NetHub

Software Manual

Version 1.0

Last Revised October 21, 2011

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PREFACE

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Terms and Conditions

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About this Manual

This Manual is designed to help you get familiar with the NetHub User Interface and introduce you to the NetHub main features.

This Manual uses the following text conventions:

Example	Description.
Main	Titles of dialog windows/boxes, names of menu options.

Screen Captures

This Manual includes sample screen captures. Your actual screen can look slightly different from the sample screen due to the receiver you have connected, operating system used and settings you have specified. This is normal and not a cause for concern.

Technical Assistance

If you have a problem and cannot find the information you need in the product documentation, contact your local dealer. Alternatively, request technical support using the JAVAD GNSS World Wide Web site at: www.javad.com.

To contact JAVAD GNSS Customer Support use the QUESTIONS button available on the www.javad.com.

Notes:

GETTING STARTED

NetHub is a Windows application for controlling navigation receivers developed and manufactured by JAVAD GNSS. Before you start using NetHub, you should become familiar with its functions and learn how to install, launch, exit, and uninstall the program.

NetHub software provides the following functionality:

- Tasks Scheduling:
    - Save file(s) to hard drive
    - Upload file(s) to FTP server
    - BAT scripts support
- Data Processing options:
    - ZIP compression
    - Subfolders by dates, receiver name, ID, etc.
    - Automatic RINEX 2.11 converting;
- Directly connect to the receiver(s), using one of the following interfaces: serial, USB, TCP/IP (through the Ethernet ports or WiFi adapter), Secure TCP/IP (TSL/SSL), Bluetooth, CAN (Kvaser CAN Interface).
- Displaying of the total number and the status of all visible and tracked satellites.
- Displaying the receiver's current position and time in real time.
- Real time satellites mapping.
- Setup of various parameters of receiver.
- Clear NVRAM, receiver reset, return to the initial parameter values.
- Start and stop file recording, deleting files, downloading files using file manager.
- Display of the current receiver options and loading of Option Authorization Files into the receiver.
- Manual mode terminal allows sending commands with prompt tip and view receiver response. This terminal supports a TCL script language to automate the "common" receiver control tasks.
- Connecting to multiple receivers.
- Support for multiple connections to the receiver for optimized simultaneous work
- Firmware update (available starting with firmware version 3.2.1).

1.1. Setting up NetHub

1.1.1. System requirements

Check that you have the following required (or recommended) items before installing and using NetHub.

- PC-compatible with Intel® Pentium® Class 1.8 GHz or faster.
- 10 GB free disk space (determined by the total size of the memory of all connected receivers).
- 1 GB RAM or more (2 GB recommended).
- 32-bit or 64-bit operating system such as Windows XP, Windows Server 2003, Windows Server 2008, Windows Vista, Windows 7.
- Color monitor at 800x600 screen resolution.

1.1.2. Installing NetHub

NetHub is available from the JAVAD GNSS website.

1. If downloading the program from the website, extract the program files into a folder on your hard drive.
2. Navigate to the location of the NetHub program and double-click the Setup.exe icon.
3. The installation process will be started. Click *Next* to install the software. Click *Cancel* to quit,

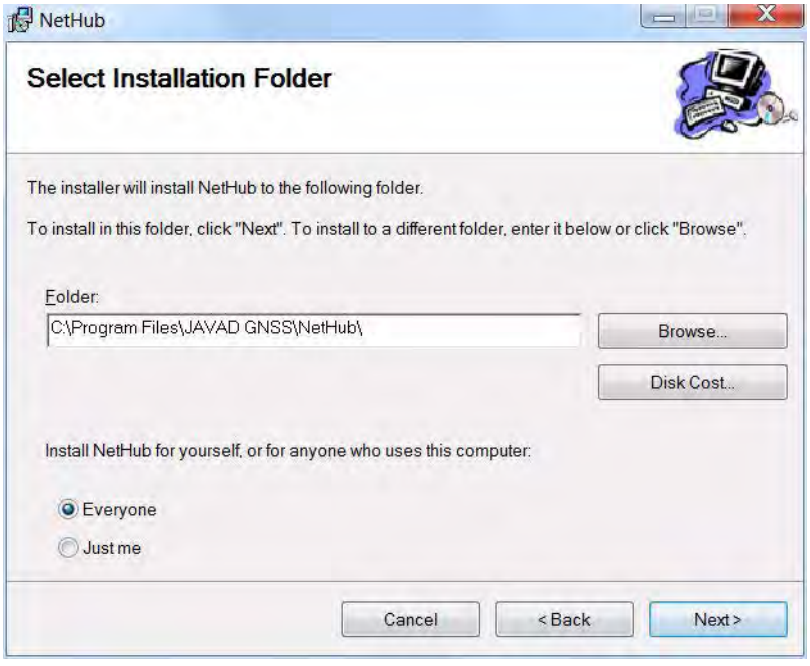


Figure 1-1. Installation

1.1.3. Uninstalling NetHub

To uninstall NetHub use the *Add and Remove Programs* from the Control Panel.

1. Open the Control Panel, then *Add or Remove Programs* tool. Find *NetHub*, and click *Change/Remove.*
2. This will uninstall NetHub.

1.2. Getting Connected

1.2.1. Starting NetHub

NetHub can be launched, as any other Windows program, for example, with the *Start* ▸ *All Programs* ▸ *JAVAD GNSS* ▸ *NetHub.*

Once NetHub is launched, the *Start* window will appear (Figure 1-2):

Figure 1-2. Start window

- *Get started* - opens the software user manual
- *Visit NetHub page* - opens software page on JAVAD GNSS web site
- *Visit JAVAD GNSS web site* - opens www.javad.com

1.2.2. Establishing connection

Click *Hub Connections*, then *Add new Connection* button. The dialog window with the connection settings appears (Figure 1-3).

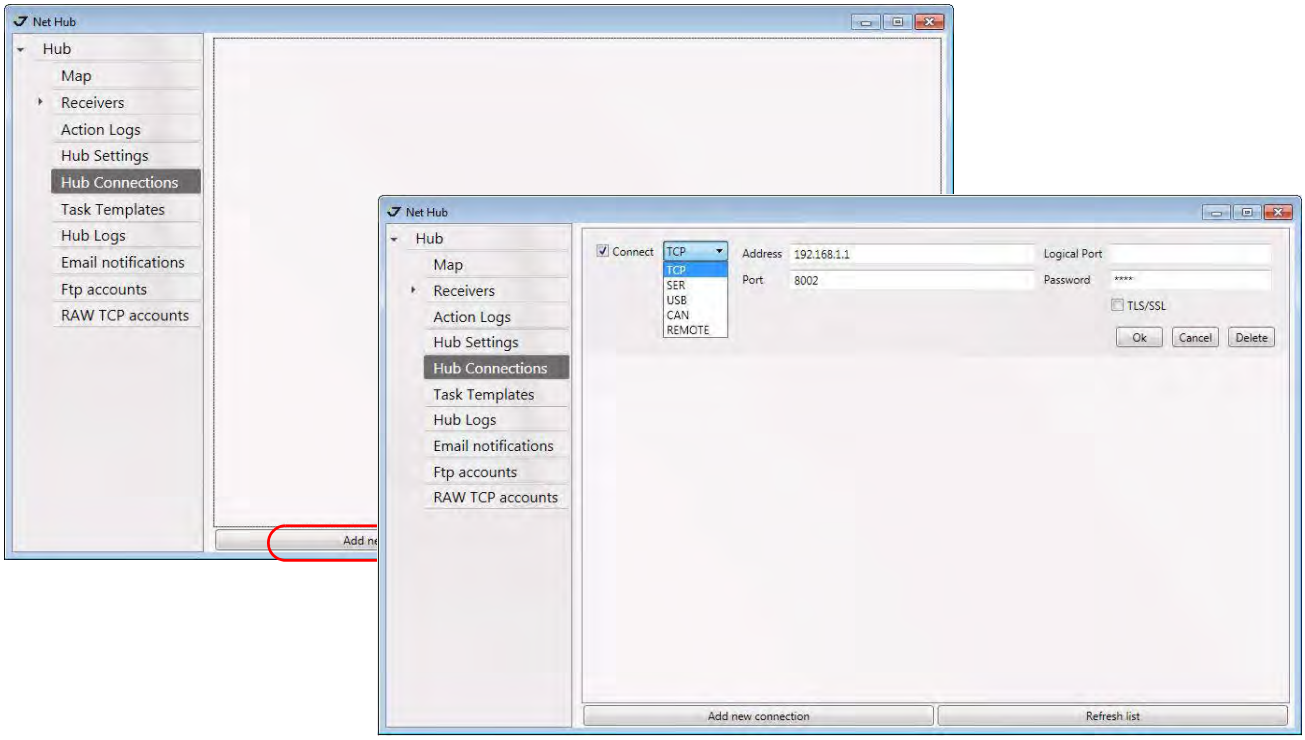


Figure 1-3. Connection window

Click the drop-down list box and select the desired connection type:

- TCP - to establish connection between your computer and remote receiver;
- SER - to establish a connection between your computer and the receiver using serial ports;
- USB - to establish a connection between your computer and the receiver using USB port;
- CAN - to establish a connection between your computer and the receiver using CAN ports;
- REMOTE - to establish a connection between your computer and the remote receiver.

To connect to the receiver, click *Ok*. If your connection settings are correct, a new receiver will be added in the navigation bar.

Please see below the detailed description of the connection settings window.

1.2.3. TCP connection

This method is used when you have an existing *local area network* (LAN) consisting of a group of computers and network communication devices interconnected and a JAVAD GNSS receiver that you want to place on this LAN. This method is also used to connect a JAVAD GNSS receiver directly to the Internet and access this receiver from a remote PC, connected to the Internet.

If the TCP connection will be used, set the following parameters (Figure 1-4):

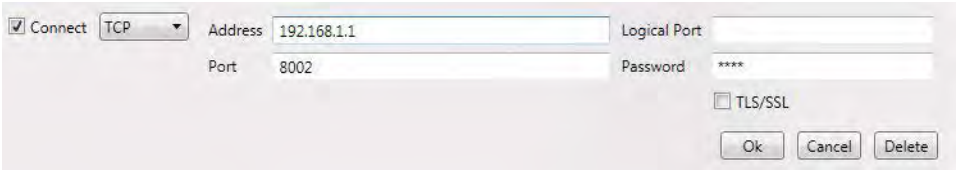


Figure 1-4. TCP connection settings

- *Address* - Host name or IP address of the receiver;
- *Port* - TCP port of the receiver. This is the port on which the receiver listens for telnet-like connections. The receiver allows up to five simultaneous telnet-like connections.
- *Logical port* - one of the five logical port mapping (a, b, c, d, e). If the value is empty, then the connection is established with the first free logical port;
- *Password* - an arbitrary sequence of characters (if you the receiver is in the _ISECURE mode, you may simply leave this field blank)
- *TSL/SSL* - Enables/disables the encrypting with cryptographic protocols that provide communications security over the Internet. This parameter should correspond with receiver's settings.

1.2.4. Serial connection

To establish a connection between your computer and the receiver using serial ports, follow these steps:

1. Connect one of the available receiver's port (usually *A*) to a communication port on the computer using a Receiver-to-Computer RS-232 serial cable.
2. Supply power to the receiver, then turn it on.

If the serial connection will be used, set the following parameters (Figure 1-5):

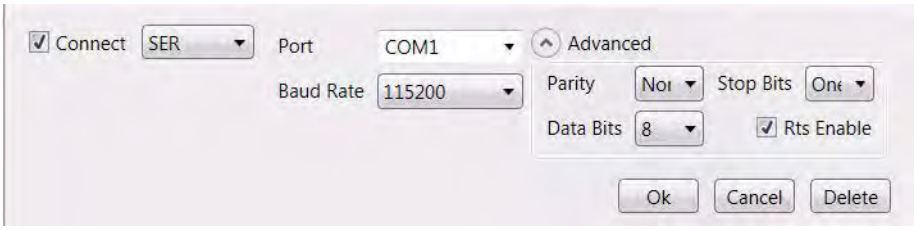


Figure 1-5. Serial port connection settings

- *Port* - serial port from a list of the ports available in the system the receiver is connected to;

- *Parity* - method for determination of transmission errors;
- *Baud rate* - data transfer rate
- *Data bits* - number of data bits in a symbol;
- *Stop bits* - duration of the stop bit;
- *Rts enable* - Data Control.

1.2.5. USB connection

Before connecting a USB equipped JAVAD GNSS receiver with PC's USB port, make sure that you have the USB Port option enabled in the receiver and the JAVAD GNSS USB driver installed on the computer. This driver is available on the JAVAD GNSS website: www.javad.com.

Installing Driver

The driver installation procedure varies slightly depending on the operating system used. In general, the installation procedure is as follows:

1. Visit the JAVAD GNSS website. Download the USB driver.
2. Unpack the archive into a separate, empty folder.
3. Connect the receiver to the computer through the supplied USB cable. Turn the receiver on.
4. Windows will automatically detect the new hardware device. Follow the on-screen instructions to finish installation process.

After Windows finishes installing the driver, you will be able to connect the receiver and the computer via USB ports.

Click the *Refresh* button on the *Hub Connections* page to refresh the list of the available USB ports.

If the USB connection will be used, set the following parameters (Figure 1-6):

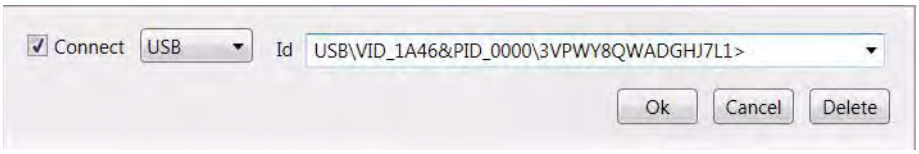


Figure 1-6. USB connection settings

Select the required ID from the list.

1.2.6. CAN connection

Before connecting a CAN equipped JAVAD GNSS receiver with PC's, make sure that you have the CAN Port option enabled in the receiver. If the CAN connection will be used, set the following parameters (Figure 1-7):

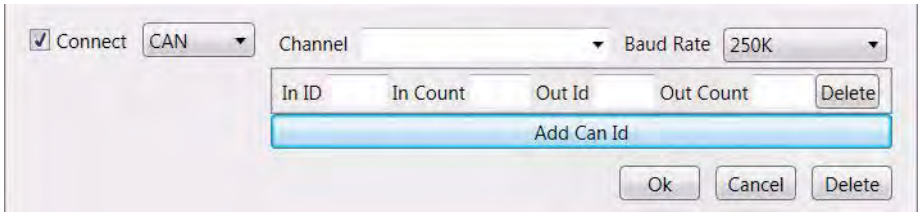


Figure 1-7. CAN connection settings

- *Channel* - allows selecting channel;
- *Baud rate* - data transfer rate;

Connection via CAN allows you to connect multiple receivers, which are in the same CAN network. In this case, the incoming (In) and outgoing (Out) identifiers should not overlap the ranges. All devices are one of CAN networks operate at one speed. The software supports only Kvaser (http://kvaser.com) adapters.

1.2.7. REMOTE Connection

This mode allows to connect to NetHub the receiver connected to the remote PC using COM-port, USB, or CAN. To establish such connection type, the Javad Net Remote Connector application should be started on remote PC. See the detailed description in the JavadNet Remote Connector user manual.

1.2.8. Closing NetHub

Clicking on the *Disconnect* button will result the disabling of the connection, and the software will not connect to the receiver (Figure 1-8).

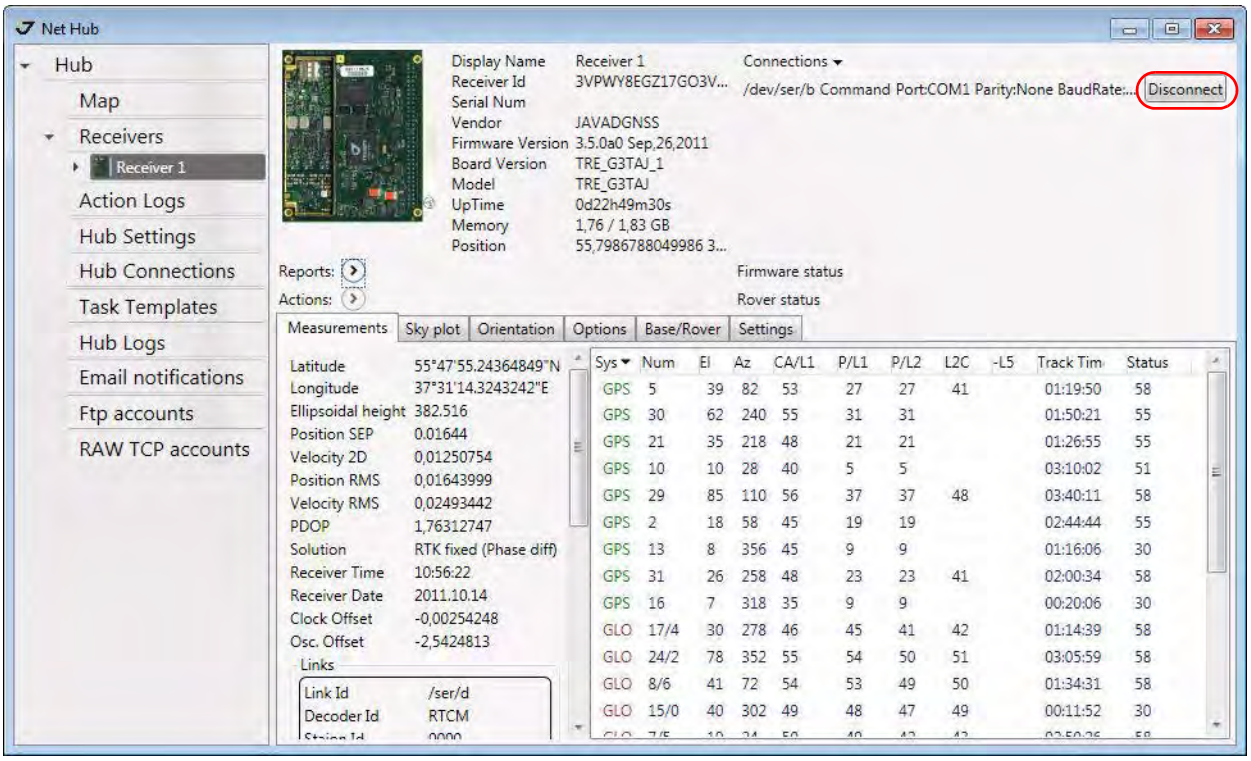


Figure 1-8. Disconnecting

The closing process may take some minutes, because the software is preparing and saving the tasks for the next session. All settings and receiver parameters will be saved and activated automatically starting the next session.

SERVER CONFIGURATION

2.1. Hub Settings

The server main settings for the incoming TCP connections and automatic tasks can be specified in the *Hub Settings* window (Figure 2-1).

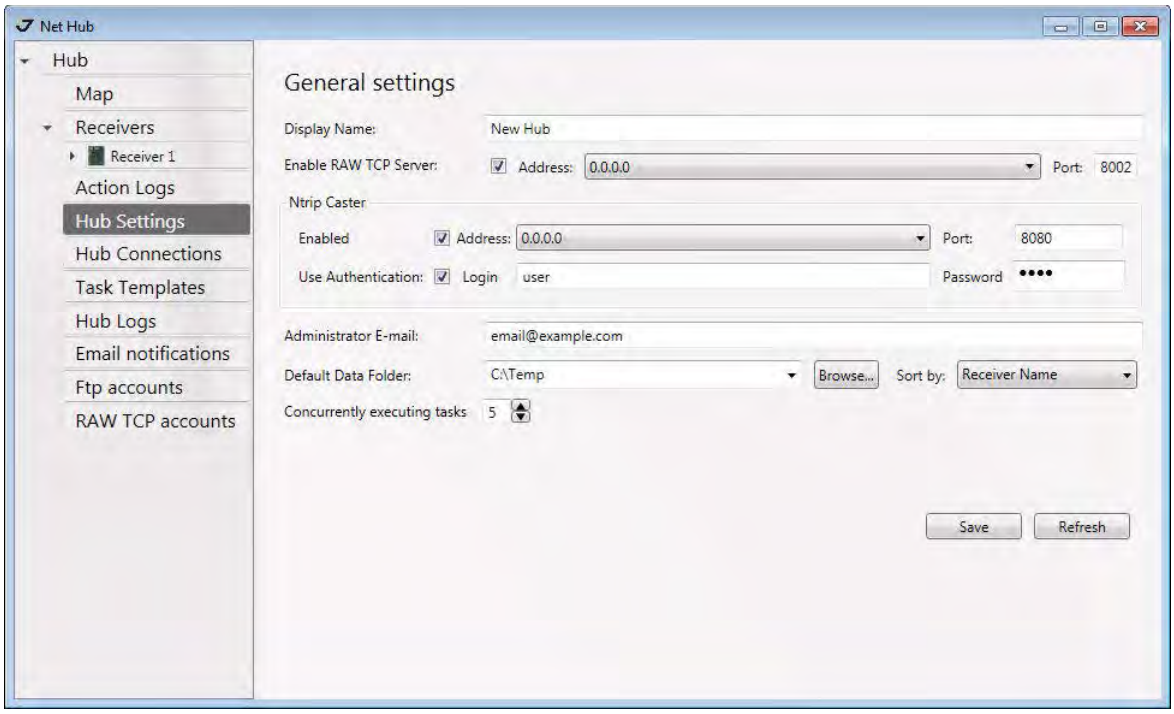


Figure 2-1. Hub Settings window

- *Enable Raw TCP Incoming* - this check mark enables/disables the RCV Server mode.
- *NTRIP Caster* - Parameters for NTRIP service access.
- *Administrator E-mail* - the email address which will be displayed in *Head admin email* for RCV clients, connected to NetHub via Telnet.
- *Default data folder* - clicking the *Browse* button the default directory for data storage can be specified.
- *Concurrently executing tasks* - maximal number of the tasks are executing concurrently.
- *Sort by* - the sort mode of the raw files to arrange them automatically and perform any specified task.

To save the settings click *Save*. To recall current settings click *Refresh*.

Note: After changing the IP addresses and RAW TCP and/or NTRIP server ports the software restart may be needed, to accept these changes.

2.2. Hub Connections

The *Hub Connections* tab allows adding and managing the server connections (Figure 2-2).

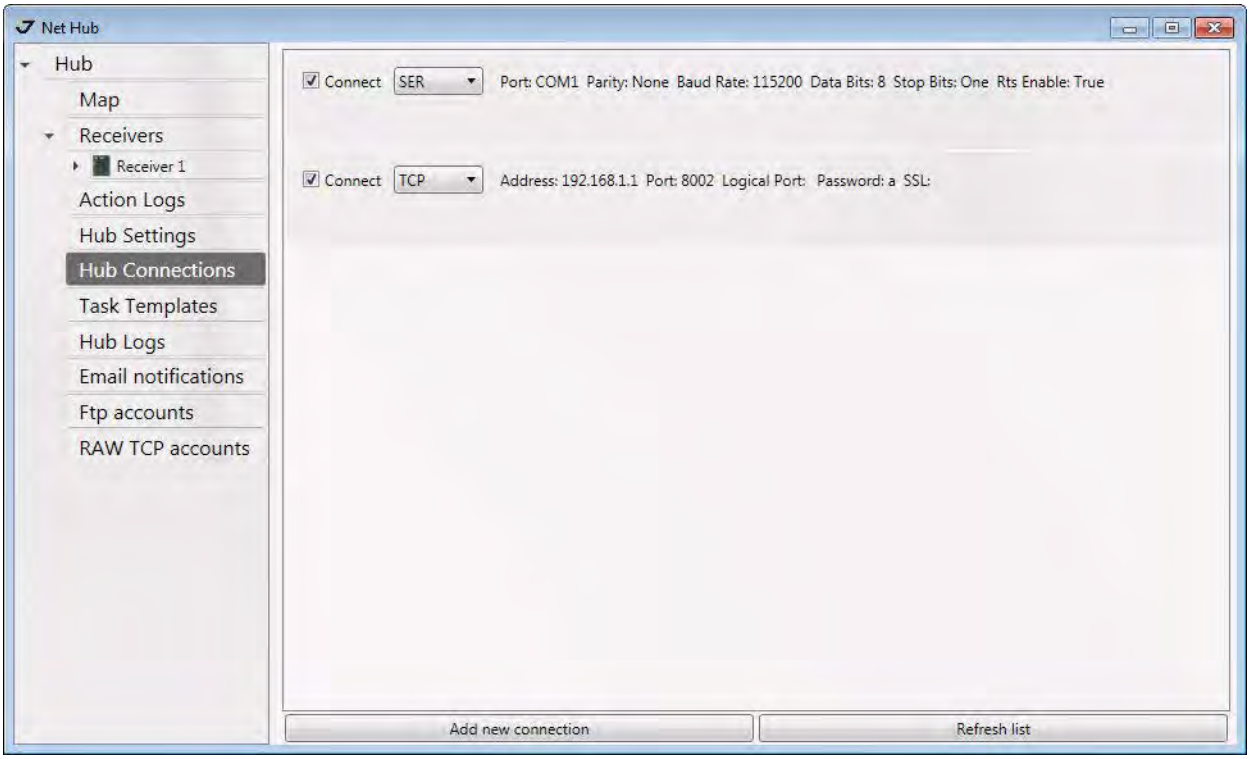


Figure 2-2. Hub Connections

In the picture above the current connections are displayed. To add new connection click *Add new connection* button. The new connection will be added to the list.

Select the desired connection mode from the drop-down list box, it can be either TCP, Serial, USB, CAN, or RCV connection. For each connection mode the appropriate parameters should be specified. How to connect the receiver to NetHub see “Getting Connected” on page 11.

To disconnect clear the check mark. If the connection is unnecessary it can be deleted. Click on the connection in the list, the button *Delete* appears.

2.3. NTRIP Settings

The *NTRIP caster* area of the *General settings* window allows configuring the receiver to send the corrections via NTRIP. To activate NTRIP Caster enable the appropriate check mark.

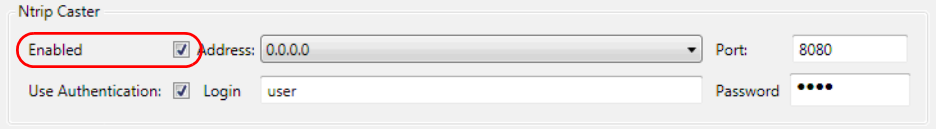


Figure 2-3. NTRIP Caster

To add the mountpoint to the mountpoint list, setup the receiver as a base. refresh the information after adding new base to the list, to view new mountpoint.

Figure 2-4. Mountpoint

2.3.1. Setup Base

To setup the base follow the instructions below:

1. Insert the exact coordinates of the base as described in “Base” on page 51.
2. Open the *Base/Rover* tab and select the *Use receiver a reference base* check mark. Set other parameters such as country, city, network name, and select the allowed corrections from the list (Figure 2-5 on page 20):

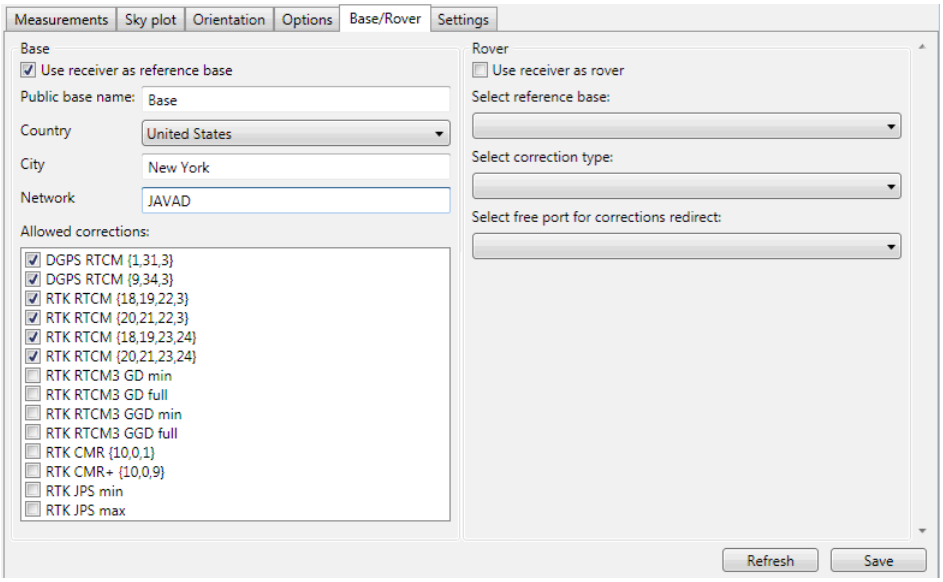


Figure 2-5. Base/Rover tab. Base configuration

3. Click *Save*.

Now this base can be used for sending the corrections in NTRIP and direct to the rovers as well.

2.4. Raw TCP accounts

There are situations, when there is no way to get connected to the receiver. It can be because receiver doesn't have static IP address, etc. In such case the TCP RCV client mode can be used. The receiver should be connected to Internet via Ethernet connector or via GPRS.

To establish such connection type, the RCV server should be configured:

1. Enable *TCP Incoming* on the *Hub Settings* window, set the address and port (see Figure 2-1 on page 17).
2. Click *Save*, and restart NetHub.

3. In the *Raw TCP accounts* page add new account:

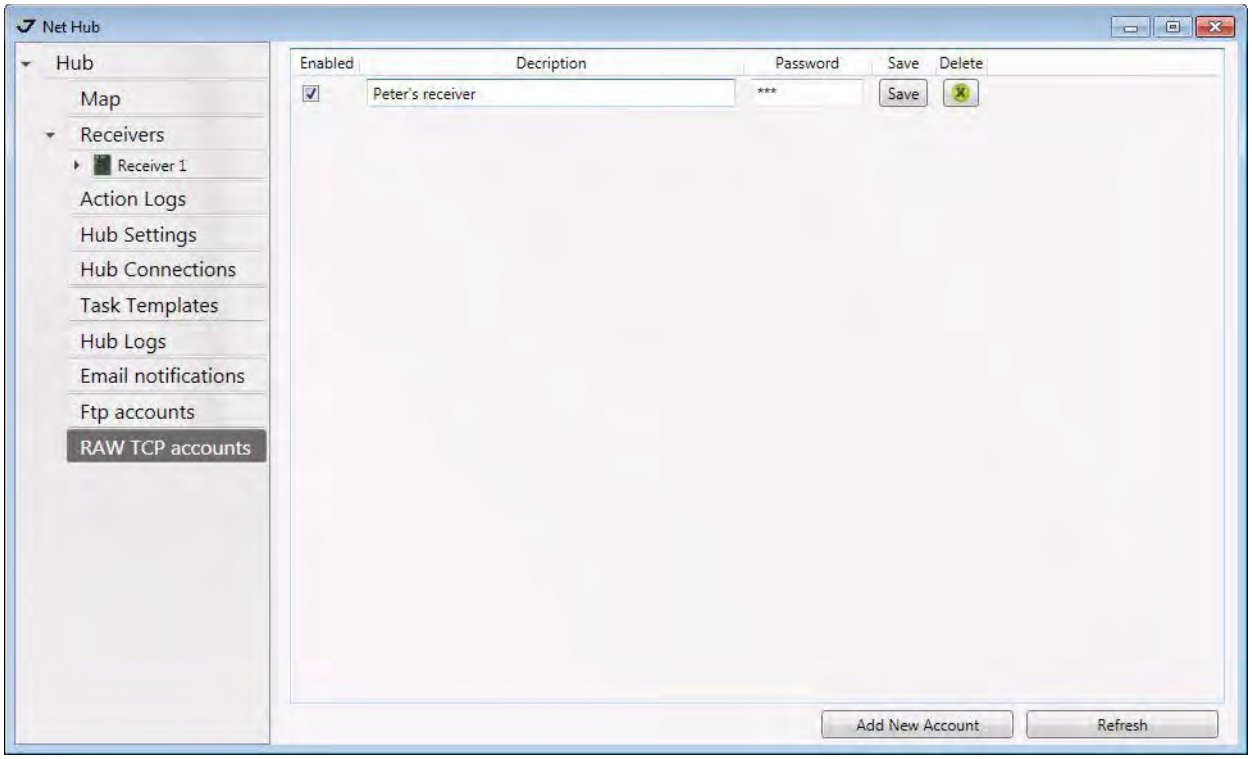


Figure 2-6. TCP accounts

4. Enter description and password. Click *Save*.
5. To delete account, highlight it and click *Delete.*
6. The *Refresh* button updates the list of the saved account.
7. How to configure RCV client mode for your receiver, see receiver's user manual (RCV client). The RCV client can be configured via Tracy Software. See tracy Software Manual for details.

This type of the connection can be used to transfer the corrections to the rover. Unlike NTRIP caster this mode allow the user to re-configure the base receiver, its files can be downloaded, the receiver is visible on the map.

2.4.1. Setup Rover

To receive the correction from the base, set up the base receiver as described above.

To setup the base follow the instructions below:

1. Open the *Base/Rover* tab and select *User receiver as rover.*
2. Select the earlier configured base from the list and correction type (Figure 2-7 on page 22):

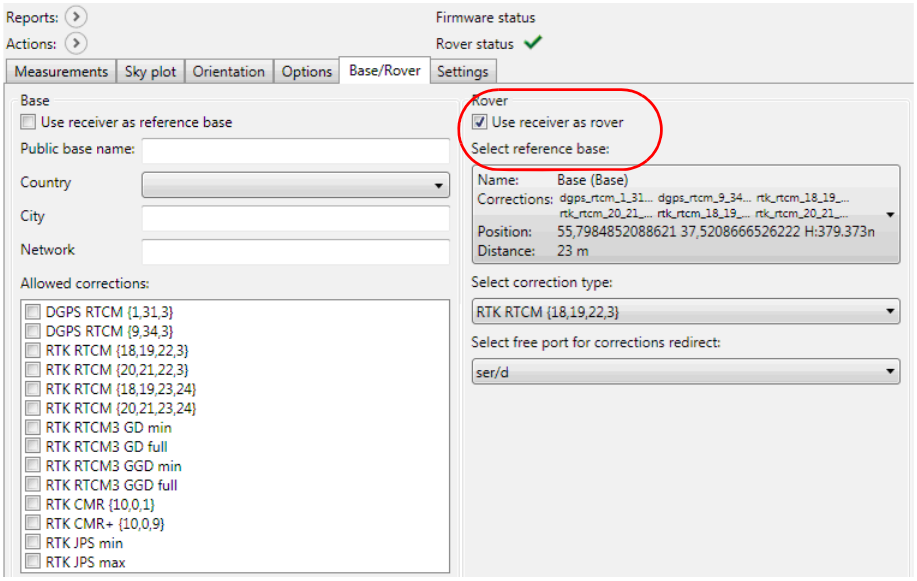


Figure 2-7. Base/Rover tab. Base configuration

3. Select the free port for the correction redirect. The redirect of the corrections is needed because the port receiver is connected trough is busy and cannot be used. Select one of free receiver's ports. Thew decoder type will be applied automatically depending on the correction type.
4. Click *Save*.
5. The rover status is displayed in the *Measurements* tab.

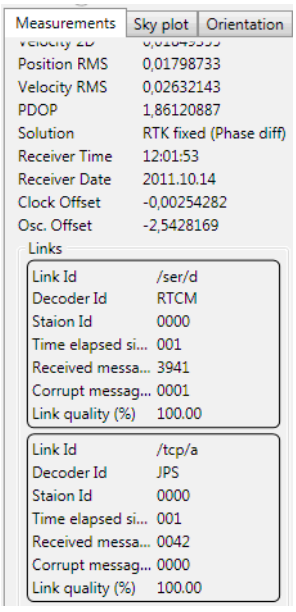


Figure 2-8. Measurements

6. Set the solution type in the Positioning tab. See "Positioning" on page 45.

2.5. Task Templates

In the *Task Templates* page the templates of the automatic task can be created. The software will perform these tasks with receiver's files. The following tasks can be performed automatically:

- Save file(s) on a server in JPS or RINEX format;
- Upload file(s) to FTP server in JPS or RINEX format;
- Run Batch file.

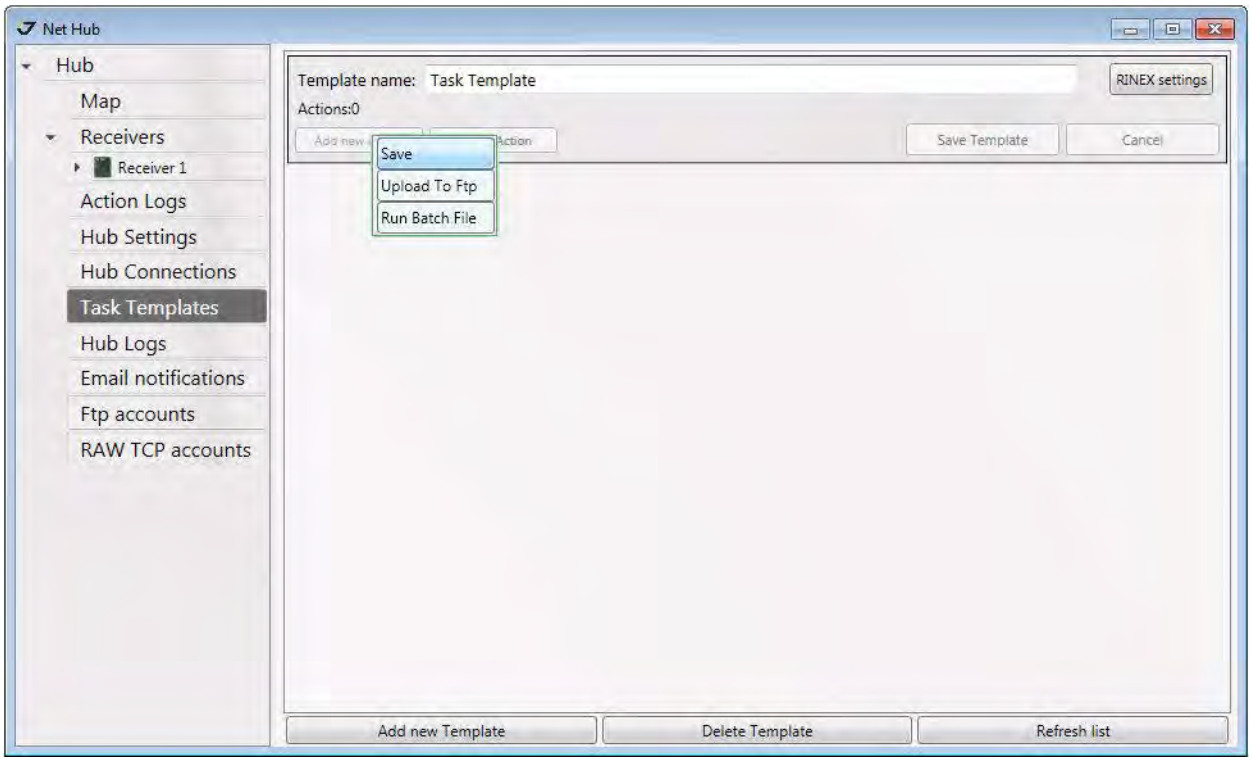


Figure 2-9. Tasks Templates window

Each template may consist of the different number of actions. But for one Task Template it is possible to set only one RINEX conversion type, which can be applied to some Actions. If the different types of RINEX conversion are needed, e.g. RINEX 2.11 and RINEX 2.12, the additional Task Template should be created.

2.5.1. Save

To set up the automatic file saving, perform the following steps:

1. Specify the directory[1] (*Save to*). Click the *Browse* button to select the desired folder. To the save path can be added the following predefined variables: year, date, GPS day, Receiver ID or receiver name (Figure 2-10). This allows arranging the files to the specified folders (e.g. sort the Raw and RINEX files by GPS day and place them to the different folders).
2. To convert the file(s) to RINEX enable the *Convert to RINEX*, to compress the file(s) to ZIP archive, enable *ZIP compress*. To set up RINEX settings, see “RINEX Settings” on page 27.

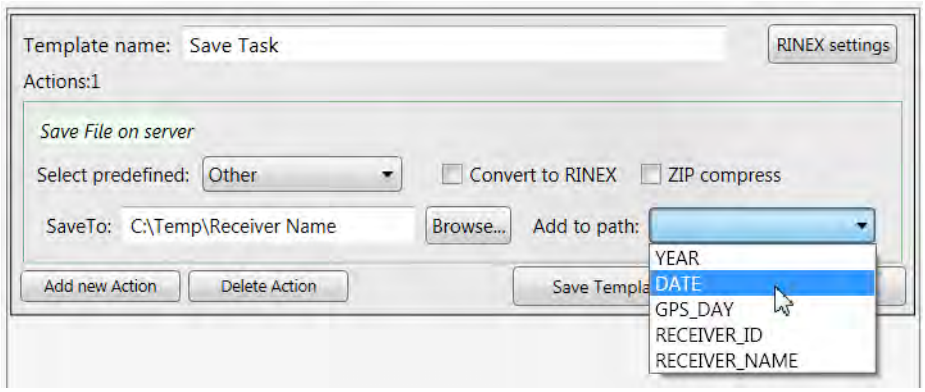


Figure 2-10. Task Template: Save

3. Click *Save Template*.
4. To add more actions click *Add new Action* button.
5. To delete action, click *Delete Action* button.
6. To delete the whole template, click *Delete Template* button on the bottom.

2.5.2. Upload to FTP

To set up the automatic file uploading to FTP, perform the following steps (see Figure 2-11 on page 25):

1. Enter FTP account or open predefined one. How to create new FTP account see “FTP Accounts” on page 27.
2. Specify the directory (*Save to*).
3. To convert the file(s) to RINEX enable the *Convert to RINEX*, to compress the file(s) to ZIP archive, enable *ZIP compress*. To set up RINEX settings, see “RINEX Settings” on page 27.

1. By default the path is the same which is specified in Hub Settings window described on page 17.

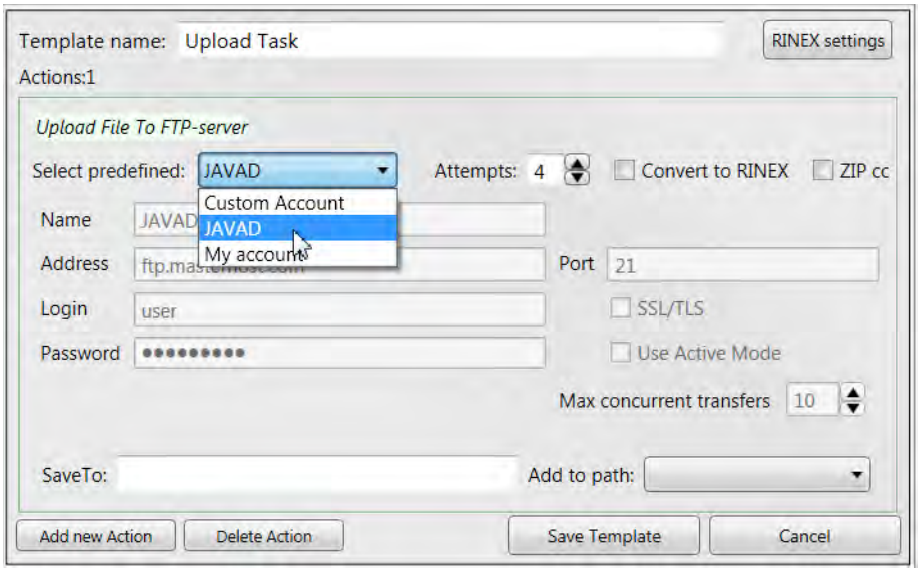


Figure 2-11. Task Template: Upload to FTP

2.5.3. Run Batch File

This Action can be used for the starting of custom processing of RINEX converter or postprocessing programs.

To set up the automatic running of batch file, perform the following steps:

1. Specify the batch file path, clicking the *Browse* button.

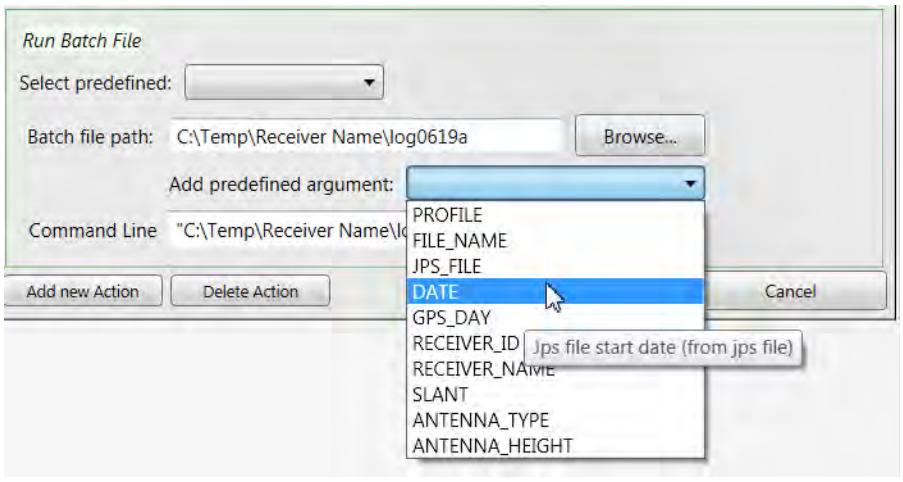


Figure 2-12. Task Template: Run Batch File

2. Add the predefined arguments to command line:
   - PROFILE - path to profile for RINEX converter;
   - FILE_NAME - name of the file in the receiver's memory;

- JPS_FILE - path to file downloaded from receiver's memory;
- DATE - start date of the JPS file recording;
- GPS_DAY - GPS day of the JPS file recording
- RECEIVER_ID and RECEIVER_NAME - ID and Name of the receiver, specified by receiver configuration (see "Settings" on page 37);
- SLANT, ANTENNA_TYPE, ANTENNA_HEIGHT - parameters of the antenna, specified in the *Site Configuration* (see "Settings" on page 37).

On the Figure 2-13 is template with three actions (save file on server, upload file to FTP-server, and run batch file) depicted:

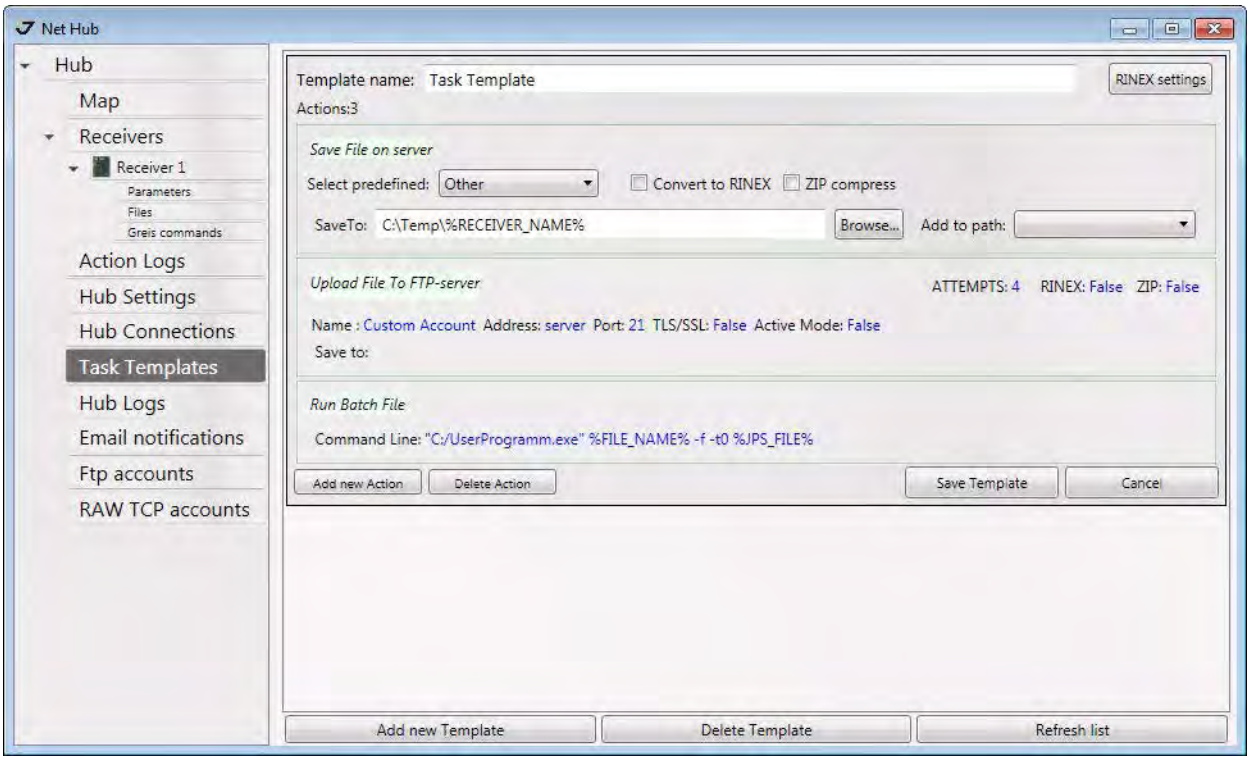


Figure 2-13. Task Template

This template means each file of the receiver will be converted to RINEX with defined settings, then compressed to ZIP, and saved in the specified folder, at the same time this file without conversing and compression will be uploaded on FTP server and the batch file will run.

Note: The file(s) will be only one time converted to RINEX. If the RINEX converting with different parameters is needed, should be created other template.

This template can be applied to every connected receiver.

2.5.4. RINEX Settings

To setup parameters for RINEX converting, click on the *RINEX settings* button.

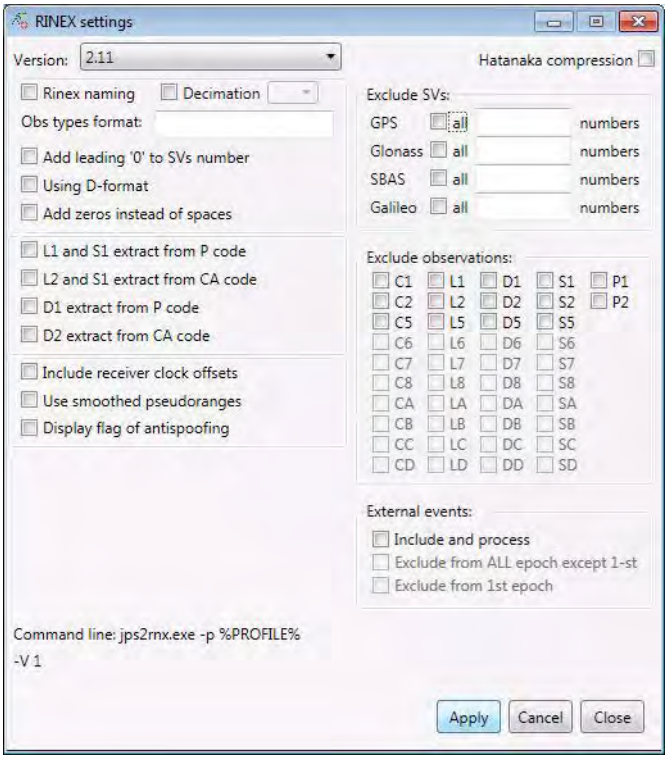


Figure 2-14. RINEX settings

The fields and check marks correspond to jps2rnx.exe. command line arguments. The command line is displayed on the top of this window.

2.6. FTP Accounts

FTP Accounts tab allows to set up the FTP parameters for Task template (Action). To add new account click the *Add New FTP account* button. Enter the standard FTP parameters.

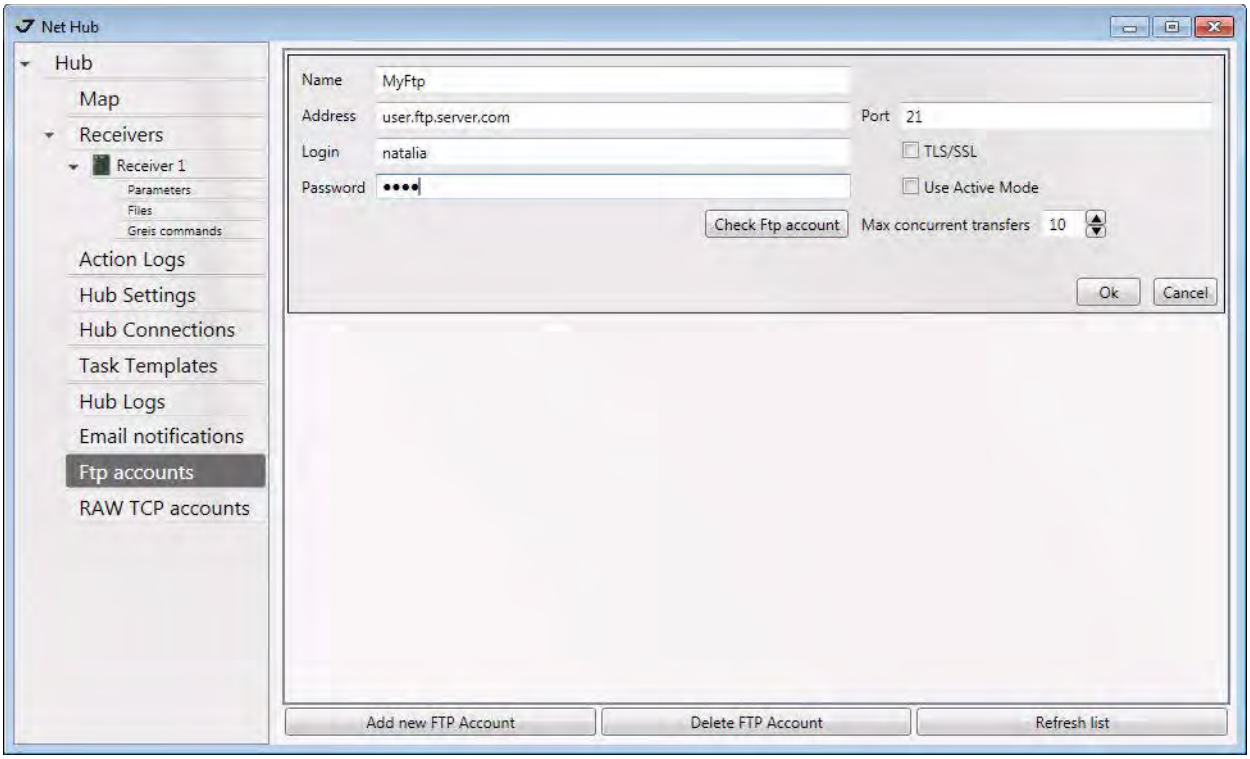


Figure 2-15. FTP Accounts tab

Click Check FTP account tab to check the connection status. If the account is successfully checked the notification “Account check passed” appears. To delete account click the *Delete FTP accoun*t button, to update the accounts list click the *Refresh list* button.

2.7. Email Notifications

The notification system allows duplicating the log messages to the email addresses, specified in this tab. Contact your system administrator about the email settings.

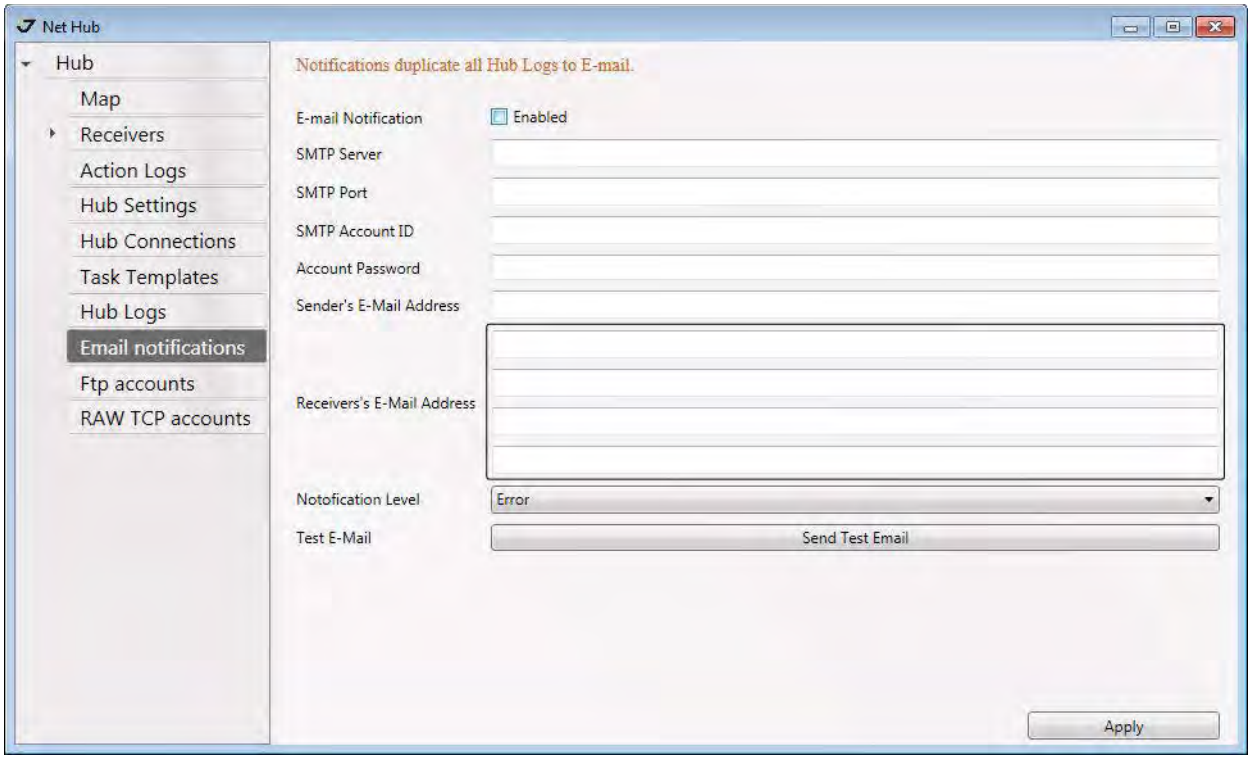


Figure 2-16. Email Notifications tab

2.8. Map

On the map displays the location of the connected receivers. Click on the receiver location to see the receiver name and its coordinates.

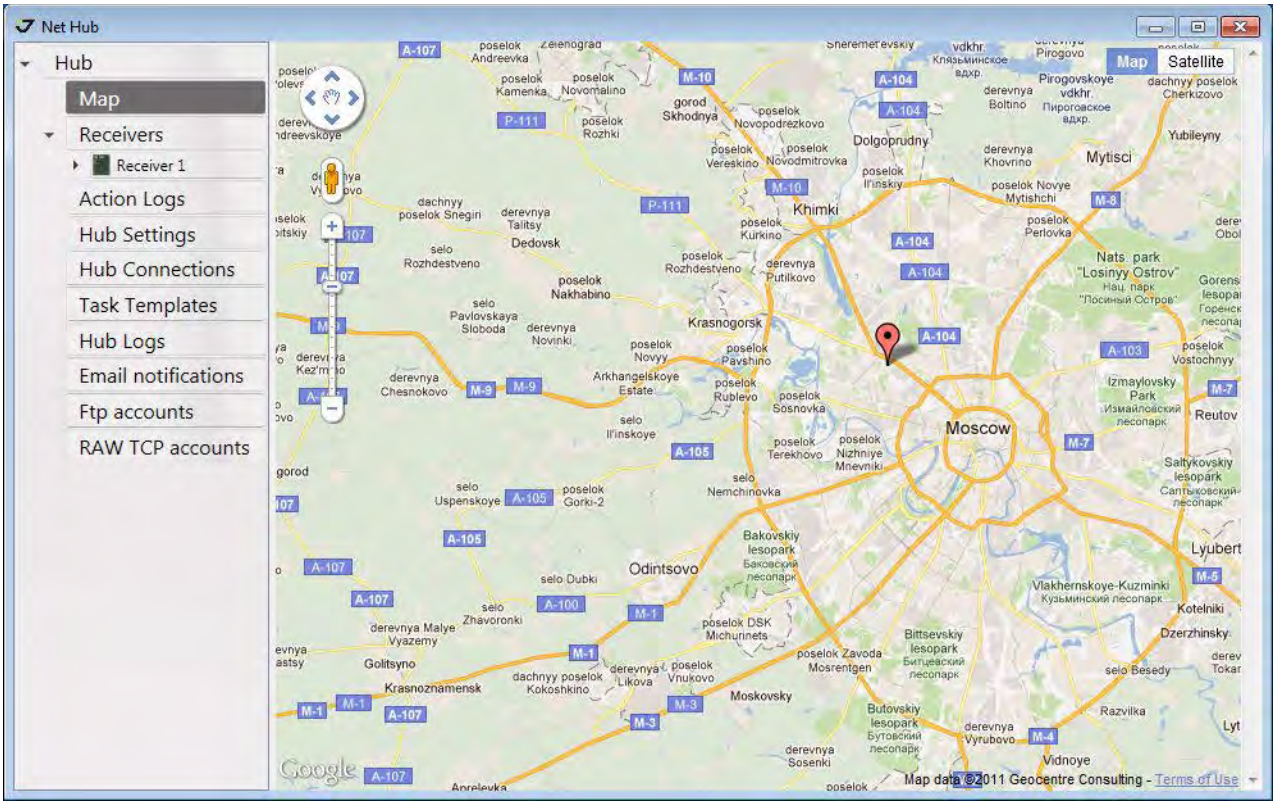


Figure 2-17. Map tab and position of the connected receivers

2.9. Hub Logs

The server log with messages, actions, and errors registration.

2.10. Action Logs

The *Action logs* tab allows tracking the performance of the automatic tasks.

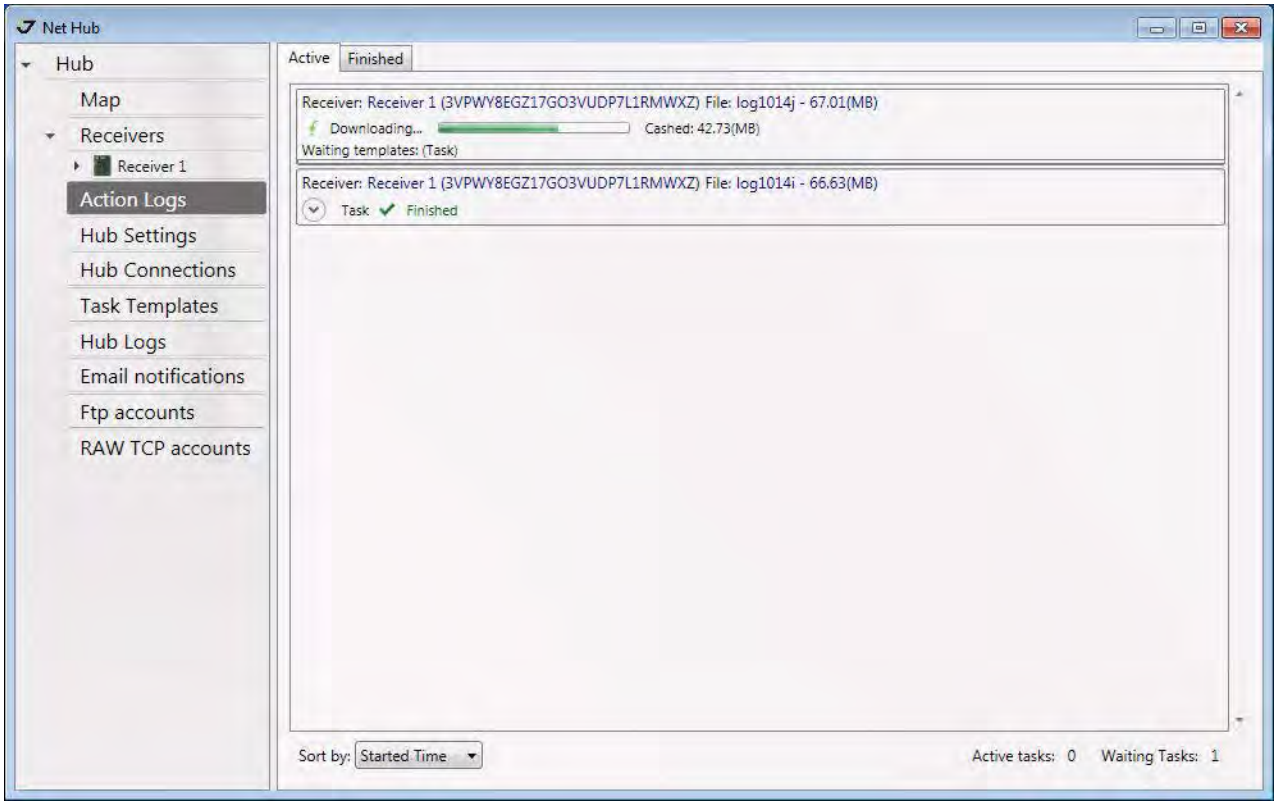


Figure 2-18. Action logs tab

Operation with Receiver

NetHub allows you to manage and control the GNSS receivers manufactured by JAVAD GNSS, and it has a user friendly interface.

3.1. Working with the receiver

Connect to the receiver as described in “Getting Connected” on page 11. Click on the item *Receivers* on the navigation bar. The list of connected receivers will appear (Figure 3-1).

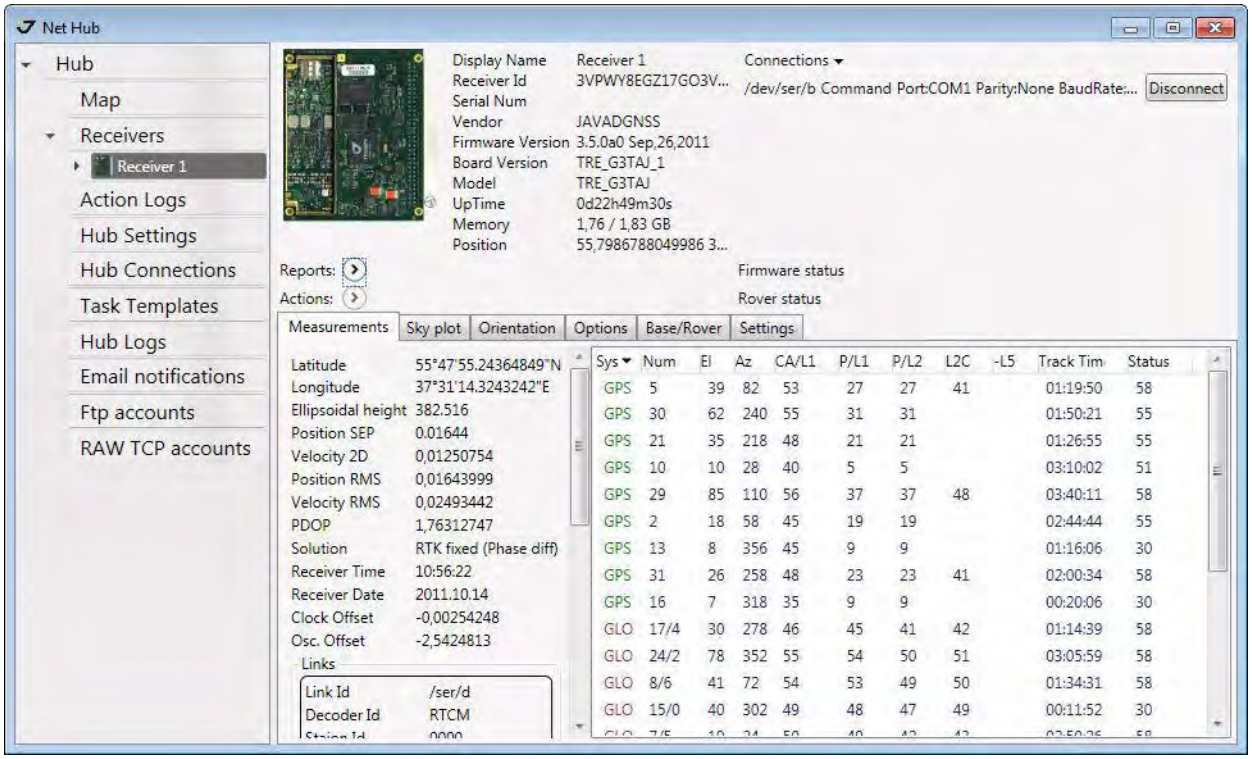


Figure 3-1. Connected receiver

In the left pane of the program there is a navigation bar. This pane is arranged as a tree whose nodes can be expanded by mouse click. Clicking on the elements of the navigation pane on the right pane a page with relevant content appears. In this case, the active element remains selected. On the right pane the following information about receiver(s) is displayed (Figure 3-2):

- Green flag *Connected* indicates that the receiver is now connected and you can work with it;
- The name of the receiver;

- *Rec* - the current files, which are logging;
- Receiver's memory capacity;
- Connection type

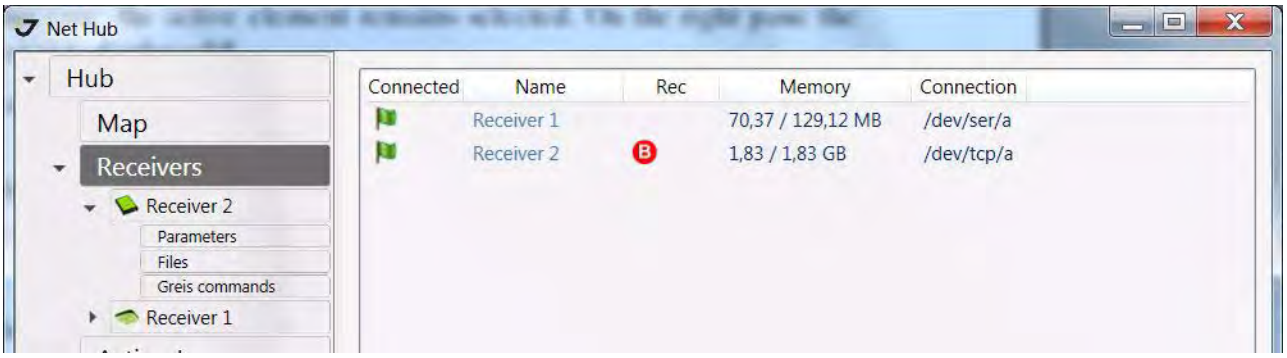


Figure 3-2. Connected receivers list

Point the receiver's name on the left pane, a tooltip will popup with detailed information about the receiver will appear.

When you click on the name of the receiver, the status page with detailed information for the selected receiver will be displayed (Figure 3-1 on page 33). This page shows the appearance of the receiver, its characteristics, the available connections, table of satellites. Tabs available *Sky Plot, Orientation, Options, Settings*.

To view and upload options of the receiver use the tab *Options*. To upload a new options file, click on *Upload*, and select the options file.

Below are described tabs on the right pane.

3.1.1. Measurements tab

Measurements tab (Figure 3-1 on page 33) displays the basic tracking information (parameters) for the locked satellites. It shows the receiver target point current position, receiver coordinates and the time-frequency parameters describing the behavior of the receiver's local oscillator.

The various navigation information is displayed, specifically:

- Geodetic coordinates[1]
  - Lat, Lon – latitude/longitude;
  - Alt – ellipsoidal height.
- *Velocity 2D* – (magnitude of the) velocity (m/s).
- *Position RMS* – rms position error[2] (m).
- *Velocity RMS* – rms velocity error* (m/s).
- *PDOP* – Position dilution of precision.
- *Solution type*:

1. These geodetic coordinates are computed in WGS 84 regardless of the current value of /par/pos/datum/cur.
2. More precisely, this is the square root of the trace of the position error variance-covariance

- Standalone/ Code differential/ RTK float / RTK fixed/WAAS DGPS differential

- *Receiver time* shows the receiver's current time within day. This value is taken from the message [~~]. For more information about [~~], see the GREIS Reference Manual.

Note: Currently the message [~~] reports the time within day in the GPS time scale only.

- *Receiver date* shows the receiver's current date as specified in the corresponding [RD] message.
- *Clock offset* describes the time derivative of (Tr – Trr), where Tr designates the receiver time, Trr designates the receiver reference time. For more information about Tr and Trr, see the GREIS Reference Manual. This parameter is obtained from the [DO] message and is expressed in ppm.
- *Osc. offset* is derived from the message [OO] and it is expressed in ppm. The parameter describes the difference between the VCO's nominal and quiescent frequencies.
- *Tracking time* is the time elapsed since the last complete loss-of-lock event in the receiver's C/A channels as specified in the corresponding [TT] message.

The tracking parameters displayed in table are described below:

Table 3-1. Tracking Parameters

Parameter	Description
* Num	GPS SV PRN. If the character "*" is shown next to PRN in the column, this means that almanac data are unavailable for the corresponding satellite. Galileo PRN. SBAS PRN. GLONASS SV Orbital Slot Number. If the character "*" is shown next to Sn in the column, this means that almanac data are unavailable for the corresponding satellite. GLONASS SV Frequency Number.
EL	Elevation angle in degrees.
AZ	Azimuth in degrees
CA/L1	Signal-to-noise ratio (C/N0) in the C/A channel [dB*Hz]
P/L1	Signal-to-noise ratio (C/N0) in the P1 channel [dB*Hz]
P2/2	Signal-to-noise ratio (C/N0) in the P2 channel [dB*Hz]
Track time	Time elapsed since the last loss-of-lock in the C/A channel for the corresponding satellite. This time is given in minutes or, if the symbol ":" is specified in the column, in seconds.
SS	Satellite navigation status. For a complete description of the satellite navigation status structure, see Appendix. If a satellite is not used in position computation, its SS flag will be set to "-". Otherwise "+" will be displayed.

Note: Empty cells will be displayed everywhere in the panels where the corresponding parameters are unavailable.

3.1.2. Sky Plot tab

The *Sky Plot* tab shows graphic representation of the satellite positions in the sky (Figure 3-3):

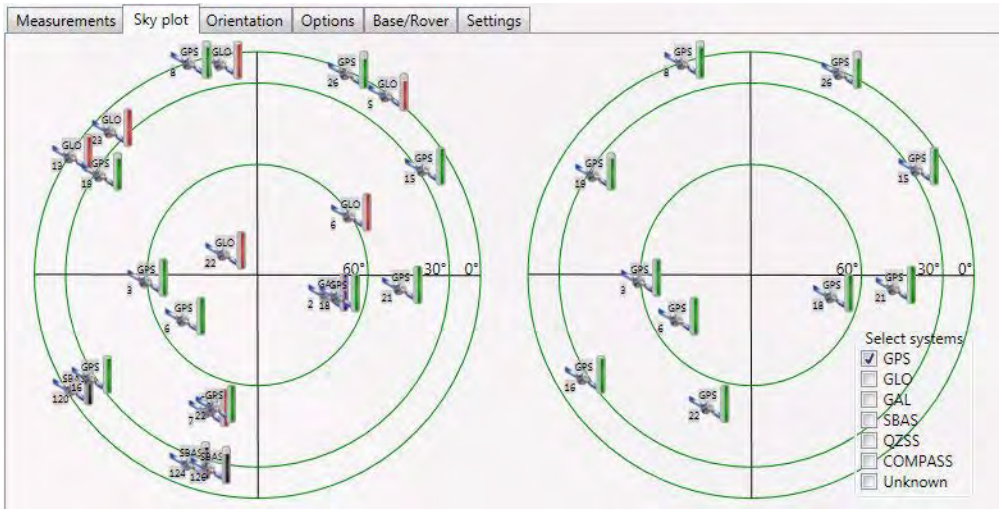


Figure 3-3. Sky plot tab

Each concentric circle represents the elevation angle above the horizon. The outermost circle corresponds to 0 degrees above the horizon. The center of the sky plot represents 90 degrees above the horizon. The dotted circle shows the position computation elevation mask angle.

The flags on the right allow the user to select the desired system to be displayed on the right plot.

3.1.3. Orientation

This information available for multi-antenna systems only and displays the orientation of the system.

3.1.4. Options

To view and upload options of the receiver use the tab *Options* (Figure 3-4 on page 37). Here you can check the status of your receiver's options and load new Option Authorization Files (OAFs) to the receiver. This window contains the following information:

- *Option name* – a name/description of the option
- *Current* – shows if the option is in force at the present or not
- *Purchased* – if the option is purchased or not
- *Leased* – if the option is leased or not
- *Date* – the date the leased option will be disabled, if applicable

To upload a new options file, click on *Upload* button, and select the options file. *Refresh* – Updates the window (Figure 3-4).

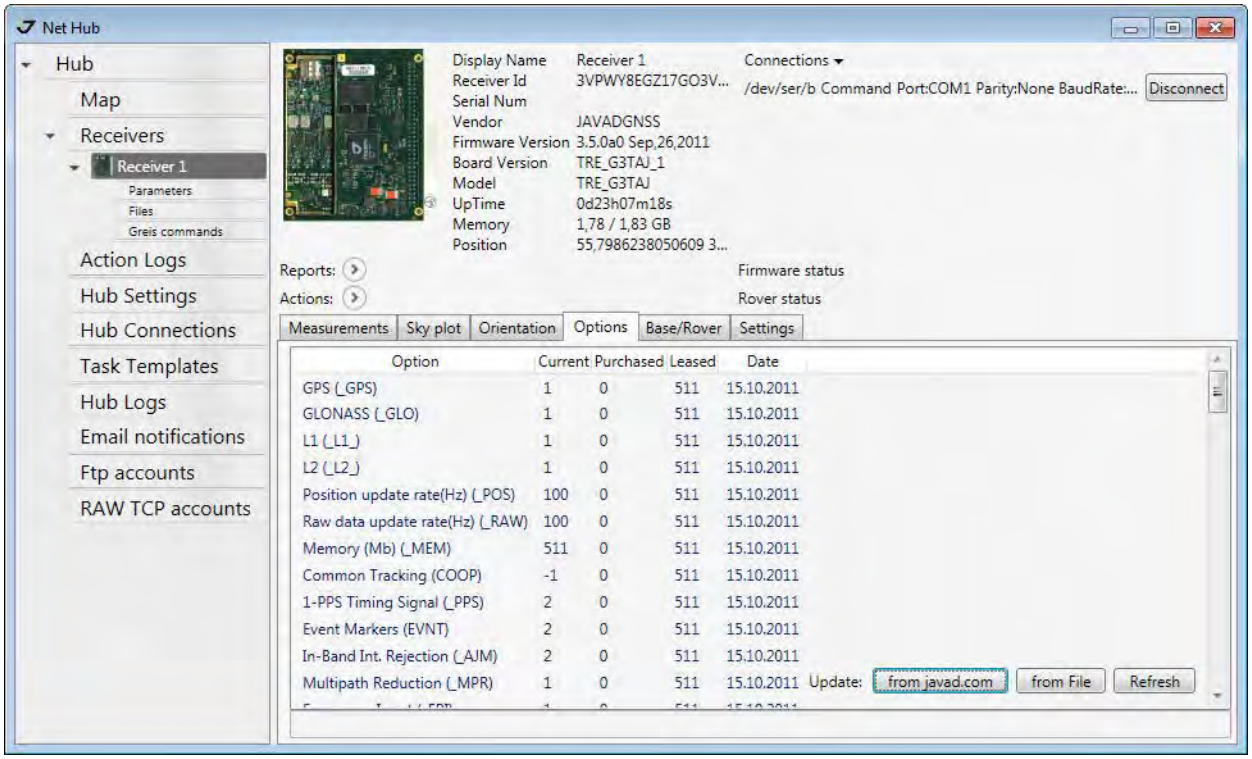


Figure 3-4. Options tab

3.1.5. Settings

In the *Settings* tab you can configure the receiver (Figure 3-5).

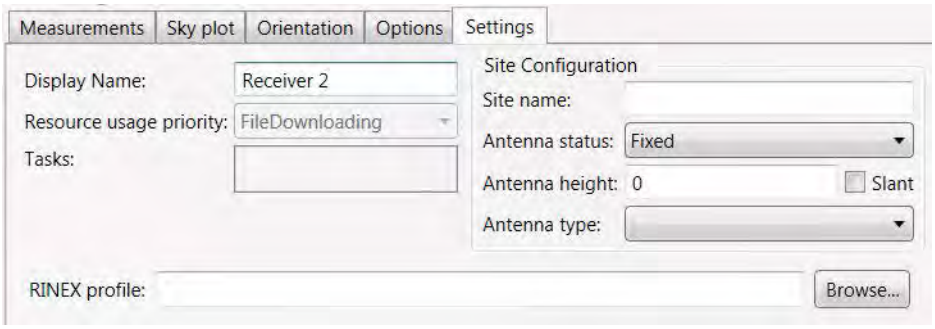


Figure 3-5. Settings tab

- Set up the receiver name in the *Display Name* field.
  - *Display Name* - Connected receiver name.
  - *Resource usage priority* - The priority of the channel usage. It can be file downloading or correction transfer.
- Setup the site configuration parameters used in the RINEX-conversion:

- *Site Name* – The site identification string (up to 20 alphanumeric characters).
- *Antenna Status* – This control allows the user to define whether the receiver antenna is in motion or is motionless.
- *Antenna Height* – The height of antenna, measured from the survey marker to the measuring mark of antenna. The measuring mark is the antenna reference point (ARP) if you use the vertical height or a known measuring mark (usually antenna edge) on the antenna if you use the slant height.
- *Slant* – Enable this checkbox if you measure the slant height. Otherwise, leave it blank.
- *Antenna Type* – Select the type of antenna you use.

- *Tasks* - Specified Task Template for the selected receiver.

3.2. Working with Files

Select *Files* in the navigation pane (Figure 3-6).

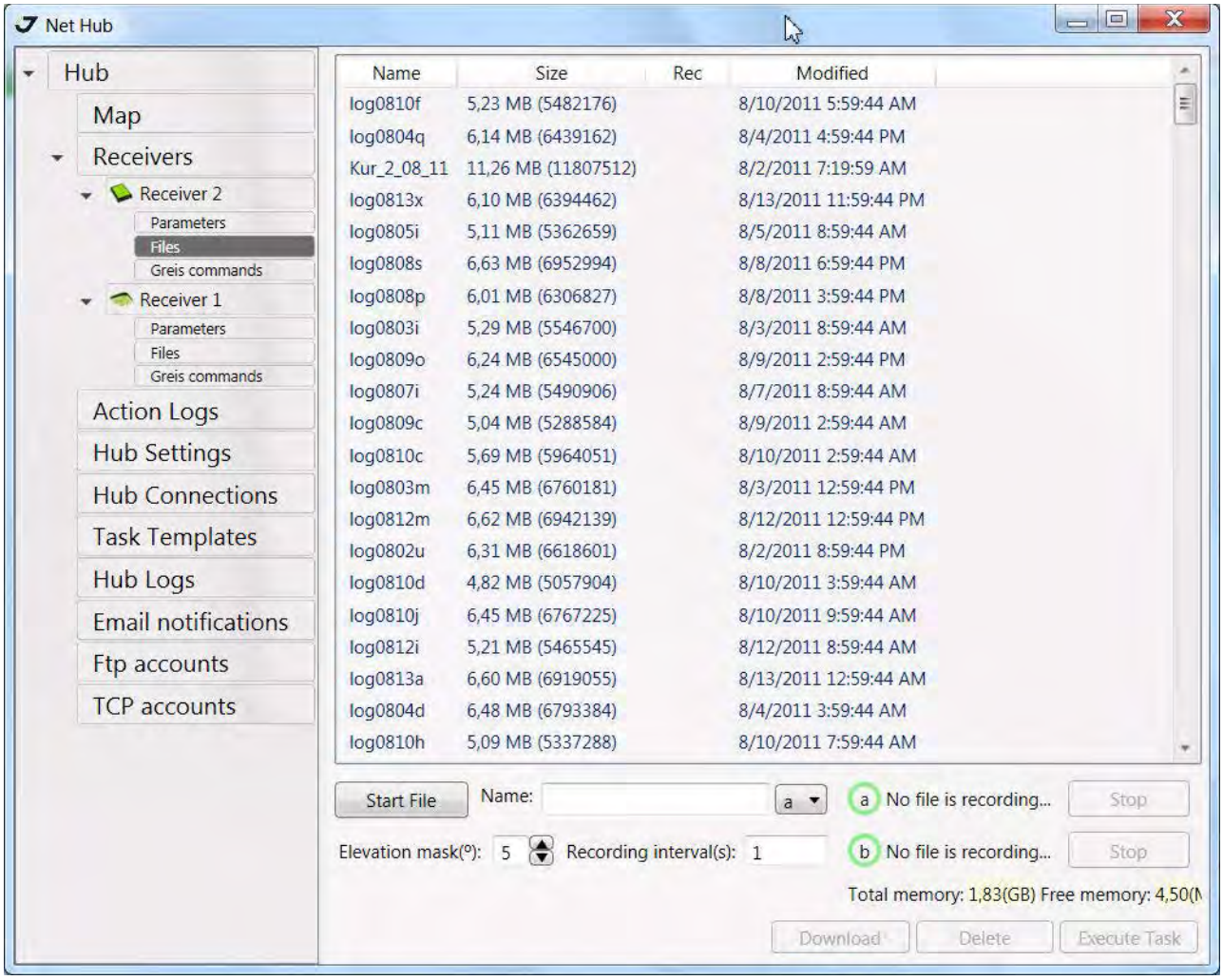


Figure 3-6. Files

On the right pane a list of files will be displayed. Select one or more files to download them by clicking the *Download* button. The new window with downloading progress will be displayed.

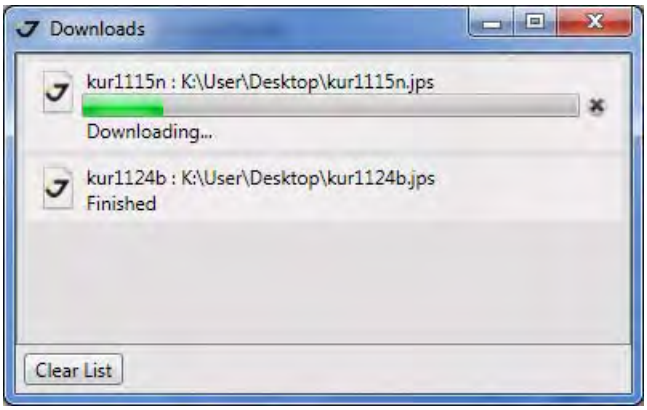


Figure 3-7. File is downloading

To delete selected files, click *Delete* button.

Files in the destination folder will have the same names and extensions as the original receiver log files. Before downloading the current log file in the destination folder, NetHub will check if there already exists a file with the same name in this folder. In the first case the contents of the log file downloaded will be appended to the existing file. In the second case, the existing file will be replaced with a new file of the same name.

On the bottom of the right pane there is the interface to start/stop data writing to the receiver internal memory (Figure 3-8):

Figure 3-8. File recording interface

To create a new log file, take these steps:

1. Enter the desired filename in the *Name* edit box.
2. Specify the desired data recording interval (i.e., data update interval) in the *Recording interval* edit box.
3. Set the desired *Elevation mask*.
4. Specify the *Site parameters*. See “Settings” on page 37.
    - Specify the desired *Site Name*.
    - Select the correct *Antenna Status* from the corresponding list box.
    - Set the *Antenna Height* parameter and select/deselect the *Slant* check box depending on whether you have specified the slant or vertical antenna height.
    - Select the correct antenna type from the *Antenna Type* box.
5. Click *Start* to start data writing. Click *Stop* to interrupt this process.

3.3. Configuring the Receiver

Select the desired receiver in the navigation pane, and expand the elements of the receiver by double clicking on the *Receiver.* Select *Parameters* item (Figure 3-9).

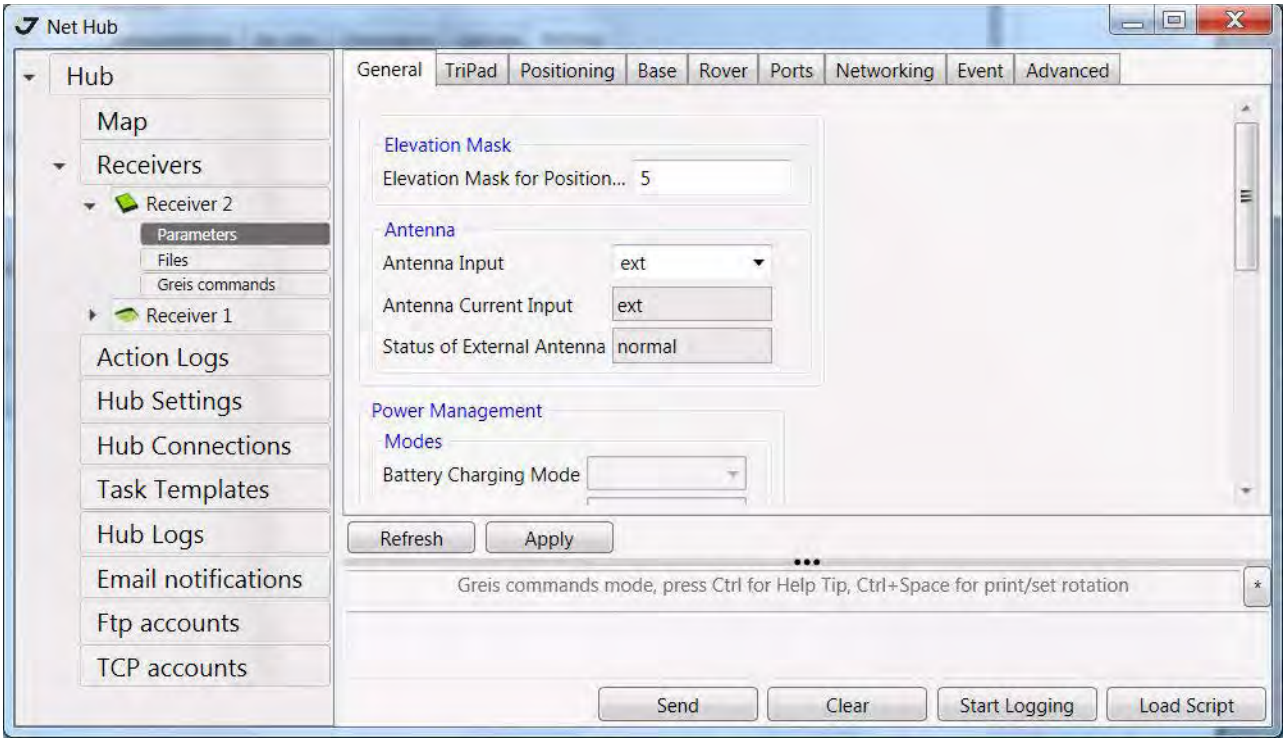


Figure 3-9. Receiver parameters

3.3.1. General tab

The *General* tab is shown on the Figure 3-9 on page 40. The general parameters such as elevation mask and antenna type can be specified in this tab, and information about the voltage, temperature, etc. can be checked.

Note: The basic receiver's parameters can be changed in the right pane.
Symbol "*" indicates that the parameter was changed, but not accepted by receiver. To accept the changes and save them in receivers memory click *Apply*.

Note: The tooltip popup menu will appear always when pointing the cursor on the parameter on the right pane.

Elevation mask

In the *Elevation Mask for Position Computation* edit box, the user enters the minimum elevation (i.e., the elevation mask angle) for the satellites whose data will be output to the current terminal (i.e., the receiver port being used for communication).

Antenna

The *Antenna Input list box* is used to select the desired antenna type:

Note: Note that some receiver models are capable of automatically detecting an external antenna only at receiver start-up time. Therefore, if one wants to switch from the internal antenna to an external one while in auto, he/she will have to power the receiver off and then back on.

- *int* – the internal antenna is being used.
- *ext* – an external antenna is being used.
- *auto* – antenna type will detect automatically.

Temperature

The *Board temperature* indicator shows the receiver board's current temperature in degrees of Celsius.

Power Management

Five group boxes allow the user to adjust/view the power settings for your receiver. Each group box contains a set of related controls.

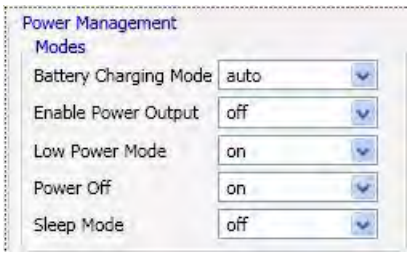


Figure 3-10. Power Management

- *Battery Charging Mode* - enables/disables battery charging mode: *Off* – receiver will not charge the batteries. *Auto* – receiver will automatically charge batteries.
- *Enable Power Output* - enables/disables power output;
- *Low power mode* - turns on/of low power mode;
- *Power Off* - turns on/of power;
- *Sleep Mode* - enables/disables sleep mode.

Voltages

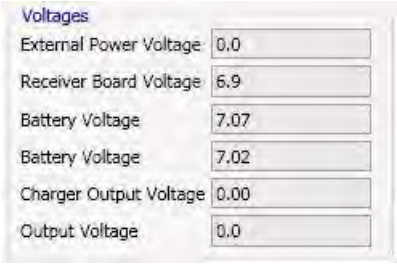


Figure 3-11. Voltages

- The *External Power Voltage* indicator shows the external power supply's voltage.
- The *Receiver Board Voltage* indicator shows what is the actual voltage presented on the receiver board.
- The *Battery Voltage* indicators show the voltage on batteries.
- The *Charger Output Voltage* indicator shows the output voltage of the internal charger during battery charging.
- The *Output Voltage* indicator displays the output voltage on the first pin of each of the receiver's serial port.

3.3.2. TriPad

In this tab (Figure 3-12), the user can configure receiver parameters, which relate to TriPad (user simple interface):

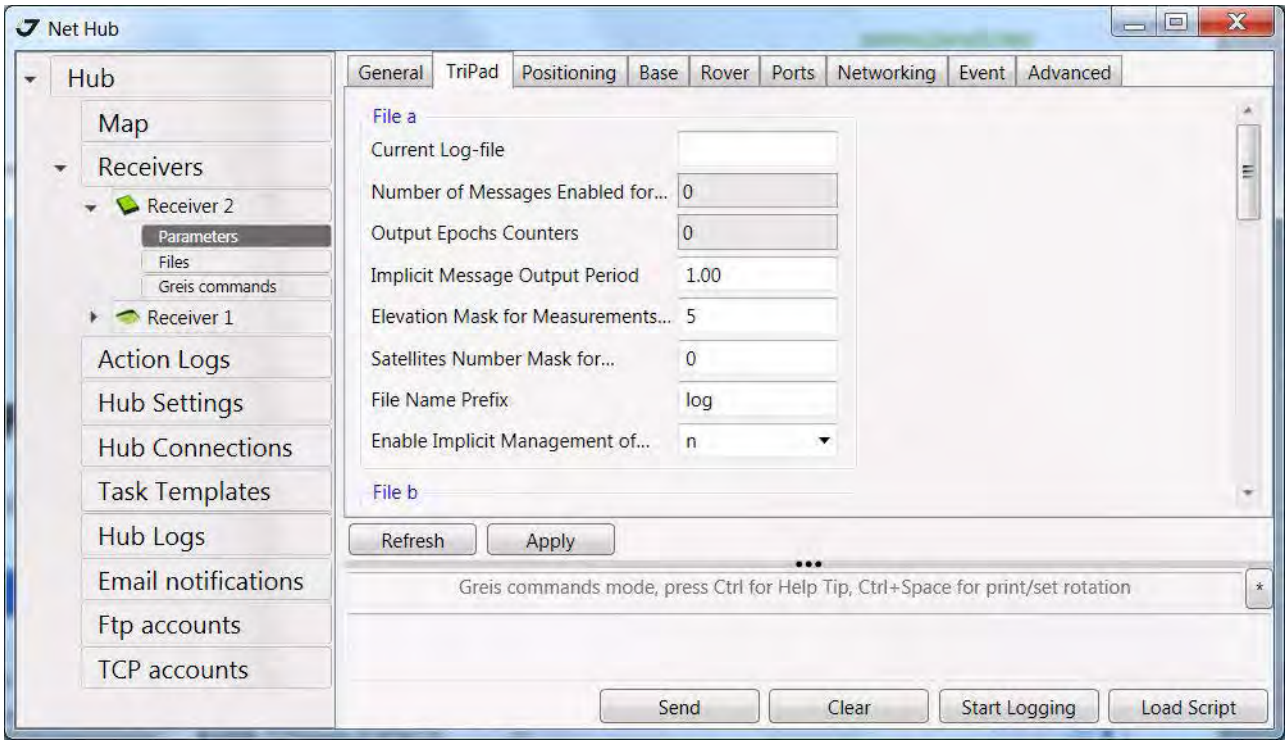


Figure 3-12. TriPad tab

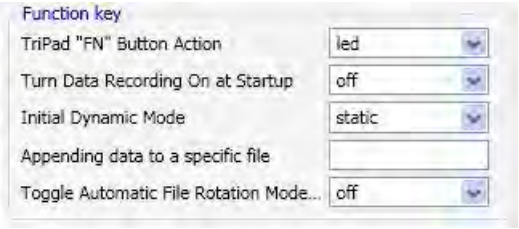
File a, File b

In the fields *File a, File b* can be specified current log-file name, message output period, etc.

- *Current log-file* edit box allows the user to specify the prefix of the log file, which will be saved into receiver memory during survey.
- In the *Output Epochs Counter* box the number of outputted epochs is shown.
- In the *Implicit Message Output Period* edit box the output period for the implicit messages can be specified. This parameter specifies the interval of outputting messages into the log-file when data logging is activated with the TriPad or through the AFRM.
- *Elevation Mask for Measurements Output* (the minimum elevation angle for the satellites whose data will be put in the receiver files logged when pressing FN).
- *Satellites Number Mask for Position computation* - Satellites with elevations lower than this mask will be excluded from position computation.
- *File Name Prefix* - this setting specifies what prefix will be added to the names of the receiver files created via MinPad, (i.e., by pressing FN). The prefix can be up to 20 characters long. Default is log.

- Enable *Implicit Management of Specific* - enables/disables the management of *Implicit Message Output Period.*

Function Key



- *TriPad "Funnybone Action* - This drop-down list box is used to program how the receiver will react to clicking FN (i.e., keeping the button depressed for less than one (1) second). In *led* blink mode switch mode, clicking FN will toggle between the TriPad's standard and extended information modes. In *occupation* mode switch you click FN to get the receiver to insert into the corresponding log file a message indicating that the occupation type has been changed from static to kinematic, or vice versa.
- *Turn Data Recording on at Startup* - enables/disables data recording on at startup,
- *Initial Dynamic Mode* - specifies the starting occupation type descriptor that will be inserted at the beginning of each receiver files logged via the TriPad. You select *static* and *kinematic* to specify that the corresponding log file will start with a static and kinematic occupation, respectively.
- *Appending data to a specific file* - If the new receiver data are to be appended to an existing log file, enter the desired filename in the Always append to the file edit box. The setting can be up to twenty characters long.
- *Toggle Automatic Rotation Mode* - enables/disables Automatic File Rotation Mode.

Automatic File Rotation Mode (AFRM) parameters

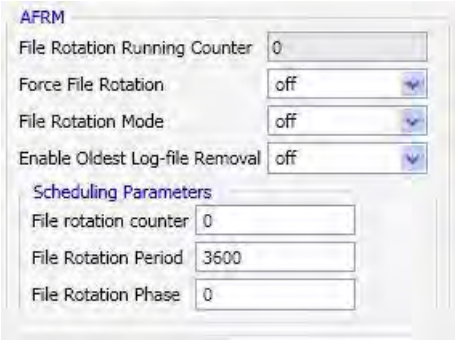


Figure 3-13. AFRM parameters

- *Period* – specifies the time duration of each of the multiple log files created in AFRM mode.
- *Phase* – specifies the *phase* (i.e., constant time shift) of the multiple log files created in AFRM mode.

- *Files (total)* – specifies how many multiple log files must be created in AFRM until this mode automatically turns off. Zero means that an unlimited number of log files will be created.
- *Files (remain)* – shows you how many log files are left for the receiver to create in AFRM.
- *Enable Oldest Log-file removal* – if active, the receiver will remove the least recent files if no free space is available in the receiver memory to record the current file.

3.3.3. Positioning

This tab contains various controls and fields that allow the user to set elevation and PDOP masks, to select satellites to track, and to specify what measurements to use in position computation.

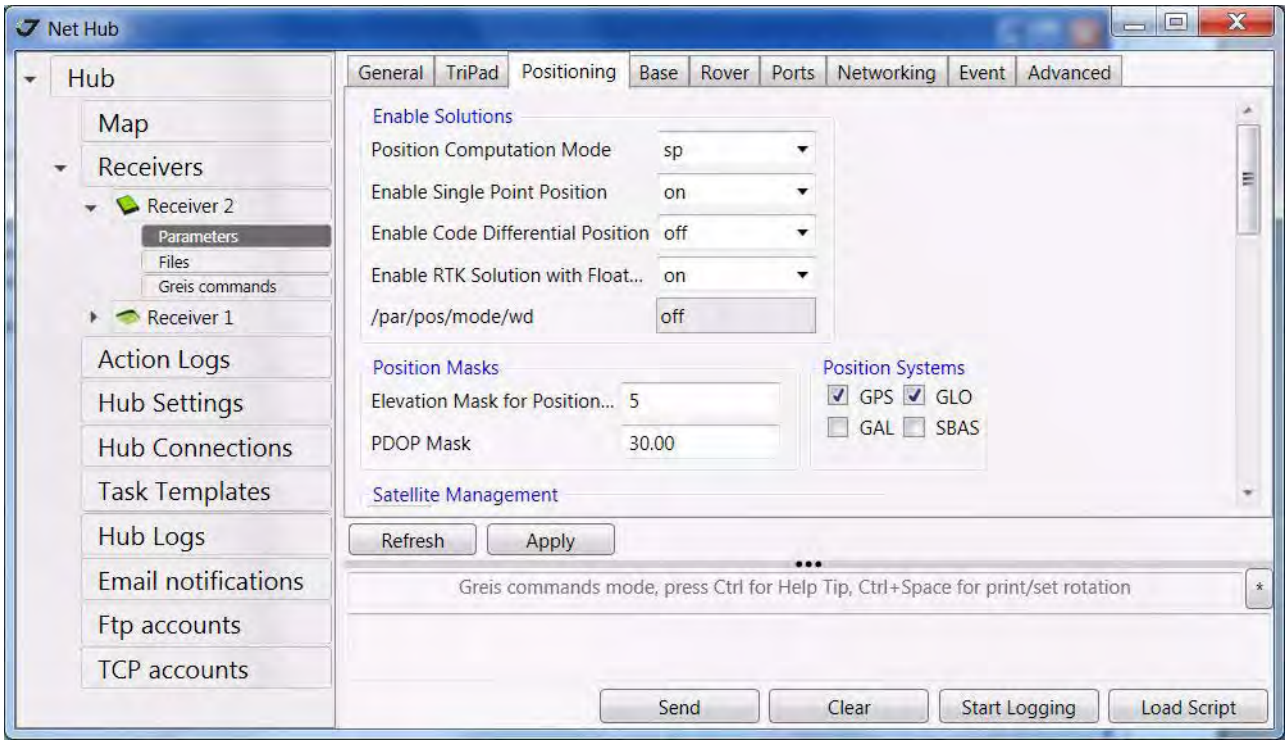


Figure 3-14. Positioning tab

Enable Solutions

- *Position Computation Mode* - this drop-down list box allows selecting the mode of position computation:
  - *pd* -carrier phase differential (RTK) with fixed ambiguities
  - *pf* - carrier phase differential (RTK) with float ambiguities
  - *cd*- code differential (DGPS) mode
  - *wd* - wide area code differential mode (WDGPS)
  - *sp* - single point positioning mode[1]

1. Also known as “absolute positioning”, “stand-alone positioning” or simply “point positioning”

- If the *Enable Code Differential Position* is activated and the rover receiver is running in RTK Float or RTK Fixed mode and is unable to obtain an RTK solution at the current epoch, it will output the current code differential position for the unavailable RTK solution.

Note: If the DGPS (Code Differential) checkbox is enabled and a DGPS solution cannot be obtained, you can instruct the receiver to output single-point position for the unavailable differential. For this, enable the Standalone checkbox.

Note: Code differential mode requires broadcasting the corresponding DGPS (not RTK) messages from the reference receiver and accepting them on the rover receiver. If any of these requirements are not met, then enabling the DGPS (Code Differential) checkbox will not have any effect.

Positioning Masks

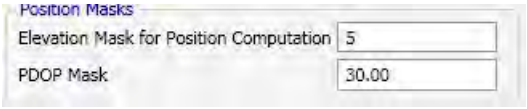
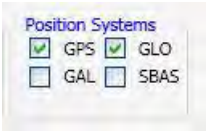


Figure 3-15. Position Masks

- In the *Elevation mask* edit box, you specify the elevation mask angle for the satellites used in position computation. The receiver will not use the satellites below the specified elevation mask to compute the position. The default value is 5 degrees.
- In the *PDOP mask* edit box, you specify the threshold value of PDOP that disables position computation. If PDOP exceeds this mask during a period of time, the receiver's position will not be computed over the corresponding epochs. The default value is 30.

Positioning Systems



Select the *GPS*, *GLONASS*, Galileo, and SBAS checkboxes if it is desired that the corresponding satellite constellations to be used in position computation.

Note: However, the selected satellite constellation will indeed be used in position computation only if the corresponding *Satellites used in pos.* checkbox from the *Satellite management* panel is selected as well.

Satellite Management

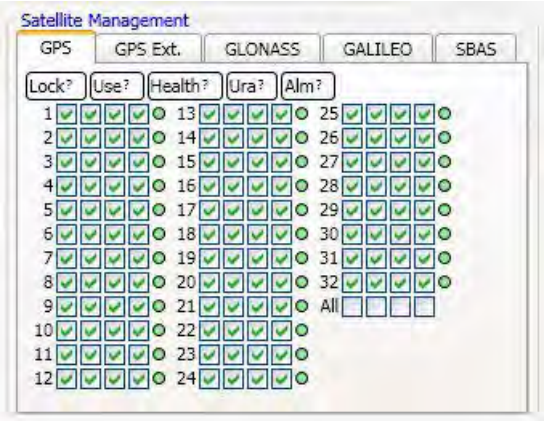


Figure 3-16. Satellite Management

GPS | GLONASS | GALILEO | SBAS

Use these tabs to explicitly specify which of the GPS, GLONASS, Galileo and SBAS satellites are enabled for tracking and position computation.

- The first tab, as its name implies, deals with the GPS satellites (Figure 3-17).

Figure 3-17. GPS tab

The tab displays the following columns, *prn*, *lock* and *use*, which are described in Table 3-2.

Table 3-2. Description of Data Displayed in the GPS Tab

Notation	Meaning
prn	GPS satellites' pseudo-random noise code numbers.
lock	Checkmarks in this column indicate that the corresponding satellites are enabled for tracking.
use	Checkmarks in this column indicate that the corresponding satellites are enabled for position computation.

Use the *All to lock* and *All to use* buttons to select all GPS satellites at one time.

Use the *None to lock* and *None to use* buttons to deselect all GPS satellites at one time.

- The second tab, as its name implies, deals with the GLONASS satellites.

Satellite Numbering

For user convenience, GLONASS satellites can be displayed ordered either by their *Frequency Channel Number* or by the *Slot Number*. The tab displays columns, *fcn*/*sat*, *lock* and *use*, which are described in Table 3-3.

Table 3-3. Description of Data Displayed in the GLONASS Tab

Notation	Meaning
fcn/sat	GLONASS satellites' frequency channel numbers, if the *Frequency Channel Number* checkbox is selected. GLONASS satellites' slot numbers, if the *Slot Number* checkbox is enabled.
lock	Enable GLONASS satellites for tracking.
use	Use this GLONASS satellite for position computation.

Use the *All to lock* and *All to use* buttons to select all GLONASS satellites at one time.

Use the *None to lock* and *None to use* buttons to deselect all GLONASS satellites at one time.

- The third tab, as its name implies, deals with the GALILEO satellites.

  The tab displays columns, *prn*/*sat*, *lock* and *use*, which are described in Table 3-4.

Table 3-4. Description of Data Displayed in the GALILEO Tab

Notation	Meaning
prn	GALILEO satellites' pseudo-random noise code numbers.
lock	Checkmarks in this column indicate that the corresponding satellites are enabled for tracking.
use	Checkmarks in this column indicate that the corresponding satellites are enabled for position computation.

Use the *All to lock* and *All to use* buttons to select all GALILEO satellites at one time.

Use the *None to lock* and *None to use* buttons to deselect all GALILEO satellites at one time.

- The fourth tab, as its name implies, deals with the WAAS/EGNOS satellites.

  A WAAS-enabled JAVAD GNSS receiver allows simultaneous tracking of two WAAS satellites. Either of the WAAS satellites is allocated its own channel.

  Use the *All to lock* and *All to use* buttons to select all SBAS satellites at one time.

Use the *None to lock* and *None to use* buttons to deselect all SBAS satellites at one time.

Measurements Used

This radio button group shows what code measurements will be used to compute the receiver's standalone position. This parameter applies only to absolute position computation.

Figure 3-18. Measurements Used

Note: For a single-frequency receiver, the radio buttons P/L1, P/L2 and Iono-Free will be gray.

If the *Iono-Correction* checkbox is selected, the receiver will correct the pseudoranges for ionosphere (based on the model defined in ICD-GPS-200, Revision C) before using them in position computation. Note that if both *Iono-Free* and *Iono-Correction* are selected, the first overrides the second. This parameter applies only to absolute position computation.

If the *Tropo-Correction* checkbox is selected, the pseudoranges will be corrected for troposphere before being used in position computation. This parameter applies only to absolute position computation.

RAIM

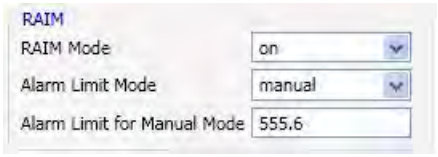


Figure 3-19. RAIM

RAIM stands for Receiver Autonomous Integrity Monitoring. When this feature is enabled, the receiver continuously checks whether the signals received from satellites are usable or not. If a fault (measurement outlier) in satellite data has been detected based on the current alarm limit, RAIM excludes this satellite(s) from the positioning calculations, thereby allowing the receiver to continue providing correct position information without an interruption in the service.

- The *RAIM Mode* if turned on, activates the RAIM algorithm.
- With the *Alarm* setting, the user specifies alarm limit mode. The alarm limit is a threshold value for the horizontal radial error. There are three pre-defined limits and one that is specified manually:
    - *Non-precision* stands for Non-precision approach. For this phase of flight, the alarm limit is equal to 0.3 nmi. This value means that an error of 0.3 nmi or greater, caused by bad satellite data, will be detected by RAIM.
    - *Terminal*. For this phase of flight, the alarm limit is 1.0 nmi.
    - *En route*. For this phase of flight, the alarm limit is 2.0 nmi.
    - *Manual*. This mode allows the user to select alarm limit values other than the pre-defined ones.

- The *Alarm limit for Manual Mode* edit box is available only if one has selected the *Manual* mode from the *Alarm* list box. Values the user enters in this edit box can vary within the range 10.0…10000.0 meters. The default value is 555.6 and it corresponds to Non-precision approach.

Datum

Figure 3-20. Datum

From the *Current Datum for Position Computation* drop-down list box, you select the datum used in position computation. Once the desired datum is selected and the *Apply* button is pressed, the receiver begins producing its position expressed in the selected datum. The default datum is WGS 84.

Note: Currently JAVAD GNSS receivers support more than 200 datums. For a list of the supported datums, refer to the GREIS Reference Manual.

Note: The receiver position, which is expressed in a datum other than WGS 84, may be viewed using NMEA messages such as GGA, GLL and so on. Position-related JAVAD GNSS messages (for example [PV]) always contain the coordinates computed in WGS 84.

3.3.4. Base

With the *Base* tab, the user can configure the receiver for use as a reference station (Figure 3-21).

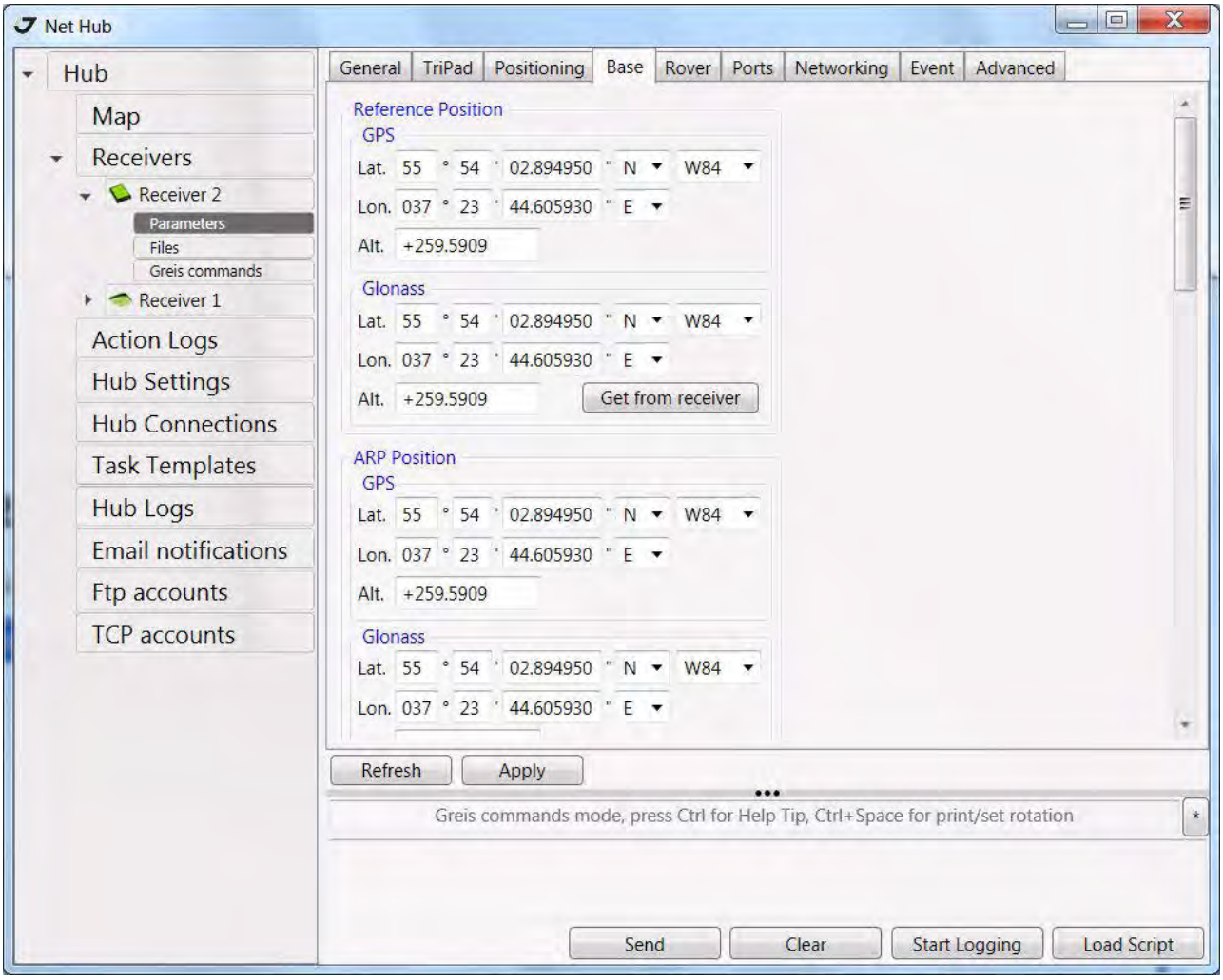


Figure 3-21. Base

In the *Reference Position* area (Figure 3-22) the user enters the geodetic coordinates of the base antenna's phase center.

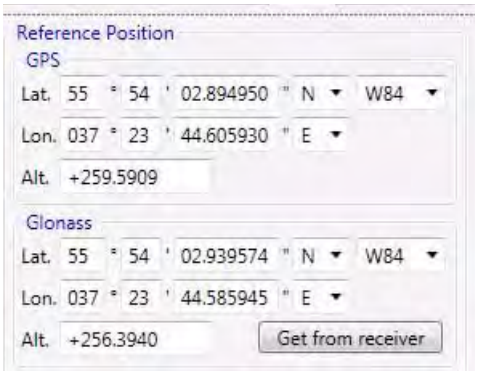


Figure 3-22. Reference Position area

- *Lat* – Antenna latitude in degrees, minutes, and seconds format with a hemisphere letter (N or S).
- *Lon* – Antenna longitude in degrees, minutes, and seconds format with a hemisphere letter (E or W).
- *Alt* – Antenna height above the ellipsoid, in meters.

Note: The reference geodetic coordinates specified in this tab will relate to the antenna L1 phase center. To account for the offset between the L1 and L2 antenna phase centers, use the parameter L1 to L2 Antenna Phase Center offsets.

Note: If the coordinates entered are expressed in a datum other than WGS 84, which is default, ensure that the correct datum ID is selected.

There are three ways to enter the coordinates:

1. Type in the precise latitude/longitude and ell. height manually (use the *Lat*, *Lon* and *Alt* edit boxes).
2. Use the absolute coordinates averaged over the specified time interval (with the *Averaged* and *Avg.Span* controls).
3. Use the instant absolute coordinates from the receiver (by pressing the *Get from receiver* button).

L1 to L2 Antenna Phase Center offsets

Use these fields if you need to account for the difference between the L1 and L2 antenna phase offsets.

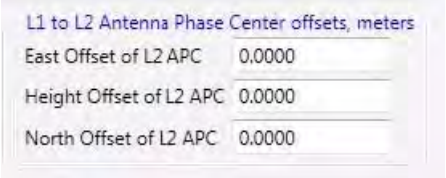


Figure 3-23. L1 to L2 Antenna Phase Center offsets

RTCM Settings

The *Station ID* edit box allows the user to assign a separate station ID to each reference station working in the area. On the rover side, this ID allows easy identification of the reference station whose RTCM messages are being received by the rover receiver. This ID must be an integer from 0 (default) to 1023.

With the *Max. number of Satellites* edit box, the user specifies the maximum number of satellites allowed for use in RTCM messages types 18 through 21. A 0 means that all of the available satellites will be included in the above mentioned RTCM message types. If an RTK system has a slow modem (the baud rate is less than 9600 bps), it is recommended to restrict the number of satellites included in these messages. The limitation allows the user to reduce the amount of data sent by the base station, which helps to avoid the data link overload. If the actual number of satellites in sight exceeds the value entered in this edit box, the RTCM messages will include data only from the satellites with higher elevations and the number of satellites included in the RTCM messages will not be greater than that specified in the edit box.

The *Health* list box is intended to define the reference station status:

- *Good* – station is operating normally.
- *Bad* – station is not working normally.
- *Unknown* – station health status is unknown.

With the *Measurements Sent* radio buttons, the user specifies the measurement types that will be included into the RTCM message types 18 through 21. Currently, the mentioned RTCM messages always contain C/A measurements. The user can also include either or both P/L1 data and P/L2 data in these messages (on condition that the JAVAD GNSS receiver is configured as a dual-frequency unit).

The *GPS* and *GLONASS* checkboxes, which are grouped together within the *System Used* area, indicate the satellite constellations included in the RTCM message types 18, 19, 20 and 21.

If the *Pseudo-range smoothing* checkbox is selected, the receiver will use smoothed pseudoranges in the RTCM message types 19 through 21.

CMR Settings

With the *Station ID* the user can specify the base station ID, which will be included into the CMR messages transmitted by this base station. On the rover side, this ID allows easy identification of the reference station whose CMR messages are being received by the rover receiver. This ID must be an integer from 0 (default) to 31.

The *Motion* list box characterizes the motion of the reference station:

- *Unknown* – the motion state is undetermined.
- *Static* – the receiver is motionless.
- *Kinematic* – the receiver is in motion.

Use the *Short ID, COGO* and *Long ID* to include the reference station's point feature code[1] into CMR message type 2.

1. Feature code is an alphanumeric code used to describe an object to be surveyed.

The *CA/L1*, *P/L1* radio buttons and the *P/L2* checkbox, which are grouped within the *Measurements Sent* area, allow the user to specify which measurement types will be included into the corresponding CMR messages broadcasted by the reference station. If the receiver is a single-frequency unit, the *P/L1* and *P/L2* controls will not be available.

The *GLONASS message* spin box allows the user to specify which message types will be associated with GLONASS measurements. You can choose any unused message types between 3 and 7.

3.3.5. Rover

In this tab, the user can configure a receiver as a rover station.

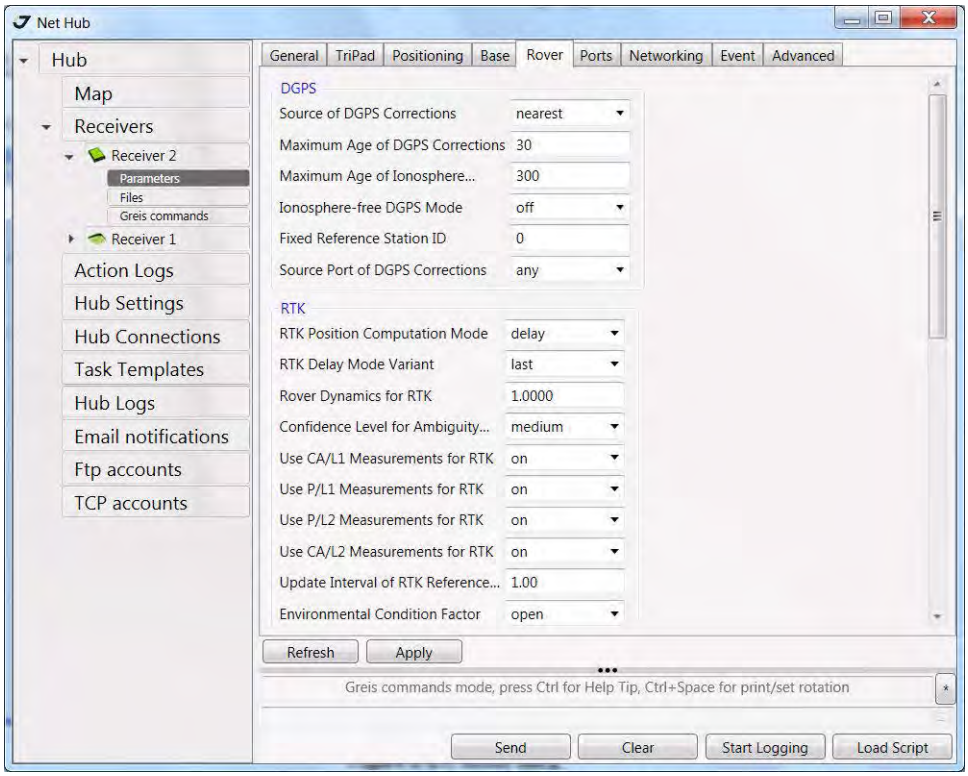


Figure 3-24. Rover tab

DGPS Parameters

Corrections usage

- *Source of DGPS Corrections* - serves to specify the source (port) from which the receiver will use differential corrections for position computation:
    - Best - If the Best radio button is selected, the receiver will use differential corrections that correspond to the most precise of the obtained position estimates. Best means that the solution has the least RMS error.
    - Nearest - If this radio button is selected, the rover will use differential corrections transmitted by the nearest reference station.

  - Any -The rover will use all available differential corrections.
  - User - If this radio button is selected, the rover will use differential corrections from the user defined source
- In the *Maximum age of DGPS Corrections* edit box, the user can set the maximum age (in seconds) of the code differential corrections used for position computation. It must be an integer value between 1 and 1200. The default is 30. If the age of the corrections exceeds the value specified in this edit box, the rover will compute a stand-alone position.
- Use the *Maximum age of Iono Corrections* edit box to specify the maximum age (in seconds) of the ionosphere corrections used for position computation.

  If you set the *Ionosphere-free DGPS Corrections* checkbox to on, the rover receiver will use in position computation both the ionosphere corrections from RTCM message type 15 and differential corrections from RTCM message types 1 and 31 (or 9 and 34).

RTK Parameters

The *RTK position Computation Mode* drop-down list box serves to toggle between the extrapolation and delay modes. If *Extrapolation* is selected, the rover will extrapolate the base station's carrier phase measurements when computing the rover's current RTK position. If *Delay* is selected, the rover will not extrapolate the base station's carrier phase measurements to compute the current rover position. Instead, the RTK engine will compute either a delayed RTK position (for the epoch to which the newly received RTCM/CMR message corresponds) or the current stand-alone position (while waiting for new RTCM/CMR messages coming from the base).

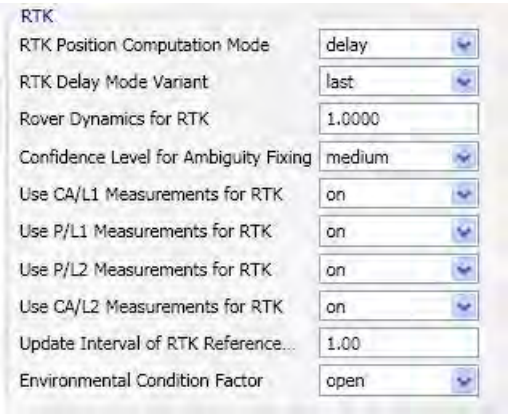


Figure 3-25. RTK Parameters

The *Confidence Level for Ambiguity Fixing* list box governs the process of the RTK engine fixing integer ambiguities. The RTK engine uses the ambiguity fix indicator when making a decision whether to fix ambiguities or not. *Low, Medium* and *High* correspond to the indicator's 95%, 99.5% and 99.9% states, respectively. The higher the specified confidence level, the longer the integer ambiguity search time. This is the price one pays for the higher reliability of the ambiguity fixed solution.

The *Use Measurements for RTK* list boxes allow the user to select measurement types used by the rover for position computation.

In the *Update Interval od RTK Preference* list box the user can set the differential correction update interval. It should be noted here that for a proper rover setup in RTK Delay mode the user should know the exact rate at which the reference station broadcasts its differential correction data.

Note: The receiver will use the Base Corrections period control only if it runs in Delay mode. Also, this edit box is used to provide more reliable synchronization between the base station and rover.

RTK Heading Parameters

This field is used for setting up the heading parameters.

The *Heading Mode* drop-down list box serves to toggle between the extrapolation and delay modes. If *Extrapolation* is selected, the rover will extrapolate the base station's carrier phase measurements when computing the rover's current RTK position. If *Delay* is selected, the rover will not extrapolate the base station's carrier phase measurements to compute the current rover position.

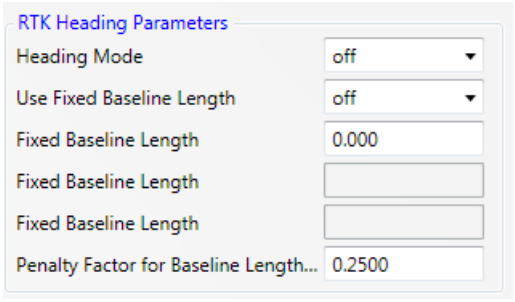


Figure 3-26. RTK Heading Parameters

The *Use Fixed Baseline Length* drop-down list box to toggle between the sets of carrier phase differential data received from the reference station:

- *last* – RTK engine will process the last set of carrier phase differential data received from the reference station.
- *every* – RTK engine will attempt to process all sets of carrier phase differential data sequentially received from the reference station.

Attitude Parameters

This field is used for setting up the attitude parameters: mode, pitch, roll, heading offset, etc.

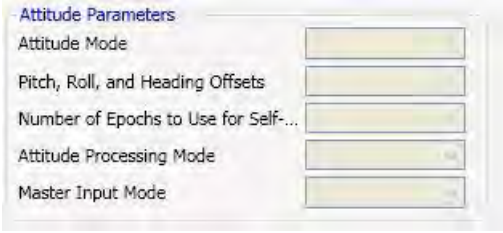


Figure 3-27. Attitude Parameters

3.3.6. Ports

The *Ports* tab, as shown in Figure 3-28, comprises different sections that are reached via the subtabs:

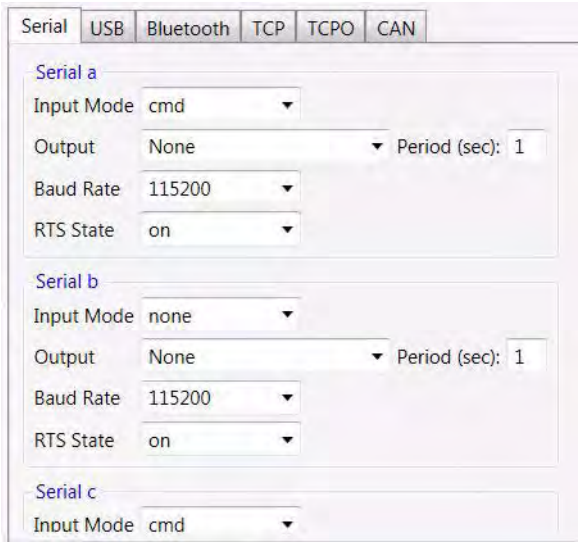


Figure 3-28. Ports tab

- *Serial* – Used to specify the data the receiver serial ports will transmit/receive. See “Serial” on page 57.
- *USB* – Used to specify the data the receiver USB port will transmit/receive. See “USB” on page 59.
- *Bluetooth* - Used to specify the data the receiver Bluetooth port will transmit/receive. See “Bluetooth” on page 59.
- *TCP* – Used to specify the data the receiver will transmit/receive over TCP/IP network. See “TCP” on page 60.
- *TCPO* – Used for transferring corrections to unlimited number of clients.
- CAN – Used to specify the parameters of the CAN port(s). See “CAN” on page 61.

Serial

Use this subtab to adjust the settings for serial ports A, B, C and D (Figure 3-28).

The *Input Mode* list box allows the user to specify what type of data to input on the selected port.

- *cmd*- command mode. Being in this mode, the receiver's port recognizes GREIS commands sent by the user.
- *echo* - echo mode.
- *jps*- GREIS input mode. In this mode receiver is capable to recognize both standard and non-standard GREIS messages.
- *rtcm* - RTCM 2.x input mode.

- *rtcm3* - RTCM 3.x input mode. In this mode the receiver recognizes and decodes the RTCM 3.x messages received through the corresponding port.
- *cmr* - CMR/CMR+ input mode. For more information on CMR format, please refer to ftp://ftp.trimble.com/pub/survey/cmr.
- *omni* - unsupported.
- *none* - means that the port will ignore any incoming data.
- *dtp* - the port is currently attached to the Data Transfer Protocol (DTP), so all the input goes there. This mode could be set only by the `get` GREIS command. The mode will return to `cmd` as soon as DTP terminates.
- *term* - the PPP data link is currently established over this port, so all the input goes there. This mode could be set only implicitly by the PPP stack. When parameter is implicitly set to this mode, attempts to change the mode will fail.

The *Output* list box allows the user to specify what type of data to output on the selected port.

- None – The port outputs nothing.
- DGPS RTCM {1,31,3} – The port outputs RTCM message types 1, 31,3.
- DGPS RTCM {9,34,3} – The port outputs RTCM message types 9, 34, and 3.
- RTK RTCM {18,19,22,3} – The port outputs RTCM message types 18, 19, 22, and 3.
- RTK RTCM {20,21,22,3}– The port outputs RTCM message types 20, 21, 22, and 3.
- RTK RTCM {20,21,22,23,24}– The port outputs RTCM message types 20, 21,22, 23, 24.
- RTK RTCM3 GD min – The port outputs RTCM 3.0 message types GD min.
- RTK RTCM3 GD full – The port outputs RTCM 3.0 message types GD full.
- RTK RTCM3 GGD min – The port outputs RTCM 3.0 message types GGD min.
- RTK RTCM3 GGD full – The port outputs RTCM 3.0 message types GGD full.
- RTK CMR {10,0,1} – The port outputs CMR message types 10, 0, 1.
- RTK CMR+ {10,0,9} – The port outputs CMR+ message types 10, 0, 9.
- RTK JPS min – The port outputs JPS messages.
- RTK JPS max – The port outputs JPS messages.
- User Defined – The port outputs data specified by the user. It means that the user defined an arbitrary message set that will be outputted through the port.

In the *Period* edit box, the user sets the message output interval (in seconds).

Note: It is worth noting, however, that the period of RTCM messages types 22, 3 and CMR message type 1 cannot be changed with this edit box. The default period for the mentioned messages is 10 seconds. If the user wants to change the period, he/she should use the em command from the Manual Mode window. For more details on em refer to the GREIS Reference Manual.

To set the baud rate for the corresponding receiver port, use the *Baud rate* list box.

The checkbox *RTS/CTS* enables/disables hardware handshaking for the port.

USB

This subtab contains settings that allow the user to specify what type of data to input/output on the USB port (Figure 3-29). These settings are the same as those in the *Serial* subtab.

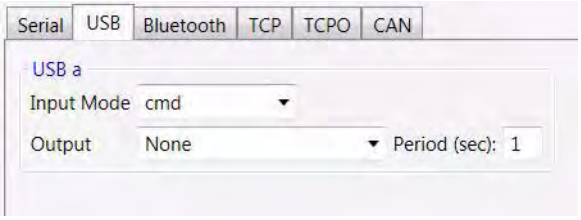


Figure 3-29. USB tab

Bluetooth

This subtab contains settings that allow the user to specify what type of data to input/output on the Bluetooth port (Figure 3-30). These settings are the same as those in the *Serial* subtab. For more information, refer to “Serial” on page 57.

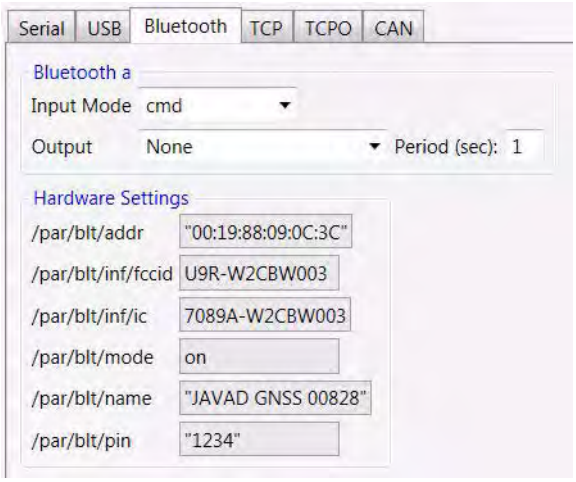


Figure 3-30. Bluetooth tab

Additionally here can be checked and/or specified hardware settings such as Bluetooth FCC ID, IC, Bluetooth mode (on/off), Bluetooth name, and PIN code.

TCP

Note: The settings on this subtab are only available if a connected receiver has the Ethernet capability.

With this subtab, the user specifies what type of data to input/output over the corresponding TCP/IP stream (Figure 3-31). These settings are the same as those in the *Serial* subtab. For more information, refer to “Serial” on page 57.

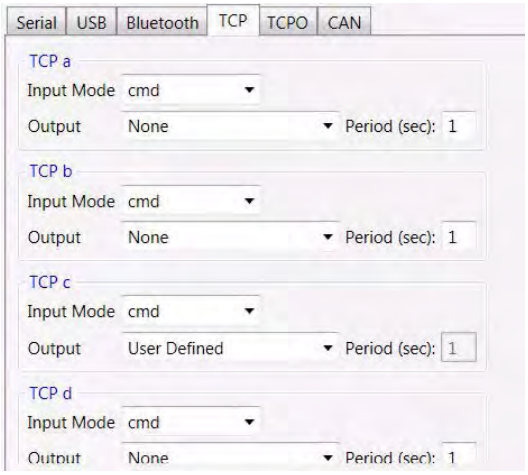


Figure 3-31. TCP tab

TCPO

Note: The settings on this subtab are only available if a connected receiver has the Ethernet capability.

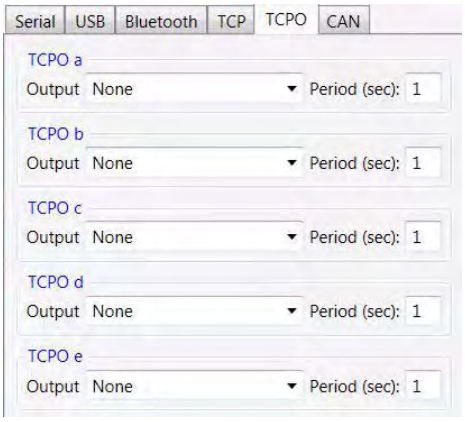


Figure 3-32. TCPO tab

With this subtab, the user specifies what type of data to input/output over the corresponding TCPO port. These settings are the same as those in the *Serial* subtab. For more information, refer to “Serial” on page 57.

CAN

Note: The settings on this subtab are only available if a connected receiver has the CAN port(s).

With this subtab, the user specifies what type of data to input over the corresponding CAN port (Figure 3-33). These settings are the same as those in the *Serial* subtab. For more information, refer to “Serial” on page 57.

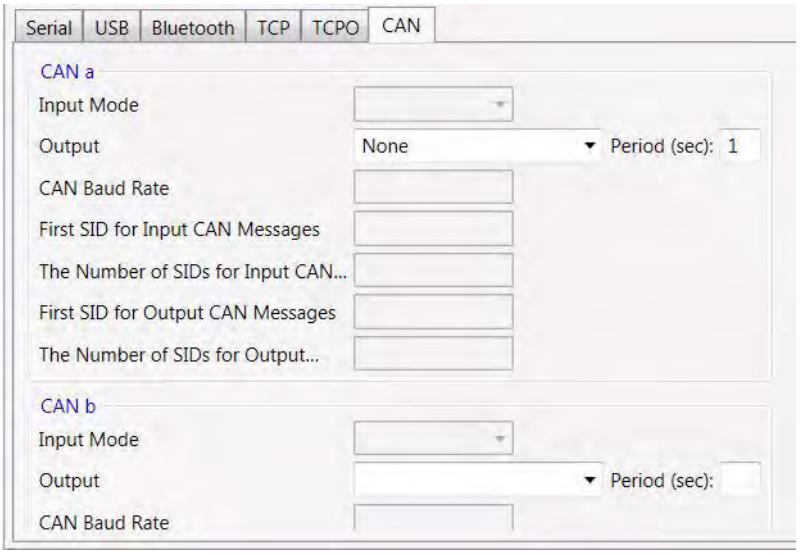


Figure 3-33. CAN tab

3.3.7. Networking Tab

This tab is used to review and configure the networking parameters.

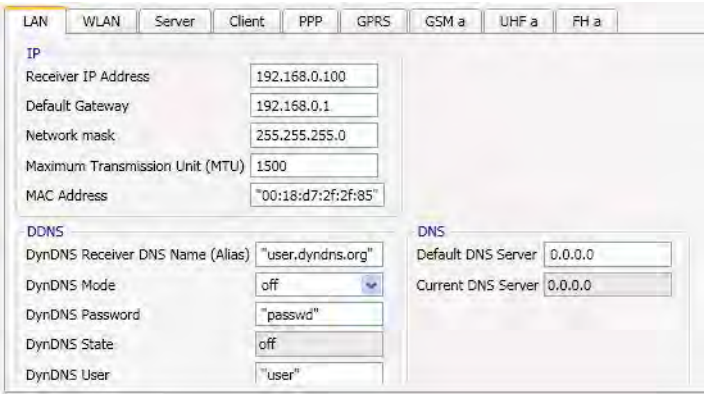


Figure 3-34. Networking

LAN

A local area network (LAN) supplies networking capability to a group of computers in close proximity to each other. A LAN is useful for sharing resources like files, printers, games or other applications. This tab allows the user ti set up the LAN parameters (Figure 3-34): Receiver IP address, gateway, network mask, MAC Address, etc.

Note: Contact your system administrator to obtain these values.

WLAN

A wireless local area network (WLAN) links two or more devices using some wireless distribution method (typically spread-spectrum or OFDM radio), and usually providing a connection through an access point to the wider internet. This gives users the mobility to move around within a local coverage area and still be connected to the network.

This tab allows the user ti set up the LAN parameters (Figure 3-35):

Figure 3-35. WLAN

Note: Contact your system administrator to obtain these values.

Server

This tab allows the user ti set up the parameters for remote receiver control via TCP/FTP connection.

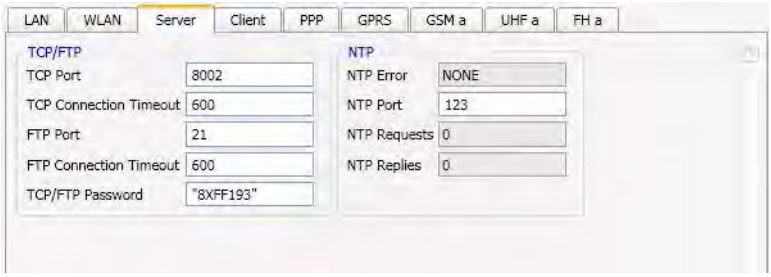


Figure 3-36. Server subtab

Client

The Transmission Control Protocol (TCP) is one of the core protocols of the Internet Protocol Suite. TCP is one of the two original components of the suite, complementing the Internet Protocol (IP), and therefore the entire suite is commonly referred to as TCP/IP.

TCP client mode can be configured using this subtab.

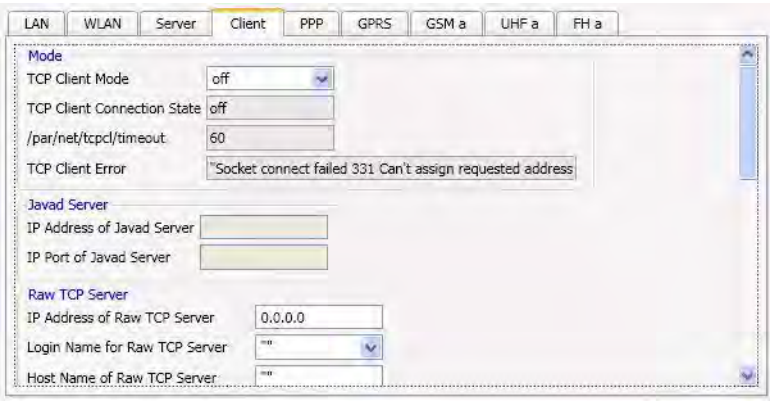


Figure 3-37. Client subtab

- *TCP Client Mode* - allows the user selecting any of the following mode: NTRIP, RCV, etc.;
- *TCP Client connection State* - shows the connection status;
- *Timeout* - shows TCP connection timeout;
- *Error* - TCP error messages.

PPP

This subtab allows user to set up the Point-to-Point protocol parameters:

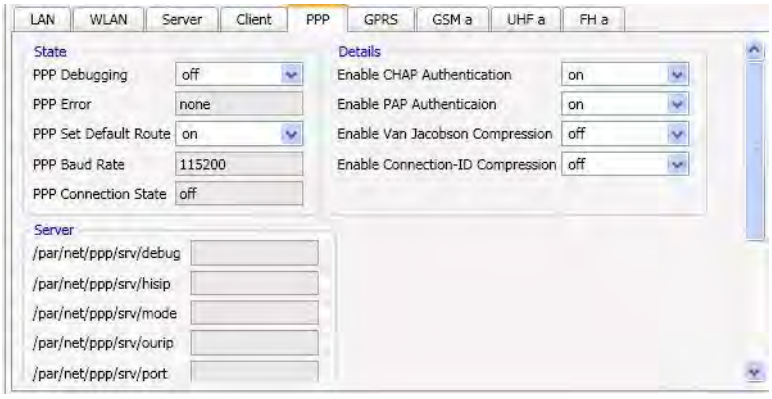


Figure 3-38. PPP subtab

The Point-to-Point Protocol, or PPP, is commonly used to establish a direct connection between two nodes.

Note: Information of PPP parameters is given by Internet service provider.

GPRS

This tab allows user to setup all necessary GPRS settings:

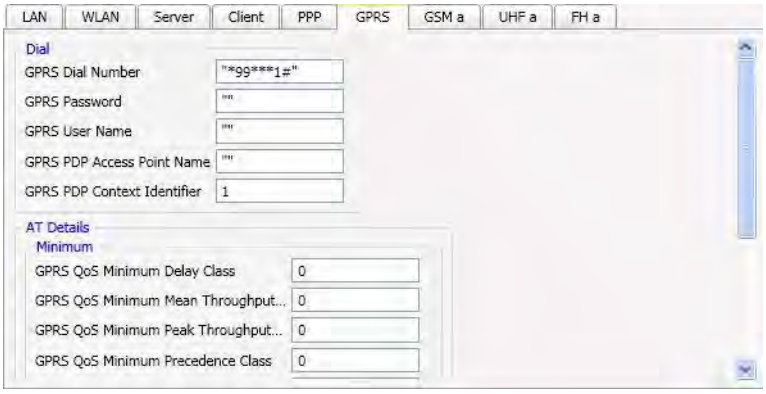


Figure 3-39. GPRS subtab

It is necessary to set the dial number, user name and password, access point name and PDP context identifier to establish a GPRS connection.

Note: This information is given by cell provider.

AT details area is designed for advanced users for finest GPRS tuning. By default, all the settings have the zero value.

Note: We recommend that you do not send any AT commands to the GSM modem before acquire good knowledge of the GPRS parameters.

GSM

This subtab is used to review and configure the GSM module parameters:

Figure 3-40. GSM subtab

Mode drop-down list box allows user to select and setup the GSM modem mode:

- *OFF* means GSM modem is inactive. To change modem's modes user has to set modem's mode firstly to *OFF* and press *Apply* button, then select and setup the necessary mode from the list. *OFF* mode means modem's hardware reset.
- *Slave* means registered in GSM network modem is waiting an incoming call to send a data. The *Slave* mode is required modem mode for the receiver configured as a base.
- *Master* means registered in GSM network modem is dialing up and establishing connection with other modem, using dial number. If the established connection is interrupted, modem dial up and connect anew. The *Master* mode is required mode for the receiver configured as a rover.

PIN Code box allows the user to enter the Personal Identification Number (PIN) of its SIM-card.

The *Dial number* edit box allows the user to set/display a dial number, the phone number of the slave modem to be dialed in to. The number you can insert is a string comprising up to 14 a/n characters.

Note: Mandatory only when running the GSM modem in master mode.

The *Send Time Out* edit box allows the user to set/display a time interval of the service word. The transmit modem will send the service word to the receive modem in every N seconds, where N is a time interval in seconds from 0 to 255. 0 stands for disabled.

Note: If the receiver has not received any data from the modem for designated seconds, the modem will be disconnected and then re-initialized.

In the *Service Word Repeat Period* edit box is possible to set/display a time interval of the service word. The receive modem will receive the service word from transmit modem in every N seconds, where N is a time interval in seconds from 0 to 255. 0 stands for disabled.

Note: To ensure reliable and secure modem communication, the *Receive Time Out* value must be always larger then the period of transmitting differential corrections. Also, care should be taken that the time interval in *Receive Time Out* box is greater than the service word repeat period by 2 to 3 seconds.

UHF

This subtab is used to review and configure the UHF modem parameters (Figure 3-41):

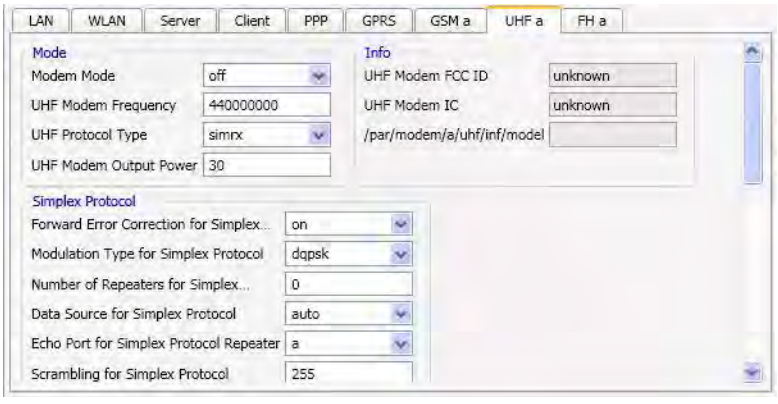


Figure 3-41. UHF subtab

- *Modem Mode* - Turns on/off UHF modem;
- *UHF Modem Frequency* - the user can set the necessary frequency;

- *UHF Protocol Type* - allows selecting protocol type:
    - *Simplex Receiver* - This mode is used for JAVAD GNSS internal/external modem on rover side when the base receiver is equipped with JAVAD GNSS internal/external modem.
    - *Simplex Transmitter* - This mode is used for JAVAD GNSS internal/external modem on base side when the rover receiver is equipped with JAVAD GNSS internal/external modem.
    - *Simplex Transmitter to Repeater* - means the modem is enabled for transmission data from the base receiver equipped with JAVAD GNSS internal/external modem to the Repeater.
    - *Simplex Repeater* - JAVAD GNSS internal/external modem enabled as repeater, with no data being passed to the local communications port.
    - *TRMB Receiver (only GMSK)* - This mode is used for JAVAD GNSS internal/external modem on rover side when the base receiver is equipped with Trimble internal/external modem.
    - *TRMB Transmitter (only GMSK)* - This mode is used for JAVAD GNSS internal/external modem on base side when the rover receiver is equipped with Trimble internal/external modem.
    - *Transparent w/EOT Receiver (only GMSK)* - This mode is used for JAVAD GNSS internal/external modem on rover side when the base receiver is equipped with Pacific Crest PDL modem.
    - *Transparent w/EOT Transmitter (only GMSK)* - This mode is used for JAVAD GNSS internal/external modem on base side when the rover is equipped with Pacific Crest PDL modem.
    - *STL Receiver (only 4FSK)* - This mode is used for JAVAD GNSS internal/external modem on base side when the rover receiver is equipped with Satel modem (model SATELLINE-3AS).
    - *STL Transmitter (only 4FSK)* - This mode is used for JAVAD GNSS internal/external modem on rover side when the base receiver is equipped with Satel modem (model SATELLINE-3AS).
- *UHF Modem Output power* - This edit box allows the user to set/query the output power value from 0.03W to 1W.
- *Forward Error corrections* - allows the receiving modem to correct burst and single bit errors in the incoming data stream. When enabled, an additional 4 bits per byte of data is transferred over the RF link. This effectively reduces the data throughput in proportion to the overhead bytes. Leave FEC enabled unless the data throughput requirements make the overhead unacceptable.
- *Scrambling* - Enable or disable data scrambling. Select the *Scrambling* check box if you want data to be scrambled. Otherwise, keep it clear. For optimal operation of the GMSK modulation, data should be scrambled. When enabled, the radio modem scrambles and unscrambles the data on transmission or reception via an exclusive-OR operation with a pseudo-random bit stream. Do not disable scrambling unless the DTE performs data scrambling and produces a data stream with approximately the same number of 1's and 0's. Use the *Apply* button to accept the changes you have made in the tab.

FH

This subtab is used to review and configure the FH modem parameters:

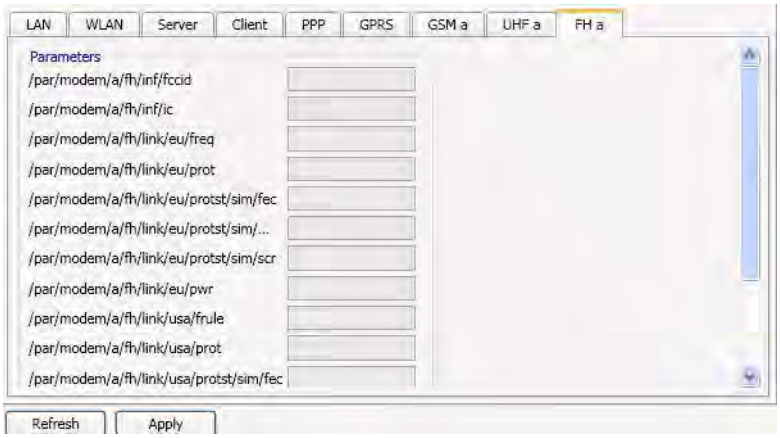


Figure 3-42. FH subtab

3.3.8. Event Tab

This tab is used to review and configure the 1PPS signal and Event marker settings.

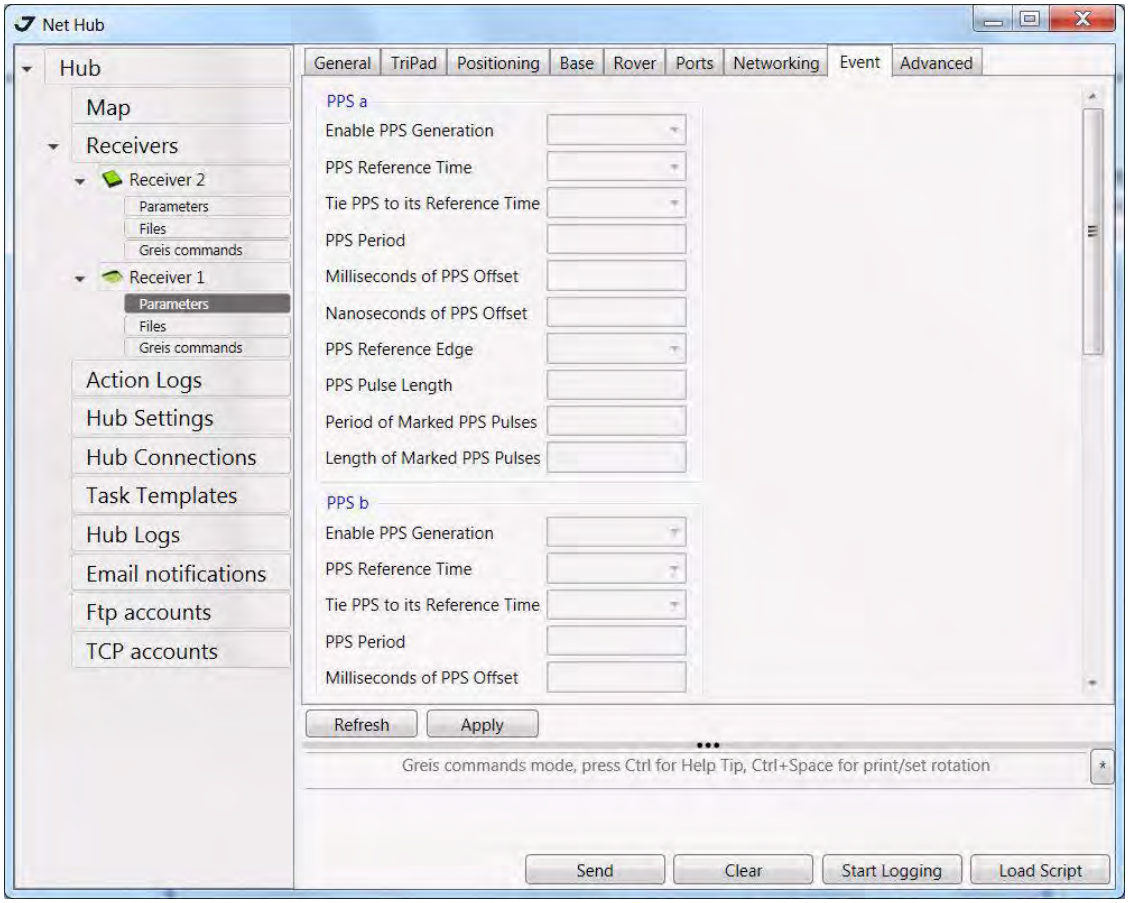


Figure 3-43. Event tab

The *Enable PPS Generation* list boxes (for PPS a and PPS b) enable the receiver to generate 1PPS signals and also allows the user to modify the settings related to the selected 1PPS signal.

The *PPS Reference Time* list box allows the user to select the reference time that the 1PPS signal will be synchronized with. There are four available reference time scales:

- *GPS* means GPS system time.
- *GLO* means GLONASS system time.
- *UTCus* means UTC(USNO).
- *UTCsu* means UTC(SU).

If the user has selected the *Tie PPS to its Reference Time*, the receiver will synchronize the 1PPS signal with the chosen reference time. Otherwise, 1PPS will be synchronized either with the receiver's internal clock or with an external reference frequency applied to the receiver.

The *PPS Period* edit box determines the rate of generating the 1PPS signals via the corresponding output connector.

The user can determine millisecond and nanosecond parts of PPS signal offsets with respect to the selected reference time grid using the *Milliseconds of PPS Offset* list box for millisecond part and *Nanoseconds of PPS Offset* for nanosecond part.

With the *Period of Marked PPS Pulses* edit box, the user specifies the period of the marked 1PPS signal.

Using the *Length of Marked PPS Pulses* the user synchronizes the edge (rising or falling) of the 1PPS signal with the specified reference time.

In order to enable or adjust the event input function, use the controls described below.

In the *Synchronize Receiver Clock with...* list box, the user specifies that the receiver executes a one-time synchronization of its one-millisecond cycle grid with the corresponding edge of the event signal.

The *Status of Receiver Clock* indicator shows whether the receiver clock is actually being synchronized with the event signals or not. If you see *on* in the field, it means the synchronization has been done successfully.

The *Rise* and *Fall* values of *Event Reference Edge* serve to measure the time of either the rising edge or falling edge of the input event signal.

3.3.9. Advanced

Warning: *Only change these advanced settings when it is known what they mean. Unsuitable changes to these subtabs can cause the receiver to run improperly. If you are doubtful of any changes you made to these subtabs, click the Set all parameters to defaults button to get the factory default settings back. For a description of these subtabs, refer to the corresponding paragraphs below.*

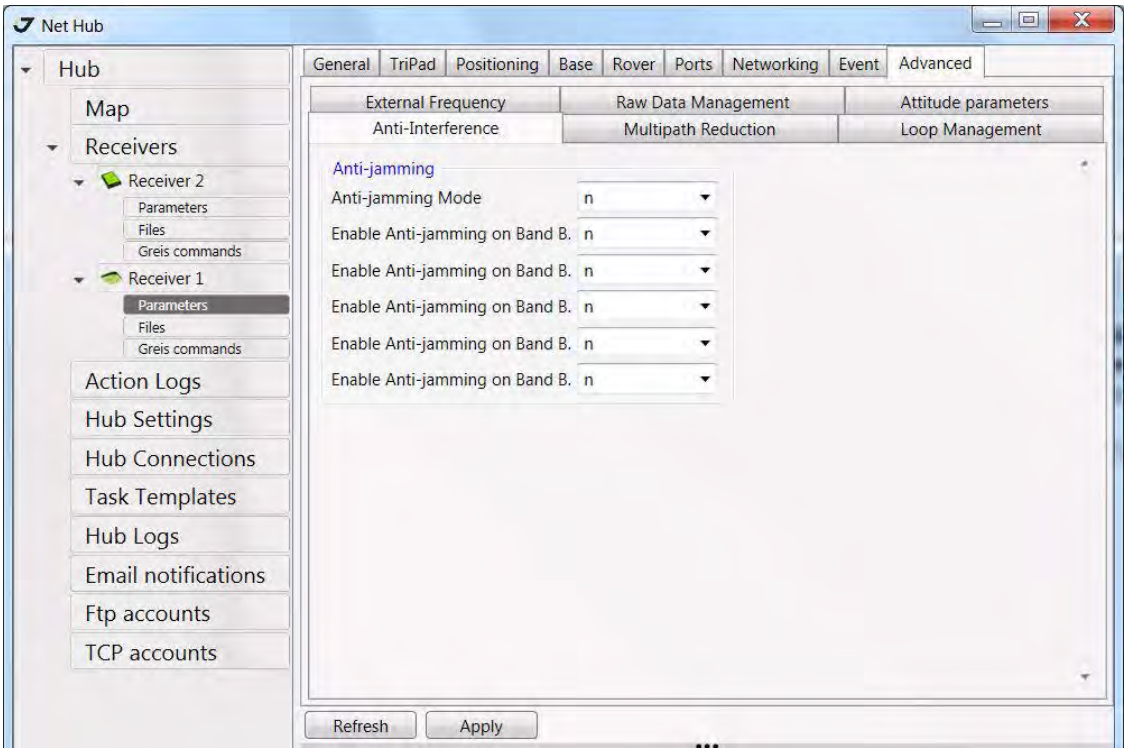


Figure 3-44. Advanced tab

Anti-Interference

With the Anti-Interference radio button group (Figure 3-45), the user enables mode allowing the JAVAD GNSS receivers to suppress the impact of narrow-band interferences.

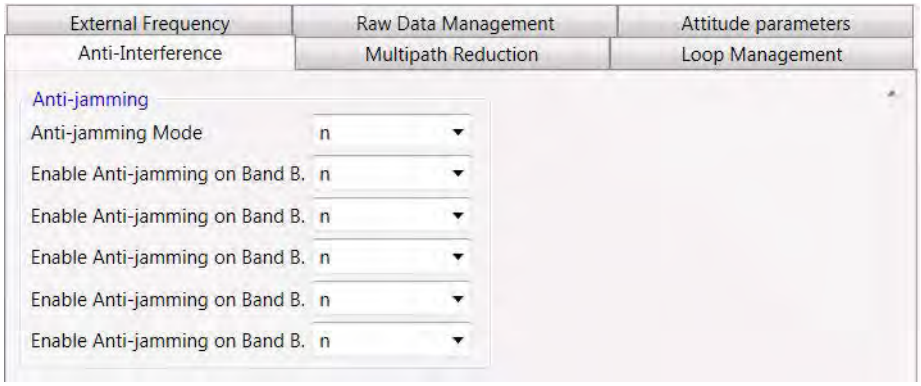


Figure 3-45. Anti-Interference subtab

The user can assess the presence of interference based on the following information:

- When the number of tracked satellites is fewer (by 2 or greater) than the number of satellites in view.
- When the signal-to-noise ratio (C/N0) in the C/A channel for the satellites having elevations above 30 degrees does not exceed 40 dB/Hz.
- When the information about interferences indicates that Jamming Suppressor detected interference signals within the specified band and also the strength of aggregate in-band interference is characterized as high or hard. This information you can obtain with the command `em,,jps/JI`.

Multipath Reduction

The list boxes *CA/L1 Carrier Phase Multipath Reduction* and *CA/L1 Carrier Multipath Reduction* are used for mitigation of the multipath phenomenon (Figure 3-46).

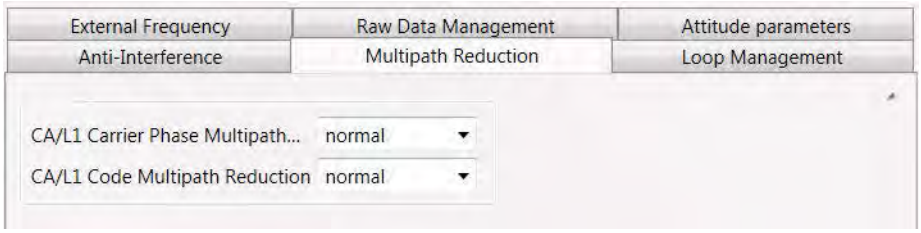


Figure 3-46. Multipath Reduction subtab

When the reference station and rover station run in DGPS mode and they are not free from the impact of multipath, we recommend that you select the Code multipath reduction checkbox for both the reference and rover stations.

Note: If you use a pair of receivers in RTK mode, you can additionally select the checkbox Carrier multipath reduction for both receivers.

Loop Management

In this subtab the user can configure the settings that deal with the receiver capability of searching, acquiring and tracking the GPS+ satellite signals (Figure 3-47 on page 71).

Warning: *Care should be taken when changing the settings for this subtab. JAVAD GNSS recommends that users do not change these settings without good reason.*

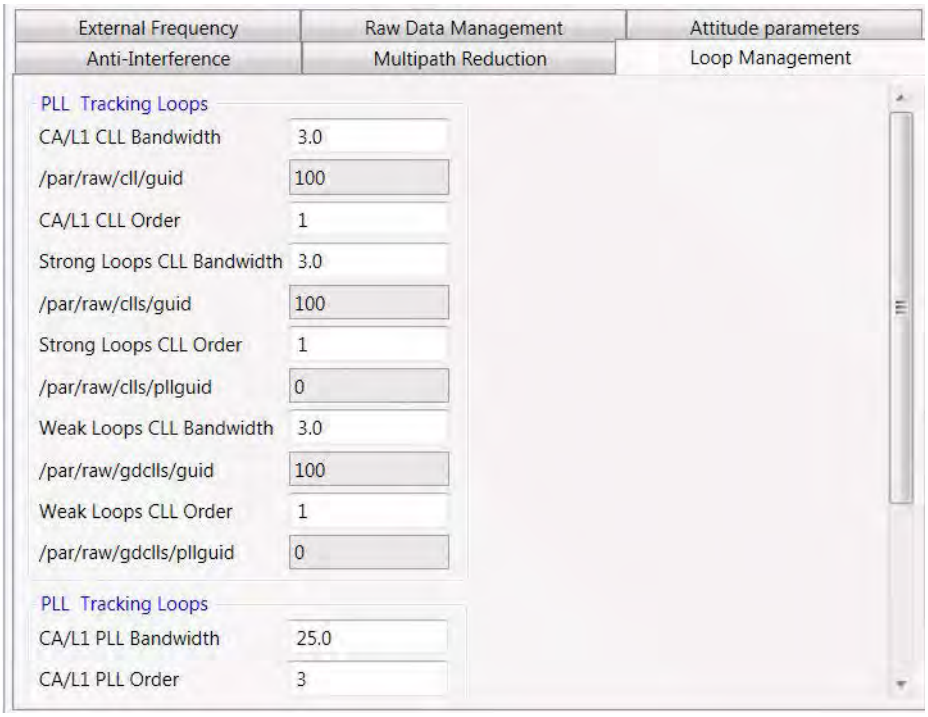


Figure 3-47. Loop Management subtab

The *CA/L1 CLL Bandwidth* edit box governs the noise bandwidth of the guiding phase lock loops. In this box, you can enter values between 2 and 50 Hz.

With the *CA/L1 CCL Order* edit box, the user can toggle guiding and common lock loop order between 2 and 3. Care should be taken when using a 2nd order PLL because this can adversely affect satellite signal tracking in some cases.

The *Strong Loops CCL Bandwidth* edit box governs all of the guided loops but the C/A DLLs. Here the user can enter values between 0.1 Hz and 10 Hz.

The C/A code guided loop bandwidth edit box specifies the bandwidth of the receiver's C/A group delay lock loop. In this box, one can enter the values between 0.1 Hz and 50 Hz.

With the Enable Adaptive Guided Loops checkbox, the user enables/disables the use of adaptive guided loops. If the user selects the checkbox, the receiver will adjust the guided loops bandwidths depending on the actual strengths of the signals tracked. The weaker the signals, the narrower the bandwidths.

With the Enable P/L1 and P/L2 tracking checkbox the user can adjust tracking settings for the receiver. If one has either a single-frequency receiver or L1 only antenna, it is recommended to disable tracking of the P/L1 and P/L2 signals.

Note: Enable the Static Mode parameter only if the receiver antenna is completely stationary. If your receiver antenna may have some movement, even for a few millimeters, disable the Static Mode parameter. Moving the antenna while in Static Mode may result in a loss of lock to satellites.

The Bandwidth of individual PLL and Bandwidth of common PLL edit boxes mean exactly what their names imply.

Select the Enable L2 common loop checkbox to avoid the loss of L2 phase tracking in dynamic applications due to antenna rotation around its axis.

External Frequency

The settings on this subtab, allow the operator to configure the use of reference frequency (Figure 3-48). It may be either a high-stability external frequency or the receiver's internal crystal oscillator.

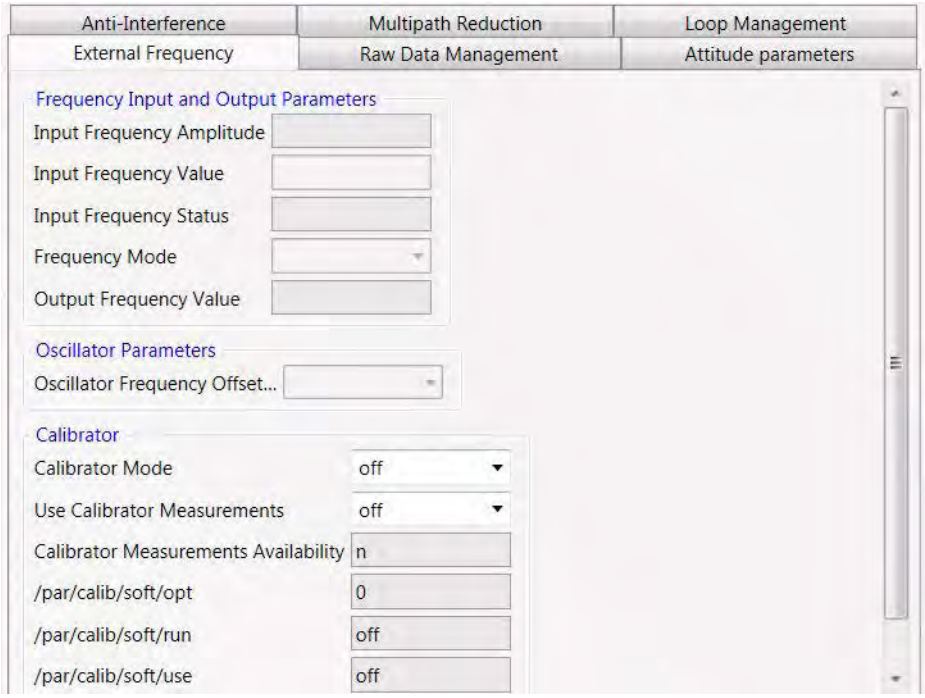


Figure 3-48. External Frequency tab

With the controls in the group, the user specifies the reference frequency input that the receiver will use:

- Internal – means the receiver uses the internal oscillator.
- External – means the receiver uses an external frequency.

Note: By switching from Internal to External and vice versa may result in a temporary loss of lock to satellites.

External Frequency Source Parameters

With the Ext. frequency value edit box the user specifies nominal external frequency value. Here the user can enter the integer values between 2 and 40 MHz. The default value is 10 MHz.

The Ext. frequency source status field shows whether the external frequency is being used or not:

- off – Indicates that the receiver is using the internal crystal oscillator.
- wait – Indicates that the receiver is waiting for the external frequency lock. More precisely, this value will be returned in the following three cases:

  –If the external frequency oscillator is disconnected

  –If the amplitude of input signal is too low

  –If the actual external frequency is different from that specified in the Ext. frequency value edit box
- locked – Indicates that the receiver is using the external frequency.

With the Ext. freq. signal amplitude field the user can estimate the external frequency signal amplitude:

- off – Indicates that the internal oscillator is actually being used.
- low – Indicates that the external frequency signal's amplitude is lower than needed.
- ok – Indicates that the external frequency signal's amplitude meets the specs.

The Oscillator Offset Reduction group box allows the user to govern the behavior of the internal crystal oscillator.

- The Off radio button means that the oscillator frequency offset reduction mode is turned off.
- The Freq. Locked radio button means that the receiver will adjust the internal oscillator's frequency until the measured frequency offset is reduced to zero. By using the incoming satellite signals, the receiver will force the internal oscillator to generate a very stable 20 MHz frequency signal. This frequency output is available via the corresponding receiver output pin.

Note: The user is able to monitor the offset reduction in the Clock offset field of the GEO tab. After selecting Freq. Locked the value in Clock offset starts to reduce and soon (usually in a few minutes) it will become equal to zero, while in contrast Osc. Offset will not change much.

The Freq. and Time Locked radio button means that the receiver will adjust both the internal oscillator's frequency until the measured frequency offset is reduced to zero and the internal clock until it gets fully synchronized with the specified reference time scale.

Note: Switching from Freq. Locked or Freq. and Time Locked to Off may result in a temporary loss of lock to satellites.

Freq. Locked guarantees that the receiver's 20 MHz output will have long-term stability, not necessarily short-term stability. However, there is a way to assure that both of these characteristics will be good enough. It can be done by selecting Enable Common tracking on the Loops Management subtab.

Attitude Parameters

This subtab, which is shown in Figure 3-49 on page 74, contains the controls for specifying the multi-antenna system parameters:

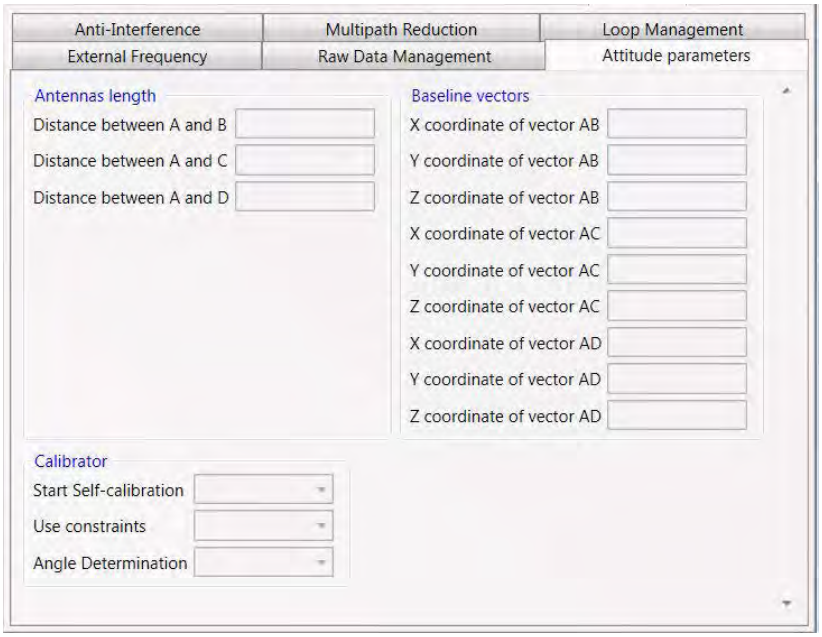


Figure 3-49. Attitude Parameters tab

Raw Data Management

This subtab, which is shown in Figure 3-50, contains the controls for specifying the frequency at which the receiver will update raw measurement and position. Also, the user may set up the controls that affect the signal processing.

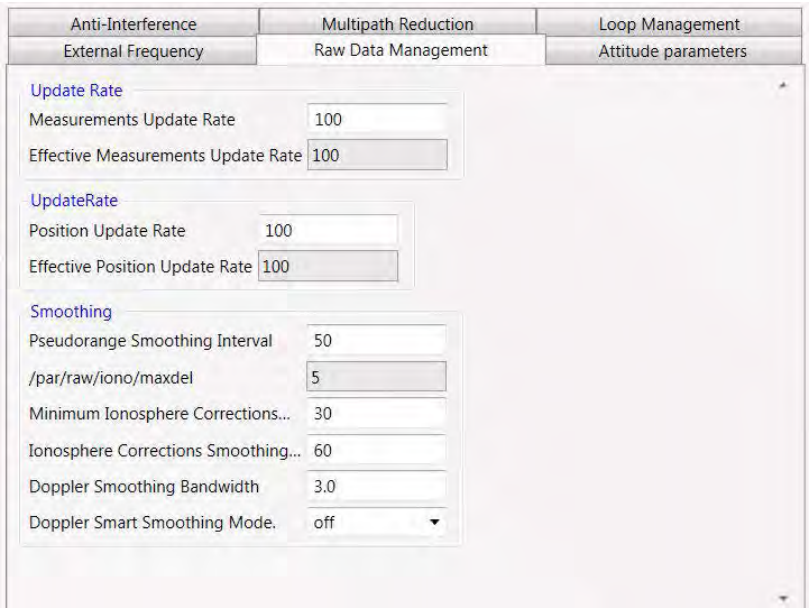


Figure 3-50. Raw Data Management tab

The *Measurements Update Rate* group allows the user to determine the raw data update period. In the *Update Rate* edit box, enter a value (in milliseconds) to specify the period. With *Effective Measurements Update Rate*, the user can check which period is actually being used by the receiver.

The *Position Update Rate* group allows the user to determine the receive position update period. In the *Update Rate* edit box, enter a value (in milliseconds) to specify the period. With *Effective Position Update Rate*, the user can check which period is actually being used by the receiver.

The *Pseudorange Smoothing interval* edit box specifies the interval over which pseudoranges are smoothed by using corresponding carrier phase measurements. Here you can enter values between 0 and 900 seconds. Zero designates that carrier phase measurements will not be used for smoothing pseudo-ranges.

With *Ionosphere Correction Smoothing Interval* edit box, the user specifies the nominal ionospheric correction smoothing interval over which raw ionospheric corrections are smoothed (assuming the receiver has been working for some time and has already obtained enough raw ionospheric corrections to perform such smoothing). This integer parameter varies between 0…900 seconds. The default value is 60.

With the *Minimum Iono Smoothing Interval* edit box, the user specifies the minimum smoothing interval for the receiver to filter raw ionospheric corrections before they can be used in position computation. This integer parameter ranges between 0 and 900 seconds. The default value is 30 seconds.

In the *Doppler Smoothing Bandwidth* edit box, the user sets the method used for smoothing Doppler. There are three available methods:

- Receiver outputs raw (unsmoothed) Doppler. Instantaneous yet rather noisy Doppler measurements.
- Doppler is computed using two consecutive carrier phase measurements, CarPhase[i] and CarPhase[i-1], where i stands for the current epoch. Such Doppler measurements are less noisy than in the first case.
- Doppler is computed using three consecutive carrier phase measurements, CarPhase[i], CarPhase[i-1] and CarPhase[i-2], where i stands for the current epoch. Doppler measurements obtained in this mode, are least noisy.

3.4. GREIS Commands

At the right pane there is a box which allows direct control of the receiver by using GREIS commands. In manual mode NetHub serves as a terminal communicating with the receiver, (i.e., it allows the user to send various receiver commands and get responses to these commands). For a complete list of commands supported by JAVAD GNSS receivers, refer to the *GREIS Reference Manual*. This document is available for download from the JAVAD GNSS website (http://www.javad.com/).

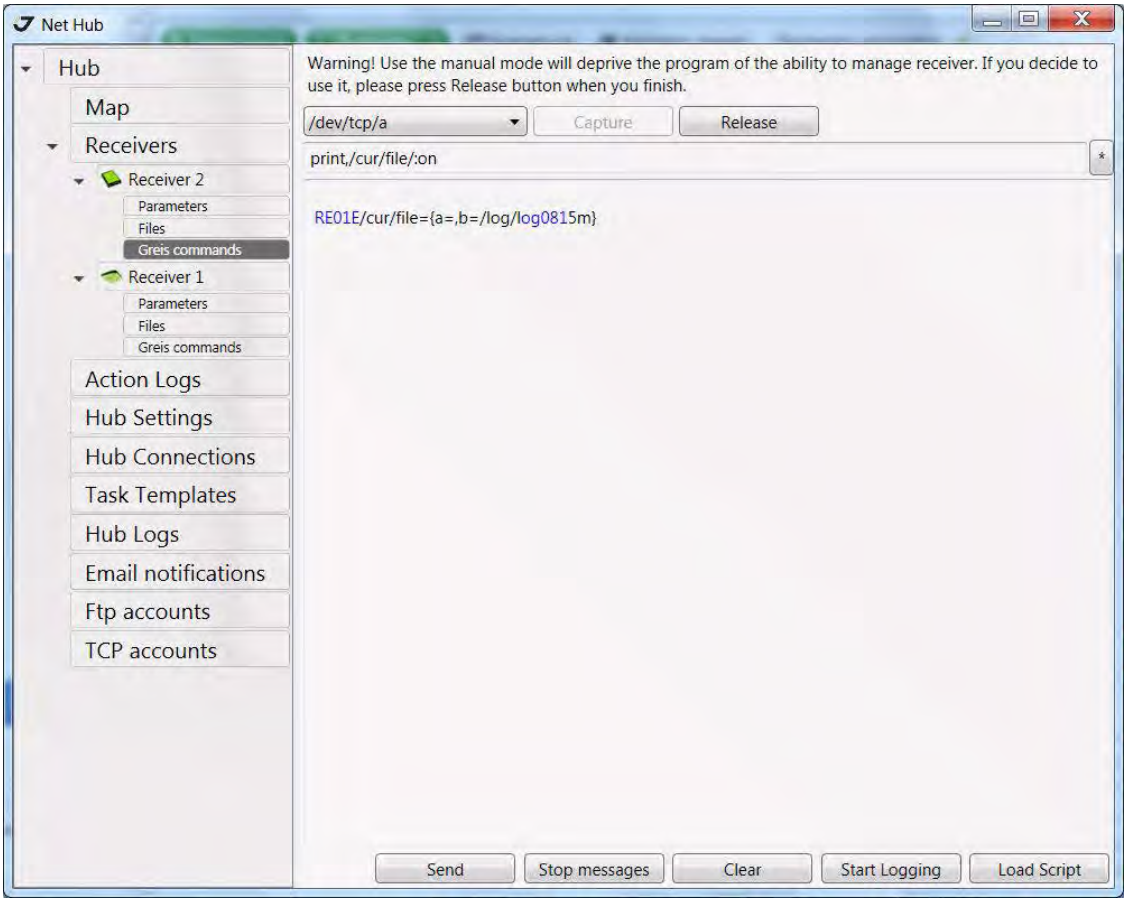


Figure 3-51. Manual command entering

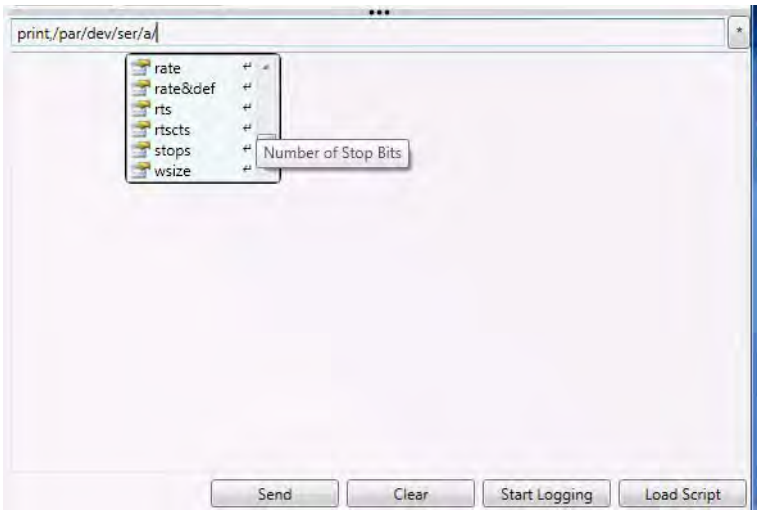
Note: We recommend that you do not send any commands to the receiver from the Manual Mode window before you familiarize yourself with the GREIS Reference Manual and acquire good knowledge of the receiver parameters.

The size of this field can be changed by stretching out the slider, which separates the parameters and the field for manual input. The slider has a typical three points in the middle.

At the top of the *Manual Mode* field there is a command line box in which the user can type a (new) command line. Alternatively, the user can open the combo-box list and select one of the previously used command lines. Note that there may be stored up to twenty (20) command lines in the list. Once the desired command line is typed (or selected), click the *Send* button or just click the *Enter* key on your

keyboard. The receiver's responses will be displayed in the receiver replies window located under the command line box.

Here, the manual entry of commands is limited, and can be sent `set` and `print` commands only, and can not be shown the output of the message flow. This is due to the fact that the program continues to use the channel for their needs, for example for downloading a file, or a service base / rover, and while sending the command is interrupted for a short time to serve this request. Then immediately returns to the execution of planned operations.



When you enter a command you can use the tip box. Choose the desired item prompted with the arrow and click on it or press Enter.

Figure 3-52. Tip box

- To cancel the window prompts and enter arbitrary commands, press Esc. In this case, when you press the Enter, command is sent to the receiver. To call the tips briefly press Ctrl.
- In the input line commands can be replaced with “set” on “print” and vice versa, by pressing the key combination Ctrl + Space.
- The right of the input command is a button bring up the last commands list.
- Call this window you can also use shortcuts Ctrl + J.
- To write to a file of all sent and received commands, click on the “Start Logging”. The inscription on the button automatically changes to “Stop Logging”.
- To download the script, click “Load Script”. The program supports a scripting language Tcl.

The program allows you to send commands to the receiver, which has exclusive grip. In this case, the internal engine of the program does not use this connection, so in this mode, the user can see all the data sent by the receiver to the port.

Select *Manual Mode* on the left and click *Connect* button. Click *Disconnect* after finish to prevent the possible problems with receiver management.

3.4.1. Load Script Button

To load script click the Load Script button. Browse the script file location and select the desired file. The file will be loaded and the script executed. NetHub supports TCL scripts. At the start of the script file should be the following string: `#!/usr/bin/tcl`. Without this string the script won't be recognized as a script.

Below is the example of the script:

```
#!/usr/bin/tcl
 puts "Checking of baud rate of serial port a. Expected value is 115200"
set result [send "print,/par/dev/ser/a/rated"]
# variable 'result' contains result of operations 'send'
# [lindex $result 0] shows error code. If code is "none" it means no errors.
if {[lindex $result 0] == "none"} {
# Error code is 'none'
# [lindex $result 1] contains answer on command print,/par/dev/ser/a/rated
if {[lindex $result 1] == "115200"} {
puts [concat "Correct baut rate: " [lindex $result 1]]
} else {
puts [concat "Incorrect baut rate: " [lindex $result 1]]
}
} else {
# # Error code is NOT 'none', [lindex $result 1] contains error text
puts [concat "Error while read baud rate. Error code '" [lindex $result 0] "' " [lindex
$result 1]]
}
puts "Script stoped"
```

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