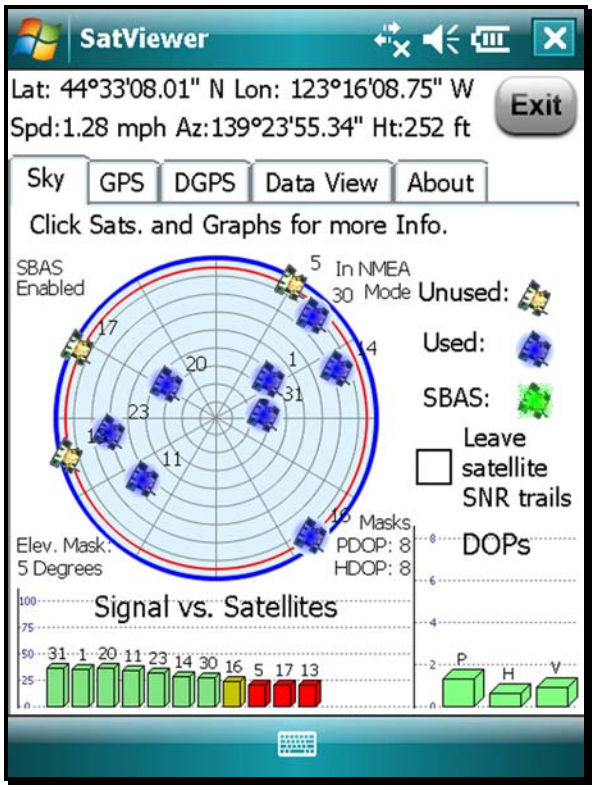
Nomad SatViewer
Getting Started Guide



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SatViewer

SatViewer™ is for use ONLY with a Nomad™ that has built-in GPS. External GPS receivers, Bluetooth GPS receivers, GPS CF cards or other external GPS devices (including other SiRF II or SiRF III GPS receivers) are not supported and may not work correctly with SatViewer.

On your Nomad, tap **Start / Settings / System / System Information / Wireless** to see if it has built-in GPS. If it does, COM2 is the dedicated hardware port for the built-in GPS (COM1 is dedicated to the external 9-pin). Your Nomad GPS receiver is compatible with applications that accept the NMEA position information using a default setting of 9600 bps.

Quick Start: The following steps will allow you to quickly connect to the GPS with default settings:

1. Start SatViewer by tapping **Start / Programs / SatViewer**.
2. Tap on the **GPS** tab.
3. Make sure the COM setting is set to **COM2**.
4. Tap **Connect to GPS**. The fields Lat, Lon, Spd, Az and Ht will all read **?** until SatViewer connects to the GPS and obtains a satellite fix. If you are attempting to get a satellite fix for the first time, it may take several minutes and it is recommended to position your Nomad unit outside with no overhead obstructions.
5. Tap **Sky**. Lat and Lon will change to current latitude and longitude when a satellite fix has been completed.

Welcome to SatViewer. Your on-board GPS receiver features a 20-channel SiRF III GPS receiver. The typical expected accuracy for this GPS receiver is about five to fifteen meters. It has the capability of receiving correction signals (Satellite-Based Augmentation System, SBAS) which may improve the accuracy of the GPS. However, these correction signals are not consistently available in all locations. The typical expected accuracy of the GPS receiver with the correction signals is about four to ten meters.

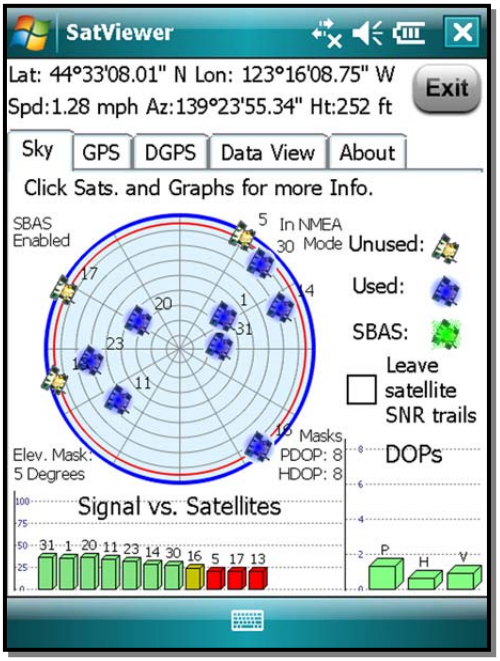
Your Nomad GPS receiver updates its position once every second. It may take several minutes to start tracking the first time you try to use it because it needs time to update its position and download current satellite information from the GPS satellites. This process will occur faster in a location with open sky.

SatViewer provides a way to quickly start using the GPS functionality of the Nomad, but it is not a stand-alone mapping, GIS or navigation program by itself. SatViewer is useful for checking the GPS configuration and enabling advanced features of your Nomad GPS receiver when these settings are not made available in other applications. When changing any GPS settings or other settings, it is important to wait a few moments after tapping on the desired option to allow time for your Nomad GPS receiver to implement the requested change. SatViewer communicates with your Nomad GPS receiver to compute your current position, speed, direction (azimuth) and

height. This information is displayed at the top of the screen along with other information about the satellite signals. Speed and direction measurements are only useful when your Nomad GPS receiver is in motion. Standing in one position with your Nomad GPS receiver may result in inaccurate readings in direction and speed. If you are not moving, direction is reported as ? and speed is reported as “0”. Height calculations from a GPS receiver are typically not very accurate. Vertical accuracy is about two to three times worse than the horizontal accuracy). Units of measurement are only displayed in U.S. feet and heights are only displayed in height above mean sea level (MSL).

The pages of the application are accessed by tapping the various tabs, which are laid out in index card format. The information in each tab is described on the following pages.

Sky Tab



Sky Plot Graphic: The Sky Plot is a graphical representation of where the satellites are positioned in the sky. The top of the circle represents north, the center is straight up, and the farthest right point is east. The outer blue circle represents the horizon and the red circle represents the elevation mask. The light gray circles radiating out from the center are the zenith angles in ten degree increments. The lines bisecting the light gray circles divide the circle into thirty degree azimuths.

The satellite icons are color coded to indicate if they are used, unused, or SBAS satellites. Each icon is labeled with the corresponding satellite's ID number (PRN). If **Leave satellite SNR trails** is checked, the path of the satellites are also marked by a dotted line as each satellite moves across the sky.

Status Indicators: The following four messages are displayed around the sky plot to indicate the current settings configured on other pages:

- **Corrections Disabled** / **SBAS Enabled**: displays if Satellite Based Augmentation System (SBAS) is enabled or disabled. When SBAS is enabled, your Nomad GPS receiver will attempt to locate, track and use correctional data supplied from an SBAS satellite in order to improve accuracy. There are a limited number of SBAS satellites available, so they may not be readily accessible in your area. This setting is configured in the **Type** field on the **DGPS** page.
- **In SiRF Bin. Mode** / **In NMEA Mode**: indicates which mode you are running in. Some applications may require GPS data to be sent to the application in the form of a NMEA message, where other applications require the GPS data be sent as a SiRF Binary message. Most mapping and navigation applications can use the NMEA message. This setting is configured with the **NMEA/SiRF Binary** radio buttons on the **GPS** page.
- **Elev. Mask**: displays the current elevation mask. This is the minimum angle above the horizon that a satellite must be located before it is used and is represented on the sky plot by a red circle. This setting is useful when using the GPS in areas where there might be obstructions to the view of low flying satellites (e.g. around buildings or trees). A typical elevation mask setting is between 5 and 15 degrees to eliminate those satellites from being used to calculate a position. The purpose for this setting is to increase the accuracy of the GPS. However, by using this setting, you are reducing the total number of satellites that can be tracked and used by your Nomad GPS receiver. The idea is to eliminate those satellites that may degrade the accuracy of your Nomad GPS receiver. This is configured in the **Masks** section of the **GPS** page.

- **Masks**: Displays the current PDOP and HDOP mask values as configured in the **Masks** section of the **GPS** page. If the measured Dilution of Precision (DOP) value exceeds the value set for the corresponding mask, the resulting calculated position will be ignored. In general, as the value of the DOP decreases, the accuracy of the GPS position increases. DOP values greater than six usually indicate the GPS position data is of poor quality (due to poor satellite geometry) and the resulting positions are less accurate. ***NOTE***: DOPs can not be displayed in Binary Mode, however, the DOP masks are still in effect.

Satellite Icons

- **Unused**: A GPS satellite whose signal is being received, but not being used for position calculations.
- **Used**: A GPS satellite that is being used to calculate your current position.
- **SBAS**: A Satellite Based Augmentation System (SBAS) satellite, which can be used for error corrections. (See the **DGPS** page for more information.)

Leave SNR trails: Creates a dot on the screen for all previous satellite positions that form a trail on the sky plot over time as the satellite moves across the sky.

DOPs Bar Graph: displays the various Dilution of Precision (DOP) values as explained below. DOPs are not displayed when **SiRF Binary** is selected on the **GPS** page.

- **PDOP**: displays the Position Dilution of Precision, which is a combination of HDOP, VDOP and Time Dilution of Precision. It will always be larger than HDOP and VDOP.
- **HDOP**: displays the Horizontal Dilution of Precision, which is a measure of the calculated accuracy of the solution. DOP has no units and lower numbers indicate better solution geometry. In general, the lower the DOP value, the better confidence you have in the position reading from your Nomad GPS receiver.
- **VDOP**: displays the Vertical Dilution of Precision, which is a measure of the calculated elevation.

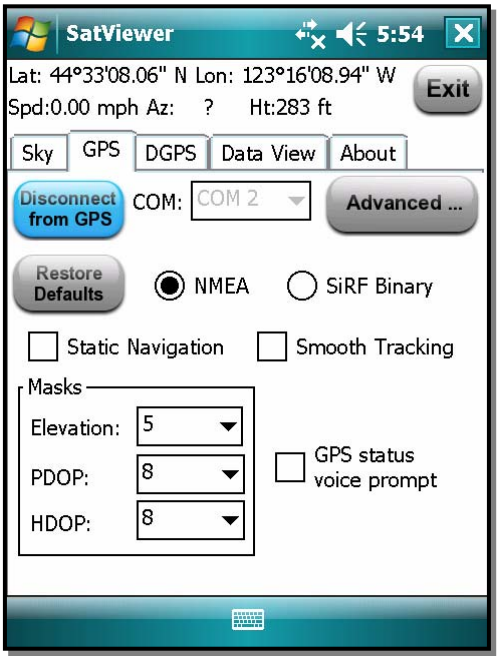
Each DOP bar is color coded to indicate the DOP quality as follows:

Green: The DOP is less than three (best).
Yellow: The DOP is greater than three, but less than six.
Orange: The DOP is greater than or equal to six, but less than twenty.
Red: The DOP is greater than or equal to twenty (worst).

Signal vs. Satellite Bar Graph: shows all the visible satellites and their corresponding ID numbers (PRN) ranging from 1 to 32. Also, the PRN for any currently tracked SBAS satellite (ranging from 122 to 138) is displayed in this graph. Tapping any bar will also display the signal to noise ratio (SNR) value for that satellite. The color of each bar indicates the following:

Green: Good satellite signal strength. Satellite is used with an SNR greater than or equal to thirty dB.
Yellow: Fair satellite signal strength. Satellite is used with an SNR less than thirty dB.
Red: No signal or the signal strength is below the minimum allowable threshold. Satellite is not used.

GPS Tab



Connect to GPS / **Disconnect from GPS**: This button either tries to establish a connection with the GPS receiver chip or disconnects the connection.

COM: used to select the COM port for communication between SatViewer and your Nomad GPS receiver. Your Nomad GPS receiver port is set to COM2 and a baud rate of 9600. The default SatViewer settings shouldn't need to be changed to connect.

NOTE: Before changing COM port or baud rate settings, you must first disconnect from your Nomad GPS receiver before making the changes. After you have changed the COM settings, then you can re-attempt to connect to your Nomad GPS receiver, using the **Connect to GPS** button.

Enabling the Microsoft GPS driver

If you would like to connect two or more programs to your Nomad GPS receiver at the same time (such as SatViewer and a navigation program) you will have to turn the Microsoft GPS driver on by performing the following steps:

1. Tap **Settings / System / GPS.**
2. Tap the **Access** tab.
3. Tap **Manage GPS automatically**. This will turn on the Microsoft GPS driver. Ensure that the GPS program port is COM3 (or any other port available in the Microsoft GPS driver screen) and the GPS hardware port is COM2 with baud rate of 9600.
4. The Microsoft GPS driver will now allow multiple applications to connect to your Nomad GPS receiver at the same time. This can be helpful so that your Nomad GPS receiver can be controlled with SatViewer while other applications are also using your Nomad GPS receiver.
5. In SatViewer and any other program using your Nomad GPS receiver, change the COM port to COM3 (or the COM port specified in Step 3 above). Both applications will connect to your Nomad GPS receiver through the Microsoft GPS driver.

Restore Defaults:

When connected to your Nomad GPS receiver: Tapping the **Restore Defaults** tab will result in the following settings being changed:

- GPS receiver output will be set to NMEA mode
- Static Navigation will be turned OFF
- Smooth Tracking will be turned OFF

- Elevation mask is set to five
- PDOP mask is set to eight
- HDOP mask is set to eight
- GPS status voice prompt is turned OFF
- NMEA message settings under the Advanced page are changed as follows:
    - GGA – 1 sec
    - GSA – 1 sec
    - GLL – off
    - VTG – off
    - GSV – 1 sec
    - RMC – off
- DGPS settings under the DGPS tab are set back to their defaults of Usage: Auto, Type: SBAS ON and SBAS Sat. PRN: Auto
- No change to any COM settings

Each of the above settings (except for the GPS status voice prompt) are sent and applied to your Nomad GPS receiver.

When disconnected from your Nomad GPS receiver: Tapping the **Restore Defaults** tab will result in the following settings:

- GPS receiver output will be set to NMEA mode
- Static Navigation will be turned OFF
- Smooth Tracking will be turned OFF
- Elevation mask is set to five
- PDOP mask is set to eight
- HDOP mask is set to eight
- GPS status voice prompt is turned OFF
- NMEA message settings under the Advanced page are changed as follows:
    - GGA – 1 sec
    - GSA – 1 sec
    - GLL – off
    - VTG – off
    - GSV – 1 sec
    - RMC – off

  NMEA message settings (set to default or otherwise) will be sent to your Nomad GPS receiver and applied the next time you connect to your Nomad GPS receiver (with output set to NMEA).

- DGPS settings under the DGPS tab are set back to their defaults of Usage: Auto, Type: SBAS ON and SBAS Sat. PRN: Auto

  Since you are **not connected** to your Nomad GPS receiver, none of the above changes are actually applied to your Nomad GPS receiver. To apply these settings, you will need to first connect to your Nomad GPS receiver and then tap on the **Restore Defaults** button.

- If the Microsoft GPS driver is not used, the COM port gets set to COM2.

- If the Microsoft GPS driver is used, the COM port gets changed to its assigned program port.
- Baud rate is set to 9600
- Data bits are set to 8
- Flow is set to None
- Parity is set to None
- Stop bit is set to 1

To completely restore your Nomad GPS receiver back to the factory settings, perform a system shut down on your Nomad for a minimum of five minutes before turning the unit back on and attempting to reconnect with your Nomad GPS receiver in SatViewer. In order to perform a system shut down, press down and hold the Power button for a few seconds and then release. A Power Menu is displayed with different options. Tap on the Shutdown button to put your Nomad into a system shutdown. This procedure is beneficial when you are unable to connect your Nomad GPS receiver to SatViewer due to a change in the communications settings caused by another software application. In most cases, the factory reset procedure only needs to be used when another application has changed the settings of the Nomad GPS receiver and you would like to set them back to their original configuration.

NMEA / SiRF Binary: is where you choose to set your Nomad GPS receiver to NMEA mode or SiRF Binary mode. When in SiRF Binary mode, DOP values are not available in the Sky page. The mode you select here will also determine the format for the information that can be viewed from the **Data View** page. Most GPS applications require that your Nomad GPS receiver be set to output NMEA messages. There are some specialized GPS applications which require the SiRF Binary output mode. Please consult the documentation of your GPS application to see which output format you should use and then choose that option via this setting.

Static Navigation: This feature keeps your Nomad GPS receiver from showing the normal erratic positions when standing still. When checked, small changes in your position are interpreted as GPS error and your computed position will remain unchanged. For applications where you will be mapping or navigating at walking speed or slower, it is recommended to disable this feature, so even small changes in position will be shown.

Smooth Tracking: This feature smooths the track generated by your Nomad GPS receiver. When checked, movement is smoothed mathematically to reduce the seemingly jagged movement resulting from GPS error. For unfiltered, raw GPS readings, you should leave this box unchecked. However, if you want to see a smoother overall position (e.g. while navigating), then turn this feature on via the checkbox.

NOTE: Both the **Static Navigation** and **Smooth Tracking** features modify your true GPS positions mathematically so these features should not be used when you need the most accurate GPS positions available.

Masks: These define limits that determine when a satellite will be used or not used.

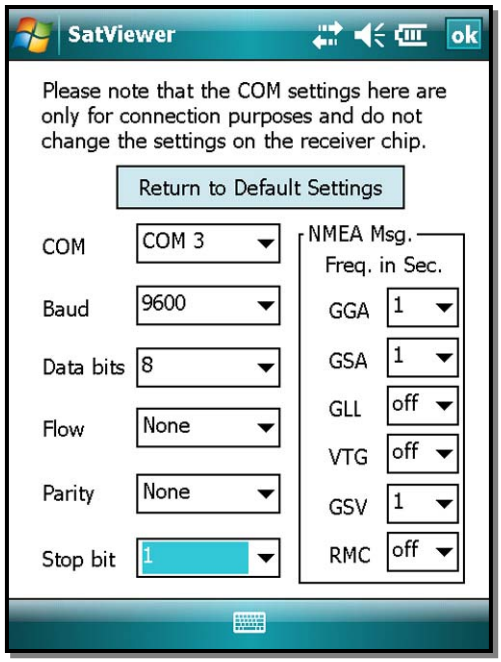
- **Elevation**: This is the minimum angle above the horizon that a satellite must be located before it is used. A value of zero would essentially turn off the elevation mask. A value of ninety would mask all satellites. A typical elevation mask setting is between five and fifteen degrees to block tracking of those satellites potentially affected by multipath error due to obstructions (e.g. buildings or trees). Multipath error is error to the GPS position from the satellite signal bouncing off of objects before reaching the GPS receiver.
- **PDOP**: This is the maximum allowable Position Dilution of Precision (PDOP), which is a combination of HDOP, VDOP and Time Dilution of Precision. While exceeded, the GPS data will not be used for position calculations. This setting is advantageous when quality and reliability of your position are of concern. Typically, PDOP values of six or greater are considered “suspect” and therefore resulting positions are less reliable.
- **HDOP**: This is the maximum allowable Horizontal Dilution of Precision (PDOP), which is a measure of the geometrical quality of the solution. While exceeded, the GPS data will not be used for position calculations.

NOTE: DOPs can not be displayed in Binary Mode, however, the DOP masks are still in effect.

GPS status voice prompt: When checked, changes in GPS quality will result in an audible message indicating the change.

Advanced: When tapped, opens the **Advanced GPS** screen described on the following page.

Advanced GPS Page



Return to Default Settings:

When connected to your Nomad GPS receiver: Tapping the **Return to Default Settings button**, the following settings are changed and applied to your Nomad GPS receiver:

- Resets NMEA strings to defaults of:
  - GGA – 1 sec
  - GSA – 1 sec
  - GLL – off
  - VTG – off
  - GSV – 1 sec
  - RMC – off

NOTE: The COM settings are grayed out and cannot be changed until you disconnect from your Nomad GPS receiver.

When disconnected from your Nomad GPS receiver: Tapping the **Return to Default Settings button**, the following settings are changed:

- Resets NMEA strings to defaults of:
  - GGA – 1 sec
  - GSA – 1 sec
  - GLL – off
  - VTG – off
  - GSV – 1 sec
  - RMC – off

  NMEA message settings (set to default or otherwise) will be sent to your Nomad GPS receiver and applied the next time you connect to your Nomad GPS receiver (with output set to NMEA).
- If the Microsoft GPS driver is not used, the COM port gets set to COM2.
- If the Microsoft GPS driver is used, the COM port gets changed to its assigned program port.
- Sets baud rate to 9600
- Data bits are set to 8
- Flow is set to None
- Parity is set to None
- Stop bit is set to 1

  Since you are **not connected** to your Nomad GPS receiver, none of the changes are actually applied to your Nomad GPS receiver.

COM: used to select the COM port for communication between SatViewer and your Nomad GPS receiver. This field is also available on the **GPS** page for convenience and changing it in one location will automatically change it in the other location.

Baud: sets the speed for communications between your Nomad GPS receiver and SatViewer. The baud rate of your Nomad GPS receiver is 9600 by default. Please note, if you have used another application to change the baud rate of your Nomad GPS receiver to 4800 then it will take longer for your Nomad GPS receiver to respond to changes made within SatViewer. During this period, you may see menu items grayed out while SatViewer is sending the new settings to your Nomad GPS receiver.

Data Bits: should match the data bit rate set in the device you are communicating with.

Flow: should match the flow control set in the device you are communicating with.

Parity: should match the parity set in the device you are communicating with.

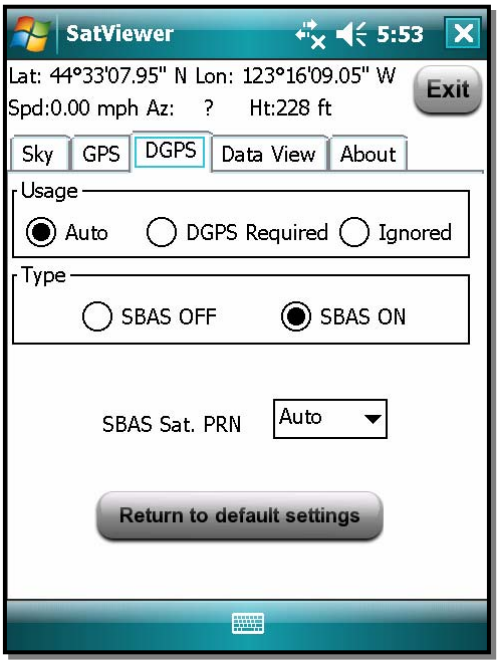
Stop bit: should match the stop bit set in the device you are communicating with.

NMEA Msg: This section allows you to control which NMEA messages are output by your Nomad GPS receiver and the rate at which they are output. The GGA NMEA message is automatically enabled by default and cannot be disabled. You may change the frequency of output for the GGA NMEA message, but you may not disable it. Other NMEA messages listed may be disabled as well as changing the frequency of output. The ability to change the frequency of output and to disable certain messages is useful when communicating at a very low baud rate to prioritize which NMEA messages are sent. Each field allows you to select a value from one to five (measured in seconds), or to select **OFF**. For example, selecting three instructs the receiver to output the corresponding NMEA message once every three seconds. Selecting **OFF** instructs the receiver to never output the corresponding message. This setting is only applicable when you need to specify your Nomad GPS receiver to send out very specific NMEA messages at specific times for your GPS application. Most users will not need to change this as the default NMEA settings will work for most GPS applications trying to display common GPS information (e.g. position, velocity, direction).

DGPS Tab

Differential GPS (DGPS) positioning involves subtracting a combination of ranges measured to various satellites from two or more receivers measuring the same satellites simultaneously. When the signals are subtracted, the major error sources cancel each other out.

The GPS receiver used with SatViewer can provide DGPS through the Satellite Based Augmentation System (SBAS), which uses multiple ground stations and then broadcasts corrections to the end users via SBAS satellites.



Usage: configures the DGPS requirements as follows:

- **Auto**: will use DGPS when available, but continue to provide autonomous (uncorrected) positions when DGPS is not available.
- **DGPS Required**: will only provide positions when DGPS is available. Autonomous positions will not be available. When DGPS data is available, it can be applied to your GPS position to increase the accuracy of your position reading.
- **Ignored**: will not provide DGPS positions even when available.

NOTE: Due to the limited number and availability of SBAS satellites in the sky, DGPS coverage from SBAS satellites may not always be available. Therefore, it is recommended that you use the **Auto** setting where the GPS will use and apply DGPS data when available, but will continue providing positions even when DGPS is not available.

Type: allows you to select SBAS ON or SBAS OFF. (Currently SBAS is the only DGPS service available, but other DGPS systems may be available in the future.)

SBAS Sat. PRN: configures which SBAS satellite to use. Selecting **Auto** instructs the GPS receiver to automatically make the selection.

Return to Default Settings: **If connected to your Nomad GPS receiver**, the following settings are changed and applied to your Nomad GPS receiver:

- Restores DGPS settings back to default state:
  - Usage: Auto
  - Type: SBAS ON
  - SBAS Sat PRN: Auto

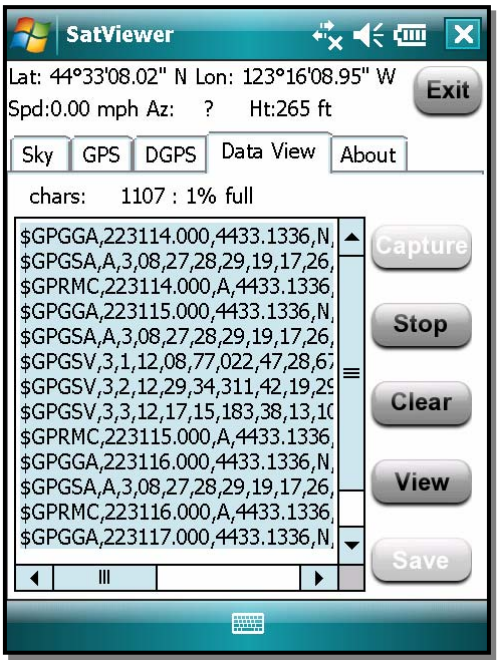
If disconnected from your Nomad GPS receiver this button has no effect on DGPS settings.

Data View Tab

The **Data View** page allows you to capture and view the GPS data being sent to SatViewer by your Nomad GPS receiver over the COM port. There are two formats for data that can be viewed from this screen depending on if you are running in NMEA or SiRF Binary mode, as configured in the **GPS** page. This feature is useful if you have a need to view or store the raw GPS messages as they come out from your Nomad GPS receiver in a textual format. This feature is for advanced GPS users who need the ability to store the raw GPS information as ASCII text in one large LOG file. This feature is intended to collect up to several minutes of data. It is not intended for extended data collection sessions.

When in NMEA mode, the data displayed is simply the raw NMEA codes being sent over the COM port, which are displayed in their original ASCII format.

When in SiRF Binary mode, the data being sent over the COM port is in binary format and therefore must be converted to ASCII text before it can be displayed in a useable format. This involves converting each binary message to hexadecimal text and adding a text tag to each message that explains what type of message it is.



Chars: Lists the number of characters captured to the buffer. The maximum amount of characters that can be stored to the buffer is approximately 64,000 characters. A "% full" indicator for the used buffer is provided for your convenience.

Capture: Begins capturing the data passing over the COM port and storing it to a buffer.

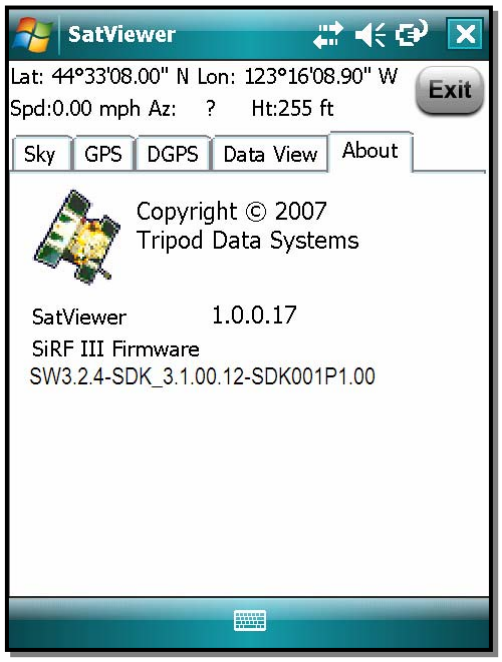
Stop: Stops capturing data and outputs the contents of the buffer to the screen.

Clear: Clears the buffer and any data listed on the screen.

View: Outputs the contents of the buffer to the screen while capturing data.

Save: Opens a new screen where the contents of the **Data View** screen can be saved to a file.

About Tab



The **About** page shows the SatViewer software version as well as the SiRF III firmware version, when connected to your Nomad GPS receiver.

Reference Materials

Nomad support (TDS):

E-mail: support@tdsway.com

Web site: www.tdsway.com. Click on Support/Downloads and select Nomad.

Accessories:

You can expand the Nomad handheld computer's capabilities by purchasing accessories. Go to www.tdsway.com/products/nomad/accessories.

NOTICE for TDS European Union Customers

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This product complies with international regulations for Restriction of Hazardous Substances Directive (RoHS)

Display images shown may vary slightly from actual display. Data and specifications are subject to change.

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