NTL10X OEM-MODULES FAMILY

FIRMWARE UPDATE

Reference Manual

2020

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1 GENERAL INFORMATION

NTL10X navigation receivers have one or two Primary Processing Units (PPU) - see relevant datasheet on OEM-module - and STM32H7-based RTK coprocessor. Each of these modules requires personal firmware. Thus, to perform full firmware update, you need three (or two) firmware files.

PPU interface includes set of commands for firmware flash memory access. Being a part of an embedded system OEM-module should be reprogrammed by host controller. See «GNSS-DCP-BUILD-6 - 62 - 00» document for commands description and «GNSS-PPU-SETUP-GUIDE-6-62-00» document for PPU description. To simplify this procedure OEM board should be connected to PC, then NTL Browser application should be used to reprogram the module. Special **NTL Eva Board** (interface adapter) or **NTL Adp Board** can be used to connect OEM receiver to PC. Step by step guidance will be stated in the next section.

The PPUs flash memory is capable of storing two firmware files - backup and basic firmware. The backup firmware version is programmed by the manufacturer only. Basic firmware can be updated by the user in a secure manner. In the case of a failure in the basic firmware updating process, the backup version will be used to load from and the device will remain functional. Special boot marker determines which firmware file to use upon start up. Boot marker setting is available via NTL Browser application as well, so both firmware versions can be used. If any receiver settings were saved in flash memory, they would be erased after firmware update. The receiver will start up with the default settings predefined by new firmware.

STM32H7 [1] MCU reprogramming is available via JTAG interface only and requires some special hardware and software tools. See Section 3 for pin assignment of XP4 (JTAG) connector. ST-LINK/V2 (or any other compatible) debugging/programming tool should be used as well as appropriate drivers and software.

Before working with the OEM-module, refer to its actual datasheet to get information about its structure and basic features.

[1] Included in the NTL101, NTL104, NTL105 and NTL106 OEM-modules

2 PPU FIRMWARE UPDATE

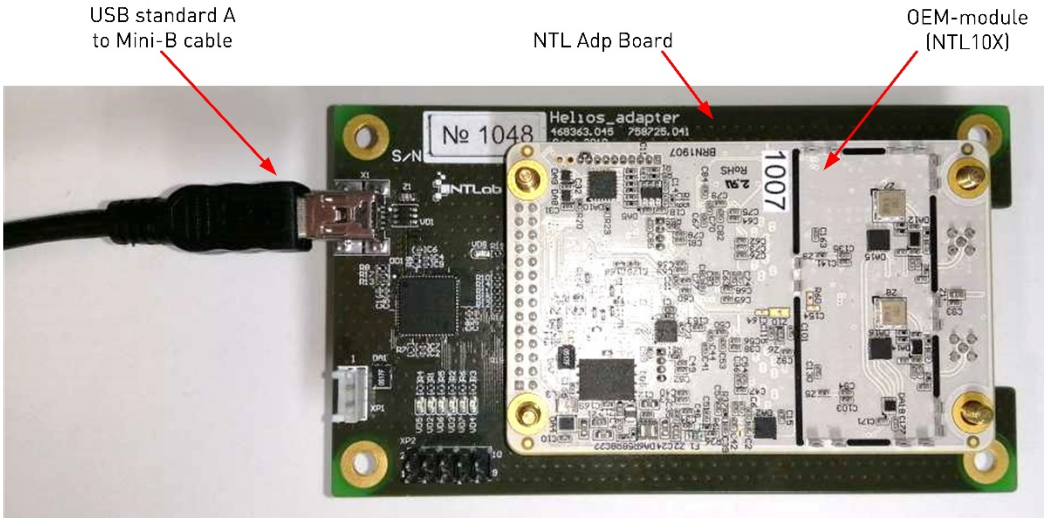
You are provided with the receiver having the latest version of firmware already installed. When more actual version of the firmware becomes available, you can use the NTL Browser to update the firmware on your receiver.

NTL Browser is a software tool designed to communicate with NTL10X through **NTL Adp Board**. NTL Browser provided as a zip file. It is available on NTLab company FTP server. Link (password and login) may be provided on request.

To upgrade the firmware:

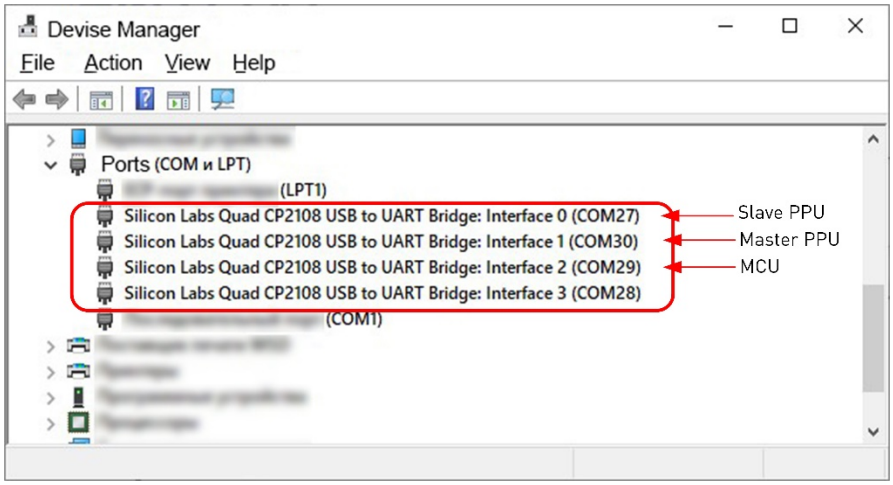
1. Install NTL Browser on computer.
2. Install CP210x drivers on computer. Utility software downloadable from: https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers
3. Connect NTL10X to the **NTL Adp Board**.
4. Connect **NTL Adp Board** to PC through mini USB cable (connector X1 of the **NTL Adp Board**).

NTL Adp Board provides +5V supply voltage for navigation module and simplifies connection to host computer. NTL10X UART outputs is available on PC via on-board 4xUART to USB converter (CP210x based) as virtual COM ports.



5. At this stage, four virtual COM ports should be detected on operating system. Three[1] or two[2] of four virtual COM ports provide access to the NTL10X.

[1] For NTL105 and NTL106 modules
[2] For NTL101, NTL102, NTL103 and NTL104 modules



The Master PPU is available through **COM30** (**Interface 1**), the Slave PPU – through **COM27** (**Interface 0**). **Port numbers** could be different for alternative PC. **Interface numbers** could be different for alternative OEM-module (see Table 2.1).

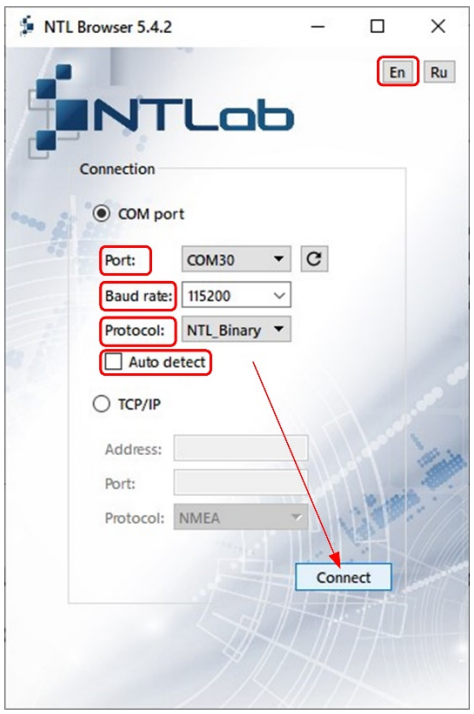
Table 2.1 – Description of the NTL10X Interfaces

NTL10X family	**Interface numbers (Virtual COM port)**	**Description**
NTL101	Interface 1	Master PPU (UART Tx/Rx line)
	Interface 2	STM32H7 MCU
NTL102	Depends on adapter type	-
NTL103	Depends on adapter type	-
NTL104	Interface 0	Master PPU (UART Tx/Rx line)
	Interface 1	STM32H7 MCU
NTL105	Interface 0	Slave PPU (UART Tx/Rx line)
	Interface 1	Master PPU (UART Tx/Rx line)
	Interface 2	STM32H7 MCU
NTL106	Interface 0	Slave PPU (UART Tx/Rx line)
	Interface 1	Master PPU (UART Tx/Rx line)
	Interface 2	STM32H7 MCU

6. Run NTL Browser on computer. Then configure it:

- Select interface language in the upper right corner of welcome page;

- Connect to the **Master PPU*** (COM30 Port);
- 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.

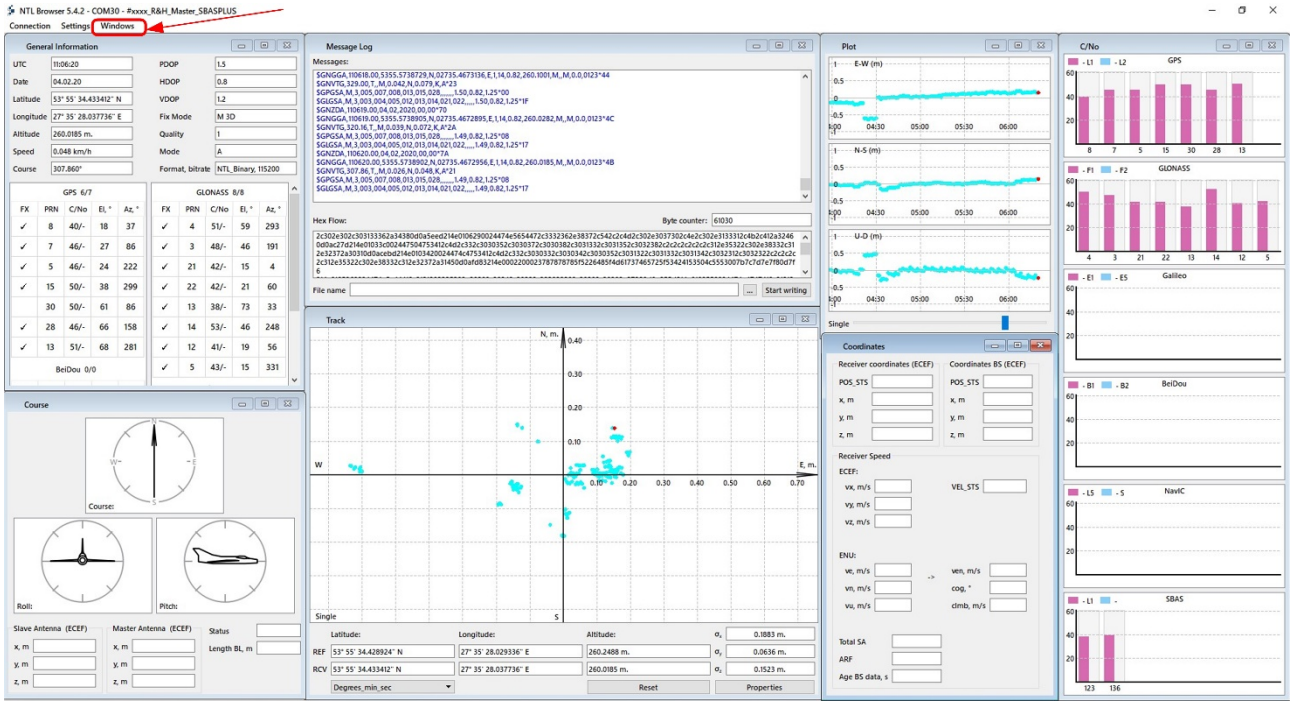


NTL Browser Main page consists of the multiple windows, that can be switched on/off in **Windows** toolbar.

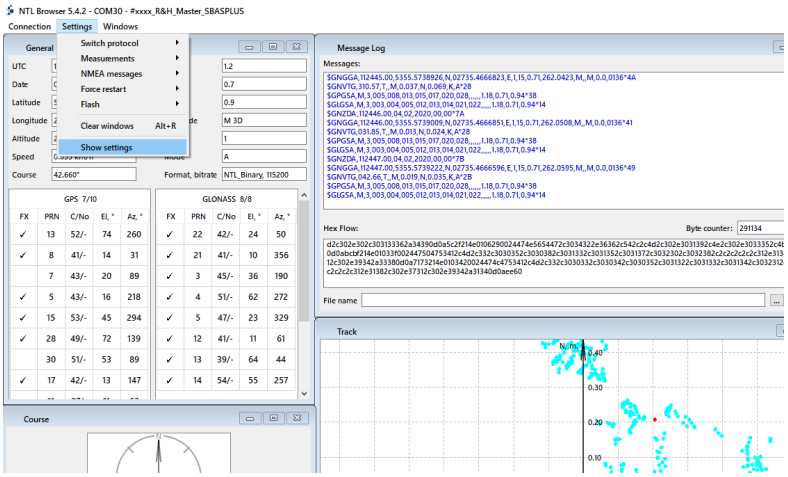
* To upgrade firmware on NTL102 and NTL103, connect to one of the available COM port.

**Auto detect mode allows to setup connection with the receiver:
- **baud rate** would be scanned and selected automatically;
- **protocol** type would be set up to NTLBinary mode;
- current UART channel would be turned to '**Master**' mode;
- raw data, if coming from this port, would be switched off.

If interfacing parameters are known in advance you may enter them manually and skip Auto detect.

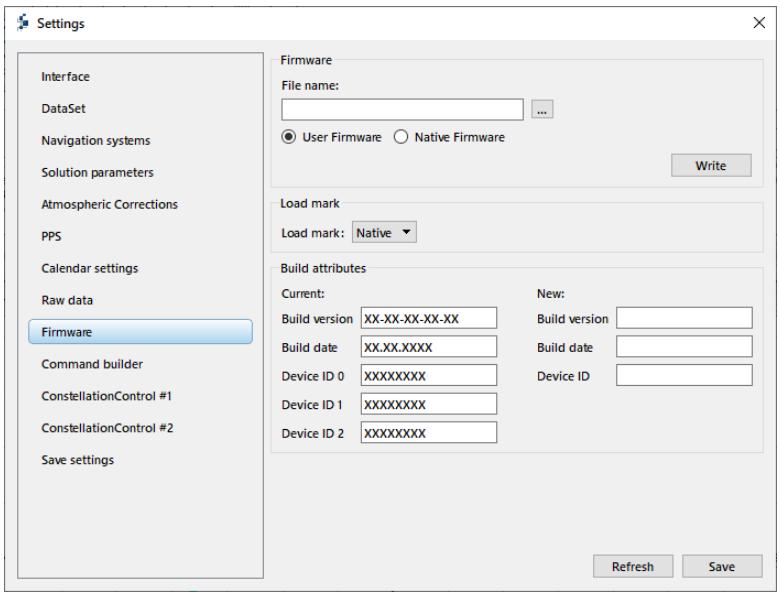


7. Select the **Settings/Show settings** section.

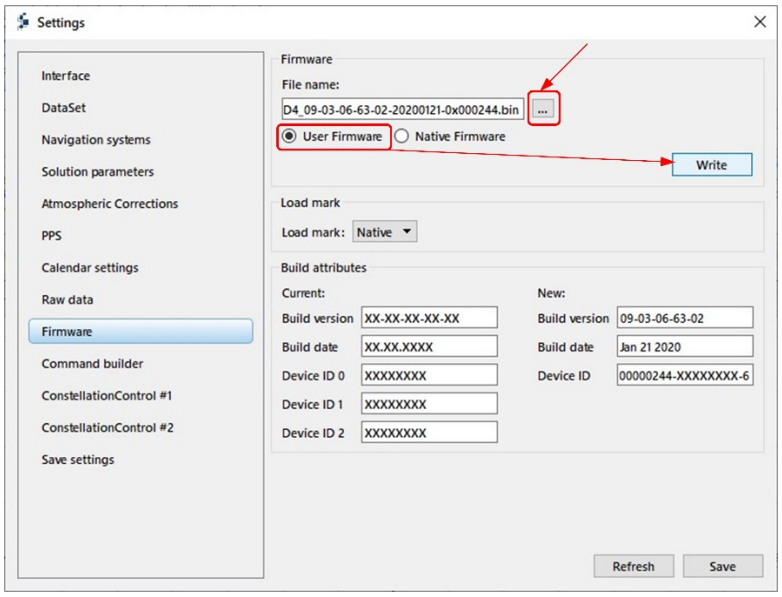


If you are in NMEA interface mode, you will be proposed to switch into NTL Binary. Click on the **Yes** button.

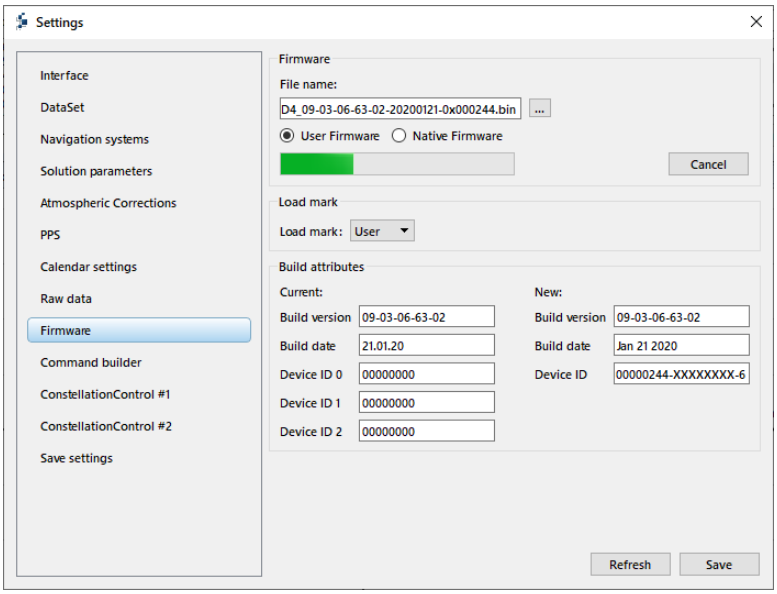
8. Then select the **Firmware** section.



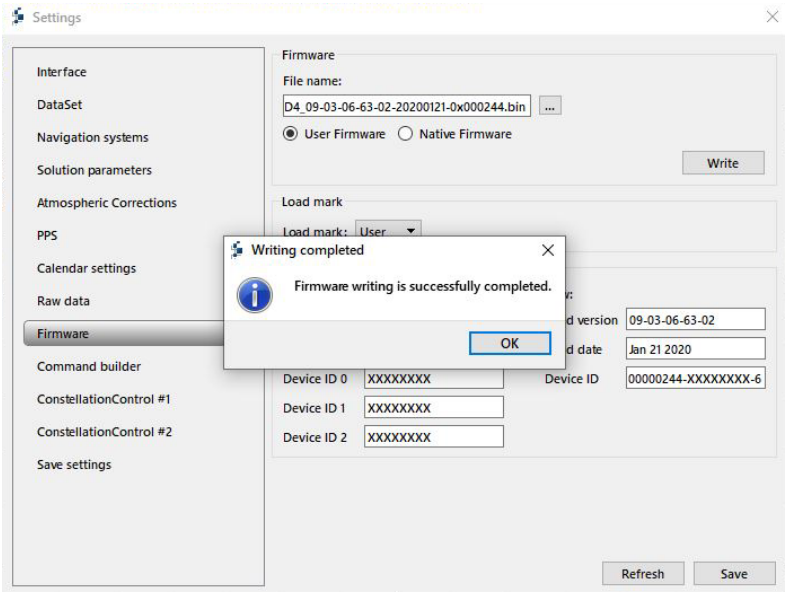
- In the **Firmware** sub-section, select firmware file for master PPU as the **File name.** Then set **User Firmware** checkbox. Click on the **Write** button.



Loading and verification process takes some minutes.

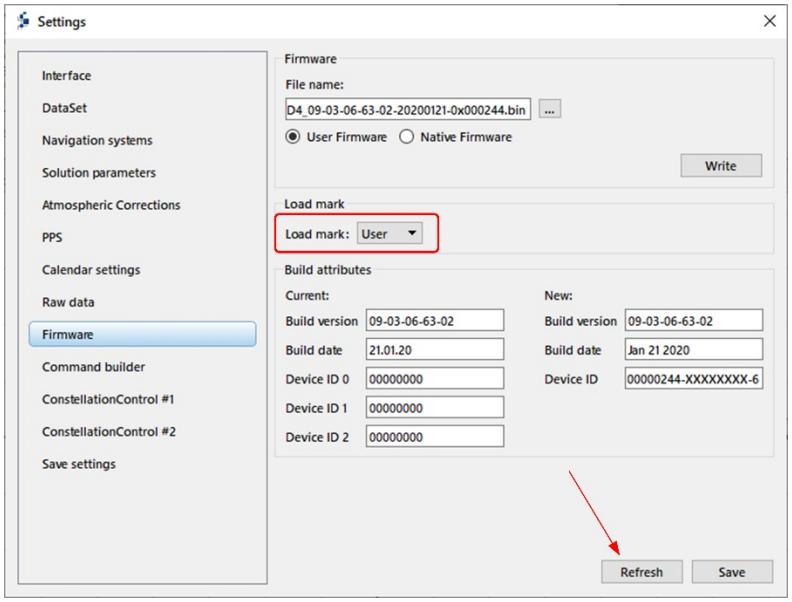


Wait for completion.



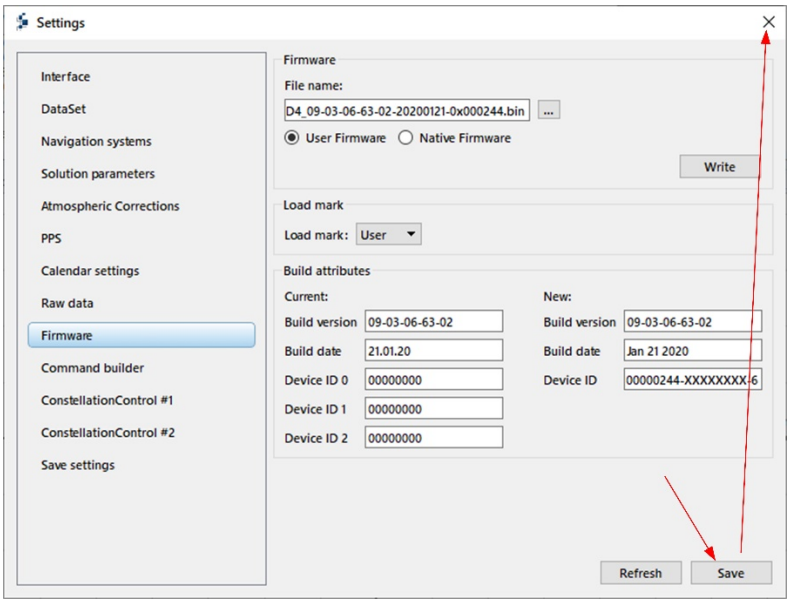
If connection is lost here, basic firmware file will be corrupted. In this case embedded firmware would be loaded from backup section, **Load mark** would indicate **Native**.

- Click on the **Refresh** button.

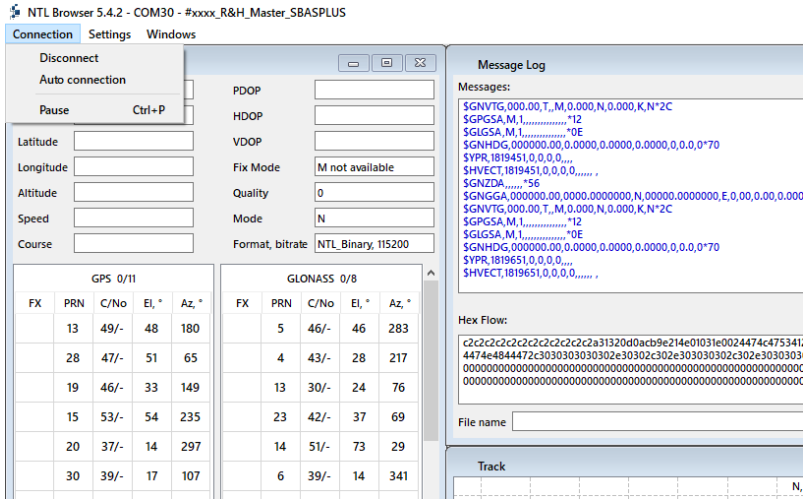


Load mark will get **User** value automatically after successful completion of User Firmware Update procedure. Though, this field is available for editing and firmware section to be loaded from may be selected manually. To do this, setup **Load mark** and click on the **Save** button.

9. Click on the **Save** button. Exit the **Settings** section.



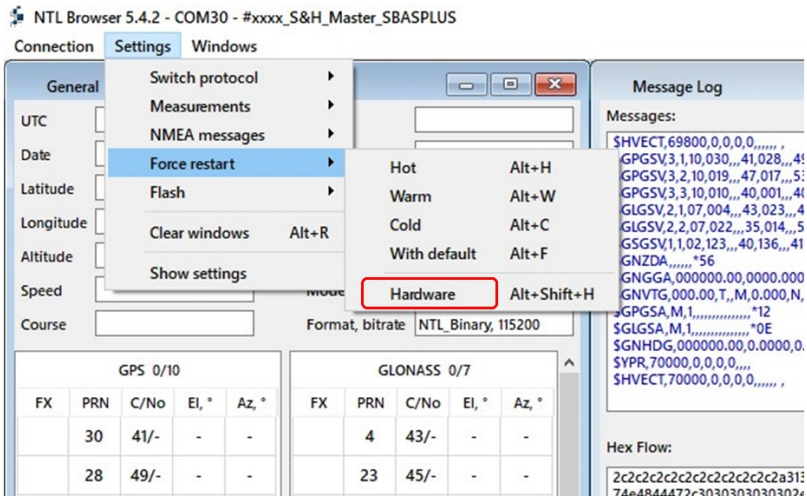
10. Exit from NTL Browser. To do this, select **Connection/Disconnect.**

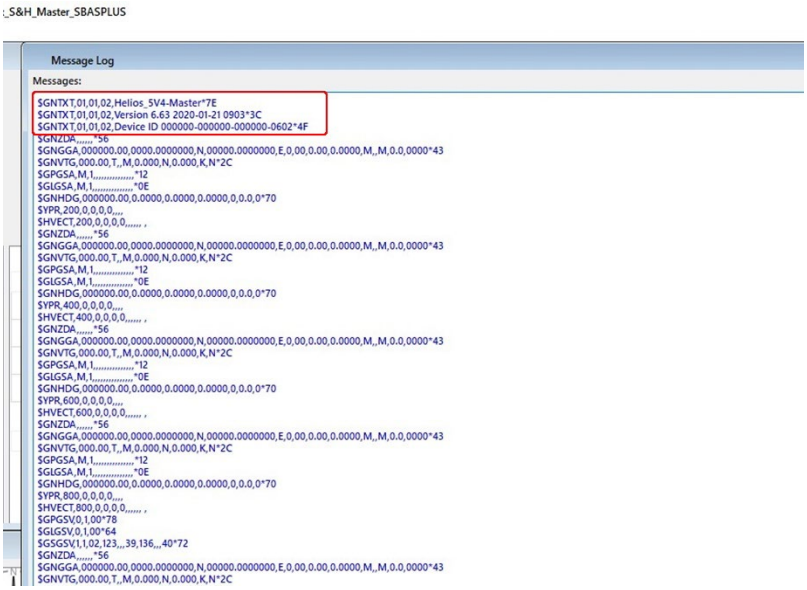


11. Restart the module.

12. Reconnect to the COM Port.

13. Make Restart to check new firmware version and build date. To do this, select **Setting/Force restart/Hardware.**





14. Exit from NTL Browser. To do this, select **Connection/Disconnect.**

15. Connect to the **Interface 0 (COM27 Port)** and **repeat steps 7…14** to update **Slave PPU** firmware. Use appropriate firmware file.

3 JTAG PIN DEFINITION

Table 3.1 – XP4 connector (JTAG) pin definitions

Pin №	Name	I/O	Description
1	3.3V	Power	Power supply voltage
2	JTRST	Input	Test Reset
3	TDI	Input	Test Data In
4	TMS	Input	Test Mode Select
5	TCK	Input	Test Clock
6	TDO	Output	Test Data Out
7	-	-	not connected
8	JSRST	Input	Reset
9	-	-	not connected
10	GND	Power	Signal and Power Ground

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