# NTL105

# CONNECTION AND SETTING UP

Getting Started Guide

2020

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## 1 CONNECTION TO PC

NTL Browser is a software tool designed to communicate with NTL105 through **NTL Adp Board** (or other interface adapter designed by NTLab company). It is provided as a zip file. It is available on NTLab company FTP server. Link (password and login) may be provided on request.

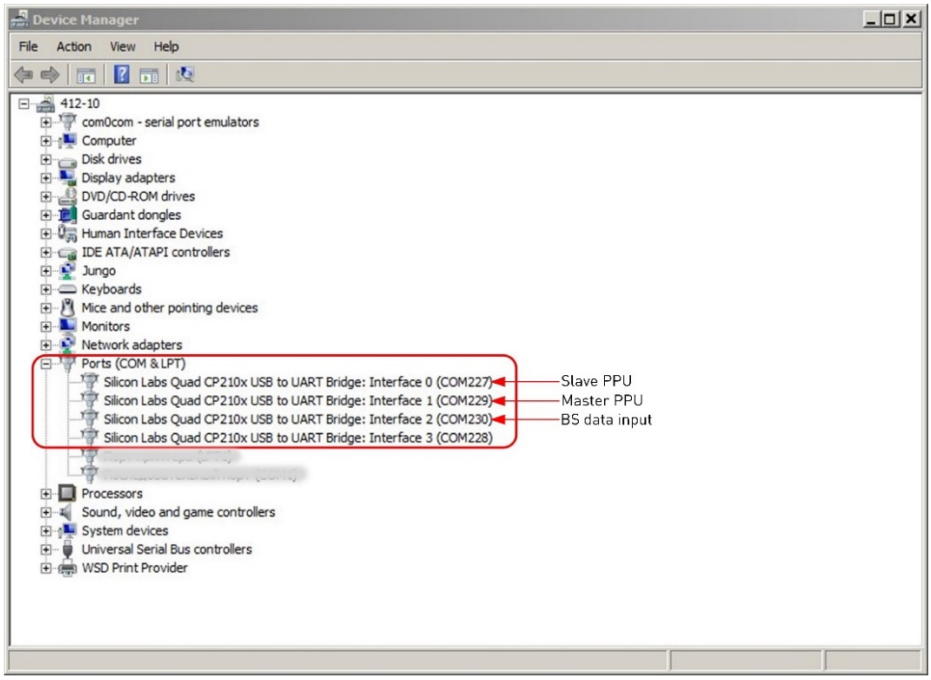
***Follow to the next steps to connect NTL105:***

1. Install NTL Browser on computer.
2. Install CP210x drivers on computer. Utility software downloadable from: https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers
3. Connect NTL105 to the **NTL Adp Board**.
4. Connect Master and Slave antennas to NTL105 (connector X1 and X2 of the NTL105, respectively).
5. Connect **NTL Adp Board** to PC through mini USB cable (connector X1 of the **NTL Adp Board**).

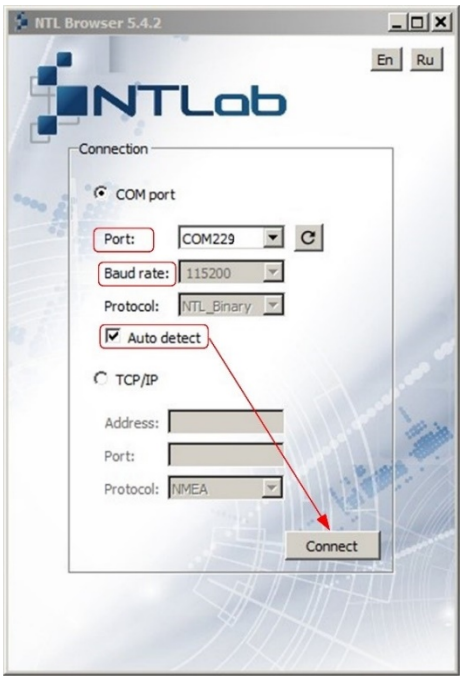
**NTL Adp Board** provides +5V supply voltage for navigation module and simplifies connection to host computer.

NTL105 UART outputs is available on PC via on-board 4xUART to USB converter (CP210x based) as virtual COM ports.

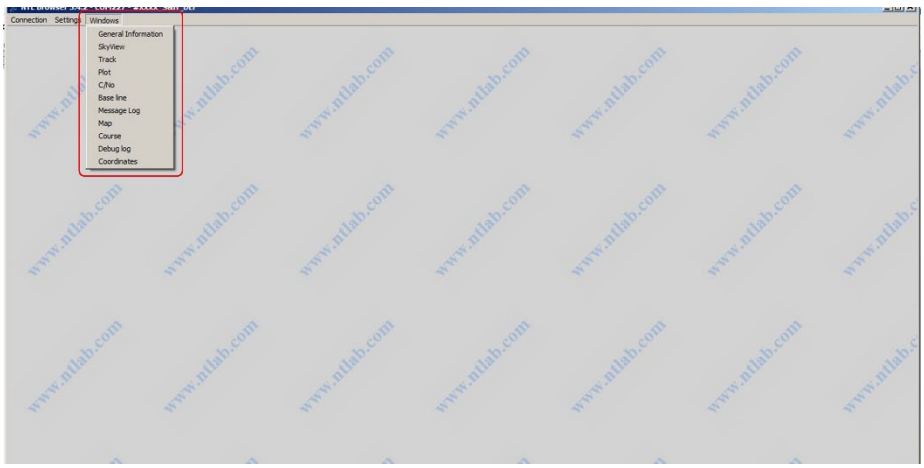
At this stage, four virtual COM ports should be detected on operating system. Three of four virtual COM ports provide access to the NTL105. The Master PPU is available through COM229 (**Interface 1**), the Slave PPU – through COM227 (**Interface 0**) and Base Station (BS) data input – through COM230 (**Interface 2**). See example below. The slave PPU doesn't require any additional setting, so the further description will be skipped.



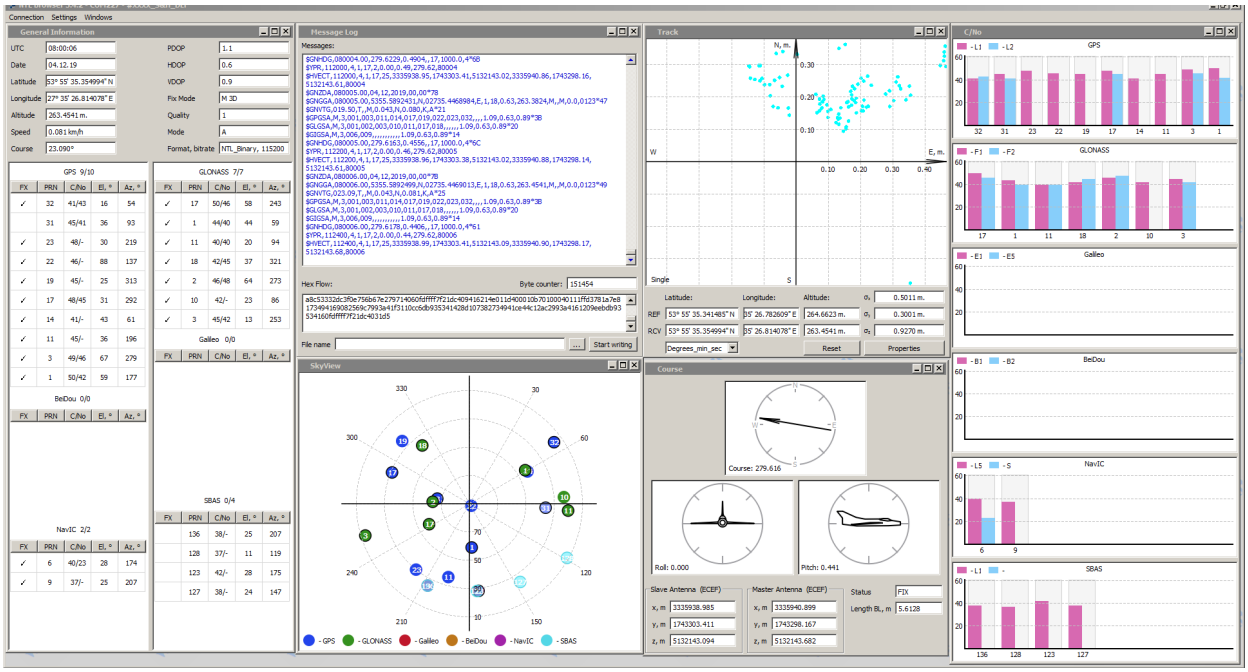
6. Run NTL Browser on computer. Then configure it:
   - Select interface language in the upper right corner of welcome page;
   - Connect to the COM229 **Port**. Port number could be different for alternative PC;
   - Set up 115200 **Baud rate** and NTL Binary **Protocol** type or Set up **Auto detect** checkbox to define them automatically
   - Click on the **Connect** button to continue.




NTL Browser Main page consists of the multiple windows, that can be switched on/off in **Windows** toolbar. Select necessary windows for your work.



Windows display different navigational information and may be configured on demand (see example below).



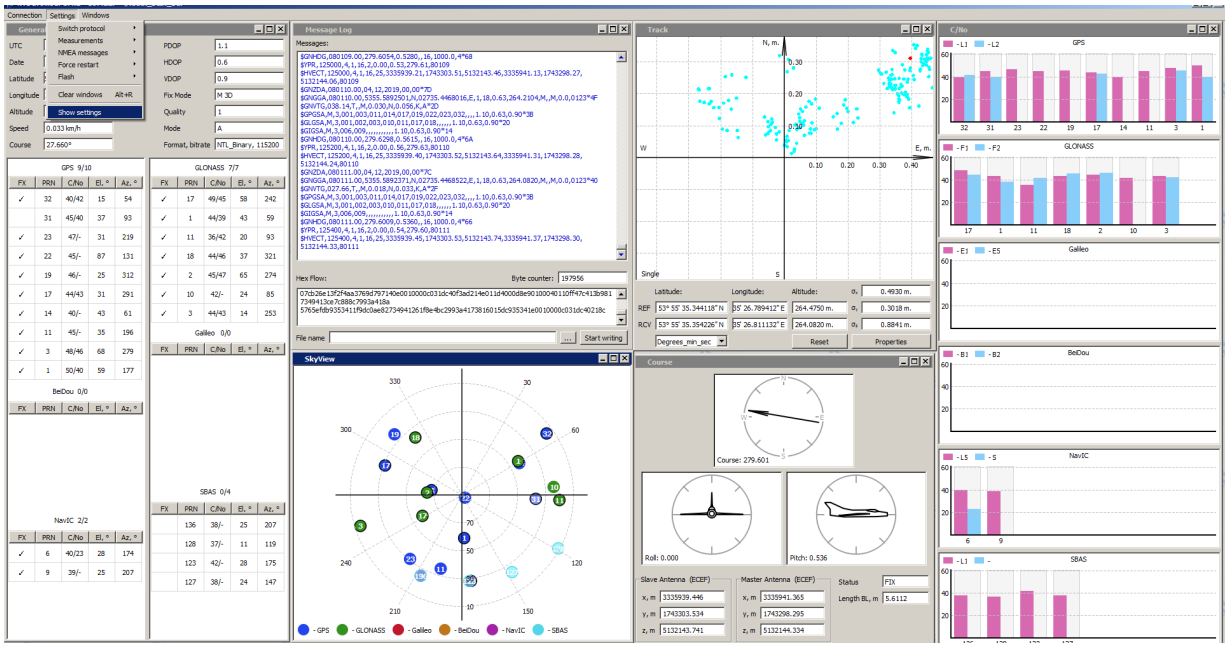
**Message Log** window displays periodical messages coming from the receiver. While the interface mode is NTL Binary, messages have binary format. You can see textual interpretation of their content in **Message Log** window printed in blue color. If the interface mode is NMEA, received data is printed directly in **Message Log** in black color.

## 2 HEADING DETERMINATION MODE (SINGLE+HEADING)

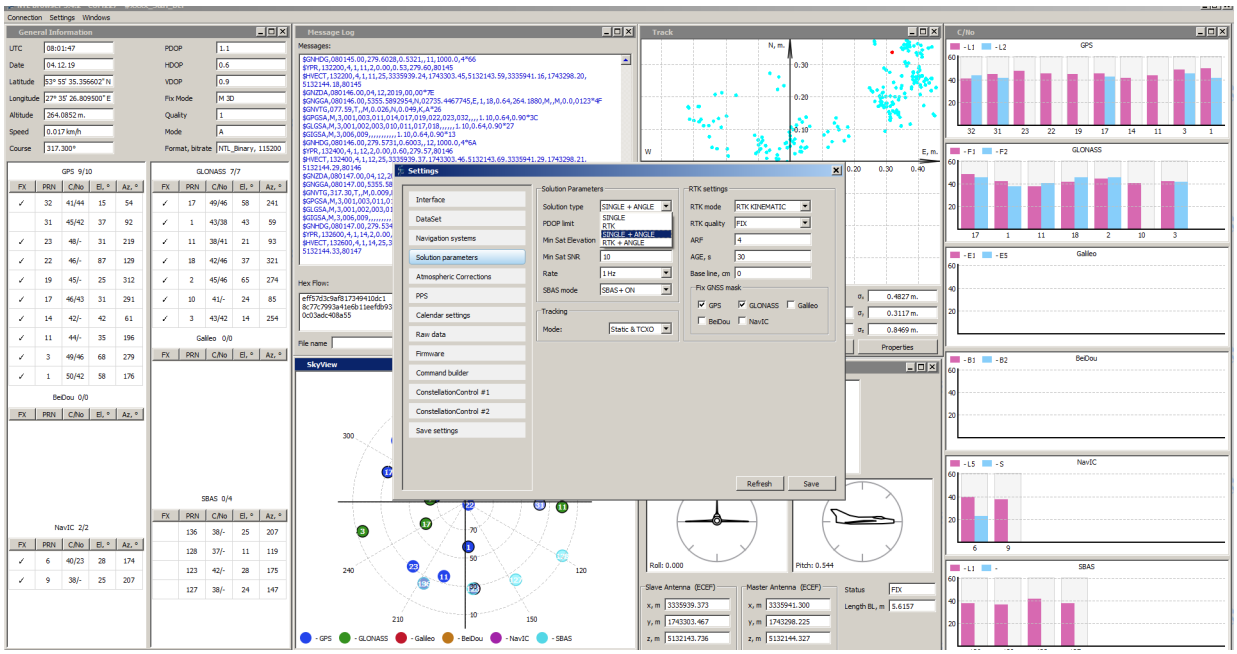
By default, master PPU channel operates in *Single solution* mode and processes GPS and GLONASS signals. While operating in NTL Binary mode, configuration settings are available in **Settings** menu.

***Heading determination mode can be switched on:***

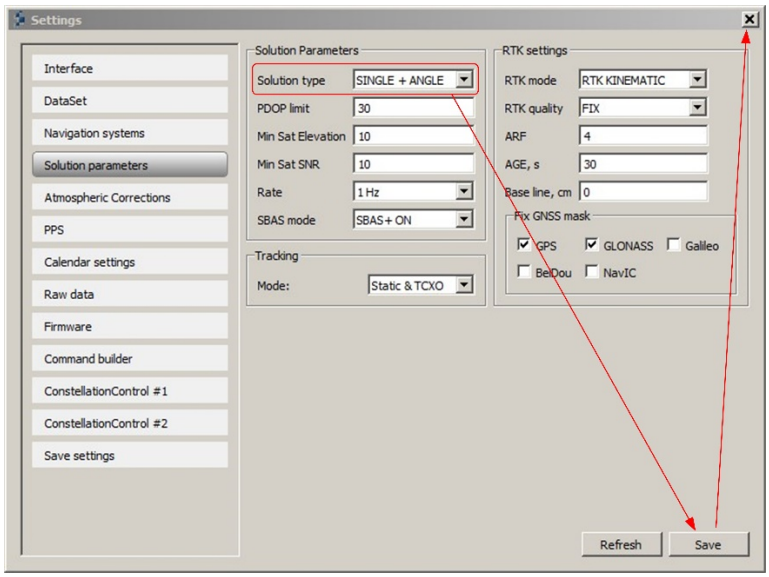
1. Select the **Settings/Show settings** section



2. Then select the **Solution parameters** section



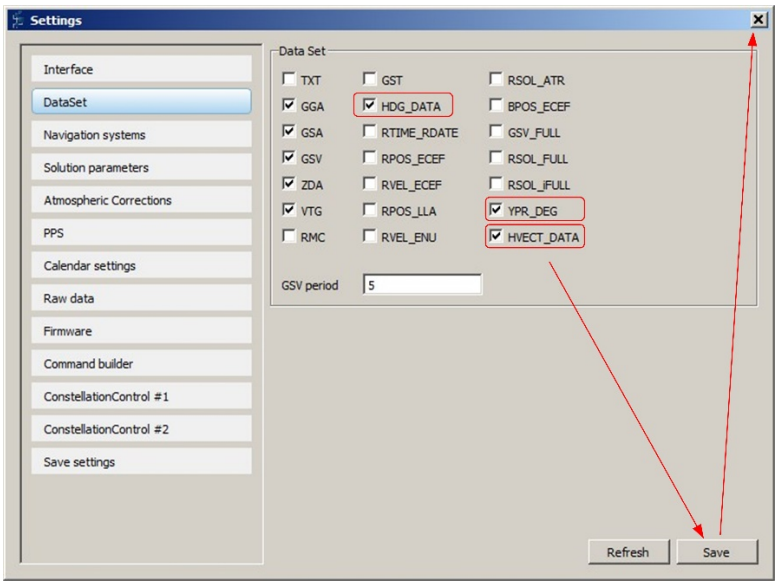
- In the **Solution Parameters** sub-section, select '**SINGLE+ANGLE**' as the **Solution type;**
- Click on the **Save** button. Exit the **Settings** section.



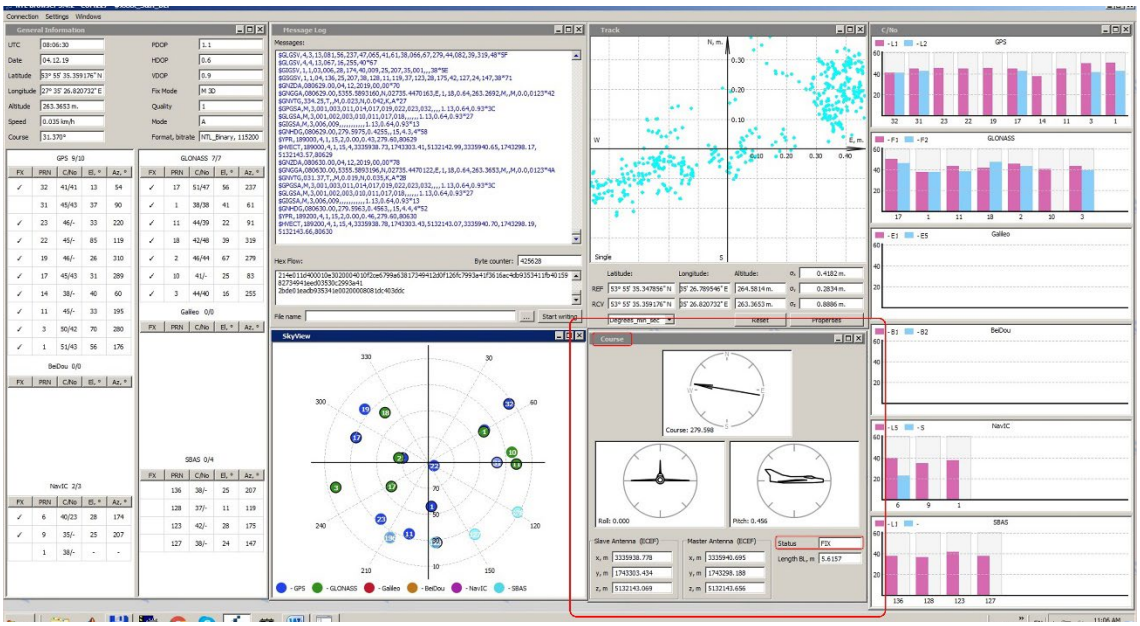

The information about 2D orientation (Heading) is displayed in the **Course** window, which represents information from HDG_DATA (it is available in NMEA mode to), YPR_DEG, HVECT_DATA messages.

*3.* Ensure that appropriate messages are switched on. To do this:

- Select the **Settings/Show settings/DataSet** section;
- Click on the **Save** button. Exit the **Settings** section.



4. Wait for the FIX **Status** in **Course** window (maximum accuracy mode):

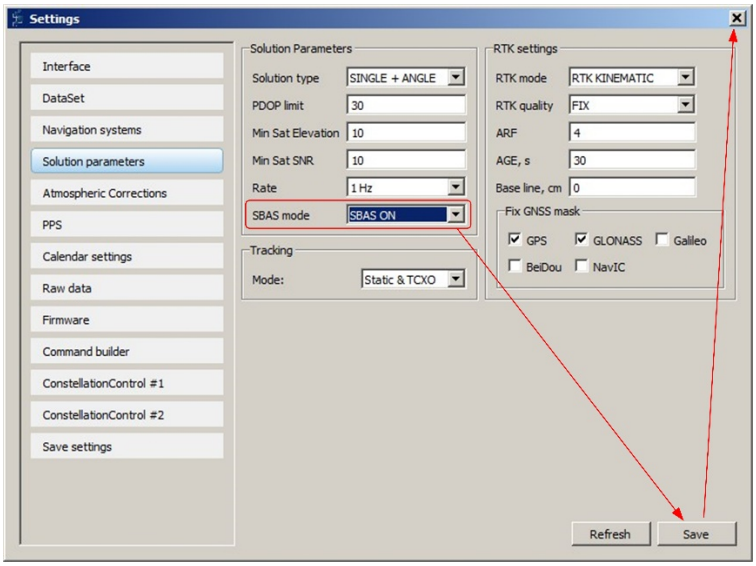


Positioning mode is standalone (Single). Orientation estimates are based on determination of mutual position of Master and Slave antennas (moving-base RTK mode).

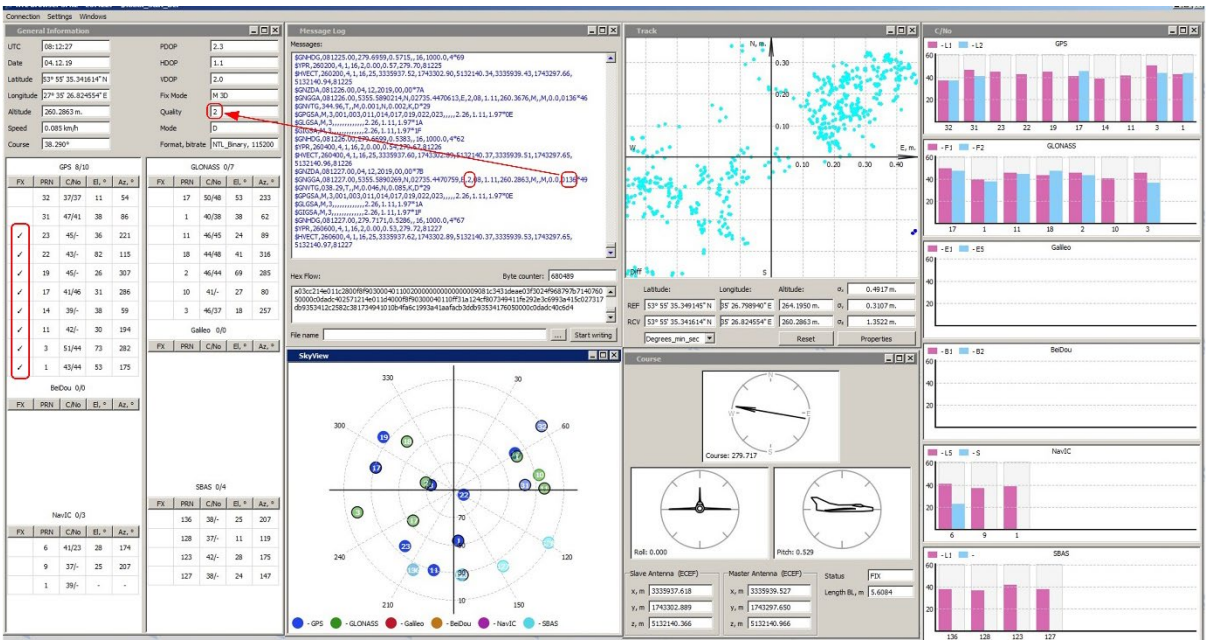
## 3 DGPS MODE

*DGPS mode can be switched on:*

1. Switch on **SBAS ON** mode:
   - Select the **Settings/Show settings/Solution Parameters** section. In the **Solution Parameters** sub-section select '**SBAS ON**' as the **SBAS mode**;
   - Click on the **Save** button. Exit the **Settings** section.

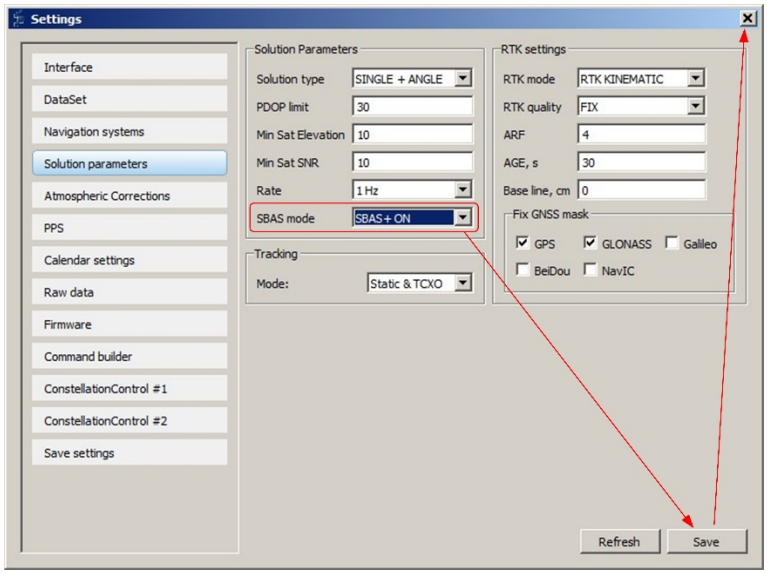



While we are in DGPS mode, only GPS+SBAS satellites will be used. DGPS mode indicated with '**2**' in the **General Information** window in the **Quality** sub-section (or status field of GGA message). See below.



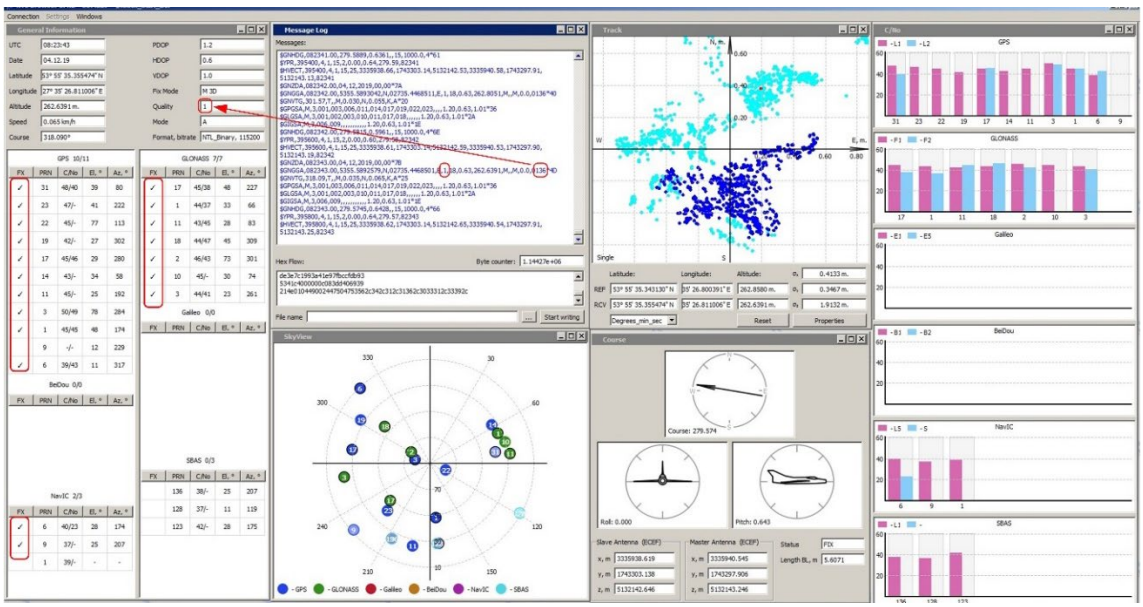
2. Switch on **SBAS+** mode:

- Select the **Settings/Show settings/Solution Parameters** section. In the **Solution Parameters** sub-section select '**SBAS + ON**' as the **SBAS mode;**
- Click on the **Save** button. Exit the **Settings** section.



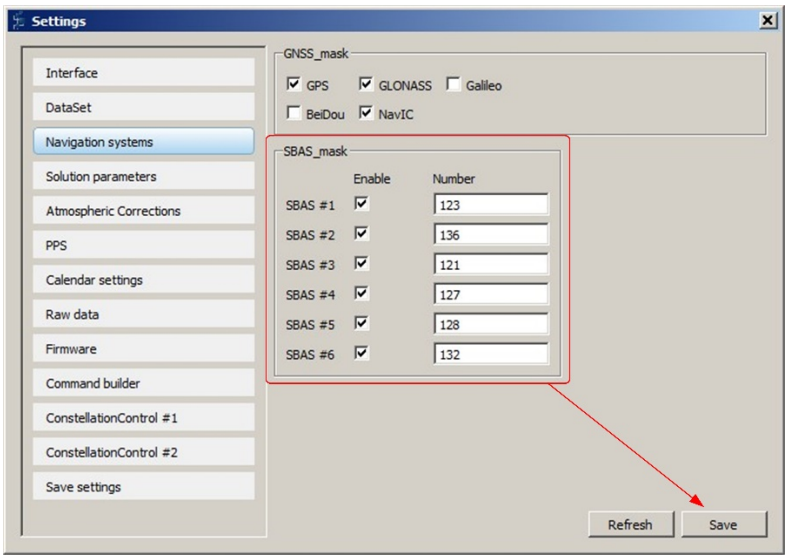

In this mode all available GNSS satellites will be used in navigation solution. GPS satellites will get full set of SBAS corrections. Measurements based on other GNSS systems will get only consistent part of SBAS corrections.

While we are in **SBAS+** mode SBAS satellite number is indicated in the last field of GGA message. GGA status field will remain '**1**' (displayed in the **General Information** window in the **Quality** sub-section). See below.

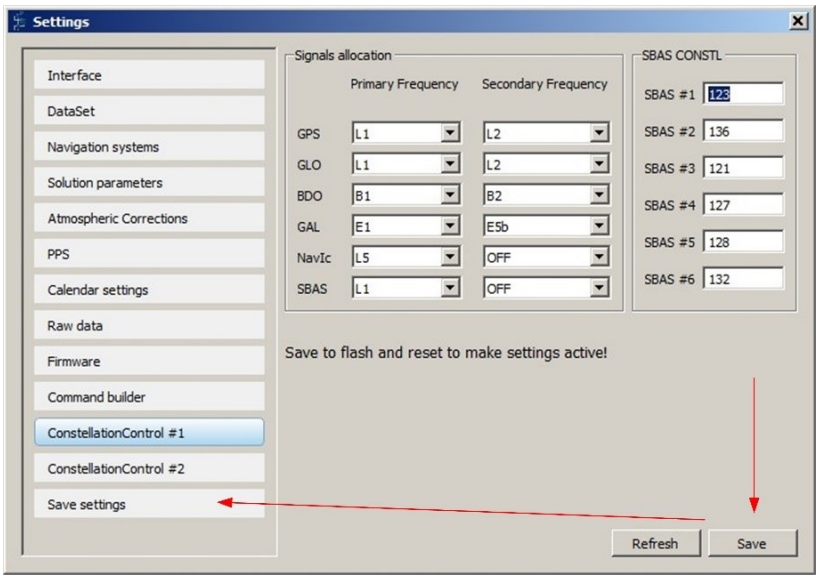


Internal logic of NTL105 selects the best SBAS satellite to be used in navigation solution. Up to 6 SBAS satellites may be tracked simultaneously.

- Select the **Settings/Show settings/Navigation systems** section to control SBAS satellites manually. By default, NTL105 module tracks EGNOS and GAGAN satellites;
- Click on the **Save** button.



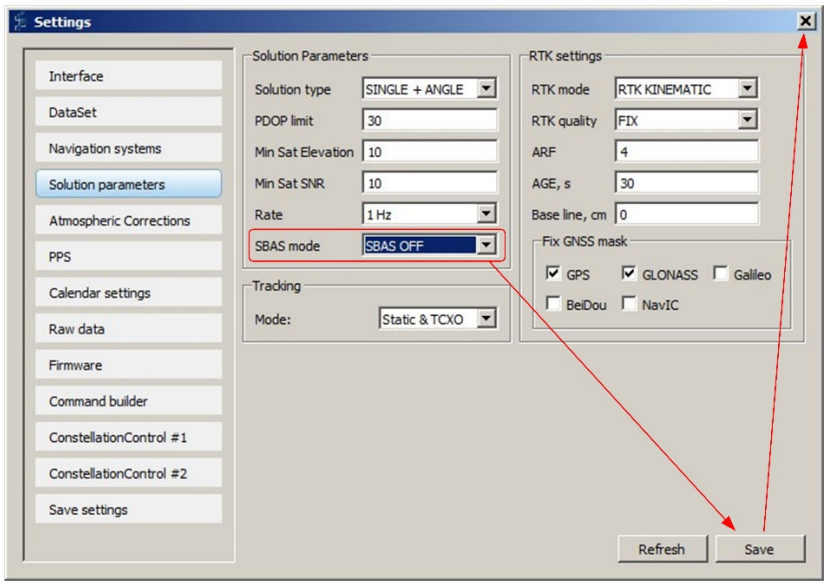

- Select the **ConstellationControl#1** section to change SBAS subsystems to be used



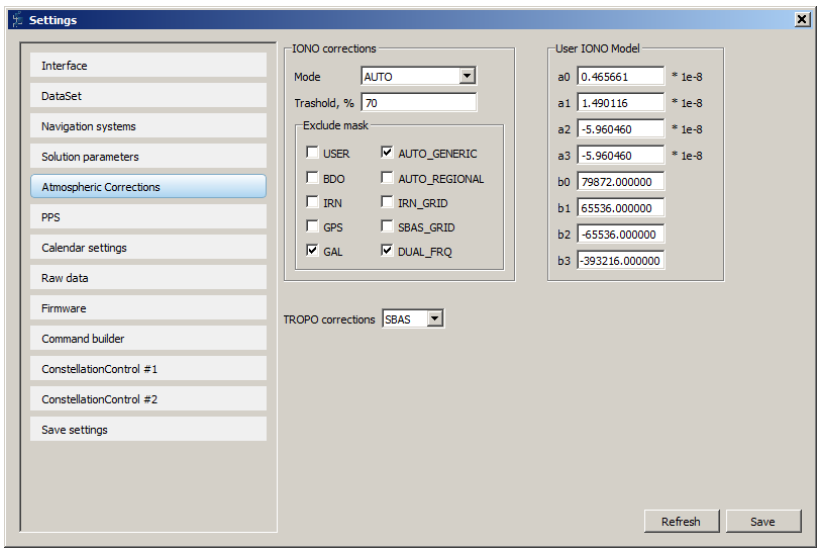

SBAS satellite numbers 120…158 may be programmed on this page. Settings would have become active only after they are saved into FLASH memory and receiver reloaded.

*3.* Switch off SBAS mode (**SBAS OFF**) to enter regular SINGLE positioning mode:

- Select the **Solution Parameters** section. In the **Solution Parameters** sub-section select '**SBAS OFF**' as the **SBAS mode;**
- Click on the **Save** button. Exit the **Settings** section.




While you are in SINGLE positioning mode, tropospheric and ionospheric corrections are performed in accordance with GNSS ICDs. Due to multi constellation support there is a variety of available correction modes. Parameters in section **Settings/Show settings/Atmospheric Corrections** allow control over correction methods. Recommended parameters are on the picture below. Refer to «GNSS-PPU-SETUP-GUIDE-6-62-00.pdf» for details before making modifications.

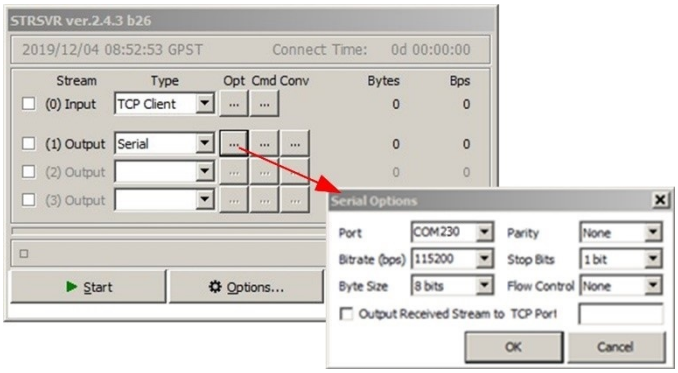


## 4 DIFFERENTIAL POSITIONING MODE (RTK+HEADING)

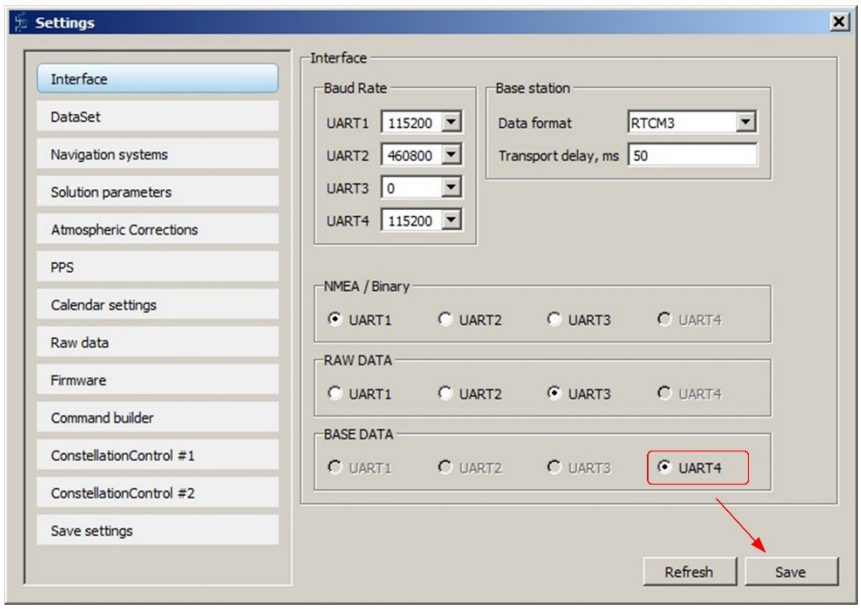
We should provide base station measurements data to make RTK positioning mode available. In this example we will receive base station data from local VRS network via Internet. STRTOSVR utility will be used to redirect data flow to COM230 (**Interface2**).

***Differential positioning mode can be switched on:***

1. Run **strsvr.exe**[1] utility from RTK LIB package

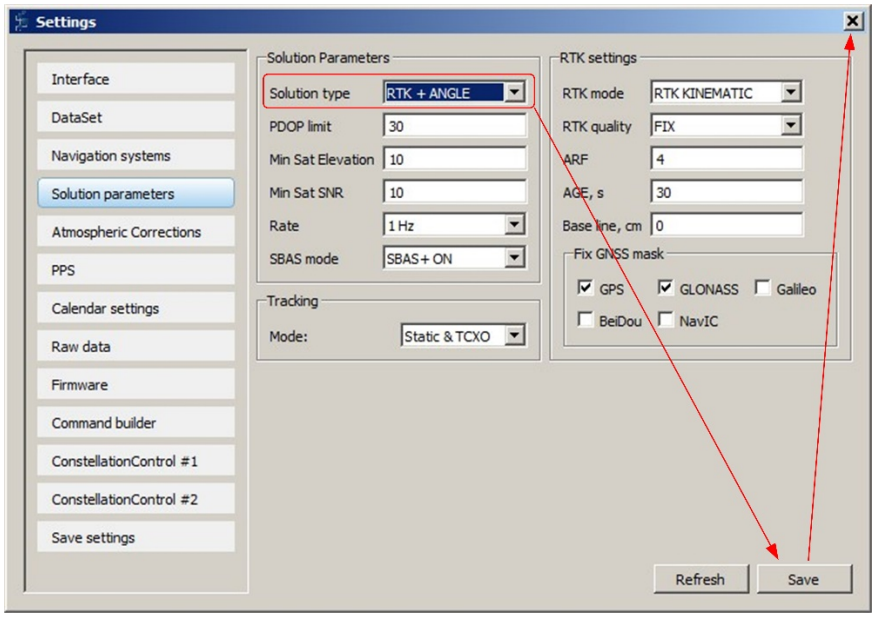



2. VRS network provides data in RTCM3 format. Novatel OEMv7 data format may be used as an alternative. Appropriate settings should be made in receiver:
   - Select the **Settings/Show settings/Interface** section. Make sure UART4 is set up



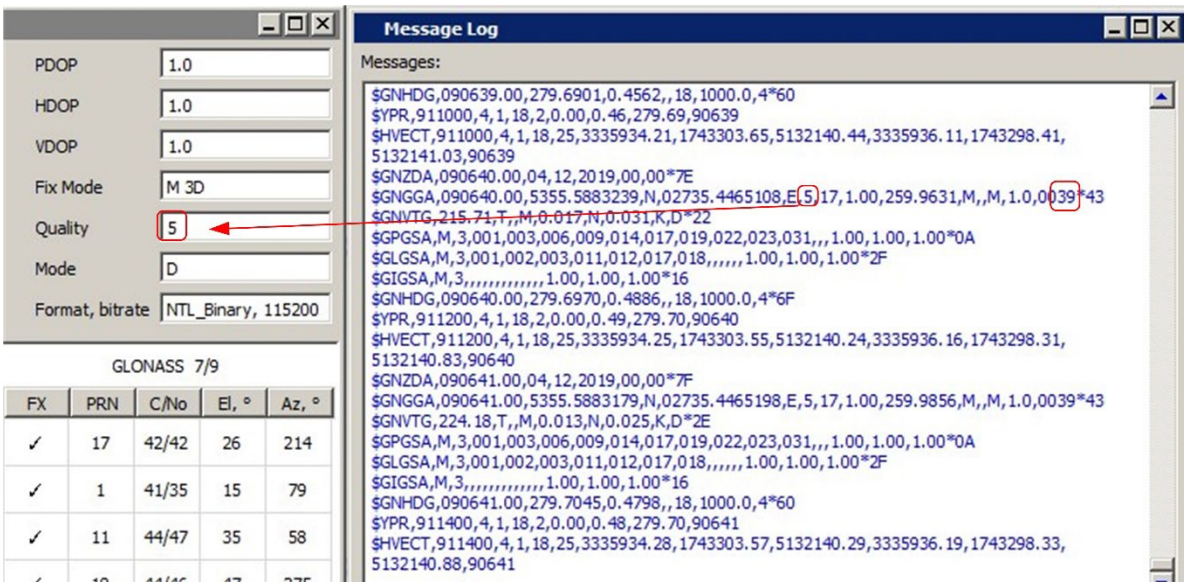

[1] Required tools are available on NTLab FTP server. Link (password and login) may be provided on request.

- Click on the **Save** button.
- Select the **DataSet** section. Make sure, the necessary messages are selected.
- Select the **Settings/Show settings/Solution parameters** section. In the **Solution type** sub-section, select '**RTK+ANGLE**';
- Click on the **Save** button. Exit the **Settings** section.

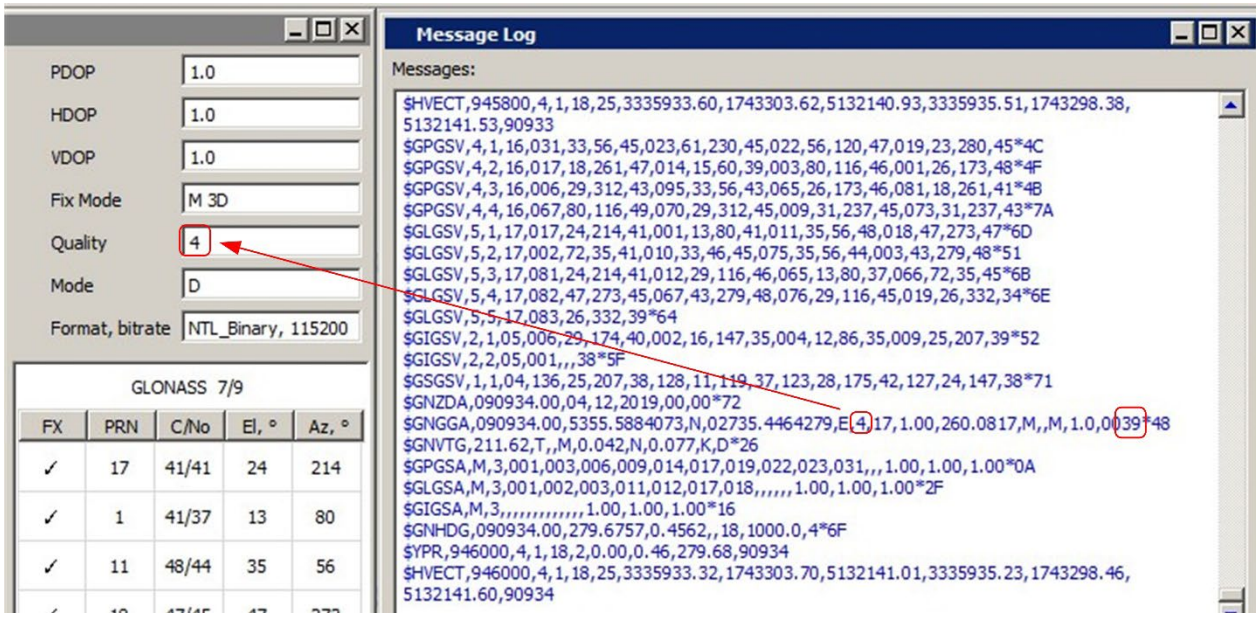



**RTK settings** sub-section contains some control parameters defining RTK positioning mode. Refer to «GNSS-PPU-SETUP-GUIDE-6-62-00.pdf» for details.

At first, receiver enters RTK FLOAT mode (**Quality '5'**):



In some time, receiver enters RTK FIX mode (**Quality '4'**) - the most accurate positioning mode. Base station number, corrections age and solution status are indicated in GGA messages.



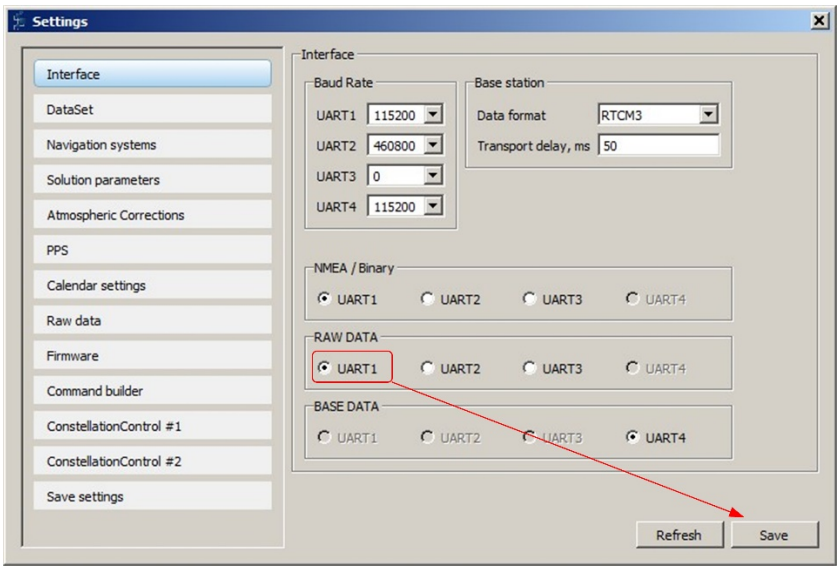

Another one NTL10X-series receiver may be used as a reference receiver instead of VRS network. Refer to Section 5 to setup receiver as a source of raw ranging data.

## 5 GENERATION OF RAW RANGING DATA

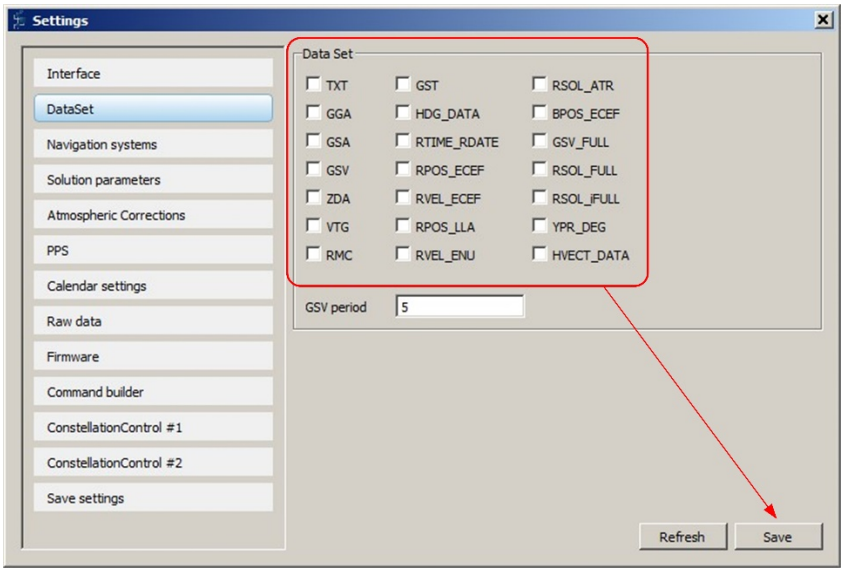
Navigation module can be used as a source of raw ranging data for further post processing or differential positioning.

*This can be done as follows*:

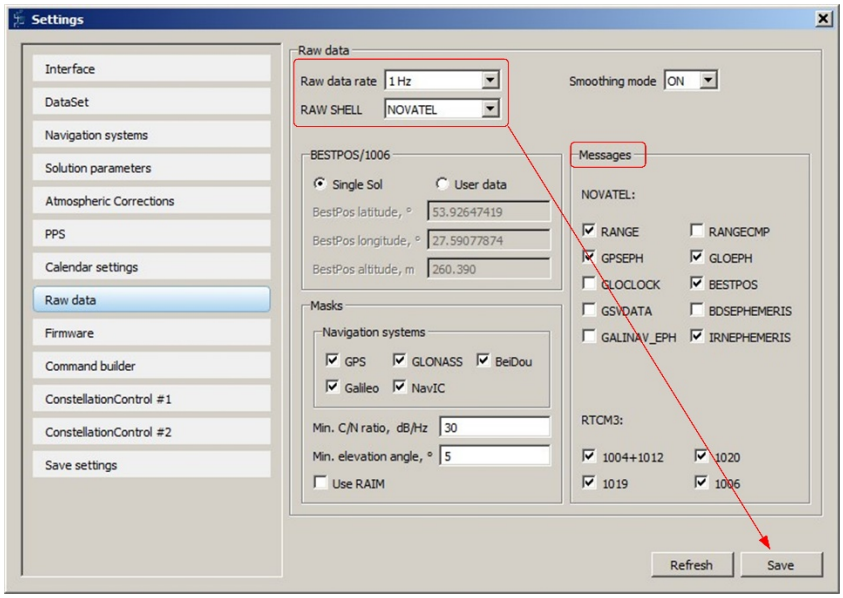
1. Select the **Settings/Show settings/Interface** section. In the **RAW DATA** sub-section set UART1. Click on the **Save** button.



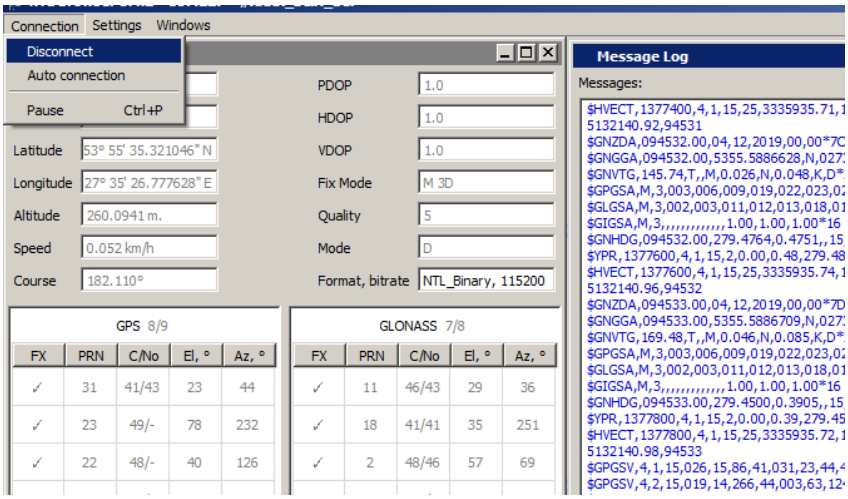

2. Select the **DataSet** section. In the **Data Set** sub-section deselect all checkboxes. Click on the **Save** button. After this action module stops NTL Binary periodic messages generation



3. Select the **Raw data** section. In the **Raw data rate** sub-section, select '**1 Hz**' and '**NOVATEL**' as the **RAW SHELL**. In the **Messages** sub-section can be specified NOVATEL and RTCM3 messages type. Click on the **Save** button. Refer to «GNSS-PPU-SETUP-GUIDE-6-62-00.pdf» for other details.

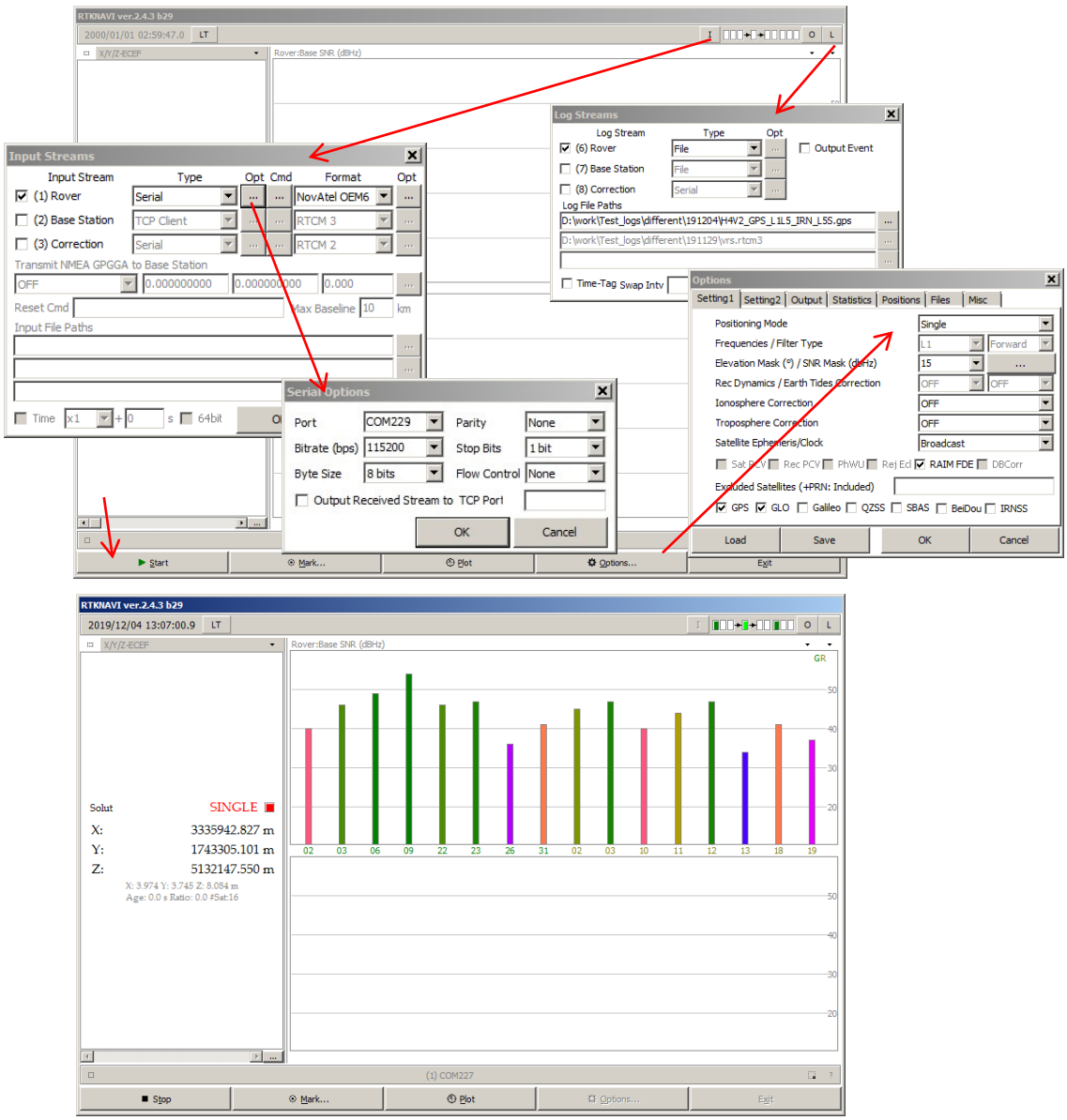



4. Exit the **Settings** section.
5. Exit NTL Browser to release COM port. To do this, select **Connection/Disconnect**




Generation of raw data in Novatel format is shown on the picture below. RTCM3 is not suitable to transmit measurements made on NavIC signals. RTKNAVI tool may be used to visualize and write Raw data measurements.

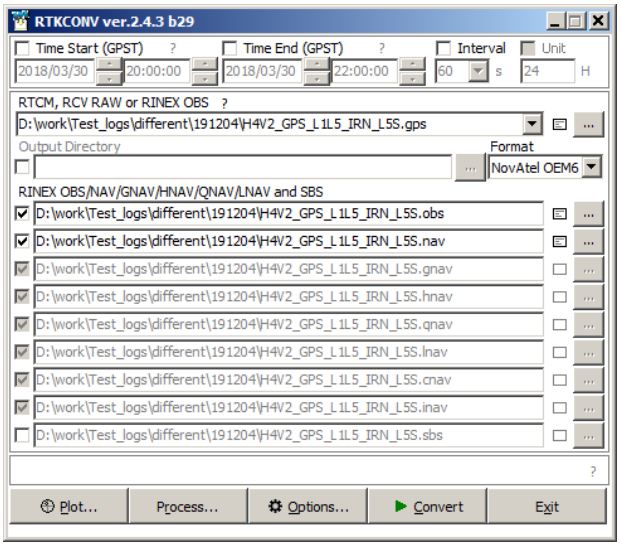
6. Run the **rtk_navi.exe**[2] utility:
   - Click on the '**I**' button;
   - In the **Format** sub-section select '**NovAtel OEM6**';
   - In the **Opt** sub-section (**Serial Options** window) select '**COM229**' as the **Port,** and '**115200**' as the **Bitrate.** Click on the '**OK**' button;
   - Click on the '**L**' button. Specify **Log File Paths**, to write raw data into. Click on the '**OK**' button;
   - Click on the '**Options**' button. Set **Positioning Mode** to '**Single**'. Click on the '**OK**' button;
   - Click on the **Start.**



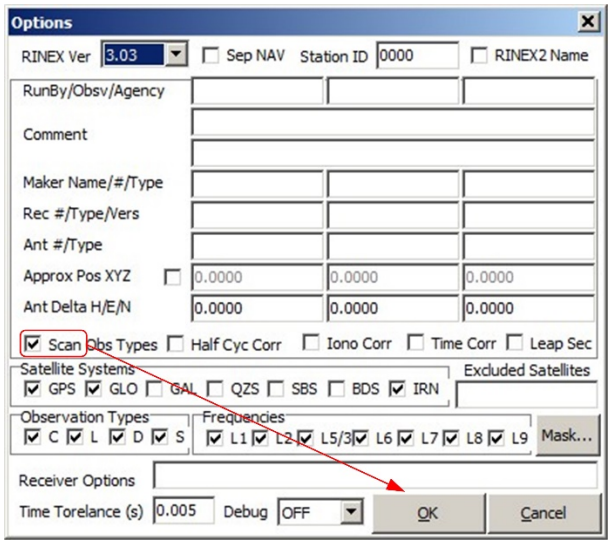

[2] Required tools are available on NTLab FTP server. Link (password and login) may be provided on request.

The **rtk_navi.exe** utility get receiver position, so raw data accepted and processed. But RTKNAVI can't visualize NavIC data.

7. Convert Novatel Raw data we have already written down into RINEX format to check ability of NavIC measurements:
   - Run the **rtkconv.exe**[3] utility

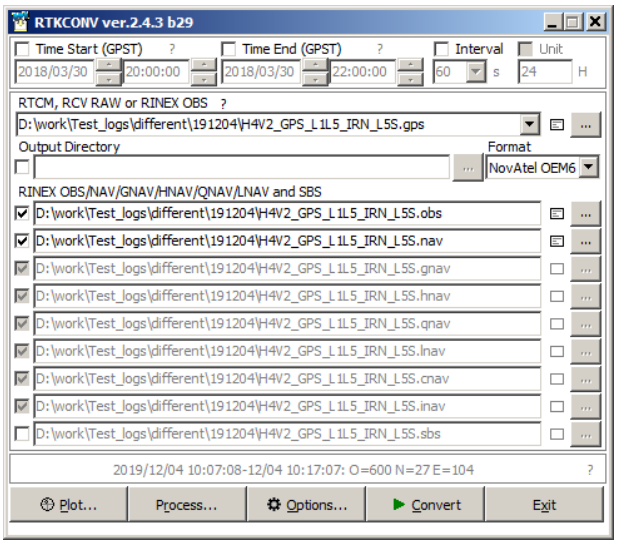



   - Select source file and data format;
   - Setup **Options** as on the picture below. Click on the '**OK**' button.




[3] Required tools are available on NTLab FTP server. Link (password and login) may be provided on request.

- Click on the '**Convert**' button




NavIC measurements present in resulting ***.obs** file:

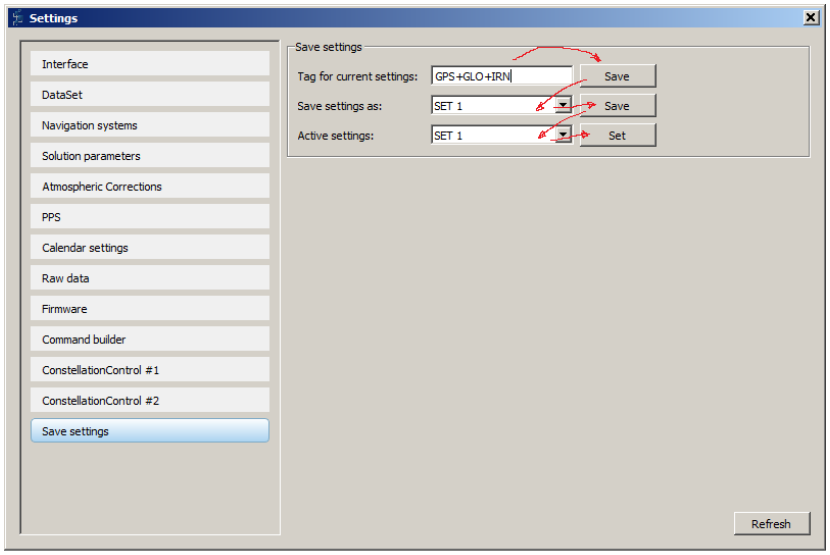
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| > 2019 12 4 10 7 8.0000000 0 20 | | | | | | | |
| I 6 38522313.570 | 151169828.197 | 69.335 | 40.000 | | | | |
| G 2 24630716.765 | 129435262.895 | 2572.844 | 41.000 | | | | |
| G26 23624243.771 | 124146245.069 | 1501.286 | 33.000 | 23624249.857 | 96737376.134 | 1169.861 | 39.000 |
| R11 22403606.853 | 119718101.054 | -2960.565 | 44.000 | 22403606.908 | 93114053.369 | -2302.530 | 43.000 |
| I 2 39306608.520 | 154247570.868 | 831.031 | 37.000 | | | | |
| R18 22083165.970 | 117881445.428 | -3605.341 | 42.000 | 22083170.497 | 91685575.641 | -2804.068 | 46.000 |
| R 2 20318455.936 | 108423181.073 | -2319.539 | 45.000 | 20318460.177 | 84329159.829 | -1804.028 | 45.000 |
| R10 22988150.773 | 122626067.580 | -3475.146 | 41.000 | | | | |
| G31 24257878.030 | 127476010.358 | -3418.558 | 40.000 | 24257881.611 | 99331969.997 | -2663.750 | 38.000 |
| G23 20569294.053 | 108092363.974 | 224.816 | 46.000 | | | | |
| G22 23057366.475 | 121167269.238 | -3020.985 | 46.000 | | | | |
| I 3 40314726.643 | 158203644.885 | -42.358 | 35.000 | | | | |
| R13 22150554.420 | 118282615.452 | 4169.452 | 35.000 | 22150557.883 | 91997639.769 | 3242.372 | 31.000 |
| I 4 39960693.172 | 156814361.183 | 376.540 | 35.000 | | | | |
| G 3 21217036.341 | 111496272.946 | -2265.922 | 46.000 | 21217041.075 | 86880231.915 | -1765.889 | 43.000 |
| R 3 19548086.940 | 104642446.091 | 1218.198 | 47.000 | 19548087.689 | 81388555.405 | 947.588 | 45.000 |
| G 6 21828941.127 | 114711862.118 | 699.199 | 49.000 | 21828946.292 | 89385866.070 | 544.793 | 49.000 |
| R12 20439991.801 | 109186791.705 | 656.740 | 48.000 | 20439992.686 | 84923050.965 | 510.642 | 45.000 |
| G 9 21018769.902 | 110454384.309 | 1973.633 | 54.000 | 21018773.753 | 86068408.483 | 1537.971 | 48.000 |
| R19 21203156.737 | 113422577.826 | -186.546 | 37.000 | 21203158.576 | 88217576.426 | -145.262 | 39.000 |

## 6 NON-VOLATILE FLASH

All receiver settings made in NTL Browser will be lost after the next power off if they are not saved into nonvolatile memory. NTL105 receiver allows two sets of controls to be saved into FLASH.

*To do this:*

1. Select **Settings/Show settings/Save Settings** section;
2. Enter textual tag for current scope of control parameters (optionally);
3. Select a name for current scope of controls: SET1 or SET2;
4. Select a set of controls to be loaded with (active set): DEFAULT or SET1 or SET2.




During the next power on saved setting will be restored and used during receiver start up.

## CONTACT

For complete contact information visit us at www.ntlab.com

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