GNSS7

S6 Plus
GNSS Receiver
User Guide

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Trademark notice

FCC Notice

S6 Plus comply with the limits for a Class B digital device, pursuant to the Part 15 of the FCC rules when it is used in the Portable Mode.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference;
(2) It must accept any interference received, including interference that may cause undesired operation.

Copyright Notice

Technical Assistance

If you have any question and can't find the answer in this manual, please contact your local dealer from which you purchased the S6 Plus. Alternatively, request technical support from technical support email: *support@comnavtech.com*. Your feedback about this Guide will help us to improve it with future revisions.

Safety Information

Before using the receiver, please make sure that you have read and understood this User Guide, as well as the safety requirements.

- Connect your devices strictly based on this User Guide
- Install the GNSS receiver in a location that minimizes vibration and moisture
- Avoid falling to ground, or colliding with other items

- Keep a sound ventilation environment
- Change the cable if damaged

Related Regulations

The receiver contains integral Bluetooth® wireless technology. Regulations regarding the use of the datalink vary greatly from country to country. In some countries, the unit can be used without obtaining an end-user license. But in some countries the administrative permissions are required. For license information, please consult your local dealer.

Use and Care

The receiver can withstand the rough treatment that typically occurs in the field. However, the receiver is high-precision electronic equipment and should be treated with reasonable care.

Warning and Caution

An absence of specific alerts does not mean that there are no safety risks involved. A Warning or Caution information is intended to minimize the risk of personal injury and/or damage to the equipment.

WARNING- A Warning alerts you to a potential risk of serious injury to your person and/or damage to the equipment, because of improper operations or wrong settings of the equipment.
CAUTION- A Caution alerts you to a possible risk of damage to the equipment and/or data loss.

Warranty Notice

GNSS7 Technology does not warranty devices damage because of force majeure (lighting, high voltage or collision).

GNSS7 Technology does not warranty the disassembled devices.

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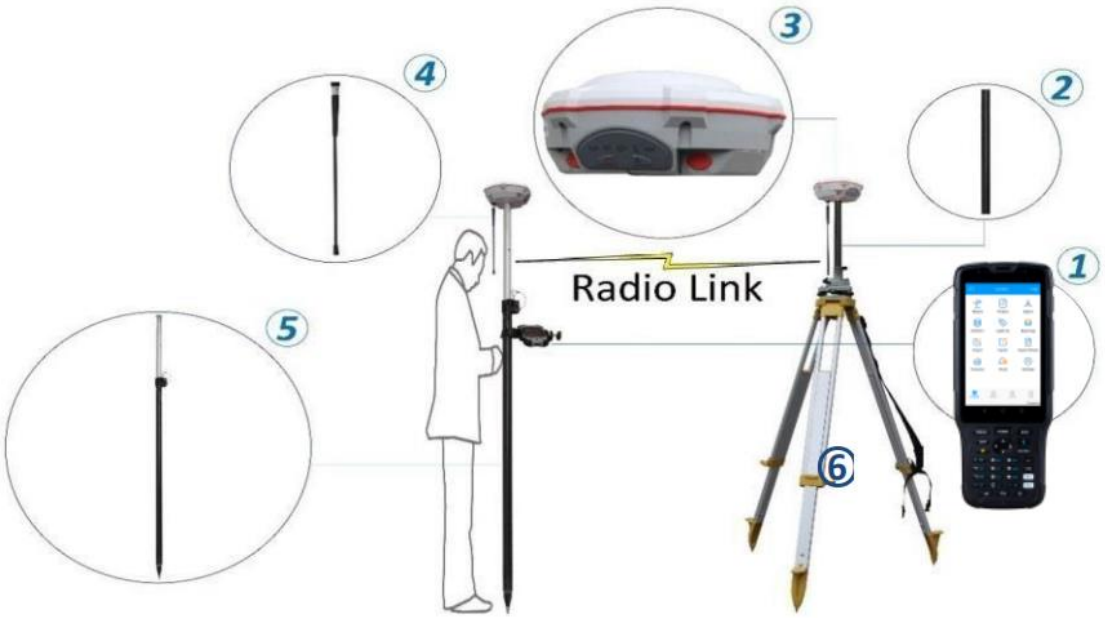

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1 A controller with software installed
2 An extension bar
3 Two units of S6 Plus GNSS receiver
4 Two whip antennas
5 A range pole with bracket
6 Tripod and tribrach

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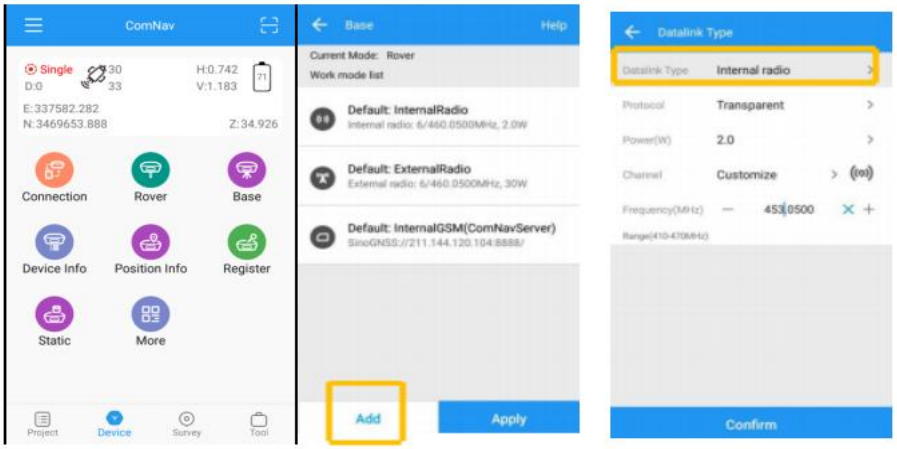
5.5.1 Start Base Station by 7 Star 22

Firstly, build Bluetooth connection between the S6 Plus receiver and your controller as shown in Chapter 5.4. 22

Secondly, modify parameters including correction format, antenna type and communication protocols: 22

- Click Device-> Base ->Add, select Internal radio. 22



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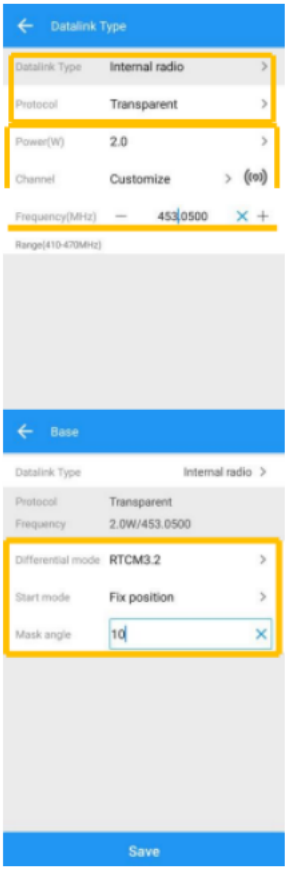
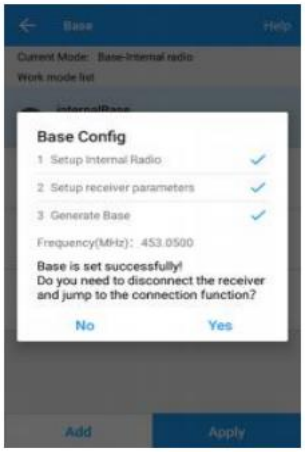
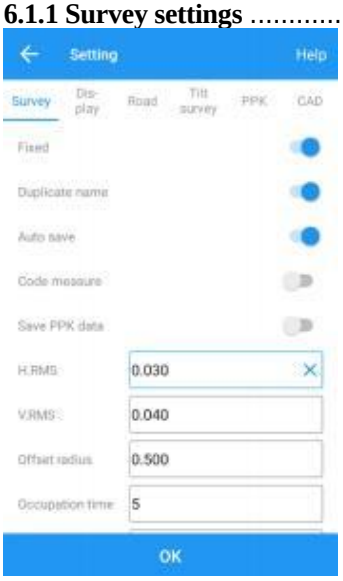


- Protocol and channel: Set protocol and frequency for the base;

- Start mode: Fix position means you have a known coordinate for base, or get a point from GNSS;
- Differential mode: Support RTCM32, RTCM32(MSM5), RTD, CMR, CMR+(GPS only)

- Library choose: Choose a known point from Element;
- Receive: Receive a point from GNSS;





1 Introduction

The S6 Plus User Guide is aimed to help you get familiar with the S6 Plus and start your project effectively. We highly recommend you to read this manual before surveying, even you have used other Global Positioning System (GPS) receivers before.

1.1 About the receiver

With SinoGNSS® Quantum™ algorithm, S6 Plus can be applied in RTK mode with all GNSS constellations. S6 Plus has ultra-small size and strong anti-interference ability to make it possible to work even in harsh environments. It is the ideal RTK/GNSS product for surveyors.

1.2 Receiver features

The S6 Plus key features:

- Ultra small and super light
  - Size: 13cm × 13cm × 10cm
  - Weight: 790g
- 1598 channels of simultaneously tracked satellite signals
- Increased measurement traceability with ® Quantum™ algorithm technology
- Cable-free Bluetooth wireless technology
- 2LEDs (indicating Satellites Tracking, RTK Corrections Data)
- IP67 waterproof
- Full base/rover interoperability
- Integrated receiving & transmitting radio
- Integrated IMU sensor
- Support NFC Fast connection
- Long distance range radio module
- Support long baseline E-RTK™ (Beidou B3 signal is included in RTK calculate engine)

1.3 S6 Plus parts list

This section provides overall S6 Plus parts list, including basic supplies and customized kits based on your requirements.

1.3.1 Basic Supply kit

The S6 Plus Basic Supply kit contains one receivers and related accessories.

Item	Picture
1* Kits S6 Plus	
1*GNSS Connector	
1*Charger adapter (EU/USA/UK)	
1*USB—Type-C cable	
1* Whip Antenna (UHF)	
1*2m-Range Pole with yellow bag	

C100 Controller	
Controller Battery, Charger and Cable	
Controller Bracket	

Optional accessories:

Double Bubbles Tribrach with High Adapter	
1* 30cm Extension bar	

2 Setting up the receiver

This chapter provides general information on environmental requirements, setup, power supply and connection of the S6 Plus.

2.1 Environmental requirements

To keep the receiver with a reliable performance, it is better to use the receiver in safe environmental conditions:

- Operating temperature: -40°C to +65°C(-40 ° F to 149 ° F)
- Storage temperature: -40°C to +85°C(-40 ° F to 185 ° F)
- Out of corrosive fluids and gases
- With a clear view of sky

2.3 Front panel

Receiver front panel contains 2 indicator LEDs, Power button. The indicator LEDs show the status of differential, satellite tracking and battery power. For detailed information, see *chapter 3.3*.

2.4 Lower housing

Receiver lower housing contains, UHF radio antenna connector and a threaded insert.

2.5 Power supply

S6 Plus supports internal batteries and external power input.

2.5.1 Internal batteries

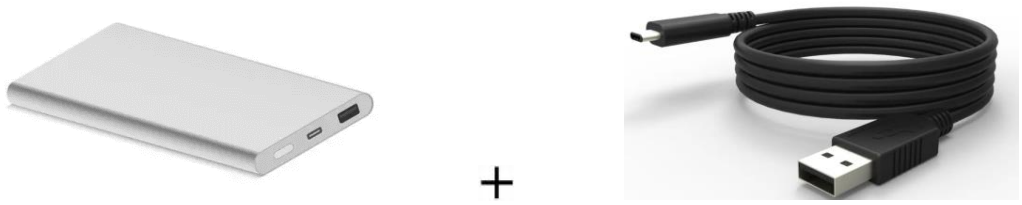
The receiver is equipped with Lithium-ion batteries, which can not be disassembled at will. The S6 Plus adopts the internal battery design that provides you an effective survey workflow. The internal batteries typically provide about 20-hour operating time as a rover. However, this operating time varies based on environmental conditions.

● Battery Safety Charge and use the battery only in strict accordance with the instructions below: – Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid. – Do not expose the battery to fire, high temperature, or direct sunlight. – Do not immerse the battery in water. – Do not use or store the battery inside a vehicle during hot weather. – Do not drop or puncture the battery. – Do not open the battery or short-circuit its contacts.
● Charging the Lithium-ion Battery Please charge the internal battery via type-c cable
● Storage of the Lithium-ion Battery – Keep batteries in dry conditions.
● Dispose of the Lithium-ion Battery – Discharge a Lithium-ion battery before dispose of it. – Dispose of batteries is an environmentally sensitive manner, and adhere to any local and national regulations concerning battery disposing or recycling.

WARNING – Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage.

2.5.2 External Power Supply

The receiver is connected to an external power supply through a Type-C cable, and make sure that use an external power supply with the correct voltage of S6 Plus, such as a 6-9V power pack. Over-voltage function cannot protect your S6 Plus if reverse connection.



Tip: The power consumption will be increasing if the base station transmits correction data through internal UHF in the RTK mode; therefore, we strongly suggest using external power (6-28 volt DC) for the base station.

2.5.3 Charge Battery via S6 Plus

The battery of the receiver cannot be disassembled at will. However, the Type-c interface makes its charging mode more flexible. S6 Plus supports adaptive charger for fast charging protocol. The standard

voltage is 9V. The portable mobile power supply can charge and power it anytime and anywhere.

1. Power off S6 Plus receiver and enter charging mode;
2. Connect S6 Plus receiver to Adaptive charger with type-c cable;
3. The LED light on the front panel of the receiver will flash according to the battery percentage, and the green light will be on when it is fully charged.

2.6 Pole-mounted setup

To mount the receiver on a range pole as the figure shown below:

- Thread the receiver onto the range pole
- Mount the controller bracket to the pole
- Install the controller into the bracket

Tip: Do not tightly clamp the controller on the Range Pole.

3 General Operation

This chapter introduces all controls for the general operation, including button functions and all LED behaviors on the front panel.

3.1 Button functions

There is a power button on the front panel.
Press the power button for about 1 second to turn on the receiver;
To turn off the receiver, long press the button for 3-4 seconds until all LEDs off.

3.2 LED behavior

The LEDs on the front panel indicate receiver working status. Generally, a lit or slowly flashing indicates normal operation, and an unlit LED indicates that no operation is occurring. The following table define each possible LED state:

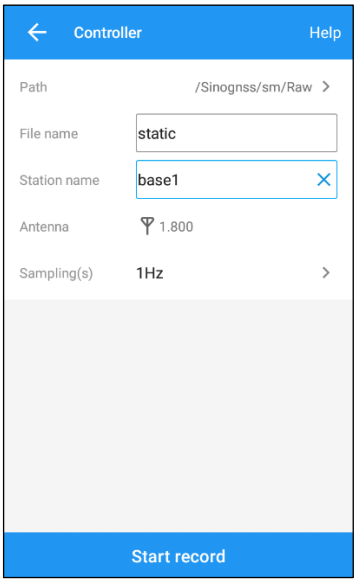
LEDs Description	States	
Power	Green	Battery is above 30%
	Yellow	Battery is below 30%
Differential Data	Flashes once per second	Receiving/transmitting differential data
Satellite Tracking	Fast flashing/ Flashes 1 time every 5 seconds	No satellite received
	Flashes N times every 5 seconds	Received N satellite signals
	Flashes according to the selected sample interval	1) Sample interval varies from 20Hz to 60s. 2) Flashing 1/s simultaneously with differential light if internal memory is run off

4 Static survey

Static survey is commonly applied for control points, which requires millimeter accuracy. After connecting with Bluetooth, you can record static data to your controller or receiver directly.

- The static data in controller

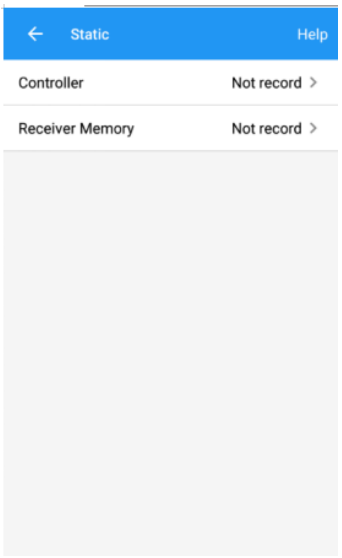
For record static data in controller, you can configure it and change sampling interval via GNSS Suvery. It's sample frequency supports 0.1s, 0.2s, 0.5s, 1s, 2s, 5s, 10s, 15s, 30s, 60s.

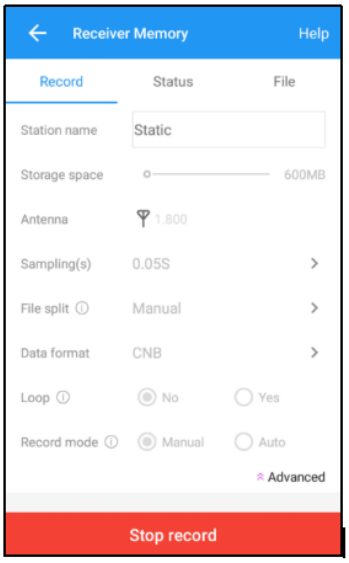


- You can enter File name, Station name, Antenna height, Sampling -> Click ***Start record***, the recorded raw data will be saved in the corresponding path.
- The raw data is in .cnb format, you can transfer to RINXE format through CRU software.

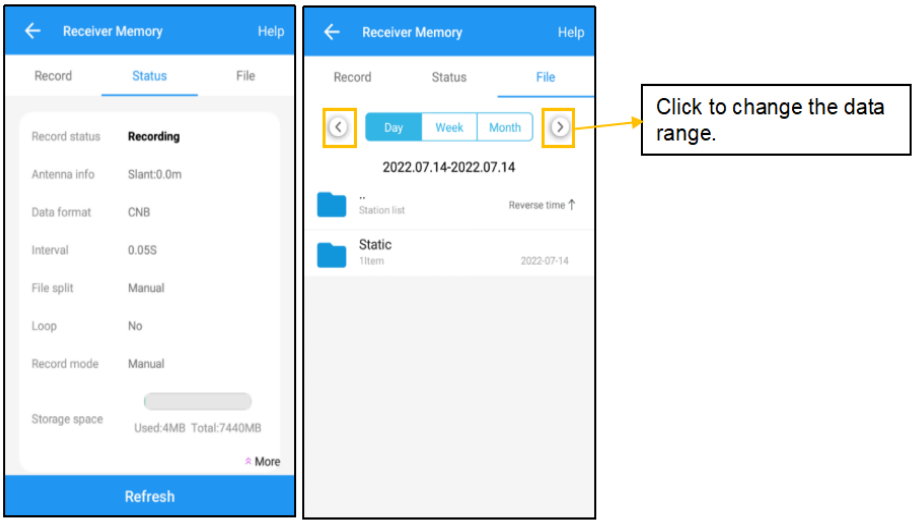
- The static data in receiver

You can record static data to receiver memory by GNSS Survey software, this function is available for S6 Plus GNSS receiver.



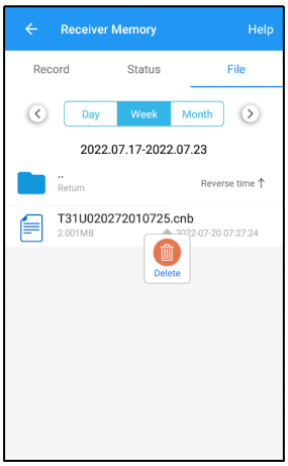


Station name: The static will be stored in this folder,
Record space: Default is 600 MB, this is set record space for the current static file.
Antenna: Set the antenna height and measure type, it will be recorded in the static file.
Sample interval: Choose sample frequency, supports 0.05s, 0.1s, 0.2s, 0.5s, 1s, 2s, 5s, 15s, 30s, 60s.
File split: Choose file split, support every 5\10\15\20\30 minutes or 1\2\4\24 hours to save a file and file split manually, default is manual. If you select 24 as file split, it will create two data file when it occurs to 24 o'clock (UTC Time). One is from start time to 24 o'clock, another is from 0 o'clock to end time.
Data format: Support CNB\ Rinex3.02\Rinex2.10
Loop: When storage is full, Yes means delete earliest data and store continually, No means stop recording
Mode: Support manually and automatically recording mode.



In ***Status*** interface, you can check the static record status, and static settings.
In ***File*** interface, you can check the static files by day/week/month. You will find the folder, and the static data is in the specific folder. Long press the static data, choose to

delete the file.



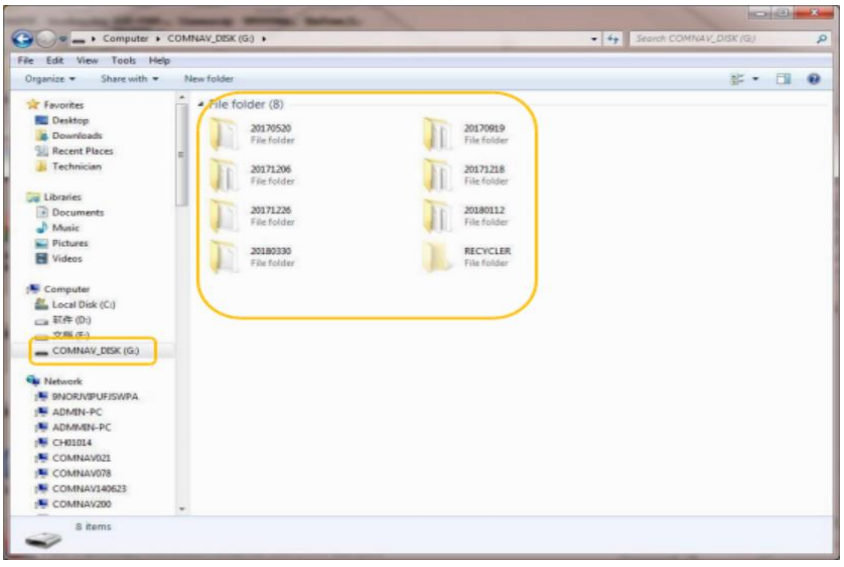
4.1 Static Data Collection

Static survey is mainly used for the control survey. To reach millimeter accuracy, follow as below:

- At least 3 GNSS receivers are required to form a stable triangulation network.
- It is better to set Data Log Session as manual on the known point.
- Power off the receiver before moving to other observation site.
- To quickly post-process static observation raw data, write down the station name, receiver SN, antenna height, start and end time for each observation site.

4.2 Static Data Download

The raw observation data is saved in internal memory of S6 Plus receiver, when connect with PC via Type-C cable, the S6 Plus receiver can work as a USB Flash Disk, which means you can copy or cut static data to PC directly.



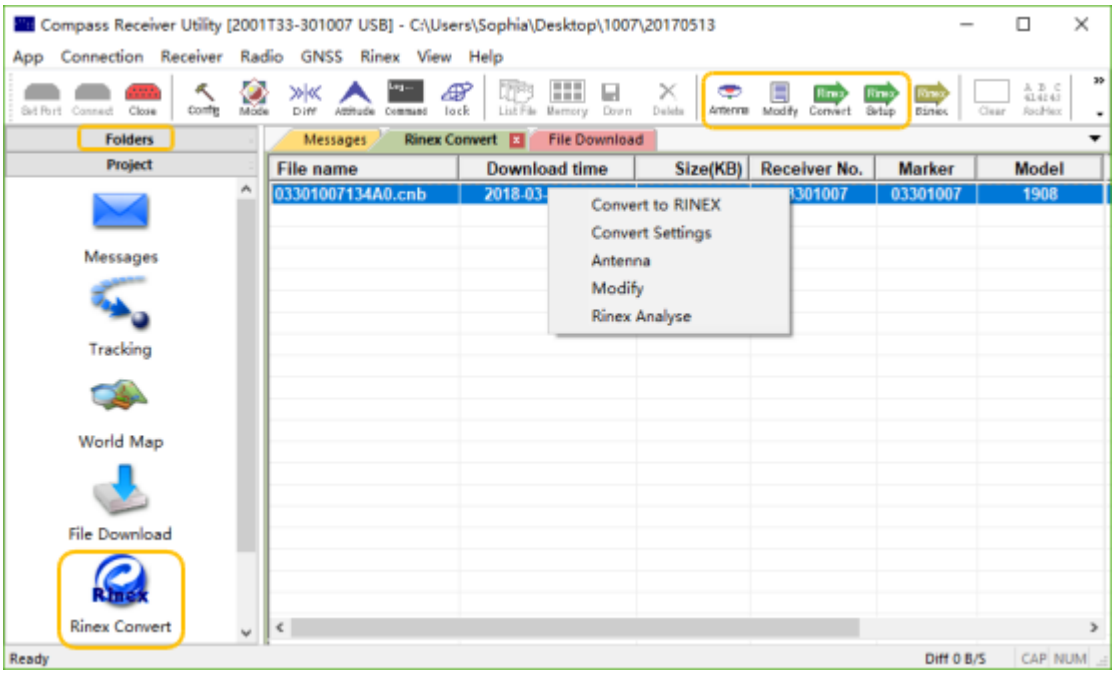
Tip1: Default memory for S6 Plus receiver is 8GB.

Tip2: The receiver will stop recording raw data if the internal memory runs out.

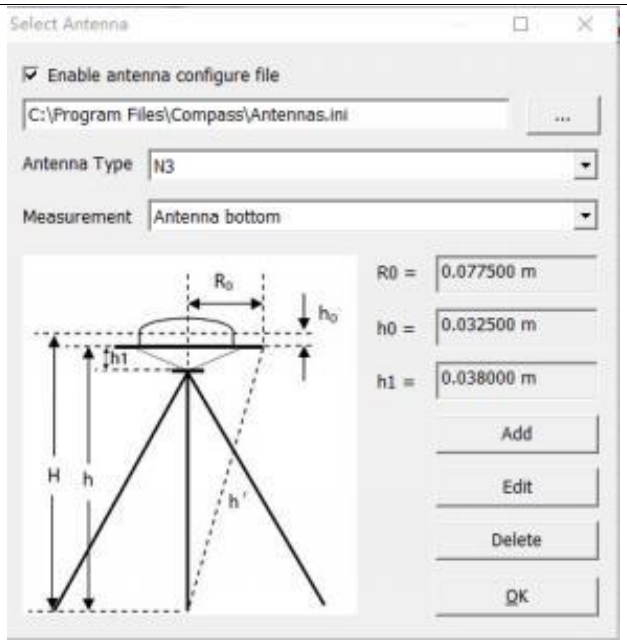
4.3 RINEX Convert

After copy raw observation data to PC, you can convert the data from ComNav binary format (*.cnb) to RINEX in CRU software.

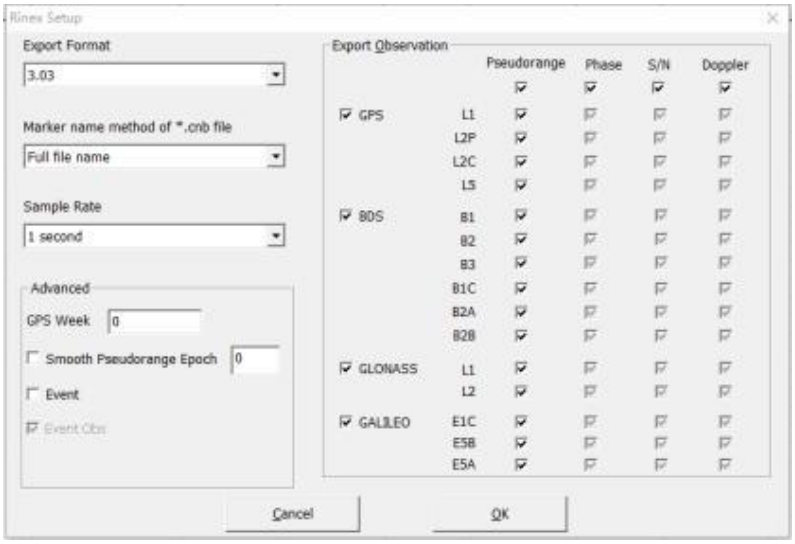
1. Start CRU software;
2. Click ***Folders*** and select the path of your CNB data;
3. Click ***Rinex Convert*** to check all raw data on main window. Right click on the file to modify antenna, Convert Settings and Convert to RENIX, or use fast icon in standard bar.



- Click Antenna to select the ***Antenna Type*** and ***Measurement***. If you cannot find S6 Plus antenna, 1) input the value of R0 (horizontal offset from measurement mark to phase center), h0 (vertical offset from measurement mark to phase center) and h1 (vertical offset from measurement mark to receiver bottom). R0 is 0.0650m, h0 is 0.0298m and h1 is 0.0481m respectively for S6 Plus; 2) or check **Enable antenna configure file** to select **Antennas.ini** file to select Antenna type again. You can also add, edit and delete antenna types based on your requirement.



● Click Rinex Setup to change ***Convert Settings***, mainly export format and export observation information.



Tip: In some Post Processing software, the BeiDou observations cannot be processed, you can uncheck the BeiDou B1,B2,B3 observations.

● Click Rinex Convert to ***Convert to RINEX***, the RINEX data will be save in the same path as raw observation data.

5 Real-Time Kinematic Survey (RTK)

This chapter introduces how to conduct RTK Survey with GNSS Survey Software, including software installation, start a new project, receiver connection and RTK working modes (CORS).

5.1 Installation of 7 Star

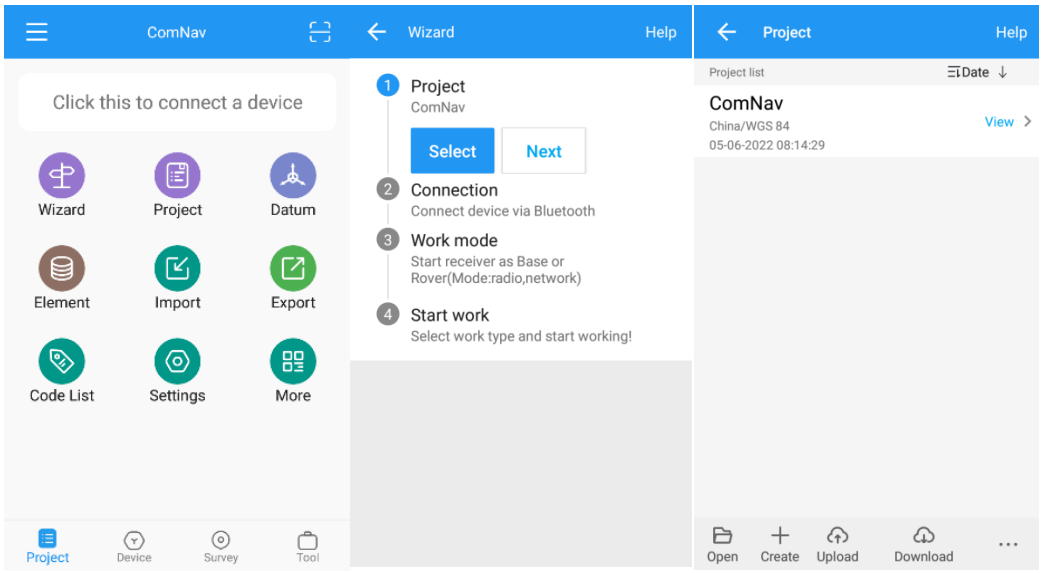
7 Star is available on Google play, you can download for free and install the software to controller C100.

5.2 Wizard function in 7 Star

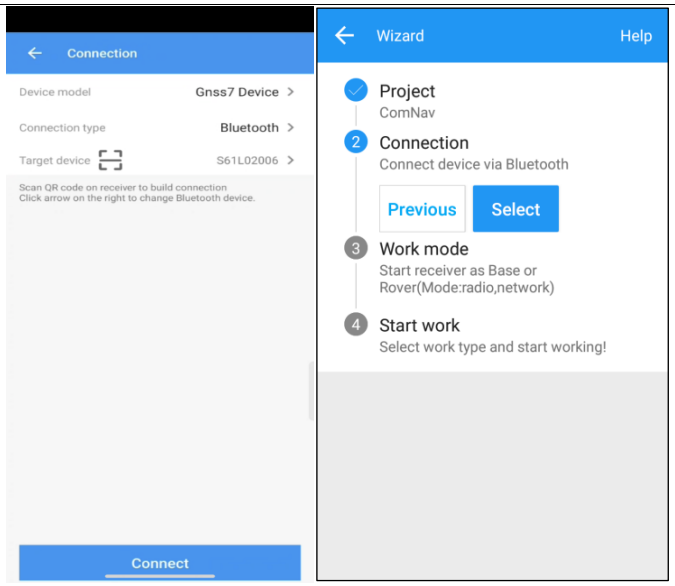
Follow the Wizard, you can quickly learn the general workflow of 7 Star, also you can quick start your survey by this function no matter you are experienced one or new user.

In Project menu, tap Wizard.

1. ***Project***: Click ***Select*** to go into Project interface to create or select a project. For detailed information, you can refer to chapter 5.3.

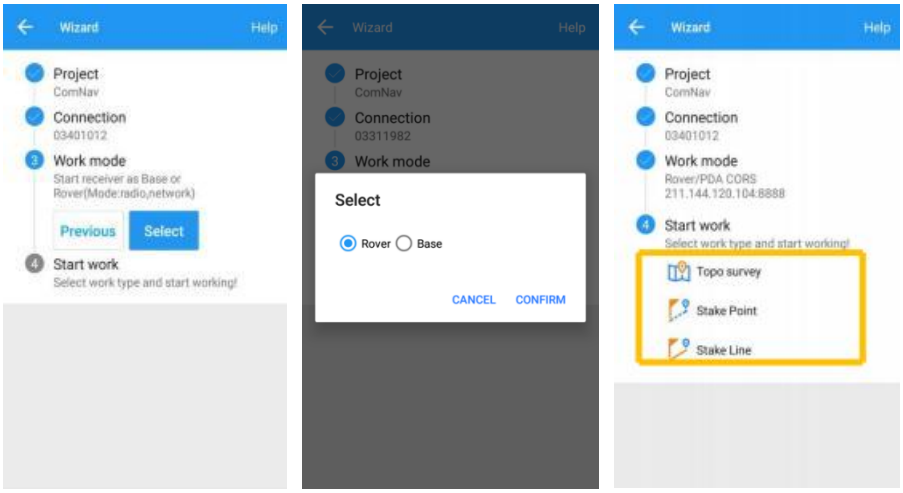


2. ***Connection***: Click ***Select*** to go into Bluetooth connection interface. For detailed information, you can refer to chapter 5.4.

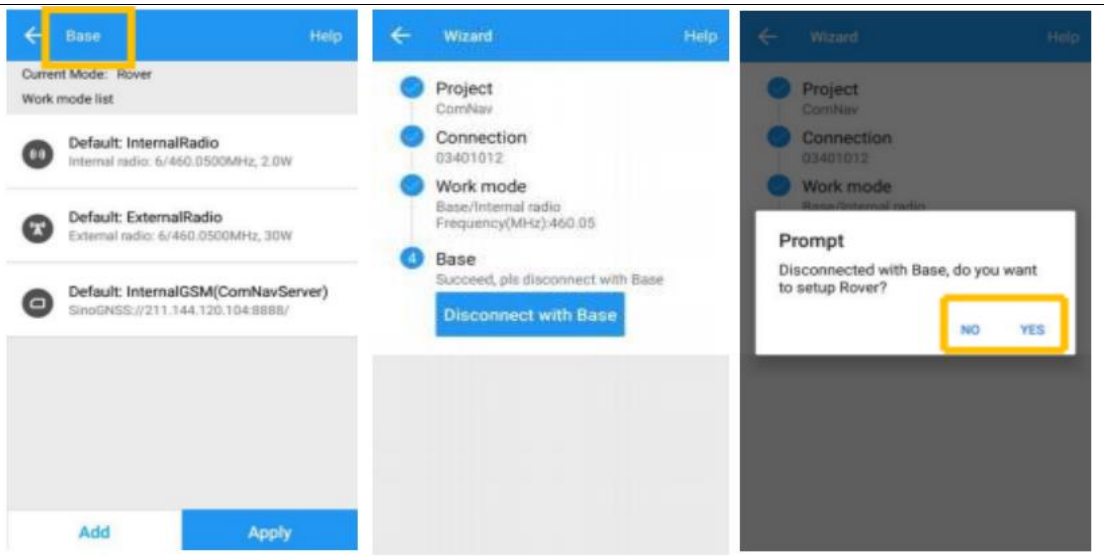


3. ***Work mode***: Click ***Select*** to go into QuickSetup interface to start your receiver as Base/Rover. For detailed information, you can refer from chapter 5.5.

If you start your receiver as Rover, then you can start work directly of topo survey or stakeout.

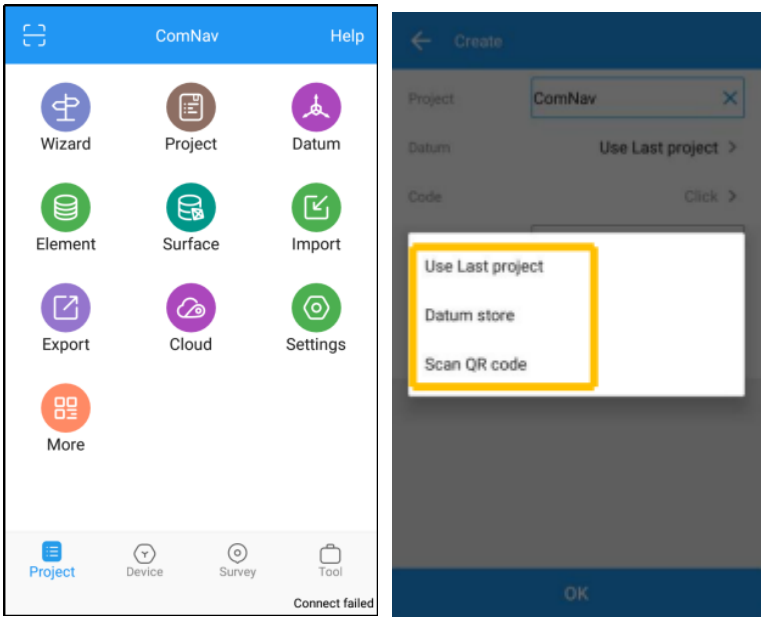


If you start your receiver as Base, after Disconnect with Base, there will be a Prompt.
YES: will guide you to start Rover in Wizard interface;
NO: will disconnect the base and exit Wizard.

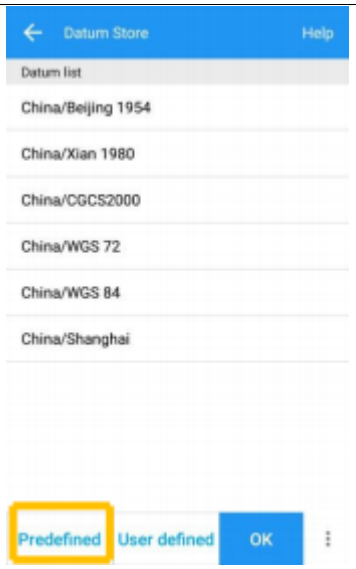


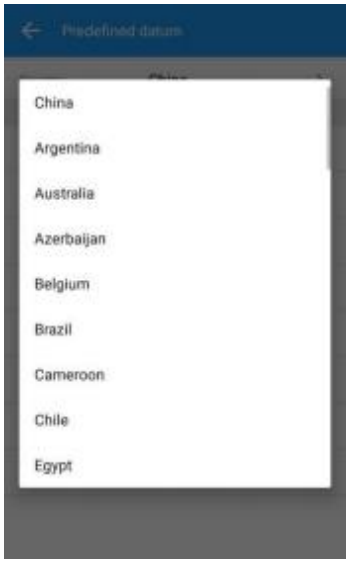
5.3 Start a New Project

Click ***Project***, you can use the same Datum with last project, choose a datum in store and scan QR code from other controller to add Datum, even sharing project with cloud.

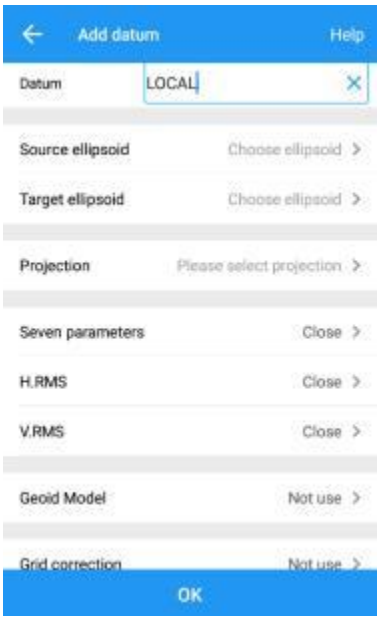


- Select a Predefined datum: You can select datum directly from the list. GNSS Survey currently has 49 countries datum and will add more afterwards.





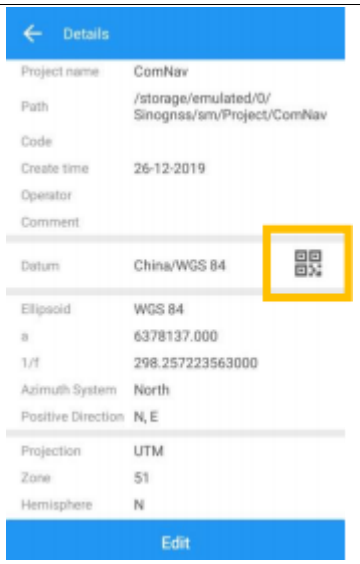
- Create a User defined datum: If you cannot find datum you want in the list, follow instructions below to add one: select Ellipsoid, Projection for your datum, and even seven parameters, geoid model based on your request.



*Tip1: if asked username and password for seven parameters, enter **admin** **admin***

*Tip2: For H.RMS and V.RMS, it will show if do **Site Calibration**.*

- Share Datum via QR code.
- After you build a project, press the project name, it will generate a QR code. Users can use the Scan function in the main interface to access the coordinate system.

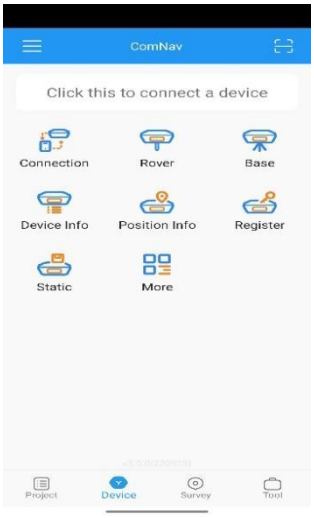


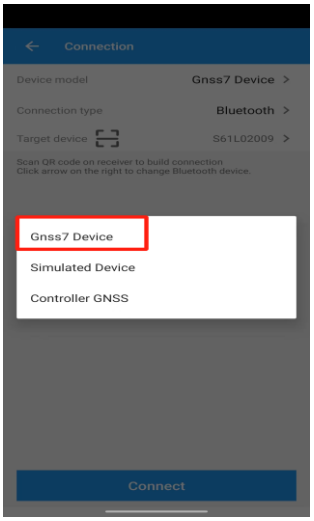
5.4 Bluetooth connection

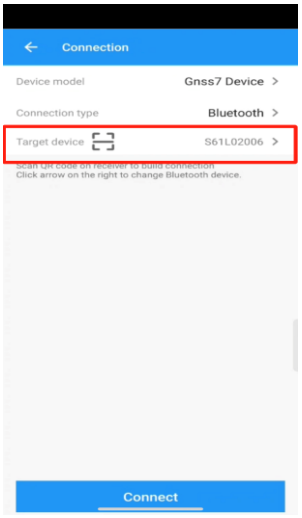
To connect GNSS Survey with S6 Plus, switch to ***Device*** interface, tap ***Connection*** to go into Bluetooth connection interface

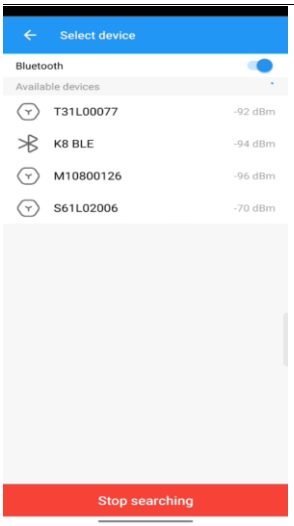
- Make sure device Bluetooth turned on;
- Click Find device—select SN of your S6 Plus —allow pair

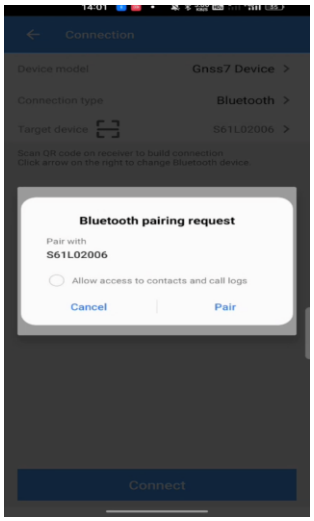
After connect GNSS7 receiver, you can check the device version in Device Info.



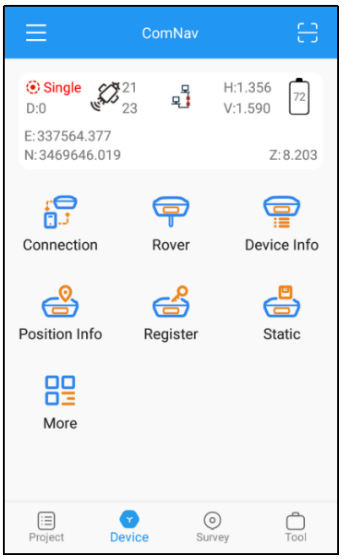








After connected successfully, the top will show the positioning status.

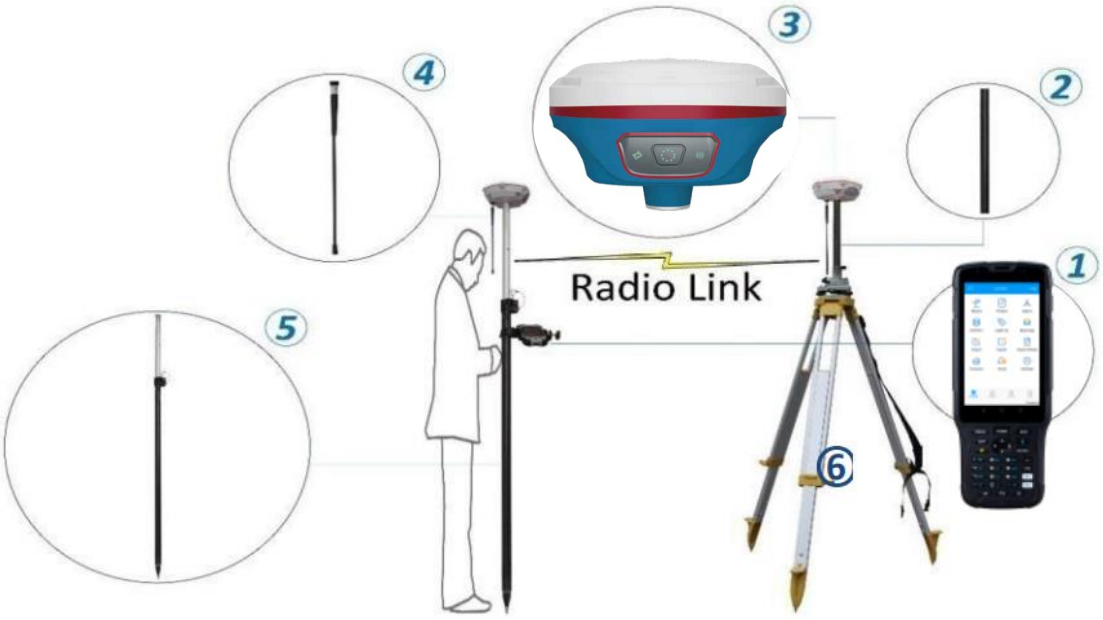


Tip: If you are failed to connect with receiver through GNSS Survey, you can just follow prompt

info to go into the device Bluetooth setting interface to make sure Bluetooth paired successfully. Sometimes you need restart the receiver or GNSS Survey Software.

5.5 Internal Radio Mode

S6 Plus GNSS receiver supports transmit & receive the correction data in internal radio mode. To conduct the RTK survey in internal radio mode, it requires:



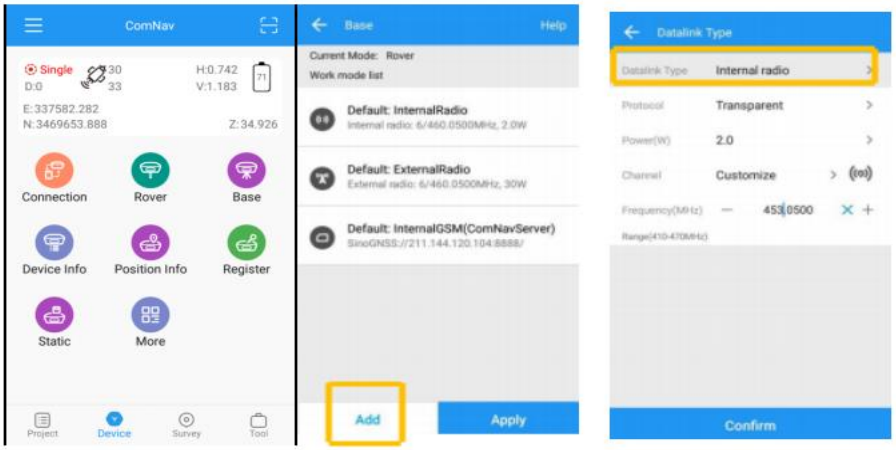
1 A controller with software installed
2 An extension bar
3 Two units of S6 Plus GNSS receiver
4 Two whip antennas
5 A range pole with bracket
6 Tripod and tribrach

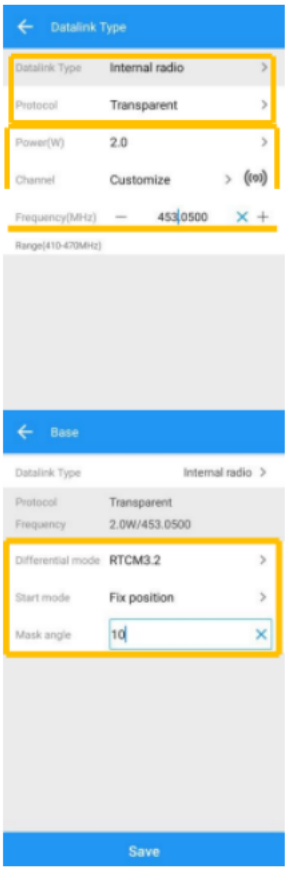
5.5.1 Start Base Station by 7 Star

Firstly, build Bluetooth connection between the S6 Plus receiver and your controller as shown in Chapter 5.4.

Secondly, modify parameters including correction format, antenna type and communication protocols:

- Click Device-> Base ->Add, select Internal radio.



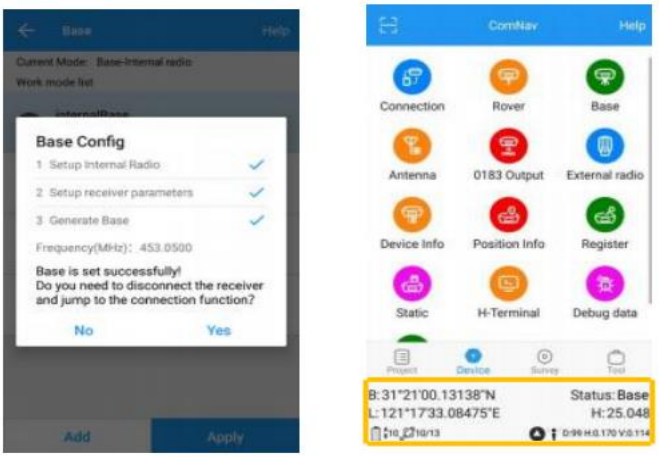


- Protocol and channel: Set protocol and frequency for the base;

- Start mode: Fix position means you have a known coordinate for base, or get a point from GNSS;
- Differential mode: Support RTCM32, RTCM32(MSM5), RTD, CMR, CMR+(GPS only)

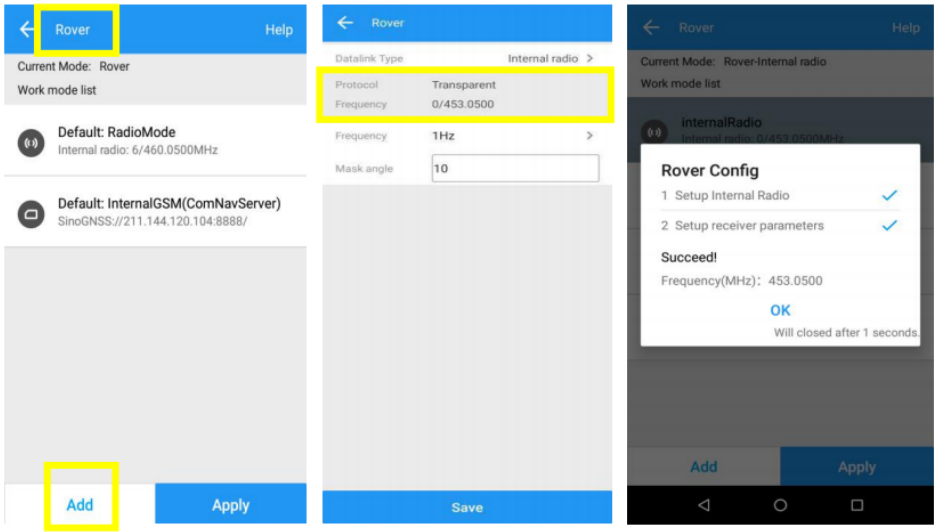
- Library choose: Choose a known point from Element;
- Receive: Receive a point from GNSS;

When start Base succeed, it will show as below in GNSS Survey software.



5.5.2 Start Rover Station by 7 Star

- Connect GNSS Survey with S6 Plus receiver via Bluetooth based on Chapter 5.4.
- Set same protocol and frequency with Base receiver.
- The current status on the bottom will change from Single to Fixed.



5.6 PDA CORS Mode

Without setting up your own base stations, the S6 Plus can receive correction data transmitted from continuously operating reference station via PDA's GPRS. To do RTK survey in PDA CORS mode, it requires:

○1 A S6 Plus receiver

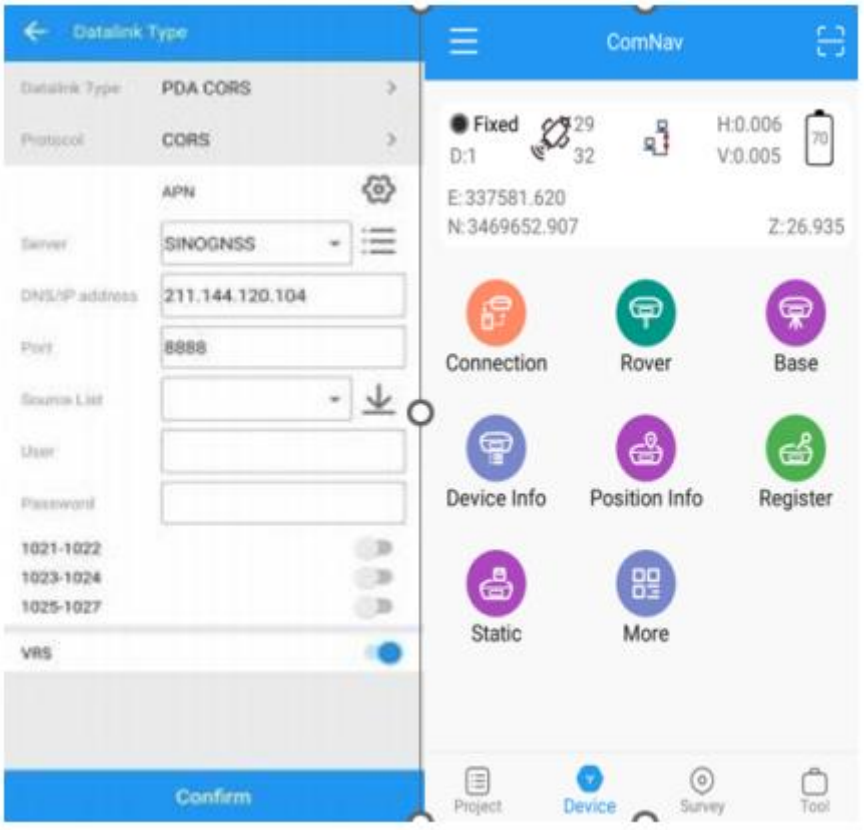
○2 A controller with SIM card and software

○3 A range pole with bracket

Configure the Rover as below:

● Make sure your controller can access to internet via SIM card or Wi-Fi, then run GNSS Survey Software.

- Build Bluetooth connection as shown in chapter 5.4. Click Device -> Rover -> PDA CORS.



- Enter CORS DNS/IP address and port -> Click Source List and select the proper source -> enter User and password.
- After Confirm succeed, the diff LED on receiver will flash, and software can get a fixed result.
- It also provides TCP protocol.

http://www.hw-group.com/products/HWg-Ares/HWg-Ares_GSM_APN_en.html#top

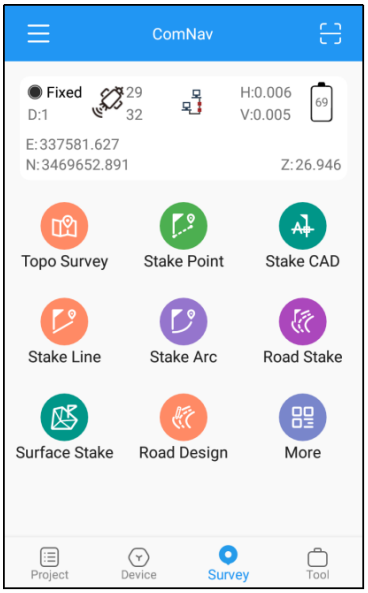
6 Basic Survey Functions

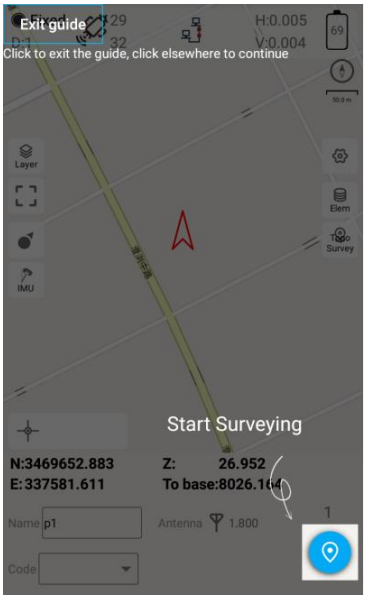
This section describes the basic survey functions of GNSS Survey, including point measurement, Topo survey, Auto survey, Area survey, Static, PPK, staking, site calibration, import and export measured points.

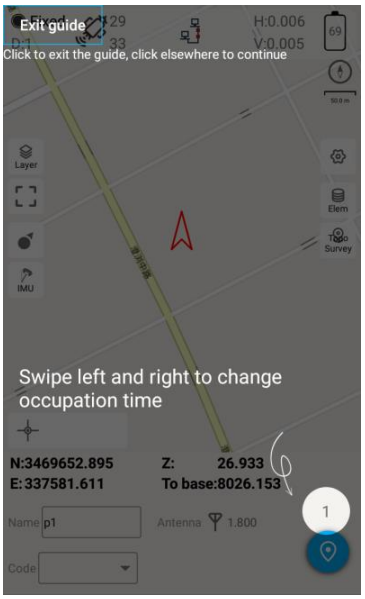
6.1 Topo survey

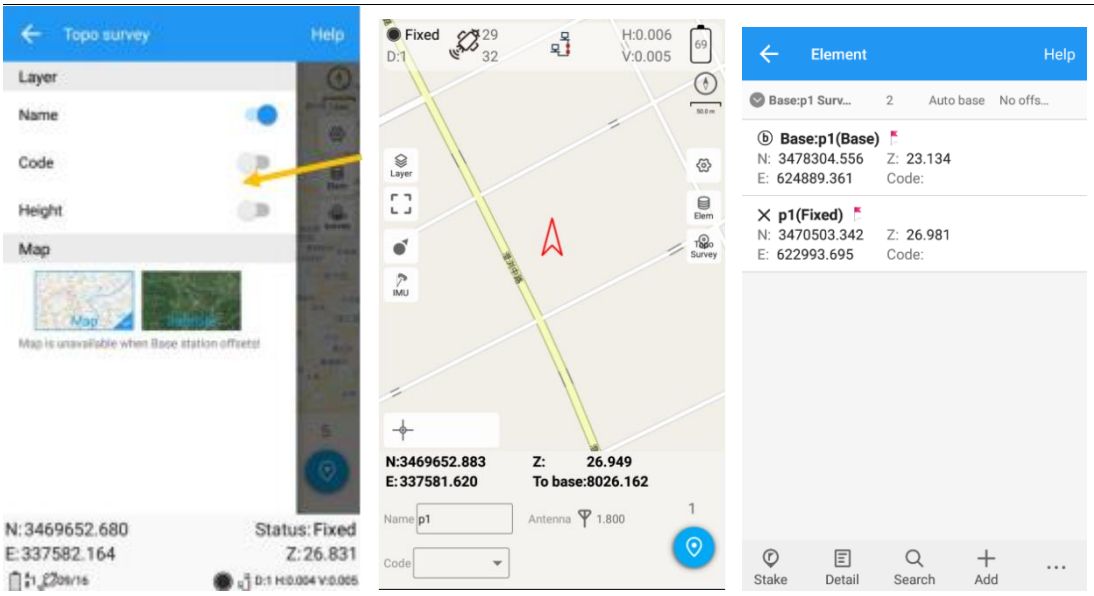
Click Topo Survey-> enter point name, ->click  to start or stop collecting data.

- You can quickly change antenna height in the survey interface.
- Tap Elem to check point coordinates.
- Tap Layer to show the layers you want display on map





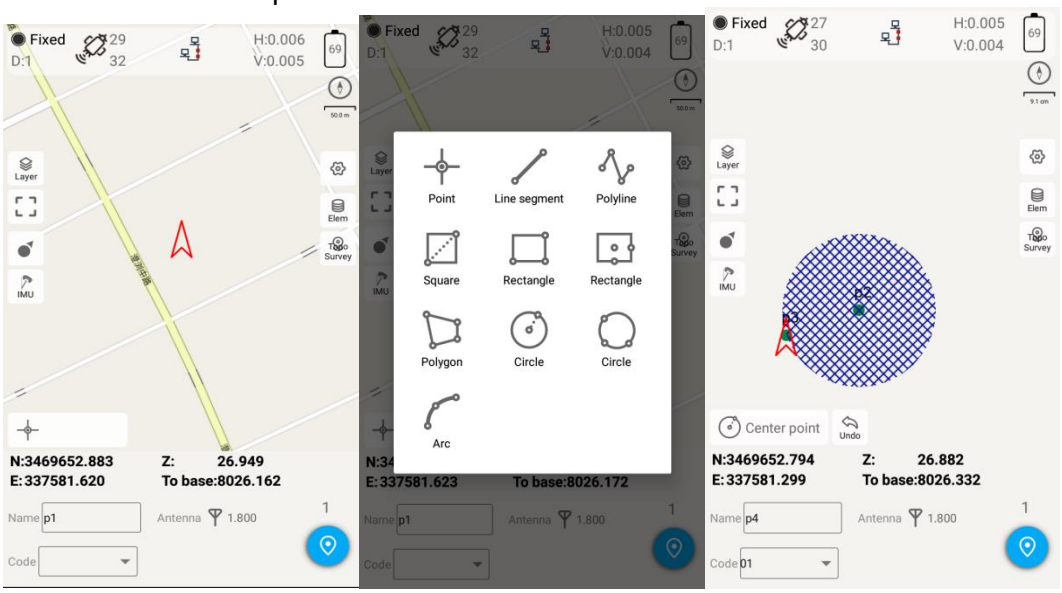




: Click this to show the whole points on the interface.

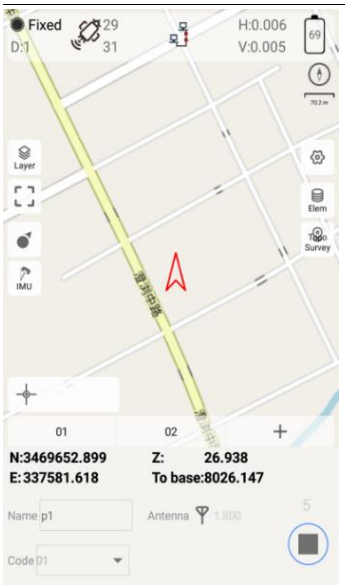
: If the arrow is out of sight on the interface, you can click this to locate the receiver position, then the arrow will be shown on the interface.

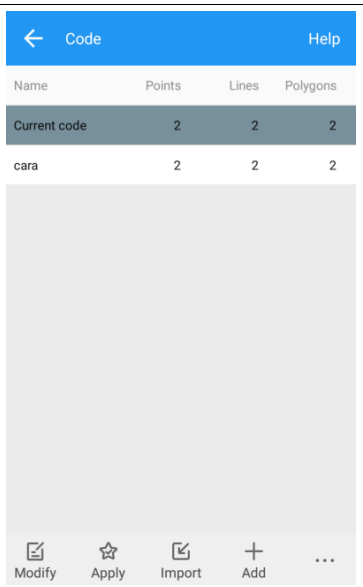
- Graphic survey: Tap the graphic button, after completing survey, will directly show the graphic on the map, you can export the graphic survey results as *.dxf format in Export interface.

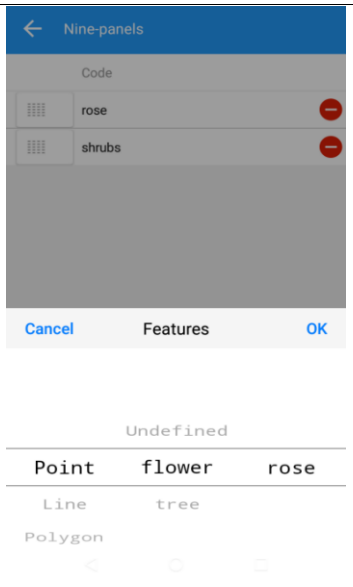


- Fast survey by pressing Code: Tap the code in nine panels, will survey the point directly.

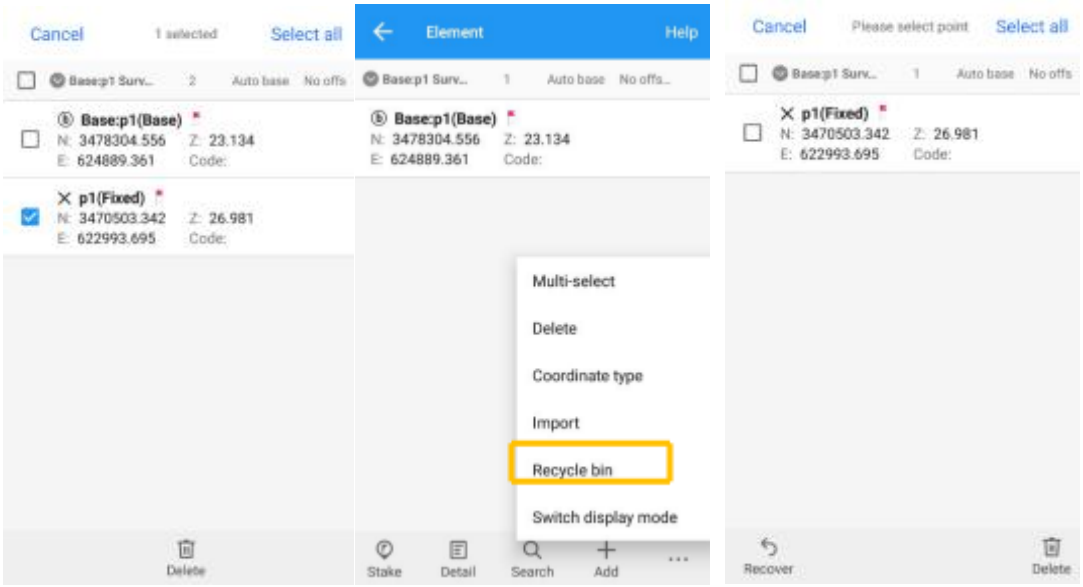
Go into code management interface to modify code list, then you can choose code to use in nine panels.





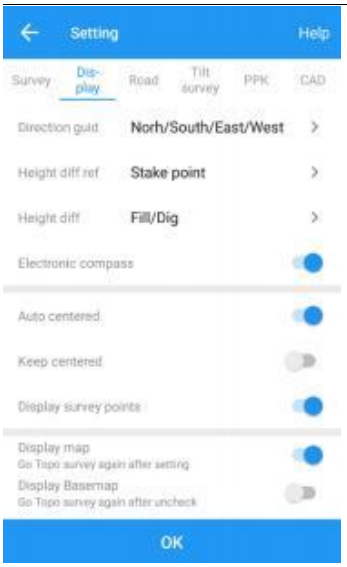


- Recover deleted points in Recycle Bin.



6.1.1 Survey settings

- Fixed: only fixed result can be saved;
- Duplicate name: allow point name same;
- RMS: point accuracy need higher than the value;
- Offset radius: point cannot offset bigger than the value during measure;
- Occupation time: measure times for one point;
- Point stepsize: for point name;
- Stake range: show circle when close to target point;



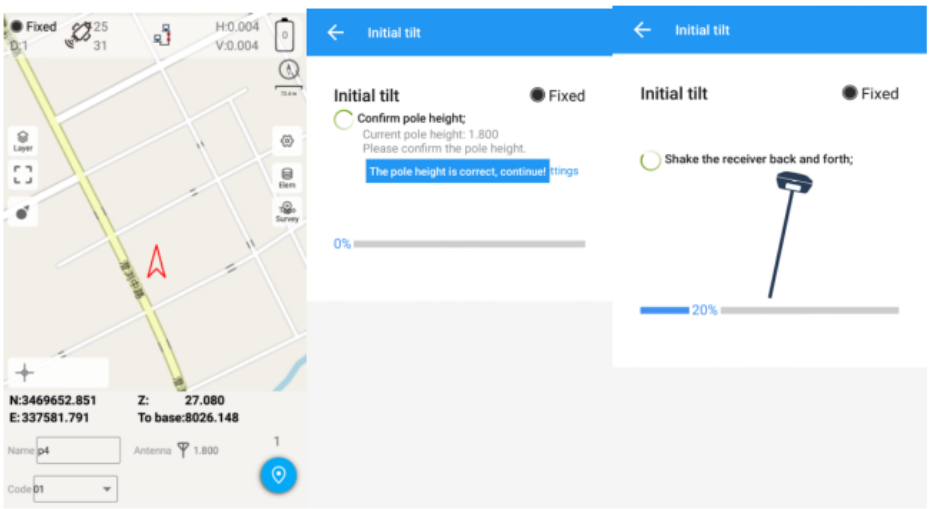
- Direction guide: 3 methods showing guide for stake out;
- Electronic compass: Use controller compass during stake out;
- Auto centered: Map will go to current location after 5 seconds;
- Keep centered: Map will go to current location after 1 second;
- Display survey points: will show all survey points on map;
- Display Basemap: for showing DXF/SHP file on map

6.1.2 Tilt survey

Tilt survey option will appear when receiver supports for tilt survey, it is available for S6 Plus GNSS Receiver, use IMU sensor.

According to the IMU sensor, can meets the requirement of high precision measurement. When the tilts within 60°, the built-in sensor based IMU precisely calculates the actual offset, which accuracy can up to 2.5 cm.

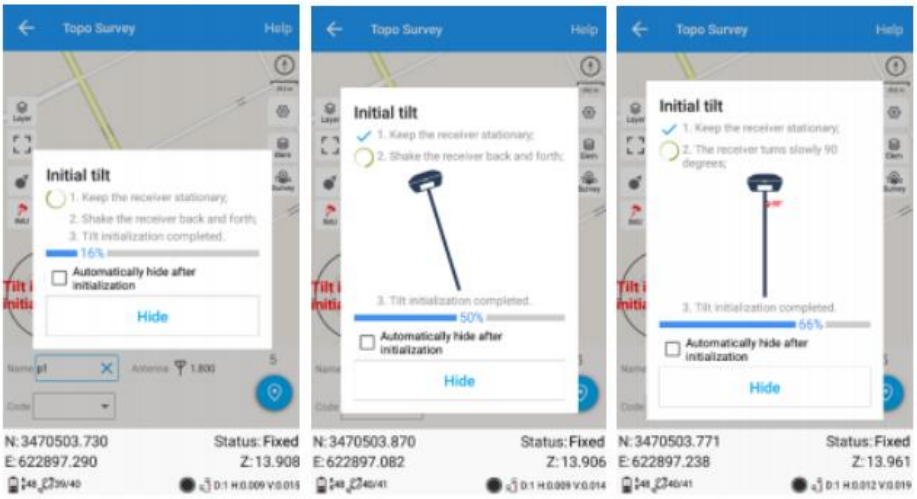
1. Open IMU: Go into Topo survey—click the button to open.



Open IMU Confirm the pole height Shake the receiver

2. Initialization

If you power off the receiver or freset it, need to initialize again. After open IMU button, you can follow the guidance in interface to complete it. During operation, make receiver can search the satellites and get a fixed solution.



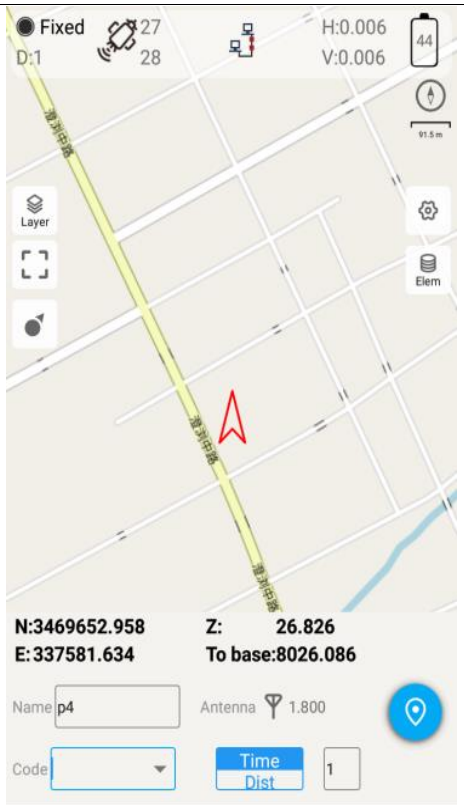
Keep the receiver stationary *shake the receiver* *rotating the receiver*

In survey interface, you can find the bubble and angle value shows the pole you tilt. For more accuracy, angle less than 60°will be better.

Tip: Do not shake or rotate the receiver violently, otherwise you need to re-initialize.

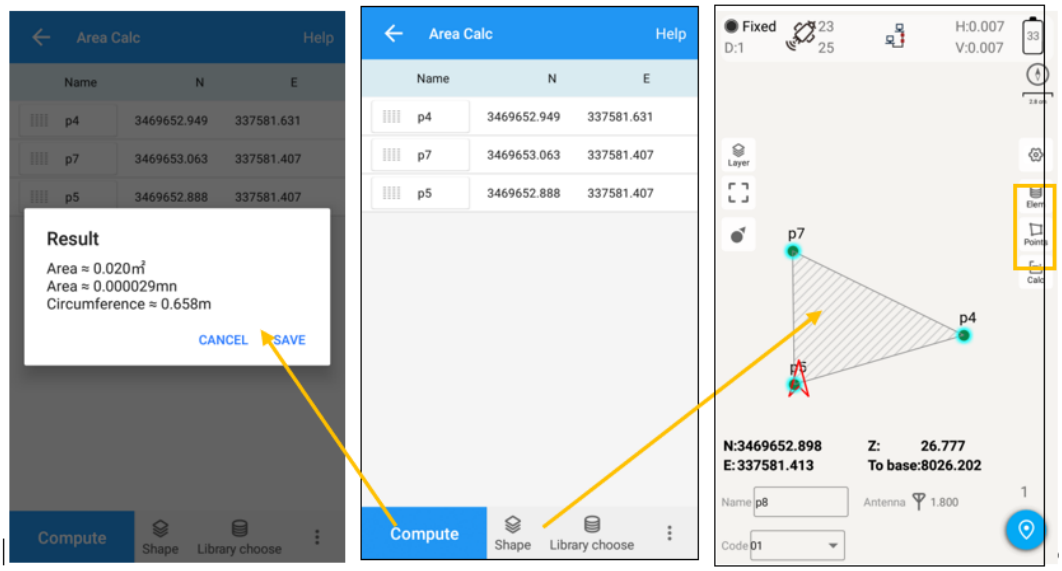
6.2 Auto survey/Area survey

For Auto survey, it supports automatic and continuous survey according to Time or Distance.



For Area survey, it can compute area directly after getting points.

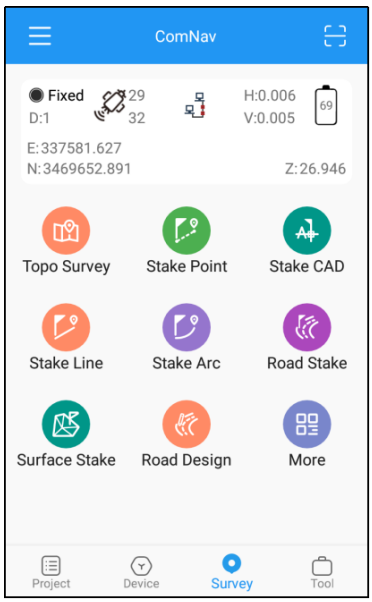
Press , it will show the coordinate information, press , it will show the area result, press , it will show the shape on map.

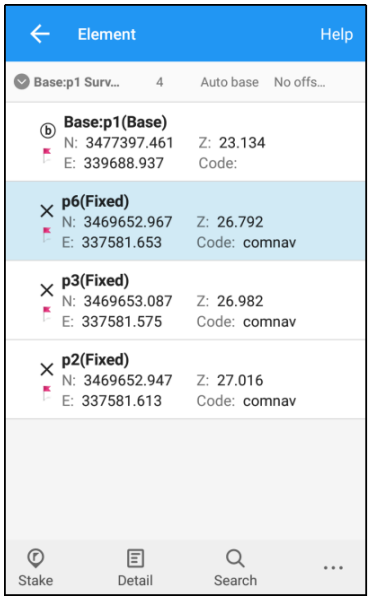


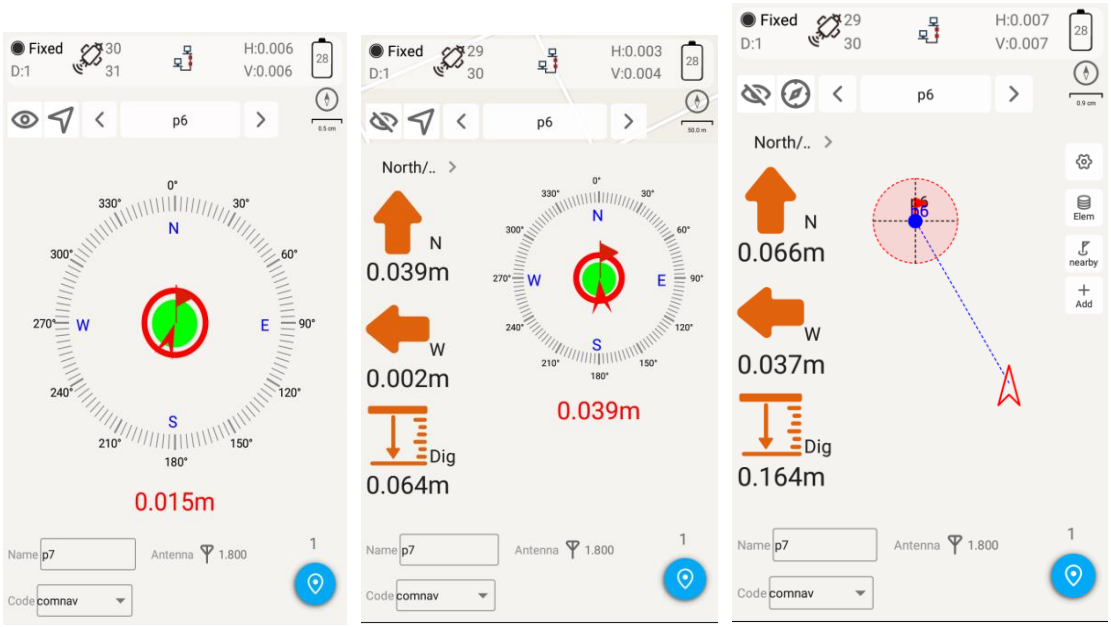
6.3 Stake points/lines

Go into ***Stake point*** interface, click to choose a point and tap ***Stake***. GNSS Survey provides a navigation map when staking points/lines. If you are close to the target point enough, it will alarm you based on the alarm range you set.

Enter the point name and code based on your requirements, then click 

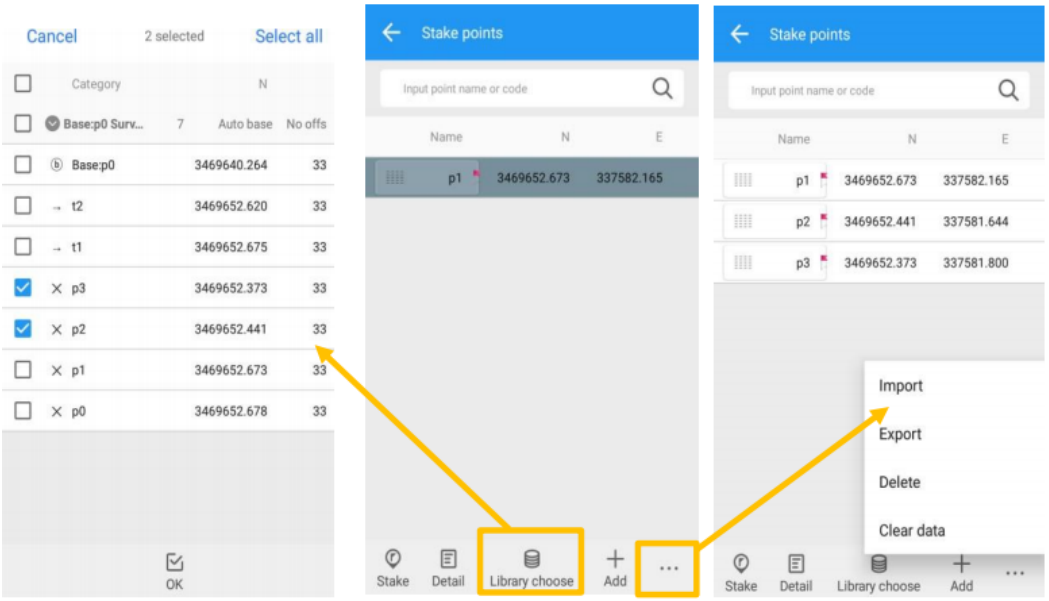






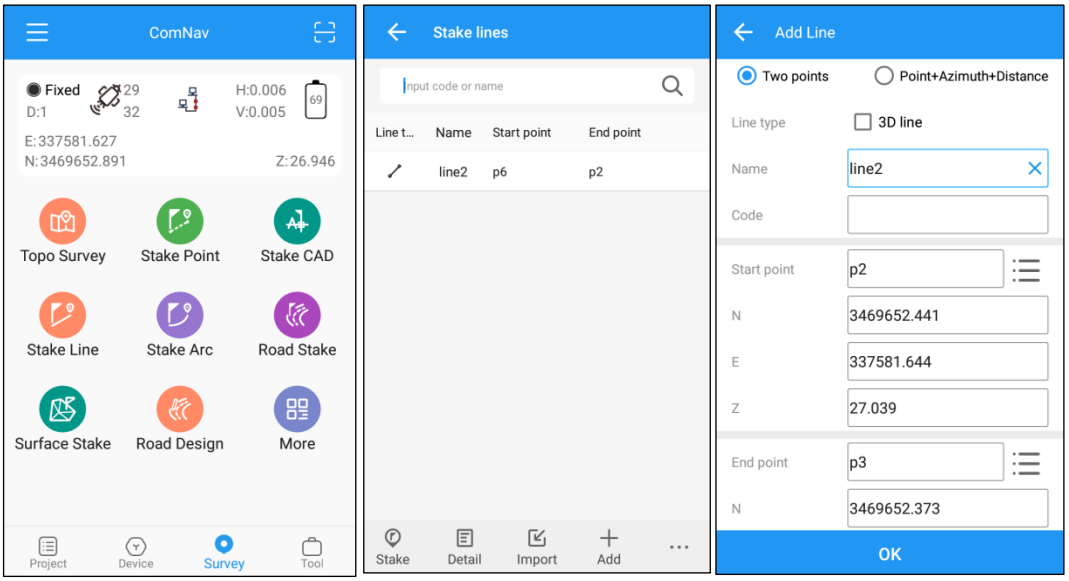
Various navigation info choices

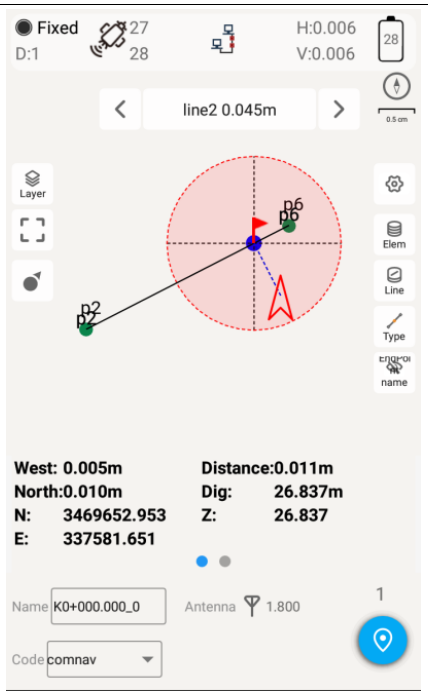
You can also ***Import*** points for staking, or add from ***Library choose.***

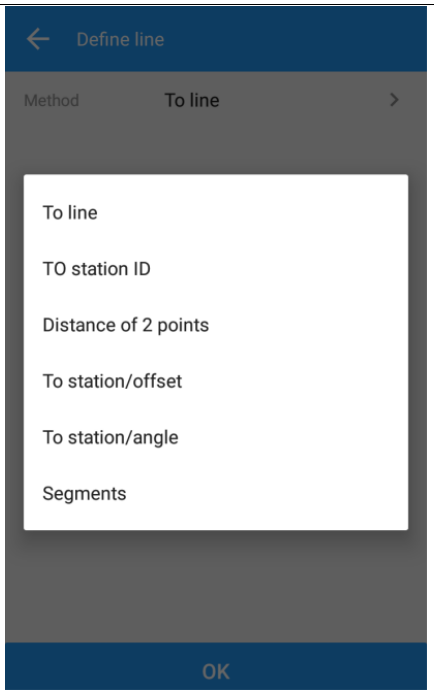


Tip: keep your receiver vertical to the ground.

For staking lines, click Add -> add line (Two points or Point + Azimuth + Distance) -> click OK -> Choose one line and click Stake. The default method to stake is “To line”, press method to choose a method you want.







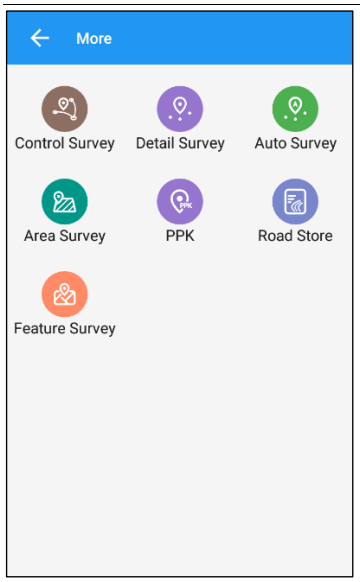
- To line: show shortest way to find a point on line;
- To station ID: stake points on line by defined interval;
- Distance of 2 points: show distance of current location to the line's start point and end point;
- Segment: Stake on line by defined segment value.

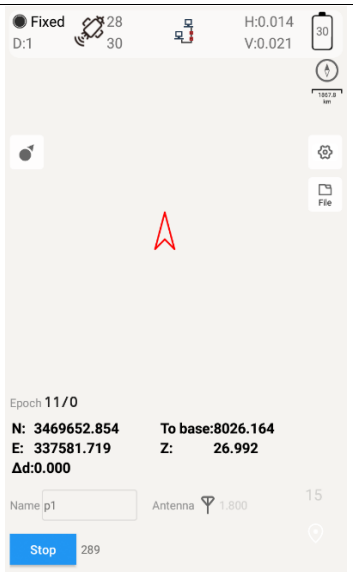
6.4 PPK

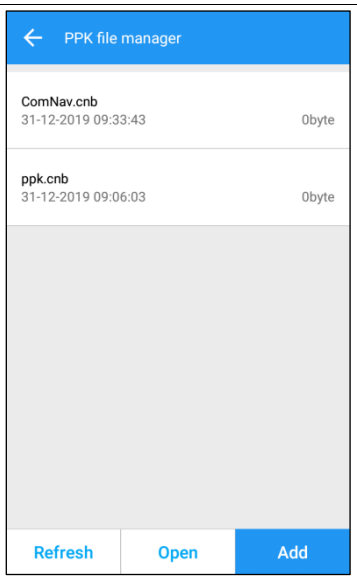
PPK (post processing kinetic) is the unique function of GNSS Survey, which is used for post-processing dynamic measurements.

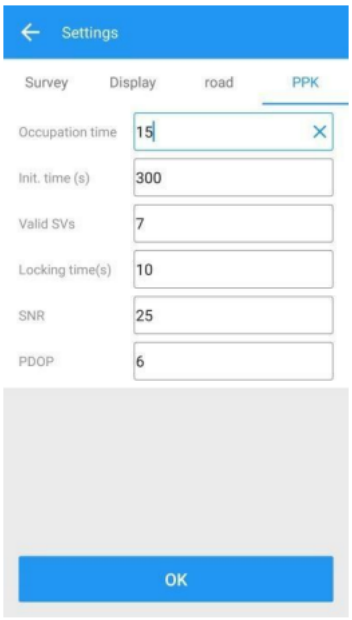
It also needs two receivers to work together, one work as Base to record static data, and S6 Plus work as Rover as shown below.

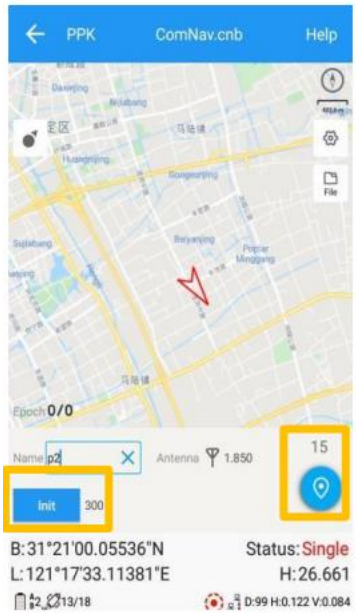
1. Click PPK in survey interface -> choose or create a PPK file.
2. Go to settings, configure PPK settings based on your requirements.
3. To get stable epoch, click  to initialize ->  to start PPK survey.


More
Control Survey
Detail Survey
Auto Survey
Area Survey
PPK
Road Store
Feature Survey


Fixed
D:1
28
30
H:0.014
V:0.021
Epoch 11/0
N: 3469652.854
E: 337581.719
Δd:0.000
To base:8026.164
Z: 26.992
Name p1
Antenna 1.800
Stop
289


PPK file manager
ComNav.cnb
31-12-2019 09:33:43
0byte
ppk.cnb
31-12-2019 09:06:03
0byte
Refresh
Open
Add


Settings
Survey
Display
road
PPK
Occupation time
15
Init. time (s)
300
Valid SVs
7
Locking time(s)
10
SNR
25
PDOP
6
OK

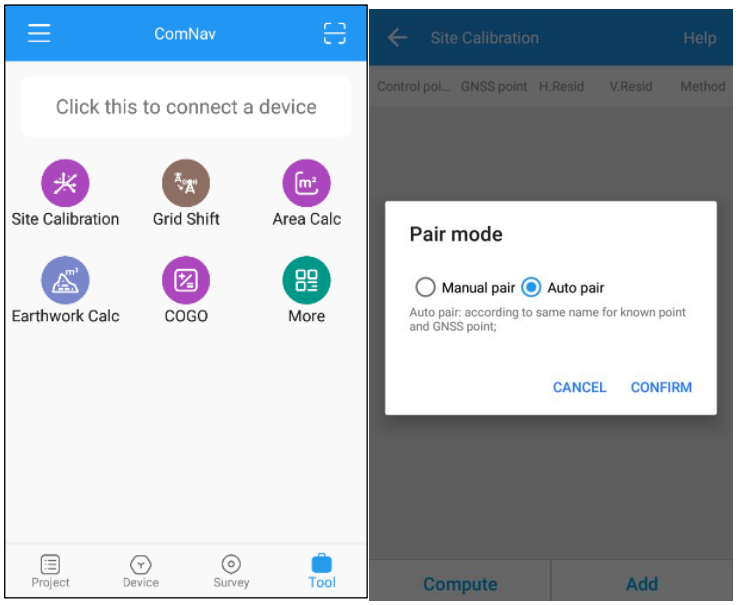

PPK
ComNav.cnb
Help
Epoch 0/0
Name p2
Antenna 1.850
15
Init
300
B:31°21'00.05536"N
L:121°17'33.11381"E
Status: Single
H:26.661
13/18
D:99 H:0.122 V:0.084

6.5 Site calibration/Grid Shift

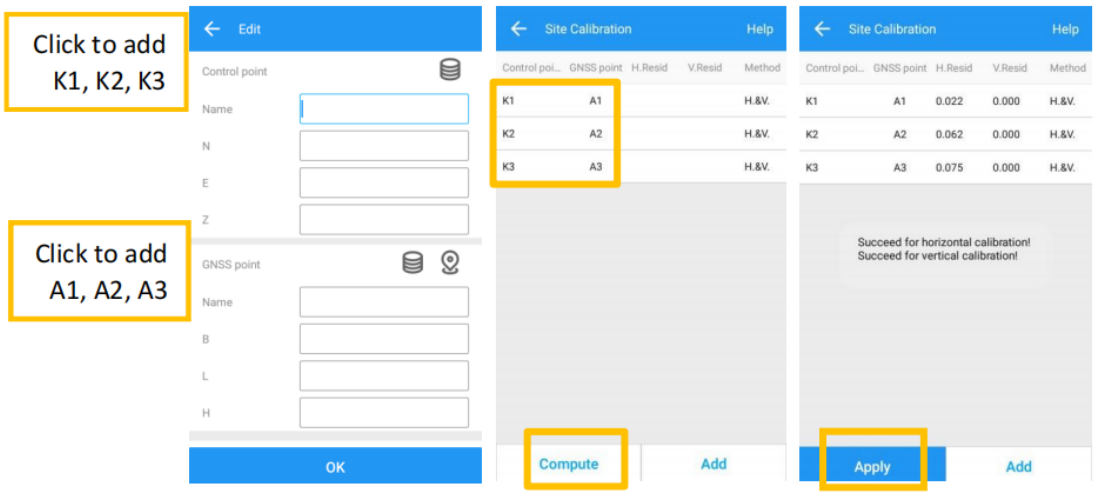
6.5.1 Site calibration

Site calibration is commonly needed once in one project, and all the points will be collected based on calibrated datum system.

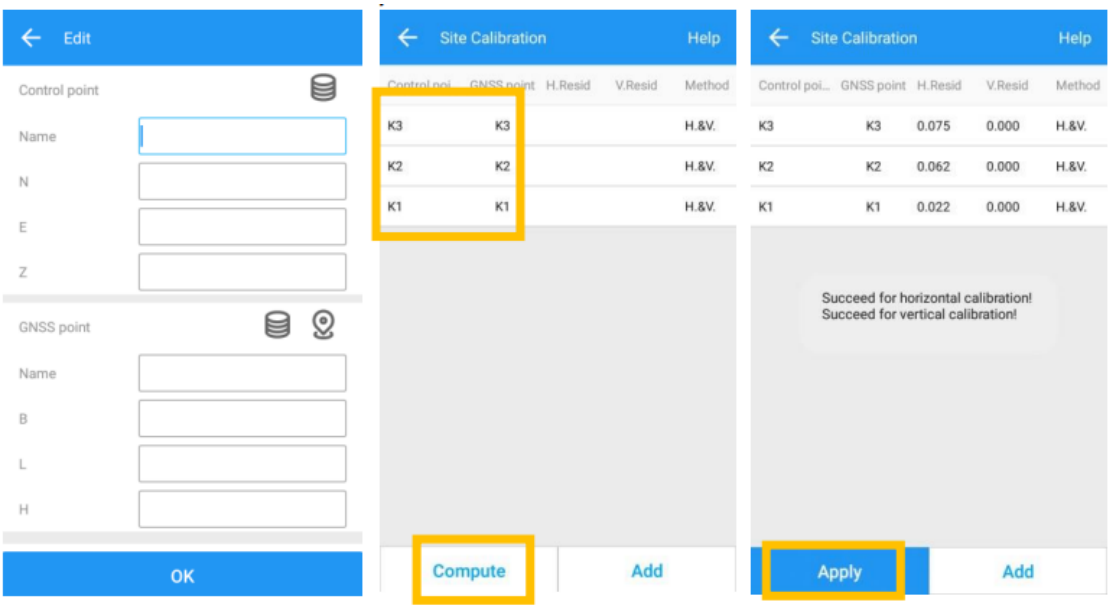
1. Choose manual pair or auto pair.



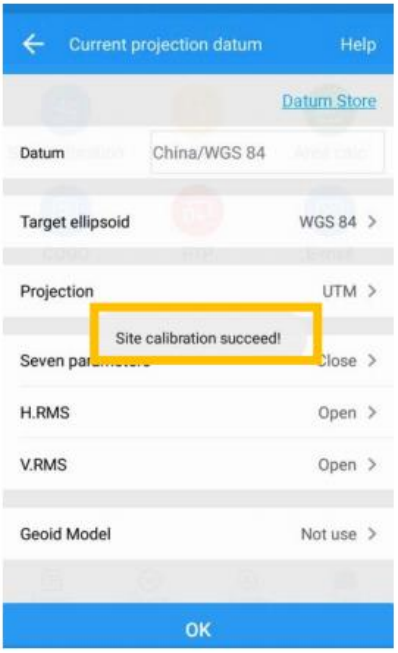
2. If you choose manual pair, you can directly enter at least three groups' point to compute. (for example, take K1,K2,K3 as known points, take A1,A2,A3 as measured points) After click Compute to calculate, the software will calibrate automatically.



3. If you choose auto pair, it will auto compute according to the same name for known point and measured point. After click Compute to calculate, the software will calibrate automatically.



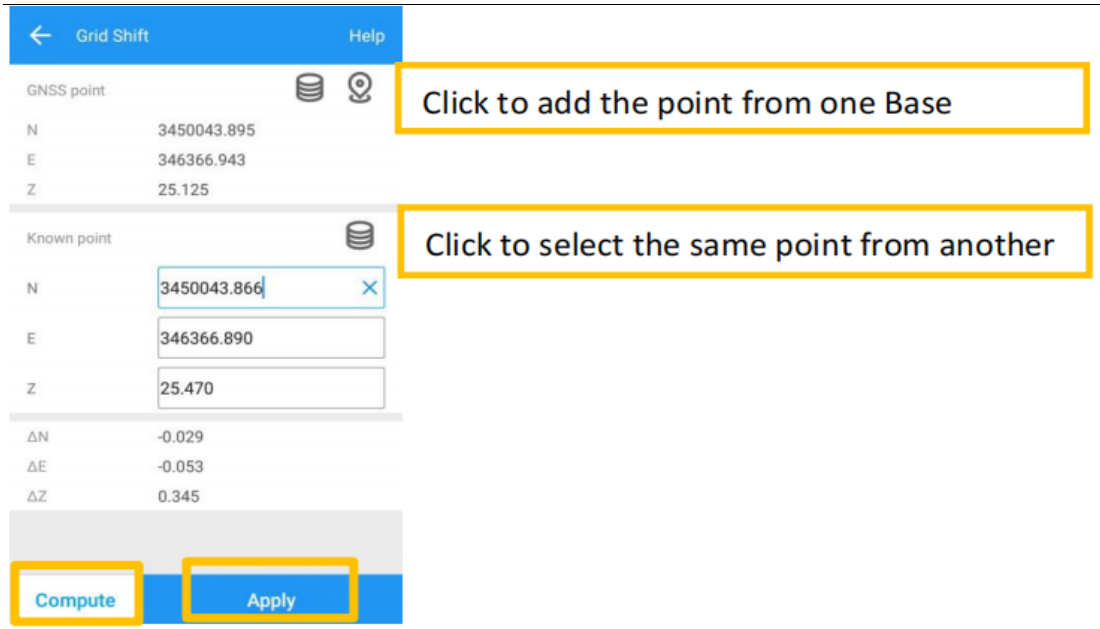
4. Click Apply to confirm to replace datum. The value of H.Resid and V.Resid should meet the requirement (H.Resid ≤ 0.015m, and V.Resid ≤ 0.02m).



6.5.2 Grid Shift

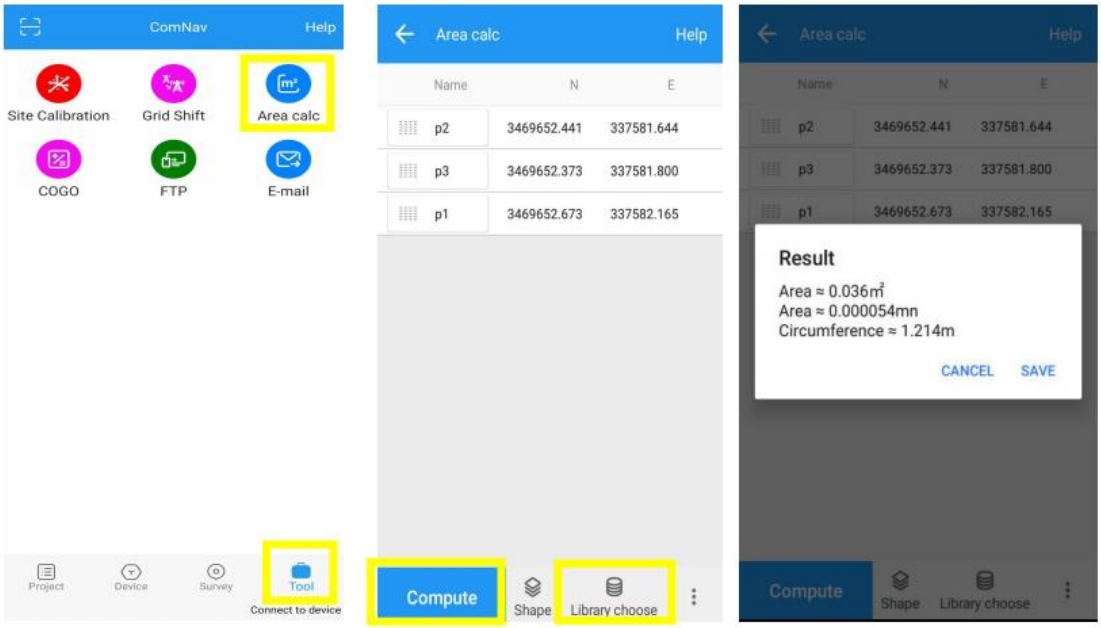
Grid reset function is applied when you need to change the position of Base station in the same project.

Click ***Grid Shift*** in Survey interface -> add current Base point and target Base point -> Click ***Compute*** -> ***Apply*** to complete grid shift.

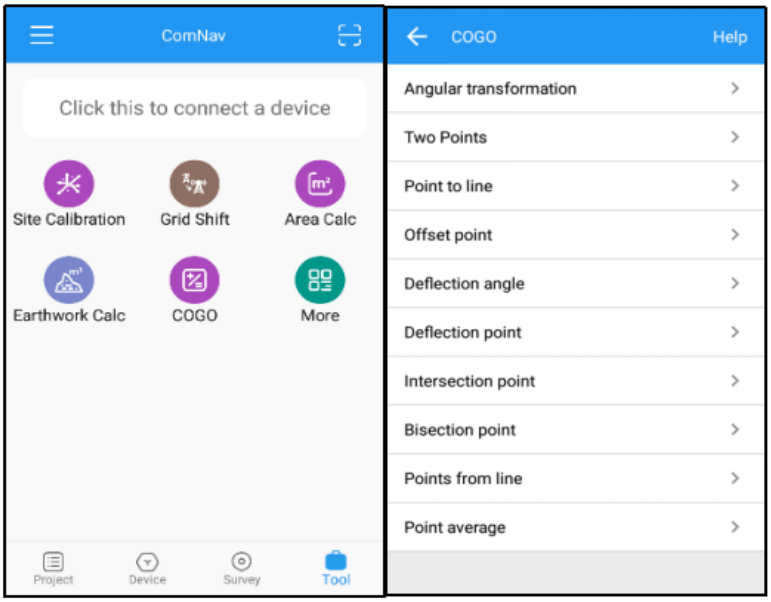


6.6 Area Calculation and COGO

Area calculation function is almost same with Area survey, you can quickly calculate the area of selected points. Click Compute to calculate area, and click Library choose to add the points.



With COGO function, you can calculate points/lines/angle directly on field.



- Angular transformation: Angular type transform;
- Two points: Calculate two points distance;
- Point to line: Distance from point to one line;
- Offset point: Calculate point with azimuth and distance;
- Deflection angle: Calculate angle of two lines;
- Deflection point: Calculate point with angle and distance;
- Intersection point: Calculate intersection points from two lines;
- Bisection point: Calculate point from angle bisector;
- Points from line: Calculate points on line by distance or segment;
- Point average: Calculate average from points;

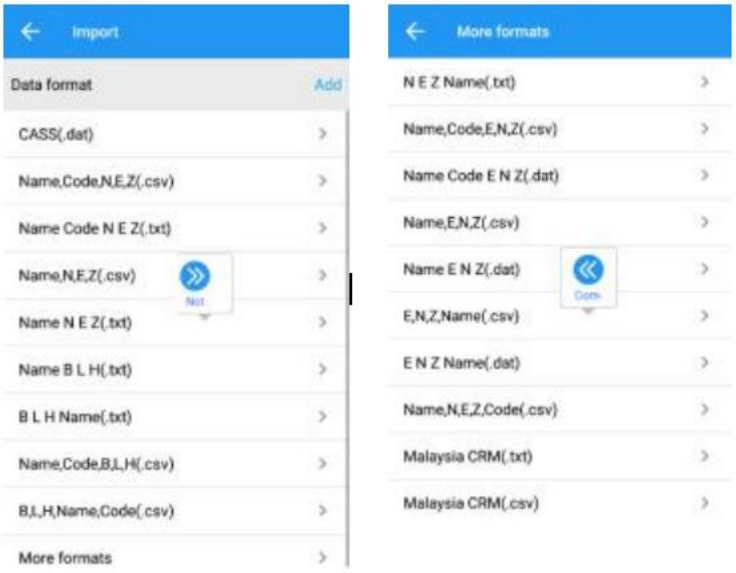
7 Data Export/Import

GNSS Survey supports to import/export data including grid coordinate, Lat/Lon coordinate with various data format, support import DXF/DWG file and export result of DXF/KML, etc.

7.1 Import

Tap ***Import*** in project interface, there are some predefined data formats, click ***More formats*** to get more predefined formats. Besides, you can click ***Add*** to create a User- defined type.

Long press the predefined data format that you don't use often, you can move this format to the More formats page; also, you can move the data format of More formats page to the previous page where stored the formats you usually use.



- Name: Enter the name for the format
- Delimiter: support Comma(,), Space( ), Semicolon(;)
- File format: support *.csv, *.dat, *.txt format

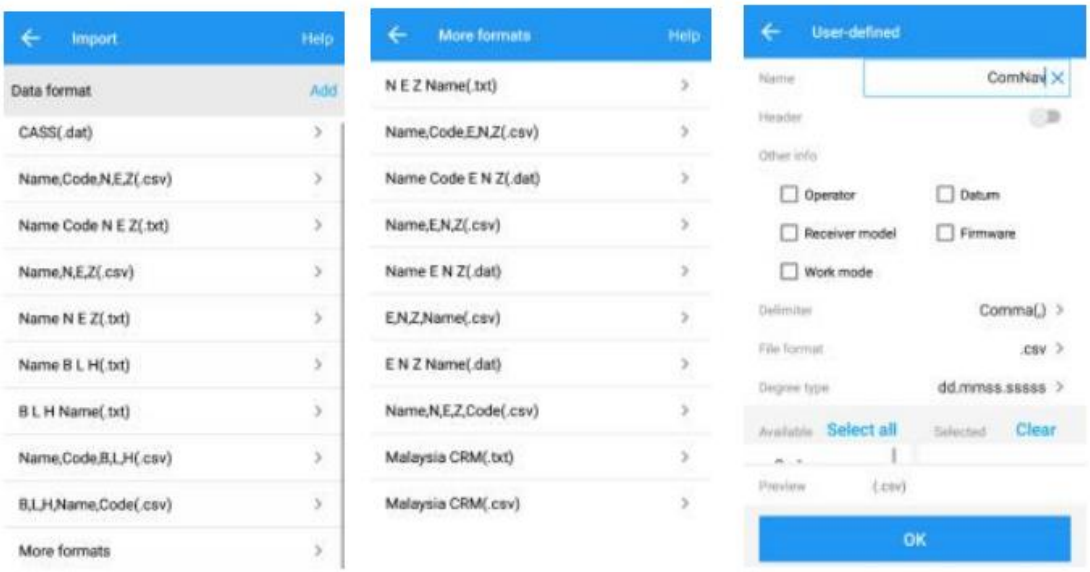
Click ***Select all*** to choose all elements, Click ***Clear*** to eliminate all elements selected.

The elements include: code, name, N, E, Z, B, L, H, X RMS, Y RMS, V.RMS, status, start time, occupation time, diff age, base ID, total AntHgt, Antenna height, measure type, antenna name, ending time, comment, RMS, PDOP, HDOP, VDOP, TDOP, GDOP, total SV, used SV, elevation, tilt offset, tilt angle, tilt distance

Tip: The format you defined will also be saved to Export interface.

Choose one format to import data.

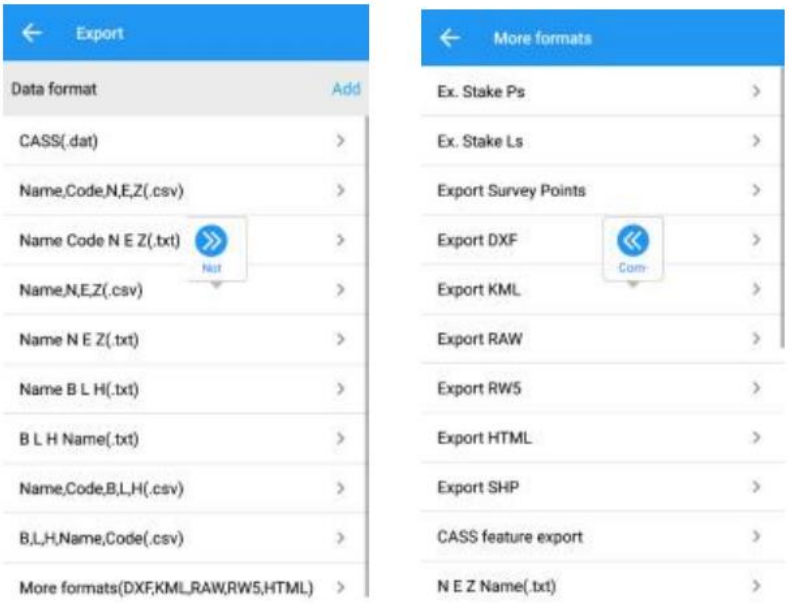
- The default export path is ⋯//sm/data, you can also click Upperfolder to change to any other path where the file is.
- Point type: support Input point, Control point, Stake point



7.2 Export

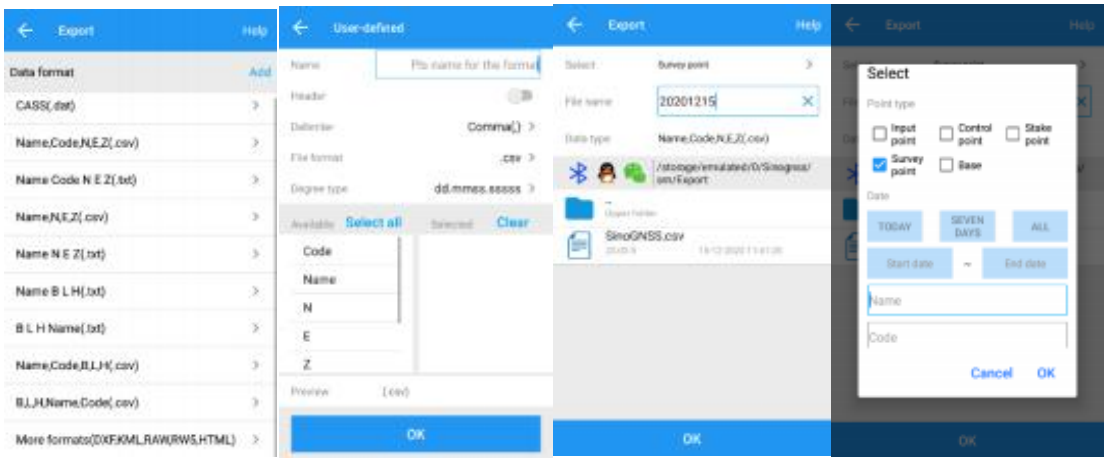
Tap ***Export*** in Project interface to export simple data of survey points. Also, click ***More formats*** to export the survey points with detailed information or other formats like stake points/lines, DXF, SHP, KML, RAW, RW5, HTML, CASS feature result.

Same with Import result, long press the predefined data format to select the interface you want to place.



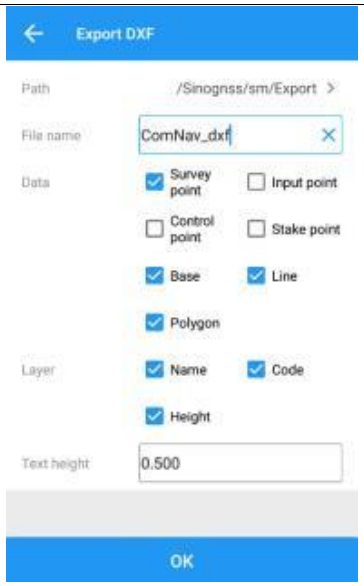
- File format: support *.csv, *.dat, *.txt format choose one format to export data.
- Select: support Survey point, Control point, Input point, Stake point, Base, also,you can set the data, name, code of data to specific export.

The default export path is …*//sm/export*, and the previous saved file will be shown below, you can also click ***Upperfolder*** to change to any other path.



For the points, lines and polygons you surveyed in Topo survey and Feature survey, you can click ***Export DXF*** to export dxf file, then you can edit them in third party CAD software, or import to ***Basemap*** to check, or import to ***Stake CAD*** to stake.

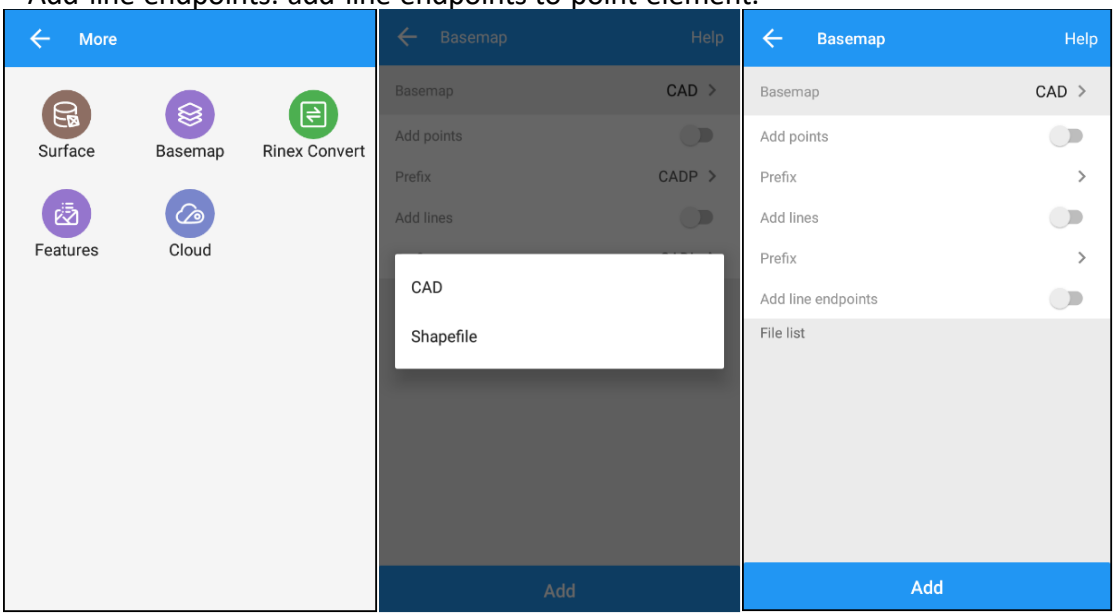
Choose the data that you want to export including survey point, input point, control point, stake point, base, line and polygon, and the layer properties includes name, code and height, the default text height is 0.5.



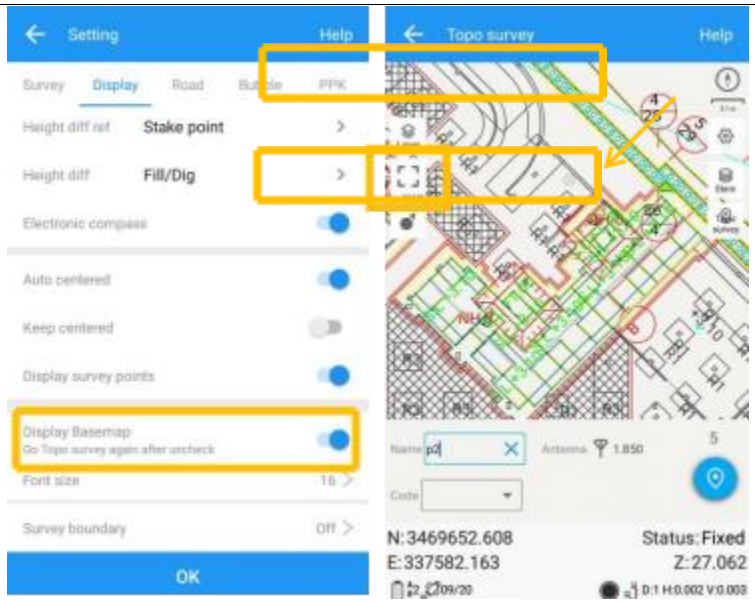
7.3 Import Basemap

Tap ***Basemap*** to import DXF/DWG/SHP file into GNSS Survey.

- Add points: Save points from the dxf/dwg/shp file to element.
- Add lines: Save lines from the dxf/dwg/shp file to element.
- Prefix: Support add prefix name for points/lines saved to Elements.
- Add line endpoints: add line endpoints to point element.



Remember go survey settings to check on display basemap, click zoom button to auto show basemap.

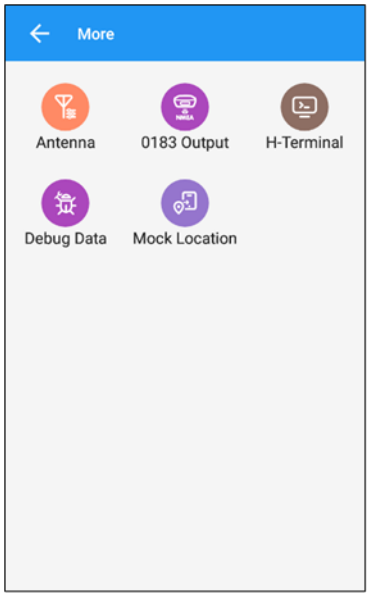


8 Export Result

8.1 NMEA 0183 output

With ***NMEA 0183*** function, you can quickly set to output NMEA data from lemo port or Bluetooth. In fact, this function is same as enter commands "log comX gpXXX ontime X".

Choose NMEA Port -> Baud -> check commands you want to output.



This option is same as the command "saveconfig".

Log com1 gpgga ontime 1

Data transfer: for transmit all the BT output to the address.

8.2 Register S6 Plus via GNSS Survey

Normally, the register code is like this:

ID:03401012 $$:49-0B-79-23-00-00-00-95-85

FUNCTIONREG:2207453726-3851620954-0949162572-0697504466-0613618189-0027539229

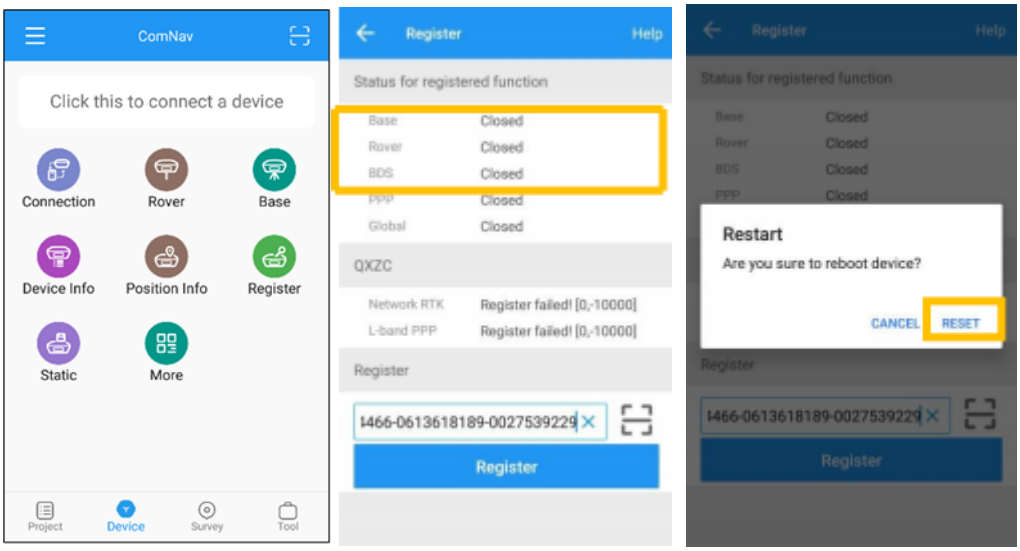
Note: The length of code may different according to different requirements.

Following shows two methods to register the receiver.

➢ **Register function**

For Register function, you need only enter the number:

2207453726-3851620954-0949162572-0697504466-0613618189-0027539229

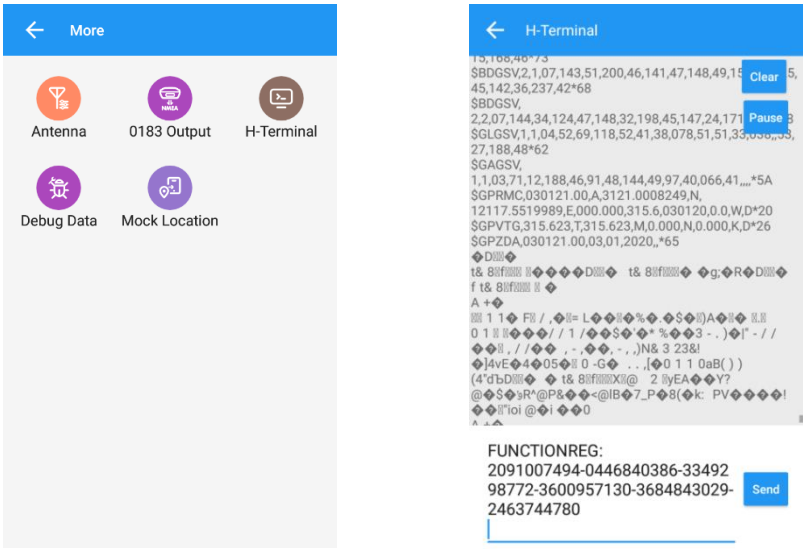


➢ **Register via commands**

You need copy the whole code, include the word 'FUNCTIONREG:'

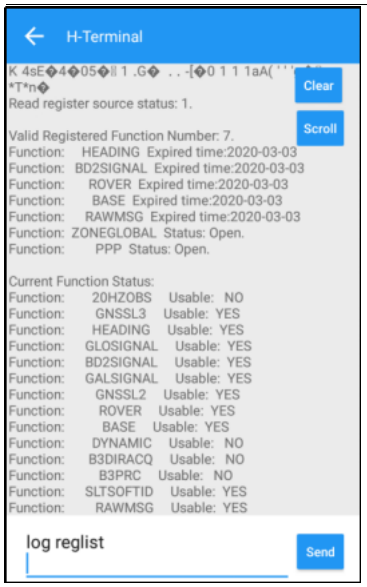
FUNCTIONREG:2207453726-3851620954-0949162572-0697504466-0613618189-0027539229

Copy the whole code, and enter the cursor to next ine, then send.



Send command: LOG REGLIST

To check receiver register status.

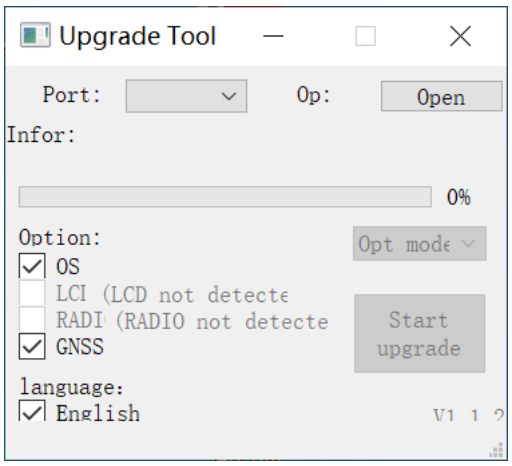


9 Firmware Upgrade

Prepare a USB-TypeC cable. And download a Driver of USB recongnition. It' s important.
S6 Plus adopts the latest chip, integrated system and board, which shall be distinguished during upgrading.

1. Copy the firmware software to your PC, connect S6 Plus to your PC via type-c cable and turn on the receiver.

2. Open the firmware program, select ***proper port*** to connect with receiver, click "***Open***", **only** choose" ***OS" and "GNSS"*** and then click "***Start***". Wait for a minute ,it will be successful.



When the progress bar is full, and "***Completed!***" appear below, it seems the update has been completed and then you can disconnect it and wait for 1 minute to finish the update.

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

•Reorient or relocate the receiving antenna.

•Increase the separation between the equipment and receiver.

•Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

•Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

RF Exposure Information

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.