SLX-1
(Foundation Enhanced)
Operation Manual

Revision

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Preface

Specification Purposes

Welcome to read the SatLab GNSS Receiver SLX-1 (Foundation Enhanced) Manual, which applies to all GNSS Receiver SLX-1 (Foundation Enhanced) products.

Brief Introduction

SLX-1 is the third generation of SatLab GNSS Receiver (Foundation Enhanced). The manual describes how to install, set up and use SLX-1 with Windows 7 and IE 9.

Experience Required

You are advised to read this manual carefully for a better use of the GNSS Receiver SLX-1 products. If you have any questions, please visit the official website of SatLab: www.satlabgps.com.

Tips

Attention: Special operation, please read carefully.

Warning: Important Tips. If you do not operate according to tips, maybe the instrument will be damaged, data lost, system collapse or even other people's safety.

About Responsibility

You are advised to read this manual carefully for a better use of the product. SatLab has no responsibility for the loss caused by user's operating wrongly with the machine because of the misunderstanding of the manual.

SatLab is committed to the continuous improvement of product functionality and performance, service quality, and keep the right to make changes to the content of the instruction manual without prior notice.

We have examined the consistency of this publication with the hardware and software, but we can't ensure 100%. Pictures are only for reference. If the product doesn't match the picture, please refer to the product.

Technology and Service

If you have any problem, Please dial the technical center of all branches and the headquarter. We will reply in time.

Relevant Information

You can find the manual in these ways:

1. The manual is included in the suit packing case when you buy a SatLab SLX-1 Procuct.(Foundation Enhanced);

2. Log in the Web management system of GNSS Receiver SLX-1 and download the E-version manual in 【Help】-【Data Download】

Your Suggestions

If you have any advice or suggestions, please contact us: (0086)400-678-6690. Your feedback information will help us to improve the products a lot.

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CHAPTER

1

Overview

Chapter 1 describes：

■Introduction

■Product Features

■Notes

Introduction

The manual describes how to install, set up and use SLX-1 with Windows 7 and IE 9.

SLX-1 (Foundation Enhanced) product innovation is a launch of the SatLab GNSS Receiver; It is equipped with the world's latest technology Samsung multifrequency motherboard and high-gain antenna for signal tracking multiple satellite systems. With the ZHD20140040 data version developed lately in SatLab, high-performance microprocessors，the large capacity flash and battery at a high speed，rich communication port, military-level standard design, and firewall, encrypted transfer and other 10 hardware safety installed inside, which makes GNSS Receivers higher in accuracy, stronger in operability, better in availability and more stable in operation. SLX-1 can be applied to all GBAS and construction of CORS in the world.

Notes: The manual does not represent the standard configuration, the items inside can be adjusted according to different user needs. Specific configuration to the storehouse of purchase shall prevail. Before using this machine, we recommend that you to check the product packaging in case of damage; Carefully open the box to confirm whether the items inside is in line with Delivery; If you find the product and its annex have been missed or damaged, please immediately contact your local office or reseller; Please read this manual carefully before you carry, transport or use the machine.

Receiver Characteristic

1、Base on Linux Operation System

SLX-1 base on Linux operation system, Is real Multi-user, Multi-mission, Multi-platform operation system. Excellent system stability, Friendly management functionality and Powerful network ability. Embedded with microprocessor, Compact size, Low power-consumption, less heat, perfect for continuously work for long time.

2、Support All GNSS Signal

72 Channels, Able to track and receive all visible GNSS satellites signal, including current GPS and GLONASS satellite signal, GPS L2C signal which is deploying, GPS L5 band and GALILEO signal in near future. Almost double the channels in receiving satellites signal compared with common GPS receiver, effectively improve survey accuracy and functionality in real time RTK survey.

3、20Hz Data Updating Rate

Data Update Rate 20Hz, maintain survey value independence and best survey quality; Low Energy Consumption, Only 4.6W.

4、Multitask Operation

SLX-1 is competent for executing more than one task at the same time. When SLX-1 is continuously tracking and recording satellites data, user can download data file from SLX-1 memory, process different types of RTK and RTD data without any loss or interruption on data collection.

5、6 Modes on Data Transmission

UHF wireless radio, Data Line Modem, Broad Band Port, Fax Modem, TCP/IP, Internal GSM/CDMA Module, SLX-1 is able to utilize Internet, Intranet or Wireless Network to process data communication and difference data transmission.

6、Tremendous Data Storage Capability, Convenient Data Download and Transmission

Internal 1GB high performance storage device and support 4GB industry level SD data storage card; 1GB storage can continuously store dual frequency GPS data (1s Sampling Interval) for 7 weeks, and it can improved to store 8 months GNSS data once 4GB SD card is added. Data is

stored as files, available for current receiver download and Remote Network sharing; Also feasible for external data stream transmission during data collection period.

7、High Precision Survey Technology

The use of high performance precision GNSS measurement techniques to measure solver engine makes the measured data to the highest levels of quality assurance.

8、Perfect Compatibility

Able to real time export RINEX and BINEX format converted from GNSS origin data, seamlessly compatible with all existing CORS system all over the world, perfect for new CORS system establishment or current CORS system expansion.

9、Remote Network Access

Able to get access to the receiver and set parameters on mobile phone and PC server.

10、Military-Standard Design

dustrial level design, enhanced aluminum alloy cover, roof, dustproof, shock resistant.

11、Various Data Port Solutions

It configures 5 RS232 data ports, being capable to simultaneously connect to two data communication equipments to transmit RTK and RTD data; Available to connect to High precision atomic clock, Meteorology Instrument, Clinometers and other sensor devices. Meteorology and clinometers data would be recorded combined with GNSS data and download together to data center which would provide excellent flexibility in setting up consummate and versatile GNSS reference station to users.

12、Wide Voltage Multimode Power Supply

SLX-1 has 4 internal independent power ports, available for 7V-36V input, supporting power supply from alternating current (Need Power Adapter), UPS accumulator and solar battery. Feasible for power supplied from alternating current and backup power at the same time. Moreover, when SLX-1 is power down no matter cause, automatic reset function can recover the instrument to the

lately setting for continue working.

Notes

Though GNSS Receiver SLX-1 are built according to the military standard, it still need to be used with patience and care.

Warning: Receiver should be kept and used in stated environment. please refer to the appendix: SLX-1 Products Parameter Table.

Please do not use the receiver in extreme conditions.

In order to improve stability and extend the life of the receiver, Please do not use the receiver in extreme conditions, such as:

1、Moisture

2、temperature higher than 75℃

3、temperature lower than -40℃

4、corrosive liquid or gas

Please do not put GNSS Antenna near to pollution sources where there is electricity and strong disturbing signal:

1、Vitta (sparking plug)

2、TV and computer monitors

3、electric generator

4、motorcycle

5、DC-AC power conversion equipment

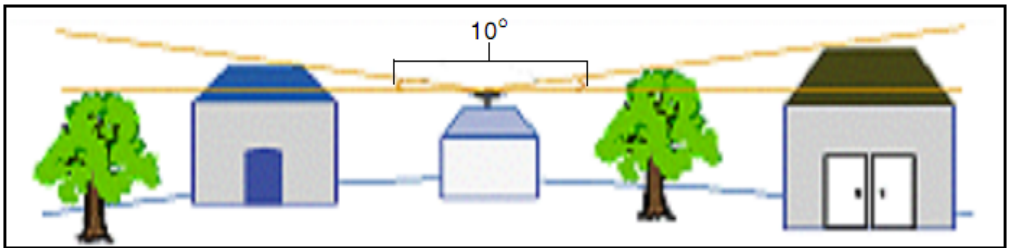
6、fluorescent lamp

7、power switch

When searching position for continuous GPS reference station, notice below options:

Position should be chosen in open place, where easy to settle

receiver. Should not be any shelter around for more than 10 degree height, to avoid GPS signals absorbed or blocked, as in Picture 1-1:



Picture 1-1

1. Around station position should not big area of water cover or object which badly interfere satellite signal, to weaken Multi-path Interference.
2. Position should be far away from high-power wireless transmission tower (TV station, microwave station), the best distance should not less than 200m; far from high pressure transmit electricity wire, distance should further than 50m, to avoid electromagnetism interference GPS signal.
3. Provide stable equipment to fix up antenna.
4. Provide reliable power supply, communication system, easy to connect with city power and internet.
5. Settle and protect GPS reference station equipment.
6. When without watcher, should assure safety of equipment, avoid purposely destroy.
7. Choose convenient traffic position for easy inspection and maintenance.

CHAPTER

2

An Introduction to GNSS Receiver

This chapter introduces

■Brief Introduction

■Appearance of the receiver

■Front Panel

■Back Panel

■Body

■Function Button

■Indicator Light

■LCD

■External Interface

Brief Introduction

This chapter mainly introduces appearance, function button, indicator lights and external interface of the GNSS receiver.

Appearance

The appearance consists of three parts: front panel, back panel and body. As shown in figure 2-1：

Figure 2-1

Back Panel

There are USB interface, SIM card slot, TF card slot, keypad, indicator light and LCD in the front panel. As shown in Figure 2-2:

Figure 2-2
1-MiniUSB interface 2-TFcard slot 3-SIM card slot
4-LCD 5- indicator light 6-USB interface 7- keypad

- MiniUSB interface：not available;
- TF card slot： TF（Micro SD）card slot is installed to extend

storage capacity;

- SIM card slot：standard SIM card is installed to be used for 2G/3G wireless network communication;
- LCD: show information and direct operation;
- Indicate light: indicate the lock, network, power supply and other information;
- USB interface: connect to U disk or USB storage device for data storage/download and firmware update;
- Keypad: insult and set receiver.

Back panel

Back panel consists of antenna connection interface, RS232, RS485, data input and output interface of the Ethernet, as shown in Figure 2-3:

Figure 2-3

1-DB9 interface 2-GNSSantenna 3-input power 4-external clock input 5-air hole 6-external expansion 7-LAN interface 8-3G antenna 9-five-core socket 10-PPS output 11-earth point

- DB9 interface : GNSS data output and external device connection;
- GNSSantenna: to connect choke ring antenna or external antenna;
- input power: main power supply input;
- external clock：TNC socket to connect external atomic clock;
- air hole: waterproof air hole;

- extension: 12VDCpower output, RS232 debug seriel port, RS485/RS422communication interface, hardware restart interface;
- LAN interface: network connection interface;
- 3G antenna: connect 3G/GPRS antenna interface;
- five-core socket: differential data output, The host and the external data link connection, Auxiliary power supply input;
- PPS output: receiver PPS output SMAinterface;
- Earth point: anti-thunder earth point.

Body

The body is made of fully aluminum alloy, shown in Figure 2-4:

Figure 2-4

Function Button

There are four buttons on the receiver control panel: power button, left button, right button and function button. Shown in Figure 2.1 and 2.2:

Figure 2.1

Operation	explanation
click	Operation time ＜0.5 sec
Double click	operation interval ＜1 sec
Touch and hold	Operation time＞6 sec

Figure 2.2

Buttons	name	function	status
	Power button	Double click: Turn on/off LCD	
		Click: turn on/confirm/change parameter	

		Touch and hold: turn off	See LCD
	Left button	Click: move left or up	
	Right button	Click: move right or down	
	Function button	Click: cancel or interface switch	
	Combination button	Core update: Press Fn and click power button	Satellite light flicker

Indicator light

There are four indicator lights: satellite light, recording light, network light and power light.(network light is green, other 3 lights are green/red),shown as Figure 2.3 and Figure 2.4:

Figure 2.3

status	explanation
Slow twinkling	twinkle at interval 1 second
Fast twinkling	twinkle at interval 0.3 second

Figure 2.4

Indicator light	Function and Signification
satellite	Green: Mainboard 1; Red: Mainboard 2 Keep on: locked Keep off: unlocked
recording	Green: Mainboard 1; Red: Mainboard 2 Slow twinkling: recording interval≥1 sec fast twinkling: recording interval＜1 sec Keep off: stop recording
network	Keep off: no network Keep on: network is connected Keep twinkling: data interaction

Power	Red light fast twinkling: warning Yellow light Keeps on：external power supply Green light Keeps on: internal power supply

Note: When power button is double clicked and LCD is turned on, all indicator lights turn off except the network light.

LCD

LCD consists of status and settings;

Status

Status display mainly shows the status information of searching satellite, network, settings. As shown in Figure 2-5:

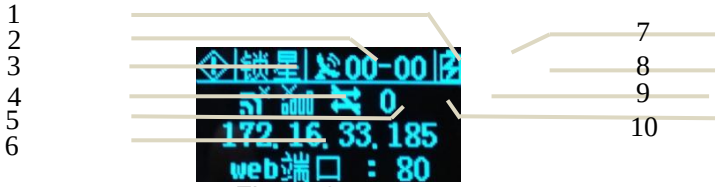


Figure 2-5

1-Mainboard 1 satellite 2-locked status 3-warning status 4-Wi-Fi status 5-3G network status 6-IP address 7- Mainboard 2 satellites 8-power supply/battery capacity 9-3G signal strength 10-3G network transmission status

- warning status: No warning , warning
- locked status: locked shows locked, unlocked shows unlocked
- Wi-Fi status: turn off Wi-Fi , turn off Wi-Fi
- 3G network status: turn off 3G module , turn on 3G module , 3G connect to public network
- power supply/battery capacity: external power supply , internal power supply
- 3G network transmission status: 3G no network transmission status , data transmission

Figure 2-6

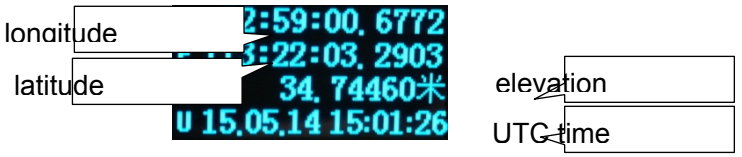


Figure 2-7

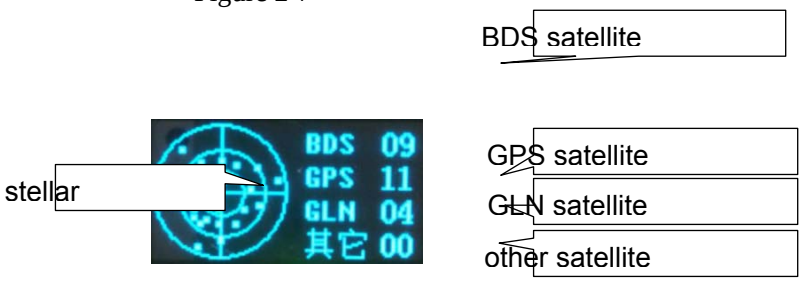


Figure 2-8

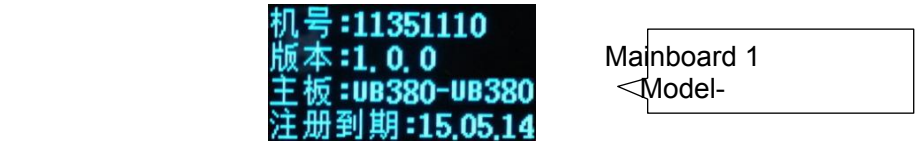


Figure 2-9

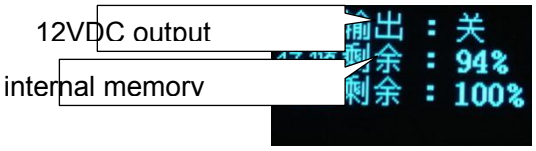


Figure 2-10

Settings display

Setting display is set up coordinated with keyboard for fast data recording, network, data download and U disk firmware updating, as shown in Figure 2-11 and 2-12:

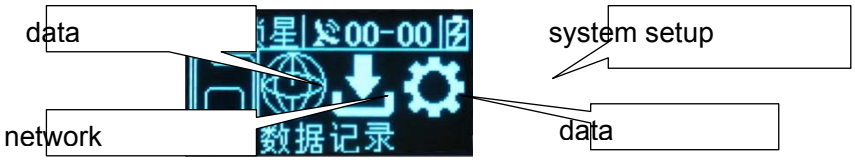


Figure 2-11

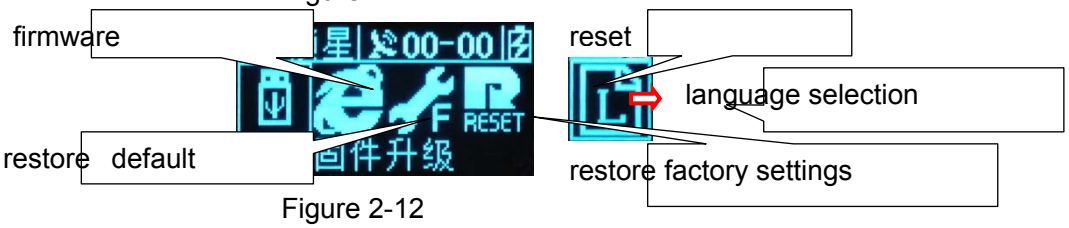


Figure 2-12

External Port

External port consists of all ports in front panel and back panel, as in Figure 2.5:

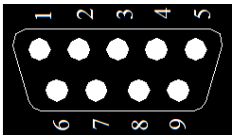
Panel	Port name	Panel display	Physical interface	function	note
Front panel	Mini USB port	/	MiniUSB（main）	/	/
	USB port	/	USB-A（main）	data storage/download, upgrading firmware	U disk and USB mobile storage
	TF/SIM card slot		TF/SIM card slot	TF card： data storage SIM card：3G/2G wireless connection	/
Back panel	GNSS antenna	GNSS ANT	TNC	Connect to GNSS antenna	/
	External clock input	OSC	TNC	Connect to external atomic clock	/
	3G antenna	3G ANT	SMA	Connect to 3G/GPRS antenna	/
	PPS output	PPS	SMA	PPS pulse output	/
	DB9 serial port	COM1	DB9	GNSS data output and connect to external sensors	Standard three-wire system serial port
	LAN port	LAN	RJ45	Connect to LAN	Support 10M/100M；
	External expansion	EXT Port	14 core（LEMO）	RS485: GNSS data output and connect to external sensors ; RS232: debug serial port EX12: 12VDC output; PW_RST: hardware restart EVT：external event input（reserved）;	hardware restart: input 4~13VDC level, close rising edge, open falling edge.
	Power input	PW1	2 core（LEMO）	Main power supply input	/
	Five core socket	PW2 COM2	Little 5 core（LEMO）	auxiliary power supply input ; differential data output	/
	Earth point	GND	/	Earth anti-thunder port	Earth anti-thunder

Warning:

1 Wide voltage of main and supplement power supports 7-36VDC;

2 when hardware restart is used or internal battery is charged, the supply voltage of receiver must be 11-36 VDC;

3、RS485 full duplex and half duplex of compatible port is defined as: 485A Pin7、485B Pin3、485Y Pin6、485Z Pin4、GND Pin5；



half duplex: A、B connect to external A、B (not necessary to Y, Z, GND)

full duplex: A, B connect to Y, Z, Y, Z connect to external A, B(not necessary to GND).

CHAPTER

3

Introduction to Web Management System

Details：

■Foreword

■User Login

■Window for Web Management System

■Basic Information

■Status Bar

■Home Page

■Systematic Information

■Working Mode

■File Management

■Advanced Setting

■User Management

Introduction

User can connect GNSS receiver from SLX-1 via the built-in Web management system to download observing data, to check working condition, to modify systematic setting or even to upgrade system, format or reboot the receiver through network, fully realizing remote control. This chapter will mainly introduce the Web management system of the receiver.

User Login

Set up the network according to the network connection and the local area network can be accessed by local IP logging of GNSS receiver.

Introduction of User Group

For active management, all the users are divided into three groups:

Guests: Be able to log in the system and browse without requirement of having a user name or key. They only acquire the basic right to check with their working status.

Formal users: Are required to use user name and key to log in. They can not only do things like checking with their instruments' status, modifying the instrument parameter, and browsing, downloading and deleting the data, but also enjoy the preferential login compared to the guest when on-line users reach the server's maximum.

Administrator: are required to use user name and key to log in. They enjoy the highest level of permission. They can add or delete user and modify the password of other users. They acquire the preferential login when on-line users reach the server's maximum.

Chart3.1 Operation Authority

Operation	Guest	Common User	Administrator
Check instruments status	○	○	○

Check positioning information and satellite	○	○	○
Check the on-going fold	○	○	○
Check the data transmission state	○	○	○
Modify the settings	×	○	○
Set down coordinate & observe parameter	×	○	○
Control & change the documentation	×	○	○
Down & delete the file recorded	×	○	○
Control & modify the setting of data transmission	×	○	○
Alter own user passport	×	○	○
Add & delete user	×	×	○
Disconnect the other user	×	×	○
Reboot the system	×	×	○
Reboot the instrument	×	×	○
Upgrade the system and application	×	×	○

User Login

After entering into the SLX-1 serious Web management system, the login page will pop out. Shown in figure 3-1:

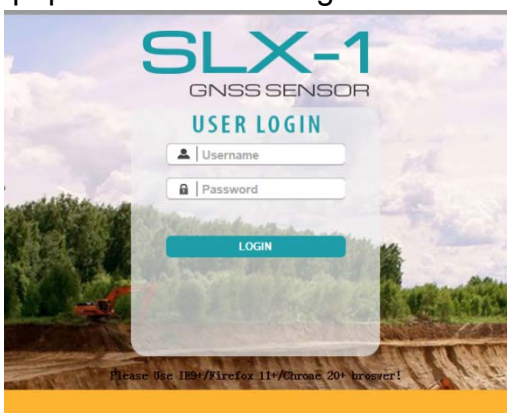


Figure3-1User login interface

Attention: Web management system of SLX-1 supports PC, server, laptop and cell phone, etc. as long as you log in through IE 9+/Firefox 11+/Chrome 20+ browser.

Enter the correct user name and password, click the button[entrance], and then you could enter the system. You could also enter as a guest, but it would only provide you with basic browsing right without permission of modifying instruments parameter or downloading, deleting data document.

As for initial case, the user system only has one administrator namely "admin" with the password of "admin". You can log in this account and add several common users.

Attention: There is only one administrator account, and its user name can not be changed, except for its password. Please change administrator password as soon as you set up your instrument. If you forget your administrator password, please contact with our technician. If you forget the password of common user, please contact with administrator and reset your password.

Window for Web Management System

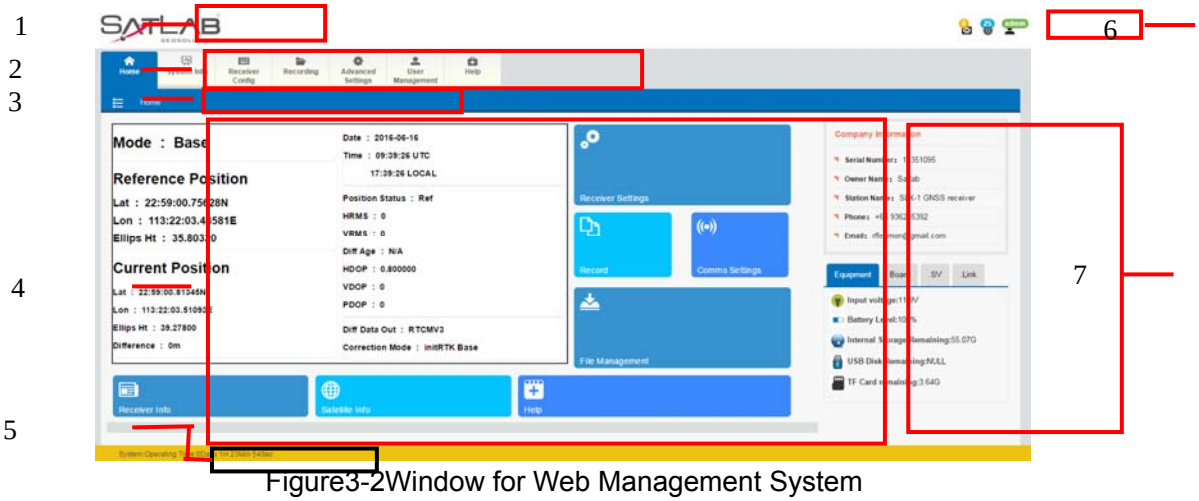


Figure3-2Window for Web Management System
1-SatLab, logo 2-navigation bar, 3-menu, 4-display & setting area 5-time for systematic operation 6-status bar 7-basic information

- SatLab logo : click this logo to jump to the【Home Page】;
- Navigation bar: also called main menu, consist of receiver status and the 7 part of setting;

- Menu: the secondary menu beneath the main menu, which is of more detailed division;
- Display and setting area: display the status &set up the parameter;
- Running time of systematic operation: display the running time;
- Status bar: consist of the status of satellite, current log-on account and language switcher;
- Basic information: display the basic information such as receiver`s series number, version number of firmware, registration status, device status, information of motherboard, satellite numbers and the current communication status；

Basic Information

The Basic Information locates at the right side of Web management system, displaying the basic information such as receiver`s series number, version number of firmware, registration status, device status, motherboard information, satellite numbers, etc. The Basic Information is always set at the right side; details are shown as figure3-3:

Motherboard number

Model: SatLab receiver model and product's name

Serial no.: Unique heading code. It'll turn red when the registration code is invalid

Current name of website: Advanced setting-Base setting

Registration status and term: It'll turn red when the registration code is invalid

Figure 3-3 Basic Information

Attention: When the receiver is not registered or is expired, the system will restrict the display of satellite amount and data transmission so that the receiver can't work normally; Therefore when the receiver is about to expire, please contact with our employees and acquire new registered code；

Status Bar

The status bar consists of the status of satellite, current registered account and language switcher; Shown as the figure3-4:

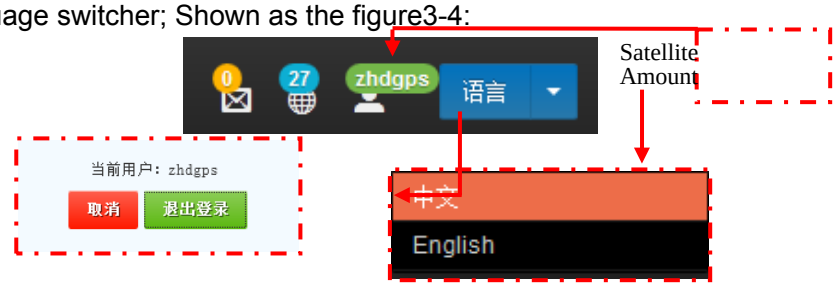


Figure3-4 Status Bar

Satellite Status: The icon displays the amount of received satellite. Click it to jump to the satellite information;

Current log-on account: The icon shows your current log-on account. Click this icon and it`ll pop up "exit" dialog box;

Language setting: Click the icon at the right side of【Language】and it will pop up language option；

Homepage

Homepage consists of welcome page, setting of reference setting, data documentation, network transmission, file download, star chart, and item for quick jump; click on the quick jump to jump directly to the

information and settings; shown as figure 3-5；

Figure3-5 Homepage

Systematic Information

Systematic information consists of instruments information, satellite information and positioning information; more details for receiver's status and satellite condition

Device Information

Display the current firmware condition, including information of instrument, motherboard, storage device, power supply, and network. Shown as figure 3-6:

Figure 3-6 device information

Click【Storage device】-【interior】 on the right side. When you switch the storage location, the storage information will be automatically queried and show the state of the current storage device

Satellite Information

Satellite information displays the star map status and serial no. elevating angle, azimuth and signal noise of each satellite; Shown as figure3-7:

Figure 3-7 Satellite information

Positioning Information

Positioning Information shows the current location of the device on the map (shown as satellite image); Shown as figure 3-8:

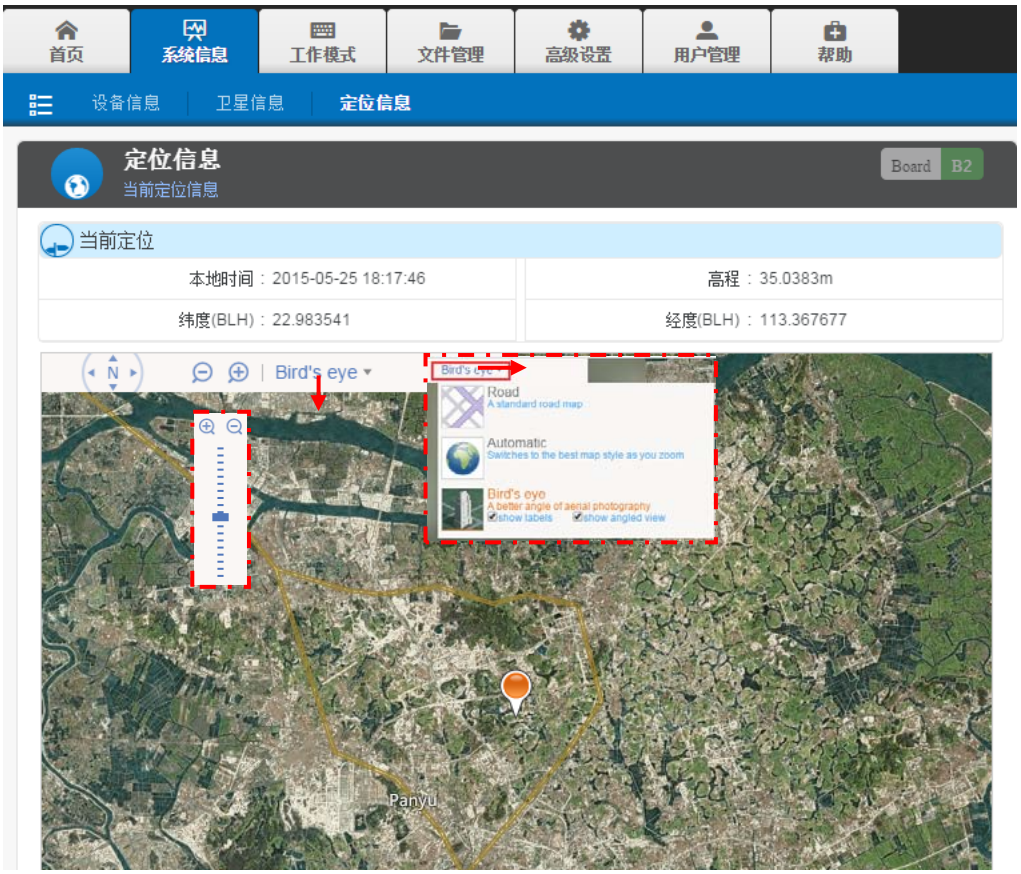


Figure3-8 positioning information

In the map, you may click for translational motion, or click for zooming; you may also click to choose 2D highway or satellite after it pops out a dialog box, or use mouse wheel for zooming.

Working Mode

Working Mode consists of setting of satellite, reference station, serial port and the block for data documentation.

Satellite setting

How to set on/turn off the satellite system and high cut-off angle setting: 【OFF】means the system is off and 【ON】means the opposite; drag the icon to modify the high cut-off angle (dragging to left reduce the high cut-off angle while dragging to right increase), and you may click 【Confirm】to submit your setting, or click【Reset】to restore default. Shown as figure3-9：

Figure3-9 Satellite settings

Reference setting

It shows the current positioning status, the setting of parameter for receiver antenna and working mode. The current positioning status displays the local time, longitude, elevation, HDOP, PDOP, VDOP; the reference station setting consists of antenna setting and mode setting.

Shown as figure3-10:

Figure3-10 Setting of reference station

Antenna setting can set down the antenna attenuation, antenna model or the antenna height.

- antenna attenuation: the attenuation can be set between 5dB to 20dB according to the model of motherboard and antenna; the computing formula is as followed:

Antenna attenuation (dB) =antenna gain- motherboard gain-cable gain

E.g. There`s a motherboard of which the best receiving gain is 28dB, while the antenna gain is 50dB, the cable applied has he length of 30meter (3dB/10m reduction), and the cable attenuation is 9dB; therefore, the gain attenuation of this receiver = 50-28-3*3, 13dB；

- Antenna model: chosen under datum station to fix the deviation of phase center;
- Height of antenna: set under base station to fix the elevation coordinate;

Receiver can be set as base station or mobile station. When the mode setting changes, data documentation, serial port, GNSS data output and network transmission will also change; shown as figure 3.2:

Figure3.2 relation between setting of reference station and data output

Reference station	The second difference	Time tag	Initial data	Differential data
Base station	Shut	Shut	Output initial data	Output differential data
	On	On	Output differential data	Output differential data
	Shut	On	Output initial data	Output time tag
	On	On	Output differential data	Output time tag
Mobile station	-	Shut	Output initial data	Output GGA
	-	On	Output initial data	Output time tag

a. Base Station

Base station includes difference scheme, difference interval, Ephemeris output interval, the second difference informative output,

setting of reference station coordinate and automatic acquisition. Shown as figure 3-11:

Figure 3-11 setting of base station

Ephemeris interval: there are options of every 1min, every 5min, every 15min or every 30min

Difference scheme/the second difference: you may choose OFF(to close differential output, CMR, RTCM(RTCM2.3), RTCMV3(RTCM3.0), RTCM32(RTCM3.2) or Binex;

Set coordinate manually: the coordinate is formatted with ():min ():second

Automatic acquisition of coordinate parameter: the working mode should be set as mobile station model prior to switch to base station model (not submitted), and click “acquisition”. The system will automatically smooth the coordinate and fill it into the blank.

b. Mobile Station

The mobile station can be set as differential scheme, ephemeris interval and GGA output interval, in which the setting of differential scheme and ephemeris interval is similar with the base station, loading GGA data into differential link; Shown as figure 3-12:

Figure 3-12 setting of mobile station

Attention： 1. Under the base station mode, you may set RTD differential format as RTCM if it needs to be set

2. Initial data can not be recorded or transferred after the second difference open, and the initial data of data transmission can be viewed as the second difference data.

Serial Port Setting

The serial port of RS232 has the same function as the one of RS485, as they are available for GNSS data transmission and external sensor connection; the setting of serial port baud rate, data bits, stop bits, and check bits are the same；Shown as figure 3-13:

Figure 3-13 Serial port setting

Use the external sensor of RS232 and the GNSS data transmission of RS485 as example;

External sensor: Set on the serial port, and choose external sensor in device connection, then submit the setting of baud rate, data bits, stop bits, and check bits, shown as figure 3-13;

GNSS data transmission: set on the serial port and choose GNSS data transmission in device connection. Choose the relevant data form prior to the submission of baud rate, data bits, stop bits, and check bits. Shown as figure 3-13;

Attention: 1.When setting the serial port, the baud rate, data bits, stop bits, and check bits shall be the same as the terminal, or it can not be able to communicate or receives as unreadable code.

2. Differential data is relative with reference station mode. When it is in base station mode, the difference data is exactly what the receiver output; when it is in mobile station, the GGAG data may be viewed as the difference data

Network Transmission

Include operations like checking the network transmission, addition or deletion to network transmission, open or shut-down to it and parameter modification, etc.;

Network transmission:

1. Serial number: serial number of network transmission

2. Start: status of on-going or shut-down;

3. Status: the status of network connection which includes the status of connecting and connected.

4. Network: such network connections provide connecting modes of wired, WIFI, 2G/3G

5. Agreement: means transmission agreement, includes Ntrip Client, TCP/IP Client, ZHD Client, UDP Client, SG Client, Ntrip Server,

TCP/IP Server, and UDP Server, among which ZHD Client and SG Client are established by SatLab;

6. IP address: it will display the IP of receiver when the network transmission is viewed as server; when the terminal be viewed as a client, it will display IP of the connected server.

7. Operation: Includes turn-on/forbidden, edition or deletion to network transmission.

Figure 3-14 Network transmission

Click ✚ to add a network transmission, and click【edition】to edit such network; While dialog box of setting of network transmission pop out, follow “basic operation” to execute;

Encryption: It needs the software that are encrypted to analysis, or the data received will be unreadable

【Setting of network transmission】：

Network: Wired, Wi-Fi, 2G/3G；When you use the network, please

make sure that the relevant network is turned on.

Data model: Includes NMEA-0183, differential data, initial data, RS232 data, RS485 data, among which the initial data can set down transmit interval[S] (0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 15, 30, 60). Please confirm that the port is set correctly if you choose RS232 data and RS485data.

There are 8 transmission agreements, and each agreement has different network mode and data model.

The setting of Ntrip Client and Ntrip Server are the same. The user name and password need to fill according to requirement, the IP and terminal need to be set according to software. Shown as figure 3-15:

Figure 3-15 Parameter setting of Ntrip Client and Ntrip Server

The setting of TCP/IP Client and UDP Client are the same. They only need to set down IP address and server; shown as figure 3-16:

Figure 3-16 parameter setting of TCP/IP Client and UDP Client

ZHD Client belongs to SatLab custom transparent agreement and it needs to set IP address, terminal, grouping number according to the requirements. Shown as figure 3-17:

Figure 3-17 Parameter setting of ZHD Client agreement

SG Client belongs to SatLab custom agreement, and it needs to set IP address, terminal and user name. Shown as figure 3-18:

Figure 3-18 Parameter setting of SG Client agreement

TCP/IP Server, UDP Server may set receiver as server. The IP address will be the IP address of the receiver`s IP; shown as figure3-19:

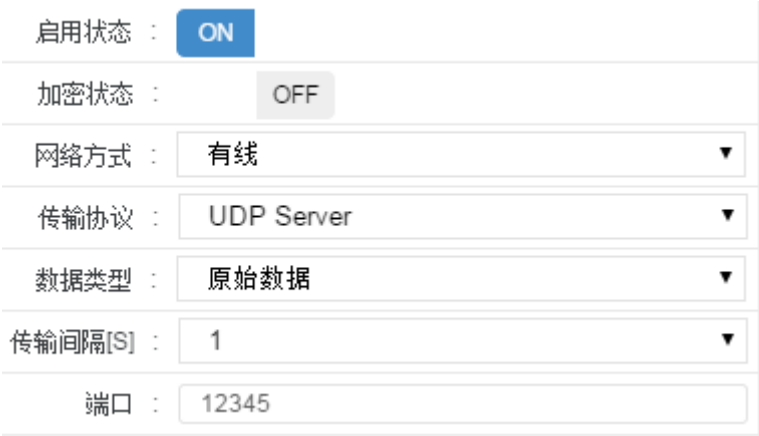


Figure Parameter setting of 3-19 TCP/IP Server and UDP Server agreement

Attention: 1. Different network transmission can not connect one server IP and terminal.

2. Differential data output is associated with reference station mode. If receiver is set as base station mode, then the differential data output is equal with the base station`s differential data; if receiver is set as mobile station mode, the differential data device may output GGA data.

3. When you select 232 or 485 port data out-put, the connection of port device should be turned on and changed into external sensor.

Data record

Click on the top left corner to add new data record. Network transmission and data document have the similar function to close, edit or delete new data record. Shown as figure3-20:

Figure 3-20 Data record

Turn on the data record, set down the symbolic name (filename, it defaults to _zhd), and choose the recording type of initial data and Rinex. The data record can take down different recording intervals, and the recording modes can be divided into every-day recording, manual recording and planned recording. When you choose a recording mode, the data can be also recorded into a file per hours or a file every two hours. After choosing the suitable mode, press the button “submission”.

“Starting using” and “Forbidden”. The Term which is forbidden will not take effect until it is started using again. When a term turns into forbidden state from on-going state, it will stop working but preserve all the connected parameter, which will still be applied when the term is restarted.

“Deletion” means empty an existing term, of which the parameter will not be preserved.

File Management

File Management manages the files that preserve data recording,

including file lists, FTP push. You can also manage the data recording files, the operations you are authorized to do including storage, viewing, downloading or deleting. Only common users and administer have the right to operate.

File List

File list can view or manage the recording files under different device, and can also set down the time for automatic deletion to clear the recording files. Shown as figure 3-21:

Figure 3-21 File lists

You can use file list to view data, delete or download files according to the files location or recording time.

You can choose the file storage location of internal (receiver's internal storage device), U-disk and TF card, and then choose the recording date. The page will refresh the list automatically;

The content of file list:

1. File name: the name of data file.

2. Type: including RINEX, initial data.

3. Size: the space that the files occupied.

4.Time of start-recording: it means the time that file starts recording, and usually the time of the first record is equal with the time of file establishment.

5. Time of stop-recording: it means the time that file stops recording.

6. Operation: including download and deletion.

The file list download system provides two modes for download: common loading and FTP. Detailed operation can be searched in the "data download" in "Basic Operation".

The deletion in file list provides modes of common deletion, alternative deletion or formatting;

Common deletion: it can only delete one files in a time. Press the deletion button of file list.

Alternative deletion: When you need to delete several files, you can tick the files and press the button of "delete the chosen one";

Formatting: Clear and empty all the files in the device.

Attention: 1.Please don't use downloading app. and don't download more than 3 files at the same time, or it may influence the responding speed of the receiver.

2.The time downloading is relevant with the file size and the network environment. You can shut down the page or the browser, but don't shut down or reboots the device.

3.The file can't be recovered after deletion, please confirm before deletion.

4.Before deletion or formatting the file, please confirm that the data recording is shut down. Please don't formatting if it's

possible in order to reduce the damage to the device.

FTP Push

FTP push can send the data record from 0:00 to the time that is set. Shown as figure 3-22.

Figure 3-22 FTP push

User name can be set as “Anonymous” when it is not customer;

“Reset” may recover the defaults.

Advanced Setting

Advanced page provides the further command and operation that aims to the device, including settings of mainframe, motherboard, network and journal management.

Advanced page only allows administer to visit.

Mainframe setting

Mainframe setting consists of systematic setting, data download,

password setting and SLX-1 control. Shown as figure3-23:

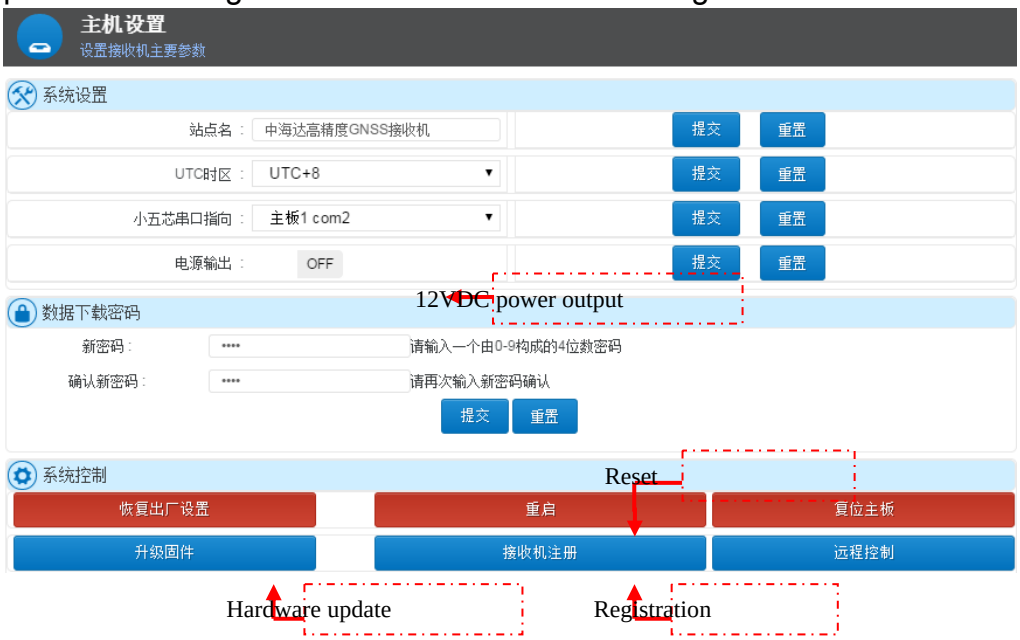


Figure 3-23 Mainframe setting

1. Systematic setting

a. Setting of site name: set the name for site name of reference station. The default name is “SatLab high-precision GNSS Receiver”. Change the name directly and then submit if you want to change it.

b.UTC time zoon setting: there`re 25 time zoon from UTC-12 to UTC+12, and the default time zoon is UTC+8; Please choose the relevant UTC time zoon if you want to change.

c. Tiny five core port pointing: tiny five core points to GNSS main board port can acquire the port data, but it can`t send command or data to the main board. Select the port and submit setting.

Attention: Main board COM1 may output information like GGA, GSV, COM2 output differential data/ time tag, COM3 output initial data/the second difference;

d. Power output: Power output can provide 12VDC, 5WMin power-supply to external device; Switch the power output to ON and submit, the device will turn on; switch the power output to OFF and

submit, the device will shut down. Shown as figure 3-24

Figure 3-24 Systematic setting

2、Password for data download

The password for data download is designed for download data from locality, and it consists of 4 numbers of which the default password is 1234. If you need to change the password, type a new password and submit. Shown as figure 3-25:

Figure 3-25 Modification of password

3. Systematic Control

You can remote control the receiver through this site by systematic control. The systematic control includes restoring the factory defaults setting, rebooting, and resetting the main board, updating the hardware, receiver registration and remote control.

a. Restoring the factory defaults setting: Press the button “restoring the factory defaults setting” and confirm, the receiver will recover to the defaults setting and reboot automatically. After reboot, all the data and setting will be deleted, except for the IP address of wired network and registration code;

b. Reboot: click the button of Reboot, and confirm. The receiver will

reboot within 10 second, the time used for reboot is about 1 second.

The reboot operation consists of stopping the application program and rebooting the device. During reboot, receiver will stop data recording and transmitting and recover the original setting and start working automatically after reboot.

c. Main board defaulting: After the GNSS main board defaulting, the applied program will reboot, and the data recording will rebuild a recording file.

d. Hardware update: The file named "SLX-110_Update.bin" can't be updated and modified. Click "hardware update" and the following page will be unfolded. Press "View" to select file and then upload. Shown as figure 3-26:

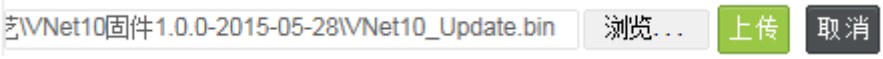


Figure 3-26 Hardware update

e. Registration of receiver: When the registration code is overdue or wrong, the receiver number and valid term on basic information will turn red; if everything is normal, they will be black. If the registration code is overdue, it won't transfer or record data, and won't show the amount of satellite.

f. Remote control: You can control receiver on other servers after the remote control is turned on. Press the remote control and the following page will unfold. Shown as figure 3-27:

Figure 3-27 Remote controls

When you turn off the remote control, you can switch the initiate mode to OFF.

When you need to turn on remote control, you can switch the initiate mode to ON and submit your setting after choosing the connection, remote server and terminal;

Motherboard setting

Motherboard setting consists of general setting, function setting and PPS setting. Shown as figure3-28:

图 3-28 Main board setting

General setting (motherboard): motherboard setting1, motherboard2, automatic switching, dual motherboard；Shown as figure 3-29:

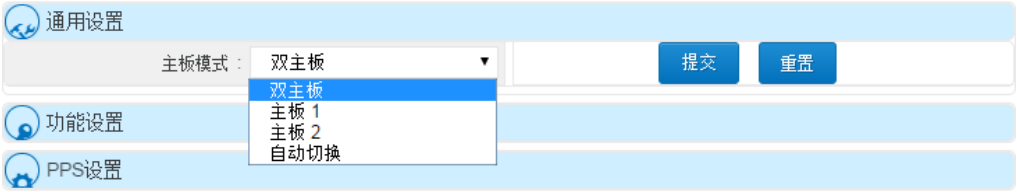


Figure 3-29 general setting

- Motherboard 1: motherboard1 priorities to work and the motherboard2 shut down. When the motherboard1 is abnormal, the motherboard2 starts to work;
- Motherboard 2: motherboard2 priorities to work and the motherboard1 shut down. When the motherboard1 is abnormal, the motherboard2 starts to work;

- Automatic switching: There won`t be any priority when a working motherboard is abnormal as the system will select the substituted motherboard automatically;
- Double motherboard: Motherboard1 and 2 works simultaneously;

Function setting: It consists of event input and external time input

- Event input: you can choose to open or close the event input and determine the triggering mode (upward or downward);
- External time input: if you need to turn on the external time input, connect the external clock and set on the external time input; if you want to shut it down, turn down the external time input, and remove the clock;

Figure 3-30 Function setting

Attention：1. Single motherboard has no general setting;
2. External clock input can not be turn-on or shut-down optionally. The motherboard can't turn on if it is not operated strictly according to requirements.

PPS setting: the output cycle of PPS is 1S; and PPS setting includes output turn-on/shut-down, triggering method (rising or declining), PPS satellite system (GPS, BDS, GLN), time tag and Pulse Width;

When you turn on the time tag, difference will turn as the information of time tag. If you want to gain time label from small five core, you need to set the core to COM2; Web management system provides pulse width of 1000us, 5000us, 10000us while user can set the needed pulse width between 1000~500000us. Shown as figure 3-31:

Figure 3-31 PPS setting

Network Setting

Network parameter includes wired network, Wi-Fi hotspot and 2G/3G network, server port setting and firewall setting. Shown as figure 3-32:

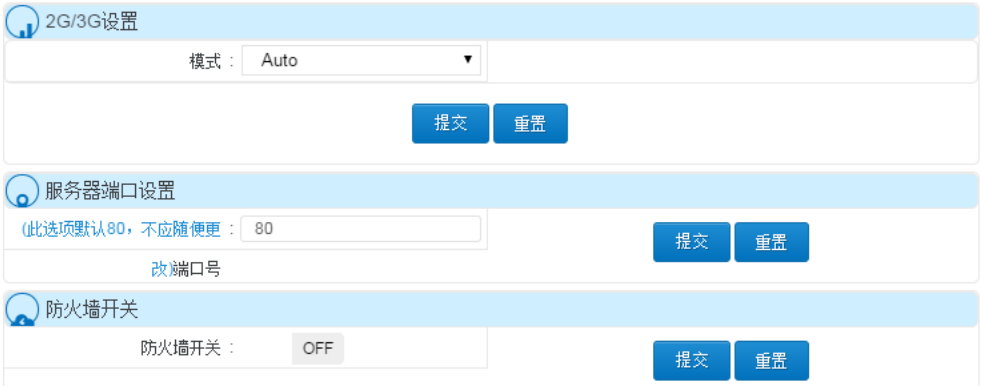


Figure 3-32 network setting

Setting of wired network: there are two acquisition modes: DHCP or manual setting. If you choose DHCP mode, you only need to click the button of submission; if you choose manual setting, you should set down IP address, subnet mask, gateway, DNS address, etc. Page of parameter setting is shown as figure 3-33:

Figure3-33 Wired network setting

Wi-Fi hotspot setting: The following parameters can be set in Wi-Fi hotspot: channel, password, IP address; Wi-Fi hotspot SSID and its password are IMEI number, the default IP address is “192.168.9.1”; receiver can use mobile station to assess to the hotspot after turning on the Wi-Fi and visit the page of systematic management. Shown as figure 3-34:

Figure 3-34 Wi-Fi setting

2G/3G setting: it provides options of turn-on/shut-down 2G/3G network or set up APN or Auto mode. After turn on the Auto mode, the system will identify automatically. The APN mode is leased mode, therefore it needs to set up AP, user name and password manually. Shown as figure 3-35:

Figure 3-35 2G/3G setting

Log Management

Systematic log records the users` operation chronologically when device is on. Systematic log mainly includes user registration system, page switching, setting modification, data recording and transmission, download or deletion of document, network parameter setting and

application rebooting /updating, etc.

In the page of systematic log, the user can check with the log by setting down time period at the top of the list. Click the deletion to delete all logs in this period. Shown as figure3-36:

Introduction for log list:

1. Time: the time recorded when logs are created (24-hours)

2. User: operating user

3. IP: User`s IP address

4. Event: the types that are recorded

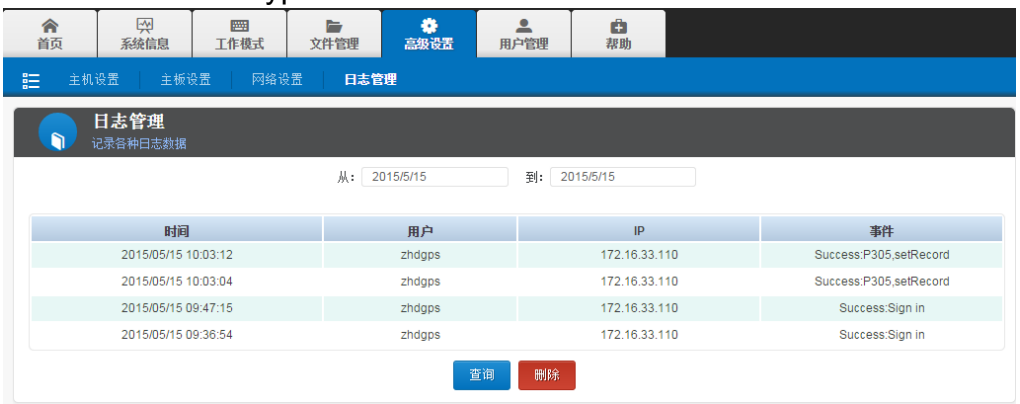


Figure 3-36 Log management

User Management

User Management consists of password management and user management.

Password management

Change the registered password of current user; shown as figure 3-37:

Figure 3-37 Password management

User addition or deletion

Only the administer (zhdgps) has the right to modify. And administer is allowed to add/delete common users only. More details can be found in User registration;

User addition: input user name and password and submit information to achieve addition (user name should be number, English character and underline while the password length should limited between 5-16 digits);

User deletion: click the button of deletion;

Figure 3-38 User deletion

CHAPTER

4

Basic Operation

Introduction to this chapter:

■Introduction

■Architectural Pattern

■Basic Composition and Connection

■Network Connect

■LCD and Keys Operation

■Set the Benchmark Station

■Add Data Recording

■Add Network Transmission

■Data Download

■Firmware Upgrade

■Register Receiver

Introduction

This chapter mainly introduces method for installing connector of GNSS receiver SLX-1 (ground-based augmentation) products.

Architectural Pattern

GNSS receiver products are applicable to Ground-based Augmentation System (GBAS), CORS and other fields. The receiver can be connected to meteorological instrument and other sensors. It also can be connected to the central service area through the network cable or 3G/2G. Its architectural pattern is generally shown in figure 4-1:

Figure 4-1 Architectural Pattern

Basic Composition and Connection

The package mainly include GNSS receiver, SLX-1 data cable (VS-3P), 3G/2G antenna, GNSS antenna cable, power adapter (CL-1233), direct connect network line. Its connection is shown in Figure 4-2:

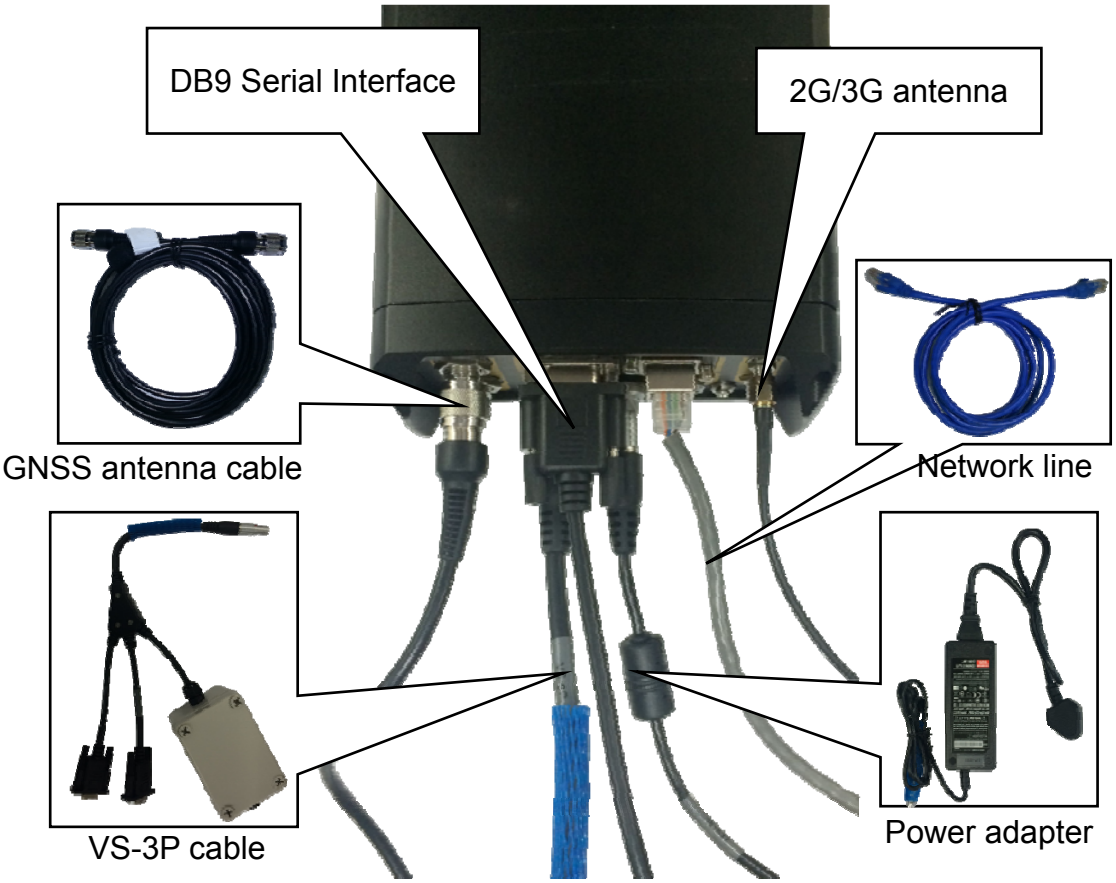


Figure 4-2 Receiver connection graph

Connector Installation

Self-locking socket is applied in three places on GNSS receiver. They are five cores socket, external expansion, power input respectively. As the figure shows below, the red dot of cable joint should be aligned with the red dot on the receiver socket when installing, otherwise the receiver socket and cable joint will be damaged. As shown in figure 4-3:

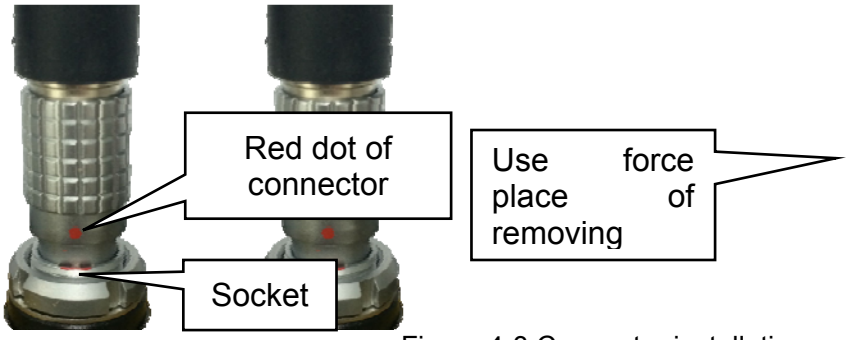


Figure 4-3 Connector installation graph

When removing the connector, the thumb and index finger should use force as the above figure shows. Only clench and remove the socket, do not use force on the black plastic head.

Install and take out SIM/TF card

1. SIM/TF installation slot is under the front panel, clockwise is to tighten the screws, and counter clockwise is to loosen the screws.
2. SIM/TF card installation: the chip side of SIM card should be upwards, while TF card should be down, directly pushed into with oblique angle inside; when hearing sounds of click, you can let it go.
3. Taking out SIM/TF: push the card inside, then loosen your hand, the card can be popped up automatically,

Figure 4-4 Sketch Map of Installing and Taking Out SIM/TF Card

Network Connections

LAN Network Connection

When setting LAN network, GNSS receiver can be directly

connected to LAN via network line. Input wired network IP address (default: 192.168.0.200) in your browser, then you can enter into the login interface of Web management system of GNSS receiver.

Note: The wired local IP of GNSS receiver is default 192.168.0.200. For example the network segmentation where LAN belongs is 192.168.0.200. While if 192.168.0.200IP is not used within LAN, GNSS receiver could directly connect to LAN. Login in through the access of IP 192.168.0.200 within LAN; if the network segmentation where LAN belongs is not 192.168.0. x, for example, the network segmentation of LAN is 192.168.1. X or other, (i.e. different from the IP of GNSS receiver) then network segmentation 192.168.0. X should be added on the computer.

Nowadays, enterprise usually uses optical fiber or ADSL for internet. Usually optical fiber has fixed IP, while most of ADSL are dynamic IP. Charge details on optical fiber or ADSL, please inquire with local telecom department.

GNSS receiver can directly connect to INTERNET; also can connect via LAN mapping outer net IP.

The method of direct connect is relatively simple, click [advanced] in the local connection under the Internet protocol. The IP address and gateway to the wide area network IP can be directly input in the appeared interface. As shown in figure 4-5

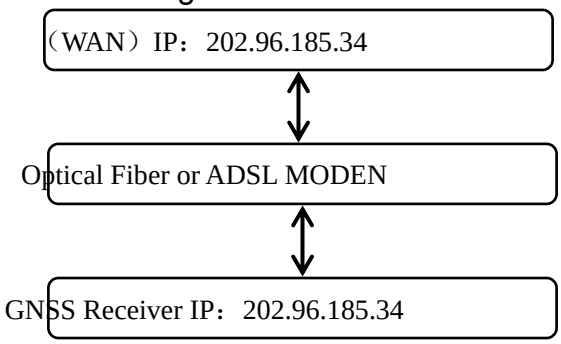


Figure 4-5 Solution of direct connection

The following graph introduces how GNSS receiver reference station connect Internet via LAN allude net IP in details. As shown in figure4-6:

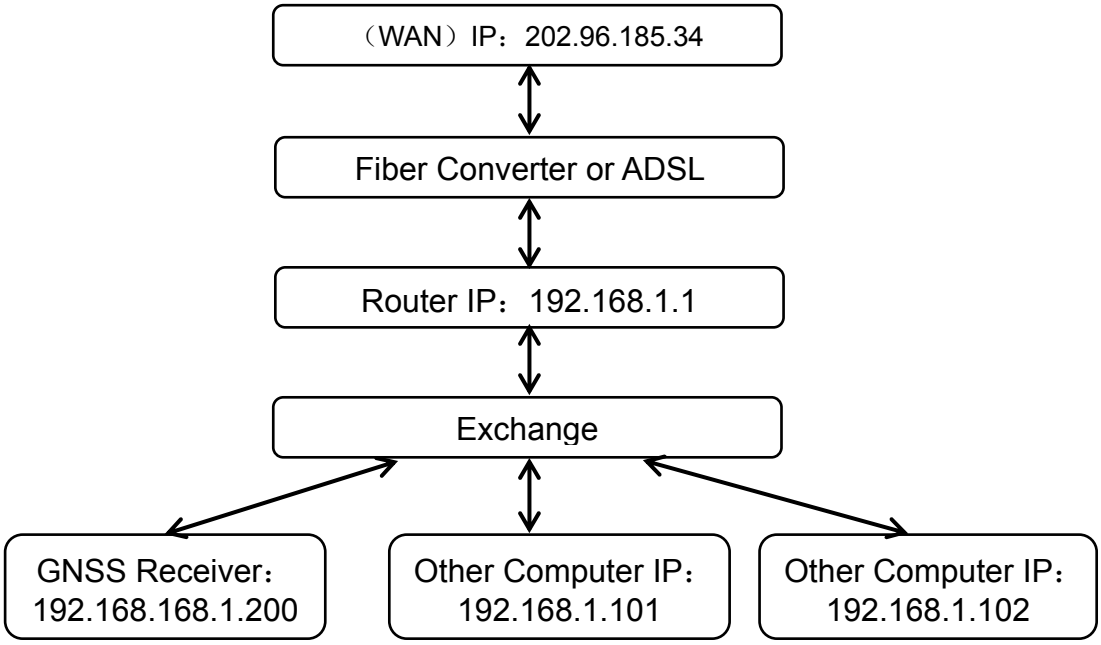


Figure 4-6 Solution of LAN allude net IP

1. Change IP of GNSS receiver

There are two solutions to change IP of GNSS receiver: Manually setup and coordinate and obtain automatically setup.

a. Manually Setup

First get local IP of GNSS receiver, such as the default IP is 192.168.0.200(if do not know the receiver's IP, please double click the power button to open LCD (Liquid Crystal Display), so as to look the receiver's IP). Using network cable to connect one PC with GNSS receiver, and set IP of the PC in the same network segmentation as the GNSS receiver, but the IP is different, such as 192.168.0.148, by the time the PC could login and visit Web management system of GNSS receiver through IP 192.168.0.200. Entering into 【Advanced setting】-【Network setting】-【cable setup】 to set the IP address, subnet mask,

gateway, DNS (optional) of the GNSS receiver, then click the submit button. As shown in figure 4-7:

Figure 4-7 Manually Set IP Address

b. Coordinate and Obtain Automatically Setup.

Double click the power button to open LCD, then click “Fn button” to enter into the menu choices, click “right-hand button” to select 【Internet setting】, click “power button” to enter and select 【cable network】, then just click “power button” and change the cable network model of receiver as 【DHCP】, system will automatically obtain IP and relevant parameter of cable network; click again the “Fn button ” to return to the main interface, checking the obtained IP and recording it. Now the PC could login and visit Web management system of GNSS receiver via the obtained IP, enter into 【Advanced setting】-【network setting】]-【cable setting】, then select【static IP】in【IP obtained way】, set the IP address, subnet mask, gateway, DNS (optional) of the GNSS receiver, then click the submit button. As shown in figure 4-8:

Figure 4-8 Setting of Obtaining IP Automatically

2. Mapping IP of Outer Network

Examples of TP-LINK routing and GNSS receiver IP address 192.168.1.200 will be introduced in the following. (Due to different routers have different setting solutions, specific operation should be done respectively according to their router setting instruction)

Open website http://192.168.1.1 (default IP), you will get the following dialogue box. (If you cannot enter the login interface, please contact with the network administrator) As shown in figure 4-9:

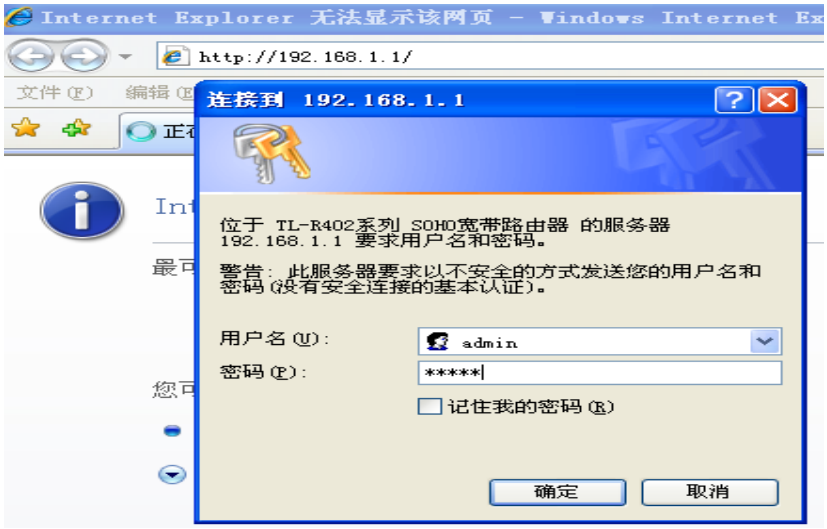


Figure 4-9 Login Interface of Router

Input user name and password, the original default user name of TP-LINK is usually admin, password: admin.

Set local LAN port in internet setting, set IP address as the IP address of GNSS receiver. As shown in figure 4-10:

Figure 4-10 Router LAN Port Setting

In order to entry from external internet, we need to set port mapping relationship between local port and external port in router. We must map instrument IP such as: 192.168.0.200 to external internet. Set both internal and external port as 801. Then login the interface of instrument server, format is 202.96.185.34：801. (If the mapping external port is 80, then there is no need to add port number). After login, please check whether the instrument number in website is consist with number of target instrument or not, if disaccord, please login again. As shown in figure 4-11:

Figure 4-11 Port Mapping

Wi-Fi Network

Wi-Fi network is mainly used in Wi-Fi browse and set up the GNSS receiver via mobile setting; Wi-Fi network can be open or close through LCD and key operation and Web management system, and password, channel and login IP of Wi-Fi network can be set in Web management system.

a. LCD and key operation: Double click “power button” to open LCD, click “Fn button” to enter menu choices, click “right-hand button” to select 【Network Setting】, click “power button” to enter and select【WiFi】, click ”power button” to control open and close of Wi-Fi network. As shown in figure4-12:

Figure 4-12 LCD Key Operate Open and Close of Wi-Fi Network

b. Web management system: Login Web management system, operate and set in【Advanced setting】-【Network setting】-【WiFi hotspot setting】. As shown in figure 4-13:

Figure 4-14 Wi-Fi Setting in Web Management System

After opening the Wi-Fi hotspot of SLX-1, search Wi-Fi account number (namely the receiver body number) in the mobile device, and then enter the password (password is the default receiver body number). At last, enter IP (default: 192.168.9.1) of the GNSS receiver in the mobile device browser. Then you can enter the login interface of SLX-1 (Ground-based Augmentation) Web management system. After login, the mobile terminal interface is like the following in figure 4-14 (account and password are the same as the PC):

Figure 4-14 Front Page of Mobile Terminal Device

2G/3G Network

When FTP push, remote control and network transmission using 2G/3G network,, you need first to connect the 3G antenna, plug the SIM card, and open the 2G/3G network in 【Advanced setting】 -【Network setting】.

Non APN (special line) mobile phone card, select 【Auto】 mode in 【2G/3G setting】and submit, the system will automatically dial and connect.

As for APN dedicated phone cards, users need to gain access point, user name and password from network operators, and select 【APN】 mode to enter the access point, user name and password (As shown in the figure below), then click 【Submit】, the system will load data to dial automatically and connect. As shown in figure 4-15:

Figure 4-15 2G/3G Network Setting

LCD and Keys Operation

Basic operation of the receiver operating need can be accomplished by the cooperation of LCD and keys. The following content will give detailed description about the keys operation. As shown in table 4-1:

Table 4-1 LCD and Keys Operation

Function	Keys Operation	Content
Open or close LCD	Double click power button	Each time you open the LCD screen, there will directly display the front page of state information
Change state information	Click left button or right button	Under the status display, circularly check various state information of the receiver, details see in Chapter two Status Display.

Change state and set display	Click Fn button	State and setting interface change circularly	
Return to the upper menu or cancel	Click Fn button		
 Change menu	Click left button or right button	Menu items from left to right: data records, network setting, data download, system setting; System setting menu items from left to right: upgrade the firmware, restore default IP, restore the factory setting, restore the motherboard, language switching ; menu that can circularly change operation.	
Enter lower level menu	Click power button	Can enter lower level setting of the menu: The main menu contains data records, network setting, data download, system setting; system setting menu contains upgrade firmware, restore default IP, restore factory settings, restore the motherboard and language switching ;	
 Data records (Note 2)	Click left / right button	Mobile option	Recording mode: one hour, two hours, every day
	Click power button	Modify recording mode or confirm setting	

 Network setting (Note 4)	Click left / right button	Mobile option	Wired network: manual, DHCP; (manual means static, DHCP means obtained IP automatically) Wi-Fi, 3G, Bluetooth: open, close;
	Click power button	Modify the parameter values	
   Data download	Click power button	Enter setting, move to the next step and confirm setting:	Copy data to USB storage devices quickly; Days of download: one day, two days, three days, seven days, fifteen days, thirty days, all
	Click left / right button	Password: left button plus 1, right button minus 1; number of days: change days option: change among password, days and confirmation.	
 U disk upgrade	Click power button	Upgrade firmware, the firmware should be placed in the root directory of U disk:	
	Click power button. Click left/	Select the language switching icon, click the power button to enter the language switching page, continue	

 Language switching	right button	to click the power button to switch the language (Chinese, English), after select the language, click the right button to enter the 【confirmation】 option, click the power button to complete the language setting.
Restore default IP, restore factory settings, reset motherboard	Click power button	Restore default IP: Click “power button” to enter the prompt page of restoring default IP, click again the “power button” to confirm. Restore factory settings and reset motherboard are same as above.

Note: 1. If the button is not operated within 60 seconds, the system will close LCD automatically and open the indicator light.

2. The data record of key setting is temporary record. The record will be deleted after restart, but the data will not lose; 1 hour, 2 hours and every day represent three ways of data recording respectively. That is divided record per hour, divided record every two hours and continuous record;

3. When the text or icon is surrounded by box, which means that the item is selected, it can be modified or enter the lower level setting.

4. During the setting process, if there is no confirmation option, which means that, the modification takes effect immediately, such as network setting.

Set the Benchmark Station

Login interface of the Web management system, then set in direct click quick link of the reference station or click 【working mode】-【reference station setting】.

a. Antenna setting

First, set antenna attenuation, antenna model, antenna height according to the actual parameters of the antenna (Refer to【working mode】- 【reference station setting】 in the chapter of introduction to Web management system): As shown in figure 4-16:

Figure 4-16 Antenna Setting

b. Reference station setting

Set working mode of the reference station as【mobile station】, and【submit】. As shown in figure 4-17:

Figure 4-17 Mobile Station Setting

Set working mode of the reference station as【benchmark station】. Select【differential formats】(OFF、CMR、RTCM、RTCMV3、RTCM32、BINEX for selection) according to actual need; ephemeris interval is

advised to select 【every 30 minutes】. (change time: every minute, every 5 minutes, every 15 minutes, every 30 minutes for selection) Manually input known longitude, latitude, and elevation, then click 【submit】button. As shown in figure 4-18:

Figure 4-18 Benchmark Station Setting

Add Data Record

Login interface of the Web management system, then set in direct click quick link of the reference station or click 【Working mode】-【Reference station setting】:

Click button in upper left corner of the interface, then a dialogue box【Data record setting】will appear, dial the launch status to【ON】, set the file [identification name] (top four of the file, the last four is serial number added by system automatically), 【data type】select 【original data】 or 【RINEX】 according to the actual need;【recording interval [S] 】1 is recommended (0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 15, 30, 60 recording interval [S] for users to choose); 【recording way】: There are every day, manual and plan time three recording ways, then click

【submit】.The three recording ways are shown in the figures below.

Record every day (24 hours record a data or record a file per hour, or record a file every two hours). As shown in figure 4-19:

Figure 4-19 Data Recording Every Day Setting

Manually record (Manually control or launch data recording), as shown in figure 4-20:

Figure 4-20 Manual Data Recording Setting

One-off plan recording (Set start and finish time according need). As shown in figure 4-21.

Figure 4-21 One-off Plan Recording Setting

Add Network Transmission

Login interface of the Web management system, then set in direct click quick link of the reference station or click 【Working mode】-【Network transmission】:

Click button in upper left corner of the interface, then a dialogue box【Network transmission setting】will appear, dial the launch status to 【ON】, 【Encryption state】is set according to actual need. 【Network mode】: wired network is recommended (wired, Wi-Fi, 2G/3G); 【Communications Protocol】: Select according to actual need. (For information on communications protocol, please turn to 【Working mode】- 【Network transmission】in chapter of introduction to Web management system. 【Data type】is selected according to actual need (original data, NMEA-0183, differential data, RS232 serial port data, RS485 serial port data for selection); 【Transmission interval [S]】 only original data has this option, 1 is recommended (0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 15, 30, 60 transmission interval [S] for users to choose); Server IP, port, user name, and other settings are related to communication protocols, details please see 【Working mode】- 【Network transmission】in chapter of introduction to Web management system. Setting as it shown in figure 4-22:

Figure 4-22 Add Network Transmission

Note: 1.Three network modes can exist simultaneously, but the IP address that transmitted to the server cannot be the same.

2. When you need to transmit Binex data, please set 【Differential format】 as 【Binex】in 【Reference station setting】. Then 【submit】. Set 【Data type】 as 【Differential data】in 【Network transmission】.

3. When you start a second differential output, the original data should be changed to second differential, details please see “Table 3.2 Reference station setting and data output table ’ in【Working mode】- 【Network transmission】in chapter of introduction to Web management system.

Data Download

There are four ways for data download, namely normal download, FTP download, FTP push and U disk download.

Normal Download

Select the location of data storage and date of recording under the 【Document management】-【Document list】 in Web management system, pop-upthe data list of the selected day, then you can download the corresponding data by clicking the 【download】button in 【operation】column on the right side of the data list. As shown in figure 4-23:

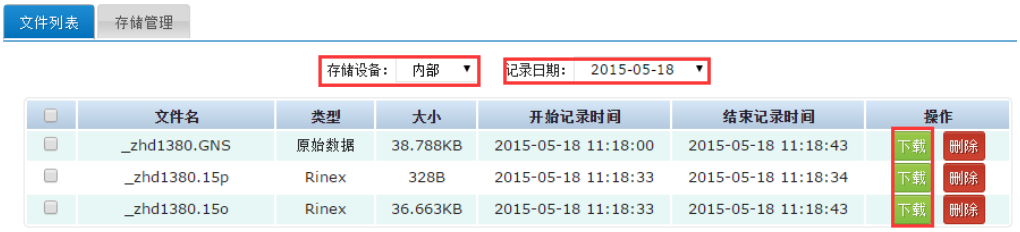


Figure 4-23 Normal Data Download

FTP Download

Before downloading data via FTP, it must be ensured that routing and LAN have turned on the FTP port.

Under the 【Document management】-【Document list】 in Web management system, click 【FTP download】button, it will turn to the FTP download list automatically. Meaning of the download list catalog in home page is shown in figure 4-24:

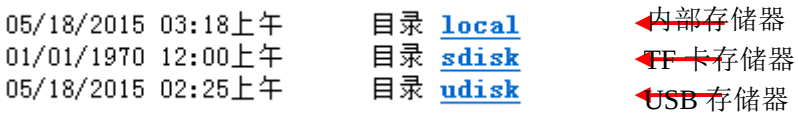


Figure 4-24 FTP Download Catalog

Click the directory folder of memory (select according to actual need), entering the date list, then click the corresponding date folder to

enter data list of the date. As shown in figure 4-25 (the left image is date list, the right image is data list of the date):

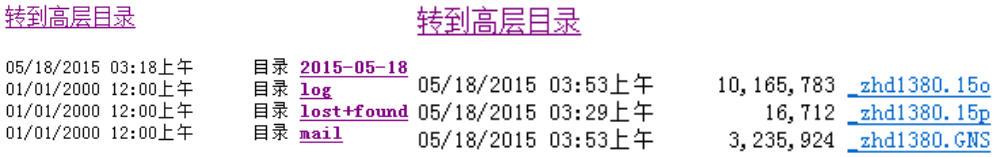


Figure 4-25 FTP Data Download

Click the data you need to download, pop-upa reminding box for save, click on the right side of the box, then a dialog box of save type appeared, you can save according to need or save by user-defined. As shown in figure 4-26:

Figure 4-26 FTP Download Data Storage

In the process of downloading the FTP data, you can return to the upper level catalog by clicking【turn to higher level catalog】.

FTP Push

FTP push can send data files to the server at regular time. Parameters setting are shown in figure 4-27:

Figure 4-27 FTP Push

First, need to launch FTP push function, according to need to set anonymity or non-anonymous user, server IP and port (FTP server IP where the data is pushed to), push method (select wired, Wi-Fi or 3G) and push time (set arbitrarily according to need). As shown in the above figure.

The interface of push time can select time quickly and user-defined. When select user-defined, first click , there will appear a time selection box, you can change the time, including hours and minutes. At last, click the “confirmation” button. When finished setting, click submit button, then the FTP push setting is completed. As shown in figure 4-28:

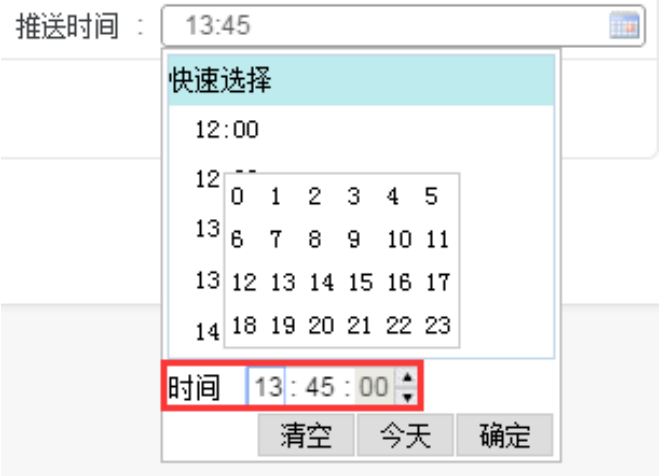


Figure 4-28 Time Selection for FTP Push

U Disk Download

Data download: in order to protect the security of data, when downloading data, there is need to enter download password (the default password is1234, this password can be changed in web 【advanced setting】 - 【data download password】.

Select【Data download】in menu bar of LCD interface, click “power button” to enter into interface of password input, when inputting password, click “power button”, then the display will switch from box to underline of the first password, click “right button” means plus one, click

“left button” means minus one, after the first password is set correct, click “power button” to switch to second password, operate others according to this way. Click “power button” when finished inputting the password, then it will switch to “confirmation” button; click “power button” to enter into download interface; click “power button” to enter into download days selection, click right or left button to change days, click “power button” when finished selection, it will switch to “confirmation” button, click again the “power button”, you can download the data ((before downloading the data with U disk, you need ensure the U disk has been installed properly, otherwise it will show “no U disk”), after finishing download, LCD shows “download finished”. As shown in figure 4-29:

Figure 4-29 U Disk Download

Note: 1. when downloading data of Rinex file, files of 15p and.15o should be downloaded in the same folder, otherwise it will be abnormal when calculating;

2. Under local (internal memory) folder of FTP server, folders named after dates are original data and Rinex data collected by receiver; log is folder for system log; mail folder is corresponding folders received by mailbox; lost +found folder is system folder;

3. Download by using download tools is prohibited.

4. The downloading time is related to size of the file and speed of your network connection, please be patient. When downloading, you can close pages and browser, but do not disconnect the network or restart the device.

Firmware Upgrade

There are two ways of upgrading firmware, namely Web page

upgrade and U disk upgrade.

Upgrade Firmware in Web Page

Under【Advanced setting】-【Main frame】-【System control】of Web management system, click 【upgrade firmware】button, it will expand a dialog box. As shown in figure 4-30:

Figure 4-30 Firmware Upgrade

Click “browse” to the dialog box for file options, choose the upgrading firmware package that need to upgrade and click “open”, as shown in figure 4-31:

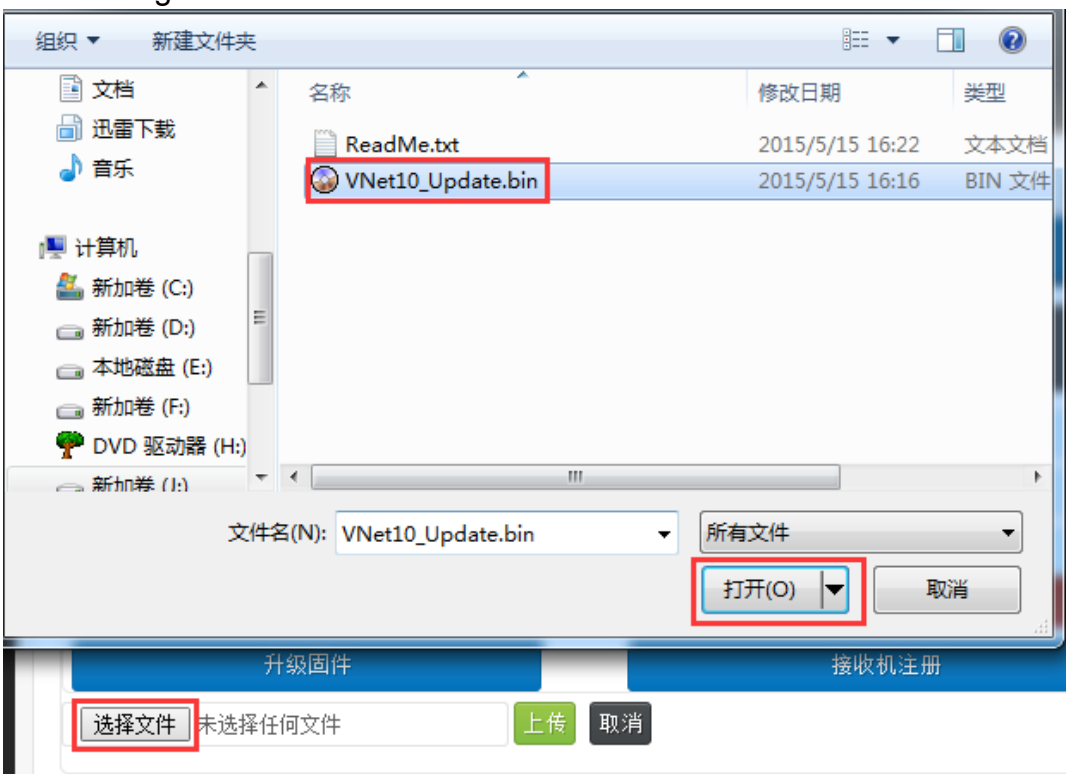


Figure 4-31 Firmware Upgrade-Files Selection

Then click "Upload", after a while, the browser will pop-up a prompt box of “submit successfully, waiting for…..”, wait one minute or so, you can complete upgrading of the receiver firmware; as shown in figure 4-32:

Figure 4-32 Firmware Download- File Upload

Note: 1. when being issued, the file is named as "SLX-110_Update.bin" (without quotes). Please do not revise this file name, otherwise the upgrade may fail.

2. When uploading firmware package, please don’t close the browser, otherwise the upgrade may fail.

3. Upload time depends on your network environment, the uploading time is about 10 seconds under LAN

U Disk Upgrade Firmware

First, copy firmware package “SLX-110_Update.bin” that need to upgrade to the root directory of U disk, then insert U disk into UAB-A interface in front panel of the receiver; as shown in figure 4-33:

Figure 4-33 U Disk Installation Diagram

Under 【System setting】menu bar of LCD interface, select 【upgrade firmware】, and click “power button”, popping-up a prompt box of “please confirm to insert U disk”. After the installation of U disk is without any peculiarities, click “power button”, it will remind sending successfully (if the installation of U disk is identified as error, it will remind that there is no U disk and return to selection interface of 【Upgrade firmware】);wait about one minute, the receiver restarts means that the upgrade is successful; as shown in figure 4-34:

Figure 4-34 U Disk Upgrade

Register Receiver

Under【Advanced setting】-【Main frame setting】-【System control】of Web management system, click 【Register receiver】button, it will expand a dialog box. As shown in figure 4-35:

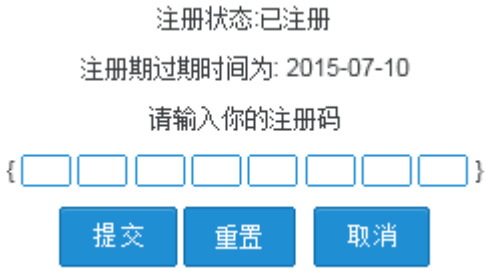


Figure 4-35 Receiver Registration

Format of the receiver’s registration code is 24 numbers, which is inputted by 8 groups, each group is 3 numbers. Directly enter the

registration code after obtaining the registration code (when inputting, system will ignore the blank space in registration code), click 【submit】 button to complete after there is no error.

If it shows “submit successfully” after submitting, this means that the registration code has been submitted successfully, but it does not mean the success of registration. You need to check number of the device in the basic information box which is on the right side. The number is red when the registration code is invalid, while the number is black when the number is valid.

NOTES：

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Diagnosis, analysis and removing ways of common faults

✧ System starts normally, the star light SV is always off.

1. Check environment of the GNSS external antenna, whether its installation is down. Whether its stationing and installation refer to the overview, use and matters need attention in the instruction manual;

2. Check whether the registration code is expired, if validity period of Web management system and number of the device changed as red, it means the registration code has expired, please contact relevant personnel of SatLab to apply for registration code, and login Web management system of SLX-1 to register receiver;

3. Check whether the connection between cable ends of the GNSS antenna, GNSS receiver and GNSS antenna is tightened, if loosened, please tighten it , and wait for about 30 seconds;

4. Monitor whether GNSS antenna cable is connected to GNSS ANT interface, rather than the WIFI ANT interface.

✧ GNSS receiver is operating smoothly, and the terminal software has been deployed, but the status of network transmission is connecting.

1. Check whether the network mode, network protocol, IP address and port are correct;

2. If the selected network is 3G, check whether 3G networks in network parameters is opened; and ensure that the local network environment has no problem, you can use your mobile internet to confirm. To ensure that the SIM card is Unicom 3G/2G or mobile 2G and the data traffic is normal, which means it has been activated and has no arrears.

- ✧ GNSS receiver is operating smoothly and network transmission has been connected, but frequency of the original data output is not correct.

  Receive data by using network debugging assistant, check whether data output frequency is correct, if the output frequency is less than the set frequency, confirm whether the recording of a data record is opened, and the record frequency is greater than or equal to frequency of network transmission original data and open the automatic removal function.

- ✧ Create several data records, its record is normal in the past few times, but it is abnormal at later stage.

  1. If the late records is intermittent, confirm whether the power supply has problem or not, if 12V battery supply is used, battery voltage should be not less than 10.5V; if switching power supply is used, ensure that the output power of power supply is greater than 15W.

  2. If there is no record at later stage: check whether the registration is expired, if it is not expired, check whether the star is locked, if it has been locked, check whether the storage space is adequate.

- ✧ The network connection is normal, but unable to login and visit Web management system of SLX-1 (Ground-based Augmentation):

  1. Confirm whether the computer is set up in accordance with network setting and cable setting in the manual.

  2. The Ping command of PC could request to GNSS receiver, but cannot visit web page; close the firewall and anti-virus software.

  3. Confirm whether the IP is correct, if you cannot judge, directly double click the power button to see the current IP address.

Appendix

Restore Factory Settings

Major Items	Content	Parameters after restore
Reference Station	Site name	SLX-1 GNSS receiver
	UTCTime Zone	UTC+8
	Antenna attenuation [dB]	5
	Antenna model	AT-1200B
	Antenna height [m]	0
	Working pattern of reference station	Mobile station
	Ephemeris interval	Every 30 minutes
	Differential format	RTCMV3
	Satellite system	All open
	Elevation mask angle	10°
Function of Receiver	Storage device	Internal storage
	2G/3G network	OFF
	RS232/RS485 Serial Interface	Close
	Server port setting	80
	Firewall	Close
	Time input	OFF
	External clock output	OFF
	PPS output	OFF
	FTP push	Close
	User	Retain administrator privileges only, and restore the default password
	Automatic clearing time when full	One day
	Direction of small five cores serial port	Mainboard 1COM2
	Power output	OFF
Data Managemnt	Network transmission	Delete entirely
	Data record	Delete entirely
	Internal data	Delete entirely
	Log management	Delete entirely

Property Parameter List of SLX-1 Products

Model	SLX-1		
GNSS Features	Channels：220		
	GPS：L1、L2、L5 GLONASS: L1、L2 BDS:B1、B2、B3	GPS：L1、L2、L5 GLONASS: L1、L2 BDS:B1、B2、B3 GALILEO:L1BOC,E5A, E5B,E5AltBOC SBAS: L1C/A,L5	GPS：L1、L2、L5 GLONASS: L1、L2 BDS:B1、B2 GALILEO:L1BOC,E5A, E5B,E5AltBOC SBAS: L1C/A,L5
	Initialization time: typically<10s		
	Initialization Reliability>99.9%		
Positioning Accuracy	RTK Horizontal：±(8mm+1X10^{-6}D) RTK Vertical：±(15mm+1X10^{-6}D) Static Horizontal：±(2.5mm+1X10^{-6}D) Static Vertical：±(5.0mm+1X10^{-6}D)		
Interface	3×RS232 Port 1×USB Port 1×Wi-Fi Communication Port 1×3G/2G Communication Port 1×RS485/RS422 Port 1×Ethernet Port 1×External Clock Port 1×PPS Output Port		
Internal Storage	64GB		
External Storage	Maximum support is not less than 1TB		
Differential Formats	CMR、RTCM2.x、RTCM3.0、RTCM3.2		
Human-Computer Interaction	Web management system		
	LCD, indicator light, button operation system		
Electrical properties	External power：7VDC~36VDC（2 Routes） Internal battery：24h continuous operation（Related to configuration） Power consumption: ≤ 5W		
Work Environment	Working temperature	-40℃～75℃	
	Storage temperature	-40℃～80℃	

	Relative humidity	100%
	Levels of protection	IP67
	Anti-corrosion	Satisfy GJB150.11
	Vibration	Satisfy GJB_1032
	Shock	Satisfy JB/T 9329 30g 3times per roller
	Crash	Satisfy JB/T 9329 10g 1000times
	Crash proof	Satisfy GB-T2423.8 survive 1m fall

Standard Configuration Table

Item Name	Unit	Number
GNSS Receiver	Set	1
Power adapter	*	1
AC Power Cable	*	2
SLX-1 Data Cable	*	1
Direct Network Cable	*	1
SLX-1 Package Packaging Box	*	1
SLX-1 Package Inner packaging	*	1
GPS antenna cable	*	1
External GNSS measuring antenna	*	1
Aluminum Lug	*	3
Cross Recessed Pan Head Screw [M3*6]	*	3

§ 15.19 Labelling requirements.
This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

§ 15.21 Information to user.
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

§ 15.105 Information to the user.
Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

***RF warning for Mobile device:**
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated wi th minimum distance 30cm between the radiator & your body.