

# Satrack User Manual

Version v1.16



北京中电华大电子设计有限责任公司  
CEC Huada Electronic Design Co.,Ltd.

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## 1. GENERAL DESCRIPTIONS

### 1.1. *Satrack Overview*

Satrack provides a platform for Satellite tracking, analyzing GNSS messages, logging data received, graphical representation of signaling, satellite communication and geographical information.

Satrack is a Windows application which is designed to communicate with HED's Cynosure GNSS receiver via serial port or USB port. Satrack provides general GNSS functions as well as real time and playback evaluation tools.

#### 1.1.1. Real time tracking

Satrack can undergo real time processing of the collected information. Satellite tracking, signal strength, read through raw NMEA messages print out and render real time path tracking to Google Earth. Raw NMEA messages can also be logged at the same time for use later on.

#### 1.1.2. Replaying log files

Other than real time tracking, Satrack also provides option for re-playing data from file(s). Such feature provides room for revisiting special log or playback scenarios for testing and investigating GNSS receiver behavior.

#### 1.1.3. Post processing

Satrack also provides function for post-processing logged data such that raw data stored in files could be converted into KML/KMZ files format which contains easy to read and nicely organized graphical information. User could also specify several options and constraints in order to customize the output file(s).

### 1.2. *Before Started*

Satrack is built on top of Microsoft .NET Framework 4.0, and please make sure it is installed. It can be downloaded from Microsoft

<http://download.microsoft.com/download/2/0/e/20e90413-712f-438c-988e-fdaa79a8ac3d/dotnetfx40.exe>

Two features of Satrack require the support from Google Earth. In order to let Satrack reach its best performance, it is highly recommended to install Google Earth onto the computer. It can be downloaded from Google <http://earth.google.com>

### 1.3. Satrack Main Platform

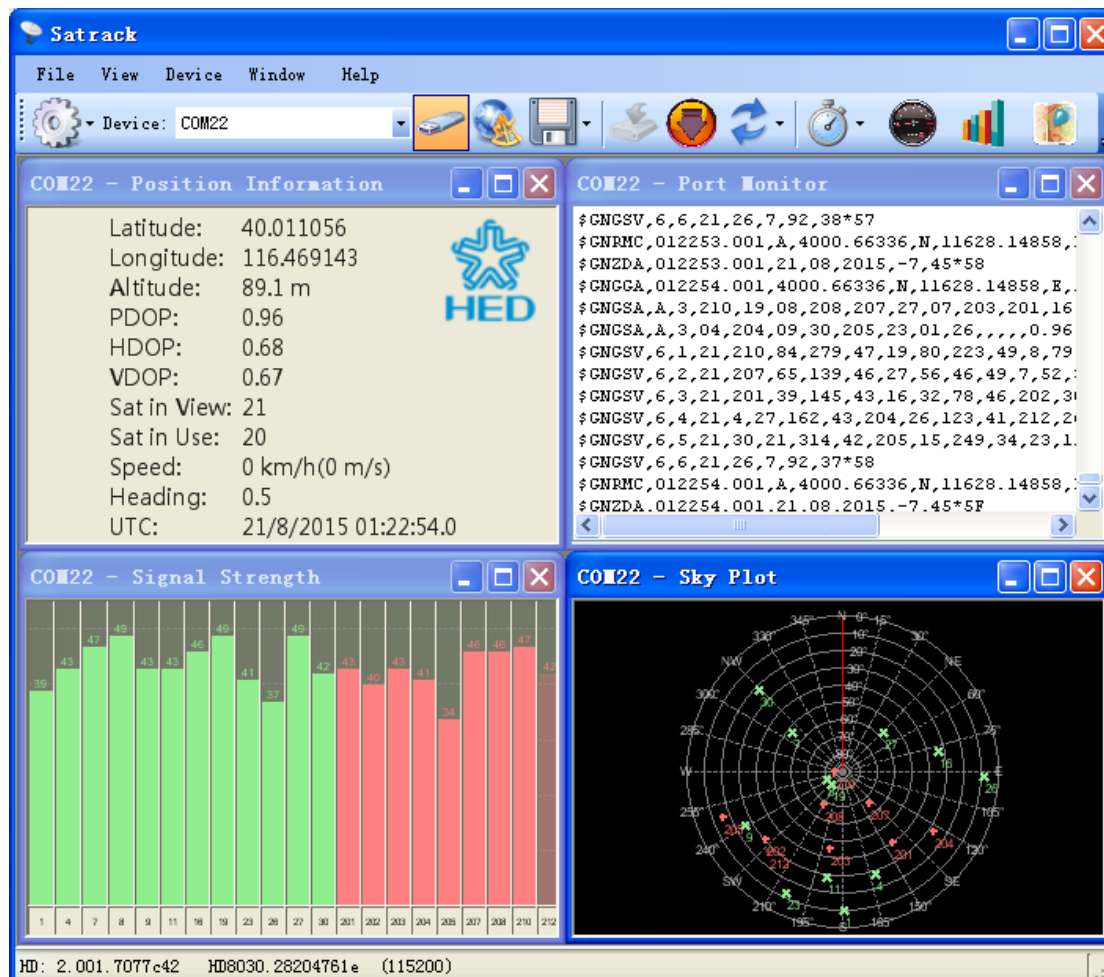


Figure 1.1 – Screenshot of Satrack Main Platform



Figure 1.2 - Menu items and strip bar at the top of Satrack main platform

### 1.3.1. Menu items

File	File related operations, such as save raw log files into KML/KMZ files or real time kml configurations.
View	Choose for additional sub-platforms to view. They include user position, com monitor, signal power, sky plot, speedometer, position map, chart and messages.  Languages of user interface can also be selected here.
Device	Configure the settings of COM port(s) and File(s).  Set device NMEA message rate.  Connecting and disconnecting all configured devices.
Window	Functions for re-ordering sub-platforms' position and included the index of the opened windows for quick and easier substitute.
Help	Information about Satrack

### 1.3.2. Sub platforms overview

User position	Display general position information including, latitude, longitude, altitude, PDOP (Position dilution of precision), HDOP (Horizontal dilution of precision) and VDOP (Vertical dilution of precision), time, etc.
Port Monitor	Allow user to monitor the current raw data read into Satrack.
Signal Strength	Show signal quality of satellites in terms signal-to-noise ratio, in form of CNR bars.
Sky Plot	Display all plots of position of satellites labeled with their identification number.
Speedometer	Display current speed information.
Position Map	Display position plots.
Chart	Graphical representation of a wide range of combination among various different kinds of data.
Messages	Binary message view designed for communicating with GNSS receiver via binary protocol.

## 2. STEP BY STEP START UP

### 2.1. Setting up COM ports and USB ports

#### 2.1.1. Setting up COM ports and USB ports

Check the Device combo box, it will appear the exist ports. As the figure 2.3, the exist ports are com ports: COM3, COM1, COM20 and usb port: HD8020 USB\_6#2. Check the port you want, you will connect to the port and communicate with it.

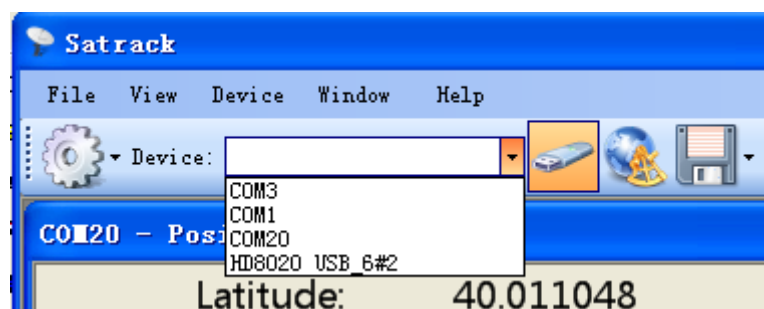


Figure 2.1 – exist ports

#### 2.1.2. Change your bits per second

Select either icon named with “**Device settings**” on strip toolbar. You can change your bits per second (baud rate) (It is only availability on com mode).

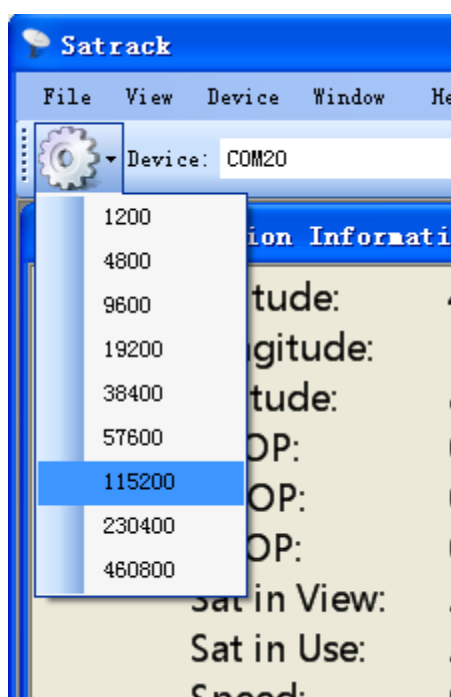


Figure 2.2 – change your bits per second

## 2.2. Setting up Log Files

1. Clicking “**Open outline file**” in “**File**” menu to select a file.
2. Then you can find the file in the device combo box. Then you can use it.
3. You can change the speed of the log, and stop pause the log play.
4. Clicking “**Delete outline file**” in “**File**” menu delete a file.

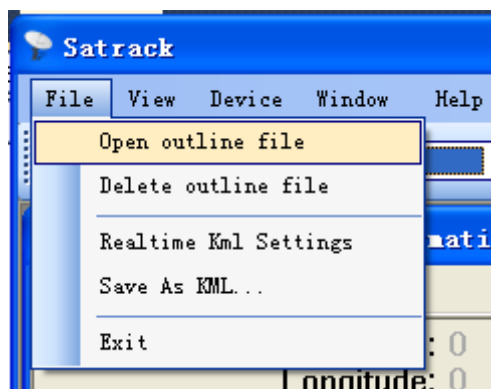


Figure 2.3 – Choose target log file

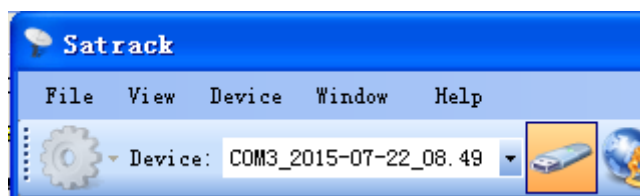


Figure 2.4 – Choose target log file

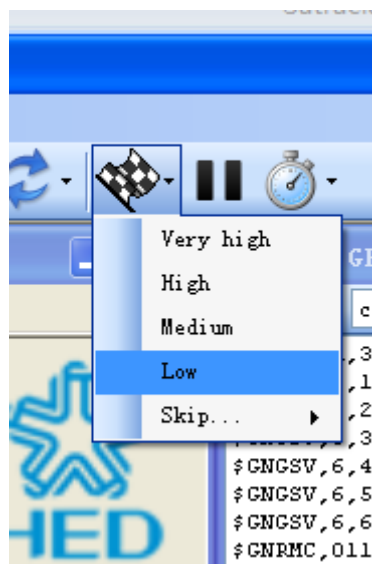


Figure 2.5 – Control the target log file

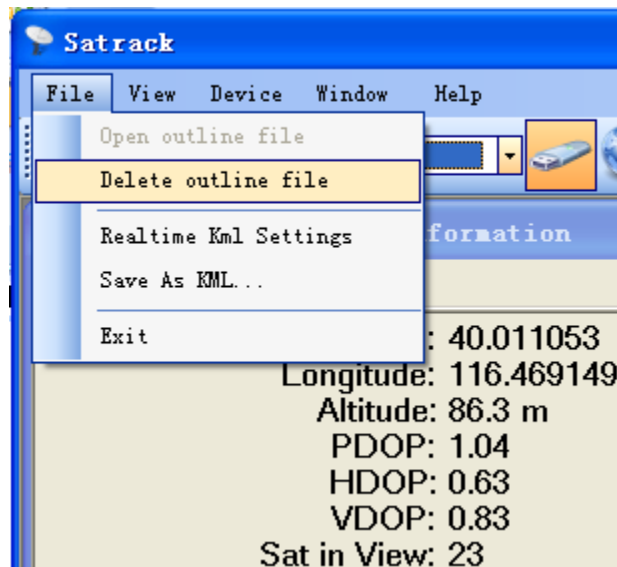


Figure 2.6 – Delete target log file

### 2.3. Retrieve setting

The using port settings are saved in hard drive of local machine. Settings will be loaded automatically when Satrack starts next time.

### 2.4. Start reading data

1. Data from GNSS receivers can be read through COM ports or from existing files. Before start, make sure either COM port or log file device source has been configured already.
2. To start reading data, select a device near “**Connect**” icon on strip toolbar and then click the icon to connect to selected device



Figure 2.7 – Connect to a device

3. As soon as the Connection has started, all data from devices are read and decoded to track information.
4. To disable the connection, click the icon named “**Disconnect**” (previously named “**Connect**”) on strip toolbar to disconnect only selected device.

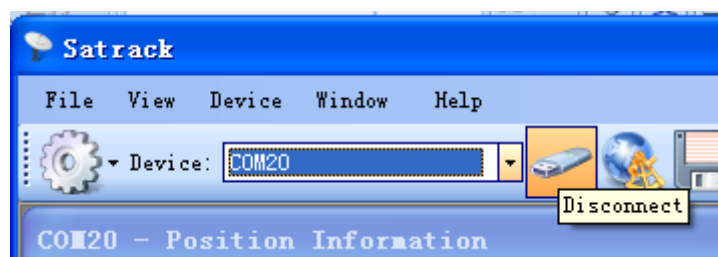


Figure 2.8 – Disconnect a device

## 2.5. Raw data logging

After connected to COM port or USB device, user can choose to save immediate data from GNSS receiver through COM port or USB into log files by clicking icon named **“Save Log”** on the strip toolbar.

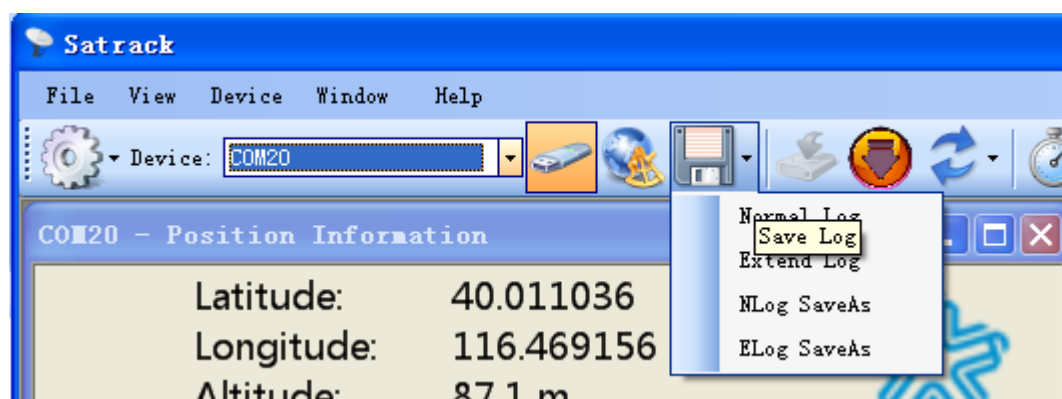


Figure 2.9 – Press the Save Log button

Click **“Normal log”** to save only NMEA messages. Directory of the saved normal log files is at My Documents\Satrack\logs. File name format: <Port name>\_<Date>\_<Log Start Time>.cyno.

Click **“NLog SaveAs”** to save extend log to the address user selected as figure 2.10.

Click **“Extend log”** to save all messages. Directory of the saved extend log files is at My Documents\Satrack\logs. File name format: <Port name>\_<Date>\_<Log Start Time>.GPS.”

Click **“ELog SaveAs”** to save extend log to the address user selected.

### 3. DEVICE MENU

#### 3.1. Set NMEA Message Rate And Baudrate

##### 3.1.1. The Dialog

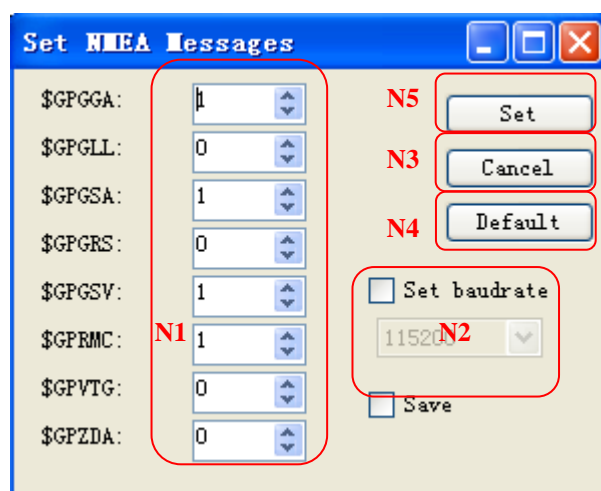


Figure 3.1 – NMEA Message rate setting dialog

- N1 - It is optional to set the baudrate of the communication channel, It is only visible in COM mode.
- N2 - Transmit configure message(s).
- N3 - Do nothing and leave this dialog.
- N4 - Return NMEA message rate to default values.
- N5 - Changing NMEA Message Rate

##### 3.1.2. Steps

To change each NMEA message output interval, select the target devices in N1. After that, modify the message rate values in N2. (0 refers to disabling that message output, any values greater than 0 refer to the interval in seconds that message should output. The maximum output interval for a message is 255 seconds). Press N4 to confirm and transmit the configure messages.

##### 3.1.3. Effects

The default values of NMEA messages rate is the recommended minimum output for Satrack to gather information. If too few messages are enabled,

some views in Satrack may not work probably as their required information does not exist. (Refer to **Section 4**)

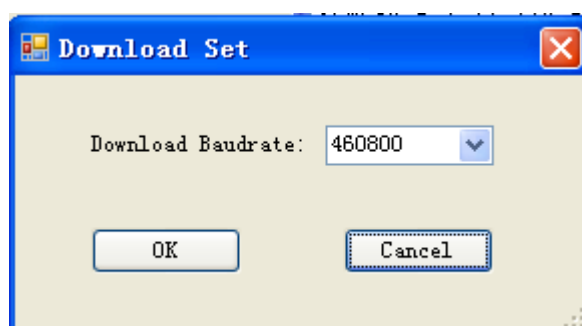
The more messages output every second means more information could be shown. However, more message output requires higher bit rates. Recommended baudrate for normal usage is 9600kbps.

### 3.1.4. Changing Baudrate

After baudrate of the connected devices has changed, Satrack will update the baudrate to use automatically. If any transmission problem appears after changing baudrate, please configure COM port settings again as described in **Section 2** and reconnect the devices.

## 3.2. Set Down Rate

### 3.2.1. The Dialog



*Figure 3.2 – Down rate setting dialog*

You can change your bits per second (baud rate) to download firmware (It is only availability on com mode). The rate is only availability to down (boot mode or user mode) as chapter 7, the rate NMEA out is no change.

## 4. MONITORING PLATFORMS

Various monitoring platforms can be displayed by clicking their names in “**View**” menu or by the shortcut icons on the top right corner of Satrack main platform.

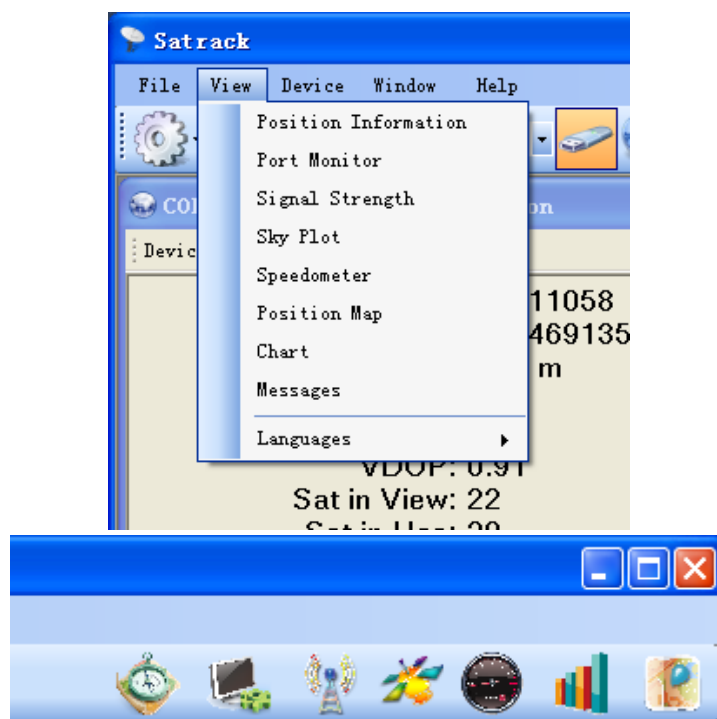


Figure 4.1 – Button to show monitoring platforms

The following table shows monitoring platform with their respective related NMEA message(s): (X: Related)

To enable/disable NMEA message output. Please refer to **Section 3**.

Platform	GGA	GLL	GSA	GRS	GSV	RMC	VTG	ZDA
User Position	X	X	X	X	X	X	X	X
Com Monitor	-	-	-	-	-	-	-	-
Signal Power	-	-	X	-	X	-	-	-
Sky Plot	-	-	X	-	X	-	-	-
Speedometer	-	-	-	-	-	X	X	-

<b>Position Map</b>	X	X	-	-	-	X	-	-
<b>Chart</b>	X	-	X	-	-	X	-	-
<b>Messages</b>	-	-	-	-	-	-	-	-

**Remarks:**

The graphical representations on these platforms are based on the raw messages output from the GNSS receiver. If the message outputs from GNSS receivers are corrupted due to COM port error or unstable environment, Satrack will not be able to decode the correct data thus the related platforms may not update accordingly.

**4.1. User Position**

1. Make sure the connection to devices has been started.
2. Select “**User Position**” in “**View**” menu.
3. This platform includes all the information of user position like longitude, latitude, altitude, speed, number of satellites in view, etc.
4. User can select a device from combo box at the top to view user position information from that device. Those information is displayed as follows,

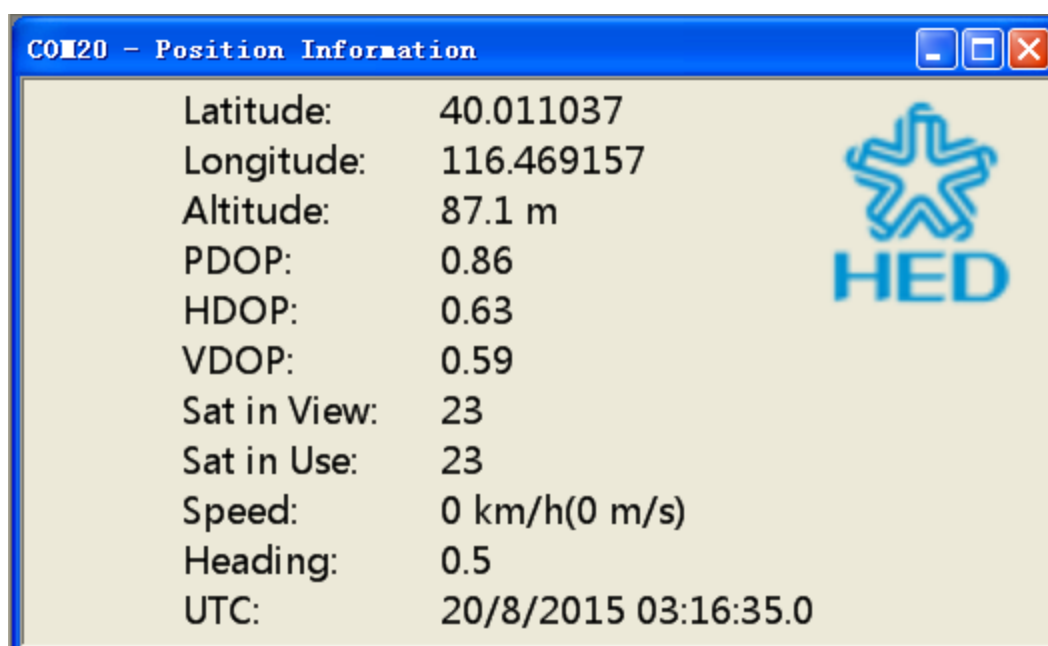


Figure 4.2 – Display of position information in User Position Information platform

**Raw Data Monitoring**

1. Make sure the connection to devices has been started.
2. Select **"Com Monitor"** in **"View"** menu.
3. User can select a device from combo box at top left hand corner to view data (ASCII message) from that device.

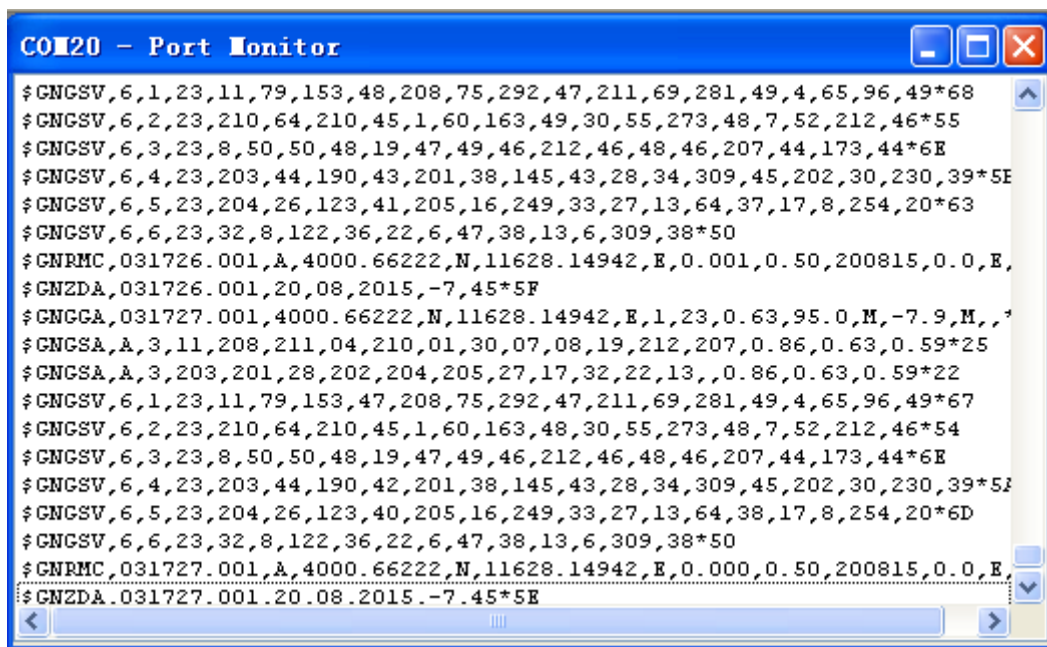


Figure 4.3 – Com Monitor with NMEA messages(ASCII)Displayed

4. Re-selection of device from list will refresh the message screen and messages from another device are shown on screen then.
5. User can copy the output message by selecting them in Com Monitor and press Ctrl+C to copy them into the clipboard.

## 4.2. Signal Quality

1. Make sure the connection to devices has been started.
2. To view signal quality of all satellites from different devices in form of CNR bars, select **"Signal Power"** under **"View"** menu item.
3. User can select to view only one device or all devices from combo box at the top.
4. The order of SVID displayed follows the original output sequence of the source device. However, when all devices are displayed together, the order of SVID is sorted in ascending order from left to right.

### Explanations:

The Signal Power platform shows the information of signal quality. It uses the GSV NMEA messages to extract the signal to noise ratio (SNR C/No) and GSA NMEA messages to extract to satellites in use. The number of SNR bars will vary according to the number of satellites in view.

SNR values are displayed above each corresponding bar. Full scale is considered for any SNR value of 55 dB or above. Satellite IDs are displayed to identify respective satellites below the signal bars.

Signal bars are displayed in brighter color if the satellite in view is in used as well. Otherwise, signal bars will be displayed with a darkened color.

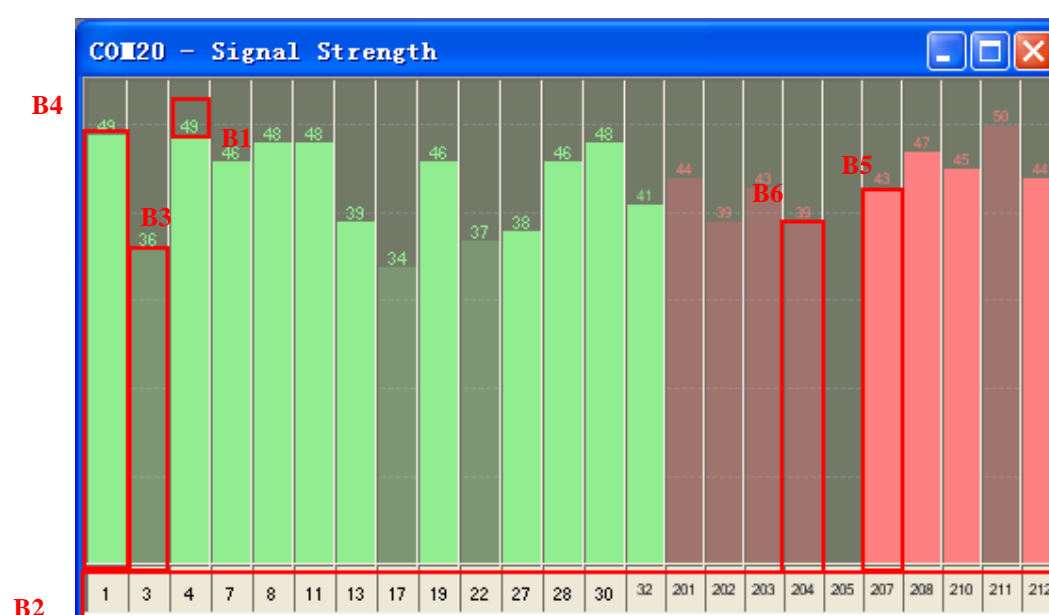


Figure 4.4 – Satrack sub-platform (Signal Power)

- B1 - SNR value (40) from satellite with ID 14
- B2 - A list of satellite IDs at instance, they are in ascending order.
- B3 - signal bar in green color, showing signal-to-noise ratio in rectangular form from a GPS satellite with ID 7
- B4 - a signal bar and SNR value in a darkened green color, meaning that the GPS satellite with ID 4 is currently not in use
- B5 - signal bar in red color, showing signal-to-noise ratio in rectangular form from a BeiDou satellite with ID 201
- B6 - a signal bar and SNR value in a darkened color, meaning that the BeiDou satellite with ID 211 is currently not in use

### 4.3. Satellites' Azimuth and Elevation

1. To view positions of satellites from devices in form of plots, select “**Sky Plot**” under “**View**” menu item.
2. User can select a device from combo box at the top.
3. The sky plot can adjust its forward side (upper side) according to the heading direction provided by the GNSS receiver. To enable this, please right click anywhere in the sky plot and select “**Compass**”
4. The Sky Plot platform shows the information of azimuth and elevation. It shows satellite position and the physical antenna mask angle. The satellite position is represented using azimuth, ranging from 0° to 360°, and elevation, ranging from 0° to 90° where 0° is the horizon.
5. Similar to the Signal Bar platform, Sky Plot platform uses the GSV NMEA messages to extract azimuth and elevation for each satellite that is in view and GSA NMEA messages to extract the in use satellites. Satellite IDs are displayed near the “X” plot to identify respective satellites.
6. Plots are displayed in a brighter color for the in used satellites while with darkened color for the not in use ones.

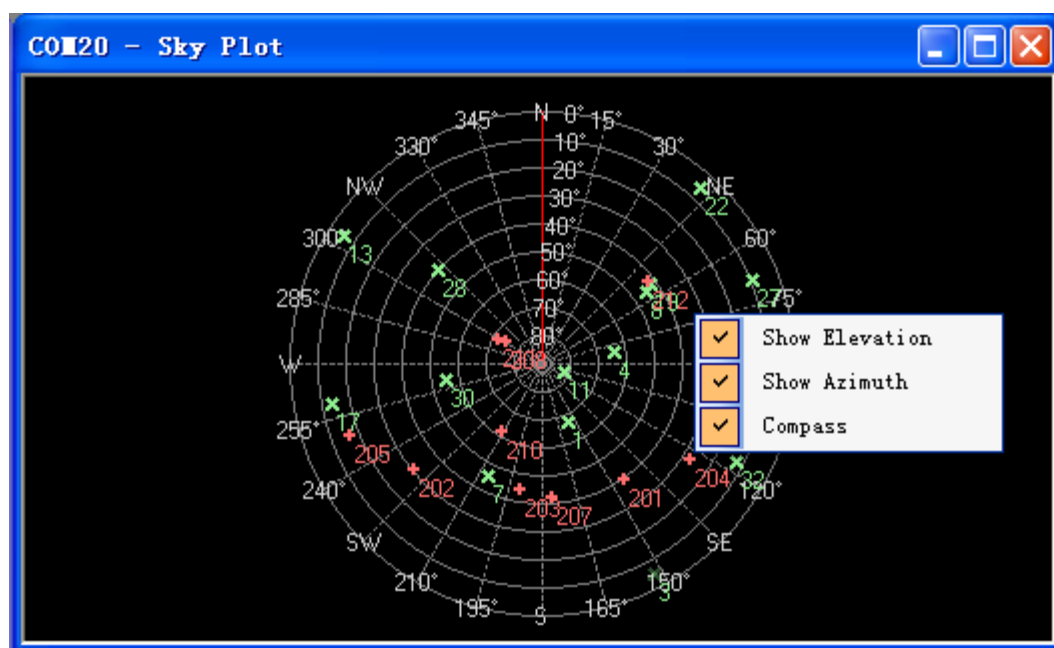


Figure 4.5 – Sky Plots with plots(I)

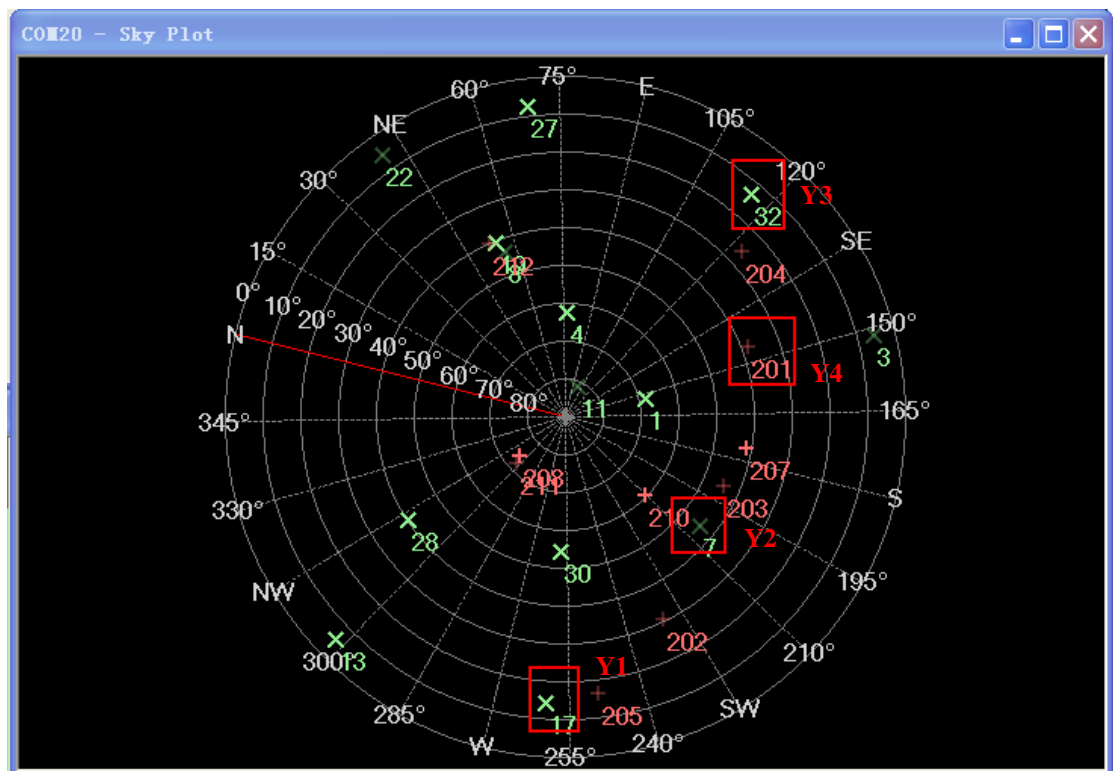


Figure 4.6 – Sky Plots with plots (II)

- Y1 - Plot of position of satellite with ID 26, which is in use, “x” and green color means GPS signal.
- Y2 - Plot of position of satellite with ID 21 which is not in use, “x” and green color means GPS signal.
- Y3 - Plot of position of satellite with ID 202 which is in use “+” and red color means beidou signal.
- Y4 - Plot of position of satellite with ID 205 which is not in use “+” and red color means beidou signal.

#### 4.4. Speedometer

1. To view positions of satellites from devices in form of plots, select “**Speedometer**” under “**View**” menu item.
2. User can select a device or from combo box at the top.
3. The speedometer can swap its speed displayed unit between km/hr and m/s. To do the swapping, please right click anywhere on the speedometer and follow instructions.
4. The maximum speed speedometer can display is 80m/s or 300km/hr.

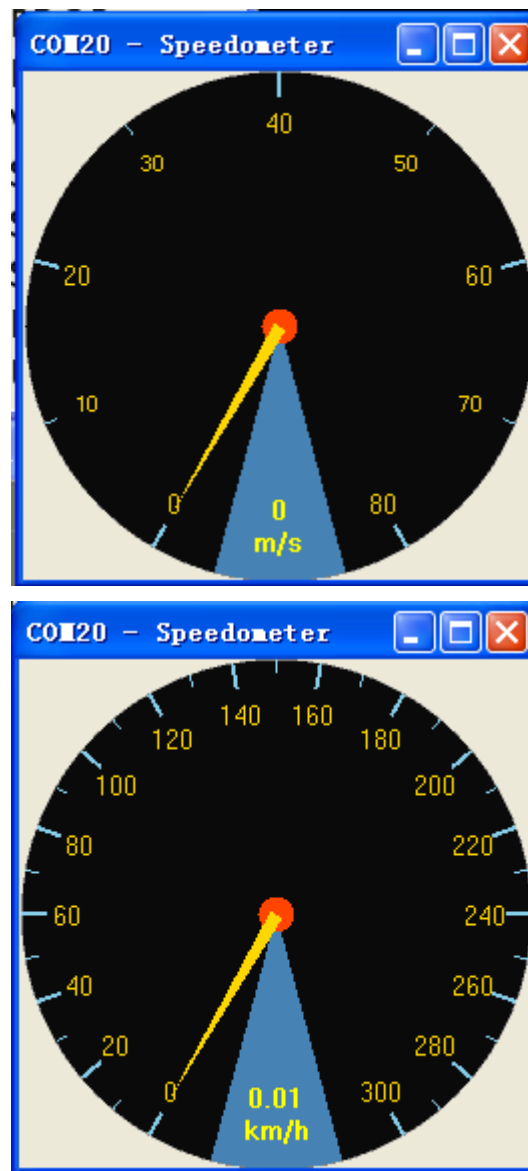


Figure 4.7 – The two mode of speedometer

#### 4.5. Position Map

1. Make sure the connection to devices has been started.
2. Select “**Position Map**” in “**View**” menu.
3. This platform includes information of user position like longitude, latitude and altitude.
4. User can select a device from combo box at the top to view user position information from that device. Position information is displayed as follows.

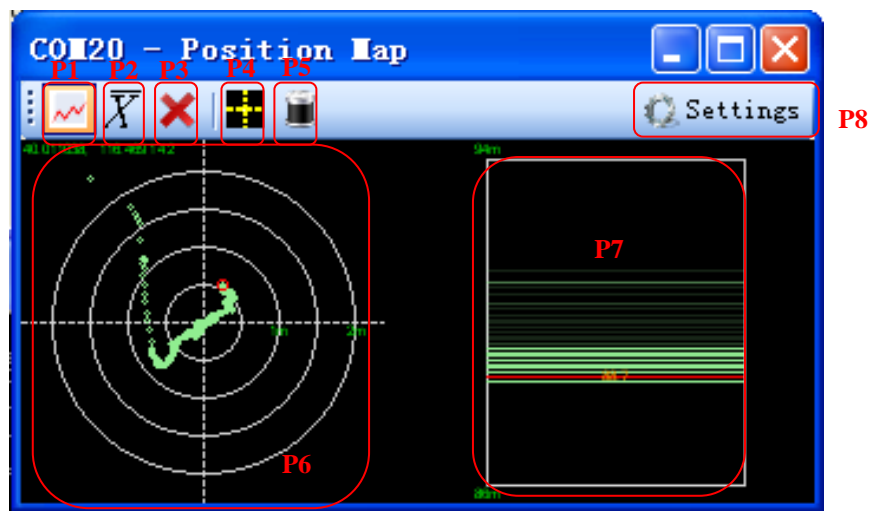


Figure 4.8 – Position Map with default setting

- P1 - Show/Hide information from target device
- P2 - Show/Hide position averaged line from target device
- P3 - Remove all data from target device
- P4 - Show/Hide position averaged line from all devices
- P5 - Remove all data from all devices
- P6 - The position chart displaying fixed positions
- P7 - The height chart displaying fixed altitude
- P8 - Open the setting dialogue of position map platform

Setting dialogue of Position Map platform.

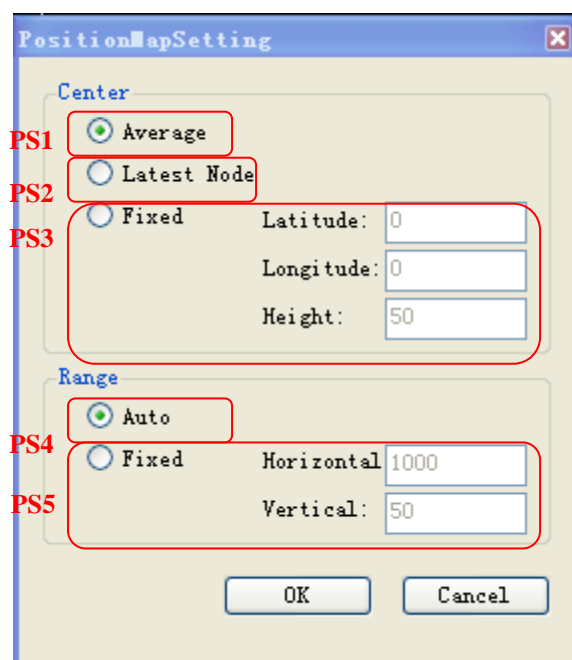


Figure 4.9 – Position Map with default setting

- PS1 - Configure the centre of position map and height chart to be the average value of all devices.
- PS2 - Configure the centre of position map and height chart to be the average of all devices' latest node.
- PS3 - Customize set the centre of position map.
- PS4 - Auto tune the range on chart such that it fits all data.
- PS5 - Fix the display range to a certain value. By doing this, position chart may not be able to display all data, those out of range data will not be displayed.

## 4.6. Chart platform

### 4.6.1. Interface Descriptions

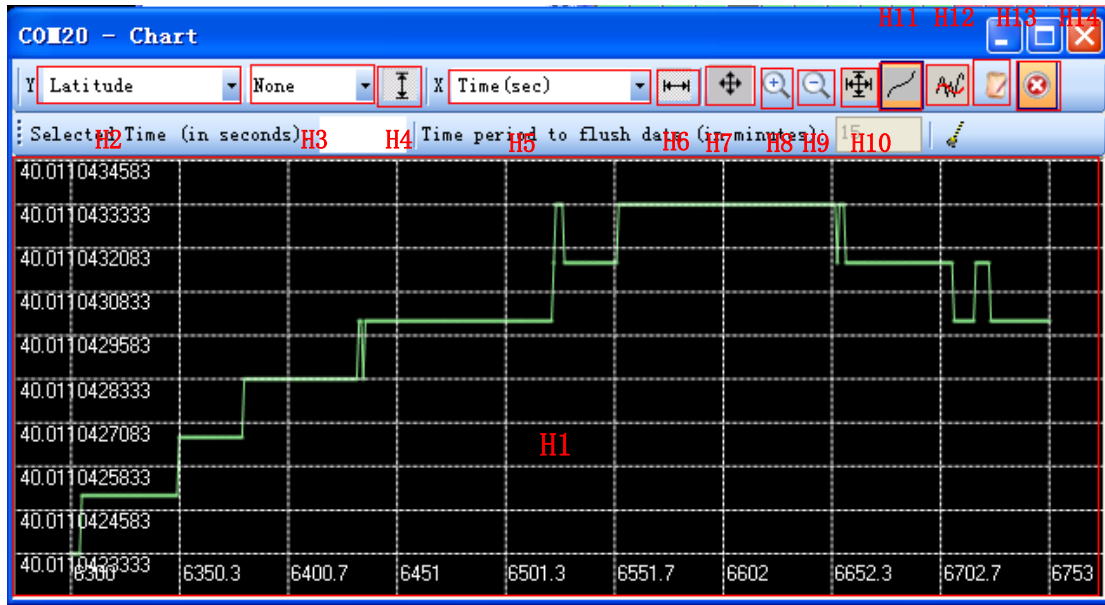


Figure 4.10 – Chart Platform

- H1 - Display of graphs plotted with various kinds of data.
- H2 - A list of values can be selected and displayed on Y-axis. Types of value include latitude, longitude, altitude, PDOP, HDOP, VDOP, speed(m/s), direction(degree) and acceleration(m/s<sup>2</sup>).
- H3 - Several statistical tools to be selected, only standard deviation and difference between any two devices on same value on across time are available. "None" means no statistical tool is selected.
- H4 - Fit the Y range.
- H5 - A list of values can be selected and displayed on X-axis. Types of value include latitude, longitude, altitude, PDOP, HDOP, VDOP, speed(m/s), direction(degree), acceleration(m/s<sup>2</sup>) and time (second).
- H6 - Fit the X range.
- H7 - Graph(s) can be moved inside chart platform. Click and drag/drop the chart.
- H8 - Zoom in the chart by clicking on one point of chart.

- H9 - Zoom out the chart by clicking on one point of chart.
- H10 - The chart is auto-scaled based on X and Y ranges.
- H11 - Draw a line to connect all plots on same device.
- H12 - Adds a moving average. The average is calculated over the number of most recent values, specified with the parameter.
- H13 - Add a function to report significant errors based on the standard deviation of value among all devices across time. Errors are reported and output to a txt file.
- H14 - Enable/disable the chart to discard data automatically.

#### 4.6.2. Steps to use Chart Platform

1. Make sure one or more devices are chosen beforehand.
2. The button for discarding data (H15) is advised to be enabled at the beginning so the graphs are shown smoothly. i.e. Discarding data is enabled in default.
3. Connect device(s) and graph(s) is/are displayed on chart platform across time.

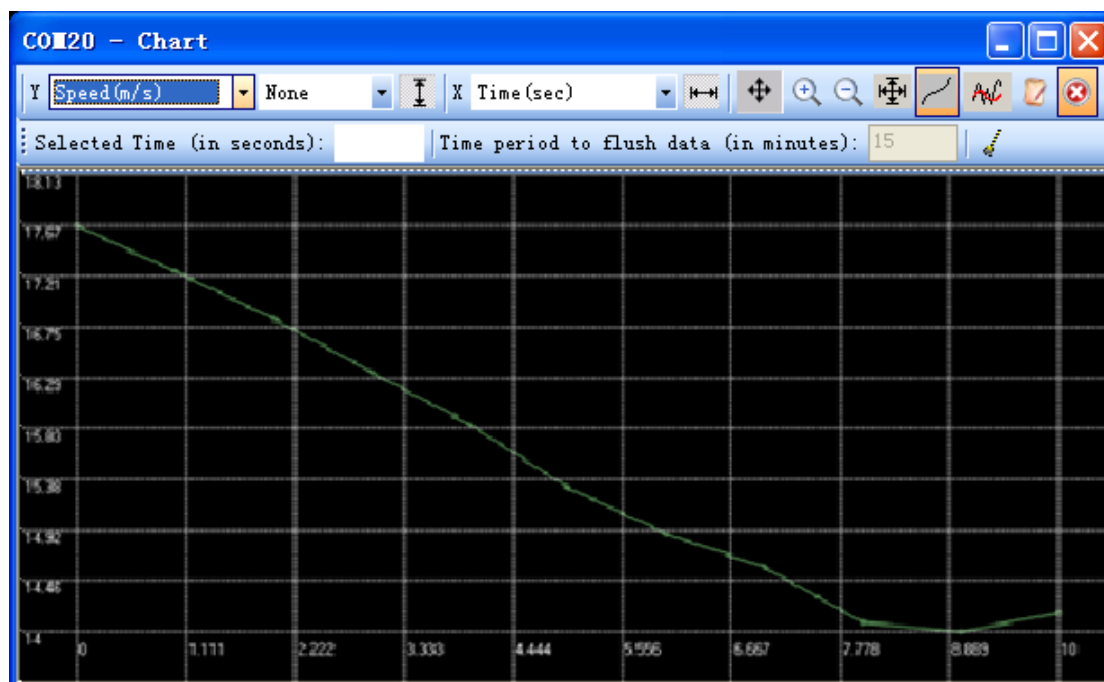


Figure 4.11 – A graph displaying speed against time from one device - a1.gps

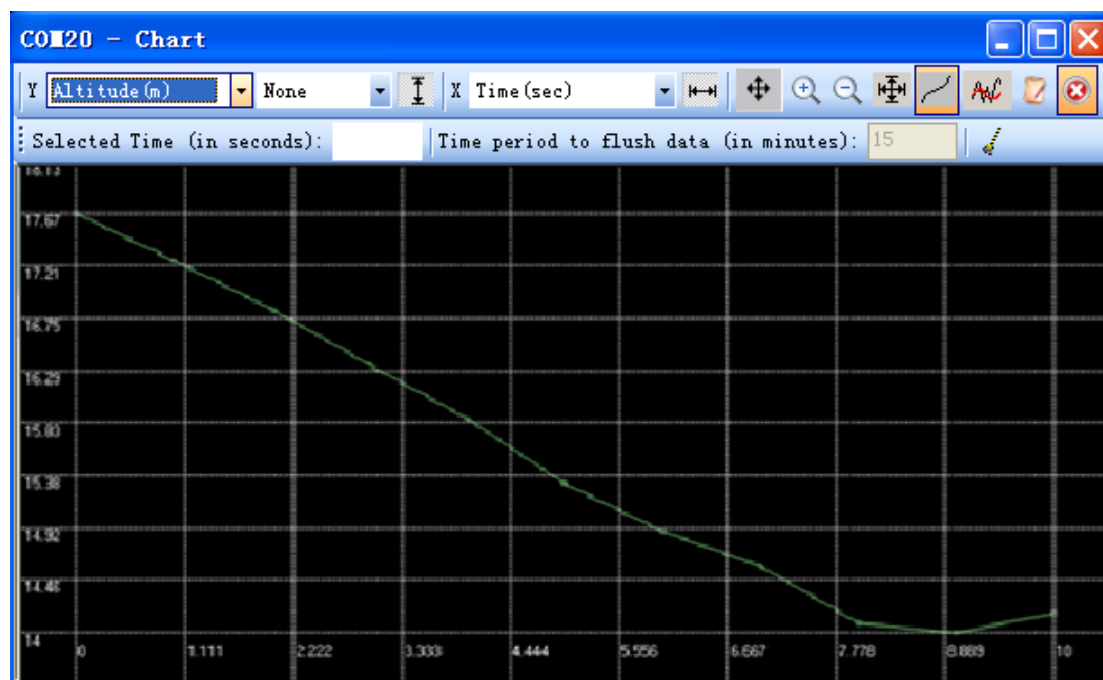


Figure 4.12 – A graph displaying altitude against time from two devices

4. Values on Y-axis and X-axis can be changed anytime by selecting values in combo boxes H3 and H6. Time can only be selected in value selection on X-axis.
5. On the other hand, difference between any 2 devices on same value is displayed by selecting “**Diff Dx - Dy**”, where x and y are device number. Select “**None**” to disable the display of graph of standard deviation and difference all the time.

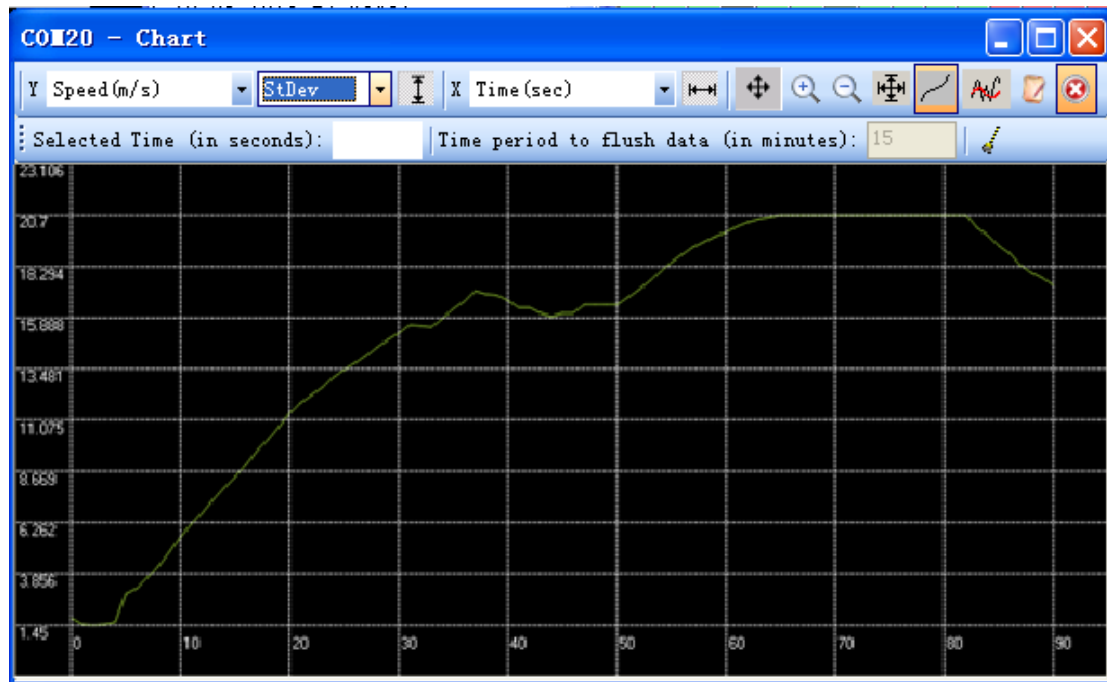


Figure 4.13 – A graph showing standard deviation of altitude from all log files

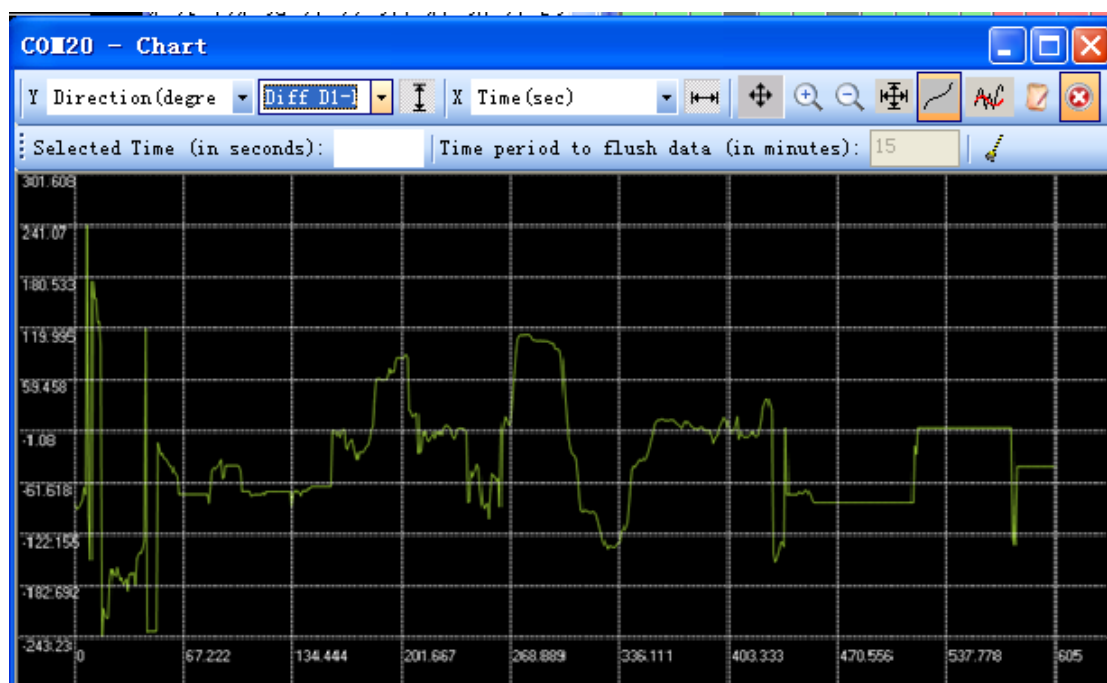


Figure 4.14 – A graph showing difference between device no.1 and no.2 on value of direction across time

6. Moving average curve is displayed by clicking the symbol H14.

7. User can use the tools (fit range, auto-scale, zoom in/out, move) to fit their viewing style and monitor the graph in detail.

### 4.6.3. Error Report

#### Introduction

At the time more than one is connected and reporting error is set up, an error report is generated. It lists out all significant differences as well as errors in values among all devices. If standard deviation of a value at a time  $t$  is higher than maximum allowable standard deviation for same value, it will be reported. For example, standard deviation of 1.8 of PDOP is recorded at time 1/6/2009 6:49:14 and maximum allowable standard deviation is 1.0, then it's reported. A line of UTC (Coordinated Universal Time), value type, data from different devices and standard deviation at that time is written on that file.

File name is combination of UTC and names of all devices. The file is then saved in a folder called "**Error report**" at the same directory of Satrack.exe file.

#### Maximum allowable standard deviation

Values chosen for maximum allowable standard deviation are selected through many tests and appropriate amount of errors are reported in ideal case.

Values for maximum allowable standard deviation are listed as below,  
(In terms of standard deviation)

Latitude (x-coordinate) - 20.0

Longitude (y-coordinate) - 20.0

Altitude (meter) - 30.0

PDOP - 1.0

VDOP - 1.0

HDOP - 1.0

Speed (meter/second) - 1.5

Direction (degree) - 20.0

Acceleration (meter/second<sup>2</sup>) - 2.0

## Outlook of error report

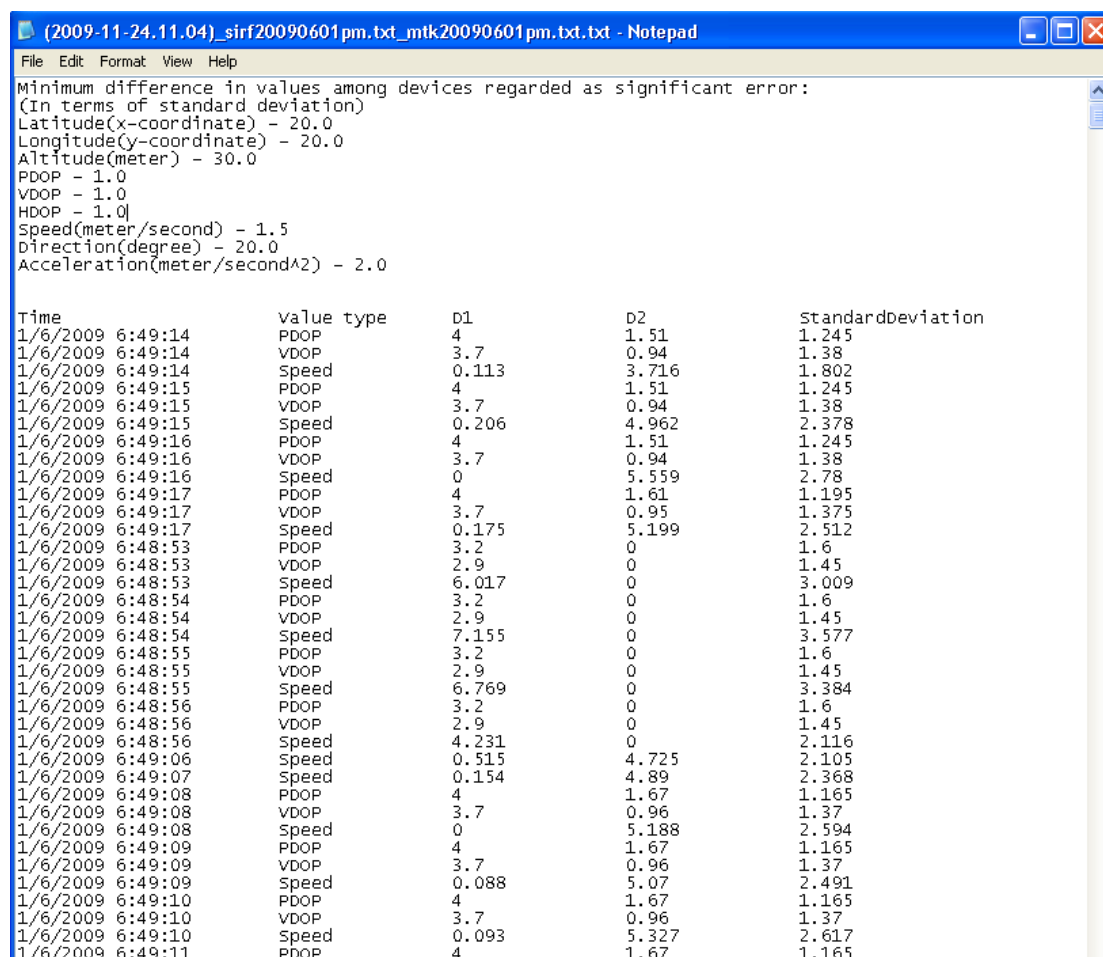


Figure 4.15 – Outlook of error report

## 4.7. Communicate with GNSS receiver

1. To view positions of satellites from devices in form of plots, select **"Messages"** under **'View'** menu item.
2. User can select a device from combo box at the bottom.
3. The Messages handled the communication in binary protocol between computer and GNSS receiver, for the details on how to use binary protocol, please refer to the protocol specification.

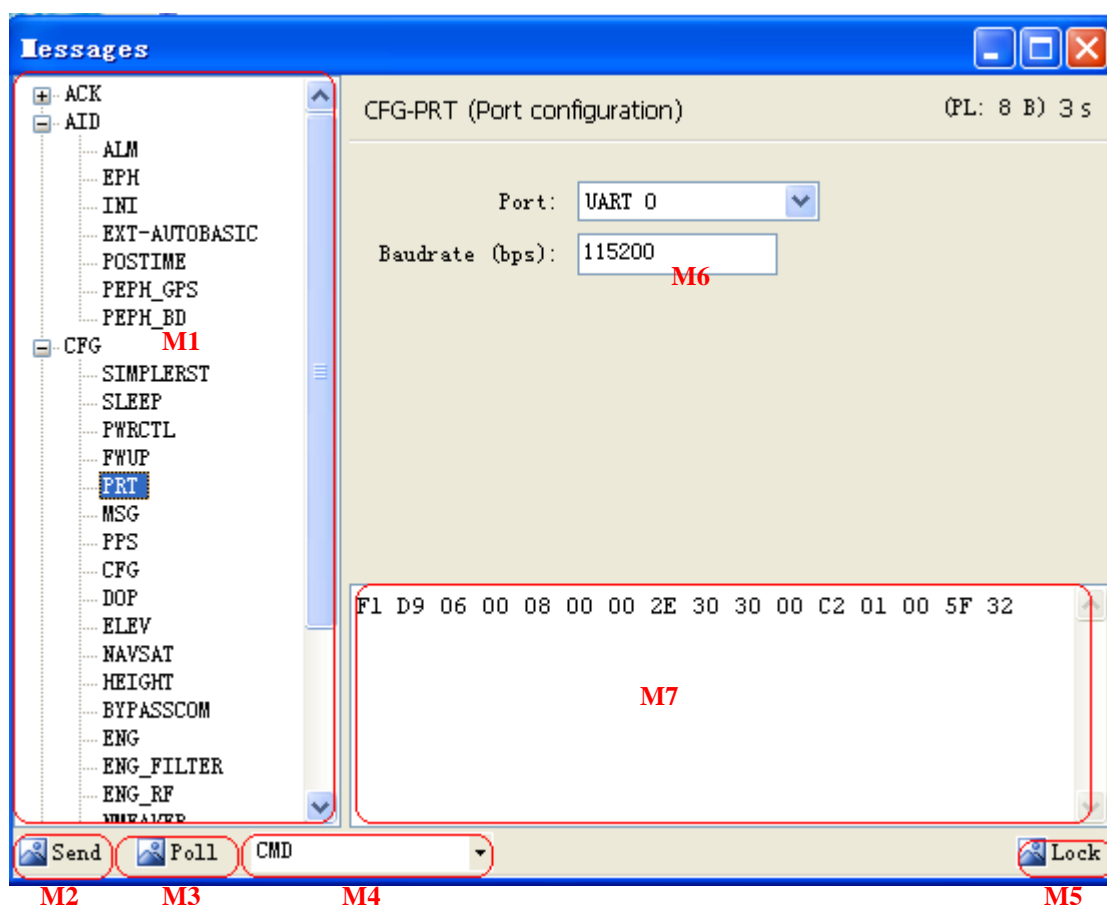


Figure 4.16 – Initial view of Messages form

- M1 - List of messages to communicate with GNSS receiver.
- M2 - Button to send binary message if applicable.
- M3 - Button to poll binary message if applicable.
- M4 - Command mode, you can select hex mode or txt mode.
- M5 - Button to lock screen update to region M6 and M7.
- M6 - It has different orientation for its respective binary message.  
Depending on the node selected in M1
- M7 - Region show binary message going to send/received in HEX.

## 5. TOOLBAR

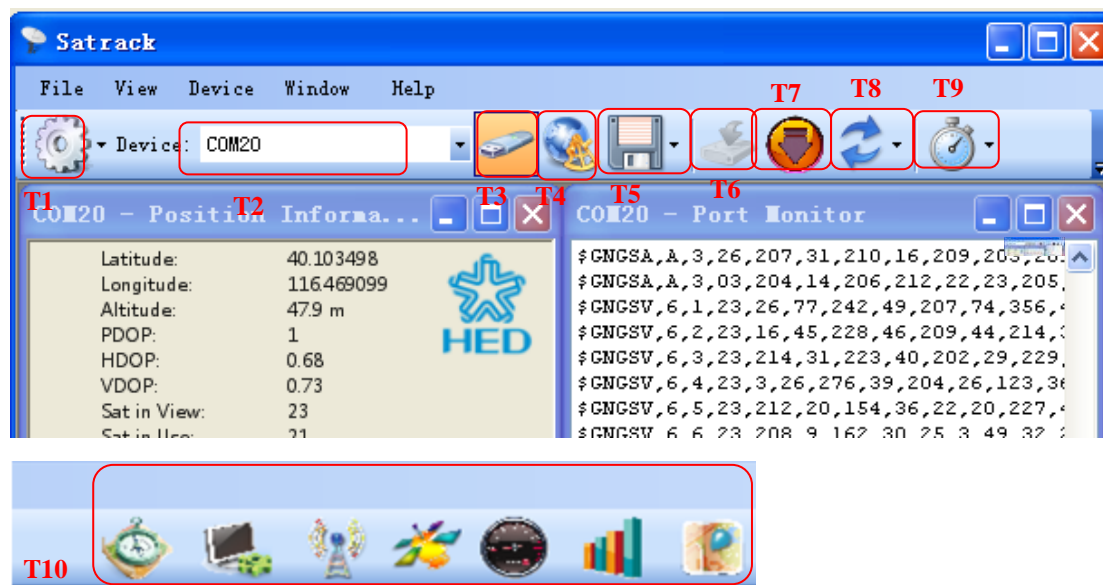


Figure 5.1 – Toolbar of Satrack

- T1 - A list of com device baud
- T2 - A list of device for selected for action.
- T3 - Connect/Disconnect the target device.
- T4 - Enable/Disable real time kml for target device.
- T5 - Start/Stop save log for target device
- T6 - Firmware update action for target device in boot mode, only available in boot mode.
- T7 - Firmware update action for target device in user mode, only available in user mode.
- T8 - Restart action for target device.
- T9 - Compare Testing for target device.
- T10 - Shortcut for showing monitoring platforms.

### 5.1. Restart action

You can do compare testing once by clicking the XXXStart button. The compare testing includes cold start, warm start, hot start and A-Gnss test.

The result will appear as Figure 5.3.

The Set Board System Data form used to set time and location or ephemeris information ,so you can do A-GNSS.

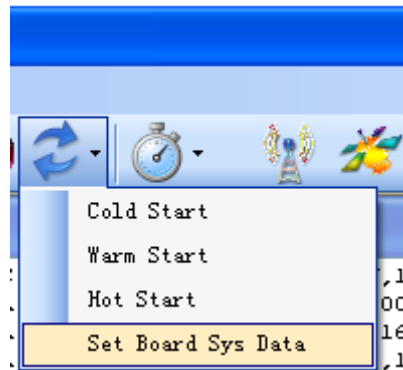


Figure 5.2 – Screenshot of Compare Testing

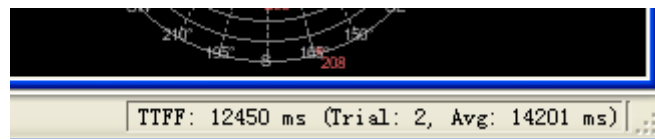
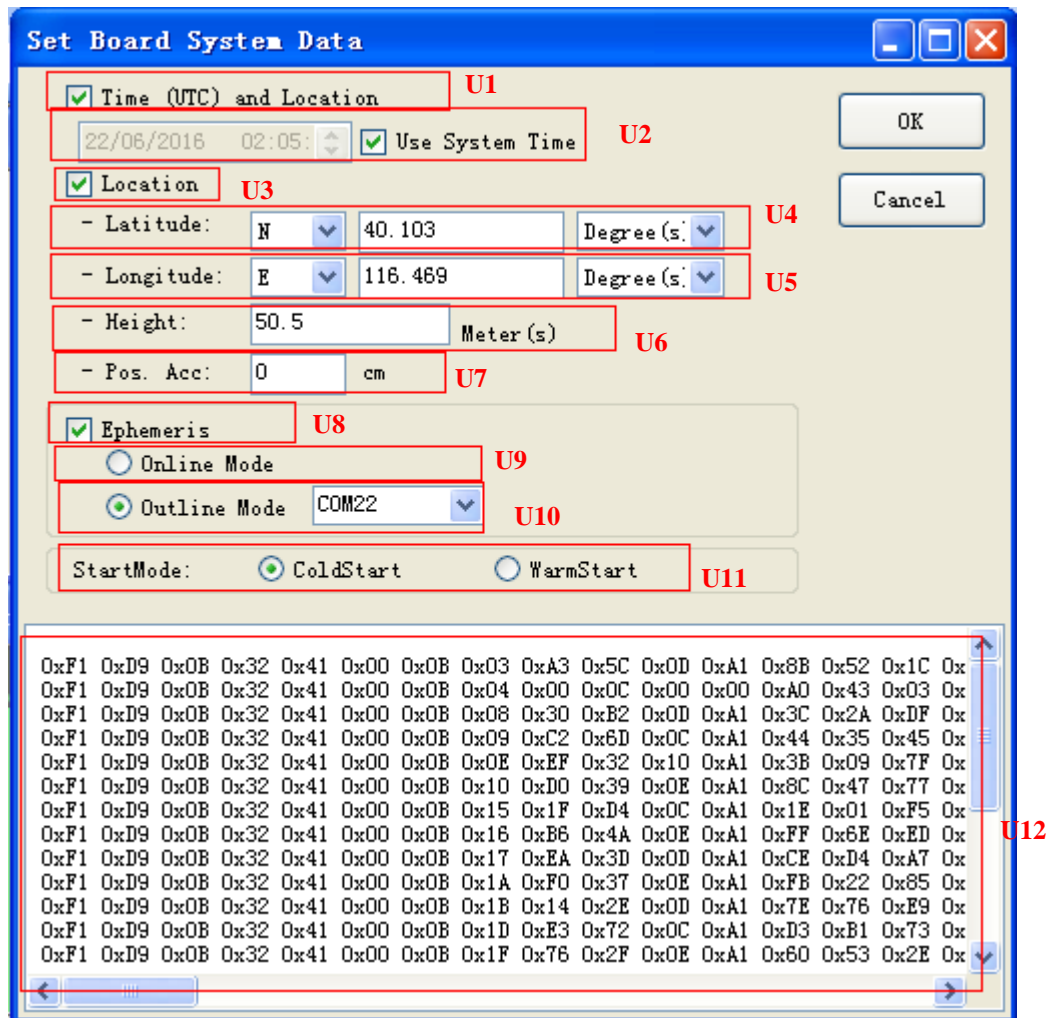


Figure 5.3 – Results of Compare Testing



**Set Board System Data**

☒ Time (UTC) and Location **U1**

22/06/2016 02:05 ☒ Use System Time **U2**

☒ Location **U3**

- Latitude: N 40.103 Degree(s) **U4**

- Longitude: E 116.469 Degree(s) **U5**

- Height: 50.5 Meter(s) **U6**

- Pos. Acc: 0 cm **U7**

☒ Ephemeris **U8**

☐ Online Mode **U9**

☒ Outline Mode COM22 **U10**

StartMode: ☒ ColdStart ☐ WarmStart **U11**

Hex Dump (U12):

```

0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x03 0xA3 0x5C 0x0D 0xA1 0x8B 0x52 0x1C 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x04 0x00 0x0C 0x00 0x00 0xA0 0x43 0x03 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x08 0x30 0xB2 0x0D 0xA1 0x3C 0x2A 0xDF 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x09 0xC2 0x6D 0x0C 0xA1 0x44 0x35 0x45 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x0E 0xEF 0x32 0x10 0xA1 0x3B 0x09 0x7F 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x10 0xD0 0x39 0x0E 0xA1 0x8C 0x47 0x77 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x15 0x1F 0xD4 0x0C 0xA1 0x1E 0x01 0xF5 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x16 0xB6 0x4A 0x0E 0xA1 0xFF 0x6E 0xED 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x17 0xEA 0x3D 0x0D 0xA1 0xCE 0xD4 0xA7 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x1A 0xF0 0x37 0x0E 0xA1 0xFB 0x22 0x85 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x1B 0x14 0x2E 0x0D 0xA1 0x7E 0x76 0xE9 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x1D 0xE3 0x72 0x0C 0xA1 0xD3 0xB1 0x73 0x
0xF1 0xD9 0x0B 0x32 0x41 0x00 0x0B 0x1F 0x76 0x2F 0x0E 0xA1 0x60 0x53 0x2E 0x

```

Figure 5.4 – Screenshot of Set Board System Data on online mode

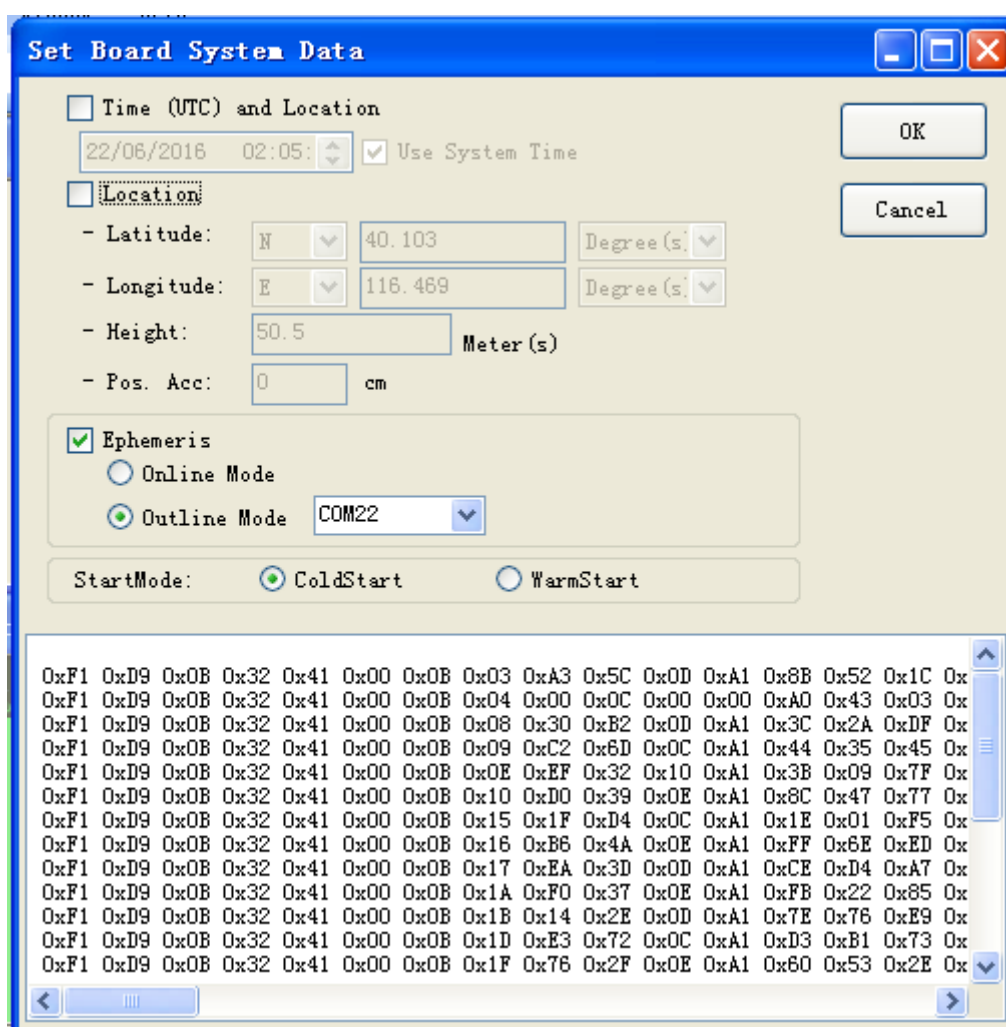


Figure 5.5 – Screenshot of Set Board System Data on offline mode

You can get ephemeris information from online mode as figure 5.4 or offline mode as Figure 5.5. Ephemeris information from online mode is getting information from website <http://www.ngs.noaa.gov>. Ephemeris information from offline mode is getting information from self-board, or another board.

- U1 - Send time to assistant position.
- U2 - Use system time or user set time.
- U3 - Send location to assistant position.
- U4 -The latitude of assistant position .
- U5 - The longitude of assistant position .
- U6 - The height of assistant position .
- U7 - The position accuracy of assistant position .

- U8 - Send ephemeris information to assistant position.
- U9 - Get ephemeris information on online mode.
- U10 - Get ephemeris information on offline mode.
- U11 - The cold start mode or warm start mode.
- U12 - The ephemeris information .If the button U8 is checked, then press F1,you can get the ephemeris information.

## 5.2. Compare Testing

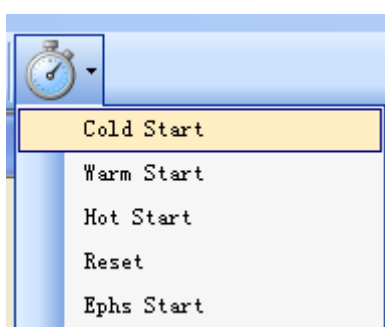


Figure 5.6 – Screenshot of Compare Testing

The compare testing is do some compare test as figure 5.6.You can do compare coldstart test, warmstart test, hotstart test, reset test or ephsstart test(A-GNSS).

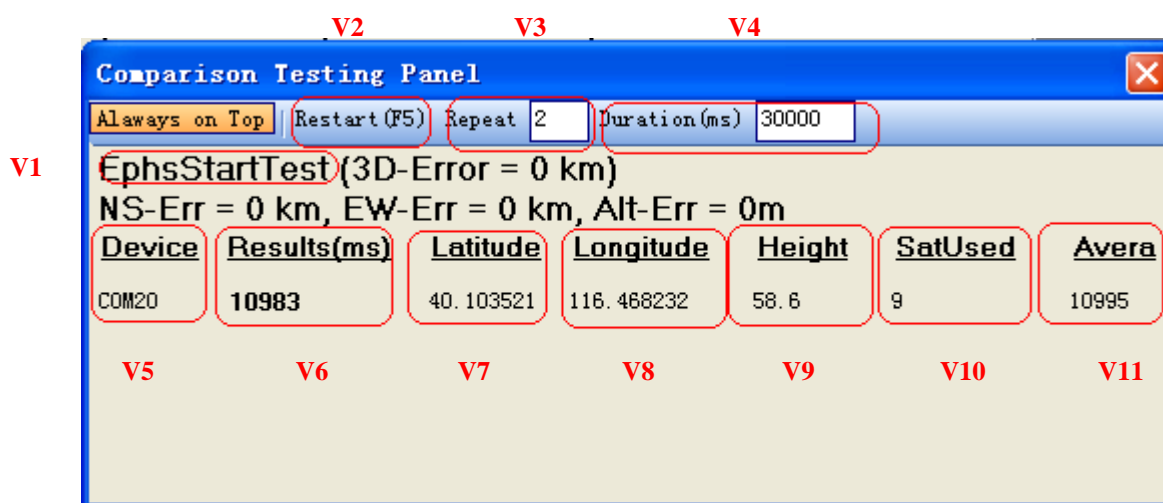


Figure 5.6 – Screenshot of Comparison Testing Panel

- V1 - Restart name, including cold start, warm start ,hot start and ephs start(ephemeris assistant test). The ephs start must restart after chapter 5.1.

- V2 - Test start, or press button F5.
- V3 - Repeat times.
- V4 - Test durations, units is millisecond.
- V5 - Device name.
- V6 - Single test results.
- V7 - Latitude.
- V8 - Longitude.
- V9 - Height.
- V10 - The satellites used.
- V11 - The multiple test results on average.

## 6. REAL TIME TRACKING USING GOOGLE EARTH

### 6.1. Steps

1. In order to use real time tracking with Google Earth, please make sure Google earth is installed on the computer.
2. Connect device(s) as described in **Section 2**.
3. Select the information source of device to direct to Google Earth. Press the button “**Real-time Google Earth Link**” as shown in the figure below.



Figure 6.1 – Google Earth toolBar

4. Only a limit latest nodes are showed, if it is needed to investigate a long chain of nodes, please log the raw messages from device and use Save KML dialog to convert raw data to KML/KMZ files in order to view them in

Google Earth after tracking finishes.

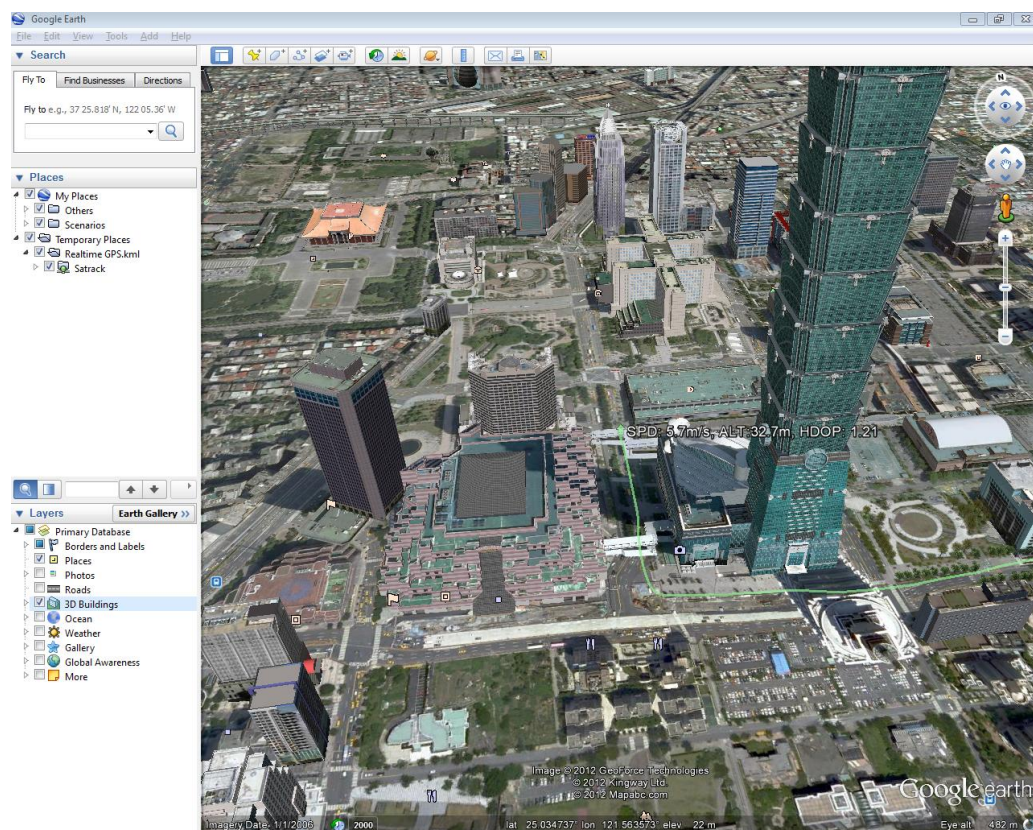


Figure 6.2 – Google Earth picture

## 6.2. Real time tracking setting

After real time tracking is enabled, the option for real time tracking will be available. To enter the setting dialog, go to menu “**File**” and select “**Real Time Kml Settings**”.

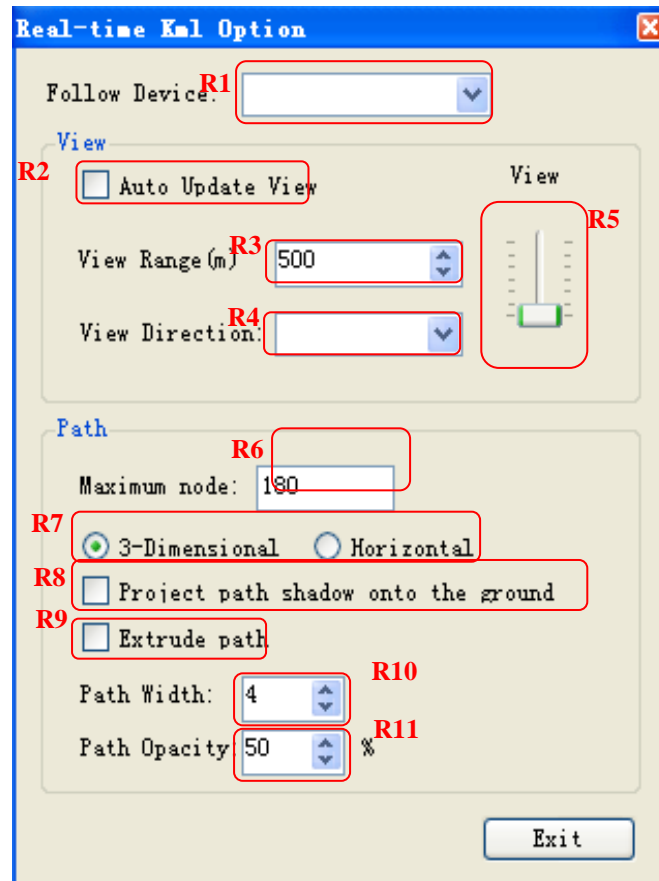


Figure 6.3 – Real time Kml option

- R1 - Choose the GPS device to follow when adjusting view.
- R2 - Auto update view to the latest position of following device.
- R3 - The distance of the view point from the last position fix node.
- R4 - Select fixed view direction or relative angle with heading direction.
- R5 - View angle relative to sea level. 90 degrees means perpendicular
- R6 - Maximum latest node to store and display

- R7 - Track orientation.
- R8 - Project path shadow onto the ground. (Only applicable in 3D mode)
- R9 - Extrude path onto the ground. (Only applicable in 3D mode)
- R10 - Width of the path.
- R11 - Opacity of the path

## 7. FIRMWARE UPDATE

### 7.1. Firmware update from Messages page

#### 7.1.1. Preparation

To update firmware please ensure the following steps have been done before proceed:

1. You have prepared a write version of the firmware file.
2. You sure you have the need to update firmware.
3. Make sure your receiver can enter BOOT mode.

#### 7.1.2. Update steps

1. Connect to the target receiver through COM ports or USB ports as described in **Section 2**.
2. Check whether BOOT mode has started by polling receiver's version. To check this information, start "**Message**" view from menu **View**. After that, expand category "**MON**" and click "**VER**" to poll receiver's version or you can poll the version by clicking "**Poll**" at the bottom left corner after enter **MON – VER** view. Make sure you have chosen the right port to communicate with.

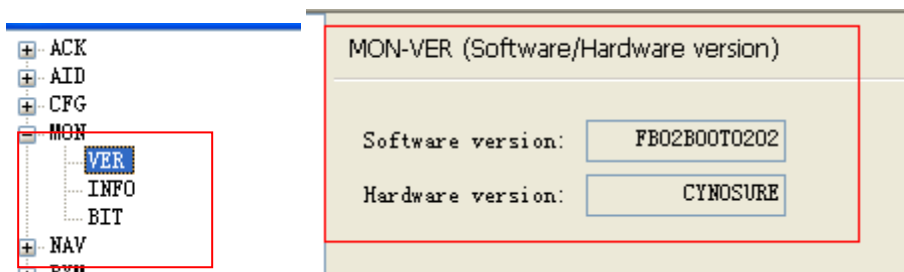


Figure 7.1 – Message page

3. The version string of BOOT mode should look like **FB02BOOTXXX**. If not, please confirm your receiver can enter BOOT mode.
4. Select "**FIRMWARE**" under category "**BOOT2**". Choose the master firmware file to send by clicking "**Browse...**" on the right.
5. Start firmware update by clicking "**Send**" at the bottom left corner. After the progress bar finishes, master firmware update is then completed.

6. \*Restore configuration to enter BOOT mode after complete for normal usage.

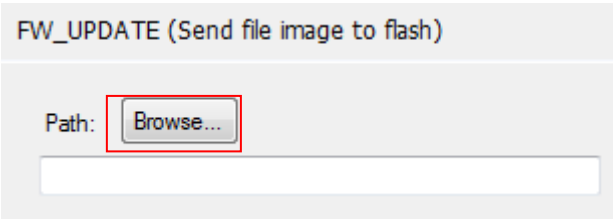


Figure 7.2– Browse Button

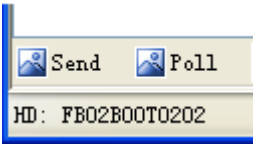


Figure 7.3– Send and Poll Button

## 7.2. Firmware update form Toolbar

### 7.2.1. Interface Descriptions in boot mode

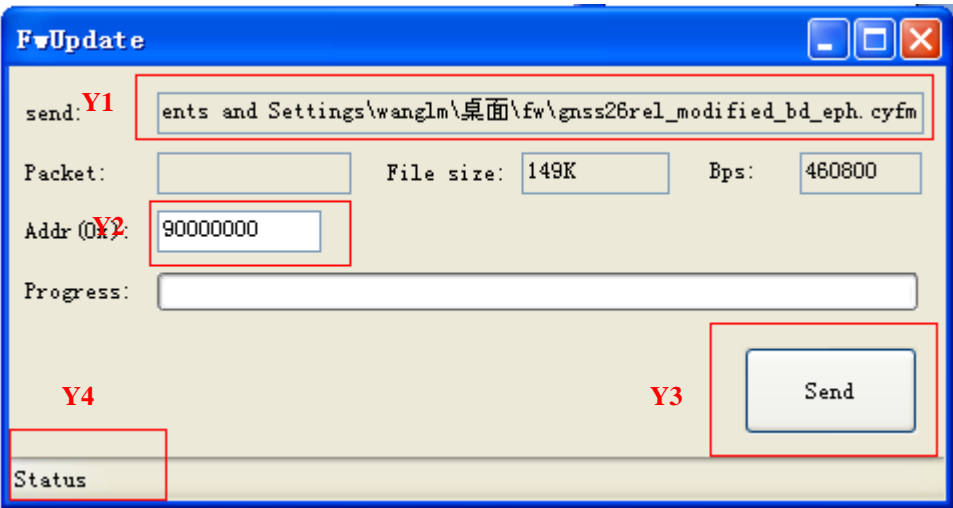


Figure 7.4 – Screenshot of the initial interface.

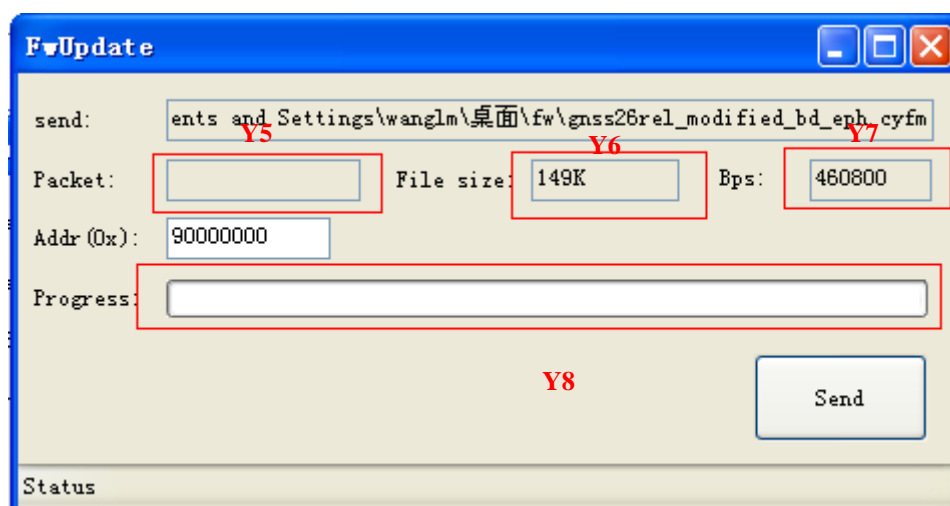


Figure 7.5 – Screenshot when sending file.

- Y1 - Full path of the file to send
- Y2 - Start address of flash
- Y3 - Start sending file
- Y4 - Status bar showing the current status of this dialog
- Y5 - The number of packet sending
- Y6 - The size of the sending file
- Y7 - Baudrate of the com port ,and is availability only in com port.
- Y8 - A progress showing the progress of the file transfer

### 7.2.2. Usage in boot mode

来源: HD: FB02B00T0203 CYNOSURE 07DF011 (115200)

Figure 7.6 – Screenshot of boot mode version.

1. Ensure COM port or USB port is initialized in boot mode.
2. Select the desire port for firmware update from the top left corner of the window.
3. Press the button as shown in the figure.



Figure 7.7 – Firmware toolbar in boot mode

4. A file choosing dialog will be shown.

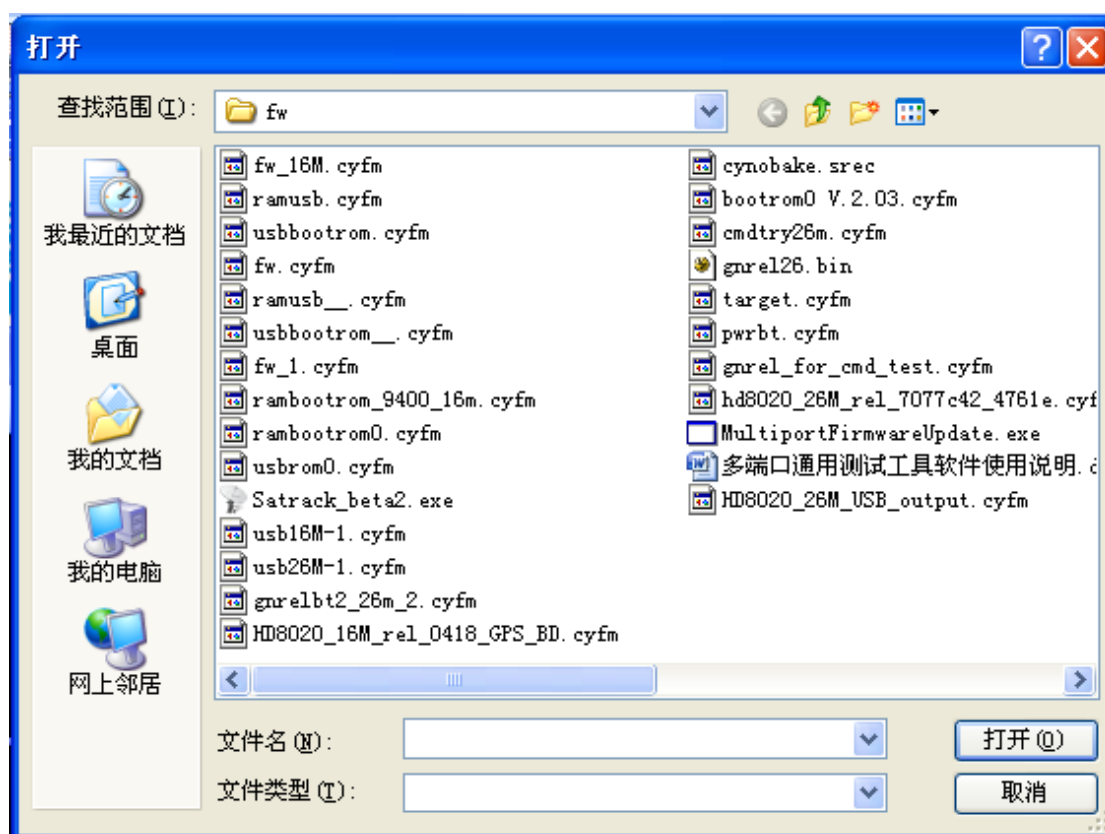
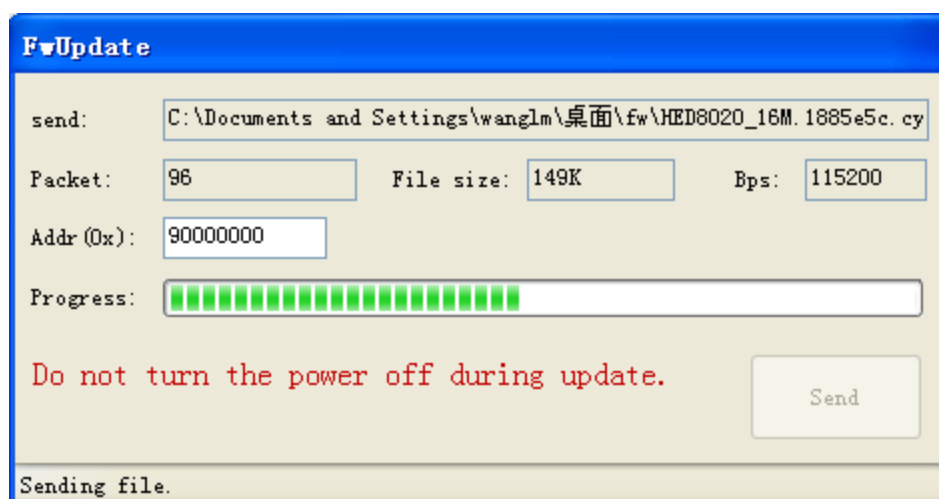


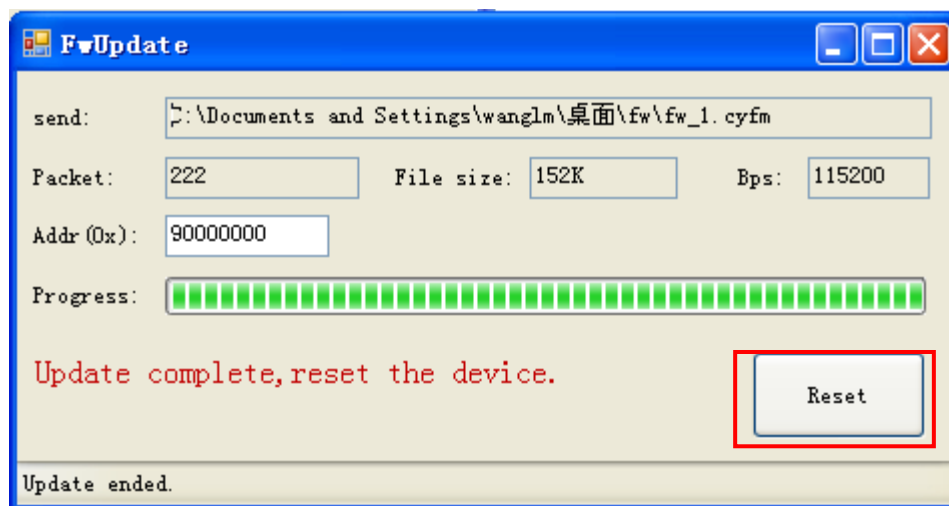
Figure 7.8 – Choose the firmware file

5. Find the file to send and press “**Open**”. To discard current file transfer, press “**Cancel**”.
6. Press “**Send**” to start sending the file (Y3).



*Figure 7.9 – Screenshot when sending file.*

7. Wait until file transfer complete.
8. After file transfer completed, press button “**Reset**” to restart the firmware transferred onto the board.

*Figure 7.7 – Screenshot when updating complete.*

9. The dialog will be closed.
10. File transfer complete.

### 7.2.3. Interface Descriptions in user mode

```
来源: HD: 2.001.f24fd3 HD8020.3546ad11e (115200)
```

*Figure 7.10 – Screenshot of user mode version.*

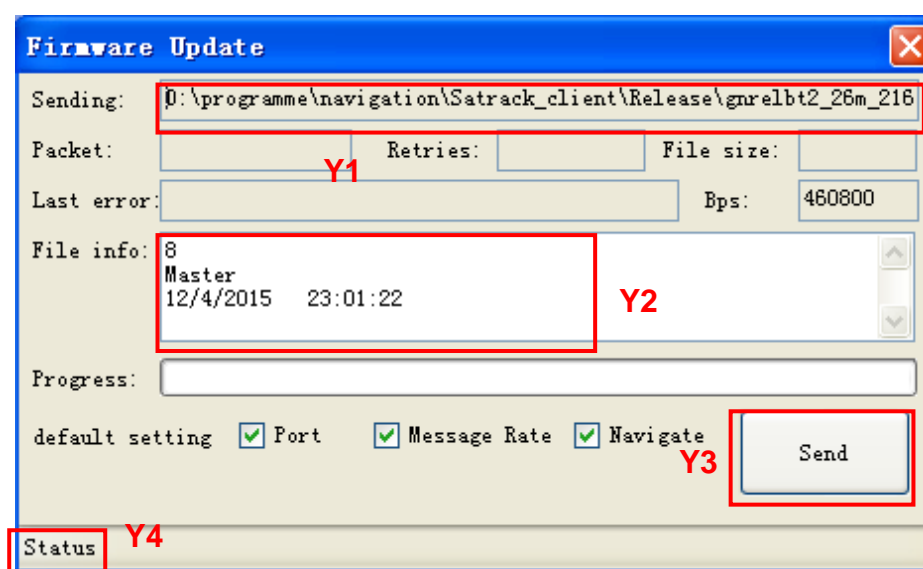


Figure 7.11 – Screenshot of the initial interface.

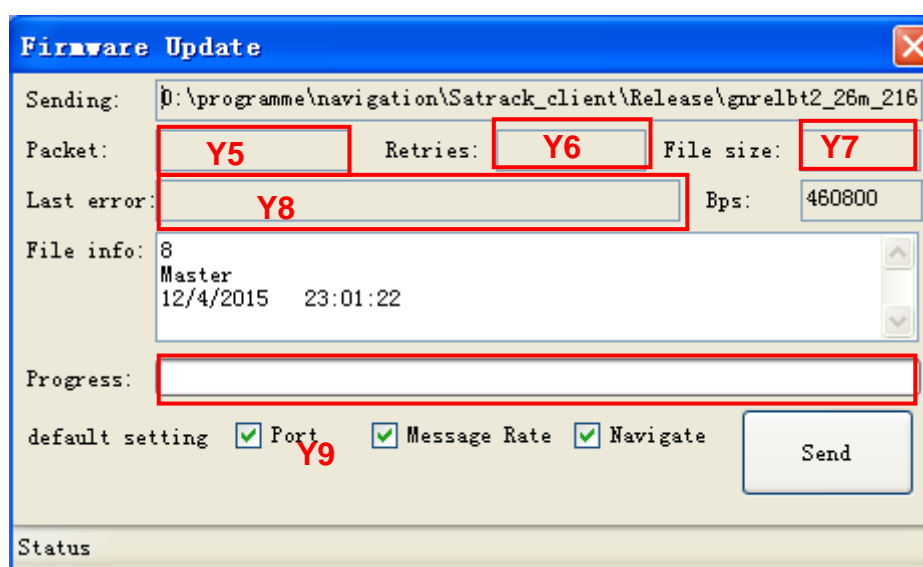


Figure 7.12 – Screenshot when sending file.

- Y1 - Full path of the file to send
- Y2 - Information of the file
- Y3 - Start sending file
- Y4 - Status bar showing the current status of this dialog
- Y5 - The number of packet sending
- Y6 - The number of retries
- Y7 - The size of the sending file

- Y8 - The last error occurred during file transfer
- Y9 - A progress showing the progress of the file transfer

#### 7.2.4. Usage in user mode

1. Ensure COM port is initialized in user mode. If not, initialize one with “**COM port setting**”.
2. Select the desire port for firmware update from the top left corner of the window.
3. Press the button as shown in the figure.
- 4.



Figure 7.13 – Firmware toolbar in no boot mode

5. A file choosing dialog will be shown.
6. Find the file to send and press “**Open**”. To discard current file transfer, press “**Cancel**”.
7. The main dialog will show, if the file to send is not in the correct format or having a different version with the connected board, a message box will show and the dialog will terminate.
8. Press “**Send**” to start sending the file (Y3).
9. Wait until file transfer complete.
10. After file transfer completed, press button “**Reset**” to restart the firmware transferred onto the board.

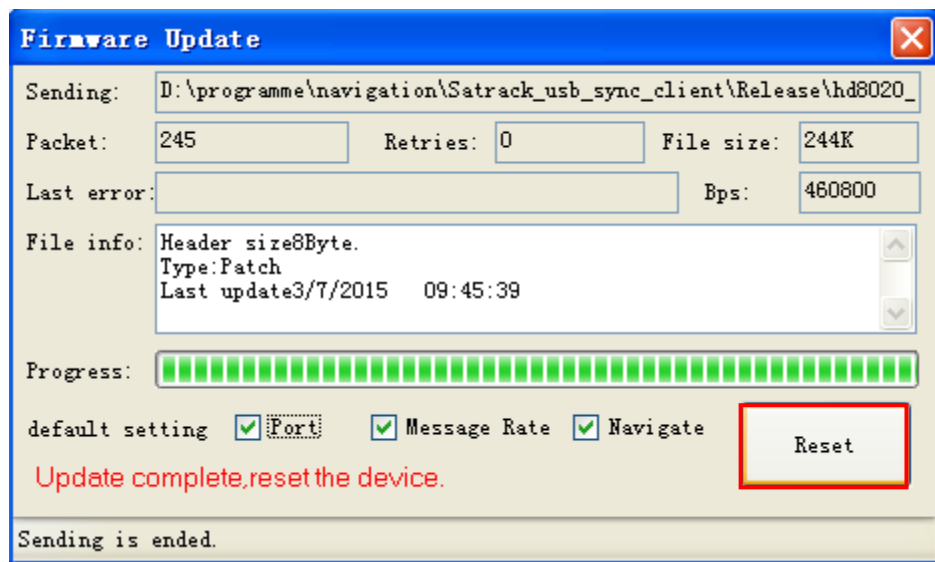


Figure 7.14 – Screenshot when updating complete.

11. The dialog will be closed.
12. File transfer complete.

### 7.3. Caution

Do not interrupt file transfer, keep program running and make sure all cables are well connected when file is transmitting.

## 8. KML FILE SAVING DIALOG

### 8.1. Interface Descriptions

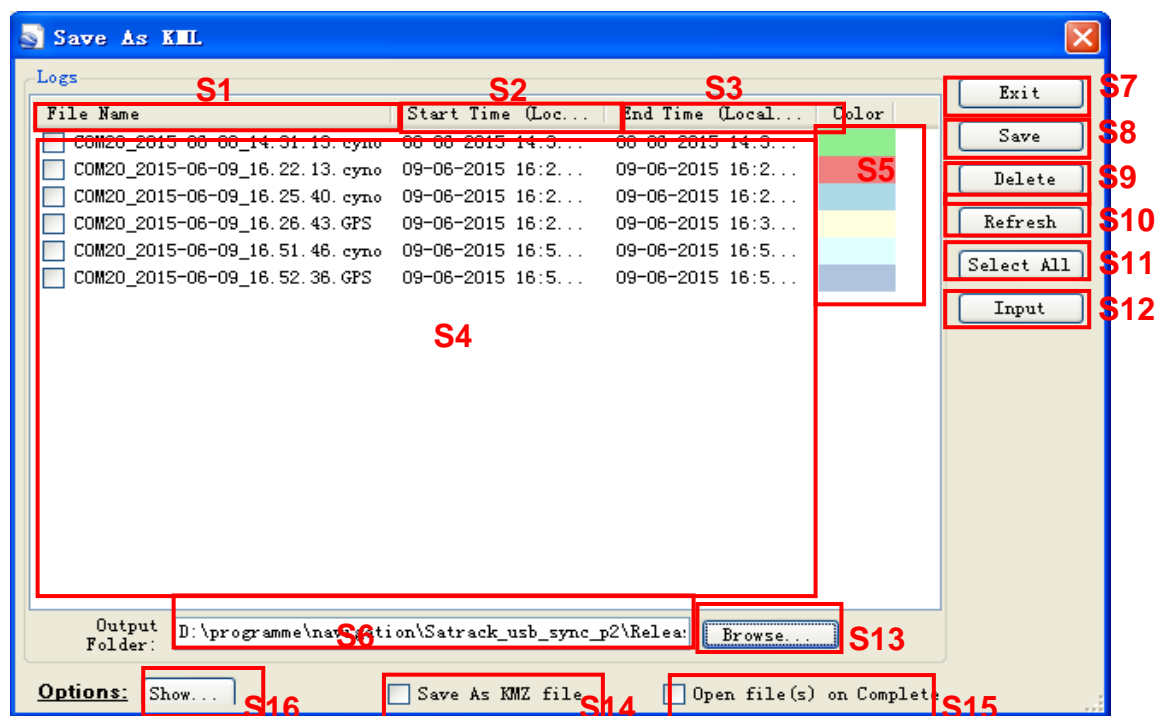


Figure 8.1 – Screenshot of the initial interface

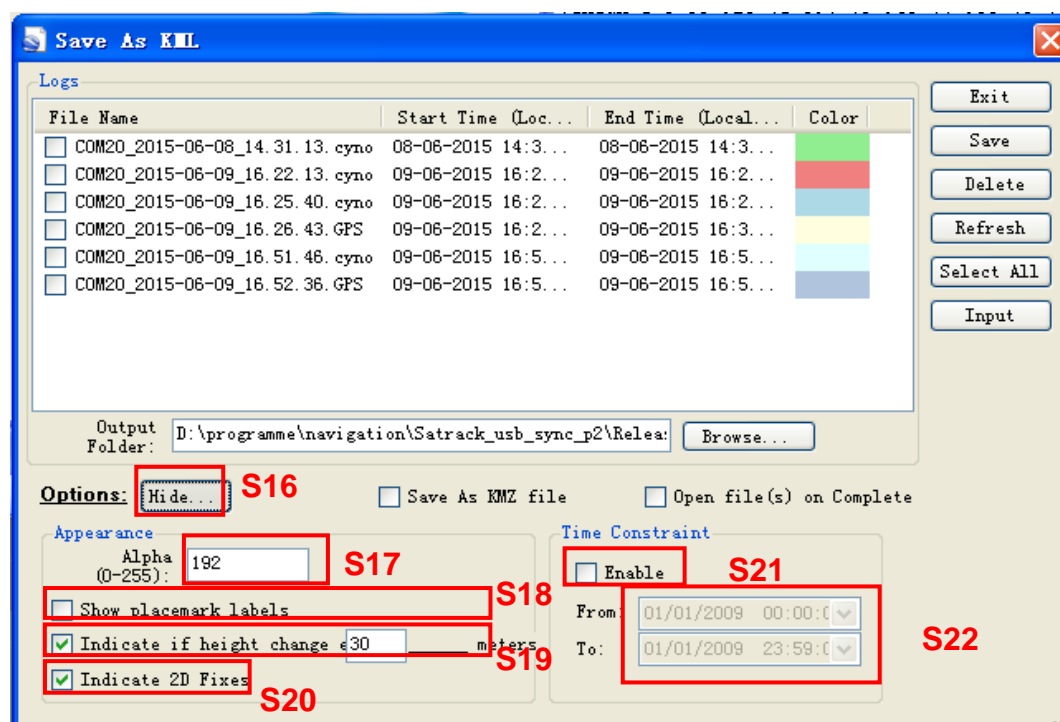


Figure 8.2 – Screenshot when S16 is pressed

- S1 - Sort the list of files displayed in box S4 with ascending or descending order alphabetically in the first column.
- S2 - Sort the list of files displayed in box S4 with ascending or descending order of time in the second column.
- S3 - Sort the list of files displayed in box S4 with ascending or descending order of time in the third column.
- S4 - File(s) will be included in file saving process if the box on its left hand side is checked. The file list is read from folder under user profile, My Documents\Satrack\logs.
- S5 - Click to change the track color in the output file.
- S6 - Set where the saved files should be stored.
- S7 - Close this dialog.
- S8 - Start saving selected file(s).
- S9 - Delete selected file(s).
- S10 - Refresh file list in box S4 for updating file which are deleted /newly added from/to the log source folder
- S11 - Check all the boxes (select all files).
- S12 - Input
- S12 - Browse for the desired output folder with a pop up dialog.
- S13 - Save as KMZ format instead of KML, save space but slower.
- S14 - Indicate whether to open the saved files automatically when saving completes. It is highly recommend installing Google Earth for opening the converted files.
- S15 - Show advanced options.
- S16 - Hide advanced options.
- S17 - Set the alpha of the path viewing under Google Earth.
- S18 - If checked, there will always have a node code beside the node icon.
- S19 - If checked, the icon of a node will be in green color if the statement holds.

- S20 - If checked, the icon of a node will be in red color to indicate 2D position fix.
- S21 - Set to extract a period of time from the input files to be converted, information out of the time constrain indicated in S20 are ignored. When this box is checked, the Start time and End time of S20 will be automatically updated to the earliest and latest time found in all files.
- S22 - The period of time should be included.
- \*\*\* - All time shown in the dialog are in local time rather than universal time.

## 8.2. Usage

1. Read the file information, sort them if needed. Select the files which should be converted by checking the boxes on its left hand side. If the file in the list cannot be converted, “**Not accessible**” will be shown on its Start time and end time field.

File Name	Start Time (Local Time)	End Time (Local Time)
<input type="checkbox"/> demo.cyno	01/06/2009 15:14:38	01/06/2009 17:52:40
<input type="checkbox"/> demo.dll	Not Accessible	Not Accessible
<input type="checkbox"/> demo.docx	Not Accessible	Not Accessible
<input type="checkbox"/> demo.kml	Not Accessible	Not Accessible
<input type="checkbox"/> demo.pdf	Not Accessible	Not Accessible

Figure 8.3 – Screenshot of the file detail

2. Select an output folder by clicking button “Browse...” (S12), or type the path directly into the textbox (S6).
3. Indicate whether the dialog should open converted files after conversion complete by setting the check box (S13).
4. Set advanced options if needed (e.g. Lline color, alpha, time constrain, indicator) (S14).
5. Start saving file(s) by click the “**Save**” button (S8).
6. A dialog showing the progress of save file will show up, pressing the cancel button can cancel the running save file process.

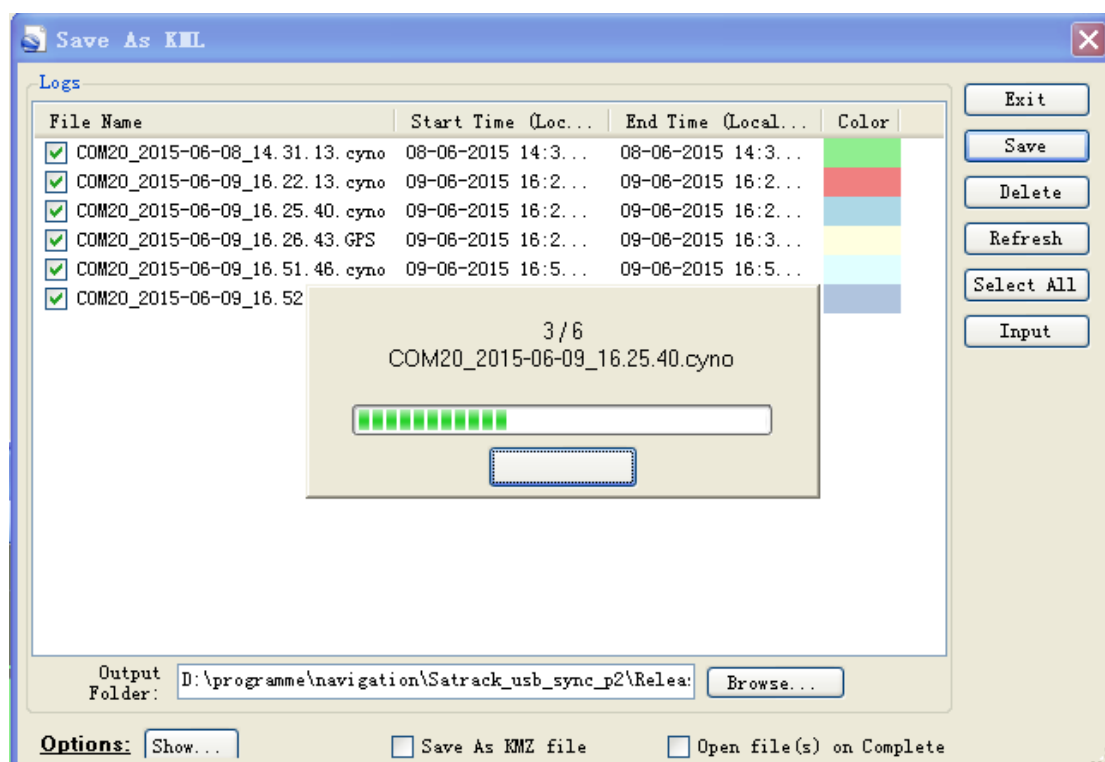


Figure 8.4 – Screenshot when Save is pressed

7. If the selected file cannot be saved, a message box will be shown.

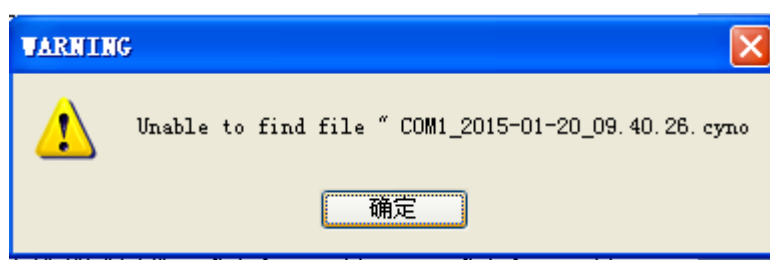


Figure 8.5 – Save error

8. The files will be saved and stored inside the output folder specified.

### 8.3. Brief description of the converted file

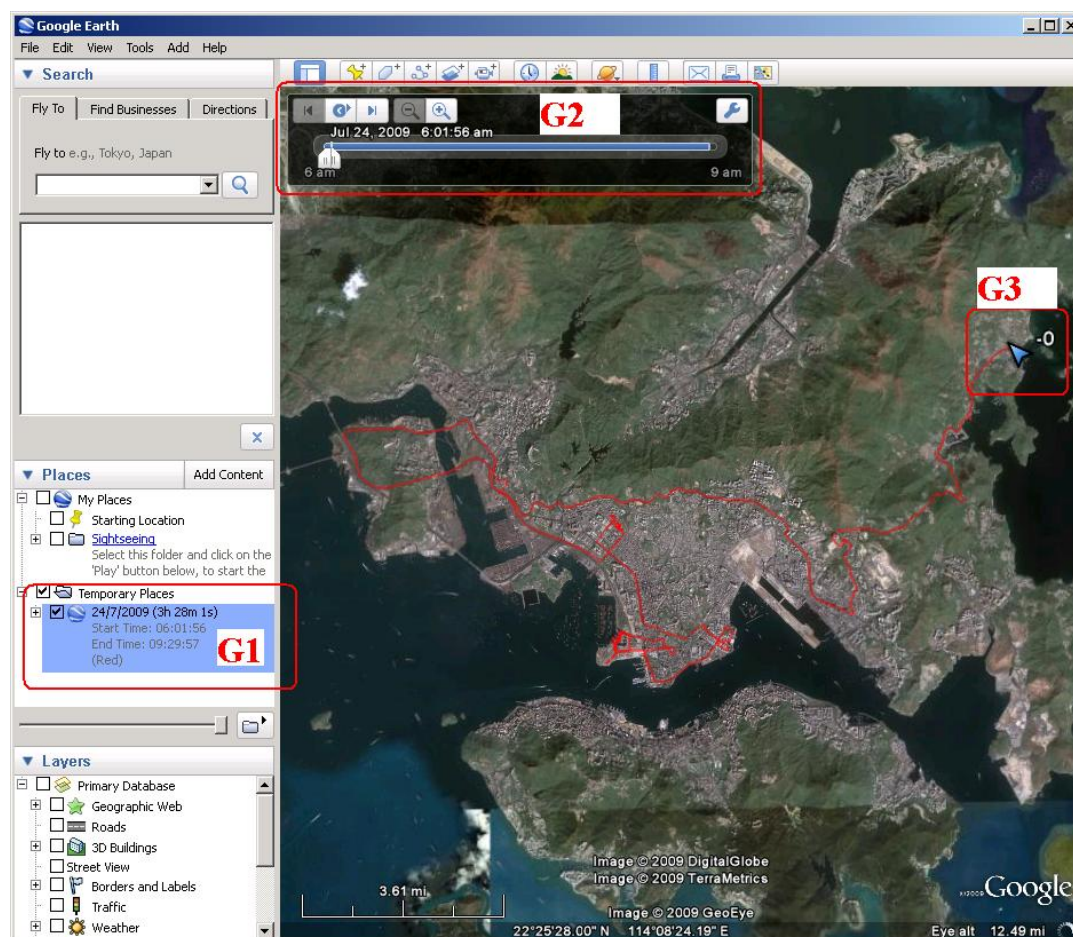


Figure 8.6 – Screenshot of a converted file opened with Google Earth.

G1 - Details of the opened file. For example:

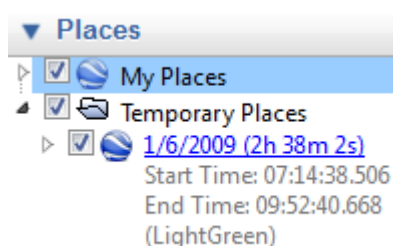


Figure 8.7 – Details of the opened file

- “1/6/2009” - Day of taking this log
- “(2h 38m 2s)” - Total duration of this log
- “Start Time: 07:14:38” - The start time of logging (UTC 24-hr)
- “End Time: 09:52:40” - The end time of logging (UTC 24-hr)
- “(LightGreen)” - Color of the line representing this log.

By clicking the link [1/6/2009 \(2h 38m 2s\)](#)

A summary of the file will be shown:

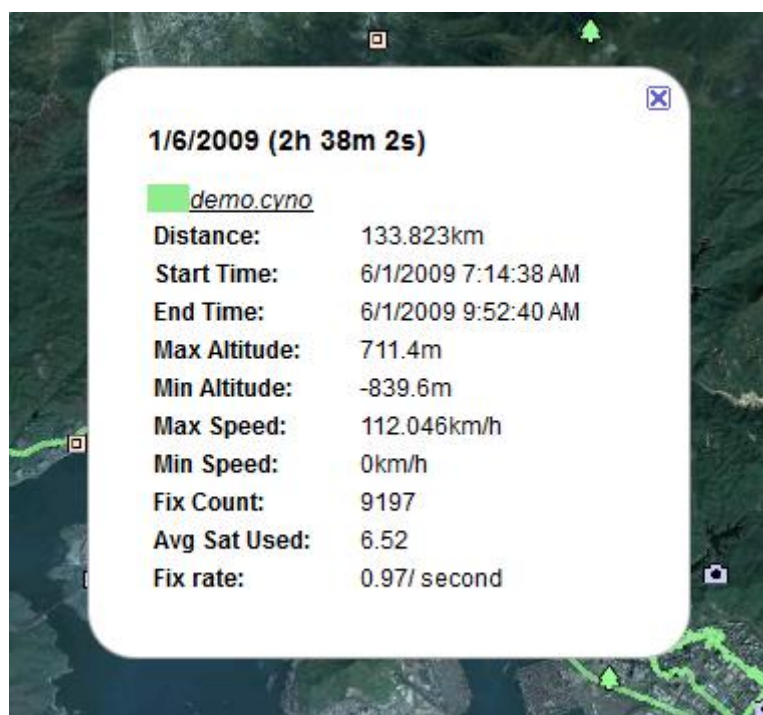


Figure 8.8 – A summary of the file

- G2 - Navigation bar for traversing between nodes.

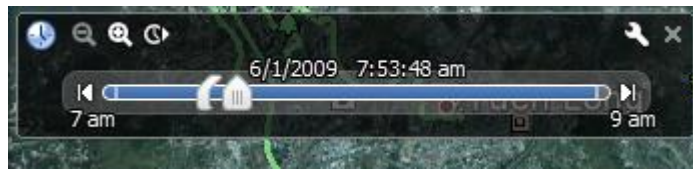


Figure 8.9 – Navigation bar for traversing between nodes

- G3 - This is one of the position nodes. By clicking on this node, a balloon containing information at this node will appear. The asterisk (\*) beside satellite ID indicates that satellites is included in calculating the node's position, otherwise, it is not used.

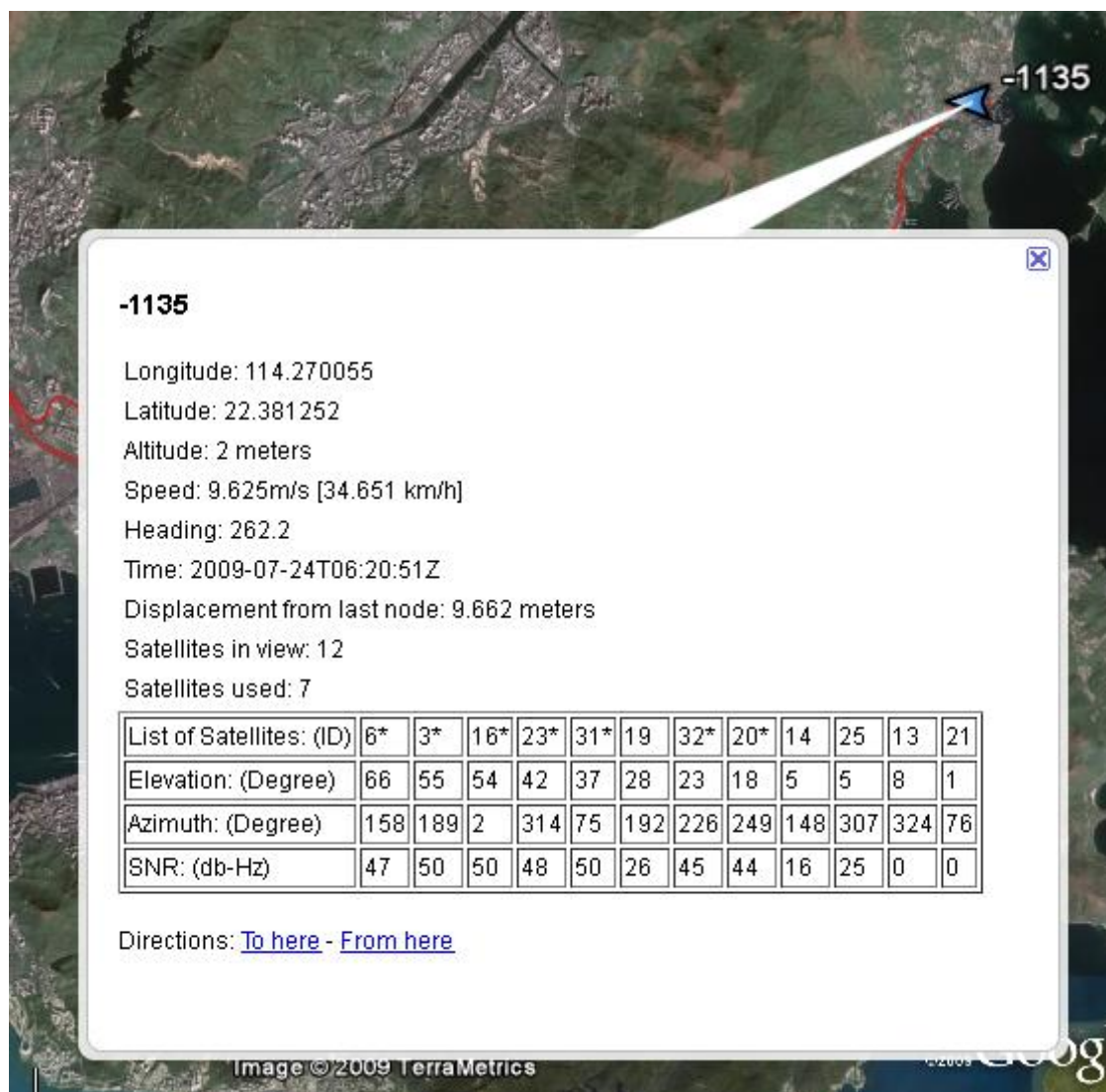


Figure 8.10 – Part of the screenshot after clicking on a node

\*\*\* The above is a very brief description on viewing the converted files using Google Earth, for details, please refer to Google Earth User Guide:

<http://www.google.com/earth/learn/>