

**GR-271**

# **CF GPS Receiver**

**User's Guide**

Nov 04, 2005

# **TABLE OF CONTENTS**

<b>1. Introduction</b> .....	<b>3</b>
1.1 Overview .....	<b>3</b>
1.2 Features .....	<b>3</b>
<b>2. Brief Information</b> .....	<b>5</b>
2.1 Hardware Interface .....	<b>5</b>
2.2 Software Interface .....	<b>6</b>
<b>3. Functional Test</b> .....	<b>9</b>
<b>4. Trouble Shooting</b> .....	<b>12</b>
<b>5. Specifications</b> .....	<b>13</b>
<b>6. Warranty</b> .....	<b>14</b>

# 1. Introduction

## 1.1 Overview



## 1.2 Features

The GR-271 provides a host of features that make it easy for integration and use.

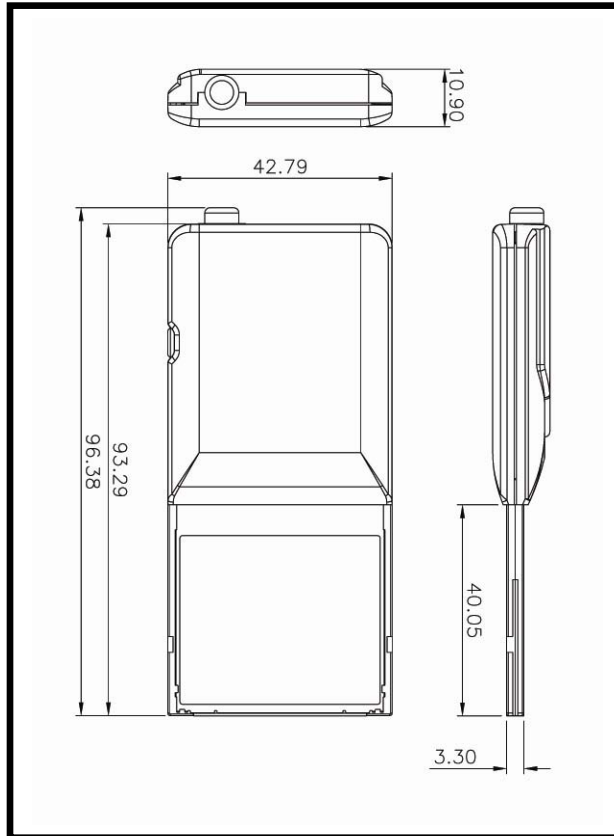
- 20 parallel satellite-tracking channels for fast acquisition and reacquisition
- Built-in hardware tracking loop processor WAAS/EGNOS demodulator
- Low power consumption with starIII chipset
- Built-in rechargeable battery for memory and RTC backup and for fast time to first fix(TTFF)
- Support NMEA0183 v2.2 data protocol and SiRF binary code
- Enhanced algorithms-SnapLock and SnapStart provide superior navigation performance in urban, canyon and foliage environments
- Support CF card type I connector suitable PDA, Hand Held PC or PC device

## 2. Brief Information

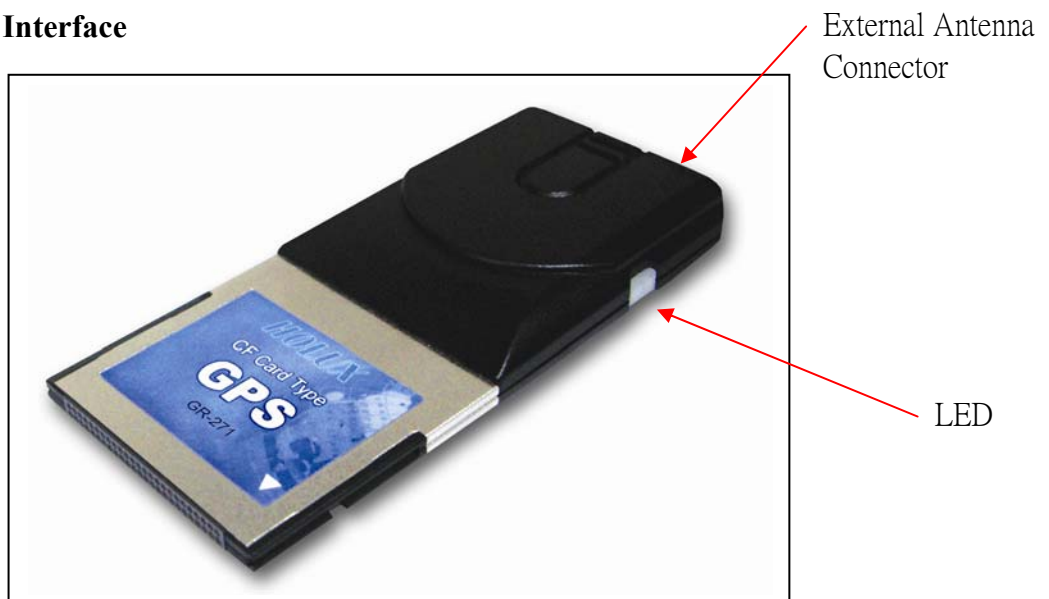
### 2.1 Hardware Interface

#### 2.1.1 GM-270 Dimension

93.5 (L) x 43 (W) x 11 (H) mm



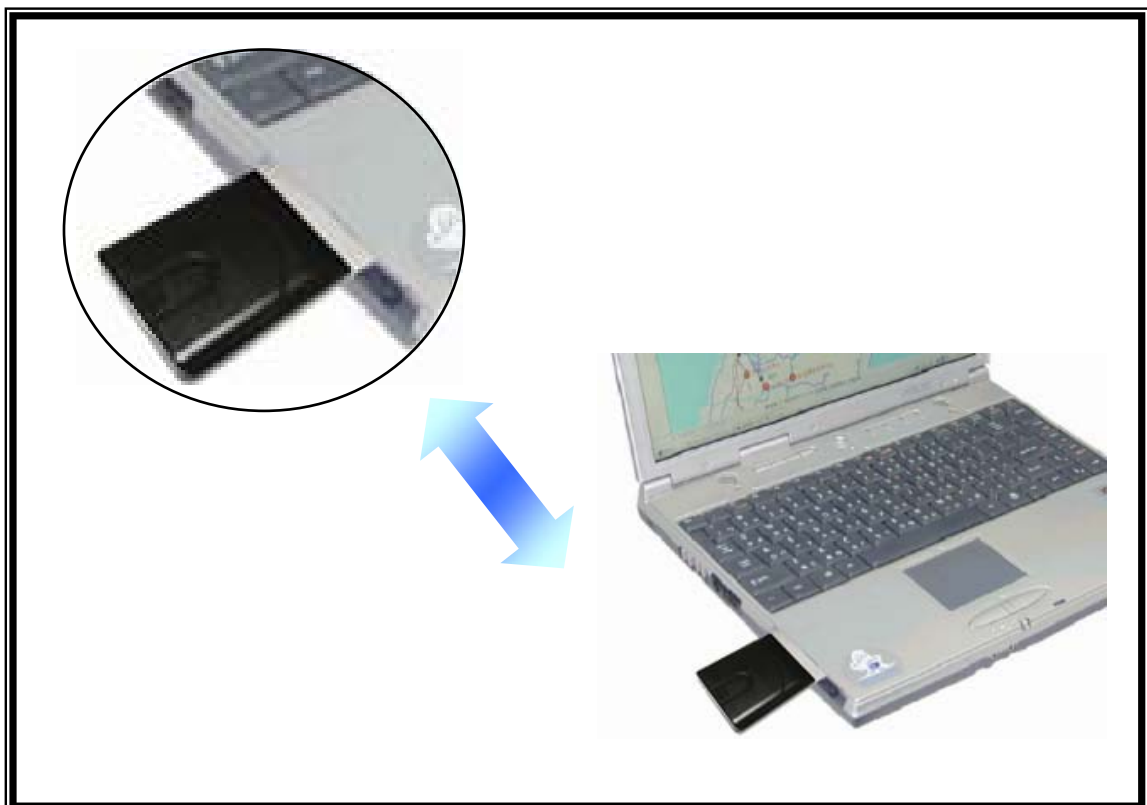
#### 2.1.2 Hardware Interface



**A. Link to PDA**



**B. Link to NoteBook**



## 2.1.3 LED & External Antenna

### ◆ LED

LED OFF	GR-271 CF GPS Receiver Switch Off.
LED ON	GR-271 CF GPS Receiver Signal Searching.
LED Flashing	GR-271 CF GPS Receiver Signal Position Fixed.

### ◆ External Antenna Connector (MCX).....Optional

As using GR-271 CF GPS Receiver in a RV car, truck or bus, it might receive poor signals through limited view to the sky. Replace the foldable antenna with the active one to get better satellite signals. Windshields with heavy tinted or likewise may interfere with signal receiving. An active antenna then becomes essential.

## 2.2 Software Interface

The GPS-271 interface protocol is based on the National Marine Electronics Association's NMEA 0183 ASCII interface specification, which is defined in NMEA 0183, Version 2.2 and the Radio Technical Commission for Maritime Services (RTCM Recommended Standards For Differential Navstar GPS Service, Version 2.1, RTCM Special Committee No.104).

### 2.2.1 NMEA Transmitted Messages

The GPS-271PS supported by SiRF Technology Inc. also outputs data in NMEA-0183 format as defined by the National Marine Electronics Association (NMEA), Standard.

The default communication parameters for NMEA output are 4800 baud, 8 data bits, stop bit, and no parity.

Table 2-1 NMEA-0183 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

#### • 2.2.1.1 Global Positioning System Fix Data (GGA)

Table 2-2 contains the values for the following example:

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

Table 2-2 GGA Data Format

Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Time	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 2-3
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSL Altitude	9.0	Meters	
Units	M	Meters	

Geoid Separation		Meters	
Units	M	Meters	
Age of Diff. Corr.		second	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*18		
<CR> <LF>			End of message termination

Table 2-3 Position Fix Indicator

Value	Description
0	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

### 2.2.1.2 GNSS DOP and Active Satellites (GSA)

Table 2-4 contains the values for the following example:

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

Table 2-4 GSA Data Format

Name	Example	Units	Description
Message ID	\$GPGSA		GSA protocol header
Mode 1	A		See Table 2-5
Mode 2	3		See Table 2-6
Satellite Used	07		Sv on Channel 1
Satellite Used	02		Sv on Channel 2
.....			....
Satellite Used			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>			End of message termination

1. Satellite used in solution.

Table 2-5 Mode 1

Value	Description
M	Manual—forced to operate in 2D or 3D mode
A	2DAutomatic—allowed to automatically switch 2D/3D

Table 2-6 Mode 2

Value	Description
1	Fix Not Available
2	2D
3	3D

### 2.2.1.3 GNSS Satellites in View (GSV)

Table 2-7 contains the values for the following example:

**\$GPGSV,2,1,07,07,79,048,42,02,51,062,43,26,36,256,42,27,27,138,42\*71**  
**\$GPGSV,2,2,07,09,23,313,42,04,19,159,41,15,12,041,42\*41**

Table 2-7 GSV Data Format

Name	Example	Units	Description
Message ID	\$GPGSV		GSV protocol header
Number of Messages	2		Range 1 to 3
Message Number	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		
<CR> <LF>			End of message termination

**NOTE:** Items <4>,<5>,<6> and <7> repeat for each satellite in view to a maximum of four (4) satellites per sentence. Additional satellites in view information must be sent in subsequent sentences. These fields will be null if unused.

### 2.2.1.4 Recommended Minimum Specific GNSS Data (RMC)

Table 2-8 contains the values for the following example:

**\$GPRMC,161229.487,A,3723.2475,N,12158.3416,W,0.13,309.62,120598,\*,\*10**

Table 2-8 RMC Data Format

Name	Example	Units	Description
Message ID	\$GPRMC		RMC protocol header
UTC Time	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
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
Speed Over Ground	0.13	knots	
Course Over Ground	309.62	degrees	True
Date	120598		ddmmyy
Magnetic Variation1		degrees	E=east or W=west
Checksum	*10		
<CR> <LF>			End of message termination

1.SiRF Technology Inc. does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions.

### 2.2.2 RTCM Received Data

The default communication parameters for DGPS Input are 9600 baud, 8 data bits, stop bit, and no parity. Position accuracy of less than 5 meters can be achieved with the GPS-271 by using Differential GPS (DGPS) real-time pseudo-range correction data in RTCM SC-104 format, with message types 1,2, or 9. As using DGPS receiver with different communication parameters, GPS-271 may decode the data correctly to generate accurate messages and save them in battery-back SRAM for later computing.

### 3. Functional Test

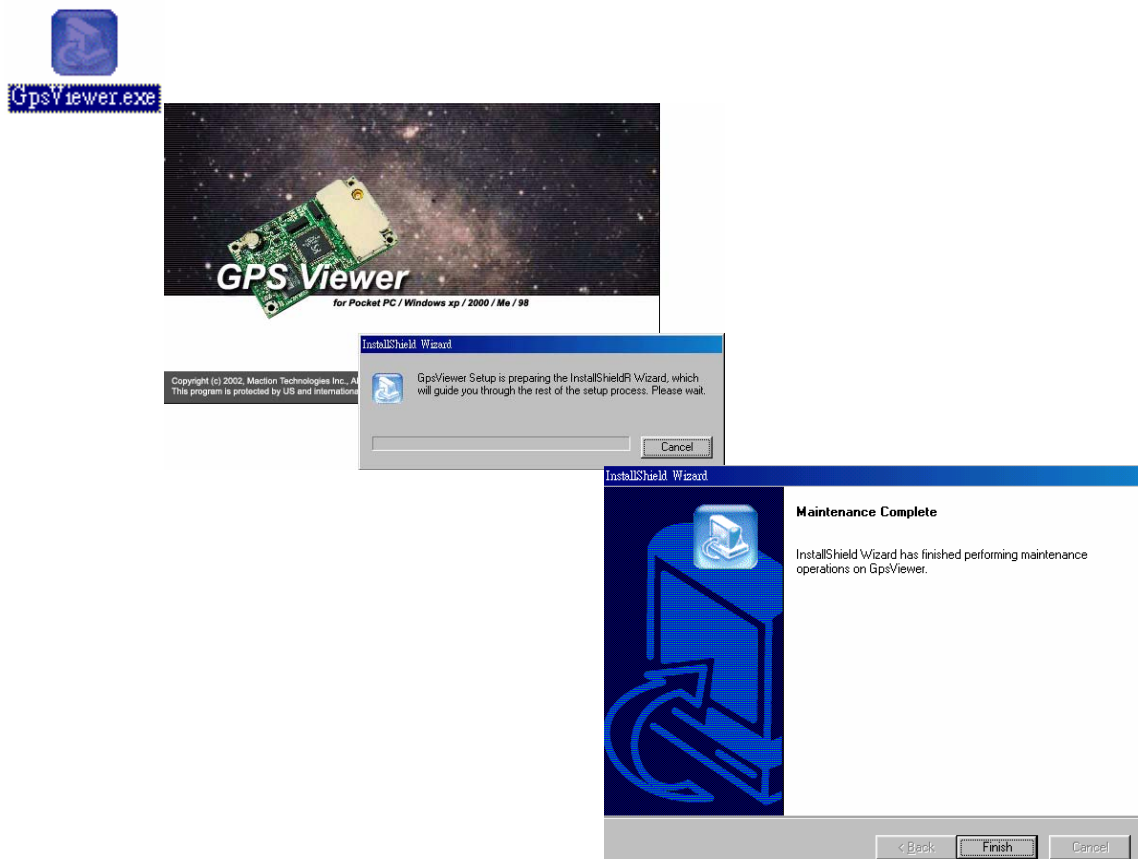
#### ◆ Install Guide :

##### 1. Install GPSViewer.exe from PC to your PDA(**Microsoft Pocket PC OS or alike**).

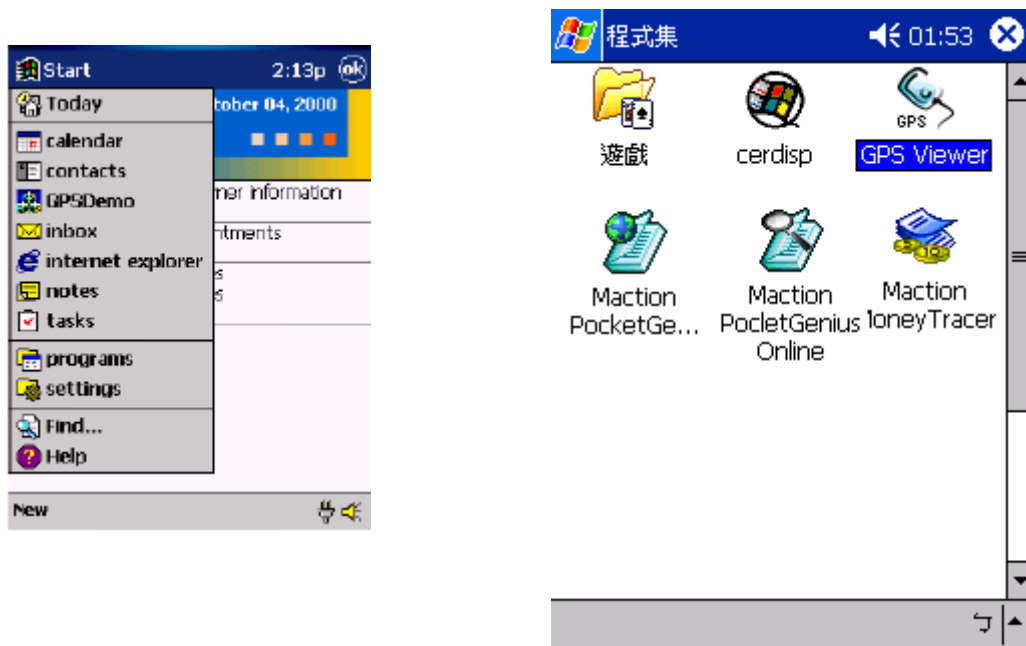
- (1) Install Microsoft ActiveSync to your PC, refer to your Pocket PC manual for installation procedure.
- (2) Setup your Pocket PC cradle to Desktop PC UART port. The Microsoft ActiveSync will detect your Pocket PC automatically.



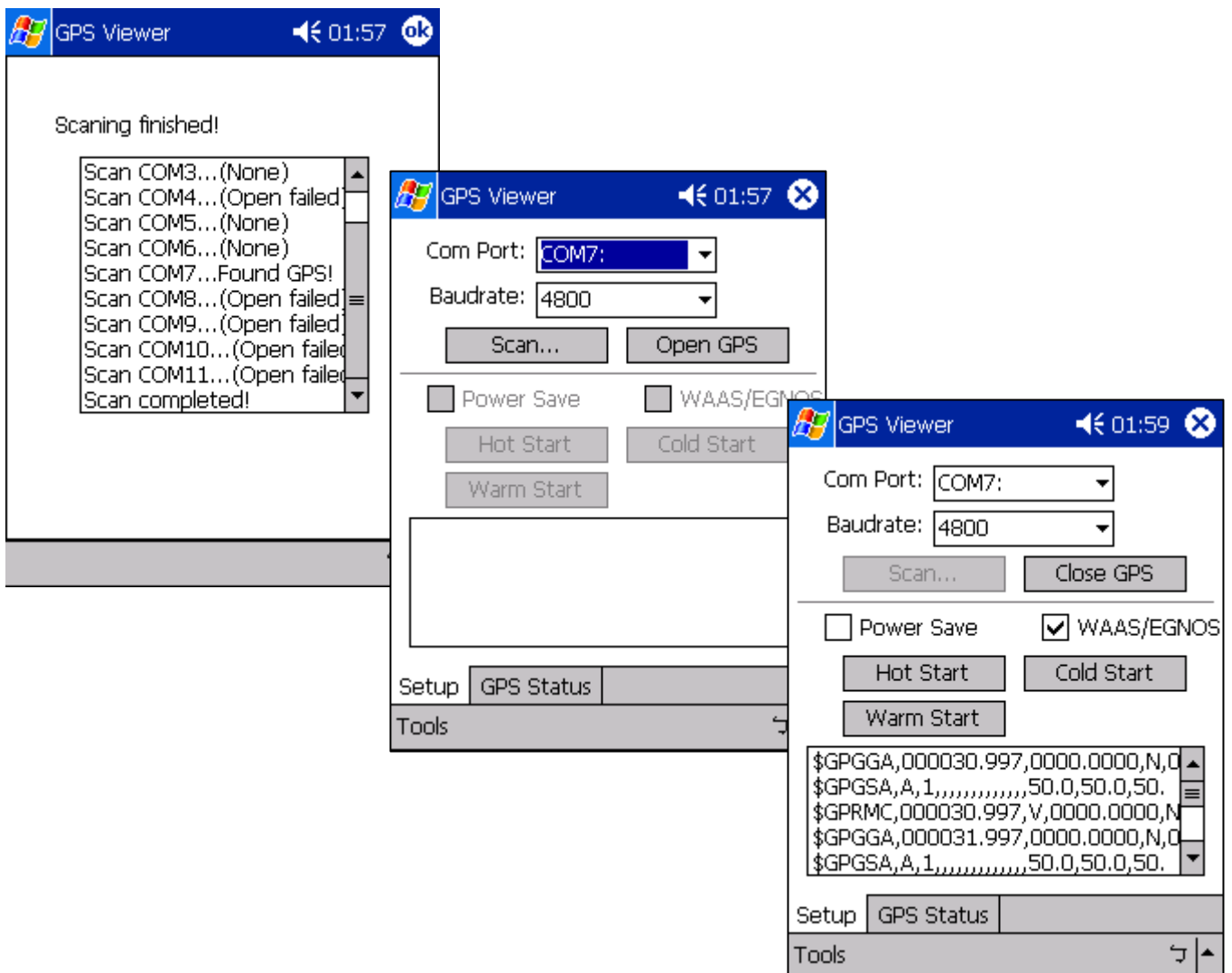
- (3) Double Click the GpsViewer.exe on your PC, then GpsViewer.exe program will install automatically.



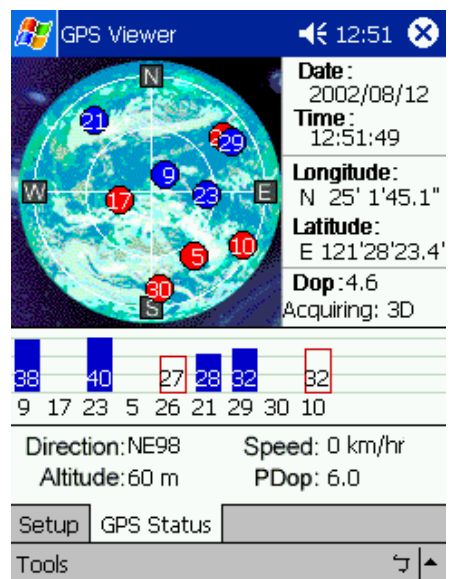
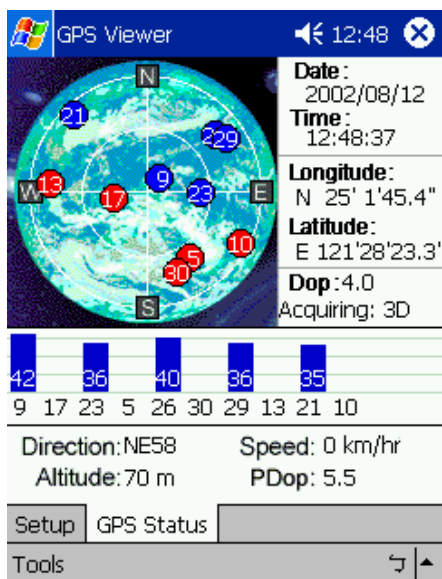
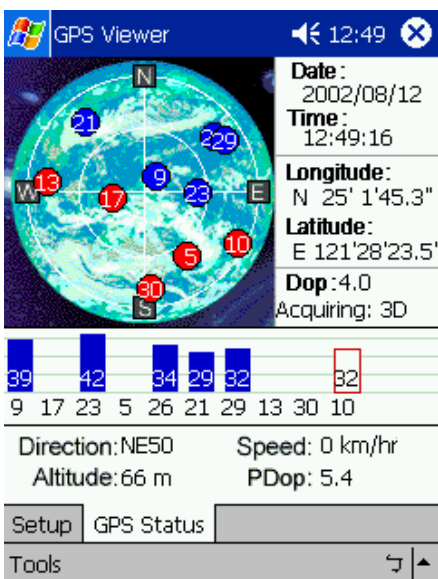
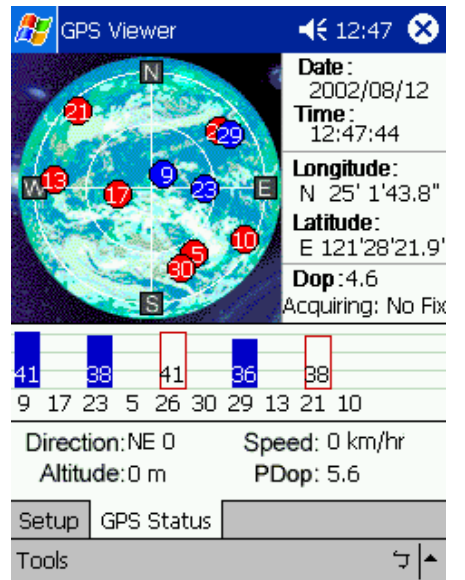
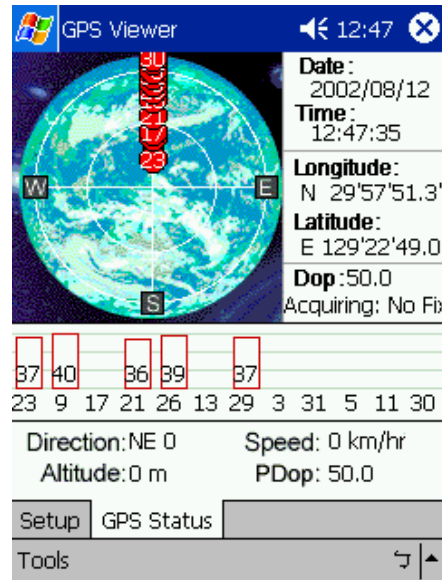
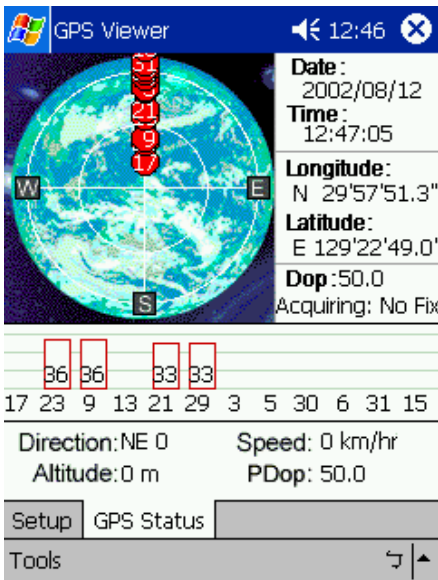
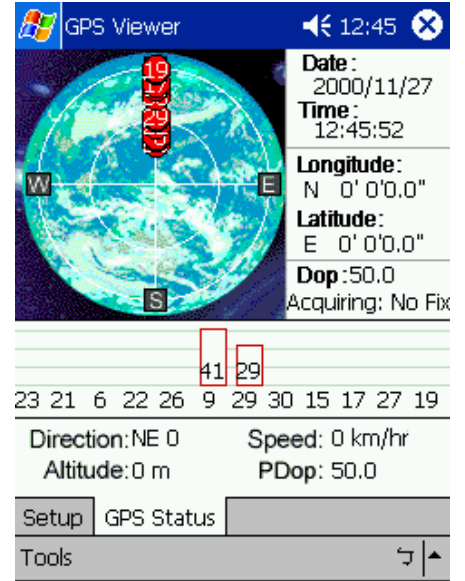
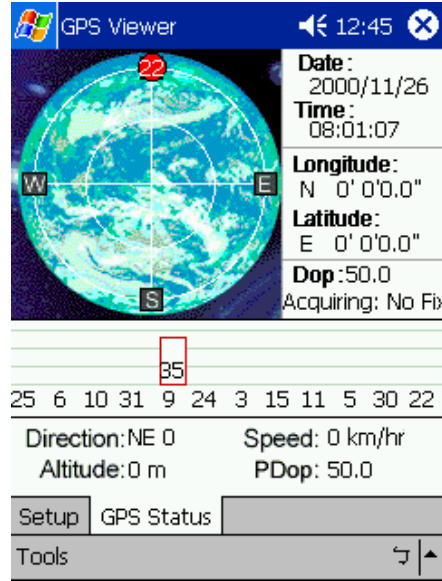
2. Push “Start”→”programs” bottom→“ GPS Viewer”



3. Push “Scan” bottom to scan your Com Port. Select your Com Port (COM 1~COM 10) , then push “Open GPS” bottom.



4. Select "GPS Status" to show the satellite diagram like below.



## 4. Trouble Shooting

<b>Problem</b>	<b>Reason</b>	<b>Solution</b>
No position output but timer is counting	Weak or no GPS signal can be received at the place of GR-271 CF GPS	Connect an external antenna which locate as a open space to your GR-271 CF GPS and then press Reset Button
	At outdoor space but GPS signal is blocked by buildings or car roof.	Go outdoor and press Reset Button to try again, or connect an external antenna to improve the poor GPS signal.
Execute Fail	Wrong CPU Type	Pocket PC support multiple types of CPU. Make sure you download the correct software. (You can use 'setting' function of start menu on your PDA to check the correct CPU type)
Can't Open COM port	GR-271 CF GPS is not inserted or some other application is using the COM port.	Insert GR-271 CF GPS or Close all other applications that using the COM port.
Can't Find GPS Module	Poor connection	Check the GR-271 CF GPs is inserted correctly.
No signal	No action for few minutes may cause Pocket PC entry power save mode. It will close the COM port at the same time.	Close the application and execute it again to reopen the COM port.
	Weak or no GPS signal when using GR-271 CF GPS indoor.	Connect an external antenna to your GR-271 CF GPS and place it at a open space, then press Reset button.

## 5. Specifications

- Tracks up to 20 satellites.
  - Receiver: L1, C/A code
  - Snap Start: <3 sec(at < 25 minutes off period).
  - Update rate: 1 HZ.
  - Acquisition time
 

Reacquisition	0.1sec.averaged
Hot start	8 sec., averaged
Warm start	38 sec., averaged
Cold start	42 sec., averaged
  - Position accuracy:
    - ◆ Non DGPS (Differential GPS)
 

Position	5-25 m CEP without SA
Velocity	0.1 m/sec, without SA
Time	1 usec sync GPS Time
    - ◆ EGNOS/WAAS
 

Position	< 2.2 m, horizontal 95% of time < 5 m, vertical 95% of time
----------	--
  - Dynamic Conditions:
 

Altitude	18,000 meters max. (60,000 feet )
Velocity	515 meters / second max. (700 knots)
Acceleration	4 G, max
Jerk	20 meters/second, max
  - Antenna Type: Built in Patch Antenna
  - Minimum signal tracked: -159dBW
  - Dimension: 93.5×43 ×11 mm
  - Weight : < 34g
- LED function:
    - power On/Off and Navigation
    - Update Indication
  - Operation Temperature:
    - 10 °C to +70 °C
  - Store Temperature:
    - 45 °C to +85 °C
  - Operation Humidity:
    - 5% to 95% No condensing.
  - Power consumption
    - <80mA at 3.3V+/-10% input
  - Protocol and interface:
    - ◆ NMEA output protocol: V.2.2
 

Baud rate:	4800 bps
Data bit:	8
Parity:	N
Stop bit:	1
    - Output format:
      - Standard: GGA,GSA,GSV, RMC.
      - Optional:
        - GLL,VTG,or SiRF binary
        - Baud rate: 9600,19200,38400 bps
    - ◆ NMEA Input messages
      - NMEA/SiRF Binary Set altitude, position, date & time, select output messages and rates
    - ◆ Interface:
 

H/W:	Compact Flash - CF type I
S/W:	Emulated COM Port 1-8 (Auto Select)

\* The specifications are subject to be changed without notice.

\* The measurement functions of this GPS CF card are not intended for use in tracking measurements that requires professional or industrial precision. Values produced by this GPS CF card should be considered as reasonable accurate representations only.

## **6. Warranty**

The GR-271 is warranted to be free from defects in material and functions for one year from the date of purchase. Any failure of this product within this period under normal conditions will be replaced at no charge to the customers.