V30 GNSS RTK System Manual

Manual Revision

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<th>Revision Date</th>
<th>Revision Level</th>
<th>Description</th>
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**V30 GNSS RTK System Manual**

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Preface

Chapter Instruction

■ Instruction
■ Relative Information
■ Your Suggestions
Instruction

Welcome to Hi-Target V30 Series GNSS RTK system manual. This manual is designed for V30 GNSS RTK system, and use V30 GNSS RTK as an example to explain the installation, setup, and usage of the GNSS RTK system.

If you have used other GNSS RTK system before, Hi-Target suggests you read this manual carefully and this manual will help you to understand our V30 GNSS RTK system easily. If you do not familiar with GNSS RTK, please check Hi-Target website: http://www.hi-target.com.cn/en/

Relative Information

You can get the manual from: 1, the complement CD when purchasing Hi-Target V30 equipment. You can get this manual from folder named Manual; 2, Download from Hi-Target website, Go to “Support” -> “Manual” -> “Surveying Products”.

Your Suggestions

If you have any suggestions or comments on the manual, please feel free to contact us, it will help us to improve our manual quality greatly.
Summary

Chapter Introduction

- Introduction
- Products Features
- Usage and Notes
Introduction

V30 GNSS RTK system adopts modularized design, so as to enable users to change into different differential transmission modules according to various requirements. Those are traditional radio transmission, GPRS and 3G communication functions. Meanwhile the designed self-diagnosis function can automatically check the working status of all hardware and software of the V30 receiver while working, and arouse the problem part by its intelligent voice messenger in case of some problem.

Data collection controller can be connected with receiver mainframe via Bluetooth or cable; built-in high-capacity battery is suitable for long-time field work; static data can be stored in the built-in memory card of receiver and downloaded via USB port to your PC.

Tips: 1. V30 GNSS RTK system has many modules. This manual does not represent standard configuration. Users need to notify their own requirements for the different configuration due to different applications.

2. And before using, we suggest users firstly to check whether the package box is damaged, and then open careful and check whether inner items matched with the order list of their own. If there are some missing or damaging cases exist for products and accessories, please contact with the local
distributor or Hi-Target Foreign Trade Dep. Immediately.

3. Last but not least, please carefully read manual before carrying, handling and using!

---

**Product Features**

1. BD970 mother board of Pacific Crest, a Trimble Company, multi-satellite, multi-system kernel.

2. Built-in transmit-receive UHF, exchangeable Base and Rover.

3. The radio power is adjustable to be 0.1w, 1w, 2w.

4. 1+X multi-module communication units.

5. PCC Radio module (optional) compatible with Trimble/Leica RTK.

6. Double battery capacity as 4400mAh, 12 hours for RTK operating.

7. The highest performance in waterproof, dustproof and anti-drop.

8. Adjustable to be single GNSS system or multi-GNSS system: GPS, GLONASS, GALILEO.

**Usage and Notes**

Although V30 receiver using chemical and impact resistance material, but necessary taking care and maintenance is still required for such a precise instrument.
Warning: The receiver must be used and stored in the specified temperature. More details please refer to Chapter 7: Technical Parameters.

To ensure the quality of continuous tracking satellites and signals, surveying work should be in open air, while there should no any obstacle in space above 15° altitude angle; in order to reduce all kinds of electrical interference to the GNSS satellite signals. Besides, there should not be strong electrical interference around within about 200m range, such as the television tower, microwave stations, high voltage transmission line. Also, in order to avoid or reduce the occurrence of multi-path effect, stations should be away from terrain or geographical objects, which will strong effect electrical signal, such as high-rise buildings, big pool, etc.
CHAPTER 3

Receiver Introduction

Chapter Introduction

- Introduction
- Receiver Appearance
- Control Panel
- Upper Cover
- Lower Cover
- Communication Module
- Battery
- Environmental Requirement
- Electric Interference
Introduction

This Chapter mainly introduces V30 receiver appearance, buttons and indicator led and so on.

Receiver Appearance

Receiver Appearance mainly including 4 parts: upper cover, lower cover, guard collar and control panel, as Figure 3-1
Control Panel

Figure 3-2, in the middle of red frame of V30 receiver is control panel. And the control panel contains the F1 key (function key 1), F2 key (function key 2) and the power button, 3 indicator leds which are respectively satellite led, the status led (dual-color led), the power led (dual-color led). The simple three buttons include all the features setting of the v30 receiver.

![Control Panel](image)

- **Satellite led (green led)**
- **Status led (red-green dual-color led)**
- **Power led (red-green dual-color led)**
- **Function Key: settings of working mode, UHF radio**
transmitting power, satellite elevation angle, automatically base setting, reset receiver and so on.

Function Key: settings of data link, UHF radio channels, collection interval, back to original setting.

Power Key: setting confirmation, automatically base setting and so on.

**Upper Cover**

Figure 3-3 indicates the upper cover of V30 receiver, the main function of which is anti-drop and anti-scratch.

- Raised Point: anti-wear point to avoid instrument being scratched
- Raised Plate: 5 raised plates can avoid wear-out and falling
Lower Cover

As figure 3-4, lower cover of V30 includes communication module slot, battery groove, five-pin port, eight-pin port, loudspeaker and so on.

- Communication Module: according to different requirements, traditional UHF radio, GPRS and 3G communication module can be chosen
- Communication module connector: connect communication module and mainframe
- Battery Groove: install 4400mAh lithium battery
- Five-pin port: connect mainframe with external data link or

![Figure 3-4 Lower Cover](image)
with external power supply

✧ Eight-pin Port: connect V30 receiver with computer, or controller for data download and delete
✧ Protection Plug: anti-dust and waterproof for socket
✧ SIM card slot: when choose GSM communication, install SIM card.
✧ Joint Nut: fix instrument with tribrach and centering pole.
✧ Loudspeaker: voice broadcast for real-time operation and status.

Tips: 1. if no need to use five-pin port, eight-pin port and differential antenna port, please affix rubber plugs to achieve waterproof and dustproof.

2. when water comes in loudspeaker, maybe it becomes silent or sound hoarse. But it will be back to normal after drying.

Communication Module

As figure 3-5 of the appearance of communication module, according to different requirements, V30 receiver can be installed with traditional UHF radio, GPRS and 3G communication module.
Battery

As figure 3-7, the appearance of 4400mAh lithium battery
Environmental Requirement

Even though V30 receiver uses waterproof materials, maintaining in a dry environment is still helpful. In order to improve the stability, and duration of the receiver, please avoid exposing the receiver in extreme environments, such as:

✧ Moist
✧ Temperature higher than 65 Celsius degrees
✧ Temperature lower than -40 Celsius degrees
✧ Corrosive liquid or gas
Electrical Interference

Do not place GNSS receiver around a strong power interference signal source, such as:

✧ Oil duct (spark plug)
✧ Television and computer monitor
✧ Generator
✧ Electric motor
✧ DC-AC power conversion equipment
✧ Fluorescent Light
✧ Power switcher
General Operations

Chapter Introduction

- Introduction
- Button Functions
- Led Status Instructions
- Turn On/Off Receiver
- Static Data Storage
- RTK Data Storage
- Reset Receiver
- Back to Original Settings
- Format Receiver
- Power Supply System
- Communication Module
- SIM Card/ USIM Card
- Firmware
Introduction

Most of the operations of V30 receiver can be done by the three buttons on the mainframe panel.

Buttons on the panel:

Explanations of buttons operations and leds hints as below:

<table>
<thead>
<tr>
<th>Operations</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single click button</td>
<td>Press a button less than 0.5 second</td>
</tr>
<tr>
<td>Double click button</td>
<td>Double click the button while the clicking interval should be between 0.2 to 1 second</td>
</tr>
<tr>
<td>Long pressing button</td>
<td>Pressing button more than 3 second</td>
</tr>
</tbody>
</table>
### Super long pressing
- Pressing button more than 6 second

### Slow flash of led
- Flashing interval more than 0.5 second

### Fast flash of led
- Flashing interval less than 0.3 second

## Button functions

<table>
<thead>
<tr>
<th>Factions</th>
<th>Button operations</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Work mode</strong></td>
<td>Double click F1</td>
<td>Then single click F1 to choose the receiver work mode among “base”, “rover”, “static”</td>
</tr>
<tr>
<td><strong>Data link</strong></td>
<td>Double click F2</td>
<td>Then single click F2 to choose the data link among “GSM”, “UHF”, “External”</td>
</tr>
<tr>
<td><strong>UHF mode</strong></td>
<td>Long pressing F1</td>
<td>Then single click F1 to set the transmit power to be high, middle, or low</td>
</tr>
<tr>
<td>Channel</td>
<td>Long pressing F2</td>
<td>Then single click F1 to choose channel by minus 1; or you can long pressing F1 to choose channel by minus 10; or single click F2 to choose channel by plus 1; or you can long pressing F2 to choose channel by plus 10</td>
</tr>
<tr>
<td><strong>Static</strong></td>
<td>Long pressing F1</td>
<td>Single press F1 to set elevation angle to be 5 degrees, 10 degrees, or 15 degrees</td>
</tr>
<tr>
<td>Collection interval</td>
<td>Long pressing F2</td>
<td>Single press F2 to set collection interval to be 1s, 5s, 10s</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>Static data collection</td>
<td>Double click F2</td>
<td>Double click F2 to start collecting static data</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Confirm setting</th>
<th>Single press power button</th>
<th>Then the receiver will speak out its current work mode, data link, radio transmit power, channel; meanwhile the power led will flash to hints its power status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto-set base</td>
<td>F1+Power button to turn receiver</td>
<td>Press F1 while than press power button at the same time to turn on the receiver until hearing “Dingdong”. Then the receiver speak out its current status.</td>
</tr>
<tr>
<td>Reset receiver</td>
<td>Long press F1</td>
<td>Reset the mother board</td>
</tr>
<tr>
<td>Back receiver to original settings</td>
<td>Long press F2</td>
<td>Then it will automatically rectify, correct and reset to the original settings.</td>
</tr>
<tr>
<td>Check current work status</td>
<td>Single click any button in non-settings status</td>
<td>For static mode: receiver speaks out “static”, collection interval, elevation angel; at the same time the power led flashing times hints the power status and the satellites led flashing times hints tracked satellites number For base in external mode: receiver</td>
</tr>
<tr>
<td>General Operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>speaks out “external, base”; at the same time the power led flashing times hints the power status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For rover in external mode: receiver speaks out “external, rover”; at the same time the power led flashing times hints the power status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For base in internal UHF: receiver speaks out “UHF, base, channel **, power *”; at the same time the power led flashing times hints the power status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For rover in internal UHF: receiver speaks out “UHF, base, channel **”; at the same time the power led flashing times hints the power status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For base in GSM mode: receiver speaks out “GSM, base”; at the same time the power led flashing times hints the power status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For rover in GSM mode: receiver speaks out “GSM, rover”; at the same time the power led flashing times hints the power status</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Led Status Instructions

<table>
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<tr>
<th>Led</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power led</strong> (yellow)</td>
<td>Always on&lt;br&gt;In normal voltage: internal battery voltage &gt;7.6V, external battery voltage &gt;12.6V</td>
</tr>
<tr>
<td></td>
<td>Always on&lt;br&gt;In normal voltage: 7.2V&lt;internal battery voltage ≤7.6V, 11V&lt;external battery voltage ≤12.6V</td>
</tr>
<tr>
<td></td>
<td>Slow flash&lt;br&gt;Low power-pressure: inter≤7.2V, external≤11V</td>
</tr>
<tr>
<td></td>
<td>Fast flash&lt;br&gt;Power status hints: one or four times of one minute</td>
</tr>
<tr>
<td><strong>Power led</strong> (red)</td>
<td>Off&lt;br&gt;In external radio, UHF mode, and static mode</td>
</tr>
<tr>
<td></td>
<td>Always on&lt;br&gt;GSM module has been connected to internet server successfully</td>
</tr>
<tr>
<td></td>
<td>Slow flash&lt;br&gt;GSM module has been connected to internet server successfully</td>
</tr>
<tr>
<td></td>
<td>Fast flash&lt;br&gt;GSM module is trying to connect to internet server</td>
</tr>
<tr>
<td><strong>Status led</strong> (green led for status)</td>
<td></td>
</tr>
<tr>
<td><strong>Data led</strong> (red led for status)</td>
<td>Slow flash&lt;br&gt;1. getting correction data via GSM or radio (only receiving corrections for rover while transmitting for base)&lt;br&gt;2. collection static data in static mode</td>
</tr>
<tr>
<td></td>
<td>Fast flash&lt;br&gt;Error in static mode (typically for no more flash memory)</td>
</tr>
<tr>
<td></td>
<td>Always on&lt;br&gt;Communication module in error for getting data, mainly resulted by problem in module so that no data output</td>
</tr>
</tbody>
</table>
### Satellite LED (Green)
- **Always on**: More than 4 satellites tracked successfully
- **Slow flash**: Loss satellites and try re-tracking
- **Off**: 1. Mother board error resulting in no data output while resetting receiver 2. Mother board error resulting in no data output while in static mode

### Led Displaying in Different Mode:

1. **Work Mode** (double click F1 to enter work mode setting, then single click F1 to choose work modes among static, rover and base. After that single click power button to confirm the current setting. If no confirming within 10 seconds, the receiver will automatically confirm the current settings.):
   - ● on ○ off

<table>
<thead>
<tr>
<th>Mode</th>
<th>Satellite led (green led)</th>
<th>Status led (green led of the dual-color led)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>Rover</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Static</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

2. **Data Link** (double click F2 to enter data link setting, then single click F2 to choose from GSM, UHF, and external, After that single click power button to confirm the current setting. If
no confirming within 10 seconds, the receiver will automatically confirm the current settings.):

- on  ○ off

<table>
<thead>
<tr>
<th>Data link</th>
<th>Satellite led (green led)</th>
<th>Status led (green led of dual-color led)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UHF/GSM/CMDDA module</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>Internal GSM/CMDDA</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>External</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

3. **Transmitting Power** (must be set in UHF mode. Long press F1 to enter transmitting power setting, then single click F1 to choose among high, middle, and low. After that single click power button to confirm. If no confirming within 10 seconds, the receiver will automatically confirm the current settings.):

- ● on  ○ off

<table>
<thead>
<tr>
<th>Choice</th>
<th>Satellite led (green led)</th>
<th>Status led (green led of dual-color led)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>Middle</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>High</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
4. **Radio Channel** (must be in UHF mode. Long press F2 to enter radio channel setting. Then single press F1 to choose channel by minus 1; or long press F1 to choose channel by minus 10; or single click F2 by plus 1; or long press F2 by plus 10. After that single click power button to confirm. If no confirming within 10 seconds, the receiver will automatically confirm the current settings.) :

<table>
<thead>
<tr>
<th>Channel</th>
<th>Satellite led (green led)</th>
<th>Status led (red led of dual-color led)</th>
<th>Data led (red led of dual-color led)</th>
<th>Power led (red led of dual-color led)</th>
<th>Power led (green led of dual-color led)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>1</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>○</td>
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<tr>
<td>5</td>
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<td>○</td>
<td>●</td>
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<td>●</td>
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<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
</tbody>
</table>
5. **Elevation Angle** (must be in static work mode. Long press F1 to enter elevation angle setting. Then single click F1 to choose elevation angle. After that single click power button to confirm. If no confirming within 10 seconds, the receiver will automatically confirm the current settings.) :

- ● on ○ off

<table>
<thead>
<tr>
<th>Choice</th>
<th>Satellite led (green led)</th>
<th>Status led (green led of dual-color led)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>10</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>15</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

6. **Collection Interval** (must be in static work mode. Long press F2 to enter collection interval setting. Then single click F2 to choose collection interval. After that single click power button to confirm. If no confirming within 10 seconds, the receiver will automatically confirm the current settings.)

- ● on ○ off

<table>
<thead>
<tr>
<th>Choice</th>
<th>Satellite led (green led)</th>
<th>Status led (green led of dual-color led)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>●</td>
<td>○</td>
</tr>
</tbody>
</table>
### Turn On/Off Receiver

<table>
<thead>
<tr>
<th>Turn on</th>
<th>Press power for 1 second</th>
<th>All leds on</th>
<th>With turning on music, receiver speaks out the last settings of work mode, data link etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn off</td>
<td>Long press power button for 3 seconds</td>
<td>All leds on</td>
<td>With turning on music</td>
</tr>
</tbody>
</table>

### Static Data Storage

The GNSS static data collected by V30 receiver will be stored in its memory, in *.GNS format.

You can connect the V30 receiver with PC by USB port of Y cable and then just copy the static data into your PC.

Note: in case of no more memory, the data led (the middle led) will be fast flashing while stopping the current static data collection.

### RTK Data Storage

The controller can be connected with the receiver via Bluetooth or cable, the data will be stored in the memory of the controller.

After fieldwork finished, you can connect the controller with PC by the data cable, and then download the RTK data.
from the controller to PC by copying.

**Reset Receiver**

Long press F1 button for more than 6 seconds to reset the mother board.

---

Warning: reset receiver will make the next tracking satellite time longer while needs users to set receiver work mode again.

---

**Module checking**

Long press F2 for more than 6 seconds to check the module in current work mode.

**Format Receiver**

Format V30 receiver by Hi-Target V30 Receiver Management Software:

✧ Connect V30 with PC by serial port of Y data cable

✧ Turn on V30 receiver

✧ Choose right serial port and open port

✧ After connecting successfully as figure 4-2: the S/N will be showed in the below

✧ Click “Format/Delete All” to complete format receiver. After this operation, all current data will be deleted forever.
Warning: Make sure all useful data has been copied to another place for spare, because all data will be deleted forever after this format.

Power Supply System

✧ Assembly and Disassembly of Battery Cover

Assembly:

1. Firstly insert one side
2. Turn the metal lock by 90° to the panel side and press it to be ok.
Disassembly:

1. Pull the metal lock up and turn to the two ports direction by 90°

![Figure 4-5](image)

2. Pull the metal lock to get off the battery cover

![Figure 4-6](image)
Install and Uninstall Battery

Install:

1. Match \[\text{[image]}\] with the \[\text{[image]}\] in the battery slot to put in the battery.

2. Insert battery towards “Close” end (see red arrow) to install it ok.
Uninstall:

Slide the battery towards to the “Open” end, and then pull out battery is ok.

Figure 4-9

✧ V30 Receiver Battery Name and Model

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>4400mAh lithium battery</td>
<td>BL-4400</td>
</tr>
<tr>
<td>V30 lithium battery charger</td>
<td>CL-4400</td>
</tr>
</tbody>
</table>
**Power Supply**

<table>
<thead>
<tr>
<th>Power supply way</th>
<th>1. lithium battery;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>2. eight-pin port and five-pin port on the mainframe for external power supply</td>
</tr>
<tr>
<td>Power range</td>
<td>6V ~ 36V</td>
</tr>
</tbody>
</table>

If use external power supply for V30 by the eight-pin port and five-pin port on the mainframe, the power supply should be 6~36V with current no less than 500 mAh.

When using both lithium battery and external battery, the receiver will check the power pressure of both batteries and choose the higher one.

And please note that if use external power supply, must use the specified external power supply from Hi-Target to avoid any destroy to the receiver.

---

Note: usually one V30 lithium battery can last 13 hours for static, 12 hours for RTK while 9 hours for base in UHF work mode with 2 W internal radio. But the working time will be decreased along with the more and more charging times or in very low temperature.
Battery charging

BL-4400 lithium battery must be charged in specified CL-4400 charger of Hi-Target for about 6 hours. The indicator led of the charger will be in red while charging, and then green when charging finished.

Charging Operations

1. Matching the blue in the battery with black in the charger, put the battery in.
2. Slide battery towards to “Close” end (as the above arrow direction) until battery is locked

3. After connecting battery with the charger, the “Charging” led becomes red.

---

Warning: 1. Only using Hi-Target specified charger and do not put the battery into fire nor make it short circuit.

2. If heating, deformed, leaking, bad smells happens while charging, using or storing, please stop using the battery right now and change another one.

3. If the working time obviously become very short, please stop using the battery right now and change another one.

---

Communication Module

✧ **Module type:**

<table>
<thead>
<tr>
<th>Module type</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM-46V</td>
<td>460MHz radio, compatible with V9 UHF</td>
</tr>
<tr>
<td>GM-46PV</td>
<td>430MHz ~ 470MHz radio, compatible with Trimble, Leica</td>
</tr>
<tr>
<td>GM-42PV</td>
<td>390MHz ~ 430MHz radio, compatible with Trimble, Leica</td>
</tr>
</tbody>
</table>
✧ Install and Uninstall Communication Modules

Communication modules are radio module, and GPRS/3G module.

![Radio module](image)

Figure 4-12 Radio module

**Installation:**

1. Put the module into the module slot.
2. There are 7 screws in the module. Please screw them down using the screwdriver.
Uninstall:

Screw out the 7 screws and pull the module out.

Radio Channel Setting

For the GM-46V radio of 455~465MHz or 440~450MHz, which is compatible with V9, there are 100 channels for users’ choice; for the GM-46PV radio of 430~470MHz and GM-42PV radio of 390MHz~430MHz, which are compatible with Trimble Leica, there are 32 channels for users’ choice.

There are two methods to set the radio frequency:

1. Long press F2 on the V30 mainframe to set.
2. After connected with controller, using Hi-RTK software to set.

Note:

1. The channel of rover must be the same as that of base, only in which case they can cooperate together.

2. Try to use the channel in a good environment with less interference. The below way is offered for users to find a good channel:
   - Firstly don’t set base, just set the rover in one channel
   - Check the data led (the middle led) of the rover. If the red led flashes, it hints that there are some other transmitting data around in this channel. You should change to another channel until you find a channel with no interference.
   - After you find a good channel, setting your base
to this channel and start your work.

SIM Card/ USIM Card

Either SIM card or USIM card can be used in V30:

<table>
<thead>
<tr>
<th>USIM Card</th>
<th>WCDMA (ZHD/VRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GPRS (ZHD/VRS)</td>
</tr>
<tr>
<td></td>
<td>GSM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIM Card</th>
<th>GPRS (ZHD/VRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GSM</td>
</tr>
</tbody>
</table>

✧ Card installation

For built-in GPRS SIM card:

1. Take out the battery, then you can see the SIM card slot

2. Insert SIM card as below:
Note: 3G card can also be installed here.

Firmware

✧ Firmware upgrading

There are two kinds of upgrading for V30: 1. Mainframe upgrading. 2. Radio module upgrading. Except the difference of choosing upgrading device, all the other operations are the same. You can see the difference below:
Steps for upgrading:

1. Connect V30 with PC by serial port of Y type data cable
2. Turn on V30 receiver
3. Choose the right serial port and open port
4. After connecting successfully as figure 4-2: the S/N will be shown in the bottom
5. Choose the “upgrade device” to be “receiver” or “module” as you need, and then click “select file” to find the firmware file in your PC
Warning: The firmware file must be with the postfix as *.098.htb, or the upgrading will be failed.

6. Click “upgrade” and then the receiver will be turned off automatically, then start again and it will start upgrading.

7. You can see the three leds on the panel will flash in turn while upgrading.

8. When the software pop up information of upgrading successfully, then restart your receiver.
Configuration of Fieldwork

Chapter Introduction

- Introduction
- Diagram for base working
- Diagram for rover working
- Fast Operation Guide
Introduction

In this section, the working program and Easy of Use for the base and rover of V30 GNSS RTK are introduced. According to the system of V30 GNSS RTK which is required by the customer, only the customer who buys the module can get the relative configuration of working program and the configuration of working program. The below is not for all the customers who buy the system of V30 GNSS RTK. Please refer to the relative configuration of working program for the instrument which you buy.

Diagram for base working

Figure 5-1 working mode for base with built-in GPRS/3G
Figure 5-2   working mode for base with built-in radio
Figure 5-3 working mode for base with external radio
Diagram for rover working

Figure 5-4 UHF rover

Figure 5-5 GPRS/3G rover
Fast Operation Guide

✧ Rover or base mode with built-in GPRS or 3G module.

1. Set base/rover

   Double click F1 with the voice prompt “base”, “rover” and “ static” to choose the working mode you need, press power button to confirm the setting.

2. Set GSM data link

   Double click F2, then choose GSM mode from UHF,GSM and external radio then click the power button to confirm.

3. GPRS setting

   There are two ways. One is using the Controller with Hi-RTK software, please refer to Hi-RTK manual to find more details on how to do the settings. The other way is by using the management software. Connecting the receiver to PC with Y type cable, then open the management software of V30 receiver, choose the serial port and then open it. After the instrument is connected, do the settings through the management software of V30 receiver. Refer to figure 5-6.
### Configuration of Fieldwork

#### GPRS Setting

![GPRS Setting GUI](image)

**Figure 5-6  GPRS Setting**

<table>
<thead>
<tr>
<th>Network mode</th>
<th>Communicating way</th>
<th>Setting Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZHD</td>
<td>GPRS/CDMA</td>
<td>Group ID, IP, port and APN</td>
</tr>
<tr>
<td></td>
<td>GSM</td>
<td>The dialing function, input the phone number of base. Make sure that the SIM cards have opened the calling function</td>
</tr>
<tr>
<td>VRS</td>
<td>CDMA/CDMA</td>
<td>IP address, port, network operator (APN), VRS user name, pass word, mount point list</td>
</tr>
</tbody>
</table>

Notes: If the server does not provide IP, you can tick “use server website” and then input the website to log in.

**Base or rover mode with UHF radio module**

1. Set base/rover
Double click F1 with the voice prompt “base”, “rover” and “static” to choose the working mode you need, press power button to confirm the setting.

2. Set UHF data link

Double click F2, then choose UHF mode from UHF, GSM and external radio then click the power button to confirm.

3. Set UHF radio channel

Hold F2 button with voice prompt to choose the channel in need, press power button to confirm.

---

Note: Base and rover must be in the same channel for a normal work.

---

The differential signal is being transmitted while the signal light (red) is flashing once at one second. Meanwhile, the rover have received the signal while the signal light (red) of rover is flashing synchronously once at one second. Now RTK work can be started. If the signal led (red) of rover does not flash, that means it has not received the differential signal.

4. Set the power of radio:

When the working distance becomes farther, you can set the power of the radio of the base through the control panel. Pressing F1 button until hearing the voice prompt: high, medium, low, the working distance is getting lower in
sequence.

- **Base or rover mode with external data link.**

  1. Set base/rover:

     Double click F1 with the voice prompt “base”, “rover” and “static” to choose the working mode you need, press power button to confirm the setting.

  2. Set External data link:

     Double click F2, then choose External radio from UHF,GSM and external radio then click the power button to confirm.

     3. Setting the radio channel of external data link in base.

        Do this through adjusting the external UHF radio to the right channel.

     4. Setting the UHF radio channel of rover:

        Hold F2 button with voice prompt to choose the channel in need and press power button to confirm.
Static Collecting

Chapter Introduction

- Introduction
- The procedure of V30 static survey
- Download data with USB
- Management software operation for Static Survey
**Instruction**

V30 receiver can be used as dual-frequency static surveying instrument. The collected static survey data is saved in the memory in the main frame. The static survey data have to be downloaded to PC with post-processing software to process.

**The procedure of V30 static survey**

1. Locate the instrument on a point, centering and leveling it.

2. Measure the height of instrument for three times, on condition that the difference of each measuring is less than 3mm and the final height of the instrument should be the average height. The height of instrument should be defined from the controlling point of base centre to upper edge of marker line. The antenna radius of V30 receiver is 0.087 meter; the height of phase center is 0.065 meter.

![](image)

**Figure 6-1 Instrument height measure point**

3. Record the point name, instrument S/N, instrument height and observing initiated time.
4. Turn on the instrument and set it to static surveying mode. The satellite led flashing means the instrument is tracking the satellites. The satellites are locked once the satellite led turns into constant on. Status led flashes due to your collection interval. If setting the interval to 1 second the led will flash once a second.

5. Turn off the instrument after the static survey is finished and record the turn-off time.

✧ **Download and post-process the data**

---

**Note:** Don’t move or change the collecting setting while the instrument is collecting data.

---

**Download data with USB drive**

The data of V30 receiver can be downloaded with USB drive, use the Y type data cable, connect one side to USB port of PC and the other side to the 8-pin jack of main frame. After connecting, you will see a folder named GNSS in the PC, the static data are here, you can copy the according files directly.

---

**Note:** The series port can not be used to download data, but can delete static data.

---

**Management software operation for static survey**
The main function of static file management software of V30 receiver:

✧ Delete original data
✧ Delete and format the whole memory
✧ Read parameters
✧ Set parameters
✧ Refresh list

![Static Collecting](image)

**Figure 6-2**

**Operating steps:**

1. Connect Y type data cable to 8-pin port of V30 receiver and the series port of PC
2. Choose the right PC port and click “connect port”

3. Refresh list, the observation data files will be in the list

4. File name: 8 digit character: the first chart is replaced by underline, the second, third, and forth are the last two numbers of S/N number of the receiver from which the data is collected; the fifth, sixth, and seventh is the year-accumulated-date; the last chard is the collecting period of the day

5. Set up time: GNSS time.

6. Delete data: choose the data need to be deleted, click delete files.

7. Change collecting interval and satellite cutoff/elevation angle: input value and click set parameters. Click read parameters to view the original collecting interval and satellite cutoff angle.

**Static data post processing:**

The new post processing software of Hi-Target is Hi-Target Geomatics Office (HGO), use this software to do post processing.

Please refer to “Hi-Target Geomatics Office Data Post Processing Software Manual” for detailed information of data processing.
Technical Parameters

Chapter Introduction

- Introduction
- Receiver
- UHF Radio Communication
- 3G/GPRS/CDMA/Internet Communication
- Ports
- Function Key and Indicator Led
- Intelligent Voice Module
- Accuracy
- Physical Feature
- Working Environment
Introduction

Here we list out all Technical Parameters of V30 GNSS RTK SYSTEM. The Technical Parameters will be a little different according to your purchase order. Please make sure about your configuration then find out Technical Parameters correspondingly.

Receiver

◎ 220 channels
◎ GPS : Synchronous tracking L1 C/A, L2E, L2C, L5
◎ GLONASS: Synchronous tracking L1 C/A, L1 P, L2 C/A (only for GLONASS M) and L2P
◎ SBAS: Synchronous tracking L1 C/A, L5
◎ GIOVE-A: synchronous tracking L1 BOC, E5A, E5B and E5AltBOC（optional）
◎ GIOVE-B: synchronous L1 CBOC, E5A, E5B and E5AltBOC（optional）
◎ GALILEO:（Upgrade）
◎ Trimble Maxwell 6 of advanced user-defined GNSS Technology
◎ A high precision measurement in the relevant organs using for global navigation satellite system
◎ Very low noise GNSS carrier phase in Surveying, Accuracy < 1 mm within 1 HZ wide band
◎ Mature low elevation-angle tracking technology
◎ Initialization time < 10 S
◎ Initialization Reliability > 99.9%
◎ 1 Hz, 2 Hz, 5 Hz, 10 Hz, 20 Hz and 50 Hz output（default
HI•TARGET

Technical Parameters

10Hz)
◎ Differential data format: CM R, CM R+, RTCM 2.1, 2.2, 2.3, 3.0, 3.1
◎ Navigation Output Format: ASCII: NMEA-0183 GSV, AVR, RMC, HDT, VGK, VHD, ROT, GGK, GGA, GSA, ZDA, VTG, GSTPJT, PJK, BPQ, GLL, GRS, GBS and binary system: Trimble GSOF

UHF Radio Communication

GM-46V Module
◎ Compatible with V8 and the other products of Hi-Target with transmitting or receiving radio in 460 MHz
◎ With difference transmit-receiver function and transmit power can be adjustable among 0.1w, 1w and 2w
◎ Radio Frequency bands of 450~470MHz with 100 flexible switching channels
◎ Reference to Radio Frequency list
◎ With top 19.2 Kbps wireless transmit speed

PCC Radio Module
◎ Compatible with Trimble/Leica RTK Radio
◎ With difference transmit-receiver function and transmit power can be adjustable to be 0.1 w, 0.5w or 1 w
◎ Radio Frequency bands 430 MHz~470MHz with 32 flexible switching channels and the frequency of each channel can be customized.
◎ With top 19.2 Kbps wireless transmit speed
◎ Support the below protocol, convenient for user to work compatible with their own products:
External PCC Radio

◎ Original import PCC radio
◎ Input power: DC 9~30 V
◎ Transmit-receiver radio. The top transmit power has different optional as 4W or 35 W
◎ Radio Frequency bands 430 MHz ~ 470MHz with 32 flexible switching channels and the baud rate of each channel can be customized.
◎ With top 19.2 Kbps wireless transmit speed
◎ Support the below protocol, convenient for user to work compatible with their own products:
  o Transparent EOT Timeout
  o Transparent EOC Character
  o Packet Switched
  o TRIMTALK 450S
  o TRIMMARK II/IIe
HI·TARGET

Technical Parameters

- TRIMTALK 3
- TT450S
- SATEL

3G/GPRS Network Communication
- Default Configuration with built in GPRS Internet Communication, with optional of 3G Module.

Ports
- 2 RS-232 serial ports
- 1 USB port
- 1 port for wireless blue-tooth communication
- 2 port for external DC power supply (Multiplex)
- 1 SIM card slot for GSM or CDMA
- 1 built-in Li-ion battery groove
- 1 built-in communication module port

Function Key and LED
- 3 Panel buttons: 1 power switch key, 2 functional keys, with these combination you can set all the function with voice and Indicator Led flexibility
- 3 LEDs: 1 Satellite LED (Single color), 1 Communication LED (Dual Color), 1 Power LED (Dual Color)

Intelligent Voice Module
- Broadcasting function for each operation in English

Accuracy
- Static, Fast Static: Horizontal: \( \pm (2.5 + 1 \times 10^{-6}D) \) mm
- Vertical: \( \pm (5 + 1 \times 10^{-6}D) \) mm
RTK Accuracy: Horizontal: ±(10 + 1×10⁻⁶D) mm
Vertical: ±(20 + 1×10⁻⁶D) mm

Physical Feature
- With ARM7 Core Control Chip, built-in 64 M Flash Memory
- Dimension: φ19.5cm×h10.4cm
- Weight: 1.3 kg (Incl. li-ion battery)
- Anti-impact from 3 meters free-falling, waterproof in 2 meters deep water
- Lithium battery. With 2 standard battery in 4400 mAh, Voltage: 7.4 V; One Single battery can work continuously for 13 hours in static mode, 12 hours in GPRS mode, and 8 hours in 2 W transmitting power
- 6~36V external DC power supported, external and internal power supply exchanged automatic
- Receiver Power Consumption: 2.5W

Environment
- Working temperature: -45°C ~ 65°C, storage temperature: -55°C ~ 85°C
- 100% Humidity non-condensing
Ports and Main Accessory

Chapter Introduction

■ Introduction
■ 5-pin Port and 8-pin Port
■ Differential Antenna
■ Y Style Data Cable
Introduction

This Section will introduce the outlook and operation for the main ports and accessory of V30 GNSS RTK system. The Technical Parameters will be a little different according to your purchase order. Please make sure about your configuration then find out Technical Parameters correspondingly.

Five-pin Port and Eight-pin Port

![Figure 8-1 Five-pin Port and Eight-pin Port](image)

1. **Five-pin port**: named as COM2/PW2, Generally used for the connection between the receiver mainframe and the external data link or the external power supply
**Eight-pin port:** Named as COM 1/USB/PW1, Generally used for the connection between the receiver mainframe and computer, controller, or for data download and data delete.

### Signal Definition

<table>
<thead>
<tr>
<th>Small Five-pin Signal</th>
<th>larger Eight-pin Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND Earth</td>
<td>RXD Data Input</td>
</tr>
<tr>
<td>GND Earth</td>
<td>USB D-</td>
</tr>
<tr>
<td>Vin Power Input</td>
<td>USB D+</td>
</tr>
<tr>
<td>RXD Data Input</td>
<td>USB V+</td>
</tr>
<tr>
<td>TXD Data Output</td>
<td>Vin Power Input</td>
</tr>
<tr>
<td></td>
<td>GC-2 Cable Insert Mark</td>
</tr>
<tr>
<td></td>
<td>TXD Data Output</td>
</tr>
<tr>
<td></td>
<td>GND Earth</td>
</tr>
</tbody>
</table>

2. Cable Insert Mark GC-1, GC-2 signal can work with the cable connect earth internal only.

3. All the round plug seats from Hi-Target name the pin by positive counterclockwise; round plug name the pin by welding face counterclockwise.

4. All above data output (TXD) and input( RXD) signal are base on receiver. TXD is a signal transmit line for receiver and RXD is receive line for receiver.

5. The connect signal for PC serial port DB9 are: 2 (RXD computer data signal to receive), 3( TXD computer data signal to transmit),5(GND earth). In a simple word “2 for receiver 3 for transmit”
Point: All above are for facing the main frame, it’s the face icon for the socket of bottom main frame (The plug welding surface)

Differential Antenna

Refer to Figure 8-3, the differential antenna is an essential part both to Base and Rover with internal UHF radio, which transmits the UHF differential signal for Base while receiving the UHF differential signal for Rover.

diamond Differential Antenna Installation

Refer to Figure 8-4, holding the bottom of differential antenna and assemble it with clockwise rotation. On the contrary you can disassemble the differential antenna.
Warning: When install the differential antenna, make sure rotating the right bottom fixed nut of differential antenna, don’t grip the top parts of differential antenna, Otherwise, it will make poor connect and reduce the working distance.

Y Type Data Cable

![Diagram of Y Type Data Cable]
◊ Eight-pin Port: to connect with the eight-pin port of V30 receiver

◊ USB Port: to connect with PC USB for data downloading from V30

◊ Serial Port: to connect with PC serial port for V30 firmware upgrade, receiver settings, manage static data file, set radio parameters, etc.

---

Warning: 1. When connecting plugs of all the V30 GNSS RTK system, (See below) please make sure to make two red points aligned, one on plug and the other in the V30 receiver socket, otherwise, it will bring damage both to socket and plug.

2. When finish your work, please take out of plug directly. Don’t spin the plug.

3. In order to protect the plug, please store the cable in a good status and places without extruding.
Regulatory Information

Chapter Introduction

■ Notes
Notes

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

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:
1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

Shielded cables must be used with this unit to ensure compliance with the Class B FCC limits.