Navi@Mouse

GPS Receiver

User Manual



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What Is Navi@Mouse?

Congratulations on your purchase of Navi@Mouse, a GPS (Global Positioning System) receiver for a variety of applications. Navi@Mouse incorporates the latest GPS technology from the leading GPS receiver manufacturer.

By connecting it to a notebook PC with the map or navigation software, Navi@Mouse helps you locate places and points of interest, conduct personal & vehicle navigation, or conduct geographical survey activity.

What Have Inside the Package?

Before you start up, make sure your package includes the following items. If any item is missing or damaged, contact your dealer immediately. Please refer to the contact information on the last page of this manual.



- ♦ Application CD
- Cable for RS232 or USB (depending on what you buy)

What Is GPS ?

In 1974 the USA Department of Defense started development of the Global Positioning System (GPS), a constellation of 24 satellites that orbit 12,000 miles above the Earth. By triangulating the signals from four of the satellites, a receiving unit on Earth can pinpoint its current location to within a few meters. A GPS device receives the data from satellites and then converts the longitude, latitude, and altitude (LLA) data into a location point. Position and navigation information is vital to a wide range of professional and recreational activities including surveying, search and rescue, tracking, hiking, navigating, and so forth.

How to Install & Operate Navi@Mouse (RS-232)?

Getting Started

Step 1:Plug RS-232 (①) to COM port of your Notebook PC or Handheld PC.

Step 2:Plug PS2 connector (2) in the PS2 mouse outlet of your Notebook PC or Handheld PC.

Step 3:Place your Navi@Mouse on the outside roof of your vehicle with magnetic base.



Figure 1 Installation of PS2/RS-232

Step 4:Power on your Notebook PC or Handheld PC. If you have ordered a cigarette adaptor, please plug the cigarette adaptor into the cigarette outlet of the car.

Step 5: Choose the correct COM port for running the map or navigation software.

Step 6:Run the Navi@mouse test program. Please refer to "How to test your Navi@mouse".

Figure 2 Installation of car cigarette power adaptor



power adaptor

(1) Make sure the power is off before started.

Notice:

- (2) For safety reason, please do not install RGM-1000 while driving.
- (3) To receive NMEA0183 navigational data, please use the Hyper Terminal program of Windows 95/98[®]. Please setup the COM port connected with Navi@Mouse to:

Baud rate	: 4800
Data bit	: 8
Parity	: None
Stop bit	:1
Flow control	: None.

- (4) The formats of NMEA messages are illustrated on Software Data section.
- (5) To prevent from the poor contact, the 4-pin mini din connector was designed as good fitting. It is strongly recommend that user doesn't plug and unplug this connector frequently.

How to Install & Operate Navi@Mouse (USB) for Windows 98[®]?

Getting Started

Step 1:Plug USB connector (①) to USB port of your Notebook PC or Handheld PC.



Step 2: After plug in the Navi@Mouse, it will automatically detect the hardware and show up pop-up dialog as follows. Click "Next>" button.

Add New Hardware Wiz	ard
	This wizard searches for new drivers for: USB <-> Serial A device driver is a software program that makes a hardware device work.
	< <u>B</u> ack Next > Cancel

Assert the "Search for the best driver for your device". Click "Next>" button.

Add New Hardware Wiz	ard
	 What do you want Windows to do? Search for the best driver for your device. (Recommended). Display a list of all the drivers in a specific location, so you can select the driver you want.
	< <u>B</u> ack Next > Cancel

Please assert the "Specify a location" and select the correct directory of the driver, "\USB_DRIVER" in CD-Disc. Click the "**Next**>" button.

Add New Hardware Wiz	ard
	Windows will search for new drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search. Eloppy disk drives CD-ROM drive Microsoft Windows Update Specify a location: C:\USB_DRIVER
	< <u>B</u> ack Next > Cancel

It will find the driver from the CD-Disc automatically. Click "**Next>**" button.

Add New Hardware Wi	zard
	Windows driver file search for the device: USB High Speed Serial Converter
	Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue. Location of driver:
	C:\USB_DR~1\FTDIBUS.INF
	< <u>B</u> ack Next > Cancel

The USB Serial converter driver is installed now.



You can check the COM port number of Navi@Mouse from the System properties now.

System Properties ? 🗙
General Device Manager Hardware Profiles Performance
• View devices by type • • • • • • • • • • • • • • • • • • •
Computer CDROM COR COR COR COR COR COR COR COR
Properties Refresh Remove Print
OK Cancel

The default COM port is COM3 in this example.

System Properties	? ×
General Device Manager Hardware Profiles Performance	
• View devices by type • View devices by connection	
	<u> </u>
E CDROM	
Disk drives Disk drives Disk drives	
🕀 🚭 Hard disk controllers	
🗈 🍪 Keyboard	
Monitors	
🗐 🖉 Ports (COM & LPT)	
Communications Port (COM1)	
Communications Port (COM2)	
UISB Serial Port (COM3)	
Properties Refresh Remove Print	
ОК	Cancel

Step 3:Place your Navi@Mouse on the outside roof of your vehicle with magnetic base.

Step 4: Power on your Notebook PC or Handheld PC.

Step 5: Choose the correct COM port for running the map or navigation software.

Step 6:Run the Navi@mouse test program. Please refer to "How to test your Navi@mouse".

Notice:

- (1) Make sure the power is off before started.
- (2) For safety reason, please do not install RGM-1000 while driving.
- (3) To receive NMEA0183 navigational data, please use the Hyper Terminal program of Windows 95/98[®]. Please setup the COM port connected with Navi@Mouse to:

Baud rate	: 4800
Data bit	: 8
Parity	: None
Stop bit	: 1
Flow control	: None.

- (4) NMEA 0183 data formats are illustrated on Software Data section.
- (5) To prevent the poor contact, the 4-pin mini din connector was designed as good fitting. We strongly recommend user that do not plug and draw this connector frequently.

How to Install & Operate Navi@Mouse (USB) for Windows $Me^{\ensuremath{\mathbb{R}}}$?

Step 1:Plug USB connector (①) to USB port to your Notebook PC or Handheld PC.

Step 2:After plug in the Navi@Mouse, it will detect the hardware automatically. Click the "Next>" button.



Please assert the "Specify a location" and select the correct directory of the driver in CD-Disc, "\USB_DRIVER". Click the "**Next**>" button.

Add New Hardware Wize	ard
	 Windows will search for new drivers in its driver database on your hard drive, and in any of the following selected Search for the best driver for your device. (Recommended). Removable Media (Floppy, CD-ROM) Specify a Jocation: D:\USB_DRIVER Browse Display a list of all the drivers in a specific location, so you can select the driver you want.
	< <u>B</u> ack Next > Cancel



Windows Me will search and find the USB serial driver. Click "Next>" button.

The USB Serial converter driver is installed now.



You can check the COM port number of Navi@Mouse from the System properties now.



Step 3:Place your Navi@Mouse on the outside roof of your vehicle with magnetic base.

Step 4: Power on your Notebook PC or Handheld PC.

Step 5: Choose the correct COM port for running the map or navigation software.

Step 6:Run the Navi@mouse test program. Please refer to "How to test your Navi@mouse".

Notice:

- (1) Make sure the power is off before started.
- (2) For safety reason, please do not install RGM-1000 while driving.
- (3) To receive NMEA0183 navigational data, please use the Hyper Terminal program of Windows Me[®]. Please setup the COM port connected with Navi@Mouse to:

Baud rate	: 4800
Data bit	: 8
Parity	: None
Stop bit	: 1
Flow control	: None.

- (4) NMEA 0183 data formats are illustrated on Software Data section.
- (5) To prevent the poor contact, the 4-pin mini din connector was designed as good fitting. We strongly recommend user that do not plug and draw this connector frequently.

How to Install & Operate Navi@Mouse (USB) for Windows 2000[®]?

Step 1:Plug USB connector (①) to USB port to your Notebook PC or Handheld PC.

Step 2:After plug in the Navi@Mouse, it will detect the hardware automatically. Click the "Next>" button.



Please select "Search for a suitable driver for my device". Click "**Next>**" button.



Please select the "Specify a location". Click "Next>" button.

Found New Hardware Wizard
Locate Driver Files Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
USB <-> Serial
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back Next > Cancel

Please browse the CD-Disc and select the directory, "\USB_DRIVER". Click "OK" button.

Found New Hard	lware Wizard
Locate Drive Where do	er Files) you want Windows to search for driver files?
Found Ne	w Hardware Wizard
2	Insert the manufacturer's installation disk into the drive OK selected, and then click OK. Cancel
	Copy manufacturer's files from: E:\USB_DRIVER Browse
	< Back Next> Cancel

Windows 2000 will find the USB Serial converter device. Click the "Next>" button.



The USB Serial driver is installed in Windows 2000[®] now.



It will setup the USB Serial port driver for Navi@Mouse. Please click "Next>" button.



Please select the "Search for a suitable driver for my device". Click "Next>" button.

Found New Hardware Wizard			
Install Hardware Device Drivers A device driver is a software program that enables a hardware device to work with an operating system.			
This wizard will complete the installation for this device:			
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.			
What do you want the wizard to do?			
Search for a suitable driver for my device (recommended)			
C Display a list of the known drivers for this device so that I can choose a specific driver			
< Back Next > Cancel			

Please select the "Specify a location". Click "**Next>**" button.

Found New Hardware Wizard			
Locate Driver Files Where do you want Windows to search for driver files?			
Search for driver files for the following hardware device:			
USB Serial Port			
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.			
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.			
Optional search locations:			
Floppy disk drives			
CD-ROM drives			
🔽 Specify a location			
Microsoft Windows Update			
< Back Next > Cancel			

Please select the directory of the Navi@Mouse, "\USB_DRIVER". Click "OK".

Found New Hardware Wizard	
Locate Driver Files Where do you want Windows to search for driver files?	
Found New Hardware Wizard	×
Insert the manufacturer's installation disk into the drive selected, and then click OK.	OK Cancel
Copy manufacturer's files from: E:\USB_DRIVER	Browse
< Back Nex	t > Cancel

It will find the driver and install it.

Found New Hardware Wizard			
Driver Files Search Results The wizard has finished searching for driver files for your hardware device.			
The wizard found a driver for the following device:			
USB Serial Port			
Windows found a driver for this device. To install the driver Windows found, click Next.			
e:\usb_driver\ftdiport.inf			
< Back Next > Cancel			

The USB Serial Port driver is installed in Windows 2000[®] now.



You can check the Com port number of the Navi@Mouse from Device Manager. It is COM3 in this example.



Step 3:Place your Navi@Mouse on the outside roof of your vehicle with magnetic base.

Step 4: Power on your Notebook PC or Handheld PC.

Step 5: Choose the correct COM port for running the map or navigation software.

Step 6:Run the Navi@mouse test program. Please refer to "How to test your Navi@mouse".

Notice:

- (1) Make sure the power is off before started.
- (2) For safety reason, please do not install RGM-1000 while driving.
- (3) To receive NMEA0183 navigational data, please use the Hyper Terminal program of Windows 2000[®]. Please setup the COM port connected with Navi@Mouse to:

Baud rate	: 4800
Data bit	: 8
Parity	: None
Stop bit	: 1
Flow control	: None.

- (4) NMEA 0183 data formats are illustrated on Software Data section.
- (5) To prevent the poor contact, the 4-pin mini din connector was designed as good fitting. We strongly recommend user that do not plug and draw this connector frequently.

How to test your Navi@Mouse

- 1. Run the setup program by double clicking the \Test programs\Demo\Navi@mouse\setup.exe file. Then the test program will automatically install into your computer.
- 2. Run the testing program by clicking the shortcut on your Window's program group.
- 3. Testing program will display as follow:

CPSD GPSD	emo		
Setup <u>E</u> e	dit <u>V</u> iew <u>H</u> elp		
Ð 🔊			
Lon :	0 ° 00'00.0''N	Speed :	0.0 KM
Lat :	0 ° 00'00.0''E	Alt:	0.0 M
Date :	2000/00/00	Mode :	Fix not available
Time :	00:00:00	Status :	Disconnect
HDOP	: 0.0 VDOP :	0.0 PD	OP: 0.0
Ready			

- 4. Before running the test program, make sure you have connected Navi@Mouse to the PC correctly.
- 5.Click the icon 🔊 on toolbar or click the Start test on the Setup menu. Then the program will automatically detect the serial port and start testing.



6. When finish the test, there is a message box showing the test result. If the test is successful, it will show the following message:



If the test fails, it will show the following message:



If it cannot open the COM port, it will show the following message:

SYSTEM	i note 🛛 🕅
	OPEN COM PORT FAIL : Close all the application programs and try again
	ОК

7.If the GPS connection is successful, you can see the satellite tracking diagram and the updated data of longitude, latitude, altitude, date time etc.



Specifications

Physical characteristics

Dimension: 100 mm (L) x 68 mm (W) x 29 mm (H) Weight 180 grams

Temperature characteristics

Storage temperature:	-20°C	$\sim +70^{\circ}$ C.
Operating temperature:	-20°C	$\sim +80^\circ\!\mathrm{C}$.

General

Sensitivity	-141 dBm
Channels	12 channels
L1	1575.42 MHz.
C/A code	1.023MHz chip rate.

Accuracy

Position accuracy : 10m, 90% without SA. Velocity accuracy : 0.1 meter / second without SA

Datum

WGS-84.

Position update rate

Once per second.

Dynamic conditions

Altitude	: 18000 meters (60000 feet) max.
Velocity	: 514 meters / second max.
Jerk	\therefore 20 meters / second ³ , max.
Acceleration	: 4 G, max.

Power

PS2/USB input power: DC 5V \pm 5 %, 210mA, typical

Car cigarette power adaptor: $+9V \sim +16V$.

Certification

FCC/CE compliant

Software Data

NMEA V2.2 Protocol

It is the RS-232 interface : 4800 bps, 8 bit data, 1 stop bit and no parity.

NMEA Output Messages

The Navi@Mouse outputs the following messages as shown in Table 1:

Table 1	NMEA	Output	Messages
---------	------	--------	----------

NMEA Record	Description
GGA	Global positioning system fixed data
GSA	GNSS DOP and active satellites
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data

GGA-Global Positioning System Fixed Data

Table 2 contains the values of the following example :

\$GPGGA, 161229.487, 3723.2475, N, 12158.3416, W, 1, 07, 1.0, 9.0, M, , , ,0000*18

Table 2 GGA Data Format

Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Position	161229.487		hhmmss.sss
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Position Fix Indicator	1		See Table 5-1
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSL Altitude	9.0	meters	
Units	М	meters	
Geoid Separation		meters	
Units	М	meters	
Age of Diff. Corr.		second	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*18		
<cr><lf></lf></cr>			End of message termination

RGM-1000

Table 2-1 Position Fix Indicator

Value	Description
0	Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3	GPS PPS Mode, fix valid

GSA-GNSS DOP and Active Satellites

Table 3 contains the values of the following example :

\$GPGSA, A, 3, 07, 02, 26, 27, 09, 04, 15, , , , , , 1.8, 1.0, 1.5*33

Name	Example	Units	Description
Message ID	\$GPGSA		GSA protocol header
Mode 1	А		See Table 3-2
Mode 2	3		See Table 3-1
Satellite Used ¹	07		Sv on Channel 1
Satellite Used ¹	02		Sv on Channel 2
Satellite Used ¹			Sv on Channel 12
PDOP	1.8		Position Dilution of Precision
HDOP	1.0		Horizontal Dilution of Precision
VDOP	1.5		Vertical Dilution of Precision
Checksum	*33		
<cr><lf></lf></cr>			End of message termination

Table 3 GSA Data Format

Table 3-1 Mode 1

Value	Description
1	Fix not available
2	2D
3	3D

Table 3-2 Mode 2

Value	Description
М	Manual – forced to operate in 2D or 3D mode
А	Automatic – allowed to automatically switch 2D/3D

GSV-GNSS Satellites in View

Table 4 contains the values of the following example :

\$GPGSV, 2, 1, 07, 07, 79, 048, 42, 02, 51, 062, 43, 26, 36, 256, 42, 27, 27, 138, 42*71

Name	Example	Units	Description	
Message ID	\$GPGSV		GSV protocol header	
Number of Messages ¹	2		Range 1 to 3	
Messages Number ¹	1		Range 1 to 3	
Satellites in View	07			
Satellite ID	07		Channel 1(Range 1 to 32)	
Elevation	79	degrees	Channel 1(Maximum 90)	
Azimuth	048	degrees	Channel 1(True, Range 0 to 359)	
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking	
Satellite ID	27		Channel 4(Range 1 to 32)	
Elevation	27	degrees	Channel 4(Maximum 90)	
Azimuth	138	degrees	Channel 4(True, Range 0 to 359)	
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking	
Checksum	*71			

Table 4 GSV Data Format

<CR $>$ $<$ LF $>$		End of message termination

RMC-Recommended Minimum Specific GNSS Data

Table 5 contains the values of the following example : \$GPRMC, 161229.487, A, 3723.2475, N, 12158.3416, W, 0.13, 309.62, 120598, *10

Table 5 RMC Data Format

Name	Example	Units	Description	
Message ID	\$GPRMC		RMC protocol header	
UTC Position	161229.487		hhmmss.sss	
Status	А		A=data valid or V=data not valid	
Latitude	3723.2475		ddmm.mmmm	
N/S Indicator	Ν		N=north or S=south	
Longitude	12158.3416		dddmm.mmmm	
E/W Indicator	W		E=east or W=west	
Speed Over Ground	0.13	knots		
Course Over Ground	309.62	degrees	True	
Date	120598		ddmmyy	
Magnetic Variation		degrees	E=east or W=west	
Checksum	*10			
<CR $>$ $<$ LF $>$			End of message termination	

Troubleshooting

Problem	Reason	Solution		
Test fail	Poor connection	Check the RS232 and PS2 connector or USB connector to make sure they are well connected.		
	Wrong BIOS setting for PS2	Check the BIOS setting to make sure the PS2 port is enable. If you still get the testing fail message, contact your local distributor.		
Open com port fail	All the serial COM port have been used for other application program	Close all the other application programs and rerun the Navi@Mouse Testing program.		
There is nothing showing on the tracking diagram even if the test result is success.	Navi@Mouse can not receive the GPS signal on the testing area.	Move Navi@Mouse to somewhere there is exposed to outdoors. Note: normally we cannot receive the GPS signal indoors.		
No position output but timer is counting	 Weak or no GPS signal can be received at the place Navi@Mouse are. At outdoor space but GPS signal is block by buildings 	Go outdoor place without high building to block the signal and retest the Navi@Mouse again.		

Appendix : Connector Interface

9 pin D-SUB

Pin NO	Signal Name	I/O	Description	Characteristics
1	No connect			
2	TX	0	Serial Data Output	High: $-3V \sim -15V$
				Low: $+3V \sim +15V$
3	RX	Ι	Serial Data Input	High: $-3V \sim -15V$
				Low: $+3V \sim +15V$
4	No connect			
5	GND	G	Ground	
6	No connect			
7	No connect			
8	No connect			
9	No connect			



6 pin mini din

Pin NO	Signal Name	I/O	Description	Characteristics
1	No connect			
2	No connect			
3	GND	G	Ground	
4	VCC	Ι	+5V DC Power Input	DC $+5V \pm 10\%$.
5	No connect			
6	No connect			



USB A Type Connector

Pin NO	Signal	Ι/	Description	Characteristics
	Name	0		
1	GND	-	Ground	Ground
2	D+	I/O	Data plus	Data plus
3	D-	I/O	Data Minus	Data Minus
4	VCC	+	+5V DC Power	+5V DC Power
			Input	Input

1 2 3 4

Notice: The Navi@Mouse is a USB device.

Limited Warranty

RoyalTek Company Ltd. grants a warranty for this product for one year starting from the date of purchasing of the product. Please retain the sales receipt as proof of purchase. During the warranty period, the product is eligible for replacement in case of defects in material and workmanship. In such case, the defective unit will be repaired or replaced according to an assessment by RoyalTek. However this warranty does not cover damages caused by improper use or from unauthorized modifications by third parties. In addition, this warranty does not cover expendable materials and defects, which constitute as normal wear or tear. Please contact us as following:

RoyalTek

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