CHCNAV NX612 USER MANUAL

Precision Agriculture | Oct 2024

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Preface

1.1 Copyright

1.1.1 Copyright 2023-2024

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1.1.2 Trademarks

All product and brand names mentioned in this publication are trademarks of their respective holders.

1.2 Safety Warning

When using the CHCNAV NX612 GNSS Auto Steering System, please observe the following safety warnings:

Before using the system, carefully read and understand the operating instructions in the user manual to ensure proper use of the system.

During system operation, strictly follow local traffic regulations and safety standards to ensure safe operation in safe environments and conditions.

Regularly check the condition and performance of the system and equipment when using the system to ensure normal operation and high-precision navigation performance.

Maintain concentration and alertness during system operation, avoid fatigue and distraction, and prevent accidents.

Avoid using the system in hazardous areas such as steep or cliff edges, water puddles, or muddy ground to prevent personal injury or equipment damage.

Stop using the system immediately and contact the system manufacturer or supplier for technical support and maintenance services when the system experiences abnormality or failure.

Protect the equipment from physical damage or weather factors when operating the system to ensure long-term stability and reliability.

Observe the relevant maintenance and upkeep requirements of the system and equipment during operation to prolong the life of the equipment and ensure normal operation.

Pay attention to the safety of the surrounding environment and other personnel when using the system to avoid accidents and stop the machine promptly to handle any abnormal situations.

The above is for reference only, and specific safety warning content may vary slightly depending on the device model and local regulations and standards. When using the CHCNAV NX612 GNSS Auto Steering System, please carefully read and observe the relevant safety warnings and usage instructions to ensure the safety and normal operation of the system.

1.3 Introduction

The CHCNAV NX612 user manual describes how to install and use the CHCNAV® NX612 system. In this manual, “the system” refers to the NX612 agricultural system unless otherwise stated. Even if you have used other agricultural products before, CHCNAV recommends that you spend some time reading this manual to learn about the special features of this product.

1.4 Technical Support

If you have a problem and cannot find the information you need in this manual or CHCNAV website www.chcnav.com or contact your local CHCNAV dealer from which you purchased the system(s).

If you need to contact CHCNAV technical support, please contact us by email support@chcnav.com

1.5 Disclaimer

Before using the system, please make sure that you have read and understood this User Guide, as well as the safety information. CHCNAV holds no responsibility for the wrong operation by users and for the losses incurred by the wrong understanding about this User Guide. However, CHCNAV reserves the rights to update and optimize the contents in this guide regularly. Please contact your local CHCNAV dealer for new information.

1.6 Your Comments

Your feedback about this user guide will help us to improve it in future revision. Please email your comments to support@chcnav.com

2 Product Overview

2.1 Introduction

The NX612 is an automated steering system that easily retrofits many types of tractors with a compact, up-to-date and all-in-one solution at a price each farm can afford. It provides significant productivity gains, works in all visibility conditions and reduces operator fatigue.

2.2 Main Components

Receiver: It is typically a Global Navigation Satellite System (GNSS) receiver, used to receive satellite signals to determine the accurate position, direction, and speed of the vehicle. It forms the foundation for autosteering system by providing precise information about the current location of the vehicle.

Electric steering wheel: Consists of a steering motor and a steering wheel. and provides steering control of the vehicle. The motor is primarily used to control the movement of the vehicle with steering. The autonomous driving system utilizes the motor to execute commands generated by path planning and navigation algorithms, ensuring the safe movement of the vehicle along predefined trajectories.

Tablet: The tablet serves as the user interface for interacting with the autonomous driving system. Farmers or operators can use the tablet device to set paths, monitor job status, and configure the system. The tablet is also employed for real-time monitoring of the vehicle's operation.

Camera: Placed in the rear of the vehicle to provide real-time images. Cameras have multiple uses in autonomous driving. They can be employed for obstacle detection, helping the machinery avoid collisions or damage to crops.

These components work together to enable the autonomous driving system to perform various tasks in the field, enhancing the efficiency and precision of agricultural production.

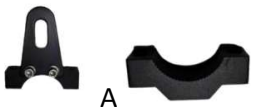
3 Installation

3.1 Product Package

All components are into one box.

List of main components:

Device name	Model	Image	Quantity
Electric steering wheel	CES-T		1
Receiver	PA-5		1
Tablet	CB-H12		1
Camera	X-MC011A		1
Ball holder			2
Double socket arm			1
Standard bracket			1

T-bracket			1
T mount kit (A&B)			1
Integrated main cable			1
Handle ball			1
Radio Antenna			1

3.2 Installation Steps

3.2.1 Steering system inspection

Before installation, please check whether the vehicle steering gear is normal, whether the dead zone (steering clearance) is appropriate.

Dead zone < 20°	Available range
20°<Dead zone < 70°	Available to install NX612 but necessary to modify the dead zone to 10~30 degrees.
Dead zone > 70°	Repair the vehicle first.

3.2.2 Original steering wheel removal

a) Remove the protective cover of the original steering wheel;

b) Stabilize the steering wheel, use the sleeve tool to loosen the original vehicle spline screws, and remove the original vehicle spline screws;

c) Pull out the steering wheel forcefully. If it is difficult to remove, it is necessary to strike the spline shaft to loosen it with a hammer and to be careful to avoid the steering wheel damage, or use of high quality puller tool to avoid damage on original steering wheel and shaft

3.2.3 Steering wheel installation

a) If the sleeve can fit the spline, please remove the protective cover of the steering wheel, place the sleeve in it, and fix the sleeve with M5*11 phillips screws (6 pcs);

b) Install T bracket or standard bracket on the motor with M5*16 hexagon screws (2 pcs);

c) Fix the T mount kit to the shaft with M8*60 hexagon screws (2 pcs);

d) Insert T bracket through T mount kit;

e) Hold the steering wheel and tighten the spline screws with tools;

f) Screw the T bracket to the T mount kit tightly with M10 nuts (2 pcs);

g) Finally shake the steering wheel, check whether it's tight, and check again whether the steering clearance is too large.

3.2.4 Receiver installation

a) The receiver needs to be installed on the central axis of the vehicle roof as possible, and the installation direction should be parallel to the vehicle as possible;

b) After confirm the installation position, wipe the roof clean and make sure the bracket installation is spotless;

c) Adjust the receiver bracket to make sure the receiver is placed horizontally, also the receiver arrow must face forward.

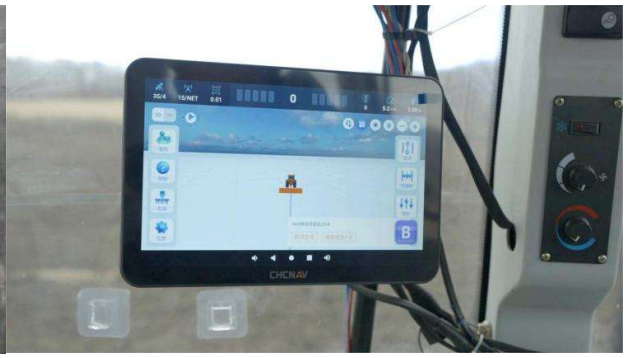
3.2.5 Tablet installation

The tablet installation requires the ball base to be installed in locations as suggested shown in the picture, and avoid damaging to the original vehicle cables. Usually there are two kinds of installation methods to fix the mounting bracket.

a. Drill more than 3 dovetail screws on the A-pillar or B-pillar to fix the ball base then install tablet with RAM bracket.

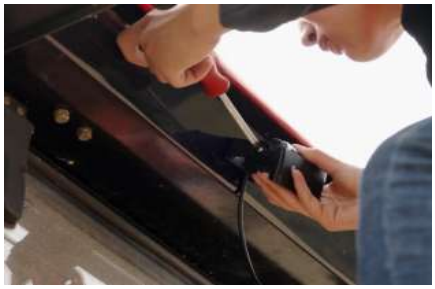
b. Fix the ball base with U bolt on the tractor crossbar and adjust it according to the driver's habits.

c) After complete the installation, it is available to adjust the tablet to a suitable position;

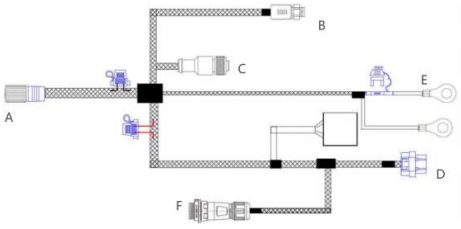


3.2.6 Camera installation

The camera can be installed anywhere (within the wire harness length range).



3.2.7 Cables connection

Name	Cable diagram	Connection
Integrated main cable		A → Receiver B → Motor C → Wheel angle sensor cable (Optional) D → Tablet Port E → Battery F → Camera G: Rocker switch

a) Wiring precautions

• When wiring, first confirm the location of the threading holes, and thread the wiring harnesses outside through the threading holes in sequence;

• When wiring, first arrange the outer wiring harnesses, then arrange the wiring harnesses in the cab;

• When wiring, pay attention to avoid high temperature, oily, sharp and abrasive areas, fans, exhaust pipes and other nearby areas;

• When wiring, keep a certain length to avoid over-tightening and loosening; the wiring harnesses layout should be smooth and cannot be twisted;

• When wiring, leave enough length in case of wheel turning to right/left all the way because the wheel angle sensor will rotate together with steer wheel;

• After wiring, cut off the extra length of cable ties. After complete the installation, please store the original vehicle accessories properly and clean up the garbage.

b) Electrical connection method and precautions

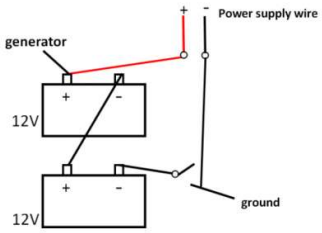
• Before connect to receiver, display, and steering wheel connectors, please connect to battery first to avoid damage caused by direct power-on or multiple power-offs;

• In the process of connecting the power cord to the battery, first connect to the positive electrode then to the negative electrode;

- Pay attention to the use of the wrench when connecting the positive electrode, and it is strictly forbidden to bonding (when the wrench contacts the positive electrode of the battery, the other end of the wrench is strictly prohibited from touching any conductive items, especially the metal parts of the original vehicle);

- 12V / 24V battery, when using the original battery power supply, please connect the positive wire to the positive electrode and the negative wire to the negative electrode;

- 12V / 24V battery, when additional battery is connected in series, connect the positive wire to the positive electrode and the negative wire to the negative electrode of the other battery, as shown in the diagram below.

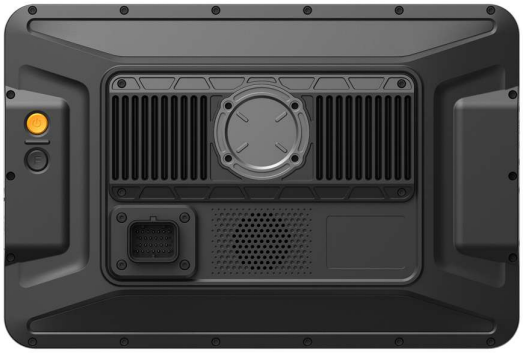


4 Quick Guide

4.1 Power On

Press the orange button for 3 seconds, and the system will boot.

Note: Pls do not turn the steering wheel when turning on the system because the motor will initialize internally.



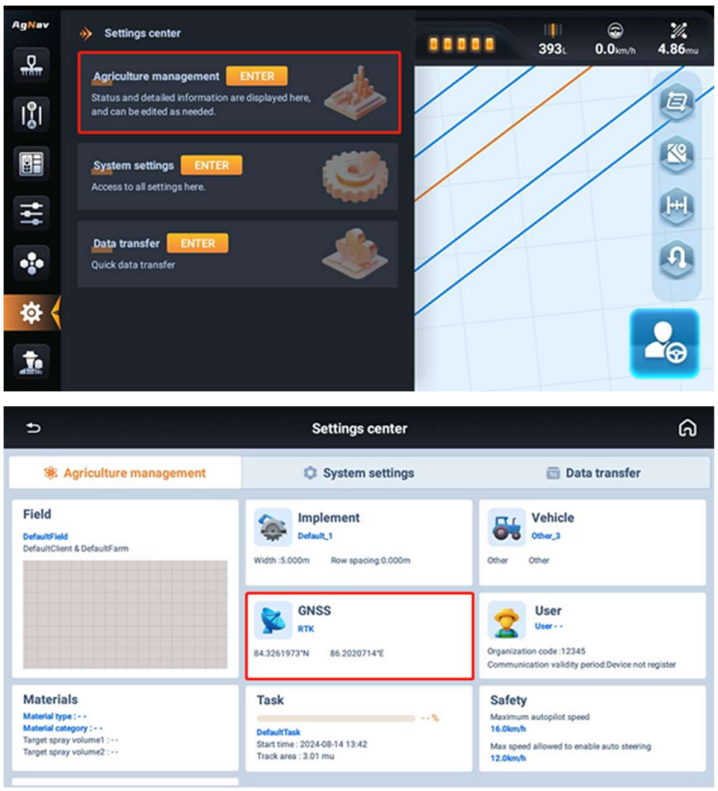
4.2 Software registration

Head to [Settings center -> System settings -> Register] to check whether the software is registered. It is necessary to register **Software registration**, **RTK**, and **Auto steering** at least. Please contact our technicians when it shows that they are **Not activated**.

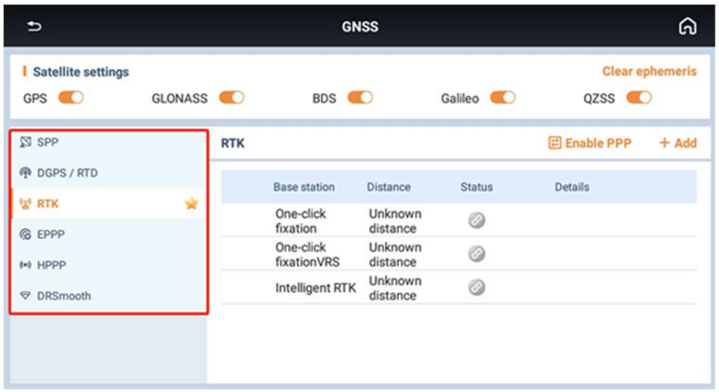
4.3 GNSS Mode

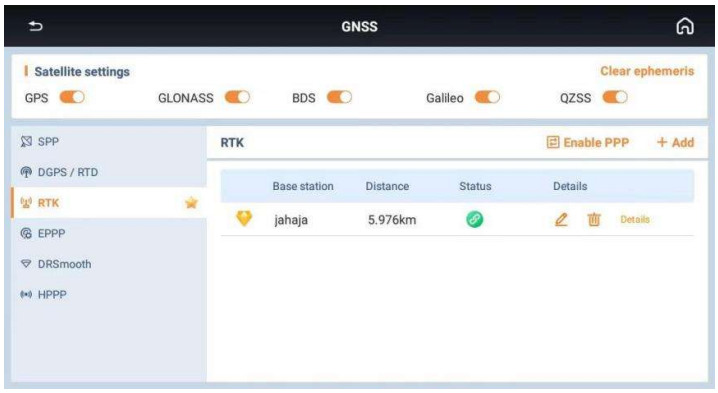
4.3.1 GNSS

Go to [Settings center -> Agricultural management -> GNSS]



4.3.2 Select RTK





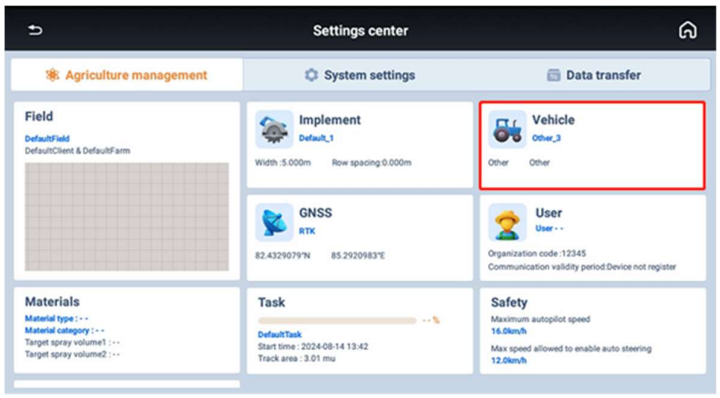
4.3.3 Status bar

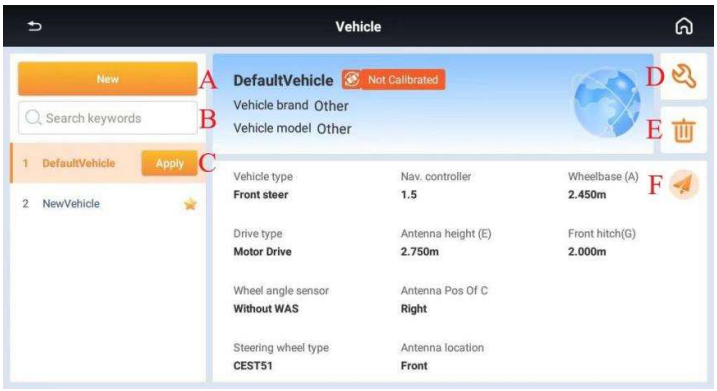
Then check the status bar. Only when they are all gray, the system is ready to use.

4.4 Vehicle

4.4.1 New vehicle

Head to [Settings center -> Agriculture management -> Vehicle -> New] to create a new vehicle.





A: Add a new vehicle.

B: Quickly search the vehicle by keywords when there are many vehicles.

C: Click to apply the vehicle.

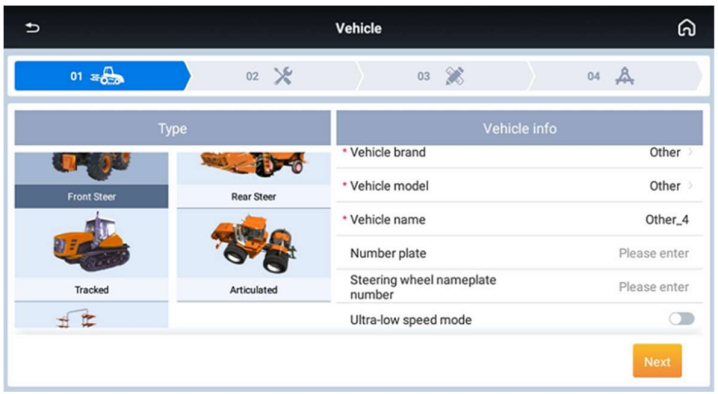
D: Edit the parameters of the vehicle.

E: Delete the vehicle. The vehicle can not be deleted when it is not selected. The last vehicle cannot be deleted.

F: Click to export the vehicle by the share code.

4.4.2 Vehicle info

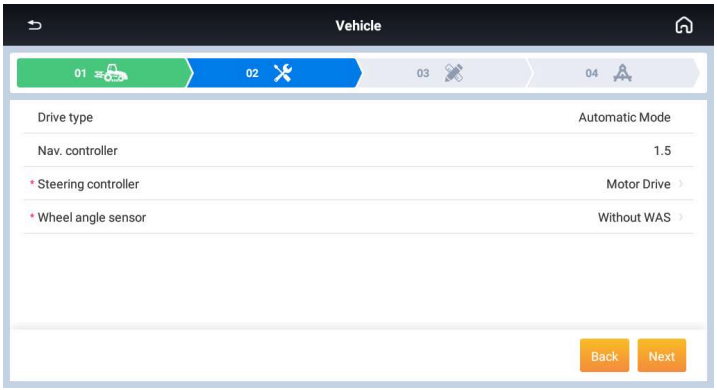
Select your tractor type(including Front Steer, Rear Steer, Tracked, Articulated, Transplanter) and set vehicle brand, model and name. (Note: Ultra-low speed mode with supporting minimum 0.1km/h speed.)



4.4.3 Steering controller and Wheel angle sensor

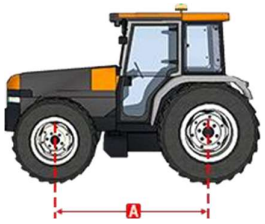
Select Steering controller from Hydraulic Drive(PWM), Motor Drive, and CANBUS.

Select Wheel angle sensor from Potentiometer, GAsensor Device, and Without WAS. For instance, this tractor selects Motor Drive and Without WAS.



4.4.4 Vehicle parameters

Wheelbase(A): Measure the distance between front wheel rotation axis and rear wheel rotation axis. Note that the tape measure needs to be parallel to the ground.



Implement Tow Point(B): Use the default value of 0 and it will be used in the futural development.

Front hitch(G): Measure the distance between the two front wheels.

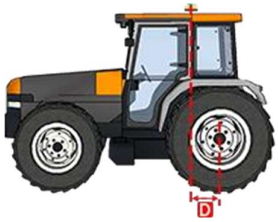
Maximum WAS: The default is 25, which represents the maximum angle the vehicle can turn.

Reference point for guideline recognition: It is available to select between Vehicle head and Vehicle rear.

To Middle Axle(C): If the receiver is not mounted on the central axis, measure the distance from the receiver to the central axis. If it is on the central axis, enter 0. In reality it is always better enter 0 and do the rest in assembly error calibration.

Antenna Pos of C: Fill in according to the receiver position.

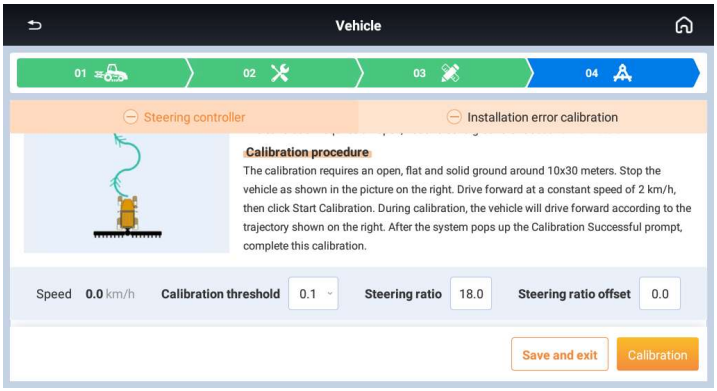
To Rear Axle(D): Measure the horizontal distance from the antenna center to the rear wheel center. (It is convenient and accurate to project the antenna center and the rear wheel center onto the ground, then measure it.)



Antenna location: The relative position between the antenna center(the position of the antenna center should be referred to the blue indicator) and the rear axis. Select **Front** if the antenna is in front of the rear axis, select **Rear** if the antenna is behind the rear axis.

Antenna height(E): Measure the vertical height from the antenna center to the ground.

4.4.5 Steering Calibration

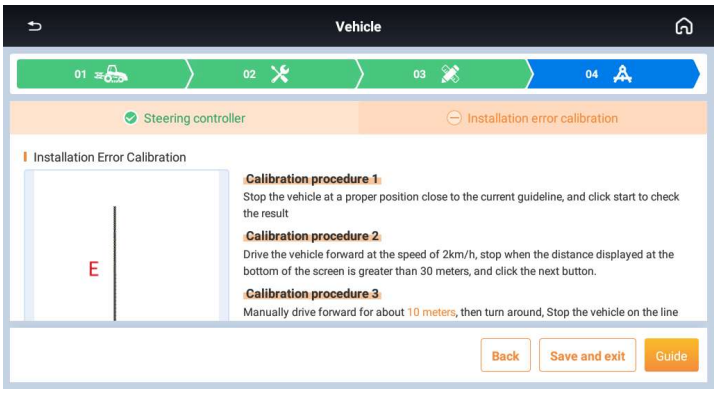


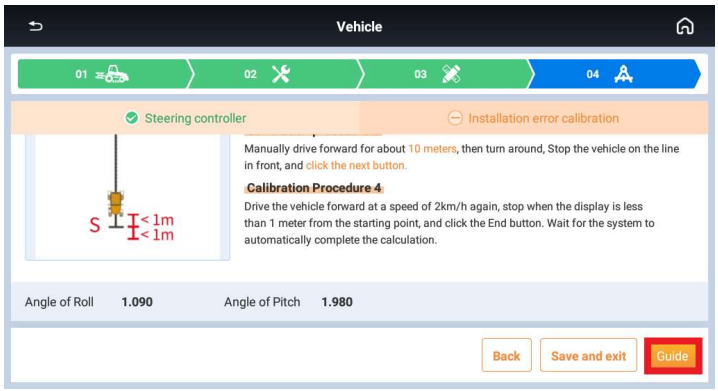
1. The calibration requires an open, flat and hard ground about 10*30 meters.

2. Keep the tractor run at 2km/h and click [Start]. During the process, the steering wheel will turn automatically.

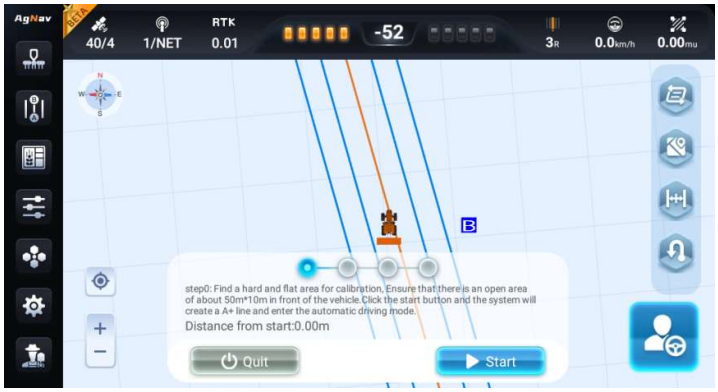
3. When the screen shows “Waiting for calibrating…”, around 2 minutes later, the calibration will be successful.

4.4.6 Installation error calibration

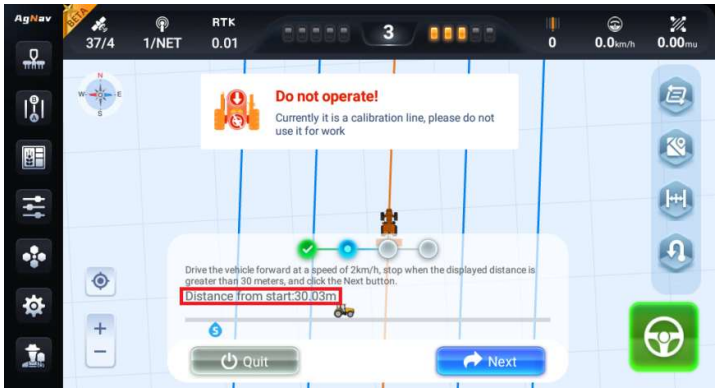




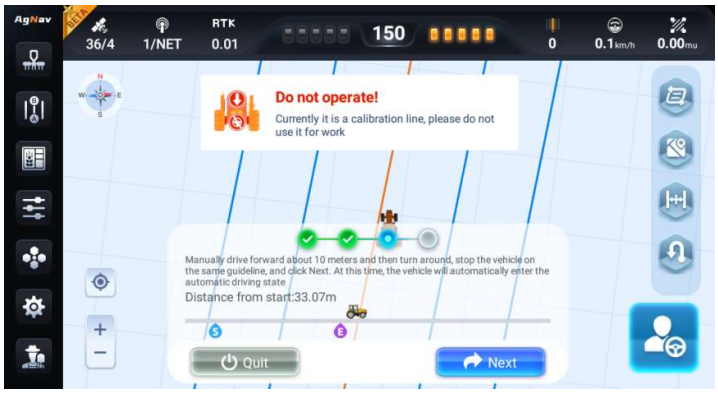
1. Stop the vehicle at a proper position close to the current guideline, and click start to check the result.



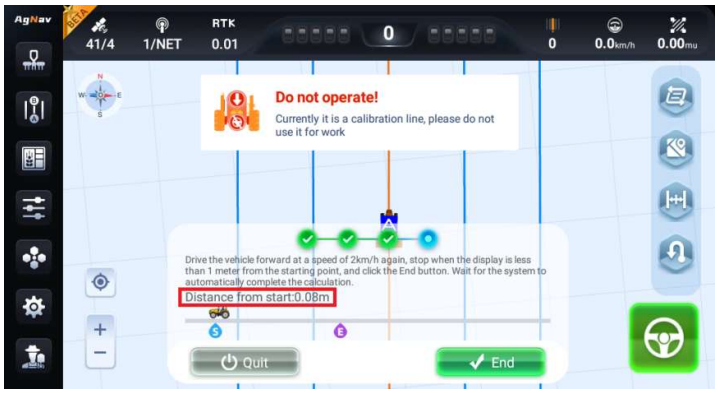
2. Drive the vehicle forward at the speed of 2km/h, stop when the distance displayed at the bottom of the screen is greater than 30 meters, and click the next button.



3. Manually drive forward for about 10 meters, then tum around, Stop the vehicle on the line in front, and click the next button.



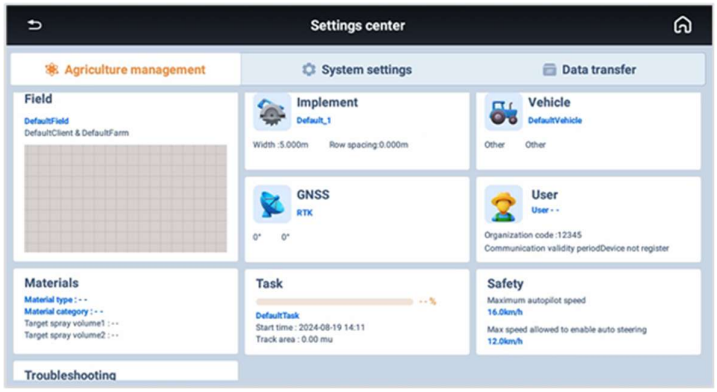
4. Drive the vehicle forward at a speed of 2km/h again, stop when the display is less than 1 meter from the starting point, and click the End button. Wait for the system to automatically complete the calculation.

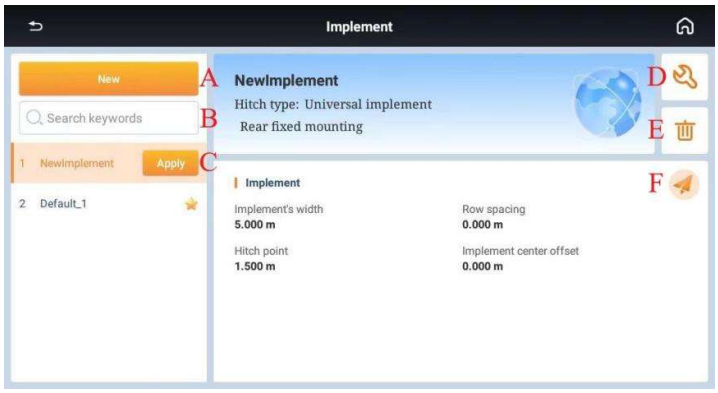


4.5 Implement

4.5.1 New implement

Go to [Setting center -> Agricultural management -> Implement -> New] to add a new implement





A: Add a new implement.

B: Quickly search the implement by keywords when there are many implements.

C: Click to apply the implement.

D: Edit the parameters of the implement.

E: Delete the implement. The implement can not be deleted when it is not selected. The last implement cannot be deleted.

F: Click to export the implement by the share code.

4.5.2 Implement selection

In this interface, the customer can select Task type including General, Spraying, Ridge building, Planting, Spreading, Harvest, Scatter sowing, Water and fertilizer, and Tilling, enter the implement name, and select the implement mounting method.

4.5.3 Implement parameters

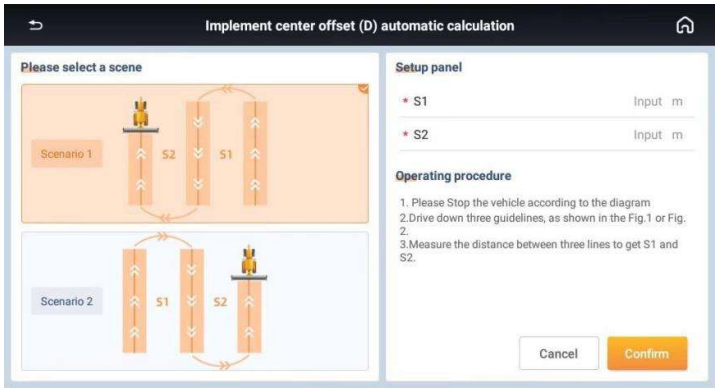
Implement width: The width of the implement, and the default value is 5m.

Row Spacing: The distance between two rows, and the default value is 0m.

Hitch Point: The distance from hitch point to implement, and the default value is 1.5m. The current algorithm do not use this value, so it has no practical significance.

Implement center offset: The offset from implement center to vehicle center.

If there is a row spacing issue with skip or overlap, it is necessary to click **Calculate** to make offset calculation.

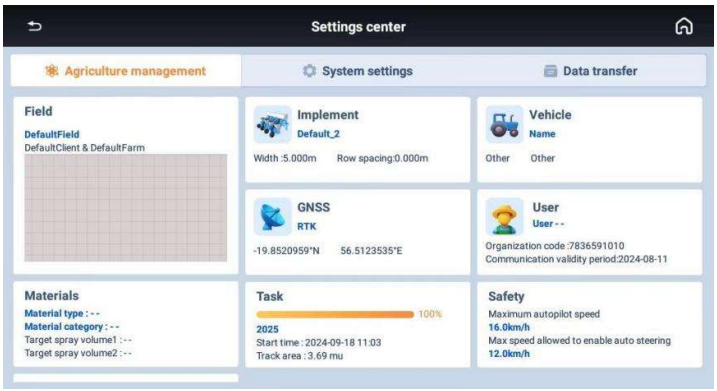


There are two methods to choose. Follow the instruction to complete the procedure.

4.6 Field

4.6.1 New field

Go to [Settings center -> Field -> Create] to create a new field.



A: Field overview. It is available to zoom in and zoom out as well as to choose the map type.

B: Quickly search the field by keywords when there are many fields.

C: Click to create a new field.

D: Select to display fields by distance or time.

E: Click to export the field by the share code.

F: Enter the field details interface.

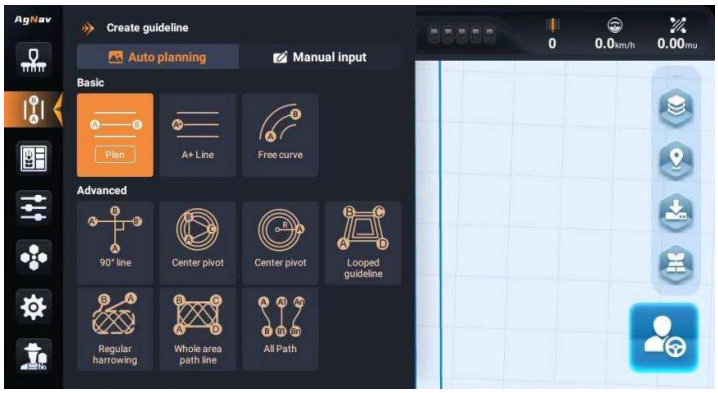
G: Edit the field name.

H: Delete the field. The field can only be deleted when it is not selected. The last field cannot be deleted.

I: Apply the field.

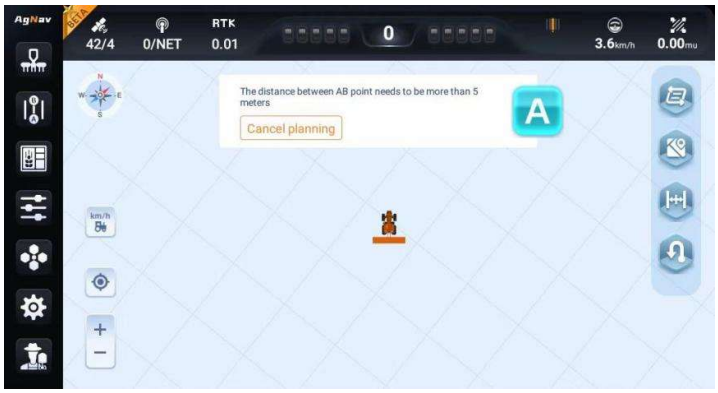
4.7 Guideline

Return to the main interface. Click the second icon from top to bottom on the left side.

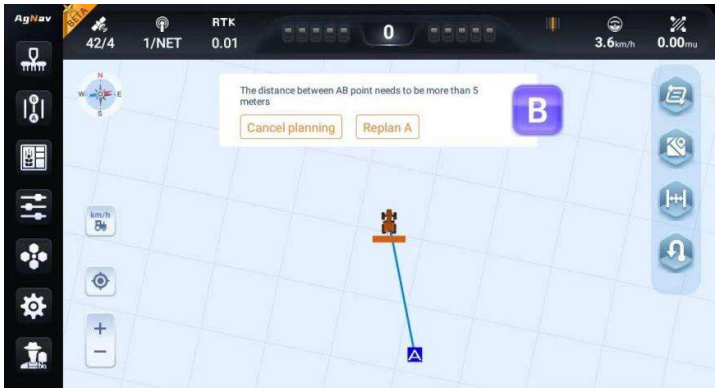


4.7.1 AB line

1. Click A in the current location.



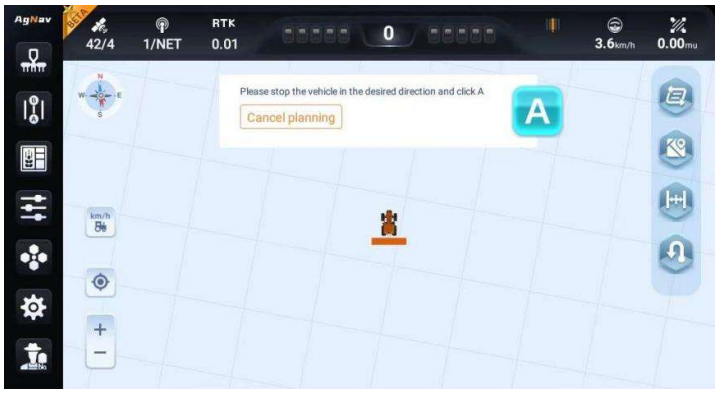
2. Drive to another end of the field and click B.



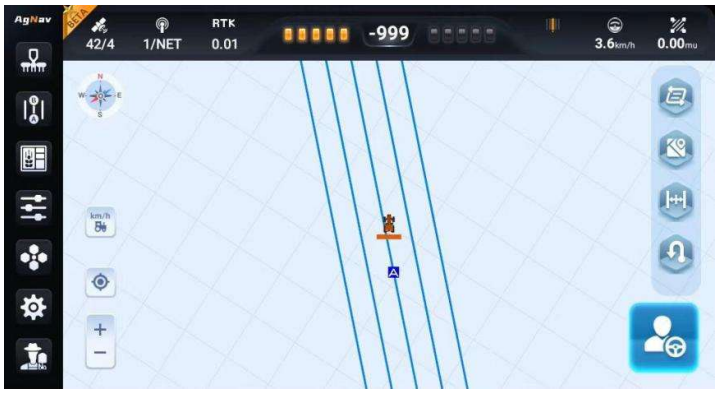
3. New AB line is created successfully.

4.7.2 A+ line

1. Click A in the current location.

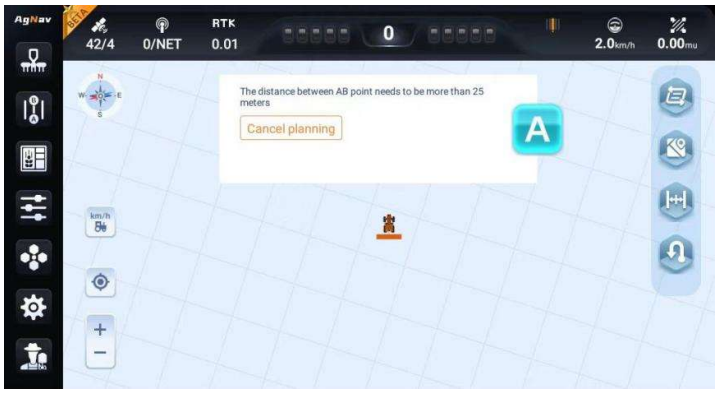


2. New A+ line is created successfully.

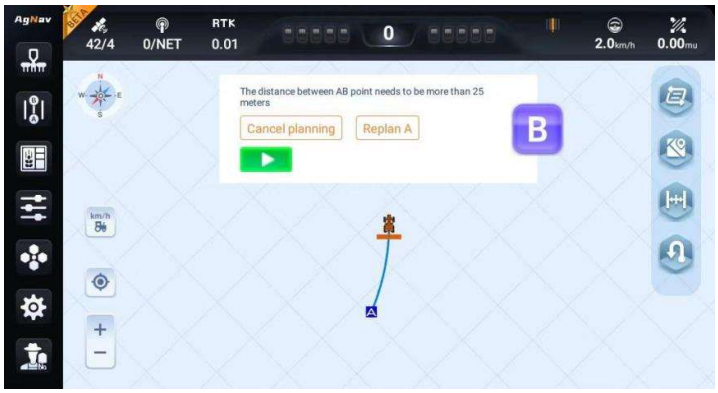


4.7.3 Free curve

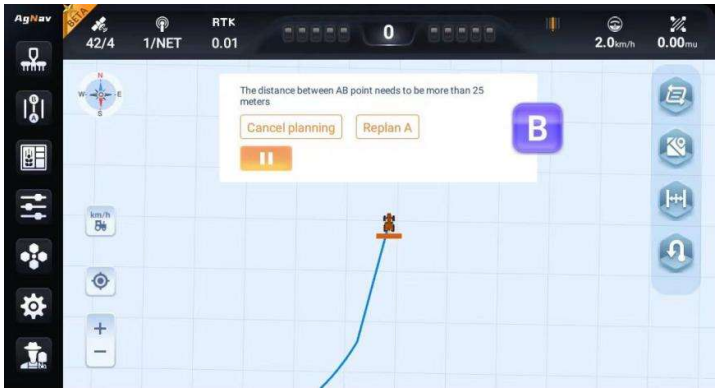
1. Click A to start the curve line.



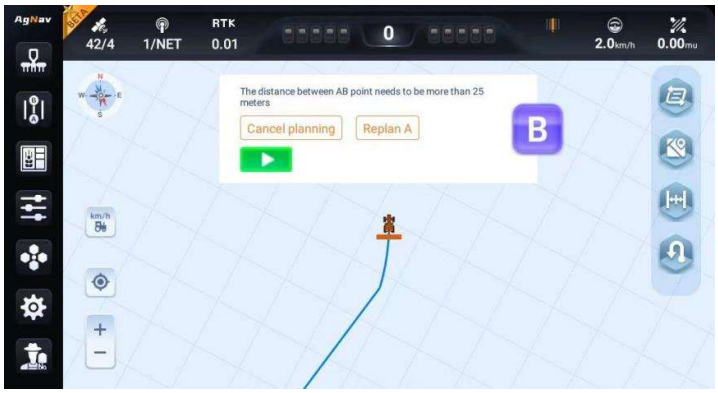
2. Click Pause to create the straight line.



3. Click Continue to continue creating the curve line.



4. Click B to finish the Free curve creation.



5. New Free curve is created successfully.

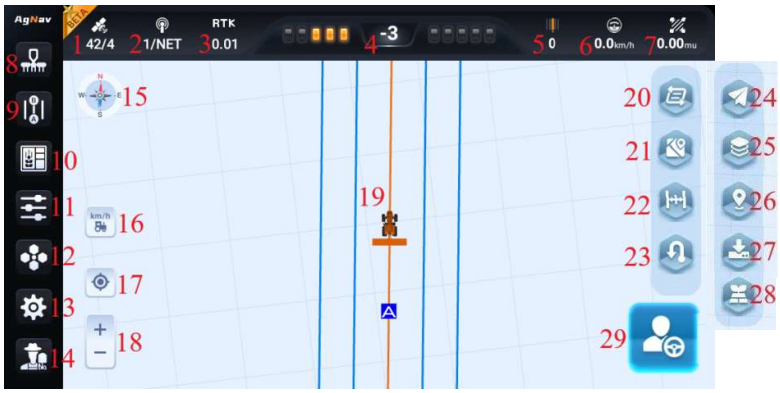
4.8 Starting Autopilot

Click to start autopilot after completing the above steps.

4.9 Turn Off

Press the orange button for 3 seconds, the system is switched off.

5 Main interface



1. Satellite status

There are two numbers displayed in the form of X / Y.

X represents the number of tracked satellites;

Y represents the RTK status:

1: Single/Autonomous 2: DGPS/SBAS 4: Fix 5: Float

2. Base station status

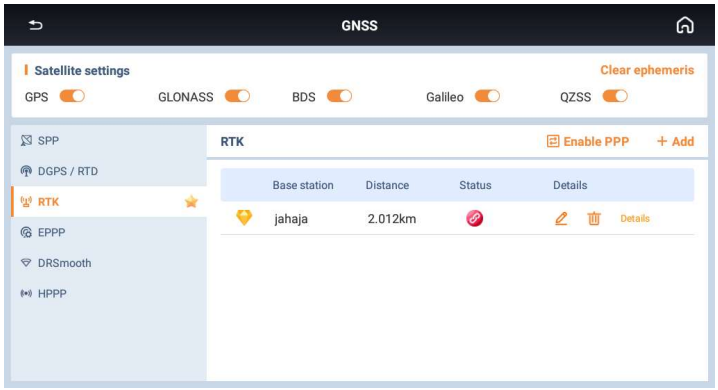
There are two numbers displayed in the form of X / Y.

X represents the signal latency. The smaller the X, the more stable the signal is, usually the recommended value is less than 10 in auto steering mode for better performance.

Y is the current radio channel number if it's radio mode; Y will change to NET if it's network mode.

3. GNSS mode and position accuracy

Click the Satellite status bar to enter the GNSS Correction Settings.



4. Lateral deviation

The real-time deviation between the current vehicle location and the marked guideline. The value is negative when the vehicle is on the left side of the guideline and positive when the vehicle is on the right side of the guideline. The unit is 1cm per grid.

5. Guideline number

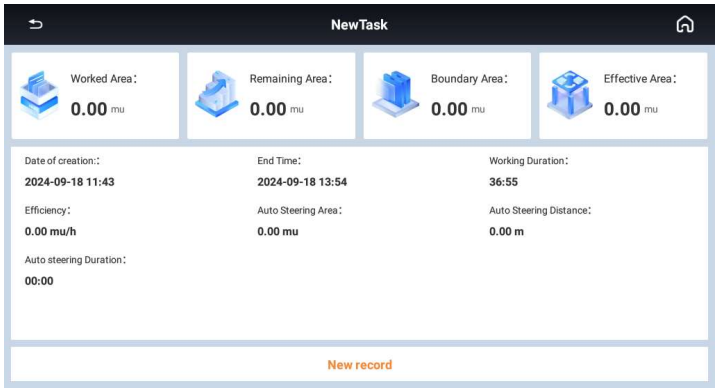
The current guideline number where the vehicle is located at(the original guideline is 0).

6. Vehicle speed

Real-time vehicle speed.

7. Worked area

Mu is the default unit, and it's adjustable in **Basic Settings**. Click this icon to view the detailed task report. This interface allows to view historical tasks and create new tasks.



Worked Area: The painting/drawing area with overlap.

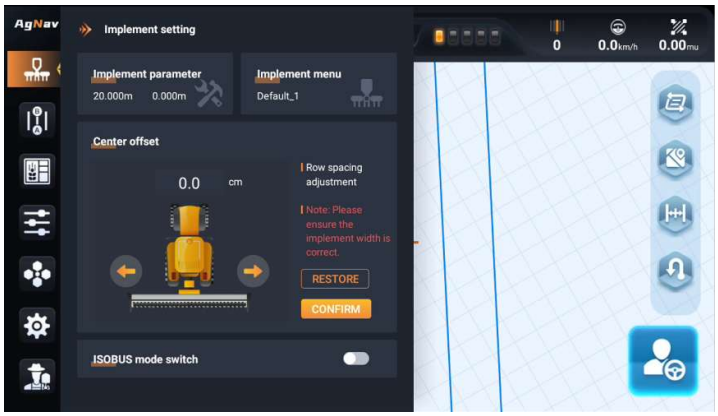
Remaining Area: The area which is subtracted effective area from boundary area.

Boundary Area: The inner area of boundary.

Effective Area: The painting/drawing area without overlap.

8. Implement

It consists of Implement parameter, implement menu, center offset, and ISOBUS mode switch.



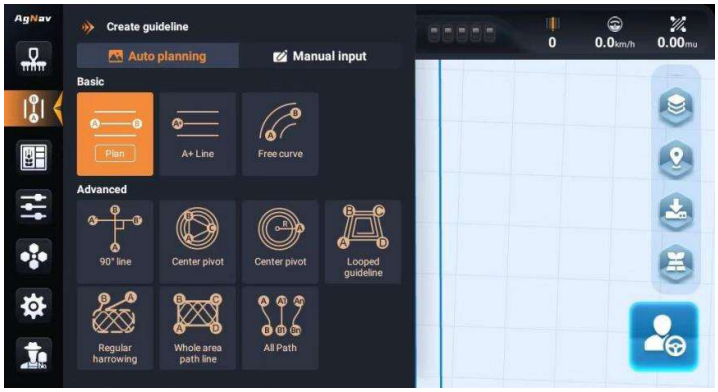
Implement parameter means the current implement information;

Implement menu means the implement library;

Center offset means quick row spacing adjustment: Click the two arrows to adjust the implement offset. For example, if the row spacing is 50cm. After driving two rows, check the actual right row spacing and find it is 45cm. In this case, click the left arrow 5 times to shift 5cm to the left. Also it is necessary to do one click restore.

ISOBUS mode switch: Enable or disable the ISOBUS mode.

9. Guideline



AB Line: Create a guideline by locating two points. The current location will be used as point A, then drive the vehicle to the other end of the field as point B.

A+ Line: The current position will be used as point A to create the A+ line, which uses the heading of the vehicle as azimuth. This feature is recommended to be used in special scenarios that require fast line creation.

Free curve: Free curve can combine the straight AB line and the identical curve. With the use of optimized algorithm, the curve line is more stable.

90° Line: 90° Line can rotate the AB line or A+ line for 90°. It requires an existing AB Line or A+ Line in the guideline list.

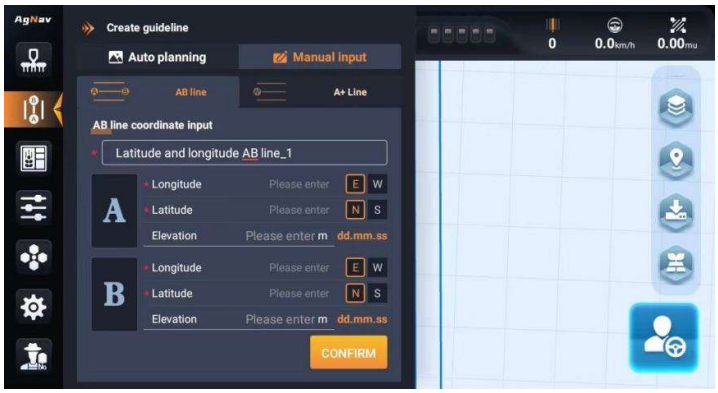
Center pivot: The circular curve can be applied to the case where the vehicle drives a circular automatically, like cutting grass.

Looped guideline: Looped guideline needs 4 points to create a shape and it will generate several separate quadrangle guidelines automatically.

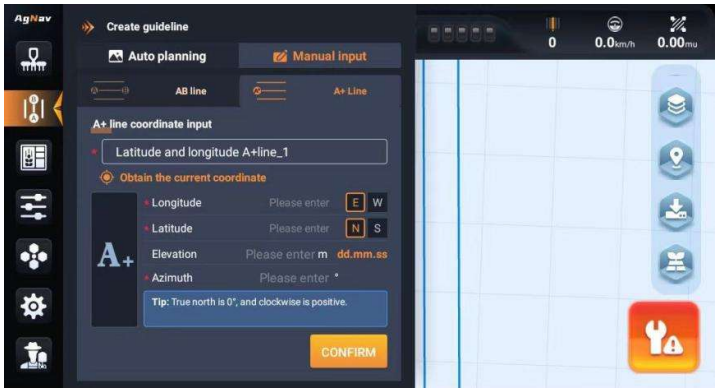
Regular harrowing: Harrowing in the field with a regular boundary. It can be applied to the case that the user needs a fuel-efficient target-ground route.

Whole area path line: Whole area path line needs 4 points to create a shape and it will generate path lines automatically.

All Path: It allows the user to create many different curve line segments which are the actual trajectory of the vehicle. It is mainly used for vine yards.



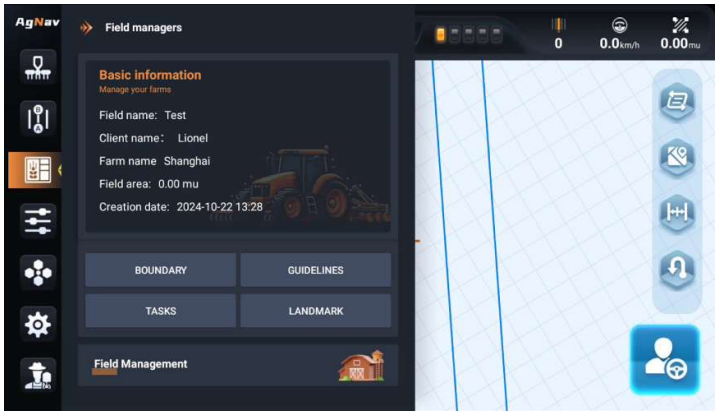
AB line coordinate input: Enter the coordinates of point A and point B, and click CONFIRM to get a new AB line.



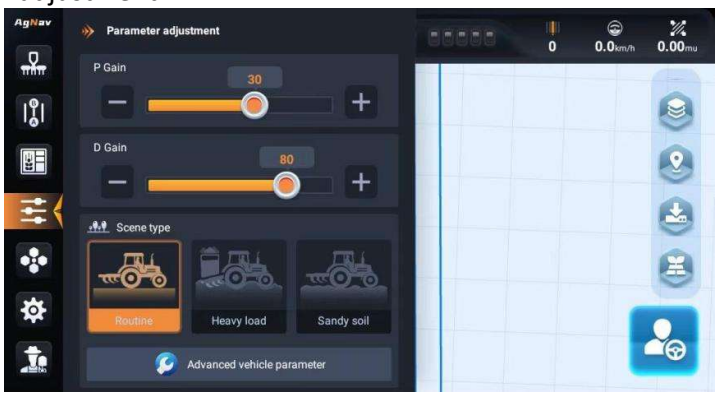
A+ line coordinate input: Enter the coordinates of point A and Azimuth, and click CONFIRM to get a new A+ line.

10. Field managers

It is accessible to manage boundary, guidelines, tasks, and landmark quickly. Also it is available to quickly access to field library.



11. Parameter adjustment



P Gain: Motor Adjustment speed ratio. The smaller the value, the slower the adjustment.

With wheel angle sensor, the recommended value is 20/25 but on the vehicle with small horsepower or small steering ratio generally less than 13, the recommended value is 25/30.

Without wheel angle sensor, the recommended value is 25/30 but on the vehicle with small horsepower or small steering ratio generally less than 13, the recommended value is 30/35.

D Gain: The higher the frequency, the more obvious the vibration of the motor movement; the smaller the frequency, the more stable the motor movement.

With wheel angle sensor, the recommended value is 80.

Without wheel angle sensor, the recommended value is 60/80.

Scene type

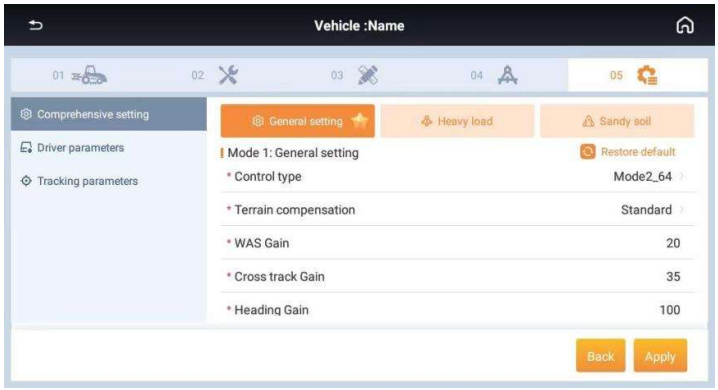
As for now, only the first scene type is allowed to use, and the other 2 scene types are not available, as they are still under testing and developing.

Routine: This type is mainly suitable for regular fields.

Heavy load: This type is suitable when the vehicle is carrying heavy loads.

Sandy soil: This type is used for sandy fields.

Advanced vehicle parameter



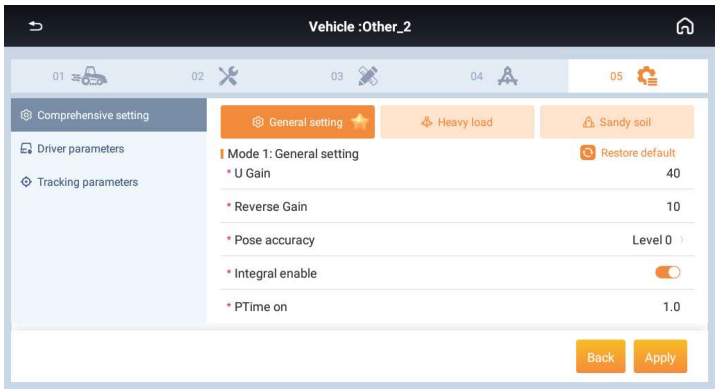
Control type: It is available to select between Mode 1 and Mode2_64. The default is Mode2_64.

Terrain compensation: It includes Slope and Standard two types. It is only useful for tracked vehicle. When switch to algorithm mode NX01, please use the standard; When switch to algorithm mode NX64, please use the slope.

WAS Gain: The default is 20, which is only valid in the without-angle mode. The smaller the steering sensitivity, the more sensitive the front wheel turns. When the vehicle steering clearance is large or the working soil is soft and sloping, the value needs to be reduced and set to 10.

Cross track Gain: No need to adjust, use online aggressiveness to adjust sensitivity.

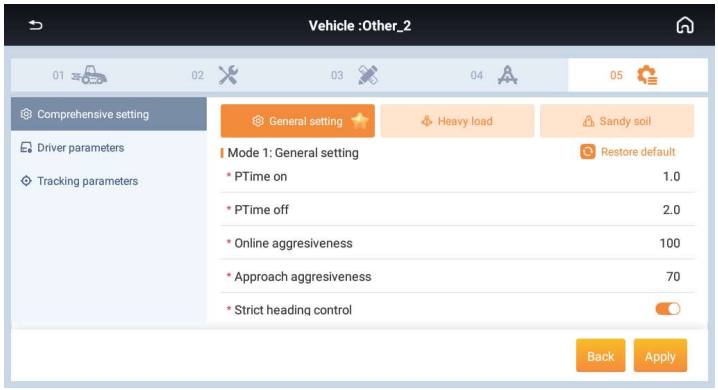
Heading Gain: No need to adjust, use online aggressiveness to adjust sensitivity.



Reverse Gain: The default is 10. When the vehicle is reversed by automatic steering, the deviation correction sensitivity is used. When the vehicle is reversing, the steering wheel swings left and right, so the value needs to be reduced.

Pose accuracy: When the vehicle is stationary, the software shows a speed of 0.2/0.3/0.4 km/h. It can be switched to level 1 which can eliminate the speed display. The default is level 0.

Integral enable: Turning it off can optimize the fixed lateral deviation issue for front-steer vehicles. However, for other vehicles, it is unnecessary to turn it off. The default is on.



PTime on: Judgment time ratio on the line. The default value is 1.0.

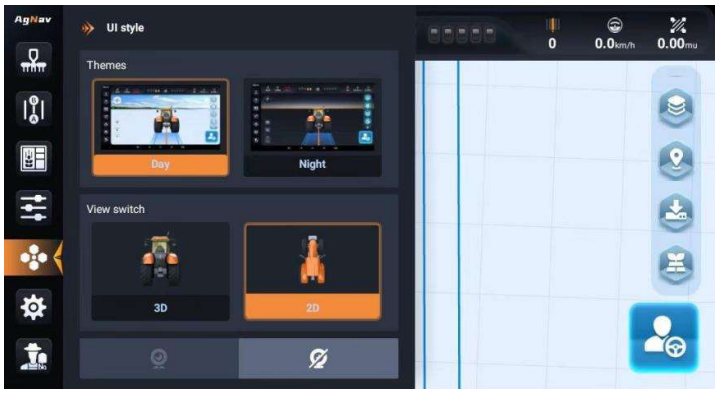
PTime off: Judgment time of approaching to the line, the default value is 2.0.

Online aggresiveness: The default is 100. The sensitivity of the vehicle's online automatic driving bias correction. If deviation is prone to occur and deviation correction is slow, increase this value to 130/150.

Approach aggresiveness: The default is 70, which controls the speed of the vehicle entering the guideline. If the steering wheel swings greatly when the vehicle enters the line, reduce the value, 40/50.

Strict heading control: The default is on.

12. UI style

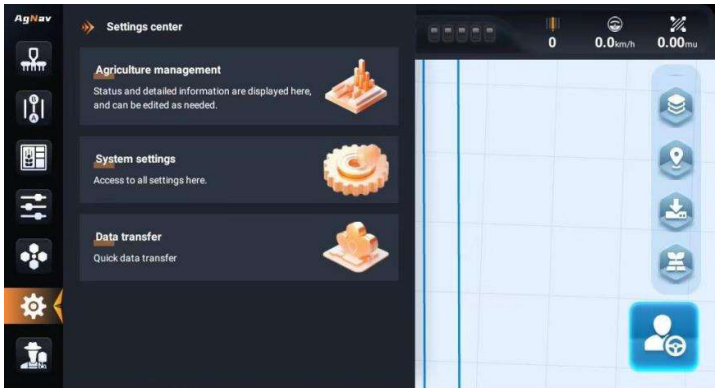


Themes: There are 2 modes, including Day and Night.

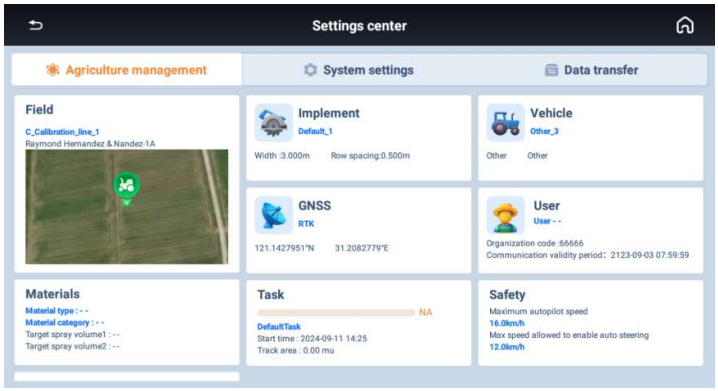
View switch: It is possible to choose between 3D and 2D depending on the customer's will.

Camera: Turn on or turn off the rear camera which is for monitoring the implement.

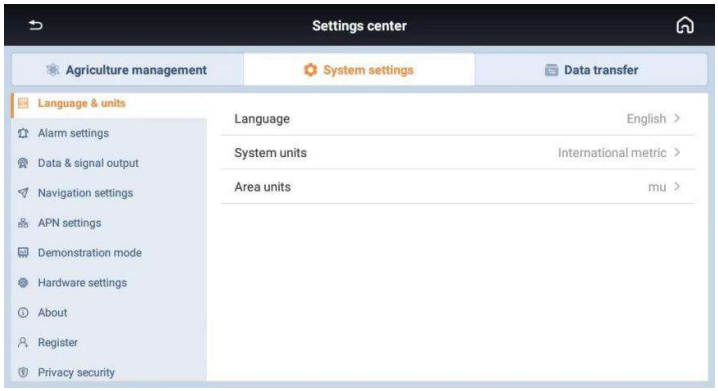
13. Settings center



Agriculture management: It is feasible to use modules such as Field, Implement, Vehicle, GNSS, User, Materials, Task, Safety, and Troubleshooting as shown below.

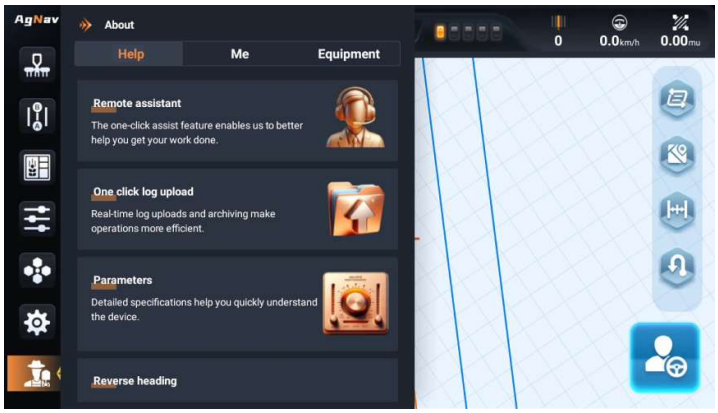


System Settings: In this part, the customer can edit many useful and basic settings.



Data transfer: In this part, it is available to share data by code and import or export file by USB disk.

14. About



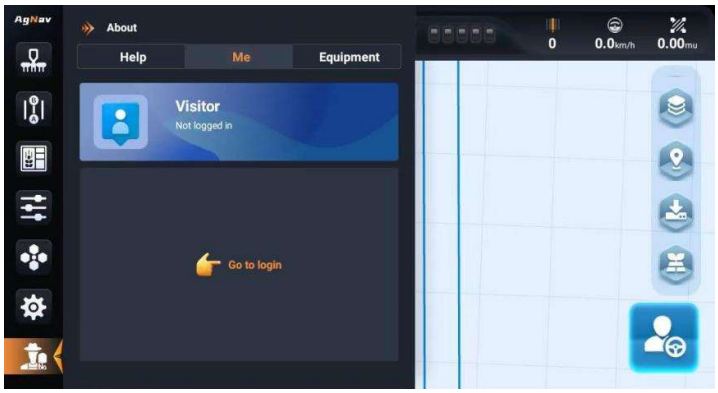
Remote assistant: Contact technicians for remote assistance via an identification code.

One click log upload: Quickly send logs to the server for technicians checking.

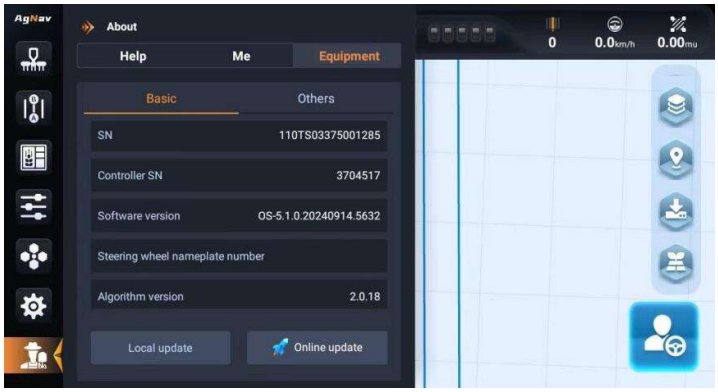
Parameters: Vehicle, configuration and calibration parameters, etc.

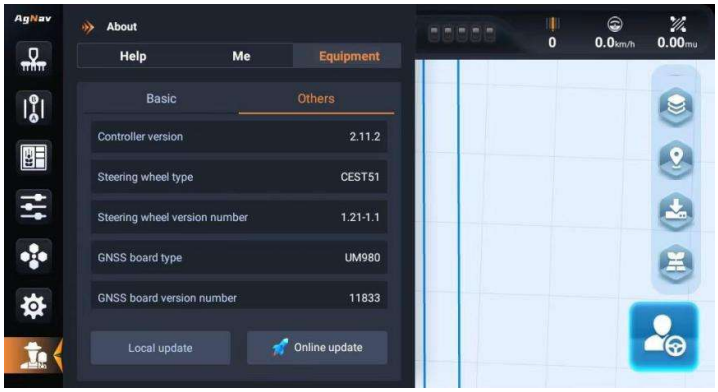
Reverse heading: When the vehicle is driving forward but the software interface indicates that it is reversing, please click it to get the correct heading.

Here it is available to connect to cloud server.



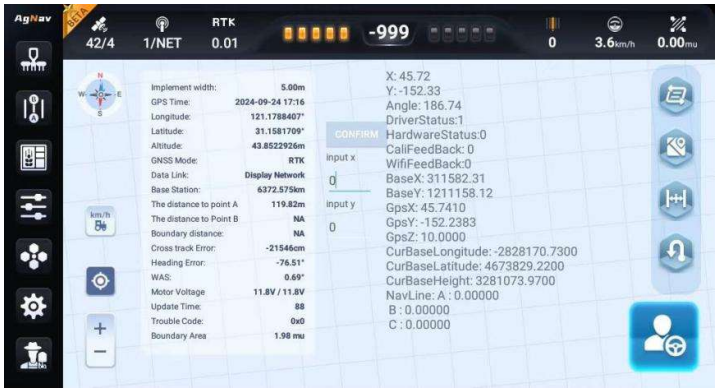
It is available to check basic information and technical information here.





15. Compass

Click it once to check the basic information. Click it seven times continuously to show the debugging information. It is able to modify the coordinates by inputting x and y manually when the device is in demonstration mode.



Base Station: The distance between the vehicle and the base station.

Cross track error: Lateral deviation. The real-time deviation between the current vehicle location and the marked guideline. The value is negative when the vehicle is on the left side of the guideline and positive when the vehicle is on the right side of the guideline.

Heading Error: The angle between guideline and vehicle heading.

WAS: The angle between guideline and front wheel.

Motor voltage: X/Y, X represents the current system voltage, Y represents the minimum voltage.

Trouble Code: The code shows up when there are any system error messages.

16. Tractor speed
Tractor speed in demonstration mode. It is available to adjust the tractor speed in the demonstration mode.

17. View switch
Switch between map orientation or vehicle orientation.

18. Zoom in/out
It can also zoom in or out of the interface by swiping fingers across the screen.

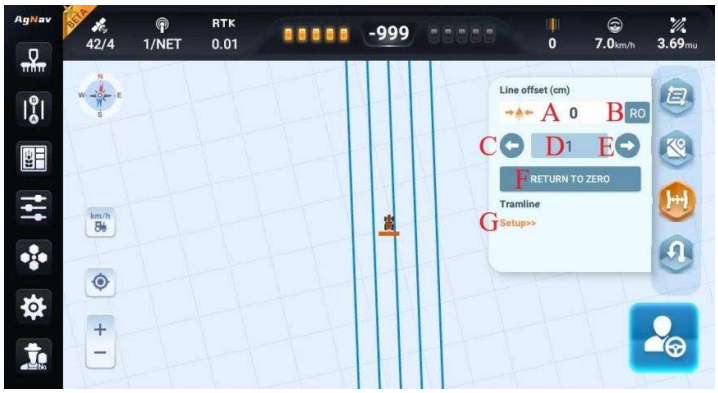
19. Vehicle and guideline
20. Guideline switching button
Click the button to quickly switch guidelines when the field has multiple guidelines.

21. Work coverage track
The track switching method can be set in [Settings center -> System settings -> Navigation settings -> Coverage logging].

Switch Mode: Turn on/off the track manually.

Automatic Mode: Turn on the track automatically when engage the automatic mode.

22. Line offset



A: It records the shifted direction and the shifted value.

B: RO clears the offset of the guideline.

C: The guideline is shifted to the left.

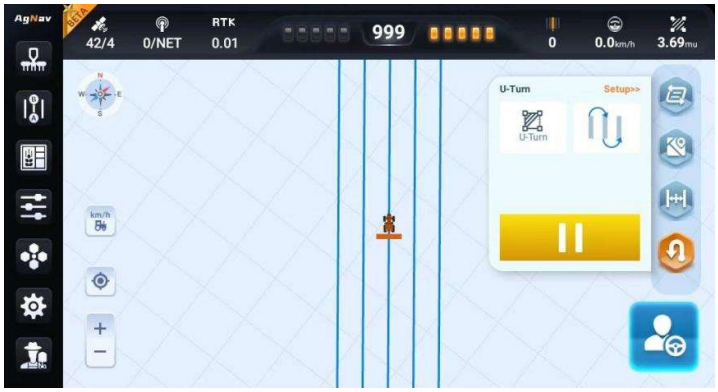
D: Enter the offset distance, the maximum value is 999cm.

E: The guideline is shifted to the right.

F: It makes the lateral deviation and current guideline counts return to zero.

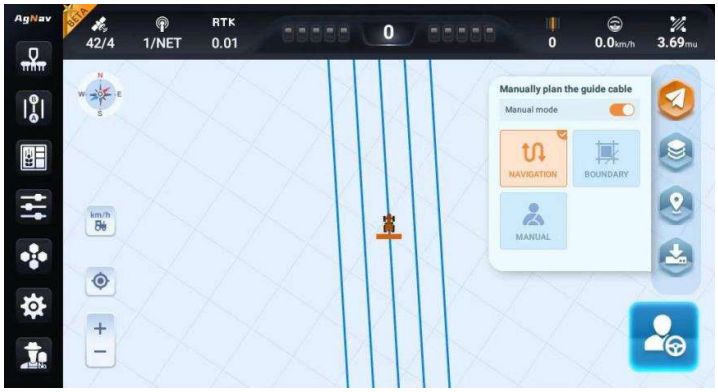
G: Click Setup to set the parameters of Tramline.

23. U-Turn



It is available to quickly access to U-turn page to enable U-turn or configure other advanced settings.

24. GBM

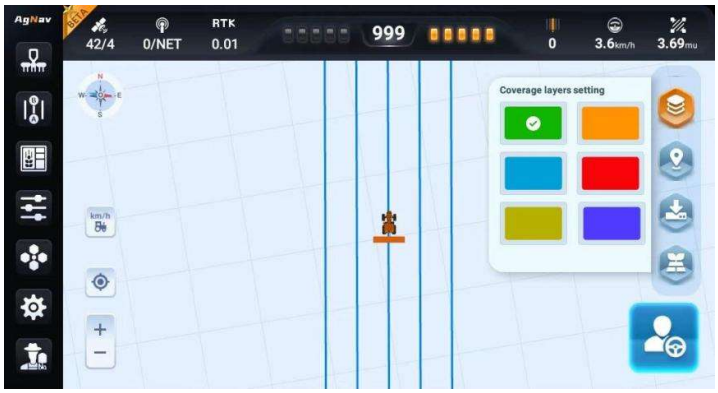


GUIDELINE: The vehicle will only recognize the guidelines and drive automatically after selection.

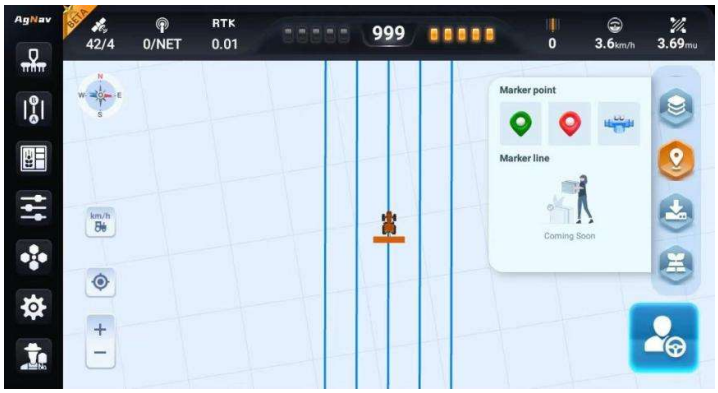
BOUNDARY: The vehicle will only recognize the boundary/headland and drive automatically after selection.

MANUAL: The vehicle will not be able to switch to the automatic driving mode after selection.

25. Coverage layers setting

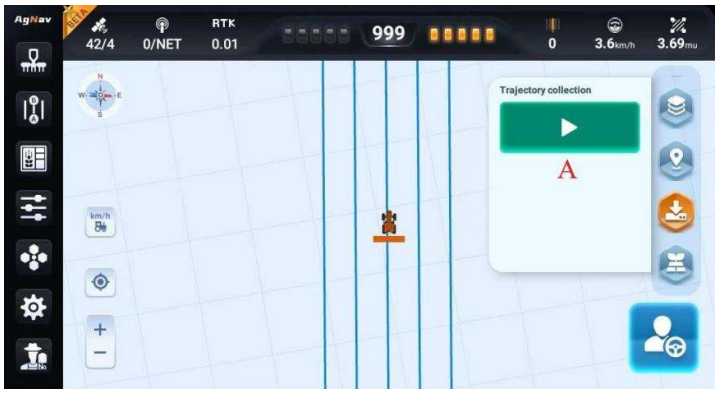


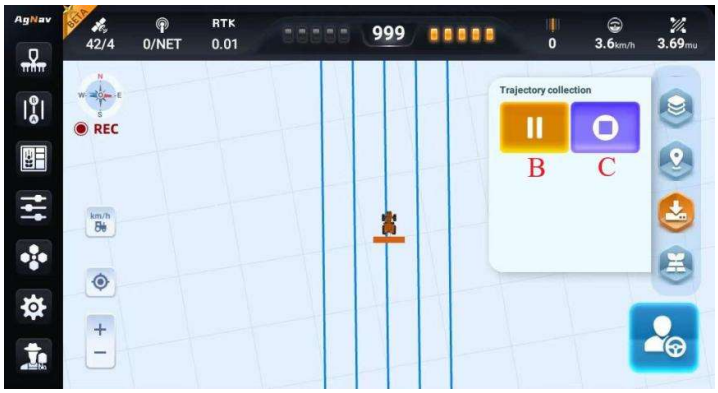
26. Marker point and Marker line

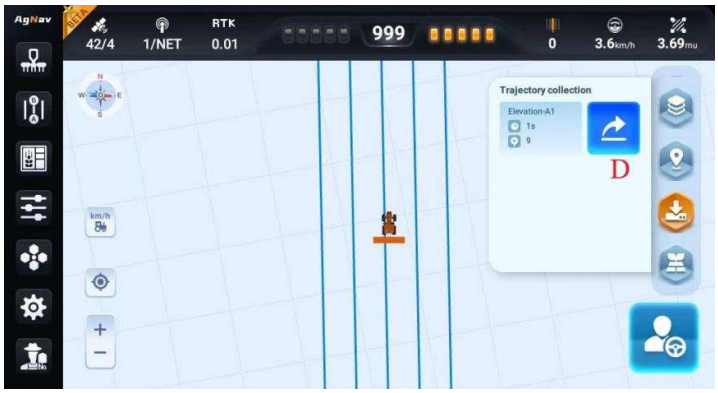


27. Trajectory collection

It is available to start collecting the real trajectory of the vehicle, pause, continue, finish, and export the collection.







A: Start to collect the trajectory.

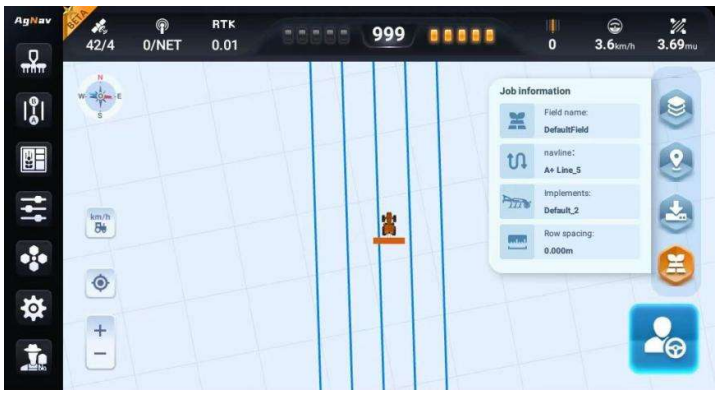
B: Pause the collection.

C: Finish the collection.

D: Export the trajectory file.

28. Job information

This module contains information of the current field, implements and row spacing.



29. Engage or Disengage

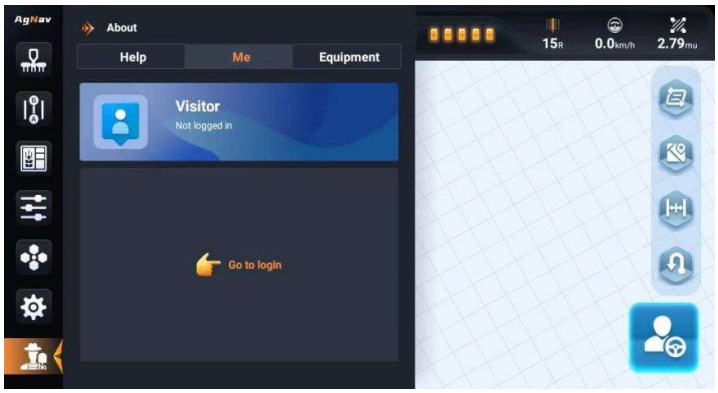
Automatic:

Manual:

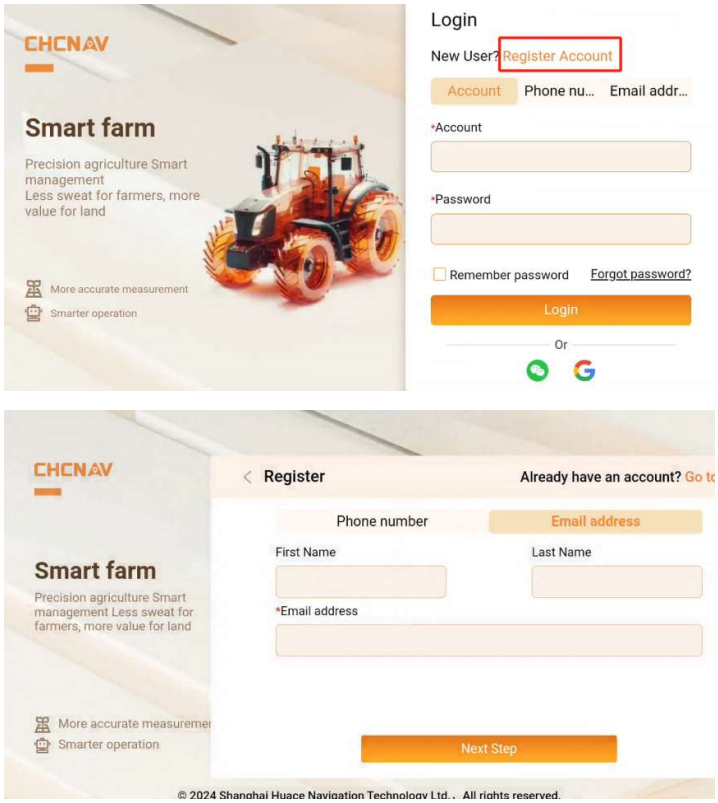
6 Main features

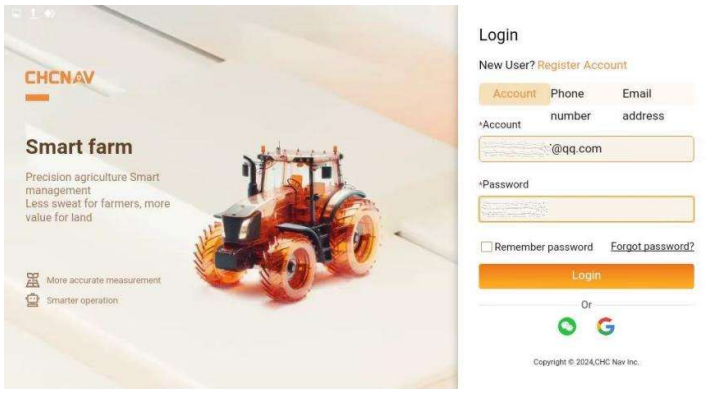
6.1 Cloud services

1. Head to [About -> Me -> Go to login].

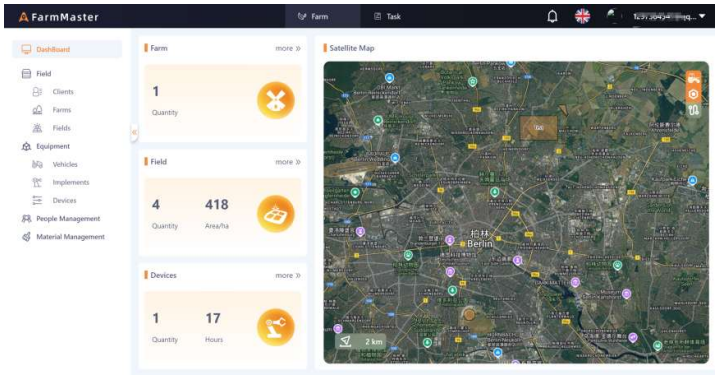


2. Register an new account here or use the account and password you have created to log in.



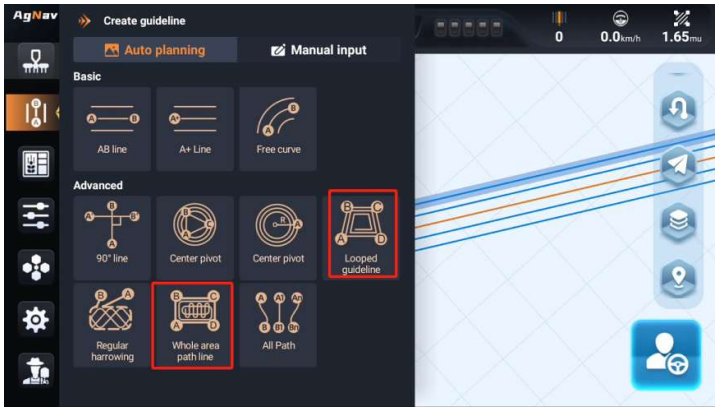


3. After connect to cloud service, it is able to establish the two-way communication between AgNav5.0 software and cloud server.



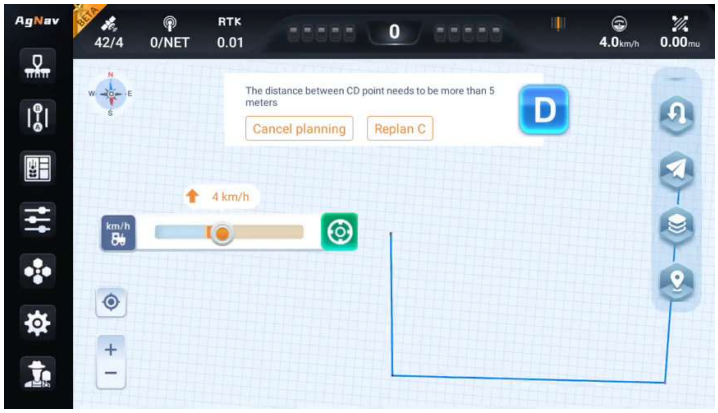
6.2 Advanced guideline modes

AgNav5.0 software also add some new guidelines modes which includes looped guideline and whole area path line compared with AgNav3.0 software.

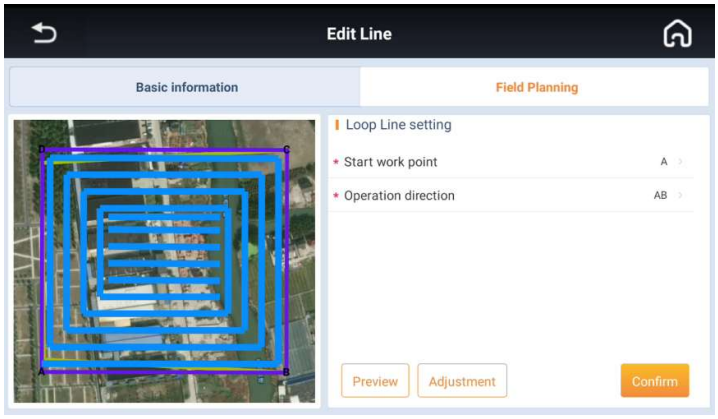


6.2.1 Looped guideline

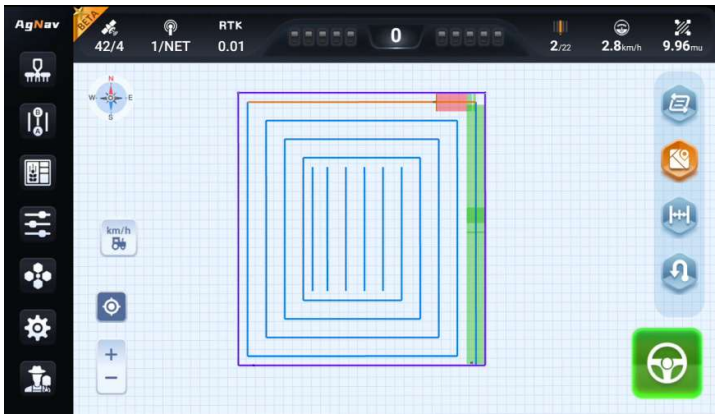
1. The creation of a looped guideline required 4 points.

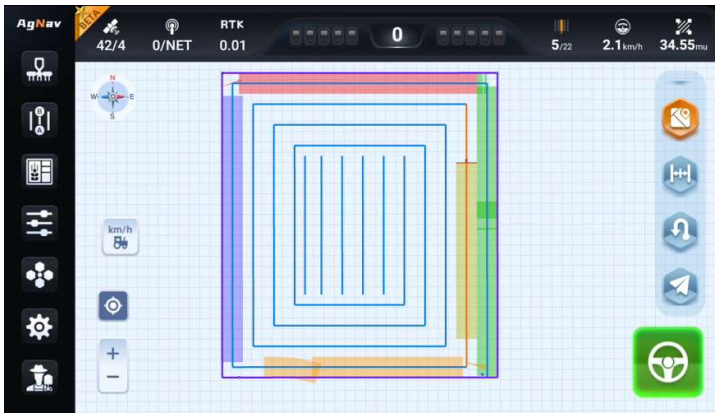


2. After creating a quadrilateral based on four points, it is available to adjust the starting point and starting direction.



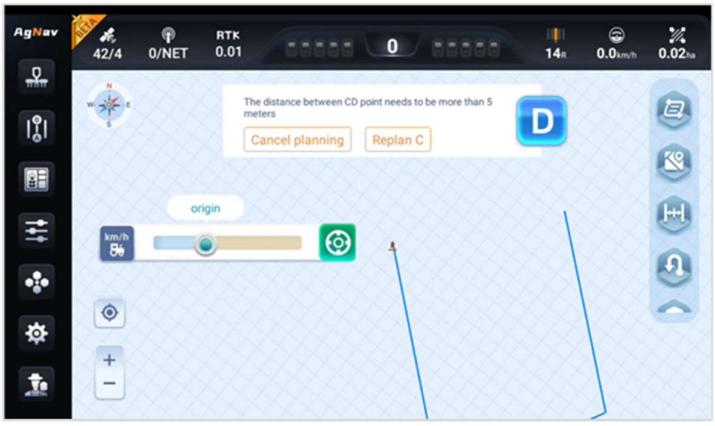
3. Go back to the main interface and start the auto steering based on the planned guidelines. System will manually disengage and it is necessary to manually switch from one guideline to another one when arrive at the corner.



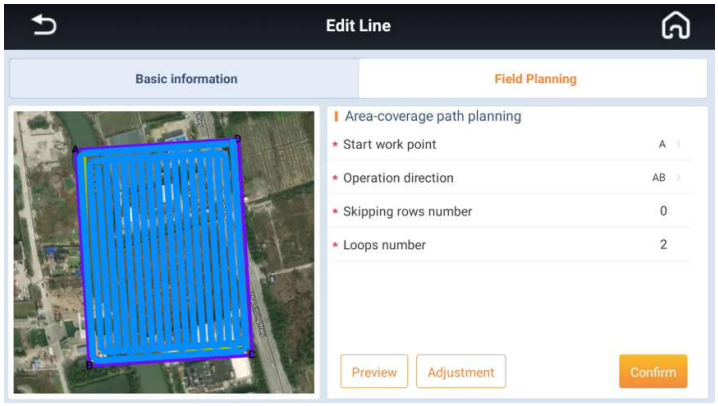


6.2.2 Whole area path line

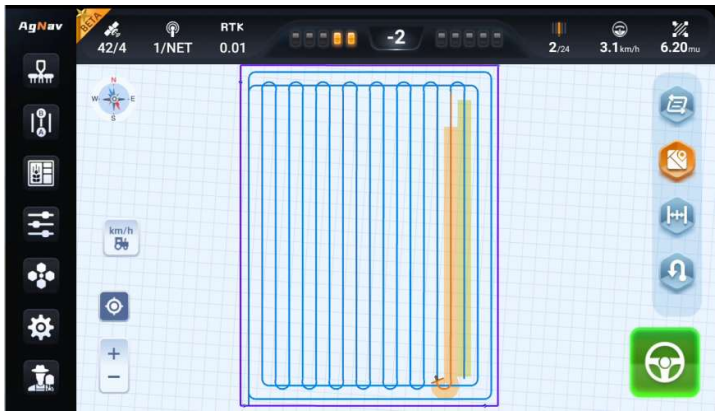
1. A whole area path line needs 4 points as well.



2. After creating a quadrilateral based on four points, it is available to adjust the starting point, starting direction, skipping rows and loops number as below.



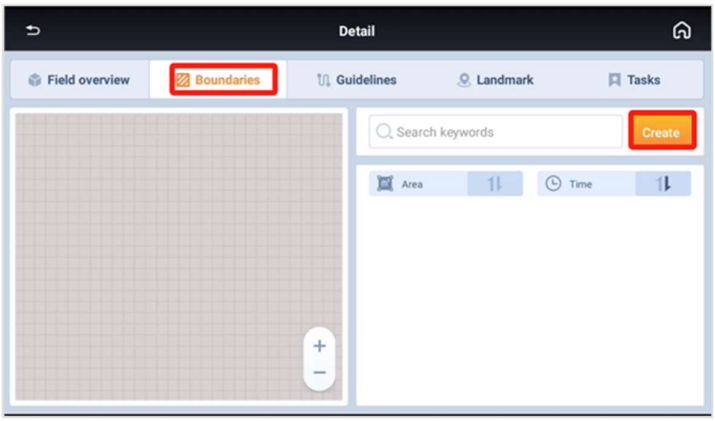
3. Go back to the main interface and start the auto steering based on the planned guidelines. All process are with auto steering and there is unnecessary to manually intervene.

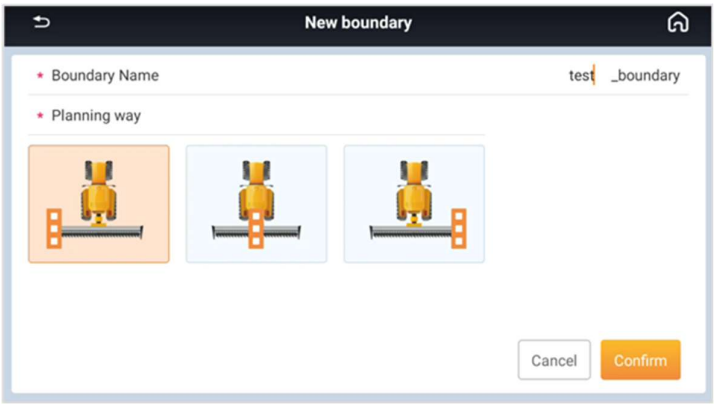


6.3 New Boundary

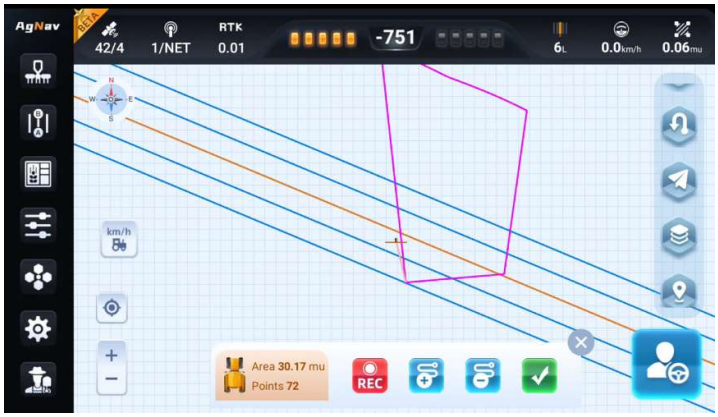
1. Go to [Settings center -> Agricultural management -> Field -> Details].

Create a new boundary with different implement location.

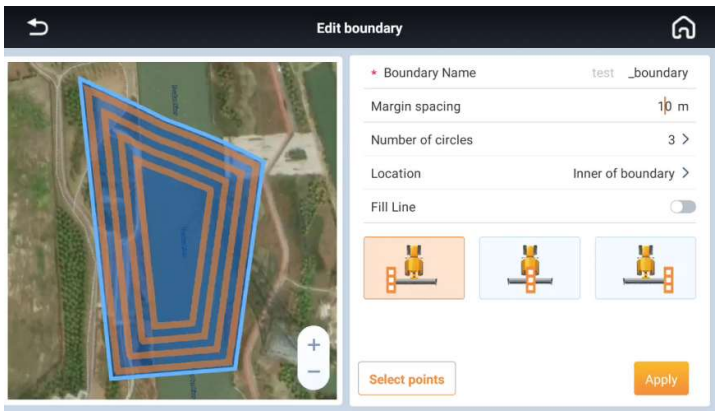




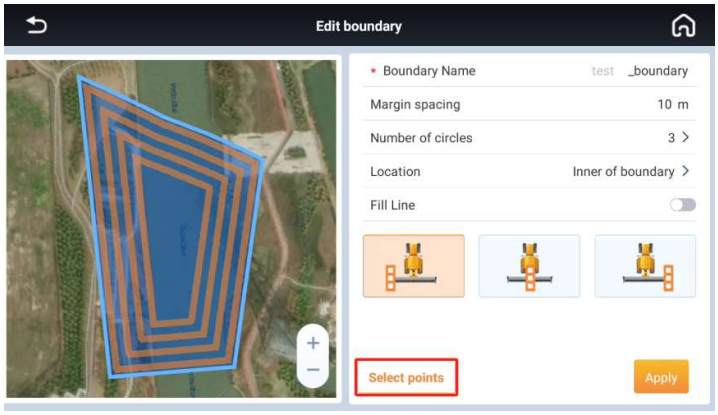
2. It is able to plan straight line and curve line by pressing the first Pause/Start button. Also it is able to add/delete mark point on the boundary by pressing the second/third button. After finish the boundary recording, please click final button to complete it.

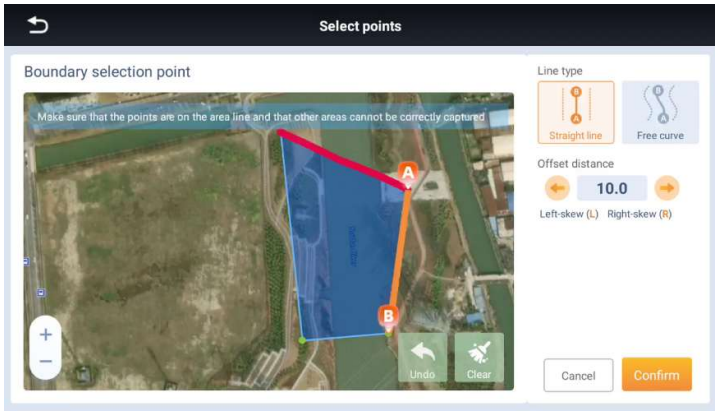


3. Now it supports to set spacing width and the maximum 10 headlines.



4. It is available to snap points to create AB line or curve line on the boundary. In addition, The offset distance can be set as well and the default distance is half of the implement width.

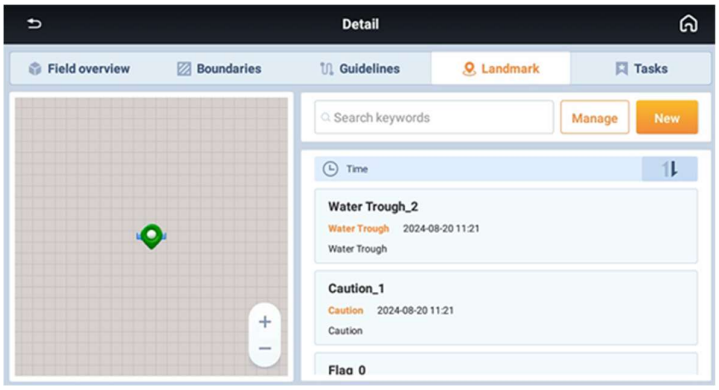




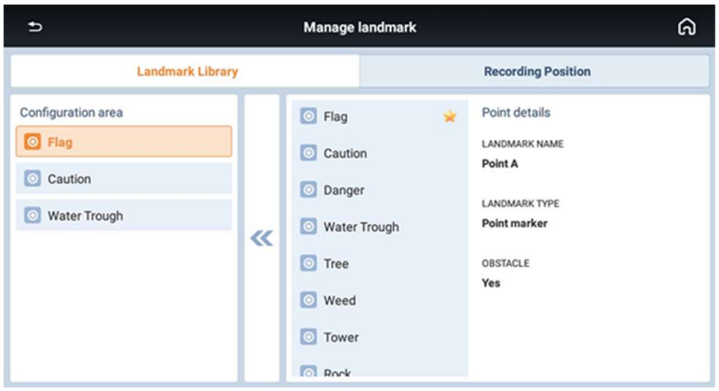
6.4 Landmarks

AgNav5.0 software can support to add landmarks to remind users when work on the field at night.

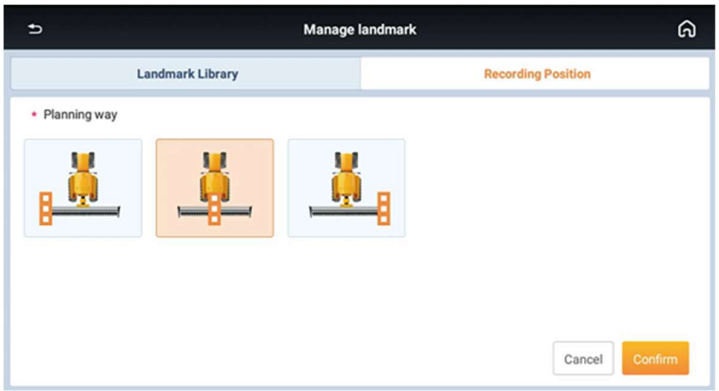
1. Go to [Settings center -> Agricultural management -> Field -> Detail -> Landmark].



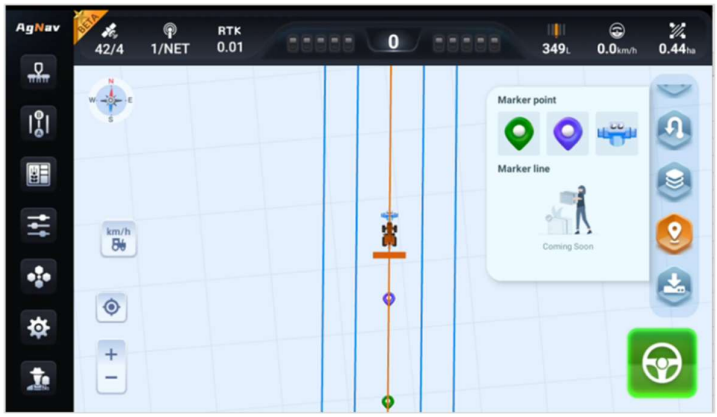
2. Different markers can be configured in the Landmark Library.



3. Setting the marker reference in recording position.

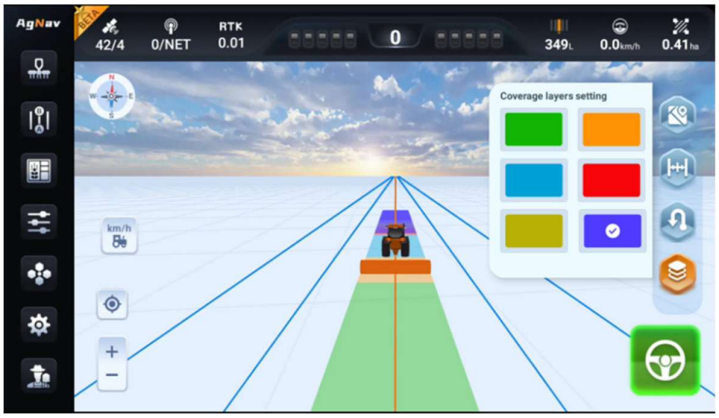


4. It is available to set markers in the main interface by shortcut icon.



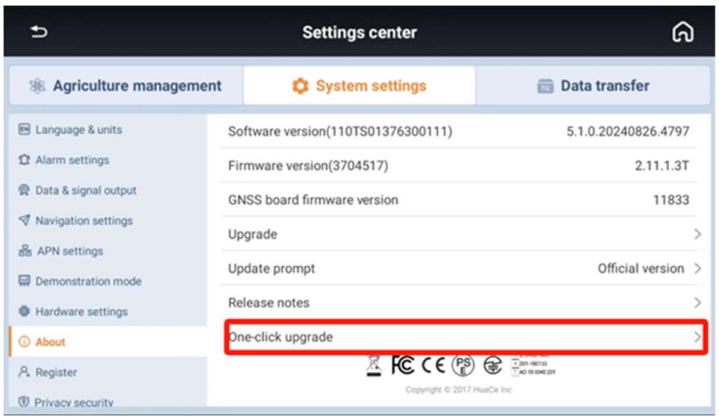
6.5 Track painting color

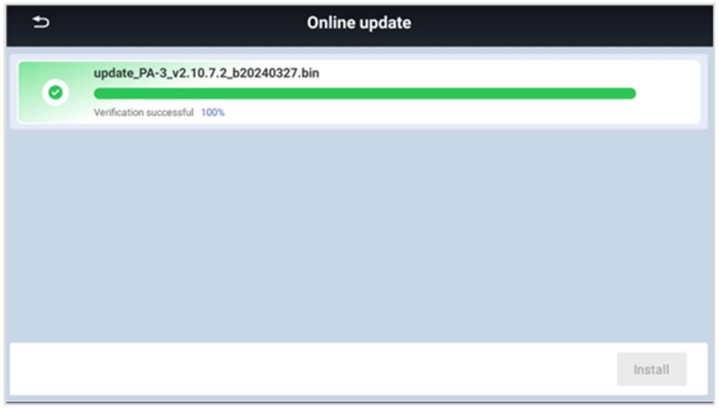
Track painting color can support 6 colors right now. It is available to change the painting color real time.



6.6 One-click upgrade

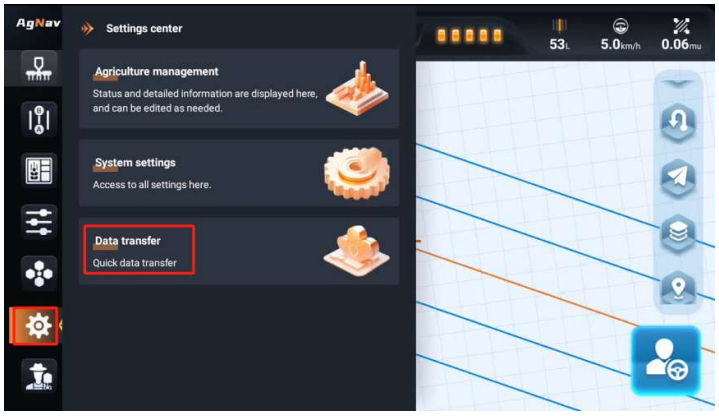
Go to [Settings center -> System settings -> About -> One-click upgrade]. The software and the firmware will be upgraded to the newest release with a click of One-click upgrade.



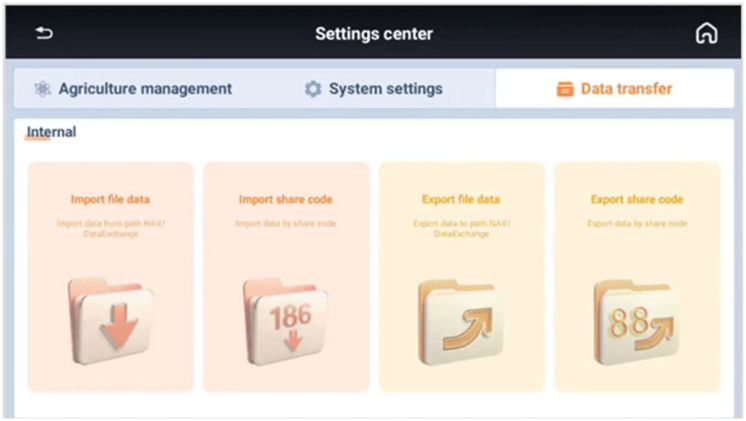


6.7 Data transfer

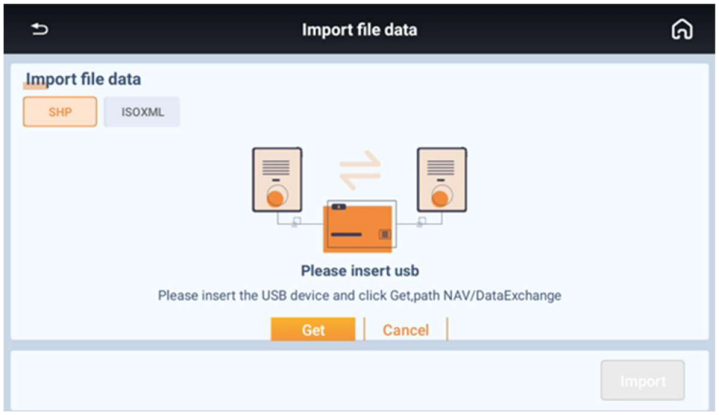
1. Go to [Settings center -> Data transfer].

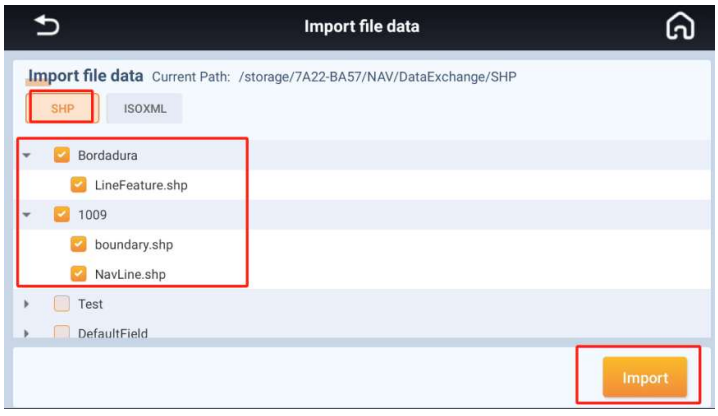


2. It is available to import file data, import by share code, export file data, and export by share code.

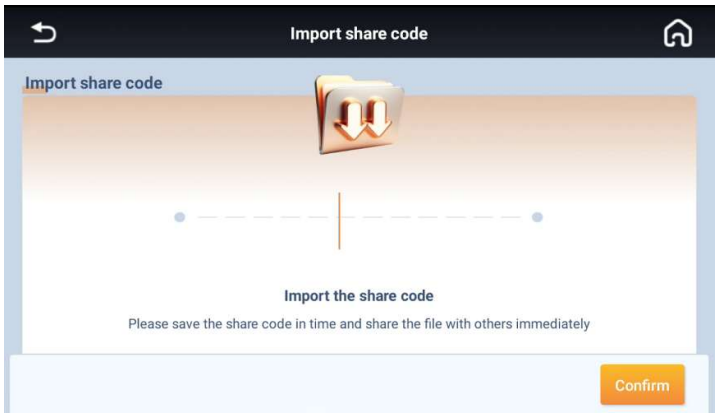


3. When import file, currently SHP and ISOXML file are supported. It is necessary to create a folder named NAV/DataExchange/SHP or NAV/DataExchange/ISOXML, and put the SHP folder or ISOXML file into this directory, finally please insert the USB device to the tablet and the software will recognize the USB and files automatically, please select the file you want to import and import it.

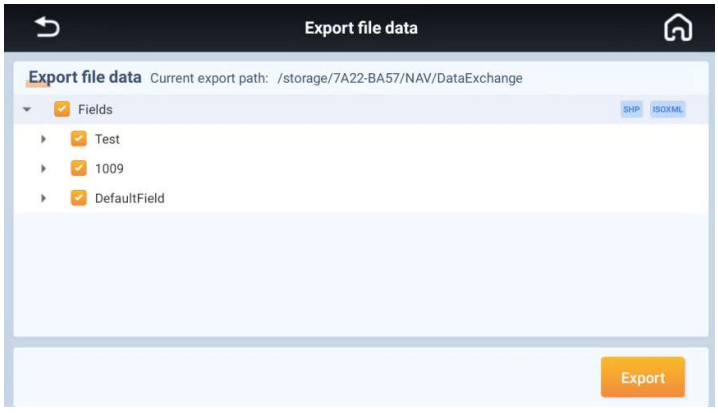




4. When import by share code, please type the code from another tablet, then it will jump to import interface and please select the file to import.



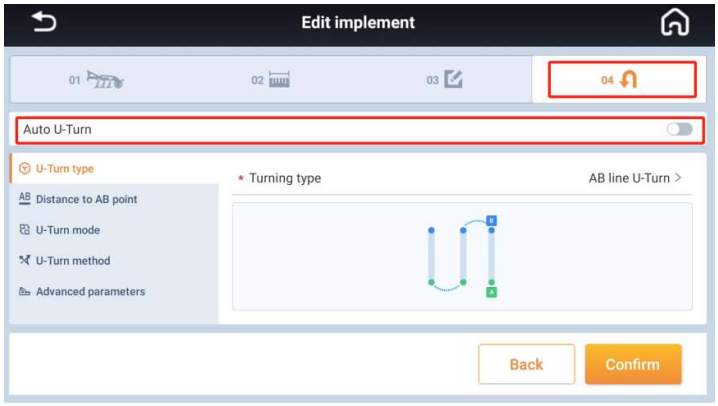
5. When export file, currently SHP and ISOXML file are supported. It is available to export to the internal memory or external USB device.



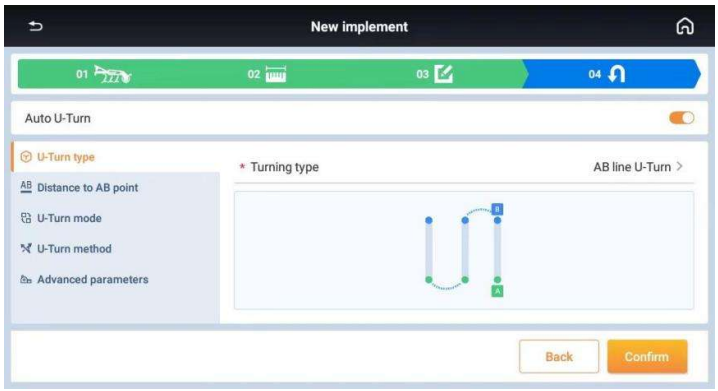
6. When export by share code, it is able to export vehicle, implements and fields information to another tablet. Please select the file and click Share, finally it will generate the sharing code.

6.8 Advanced U-Turn

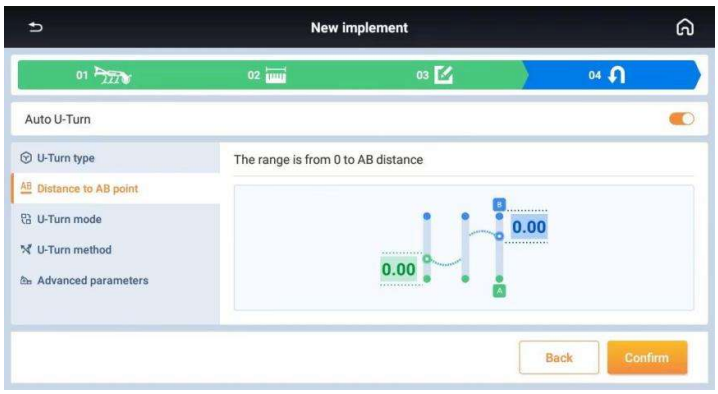
1. Go to [Settings center -> Agricultural management -> Implement], it is available to enable/disable Auto U-turn in the first option.



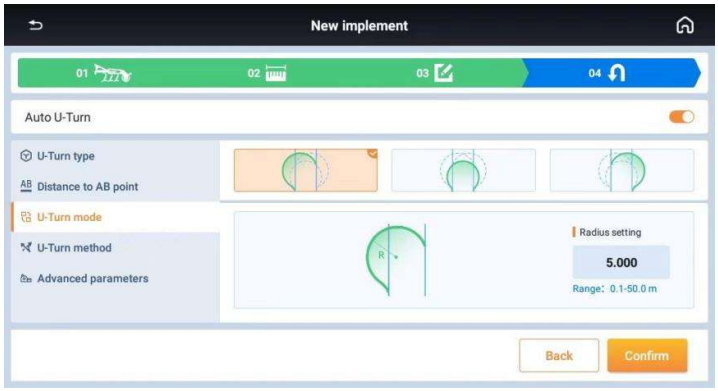
2. It is available to select the U-Turn type including AB line U-Turn, A+ line U-Turn, Boundary U-Turn, and Headline U-Turn.



3. Also it is possible to determine where the vehicle enables the auto U-Turn feature by setting the distance to AB point.

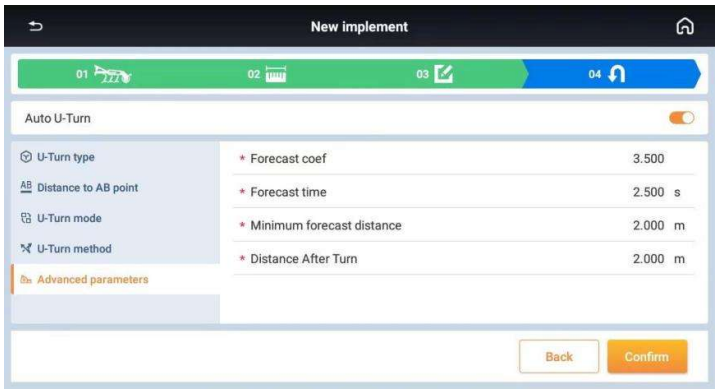


4. It is accessible to select the U-Turn shape and set the radius.



5. It is feasible to choose the U-Turn method including U-shaped mode, Alternate mode, and one-way mode with defining the U-Turn direction and skip rows.

6. There are some advanced parameters related to U-Turn.



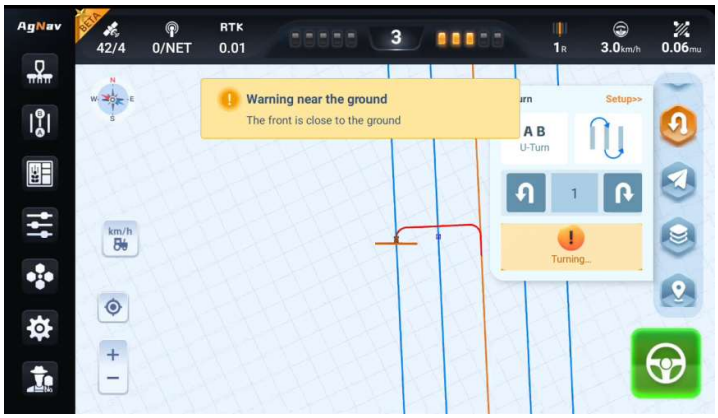
Forecast coef: Decrease the value if the vehicle enters the next guideline slowly after U-turn. The range is from 0.1 to 5.0.

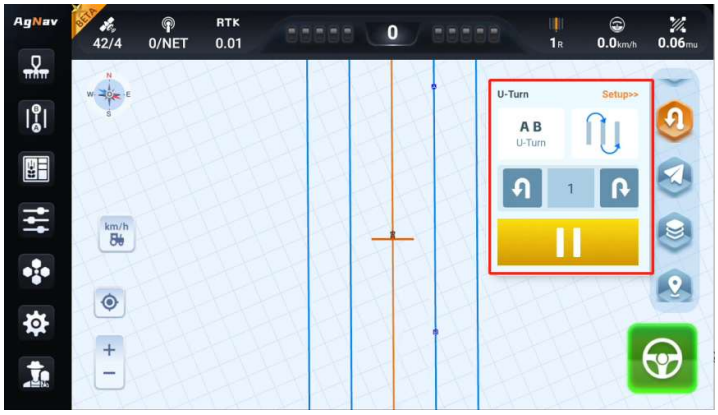
Forecast time: Increase the value if the vehicle deviation distance is large during U-turn. The range is from 0.1 to 5.0.

Minimum forecast distance: Predict the turnaround path by the vehicle's current position to give sufficient time for U-turn. The smaller the value, the later the vehicle turns around. The range for transplanter is 1.7-2.5, for tractor is 2.0-4.0 and the adjustment interval is 0.1.

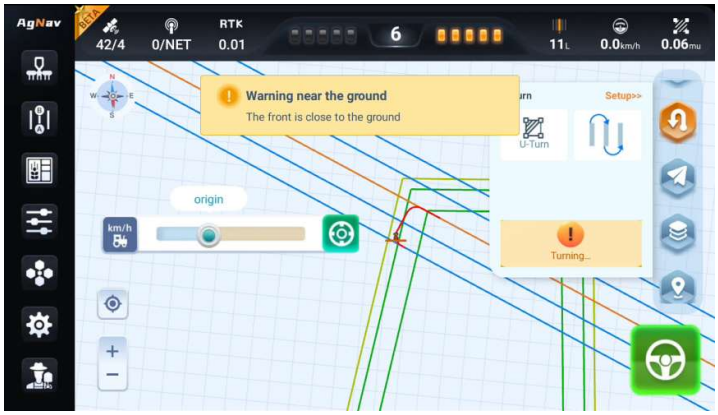
Distance After Turn: Distance required for vehicle to fully enter the guideline after U-turn.

7. In the main interface, the tractor will start the auto U-turn based on the distance to AB line. Also it is available to start the U-turn by manual settings.





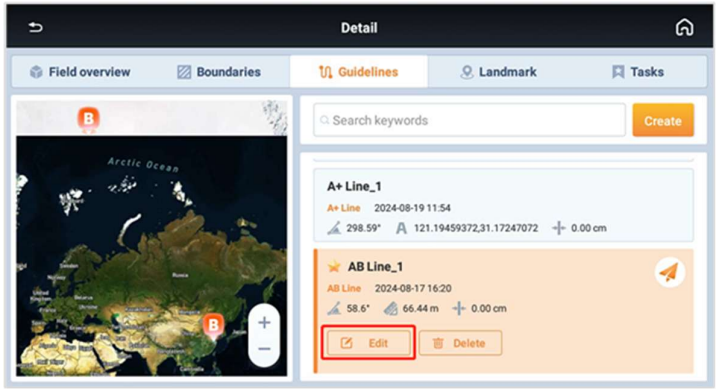
8. In addition, boundary U-turn can also work as the preset distance to the boundary.



6.9 Access paths

Access paths feature usually is used for drainage ditch scenarios as the picture below.

1. Go to [Settings center -> Agricultural management -> Field -> Detail -> Guidelines].



Rows in first group: The number of lines of the first group.

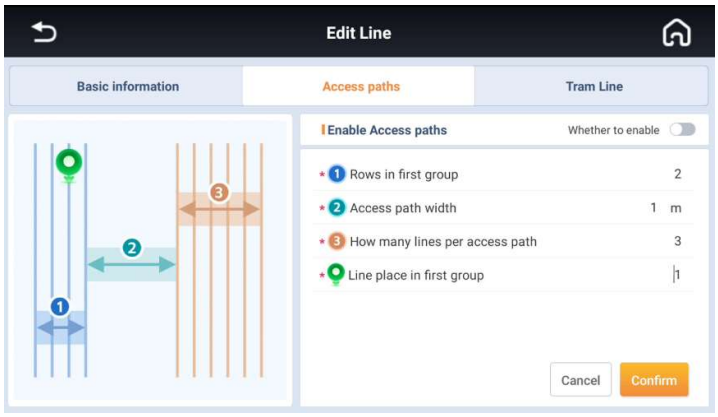
Access path width: The distance between each two access path.

How many lines per access path: The number of lines for each access path.

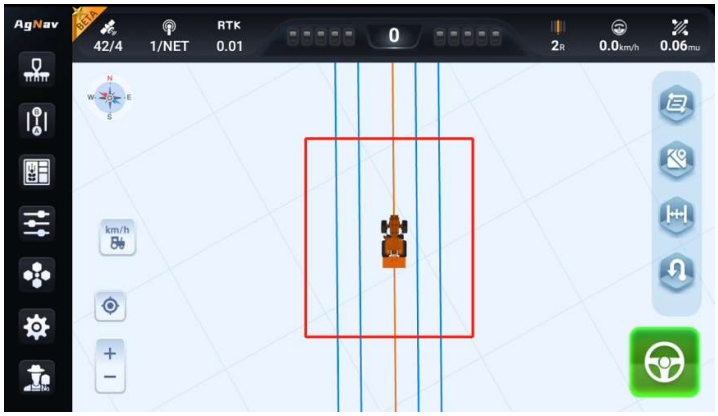
Line place in first group: The number you enter will decide which line will be line 0 in the first group.

2. Here take an example, set 2 rows in the first group, 1m access path width, 3 rows

per access path and 1st place in the first group.



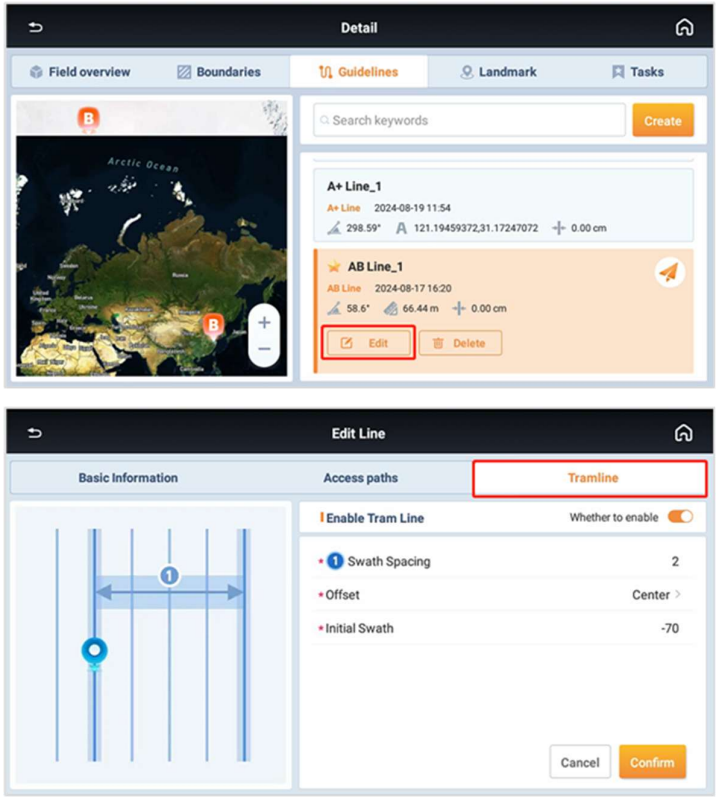
3. Go back to main interface and check the display.



6.10 Tram line

The principles of tramlines, they are placed in the field at seeding time. The width of the sprayboom has to be evenly divisible by the drill/air-seeder width, for example a 30' air-seeder and a 60'spray boom or a 40'air-seeder and a 120'spray boom.

1. Go to [Settings center -> Agricultural management -> Field -> Detail -> Guidelines].

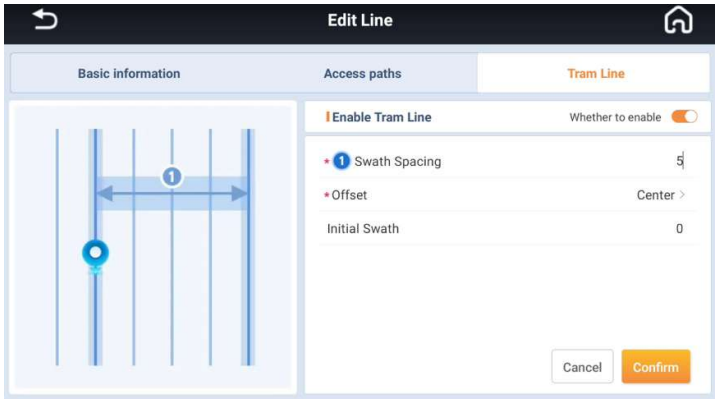


Swath Spacing: The skipping rows and the range is from 1 to 99.

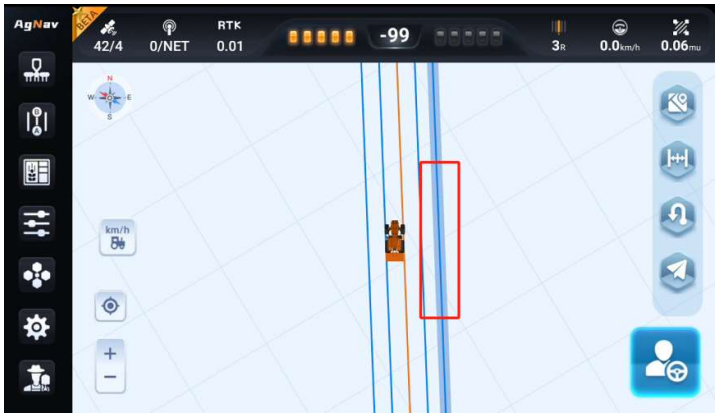
Offset: Select among left, center, and right.

Initial Swath: The location of the first Tram line line number.

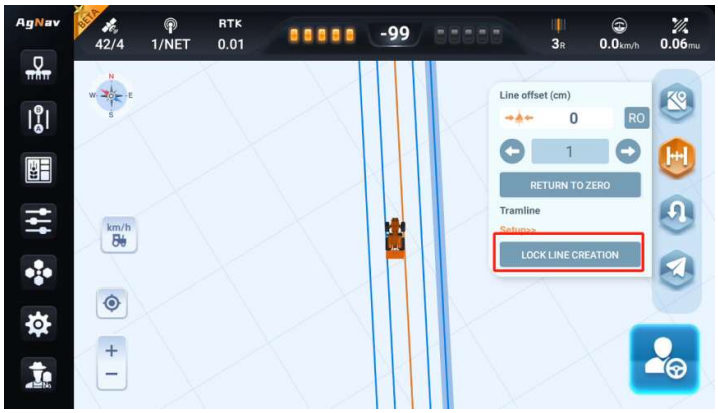
2. Here take an example, set 2 rows in the first group, 1m access path width, 3 rows per access path and 1st place in the first group.

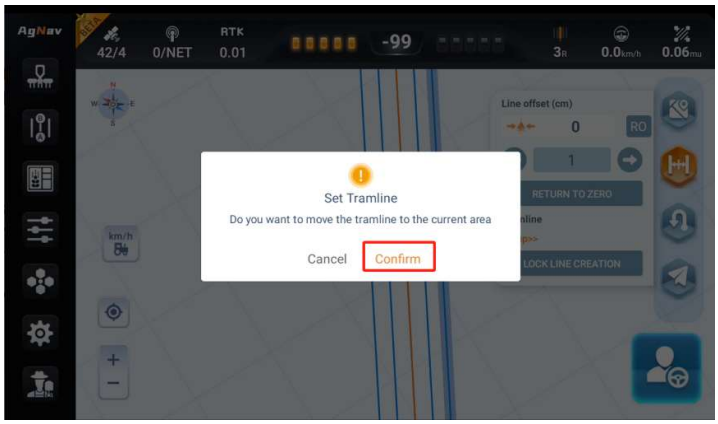


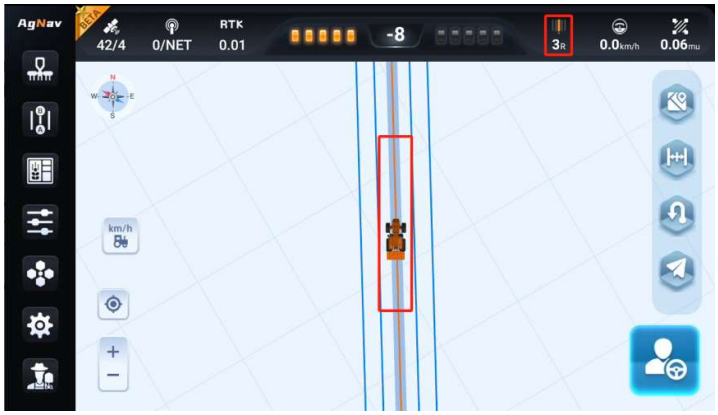
3. Go back to main interface and check the display.

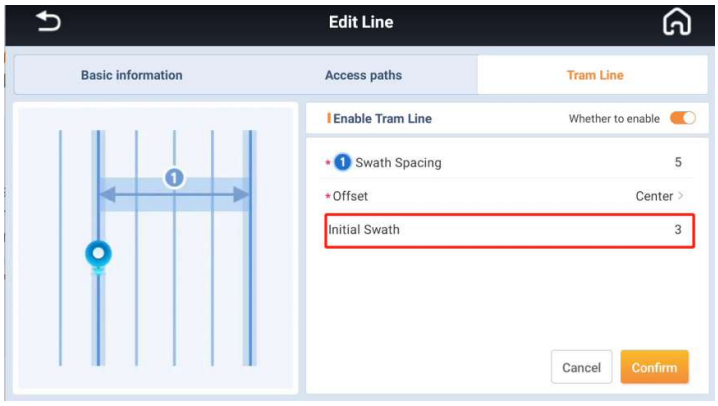


4. Also it is possible to change the initial swath.





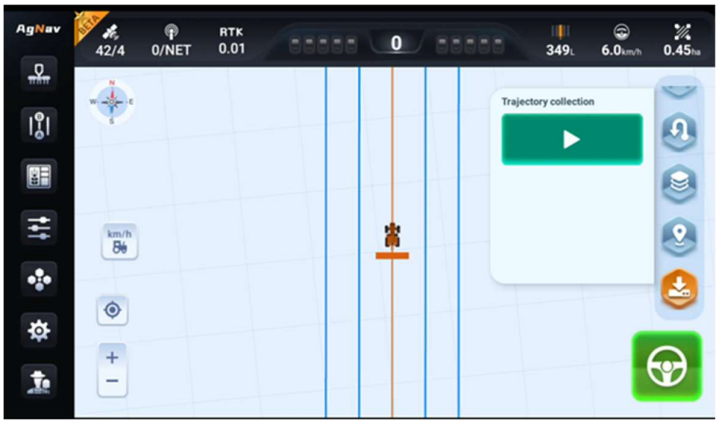




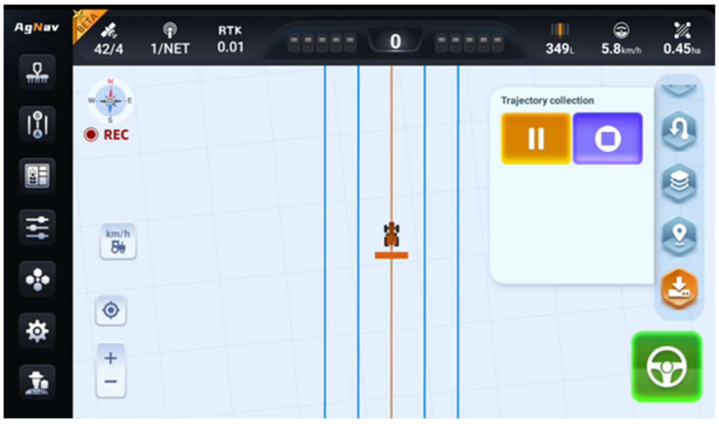
6.11 Trajectory recording

With trajectory recording feature, software can record real-time track 3D coordinates, which can be exported in txt and shp formats. In Brazil, many customers want to record the real track when doing auto steering, because some ground may be not flat and the vehicle will slide, so it is necessary to record the real one and use the same one next time.

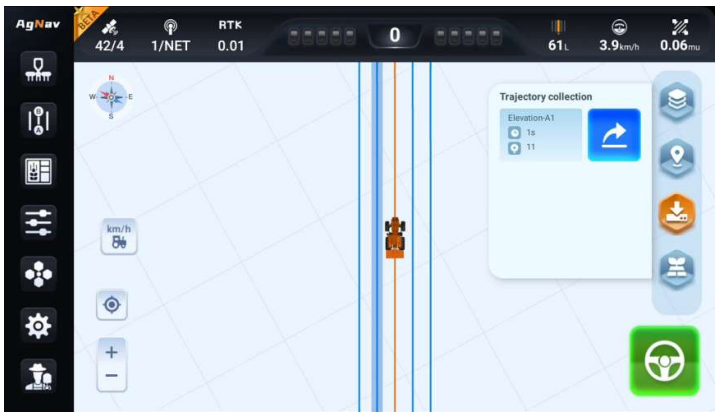
1. Click the icon as the picture below to enable the trajectory collection.

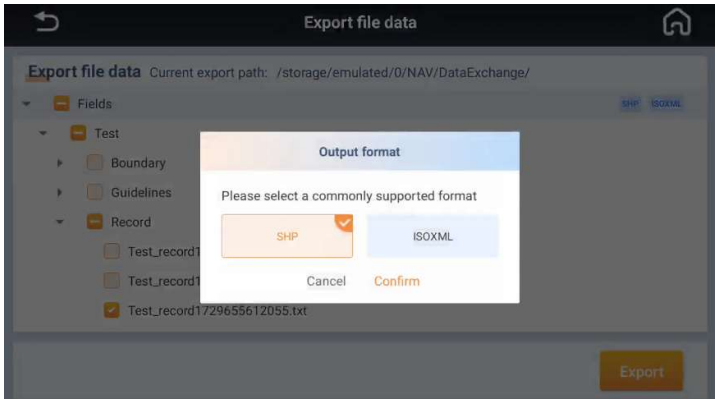


2. It is able to pause or end the collection.



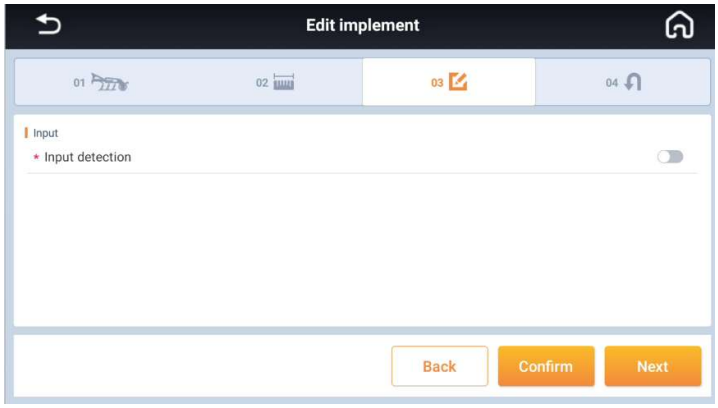
3. After enter the collection, it is able to check the basic information and export data by TXT/SHP/ISOXML format.



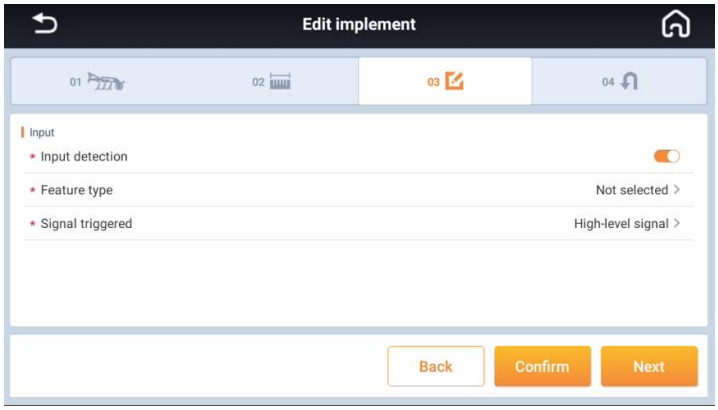


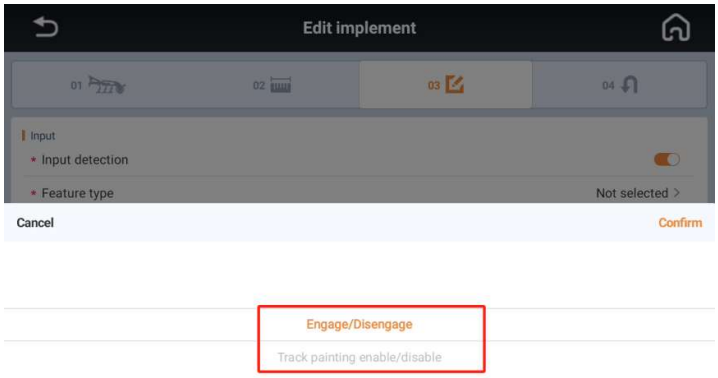
6.12 Implement signal input

1. Go to [Settings center -> Agricultural management -> Implement -> Input].

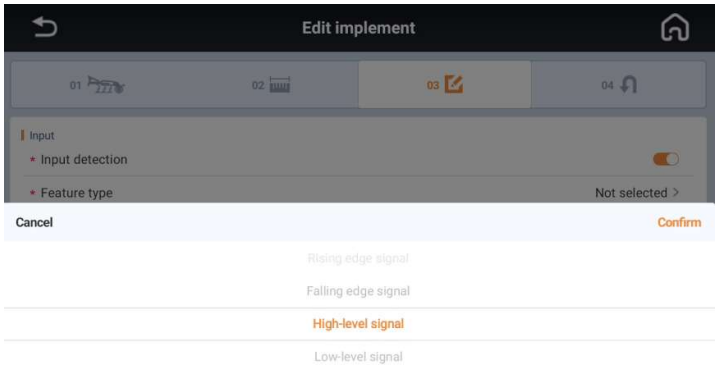


2. It is allowed to enable/disable autopilot or track painting.



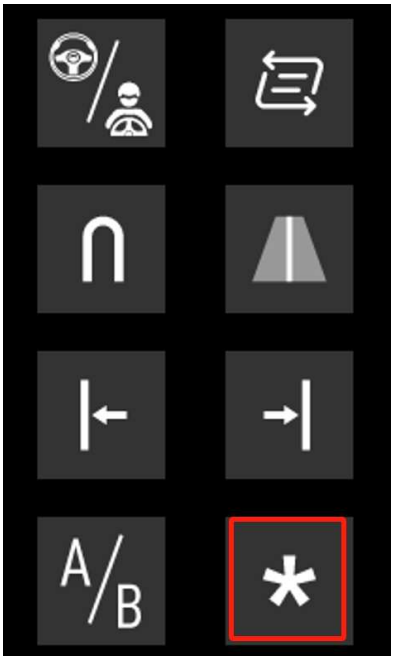


3. Also four kinds of signals including rising edge signal, falling edge signal, high-level signal and low-level signal can be set to trigger software to execute specific instructions.

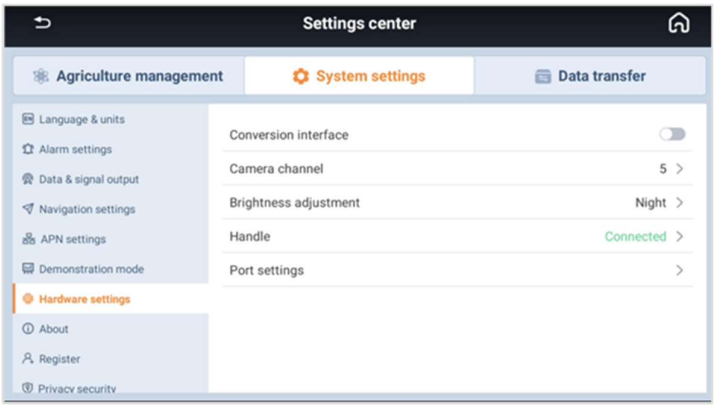


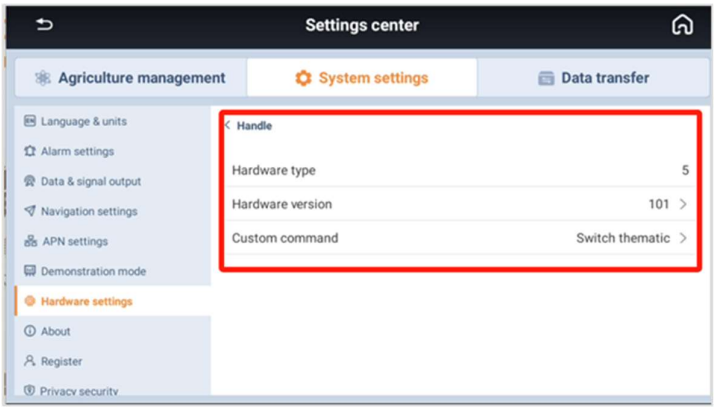
6.13 Multi-function panel

AgNav5.0 also can support to query the multi-function panel information and customize different features for reserved button *



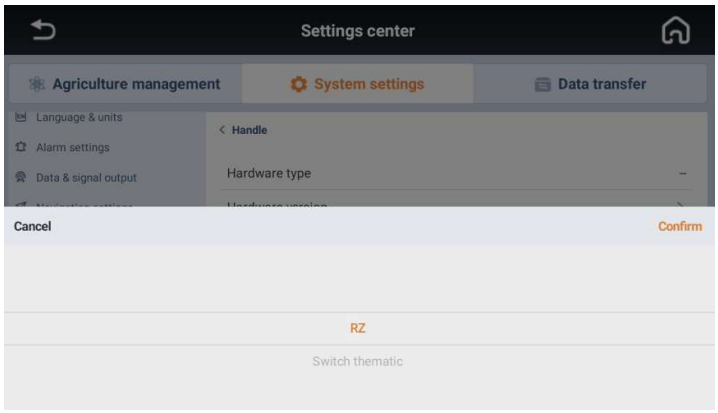
1. Go to [Settings center -> System settings -> Hardware settings -> Handle] to check the handle version.





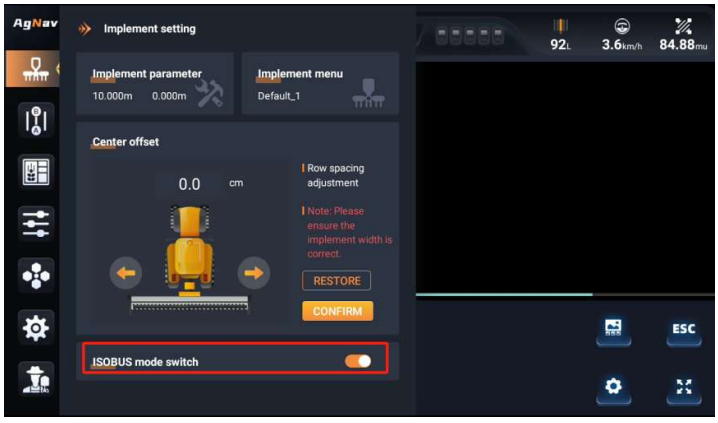
2. Currently it is available to customize the [RZ] and [thematic switch] these two

features.

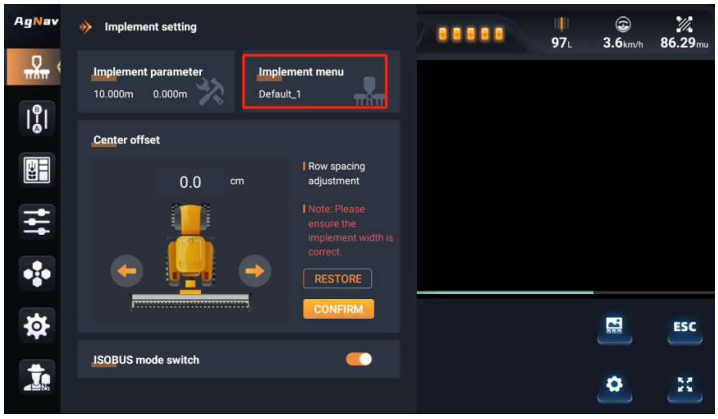


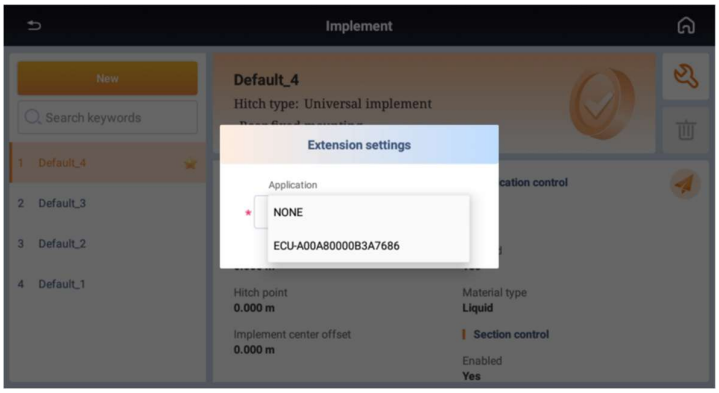
6.14 ISOBUS UT & TC-SC

1. Go to [Implement setting -> ISOBUS mode switch] to enable ISOBUS.

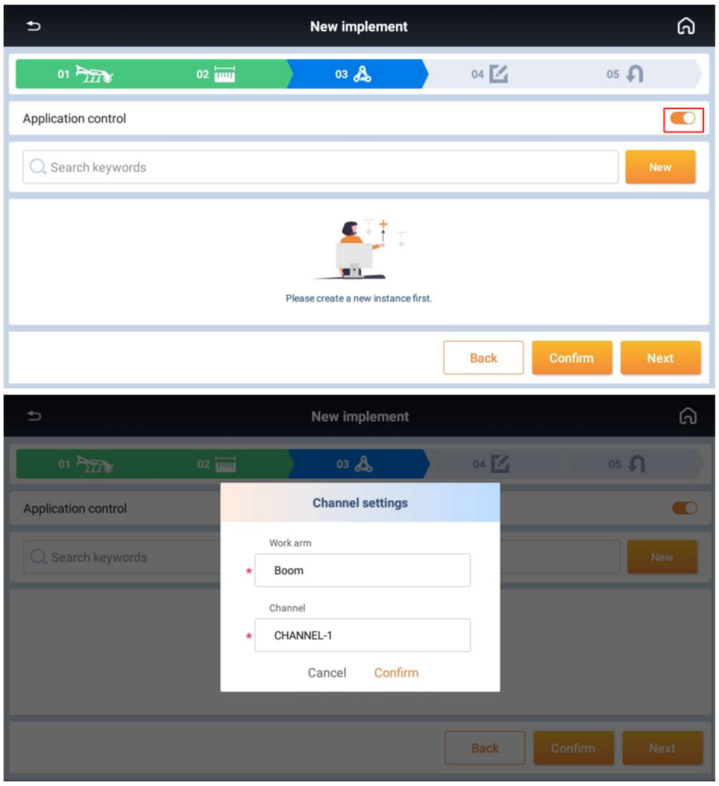


2. Go to [Implement menu] to add a new implement and select this ISOBUS implement.

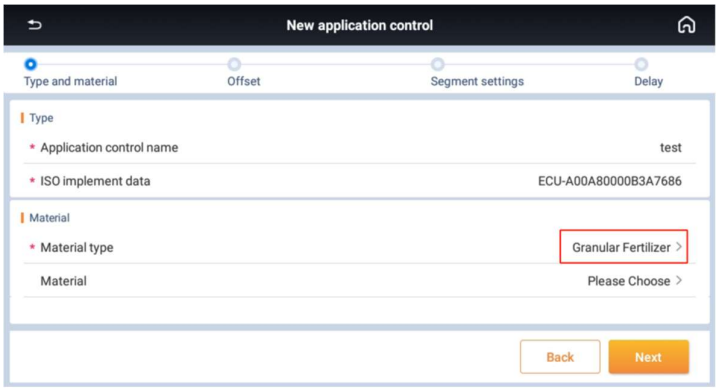


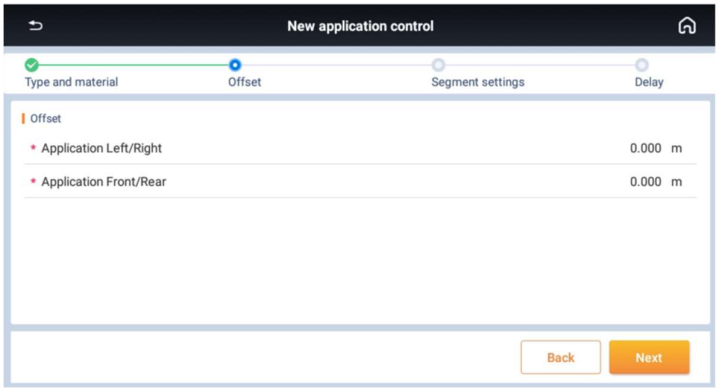


3. Enable the application control and new a application control and set the channel.

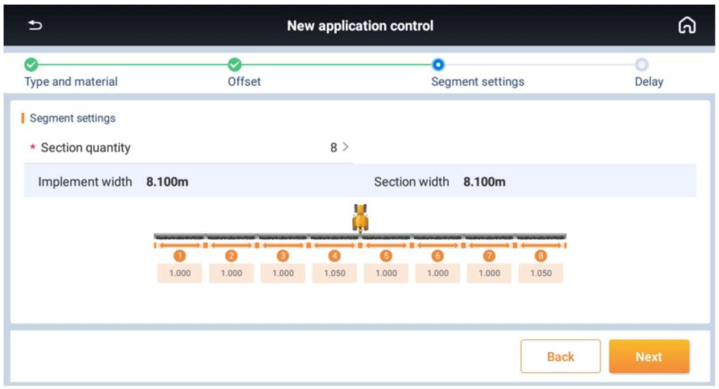


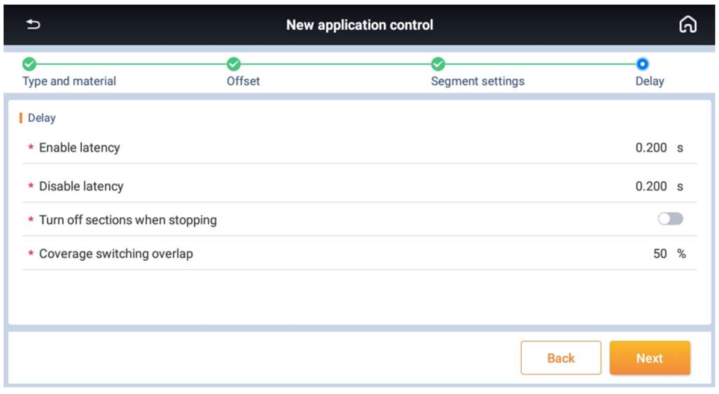
4. Give a name then select the material type and set the offset value.



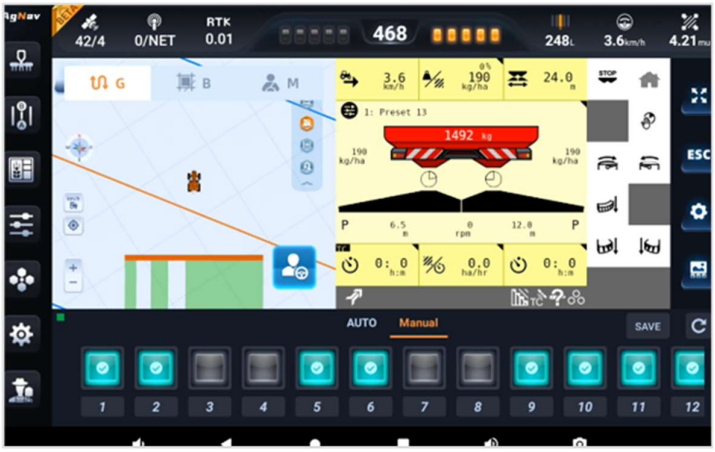


5. Set the section quantities and latency, etc, finally finish the new application control.



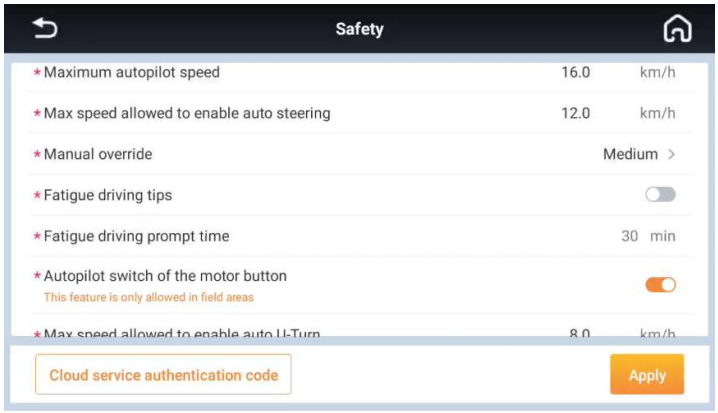


6. Go back to the main interface, the customer can switch between AUTO and Manual for ISOBUS TC-SC.



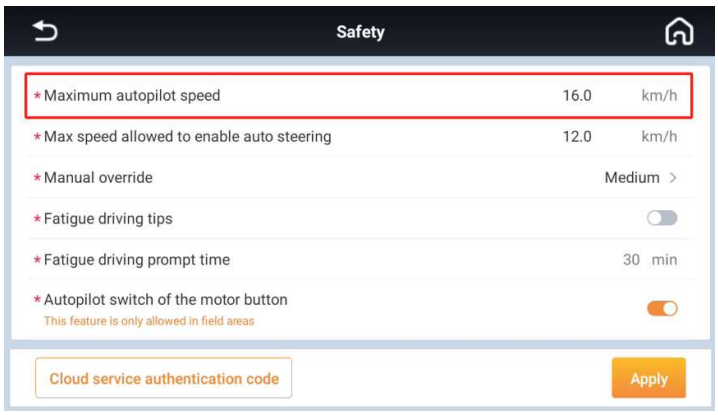
6.15 Safety

In order to ensure the safety, currently it is available to support users to set the maximum autopilot speed, the max speed allowed to engage the autopilot and the maximum speed allowed to enable Auto U-Turn . It is also possible to set the level to manually disengage the autopilot. Go to [Settings center -> Agricultural management -> Safety].



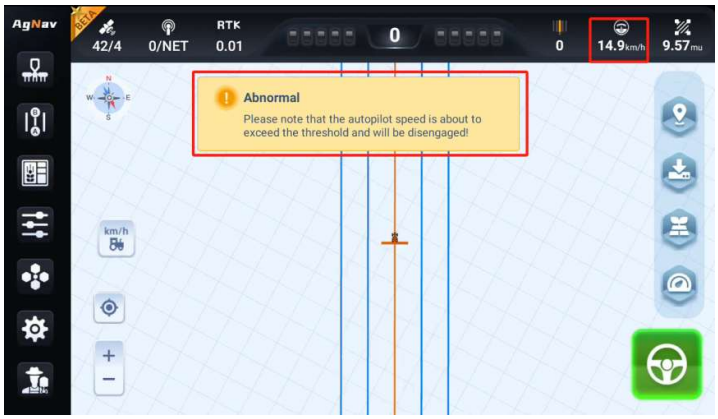
6.15.1Maximum autopilot speed

Set the maximum autopilot speed, when the vehicle in autopilot mode, it’s speed cannot exceed the set thresholds.



If the current speed is 2km/h below to the threshold, it will have message prompts and audible alarms which remind users the current speed is close to max limit and auto steering will be disengaged.

The default maximum autopilot speed is 16km/h and the configuration range is from 1km/h to infinity.

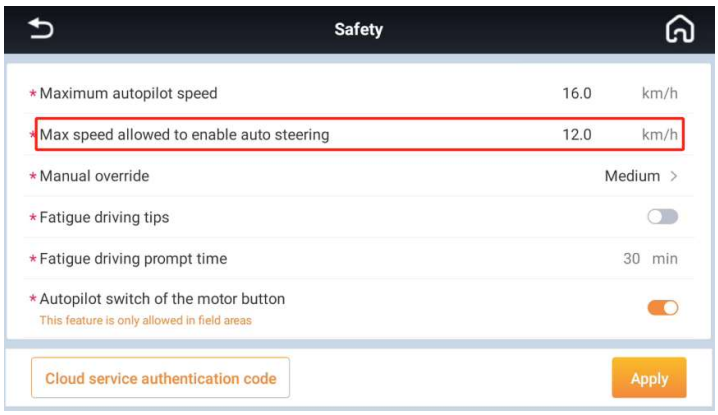


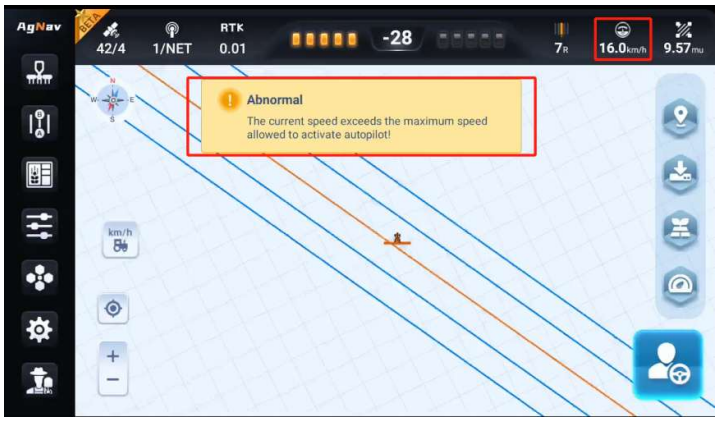
If the current speed exceeds the operators set, the auto steering will be disengaged.

6.15.2Maximum speed allowed to enable auto steering mode

Set the max speed allowed to engage the autopilot, if the current speed exceeds the threshold, it can not enter autopilot mode.

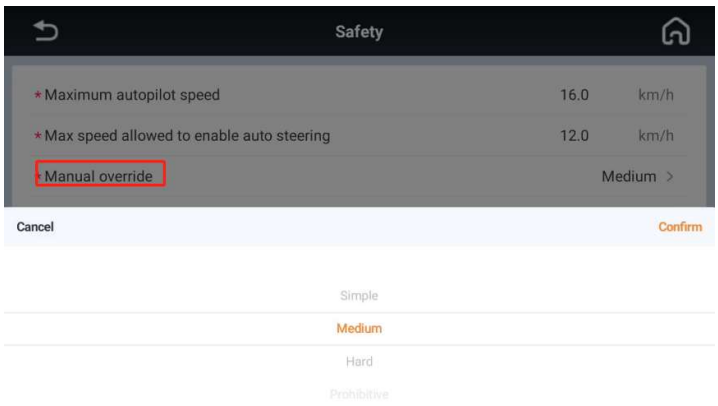
The default maximum speed allowed to enable autopilot is 12km/h and the configuration range is from 1km/h to infinity. Also it should be less than the maximum autopilot speed as above.





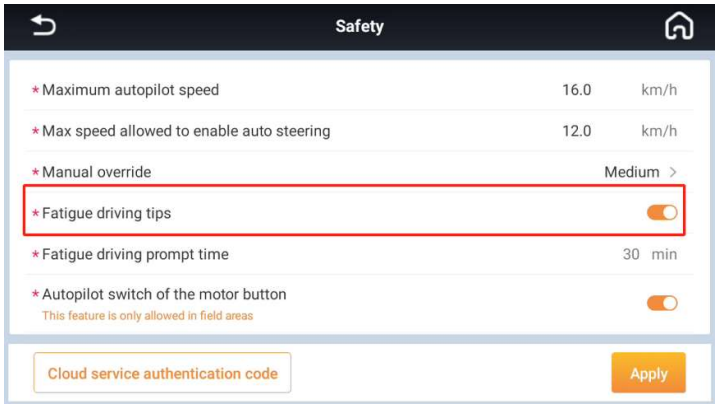
6.15.3Manual override

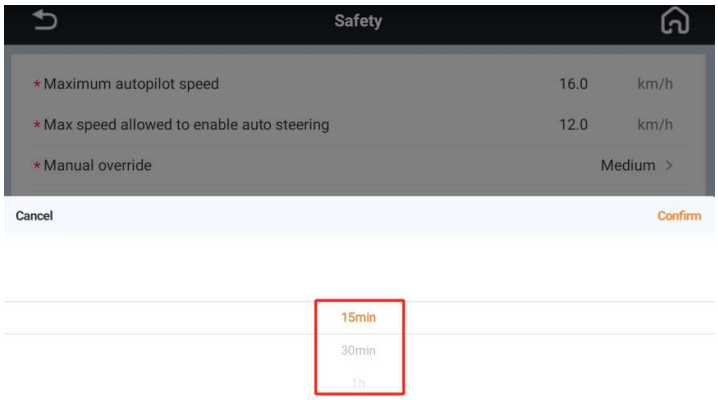
Manual override function allows users to turn the steering wheel to disengage autopilot mode in an emergency. It is allowed to set the different level to manually disengage the autopilot which includes the Simple, Medium, Hard, Prohibitive four Modes



6.15.4Fatigue driving

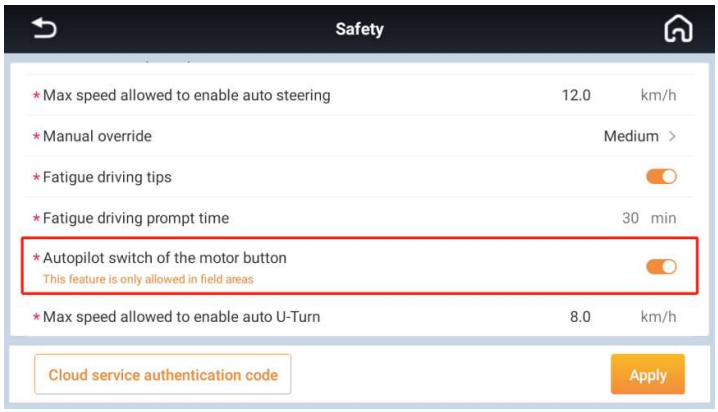
In order to ensure the safety, currently it is available to support users to set the fatigue driving alert and trigger time.





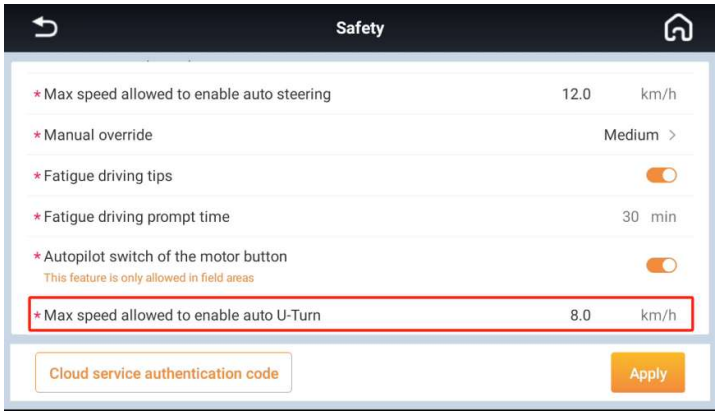
6.15.5Autopilot switch of the motor button

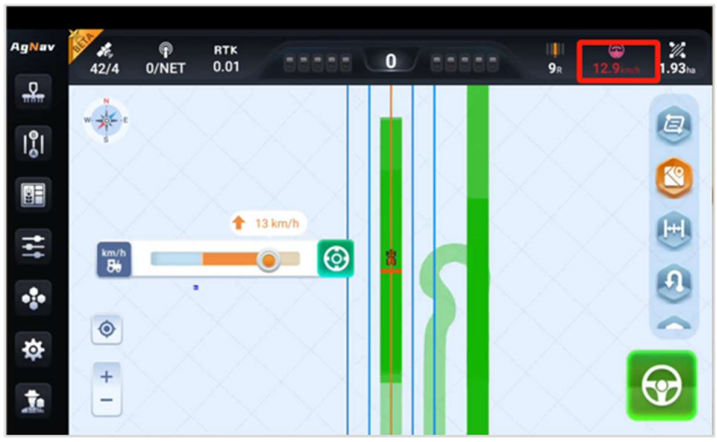
Allow autopilot mode control via motor button. The default option is on and some users can turn it off in case of the safety reason.



6.15.6Max speed allowed to enable auto U-Turn

When the vehicle speed is more than the threshold, the Auto U-Turn will not be triggered.

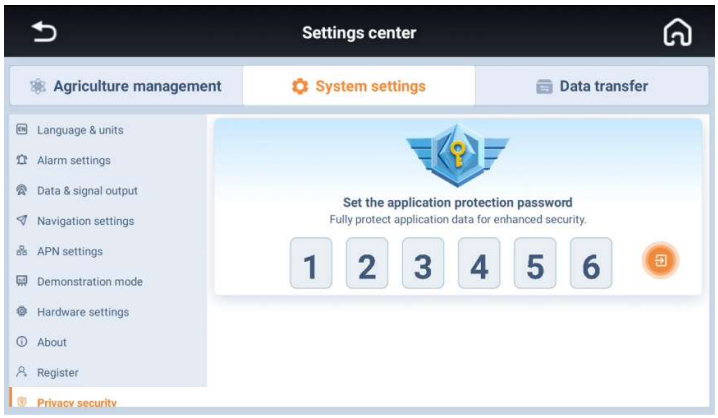


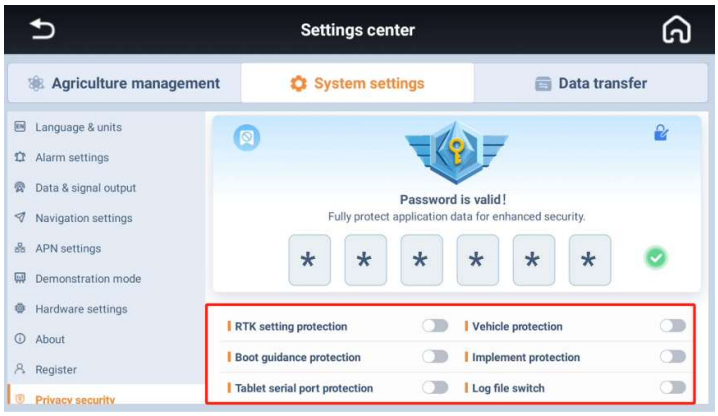


6.16 Privacy security

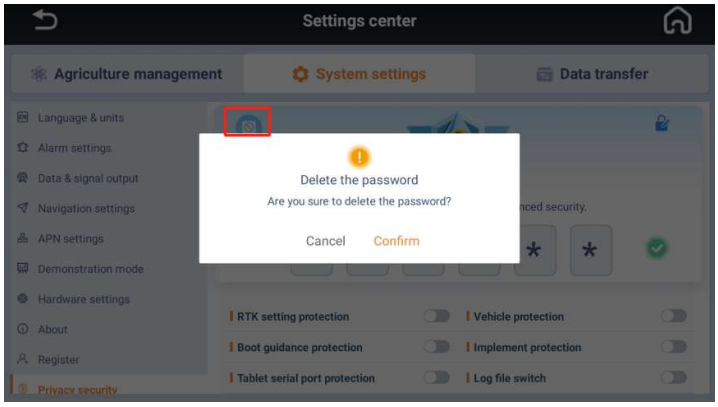
AgNav5.0 adds a new feature to protect different settings with the password.

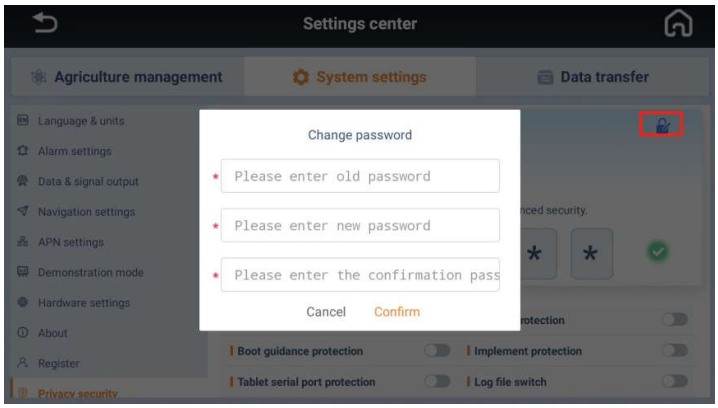
1. Go to [Settings center -> System settings -> Privacy security]. It is accessible for protecting multiple items with the defined password. For example, set 123456.



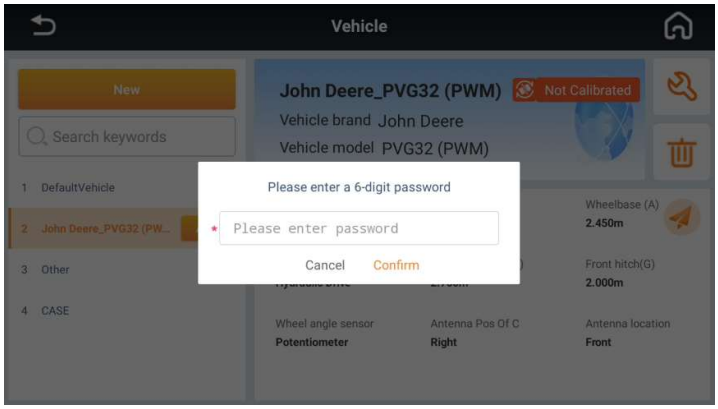


2. Also it is able to delete the password or change the password.



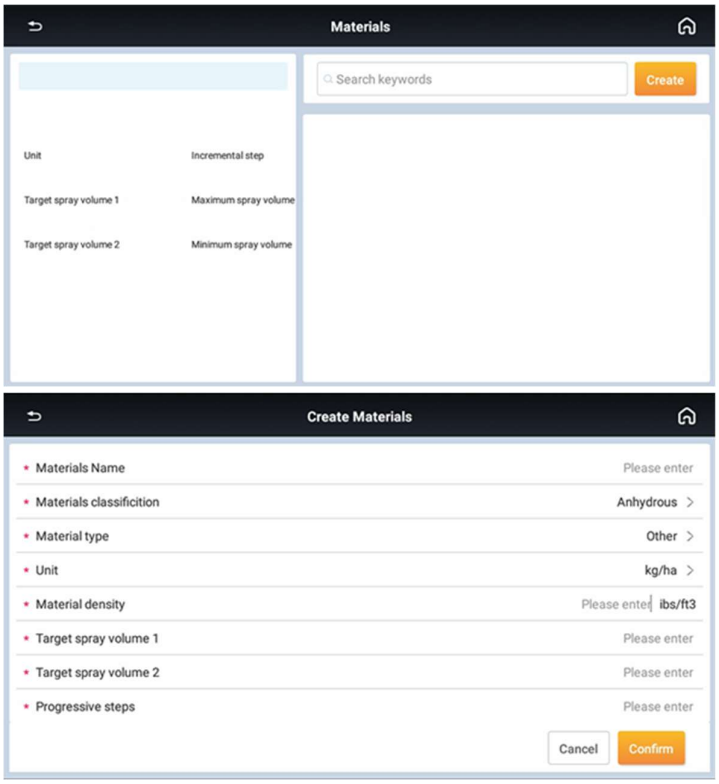


3. Once set the password for selected settings, it is necessary to enter the password when do some operations.



6.17 Materials

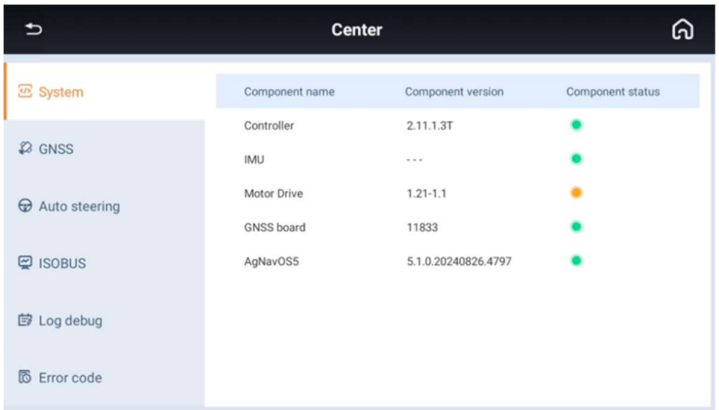
Go to [Settings center -> Agricultural management -> Materials]. Manage spraying equipment and materials on this interface.

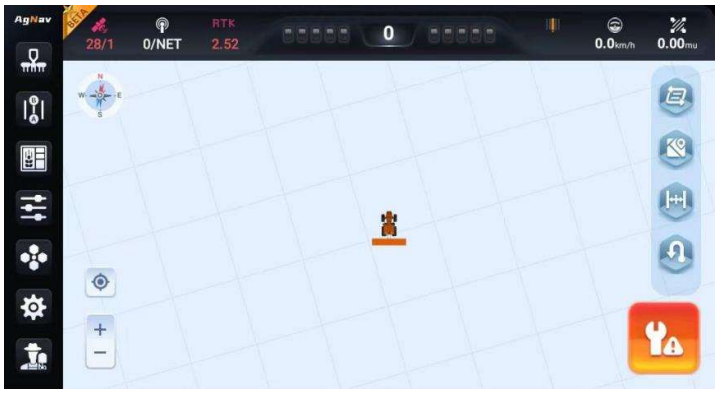


6.18 Troubleshooting

Go to [Settings center -> Agricultural management -> Troubleshooting].

When encountering a malfunction, please check the information of each module on this interface and provide it to CHC engineers.




AgNav
28/1
0/NET
RTK
2.52
0
0.0km/h
0.00mu

7 Maintenance

1. To ensure the normal operation and service life of the equipment, please maintain the equipment under the instruction of the manual.
2. Please do not disassemble the main components of the system. If necessary, please contact the CHCNAV after-sales service support@chcnav.com.
3. Please use device under the instruction of user guide.
4. Regularly check each screw, wiring harness and connector of the system, such as controller fixing screws, angle sensor fixing screws, data cable connectors, etc.
5. Keep the motor clean.
6. Maintain the environment in which the motor is used. Please do not wrap materials such as cotton cloth and dustproof film on the motor.
7. Before starting the work, check whether the transmission device is flexible; whether the concentricity of the coupling is standard; the flexibility of the gear transmission.

CHC Navigation

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