

ComNav Technology

User Guide

M300PRO GNSS Receiver



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1. Introduction

Thank you for choosing the M300Pro GNSS receiver.

This Getting Started Guide will provide useful information about M300Pro. It will also guide you through your first step of using M300Pro GNSS receiver.

1.1 Safety Information

Before using the receiver, please make sure that you have read and understood this Getting Started Guide, as well as the safety requirements.

The M300Pro has a built-in internal Lithium battery, and a damaged battery can cause personal injury or property damage. Please obey the following regulations:

- Be sure that power off M300Pro when delivering
- Do not put the battery in water
- Do not use the damaged battery
- Do not expose the battery to fire or high temperature
- Internal battery can be replaced only at Authorized ComNav distributors.

1.2 Warning and Cautions

An absence of specific alerts does not mean that there are no safety risks involved. A Warning or Caution information is intended to minimize the risk of personal injury and/or damage to the equipment.

WARNING-A Warning alerts you to a potential misused or wrong setting of the equipment.

CAUTION- A Caution alerts you to a possible risk of serious injury to your person and/or damage to the equipment.

1.3 Use and Care

The M300Pro is designed to withstand the rough environment that typically occurs in the field. However, the M300Pro is high-precision electronic equipment and should be treated with reasonable care.

1.4 Technical Assistance

If you have any question and can't find the answer that you need in this manual, please contact your local dealer from which you purchased the M300Pro. Alternatively, please request technical support using the ComNav Website at: www.comnavtech.com or technical support email: support@comnavtech.com.

1.5 Your Comments

Your feedback about this Getting Started Guide will help us to improve it with future revisions. Please email your comments to: support@comnavtech.com.

2. Overview

This chapter will introduce the main features, technical specifications and basic kit of M300Pro receiver.

2.1 Receiver features

The M300Pro is designed as a multi-purpose GNSS receiver for a wide range of applications. With its powerful integration ability, the M300Pro serves as a key part of positioning infrastructure, active geodetic network, deformation monitoring system, machine guidance, harbor construction, land surveying, marine surveying and in any project that accuracy and reliability matter the most.

With all communication ports and interfaces available in the front panel, the M300Pro is ready to track all constellation signals in any mode. External GNSS antenna design makes the receiver easy and safe to operate in various kinds of environment.

With its advanced dynamic acquisition ability and high accurate carrier phase algorithm, the high dynamic processing engine enhances the reliability and consistency of survey in challenging environments for GNSS signal tracking.

The M300Pro is based on IP and ready for GNSS Cloud Computing. Easily configured by an advanced built-in web server, the M300Pro supports all the GNSS standards such RTCM, NTRIP, RINEX, NMEA. New and existing GNSS positioning infrastructures (GNSS Networks and CORS) will benefit of such plug-and-play architecture. Powered by RTK and E-RTK processing on-board for positioning and integrity monitoring, the M300Pro is designed for professionals engaged in high-precision positioning projects.

2.2 Technical specifications

Signal Tracking • 496 channels with simultaneously tracked Satellite signals - GPS: L1 C/A code, L1/L2 P code, L2C, L5 - BeiDou: B1, B2, B3(See Appendix A) - GLONASS: L1, L2 - Galileo: E1, E5-A, E5-B - QZSS: Reserved - SBAS: WAAS, EGNOS, MSAS, GAGAN	- Extended NMEA-0183 BDGGA, GPNTR, GPCDT, GPHPR • Observations ComNav binary, BINEX, RTCM3.X, compatible with major CORS software (VRS, FKP and iMax). Data logging • Loop recording data function
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• Advanced multipath mitigation technology • Low noise carrier phase measurements with <1 mm precision in a 1 Hz bandwidth • High precision multiple correlates for GNSS pseudo range measurements • Signal Noise Ratios reported in dB-Hz Time Precision • GPS+Glonass+Beidou 10ns Positioning Specifications • Post Processing Static - Horizontal: 2 mm + 0.5ppm RMS - Vertical: 4 mm +0.5 ppm RMS • Single Baseline RTK(<30KM) - Horizontal: 8 mm + 1 ppm RMS - Vertical: 15 mm + 1 ppm RMS • Network RTK - Horizontal: 8 mm +0.5 ppm RMS - Vertical: 15 mm + 0.5 ppm RMS • E-RTK - Horizontal: 0.2 m +1 ppm RMS - Vertical: 0.4 m + 1 ppm RMS • DGPS : 0.5 m 3D RMS • SBAS : 1 m 3D RMS • Standalone : 1.5 m 3D RMS Communications • 3 Lemo Ports - 1 Lemo port(2 pin): power supply and battery charging - 2 Lemo ports(7 pin): USB UART port, system debugging and static data download; RS485 Protocol - configuring and connecting with external	supports long time record • Data logging frequency, maximum 50Hz • Storage capacity - 32 GB internal memory - 1TB External memory maximum • File format - Rinex 3. X or 2.X or ComNav binary format • File log session - Days or hours can be set by user • Data transfer - FTP access download directly Physical • Size (L x W x H): 202mm x 163mm x 75mm • Weight: 2.4 kg • Case: Rugged and light high performance metal Environmental • Operating temperature: -40°C to +80°C • Storage temperature: -45°C to +85°C • Humidity: 100% no condensation • Water proof and dust proof: IP67, survives the temporary immersion to a depth of 1 m • Shock: rugged aluminum case plus plastic ring seal, designed to survive a 1m drop onto concrete Electrical • Power consumption: 3.5W • External power input:9.5-15 VDC, with over-voltage protection • Integrated 17.6Ah Li-ion battery, 30
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device(meteorological sensor/barograph/inclinometer) • 1 DB9 male port - Standard RS232 protocol • 1 Standard USB port, - Connect with external storage card • 1 RJ45 LAN Ethernet port (10/100M Bit) supports protocols HTTP, HTTPS, TCP/IP, UDP, FTP, NTRIP • 3 SMA male connectors - 1 PPS output - Event input - Reserve for WLAN and Bluetooth • 2 TNC connectors - GNSS Antenna connector - Frequency-marker oscillator input connector Data Format • Correction data I/O: - RTCM 2.x, 3.x, RTCM3.2, MSM4, MSM5, CMR (GPS only), CMR+(GPS only) • Positioning data outputs: - ASCII: NMEA-0183 GSV, RMC, HDT, VHD, GGA, GSA, ZDA, VTG, GST, PJK, PTNL	hours continuously working Antenna • AT330 GNSS Geodetic Antenna • AT500 GNSS Choke Ring Antenna User Interface • Button and front LCD panel - 5 functional buttons on the left and 3 buttons on the right - LCD panel shows the status and setting • ComNav M300 Pro Web Server Specifications subject to change without notice.
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2.3 M300Pro Basic Kit

The table below provides an overview of items included in the M300Pro basic Kit.

Items	Picture
M300Pro GNSS Receiver	 A black and silver M300Pro GNSS Receiver with a small LCD screen and several buttons on the front panel.
Charger	 A black power adapter with a coiled black cable and a small connector at the end.
Network Cable	 A coiled white Ethernet network cable with RJ45 connectors on both ends.
GNSS Antenna Cable/ Special cable can be provided if you require	 A coiled black cable with two different connectors at each end, one of which appears to be a specialized antenna connector.
Transport Case	 A black hard-shell transport case with a handle. The interior is lined with foam and contains the GNSS receiver, a coiled antenna cable, and other accessories.
Lemo to USB cable	 A black cable with a Lemo connector on one end and a standard USB-A connector on the other.

Double Female DB9 Serial
Port Cable



ComNav also supply various types of antennas, for additional introduction please see [chapter 3.1.3](#).

3. Setting up the receiver

3.1 Guidelines

Please follow these guidelines when setting up your receiver.

3.1.1 Environmental requirements

To keep the receiver with a reliable performance, it is better to use the receiver in safe environmental conditions.

- Operating temperature: -40°C to +80°C
- Storage temperature: -45°C to +85°C
- Out of corrosive fluids and gases

3.1.2 Power supply

The M300Pro has a built-in internal Lithium battery, which can work for up to 16 hours. If you set M300Pro as a permanent site (reference station), a uninterruptible power supply (UPS) is recommended to protect receivers from power surges and power outage.

3.1.3 Mounting the antenna

Choosing the optimal location for the GNSS antenna is critical to the performance quality of your M300Pro receiver. Poor or incorrect placement of the antenna may impact the accuracy and reliability of observation, resulting a degraded performance of normal operation.

Follow these guidelines to select the antenna location:

- If the application is mobile / kinematic, place the antenna on a flat surface

along the centerline of the vehicle.

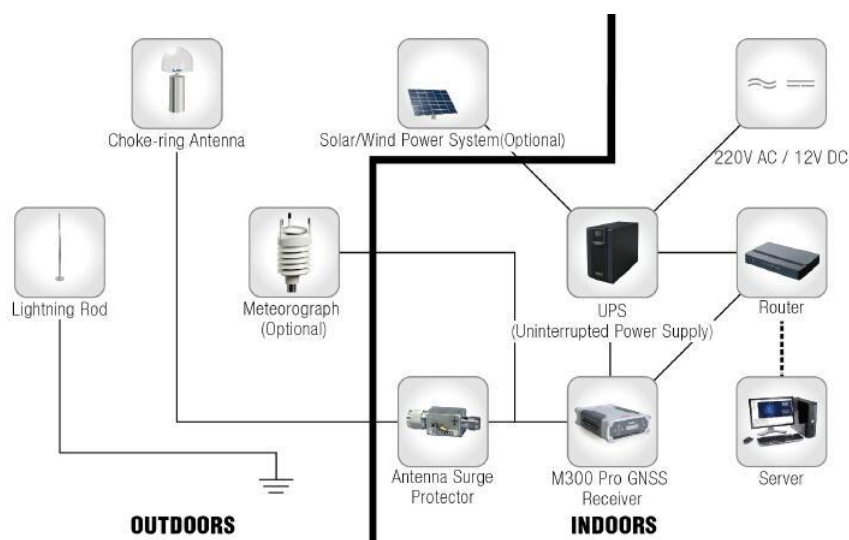
- Choose an area with open view to the sky and far from metallic objects.
- Avoid areas with high vibration, excessive heat, electrical interference or strong magnetic fields.
- Avoid mounting the antenna close to electrical cables, metal masts and generally close to other antennas

AT-series antenna is recommended, if use other kinds of antenna please check the specifications with the ComNav support team.

Antenna type	AT330	AT350	AT500	AT500 3D
Description	Geodetic, Mobile survey, machine control	Mini chock ring GNSS antenna, mainly used as monitoring	Chock ring antenna, high accuracy geodetic antenna, CORS station antenna	Chock ring antenna, very high accuracy, national CORS reference station antenna
Picture				

3.1.4 M300Pro connection view

M300Pro is mainly used as a CORS reference station, the below figure explains the connection of each equipment. The GNSS antenna and lighting rod are fixed on the ground or top of building, inner devices including the M300Pro, the power supply and internet, are settled in the office.



3.2 Front Panel

You can do some basic settings for receivers including IP, port, storage mode and check the receiver status, such as the version, SN number, current position, residual memory and power etc.



3.2.1 Button functions

①~④ Direction button

Switch the page of display screen and modify settings

⑤ Enter button

Press it to confirm your configuration

⑥ Display Screen

Display the basic configuration information

⑦ Reset button(Reserved)

Make the receiver to recover to factory default settings.

⑧ Power button

Turn on or off the receiver

- Receiver is turned on automatically when connecting with the power charger. Without the power supply, press the power button to turn on the receiver with screen display **【M300 pro System Init...】** .
- To turn off the receiver, please hold power button down for 3 seconds, the display shows **【Power Off?】**, press **Enter** button to select Yes, press **Esc** button to select No.

⑨ Cancel button

Cancel the modification setting.

3.2.2 Status screens

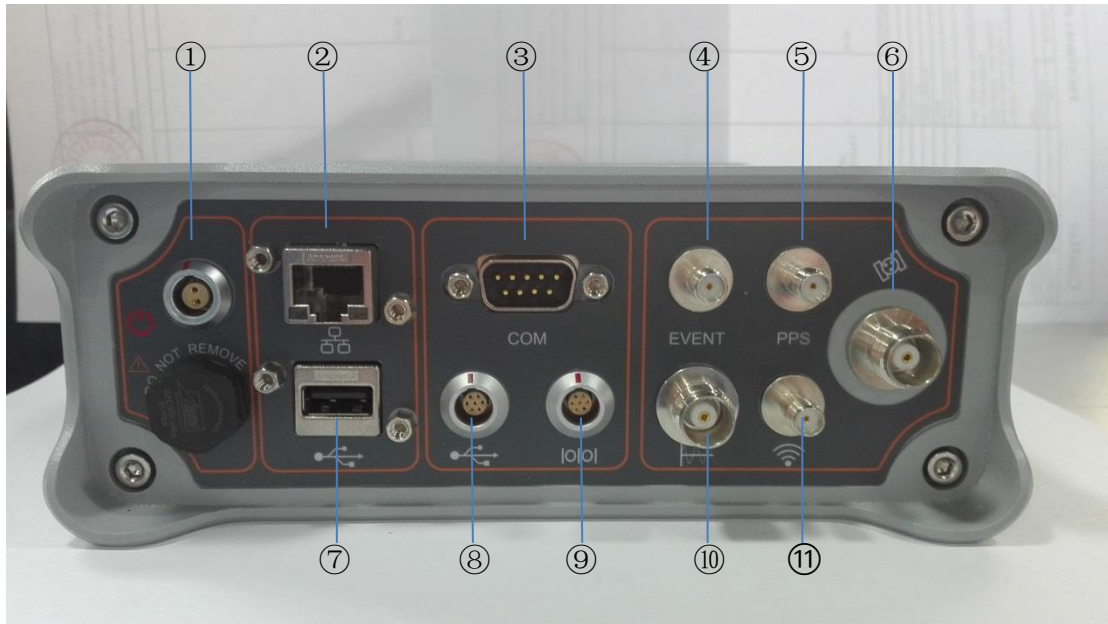
To review and change the receiver's settings, press direction button to display status screens. There are 13 status screens showing the following information:

- Home screen: the number of satellites, the battery level and internal storage. In power-saving mode, the display screen will go dark If non-operation for a short time. Press any button to reactivate the screen.
- Latitude and longitude
- PDOP, and height values
- Receiver serial number
- Receiver version
- Expired date
- Configurable items
- Receiver local IP address
- Receiver default gateway
- Current subnet mask
- Auto IP
- HTTP, FTP port
- Storage setting and format SD
- Default and reset settings

To change the above settings, using left and right buttons to move the cursor, up and down buttons to change the setting.

3.3 Rear connectors

All connectors are located on the back of the receiver, you can connect other external devices through these connectors.



① Power Supply and Battery Charge Port

Port for external power supply, and internal Battery charging of the receiver

② Ethernet Port

Connect to internet

③ Com1 Port of Main Board (RS232 port)

Control the mainboard and request data from this port

④ EVENT Signal Connector

Access Event signal trigger and can be configured through a web browser

⑤ PPS Connector

Output PPS signal and can be configured through the web browser

⑥ GNSS Antenna Connector

Connect to the GNSS antenna

⑦ USB

Connect to external USB drive for external data logging

⑧ Lemo to USB Data Download Connector

Connect with PC to download raw data from the internal memory

⑨ Com2 Port of Main Board

Connect with Meteorological sensor, RS-485 communication protocol; receive and save meteorological data in RINEX format

⑩ 10 MHz frequency input

10MHz external frequency input, Used for precision timing

⑪ WIFI Antenna connector(Reserved)

4. Receiver configuration through a Web Browser

M300Pro has the advanced built-in web server, you can access the web setting page and do configurations remotely. This section describes how to change receiver's settings through a web server.

4.1 Login the configuration page of M300Pro

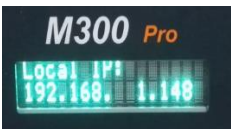
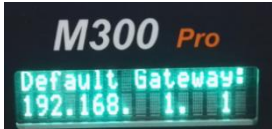
The M300Pro receiver can connect to an Ethernet network through its Ethernet port. It means that you can configure and monitor the receiver's settings without serial cable connection.

1. Firstly, make sure that the M300Pro and your computer are within the same Local Area Network (LAN). Then change your receiver' IP address through the front panel based on your office computer. For example IP address in your computer:

```
Ethernet adapter Local Area Connection:

Connection-specific DNS Suffix . : 
Link-local IPv6 Address . . . . . : fe80::45d1:8f50:7c4e:f827%12
IPv4 Address. . . . . : 192.168.1.58
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.1.1
```

IP address of M300Pro:

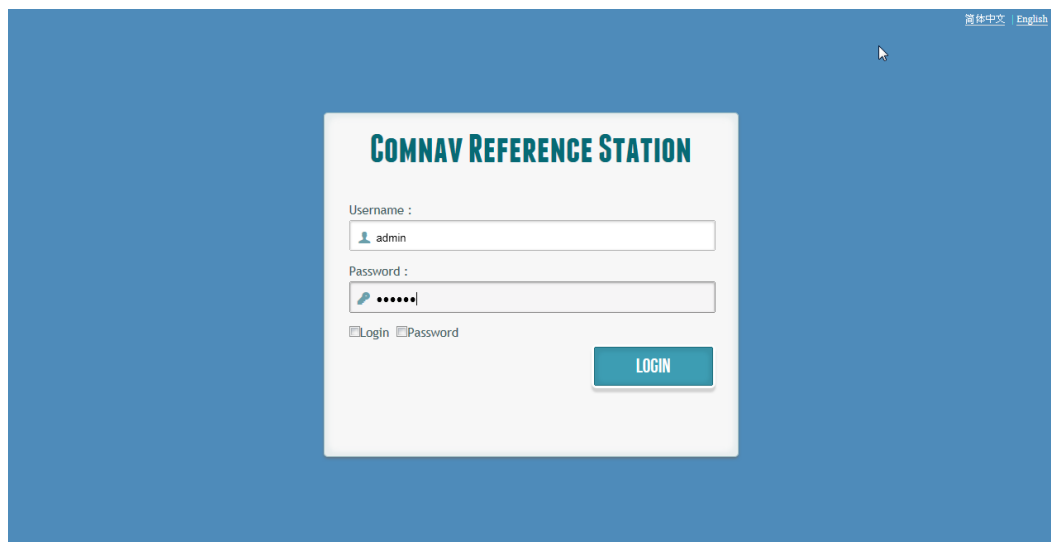
			
---	---	--	---

2. Enter the IP address and HTTP port of the receiver into the address bar, you will access the configuration page of M300Pro. The default setting for the HTTP port is 80, which is the standard port for web servers. However, HTTP port need to be changed in some cases.

For example, using default port 80: <http://192.168.1.148>

If your receiver has a port other than 80, you must enter the IP address followed by

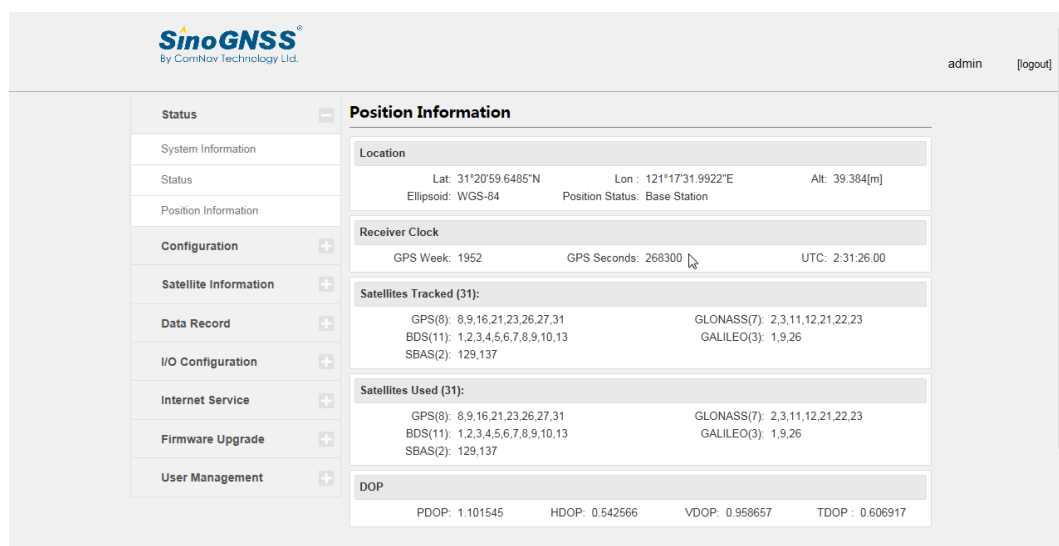
port number. As example showed above: <http://192.168.1.148:8000>



3. Enter the default login settings to access the main page:

- Username: admin
- Password: admin

After accessing the main page, configuration menus are listed on the left, and receiver's settings on the right. Each configuration menu will be demonstrated in the following sections.



4.2 Checking the receiver status

Click **Status** -> **System Information**, **Status** or **Position information**, you can check the corresponding receiver status, including:

- System information: IP address, SN, Firmware Version, Web Version etc.

- Status: work mode (Base, Rover or Single point positioning), Disk Capacity etc.
- Position Information: GNSS constellation system tracked etc.

System Information	
Receiver Type:	M300PRO
Serial Number:	S4904712111291
MAC:	70:b3:d5:b1:2a
Ethernet IP:	192.168.2.205
Hardware Version:	Pluto001
Firmware Version:	PRO170520H
Board Version:	3.23T-2.052-1
Web Version:	web8.0
Expire Date:	2050-01-01

Status		
Work Mode : Base		
Data Link : None		
Temperature : 45°C		
Power Type : Built-in power supply		
Remaining Power Remaining 99% Power 	Internal Memory Used 12 M Free 7412 M 	External Memory Used 0 M Free 0 M 

4.3 Receiver Configuration

Use **configuration** menu to do basic configurations of your receiver.

4.3.1 General Config

There are 2 work modes you can choose:

- Base station: configure the receiver as a Base station, you can change its settings in *Base Setup* menu
- Rover: setting the receiver as a rover, and *Base Setup* menu is not available for rover mode.

Also, active the external input/output as 1pps, please enable Event Marker and External clock only when the external clock or events are connected.

General Config	
Registration	
Serial Number: S4904712111291	
Expire Date: 2050-01-01	
Code:	Registration
Mode Setting	
Work Mode:	Base
Data Link:	None
1PPS:	☒
Event In:	☐
External clock:	☐
Enter Cancel	

4.3.2 Antenna Setup

Enter the proper values of marker name and antenna height (height limited 0 to 6.5535m), select the antenna type and measurement method.

Antenna Setup

Marker Name:

Antenna Type:

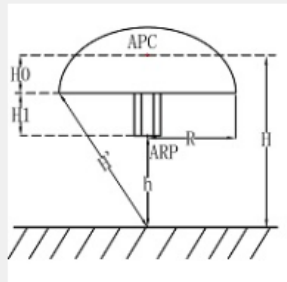
Antenna Type

Antenna Height: [m]

Measurement M.:

Enter

Cancel



4.3.3 Base setup

After setting M300Pro in the base mode, the *base setup* menu is available for you. However, you can change the base setup only when it's on **manually start station** mode with **stopped** status.

To configure the base station:

- Change base start mode from **automatically to manually** -> press **enter**, ensure that Base Start Mode is on manual
- Press **Stop** to restart editing
- Then input coordinates of known sites, or press **Get Position** button to get coordinates of the current position
- Set proper base station ID based on your project planning
- Change base start mode from manually to Automatically, then click **Start** to active configuration

Base Setup

Lon: ° ' " ☒ E ☐ W
 Lat: ° ' " ☒ N ☐ S
 Alt: [m]

Base Station ID:

PDOP Value:

Status:

Base Start Mode: ▼

4.3.4 Satellite Tracking

Select smooth pseudorange, setup the mask angle and select the types of the tracking signal based on surveying requirements.

Satellite Tracking

Smooth Pseudorange : ▼ Mask Angle : degree

Type	on-off	Signal	☒
GPS	ON ▼	L1-CA	☒
		L2-C/P	☒
		L5	☒
GLONASS	ON ▼	G1P	☒
		G2P	☒
BDS	ON ▼	B1	☒
		B2	☒
		B3	☒
GAL	ON ▼	E1	☒
		E5-A	☒
		E5-B	☒

4.3.5 Receiver Utility

In this section, you can control M300Pro remotely, including:

- Clean EPH: delete ephemeris information saved in the receiver
- Reboot: Restart the receiver
- Power Off: Turn off the receiver
- Factory Default: recover the receiver to factory default setting

Receiver Utility

Clean EPH

Reboot Power Off

Factory Default

4.3.6 Running Log

Download user/system log to local;

- User Log contains power on/off, search satellite completed, TCP changed, data record changed, email alert, OEM status
- System Log contains system warning and system info.

Log setting

Download Log

Download User Log Download System Log

☐ User Log Setting

☒ Power on
☒ Power off
☒ Search satellite completed
☒ TCP changed
☒ Data Record changed
☒ Email alert
☒ OEM status

Enter

4.3.7 Default Language

Two language options are available: Chinese/English

Default Language

Default Language: English

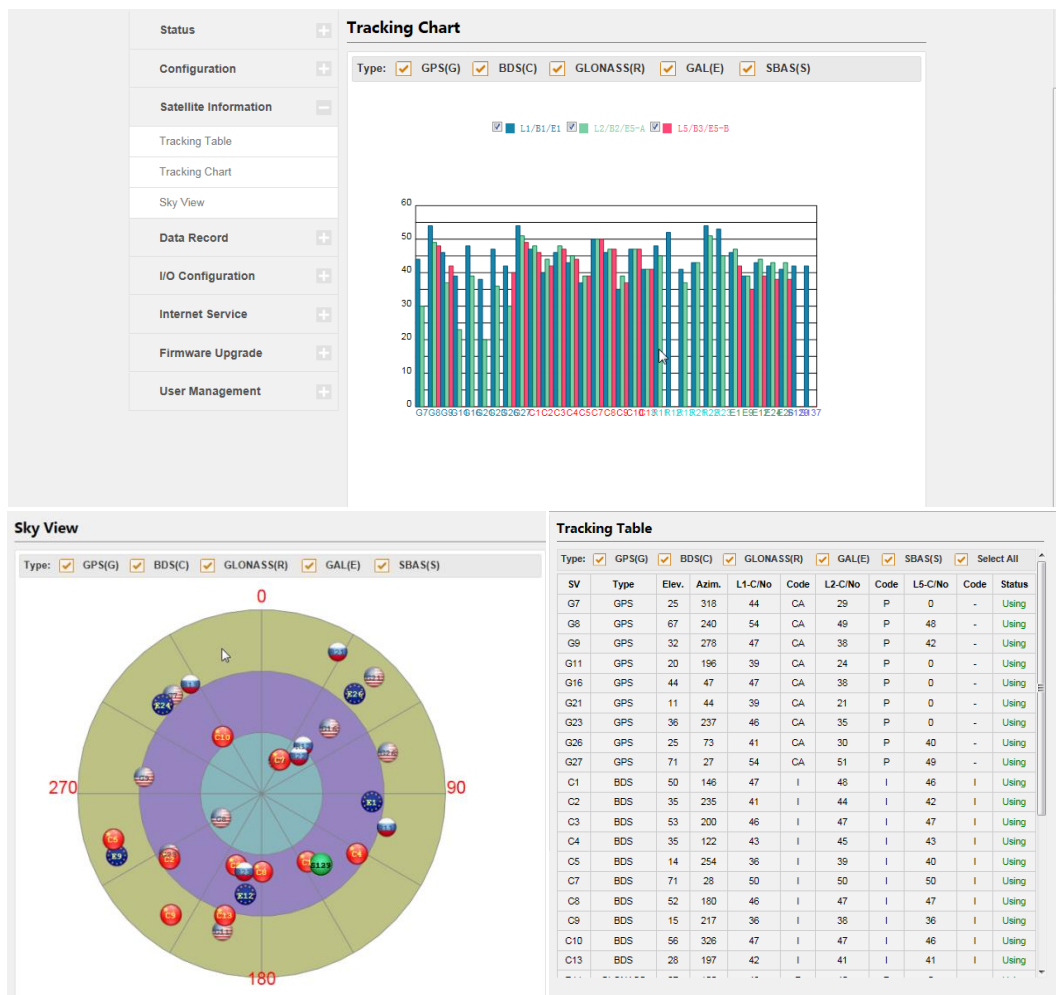
Enter Cancel

4.4 Satellite Information

Satellite information menus provide you an overall view of satellite tracking details,

including Tracking Table, Tracking Chart and Sky View. You can enable/disable GPS, BDS, GLONASS, GAL and SBAS (WAAS/EGNOS/MSAS) satellites' display without stopping tracking status.

These displays refresh every 5 seconds, always keeping satellites information up to date.



4.5 Data Record

Use the *data record* menu to set the storage mode (internal/external) for surveying data, and download data to your office computer, especially for the remote receiver control.

4.5.1 Recording Config

Information is showed below:

- Internal Memory: 32 GB, 1 Hz sample frequency could be used for 8-month record.

- External Memory: If set as external memory without inserting a USB drive, it will be prompted with a message that “please connect to an external memory”.
- Show record name, status, data format, record mode and operation in table, click **Setting** button to configure the data recording settings.

CAUTION - Please be careful to click the **Format Disk** button. It will empty all your data files in M300Pro.

Recording Config

Location	Capacity	Free Storage	Operation
Internal Memory	7424M	7412M	Format Disk
External Memory	0M	0M	Format Disk

NO.	Record Name	Status	Data Format	Mode	Operation
1	m1	Unrecorded	RINEX2.10	Manual Recording	Setting
2	Roy	Unrecorded	CNB	Manual Recording	Setting
3	JINIXN	Unrecorded	CNB	Manual Recording	Setting
4		Unrecorded	CNB	Manual Recording	Setting
5	m2	Unrecorded	RINEX2.10	Manual Recording	Setting

NOTE : System reserved the 400M storage space(Internal Memory)

To configure the data recording settings, please make sure that recording mode is on **manual** with **unrecorded status**.

Setting options are showed below:

- Record Name: Support only number or letter
- Storage Option: Choose storage location to internal memory or external memory
- Sample Interval: Choose sample frequency, support 0.05\0.1\0.2\0.5\1\2\5\15\30\60 S.
- File Split: Choose file split, support every 5\10\15\20\30 minutes or 1\2\4\24 hours to save a file. If you select 24 as file split, it will create two data file when it occur to 24 o'clock (UTC Time). One is from start time to 24 o'clock, another is from 0 o'clock to end time.
- Data Format: Support CNB\BINEX\Rinex3.02\Rinex2.10(excluding BeiDou)
- Loop: When storage is full, **Yes** means delete earliest data and store continually, **No** means stop recording
- Storage Space: Separate storage space in internal memory\external memory
- Mode: Support manually and automatically recording mode.

Disk Record Setting
✕

Status: Unrecorded

Record Name:

Storage Option: Internal Memory External Memory

Sample Interval: [S.]

File Split:

Data Format: CNB RINEX2.10 RINEX3.02 BINEX

Data Compres... ☐

Loop: Yes No

Storage Space: MB

Mode:

Enter
Cancel

4.5.2 Data Download

You can download internal data files through a web server, USB drive or FTP

1. Data download through a web server

Firstly, select data source (Internal or external memory), folder name, file type (CNB\BINEX \Rinex3.02\Rinex2.10) and date. Then click **Get Data**, you will see data files meet the demand. Click **Download** icon to download the data file you need, or click **Delete** icon to delete this file.

Data Download

Data Source: Internal Memory External Memory

Folder:

File Type: CNB RINEX2.10 RINEX3.02 BINEX

Select Date :

Get Data

Check	Itme	File Name	Size	Data	
☐	1	1611580351.cnb	821.71KB	Download	Delete
☐	2	1611580356.cnb	923.94KB	Download	Delete
☐	3	1611580401.cnb	887.73KB	Download	Delete

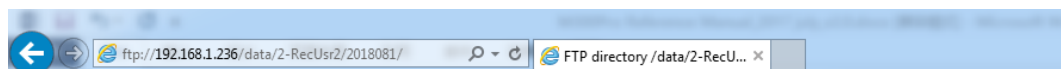
5 Rows
All
Delete
First
Last
Next
End
Jump
1
/1Pages

2. Data download through a USB port

Use Lemo to USB cable to connect M300Pro with your office computer, internal memory will be identified automatically as a removable disk. Double click to open disk, and copy raw data files out.

3. Data download through FTP

Input FTP address in your brewer, for example: ftp://192.168.1.236. Then download your files.



FTP directory /data/2-RecUstr2/2018081/ at 192.168.1.236

To view this FTP site in File Explorer: press Alt, click View, and then click Open FTP Site in File Explorer.

[Up to higher level directory](#)

03/22/2018 01:00AM	9, 289, 412	1234560810000.cnf
03/22/2018 01:59AM	8, 542, 916	1234560810100.cnf
03/22/2018 02:59AM	8, 771, 732	1234560810200.cnf
03/22/2018 04:00AM	9, 442, 748	1234560810300.cnf
03/22/2018 04:59AM	9, 275, 462	1234560810400.cnf
03/22/2018 05:59AM	9, 200, 924	1234560810500.cnf
03/22/2018 06:59AM	9, 027, 940	1234560810600.cnf
03/22/2018 07:59AM	9, 158, 756	1234560810700.cnf
03/22/2018 08:59AM	9, 345, 724	1234560810800.cnf
03/22/2018 09:59AM	8, 620, 388	1234560810900.cnf
03/22/2018 10:59AM	8, 658, 892	1234560811000.cnf
03/22/2018 11:59AM	8, 797, 396	1234560811100.cnf
03/22/2018 12:59PM	9, 220, 828	1234560811200.cnf
03/22/2018 01:59PM	8, 639, 032	1234560811300.cnf
03/22/2018 02:59PM	8, 688, 100	1234560811400.cnf
03/22/2018 03:59PM	9, 126, 044	1234560811500.cnf
03/22/2018 04:59PM	8, 558, 236	1234560811600.cnf
03/22/2018 05:59PM	8, 739, 068	1234560811700.cnf
03/22/2018 06:59PM	8, 994, 428	1234560811800.cnf
03/22/2018 07:59PM	9, 005, 884	1234560811900.cnf
03/22/2018 08:59PM	9, 037, 036	1234560812000.cnf
03/22/2018 09:59PM	8, 675, 656	1234560812100.cnf
03/22/2018 10:59PM	8, 637, 932	1234560812200.cnf
03/23/2018 12:00AM	8, 984, 564	1234560812300.cnf

4.6 I/O Configuration

There are two ways to transfer raw data from the M300Pro receiver to your office computer, LAN ports or serial ports. Serial ports support RS232 (com1, DB9 port) and RS485 (com2, Lemo port) protocol; the LAN ports support TCP and Ntrip protocol.

Port Summary				
Type	Port	Data Flow	Operation	
COM	LEMO	Raw Observation Data	Setting	
COM	COM	Correction Data	Setting	
TCP/IP 1	20134	Correction Data	Setting	
TCP/IP 2	1121	BINEX	Setting	
TCP/IP 3	1122	Navigation Data	Setting	
TCP/IP 4	1123	Navigation Data	Setting	
TCP/IP 5	1124	Navigation Data	Setting	
NTRIP Server	-	Correction Data	Setting	
NTRIP Client	-	-	Setting	
NTRIP Caster 1	20135	-	Setting	

4.6.1 Serial Port Config

The data will output from the Lemo or COM port of the receiver when you complete the serial port settings. Select proper baud rate and data flow, and click **Enter**, the corresponding serial port will output data. The format of Data flow includes:

- Raw observation data: ComNav binary format raw data
- Correction data: format from RTCM
- Navigation data: GPGGA and GPZDA message
- Ephemeris data: Raw observation ephemeris data
- AGNSS data: Assisted GNSS data
- Meteo data: the data input from the meteorological sensor.

Port Configuration

LEMO

Serial Port

Baud Rate : 115200 Odd/Even : ODD

Data Flow

Raw Observation Data

Enter Cancel

Port Configuration

COM

Serial Port

Baud Rate : 115200 Odd/Even : None

Data Flow

☐ Raw Observation Data

☒ Correction Data RTCM3.0

1004: OFF 1005: OFF 1012: 1s 1033: 1s

1006: OFF 1007: OFF 1019: OFF 1020: QSF

1104: OFF

☐ Navigation Data

☐ Ephemeris Data

☐ AGNSS Data

☐ Meteo Data

Enter Cancel

COM--- COM1, RS232 (DB9 port), Lemo—COM2, RS485 (Lemo port)

4.6.2 TCP/IP Config

Dataflow can be transferred via the internet by using TCP Server or TCP clients.

TCP Server: Any user can receive the data through TCP Clients protocol

TCP Clients: Send data to the specified IP address and port

For data flow:

- Correction data: Choose the format and the corresponding message
- Navigation data: GPGGA message
- Raw observation data: ComNav binary format raw data
- Meteo data: the data input from the meteorological sensor.
- Ephemeris data: Raw observation data compatible with Novatel
- BINEX: 0x00, 0x01-01, 0x01-02, 0x01-05, 0x7d-00, 0x7e-00, 0x7f-05
- Raw observation data 2: Contains AGNSS data, meteo data and network data.

Port Configuration

TCP/IP 1 20134

TCP Server TCP 192.168.2.205 : 20134

☐ Client

☒ Active

☐ Encrypt

Max Client Count: 99 (1~100)

Data Flow Correction Data **RTCM3.2**

1005: ON	1007: ON	1033: ON	1074: ON
1084: ON	1124: ON	0063: OFF	1006: ON
1019: ON	1020: ON	1045: OFF	1046: OFF
1094: OFF	1095: OFF	4011: OFF	1230: OFF

Enter Cancel

Port Configuration

TCP/IP 1 20134

TCP Client TCP 192.168.2.205

☒ Client

☒ Active

Remote IP: 123.31.47.28 : 1007

Data Flow Correction Data **RTCM3.2**

1005: ON	1007: ON	1033: ON	1074: ON
1084: ON	1124: ON	0063: OFF	1006: ON
1019: ON	1020: ON	1045: OFF	1046: OFF
1094: OFF	1095: OFF	4011: OFF	1230: OFF

Enter Cancel

4.6.2.1 Direct connection model

The M300Pro provides a more machine friendly method for users to check and configure receivers by TCP/IP. This function only can be used in TCP/IP1.

- Enable **Active** and **Client** button
- Enter TCP server port
- Select Direct connection in data flow
- Click **Enter** button

Then connect it by TCP Client in CRU software.

Connection Settings

☐ Serial Port COM Baud Rate 115200

☒ TCP Client Host 211.144.120.104 Port 8001

☐ Data File

256 B/s

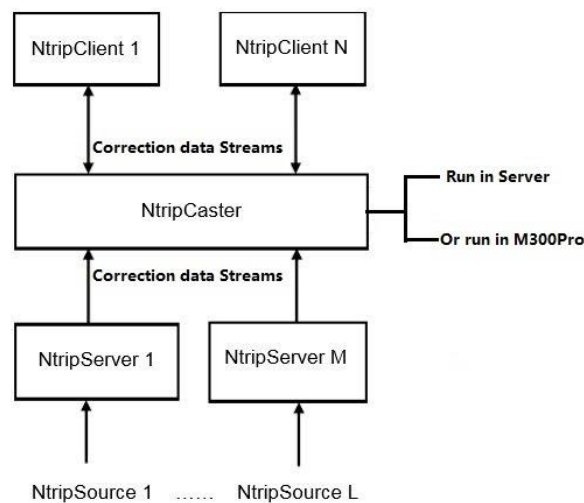
Setup Ok Cancel

For programmatic commands, Please refer to **5.1 Frequently used commands**.

4.6.3 NtripConfig

The M300Pro can support NtripClient, NtripServer and NtripCaster protocols. You can acquire correction data from CORS through Ntrip Client protocol if setting the receiver as a rover. It is also very easy to transmit correction data as the base station by using NtripServer and NtripCaster protocol.

For a base station, you can broadcast correction data by using NtripServer protocol or the data forward software (supporting NtripCaster protocol, such as SinoGNSS's CDC+ software) running in the server. If you have a static IP address, you can use NtripServer and NtripCaster of M300Pro simultaneously to create a single reference station, this mode does not need any software to support, and is very convenient for using.



*Tips: You need to uncheck all **Active** (Client, Server and Caster), and click **Enter** button to disconnect them before you configure this interface.*

1. Ntrip Clients

Before setting the NtripClient, you should configure the receiver as Rover mode.

- Enable **Active** button
- Enter IP address, Port, User name and Password of CORS
- Click Get List to acquire the Mount Point list
- Choose one of mount point and click **Enter** button, you will receive correction data from CORS.

Port Configuration

NTRIP Client ▼

NTRIP Client

Status: Disconnect

Active: ☒

Ntrip Version: NTRIPv1.0 ▼

Eagle Mode: ☐

NtripCaster IP: 211.144.120.104 : 8888

User: ssss

Password: ●●●●

Mount Point: BASEJ/BASEJ/GNSS/CDK ▼ Get List

Enter Cancel

Click **position information** in **Status menu** to check the rover's status, and position status should be Fixed.

Position Information

Location		
Lat: 31°20'59.6911"N	Lon: 121°17'32.041"E	Alt: 40.117[m]
Ellipsoid: WGS-84	Position Status: Fixed	
Receiver Clock		
GPS Week: 1952	GPS Seconds: 278500	UTC: 5:24:38.00
Satellites Tracked (31):		
GPS(9): 1,7,8,9,11,16,27,28,30	GLONASS(6): 12,13,14,22,23,24	
BDS(10): 1,2,3,4,5,7,8,10,12,13	GALILEO(4): 1,11,12,24	
SBAS(2): 129,137		
Satellites Used (31):		
GPS(9): 1,7,8,9,11,16,27,28,30	GLONASS(6): 12,13,14,22,23,24	
BDS(10): 1,2,3,4,5,7,8,10,12,13	GALILEO(4): 1,11,12,24	
SBAS(2): 129,137		
DOP		
PDOP: 1.006640	HDOP: 0.610055	VDOP: 0.800722 TDOP: 0.567838

2. Ntrip Server

Before setting the Ntrip Server, you should configure the receiver as *Base mode*, also select correction data format as RTCM3.0 or RTCM3.2 (recommended). Then start Ntrip Server configuration:

- Enable **Active** button

- Enter the server IP address as NtripCaster address and NtripCaster port. As the example showed above, our company's server is under running: 211.144.120.104: 8888
- Set custom username and password (Username and password of our server can be anything you choose).
- Mount point: Ntrip caster mount point
- Correction: Choose the format and the corresponding message
- Click **Enter** button, you will transmit the correction data to server.

Port Configuration

NTRIP Server ▼

NTRIP Server

Status: Disconnect

Active: ☒

Eagle Mode: ☐

Ntrip Version: NTRIPv1.0 ▼

NtripCaster IP: 211.144.120.104 : 8888

User: comnav

Password: ●●●●●●

Mount Point: WDXW

Correction RTCM3.0 ▼

1004: ON ▼ 1005: ON ▼ 1012: ON ▼ 1033: ON ▼

1006: ON ▼ 1007: ON ▼ 1019: ON ▼ 1020: ON ▼

1104: ON ▼

Enter Cancel

3. Ntrip Caster

M300Pro can also work as a single reference station and send correction data through NtripCaster protocol. You need to configure both NtripServer and NtripCaster when you use this protocol. The setting is shown below:

1. Configuration of NtripServer:

- Enable Active button of NtripServer
- Set the NtripCaster address and NrtipCaster port; this IP address is the same as M300Pro IP address, and the port should be mapped by router.
- Enter custom username and password
- Access point: the Ntrip caster mount point

Press **Enter** to save the configuration

2. Configuration of NtripCaster:

Enable **Active** button of NtripCaster

- Enter port, this port should be same with NtripServer
- Enter Password, this password should be also same with NtripServer
- Press **Enter** to save configuration

All configurations of NtripCaster Protocol are shown above, then you can use a rover to get correction data.

The screenshot shows a 'Port Configuration' window with a dropdown menu set to 'NTRIP Caster 1'. Below this, the 'NTRIP Caster' section contains the following fields:

- Status: Disconnect
- Active: ☒ (The 'Active' label is highlighted with a dashed border)
- NtripCaster Port: 20135
- User: comnav
- Password: (masked with dots)

At the bottom, there are 'Enter' and 'Cancel' buttons.

4.7 Internet Service

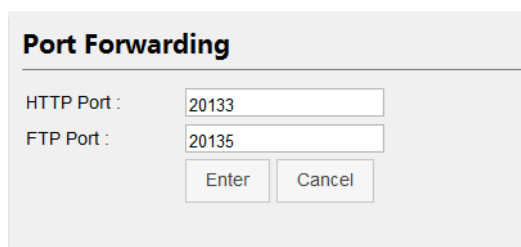
4.7.1 Internet Config

Use the *Ethernet Config* menu to set IP address, subnet mask, default gateway, and the Port Forwarding to set HTTP port and FTP port of M300Pro. After changing those settings, you need to change your computer's IP address and relogin configuration webpage based on the new IP address.

The screenshot shows an 'Ethernet Config' window. The 'IP Setting' dropdown is set to 'Static IP'. The configuration fields are as follows:

- IP Address: 192 . 168 . 2 . 205
- Subnet Mask: 255 . 255 . 255 . 0
- Default Gateway: 192 . 168 . 2 . 1
- DNS1: 192 . 168 . 2 . 1
- DNS2: 0 . 0 . 0 . 0

At the bottom, there are 'Enter' and 'Cancel' buttons.



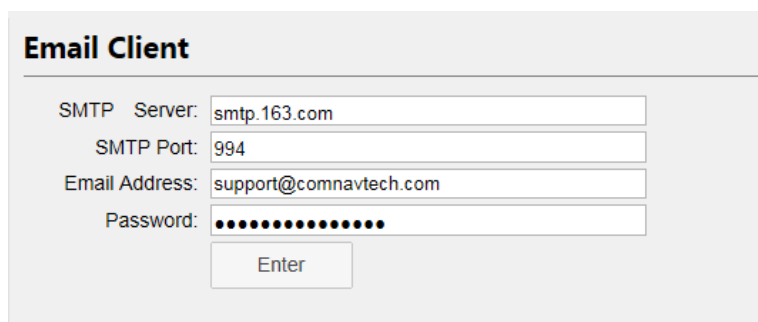
Port Forwarding

HTTP Port :

FTP Port :

4.7.2 Email Client

Before setting a Email Client, open your mail client SMTP authorization firstly, then set SMTP Server, SMTP Port, Email Address and password. Enable **Enter** button to save configuration.



Email Client

SMTP Server:

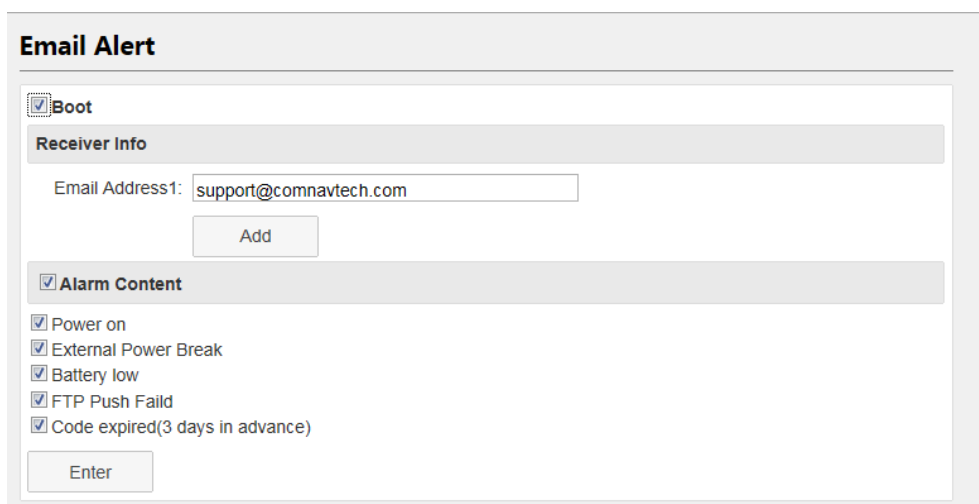
SMTP Port:

Email Address:

Password:

4.7.3 Email Alert

After set the Email Client, you can add no more than 3 email addresses to receive M300Pro's alarm, including Power on/External Power Break/Battery low/FTP Push Failed/Code expired.



Email Alert

☒ **Boot**

Receiver Info

Email Address1:

☒ **Alarm Content**

☒ Power on

☒ External Power Break

☒ Battery low

☒ FTP Push Failed

☒ Code expired(3 days in advance)

```
[ALERT] M300Pro-Receiver@S4904712111291: Boot at 2018-03-22 10:31:02.
```

```
[ALERT] M300Pro-Receiver@S4904712111291: External power supply was disconnected at 2018-03-22 10:31:02.
```

4.8 Firmware Update

You can update the system firmware, board firmware and front panel firmware in this menu.

Select system, board or front panel upgrade according to your demand, then click **Browse** to select the latest firmware version. Click **Install**, a progress bar shows 0 to 100% and status will be "Not allowed to do other operations during the upgrade". When completing firmware update, the receiver will restart automatically and information prompted below:

System Firmware Information

Firmware Version: PRO171114P

System Upgrade

Firmware Path:

Status:

Firmware Upgrade

System Firmware Information

Firmware Version: PRO171114E

System Upgrade

Firmware Path:

Status: The firmware is being upgraded, please wait... ..

70%

Not allowed to do other operations during the upgrade

4.9 User Management

Use *user management menu* to add, delete users or edit limits of authority.

User Management					
Add User					
Name	Limits of Authority	Status	Operation		
admin	Administrator	Online	Delete	Edit	
guest	Ordinary User	Offline	Delete	Edit	

Click **Add User** button, enter the name, password, and choose limits of authority, then click **Enter**, you will add a user successfully. The maximum number of user is 100.

User Management

Name:

Password:

Limits of Authority:

5. Programmatic Interface

This section describes a method of controlling M300Pro receiver through programmatic commands. It provides a more machine friendly method for users to check and configure receivers, such as base/rover, NMEA data output. Please read these tips before sending commands to your M300Pro receiver.

- Select and send proper commands, all commands are case insensitive: Log version=LOG VERSION
- Press **Enter** button at the end of every command to check receivers' feedback information or input another command
- For More detailed programmatic commands, please refer to **ComNav OEM CARD REFERENCE MANUAL**

WARNING-These commands are only suitable for COM1. The COM2 and COM3 are connected to the web interface, please do not change the baud rate and the data output of these two ports.

5.1 Frequently used commands

● Check Version Information

log version // Version information about the board

```
<VERSION COM1 0 60.0 UNKNOWN 1869 200404.500 00000000 0000 1114
< 1< GPSCARD "S32030K708" "02801074" "CRDK-708AA-TTT-0" "2.20R-
2.032-1" "5.000" "2015/Aug/25" "17:27:16"
OK!
Command accepted! Port: COM1.
```

● Check Port Information

log com configa // Information of the port.

```
=====
Port| Baud |Parity|Databits|Stopbits|Handshake|Echo|Breaks|RxType|TxType|
Response|
=====
COM1|115200| 0| 8| 1| 0| 0| 1| 1| 1|
1|
COM2|921600| 0| 8| 1| 0| 0| 1| 1| 1|
1|
COM3|115200| 0| 8| 1| 0| 0| 1| 1| 1|
1|
COM4|115200| 0| 8| 1| 0| 0| 1| 1| 1|
1|
OK!
Command accepted! Port: COM1.
```

● Change the serial port baud rate

com com1 9600// Change the baud rate of com1 to 9600

● Check System Information

log sysconfiga //All the configuration of the system can be viewed by this command.

● Check the Output data Information

log loglista//View the output data information about all the ports.

```
<command>
log loglista
</command>
#LOGLISTA, COM1, 0, 60.0, UNKNOWN, 1869, 201015.800, 00000000, 0000, 1114:
COM2, RAWEPHEM, BINARY, ONCHANGED, 1.000,
COM2, BESTPOS, BINARY, ONTIME, 120.000,
COM2, BD2EPHEM, BINARY, ONCHANGED, 1.000,
COM2, RANGECP, BINARY, ONTIME, 1.000,
COM2, PSRDOP, BINARY, ONTIME, 2.000,
COM2, BD2RAWEPHEM, BINARY, ONCHANGED, 1.000,
COM2, GPSEPHEM, BINARY, ONCHANGED, 1.000,
COM2, GLOEPHEMERIS, BINARY, ONCHANGED, 1.000,
COM2, GLORAWEPHEM, BINARY, ONCHANGED, 1.000,
COM2, M925, BINARY, ONTIME, 10.000,
COM3, GPGGA, ABBASCII, ONTIME, 1.000,
COM3, GPGSA, ABBASCII, ONTIME, 1.000,
COM3, GPGSV, ABBASCII, ONTIME, 1.000,
COM3, GPZDA, ABBASCII, ONTIME, 1.000,
```

- **Lockout/unlockout satellite system**

Command	Description
(un)lockout bd2	(un)lockout Beidou system
(un)lockout gps	(un)lockout GPS system
(un)lockout GLONASS	(un)lockout Glonass
Unlockoutall	Unlock all GNSS system

- **NMEA data output**

The serial port is for COM1, you can output any NMEA data through COM1. For example:

```
log com1 gpgga ontime 1
```

```
log com1 gpgsv ontime 1
```

- **Raw data output**

```
Log com1 rawephembonchanged //Output GPSEphememeris
```

```
Log com1 glorawephembonchanged //Output Glonassephememeris
```

```
Log com1 bd2rawephemb onchanged //Output Beidouephemeris
```

```
Log com1 rangecmpbontime 1//Set com1 output cmp1 data, the frequency is 1Hz.
```

```
Unlogall com1
```

- **Base setup & Rover setup**

Output/Input correction data from serial port(com1).

For base(RTCM3):

```
fix auto
```

```
log com1 rtc1004b ontime1
```

```
log com1 rtc1005b ontime5
```

```
log com1 rtc1012b ontime1
```

```
log com1 rtc1104b ontime1
```

For rover:

```
interfacemode com1 auto auto on
```

5.2 Commands related to external devices

5.2.1 Event marker

The M300pro receiver supports the event marker function. Use the command

MARKCONTROL to control the event functions.

Format

MARKCONTROL signal switch [polarity] [timebias [timeguard]]

Description

At present, *Signal* only supports *mark1*, and *Switch* supports *ENABLE* and *DISABLE*. *Polarity* supports *POSITIVE* (positive pulse triggering) and *NEGATIVE* (negative pulse triggering). *Timebias* and *timeguard* are not available currently.

Example

```
markcontrol mark1 enable negative 0 0
```

After configuration, you can save and check settings via command *saveconfig* and *logsysconfig*.

Output Messages

Markpos and *marktime* provide the position and accurate time of the event moment. The two messages support binary and ASCII formats, so the messages provide formats *markposa*, *markposb*, *marktimea* and *marktimeb*.

Examples

```
logcom1 markposaonnew
```

```
logcom1 marktimeaonnew
```

Once you triggered the Event signal connector, it will output the event information from the serial port (com1). The event information (marktime&markpos) will record to the raw data once it be triggered if you enabled the event function.

```
#MARKPOSA,COM1,0,60.0,FINESTEERING,1869,266789.692,00000000,0000,1114;SOL_COMPUTED,FIXEDPOS,3
1.17449545000,121.38782552000,47.6820,0.0000,WGS84,0.1361,0.5493,1.3065,"0008",99.000,658.000
,26,26,26,26,0,0,0,25*3dd5ce03
#MARKTIMEA,COM1,0,60.0,FINESTEERING,1869,266789.692,00000000,0000,1114;1869,266789.692000000,
4.895151192e-04,8.062574872e-04,-17.000000001,VALID*8169c4d9
```

5.2.2 PPS output

The M300pro receiver supports the PPS output. Use the command *PPSCONTROL* to configure the PPS output.

Format

PPSCONTROL <switch><polarity><period><pulse-width>

Description

This command can be used to set the polarity, period and pulse-width of PPS output.

Parameters

<switch>: switch 'enable' or 'disable', the switch should be set to 'enable', and 'disable' is not allowed.

<polarity>: Select 'positive' if with a high level pulse, and 'negative' mode if a low level pulse.

<period>: fixed to 1 second

<pulse-width>: in microseconds, should be less than half of period.

Example

PPSCONTROL ENABLE POSITIVE 1 1000

5.2.3 10 MHz frequency input

This port is used for external clock input, and it can be an external atomic clock.

Command:

Set atom on/off // on: use the external atomic clock; off: use the internal atomic clock.

Appendix A: Beidou Coverage and the positioning stability

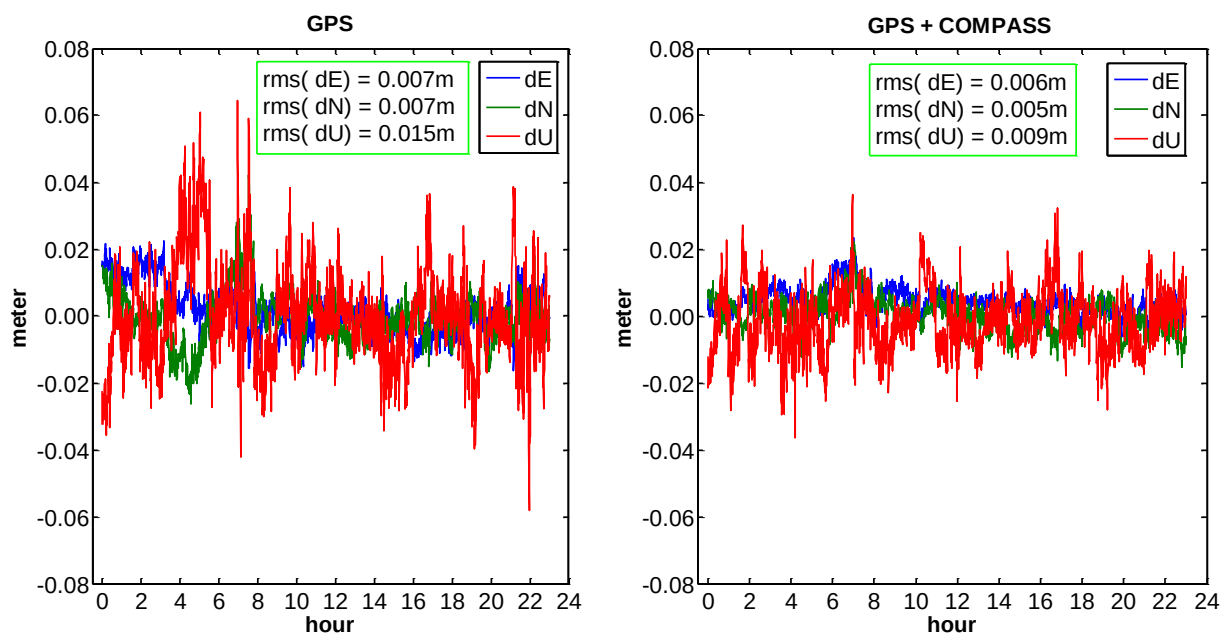
The BeiDou Navigation Satellite System(BDS) has been offering positioning services to customers in the Asia-Pacific region since December 2012. The global service is planned to open in 2020. All user can get 6 to 10 Beidou satellites within this area currently, you may also receive 1 to 5 Beidou satellites if you are out off this coverage. Current Beidou coverage are shown bellow:



Moreover, the below figures show relatively high positioning stability of our GNSS devices with Beidou satellites.

Table 4 Time to Fix Percentage 17km Baseline Canopy Test

Receiver Type	GNSS Type	RTK Fix Success	Max Fix Time(s)	Min Fix Time(s)	Mean Fix Time(s)	RTK Fix Success Rate	Error Percentage
T300	GPS+BeiDou	69/70	150	10	28.81	98.6%	4%
T300	GPS+GLO	37/70	165	13	75.35	52.9%	0%



To improve the positioning stability, please operate receivers as the instruction shown below:



Appendix B: Advantages of Beidou B3 signal

ComNav technology is a high-tech company with CORE GNSS Positioning technology, in China. So we have a better understanding of Beidou signal, providing reliable receivers and positioning solutions for you. ComNav declares that Beidou B3 signal is only used for customers in China with its two advantages:

E-RTK: long baseline RTK(supper wide int solution) , which can reach 100km distance.
RTK initialization time and RTK stability: the Beidou B3 can improve the RTK fix time.