gRob R1
Hardware Operating Instructions

Geosun Spatial Technology Co., Ltd.

Preface

Thank you for choosing Geosun's gRob R1. The gRob R1 is a high-accuracy and high-performance multi-frequency GNSS RTK and mapping system professionally designed for surveying fieldwork by Geosun.

Please read the instructions especially the notes and reminding items before you start the fieldwork!

The below contents of gRob R1 are introduced in sequence: the appearance and technical specifications, the basic operations, the external radio instructions, and troubleshooting.

Regards to the GeoRef K2E or gPad as the controller for gRob R1, the detailed information will be introduced in their corresponding manuals.

To make sure the optimal performance of the instrument, please use the original accessories in the standard package, or the recommended accessories by Geosun referring to the Geosun instructions or manuals. Any damage caused by improper operations or unspecified accessories, users should bear all the consequences.

This instructions is aimed to guide users how to use the gRob R1 correctly for best performance. The pictures attached are only for reference. And any update is without notice. Users can visit our company website www.geosun-gnss.com or contact the local distributor directly for more lasted information.

ILLUSTRATIONS, DESCRIPTIONS AND TECHNICAL DATA IN THIS USER MANUAL ARE NOT BINDING, ALL RIGHTS RESERVED.

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Overview

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- **gRob R1 Overview**
- **Function Features**
- **Technical Specifications**
- **Notes and Reminding Items**

gRob R1 Overview

The gRob R1 is a high-accuracy and high-performance multi-frequency GNSS RTK and mapping system professionally designed for surveying fieldwork by Geosun. With the most advanced high-precision real-time kinematic positioning technologies, gRob R1 is able to search and track all the GNSS satellites signal in view so as to provide users with high-accuracy, high-efficiency and most reliable RTK survey performance. Being an outstanding assistant and tool in different fields such as electric power, transportation, agriculture, forestry, and land survey, it can do high-accuracy RTK, wide-range control survey, construction stakeout, topographic mapping, high accuracy marine survey and etc.

Together with the GeoRef K2E as the standard packaged controller, or with the gPad as an optional controller, gRob R1 system is the professional RTK while completes the data collection and processing both during fieldwork, providing powerful and flexible solution for various GNSS applications. It does greatly improve the fieldwork efficiency.

Function Feature

- Initiating RTK + Pad fieldwork mapping system in China
- Dual power supply design, industry's highest large capacity Li-ion battery, supports hot plug power battery replacement
- Configured with software supporting GPS, GLONASS, and Compass carrier phase
- Seamless compatible with various CORS systems
- Linux intelligent system
- Support GPS, GLONASS, Compass, Galileo
- Support WASS, EGNOS, MSAS, GAGAN
- Fast initialization and satellite tracking technology
- Intelligent fault diagnosis and audio reminder function
- Built-in high-performance processor can process 20Hz data
- Built-in GPRS, Bluetooth
- Support one-key setup for base
- Standardized design, exchangeable base and rover

Technical Specifications

Processor and memory configuration

Processor	454MHz industrial level processor
Memory capacity	256M Byte DDR2 SDRAM
Saving capacity	2G Byte NAND Flash
GNSS technical parameters	
Main board type	Compatibility with multi-frequency multi-satellite main boards such as BD970, BD920, OEMV-2, OEM 615 and so on

Tracking channels	220 channel (BD970）： –GPS: L1 C/A, L2E, L2C, L5 –GLONASS: L1 C/A, L1 P, L2 C/A, L2 P –GIVOVE-A/B –SBAS	120 channel (OEM615): –GPS: L1, L2, L2C –GLONASS: L1, L2 –Galileo: E1、GIVOVE-A/B –Compass –SBAS
Positioning accuracy	RTK: Plane：±(1cm + 1×10-6D) Altitude：±(2cm + 1×10-6D)	Static, fast static positioning: Plane：±(2.5mm+1×10-6D) Altitude：±(5mm+1×10-6D)

Output updating frequency	1Hz，maximum customized 20Hz
Communication parameters	
Bluetooth	2.4GHz V2.0+EDR
USB	USB 2.0
Hardware interface configuration	
Indicator	Power indicator，satellite indicator，communication indicator
Button	One power button，two function buttons
Data communication Application function Indicator Button Data communication	External charging port×2 (2 charging ports) SIM card slot (Under the battery)
	Speaker, audio reminder
	Power indicator，satellite indicator，communication indicator
	One power button，two function buttons
	External charging port×2 (2 charging ports) SIM card slot (Under the battery)
Application function	Speaker, audio reminder
Power performance	

Battery	Dual power supply design (4400mAh×2+650mAh) ,supports the main battery hot plug

Physical parameters	
Size	φ198×122mm
Weight	1.5kg (including batteries)
Working circumstanc	
Working temperature	−45°C~+65°C
Storage temperature	−55°C~+85°C
Water-proof and dust-proof	IP67

Note

To ensure the continuity and quality of the satellite tracking, the space over observation site should be as open as possible, without large obstacles over 15° elevating angle. To reduce various electromagnetic interference to GNSS satellite signal, please make sure no strong electromagnetic interference in 200m range around the observation site, such as TV tower, microwave station, high-voltage transmission. To avoid or to reduce the multi-path influence, the site should be set far away from the terrain and ground features where the electromagnetic wave signal reflection is strong, such as high buildings, large area waters, etc.

Note:
- ◼ This equipment contains ESDS (Electrostatic Discharge Sensitive Device), with level C of electrostatic anti-interference test. To touch, move, or plug the equipment please follow the ESD (electro-static discharge) instructions.
- ◼ Must be used and preserved in the stipulated temperature range. For details, please refer to the previous chapter: **Technical Specifications。**

gRob R1 Introduction

- **Front View**
- **Control Panel**
- **Lower Cover**
- **Battery**
- **Main Accessories**
- **gRob R1 Base Standard Configuration List**
- **gRob R1 Rover Standard Configuration List**
- **gPad Control Configuration List (Optional)**

Front View

- Upper case
- protection ring
- Bolt hole
- Control panel
- Lower case

Control Panel

- Battery light
- Communication light
- Sat. light
- Function key F1
- Function key F2
- Power button

Indicator

Indicator	Explanation
Power indicator	**Flash in red**: in charging **Fast flash in red**: low battery **Slow flash in green**: power supplied by external battery, and low battery **Green**: normal status, power supplied by external battery, and full battery
Communication indicator	**On**:2G connected/waiting for data from server/waiting for data in radio communication way **Flash**: In radio or GPRS mode : every flash in every second means one differential correction data sent/received; In static mode: flash once in the set collection interval **Off**: no data transmission in procedure

	On: satellites tracked
Satellite indicator	**Flash** (in static collection mode): the flashing times stands for the tracked satellites number
	Off: no satellites tracked

Button

Button name	Operation	Explanation
Power button	Long press for 3 seconds	Long press for 3 seconds in turned-off status to turn on the receiver; long press for 3 seconds in turned-on status to turn off the receiver.
	Single click	Confirm setting
Function button F1	Single click F1	Select working mode, or check current working mode
	Double click F1	Enter working mode configuring
	Supper-long press F1	One-key setup base
Function button F2	Single click F2	Working parameters configuring, or check current working mod
	Double click F2	Enter working parameters configuring
	Supper-long press F2	gRob R1 autodiagnosis

Note: single click time is 100ms~800ms, double click means two single clicks whose interval is 100ms~200ms, long press time is 3s~5s, super-long press time is more than 5s.

Working mode configuring

■ **Button operation flow**

Double click F1 -------> single click F1 -------> single click power button

■ **Audio broadcast process**

Double click F1:
"Please select working mode"

Single click F1:

"External radio base"

"External radio rover"
"Static"

Single click power button:
"Configure successfully" or "Configure failed"

Working parameters configuring
■ **Button operation flow**

Double click F2 -------> single click F2 -------> single click F1 -------> single click power button

■ **Audio broadcast process (in accordance with the current working mode)**

Double click F2:
"Working parameter configuration"

Single click F2:
"Elevation angle configuration" (in static mode)
"Collection interval configuration" (in static mode)

Note: If long press F1, the channel broadcast sequence will be in clockwise; If long press F1 again, the channel broadcast sequence will be in counterclockwise. The default sequence is clockwise.

One-key setup base
■ **Button operation flow**

Super-long press F1

■ **Audio broadcast process**

"One-key setup base"
"One key setup base successful"
"One key setup base failed"

gRob R1 autodiagnosis
■ **Button operation flow**

Super-long press F2

■ **Audio broadcast process (in accordance with the current working mode)**

"Fault diagnosis"
"GNSS module ok" or "GNSS module error"
"Bluetooth ok" or "Bluetooth error"

"Radio ok" or "Radio error"

Working status audio broadcast
- **Button operation flow**

Single click F1 or F2

In base working mode through external radio:
"External radio base"
In rover working mode through external radio:
"External radio rover"

In static mode:
"Static"
Elevation angle: "5 degrees", "10 degrees", or "15 degrees"
Collection interval: "1 second", "5 seconds", "10 seconds", or "15 seconds"
Satellites number: 1 ~ 22

- **Automatical audio broadcast process**

"Satellite locked" or "Satellite losing-lock"
"Remote server connected" or "Remote server disconnected"

Battery

OPEN

Battery +

CLOSE

Battery -

Main Accessories

Charger Adapter	Data cable
Tribrach	Stud
Battery charger	Extension pole (up) and centering pole (down)

gRob R1 Base Standard Configuration List

Product name	Quantity
gRob R1 receiver	1
Charger adapter	1
Data cable (power port + USB + D-sub9 female serial port)	1
Tribrach (with leveling bubble)	1
Extension pole for Tribrach	1
Battery	2
Battery charger	1
Stud connector	1
Tape (3.5m)	1
Carry case	1

gRob R1 Rover Standard Configuration List

Product name	Quantity
gRob R1 receiver	1
Battery	2
Data cable (power port + USB + D-sub9 female serial port)	1
Battery charger	1
Charger adapter	1
GeoRef K2E handheld GPS as controller	1
GeoRef K2E controller bracket	1
GeoRef K2E battery	2
GeoRef K2E charger	1
Adapter for GeoRef K2E charger	1
Adapter (British, European, US, three style for option)	1
GeoRef K2E USB data cable	1
Micro SD card (2G)	1
Touch pen	1
GeoRef K2E bag	1
Stud connector	1
Centering pole	1
Centering Pole Bag	1
Tape (3.5m)	1
KQ GEO CD	1
Carry case	1

gPad Control Configuration List (Optional)

gPad GPS receiver as controller	1
gPad bracket	1
gPad charger	1
gPad data cable	1
KQ GEO CD	1

gRob R1 Operations

	CHAPTER	3

- **Power On and Power Off**
- **Power Management**
- **SIM Card Installing**
- **Audio Broadcast**
- **Register**

Power On and Power Off

Operation	Description
Power on	In power-off status (no indicator on), long press power button for 3 seconds. Then the receiver will be turned on, with power indicator on.
Power off	In power-on status (power indicator on), long press power button for 3 seconds. Then the receiver will be turned off, with all indicators off.

Power Management

gRob R1 is adopted with dual-battery design, which is the largest battery capability in GPS receiver market, one 4400 mAh Li-ion battery as the main battery and while with one internal 650 mAh Li-ion battery as the assistant battery to support uninterruptable hot plug when changing battery. Before the main battery is used up, the assistant internal battery is in stand-by status; only when the main battery has been used up or disconnected from the receiver, the assistant one will automatically supplying the power without any interruption. Furthermore, there are two main batteries in the standard package to guarantee the whole day continuous fieldwork.
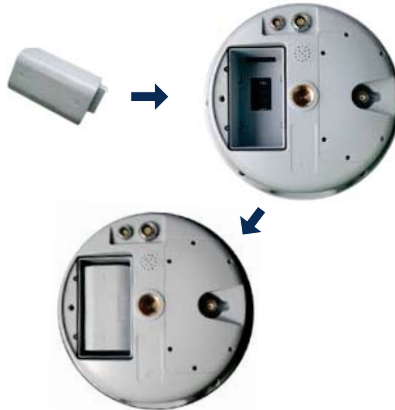
Battery cover installing

- **Installing:** insert the battery cover matching the two cover slots as above figure until the cover is totally fill the slot, then press it to make sure it covers well. Finally turn the metal buckle 90 degrees counterclockwise to lock the cover well.

- **Uninstalling:** lift up the metal buckle on the battery cover and turn it 90 degrees clockwise, then the cover can be easily taken off.

Battery installing

- **Installing:** put the battery into the battery slot with the "Close" end pointing to the inserting holes, and then push it towards the inserting hole to lock the battery well. Finally install the battery cover.
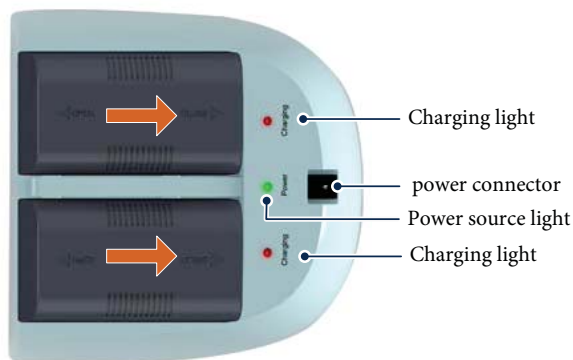

- **Uninstalling:** take off the battery cover first, push the battery towards to "Open" direction, and then take it out.

Charging

Please use the special charger in the gRob R1 standard package to charge the battery in the allowed certain temperature range $0℃ \sim 40℃$. For the first time using, please do not charge the battery until using up the remained power in it. And then charge it 12 hours each time for the first three times. After the first three times, the charging time should be enough as long as 8 hours every time normally. And make sure only charge the battery after it has been used up. Furthermore, if the battery is not used for a long time, it should be charged once every month to keep it active.

The gRob R1 charger can charge two batteries at the same time. Please put the battery onto the charger with the "Close" pointing to the indicator led of the charger as below figure, and then push it until it is locked well.

When the "Charging" indicator is on in red, it means the battery is being charged; when green, it means the battery is charged full. But now please keep charging the battery for more 1~1.5 hours, then take the battery off.

Charging light

power connector

Power source light

Charging light

Warning:
- ■ Don't put battery in fire or use metal short-circuit electrode. Please use the special battery and charger from manufacturer only.
- ■ Stop using the battery once you find it heated abnormally, distorted, leaked, or smelly. Please replace it by a new one.
- ■ If the battery life significantly shortened, please stop using and change a new one as the battery has aging.

Check the Remaining Power

Users can check the remaining power of gRob R1 receiver by its power indicator on the control panel.

- ■ Power indicator is on: the power is supplied by the main battery. And the left power of the main battery is above 24%.
- ■ Power indicator is flashing slowly: the power is supplied by the main battery. But the left power of the main battery is less than 24%.
- ■ Power indicator is flashing fast: the power is supplied by the internal assistant battery, which can only last about 0.5 hour. Please change the main battery in time.

SIM Card Installing

SIM card slot is inside the battery slot as below figure:

For inserting SIM card, please pull up the holder of the slot, insert the SIM card with the metal side downward, then put down the holder and gently push it to lock well.

Note: Please do not insert or take out SIM card when the receiver is still power on, or the receiver will not detect the SIM card.

Audio Broadcast

gRob R1 will automatically broadcast the current operations and working mode of the receiver with the internal speaker so as to assist users with every operation.

Register

Note: Please do register the gRob R1 receiver in time. If any economic loss caused by receiver registration expired, Geosun assumes no responsibility for it.

FCC Statement

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.

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.

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

RF Exposure Warning Statements:

The distance between user and product should be no less than 20cm for normal operations.