

Firebird LOCOSYS positioning product test software Quick guide

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1. Company introduction

Founded in 1995, LOCOSYS Technology Company provides global navigation satellite system (GNSS), wireless communication, embedded system both hardware and software, quality products and fast service, all-round integrated solutions.

From avionics, unmanned vehicles, to consumer positioning and correlation electronics, we can respond to a variety of customer needs. Currently, we have become long-term partners with many companies in various countries, and we not only provide high-quality products to customers around the world, but also support customers with OEM and ODM services. We will continue to provide good products and services to our customers.



IATF 16949



ISO 9001



RoHS

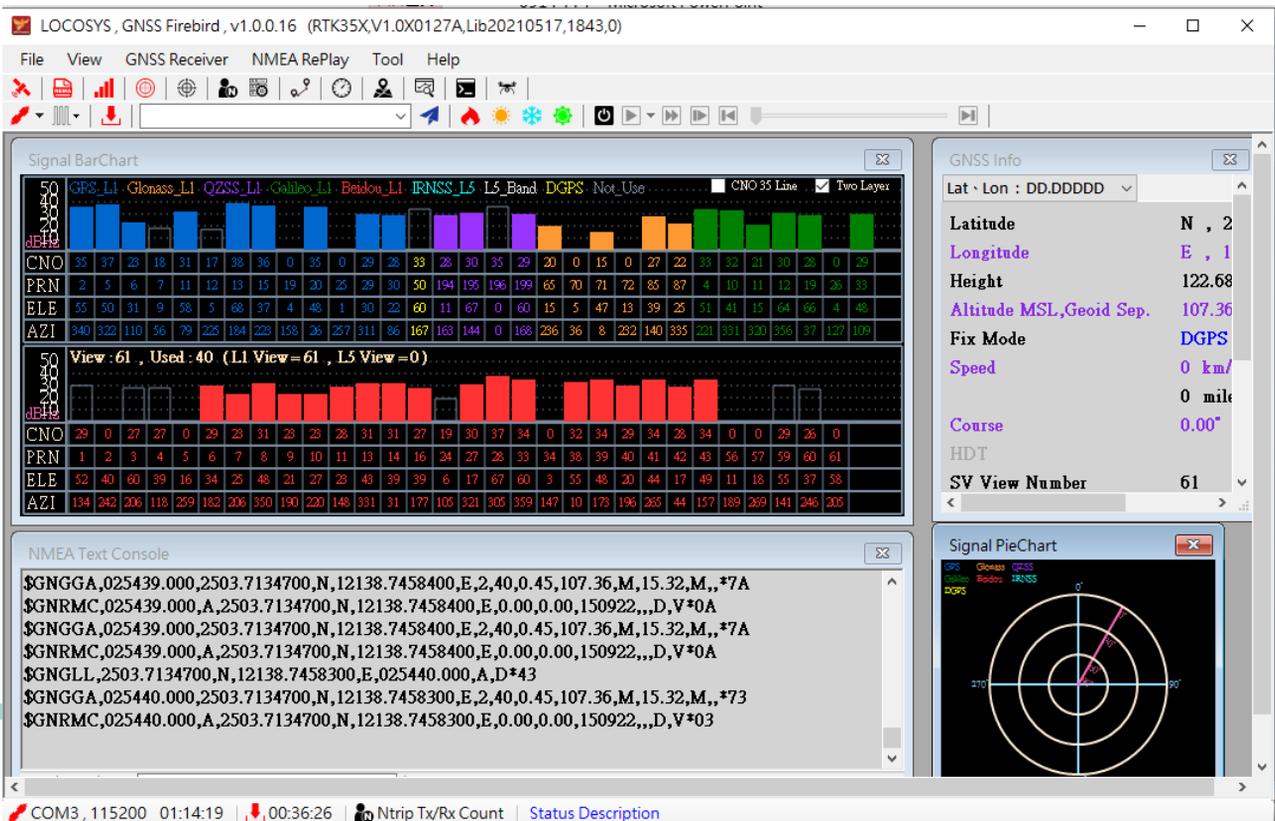


REACH



2. Intended use of Firebird software

- Accuracy check of LOCOSYS positioning products
- Positioning of current position
- Acquisition and analysis of positioning log data
- RTK mode test possible



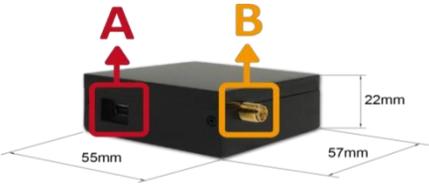
3. Introducing Firebird

3-1 Introduction of hardware

Using Firebird requires two parts, the hardware and the Firebird software.

EVB

A USB connector
B RF connector



Cable

Mini USB cable



RTK system

Model : RTK-M300



Monitor



Antenna

1. Helix antenna
2. Survey antenna
3. Stack antenna



1. 2. 3.

There are 3 types of antennas. Please contact our sales representative for details.

3. Introducing Firebird

3-2 Software introduction

Download the Firebird software from the LOCOSYS website.
<https://www.locosystemech.com/en/page/support.html>

This quick guide introduces the GNSS module as an introduction example, so please download it as shown in the figure below. If you have other products, please download the appropriate software.

Kind	Product Name	Software Package	Download zip	Download rar
GNSS	MC-1010-Vxx series MC-1612-Vxx series LS2003x-Vx series LS2303x-Vx series	(1) Prolific Driver (2) EVK Quick Guide For Sub-meter product (3) GNSS_Firebird_Release_v1.0.0.16 (4) Firebird basic function (Click the link)		
RTK	*RTK-1010 & RTK-1612 * RTK-4057-MHPD	(1) LOCOSYS RTK-1010_1612 EVK HW quickly setup guide (2) Prolific Driver (3) GNSS_Firebird_Release_v1.0.0.16 (4) Firebird basio function (Click the link) (5) Firebird : RTK base & rover (Click the link)		
RTK	RTK-4671 Series	(1) PL2303_Prolific_DriverInstaller (2) CP210x_Universal_Windows_Driver(Win10) (3) CP210x_Windows_Drivers(WIN7_WIN8) (4) EVK Quick Guide For RTK-4671 Series		

Note:

1. The OS version of your computer must be Windows 10, 11 or higher.
2. A password is required for software decompression. Please contact our sales representative for details.

3. Introducing Firebird

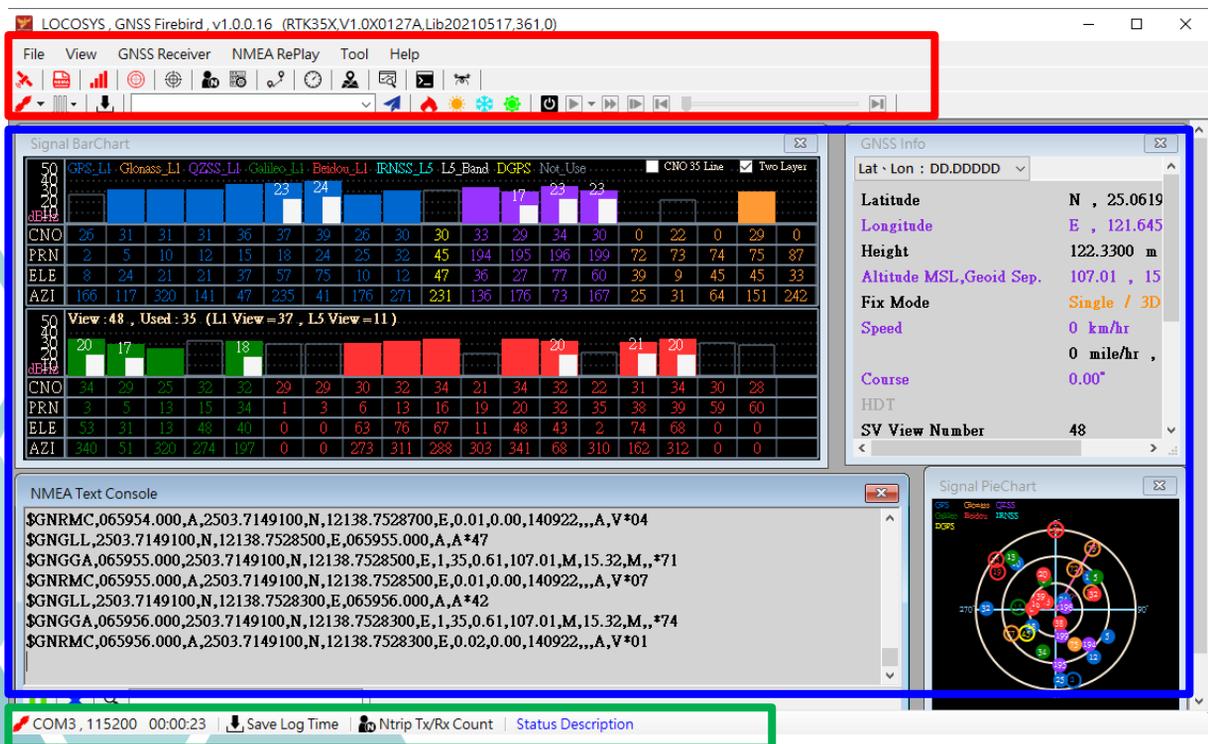
3-3 Configure Firebird's HMI interface

When you open the Firebird software, what you see is a simple HMI interface, divided into three main parts.

1. **Red frame** is the function table
2. **Blue frame** is GNSS positioning information, presented in four main presentations.
3. **Green Frame** indicates the Firebird state.

1. The function table consists of 3 columns, and the top row is the menu.

The bottom two rows are menu shortcuts. It is linked with the shortcut icon and menu. When turned on, the color of the icon changes from black to red. Then, a check symbol will appear in the menu. The opposite is also true. When turned off, the icon color changes from red to black. Then the check symbol disappears from the menu.



3. Introducing Firebird

3-3 Configure Firebird's HMI interface

2. The blue frame is the GNSS positioning information, shown in four main presentations.

- A. Shows the status of satellite signal reception in a bar graph. (Signal Bar chart)
- B. Indicates GNSS data. (GNSS data table)
- C. Pie chart showing satellite signal reception status. (Satellite pie chart)
- D. Indicates the message of NMEA. (NMEA text console)

3. The green frame indicates the Firebird status.

The leftmost shows the COM-port status and connection time. The middle is the log data storage record. NTRIP state.

LOCOSYS, GNSS Firebird, v1.0.0.16 (RTK35X,V1.0X0127A,Lib20210517,361.0)

File View GNSS Receiver NMEA RePlay Tool Help

Signal BarChart

	GPS_L1	Glonass_L1	Galileo_L1	BeiDou_L1	IRNSS_L5	L5_Band	DGPS	Not_Used											
CNO	26	31	31	31	36	37	39	26	30	30	33	29	34	30	0	22	0	29	0
PRN	2	5	10	12	15	18	24	25	32	45	194	195	196	199	72	73	74	75	87
ELE	8	24	21	21	37	57	75	10	12	47	36	27	77	60	39	9	45	45	33
AZI	166	117	320	141	47	235	41	176	271	231	136	176	73	167	25	31	64	151	242

View: 48, Used: 35 (L1 View = 37, L5 View = 11)

	GPS_L1	Glonass_L1	Galileo_L1	BeiDou_L1	IRNSS_L5	L5_Band	DGPS	Not_Used											
CNO	34	29	25	30	32	29	29	30	32	34	21	34	32	22	31	34	30		
PRN	3	5	13	15	34	1	3	6	13	16	19	20	32	35	38	39	59		
ELE	53	31	13	48	40	0	0	63	76	67	11	48	43	2	74	68	0		
AZI	340	51	320	274	197	0	0	273	311	288	303	341	68	310	162	312	0		

GNSS Info

Lat · Lon : DD.DDDDD

Latitude N , 25.0619

Longitude E , 121.645

Height 122.3300 m

Altitude MSL, Geoid Sep. 107.01 , 15

Fix Mode Single / 3D

Speed 0 km/hr

0 mile/hr

Course

HDT

SV View Number 48

NMEA Text Console

```

$GNRMC,065954.000,A,2503.7149100,N,12138.7528700,E,0.01,0.00,140922,,,A,V*04
$GNGLL,2503.7149100,N,12138.7528500,E,065955.000,A,A*47
$GNGGA,065955.000,2503.7149100,N,12138.7528500,E,1,35,0.61,107.01,M,15.32,M,,*71
$GNRMC,065955.000,A,2503.7149100,N,12138.7528500,E,0.01,0.00,140922,,,A,V*07
$GNGLL,2503.7149100,N,12138.7528300,E,065956.000,A,A*42
$GNGGA,065956.000,2503.7149100,N,12138.7528300,E,1,35,0.61,107.01,M,15.32,M,,*74
$GNRMC,065956.000,A,2503.7149100,N,12138.7528300,E,0.02,0.00,140922,,,A,V*01
    
```

COM3, 115200 00:00:23 | Save Log Time | Ntrip Tx/Rx Count | Status Description

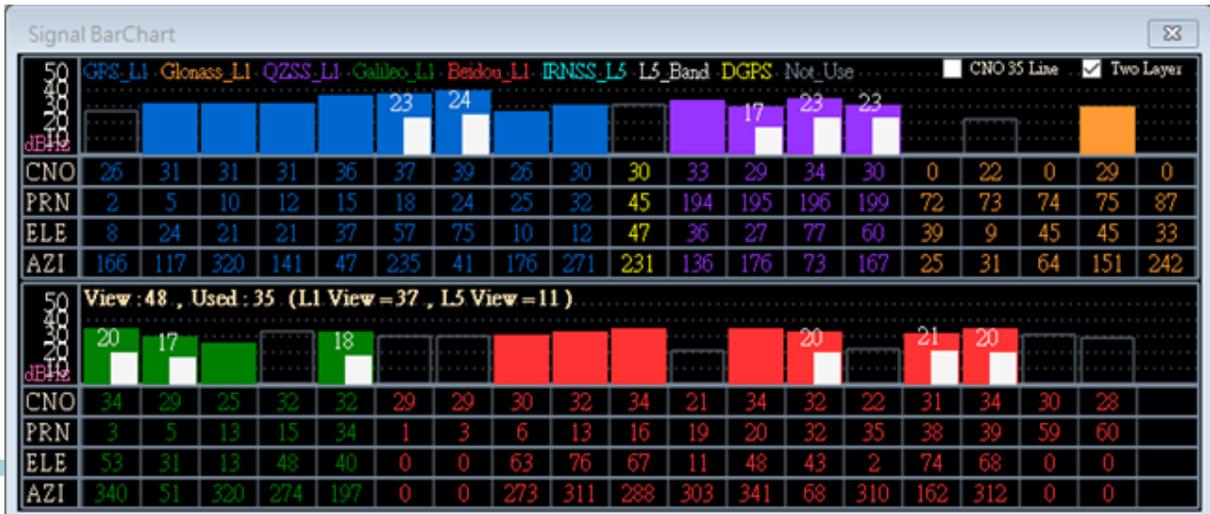
3. Introducing Firebird

3-3 Configure Firebird's HMI interface

3-3-1 Bar graph of satellite signal reception status

 Each satellite system is represented by a bar graph and color distinguishes the system. For example, GPS is blue.

- * Colored bar graphs indicate L1 signals, and white graphs indicate L5 signals.
- * There are two check boxes on the upper right, and when you click "35CN Line", a green line will appear. Calculations are made using data from satellites above this green line.
- * If 13 satellites are above the green line, RTK mode can be set.
- * If you click "Two Layer", the graph becomes a two-layer graph.



Displaying colors in GNSS systems

- *CNO: Signal-to-noise ratio.
- *PRN: Random satellite number.
- *ELE: Elevation angle, 0 to 90°
- *AZI: Depression angle, 0 to 359°

- Blue bar: GPS
- Orange stick: GLONASS
- Purple stick: QZSS
- Green bar: Galileo
- Red bar: Beidou
- Shallow bar: IRNSS
- Yellow bar: DGPS

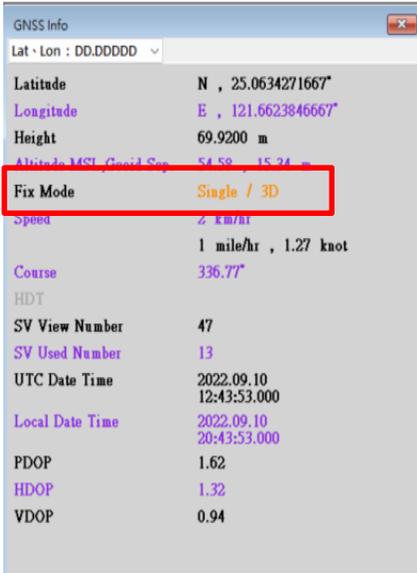
3. Introducing Firebird

3-3 Configure Firebird's HMI interface

3-3-2 GNSS data



Shows the information of the current positioning position. The contents are latitude, longitude, UTC time, number of satellites, etc.



Fix Mode has three modes.

Single/3D: Displays SINGLE/3D when positioning starts. Stay in SINGLE/3D mode if there is any occlusion or obstacles.

DGPS/3D: If a SABS system satellite is used as a positioning calculation satellite, it will show "DGPS/3D" mode.

RTK Fix/3D: Shows "RTK Fix/3D" after setting RTK .

3-3-3 Satellite Pie chart



The circled number is the PRN number (random number) of the satellite. Hollow circles are currently unused satellites. The colored circles are satellites used for positioning.



Displaying colors in GNSS systems

- Blue circle: GPS
- Orange circle: GLONASS
- Purple circle: QZSS
- Green circle: Galileo
- Red circle: Beidou
- Pale blue circle: IRNSS
- Yellow circle: DGPS

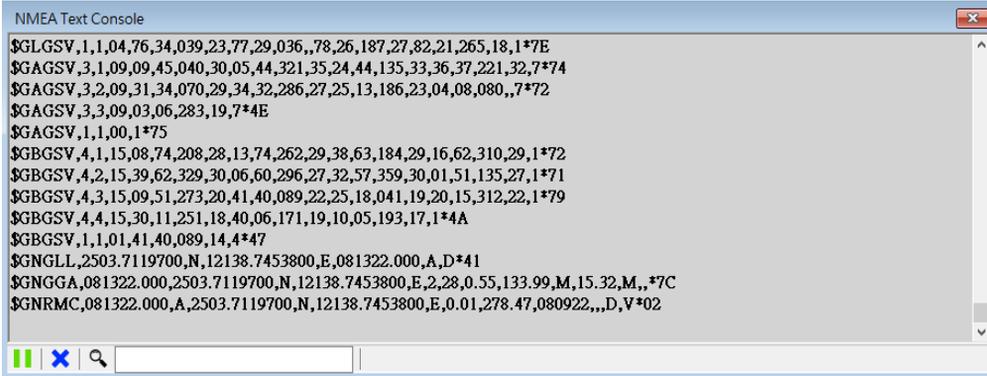
3. Introducing Firebird

3-3 Configure Firebird's HMI interface

3-3-4 NMEA messages

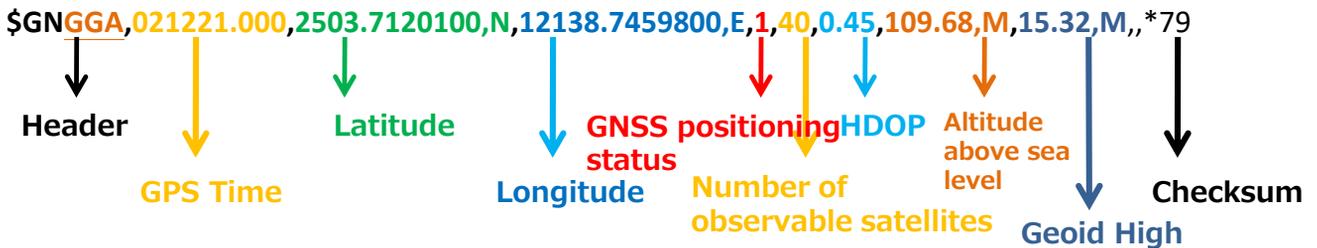


Satellite information is transmitted in NMEA sentences while using this EVK. "NMEA text Console" is a NMEA sentence.



3-4-5 NMEA sentence

Below is a list of commonly used NMEA records.



NMEA record	explanation
GGA	Global positioning system data (introduction example above)
GLL	Geographic Location -Latitude/Longitude
GSA	GNSS DOP and satellite availability
GSV	Observable GNSS satellites
RMC	GNSS minimum positioning data
VTG	Heading speed information
GST	Position measurement estimation error

The header shows the NMEA record. Looking at headers such as GLL, GSA, GSV, RMC, VTG, the data types of that sentence are divided.

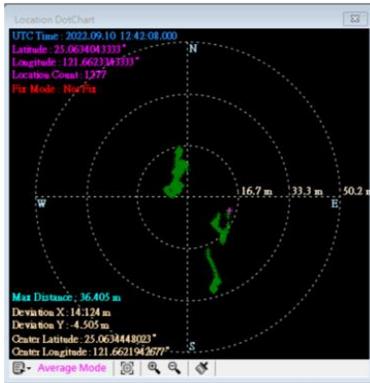
3. Introducing Firebird

3-4 Features

3-4-1 Function icon



Location Dote Chart Current location dot chart. The left figure below is the dot chart of the current position. The azimuth and distance that the GNSS positioning module can fix each time is indicated by one plus "+" symbol. Trajectories appear over time.

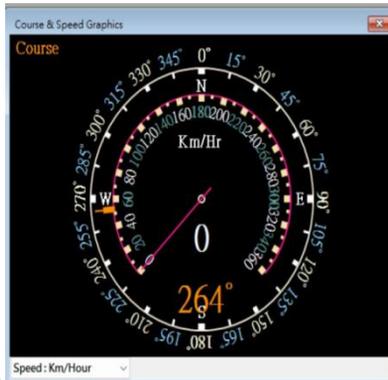


This chart has 4 modes. Users can choose by themselves.

User Manual (Fixed Point): The position entered by yourself is used as the quasi-position. Current Location (Dynamic Point): The position measured just now is used as the reference position. Capture Location (Fixed Point): Use the specified position on the chart as the reference position. Average Location (Dynamic Point): The position obtained by average positioning is used as the reference position.



Course & Speed Graphics Course and speed graphs The right figure below shows the ground depression angle and speed. The outer circle is azimuth and the back circle is velocity. There are 3 speed modes.



Km/Hour Kilometer/hour Mile/Hour
Mile/hour (1.61km/hr)Knot/Hour
Knot/speed (1.852km/hr)



MAP This is the road map of the current positioning position. If you are not connected to the Internet, the highway map will not appear.



At the bottom left are two checkboxes.

Flag in center of the map: If checked, the pin will always point to the center of the screen.

Popup Location Info: If you check this, clicking any point on the map will show the information of the corresponding position.

3. Introducing Firebird

3-4Features

3-4-2 Proprietary command introduction



Sending a proprietary command to Firebird displays the command and return in the NMEA message field. Information will appear.

For example: Sending the 061 command will result in a return.

```
$PAIR001,061,0*3C
$PAIR061,0*21
```

Proprietary Commands contains all the frequently used commands. If you have any issue about commands, please feel free to contact LOCOSYS sales representatives.

3. Introducing Firebird

3-4 Features

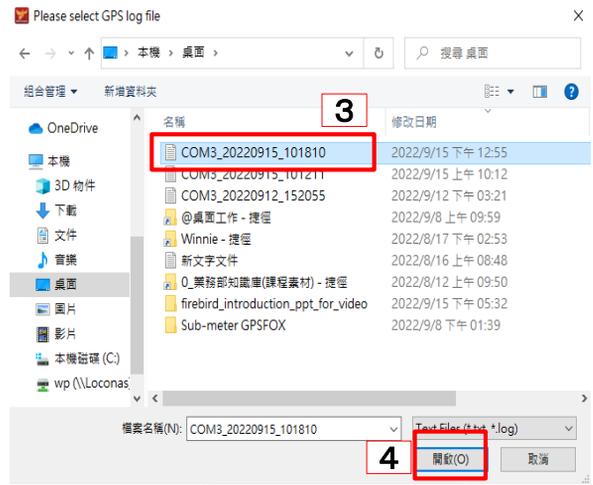
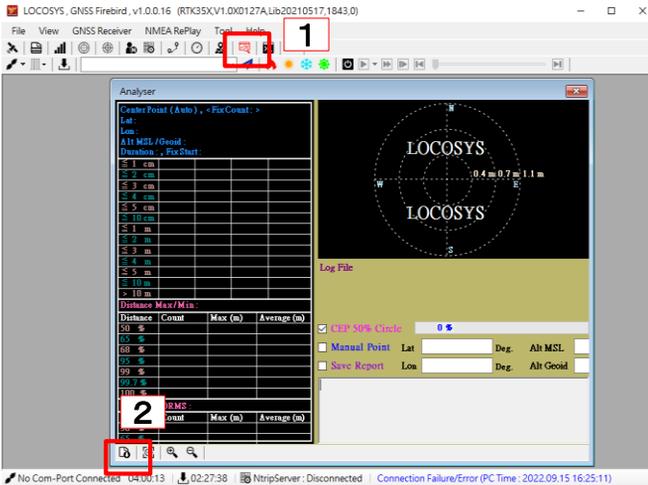
3-4-3 NMEA log analysis



If there is log data, click the icon to select the log data and analyze the contents of this log data.



1. Click the NMEA log data icon
2. Click the log data icon
3. Select log data file
4. open a file
5. show insights



Analyser

Center Point (Auto), < Fix Count: 8796 >
 Lat: 25.061887564 "
 Lon: 121.645778904 "
 Alt MSL / Geoid: 118.6310 m / 15.3200 m
 Duration: 02:37:11, Fix Start: 2022.09.15 02:18:15

Distance	Count	Max (m)	Average (m)
≤ 1 m	624	624	7.09 %
≤ 2 m	2536	3160	28.83 %
≤ 3 m	1057	5017	21.11 %
≤ 4 m	681	5698	7.74 %
≤ 5 m	458	6156	5.21 %
≤ 6 m	291	6447	3.31 %
≤ 7 m	499	6946	5.67 %
≤ 8 m	659	7605	7.49 %
≤ 9 m	334	7939	3.80 %
≤ 10 m	285	8224	3.24 %
> 10 m	572	8796	6.50 %

Distance Max/Min: 15.4555 m / 0.0265 m

Distance	Count	Max (m)	Average (m)
50 %	4398	2.5554	1.5948
65 %	5717	4.0187	1.9401
68 %	5981	4.3981	2.0402
95 %	8356	10.7173	3.5568
99 %	8708	13.6834	3.8990
99.7 %	8769	14.9169	3.9704
100 %	8796	15.4555	4.0048

RMS: 3.0665 m, 2DRMS: 6.1329 m

Alt MSL	Count	Max (m)	Average (m)
50 %	4398	11.6510	5.1998
65 %	5717	13.2610	6.8965
68 %	5981	13.6818	7.1869

14.6 m @ 9.6 m @ 4.7 m

*Log File Path : C:\Users\wchu\Desktop\COM3_20220915_101810.txt
 *Log File Name : COM3_20220915_101810.txt (Size: 4406365 Bytes)
 *Update Rate : 1 Hz (1 Sec)
 *Error Checksum Count : 77 , GGA / RMC Lost Time Count : 5 / 5

CEP 30% Circle 100 % (2 / 2)

Manual Point Lat Deg. Alt MSL m

Save Report Lon Deg. Alt Geoid m

```

-17, Error Checksum [#68350] = [BOOT task_main..]
-18, Error Checksum [#68355] = [Main_RTK_init(1)]
-19, Error Checksum [#68356] = [End Main_RTK_init(g_interval=0,baudr=0)]
-20, Error Checksum [#68372] = [*No log file selected !!
                    
```

3. Introducing Firebird

3-4 Features

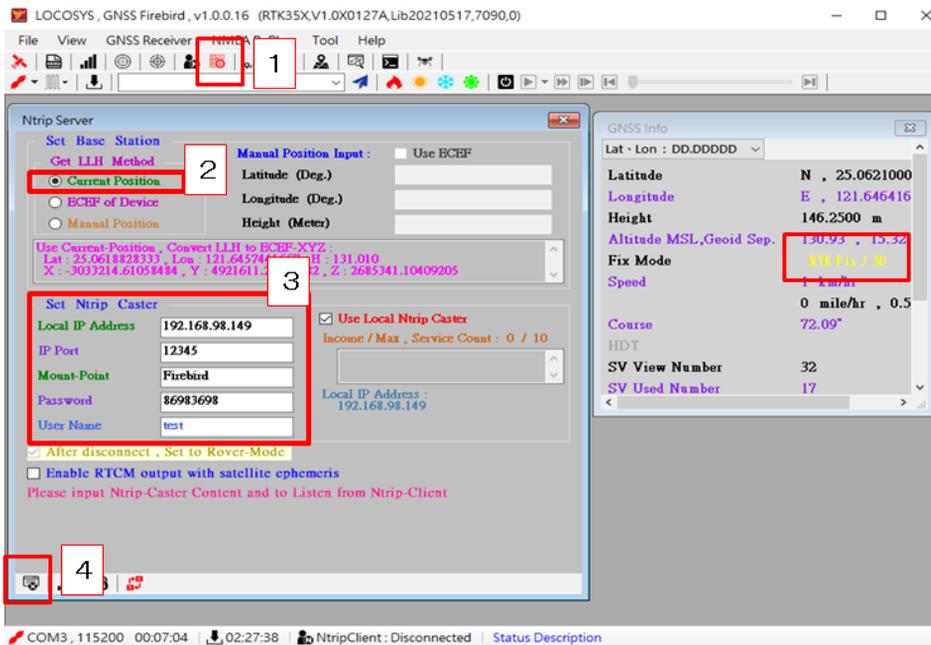
3-4-4 Setting the base/CORS station



Introducing base station settings. (If your product is set as a base station)

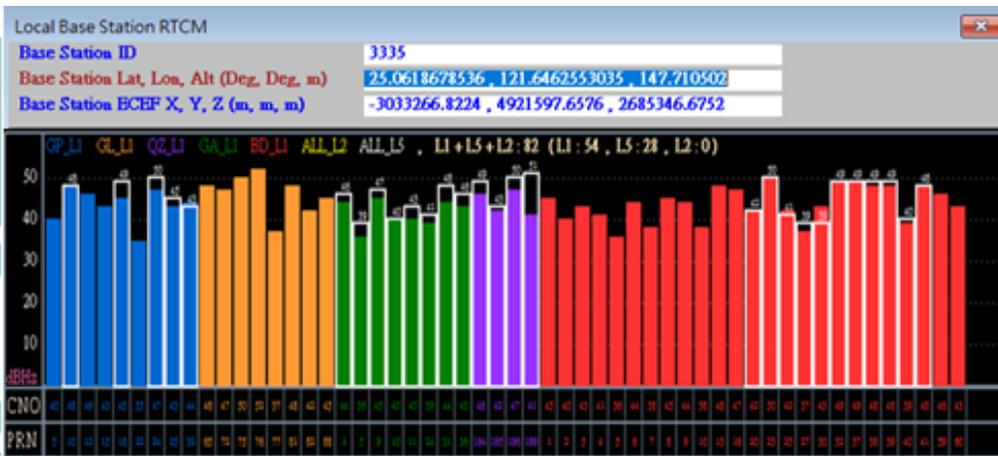


1. Open NTRIP Server.
2. Check the Current Position of the Set Base Station in the top left.
3. Enter the Caster information you are requesting for setting Ntrip Caster.
4. Click the connection icon on the bottom left. That's it, the base station setup is complete!



*The information on the left screen is an introduction example. Users must enter the actual Ntrip Caster data.

You can check the corresponding position and satellite acquisition status from the screen of the base station RTCM. If the satellite acquisition status of the base station is good, the positioning accuracy of RTK is also secured, so please check the connection status of the base station regularly.



3. Introducing Firebird

3-4 Features

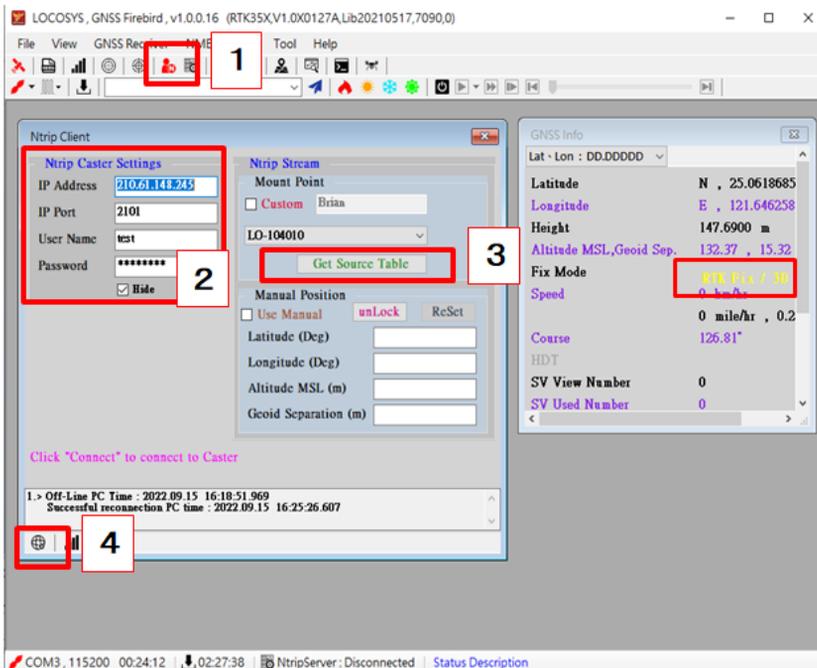
4-4-5 Rover station settings



Introduce the setting of the rover station. (If your product is set as a rover station)



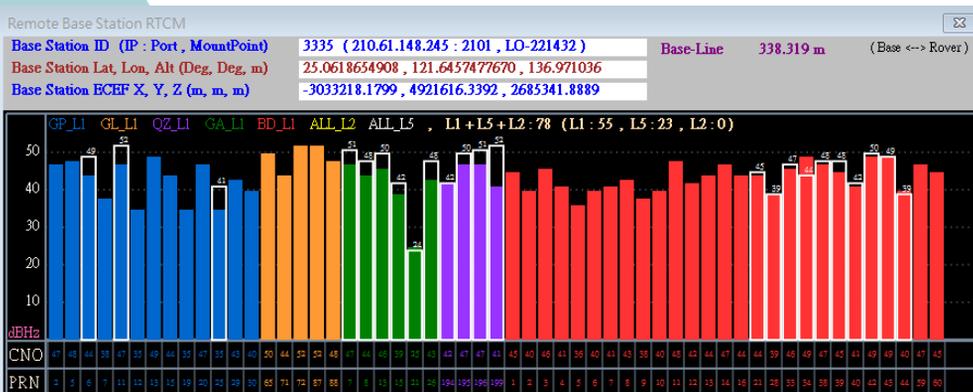
1. Open NTRIP Client.
2. Please enter the request data of Ntrip Caster Settings on the upper left to connect with Caster.
3. Press "Get Source Table" and select the corresponding mount point.
4. Click the connection icon on the bottom left, then it completes the rover station setup.



* Basically, one device is set as one RTK station. If you want to set your PC as Caster and your EVK as Rover, open two Firebirds and test.

*The information on the left screen is an introduction example. Users must enter the actual Ntrip Caster data.

From the rover station RTCM screen, you can check the corresponding position and satellite acquisition status. If the rover station's satellite acquisition condition is good, RTK positioning accuracy is also ensured. Periodically check the connection status of the rover station.



3. Introducing Firebird

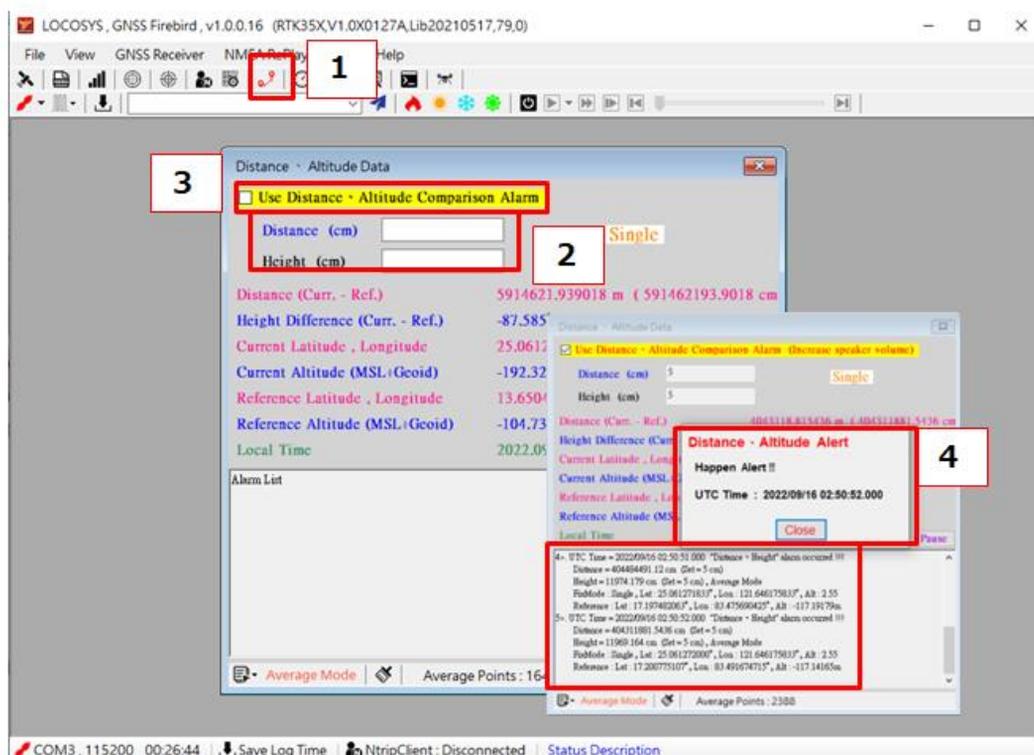
3-4 Features

3-4-6 Positioning point and reference position test



The function of “Positioning point and reference position test” is the function of positioning (EVK position) between Reference position (distance and height set by yourself), error of both positions is a function for reference. In addition, if the positioning data exceeds the set distance and height, an alarm display and sound will on automatically. .

1. Open Distance, Altitude Data.
2. Enter a number in the Distance field.
3. Enter a number in the Height column.
4. Press the yellow Harleed check box, and if there is an error in the position of both points, an alarm will be displayed and sounded.



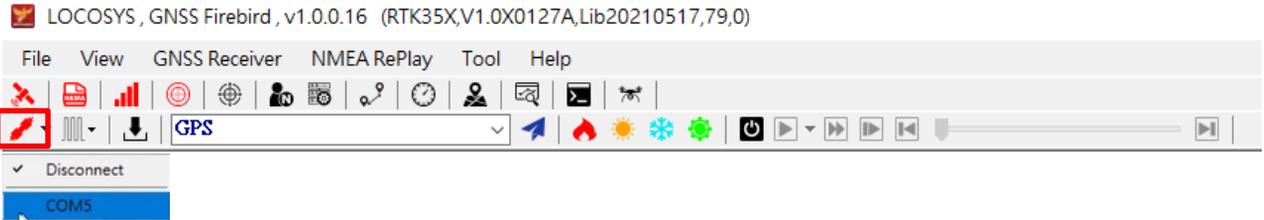
3. Introducing Firebird

3-4 Features

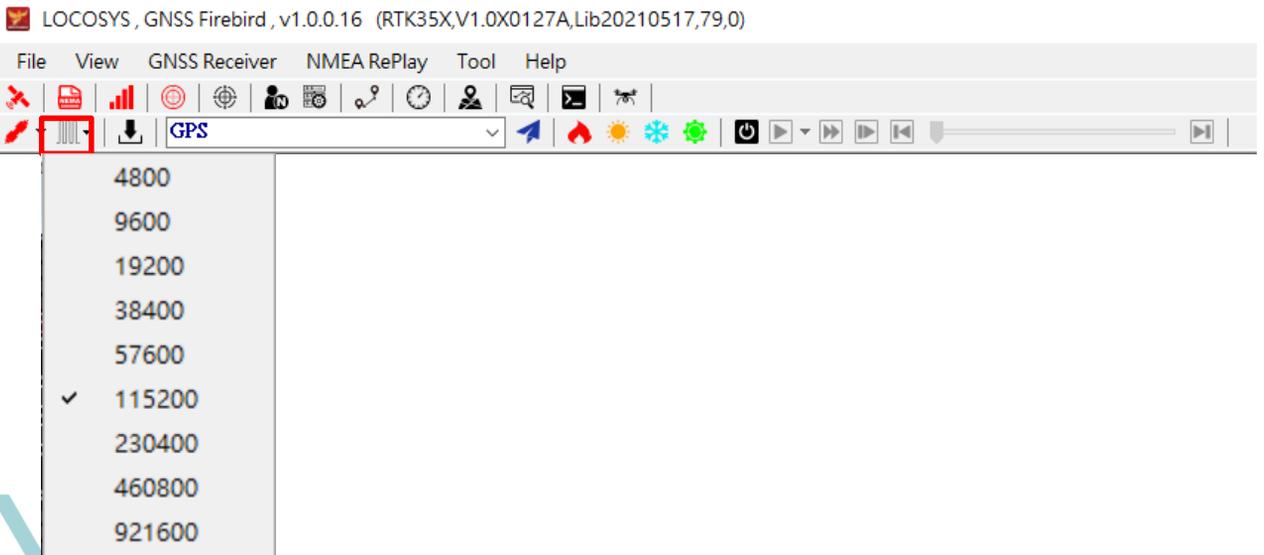
3-4-7 Other functions



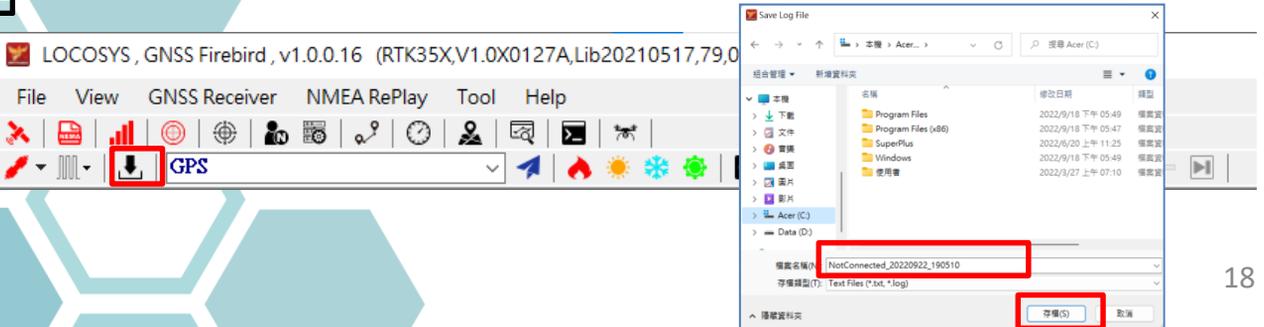
In COM-PORT, if you press the COM-PORT you want to use, it will change from black to red and start Firebird.



Baud rate, default is 115200. This part shows the EVB's initial settings automatically. No need to adjust.



Log data download function. Press this to download NMEA data.



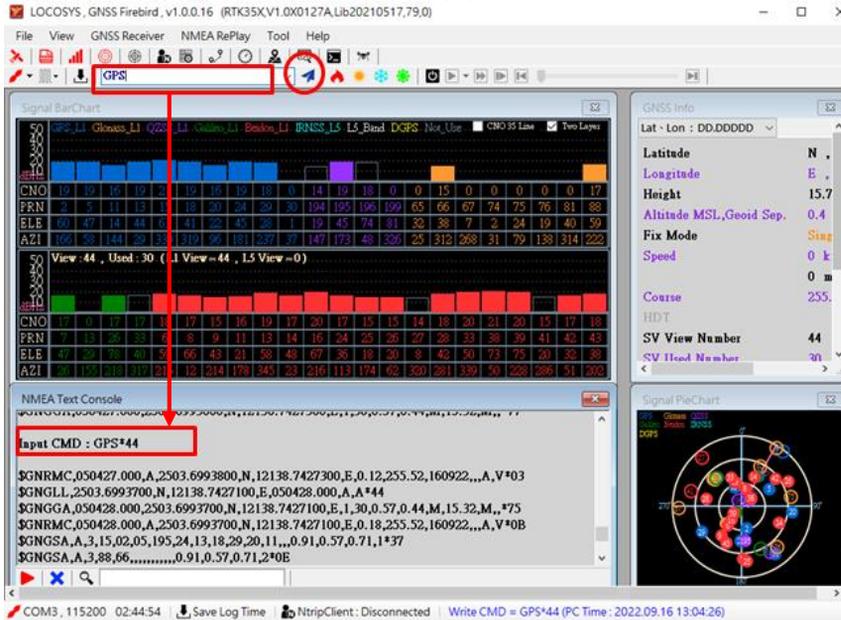
3. Introducing Firebird

3-4 Features

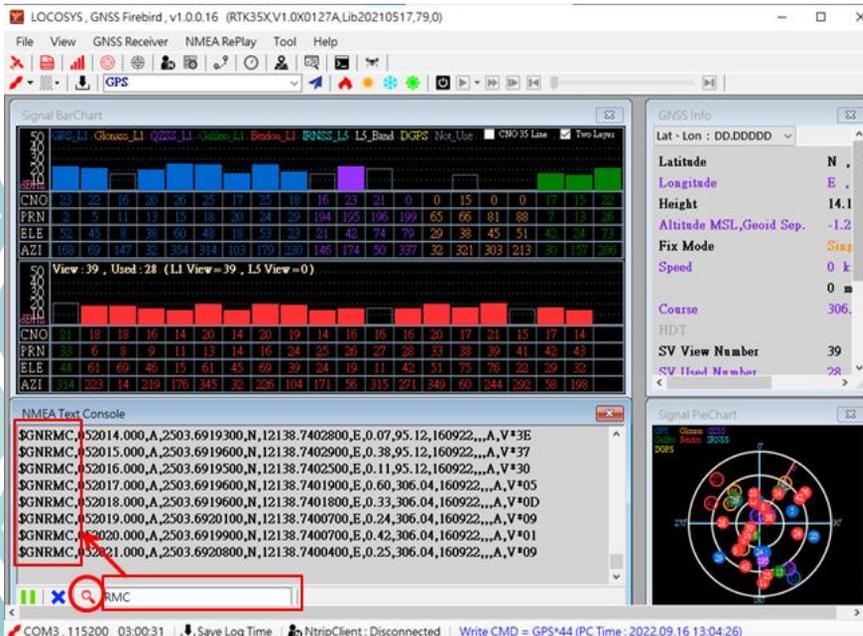
3-4-7 Other functions



To enter a command. For example: Enter "GPS" in the blank field, click the blue icon on the right, and the message "Input CMD: GPS*44" will appear in the "NMEA Test Console".



"NMEA Test Console" Since there is a magnifier icon under the NMEA message, this is a function to search for specific data from the NMEA message.



3. Introducing Firebird

3-4 Features

3-4-7 Other functions

There are four function icons in Start. Pressing each different icon activates the corresponding function. For example: Pressing hot start will start the hot start counter and stop counting when finished. Now you can test the time of each start.



1. Hot start



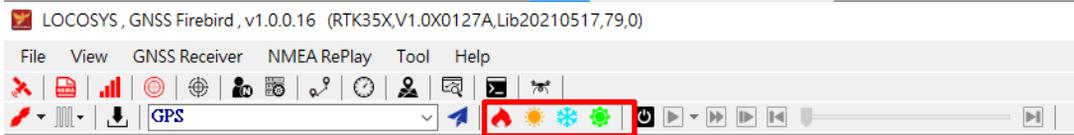
2. Warm start



3. Cold start

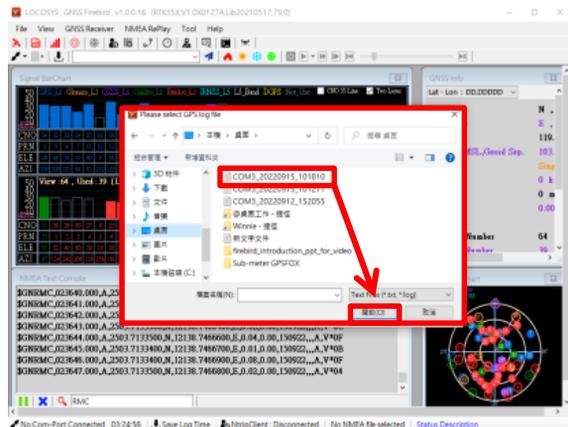
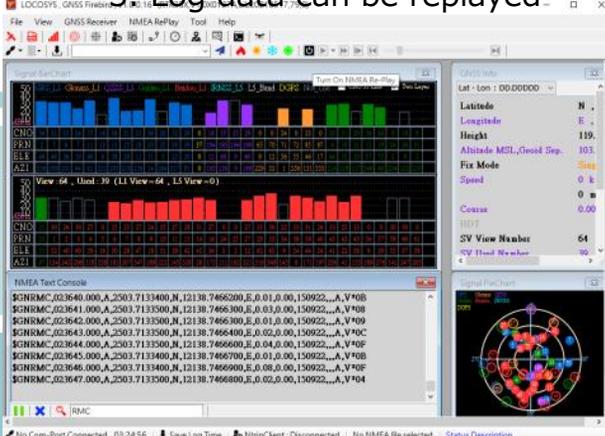


4. Factory Reset



Next is the function icon for "Turn On NMEA Re-Pl" 

1. Press the "Turn On NMEA Re-Play" icon
2. Turn off the COM-Port connection
3. Select the log data you want to check and press the check button
4. All the colors of the recorder icon become bright
5. Log data can be replayed.



3. Introducing Firebird

3-4 Features

3-4-7 Other functions

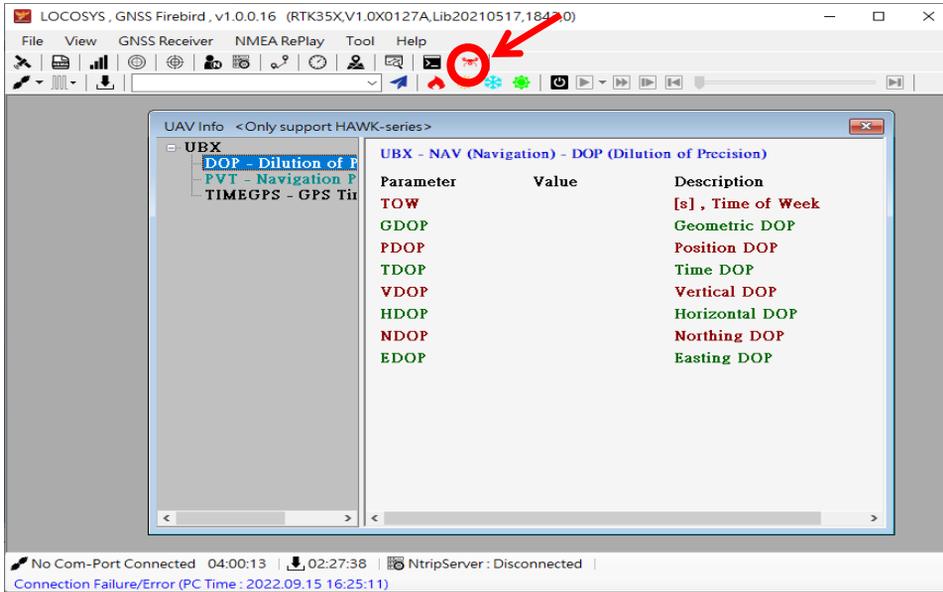


UAV Info (HAWK series exclusive function)

DOP - Dilution of Position

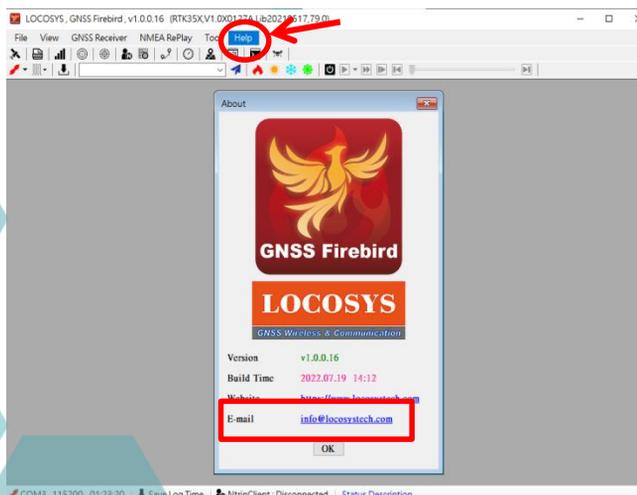
PVT - Navigation PVT Solution

TIMEGPS - GPS Time



3-4-9 Inquiries

If you have any questions when using Firebird, please click "Help" at the top right of the function table. Then, press E-mail on LOCOSYS, write your question in an e-mail and send it to us.



3. Introducing Firebird

3-4 Features

3-4-9 List of function icons

Menu	Icon	Item content	Reference page
File		Saving NMEA logs	18
View		GNSS data	10
		NMEA messages	11
		Satellite reception status bar chart	9
		Satellite reception pie chart	10
		Positioning and reference location test	17
		Dot chart	12
		Course and speed graph	12
		Map	12
		UAV	21
GNSS Receiver		Comport connection	18
		Baud Rate	18
		Rover station settings	16
		Base station settings	15
		Command	13
NMEA Replay		NMEA log data playback	20
Tool		NMEA log analysis	21
Help	(No icon)	About	21
	(No icon)	version	21



Kindly note Firebird software versions are subject to change without notice.

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