



SMART-OS POSITIONING OPERATIVE SYSTEM

USER - MANUAL

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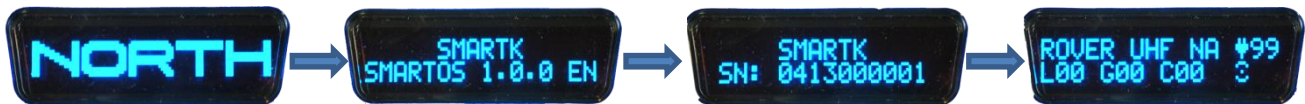
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## 1. Operation

The **North SmaRTK** is a GNSS RTK receiver designed to be the simplest to use, and to be compatible with most platforms and communication protocols.

The SmaRTK receiver has a mainframe that operates with the **SmartOS** Operative System on board, that is designed for a flexible and simple use, with the main feature of being able to be upgraded to add new features over time on the same hardware.

**Long-Press** (3 seconds) used To turn on the SmaRTK Long-Press the button. The display will start, show the serial number and SmartOS version, and then enter to the Main Screen.






### 1.1 Main screen

The Main Screen shows the current RECEIVER MODE of the receiver, that will be the last one that the receiver was set to. Also it will show the number of locked satellites, the battery/power status, and the Communication status.







1. Can see the SmaRTK mode, to see more Smartk modes see "**1.2.2 Receiver mode**"
2. The constellations are divided into:
  - L: Locked GPS (Navstar) Satellites.
  - G: Locked GLONASS Satellites.
  - C: Locked COMPASS Satellites

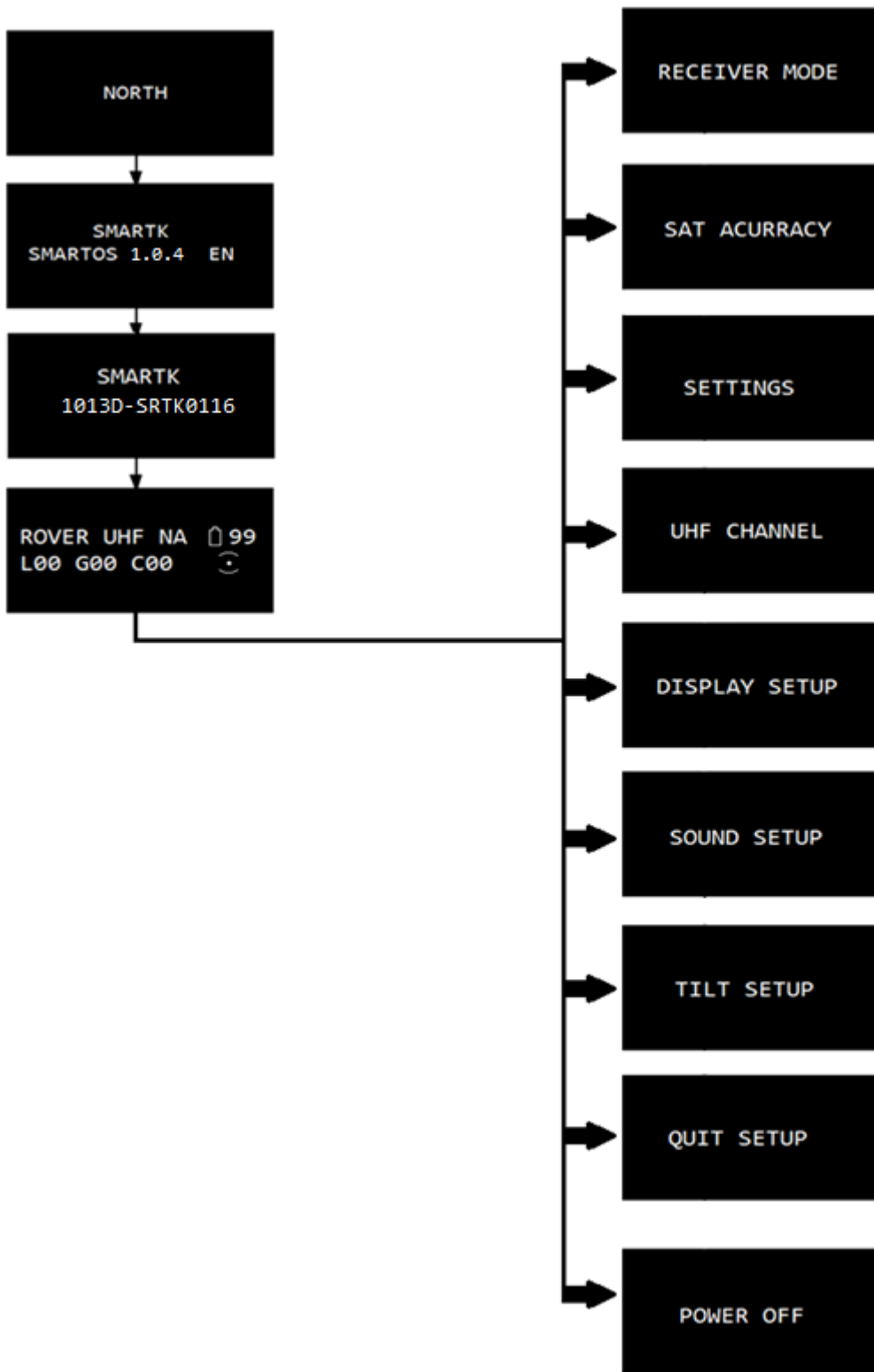
### 3. Data transmitter indicator

-  “Hourglass” Icon indicates that the Mobile Network is connecting
-  “Bars” Icon: Indicator of the Mobile Network strength
-  “Waves” Icon, Indicator of the UHF Radio-modem operation
- **TX**: Indicates that the SmaRTK is Transmitting correction data.
- **RX**: Indicates that the SmaRTK is Receiving correction data.
- **RDY**: Indicates that the SmaRTK is Ready to record Raw Data for Static Post-Processing.
- **REC**: Indicates that the SmaRTK is Recording Raw Data for Static Post-Processing.

### 4. Battery level indicator

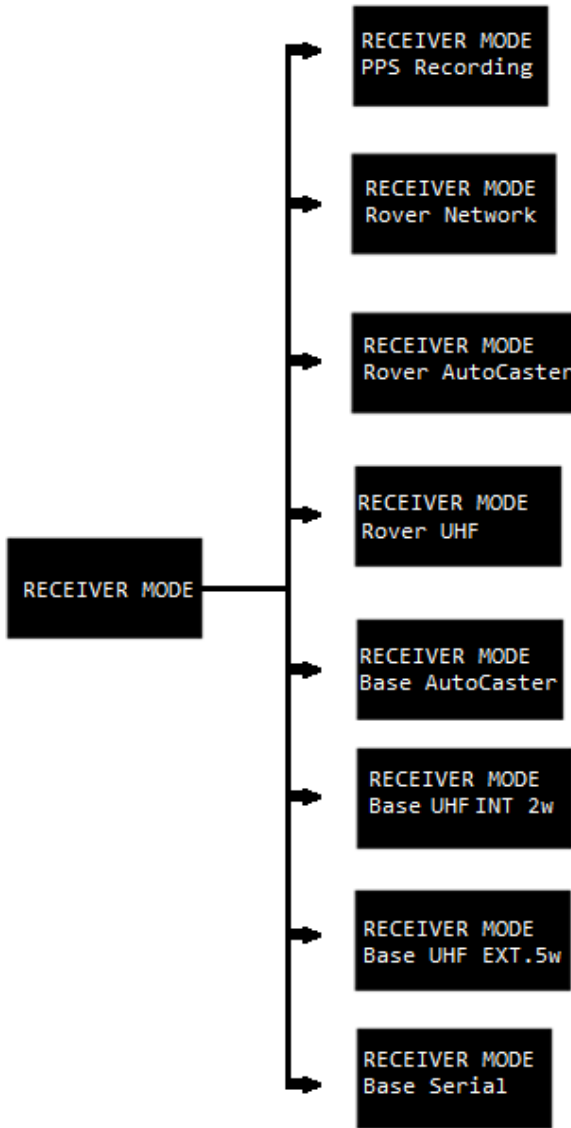
-  Shows the Battery level up to 100%.
-  : Charging Icon, indicates that the external power is connected.
-  : Battery Empty Icon, indicates that the battery is charging.
-  : Battery Full Icon, indicates that the battery is fully charged.

### 1.2 Screens diagram



2. Main menu

2.1.1 Receiver mode



**-PPS Recording:**

The RTK recorded format crude raw data “NOR” to internal memory as static point. The file will download and convert to RINEX for post-processing. Bluetooth is on. For more information see the “2.1.2 PPS Recording”

**-Rover Network:**

The RTK transmits correctly data (in RTCM 3 format). This mode would be displayed and you will see an “hourglass” icon. The internal modem is connecting to the CORS server through the Mobile Network. Bluetooth is on.

**-Rover AutoCaster:**

The RTK is set to Rover Mode. GPRS modem is On. The Rover receives corrections via GPRS from AutoCaster server. Bluetooth is on.

**-Rover UHF:**

The RTK is set to Rover Mode. UHF modem is On in receive mode. The UHF receives corrections from radio modem on mode transparent. Bluetooth is on.

**-Base AutoCaster:**

The RTK is set to Base Mode. GPRS modem is On. The GPRS modem transmit corrections to "Auto caster" server in RTCM3 format.

**-Base UHF INT 2W:**

The RTK is set to Base Mode. Turn On the UHF set to transmission mode with an output of 2W.

**-Base UHF EXT .5W:**

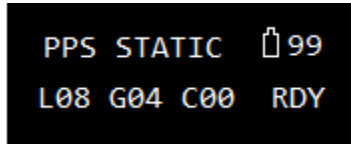
The RTK is set to Base Mode. Turn On the UHF set to transmission mode with an output of 0.5W. This mode is to put the “U-CAST 25/45w Amplifier” in the TNC port.

**-Base Serial:**

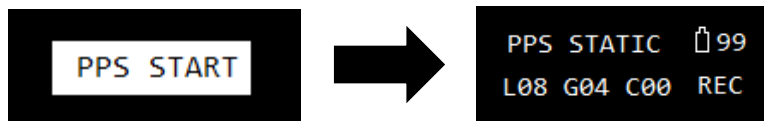
The RTK is set to Base Mode. This mode is for connection to a radio from another brand (Pacific Crest, etc..) Or PC to operate as CORS.

### 2.1.2 PPS Recording

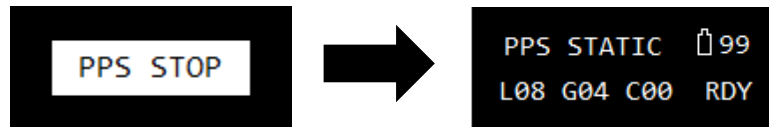
For post process is necessary to have the SmaRTK in "PPS Recording" mode. You will have on your main screen as follows:



The SmaRTK is ready to use to post process. Now, if you want to start post processing, press the button to start the post process, appear as follows:



To stop the post-processing, please press the button. Appear as follows:



For more information to downloading data for post-processing view the user manual "*Quick Operation Guide Smart-Os*".

### 2.1.3 Sat Accuracy



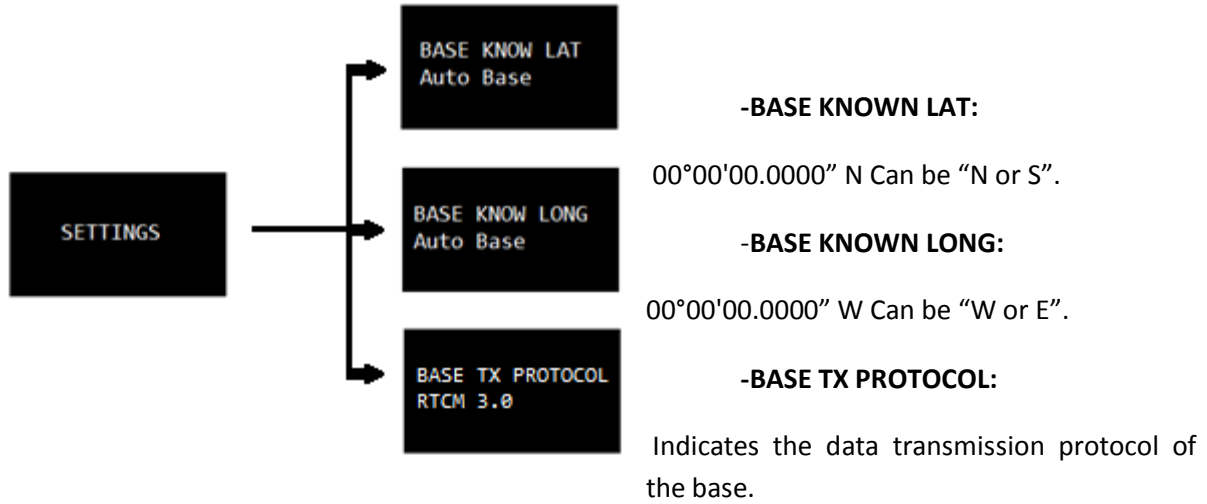
**-SAT ACCURACY:**

P0.0 H0.0 V0.0. PDOP, HDOP and VDOP respectively.

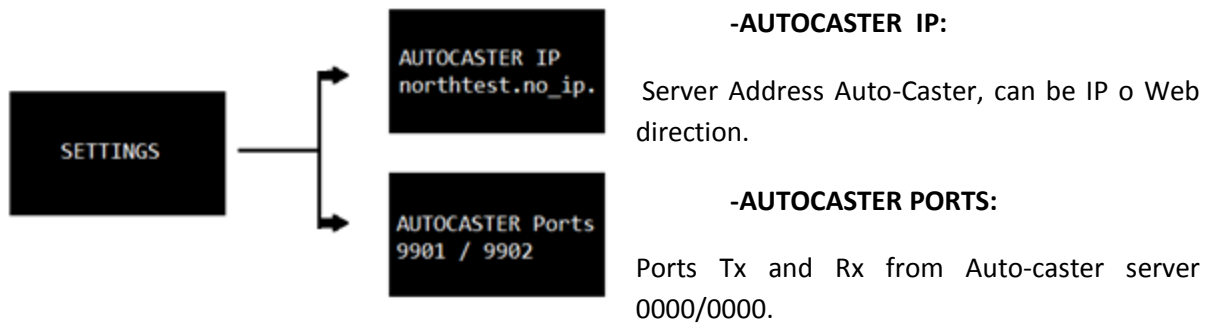


## 2.1.4 Settings

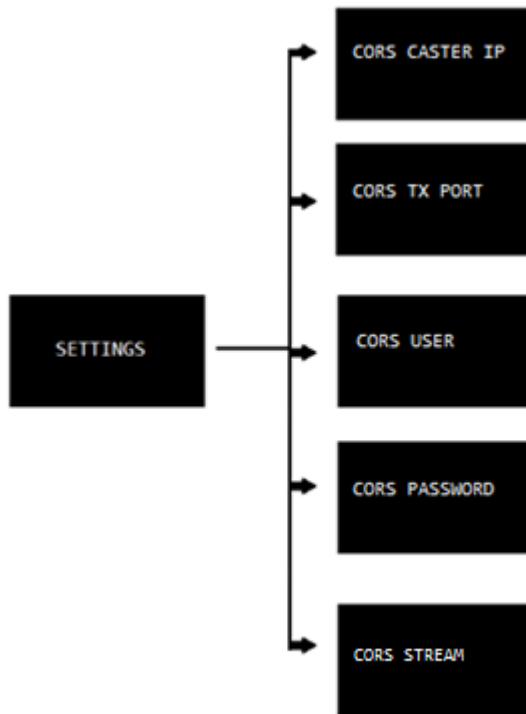
### 2.1.4.1 Base known



### 2.1.4.2 Autocaster



**2.1.4.3 CORS**



**- CORS CASTER IP:**

Server Address CORS, can be IP o Web direction.

**-CORS TX PORT:**

Ports Tx from CORS server 0000/0000.

**-CORS USER:**

Shows the CORS users.

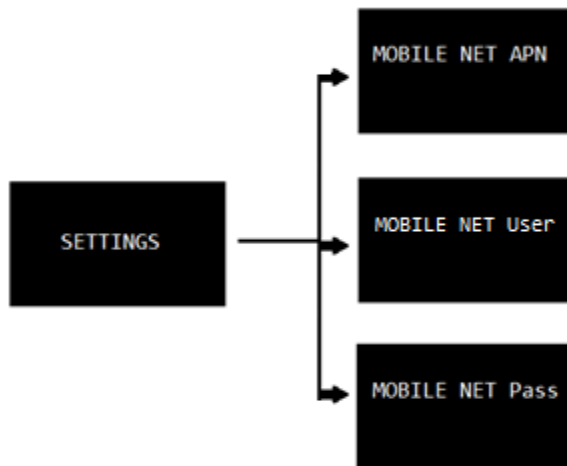
**-CORS PASSWORD:**

Shows the CORS password users.

**-CORS STREAM:**

Shows the correction data format.

**2.1.4.4 MOBILE NETWORK**



**-MOBILE NET APN testAPN:**

Displays the “Access Point Name” Mobile network.

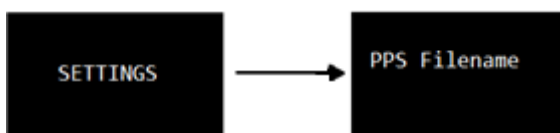
**-MOBILE NET User test User:**

Shows the Mobile Network users.

**-MOBILE NET Pass, test Password:**

Shows the Mobile Network Password.

**2.1.4.5 PPS filename**



**-PPS Filename:**

Show the name set to PPS file.

### 2.1.5 UHF Channel

Choose between the three bands in the range of 410-470 MHz. Please check the appropriate frequency to work according to the requirements of your country. UHF radio transceiver with 48 pre-selected channels and custom channels setup.

Find the option "Main menu >> UHF channel" on main menu, when selected, you can choose between 3 ranges of bands. Each band contains 16 channels assigned to specific frequencies:

UHF Channel	Frequencies 410 – 430 MHz
#0	420.0125 MHz
#1	420.5125 MHz
#2	419.5125 MHz
#3	421.0125 MHz
#4	419.0125 MHz
#5	421.5125 MHz
#6	418.5125 MHz
#7	422.0125 MHz
#8	418.0500 MHz
#9	422.5125 MHz
#10	418.0125 MHz
#11	423.0125 MHz
#12	417.5125 MHz
#13	423.5125 MHz
#14	417.0125 MHz
#15	420.0000 MHz

UHF Channel	Frequencies 450 – 470 MHz
#0	460.0125 MHz
#1	460.5125 MHz
#2	459.5125 MHz
#3	461.0125 MHz
#4	459.0125 MHz
#5	461.5125 MHz
#6	458.5125 MHz
#7	462.0125 MHz
#8	458.0500 MHz
#9	462.5125 MHz
#10	458.0125 MHz
#11	463.0125 MHz
#12	457.5125 MHz
#13	463.5125 MHz
#14	457.0125 MHz
#15	460.0000 MHz

UHF Channel	Frequencies 430 – 450 MHz
#0	440.0125 MHz
#1	440.5125 MHz
#2	439.5125 MHz
#3	441.0125 MHz
#4	439.0125 MHz
#5	441.5125 MHz
#6	438.5125 MHz
#7	442.0125 MHz
#8	438.0500 MHz
#9	442.5125 MHz
#10	438.0125 MHz
#11	443.0125 MHz
#12	437.5125 MHz
#13	443.5125 MHz
#14	437.0125 MHz
#15	440.0000 MHz

### 2.1.6 Display Setup

- Always ON:** the display will remain on all the time. The duration of the battery is reduced.
- Auto OFF 1 min.:** the display will remain on 1 min. The duration of the battery is extended.
- Auto OFF 10 min:** the display will remain on for 10 min. the duration of the battery is the average.

### 2.1.7 Sound Setup

- Sound ON:** The sound is active
- Sound OFF:** the sound has been deactivated.

### 2.1.8 Tilt Setup

- Tilt setup set zero:** Press multifunctional button to set zero the horizontal and vertical angle.



### 2.1.9 Quit setup

Exit the menu and returns to main screen.

### 2.1.10 Power OFF

The receiver turns "OFF".

## Appendix A

### NMEA 0183 output

This appendix describes the formats of the subset of NMEA-0183 messages that are available for output by the receiver. For a copy of the NMEA-0183 Standard, go to the National Marine Electronics Association Website at [www.nmea.org](http://www.nmea.org)

#### NMEA-0183 Outputs

When NMEA-0183 output is enabled, a subset of NMEA-0183 messages can be output to external instruments and equipment connected to the North receiver serial port. These NMEA-0183 messages let external devices use selected data collected or computed by the receiver.

All messages conform to the NMEA-0183 version 3.01 format. All begin with \$ and end with a carriage return and a line feed. Data fields follow comma (,) delimiters and are variable in length. Null fields still follow comma (,) delimiters but contain no information.

An asterisk (\*) delimiter and checksum value follow the last field of data contained in an NMEA-0183 message. The checksum is the 8-bit exclusive OR of all characters in the message, including the commas between fields, but not including the \$ and asterisk delimiters. The hexadecimal result is converted to two ASCII characters (0–9, A–F).

The most significant character appears first.

The following table summarizes the set of NMEA messages supported by the receiver, and shows the page where detailed information about each message can be found.

Message	Function
AVR	Time, yaw, tilt, range, mode, PDOP, and number of SVs for Moving Baseline RTK
GGA	Time, position, and fix related data
GSA	GNSS DOP and active satellites
GST	Position error statistics
GSV	Number of SVs in view, PRN, elevation, azimuth, and SNR
HDT	Heading from True North
PTNL,GGK	Time, position, position type and DOP values
PTNL,GGK_SYNC	Time, synchronized position, position type and DOP values
PTNL,PJK	Local coordinate position output
PTNL, PJT	Projection type
PTNL, VGK	Time, locator vector, type and DOP values
PTNL, VHD	Heading Information
RMC	Position, Velocity, and Time
ROT	Rate of turn
VTG	Actual track made good and speed over ground
ZDA	UTC day, month, and year, and local time zone offset

To enable or disable the output of individual NMEA messages, do one of the following:

- Create an application file in the GPS Configurator software that contains NMEA output settings and then send the file to the receiver.
- Add NMEA outputs in the *Serial outputs* tab of the GPS Configurator software and then apply the settings.

### 1. Common Message Elements

Each message contains:

- A message ID consisting of \$GP followed by the message type. For example, the message ID of the GGA message is \$GPGGA.
- A comma
- A number of fields, depending on the message type, separated by commas
- An asterisk
- A checksum value

Below is an example of a simple message with a message ID (\$GPGGA), followed by 13 fields and a checksum value:

```
$GPGGA,172814.0,3723.46587704,N,12202.26957864,W,2,6,1.2,18.893,M,-25.669,M,2.0,0031*4F
```

### 1.1 Message values

The following values can be found in NMEA messages that the receiver generates.

#### Latitude and longitude

Latitude is represented as *ddmm.mmmm* and longitude is represented as *dddmm.mmmm*, where:

- *dd* or *ddd* is degrees
- *mm.mmmm* is minutes and decimal fractions of minutes

#### Direction

Direction (north, south, east, or west) is represented by a single character: *N*, *S*, *E*, or *W*.

#### Time

Time values are presented in Universal Time Coordinated (UTC) and are represented as *hhmmss.cc*, where:

- *hh* is hours, from 00 to 23
- *mm* is minutes
- *ss* is seconds
- *cc* is hundredths of seconds

## 2. NMEA Messages

When NMEA-0183 output is enabled, the following messages can be generated.

### 2.1 AVR. - Time, Yaw, Tilt, Range for Moving Baseline RTK

The AVR message string is shown below, and the follow table describes the message fields.

```
$PTNL,AVR,181059.6,+149.4688,Yaw,+0.0134,Tilt,,,60.191,3,2.5,6*00
```

Field	Meaning
1	U TC of vector fix
2	Yaw angle in degrees
3	Yaw
4	Tilt angle in degrees
5	Tilt
6	Reserved
7	Reserved
8	Range in meters
9	Quality indicator: 0: Fix not available or invalid 1: Autonomous GPS fix 2: Differential carrier phase solution RTK (Float) 3: Differential carrier phase solution RTK (Fix) 4: Differential code-based solution, DGPS
10	PDOP
11	Number of satellites used in solution

## 2.2 GGA. - Time, Position, and Fix Related Data

An example of the GGA message string is shown below. Followed table describes the message fields.

\$GPGGA,172814.0,3723.46587704,N,12202.26957864,W,2,6,1.2,18.893,M,-25.669,M,2.0,0031\*4F

Field	Meaning
1	UTC of position fix
2	Latitude
3	Direction of latitude: N: North S: South
4	Longitude
5	Direction of longitude: E: East W: West
6	GPS Quality indicator: 0: Fix not valid 1: GPS fix 2: Differential GPS fix



	4: Real Time Kinematic, fixed integers
	5: Real Time Kinematic, float integers
7	Number of SVs in use, range from 00 to 12
8	HDOP
9	Orthometric height (MSL reference
10	M: unit of measure for height is meters
11	Geoid separation
12	M: geoid separation is measured in meters
13	Age of differential GPS data record, Type 1 or Type 9. Null field when DGPS is not used.
14	Reference station ID, ranging from 0000 to 1023. A null field when any reference station ID is selected and no corrections are received.

### 2.3 GSA. - GNSS DOP and active satellites

An example of the GSA message string is shown below. Following Table describes the message fields.

```
$GPGSA,<1>,<2>,<3>,<3>,,,,,<3>,<3>,<3>,<4>,<5>,<6>*<7><CR><LF>
```

Field	Meaning
1	Mode 1, M = manual, A = automatic
2	Mode 2, Fix type, 1 = not available, 2 = 2D, 3 = 3D
3	PRN number, 01 to 32, of satellite used in solution, up to 12 transmitted
4	PDOP-Position dilution of precision, 0.5 to 99.9
5	HDOP-Horizontal dilution of precision, 0.5 to 99.9
6	VDOP-Vertical dilution of precision, 0.5 to 99.9
7	Checksum

### 2.4 GST . - Position Error Statistics

An example of the GST message string is shown below. Following table describes the message fields.

```
$GPGST,172814.0,0.006,0.023,0.020,273.6,0.023,0.020,0.031*6a
```

Field	Meaning
1	UTC of position fix
2	RMS value of the pseudorange residuals (includes carrier phase residuals during periods of RTK(float) and RTK(fixed) processing)
3	Error ellipse semi-major axis 1 sigma error, in meters
4	Error ellipse semi-minor axis 1 sigma error, in meters
5	Error ellipse orientation, degrees from true north
6	Latitude 1 sigma error, in meters
7	Longitude 1 sigma error, in meters
8	Height 1 sigma error, in meters

### 2.5 GSV. - Satellite Information

The GSV message string identifies the number of SVs in view, the PRN numbers, elevations, azimuths, and SNR values. An example of the GSV message string is shown below. Following table describes the message fields.

```
$GPGSV,4,1,13,02,02,213,,03,-3,000,,11,00,121,,14,13,172,05*67
```

Field	Meaning
1	Total number of messages of this type in this cycle
2	Message number
3	Total number of SVs visible
4	SV PRN number
5	Elevation, in degrees, 90° maximum
6	Azimuth, degrees from True North, 000° to 359°
7	SNR, 00–99 dB (null when not tracking)
8-11	Information about second SV, same format as fields 4–7
12-15	Information about third SV, same format as fields 4–7
16-19	Information about fourth SV, same format as fields 4–7

### 2.6 HDT. - Heading from True North

The HDT string is shown below, and the following table describes the message fields.

```
$GPHDT,123.456,T*00
```

Field	Meaning
1	Heading in degrees
2	T: indicates heading relative to True North

### 2.7 PTNL, GGK. - Time, Position, Position Type, DOP

An example of the PTNL,GGK message string is shown below. The following table describes the message fields.

```
$PTNL,GGK,172814.00,071296,3723.46587704,N,12202.26957864,W,3,06,1.7,EHT-6.777,M*48
```

Field	Meaning
1	UTC of position fix
2	Date
3	Latitude
4	Direction of latitude: N: North S: South
5	Longitude
6	Direction of Longitude: E: East W: West
7	GPS Quality indicator: 0: Fix not available or invalid 1: Autonomous GPS fix 2: Differential, floating carrier phase integer-based solution, RTK(float) 3: Differential, fixed carrier phase integer-based solution, RTK(fixed) 4: Differential, code phase only solution (DGPS)
8	Number of satellites in fix
9	DOP of fix
10	Ellipsoidal height of fix
11	M: ellipsoidal height is measured in meters

*Note – The PTNL, GGK message is longer than the NMEA-0183 standard of 80 characters*

### 2.8 PTNL, GGK\_SYNC. - Time, Synchronized Position, Position Type, DOP

The PTNL,GGK\_SYNC message has the same format as the PTNL,GGK message, but outputs Synchronized 1 Hz positions even in Low Latency mode. An example of the PTNL,GGK\_SYNC message string is shown below. The following table describes the message fields.

```
$PTNL,GGK_SYNC,172814.00,071296,3723.46587704,N,12202.26957864,W,3,06,1.7,EHT-6.777,M*48
```

Field	Meaning
1	UTC of position fix
2	Date
3	Latitude
4	Direction of latitude: N: North S: South
5	Longitude
6	Direction of Longitude: E: East W: West
7	GPS Quality indicator: 0: Fix not available or invalid 1: Autonomous GPS fix 2: Differential, floating carrier phase integer-based solution, RTK(float) 3: Differential, fixed carrier phase integer-based solution, RTK(fixed) 4: Differential, code phase only solution (DGPS)
8	Number of satellites in fix
9	DOP of fix
10	Ellipsoidal height of fix
11	M: ellipsoidal height is measured in meters

*Note – The PTNL,GGK\_SYNC message is longer than the NMEA-0183 standard of 80 characters.*

## 2.9 PTNL, PJK. - Local Coordinate Position Output

An example of the PTNL,PJK message string is shown below. Table A.9 describes the message fields.

```
$PTNL,PJK,010717.00,081796,+732646.511,N,+1731051.091,E,1,05,2.7,EHT-28.345,M*7C
```

Field	Meaning
1	UTC of position fix
2	Date
3	Northing, in meters
4	Direction of Northing will always be N (North)
5	Easting, in meters

<b>6</b>	Direction of Easting will always be E (East)
<b>7</b>	GPS Quality indicator: 0: Fix not available or invalid 1: Autonomous GPS fix 2: Differential, floating carrier phase integer-based solution, RTK(float) 3: Differential, fixed carrier phase integer-based solution, RTK(fixed) 4: Differential, code phase only solution (DGPS)
<b>8</b>	Number of satellites in fix
<b>9</b>	DOP of fix
<b>10</b>	Ellipsoidal height of fix
<b>11</b>	M: ellipsoidal height is measured in meters

### 2.10 PTNL, PJT. - Projection Type

An example of the PTNL,PJT message string is shown below. Following table describes the message fields.

\$PTNL,PJT,NAD83(Conus),California Zone 4 0404,\*51

Field	Meaning
<b>1</b>	Coordinate system name (can include multiple words)
<b>2</b>	Projection name (can include multiple coordinates)

### 2.11 PTNL, VGK. - Vector Information

An example of the PTNL,VGK message string is shown below. Following Table describes the message fields.

\$PTNL,VGK,160159.00,010997,-0000.161,00009.985,-0000.002,3,07,1,4,M\*0B

Field	Meaning
<b>1</b>	UTC of vector in hhmss.ss format
<b>2</b>	Date in mmddy format
<b>3</b>	East component of vector, in meters
<b>4</b>	North component of vector, in meters
<b>5</b>	Up component of vector, in meters
<b>6</b>	GPS quality indicator: 0: Fix not available or invalid 1: Autonomous GPS fix 2: Differential carrier phase solution RTK(float) 3: Differential carrier phase solution RTK(fix)

	4: Differential code-based solution, DGPS
7	Number of satellites if fix solution
8	DOP of fix
9	M: Vector components are in meters

**2.12 PTNL, VHD. - Heading Information**

An example of the PTNL,VHD message string is shown below. Following table describes the message fields.

\$PTNL,VHD,030556.00,093098,187.718,-22.138,-76.929,-.015,0.033,0.006,3,07,2.4,M\*22

Field	Meaning
1	UTC of vector in hhmmss.ss, <i>ddmmyy</i> format
2	Date in mmddyy format
3	Azimuth
4	$\Delta$ Azimuth/ $\Delta$ Time
5	Vertical angle
6	$\Delta$ Vertical/ $\Delta$ Time
7	Range
8	$\Delta$ Range / $\Delta$ Time
9	Quality indicator: 0: Fix not available or invalid 1: Autonomous GPS fix 2: Differential carrier phase solution RTK(float) 3: Differential carrier phase solution RTK(fix) 4: Differential code-based solution, DGPS
10	Number of satellites used in solution
11	PDOP

**2.13 RMC. - Position, Velocity, and Time**

The RMC string is shown below, and following table describes the message fields.

\$GPRMC,123519,A,4807.038,N,01131.000,E,022.4,084.4,230394,003.1,W\*6A

Field	Meaning
1	UTC of position fix
2	Status A=active or V=void

3	Latitude
4	Longitude
5	Speed over the ground in knots
6	Track angle in degrees (True)
7	Date
8	Magnetic variation
9	The checksum data, always begins with *

#### 2.14 ROT. - Rate of Turn

The ROT string is shown below, and Table A.14 describes the message fields.

\$GPROT,35.6,A\*4E

Field	Meaning
1	Rate of turn, degrees/minutes, "-" indicates bow turns to port
2	A: Valid data V: Invalid data

#### 2.15 VTG. - Actual Track Made Good Over and Speed Over Ground

An example of the VTG message string is shown below. The following table describes the message fields.

\$GPVTG,,T,,M,0.00,N,0.00,K\*4E

Field	Meaning
1	Track made good (degrees true)
2	T: track made good is relative to true north
3	Track made good (degrees magnetic)
4	M: track made good is relative to magnetic north
5	Speed, in knots
6	N: speed is measured in knots
7	Speed over ground in kilometers/hour (kph)
8	K: speed over ground is measured in kph

## 2.16 ZDA. - UTC Day, Month, And Year, and Local Time Zone Offset

An example of the ZDA message string is shown below. The following table describes the message fields.

```
$GPZDA,172809,12,07,1996,00,00*45
```

Field	Meaning
1	UTC
2	Day, ranging between 01 and 31
3	Month, ranging between 01 and 12
4	Year
5	Local time zone offset from GMT, ranging from 00 to $\pm 13$ hours
6	Local time zone offset from GMT, ranging from 00 to 59 minutes

Fields 5 and 6 together yield the total offset. For example, if field 5 is  $-5$  and field 6 is

$+15$ , local time is 5 hours and 15 minutes earlier than GMT.



## Appendix B RTCM Output

### Generated messages

Messages that are generated when you select a specific RTCM version are as follows. These messages are in the same order as they appear in the GPS Configuration software. For the details of the contents of individual messages, refer to the RTCM documentation.

Selection	Message								
<b>Version 2</b>	1	3			22			59	
<b>USCG 9-3</b>		3	9-3						
<b>RTCM/RTK 2.2+2.3</b>	1	3		18	19	22	23	24	59
<b>RTK Only 2.2+2.3</b>		3		18	19	22	23	24	59
<b>RTCM/RTK 2.3</b>	1			18	19		23	24	
<b>RTK Only 2.3</b>				18	19	22			
<b>RTCM/RTK 2.2</b>	1	3		18	19	22			59
<b>RTK Only 2.2</b>		3		18	19	22			59
<b>RTCM/RTK 2.1</b>	1	3		18	19	22			59
<b>RTK Only 2.1</b>		3		18	19	22			59
<b>RTCM/RTK 3.00</b>						1004	1006	1008	1013

### Message scheduling

The frequency at which messages are generated when they are enabled in a base receiver is as follows.

Type	Frequency
<b>1</b>	Every second
<b>3</b>	The 10th second after the first measurement, then every 10 seconds after that
<b>9-3</b>	Every second
<b>18</b>	Every second
<b>19</b>	Every second
<b>22</b>	The 5th second after the first measurement, then every 10 seconds after that
<b>23</b>	The 4th second after the first measurement, then every 10 seconds after that
<b>24</b>	The 4th second after the first measurement, then every 10 seconds after that
<b>59-sub,13</b>	The 5th second after the first measurement, then every 10 seconds after that
<b>1004</b>	Every second
<b>1006</b>	Every 10 seconds
<b>1008</b>	Every 10 seconds
<b>1013</b>	Every 300 seconds

## Appendix C

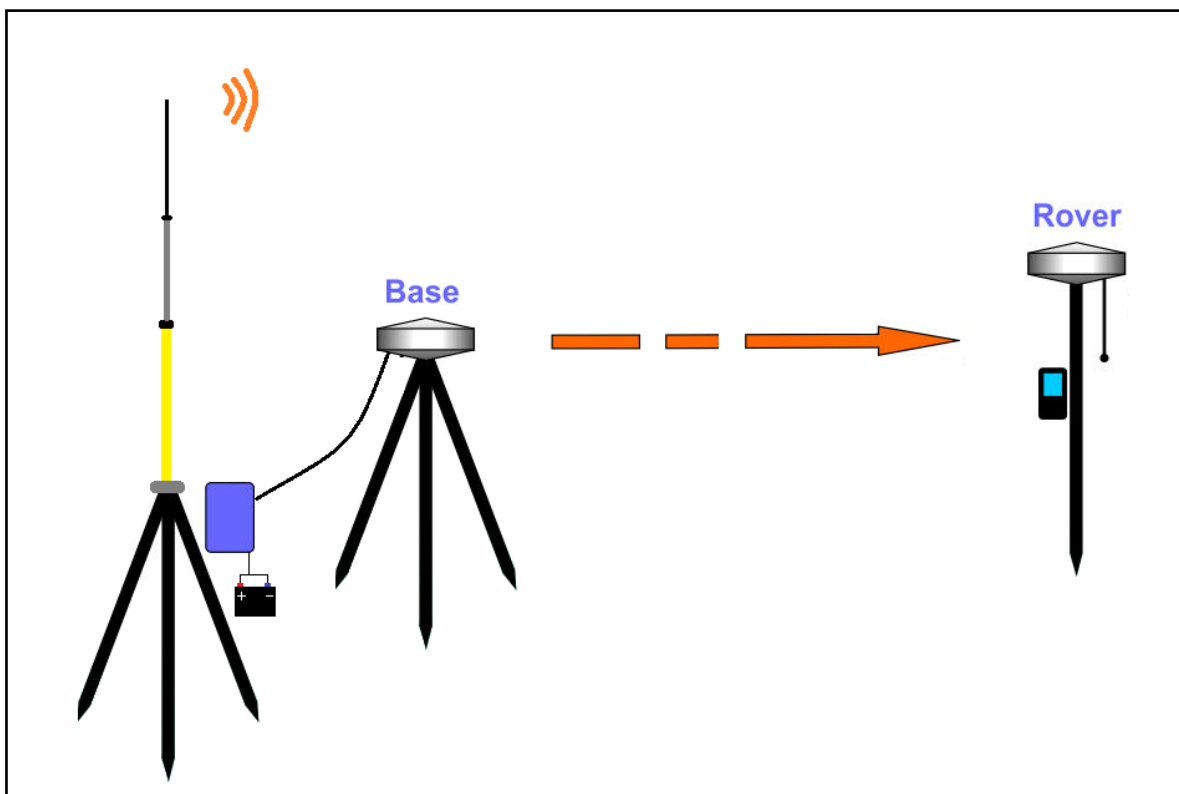
### Setting up RTK system

#### RTK Base Setup

#### Prerequisites

- You need a tripod and a tribrach to install the base.
- To power the radio, you need a standard 12-V DC battery (A car, motorcycle, or other kinds can be used).
- Datalink UHF Radiomodem

Mount the different items shown as the picture



- 1) Put tripod on a location with known coordinates or unknown coordinates, attach receiver to tribrach.
- 2) Precisely level and center the instrument

- 3) Set the transmitting antenna and radio: using pole support is better, rise the antenna as high as possible, and then put the radio at suitable position.

**⚠️WARNING: There is sequence for the cables linking to Radiomodem**

1. Affix the antenna cable to the radio.
  2. Affix the Power cable to the radio
  3. Affix the data cable to the radio
- 
- 4) Make sure the connection is right, and then switch on the radio and mainframe.

GSM/GPRS Model

Mount the different items shown as the picture



For GPRS mode is not necessary to set up the radio antenna

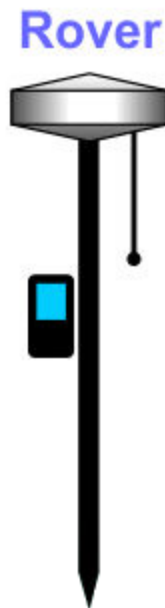
## RTK Rover Setup

### Prerequisites

- If a radio link is used with the base, your rover should normally have been fitted with the radio module that matches the reception band covered by the radio transmitter used at the base.
- If a GPRS connection is used, rover should normally have been fitted with the SIM card that will allow it to perform a network connection. Remove the rear cover, this gives access to an electronic card on which you can insert the SIM card as shown on the picture.

### Radio Link

- 1) Install the pole, rover and receiving antenna, then power on the mainframe.
- 2) Install the bracket, fix the handheld to the bracket, open the handheld to connect the Bluetooth, then you can do the setting of the instrument.

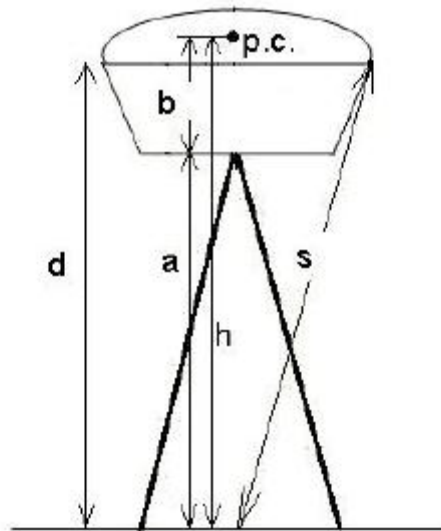


As a standard feature, the receiver incorporates a built-in GSM modem. Mount the different items as shown on the above Figure, including the receiver, the range pole, and the field terminal with its mounting bracket.

### How to measure the antenna height?

The height of receiver is 78mm, the diameter is 208mm, and the height from the center of the sealed rubber ring to the bottom is 47mm.

The antenna height is conventionally defined as the vertical height from the phase centre to the ground surveyed point (the distance “ $h$ ” in the follow fig). It is not possible to measure it directly: you have to measure other reachable heights (the distances “ $a$ ” and “ $s$ ” in fig). The distance “ $a$ ” is the vertical height from the ground to the mainframe’s bottom (bottom of antenna), the distance “ $s$ ” is measured from the ground surveyed point to the middle of the rubber ring and is called “bottom of notch”. You have to choose the measuring method according to the used software:





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