DiMap Surveying Software

（Android Platform）

Instruction Manual

version	date
V2.0	2023.6.10

Guangzhou Alpha Surveying Technology Co.,Ltd

Contents

1 Overview of DiMap

1.1 Software Introduction

DiMap is an engineering surveying data acquisition and processing software designed and developed on the Android platform, Alpha's product development team has more than a decade of experience in the surveying and mapping industry, and is very familiar with the application needs of different areas of the surveying and mapping industry, as well as our massive user base, enabling us to develop a professional surveying software. This software integrates the functions of RTK control acquisition, point line surface measurement, road design and release. The software has a humanized operation process, better graphical interaction and more powerful functions. This book mainly introduces the actual basic operation process and the functions of each menu of DiMap.

DiMap main menu has four options: 【Project】, 【Device】, 【Survey】 and 【Me】, as shown in Figure 1.1-1.

【Project】 is mainly used to operate the project, and the main menus are Project management, Coordinate system, Localization, Calibrate point, Point database, Export achievement, and System settings. After you have created a new project file in Project management, you can set the coordinate parameters inside the Coordinate system, and all the points collected during the surveying process can be viewed in the coordinate point library. If you want to upgrade the software, you can enter it in About Software and check whether there is a new version currently available.

【Device】 is mainly used to set the working mode of the host and view the host information after connecting to the host. The main menus are Connect Receiver, Rover Mode, Base Mode, and Static Mode. After successfully connecting the instrument via Bluetooth in Connect Receiver, selecting the working mode of Base Mode, Rover Mode or Static Mode, you can learn the current version information of

each component of the instrument in Device information. If the registration code of the instrument has expired, you can register it in Device activation.

【 Survey 】 contains Point survey, Detail survey, CAD, Point stakeout, Line stakeout, Middle or side Staking, Staking to Line, Common Side Staking, Section survey, etc., covering the main data collection and stakeout function requirements of engineering surveying industry.

【 Me 】 contains Coordinate converter, Perimeter and area, Calculator, Geometric calculation, and other data processing functions that may be encountered during surveying and data processing.

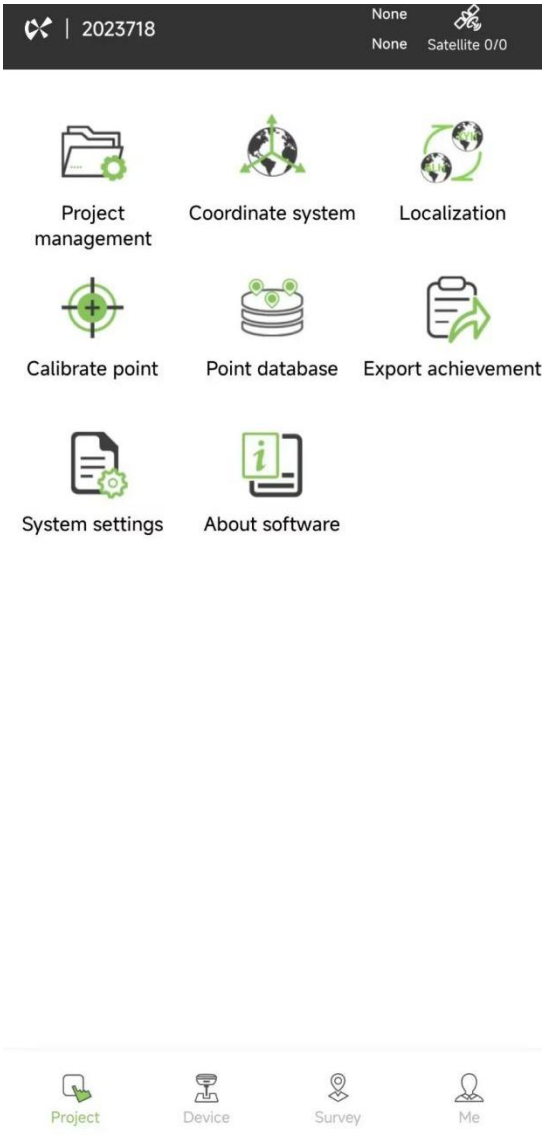


Figure 1.1-1 DiMap main interface

1.2 Software interface

Launch Interface: On Android devices, run this software, if there is an existing project project will directly enter the main interface, in order to slide to the left will enter the next navigation menu interface.

Main interface title bar:

The title bar mainly displays the project name of the currently opened project, the solution status after connecting the instrument and some shortcut functions.

 ： Used to view the Location information, including Satellite Map and Base Station Info.. As shown in Figure 1.2-1 and Figure 1.2.2.

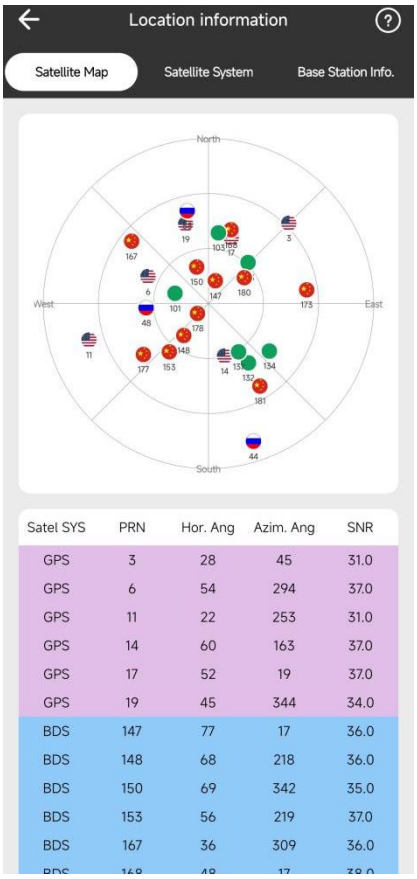


Figure 1.2-1

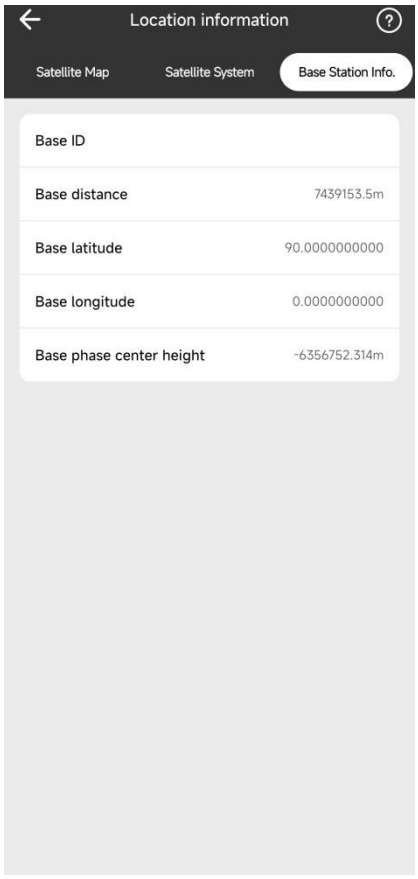


Figure 1.2-2

1.3 Installation and uninstallation

Installation：

⑴ Download Android DiMap software installer（*.apk）.

⑵ Installation method: Copy the DiMap installation program to your controller. Find the software installer in the file management of the controller, click the installer, and the installation dialog box will pop up. Click 【Install】, the dialog box of preferred installation location will pop up, wait for a while and the installation completion dialog box will pop up. Click Finish to return to the desktop of the device, and click 【Open】 to run DiMap.

Uninstallation：

Uninstallation method 1: Long press the desktop software icon, pull to the 【Uninstall】 option box, the dialog box will pop up whether to uninstall. Click Confirm to finish uninstalling the software.

Uninstallation method 2: Click 【Settings】->【Applications】 to find DiMap. Click DiMap->Click 【Uninstall】, a dialog box will pop up whether to uninstall the application software, click Confirm to complete the software uninstallation

2 QuickStart

Take the rover mode as an example-connect the RTK through Bluetooth-set the working mode as controller network, and the next step is to to quickly connect the instrument for surveying. The specific operation steps are as follows:

2.1.Preparation

A GNSS receiver (here Alpha 4i as an example), an Alpha Bi controller with DiMap installed, the controller needs to have an internet connection (SIM or WIFI).

2.2.New construction projects

Run DiMap, execute 【Project】->【Project Management】->【New】, create a new project, type the project name, builder name, date, and select coordinate parameters, including reuse project and coordinate system (default: China CGCS 2000).

2.3.Connecting and setting the operating mode

Execute 【Device】->【Connect Receiver】, select the device type as RTK, and then select the model (if you just need to operate the software process can choose the demo mode), click 【Search】, search for the device to be connected to the device, click on the corresponding device and then point to connect. Here we choose Bluetooth mode, click 【Search】, in the Bluetooth device list to find their own instrument's Bluetooth name, click 【Connect】, the connection progress box pops up, meaning that the connection is successful. Or choose 【Quick Connect】 to operate in the same way as above.

Execute 【Instrument】->【Rover Mode】, in which there are various rover modes, such as built-in radio, controller network, etc., as shown in Figure 2.3-1.

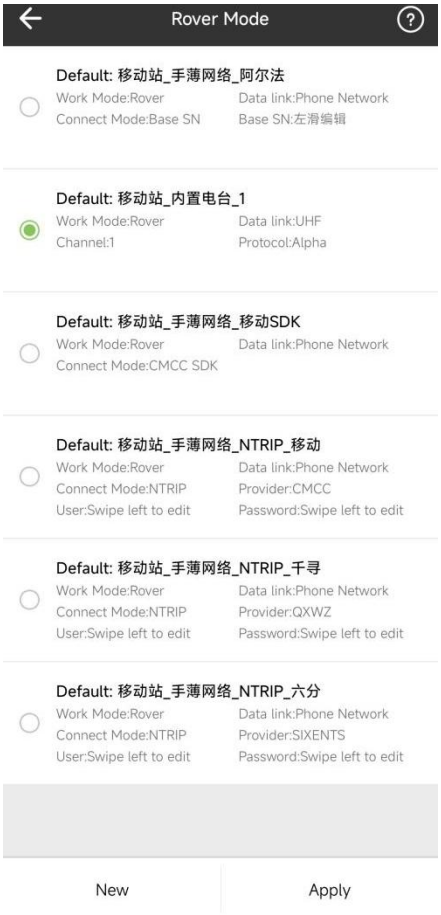


Figure 2.3-1

2.4.Check

- Calibrate point

In the fixed solution state, execute 【Project】->【Calibrate point】, manually type the coordinates or select the coordinates of the known control points from the point database in Known point coordinates; select the coordinates surveyed by the rover station on the known control point in Survey point coordinates, and click Calculate to get the calculation result after selecting it.

- calculate the transformation parameter

At the beginning of a surveying project, it is often necessary to first calculate the transformation parameter in order to match the GNSS raw coordinate data with the actual construction design coordinates.

The general situation of solving transformation parameters: Assuming that we utilize the three known control points A, B and C to seek transformation parameters, then first, we need to have the original recorded coordinates and local coordinates of the three points A, B and C. There are two ways to obtain the original recorded coordinates of the three points: One is to set up a static controlling network, and use the original recorded coordinates of the processing software when setting up the static controlling network; the other is to obtain the original recorded coordinates of the rover station when no correction parameters play a role in a fixed solution state.

Execute 【Project】-> 【Localization】, input the coordinates of known control points (selected from the coordinate point database or manually input)and the original coordinates, set whether to use horizontal correction and vertical correction, click 【Confirm】 to complete the input of the transformation parameter. Click 【Calculate】 in the transformation parameter interface to get the transformation parameter report.

2.5.Survey

Execute 【Survey】-> 【Point survey】, take topo point as an example, click the point type button, select Topo points, click 【Display information settings ⚙】 to set the limitations for recording topo points (solution: fixed, H: 0.05, V: 0.1, PDOP: 3.0, diff age: 5, average: 1), and then click the button on the lower-right corner of the point collection button or the controller to complete the target point collection and saving.

If you are using the tilt survey function to collect points, one thing to keep in mind is to note whether or not the IMU is available. If IMU is available, three types of points can be collected: topo points, quick points, and auto points.

2.6.Import and export of data

1）Project management-Import

This is to import project files from other devices or import backup projects. Copy the data files to be imported into the DiMap folder of the controller, execute

【Project】->【Import】->【Select backup data and import】, select the data files to be imported, and then click 【Confirm】 to import the data files.

2）Backup

When we measure in the field, at the end of a section of the project, you can back up the project data to ensure the safety of the data, the implementation of the 【Project】->【Export】->【Collect backup data】, will pop up a prompt box of the completion of the data backup as well as the path to the storage directory, click on the 【Send to】, you can send the data to online applications.

3）Export of results

The measurement reasults can be output via 【Project】->【Export】, in the results export interface to select the desired results format, if the exported results have requirements, you can click on the lower-right corner of the three points to entry, and select the filtering of the data exported.

3 Project

In the main interface of the software, click 【Project】 and the submenu appears as shown in Figure 3-1. The submenu contains eight items such as Project management, Coordinate system, Localization, Calibrate point, Point database, Export achievement, System settings, About software. The black task bar in the figure from left to right are: Alpha Surveying Technology Co., Ltd., current project name, base station information, the number of stars received.

DiMap manages software in the form of project files, and all software operations are completed under a certain defined project. Every time you enter DiMap, the software will automatically call in the project file of the last time you use the software. In general, every time before starting the construction of a region's survey, you have to create a new project file that matches the coordinate system of the current project. After the project is built, a folder with the same name as the project name will be generated by default in the storage disk of the mobile device, in which all related data will be saved.

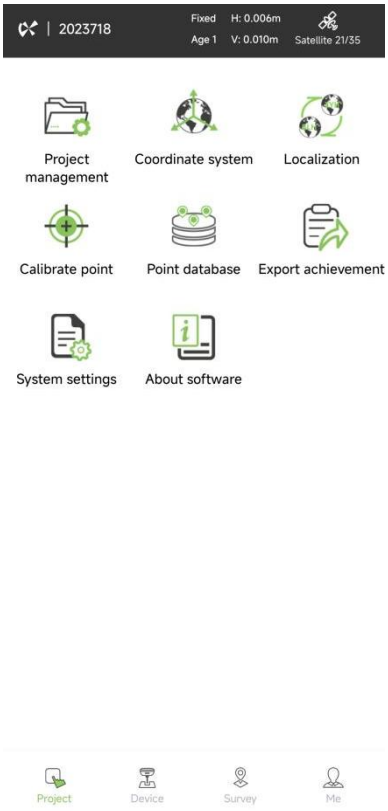


Figure 3-1

3.1 Project management

Click 【Project】->【Project management】, as shown in Figure 3.1-1.

Click 【New】 to create a new project file, new project interface as shown in Figure 3.1-2, enter the project name (required, the default date is the current day), the builder, the date of creation, reuse project, the coordinate system defaults to the CGCS2000 (if you want to select other coordinate system can click the button to select), click 【Confirm】, then the new project is successfully created, and will return to the 【Project management】 interface.

Click 【Import/Export】 to import or export project files.

If you need to delete the project, press and hold your finger on the corresponding project file and slide it left, as shown in Figure 3.1-3, click 【Delete】, and then select 【Delete】 in the pop-up warning box to delete the project file from the project list, and the project that is currently in use cannot be deleted.

Click 【Backup】 to collect the project data into a zip archive, click 【Collect backup data】 and the data backup will start.

Figure 3.1-1

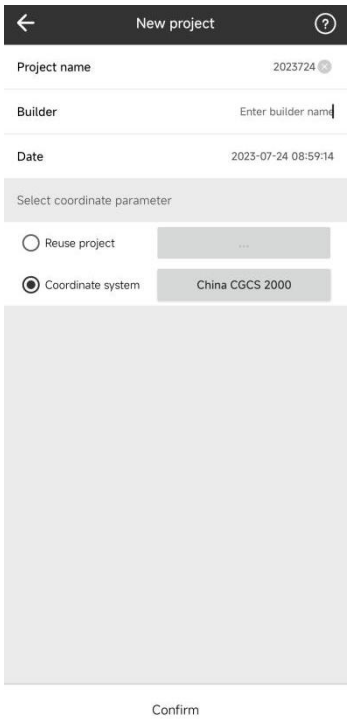


Figure 3.1-2

Figure 3.1-3

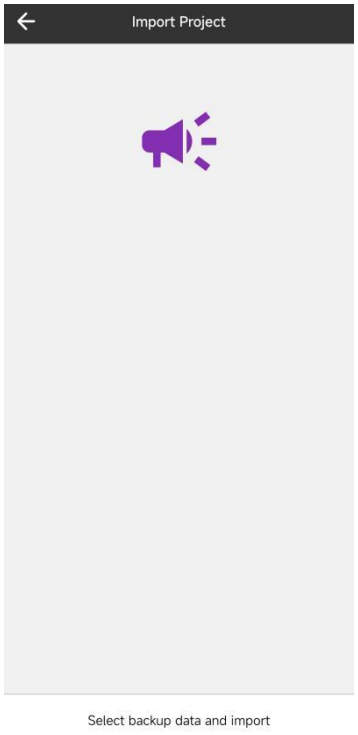


Figure 3.3-4

Data Restore: Click the Import button at the bottom of the project management page and select the backup zip file to restore the data to the software, as shown in Figure 3.1-4.

3.2 Coordinate system

Click 【Coordinate system】, the sub-interface is shown in Figure 3.2-1, the default coordinate system is CGCS2000, you can click 【Select】 to select the coordinate system; you can import or export the coordinate system through 【Import】 and 【Export】 buttons. Coordinate system settings include Ellipsoid coordinates, Projection mode, Datum transform, Plane transform, Elevation fitting, Base correction parameters, which can be set by the actual needs, and click the 【Confirm】 to complete the coordinate system settings after completion of the settings.

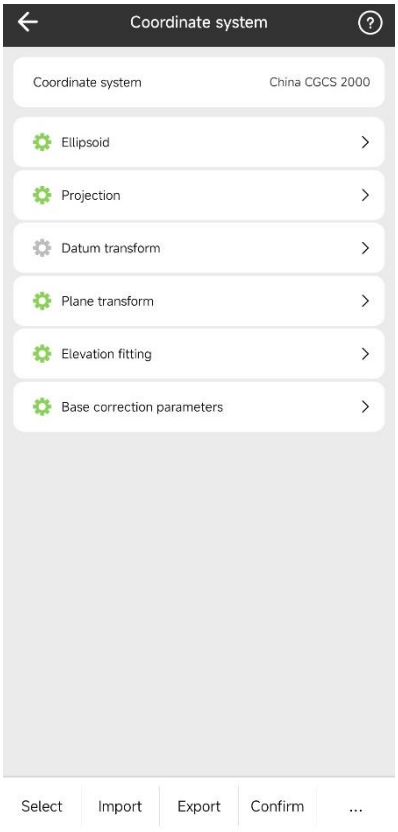


Figure 3.2-1

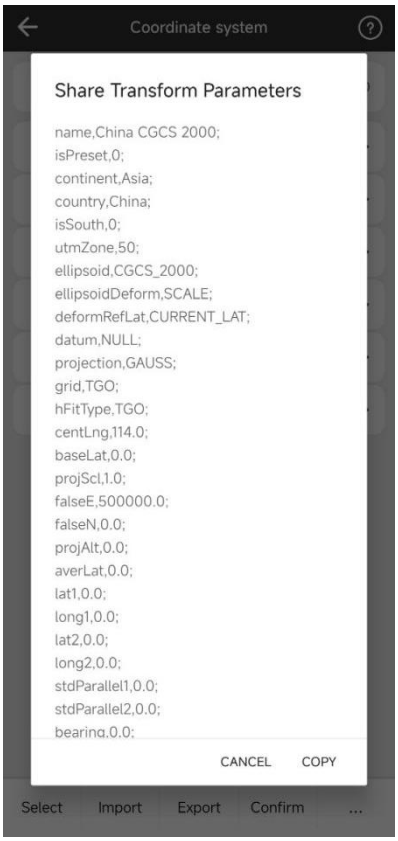


Figure 3.2-2

Figure 3.2-3

In practical application,the specific process of importing coordinate system is as follows: In the main interface of coordinate system, click 【Export】, copy the parameters in dialog box Share Transform Parameters, as shown in Figure 3.3-2, click 【Import】, paste the copied parameters in the Import Transform Parameters dialog box, as shown in Figure 3.3-3, and then click 【Import Parameters】, and then the importing of coordinate parameters is completed.

The coordinate system is provided to the user to quickly view the information of the coordinate system used, except for the central meridian in the projection which needs to be confirmed by the user every time, other parameters are not recommended to be modified manually by the user.

In the coordinate system, the green gear indicates that the module is in use and has parameters. A gray gear indicates that the module is not in use.

3.3 Localization

Click 【Localization】, the sub-interface is shown in Figure 3.3-1.

【Localization】-> 【Add】, input the known control point coordinates and measurement point coordinates for level correction and elevation correction, as shown in Figure 3.3-2. The types of coordinates include plane coordinates and geodetic coordinates. There are two ways to input coordinates: One is directly input; the second is imported through the point database, the specific steps are as follows:

Click the button on the upper-right side of the input box to enter the point database, as shown in Figure 3.3-3, select the required imported points (can be quickly located through the filter function to find), click 【Apply】, to complete the data input, as shown in Figure 3.3-4. Measuring point coordinates input method as above. Click 【Confirm】-> 【Calculate】 to complete the transformation of coordinate parameters. Horizontal correction and Elevation correction are turned on by default. By solving the transformation parameters, you can obtain the horizontal and elevation coordinate values based on a specific coordinate system.

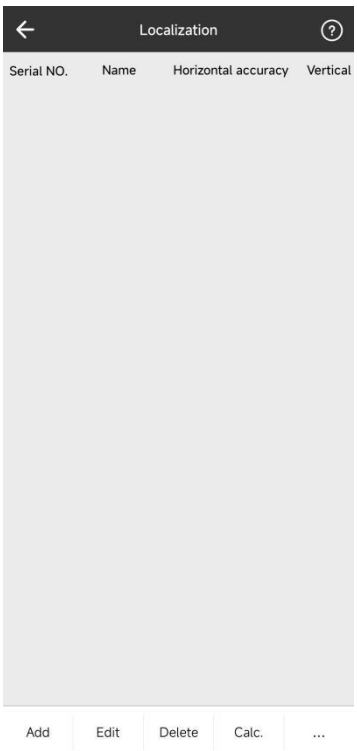


Figure 3.3-1

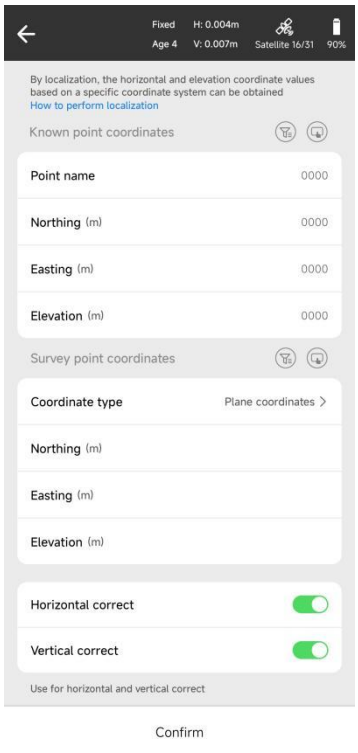


Figure 3.3-2

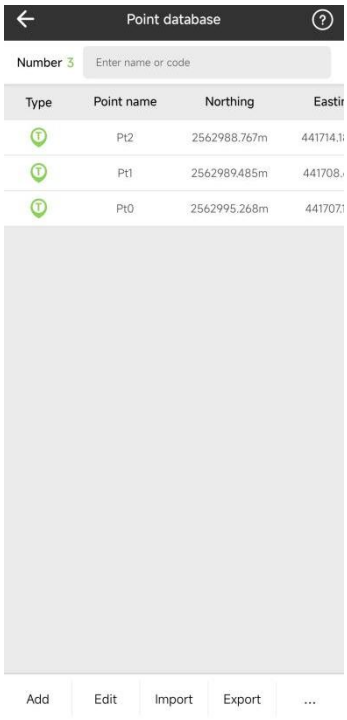


Figure 3.3-3

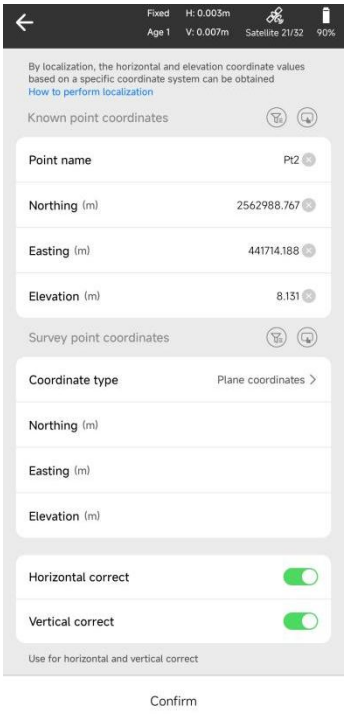


Figure 3.3-4

3.4 Calibrate point

Calibrate point is a compensation method used when the base station is offset or tilted due to various factors when the user uses the base mode and rover mode. Calibrate point will directly affect the latitude and longitude of the original measurement data, and incorrect use will cause irreversible losses! Do not use Calibrate point for single-point calibration. For single-point calibration, please use 【Localization】 to calibrate.

Click 【Project】 -> 【Calibrate point】, the station calibration interface is shown in Figure 3.4-1, and there are three options in the sub-page: 【Calculate】, 【Reset】, and 【Apply】.

The calibration method is to input known control point coordinates (which can be selected from the point database in the upper-right corner or directly input) and measurement point coordinates (which can be selected from the point database in the upper-right corner,directly dot and survey or input). After completing the input,

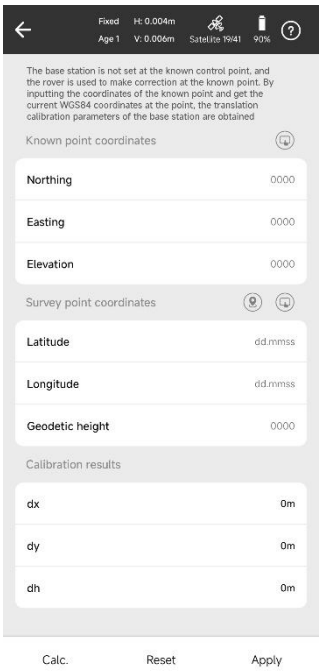
click on 【Calculate】 to obtain the correction result. If the result meets the expectations, click on 【Apply】 to complete the correction.

The specific calibration process is as follows:

Click on 【Calibrate point】 and input the coordinates of known control points. There are two ways to input coordinates: One is to extract the previously saved base station coordinates from the coordinate point database; The second is to directly input the north coordinate, east coordinate, and elevation of a known point; Input measurement point coordinates: There are three ways to input measurement points: ① Directly input latitude, longitude, and geodetic height; ② Extract the previously saved base station coordinates from the coordinate point database; ③ Click the positioning button next to the measurement point coordinates to input coordinates.

Click 【Calculate】 to see the calculation results, as shown in Figure 3.4-2, and click 【Apply】 to apply the calculation results directly.

Note: Calibrate point can only be used when the GNSS receiver is in a fixed solution state



Figures 3.4-1

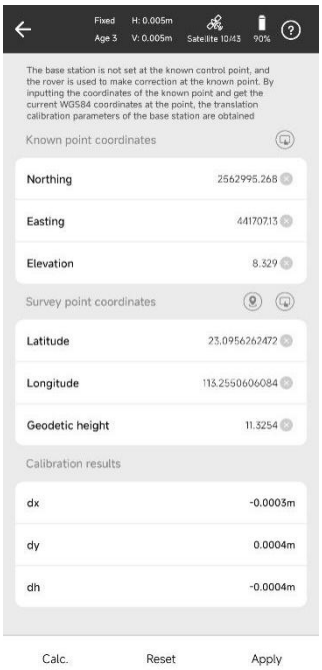


Figure 3.4-2

3.5 Point database

Type： The point elements in the point database are input point, topo point, control point, quick point, continuous point, which can be distinguished by different icons.

Click 【Project】->【Point database】, as shown in Figure 3.5-1.

Point database is used to manage various types of coordinate points, and is used to input the coordinates of points that need to be used for operations, so that they can be easily called up during point stakeout. You can quickly search for a point by inputting the point name or code in the search box. Point database includes Add, Edit, Detail, Delete, Import, Export, and Option functions.

Click 【Add】, as shown in Figure 3.5-2. Coordinate points can be categorized into plane coordinates and geodetic coordinates according to the type of coordinates. Coordinate points can be categorized into auxiliary points, control points and input points according to the type of attributes. After selecting the coordinate type and coordinate attribute, input the point name, coordinate data, elevation, point type, pole height, code, comments (optional), add time (automatically inputted by the system), and then click 【Confirm】 to complete the parameter setting of the new coordinate point.

Click 【Edit】 to set up the code base and connect n points (n≥1) in positive and negative order. Click 【Add】 to manually add the code files one by one, click 【Confirm】 to save the code files after adding, and return to the previous interface; click 【Edit】 to modify the added code database files; click 【Delete】 to delete the existing code database files; click 【Import】 to import the code files with the format of .dat or .txt; click 【Confirm】 to confirm the use of the code database file.

Data import: Click 【Import】, in the import format, select the required import format, including plane coordinates, latitude and longitude coordinates and other formats. Click 【Confirm】, select the required data in 【Open】 to complete the import of coordinate points.

Data export: Click 【Export】, select the export format, click 【Export】, input the export Csv file name, click 【Confirm】, there are two export paths: The first is to click 【Open】, select the file or app you want to import; the second is to click 【Send to】, Csv files can be sent to online chat apps.

Delete data from coordinate point database: Click 【...】, click 【Delete】, you can select a data point or multiple data points can be deleted, click 【Delete】 will appear in the prompt box, as shown in Figure 3.5-3, click 【Confirm】 to complete the deletion.

Filtering data from coordinate point database: Click 【...】, click 【Filter】, the filtering conditions include data classification (survey point, input point, control point), measure time (today, 7 days, all), and customization. The customization options include date, name keyword, code keyword, and remark keyword. Click 【Confirm】 to complete the filtering of the relevant points, as shown in Figure 3.5-4.

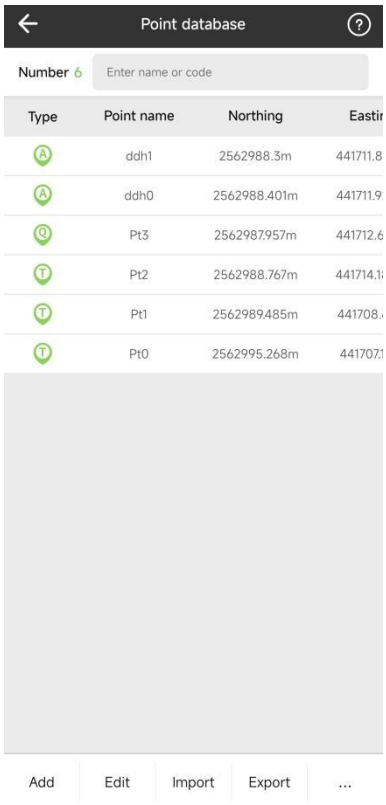


Figure3.5-1

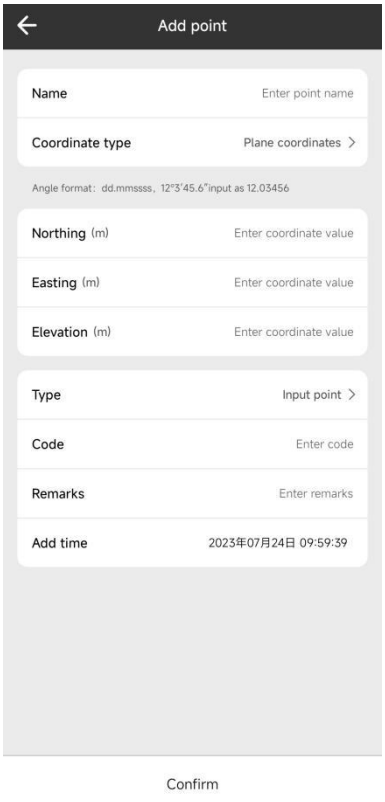


Figure3.5-2

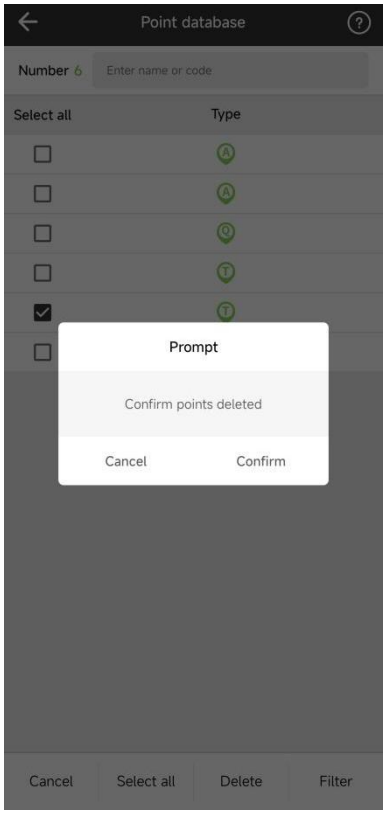


Figure3.5-3

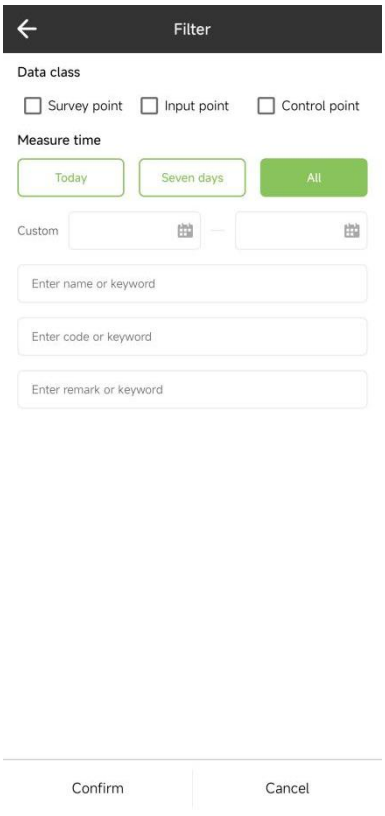


Figure3.5-4

Click on the lower-right corner of the 【...】 then the menu can be reflected, select 【Details】, you can get the details of the survey point as shown in the Figure3.5-5:

Figure3.5-5

Note: Only the points of point survey, input and export will exist in the 【Point database】, and the staking out points exist in the 【Point stakeout record】 of each stakeout interface.

3.6 Export achievement

There is a default export format that cannot be deleted in Export achievement, users can directly select the default export format, you can also click 【New】 to create a customized export format.

The detailed steps for selecting the default export format are as follows:

Click 【Project】->【Export achievement】, the data file export is to export the survey data file into the data format required by the user.

Data file export can export data to a data file of specified format or to a data file of customized format. To export data files, you need to select the data file and file format, the file format includes: plane coordinates, latitude and longitude coordinates, dxfgoogle,kml, etc., as shown in Figure 3.6-1. Click 【Export】, input

the file name, and then click 【Confirm】, you can export the file to the specified path as Figure 3.6-2.

You can choose the type of exported coordinate points for different file formats. Click on the type of coordinate point you want to export. The types of coordinate points include: auxiliary point, survey point, control point, input point, calculation point, stakeout point, base point, and screen point.

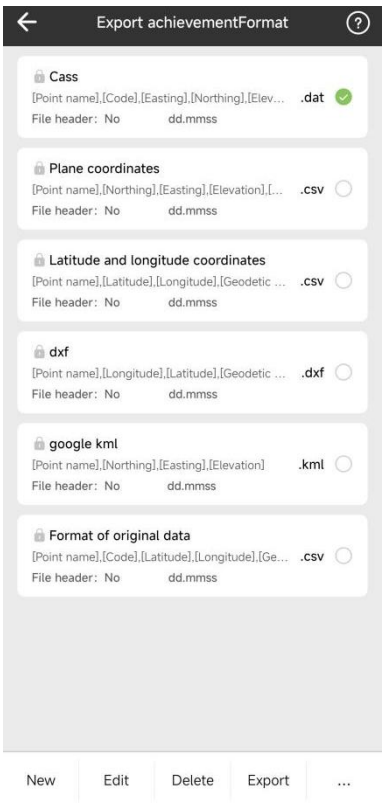


Figure 3.6-1

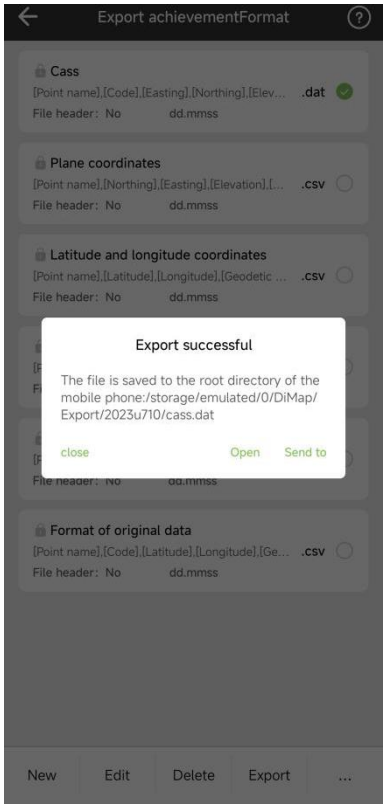


Figure 3.6-2

3.7 System settings

The system settings sub-interface includes center longitude unusual remind, tilt init, check firmware update, and distance unit. All the above functions need to be connected to RTK firmware to achieve, where the distance unit defaults to meter, as shown in Figure3.7-1.

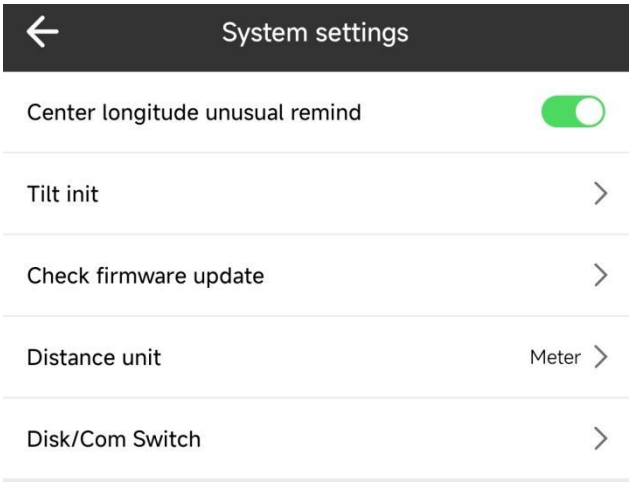


Figure3.7-1

3.8 About software

The About software sub-screen includes: Option feedback, Check latest version and Crash log collection.

Option feedback: Thank you for using our software, please leave your valuable comments, we will certainly take your feedback questions, comments and suggestions seriously. You can write your comments in the text box, leave contact information. Click 【Submit】, prompted to send success, your comments will be automatically sent to us.

Check latest version: Click 【Check latest version】 to check whether the current DiMap is the latest version. If there is a new version, a software update prompt box will pop up, click 【Update】 and the software will be updated automatically. If there is no new version, it will prompt that the current software is already the latest version.

Crash log collection: Collecting logs includes collecting log information and collecting cache information. Collecting crash logs will help you solve the problem faster, you can send the information to the relevant personnel through email or WeChat.

4 Device

4.1 Connect Receiver

（1）Bluetooth connect

Click 【Device】->【Connect Receiver】,select the device model in Model and click Search below. The software will search for nearby devices, as shown in Figure4.1-1. Select the device number found and click Connect to complete the instrument connection; If there is only one device, you can directly click Quick Connect below, and the software will automatically search for and connect the device,as shown in Figure4.1-2 and Figure4.1-3.

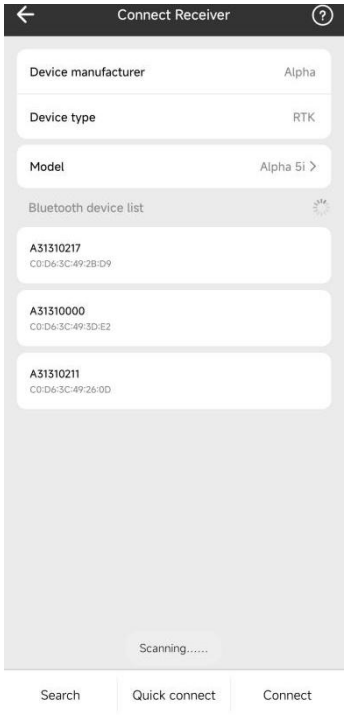


Figure4.1-1

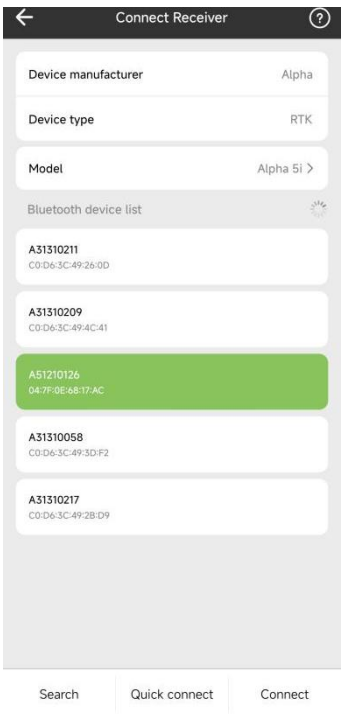


Figure4.1-2

Figure4.1-3

Device manufacturer: Alpha.

Device type: RTK(support for Total Station will be added later).

Device model: Alpha 4i, Alpha 5i or demo mode,(increasing with the increase of product models).

(2) Demo mode

Select the 【Demo mode】 under the device type, set the starting point coordinate and direction (randomly or manually input), and then click 【Start】 to enter the demo mode. The demo mode does not require a GNSS receiver connection and allows for trial and viewing of various software functions, as shown in Figure 4.1-4.

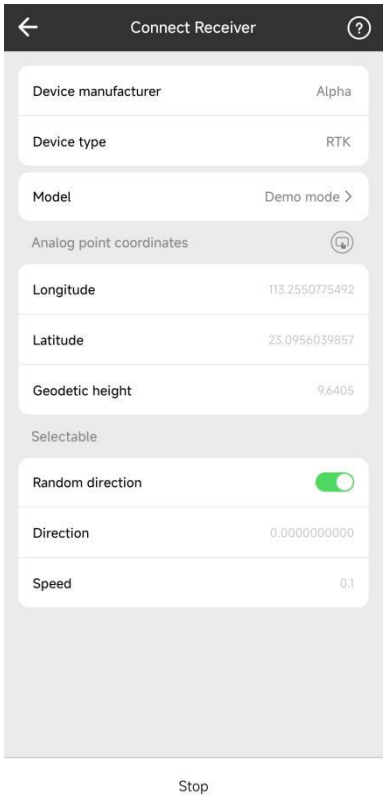


Figure 4.1-4

4.2 Rover Mode

Click on 【Device】 -> 【Rover Mode】, as shown in Figure 4.3-1. The mobile station contains multiple quick configuration modes internally. Users can use existing mobile stations or create new ones as needed.

The following is a detailed introduction to various parameter settings:

Configuration Set: You can choose between default and user saved configurations.

Elevation Mask: The angle between the connecting line between the satellite and the GNSS receiver and the horizon, and the receiver does not receive satellite signals smaller than the cutoff angle. Value range: 0-45 degrees,take the default value.

Data link: Six ways include whether there has a data link, host network, built-in radio, extend radio, controller network, Beidou station (some instruments have the function).

Note: There are differences in the data links applicable to different models.

1. No data link: Differential signal not sent.
2. Host network: Refers to the mode of operation in which differential signals are transmitted through the instrument's built-in network, which requires SIM to transmit data.
3. Built-in radio: It refers to the working mode of using the built-in radio of the instrument to transmit differential signals, and both the base station and the mobile station have built-in radios can transmit and receive. The base station transmits differential signals through the built-in radio, and the mobile station receives differential signals from the base station through the built-in radio.
4. Extend radio: It refers to the working mode when the host connects an extend large radio to transmit differential signals.
5. Controller network:This refers to the operating mode of transmitting differential signals through the network of a controller, which requires the controller to be inserted into a SIM or connected to a valid wifi to transmit data.
6. Beidou Station:It refers to the working mode of Precise Point Positioning （PPP） using the China Beidou satellite system to achieve the accuracy of about 10cm for a single device, and the convergence time is about 15 minutes. It does not rely on the ground base station, CORS or network. It

can quickly locate a single device in the non differential signal area, desert, ocean, and mountain area,can easily achieve high-precision.

Select the appropriate data link mode, and after successful setting, the mobile station can receive differential signals from the base station. If using the built-in radio mode, the frequency and protocol settings of the mobile station and the base station must be consistent.

4.2.1 Setting up new mobile station

【Rover Mode】->【New】， as shown in Figure4.2.1-1. New attributes include: Configuration Name, Elevation Mask, Data link, Connection Mode, Provider, Coordinate Frame, User, and Password.

The data link includes host network, built-in radio, and controller network, as shown in Figure 4.2.1-1 and Figure 4.2.1-2.

The default elevation mask is 10°, and the selectable range is shown in Figure 4.2.1-3.

The Connection Mode includes: Base Serial Number, NTRIP (CORS), and TCP. The Base Serial Number is the device number; NTRIP is a standard network transmission differential mode, commonly used in CORS networks; TCP: Used to input a specific IP and port to obtain differential data advertised by the server.

Provider： When selecting a custom service provider, you need to manually set the IP, Port, and Mount Point, as shown in Figure 4.2.1.4.

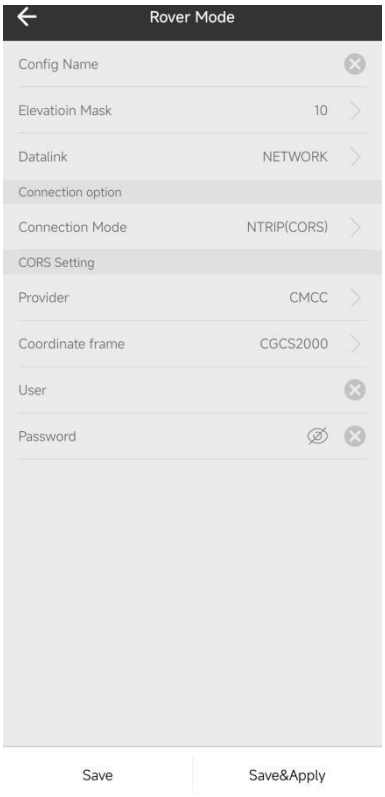


Figure 4.2.1-1

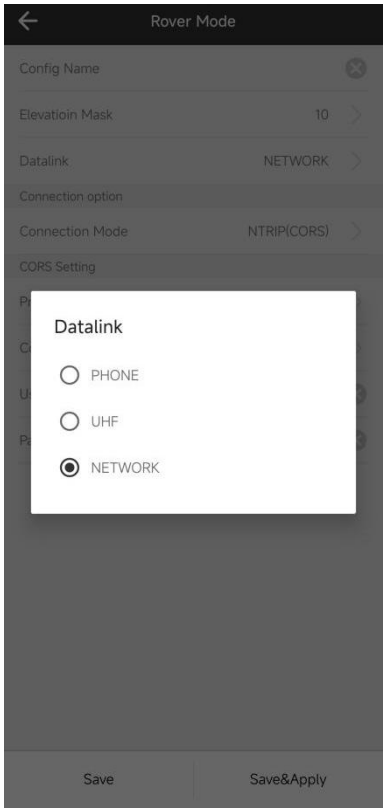


Figure 4.2.1-2

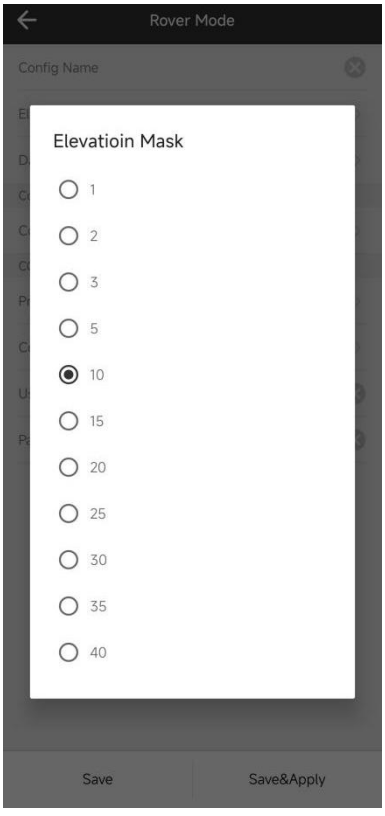


Figure 4.2.1-3

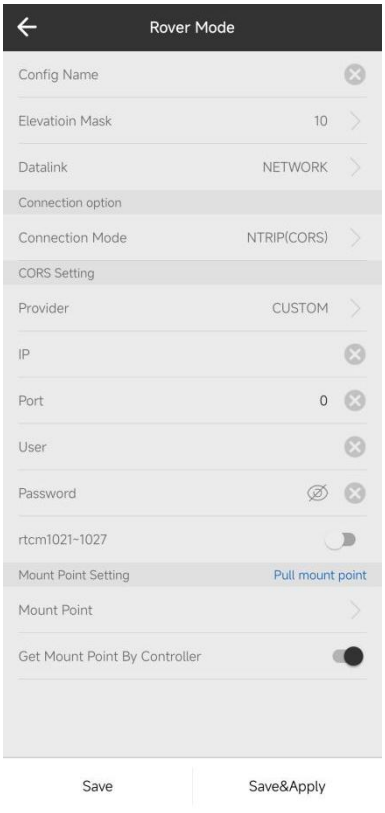


Figure 4.2.1-4

After setting all options, click 【Save】 to save the newly created mobile station in the default mobile station, as shown in Figure 4.2.1-5; Click 【Save&Apply】. After the connection progress is completed, the new mobile station will be saved in the default configuration set of mobile station and immediately applied.

CORS Setting requires setting IP, Port, Username, and Password. If the user has set up their own base station, their account and password can be set freely; If using a CORS account other than your own, you need to enter the corresponding CORS account password.

Mount Point Setting: You need to first click 【Pull mount point】 to open the automatic network connection before selecting a mobile station mount point in the 【Mount Point】 list (usually the default mount point is the base station host number).

After setting up everything on the mobile station, click on 【Apply】. The mobile station host network data link settings can be completed.

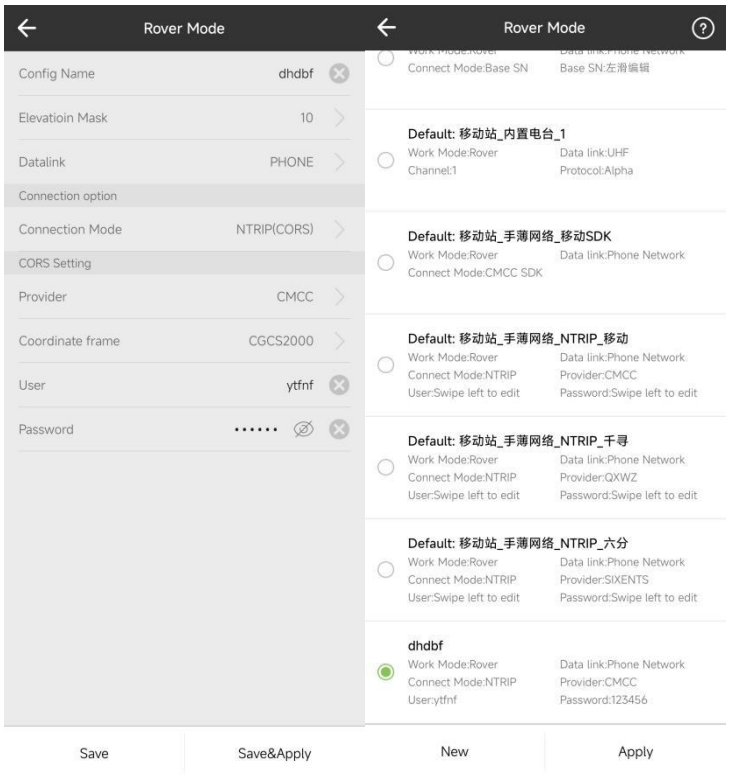


Figure 4.2.1-5

4.3 Base Mode

Click 【Device】-> 【Base Mode】, as shown in Figure 4.3-1. After setting various parameters, click 【Apply】 to set the receiver as the base mode.

Settings of base station include Configuration Name, Start Up Type, Base ID, Elevation Mask, Delayed Start Up (s), Enable PPK, Diff Format, Datalink, Connection Mode, and CORS Setting.

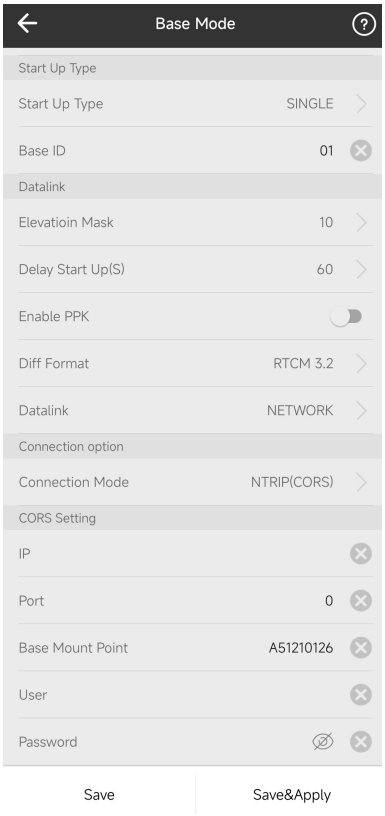


Figure 4.3-1

Start Up Type: There are two types for the base station setting, namely Single and Fix.

a) Single: Means the base station is not set up at a known point and can be set up arbitrarily. The mobile station calibrates its coordinates through a known point

b) Fix: Means the base station is set up at a known control point, and the device height needs to be accurately measured and the known point coordinates need to be inputted.

When using the specified base station coordinates, the base station coordinate can be selected from the Point database, the current GPS coordinate can also be directly obtained, or you can manually input coordinate. Select the antenna measure mode and measure antenna height, then input the correct antenna height(m).

Diff Format: Diff format is used to control the differential data format sent by the base station, includes RTCM3.2, RTCM3.0, RTCM2.3, CMR, CMR+, DGPS, RTCA, Novatel X, and sCMRx. The most commonly used format currently is RTCM3.2.

Datalink: Set the working mode of the receiver, which can be selected from four methods: Network, built-in radio, and extend radio.

1. Network: Refers to the working mode of transmitting differential signals through the built-in network of the device, which requires the insertion of a SIM card to transmit data.

2. Built-in radio: Refers to the working mode of using the device's built-in radio to transmit differential signals. Both the base station and the mobile station have Rx & Tx radio stations. The base station transmits differential signals through a built-in radio station, while the mobile station receives differential signals from the base station through the built-in radio station.

3. External radio: Refers to the working mode in which the host connects to an extend large radio station to transmit differential signals.

After selecting the appropriate data link mode and successfully setting it, the base station can send out differential signals that can be received by the mobile station. If using the built-in radio mode, the frequency and protocol settings of the mobile station and the base station must be consistent.

4.3.1 Base station-Host network

To select 【Network】 for the Datalink, you need to set Connection Option and CORS Setting.

Connection Option requires setting the connection mode, including two connection modes: NTRIP (CORS) and Base Serial Number. The connection mode options are detailed as follows:

NTRIP: Means standard network transmission differential mode, commonly used in CORS networks.

Base Serial Number: Essentially is NTRIP mode, but there are differences in transmission methods.

Note:some models do not have this function.

4.3.2 Base station-Built-in radio station

To select 【UHF】 for the data link, it is necessary to set four contents: Radio Channel, Frequency, Protocol, and Power Mode, as shown in Figure 4.3.2-1. Channel 1-7 is a fixed channel, and the corresponding frequency of the channel cannot be modified; Channel 8 is a custom channel, and the frequency of the channel can be set according to actual needs. Radio protocols include TRIMTALK 450S 、TRIMMARK Ⅲ 、SOUTH9600、SOUTH19200、SATEL9600、SATEL19200、TRANS PARENT. The power level of the base station will affect the operating distance of the radio station, low power leads to low power consumption and short operating distance; high power leads to high power consumption and long operating distance.

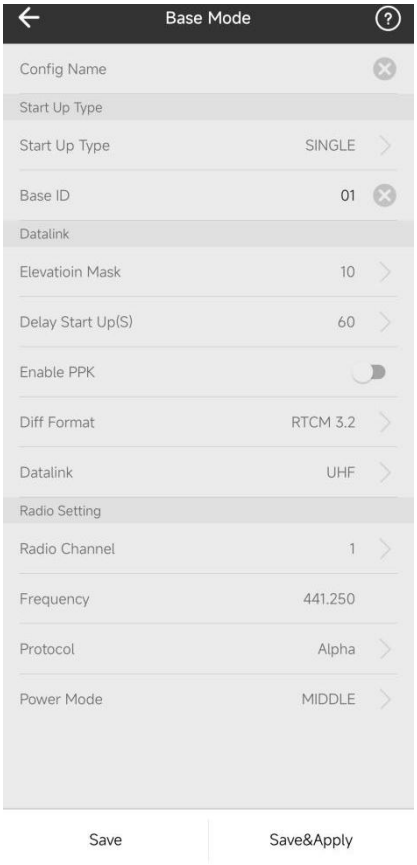


Figure 4.3.2-1

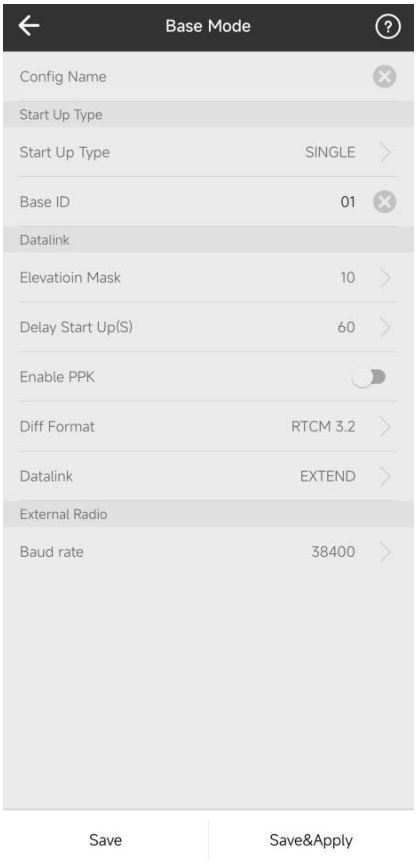


Figure 4.3.3-1

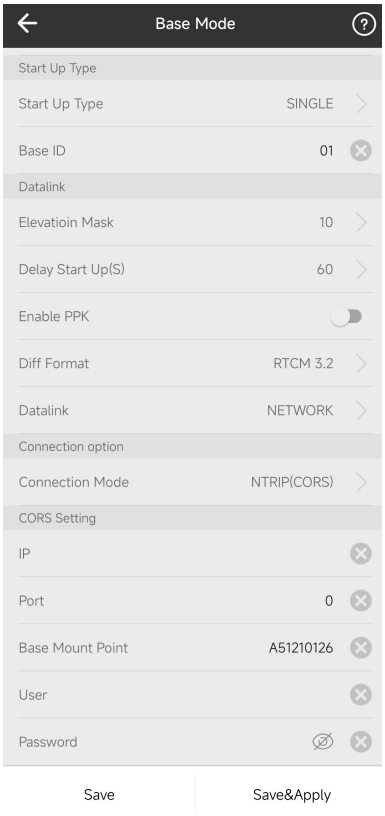
4.3.3 Base station-Extend radio station

Select 【Extend】 for the Datalink, as shown in Figure 4.3.3-1. Only the Baud needs to be set, and the default value is 38400.

Note:some models do not have this function.

4.3.4 Detailed Configuration

Base Mode:

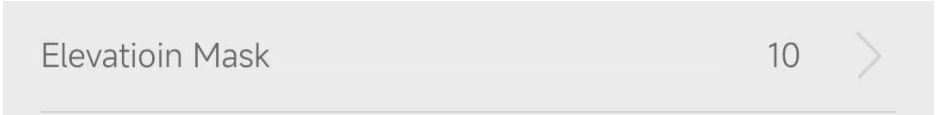


Start Up Type：

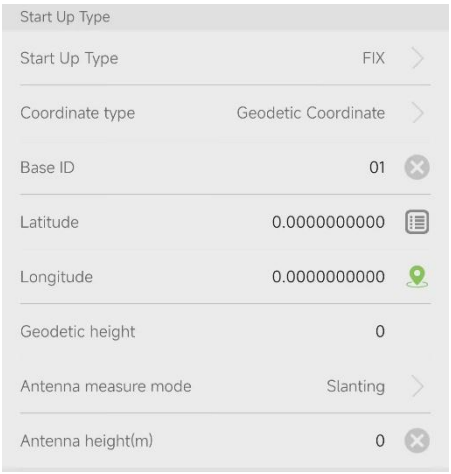
Single： Means the base station is not set up at a known point and can be set up arbitrarily. The mobile station calibrates its coordinates through a known point

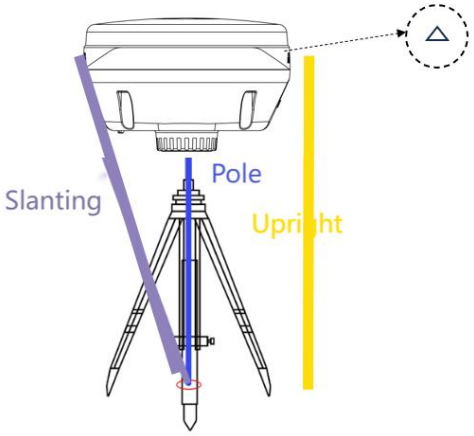
Fix: Means the base station is set up at a known control point, and the device height needs to be accurately measured and the known point coordinates need to be inputted.

Elevation Mask：

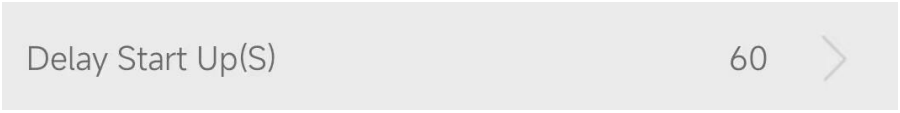


A smaller elevation mask can observe more satellites, However, a low elevation mask can cause satellite interference in data calculation, and it is usually recommended that the elevation mask of the base station be higher than 15 degrees.



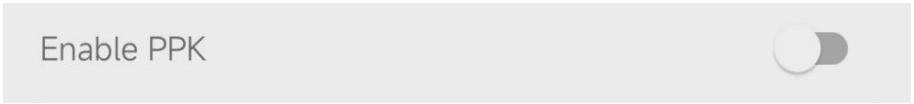


Delay Start Up(S)：



The positioning results of the device are not reliable for a period of time after start up. Delayed Start Up is used to wait for the observation data to stabilize and send to the data server after the device is started for a certain period of time.

Enable PPK：(Note: Some models do not have this feature.)



PPK Technology is used for differential post-processing, and the device will simultaneously record static data. The following are details about static data processing:

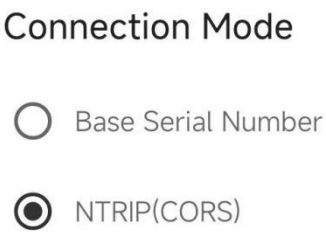
Diff Format

The diff format is used to control the differential data format sent by the base station, and currently the most commonly used format is RTCM3.2

Datalink

The datalink is used to control the broadcast link of the observation data of the base station. The host network requires the insertion of a SIM card, and the data is broadcast through the network. It is required that both the mobile station and the base station can connect to the network; The built-in radio mode requires both the base station and mobile station to insert UHF antennas, and data is transmitted through the radio, suitable for areas without network coverage.

Connection Mode



Connection Mode is only available when the datalink is selected as Network.

Base serial number: Where the user mounts the base station on Alpha server. The number of mount point is the host's number, IP 1.116.64.145, and port 8021.

NTRIP: Is a protocol for RTK data transmission over the internet. All RTK data formats (RTCM, etc.) can be transmitted. Select when you need to mount the host to a self built server.

Radio Setting

Radio setting is set after datalink selecting the radio mode.

The base station and the mobile station needs to set the same frequency and protocol in order to achieve communication.

Channel: Each channel corresponds to a different frequency, channel 8 can be customized by users; The antenna frequency for Alpha RTK is 430-450HZ, and setting the antenna frequency range outside may cause it to not function properly.

Protocol: Radio data broadcasting protocol.

Power: Higher power can cover a wider range, but it also consumes more electricity.

4.4 Static Mode

Click on 【Device】-> 【Static Mode】. The initial interface is shown in Figure 4.4-1, which includes two options: New and Apply. Click on 【Apply】 to use the saved static mode in the interface. Click 【New】, and the new settings options include Configuration Name, Point Name, Elevation Mask, Sampling Interval, Static

Auto Record, Antenna measurement mode, Antenna measurement height(m), etc., as shown in Figure 4.4-2.

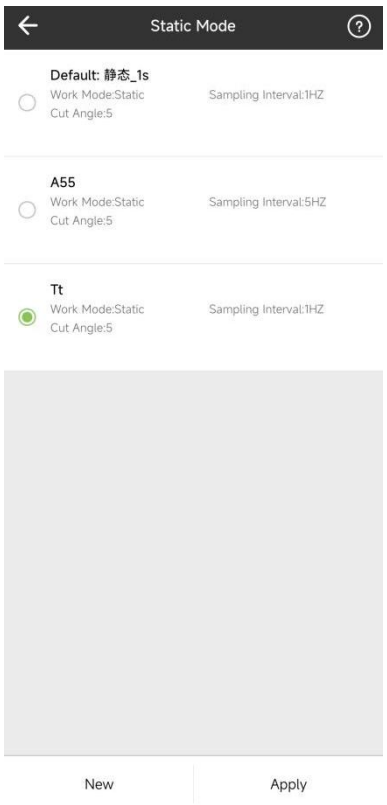


Figure 4.4-1

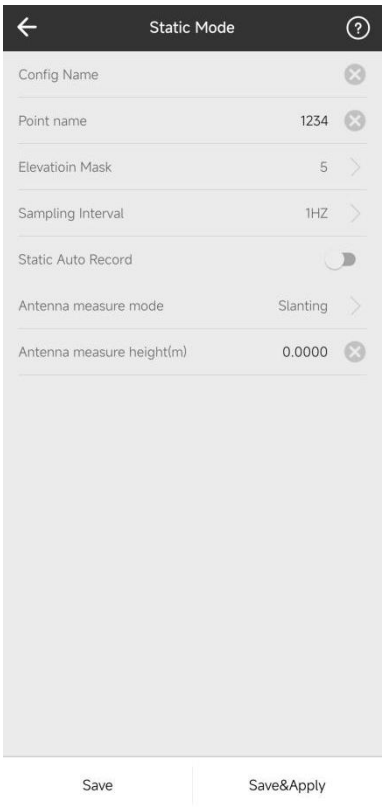


Figure 4.4-2

Among them:

Configuration Name: Property name.

Point name: The point name of static data.

Elevation Mask: The angle between the line connecting the satellite and the receiver and the horizon, and the receiver does not receive satellite signals below the elevation mask. Value range: 0-45°.

Sampling Interval: 1HZ represents collecting one data per second; 5HZ represents collecting five data per second; 5 seconds represents collecting one data per five seconds, and so on.

Static Auto Record: If the button for this option is turned on, the receiver will automatically start recording after receiving the satellite signal when receiver is

turned on; If the button for this option is turned off, you need to manually set the start of recording static data after the receiver is turned on.

The antenna measurement mode include pole height (default), upright height, and slanting height.

Antenna measure height(m): Refers to the height from the measurement position to the ground point.

Antenna parameters

Measurement height: Generally refers to the height from the measurement position to the ground point.

Antenna height: Generally refers to the vertical height(h) from the antenna phase center to the ground point.

The device provides known values as shown in Figure 4.4-3, The meanings represented by each letter are as follows:

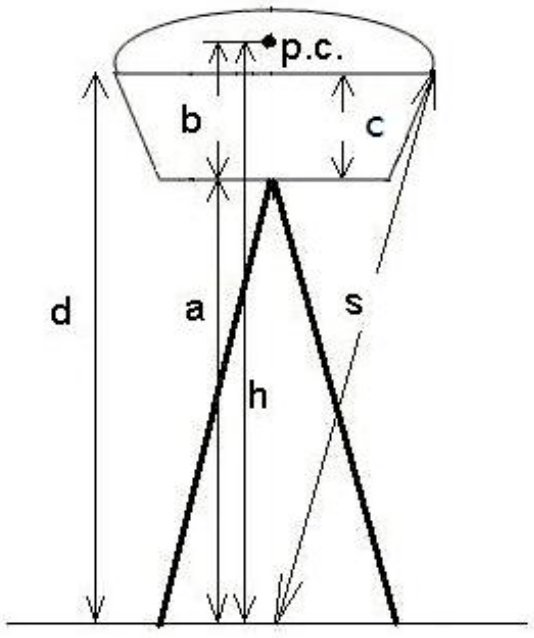


Figure 4.4-3

b: The height from the bottom of the device to the phase center p.c;

c: The height from the bottom of the device to the rubber ring;

R: The radius of the device's rubber ring.

When the measurement value is the vertical height(a) from the ground point to the bottom of the host, The height measured by this measurement method is called Pole Height. ($h = a + b$).

When the measurement value is the height from the ground point to the phase center, the height measured by this measurement method is called Upright Height. ($h = h$).

When the measurement value is the slanting height(s) from the ground point to the rubber ring, the height measured by this measurement method is called Slanting Height. ($h = \sqrt{S^2 - R^2} - c + b$).

Altimeter is a device fixed at the bottom of the device, which measures the length from the ground point to the edge of altimeter (i.e. the slope height(S) of altimeter). and the radius of the altimeter is known to be R_C, ($h = \sqrt{S^2 - R_C^2} + b$).

The antenna height is usually defined as the vertical distance from the phase center of the antenna to the measurement point. Since it cannot be directly measured, it is generally calculated through other measurement methods. Select the measurement method and input the measurement height to obtain the antenna height value.

After setting various parameters in the static station settings, click 【Apply】 to modify the receiver's working mode to static mode.

4.5 Device information

【Device】 -> 【Device information】,The device information includes Device information, Radio information, and Other, as shown in Figure 4.5-1. Among them, the device information includes: Device serial No., device type, Hardware version, Firmware version, GNSS version, OS version, BIOS version, Work mode, Current data link, Battery 1, and Battery 2. Radio information includes Radio power, Radio channel, Frequency. Other information includes: Enable GPS, Enable Beidou, Enable GLONASS, Enable GALILEO, Enable QZSS, Enable SBAS, Antenna type, and Pole H..

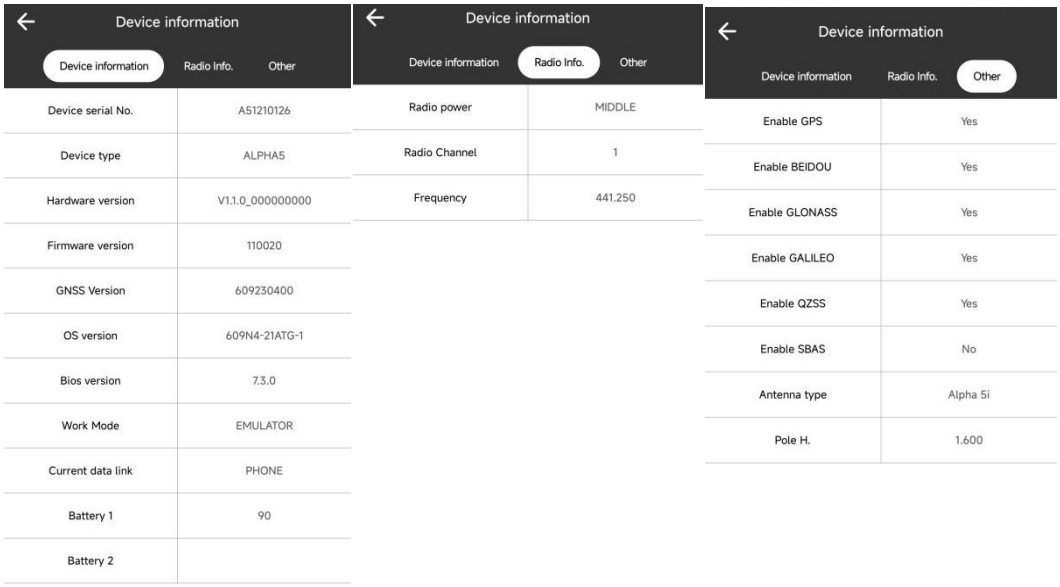


Figure 4.5-1

4.6 Default Radio Setting

【 Device 】 -> 【 Default Radio Setting 】 , the setting options include manufacturer and frequency, as shown in Figure 4.6-1. Manufacturers include: Alpha, Stonex, GEO, UniStrong, South, FOIF, UFO,as shown in Figurse 4.6-2.

Note:some models do not have this function.

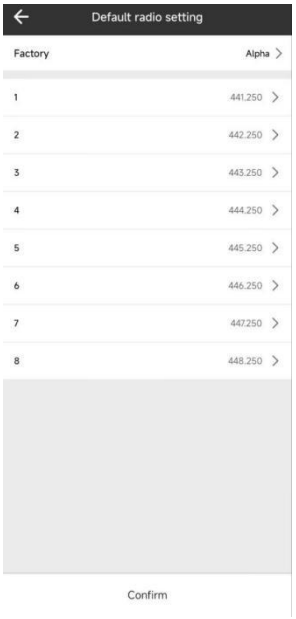


Figure 4.6-2 Figure 4.6-2

To modify or edit the frequency, you can click the button on the right side of the frequency to modify it, as shown in Figure 4.6-3.

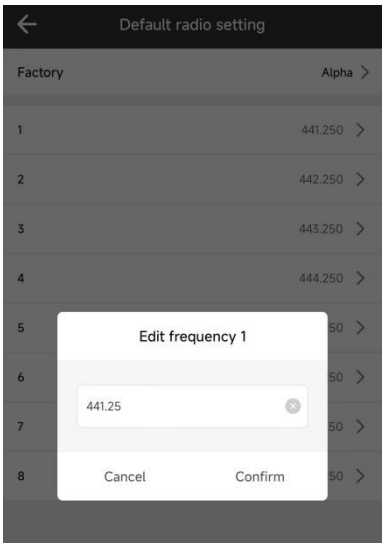


Figure 4.6-3

4.7 Restart Positioning

Click 【Device】->【Restart Positioning】, a prompt box will pop up, indicating that this function will cause the receiver to relocate. Do you want to continue? As shown in Figure 4.7-1, click 【Confirm】 to reposition. It can enable the receiver to search and lock the satellite again, and its function is to initialize the motherboard and receive the satellite signal again for positioning.

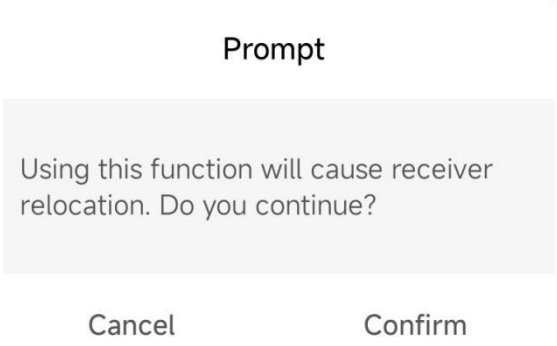


Figure 4.7-1

4.8 Device Activating

After connecting the controller to the receiver, you can view the Device Serial Number, Machine Code, Basic Expire Date, and Global Expire Date (not activated), as shown in Figure 4.8-1. When you need to register the RTK host, you can either manually enter the registration code or click to scan QR Code to obtain the registration code. After the registration code is entered, click 【Confirm】 to register the instrument. The registration code of the device needs to be obtained by contacting our company or agent.

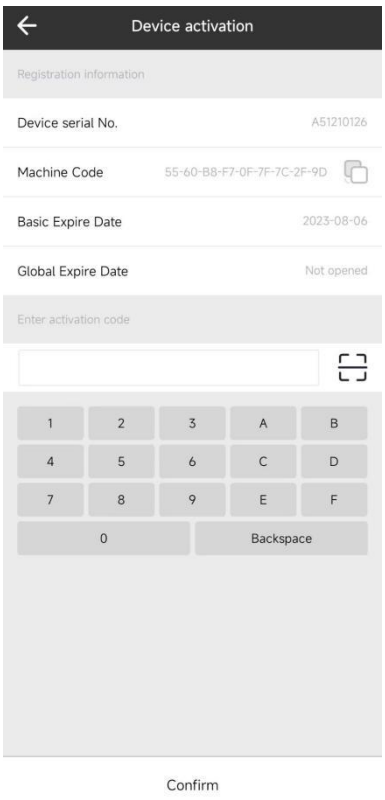


Figure 4

5 Survey

5.1 Point Survey

Click 【Survey】-> 【Point Survey】, and the Home screen of Point Survey is shown in Figure 5.1-1. The Home screen of Point Survey consists of status bar, attribute bar, function bar and display area.

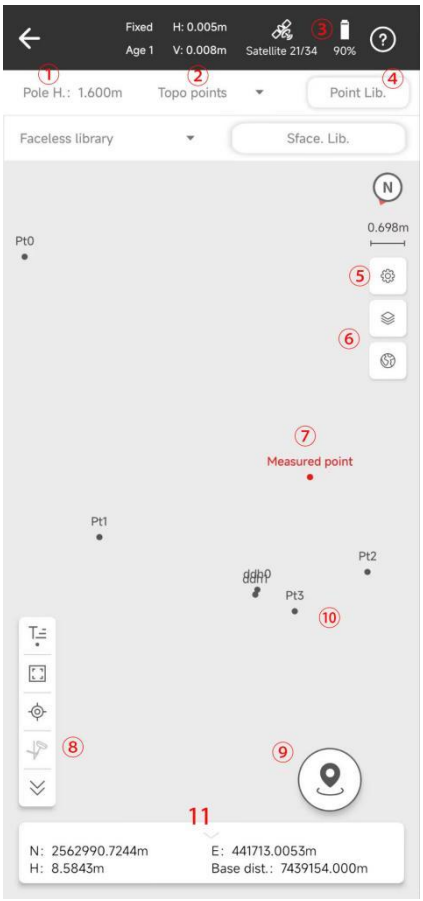


Figure 5.1-1

① Edit Pole Height: Displaying the current pole height value, click to set the pole height

② Point survey mode: Displaying the current point survey mode. Click to select Topo points, Quick points, Auto points, and Control points.

③ Current battery level of GNSS receiver

④ Button to access the coordinate point database

⑤ Button to access the setting of point survey

⑥ Button to switch the satellite map and 2D map

⑦ Current location of GNSS receiver

⑧ Button to switch IMU measurement

⑨ Button for point survey, click to save the current point

⑩ Surveyed points

⑪ The display content of the bottom information bar can be modified in ⑤.

Point database: All points collected using DiMap are saved in the Point database. Click 【Add】 to create a new point, select any survey point in the Point database, and click 【Edit】 to modify the coordinate point information; Click on 【Details】 to view the detailed information of the survey point; Click 【Delete】 to delete the survey point. Click 【Import】 and select a file format to import coordinate files. Click 【Options】 to turn on or turn off point types and can filter the points in the point database based on the point type

Topo points: Display the limit of point acquisition records based on the set point type, default to topo points.

Control Points: The interface will pop up when collecting control points, as shown in Figure 5.1-2. After clicking on 【Control point】, a fixed delay of 15 seconds will be passed before data collection. Record one point every 2 seconds, continuously record 10 points, and collect data from two sets of 10 points (the above data is based on the control point record settings as an example). After the collection is completed, click 【Confirm】, a dialog box will pop up stating that Control Point Report Generated. Click 【Confirm】 to view the survey report of control point.

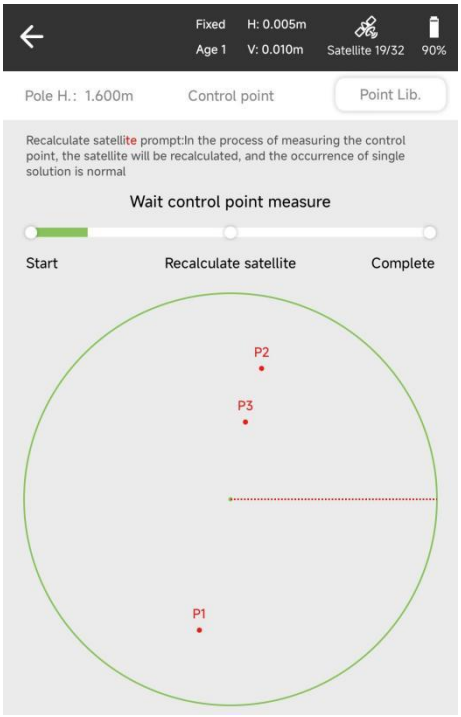


Figure 5.1-2

Quick Points: Select Quick Points and click the point acquisition button. If the collected points meet the storage conditions, the quick points acquisition will be completed after hearing the prompt tone, and the storage interface will not pop up.

Auto points: After selecting the collection auto points, click ⚙ to set recording parameters, and then click the button acquisition to collect points. If collection needs to be paused during the collection process, you can click 【Pause】, click 【Start】 to continue collection.

Precautions for using IMU for point survey:

1.Gently shake the RTK left and right, or back and forth until the reminder disappears before continuing to use IMU;

2.After the receiver remains stationary for 30 seconds, it will prompt for tilt measurement initialization;

3. It is necessary to ensure that the centering rod cannot shake when collecting points in the case of tilt measurement.

Please note that according to different measurement point modes,

Topo points

Quick points

Auto points

Control point

the content displayed is different,as shown in Figure 5.1-3

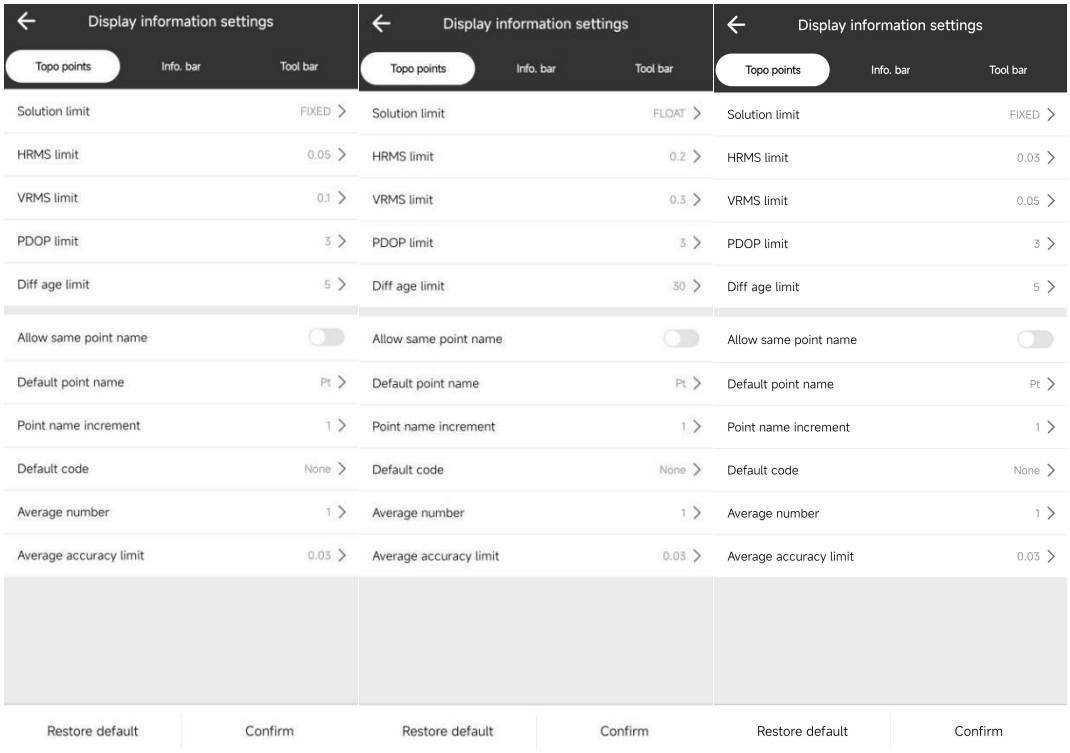


Figure 5.1-3

Solution limit: State limitations for save points, if a fixed solution is selected, saving points is only allowed under the fixed solution.

RMS limit: Positioning residual limit, the smaller the value, the more accurate the localization result, but it may make it impossible to save points.

PDOP limit: Satellite condition limit, default is sufficient.

Diff age limit: Excessive delay may lead to inaccurate calculation results, and it is usually recommended to set it to within 5.

Allow same point name: Allow storage of points with the same name after activation.

Default point name: Default name prefix

Point name increment: The increase of the number of point name.

5.2 Detail Survey

Detail survey is the survey of the plane position and elevation of the detail points. For land features, the detail point should be selected at the direction change of the contour line of the feature, such as the corner point of the building, the turning point of the road, the intersection point, the turning point of the riverbank line, and the center point of the independent feature. By connecting these feature points, the shape of the land feature is obtained that is similar to that of the field. For landforms, detail points should be selected on topographic lines such as crest lines and valley lines that best reflect the characteristics of the topographic. Places with changes in slope and direction, such as mountaintops, saddles, crests, valleys, slopes, and foothills. Draw contour line according to the elevation of these characteristic points, and then the landform can be shown on the map

Click 【Survey】 -> 【Detail survey】 to enter the Detail survey interface, as shown in Figure 5.2-1. The information in the upper status bar is the same as the point survey interface. Detail survey is a simplified version of the point survey, suitable for fast and continuous survey of coordinate data.

5.3 CAD

The CAD function is mainly used for importing and editing existing CAD drawings, and can perform line staking out on existing lines in CAD drawings.

Click on 【Survey】 -> 【CAD】 to enter the CAD function as shown in Figure 5.3-1. The following provides a detailed introduction to this interface. Click to open and enter the root directory of the folder, as shown in Figure 5.3-2. Select the CAD file (.dwg) that needs to be opened in the root directory of the folder, and after opening, the display area is shown in Figure 5.3-3. The opened file will be displayed in the recently opened interface, as shown in Figures 5.3-4

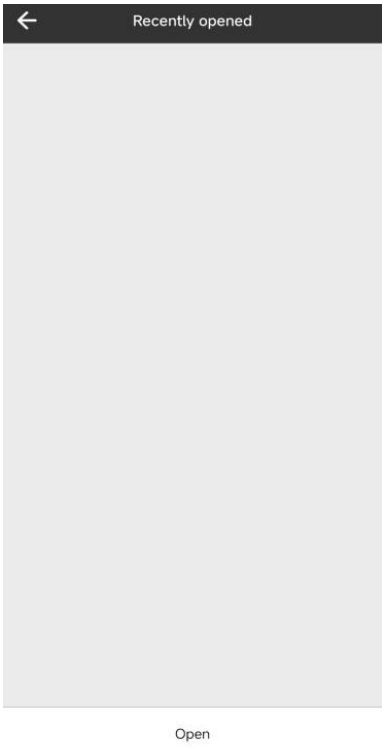


Figure 5.3-1

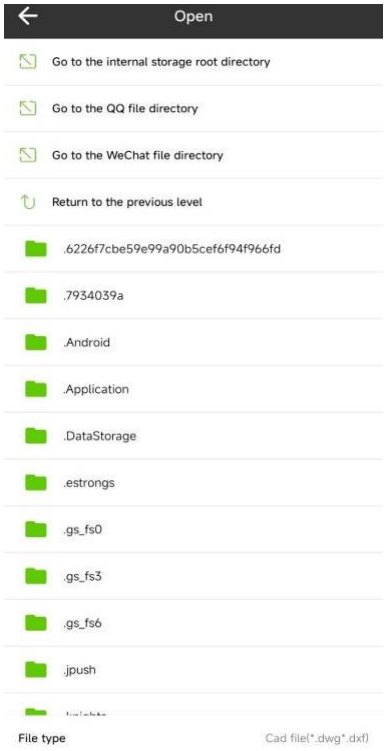


Figure 5.3-2

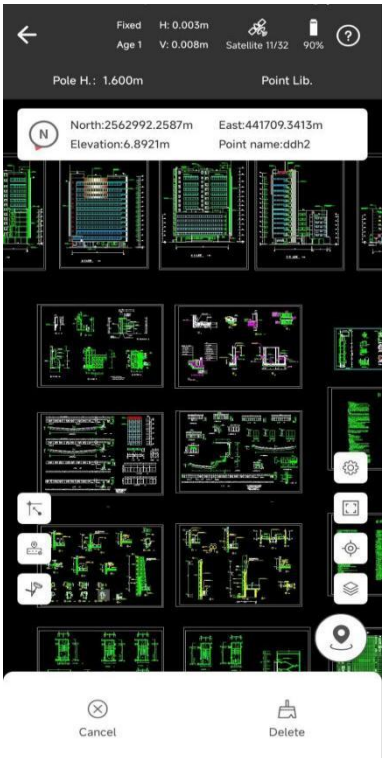


Figure 5.3-3

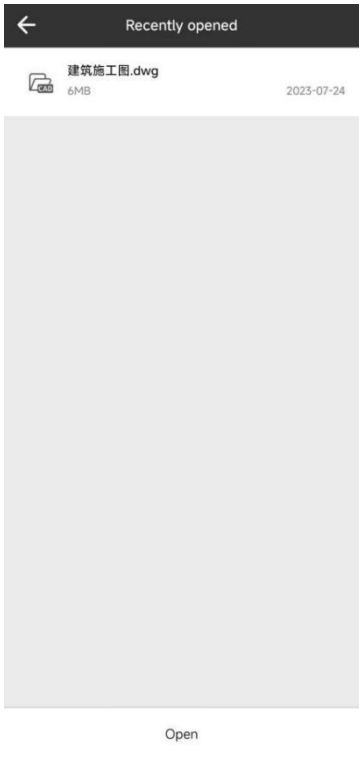


Figure 5.3-4

5.4 Point Stakeout

Point lofting is the process of inputting the target coordinates into the software then stake out in the filed.

Click on 【Survey】-> 【Point stakeout】-> 【Point database】, select a point for staking out, and enter the Point stakeout interface, as shown in Figure 5.4-1; If there are setting out points, the home screen is shown in Figure 5.4-2

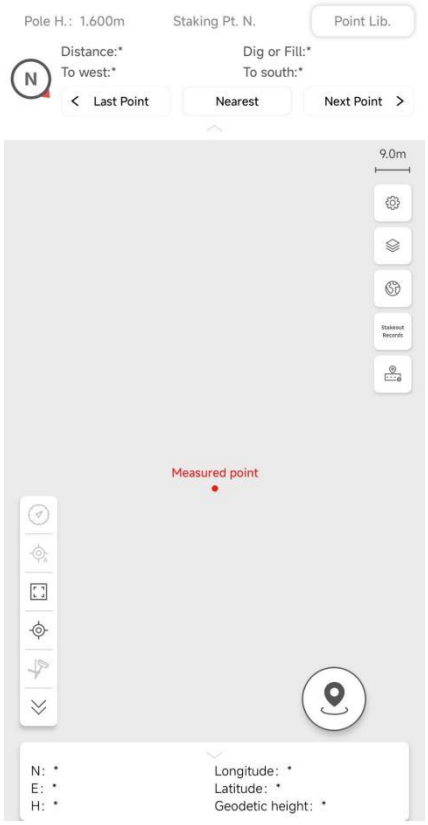


Figure 5.4-2

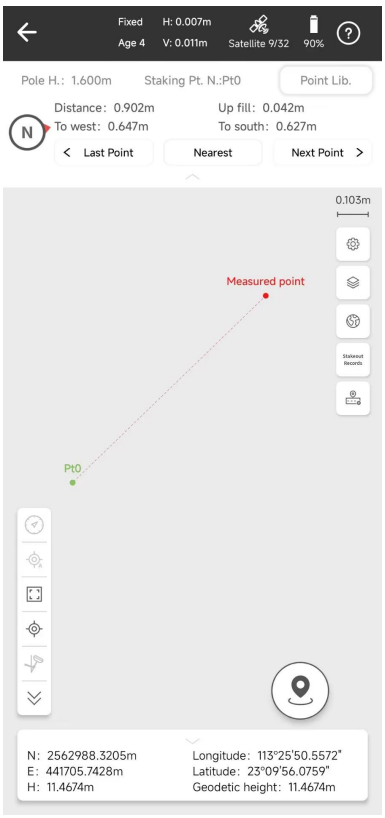
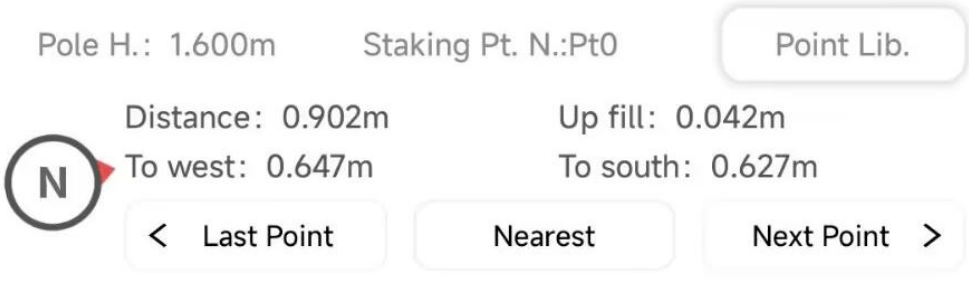


Figure 5.4-2

Top Bar



Pole height: Click to enter the pole height value.

Staking Pt.N:: The point name currently being lofted.

Distance: The spatial distance between the current point and the setting out point.

Up fill: The height difference between the setting out point and the current point.

To east/To north: The direction of movement of the setting out point from the current position.

Map interface

As shown in Figure 5.4-3.

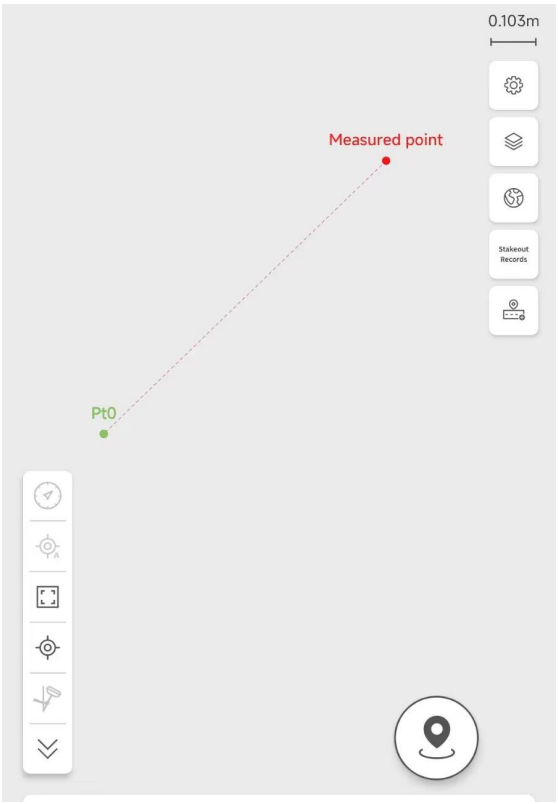


Figure 5.4-3

Can control map display, capable of loading satellite map and 2D base map.

Stakeout records, all the setting out points in this interface can be accessed to view and export data. The interface of point stakeout records is shown in Figure 5.4-4.

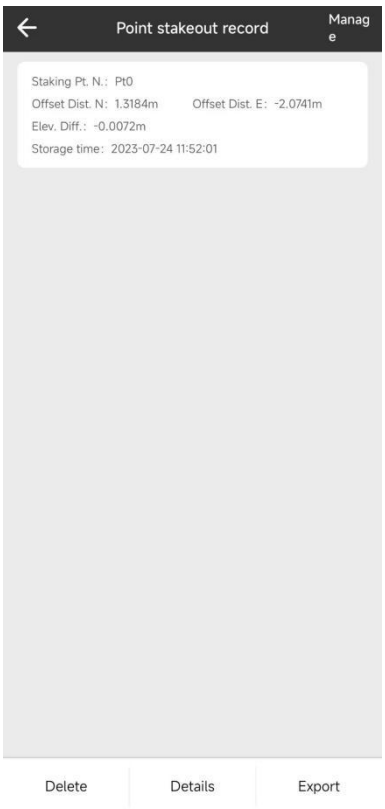


Figure 5.4-4

Adding stake：

You can manually input coordinate points for staking out, as shown in Figure 5.4-5.

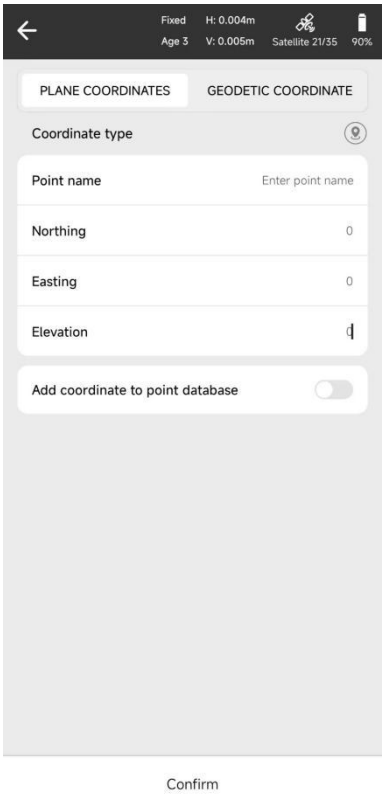
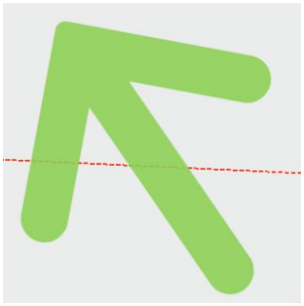


Figure 5.4-5

Arrow：



When the distance from the staking out point to the current point is greater than the set distance, an arrow will be displayed on map. Move in the direction indicated by the arrow to approach the staking out point. When the distance from the staking point is within the 【Range】, the arrow will disappear and be replaced by the arc radius. When it is within the 【 Staking out limit 】, the controller will give a tinkling prompt, as shown in Figure 5.4-6.

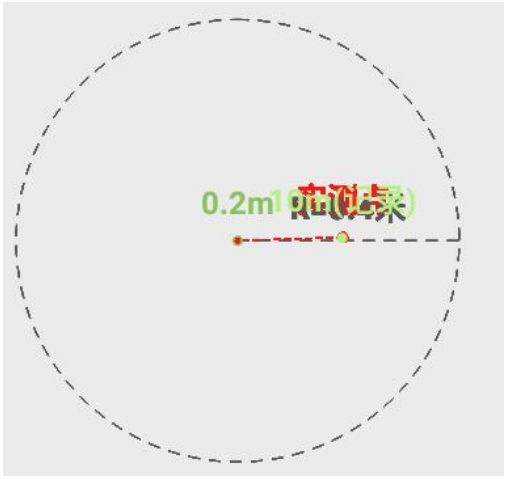
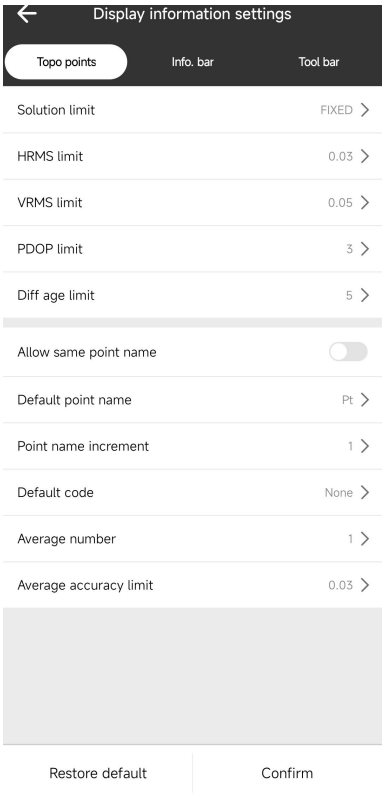


Figure 5.4-6

Users can modify the values of 【Range】 and 【Staking out limit】 in the 【Display information settings】:



Point staking out steps:

(1) Select the staking out points in the point database, and click 【Apply】 to enter the stakeout interface. The arrow is a direction indicator, indicates the direction of current device movement. When the direction of the arrow

coincides with the connection between the current point and the target point, moving forward in that direction can reach the target point.

(2) According to the prompts in the status bar, move from the current point to the staking out point, and the height of excavation or filling will be prompted based on the difference in elevation.

(3) When the current point is within the prompt range, prompt sound will appear to enter the precise stakeout.

(4) After reaching the location of the staking out point, end the staking out and proceed with pile driving.

5.5 Line stakeout

Line stakeout refers to the layout of a designed straight line, which includes the mileage of the straight line, the left and right offset, and the elevation control within the designed straight line range.

Click on 【Survey】-> 【Line stakeout】-> 【Lines Lib.】, select a straight line for staking out, and click 【Confirm】 to enter the straight line setting interface, as shown in Figure 5.5-1.

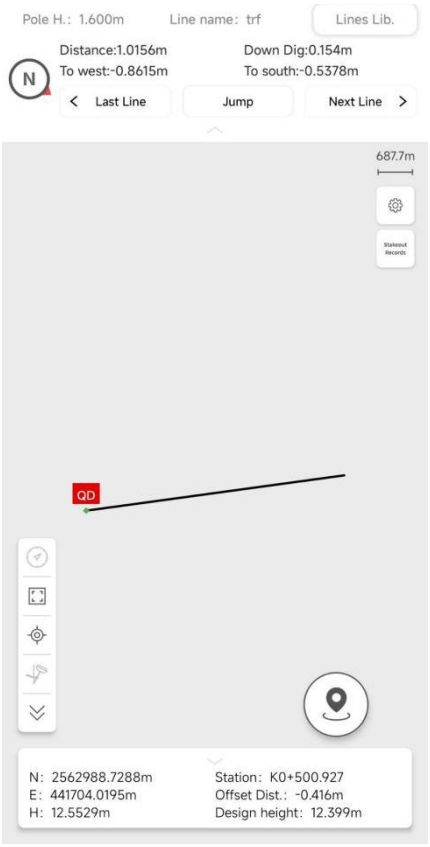


Figure 5.5-1

Add staking out lines:

Click on 【Lines Lib.】-> 【Add】, select the type of desired staking out line, as shown in Figure 5.5-2; Taking the newly added Straight line as an example, the editing interface is shown in Figure 5.5-3. The setting options include line name, starting mileage, starting point coordinate setting, and ending point coordinate setting. After setting, click 【Confirm】 and the layout line will be saved in the layout line library, as shown in Figure 5.5-4

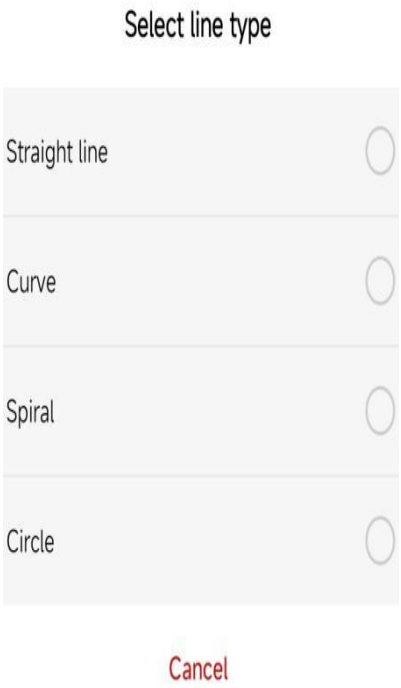


Figure 5.5-2

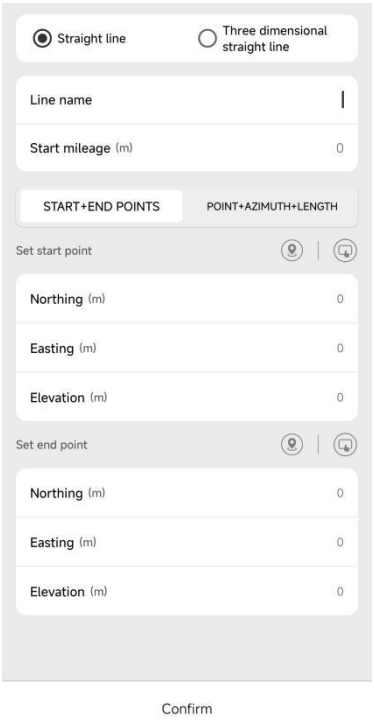


Figure 5.5-3

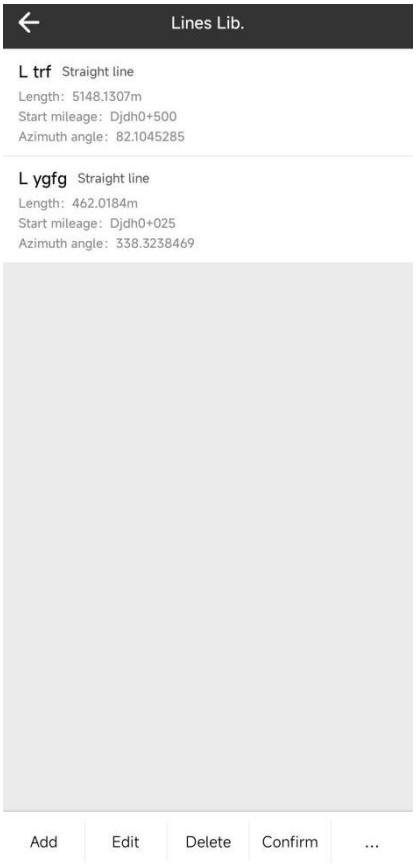


Figure 5.5-2

The illustrations of each function of the side toolbar of Line stakeout are as follows:

：Direction navigation: Open then the arrow indication can be activated, as shown in Figure 5.5-5

Stakeout Records：Stakeout Records: Click the icon to view the stakeout records. The Stakeout records interface is shown in Figure 5.5-6. Click 【Details】 to view the detailed information of the staking out.

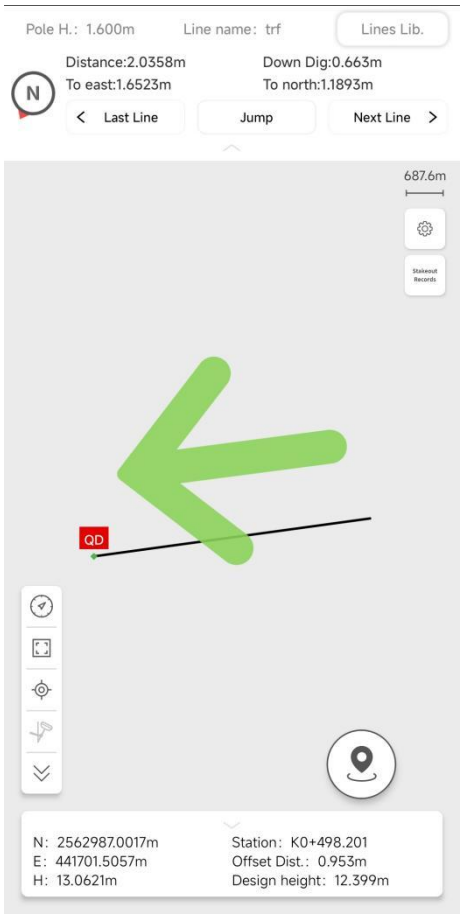


Figure 5.5-5

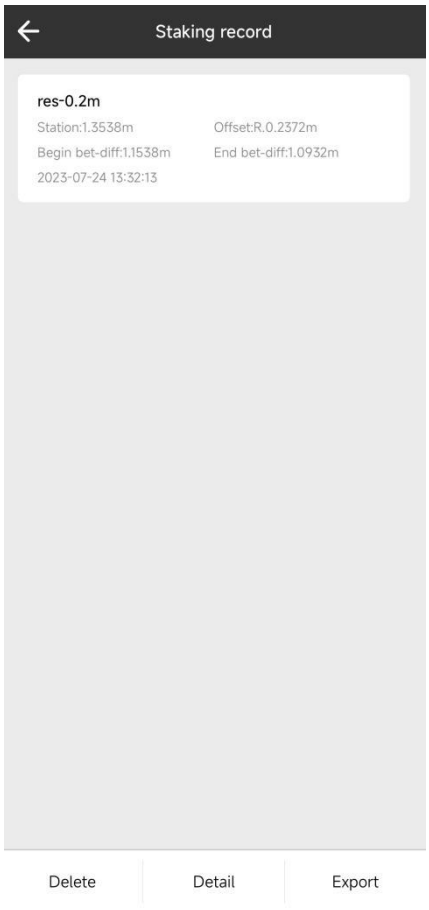


Figure 5.5-6

The default explanation for the status bar is as follows:：

Line Name: The name of the current staking out line.

High: The elevation of the current point.

Station: The distance from the current point to the starting point after making a perpendicular add or subtract the starting point mileage.

Offset Dist: Draw a perpendicular line through the current point, perpendicular to the distance from the current point. When the current point is on the left side of the straight ahead direction, the offset is negative; When the current point is on the right side of the straight ahead direction, the offset is positive.

Line lofting steps:

(1) According to the engineering design, edit the staking out line in advance or import the line file.

(2) Select the straight path for staking out, click 【Confirm】 to enter the staking out interface. The starting point displays the mileage of 0.000, and the ending point displays the true mileage of the straight line.

(3) Movement direction: Move along the vertical direction from the current point to the straight line to return to the staking out line; Alternatively, according to the direction prompt in the lower status bar, the correct direction of the staking out line can also be found.

(4) Follow the prompts on the status bar to perform staking out.

(5) When the offset of the line is within the prompt range, parallel lines are generated on both sides of the staking out line according to the setting of the prompt range to enter precise staking out.

(6) If it is necessary to add pile to the straight line during the staking out process, click 【Add Pile】 to set the pile adding mode and adding position, and click 【Confirm】 to pop up the calculation result dialog box. Click 【Stakeout】 to enter the staking point staking out interface, and follow the prompts in the status bar to set out. When the distance between the staking point and the current point is less than 3 meters, a circular prompt circle will be generated centered around the staking point to enter precise staking.

(7)Adjacent staking out lines in the line library can be switched between the 【Last Line】 and 【Next Line】 lines.

5.6 Middle or side Staking

Click on 【Survey】-> 【Middle or side Staking】, select a route from the 【Roads Lib.】 in the upper right corner. If there has not a road, enter a route according to the key points of route creation, as shown in Figure 5.6-1.

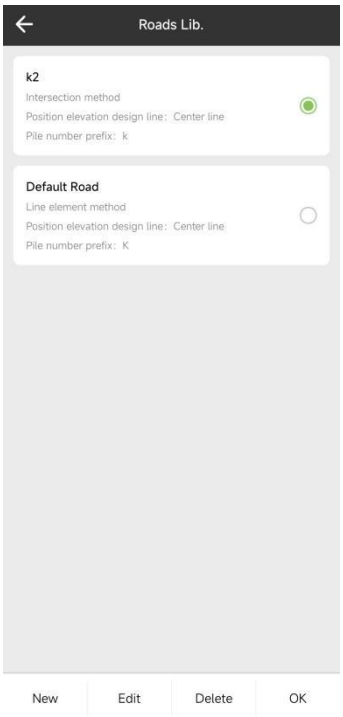


Figure 5.6-1

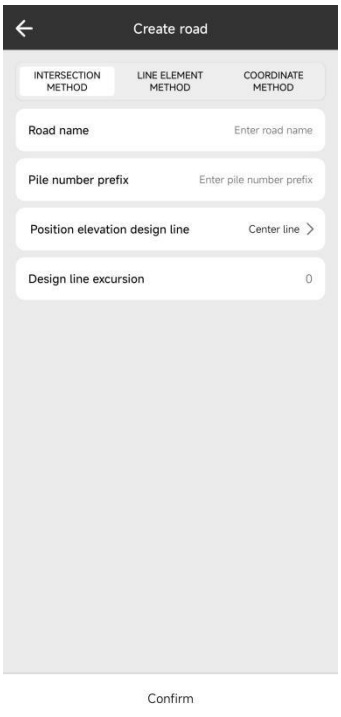


Figure 5.6-2

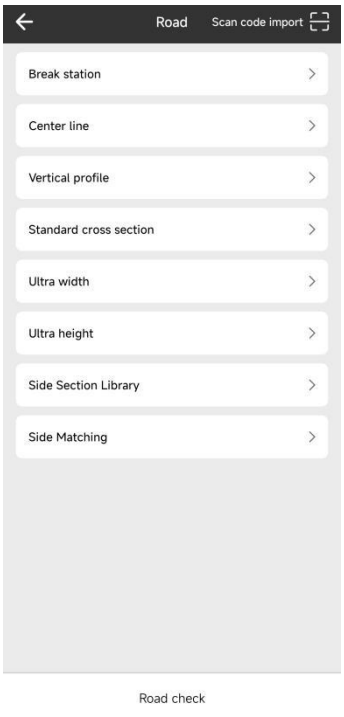
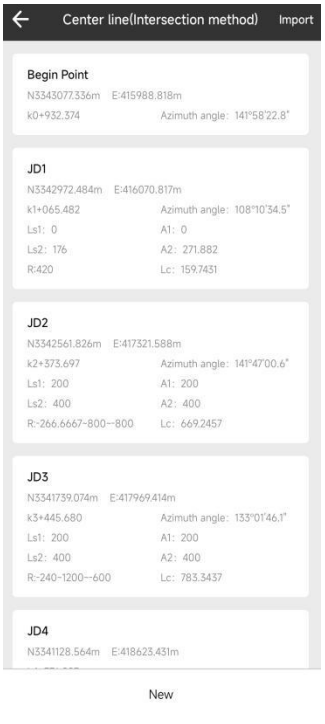
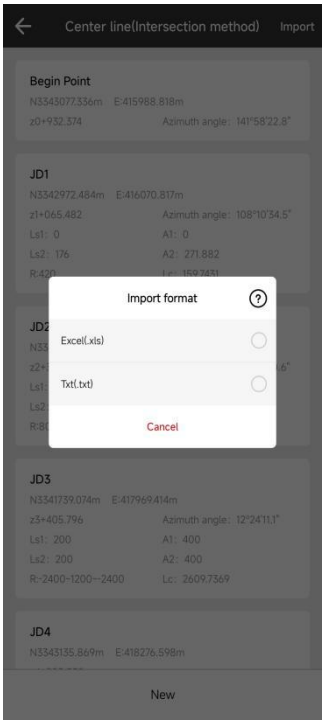


Figure 5.6-3

5.6.1 Line Editing

Roads library: Roads library includes four operations: New, Edit, Delete, and OK. After clicking 【New】, the three commonly used methods for inputting roads will be displayed, as shown in Figure 5.6-2: Intersection Method, Line Element Method, and Coordinate Method. After selecting the corresponding method, enter Road name, Pile number prefix, Position elevation design line, and Design line excursion, which indicates that the road attribute information has been entered.





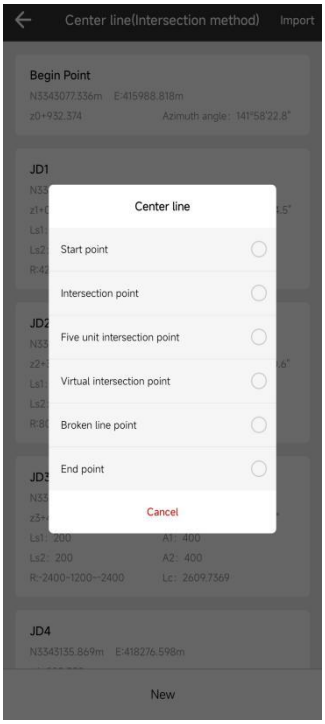


Figure 5.6-4 Figure 5.6-5 Figure 5.6-6

After editing the attribute information of the road, click the corresponding road and then click 【Edit】， enter the road design data editing, as shown in Figure 5.6-3, based on the design data provided by the road construction, the first step is to input the Center line parameters. Other road elements are selectively input according to the line design needs, such as Vertical profile, Standard cross section, slope information, Ultra height and Ultra width, and whether there is any brake station.

***Center line import method**:

1. Excel (. xls) format

Enter in Excel in the following format

	A	B	C	D	E	F	G	H
1	Start Point	X of Start Point	Y of Start Point					
2	Intersection Point 1	x	y	Ls1	Ls2	A1	A2	R
3	Intersection Point 2	x	y	Ls1	Ls2	A1	A2	R
4	X of End Point	Y of End Point						

	A	B	C	D	E	F	G	H
1	QD	2738446.48	468252.156					
2	JD1	2738434.64	468175.103	0	250	0	670.82	1800
3	JD2	2737968.91	466780.944	250	250	636.396	636.396	1620
4	2736665.77	466791.732						

Note: The X coordinate of the endpoint is filled in the first column, and the Y coordinate is filled in the second column.

2. Txt format

Starting station, X coordinate of starting point, Y coordinate of starting point

Intersection name, X coordinate, Y coordinate, Ls1, Ls2,

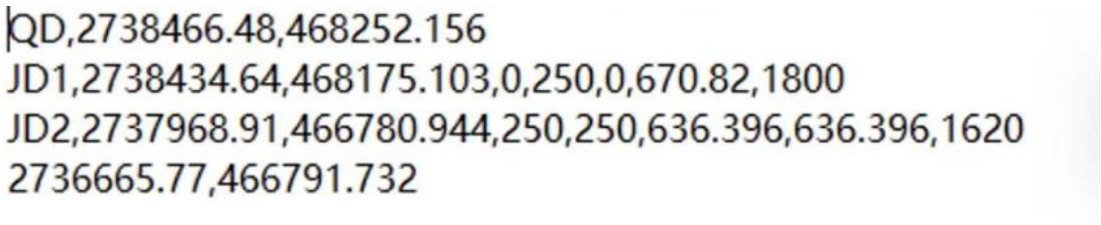
A1, A2, R

Intersection name, X coordinate, Y coordinate, Ls1, Ls2,

A1, A2, R

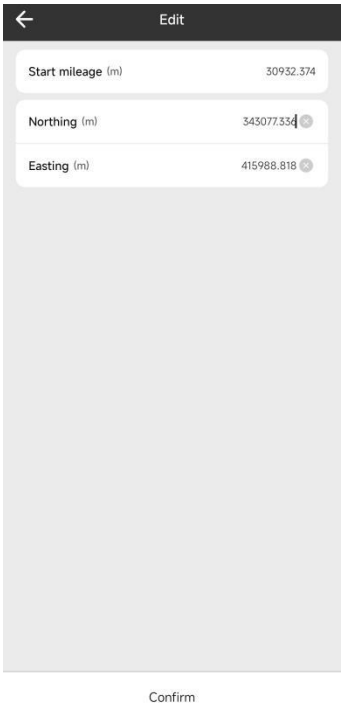
X coordinate of end point, Y coordinate of end point,

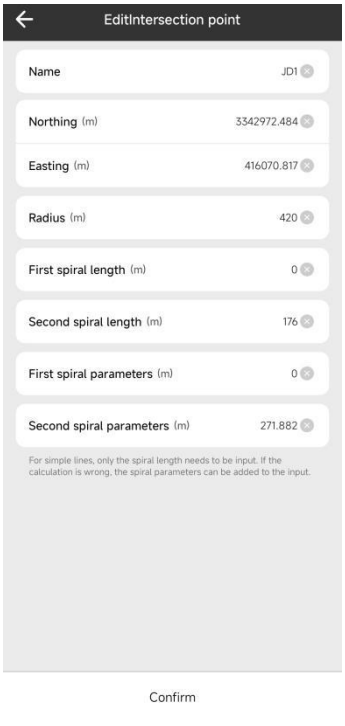
For example:



*Method for creating center line:

As shown in Figure 5.6-6, when there are no files to import, you can input the design data in sequence. In the interface shown in Figure 5.6-4, click 【New】 at the bottom to display as shown in Figure 5.6-6. Enter Start point, Intersection point, and other element information. Enter the start point data, as shown in Figure 5.6-7, and the intersection data, as shown in Figure 5.6-8.





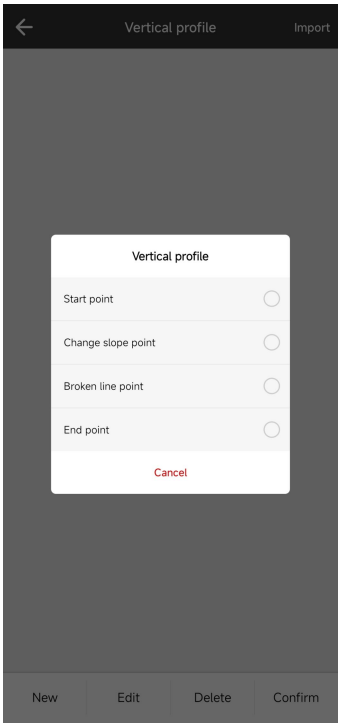


Figure 5.6-7 Figure 5.6-8 Figure 5.6-9

*Vertical curve import method:

As shown in Figure 5.6-10, is the process of importing a vertical curve file. The DiMap supports the import of vertical curve parameters using Excel, txt, for exporting design lines of vertical section in Excel format.

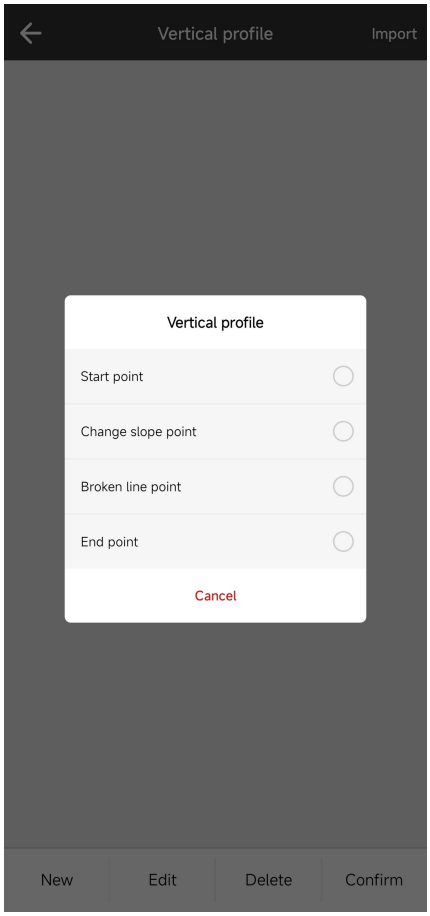


Figure 5.6-10

1. Excel format import (. xls/. xlsx)

Starting mileage, elevation

Variable grade point mileage, elevation, radius (no radius input for line points)

End mileage, elevation

	A	B	C	D
1	36250	296.212		
2	36550	295.612	3000	
3	37150	280.462	5000	
4	38150	274.462	5000	
5	39400	274.462		

2. TxT format

Starting mileage, elevation

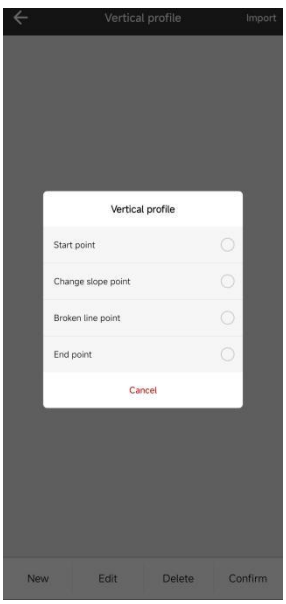
Variable grade point mileage, elevation, radius (no radius input for line points)

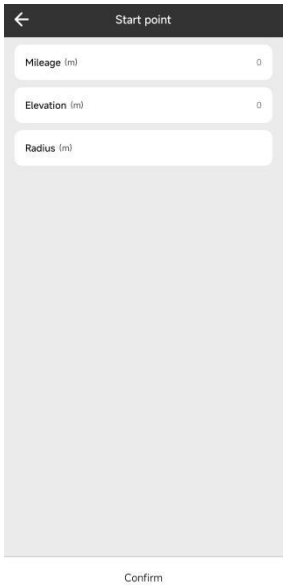
End mileage, elevation

```
36250,296.212,
36550,295.612,3000
37150,280.462,5000
38150,274.462,5000
39400,274.462,
```

*Method for creating vertical profile:

Click 【Vertical profile】 to enter the input interface, click 【New】 in the bottom left corner, as shown in Figure 5.6-11. Enter the start point information in sequence, as shown in Figure 5.6-12, and the information of each change slope point, as shown in Figure 5.6-13.





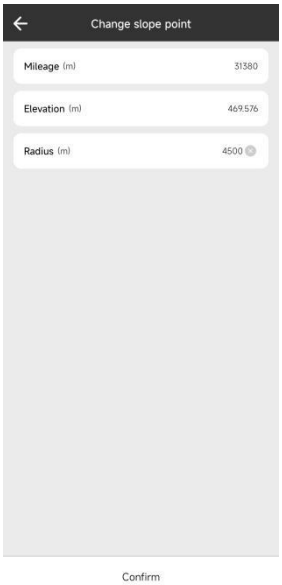


Figure 5.6-11 Figure 5.6-12 Figure 5.6-13

*Import method for standard cross section:

Click 【Standard cross section】 in the upper right corner of Figure 5-6-3 interface to enter the interface shown in Figure 5.6-14, and import the corresponding file according to the cross-sectional file format.

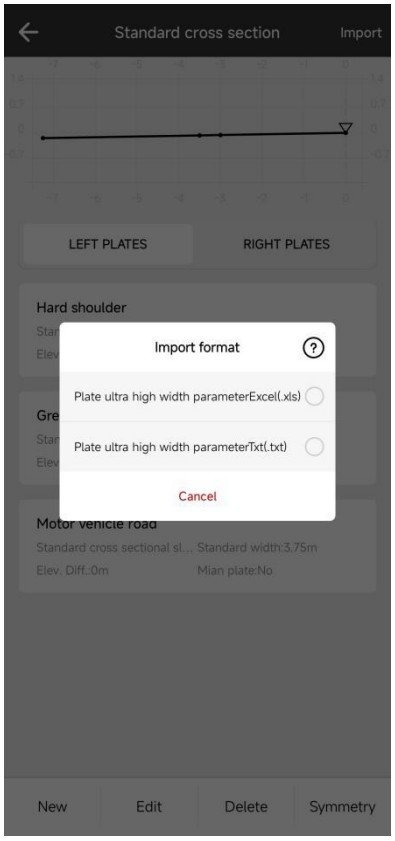


Figure 5.6-14

*Input method for standard cross section:

As shown in Figure 5.6-15, input the cross-sectional data into the cross-sectional library. For the section with the road center line as the center and the slope changing outwards, when inputting the slope, the slope number is negative; On the contrary, it is positive. When inputting blocks, input them sequentially from left to right, as shown in Figure 5.6-16 and Figure 5.6-17.

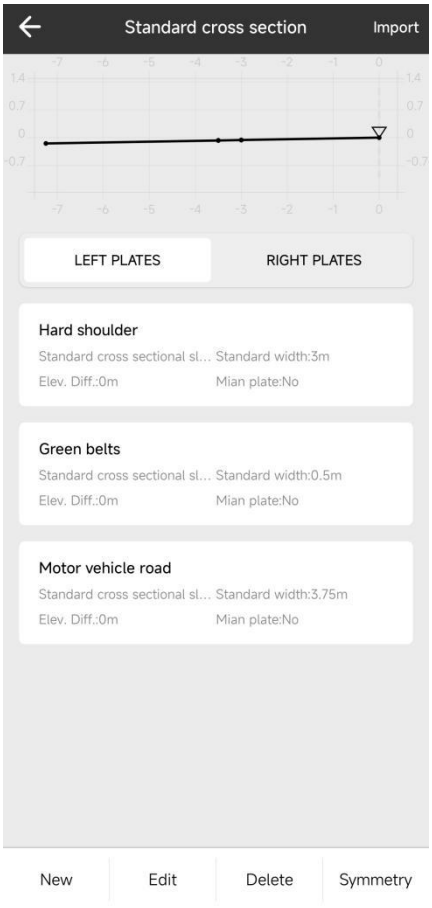


Figure 5.6-16

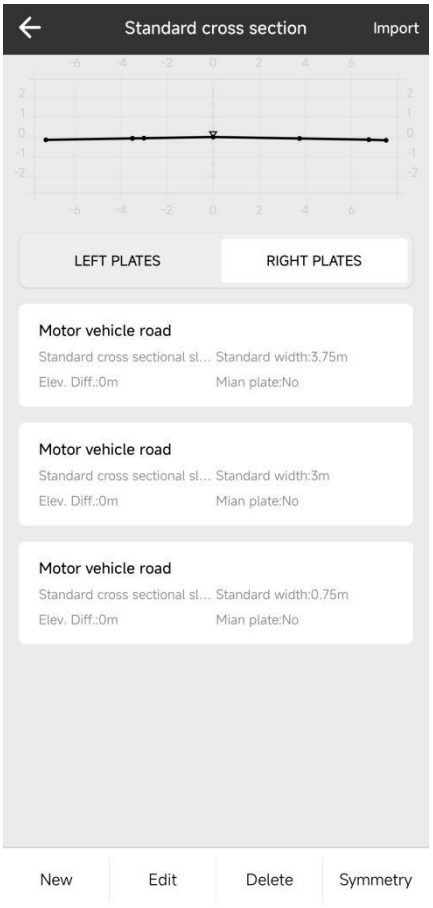


Figure 5.6-17

*Brake station:

Brake station refers to the phenomenon of disconnected pile numbers caused by local rerouting or segmented measurement. Overlapping stations are called long chains, while intermittent stations are called short chains. When there is a brake station in the road data, input the brake station information into the corresponding module.

*Ultra width and Ultra height:

In highway bends, in order to balance the centrifugal force generated by cars during turns, the route is designed as a one-way slope with high outer bends and low inner bends, in order to eliminate the centrifugal force generated by cars.

For the sake of driving safety, curved sections with a radius of less than 250 meters are generally widened.

If the line has these two parts of data, they correspond to the input.

*Side Section Library:

In line construction, there will be many types of slopes, and all of them will be recorded in sequence.

In Figure 5.6-18, after clicking the Side Section Library, enter Figure 5.6-19. Click 【New】 on this page to start creating the filling and excavation information of the slope. The editing of the slope is shown in Figure 5.6-20 and Figure 5.6-21. After editing the slope surface and platform information on this page, it will be graphically displayed above for easy verification.

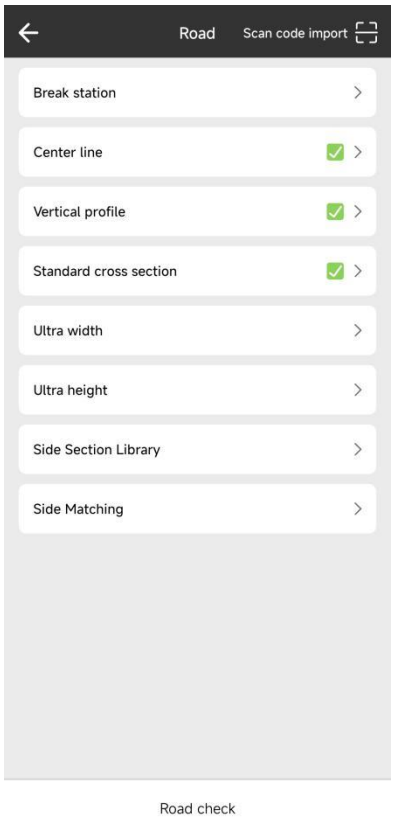


Figure 5.6-18

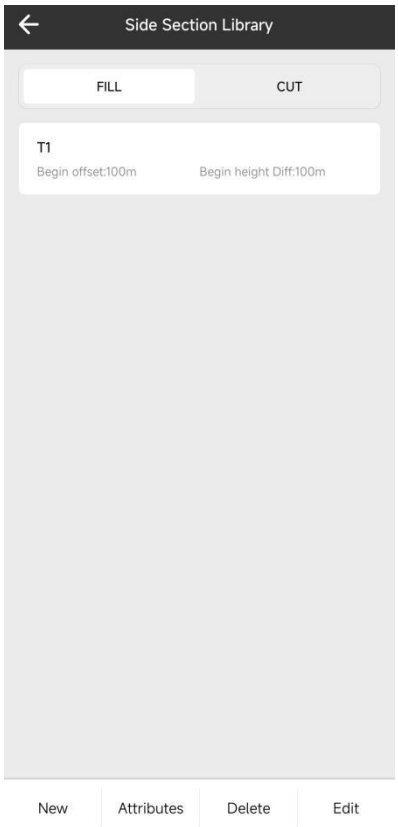
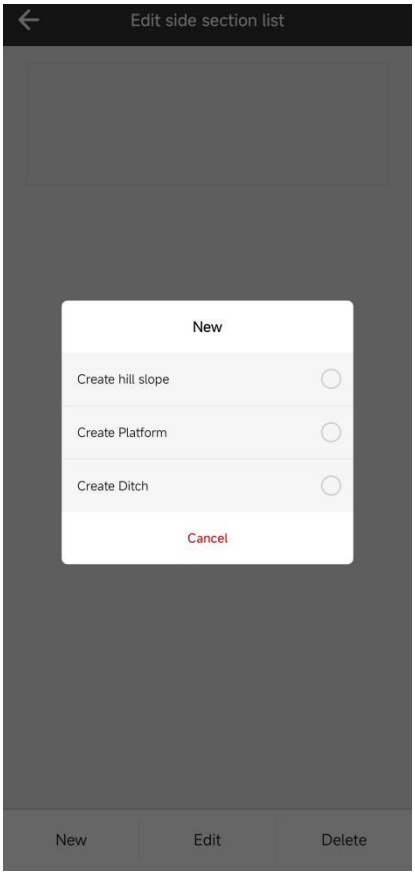


Figure 5.6-19



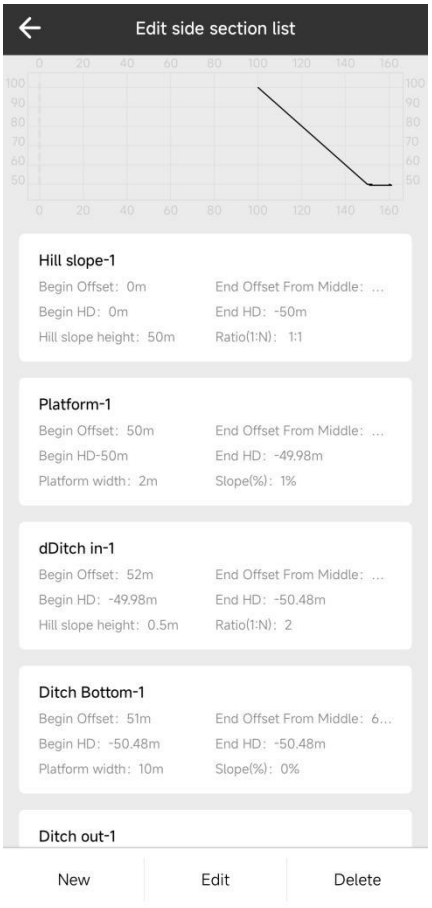
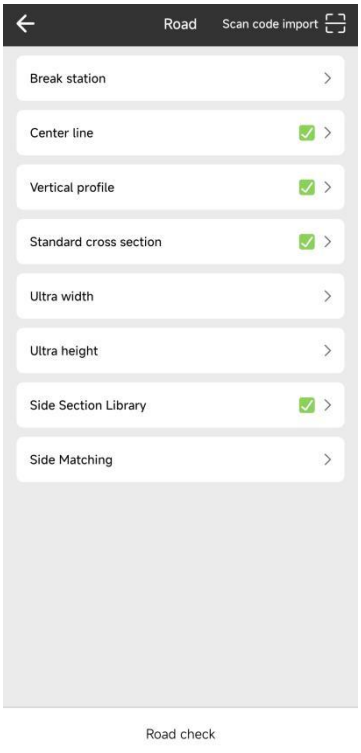
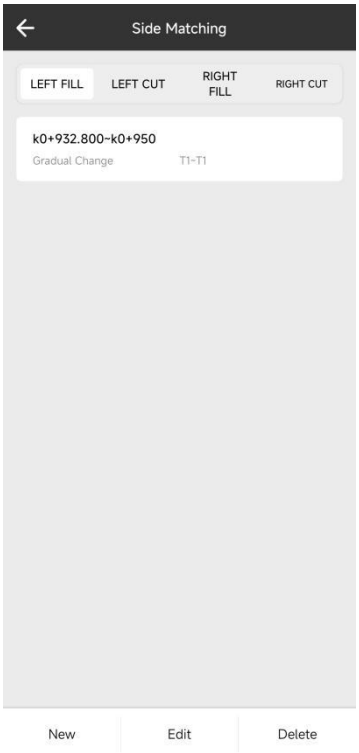


Figure 5.6-20 Figure 5.6-21

*Matching of Side Section Library:

In Figure 5.6-22, after clicking the Side Matching, enter Figure 5.6-23.Matching of Side Section Library is the marking of which section to use for construction at different mileage positions on the route. Click 【New】 to add matching information for the filling and excavation mileage on both sides of the line, as shown in page 5.6-21 below. After creation, click 【Edit】 to enter Figure 5.6-22 where you can modify the edited matching information.





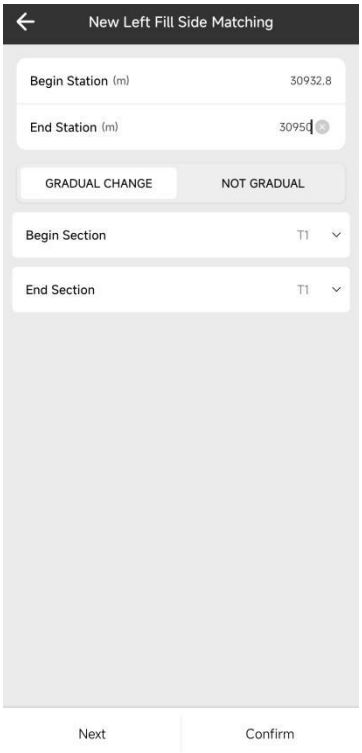


Figure 5.6-22 Figure 5.6-23 Figure 5.6-24

5.6.2 Middle or side Staking

After selecting the line, it starts to enter the interface of middle or side staking, as shown in Figure 5.6-23 below, you can see the positional relationship between the current point and the line, and at the same time, the software will display the mileage of the current point, deviation, filling and digging information on top of the software.

【L.MID.R.】: it is the function of switching the center line, left line and right line of the road;

: Click the gear to enter the page of staking setting, which can set the staking limit difference, road thickness, information column and toolbar display switching, as shown in Figure 5.6-24.

Interval : As shown in Figure 5.6-26, in this interface, you can set the pile spacing, choose the way to set the pile distance and so on.

Offset : Select each plate in this interface, and then take the corresponding plate to stake the sample, as shown in Figure 5.6-25.

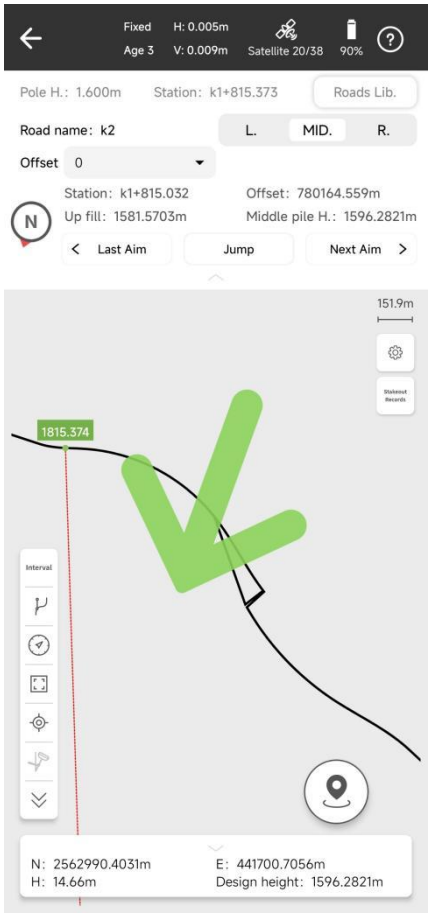


Figure 5.6-23

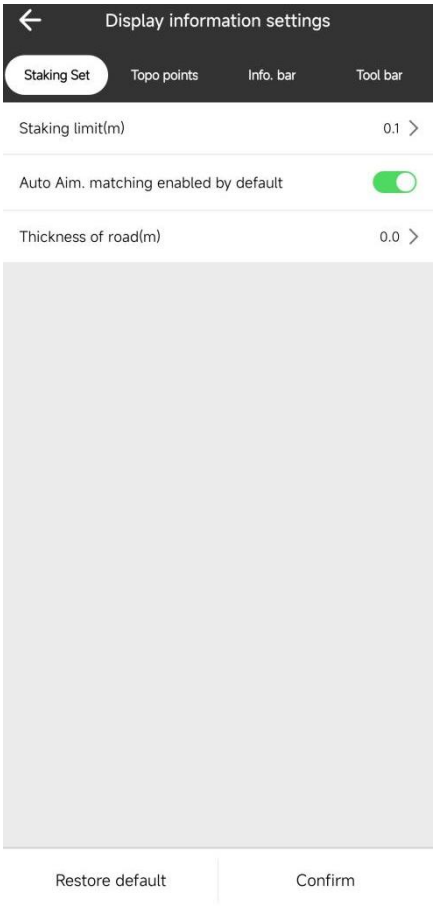


Figure 5.6-24

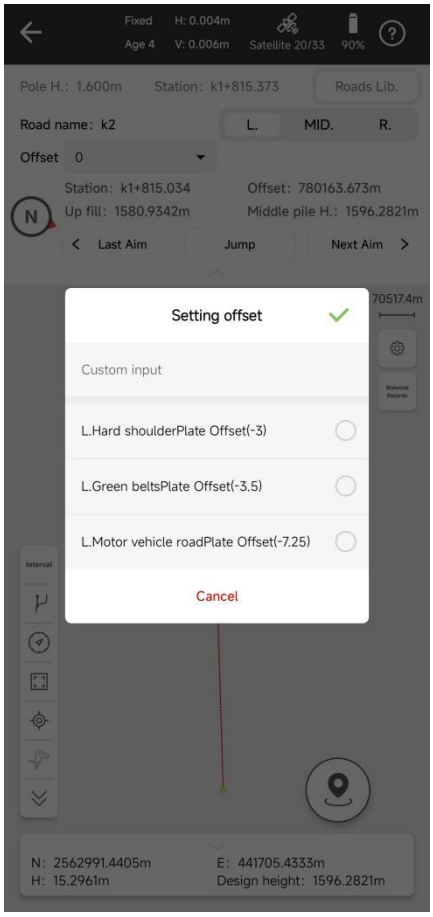


Figure 5.6-25

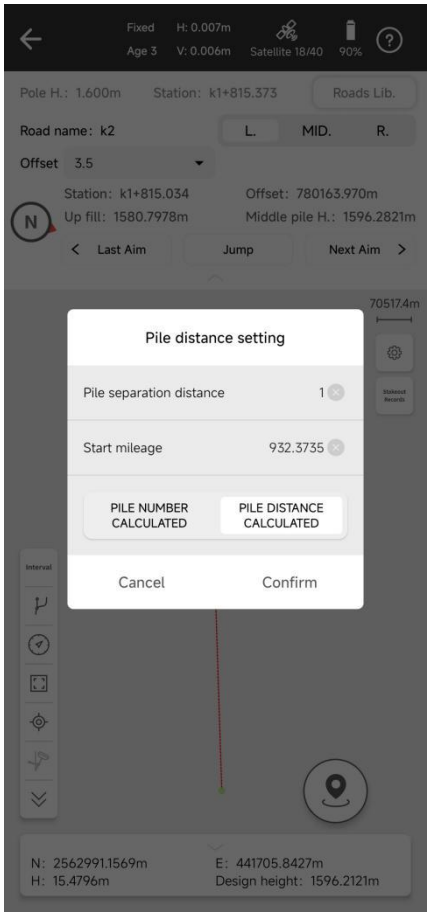


Figure 5.6-26

5.7 Staking to Line

Staking to line is a type of line construction staking, are based on the same road data for staking, and the difference between the middle or side staking is very small, when you arrive at the line needs to be sampled, click the collection and positioning icon to store the staking data, click the 【Stakeout Record】, you can view the stakeout record points stored.

5.8 Common Side Staking

As shown in Figure 5.6-27, after selecting the line in the road library, start the side staking, when the left side of the road slope, select 【L.S】, when the right side of the road, select 【R.S】, the graphical interface of the placement will display the current position and the current slope position relationship. The graphical interface

will display the curret position and the current matching slope position relationship. The data of the staking point is stored in the staking record for easy viewing.

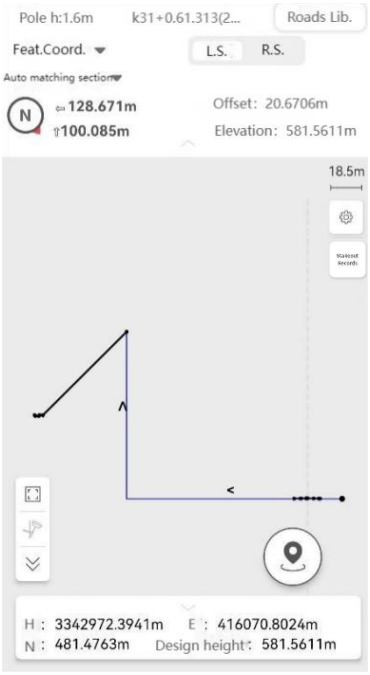


Figure5.6-27

5.9 Section survey

Section survey is to collect the topographic features within a certain range of a line.

After selecting a line in the 【Road Library】, section survey will be started, and the section spacing can be set in this page, as shown in Figure 5.6-28; for the cross-section to collect data within a wide range, it is set in the left and right distance is set in left and right offsetting distances, as shown in Figure 5.6-29 and Figure 5.6-30.

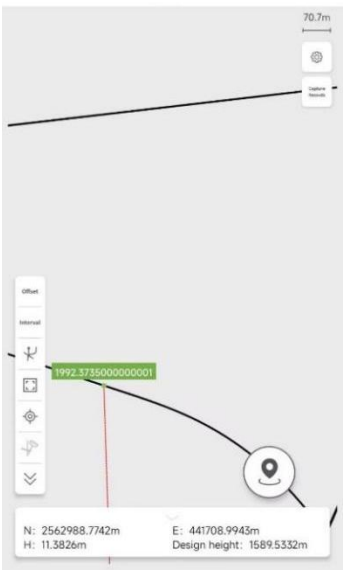


Figure 5.6.28

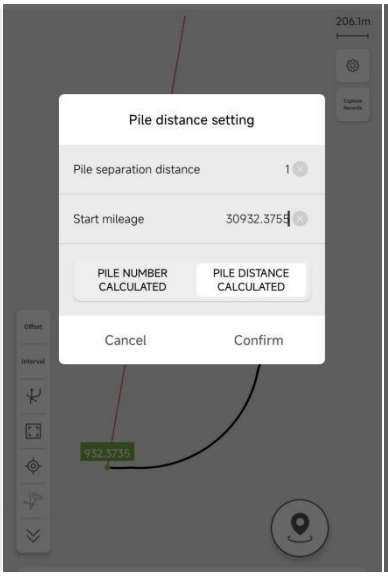


Figure 5.6-29

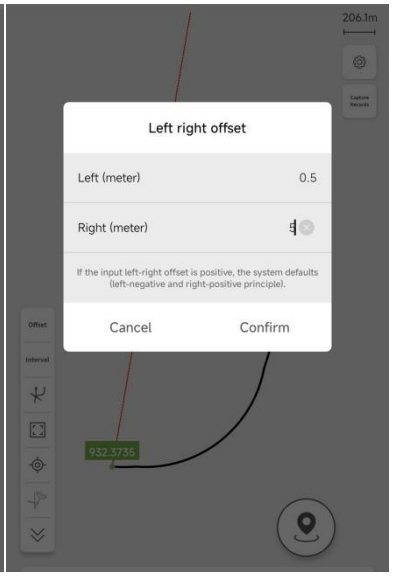


Figure 5.6-30

6 Me

6.1 Coordinate converter

Click 【Me】-> 【Coordinate Converter】, in the 【Coordinate Converter】 interface, it is divided into two parts: source coordinates and target coordinates. In the source coordinates, you can input coordinates under three different coordinate systems: BLH, XYZ and NEh. By clicking, you can locate the current point and input coordinates automatically; by clicking, you can click the point that needs to be converted into coordinates from the coordinate point library; by clicking 【Filtering】, you can filter the points by point type, collection time and keywords; by selecting the point you want to view and clicking 【Detail】, you can view the detailed positioning information of the point; by selecting the point that needs to be converted, and clicking 【Apply】, you will be returned to the 【Coordinate Converter】 interface. DiMap will automatically calculate the coordinates of the point in the target coordinate system. In the target coordinates, select the coordinates of the point under the required coordinate system, click 【Save】, enter the 【Add Point】 interface, enter the point name, the coordinate type is determined by the selected target coordinate system, select the point type, enter the code and remarks, click 【Confirm】, then it will be saved successfully.

Input format tips: such as latitude and longitude: 12°3’45.6”, the input format is: 12.03456. The rest of the source coordinate types are input in the same way as above.

6.2 Perimeter and area

Click 【Me】-> 【Perimeter and area】, in 【Perimeter and area】, it is divided into 【Selected Point Calculated】 and 【Measure Calculate】.

In 【Selected Point Calculated】, click [Import from Point Library】, enter 【Coordinate Point Library】, select the required points and click 【Apply】 to carry

out the perimeter area calculation (at least three points are selected), and then it will return to the interface of 【Perimeter and area】, at the same time, 【Graphic Preview】 will show the points and areas, and the results of the calculation of the table/oblique area, perimeter, projected area, and hectare will be shown at the bottom. At the bottom of this interface is a list of calculation points, which can be sorted by dragging by long-pressing the selected point, and the point can be deleted by left-sliding the selected point.

Click 【Measurement Calculation】 and click 【Settings】 to modify the parameter settings for fragmentation measurement. Return to the 【Measure Calculate】 interface, input the antenna height and click the Measurement button, the current point coordinates will be collected automatically. If you need to use inertial guide, please turn on 【INS】. The graph enclosed by the collected points will be displayed in 【Graph Preview】, and the table/oblique area, perimeter, projected area, hectare, and NEh coordinate values will appear at the bottom. In the bottom 【List of calculation points】, you can sort the points by dragging them by long-pressing the selected point, and you can delete the point by left-sliding the selected point.

6.3 Calculator

Click 【Me】-> 【Calculator】， numerical calculations can be performed.

Tip: Angle format: degrees. Minutes and seconds, 12°3′45.6″ input 12.03456, between the angle can not be added or subtracted from the calculation.

6.4 Geometric Calculation

Click 【Me】-> 【Geometry Calculation】, in the interface, it contains: Coordinate positive calculation, Coordinate inverse calculation, Point line calculation, Space distance, Two lines angle, Intersection calculation, Resection, Forward intersection, Offset point calculation, Equal point calculation, Extend point calculation, and Ver.Offset calculation.

(1) Coordinate positive calculation:

Description： The coordinates of start point A and end point B are known, ∠A=α, AP=L1,find the coordinates of point P.

Operation method: input the length of line segment L1 (m) and angle α (degree. Minutes and seconds), set the starting point can directly locate the current point or selected from the coordinate point library. Click 【Calculate】, you can get the result of coordinate calculation, click 【Save】 to save the calculated point result.

(2) Coordinate inverse calculation:

Description: known point A and B coordinates, find the azimuth angle α of AB two points, AB plane distance, AB space distance, AB two points of elevation difference, slope ratio slope angle.

Operation method: set the start point and end point coordinates, you can directly locate the current point or select it from the coordinate point library. Click 【Calculate】, you can get the slope distance, flat distance, azimuth, vertical angle, slope ratio, horizontal ratio.

(3) Point line calculation:

Description: The coordinates of start point A, end point B and offset point C are known, and point P is the pendant, find the start distance AC, end point distance BC, start pendant distance AP, end point pendant distance BP, offset distance CP, angle of deviation α and angle of inflection β.

Operation method: set the coordinates of start point, end point and offset point, you can locate the current point directly or select it from the coordinate point library. Click 【Calculate】, you can get AC, BC, AP, BP, CP, α, β.

(4) Space distance:

Description： The latitude and longitude coordinates of the starting point A and ending point B are known, and the spatial distance between the two points AB is sought.

Operation method: set the starting point and end point, you can directly locate the current point or select from the coordinate point library. Click 【Calculate】, you can get the spatial distance between the two points.

(5) Two lines angle:

Description: The coordinates of coordinate points O, A and B are known, and the angle ∠AOB is sought.

Operation method: set the coordinates of the three coordinate points, you can directly locate the current point or select from the coordinate point library. Click 【Calculate】 to get the angle of clockwise and counterclockwise rotation.

(6) Intersection calculation:

Description: Know the coordinates of the starting point A and ending point B of the line AB, the coordinates of the starting point C and ending point D of the line CD, and find the coordinates of the intersection point P of the line AB and CD.

Operation method: set the coordinates of A, B, C, D, you can directly locate the current point or select from the coordinate point library. Click 【Calculate】 to get the coordinates of the intersection point and the angle. Click 【Save】 to save the coordinates and angle values.

(7) Resection:

Description: The coordinates of triangle ABP points A and B are known, AP = L1, BP = L2, find the coordinates of P point.

Operation: Enter the length of the line segment L1, L2, set the coordinates of the coordinate points A and B. You can directly locate the current point or select it from the coordinate point library. Click 【Calculate】 to get the unknown point coordinates, and the result can be saved.

(8) Forward intersection:

Description： The coordinates of point A and point B of triangle ABP are known, ∠A=α, ∠B=β, find the coordinates of point P.

Operation method: input α, β, A, B coordinates. Click 【Calculate】 to get the coordinates of the unknown point, and the result can be saved.

(9) Offset point calculation:

Description： The coordinates of the starting point A and ending point B of the line AB are known, and the coordinates C of the specified mileage L1 and deviation L2 of the line are sought.

Method of operation: Set the coordinates of A and B, enter the mileage and deviation values in the parameter settings, and click 【Calculate】 to get the coordinates of the deviation point.

(10) Equal point calculation:

Description: The coordinates of the start point A and end point B of the line AB are known, and the coordinates of the line segment divided into n equal parts are sought.

Method of operation: set the starting point, end point NEh coordinates, enter the number of segments between the two points in the parameter settings, click 【Calculation】 to get the coordinates of each segment point. The result can be saved.

(11) Extend point calculation:

Description: straight line AB extension line has a point O, known point A, B coordinates, OB = L1, O point coordinates.

Method of operation: set A, B coordinates, parameter settings, enter the value of L1. Click 【Calculate】 to get the offset point coordinates. The result can be saved.

(12) Ver.Offset calculation:

Description: The coordinates of points A and B on the known straight line AB and the coordinates of a point C outside the line, find the distance L of the pendant of point C from the straight line AB, and the coordinates of the pendant point P.

Operation method: set the coordinates of A, B, C, click 【Calculate】 to get the vertical distance and the coordinates of the pendant point. The result can be saved.

6.5 Slow bending calculation

Click 【Me】-> 【Slow bending calculation】, in 【Slow bending calculation】, it is divided into three parts: Slow Para.(A), Starting R.(R1), and Ending R.(R2).

(1) Slow Para.(A):

Description: Calculate the easing curve parameter A with known easing curve length L, starting radius R1 and ending radius R2.

Operation method: In the known data, input curve length L, starting point radius R1 and ending point radius R2 (if you want to input ∞, please click the corresponding button), and click 【Calculate】 to get the easing curve parameter A.

(2) Starting R.(R1).

Description： Knowing the length of the easing curve L, the end radius R2 and the parameter A of the easing curve, calculate the starting point radius R1.

Operation method: Input the known easing curve length L, end radius R2 and easing curve parameter A, and then click 【Calculate】 to calculate the starting point radius R1.

(3) Ending R.(R2).

Description： Know the length of the easing curve L, the starting point radius R1 and the easing curve parameter A, and calculate the end point radius R2.

Operation method: Input the known easing curve length L, starting point radius R1 and easing curve parameter A, and then click 【Calculate】 to calculate the end point radius R2.

6.6 Compass Correction

Click 【Me】-> 【Compass Correction】 to view the compass and enter the true north angle value to correct it.