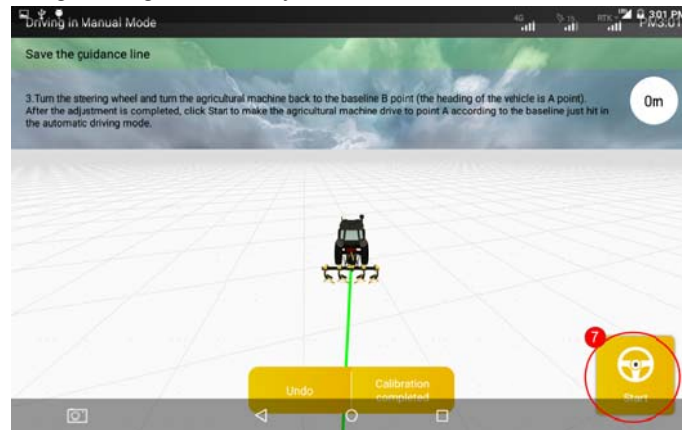


Figure 3.2.36 Starting auto steering driving after turning around

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

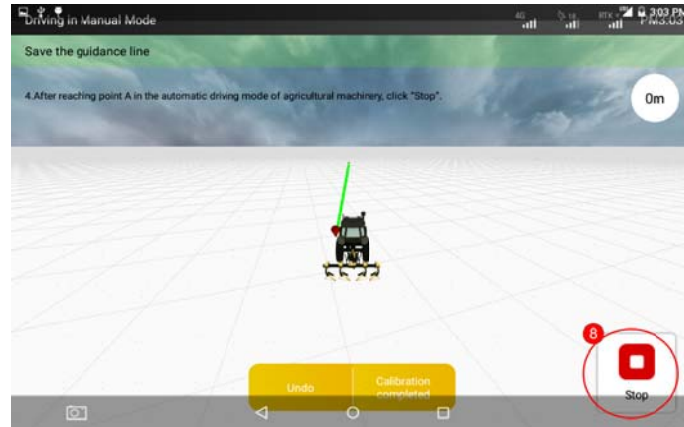


Figure 3.2.37 Stopping auto steering driving

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, tap Start to make the vehicle run from Point A to Point B in the auto steering driving mode.

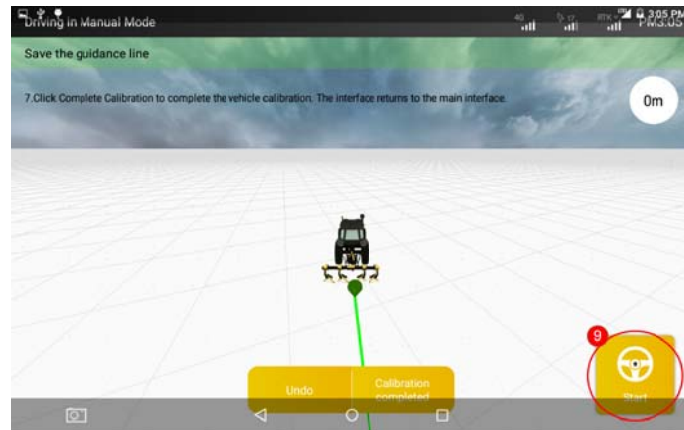


Figure 3.2.38 Manually turning around and start the auto-working

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

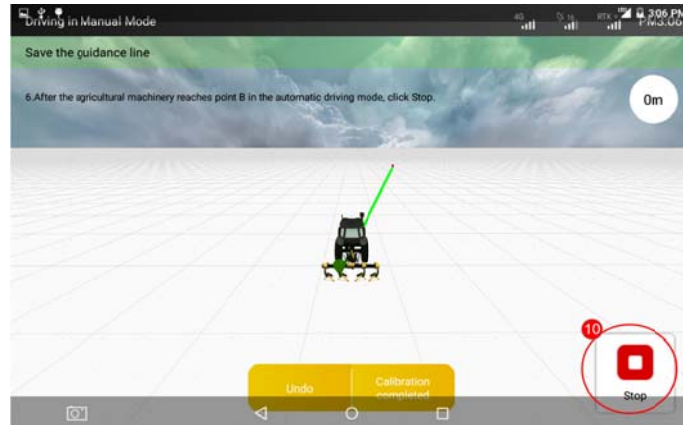


Figure 3.2.39 Stop autosteering driving after reaching the point A

Step 10: tap Calibrating completed to complete the vehicle calibration and return to the home screen.



Figure 3.2.40 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

Confirm the source connection → Add guidance line → Import guidance line → Start operation

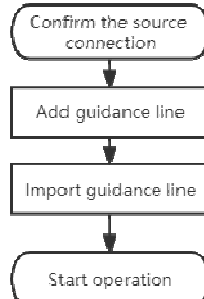


Figure 3.3.1 Preparatory operation procedure

3.1.1 Confirm the Source Connection

Confirm the source connection before operation preparation:

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

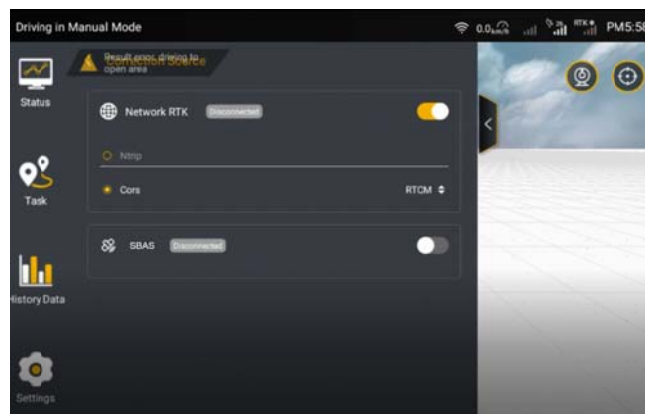


Figure 3.3.2 Confirm the source connection mode

(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.

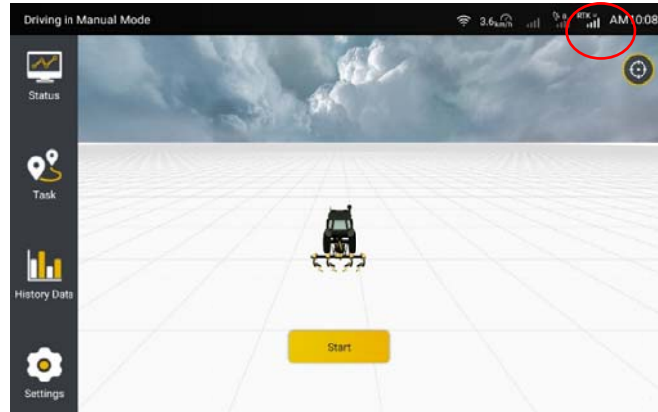


Figure 3.3.3 "RTK" displayed in the upper right corner when the RTK mode is used

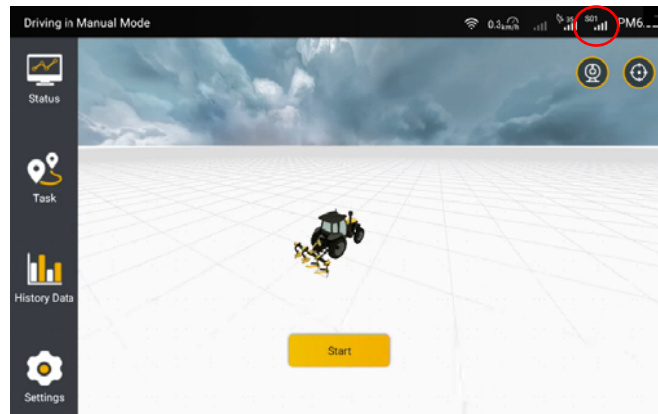


Figure 3.3.4 "SXX" displayed in the upper right corner when the SBAS mode is used

3.1.2 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.

3.1.3 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 tap Import button in the required guidance line tab to import the line to the current operation.

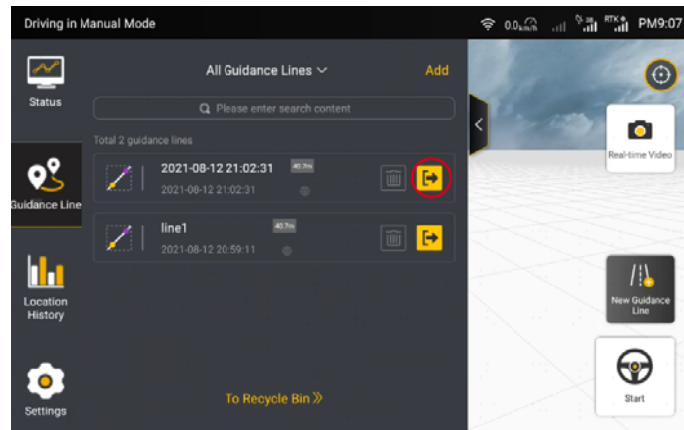


Figure 3.3.5 Guidance line list

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 multiline mode, as shown in the following figure.

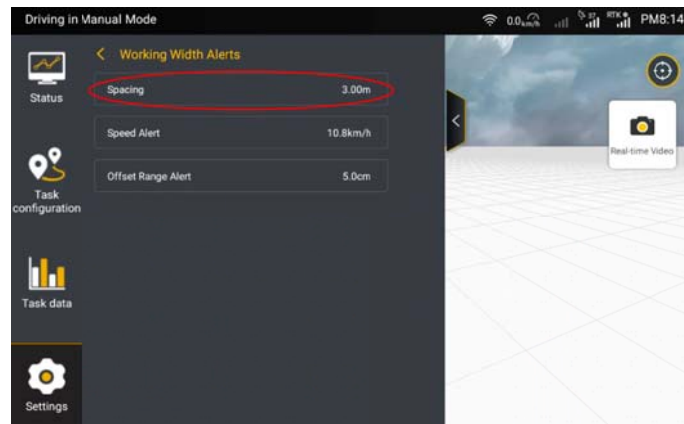


Figure 3.3.6 Setting the operating space

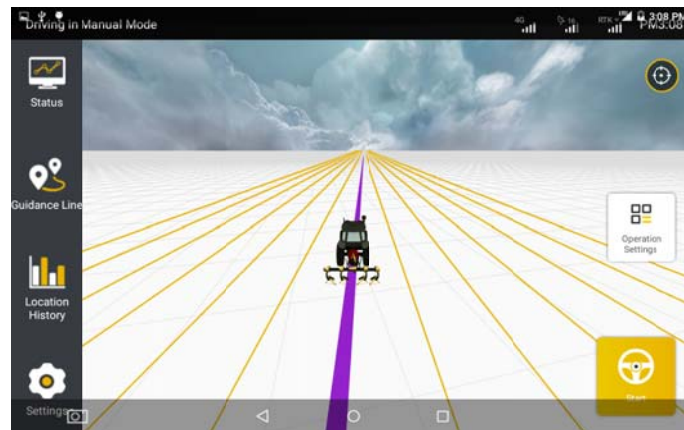


Figure 3.3.7 Guidance line imported

3.2 Preparatory Operation for Advanced Mode

Confirm Source connection → Add and select field → Add and select task → Add and select boundary → Add and select guidance line → Confirm task configuration → Start operation

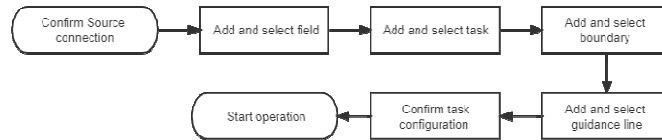


Figure 3.3.8 Preparatory operation flow chart

3.2.1 Confirm the Source Connection

Before preparing the operation, please confirm the current source connection. For the specific operation steps, see 3.1.1 Confirm the source connection.

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.

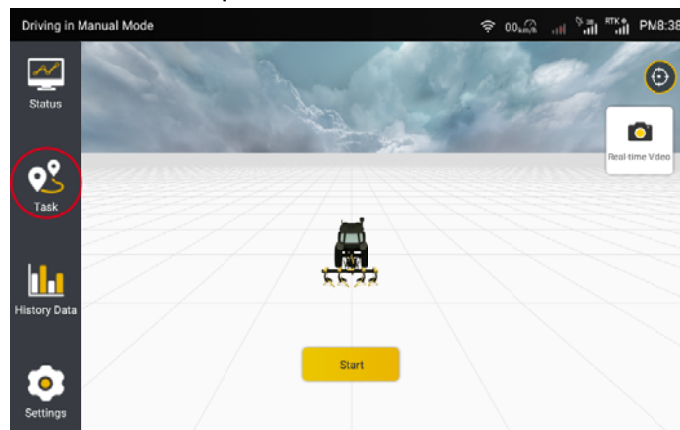


Figure 3.3.9 Task configuration entry

The configuration field interface is shown in the figure below:

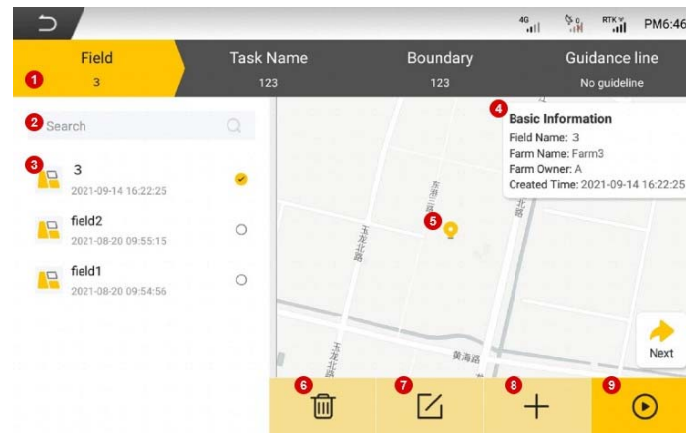


Figure 3.3.10 Configure field interface

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 deleted after deletion 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 is not selected, it is impossible to set the boundary, guidance line and task setting cannot be selected

Add field

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

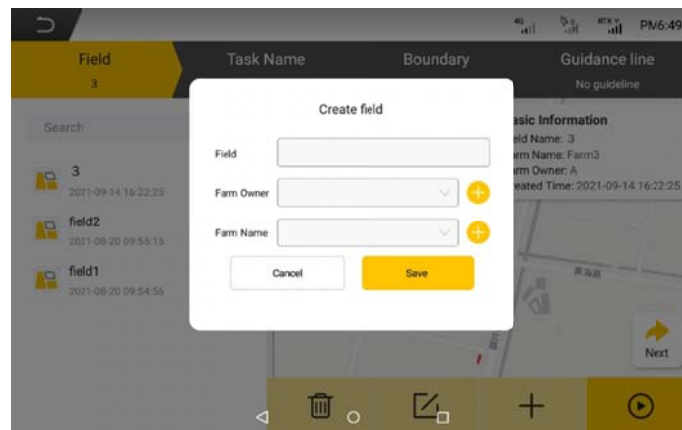


Figure 3.3.11 Interface for adding field

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:

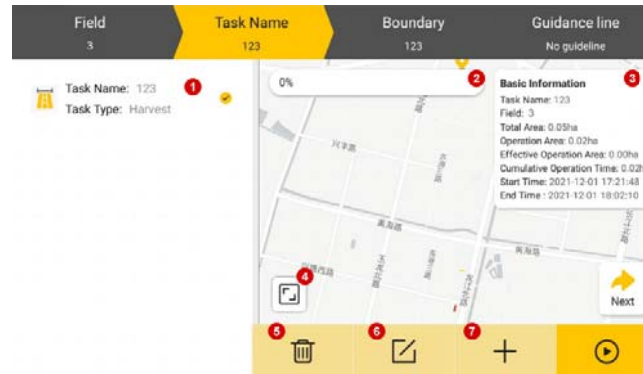


Figure 3.3.12 Setting Interface for Task Name

- 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:

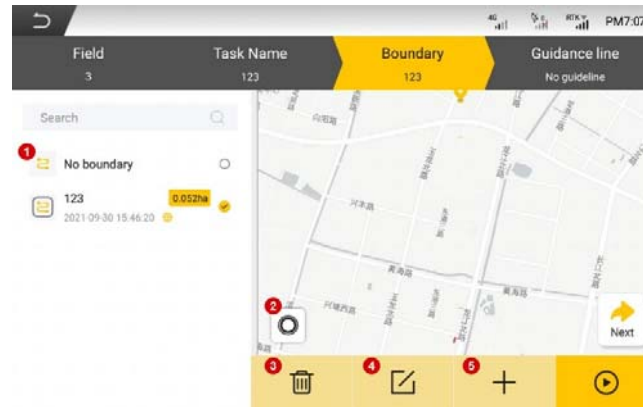


Figure 3.3.13 Interface for configuring boundary

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.

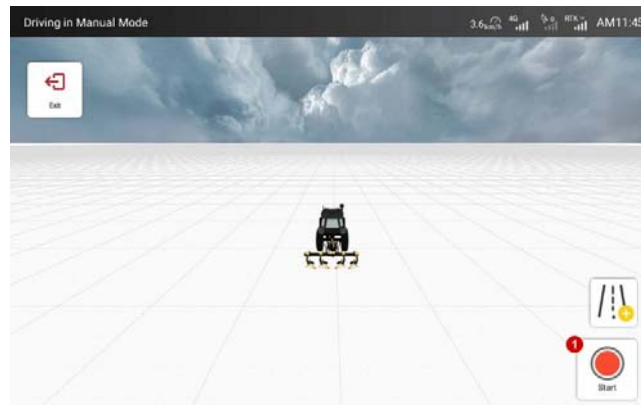


Figure 3.3.14 Interface of "Add Boundary"

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

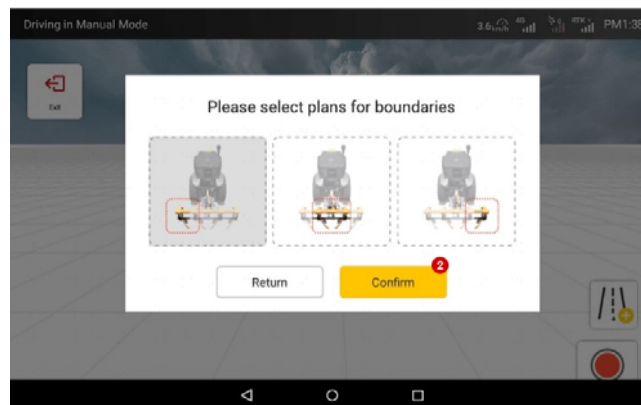


Figure 3.3.15 Interface of boundary plan

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

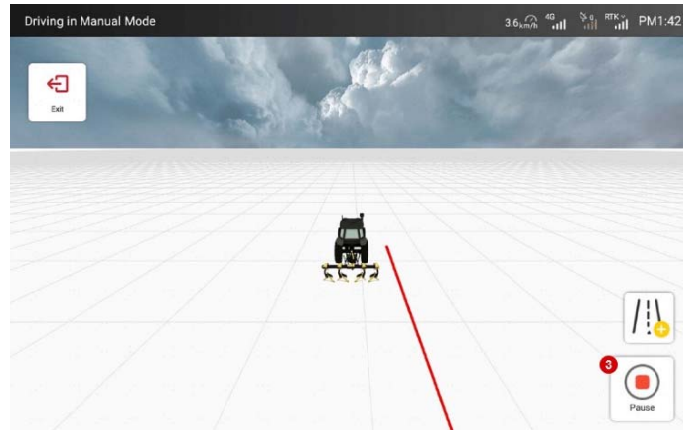


Figure 3.3.16 Interface when finished recording the boundary

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.

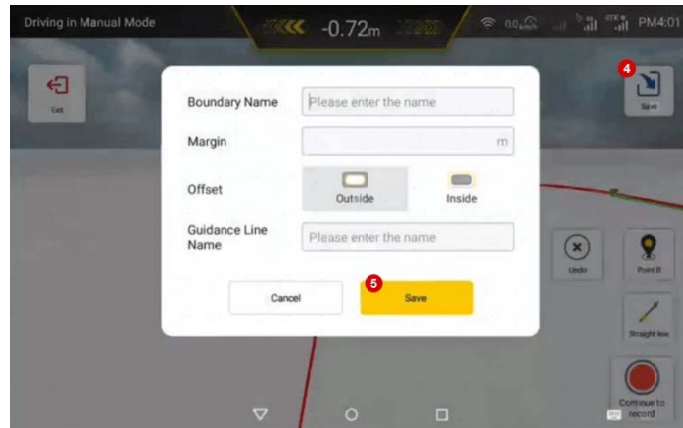


Figure 3.3.17 Interface of saving the boundary

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:

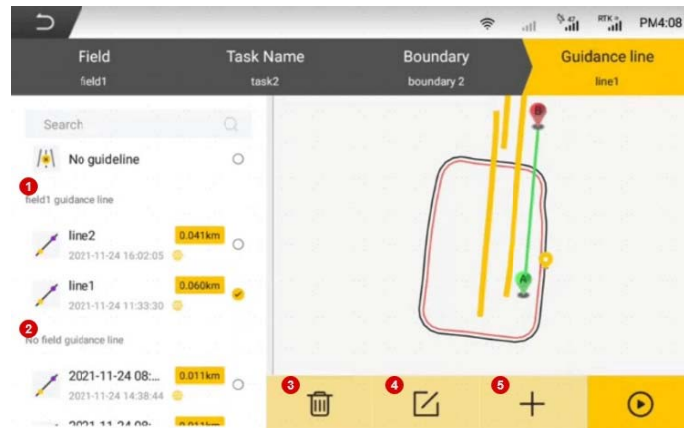


Figure 3.3.18 Interface for configuring guidance line

- 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.

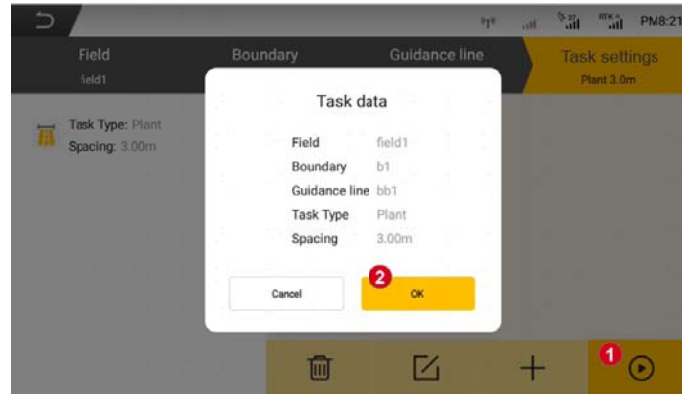


Figure 3.3.19 Interface for confirming configuration

4CreateGuidanceLines

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.

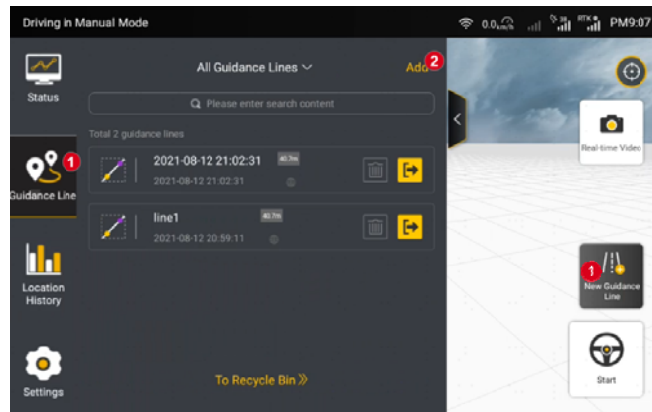


Figure 3.4.1 Adding new guidance lines in Fast Mode

In Advanced Mode, click the "Task" in the left 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.

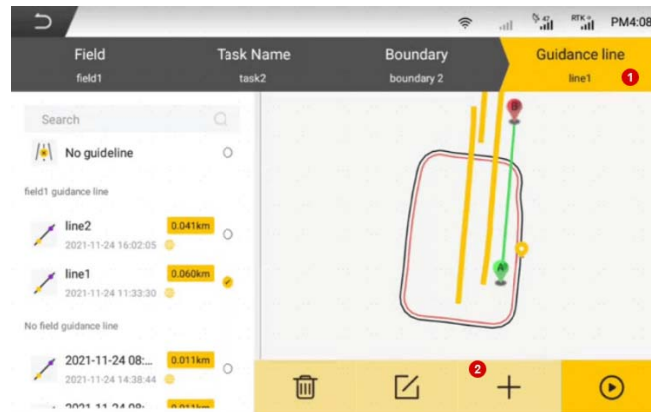


Figure 3.4.2 Adding guidance lines in Advanced Mode

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 tap **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 15–20 m.

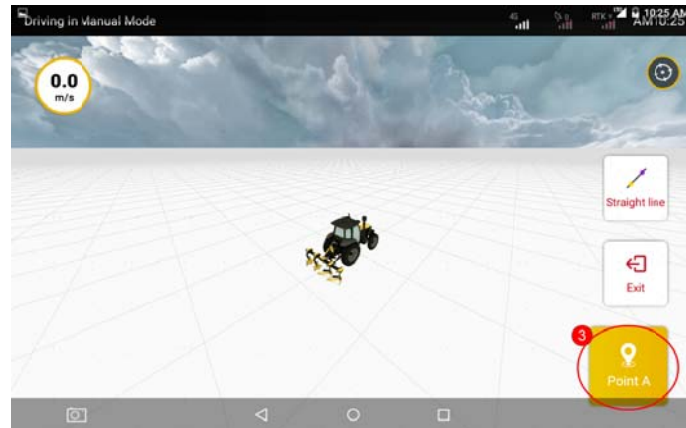


Figure 3.4.3 Confirming Point A

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

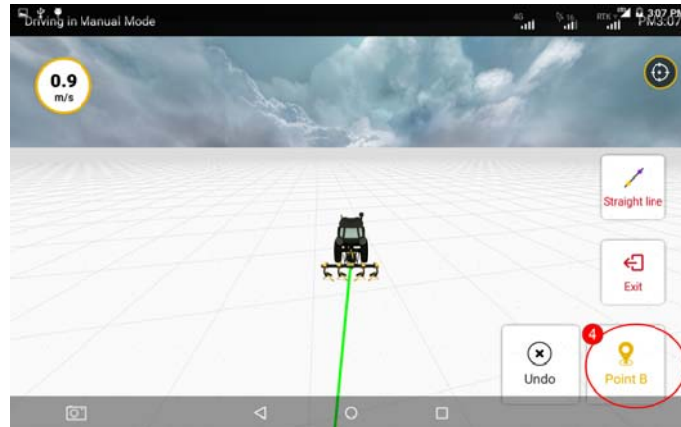


Figure 3.4.4 Confirming Point B

Step 3: After confirming Point B, please tap “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.

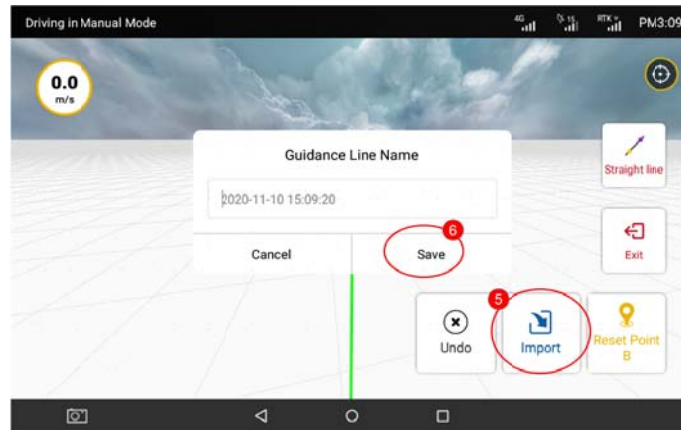


Figure 3.4.5 Import Guidance Line

● Curve Mode :

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

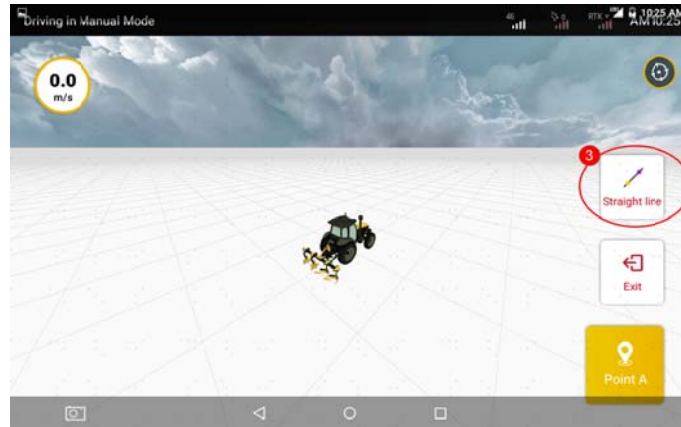


Figure 3.4.6 Switch plotting mode to the curve

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

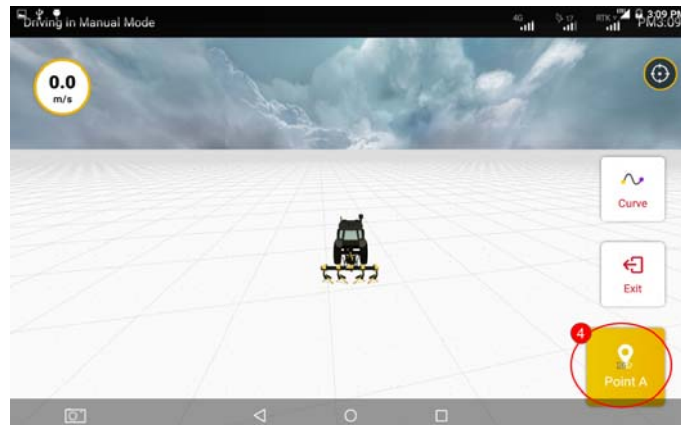


Figure 3.4.7 Confirming Point A

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 tap Confirm Point B.

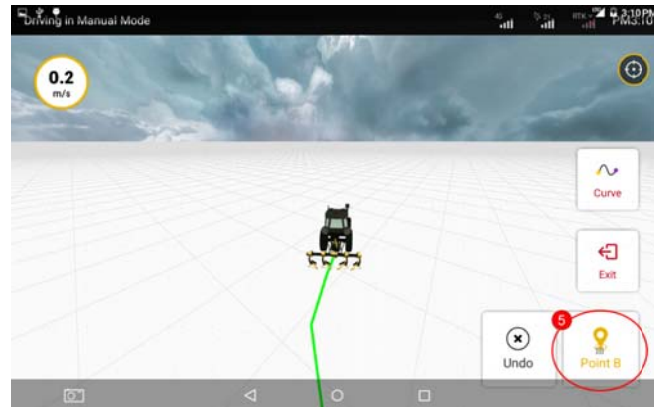


Figure 3.4.8 Confirming Point B

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

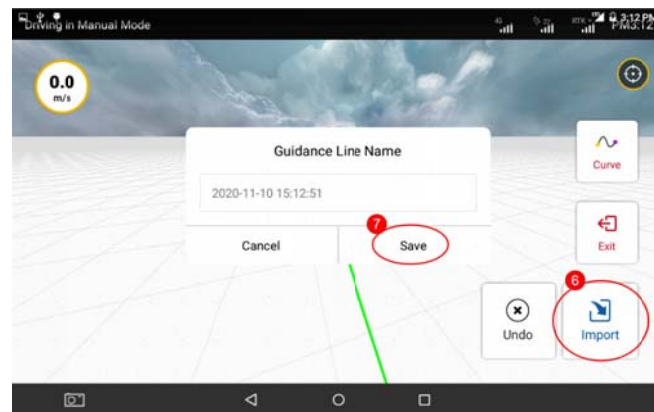


Figure 3.4.9 Import new guidance line

Notes for the curve mode:

1. In the curvilinear mode, Point A is the starting point and Point B shall be

a point on another field edge.

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

3. In curvilinear mode, after confirming Point A, you cannot directly tap Linear to switch to linear mode. Please cancel the plotting before switching the mode.

●Pivotmode :

Pivotmode 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.

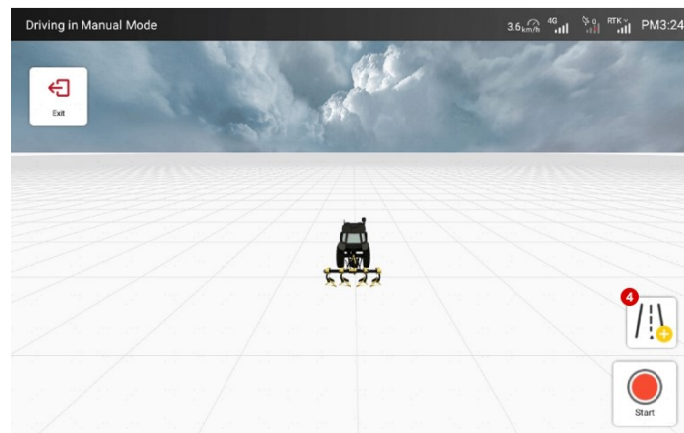


Figure 3.4.10 Create a guidance line

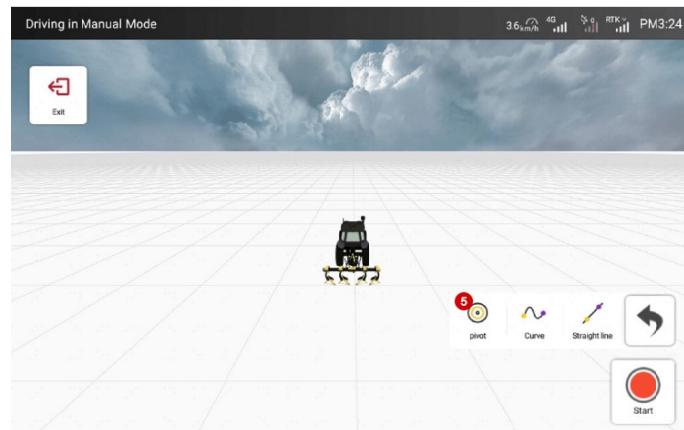


Figure 3.4.11 Switch to Pivot Mode

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".

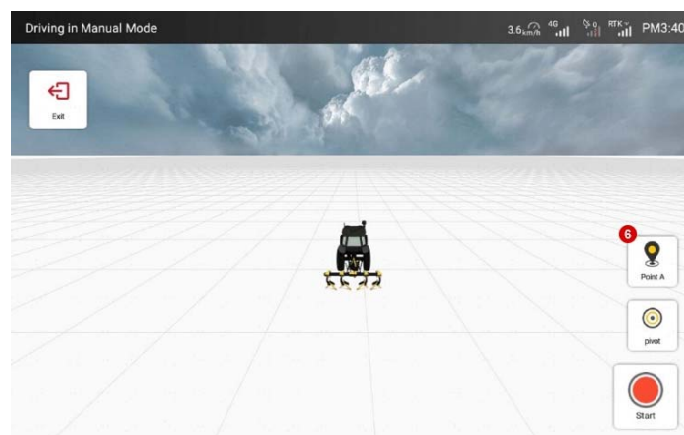


Figure3.4.12 SetpointA

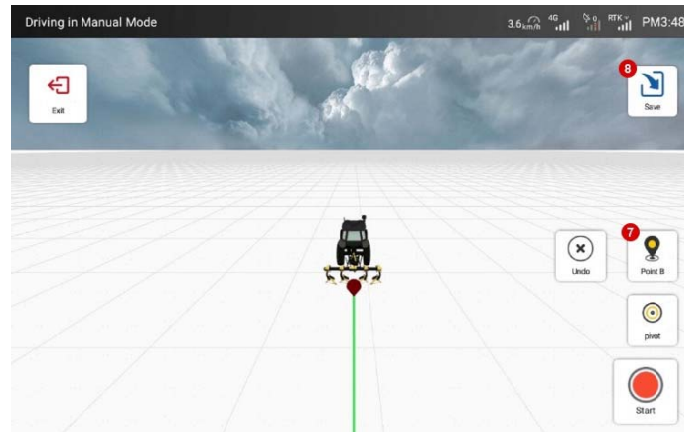


Figure3.4.13 SetpointB

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.

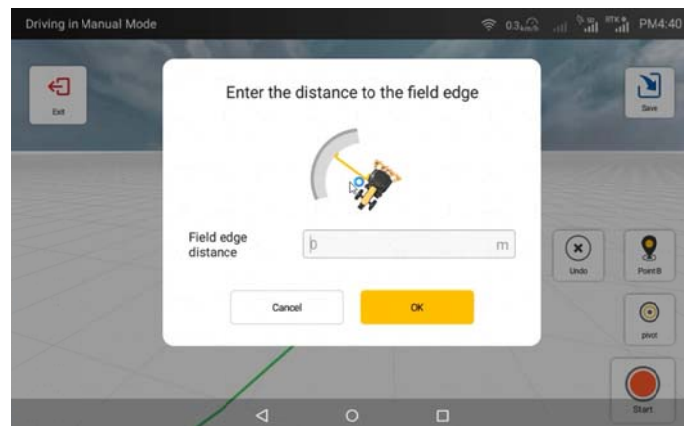


Figure 3.4.14 Set field edge distance

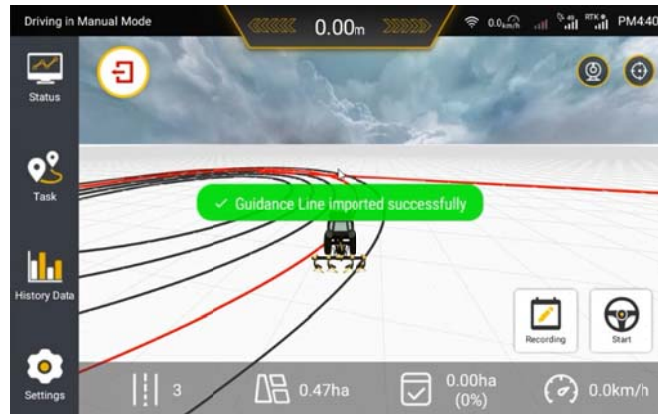


Figure 3.4.15 Interface of working with Pivot Mode

Note: When working with Pivot Mode, when 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, and then repeat the above operations until all paths are completed.

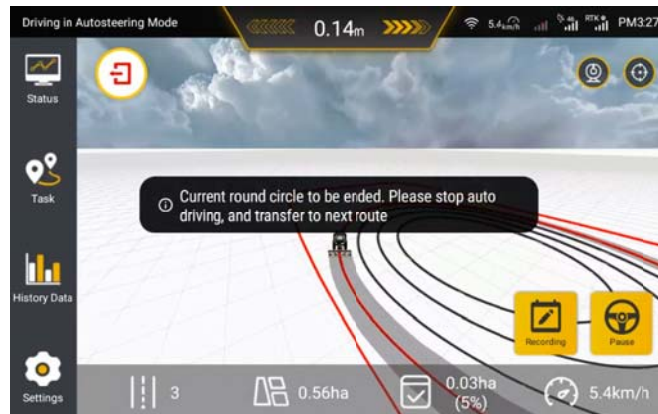


Figure 3.4.16 Interface of auto-steering