

N2 GNSS Receiver

User Guide

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FCC Notice

SinoGNSS N2 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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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 N2 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^{OR} N2 GNSS Receiver User Guide *s* aimed to help you get familiar with the N2 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, N2 GNSS receiver can be applied in RTK mode with all GNSS constellations. N2 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® N2 GNSS Receiver keyfeatures:

- Ultra small and super light
 - Size (W × H): 14.9cm × 4.8cm
 - Weight: 650g
- 1590 channels of simultaneously tracked satellitesignals
- Increased measurement traceability with SinoGNSS[®] Quantum[™] algorithm technology
- Cable-free Bluetooth wireless technology
- 4 indicator LEDs for battery, diff, satellite, and 2 function buttons for power and static
- IP67 waterproof
- Full base/rover interoperability
- Integrated receiving & transmitting radio
- Integrated IMU sensor
- Long distance range radio module
- Support long baseline E-RTK[™] (Beidou B3 signal is included in RTK calculate engine)

1.3 N2 Receiver parts list

This section provides overall N2 receiver parts list, including basic supplies and customized kits based on your requirements.

1.3.1 Basic Supply kit

SinoGNSS[®] N2 GNSS Receiver Basic Supply kit contains two receivers and related accessories.

ltem	Picture
2* Kits N2 Receivers	0
1*GNSS Connector	
2* Whip Antenna (UHF)	
1*2m-Range Pole with yellow bag	And Contraction of the second se



Optional accessories:

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

2 Setting up the receiver

This chapter provides general information on environmental requirements, setup, power supply and connection of the N2 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, GPRS and battery. For detailed information, see <u>chapter 3.3</u>.



2.3 Lower housing

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

2.4 Power supply

N2 GNSS receiver supports internal batteries and external power input.2

.4.1 Internal batteries

The receiver is equipped with two Lithium-ion batteries, which can be removed for charging. The N2 receiver adopts the internal 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

Please charge the internal battery via type-c cable

- Storage of the Lithium-ion Battery
 - Keep batteries in dry conditions.

- Dispose of the Lithium-ion Battery
 - Discharge a Lithium-ion battery before dispose of it.
 - Dispose of batteries is an environmentally sensitive manner, and adhere to any local and national regulations concerning battery disposing or recycling.

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

2.4.2 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 N2 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 N2 Receiver

N2 GNSS Receiver can work as a charger, it means you can charge batteries directly if the charger not by your side.

1. Power off N2 receiver with batteries inside;

2. Connect N2 receiver to 12V external power with type-c cable;

3. Receiver will charge the battery from Side B to Side A, the white 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 table define each possible LED state:

LEDs	States	Description
Dower	Lit	Enough power
Power	Flashing	Low power
Differential Data	Flashes once per second	Receiving/transmitting differential data
Satellite Tracking	Fast flashing/ Flashes 1 time every 5 seconds	No satellite received
	Flashes N times every 5 seconds	Received N satellite signals
	Flashes according to the selected sample interval	1) Sample interval varies from 20Hz to 60s.
		 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.

4 Static survey

This chapter describes static survey through N2 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. Connect the receiver with your PC through serial port cable.
- Turn on your N2 receiver and 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.

Tips: two types of cable are provided in your package,

1) We recommend to use type-c cable to *download* raw observation data;

2) With type-c cable, you can connect N2 receiver with external power or firmware upgrade.

- 4. Click *Config* to configure the receiver:
- **Sample Interval**: change the sample interval of observations, the maximum data rate is 20 Hz, the minimum is one observation per minute.
- Mask angle: disable the receiver to track satellites that below the mask angle. You can set mask angle values for different constellations, which can reduce serious multipath influence or low SNR.

- Data Log: logging data manually or automatically.
- Data Log Session: 1) Manual means that the receiver keeps recording data in one file until the receiver is turned off or its memory runs out; 2) if set to 1\2\3\4\12 hours, the data recorded will be saved into a file every 1\2\3\4\12 hours.

eceiver Configurations			×
Item	Parameter	^	Default Settings
Model of the receiver	2001		
Receiver No.	302520		Refresh Settings
Date of manufacture	2018/03/01		
Option	No		Apply Settings
Version	H:1.12 B:5.0.1 S:3.6.8		
Memory	255MB		Register Receiver
Sample Interval(second)	5 s		
GPS Mask Angle(degree)	10		Update Firmware
BDS Mask Angle(degree)	10		Local Loa
GLONASS Mask Angle(degree)	10		Local Log
GALILEO Mask Angle(degree)	10		
Data Log	Manual		
Data Log Session	Manual		
Port Configration	Normai		
Work Mode	Normal		
Correction Port	Port 1		
Format of Correction	CMR		
Register Code	16777215-42949-67295	~	Exit

5. Complete all configurations and click Apply Settings to save settings. Exit and restart the receiver to activate configurations

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 N2 receiver, when connected with PC via USB cable, the N2 receiver can work as a USB Flash Disk, which means you can copy or cut static data to PC directly.



Tip1: Default memory for N2 *receiver is 8GB, and 16GB, 32GB optional. Tip2: 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.

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Compass Receiver Utility	[2001	1T33-301007 USB1 - C:\Us	ers\Sophia\De	esktop\1007	\20170513		-	пх
App Connection Receiver	Rad	dio GNSS Rinex View	Help					_
Contract Close Contract	() Mot	Diff Attitude Command	eck List File 1	Bernory Down	E Dalada	Modify Convert 8	atup Dines	A B C 41.42.43 Clear RocHex •
Folders		Messages Rinex (Convert 🖪 🦲	File Download	đ			•
Project	1	File name	Downlo	ad time	Size(KB)	Receiver No.	Marker	Model
Messages	^	03301007134A0.cnb	2018-03-	Conve	rt to RINEX rt Settings	3301007	03301007	1908
5				Modif Rinex	y Analyse			
Tracking								
\$								
World Map								
1								
File Download								
RINGR								
Rinex Convert	¥	<						>
Ready							Diff 0 B/	S CAP NUM:

Click to select the Antenna Type and Measurement. If you cannot find

N2 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 0.0745m, h0 is 0.0135m and h1 is 0.0294m respectively for N2 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.

C:\Program Files\Compass\A	ntennas.ini	
Antenna Type N3		-
Measurement Antenna botto	m	2
Ro	R0 =	0.077500 m
	h ₀ h0 =	0.032500 m
The A	T h1 =	0.038000 m
/		Add
$\left \frac{H}{1} \right $	、 、	Edit
	\backslash	Delete
		QK

Click 📰 to change Convert Settings, mainly export format and export

observation information.

nes Setup						
Export Format	Export Observati	on	Alexandra a			
3.03			Pseudorange	Phase	S/N	Doppler
	23	12	-	-	<u> </u>	×
Marker name method of *.cnb file	I¥ GPS	11	×	2	1	2
Full file name		120	M	~	M	14
		LZC.	¥	×	N.	14
Samolo Pata		12	M	P	10	P
Sample Nate	I7 805	81	P	P	17	4
1 second 💌		82	R	₩.	R	F
		83	P	P	17	P
Advanced		B1C	9	퍽	R	되
CPS Week		B2A	P	尿	R	R
		828	₩.	₽.	17	F
Smooth Pseudorange Epoch 0	GLONASS	11	F	1	17	7
IT Event		12	₽.	F	F	厚
D Deart Char	GALILEO	E1C	R	E.	R	R
		E58	R	P	F	7
		E5A	R	P	14	F

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

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

5 Real-Time Kinematic Survey (RTK)

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

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>Software Download ComNav Technology Ltd.</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.

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1. **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>.



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

Connection	Help
Device model	ComNav >
Connection type	Bluetooth >
Target device	03401012 >

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.

÷	Wizard	Help 🗧	Rover		Help 🗧 🗧	Wizard	Help
•	Project ComNav	Curre Work	nt Mode: Rover mode list			Project ComNav	
•	Connection 03401012		Default: RadioMo Internal radio: 6/460	ode 0.0500MHz	•	Connection 03401012	
0	Work mode Start receiver as Base or Rover(Mode:radio,network)	0	Default: InternalG	SSM(ComNavServ	er)	Work mode Rover/PDA CORS 211.144.120.104.8888	
	Previous Select				0	Start work Select work type and start wo	rkingt
0	Start work Select work type and start working!				ſ	Topo survey	
						Stake Point	
					. L	5 Stake Line	
			Add	Apply			

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.

8	ComNav	Help	← Create		
æ	a		Project	ComNav	×
Wizard	Project	Datum	Datum	Use	Last project >
8	8	8	Code		Click >
Element	Code	Basemap	Use Last p	roject	
C	0		Datum sto	re	
Import	Export	Export Result	Scan QR c	ode	
2	6	0			
Features	Cloud	Settings			
_					
Project	<u> </u>	D.			
Contract, Contra		Connect to device			

• 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	e Prodefined datum
Datum list		
China/Beijing 1954		China
China/Xian 1980		Argentina
China/CGCS2000		Australia
China/WGS 72		Azerbaljan
China/WGS 84		Belgium
China/Shanghai		Brazil
		Cameroon
		Chile
		Egypt
Predefined User defined OK	:	

• 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	Help	← Add	datum	Hei
Datum list		Datum	LOCAL	×
China/Beijing 1954				
China/Xian 1980		Source ellips	bid	Choose ellipsoid 3
China/CGCS2000		Target ellipso	id	Choose ellipsoid
China/WGS 72		Projection	Please	elect projection
china/WGS 84				
China/Shanghai		Seven param	eters	Close 3
		H.RMS		Close)
		V.RMS		Close 3
		Geoid Model		Not use
	_	Grid correctio	m	Not use 7
Predefined User defined	ок 🗄		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 N2, 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 N2 receiver—allow pair

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



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

N2 GNSS receiver supports transmit & receive the correction data in internal radio mode. To conduct the RTK survey in internal radio mode, it requires:



1 A controller with software installed
2 An extension bar
3 Two units of N2
GNSS receiver
4 Two whip antennas
5 A range pole with bracket
6 Tripod and tribrach

Tip: The external power supply is recommended when N2 set as a base station.

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



5.5.1 Start Base Station by Survey Master

Firstly, build Bluetooth connection between the N2 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.

8	ComNav	Help
67	9	
Connection	Rover	Base
(F)	1	9
Antenna	0183 Output	Device Info
4	đ	6
Position Info	Register	Static
	-	60
H-Terminal	Debug data	Mock Location
Project	O O	y D

N:3469646.099

E:337564.378

Status: Single

Z:8.080

JJ21/23	۲	D:0 H1.356 V1.590
← Datalink 1	Гуре	
Datalink Type	Internal radio	>
Protocol	Transparent	>
Power(W)	2.0	>
Channel	Customize	> ((0))
Frequency(MHz)	- 453,050	0 × +
Range(410-470MHz)		
← Base		
Dataliah Tura	int.	and radio - N
Datalink Type	Inte	emai radio 2
Protocol	Transparent	
Prequency	2.0W/453.0500	
Differential mode	RTCM3.2	>
Start mode	Fix position	>
Mask angle	10	×

Datalink Type	Internal radio	>
Protocol	Transparent	>
Power(W)	2.0	>
Channel	Customize	> ((0))
Frequency(MHz)	- 453 0500	× +
Range(410-470MHz)		

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

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



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

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



5.5.2 Start Rover Station by Survey Master

- Connect Survey Master with N2 receiver via Bluetooth based on Chapter 5.4.
- Set same protocol and frequency with Base receiver.
- The current status on the bottom will change from Single to Fixed.



5.6 PDA CORS Mode

Without setting up your own base stations, the N2 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:



O1 A N2 receiver
 O2 A controller with SIM card and software
 O3 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.

Dataink Type	PDA CORS		3
Protocol	CORS		>
	APN		⊚
Server	SINOGNSS	*	:=
ONS/IP address	211.144.120.10	94	
Port	8888		
Source List		*	$\underline{+}$
User			
Password	1		
1021-1022			0.0
1023-1024			2
1025-1027			D
VRS			

- 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.

http://www.hw-group.com/products/HWg-Ares/HWg-Ares GSM APN en.html#top

5.6.1 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, wireless network 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.

			← Base		←	FixPosit	ion	
Datalink Type	Internal GSM	>	Datalink Type	Internal GSM 2	1000			
Protocol	CORS	>	Protocol Port	SinoGNSS 211.144.120.104:8888	States o	nation cook.	Library choose	Receive
APN	CMNET	0	Differential mode	RTCM3.2	Nome		Base:p0	×
Server	SINOGNSS		Start mode	Fix position	Code			
DN4S/IP address	211.144.120.104		Mask angle	10	Displa	у Тура	Local grid coordin	ate >
Port	8888				N		3469655 236	1
BaseName		- <u>+</u>						
Uper					E.		337581.203	
Password					Z.;		25.088	
					Slamt()	s)	1.850	
						0	lottom of receiver(H)	Slant(S)
					Antoni	na type	T	30(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		0
server	SINOGNISS	*	=
DNS/IP address	211.144.120.104		
Port	8888		
art	8888	-	, la
ort aseName	4444	*	Ŧ
Port IaseName	8888	×	Ŧ
Part	8888	*	⊻
Part	8888	*	Ŧ
hart ItaxeNarme	0.00	*	Ŧ

5.6.2 Ntrip client mode

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

- 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.

🔶 Торо вигие		Help	← Ni			
1		۲		Code		
		- Him -	111	rose		•
1.1				shrubi		•
		10				
		neat.				
		20.89				
		- and				
			Cancel		Features	OK
1056	shube	+				
late p2	Automa 9 1.850	5			Undefined	
Cuterose •			Poir	t	flower	rose
N-3460652 674	51	stue Eivad			A. 1 No. 40	_
£:337582.166	31	Z:27.056	Polyg	on		
121 2711/18	-301	HIG-008 V 0.010				

• Recover deleted points in Recycle Bin.

C	ancel 1 aut	ected S	elect all	- Elemen			Help	Ci	ancel	Please	select poir	t Se	lect all
	Base:p1 Surv	2 Auto bas	e Nooffe Ot	Base:p1 Surv	1	Auto base 🕴	No offs		O Basep1	Surv	а а	uto base	No offs
	 ⑧ Base:p1(Base) № 3478304.556 E: 624889.361 	Z 23.134 Code:	® N: E:	Base:p1(Bas 3478304.556 624889.361	e) 🖡 Z: 23. Code:	134			× p1(Fit N: 34705 E: 62299	xed) * 503.342 3.695	Z. 26.9 Code:	81	
	× p1(Fixed) * N: 3470503.342 E: 622993.695	2: 26.981 Code:											
					M	lulti-select elete							
					c	oordinate ty	pe						
					In	nport	_						
					R	ecycle bin							
	T De	ال Lece	Sta) E ke Detail	Q Searc	witch displa + h Add	ry mode	e Rec	D Over				Delete

6.1.1 Survey settings

← Setting	Help	Fixed: only fixed result can be saved;
Survey Dis- play Road Titt PPK	CAD	Duplicate name: allow point name same;
Fixed Duplicate name	•	RMS: point accuracy need higher than the value:
Auto save	•	
Code missaure		than the value during measure;
H.RMS 0.030	× •	Occupation time: measure times for one point:
V.RMS 0.040	-	Point stensize: for point name:
Offset radius 0.500		
Occupation time 5		Stake range: show circle when close to target point:
OK		
C Setting	Help CAD	Direction guide: 3 methods showing
Setting Survey Dis- Direction guid Norh/South/East/Wes	CAD •	Direction guide: 3 methods showing guide for stake out;
Setting Survey Dis- play Road Tilt survey PR Direction guid Norh/South/East/Wes Height diff ref Stake point Height diff Fill/Dia	Help CAD t > >	Direction guide: 3 methods showing guide for stake out; Electronic compass: Use controller compass during stake out;
Setting Survey Des Phy Road Tilt phy PPK birection guid Norh/South/East/Wes Height diff ref Stake point Height diff Fill/Dig Electronic compass	Help CAD t > > > >	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:
Setting Survey Dis- play Road Tilt OPPK Corvery PPK Direction guid Norh/South/East/Wes Height diff ref Stake point Height diff Fill/Dig Electronic compass Auto centered	Help CAD t 2 2 3 4 0	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;
✓ Setting Survey Das- play Road Tilt survey PPK Direction guid Norh/South/East/Wes Height diff sef Stake point Height diff Fill/Dig Electronic compass Auto centered Keep centered	Help CAD t 3 3 4 0 0 0 0 0 0 0 0 0 0 0 0 0	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:
Survey Dis- play Road Till survey PPK Direction guid Norh/South/East/Wes Height diff net Stake point Height diff Fill/Dig Electronic compass Auto centered Keep centered Display survey points	Help CAD t > > > 0 0 0 0 0 0 0	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;
Image: Constraint of the section	Help CAD • • • • • • • • • • • • • • • • • • •	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;
Image: Constraint of the setting	Help CAD 2 3 4 0 0 0 0 0 0 0 0 0 0 0 0 0	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

6.1.2 Tilt survey

Tilt survey option will appear when receiver supports for tilt survey, it is available for ComNav Technology N2 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 🐭 , it will show the shape on map.

~				÷				÷			Help
		N			Name	N	E				٢
	p2	3469652.441	337581.644		p2	3469652.441	337581.644	.9			 ©
1111	p3	3469652.373	337581.800		р3	3469652.373	337581.800	53			
111	p1	3469652.673	337582.165		p1	3469652.673	337582.165			1	E
R	lesult										E
A C	rea ≈ 0.036 rea ≈ 0.000 ircumferen	oni 1054mn ce = 1.214m CA	NCEL SAVE					p2	P3		
								/	rose shr	ubs	+
							/	Name p	Arte	nna 🖞 1.850	5 ()
			0					N:346	9652.681	Stat	us: Fixed
Co		Shape Libr	ary choose		ompute	Shape Lib	ary choose	E:337	582.175 310/17	🕒 🔥 D: 1 H:	2:27.030 0.008 V:0.010

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.



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

Various navigation info choices

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

Cancel 2	selected Sele	ct all	÷	Stake poir			~	Stake po	pints	
Category	Ν			nput point name	or code	Q	Inp	t point nar	ne or code	
🗌 🕲 Baserpü Surv	7 Auto base	No offs		Name	N	E		Name	N	
Base:p0	3469640.264	33		p1 *	3469652.673	337582.165		p1	3469652.673	3375
t2	3469652.620	33						p2	3469652.441	3375
- ti	3469652.675	33						p3	3469652.373	3375
🗹 🗙 p3	3469652.373	33								
🗹 🗙 p2	3469652.441	33								
□ × p1	3469652.673	33							Import	
□ × p0	3469652.678	33							Export	
								/	Capon	
							1		Delete	
	5.		0	_				_	Clear da	ta
	OK CK		Stake	Detail	Library choose	+ Add	Stake	E	Library choose	+ Add

Tip: keep your receiver vertical to the ground.

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

		Help	÷ :	Stake lin				← Add Line		
			Inpu	t code or n	ame		Q	Two points	O Point+Azimu	uth+Distance
Topo survey	Detail survey	Auto survey	Line t	Name	Start point	End point		Line type	3D line	
	0	0	1	line1	p0	p1		Name	line2	×
Stake Point	Stake Line	Stake Arc						Code		
	8	@						Start point	p2	
Stake CAD	Area survey	PPK						Ν	3469652.441	
R	(it)	6						E	337581.644	
Road Design	Road stake	Road Store						Z	27.039	
	© •	<u>Ö</u>						End point	p3	=
N:3469652.68	10	Status: Fixed				_		N	3469652.373	
E:337582.165		Z:27.026	Ø	Ŧ	Ľ	+			OK	
1:1,2309/15		0:1 H:0.005 V:0.007	Stake	Detail	Import	Add			UK	

← staking line	Help 🔶 Define line	
	Image: Segments 5 5 5 5	 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.
€ \$2,\$208/14 € 3 0.1 H.0.0	OK OK	

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.



		€ врк	ComNexonb	Help
Survey Di	splay road I	PPK	Hard I	0
Occupation time	15	× • • •	- con	
toit, time (a)	300	A name	j-	D
Valid SVe	7	1115	2 m to	
Looking time(s)	10	14	-1	-
SNR	25	- Andrew	N N	1
PDDP	6			4
		fax: 0/0		
		Marrie pd	Arterra 9 1.850	15
		int 200	~	0
	ок	B: 31*21'00.055 L: 121*17'33.11	36"N Sta 381"E	tus: Single H: 26.661

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

automatically.

Click to add	€ Edit	
	Control point	8
$\mathbf{R}_{1}, \mathbf{R}_{2}, \mathbf{R}_{3}$	Name	
	N	
	E	
	z	
Click to add	GNSS point	0
A1, A2, A3	Name	
	00	
	с	
	H	

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

			← Site		
l point	8		Control poi	GNSS point	H.Reaid
			К3	K3	0.075
			KZ	K2	0.062
_			к1	K1	0.022
			Suc	ceed for h	orizontal
point	8 2		Suc	ceed for v	vertical cal

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 projection datum 	Help
	Datum Store
Datum China/WGS 84	
Target ellipsoid	WGS 84 >
Projection	итм⇒
Site calibration succeed	close >
HRMS	Open >
VRMS	Open >
Geoid Model	Not use >

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 Shi			
GNSS point		0	Click to add the point from one Base
N	3450043.895		·
E	346366.943		
Z	25.125		
Known point	(9	Click to select the same point from another
N	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.

		Help	← coso	
*	0	6	Angular transformation	>
Site Calibration	Grid Shift	Area calc	Two Points	>
	62		Point to line	>
COGO	FTP	E-mail	Offset point	>
			Deflection angle	>
			Deflection point	>
			Intersection point	>
			Bisection point	>
Project D	() eeste () Suivery	Tool	Points from line	>
1:3450043.909 2:346366.937		Status: Fixed Z:25.154	Point average	>
1 12 2313/18	• 4	D1H0.005V0.009		

- 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(.det)	>	Name,Code,E,N,Z(.csv)	>
Name,Code,N,E,Z(.csv)	>	Name Code E N Z(.dat)	- 3
Name Code N E Z(.bxt)	>	Name,E,N,Z(.csv)	\rightarrow
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)	2
B L H Name(.txt)	>	Name,N,E,Z,Code(.csv)	2
Name,Code,B,L,H(.csv)	>	Malaysia CRM(.txt)	>
B,L,H,Name,Code(.csv)	5	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 **Upperfolder** to change to any other path where the file is.
- Point type: support Input point, Control point, Stake point

← Import	Help	← More formats	Help
ata 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)	5	E N Z Name(.dat)	>
8 L. H. Name(.txt)	5	Name,N,E,Z,Code(.csv)	>
Name,Code,B,L,H(.csv)	>	Malaysia CRM(.txt)	>
8,L,H,Name,Code(.csv)	>	Malaysia CRM(.csv)	>
More formats	>		

Name	ComNav ×		
Header	62		
Other info			
Operator	Datum		
Receiver model	Firmware		
Work mode			
Delimiter	Comma(,) >		
File format	.csv >		
Degree type	dd.mmss.sssss >		
walable Select all	Selected Clear		
* · I			
Preview (.cev)			

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	2
Name,N,E,Z(.csv)	2	Export KML	>
Name N E Z(.txt)	>	Export RAW	2
Name B L H(.txt)	>	Export RW5	>
B L H Name(.txt)	>	Export HTML	>
Name,Code,B,L,H(.csv)	>	Export SHP	5
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.

← Equal	Help	← User-defined	← Equar	())	Help	← Export	
Data format	Acd	Name Pits statute for the I	formet .	Survey point	3	Select	2
CASS(.dat)	2	Peador	20 Ficture	20201215	×	File Point type	×
Name/Code/N.E.Z(.cov)	2	Delecter Comm	a() > (talls type	NameCode/NE2(.cov)		Dar point point point	Stake point
Name Code N E 2(.txt)	э.	Degree tipe difference and	***	/storoge/ensilated/0/Sinog en/Export	pasa.	point Base	1
Name,N,E,Z(.csv)	ð.	Available Soloct all taiwant C	tour	-		TODAY SEVEN	ALL
Name N E Z(.txt)	6	Code	SinoSN	ISS.cov		Start date ~ En	d dete
Name B L H(.txt)	2	Name				Name	
B L H Name(txt)	>	E				Code	
Name,Code,ILLH(.cov)	5	z				Cancel	ок
BJJHName,Code(.cov)	2	Provide (Kell)	_			_	-
More formats(DXF.KML,RAW(RW5,HTML)	1.0	OK		OK		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.

Path	/Sinogns:	s/sm/Export >
File namie	ComNav_dxf	×
Data	Survey point	Input point
	Control point	Stake point
	Base	Iine Line
	Polygon	
Layer	🛃 Name	Code
	I Height	
Text height	0.500	

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
Ф	R		Basemap	CAD >	Basemap	CAD >
Wizard	Project	Datum	Add points	()	Add points	(9
6		6	Prefix	CADP >	Prefix	>
	V		Add lines	()*	Add Toos	(P)
Element	Code	Basemap		_	Prefix	5
ß	ß		CAD		Add line endpoints	(D)
Import	Export	Export Result	Shapefile		File lat	
ø	<u>@</u>	0				
Features	Cloud	Settings				
E Project	Device Survi	iy Tool				
N:3469652.62	2	Status: Fixed				
E: 337582.169		Z: 27.066	Add		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 N2 via Survey Master

 Normally, the register code is like this:

 ID:03401012
 \$\$:49-0B-79-23-00-00-05-85

 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*

	ComNav	Help		
67	9			
Antenna	Rover 0183 Output	External radio	Ca	Copy the and enter
Device Info	Position Info	Register		
Static	H-Terminal	Debug data		
Project	Device Stave	y Tool		
31°21'00.04 121°17'33.1	1930"N 1995"E	Status: Fixed H: 27.089		
₩,Ø%20	entinii)	្មី D-1 H 0.006 V 0.018		
lid Registered notion: HEAE notion: BD258 notion: ROV notion: BAS notion: BAS	Function Number, 5 ING Expired time 20 SNAL Expired time 20 ER Expired time 2020 IE Expired time 2020 MSG Expired time 21	120-07-05 1920-07-05 19-07-03 1-07-03 1-07-03 020-07-05		
unent Function Inction: 20H Inction: GN Inction: HEI Inction: GLO	Status 2085 Usable: NO SSL3 Usable: YES KDING Usable: YES SIGNAL Usable: YE SIGNAL Usable: YE SIGNAL Usable: YE	5 15 15 15		
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9 Firmware Upgrade

Prepare a Lemo to serial port cable.

1. Copy the firmware software to your PC, connect N2 to your PC via type-c 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	COM8	•
🗆 Manual U	odate (Default Ba	udrate 9600)
🗖 Change B	audrate to 11520	0
	<u>0</u> K	<u>C</u> ancel

3. Click "*Link*" icon to build the connection (this is important to check if the N2 is connect to PC successful)



Then click "**Update**" icon to start the update (a few seconds are needed), during update, the N2 will restart automatically and all LEDs on N2 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.

d receive 350110 sion: 601 ersion: 7 ial port	r inform A0 - 210 .2.2 is COM8	nation: 505	
ial port	is COM8		
date, res date 01A0 C2E00 Firmware d!	tarting M11	the re e wait.	ceiver
	C2E00 Firmware dt	C2E00 Firmwaret please dt	C2E00 Firmware! please wait. d!

FCC Statement

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

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

RF Exposure Information

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