Mobile Bluetooth GPS Receiver/Data Logger

SPK-GL-050B

User's Manual

Version 1.5.

Please read this manual before operating the unit

July 1 2006

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Chapter 1 Overview

Congratulations on the purchase of **SPK-GL-050B**, a new member of our **GPS Logger** family. You will find the device an ***accurate***, ***reliable*** and ***useful*** aid to your position tracking pursuits.

1.1 What Makes SPK-GL-050B Different

With a GPS logger, MTK technology and active patch antenna built in a miniature construction, **SPK-GL-050B** features an all-in-one, cost-effective mobile navigational GPS solution freeing you from the hassle of mounting any other GPS receivers and antennas. Coming up with innovative Plug-Navigate-Position concepts, **SPK-GL-050B** offers accurate position tracking and mapping capabilities. Thanks to its plenteous 8 megabytes flash memory space, **SPK-GL-050B** allows you to record navigational data and download them to your computer, which is ideal for applications in AVL, Fleet Management System and Marine Navigational Aids.

Connecting **SPK-GL-050B** to your computer via the Bluetooth for either navigation or downloading the data in the flash memory in **SPK-GL-050B**. You also can do navigation by connecting **SPK-GL-050B** to the devices, such as PDA, Palmtop and mobile phone. This way, **SPK-GL-050B**, designed as a low profile, enclosure featuring with Bluetooth interface, provides you with real-time GPS position, speed, distance traveled and header information in the NMEA-0183 format.

In addition, for the power, the operation time will be extended by a special design.

1.2 Packet Content

1. **SPK-GL-050B Body**

2. **Bluetooth wake up slide-switch** **(Please read page 8 for more information)**

2. **Mini USB-> USB cable**

3. **Software CD** (including a utility program (**GPSTRACE V3.14**) and a user manual)

Chapter 2 Main Features & Applications

2.1 The main features of SPK-GL-050B GPS Tracker

- Allowing users to store over **100,000**-tracks long points ($GPRMC)
- Memory-saving **Automatic Save** function
- FIFO logging logic (First In First Out)
- Capability of reading **NMEA-0183 (RMC, GGA, GSA, GSV and ZDA) sentences** from GPS.

  Note: (1) **RMC**, **GGA**, **GSA**, **ZDA** will be sent in every second.

  (2) **GSV** will be sent in every 5 seconds.

2.2 Applications:

- Record track-logs of your journeys
- Applicable in car/4WD/truck/bus/motorcycle
- Fit for sealed plastic bag for Marine use
- Record movement of Loan/Hire cars
- Record movement of delivery vans
- Record movement of aircraft
- Any other applications meeting your specific needs
- Allowing users to store GPS position, speed, distance traveled and header information
- Programmable Logging Data Intervals
- Allowing users to download NMEA-0183 output sentences in ASCII format

2.3 Specifications

PHYSICAL CONSTRUCTION		PERFORMANCE	
Dimension:	42 (W) x 63 (L) x 27.5 (H) mm	Antenna element:	High-reliability ceramic patch
Weight:	80 grams (± 5% ~ 10% or 10 ~ 20 grams) without cable	Antenna LNA:	Gain: 23+/-2dB, NF: 2.0 max.
Receiving frequency:	1575.42MHZ, C/A code	Receiver architecture:	32 parallel channels
Enclosure:	Corrosion-proof & polycarbonate resin	Reacquisition time:	3 sec. typical (hot start) 35 sec. typical (warm start) 41sec. typical (cold start)
Construction:	Ultrasonic welded	Position accuracy:	15m or 50 feet RMS
Mounting:	Suction mount	Velocity accuracy:	0.1 Knot RMS steady state
LED Indicators:	2 low current single-color LED lamp—Red & Blue	Update rate:	1 sec. continuous
Flash Memory Size:	8 megabytes	Operation time	10 hours in continuous use after batteries are fully charged.
ENVIRONMENTAL CONDITIONS		Dynamics:	Up to 50m/s.s. (Tracking sustained)
Temperature:	Operating: -0 ~ +70 Storage: -20 ~ +85	Power supply:	USB @ 5V, with reverse protection
Humidity:	95% RH non-condensing	Current Consumption:	100mA @ 5V
COMMUNICATION		Power Consumption:	0.63watt max.
Protocol:	NMEA 0183 at 4800 Baud rates	EMI filter:	Rejects power line interference
Interface:	Bluetooth 1.2 certified (Class 2) Compatible with Bluetooth devices with Serial Port Profile (SPP)	GPS INTERFACE CAPABILITY	
DATA CABLE (Mini USB-> USB with +5.0V Input)		Output Protocol:	NMEA 0183 Sentences
Length:	90 cm (standard)	Standard output sentences:	GGA: GPS position & Time ZDA: time & date GSV: satellite details RMC: position, time, speed, course
Description:	Multi-conductor shielded cable with USB receptacle with strain relief		
Cigar Adaptor Cable (+12V -> +5V)		* may add other NMEA sentences to the standard output to maximize interfacing capabilities.	
Length:	30 cm (standard)	Logger Interval:	RMC: 01 sec. Others: 00 sec.
Description:	Cigar adaptor converts 12.0V DC to 5.0V DC and supply power to GL-50B.	Built-in Logger Functions:	Available
		Logging Data Interval Programmability:	Available

Chapter 3 Hardware & Software Installation

3.1 Connecting USB-> Mini USB Adaptor cable for charging

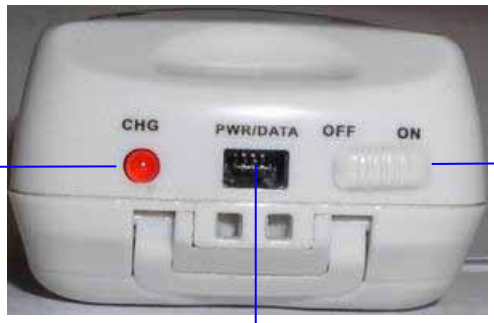
1. Derive power supply from the **USB-> Mini USB Adaptor cable**, a standard accessory shipped with **GL-105BT**:

Functions of the interfaces

Interface	Charging	Download	Navigation
Bluetooth	X	○	○
Mini USB	○	X	X

LED Indicator VS Status

Status	LED (Red)	LED (Blue)	Description
Fix status	Light on	Light flashing	1. When GL-105BT is fixed, the logger will then just start to log data. 2. Fix status identification *RMC Status = A *Number of satellites on the GGA used for positioning >= 4
Logging status	Light on	Light flashing with quick blink (recording)	Logger will start to record according to the time that user sets.
Low battery	Light flashing	Light flashing	The power of battery is low. The logger needs to be recharged.



Charging Status Indicator
Charging: Red

Power Switch
Right: ON
Left: OFF

Mini USB is for charging **ONLY**.

AAA Batteries

PS: 1. When it is fully charged and operated for 5 hours, please switch off the SPK-GL-050B to prolong the battery lives.

2.The ampere of battery is 850mA

Bluetooth wake up slide switch

PS: Before you connect your device (for example, PDA or computer) with SPK-GL-050B by Bluetooth, you need to slide this switch to initial the Bluetooth of SPK-GL-050B. When Bluetooth of SPK-GL-050B will shut down if it does not connect to a device for a certain while. This is for power saving purpose.

3.2 Installation of SPK-GL-050B Utility Program

1. Open the **Windows Explorer** and then double-click your CD-ROM drive icon to view the content of the CD shipped with the product.

2. Please follow this directory Data Logger Series\Documents & Utility\SPK-GL-050B\GPSTRACE Utility V3.14 and go to GPSTRACE Utility BT V3.14

3. Double-click **GPSTRACE Utility (BT) V3.14** to open the folder.

4. Double-click the **Setup(BT)** icon  to install **GPSTrace (BT) V3.14**.

5. The installation password is **demover**.

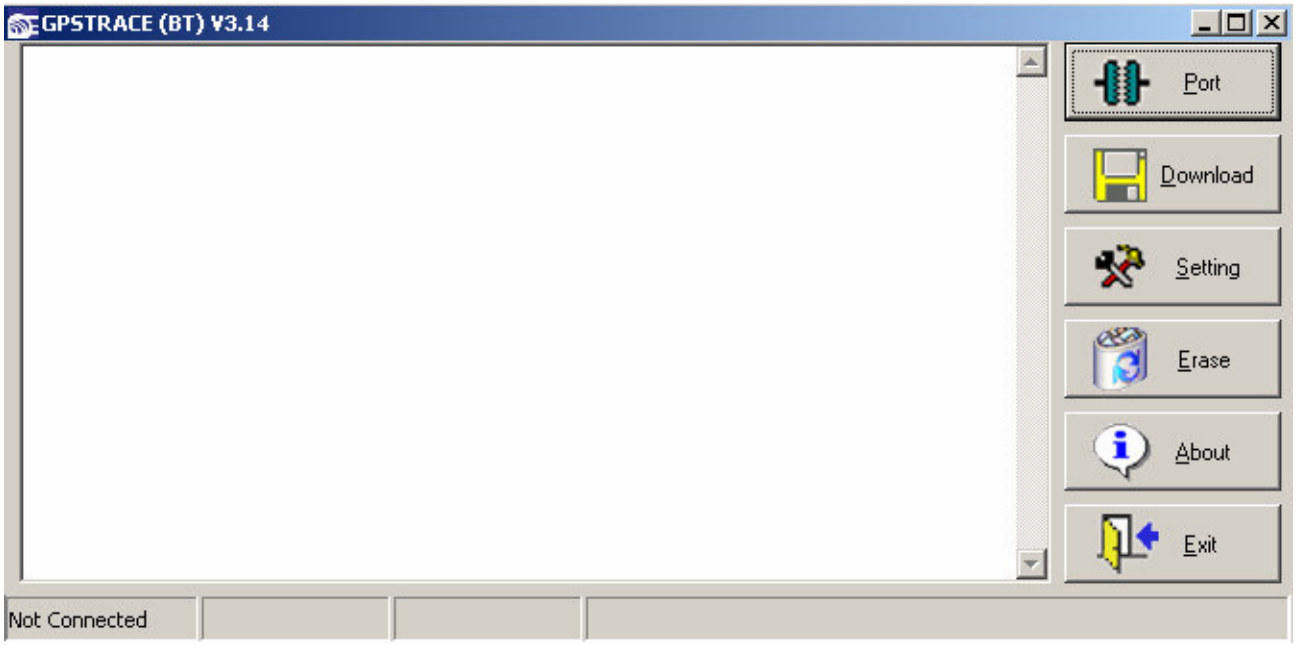
6. Follow the installation wizards to complete the installation.

*Note: If you cannot complete the installation from the CD, please copy the folder **GPSTRACE Utility V3.14** to your local driver and try again.*

Chapter 4 GPSTRACE Utility Operation

4.1 Getting Started

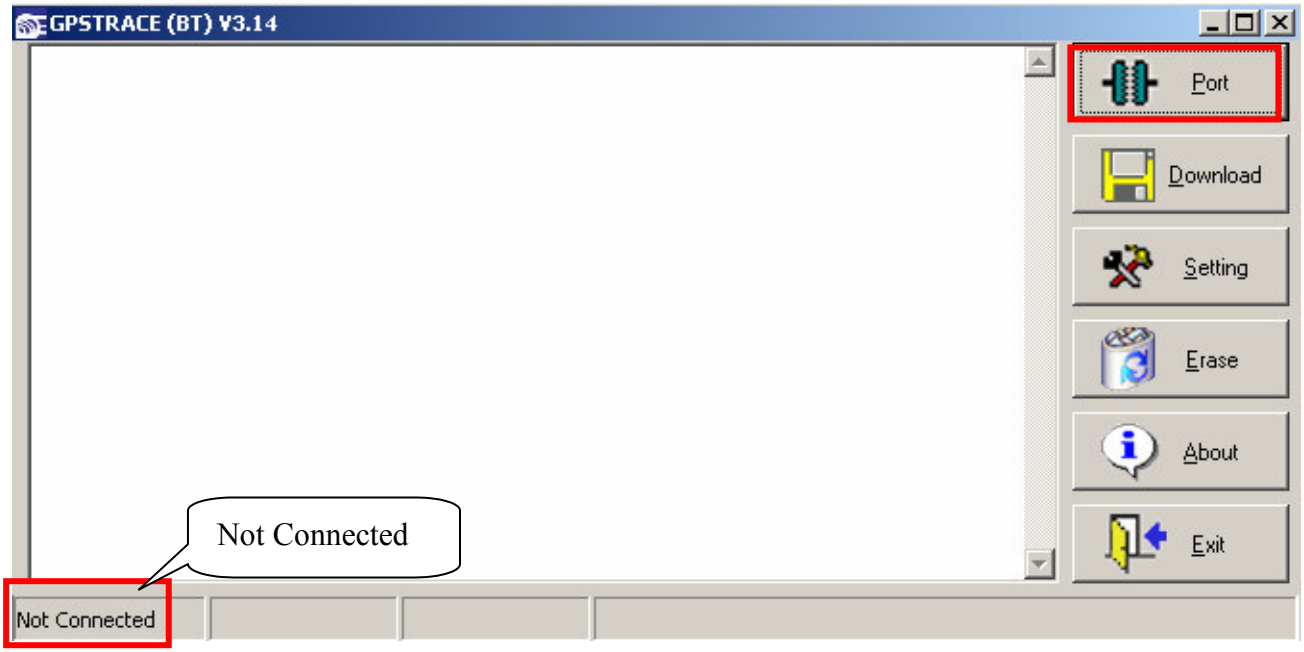
1. Refer to the **Section 3.1** to finish hardware installation, also check the Windows Device Manager to make sure that your device is currently in function.
2. Click **Starts ‰ Programs ‰ GPSTRACE Utility ‰ GPSTRACE** to launch the utility program "**GPSTRACE V3.14**".
3. The main menu window appears like below.
4. Connect the SPK-GL-050B via Bluetooth to a PC. *Note that the mini-USB is only for power supply/charging.*



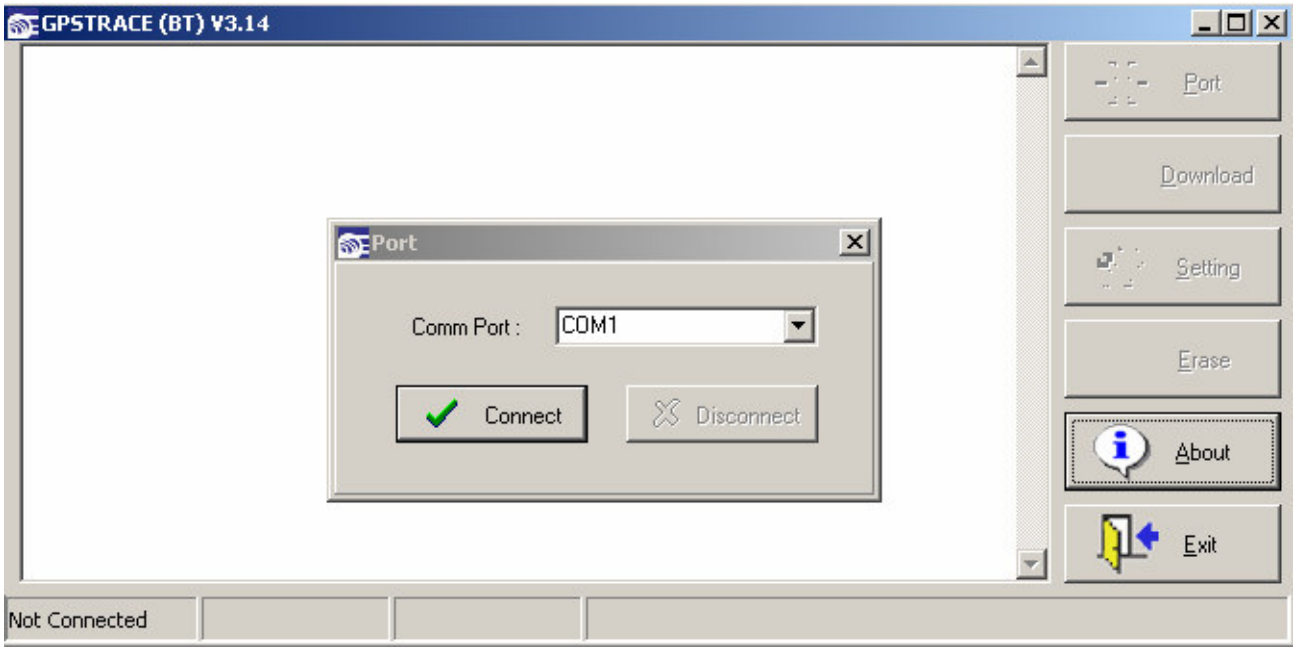
4.2 Logger Setup & Configuration

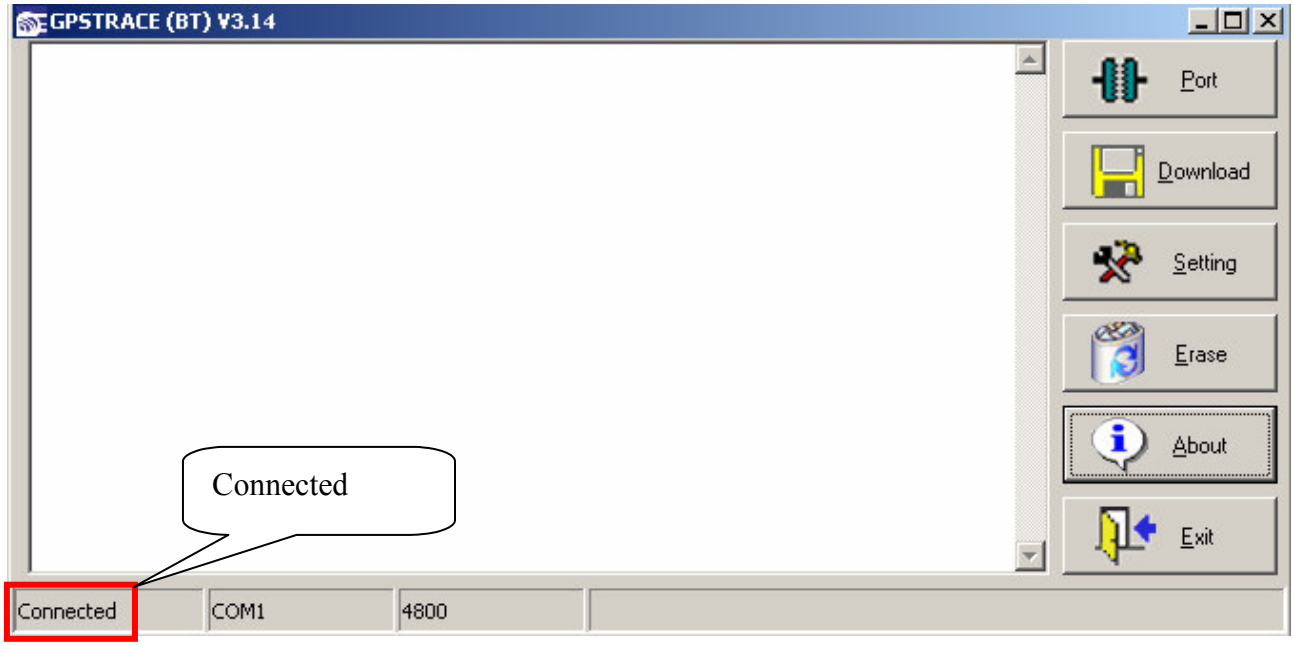
4.2.1 Connecting GPSTrace V3.14 with SPK-GL-050B

1. Click on **Port** to configure the Comport.



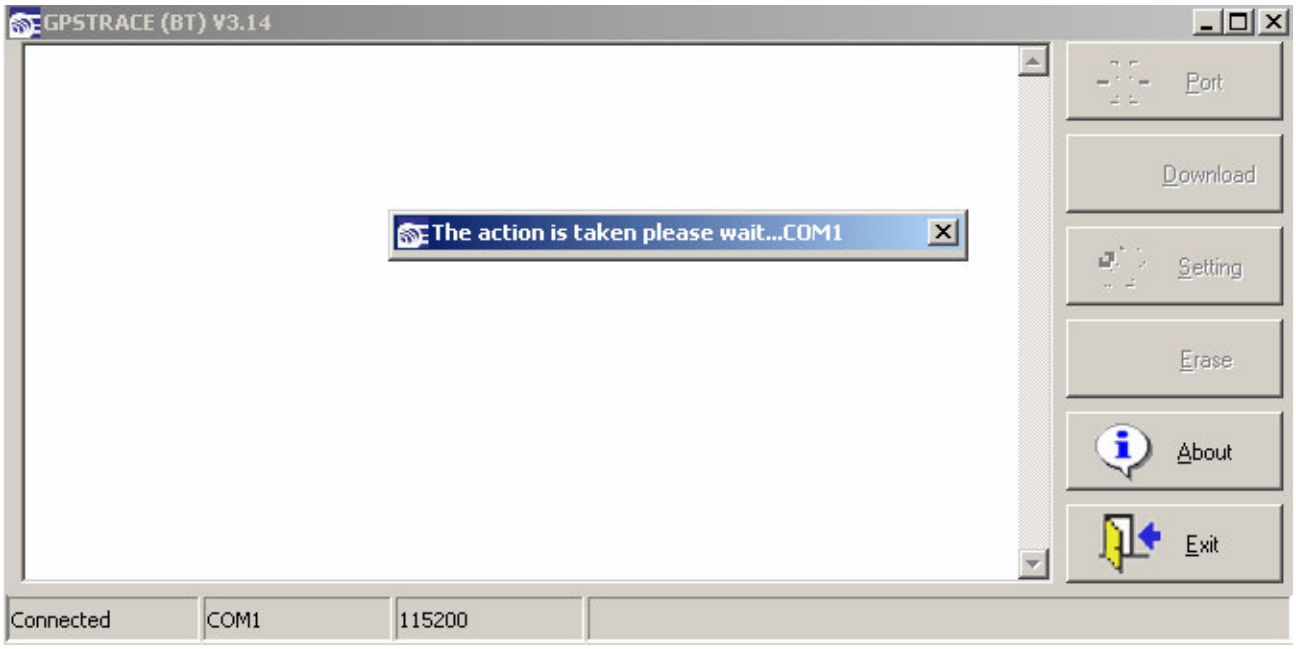
2. Select the corresponding Comport of where the SPK-GL-050B connects. Then click on **Connect**.



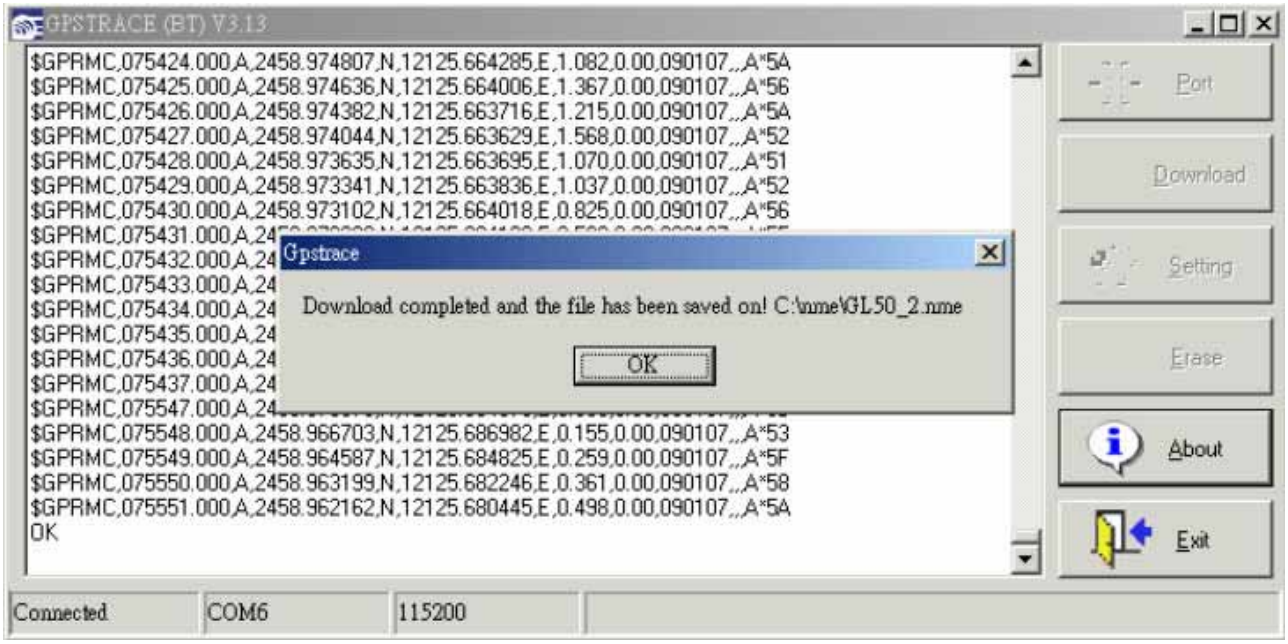

GPSTRACE (BT) V3.14
Port
Download
Setting
Erase
About
Exit
Connected
Connected
COM1
4800

4.2.3 Download NMEA 0183-Formatted Data

1. Click on **Download** to execute download and the windows below should appear.



2. When download is successful, the utility will create a folder named ***"nme"*** under C directory and save the logged file under the name of **ID**. (You can simply see the logged file in **C:\nme**)



3. After downloading, the windows below will appear. Click **OK** if you would like to erase the data in the flash

memory, and click **Cancel** if you still would like to keep the data in it.

Chapter 5 Using Hyper Terminal To Set SPK-GL-050B

There are 14 commends provided to setup SPK-GL-050B. After reading this chapter, you can very easy to know how to make the SPK-GL-050B set by using Hyper Terminal. For the detail information of commands, please refer to the data shown following.

5.1 Commands Table

Basic Commands		
Description	**Commands**	**Output**
1. Logger Reboot	@PCdr	
2. Show Firmware version	@PCdv	To see the firmware version of SPK-GL-050B
3. Show the settings parameter	@PCdw	To see the previous setting
4. Start GPS	@PCgr	
5. Stop GPS	@PCgs	
Logger Baud Rate Setup		
6. Setting the baud rate to be 4800	@PCb3	<CR><LF>4800bps<CR><LF>OK<CR><LF>
7. Setting the baud rate to be 115200	@PCb8	<CR><LF>115200bps<CR><LF>OK<CR><LF>
Setup SPK-GL-		
8. Clear the setting	@PCse	.
9. Read the setting	@PCsr	<CR><LF>OK<CR><LF>
10. Setting SPK-GL-050B **(*)**	@PCsw	<CR><LF>OK<CR><LF>
Output the logger record		
10. Erase all logs	@PCe	……
11. Read the logged data	@PCrr	Data output
12. Stop reading logged data	@PCrs	Ok
13. Read the data logged location	@PCri	0000h~3FFFh

Table 5.1.1

(*) For this part, please see the 5.2 for detail information

5.2@PCsw command

@PCsw is a command to set up the sentence time interval, speed limit, user ID and power mode of SPK-GL-050B. Please take look at following explanation for more detail.

Ex: Below is an example to explain how to make the SPK-GL-050B set up

@PCsw1111222233336666777788880000,SPK-GL-050B;

The parameter that the command contents	Description
@PCsw	Command name
1111(1st to 4th digital)	Speed limit; unit: knot. **1111=111.1knots**
2222(5th to 8th digital)	**RMC** interval; unit: second. 2222=2222sec./time
3333(9th to 12th digital)	**GGA** interval; unit: second. 3333=3333sec./time
6666(13th to 16th digital)	**ZDA** interval; unit: second. 6666=6666sec./time
7777(17th to 20th digital)	**GSA** interval; unit: second. 2222=2222sec./time
8888(21st to 24th digital)	**GSV** interval; unit: second. 2222=2222sec./time
0000(25th to 28th digital)	Power mode; **0000**=normal mode; **0001**=saving mode
SPK-GL-050B	The user's ID
;	End command sign

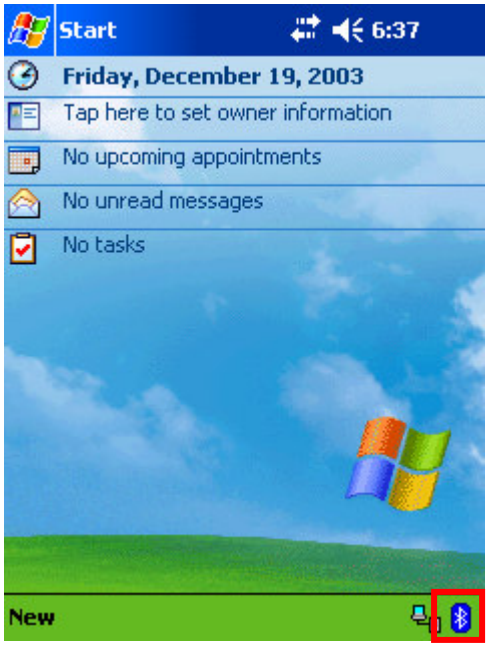
Table 5.2.1

Remark	
1.	A space is not allowed or omitted if that digital is **0.** Ex: 10 is incorrect but 0010.
2.	Before the 4th digital is a ".", which GL-50B will automatically to identify. Ex: 1110=111.0knots
3.	Please note GSV will only be received every 5 seconds. Though the interval is set 0001, each GSV will still be recorded every 5 seconds
4.	The maximum length of user ID can't be over **16** characters.

Table 5.2.2

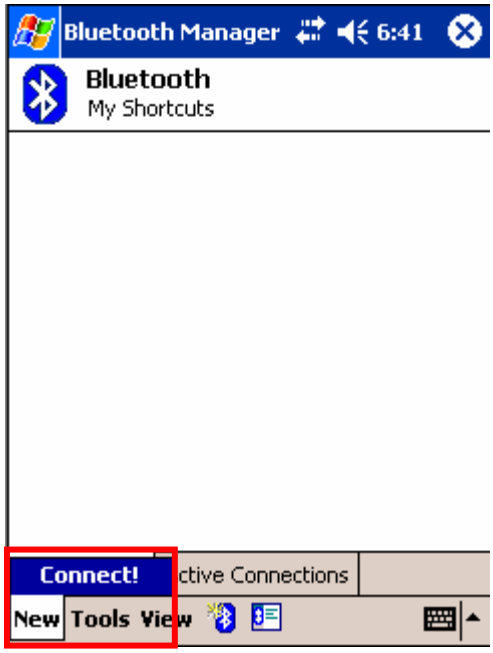
Chapter 6 Connect SPK-GL-050B to Pocket PC

1. Load 3 fully charged AAA NiMH batteries into SPK-GL-050B; make sure the batteries are loaded in their correct polarity (+or -) of the terminals.
2. Turns SPK-GL-050B on. The Red LED will soon be lighted on to indicate power success. When the Green LED starts flashing, it is searching the GPS signals.
3. Secure your SPK-GL-050B in an unobstructed, open sky/ view and stable place. If you use SPK-GL-050B in you vehicle, place SPK-GL-050B on the dashboard with the front surface facing the sky.
4. To access Bluetooth communication between SPK-GL-050B and Pocket PC, power on your Pocket PC first. After initializing, you will see the Bluetooth icon on the right down corner on your screen.



5. Click the Bluetooth icon; select “Bluetooth Manager”. Note that the Bluetooth function should be on automatically when you initialize Pocket PC.

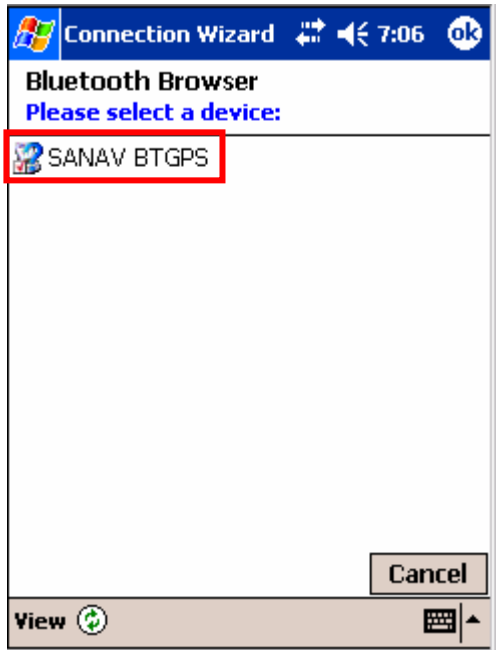
6. In Bluetooth Manager program, Click “New” & “Connect” to find other devices via Bluetooth.



7. In the Bluetooth Connection Wizard, select “Explore a Bluetooth device” then click “Next”.

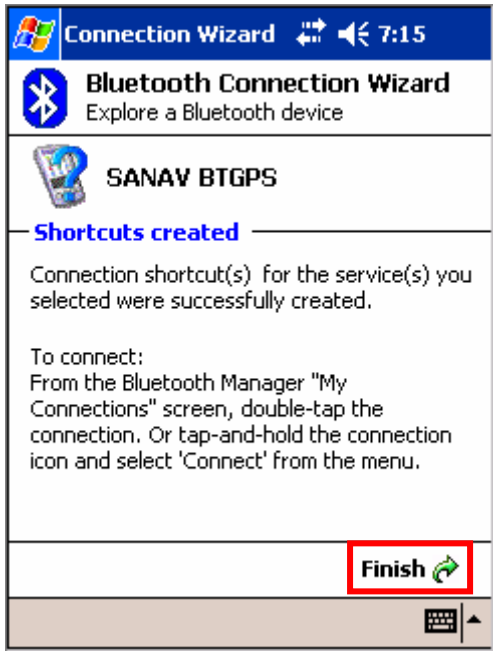
8. Click “Next ”to continue Bluetooth Connection Wizard.

9. Await Pocket PC searching for Bluetooth devices. You will see “ETEK BTGPS” in you’re the Bluetooth Browser window. Click it to continue.

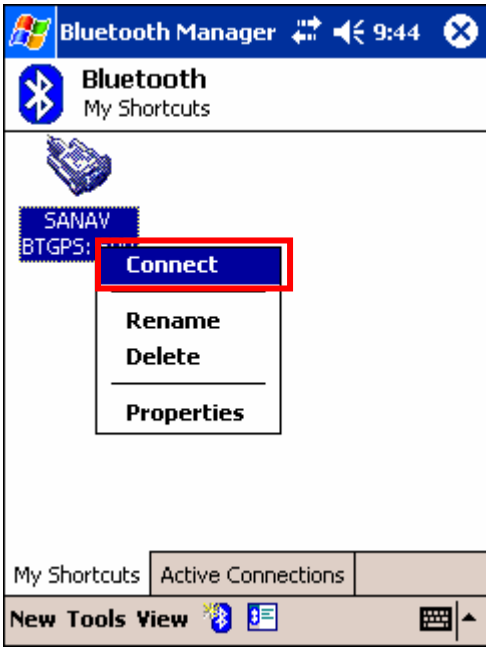


10. Select Bluetooth available service “SPP” in the Service Selection menu, and click “next” to continue. If paring pin code is needed, the pin is **0000**.

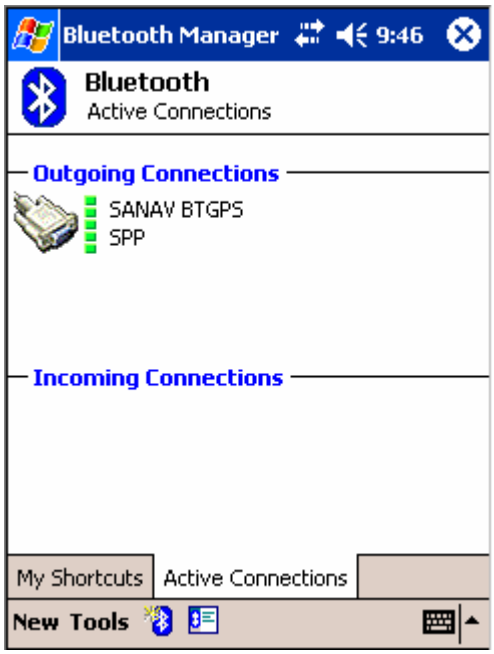
11. Now you have already successfully created Bluetooth Connection shortcut. Click “Finish” to close the Connection Wizard program.



12. Now in the Bluetooth Manager menu, you will see the ETEK BTGPS shortcut. Click still and select the Connect option.



13. In the Active Connection window, you can check the Bluetooth connection is on or not.



14. Await TTFF simultaneously, the GPS status LED will be Blue to indicate GPS positioning fix.
15. SPK-GL-050B will now automatically and continuously receive the satellites' GPS NMEA data and transfer to Pocket PC via Bluetooth and process the information.

Chapter 6 Glossary

- Almanac (GPS Data)

  Almanac is constellation data for all GPS satellites. Each GPS satellite transmits almanac. The unit receives GPS satellites referring to almanac. (Unlike ephemeris, almanac indicates rough constellation only, and is not directly used for position/time fixing.) Unless almanac is available, the unit must try to acquire satellites sequentially until it successfully acquires one.

- Almanac Data (Output Data)

  Almanac is a very stable data like your calendar. So, once the unit receives almanac, it is preserved for a considerable long term. Almanac date output indicates when the unit received the existing almanac.

- RTCM SC-104 Differential GPS

  Error correcting data based on the standard released by the Radio Technical Commission for Maritime Services, Washington D.C. This unit supports the following three data:

  © Type 1 Message: Differential GPS Correction Data (Basic Data)
  © Type 3 Message: Locations of Base Stations
  © Type 9 Message: High-rate Differential GPS Correction Data

  When these correction data are entered, DGPS mode is invoked automatically, resulting in high-precision position fixing. When DGPS mode is invoked, the position fixing status changes to DGPS automatically.

  * DBR-300 ignores messages other than TYPE 1, 3, and 9.

- 3D Position Fixing

  In 3D position fixing, altitude is obtained in addition to L/L. For 3D fixing the following conditions should be met:

  © More than four satellites can be acquired/tracked.
  © PDOP, which is determined by relative allocations of satellites in the sphere, must be smaller than the preset threshold:
  PDOP < PDOP Threshold (Default=6, Setting may be altered.)

- Number of Satellites for DGPS

  Satellite correction number involved in DGPS input data.

- DGPS Station ID

  DGPS station ID number ranging from 0 to 1023 as defined by RTCM SC-104 specifications.

- 2D Positioning

  Assuming the altitude at 0 meter, the unit fixes L/L. If a reliable altitude had been obtained by 3D positioning, that altitude is assumed instead of 0 meter.

  2D positioning is performed when the following two conditions are met:

  At least one satellite is available for acquisition and tracking.

  HDOP, which is determined by satellite allocations in the sphere, is smaller than 10. HDOP < 10

  The unit does its best to perform 3D positioning, but switches to 2D positioning only when either condition can't be met.

- PDOP Threshold

When PDOP degrades exceeding this parameter, the unit switches from 3D to 2D positioning
automatically. Bear in mind that the altitude is updated by 3D positioning only.

< PDOP, HDOP, VDOP

In GPS positioning, position-fixing accuracy depends on satellite allocating positions in the sphere. Parameters PDOP, HDOP, and VDOP indicate this type of degrading indexes for GPS position fixing;
the smaller the values are, the higher the position fixing accuracy gets. HDOP means horizontal dilution of position fixing and affects 2D positioning; VDOP does vertical dilution; PDOP contains these two components as expressed below, and can be used for 3D positioning.

PDOP = SQRT (HDOP x HDOP + VDOP x VDOP)

< UTC Time

This is Coordinated Universal Time. Depending on earth's rotating speed, leap second of one second or so may be inserted per year. The UTC output by the unit is based on both almanac data and satellite tracking. Therefore, the UTC output directly after power-on may not be accurate. Japanese local time is obtainable by adding 9 hours to UTC. The UTC, which you enter, is used for the first time search of a satellite directly after power-on. If UTC you enter is deviated much from the actual UTC, first fix will delay accordingly. UTC entry with 10 minutes' accuracy is desirable. When DGPS-220 internal UTC is incorrect due to discharge of the backup battery, etc., enter UTC as correctly as possible. DGPS-220 internal UTC is automatically adjusted to a correct value once a satellite is tracked.

Common Terms:

1. PC: Personal Computer
2. Comm: Communications
3. LED: Light Emitting Diode
4. GPS: Global Positioning System
5. INT: Interval
6. GGA: Global Positioning System Fixed Data
7. GLL: Geographic Positioning –latitude/longitude
8. GSA: GNSS DOP and active satellites
9. GSV: GNSS Satellites in View
10. RMC: Recommended Minimum Specific GNSS Data
11. VTG: Course Over Ground and Ground Speed
12. DC: Direct Current
13. TTL: Time To Live
14. TTFF: Time To First Fix

Chapter 7 Troubleshooting

Case 1

With installation of hardware and software both completed, I found out that there was still nothing shown in the **COMM** window of **Logger Utility** after turning on **SPK-GL-050B**.

Suggested Solution:

Check whether **SPK-GL-050B** is securely connected to power supply. Effective power supply is a prerequisite of successful signal transmission.

Case 2

There were only random codes, instead of NMEA sentences as expected, in the **COMM** window.

Suggested Solution:

Shut down **Logger Utility** and turn off **SPK-GL-050B**. Plug off power supply from **SPK-GL-050B** and attach **SPK-GL-050B** to power supply, and then turn on **SPK-GL-050B** again. This way, the program should be able to display normal NMEA sentences again.

Case 3

The NEMA sentences descriptions are seen in the "SIRF NMEA.pdf" in the CD.

Case 4

After finishing configuration via GPSTrace V3.14, how can I bring the unit to do navigation or logging?

Suggested solution:

After finishing configuration via GPSTrace V3.14, please exit the GPSTrace if you would like to do either navigation or logging. If you are using hyper terminal or other applications to do the configurations, please exit the application when you finish configuring.

Note: When you start to remove the installed **Logger Utility**, please make sure that the program is not running in the system's background. You can check this out by pressing the **Ctrl**+**Alt**+**Delete** buttons at the same time to open **Task Manager**, as shown below:

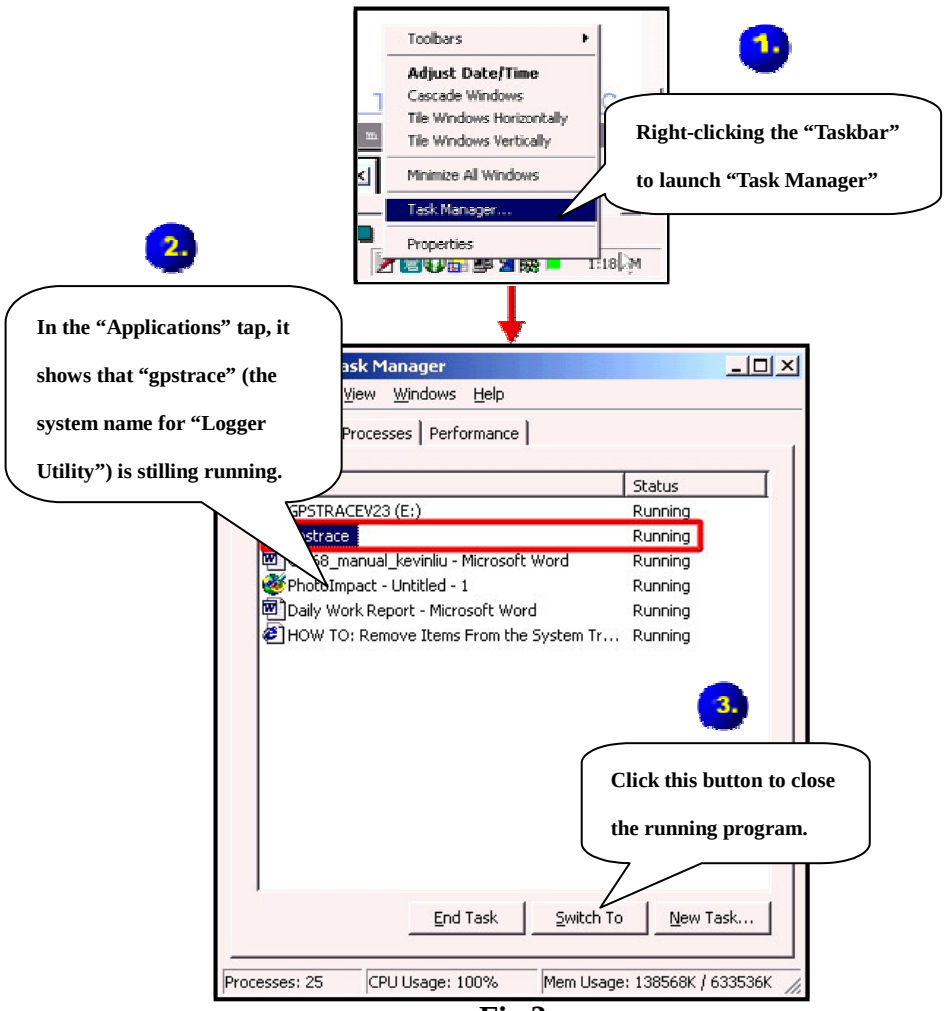


Fig 3

Referring to **Fig 3**, we can see that **gpstrace** (the system name for **Logger Utility**) is still running despite the fact that the program has been removed. In order to successfully install the latest version of the program, click 

to close that running program in advance.

Chapter 8 Warranty

LIMITED WARRANTY

S.P.K. ELECTRONICS CO., LTD. expressly warrants that for a period of one (1) year from the date of purchase. Our accessories will be free of defects in material (parts) and workmanship (labor). Within the warranty period, a unit will be tested, repaired, or replaced at our option at no charge.

If your unit is out warranty, we will quote repair charges necessary to bring your unit up to factory standards.

THIS WARRANTY APPLIES ONLY TO ORIGINAL PURCHASE

Any unit under warranty should be shipped prepaid to our factory. Warranty replacements will take approximately ninety (90) days.

WARRANTY EXCLUSION

THE FOREGOING EXPRESS WARRANTY IS MADE IN LIEU OF ALL OTHER PRODUCT WARRANTIES, EXPRESSED AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE SPECIFICALLY DISCLAIMED. The express warranty will not apply to defects or damage due to accidents, neglect, misuse, alternations, operator error, or failure to properly maintain, clean or repair products.

LIMIT OF LIABILITY

In no event will S.P.K. ELECTRONICS CO., LTD. or any seller will be responsible or liable for any injury, loss or damage, direct or consequential, arising out of the use or the inability to use the product. Before using, users shall determine in the suitability of the product for their intended use, and users assume all risk and liability whatsoever in connection therewith.

PURCHASER'S DUTIES

The purchaser must return the unit postpaid, with proof of the date of original purchase with the return address to:

S.P.K. ELECTRONICS CO., LTD.

Add：10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI,TAIWAN

Tel：02-2346-2323 Fax：02-2346-3939

E-mail：spktw@ms34.hinet.net WEB:http://www.spkecl.com