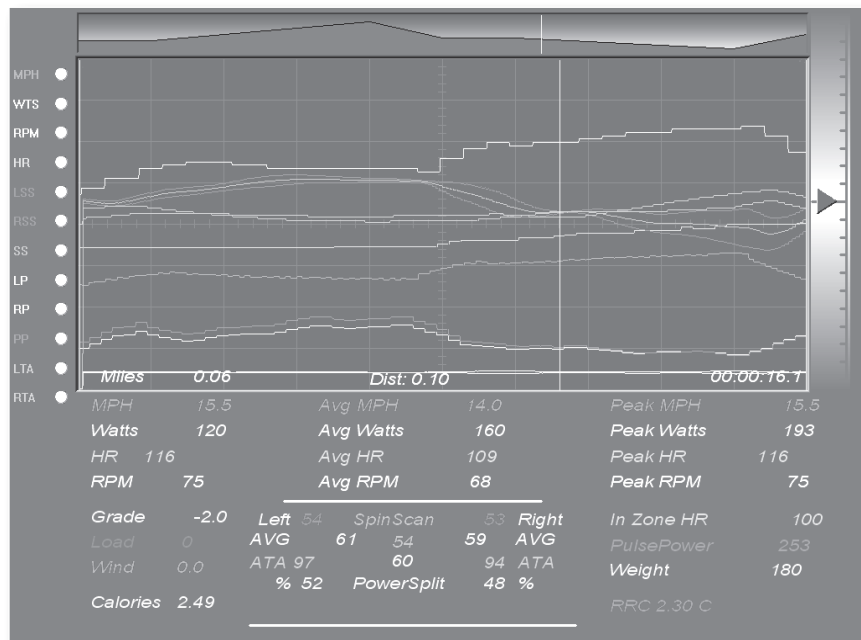


# VELOTRON

## Bicycle Training Technology for World Class Performance



## Velotron Coaching Software (CS)

### Users Guide

June 2010

***Velotron Coaching Software (CS)***  
***Users Guide***

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# CONGRATULATIONS!

Welcome! You are the owner of the RacerMate Velotron Coaching Software (CS). The Velotron with the Coaching Software was designed to analyze your Saved Performance Files (from either Velotron CS or 3D) or run Real Time Watts/Time test protocols, and run Full-Screen SpinScan tests.

Coaching Software is not “race software”, like Velotron 3D, but it can utilize road courses used by CS or 3D software to allow you to ride in a “test” mode instead of a “race” mode. It contains unique features making it a very useful tool for the coach or trained athlete who might be unable to coach or be coached in person. In these cases a Coach can look at what the athlete is doing by having the athlete e-mail any Velotron Saved Performance File to the coach who can then prescribe new courses or make new tests, which can then be sent via e-mail back to the athlete. Hence the name “Coaching Software.”

*Please* read through this and other accompanying operation manuals thoroughly to take full advantage of all the sophisticated capabilities your Velotron provides. Certain items in the manual are constantly overlooked and result in the majority of technical support calls. You will find a  (hand) indicating these potential areas of concern.

Software updates and new courses may be offered over time. To access these updates you should periodically go to our web site at [www.racermateinc.com](http://www.racermateinc.com). You are also invited to join the RacerMate Forum, which is also a good resource for information on troubleshooting your Velotron and contacting technical support. Changes to the software will obviously not always be represented in this manual, so you should also look for readme files and updated manuals on the web site to accompany any software enhancements.

*Thank you for the Velotron with Coaching Software and please keep this manual in a safe place for quick reference!*

## **Software Installation Procedure**

Velotron ships with as many as three separate programs, each with its own installation executable. Before inserting the CD-ROM into the drive, check the CD-ROM cover sleeve for any installation notes newer than what is stated here.

### **To Install:**

- 1 Start Windows™ (if not already running).
- 2 Close all Windows™ programs to prevent possible problems.
- 3 Insert the Velotron Software CD. An Install Menu screen appears.
- 4 Click on the program you wish to install. Follow the instructions to complete the install.
- 5 Continue to add other software choices until all desired software programs have been installed.

### **If the Install Menu screen does not appear:**

- 1 Double-click the My Computer icon.
- 2 Double-click the icon for your CD-ROM drive.
- 3 Double-click Autorun.exe (to activate the menu).
- 4 Continue as noted in item 4 above.

**Attention Vista Users:** You must install our software in C:\ and **NOT** C:\Program Files. If you do not have a disc showing a Vista installation setup icon, just be sure to edit the installation path (when prompted) and install to C:\Velotron CS 1.6

Be sure to read the readme file for each version of Velotron software for last minute up-to-date changes that didn't make it into this manual. Shortcuts to the readme.txt files are provided in the Start Menu Program Groups of each program.

## **Uninstalling Procedure**

Velotron software can be uninstalled easily. This will remove the program files that were added to your PC at the time the software was first installed, but may not remove files added after the program was installed, such as rider data files and saved performance files. An option for that is shown below.

### **To Uninstall:**

- 1 Start Windows™ (if not already running).
- 2 Close all Windows™ programs to prevent possible problems.
- 3 Go to the Program group for the Velotron CS program.
- 4 Click on the Uninstall link. Follow the instructions to complete the software removal.
- 5 To verify all the files are removed, double-click My Computer and then double-click the drive you installed the software. Locate the Velotron CS folder and right-click this folder and then left-click on delete.

**Please note:** Uninstalling and deleting files may remove courses and saved performance files that can not be replaced. Be sure if you intend to use these types of files in the future that you copy them to a remote temporary location until they are needed again.

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**Caution:** Consult your doctor before beginning any exercise program

## Quick Setup Guide

### Real Time -- CS connected to your Velotron feeding the data to the PC

**Step 1** -- Start the program by going to **Start - Programs - Velotron CS**. Left click **Velotron CS**.

**Step 2** -- Select "**Real-Time**" in the **Source** menu.

**Step 3** -- First use? Select **Source - New**. Create a *User Data File* and save it. On subsequent uses select **Open** to choose this user file. If you are the only user, then this selection needs only to be done the first time, as the software always remembers who used it last. If there is more than one user, create a *User Data File* for each person who will use the Velotron.

**Step 4** -- Make sure your Velotron is plugged into the PC and is turned on. Run the **Test Comm Ports** program from the **Test** menu to determine what serial port your Velotron is connected to. With this information, select **Source - Real-time - Comm Port** and verify the correct port found in the test has been set.

**Step 5** -- Select the **Options** menu. Here you can setup your Manual Ergo settings, Screen Capture Options, Drag Factor™ settings, Reports, and decide whether you want to run the test in Miles Per Hour or Kilometers Per Hour.

**Step 6** -- Select **Start**, then **Charts, Manual Ergo Mode, or SpinScan**. Only "Charts" will open a selection window for the courses or tests you want to use for your test. Select a course and then click on Open, the Chart screen will appear with this selection.

**Step 7** -- In the Chart screens (Manual or Controlled), left-click the red or green buttons on the left-hand side of the chart window to enable or disable the various channels of data.

**Step 8** -- Hit **F1** on the *Velotron Handlebar Controller* to start the timer. The course or test will start.

### File Mode -- Viewing Saved Race Files.

**Step 1** -- Select "**Saved File**" from the **Source** menu.

**Step 2** -- Select **Options** and check or uncheck Metric as desired.

**Step 3** -- Select **Start**, then **Charts**, and you will be presented with a window where you can browse to any folder from the "Look In" drop down window to select a saved performance file. Once the file is found, highlight it and select **Open**. The chart screen will appear with the race data showing in it's entirety. To open another file, press Ctrl - O.

**Step 4** -- Left-click the red or green buttons on the left-hand side of the chart window to enable or disable the various channels of data.

**Step 5** -- You can now move the mouse left and right over the data and zoom in and out with the left and right mouse buttons. Right-click your mouse for Full Zoom In, and scroll forward and back through the data by moving the *Time Indicator Bar* from the left-hand or right-hand side of the Chart Window, or establish a Zoom Window using the left/right and up/down arrow keys of your PC keyboard and hit Enter to activate this level of zoom.

## Saving and Exporting

**Step 1** -- Saving the data. When the test is complete, a Save dialog will appear allowing you to decide to save or not to save this test. On Manual Charts or SpinScan tests, press the reset command on the Handlebar Controller F5 (reset) to display the Save Dialog.

**Step 2** -- Exporting the data. Saved Race Files from any Velotron PC program (available on your hard drive) can be exported as ASCII text files. This can be done automatically or manually. If you always want an export performance files after a test (for use in 3rd party applications) check the AutoExport option in the Export Options menu. For manual export choose File, then select either the Export function or change the Export Options as needed (check-mark both "short format" & "comma delimited" in the options if you plan to use these export files in a spreadsheet). You will be asked to select the original saved performance file. You can then browse to any folder where the file may reside. Once exported, these files have the same name as the original file, but with a new .txt file extension.

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**Caution: Consult your doctor before beginning any exercise program**

## **PLEASE READ!**

### **Are you a previous user of Coaching Software? Here's what might be new!**

- Major improvement on the ability to read 3D courses -- especially those with multiple laps or those where you used the "Start From" feature in 3D.
- Added an AutoExport feature to automatically create an export file at the same time you save a performance file. This eliminates the extra step needed to generate this file. It will still use the setting you establish in the Export Options window. Perfect for those using Cycling Peaks software. To enable this feature, open and edit the Export Options menu and check Auto Export.
- You can open a new performance file without closing the previous file (returning to the menu) by pressing the Ctrl - O keys on you PC keyboard (for File Open) and select the new file.
- Added y-axis Torque Scale and a x-axis degree scale to the SpinScan screens.
- Added new menu functions to allow editing the chart scaling.
- Added DragFactor™ to the software. This feature allows you to edit your frontal area to match existing outdoor conditions.
- Added User Reports to allow a customizable/printable post-race report containing race statistics.

We're always looking for ways to make things better. If you have a suggestion or comment, please be sure to let us know. You can send these to [roger@Velotron.com](mailto:roger@Velotron.com) or, if you're having difficulty with the software, send these requests to [service@Velotron.com](mailto:service@Velotron.com)

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### **Step 1....Insert USB to Stereo Adapter**

Before inserting the USB to Stereo adapter you should install the driver for it first. The driver is installed as part of the 3D software setup, so if you have not installed the 3D software yet, please do that before proceeding.

Plug the **USB to Stereo Adapter** into a free USB port on the PC. If you do not have an available USB port, you may need to purchase a USB Hub to add more USB ports.



### **Step 2....Plug the Stereo Cable Into USB to Stereo Adapter and Velotron Load Generator**

Plug one end of the **Stereo Cable** into the jack on the **USB to Stereo Adapter** for the main Velotron. If a “Second Velotron” is also to be used, it will require a second **USB to Stereo Adapters** (available from RacerMate – part number R980-105-00) plugged into another USB Port. Plug the other end of **Stereo Cable** into the **Velotron Load Generator - EXT. PC** jack.

### **Step 3....Disable or Increase Computer Power Management Times**

Computers generally look to see whether you are typing or moving the mouse to determine whether the computer is being used. Data streaming in and out of the computer does not disable screen savers and power management schemes. The CS software will disable the screen saver, but power management settings. These are also found in the screen-saver section of the Windows™ Display Properties and must be disabled or increased by the user. It is advised to extend the duration prior to power management activation to a time period that is longer than you longest Velotron ride.

To change your Power Management settings, right-click the Windows™ desktop, then left-click Properties or Personalize, then go to the Screen saver option and then click on Power setting.

### **Step 4.....READY TO USE**

All PC connections now complete, you can use your Personal Computer with your Velotron.

#### ***PC vs. Handlebar Controller keys***

Not every command needed to setup and operate Velotron software is available using the 6 Handlebar Controller keypads; therefore, setting up a race will usually be done at the PC. Starting the race, pausing the race, changing between Bar and Polar SpinScan will be initiated by key presses from the *Handlebar Controller*. See the Handlebar Controller & Keyboard Keys shortcut page (on page 38) for more details.

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### **Maximum Cable Lengths**

#### **My Velotron and computer are in two different rooms!**

If you intend to place your Velotron in a room other than where your PC is located, extended lengths of cable will be needed to connect the two systems together. Unfortunately not all cables on the PC are easily available in lengths over 6 feet. The following should help you decide what works best for your situation.

**1 Stereo Cable:** The ***Stereo Cable*** can be up to 50 feet long. This wire transfers data between the Velotron and the PC. You can order this cable from RacerMate in 50-foot lengths (part number R980-064-50), which includes a coupler.

**2 PC to PC Monitor:** The longest cable readily available to extend a PC monitor is 6 feet. Signal loss is a major concern with extending this cable, so a good 6' cable can cost as much as \$30.00 and does very little to help in this application. Specialty cable makers found on the Internet do make cables that exceed this 6 foot length, but be prepared to spend a few bucks for these.

**3 PC to TV:** Adding a new PC to TV video card (replacing your existing video card) **or** installing a VGA to TV "Presentation Device" which has S-Video or Video outputs to connect your computer to a Television (*see the system requirements page or our web site for current information about video cards*). The following examples explain what may then be needed to connect the PC to a TV:

- a) TV's with only an RF input (Cable TV input only):** Connect a ***high quality coaxial cable*** between the Composite Video Output of the video card and the RF input on the TV using a Radio Shack Part No. 15-1244 Video to RF Modulator. This device converts video from the video card to a RF signal the TV can use.
- b) TV's with audio/video inputs:** Connect a high quality video cable (with RCA style connectors) between the Video Output of the video card to the Video Input on the TV. For lengths over 6 feet connect a high quality coaxial cable with RCA style adapters (Radio Shack part no. 278-252) between the PC and TV.
- c) S-Video compatible TV's:** This type of connection is by far the best in terms of a quality reproduction of PC monitor graphics, but S-video cables are typically less than 25 ft. long. Longer cables are available from specialty cable suppliers on the Internet, but in general using S-Video will be limited to close proximity PC to TV use.

**Note:** Extended length **Stereo Cable** and coaxial cable are both available from RacerMate.

**4 PC Keyboard and Mouse:** Only 6 foot cables are available. Wireless mice and keyboards are available that offer ranges up to 25 feet.

### Testing for Installed Components

Velotron CS includes a very useful tool to help determine how many Serial Communications Ports exist and the devices that may be attached to them. The Velotron sends a message saying, "Velotron" and this test will display this, as well, if found. Using this test will confirm whether the Velotron is communicating to the PC and what port settings will be set in Source - Realtime - Comm Port menu.



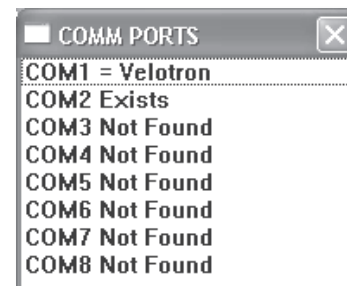
**Please be aware that this test only indicates serial communication port settings, but may not make the correct changes to the communication port settings menu if more than one Velotron is connected to the software**

If you have two Velotrons connected, the software cannot determine the position for each Velotron (left and right) and will set the first Velotron found to Rider One and the second Velotron will be ignored in Coaching Software. If you find the comm port set is for the wrong Velotron, you can swap the cables -or- rerun the test with only the Velotron turned on you intend to use. The software will set the comm port for that trainer, when found.

- 1 To begin the test, turn the **Velotron ON**. Be sure you have the **Stereo Cable(s)** inserted correctly into **Load Generator(s)** and **USB to Stereo Adapter(s)**.
- 2 Double click the *Velotron CS 1.6* icon in the Velotron CS Program Group. The CS Menu will open (below left): Choose **Utilities** then **Comm Ports**.



Velotron CS Menu Screen



Comm Test Results

- 3 The test will now search for available comm ports and determine whether any CompuTrainer is connected.
- 4 When the test is completed, a window like the one above (right) will display. The software will set the comm port in Source - Realtime - Comm Port to the first Velotron it finds.
- 5 If no Velotron is found during this test, please refer to Appendix C - PC and CS Setup Tips at the rear portion of this manual.

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## VELOTRON COACHING SOFTWARE (CS) - INTRODUCTION

**Velotron CS** is a tool for coaches and Velotron users alike. It was designed to help anyone develop workouts and analyze saved performance files from any Velotron software program.

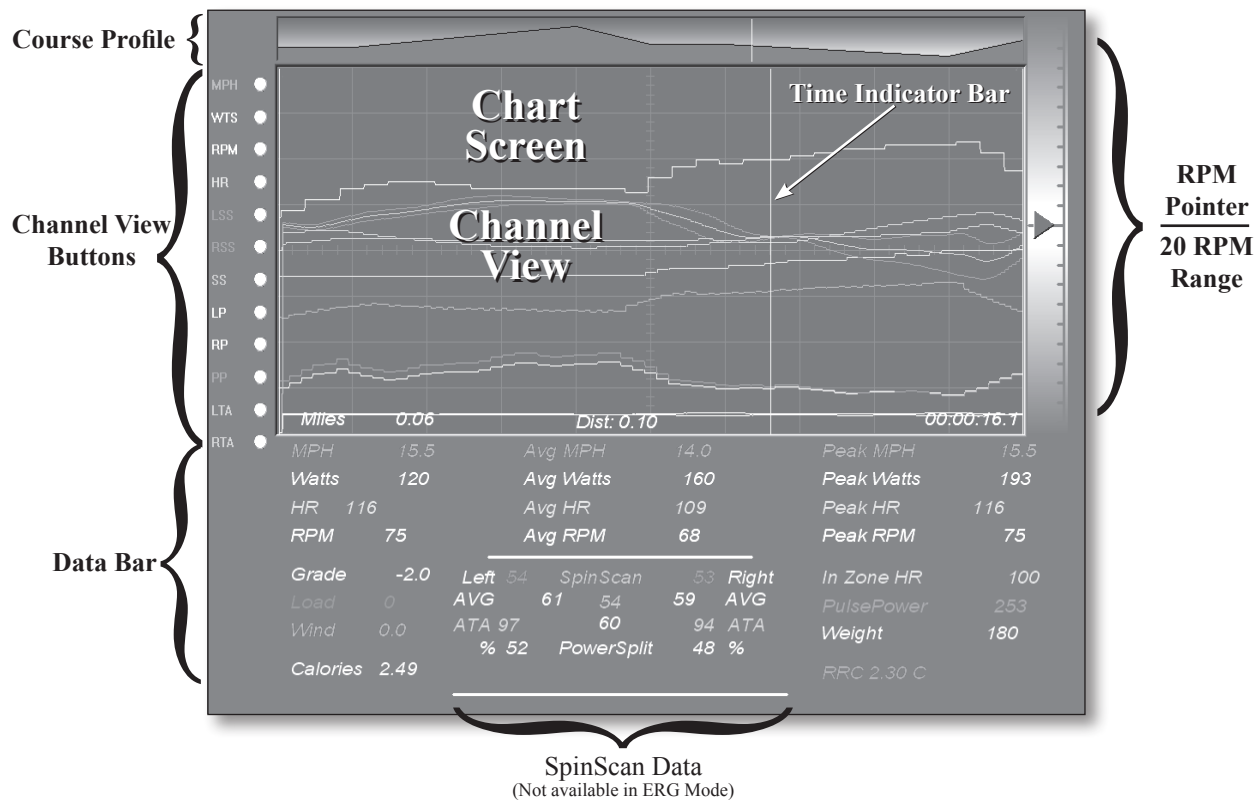
### For the Coach

Coaches can “prescribe” workouts for their athletes via e-mail or their coaching web site. With Velotron CS the coach can create these tests which the athletes can then run. Afterward, the athlete can provide the coach (by way of e-mail or recording media) the workout results for analysis leading to further prescribed workouts.

### For the Athlete

Velotron users can create a multitude of personal testing protocols and export the data into personal training diaries and spreadsheet programs. With the addition of Training Peaks software ([www.trainingpeaks.com](http://www.trainingpeaks.com)), you can dig deep into the files to learn all you can about your performance data.

### List of Chart Screen Features for Velotron CS:



- 1) Full array of data taken directly from a Velotron saved performance file.
- 2) Current, Peak and Average display of data. HR zone % and PulsePower™, Gear and Gearing.
- 3) User selectable color graphs that correspond to the data section.
- 4) Time Indicator Bar to pinpoint exact time coordinates.
- 5) Course/program profile for Real Time use to indicate current position, or workload.
- 6) Multiple Zoom Levels in File Mode operation.
- 7) RPM zone pointer to help maintain a fixed RPM during any test. It is ideal for fixed wattage tests.

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## List of functions for Velotron CS:

- Import all Velotron Saved Race Files for immediate scrolling and analysis of data points. When imported, the saved race file appears in the Chart View window as a full length race file – from beginning to end – in *“full zoom out”* mode. The individual data channels are color-coded and can be reviewed in this mode by moving the *Time Indicator Bar* left and right and watching the corresponding, color-coded numerical data bar. When you want a closer look at the data, the *Time Indicator Bar* can be positioned at this point of interest and with the click of the right mouse button you will fully zoom in to view the file with maximum details.
- Scroll Mode. In full “zoomed in” mode, the data channels can be scrolled – in either direction – by moving the Time Indicator line to the left hand or to the right hand side of the view window. The numerical data in the data bar will update as the screen scrolls past the Time Indicator Bar.
- View Option buttons. You have the option of displaying as much or as little of the data channels on the chart view window as you choose. Each selection of view data displays another channel of data within the charts view window. Regardless of the data channels you choose to be graphically displayed, the data bar at the bottom of the screen will show the full amount of data that is available.
- Gear Selection. This feature will allow you to design the gearing to match your racing bicycle, or to experiment virtually with any gear cluster arrangement. The screen will display both “gear inches” and “gearing” to allow you full knowledge of the gear you are in. Virtual front gears can change independently of rear gears using a unique key press timing function.
- Realtime Ergometer Tests. Using Velotron CS you can create automated Realtime “time/watt” based test protocols or run them manually using the Manual Charts mode. Tests can be in 1 watt increments with time steps as low as a hundredth of a minute. Manual Charts can be preset at a beginning wattage and allows for step changes from 1 watt up per key press.
- Realtime Road Courses. Using courses easily created for CS you watch your selected data channels scroll onto the charts view window in real time “distance and grade” based changes.
- SpinScan. This program analyses your pedaling efficiency. Pinpoint dead-spots in your pedal stroke with 72 multi-color display bars or the Polar SpinScan display. Average Torque Angle displays to help indicate whether your legs fire at similar points; preferably at or around 90 degrees from top dead center.
- Save - Velotron Data Files (\*.vel). Real Time ergo or road course performance files you save using your Velotron CS program can be subsequently reviewed the same as any other saved race file.
- Screen Capture - Preset a screen capture prefix for the capture file name. You can capture screen shots sequentially during either real time or file-mode operation. The screen captures will be saved with the prefix and then a sequential number in the popular Windows™ Bitmap format.
- Export Saved Race Files to ASCII. All Velotron CS Saved Race Files are encrypted and can only be read by CS. You can export any encrypted Velotron file as ASCII text for import into your favorite spreadsheet program or training diary that accepts ASCII.

## Running the CS Software

- When first executing the software from the program shortcuts, you will be looking at the Menu structure (as seen on page 11) where choices are made prior to beginning any test or analysis.

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## VELOTRON COACHING SOFTWARE (CS) - MENU STRUCTURE DEFINITIONS

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The file menu structure is the map to using Velotron CS. Each Menu heading has subheadings as shown below. Each menu and sub menu will be described in detail as you read this manual.

### File

#### Export

**Export** - Exports as ASCII your saved performance data.

**Export Options** - Opens the Export Options dialog

**Open Report** - Opens a dialog window to select and open a report in the Reports folder

**Exit** - Exits the CS program.

**Source** - Selects between Real Time and File Mode operation.

**Realtime** - Check mark to run Real Time tests using your PC based Velotron.

**New** - Create a new Velotron data file. (user data)

**Open** - Open an existing Velotron data file as a current rider.

**Comm Port** - choose the Serial Communications Port used by your Velotron.

**Saved File** - Run CS in File mode. To select a saved race file, choose Start - Charts.

A dialog will appear prompting you to select the location and file name.

**Test** - Test the serial communications ports, reporting what is attached to your PC.

**Test Comm Ports** - Test Comm Ports's 1-20 for attached devices.

**Accuwatt** -- Verification program to determine factory calibration values still exist.

**Enter Factory Calibration** - Used to enter Factory Calibration Value.

**Run Accuwatt** - Runs the Accuwatt program.

**Get Velotron Settings** - Verifies the settings stored within the Velotron firmware.

**Options** - Choices for Real Time operation, Course selection occurs from selecting Start - Charts.

**Metric** - when selected, CS displays metric values, in Real Time or File Mode.

**Enter Gears** - allows gear sprocket entry for up to 30 gears to mimic a road bike setup

**Screen Capture** - enter a prefix that will be used in the file name of a screen capture

**Manual Ergo Options** - set the Manual Charts starting wattage and incremental wattage

**Set Pointer** - sets the "center of the scale" (20 RPM window) on the RPM scale in Charts.

**Scaling** - Changes the y-axis scaling to help control channel clutter.

**Drag Factor** - enables the Drag Factor™ feature

**Setup Report** - Report setup dialog to enable reports and setup logos for report

### Start -

**Charts** - Starts CS Chart Screen , Real Time or File Mode, first opening a file selection window.

In Real Time -- Road courses or Ergo Tests are available

In File Mode -- All Velotron saved race files are available (except Wingate tests).

**Manual Ergo Mode** - Adjust the wattage manually during a test

**SpinScan** - Starts SpinScan Screen. F2 key toggles between Bargraph and Polar display.

### Help

**About Charts** - display the current CS version information.

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**Caution:** Consult your doctor before beginning any exercise program

## Realtime and File-Mode -- What do these mean?

Velotron CS operates in two modes: *Real-Time* and *File-Mode*. In Realtime, CS is connected to your Velotron and shows training data as you pedal. In File-Mode, you will be analyzing preexisting saved race files created by any Velotron software program.

### Realtime Operation

#### 1 Select “Source -Realtime”

In Realtime, your Velotron is providing the data to the PC (*for details on connecting your Velotron to the PC, refer to page 9 of this manual*). You will switch between File-Mode and Real-Time, or vice versa, using the Source Menu. When Source - Realtime is checked, the menu subtitles *New*, *Open*, and *Comm Ports* will become available.

#### 2 Create or Open a “Velotron Data File”

Velotron CS allows multiple users to store their name, weight and heart rate limits on the hard drive of the PC for future recall. These files have a \*.VDF file extension.

### Creating a New Velotron Data File

If this is the first use of Velotron CS, you will need to choose the **New** sub menu under **Source - Realtime** and fill in the data fields. Once completed, choose **OK**. You will then be prompted to select a destination (*Save in*) and name (*File name*) for the Velotron data file. After doing so choose **Save**. These files are saved with \*.VDF file extensions. It is advised to save these files in the Velotron CS root folder (*this is the default path*).

### Opening an existing Velotron Data File

Select **Source - Realtime - Open** and select the desired Velotron Data File (\*.VDF). If the file doesn't exist, you may have saved it into a different folder or you can create a new one using the **New** option as described above.

#### 3 Comm Port Selection

Before you make this selection you should first ensure your Velotron is connected to the PC and turned on. Then you should verify the current Serial Communications Port the Velotron(s) are using by running the **Test Comm Ports** program found in the **Test** Menu. Once the test completes, the results of this test should be compared to the settings made under **Source - Realtime - Comm Ports** and changes made accordingly.



The Test Comm Ports will automatically make changes to the comm port menu. If you have two Velotrons and both are plugged in and turned on it will use the first trainer found during the port test. You may need to swap stereo cables if it chooses the wrong trainer.

### Channel Views and the Data Bar

The Channel View Screen is an X/Y chart where performance data is shown. The y-axis Data Channels (the multi-colored lines) and the numbers shown in the Data area are in direct relation to each other in both value and color. By comparing the color of the channel with the text color of the Data, you can easily determine what channel of data you are looking at. The Performance Data is referenced to the Time Bar Indicator, which is on the far right hand side of the screen in Realtime, but is floating and controlled by the PC mouse in File-Mode.

**MPH** -- Current speed in Realtime or speed at the current Time Marker location in File-Mode.

**Watts** -- Power produced by the rider in Realtime or at the current Time Marker location in File-Mode.

**RPM** -- Revolutions Per Minute of the crank in Realtime or the at the current Time Marker location in File-Mode.

**Heart Rate** -- Current heart rate in Realtime or at the current Time Marker in File-Mode.

**Left, Right and Overall SpinScan** -- SpinScan data refers to the overall efficiency of the pedal stroke while riding on Velotron. See the section on SpinScan in this manual for complete details.

**Left Power** -- Left leg percent power output from the SpinScan data section in Real Time or the left power as recorded in a data file that contains SpinScan data in File mode.

**Right Power** -- Right leg percent power output from the SpinScan data section in Real Time or the right power as recorded in a data file that contains SpinScan data in File mode.

**LATA or RATA** -- Average Torque Angle values shown in the Polar and Bar SpinScan screen.

**Please Note:** Due to the nature of the Ergometer mode, SpinScan is disabled during an Ergometer Test. The purpose of an Ergometer test is maintain a wattage constant through the entire pedal stroke, so pedal modulation normally seen in SpinScan, though perhaps still present to some degree, is considerably difficult to analyze. As such, pedal-stroke analyzation in this mode is unavailable.

**PulsePower™** -- PulsePower™ is the relation between heart rate and watts. The efficiency at which a cyclist produces power for a given heart rate is what determines the PulsePower™ value. By adding rider weight into this equation (as we did) the coach or athlete can accurately compare multiple riders, regardless of weight, to determine who, for a given physiological makeup, will be most apt to excel in a specific cycling function -- be it sprinter or endurance. The higher this PulsePower™ number, the better.

PulsePower™ is defined as the ratio of watt seconds per heart beat, or heart energy output, in ft.-lbs. per beat divided by the body weight times 1000.

### Changing Channel Views

The Chart Window, *also called the Channel View* (the area of graphic detail) will display as much information as you choose using the **Channel View Buttons** (see the image on page 12). These buttons are to the left of the Chart Window and can be changed on-the-fly. Keep in mind, the more data you select, the busier the screen will appear.

The *Performance Data* (the numerical section below the chart window) will show all available data regardless the Channel View settings. When an item is selected, it will display as a colored line in the Chart Window that will match in color to the numerical value in the Data Bar.

**Please Note:** Y-Axis scaling for each channel of data can be changed for each value within the Options menu. See page 18 more detailed information.

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**Caution:** Consult your doctor before beginning any exercise program



**Test - Test Comm Ports - See also - Testing Connections and Ports (page 11)**

This test queries the Windows™ operating system to determine what serial communication ports exist on your PC and what may be connected to them. Using the results from this test, you can make the correct selection in the Comm Port section sub-menu under Source/Realtime. Full details on this test are found on Page 11.

**Test - Accuwatt™**

Accuwatt will confirm whether the Velotron is still calibrated and functioning as it was when it left the factory. Knowing this will eliminate any doubt about the validity of a test. The factory calibration value must be entered prior to running this test to give Accuwatt™ its reference point (see the Factory Calibration documentation supplied with your Velotron). Once entered, the Accuwatt™ program will provide you with two pieces of data: 1) deviation from the factory reading, and 2) deviation from each previous run of the Accuwatt test.

**Entering the original factory calibration value**

- 1 Go to Tests\AccuWatt\Enter Factory Calibration.
- 2 Enter the 6-digit calibration value and left-click OK.

**Running the AccuWatt test**

- 1 Left-click **Run AccuWatt** From the **Tests** menu. You will see a large window showing speed and the title-bar will state: Speed up to 23 MPH and Stop.
- 2 Accelerate to between 22 and 23 Miles Per Hour and stop pedaling. It is important to stop all leg movement forward or backward during this portion of the test -- but do not unclip from the pedals.
- 3 When the speed decelerates to 22 MPH the test will begin and load will be applied. The results screen will then appear showing a pulse count, factory deviation, and successive deviation. Further instructions are also shown to aid in running more tests or to exit.

**Note:** Some deviation from the factory setting will occur and is normal. Typical deviation will be very small, less than 0.05%. To exceed the rated +/- 1.5% wattage accuracy established for Velotron, a change of almost +/- 2500 pulse counts must occur. Anything less than this is acceptable, but trends towards higher than normal pulse count errors may be cause for investigation.

**Getting Velotron Information**

- 1 Go to Tests\Get Velotron Info.
- 2 Factory Calibration and Firmware information will display.

**Accuwatt Notes**

- The AccuWatt test results can vary slightly due to ambient temperature change, bearing grease viscosity, as well as chain tension. AccuWatt should be run while the unit is at room temperature (i.e., 70°F or 21°C), which is the temperature at the factory where the original calibration value was established. You should also check for excessive chain tension (too tight) and adjust to about 1" to 1½" of slack.
- It is possible to see Factory Deviations greater than 1.5%, but still have very low Successive Deviation values. This would indicate the Velotron has changed in some way, even though it is still repeatable in its current condition -- whatever that may be. Statistical "flyers" (one-time errors that may exceed rated specification) can occur to produce large errors. Statistical "flyers" can be ignored.
- Though every effort has been made to eliminate any potential "flyers", it is not uncommon -- especially on the very first run -- to have a value that is seemingly incorrect. You should always run a few consecutive tests before recording data. This will allow the Velotron to stabilize and also will allow the chain, bearings and grease to loosen up.

**Caution:** Consult your doctor before beginning any exercise program

**Options Menu**

**Metric** - This function works the same in Real Time, File Mode and Export. Check-mark this menu selection for displaying your information with Metric values (KPH and Kg's).

**Enter Gears** - This function allows you to enter the gearing (sprockets) found on an existing road bike. This will allow you to mimic this road bike by allowing you to shift the front gear cluster separate from the rear using a unique timing function of the gear changing key presses.

On the various screens you will see both Gear and Gearing displayed. Gear is 'gear inches' and Gearing is the typical "52/12" type of display known to most cyclists.

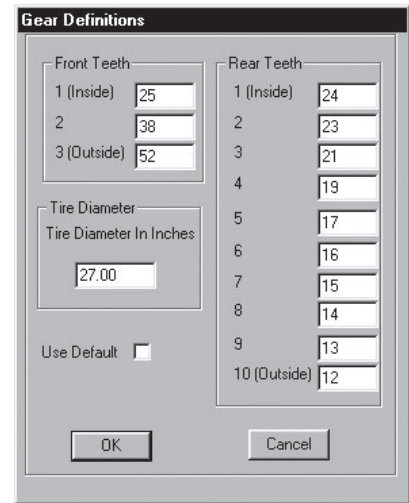
**Shifting Gears.** To shift the rear sprocket using a gear table as shown, you press shifter (up/down or brake-hood switch) keys quickly, once for each gear change. To shift the front sprockets, press and hold the appropriate key for about 1 second to initiate the change. The software uses the time period you hold these keys down to determine whether you intend to shift the front or rear sprockets.

**Screen Capture** - This setting will allow you to establish a "file save prefix" given to the screen capture routine. In other words, you can set a prefix; perhaps like Bob. The software will capture a screen shot each time the "C" key is pressed on the PC keyboard and will add a sequential number after the prefix (i.e., Bob1.bmp, Bob2. bmp, etc.). By referencing the Date/Time stamp given the file name by Windows™, you do not need to give a prefix more than this. The captured files are stored in a Capture sub-folder found in the Velotron CS folder.

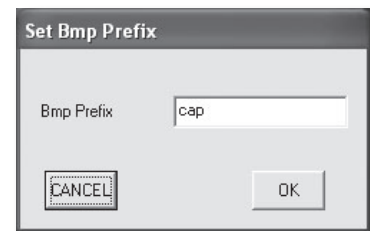
**Manual Ergo Options** - This setting establishes the starting wattage and the wattage increment of the Manual Ergo Mode feature. You can set the starting wattage anywhere between 0 and 2000 watts. Incremental changes can be set between 1 and 2000.

Using this option you can run a test that allows a warm-up, at say, 100 watts, and then in one press load the system to 1000 watts. Doesn't sound like a fun test or likely realistic, but most tests probably don't feel too fun anyway.

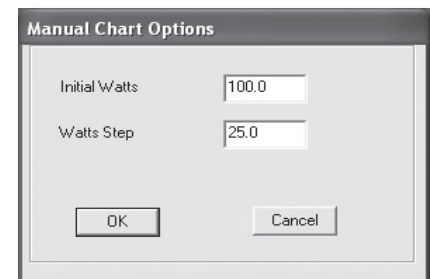
**Drag Factor™** - Select this to enable the Drag Factor™ display on the Chart and SpinScan screens. Drag Factor™ will allow you to adjust your aerodynamic drag to more closely match what you encounter on the road.



*Gear Dialog*



*Screen Capture Dialog*



*Manual Ergo Settings Dialog*

Please Note: You can only adjust your Drag Factor prior to starting the timer using F1. Once the timer starts the Drag Factor™ set is held throughout that ride. Drag Factor™ is only available in "wind-load" based training. If know, you can also preset the DragFactor™ in rider setup (Source - Realtime - New).

**Caution: Consult your doctor before beginning any exercise program**

**Set RPM Pointer** - This setting establishes the “center of the dial” for the RPM Pointer found to the right of the Channel View Chart Window. This RPM pointer has a 20 RPM swing, so if you set this at 90 (as shown) and pedal the bike, the RPM scale will be from 80 RPM to 100 RPM.

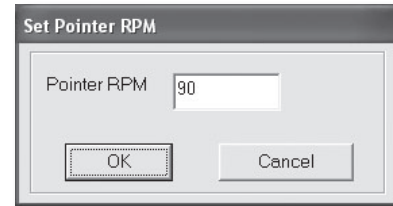
The purpose of this is to help keep you at a steady RPM during Ergometer tests, where changes in RPM can have an effect on how well the software can adjust the loads at the Load Generator to keep the watt constant. The smaller the changes in RPM you can sustain, the more consistent the loads will be.

**Scaling** - The Y-axis scaling on the Charts screen is set using the Edit Scaling option. In this dialog are a list of Minimum and Maximum values that determine the location within the Chart Window where the channels of data will reside and how high or low the numbers will go.

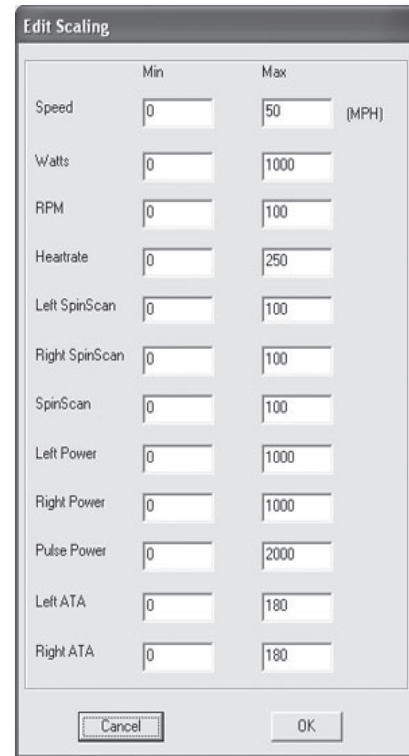
When you adjust the scale of any value, this not only increases the maximum number shown, but the location in the window the channel will run. 150 watts displayed within a Charts screen set at 0 Min and 300 Watts Max will show 1/2 way up in the middle of the screen. Set the scale to 600 Watts Max and the 150 watt value will show 1/4 of the way up the scale.

**Setup Report** - The main purpose of this file is to allow coaches and training centers to give a printed report to a client who has just done a ride. These are HTML files and will open in the default Internet browser. Printing these files is done as well using the Internet browser “print” option.

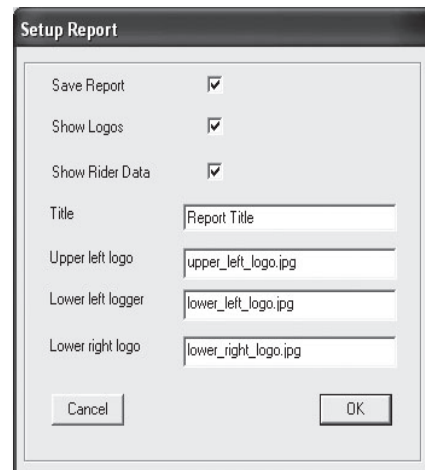
- ❑ There are example images supplied within the Reports sub-folder you can edit to suit your needs. Replacement files should be of similar size and file type if you make new files. If you change the names of these files, be sure to type the name to their path in the Setup Report menu dialog box.
- ❑ You will be prompted to save the report when you end the ride. If you have no plans to save any reports, you can turn off the report feature by unchecking “Save Report” in the Options Screen.
- ❑ Setting the feet/meters option in the Option Screen will establish whether the report displays metric values or not.



Set Pointer RPM Dialog



Scaling Screen



Setup Report Dialog

**Caution:** Consult your doctor before beginning any exercise program

### **Start Charts - Realtime**

“Charts” is the term for the graphic screen shown when CS is running. When you choose *Start - Charts* while Source is set to Real-Time, an “Open” dialog box will appear. Displayed will be all files with the course file types of ERG, CRS or 3D.

The file types available; “.crs”, “.erg”, or “.3dc” files are created in different ways. Information on creating .crs or .erg files are found in Appendix A, whereas .3dc files are typically created using the Velotron 3D software. You may need to browse to a different folder to gain access to some courses.

#### **The Charts Screen using Automated Ergometer Mode - .ERG files**

Ergometer tests are time/watt based tests and the load felt by the cyclist is controlled during the test regardless of speed or RPM. The word DUR, found in the center of the Chart Screen, stands for “Duration” and matches the final time value found in the .erg file. At the top of the screen, you will see a representative profile of the test with a moving pointer indicating your progress through the test. SpinScan is not available in a “watt constant” test, so in ergometer mode, this section of the screen has been grayed out.

#### **The Charts Screen using Road Courses - .CRS or .3DC**

When using CRS or 3DC files, the screen is identical to that of the ergometer mode, except the *Grade* and *Wind* lines are now active. DIST (for distance) is now shown in the center of the Charts window and matches the total length of all course legs in the .crs or .3dc file. At the top of the screen is a course profile and a pointer indicating your progress through the course.

#### **The Charts Screen using Manual Ergometer Mode**

A Manual Ergo Test is controlled by the Handlebar Controller and there is no profile and no predefined duration shown. Wattage is controlled by using the **Up/Down** arrow keys or the up or down arrow keys on the PC keyboard. You can establish the beginning wattage and the wattage steps in the Options/Manual Ergo Mode drop-down menu.

#### **Starting Tests Using the Handlebar Controller in Realtime**

**F1** begins and/or pauses the timer and data collection. If at any time you want to pause a test, you may press the **F1** key again to pause the timer and data collection.

#### **RPM Pointer**

This floating pointer (to the right of the Chart Screen) will help the athlete maintain a steady RPM during the test. The range is 20 RPM (10 RPM above and below the set point) as set in Options/Set Pointer. A steady RPM will minimize the corrections in the *load control loop* needed to maintain a watt constant in ergo mode.

### **Reading the Chart Screen**

As you pedal, the chart window will display the channels you selected and performance data will update with real-time numbers. In real-time, only the most radical of changes may be noticed in the channels. Peak and Average display functions only occur when the timer is running, as well as the collection of the performance data. In ergo mode, before the timer begins, the Velotron is in “Wind-load mode” on a flat grade to allow for warming up.



**Please Note:** The y-axis placement of the channel data on the Chart Screen is dependent upon the value of the particular data type. It would be very difficult to display numerically the value of each y-axis scale for each channel of data, considering each can be different. To check what the scale is, or change the scale for any channel, see page 19 “Scaling”.

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**Caution:** Consult your doctor before beginning any exercise program

### **Concluding a Test**

When you have completed your test, you can either reset the timer and run a new test, or save the performance data as a permanent record.

- At the conclusion of a known length test a dialog will appear asking you to “Reset or Save.”
- If the test is open-ended you would press the F5 (reset) button to prompt a “Save, Reset, or Cancel” (Cancel added in case you pressed F5 by mistake). These questions can be answered using the Handlebar Controller keys shown in the dialog to eliminate having to dismount the bike.

### **Saving the Race/Test Data**

Performance files in CS are saved as .vel files. Vel file extensions are created whether the test was an ERG file, CRS file, or saved SpinScan session. The performance files will be saved with a User Name/ Course or test type/Date/Time.vel format.

- 1 Press RESET after the completion of a test to display the “Do you want to save” dialog. Answer **Yes**.
- 2 Using the Handlebar Keys, press F1 to Save or F2 not to save.

### **Canceling a Test**

- If you decide to cancel a test, you can press F5 to display the Save Dialog. In this case you will press **No** when asked to save. This will or discard the performance data, reset the timer and course information (if any). If you selected RESET by accident, you can press Cancel to resume the test from that point.

### **Saved Race Notes**

- Saved Performance Files also contain “course data” to allow you to correlate the performance data with course correctly.
- After saving a performance you may be prompted to save a Report as well (if enabled).

## Analyzing Saved Race Files – File Mode

Velotron CS will review any file created using PC based Velotron Software (*except Wingate*).

These files types are:

- .3dp** – created by Velotron 3D (*see appendix D for information on 3D files and CS*)
- .Vel** -- created using the Velotron Coaching Software or MultiRider Time Trials

### To play back these files:

- 1 Choose **Source - Saved File**.
- 2 Then choose **Start - Charts**. An Open File Windows™ dialog box will appear.
- 3 Choose the folder the file is contained within using the “Look in:” box.
- 4 Select the file and left click Open

Note: If the files you want to look at do not reside within the Velotron CS folder, you can browse to a different location and open them from there.

**Tip:** If you would like to open another saved race file while still on the chart screen in File Mode, press the Ctrl O key to launch the Open File dialog window.

### View options - File Mode

Once a file is selected it will appear *in its entirety* within the Charts Window. The *Channel View* buttons work the same here as they do in Real Time -- the more you select, the more channels of information you will see in the Chart Screen.

### Viewing Saved Data

Once the data is loaded into CS it will be displayed in “full zoom out” mode. Moving your mouse left and right will move the **“Time Indicator Bar”** back and forth over the data. The values for any point in time will display in the Data Bar below. The average and peak values are computed from the beginning of the file to the Time Indicator Bar.

### Zooming into the data – Full Zoom In

To **zoom into** the data at any given point in time, **right click the mouse button** from within the Chart Screen -- paying particular attention to the timer. For instance, if you want to zoom into a file at the 10 minute mark, then move the Time Indicator left or right until the timer reads 10:00:00. If no zoom change takes place, the file data is too short for further zoom levels other than full zoom out.

### Zooming out of the data – Full Zoom Out

To **zoom back out** to “full zoom out” view, **left click the mouse button** within the Chart Screen.

### Multiple Level Zoom

You can define a zoom window and thus have many levels of zoom. To do this, use the **right (→) and left (←) arrow keys** on your *PC keyboard* to move the left and right Chart Screen borders inward. This establishes a new window boundary. When placed where you want to zoom in, hit the **Enter** key on your PC keyboard to zoom to that level. Moving the mouse forth and back reveals the data points for that zoom level. You can repeat this until you are “full zoom in”, at which point the left and right arrow keys no longer affect the Chart Window borders. At this level you can move through the file using the scrolling method described.

### **Scrolling through data – Full Zoom In**

You can scroll through your saved race files while in “**full zoom in**” only. By moving the mouse to the left and right *forcing the Time Indicator Bar against the right or left border of the Chart Screen*, the data will begin moving forward and backward through the file. To stop scrolling, move your mouse away from the window border.

You may -- at any time the screen is not scrolling -- left click to go back to full zoom out mode, reposition the time marker, and right click to zoom into another area of the saved race file and continue scrolling from there.

### **Changing Scroll Speed**

Depending on the speed of your computer, the scroll rate can be increased or decreased. While scrolling, use the up (↑) and down (↓) arrow keys on your PC keyboard to change the rate (speed) of scroll. Slower computers and slower graphics cards may not allow increasing your scroll rate and doing so may actually negatively affect scroll speed.

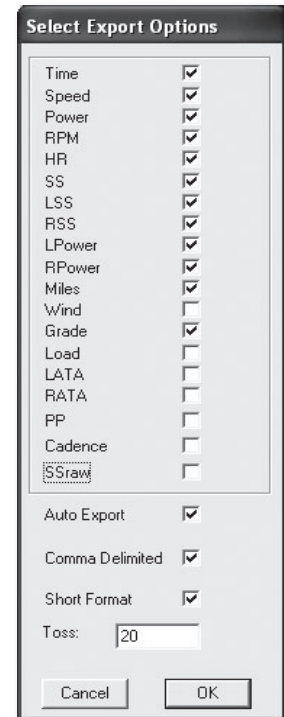
If the scroll rate appears too slow, try using the down arrow (↓) key to free up some graphic headroom. Most newer computers are already running far faster than when this feature was added, so you may not notice any changes.

### Exporting Saved Race Files

You can export your saved race files as ASCII text. There are four ways you can export saved race files, short format (with and without comma delimited) and long format (with and without comma delimited). Short format, comma delimited, allows for only one “white space with comma” between data columns and is better suited to import into a spreadsheet program or training diary. Long format columnizes the data and allows for easy viewing of the data in a text editor.

#### Export Options

Select File/Export Options (see the figure at right) before exporting a performance file. Here you can select the information within the file to export. Check-mark those you want in the export. The example on the right would best file an export from an ERG file, where SpinScan data (in this case, a lot of zeros) is removed before it is exported.



Export Options

#### Acceptable Export File Sizes for Spreadsheet Programs

Most spreadsheet programs have a limited number of lines of data they can accept (around 64,000). First, export the file first with toss=0 to determine the amount of lines an unaltered data file would be. Then you can then look at this number of records and divide this by 62,000 to give the number (rounded up) to put into Toss: .

#### Toss: Notes

- The Toss feature will tell the export function how many lines of data you would like to remove from the file. For instance, if you choose toss=5, the export function will choose the first line, toss 5, choose the 7th line, toss 5 and so on. The amount that you may need to remove will depend on the size of the saved race file and the requirement of the 3rd party export reader.

#### Changing Export Formats

To change the export format:

- 1 Select **File - Export**
- 2 Choose to save with or without **Comma Delimited** format by check-marking this option to make it active.  
**Note:** If you plan to use these export files with a spread sheet, select Comma Delimited.
- 3 Choose either **Long** or **Short** Format.
- 4 A dialog box will appear asking you to select a file to export. Once you have selected the file a timer bar will appear for some period of time, longer for bigger files, shorter for smaller files. After the export process, a dialog box appears indicating the export process is complete and shows the name of the file. The file will be saved with the same file name as it was originally saved, with the exception of a .txt extension. This file will be automatically saved into the folder the original saved race was stored in.

#### Export Notes

- The size of exported saved race files may be well over 10 times the size of the original saved race file. Care should be taken, especially when Auto Export is enabled, to monitor how many of these you export into your computer.
- If you will always want an export of your performance files, you can use the Auto Export Feature. This will export the performance file at the same time you save the performance and will use the settings you have set in the Export Options Screen. For Details on this feature, so Appendix B at the rear of this manual.

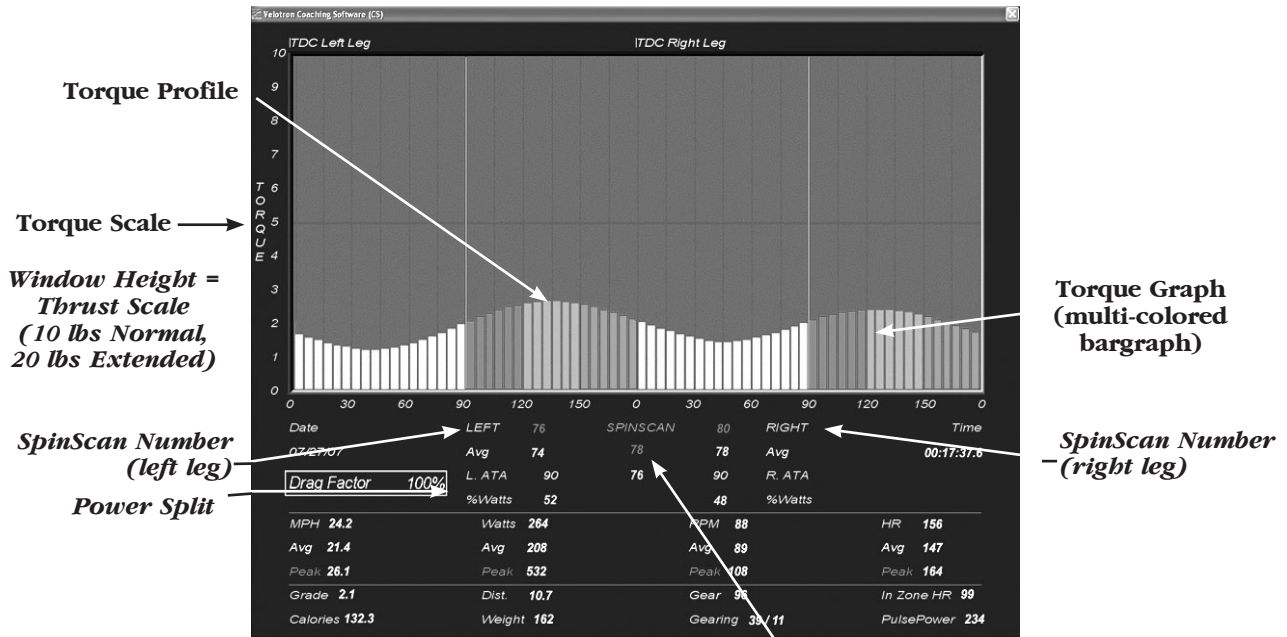
**Caution: Consult your doctor before beginning any exercise program**



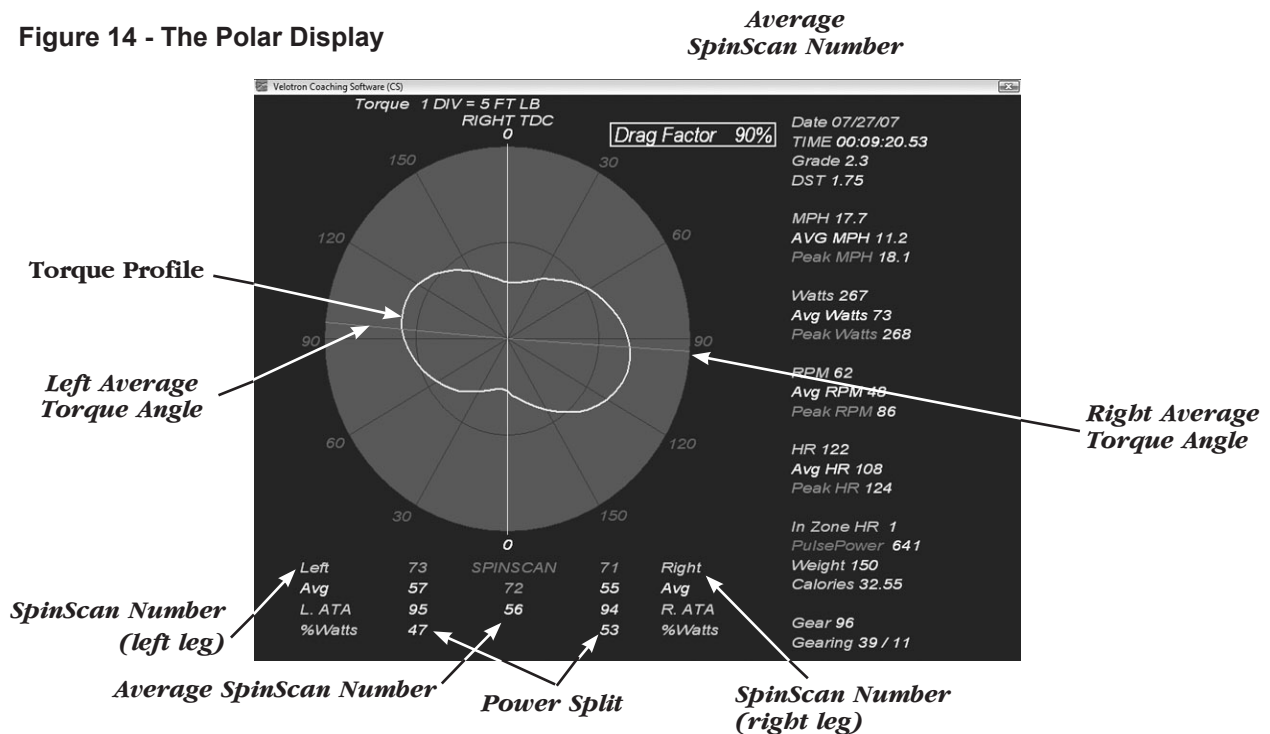
**Understanding SpinScan**

SpinScan comes in two forms -- Bargraph and Polar. Both provide much the same information, but display it in different ways. The Bargraph version is the original version of SpinScan and due to its familiarity is the most popular. The Polar version on the other hand, is being readily accepted among the engineering crowd as the most intuitive. The fact is: both are good for different reasons as you will soon see in the written description for both.

**Figure 13 - The Bargraph Display**



**Figure 14 - The Polar Display**



**Caution: Consult your doctor before beginning any exercise program**

### **SpinScan Definition**

*The SpinScan number is defined as: Average Torque divided by Maximum Torque multiplied by 100.*

In essence, the SpinScan numbers represent efficiency of the muscle groups in the legs to produce power evenly through the stroke. The more efficiently you use the muscles in your legs to “pedal in circles”, the higher the SpinScan values will become and the flatter (bargraph) or rounder (polar) the SpinScan Torque Profile will become. If your legs could produce power like an electric motor, the graphs would be perfectly flat (or round) and the SpinScan values would be 100, as in 100% efficient.

#### **The Bargraph SpinScan (see fig. 13)**

The Bargraph **Torque Graph** is a multicolored bar graph and represents one full 360 degree pedal stroke divided into 15 degree segments, 24 in all. The first bar is the *left leg* at Top Dead Center (TDC) and TDC for the *right leg* starts 180 degrees later, or 12 bars later, in the center of the graph. The height of the bars are proportional to torque, showing road thrust in foot pounds. By referencing the weaker (lower) areas of the **Torque Graph** you can determine which muscle group(s) can best improve this weak area. Specifically training these muscle group(s) to “fill in” the weak area will thereby produce an overall “flat” SpinScan over time. A flatter **Torque Profile** along with higher **SpinScan Numbers** should equate to less fatigue for any single muscle group and improved overall endurance.

#### **The Polar SpinScan (see fig. 14)**

The **Polar SpinScan** works exactly the same as the Bargraph version, but instead of the **Torque Graph** being individual bars, which represent 15-degree increments, the Polar SpinScan shows a **Torque Graph** in a circular, or polar, pattern.

The Polar version also adds **ATA** (Average Torque Angle), which is a visual representation of where the average torque is being applied. It represents how you use the “lever-arm” of your bike cranks. The longest, and most efficient “lever-arm” of a bicycle crank is while it is at 90-degrees from TDC. If the muscles are firing too early or too late, ATA will indicate this. Values too high, too low, or uneven may awaken the need to have an expert coach or exercise physiologist examine what you’re doing.

- A **Torque Graph** displaying power output to the road for one full crank revolution.
- A **Torque Profile** displaying a graphic representation of how power is being transferred to the road in 5 degree incremental changes.
- The **SpinScan Numbers**: left leg, right leg, overall, AVG right, AVG left, and overall AVG.
- A **Power Split** displays power output differences between left and right leg in %.
- Left and Right ATA** (Average Torque Angle): displays the average point in degrees that represent efficient crank arm length usage.

### **Necessary Connections and Settings**

**SpinScan** requires an RPM signal to function and will not work without an RPM reading above 30 RPM; therefore, before using SpinScan, be sure you have correctly mounted the **Cadence Sensor** to the bike. Though not shown on the Race Screen, *you must enter your correct weight into memory*. See Page 15 -- “Velotron Data Files” for details on entering your weight.

Press the F2 or F3 key on the Handlebar Controller until the appropriate SpinScan screen appear. To go from the Bar to the Polar and back again requires pressing F2, or if the PC keyboard is handy, you can toggle forth and back using the F2 PC key.

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**Caution: Consult your doctor before beginning any exercise program**

## Using SpinScan

In order to understand how to use SpinScan, you must first understand what it displays and what it doesn't. The **Torque Graph** represents power output - to the road - of *both the right and left leg at the same point in time* - not individually. Because your legs are connected to one another through the crank arm and because the power output on Velotron is calculated in the Load Generator, each bar of the graph represents power for both the push of one leg and the pull of the other. Velotron uses the cadence sensor to determine crank position.

It is commonly known that the "push" muscle groups are stronger than the "pull" muscle groups in cycling. Taking this into consideration, SpinScan can accurately define the **Power Split** produced by both legs downstroke. The majority of the power produced in cycling occurs during the push (downstroke) portion of the pedal stroke using 5 of the 6 major muscle groups. This occurs from about 45 to 120 degrees of the downstroke. The muscle groups that provide any appreciable power on an up-stroke pull will always be "shadowed" by the strongest muscle groups in the opposite downstroke positions and therefore don't affect the shape of, or the height of, the Torque Graph -- except to the degree they are not resisting the downstroke push. The purpose of clipless pedals is to help minimize the effect of dead weight on the upstroke.

The interaction between muscle memory and equipment variables will determine what the **Torque Graph** looks like and changing any of these variables will likewise have some affect on the graph. For instance, if you consciously modify muscle coordination by pulling up before, or pushing forward at TDC (Top Dead Center), or pulling back at BDC (Bottom Dead Center), this will show dramatic changes in the **Torque Profile**. Likewise, equipment variables such as oval chain rings, clipless pedals, crank arm length changes, etc., will each have their own distinct effect on the **Torque Profile**. It has been demonstrated that an uneven **Power Split** can be compensated for by using different length crank arms, or pedal shims, while also having a positive effect on the **Torque Profile**. The beauty of SpinScan is seeing the effect of any changes instantly.

## What is an Optimum SpinScan?

As a general rule, higher numbers are better than lower numbers. It has been our observation that roadies produce numbers in the 70's to mid 80's range, while mountain bikers may see much lower values because they spend more time standing on the pedals. Clearly, staying in the seat as long as you can while increasing the grade and eventually you will produce higher SpinScan numbers.

## Making Your SpinScan Better

Special one-way cranks and clipless pedals do a lot to help build muscle strength in the up-stroke. Most dead spots in the pedal stroke, though, are at Top-Dead-Center and Bottom-Dead-Center. Workouts should be created to combine the strengths of the two or three "equally weak" muscle groups that fire within these areas to help fill in these dead spots.

With the majority of power being produced by the largest and strongest muscle groups -- at the same instance where you also have the most leverage to produce it (at about 90 degrees from top dead center). Concentrating on the dead-spot areas at top dead center and bottom dead center while using SpinScan should be considered for your workout routine, but you should consult your coach or trainer before making any final analysis.

## Further SpinScan Tips

Further into this manual (Appendix E) you will find a section containing SpinScan tips supplied by Coaches who use Velotron or CompuTrainer. We will add more comments there, crediting those who submit them, as they are sent to RacerMate.

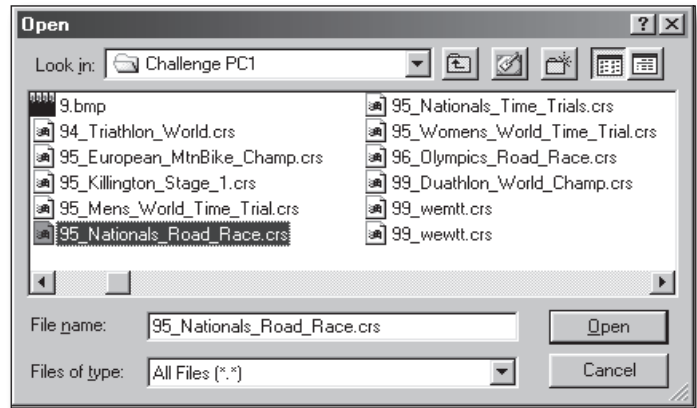
---

**Caution: Consult your doctor before beginning any exercise program**

**Creating Courses using Windows™ Notepad**

Notepad is a text editor supplied with Windows™, which can be used to create ASCII text files (a programming language). You can create or edit course profiles with minimal computer skills by following these instructions.

- 1 Left-click Start and then Programs.  
Left-click Accessories and then Notepad.
- 2 With Notepad running, click on File,  
then Open (see fig. 15).
- 3 Left-click the down arrow in the “Look  
in:” section and browse to the folder  
containing your courses. Left-click it to  
place it in the Look in: section.
- 4 By default Notepad looks only for “text  
files”, but if you left-click on the down  
arrow in the “Files of type:” section and  
choose “All Files (\*.\*)”, then all the files  
in this folder will appear.
- 5 The files with a “.crs” extension (the last 3 characters in a file) will be courses. These can be opened  
and edited to make new courses.
- 6 Left-click on a course to highlight it and place it in the “File name:” section.
- 7 Left-click the Open button to open this file in Notepad.



(Fig. 15) Open an existing course file

**Course Creation Details**

Below is a view of a course opened in Windows Notepad. Details of the course construction are shown to the left of the display (see Fig. 16). We’ll continue with editing a course to make it a new one, which is the easiest way to also make a new course.

<p>Windows Title Bar – Notepad Menu –</p> <p>COURSE HEADER [in Brackets] – UNITS (English or Metric) – DESCRIPTION of course – FILE NAME (must match Windows™ file name) – Table Description (informational only) – Comments of any kind can go after semicolon – END COURSE HEADER [in Brackets] –</p> <p>COURSE DATA [in Brackets] – Course Data (as many lined as needed) –</p> <p>This data makes up the course as it is displayed on the Race Screen. The first column of data represents the course leg lengths to a hundredth of a mile if you choose. The second column of data represents the course grades. Add a negative sign (-) to indicate downhill grades. The last column of data represents wind and can be both headwind or tailwind. Again, add a negative sign (-) to indicate tailwind. No tenths or hundredth places for wind.</p> <p>END COURSE DATA [in Brackets] –</p>	<pre> 94 Triathlon World.crs - Notepad File Edit Search Help [COURSE HEADER] UNITS = ENGLISH DESCRIPTION = '94 TRIATHLON WORLD CHAMPIONSHIP FILE NAME = 94 Triathlon World.crs ;DISTANCE          GRADE          WIND ; COMMENTS [END COURSE HEADER]  [COURSE DATA] 1.2                0.4                0 6.0                0.1                0 1.2                6.0                0 1.2                -5.0               0 1.2                -1.7               0 1.2                0.8                0 1.2                3.0                0 1.2                -1.5               0 1.2                -0.5               0 2.4                0.2                0 3.6                -0.3               0 1.2                0.0                0 1.2                -0.4               0 [END COURSE DATA]                     </pre>
--	--

(Fig. 16) CRS Course Details

**Caution: Consult your doctor before beginning any exercise program**

## Using an Existing Course to make a New Course

Because course files must retain the format as shown in the image on the previous page, it is recommended to edit one of the preexisting courses when making a new course. This will almost guarantee a usable course every time.

- 1 To create a new course from an existing course while in Notepad, first open a preexisting course as described on the previous page.
- 2 Left click **File / Save As** from the menu.
- 3 Type a new name (with the .crs extension) for your new course in the *File name* area.
- 4 Choose All Files (\*.\*) in the *Save as type* area.
- 5 Left click **Save** to make a “carbon copy” of, and close, the first opened course.
- 6 Now you can proceed with changes to make it your new course.

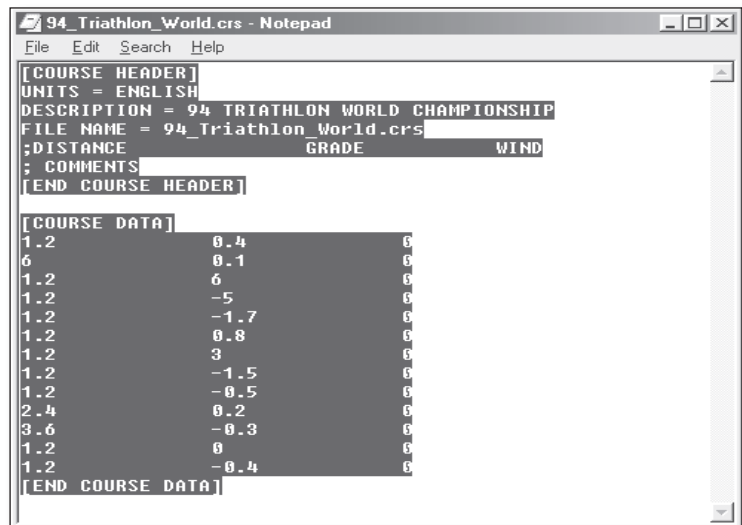
☆ **Tip:** To learn more about creating custom courses, open the *customcrs.txt* file which was copied into the Velotron CS folder. This too can be viewed using Notepad.

- 7 When finished creating a course, left click **File / Save** to save the new file changes.

## Checking your New Course

The best way to check your course for hidden character errors (as noted below in the Course Creation Notes) is to highlight the entire course when you are finished with it as shown to the right. The highlighted areas should “hug” the text (see the figure at right). You can do this as follows:

- 1 Left-click and hold the mouse button down in the left top corner of the Notepad window.
- 2 While holding the left mouse button down, drag diagonally across the window to the bottom right corner of the Notepad window.
- 3 Release the mouse when the complete text is highlighted and make note of any areas that are highlighted beyond where there is text shown.
- 4 You can now highlight and delete these areas until the course looks like the example above.



```

[COURSE HEADER]
UNITS = ENGLISH
DESCRIPTION = 94 TRIATHLON WORLD CHAMPIONSHIP
FILE NAME = 94_Triathlon_World.crs
;DISTANCE          GRADE          WIND
; COMMENTS
[END COURSE HEADER]

[COURSE DATA]
1.2                0.4                0
6                  0.1                0
1.2                6                  0
1.2                -5                 0
1.2                -1.7               0
1.2                0.8                0
1.2                3                  0
1.2                -1.5               0
1.2                -0.5               0
2.4                0.2                0
3.6                -0.3               0
1.2                0                  0
1.2                -0.4               0
[END COURSE DATA]

```

Highlighting a Course Profile to spot hidden character errors

## Course Creation Notes

- There cannot be any blank lines between the ‘Course Header’ and ‘End Course Header’ section and the ‘Course Data’ and ‘End Course Data’ section. Likewise, there cannot be any lines of data before the ‘Course Header’ section or after the ‘End Course Data’ section.
- There cannot be any missing data from any columns. If data is missing the program will not run the course.
- The *file name line* must match the same characters as shown in the Windows™ Title Bar.

**Caution:** Consult your doctor before beginning any exercise program

### ***Ergometer Tests – Creating .erg (ERG) files***

Included in the Velotron CS folder are at least three sample .erg files. As coaches use the software and create more tests, we will include more and post them on our web site. If you have created tests that you would like to see included, e-mail them to us and we will supply them within the program and post them in our Free Courses page at [www.racermateinc.com](http://www.racermateinc.com).

Because ergometer test protocols are time based and not distance based (road courses) the format of the .erg file needs a beginning (0.00) and ending “time mark”.

- In Example 1 ( shown on the following pages) some time marks show the same time but have two different watt values. This is a step in watts at a given point in time, where the watt value increases each step.
- In Example 2, the test will have both a step watt change over some portion and then ramped watt change for the remainder.
- In Example 3, the test is ramping the watt changes over the entire period.

The ERG tests are made up of a Course Header and a Course Data section. The Course Header section describes the name that will be stored in the saved file for future reference if exported. The Course Data section is what drives the *Watts* display in the data bar and the load changes in the Velotron Load Generator.

### ***Formatting ERG files***

#### **Allowable Ergo Test Time Increments**

The time is in decimal minutes. This means 1.5 = 1 minutes 30 seconds. You can go as low as .01 of a minute, which equates to 6 tenths of a second.

#### **Allowable Ergo Test Watt Increments**

Watt increments can be as low as 1 watt.

#### **ERG Test Notes**

- When formatting ERG files, be aware that ERG files need a beginning time (which is always 0.00) and a final test completion time, at which the data collection ends.

### ***Cycling Peaks ERG+***

Erg+, which is currently sold by the Cycling Peaks, Training Peaks division, was originally developed and sold through Intellicoach Software. This program takes creating ERG file to the highest place possible. For further details on this, or other Training Peaks offerings, go to [www.trainingpeaks.com](http://www.trainingpeaks.com).

## Ergo Test Examples

### Example 1 – Step Change Ergometer Test

```
[COURSE HEADER]
VERSION = 2
UNITS = ENGLISH
DESCRIPTION = 5 MINUTE TEST
FILE NAME = FIVE_MINUTE_TEST.ERG
MINUTES   WATTS
[END COURSE HEADER]

[COURSE DATA]
0.0       300
1.0       300
1.0       400
2.0       400
2.0       500
3.0       500
3.0       400
5.0       400
[END COURSE DATA]
```

In Example 1 above, the load stays at 300 watts from time mark 0:00 to 1:00 minutes. Then at 1:00 minutes the load steps to 400 watts and maintains this value until 2:00 minutes. At the 2:00 minute mark the load steps to 500 watts and maintains this value to the 3:00 minute mark where at 3:00 it steps back down to 400 watts and maintains 400 watts to the 5.00 minute mark. Total time of this test is 5 minutes.

### Example 2 - Step Change Ergometer Test with Ramp Conclusion

```
[COURSE HEADER]
VERSION = 2
UNITS = ENGLISH
DESCRIPTION = 7 MINUTE STEP_RAMP
FILE NAME = SEVEN_MINUTE_STEP_RAMP.ERG
MINUTES   WATTS
[END COURSE HEADER]

[COURSE DATA]
0.0       300
1.0       300
1.0       400
2.0       400
2.0       500
3.0       500
3.0       400
7.0       0
[END COURSE DATA]
```

In Example 2, the load stays at 300 watts from time 0:00 to 1:00 minute. At 1:00 the load steps to 400 watts and maintains this value until 2:00 minutes. At the 2:00 minute mark the load steps to 500 watts and maintains this value to the 3:00 minute mark where at 3:00 it steps back down to 400 watts and then ramps down to zero over the next 4 minutes to the 7:00 minute mark. Total time of this test is 7 minutes.

---

**Caution:** Consult your doctor before beginning any exercise program

Example 3 - Ramp Test

```
[COURSE HEADER]
VERSION = 2
UNITS = ENGLISH
DESCRIPTION = 5 MINUTE RAMP
FILE NAME = FIVE_MINUTE_RAMP.ERG
MINUTES   WATTS
[END COURSE HEADER]
```

```
[COURSE DATA]
0.0          300
1.0          400
2.0          500
3.0          400
4.0          300
5.0           0
[END COURSE DATA]
```

In Example 3, the load ramps from 300 to 400 watts from 0:00 to 1:00. From 1:00 to 2:00 it ramps from 400 watts to 500 watts. From 2:00 to 3:00 it ramps from 500 watts back down to 400 watts. From 3:00 to 4:00 it ramps from 400 watts back down to 300 watts and finally from 4:00 to 5:00 it ramps from 300 watts to zero. Total time of this test is 5:00 minutes.



### Auto Export

Auto Export will export the performance file at the same time you save it. This export will be the same name as the saved performance file, but with a TXT file extension after the Vel file extension. To enable this feature, check the box in the File menu/Export Options.

### Drag Factor

Drag Factor is similar to adjusting your aerodynamic drag without knowing your aerodynamic drag coefficient. Drag Factor will increase or decrease the frontal area component of the wind-load curve, thus allowing you to adjust the feel of the system to more closely match your actual road bike.

#### Determining your Drag Factor™

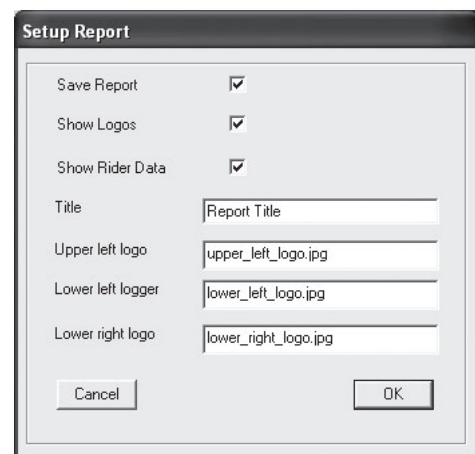
To adjust the Drag Factor requires knowing what to adjust it to. This is best accomplished by doing on-the-road testing to calculate what your speed-to-heart rate is on a one-mile flat time-trial. In other words, find the flattest mile-long section of roadway you can on the calmest day and ride it at a steady state in one direction while monitoring your heart rate. Record your heart rate when it has stabilized at a fixed, mid effort speed. Then repeat the ride in the opposite direction and do the same thing. This will eliminate any grade or wind variations. Now average these two readings to determine what your heart rate is at a given speed on a flat road. Now ride the trainer on a flat on-mile or longer course. When your heart rate has stabilized, adjust the Drag Factor until the speed and heart rate matches as recorded on the outdoor ride.

- You can only adjust your Drag Factor using Fn up/down prior to starting the timer. Once the timer starts the Drag Factor is set and can no longer be changed for that session.
- Drag Factor values are saved within performance files to allow verification of whether the wattage output is, or isn't, based upon a drag factor adjustment. Lower Drag Factor numbers will show a lower wattage for a given speed -- the same way any aerodynamic changes on the bike can lower wattage outputs on the road.

### User Reports

In addition to the CSV RaceLog file, a customizable User Report can be saved as well. The main purpose of this file is to allow coaches and training centers the opportunity to give a printed report to a client who has just done a ride. These are HTML files and will open in the default Internet browser. Printing these files is done as well using the Internet browser "print" option.

- Open and existing report by going to File - Open report. This will open to the Reports folder by default.
- There are example images supplied within the Reports sub-folder you can edit to suit your needs. Replacement files should be of similar size and file type if you make new files. If you change the names of these files, be sure to type the name to their path in the Setup Report menu dialog box.
- You will be prompted to save the report when you end the ride. If you have no plans to save any reports, you can turn off the report feature by unchecking "Reports" in the Options Screen.
- Setting the feet/meters option in the Option Screen will establish whether the report displays metric values or not.



Setup Report Dialog

**Caution:** Consult your doctor before beginning any exercise program

### Setup Tips for your PC and Velotron

- When problems arise, always refer to the PC Setup - Making Connections portion on page 11 along with the user's guides that came with your Personal Computer and related devices.
- Be sure you have the version of Direct X found on our install disc (or higher) installed on your PC. This can be determined by running DXDIAG from the Run command of the Windows™ Start menu.
- Shut down all running applications before using your Velotron software.

### Serial Communication Tips - Test Comm Ports

A Velotron with external Velotron software uses *Serial Communication* to transmit data to and from the PC. Any problem with the communication path, either from the Velotron to the PC, or from the PC to the Velotron, can keep the two systems from "talking" to each other.

One problem diagnosing serial port communication errors is the limited information provided by the computer as to what peripheral device(s) are using the available serial ports. We have included a test in the Utilities Menu that will query any devices installed on your PC. This software will then report back what is installed and if any pertain to the Velotron. Using the *Check Comm Ports* feature will provide information needed for Velotron setup, i.e., which Velotron is connected to which Comm port(s). S

See Page 11 – Testing for Installed Components for further details on this test and the newest Auto Detection feature currently supplied also.

### USB adapters

You can use the supplied USB to Stereo Adapter to connect your Velotron to a USB port. (See page 9 for more details on USB to Serial Adapters).

- Make sure the **Velotron** is **ON** and the **Stereo Cable** is inserted into the **USB to Stereo Adapter** and **Load Generator** when using the *Test Comm Ports* program.
- A Second Velotron requires a second USB to Stereo Adapter in a separate serial port.

### Things to look for if errors occur during Check Comm Ports:

#### **No Velotron(s) detected:**

- The **Stereo Cable** is not plugged into the **USB to Stereo Adapter** or the **Ext. PC** connection on the **Load Generator**.
- Check the **Stereo Cable** for shorts or breaks using hardware troubleshooting documentation available at [www.racermateinc.com](http://www.racermateinc.com). These will be found in the Technical Support section.
- The driver for the USB to Stereo adapter is not installed. Use Windows™ Device Manager to verify the existence of available serial ports. Run Add New Hardware Wizard to auto-detect uninstalled hardware.

New issues and fixes arise daily, so be sure to check [www.racermateinc.com](http://www.racermateinc.com) and click on the Coaching Software support link before calling for technical support. In addition you will find a link to the RacerMate Forum site, where chances are good your answers will already be posted and answered here or in our comprehensive Q&A sections.

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**Caution: Consult your doctor before beginning any exercise program**

### **Troubleshooting Q&A**

**Q:** There appears to be a limit set for some of the values I see on the screen that keep me from seeing what I'm actually doing. Why is this?

**A:** There are high and low settings in the Scaling options menu. You can edit these to a higher number to increase the scale of this window. See page 19 for details on this feature.

**Q:** On the right of the screen is a floating pointer that I don't know how to control. What is this?

**A:** This is the RPM indicator. It is a 20 RPM scale and the center of this scale is the RPM you can set in Options/Set Pointer.

**Q:** My SpinScan on Velotron is much smoother than when compared to a CompuTrainer. Why is this?

**A:** This is due to the smoothing effect that happens with the aid of a 55lb flywheel and no egregious tire drag. CompuTrainer has to maintain a fairly high tire drag to keep the tire from slipping — as well as having a small flywheel to minimize the potential of slip during acceleration; not to mention the possibility of wearing a hole in your tire if you applied the brake and a larger flywheel continued to spin. Velotron can more closely mimic the stored energies you see on the road — thus making it a better comparison to real road riding than CompuTrainer. This in no way “devalues” CompuTrainer — as many will attest to. If anything it shows how things can improve with technology.

**Q:** I can't get the SpinScan to display during an Ergo test. Why is this?

**A:** Due to the nature of the Ergometer mode, SpinScan is disabled. The purpose of an Ergometer test is maintain a wattage constant through the entire pedal stroke, so pedal modulation normally seen in SpinScan, though perhaps still present to some degree, is considerably difficult to analyze. As such, pedal-stroke analyzation in this mode is unavailable.

**The SpinScan Feature**  
**(by Bill Edwards, Ph.D.)**

**Pedaling Efficiency**

Improvements in pedaling efficiency can make it possible to produce power with less muscle stress and less fatigue. Many of the world's greatest cyclists have worked hard to improve pedaling efficiency using sophisticated scientific measurements of pedal pressure. The SpinScan function provides a direct visual measure of pedaling efficiency, thereby allowing one to work on improving pedaling efficiency by the use of real-time biofeedback. One can actually see the immediate effects of modified recruitment patterns on pedaling efficiency.

Inefficient pedaling causes one to recruit a relatively few leg-muscle fibers at high intensity, whereas efficient pedaling technique spreads the load out over a great many muscle fibers at a much lower intensity. Muscle fibers fatigue very quickly at high intensity, whereas muscle fatigue occurs much more gradually at lower intensities. It therefore is an advantage to be able to produce power using lower average intensity.

**The SpinScan Displays**

There are two displays available in the SpinScan function:

(page 25) BarGraph

(page 25) Polar Plot

The bar chart displays the torque on the pedals as a function of position on the circle, starting with the left foot, and then the right foot. Using the bar chart display, the graph of inefficient pedaling can be displayed by "stomping" down hard on the pedals one at a time (right-left-right-left, etc.). You will see two distinct mountain peaks corresponding to the left and right feet pushing down the pedals. At the bottom of the chart you will see three efficiency numbers corresponding to the left foot, average of both feet, and right foot, respectively. These numbers represent the ratio of the average torque to the maximum torque applied to the pedals multiplied by 100.

If you next try rotating the pedals while keeping a constant light pressure on the bottoms of your feet all around the entire circle, the graph becomes flatter and the peaks less distinct, and you will feel less intense muscle stress. You should notice that the efficiency numbers displayed at the bottom of the chart have increased. At first, you may find it difficult to maintain this circular pedaling technique and increased efficiency for very long, but with constant practice it will become second nature. It just takes time for your muscle cell firing patterns to adapt and to "learn" the new technique.

The polar display shows the torque around the entire circle of the pedals. When "stomping" on the pedals one at a time, the display shows two distinct lobes (like an airplane propeller). With circular pedaling, the display becomes a nearly perfect circle, and the efficiency numbers will increase.

Another feature displayed on the polar graph is the angle of attack (the red lines). The angle of attack is the angle at which the average torque is applied to each pedal. A good target for this angle is 90 degrees (i.e., when the pedal cranks are horizontal to the ground). However, this angle depends on saddle position and the degree to which one can recruit hamstrings versus quads in the power stroke. Sprinters normally prefer to have their saddles more forward, and tend to recruit more of the hamstring and hip flexor muscles. Their angle of attack will most likely be greater than 90 degrees. For road riders, the preferred angle of attack is closer to 90 degrees. For time trial bikes, the angle of attack is a compromise between loss of power at the pedals and the gain one can achieve by being more aerodynamic.

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***Caution: Consult your doctor before beginning any exercise program***

### **Using the SpinScan Function**

Typical SpinScan efficiency numbers for cyclists range from as low as 50 percent or less up to as high as 85-90 percent. However, it is not productive to compare your efficiency numbers with those of other cyclists. What is productive is to start from where you are now, and work toward improving your efficiency from that starting point. Practice makes perfect.

A good way to begin is to try concentrating on improved efficiency by lightening up on the pedals for about 3-5 minutes at a time at first. Try imagining that you have eggshells under your feet and you mustn't crush them. You should be able to wiggle your feet around in your shoes while you are pedaling hard. If you try an experiment of using this technique while out on the road, you will notice that your speed on the bike will go up by 0.5-1.0 MPH with no additional stress. That is what you are looking for.

Be patient, because it takes time to get permanent results, but it's worth the effort!

### **Keyboard Shortcuts**

These items within CS are user selectable and can be used to further enhance or debug the software should it be needed. These are:

#### ***G key***

Pressing the G key will turn on and off the grid within the Charts window. This may be helpful to “unclutter” the window.

#### ***C Key***

Pressing the C key will cause the software to generate a screen capture of the screen shown at that time. Settings for this feature are found in the Options/Screen Capture menu.

#### ***D key***

Pressing the D key will turn on and off the frame rate/programming flag indicator. This red display (at the top of the screen) may help when problems occur, like slow scrolling speeds. In addition you will see [PRPM], which is the actual pedal RPM -- useful in aiding the alignment of the cadence sensor.

#### ***Ctrl-O keys***

Pressing the Ctrl key and then the “O” (not zero) will open a new performance file without exiting the Chart Screen to the menu.

#### ***↑ and ↓ Arrow Keys***

These arrow keys on the PC keyboard change the scroll speed when viewing a saved file in a full zoomed in scroll mode.

#### ***← and → Arrow Keys***

These arrow keys on the PC keyboard change the manual zoom window size, where when sizes the Enter key changes to this zoom level. Scrolling may not occur at these levels of zoom.

### **Handlebar Controller Shortcuts**

- F1 Key -** Starts and Pauses the timer and Performance Data Collection.  
Activates the Save Dialog at the race end or Reset.
- F2 Key -** Scrolls from Bargraph to Polar SpinScan Display (Start - SpinScan ONLY)  
Answers “No” to a request to Save Performance
- F3 Key -** Answers “Cancel” to a request to Save Performance
- F5 Key -** Reset Timer and Performance Data (Save dialog appears)
- F6 Key -** Brake Flywheel
- Up /Down Keys -** Gear Up and Gear Down
- Fn AND Up/Down Keys -** Grade Up and Grade Down (SpinScan Screen ONLY)  
Watts Up and Watts Down (Manual Ergo Mode ONLY)  
Increases/Decreases DragFactor™ value (prior to timer start)

---

**Caution: Consult your doctor before beginning any exercise program**

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