

NTL104 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 NTL104 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 NTL104:

- 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 NTL104 to the NTL Adp Board.
- 4. Connect Master and Slave antennas to NTL104 (connector X1 and X2 of the NTL104, 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.

NTL104 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. See example below. Two of four virtual COM ports provide access to Master PPU (Interface 0) and Base Station (BS) data input (Interface 1).





- 6. Run NTL Browser on computer. Then configure it:
 - Select interface language in the upper right corner of welcome page;
 - Connect to the COM227 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 5.4.2	
10 C	En Ru
INTLOD	
Connection	
COM port	
Port: COM227 C	
Baud rate: 115200	
Protocol: NTL_Binary	
Auto detect	0
С тср/др	100
Address:	1 Julio
Port:	
Protocol: NMEA	
Connect	
# THAI	

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

- [0] ×



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, GLONASS and NavIC 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



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

	Solution Parameter	S		-RTK settings -	
Interface	Solution type	SINGLE + ANGLE		RTK mode	RTK KINEMATIC
DataSet	PDOP limit	30		RTK quality	FIX 💌
Navigation systems	Min Sat Elevation	10		ARF	4
Solution parameters	Min Sat SNR	10	X	AGE, s	30
Atmospheric Corrections	Rate	1 Hz		Base line, cm	0
PPS	SBAS mode	SBAS+ON		Fix GNSS ma	ask
Calendar settings	Tracking			GPS	GLONASS Galie
Raw data	Mode:	Static & TCXO 💌		1 Delpou	1 Navic
Firmware					\backslash
Command builder					\mathbf{A}
ConstellationControl #1					
ConstellationControl #2					
Save settings					

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.

	Data Set			
Interface	Г тхт	GST GST	RSOL_ATR	
DataSet	GGA	HDG_DATA	BPOS_ECEF	
Navigation systems	GSA GSA	RTIME_RDATE	GSV_FULL	
Solution parameters	GSV	RPOS_ECEF	RSOL_FULL	
Almontharia Competing	I ZDA	RVEL_ECEF		
Atmospheric Corrections	I VTG	RPOS_LLA	VPR_DEG	
PPS	T RMC	RVEL_ENU	HVECT_DATA	
Calendar settings			_ \	
Raw data	GSV period	5		
Firmware				
Command builder				\backslash
ConstellationControl #1				
ConstellationControl #2				$\langle \rangle$
Save settings				
				\sum





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.

	Solution Paramete	rs		RTK settings		
Interface	Solution type	SINGLE + ANGLE	-	RTK mode	RTK KINEMATIC	-
DataSet	PDOP limit	30	- 11	RTK quality	FIX	-
Navigation systems	Min Sat Elevation	10	-	ARF	4	_
Solution parameters	Min Sat SNR	10		AGE, s	30	
Atmospheric Corrections	Rate	1 Hz	•	Base line, cm	0	
PPS	SBAS mode	SBAS ON	•	Fix GNSS m	ask	
Calendar settings	Tracking		Z	GPS	GLONASS I	Galileo
Raw data	Mode:	Static & TCXO	-	1 Delbou	1 Navic	
Firmware						
Command builder						
ConstellationControl #1					\backslash	
ConstellationControl #2						
Save settings						

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.

	Solution Paramete	rs	RTK settings	
interface	Solution type	SINGLE + ANGLE	RTK mode	RTK KINEMATIC
DataSet	PDOP limit	30	RTK quality	FIX
Navigation systems	Min Sat Elevation	10	ARF	4
Solution parameters	Min Sat SNR	10	AGE, s	30
Atmospheric Corrections	Rate	1 Hz 💌	Base line, cm	0
PS	SBAS mode	SBAS+ON	Fix GNSS m	ask
Calendar settings	Tracking	,	GPS	GLONASS Galileo
Raw data	Mode:	Static & TCXO		1 Navic
Firmware				
Command builder			$\langle \rangle$	
ConstellationControl #1				
ConstellationControl #2				
Save settings				

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 NTL104 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, NTL104 module tracks EGNOS and GAGAN satellites;
- Click on the **Save** button.

5 Settings		×
Interface DataSet	GNSS_mask GPS GDI GLONASS Galileo Gebou GNAVIC	
Navigation systems	SBAS mask	
Solution parameters	Enable Number	
Atmospheric Corrections	SBAS #1 🔽 123	
PPS	SBAS #2 🔽 136	
Calendar settings	SBAS #3 🔽 121	
Raw data	SBAS #5 🔽 128	
Firmware	SBAS #6 🔽 132	
Command builder		
ConstellationControl #1		
ConstellationControl #2		
Save settings		
	Refresh Save	1
		_

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

	Signals	allocation		SBAS CONSTL
interface		Primary Frequence	y Secondary Freque	ncy SRAS #1 122
DataSet				
lavigation systems	GPS	L1	L2	▼ SBAS #2 136
	GLO	L1	L2	SBAS #3 121
solution parameters	BDO	B1	B2	SBAS #4 127
Atmospheric Corrections	GAL	E1	E5b	
PPS	NavIc	L5	• s	▼ SBAS #5 128
Calendar settings	SBAS	L1	OFF	SBAS #6 132
Raw data				
Firmware	Save to	flash and reset	to make settings acti	ive!
Command builder				
ConstellationControl #1				
ConstellationControl #2				
Save settings 🚽	-			•

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.

🗄 Settings				×
	Solution Paramete	rs	RTK settings	†
Interface	Solution type	SINGLE + ANGLE	RTK mode	
DataSet	PDOP limit	30	RTK quality	FIX
Navigation systems	Min Sat Elevation	10	ARF	4
Solution parameters	Min Sat SNR	10	AGE, s	30
Atmospheric Corrections	Rate	1 Hz	Base line, cm	0
PPS	SBAS mode	SBAS OFF	Fix GNSS m	ask
Calendar settings	Tracking		GPS	GLONASS Galileo
Daw date	Mode:	Static & TCXO	E BeiDou	□ NavIC
Raw data				
Firmware				
Command builder				
ConstellationControl #1				
ConstellationControl #2				
Save settings				
				Refresh Save
1				

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.

2. Settings		<u>×</u>
Interface	IONO corrections	User IONO Model
DataSet	Trashold, % 70	a0 0.465661 * 1e-8 a1 1.490116 * 1e-8
Navigation systems	Exclude mask	a2 -5.960460 * 1e-8
Solution parameters		a3 -5.960460 * 1e-8
Atmospheric Corrections		b0 79872.000000
PPS	GPS SBAS_GRID	b1 65536.000000
Calendar settings	GAL DUAL_FRQ	b3 -393216.000000
Raw data		
Firmware	TROPO corrections SBAS	
Command builder		
ConstellationControl #1		
ConstellationControl #2		
Save settings		
		Refresh Save



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 COM229 (Interface1).

Differential positioning mode can be switched on:

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

STRSVR ver.2.4.3	3 b26						
2019/12/04 08	8:52:53 GPST	Connect	: Time: 0d	00:00:00			
Stream	Туре	Opt Cmd Conv	Bytes	Bps			
(0) Input	TCP Client	·	0	0			
(1) Output	Serial		0	0			
(2) Output	-		0	0			
(3) Output			Serial Option	15			×
			Port	сом229 💌	Parity	None	•
			Bitrate (bps)	115200	Stop Bits	1 bit	
► <u>S</u> tart		Options	Byte Size	8 bits 💌	Flow Control	None	•
			C Output R	eceived Stream t	o TCP Port		
					OK	Cancel	

- 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

	Interface		
Interface	Baud Rate Ba	ase station	
DataSet	UART1 115200 T	ata format	RTCM3
Navigation systems	UART2 460800 T	ransport delay, ms	50
Solution parameters	UART3 0		
Atmospheric Corrections	UART4 115200 💌		
PPS			
Calendar settings		C HARTS	C HAPT4
Raw data		Onicio	O GARTY
Firmware	C UART1 C UART2	C LIARTS	C HART4
Command builder			
ConstellationControl #1	C LIARTI C LIART2	C HARTS	@ UART4
ConstellationControl #2			
Save settings			

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 subsection, select 'RTK+ANGLE';
- Click on the Save button. Exit the Settings section.

	Solution Paramete	rs		RTK settings	
Interface	Solution type	RTK + ANGLE	F	RTK mode	RTK KINEMATIC
DataSet	PDOP limit	30		RTK quality	FIX
Navigation systems	Min Sat Elevation	10		ARF	4
Solution parameters	Min Sat SNR	10		AGE, s	30
Atmospheric Corrections	Rate	1 Hz	•	Base line, cm	0
PPS	SBAS mode	SBAS+ON	-	Fix GNSS m	ask
Calendar settings	Tracking			GPS	GLONASS Galileo
Raw data	Mode:	Static & TCX	• •	BeiDou	I Navic
Firmware					
Command builder					
ConstellationControl #1					
ConstellationControl #2					
Save settings					

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

			ļ	- 🗆 ×	Message Log	- 🗆 ×
PDC	OP	1.0			Messages:	
HDO	OP	1.0			\$GNHDG,090639.00,279.6901,0.4562,,18,1000.0,4*60 \$YPR,911000,4,1,18,2,0.00,0.46,279.69,90639	
VDC	OP	1.0			\$HVECT,911000,4,1,18,25,3335934.21,1743303.65,5132140.44,3335936.11,1743298.41, 5132141.03.90639	
Fix	Mode	M 30)		\$GNZDA,090640.00,04,12,2019,00,00*7E \$GNGGA,0990640.00,5355.5883239,N,02735.4465108,E517,1.00,259.9631,M,,M,1.0,0039*43	
Qua	ality	5	-		\$GRV1G,215,71,7,7,7,7,0.031,7,0.031,7,019,022 \$GPGSA,M,3,001,003,006,009,014,017,019,022,023,031,,,1.00,1.00,1.00*0A	
Mod	le	D			\$GLGSA,M,3,001,002,003,011,012,017,018,,,,,,1.00,1.00,1.00*2F	
Ear	and hiter		Dianau	115200	\$GNHDG,090640.00,279.6970,0.4886,,18,1000.0,4*6F	
For	mat, bitra	te INTL	binary,	115200	\$YPR,911200,4,1,18,2,0.00,0.49,279.70,90640	
			10		\$HVECT,911200,4,1,18,25,3335934.25,1743303.55,5132140.24,3335936.16,1743298.31, 5132140.83,90640	
	GL	UNASS /	19		\$GNZDA,090641.00.04,12,2019.00.00*7F	
FX	PRN	C/No	El, °	Az, °	\$GNGGA,090641.00,5355.5883179,N,02735.4465198,E,5,17,1.00,259.9856,M,,M,1.0,0039*43 \$GNVTG,224.18.T.,M.0.013,N.0.025,K,D*2E	
1	17	42/42	26	214	\$GPGSA,M,3,001,003,006,009,014,017,019,022,023,031,,,1.00,1.00,1.00*0A \$GLGSA_M_3.001.002.003.011.012.017.0181.00.1.00.1.00*7E	
1	1	41/35	15	79	\$GIGSA,M,3,,,,,,,1.00,1.00,1.00,100,16 \$GINHDG,090641.00,279.7045,0.4798,,18,1000.0,4*60	
1	11	44/47	35	58	\$YPR,911400,4,1,18,2,0.00,0.48,279.70,90641 \$HVECT,911400,4,1,18,25,3335934.28,1743303.57,5132140.29,3335936.19,1743298.33,	
	10	AAIAC	47	275	5132140.88,90641	

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.

				ļ	- 🗆 🗵	Message Log	- 🗆 ×
	PDC	P	1.0			Messages:	
	HDC	P	1.0			\$HVECT,945800,4,1,18,25,3335933.60,1743303.62,5132140.93,3335935.51,1743298.38, 5132141 53,90933	
	VDC	P	1.0			\$GPGSV,4,1,16,031,33,56,45,023,61,230,45,022,56,120,47,019,23,280,45*4C \$GPGSV,4,2,16,017,18,261,47,014,15,60,39,003,80,116,46,001,26,173,48*4F	
	Fix I	Mode	M 30)		\$GPGSV,4,3,16,006,29,312,43,095,33,56,43,065,26,173,46,081,18,261,41*48 \$GPGSV,4,4,16,067,80,116,49,070,29,312,45,009,31,237,45,073,31,237,43*7A	
	Qua	lity	4	-		\$GLGSV,5,1,17,017,24,214,41,001,13,80,41,011,35,56,48,018,47,273,47*6D \$GLGSV,5,2,17,002,72,35,41,010,33,46,45,075,35,56,44,003,43,279,48*51	
	Mod	le	D			\$GLGSV,5,3,17,081,24,214,41,012,29,116,46,065,13,80,37,066,72,35,45*6B \$GLGSV,5,4,17,082,47,273,45,067,43,279,48,076,29,116,45,019,26,332,34*6E	
	Forr	nat, bitra	ate NTL	_Binary,	115200	\$GLGSV,5,5,12,083,26,332,39*64 \$GIGSV,2,1,05,006,29,124,40,002,16,147,35,004,12,86,35,009,25,207,39*52	
Γ		GL	ONASS 7	7/9		\$GSGSV,1,2,05,001,,,38"5F \$GSGSV,1,1,04,136,25,207,38,128,11,119,37,123,28,175,42,127,24,147,38*71 \$CNI7A 000024 00 04 13 2010 00 00873	
	FX	PRN	C/No	El, °	Az, °	\$GNGCA,090934.00,04,12,2019,00,007/2 \$GNGGA,090934.00,5355.5884073,N,02735.4464279,E(4)17,1.00,260.0817,M,,M,1.0,0(39)*48 \$GNVTC_211_6_7M_0_042_N_0_077_C_D*76	
L	1	17	41/41	24	214	\$GFGSA,M,3,001,002,003,014,017,019,022,023,031,,,,1.00,1.00,1.00*0A \$GFGSA,M,3,001,002,003,011,012,018 10,01,001,001,001,00*0A	
	1	1	41/37	13	80	\$GIGSA,M,3,,,,,,,,1.00,1.00,1.00*16 \$GNHDG.090934.00.279.6757.0.4562., 18,1000.0.4*6F	
ľ	1	11	48/44	35	56	\$YPR,946000,4,1,18,2,0.00,0.46,279.68,90934 \$HVECT,946000,4,1,18,25,3335933.32,1743303.70,5132141.01,3335935.23,1743298.46,	
	,	10	47/45	47	272	5132141.60,90934	-

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:

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

	Interface
Interface	Baud Rate Base station
DataSet	UART1 115200 💌 Data format RTCM3 💌
Navigation systems	UART2 460800 Transport delay, ms 50
Solution parameters	UART3 0
Atmospheric Corrections	UART4 115200 💌
PPS	
Calendar settings	
Raw data	
Firmware	
Command builder	OAKT2 S OAKT2 S OAKT3 S OAKT4
ConstellationControl #1	
ConstellationControl #2	CONTRACTORIE CONTRACT
Save settings	

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			}
nterface	Г тхт	GST GST	RSOL_ATR	
DataSet	GGA	HDG_DATA	BPOS_ECEF	
lavigation systems	☐ GSA	RTIME_RDATE		
Solution parameters	☐ GSV	RPOS_ECEF	RSOL_FULL	
	☐ ZDA	RVEL_ECEF	RSOL_IFULL	
Atmospheric Corrections	Г утс	RPOS_LLA	F YPR_DEG	
PPS	☐ RMC	RVEL_ENU	HVECT_DATA	
Calendar settings)
Raw data	GSV period	5		
Firmware				\backslash
Command builder				$\langle \rangle$
ConstellationControl #1				
ConstellationControl #2				
ave settings				

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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.

Interface		Smoothing mode ON
DataSet	RAW SHELL NOVATEL	
Navigation systems		
Solution parameters	BESTPOS/1006	Messages
Atmospheric Corrections	Single Sol C User data	NOVATEL:
PPS	BestPos longitude, ° 27,59077874	
Calendar settings	BestPos altitude, m 260.390	GPSEPH GLOEPH
Raw data	Masks	CLOCLOCK BESTPOS
Firmware	Navigation systems	GALINAV EPH V IRNEPHEMERIS
Command builder	GPS I GLONASS I BeiDou	
ConstellationControl #1	Galileo 🔽 NavIC	
ConstellationControl #2	Min. C/N ratio, dB/Hz 30	RTCM3:
Save settings	Min. elevation angle, ° 5	↓ 1004+1012 ↓ 1020
	Use RAIM	I 1019 I 1006

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

🗄 NTL B	rowser	5.4.2 -	COM22	7 - #xxxxx	_ S&H_ D	EF					
Connection Settings Windows											
Discon	nect								- 🗆 🗵	Message Log	
Auto c	onnectio	n			PDC	P	1.0			Messages:	
Pause		Ctrl+P			HDC	P	1.0			\$HVECT,1377400,4,1,15,25,3335935.71,1	
Latitude	53° 5	5' 35.321	1046" N		VDC	VDOP		1.0		\$GNZDA,094532.00,04,12,2019,00,00*7C \$GNGCA_094532_00_5355_5886628_N_027	
Longitud	e 27° 3	35' 26.77	7628" E		Fix I	Mode	M 30)		\$GRVTG, 145.74, T, ,M,0.026, N,0.048, K,D* \$GPGSA M 3.003.006.009.019.022.023.02	
Altitude	260.	0941 m.			Qua	lity	5			\$GLGSA,M,3,002,003,011,012,013,018,01 \$GIGSA,M.3,	
Speed	0.05	2 km/h			Mod	e	D			\$GNHDG,094532.00,279.4764,0.4751,,15 \$YPR.1377600.4.1.15,2.0.00.0.48,279.48	
Course	182.	110°			Format, bitrate NTL_Binary, 115200				115200	\$HVECT, 1377600, 4, 1, 15, 25, 3335935.74, 1 5132140.96, 94532	
		CDE 0/0			CLONASS 7/9					\$GNZDA,094533.00,04,12,2019,00,00*7D \$GNGGA.094533.00,5355.5886709,N.027;	
		GF3 6/9			GLO			//0		\$GNVTG, 169.48, T, , M, 0.046, N, 0.085, K, D*	
FX	PRN	C/No	El, °	Az, °	FX	PRN	C/No	El, °	Az, °	\$GPGSA,M,3,003,006,009,019,022,023,02	
1	31	41/43	23	44	1	11	46/43	29	36	\$GIGSA,M,3,002,003,011,012,013,018,01 \$GIGSA,M,3,,,,,1.00,1.00,1.00*16 \$GNHDC 094533.00.279.4500.0.3905_15	
1	23	49/-	78	232	1	18	41/41	35	251	\$YPR,1377800,4,1,15,2,0.00,0.39,279.45 \$HVECT,1377800,4,1,15,25,3335935.72,1	
1	22	48/-	40	126	1	2	48/46	57	69	5132140.98,94533 \$GPGSV,4,1,15,026,15,86,41,031,23,44,4	
										\$GPGSV,4,2,15,019,14,266,44,003,63,12	

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 'COM227' 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.

RTKNAVI ver.2.4.3 b29 2000/01/01 02:59:47.0 LT		I	L
X/Y/Z-ECEF R	vver:Base SNR (dBHz)		*
-		Log Streams	
		Log Stream Type Opt	tout Event
Input Streams	ad Format Ont	(7) Base Station File	
(1) Rover Serial	NovAtel OEM6	(8) Correction Serial	
(2) Base Station TCP Client	RTCM 3	D:\work\Test_logs\different\191204\H4V2_GPS_L1L5_IRN_L5	S.gps
C (3) Correction Serial	RTCM 2	D:\work\Test_logs\different\191129\vrs.rtcm3	
Transmit NMEA GPGGA to Base Station	000 0.000	Time-Tag Supp Table Options	×
Reset Cmd	Max Baseline 10 km	Setting1 Setting2 Output	Statistics Positions Files Misc
Input File Paths		Positioning Mode	Single
		Frequencies / Filter Type Elevation Mark (%) / SNP (Hack (dirtz)
Cavial Ontin		Rec Dynamics / Earth Tide	s correction OFF V OFF V
Senar Optio		Ionosphere Correction	OFF
Port	COM227 Parity None	Troposphere Correction	OFF
Bitrate (bps) 115200 💌 Stop Bits 1 bit	Sate V Rec PCV	PhWU Rej Ed RAIM FDE DBCorr
Byte Size	8 bits 💌 Flow Control None	Expluded Satellites (+PRN	I: Induded)
C Output i	Received Stream to TCP Port	GPS 🔽 GLO 🗆 Gal	ileo 🗌 QZSS 🔲 SBAS 📄 BeiDou 🗌 IRNSS
		Load Sa	ve OK Cancel
► <u>S</u> tart	OK Cancel	Coptions Exit	
PTKNAVI ver 2.4.3.b29			
2019/12/04 13:07:00.9 LT			L
x/Y/Z-ECEF	Rover:Base SNR (dBHz)		
			50
			40
			30
Solut SINGLE			20
X: 3335942.827 m			
Y: 1743305.101 m Z: 5132147.550 m	02 03 06 09 22 23 26	31 02 03 10 11 12 13 18 19	
X: 3.974 Y: 3.745 Z: 8.084 m Age: 0.0 s Ratio: 0.0 #Sat16			50
			-40
			-30
			-20
1 F			
T T	(1) COM227	0	1

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

🖥 RTKCONV ver.2.4.3 b29	
Time Start (GPST) Time End (GPST) Interval 2018/03/30 2018/03/30 22:00:00 60 s s z	Unit 24 H
RTCM, RCV RAW or RINEX OBS ?	
D:\work\Test_logs\different\191204\H4V2_GPS_L1L5_IRN_L5S.gps	• 🗉 📖
Output Directory Forma	t
V D:\work\Test logs\different\191204\H4V2 GPS L1L5 IRN L5S.obs	E
D:\work\Test_logs\different\191204\H4V2_GPS_L1L5_TRN_L5S.nav	
D: \work\iest_logs\amerent\191204\H4v2_GPS_L1L5_1RIV_L55.nnav	
D:\work\Test_logs\different\191204\H4V2_GPS_L1L5_IRN_L5S.qnav	
D:\work\Test_logs\different\191204\H4V2_GPS_L1L5_IRN_L5S.lnav	
D:\work\Test_logs\different\191204\H4V2_GPS_L1L5_IRN_L5S.cnav	
D:\work\Test_logs\different\191204\H4V2_GPS_L1L5_IRN_L5S.inav	
D:\work\Test_logs\different\191204\H4V2_GPS_L1L5_IRN_L5S.sbs	
	2
	:
⑦ Plot Process ♀ Options ► Convert	E <u>x</u> it

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

Options		×				
RINEX Ver 3.03 Sep NAV S	tation ID 0000	RINEX2 Name				
RunBy/Obsv/Agency						
Comment						
Maker Name/#/Type						
Rec #/Type/Vers						
Ant #/Type						
Approx Pos XYZ D.0000	0.0000	0.0000				
Ant Delta H/E/N 0.0000	0.0000	0.0000				
Scan Obs Types 🗌 Half Cyc Corr	Iono Corr 🔲 Time	Corr 🗌 Leap Sec				
Satellite Systems ▼ GPS ▼ GLO GAL QZS SB	S BDS V IRN	Excluded Satellites				
Observation Types ▼ C ▼ L ▼ D ▼ S ▼ L1 ▼ L2 ▼ L5/3 ▼ L6 ▼ L7 ▼ L8 ▼ L9 Mask						
Receiver Options						
Time Torelance (s) 0.005 Debug OFF	<u>•</u> <u>О</u> К	Cancel				

• Click on the 'Convert' button.

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



🖥 RTKCONV ver	.2.4.3 b29				I×
Time Start (GPS	ST) ? 7 20:00:00 201	Time End (GPST) 8/03/30	? Inte	rval 🚺 Unit s 24	Н
RTCM, RCV RAW	or RINEX OBS ?				
D:\work\Test_logs	s\different\191204\⊦	14V2_GPS_L1L5_IRM	l_L5S.gps	– E	
Output Directory				Format	
				NovAtel OEM	5 💌
RINEX OBS/NAV/G	NAV/HNAV/QNAV/LI	NAV and SBS			
D:\work\Test_	ogs\different\19120	4\H4V2_GPS_L1L5_	IRN_L5S.obs	11	
D:\work\Test_	ogs\different\19120	4\H4V2_GPS_L1L5_	IRN_L5S.nav		
D:\work\Test_	ogs\different\19120	4\H4V2_GPS_L1L5_	IRN_L5S.gnav		
D:\work\Test_	ogs\different\19120	4\H4V2_GPS_L1L5_	IRN_L5S.hnav		
D:\work\Test_	ogs\different\19120	4\H4V2_GPS_L1L5_	IRN_L5S.qnav		
D:\work\Test_l	ogs\different\19120	4\H4V2_GPS_L1L5_	IRN_L5S.lnav		
D:\work\Test_l	ogs\different\19120	4\H4V2_GPS_L1L5_	IRN_L5S.cnav		
D:\work\Test_	ogs\different\19120	4\H4V2_GPS_L1L5_	IRN_L5S.inav		
D:\work\Test_l	ogs\different\19120	4\H4V2_GPS_L1L5_	IRN_L5S.sbs		
20	19/12/04 10:07:08-	12/04 10:17:07: O=	=600 N=27 E=104		?
Plot	Process	Options	► <u>C</u> onvert	E <u>x</u> it	

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

> 2019 12 4 10 7 8.000000 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 2	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

S-band measurements are not converted by RTKCONV. Some custom tools should be developed to get this data in RINEX format.



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. NTL104 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.

∱ Settings X						
		Save settings				
Inte	erface	Tag for current settings:	GPS+GLO+IRN	Save		
Dat	aSet	Save settings as:	SET 1	S - Save	-	
Nav	rigation systems	Active settings:	SET 1	Set		
Solu	ution parameters		, 			
Atm	nospheric Corrections					
PPS						
Cale	endar settings					
Rav	v data					
Firm	ware					
Con	nmand builder					
Con	nstellationControl #1					
Con	stellationControl #2					
Sav	e settings					
						Refresh

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



CONTACT

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