



V3

USER MANUAL

Version 1.0

SOUTH SURVEYING & MAPPING TECHNOLOGY CO., LTD

Content

Chapter 1 Preface	- 1 -
§1.1 Introduction	- 1 -
§1.2 Applications.....	- 1 -
§1.3 Main Features	- 1 -
Chapter 2 V3 receiver introduction	- 5 -
§2.1 Receiver components	- 5 -
§2.2 Receiver screen menu.....	- 7 -
§2.2.1 Main display interface	- 7 -
§2.2.2 Main menu.....	- 7 -
§2.2.3 Work mode	- 8 -
§2.2.4 Set Datalink	- 8 -
§2.2.5 System Setup	- 9 -
§2.3 Hardware Operation	- 10 -
Chapter 3 Web UI Management	- 11 -
§3.1 Overview	- 11 -
§3.2 Access by WiFi.....	- 11 -
§3.3 Access by USB	- 12 -
§3.4 Web UI main interface.....	- 16 -
§3.4.1 Status	- 17 -
§3.4.2 Configuration.....	- 19 -
§3.4.3 Satellite Information.....	- 29 -
§3.4.4 Data Record.....	- 31 -
§3.4.5 Data Transfer	- 34 -
§3.4.6 Network Config.....	- 38 -
§3.4.7 Radio Config	- 43 -
§3.4.8 Firmware Update.....	- 45 -
§3.4.9 Track Manage	- 47 -
§3.4.10 Coordinate System(reserve)	- 50 -
§3.4.11 Online Service(reserve)	- 50 -
§3.4.12 User Management.....	- 51 -
§3.4.13 System log	- 52 -
Chapter 4 New functions	- 53 -
§4.1 AR Stakeout.....	- 53 -

§4.2 Photogrammetry	- 56 -
Chapter 5 Accessories	- 63 -
§5.1 Instrument Case	- 63 -
§5.2 Charger &Adapter	- 63 -
§5.3 Differential Antennas.....	- 64 -
§5.4 Cables	- 64 -

Chapter 1 Preface

Read this chapter, you will have a brief knowledge of SOUTH Company and V3 measurement system.

§1.1 Introduction

Welcome to SOUTH Surveying Instruments Co., Ltd, which is China's leading manufacturer of surveying equipment including GNSS receivers and Total Stations. To know more about SOUTH, please visit our official website <https://www.southinstrument.com//>

This manual takes the new V3 positioning system for example, to explain how to install, set up and use the RTK system as well as the use of the accessories. We recommend that you read these instructions carefully before using the instrument.

§1.2 Applications

Control Survey: dual-band (dual-frequency) system static measurements can accurately complete the high-precision deformation observation, photo-control point measurement.

Highway Survey: quickly complete the encryption of the control points, road topographic mapping, cross-section measurement, profile measurement with Survstar

CORS Application: provide more stable and convenient data link for field operations. It is seamlessly compatible with all types of domestic CORS applications.

Data acquisition measurement: perfect match South's various measurement software to do quick and easy data acquisition.

Stakeout shot: large-scale point, line, plane lofting.

Electric Power Measurement: power line measurement orientation, ranging, angle calculation.

Marine application: oceanographic research, dredging, piling, inserted row, making the marine operations convenient and easy.

§1.3 Main Features

AR Stakeout

Augmented Reality (AR) stakeout revolutionizes conventional surveying methods by integrating

various sensory modalities, including visual and auditory. This approach eliminates the proficiency gap between experienced surveyors and novices by providing real-time visual guidance within authentic environments. Additionally, voice prompts are employed when nearing designated targets. This streamlined process allows surveyors to stake out targets without the need for leveling the pole, relying on visual and auditory guidance for precise stakeout each time.

Visual Positioning

V3 visual positioning broadens the scope of RTK applications through the synergistic integration of photogrammetry and RTK positioning technologies. With an 8-megapixel camera, “Fast” IMU and the latest positioning algorithm, V3 is adept at capturing and processing images or videos to derive precise coordinates. Therefore, it excels in surveying targets that pose challenges for traditional methods, including intricate corners beneath roofs, obstructed fields, and bridges spanning rivers. This capability enhances surveying versatility, allowing for the efficient and accurate surveying and mapping of locations that were previously difficult to access with RTK surveying techniques.

BDS PPP and HAS: Keep working in remote areas with no CORS network coverage

V3 can receive B2b signal of BDS GEO satellites (Asian Pacific area), and E6-B signal from GALILEO. After waiting 20 min in open environment, V3 can achieve 10-20cm horizontal accuracy and 20-40cm vertical accuracy.

Color Screen: Easy operate

HD 1.14 inches color screen with high brightness and low power consumption is more suitable for field work, which is convenient and efficient to complete information browsing, function settings.

Intelligent Platform

New generation of embedded Linux operating system platform improves RTK performance and work efficiency. Its operating efficiency is higher; a unique core processing mechanism which can respond to more than one command at one time; it starts faster and more responsive in real time. While the stability of system is much higher, it can be adapted to the job of longer uninterrupted power.

The “Faster” IMU: Faster, More Stable and More Accurate

V3 is integrated with a new generation IMU module that it only needs 2-5s of shaking or walking to complete the initialization, and the maximum tilt compensation angle can be 60 degrees. it can ignore magnetic interference while RTK receiver works in such a magnetic environment. This professional IMU module can keep the tilt effect for about 40s if RTK receiver stays on a point without moving.

Internal Web UI management

Embedded Web UI management platform supports WIFI and USB mode connection. Users can monitor the receiver status and configure it via the internal Web UI management platform.

WiFi

As a feature and technology adopted on V3, it not only can be used as data link to access to internet, but also can be as a hotspot which can be accessed by any other smart devices to configure the receiver.

Advanced UHF module

V3 adopts new and excellent datalink system, which is compatible with current radio protocols in the market, and realizes the random switching of the radio range 410MHZ-470MHZ and the power level as well.

Intelligent Interaction

Support to access the internal web UI manage page of receiver with WiFi and USB connection, monitor host state real-time, configure receiver freely.

Electronic Bubble & Tilt Compensation

Integrated with a new generation IMU module which makes tilt measurement more stable, accurate and fast that without strict leveling the receiver to measure the point at will.

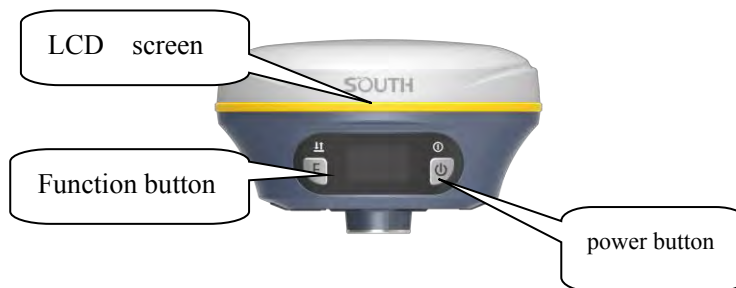
NFC Function

The internal NFC module can make the complicated Bluetooth communication easy and simple.

Chapter 2 V3 Receiver Introduction

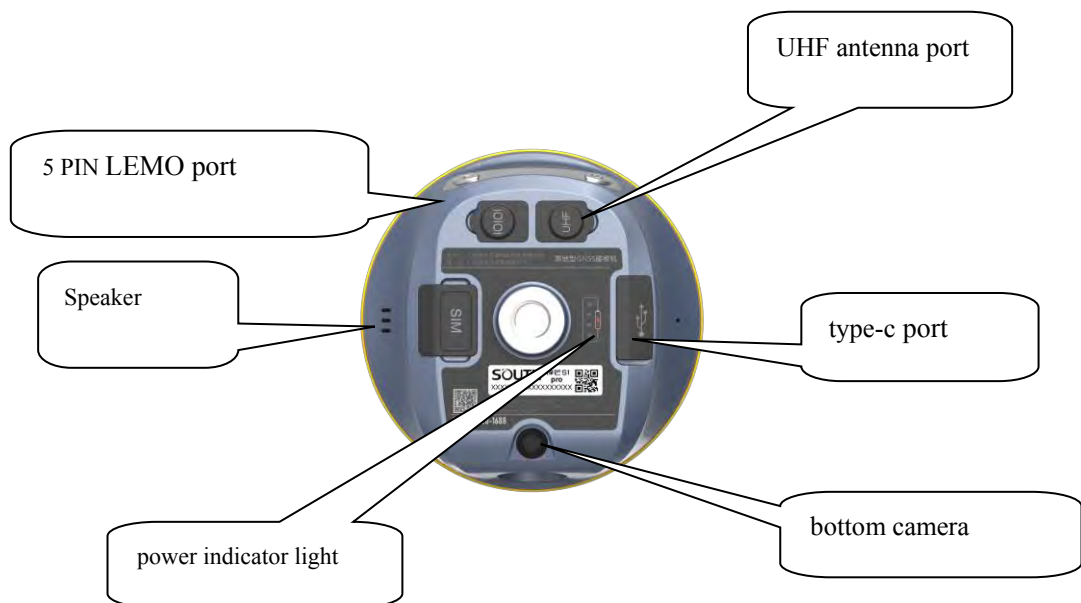
§2.1 Receiver Components

Receiver front view



Receiver back view



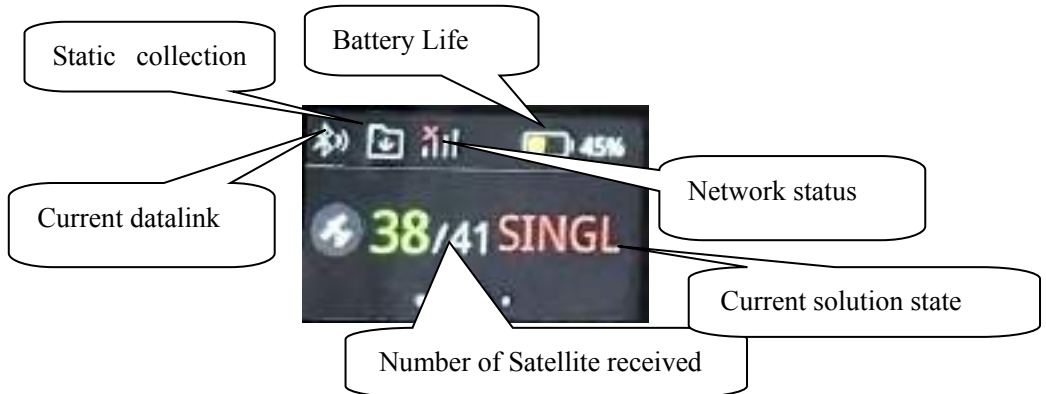
Receiver bottom view

- **type-c port:** for static data downloading, OTG (for external storage) and charging.
- **5-Pin port:**
 - 1) For external power supply
 - 2) For export data, debug and configure receiver
- **power indicator light:** Displays the current battery, with one bar representing 25% charge
- **SIM card slot:** When using GSM/CDMA/4G and other networks, the chip is inserted upward into the phone card

§2.2 Receiver Screen Menu

§2.2.1 Main display interface

After the device is powered on, the current working status is displayed. The status interface consists of ICONS and text



§2.2.2 Main menu

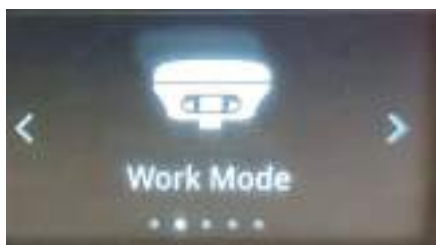
Main menu: Press F key to switch the screen menu



[System Setup]



[Set Datalink]



[Work mode]



[Receiver information]

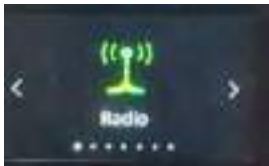
§2.2.3 Work mode

To switch work mode between Rover mode, Base mode and Static mode.



§2.2.4 Set Datalink

To configure datalink and there are 5 datalink modes as below:



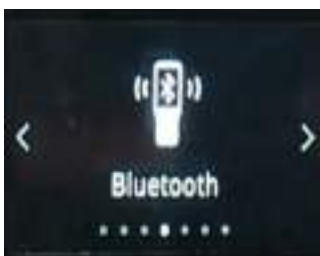
UHF(inbuilt radio) as datalink



Cellular network (via SIM card) as datalink



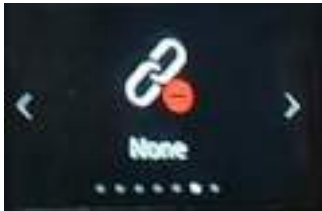
External radio as datalink



Bluetooth datalink (also called controller network as datalink)

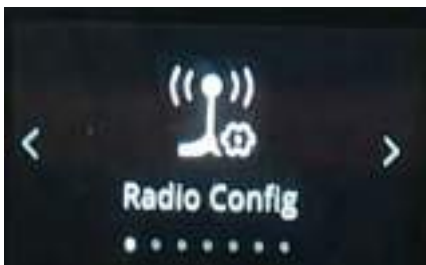


WIFI datalink



No datalink

§2.2.5 System Setup



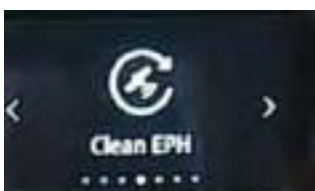
Radio Config



Self-check



Factory Default



Clean EPH



Reset OEM



Eco

§2.3 Hardware Operation

Power on

After pressing the power button for three seconds, the instrument can be turned on and used normally.

Press the power button for few seconds (around 10 seconds), the instrument completes initializing along with voice prompt about the working mode (for example, “Rover, internal radio mode”). After a while, instrument starts to track satellites.

Power off

Press the power button and hold for a while, after 3 beeps and the “Power off” voice prompt at the third beeping, release power button, the instrument will switch off.

Check working mode

Press the power button for once in the state of power-on, the instrument will prompt with voice message about current working mode (for example, “Rover, internal radio mode,channel1”).

Self-check is an useful operation to simply check the main hardware components if the instrument is abnormal or not working properly.

Charging

Charging state, in the middle of the charging process, the red light will turn green when full. Lamp power display current power, each light on represents 25% power.

Chapter 3 Web UI Management

§3.1 Overview

Because of using the smart embedded Linux operating system and SOUTH intelligent cloud technology, the web UI allows users to configure and monitor the status of V3 in real-time. The accessing way is not only by WiFi connection, but also can be USB mode.

§3.2 Access by WiFi

The WIFI hotspot is default broadcasted by V3, search the WIFI hotspot which named with SOUTH_xxxx using smartphone, tablet or laptop, then establish the WIFI connection, input the **default IP (10.1.1.1)** into browser, on the login interface, apply “admin” for the username and password.

For example, search the WIFI hotspot broadcasted by a V3 receiver using a laptop PC, choose the WIFI hotspot and click on connect button to establish the connection without password.

Run IE browser on computer and input the **default IP (10.1.1.1)** into address bar, after a while, the system login interface is refreshed, then apply “**admin**” for username and password to login.



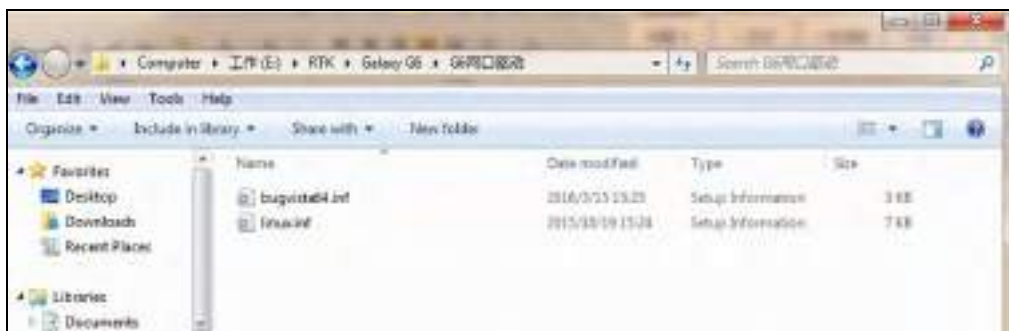


§3.3 Access by USB

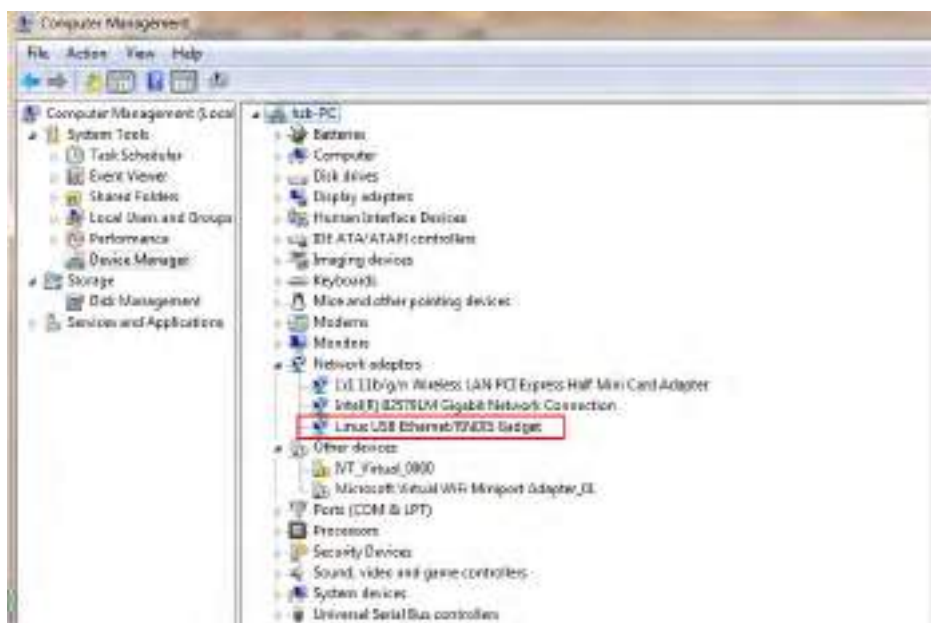
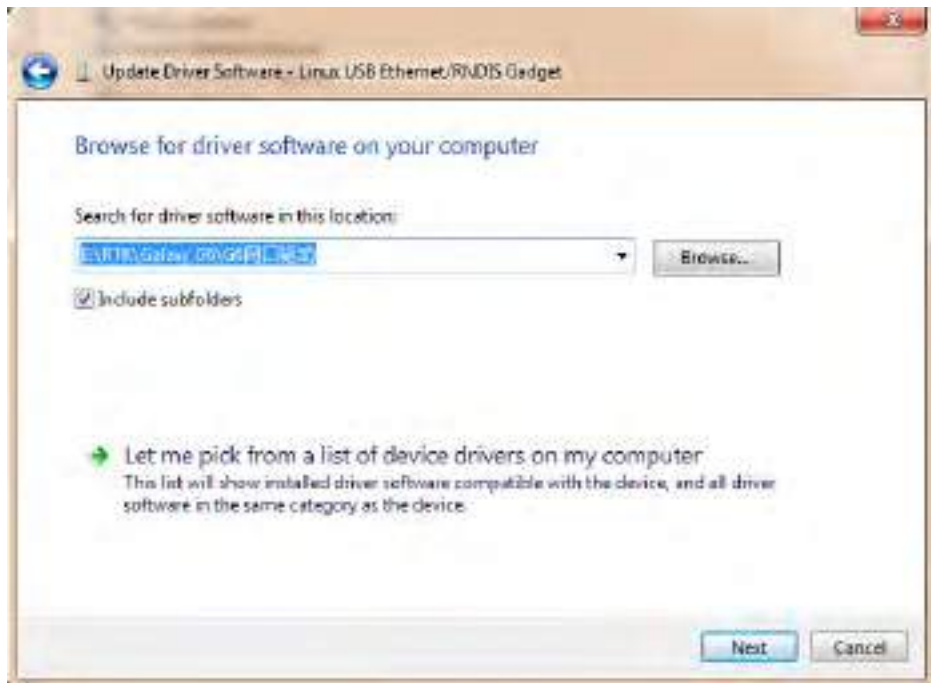
On this mode, the Type-C USB port of V3 must work as an Ethernet port, then internal web UI shall be accessed via USB cable connection with computer.

First of all, a corresponding driver is required to install to the computer, then this function could be activated.

Due to different operating system is installed on computer, the drivers should be applied to a suitable one. The file [bugvista64.inf](#) is applied to 64bit operating system, and [linux.inf](#) is for 32bit operating system.



Choose the folder which contains the drivers



NOTE: The driver can be downloaded from official website automatically or please contact with us for more supports.

If the driver has been successfully installed, the USB port of V3 will be recognized as **Linux USB Ethernet/RNDIS Gadget**, and a local area connection will generate in **Network Connections** on the computer. For example, Local Area Connection 138 generates after connecting V3 receiver to computer via USB network interface.

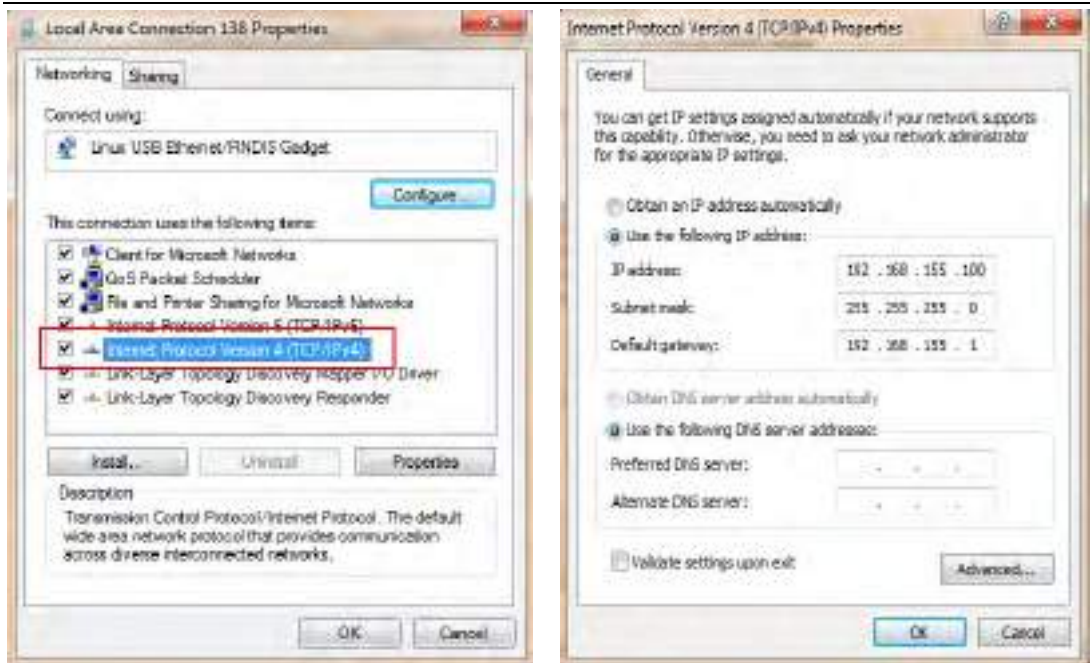


However, sometimes the computer cannot detect the receiver by USB network interface because there is something wrong with acquiring IP automatically, therefore, we need to do something to avoid such problem, that is to set a fixed LAN IP for the connection:

Right click on the local area connection which newly generates, choose properties to call out the local area connection properties window.



Then double click on Internet Protocol Version 4 (TCP/IPv4) option or click on properties button to call out Internet Protocol Version 4 (TCP/IPv4) properties window, set the fixed LAN IP address as shown in following, then click OK button and confirm the settings, return to the IE browser and use the IP address 192.168.155.155 to access the internal web UI.



Run IE browser on computer and input the **default IP (192.168.155.155)** into address bar, after a while, the system login interface is refreshed, then apply **“admin”** for username and password to login.











§3.4 Web UI main interface

After login the Web UI management of V3 by WIFI or USB connection, the main interface appears with displaying configuration items and positioning. As shown at following figures.



In the Web UI home page, the configuration items are listed at left side. And the positioning information including coordinates information and satellites are displayed at right side

Ref	Component	Description
	Status	Positioning information, satellite tracking and the others will be displayed in this page
	Configuration	It contains registration for receiver, base configuration, antenna configuration, satellite configuration, receiver configuration and system configuration.
	Satellite Information	Display and control the satellites are used or not
	Data Record	Configure the parameters for static mode and raw data download
	Data Transfer	Contains NTRIP configuration, TCP/IP configuration and data transferring with PC
	Network Config	Contains network parameters configuration, WIFI configuration and the other functions

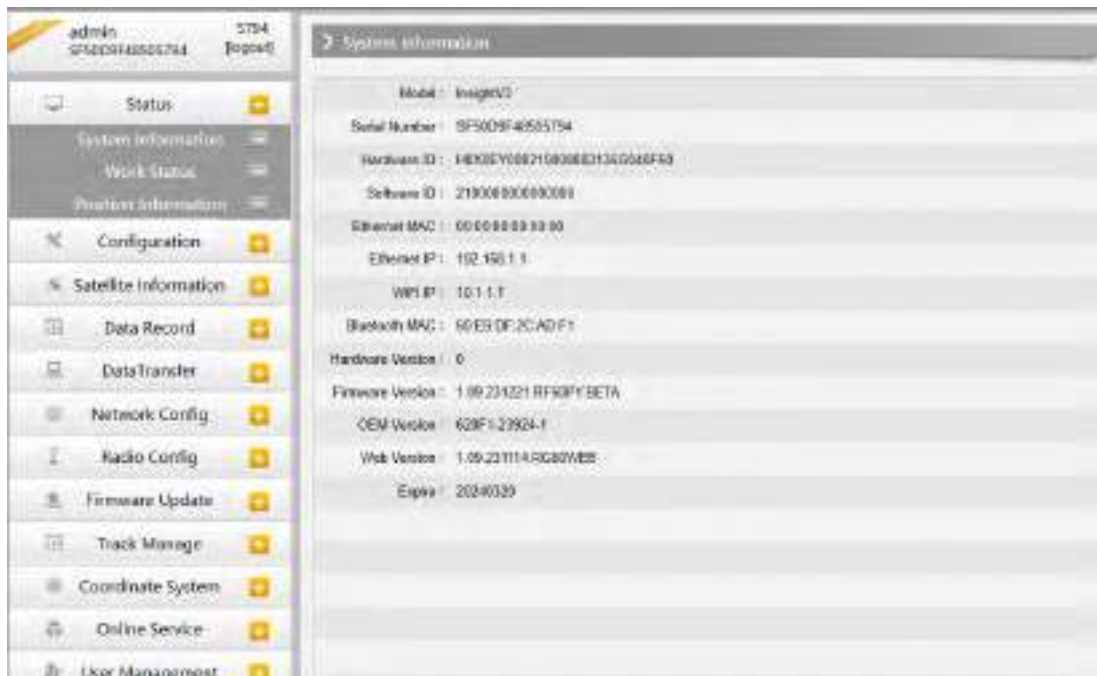
	Radio Config	Configure the parameters and frequency for radio modem
	Firmware Update	It is used to upgrade the firmware for receiver and each modem
	Track Manage	Record track file while doing measurement
	Coordinate System	Setup a local coordinate system for V3
	Online Service	Upload data onto a server in real-time
	User Management	Add and manage the Web UI users
	Frequency Spread	Frequency spread analysis
	System Log	System and data log

§3.4.1 Status

System Information, Work Status and Position Information are listed under Status menu.

System Information

In this page, all the information of V3 is displayed such as serial number, hardware ID, MAC address, firmware version and so on.



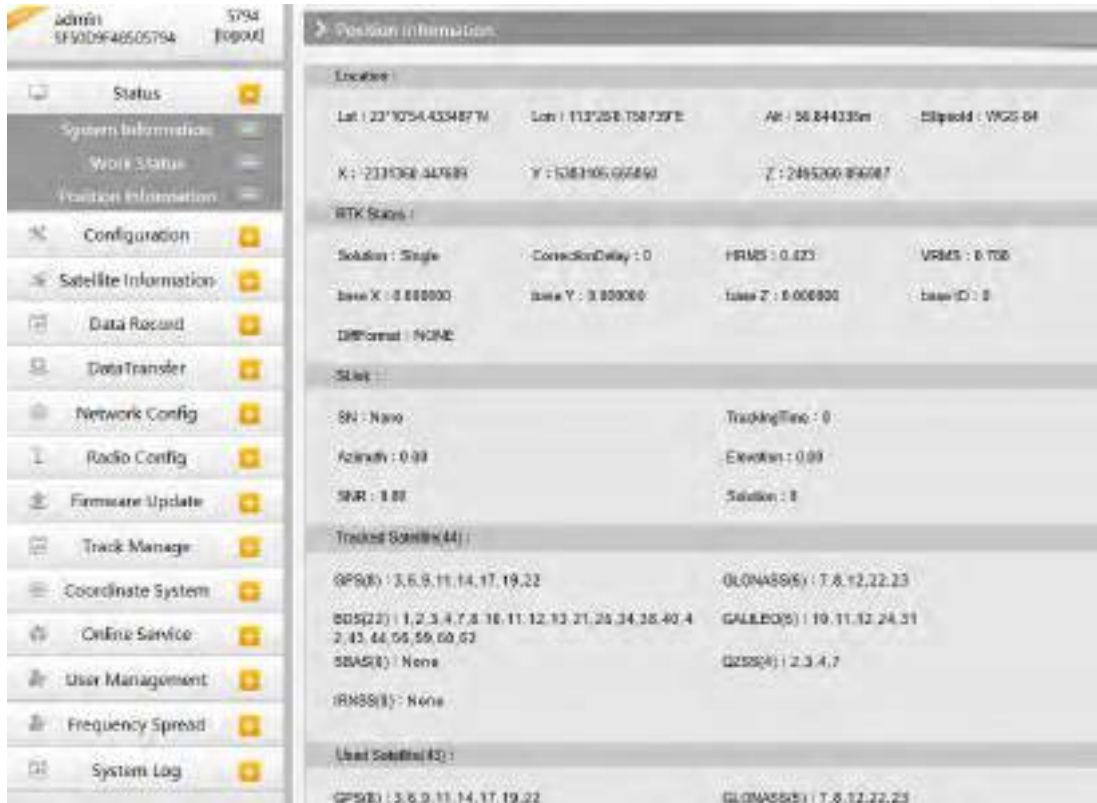
Work Status

The physical state of V3 such as working mode, datalink, host temperature, remaining power and the free memory is obtained from this page



Position Information

In this page, users can be clear at a glance on current position information and satellite

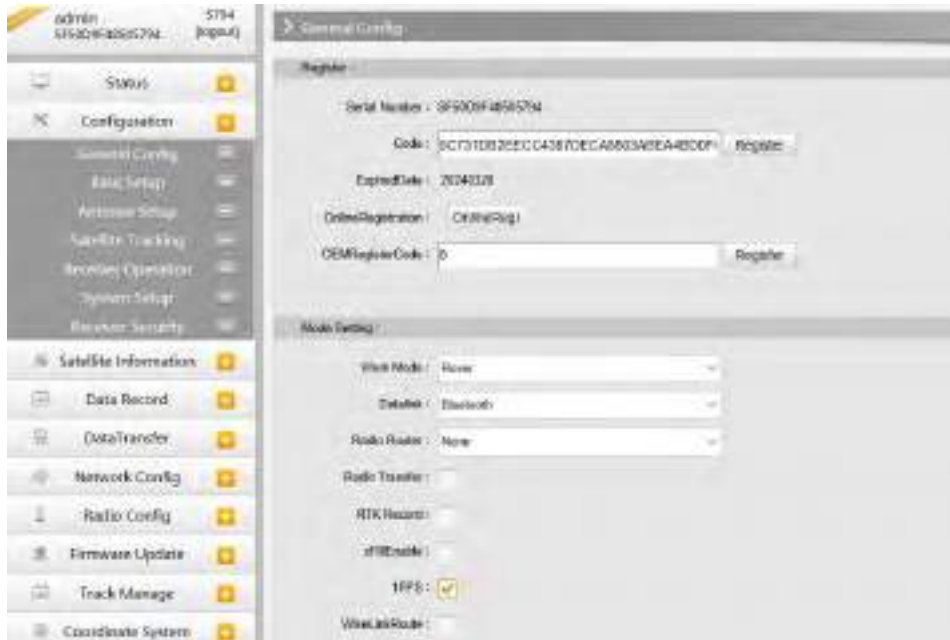


§3.4.2 Configuration

General Config, Base Setup, Antenna Setup, Satellite Tracking, Receiver Operate and Default Language are contained under Configuration menu. Users are able to configure all kinds of parameters for V3 under Configuration menu, and all the settings are immediate effect after saving.

General Config

The registration for receiver working mode setting can be completed in this general configuration page.



If the code of V3 has expired or is going to be run out, please provide the serial number of your V3 for us to apply for another available code, then input the code into the blank or register the receiver online.



V3 allows users to setup the working mode and datalink from this Web UI that only need the mobile phone or tablet PC is able to connect the wifi hotspot of V3.

Mode Setting:

Work Mode: Rover

Datalink: Radio

Radio Router: None

Radio Transfer:

RTK Record:

xFileEnable:

1PPS:

WireLinkRoute:

EVENT:

EVENT Polarity: Negative

BDSPPP: Disable

Enter Cancel

Work Mode: There are Rover, Base and Static contained in this dropdown list

Datalink: Pull down the list, there will be all kinds of options for datalink, such as radio, Network, External, Bluetooth, WIFI.

Radio

None

Radio

Network

External

Dual

Bluetooth

WiFi

IntelligentDataLink

Radio Route: This feature is used to transfer the correction which from the reference station to the other rover by radio, the rovers will have the same reference coordinates. This is in the case of working in some places where there is poor signals from reference station or there is only a SIM card for a few rovers. It is able to use internal radio or connect an external radio to transfer the correction. This feature is only available on Rover mode.

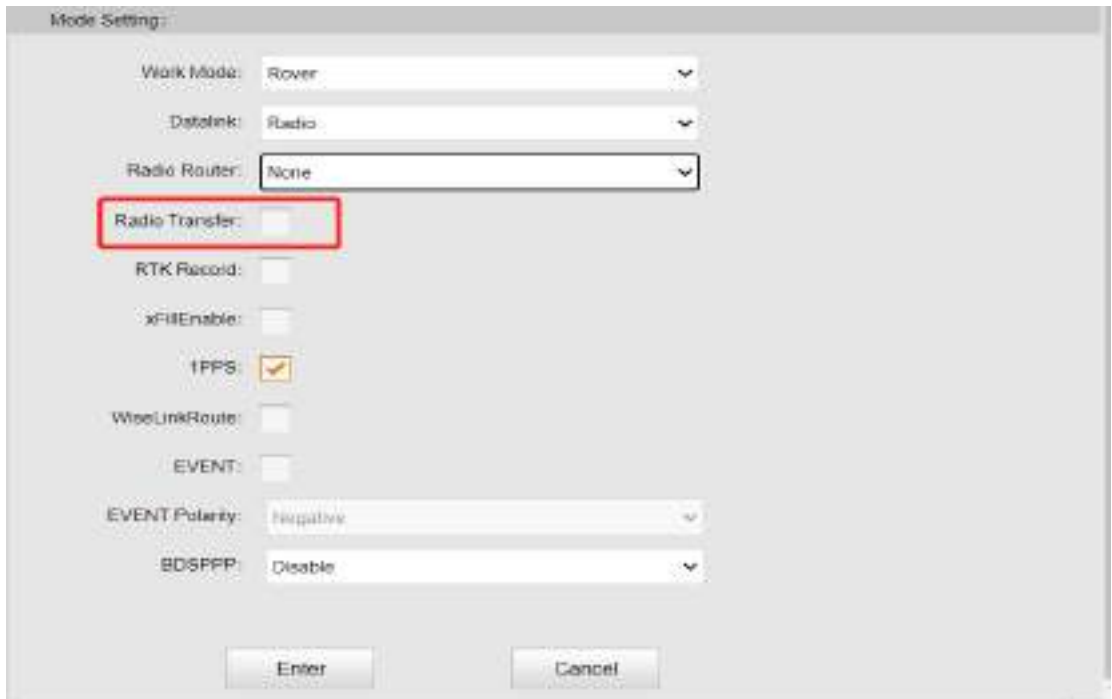
None

None

Inner Radio Router

External Radio Router

RadioTransfer: This is the function that V3 is able to transfer the correction from Base station to the other rovers with the internal UHF, definitely, V3 can work as a radio transfer (radio repeater).



Mode Setting:

Work Mode: Rover

Datalink: Radio

Radio Router: None

Radio Transfer:

RTK Record:

xFileEnable:

1PPS:

WseLinkRoute:

EVENT:

EVENT Polarity: Negative

BDSPPP: Disable

Enter Cancel

Operation:

1, check the box of “RadioTransfer” on “General Config” dialog for Base station.



Mode Setting:

Work Mode: Base

Datalink: Radio

Radio Router: None

Radio Transfer:

2, open the same function for Rover in critical status (when the Rover is close to working distance of Base internal UHF).

Mode Setting:

Work Mode: Rover

Datalink: Radio

Radio Router: None

Radio Transfer:

3, configure the datalink of the other rovers into internal UHF mode, then make sure the channel, protocol and frequency point are same as “Repeater” rover.

Note: please take in mind that the “Repeater” rover should keep away from Base station to avoid signal interference.

RTK Record: This is used to enable raw data recording in base mode or rover mode for post-processing

xFillEnable: the “Fixed-keep” function, to allow V3 keep the centimeter-level accuracy when the correction is missing

1 PPS: This option is for the 1 pulse per second output

WiseLinkRoute: receivers first priority to use internet transmit and receive corrections (a internet server is needed), if lost the internet signals, then receivers will use radio transmit and receive corrections

EVENT: This option is for the EVENT marker input

EVENT Polarity: EVENT input method.

Base Setup

When V3 works as a base, the basic configuration for base can be setup in this page. Users can input the correct coordinates or capture a current position for the base. Also users can define what kind of correction format is transmitted.

The screenshot shows the 'Base Setup' configuration page. The left sidebar contains a navigation menu with options like Status, Configuration, General Config, Base Setup, Antenna Setup, Satellite Tracking, Receiver Operation, System Setup, Receiver Security, Satellite Information, Data Record, Data Transfer, Network Config, Radio Config, Firmware Updater, Track Manage, Coordinate System, Online Service, and User Management. The main content area is titled 'Base Setup' and contains the following fields and controls:

- CMR ID: 20
- RTCM2.x ID: 794
- RTCM3.x ID: 794
- Base Lon: 110, 20, 0.059432, E, Y
- Base Lat: 23, 10, 24.062217, N, S
- Base Alt: 55 365454
- Buttons: Position, Spare
- Starting Mode: Auto By Current Point
- SLink Base Accuracy: L
- Buttons: Start Base, Stop Base
- Correction: RTCM3
- DifferInterval: 1
- PDOP Value: 3.5
- Base Status: Starting
- Buttons: Enter, Cancel

CMR ID/RTCM2.X ID/RTCM3.X ID: Users can specify the ID for transmitting correction.

Position: Click this button to capture the coordinates for current position

Spare: This is used to the repeat station

Base Start Mode: Here contains 3 methods to start the Base, manually start base, automatically start base by fixed point, automatically start base by current point.

SLink Base Accuracy: Here contains 3 methods to make sure the Base accuracy, L, M, H. Choose different methods according to different needs.

Correction: Here contains the global general used correction formats including RTCM30, RTCM32

DifferInterval: Base differential transmit interval (seconds/once)

POP Value: This value is setup for the PDOP limitation.

Status: Here will display the status for base in real-time.

Antenna Setup

The antenna parameters are configured in this page including the antenna height, measuring method.

The screenshot displays the 'Antenna Setting' configuration window. The interface includes a sidebar with navigation options and a main configuration area. The configuration area contains the following fields:

- Antenna NID: 9F50D9F40905794
- Antenna Height: 1.800
- MeasuringMethod: Carrier Phase Center
- Model: 0
- RINEX: 1
- AntennaR: 0
- AntennaH1: 700
- AntennaH2: 700

Buttons for 'Enter' and 'Cancel' are located at the bottom of the configuration area.

Antenna Height: This is the value for height of antenna while surveying.

Measuring Method: Here provides several methods for measuring the antenna height such as carrier phase center, slant height, antenna edge, height plate and to the bottom.

The close-up shows the 'MeasuringMethod' dropdown menu with the following options:

- To The Bottom
- Carrier Phase Center (Selected)
- Slant Height
- Antenna Edge
- Height Tape
- To The Bottom

Satellite Tracking

In this page, users can define the mask angle for satellite tracking, and check on the box of corresponding band from the constellation that to use this band or not

The screenshot shows the 'Satellite Tracking' page in the SOUTH V3 web interface. The top left corner displays the user 'admin' with ID '3F509F48585794' and a 'logout' link. The sidebar menu includes 'Status', 'Configuration', 'Satellite Information', 'Data Record', 'Data Transfer', 'Network Config', 'Radio Config', 'Firmware Update', 'Track Manage', 'Coordinate System', 'Online Service', and 'User Management'. The main content area features a 'Mask Angle' input field set to '10' and a table of satellite signals.

Type	Signal	
GPS	L1-CW	✓
GPS	L1-P	✓
GPS	L2-CW	✓
GPS	L2-P	✓
GPS	L5	✓
GLONASS	L1-CW	✓
GLONASS	L1-P	✓
GLONASS	L3-CW	✓
GLONASS	L3-P	✓
GLONASS	L3	✓
BDS	B1	✓
BDS	B2	✓
BDS	B3	✓
BDS	B3A	✓
SBAS	L1-CW	✓
SBAS	L5	✓
Galileo	E5	✓
Galileo	E5	✓

Receiver Operate

The page provides all kinds of operations to control the receiver such as self-check operation, clean epochs, factory reset, reboot and power off.



Self-check: Users can also do the self-check from this configuration page, click on the Check all button to check all the modems or click on the check button corresponding to the modem to check one by one.

Clean EPH: Click this button to clear the remaining epochs to let receiver track the satellites better.

Factory Default: Click this button to bring the receiver back to factory default setting.

Reboot: Click this button to restart the receiver.

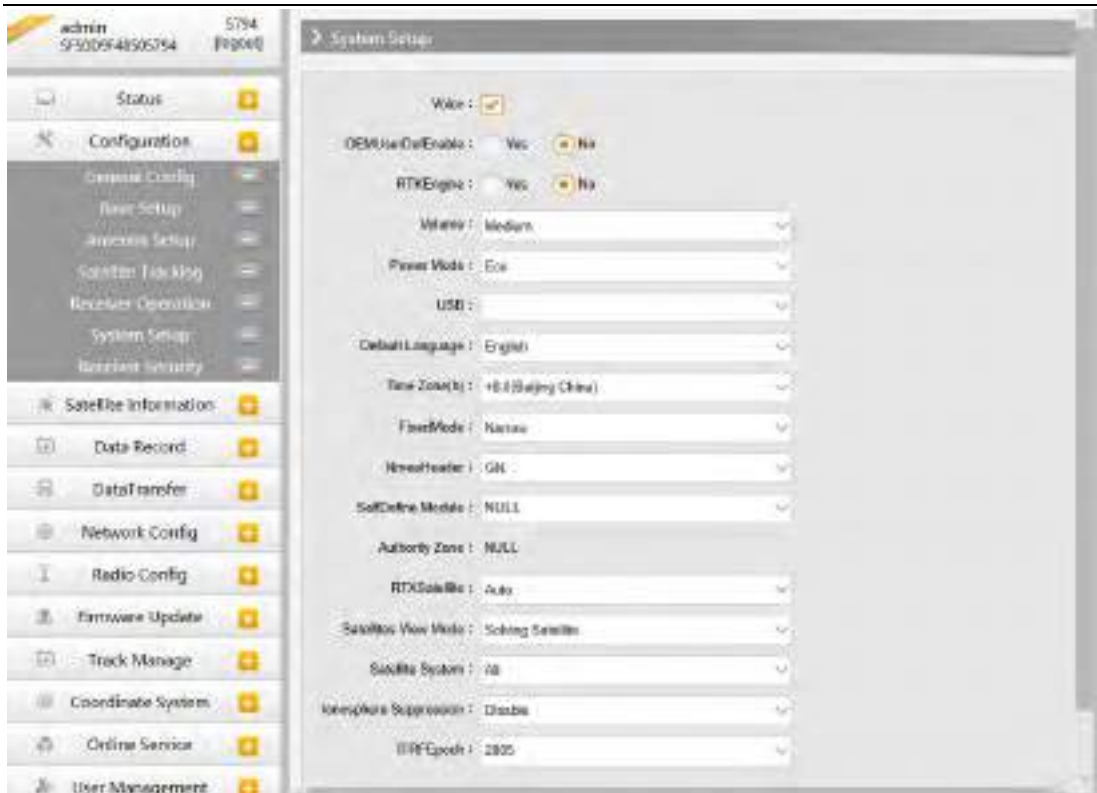
Power Off: Click this button to power off the receiver.

Reset OEM(cold): to reset OEM, and receiver will restart.

Reset OEM(hot): to reset OEM, receiver will not need to restart.

System Setup

This page is used to control Voice prompt, volume of voice, power saving, USB mode and the default language for receiver.



Voice: Check on this box to turn on the voice guide for V3, uncheck it to turn off the voice guide.

OEMUserDefEnable: check “No” for V3.

RTKEngine: check “No” for V3.

Voice Volume: Define the voice volume for V3’s speaker.

Power Mode: Configure the receiver to use the power saving mode or not.

USB: Now V3 supports the USB mode and Network interface at the same time through the usb type-c cable.

Default Language: Configure the default language for V3 which associates with voice guide.

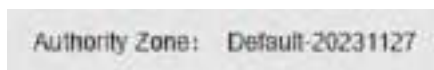
TimeZone(h): Use this to setup the corresponding time zone for your country or area.

FixedMode: Some receiver has the option for fixed mode narrow or wide, but this option is not working on V3.

NMEAheader: Choose the output data header in GN, GP or HE format.

Self-defense module: To set a user-defined work mode and output mode for receiver. Usually please choose NULL.

Authority zone: Default means the default area. Global-20991215 means it can work in all around the world.



Authority Zone: Global-20981216

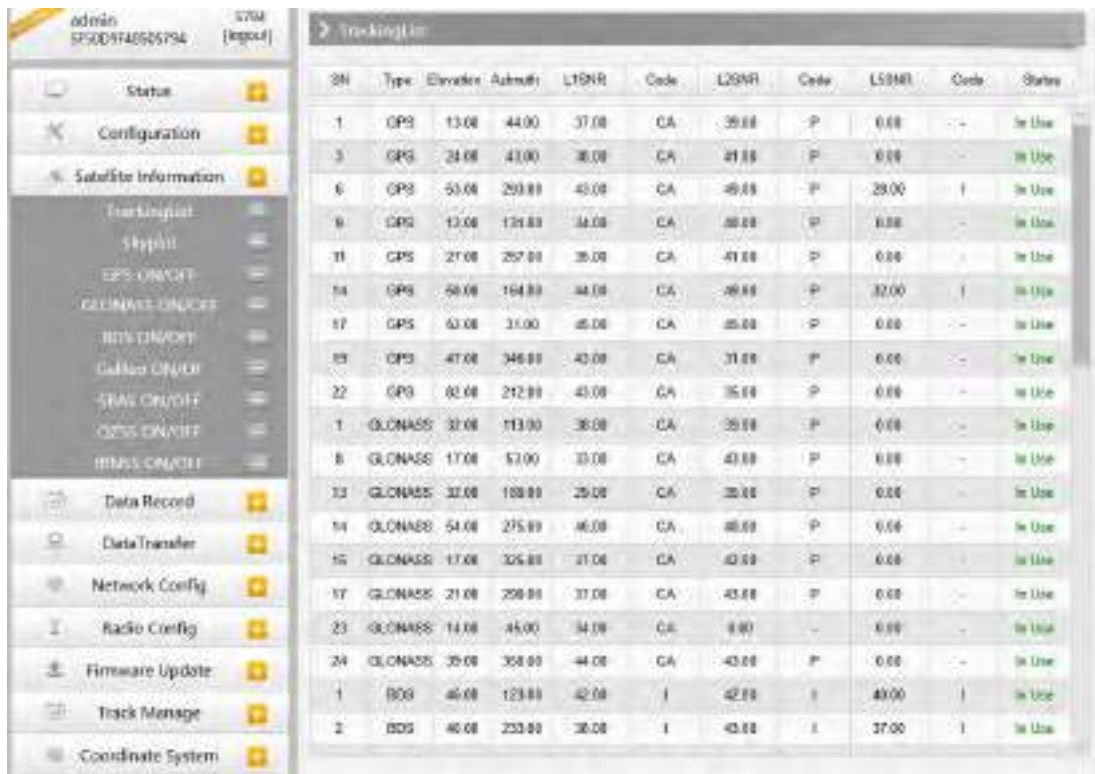
Satellites View Mode: There are two methods, Solving Satellite and Common Visible Satellite.

Satellites System: You can choose the different satellite systems in here.

Ionosphere Suppression: It has a big influence for RTK when the ionosphere is active, so you can try turn on this feature.

ITRFepoch: epoch selection, select an epoch at a different time based on the update time.

Receiver security: to backup the receiver system, so that we can use the backup system if the receiver has any problem.



The screenshot shows a web interface for satellite tracking. On the left is a sidebar with various configuration options, and on the right is a table titled 'TrackingList'.

Sidebar Configuration Options:

- Status
- Configuration
- Satellite Information
 - TrackingList
 - Skyplot
 - GPS ON/OFF
 - GLONASS ON/OFF
 - BDT ON/OFF
 - Galileo ON/OFF
 - SBAS ON/OFF
 - QZSS ON/OFF
 - IRNSS ON/OFF
- Data Record
- Data Transfer
- Network Config
- Radio Config
- Firmware Update
- Track Manage
- Coordinate System

TrackingList Table:

SN	Type	Elevate	Azimuth	L1SNR	Code	L2SNR	Code	L3SNR	Code	Status
1	GPS	13.08	44.00	37.08	CA	39.88	P	0.08	--	In Use
3	GPS	24.08	43.00	38.08	CA	41.88	P	0.08	--	In Use
6	GPS	53.08	293.88	45.08	CA	46.88	P	28.00	I	In Use
9	GPS	12.08	124.88	34.08	CA	38.88	P	0.08	--	In Use
11	GPS	27.08	257.88	35.08	CA	41.88	P	0.08	--	In Use
14	GPS	58.08	164.88	44.08	CA	46.88	P	32.00	I	In Use
17	GPS	63.08	31.00	45.08	CA	48.88	P	0.08	--	In Use
19	GPS	47.08	346.88	43.08	CA	31.88	P	0.08	--	In Use
22	GPS	82.08	212.88	43.08	CA	35.88	P	0.08	--	In Use
1	GLONASS	33.08	113.00	38.08	CA	39.88	P	0.08	--	In Use
8	GLONASS	17.08	57.00	33.08	CA	43.88	P	0.08	--	In Use
13	GLONASS	32.08	188.88	29.08	CA	38.88	P	0.08	--	In Use
14	GLONASS	54.08	275.88	46.08	CA	46.88	P	0.08	--	In Use
15	GLONASS	17.08	325.88	31.08	CA	40.88	P	0.08	--	In Use
17	GLONASS	21.08	258.88	37.08	CA	43.88	P	0.08	--	In Use
23	GLONASS	14.08	45.00	34.08	CA	9.80	--	0.08	--	In Use
24	GLONASS	39.08	368.88	44.08	CA	43.88	P	0.08	--	In Use
1	BDT	46.08	123.88	42.08	I	42.88	I	43.00	I	In Use
2	BDT	46.08	233.88	38.08	I	43.88	I	37.00	I	In Use

§3.4.3 Satellite Information

The “Satellite Information” provides all kinds of tables, graph and the skyplot to view the information of tracking satellites. And it is allowed to configure to use which satellite in constellation on/off page by checking on the corresponding box.

Tacking Table

Here is the table to list all current used satellites and the other information for these satellites.

ID	Type	Frequency	Altitude	UHFREQ	Code	L2990	Code	L2995	Code	Status
2	GPS	8.12	188.84	23.00	CA	33.80	F	0.00	-	On Use
3	GPS	6.13	218.07	23.00	CA	33.80	F	27.80	-	On Use
4	GPS	81.02	268.32	40.00	CA	43.80	F	43.80	-	On Use
7	GPS	3.75	312.46	30.00	CA	0.00	-	0.00	-	On Use
8	GPS	58.02	212.07	45.00	CA	47.80	F	46.80	-	On Use
9	GPS	28.17	302.77	45.00	CA	43.80	F	46.80	-	On Use
16	GPS	41.02	26.18	45.00	CA	37.80	F	0.00	-	On Use
21	GPS	13.88	373.49	41.00	CA	38.80	F	0.00	-	On Use
25	GPS	28.05	21.00	41.00	CA	41.80	F	41.80	-	On Use
27	GPS	74.77	81.71	45.00	CA	43.80	F	43.80	-	On Use
33	GPS	15.00	119.74	45.00	CA	43.80	F	41.80	-	On Use
37	GPS	34.87	108.02	45.00	CA	43.80	F	0.00	-	On Use
6	GLONASS	32.74	232.72	21.00	CA	0.00	-	0.00	-	On Use
7	GLONASS	32.28	204.21	45.00	CA	38.20	F	0.00	-	On Use
9	GLONASS	33.92	238.12	45.00	CA	40.20	F	0.00	-	On Use
10	GLONASS	4.40	204.09	21.00	CA	0.00	-	0.00	-	On Use
15	GLONASS	0.20	89.54	21.00	CA	34.20	F	1.00	-	On Use
16	GLONASS	32.45	36.87	45.00	CA	34.20	F	0.00	-	On Use
18	GLONASS	34.82	68.22	45.00	CA	44.20	F	0.00	-	On Use

Skyplot

In this page, all the tracking satellites are shown on the skyplot, this let users intuitively view and know where the current position of satellite is.

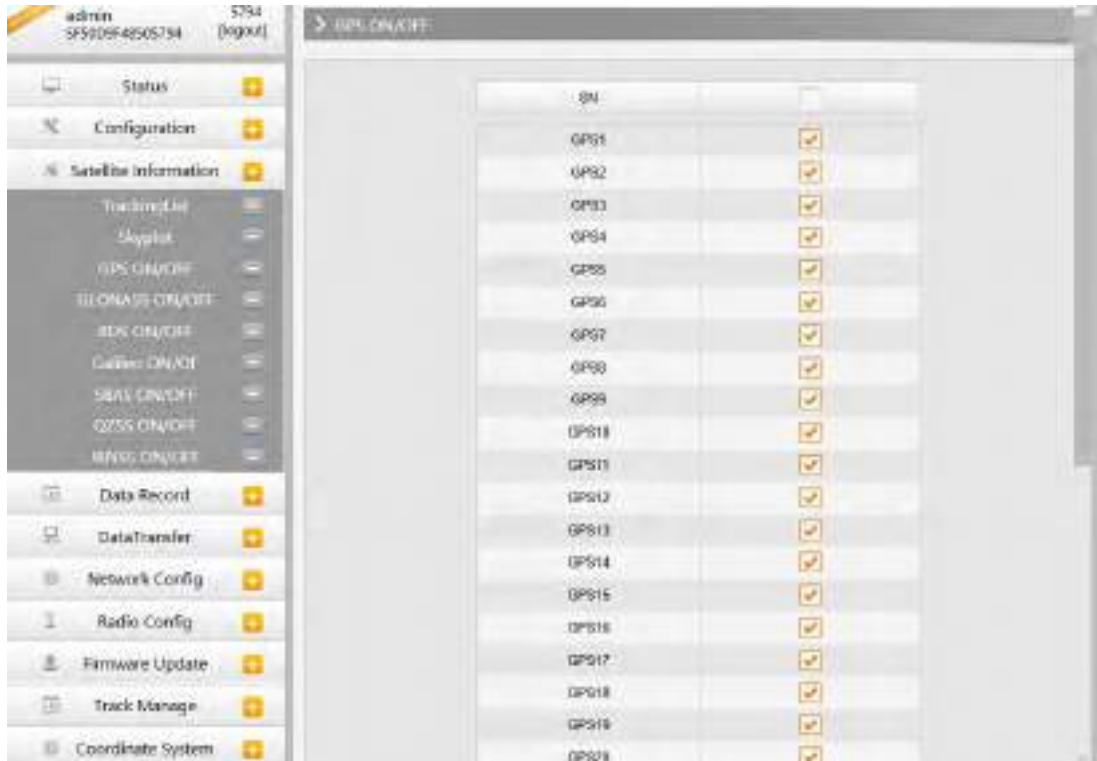


GPS on/off

For all the running GNSS constellations or the augmentation system, V3 allows to configure to use which satellite or not.

In gnss on/off page, all the running satellites are listed, and unselect the box corresponding to the

satellite to not use it.



GLONASS on/off: to check and uncheck the satellites for tracking

BDS on/off: to check and uncheck the satellites for tracking

GALILEO on/off: to check and uncheck the satellites for tracking

SBAS on/off: to check and uncheck the satellites for tracking

QZSS on/off: to check and uncheck the satellites for tracking

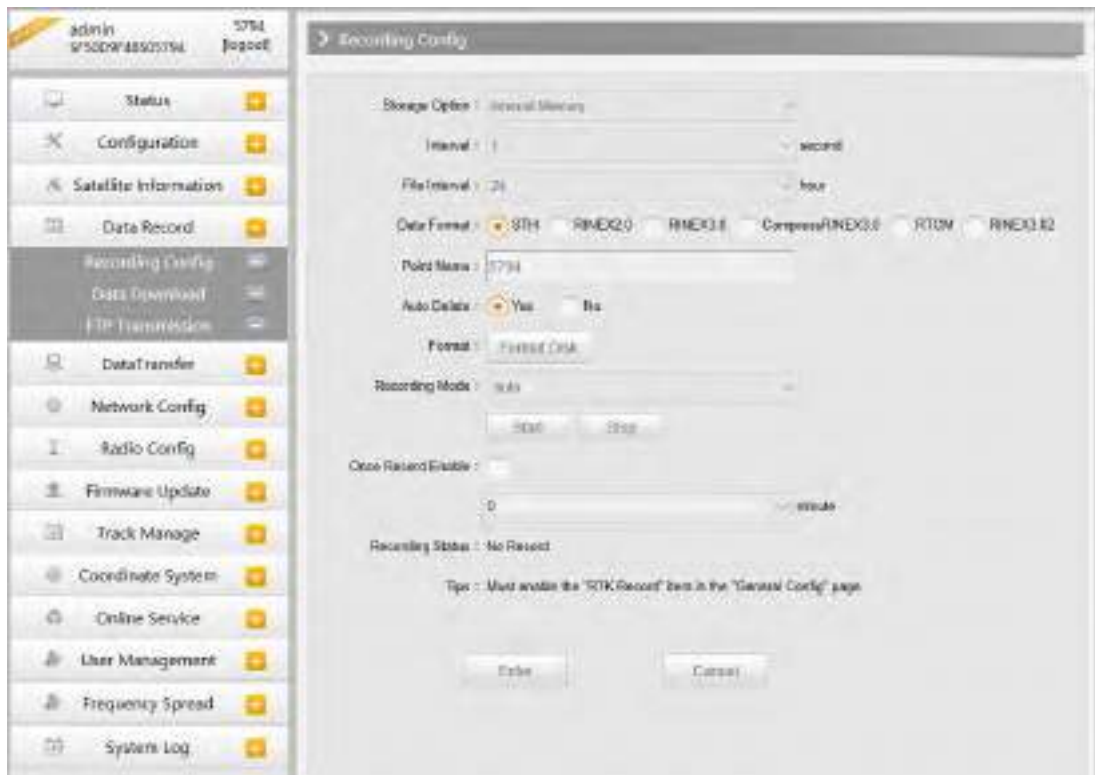
IRNSS on/off: to check and uncheck the satellites for tracking

§3.4.4 Data Record

The “Data Record” performance is mainly used to configure all the parameters for receiver in static mode. Much more operations can be done on V3 such as storage path, interval, data format and data files download.

Recording Config

The page provides more practical operations for raw data storage.



Storage Option: Here are the options to be selected for where the raw data will be stored, internal memory or external memory.

Interval: This is the sampling interval for data storage, 50Hz (0.02s) sampling interval now is available for V3.

File Interval: This is used to defined the data storage time for the static file.

Data Format: Here are 3 options to selected for V3 to store what kind of format data, STH, Rinex2.0 and Rinex3.0.

Point Name: A point name is required, the last 4 digits of SN is default setting for the point name.

Auto Delete: This is used to configured V3 to delete the previous data files automatically if the memory is full.

Format: Click this button to format the internal memory for V3.

Recording Mode: Here are 2 options to configure V3 to record raw data automatically or not if it achieves the sampling conditions.

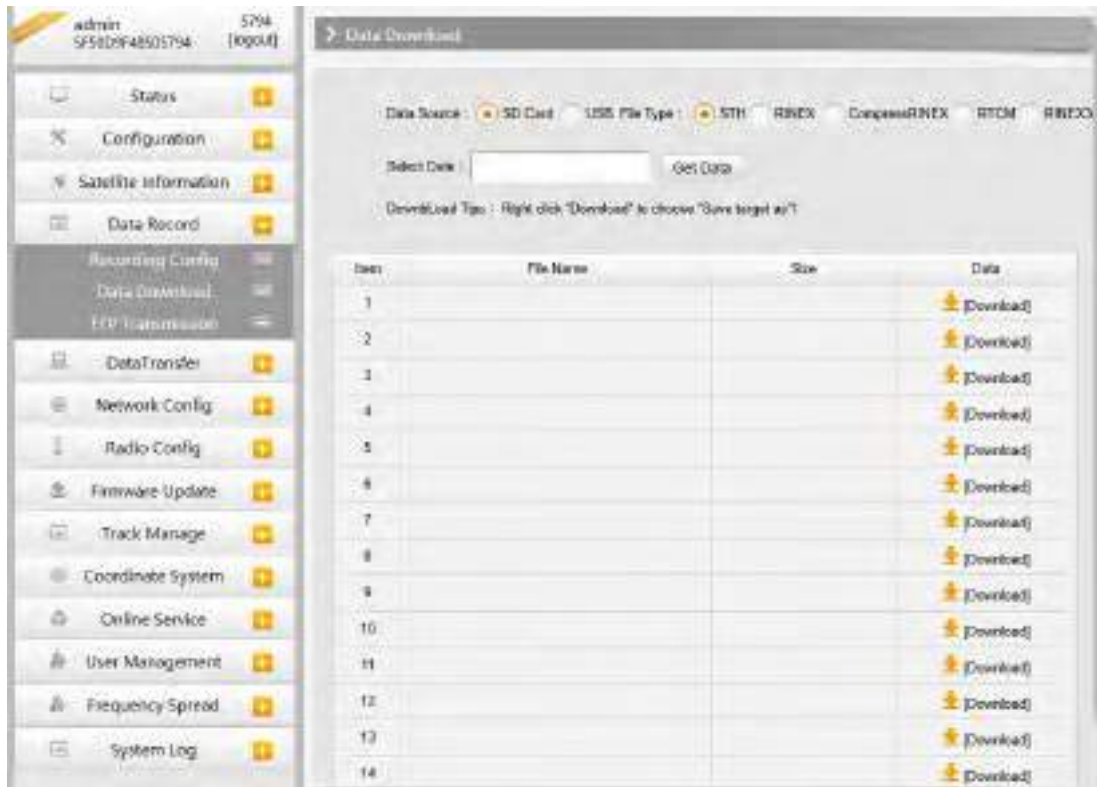
Once Record Enable: to set a Timer for static recording, for example if set 5 minutes, then the receiver will only record 5 minutes, after that receiver will stop record static data.

Recording Status: Here shows the status(time) of static data storage.

Data Download

This page provides the data files to download.

Choose the storage where the static data recorded, and file type, then click on the blank of “Select Date” to choose what date the data was recorded and click “Get Data” button, all the files recorded in the date you choose will show in the table, tap download button to download the data files.



FTP Transmission

FTP is a file transfer protocol.

By logging in to an existing or newly created ftp server, the user communicates with another host by means of file operations (such as file addition, deletion, modification, search, transmission, etc.)



§3.4.5 Data Transfer

This performance contains General, Serial Port Config, TCP/IP Config, NTRIP Config and Data Flow Config. The “Data Transfer” allows to configure the output mode for raw observation data and differential data, as well as to the NTRIP performance configuration.

General

This page shows the service condition and the output contents of the ports, if the port item display in green, that means the port is being used, and the port is not used while the item display in red.



The screenshot shows the 'Data Transfer' configuration page. On the left is a navigation menu with options: Status, Configuration, Satellite Information, Data Record, Data Transfer, General, Serial Port Config, TCP/IP Config, NTRIP Config, Multiple Ports, Data Flow Config, and RTCM Config. The main area is titled 'General' and contains a table with the following data:

Type	Output	Input	Output
Serial	LEMO(115200)	None	Navigation Data
Serial	BLUETOOTH(115200)	None	Navigation Data

Serial port Config

This page is allowed to configure the baud rate, odd-even check and the data flow for serial port (5-pin port) and Bluetooth.



The screenshot shows the 'Serial Port Config' page. The navigation menu is the same as in the previous screenshot. The main area is titled 'Serial Port Config' and contains a table with the following data:

Item	Serial Port	Baud Rate	Odd/Even	Data Flow	Enable
1	LEMO	115200	None	Navigation Data	<input checked="" type="checkbox"/>
3	BLUETOOTH	115200	None	Navigation Data	<input checked="" type="checkbox"/>

At the bottom of the table are 'Enter' and 'Cancel' buttons.



CAUTION: do not change the default value in this page for each item, if you want to change the settings, please contact with SOUTH technician for further support.

In the dropdown list of data flow, there shows 4 items for selection.

Raw observation data: This is the raw observation data straight from OEM board.

Correction Data: This is the correction data straight from OEM board.

Navigation Data: This is the navigation data output from receiver such as NMEA-0183, GSV, AVR, RMC and so on. It is configured in Data Flow Config page.

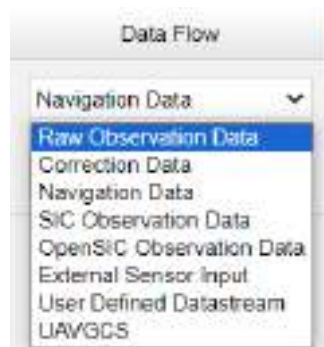
SIC Observation Data: This is the user-defined format observation data from SOUTH.

OpenSIC Observation Data: This is the open version of SOUTH user-defined format observation data for secondary development.

External Sensor Input: The Data that input via an external sensor.

User Defined Datastream: You can choose this option when you want to defined datastream.

UAVGCS: UAV data format.

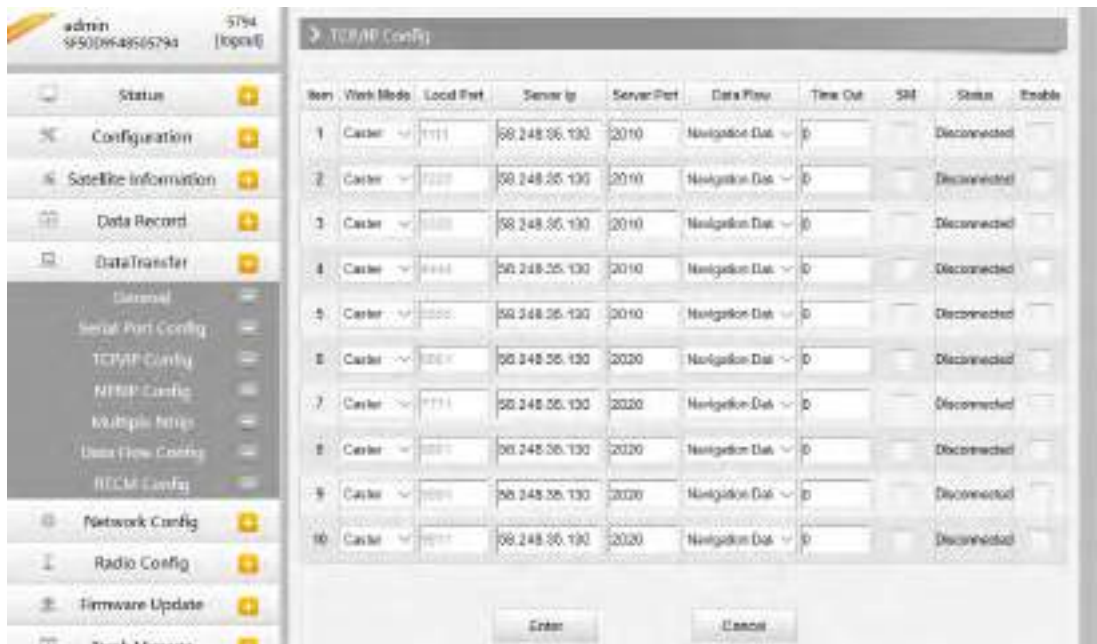


TCP/IP Config

This is used to configured the raw data or navigation data to be uploaded or transferred to a server. And there are Caster and Server working mode for this performance.

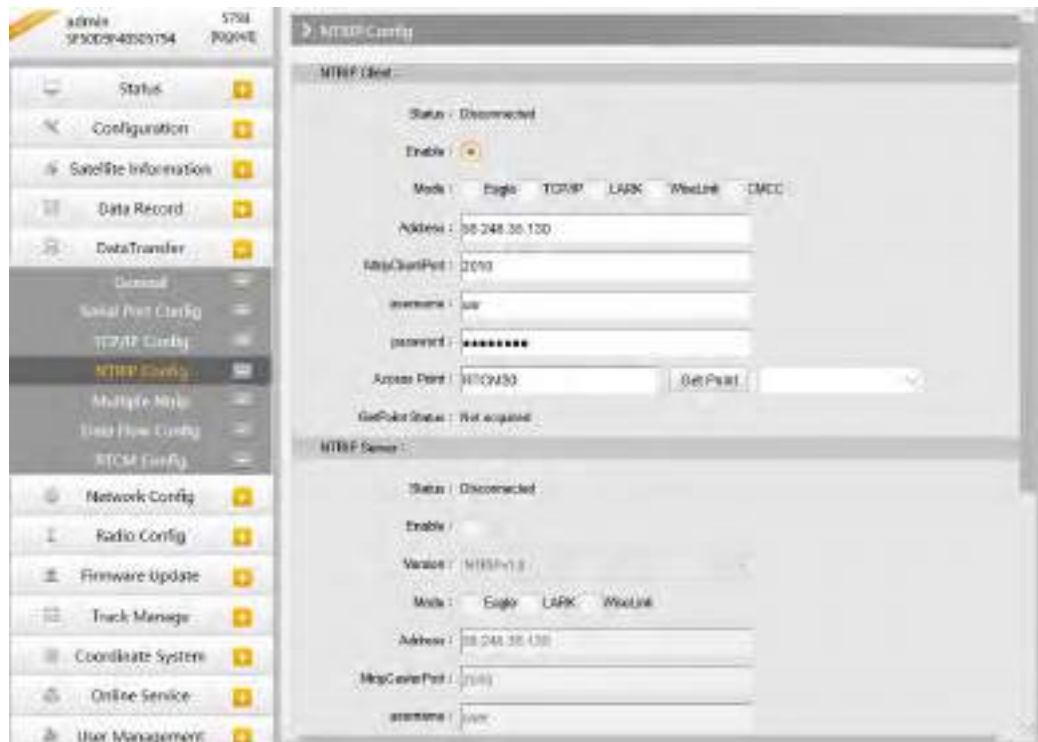
Caster: If this working mode is selected, V3 will be a client to upload the data to a specify server if it connects to the internet by WIFI or GPRS connection with SIM card inserted. Input the specified IP and port for server, and the data format what is uploaded. Then users are able to see the uploaded data on server.

Server: V3 will upload the data onto internet by the static WIFI if server is selected, then users are able to obtain its dynamic data by accessing to V3 through the IP from receiver.



NTRIP Config

This is used to configure the NTRIP performance while receiver is going to connect to internet. V3 supports complete NTRIP performance including NTRIP Client, NTRIP Server and NTRIP Caster.



Multiple Ntrip

To transmit corrections to different server at the same time through Ntrip protocol



Data Flow Config

In this page, users can optionally to configure the content and the update rate of data flow that to output or not to output what kind of data format.

Click on the dropdown list for each data format to define the update rate



RTCM Config

In this page, users can set different differential signal formats.



§3.4.6 Network Config

The “Network Config” is able to configure the ways and the contents for internet access of New V3 plus. GSM/GPRS Config, CSD Config, WIFI Config, Bluetooth Config, Port Forwarding, Router and Network Testing are under the list of Network Config

GSM/GPRS Config

In this page, all the information of receiver under GPRS mode will be displayed including the hardware information and dialing status.

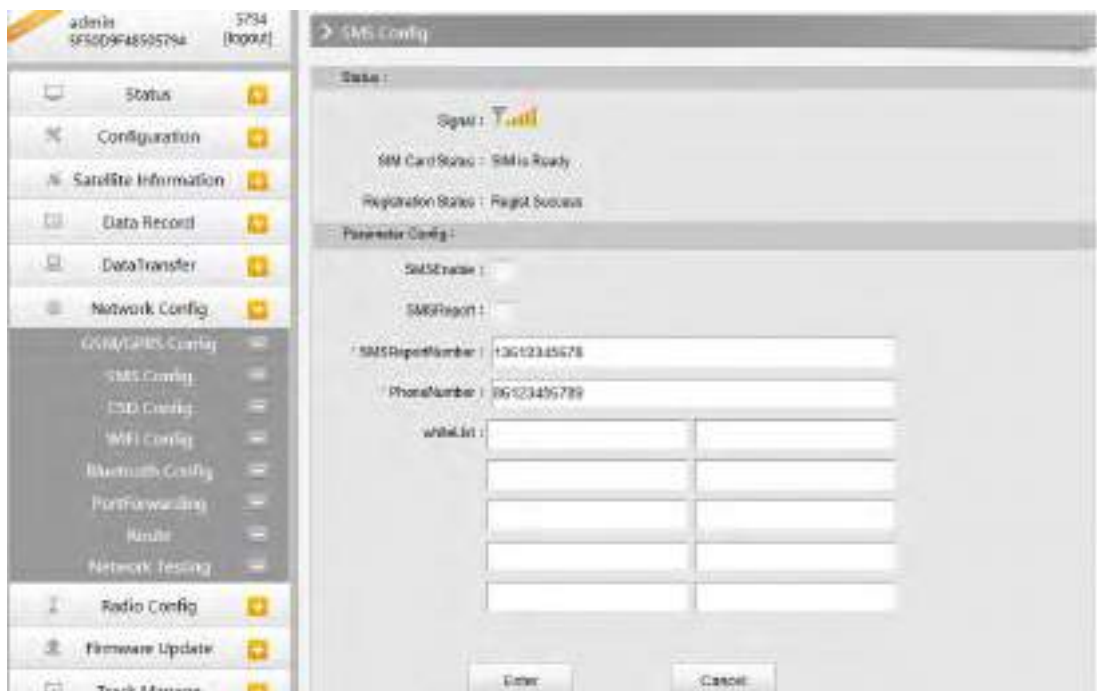
Status: The dialing status and hardware information are displayed in this field that users can intuitively to view the signal of network, module model and the IMEI number of the module.

Parameter Config: The parameters of SIM card are input in this field including APN, assigned username and password, dial mode.



SMS Config

On this configuration dialog, input a phone number into the blank, New V3 plus will send text message onto the phone which number is written.



WIFI Config

This is mainly used on the WIFI configuration for V3, there are AP mode and Client mode for optional.

V3

AP: This is used to enable the WIFI hotspot for V3 to broadcast for mobile terminals such as smartphone or tablet to connect and access the Web UI.

Check the box of AP in Work Mode to enable the WIFI hotspot for V3, and define the SSID, password, encryption method and broadcasting channel for WIFI connection.

DHCP IP Range: This is allowed to user-defined the IP for Web UI login.



Client:

This option enables V3 to search and connect the other WIFI hotspot which connects to the internet, the receiver is able to download and use the mountpoint from reference station.

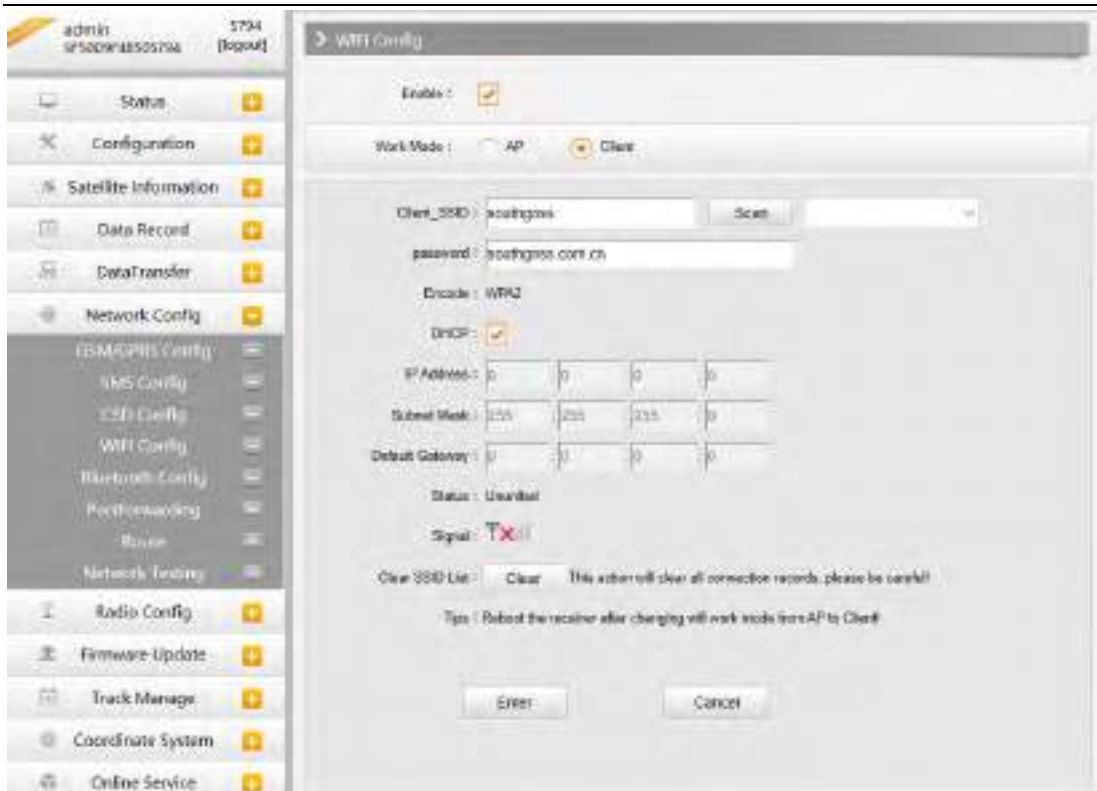
Client_SSID: This is the WIFI hotspot which V3 is going to connect

Scan: Click this button to search the surrounding available WIFI hotspot.

Password: This is the password which the WIFI hotspot requires.

IP fields: If V3 successfully connects to the WIFI, there will be an LAN IP address generated by V3.

ClearSSID: Click this button to clear the SSID list.



Bluetooth Config

In this page, users can view the information and connection status of Bluetooth, such the MAC of Bluetooth, discoverable or not, the PIN code, and the connection devices in following table. The advanced Settings module enables Bluetooth search.



Port Forwarding

This page is mainly used to view and configure the internet transmission port for V3, customize and debug receiver.



NOTE: Usually we will keep the default setting in this page, if you would like to modify it, please contact with SOUTH technician for more supports.

Route

This is mainly used to view and configure the parameters for router, only under the condition of customize and debug receiver.



NOTE: Usually we will keep the default setting in this page, if you would like to

modify it, please contact with SOUTH technician for more supports.

Network testing

In this page , after entering the IP address, the user can query the network status.



§3.4.7 Radio Config

As the name implies, the parameters of radio can be done in “Radio Config”, it is divided into Radio Parameter and Radio Frequency.

Radio Parameter

This page is mainly used to configure the parameters for internal radio module of V3.



High performance mode: To increase the radio performance in the forest and harsh environment, both Base and Rover should be enable this function at the same time, and the protocol should be farlink. If Rover doesn't support Farlink protocol, then the Base should disable this function, otherwise Rover cannot get fixed solution. Usually we suggest clients disable this function.

Air Baud Rate: This represents the data transmission rate in the air of internal radio, the higher value, the bigger of data size transmitted per second, usually keep the default setting with 9600.

Data Baud Rate: This represents the rate of data transmission port of internal radio. The rate should be the same in both Base and Rover. In general, the data baud rate of SOUTH radio module has been unified to be 19200, keep it as default.

Channel: This is the communication channels for internal UHF, the value of the channel must be the same both in Base and Rover.

Power: This appears only in Base mode, the radio transmitting power is allowed to define in High, Middle or Low power.

Protocol: This is radio communication protocol for data transmission, SOUTH (SOUTH) , Farlink and TRIMTALK are optional in this page and SOUTH is the default setting, if it is changed, Base and Rover must use the same protocol for communication.

LockBase: If users choose FarLink protocol, the signal sent when the base station connects to the mobile station will be locked and will not be interfered by other base stations.

BaseNetID: If enable the LockBase, then you can input the ID of the Base you will receive.

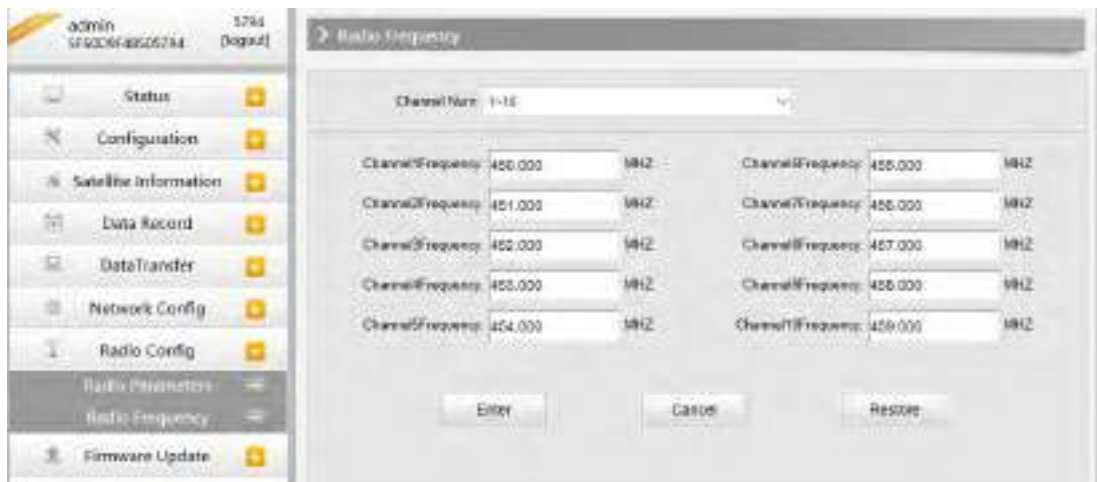
BaseAlarm: If Base receiver moves(by some unexpected reasons), rover will receive a notification about the base movement.

Factory Default: Click this button to restore the factory default for internal UHF module.

Radio Frequency

For V3, the powerful internal radio module supports much more radio channels apply to the legal frequency in different countries or areas.

There are 16 radio channels listed in this page after clicking on radio frequency. Users are able to change the frequency freely in the channel spacing, click Restore button to bring the frequency of each channel back to default setting.



§3.4.8 Firmware Update

Update the latest firmware for receiver or for corresponding modems can be done in “Firmware Update”.

Firmware Update

This page displays all the information of the firmware which current installed on V3, and allows to update the latest version firmware for receiver. To get latest version firmware please contact with SOUTH technician.

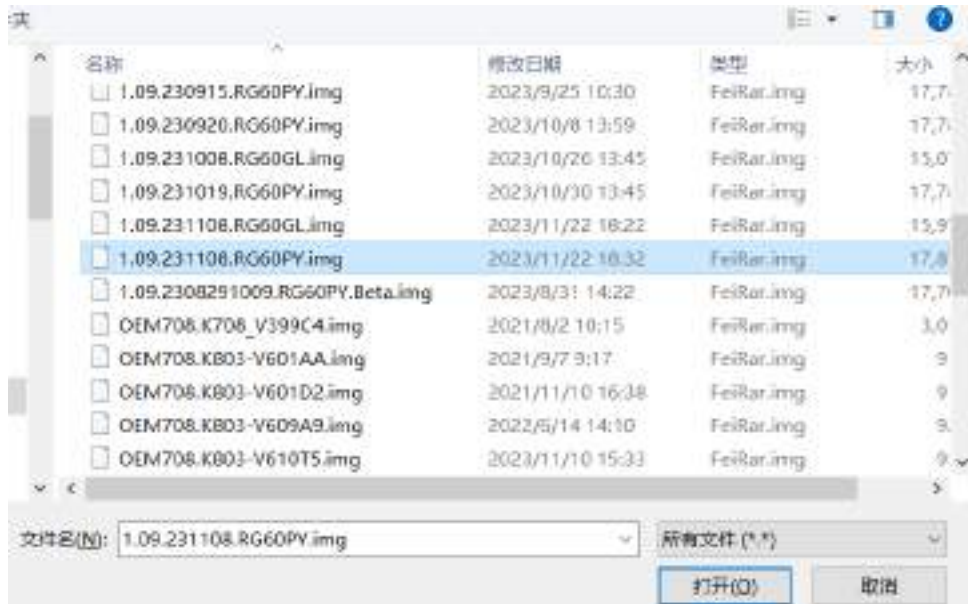


Online Update: V3 supports to update the firmware online anytime if there is something update or optimized.

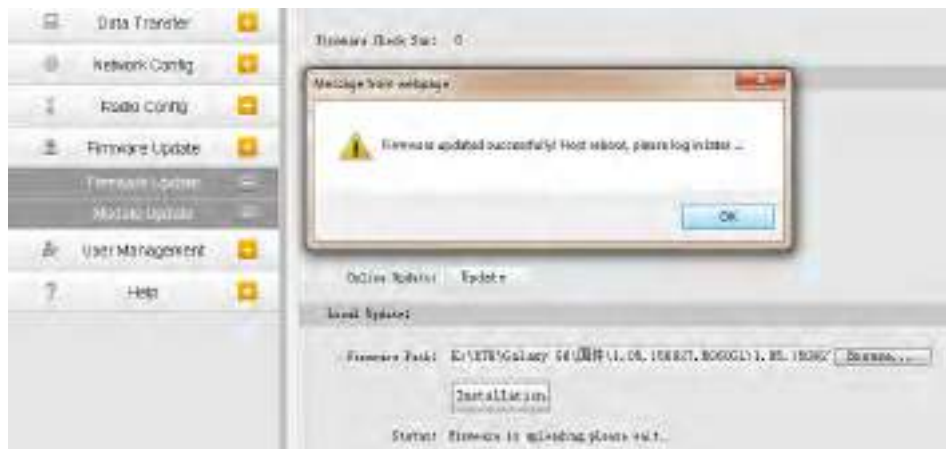
Local Update: Update the latest firmware by using a firmware file.

How to upgrade the firmware with Local Update

- a) Click on “Browse” button to load firmware file (Please take in mind that the firmware is ended with .img as the extension name).



- b) And then click “Installation” button to start upgrading.



- c) After the firmware is completed upgrading, a dialog will appear saying “Firmware updated successfully! Host reboot, please log in later...”, then the receiver will restart automatically.



SPECIAL REMIND: V3 doesn't support to update the firmware with the help of INstar program any more, in the future, update the firmware for V3 shall be done through the Web UI.

Module Update

This page is used to update the firmware for corresponding modem such as OEM board, radio module and sensor.

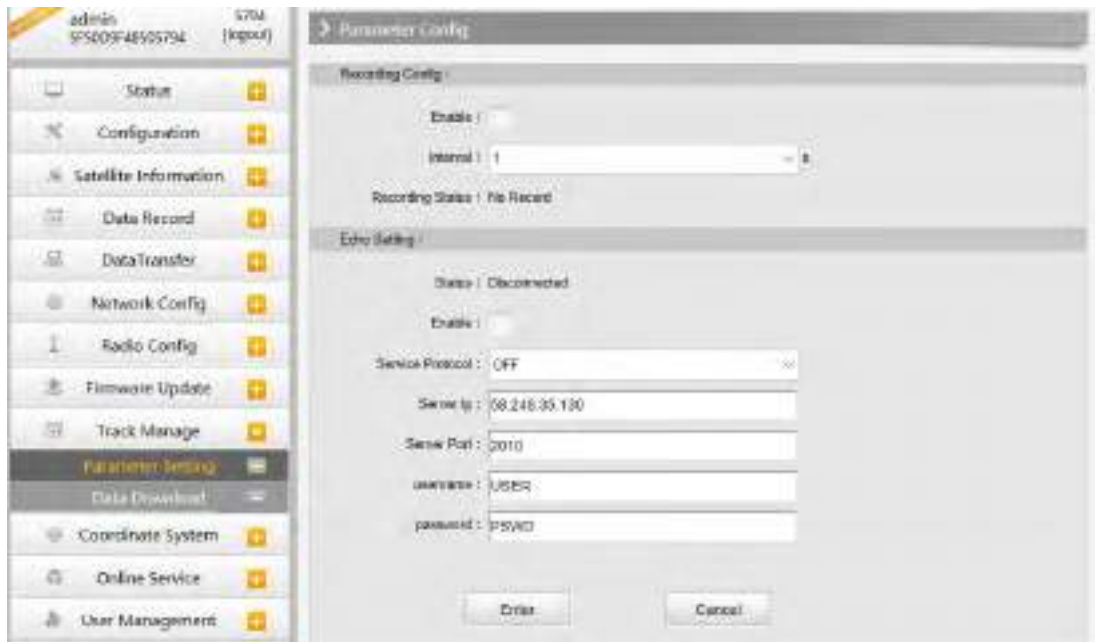


§3.4.9 Track Manage

V3 now supports to record the track while doing measurement, and upload the data onto the

server.

Parameter Setting



Record Setting

Check on the box of “Record Enable” to activate track recording function, and choose a proper recording interval in dropdown list of “Record Interval”.



EchoEnable Setting

This configuration dialog is used to upload the recording data to a server in real-time.

Echo Setting

Status: Disconnected

Enable:

Service Protocol: OFF

Server Ip: 58.248.35.130

Server Port: 2010

username: USER

password: PSWD

Enter Cancel

Data Download

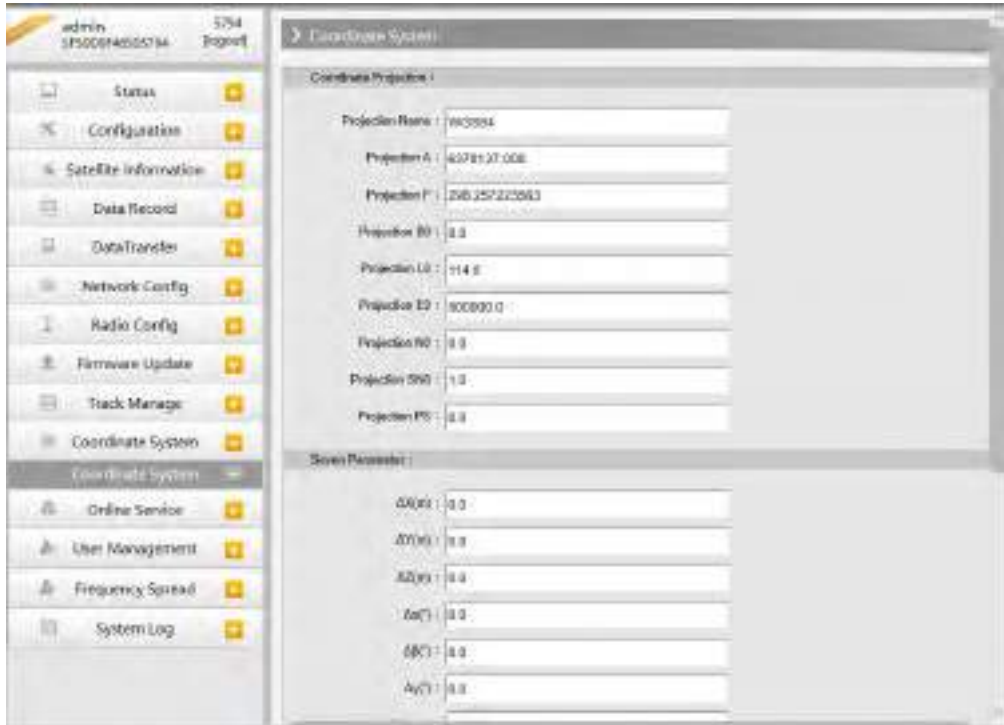
On this page, users can download the track data file from receiver. Choose the recording date and click “Get Data” to load all the data files recorded at that day, then choose the files and click download button.

The screenshot shows the 'Data Download' interface. At the top, there is a 'Select Date' field with a calendar pop-up showing the date 2014-03-14. Below the calendar, there is a 'Download TI' field showing '83, 2924' and a 'Get Data' button. The main area contains a table with columns for 'Item', 'Size', and 'Data'. Each row in the table has a 'Download' button and a 'Delete' button.

Item	Size	Data
1	[Download]	[Delete]
2	[Download]	[Delete]
3	[Download]	[Delete]
4	[Download]	[Delete]
6	[Download]	[Delete]
8	[Download]	[Delete]
7	[Download]	[Delete]
0	[Download]	[Delete]
9	[Download]	[Delete]
10	[Download]	[Delete]
11	[Download]	[Delete]
12	[Download]	[Delete]
13	[Download]	[Delete]
14	[Download]	[Delete]
15	[Download]	[Delete]

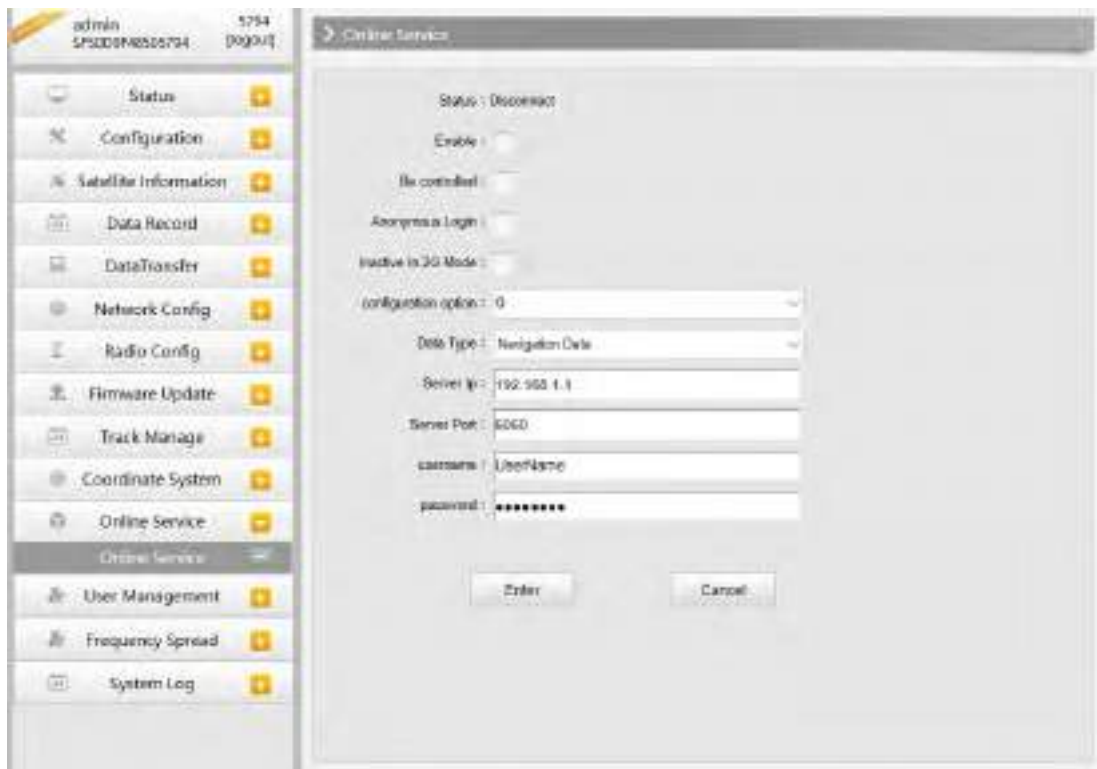
§3.4.10 Coordinate System (reserve)

V3 allows users to setup the local coordinate system on internal web UI management. The instrument would output the local coordinates according to this coordinate system.



§3.4.11 Online Service (reserve)

This function is to upload the data onto a server real-time, including Navigation data, raw observation data, correction data, SIC observation data and open SIC observation data.



§3.4.12 User Management

This page is used to manage the authority of login Web UI for users, including the username, password and add users.

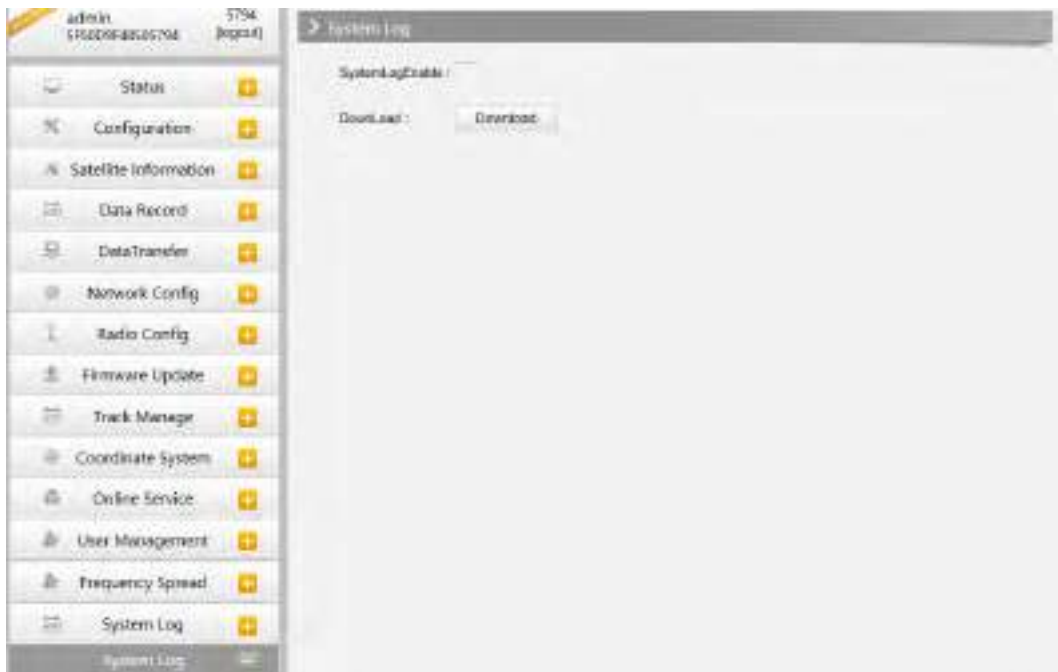


§3.4.13 System log

System log

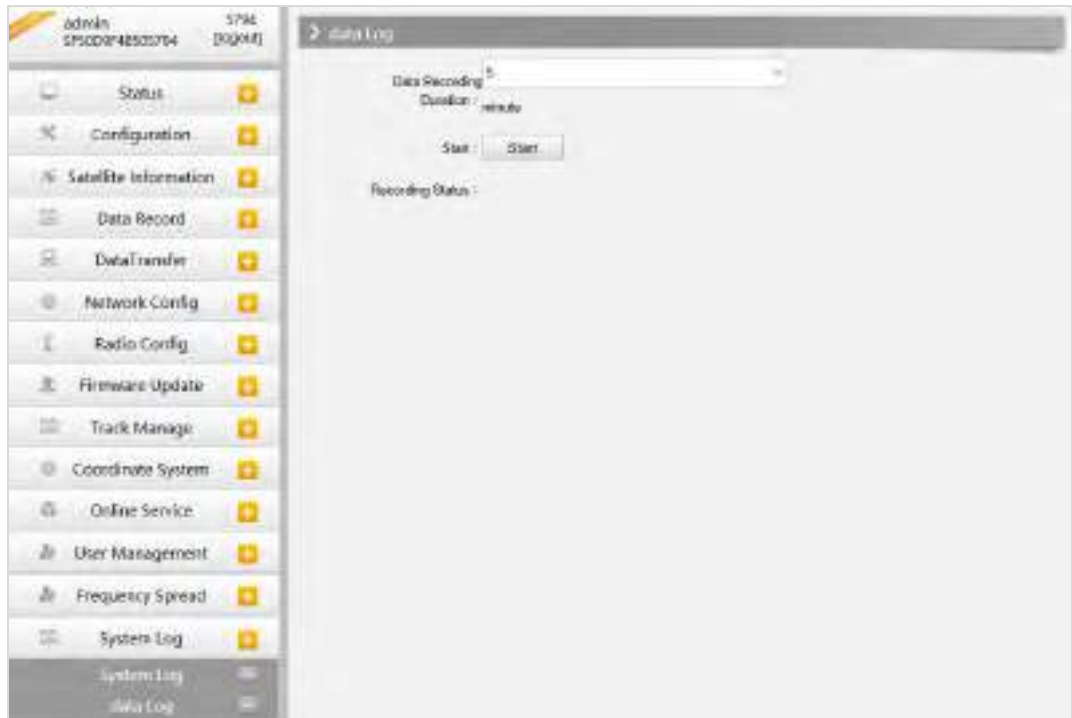
In this page, users can download the system log book of receiver (the log book can help to backtrack the working status of receiver).

NOTE: Only the administrator can modify any parameters for receiver and manage users, and the ordinary users only have the right to view the relative parameters.



Data log

In this page, users can record data and choose duration.



Chapter 4 New functions

§4.1 AR Stakeout

Augmented Reality (AR) stakeout revolutionizes conventional surveying methods by integrating various sensory modalities, including visual and auditory. This approach eliminates the proficiency gap between experienced surveyors and novices by providing real-time visual guidance within authentic environments. Additionally, voice prompts are employed when nearing designated targets. This streamlined process allows surveyors to stake out targets without the need for leveling the pole, relying on visual and auditory guidance for precise stakeout each time.

This function must be tilt survey initialization. After completing the tilt survey initialization, select the point to be lofted, click the [AR] icon on the right side of the screen, and then lofted according to the direction and position displayed on the interface. (Note that the direction of the device camera is the same as the direction of the controller)

Detailed steps:

1) Use wifi connection to connect to the device. The device is connected to CORS to achieve a

V3

fixed solution.



2) Click the "Point stakeout" function, select a point and turn on the tilt survey function. Shake the device as prompted to initialize the tilt survey. (Note that the pole height is consistent with the actual pole height)



V3

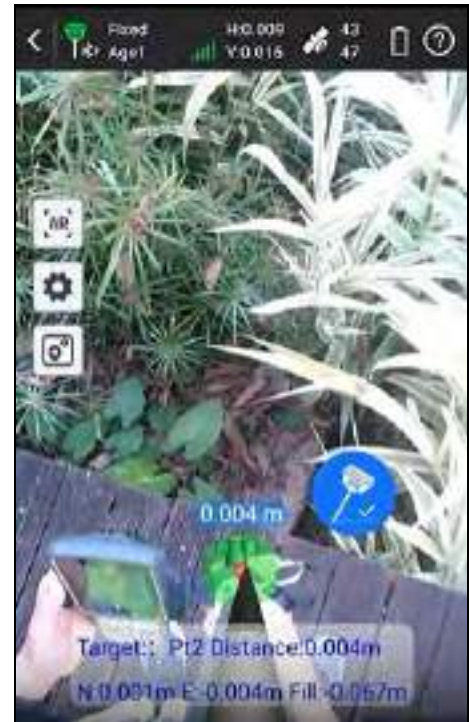
3) After the initialization page is displayed, perform initialization as prompted. After the initialization succeeds, the tilt measurement icon is displayed as follow.



4) Click the AR icon to realize the real scene lofting.



5) Follow the arrow guide to find the target point easily.



§4.2 Photogrammetry

V3 visual positioning broadens the scope of RTK applications through the synergistic integration of photogrammetry and RTK positioning technologies. With an 8-megapixel camera, “Fast” IMU and the latest positioning algorithm, V3 is adept at capturing and processing images or videos to derive precise coordinates. Therefore, it excels in surveying targets that pose challenges for traditional methods, including intricate corners beneath roofs, obstructed fields, and bridges spanning rivers. This capability enhances surveying versatility, allowing for the efficient and accurate surveying and mapping of locations that were previously difficult to access with RTK surveying techniques.

When surveyors have a high-quality internet connection, they can process image data online through the network and cloud servers. V3 can obtain coordinate data for image measurements with 2cm accuracy in just a few minutes. This processing mode balances high accuracy and fast processing speed.

When outside the coverage area of internet, surveyors can achieve offline processing of image data through the data controller app. This processing mode boosts the fastest processing speed

by saving time of uploading image data, providing 4cm accuracy results within 30 seconds.

There are three modes for you to choose from: 'Taking Photos Mode', 'Taking Videos Mode' and 'Modeling for Post-processing'. Use 'Taking Videos Mode', keep the target inside the frame, take at least 5 photos around or in a circular motion, with a walking distance of more than 2 meters.

Use 'Taking Videos Mode', click to start shooting, keep the target to be measured in sight, walk horizontally or in a circular motion to shoot video for at least 5 seconds, and walk more than 2 meters. Click to end the shoot.



SOUTH's 3D modeling technology are fully utilized and transformed in V3. The results of image measurements by V3, can be seamlessly integrated with data outcomes from UAV.

UAV surveys often face challenges of data gaps, leading to incomplete model outcomes. In such cases, surveyors can use V3 to collect image data on the ground and incorporate it into aerial survey data as a supplement, thereby enhancing the overall model outcome.



UAV Survey for SOUTH building, Lion statue detail lost



V3 scan the Lion statue



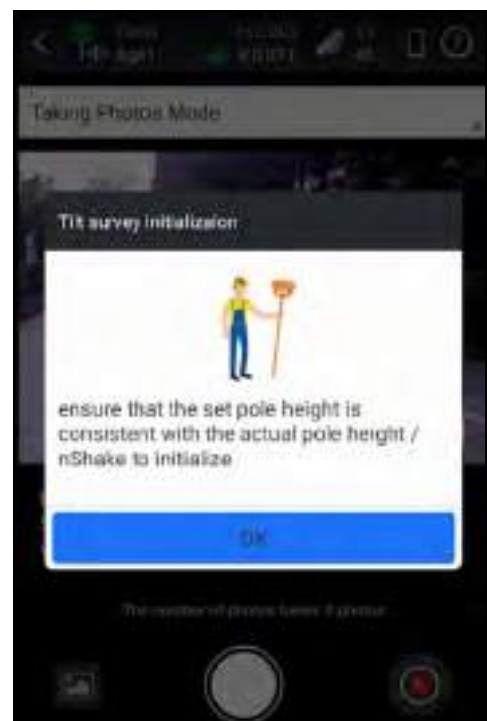
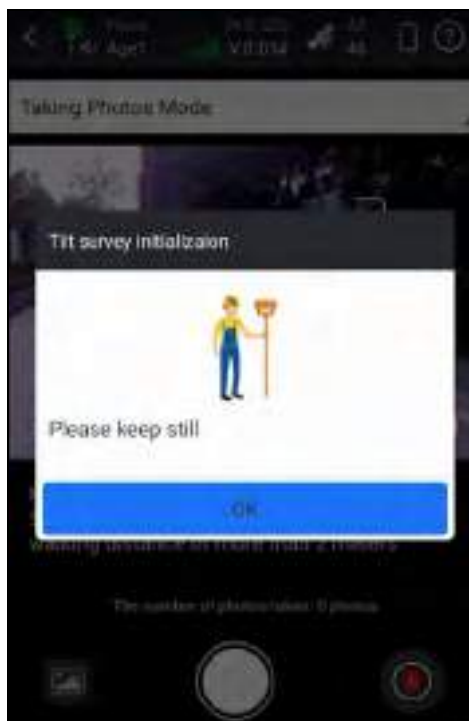
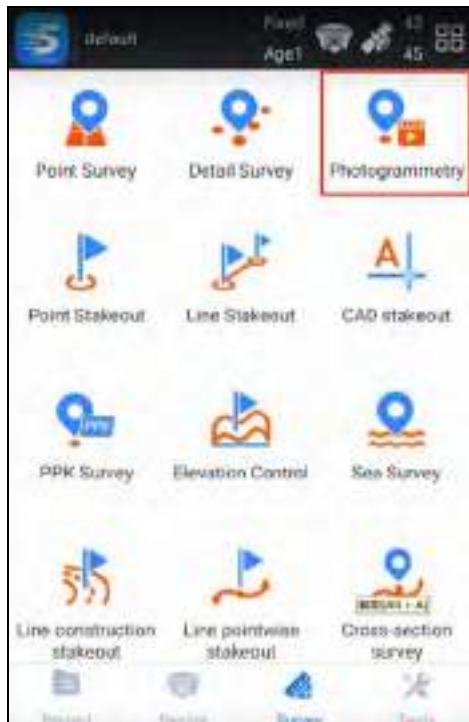
V3 scan the Car

Detailed steps:

1) Use wifi connection to connect to the device. The device is connected to CORS to achieve a fixed solution.

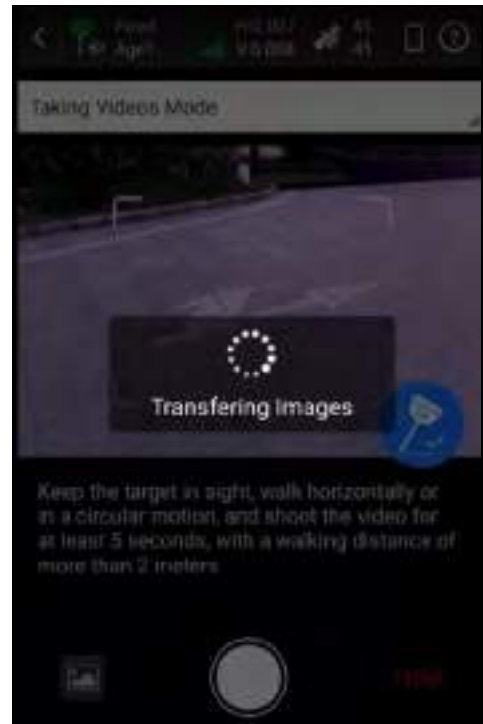


2) To enter photogrammetry, this function needs to be combined with the tilt survey function. If the tilt survey function is available, shake the device as prompted to initialize the tilt survey. (Note that the pole height is consistent with the actual pole height)



3) There are three modes for you to choose from: 'Taking Photos Mode', 'Taking Videos Mode' and 'Modeling for Post-processing'. Use 'Taking Videos Mode', click to start shooting, keep the target to be measured in sight, walk horizontally or in a circular motion to shoot video for at least 5 seconds, and walk more than 2 meters. Click to end the shoot. (Photo transfer in

progress: The picture taken by the device is being transferred to the controller)



4) Click OK to perform the upload server calculation. (The calculation time is related to the number of uploaded pictures, the more pictures, the longer it takes)



Chapter 5 Accessories

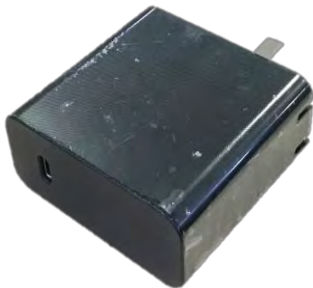
§5.1 Instrument Case



The instrument case for V3 contains two layers of packing: the inner layer is filled with anti-collision foam, the host and other accessories can be dispersed and embedded; the outer layer is a hard instrument case, sealing-strong, wear-resistant anti-wrestling. Compact, durable, can effectively prevent the impact, easy to clean.

§5.2 Charger & Adapter

V3 is equipped with a rechargeable internal battery, it uses a type-c cable and a PD adapter for the charging.



§5.3 Differential Antennas



The differential antennas are as shown above;

The UHF differential antenna is required to install to the interface at the bottom of receiver if V3 is set up into internal UHF mode.

§5.4 Cables

Type-C cable

This cable is used to connect the receiver with computer for static data transmission, Web UI accessing and firmware update.

