Aurora Navigation G1000 Quick Start Manual

Version 1.0.0

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1. Introduction

The **Aurora Navigation G1000** is a high-performance, multi-functional GNSS receiver designed for precise positioning applications in a wide range of environments. Leveraging multi-constellation RTK capabilities and the 1408-channel GNSS chip, the G1000 delivers reliable centimeter-level accuracy for surveying, mapping, UAV navigation, precision agriculture, and other demanding applications.

Key Features

- **High-Precision RTK Positioning**: Supports GPS, GLONASS, Galileo, BeiDou, QZSS, NavIC and SBAS constellations with advanced RTK and PPP algorithms for reliable, real-time positioning.
- **Industrial Durability**: Working temperature ranges from -40 to 60 ℃, built to IP67 standards for water and dust resistance, the G1000 operates reliably in harsh field conditions.
- **Long-Range Radio Communication**: Equipped with a 1W internal LoRa radio for base-rover communication over extended distances.
- **Flexible Connectivity**: Bluetooth, USB, and serial interfaces ensure seamless connection with Android devices, PCs, and external service network.
- **Onboard Data Logging**: Internal data recording to micro-SD card allows for post-processing and long-term storage.

Whether used as an RTK base, a rover, or a static logger, the G1000 is engineered to provide professional-grade accuracy and performance — anytime, anywhere.

2. Package contents

Item	Description
G1000 receiver main unit	The main unit featuring integrated GNSS antenna, LoRa radio, and data logging capabilities.
LoRa radio antenna	High-gain LoRa antenna for improved range reception
USB Type-C cable	Used for charging the device and data transfer.
Mounting disc	Mounting disc for the use of a tripod

Item	Description
Micro-SD Card (Pre-installed)	Industrial-grade UHS-I micro-SD card for onboard data logging.
Micro-SD card reader	Supports fast read/write speeds and is compatible with most operating systems.
Power Adapter	AC wall charger with compatible Type-C output
Warranty Card	Includes product serial number and terms of coverage.

3. Hardware Overview

Below are the front view and the bottom view of the device.

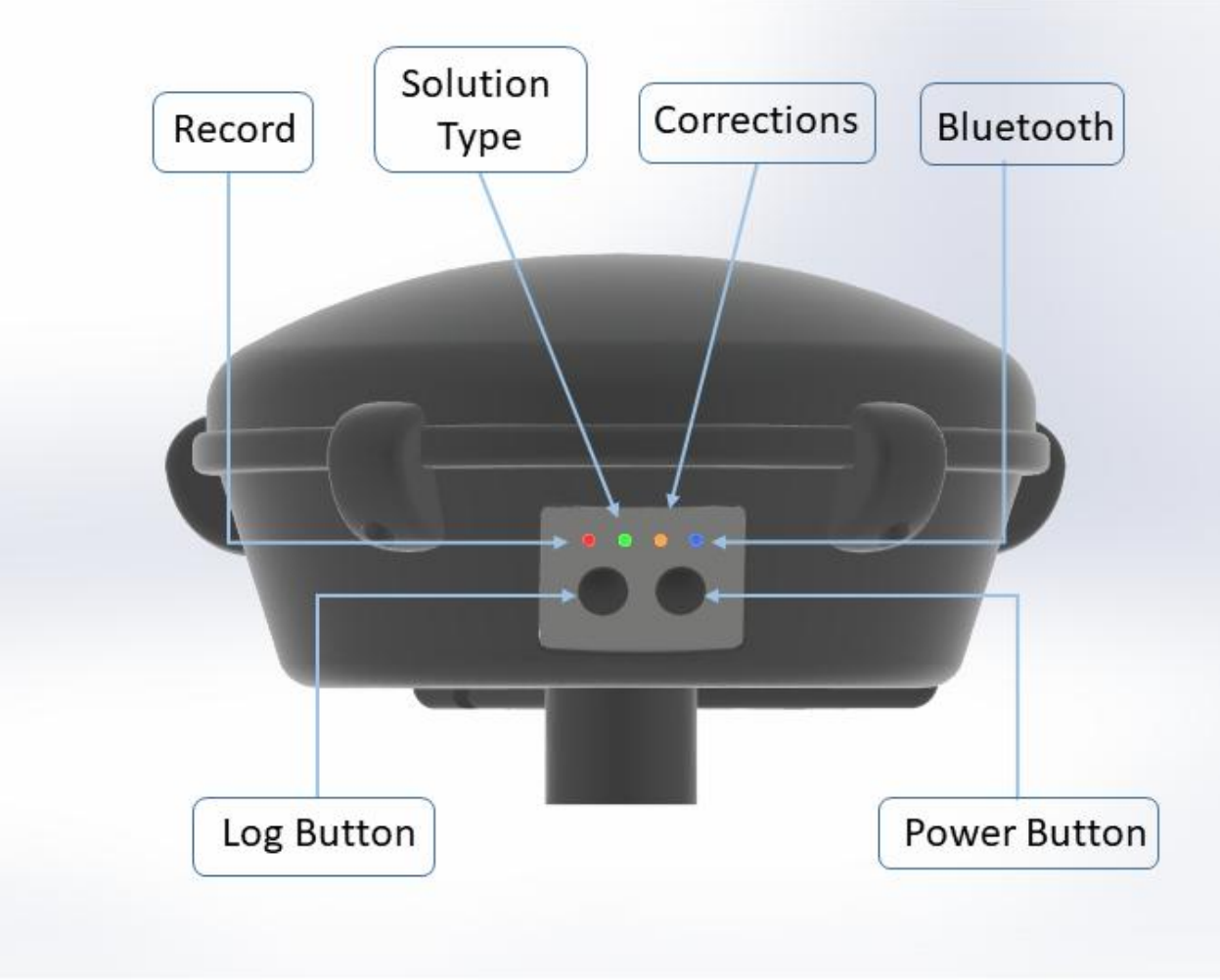

Figure 3-1 Front view of G1000

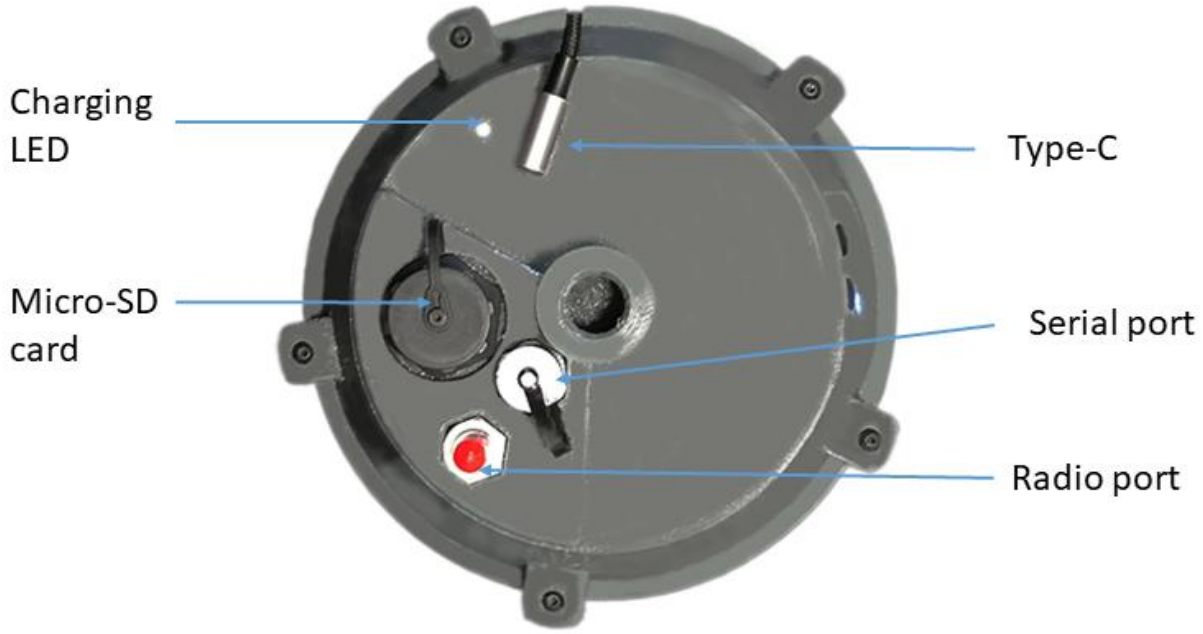

Figure 3-2 Bottom view of G1000

3.1. Buttons Functions

- Power button

  Press and hold it for 2 seconds to power on or off the device.

  On startup, the Log (green) LED will light up briefly to indicate a successful boot.

  On shutdown, all four LEDs will light up to indicate the device is powering off.

- Record button

  Press and hold it for 2 seconds to start or stop internal data logging.

  The Log LED will flash when recording is active.

3.2. LED Indicators

LED Name	Color	Function
Record	Red	Indicates internal recording frequency
GNSS solution	Green	Indicates current GNSS solutions: (1) SPP: slow flash (2S cycle) (2) DGPS/Float: quick flash (1S cycle) (3) Fixed: solid
Correction	Orange	Flashes when correction data is being received or transmitted.

LED Name	Color	Function
Bluetooth	Blue	Indicates Bluetooth connectivity status (1) Disconnected: off (2) Connected: solid (3) Connecting: flash

3.3. Interfaces

Port	Description
USB Type-C	Charging and data transfer. Supports charging during operation.
RS232 serial port	Standard communication port for external radios, sensors, or data loggers.
Radio port	Radio antenna installation port
Micro-SD Card Slot	Pre-installed with industrial-grade memory for data logging and firmware upgrade.

3.4. Powering On/Off the Device

To turn the G1000 on or off:

Press and hold the **Power button** for **2 seconds**.

When powering on, the **Log LED** (green) will illuminate briefly to indicate a successful boot.

When powering off, **all four LEDs** will illuminate momentarily, signaling that the unit is shutting down and clearing memory.

3.5. Charging the Device

You can charge the G1000 using the **USB Type-C** port located at the bottom of the receiver.

A **solid white LED** around the Type-C port indicates that charging is in progress.

The **LED will turn off** once charging is complete.

The receiver **supports operation while charging**.

Note: Use only the supplied or certified 5V USB-C charger for optimal charging performance.

3.6. Battery and Temperature Guidelines

The G1000 is equipped with an **industrial-grade lithium battery** that supports use in extreme environments:

Condition	Temperature Range
Discharging (in use)	–40°C to +60°C
Charging (safe range)	0°C to +60°C

Charging the battery outside the safe temperature range can **permanently damage** the battery. To prevent this:

The G1000 includes **thermal protection circuitry**.

If the temperature is unsafe, **charging will pause**, and the **white LED will flash** to indicate a charging error.

Charging will automatically resume once the battery temperature returns to a safe range.

4. Device operations

4.1. Proper Placement of the G1000 Receiver

- Mount the receiver **upright** on a tripod or survey pole with the antenna facing upward.
- Place it in a **clear, open-sky environment**, free from obstructions such as buildings, trees, or vehicles.
- Avoid placing it near **metal objects or sources of interference** like radio antennas or reflective surfaces.

⊘ **Do NOT** place the receiver lying on its side, under cover, or on a car hood (Figure 4-1).

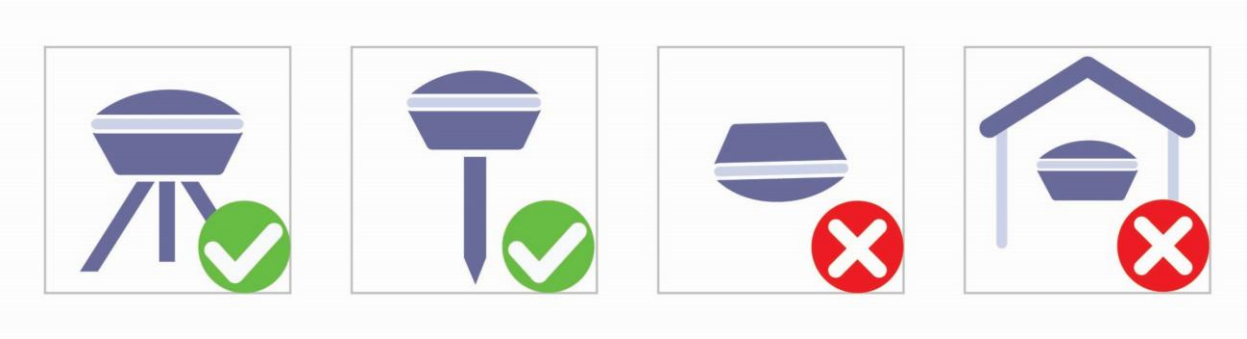

Figure 4-1 Placement of the device

4.2. Connecting to the Anypos App (via Bluetooth)

(1) Power on the G1000.

(2) On your mobile device, open the Anypos App.

(3) Navigate to the Device page and tap Device connect, as shown in Figure 4-2.

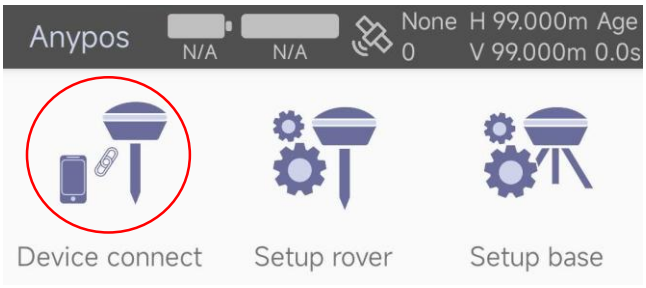

Figure 4-2 Device connect module in Device page

(4) Set the Connection method to Bluetooth and press Scan.

(5) The G1000 will appear as G1000x-XXXXXX_BLE. Select it and tap Connect, see Figure 4-3.

(6) Once connected, the page header will turn **green**, confirming successful pairing, see Figure 4-3.

⚠ **Note:** The G1000 can only connect to **one mobile device at a time**. If it's already connected to another phone, it won't appear in the Bluetooth scan list. Disconnect it from the other device before switching.

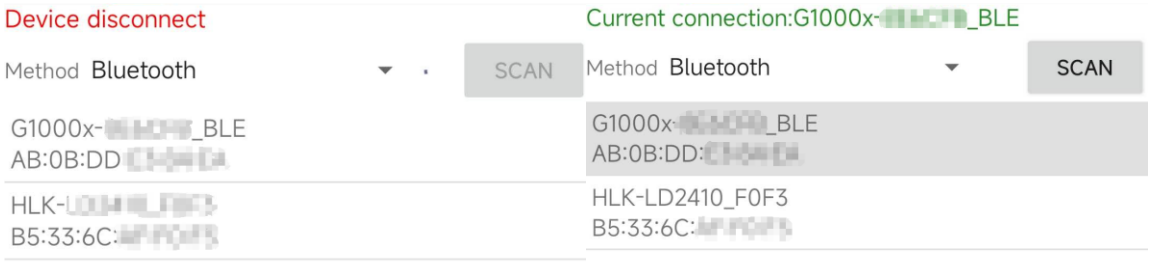

Figure 4-3 Bluetooth scan results and successful connection

Once connected, the Anypos App toolbar will display real-time status from the G1000 (Figure 4-4):

(1) Battery level (percentage)

(2) Remaining / total storage space

(3) Satellite tracking info (used / tracked, fix type: Fixed/Float/SPP/DGPS)

(4) Horizontal and vertical positioning RMS accuracy

(5) RTK Differential age (if applicable)

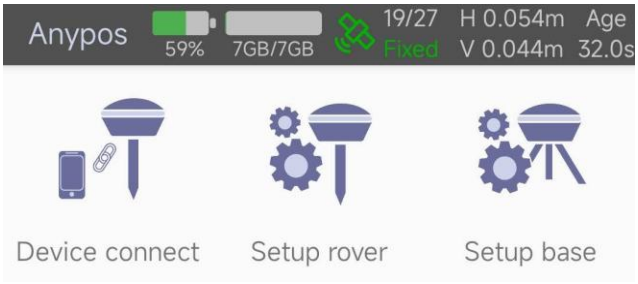

Figure 4-4 The toolbar when it is connected to G1000

Tap anywhere on the toolbar to open advanced views:

- **Skyplot** (shows satellite positions)
- **C/N₀ Plot** (shows signal strength)

Press anywhere on the toolbar, the satellite sky plot and the C/N0 plot will show up (Figure 4-5).

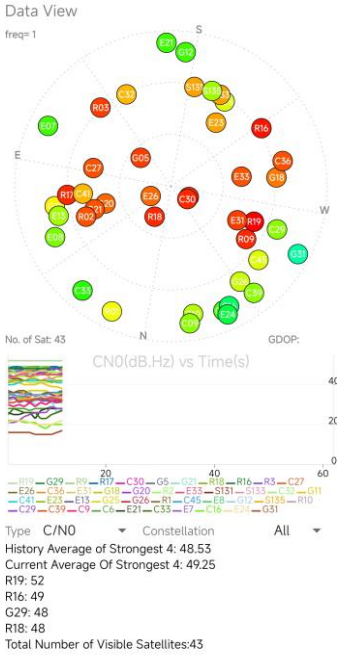

Figure 4-5 Skyplot and C/N0 plot

In the skyplot, satellites are color-coded from **blue** (weak signal) to **red** (strong signal). Low-elevation satellites usually have weaker signals.

Note: In open-sky environments, C/N0 of the strongest signals shall be **close to 50 dB/Hz**, which can be used to verify whether the receiver is suffering from signal interference.

4.3. Device configuration

Navigate to the **Device configuration** (Figure 4-6) module in the Anypos app to manage system settings.

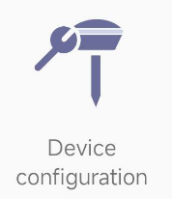

Figure 4-6 Device configuration module

This module allows you to customize several key features:

Setting	Description
Constellations	All GNSS constellations are enabled by default. You may disable some to reduce power use, radio bandwidth, and log file size.
Observation Rate	Sets how frequently raw GNSS data and positions are recorded. RTK base corrections are always transmitted at 1 Hz.
Elevation Mask	Filters out low-elevation satellites. A 5°-15° mask is typical. Higher masks reduce power use, radio bandwidth, and log file size, but may affect positioning accuracy.
Data Logging	Toggle on to begin onboard recording of raw GNSS, solutions, corrections, and IMU data (if applicable). You may also long-press the physical Record button to control this.

Actions:

- **Pull**: Loads current settings from the receiver.
- **Send**: Uploads your modified settings to the receiver.

Upon entering the configuration module, the app will automatically perform a **Pull**. A pop-up message saying "**Synchronized**" confirms that settings have been successfully retrieved or uploaded.

4.4. RTK Rover setup

To configure the G1000 as an **RTK rover**, open the **Setup rover** module in the Anypos app (Figure 4-7).

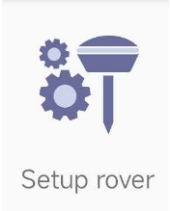

Figure 4-7 Setup rover module

In the **Rover Stream Link** section, supported methods of receiving RTK corrections include:

- **Radio**
- **TCP client**
- **TCP server**
- **Ntrip client**

Only one stream can be enabled at a time.

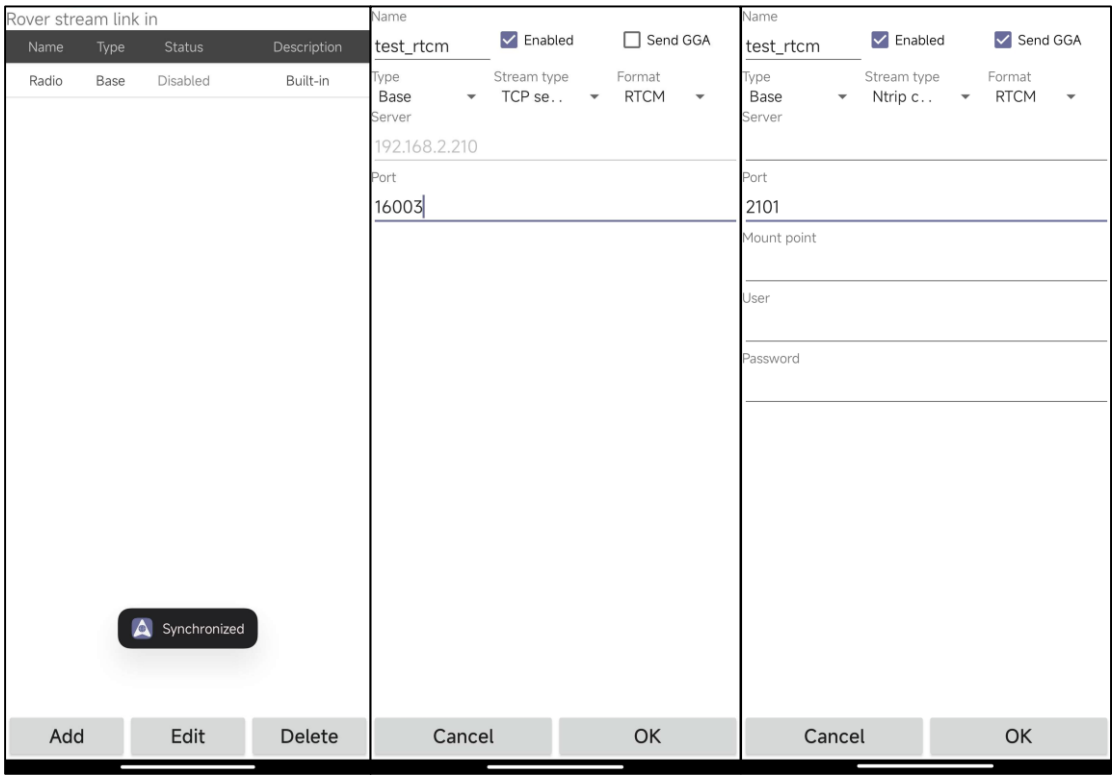

Figure 4-8 Rover stream link in page, TCP server configuration and Ntrip client configuration

For **radio-based corrections**, refer to Section 5.5 on how to configure the radio module before enabling it here.

For **TCP client**, **TCP server** or **Ntrip client** (Figure 4-8):

- Leave the **Type** as "Base" (indicating the input is from a base station/CORS data stream).

- Set **Format** to **RTCM**.
- For Ntrip client, contact your correction service provider to get the credentials and mountpoint required for configuration.
- You may need to check **Send GGA** if your service provider need your position (e.g. VRS based network RTK).

The cellphone's IP will be shown in the Server input box if you choose **TCP Server**, and a TCP client from other devices can use this IP to connect to the cellphone.

Once the stream is correctly configured:

- The **Correction LED** will flash, indicating data is being received.
- The Anypos app toolbar will show the **RTK correction age**.

Note: If correction age increases without bound, it means valid correction data is not being received.

Valid RTK solution types include: **DGPS**, **Float** and **RTK Fixed**:

Solution Type	Description
DGPS	Code-based differential GNSS by RTK or SBAS. Accuracy: decimeter to meter level. Appears in the early phase or poor signal conditions.
Float	Carrier phase-based solution, but ambiguities not yet resolved. Accuracy: decimeter to sub-meter.
RTK Fixed	Full carrier phase ambiguity resolution achieved. Accuracy: centimeter level.

4.5. RTK Base setup

Antenna placement:

For optimal RTK performance, place the base station antenna in an open area with a full, unobstructed view of the sky. Avoid nearby tall buildings, trees, metal structures, or strong radio transmitters. Elevating the antenna on a tripod or fixed pole helps reduce signal multipath and interference.

To set up the G1000 as a **base station**, follow these steps:

4.5.1. Step 1: Measure Base Coordinates

If the precise coordinates of your base station location are unknown, you can determine them using the Point Survey function:

(1) In the Anypos app, open or create a **Project**.

(2) Navigate to the **Project page** and configure the **Coordinate system**. If you're using a custom local reference frame, set it here. If available, connect to an RTK base or CORS stream to enhance positioning accuracy. If not, the G1000 will fall back to SPP (Single Point Positioning) solution or SBAS based DGPS solution.

(3) Open the **Survey** module and select **Point Survey** (Figure 4-9).

Figure 4-9 Point survey in Survey module

(4) Switch **Survey Mode** to **Control**. As shown in Figure 4-10, this enables a static survey to determine a fixed point.

(5) Choose a desired number of epochs for point survey in **Settings** by **Smooth count** droplist. Default is a 100-epoch static survey to determine the base station coordinate. The longer time for the static survey, the better results will be acquired. Change the point name if you want.

(6) Tap **Measure** to begin collecting static position data.

For point survey with SPP or DGPS solutions, two errors will show up indicating that the quality control threshold cannot be satisfied. You have to press IGNORE in this case as you cannot get better solution utilizing RTK. Changing the threshold in the Settings to permanently omit the errors is not recommended as you may forget to change it back in normal survey mode.

After the process, a survey point will be generated in the database and you can see it in the Point management module in the Project page.

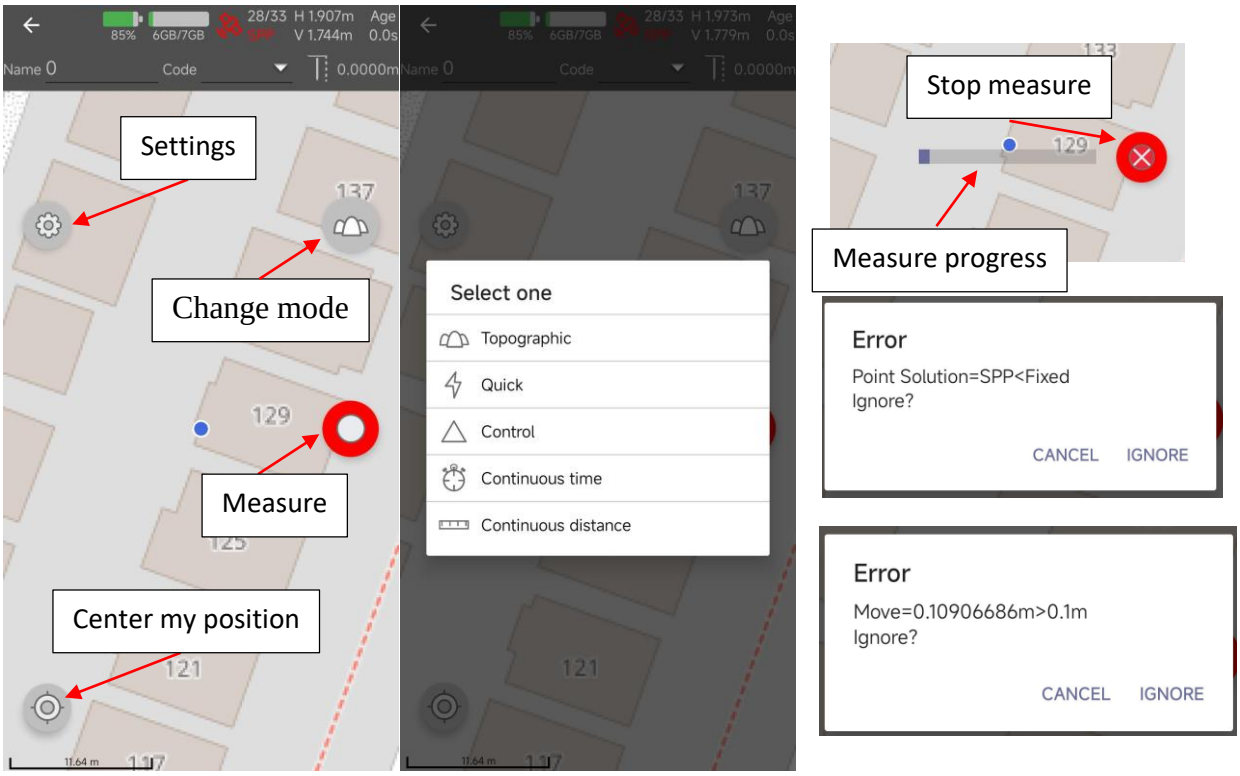

Figure 4-10 Survey base station coordinate (left), change survey mode(middle) and prompt in measure process (right)

It should be noted that, any reasonable bias (<10 meters) in the base station coordinate would cause the same amount of bias in the rover station RTK solution. If only SPP or DGPS solutions are available to determine the base station coordinate but you still wish to achieve absolute precise coordinate at the rover station, you can collect long term base station raw observation (1~24h or even longer) to determine high accuracy base station coordinate using PPP or PPK, so that the bias in the rover RTK solution can be corrected afterwards.

4.5.2. Step 2: Set up base station and outgoing streams

(1) Go to the **Setup Base** module.

Figure 4-11 Setup base module

(2) Set a **Station ID** to differentiate from other nearby base stations.

(3) Enter a precise base coordinate manually, or tap **Select from Map/List** to use the previously surveyed point.

(4) Switch **Base Mode** on, then tap **Send** to apply the settings to the receiver.

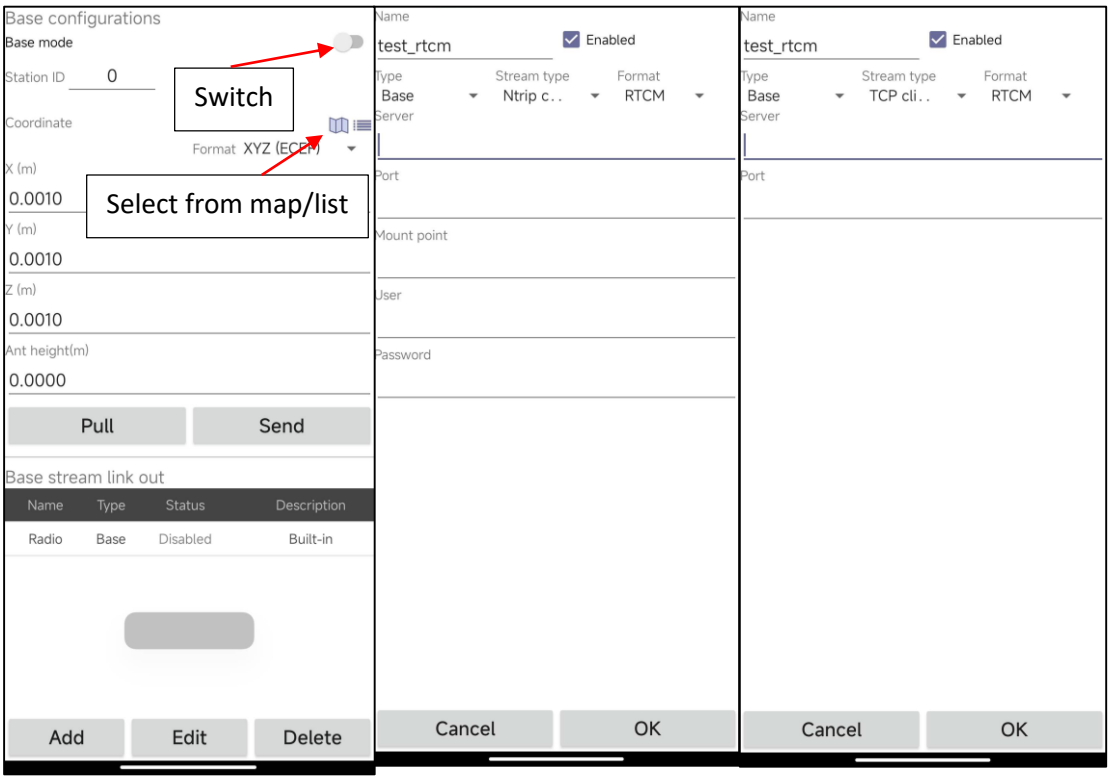

Figure 4-12 Base stream link in page, NtripClient configuration and TCPClient configuration

You can transmit corrections via:

- Radio
- TCP client
- TCP server
- Ntrip client

Multiple streams configured here can work at the same time.

For the radio stream out, please refer to section 5.5 on how to set radio properly, then enable it here to send out base station data through the radio.

For **Ntrip client, TCP client and TCP server**, leave the type as **Base**. Select format as RTCM. If you are using Ntrip client, please ask your service provider on how to populate the Ntrip client form with correct configurations to send out the base station data.

When configured properly:

- The **Correction LED** will flash, indicating outgoing data.
- Exit the Setup base module, the app toolbar will show **radio utilization**. A constant high utilization of the radio (>90%) means the data rate is a bit too high for the radio, reduce data load (disable some constellations, or raise the elevation mask to avoid data blockage at the radio).

Note: When Base Mode is active, the internal RTK engine is disabled. The device will only report an SPP or DGPS (standalone) solution.

4.6. Radio Configuration

The internal 1W LoRa radio allows the G1000 to transmit or receive RTK corrections without external radios. Set fundamental parameters in **Radio configuration** module to make radio work properly.

Figure 4-13 Radio configuration module

Basic Settings

Open the **Radio Configuration** module (Figure 4-14):

- **Band**: Set frequency band from 0 (850Mhz) to 80 (930Mhz).
- **Power**:

  Max (30 dBm, 1W)

  High (27 dBm, 0.5W)

  Medium (20 dBm, 0.1W)

  Low (10 dBm, 0.01W)

Higher power improves signal penetration and distance but uses more battery. If you have very good visibility between the radio and the rover station, lower it to save battery power.

Radio Scan

Use the **Scan** button to perform a full frequency scan to detect nearby radio interference or active base stations.

- The scan takes ~30 seconds.
- Do not exit the page during scanning.
- Once the scan progress complete, valid Aurora Navigation base stations will appear with station IDs.
- Choose a clean frequency to avoid collisions.

The band can be set from 0 (850Mhz) to 80 (930Mhz)

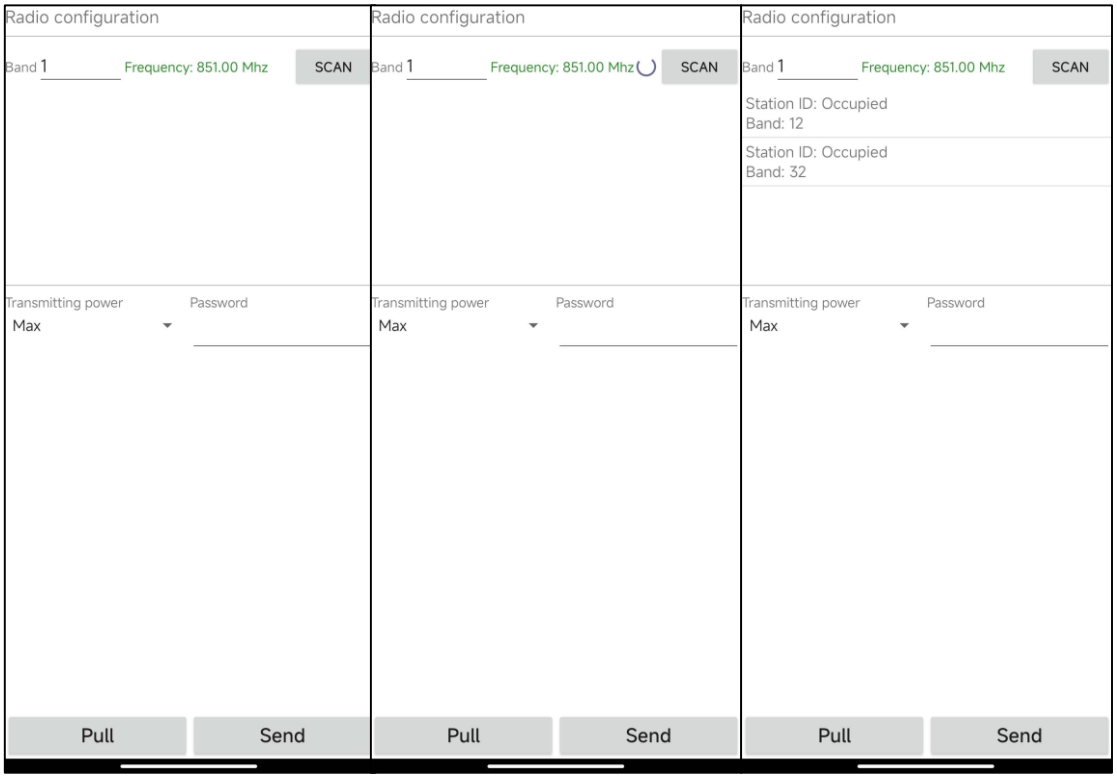

Figure 4-14 Radio configuration page (left) and radio scan in progress (middle) and scanned results (right)

Security

- Set a **password** for data encryption.
- The password must match between rover and base.

Warning: Comply with your region's radio regulations. Aurora Navigation is not responsible for the consequence of misuse of transmission power or frequencies.

4.7. Data export

You can export recorded data in two ways:

1. **USB Connection**

(1) Plug the receiver into a PC via USB-C.

(2) Power on the device. A USB drive will appear, allowing file access.

2. **Micro-SD Card Reader** (Recommended for large files)

(1) Power off the device.

(2) Remove the micro-SD card.

(3) Use a card reader to access files from your computer.

Method 2 is faster and recommended if your file is very large.

4.8. Firmware upgrade

Follow the steps to upgrade firmware:

(1) Download the latest firmware from www.auroranav.com, extract and rename the firmware file to firmware.bin.

(2) Turn off the device, then remove the micro-SD card, copy the firmware.bin to the root directory of the micro-SD card.

(3) Insert the micro-SD card back into the G1000.

(4) Press and hold the **Log** button, while holding it, press the **Power** button. You can release the buttons when all four LEDs light up.

(5) All four LEDs will flash quickly during firmware upgrade process, after completion, the receiver will turn off automatically.

4.9. Factory reset

The receiver configuration is stored on the micro-SD card.

(1) Power off the G1000.

(2) Remove the micro-SD card.

(3) Delete the file named `config0.xml` in the root folder.

(4) Reinsert the card and power on the device.

(5) A default configuration file will be regenerated with factory configurations.

5. Troubleshooting

Issue	Solution
G1000 not showing in Bluetooth list	1. Make sure the device is powered on. 2. The device can only connect to one cellphone at a time. Disconnect it from any previously connected mobile device.
Flashing charging LED (charging error)	For safety, the charging temperature is limited to 0–60°C. Warm or cool the unit as needed.
Recording LED does not flash	1. Ensure logging is enabled in the app. 2. This may be a file system corrupt. Reformat the micro-SD card to FAT32. Use a UHS-I card with a maximum space of 32GB.
Radio scan will not complete	Bluetooth signal may be weak. Move your phone closer to the device and try again.
Correction LED flashes, but no RTK fix	1. The correction LED may be indicating corrections sending out instead of receiving, ensure Base Mode is off. 2. Check nearby interference resources, verify C/N0 is within normal range 3. The environment may be too challenging to fix the ambiguity, verify if the RTK can be fixed in open-sky environments 4. Check corrections configurations in the base station
Cannot receive radio correction data	Ensure radio is enabled on the rover. Make sure band and password match the base. Scan for interference and switch bands if needed. Check for physical obstructions between the rover and the base.
Firmware upgrade fails or device won't power on	Reformat the micro-SD card to FAT32, re-download the firmware and put it in the root directory of the micro-SD card, and retry the upgrade. Ensure the file is correctly named **`firmware.bin`**.

6. Technical Specifications

GNSS	Channels	1408
	Signal Tracking	GPS: L1C/A, L1C, L2C, L2P(Y), L5
		GLONASS: G1, G2, G3
		Galileo: E1, E5a, E5b, E6
		Beidou: B1I, B2I, B3I, B1C, B2a, B2b
		QZSS: L1C/A, L1C, L2C, L5, L6
		NavIC: L5
		SBAS: L1C/A
	Antenna gain	40±2dB
	Single Point Positioning(RMS)	Horizontal: 1.5m Vertical: 2.5m
	DGPS (RMS)	Horizontal: 0.4m Vertical: 0.8m
	RTK (RMS)	Horizontal: 0.8cm+1ppm Vertical: 1.5cm+1ppm
	Velocity Accuracy (RMS)	0.03 m/s
	Cold Start	< 12 s
	Initialization Time	< 5 s (typical)
	Initialization Reliability	> 99.9%
	Data Update Rate	20Hz
	Differential Data	RTCM V3.X
System parameters	System	Low latency RTOS
	Data record	DAT
	Bluetooth	SPP5.0+BLE5.0, backward compatible
	Power	1W

Radio	Modulation	LoRa
	Sensitivity	-120 dBm
	Frequency	850Mhz-930Mhz
	End-to-end encryption	Yes
	Range	Up to 25KM (2m height, line-of-sight)
	Other functions	Listen-before-talk Frequency occupation scan
Power	Charge power	5V 3A
	Working time	25h (Rover mode) 10h (Radio transmission)
	External power input	10-30V
Port	Type-C	Charging & data transmission
	SMA	Radio antenna
	GX12	External power input Serial data input/ output External trigger input/ output
	TF card slot	Data storage, up to 32GB supported
Physical	Dimension	153mm * 90mm
	Weight	658g
Environment	Operation temperature	-40 ~ 60 ℃
	Storage temperature	-40 ~ 70 ℃
	Water/dust proof	IP67
	Shock proof	1.6m
	Humidity	100%

7. Appendix

7.1. Tcp client and Tcp server