ALPHA+ RTK RECEIVER
USER GUIDE

Version 1.11

August 30, 2021

info@polaris-gnss.com

https://www.polaris-gnss.com

Table of Contents

1 Overview 4
1-1 Introduction 4
1-2 RTK Operation Guidelines 4
1-3 Alpha+ RTK Receiver Features 5
2 Applications 6
3 Description of Interfaces 7
3-1 Appearance 7
3-2 Pinout of 6-Pin Connector 8
3-3 Pinout of 4-Pin Connector 8
3-4 Connector Cables for Alpha+ 9
3-4-1 Wire for connecting Base-to-Rover (for base/rover pair short baseline testing) 9
3-4-2 Wire for connecting Rover-to-UAV 9
3-4-3 4-Wire Extension 9
3-4-4 Wire for 6-pin TTL connector with pitch 2.54 Dupont Lines 10
3-4-5 Wire for 4-pin TTL connector with pitch 2.54 Dupont Lines 10
4. Application Scenarios 11
4-1 Special Short Baseline Experimental Setup 11
4-2 RTK Survey and Data Collection 12
4-3 Real-Time Precision Guidance 14
4-4 Hardware Configuration Settings 17
5. Preparing for First-Time Use 18
5-1 RTK Viewer 18
5-3 Checking Alpha+ Receives Satellite Signal 18
6. RTK Setup 20
6-1 Introduction 20
6-2 Configuring the Rover 21
6-3 Configuring the Base 22
6-3-1 Input Fixed Base Antenna Coordinate 23
6-3-2 Set Receiver to Self-Survey Approx. Coordinate for 60sec Each Time Powering Up 24
6-3-3 Set Receiver to Self-Survey Approx. Coordinate for 60sec and Set It As Fixed Base Antenna Coordinate Permanently 25
6-3-4 Using RTK Base Station to Determine Base Antenna Coordinate and

Set It As Fixed Base Antenna Coordinate 25
6-4 RTK Application Scenarios In Detail 26
6-4-1 Short Baseline Test Setup 26
6-4-2 Connecting to 3rd Party Base Using Phone 29
6-4-3 GIS Survey Using Locally Setup Base/PC and Phone Connection 36
6-4-4 UAV Using Locally Setup Base / PC / Mission Planner and Radio Connection 37
6-4-5 Real-Time Guidance Using Locally Setup Base/PC and Radio Connection 41
6-4-6 Real-Time Guidance Using Locally Setup Base/PC and Phone Connection 42
7 Raw Measurement Recording and Post Processing 43
8 Software Update 44
8-1 RTK Viewer Software Update 44
8-2 Alpha+ RTK Receiver Software Update 44
APPENDIX 48
A-1 Additional Software Configurations 48
A-1-1 Configure Baud Rate 48
A-1-2. Configure Update Rate 49
A-2 NTRIP Server/Caster Setup for Users Without Fixed IP 50
A-3 NTRIP Server/Caster Setup for Users With Fixed IP 53
A-5 Configure RTK License (for Alpha+ Receiver Purchased After 2021.09.01) 58
FAQ. 59

1 Overview

1-1 Introduction

Alpha^{+} (Alpha plus) is a high performance dual-band RTK receiver with multiple interfaces, including UART, USB, and Bluetooth. It offers centimeter-level positioning accuracy suitable for survey, mapping, GIS data collection, and outdoors robotic precision guidance.

By default, Alpha^{+} is shipped as RTK rover to accept RTCM3.x message or SkyTraq carrier phase raw measurement data from a RTK base, and provide centimeter-level accurate position result relative to the RTK base in standard NMEA message format. Alpha^{+} can also be configured as a RTK base to provide RTCM3.x message or SkyTraq carrier phase raw measurement data output.

Alpha^{+} has three major interfaces for different applications. The USB interface is mainly used for configuration, monitoring, and supplying power. With Bluetooth V2.1+EDR module built-in, Alpha^{+} can be used as external Bluetooth RTK receiver for Android Mobile Device to provide higher accuracy positioning than internal GPS. The 3.3V LV-TTL UART interface allows simple connection to controllers for precision guidance applications, replacing normal meter-level accuracy GPS receiver.

Alpha^{+} can easily connect and use with Pixhawk / ArduPilot using the supplied connector cable, enabling UAV to navigate with centimeter-level position accuracy.

1-2 RTK Operation Guidelines

To provide centimeter-level RTK accuracy, Alpha^{+} requires much better operating condition than conventional meter-level accuracy GPS receiver:

- Baseline distance between base and rover should be under 30Km.
- Open sky environment without interference and signal blockage
- Received signal level should be no less than 40dB/Hz.
- 10 or more satellites with elevation angles over 15 degrees
- Good satellite geometry with satellites spread over four quadrants of the sky.

1-3 Alpha^{+} RTK Receiver Features

- Base or Rover Mode Configurable Using RTK Viewer Utility
- Supports GPS L1/L2C, Beidou B1I/B2I, Galileo E1/E5b, GLONASS L1/L2 RTK Operation
- Supports LV-TTL UART / USB / Bluetooth V2.1+EDR Interface
- Supports SDHC micro-SD Card for Data Logging Post Processing
- RTK Position Accuracy 7mm + 1ppm
- Maximum RTK Update Rate 10Hz
- Supports RTCM 2.x / 3.x Messages
- NMEA Output
  - Update Rates：1 / 2 / 4 / 5 / 8 / 10 Hz for RMC / GGA / VTG / PSTI-030
  - Messages：GGA / GLL / GSA / GSV / RMC / VTG / ZDA / PSTI
- Baud Rate
  - Bluetooth：115200
  - UART / USB：4800 / 9600 / 19200 / 38400 / 57600 / 115200, default 115200
- Current Consumption
  - 60 mA @ 5V
- Weight：40 g

2 Applications

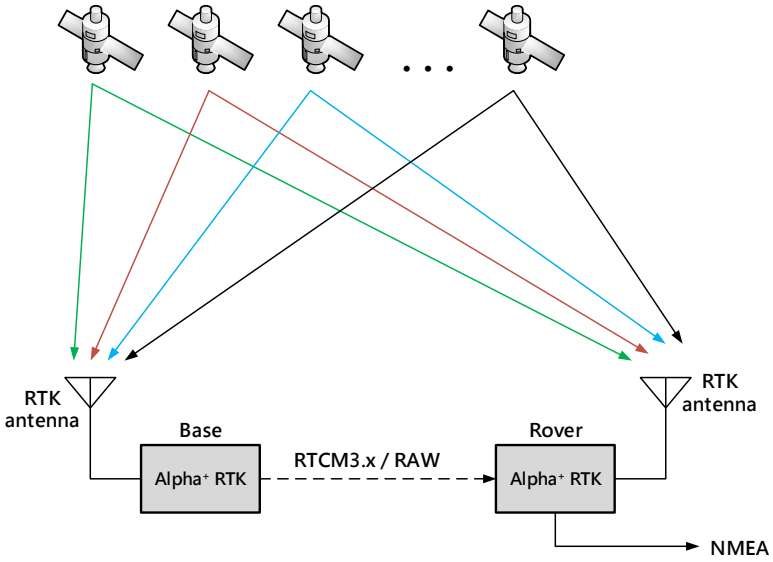


Figure 2-1

Alpha$^+$ RTK rover works with carrier phase measurement, using fractional part of ~19 centimeter wave length GNSS signals and differential principles to achieve centimeter-level accuracy positioning with respect to the RTK base.

Referring to figure 2-1, Alpha$^+$ RTK base antenna is set at a fixed location, with antenna location coordinates already a known reference, or surveyed by method described in later section. It receives signals from GNSS satellites, generates correction data in RTCM3.x or SkyTraq raw measurement format, and sends it to remote Alpha$^+$ RTK rover through wireless channel. The rover uses this correction data along with signals received from satellites to calculate the precise position of the RTK rover antenna, and output antenna position / velocity / time information in NMEA-0183 format. Correction data from the one RTK base can be sent to an unlimited number of RTK rovers.

The Alpha$^+$ RTK receiver is suitable for, but not limited to, following applications:

- Surveying and GIS data collection with Android mobile device
- Precision farming machine guidance
- Precision grass cutting machine guidance
- Precision guidance of unmanned aerial vehicles (UAV)
- Aerial survey RTK position stamping without need of ground control points
- Precision tracking of vehicle dynamics

3 Description of Interfaces

3-1 Appearance

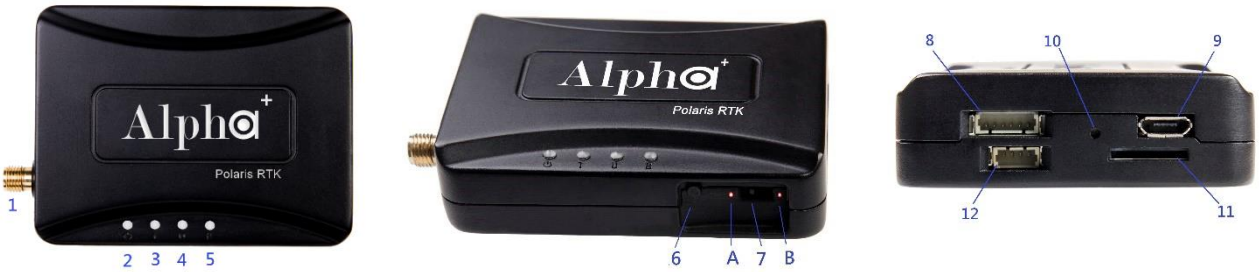


Figure 3-1

No.	Description
1	SMA connector for RTK antenna.
2	Status LED. There are three states shown for Alpha+ as Rover 1. Base data not received: flashes two times followed by 1 sec of silence. 2. In process of finding RTK solution: flashes with frequency at 1Hz or 4 Hz depends on the RTK ratio is in between 1 and 3 or in between 3 and 5. 3. RTK solution found: remain lighted continuously. This LED is always off when Alpha+ is configured as Base.
3	LED for indicating the TTL UART interface is selected.
4	LED for indicating the USB interface is selected.
5	LED for indicating the Bluetooth interface is selected.
6	Push button for interface selection. Each time the button is clicked, the selected interface toggles. Press this button for more than 3 seconds will enable/stop logging measurement data to SD Card.
7	Slide switch for choosing the operating mode, see section 4-4 for details.
8	6-pin TTL connector for Base-to-Rover or Rover-to-UAV applications, see section 3-2 for details.
9	Micro USB connector
10	SD card status LED. When the SD card is inserted, this LED will flash and record raw measurement data to the SD card, until number of files on the SD card reaches 129. In this case the LED lights up continuously, and recording stops. If no SD card is inserted, the LED is off.
11	Micro SD card connector for raw measurement data recording.
12	4-pin TTL connector for aerial survey applications. See section 3-3 for details.

Table 3-1

3-2 Pinout of 6-Pin Connector

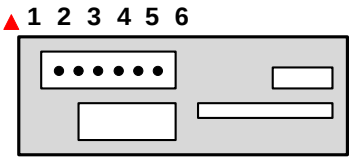


Figure 3-2

The red spot indicates the top side.

No.	Description	I/O	Voltage	
			Min	Max
1	Power input pin to Alpha+ when power from USB connector is unavailable. Power output from Alpha+ if power from USB connector is present	PWR	3.3V 4.6V	5.5V 5.0V
2	UART input for base measurement data, the format should be in RTCM3.x or SkyTraq raw format.	IN	3.0V	3.6V
3	UART output for NMEA message	OUT	3.0V	3.3V
4, 5	NC			
6	Ground	PWR		

Table 3-2

3-3 Pinout of 4-Pin Connector

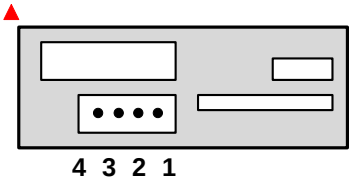


Figure 3-3

The red spot indicates the top side

No.	Description	I/O	Voltage	
			Min	Max
1	DC power output from Alpha+ to external device	OUT	3.1V	3.3V
2	1PPS (1 pulse per second) output signal	OUT	3.1V	3.3V
3	External camera trigger input signal	IN	1.5V	5.0V
4	Ground	IN		

Table 3-3

3-4 Connector Cables for Alpha+

There are several types of connector cable supplied with the Alpha+ RTK Kit for different applications.

3-4-1 Wire for connecting Base-to-Rover (for base/rover pair short baseline testing)

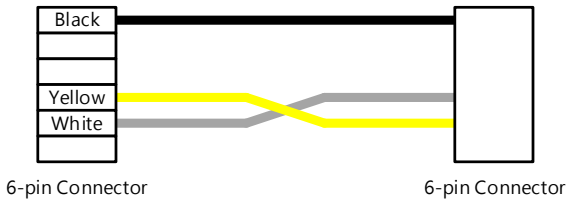


Figure 3-4

3-4-2 Wire for connecting Rover-to-UAV

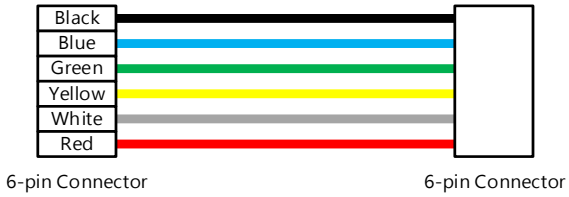


Figure 3-5

3-4-3 4-Wire Extension

Figure 3-6

3-4-4 Wire for 6-pin TTL connector with pitch 2.54 Dupont Lines

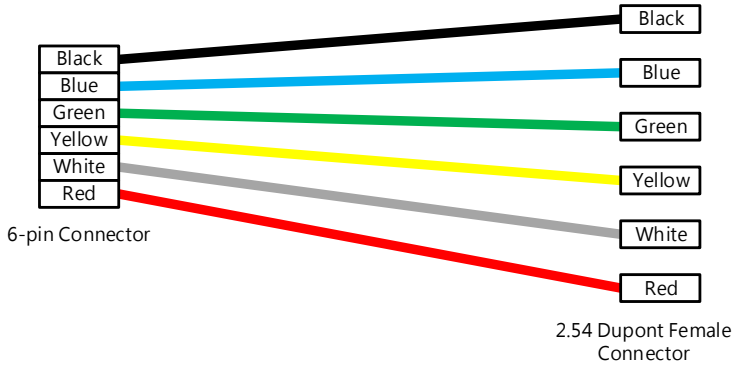


Figure 3-7

3-4-5 Wire for 4-pin TTL connector with pitch 2.54 Dupont Lines

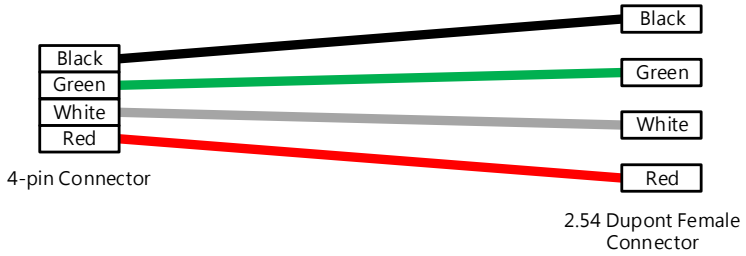


Figure 3-8

4. Application Scenarios

4-1 Special Short Baseline Experimental Setup

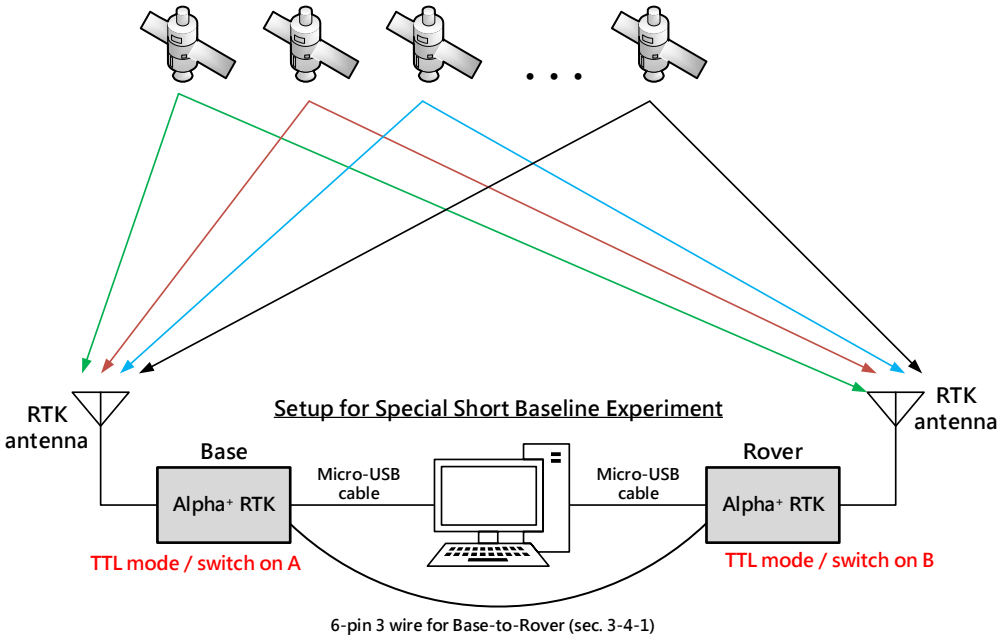
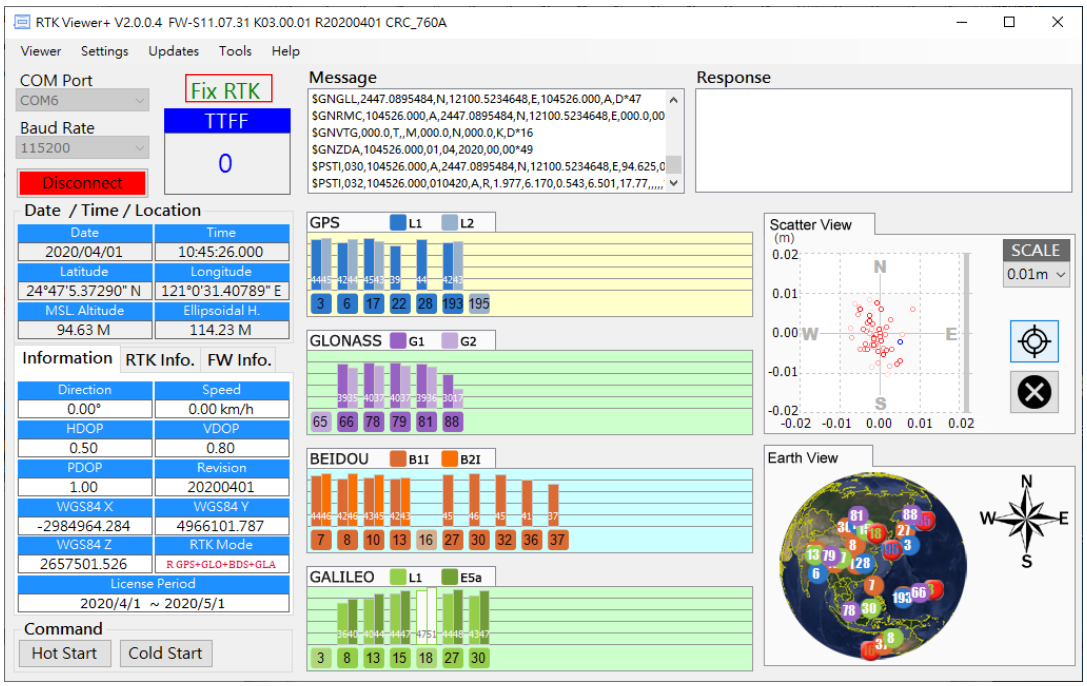


Figure 4-1

For users setting up a local RTK base for use with RTK rover, this experimental setup allows quickly becoming acquainted with all aspects of Alpha$^+$ RTK receiver operation. Using our RTK Viewer Windows-PC software, users can configure Alpha$^+$ to be base or rover; see section 6 for details.

Figure 4-2



4-2 RTK Survey and Data Collection

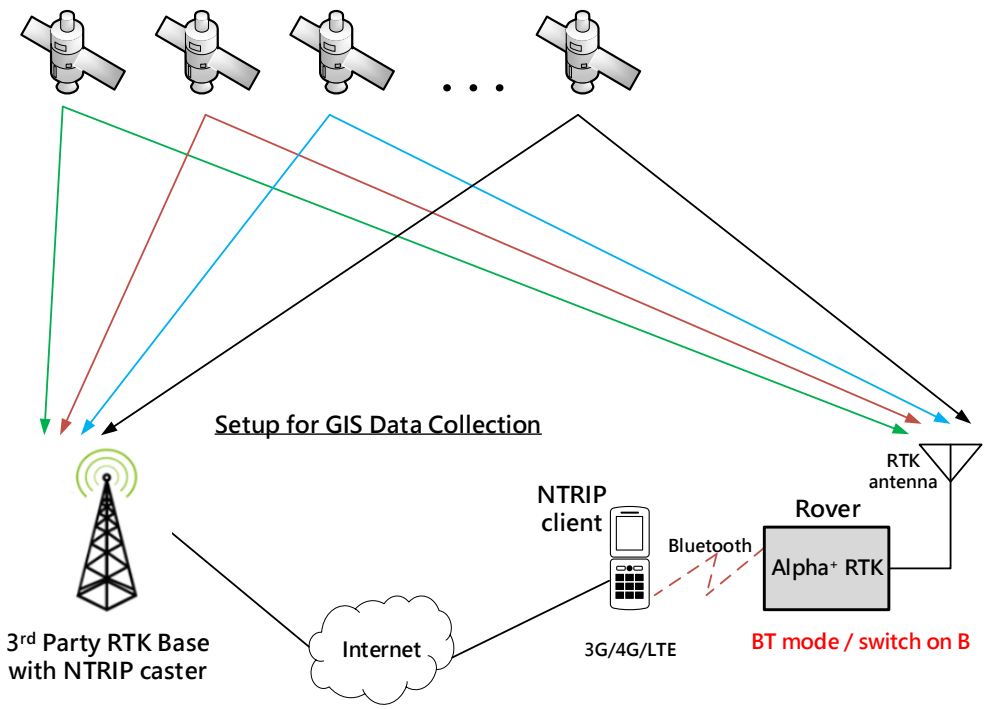


Figure 4-3

When used with Trimble or Leica RTK base station within 30Km distance, or Trimble or Leica RTK base station with Virtual Reference Station (VRS) service as shown in figure 4-3 for RTK survey and data collection, then only one Alpha+ RTK receiver is needed. It's configured as RTK rover and connects to

an Android smartphone via Bluetooth. User can then run the free Lefebure NTRIP Client App on the smartphone for retrieving 3rd-party RTK base station data over Internet and sending it to the Alpha+ RTK receiver. With “MOCK Location” option enabled on the smartphone, GPS related location Apps on the smartphone will be able to use the more accurate position from Alpha+ RTK receiver.

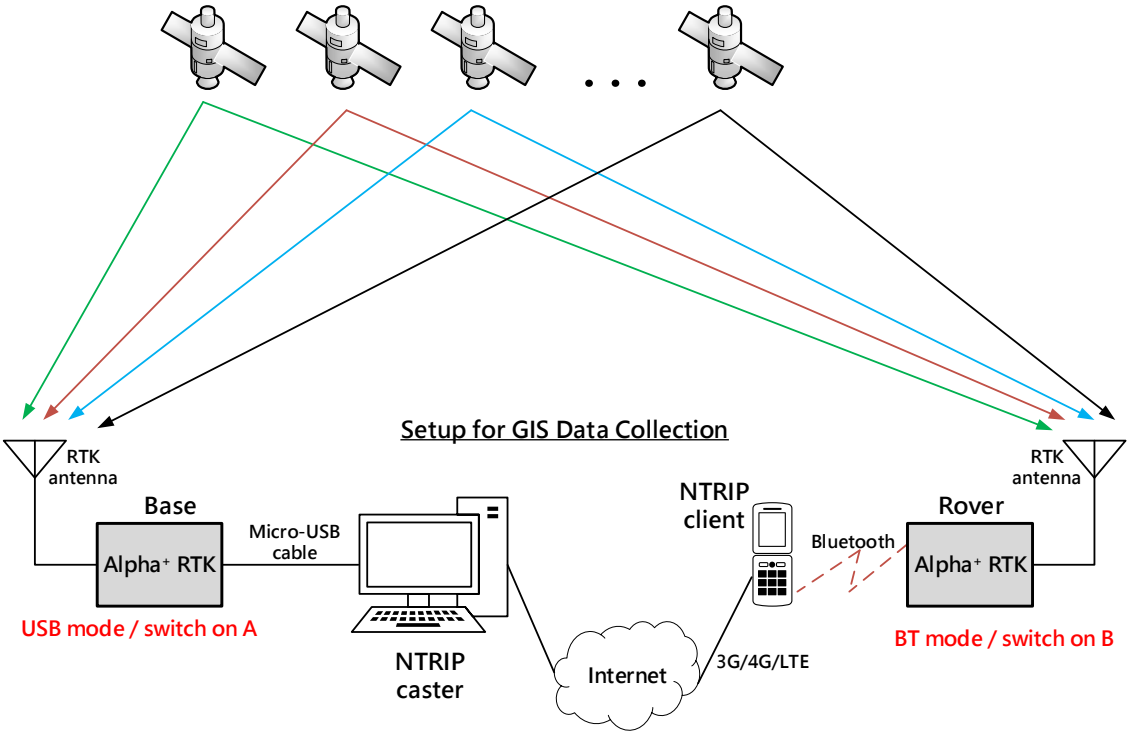


Figure 4-4

In case of setting up a local RTK base with known reference location as shown in figure 4-4 for RTK survey or data collection, one Alpha+ RTK receiver is configured as RTK base connecting via micro-USB port to a computer running NTRIP Server/Caster, and another Alpha+ RTK receiver is configured as RTK rover connecting via Bluetooth to an Android smartphone. User can run the free Lefebure NTRIP Client App on the smartphone to retrieve the Alpha+ RTK base data over Internet and sending it to the Alpha+ RTK rover. With “MOCK Location” option enabled on the smartphone, the GPS related location Apps on the smartphone will be able to use the more accurate position from Alpha+ RTK rover.

4-3 Real-Time Precision Guidance

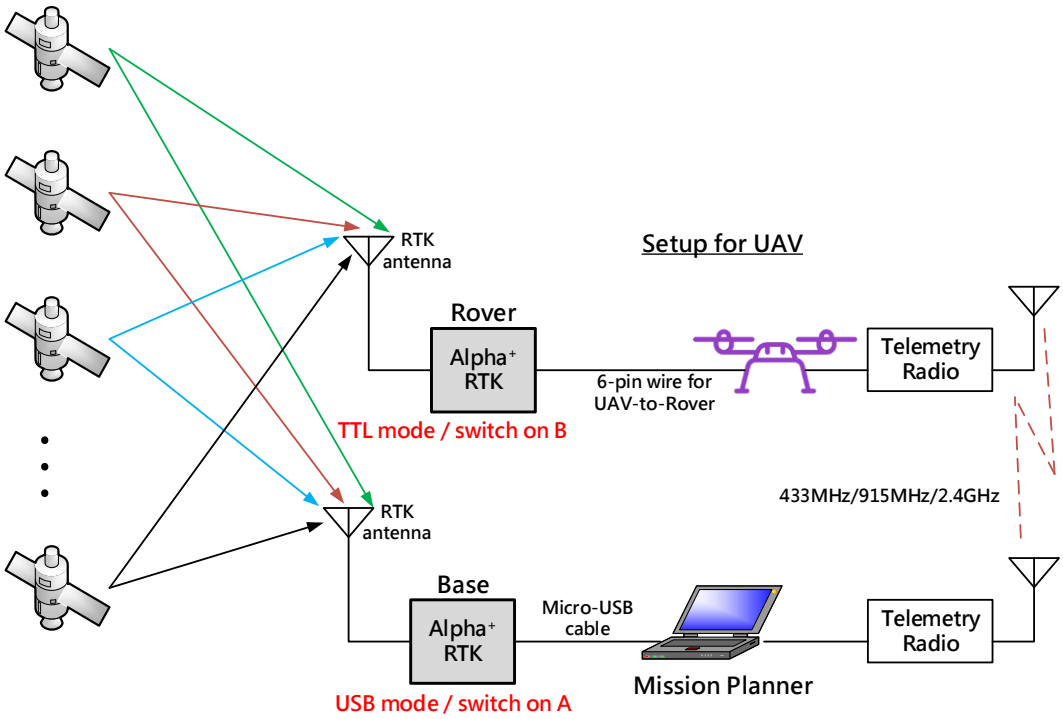


Figure 4-5

When using Alpha$^+$ RTK receiver in Unmanned Aerial Vehicle (UAV) applications as shown in figure 4-5, one Alpha$^+$ is configured as RTK base connecting via micro-USB cable to a computer running Mission Planner, the computer is also connected with a telemetry radio to communicate with another telemetry radio installed on the UAV. A second Alpha$^+$ is configured as RTK rover, connecting to the autopilot of the UAV via a 6-pin 6 wire cable provided along with the Alpha$^+$ RTK Kit. In this application scenario data from RTK base is encapsulated in MAVLink injection protocol sent to autopilot of the UAV, and autopilot then relays the data to RTK rover, the NMEA message output from RTK rover is sent to autopilot of the UAV for precision guidance.

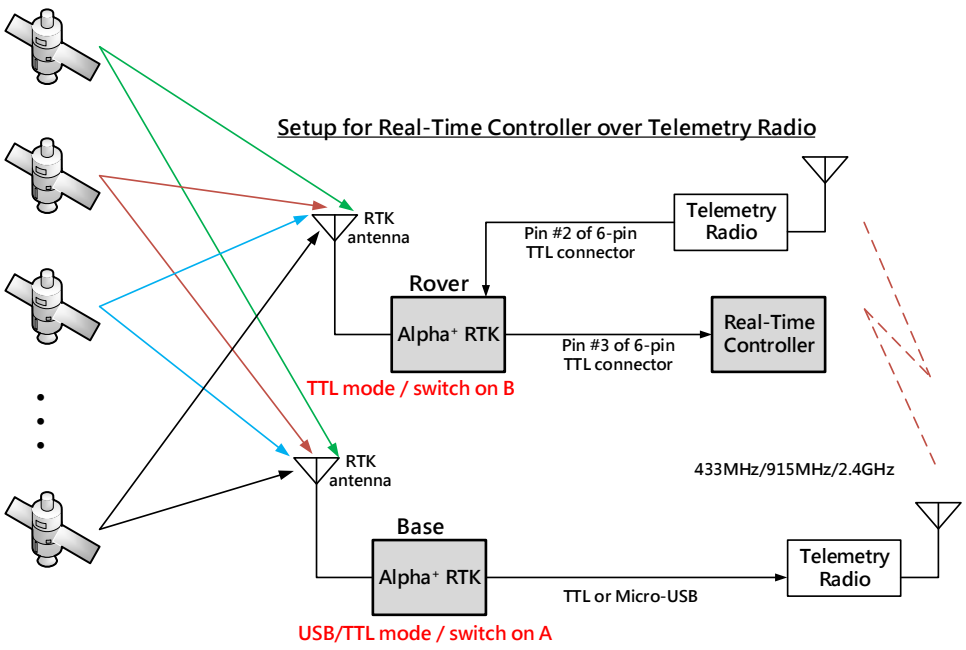


Figure 4-6

For line-of-sight precision guidance applications that do not use Mission Planner with MAVLink protocol as in figure 4-6, user can configure one Alpha$^+$ RTK receiver as RTK base and use 6-pin UART connector port or micro-USB port to connect to a telemetry radio for sending correction data to the RTK rover. Another Alpha$^+$ RTK receiver is configured as RTK rover, using pin-2 of the 6-pin connector to connect to another telemetry radio for receiving correction data from the RTK base, and using pin-3 of the 6-pin connector to send RTK NMEA message output to the real-time controller.

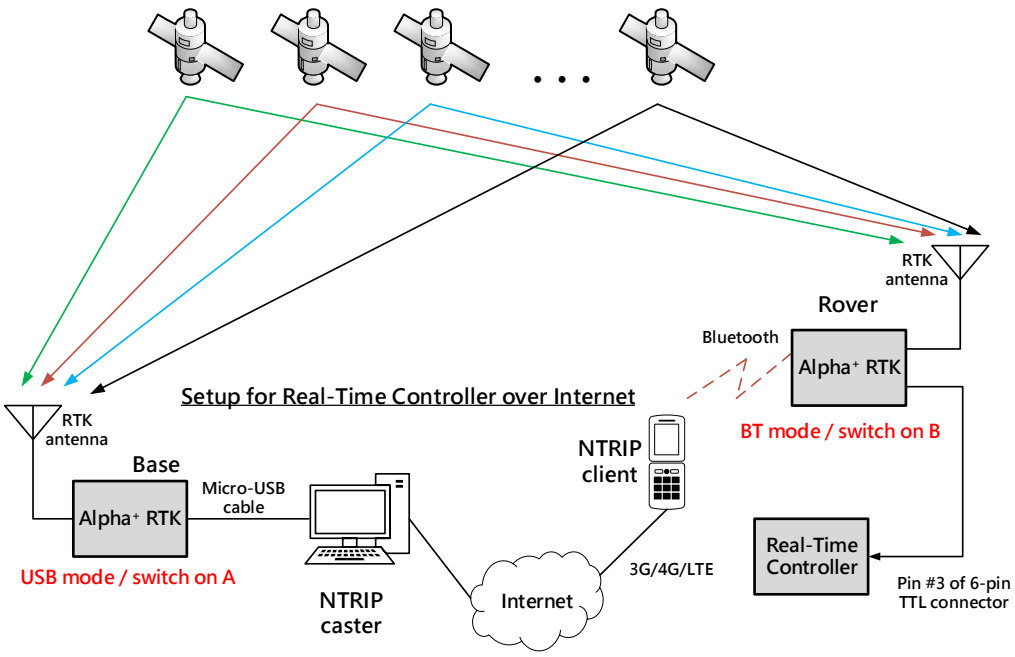


Figure 4-7

A smartphone can be used to connect RTK rover with RTK base over Internet instead of using a pair of telemetry radios for non-line-of-sight real-time precision guidance application as shown in figure 4-7. In this case user can setup an Alpha$^+$ RTK base as described previously with figure-4-4, and with Alpha$^+$ RTK rover also connecting pin-3 of the 6-pin connector to the real-time controller's UART input for sending the NMEA output messages to the real-time controller.

4-4 Hardware Configuration Settings

Table 4-1 shows push button and slide switch configuration settings for Alpha^{+} RTK receiver in different application scenarios. For each usage scenario, **V** indicates which of the TTL / USB / Bluetooth interface should be selected to have Alpha^{+} LED light up, **A** or **B** indicates which position to put Alpha^{+} slide switch. The boldface **Output** indicates which NMEA output interface is used for this usage scenario. The boldface **Input** indicates which input interface used by rover to receive base data.

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Connecting to PC Setting Up Software Configuration Using RTK Viewer			V		A						
Figure 4-1 Short BaselineTest Setup Using Laptop	Base	V			A				**Output**	Output	
	Rover	V			B	**Output**	Output		**Input**		
Figure 4-3 Connecting to 3rd Party Base Using Phone	Rover			V	B	Output	Output	**Output**			**Input**
Figure 4-4 GIS Survey Configuration Using Locally Setup Base/PC and Phone Connection	Base		V		A					Output	
	Rover			V	B	Output	Output	**Output**			**Input**
Figure 4-5 UAV Configuration Using Locally Setup Base/PC/MissionPlanner and Radio Connection	Base		V		A					Output	
	Rover	V			B	**Output**	Output		**Input**		
Figure 4-6 Realtime Guidance Configuration Using Locally Setup Base/PC and Radio Connection	Base	V			A				**Output**	Output	
	Rover	V			B	**Output**	Output		**Input**		
Figure 4-7 Realtime Guidance Configuration Using Locally Setup Base/PC and Phone Connection	Base		V		A					Output	
	Rover			V	B	**Output**	Output	Output			**Input**

Table 4-1

5. Preparing for First-Time Use

5-1 RTK Viewer

RTK Viewer is a Windows-based software for configuring or monitoring Alpha$^+$ RTK receiver. User can download the software from below link:

http://polaris-gnss.com/alpha/rtk-viewer.zip

5-2 USB Driver

USB driver from Silicon Labs may need to be installed:

https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers

5-3 Checking Alpha$^+$ Receives Satellite Signal

Below steps bring up Alpha$^+$ as normal GNSS receiver to receive satellite signal:

- Connect antenna to the Alpha$^+$ SMA connector and place antenna at a window side having good sky view. Put Alpha$^+$ slide switch to A position.
- Open RTK Viewer. Connect Alpha$^+$ to PC using micro-USB cable. A dialog box for COM port and baud rate will appear. Click “Connect”.

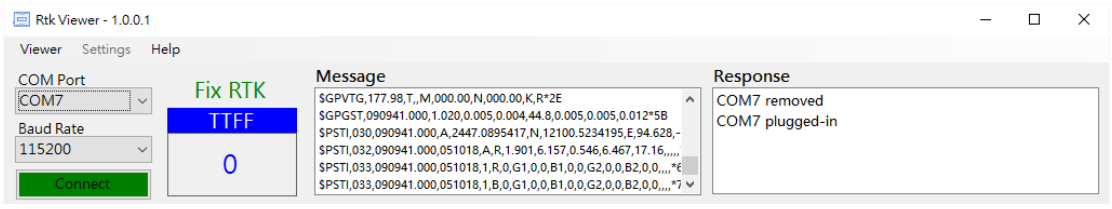


Figure 5-1

- Click push button on side of Alpha$^+$ to select USB interface. NMEA output should be seen on the Message screen. If having good sky view with sufficient number of satellites tracked, the signal bar will turn solid and have position fix.

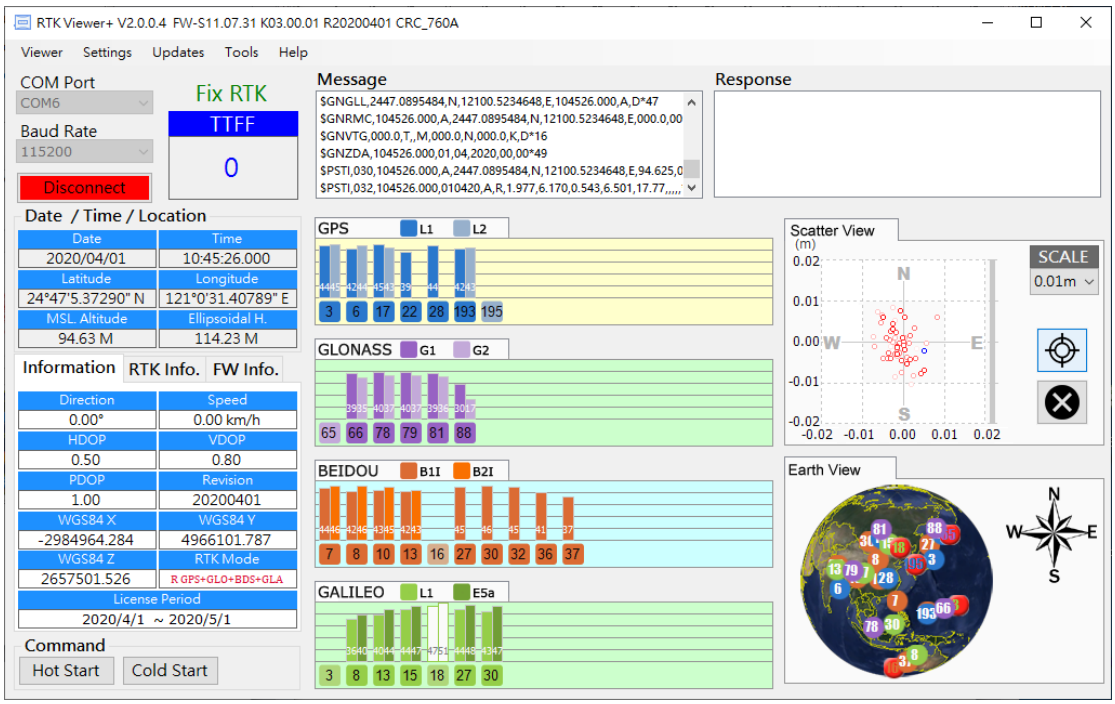


Figure 5-2

Tip: if not sure which COM port is used by Alpha^{+}, can use Windows “Device Manager” to find out.

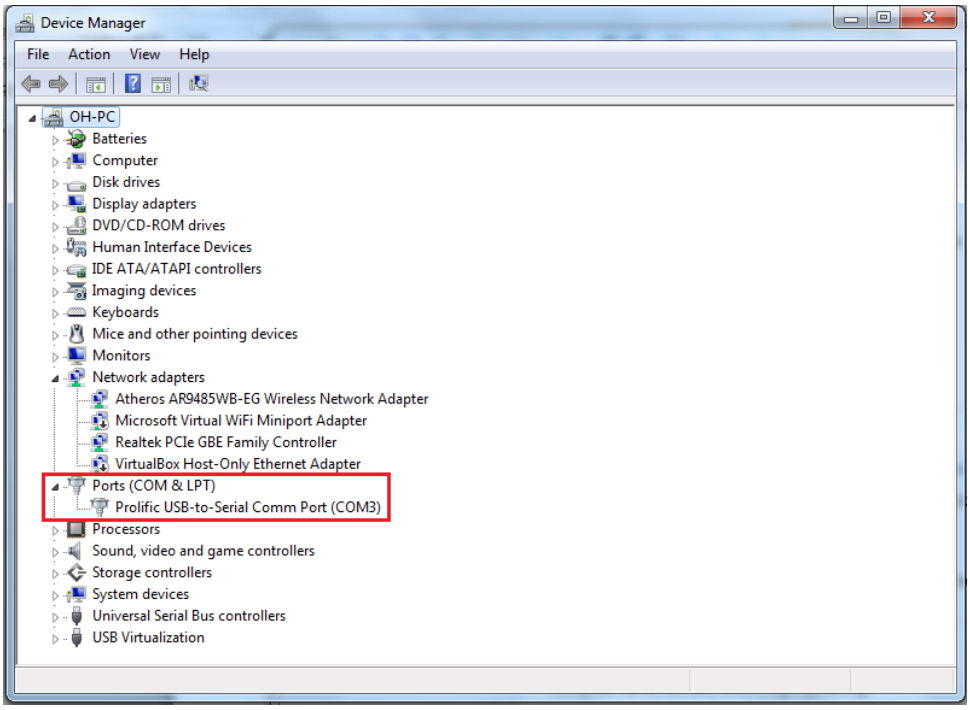


Figure 5-3

6. RTK Setup

6-1 Introduction

Typical uses of Alpha$^+$ RTK receiver are (1) rover-only: Alpha$^+$ works with a 3rd party RTK correction data provider, (2) base/rover pair: two Alpha$^+$ are configured as a base and a rover, respectively.

For rover-only usage, Alpha$^+$ RTK receiver can be used with RTK base station service providers having Virtual Reference Station (VRS) service, or a physical RTK base station within 30Km distance. Typical setup would be to use an Alpha$^+$ RTK rover connecting via Bluetooth to Android phone running NTRIP Client that connects with RTK base station over Internet. Alpha$^+$ can work with popular Trimble and Leica base stations.

For base/rover pair usage, the applications could be: (1) an Alpha$^+$ RTK receiver setup as local RTK base at some known reference location to serve other Alpha$^+$ RTK receiver rovers within 30Km distance, (2) An Alpha$^+$ RTK receiver first connecting to RTK base station service to determine its position accurately then later setup as local RTK base to serve other Alpha$^+$ RTK receiver rovers within 30Km distance.

6-2 Configuring the Rover

To configure Alpha+ as RTK rover, put slide switch to position A, connect micro-USB cable to Alpha+ and a Windows PC running RTK Viewer. From the “Settings” pull-down menu on RTK Viewer select “Configure RTK Mode”. On the dialog box select “Configure as Rover” and press “Next” button.

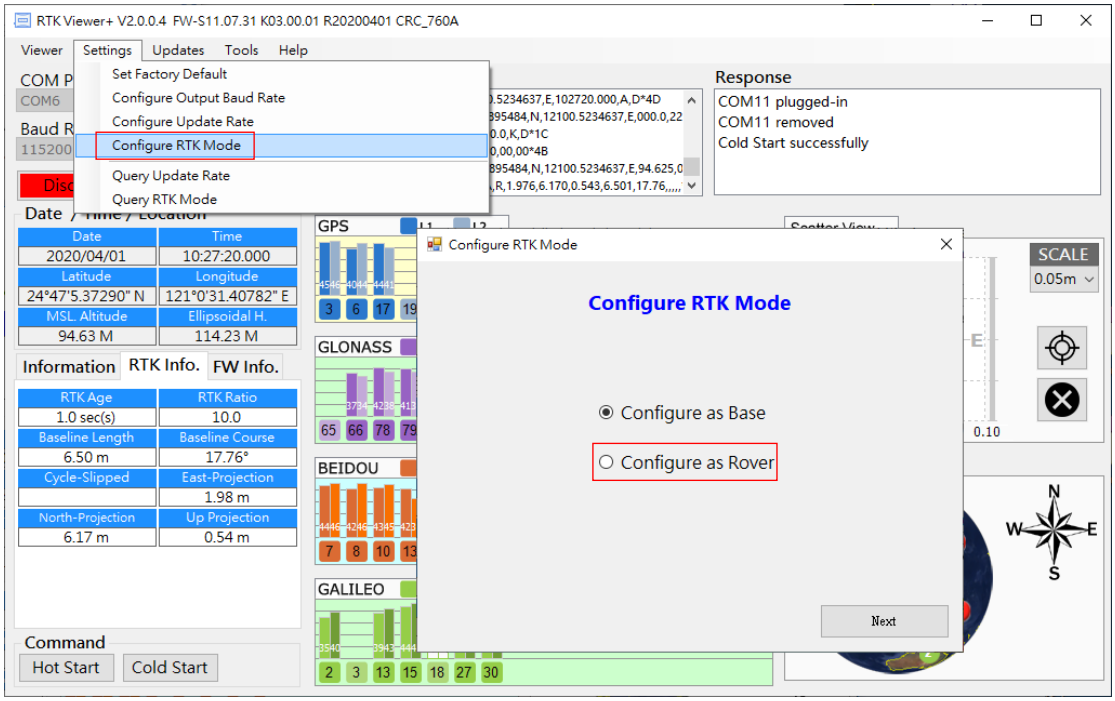


Figure 6-1

On the next dialog box select “NMEA Message” for most applications. “UAV Binary Message” is to be selected only if using Alpha+ with ArduPilot/Pixhawk.

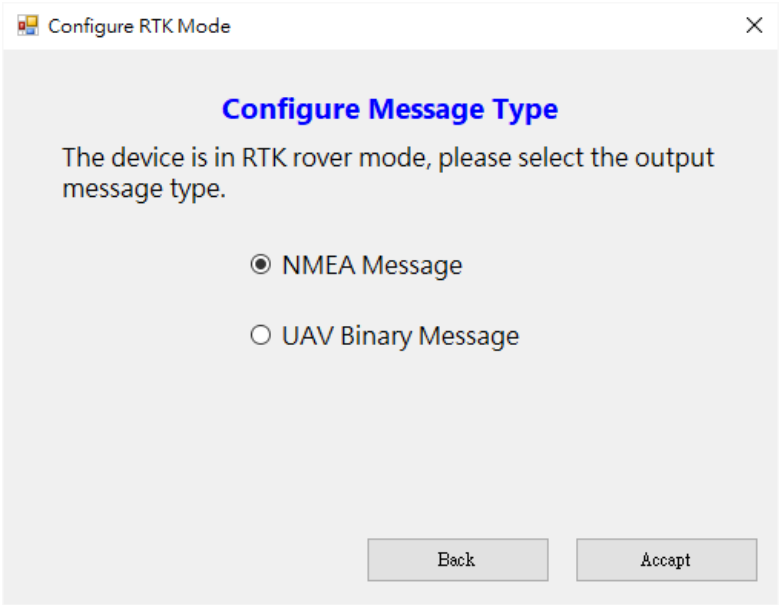


Figure 6-2

When done, put slide switch to position B for later use as RTK rover.

6-3 Configuring the Base

To configure Alpha+ as RTK base, put slide switch to position A, setup base antenna at location having unblocked sky view, connect antenna to Alpha+ using RF cable, connect Alpha+ to a Windows PC running RTK Viewer using micro-USB cable. From the “Settings” pull-down menu on RTK Viewer select “Configure RTK Mode”. On the dialog box select “Configure as Base” and press “Next” button.

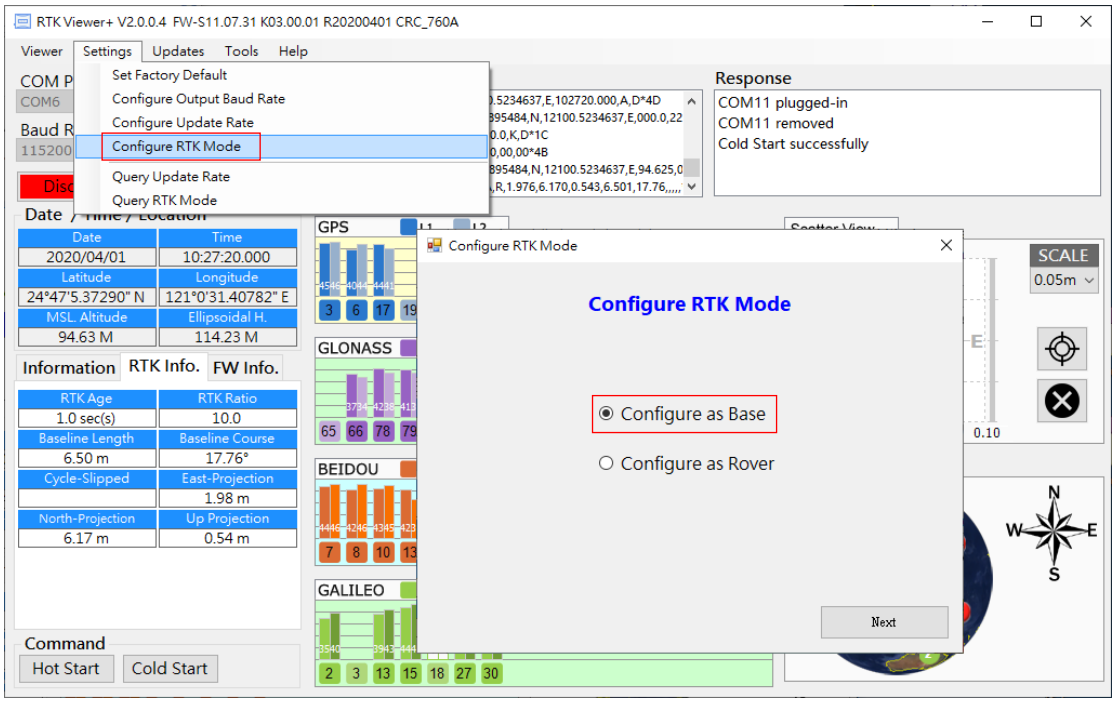


Figure 6-3

On the next dialog box, Operating as RTK base, Alpha+ can output base data in SkyTraq raw measurement format or RTCM format. For UAV application using Mission Planner, RTCM format is preferred to reduce the amount of data being sent. For all other applications, SkyTraq raw data format is preferred.

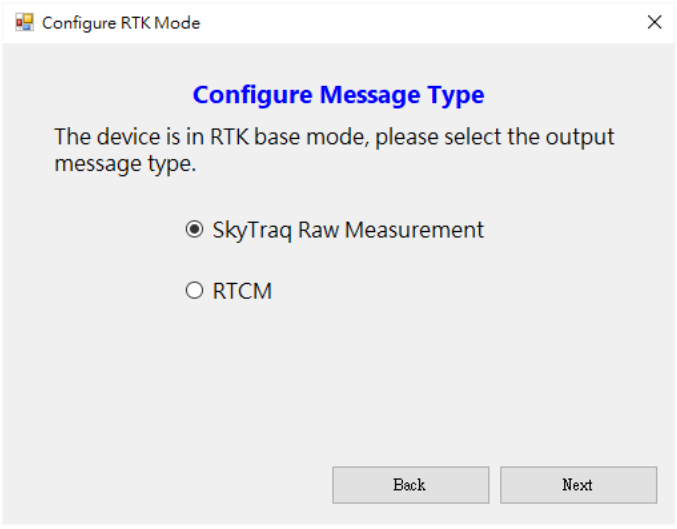


Figure 6-4

On the next dialog box, there are 4 ways to configure the base antenna position:

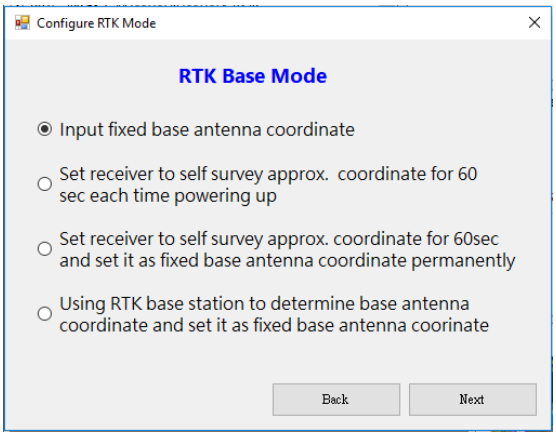


Figure 6-5

6-3-1 Input Fixed Base Antenna Coordinate

When a reference point with known coordinate is available to setup the RTK base antenna, this option is to be selected. Coordinate of the L1 antenna phase center position, extending from the known reference point, is to be entered.

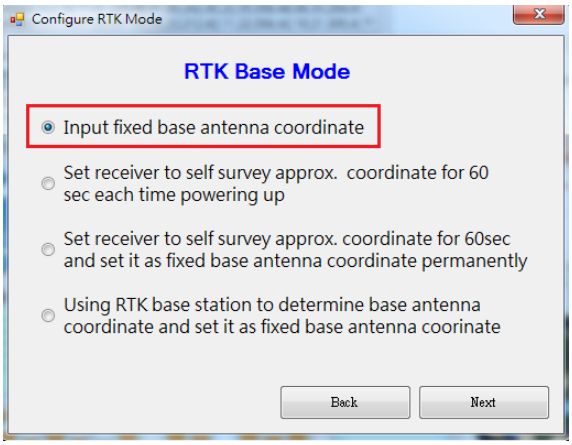


Figure 6-6

There are 3 different formats for entering the longitude and latitude: in degrees, degree/minute, or degree/minute/second.

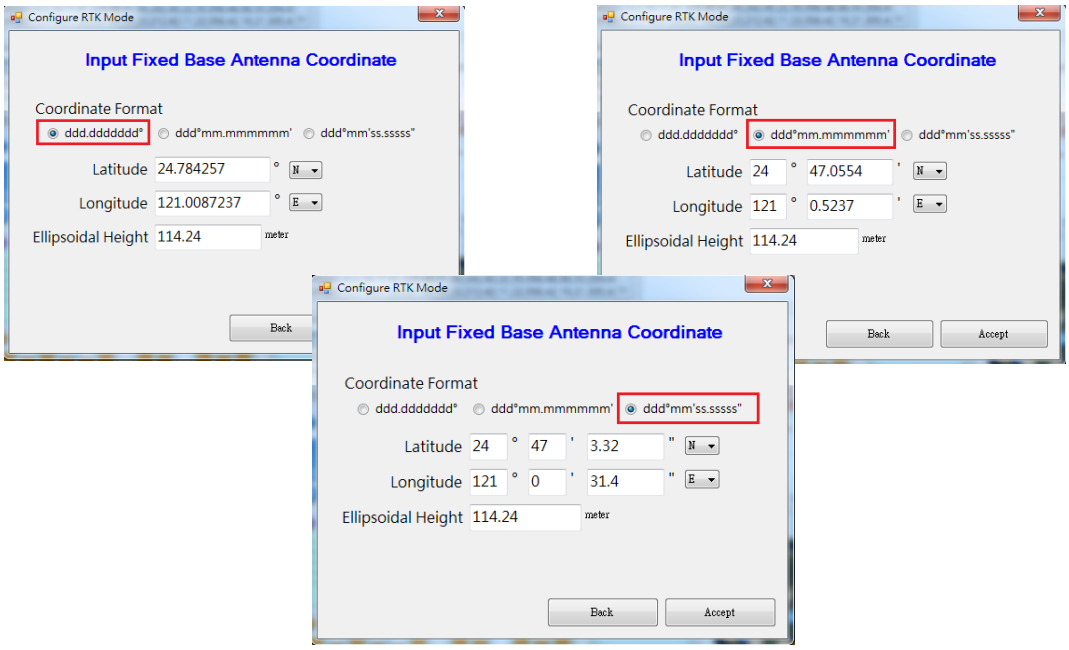


Figure 6-7

After pressing “Accept”, the entered coordinate will be set to Alpha$^+$ permanently. Each time powered on, Alpha$^+$ will function as RTK base and use the coordinate for antenna position reporting.

6-3-2 Set Receiver to Self-Survey Approx. Coordinate for 60sec Each Time Powering Up

With this setting, every time Alpha$^+$ is powered up it’ll use the averaged position of initial 60 position fix for base antenna position reporting. This may be useful for RTK testing situations where position of the base will be moved from time to time, and rover’s centimeter-level accuracy relative-positioning from the base is more important than having accurate position from a global reference.

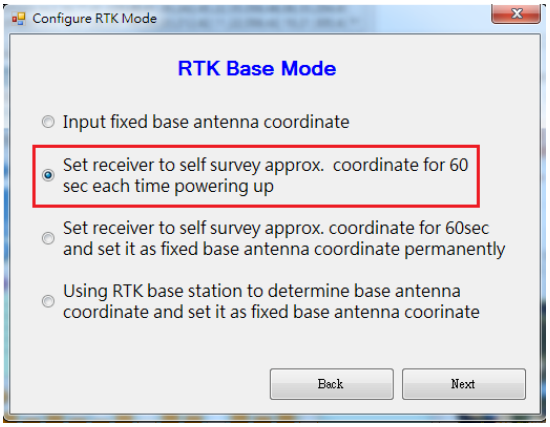


Figure 6-8

6-3-3 Set Receiver to Self-Survey Approx. Coordinate for 60sec and Set It As Fixed Base Antenna Coordinate Permanently

This setting is similar to 6-4-2 except self-survey will be performed immediately and the averaged position will be used to set permanent base antenna coordinate. Afterwards powering up, Alpha^{+} will use that antenna position coordinate for base antenna position reporting.

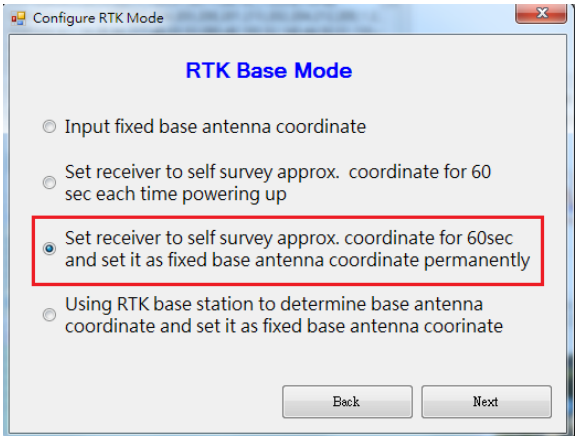


Figure 6-9

6-3-4 Using RTK Base Station to Determine Base Antenna Coordinate and Set It As Fixed Base Antenna Coordinate

This setting uses public or private RTK base station service to determine base antenna position and set it as fixed base antenna position. Below procedures need to be first performed on the to-be RTK base Alpha^{+} receiver:

- Change Alpha^{+} interface selection to Bluetooth
- Put slide switch to position B
- Connect Alpha^{+} to base station service via Android phone as described in section 6-4-2.

This prepares Alpha^{+} RTK receiver as 3rd-party base station connected RTK rover, able to determine its position to centimeter-level accuracy. Have a USB cable connecting Alpha^{+} and RTK Viewer, we can now select this 4th option to setup the Alpha^{+} RTK base antenna position. RTK Viewer will take 60 RTK Fix position averaged value to set permanent base antenna coordinate. When done, put slide switch back to position A for Alpha^{+} to function as base.

6-4 RTK Application Scenarios In Detail

This section we go into details on application scenarios.

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Connecting to PC Setting Up Software Configuration Using RTK Viewer			V		A						
Figure 4-1 Short BaselineTest Setup Using Laptop	Base	V			A				**Output**	Output	
	Rover	V			B	**Output**	Output		**Input**		
Figure 4-3 Connecting to 3rd Party Base Using Phone	Rover			V	B	Output	Output	**Output**			**Input**
Figure 4-4 GIS Survey Configuration Using Locally Setup Base/PC and Phone Connection	Base		V		A					Output	
	Rover			V	B	Output	Output	**Output**			**Input**
Figure 4-5 UAV Configuration Using Locally Setup Base/PC/MissionPlanner and Radio Connection	Base		V		A					Output	
	Rover	V			B	**Output**	Output		**Input**		
Figure 4-6 Realtime Guidance Configuration Using Locally Setup Base/PC and Radio Connection	Base	V			A				**Output**	Output	
	Rover	V			B	**Output**	Output		**Input**		
Figure 4-7 Realtime Guidance Configuration Using Locally Setup Base/PC and Phone Connection	Base		V		A					Output	
	Rover			V	B	**Output**	Output	Output			**Input**

Table 6-1

6-4-1 Short Baseline Test Setup

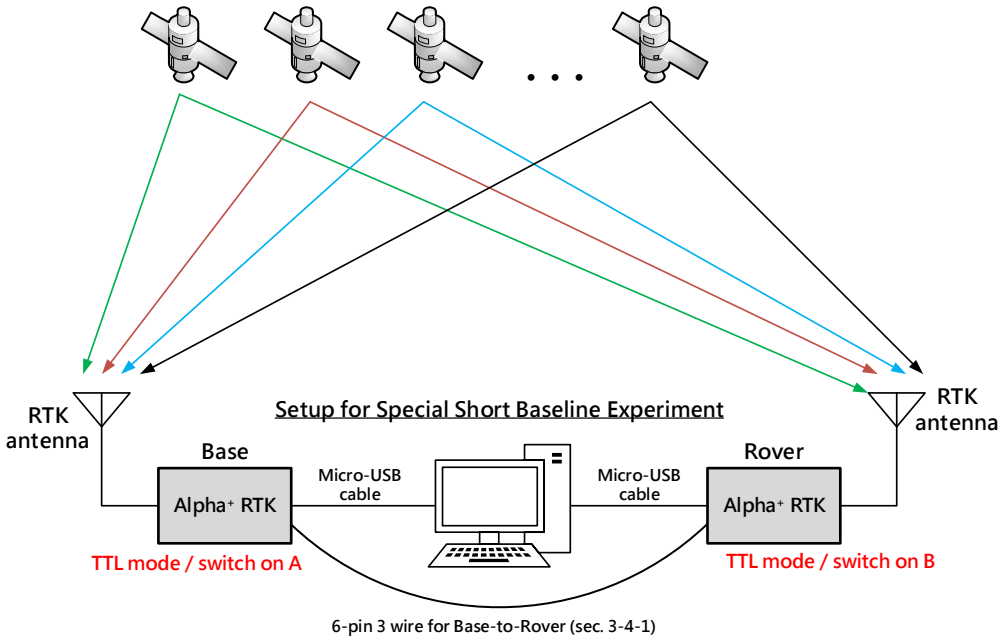


Figure 6-10

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Connecting to PC Setting Up Software Configuration Using RTK Viewer			V		A						

Configure one Alpha$^+$ as rover (cf. section 6-2). Configure the other Alpha$^+$ as a base with option "Set Receiver to Self-Survey Approx. Coordinate for 60sec Each Time Powering Up" (cf. section 6-3-2)

Figure 6-11

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Figure 4-1 Short BaselineTest Setup Using Laptop	Base	V			A				Output	Output	
	Rover	V			B	Output	Output		Input		

In this base/rover short baseline test setup, the communication link from base to rover is using UART port on the 6-pin TTL connector port. Use the supplied Base-to-Rover connector cable to connect Alpha^{+} RTK base and Alpha^{+} RTK rover. The USB cable connecting to the laptop supplies power and is also used for monitoring using RTK Viewer.

Testing under open sky environment where the antennas can have clear view of the sky, both base and rover should be able to pick up 10 or more signals with signal strength in range of 40 ~ 50 dB/Hz. If using the smaller High Precision Antenna, putting a 10cm x 10cm or larger metallic plate underneath the antenna will much improve RTK performance.

The rover will first show GPS or DGPS status; a while later it will show Float RTK status, then after some time it will show Fix RTK denoting it has converged to RTK centimeter-level accuracy solution. Select “RTK Info” tab to show additional RTK related information. RTK Age shows the time delay rover receives the base data. Float RTK status turns in to Fix RTK status when RTK Ratio reached 3 or higher value. When base data is being received, after a while Float RTK status will show if receiving 10 or more signals under open sky. If the shown status remains to be in GPS or DGPS mode one minute later after setting up, then rover is not correctly receiving base data.

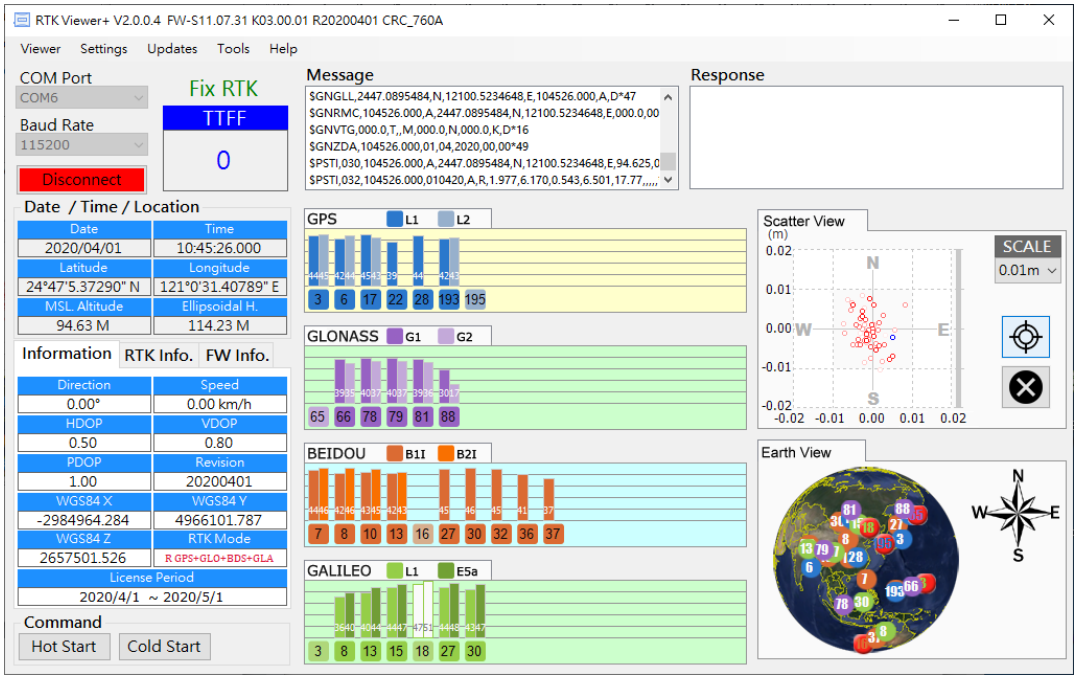


Figure 6-12

With the right side Scatter View on RTK Viewer, “Set Origin” button can be clicked to re-center, the “Scale” pull down menu allows adjusting scatter plot viewing range.

On left hand side bottom, clicking “Cold Start” button restarts the receiver from scratch; clicking “Hot Start” button restarts the receiver without clearing internal data.

6-4-2 Connecting to 3rd Party Base Using Phone

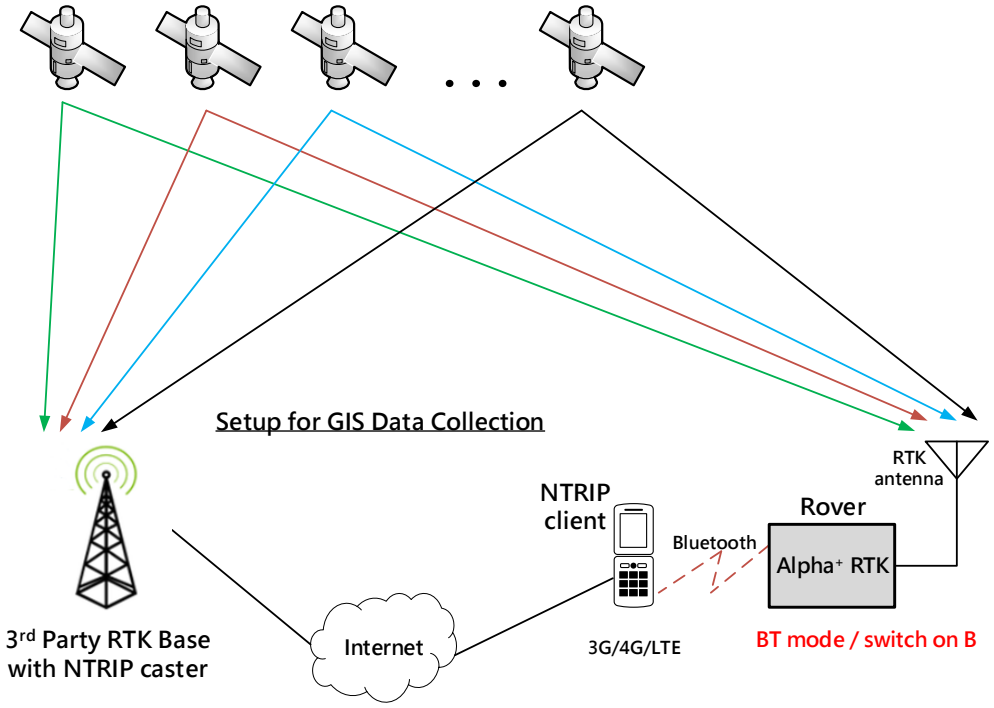


Figure 6-13

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Connecting to PC Setting Up Software Configuration Using RTK Viewer			V		A						

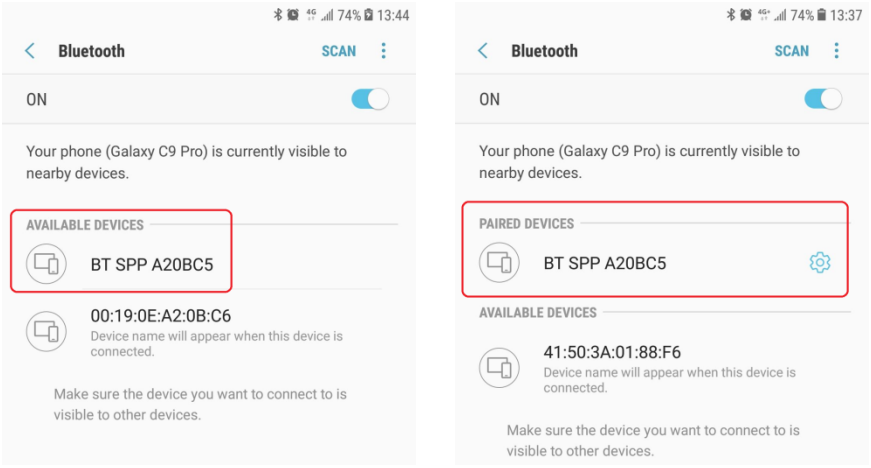
Use section 6-2 method to configure Alpha+ into RTK rover.

Figure 6-14

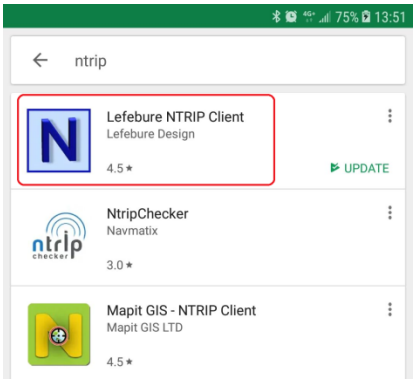
Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Figure 4-3 Connecting to 3rd Party Base Using Phone	Rover			V	B	Output	Output	Output			Input

Once Alpha+ RTK rover setting is configured, use below steps to prepare for connecting to 3rd party RTK base station:

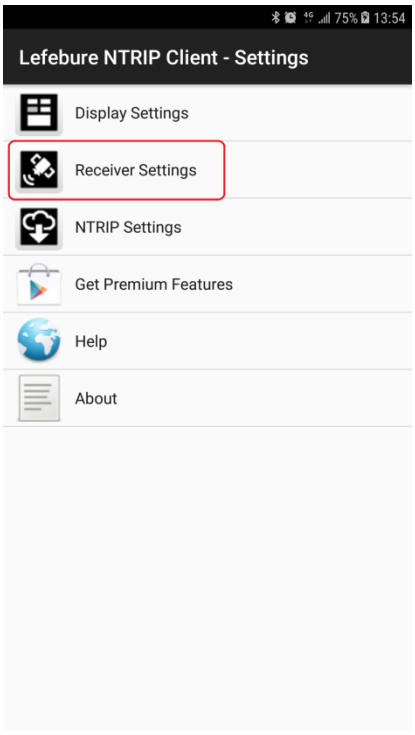
1. Mount the rover antenna on a range pole or tripod.
2. Mount Alpha+ RTK receiver, power bank, and smartphone to range pole or tripod using holders.
3. Use antenna cable to connect antenna and Alpha+.
4. Use USB cable to connect power bank and Alpha+.
5. Turn on power bank to supply 5V to power Alpha+
6. Turn on Bluetooth of Android phone, scan for “BT SPP xxxxxx” device, select to pair.



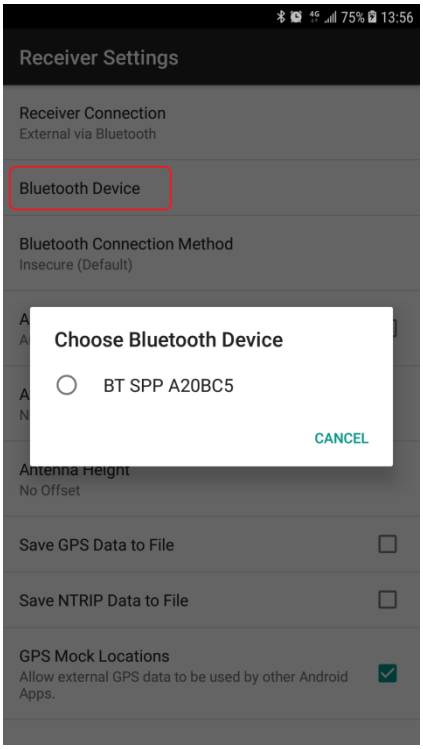
7. Install Lefebure NTRIP Client from Google Play Store, open it.

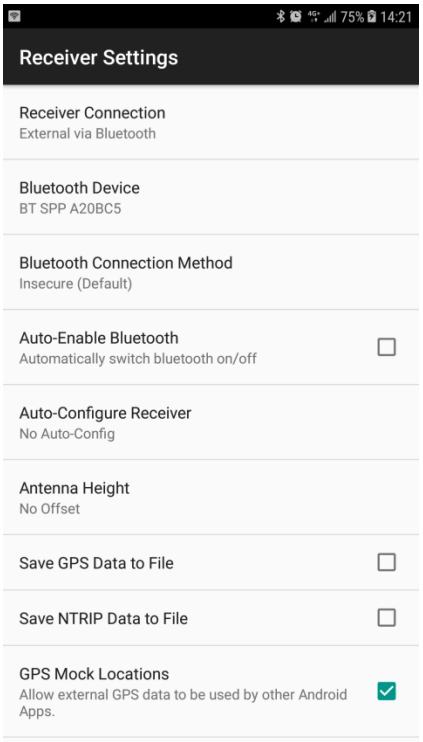


8. Select the gear setup icon on the upper right corner. Select “Receiver Settings”.

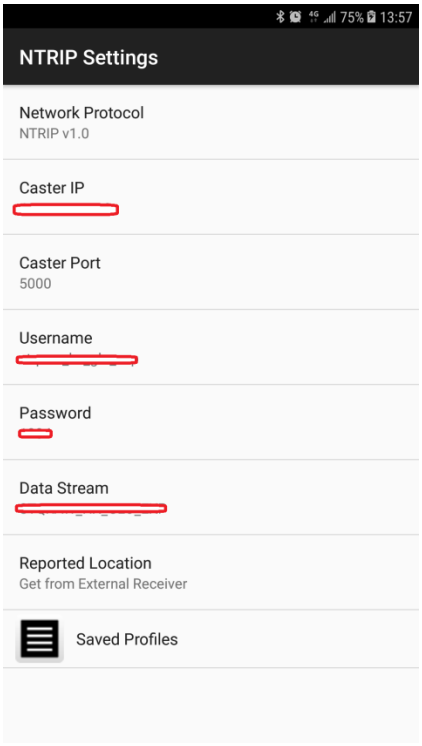


9. For “Receiver Connection” select “External via Bluetooth”. For “Bluetooth Device” select the “BT SPP xxxxxx” device. Check “GPS Mock Locations”.

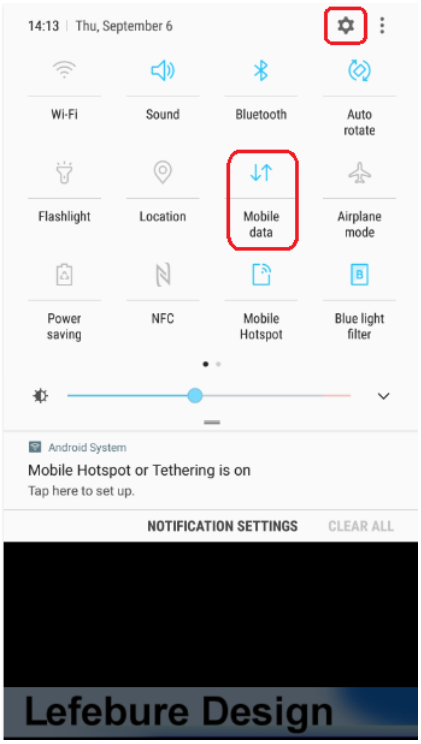




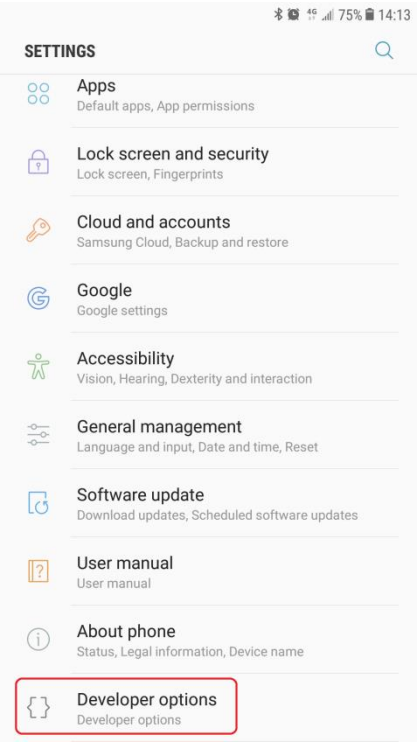
10. Select “NTRIP Settings”. Network Protocol select “NTRIP v1.0”. Enter base station and account information for Caster IP / Caster Port / Username / Password / Data Stream. Report Location select “Get From External Receiver”.

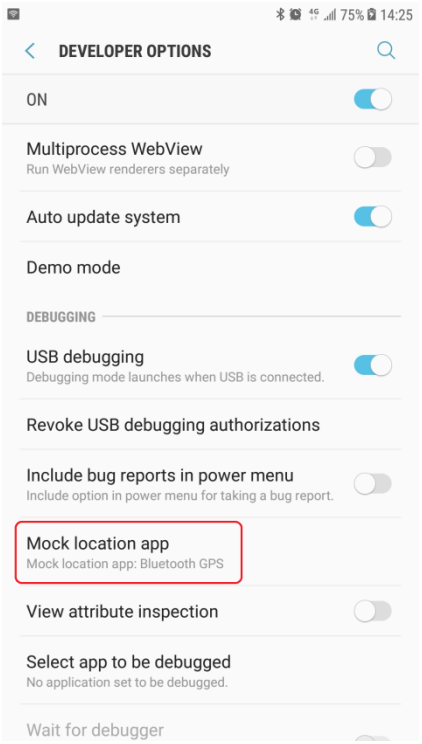


11. Enable phone's Mobile Data connection. Select the gear icon on upper right to enter phone Settings configuration page.

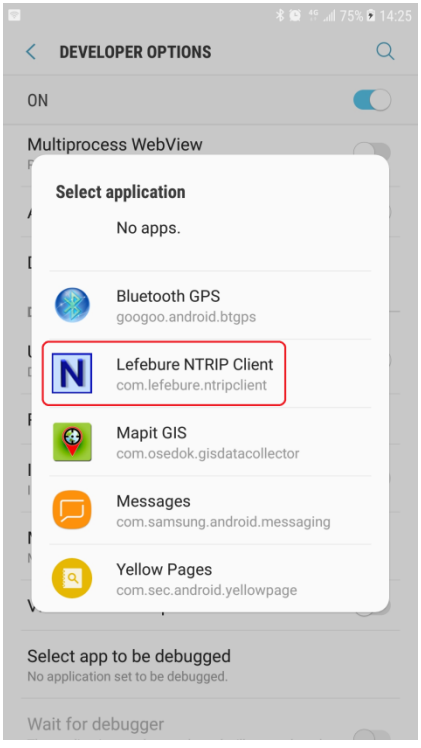


12. Select "Developer Options" near the bottom of Settings page. Sliding down Developer Options page, select "Mock Location App".

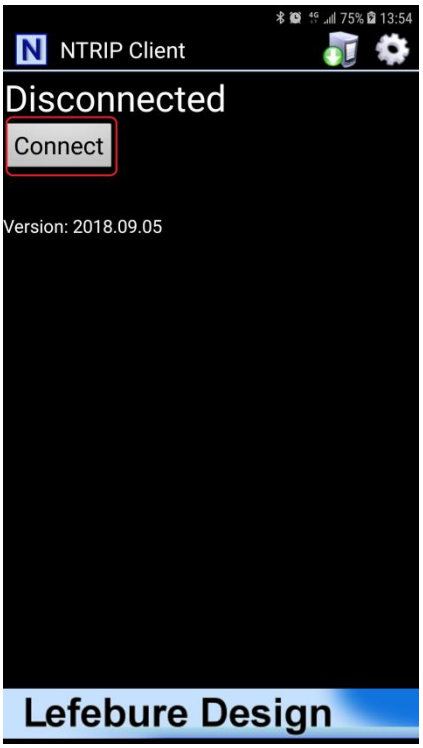




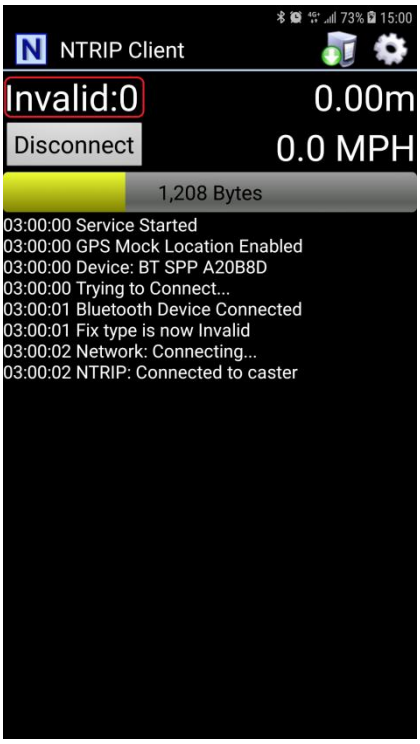
13. Select “Lefebure NTRIP Client”.

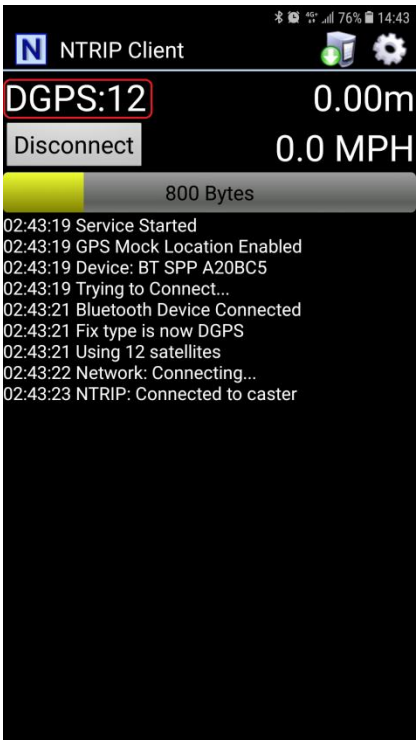


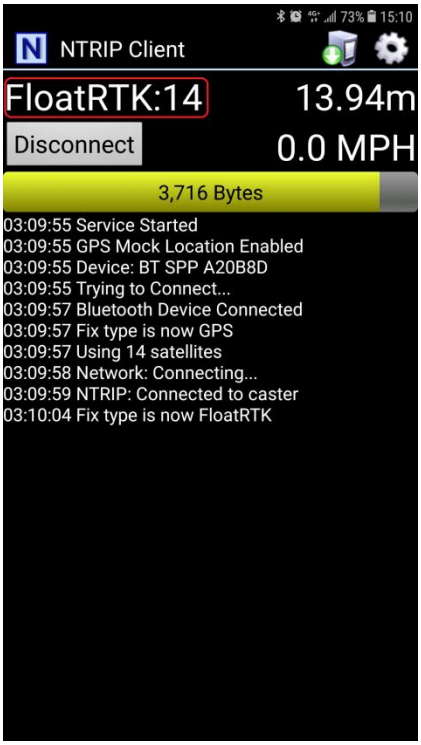
14. Return to Lefebure NTRIP Client App, click “Connect” to connect with Alpha^{+} RTK receiver via Bluetooth and RTK base station via Internet.

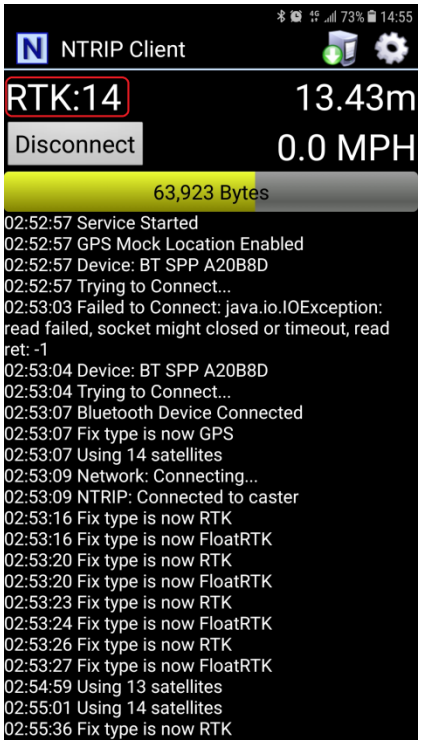


15. After connection is made, upper left screen will first show Invalid, denoting receiver does not have position fix yet. Next it'll show GPS or DGPS and number of satellites used, denoting receiver has meter-level accuracy position fix. Then it'll show FloatRTK for some time, denoting the receiver is trying to converge to centimeter-level accuracy position. When the receiver has centimeter-level accuracy position it'll show steady RTK status. Afterwards third party Data Collector Apps can next be used to record the position.









16. When surveying a group of locations within walking distance, can leave Alpha^{+} powered up, taking the range pole or tripod to next location to survey. Switch to the Lefebure NTRIP Client App to check if Alpha^{+} is in RTK Fix state before recording the next location position with Data Collector App. The setup procedure only needs to be performed once. Later use only need to run Lefebure NTRIP Client and connect.

6-4-3 GIS Survey Using Locally Setup Base/PC and Phone Connection

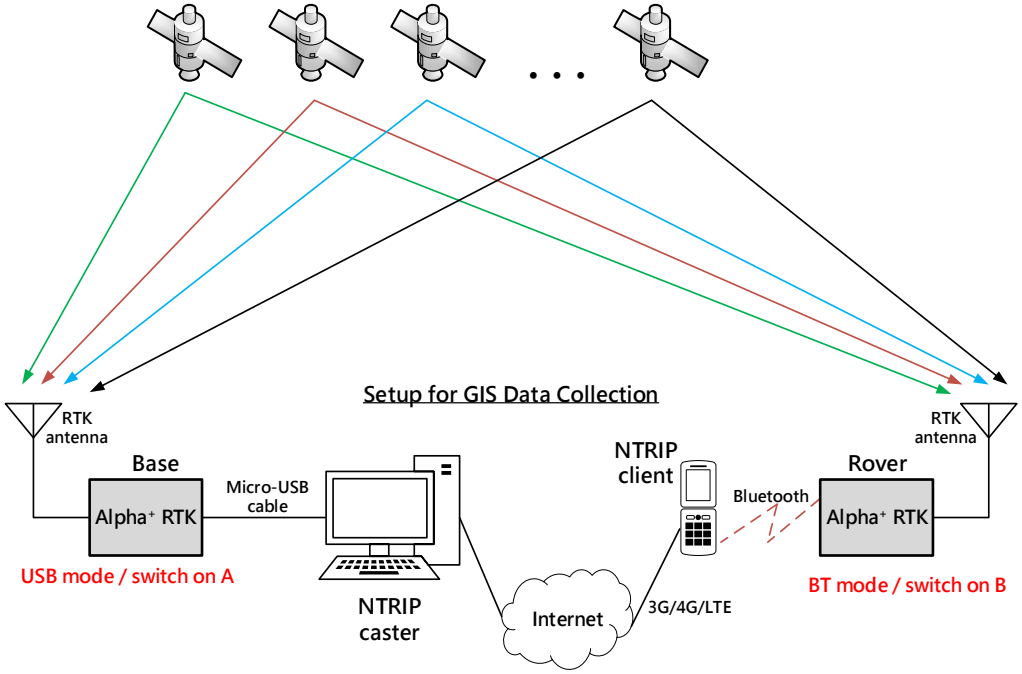


Figure 6-15

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Connecting to PC Setting Up Software Configuration Using RTK Viewer			V		A						

Use section 6-2 method to configure one Alpha$^+$ receiver into RTK rover. Depending on what's available to determine base antenna position, select one of the options to configure the second Alpha$^+$ RTK receiver into RTK base as described in section 6-3.

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Figure 4-4 GIS Survey Configuration Using Locally Setup Base/PC and Phone Connection	Base		V		A					Output	
	Rover			V	B	Output	Output	**Output**			**Input**

Once Alpha$^+$ RTK base and rover settings are properly configured and able to get rover RTK Fix with short baseline experiment as described in section 6-4-1, one can proceed to setup base to send data over Internet.

If having fixed IP to setup a local base, one can use RTKLIB's STRSVR to setup NTRIP Server/Caster RTK base station to work with remote NTRIP Client. Please refer to Appendix A-3 for setup procedures.

Polaris offers a very low-cost subscription service that allows customers, who do not have fixed IP Internet connection, to setup RTK base station using open-source RTKLIB's STRSVR to stream the base data to our re-directing server. The Lefebure NTRIP Client running on customer's Android phone can then connect to our re-directing server to fetch the streamed base data. This way no fixed IP is required to setup RTK base station. Refer to Appendix A-2 for setup procedures.

After local RTK base for Internet NTRIP connection is prepared, setup procedure as described in section 6-4-2 is to be applied to use the RTK rover.

6-4-4 UAV Using Locally Setup Base / PC / Mission Planner and Radio Connection

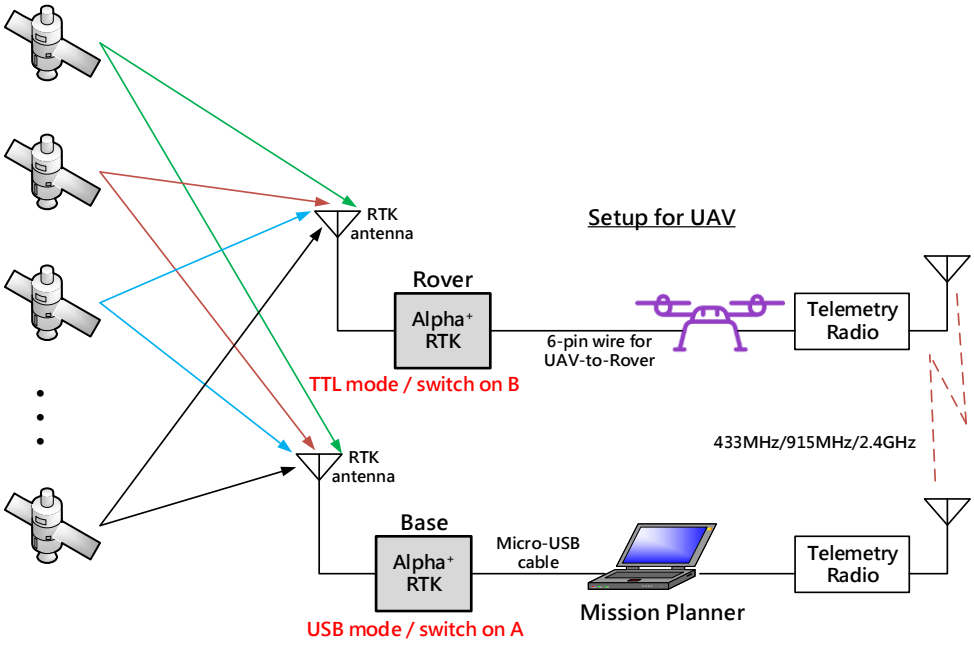


Figure 6-16

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Connecting to PC Setting Up Software Configuration Using RTK Viewer			V		A						

Use section 6-2 method to configure one Alpha+ receiver into RTK rover. Depending on what's available to determine base antenna position, select one of the options to configure the second Alpha+ RTK receiver into RTK base as described in section 6-3.

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Figure 4-5 UAV Configuration Using Locally Setup Base/PC/MissionPlanner and Radio Connection	Base		V		A					Output	
	Rover	V			B	Output	Output		Input		

Once Alpha+ RTK base and rover settings are properly configured and able to get rover RTK Fix with short baseline experiment as described in section 6-4-1, one can proceed to setup base/rover for UAV application.

ArduPilot is the most popular, full-featured and reliable open source autopilot software. It provides a "RTK/GPS injection" method of using only one pair of radio for sending RTK base correction data and Mission Planner data. Items needed for building a complete RTK system are shown below.

Figure 6-17

Since Mission Planner expects RTCM format base data, user must configure the Alpha^{+} RTK base to output in RTCM as described in section 6-3-5.

Open Mission Planner and follow below steps:

- Select the 【INITIAL SETUP】 tab on top of GUI.
- Select the 【RTK/GPS Inject】 icon on left panel of GUI.
- Select the COM port on which Alpha+ RTK base is assigned for the USB connection.
- Select 115200 baud rate that Alpha+ RTK base output RTCM data to Mission Planner.
- Check the 【Inject MSG Type】 feature.
- Press the 【Connect】 icon and you should see it becomes 【Stop】.

Once having done above configurations, one should see below screen.

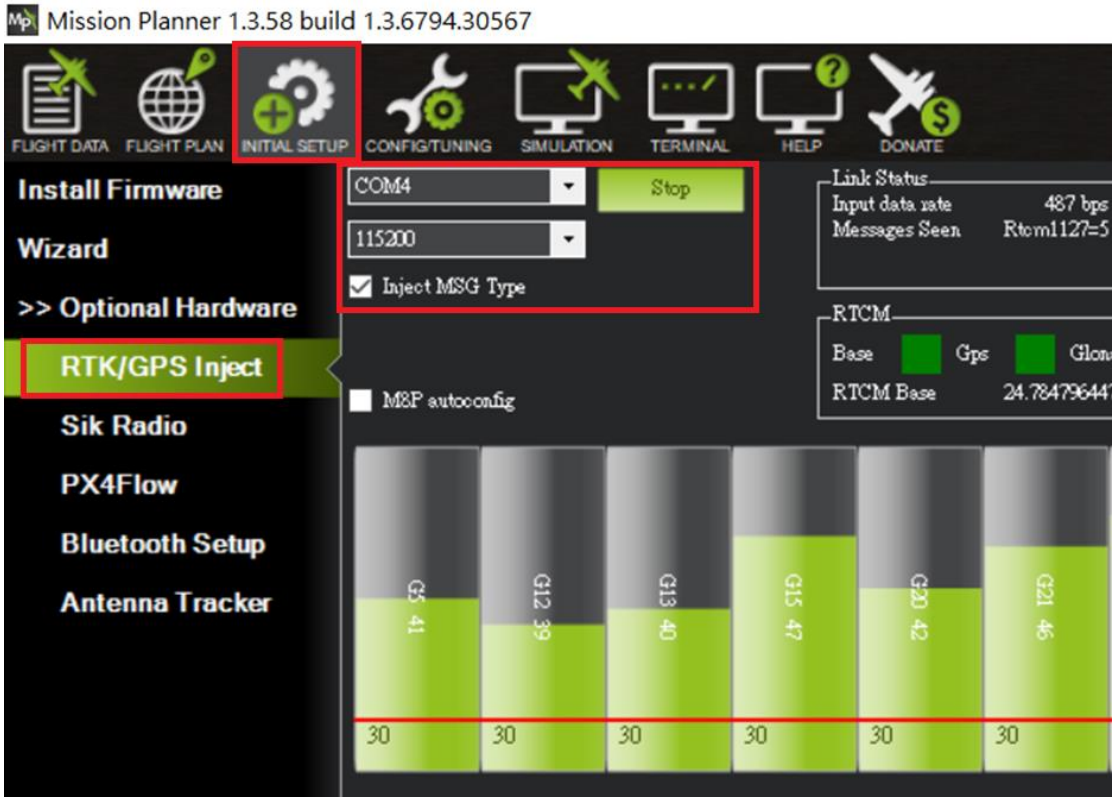


Figure 6-18

Select【**Flight Data**】icon on the top menu bar to return to main page, Mission Planner will show current GPS status in below red rectangle enclosed area, and user could check and see if it's working correctly.

GPS: RTK Fixed	GPS Status = 6.00
GPS: RTK Float	GPS Status = 5.00
GPS: 3D DGPS	GPS Status = 4.00
GPS: 3D Fix	GPS Status = 3.00

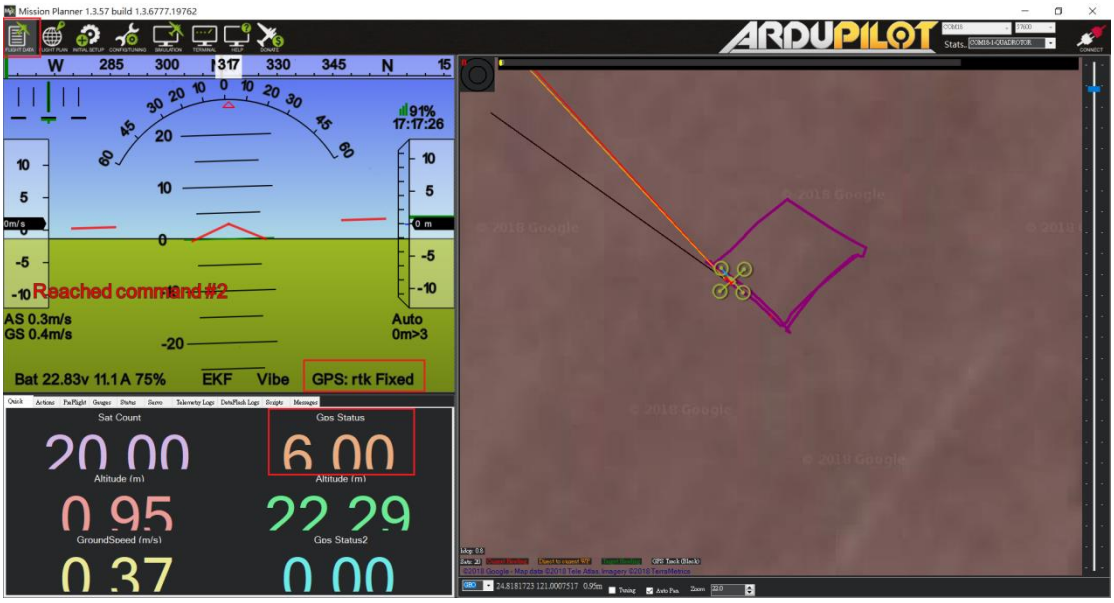


Figure 6-19

6-4-5 Real-Time Guidance Using Locally Setup Base/PC and Radio Connection

For line-of-sight real-time control application, telemetry radio can be used to send RTK base data.

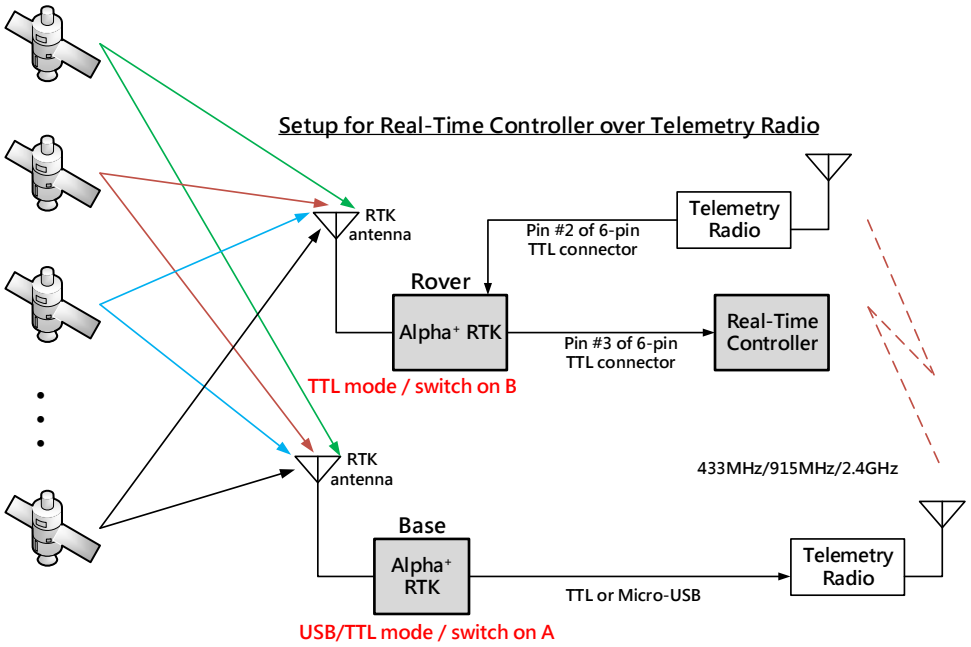


Figure 6-20

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Connecting to PC Setting Up Software Configuration Using RTK Viewer			V		A						

Use section 6-2 method to configure one Alpha+ receiver into RTK rover. Depending on what's available to determine base antenna position, select one of the options to configure the second Alpha+ RTK receiver into RTK base as described in section 6-3.

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Figure 4-6 Realtime Guidance Configuration Using Locally Setup Base/PC and Radio Connection	Base	V			A				**Output**	Output	
	Rover	V			B	**Output**	Output		**Input**		

Assume the radio is properly setup for sending and receiving RTK base data at 115200 baud rate, (1) connect RTK base UART output on pin-3 and GND on pin-6 of the 6-pin connector to radio transmitter, (2) connect RTK rover UART input on pin-2 and GND on pin-6 of the 6-pin connector to radio receiver, (3) connect RTK rover UART output on pin-3 of the 6-pin connector and GND on pin-4 of the 4-pin connector to the real-time controller, apply power to both radios then RTK rover will be able to receive RTK base data and function.

6-4-6 Real-Time Guidance Using Locally Setup Base/PC and Phone Connection

For longer range non-line-of-sight real-time control application, NTRIP Internet connection can be used to send RTK base data.

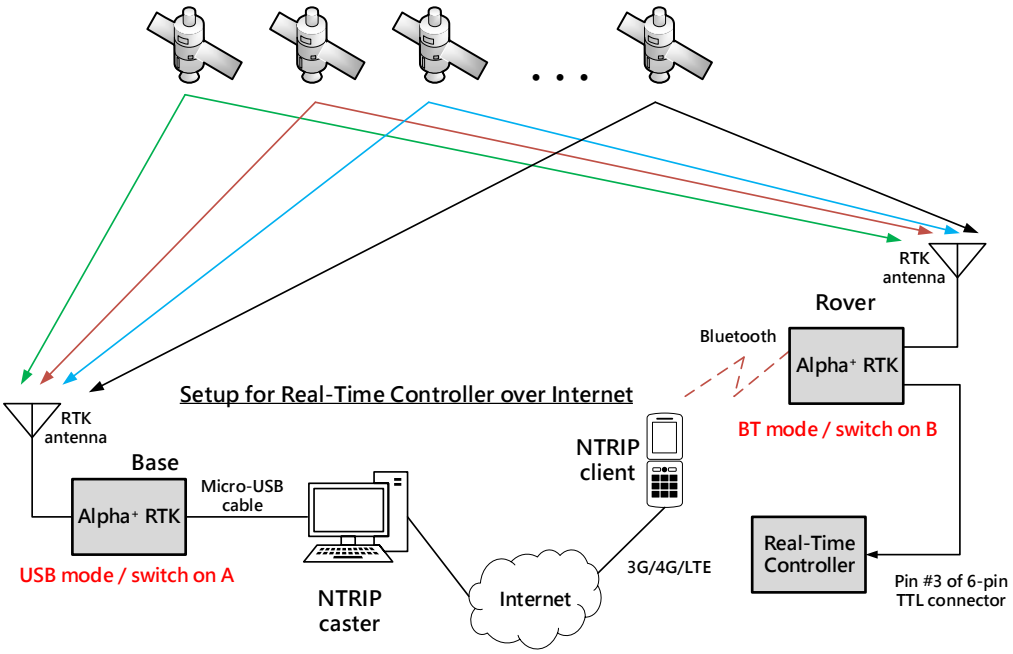


Figure 6-21

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Connecting to PC Setting Up Software Configuration Using RTK Viewer			V		A						

Use section 6-2 method to configure one Alpha+ receiver into RTK rover. Depending on what's available to determine base antenna position, select one of the options to configure the second Alpha+ RTK receiver into RTK base as described in section 6-3.

Application Scenario	Mode	Interface Selection LED			Slide Switch Position	NMEA Output Available Port			RTCM or RAW Data Port		
		TTL	USB	Bluetooth		TTL	USB	Bluetooth	TTL	USB	Bluetooth
Figure 4-7 Realtime Guidance Configuration Using Locally Setup Base/PC and Phone Connection	Base		V		A					Output	
	Rover			V	B	**Output**	Output	Output			**Input**

Use the same method as described in section 6-4-3 to setup base/rover Internet NTRIP connection capability. Connect RTK rover UART output on pin-3 and GND on pin-6 of the 6-pin connector to the real-time controller, then it's ready to use!

7 Raw Measurement Recording and Post Processing

For post-processing, both base data and rover data need to be available. The base data can be (1) stored RTCM data received from RTK base station service or (2) stored SkyTraq raw measurement data from Alpha$^+$ RTK base. The RTK rover data is stored SkyTraq raw measurement data from Alpha$^+$ RTK rover.

To store raw measurement data, the supplied 16GByte SD Card needs to be inserted into Alpha$^+$ SD Card holder. To enable raw measurement recording, pressing the push button for 3 seconds until SD Card LED turns ON. When SD Card is recording the LED will flash. Pressing the push button for another 3 seconds until SD Card LED ceases flashing will stop raw measurement recording. To avoid recording file corruption, always stop raw measurement recording before powering off Alpha$^+$.

The logged raw measurement data or RTCM data can be converted to RINEX format using v.2.4.3 RTKLIB's RTKCONV program. After converting base and rover logged data into standard RINEX format, they can be post-processed using RTKLIB's RTKPOST or other post-processing software.

8 Software Update

Occasionally there will be new update software for RTK Viewer and Alpha+ RTK receiver. User can manually check and update using RTK Viewer on computer with Internet connection.

8-1 RTK Viewer Software Update

To check if update for RTK Viewer is available, select “Check RTK Viewer Update” from the Viewer pull-down menu.

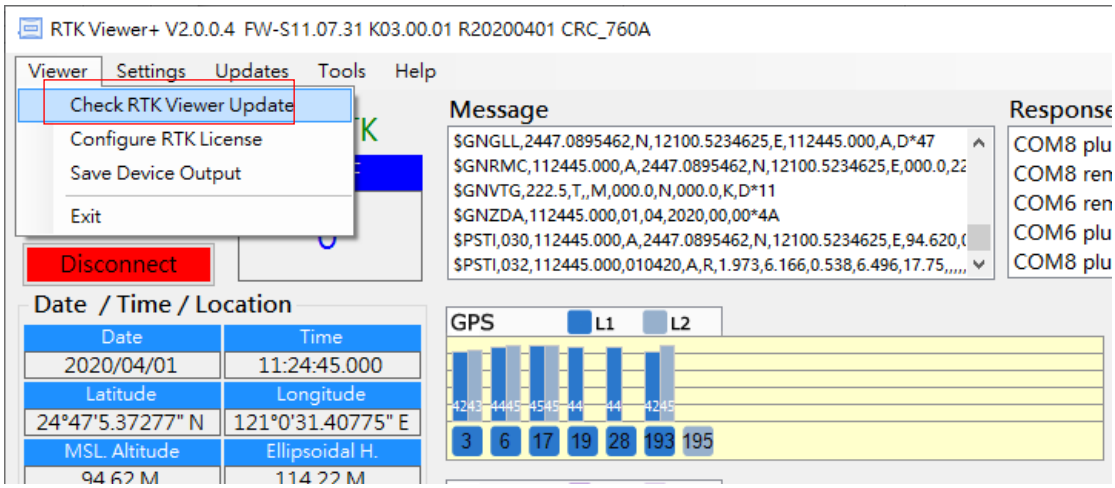


Figure 8-1

8-2 Alpha+ RTK Receiver Software Update

Before checking if new update software for Alpha+ is available, make sure Alpha+ is connected to RTK Viewer. From RTK Viewer “Updates” pull-down menu, select “Check Firmware Update”, then a message box showing “checking for updates” will pop up.

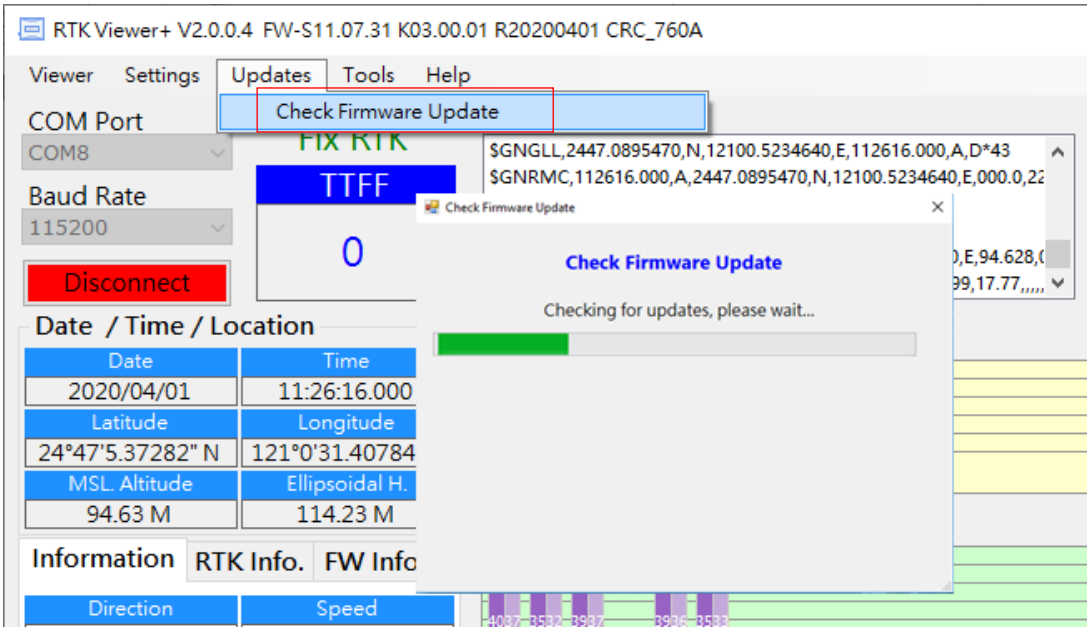


Figure 8-2

If no new update is available, RTK Viewer will notify already running latest software.

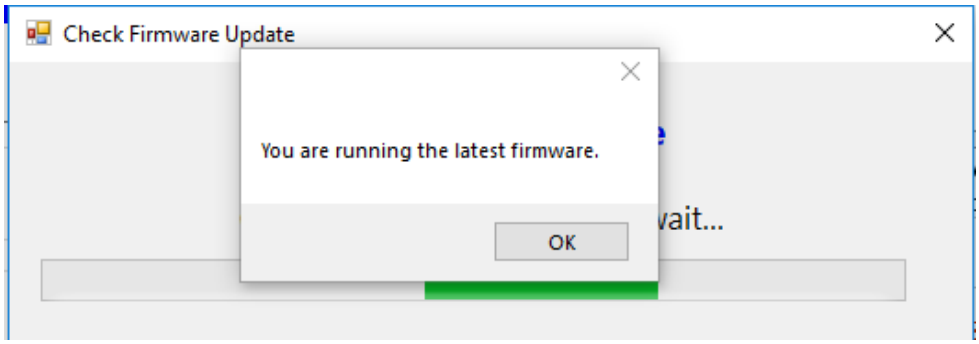


Figure 8-3

In case new update software is found, a dialog box will appear. Press “Download and Update” to update, or “No” to cancel update.

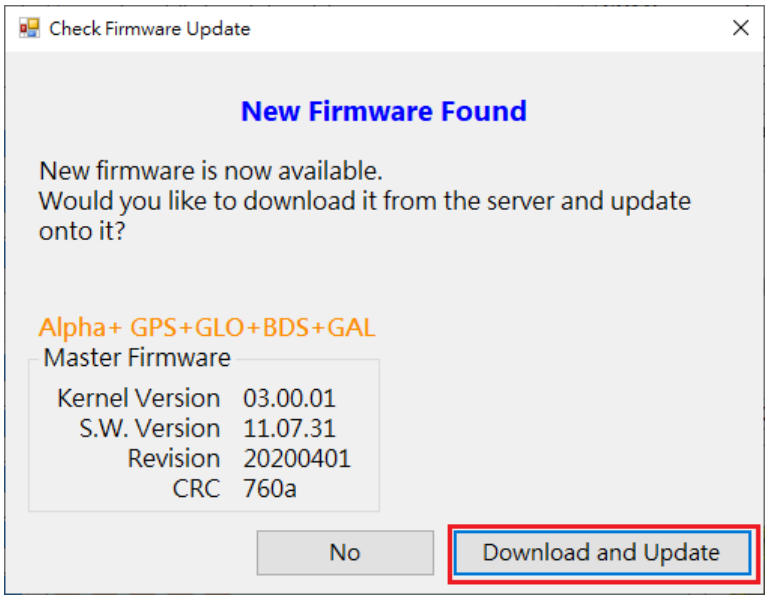


Figure 8-4

After pressing “Yes” RTK Viewer will download the new software from Polaris’ website and load it to Alpha^{+}, RTK Viewer will show below message box indicating software update status.

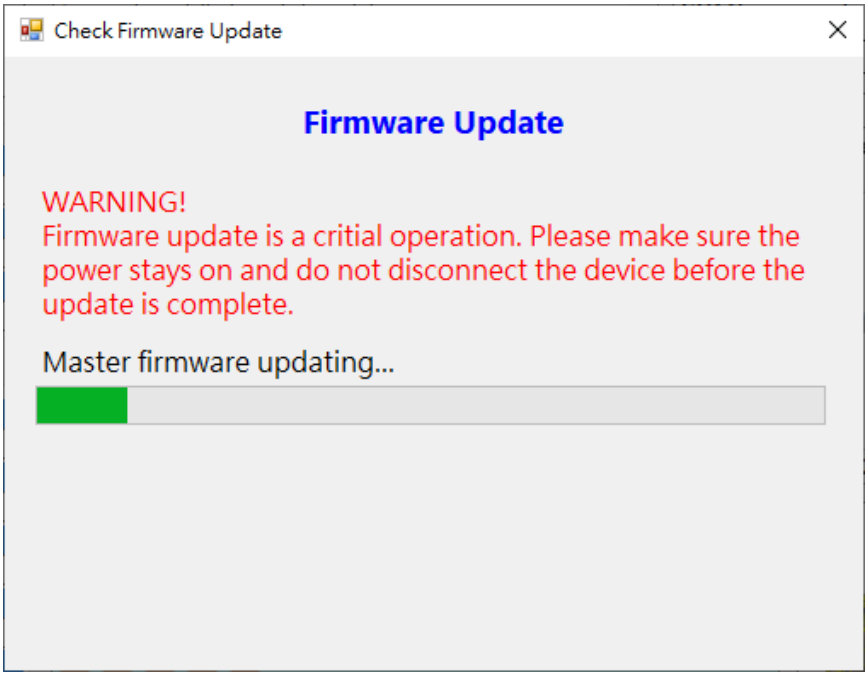


Figure 8-5

When software update is in progress, **DO NOT** remove the USB cable, or press Alpha^{+} push button, or change position of the slide switch until seeing software update is completed.

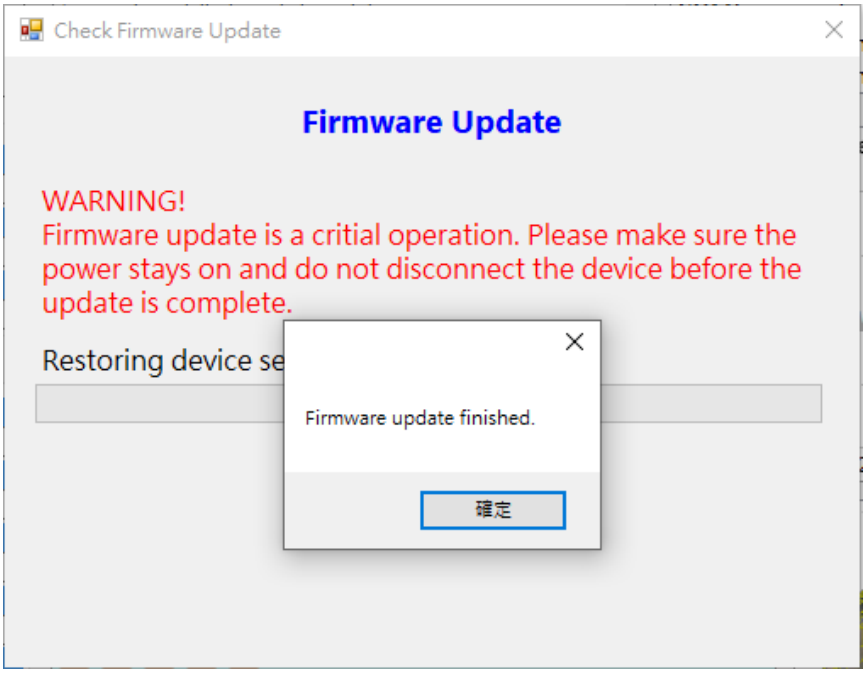

Check Firmware Update
Firmware Update
WARNING!
Firmware update is a critial operation. Please make sure the power stays on and do not disconnect the device before the update is complete.
Restoring device se
Firmware update finished.
確定

Figure 8-6

APPENDIX

A-1 Additional Software Configurations

A-1-1 Configure Baud Rate

Alpha^{+} supports multiple NMEA output baud rates on UART and USB interface while the baud rate of Bluetooth is fixed at 115200. User should NOT use any baud rate other than 115200 when Bluetooth interface is selected, or it'll not be possible to get RTK Fix.

User can change the NMEA output baud rate of UART and USB interface from the Setting pull-down menu on RTK Viewer, select "Configure Output Baud Rate" and choose the desired baud rate in dialog box.

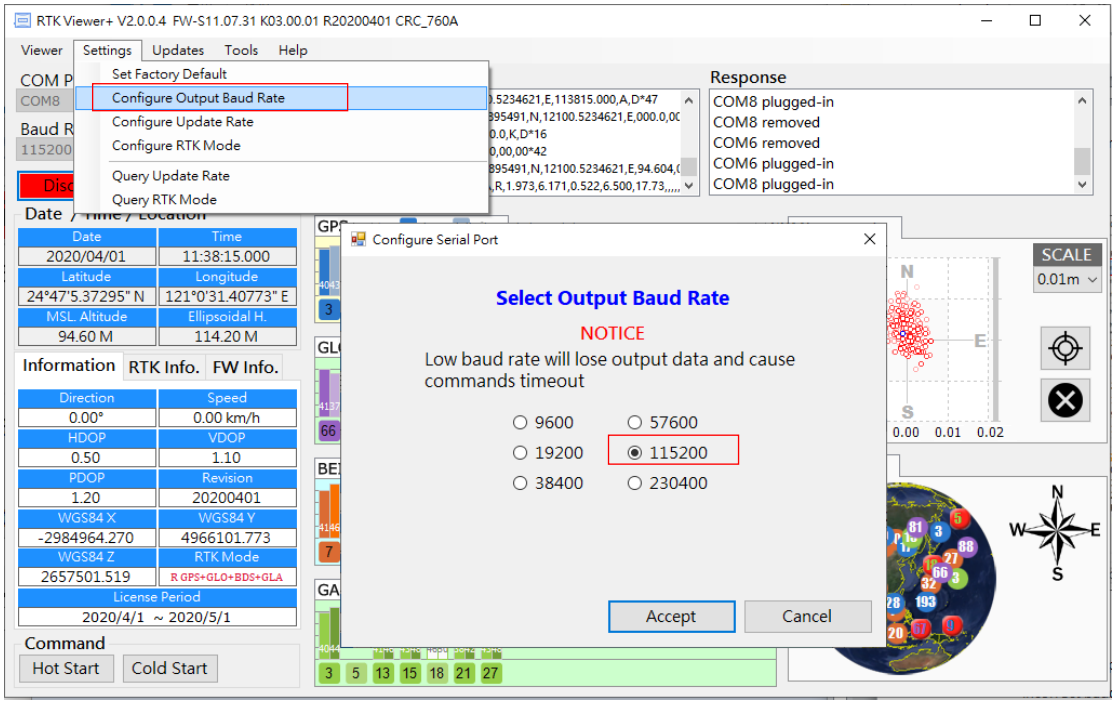


Figure A-1-1

Base data input baud rate of Alpha^{+} RTK rover is fixed at 115200. Sending base data to rover at incorrect baud rate will cause the rover unable to receive base data and never enter Float RTK state.

A-1-2. Configure Update Rate

Alpha+ supports 1 / 2 / 4 / 5 / 8 / 10 Hz RTK update rate; default is 1Hz. Higher update rate can be useful for precision guidance applications. Update rate command affects $GGA / $RMC / $VTG / $PSTI 030 messages; the other NMEA sentence is slow changing and remains at 1Hz unaffected by update rate command.

User can change the update rate from Settings pull-down menu of RTK Viewer, select “Configure Update Rate” and choose the desired update rate.

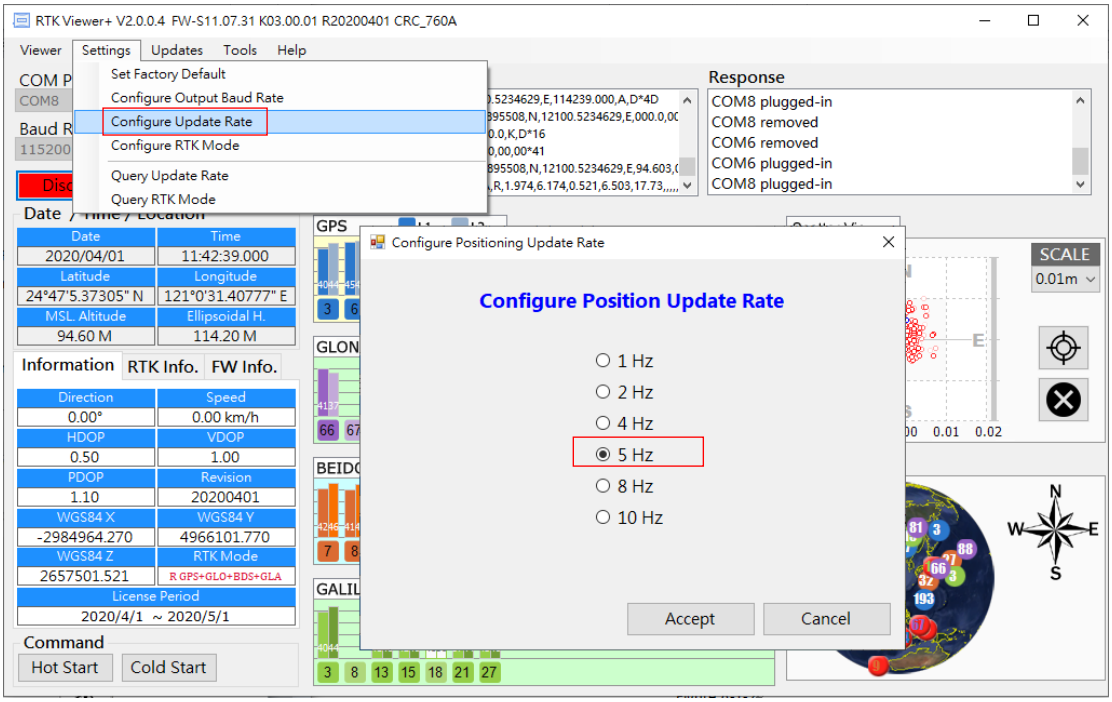


Figure A-1-2

A-2 NTRIP Server/Caster Setup for Users Without Fixed IP

Polaris offers a very low-cost subscription service that allows customers without fixed IP to setup RTK base station using open-source RTKLIB's STRSVR to stream the base data to a re-directing server. The Lefebure NTRIP Client running on customer's Android phone can then connect to the re-directing server to fetch the streamed base data. This way no fixed IP is required to setup RTK base station.

Since the newest version RTKLIB v.2.4.3 provided on official website is in source code format and compilation required Borland™ C++ builder, a pre-compiled binary executable is made available at: https://www.polaris-gnss.com/strsvr.zip. After downloading, unzip it, "strsvr 2.4.3.exe" can be executed directly.

After executing the binary, the main STRSVR dialog screen will appear. Below shows an input data stream from a serial device and one output data stream to NTRIP Caster.

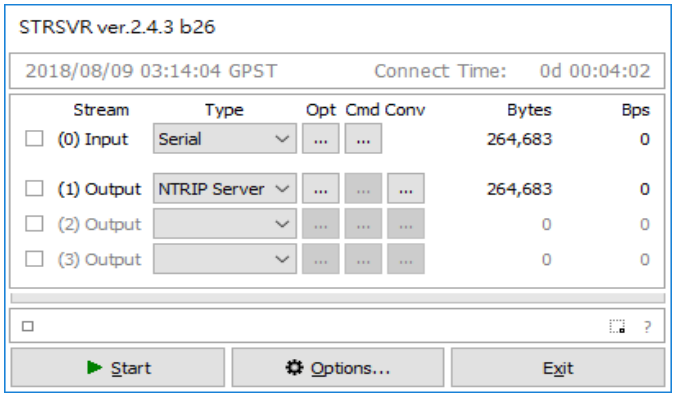


Figure A-2-1

Follow steps below to set up STRSVR.

1. Set up an input stream of type "Serial" and press the "Opt" button to set the input stream options.

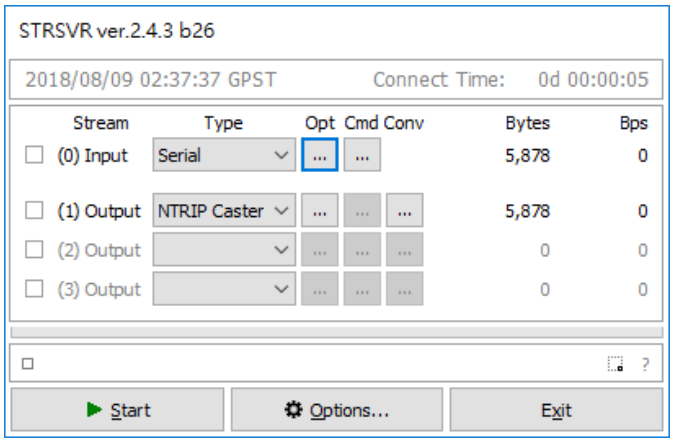


Figure A-2-2

2. Configure the input stream options as follows. Press the OK button to return to the STRSVR dialog when finished.

Field	Description	Example
Port	Select the COM port for base data input	COM7
Bitrate (bps)	Serial port data input bit rate.	115200
Byte Size	Byte Size depends on serial settings.	8 bits
Parity	Parity depends on serial settings.	None
Stop Bits	Stop Bits depends on serial settings.	1 bit
Flow Control	Flow control depends on serial settings.	None

Table A-2-1

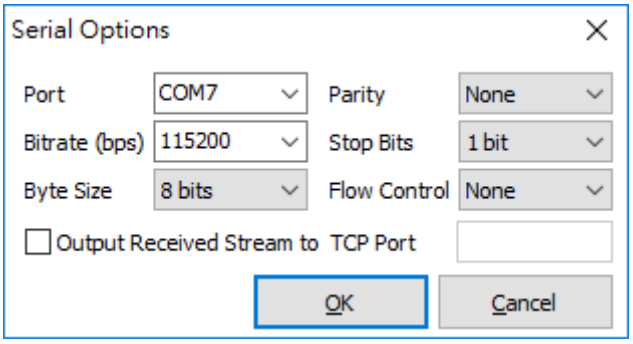


Figure A-2-3

3. Setup an output stream of type "NTRIP Server" and press the "Opt" button to set the output stream options.

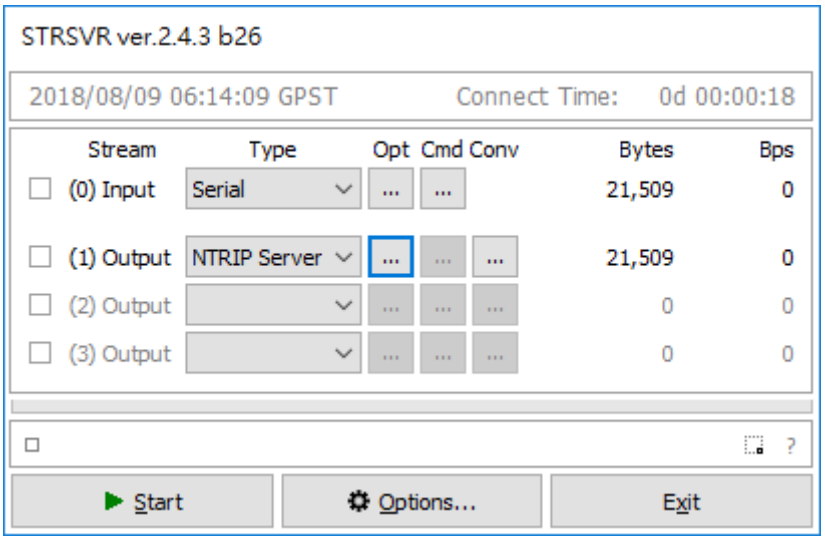


Figure A-2-4

4. Set the output stream options as follows. Press the OK button to return to the STRSVR dialog when finished. The red color NTRIP Caster Host IP and Port Number are provided by Polaris to Base Data Redirecting Service subscription customers. The blue color Mountpoint and password are specified by customer at time of subscription application.

Field	Description	Example
NTRIP Caster Host	Enter the Caster URL, or the machine's IP.	60.250.205.31
Port	Enter the port used by Caster.	4999
Mountpoint	Enter Caster mount point name	MY_GLO_BASE
password	Enter password to access the base data	1234

Table A-2-2

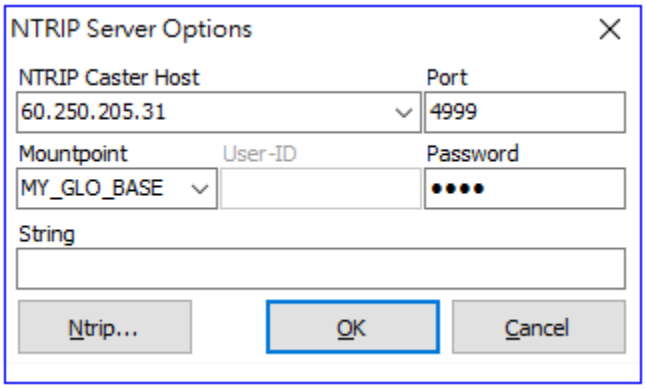


Figure A-2-5

Press Start button on the STRSVR panel to start sending local RTK base data to the redirecting server.

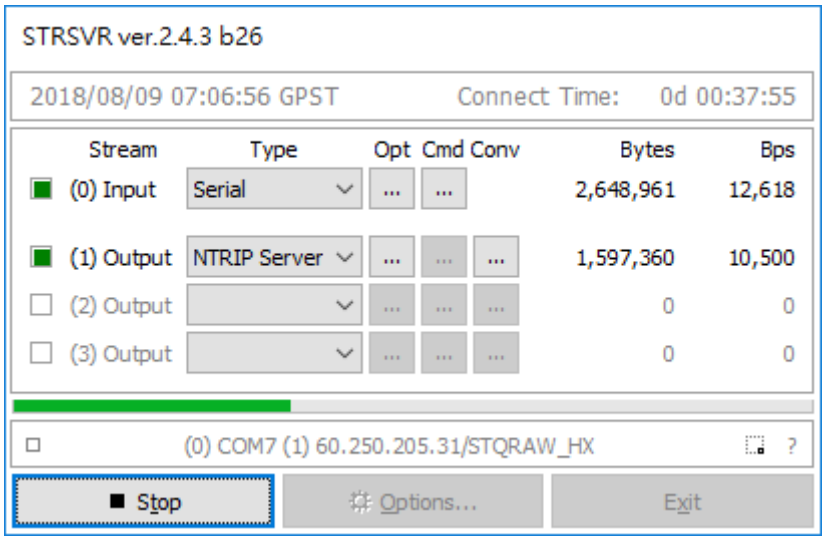


Figure A-2-6

A-3 NTRIP Server/Caster Setup for Users With Fixed IP

Since the newest version RTKLIB v.2.4.3 provided on official website is in source code format and compilation required Borland™ C++ builder, a pre-compiled binary executable is made available at: https://www.polaris-gnss.com/strsvr.zip. After downloading, unzip it, “strsvr 2.4.3.exe” can be executed directly.

After executing binary, the main STRSVR dialog screen should appear as shown in below

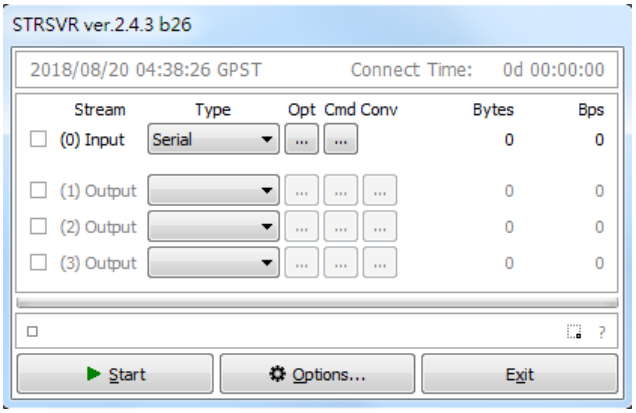


Figure A-3-1

1. Set up an input stream of type "Serial" and press the "Opt" button to set the input stream options.

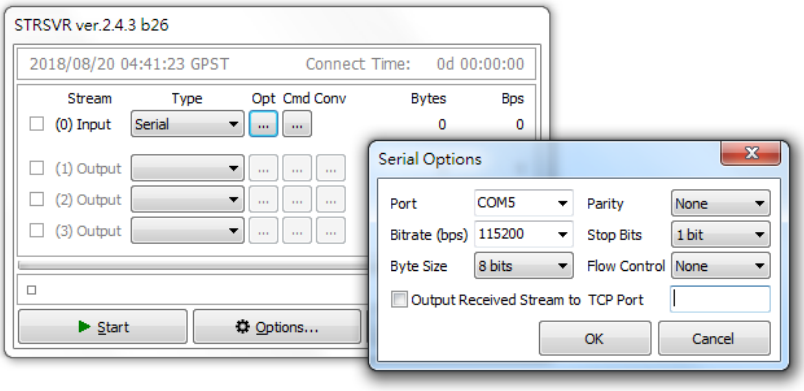


Figure A-3-2

2. Configure the input stream options as follows. Press the OK button to return to the STRSVR dialog when finished.

Field	Description	Example

Port	Select the COM port for base data input	COM5
Bitrate (bps)	Serial port data input bit rate.	115200
Byte Size	Byte Size depends on serial settings.	8 bits
Parity	Parity depends on serial settings.	None
Stop Bits	Stop Bits depends on serial settings.	1 bit
Flow Control	Flow control depends on serial settings.	None

Table A-3-1

3. Setup an output stream of type "NTRIP Caster" and press the "Opt" button to set the output stream options.

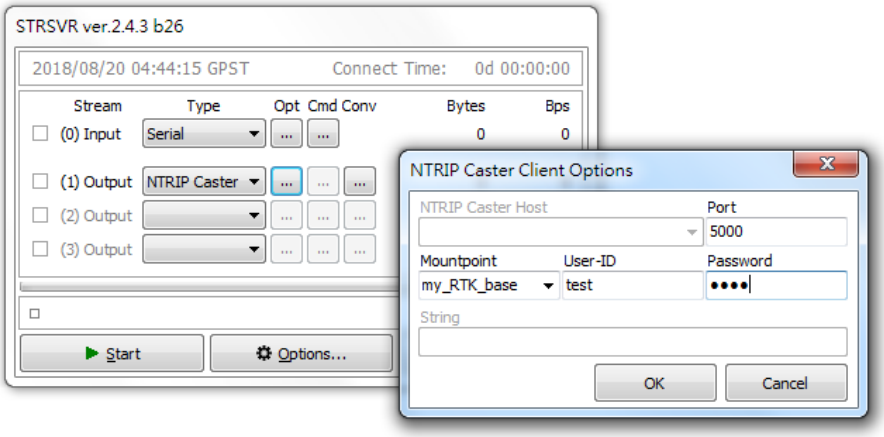


Figure A-3-3

4. Set the output stream options as follows. Press the OK button to return to the STRSVR dialog when finished. The blue color Mountpoint, User-ID and password are specified by user, and rover can access the base data with this authentication info later on.

Field	**Description**	**Example**
NTRIP Caster Host	Grey-out for STRSVR will use local WAN IP as host IP	None
Port	Enter the port used by Caster.	5000
Mountpoint	Enter Caster mount point name	my_RTK_base
User-ID	Enter user ID to access the base data	test
password	Enter password to access the base data	1234

Table A-3-2

5. Press the Start button on the STRSVR panel to start the service and wait for the connection.

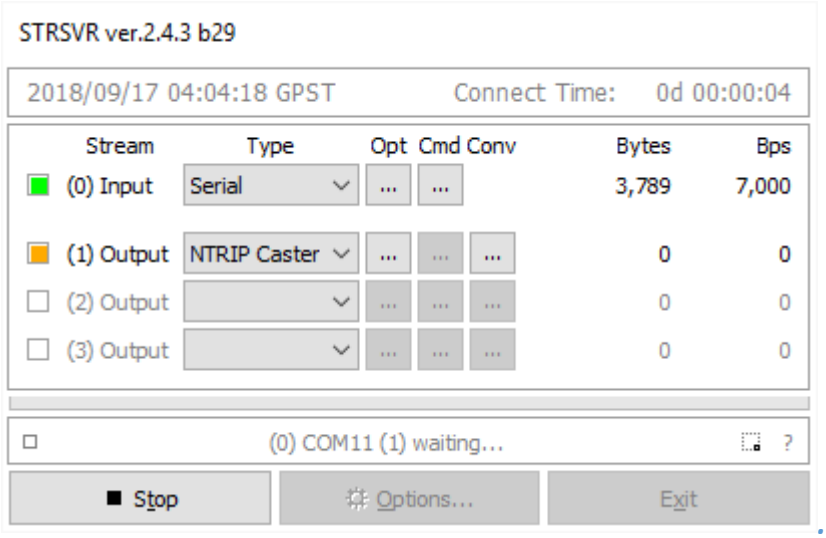


Figure A-3-4

6. After remote NTRIP Client making connection, user should see the screen like following image. The green square flashes when there is ongoing data transmission and how many bytes have been transmitted is also shown on screen.

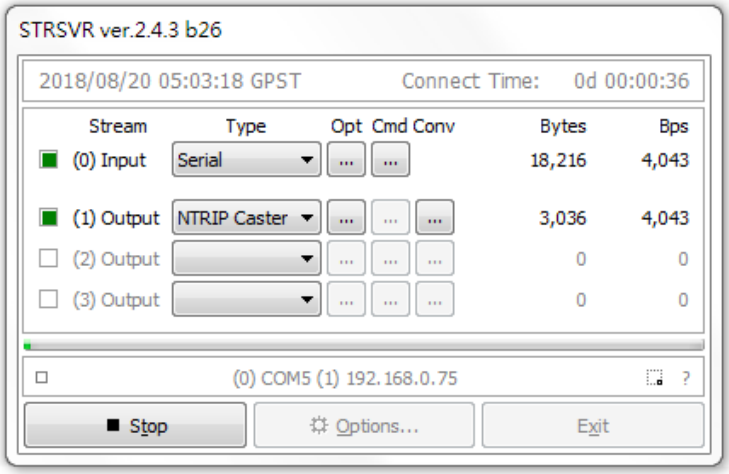


Figure A-3-5

A-4 Data Flow of the I/O Interface

There are 3 types of I/O interface, Bluetooth / USB / LV-TTL UART, on the Alpha+ RTK receiver for output of NMEA or base data, receiving base data, and receiving configuration command. The following figures provide a clear view for all 6 operation modes specified by the three interface selection LEDs and the two slide switch positions.

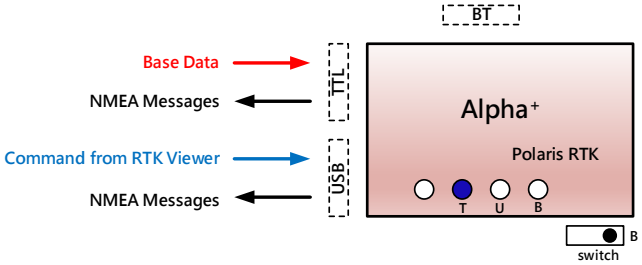


Figure A-4-1

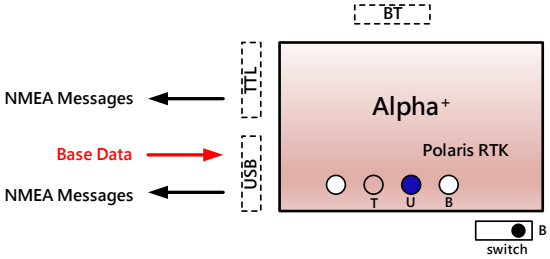


Figure A-4-2

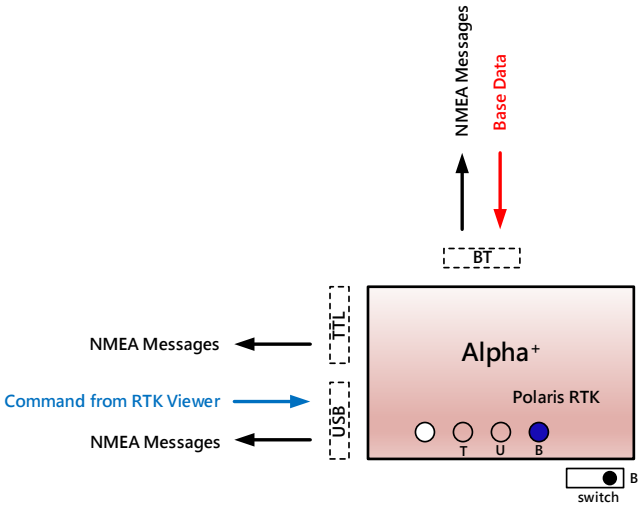


Figure A-4-3

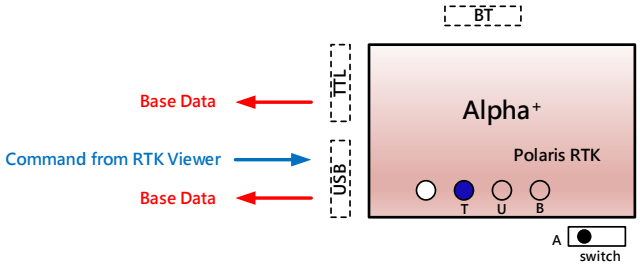


Figure A-4-4

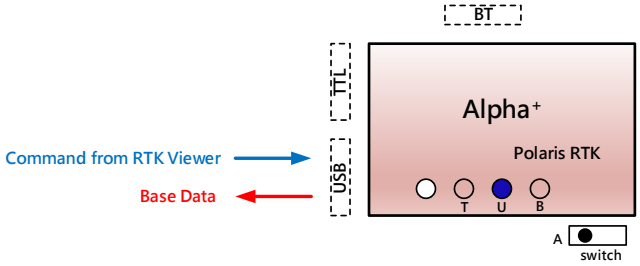


Figure A-4-5

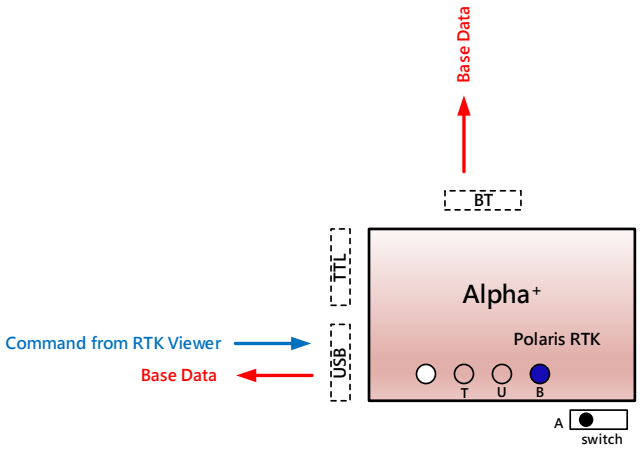


Figure A-4-6

A-5 Configure RTK License (for Alpha+ Receiver Purchased After 2021.09.01)

The shipped Alpha+ RTK receiver in Alpha+ Standard Kit or Alpha+ Lite Kit functions like a normal meter-level accuracy GNSS receiver prior to License Activation purchase and RTK activation license is applied.

When License Activation is purchased, an email will be received by the customer requesting information on Alpha+ Serial Number. To check the Alpha+ Serial Number, from RTK Viewer's Viewer pull-down menu select "Configure RTK License", click "Copy Serial Number" button, then paste it to the reply email. Later when receiving License Key, simply copy and paste it to the License Key entry and click "Activate".

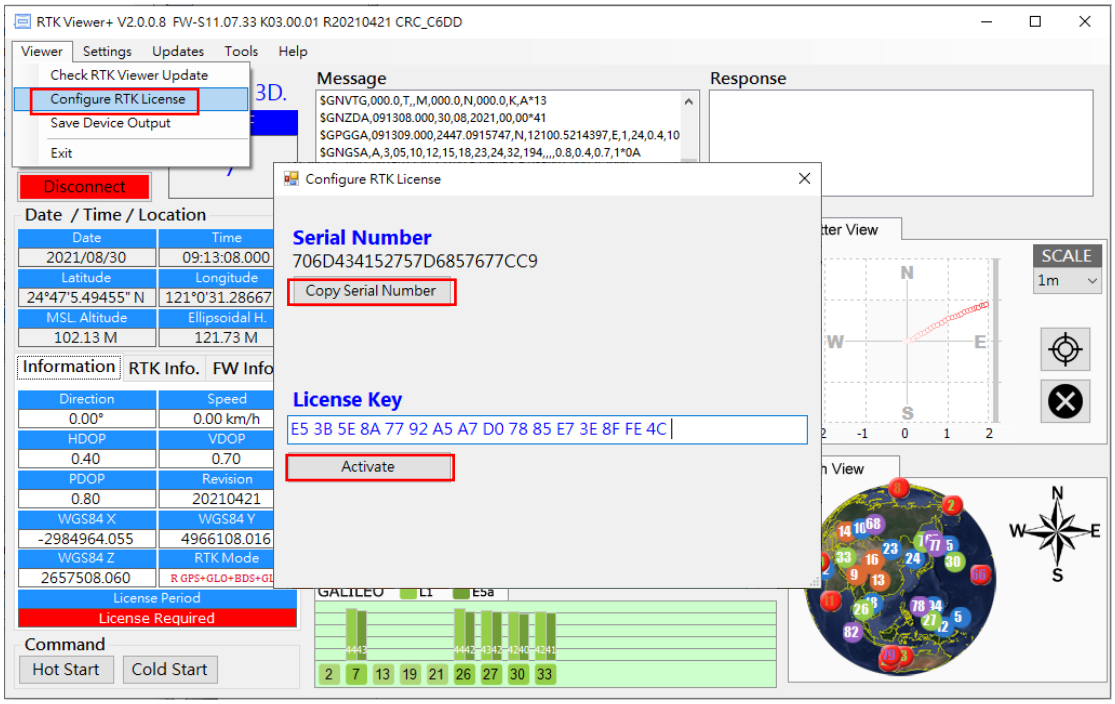


Figure A-5-1

FAQ

Question #1: Why I'm unable to get RTK Fix when connecting to my local RTK base service?

Answer #1: RTK base service has several mountpoint options to select from, mountpoint with compatible correction format need to be chosen in order to work. The mountpoint to choose for Alpha+ are **VRS** type, **NRT** type, or **RTCM3.x** type supporting 1004 / 1012 sentence, or MSM4 / MSM5 / MSM6 / MSM7 message ones, but not the **FKP, MAC, iMAX, SSR, CMR, CMR+** ones.

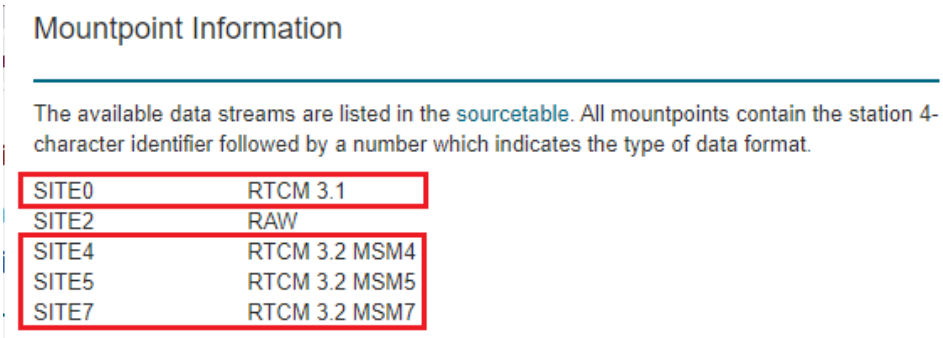
Supported MSM4 messages are 1074, 1084, 1094, 1124.

Supported MSM5 messages are 1075, 1085, 1095, 1125.

Supported MSM6 messages are 1076, 1086, 1096, 1126.

Supported MSM7 messages are 1077, 1087, 1097, 1127.

Example 1. Newer MSM4 / MSM5 / MSM7 formats are preferred over older RTCM 3.1 format.



Example 2. VRS (Virtual Reference Station) type is preferred over NRT (closest physical base station) type, as VRS has no operating range limit. Alpha+ being GPS+GLO+GAL+BDS receiver, RTK base supporting more satellite constellation (GPS+GLO+GAL) is preferred over one supporting lesser satellite constellation (GPS+GLO).

Service	Mountpoint	Constellations	Stream data format
MAC RTCM 3.x	RTK_MAC/MAX_RTCM3	GPS+GLO	RTCM 3
VRS Galileo	GAL_VRS_MSM5	GPS+GLO+GAL	RTCM 3 (MSM5)
VRS RTCM 3.x	RTK_VRS_RTCM3	GPS+GLO	RTCM 3
VRS RTCM 2.3	RTK_VRS_RTCM2	GPS+GLO	RTCM 2.3
VRS CMR	RTK_VRS_CMR	GPS+GLO	CMR
VRS CMR+	RTK_VRS_CMR+	GPS+GLO	CMR+
iMAX Galileo	GAL_iMAX_MSM5	GPS+GLO+GAL	RTCM 3 (MSM5)
iMAX RTCM 3.x	RTK_iMAX_RTCM3	GPS+GLO	RTCM 3
FKP RTCM 2.3	RTK_FKP_RTCM2	GPS+GLO	RTCM 2.3
NRT Galileo	GAL_NRT_MSM5	GPS+GLO+GAL	RTCM 3 (MSM5)
NRT RTCM 3.x	RTK_NRT_RTCM3	GPS+GLO	RTCM 3

Example 3. FKP, MAC, RTCM23, SSR, VRS23, RTCM2.2 ones are not to be used. RTCM 3.2 with 1071 GPS MSM1 and 1081 GLONASS MSM1 are of incompatible type, not be used.

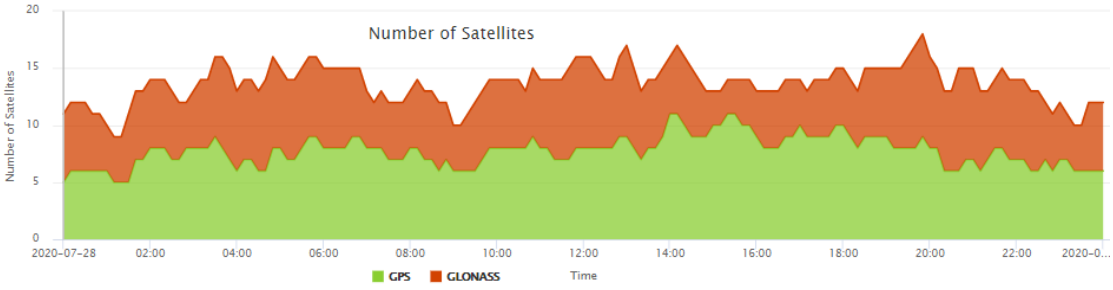
Mountpoint	Identifier / Description	Format	Format Details (Rate)	Carrier Phase	GNSS
FKP2	FKP23	RTCM 2.3	1, 3(10), 14(60), 16(300), 20, 21, 22(10) 23(10), 24(10)	L1 L2	GPS
FKP2_raw	FKP23 raw	RTCM 2.3	1, 3(10), 14(60), 16(300), 18, 19, 22(10) 23(10), 24(10)	L1 L2	GPS+GLO
FKP3	FKP31	RTCM 3.1	1004, 1006(10), 1007(30), 1012, 1030(30), 1031(30), 1033(10), 1034(10), 1035(10)	L1 L2	GPS+GLO
MAC	MAC	RTCM 3.1	1004, 1006(10), 1007(10), 1012, 1014(10), 1017(10), 1030(30), 1031(30), 1033(60), 1039(10)	L1 L2	GPS+GLO
RTCM23	RTCM23	RTCM 2.3	1, 3(17), 14(61), 16(300), 20(1), 21(1), 22(17), 23(17), 24(17)	L1 L2	GPS
RTCM23_raw	RTCM23 raw	RTCM 2.3	1, 3(17), 14(61), 16(300), 18(1), 19(1), 22(17), 23(17), 24(17)	L1 L2	GPS+GLO
RTCM30	RTCM30	RTCM 3.0	1004(1), 1006(10), 1012, 1033(10)	L1 L2	GPS+GLO
SSR	SSR	RTCM 3.1	1004, 1006(10), 1007(30), 1012(1), 1030(30), 1031(30), 1032(60), 1033(60)	L1 L2	GPS+GLO
VRS2	VRS23	RTCM 2.3	1, 3(10), 14(60), 16(300), 20, 21, 22(10), 23(10), 24(10)	L1 L2	GPS
VRS2_raw	VRS23 raw	RTCM 2.3	1, 3(10), 14(60), 16(300), 18, 19, 22(10), 23(10), 24(10)	L1 L2	GPS+GLO
VRS3	VRS30	RTCM 3.0	1004(1), 1006(10), 1007(30), 1012, 1030(30), 1031(30), 1032(10), 1033(60)	L1 L2	GPS+GLO
DGNSS_NET_2	DGNSS_NET_RTCM2.2	RTCM 2.2	1, 3(10), 16(300), 31(1)	L1 L2	GPS+GLONASS
DGNSS_2	DGNSS_RTCM2.2	RTCM 2.2	1, 3(10), 16(300), 31(1)	L1 L2	GPS+GLONASS
DGNSS_NET_3	DGNSS_NET_RTCM3.2	RTCM 3.2	1006(10), 1007(10), 1071(1), 1081(1)	L1 L2	GPS+GLONASS
DGNSS_3	DGNSS_RTCM3.2	RTCM 3.2	1006(10), 1007(10), 1071(1), 1081(1)	L1 L2	GPS+GLONASS

Question #2: I've used correct mountpoint, but still unable to get RTK Fix, why?

Answer #2: RTK require strong signal to work. Make sure Alpha+ is used outdoors under clear open sky unblocked signal environment.

Although Alpha+ is GPS/GLONASS/Galileo/Beidou quad-GNSS, only common set of satellite signals tracked by both base and rover are used for RTK computation, thus when used with GPS/GLONASS RTK base, effectively Alpha+ is no different from GPS/GLONASS-only RTK receiver, and actual RTK used satellite number will be less than tracked satellite number.

On initial use, it's good to choose time of day when there are more satellites overhead, avoid least number of satellite situation, because if blocked by distant trees then actual usable satellites becomes fewer, and it'll be more difficult to get RTK Fix. https://www.gnssplanning.com/



RTK is susceptible to interference. Normally the signal should fluctuate not more than 1dB-Hz in short period. If seeing signal fluctuating by several dB in short time, it means there is interference affecting RTK operation. A different location or different time of day without interference affecting RTK operation will get RTK Fix.

Question #3: I'm having connection problem with Bluetooth. What to do?

Answer #3: If having below connection problem, please see this.

The information provided is believed to be accurate and reliable. These materials are provided to customers and may be used for informational purposes only. No responsibility is assumed for errors or omissions in these materials, or for its use. Changes to specification can occur at any time without notice.

These materials are provides “as is” without warranty of any kind, either expressed or implied, relating to sale and/or use including liability or warranties relating to fitness for a particular purpose, consequential or incidental damages, merchantability, or infringement of any patent, copyright or other intellectual property right. No warrant on the accuracy or completeness of the information, text, graphics or other items contained within these materials. No liability assumed for any special, indirect, incidental, or consequential damages, including without limitation, lost revenues or lost profits, which may result from the use of these materials.

The product is not intended for use in medical, life-support devices, or applications involving potential risk of death, personal injury, or severe property damage in case of failure of the product.