

N3 IMU RTK GNSS Receiver

User Guide



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Trademark notice

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FCC Notice

SinoGNSS[®] N3 GNSS receivers 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.

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This is the V1.0 (November, 2021) revision of the N3 GNSS Receiver User Guide. It cannot be copied or translated into any language without the written permission of ComNav Technology.

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 N3 receiver. Alternatively, request technical support from ComNav Technology Website: <u>www.comnavtech.com</u> or technical support email: <u>support@comnavtech.com</u>. 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

- Do not rotate 7-pin Lemo port
- Do not cover the radio, keep a sound ventilation environment
- To reduce radiation, please keep above 2 meters away from the radio station
- Take lighting protection measures when installing antennas
- Change the cable if damaged

Related Regulations

The receiver contains integral Bluetooth[®] wireless technology and UHF. 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

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

ComNav Technology does not warranty the disassembled devices.

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1 Introduction

The SinoGNSS[®] N3 GNSS Receiver User Guide is aimed to help you get familiar with the N3 receiver 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, N3 GNSS receiver can be applied in RTK mode with all GNSS constellations. N3 receiver has ultra-small size and strong antiinterference 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 SinoGNSS® N3 GNSS Receiver keyfeatures:

- Ultra small and super light
 - Size (W × H): 15.5cm × 7.3cm
 - Weight: 1.2kg (including 2 batteries)
- 1198 channels of simultaneously tracked satellite signals
- Increased measurement traceability with SinoGNSS[®] Quantum[™] algorithm technology
- Hot swap battery design
- Cable-free Bluetooth wireless technology
- 5 indicator LEDs for battery, diff, satellite, WIFI/GPRS and 2 function buttons for power and static
- IP67 waterproof
- Full base/rover interoperability
- Integrated receiving & transmitting radio with 12.5KHz frequency interval
- Integrated IMU sensor
- Integrated WiFi module
- Long distance range radio module
- Integrated 4G module, support Ntrip and Point to Point/Points protocols
- Support long baseline E-RTK[™] (Beidou B3 signal is included in RTK calculate engine)

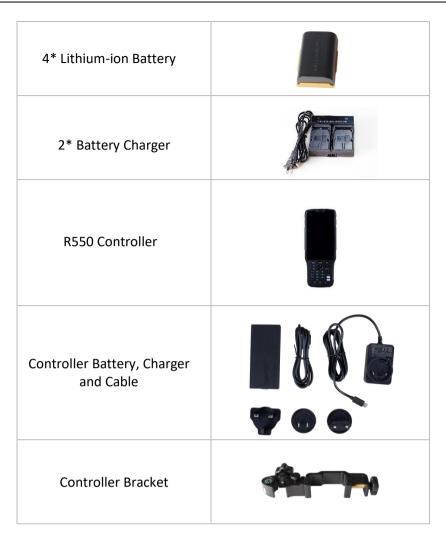
1.3 N3 Receiver parts list

This section provides overall N3 receiver parts list, including basic supplies and customized kits based on your requirements.

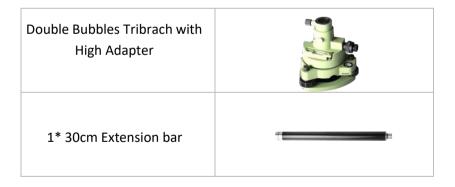
1.3.1 Basic Supply kit

SinoGNSS® N3 GNSS Receiver Basic Supply kit contains two receivers and related accessories.

ltem	Picture
2* Kits N3 Receivers	
1*GNSS Connector	
2*7-pin Lemo to RS232 Cable	
2* 7-pin Lemo to USB Cable	
External Power Cable	
2* Whip Antenna (UHF)	ē
1*2m-Range Pole with yellow bag	



Optional accessories:



1.3.2 Optional Datalink kit

This kit is necessary for long distance radio communication, shown in the following figures:

Item	Picture
External Radio CDL7	
2-pin Lemo Power Cable	
7-pin Lemo Data Cable	
N-Type to TNC Convertor	
N-type to N-type Antenna Cable	
N-Type Radio Antenna	

1.3.3 Transport Cases

Standard transport case is designed for containing basic supply kit of one SinoGNSS[®]N3 GNSS Receiver.





Base

Rover

The optional choice is provided to have capacity of two kits of N3 receivers.



2 Setting up the receiver

This chapter provides general information on environmental requirements, setup, power supply and connection of the N3 receiver.

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
- Storage temperature: -40°C to +85°C
- Out of corrosive fluids and gases
- With a clear view of sky

2.2 Front panel

Receiver front panel contains 5 indicator LEDs, Power button and Record button. The indicator LEDs show the status of differential, satellite tracking, WIFI/GPRS and battery. For detailed information, see <u>chapter 3.3</u>.



2.3 Lower housing

Receiver lower housing contains a serial port, UHF radio antenna connector, two removable battery compartments (the SIM card slot is located in compartment A), and a threaded insert.



2.4 Power supply

N3 GNSS receiver supports internal batteries and external power input.

2.4.1 Internal batteries

The receiver is equipped with two rechargeable Lithium-ion batteries, which can be removed for charging. The N3 receiver adopts the hot swap battery design that provides you an effective survey workflow. The internal batteries typically provide about 25-hour operating time as a rover, about 19-hour operating time if operated as a base station with internal UHF Tx (transmit at 1-2 watts). 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

Although a dual battery charge is provided, the lithium-ion battery is supplied partially charged. To charge the battery, first remove the battery from the receiver, and then place it in the battery charger, which is connected to AC power. Please obey the following instructions when charging your batteries:

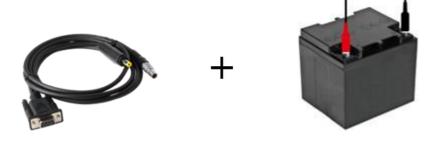
- Charge the battery completely before using it for the first time.
- Fully charge takes approximately 6 hours per battery at room temperature.
- If the battery has been stored for a long time, charge it before your field work.
- Re-charge the battery at least every three months if it is to be stored for long time.
- Storage of the Lithium-ion Battery
- Do not keep batteries inside the receiver if the receiver not used for long time.
- Keep batteries in dry conditions.
- Take out the batteries from receiver for shipment.

- 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.

2.4.2 External Power Supply

The receiver is connected to an external power supply through a lemo to RS232 cable, and make sure that the red alligator clip is connected to the positive of external power supply, black one to negative. Over-voltage function cannot protect your N3 receiver 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 (7-28 volt DC) for the base station.

2.4.3 Charge Battery via N3 Receiver

N3 GNSS Receiver can work as a charger, it means you can charge batteries directly if the charger not by your side.

- 1. Power off N3 receiver with batteries inside;
- 2. Connect N3 receiver to 12V external power with serial cable;
- 3. Receiver will charge the battery from Side B to Side A, the red power led will flashing during charging and will off when battery full.



2.5 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 are two buttons on the front panel, power button and record button.

• Power button:

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.

• Record button:

Switch to static mode: Long press the record button for about 2 seconds, release immediately when hearing beep from receiver;

Switch to RTK mode: press the button until Raw Data recording LED off.

Tip: The record button only works when receiving satellite signals, otherwise it will show timeout.

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 figure and table define each possible LED state:



LEDs	States	Description	
Power	Lit	Enough power	
Power	Flashing	Low power	
	Flashes once per second	Receiving/transmitting differential	
Differential Data		data	
Satellite Tracking	Fast flashing/ Flashes 1 time every 5 seconds	No satellite received	
	Flashes N times every 5 seconds	Received N satellite signals	
Internal 4G and WIFI	Flashes once per second	GPRS function is working	
	Flashes once per five- second	WIFI is working	
	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	

Power LEDs:

Power supply: 1) Two power LEDs are on if using the external power supply; 2) Only power LED of working battery will be on if using the internal battery.

Low battery: 1) Power LED will flash with beep only with one battery; 2) if with two batteries, the power LED of low battery will flash, and swapped to another battery when it is run off.

3.3 Receiver Web GUI interface

Step 1: Connect Wi-Fi of N3 receiver

Turn on the N3 GNSS receiver and wait for the N3 serial number to appear under the available Wi-Fi networks on your smart phone or office computer.

For example, **N3-T31LXXXXX** (where xxxxx represents the last five digits of the receiver serial number).

Enter password: 12345678

Step 2: Login the Web

Select the receiver, open a web browser and then enter the following IP address:

http://192.168.1.8

Tip: Most web browsers for computers / laptops and smart phones / PDAs support the receiver Web GUI

Step 3: Enter the default login settings to access the main page

- Username: admin
- Password: admin

After accessing the main page, configuration menus are listed on the left, and receiver's settings on the right. Each configuration menu will be demonstrated in the following sections.

← → C 命 ▲ 不安全 192.168.1.8			Ø ∂ð	٢ô	£≡	Ē	
Sino GNSS [®] By ComMay Technology Ltd.		admin	logout	简体中文 English			
Device Info 🗸 🗸	Position Info						
Configuration	Position Lat: 31*21'0.14652" N Lon: 121*17'33.08995" E						
Receiver Management \sim	Alt: 28.2735M Ellipsoid: WGS-84 Status: Single						
Firmare Update 🗸 🗸	Receiver Clock						
	GPS Week: 2164 GPS Seconds: 458621.000 UTC: 02/07/2021 07:23:23						
	Tracking Satellite(29)						
	GPS(4): 6.13,17,19 GLONASS(3): 6.7,20 BDS(16): 1.2,3,4,6,7,10,11,16,33,34,39,40,41,43,59 GALILEO(3): 5.9,11						
	SBAS(0): QZSS(3): 1,3,7						
	Usable Satellite(29)						
	GPS(4): 6,13,17,19 GLONASS(3): 6,7,20						

3.3.1 Checking the receiver status

In the section, you can check System information, Status, 4G Network, Bluetooth,

Wifi, Position info, satellite info.

- (1) System information, includes the basic information includes receiver type, serial number, system firmware version, board firmware version, radio firmware (radio type), front panel firmware (N3 doesn't have front LCD panel), Web version.
- (2) Status: Show the device status and data link status, includes work mode, data link, internal storage capacity and current free storage. The default work mode is rover with the new device, others will be same with the Survey Master settings. Data link status will vary from different work mode, the default is null.

system information	n	Status
Receiver Type:	N3	Device Status
Serial Number:	N31L02594	Work Mode: Rover
Firmware Version:	V1.2.2	Data Link:
Board Firmware :	600AB-21523-1	Capacity: 7.4GB
Radio Firmware:	V1.0.3(U70)	Free Storage: 7.4GB
Front Panel Firmware :	null	Data Link Status
Web Version:	v-1.0-3	

(3) 4G Network, when there is SIM card inside in the receiver, it will start itself, and read the signal intensity, APN, and show started. If there is no SIM card inside, it will show stopped.

4G network		4G ne	etwork	
Signal Intensity: Sim Card State: SIM ID:	OK 898600670920F8002133		gnal Intensity: m Card State: SIM ID:	31 ERR
Net Status:	Started		Net Status:	Stoped
APN:	cmnet		APN:	cmnet
Username:	zynq		Username:	zynq
Password:			Password:	••••
Start	off		Start	off

(4) Bluetooth information, shows Bluetooth name and Mac address, Bluetooth name cannot be changed; WIFI information, shows WIFI name, current Wifi password and Mac address. The Wifi password is 12345678, the client can change the password, click **Save config** to save configuration.

	Wifi
Bluetooth	Wifi Name: N3-N31L02594
Name: N31L02594	Mac Address: F5:C8:7d:41:01:79
Mac Address: a4:04:50:a6:41:dd	Status: Started
Status: Started	Save Config

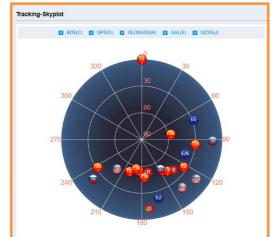
(5) Position info, shows position status, clock status, tracking satellites, used satellites and DOP status.

Position Info					
Position					
Lat: 31°21'0.098	39" N	Lon: 121°17'33.09980" E			
Alt: 30.1361M Status: Single		Ellipsoid: WGS-84			
Receiver Clock					
GPS Week: 217 UTC: 13/08/202	-	GPS Seconds: 448592.000			
Tracking Satelli	te(30)				
GPS(3):	6,13,19				
GLONASS(4):	1,8,21,22				
BDS(17):	1,2,3,4,6,7,10,11,16,33,34,39,40,41,43,56,59				
GALILEO(3):	7,8,15				
SBAS(0):					
QZSS(3):	1,3,7				
Usable Satellite	:(27)				
GPS(3):	6,13,19				
GLONASS(4):	1,8,21,22				
BDS(17):	1,2,3,4,6,7,10,11,16,33,34,39,40,41,43,56	,59			
GALILEO(3):	7,8,15				
SBAS(0):					
QZSS(3):	1,3,7				
DOP:					
PDOP: 1.7828		HDOP: 1.1586			
VDOP: 1.3547		TDOP: 1.3440			

(6) Satellites Info, includes Tracking graph, Tracking skyplot.

sv	Type	Elev.	Azim.	L1.	L2.	L5.
5	GPS	16	125	47	42	0
12	GPS	18	141	46	41	0
18	GPS	49	222	43	35	49
2	QZSS	41	135	47	0	52
3	QZSS	13	174	42	0	50
7	QZSS	53	169	42	0	52
1	BDS	45	141	49	50	48
2	BDS	0	0	0	40	0
3	BDS	52	201	47	49	47
4	BDS	34	123	47	50	48
8	BDS	56	185	46	50	49
20	BDS	30	94	47	0	50
36	BDS	46	176	52	0	54
38	BDS	58	191	51	0	52
	202		~		•	**





3.3.2 Configuration

This section includes Satellite tracking, work mode, Antenna setup and Base station configuration.

- Satellite tracking, includes Smooth Pseudorange, default is OFF; Elevation mask: default is 10 degrees; and every system status, supports to change by customers, click *Enter* to save settings, click *Cancel* to cancel the settings.
- Antenna setup: measure method supports Slant height and vertical height, choose Antenna type, and setup antenna height, click Enter to save configuration.

Slant height(S): 1.80000	s t height(S) vertic	al height(H)			
Name	Radius(R)	Distance Measurement (L)	Height from bottom(V)		
T300(NGS)	0.079	0.0373	0.0753		
T300 Plus(NGS)	0.079	0.0327	0.0707		
T30(NGS)	0.0775	0.0287	0.0667		
N5(NGS)	0.0775	0.0337	0.0717		
N6(NGS) 0.0615 0.0243 0.0623					
Enter C	ancel				

Base station configuration: Setup the station ID, Antenna height, measure method supports slant height and vertical height; then click *Get position* to set the current position or you can enter the coordinate yourself, click *Start* to start the base setup, click *Stop* to stop the base setup.

Sino GNSS [®] By ComNav Technology Ltd.			admin	logout	简体中文 English
Device Info ~	Base Station C	onfiguration			
Configuration ^	Station ID:	123456 setup			
Satellite Tracking	Coordinate:	Get position			
Work Mode					
Antenna Setup	Lon:	121 ° 17 ′ 33.067938 ° OE W			
Base Station Configuration	Lat:	31 ° 21 ' 0.061836 ' ON S			
Receiver Management 👋	Alt:	28.834900 M			
Firmare Update V	vertical height(H) measure method:	1.8 Slant height(S) • vertical height(H)			
	Status:	Stoped			
		Start Stop			

• Work mode, includes rover settings and base settings.

Rover settings include Ntrip Client (Same with internal GSM in Survey Master) and Radio (Same with internal radio in Survey Master).

Node Setting			
• Rover O Base			
Туре	Port	data stream	setup
Type NTRIP Client	Port 25001	data stream -	setup

(1) Ntrip Client: Set Ntrip version, includes NTRIP v1.0 and NTRIP v2.0, IP, port, username, password, then click **Get List** and select mountpoint, check on **Use**, click **Enter** to apply the Ntrip Client; Check off **Use**, click **Enter** to cancel the work mode.

Port Configuration		×
NTRIP Client	~	
Status:	disconnect	
Use:		
Ntrip version:	NTRIP v1.0 V	
CasterAddress :	140.207.168.210 25001	
Username:	comnav	
Password:		
mountpoints:	8KM_K803_RTCM32 V Get List	
	Enter	Cancel

When setup the Ntrip Client, you can go to Device Info->Status to check current device status and datalink status.

Device Info	Status	
system information	Device Status	
Status	Work Mode:	Rover
Position Info	Data Link:	Net
Satellite Info	Capacity: Free Storage:	7.4GB 7.4GB
4G network	Data Link Status	
Wifi	Data Link Status	
Bluetooth	Protocol:	NtripClient 140.207.166.210
Configuration ~	Port:	25001
Receiver Management	mountpoints: Status:	8KM_K803_RTCM32 Link
Firmare Update		

(2) Radio: The model is RX, set the frequency, minimum interval is 12.5 KHz; the protocol is Transparent; set the power, supports 0.5w, 1w and 2w; check on **Use**, click **Enter** to apply the internal radio; Check off **Use**, click **Enter** to cancel the work mode.

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Radio		~			
Status:	disconnect				
Use:	~				
model:	RX	~			
frequency:	460.05		MHZ		
Protocol:	Transparent	~			
power:	1w	~			

After setup, you can go to Device Info->Status to check device status.

Device Info	Status	
system information	Device Status	
Status	Work Mode:	Rover
Position Info	Data Link:	Radio
Satellite Info	Capacity:	7.4GB
Satellite Into	Free Storage:	7.4GB
4G network		
Wifi	Data Link Status	
Bluetooth	frequency:	460.0500MHZ
	Protocol:	Transparent
Configuration ~	Baud Rate:	115200
	model:	RX
Receiver Management 👋	power:	1W
Firmare Update		

Base settings include Ntrip Server (Same with internal GSM in Survey Master) and Radio (Same with internal radio in Survey Master).

(1) Ntrip Server:

a) Start the base: if you have started the base setup in Base Station Configuration, then no need to setup again, just click **Next**; If you have not started base setup, you can go to **Base Station Configuration** to set the base, or you can set the station ID, and set the base coordinate here, then go to **Antenna Setup** to set the base antenna, then start the base, click Next to the Ntrip settings.

Base Station Con	figuration	×
Station ID:	1234 setup	
Coordinate:	Get position	
Lon:	121 ° 17 ′ 33.133092 ′ • E O W	
Lat:	31 ° 20 ′ 59.998416 ′ O N OS	
Alt:	35.000000 M	
Status:	Stoped	
	Start Stop Next	

b) Ntrip settings: Choose Ntrip version, set IP, port, username, password, mountpoint, and choose data stream, supports RTCM3.2, RTCM3.2(MSM5), RTCM3.0, RTD, CMR. Check on **Use**, and click **Enter** to apply, click **Cancel** to cancel apply; Check off **Use**, and click **Enter** to cancel the previous base setup.

Port Configuration			×
NTRIP Server	~		
Status:	disconnect		
Use:	Image: A start of the start		
Ntrip version:	NTRIP v1.0 V		
CasterAddress :	140.207.166.210	25001	
Username:	comnavtest		
Password:			
mountpoints:	Base		
data stream: RTC	M3.2 🗸		
		E	Cancel

After you setup base using Ntrip server successfully, you can go to Device->Status to check current base settings, and the rover can get the mountpoint from the server you set.

- (2) Radio:
- a) You need to setup base station coordinate first, refer to the Ntrip Server settings.

b) Setup the radio parameters: The model is TX, set the frequency, minimum interval is 12.5 KHz; the protocol is Transparent; set the power, supports 0.5w, 1w and 2w; choose data stream, supports RTCM3.2, RTCM3.2(MSM5), RTCM3.0, RTD, CMR; check on **Use**, click **Enter** to apply the internal radio; Check off **Use**, click **Enter** to cancel the work mode.

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Radio		~			
Status:	Use				
Use:	~				
model:	TX	~			
frequency:	460.05		MHZ		
Protocol:	Transparent	~			
power:	1w	~			
data stream:	RTCM3.2	\sim			
				Ente	

After setup the base, you can go to the Device Info-> Status to check base settings.

3.3.3 Receiver Management

This section includes Data Transfer, Data record, Data Download and Receiver Utility.

3.3.3.1 Data Transfer

Data transfer has five types: Com1, Com2(Bluetooth), TCP Server, TCP Client, Web Ntrip.

- **Com1**: This is setup to transfer the data through com1 port of the OEM board inside. You can use serial port cable to check the data transmission (the lemo port is connected to Com1 of the OEM board inside).
 - (1) Baud rate supports 115200, 57600, 38400, 19200, 9600, the default is 115200.
 - (2) The supported file formats include navigation data, raw observation data, RTCM3.2, RTCM3.2(MSM5), RTCM3.0, RTD, CMR.
 - (3) Observation and ephemeris output frequency support 1s, 2s, 5s, 10s and 15s.

Port Configuration	×
COM1 ~	
Use Use	
Baud Rate: 115200 🗸	
Odd/Even: ODD ~	
data stream: Raw Observeation Dat ✓	
Rangecmpb 1s v RawEph 1s v	
	Enter Cancel

• **Com2**: This is used to output data through com2 port of the OEM board (connected to the Bluetooth modem), you can output NMEA data via this port, it is the important step to connect the receiver to other brand software.

(1) Baud rate supports 115200, 57600, 38400, 19200, 9600, the default is 115200.

(2) The supported file formats include navigation data, raw observation data, RTCM3.2, RTCM3.2(MSM5), RTCM3.0, RTD, CMR.

(3) NMEA data output frequency supports 1hz, 2hz, 5hz, 10hz, 15hz.

Port Configura	ation									\times
COM2				~	•					
	Us	e								
Baud Ra	ate: 11	5200			~					
Odd/Eve	en: OE	D			~					
data stream:	Naviga	tion Data •	~							
GPGGA	1hz 🗸	GPZDA	off	~	GPRMC	off	~	GPGLL	off	~
GPVTG	off 🗸	GPYBM	off	~	GPHDT	off	~	GPTRA	off	~
PTNLPJK	off 🗸	PTNLAVR	off	~	HEADING	off	~	KSXT	off	~
								Enter	Canc	el

 TCP Server: You can output data through TCP server, then use TCP client to get data. For example, connect your rover or computer and N3 receiver in the same LAN, setup N3 to output RTCM data via TCP server, and rover receives via TCP Client.

The supported file formats include navigation data, raw observation data, RTCM3.2, RTCM3.2(MSM5), RTCM3.0, RTD, CMR.

												×		
							- I	Server Address			Port			
Port Configuration	n					\times		192.168.1.8		~	12345			
700 (11/50) 70/5								Mountpoint		User-ID	Password			
TCP1/WEBNTRIP	'1	~						Hebron	\sim	hosamid				
~	Use							String						
Work Mode:	Server	~					11			01	-			
IP:	192.168.1.8						11			<u>O</u> K	Can	e		
Port:	12345													
								2021/11/30 0	7:52	2:12 GPST	Connect	Time:	0d 00	:00:05
data stream: Na	avigation Data 🗸 🗸							Stream		Type Opt	Cmd Conv	Byt	tes	Bps
GPGGA 1hz	∠ ∨ GPZDA	off 🗸	GPRMC	off 🗸	GPGLL	off 🗸		🗌 (0) Input	TCF	P Client 🗸 🛄		4	35	0
GPVTG off	✓ GPYBM	off 🗸	GPHDT	off 🗸	GPTRA	off 🗸		(1) Output		×			0	0
		- 46		-#	KOVT	-#		🗌 (2) Output		×			0	0
PTNLPJK off	✓ PTNLAVR	on 🗸	HEADING	off 🗸	KSXI	off 🗸		(3) Output		×			0	0
				_										
					Enter	Cancel								2
								► <u>S</u> tart	85	🗘 Opti	ons		Exit	

TCP Client:

If you have a TCP server with a static IP, you can output the data via TCP Client, then the data will be transmitted to your TCP server. The IP is your PC IP, the port should be mapped. For example, you can output the NMEA data to your TCP Server, then you can check the status of the rover in the office while the rover works in the field.

Port Configuration	٦									\times
TCP1/WEBNTRIF	21			``	/					
	Use									
Work Mode:	Clier	nt			~					
Remote IP:	182	.162.222.111				8612				
data stream: Na	avigatio	on Data 🔹	/							
GPGGA 1hz	· •	GPZDA	off	~	GPRMC	off	~	GPGLL	off	~
GPVTG off	~	GPYBM	off	~	GPHDT	off	~	GPTRA	off	~
PTNLPJK off	~	PTNLAVR	off	~	HEADING	off	~	KSXT	off	~
								Enter	Canc	el

WEBNTRIP

This function can be used to work with Drone via WIFI.

- (1) Base setup: setup base coordinate and antenna first.
- (2) WEB configuration: setup the IP 192.168.1.8, port 12345, mountpoint T31U02027, and choose RTCM3.2(MSM5), then check on Use, click Enter, it will transfer data through WIFI
- (3) Connect your drone remote with the receiver WIFI.
- (4) Configure the drone, select Ntrip Client, setup IP 192.168.1.8 and port 12345, get the mountpoint T31U02027, then the drone can do RTK.

Port Configura	tion			\times
TCP1/WEBNT	RIP1	~		
l. I	✓ Use			
Work Mod	e: WEBNTRIP	~		
	IP: 192.168.1.8			
P	Port: 12345			
Mount poir	nt: T31U02027			
data stream:	RTCM3.2(MSM5) V			
			Enter Cance	el

3.3.3.2 Data record

This is used to log static data, the data will be saved in the receive, you can download data via web interface, go to chapter 3.3.3.3 for more information, or you can use USB cable to connect PC and download static data.

In recording setting interface, you can get following information:

 Current internal memory capacity and free storage; you can click Format Disk to format the receiver internal memory;

Data recor							
record Settin	ng						
	Position	Capacity	torage	Format Disk			
Inte	rnal memory	7360M	716	4M	Forma	ormat Disk	
number	Name	Record State	data format	reco	rd mode	Operation	
1	record1	Unrecorded	CNB	Manua	Recording	setup	

Current record state, data format, record mode.

Click *Setup* to configure the static settings:

- Name: You can choose record1, then the file will be saved in record1 folder.
- Sample Interval: change the sample interval of observations, the maximum data rate is 20 Hz, the minimum is one observation per minute, it supports 0.05/0.1/0.2/0.5/1/2/5/15/30/60 S
- File Split: supports every 15 minutes or 1\2\4\24 hours to save a file, or you can choose Manual mode, then it will save a one file when you manually stop the record by pressing on the static button, or click the *Stop* button. If you select 24 as file split, it will create two data files 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: Supports CNB, RINEX 2.10, RINEX 3.02
- Loop: When storage is full, Yes means delete earliest data and store

continually, **No** means stop recording

- **Storage Space**: Separate storage space in internal memory
- **Record mode**: logging data manual recording or auto recording.
 - (1) Auto recording: when you set automatically, it will record static data automatically when the receiver tracks satellites, and you can stop recording by pressing the static button on the receiver;
 - (2) Manual recording: when you set manually, then it will not record data automatically when the receiver tracks satellites, need to press the static button on the receiver. Click *Enter* to start the recording, and it will save the configuration, you can stop the recording by pressing the static button or click *Stop* on the interface.

Disk Record Settin	ng ×	Disk Record Setti	ng ×
Record State:	Unrecorded	Record State:	Recorded
Name:	record1	Name:	record1
Sample Interval:	1s 🗸	Sample Interval:	1s 🗸
File Split:	1h 🗸	File Split:	Manual mode v
data format:	CNB RINEX2.10 RINEX3.02	data format:	CNB RINEX2.10 RINEX3.02
Loop:	Yes No	Loop:	Yes No
Storage Space:	5000	Storage Space:	5000
record mode:	Manual Recording	record mode:	Manual Recording ~
	Cancel Start		Cancel Stop

3.3.3 Data Download

- Firstly, select record Name, File type (CNB\Rinex3.02\Rinex2.10) and the date.
- Then click *Get Data*, you will see data files.
- Click *Download* icon to download the data file you need; or click *Delete* icon to delete this file; click *Select All*, you can select all the data in the current interface, download and delete them in batches. Rinex files include observations and ephemeris and not are zip files.

Configuration 🗸	record Setting									
	Name:	1-CNB	~							
Receiver Management 🗠										
Data Transfer	File Type:	File Type: CNB RINEX2.10 RINEX3.02								
Data record	Select Date:	Select Date: 2021-08-11								
Data Download		Get Data								
Receiver Utility		Get Da	lia							
Firmare Update	Ite	m	n FileName		downlo	ad				
		1	N31L025942231105.21C	9.07KB	download	delete				
		2	N31L025942231105.21G	2.82KB	download	delete				
		3	N31L025942231105.21L	15.32KB	download	delete				
		1	N31L025942231105.21M	0.00B	download	delete				
		5	N31L025942231105.21N	5.32KB	download	delete				
		6	N31L025942231105.21O	50.41KB	download	delete				

3.3.3.4 Receiver Utility

In this section, you can control N3 remotely, including:

- Reboot: Restart the receiver
- Factory Default: recover the receiver to factory default setting

Re	Receiver Utility								
	Reboot								
	Factory Default								

3.3.4 Firmware update

You can update the system firmware (OS), board firmware (GNSS), front panel firmware (LCD) and radio firmware (RADIO) in this menu. Select system, GNSS, RADIO firmware upgrade according to your demand, then click Browse to select the latest firmware version. Click Install, a progress bar shows 0 to 100% and status will be "Not allowed to do other operations during the upgrade". When completing firmware update, the receiver will restart automatically and information prompted below

Tips:

- 1. N3 receivers don't have front LCD panel, so LCD firmware will not be updated.
- 2. The supported firmware file is only *bin format.

System Upgrade								
Path:				Browse				
升级选项:	\checkmark	OS	\checkmark		RADIO	\checkmark	GNSS	
					Install			

4 Static survey

This chapter describes static survey through N3 receiver and CRU software. For static survey, you cannot change settings through front panel, you can configure it via Compass Receiver Utility (CRU): 1) Receiver configuration; 2) check receiver settings and status; 3) convert data to Rinex format.

4.1 Receiver Configuration

1. Download and install CRU software from the link below (ensure the driver is properly installed in your PC):

http://www.comnavtech.com/download.asp?bigclassid=28

- 2. Put a battery in the N3 receiver and turn it on.
- 2. Connect the receiver with your PC through serial port cable.
- Click set port in CRU -> select proper serial port in the serial port option-> enter proper baud rate -> click Ok to complete receiver connection. The SN of receiver will appear in the title bar if connected successfully.

Compass Receiver Utility [Unkown receiver] - C:\Users\123\De		-	
Ann Consection Receiver Radio GNSS Rinex View He			
Set Port Connect Close Config Nicole Diff Attitude Command Lock	Strip List Fiel New Processor New Processor		
Folcers Messages X	we have need one can be need one one can be been a	PVT View	Д 🔀
Windows.ol ^ Name	ID Size Count	[]:	
.andr		-	
.cdc	Connection Settings X		
B- CDC		-	
⊕QtW ⊕3D ₹	Serial Port COM COM3 - USB S -		
	Baud Rate 115200 👻	-	
□ ➡ 下载		1.	
	C TCP Client Host 101.83.146.246		
田一 四方	0612		
□ 🔶 收藏:	Port 8612	· · · · · · · · · · · · · · · · · · ·	
□ 圓 文档	C Data File	-	
白· 三 桌面 由· 3		~	
3	256 B/s		
₽ 21 ₽ A	Setup Ok Cancel	- /	
⊞ ct			
B m		-	
		1×1	
		- N	
		a de la companya de l	
		-	
< > Project			
Ready		Diff 0	B/S CAP NUM

Tips:

1) For N3 receivers, USB cable is only used to download raw observation data, cannot to connect to CRU software and update firmware;

2) With 7-pin Lemo to RS232 cable, you can connect N3 receiver with external power or firmware upgrade.

3) It can not to configure the static settings, only supports to configure using web UI.

4.2 Static Data Collection

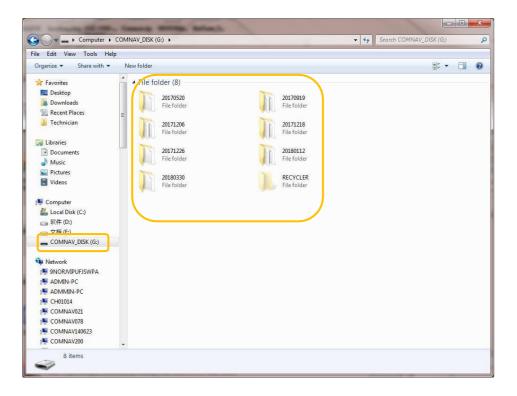
Static survey is mainly used for the control survey. To reach millimeter accuracy, follow as below:

- 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.

Tip: You can start recording static data in the front panel, it's convenient for you.

4.3 Static Data Download

The raw observation data is saved in internal memory of N3 receiver, when connected with PC via USB cable, the N3 receiver can work as a USB Flash Disk, which means you can copy or cut static data to PC directly.



Tips:

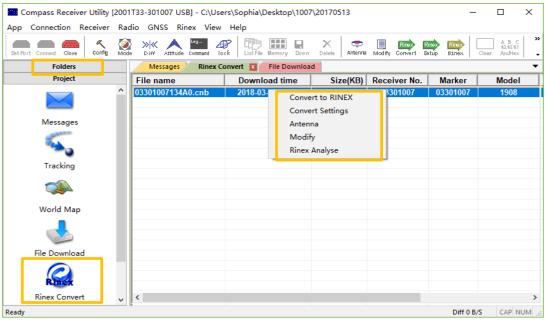
- 1. You need to put a battery inside first, and turn it on, then you can connect to the PC.
- 2. Default memory for N3 receiver is 8GB, and 16GB, 32GB optional.
- 3. The receiver will stop recording raw data if the internal memory runs out.

4.4RINEX 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 Type and Measurement. If you cannot find

N3 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 0.0775m, h0 is 0.0325m and h1 is 0.038m respectively for N3 receiver; 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.

Select Antenna					\times				
✓ Enable antenna configure file									
C:\Program Files\Compass\Antennas.ini									
Antenna Type N3					•				
Measurement Antenna bottom					•				
; R ₀ ;		R0 =	0.07750)0 m					
	h ₀	h0 =	0.03250	0 m					
	1	h1 =	0.03800)0 m					
				Add					
				Edit					
			D	elete					
	\setminus			<u>о</u> к					

Click to change Convert Settings, mainly export format and export observation information.

Export Format	Export Observati	on —	Pseudorange	5	- (H)	
3.03				Phase 🔽	S/N I⊽	Doppler v
	GPS	L1	<u>.</u>		2	2
Marker name method of *.cnb file		L2P		$\overline{\lor}$	$\overline{\lor}$	
Full file name 🔹		L2C		$\overline{\lor}$	$\overline{\lor}$	<u>v</u>
		L5		V	$\overline{\mathbf{V}}$	<u></u>
Sample Rate	BDS	B1		$\overline{\mathbf{v}}$	$\overline{\mathbf{V}}$	2
1 second 🔹		B2		$\overline{\mathbf{v}}$	$\overline{\lor}$	<u>N</u>
		B3	$\overline{\mathbf{v}}$	$\overline{\lor}$	$\overline{\lor}$	V
Advanced		B1C	V	$\overline{\mathbf{v}}$	$\overline{\lor}$	$\overline{\mathbf{v}}$
GPS Week 0		B2A	$\overline{\mathbf{v}}$	$\overline{\mathbf{v}}$	$\overline{\lor}$	$\overline{\checkmark}$
		B2B		$\overline{\mathbf{v}}$	$\overline{\lor}$	$\overline{\mathbf{v}}$
Smooth Pseudorange Epoch 0	GLONASS	L1	$\overline{\mathbf{v}}$	V	$\overline{\mathbf{v}}$	M
Event		L2	V	$\overline{\vee}$	$\overline{\lor}$	$\overline{\mathbf{v}}$
▼ Event Obs	GALILEO	E1C	v		$\overline{\lor}$	2
P EVENCODS		E5B		$\overline{\mathbf{v}}$	$\overline{\mathbf{V}}$	
		E5A		$\overline{ \mathscr{V} }$	$\overline{ \checkmark}$	$\overline{\mathbf{M}}$
	1		1			
<u>C</u> an	icel		<u>O</u> K			

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

• Click 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 Survey Master Software, including software installation, start a new project, receiver connection and RTK working modes (Radio, CORS and GPRS).

5.1 Installation of Survey Master

Survey Master is available on Google play, you can download for free and install the software to SinoGNSS controller R550.

Also you can download the latest version from our website: <u>http://comnavtech.com/download.asp?bigclassid=28</u>

5.2 Wizard function in Survey Master

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

In Project menu, tap Wizard.

 Project: Click Select to go into Project interface to create or select a project. For detailed information, you can refer to <u>chapter 5.3</u>.

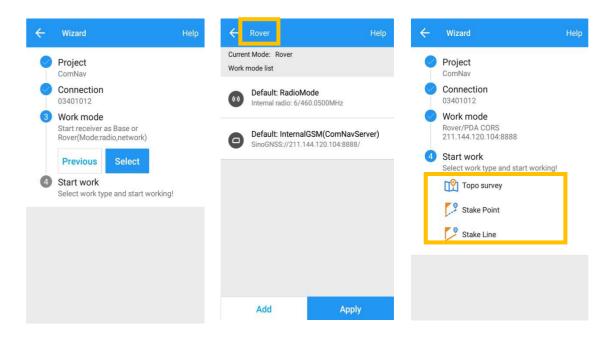
63	ComNav	Help	← Wizard		Help	÷	Project			Help
Wizard	Project	Datum	1 Project ComNav	Next		China/	list 1 Nav WGS 84 2019 15:46	:53		View >
Element	Code	Basemap	 Connect d Work mo Start recei 	ion evice via Bluetooth						
Import Eeatures	Export Cloud	Export Result	Start wo Select wor	rk k type and start working!						
E Project	O O Device Survey	Tool				D Open	+ Create	(f) Upload	(Download	

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

	Help		Help
Project ComNav		Device model	ComNav >
Connection		Connection type	Bluetooth >
Connect device via Blue	tooth	Target device	03401012 >
Previous Selec		Scan QR code on receiver to build Click arrow on the right to change	
Work mode Start receiver as Base or Rover(Mode:radio,netwo			
Start work Select work type and sta	rt working!		
		Conne	ect
			Connect to device

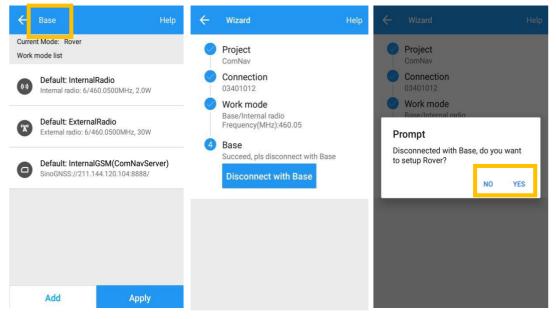
3. *Work mode*: Click *Select* to go into QuickSetup interface to start your receiver as Base/Rover. For detailed information, you can refer from <u>chapter 5.5</u>.

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



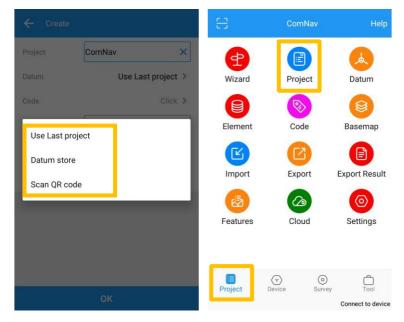
If you start your receiver as Base, after Disconnect with Base, there will be a Prompt. YES: will guide you to start Rover in Wizard interface;

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. Survey Master currently has 49 countries datum and will add more afterwards.

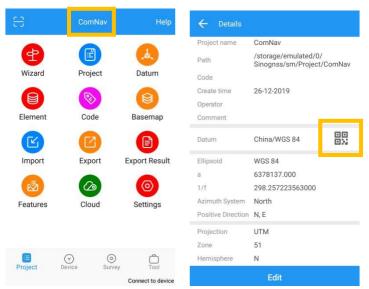
← Datum Store	Help	Predefined datum
Datum list		Country Oblas N
China/Beijing 1954		China
China/Xian 1980		Argentina
China/CGCS2000		Australia
China/WGS 72		Azerbaijan
China/WGS 84		Belgium
China/Shanghai		Brazil
		Cameroon
		Chile
		Egypt
Predefined User defined O	к	

• 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.

← Datum Store He	elp	÷	Add datu	ım	Help
Datum list		Datum		LOCAL	×
China/Beijing 1954					
China/Xian 1980		Source	ellipsoid		Choose ellipsoid $ {\color{red} } $
China/CGCS2000		Target e	ellipsoid		Choose ellipsoid >
China/WGS 72		Projecti	ion	Pleas	e select projection >
China/WGS 84					
China/Shanghai		Seven p	arameters	3	Close >
		H.RMS			Close >
		V.RMS			Close >
		Geoid N	lodel		Not use 🗲
		Grid co	rection		Not use >
Predefined User defined OK	:			ОК	

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.

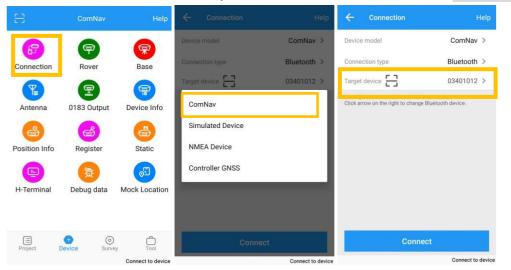


5.4 Bluetooth connection

To connect Survey Master with N3, 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 N3 receiver—allow pair

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



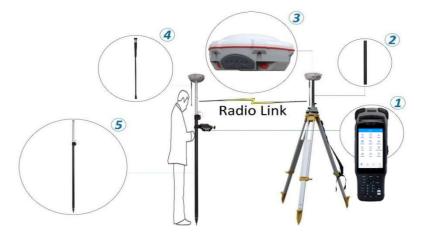
← Select device		Help	8	ComNav	Help
Bluetooth	Device model	ComNav >	8	P	(P)
Available devices	Connection type	Bluetooth >	Connection	Rover	Base
✓ 03301015	Target device	03401012 >	¶∎		P
(v) 03401012	Sca	_	Antenna	0183 Output	Device Info
	Pair with 0340101	1994	4	e	-
	Allow access to your of history	contacts and call	Position Info	Register	Static
	CA	NCEL PAIR		资	E
	_		H-Terminal	Debug data	Mock Location
			Project	Oevice Surve	
	Connect		N:3469646.19 E:337564.380	6	Status: Single Z:8.206
Find device	.	Connect to device	E.337564.380 221/23	۲	2.8.200 ای H:1.356 V:1.590

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

Tip: If you are failed to connect with receiver through Survey Master, 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 Survey Master Software.

5.5 Internal Radio Mode

N3 GNSS receiver supports transmit & receive the correction data in internal radio mode. To conduct the RTK survey in internal radio mode, it requires:



 A controller with software installed



② An extension bar

③ Two units of N3 GNSS receiver

④ Two whip antennas

⑤ A range pole with bracket

6 Tripod and tribrach

Tip: The external power supply is recommended when N3 set as a base station.

More: Aim to improve the radius of work field, we can change the base receiver's Whip Antenna to External Antenna. And others no need change.



- ① N3 GNSS Receiver
- ② External Antenna

5.5.1 Start Base Station by Survey Master

Firstly, build Bluetooth connection between the N3 receiver and your controller as shown in <u>Chapter 5.4.</u>

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

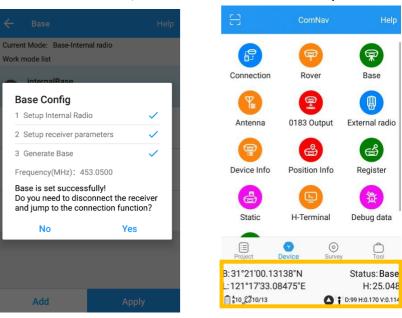
• Click Device-> Base ->Add, select Internal radio.

	ComNav	Help	← 1	Base	Help	🔶 🛛 Datalink T	Гуре	
19	Ģ	Ţ	Current Work me	Mode: Rover		Datalink Type	Internal radio	>
Connection	Rover	Base		Default: InternalRadio Internal radio: 6/460.0500MHz,	, 2.0W	Protocol Power(W)	Transparent 2.0	> >
Antenna	0183 Output	Device Info		Default: ExternalRadio External radio: 6/460.0500MHz	r, 30W	Channel	Customize	> ((0))
Position Info	Register	Static		Default: InternalGSM(Com		Frequency(MHz) Range(410-470MHz)	— 453 <mark>,</mark> 0500	× +
H-Terminal	Debug data	Mock Location		311001433.//211.144.120.104.6	5566/			
Project	Device Survey	y Tool						
N: 3469646.09 E: 337564.378		Status: Single Z: 8.080 D:0 H:1.356 V:1.590	F	Add A	oply		Confirm	
NUL II LO								
Datalink Type Protocol Power(W) Channel	Internal radio Transparent 2.0 Customize	> > > (0)		Protoce	ol and	channe	l: Set	
Frequency(MHz) Range(410-470MHz)	- 453 050	<i></i>		protoci base;	ol and fi	requency	for the	
Range(410-470MHz) ← Base	- 453 <mark>,</mark> 050		ſ	base;				
Range(410-470MHz)	- 453 <mark>,</mark> 050	00 × +		 Start mo have a k 	de: Fix po nown co	osition me ordinate f	eans you	
Range(410-470MHz)	- 453 050	00 × +		• Start mo	de: Fix po nown co	osition me ordinate f	eans you	

← FixPosit	ion					
Base station coor	Library choose	Receive				
Name	Base:p0	×				
Code						
Display type	Local grid coordin	ate >				
Ν	3469655.236					
E	337581.203					
Z	25.088					
Slant(S)	1.850					
() E	Bottom of receiver(H)	Slant(S)				
Antenna type	TS	30(NGS) >				
	ОК					

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

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



5.5.2 Start Rover Station by Survey Master

- Connect Survey Master with N3 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.

÷	Create			← Rover			~	Rover		Help
_				Datalink Type		Internal radio >	Curr	rent Mode: Rover-I	nternal radio	
		ComNav ×		Protocol	Transparent		Wo	rk mode list		
		Use Last project >		Frequency	0/453.0500			internalRadio		
		out cust project y		Frequency	1Hz	>	(1)	Internal radio: 0		Hz
		Click >		Mask angle	10			Rover Config		
-			11					1 Setup Internal F	Radio	~
Us	e Last proje	ect					11.5	2 Setup receiver	parameters	~
								Succeed!		
Da	tum store							Frequency(MHz):	453.0500	_
Sc	an QR code								ок	_
_							ы.			after 1 seconds.
							1.60			
								Add		
		ОК			Save			\bigtriangledown	0	

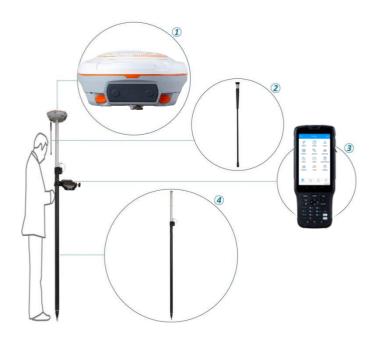
5.6 External radio mode

The external radio mode can extend RTK working distance, which is ideal for areas with high constructions or strong signal interference. To set up external radio mode, it requires:

Base station
In external radio
An external power supply
A long whip antenna
Transmission cables
A N3 receiver
Tripod and tribrach

Tip: 1) See <u>Appendix A</u> for detailed definition of 7-pin Lemo cable that connects the N3 receiver and external radio; 2) See <u>Appendix B</u> for the operating information of CDL7. Warning: 1) You **MUST** connect CDL7 to external antenna firstly and then supply power, otherwise the CDL7 will have a risk of burnout; 2) You'd better put it in a shelter when raining, because it's not water-proof.

Rover station



A N3
 receiver
 A Whip

antenna

- ③ A controller with software installed
- ④ A range pole with bracket

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

← Datalink	Туре			
Datalink Type	External radio	>		
Protocol	Transparent	>		
Power(W)	30	>		
Channel	6	> ((0))		
Frequency(MHz)	- 460.05	00 +		
Range(400-480MHz)				
Air baudrate	9600	>		
BaudRate	38400	>		
Set CDL3/CDL5 radio Select BaudRate for your External Radio, the other parameters are only work for ComNav CDL5 External Radio.				
Confirm				

- When start succeed, set up the frequency channel, and Rover frequency should be same.
- Be sure to set the same baud rate as your CDL7(default value is 38400, you also can change in *Param tab* based on your CDL7).

5.7 PDA CORS Mode

Without setting up your own base stations, the N3 GNSS receiver can receive correction data transmitted from continuously operating reference station via PDA's GPRS or WIFI. To do RTK survey in PDA CORS mode, it requires:



1 A N3 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 Survey Master Software.
- Build Bluetooth connection as shown in <u>chapter 5.4</u>, Click **Device** -> **Rover** -> PDA CORS.

Datalink Type	PDA CORS	>
Protocol	CORS	>
	APN	ලි
Server	SINOGNSS	• :=
DNS/IP address	211.144.120.104	
Port	8888	
Source List		- 1
User		
Password		
1021-1022		
1023-1024		
1025-1027		
VRS		
	Confirm	

- 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 (yellow) on receiver will flash, and software can get a fixed result.
- It also provides TCP protocol.

5.8 Internal GPRS Mode

For Internal GPRS mode, N3 receiver supports Point to Point/Points and Ntrip client mode. To acquire the APN (access point number) from the mobile service provider, you need to insert a SIM card into the N3 receiver. It commonly acquires the APN from the mobile network provider, otherwise try to get via the link:

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

5.8.1 Point to Point/Points mode (P to PS mode)

In point to point mode, the correction data is transmitted from the base station to the server, then rovers can log on the server to get the correction data. Therefore, SIM cards are required both in the Base and Rover.

Tip: ComNav technology provides a free static server address **<u>211.144.120.104:8888</u>**, anyone can upload CORS data as long as abide by the agreement.

Below shows Base configuration with ComNav server:

- Server: select SINOGNSS server(IP: 211.144.120.104 and Port:8888)
- BaseName: Click BaseName to get SN of Base receiver directly, when start Rover, just select the name as source
- Differential mode: make sure to choose RTCM32
- Fix Position: Click *Library choose* to select a known point for the Base, or *Get* from GNSS if you do not have a known point.

← Datalink	Туре	← Base		← FixPosit	ion
Datalink Type	Internal GSM >	Datalink Type	Internal GSM >		
Protocol	CORS >	Protocol Port	SinoGNSS 211.144.120.104:8888	Base station coor	Library choose Receive
APN	CMNET 🐼			Name	Base:p0 ×
Server	SINOGNSS - :=	Differential mode		Code	
DNS/IP address	211.144.120.104	Start mode	Fix position >	Display type	Local grid coordinate >
Port	8888	Mask angle		N	3469655.236
BaseName	- <u>+</u>			N	3409055.230
User		•		E	337581.203
Password				Z	25.088
				Slant(S)	1.850
					Bottom of receiver(H) () Slant(S)
				-	
				Antenna type	T30(NGS) >
	Confirm		Save		ок

After successfully starting the Base station, the differential LED (yellow) flashes once per second, which means the Base is broadcasting correction data;

Configure the Rover as below:

- Protocol: Select SINOGNSS directly;
- BaseName: Enter the SN of the Base receiver.

Datalink Type	Internal GSM		>
Protocol	SinoGNSS		>
APN	CMNET		త
Server	SINOGNSS	*	:=
DNS/IP address	211.144.120.104		
Port	8888		
BaseName			\downarrow

5.8.2 Internal 4G Ntrip client mode

For Ntrip client mode, Rover acquires correction data from Ntrip(CORS) server.

← Datalink Type					
Datalink Type	Internal GSM	>			
Protocol	CORS	>			
APN	CMNET	ල			
Server	SINOGNSS]:≡			
DNS/IP address	211.144.120.104				
Port	8888				
Source List	~	$\overline{1}$			
User	sxbhd				
Password	••••	×			
VRS		•			
	Confirm				

- Enter proper APN, DNS/IP Address and Port.
- Click Source List, select the proper source-> enter User and Password

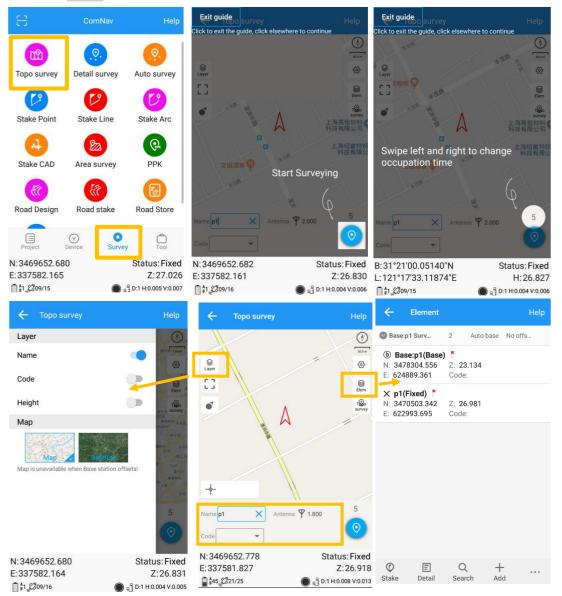
6 Basic Survey Functions

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

6.1 Topo survey

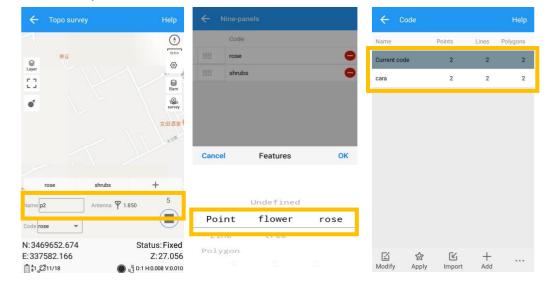
Click Topo Survey-> enter point name, ->click 📀 to start or stop collecting data.

- 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.



• 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.

Cancel 1 selected Select all	🔶 Element Help	Cancel Please select point Select all
Base:p1 Surv 2 Auto base No offs	Base:p1 Surv 1 Auto base No offs	Base:p1 Surv 1 Auto base No offs
Image: Base:p1(Base) ™ N: 3478304.556 Z: 23.134 E: 624889.361 Code:	 ● Base:p1(Base) N: 3478304.556 Z: 23.134 E: 624889.361 Code: 	× p1(Fixed) □ □ N: 3470503.342 Z: 26.981 E: 622993.695 Code:
➤ p1(Fixed) ✓ N: 3470503.342 Z: 26.981 E: 622993.695 Code:		
	Multi-select	
	Delete	
	Coordinate type	
	Import	
	Recycle bin	
	Switch display mode	
间 Delete	© E Q + Stake Detail Search Add	S Delete

6.1.1 Survey settings

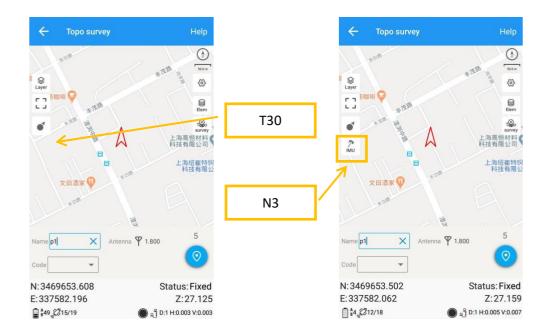
← Setting Help
Survey Dis- Road Tilt PPK CAD
Fixed
Duplicate name
Auto save
Code measure
Save PPK data
H.RMS 0.030 ×
V.RMS 0.040
Offset radius
Occupation time 5
ок
← Setting Help
Survey Dis- Play Road Tilt PPK CAD
Direction guid Norh/South/East/West >
Height diff ref Stake point >
Height diff Fill/Dig >
Electronic compass
Electronic compass
Electronic compass
Electronic compass Auto centered Keep centered Display survey points
Electronic compass Auto centered Keep centered Display survey points Co Topo survey again after setting
Electronic compass Auto centered Keep centered Display survey points Display map

- 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

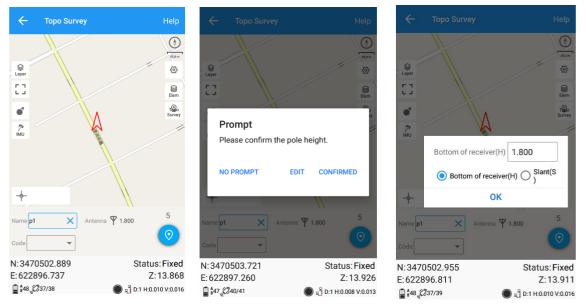
6.1.2 Tilt survey

Tilt survey option will appear when receiver supports for tilt survey, it is available for ComNav Technology N3 GNSS receiver, use IMU sensor.

According to the IMU sensor, can not only meets the requirement of high precision measurement, but also relieves the users from continually checking whether the pole is plumb. When the pole 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.

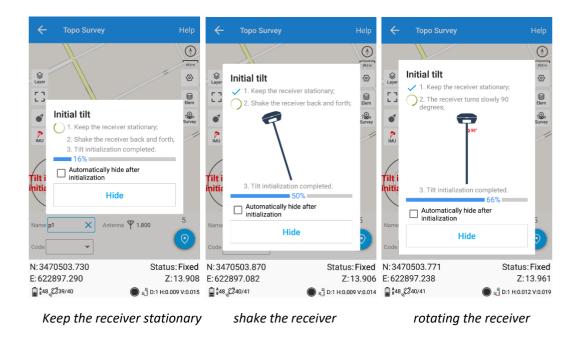


After you click IMU button, it will give you one prompt to check the antenna information. *Edit*: Change the antenna information.

Confirmed: You have been confirmed the antenna information, and it is correct. **NO PROMPT**: will not give this prompt next time when you do IMU calibration.

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.



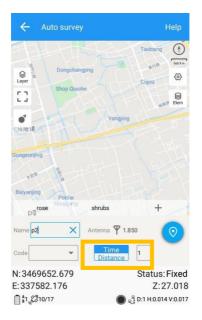
In survey interface, you can find the bubble and angle value shows the pole you tilt. For more accuracy, angle less than 60° will be better.



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.



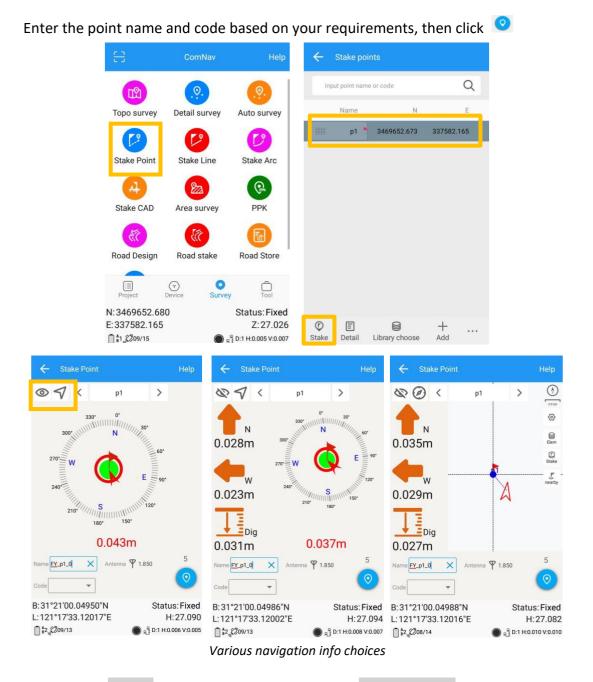
For Area survey, it can compute area directly after getting points.

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

÷	Area cal	с	Help	÷	Area cal	c		Help	÷	Area survey	Help
	Name	N			Name	١	I	E			٢
1111	p2	3469652.441	337581.644		p2	3469652.44	1 337581.64	44			_ 44 m
	р3	3469652.373	337581.800		р3	3469652.37	3 337581.80	00			
	p1	3469652.673	337582.165		p1	3469652.67	3 337582.16	65			Points
A	rea ≈ 0.03 rea ≈ 0.00 ircumfere	0054mn nce ≈ 1.214m	NCEL SAVE						p2	p3 rose shrub	6 +
									Name p	• •	a ♥ 1.850 5
Co		Shape Lib	rary choose		ompute	Shape L	ibrary choose	:		59652.681 582.175 ₿10/17	Status: Fixed Z: 27.03 ای 1 H:0.008 V:0.01

6.3 Stake points/lines

Go into **Stake point** interface, click to choose a point and tap **Stake**. Survey Master 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.



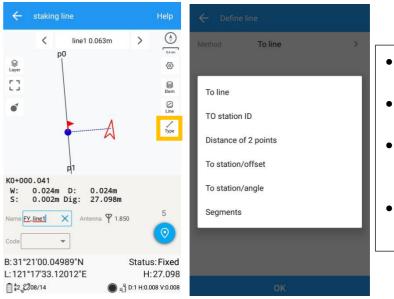
You can also Import points for staking, or add from Library choose.

Cancel 2 s	elected Select all	← Stake points		← Stake points	
Category	Ν	Input point name or code	Q	Input point name or code	Q
Base:p0 Surv	7 Auto base No offs	Name N	E	Name N	E
b Base:p0	3469640.264 33	p1 3469652.673	337582.165	p1 53469652.673 337	582.165
□ → t2	3469652.620 33			p2 5 3469652.441 337	581.644
□ → t1	3469652.675 33			p3 5 3469652.373 337	581.800
🗹 🗙 рЗ	3469652.373 33				
✓ X p2	3469652.441 33				
□ × p1	3469652.673 33			Import	
□ × p0	3469652.678 33			Export	
				Delete	
	ß	¢ e e	+	Clear data	
	ок	Stake Detail Library choose	Add	Image: Constraint of the second sec	

Tip: keep your receiver vertical to the ground.

For staking lines, click $\xrightarrow{+}$ add line (Two points or Point + Azimuth + Distance) -> click $\xrightarrow{-}$ Choose one line and click Stake. The default method to stake is "To line", press method to choose a method you want.

8	ComNav	Help	\	Stake lin	es			← Add Line	
B			npu	it code or n	ame		Q	Two points	Point+Azimuth+Distance
Topo survey	Detail survey	Auto survey	Line t	Name	Start point	End point		Line type	3D line
[]			1	line1	p0	p1		Name	line2 ×
Stake Point	Stake Line	Stake Arc						Code	
A	22							Start point	p2
Stake CAD	Area survey	РРК						Ν	3469652.441
ett	Sit							E	337581.644
Road Design	Road stake	Road Store						Z	27.039
Project	Device Survey	Tool						End point	p3
N:3469652.68		Status: Fixed				_		Ν	3469652.373
E:337582.165		Z: 27.026	© Stake	(E Detai	ビ Import	+ Add			ок



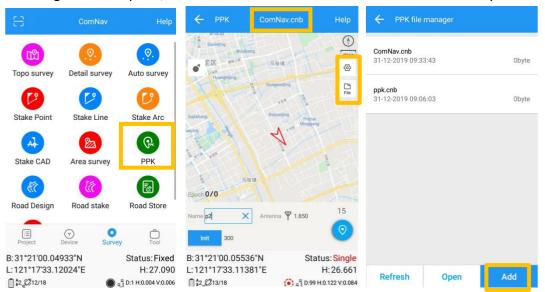
- To line: show shortest way to find a point on line;
- To station ID: stake points on line by defined interval;
- Distance of 2 points: show distance of current location to the line's start point and end point;
- Segment: Stake on line by defined segment value.

6.4 PPK

PPK (post processing kinetic) is the unique function of survey master, 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 another one 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.



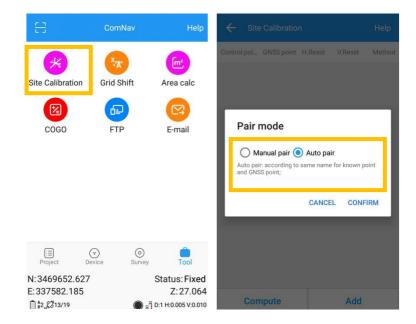
\leftarrow Settings			← РРК	ComNav.cnb	Help
Survey Di	splay road	РРК	Daxlejing Nijabang	ELL .	<u>()</u>
Occupation time	15	×		马蒜镇	(41.47) (合)
Init. time (s)	300		Huangnijing	Gongsunjing	C ¹ File
Valid SVs	7			REP Baiyanjing	
Locking time(s)	10		Sujiabang	A water Ming	gang
SNR	25			N	1
PDOP	6		马牌		
			Epoch 0/0	*	The second
			Name p2 ×	Antenna 🏆 1.850	15
	ОК		B:31°21'00.05536 L:121°17'33.1138 ⋒₽2,©13/18	1"E	tatus: <mark>Single</mark> H: 26.661 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.



 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

Click to add	← Edit		÷	Site Calibrati			Help	÷	Site Calib	oration			Help
K1, K2, K3	Control point		Control	poi GNSS poir	t H.Resid	V.Resid	Method	Control	poi GNSS	point H.	I.Resid	V.Resid	Method
K1, K2, K3	Name		К1	A1			H.&V.	К1	A	.1 0.	.022	0.000	H.&V.
	Ν		К2	A2			H.&V.	К2	A	.2 0.	.062	0.000	H.&V.
	E		кз	A3			H.&V.	К3	A	.3 0.	.075	0.000	H.&V.
	Z												
Click to add A1, A2, A3	GNSS point	8 2							Succeed Succeed				
	В												
	L												
	н												
		ок		Compute		Add			Apply			Add	

automatically.

 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.

← Edit	÷	Site Calibratio			Help	← Site	e Calibratio			Help
Control point	Control	ooi GNSS point	t H.Resid	V.Resid	Method	Control poi	GNSS point	H.Resid	V.Resid	Method
Name	 КЗ	кз			H.&V.	КЗ	КЗ	0.075	0.000	H.&V.
N	 K2	К2			H.&V.	K2	K2	0.062	0.000	H.&V.
E	 К1	К1			H.&V.	К1	К1	0.022	0.000	H.&V.
Z							ucceed for h			
GNSS point						SI	ucceed for ve	ertical calib	oration!	
Name										
В										
L										
н										
						_	_			
ок		Compute		Add		Ar	oply		Add	

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

← Current p	rojection datum	Help
æ		Datum Store
Datum	China/WGS 84	
Target ellipsoid		WGS 84 >
Projection		UTM >
Site	calibration succeed	Close >
H.RMS		Open >
V.RMS		Open >
Geoid Model		Not use >
	Ð Ø	
	ОК	

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.

← Grid Shif		Help	
GNSS point		0	Click to add the point from one Base
N	3450043.895		·
E	346366.943		
Z	25.125		
Known point		8	Click to select the same point from another
Ν	3450043.866	×	
E	346366.890		
Z	25.470		
ΔN	-0.029		
ΔE	-0.053		
ΔZ	0.345		
Compute	Apply		

6.6 COGO

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

8	ComNav	Help	← собо	Help
*	Augo	(m)	Angular transformation	>
Site Calibration	Grid Shift	Area calc	Two Points	>
	æ		Point to line	>
COGO	FTP	E-mail	Offset point	>
			Deflection angle	>
			Deflection point	>
			Intersection point	>
			Bisection point	>
	evice Survey	Tool	Points from line	>
N: 3450043.909 E: 346366.937		Status: Fixed Z: 25.154	Point average	>
		B D:1 H:0.005 V:0.009		

- 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

Survey Master 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.

← Import		← More formats	
Data format	Add	N E Z Name(.txt)	
CASS(.dat)	>	Name,Code,E,N,Z(.csv)	
Name,Code,N,E,Z(.csv)	>	Name Code E N Z(.dat)	
Name Code N E Z(.txt)	>	Name,E,N,Z(.csv)	
Name,N,E,Z(.csv)	>	Name E N Z(.dat)	
Name N E Z(.txt)	>	E,N,Z,Name(.csv)	
Name B L H(.txt)	>	E N Z Name(.dat)	
B L H Name(.txt)	>	Name,N,E,Z,Code(.csv)	
Name,Code,B,L,H(.csv)	>	Malaysia CRM(.txt)	
B,L,H,Name,Code(.csv)	>	Malaysia CRM(.csv)	
More formats	>		

- 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 .../Sinognss/sm/data, you can also click Upper folder • to change to any other path where the file is.
- Point type: support Input point, Control point, Stake point

← Import	Help	← More formats	Help
oata format	Add	N E Z Name(.txt)	>
CASS(.dat)	>	Name,Code,E,N,Z(.csv)	>
Name,Code,N,E,Z(.csv)	>	Name Code E N Z(.dat)	>
Name Code N E Z(.txt)	>	Name,E,N,Z(.csv)	>
Name,N,E,Z(.csv)	>	Name E N Z(.dat)	>
Name N E Z(.txt)	>	E,N,Z,Name(.csv)	>
Name B L H(.txt)	>	E N Z Name(.dat)	>
B L H Name(.txt)	>	Name,N,E,Z,Code(.csv)	>
Name,Code,B,L,H(.csv)	>	Malaysia CRM(.txt)	>
B,L,H,Name,Code(.csv)	>	Malaysia CRM(.csv)	>
More formats	>		

← User-defined	
Name	ComNav 🗙
Header	
Other info	
Operator	Datum
Receiver model	Firmware
Work mode	
Delimiter	Comma(,) >
File format	.csv >
Degree type	dd.mmss.sssss >
Available Select all	Selected Clear
A 1	
Preview (.csv)	
OI	ĸ

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.

← Export		← More formats
Data format	Add	Ex. Stake Ps
CASS(.dat)	>	Ex. Stake Ls
Name,Code,N,E,Z(.csv)	>	Export Survey Points
Name Code N E Z(.txt)	>	Export DXF
Name,N,E,Z(.csv)	>	Export KML
Name N E Z(.txt)	>	Export RAW
Name B L H(.txt)	>	Export RW5
B L H Name(.txt)	>	Export HTML
Name,Code,B,L,H(.csv)	>	Export SHP
B,L,H,Name,Code(.csv)	>	CASS feature export
More formats(DXF,KML,RAW,RW5,HTML)	>	N E Z Name(.txt)

- 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 date, name, code of data to specific export

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

← Export	Help	← User-defined	🔶 Export Help	← Export Help
Data format	Add	Name PIs name for the format	Select Survey point >	Select
CASS(.dat)	>	Header	File name 20201215 ×	File Point type
Name,Code,N,E,Z(.csv)	>	Delimiter Comma(,) >	Data type Name,Code,N,E,Z(.csv)	Dat Input Control Stake point point point
Name Code N E Z(.txt)	>	Degree type dd.mmss.sssss >	/storage/emulated/0/Sinognss/ sm/Export	
Name,N,E,Z(.csv)	>	Available Select all Selected Clear	Üpper folder	TODAY SEVEN ALL
Name N E Z(.txt)	>	Code	SinoGNSS.csv 20.00 B 15-12-2020 11:41:20	Start date ~ End date
Name B L H(.txt)	>	Name		Name
B L H Name(.txt)	>	E		Code
Name,Code,B,L,H(.csv)	>	Z		Cancel OK
B,L,H,Name,Code(.csv)	>	Preview (.csv)		
More formats(DXF,KML,RAW,RW5,HTML)	>	ОК	ок	ОК

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.

← Export D	DXF	
Path	/Sinogns	s/sm/Export >
File name	ComNav_dxf	×
Data	Survey point	Input point
	Control point	Stake point
	✓ Base	🗹 Line
	🗸 Polygon	
Layer	🗹 Name	Code
	🖌 Height	
Text height	0.500	
	ОК	

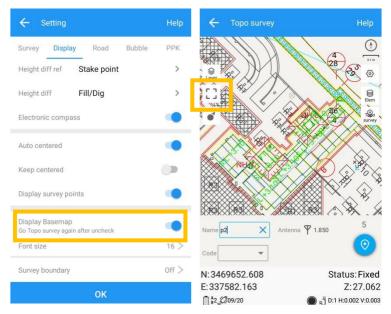
7.3 Import Basemap

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

- 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.

e	ComNav	Help	← Basemap	Help	← Basemap	Help
¢			Basemap	CAD >	Basemap	CAD >
Wizard	Project	Datum	Add points		Add points	
			Prefix	CADP >	Prefix	>
Element	Code	Basemap	Add lines		Add lines	
C			CAD		Prefix	>
Import	Export	Export Result	Shapefile		Add line endpoints File list	
				_		
Features	Cloud	Settings				
		·				
E Project	Device Surve					
N:3469652.62 E:337582.169		Status: Fixed Z: 27.066				
E. 337582.109		Z: Z7.000 D:1 H:0.002 V:0.003	Ad	d	Add	

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

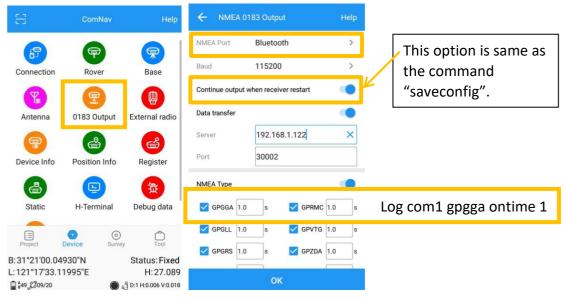


8 Export Result

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.



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

8.2 Register N3 via Survey Master

 Normally, the register code is like this:

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

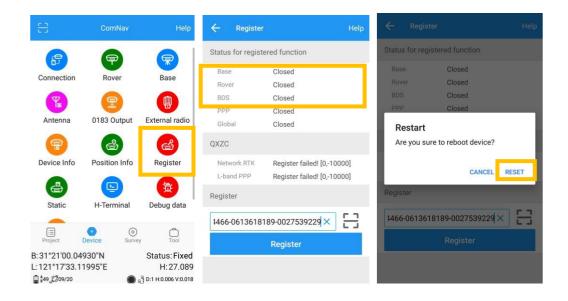
 FUNCTIONREG:2207453726-3851620954-0949162572-0697504466-0613618189-0027539229

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

Following shows two methods to register the receiver.

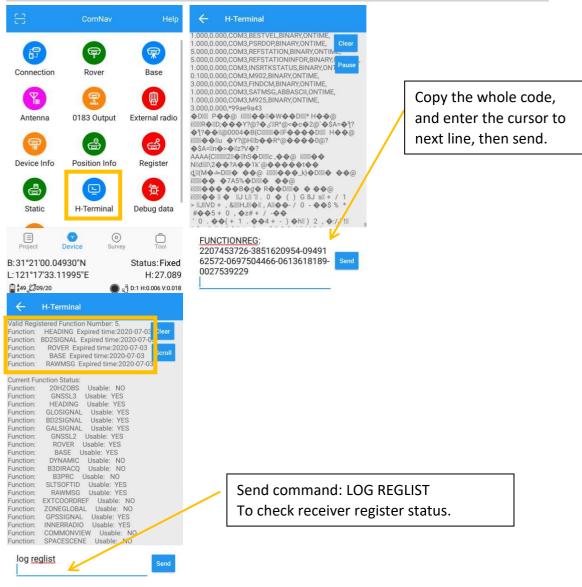
Register function

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



9 Firmware Upgrade

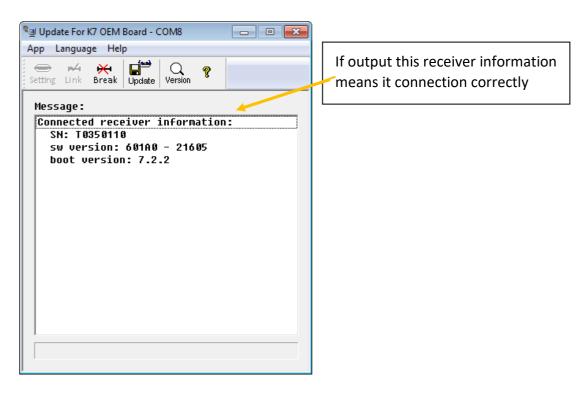
Prepare a Lemo to serial port cable.

1. Copy the firmware software to your PC, connect N3 to your PC via serial port cable and turn on the receiver.

2. Open the firmware program, choose "APP->Link setup", select **proper port** to connect with receiver, and then click "OK".

Link Setup		×
Serial Port	СОМ8	•
🗆 Manual Uj	odate (Default B	audrate 9600)
🗖 Change B	audrate to 1152(10
	<u>0</u> K	<u>C</u> ancel

3. Click "*Link*" icon to build the connection (this is important to check if the N3 is connect to PC successful)



Then click "*Update*" icon to start the update (a few seconds are needed), during update, the N3 will restart automatically and all LEDs on N3 should be on.

When the progress bar is full, and "*Completed!*" appear below, it seems the update has been completed and then you can click "*Break*" to finish the update.

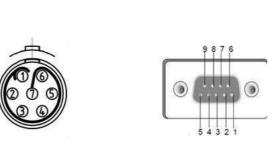
Tips:

- 1. N3 receivers don't support USB cable to update firmware.
- 2. The latter firmware will update by WIFI, the supported system firmware should not be lower than 1.3.2. For more information about update by WIFI, pls refer to the manual "Q&A How to update firmware of N3 receiver via WIFI".

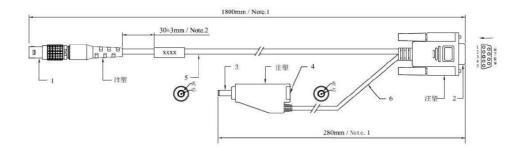
🖳 Update For K7 OEM Board - COM8 📃 🔲 🔜
App Language Help
Setting Link Break Update Version ?
Message:
Connected receiver information:
SN: T0350110 sw version: 601A0 - 21605 boot version: 7.2.2
Your serial port is COM8 Begin update, restarting the receiver Begin update 01A0A11 Address: C2E00 Updating Firmware! please wait Completed!

Appendix A: 7-Pin Lemo definition

The following figures show the definition of 7-pin lemo, and the structure of 7-pin Lemo to RS232 Cable:



7 pin Lemo	Description	
1	Signal GND	
2	GND	
3	TX data out (TXD)	
4	NONE	
5	NONE	
6	Power In (+)	
7	Serial data in (RXD)	



Appendix B: Physical Parameter of Modules inside of N3

idio parameter	Specifications
- requency range	410.0250-469.9750MHz
Protocol	Transparent
Airlink rate	9600 bps
Bandwidth	25kbps
Power	0.5, 1, 2 Watt adjustable
Work distance	10-15km, depends on power supply and environment condition
Modulation	GMSK

> Bluetooth:

- Frequency Range: 2.402Ghz-2.480Ghz
- RF Power (Max): 4dBm
- Band Width: 2Mhz