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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.
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 Configuration Interface]

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

   ![NTL Browser Main Page]

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.

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 strsver.exe\(^1\) utility from RTK LIB package

   ![Serial Options](image)

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.

![Interface Settings](image1)

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.

![Data Set Settings](image2)
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` 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.

\[\text{Required tools are available on NTLab FTP server. Link (password and login) may be provided on request.}\]
The *rtk_navi.exe* utility gets 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* utility
     
     ![rtkconv.exe utility](image)
     
     - Select source file and data format;
     - Setup **Options** as on the picture below. Click on the 'OK' button.

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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
G 2 24630716.765 12943526.895 2572.844 41.000
G 26 23624243.771 124146245.069 1501.286 40.000
G 22 2403606.853 119718101.054 2960.565 40.000
G 3 24257878.030 127476010.358 -3418.558 40.000
R 2 20318455.936 108423181.073 -2319.539 45.000
R 18 22083165.970 117881445.428 -3605.341 42.000
R 10 22988150.773 122626067.580 -3475.146 41.000
G 31 24257878.030 127476010.358 -3418.558 40.000
G 23 20569294.053 108092363.974 224.816 46.000
G 22 23057366.475 121167269.238 -3020.985 46.000
R 3 40314726.643 158203644.885 -42.358 35.000
R 13 22150554.420 118282615.452 416.452 35.000
R 14 39960.936 156813631.183 376.540 35.000
G 3 21217036.341 11496272.946 -2265.922 46.000
R 3 19548086.940 10646246.091 1218.198 47.000
G 6 2182981.127 11471862.118 699.199 49.000
R 12 2049991.801 109186791.705 656.740 48.000
G 9 21018769.902 110454384.309 1973.633 54.000
R 19 21203156.737 113422577.826 -186.546 37.000
```
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

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