
SingularXYZ



SAGRO180
GNSS Guidance System
User Manual

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Corporate Office

SingularXYZ Intelligent Technology Ltd.

Address: Floor 2, Building A, No. 599 Gaojing Road, 201702 Shanghai, China

Tel: +86-21-60835489

Fax: +86-21-60835497

Website: <https://www.singularxyz.com>

E-mail: singularxyz@singularxyz.com

Technical Assistant

If you have any questions that can't be solved in this manual, please contact your local SingularXYZ distribution partner. Alternatively, request technical support from SingularXYZ Intelligent Technology Ltd.

Support Email: support@singularxyz.com

Support Teams: support@singularxyz.com

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1 System Introduction

The SAgro180 seamlessly integrates multiple cutting-edge technologies, such as GNSS high-precision positioning, GNSS + IMU navigation, and autopilot. This manual helps you better understand product parameters, system settings, software operation precautions, and other information.

1.1 Packing List

Table1: Packing List

Electric Motor		Steering Wheel	
S300 GNSS Receiver		T10 Tablet	
Camera		Main Harness	
G200 IMU Sensor		450-470MHz Radio Antenna	
T-shaped Motor Bracket (A, C)		T-shaped Motor Bracket Fixing Ring (A/B, A/C)	
L-shaped Motor Bracket		RAM Mount (With Ball Head)	

<p>IMU Sensor Mount Kit</p>		<p>Spline Sleeve (A, B, N)</p>	
<p>Cable Tie Kit</p>		<p>Tablet Fixing Kit Type-A (Hex Head Self-Drilling Screw)</p>	
<p>Tablet Fixing Kit Type-B (U-bolt)</p>		<p>Warning label</p>	

2 System Installation

2.1 Electric Steering Wheel Installation

2.1.1 Disassemble the Original Steering Wheel

After selecting the appropriate sleeve and turning the shaft nut to the top of the shaft, ensure that 2–3 threads remain exposed to protect the steering column from damage during the removal process. With your legs braced against the steering wheel for leverage, use a hammer to strike the nut forcefully until the original wheel loosens, at which point it can be removed. If this method proves ineffective, utilize a puller, ensuring it is securely fixed to prevent component damage or personal injury. In cases where the steering wheel remains stuck despite these efforts, a grinder may be used as a final resort to facilitate removal.



2.1.2 Install the Spline

Select a suitable spline based on the specific vehicle model (Please specify the diameter and teeth number of your tractor steering shaft). Install the spline onto the shaft and manually shake it to check for any noticeable gaps. If a gap is present, replace it with a better-fitting spline. Once the correct spline is selected, install it onto the electric steering wheel and securely tighten the screws. Align the center of the spline with the tractor's steering shaft.



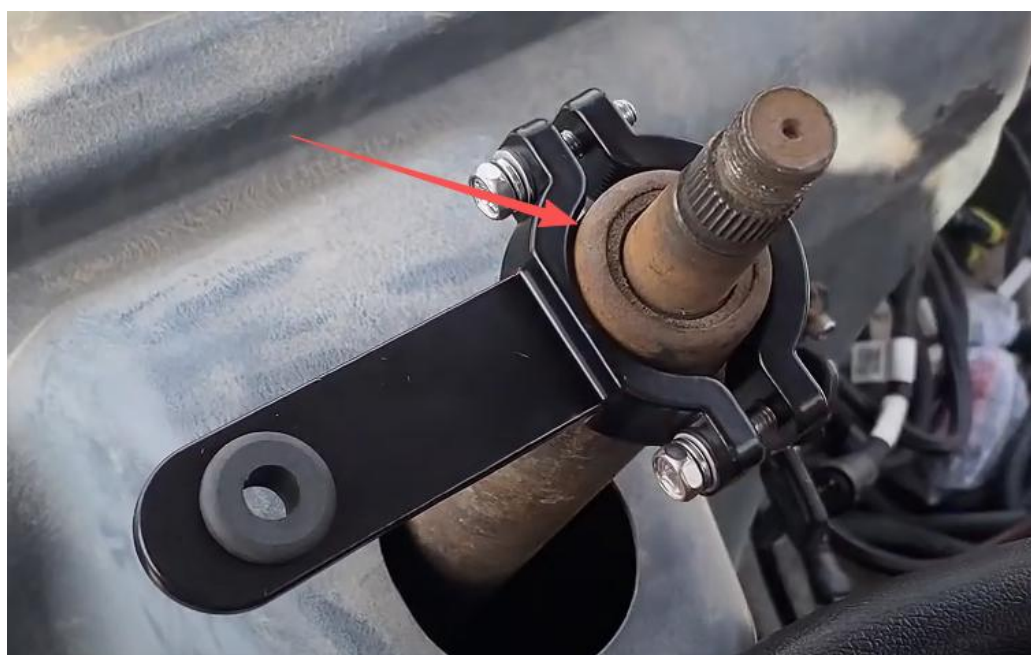
2.1.3 Install the T-shaped Bracket

Secure the T-shaped bracket to the motor housing, but do not fully tighten the screws. Connect the T-shaped bracket to the ring clip below. Once secure, tighten the screws.



2.1.4 Install the Ring Buckle

Ensure the ring buckle is rigidly connected to the vehicle's central steering column housing. Double check that it is securely installed to prevent any movement or loosening.



2.2 S300 GNSS Receiver Installation

To ensure a stable and accurate installation, the S300 GNSS Receiver should be mounted on the tractor's roof rather than the engine compartment, which helps mitigate potential issues from heat and vibration. Begin by thoroughly cleaning the roof with a wet towel to remove all dust, ensuring the surface is completely dry before proceeding. Use a tape measure to identify and mark the center of the vehicle's roof, as well as the center of the crossbar, to facilitate precise alignment of the components. Once the center is marked, peel the 3M adhesive backing from the S300 GNSS Receiver bracket and position it so that the directional arrow points toward the front of the vehicle (Please secure the receiver with screws if possible). If the roof surface is sloped, utilize the adjustment screws on both sides of the controller to ensure the unit remains perfectly level.

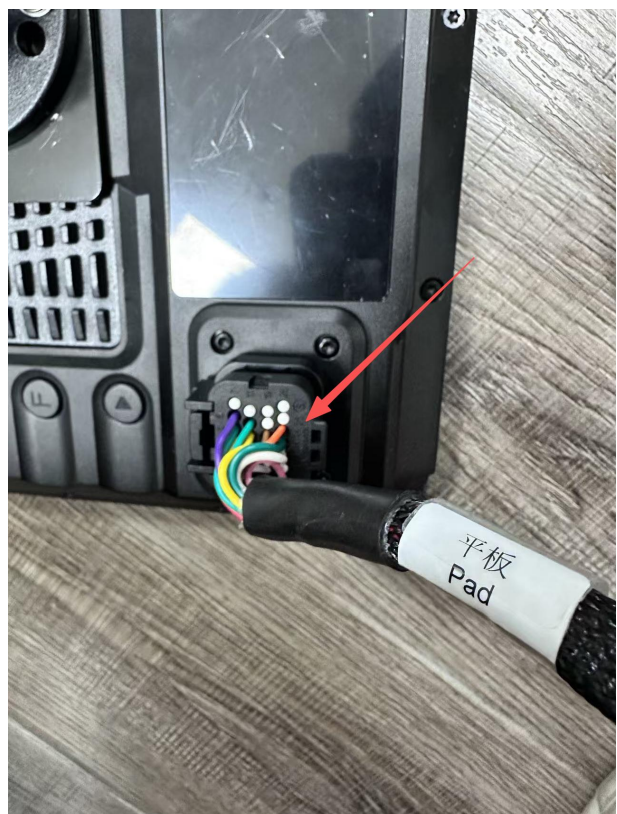
2.3 T10 GNSS Tablet Installation

Select the door armrest pillar on the right side of the driver's cab to fix the ball-head bracket using a U-shaped buckle, or if no such pillar is available, identify a suitable alternative position to secure the bracket with dovetail nails. When drilling for these nails, it is critical to first verify that no original vehicle cables are located within the steel tube at the chosen site to prevent electrical damage. Once the bracket is firmly mounted, attach the RAM connecting arm to the ball head and adjust it to the desired viewing angle before tightening the side knob to lock the assembly in place. Finally, ensure the display or controller is securely seated on the bracket and that all mounting hardware is tensioned to withstand the vibrations of field operation.



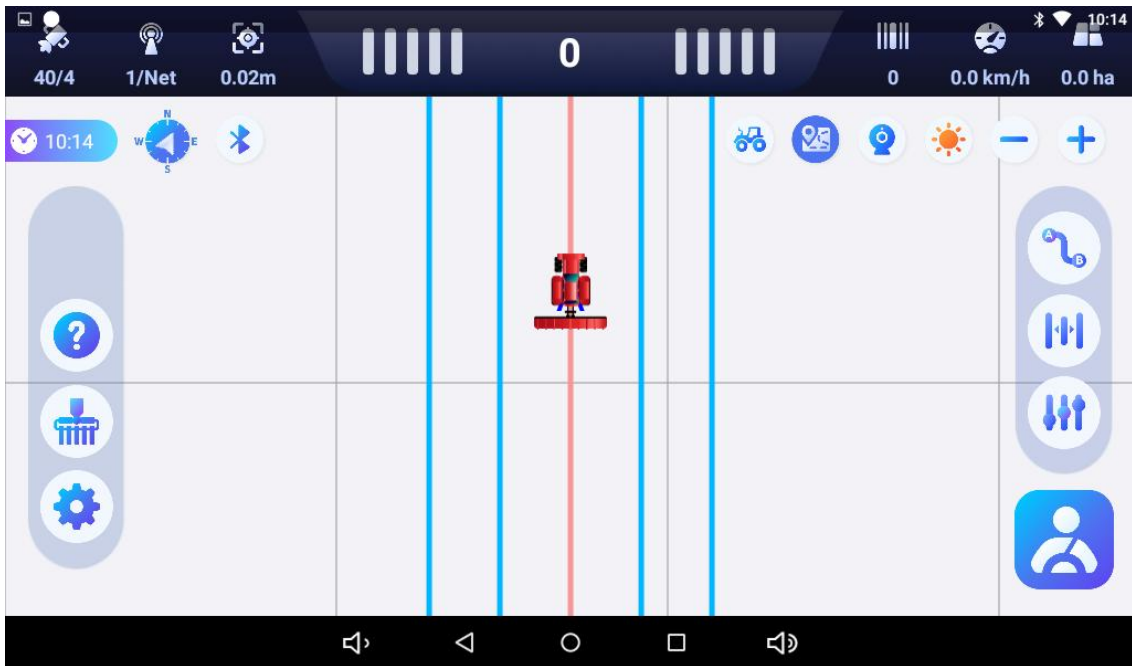
2.4 Connecting the Main Cables

After connecting the motor connector, install the rocker switch and attach both the computer and rocker switch connectors before proceeding to link the S300 GNSS Receiver to the system. Mount the camera in a stable position on the vehicle and securely connect its cable, ensuring all wiring is tidy and clear of moving parts (You can use Table tie kit to organize the wire harness). With the rocker switch set to the **OFF** position, connect the power cable to the vehicle battery by attaching the positive (+) pole first followed by the negative (-) pole. Turn the rocker switch to the **ON** position to power up the system; the computer will boot automatically, at which point you should verify that the application is functioning correctly. If the system operates as expected, the installation is complete; otherwise, perform a thorough inspection of all cable connections to ensure they are properly seated.





3 System Configuration



Only when the displays of the satellite positioning status, control accuracy and the 4G signal status are all in gray, the system can then carry out auto-steering operations

Red line: the current operation line of the vehicle.

Blue line: the line where the vehicle has operated on or is going to operate on.



Number of satellites searched by the receiver



Correction data age



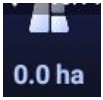
Device accuracy



Number of navigation lines



Vehicle Speed



Work Area Size



Device Heading and Device Information



Control vehicle speed and heading (this feature is supported only in Demo Mode)



Turn on/off the camera



Switch screen brightness for different weather modes.









Zoom in



Zoom out

Table 2: Signal Status Description


Satellite positioning status	<p>Red: poor positioning</p>  <p>accuracy 10/1</p>	<p>Gray: high positioning</p>  <p>accuracy 40/4</p>
------------------------------	---	--

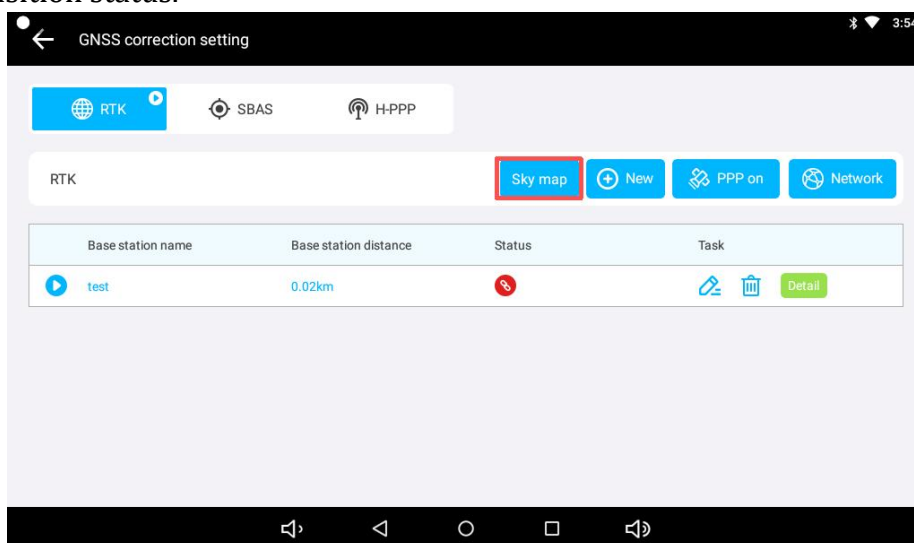
Estimated Accuracy	Red: poor positioning differential signal  quality	Gray: high positioning differential signal  quality
Network signal status	Red: Weak network  connection	Grey: Strong Network  Connection

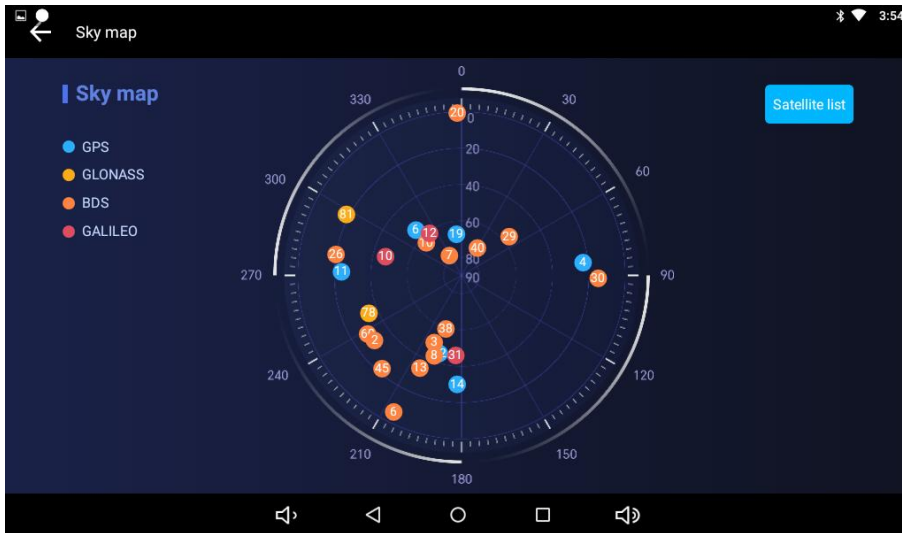
3.1 GNSS Correction Setting

In this feature, you can configure differential positioning for the device. You can set **Ntrip setting**, **Radio settings**, enable **SBAS** and enable **H-PPP**.

3.1.1 Sky Map

Click  to enter the satellite view interface, where you can check the device's satellite acquisition status.



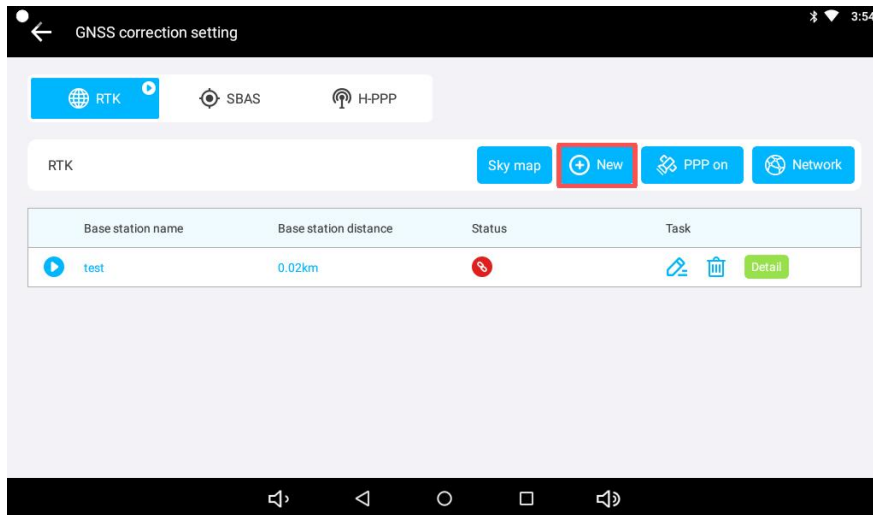


Click [Satellite list](#) to enter Satellite list interface. You can conduct a detailed check of the device's satellite acquisition status.

Satellite No.	Type	Elevation angle	Azimuth angle	C/N ratio
14	GPS	30	180	44
22	GPS	46	193	45
6	GPS	56	318	36
11	GPS	26	272	26
19	GPS	67	359	29
4	GPS	20	84	29
78	GLONASS	37	247	40
81	GLONASS	20	299	30
60	BDS	31	237	38
2	BDS	32	232	37
3	BDS	51	199	37
13	BDS	35	202	43
38	BDS	60	192	41
8	BDS	44	196	36
29	BDS	54	53	27
6	BDS	7	205	22
45	BDS	24	219	26
10	BDS	65	317	20

3.1.2 Ntrip Mode

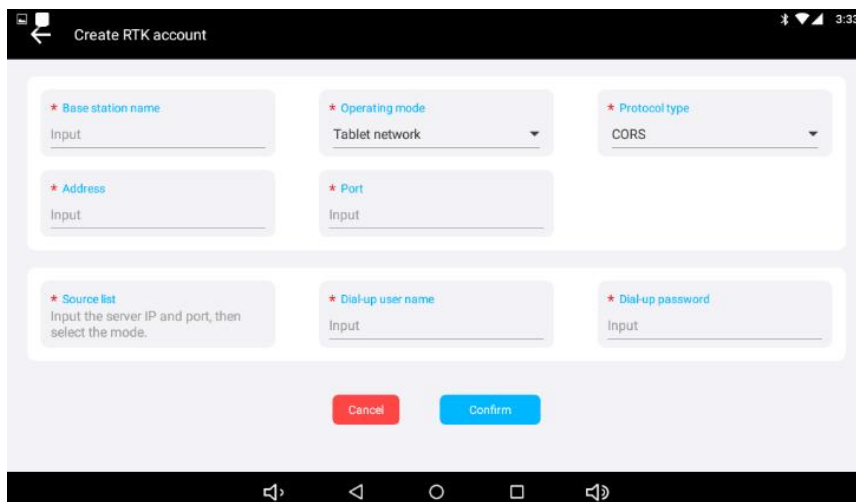
Click **New** to create a new project.



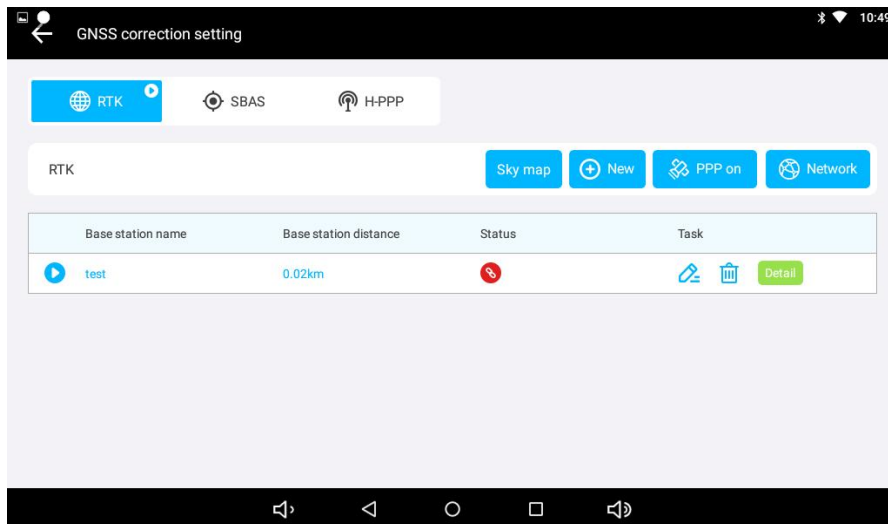
You need enter the following parameters: **Base station name**, **Operating mode** (Receiver network or Tablet network), **Protocol type**, **Address** and **Port**.


After enter above parameters. Click **Source list** to obtain the Mountpoint list. You need to choose one of them, then **enter Dial-up user name** and **Dial-up password**.


Click **Confirm** icon to save this account.




After that, you can see the account you just saved displayed in the list. It will show the Base station distance and status.



If  is displayed to the left of the base station name, it means that this account is currently in use.

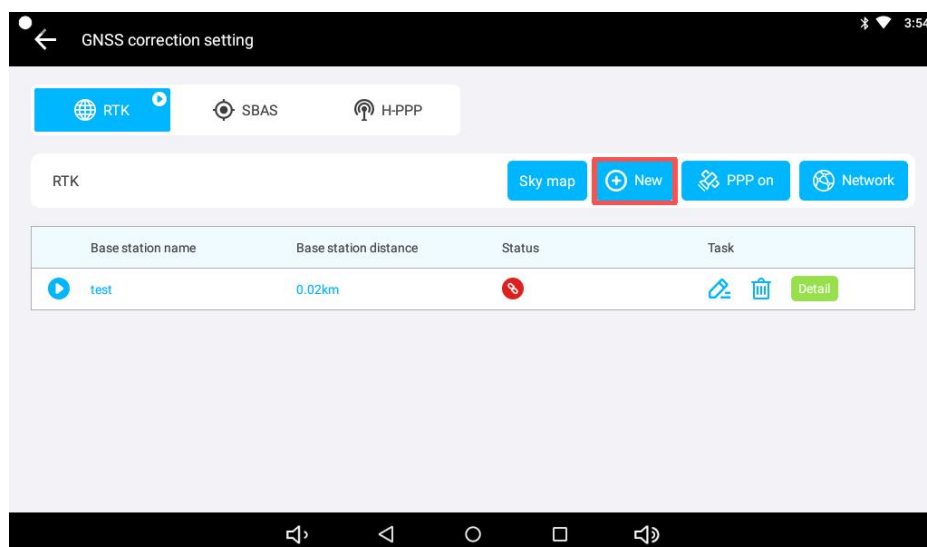
Click  to edit this account

Click  to delete this account

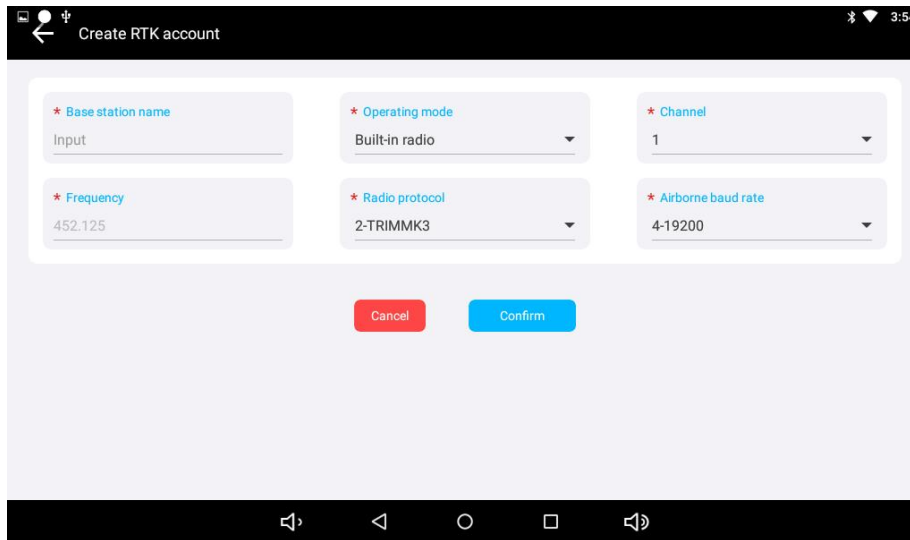
Click  to check network status

3.1.3 Radio Setting

Click **New** to create a new Radio account.

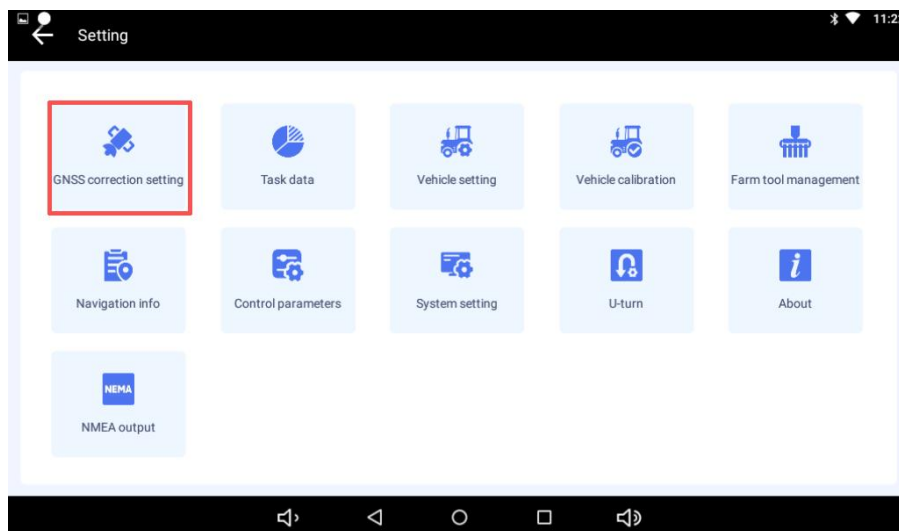


Choose Operating mode as **Built-in radio**, set **Channel**, **Radio protocol** and **baud rate**. Set **Frequency**, when you choose **0** channel, you can customize the frequency. Then Click **Confirm** icon to save this Radio account.

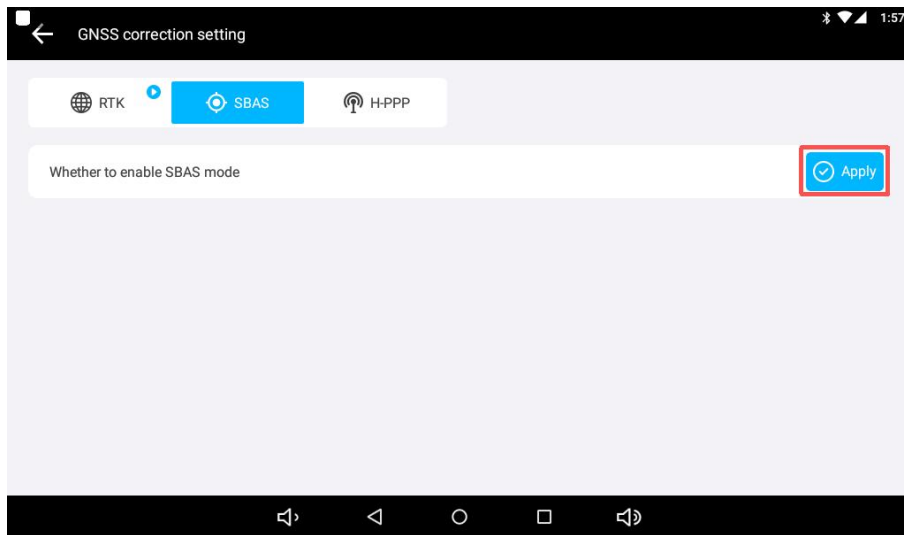


3.1.4 SBAS and H-PPP Mode

Go to **GNSS correction setting**.

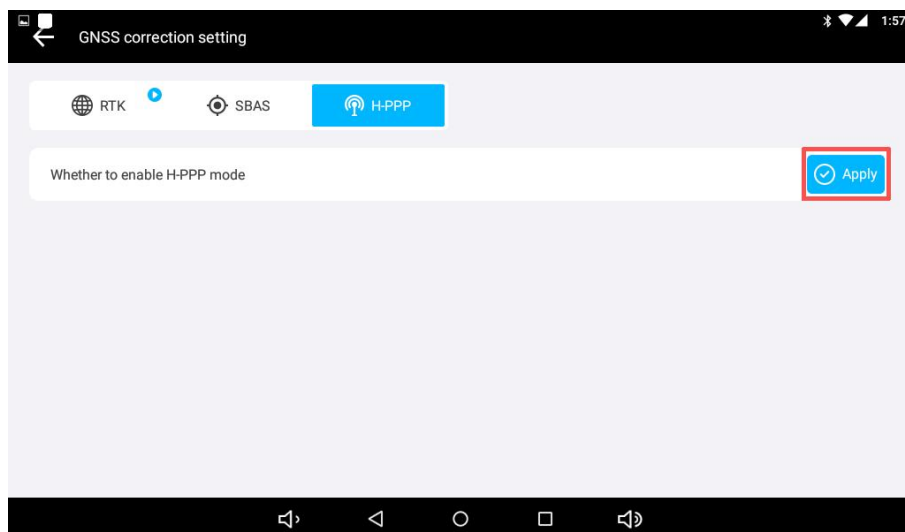
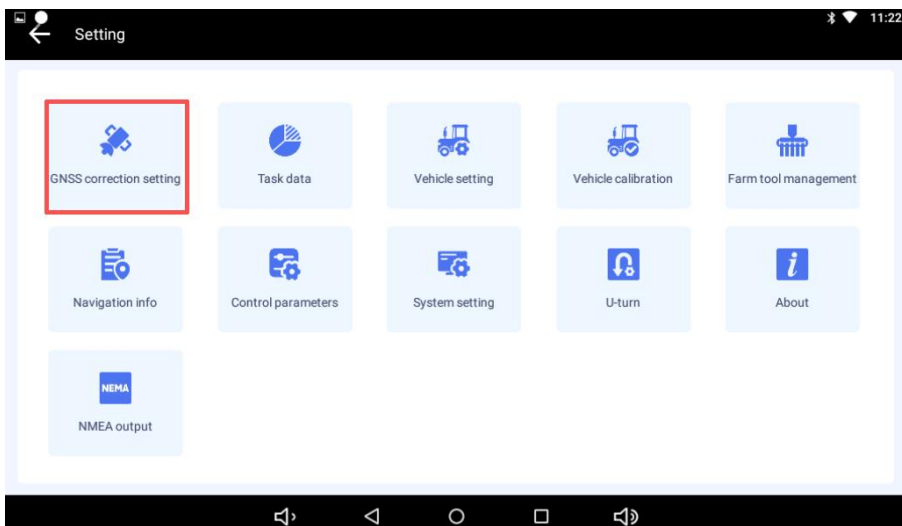


If you need **SBAS** function, you need go to SBAS interface then click **Apply** to enable SBAS mode.



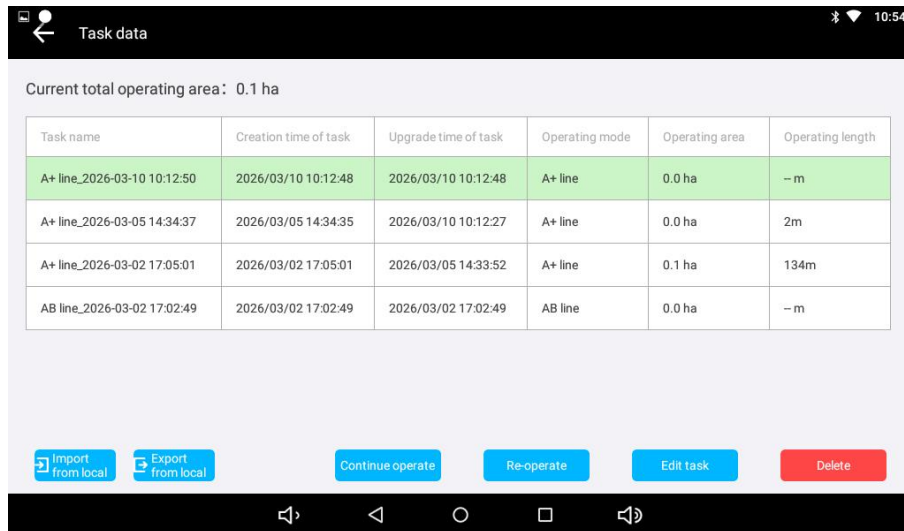
Go to GNSS correction setting. To the right of the SBAS function is the **PPP** function.

You can click **Apply** to enable PPP mode.



3.2 Task Data


On this screen, you can see all the tasks you've created. Click on the task you want to edit. The taskbar displays green to indicate the current task and red to indicate the currently selected task.




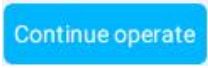
Current total operating area: 0.1 ha

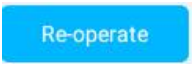
Task name	Creation time of task	Upgrade time of task	Operating mode	Operating area	Operating length
A+ line_2026-03-10 10:12:50	2026/03/10 10:12:48	2026/03/10 10:12:48	A+ line	0.0 ha	-- m
A+ line_2026-03-05 14:34:37	2026/03/05 14:34:35	2026/03/10 10:12:27	A+ line	0.0 ha	2m
A+ line_2026-03-02 17:05:01	2026/03/02 17:05:01	2026/03/05 14:33:52	A+ line	0.1 ha	134m
AB line_2026-03-02 17:02:49	2026/03/02 17:02:49	2026/03/02 17:02:49	AB line	0.0 ha	-- m


Import from local Export from local Continue operate Re-operate Edit task Delete

Click  you can import task from local

Click  you can export task from local

Click  you can continue with this task

Click  you will clear the task data

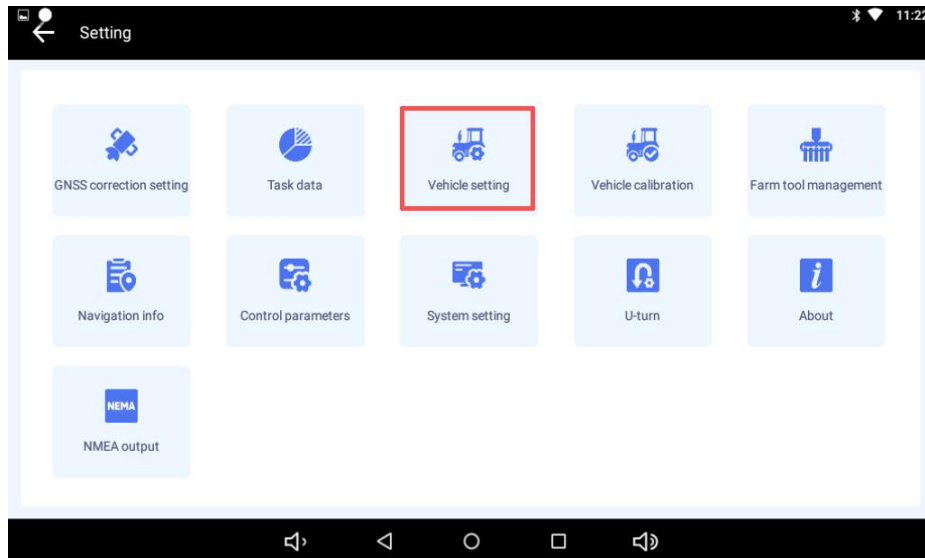
Click  you can edit this task name

Click  you can delete this task

3.3 Vehicle Setting

3.3.1 Vehicle Parameter Setting

Go to **Vehicle Setting**.



Click **Setting**, then go to **Vehicle setting**, select **Vehicle parameter**. Parameters to be input include the contents shown below:

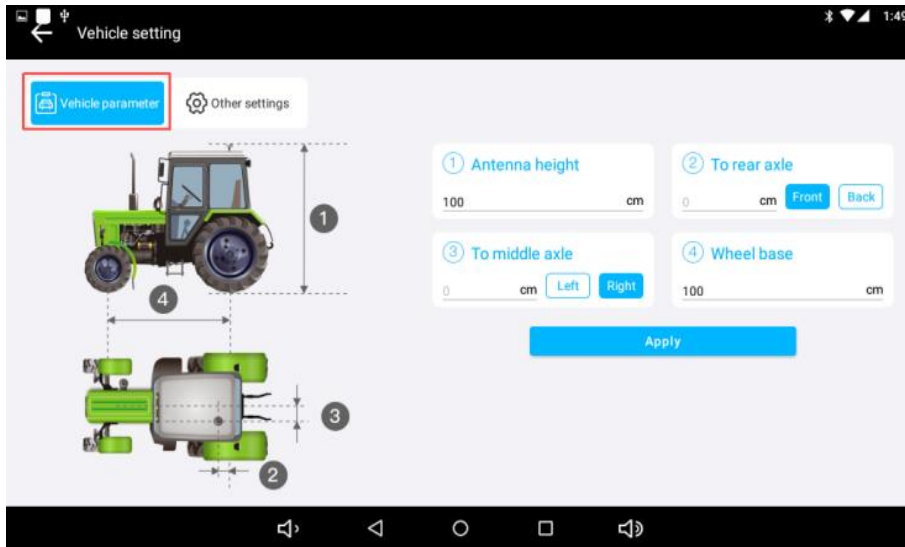
Antenna height: Height from the roof antenna to the ground

To rear axle: The horizontal distance from the antenna to the center axis of the rear wheel

To middle axle: The horizontal distance from the antenna to the vehicle's central axis.

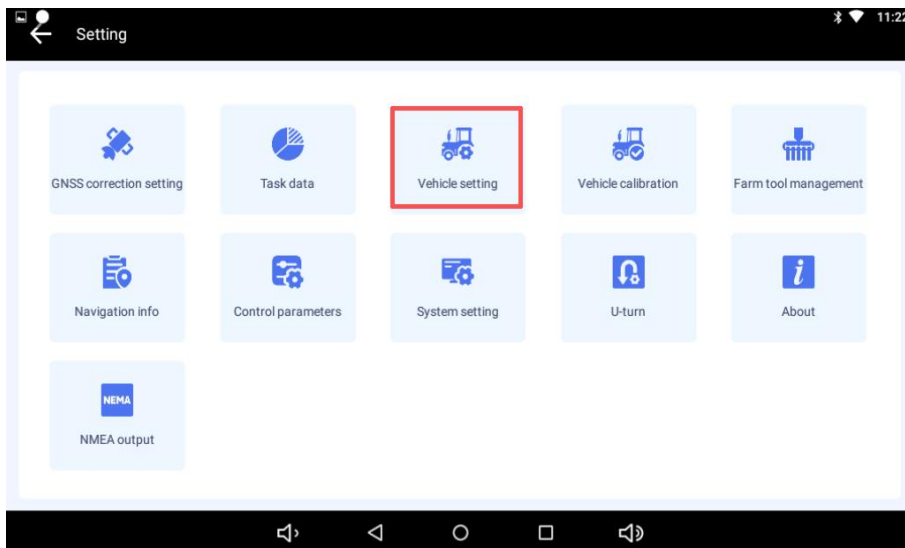
Wheel base: The distance between the front and rear wheel axles

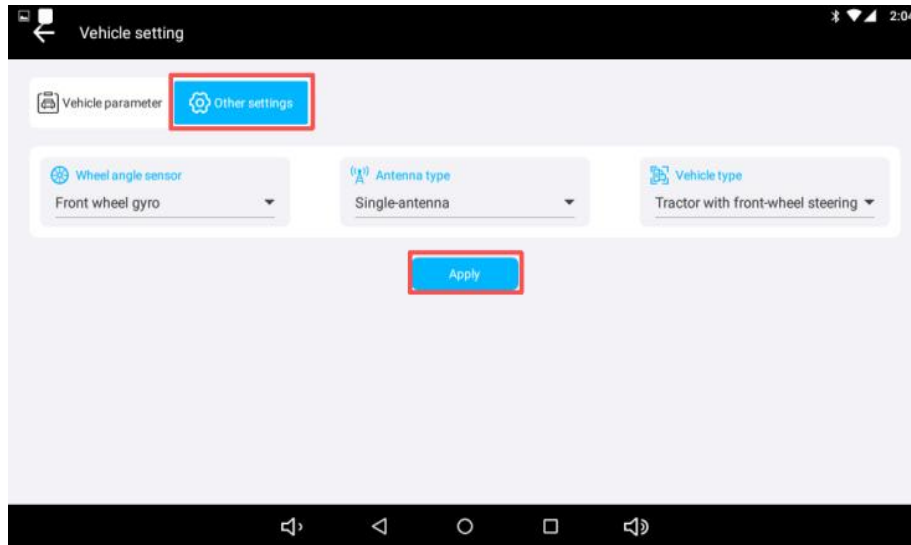
After all parameters are input, click **Apply**, and the system will save all parameters automatically.



3.3.2 Other Setting

Click **Setting**, select **Vehicle setting**, then go to **Other settings**. Set **Front wheel encoder** for **Wheel angle sensor**, then set **Antenna type** and **Vehicle type** respectively. The default settings are as shown below. After the setting, click **Apply**, and the system will save all parameters automatically.



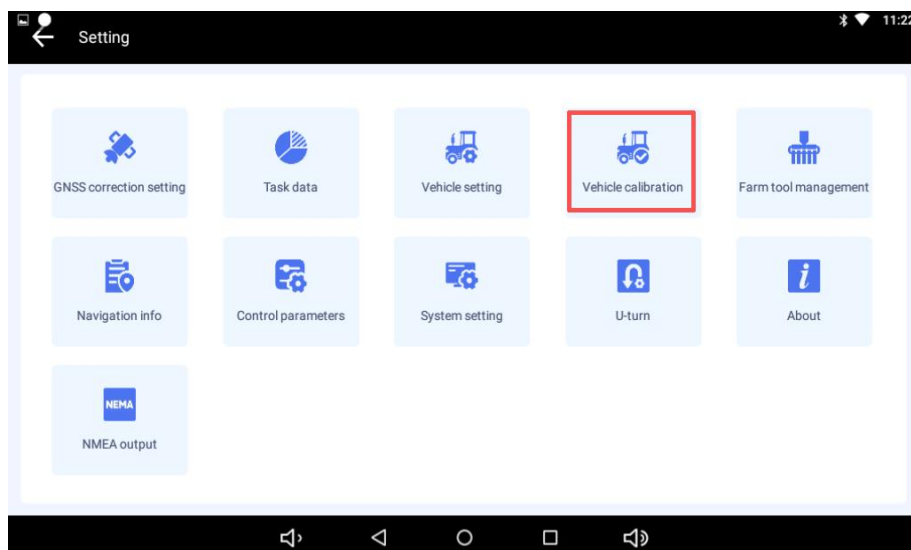


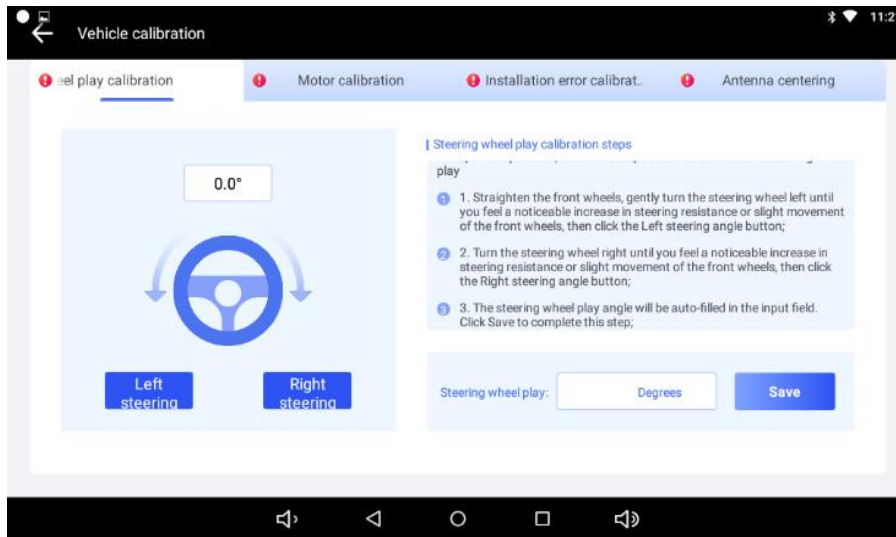
3.4 Vehicle Calibration

On this interface, you can do the steering wheel play calibration, motor calibration, installation error calibration, and antenna centering.

3.4.1 Steering Wheel Play Calibration

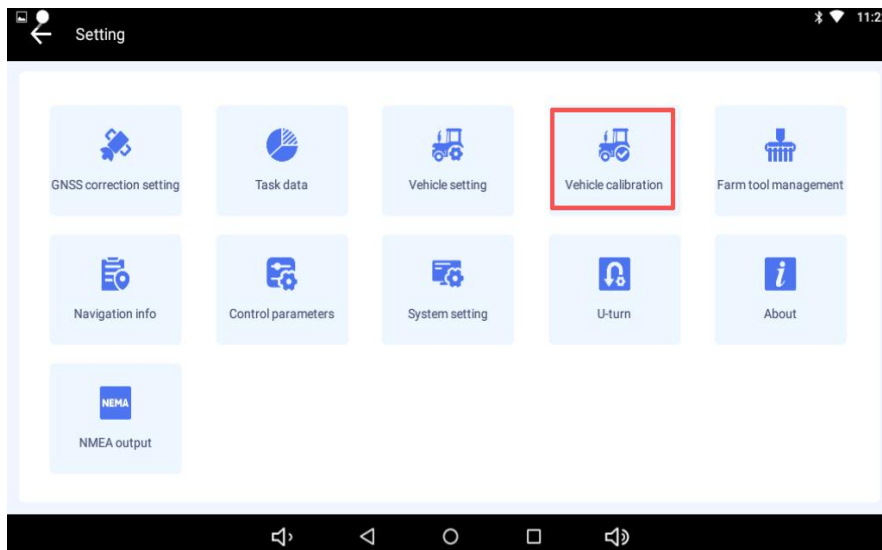
First, center the front wheels; then, follow the prompts on the right side to perform the calibration. Once the operation is complete, the calibration angle for **Steering Wheel Play** will be automatically generated. Click **SAVE** to finalize the calibration.

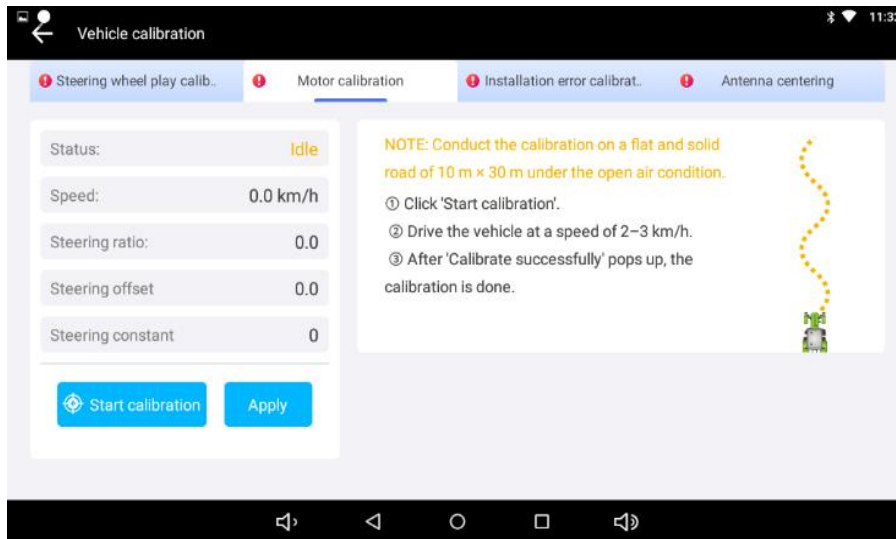




3.4.2 Motor Calibration

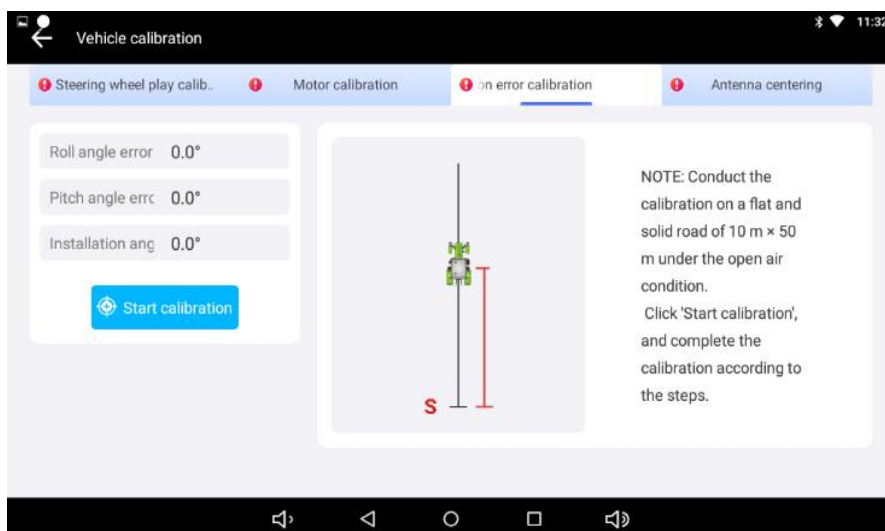
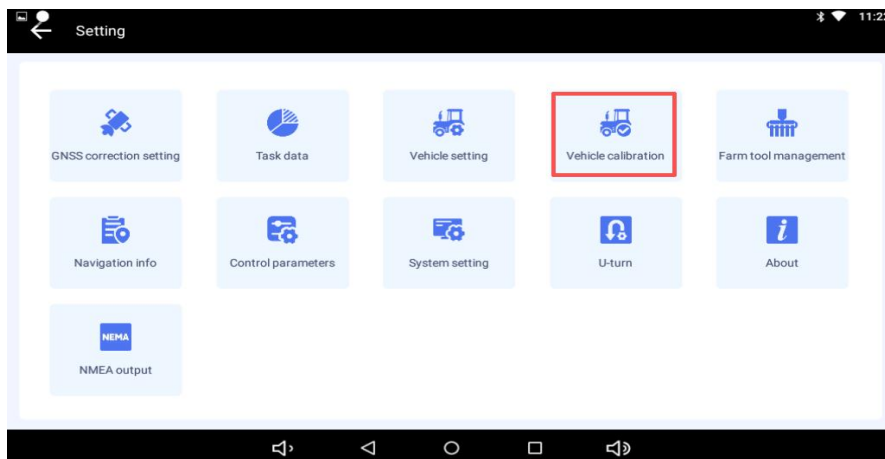
Motor calibration should be carried out on a flat road. Click **Setting**, select **Vehicle Calibration**, then **Motor Calibration** and click **Start**. The vehicle will drive automatically on a curved line as shown below. The calibration time is about 30 seconds, and the result will pop up automatically after the calibration.



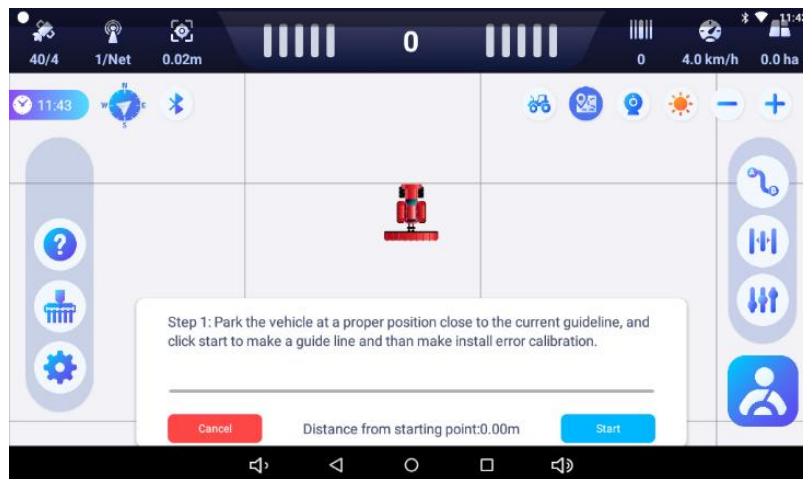


3.4.3 Installation Error Calibration

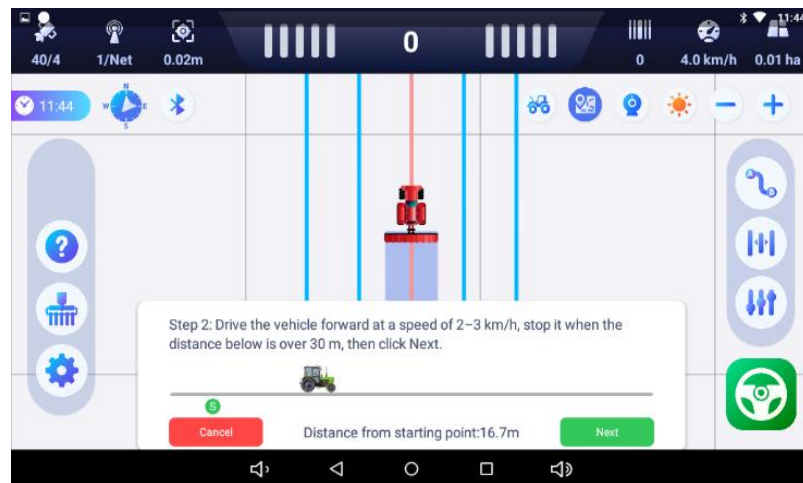
Go to **Vehicle calibration interface**, then select **Installation error calibration**. Click **Start Calibration**.



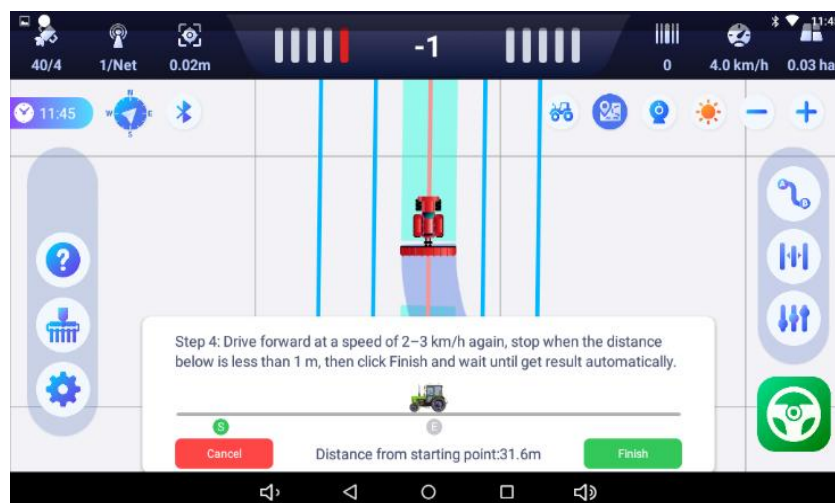
click **Start** to start calibrate.



After the vehicle has driven for more than 30 meters, and the steering wheel begins to turn automatically, click **Next**.

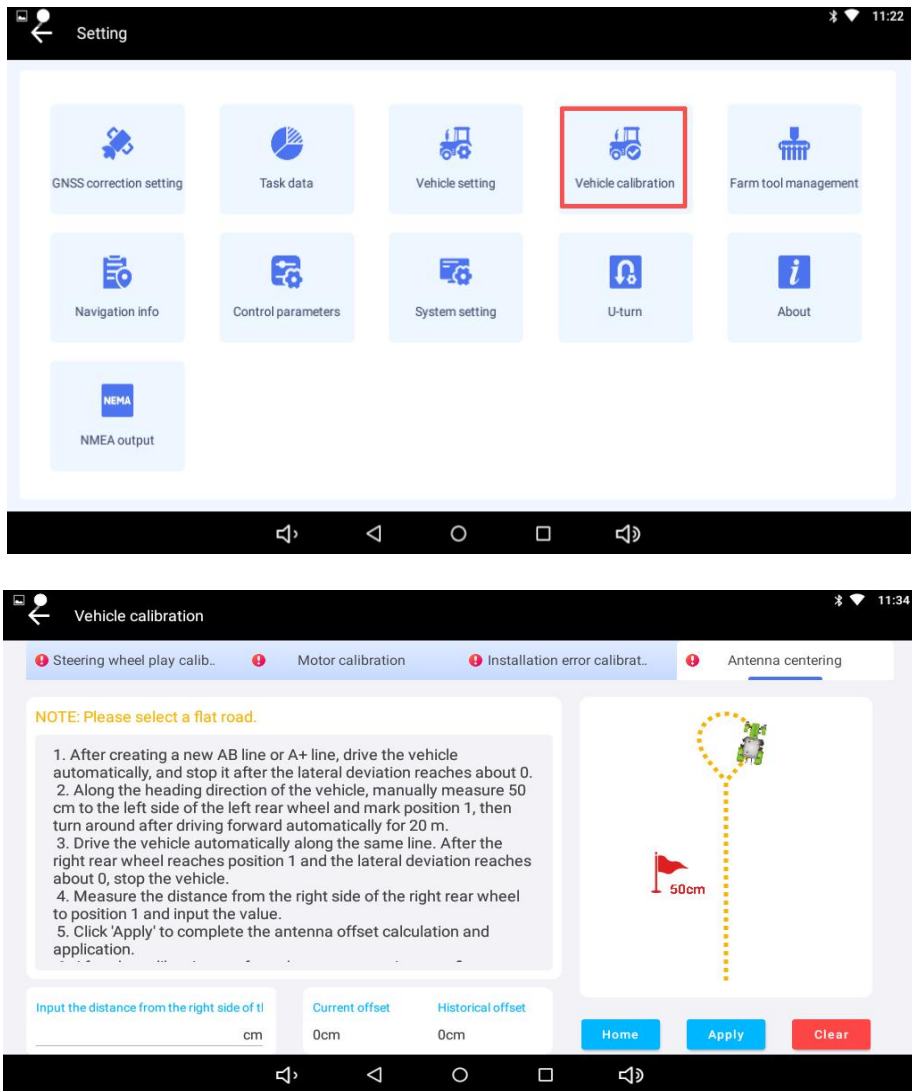


Manually turn the vehicle around. Click **Next**. The vehicle will follow the preset line as the steering wheel turns automatically. When the vehicle is within 1 meter of the starting position, click **Finish** to complete the installation error calibration.



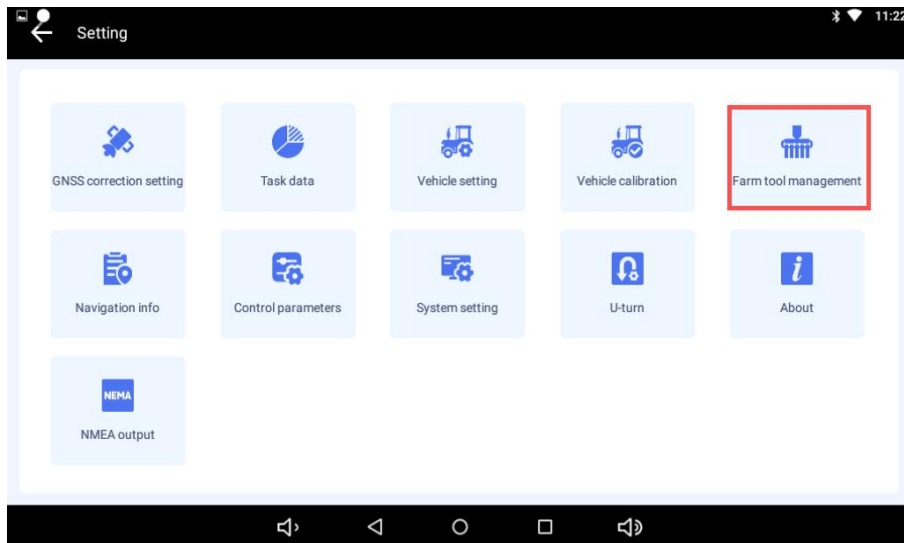
3.4.4 Antenna Centering

Click **Setting**, then **Vehicle setting**, select **Antenna centering**. Follow the on-screen prompts to set an AB line under the same test conditions. As the vehicle drives along the preset line with the steering wheel turning automatically and the error shown on the screen is **0**, stop the vehicle. Use a tape measure to mark a point 50 cm from the left rear wheel of the vehicle. After the vehicle has driven approximately 20 meters with the steering wheel turning automatically, turn the vehicle around and continue auto-steering. When the right rear wheel reaches the marked position, stop the vehicle and measure the distance from the right rear wheel to the marker. Enter the measured value into the screen and click **Apply**. Once calibration is complete, repeat the process to verify the accuracy of the result.



3.5 Farm Tool Management

Go to **Farm tool management** interface.



Click **Setting** and select **Farm tool management** to set the name, the width, the spacing and other parameters of the farm tool.

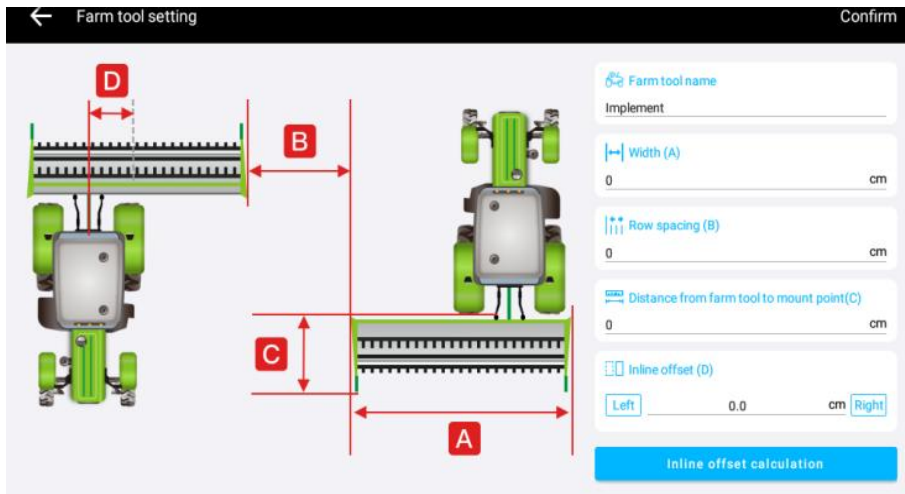
A: Width of the farm tool

B: The Row spacing

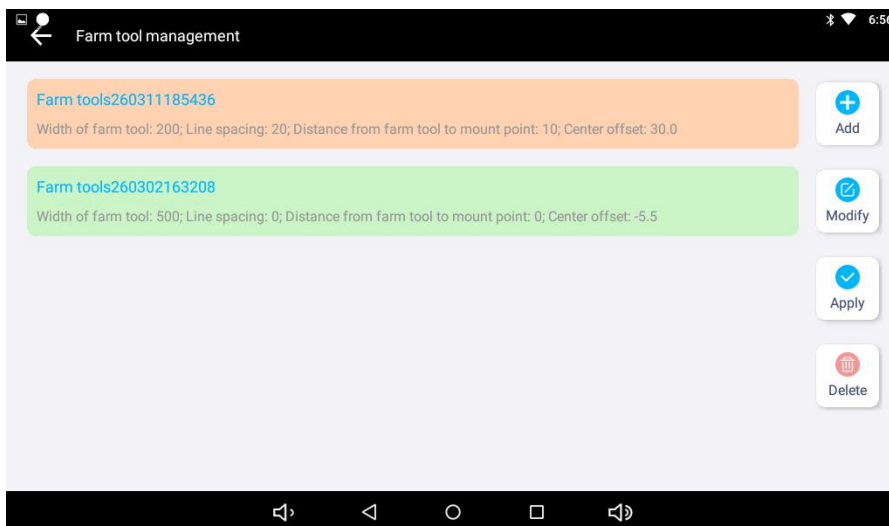
C: Distance from farm tool to mount point

D: inline offset

After all parameters are input, click **Apply**, and the system will save all parameters automatically.



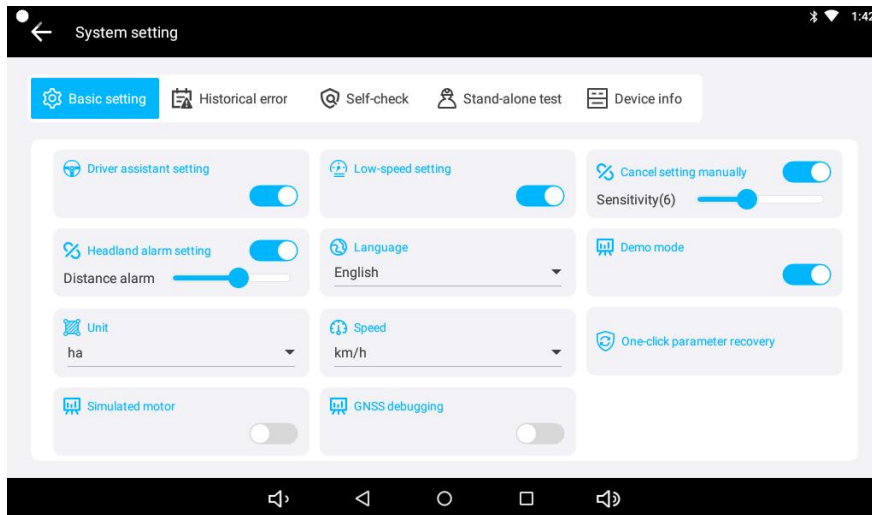
After you save these parameters, it will display in the list, you can choose one to **modify**, **apply** and **delete**.



3.6 System Setting

3.6.1 Basic Setting

Click **System setting** to check and modify the Basic setting.



Driver assistant setting : Once assisted driving is enabled, the device will not control the vehicle via the motors; you can drive the vehicle yourself.

Low-speed setting: When the vehicle speed is around 0.5 km/h, Low-Speed Mode must be activated.

Cancel setting manually: You can disengage Autopilot mode by rapidly turning the steering wheel; the higher the Sensitivity value, the more responsive the device is to this action.

Headland alarm setting: Once activated, the device emits an alarm when approach the headland, alerting the driver to turn around.

Language: software will restart automatically after you change the language.

Demo mode: You can perform a series of simulated operations — such as controlling the motor's speed and direction, creating tasks, and more.

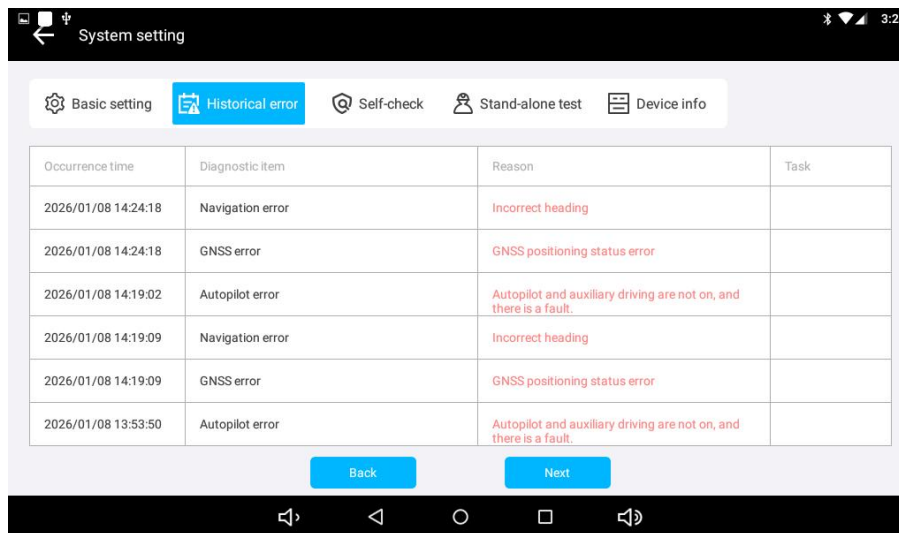
Unit: Support acre, km² and ha

Speed: Support km/h and mi/h

One-click parameter recovery: Click to recovery the Control parameters

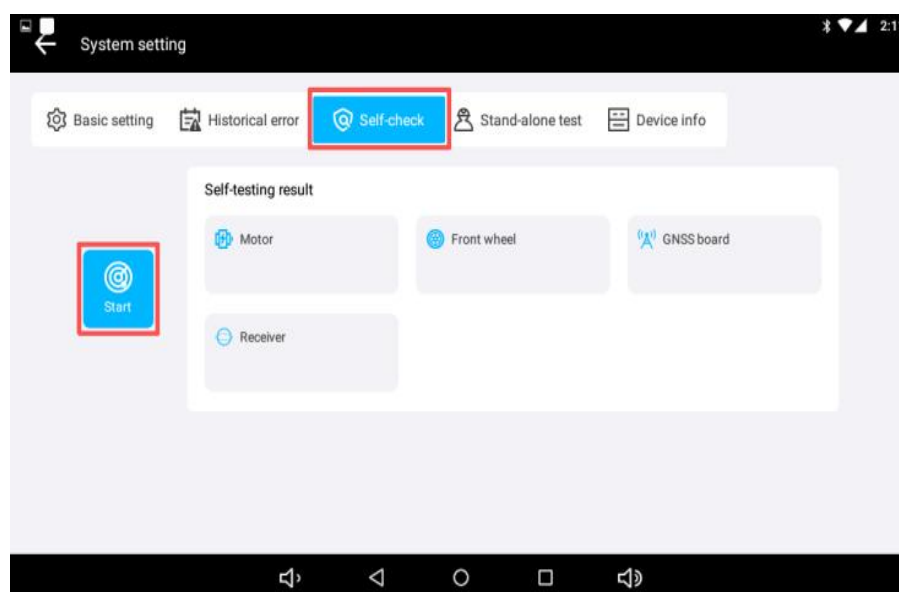
3.6.2 Historical Error

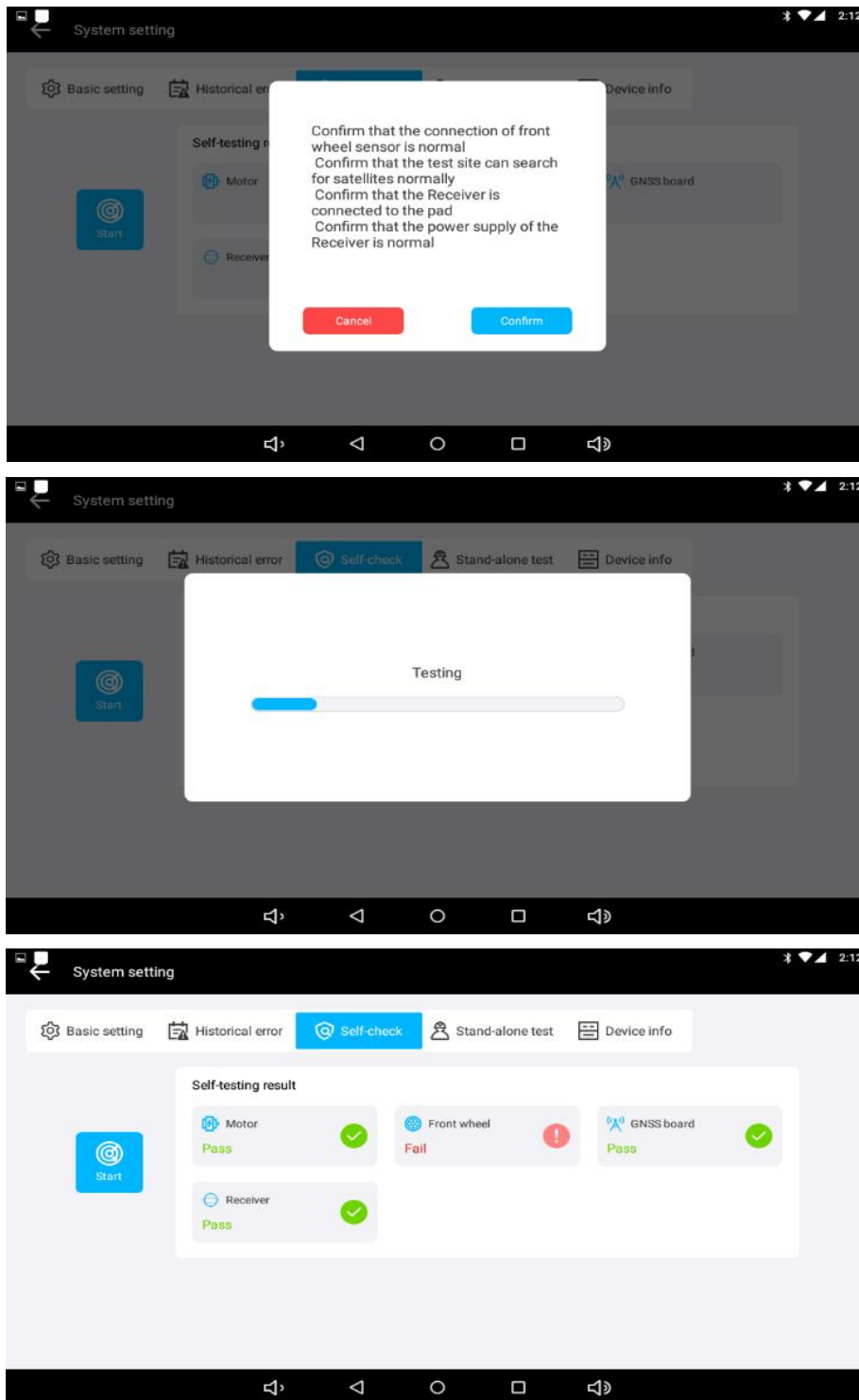
Click **Historical error**. You can check the error unit, error date, and the error reason.



3.6.3 Self-check

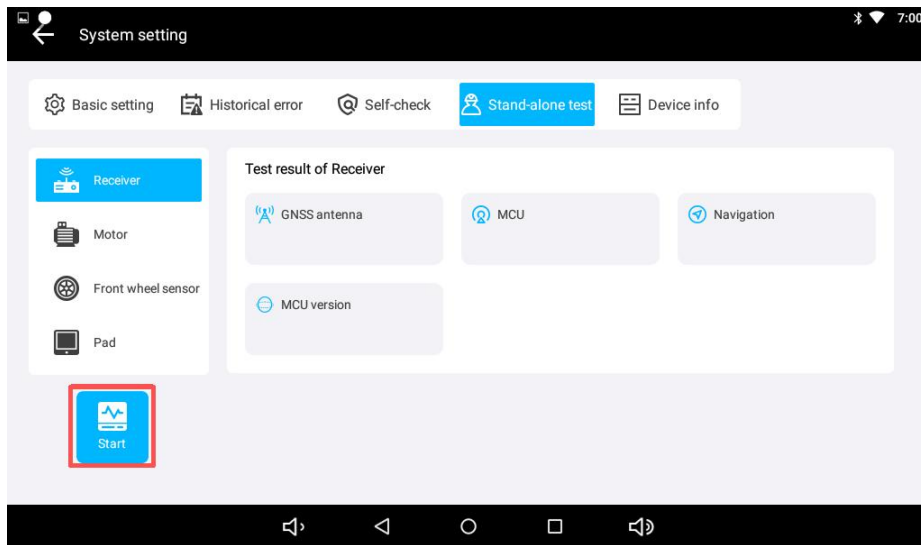
Test all parts of the system. Click **Start** then confirm the note. A progress bar will be displayed on the screen. After that you can check the result of Self-testing.



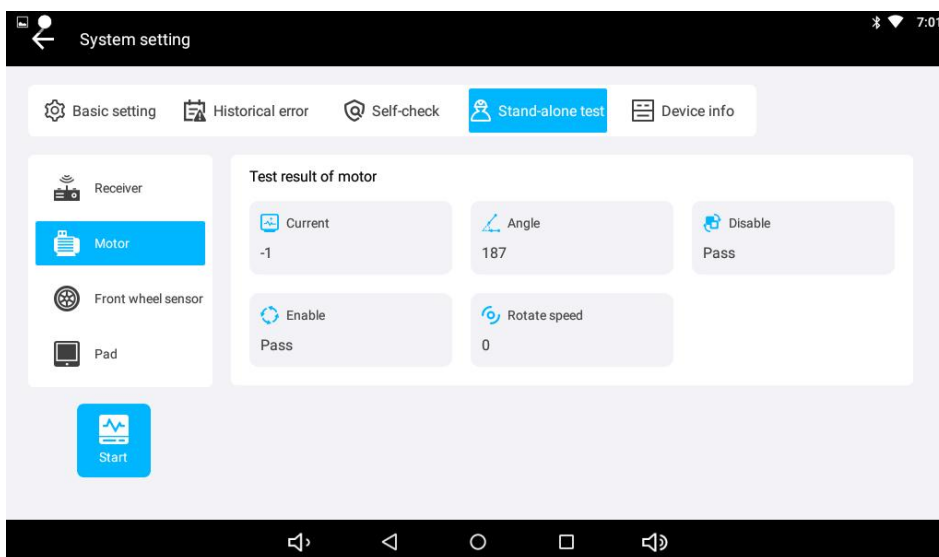
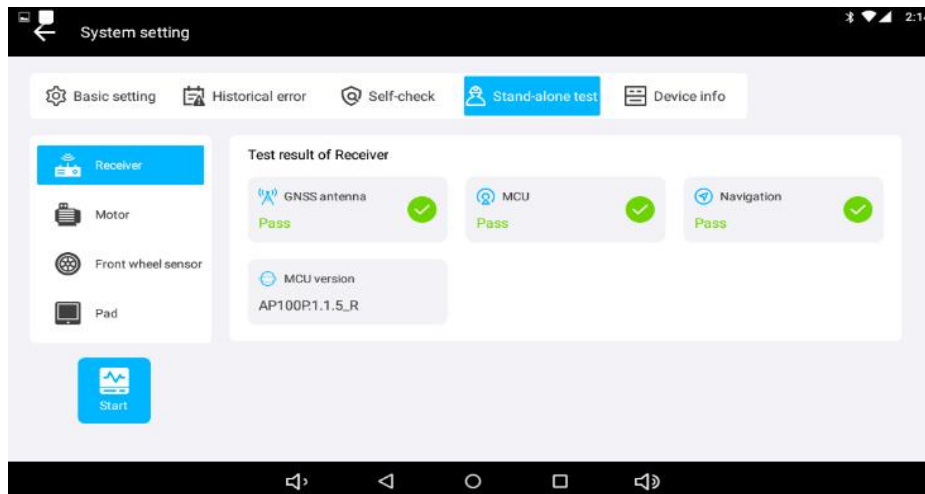


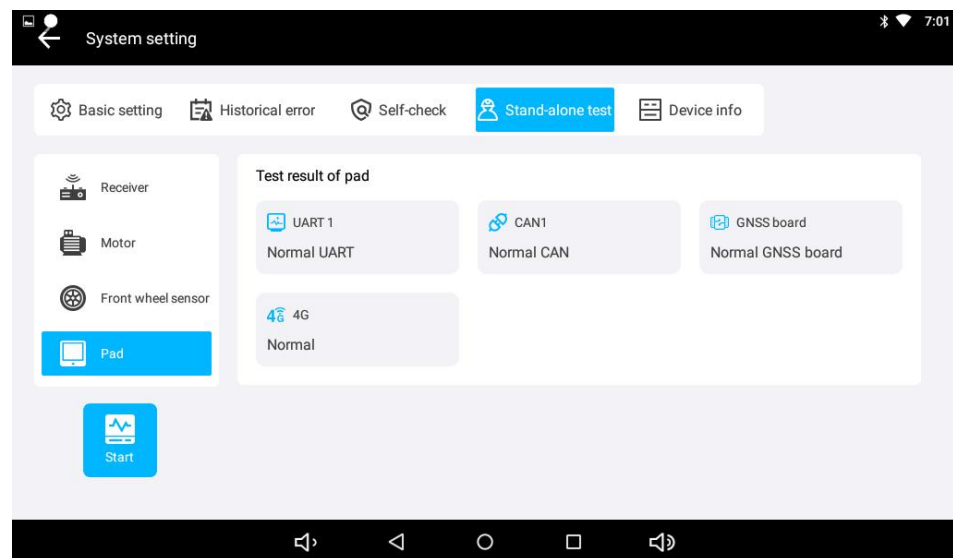
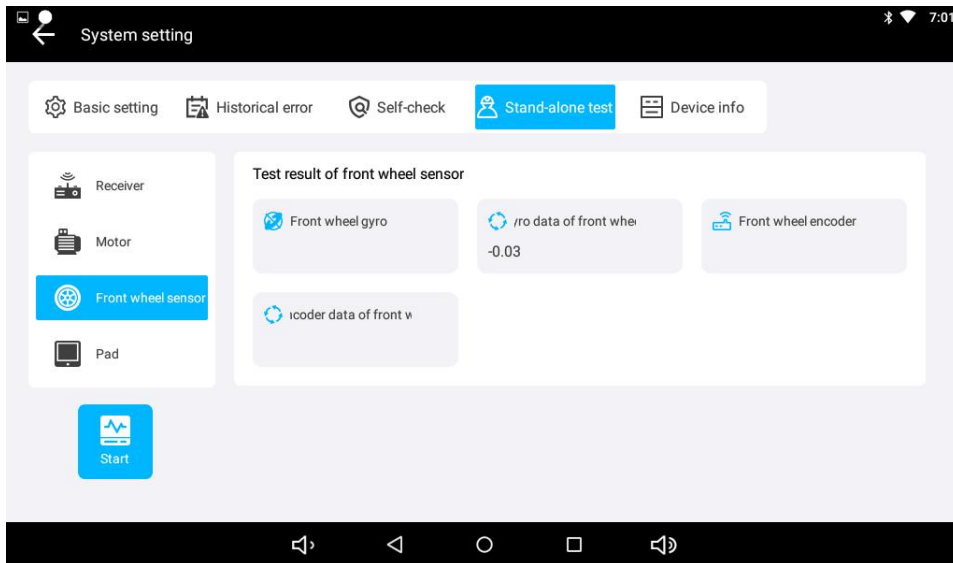
3.6.4 Stand-alone Test

If you want to examine the detailed information of a particular component, you can do **Stand-alone test**. Choose Receiver, Motor, Front wheel sensor or Pad to test. Click Start then confirm the note. A progress bar will be displayed on the screen. After that, you can check the Test result of it. Here we will take Receiver test as an example.



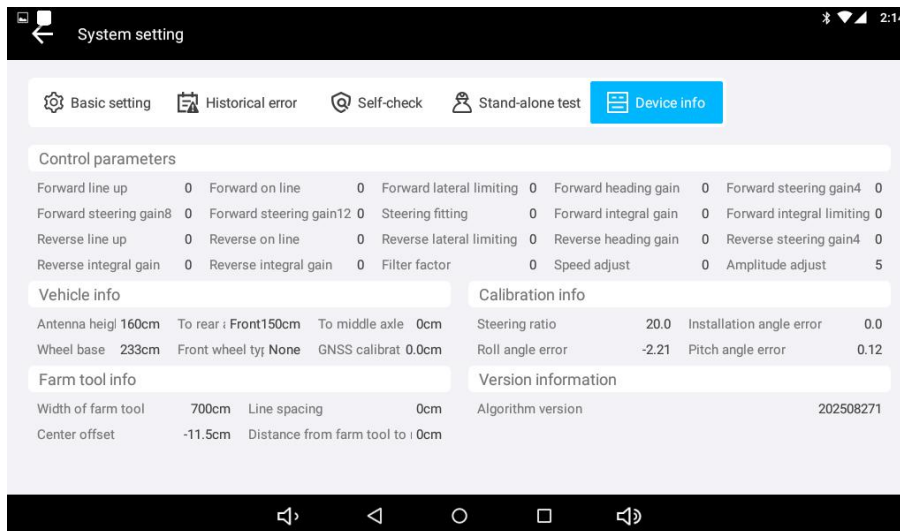
The test results for each section are presented below:





3.6.5 Device Info

You can check all the info of Device: Control parameters, Vehicle info, Farm info, Calibration info and Version info.



3.7 U-Turn

After turn on the U-turn function. The main interface will display the U-turn setting icon

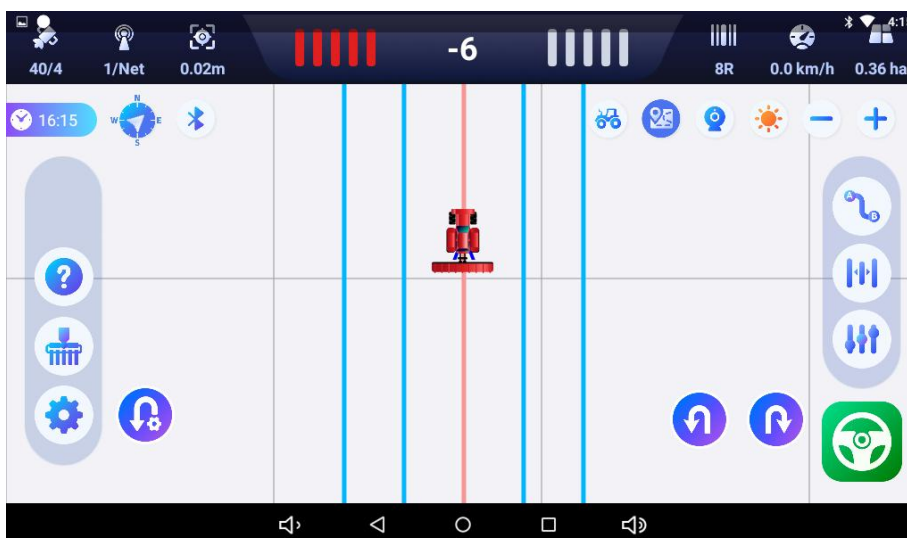


.After you turn on the auto-steering, U-turn icon

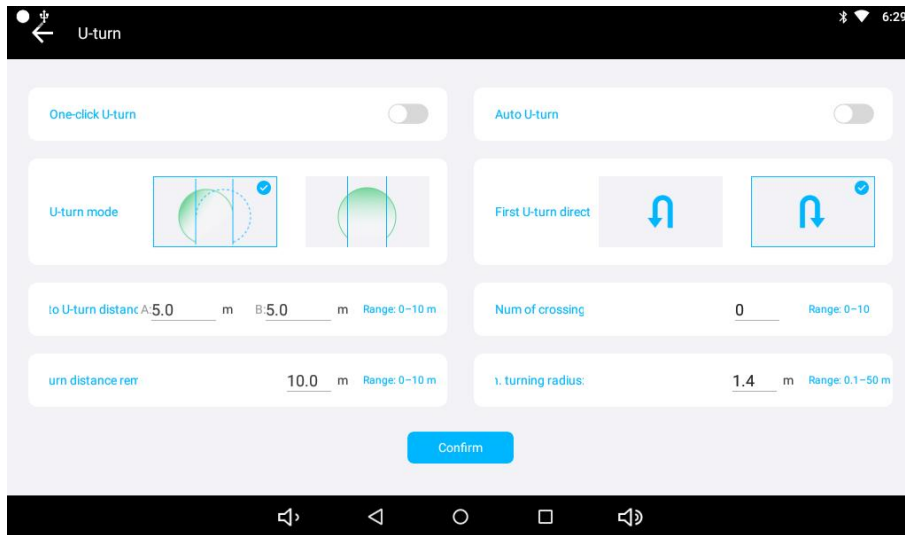


will display on the main

interface.



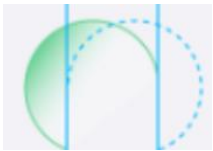
Go to U-turn setting, here are two options: **One-click U-turn** and **Auto U-turn**.



One-click U-turn: You can control the vehicle to make a U-turn by clicking the U-turn button on the main interface.

Auto U-turn: You can set the Auto U-turn distance and the U-turn direction then as the vehicle approaches the headland, it automatically turns around.

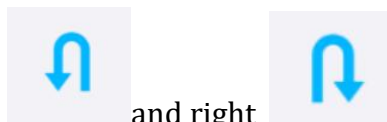
U-turn mode:



The vehicle executes a U-turn along a semi-circular path to align with the navigation line.



The vehicle will make a U-turn onto the second lane, positioning itself at a location that is relatively aligned with its initial starting position.



First U-turn direction: You can choose left and right .

Auto U-turn distance: Set the distance from the headline where the vehicle will U-turn.

Num of crossing lines during a U-turn: Set the number of navigation lines for the vehicle to

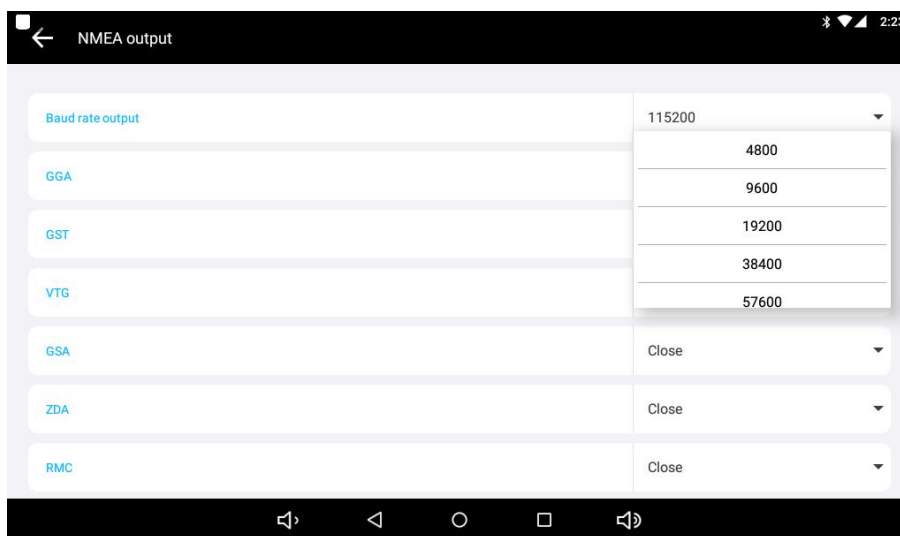
perform a U-turn crossover.

U-turn distance reminder: Set the distance for the U-turn alert.

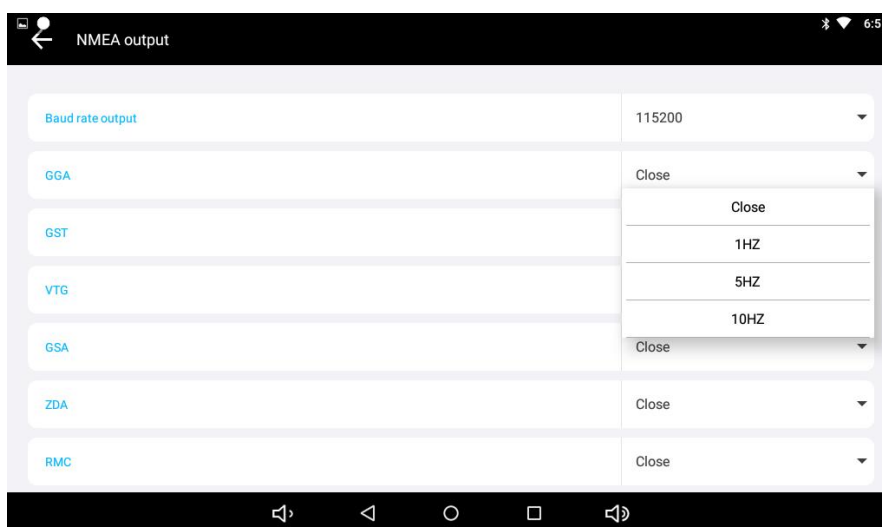
Min. turning radius: Set the minimum turning radius.

3.8 NMEA Output

Select the baud rate for the output port and customize the data output, you can choose the data output frequency or disable data output.



All data can be configured to be Close, 1HZ, 5HZ and 10HZ.




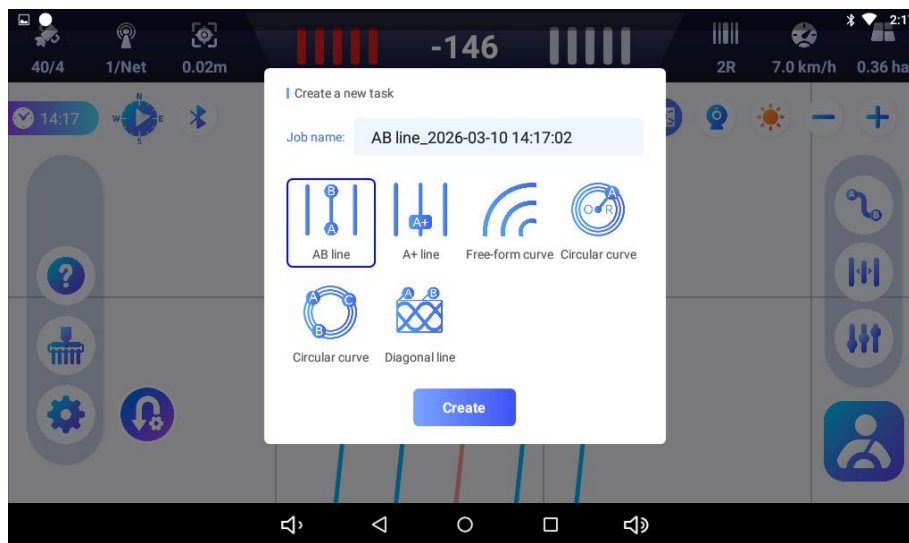
4 System Operation

After the system configuration. You will begin creating tasks then start working.

4.1 Create a Job Line



Click  to create a new task, select operation modes such as AB line, A+ line, Free-form curve, Circular curve and Diagonal line.



AB line: Click **A** at the desired vehicle departure point. After mark A is established, drive the vehicle to the desired destination manually and click B. At this time, the interface will display five navigation lines and the vehicle will drive along the line connecting mark A and mark B.

A+ line: Click **A+** at the desired vehicle departure point. After A+ is established, a straight line that goes through mark A will be generated automatically. At this time, the interface will display five navigation lines and the vehicle will drive along the straight line that goes through mark A.

Free-form curve: Click **A** at the desired vehicle departure point. After mark A is established, drive the vehicle to the desired destination manually and click B. At this time, the interface will display five navigation lines and the vehicle will drive along the curve connecting mark A and mark B.

Circular Curve: Click **A** at the desired vehicle starting point. After mark A is established, manually drive the vehicle to another point on the arc, and then click **B**. At this time, the

interface will display three navigation lines and the vehicle will drive along the circle connecting mark A and mark B.


Circular curve: Click **O** at the desired vehicle starting point. When you drive your vehicle away from point **O**, the system will automatically generate a circular trajectory line based on the vehicle width you set.

Diagonal line: Click **A** at the desired vehicle departure point. After mark A is established, drive the vehicle to the desired destination manually and click B. Repeat the above steps and click **C** and **D** again to create a quadrilateral. The system will then automatically create regular curves within the quadrilateral.

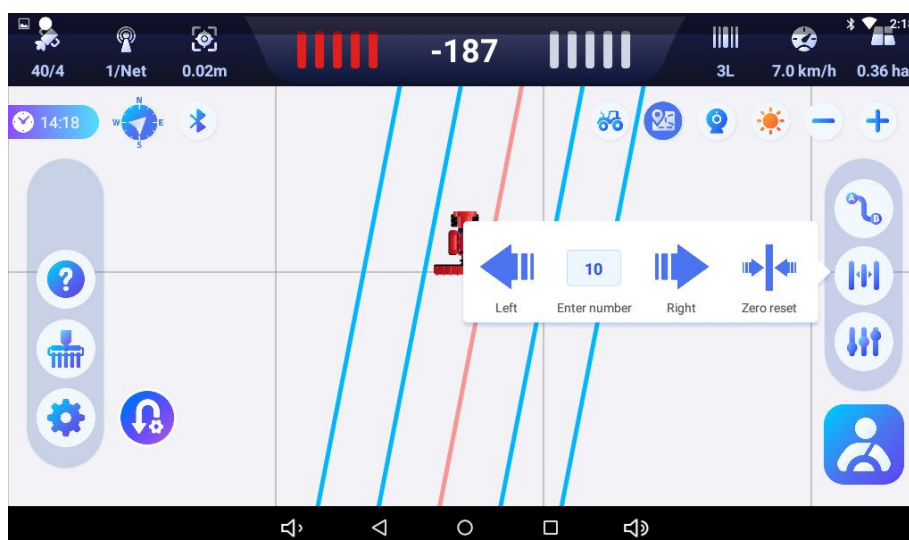
Whenever the vehicle arrives at a new plot that has not been operated on before, it is necessary to set the AB line again. After configuration/reconfiguration, click **Save Current Work Marks**. Reload it, and the AB line can be imported.

4.2 Shifting



Click  you need input the shifting distance or you can click **Zero** to eliminate the shifting distance. Note that this function is not available when the U-Turn function is enabled.

Click **Left** or **Right**, the vehicle will shift according to the value that you input.



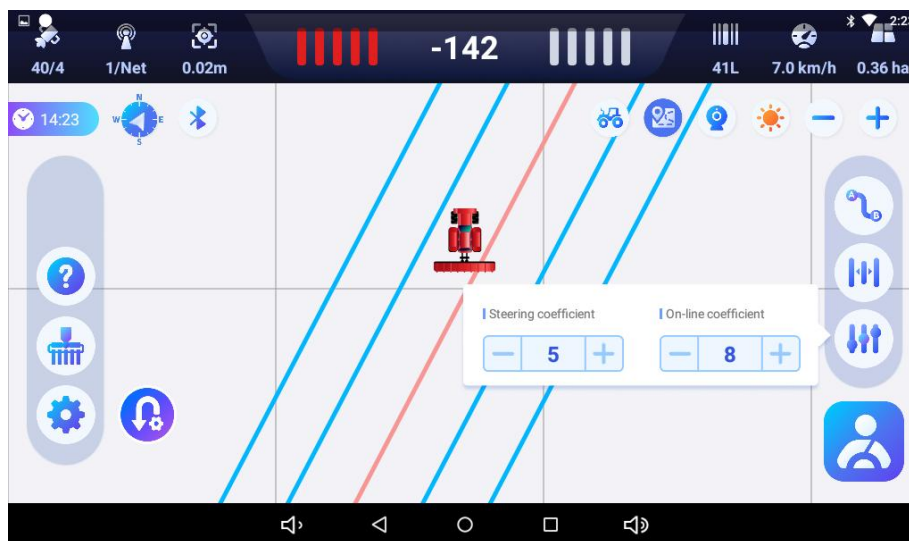
4.3 Tune




Click  to change the **Steering coefficient** and **Error coefficient**.

These two need to be adjusted simultaneously. Steering coefficient can be slightly less than the error coefficient.

1. If the auto alignment process is slow, increase the steering coefficient.
2. If the accuracy during the auto alignment fluctuates violently, reduce the steering coefficient.
3. If the stable tracking cannot be maintained after auto alignment, increase the error coefficient.
4. If the accuracy fluctuates drastically after the auto alignment, reduce the error coefficient.
5. If the requirements are met, parameter adjustment is completed.



4.4 Auto Steering Switch

Set the AB line for auto-steering on the main interface. When the icon displays **blue**  that means the auto-steering function has been deactivated. Tap once then the icon turns **green**



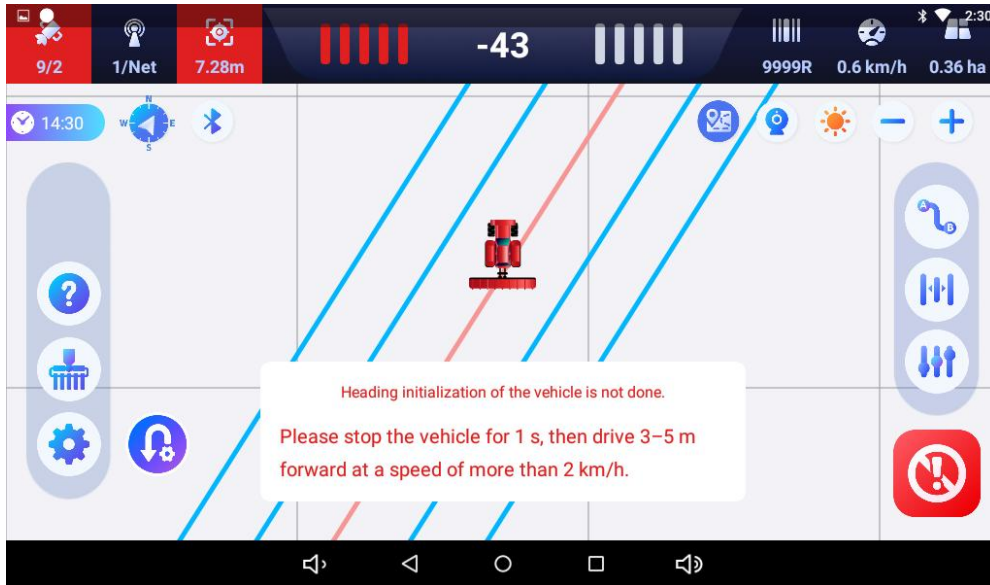
and the device emits an audible alert, the auto-steering function is active.



When using the system, once the device sends out the safety warning and triggers the sound alarm, stop the operation immediately, check abnormalities and faults, and clear the alarm before continuing the operation. The following lists several common faults.

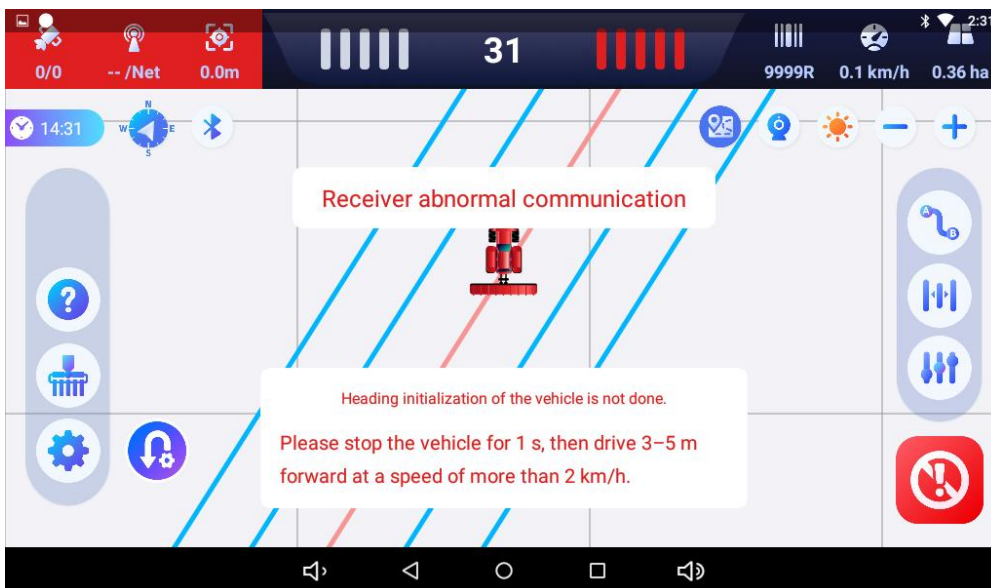
GNSS Position Status Error

When the satellite status changes from blue to red, it indicates a GNSS positioning error, triggering a voice alert. Stop the operations immediately and verify the satellite positioning function.



S300 Controller Communication Error

If the pop-up window shows S300 Controller communication error, it indicates a disconnection between the S300 controller and the system, triggering a voice alert. Stop the operations immediately and verify the S300 controller and the cables.

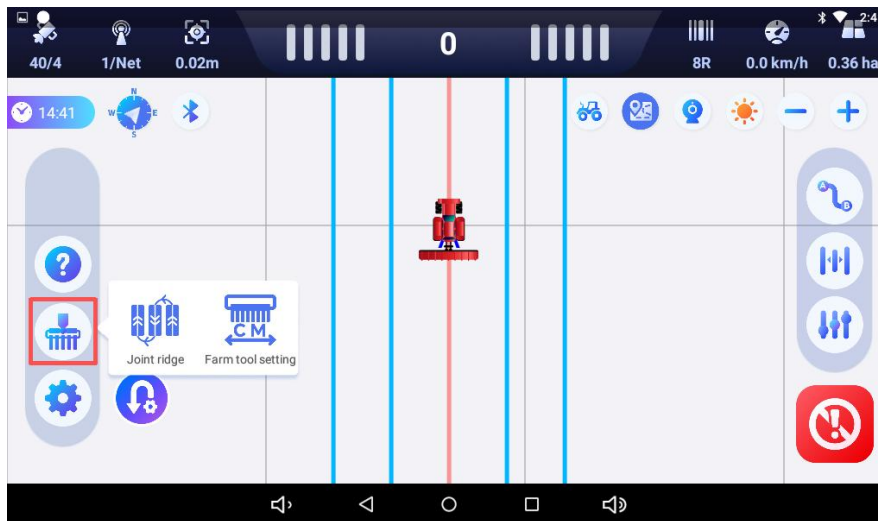


Motor Communication Error

If the pop-up window shows Motor communication error, it indicates a disconnection between the motor and the system, triggering a voice alert. Stop the operations immediately and verify the motor and the cables.

4.5 Farm Management

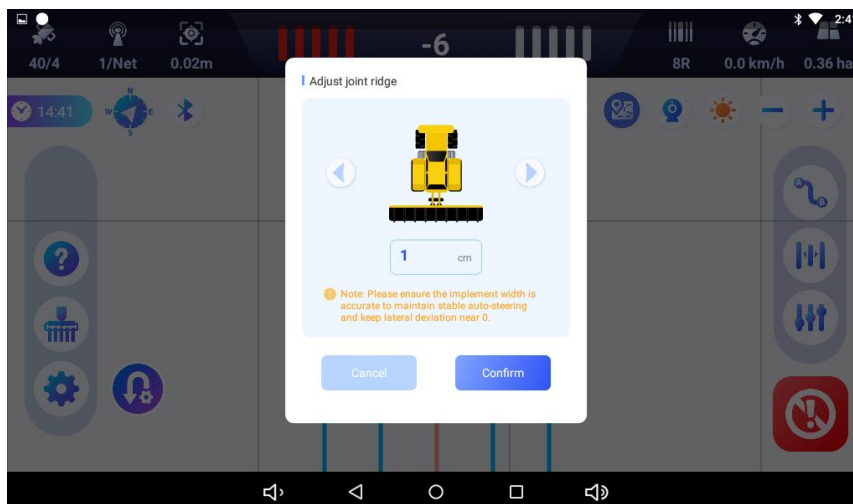
This feature allows you to modify the **joint ridge**, and go to **Farm tool setting** interface.



4.5.1 Joint Ridge



Click **Joint ridge** You can adjust the joint ridge according to the software Instruction. When making adjustments, please pay attention to the software's **Note**.



4.5.2 Farm Tool Setting



Click **Farm tool setting** to go to Farm tool setting, more information you can check section 3.5.

5 Safety Information

1. The product quality assessment procedure conforms to the provisions of Chapter 6 of ISO 11684.
2. The safety mark set in the product conforms to the provisions of ISO 11684.
3. In the process of installation, disassembly and carrying, all components should to be handled gently to prevent damage.
4. Do not get on/off the vehicle during the auto-steering.
5. During the auto-steering, please observe obstacles on the driving route and take corresponding emergency measures. Do not drive when tired.
6. During the auto-steering, if the agricultural machinery does not drive normally according to the preset, brake immediately and stop the operation.
7. When using the product, if a safety warning in Chapter 5.2 occurs, perform the relevant operations to rectify the fault.
8. Do not use the product outside the farmland.
9. This device meets the EU requirements (2014/53/EU Article 3.1a) on the limitation of exposure of the general public to electromagnetic fields by way of health protection. The device complies with RF specifications when the device used at 20 cm from your body.

6 Product Specification

Table3: Packing Specification

System Performance	
Precision discrepancy	≤ ±2.5 cm
Input voltage range	9~30 V DC
Rated operational voltage and current	12 V DC @ 12 A
Operating temperature	-20 °C~70 °C
Storage temperature	-40 °C~85 °C
Supports over-voltage, under-voltage and reserve voltage protection	
S300 GNSS Receiver	
4G communication	GSM: B2/ B3/ B5/ B8 UMTS: B1/ B2/ B4/ B5/ B6/ B8/ B19 LTE-FDD: B1/ B2/ B3/ B4/ B5/ B7/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B26/ B28 LTE-TDD: B38/ B39/ B40/ B41
GNSS communication (This feature is only used for receiving purpose in the product)	BDS: B1I, B2I, B3I GPS: L1, L2, L5 GLONASS: L1, L2 Galileo: E1, E5a, E5b QZSS: L1, L2, L5
Radio frequency (This feature is only used for receiving purpose in the product)	410~470 MHz
Positioning accuracy RTK (RMS)	Horizontal: 0.8 cm + 1 ppm Vertical: 1.5 cm + 1 ppm
Positioning frequency	20 Hz
Electric steering wheel	
Torque	Rated: 7 N·m Peak: 13 N·m
Electric motor	Size: 170 mm × 76 mm
T10 GNSS Tablet	

Screen	10.1 inches multi-touch capacitive LCD screen
Resolution	1024 × 600 pixel
Brightness	750 nits
Storage	2G RAM + 16G ROM
System	Android
Communication	Wi-Fi, Bluetooth, 4G