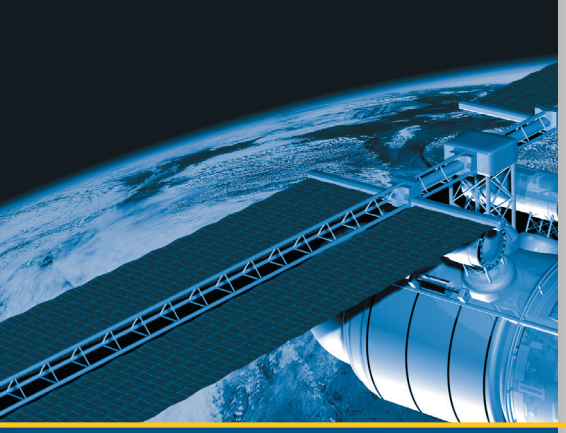

USER GUIDE

Trimble® GPS Studio Application

The right one.™

Trimble®

USER GUIDE

Trimble® GPS Studio Application

Version 1.01.20
Revision B
August 2011

Trimble

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This is the August 2011 release (Revision B) of the *Trimble GPS Studio Application User Guide*.

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CHAPTER

1

Introduction to Trimble GPS Studio

In this chapter:

- Features
- Technical assistance

The *Trimble GPS Studio Application User Guide* describes the Trimble® GPS Studio application, which you can use to configure GPS receivers. With a rich user interface and feature set, the Trimble GPS Studio has replaced earlier programs used for monitoring and interacting with Trimble Embedded Devices.

The application, which works with a serial connection, needs a virtual serial USB driver to work with the standard USB interface provided on GPS receiver starter kits.

Instructions for the virtual serial USB interface are included.

Features

Feature	Description
New Connection with Auto-Detect Receiver	Tests a GPS receiver port for protocol and baud rate so that you do not have to remember them when you connect the GPS Studio application to the GPS receiver.
Monitor	Shows time, velocity, position data, receiver mode and status, map functions, and an auto-query function to report satellite data, and more.
Receiver Configuration	Enables you to configure a receiver and save its configuration
Configurator.	Enables you to load, modify, and save receiver configurations and then apply them to additional receivers.
Data Logger	Logs the output of one or more GPS devices at the same time.
Data Converter	Converts logs from the data logger into formats used by other applications.
Generic Packets	Sends and views received raw data.
Flash Loader	Loads new firmware into the GPS receiver.

Technical assistance

If you have a problem and cannot find the information you need in the product documentation, contact the Trimble Technical Assistance Center at 800-767-4822 or email ctsupport@trimble.com.

CHAPTER

2

Downloading and Installing the Application

In this chapter:

- Downloading and installing the application
- Extracting the Trimble GPS Studio application
- Installing the FTDI USB Virtual COM port driver
- Connecting the starter kit to the computer
- Assigning the USB virtual COM port
- Disabling the Microsoft serial ballpoint driver

This chapter describes how to install software and hardware needed for the Trimble GPS Studio application, and how to connect the Starter Kit to your computer.

Downloading and installing the application

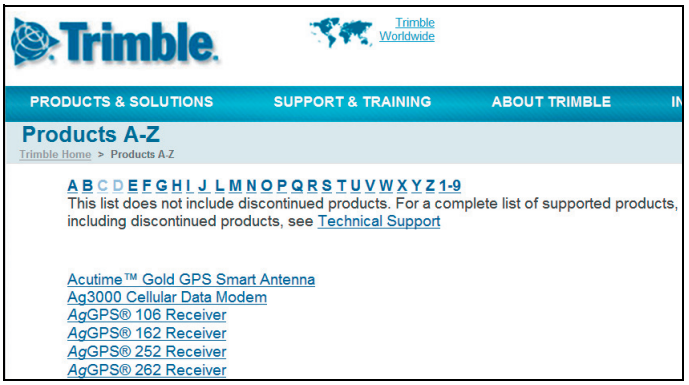
Requirements

You need the following:

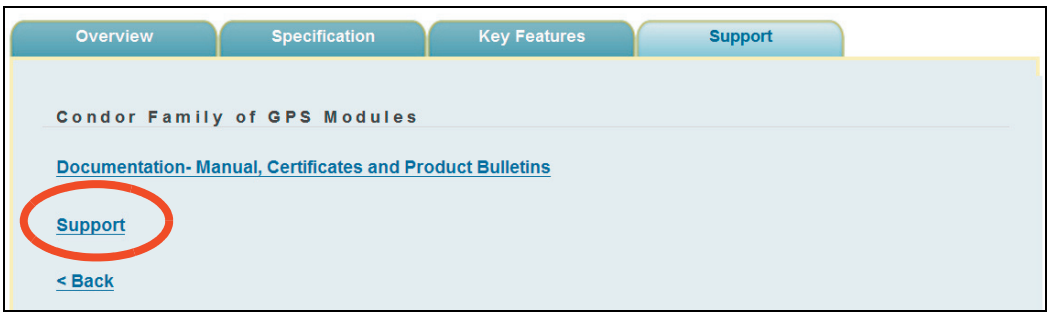
- A computer running one of the following Microsoft® operating systems:
  - Windows® 7
  - Windows Vista®
  - Windows XP with Service Pack 3
- A free USB port on the computer
- Internet access

Downloading the application

1. Go to the Trimble Support website at http://www.trimble.com/support.shtml.
2. In the *Support A-Z* screen, scroll to and then click the GPS receiver that is included in your starter kit, for example the Condor Family of GPS Modules or the Copernicus® II.



3. Click the *Support* tab for the selected product.
4. In the *Support* tab, select the *Support link*.



The *Support* page shows all the software that is available for download.

5. Download the files you require and save them to a folder on the computer hard drive.
   - You ***must*** download:
     TrimbleStudio_vn-nn-nn.zip (where "vn-nn-nn" is the file version)
   - If you are not currently running the Windows 7 operating system, you ***may*** need:
     FTDI_USB-Serial_Driver.exe.

Extracting the Trimble GPS Studio application

1. Use Windows Explorer to browse to the TrimbleStudio_Vn-nn-nn.zip file you downloaded.
2. Extract the application to a location on the hard drive.

Note – *The directory you select will also become the initial default directory for logs and reports from the application.*

Installing the FTDI USB Virtual COM port driver

The starter kit uses a USB 2.0 dual serial port emulator interface chip from Future Technology Devices International (FTDI) Ltd. The GPS Studio application requires the FTDI driver.

- Installation is automatic if you are running the Windows 7 operating system, have granted Windows Update permissions, and are currently accessing the Internet. In this case, continue with the procedure described in Connecting the starter kit to the computer, page 8.

Note – *The Windows 7 operating system automatically connects to the Windows Update website and to install the latest WHQL" (Microsoft Windows Hardware Quality Labs) Certified Available driver for the USB-to-serial emulator interface chip from FTDI. This happens when you plug in the USB cable, as long as you have an available Internet connection and if your update settings are set to allow this.*

- If you are ***not*** running the Windows 7 operating system, you must manually install the driver that you downloaded from www.trimble.com. See below.

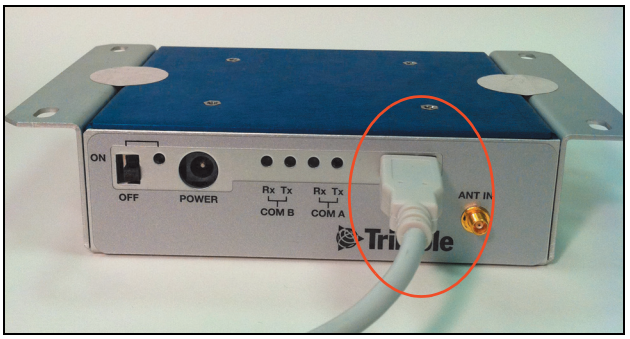
Note – *The latest driver is available as a setup executable from the FTDI website at http://www.ftdichip.com/Drivers/VCP.htm.*

Manually installing the driver

1. Use Windows Explorer to browse to the *FTDI_USB-Serial_Driver.exe* file you downloaded from the Trimble website (or the file from the FTDI website) and then double-click it.
2. The following message may appear: FTDI CDM Drivers have been successfully installed. Click **OK**.
3. Save any open files, close open programs and then click **Restart Now**.

Connecting the starter kit to the computer

1. Connect one end of the USB cable (supplied) to the USB connector on the Starter Kit:



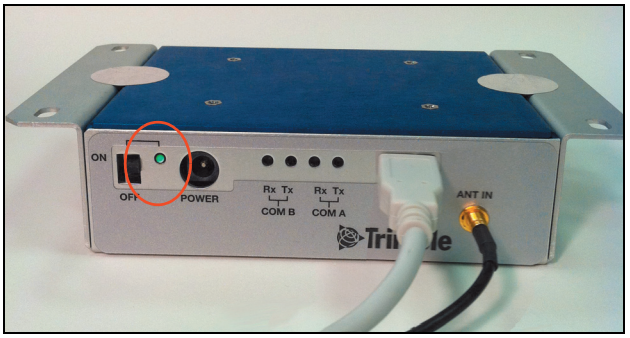
2. Connect the other end of the USB cable to your computer. The USB cable now supplies power to the unit.

Note – *Depending on the starter kit product and the antenna supplied with it, you may need to connect power supply to the power connector on the starter kit. (One or more power supply accessories may be supplied with the starter kit; accessories vary by GPS receiver product.)*

3. Connect the GPS antenna to the interface unit:

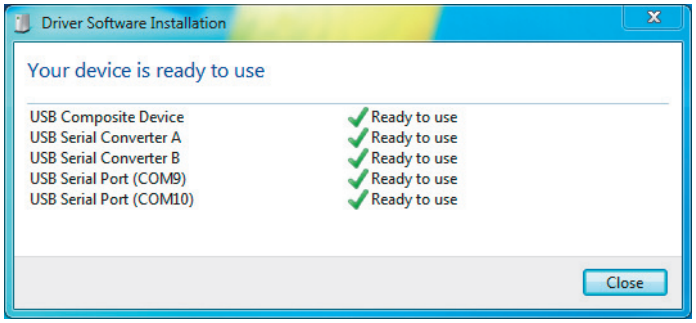
4. For the best GPS reception, place the antenna outside or near a window.
5. Optionally connect to the BNC connector on the rear of the interface unit for the PPS output:

6. Turn on the GPS Starter Kit (interface) unit. The power LED lights green.



Assigning the USB virtual COM port

After you have physically plugged in the USB connectors and turned on the Starter Kit, a dialog similar to the following appears on the desktop. It indicates that the FTDI driver has automatically assigned two virtual serial COM ports to the USB port. Click **Close**.

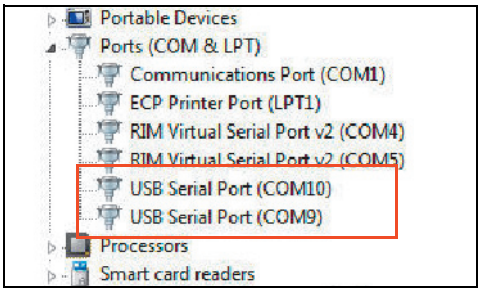


Note – *When you later need to select a COM port within the GPS Studio application, these two USB Serial Ports appear in the application for selection.*

Note – *If the Windows 7 operating system did not automatically install a driver for the USB-to-serial emulator interface chip from FTDI, you may need to install the driver manually. See* *Installing the FTDI USB Virtual COM port driver, page 7**.*

Viewing the assigned COM ports in Windows Device Manager

Expand the *Ports (COM & LPT)* node and then find the two USB Serial Port COM numbers; in this example, COM10 and COM9.

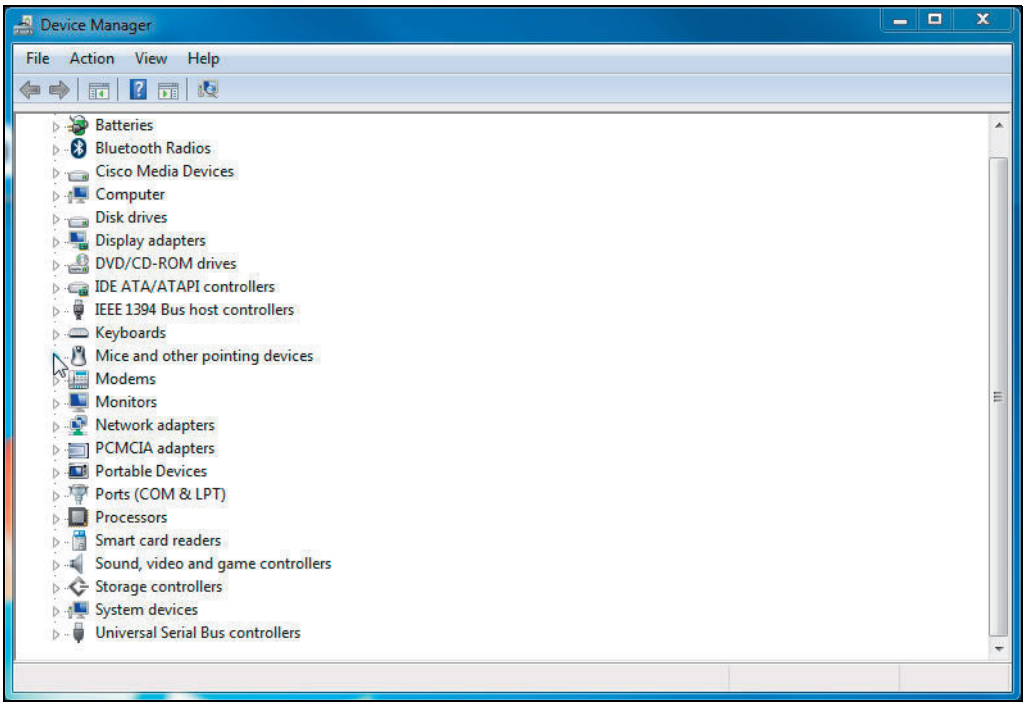


Note – *In general, the COM A port of the GPS device is the lower COM number; the COM B port is the higher number.*

Disabling the Microsoft serial ballpoint driver

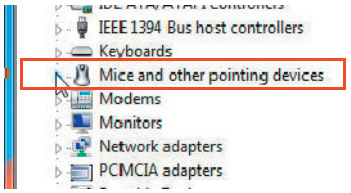
If the mouse pointer jumps around on the screen, check the system tray to see if the Microsoft serial ballpoint (mouse pointer) device has been enabled. If this is the case, do the following to disable it:

1. Turn off the Starter Kit to stop the pointer jumping.
2. On the computer, open the *Device Manager*:

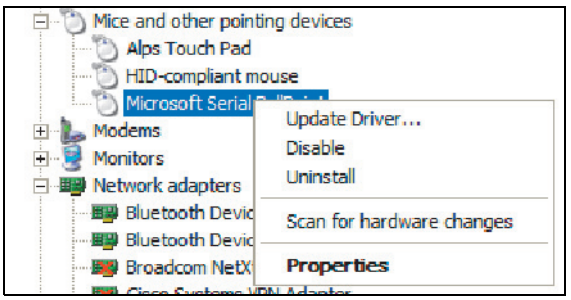


Note – *In the Windows 7 Start menu, enter* **Device Manager** *in the Search field and then select it from the results list under the Control Panel heading.*

3. Expand the *Mice and other pointing devices* node.



4. If *Microsoft Serial BallPoint* is listed, right-click it and then select *Disable*.



5. Turn on the starter kit.

CHAPTER

3

Running the Application

In this chapter:

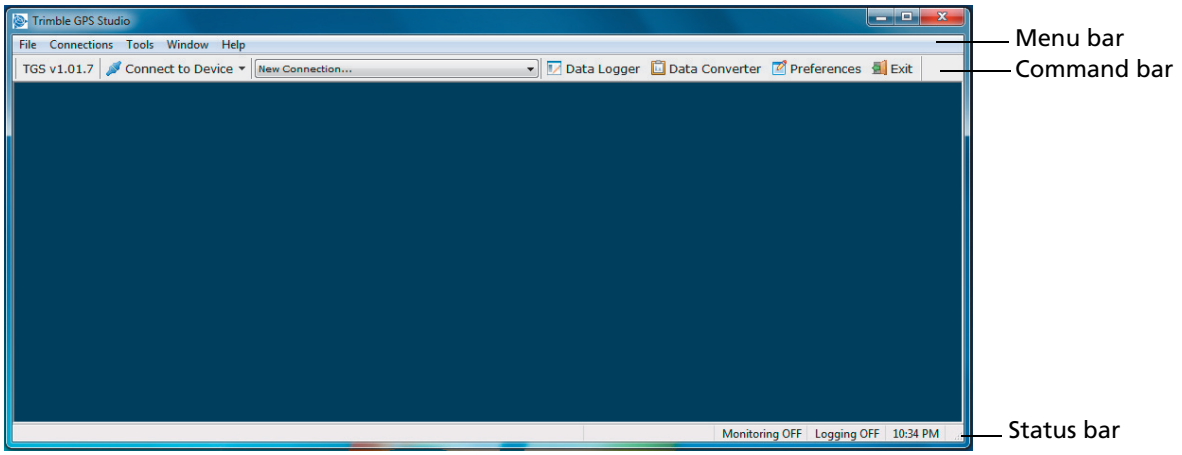
- Starting the Trimble GPS Studio application
- Trimble GPS Studio screen
- Connecting the Trimble GPS Studio application to the GPS receiver
- Monitor screen

This chapter describes how to start the Trimble GPS Studio application and how to connect to the Starter Kit from the application. It also includes overview descriptions of the *Trimble GPS Studio* window and the *Monitor* window.

Starting the Trimble GPS Studio application

Double-click the icon in the folder where the application is stored.

Trimble GPS Studio screen



Note – *Additional windows appear within the main Trimble GPS Studio window if you leave them open when you exit the application.*

Menu bar

Select ...	To access ...
File	Preferences and Exit
Connections	New Connection, Auto-Detect, Refresh Com List, and Device Manager
Tools	Data Logger, Data Converter, Flash Loader, and Configurator
Window	Window functions and a list of the open windows ***Note –*** *By selecting an open window this is brought into view.*
Help	Current release information

Command bar

Click ...	To ...
Version number	Open the *About* screen.
Connect to Device drop-down list	View the list of devices that you can connect to. Click an item on the list to select it.
New Connection drop-down list	View a list of connection features and COM ports. Click an item on the list to select it. ***Note –*** *This is the featured method for connection used in the user guide.*
Data Logger	Log raw data from one or more connected devices.
Data Converter	Convert logged raw data to various formats

Click ...	To ...
Preferences	Configure various program settings.
Exit	Exit the Trimble GPS Studio application

Status bar

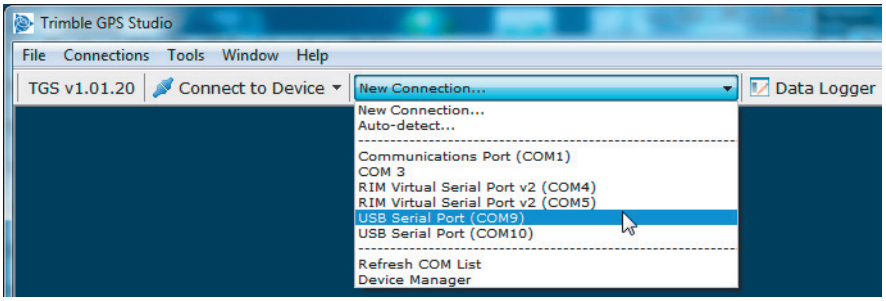
This contains the following display-only status items:

Status item	Options
Monitoring	ON or OFF.
Logging	ON or OFF.
Time	Hours, minutes; AM or PM

Connecting the Trimble GPS Studio application to the GPS receiver

The *New Connection* feature enables you to connect to the GPS receiver and provides auto-detection of baud rates, parity, data bits, and stop bits settings.

1. Click **New Connection...▼** and then select the required USB Serial Port (in this example, *USB Serial Port (COM 9)*) from the drop-down list:

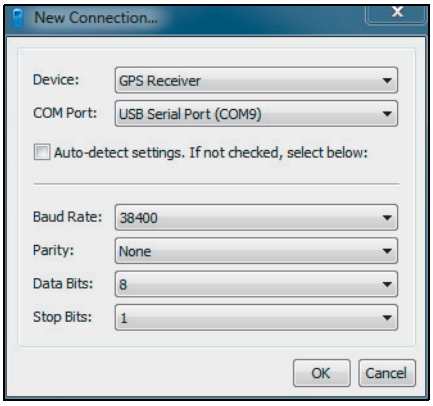


Note – *If you know which port serves a particular protocol, select the port for the protocol you want.*

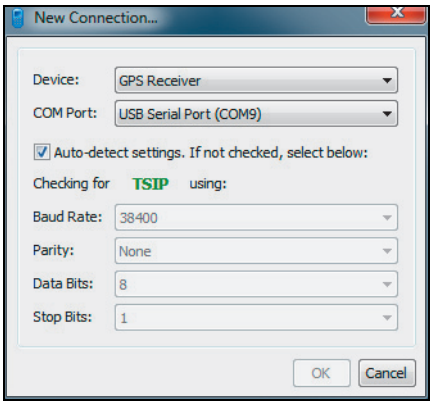
Note – *If you do not see the COM ports for the GPS receiver in the list, refresh the list as follows:*

1. *Select New Connections / Refresh COM List.*
2. *Click the information screen to close it.*
3. *If it is open, close the New Connection screen.*
4. *Click* ***New Connection... ▼*** *again. The COM port should now appear in the list.*

The *New Connection* dialog appears:

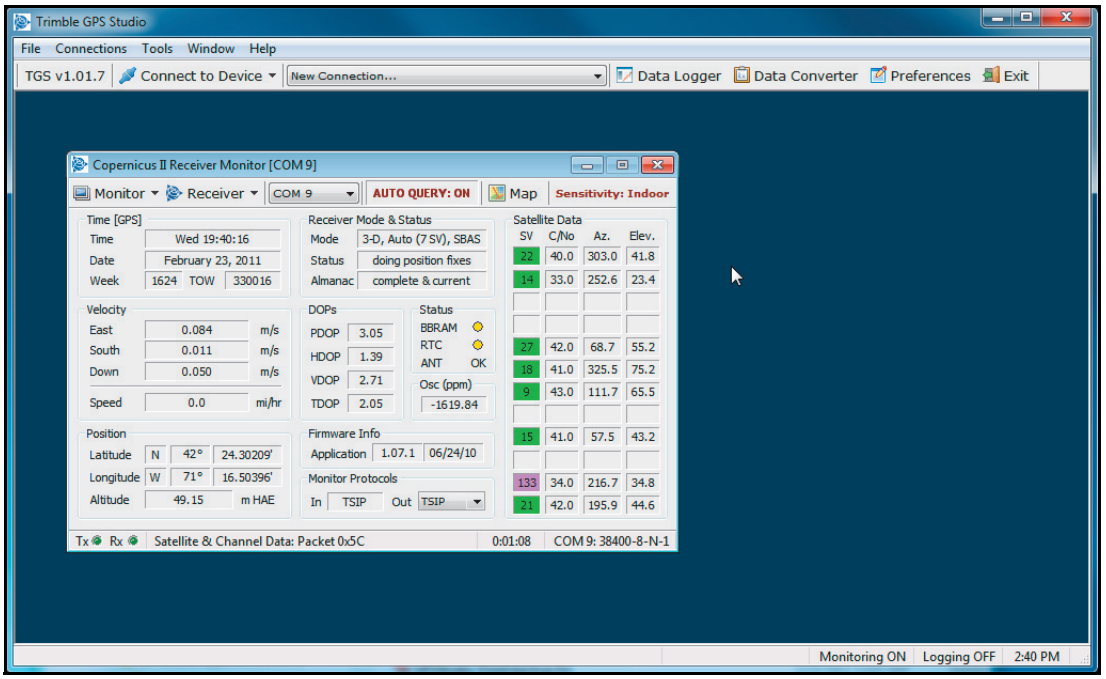


2. Select the *Auto-detect settings* check box. The Trimble GPS Studio application now auto-detects baud rate and other settings in turn for each protocol. A message Checking for <PROTOCOL> using appears on screen to show the auto-detect status:

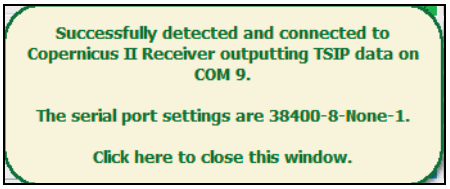


Note – *If you clear the check box, only the settings selected in the bottom half of the dialog (for Baud Rate, Parity, Data Bits, and Stop Bits) are used.*

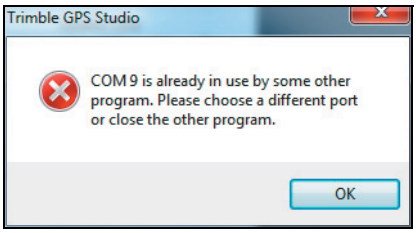
3. Click **OK**. The *Monitor* screen appears:



- If the receiver ***is*** detected, data appears in the *Monitor* screen, and a message screen appears. Click the message screen to close it:



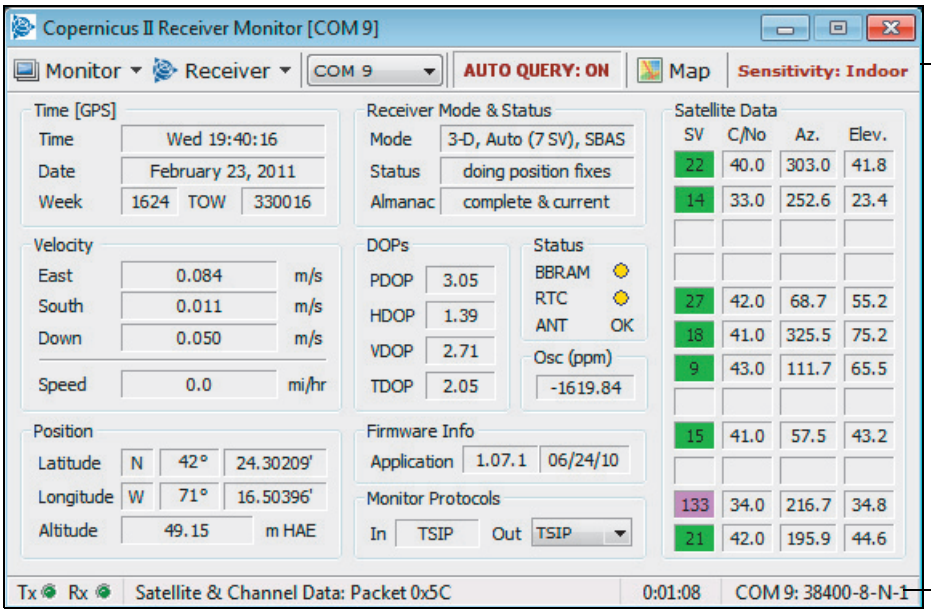
- If the receiver is ***not*** detected, an error message appears. You can try to resolve the issue by doing the following:



  - If you cleared the *Auto-detect settings* check box, select it and then try again.
  - Select another COM port and then try again.
  - Refresh the COM port list, see page 15.
  - Use the On / Off switch to turn off the starter kit and then turn it on again.

Monitor screen

The *Monitor* screen indicates that the Trimble GPS Studio application is connected to the GPS receiver; use it to monitor the receiver performance.

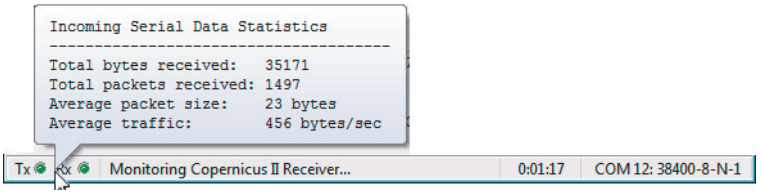


Command bar

Click ...	To ...
Monitor drop-down list	Access a menu that includes raw data, GPS receiver, and GPS system information.
Receiver drop-down list	Access a menu that includes GPS receiver configuration and reset options.
Port drop-down list	Select the appropriate port. When you select a port from the list, the *Port Settings* dialog appears.
Auto Query (ON or OFF)	Click, if ON, to request additional information from the GPS receiver (this information is not automatically sent by the receiver).
Map	Open the *Position Map* window.
Sensitivity	Read-only field with either "Outdoor" or "Indoor" as value.

Status bar

This contains the following display-only status items:

Status item	Options
Tx	If blinking green, this means that the application is transmitting to the GPS receiver. Mouse over *Tx* to view the *Incoming Serial Data Statistics*: 
Rx	If blinking green, this means that the application is receiving from the GPS receiver.
Elapsed Time	The hours, minutes, and seconds that the application has been connected to the receiver.
Port	COM port settings

CHAPTER

4

Configuring the Receiver

In this chapter:

- Configuring the GPS port
- Configuring outputs
- Configuring PPS
- Configuring NMEA
- Completing the configuration

This chapter describes how to configure the GPS receiver. To do this, you will configure the GPS port, Outputs, PPS, and NMEA.

Note – *GPS modules from the Condor family have a limit of 8 "Saves" in the Configure Receiver screen. After this, you must reflash the device. See* *Using the Flash Loader application, page 39**.*

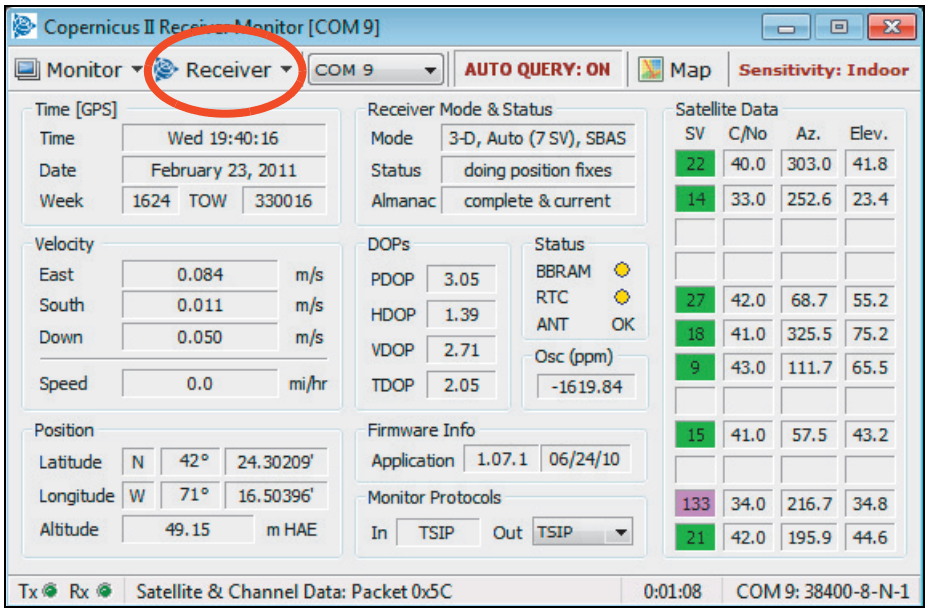
Note – *Change the settings that you require and then click* ***Set****. Only click* ***Save Configuration*** *when you are completely done.*

Note – *The options that are available from the Configure Receiver drop-down list depend on the device that is being configured.*

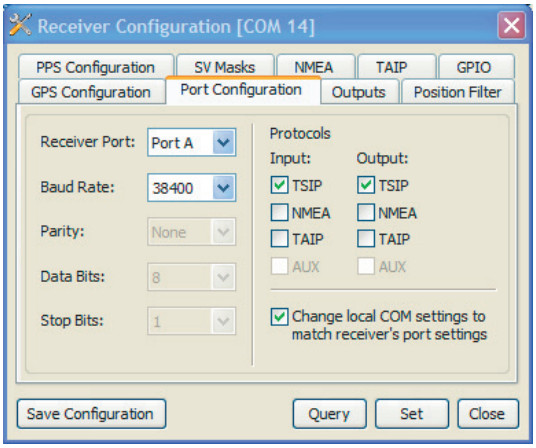
Configuring the GPS port

1. From the *Monitor* window, click **Receiver** and then select *Configure* from the drop-down list*:*

Note – *Options available within the Configure Receiver box depend on the device being configured.*



2. In the *Receiver Configuration* dialog, select the *Port Configuration* tab:



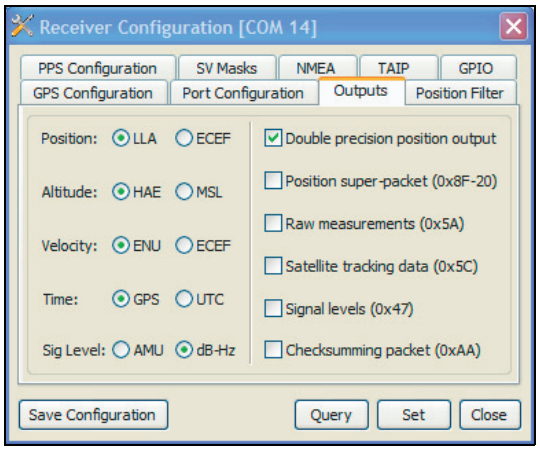
3. Select:
   - The required *Receiver Port*, *Baud Rate*, *Parity*, *Data Bits*, and *Stop Bits*.
   - One *Input* and one *Output* protocol.
4. Click **Set** to save the settings on this tab.

Note – *Do not click* ***Save Configuration*** *until you have completed changes on all tabs.*

5. Continue with Configuring outputs or go to Completing the configuration

Configuring outputs

1. In the *Receiver Configuration* dialog, select the *Outputs* tab:



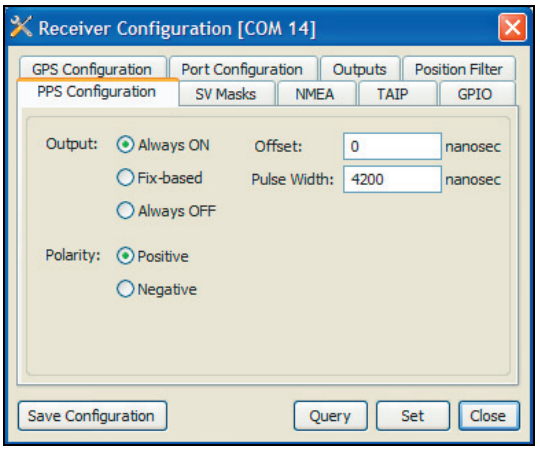
2. Select the required setup options.
3. Click **Set** to save the settings on this tab.

Note – *Do not click* ***Save Configuration*** *until you have completed changes on all tabs as needed.*

4. Continue with Configuring PPS or go to Completing the configuration.

Configuring PPS

1. In the *Receiver Configuration* dialog, select the *PPS Configuration* tab.:



2. Select an option from the *Output* list. The options are:
   - *Always ON*. PPS is present even without a GPS fix and will free-run until a fix is obtained.
   - *Fix-based*. The PPS is output only when the receiver has a fix.

– *Always OFF.*

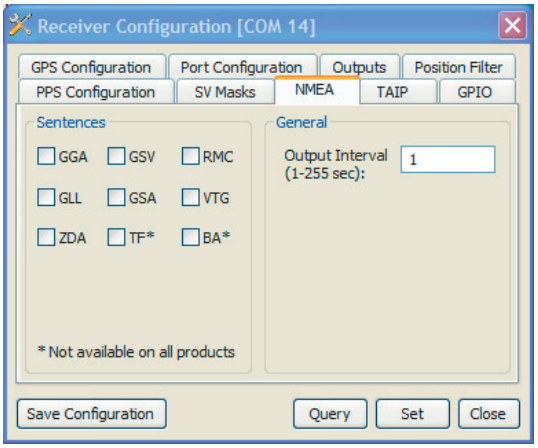
3. Enter values or select settings for additional fields as required. The parameters and settings in this step are determined by the receiver being configured:.
   – Enter a value in the *Offset* field (units are in nanoseconds).
   – Enter a value in the *Pulse Width* field (units are in nanoseconds).
   – Select an option in the *Polarity* field (positive or negative).
4. Click **Set** to save the settings on this tab.

Note – *Do not click* ***Save Configuration*** *until you have completed changes on all tabs as needed.*

5. Continue with Configuring NMEA or go to Completing the configuration

Configuring NMEA

1. In the *Receiver Configuration* dialog, select the *NMEA* tab:



2. Select the required setup options:
   – *Sentences:* Select one or more NMEA messages. The options are:

Message	Description
GGA	GPS fix data
GSV	GPS satellites in view
RMC	Recommended minimum specific GPS/Transit data
GLL	Geographic position - Latitude/Longitude
GSA	GPS DOP and active satellites
VTG	Track made good and ground speed
ZDA	Time and date
TF[1]	Receiver status and position fix
BA[1]	Antenna status
GST[1]	GPS Pseudo-range noise statistics
CHN[1]	GPS channel status

[1]Not available on all products

- *General*: Enter an integer (between 1 and 255) to represent the output interval in seconds.

3. Click **Set** to save the settings on this tab.

Note – *Do not click* ***Save Configuration*** *until you have completed changes on all tabs as needed.*

4. If required, you can now click any other tab to set additional parameters or go to Completing the configuration.

Completing the configuration

1. Once you have made all changes, in the last tab click **Set** and then click **Save Configuration**.

Note – *GPS modules from the Condor family have a limit of 8 "Saves" in the Configure Receiver screen. After this, you must reflash the device. See* *Using the Flash Loader application, page 39**.*

2. Click **Close** to close the *Configure Receiver* dialog.

CHAPTER

5

Using the Core Tools

In this chapter:

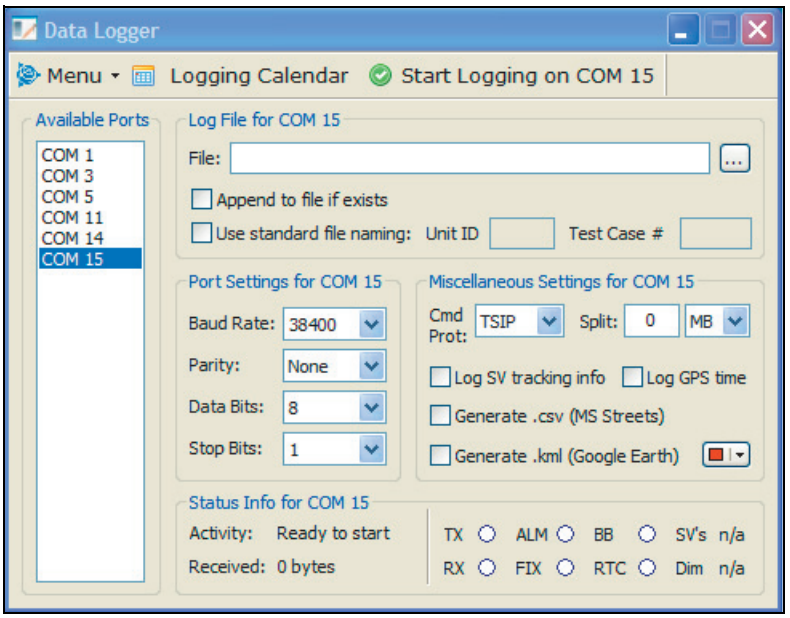
- Logging the GPS receiver output
- Converting output logs
- Sending raw data to the receiver
- Managing configurations
- Using the Flash Loader application

This chapter describes how to use the core tools of the Trimble GPS Studio application.

These tools are useful for a range of activities including debugging, testing new commands, systematically configuring GPS receivers, and updating receiver firmware.

Logging the GPS receiver output

1. In the command bar of the main *Trimble GPS Studio* screen, click **Data Logger**:



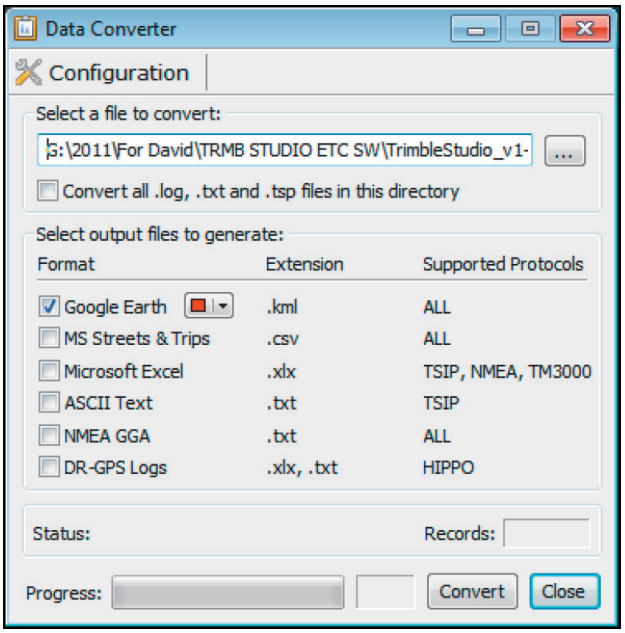
2. From the *Available Ports* list, select the COM port that connects to your device.
3. In the *Log File* field, enter a filename and path or click the **Browse** button to select the path.
4. If appropriate, select the *Use standard file naming* check box and then complete the *Unit ID* and *Test Case #* fields.
5. Select the correct protocol and logging options.
6. Click **Start Logging**.

Note – *If you are working with more than one receiver, you can create additional logs on the other available COM ports.*

Converting output logs

It is sometimes useful to convert the files from the Data Logger into formats used by other applications, for example Google Earth or the Microsoft Excel® spreadsheet software:

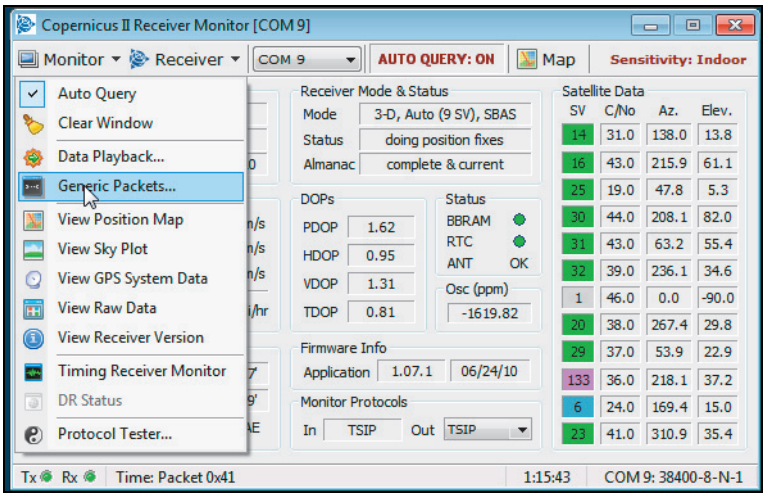
1. In the command bar of the main *Trimble GPS Studio* screen, click **Data Converter**:



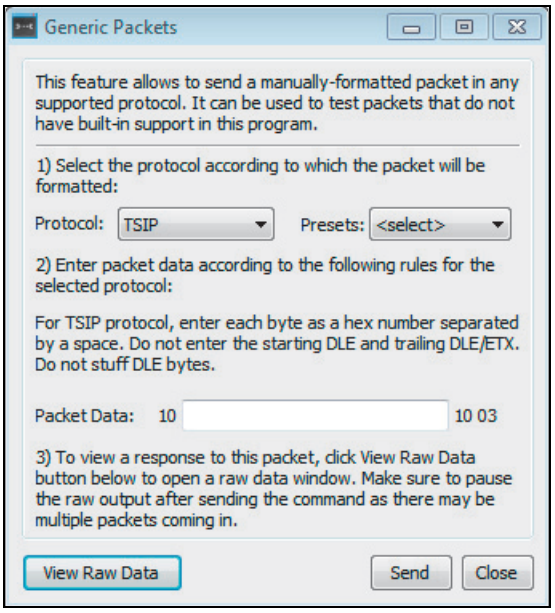
2. In the *Select a file to convert* field, browse to and then select the file that you want to convert.
3. In the *Select output files to generate* section, select the check box next to each type of output file that you want to generate.
4. Click **Convert**. The converted files appear in the source file directory.

Sending raw data to the receiver

1. In the *Monitor* screen, select *Monitor* / *Generic Packets*:

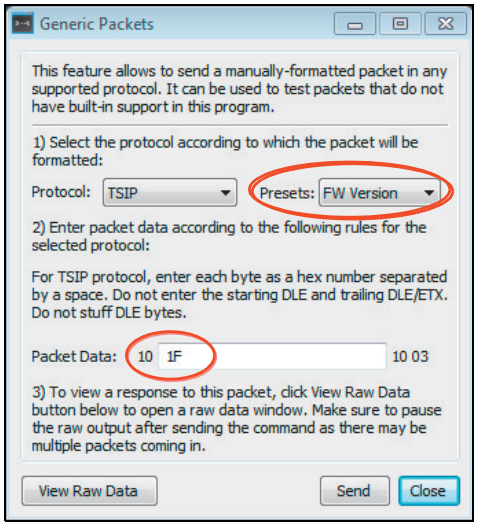


2. In the *Generic Packets* window, in the first section:



   - Select the required *Protocol* to use for sending the raw data from the drop-down list.
   - ***Optional***. Select an existing message from the *Presets* drop-down list. This message populates the *Packet Data* field (in the second section) with data in accordance with the selected protocol.

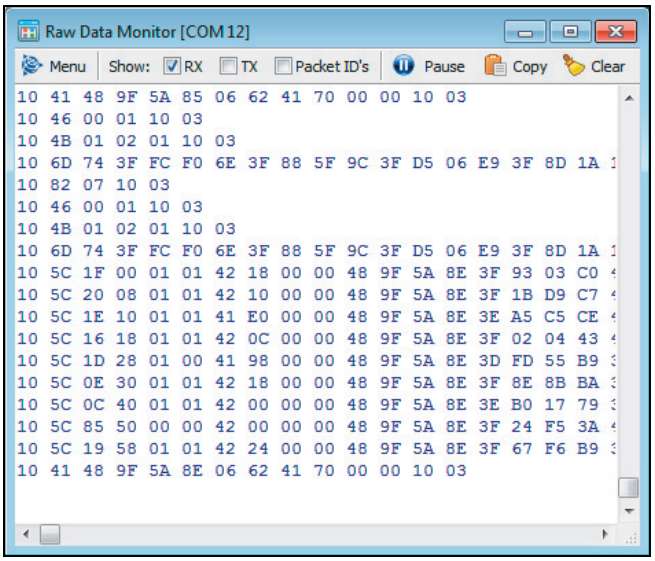
Tip – You can use *Presets* to see an example of how to enter a packet for the selected protocol. You can then edit the *Packet Data* field as required for your selected message.



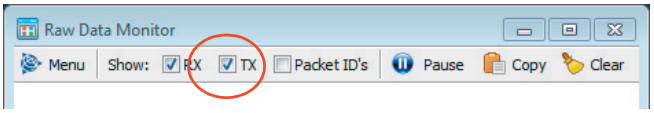
3. If you did not select a *Presets* message, enter your own data in the *Packet Data* field.

Note – *Enter the user data only, not the start and end bytes that appear to the left and right of the field.*

4. Click **View Raw Data**. This opens the *Raw Data Monitor* screen where you can view data from the GPS receiver—by default, only the *Show RX* check box is selected, meaning that the window displays only data received by the application from the GPS receiver:

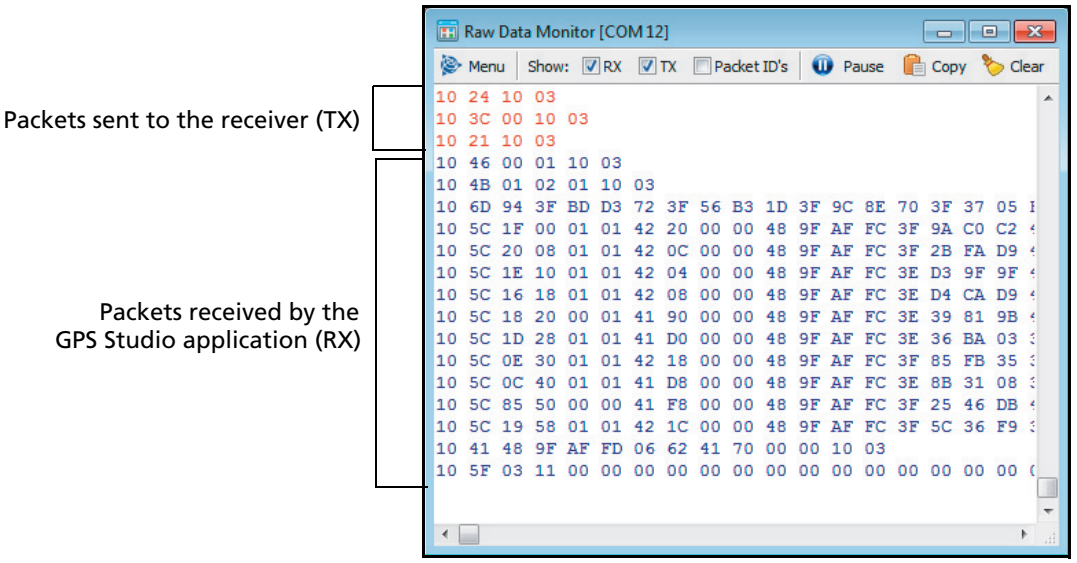


Note – *To also view data sent to the GPS receiver, select the TX check box. Sent data appears in red on the screen:*



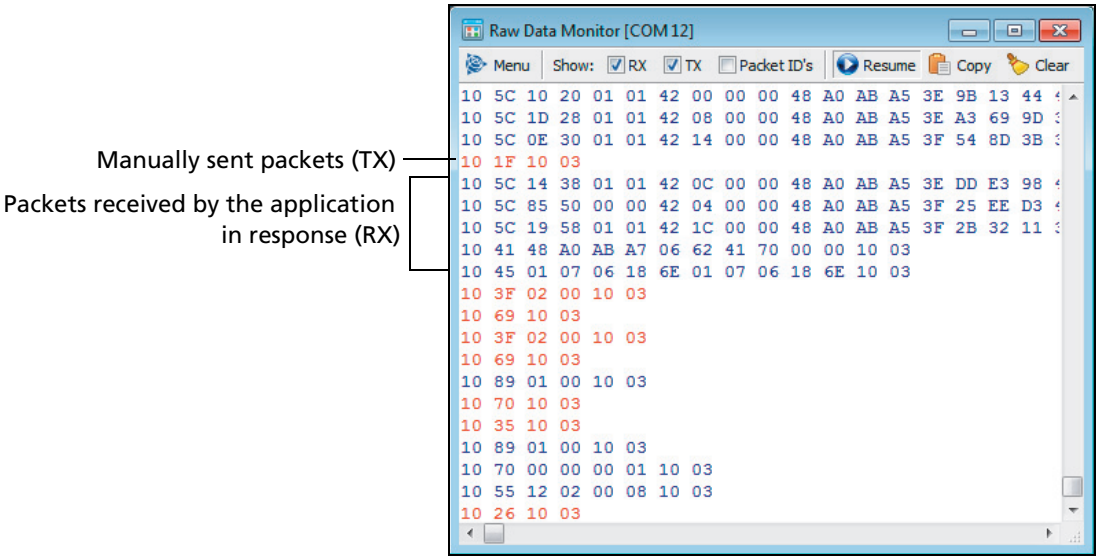
Note – *Depending on the GPS receiver and its setup—and whether the application GPS Studio has Auto Query set to ON—the Raw Data Monitor screen may immediately show data being received by the application.*

5. Press **Pause / Resume** as required so that you can examine the stream of data more easily:



6. To return to the *Generic Packets* window, close the screen.
7. To send the raw data to the receiver, in the *Generic Packets* window, click **Send**.

8. Click **View Raw Data** again—you can now see the packets that you specified for sending to the GPS receiver, and the packets returned in response:



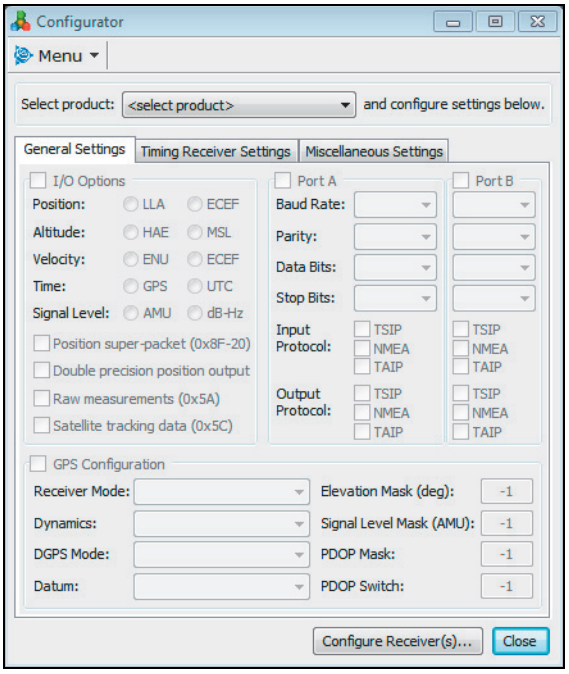
Note: *Red: Sent (by TGS) data; Blue: Received (from GPS module) data.*

9. Return to the *Generic Packets* screen and then click **Close**.

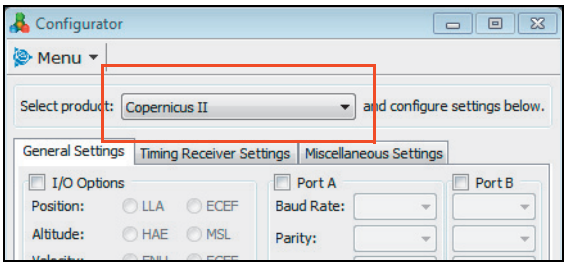
Managing configurations

You can load receiver configurations into the GPS Studio application's *Configurator* and then edit the settings if required (optional). After you have finalized a configuration, you can then save it to a file. You can open this file later and use it to configure one or more receivers.

1. From the menu bar of the main *Trimble GPS Studio* window, select *Tools / Configurator:*

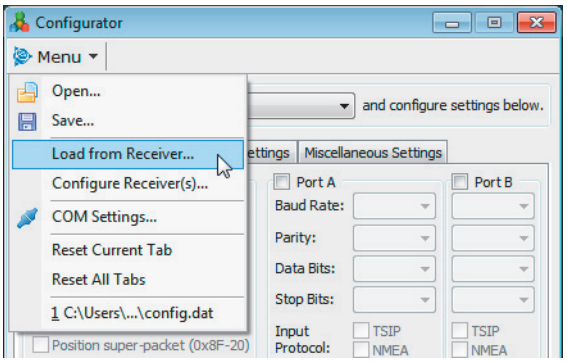


2. Select the product.

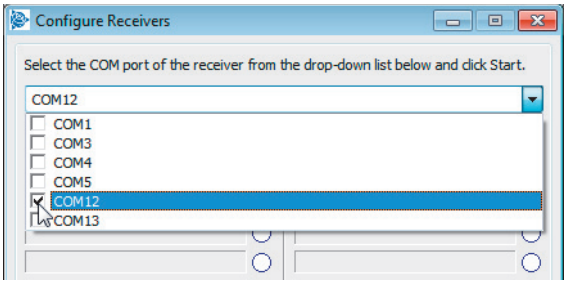


Loading the configuration from the receiver

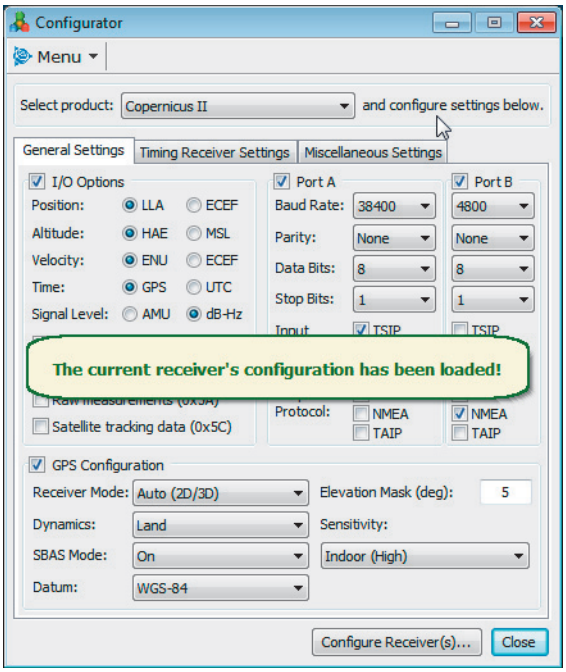
1. From the *Menu* drop-down list, select *Load from Receiver* to load the settings from the receiver into the Configurator:



2. In the *Configure Receivers* dialog, select the required COM port from the drop-down list and then click **Start**:

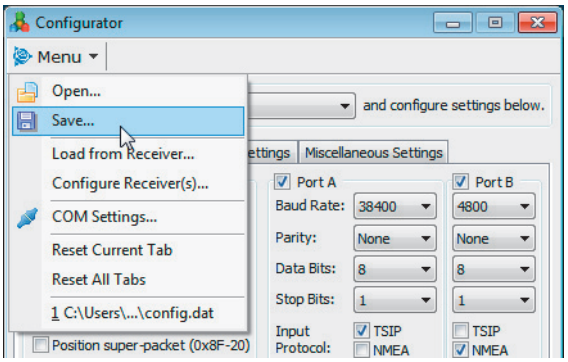


This loads the configuration into the *Configurator* dialog:

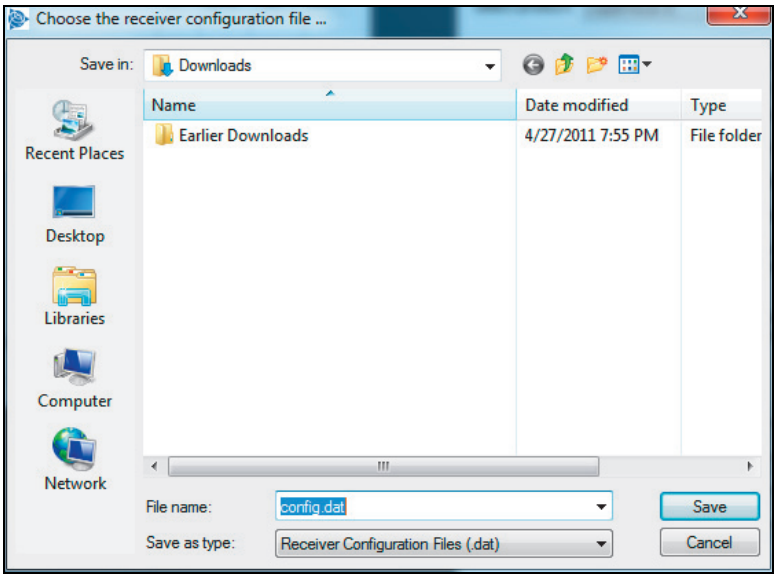


Saving a configuration file

1. From the *Menu* drop-down list, select *Save*:

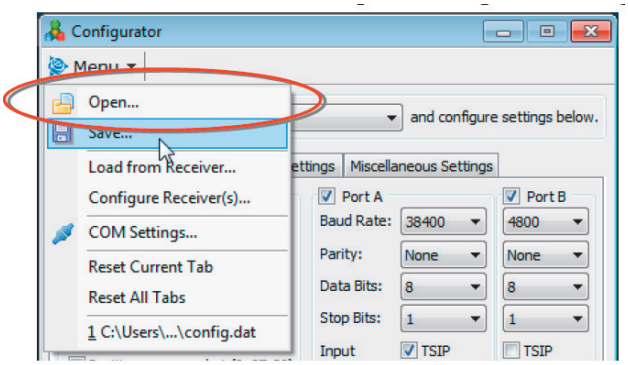


2. In the *Choose the receiver configuration file* dialog, browse to the required location, rename the file as appropriate and then click **Save**:

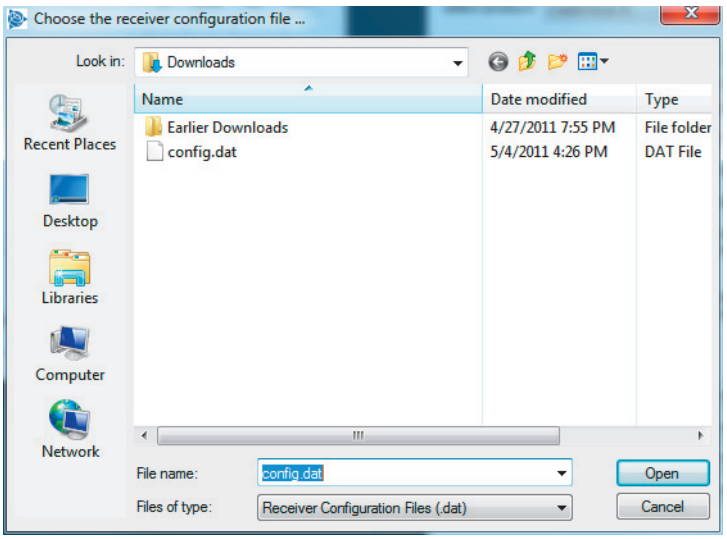


Opening a configuration file

1. From the *Menu* drop-down list, select *Open*:

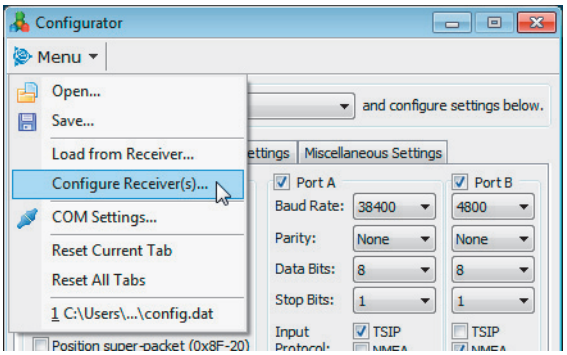


2. In the *Choose the receiver configuration file* dialog, browse to the required location, select the required file and then click **Open**:



Configuring receivers using the Configurator settings

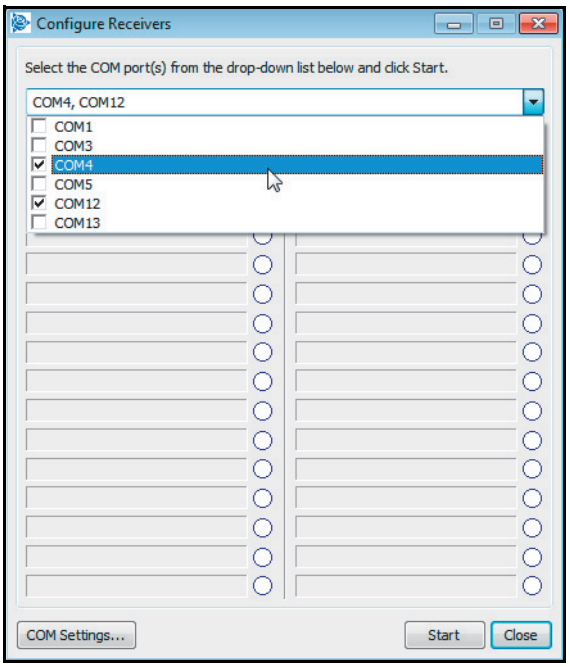
1. From the *Menu* drop-down list, select *Configure Receiver(s)*:



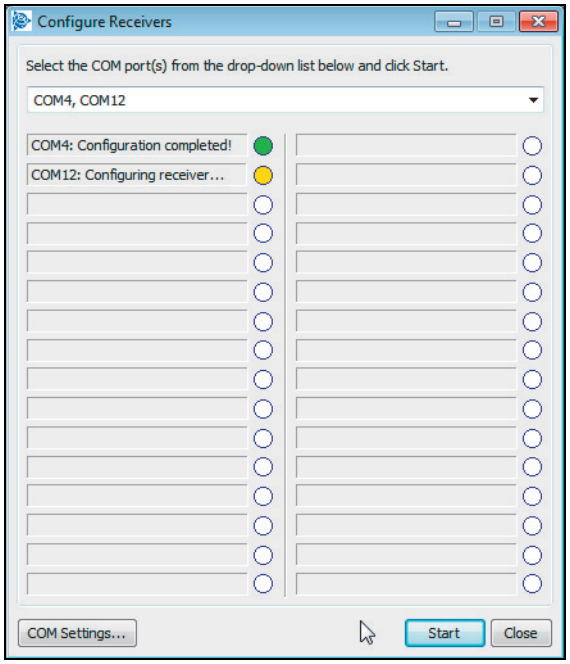
Note – *Alternatively, click* ***Configure Receiver(s)****.*

2. In the *Configure Receivers* dialog, select one or more COM ports from the top drop-down list and then click **Start**:

Note – *You would select multiple COM ports if you are working with more than one receiver.*



3. The receiver(s) are configured, and a message appears in the *Configure Receivers* window. Click **Close**:



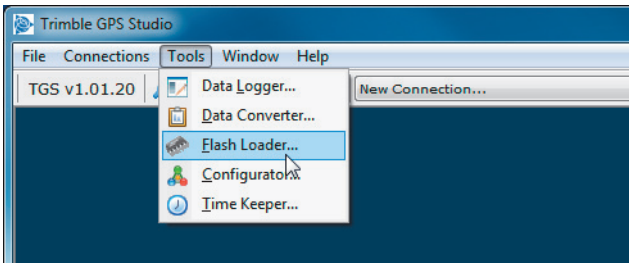
4. Click **Close** in the *Configurator* window.

Using the Flash Loader application

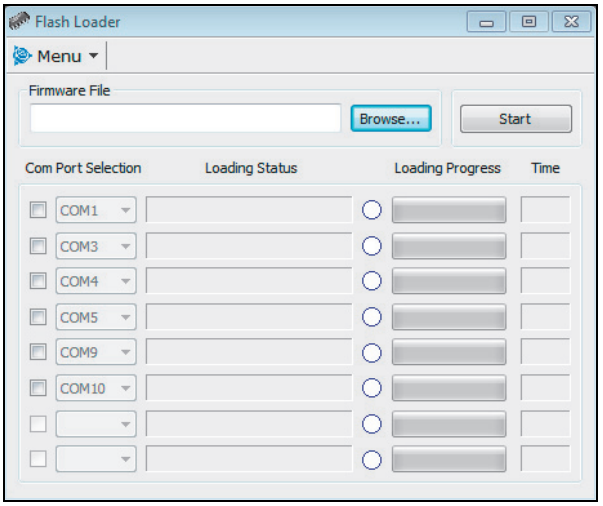
Use the Flash Loader application to load firmware onto the GPS receiver.

Tip – To use the Flash Loader, your computer must be physically connected to the GPS receiver.

1. Download and extract the new firmware.
2. From the main *Trimble GPS Studio* window, select *Tools / Flash Loader:*

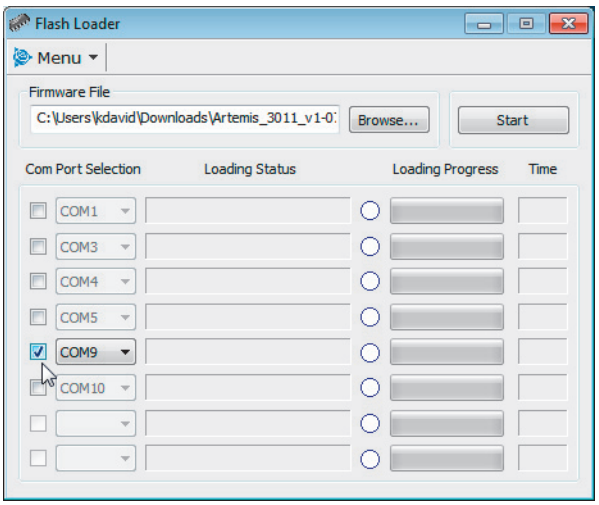


3. In the *Flash Loader* dialog, click **Browse**:



4. In the *Choose the firmware file* dialog, navigate to the required firmware file and then click **Open**.

5. In the *Com Port Selection* list, select the required communications port and then click **Start**:



The current firmware is erased and the new firmware is loaded.

6. When the firmware has been successfully loaded, close the *Flash Loader* window.

7. Turn the GPS receiver off and then turn it on again.

8. Connect to the GPS receiver, see Connecting the Trimble GPS Studio application to the GPS receiver, page 15.

   The new firmware version appears in the Monitor screen, in the *Firmware Info* section.

CHAPTER

6

Using the Position Map

In this chapter:

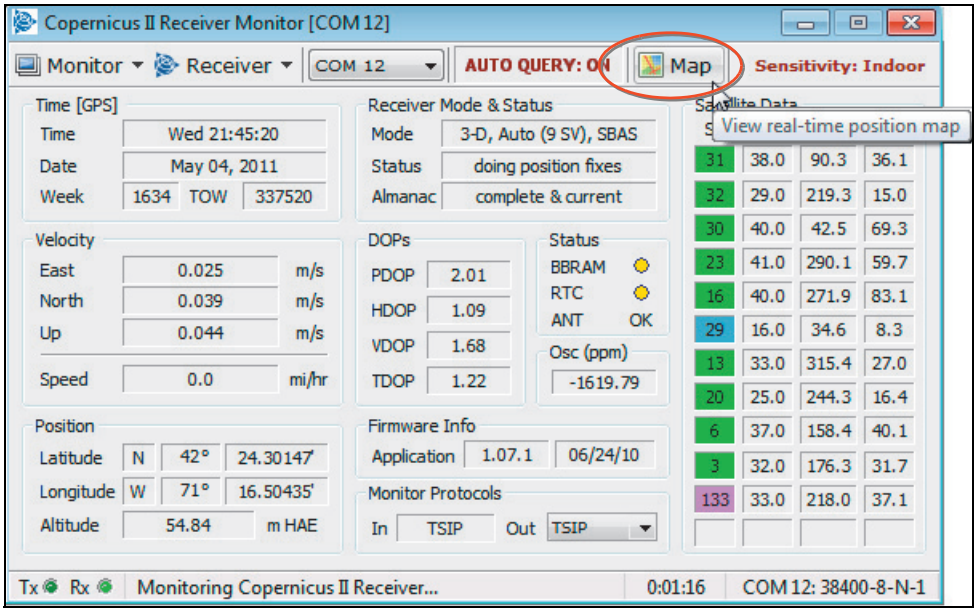
- Position Map tab
- Position Plot (Horizontal, 2D) tab

This chapter describes how to use the *Position Map* dialog, accessed from the *Monitor* window.

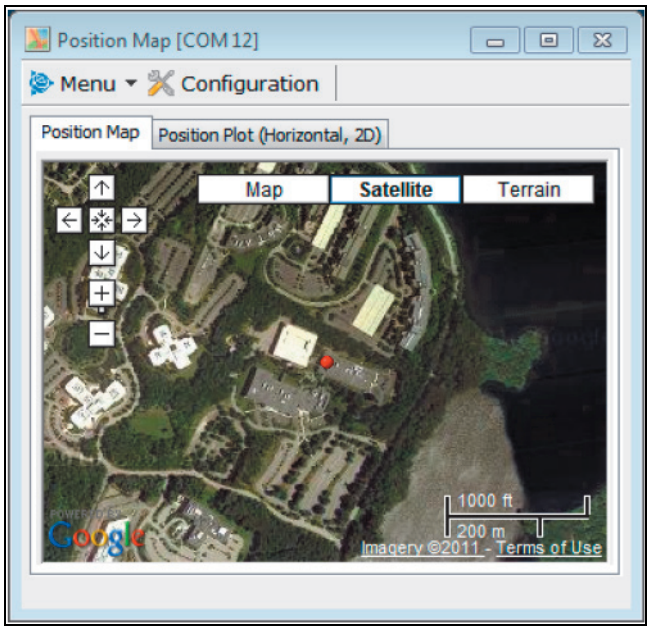
The *Position Map* dialog has two tabs: The *Position Map* tab, and the *Position Plot* tab.

Position Map tab

If you are connected to the Internet, the *Position Map* screen enables you to view Google Maps for your location in the *Position Map* tab. In the *Monitor* window, click **Map**:

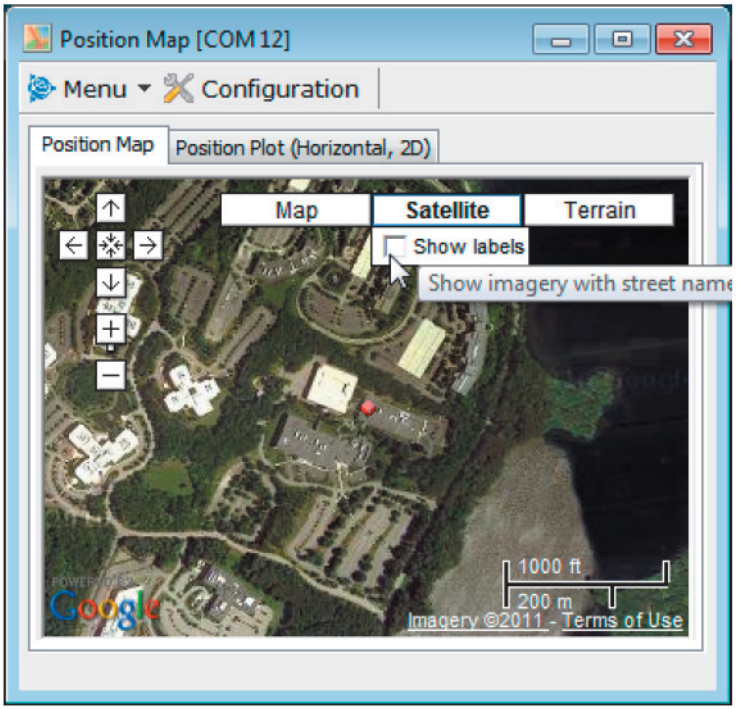


The *Position Map* screen opens, showing the *Position Map* tab—wait for Google Map data to load. The default view is the Satellite view, and the screen shows the usual Google Map controls:

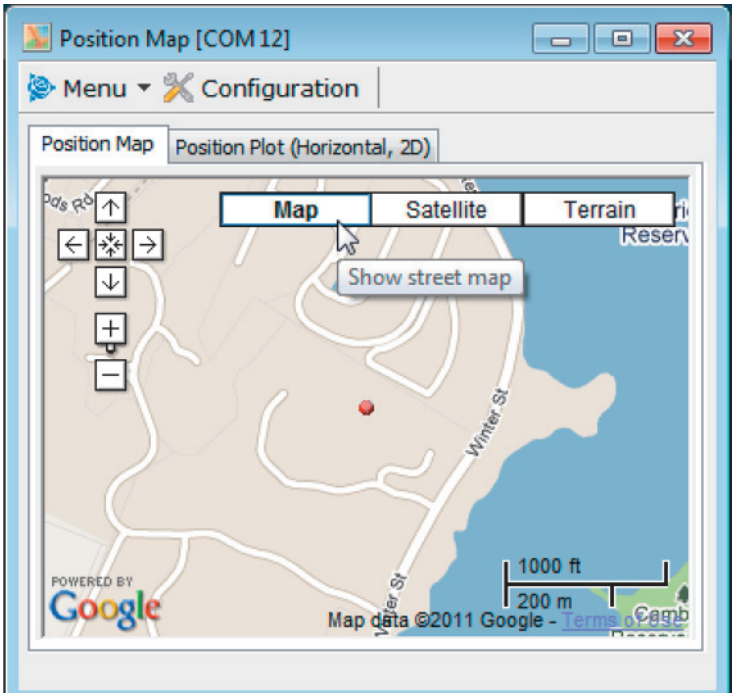


You can now do the following:

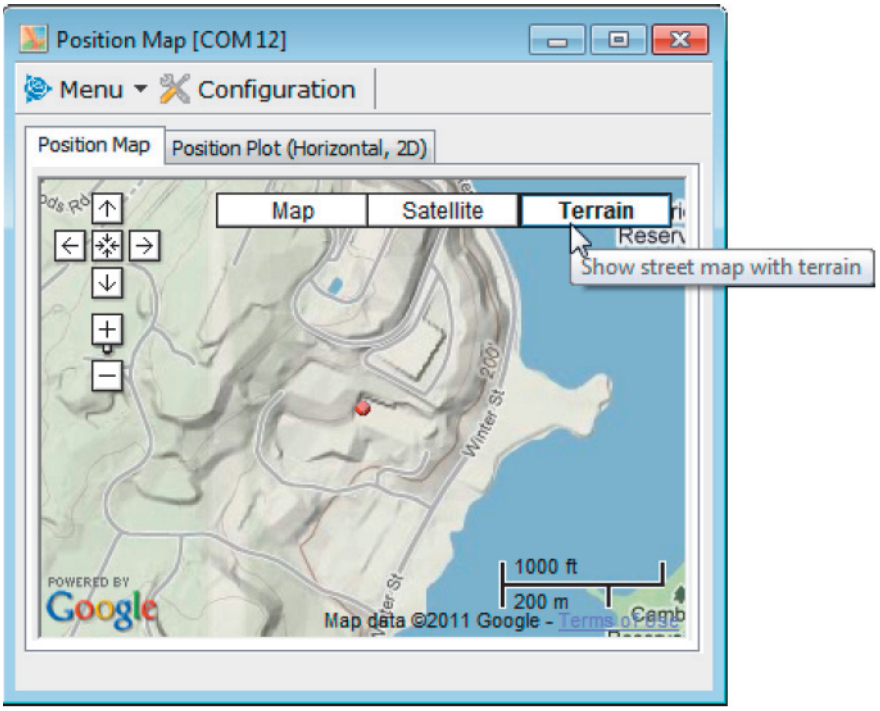
- Mouse over the **Satellite** button to see the *Show labels* check box. Select or clear this check box to turn overlay map labels on or off:



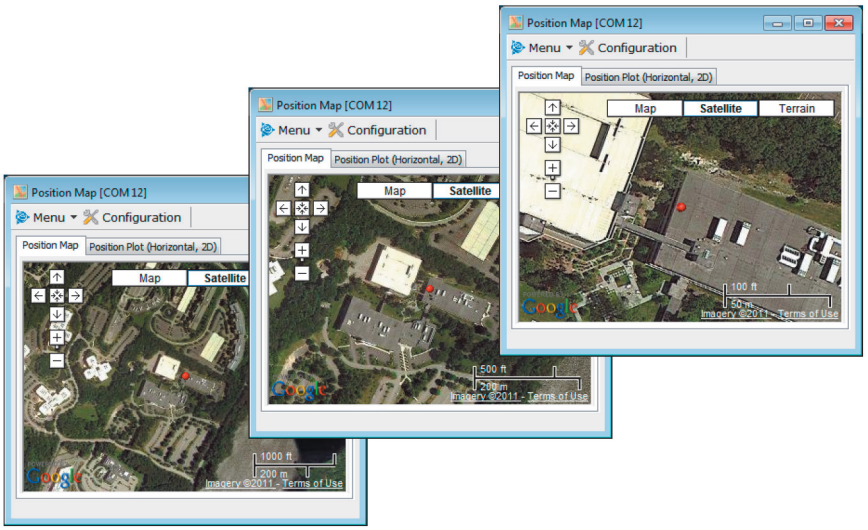
- Click **Map** to show the street map view:



- Click **Terrain** to show the terrain view:

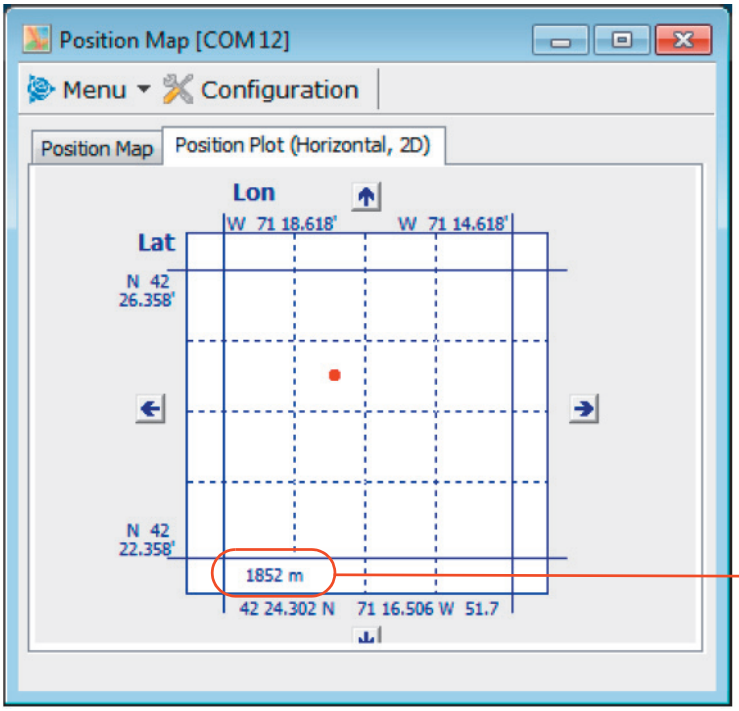


Tip – To use the screen features (such as *Zoom In, Zoom Out, Erase,* and *Measure Distance*), you can either use the screen controls, or select them from the *Menu* drop-down list. The following example shows how you can select a closer view by using the Zoom In feature:

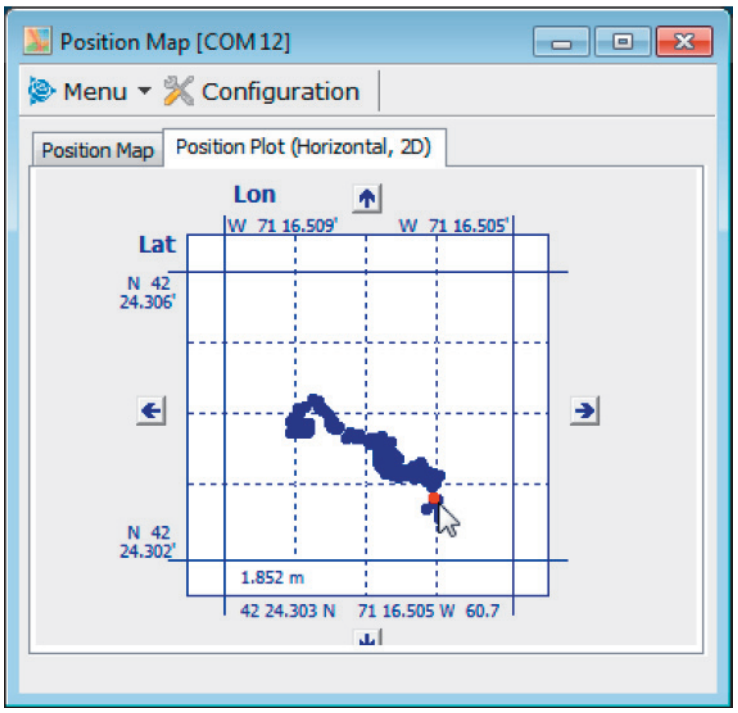


Position Plot (Horizontal, 2D) tab

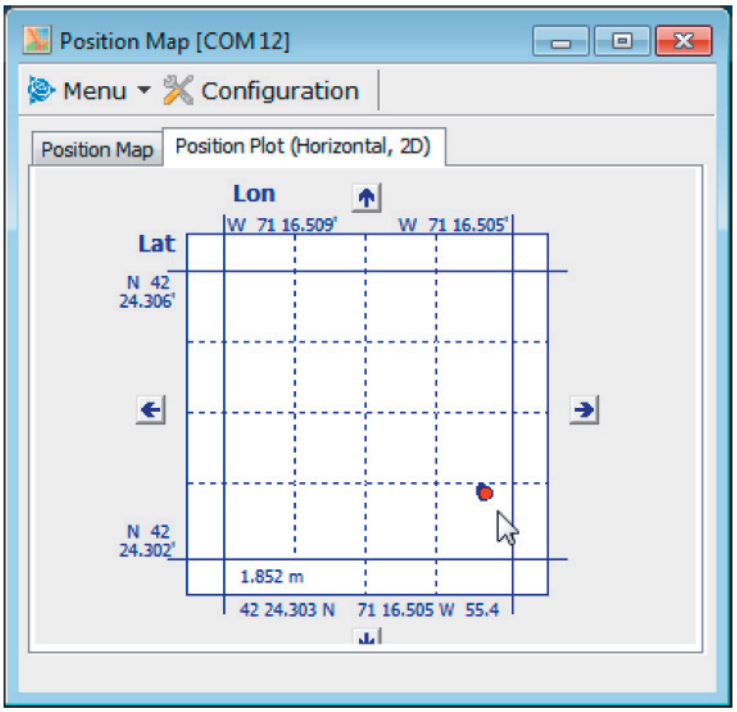
Click the *Position Plot (Horizontal, 2D)* tab:



Tip – To use the screen features (such as *Zoom In, Zoom Out,* and *Erase*), you can either use the screen controls, or select them from the *Menu* drop-down list. The following example shows the *Position Plot* tab using the *Zoom In* feature:



To erase the displayed plot, select *Menu / Erase:*



CHAPTER

7

Using GPS Studio With GPS Timing Receivers

In this chapter:

- Overview of GPS timing receivers
- Connecting the GPS Studio application to the GPS timing receiver
- Configuring the timing receiver

This chapter describes how to use the Trimble GPS Studio application with GPS timing receivers. It includes descriptions of the *Timing Receiver Status and Control* window and the *Timing Receiver Configuration* window.

Overview of GPS timing receivers

GPS timing receivers are high-performance receivers that have been specially adapted for timing applications. Trimble GPS timing receivers feature the Trimble improved signal processing code, a high-gain RF section for compatibility with standard active gain GPS antennas, and a CMOS level pulse-per-second (PPS) output for timing and synchronization applications. Timing applications are assumed to be static.

GPS timing receivers operate in two main modes:

- Self-survey mode (position fix operating mode, at startup)
- Overdetermined Clock mode (timing mode, after reference position fix)

The special timing software used with a timing receiver configures the unit into an automatic self survey mode at startup. The receiver will average position fixes for a specified time (one per second) and at the end of this period will save this reference location. The receiver then goes into an Overdetermined Clock mode, during which time the receiver no longer solves for position. Instead, it only solves for clock error and clock bias using all of the available satellites. This provides an accuracy of 15 ns RMS or better for the 1PPS output.

User settings such as port parameters and TSIP settings can be stored in the receiver's non-volatile (Flash) memory. These settings are retained without mains power.

Note – *When customizing port assignments or characteristics, confirm that any changes do not affect the ability to communicate with the receiver.*

Self-Survey mode

At power-on, the unit performs a self-survey by averaging position fixes. The default number for position fixes (2000) is configurable in the GPS Studio application.

The default mode during self-survey is 2D/3D Automatic, where the receiver must obtain a 3D solution. If fewer than four conforming satellites are visible, the unit suspends the self-survey. 3D mode may not be achieved when the receiver is subjected to frequent obscuration or when the geometry is poor due to an incomplete constellation.

Overdetermined Clock mode

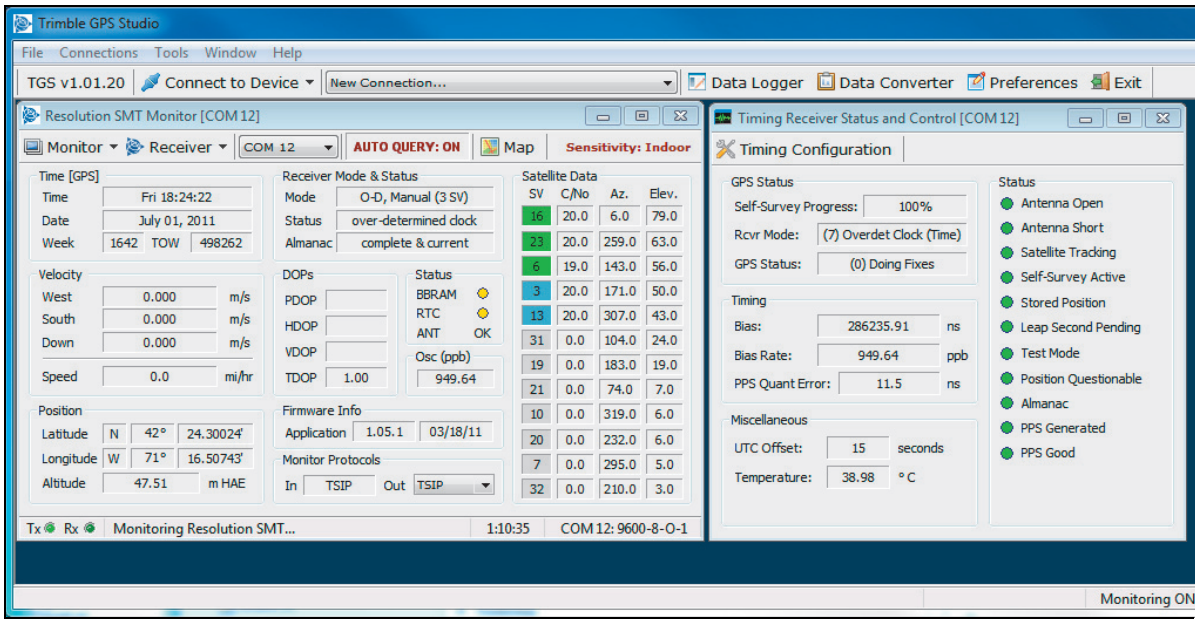
Overdetermined Clock mode is used only in stationary timing applications. This is the default mode for GPS timing receivers once a surveyed (or user-entered) position is determined. After the receiver self-surveys its static reference position, it automatically switches to Overdetermined Clock mode and determines the clock solution. The timing solution is qualified by a TRAIM algorithm, which automatically detects and rejects faulty satellites from the solution.

Connecting the GPS Studio application to the GPS timing receiver

The *New Connection* function enables you to connect to the GPS timing receiver, opening both the *Timing Receiver Status and Control* and the *Monitor* dialogs.

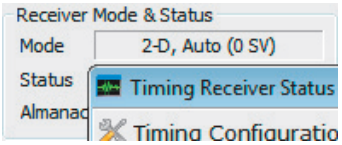
The *New Connection* function provides auto-detection of baud rates, parity, data bits, and stop bits settings.

To connect to the GPS receiver, see Connecting the Trimble GPS Studio application to the GPS receiver, page 15:



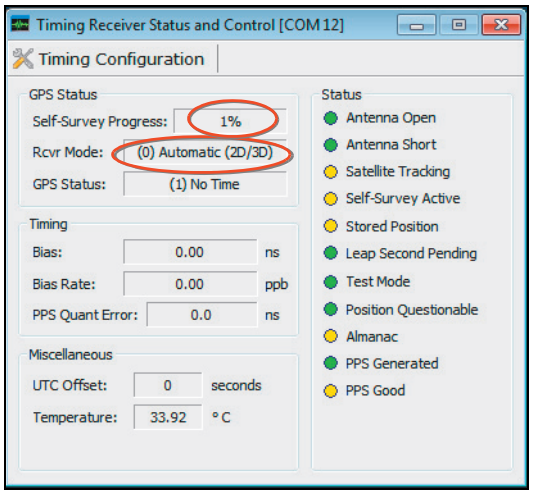
The Trimble GPS Studio application is now connected to the GPS timing receiver. You can use the application to configure and monitor the performance of the GPS timing receiver.

Note – *In the Monitor window, notice the Receiver Mode & Status section in the upper middle. After self-survey, the Mode will be "O-D only" (initially, it may be "2D, Auto" then "3-D, Auto").*

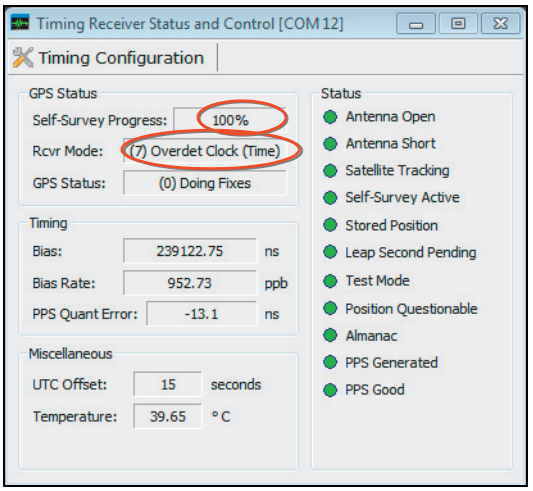


Timing Receiver Status and Control dialog

The *Timing Receiver Status and Control* dialog displays key GPS status information and status alerts that change during a self-survey of position fixes:



Self-survey in progress



Self-survey completed

The screen shows the following information:

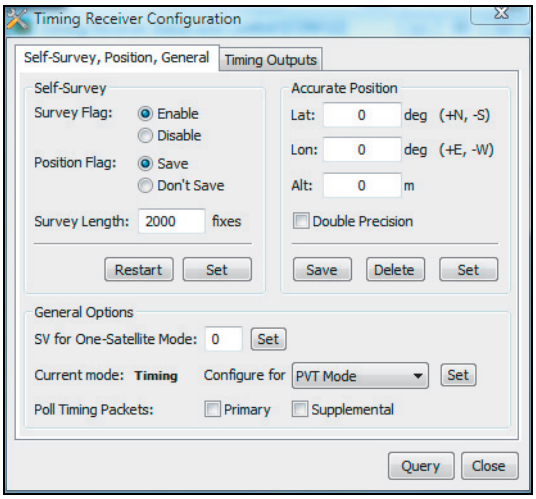
Element	Description
Timing Configuration	Click to open the *Timing Receiver Configuration* dialog.
GPS Status	The options are: • *Self-Survey Progress*: Shows the percentage of GPS fixes collected so far during the self-survey process. (Percentage of total fixes in the T*iming Receiver Configuration* dialog's *Survey Length* field.) It shows 100% when a self-survey has been completed. • *Rcvr Mode:* Shows the fix mode the GPS timing receiver is currently configured for. GPS timing receivers spend most of their time in the Overdetermined Clock ("O-D time only") mode, in which they use all available satellites to perform the best time-only fix possible. • *GPS Status*: "(0) Doing Fixes", "(1) No Time".
Timing	• *Bias:* In ns. • *Bias Rate:* In ppb. • *PPS Quant Error:* In ns.
Miscellaneous	• *UTC Offset*: In seconds. • *Temperature*

Element	Description
Status indicators	The status indicators are user alerts. They do not necessarily indicate impaired function. • *Antenna Open:* If this indicator is yellow, the antenna input connection is open, that is, not drawing sufficient current. Normally, GPS timing receivers provide power to the antenna's LNA (Low Noise Amplifier) through the center conductor of the antenna cable. On-board circuitry senses this current draw, and if it is low, this indicator is yellow. If the antenna is powered elsewhere (for example, when using a splitter) the antenna open condition is expected. This does not imply a fault condition, and does not impair operation. • *Antenna Short:* If this indicator is yellow, the antenna input is shorted (drawing too much current). • *Satellite Tracking:* If this indicator is yellow, no satellites are usable yet. For a satellite to be usable, it must be tracked long enough to obtain ephemeris and health data. • *Self-Survey Active:* If this indicator is yellow, a self-survey procedure is in progress. • *Stored Position:* If this indicator is yellow, no position is stored in Flash ROM. • *Leap Second Pending:* If this indicator is yellow, the GPS system has alerted the timing receiver that a leap second transition is pending. • *Test Mode:* If this indicator is yellow, the timing receiver unit is operating in one of its test modes. • *Position Questionable:* If this indicator is yellow, the accuracy of the position used for time-only fixes is questionable. It may mean that the unit has been moved since it last completed a self-survey procedure. If this alarm persists, restart the self-survey of the unit. See Configuring the timing receiver, page 52. • *Almanac:* If this indicator is yellow,means the Almanac is not current or complete. • *PPS Generated:* If this indicator is yellow, the PPS was not generated this second. This could mean that there were not enough usable satellites to generate an accurate PPS output. It could also mean that the unit is generating an Even Second output (see Packet 8E-4E) and that the unit did not output a PPS on the odd second. • *PPS Good*: If this indicator is green, the PPS is good.

Configuring the timing receiver

You can configure position, self-survey, and timing output.

To configure the timing receiver, click **Timing Configuration** in the command bar of the *Timing Receiver Status and Control* dialog:



The *Timing Receiver Configuration* dialog has two tabs:

- Self-Survey, Position, General tab, page 52
- Timing Outputs tab, page 54

Click **Query** to query the receiver for its current configuration settings.

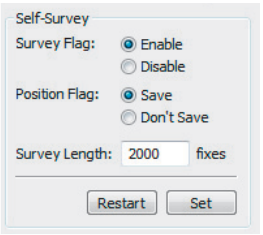
Click **Close** to close the screen.

Self-Survey, Position, General tab

Use this tab to reset and restart the self-survey, and reset position and general options.

Self-Survey

The Self-Survey area is used to configure and restart a self-survey:



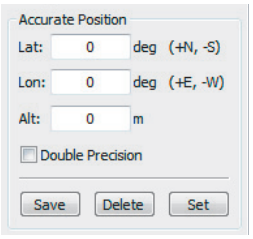
1. In the *Self-Survey* area, you can make the following changes if required:
   - *Survey Flag:* Enable or disable self-surveys.
   - *Position Flag*: Save (or do not save) the surveyed position when the self-survey is complete.

Note – *The survey flag and position flag are both enabled by default. If you disable them, there is the option to set your own position. See Accurate Position, page 53.*

- *Survey Length:* To shorten the survey process, change the total number of fixes that are to be averaged together to form the self-surveyed position to be used for clock-only fixes.

2. If you changed any parameters, click **Set**.
3. Click **Restart**. In the *Timing Receiver Status and Control* window, the *Self-Survey Progress* field restarts at 0%.

Accurate Position



The *Accurate Position* fields are used to specify and save the position used to perform time-only fixes. Use the WGS-84 datum to enter the coordinates.

1. Enter or edit the following coordinates:
   - *Lat* (deg (+N, -S)): Latitude of the accurate position, in decimal degrees. For a southern latitude, enter a minus sign before the value.
   - *Lon* (deg (+E, -W)): Longitude of the accurate position, in decimal degrees. For a western longitude, enter a minus sign before the value.
   - *Alt* (m): Altitude of the accurate position (in meters).

Note – *Click the* ***Query*** *button at the bottom of the screen to populate the fields with any currently set coordinates.*

2. Select the *Double Precision* check box (recommended) to send double-precision values of the position. If you do not do this, a single-precision packet is used.
3. Click **Set** to immediately set the receiver's position to the specified coordinates and switch the receiver to Over Determined timing mode.

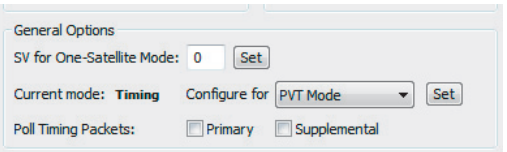
Note – *If a self-survey is in progress when you click* ***Set****, the self-survey is cancelled.*

Note – *If you click* ***Set****, the position to not saved automatically to non-volatile (Flash) memory.*

4. Wait at least two seconds and then click **Save** to save the receiver's currently set position to non-volatile (Flash) storage.

   To delete saved coordinates from Flash storage, click **Delete**.

General Options



In this area, you can do the following:

1. *SV for One-Satellite Mode:* Enter the satellite ID (1 to 32) that you want to use for the one-satellite, time-only fix mode and then click **Set**.

Note – *If you enter 0 , the GPS receiver automatically selects the best satellite.*

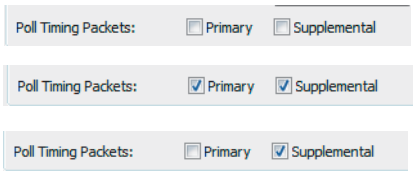
2. *Current Mode:* From the *Configure for* drop-down list, select the required mode (*Timing* or *PVT Mode)* and then click **Set**:

- *Timing Mode:* This is the timing receiver output mode. If you select this option, the receiver will automatically outputs timing packets only, for example, 0x8F-AB and 0x8F-AC.
- *PVT Mode:* This is the position/velocity/time mode. If you select this option, the receiver automatically outputs packets associated with positioning, for example, 0x56, 0x6D, and 0x84.

Note – *Always use timing receivers in static applications in timing mode. Do not use them in PVT Mode before talking to Trimble Support.*

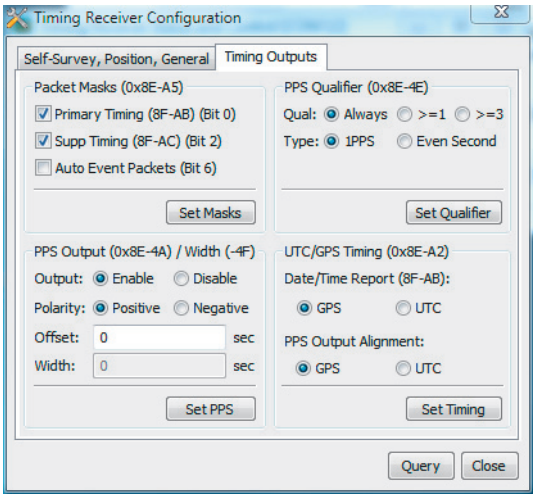
3. Select the *Poll Timing Packets* check boxes to turn on polling of timing packets only if the product being monitored does not automatically output the particular timing packet. If you select Primary, you must also select Supplemental, but you may use Supplemental on its own:
   - *Primary*: Select this option to turn on polling of the primary timing packet 0x8F-AB. *Supplemental*: Select this option to turn on polling of the supplemental timing packet 0x8F-AC.

   Collectively, there are only three valid states for these check boxes:



Timing Outputs tab

Use this tab to change settings for Packet Masks, PPS Qualifier, PPS Output, and UTC GPS Timing.



Packet Masks (0x8E-A5)

The broadcast mask is bitwise encoded to allow you to turn on and off the broadcast of certain packets. The settings for Packet Masks are:

Setting	Select to automatically output ...
Primary Timing (8F-AB) (Bit 0)	the primary timing packet 0x8F-AB.
Supplemental Timing (8F-AC) (Bit 2)	the supplemental timing packet 0x8F-AC.
Auto Event Packets (Bit 6)	the position, velocity, and receiver mode packets 0x56, 0x6D, and 0x84.

Click **Set Masks** to set the packet broadcast masks according to the options.

Note – *If broadcast packets have multiple formats, the receiver broadcasts only one of the formats. If more than one of the formats is masked **on** for broadcast, the format with the greatest precision of content masked **on** is sent and the rest is not sent.*

PPS Output (0x8E-4A) / Width (-4F)

You can specify the PPS Output characteristics that apply to the receiver. The settings for PPS Output are:

Setting	Description
Output	Enable or Disable PPS output
Polarity	Set polarity positive (on time rising edge) or negative (on time falling edge).
Offset (in seconds)	Value for PPS offset or cable delay. Negative offset values advance the PPS, and are normally used to compensate for cable delay.
Width (in seconds)	Value for PPS pulse width. If this field is unavailable, the receiver does not support setting the PPS pulse width.

Click **Set PPS** to set the PPS Output characteristics according to the selected options.

PPS Qualifier (0x8E-4E)

The settings for PPS Qualifier are:

Setting	Description
Qual	When PPS is turned on: • Always: PPS is always turned on. • >=1: PPS is output when at least one satellite is tracking. • >=3: PPS is output when at least three satellites are tracking.
Type	• 1PPS: PPS is generated every second (Qual setting applies). • Even Second: PPS is generated every even second (Qual setting applies).

Click **Set Qualifier** to set the PPS Qualifier according to the selected options.

UTC/GPS Timing (0x8E-A2)

You can specify the UTC/GPS time report alignment (time and date fields) in packet 0x8E-A2 and the temporal location of the output PPS. The settings for UTC/GPS Timing are:

Setting	Description
Date/Time Report (8F-AB) – GPS or UTC	Time report is to be aligned to the GPS time or UTC time.
PPS Output Alignment – GPS or UTC	PPS is to be aligned to the GPS time or UTC time.

Click **Set Timing** to set the time report alignment and the temporal location of the output PPS according to the selected options.

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