

RH-1 USERS MANUAL

Please read these Terms and Conditions carefully.

This product is designed to be used by a professional. The user should have a good knowledge of the safe of the product and implement the types of safety procedures recommended by the local government protection agency for both private use and commercial job sites.



Any changes or modifications to the equipment not expressly approved by the party responsible for compliance could void your authority to operate such equipment.

Turn off the power supply near a highly accurate electronic equipment.

RH-1

• Outline of product

RH-1 is GPS receiver in GRS-1 to measure the GPS data in real time.

RH-1 supplies the electric power to GRS-1 by two battery and outside AC power, and enables the operation of GRS-1 of long time.

• Surveying to use the wireless modem

This method of GPS survey allows the operator to reduce the point occupation time, thus permitting field crews to survey many more points compared to the other methods available.

Real Time Kinematic Surveying

In RTK surveying, one receiver serves as the reference station. The receiver conducts observations with its antenna affixed to a stationary tripod or another device. The second receiver functions as a rover, and conducts observations (using an antenna) affixed to a mobile pole and moved to observation points.

Unlike post-processed kinematic surveys, RTK surveys uses a communications link between the Base and Rover. Using a radio modem link, the Base receiver transmits its measurement and location data to the Rover receiver. The Rover, based on the transmitted data and its own observation data, immediately conducts a baseline analysis and outputs the results.

The GPS receiver receives the correction data that RH-1 received through the connection by Bluetooth. The GPS receiver uses GRS-1 usually.

General Specification

Table A-1 Physical Specification

Table A-2 lists the Bluetooth wireless technology module's general

Table A-3 lists the internal Digital UHF Modem's General Specifications

Table A-4 lists the internal Spread Spectrum Modem's General Specifications

For RH-1/U

For RH-1 /FH

Physical Specifications

Table A-1 Physical Specification

Dimensions	8.50" x 5.83" x 6.71" (216 x 148 x 170.5 mm) ※no Antenna 15.47" x 5.83" x 6.71" (393 x 148 x 170.5 mm) ※with Antenna
Weight	1.4Kg
Input / output	Bluetooth,Serial, Power, Antenna,Communication pins(for GRS-1)
Battery Type	Li-ion battery, Rechargeable / Replaceable
Input voltage	12V
Operating temperature	-20 C° to +50 C°
Storage temperature	-30 C° to +60 C°
Waterproof	IPX4

Wireless specifications

Table A-2 Bluetooth Module Specifications

Range	up to 10 m (indoor)
Type	Class 2
Supported profiles	SPP

Digital UHF Modem General Specifications(For RH-1 /U)

Table A-3 lists the internal Digital UHF Modem's General Specifications

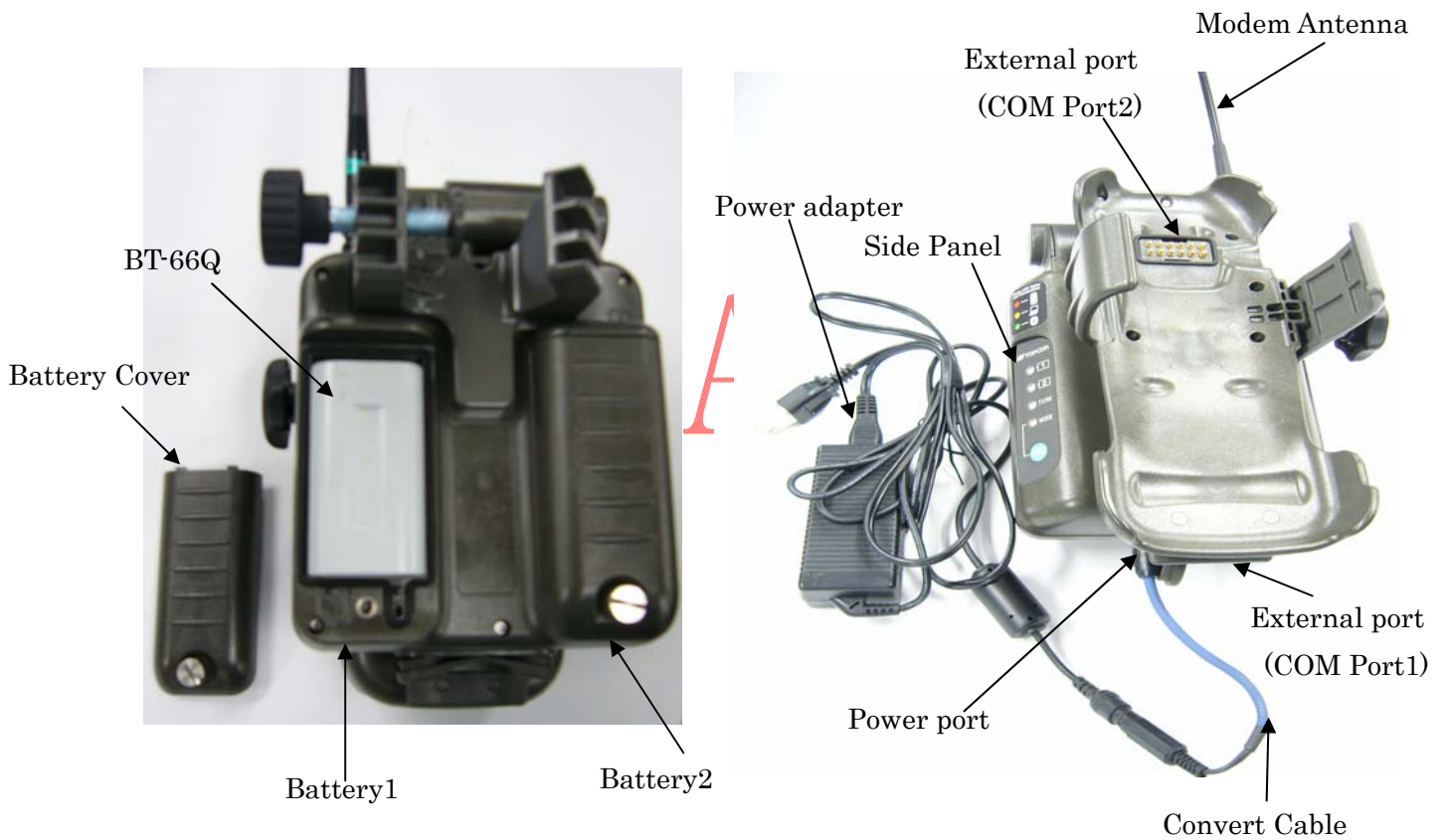
Parameter	Specification
Operating frequency range country/region/purpose dependent	410-470 MHz
Modulation techniques	GMSK,
Channel spacing	12.5 kHz/25 kHz
Transmission rates at 25 kHz spacing	· GMSK- 9600 bps
Transmission rates at 12.5 kHz spacing	· GMSK- 4800 bps
Data speed of serial interface	Max 115200 bps
Forward Error Correction	Available
Scrambling	Available
Communication mode	Half-Duplex
Output power	0.01 W (+10dBm), 0.02 W (+13 dBm), 0.05 W (+17 dBm), 0.1 W (+20 dBm), 0.25W (+24 dBm), 0.5 W (+27 dBm), 1W (+30 dBm)
Nominal output impedance	50 Ohms 2.0:1 VSWR
Output power control accuracy	+ 1dB (at normal test condition) +2.0 dB and -3.0 dB (under extreme test condition)
Adjacent channel selectivity	-70 dB for 25 kHz Channel Spacing -60 dB for 12.5 kHz Channel Spacing
Nominal output impedance	50 Ohms 2.0:1 VSWR
Output power control accuracy	+ 1dB (at normal test condition) +2.0 dB and -3.0 dB (under extreme test condition)

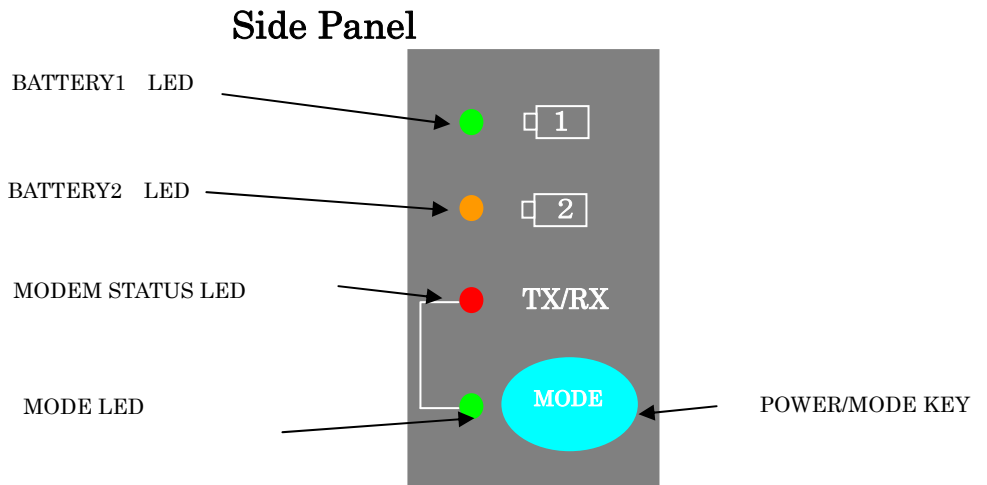
Spread Spectrum Modem's General Specifications (For RH-1 /FH)

Table A-4 Internal Spread Spectrum Modem's General Specifications

General	
Frequency Range country/region/ purpose dependent	902 to 928 MHz, United States 915 to 925 MHz, Australia
Signal structuring	Frequency-hopping spread spectrum
Hopping pattern	5 per band, user-selectable
Hopping channels	128
Occupied bandwidth	100 KHz
Frequency modulation technique	FSK, 64 Kbps
System gain	135 dB
Network topology	Point-to-point, Point-to-multipoint
Operation mode	Transmitter, Receiver, Repeater
Protocol	FH915, FH915+
Transmitter (TX)	
Carrier power	250 mW (24 dBm)/1 W (30 dBm), user selectable
Receiver (RX)	
Sensitivity	-105 dBm at 10 ⁻⁴ BER
Dynamic range	105 dBm
Data communications	
Serial interface	RS232
Serial data rate	9600, 19200, 38400, 57600 bps, user selectable
Effective radio link rate	9600, 10200, 17000, 51000 bps User selectable for FH915; automatic selection for FH915+
Error correction	FEC (15.7), majority decoding
Antenna Type	
Type	1/2 wave articulating whip
Connector	Reverse TNC polarity
GAIN	2.4dBi

- **RH-1 standard package includes**
 - Radio Holder unit
 - Two Li-ion Battely
 - Radio antenna
 - Power adptor AD-11 (AC-DC Adptor)
 - AC Cable (for AD-11)
 - Serial Cable (DB9)





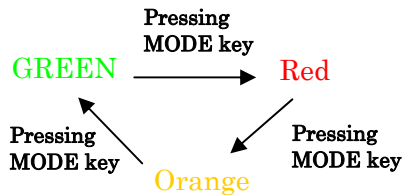
Power ON/OFF

ON :Pressing the **MODE** key turns the RH-1 on.

OFF:Pressing the **MODE** key for 5 seconds or more turns the RH-1 off.

MODE key Functions and connection mode LED status

Pressing the MODE key for 0.3 second, changing the MODE and change the color.



LED	Function of the MODE
GREEN	Connecting with GRS-1 using Bluetooth.
Orange	Connecting MODEM with COM Port 1
RED*1	Connecting COM Port1 with ComPort2.

*1: It is necessary to connect RH-1 and GRS-1 by using Bluetooth to use this function.

TX/RX LED STATUS

Display the communication of the modem.

(The lighting pattern must depend on the internal modem).

About BATTERY LED

The color of the battery LEDs display the status of the remaining charge for the corresponding battery and is the same for LEDs:

Green	More than 60%
Orange	20% to 60%
Red	Less than 20%
No light	There is not battery

The blink interval and length of time lit of the battery LEDs display the status of the battery when in use:

In use:	a 2second light in 0.5 second intervals *Color is depended on the remaining charge
Not in use	Solid light *Color is depended on the remaining charge
Error	Rapid red blink (EX. Open the battery's cover)

The charging with the AC adaptor

The AC Adaptor supports charging-on-the-run for RH-1

With the adapter plugged into an AC outlet and the batteries installed, the batteries will also be charged.

The charging status varies depending on the state of the batteries.

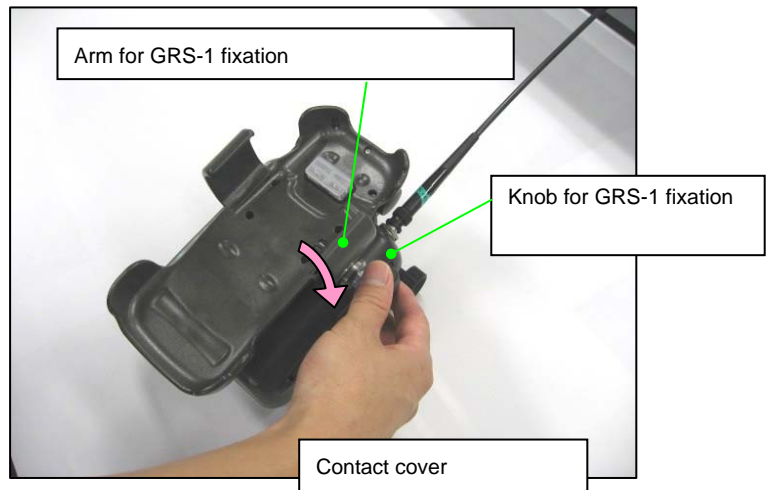
Both battery LEDs use the same blink pattern while the corresponding battery charge.

While charging, the battery LED for the charging battery blinks in 2 second intervals.

Solid green light	battery charging is completed
Red blink	Charging battery
Solid Orange	Not in charging
Rapid red blink	Charging error

Joint method with GRS-1

Turn the knob, and open the arm for GRS-1.

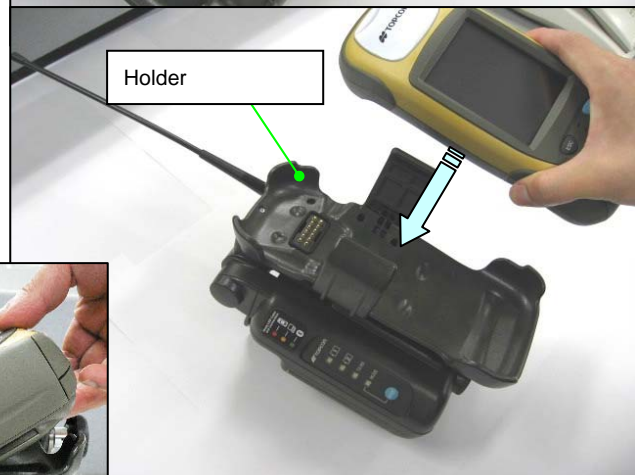


Remove the contact cover.

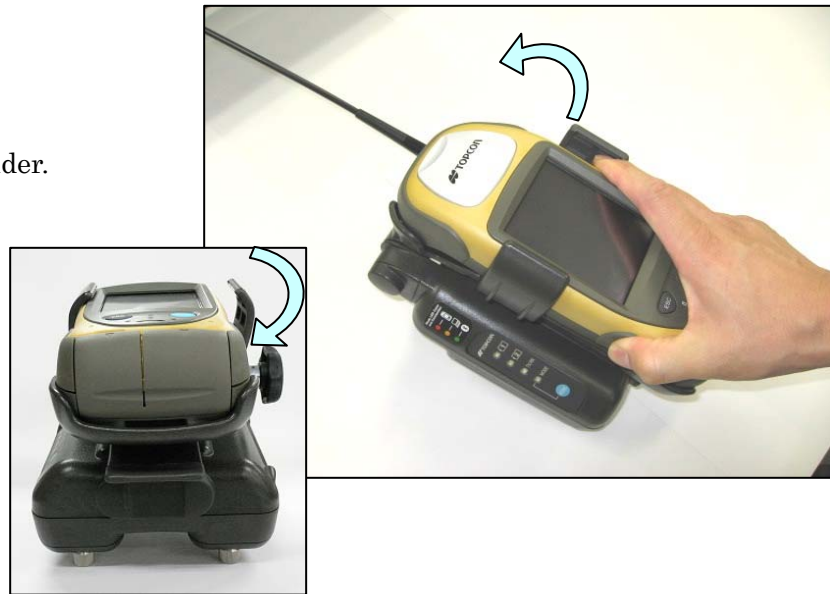
DF



Insert GRS-1 from the left side in the holder of RH-1.



Set GRS-1 up in the holder.



Turn the knob, and fix GRS-1.

DE



Notes

The power supply of RH-1 does not turn on if the knob does not surely close.

When GRS-1 is repeatedly detached, externals of GRS-1 are damaged.

The shape of the holder will be changed as measures of the above-mentioned trouble point.

FCC Regulatory Statement

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.

Caution:

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

Caution Exposure to radio frequency radiation

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

DRAFT

Industry Canada Canada Regulatory Compliance Statement

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

For Customers in Canada

This device complies with RSS 210 of Industry Canada (IC).

Operation is subject to the following two conditions:

- this device may not cause interference, and

- this device must accept any interference, including interference that may cause undesired operation of this device.

L'utilisation de ce dispositif est autorisée seulement aux conditions suivantes:

- il ne doit pas produire de brouillage et

- l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

Exposure to radio frequency radiation

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website at www.hc-sc.gc.ca/rpb.