



# SONY GPS EVALUATION KIT QUICKSTART INSTRUCTIONS

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## 1.0 INTRODUCTION

The 10001750-1 and -4 Low-Cost Evaluation Kits are designed to support the Sony GXB5005, and GXB5210 GPS receivers respectively. The receivers are very similar in operation, but while the GXB5005 requires a separate active antenna the GXB5210 module contains its own built in patch antenna and lo-noise amplifier. Because of these differences the kits are configured slightly differently.

The Evaluation Kits consist of these main components:

### 10001750-1 (GXB5005 receiver)

<u>Synergy P/N</u>	<u>Description</u>	<u>Qty</u>
10001755-1	Sony GXB5005 Evaluation Board	1 ea.
10001799	AR-10N Active GPS Antenna	1 ea.
10001107	Standard 9 Pin Male/Fml Serial Cable	1 ea.
10001686	USB A Male to B Male Cable	1 ea.
10001750QS	Quick Start Guide	1 ea.
10001752	Support CD	1 ea.

### 10001750-4 (GXB5210 receiver)

<u>Synergy P/N</u>	<u>Description</u>	<u>Qty</u>
10001755-4	Sony GXB5210 Evaluation Board	1 ea.
10001107	Standard 9 Pin Male/Fml Serial Cable	1 ea.
10001686	USB A Male to B Male Cable	1 ea.
10001750QS	Quick Start Guide	1 ea.
10001752	Support CD	1 ea.

## 1.1 Software Components

The CD supplied with the kit contains several programs and drivers:

- Sony's GPS View Test/Display Software
- Visual GPS Test/Display Software
- TeraTerm Terminal Emulator
- Driver for the FTDI USB to Serial converter chip on the Evaluation Board to enable USB communications

In addition, there is a wide range of additional documentation, consisting of data sheets, communications protocol descriptions, and instructions on general operation of the various software packages.

## 1.2 System Requirements

The software requires a PC running Windows™ 98/2K/NT/XP. The kit has been configured to support several serial port/USB port configurations in an attempt to insure that most users will be able to operate the kit without buying any extra cables, power supplies, etc. At a minimum, the host system must have at least one USB port to provide both power and a communications gateway to the Evaluation Board. The availability of a serial port gives the user the ability to use

the 1PPS present on Pin 1 of the serial DB-9 connector (DCD) to synchronize a PC to GPS time. For normal operation all that is required is a serial/USB connection between the Evaluation Board and the host PC.

## 2.0 GETTING STARTED

### 2.1 Evaluation Board Description

The Evaluation Boards supports both styles of Sony GPS receivers by supplying them with power and a communications interface with the host computer. The boards receive +5V power through the USB cable. Typical current draw for both boards is approximately 80mA. The Evaluation Boards can communicate with the host through either the USB port or a standard serial port by changing jumpers on the board (USB is the factory default configuration).

The boards are very similar in appearance, but they are populated slightly differently depending on which receiver is being supported.

On the 10001755-1 Evaluation Board a Sony GXB5005 receiver is mounted directly through the nineteen surface mount pads on the periphery of the receiver. Interface to the AR-10N active antenna included in the -1 kit is accomplished through J3, a R/A SMA jack on the edge of the board. Between the RF input to the receiver and the antenna jack is circuitry that provides bias to the antenna and controls the bias using the antenna sense/control circuitry present in the GXB5005.

On the 10001755-4 Evaluation board with the Sony GXB5210, the receiver is mounted by soldering the shield can on the bottom of the module to a couple of ground pads on the top surface of the Evaluation Board. Electrical interface to the GXB5210 is made through a 10 conductor, 1mm pitch flexible printed circuit (FPC). The FPC plugs into J4 on the Evaluation Board.

**2.1.1 Jumpers** - There are two user selectable jumpers on the Evaluation Board that control which I/O connector is used.

**JP1** (RxD SEL) and **JP2** (TxD SEL) configure the board to communicate either through the serial port (J2) or the USB port (J1). To use the USB port both jumpers should be in the 'USB' position (factory default). As you might expect, these jumpers should be moved to the 'RS-232' position if you plan on communicating through the serial port.

**2.1.2 Switches** - There are two switches on the board. Functions are as follows:

**S1** - Receiver RESET. Pressing this button results in the receiver performing a reset and starting operation from scratch.

**S2** - Configuration. S2 is a 6 position DIP switch that allows the user to select default parameters for the receiver. Functions are as follows:

<u>Position</u>	<u>Function</u>
S2-1	GXB5005 WAAS Select "WA0"
S2-2	GXB5005 WAAS Select "WA1"
S2-3	Spare
S2-4	Baud Rate Select "BR0"
S2-5	Baud Rate Select "BR1"
S2-6	Battery Backup Enable

## WAAS/EGNOS Function

**GXB5005** - As shipped, switches S2-1 and S2-2 are in the **OFF** position, enabling WAAS/EGNOS functionality in -1 kits with the GXB5005 receiver. If software control of the WAAS/EGNOS function (@WA command) is desired, move S2-2 to the **ON** position. With S2-2 **ON**, the position of S2-1 does not matter. Upon a Reset or power cycle the WAAS function will be enabled.

**GXB5210** - For the -4 kits with the GXB5210 receiver S2-1 and S2-2 perform no function, as WAAS/EGNOS is **ALWAYS** active on the GXB5210.

### GXB5005 Power On/Reset WAAS/EGNOS Switch Settings

WA0 (S2-1)	WA1 (S2-2)	Status
On	Off	WAAS/EGNOS <b>OFF</b>
Off	Off	WAAS/EGNOS <b>ON</b>
Don't Care	On	S/W Control

**Baud Rate Selection** - As shipped, S2-4 is **OFF** and S2-5 is **ON**, resulting in 4800 baud communications. By varying the positions of these two switches one can command the default baud rate to be 4800, 9600, 19200, or 38400. The various switch combinations and resultant baud rates are shown below:

### Power On Default Baud Rate Switch Settings

	4800 Baud	9600 Baud	19200 Baud	38400 Baud
S2-4	Off	On	On	Off
S2-5	On	On	Off	Off

Once the GPS receiver is powered up and running these default rates may be over-ridden by using the Sony @CB command.

**Backup Power Selection** - S2-6 controls whether the receiver gets backup power during times when the board is un-powered. A 0.1F Supercap that automatically charges during normal operation and is capable of keeping receiver RAM alive for a day or so supplies backup power. Default position is **ON**.

**2.1.3 Antennas** - The 10001750-1 kit is supplied with a Synergy Systems AR-10N active antenna. The antenna has a net gain (LNA - cable loss) of approximately 22dB and contains a single filter stage. The antenna is terminated with an SMA plug and connects directly to J3 on the Evaluation Board.

Since the GXB5210 receiver modules in the 10001750-4 kits have self-contained antennas there are no separate antennas included in these kits.

**2.1.4 LEDs** - The Evaluation Board has 8 LEDs that indicate status of both the board and the GPS receiver. Functional definitions are as follows:

D2 - Green - POWER - Illuminated whenever +3.3VDC supply on Evaluation Board is active. This should ALWAYS be illuminated when the USB cable is plugged in and supplying power.

D3 - Red - USB RX - Flashes whenever commands are received from the host computer by the USB port.

D4 - Red - USB TX - Flashes whenever the GPS receiver sends data to the host computer.

D6 - Red - 1PPS - Flashes when the 1PPS output from the GPS receiver is High.

D7 - Red - RXD0 - Flashes whenever commands are received from the host computer by the serial port (J2).

D8 - Red - TXD0 - Flashes whenever the GPS receiver sends data to the host computer through the serial port.

D10 - Green - STATUS - For 10001750-1 kits with the GXB5005 receiver. This LED will flash to indicate receiver status. When first powered up this LED will flash at a 1/2 Hz rate to indicate that the receiver is attempting to acquire satellites. Once satellites are acquired and tracked the flash rate will increase to 1 Hz. Once a position has been determined the LED will be illuminated continuously.

*On -4 kits fitted with the GXB5210 this LED performs no function.*

D11 - Green - ANT DRIVE - If the Evaluation Board is fitted with a GXB5005 receiver this LED will indicate status of the active antenna bias circuitry. If Antenna Drive control has been enabled by using the @ANT command and the antenna is drawing less than 35mA (11mA is typical with the antenna included in the kit) the antenna bias will remain active, illuminating this LED. If excessive current is drawn, the receiver will turn off bias every three seconds as it waits for the overcurrent condition to clear, causing the LED to blink.

*On -4 kits fitted with the GXB5210 this LED performs no function.*

## **2.2 INITIAL HARDWARE CHECKOUT**

Upon the application of power, The POWER LED should illuminate. The USB TX LED will turn on and flash, indicating that the receiver is sending NMEA sentences to the host computer through the USB port. If you have moved the JP1 and JP2 jumpers to select standard serial port operation the TXD0 LED will be flashing. The 1PPS LED should also be flashing at this time.

Note that for the previous step to be completed successfully, the receiver does not need to be receiving data from the GPS satellites. In fact, in the case of the GXB5005 the antenna doesn't even need to be connected. Naturally, this isn't a very useful state of operation, but if the LED(s) are flashing as indicated above you can be fairly sure that the Sony GPS receiver is operational and ready for use.

## **3.0 INSTALLING and CONFIGURING DRIVERS and SOFTWARE**

The Evaluation Kit comes complete with a driver for the FTDI USB-Serial IC on the Evaluation Board and three programs used for controlling the receivers and displaying the resultant data. GPS View and Visual GPS both provide a display of the GPS data, while TeraTerm is a terminal emulator that allows the user to easily change the operating parameters of the Sony GPS receivers.

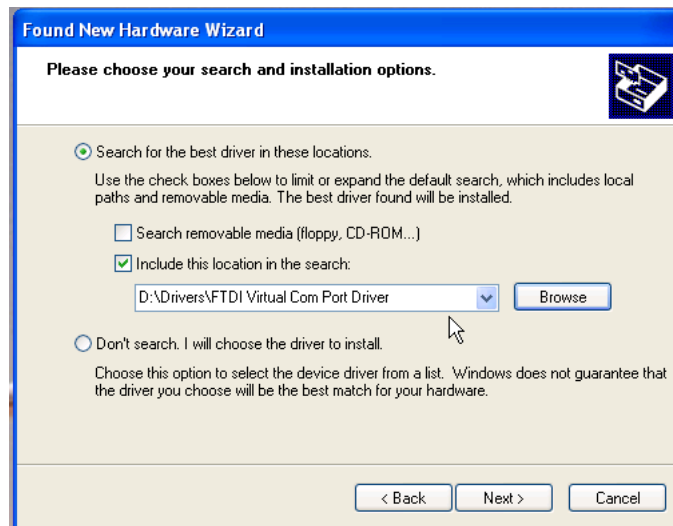
**3.1 Installing the FTDI USB to Serial IC Driver** - If you plan to communicate with the Evaluation Board directly through a USB connector on your PC you need to install this driver.

With this driver installed the Evaluation Board will appear to your computer as a standard serial device communicating through a Com port. To install the driver follow these steps:

1. Make sure both the **TXD SEL** and **RXD SEL** jumper strips on the Evaluation Board are in the '**USB**' position.
2. Make sure the CD that came with the kit is in your CD drive.
3. Connect the Eval Board to your computer using the supplied USB cable.
4. As soon as the USB cable is plugged in the **Windows Found New Hardware** wizard should start, showing you the opening screen shown on the next page:

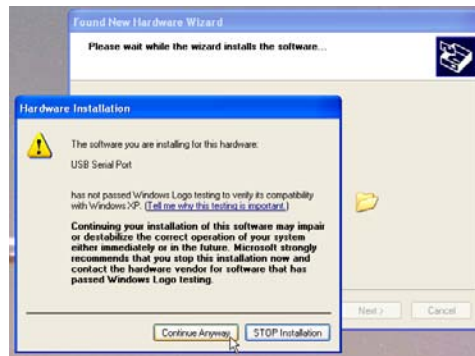


Click on the radio button named *Install from a list or a specific location (Advanced)*, and then click *<Next>*. The following screen will appear:

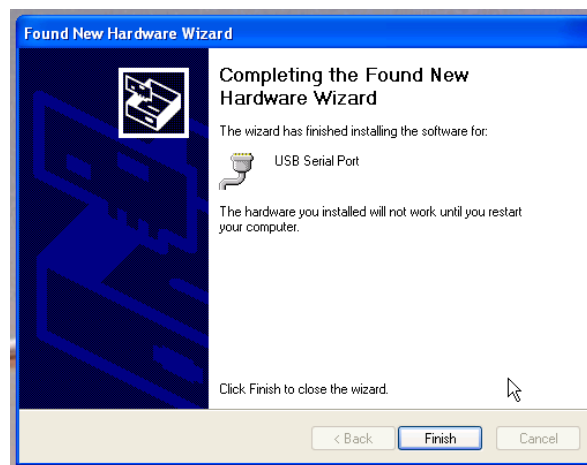


Make sure the "Search for the best drivers in these locations." radio button is highlighted and then check "Include this location in the search". Click on "Browse", navigate to the folder on the

CD shown above, and then click on <Next>. You should see the following windows open. Click on "Continue Anyway" to finish driver installation.



When installation is complete the following window will open. Click on <Finish>, reboot, and you are done.

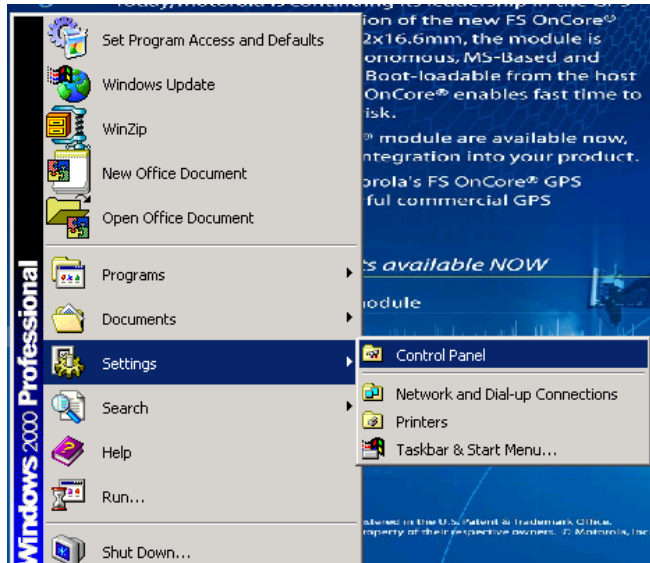


### **Windows Headache #1**

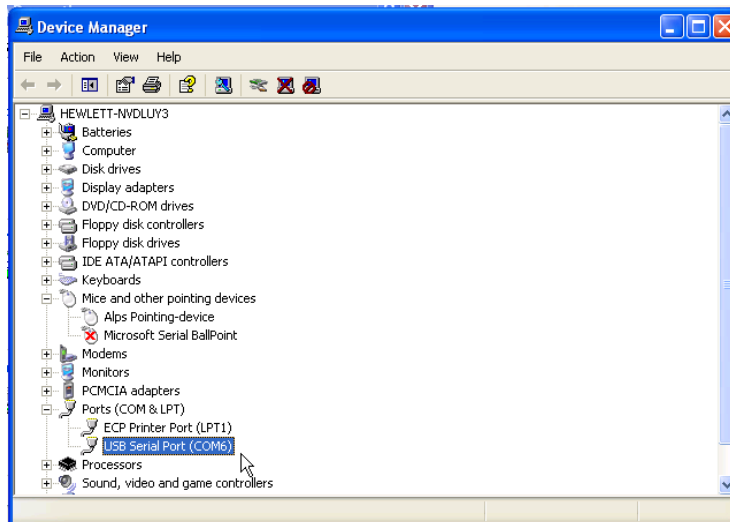
Depending on your particular hardware and/or version of Windows you may see your computer try to install a **Microsoft Serial Ballpoint Mouse** when you plug in the Evaluation Board. Windows will alert you to this with a pop-up message and then your cursor will start jumping uncontrollably all over the screen as Windows tries to convert NMEA sentences into Serial Ballpoint data. If this happens, refer to the Disabling Detection of Microsoft Ballpoint Mouse document included on the CD accompanying the kit.

### **Windows Headache #2**

If you **are** communicating through the USB port you will now need to check and see what Com port Windows™ assigned to the FTDI USB-to-Serial chip driver. To do this, go back to your Desktop, click on <Settings>, and then <Control Panel> as shown on the next page:



Once the Control Panel is open, click on the <System> icon, and then select <Hardware> from the 'System Properties' dialog box. Click on <Device Manager> in order to get to the hardware breakdown for your computer. If you open up the 'Ports (COM and LPT)' section you should see where your COM ports and the USB-to-Serial devices are installed. A typical display is shown below:

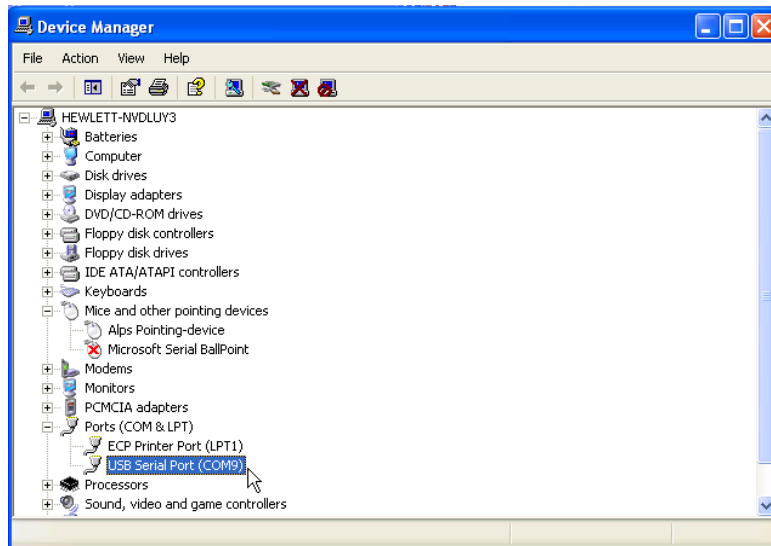


As you can see, the **USB-Serial Port** chip on the Evaluation Board has been assigned COM6.

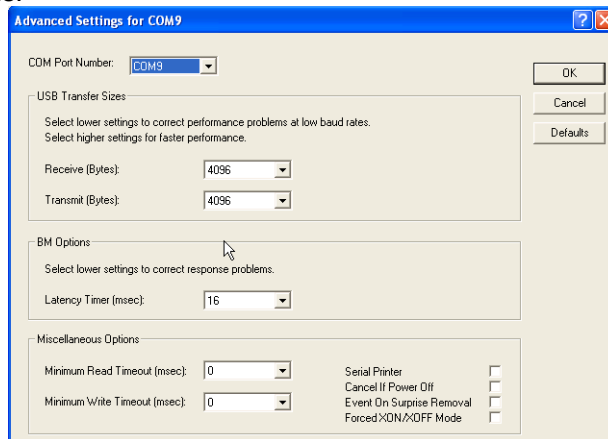
This is what SHOULD happen. Unfortunately, Windows™ seems to assign totally random COM port numbers to the USB adapters when they are installed (especially if you have installed other port emulators previously). This is OK so long as you check to make sure which ones are being used, but one thing to watch out for is if Windows™ assigns COM ports higher than COM8 to the USB adapter as Visual GPS and TeraTerm will only recognize COM ports "8" or lower.



If your USB adapter gets assigned COM9, COM10, etc., you will need to dig a little deeper into Windows and manually change the port assigned to it. This condition is shown below:



First, right click on the <USB-to-Serial Port (COM9)> line in the device manager, and then click on <Properties>. Next, click on <Port Settings> and then <Advanced>. You should see a screen that looks similar to this:



As you can see, Windows has assigned COM9 to the USB-to-Serial cable and is insisting that COM Ports 1-8 are all in use. To fix this, simply click on a lower numbered COM port (I usually use 3 or 4 for the Eval Kit), and then click OK.

#### NOTE

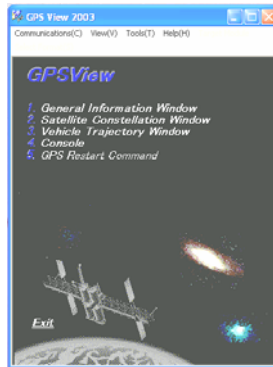
*If you happen to be the proud owner of a computer that REALLY has COM ports 1-8 in use (or the memory locations normally assigned to them), you cannot just go in and assign the USB cable to one of these without compatibility problems. Since several of the software packages supplied with the kit will not recognize anything higher than COM8 my suggestion is to see if you can assign some of your other COM ports to higher numbers and make sure that the USB to serial converter is not assigned to a port higher than COM8.*

### 3.2 Sony GPS View Program

Sony's GPS View program is a simple Windows console application for displaying the GPS data being output by the receiver. There are several windows that may be opened showing different aspects of the data.

Installation - GPS view is a self-contained program that does not need to be installed and registered with Windows. The executable may simply run from a folder you create on your machine (C:\Sony GPS View) for example, or it may be run directly from the 10001752 CD that accompanies the kit. Basic steps are these:

1. Start GPS View. You should see the following screen:

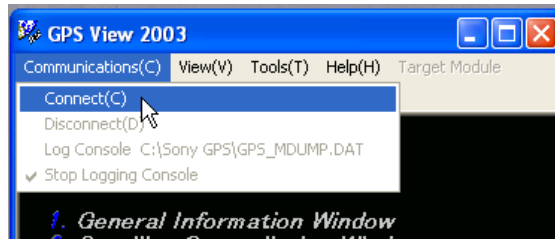


2. Click on Tools(T), and the Configure COM Port (O). You should see the next window:

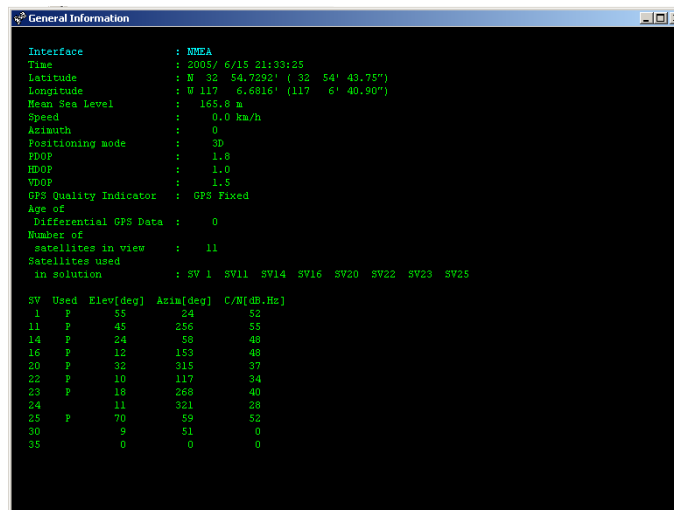


Verify that the settings are correct and then click on <OK>.

3. Next, click on Communications(C), and then Connect(C) as shown on the next page.

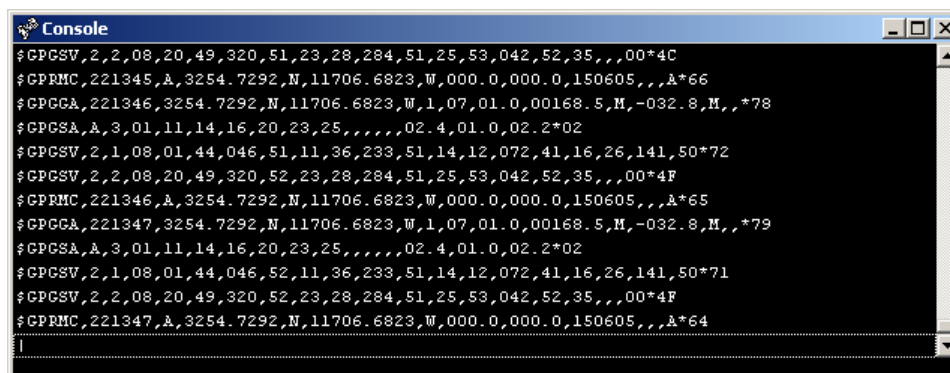


You will be returned to the main window as shown in Step 1 above. Here you have the opportunity to select one of five different windows. The **General Information Window** is probably the most commonly used, and a typical screen shot is shown below:



The CD accompanying the kit has a complete manual on working with the GPSView program. This manual will demonstrate use of all the different screens that GPSView is capable of displaying.

Depending on what NMEA messages are enabled, you may not get information on all of GPS View's screens, so we might as well quickly cover how to communicate with the Sony receiver. By default, when the Sony receiver is set to 4800 baud it starts up with the GGA, GSA, GSV, and RMC messages active as shown below in a screen shot of the <Console> window:



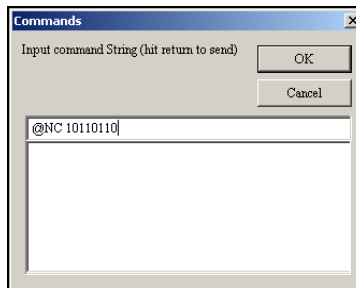
As you can see, the GGA, GSA, GSV, and RMC messages are indeed active. However, if we want all of the GPS View windows to operate properly we need to turn on the VTG and ZDA messages.

To enable more messages, start by simply typing the "@" symbol on your keyboard. This is the initial character of all Sony GPS commands, and as soon as you type this symbol a new window opens to allow you to send messages to the receiver. It should look something like this:

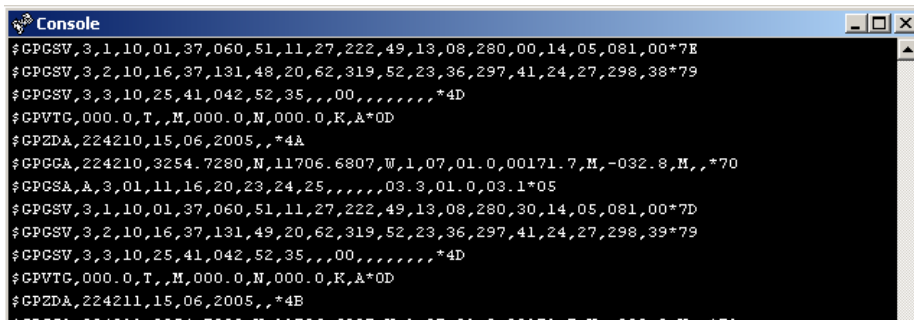


Next, we have to figure out what to tell the receiver to change the output strings. For this we need to refer to page 33 of the GXB Integration Guide on the CD and look at the "NC" command. As you can see you can both turn messages on and off, and also change the output rates of the messages independently. For instance, if you wanted to turn ALL messages off you could type in the string: "@NC 00000000". This simply gives each message an output rate of zero (or never.)

Getting back to what we want to do, we want to turn the RMC message **OFF**, and turn the VTG and ZDA messages **ON**. Looking at the formatting in the manual we see that we want to send the command: @NC 10110110<Enter>. GPS View adds the requisite <CR> and <LF> characters. This looks like the following:



If we now look at the receiver output on the Console screen things look like this:

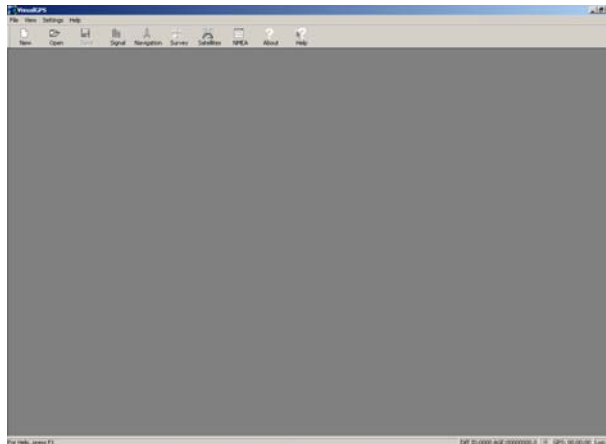


Note that you can also use the "@NC" command to change the rates at which the messages are output. For instance, if you want the GGA message to come out once each 5 seconds in the example above, Just change the command to: @NC 50110110<Enter>. Easy enough.

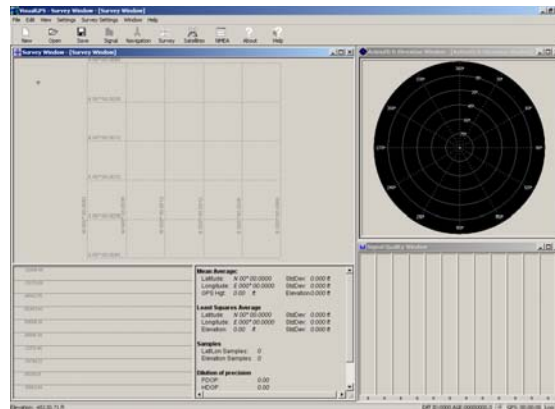
### 3.3 Visual GPS

*Visual GPS* is another GPS data display program, but it has the advantage of showing data in graphical format, giving the user a better feel for how the GPS receiver is behaving. You may install *Visual GPS* directly from the CD in the Eval Kit. The installation program will place a shortcut on your desktop.

The first time you start *Visual GPS* you should see a blank screen that looks something like this:



Not very interesting, but we'll soon fix that. Three windows are normally opened: Survey, Satellites, and Signal. After moving the resulting windows around a little bit, the windows should be arranged something like this:



Open <Settings>, and then <Communications>. Make sure your Com Port and baud rate settings match the way the Evaluation Board is hooked up. When you are done click <OK>.

If you are actively tracking satellites you should see satellite signal strengths and possibly location plots begin to appear. If nothing appears to be happening you can click on the <NMEA> icon to open the NMEA Monitor window to see if you are receiving data from the Sony GPS receiver. Typical data looks something like the screen shot on the next page:

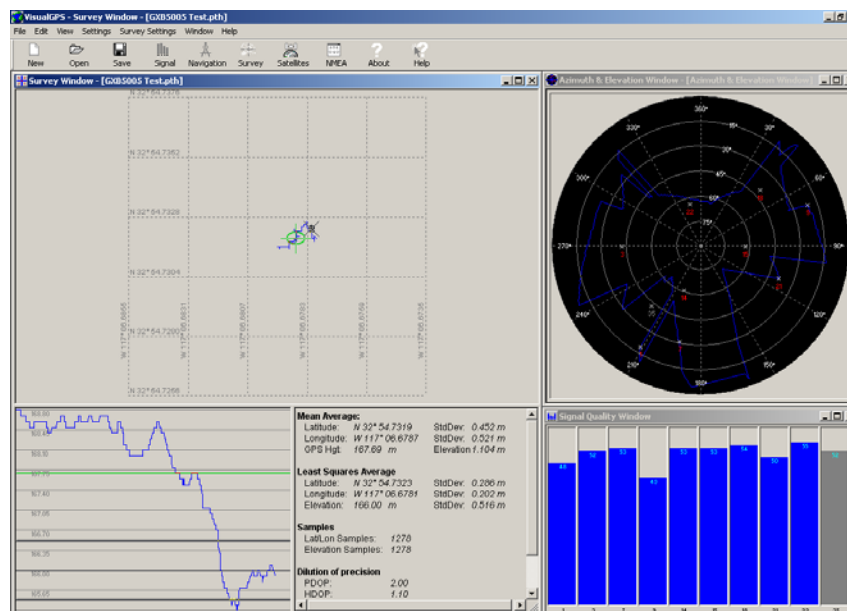
```

NMEA Monitor Window
$GPGSV,2,1,07,02,66,031,00,04,23,044,36,05,80,273,35,06,20,290,00*7F
$GPGSV,2,2,07,09,22,210,32,10,39,139,41,30,45,313,43,...*44
$GPGGA,182002,3254.7278,N,11706.7007,W,1,04,02,4,00035.5,M,040.7,M,*,50
$GPGSA,A,3,04,05,10,30,...,05,1,02,4,04,5*02
$GPGSV,2,1,07,02,66,031,26,04,23,044,35,05,80,273,37,06,20,290,27*7F
$GPGSV,2,2,07,09,22,210,32,10,39,139,41,30,45,313,43,...*44
$GPGGA,182003,3254.7278,N,11706.7007,W,1,04,02,4,00035.4,M,040.7,M,*,50
$GPGSA,A,3,04,05,10,30,...,05,1,02,4,04,5*02
$GPGSV,2,1,07,02,66,031,00,04,23,044,36,05,80,273,36,06,20,290,00*7C
$GPGSV,2,2,07,09,22,210,33,10,39,139,40,30,45,313,43,...*44
$GPGGA,182004,3254.7278,N,11706.7007,W,1,04,02,4,00035.4,M,040.7,M,*,57
$GPGSA,A,3,04,05,10,30,...,05,1,02,4,04,5*02
$GPGSV,2,1,07,02,66,031,26,04,23,044,35,05,80,272,36,06,20,290,26*7E
$GPGSV,2,2,07,09,22,210,33,10,39,139,40,30,45,313,43,...*44
$GPGGA,182005,3254.7278,N,11706.7007,W,1,04,02,4,00035.3,M,040.7,M,*,51
$GPGSA,A,3,04,05,10,30,...,05,1,02,4,04,5*02
$GPGSV,2,1,07,02,66,031,00,04,23,044,36,05,80,272,37,06,20,290,00*7C
$GPGSV,2,2,07,09,22,210,31,10,39,139,40,30,45,313,43,...*46
$GPGGA,182006,3254.7278,N,11706.7007,W,1,04,02,4,00035.3,M,040.7,M,*,52
$GPGSA,A,3,04,05,10,30,...,05,1,02,4,04,5*02
$GPGSV,2,1,07,02,66,031,27,04,23,044,36,05,80,272,36,06,20,290,27*7D
$GPGSV,2,2,07,09,22,210,29,10,39,138,39,30,45,313,42,...*41

```

If you do not see any data re-check your cabling and port settings. Note that you do not need to be tracking satellites to receive the NMEA strings.

Once things get going and you start collecting data the windows will start displaying data as shown below:



This plot is a culmination of over 1200 position reports. It is worth noting that during this time the GPS X/Y position has varied a little less than 2 meters, and the altitude has varied a little under 3 meters. The GRAY satellite strength bar at the lower right hand corner is the WAAS satellite being used by the receiver ( in this case SVN 35).

That's about it for *Visual GPS*. There are many more features available that we don't have time to go into here, but the *Visual GPS* Help files will take you through the rest of the ins and outs. The *Visual GPS* website at: [www.visualgps.net](http://www.visualgps.net) is also an excellent resource.

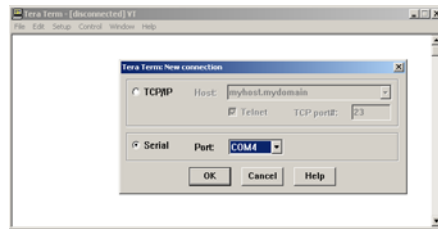
### 3.4 TeraTerm

The last program to be discussed is a little terminal emulator called TeraTerm. This program was originally developed by Sony engineers back in the 1990's and is freeware. The homepage for TeraTerm v2.3 is: <http://hp.vector.co.jp/authors/VA002416/teraterm.html>. Besides the program, you can also download some enhancements and source code for TeraTerm in both Pascal and C.

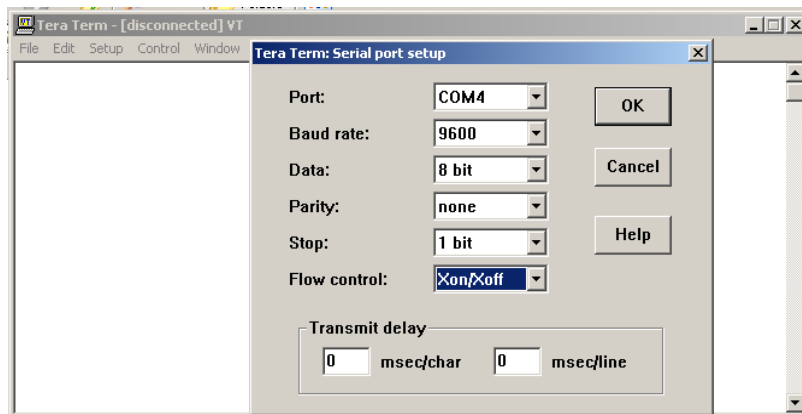
A company by the name of Ayera Technologies further enhanced TeraTerm Pro Web (v3.1.3) and made it more web friendly. It is still freeware and can be downloaded at: <http://www.ayera.com/teraterm>.

Either version of the program works fine with the evaluation Kit. The only REAL difference as far as we are concerned is that you can modify the "ini" file for TeraTerm 2.3 to allow for Com ports 1-8, whereas v3.1.3 only supports 1-4. Of course, if you have your own favorite terminal emulator program, it should work fine with the evaluation kit.

To install TeraTerm, simply unzip the files on the CD, run setup.exe and follow the prompts. When started, TeraTerm will present you with the following opening window:



It's quicker to just Cancel this window and go to **<Setup><Serial Port....>**. This gives you the following window, which gives you a chance to set up the serial port all at once.



Note that things are set up for COM4, 9600 Baud, 8/N/1, and Xon/Xoff flow control. Flow control with these receivers should actually be "None", but Teraterm does not give you this option. Once you have the serial port set up properly you should see the ASCII strings being sent out by the receiver. Depending on the messages enabled and the current status of the receiver you should see something like this:

```

Tera Term - COM1 VT
File Edit Setup Control Window Help
$GPGSA,A,3,05.06,21.26,29.30,,,,,03.6,01.7,03.2*0C
$GPGSU,3,1,11.02,07.069,28.05,14,176,47,06,76,354,51,10,32,042,52*78
$GPGSU,3,2,11.15,08,262,27,16,08,322,00,18,27,209,50,21,44,285,52*72
$GPGSU,3,3,11,26,22,127,51,29,27,105,52,30,40,203,48,,,,*4A
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$GPGGA,190736,3254.7285,N,11706.6785,W,1.06,01.7,00113.6,M,040.7,M,,*59
$GPGSA,A,3,05.06,21.26,29.30,,,,,03.6,01.7,03.2*0C
$GPGSU,3,1,11.02,07.069,28.05,14,176,47,06,76,354,51,10,32,042,52*72
$GPGSU,3,2,11.15,08,262,27,16,08,322,00,18,27,209,50,21,44,285,52*77
$GPGSU,3,3,11,26,22,127,50,29,27,105,52,30,40,203,48,,,,*4B
$GPRMC,190736,A,3254.7285,N,11706.6785,W,0.000,0.000,0.280305,,,A*61
$GPRGA,190737,3254.7284,N,11706.6786,W,1.06,01.7,00113.7,M,040.7,M,,*5B
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$GPGSU,3,1,11.02,07.069,28.05,14,176,47,06,76,354,51,10,32,042,52*78
$GPGSU,3,2,11.15,08,262,28,16,08,322,00,18,27,209,50,21,44,285,52*7D
$GPGSU,3,3,11,26,22,127,51,29,27,105,52,30,40,203,48,,,,*4A
$GPRMC,190737,A,3254.7284,N,11706.6786,W,0.000,0.000,0.280305,,,A*62
$GPGGA,190738,3254.7283,N,11706.6785,W,1.08,01.2,00114.2,M,040.7,M,,*59
$GPGSA,A,3,05.06,10,18,21,26,29,30,,,,,02.8,01.2,02.5*0B
$GPGSU,3,1,11.02,07.069,28.05,14,176,48,06,76,354,51,10,32,042,52*7D
$GPGSU,3,2,11.15,08,262,00,16,08,322,00,18,27,209,50,21,44,285,52*77
$GPGSU,3,3,11,26,22,127,51,29,27,105,52,30,40,203,48,,,,*4A
$GPRMC,190738,A,3254.7283,N,11706.6785,W,0.000,0.000,0.280305,,,A*69

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Note that the GGA, GSA, GSV, and RMC sentences are enabled as before.

## ERRATA

The silkscreen on the Evaluation Board indicates that the WAAS/EGNOS function select switches (S2-1 and S2-1) are used with the GXB5010 and GXB5210 receivers. Due to a late change in receiver part numbers this silkscreen is incorrect. S2-1 and S2-2 are for use with the [GXB5005](#) receiver only. The WAAS/EGNOS differential function is ALWAYS active in the GXB5210.

This concludes the Quick-Start Guide for the 10001750-1 and 10001750-4 Sony GPS Evaluation Kits. If you come up with ANY questions or problems in operating the Sony receivers and/or the Evaluation Kit, please do not hesitate to contact us.

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