



MEDIATEK (MTK) FAQ

OriginGPS.com



Document History

Revision	Date	History	Author
1.0	8.5.2016	EPO Management, TTFF testing	Mark K.
1.1	21.7.2016	Performance test condition note, Title update	Mark K.
1.2	30.10.2016	Adding Data Logging – section 5	Mark K.
1.3	5.3.2018	Section 4 – English Windows setup remark	Mark K.
1.4	9.9.2018	Section 1.b – GNSS search mode	Igor M.

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*****All performance tests must be performed in one of the following conditions:**

a. Outdoors, Under open skies.

b. Under GPS repeater

Please note: when you enter a command manually (not through PowerGPS GUI) you must add a checksum in the end of every command. You may use OriginGPS' proprietary Checksum Calculator, or any other valid checksum calculator.

1. SETTING NMEA MESSAGES

a. Enabling / Disabling message types

Message no. 314 – Set NMEA Output messages ON / OFF and their update rates.

The message contains a total of 19 fields, including 10 data fields that represent output rates for the 10 supported NMEA sentences individually, and 8 non-relevant fields.

The supported NMEA sentences and their corresponding position in the command:

- 0 NMEA GLL messages – Geographic Position – Latitude longitude.
- 1 NMEA RMC messages- Recommended minimum specific GNSS sentence.
- 2 NMEA VTG messages – course over ground and ground speed.
- 3 NMEA GGA messages – GPS fix data
- 4 NMEA GSA messages – GNSS DOPS and active satellites
- 5 NMEA GSV messages – GNSS satellites in view
- 6 NMEA GRS messages – GNSS range residuals
- 7 NMEA GST messages – GNSS Pseudo range errors statistics

- 17 NMEA ZDA messages – Time & Date
- 18 NMEA PMTKCHN – GNSS channel status

Positions 8-16 are N/A.

Each field defines the update rate of the corresponding message, as follows:



0 – Disabled or not supported sentence

1 – Output every one position fix (for example, working in 1Hz frequency, the output will be 1 message per second)

2 – Output every two position fixes

3 – Output every three position fixes

4 – Output every four position fixes

5 – Output every five position fixes

Example:

```
$PMTK314,0,1,1,5,1,0,0,0,0,0,0,0,0,0,0,0,1,1*2C
```

GLL messages – disabled

RMC messages - Output every one position fix

VTG messages - Output every one position fix

GGA messages - Output every five position fixes

And so on.

b. GNSS search mode

This command is used to configure the module in which satellite system to work.

In this command we will use \$PMTK353 and Enable / Disable the satellites system according to user decision.

Pattern - \$PMTK353,GPS,GLONASS,GALILEO,GALILEO_FULL_MODE,BEIDOU*Checksum

Enable – will be '1' . Disable – will be '0'

For example:

GPS only mode - \$PMTK353,1,0,0,0,0*2A

GPS and GLONASS mode - \$PMTK353,1,1,0,0,0*2B

GPS and BEIDOU mode - \$PMTK353,1,0,0,0,1*2B

*GLONASS and BEIDOU cannot be enabled at the same time.



2. Changing Port Baud Rate

\$PMTK251,Baudrate (+checksum)

Possible values for baud rate:

0 – default setting

4800

9600

14400

19200

38400

57600

115200

230400

460800

921600

Example:

\$PMTK251,38400*27

Please note: After sending the change baud rate – you must also change your host's baud rate.

if you are using PowerGPS GUI, after sending a baud rate change command you must disconnect and connect ones again with the new baud rate.

Important: The baud rate will return to default after a power cycle.



3. Changing Frequency

Before changing the frequency – it is required to change the baud rate for preventing overflowing of the port.

The default frequency of MTK modules is 1Hz (if wasn't ordered with special configuration) and default baud rate is 9600.

MTK - Frequency Vs Baud Rate		
Frequency	Baud Rate	RS232 bandwidth usage
1Hz	9600	56%
5Hz	38400	71%
5Hz	57600	47%
10Hz	57600	94%
10Hz	115200	47%

After your module is set to an appropriate baud rate for the desired frequency, the command for frequency change is:

\$PMTK220,fix interval[msec] (+checksum)

Example:

Setting 10Hz frequency:

\$PMTK251,115200*1F (setting the baud rate to 115200)
\$PMTK220,100*2F (setting frequency to 10Hz)

Important: The baud rate and frequency will return to default after a power cycle.



4. Using PowerGPS software

Important: For proper operation, PowerGPS software requires Windows operation system with English language setup. The software might not operate properly in case the Windows setup is in a language other than English.

1. Install MTK's proprietary PowerGPS software attached.
2. Set the port settings – COM port number, baud rate – MTK standard is 9600. After you set the baud rate configurations, press the connect button (figure 1).

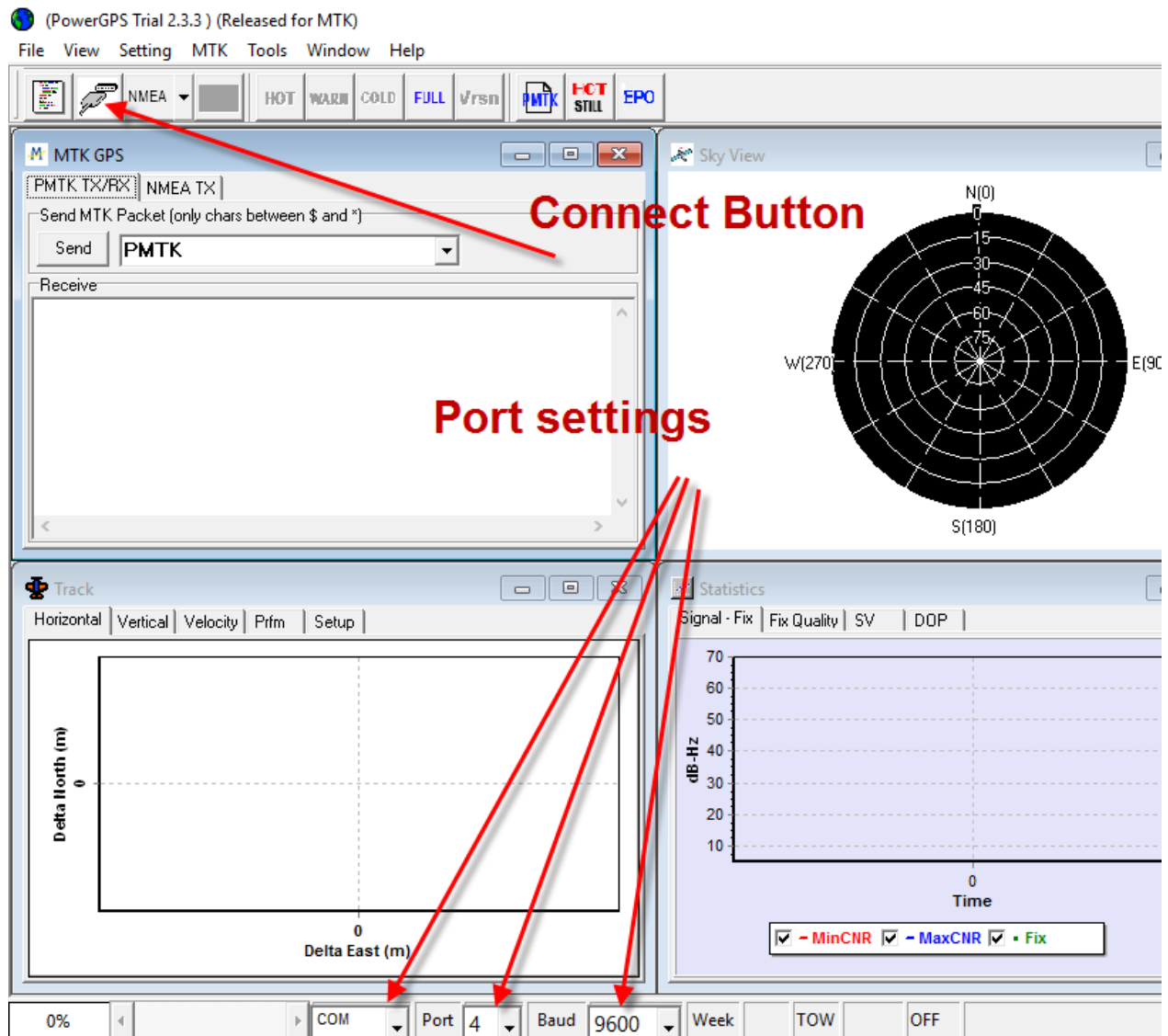


Figure 1 – PowerGPS main window



After pressing the “connect” button, you should see the following:

1. SNR bars in the “Signal” window (figure 2).
2. NMEA messages running in the “NMEA Text” window (figure 2).

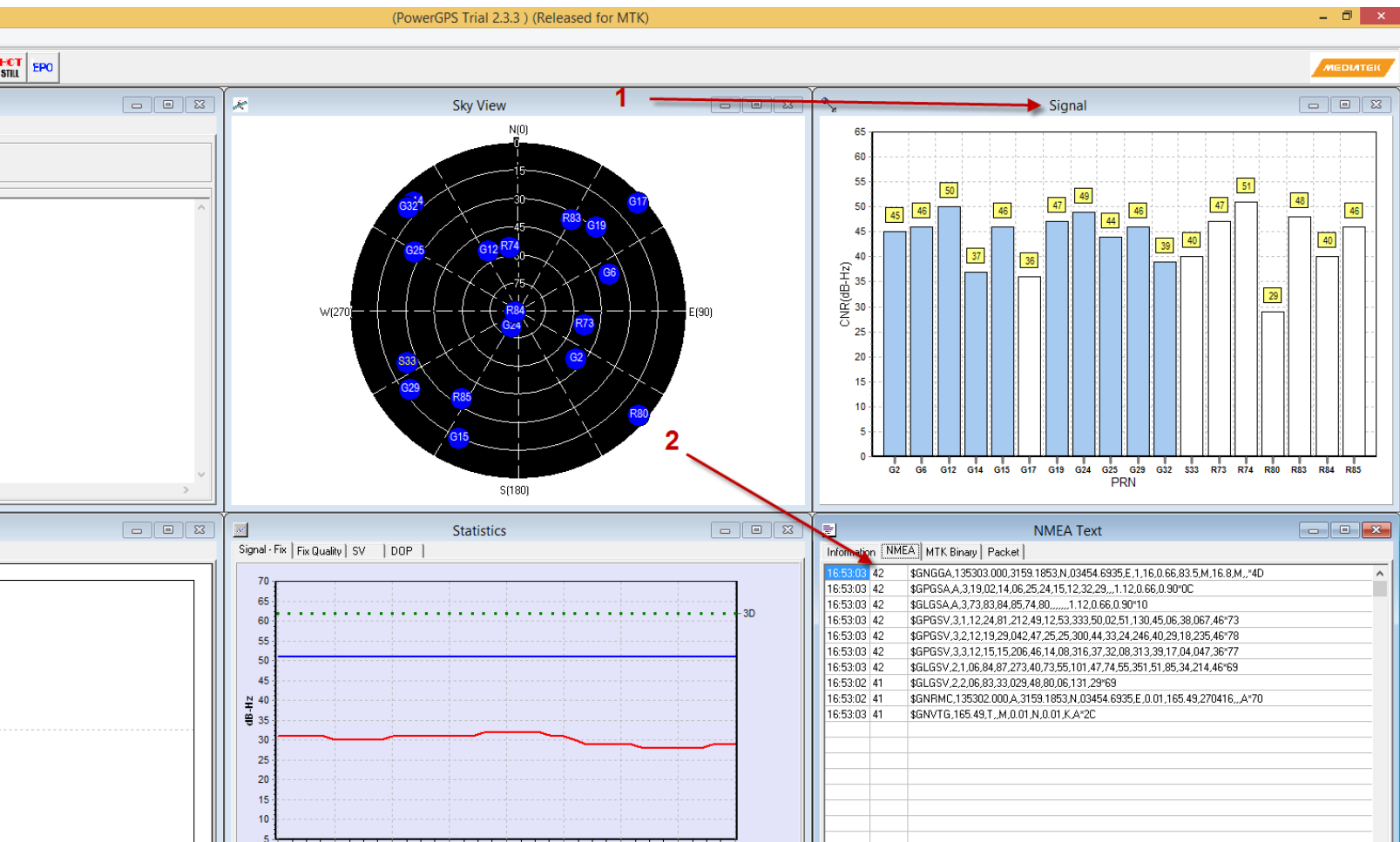


Figure 2 – PowerGPS software screen



5. Data Logging in PowerGPS

PowerGPS GUI allows you to record a log file.

It is possible to save a NMEA or binary log.

NMEA is the most common protocol in GPS and usually logs are required in NMEA.

In order to configure a log recording, go to “Settings” on top menu.

You will have options window opened. Select “Data Log”. See figure 3.

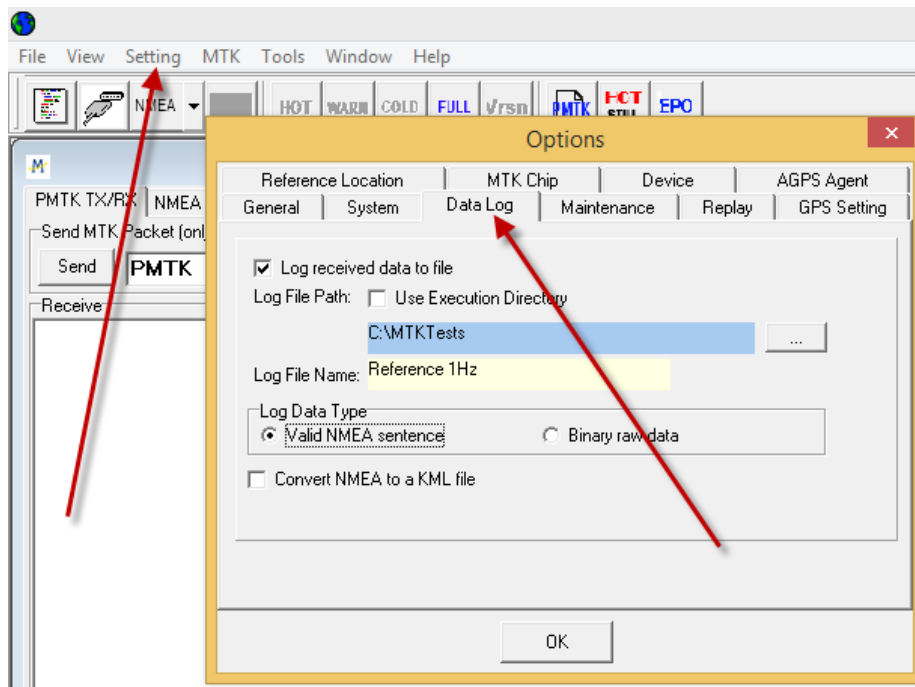


Figure 3 – Data Log menu

1. To get a log file, check the “Log received data to file” box.
2. It is recommended to uncheck the “Use Execution Directory” box, and to specify your own folder for logs. This is because of permission issues.
3. Specify the folder which will contain the log files. In this example – it is c:\MTK Tests.
4. Specify log file name. In this example – Reference 1Hz.
5. Choose the log data type – “Valid NMEA sentence” or “Binary data”.
6. Click OK.

Now the data sent from module will be recorded in the log file. To stop the recording, simply click the disconnect button. See figure 4.

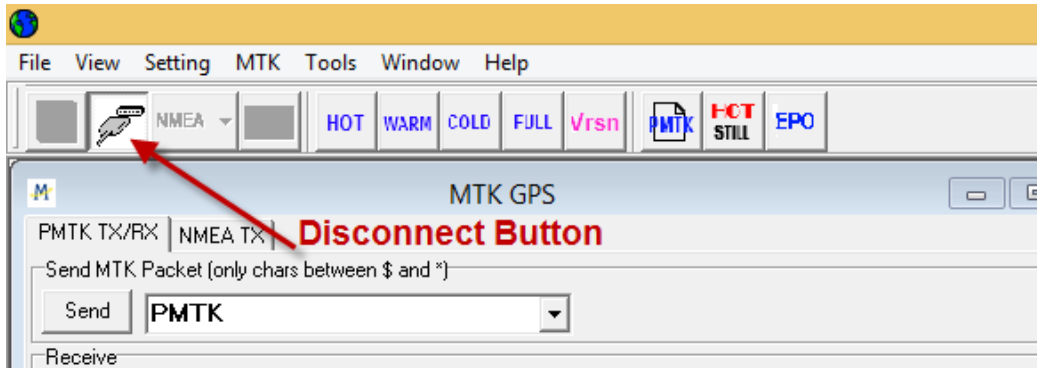


Figure 4 – Disconnect button will stop recording the log file

To see the recorded log file, go to the folder you specified in section 3. In this folder you will see “Data” sub-Folder, and sub folders of date and COM port. Select the relevant folder by date and COM port number, and you will find inside the log file. See figure 5.

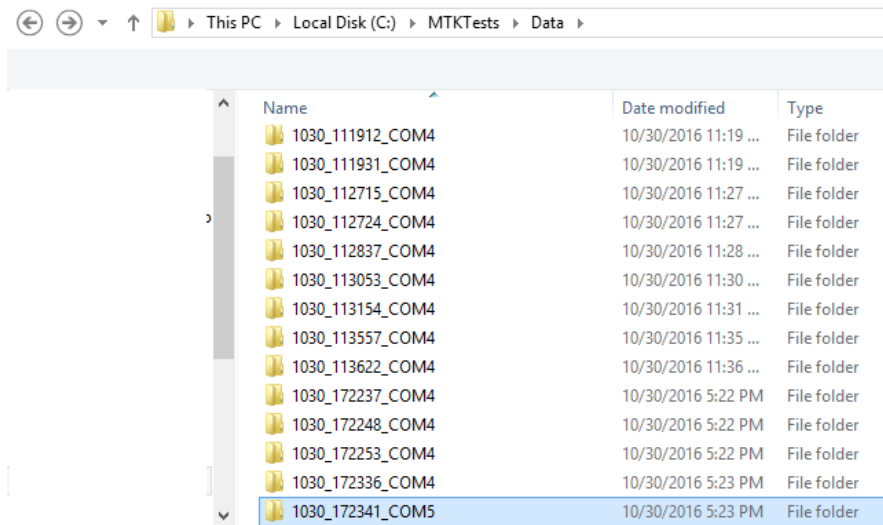


Figure 5 – Log files Folders

Please notice: You will not see the log file and its sub-folder until you stop the log recording by pressing disconnect button.



6. Sending manual commands in PowerGPS

In the “MTK GPS” window – PMTK TX/RX you can enter manual commands.

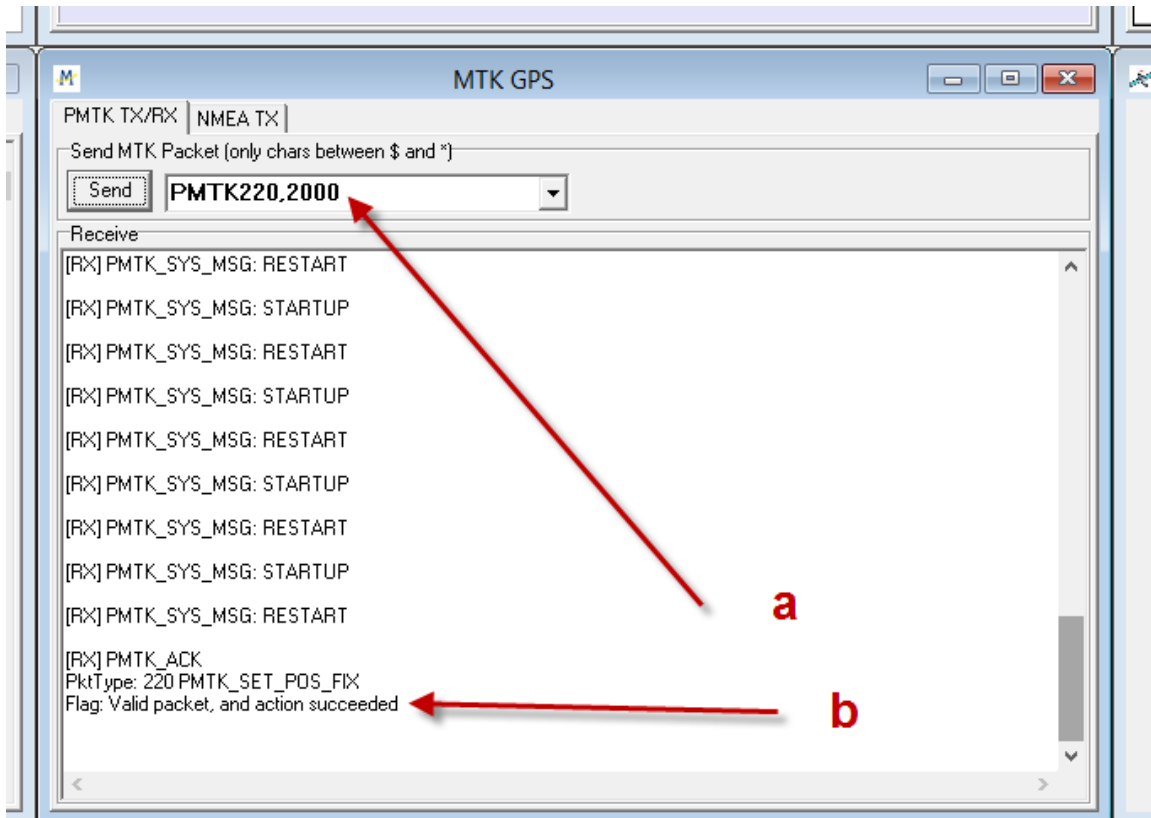


Figure 6 – Entering manual commands

- a. Enter the wanted command, without the ‘\$’ sign and without checksum. Those will be added automatically by the software. Press “Send” button (figure 6).
- b. After sending the command – you will receive ACK if the command is valid and accepted or NACK – if the command is rejected, with the command number and information about the packet – valid / not valid, and action – succeed / failed (figure 6).



7. Using Flash EPO aiding

EPO -Extended Prediction Orbit – Ephemeris data file that can be downloaded from OriginGPS FTP.

Please contact us for terms and commercial conditions of FTP access.

The use of Flash EPO shorten the TTFF after a cold start.

When you have the EPO file, do the following steps:

- A. On top menu – select MTK->EPO Management Tool. (see figure 7)

- b. You will have a “MTK EPO Management Tool” window opened. Press the “EPO file...” button, and browse for the attached EPO14days.dat (figure 7).

- c. Press “update EPO” button. The progress bar will run as the process go on. (figure 7)

- d. When the progress bar reaches successfully 100% - near the completed will appear a “1” digit” (see figure 8).

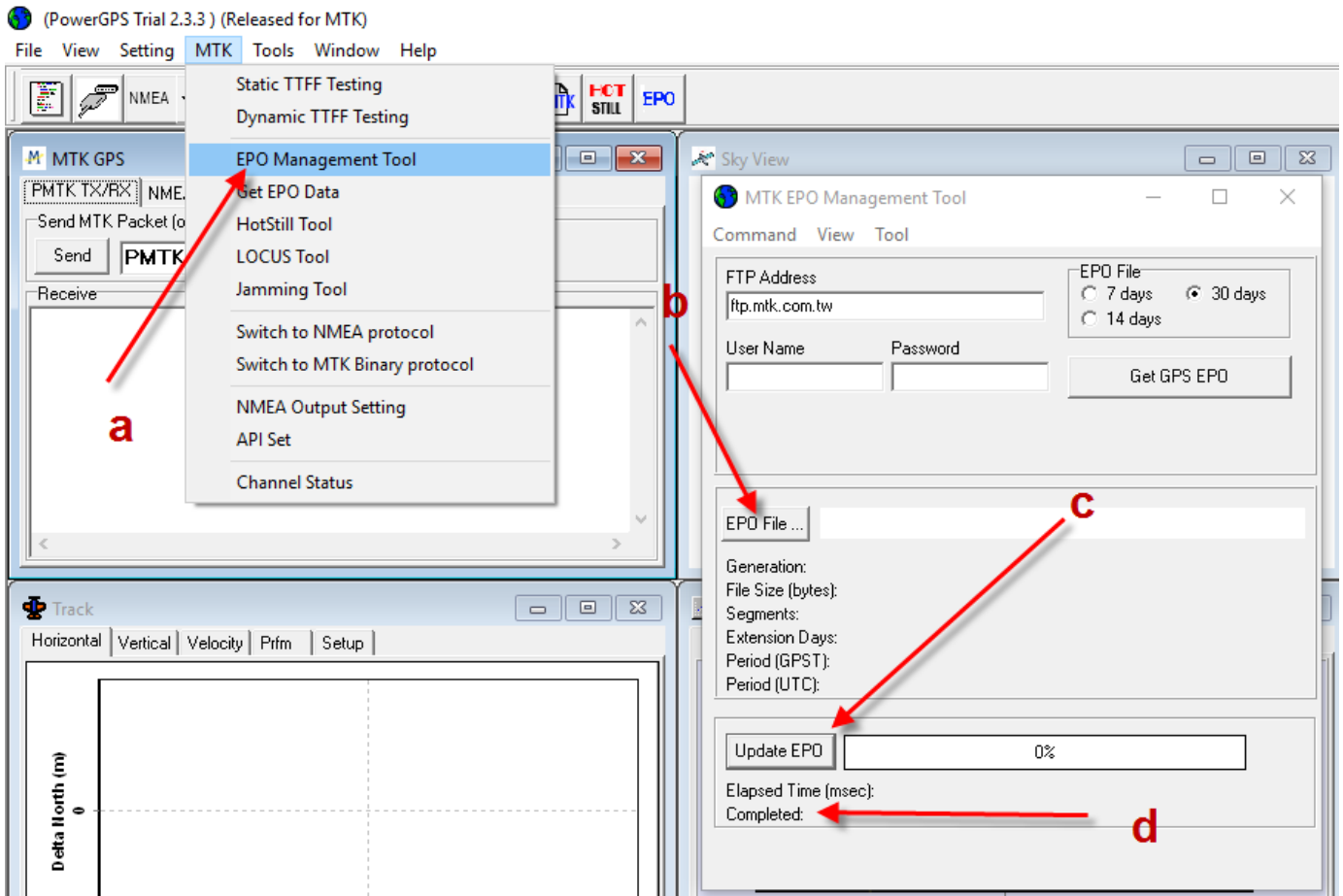


Figure 7 – EPO management tool

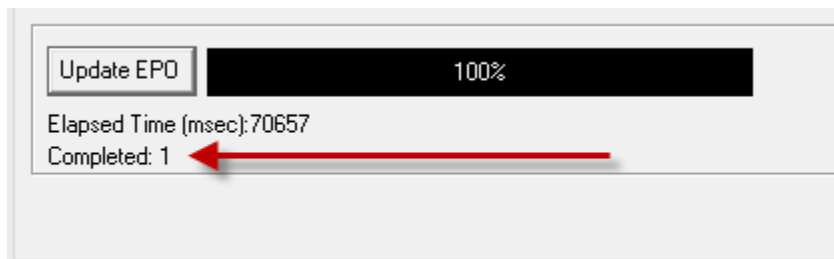


Figure 8 – EPO management tool – end of upload progress



8. Testing TTFF

In the top menu, select MTK ->Static TTFF testing

You will have the following window opened:

Automatic TTFF Testing

Restart Type
 HOT WARM COLD FULL

Number of Tests
 1 10 20 100 1000 10000 Define

Run Stop Result Chart Config Set Reference Point Cold Restart TTFF [6/20]

Ref. Lat	Ref. Lon	Current Lat	Current Lon	2D Error(m)	3D Error(m)	UTC Time	Fix Mode
31.986481	34.911507	31.986375	34.911482	11.9	24.5	14:18:03	3D

INFO	TT1SV	TT3SV	TT4SV	TT3EPH	TT4EPH	TT1GNSS	FF2DAcc	FFVAcc
Current	1.5	1.5	3.6	13.3	13.3	13.3	11.9	21.4
Min	0.3	0.5	1.3	12.8	12.8		8.7	17.0
Mean	0.6	1.2	1.7	16.5	16.5		13.1	22.0
Max	1.5	1.5	3.6	32.5	32.5		17.5	25.6
90%	1.5	1.5	3.6	32.5	32.5		17.5	25.6
95%	1.5	1.5	3.6	32.5	32.5		17.5	25.6

	2D-10km	2D-600m	2D-100m	3D-100m	2D-50m	3D-50m	Dynamic	TT4GNSS
TTFF	13.3	13.3	13.3	13.3	13.3	13.3	13.3	
Tests	6	6	6	6	6	6	6	
Min	12.8	12.8	12.8	12.8	12.8	12.8	12.8	
Mean	16.5	16.5	16.5	16.5	16.5	16.5	16.5	
Max	32.5	32.5	32.5	32.5	32.5	32.5	32.5	
50%	13.2	13.2	13.2	13.2	13.2	13.2	13.2	
67%	14.3	14.3	14.3	14.3	14.3	14.3	14.3	
90%	32.5	32.5	32.5	32.5	32.5	32.5	32.5	
95%	32.5	32.5	32.5	32.5	32.5	32.5	32.5	
99%	32.5	32.5	32.5	32.5	32.5	32.5	32.5	

Wait 24 seconds, Remain (sec): 15

Figure 9 – Automatic TTFF testing window

- Select the desired type of restart (figure 9)
- Select the desired number of tests (figure 9)
- Set reference location – in order to rush TTFF and calculate the accuracy.
To improve TTFF you need to use system time and nearby location.
After you press the “Set Reference Point” button – you will have an “Options” window – select “Reference Location” and enter your location in either Lat/Lon/Height or XYZ – ECEF- (figure 9).
- “Config” – test configurations. When you press this button you will have the following window opened (see figure 10):

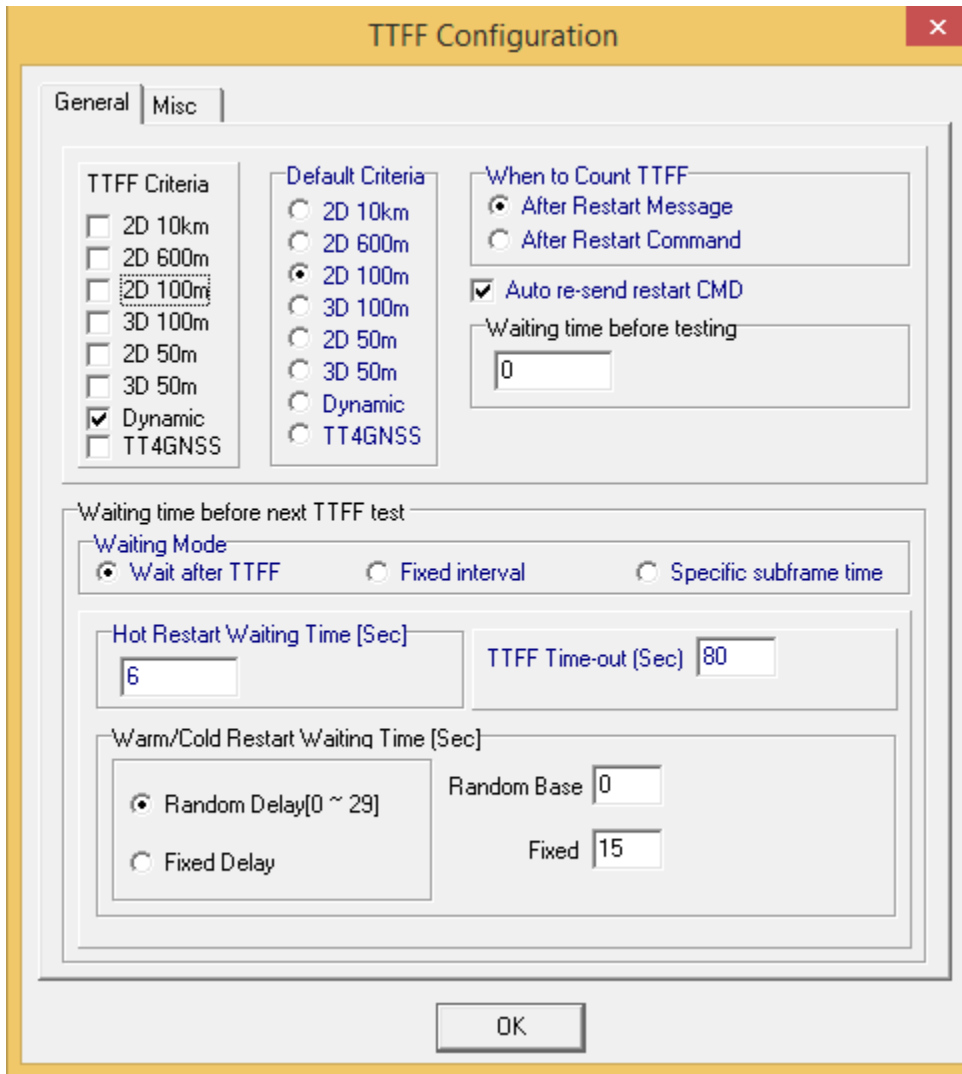


Figure 10 – TTF Configuration

TTF Criteria – selection of the accuracy criteria for TTF, for instance “3D-100m” means the time it takes for the receiver to reach the 3D fix mode and the offset of less than 100 meters. “Dynamic” means the time it takes for the receiver to get fix regardless of fix mode and offset.

In “Default Criteria” you can set which type of test will be shown as a result in the result chart. In the other fields of the configuration you can set the time measurement parameters of the test, timeout and time between tests.

When you finish – press “OK”.

e. Press “Run” to start the test (figure 11).



TTFF Test Results:

When the test is finished you will receive the following Test Results screen (figure 11 and 12):

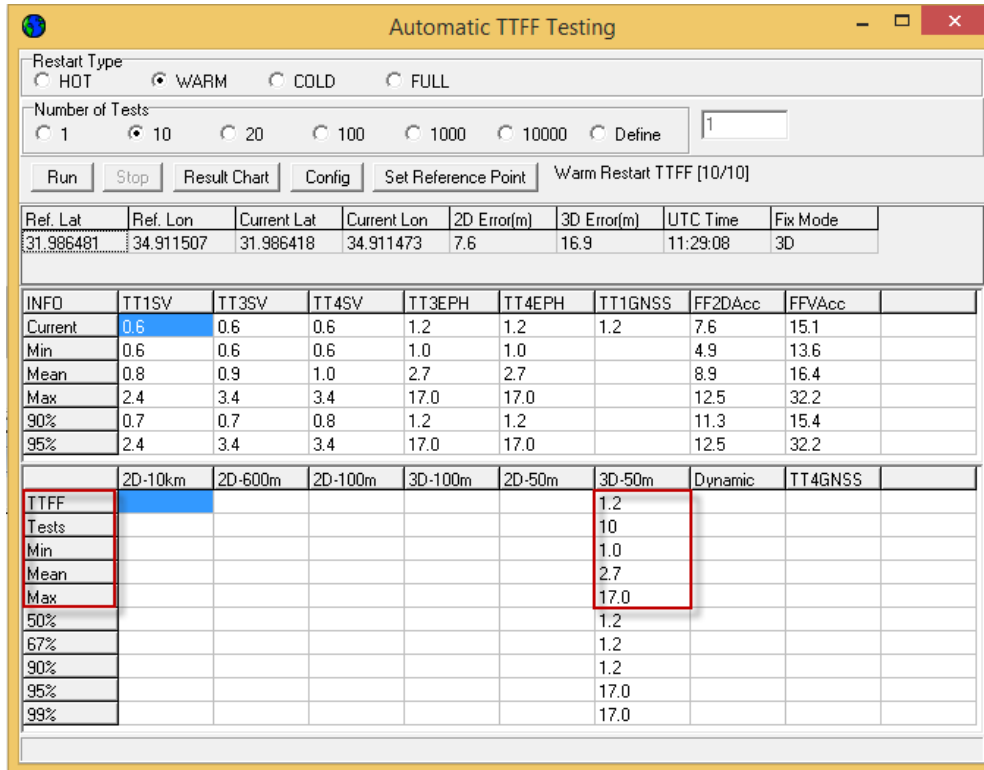


Figure 11 – Test Results window

In the line of TTFF is the result of the last test,

Tests – number of tests,

Min, Mean and Max results and below it - statistic distribution of the results.

You will also have a window that shows results in a graph – figure 6b.

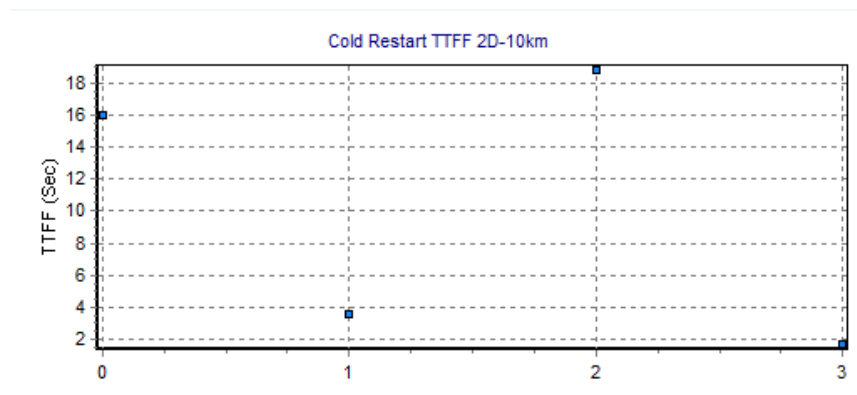


Figure 12 – Test Results in a graph