Preface

Introduction

The introduction is applicable to Hi-Target V60 products. V60 is a new type of GNSS receiver used for measurement. The introduction describes how to install, set and use V60 products.

In order to help you better use Hi-Target series products, Hi-Target suggests you carefully reading the instruction. If you are unfamiliar with V60 products, please refer to www.hi-target.com.cn/en/

Tips for safe use

Note: the contents here generally are special operations, needing your special attention. Please read the contents carefully.

> (!) Warning: the contents here generally are very important. In case of failing to operate based on warning contents, it will damage the machine, lose the data, break down the system and endanger personal safety.

Exclusions

Before using the products, please carefully read the operating instruction, and it will help you better use the product. Hi-Target Surveying Instrument Co., Ltd will not assume the responsibilities if you fail to operate the product according to the requirements in operating instruction, or operate the product wrongly because of failing to understand the operating instruction.

Hi-Target is committed to constantly perfect product functions and performance, improve service quality and reserve the rights to change the contents in operating instruction without separate notice.

We have checked the consistency between contents in instruction and software & hardware, without eliminating the possibility of deviation. The pictures in operating instruction are only used for reference. In case of inconformity with products, the products shall prevail.

Content

Product Introduction

This chapter describes:

■ Preface

■ Product characteristics

■ Cautions for use

Preface

V60 is a new type of GNSS receiver used for measurement pushed forward by Hi-Target recently. The receiver is provided with 1G mass storage and one SD card extendable slot, which can record static data in forms of GNS and Rinex simultaneously. With brand new appearance design and optimized internal structure, the product extends the design style of previous products, making it cope with various complex conditions outside. The product has self-diagnostic function, which can intelligently monitor the immediate situations of various software and hardware during operation process; the product adopts brand new high-precision RTK system on color liquid crystal screen with modular design. The product boasts stable and GPRS network module, which can exchange difference transport module according to customer requirements and seamlessly connect CORS network system in main manufactures.

Warning: the instruction represents no standard configuration. The articles within the box can be adjusted according to different user requirements. The specific configuration shall be subject to the outgoing list upon purchasing. The suggestions before using the machine: check whether the product package is damaged; please open the package carefully and confirm whether the articles are consistent with outgoing list; in

case of loss or damage in the product and its accessories, please immediately contact with local office or dealers; please carefully read the operating instruction before carrying, transporting and using the product.

Product Characteristics

◇ Obtain the CE0890 certification

◇ Apply multi-satellite system and multi-frequency GNSS unit; support BDS, GPS and GLONASS system navigation and positioning

◇ Internally install 1G mass memory; support SD card data storage, 32GB as a maximum

◇ Internally install a transceiver; then base and rover can be exchange completely

◇ GPRS Communication function:

◇ With high-capacity lithium battery, the product can meet long-time operation requirements outside

◇ Intelligent voice

◇ Intelligent self-diagnostic function

◇ Function of accelerating and express upgrading

◇ Static data are stored in two formats (*.GNS / RINEX Data)

◇   128x64 resolution; 1.54-inch liquid crystal display
The user can flexibly set the instrument and observe
the operations of instrument through display

Cautions for Use

As a precise instrument, the receiver shall be used and
maintained carefully regardless of the materials resistant to
chemical agent and impact.

> **Warning:** the receiver shall be in stipulated
> temperature range upon using and storage.
> The detailed requirements are shown in
> Chapter V: Technical Parameters —>
> Environment.

In order to guarantee the quality of continuous tracking
observation and satellite signals, it is required that the
overhead observation station shall be open, without flaky
barriers above 15° elevating angle; in order to diminish the
interference of electromagnetic wave to GNSS satellite signals,
the observation station shall be free form strong
electromagnetic wave within the range of 200m, such as
television tower, microware station and high-voltage
transmission line; in order to avoid or reduce multipath effect,
the observation station shall be far away from the terrain and
ground features with strong reflection against electromagnetic
wave signal, such as high-rise buildings, waters, etc.

Changes or modifications not expressly approved by the party

responsible for compliance could void the user's authority to operate the equipment.

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.

Introductions to Receiver

This chapter describes:

■ Receiver appearance

■ Control panel

■ Upper cover

■ Bottom cover

■ Five-core and eight-core sockets

■ Batteries

■ Environmental requirements

■ Electronic jamming

Receiver Appearance

The product appearance is divided into four sections, upper cover, bottom cover, guard circle and control panel.
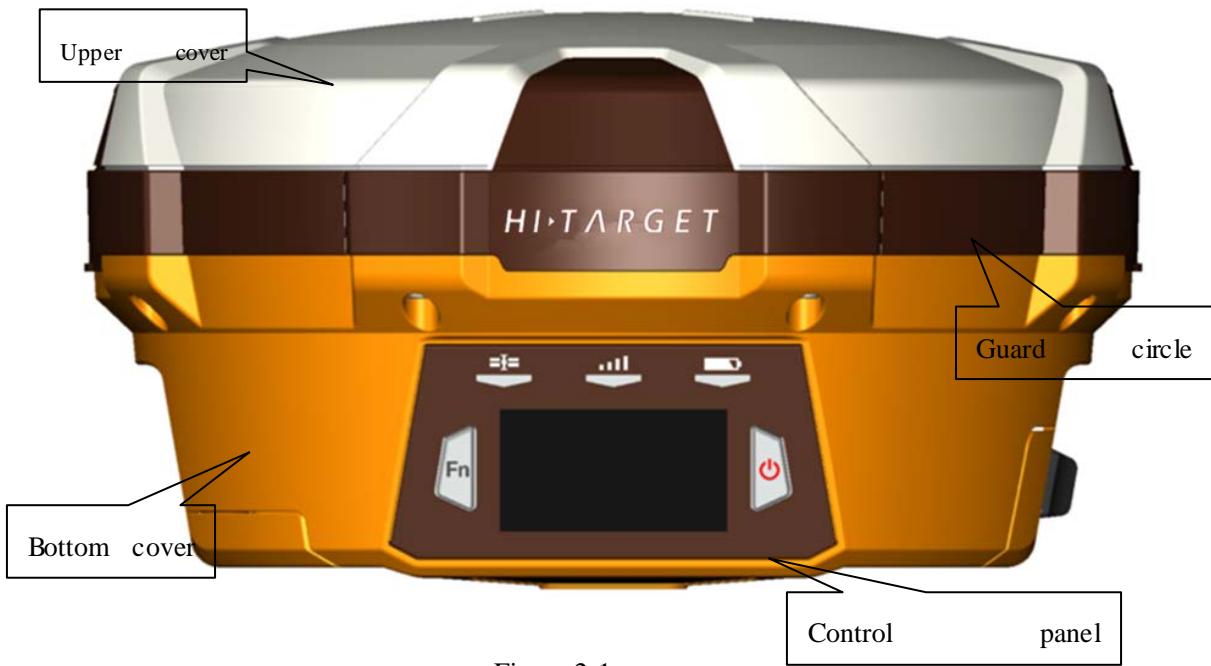
Figure 2-1

Control Panel

The control panel includes Fn key (function key), power button, LED display and 3 indicator lights which are satellite light, status light (bi-color light) and power light (bi-color light). Two buttons cover all functions of V60 receiver setting.
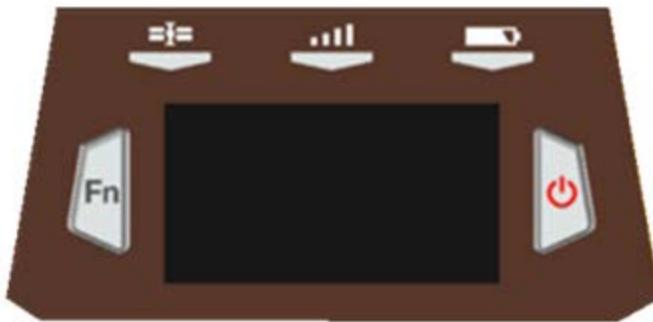
Figure 2-2

Satellite light (green light), status light (red and green light) and power light (red and green light)

Function key: set work mode, data link, satellite elevation, sampling interval, reset receiver, etc.

Power button of startup & shutdown: set confirmation and inquire current work mode.

Upper Cover

Convex plate
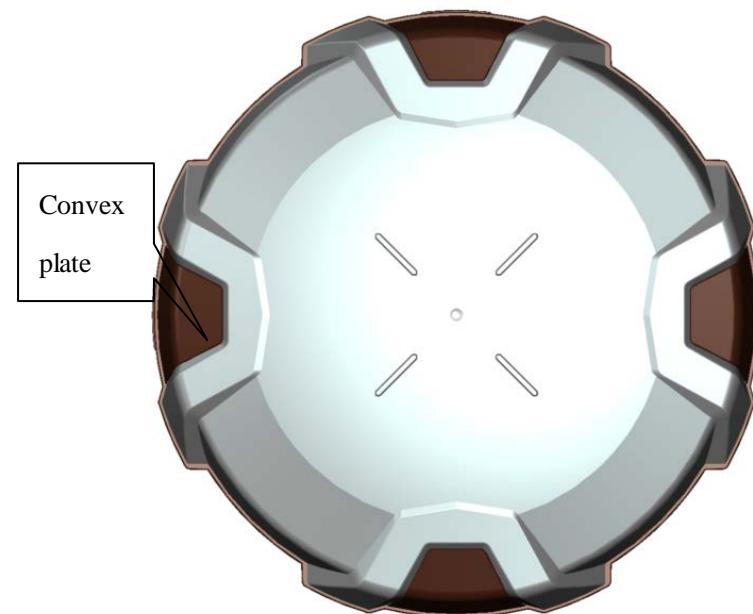
Bottom Cover

Include battery slot, five-core socket, eight-core socket, trumpet, etc.
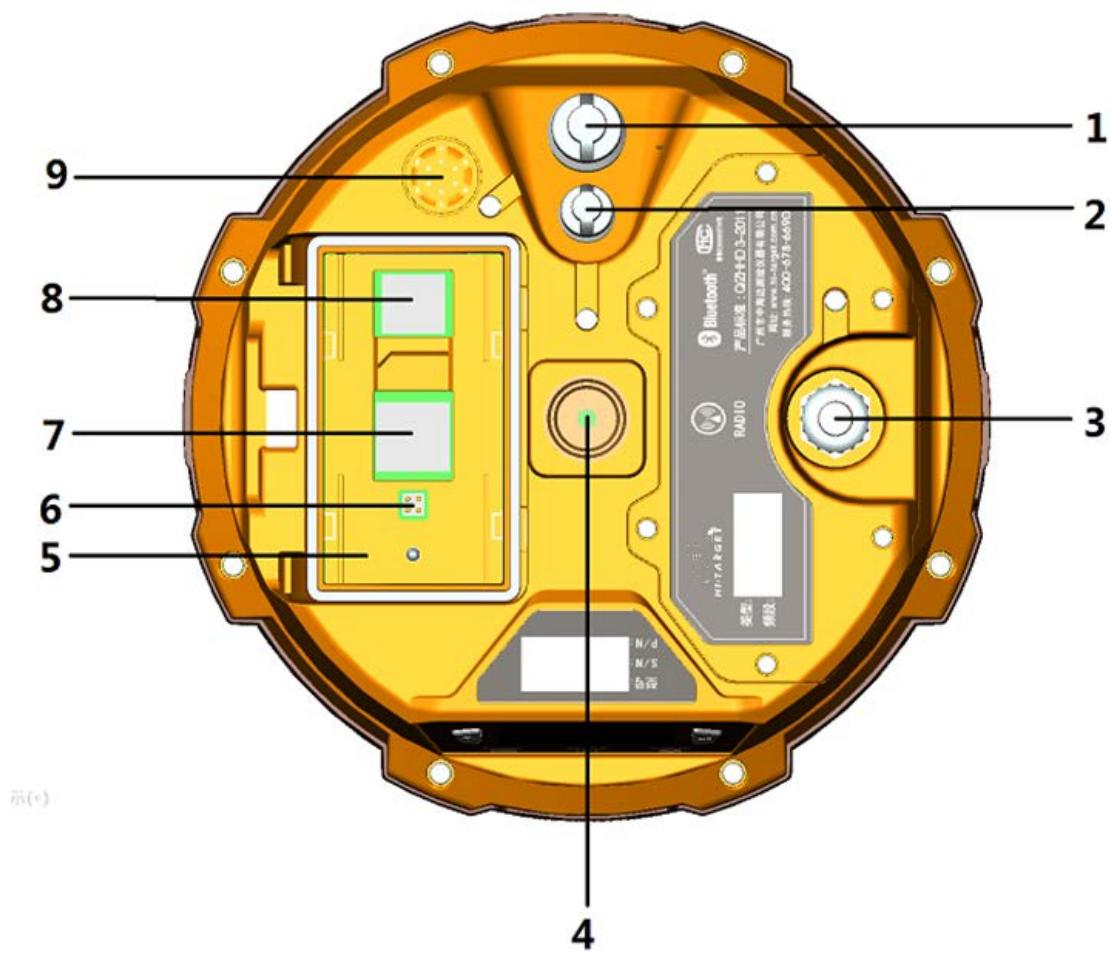
1. Eight-core socket and protection plug; 2. Five-core socket and protection plug; 4. Connecting screw; 5. Battery slot; 6. Vibrating needle power socket; 7. SIM slot; 8. SD card slot; 9. Trumpet

Figure 2-3

◇   Eight-core socket: it is used to connect the receiver, computer, handbook and external power supply, and load and delete the data.

◇   Five-core socket: it is used to connect the receiver, external data chain and external power.

◇ Connecting screw: it is used to fasten the instrument to base or centering rod

◇ Battery slot: it is used to place lithium battery

◇ Vibrating needle power socket: it is used to connect the lithium battery and host

◇ SIM card slot: when communicating with GSM data, it is used to place SIM card.

◇ SD card slot: it is used to place SD card, which can store massive static data.

◇ Trumpet: timely operate the instrument and broadcast the status with voice

◇ Protection plug: it is used to prevent dust in interface

Note: 1. If it is unnecessary to use five-core socket, eight-core socket and difference antenna interface, please cover the rubber plug to prevent dust.

2. In case of inflowing, the trumpet may be silent or hoarse, which will recover normally after drying.

# Five-core and Eight-core Sockets

Figure 2-4
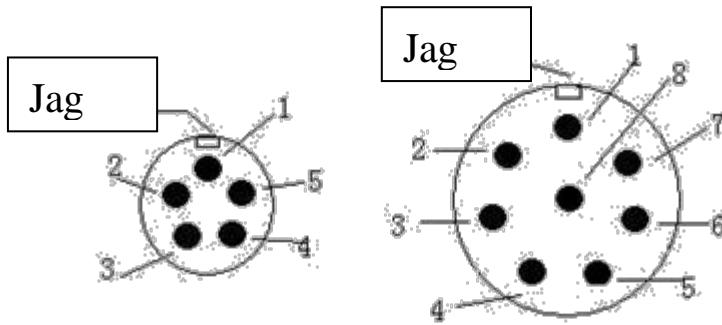
Figure 2-5

1. Five-core socket: it is also called as COM2/PW2, which is used to connect the host and external data chain, and external power supply.

2. Eight-core socket: it is also called as COM1/USB/PW1, which is used to connect the computer and controller, set parameters, download and delete files.

Table 2.1 Description of five-core and eight-core socket signals

Small five-core signal		Large eight-core signal	
1	Ground GND	1	Data into RXD
2	Ground GND	2	USB D-
3	Power into Vin	3	USB D+
4	Data into RXD	4	USB V+
5	Data out TXD	5	Power into Vin
		6	Cable insertion mark GC-2
		7	Data out TXD
		8	Ground GND

◇ Symbol of cable insertion: GC-2 is cable interior

ground

◇ All round sockets are numbered anticlockwise in positive face; all round plugs are numbered anticlockwise in weld face.

◇ All TXD and RXD are described by the receiver. EXD is the transmit data line of receiver; RXD is the receive data line of receiver.

◇ The signal of computer serial DB9 pin joint: 2 (RXD computer data receiving signal line); 3. (TXD computer data transmit signal line) and 5. (GND signal earth). "2 receiving 3 sending" for short

Note: It refers to the socket front of host bottom in the face of host (weld face of socket).

Batteries
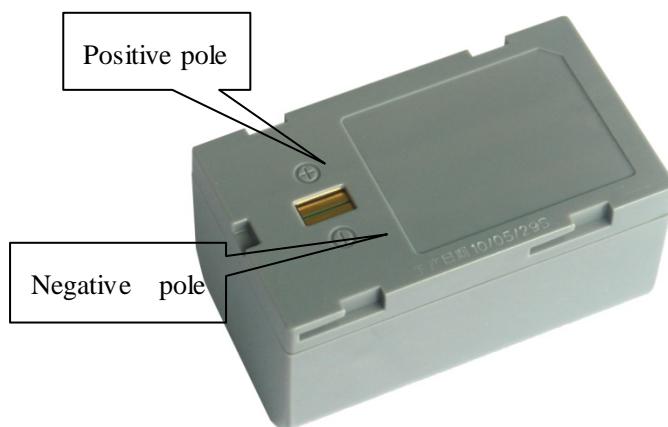
Figure 2-6

Environmental Requirements

The receiver shall operate in dry working environment regardless of waterproof materials. In order to advance the stability and service cycle of receiver, the receiver shall be prevented from extreme environment, such as:

◇   Moisture

◇   Temperatures above 65 degrees centigrade

◇   Below - 40 degrees centigrade

◇   Corrosive liquids or gases

Electronic Jamming

The receiver shall not be installed in the place near to strong electric power and interference signal, such as:

◇   Oil duct (spark plugs)

◇   Generator

◇   Battery-operated motor cycle

◇   DC-AC power supply changeover equipment

◇   Signal transmitting station (tower)

◇   Power supply

Warning: the receiver shall be installed 1 meter away

from human body.

Elementary Operation

This chapter describes:

■ Power supply

■ Control panel

■ Function Key

■ Start and stop receiver

■ SIM card/USIM card

■ Static data storage

■ RTK data storage

■ Reset receiver

■ Formatting receiver

■ Firmware

Power Supply

Battery cover plate installation and removal

Installation: obliquely insert the two raised areas on battery cover plate into the slot; press downwards and fasten the battery cover upon the sound of "bang"; place the pushing and dialing key in locking status.

Removal: move the pushing and dialing key to deblocking status; the battery cover will be popped automatically and opened.

Unlock   state   Lock   state
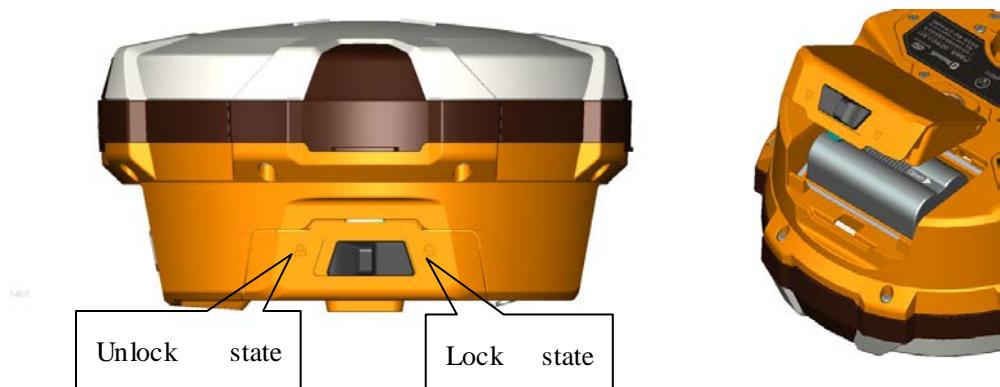
Figure 3-1

Battery installation and removal

Installation: 1. Align   n" side at battery slot   with vibrating needle power socket   .

　　2. Lightly push in towards "close" side (as shown by red arrow) to install battery.
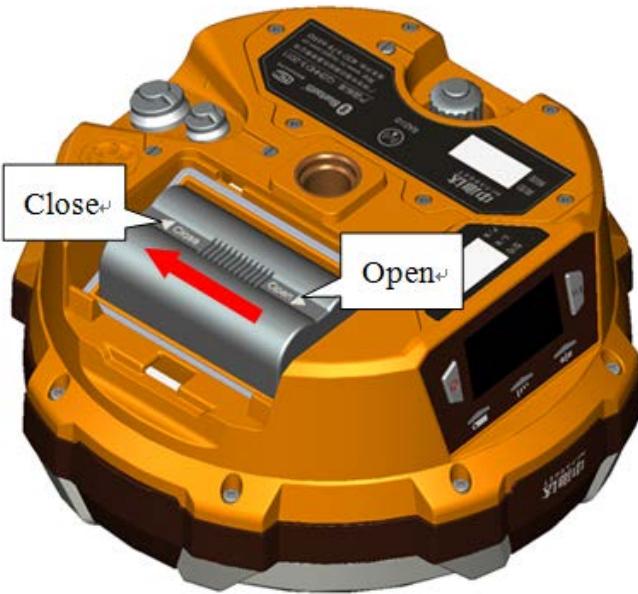
Figure 3-2

Removal: push out along with "open" side and pour out the battery to dismantle the battery.

Power supply mode

Table 3.1 Power supply mode of V60 receiver

Power supply	Power supply mode	Built-in lithium battery, eight-core socket/five-core socket external power supply
	Scope of Power Supply	DC power: 6V-28V

The receiver can also supply power through eight-core

socket/five-core socket external power supply. Where:

The receiver will automatically start after energizing eight-core socket external power supply

The receiver will start through pressing the power button on control panel after energizing five-core socket external power supply.

The external voltage range of GSM operation mode is DC 6-28V. The current shall be more than 1,000 mA. Upon external power supply, the host will automatically detect the voltage of lithium battery and external power supply, and supply power choosing higher voltage. As for external power supply, it shall use the special power specified by Hi-Target.

⚠ **Note:** 1. The service life of lithium battery will decrease along with the decrease in temperature and increase in charging-discharging times. A new 5000 mAh lithium battery can be used for 12 hours upon collection of static data, 9 hours upon GPRS rover.

2. After using up, it shall charge the battery within 24 hours, or the battery performance will be damaged.

3. When the battery is not used for a long time,

please charge once every month to prolong the service life of battery.

Recharge

BL-5000 lithium battery shall use Hi-Target CL-4400 lithium battery charger to charge. About 7 hours of charging time CL-4400 charger is designed with charge lamp. The lamp is red during charging process and turns green upon finishing charging. The battery is full continue charging for another 1-1.5 hours.


Charging lamp

Charger lamp
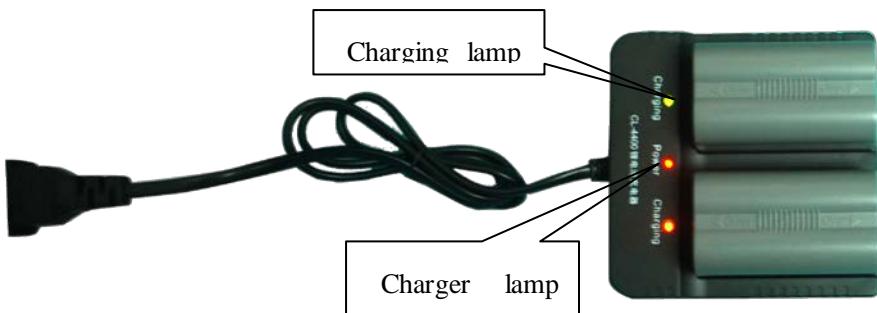
Figure 3-3

Warning: 1. only the battery and charger configured by the manufacturer can be used; the battery shall not be thrown into fire or used in metal short circuit electrode.

2. It shall stop using in case of heating, deformation, liquid leakage, smelling or other abnormal reactions during using, charging or storage process. Check whether the battery and charger are in failure.

3. If the service time of battery is shortened or the battery is aged, it shall exchange new battery.

Control Panel

Most settings and operations of receiver are completed using two keys on control panel.
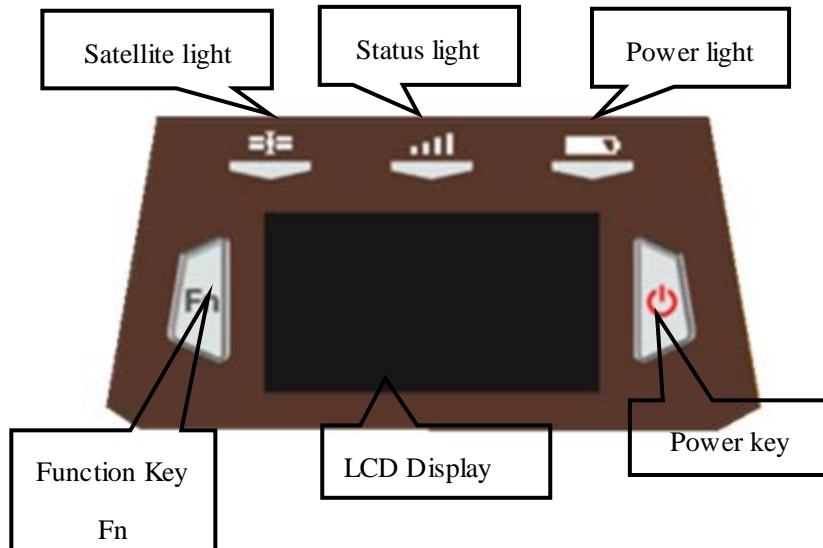
Figure 3-4

Table 3.2 Description of keys operation time

Operation name	Note
Click action	The key operation shall be less than 0.5 seconds
Double-click action	The interval between double click shall be less than 1 second and more than 0.2 seconds
Long-press operation	The key operation shall be more than 3 seconds and less than 6 seconds, upon the sound of "ding-dong"

Super long-press operation	The key operation shall be more than 6 seconds, upon two counts of "ding-dong"
Slow flashing	Light on greater than 0.5 seconds
Quick flashing	Light on less than 0.3 seconds

Key Functions

V60 GNSS RTK system can on or off LCD panel display through double clicking power key. High-definition LCD panel can complete the basic requirements of receiver with two keys, which also can flexibly set three work modes, base, rover and static mode. The key operation of control panel is specified as follows:

LCD coordinates key operation

Double click the power key and start the LCD; the initial interface will display current work mode and relevant basic information.

Figure 3-5

Visible satellite

Remaining power of host

PDOP value

File name of static data

Working mode
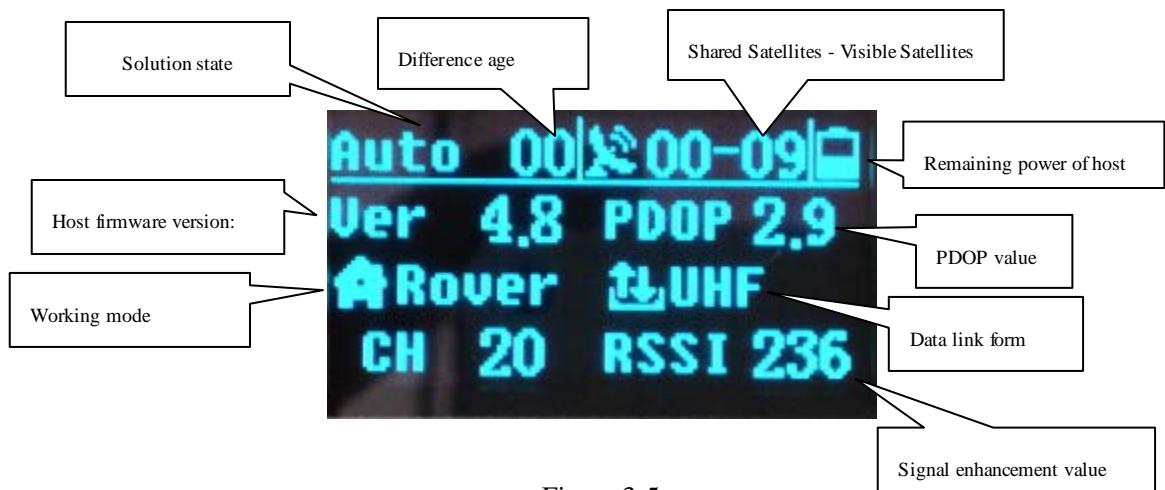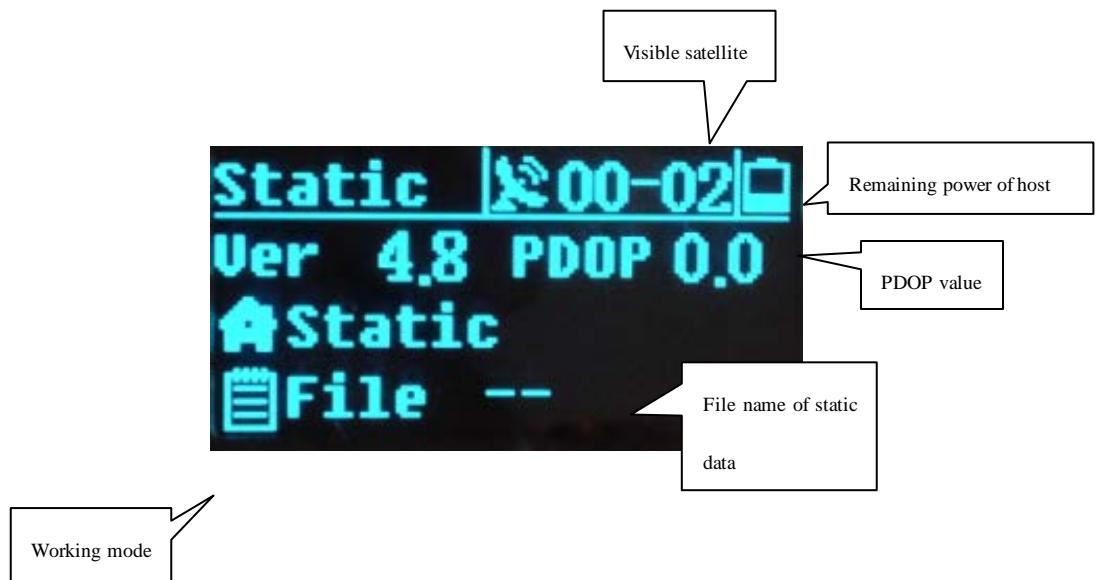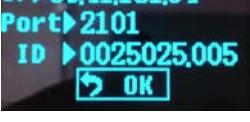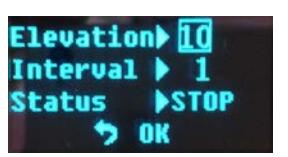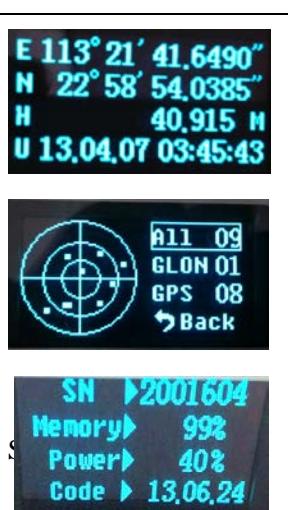
Figure 3-6

Table 3.3 Description of key operation (LCD state)

Function	Operation Keys	Content
On / Off LCD screen	Double click power key	
Selection menu	Click Fn key	Click Fn key and the choice box is skipped to next option
Confirm choice option	Click power key	Click power key; confirm the contents in menu including choice box; enter into lower menu
Display / close initial interface	Double click power key	Display work mode of receiver, satellite information and version information

△Fix ⌚00-04▢ **Information**	Click Fn key	PTK mode is indicated as from left to right: Data link; difference parameters; work mode; system information
△Fix ⌚00-11▢ **Device▶UHF** Switch data chain	Click Fn key and skip choice box; click power key to confirm the choice	Data link menu contains three optional data chain models: GSM, plug-in and returning to previous menu options
IP▶59.41.181.34 Port▶2101 ID ▶0025025.005 ↩ OK GSM Parameter set:	Click Fn key and skip choice box; click power key and enter into edit state After finishing edit, click Fn key choice box and skip to "ok"; click power key to return to previous menu	GSM data link: import IP of server; port; group No.; team No.
Message ▶ -- Elev ▶ 10 Position▶ ▢ ↩ OK B 22:58:52.91096N L 113:21:29.94052E H +52.8710 ↩ OK Differential parameter setting in base		The setting of difference parameters in base contains: 1. Difference massage format: CMR/RTCM2 /RTCM3/sCMRx 2. Elevation angle: 0°-30° 3. Known points: B L H
Message ▶ ▢ Elev ▶ 10 Send GGA▶ NO ↩ OK Parameter setting of rover		The setting of difference parameters in rover contains: 1. Difference massage format: any forms auto-adapted to base. 2. Elevation angle: 0°-30° 3. Frequency of transmitting GGA data: 0s, 1s, 2s, 5s, 10s, 30s, 60s
Static ⌚00-07▢ **Static Set**		Static mode is indicated as from left to right: Static parameter; work mode; system information

Elevation▶ 10 Interval ▶ 1 Status ▶STOP ↺ OK		Static parameter setting Elevation angle 0 ° - 30 ° Sampling interval: 1s, 2s, 5s, 10s, 15s, 30s
E 113° 21′ 41.6490″ N 22° 58′ 54.0385″ H 40.915 м U 13.04.07 03:45:43 All 09 GLON 01 GPS 08 ↺ Back SN ▶2001604 Memory▶ 99% Power▶ 40% Code ▶ 13.06.24	1. Choose ↺ **Back** , click power key to return to previous menu; 2. If the interface has no returning option, click power key to return to previous menu;	System information provides the current coordinates of receiver, sky plot and system state for users to inquire.

Parameter editing method

Taking edit height as an example, liquid crystal interface parameters are edited from left to right. It will pop up a digital option box for selecting operation.

1. Firstly, the cursor is shown in underline quick flashing state at tens digit. Click Fn key to choose figures; click power key after confirming; the cursor will be automatically kipped to next bit;

2. If it is unnecessary to edit from the first bit, open the option box to pitch on the cursor ➡ or ⬅, the cursor will skip one bit upwards or downwards;

3. After editing, click Fn key, pitch on the frame and skip to next edit option (such as sample interval).

Cursor skips one place downwards

Cursor skips one place upwards
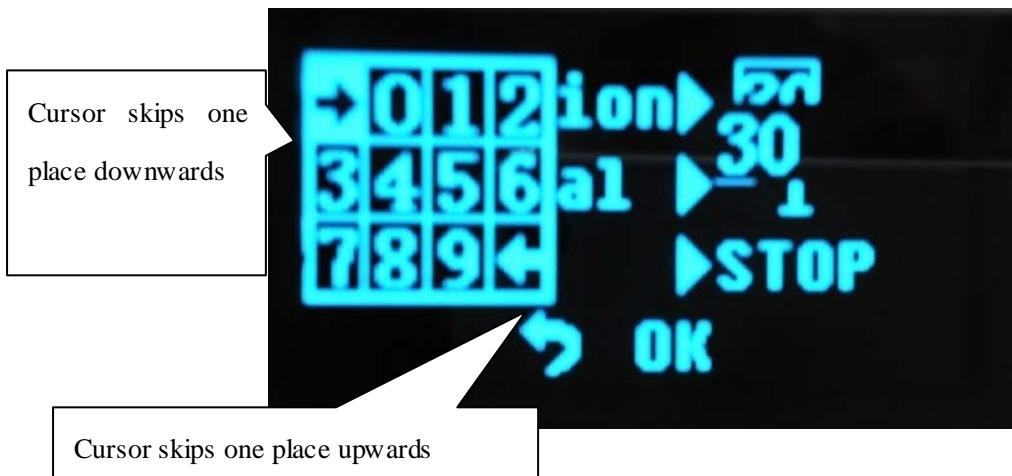
Figure 3-7

Notes:

1. Only when liquid crystal displays initial interface or state information, can the equipment terminal software be connected with host through serial port/Bluetooth. When liquid crystal interface is in mode parameter setting interface, the terminal is unable to connect with the host. It is necessary to wait for liquid crystal operation and return to previous menu.

2. As for GSM data link parameter setting interface, the panel can be effective only setting Hi-Target server IP: 202.96.185.34, port: 9000, group number (7 bits), team number (3 bits); if connected by CORS, parameter setting shall be operated through Hi-Target handbook software.

3. During the process of static data collection, it is effective to set parameters (elevation angle, sampling interval). The successful parameters will be effective upon restarting static collection.

4. If the keys are not operated exceeding 50 seconds under LCD state, the LCD will close automatically and the system will enter

into key mode, in order to economize power consumption. The user can double click power key to restart LCD.

Use keys to off LCD.

If there is no LCD, it can switch the work mode through two keys and provide voice service to assist the users in finishing operation.

<div align="center">Table 3.4 Description of key operation (without LCD state)</div>

Function	Operation keys	Content
Working mode	Double click Fn key (interval >0.2 S; less than 1S	Choose the work mode of "base", "rover" and "static".
Data link	Long-press Fn key (Greater than 3 S)	Enter into the mode choice of "GSM" and data link; click power key to pitch on the mode
Setting confirmation	Click power key	Promote current work mode, data link mode with voice; use power lamp to indicate electric quantity of battery
Automatic set-up base	Fn key + power button startup	Press on Fn key and then press power key to start; loosen Fn key upon the sound of "ding dong". Confirm the current state of receiver with voice prompt

Reset receiver	Super long Fn key press	Reset motherboard If the handbook Bluetooth fails to connect with the host after resetting the host, it can adjust the host in static mode and then reset after data collection.

Start and Stop Receiver

Table 3.5 Description of display state of indicator under startup and shutdown mode

Boot-strap	Press the power button for 1 second	All indicator lights on	Starting music, work mode before previous startup and Voice prompt of data link mode
Shutdown	Long press power button for 3 seconds	All indicator lights off	Shutdown music

The display state of indicator under different setting modes is different. See appendix 3: description of indicators on control panel.

SIM card/USIM Card

The receiver uses online data link mode to operate RTK; it is necessary to prepare online communication card and open the relevant data communication business. The card quantity demanded is set according to the configuration of RTK

measurement system. Each host and controller installs one card. The receiver supports SIM card and USIM card

Table 3.6 Description of SIM card / USIM card

USIM card	GPRS（ZHD/VRS）
	GSM
SIM card	GPRS（ZHD/VRS）
	GSM

Before using SIM card or USIM card, please ensure GPRS data business has been opened.

SIM installation procedure

1. Dismantle battery cover plate; take down the battery and disclose SIM card slot.
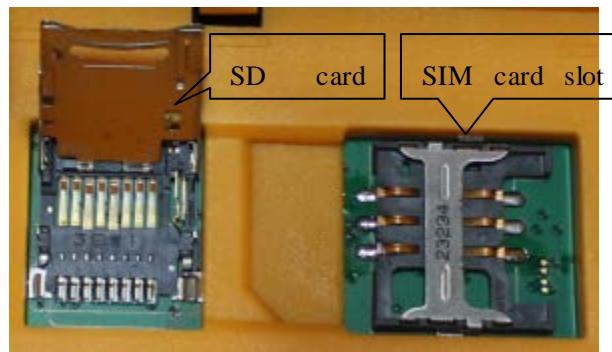
Figure 3-8

2. Place SIM card into cassette; insert the card into slot with front down (the face with mental contacts) and lock the card

Figure 3-9

Static Data Storage

Dual format storage for static data

It can use Hi-Target RTK software to start or close static data collection function under standard form in GPS →information → advanced settings →RTK setting; it shall open or close static data collection function under standard form before recording static collection; if it is necessary the carry out the operation during collection process, the collection will continue to record new file after stopping records. At this time, the static data have been stored in two files.

Save data in internal storage

GNSS static data are stored in "static": in 1G massive memory. The effective storage space is 800M bytes. There are 3 files in total: log, gnss, rinex. log folder stores log information; gnss folder stores static data file whose format is *. GNS, rinex folder stores static data under standard format. You can use USB of Y –type data line to connect with the computer. Use USB to copy the static data to your computer.

Name ▲	Type	Date Modified	Size
📁 rinex	File Folder	2014-4-14 12:14	
📁 log	File Folder	2014-4-14 12:14	
📁 gnss	File Folder	2014-4-14 12:14	

Note: when the storage space of receiver is less than 2M bytes, the data light (red light) will flash quickly and stop recording data. The current data file will not be covered.

External SD card data storage

The receiver shall support SD card data. SD card slot is installed under the battery. When the capacity of internal storage is not enough, the system will automatically store the static data into SD card.

Before external data collection, it can use Y-type data line to connect the computer and receiver. Through receiver management software, manually set the storage location of static file in SD card/internal memory. The setting is successful after restarting the instrument.

Raw Data Parameters

Collect Interval: 1   ECutoff: 15   [Read] [Set]

Prefix: *   File SN: 001   [Read] [Set]

Store Location: ○ SD Card   ⊙ FLASH   [Read] [Set]

Figure 3-11

internal storage disc symbol   SD symbol

static (I:)   Removable Disk (J:)

Figure 3-12

SD card

SD card installation procedure

1. Dismantle battery cover plate; take down the battery and disclose SD card slot.

2. Push up the mental cover according to the prompts; open the upper cover of SD card and place SD card.
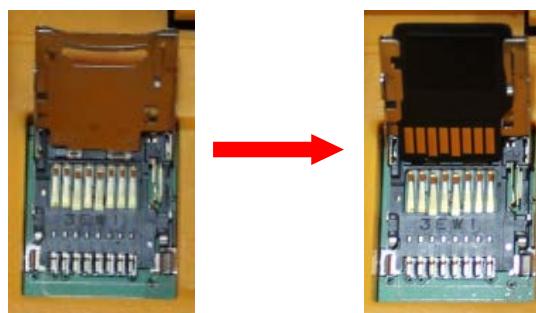
Figure 3-13

3. Push down the upper cover and push outside to fasten the upper cover.
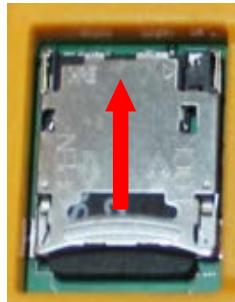
Figure 3-14

Note: it shall turn off the power of receiver before installing card. If SIM card is installed under startup state, the receiver will fail to detect SIM card, and the setting of work mode will be ineffective.

RTK Data storage

The controller can be connected with the receiver through Bluetooth. After finishing setting, the collected RTK data will be store in NandFlash of the controller. You can download RTK data to your computer through the cable.
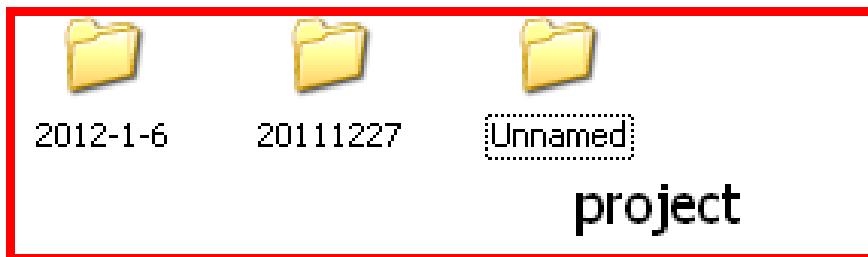
Figure 3-15

Reset receiver

Super long-press Fn key and reset the motherboard. The motherboard can be recovered to delivery state.

> ⚠ **Warning:** the reset of motherboard will prolong the first locking time of receiver. It is necessary to reset the work mode of receiver.

Formatting Receiver

If it is necessary to format the receiver, use the serial port of Y-type data line to connect with the computer; open GNSS receiver management software, choose serial port and open serial port. After connecting the instrument, the upper side of management software will display the machine number. Click "Format/Delete all" to format the receiver. All data will be deleted and unable to recover.
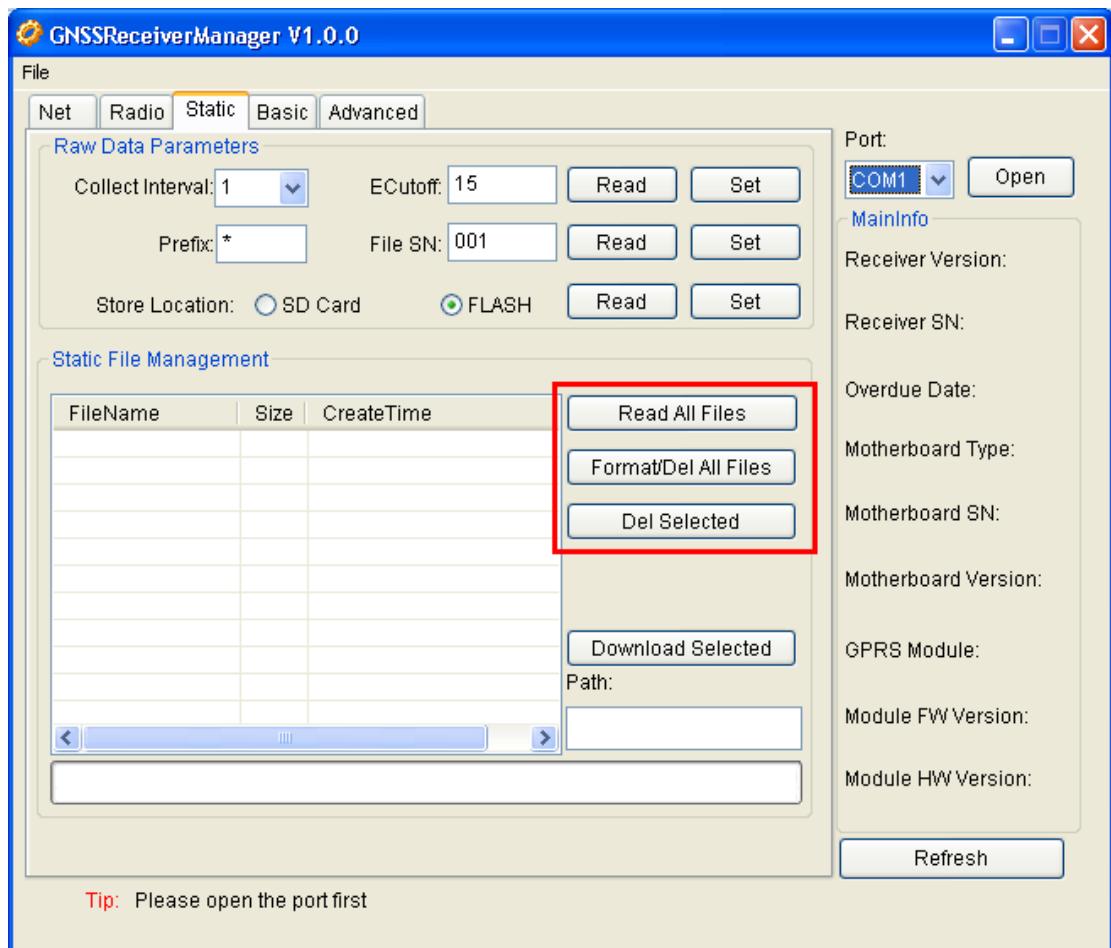
Figure 3-16

> **Warning:** Before formatting the receiver, it shall ensure all useful data in receiver are copied to the computer.
>
> The data will not be recovered upon deletion or formatting.

Firmware

The receiver can upgrade firmware through USB drive.

Upgrade steps of firmware:

Devices with Removable Storage

DVD Drive (G:)   update (H:)   static (J:)

Figure 3-17

1. Firstly, it shall open the receiver and use Y-type data line to connect with USB port of computer. Open "my computer", and "update" disk will appear.

2. Copy the firmware (the firmware can be downloaded from official website) to "update" disk; remove U disk, pull up Y line and restart the receiver.

3. During restarting process, it will have voice prompts in case of failure or success. In case of failure in updating, please update again or contact with technicians.

C H A P T E R

4

Static Collection and Data

Transmission

This chapter describes:

■ Preface

■ Static measurement

■U disk data download

■ Operations of static management software

Preface

V60 receiver can be used in double-frequency static measurement. The setting method is double clicking Fn key, and then the voice broadcast will enter into work mode. Continue clicking Fn key and the work mode of voice broadcast is static mode when the satellite light and state light are on. Click power key to confirm. After successful setting, the red state light will flash one by several seconds (according to the sampling interval), one epoch will be collected by one flash. The static data can be stored in host or SD card. If the static data document shall be downloaded to computer, it shall use static post-processing software to process.

Static Measurement

1. Setup the instrument in measurement point; align and level the instrument.

2. Measure height of the instrument for three times; the difference between two times shall not be more than 3mm; the average is regarded as the final height of instrument. Height of instrument refers to the distance between center of measurement point and measurement marker line of instrument.

3. Receiver parameters:

◇ Receiver radius 91mm

◇ The height from receiver bottom to phase center of antenna is 94.2mm

◇ The height from measurement line of instrument to phase center of antenna is 39.3mm.

Measuring position of antenna height (lower edge of embossing position)

Figure 4-1

4. Record the point name, instrument SN, height and initial observation time.

5. Start up and set the receiver as static mode. Flashing satellite light indicates that it is searching the satellite. If the satellite light turns to long-light state from flashing state, it indicates that the satellite is locked. The state light will be flashing according to sampling interval. One time of flashing indicates one epoch is collected.

6. Shut down after finishing measurement and record shutdown time.

7. Download and process data.

⚠ **Note:** it is unable to move the base and change collection parameters during collection process.

U Disk Data Download

Receiver file management is stored by USB drive. It can be used upon inserting and download by dragging directly without download programs. It can only download static data and unable to write or read the receiver.

The receiver can download USB drive data with Y-type data cable, one end is connected to computer USB and the other end is connected to eight-core socket on bottom of receiver. After connection, "static" disk and SD card will appear in computer. After opening the disk, it can copy the collected static file.

internal storage disc symbol   SD symbol

static (I:)   Removable Disk (J:)
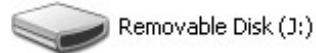
Figure 4-2

The steps to modify point name and antenna height of downloaded static file are:

1. Choose *. GNS and double click the mouse

2. Pop up the dialogue of "file edit" to modify point name and input antenna height, and then click "ok"

Figure 4-3

Note: the static files in removable disk can be deleted by GNSS receiver management software rather than deleting directly.

Operations of Static Management Software

The main functions of GNSS receiver management software:

◇ Delete the original data document

◇ Delete and format the whole internal storage

◇ Read and set the parameters

◇ Set the storage path of static data

Procedures:

1. Use two ends of Y-type data line to connect eight-core socket of receiver and serial port of computer.

2. Select computer port and click connect.

3. Refresh directory; the observed data file will appear in the

form.

4. File name: 8 characters in total. The first character is replaced by underline; the second, third and fourth character are the last three characters of machine number; the fifth, sixth and seventh character are annual day; the eighth character is the number of time on that day.

5. Creation time: creation time of file (Beijing Time)
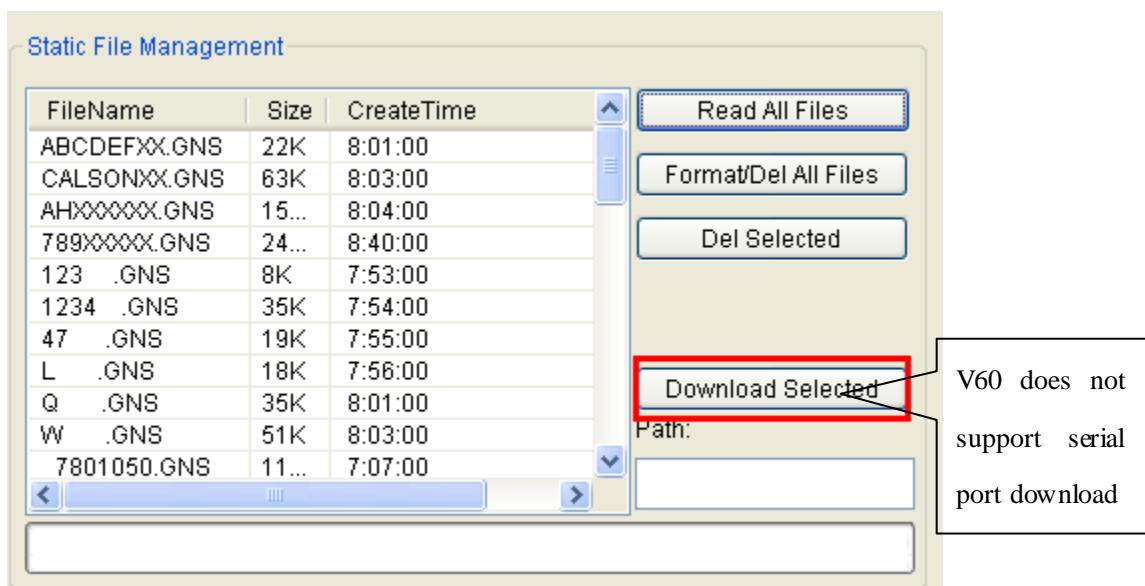
Figure 4-4

6. Deleting data: pitch on the data to delete, click and delete the selected file.

7. Change collection interval and satellite cutoff angle: transmit the data to change and click setting parameters Click and read the parameters to investigate the original collection interval and satellite cutoff angle.

8. Format data: click "Format/Delete all" to format the receiver. All data will not be recovered after deleting.

Technical Parameters

This chapter describes:

■ GNSS part

■ Receiver precision

■ Interface

■ Physical characteristics

■ Environment

GNSS Part

◇ GPS: synchronously track L1 C/A, L2E, L2C, L5

◇ BDS: synchronously track B1, B2

◇ GLONASS: synchronously track L1 C/A, L1 P, L2 C/A (only limited to GLONASS M) and L2P

◇ SBAS, WASS, MSAS, ENGOS

◇ GALILEO:(upgrade reserved)

◇ Initial time is less than 10 seconds

◇ Initial reliability: >99.9%

◇ 1Hz, 2Hz, 5Hz, 10Hz, 20Hz and 50Hz navigation output

◇ Difference format supports: sCMRx, CMR, CMR+, RTCM 2.1, 2.2, 2.3, 3.0, 3.1, 3.2

◇ Navigation output format: ASCII: NMEA-0183 GSV, AVR, RMC, HDT, VGK, VHD, ROT, GGK, GGA, GSA, ZDA, VTG, GST, PJT, PJK, BPQ, GLL, GRS, GBS

Receiver Precision

◇ Accuracy of static mode and fast static mode:
Horizontal: $\pm(2.5+0.5\times10-6D)$ mm

Vertical: $\pm(5+0.5\times10-6D)$ mm

◇ RTK navigation accuracy: Horizontal: $\pm(8+1\times10-6D)$ mm

Vertical: $\pm$ (15+1×10-6D) mm

Interface

◇   Two RS232 serial interfaces

◇   One USB interface

◇   1 SIM card interface

◇   1 SD card interface

◇   1 Bluetooth interface

◇   1 built-in lithium battery interface

◇   Two external DC power input interface

Physical characteristics

◇   Built-in 1GB memory

◇   Volume: φ182mm×h98mm

◇   Weight: 1.25kg (excluding lithium battery)

◇   It can resist 2m natural falling and 2m underwater soaking

◇   5000 mAh large-capacity lithium battery is installed internally for power supply The continuous working hours of new battery: 12 hours in static; 9 hours in GPRS mode

◇   External DC power supply; input range of width is 6-28V; internal and external power supply can switch automatically

◇   Host power consumption (under static mode):

≤3.5W

Environment

◇ Protection grade: IP67

◇ Working temperature: -40 ~65 ℃; storage temperature: -40 ~75 ℃

C H A P T E R

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Socket and Main Accessories

This chapter describes:

■ Preface

■ Y-type data cable

Preface

The chapter will introduce the appearance and application of main interface of receiver and accessories. The following equipment does not represent all users purchased V60. According to different configurations, the specific configuration shall be subject to the delivery order upon purchasing.

Y-type Data Cable

Figure 6-2

Eight-core plug: connect eight-core socket of receiver

USB interface: connect computer USB interface and download the static data of receiver.

Serial interface: it is used to connect with computer serial port, update receiver firmware, set the receiver, manage static data.

Warning: 1. when connecting various plugs of receiver, it shall align the red point in line joint at the red point in receiver socket, or it will damage the receiver socket and plugs of

various lines.

2. When plug out the plug, directly grasp the sliding collar and pull out the plug with effort. It shall not rotate the plug.

3. After using the cable, it shall place the cable in the place difficult for extrusion, in order to prevent damaging the plug. When installing the difference antenna, it shall rotate the fixed nut in bottom of difference antenna with hand, rather than grasping the upper side to rotate, or the difference antenna will be in bad contact and influence the operating range.

Annexed Table 1 Instructions of Indicator Lights in Control Panel

Annexed Table 2.1 Instructions of indicator lights

Operation	Signification	
Power light (Yellow)	Always on	Normal voltage: internal battery >7.6V; external battery >12.6V
Power light (Red)	Always on	Normal voltage: 7.1V< internal battery≤7.6V, 11V<external battery≤12.6V
	Slow flashing	Under voltage: Internal battery ≤7.1V; external battery ≤11V
	Quick flashing	Indicating electric quantity: flash 1-4 times every minute; indicate electrical quantity
Signal lamp; indicator (Status Green)	Always off	GSM is not used
	Always on	GSM connection to server
	Slow flashing	It indicates that it has logged in GPRS network upon GSM
	Quick flashing	It indicates that it is logging in GPRS network upon GSM
Data light (Status Red)	Slow flashing	1. data link receiving and transmission data (the rover is only for promoting receiving; the base is only for promoting the transmission) 2. Static data collection
	Quick flashing	1. error occurred upon static mode (FLASH storage space is not enough)

	Always on	The data link equipment used in rover or base is unable to communicate. The communication module is in failure without data output.
Satellite light (Green)	Always on	Locked satellites
	Slow flashing	Satellite search or satellite losing lock
	Quick flashing	Report the number of satellite once every minute upon locking the satellite
	Always off	1. Upon resetting receiver, the motherboard is in failure without data output. 2. Under static mode, the motherboard is in failure without data output.

The display status of indicator under different setting modes:

1. Work mode (double click Fn key to enter into the pattern of work mode setting; choose the mode after clicking Fn key; press power key to confirm; it will automatically confirm if the power key is not pressed for exceeding 10 seconds;) ●on; ○off

Annexed Table 2.2 Display status of indicator under work mode

Mode	Satellite lamp (single green)	Signal light (green light in double lights)
Base	●	○
Rover	○	●
Static	●	●

2. Data link (long press Fn key to enter into data link setting mode; choose the mode after clicking Fn key; press power key to confirm; it will automatically confirm if the power key is not pressed for exceeding 10 seconds;) ● on; ○ off

Annexed Table 2.3 Display status of indicator under data chain mode

Type	Satellite lamp (single green)	Signal light (green light in double lights)
GSM	○	●
External	●	●