K Series GNSS Receiver Getting Started

HI-TARGET

Content

CHAPTER

1

Introduction of K3 Split Design Beacon Receiver

- Beacon technology
- Key features and specifications of K3
- Mainframe and accessories

1.1. Beacon technology

Beacon differential technology is a kind of DGPS .Using the existing beacon to transmit differential correction signal, which includes navigation and positioning data. At present , most of countries and regions in the world are unified the using-frequency. Due to its universal use ,it can save user's cost and make their work more efficiently .

The base station should be located in an open and high place. Differential data will transmit to the rover, then the rover will process the differential data and add the correction value to the current data, thus to improve the positioning accuracy .

1.2 Key features and specifications of K3

Table 1-1: Key features

Item	Features
Split design	GNSS receiver and antenna split design
High accuracy	Positioning accuracy up to 0.5 meter

Table 1-2 Technical specifications

Item	Specification
GNSS receiver channels	14
Beacon search channels	Dual automatic channels
Radio frequency range	283.5KHz~325KHz
Beacon working range	500km for sea and 200km for land
Export format	Standard NEMA-0183 format

Table 1-3: Port quantities

Item	Quantity
RS-232 serial port	1
External DC power input port	2
Bluetooth port	1
USB port	1

Table 1-4: Electrical and physical specifications

Item	Specification
Storage	64MB
Power consumption	2.5W
Input voltage	DC 7~36V
Size	22.5cm*13.8cm*7cm
Weight	1.0 Kg

Table 1-5: Environmental specifications

Item	Specification
Operating temperature	-40℃~65℃
Storage temperature	-55℃~85℃
Water/dustproof	IP 65

1.3 Mainframe and accessories

1.3.1 Front side, lamp indicator

Mainframe

Fig 1-1 Mainframe

Introduction of the front side

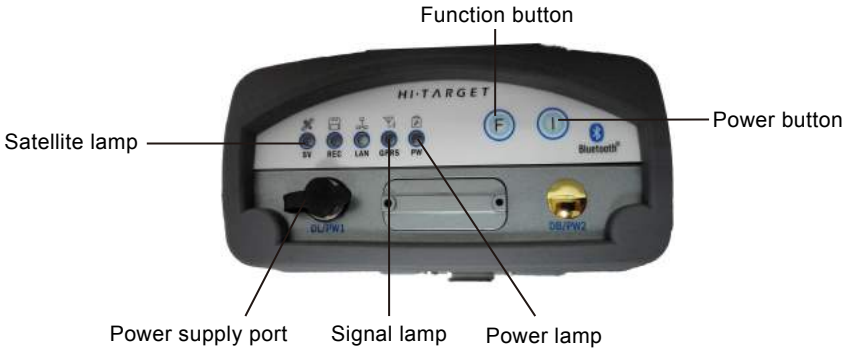

Fig 1-2 Front side

Introduction of the control panel and indicator lamp

Table 1-6 work mode: ● on ○off

Mode	Satellite lamp (green)	Signal Lamp(green lamp of the dual-color)
Base station	●	○
Rover	○	●
Static	●	●

Table 1-7 Data chain

Mode	Satellite lamp (green)	Signal Lamp (green lamp of the dual-color)	Signal Lamp (red lamp of the dual-color)
Internal UHF	●	○	○
Internal GSM	○	●	○
External Radio	●	●	○
Beacon	○	○	●

Function button operation instructions

Double press button F (0.2s＜interval＜1s) to enter into the "working mode " settings. There are three kinds of working mode to be selected ; "Base" ,

"Rover" and "Static", and K3 only used for "Rover".

Long press button F (interval＞3s) to enter into the "data chain" settings. There are four data link to be selected; "UHF" , "GSM" , "external" , and "Beacon" , and K3 only used for "Beacon".

Indicator lamp operation instructions

Power lamp (red)	Always on: normal voltage, voltage＞11V Slow flashing: low voltage ,Voltage≤11V Quick flashing: battery capacity indication
Satellite lamp (green)	Slow flashing: tracking the satellite or losing the satellite Always on: the satellite has been tracked
Signal lamp (red)	Always on: the beacon has received the signal from the base station.

Power on/off operating instructions

Power on：Long press for 1 second until all lamps light.

Power off：Long press for 3 seconds until all lamps off

1.3.2 Rear side

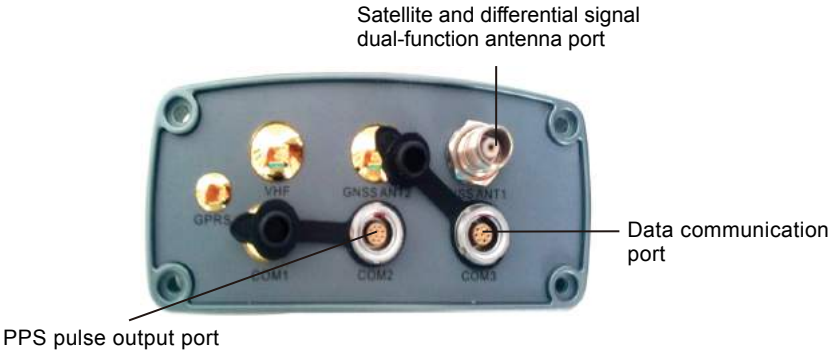

Fig 1-3 Rear side

As above Figure 1-3 shows, there are three ports in the rear side.

Dual-function antenna port: transmit satellite signal and differential signal to the motherboard.

PPS pulse output port: export the PPS pulse from the beacon of K3.The PPS signal will export from the ninth pin of the RS-232 port.

Data communication port:export the received data ,also can be used as power supply port.

1.3.3 Bottom side

Fig 1-4 Bottom side

1.3.4 Accessories

GC-3 cable

Fig 1-5 GC-3 cable

Usage of GC-3: Connect K3 beacon with PC to transmit data. Also can be used as the power supply cable.

⚠ Notice:

Make sure the COM port doesn't being occupied by other programs.

PW-25

Fig 1-6 PW-25

Usage of PW-25: Connect K3 beacon with storage battery .

⚠ Notice:

Red wires connect to the positive and the black wires connect to the negative.

AG-X

Fig 1-7 AG-X

Usage of PW-25: Connect K3 beacon with satellite antenna or beacon antenna.

Notice:

Cable length can be optional . Better not install the cable parallel with other cable to avoid the signal attenuation.

AT-1500

Fig 1-8 AT-1500

Usage of AT-1500: receive the satellite or beacon signal.

Notice:

Keep away from the high frequency antenna like high frequency radar .

CHAPTER

2

Setting Up K3 with Hi-MAX Software

- Connect K3 to Hi-MAX software
- Setup of beacon/SBAS signal

2.1 Connect K3 to Hi-MAX software

2.1.1 Serial port

See steps as below show.

Fig 2-1

1.Click "Start/All program /Hi-MAX /Echo-sounder Survey software".

2.Click"Serial Debug", the dialog box will show in Fig 2-2 following.

Fig 2-2

3.Set up "port" as COM1, " Baud Rate" as 19200 and "GPS type" as K2/K3/HD8600.

4.Then click "Connect".

2.1.2 Sky plot

Fig 2-3

1.Enter into the main interface. Click "GPS Info" to enter into GPS Info interface.

Satellite Map: Green dots in the circle means satellites have been tracked.

Coordinate Info: Including time , B, L, H based on WGS-84 coordinate system.

Satellite Info list: Including satellite number, Azimuth angle, Elevation angle, SNR L1 and SNR L2. and the value of SNR should be greater than 12 when received stabilized differential data.

Differential Info: Including total number of satellites, differential data source, solution and latency.

2.1.3 Date debug

Fig 2-4

1.Click "Data Debug" to enter into the Data Debug interface, users can select data output format and frequency.

Tips: After power on, k3 default output 1PPS data.

2.2 Setup of beacon/SBAS signal

2.2.1 Setup of beacon

Fig 2-5

1.Click "Set Rover", and choose "Beacon setting".

2.Three ways to track the beacon. Auto, Manual and Station .If users know the frequency and rate, it can be manual input.

3.Then click "Apply" .

4.After apply it click "Close".

2.2.2 Setup of SBAS

Fig 2-6

1.Click "SBAS setting" to enter into the interface of settings.

2.choose the difference type and check satellites .

3.then click "OK".

CHAPTER

3

Introduction of K5 Heading and Positioning Beacon Receiver

- Key features and specifications of K5
- Mainframe and accessories

3.1 Key features and specifications of K5

K5 is designed for professional marine survey so it comes with an external dual-antenna, which allows users to put the receiver(main part) in the cabin so it would be safer and easier for user to check information.

Features	Split design, GNSS receiver cooperated with external antenna	
	Accuracy	Horizontal: up to 0.5 m (1δ) Pitching: <1 Heading: <0.5 (1δ), up to 0.02 when baseline is 1 meter
Technical specifications	GNSS	540 channels , including 2 channel SBAS parallel racking GPS L1, GLONASS L1, SBAS
	Beacon	Frequency range: 283.5KHz~325KHz Working range: 500km for seashore and 200km for land Dual automatic channels
	Output	Standard NEMA-0183 format 1PPS
Physical Interface	1 X	RS-232 serial port Bluetooth port USB port(multiplex)
	2 X	External DC power input port (multiplex)

Electrical and physical properties	Electrical	Storage: 64MB Host power consumption: 2.5W Input voltage: 7~36V DC
	Physical	Size: 22.5cm*13.8cm*7cm Weight: 1.0 Kg
Environmental specifications	Rugged design	IP 65
	Temperature	Work: -40℃~65℃ Storage: -55℃~85℃

3.2. Mainframe and accessories

3.2.1 Front side,lamp indicator

Mainframe

Fig 3-1 Mainframe(front side)

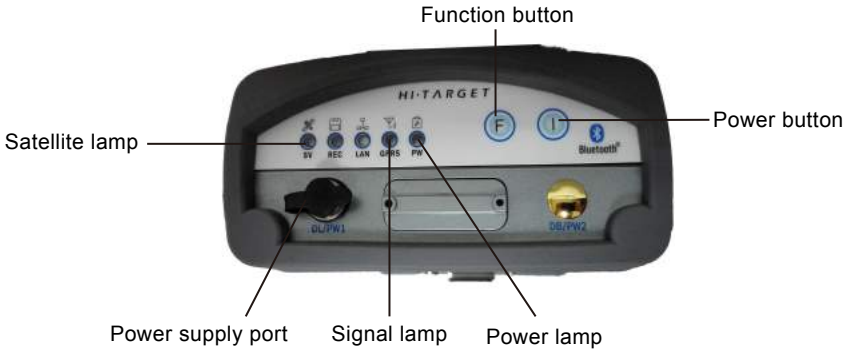

Fig 3-2 Control panel

Table 3-1 Motion: ● on ○off

Motion	Satellite lamp (green)	Signal Lamp(green lamp of the dual-color)
Base station	●	○
Rover	○	●
Static	●	●

Table 3-2 Data link

Mode	Satellite lamp (green)	Signal Lamp (green lamp of the dual-color)	Signal Lamp (red lamp of the dual-color)
Internal UHF	●	○	○
Internal GSM	○	●	○
External Radio	●	●	○
Beacon	○	○	●

Function button operation instructions

Double press button F (0.2s＜interval＜1s) to enter into the "working mode " settings. There are three kinds of working mode to be selected ; "Base" , "Rover" and "Static", and K3 only used for "Rover".

Long press button F (interval＞3s) to enter into the "data chain" settings. There are four data link to be selected; "UHF" , "GSM" , "external" , and "Beacon" , and K3 only used for "Beacon".

Indicator lamp operation instructions

Power lamp (red)	Always on: normal voltage, voltage＞11V Slow flashing: low voltage ,Voltage≤11V Quick flashing: battery capacity indication
Satellite lamp (green)	Slow flashing: tracking the satellite or losing the satellite Always on: the satellite has been tracked
Signal lamp (red)	Always on: the beacon has received the signal from the base station.

Power on：Long press for 1 second until all lamps light.

Power off：Long press for 3 seconds until all lamps off

3.2.2 Rear side

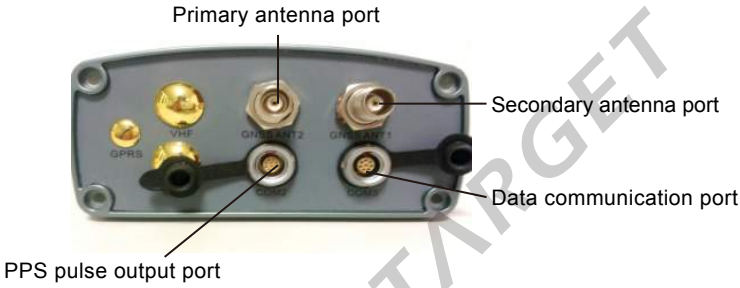

Fig 3-3 Rear side

There are 4 ports on the rear side.

Primary antenna port: input GNSS position information and beacon signal from primary antenna.

Second antenna port: input GNSS information from second antenna.

PPS output port: export the PPS pulse from the beacon of K5.The PPS signal will export from the ninth pin of the RS-232 port automatically after you power on the device.

Data output port: output the received data ,also can be used as power supply port.

3.2.3 Bottom side

Fig 3-4 Bottom side

3.2.4 Accessories

GC-3 cable

Fig 3-5 GC-3

Usage of GC-3: Connect K3 with PC to transmit data. Also can be used as the power supply cable.

Notice:

Make sure the COM port hadn't been occupied by other programs.

PW-25

Fig 3-6 PW-25

Usage of PW-25: Connect K5 beacon with storage battery .

Notice:

Red wires connect to the positive and the black wires connect to the negative.

AG-20

Fig 3-7 AG-20

Usage of AG-20: Connect K5 beacon with satellite antenna or beacon antenna.

Notice:

Cable length can be optional . Better not install the cable parallel with other cable to avoid the signal attenuation.

AT-1500

Fig 3-8 AT-1500

Usage of AT-1500: primary antenna, receiving the satellite and beacon signal.

AT-1200B

Fig 3-9 AT-1200B

Usage of AT-1200B: second antenna, receiving the GPS L1 signal.

CHAPTER

4

Setting Up K5 with Hi-MAX Software

- Connect K5 to Hi-MAX software
- Setup of beacon/SBAS signal
- Setup of navigation

4.1 Connect K5 to Hi-MAX software

4.1.1 Serial port

Fig 4-1

See steps as below show.

1. Click "Start/All program/Hi-MAX/Echo-sounder Survey software".

2. Click"Serial Debug", the dialog box will show in Fig 4-2 following.

Fig 4-2

3. Set up "port" as COM1, " Baud Rate" as 19200 and "GPS type" as K5/K7.

4. Then click "Connect".

4.1.2 Sky plot

Fig 4-3

1. Enter into the main interface. Click "GPS Info" to enter into GPS Info interface.

Satellite Map: Green dots in the circle means satellites have been tracked.

Coordinate Info: Including time , B, L, H based on WGS-84 coordinate system.

Satellite Info list: Including satellite number, Azimuth angle, Elevation angle, SNR L1 and SNR L2. and the value of SNR should be greater than 12 when received stabilized differential data.

Differential Info: Including total number of satellites, differential data source, solution and latency.

4.1.3 Date debug

Fig 4-4

1. Click "Data Debug" to enter into the Data Debug interface, users can select data output format and frequency.

4.2 Setup of beacon/SBAS signal

4.2.1 Setup of beacon

Fig 4-5

1.Click "Set Rover", and choose "Beacon setting".

2. Three ways to track the beacon. Auto, Manual and Station .If users know the frequency and rate, it can be manual input.

3. Then click "Apply" .

4. After apply it click "Close".

4.2.2 Setup of SBAS

Fig 4-6

1.Click "SBAS setting" to enter into the interface of settings.

2.choose the difference type and check satellites .

3.then click "OK".

4.3 Setup of navigation

4.3.1 Physical setup of antenna

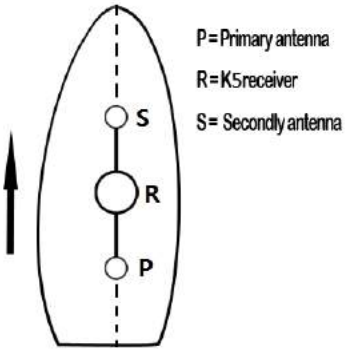

Fig4-7 Setup of dual-frequency antenna instruction

Fig4-8 antenna installation

- ◇ Pallel the antenna baseline with the axis of the boat, as you can see in Fig 4-7
- ◇ Primary antenna should be mounted at the bow end and the Secondary antenna should be mounted at the boat poop.
- ◇ There is a base shelf that both antennas can be installed on it. The distance between them is 1 meter. We suggest you to fix them with distance 1 meter.

4.3.2 Software setup of antenna

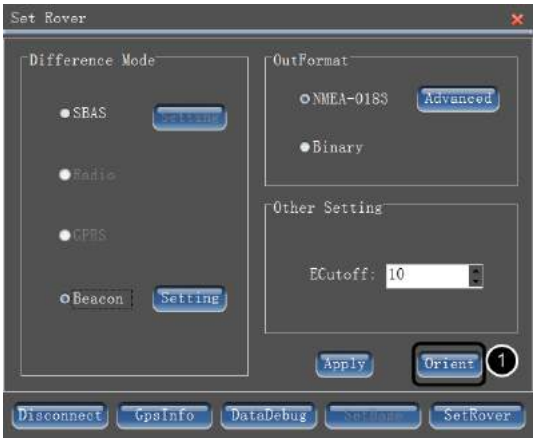

Fig 4-9

After installed the antenna on the pole, connect antenna to receiver K5, then

1.click “Orient” button to make further setting.

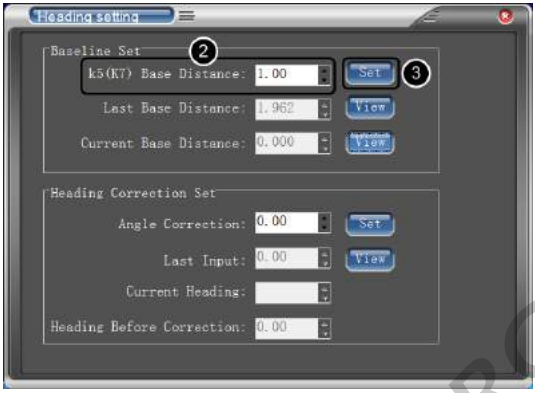

Fig 4-10

2.Measure the distance between two antenna(measure the phase center). Input the value into it. It is recommended to install the antenna on the pole which furnished by Hi-Target. Then the distance is 1 meter.

3.Click “Set ” button to confirm.

4.3.3 Setup of navigation

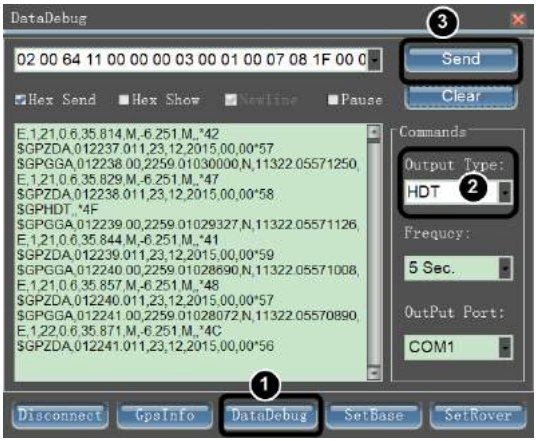

Fig 4-10

1. In serial Debug interface, Connect the K9 receiver ,Click "Data Debug".
2. Choose "HDT" as the output type .
3. And click "Send".

CHAPTER

5

Introduction of K9 RTK Heading and Positioning Receiver

- Key features of K9
- Technical specifications of K9 receiver
- Mainframe and accessories

5.1 Key features of K9

Based on HI-TARGET GNSS technology, the K9 is designed for precise marine applications that requires precise heading and RTK position performance .And there three key features for the dual frequency GNSS receiver.

Dual-frequency: Built-in Trimble's OEM motherboard to ensure that K9 dual-frequency receiver provide high positioning accuracy and receiving stable signal.

Performance on long baselines: No more measuring the baseline length and no need to put the position antenna and orientation antenna in the same horizontal level makes marine survey easy and efficiently.

Long distance RTK working technology: make sure that even in a very long distance ,the receiver can provide a very stable signal.

5.2 Technical specifications of K9 receiver.

Table 5-1: Module technical specifications

Item	Specification
GNSS technology	Trimble Maxwell 6 advanced customization GNSS technology
Initialization time	Performing initialization time in less than 10 seconds and better than 99.9% of the time

Table 5-2: Internal communication specifications

Item	Specification
Radio frequency range	283.5KHz~325KHz
Built-in connection module	GM-46V radio / Beacon module
Beacon working range	500km for sea and 200km for land
Radio Channels	100
Radio transmission speed	19.2Kbs

GPRS module	optional
CDMA/3G module	optional

Table 5-3 Technical specifications

Item	Specification
GNSS receiver channels	220
Signal types	GPS:L1 C/A, L2E, L2C, L5
	GLONASS:L1C/A, L1P, L2P(optional) L2C/A(for GLONASS)
	SBAS: WAAS, MSAS, EGNOS
	BDS and GALILEO: reserved
Export format	Standard NEMA-0183 format GSV, GGA, GSA, ZDA,VTG, GST, PJT, PLK,AVR,RMC, HDT,VGK, VHD,ROT,GGK,BPQ,GGL,GRS, GBS,
Differential format	CMR, CMR+, RTCM2.1, RTCM2.2, RTCM2.3, RTCM3.0, RTCM3.1,

Table 5-4 Accuracy specifications

Item	Specification
Positioning accuracy	Static: Horizontal2.5mm+1ppm Elevation ±5mm+1ppm
	RTK: Horizontal± 0.8cm+1ppmt Elevation 1.5cm+1ppm
	RTD：±0.45m
Heading Accuracy for 2meters baseline	single point positioning，SBAS：0.200°
	Beacon：0150°
	RTK：0.090°
Heading Accuracy for 10meters baseline	single point positioning，SBAS：0.150°
	Beacon：0.100°
	RTK：0.050°

Table 5-5：Environmental specifications

Item	Quantity
RS-232 serial port	2
External DC power input port	2
Bluetooth port	1
USB port	1

Table 5-6: Electrical and physical specifications

Item	Specification
Storage	64MB
Power dissipation	2.5W
Input voltage	DC 7~36V
Size	22.5cm*13.8cm*7cm
Weight	1.0 Kg

Table 5-7: Environmental specifications

Item	Specification
Operating temperature	-40℃~65℃
Storage temperature	-55℃~85℃
Humidity	95%，non-condensing
Enclosure rating	IP 65

5.3 Mainframe and accessories

5.3.1 Introduction of the front side

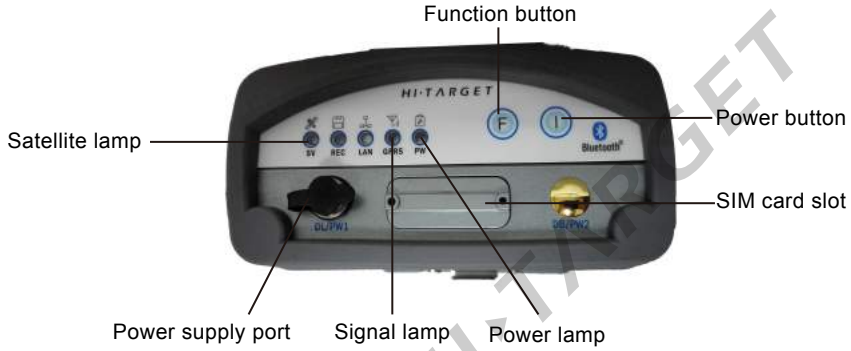

Fig 5-1 Front side

5.3.2 Introduction of the control panel and indicator lamp

Table 5-8 work mode ● on ○off

Mode	Satellite lamp (green)	Signal lamp(green lamp of the dual-color)
Base station	●	○
Rover	○	●
Static	●	●

Table 5-9 Data chain

Mode	Satellite lamp (green)	Signal lamp(green lamp of the dual-color)
Internal UHF	●	○
Internal GSM	○	●
External Radio	●	●

Table 5-10 Channel Chart

Channel	Satellite lamp (red)	Satellite lamp (green)	Signal lamp(green in dual-color lamp)	Data lamp (red in dual-color lamp)
0	○	○	○	○
1	●	○	○	○
2	○	●	○	○
3	●	●	○	○
4	○	○	●	○
5	●	○	●	○
6	○	●	●	○

7	●	●	●	○
8	○	○	○	●
9	●	○	○	●
A	○	●	○	●
B	●	●	○	●
C	○	○	●	●
D	●	○	●	●
E	○	●	●	●
F	●	●	●	●

Function button operation instructions

Double press button F (0.2s＜interval＜1s) to enter into the "working mode " settings. There are three working mode to be selected ; "Base" ,"Rover" and "Static".

Long press button F (interval＞3s) to enter into the "data chain" settings. There are four data chain to be selected; "UHF" , "GSM" , "external" , and "Beacon".

For rover in the internal UHF mode， press button F to enter into the "UHF radio channels " settings. There are 0~9,A~F in all of 16 channels .use our software of Hi-Survey to set specific channels. Users can refer to the V30 channels settings.

Table5-11 Indicator lamp operation instructions

Power lamp (red)	Always on: normal voltage, voltage＞11V Slow flashing: low voltage ,Voltage≤11V Quick flashing: battery capacity indication
Satellite lamp (green)	Slow flashing: tracking the satellite or losing the satellite Always on: the satellite has been tracked
Signal lamp (green)	Always on: For Rover, internal UHF radio indicator Always off: for Base, external radio
Signal lamp(red)	Flashing indicate the data transmit

Power on/off operating instructions

Power on：Long press for 1 second until all lamps light.

Power off：Long press for 3 seconds until all lamps off

5.3.3 Rear side

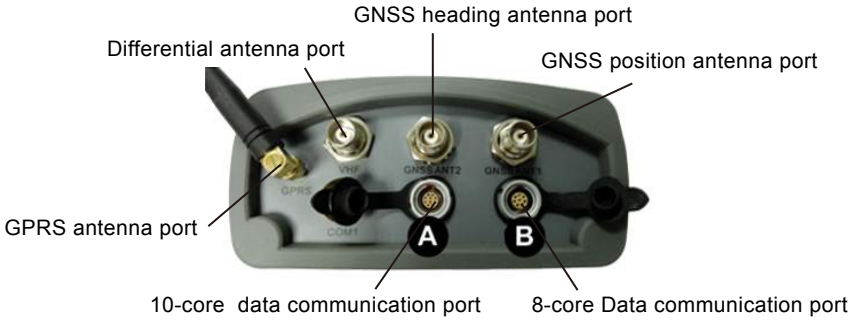

Fig 5-2 Rear side

Hardware port introductions

Correction data port: Five-core port(DL/PW1),For differential data port; For power supply port, input range DC 7V~36V;For external data link port, connect with DG-3and UC-1 such as external radio .

Port A: Ten-core port, output the PPS (1 pulse per second) from the ninth pin. Port A connected to the internal COM3 for output PPS data .

Port B: Eight-core port; For power supply port, input range DC7V~36V;For PC connection port, connect with GC-3 cable. Port B (eight-core port) is connected the internal COM1,which is the data debug COM port and used for output the HDT data.

GNSS antenna port: There are two external GNSS antenna port ,GNSS ANT1 for positioning and another for heading.

GPRS antenna port: MCX port, For external GPRS antenna port.

UHF antenna port: Internal radio port.

5.3.4 K9 GPRS SIM card slot introduction

Fig 5-3 Fixed screw

Fig 5-4 SIM card slot

Fig 5-5 Bottom side

5.3.5 Accessories

Dual-frequency high-gain antenna

Fig 5-6 Dual-frequency high antenna gain

With built-in OEM Trimble's motherboard, K9 must use high-gain antenna which should be more than 40DB.Our standard configuration AT-2300H antenna is 43DB high-gain antenna. The distance of positioning and orientation antenna should be less than 2 meters，and the difference of elevation should be less than 1 meters. The instrument can calculate the antenna distance automatically.

Fig 5-7 Installation Instruction

Tips for installation

- ◇ Install the antenna baseline parallel with the boat.
- ◇ When install this antenna，install as high as possible，normally above the fence at the top of the cockpit 2 meters.
- ◇ Installation position should be far away from electromagnetic interference, such as HF marine telephone, HF radar.
- ◇ Waterproof protection is necessary for the antenna and the cable connector.

PW-25

Fig 5-8 PW-25

Usage of PW-25: Connect K9 with storage battery .

⚠ Notice:

Red wires connect to the positive and the black wires connect to the negative.

GC-3 cable

Fig 5-9 GC-3 cable

Usage of GC-3: Connect K9 with PC to transmit data. Also can be used as the power supply cable.

Notice:

Make sure the COM port hadn't been occupied by other programs.

RF-35 460M differential antenna

Fig 5-10 RF-35 460M differential antenna

Usage: Transmit the differential data to the Rover

- ◇ Differential antenna should be mounted as high as possible.
- ◇ Differential antenna should be far away from the satellite receiving antenna at least 5 meters.
- ◇ Differential antenna should be far away from the interference sources more than 200 meters, such as power lines.

CHAPTER

6

Setting Up K9 with Hi-MAX Software

- Connect K9 to Hi-MAX software
- Setup of Rover
- Setup of dual-frequency gain antenna

6.1 Connect K9 to Hi-MAX software

Serial port

See steps as below show.

Fig 6-1 Echo-sounder Survey software Interface

1.Click "Start/All program/Hi-MAX/Echo-sounder Survey software".

2.Click"Serial Debug", the dialog box will show in Fig 6-2 following.

Fig 6-2 Port connect interface

3.Set up "port" as COM1, " Baud Rate" as 19200 and "GPS type" as K9.

4.Then click "Connect".

Sky plot

Fig 6-3 GPS Info interface

1.Enter into the main interface. Click "GPS Info" to enter into GPS Info interface.

Satellite Map: Green dots in the circle means satellites have been tracked.

Coordinate Info: Including time , B, L, H based on WGS-84 coordinate system.

Satellite Info list: Including satellite number, Azimuth angle, Elevation angle, SNR L1 and SNR L2. and the value of SNR should be greater than 12 when received stabilized differential data.

Differential Info: Including total number of satellites, differential data source, solution and latency.

Date debug

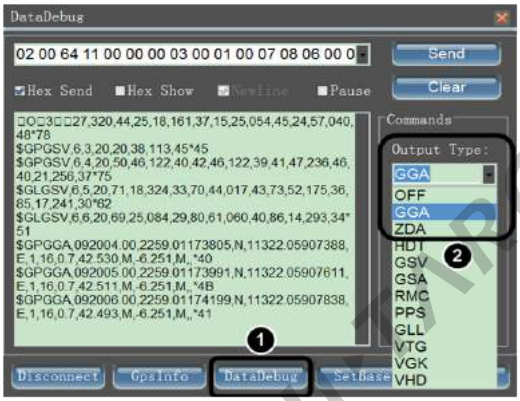

Fig 6-4 Data debug interface

1.Click "Data Debug" to enter into the Data Debug interface.

2.Users can select data output format and frequency.

6.2 Setup of rover

6.2.1 Radio differential mode settings

Fig 6-5 Radio setup interface

1.Click "Set Rover".

2. Choose "Radio".

3.In the difference mode ,Choose the "Radio". The "Radio Channel" and the "Message type" should be the same with the Base Station. 4.After check all these settings ,Click "Apply".

6.2.2 SBAS differential mode settings

K9 defaults to SBAS differential mode, that is single point positioning .

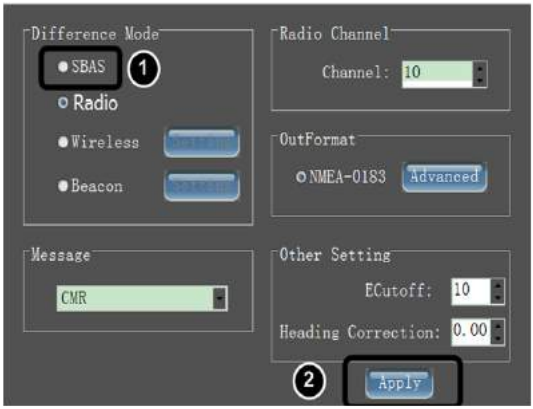

Fig 6-6 SBAS setup interface

1.In Rover setting interface. Choose the "SBAS" mode,

2.then click "Apply". There is no differential data in SBAS differential mode only single point positioning data.

TIPS: If the data link was disconnected when doing RTK survey, K9 will display in "single point positioning" for half a minute. And when data link connect again, the signal lamp will flashing red.

6.2.3 Wireless differential mode settings

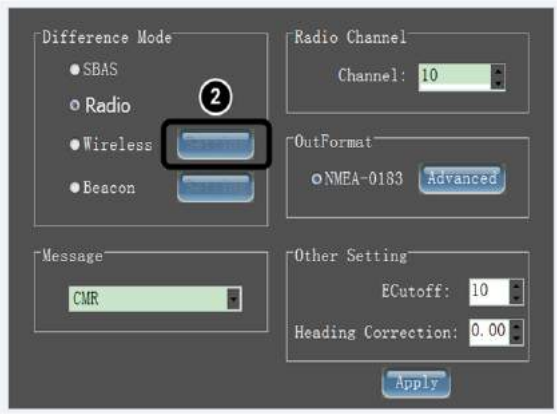

Fig 6-7 Wireless mode setup interface

1.In Rover setting interface. Click into the "Set Rover"

2.Click the "setting"

3.All the settings should be the same with Base station, which include Wireless type, APN, IP, Port, Network, Area ID,Group ID. After confirm all the settings, Click "Apply".

TIPS: If the data link was disconnected when doing RTK surveying, K9 will display in "single point positioning" for half a minute. And when data link connect again, the signal lamp will flashing red.

6.3 Setup of dual-frequency gain antenna

6.3.1 Setup of dual-frequency gain antenna

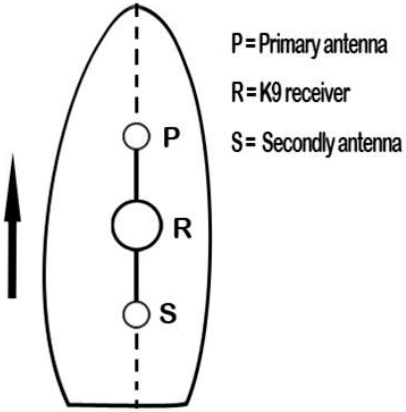

Fig 6-8 Setup of dual-frequency antenna instruction

1.Pallel the antenna baseline with the axis of the boat, as you can see in Fig 6-8.

2.Primary antenna should be mounted at the bow end and the Secondary antenna should be mounted at the boat poop.

3. ANT1 port is for the primary antenna and ANT2 is for the secondary antenna.

Tips： Built-in Trimble motherboard will automatically calculate the position and orientation accuracy. Antenna baseline should be greater than 1 m. Spacing between the antennas shouldn't be too long, we recommend using the standard one meter bracket from HI-TARGET.

Tips for installation

- ◇ Install the antenna baseline parallel with the boat.
- ◇ When install this antenna，install as high as possible，normally above the fence at the top of the cockpit 2 meters.
- ◇ Installation position should be far away from electromagnetic interference，such as HF marine telephone, HF radar.
- ◇ Waterproof protection is necessary for the antenna and the cable connector.

6.3.2 Setup of navigation

Fig 6-9 Setup of navigation output interface

1.In serial Debug interface, Connect the K9 receiver ,Click "Data Debug".

2.Choose "HDT" as the output type .

3.And click "Send".

6.3.3 Setup of 1PPS

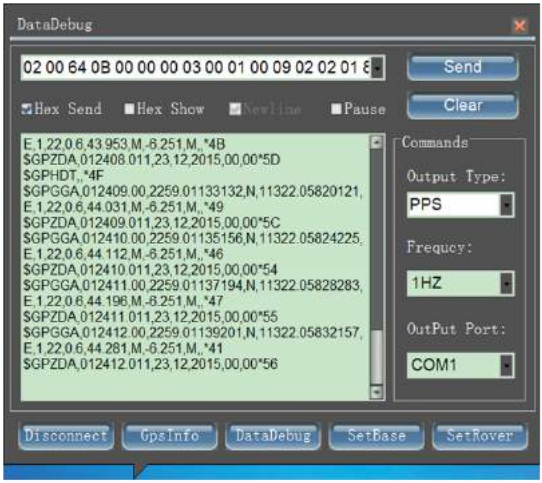

Fig 6-10 Setup of 1PPS output interface

1.In Data Debug interface, Choose output type as "PPS"

2.Click "Send"

CHAPTER

7

Introduction of K10 Split RTK Receiver

- Key features of K10
- Technical specifications of K10 receiver
- Mainframe and accessories

7.1 Key features of K10

Based on HI-TARGET GNSS technology, the K10 is designed for precise marine applications that requires precise heading and RTK position performance .And there four key features for the dual frequency GNSS receiver.

Split Dual-frequency GNSS receiver: Built-in Trimble's OEM motherboard to ensure that K10 dual-frequency receiver provide high positioning accuracy and receiving stable signal.

Long distance RTK working technology: make sure that even in a very long place ,the receiver can provide a very stable signal.

Compatible with CORS: With stable network transmission technology, K10 can connect with CORS .That means just one Rover can conduct RTK work.

GPRS/ DMA/ UHF/ URS Transmission technology:A variety of transmission function make users easy to use.

7.2 Technical specifications of K10 receiver

Table 7-1: Internal communication specifications

Item	Specification
Radio frequency range	283.5KHz~325KHz
Built-in connection module	GM-46V radio / Beacon module.

Table 7-2 Technical specifications

Item	Specification
GNSS receiver channels	220
Signal types	GPS:L1 C/A, L1P, L2P(optional)
	GLONASS:L2C/A
	SBAS: L1C/A,L5
	BDS and GALILEO: reserved

Export format	Standard NEMA-0183 formatGSV, GGA, GSA, ZDA, VTG, GST, PJT, PLK, AVR, RMC,HDT,VGK,VHD,ROT,GGK,BPQ,GGL, GRS,GBS and Binary: Trimble GSOF
Differential format	CMR, CMR+, RTCM2.1, RTCM2.2, RTCM2.3, RTCM3.0, RTCM3.1

Table7-3：Accuracy specifications

Item	Specification
Positioning accuracy	Static: Horizontal±2.5mm+1ppm Elevation ±5mm+1ppm
	RTK: Horizontal± 0.8cm+1ppm Elevation 1.5cm+1ppm
	RTD：±0.45m
Heading Accuracy for 2meters baseline	single point positioning，SBAS：0.200°
	Beacon：0150°
	RTK：0.090°
Heading Accuracy for 10meters baseline	single point positioning，SBAS：0.150°
	Beacon：0.100°
	RTK：0.050°

Table7-4: Port quantities

Item	Quantity
RS-232 serial port	2
External DC power input port	2
Bluetooth port	1
USB port	1

Table 7-5: Electrical and physical specifications

Item	Specification
Storage	64MB
Power dissipation	2.5W
Input voltage	DC 7~36V
Size	22.5cm*13.8cm*7cm
Weight	1.0 Kg

Table7-6: Environmental specifications

Item	Specification
Operating temperature	-40℃~65℃
Storage temperature	-55℃~85℃
Enclosure rating	IP 65

7.3 Mainframe and acessories

7.3.1 Introduction of the Front side

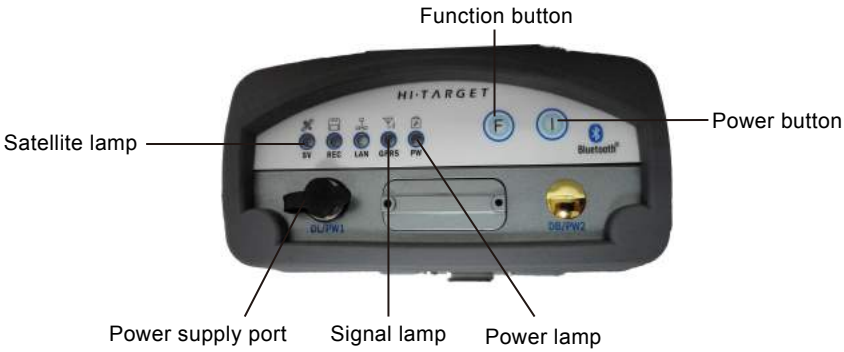

Fig 7-1 Front side

Introduction of the control panel and indicator lamp

Table 7-7 work mode ● on ○off

Mode	Satellite lamp (green)	Signal lamp(green lamp of the dual-color)
Base station	●	○
Rover	○	●
Static	●	●

Table 7-8 Data chain

Mode	Satellite lamp (green)	Signal lamp(green lamp of the dual-color)
Internal UHF	●	○
Internal GSM	○	●
External Radio	●	●

Function button operation instructions

Double press button F (0.2s＜interval＜1s) to enter into the "working mode " settings. There are three working mode to be selected ; "Base" ,"Rover" and "Static".

Long press button F (interval＞3s) to enter into the "data chain" settings. There are three data chains to be selected; "UHF" , "GSM" , "external".

For rover in the internal UHF mode， press button F to enter into the "UHF radio channels " settings. There are 0~9,A~F in all of 16 channels .use our software of Hi-Survey to set specific channels. Users can refer to the V30 channels settings.

Introduction of the control panel and indicator lamp

Power lamp (red)	Always on: normal voltage, voltage＞11V Slow flashing: low voltage ,Voltage≤11V Quick flashing: battery capacity indication
Satellite lamp (green)	Slow flashing: tracking the satellite or losing the satellite Always on: the satellite has been tracked
Signal lamp (green)	Always on: For Rover, internal UHF radio indicator. For internal GSM mode， connected to the network. Always off: for Base, external radio Quick flashing：In static mode，data error
Signal lamp(red)	Flashing indicate the data transmit

Power on/off operating instructions

Power on：Long press for 1 second until all lamps light.

Power off：Long press for 3 seconds until all lamps off

7.3.2 Rear side

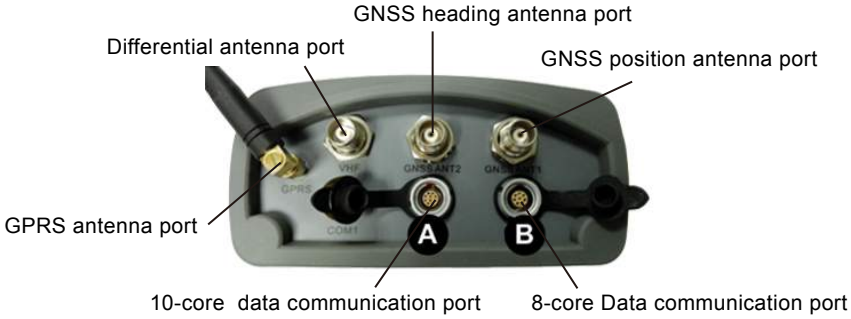

Fig 7-2 Rear side

Fig 7-3 Card Slot

Fig 7-4 Bottom side

Hardware port introductions

Correction data port: Five-core port(DL/PW1),For differential data port; For power supply port, input range DC 7V~36V;For external data link port, connect with DG-3and UC-1 such as external radio .

COM2: Ten-core port, output the PPS (1 pulse per second) from the ninth pin.

COM3: Eight-core port; For power supply port, input range DC7V~36V;For PC connection port, connect with GC-3 cable.

GNSS antenna port: There are two external GNSS antenna port ,GNSS ANT1 for positioning and another for heading.

GPRS antenna port: MCX port, For external GPRS antenna port.

UHF antenna port: Internal radio port.

7.3.3 Accessories

Dual-frequency high antenna gain

Fig 7-5 Dual-frequency high antenna gain

With built-in OEM Trimble's motherboard, K10 must use high-gain antenna which should be more than 40DB.Our standard configuration AT-2300H antenna is 43DB high-gain antenna. The distance of positioning and orientation antenna should be less than 2 meters， and the difference of elevation should be less than 1 meters. The instrument can calculate the antenna distance automatically.

Tips for installation

◇ When install this antenna，install as high as possible，normally above the fence at the top of the cockpit 2 meters.

◇ Installation position should be far away from electromagnetic interference，such as HF marine telephone, HF radar.

◇ Waterproof protection is necessary for the antenna and the cable connector.

PW-25

Fig 7-6 PW-25

Usage of PW-25: Connect K10 with storage battery .

⚠ Notice:

Red wires connect to the positive and the black wires connect to the negative.

GC-3 cable

Fig 7-7 GC-3 cable

Usage of GC-3: Connect K10 with PC to transmit data. Also can be used as the power supply cable.

Notice:

Make sure the COM port hadn't been occupied by other programs.

4. RF-35 460M differential antenna

Fig 7-8 RF-35 460M differential antenna

Usage: Transmit the differential data to the Rover

Tips for use

- ◇ Differential antenna should be mounted as high as possible.
- ◇ Differential antenna should be far away from the satellite receiving antenna at least 5 meters.
- ◇ Differential antenna should be far away from the interference sources more than 200 meters, such as power lines.

CHAPTER

8

Setting Up K10 with Hi-MAX Software

- Connect K10 to Hi-MAX software
- Setup of rover
- Setup of navigation and 1PPS

8.1 Connect K10 to Hi-MAX software

Serial port

See steps as below show.

Fig 8-1 Hi-MAX software interface

1.Click "Start/All program/Hi-MAX/Echo-sounder Survey software".

2.Click"Serial Debug", the dialog box will show in Fig 8-2 following.

Fig 8-2 Serial Debug interface

3.Set up "port" as COM1, " Baud Rate" as 19200 and "GPS type" as K9.

4.Then click "Connect".

Sky plot

Fig 8-3

1.Enter into the main interface. Click "GPS Info" to enter into GPS Info interface.

Satellite Map: Green dots in the circle means satellites have been tracked.

Coordinate Info: Including time , B, L, H based on WGS-84 coordinate system.

Satellite Info list: Including satellite number, Azimuth angle, Elevation angle, SNR L1 and SNR L2. and the value of SNR should be greater than 12 when received stabilized differential data.

Differential Info: Including total number of satellites, differential data source, solution and latency.

Date debug

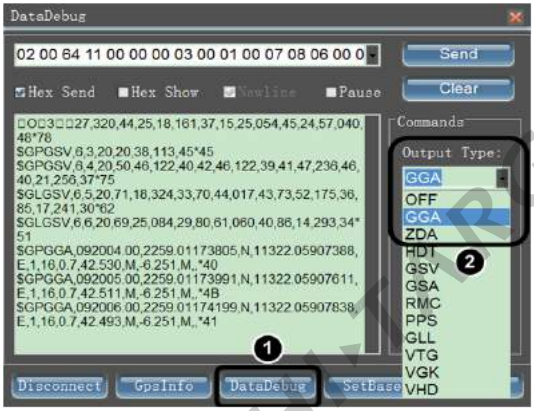

Fig 8-4 Date debug interface

1.Click "Data Debug" to enter into the Data Debug interface.

2.Users can select data output format and frequency.

8.2 Setup of rover

8.2.1 Radio differential mode settings

Fig 8-5 Rover setting interface

1.Click "Set Rover".

2. Choose "Radio".

3.In the difference mode ,Choose the "Radio". The "Radio Channel" and the "Message type" should be the same with the Base Station. 4.After check all these settings ,Click "Apply".

TIPS: If the data link was disconnected when doing RTK surveying, K10 will display in "single point positioning" for half a minute. And when data link connect again, the signal lamp will flashing red.

8.2.2 SBAS differential mode settings

K10 defaults to SBAS differential mode, that is single point positioning .

1.In Rover setting interface. Choose the "SBAS" mode, then click "Apply". There is no differential data in SBAS differential mode only single point positioning data.

8.2.3 Wireless differential mode settings

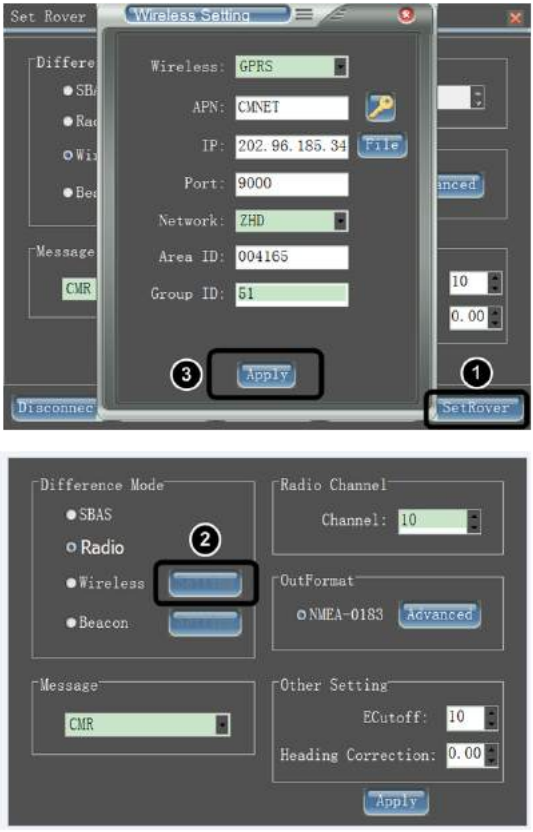

Fig 8-6 Wireless setting interface

1.In Rover setting interface. Click into the "Set Rover"

2.Click the "setting"

3.All the settings should be the same with Base station, which include Wireless type, APN, IP, Port, Network, Area ID, Group ID.After confirm all the settings, Click "Apply".

TIPS: If the data link was disconnected when doing RTK surveying, K10 will display in "single point positioning" for half a minute. And when data link connect again, the signal lamp will flashing red.

For Beacon settings , pls refer to K3 USER QUICK GUIDE manual.

8.3 Setup of navigation and 1PPS

8.3.1 Setup of navigation

Fig 8-7 Setup of navigation output interface

1.In serial Debug interface, Connect the K9 receiver ,Click "Data Debug".

2.Choose "HDT" as the output type .

3.And click "Send".

8.3.2 Setup of 1PPS

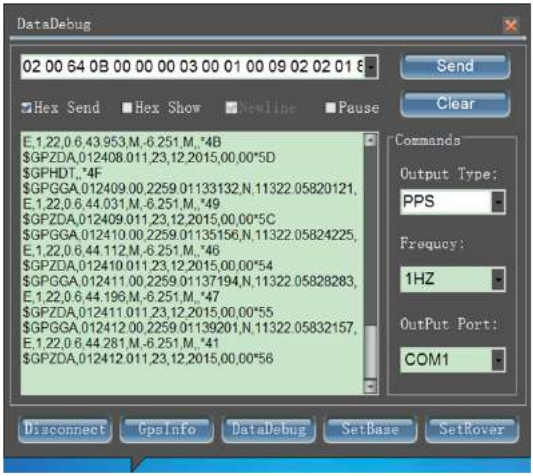

Fig 8-8 Setup of 1PPS output interface

1.In Data Debug interface, Choose output type as "PPS"

2.Click "Send"