SC-1 Reference Manual

Firmware Version 2.3B (Basic Functionality)

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Introduction

SC-1 Features

The SC-1 Basic firmware is an easy to use, stripped down version of the more powerful but complicated SC-1 Full firmware. The Basic firmware version gives the SC-1 the following features:

- Speed and compass updated at 2 times a second
- Maximum and best 10 second average speed recall
- Over 35 hours of GPS data storage at record rate of every 2 seconds
- Data downloading through USB link
- User configurable device settings allow customization of select SC1 functionalities
- Up to 25 hours of battery life
- Internet updatable firmware allows you to benefit from ongoing product improvements and feature additions

To successfully use the SC-1 with the basic firmware, the only procedure that absolutely must be learned is how to turn the device on. Use the basic firmware if you don't like reading instruction manuals and you only need a speedometer and compass.

Also, because the basic firmware does not have multiple modes that it can switch between, it is not affected by water splashing on its buttons. Use the basic firmware if you are having problems with splashing water unlocking your SC-1's buttons and inadvertently changing the display mode.

Manual Organization

This manual is divided into two main sections. The first section, On the Water describes how to use the SC-1 to obtain real-time feedback while you are sailing. The second section, When You Get Home describes how to download and view GPS data from your SC-1 using a PC.

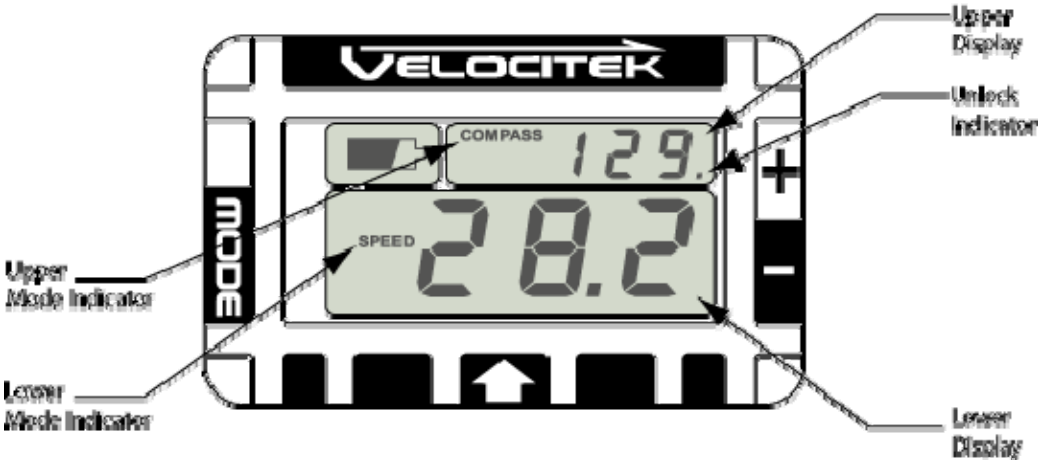
On the Water

This section describes how to use the SC-1 to obtain real-time feedback while you are sailing

Device Overview

Displays

The following diagram shows the SC-1's two main display areas:

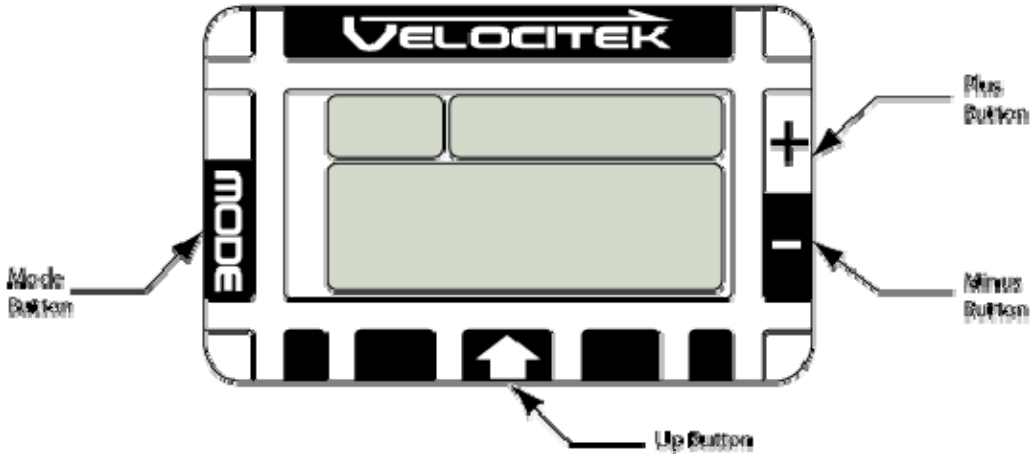


Speed and heading are displayed in the lower and upper displays respectively. The information shown on each display is made clear by a mode indicator immediately to the left of the numerical display area.

The first decimal point on the upper display is used as an unlock indicator if any of the lock features are enabled. The indicator is not displayed if all lock features are disabled.

Buttons

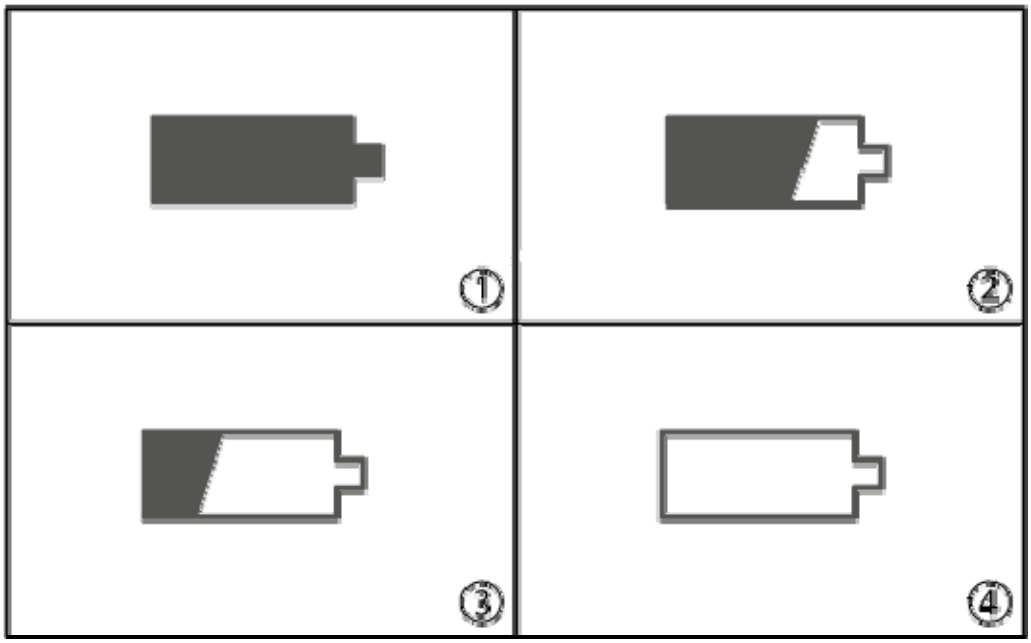
The SC-1 is controlled by four different capacitive touch sensors. These touch sensors detect the presence of your thumbs when they are placed on top of the regions shown in the following diagram:



The captions on the above diagram indicate how the different touch sensors will be referred to in the rest of this manual.

Battery Life Indicator

The battery life indicator is located in the top left corner of the SC-1. As the energy in the device's batteries is consumed, the battery life indicator will undergo the following progression to show you how much run time you have left:



1 When the indicator is fully illuminated you have approximately 25 hours of battery life remaining.

2 When the indicator is two thirds illuminated you have less than 18 hours of battery life remaining.

3 When the indicator is one third illuminated you have less than 12 hours of battery life remaining.

4 When the indicator is not illuminated you have less than 6 hours of battery life remaining.

When the batteries are too low to properly power the GPS chipset the whole display will go blank and flash "LO" in the lower display.

Note: The above applies for rechargeable nickel metal hydride (NiMH) batteries. Disposable alkaline batteries will provide approximately half the life of NiMH batteries. Also with disposable batteries, there will be a tendency for the life indicator to remain fully illuminated for most of the battery life and only drop down to the lower levels when the batteries are nearly exhausted.

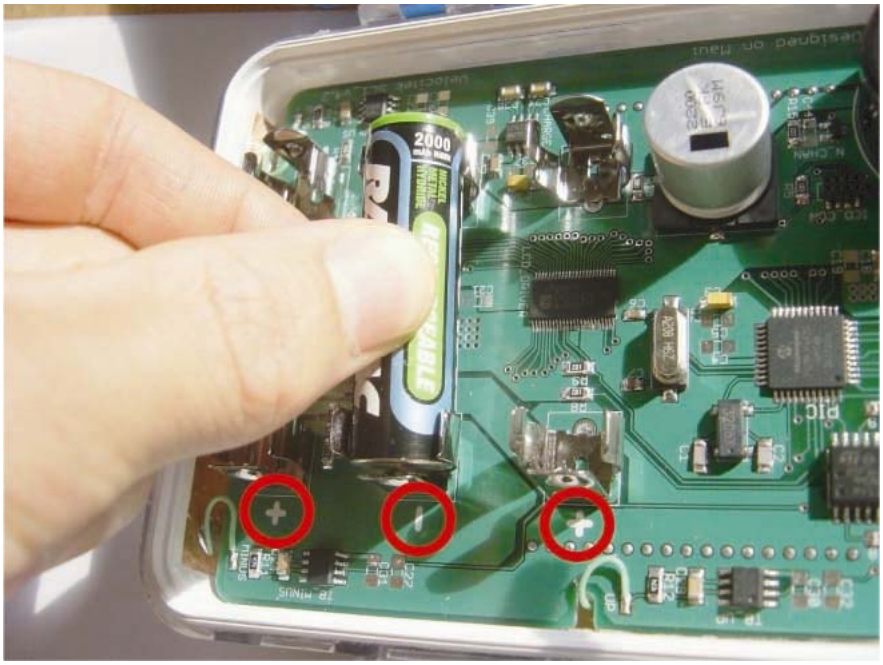
The SC-1 will slowly deplete batteries even when it is turned off. Fully charged batteries will be exhausted in about 100 days when the device is left turned off. For long term storage, remove any one of the three batteries from the device to prevent this slow drain.

Getting Started

This section describes everything you need to know before hitting the water with your SC-1.

Inserting Batteries

Open the waterproof case and insert 3 AA batteries into the metal clips on the circuit board. Be careful to orient the batteries according to the polarity markings on the circuit board. These markings are circled in red on the following photograph:



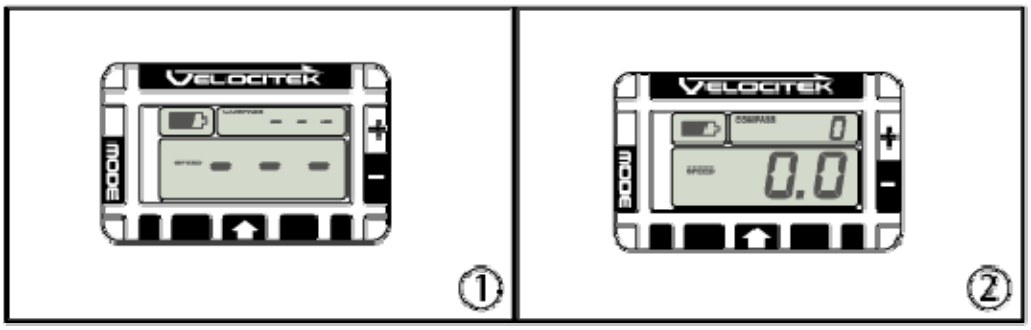
The SC-1 will work with rechargeable nickel metal hydride (NiMH) batteries or standard disposable AA batteries. Disposable batteries will provide approximately 12 hours of life while rechargeable NiMH batteries will last for 25 hours or longer. The remaining battery life indicator on the SC-1 is calibrated to work with rechargeable NiMH batteries.

Signal Acquisition

The operation of the Velocitek SC-1 relies on low-power radio signals from GPS satellites that orbit the earth at an altitude of approximately 20,000 km. As a result, the SC-1 must be outdoors with a clear view of the sky to function properly.

When the SC-1 is first turned on, it must download information from GPS satellites before it can acquire a GPS solution. The data download process normally takes 1-2 minutes or up to 5 minutes if fresh batteries have just been installed.

The following illustration depicts the GPS signal acquisition process:



1 When the SC-1 is first turned on, both the upper and lower display will show "- - -". The lower display will also blink on and off.

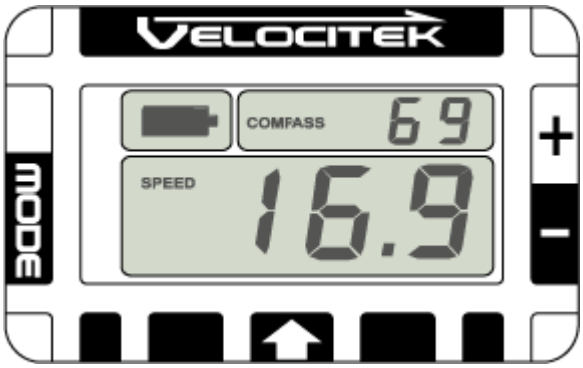
2 Once the device has acquired a GPS solution and is capable of providing information, both upper and lower displays will show solid numbers.

Please Note: The SC-1 cannot obtain a GPS solution indoors.

Operating Modes

The device displays current speed on the lower display and heading in degrees on the upper display. In Basic firmware the SC1 modes cannot be changed for either display. Modes can be edited and more modes, VMG, tactical compass, timer and start line, are available in the Full firmware. Refer to the Full firmware manual for more information. The firmware on the device can be updated by connecting the SC-1 to the PC.

The below figures shows speed of 16.9 knots and compass heading of 69 degrees:



Speedometer Mode

In Speedometer mode the display will show your current speed updated at 2Hz (twice a second). The speed can be displayed in knots, miles/hour, kilometers/hour or meter/second by editing the device settings. The default is to display speed in knots.

Compass Mode

In compass mode, the device displays either true or magnetic heading at an update rate of 2Hz (twice a second). True heading is the direction you are moving referenced to true north. Magnetic heading is the degrees you are heading in reference to the local magnetic north. When using a magnetic compass in conjunction with the SC-1, setting the compass declination to the local declination is useful since both instruments will be referenced to magnetic north. By default the compass displays true heading, to display magnetic heading the local magnetic declination must be defined in device settings.

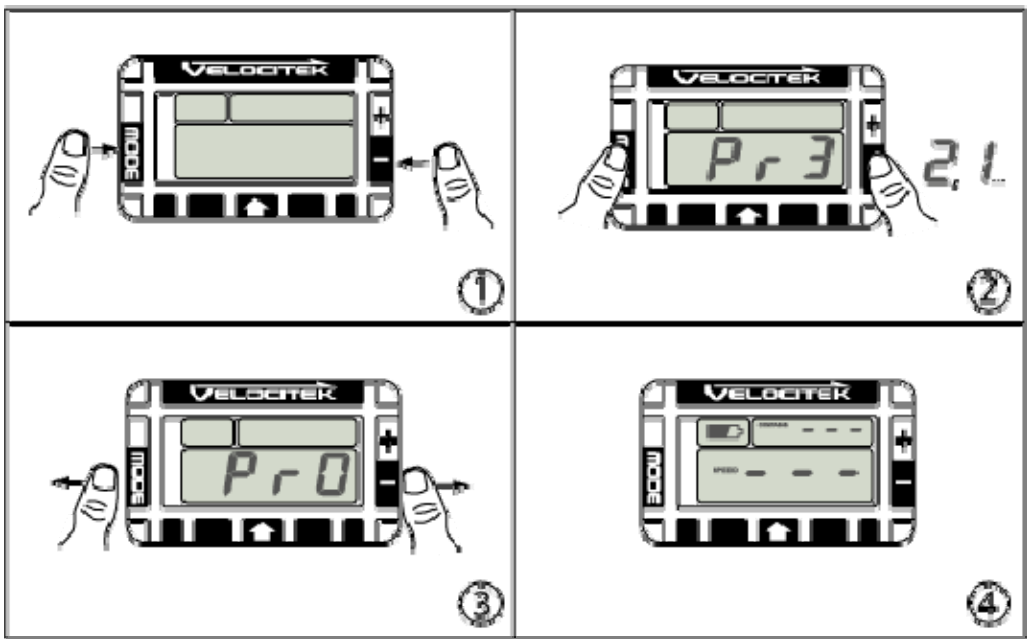
The SC-1 displays heading only when your speed is greater than 1 knot, otherwise it will show a heading of 0 degrees regardless of which direction you are actually moving.

The difference of the SC-1 to a conventional magnetic compass is that the SC-1 measures the direction the device is moving in rather than the direction it is pointed in.

A major benefit of the SC-1 over a conventional magnetic compass is that it will give you accurate heading information, regardless of the orientation in which it is mounted on your boat. SC-1's compass reading depends only on the direction you are moving, not the direction the device is pointing.

Turning Power On

Use the following procedure to turn on the SC-1:



1 Use your thumbs to cover both the Mode and Minus buttons.

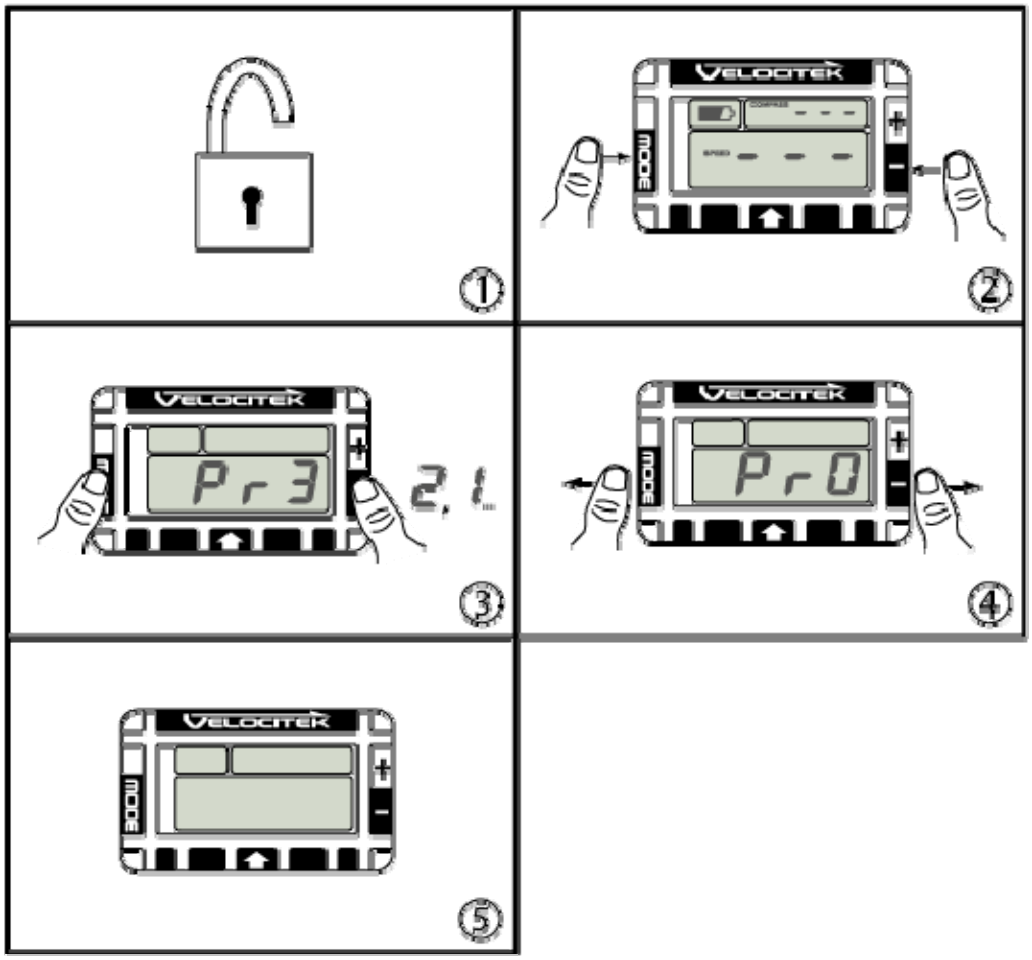
2 You will see a countdown starting from 3 on the lower display. If you do not see the countdown appear, remove and reapply your right thumb.

3 When the countdown reaches zero, remove both your thumbs.

4 The device will turn on.

Turning Power Off

When you first insert batteries into the SC-1 it will automatically turn on. To turn it off, use the following procedure:



1 Make sure the SC-1's buttons are unlocked.

2 Use your thumbs to cover both the Mode and Minus buttons.

3 You will see a countdown starting from 3 on the lower display.

4 When the countdown reaches zero, remove both your thumbs. The device will turn off and the display will go blank.

Auto Power-Off

The feature automatically turns off the SC-1 when all of the following conditions are continuously present for over 10 minutes:

- A GPS signal is not available
- The speed indicated on the SC-1 is less than 2.0 knots
- There are no button inputs
- The device is not connected to a PC

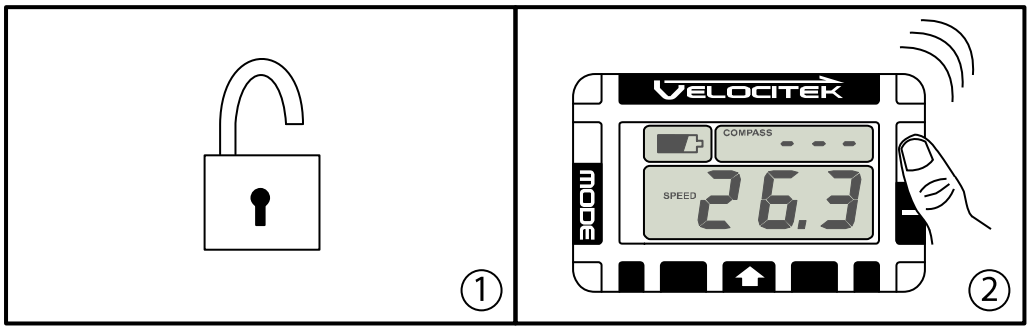
The auto power-off feature is disabled by default. The feature can be enabled by connecting the SC-1 to a PC.

Button Locking

The Velocitek SC-1 uses touch sensors to accept user input. Splashing water can trigger the touch sensors. To prevent the device from being inadvertently controlled by splashing water the device locks, or does not accept button inputs, when the indicated speed exceeds the speed lock value. At speeds below the speed lock value, the buttons are unlocked and will accept user input. The lock feature can be customized by connecting the SC-1 to a PC. By default the locking is enabled with a speed lock value of 2.0 knots.

Recalling Maximum Speeds

When the lower display is in speedometer mode, you can recall your maximum speed and your best 10 second average speed. To recall your maximum speed:



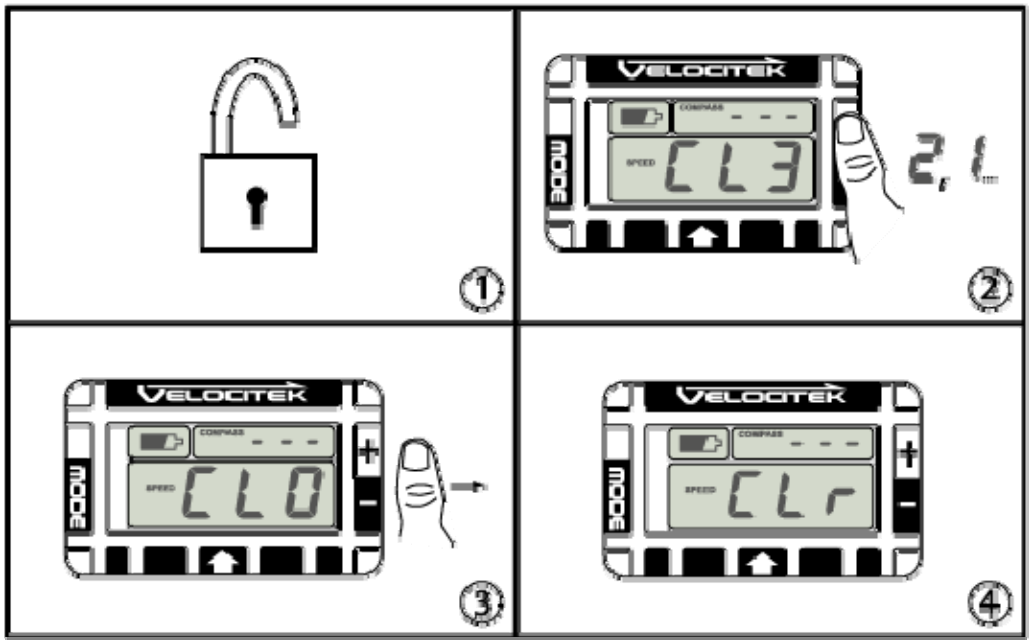
1 Make sure the SC-1's buttons are unlocked.

2 To recall your maximum speed hold the Plus button

3 To recall your best 10 second average speed hold the Minus button

Resetting Maximum Speeds

Use the following procedure to reset the maximum and best 10 second average speeds recorded on the SC-1 to zero:



1 Make sure the SC-1's buttons are unlocked.

2 Cover both the plus and the minus buttons with your thumb. You will see a countdown from 3 to 0 on the lower display.

3 When the countdown reaches 0 remove your thumb from both buttons.

4 You will see "CLr" displayed on the lower display. This indicates that the maxim speeds have been successfully reset.

Please Note: This procedure only resets the values that you see when you press the plus or minus button on speedometer mode. It has no effect on the stored GPS data that gets downloaded through the USB connection.

When You Get Home

This section describes how to install Velocitek Control Center, change device settings on the SC-1 and download GPS data from the SC-1.

Software Installation Required to Download GPS Data from Your Device

The following items will be installed on your PC by the Velocitek installer:

- Velocitek Control Center 2.3
- Velocitek Device Drivers (Required for communication with SC-1)
- Microsoft .Net Framework 2.0 (Required for Velocitek Control Center 2.3)
- Microsoft .Net Framework 3.0 (Required for Velocitek Control Center 2.3)
- Java (Required for GPS Action Replay)

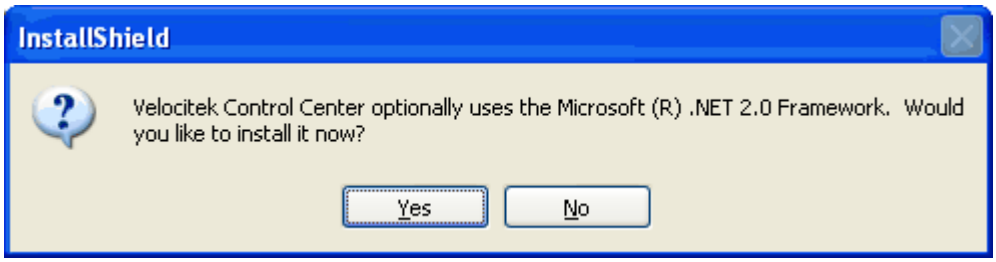
The Velocitek installer can be downloaded from http://www.sailgps.com/downloads

Installing Velocitek Control Center

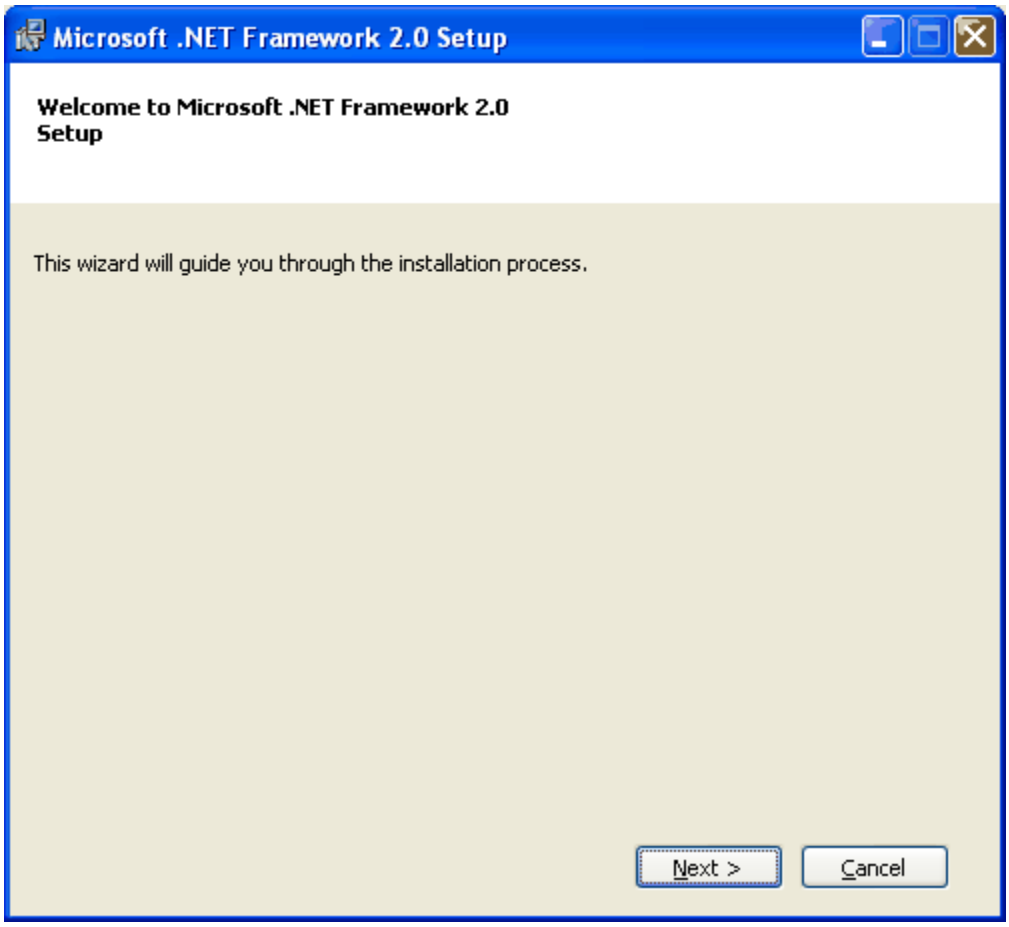
Download setup.exe for Velocitek Control Center 2.3 from http://www.sailgps.com/downloads

1 Double click on setup.exe.

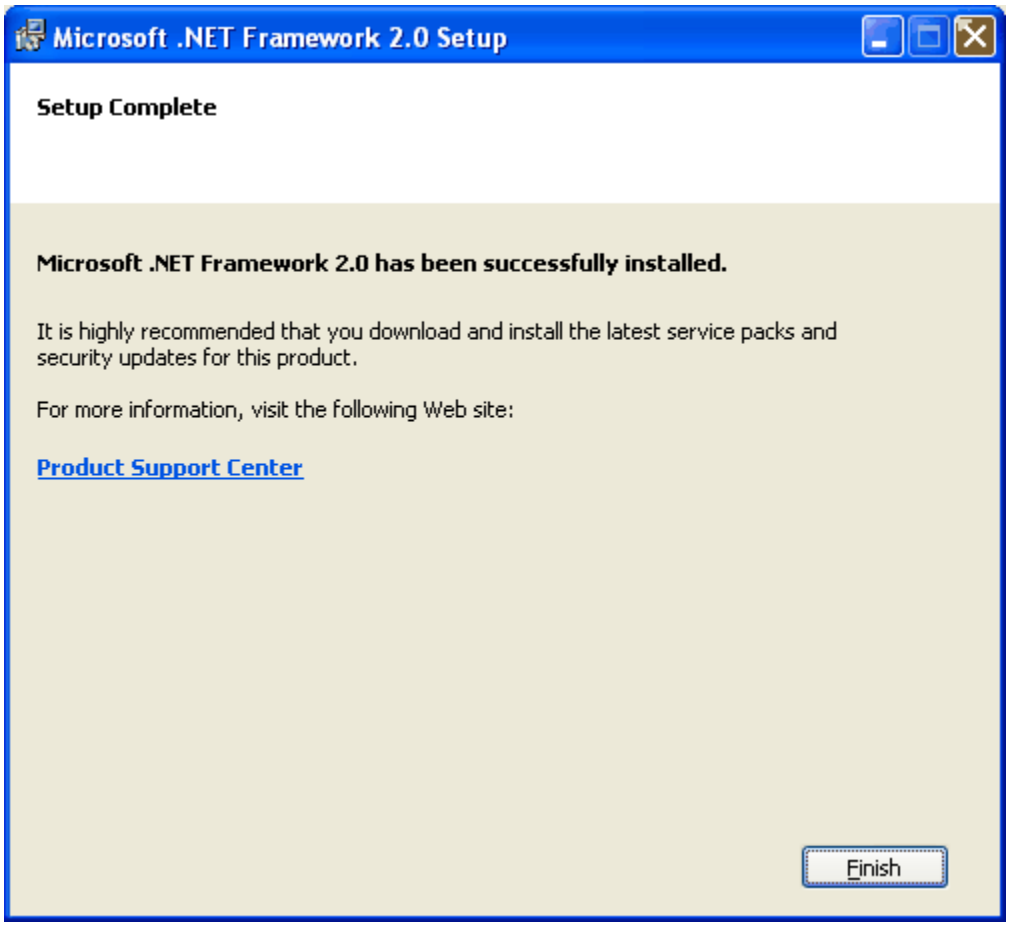
2 If you do not have the .NET 2.0 framework installed, the Velocitek Control Center installer will download the .NET 2.0 framework from Microsoft and install it for you. Click OK to begin installing the framework.



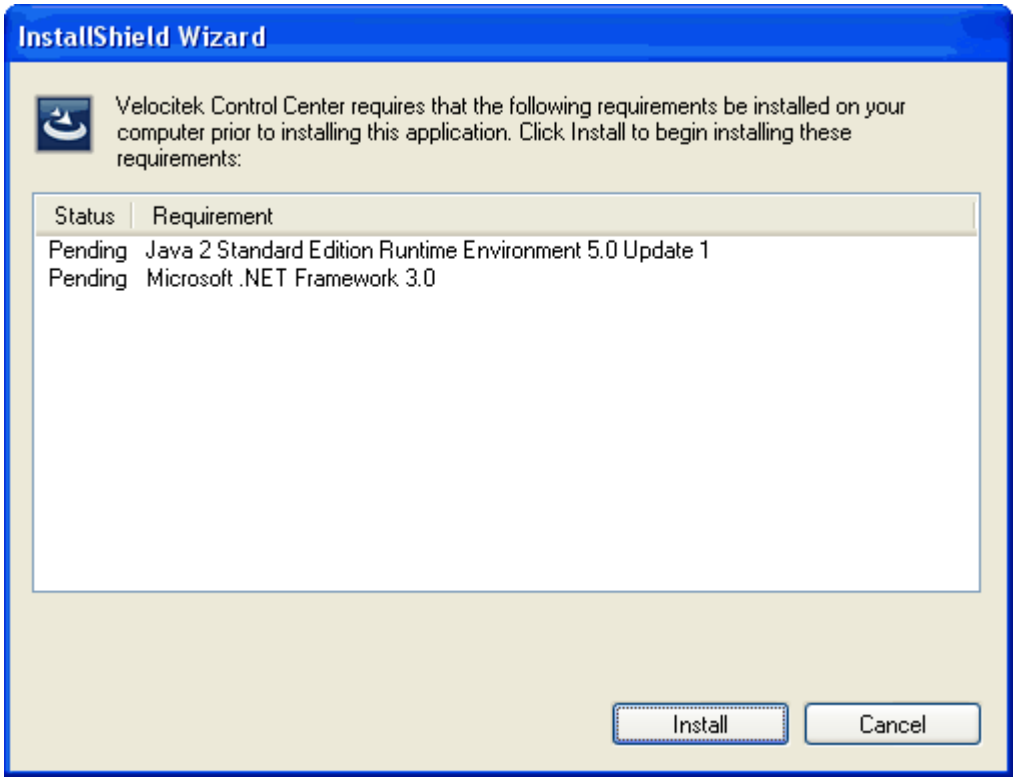
3 Click Next.


Microsoft .NET Framework 2.0 Setup
Welcome to Microsoft .NET Framework 2.0 Setup
This wizard will guide you through the installation process.
Next >
Cancel

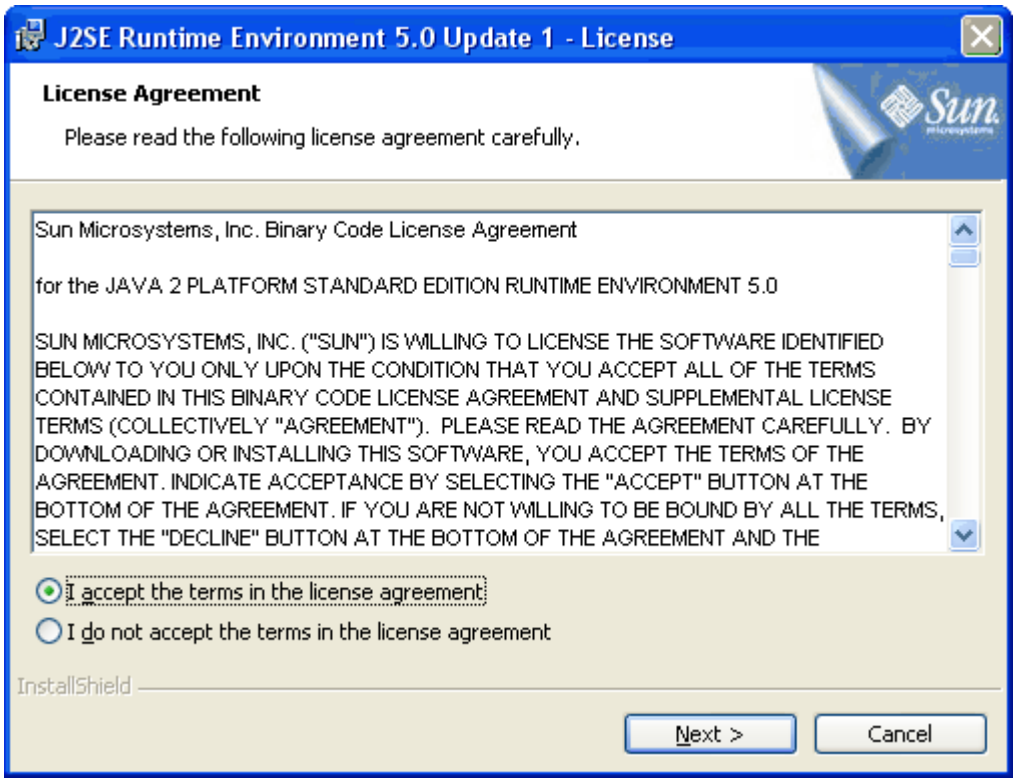
4 Once the setup is complete you will get the following message. Click Finish.



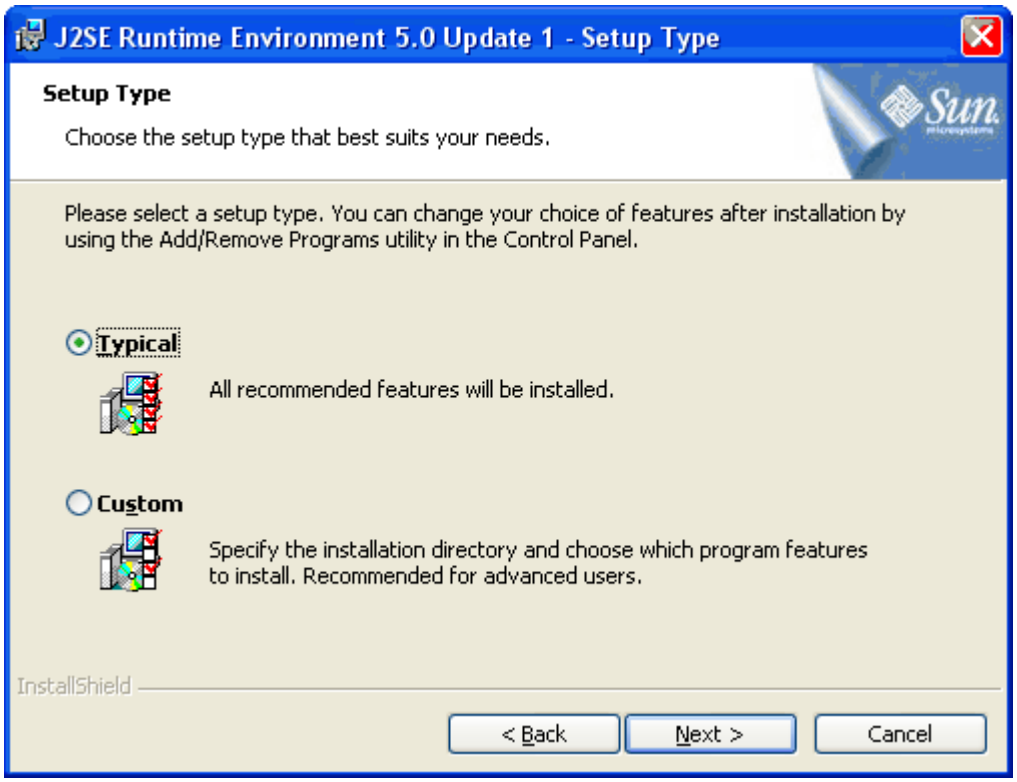
5 The rest of the installation will be guided by the Install Shield Wizard. If you do not have Java 2 or .Net Framework 3.0, the wizard will proceed to install them. Click Install. Otherwise the wizard will proceed with installing Velocitek Control Center.



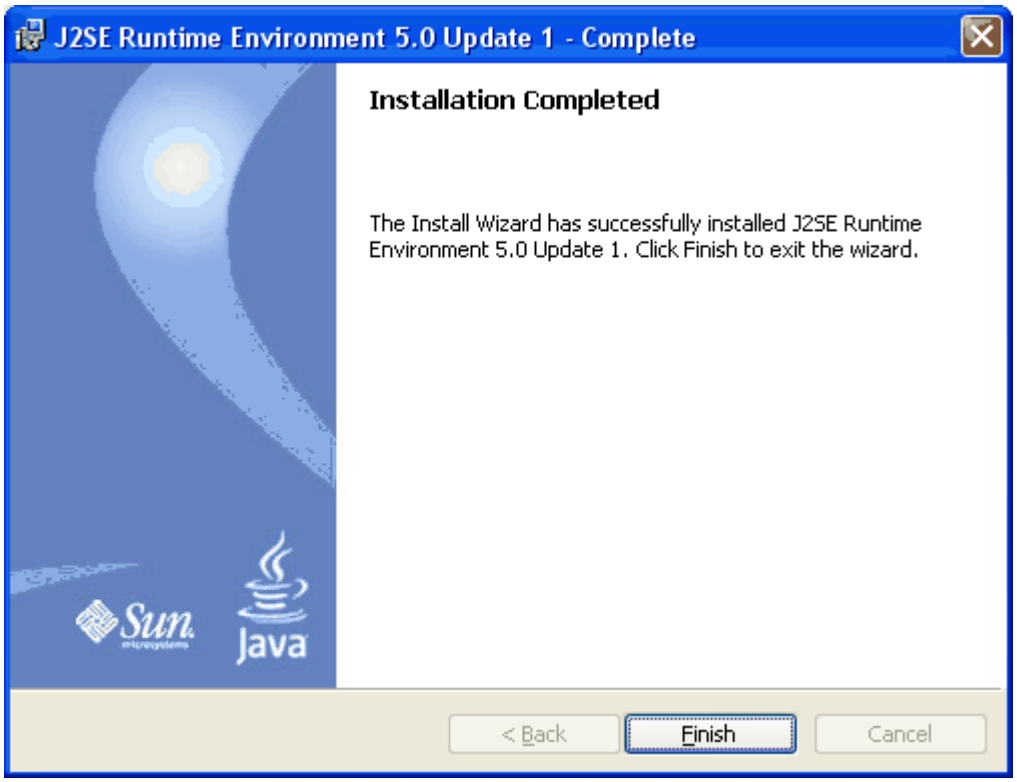
6 Select I accept, click Next.



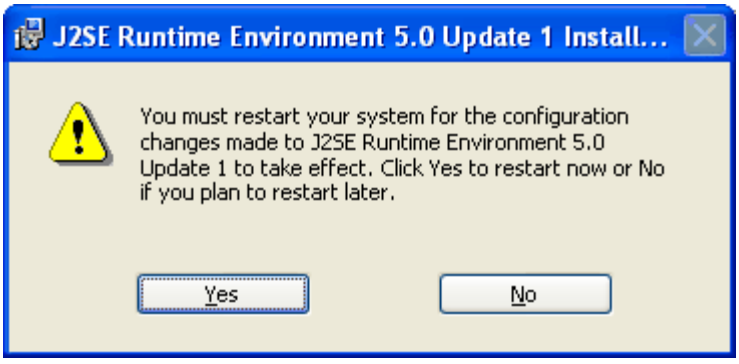
7 Select Typical, click Next.



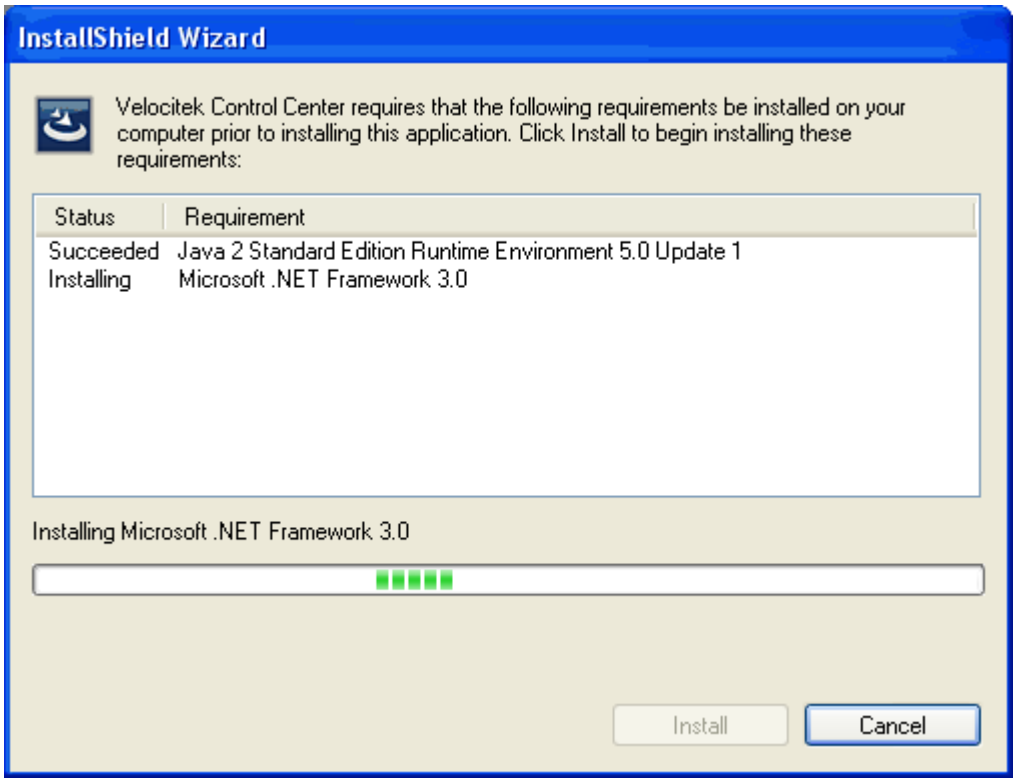
8 Once Java installation is complete you will get the following message. Click Finish.



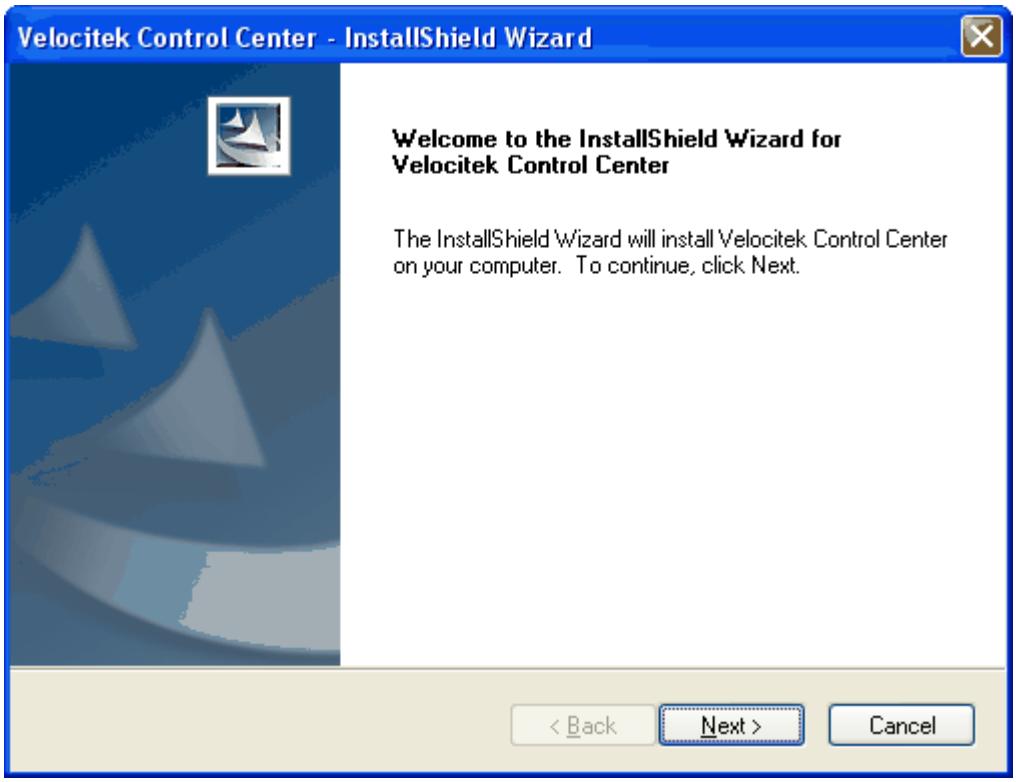
9 If you get the following message, do not restart computer to proceed with rest of the installation. Click No.



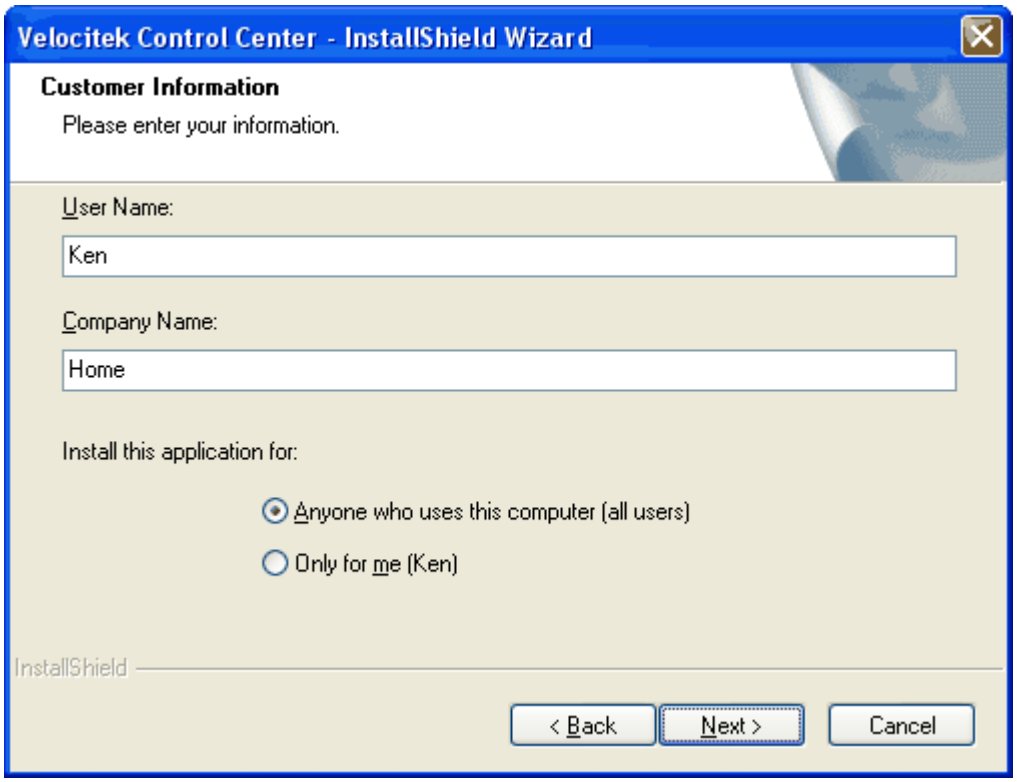
10 The wizard will continue with the installation of .Net Framework 3.0.



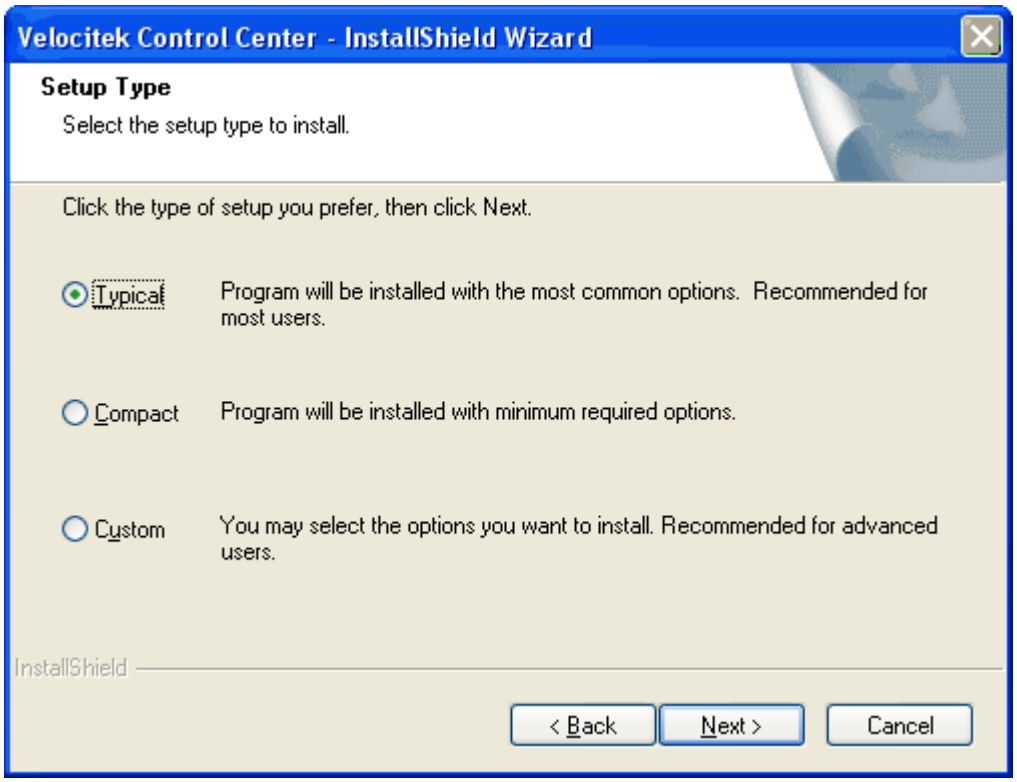
11 Once .Net Framework 3.0 is installed, the wizard will proceed with the installation of Velocitek Control Center. Click Next.



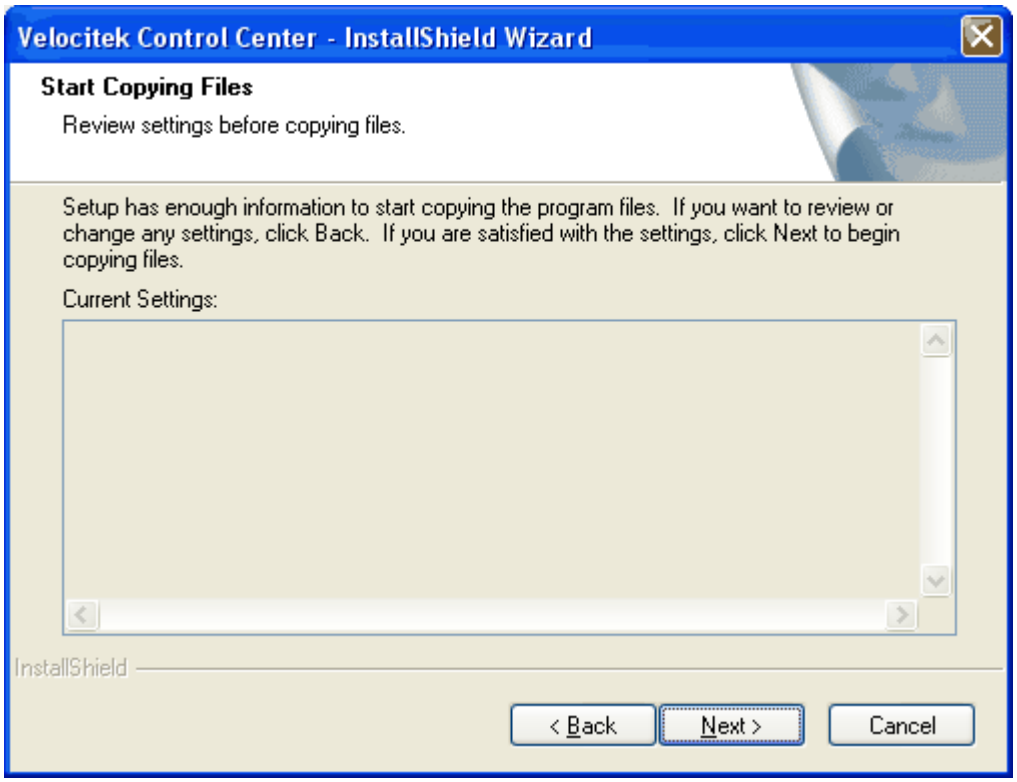
12 Enter User Name and Company Name. Click Next.



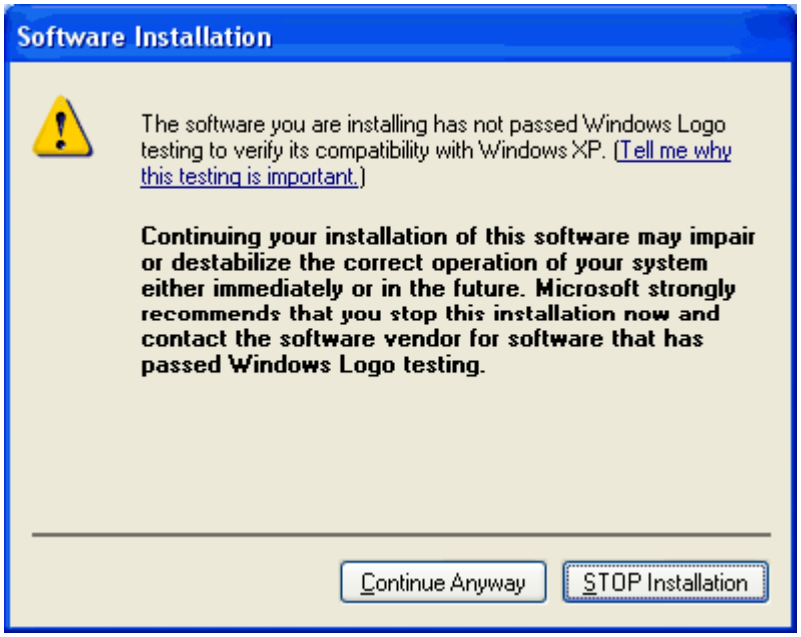
13 Select Typical, click Next.



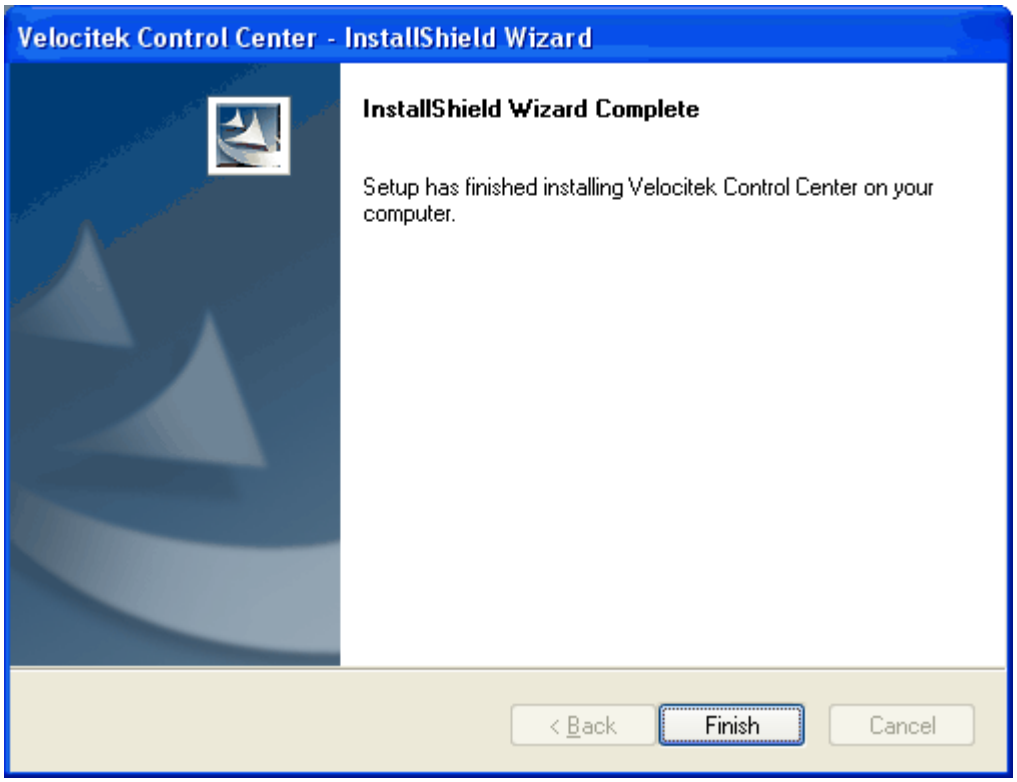
14 Click Next.



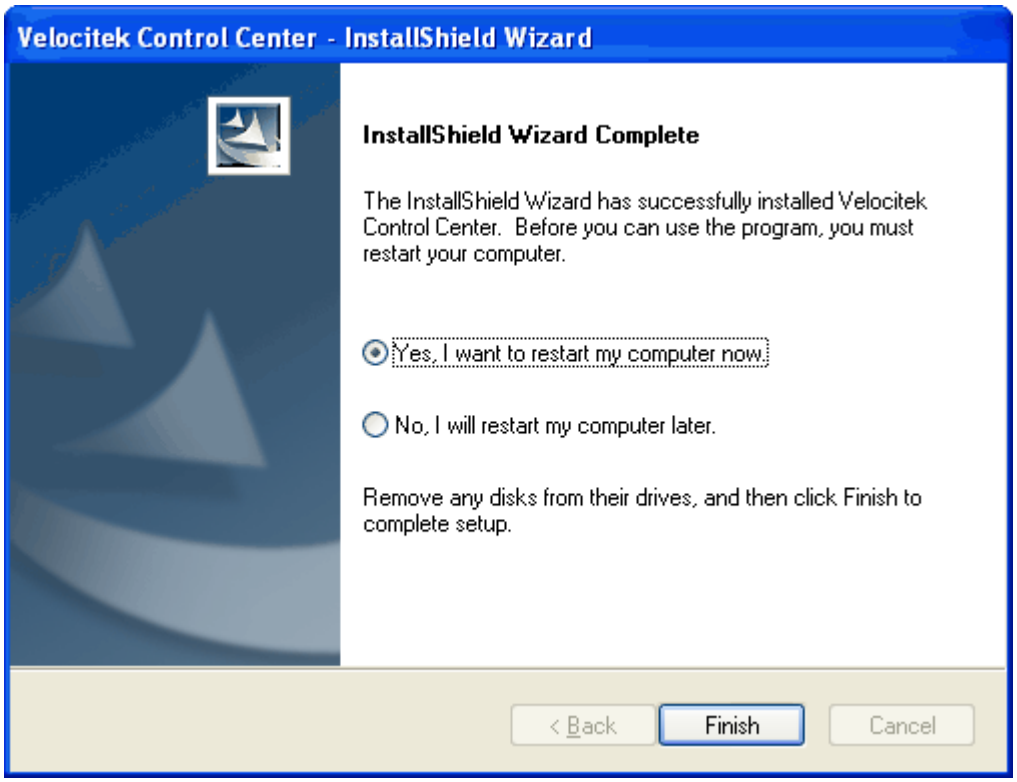
15 Click Continue Anyway.



16 Once Velocitek Control Center is finished installing you will get the following message. Click Finish.



17 If prompted, restart your computer. Select Yes, click Next.



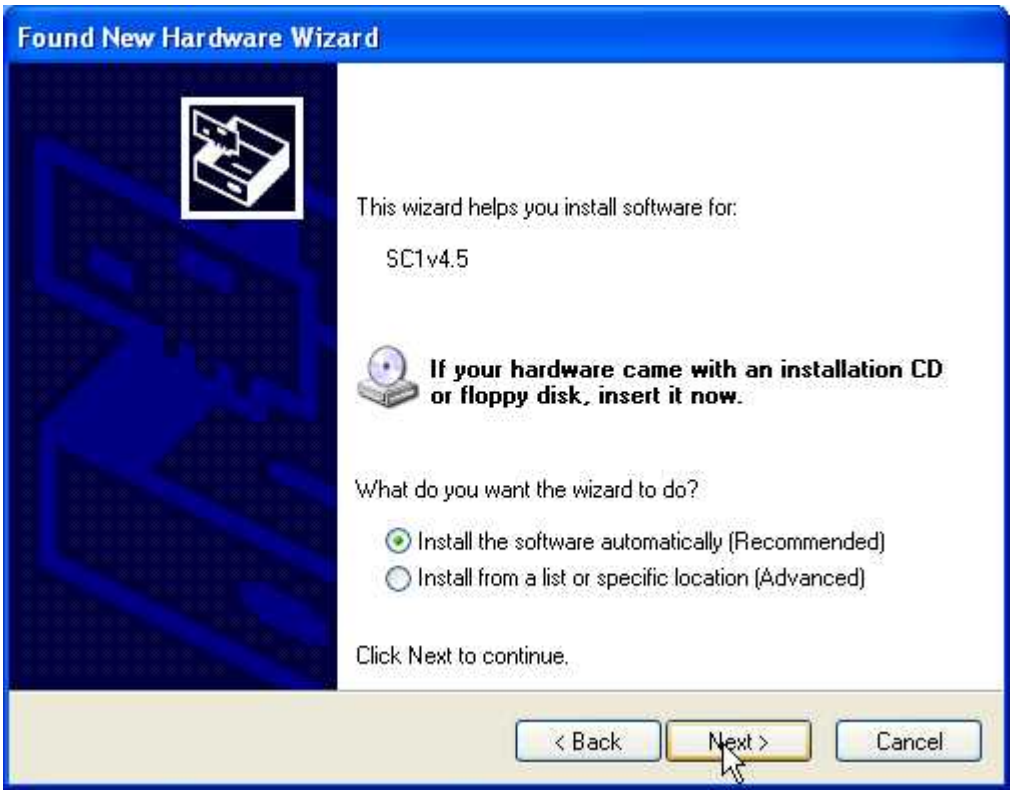
Installing Drivers for Your Velocitek Device

Before installing drivers, you must have Velocitek Control Center installed on your computer. Drivers are the low-level software that allows Velocitek Control Center to communicate with your GPS device through a USB link. Use the following procedure to install the drivers for your Velocitek GPS device:

1 Open your device's waterproof case and connect your GPS device to your computer using the included USB cable. Make sure that your GPS device contains batteries that are correctly installed and that it is switched on.

2 Once the device has been connected to your PC, the following window will appear. Select the **No, not this time** option and click on **Next**.

3 Select Install the software automatically and click on Next.



4 Select Continue Anyway.

5 Click Finish and you will be taken back to a screen that looks like what you saw in step 3. Repeat steps 3 through 5 to complete the driver installation.

Congratulations! You are now ready to start downloading GPS data from your Velocitek device.

Using Velocitek Control Center

The Velocitek Control Center can be used to download GPS data from the SC-1 and change device settings on the SC-1.

SC-1 GPS Data Storage

Whenever your Velocitek SC-1 is turned on and has a GPS solution (i.e. when it is showing you speed, heading or VMG information) it records GPS trackpoints every 2 seconds. Each trackpoint contains the following information:

- Latitude
- Longitude
- Heading
- Speed
- Time

The SC-1 has room for 35 hours worth of GPS trackpoints at a record rate of every 2 seconds. When the SC1's memory becomes full, the oldest trackpoints on the device are automatically deleted to free up space for new ones. At any point in time, the SC-1 will contain a record of your last several days of sailing.

Downloading GPS Data

Use the following procedure to download GPS data from your SC-1:

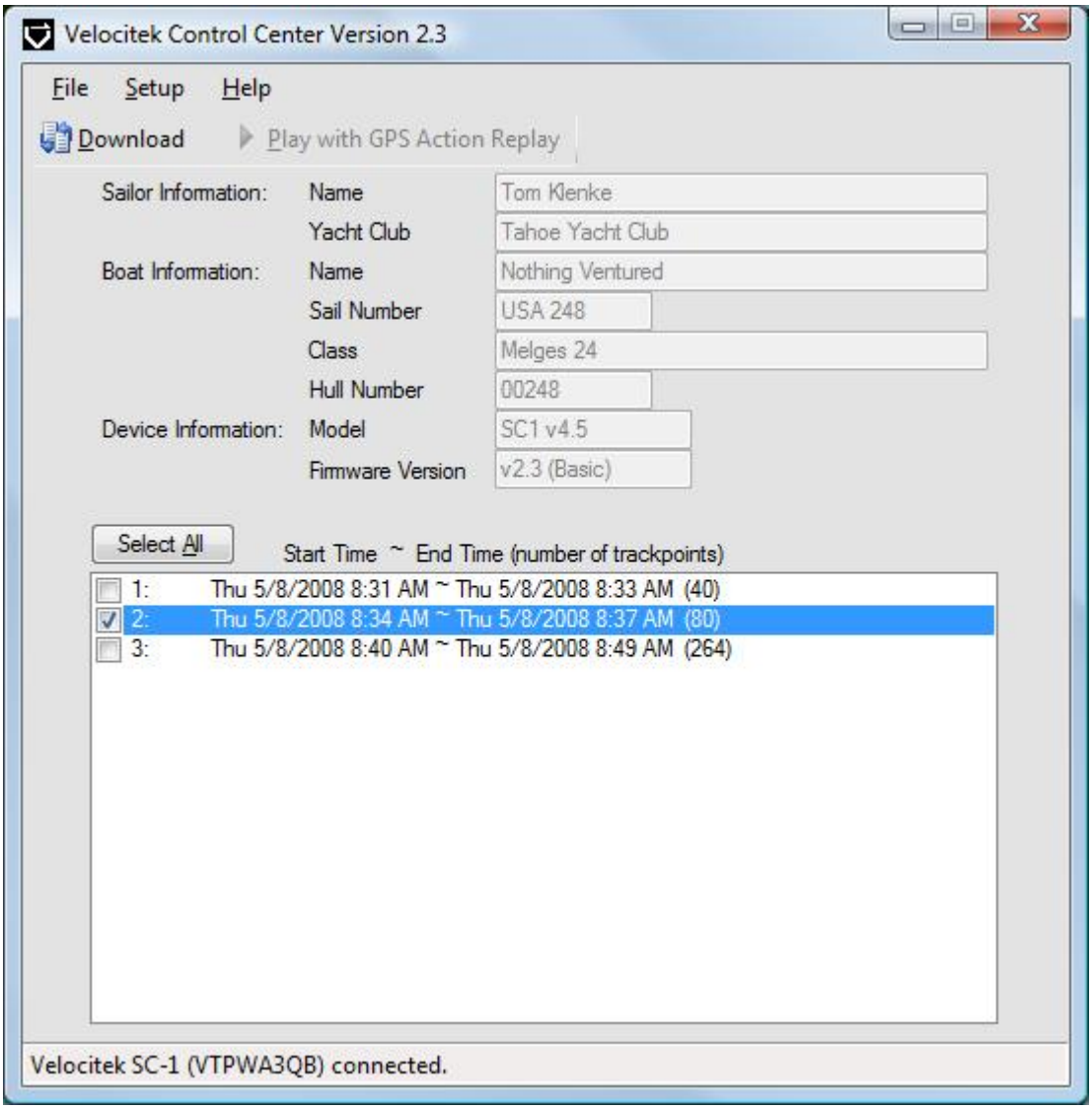
1 Run Velocitek Control Center.

2 Connect your SC-1 to your PC with the included cable

3 Your GPS tracks are automatically broken up into segments whenever

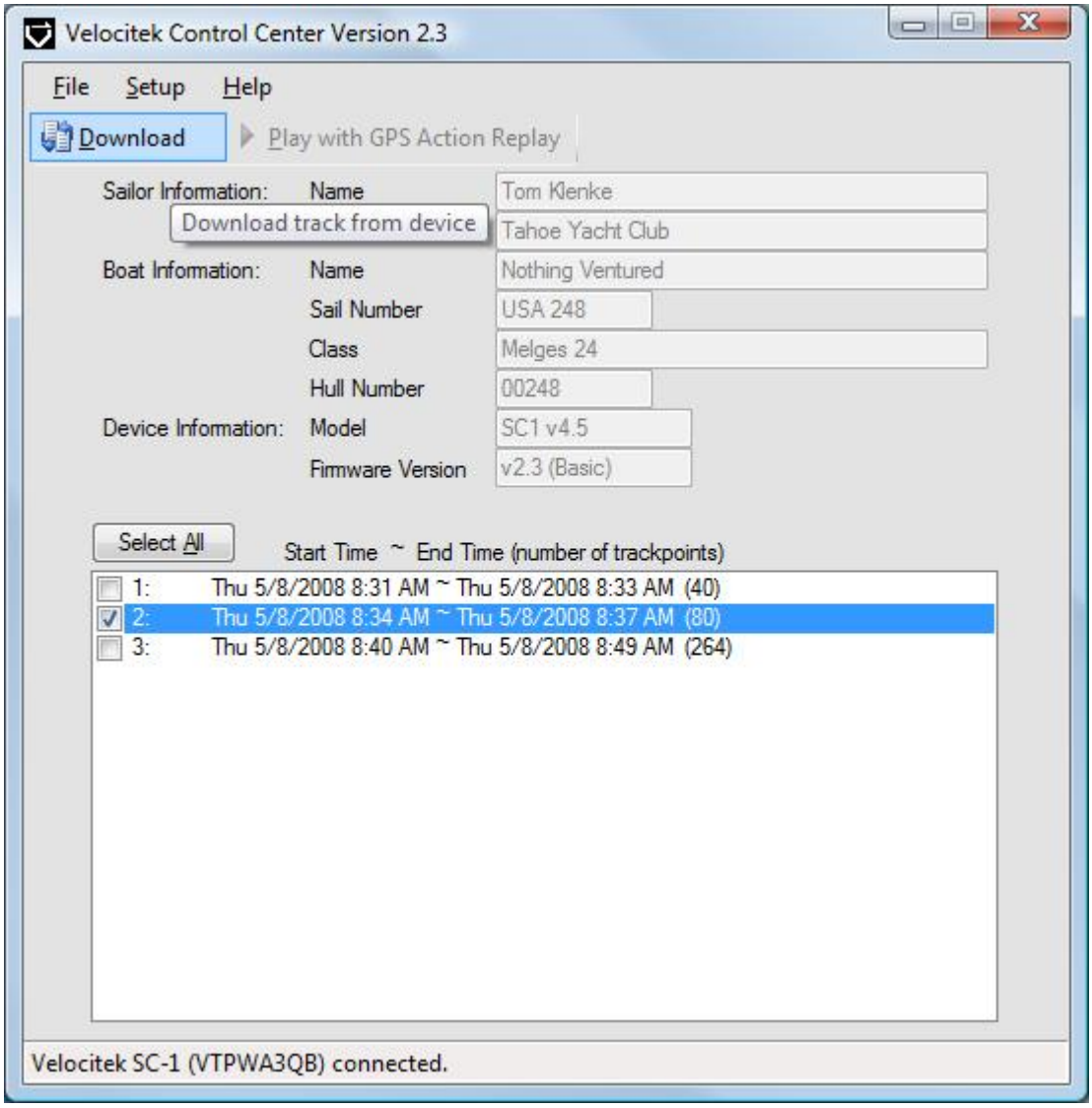
- The SC-1 is turned off and on again
- USB cable is disconnected

The start and end dates and times for each track segment are shown in the track segment window using the system time zone of the PC. The most recently recorded track segments are listed first. Select the track segments you wish to download and combine them into a single GPS data file by clicking the corresponding check boxes in the track segment window as shown below.



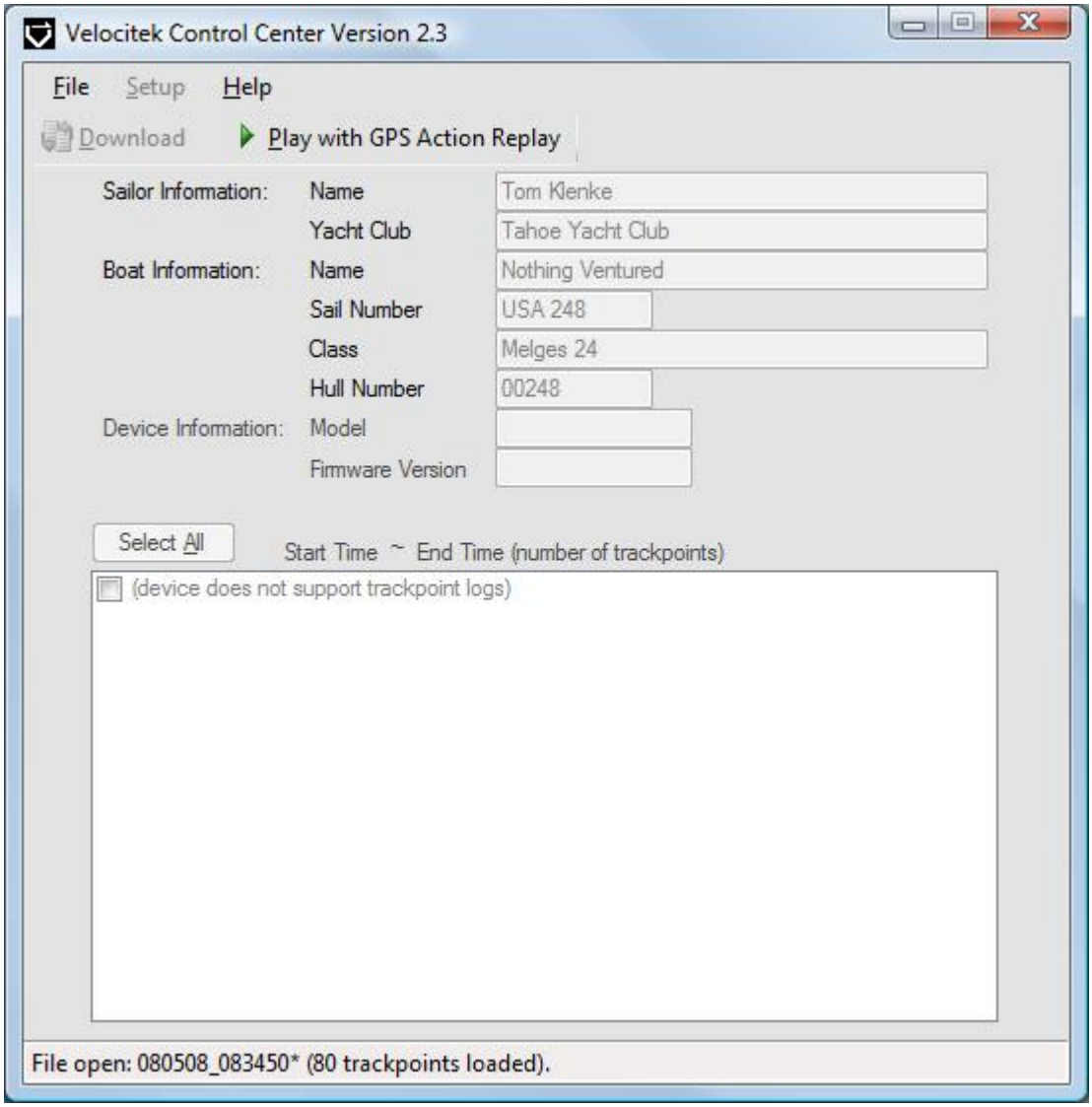
Note: The dates shown in the track segment window are written using the American month/day format.

4 Click on the Download button to begin transferring the GPS data from your SC-1 to your computer. This process can take as long as 30 seconds for every hour of GPS data stored on the device. If the SC-1's memory is completely full you can expect to wait as long as 10 minutes.



5 Once the data transfer is complete, you will see an automatically generated file name appear at the bottom of the Velocitek Control Center window. In the example shown this file name is 080508_083450. The file names are automatically generated. The file names are created with the following format: *yearmonthday_hourminutesecond*. For example, 080508_083450 corresponds to a track segment where the first trackpoint was recorded at 8:34:50 am on May 08, 2008.

In the screenshot below, the asterisk following the file name indicates that the file has not been saved.



Please see the next section of this manual for instructions on how to save the GPS data you have downloaded in a number of different formats.

Saving GPS Data

When you download GPS data from your device you can save it on your PC in three different formats:

- .gpx, a standard format widely used for exchanging GPS data between applications. This is the format used by the replay software GPS Action Replay. The .gpx format contains positions and times.
- .kml, this is the format used by Google Earth. The .kml format contains only a list of positions.
- .vcc, this is Velocitek's proprietary format. It can only be viewed in a text editor such as Notepad. The .vcc file format contains a list of times, positions, speeds, and headings. The speeds and headings in a .vcc file were determined in real time directly from measurements of the Doppler shift in the available GPS signals. These speeds and heading are significantly more accurate than what can be obtained by through calculations based on the position and time data present in other file formats.

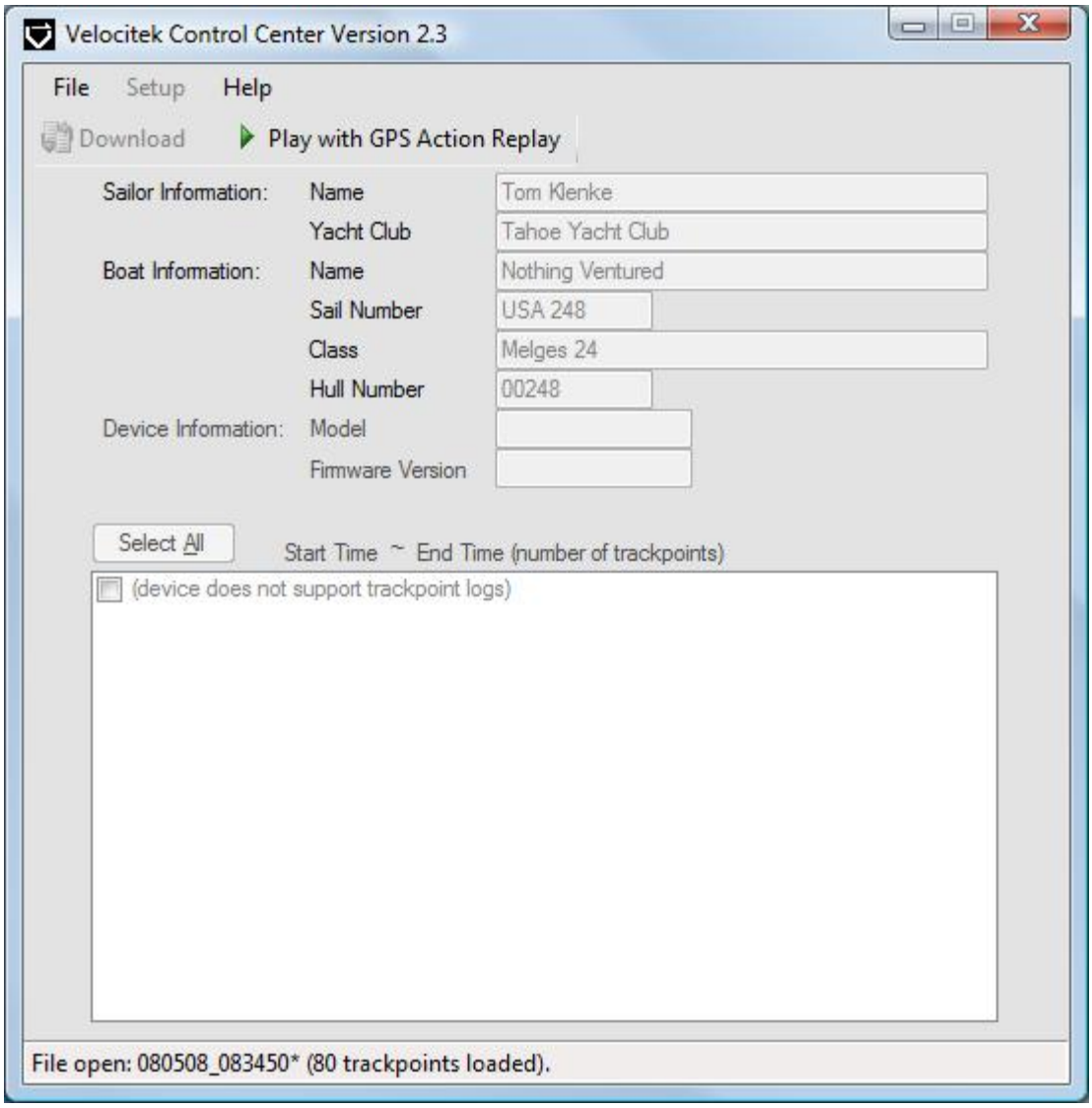
.vcc is also the only format that contains the user information programmed on your device.

You can also open saved .vcc files in Velocitek Control Center and save them as .gpx or .kml files. The reverse of this transformation is not possible.

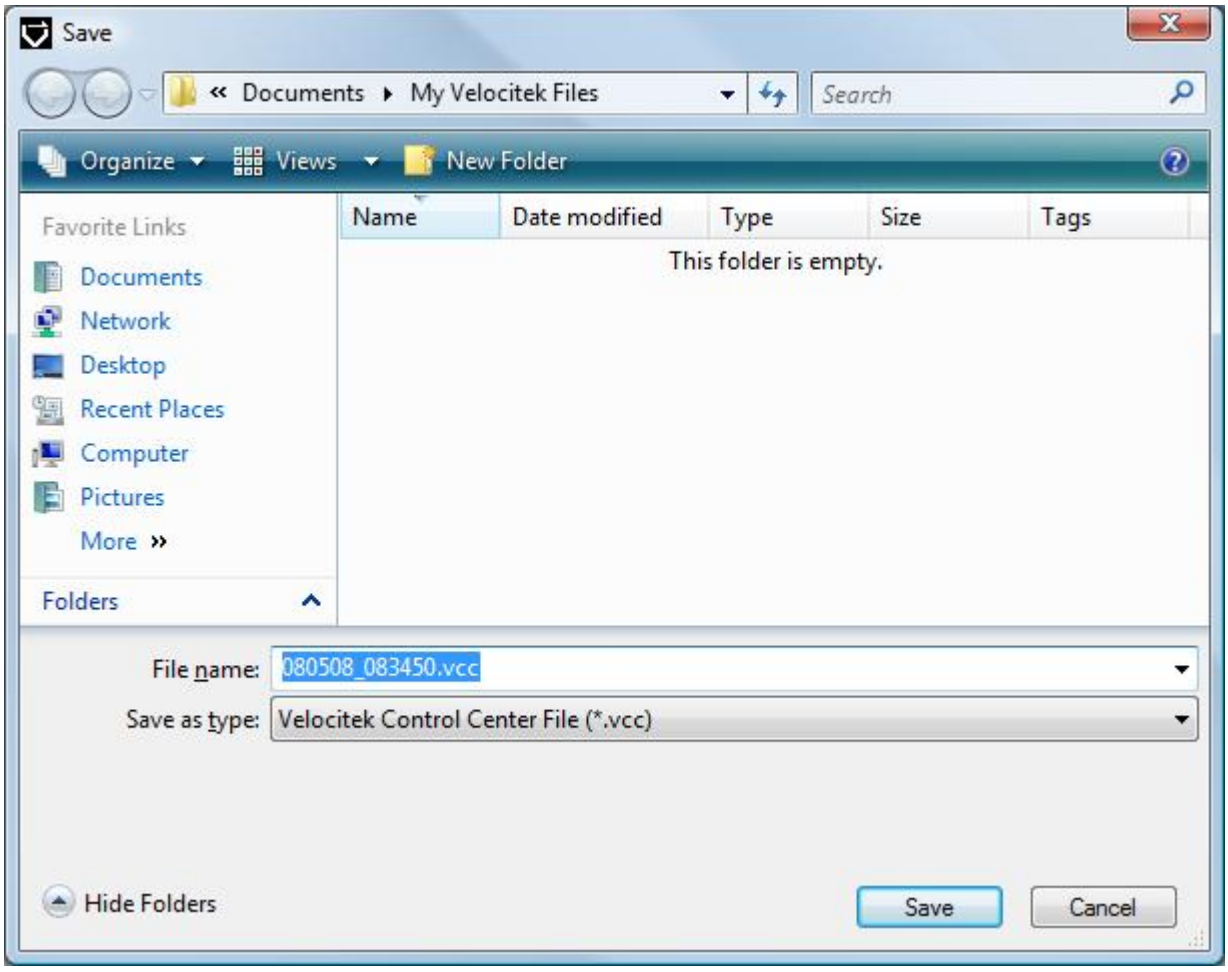
Saving GPS Data as a .vcc File

1 Download the GPS data you want the file to contain.

2 Select File->Save



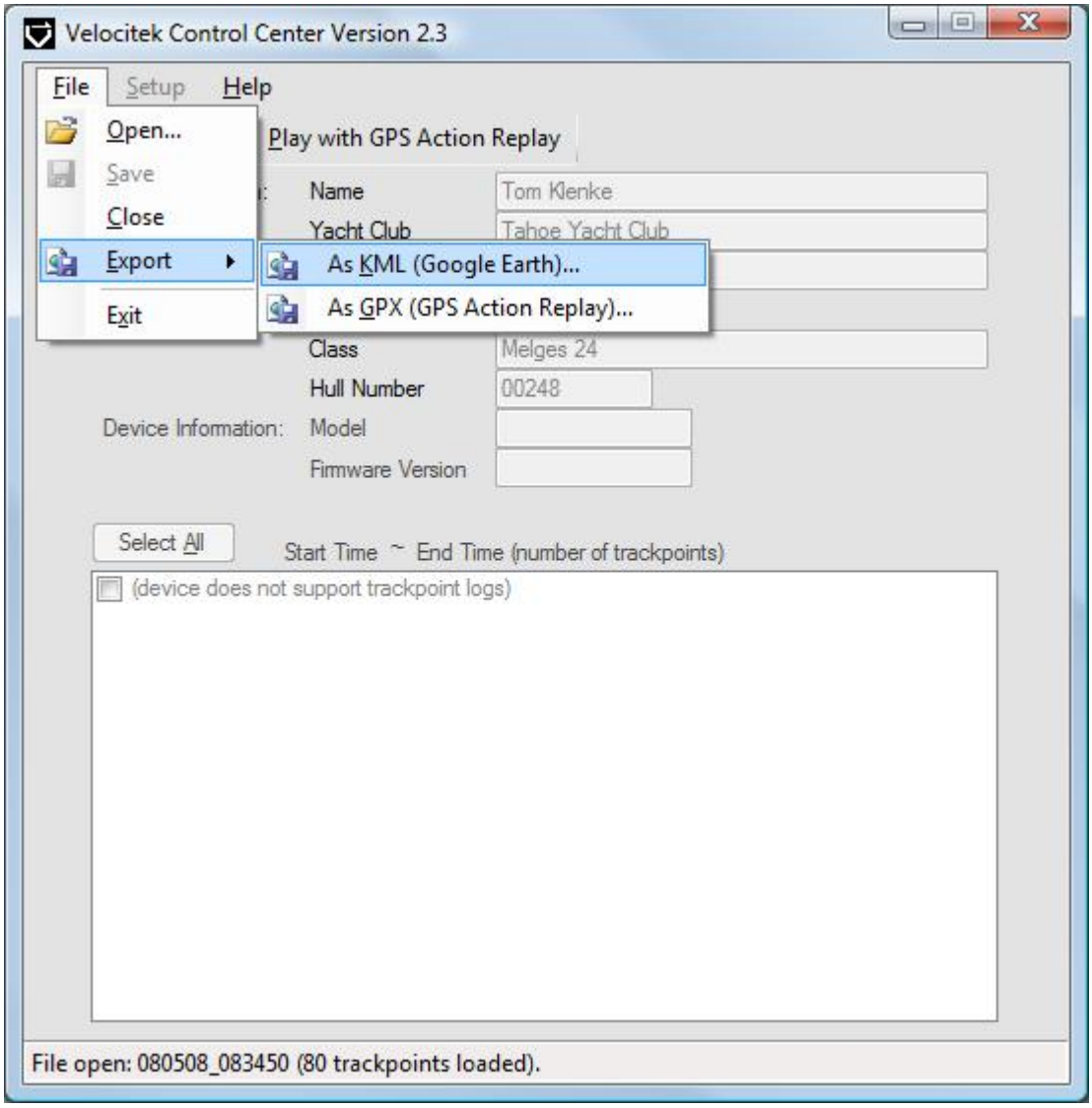
3 Give the file a different name from the automatically generated one if you wish. Click on the Save button to complete the process.



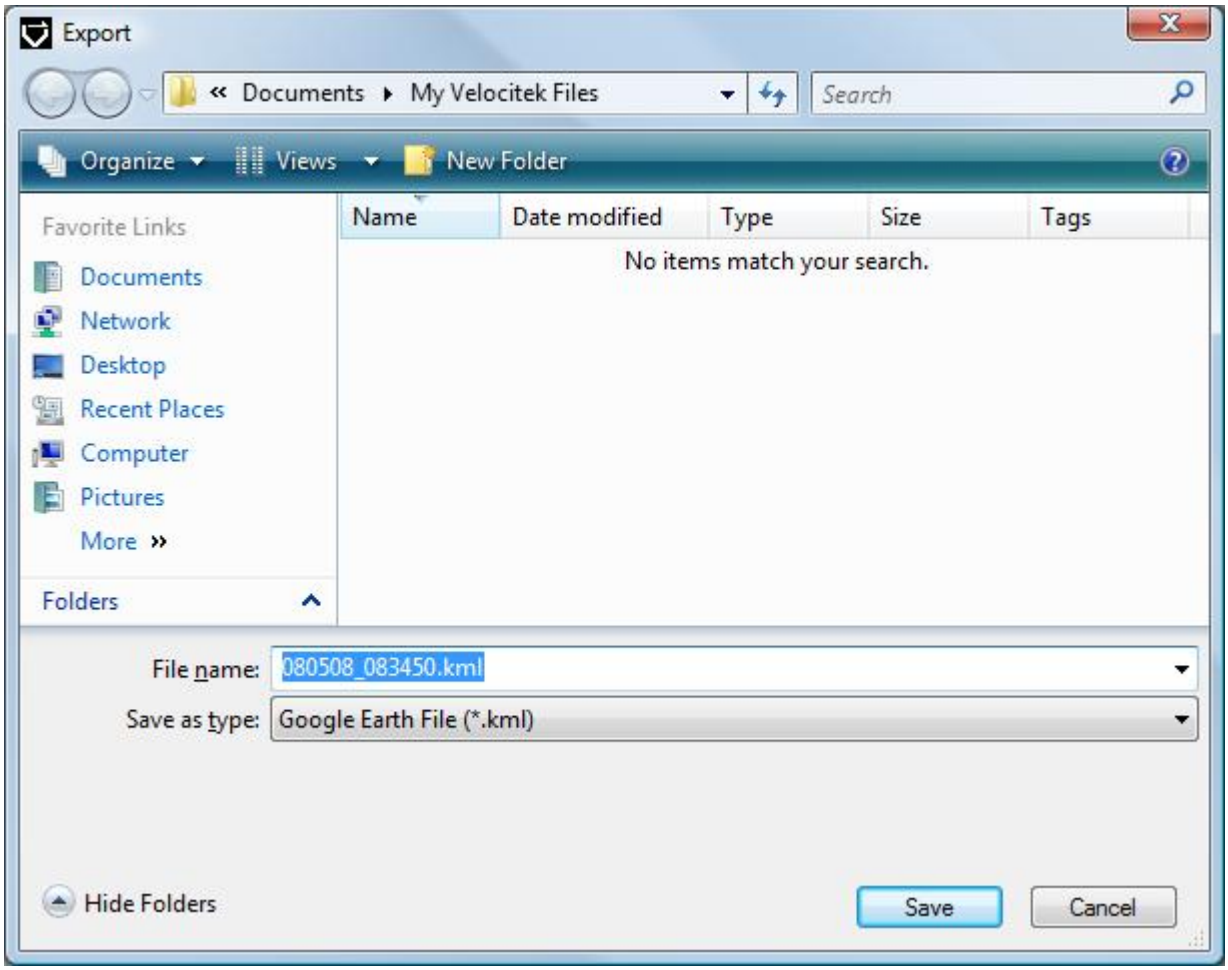
Saving GPS Data as a .kml or .gpx File

1 Download the GPS data you want the file to contain.

2 Select File->Export and then choose the format you want. In the screenshot, the .kml format was selected.

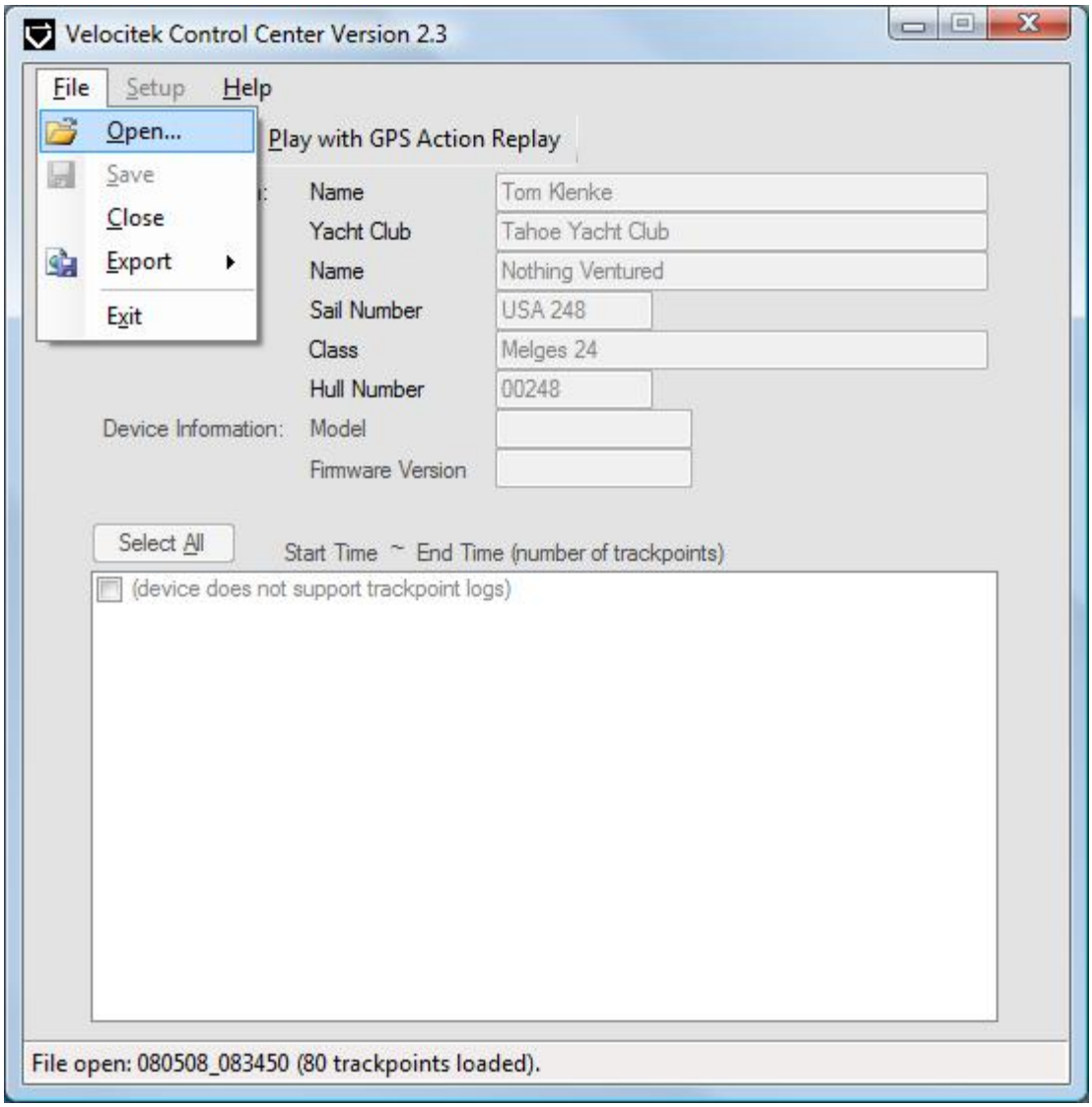


3 Name the file and click on the Save button to complete the process.

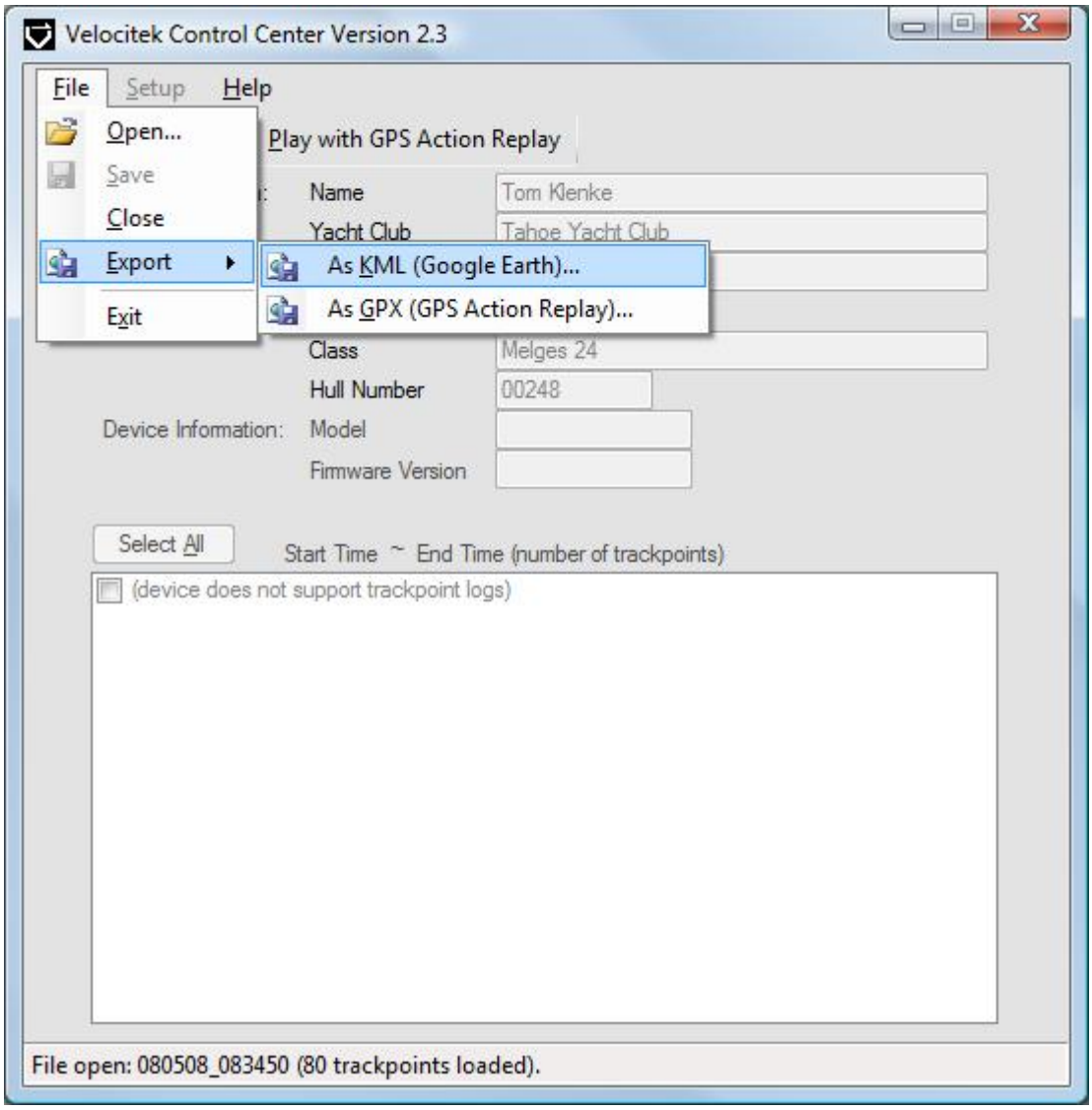


Converting a .vcc File into a .gpx or .kml File

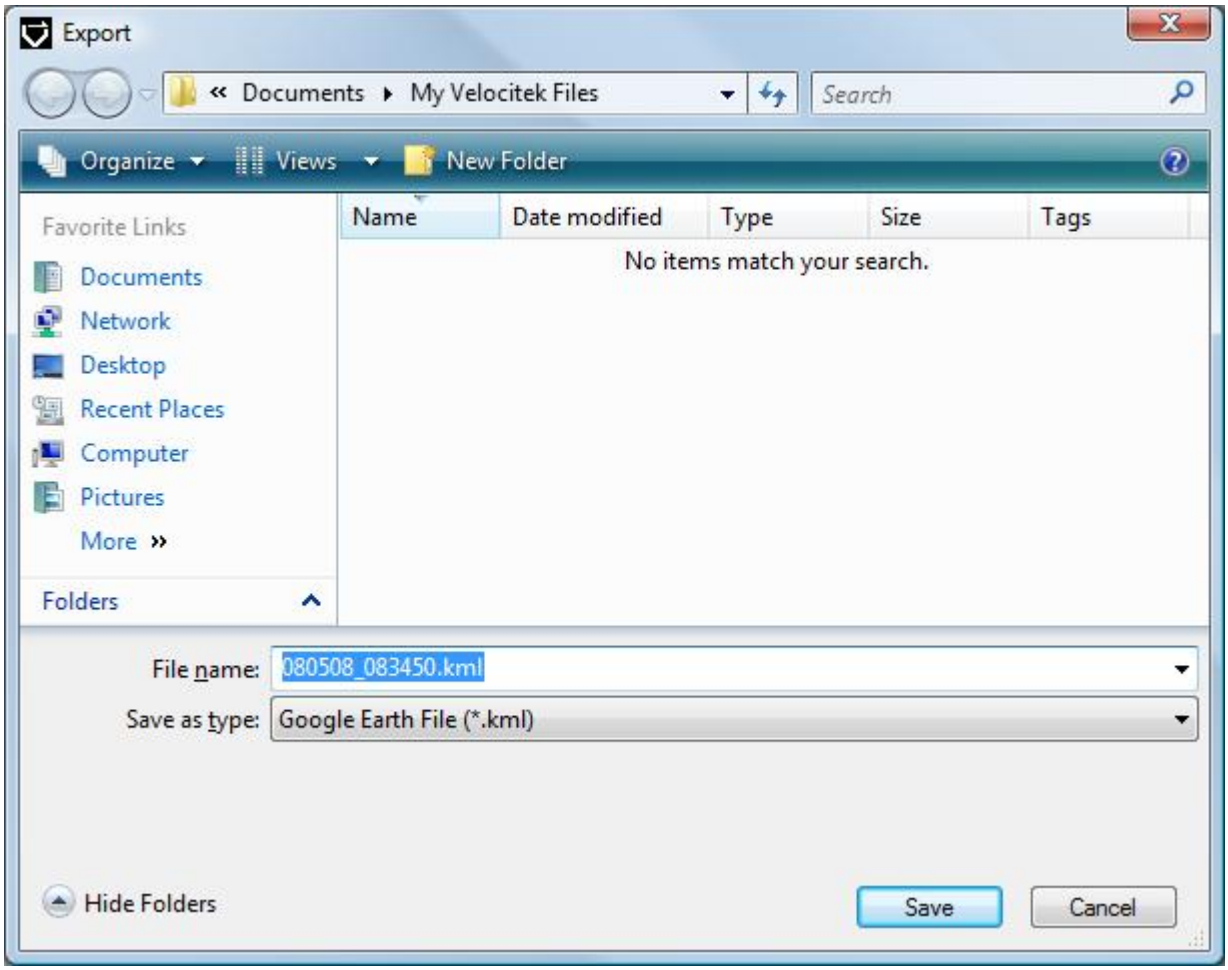
1 Select File->Open and then choose the .vcc file you want to convert.



2 Select File->Export and then choose the format you want to convert it to.

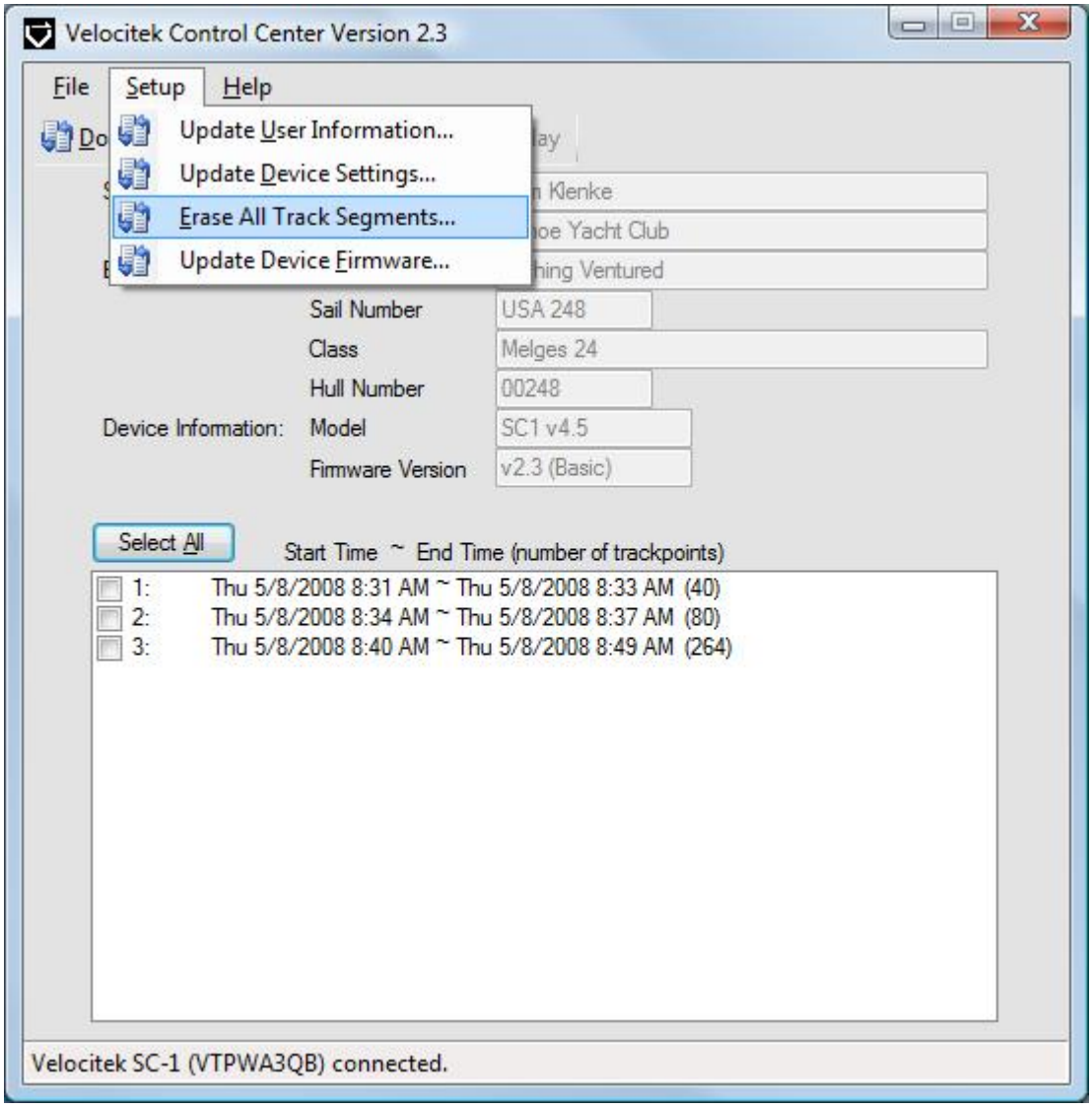


3 Change the name of the converted file (optional) and click the Save button to complete the process.



Clearing GPS Data

Since old data is automatically deleted, you may never need to clear GPS data from the SC-1's memory. If for any reason you do want to delete GPS data, select Setup->Erase All Track Segments.



Doing this will remove all track segments from the device. It is not possible to delete individual track segments while keeping others. Performing the above procedure will not affect the user information (your name, boat name, etc...) stored on the device.

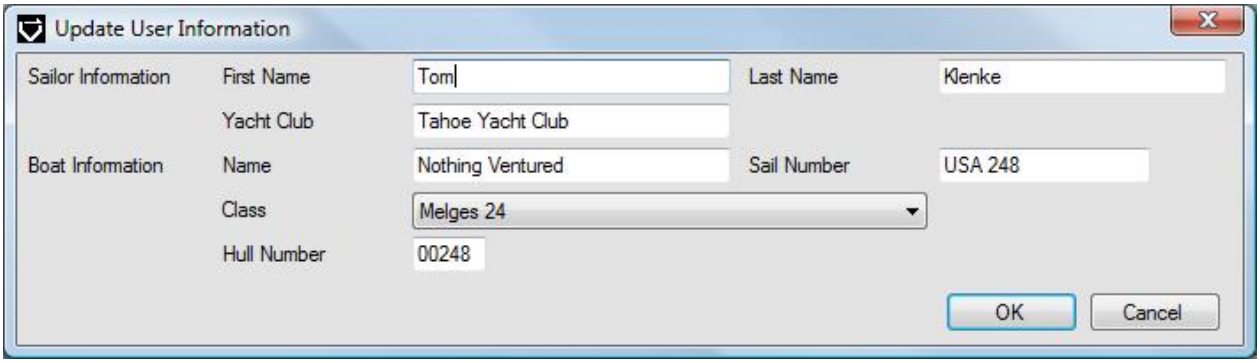
Updating User Information

You can store information about yourself and your boat in the SC-1. The information will be displayed in Velocitek Control Center when your device is connected to a computer. It will also be attached to .vcc files created with data from your device.

Use the following procedure to store user information on the SC-1.

1 Select Setup->Update User Information.

2 The following form will appear. Fill out the form and click OK to program your device or Cancel to discard the changes.



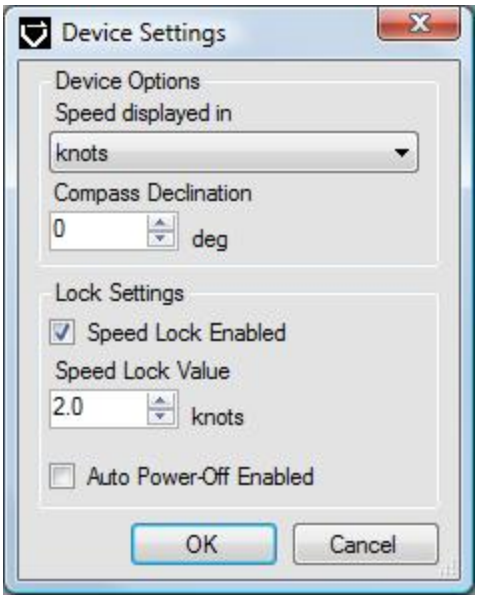
Please Note: If the name of your class does not appear in the list of classes, please send an email with the name of your class and your geographic location to classes@sailgps.com

Updating Device Settings

User configurable device settings allow you to customize how your SC-1 works on the water.

1 Select Setup->Update Device Settings.

2 The following form will appear. Customize the device settings and click OK to program your device or Cancel to discard the changes.



Speed Display In

Speed can be displayed in 4 different units of measurement, knots, miles/hour, kilometers/hour and meters/second. The default unit of measurement is knots.

Compass Declination

When defined to the local declination the compass measurement will be referenced to local magnetic north. Positive declination represents west and negative declination represents east. To reference the compass measurement to true north, input 0 for compass declination. Default compass declination is 0 degrees. When using a magnetic compass in conjunction with the SC-1, setting the compass declination to the local declination is useful since both instruments will be referenced to magnetic north.

Speed Lock Enable

When enabled, the buttons lock when the device speed is above the speed lock value. Speed lock is enabled by default.

Speed Lock Value

The threshold speed in knots at which the device buttons will lock if speed lock is enabled. The default speed lock value is 2.0 knots.

Auto Power-Off Enabled

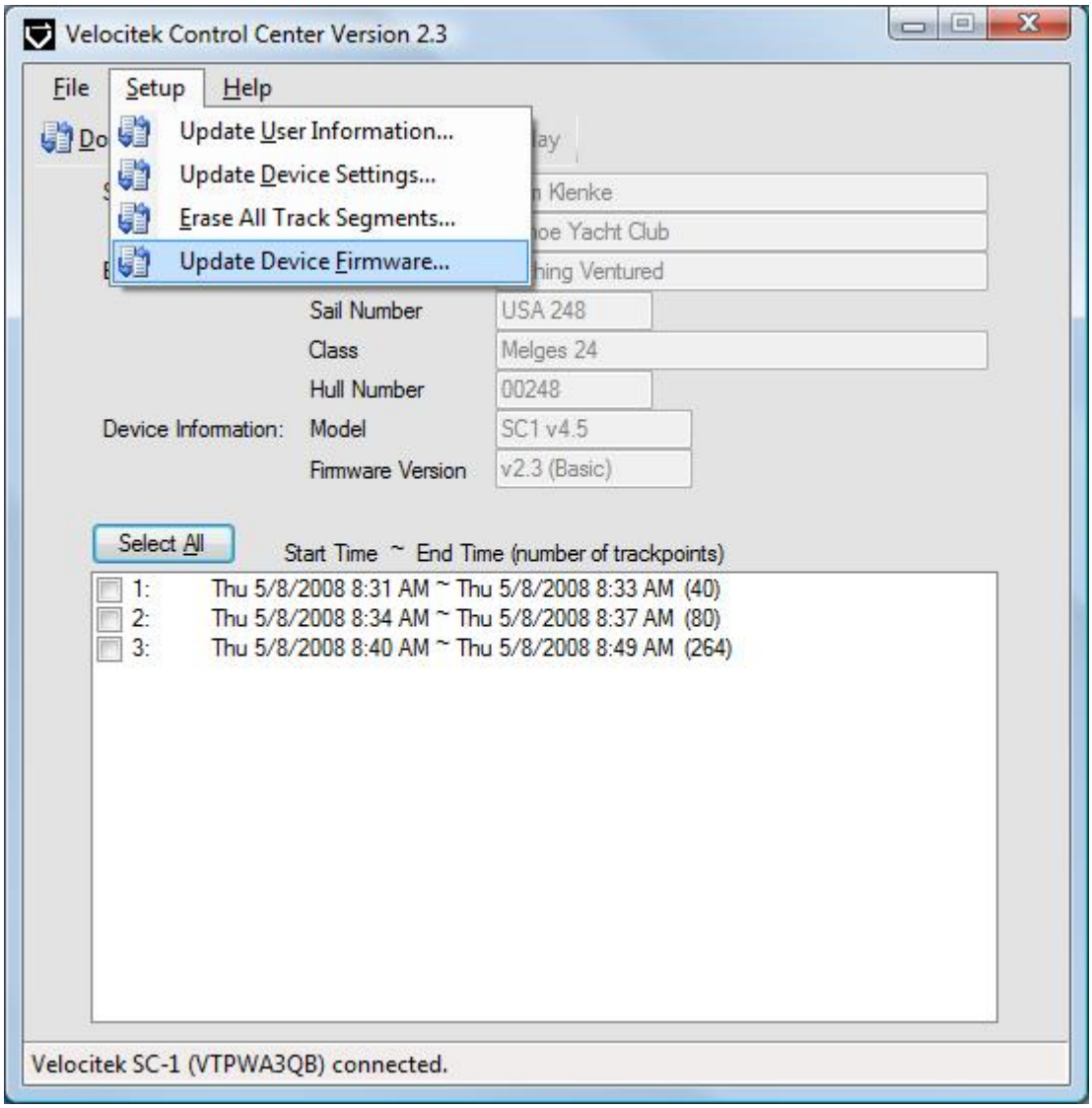
Enable or disable Auto Power-Off. When enabled the device automatically powers off when it is inactive for over 10 minutes. The feature is disabled by default.

Updating Firmware

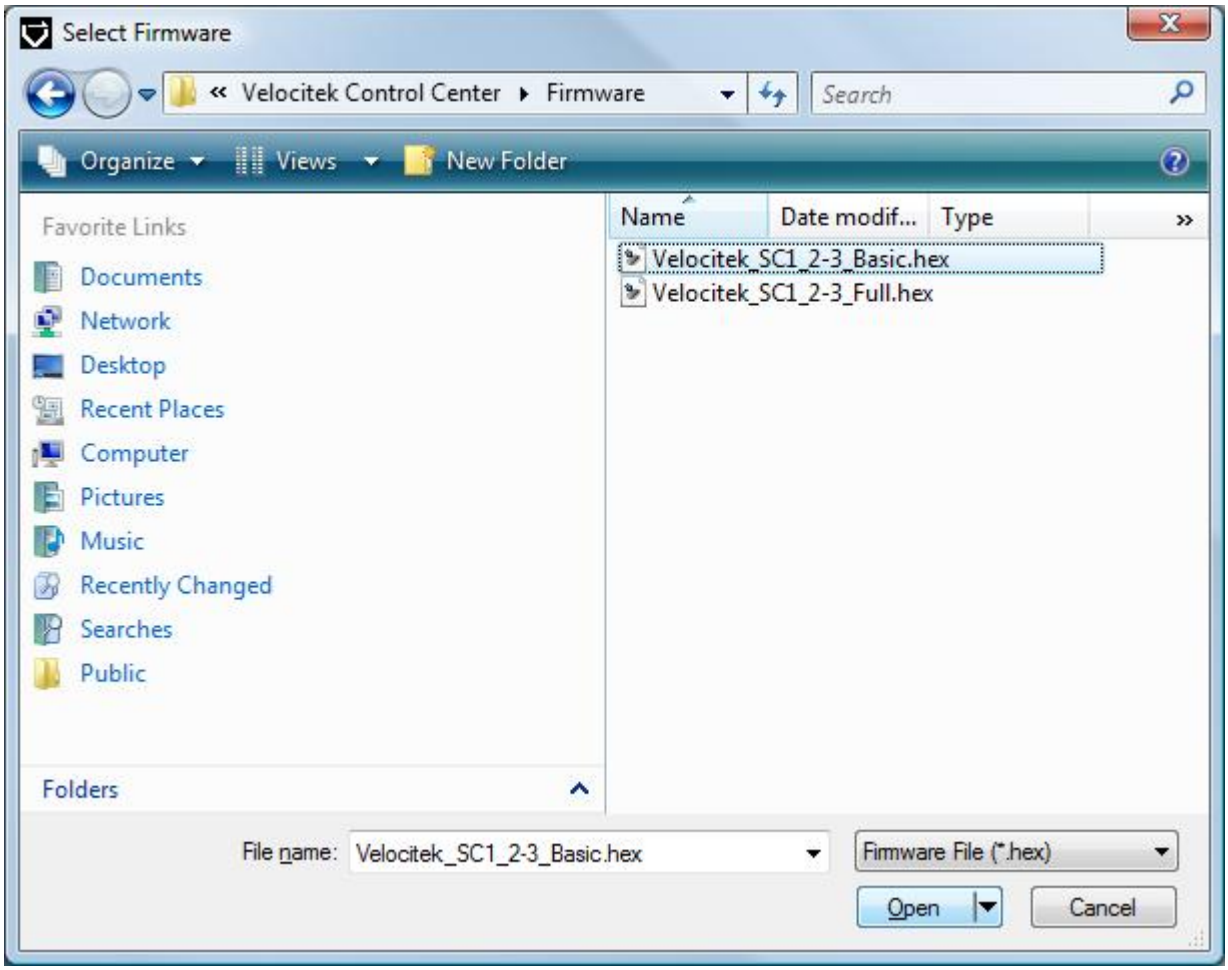
Firmware is the miniature computer program that runs on the GPS device's microprocessor to control how it operates. From time to time Velocitek releases new versions of its GPS device firmware. These updates are designed to either improve your device's performance or to tailor its functionality towards a specialized application. You can check for the latest available firmware versions at www.sailgps.com/downloads.

To update your device's firmware, use the following procedure:

1 Select Setup->Update Device Firmware.



2 Choose the firmware .hex file you want to install and click Open.

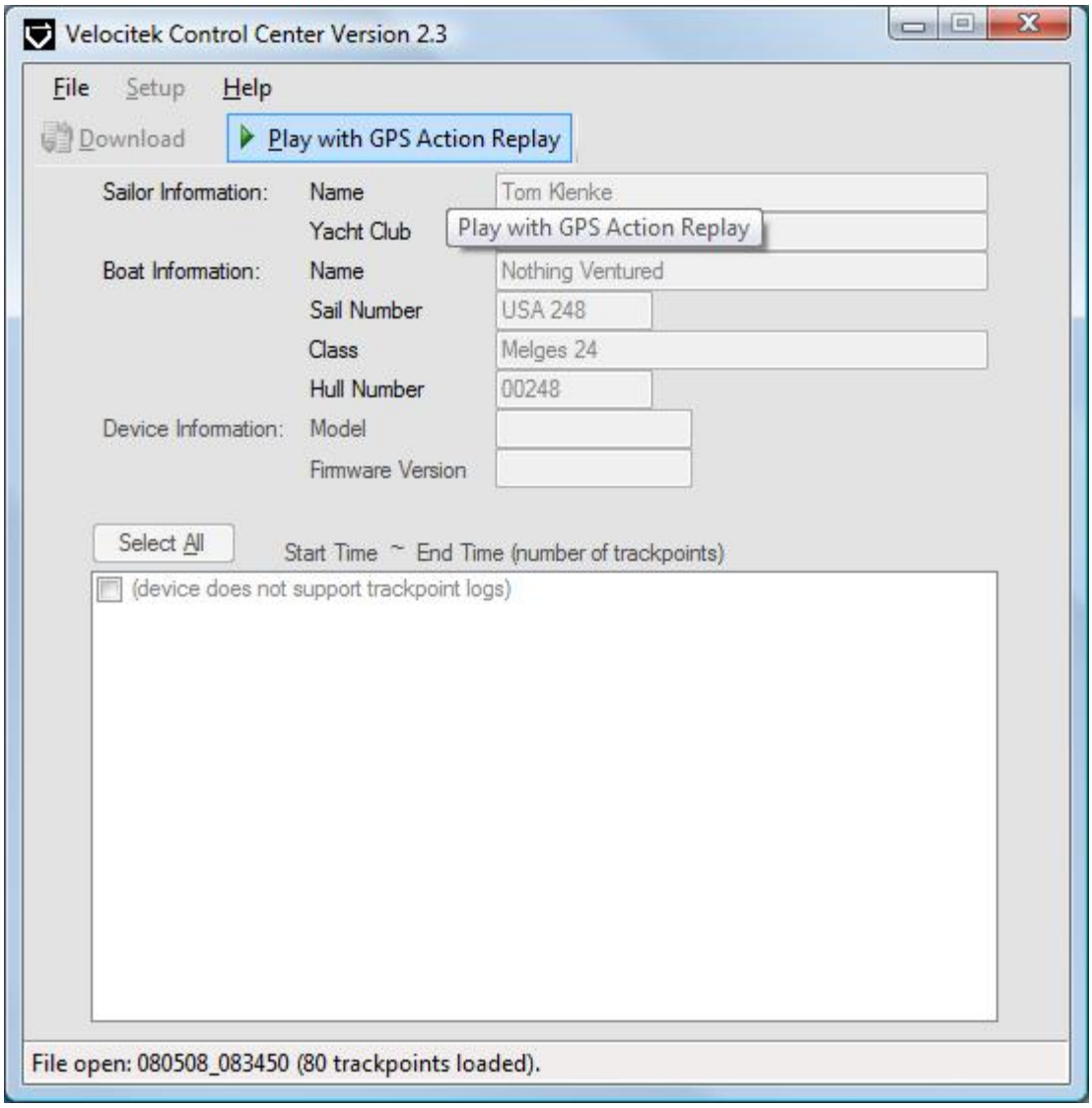


3 Wait for the firmware file to be uploaded to your GPS device. This will take approximately 10 minutes. Progress will be indicated by a horizontal bar graph at the bottom of the Velocitek Control Center window.

Launching GPS Action Replay from Velocitek Control Center

1 Download GPS data or open *.vcc files in Velocitek Control Center.

2 Click Play with GPS Action Replay.



Maintenance

To ensure your SC-1's enclosure remains watertight and the electronics are not destroyed by corrosion, please take the following precautions:

- Store your SC-1 with the latches undone and the enclosure partially open. This leaves the gasket decompressed and allows it to expand. This ensures that it will fit tightly when the enclosure is latched and fully closed.
- If you ever see signs that water is leaking inside the SC-1's enclosure please contact Velocitek immediately at (800)-693-1610 or support@sailgps.com to arrange for your device to be repaired and made watertight again. If ignored for an extended period of time, a leaky enclosure will wreck your SC-1

Contact

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271 B Kahiko St.
Paia, HI 96779
USA

Fax: +1-650-618-2679

Phone: Calls will be answered 9AM ~ 6PM, Hawaiian Standard Time (GMT-10)
US and Canada: +1-800-693-1610
International: +1-650-362-0499

Email: support@sailgps.com

Forum: http://www.sailgps.com/forums/

Downloads: http://www.sailgps.com/downloads/

Website: http://www.sailgps.com

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