DURATRAX®
THE LEADER IN AWESOME R/C™

Real Race™
GENERATION 2

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CHAPTER 1. INTRODUCTION

INTRODUCTION

Welcome to the RealRace™ Generation 2 R/C Simulator, the most advanced R/C car simulation available. RealRace G2 is so realistic, you'll hardly believe it's a simulation. Whether you're a seasoned racing veteran, or an entry-level R/C-er, RealRace G2 is the ideal way to learn to drive, try new setups, race with your friends or against the computer, or just have an incredible amount of fun.

Adventurous modelers will enjoy RealRace's incredible versatility--create custom paint/decal schemes, design a racetrack, create computer-controlled opponents with different personalities, or alter any of more than 100 adjustable car parameters. If, however, you don't wish to do so, that's fine too. We've included 15 models that look and drive like the real thing, plus 13 different racetracks—each with its own characteristics.

More importantly, RealRace G2 offers an amazing array of tools to help you understand how to use the program, and how to improve your R/C driving skills. From extensive tooltips that explain every feature and option as you use it, to our extensive manual and technical support, *no other R/C simulator goes further to enrich your R/C experience*.

The following section briefly outlines some of the new features in Generation 2 (G2). If you don't wish to read the new feature summary, you can skip the following section and proceed to "Chapter 2. Before You Begin" on page 3. Subsequent chapters will describe all RealRace features (new and old) in complete detail.

WHAT'S NEW IN GENERATION 2

This section briefly outlines some of the new features included in G2. If you are new to RealRace, or just don't want to read this section, you can proceed to the next chapter. Subsequent chapters will cover all of this material in complete detail.

First of all, we'd like to thank you for purchasing RealRace G2. We think you will be enormously pleased with G2, which incorporates many of the features our users have most frequently requested (plus a few others that we thought of ourselves!).

Upon starting G2, the first thing that you are likely to notice is the completely redesigned user interface. RealRace now runs in a window (assuming your video

card supports this option), and the interface is completely menu-driven. (If you liked version 1's full-screen look, you can recover this in G2 by removing the check mark from the "Run in Window" item in the Options menu. [In full-screen mode, you will need to hit "ALT" or "ESC" to access the RealRace menus.])

ADDITIONAL NEW FEATURES:

- Race against computer generated opponents. You can control your opponents' personalities, driving styles, skill level, setups, etc.

- Incredibly realistic car and scenery graphics, using detailed, 24-bit textures.

- Fully editable racetracks. Create your own track with the layout, topography, surface properties and textures that you want. Or, add, remove, move, resize, and reorient barriers, pylons, buildings and other scenery objects. You can add, remove, size, or seasonally color incredibly realistic trees and foliage…and much, much more. (Some advanced track editing features require use of a third-party bitmap editor, not included with the RealRace G2 software.)

- Test your driving skills on courses with hazards—ramps, turnstiles, "lazy susans"—that *actually move, and can move your car, as well, if you're not careful!*

- You can now create and edit custom paint/decal schemes for your car. (To create and edit color schemes, you must use a third-party bitmap editor—not included—capable of editing ".tga" [Targa] files.)

- Improved multiplayer support. You can drive with up to seven other RealRace G2 users over the Internet, or over your Local Area Network (LAN).

- You can now create multiple, independent picture-in-picture viewports within the RealRace display. You can size and reposition viewports using your mouse. Also, each viewport is completely independent and fully adjustable to suit your personal taste.

- On-screen "Gadgets" let you view continuously updated car/radio data, or access RealRace controls with a mouse click.

- Full collision detection. If you hit a building, a tree, or another car, your car bounces, spins or flips just like you'd expect. You can even collide with multiplayer or computer-controlled cars.

- G2 has a wealth of new view options. For example, you can look at your car, a fixed location, or at someone else's car. You can easily adjust your viewpoint using your mouse. You can even store viewpoints and return to them later.

- G2's new Control Panel allows for easy, one-click updating and simplified technical support should the need arise.

We hope you enjoy these, as well as the various other new features, in G2. Keeping the "Tip of the Day" feature active serves as a great reminder about these new features.

And please, keep the suggestions coming! DuraTrax is continually enhancing RealRace, and strives to provide you with the most accurate R/C Simulator ever created.

CHAPTER 2. BEFORE YOU BEGIN

SYSTEM REQUIREMENTS

The system requirements below are what we consider to be the minimum PC configuration in which RealRace G2 should be installed. Meeting the minimum requirements will allow you to still enjoy G2; however, in order to take complete advantage of the many features and functions offered by G2, you should have a computer at, or near, the specifications as listed under the optimum system requirements.

SYSTEM REQUIREMENTS

- Windows® XP*, 2000*, ME, 98
- Intel® Pentium® 500 or equivalent
- DirectX® 8.1 (or above) compatible video and sound card
- 3D Accelerated video card with 8MB RAM (Optimum 32MB)
- 64 MB RAM (Optimum 128 MB)
- 500 MB Hard Drive Space
- 4X CD-ROM Drive
- IBM® Compatible Game Port[**]

*local administrator access required

[**]or a third-party USB Game Port adapter

MULTIPLAYER REQUIREMENTS

- LAN: IPX/SPX or TCP/IP Protocol
- Internet: TCP/IP connection requires an Internet account and 28.8 kbps or faster modem
- 64MB RAM

- Intel® Pentium 600+ ***

- 128MB RAM

*** = Minimum processor speed is dependent upon number of computer opponents selected. Multiple computer opponents will require faster processor speeds.

VIDEO AND SOUND CARDS

In order to achieve optimum performance and the ultimate satisfaction from RealRace, there are two important components of your computer that deserve special attention: the video and sound cards.

While RealRace will work well on a wide variety of hardware configurations, it offers many features that are designed to take particular advantage of the latest video technology. If you have an older computer, or a newer computer with a lower-end video card, you may want to consider purchasing a new video card to take advantage of these features. This moderately priced upgrade can vastly enhance your enjoyment of RealRace. Aside from increasing your satisfaction with G2, a new video card will also work with many other games or simulators, improving their performance as well.

While not as important as a video card, upgrading your sound card may also improve your satisfaction with RealRace. This is especially true if your computer uses an on-board sound card (that is, a sound card affixed directly to the motherboard.)

GETTING THE MOST OUT OF REALRACE

We think you'll agree that for both beginners and experienced drivers, RealRace offers the finest set of instructions and practice tools of *any* R/C car simulator. DuraTrax and Knife Edge Software**Error! Bookmark not defined.** are committed to the continual improvement of our products. When using the software, there are a few things you should keep in mind.

First of all, RealRace G2 is fun simply to drive around in. But, under the hood it is a powerful simulation that lets you control almost everything about your car and its environment. Therefore, you can enjoy RealRace on several different levels:

- **Basic**—You can use it like a game. You can participate in races against computer-controlled opponents or your friends, as well as download new color schemes and tracks.

- **Advanced**—You can use it as a tool to learn about different car types and setups. You can tweak individual car settings, such as differential slip, shock spring pre-load, and wheel alignment, to learn how they affect a car's performance on the track. You can also edit the tracks themselves and rearrange their race paths.

- **Master**—You can recreate your own R/C car to drive in RealRace, and even create—and race on—your own tracks. Whether recreating your real-life car and club track, or designing your dream car and the perfect racetrack to go with it, *your imagination is the only limit*.

However, while the simulator's realism will help you learn important driving skills, remember that there is no substitution for actual driving time. Talking with more experienced R/C enthusiasts will teach you more about the hobby, and about how to keep your real cars running well.

However you choose to use RealRace G2—on a beginner, advanced, or master level—we feel confident that its unprecedented realism will provide you with many hours of enjoyment.

Note for Advanced Users. When you set up cars in RealRace, you may sometimes notice that specific car setup measurements (shock oil weight, spring rate, etc.) will not exactly match your real car's measurements, even though the simulated and real cars perform similarly. There are two reasons this may happen. First, the simulation sometimes uses a single parameter (e.g., "shock oil weight") to represent several properties of your real car (shock oil weight, shock piston shape, the number and size of shock valves, etc.). In the shock example given here, you can vary the shock oil weight to find a value that will make the simulated shocks dampen much like the real ones. Second, the simulated car may have small measurement errors in the dimensions of the fixed elements in your suspension system; you can compensate for these errors by changing some of the adjustable elements (shock length, etc.).

CHAPTER 3. GETTING STARTED

OVERVIEW

This chapter covers the installation procedure for RealRace G2, describes the basics in running the program, and will introduce you to some of RealRace's most often used features.

The first section, *Installing RealRace Generation 2*, offers a step-by-step approach to the installation procedure for both the program software and the controller.

The second section, *Exploring RealRace G2*, offers a brief tour of the *RealRace* G2 program. You'll learn how to perform some basic functions, such as selecting the vehicle you wish to drive, performing simple edits to the racetrack, manipulating viewports, and racing against computer-controlled opponents.

This chapter only touches on some of RealRace G2's features. While reading the chapter is enough to get you acclimated to the program, you'll more than likely want to refer to subsequent chapters, which describe the various features in comprehensive detail.

INSTALLING REALRACE G2

PROGRAM INSTALLATION

UPDATE DRIVERS

Before you begin installation, we strongly suggest that you update the drivers for both your sound and video cards. A *driver* is a software program that your computer uses to control hardware devices. Each card has its own respective driver. Most problems with installing and using RealRace, as well as many other programs that use DirectX,**Error! Bookmark not defined.** arise from outdated video and/or sound card drivers.

If you're not sure how to update your drivers, you can find instructions in article ***Q01-1038, How to Update Drivers***, at http://www.gpsoftware.com/kb/q01-1038.htm. That article will take you through the process step-by-step, and has links to driver download sites for most manufacturers.

Alternatively, you can contact your PC's manufacturer for information on how to locate, download, and properly install drivers for your PC.

START INSTALLATION PROGRAM

Once you've installed the new drivers, you're ready to install RealRace G2. Shut "off" the computer and plug the RealRace controller into the game port. Next, turn the computer "on" and ensure that all other applications are closed. Insert the CD-ROM into the CD-ROM drive. If auto-play is active, the RealRace Control Panel will appear. Click the "Install RealRace G2 CD" button located at the top of the Control Panel to begin the installation process.

If auto-play is not active, you will need to locate and run the program "SETUP.EXE" from the root directory of the CD-ROM. To do this, click the "Start" button on the Windows® Taskbar, then select "Run" from the Start menu. In the "Run" window, type "d:\setup" and press [Enter] or click "OK" (assuming "d:\" is the designation for the CD-ROM drive). This should start the setup program.

RUN INSTALLATION PROGRAM

Follow the onscreen instructions, filling in information when queried by the setup program. When the setup program asks for your program serial number, enter the RealRace serial number as it appears on the rear side of the CD-ROM jewel case. This number must be entered exactly as it appears in order to proceed to the next phase of the installation process.

INSTALL DIRECTX

After the program has finished copying the necessary files, it will ask you if you want to install DirectX. If you do not meet the minimum DirectX version requirement as queried by the RealRace program, click "Yes" to install this updated version of DirectX. It will not harm your computer to install DirectX more than once. Therefore, if you are unsure as to the status of this program we suggest that you install it at this time. When DirectX has been installed, click "Finish" to complete the Setup.

RUN REALRACE

To complete the installation and start the program, click on the RealRace icon located on the desktop. RealRace will guide you through the final installation steps, as well as the calibration of your controller.

Now, you're ready to start using RealRace. You can now proceed to *"Exploring RealRace G2"* below, which will walk you through the basics of using RealRace.

EXPLORING REALRACE G2

Now that you've installed RealRace G2, it's time to begin exploring the program. The following sections will take you on a quick tour of RealRace G2's most popular features, such as selecting a car to drive, changing racetracks, customizing your racetrack, racing against computer-controlled opponents, etc. Along the way, we'll show you where to go for help, and how to obtain additional information.

You'll want to read this section even if you are upgrading from a previous version of RealRace. Most of the features described here are either new, or have been completely re-engineered for Generation 2.

START THE PROGRAM

After installation, you should see a RealRace G2 icon on your computer's desktop. First, close all open programs and windows (RealRace works best when it is the only program running). Then, start RealRace by double-clicking the icon.

The first time you open RealRace, two things will happen. First, you will be asked to calibrate your controller (follow the instructions that RealRace gives you). Second, you will see a Tip of the Day. The 'Tip of the Day' feature is a sequence of helpful tips, hints and facts about RealRace that will enhance your enjoyment of the program.
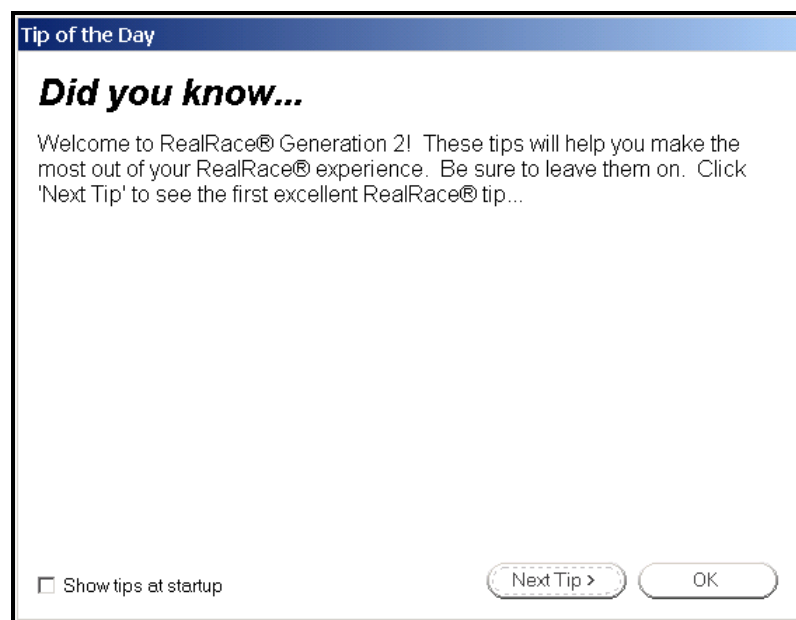
Normally, you will see a new tip each time you start RealRace. If you wish, you can deactivate this feature by removing the check mark from the "Show tips at startup" box. (If you turn "Tip of the Day" **off,** you can turn it **on** again using RealRace's Help menu.)

We suggest leaving Tip of the Day **on** for a while. The tips will point out many great RealRace features that you may not have noticed. For now, just click "OK" to close the Tip of the Day window and start driving.

THE REALRACE MAIN DISPLAY

When you first run RealRace, you should see a window like the one below (assuming your video card supports DirectX Window mode; most cards do).

You can move, resize, minimize, maximize and restore the RealRace G2 main window just as you would any other application.

You interact with RealRace using the *menus* in the main window's menu bar:

- **Racetrack**

- **Car**

- **Events**

- **Options**

- **View**

- **Multiplayer**

- **Help**

If RealRace is running, but you don't see any window borders or menus, you may be operating in full screen mode. "Full screen mode" means that the RealRace main display will take up your entire monitor screen. If this is the case, you can access the menus by hitting your keyboard's "ALT" key or, alternatively, the "ESC" key. (For more about window mode and full screen mode, *see "Run in Window" on page 88.*)

Later in this manual, you'll find a separate chapter for each menu. These later chapters will describe, in detail, every single menu item and option. For now, though, we want to show you two things:

- How to navigate the menus and find out what the different commands do; and

- How to perform some of the most common tasks—selecting a car and racetrack, etc.

Menus, Tooltips, and Diagrams

Menus allow you to access RealRace commands. You open a menu by clicking on its title (e.g., "Car"):
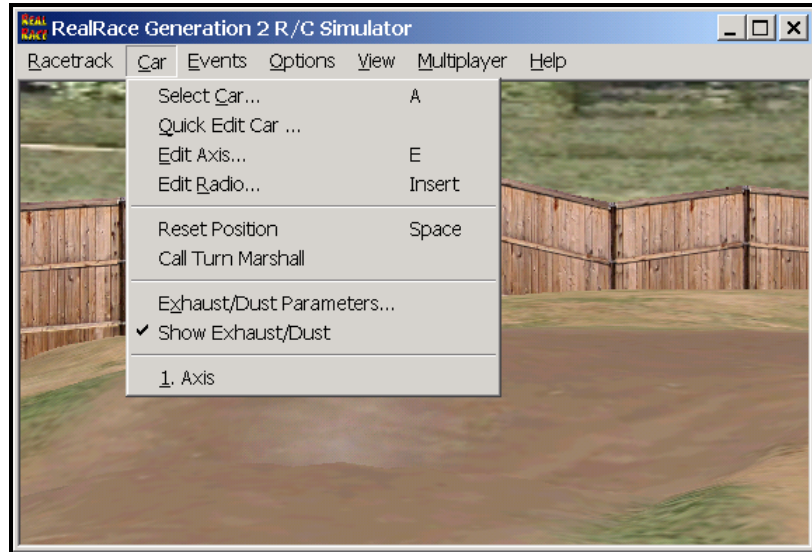
Menu Tool Tips

If you ever want to know what a menu item does, hold the mouse cursor over the item for several seconds. You will see a yellow popup window, called a *tooltip* window, that explains the item's function. For example, if you put the mouse cursor over the "Select Racetrack…" item in the "Racetrack" menu, this is what you would see:
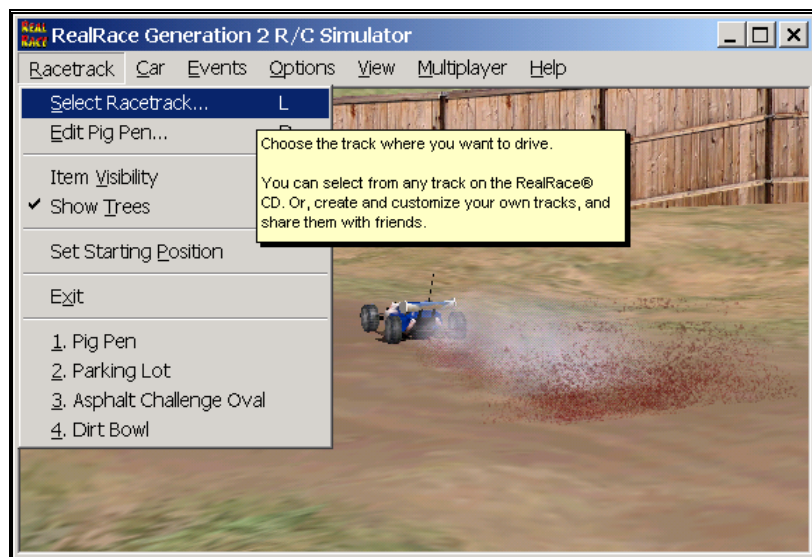
Dialog Tool Tips

Tooltips also work for RealRace dialogs as well. If you see a RealRace dialog, and want to know what a control (button, checkbox, etc.) in that dialog does, just place the mouse cursor over the item until you see a tooltip window. For example:
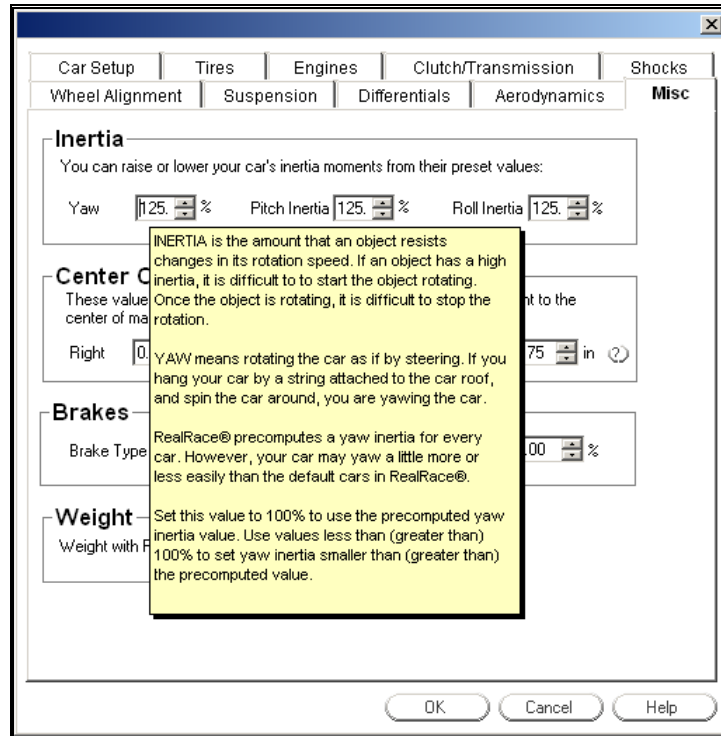
Diagram Tool Tips

In some dialogs, you will see buttons labeled with a question mark ("?"). For example, in the above dialog the "Toe-In Angle" field has a "?" button.

When you press a "?" button, RealRace will show you a diagram that will help you understand what the item is for. For example, if you hit the "?" button next to "Toe-In Angle", you would see the following diagram:

Toe in (usually positive)
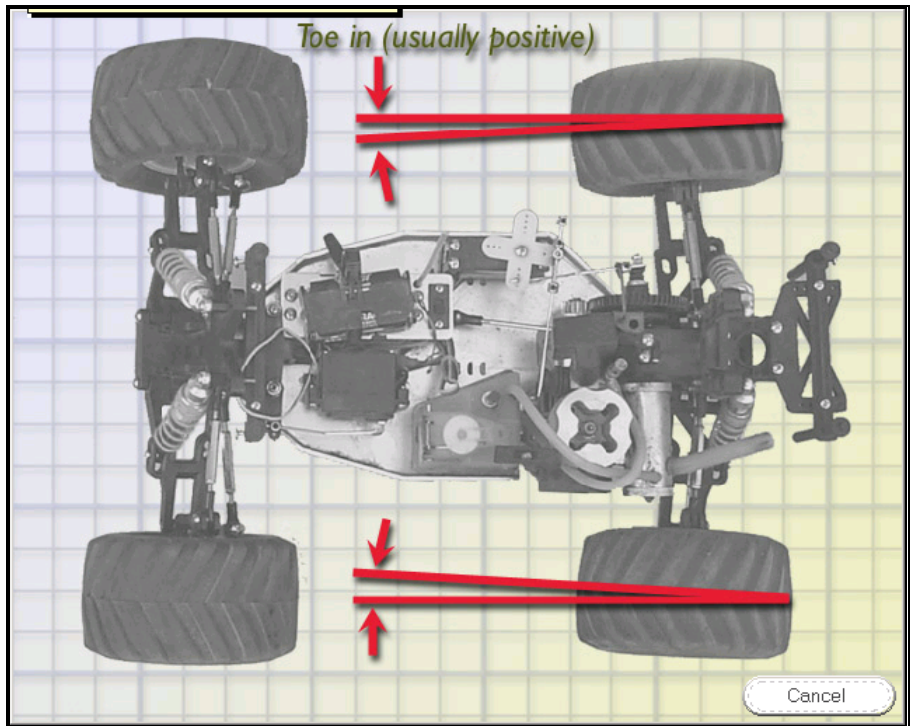
Now that you're familiar with the basics of the RealRace user interface, let's perform some common RealRace tasks.

CHOOSING YOUR CAR

When you first open RealRace, you will be driving a default car. In the examples below, the default car is an Axis buggy.

To change your car, choose the "Select Car…" menu item in the Car menu:
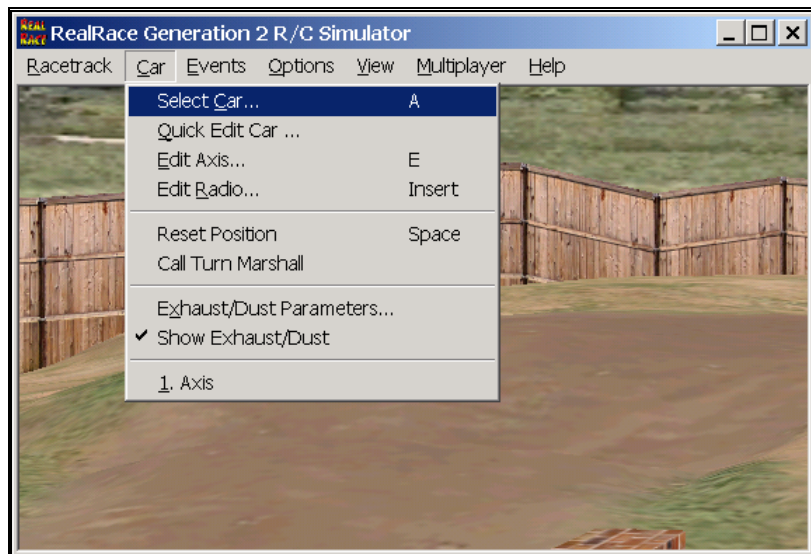
You will see a dialog that looks like this:
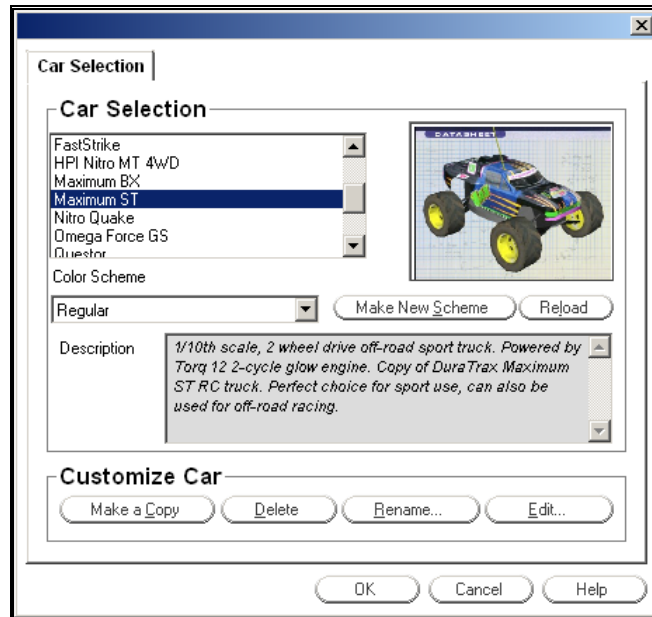
Pick the car you want from the list in the upper left corner of the dialog (under "Car Selection"). For example, to drive a Maximum ST, scroll the list to find the Maximum ST, and select it.

The list contains every car available to you. Whenever you select a car, a picture of that car appears in the preview panel to the right.

This dialog also allows you to select a paint/decal scheme for your car (or even create and edit a new scheme). See "Creating A Custom Color Scheme*" on page 62.*

When you have finished selecting a new car, click "OK." The "Car Selection" dialog will disappear, and you will return to the RealRace main window, with your new car loaded.

Most Recently Used Lists

RealRace has several Most Recently Used lists (MRUs). These lists show you the recently used cars or racetracks or other lists. All of the MRUs operate similarly. To see the Car MRU, open the "Car" menu again, and look at the last two items:
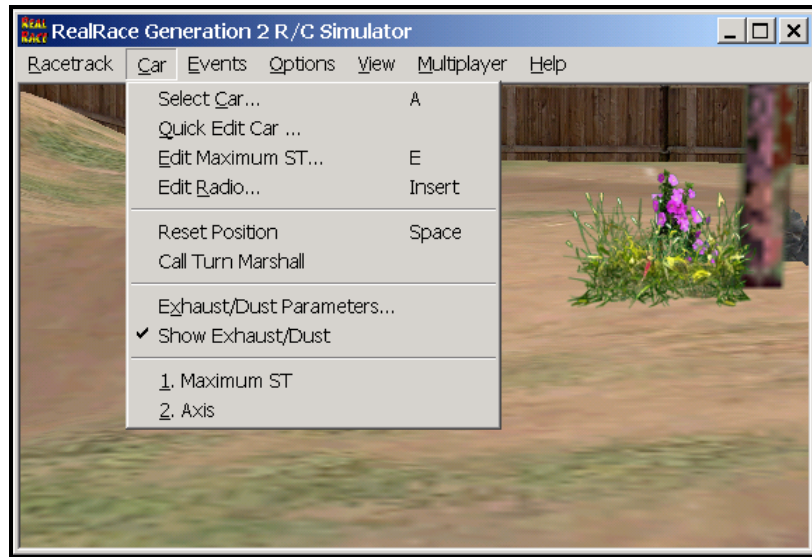
Your current car (Maximum ST) is now the next-to-last item in the menu, and your previous car (the Axis) is now the last item. If you want to return to driving an Axis, you can use the "Select Car…" item, or you can just select "2. Axis" from the Car menu.

The Car menu will list your four most recently used cars. To reload a previously used car, simply select it from the list.

CHANGING RACETRACK

To change racetracks, click on the "Select Racetrack…" menu item in the Racetrack menu. You will see the following dialog:
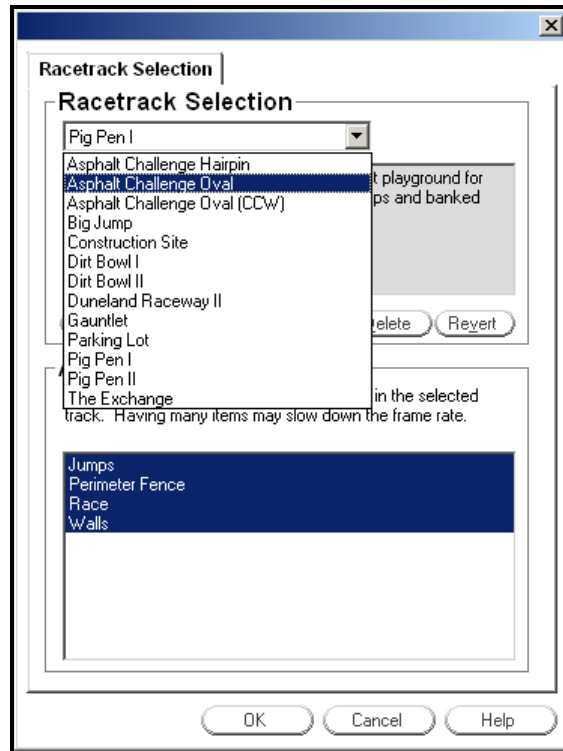
Select the racetrack you want from the list at the top of the box. For example, to switch from "Pig Pen I" to "Asphalt Challenge Oval":

- Select "Asphalt Challenge Oval" from the list; and

- Click "OK."

RealRace will load the new racetrack.

The Racetrack menu will display your most recently used racetracks, in the same way the Car menu displayed the most recently used cars:

If you want to return to Pig Pen I, just select it from the list at the bottom of the menu.

SOME COMMON TASKS

Now that you've picked a car and racetrack, you can drive around the track. While you're driving:

- To reset your car back to its original starting position, select "Reset Position" under the "Car" menu. Alternatively, you can hit your keyboard's spacebar.

- If your car flips over or happens to get stuck, you can put it right side up by selecting "Call Turn Marshal" from the "Car" menu. Alternatively, you can hit your keyboard's "T" key.

- To turn car exhaust 'on' or 'off', select "Show Exhaust" from the "Car" menu. Alternatively, you can hit your keyboard's "`"(tick) key. The tick key is located directly to the left of the "1" key on most keyboards. It's the same key that, when combined with the shift key, produces the "~"(tilde).

- To zoom in on a car, select "Zoom in" in the "View" menu. Alternatively, you can hit your keyboard's F2 key. Repeat to increase the zoom level further. Use F3 to zoom back out.

- To set your viewpoint using the mouse, select "Driver in Fixed Position" in the "View" menu. When a submenu appears, select "Set with Mouse." Then, you can move your viewpoint towards or away from your car by sliding the mouse forward and back. You can circle around your car by moving the mouse sideways. You can move your viewpoint up or down using the mouse wheel. (If you don't have a mouse wheel, hold the right button down and slide the mouse.)

RACING AGAINST COMPUTER OPPONENTS

Once you've driven a few laps by yourself, you'll want to try racing against some computer-controlled opponents.
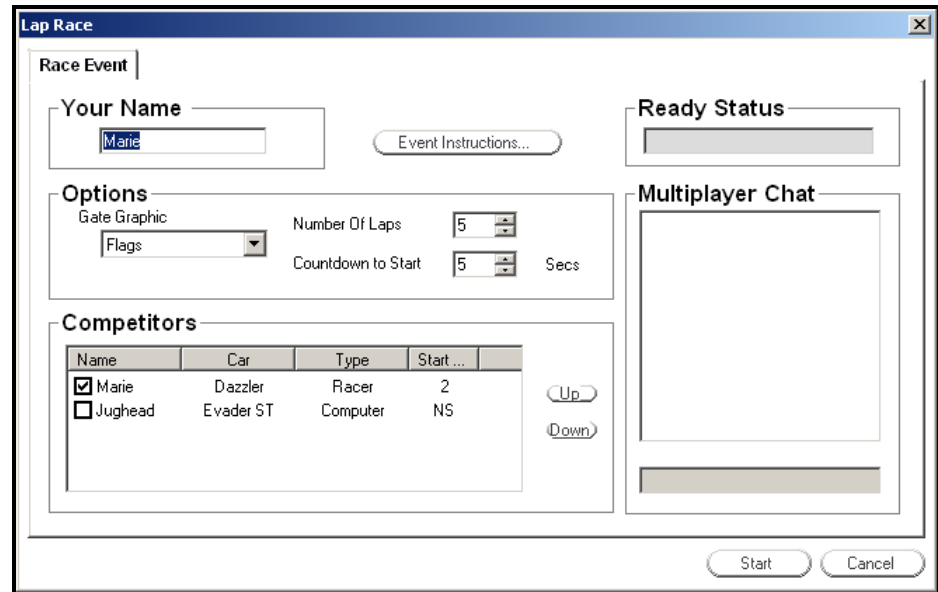
Later sections will explain RealRace's rich features for designing computer-controlled opponents. For now, this section will describe how to run a simple lap race.

- First, select the car and racetrack you want to use.

- In the Event menu, select Start Event > Lap Racing. This will bring up the racing dialog (see diagram below).

- Fill in the information. For a simple lap race, you can fill in a name or moniker you want to use and a number of laps; you can leave the other settings at their default values for now.

- Under "Competitors", pick opponents you want to race against and check the boxes next to their names. (When you're ready to explore advanced racing features, you can double-click on an opponent's name to edit that opponent's car type, raceline, skill level, etc., but for now feel free to use the default settings for opponents.) **Note that the number of opponents you can race depends on how powerful your computer is.** More powerful computers can handle more competitors at the same time. If you find that your frame rate drops noticeably during a race, try using fewer competitors. The reason for this limitation is simple: each computer-controlled opponent operates under

the exact same physics constraints that you do. Therefore, the more cars that are running, the more demand is placed on your computer to perform all of the necessary physics calculations.

- When you're finished and ready to race, click "OK". You will return to the racetrack, with cars (yours and your opponents') lined up on starting markers. When you hear the signal, *GO!*

The racecourse is marked by a series of gates. The gate markers will be visible on the track. (You can set the type of gate marker you want to use in the "Options" section of the Lap Racing dialog.) On each lap, you must pass through each gate, in order, without "cutting." If you cut, you must backtrack and pass through the gate. You can pass through a gate in any direction, but you must take the gates in order to get credit for a lap.

For lap racing, the first car across the finish line wins.

As mentioned above, if your computer's frame rate drops noticeably when you start a race, try racing against fewer opponents.

During the race, you will see a display on your screen, called the **Event Gadget**. This provides you with information about the race.

The Event Gadget, visible during racing events.

To get detailed information, click the small red arrow at the bottom of the display. This will show you the race standings.

Event Gadget with standings displayed.

After the race is over, you can close the Event Gadget by clicking on the small red "X" next to "Event" in the title tab.

CREATING A VIEWPORT

RealRace lets you create multiple, independent, picture-in-picture viewports.

For example, suppose you want to create a viewport that has a view from inside the car. First, under the View menu, select "Create New View." A new viewport will appear in the RealRace main window. Mouse click on the new viewport to select it, then, under the "View" menu, select "Driver in Car." You should see something like this:

The inset view now shows the view from the car's driver seat.

You can add as many viewport windows as you like. You can adjust the viewpoint, zoom level, view direction, etc. of each viewport completely independent of the others. (Adding more windows does require more computer power, so eventually there will be a practical limit to the number of windows you can add.)

- You can move a viewport around the RealRace main window by mouse-dragging the viewport's title bar.

- You can resize a viewport by mouse-dragging the viewport's border.

- You can remove a viewport by clicking the small red "X" on the viewport's title bar.

- You can set options for a viewport by clicking the small red circle on the viewport's title bar.

USING GADGETS

RealRace G2 comes with several "Gadgets" you can display in your main window. A *Gadget* is an onscreen display that provides helpful information.

For example, the Advanced NavGuides™ Gadget displays continuously updated information about your car's speed, engine RPM, etc. To display the Advanced NavGuides Gadget,

- Open RealRace's View menu.

- Select "Gadget".

- When a submenu appears, select "Advanced NavGuides".

When you select Advanced NavGuides, you should see the Advanced NavGuides Gadget appear on your screen:

Like viewports, you can:

- close any gadget by clicking the red "X" on the gadget's title tab;

- move any gadget by mouse-dragging its title tab;

- edit a gadget's properties by clicking the red circle on the title tab; or

- resize some gadgets by mouse-dragging the edge of the gadget.

Note: The first time you display the Advanced NavGuides, you must click on the red circle as described above and choose which items you would like the readout to display.

You can display any of the gadgets by selecting them from the "View: Gadgets" submenu.

Using RealRace G2's built-in **Advanced Terrain Editor (ATE)™**, you can customize racetracks that come on the RealRace G2 CD. You can add, remove, orient, or resize barriers and scenery items (cones, gates, jumps, buildings, fences, etc.) You can position and orient ground objects (such as pit areas, starting markers and finish lines) that "wrap" to the terrain—you can even have a finish line running up a hill! You can add, remove, size, or position trees and foliage. You can control lighting, terrain, and much more. **And unlike other car sims/games, the ramps, barriers, etc. that you reposition are** *fully functional***—your car realistically bounces off the barriers and jumps when it hits a ramp!**

For advanced users, however, RealRace G2 goes even further. By using a third-party bitmap editor (e.g., Adobe® Photoshop®, not included with RealRace) *you can create all-new tracks, with whatever surface topography, textures and surface types (dirt, grass, ice, etc.) you want.*

With RealRace G2, you have almost unlimited freedom to create the driving environment you desire. Best of all, when you've created or customized a racetrack, you can share it with other RealRace G2 users.

If you want to learn all about RealRace G2's **Advanced Terrain Editor** for customizing existing tracks, you can read "Edit (Current Racetrack)…" on page 35. For information about creating new tracks, see *"Appendix A. Creating a New Racetrack" on page 193* (note, however, that creating a new track is a much more advanced skill).

For now, this section will get you started by walking you through a simple edit. The following example will show you how to add a jump to the "Pig Pen" racetrack.

Step 1. Open the ATE

If your racetrack is not set to "Pig Pen," please set it to "Pig Pen" now.

Then, in the Racetrack menu, select "Edit Pig Pen…". (You can only edit the current racetrack, so the name of this item changes when you change the current racetrack.)
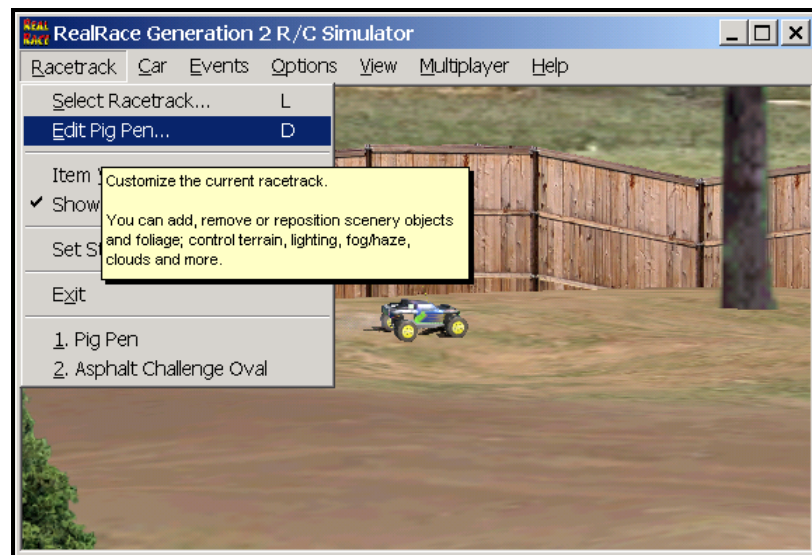
When a dialog appears, select the "Racetrack Editor" page. You should see the following dialog:
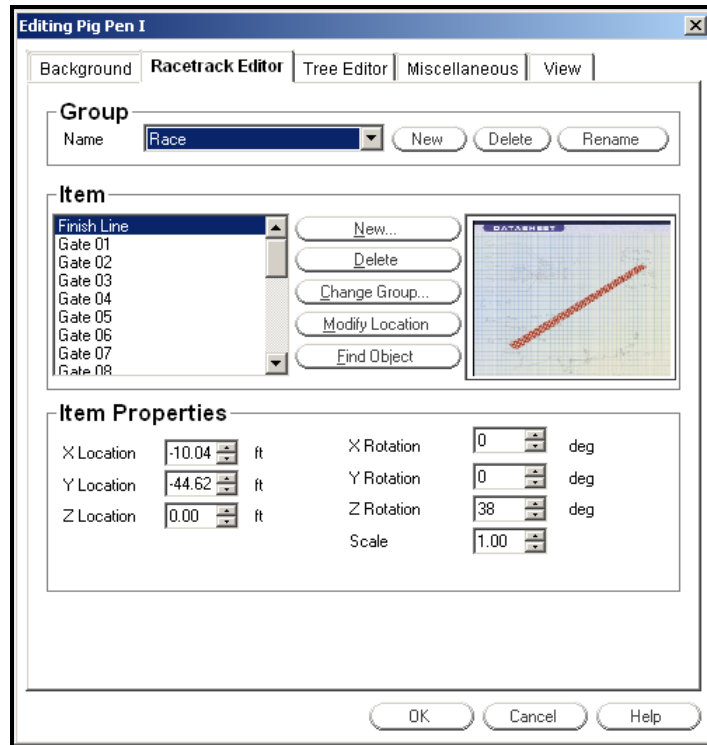
Step 2. Select a Group

RealRace G2 places every scenery object into a '*group'*. You don't *see* groups in your racetrack; you only see scenery objects. A group is just a way of sorting scenery objects into categories, to make it easier to edit a racetrack with many objects. You can have many different groups in your racetrack, or just one group if you prefer.

To add a scenery object such as a jump, you first must pick a group to put it in. In this example we will create a new group called "Jumps" and add a jump to it.

First, in the "Group" area at the top of the dialog, click the "New" button. You will be prompted for a group name. Enter "Jumps" and click OK. The group "Jumps" should now appear in the "Groups" list; select it now.

Step 3. Add an Object

Now it's time to add the jump. Click the "New" button in the "Item" category. (Don't confuse this with the "New" button in the "Group" category, which creates a new group.)

When you click "New," you should see this dialog:
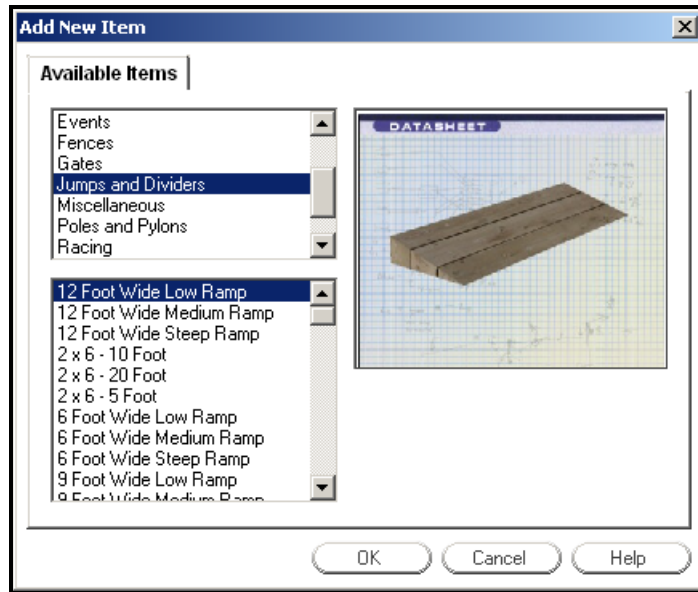
The top list has categories of objects you can add. Select "Jumps and Dividers" from that upper list. Then, select any of the jumps from the lower list.

Click "OK" to add the jump.

Step 4. Position the Object

When you click "OK", you will temporarily return to the RealRace main window. You should see the new jump, highlighted by bright yellow markers.

Move your mouse back and forth to position the barn accordingly. When the jump is located in the place you want, click the left mouse button to "lock" the jump into that position. When you do this, RealRace will return you to the "Racetrack Editor" page.

At that time, you can "tweak" the jump's position, orientation, size, etc. by using the "Item Properties" controls at the bottom of the Racetrack Editor page ("X Location", "Y Location", "Scale", etc.). The best way to see the function of these controls is to try each one out.

To edit any other scenery object, select it in the list of items (on the left side of the "Item" panel in the Racetrack Editor page). Then, use the buttons (New, Delete, Change Group, etc.). For example, to move an object, select it on the list and click "Modify Location." You will temporarily return to the RealRace main window, where you can position the object using your mouse.

When you have finished editing racetrack objects, click "OK" in the **ATE** to finish and return to driving.

If you try driving your car over your new jump, you will notice that it is fully functional—the car actually jumps when it goes over the ramp!

Step 5. (Optional) Copy Your Racetrack

In the previous sections, you edited a racetrack (Pig Pen) that comes on the RealRace CD. In fact, unlike cars, RealRace will allow you to edit any racetrack on the program CD. You can undo any of your changes (that is, revert back to the original version of the racetrack) by clicking the "Revert" button in the "Racetrack Selection" page (Racetrack menu, "Select Racetrack…").

Directly editing the default racetracks is fine if you are only making minor changes (like adding a jump). If, however, you plan on extensive racetrack editing, and especially if you plan on sharing racetracks with other RealRace users, you will probably find that you want to create new racetrack files to edit. In RealRace, you create a new racetrack by copying an existing one.

Let's make a copy of Pig Pen. First, open the "Racetrack Selection" page (in the Racetrack menu, click on "Select Racetrack…"). When the page appears, select "Pig Pen" from the list at the top of the dialog. Then, click the "Make a Copy" button:
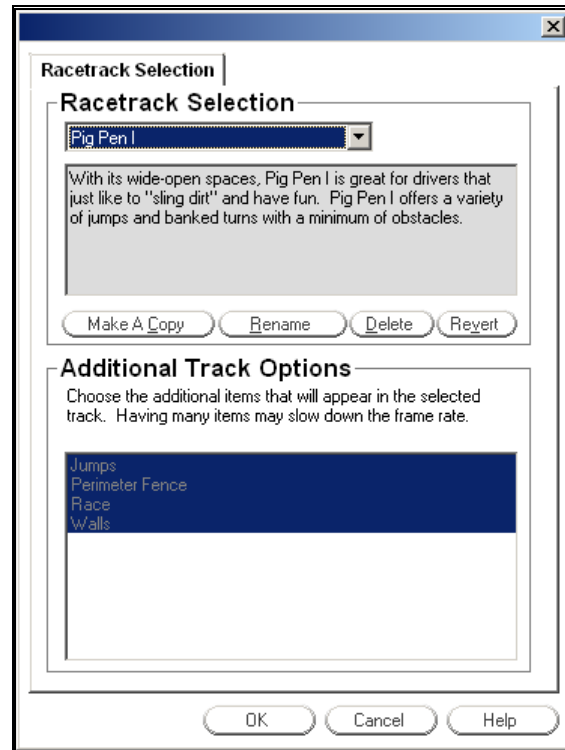
When you click "Make a Copy," you will be prompted for the name of your new racetrack. You can use any name you like, as long as you don't currently have another racetrack with the same name. In this example, you may want to call your new racetrack "Pig Pen I copy 1":

When you have named your new racetrack, click "OK" to return to the Racetrack Selection dialog.

It's that simple—you have now created a new racetrack. To use or edit the new racetrack, you must *select your new racetrack ("Pig Pen copy 1") from the list at the top of the Racetrack Selection dialog*. This makes "Pig Pen copy 1" your current racetrack.

Finally, click "OK" to return to the RealRace main window.

You can now edit "Pig Pen copy 1" any way you want—in fact, it might end up not looking anything like the original Pig Pen. But since you are keeping your new racetrack and the original Pig Pen in separate files, you can drive either racetrack whenever you want.

WHERE TO GO FROM HERE

The examples in this chapter only scratch the surface of RealRace G2's capabilities. You can race with others over the Internet, create a new track with your own layout and terrain, customize your car's physical parameters, and much, much more. We encourage you to explore RealRace using some of the methods below.

- You may want to browse the menus, pausing the mouse cursor over each item to read the tooltips. This gives you a good overview of RealRace commands.

- Keep the 'Tip of the Day' feature active until you have read through all the tips at least once. Tip of the Day describes many features that you may have missed.

- If you'd like to learn more about a particular menu or item, look it up in this manual's table of contents.

- If you'd like RealRace to do something, but can't find an appropriate command, check this manual's index.

- Use the Help facilities in RealRace's "Help" menu.

Talk to other RealRace users. When you visit http://www.knifeedge.com, check out our chat room.

CHAPTER 4. USING REALRACE G2

INTRODUCTION

Chapter 3 took you on a brief tour of some of RealRace's most commonly used features. This chapter will provide you with a broad overview of all RealRace features, and advise you how and where to find detailed information about the features that most interest you.

FEATURES:

SUMMARY OF FEATURES

- **Generation 2 (G2) graphics technology** – RealRace G2 takes complete advantage of today's state-of-the-art 3D accelerated video cards, providing the smoothest and most realistic driving experience possible. RealRace uses incredibly detailed, 24-bit textures on cars, trees, buildings and landscape to add to the authenticity.

- Uses **VirtualRevolution™** sound technology – Doppler-correct stereo sounds heighten the realistic effect with true sound recordings of 2-stroke, 4-stroke, and electric engines. And, as the car crosses the track, the engine sound follows; just like its R/C counterpart. Moreover, RealRace includes numerous CD-quality soundtracks in a variety of musical styles and original compositions.

- Uses **RealPhysics™** technology – True to the physics of driving, RealRace's exclusive RealPhysics technology performs hundreds of thousands of floating point operations each second, delivering sizzling real time driving performance and accuracy. And, with over 100 editable car parameters, RealRace enables you to alter almost any physical characteristic of the car, and immediately view the effects on driving performance.

- **Computer-Controlled Opponents** – RealRace provides challenging and customizable computer-controlled opponents to for you to race against. These competitors are not your ordinary computer-controlled

opponents. You create and train them with the personality, driving styles and skill level you want, for the track/layout you want (including tracks you designed yourself). (Note that the number of opponents simultaneously available to you depends on your available computer power.)

- **ATE (Advanced Terrain Editor)™** – Using RealRace G2's built-in editor, you can customize tracks any way you want. You can add/remove/move/orient barriers, ramps, obstacles, buildings, fences, etc. any way you want. Add/remove/move/seasonally color incredibly realistic foliage. Lay out a racecourse any way you want. Best of all, **the changes you make are *fully functional*—cars realistically bounce from obstacles, and jump when they hit a ramp!** And, you can share your customized racetracks with other RealRace G2 users.

- **Create entirely new tracks** – Using a third party bitmap editor (like Adobe® Photoshop®)—not included with the RealRace program—you can create entirely new tracks, with whatever surface topography, textures and surface material type (dirt, asphalt, etc.) you want. You can reproduce your local club track right down to the color of the pavement and that bump coming into the pits!

- **Collision Detection** – G2 has full collision detection with racetrack objects (cones, ramps, barriers, trees, buildings, fences etc.) When you hit a car, your car bounces!

- **Advanced NavGuides™** – Using the Advanced NavGuides, you can display any of dozens of onscreen informational displays. Options range from speed to engine RPM, and virtually everything in between. While you can't do this for a real R/C car, this feature improves you ability to "see" what is going on in your virtual world.

- **Viewports** – You can open up multiple picture-in-picture displays (number is only limited by the capability of your computer). These can be used for viewing opponents, gaining multiple viewpoint perspectives on your car, looking at a specific corner or jump, and more. Each viewport is treated as an independent "window on the world"; each viewport's vantage point, zoom level, direction of view, etc. can be individually adjusted.

- **Improved Multiplayer** – You can drive with up to seven additional RealRace G2 owners in competitions, or just for the thrill of driving with one another. Use our new list server to team up with drivers from across the street or around the world. Please note: Although up to 8 participants may compete in an event, only the top six drivers in the multiplayer events will be listed on the scoreboard.

- **Control Panel** – RealRace G2's Control Panel allows for easy one-click program upgrading, online registration, and technical support.

- **Animated Suspension movement** – Wheels and shocks move realistically as you drive.

- **Car exhaust/Tire dust** – You can control the color, density, 'hang time', etc. of exhaust from your car, and of dirt kicked up by your tires.

- **Slow/fast motion effects** – You can adjust RealRace to run in slow or fast motion.

- **Fully editable car paint/decal schemes** – Make your car look the way you want. (To design your own paint scheme, you must use a third-

party bitmap editor—not included with RealRace G2—that edits ".tga" files.)

- **Fully editable keyboard mapping** – You can set almost any key on your computer keyboard to execute almost any RealRace command.

- **Extensive Help materials** – RealRace G2 features extensive online tooltips and diagrams, a detailed manual, and technical support to enhance your enjoyment of the program.

WINDOWS® XP, 2000, ME, AND 98 COMPATIBLE

RealRace G2 is a native 32-bit program, designed for Windows XP/2000/ME/98. It uses Microsoft's DirectX 8.1 to provide cutting-edge graphics realism.

CUSTOMIZABLE RACETRACKS

RealRace G2 offers you unprecedented freedom in designing your own racetracks. And with our new G2 graphics, your racetracks look more realistic than ever. *Your imagination is the only limit.*

- Select scenery objects such as buildings, telephone poles, fences, etc. from a large collection of high quality, textured models.

- You have complete freedom to insert, remove, move, rotate and size scenery objects.

- You can insert, remove, move, resize and seasonally color incredibly realistic trees and foliage.

- You can set lighting to match what you'd expect at different times of day, from morning to midday to late afternoon.

- Using a third-party bitmap editor, you can create entirely new track surfaces, with whatever topography, textures and simulated surface material (asphalt, dirt, etc.) you want.

GRAPHICS

- Supports Gouraud shading, bilinear textures, and dithering.

- High quality 3D objects that you can situate anywhere you wish.

- Realistic shading on all objects, including the cars.

- RealRace uses transparency to simulate exhaust and smoke from the cars, see-through car windows, and atmospheric effects such as rainbows.

- High-resolution graphics, including visible panel lines and moving suspension systems, for added realism and authenticity.

- G2's Graphics Optimization controls allow the user to customize the resolution of the textures, the graphics, and the terrain independently to achieve the most realistic look and "feel" for the simulation. The controls also allow the user to tailor the program to optimize the performance on his/her PC.

SOUND

- Employs Doppler-correct VirtualRevolution sound technology, heightening the realistic effect with true recordings of a variety of power plants throughout their RPM range. The recorded power plants include 2-stroke and 4-stroke engines, as well as electric motors.

- CD-quality soundtrack features a variety of musical styles and original compositions; includes ambient sounds typically heard at racetracks.

- Doppler-correct stereo effects. As the car crosses the track, the engine sounds follow; just like its R/C counterpart.

- RealRace G2 even allows the user to import MP3 music files of his/her choice into the program. This allows the user to listen to music of his/her own choosing.

PHYSICS

- The exclusive RealPhysics technology calculates hundreds of thousands of floating point operations each second, delivering sizzling real time driving performance and accuracy.

- RealRace's physics have undergone countless of hours of testing and revisions to ensure that the models not only have a lifelike appearance but also perform just like their R/C counterparts as well.

- RealRace G2 features detailed collision detection. Drive up ramps, on top of tables, under overpasses, bounce off walls—all of which you positioned and oriented yourself!

CUSTOMIZABLE CARS

- Create and save your own car descriptions and parameters.

- Simple "point-and-click" menus for modifying parameters; eliminates the need for difficult calculations. Extensive tooltips and diagrams to guide your customization.

- Radio editing supports almost unlimited mixing possibilities.

- Select either SI (metric) or English (SAE) measurements.

- Over 120 editable car and radio parameters.

- Create customized trim schemes using third-party bitmap editors. (Third-party software—not included—must be capable of editing Targa [".tga"] files.)

ERROR! BOOKMARK NOT DEFINED.GRAPHICS AND SOUND QUALITY

The makers of RealRace continually work to bring you the most realistic graphics and sound possible, since we feel that these are important contributions to your simulation experience. To do so, we take full advantage of modern video and sound hardware. However, we still provide you with extensive, detailed control over

graphics and sound quality, so that you can usefully run RealRace G2 on computers with widely varying speed, power and performance.

FRAME RATE

Frame rate is usually described as how fast the computer can compute and display a new "snapshot". In other words, it is the rate at which **frames** (the individual pictures that are shown in sequence to create the illusion of motion) are displayed in a film or video. Frame rate is measured in frames per second**Error! Bookmark not defined.** (fps). Like a movie picture, when stills are quickly flashed by, RealRace creates a sequence of frames that provide the illusion of motion. Television is flickering the pictures at 30 times per second (30FPS). A typical movie theater displays about 24/48FPS. RealRace can produce output ranging from 2FPS to over 150FPS.

Frame rate is a function of many things and cannot be "set" by the end user. It is a combination of:

- Computer Speed

- Video card speed

- Sound card speed

- How many optional racetrack items are selected

In order for the simulator to work best, you should run at a high enough frame rate so that you do not notice the picture moving from one frame to the next. Rather, it should appear as a smooth, fluid motion. If you observe any "stop-and-go" motions from the simulation, there are several things that may improve the frame rate. *For more information, please see "*Improving RealRace G2 Performance*" on page 251.*

GRAPHICS QUALITY

RealRace is capable of many different levels of graphics quality, some of which are entirely dependent upon the video hardware and monitor used. RealRace Generation 2 allows you to control a multitude of graphics variables in order to configure the simulation to attain the highest possible performance. You can control these variables using either the "Graphics Optimizations" or "Direct3D" items in the Options menu.

SOUND QUALITY

In order to use your sound card with RealRace, the sound card must support Microsoft's DirectSound. Many sound cards accelerate the mixing of multiple sounds. RealRace will take advantage of any acceleration that the card supports. This acceleration will free up your CPU, thereby increasing your frame rate.

ERROR! BOOKMARK NOT DEFINED.TECHNICAL SUPPORT

Besides providing the best R/C simulator, we sincerely feel that we provide the most extensive product support for any R/C simulator. Since cards, drivers, operating systems, etc. are always changing, we work hard to keep our support up to date on the latest issues and problems RealRace G2 users might encounter.

We provide a wide variety of sources for information, help and advice about installing, using, and resolving problems with RealRace G2 (as well as our other software products). These sources range from a detailed, publicly accessible product knowledge base, to live technical support, to peer chat**Error! Bookmark not defined.** and message boards. Should you encounter any problems with RealRace G2, you can access any of these sources, many with a click of the mouse or telephone call.

To learn more about RealRace G2's many support options, please see "Appendix D. If You Experience Difficulties With RealRace G2…" (page 247).

CHAPTER 5. THE RACETRACK MENU

RACETRACK MENU OVERVIEW

The **Racetrack** menu allows you to access all racetrack-related features and options. When you open up the pull-down menu, you will see something like this:
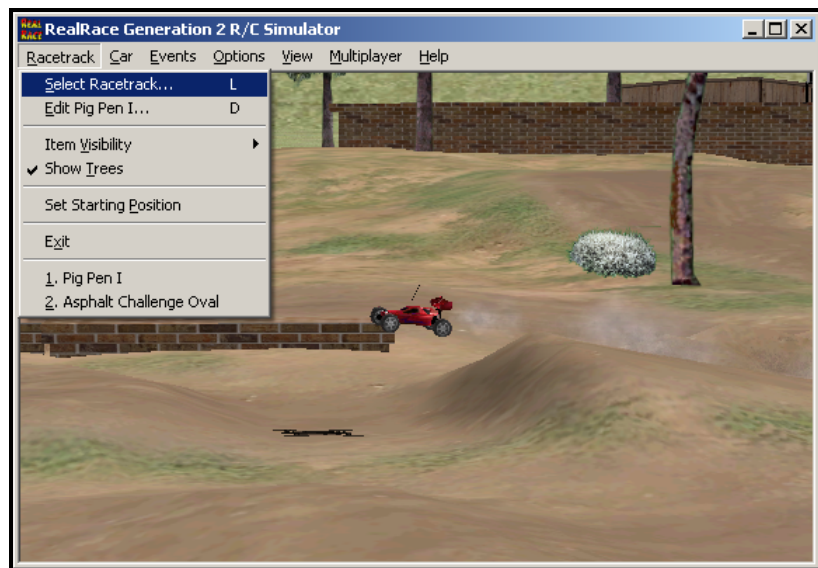
The items in this menu are:

- Select Racetrack…**Error! Bookmark not defined.**
- Edit (Current Racetrack)…
- Item Visibility
- Show Trees
- Set Starting Position
- Exit
- Racetrack MRU

The following sections describe the function or purpose of each of these items.

SELECT RACETRACK…

When you click on **Select Racetrack…** the following dialog appears:
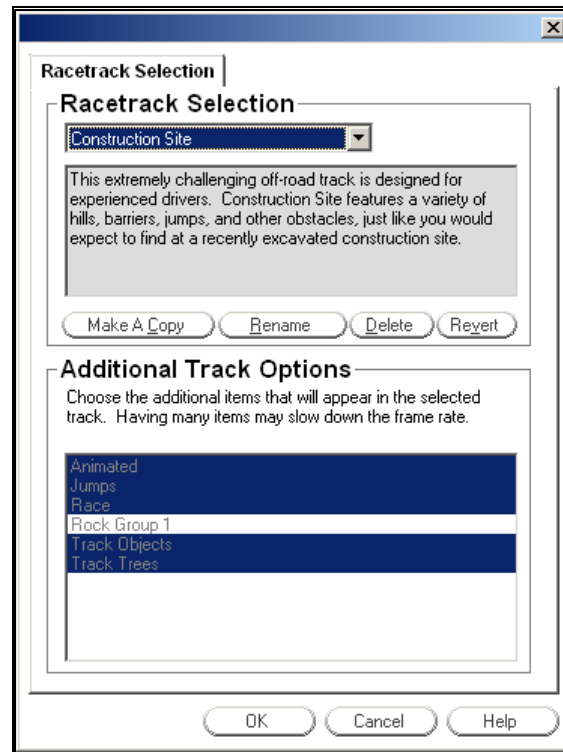
This dialog lets you choose the racetrack and track options that you wish to use for your race. Each track offers its own unique characteristics and challenges.

The list at the top of the dialog displays all of the racetracks available. (In the example above, the user has selected a track named "Construction Site") If you have created any racetracks, they will also be visible here. Highlight the track that you wish to select.

MAKE A COPY*ERROR! BOOKMARK NOT DEFINED.*

By clicking this button, you create a copy of the current racetrack (the racetrack selected in the list at the top of the dialog). RealRace will prompt you for a name for the new track.

What is the purpose of copying a racetrack? The Copy command allows you to create a new track. RealRace does allow you to edit the racetracks on the RealRace CD. If you directly edit a track from the CD, however, you won't be able to revert to the original, unedited CD version of the track without losing all your edits. The solution is to make a copy of the CD racetrack first, and then edit the copy. That way, you will be able to retain both the original racetrack from the CD and your own edited track.

To make your own racetrack, follow these steps:

- Select an existing racetrack.
- Use the "Make a Copy" button to copy the track.
- When prompted, supply a name for your new track.

- Edit your new racetrack (*see "Edit (Current Racetrack)..." on page 35*) as you see fit.

RENAME

Rename the selected racetrack. Please note: you can only rename racetracks that you (or another RealRace user) have created.

DELETE

Delete the selected racetrack. If you inadvertently delete one of the default tracks, don't worry. The next time that the program is run, the default racetrack will be restored.

REVERT

If you have edited one of the racetracks from the RealRace CD, you can "Undo" all your edits (restore the original, unedited version from the CD) by selecting the racetrack and pressing "Revert". Note: this only works on racetracks from the CD.

ADDITIONAL RACETRACK OPTIONS

Select the additional racetrack items that you wish to appear at your track. This list may contain scenery items, (buildings, dividers, etc.), foliage (trees, shrubs, etc.), jumps, and more. The more objects that appear on the racetrack the more realistic it may appear. However, additional objects may slow down the rendering, as they require more time and computer power to process.

When you select items in this list, you are deciding whether or not to show or hide objects that are already in this racetrack. You can add additional objects by editing the track (*see "Edit (Current Racetrack)..." on page 35*).

EDIT (CURRENT RACETRACK)…

RealRace G2 gives you unparalleled freedom to design your own racetracks. Add or remove scenery items, and move, rotate, or even resize existing scenery items. You can also control lighting conditions. Additionally, you can add, remove, reposition, or even seasonally color the foliage.

The "Edit (Current Racetrack)…" menu item is the starting place if you wish to modify the selected track. When you select this item, the following dialog appears:
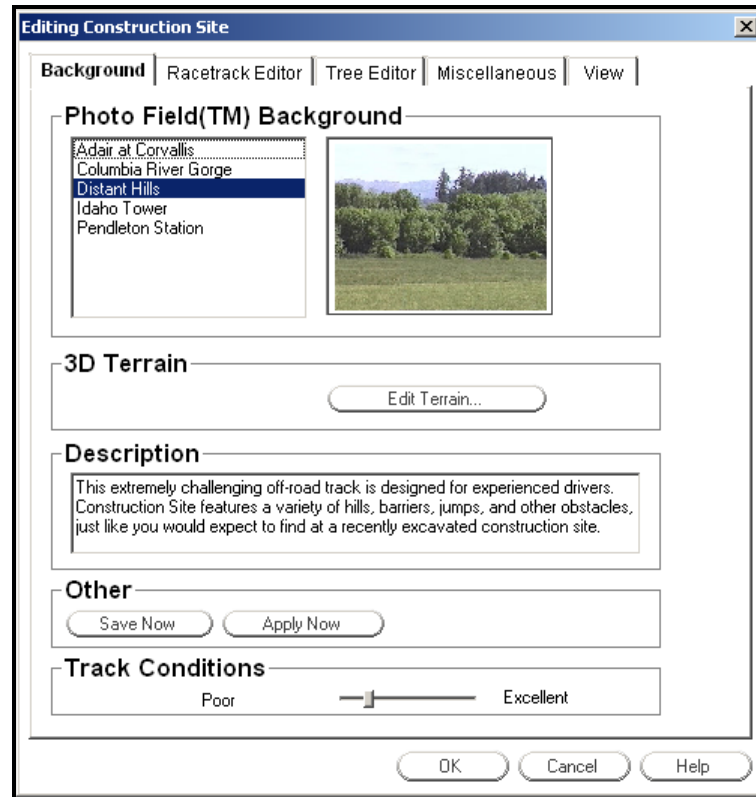
Notice that the top of the dialog has five tabs:

- Background

- Racetrack Editor**Error! Bookmark not defined.**

- Tree Editor

- Miscellaneous

- View

Clicking on one of the tabs above will bring up a subdialog, called a "page." Each page edits a different property of the current racetrack. The sections below describe each page in detail.

BACKGROUND PAGE

The Background page (see diagram above) allows you to edit the overall look of the terrain and environment.

PHOTOFIELD BACKGROUNDS

Select a Photofield background to use for this racetrack. Photofield backgrounds are the panoramic photographs used as backdrops for your tracks, and you can choose from five different backgrounds. The panel on the right shows a preview of the selected background.

3D TERRAIN

The 3D Terrains feature true three-dimensional topography. That is, you get true hills, jumps, and dips in your racetrack. To edit the 3D terrain for the current racetrack, click **Edit Terrain**. *See "Terrain Editor (Edit Terrain)" below for more details.*

DESCRIPTION

Enter a text description of the track. The information entered into this field will be stored until the racecourse is deleted, and can be viewed by anyone using the course. You can edit the description at any time. The track description is particularly useful for keeping track of any modifications, etc. that have been made to a particular course.

SAVE NOW

This button saves any changes to the racetrack, without closing the "Background" page.

APPLY NOW

Clicking on this button does two things: 1) it updates the main RealRace window to reflect any changes to the racetrack; and 2) it keeps the **Background** page open. This lets you see the results of your changes while an editing session is in progress. For example, click **Edit Terrain**Error! Bookmark not defined. and change the color applied to the ground. Exit the **Terrain Editor** and click on the **Apply Now** button. You will immediately notice the new terrain color appear in the background of the track.

TRACK CONDITIONS

This feature mainly controls traction. When set to "Poor", cars experience reduced traction and generally handle more poorly. When set to "Excellent", cars will have better traction and handle much better in general. This simulates the good and bad driving conditions that you may experience on a real track (warm dry day, rain, etc.).

TERRAIN EDITOR (EDIT TERRAIN)

RealRace will allow you to modify the terrain to suit your personal taste. When you click the "Edit Terrain…" button, the following dialog appears:
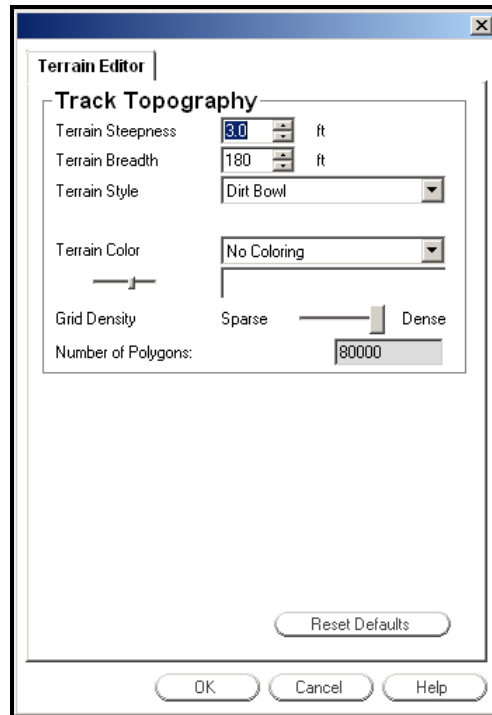
RealRace generates ground bumps and dips while you're driving. This page lets you customize the terrain and appearance of your surroundings.

TERRAIN STEEPNESS

Adjusts the height of the tallest hill in the terrain, and scales the rest of the terrain accordingly. Increase this value to make the topography steeper.

TERRAIN BREADTH

Adjusts the width of the terrain. Higher values will widen your track (i.e. increase the size of the virtual "world"), and pull the hills further apart. Smaller values will increase the frame rate but will reduce the size of the track.

TERRAIN STYLE

Choose the layout of the ground. Each style represents a different track topography.

TERRAIN COLOR*ERROR! BOOKMARK NOT DEFINED.*

RealRace can color the ground so that different elevations have different colors. That is, the base of each hill will have a certain tint; this tint will vary continuously as you move to the top of the hill. The Terrain Color control lets you pick a style of tint variation with elevation. The style you select from this list will appear in the panel below. The color on the left side of the panel indicates the color of the hill base. The color on the right side of the panel indicates the color of the hilltops. You can adjust the contrast of this color scheme**Error! Bookmark not defined.** using the slider control (see below).

TERRAIN LIGHT SLIDER (UNLABELED)

The Terrain Color control (above) lets you pick a scheme for varying the ground color with elevation. This slider lets you control the "strength", or contrast, of the elevation-coloring scheme you have chosen. The preview panel (to the right of the slider) shows the actual coloring that will be applied.

TERRAIN COLOR PREVIEW (UNLABELED)

This display provides a preview of the elevation colors that are applied to the ground. The left hand side of the preview shows the colors for the lower elevation of the ground; the right hand side shows the colors for the higher elevations.

GRID DENSITY SLIDER

This slider adjusts the polygon density of the terrain. A sparse density will create hills with a jagged appearance, as there are fewer polygons that comprise the terrain. A dense setting will create smooth hills and dips; however, it may slow down the rendering speed slightly.

NUMBER OF POLYGONS

This field displays the number of polygons that will be used in the landscape. This is directly related to the mountain width and terrain density.**Error! Bookmark not defined.** While increasing the density will improve the appearance, the additional polygons may slow down your frame rate.

RESET DEFAULTS

Clicking on this button will reset all "Terrain Editor**Error! Bookmark not defined.**" options to their default settings for this racetrack.

ERROR! BOOKMARK NOT DEFINED.RACETRACK EDITING SHORTCUTS

The Racetrack Editor**Error! Bookmark not defined.** Page, Tree Editor Page,**Error! Bookmark not defined.** and View Page will switch into "Edit Mode" on certain actions. This means the dialog will temporarily disappear and you can interact with environment using the mouse and the keyboard. While in this mode, you can use several keyboard and mouse shortcuts to help you navigate.

Action	Description	Add Tree	Modify Tree	Add Object	Modify Object	Change View
Slew Mode	Move the mouse toward the left, right, top or bottom of the screen to move the camera.	X	X	X	X	X
Pan Mode	Hold the CONTROL Key and move the mouse toward the left, right, top or bottom of the screen to rotate the camera.	X	X	X	X	X

Zoom Level	Hold the ALT Key and move the mouse toward the top or bottom of the screen to change the zoom level.	X	X	X	X	X
Altitude Change	Hold down the RIGHT mouse button and move the mouse toward the top or bottom of the screen to change the altitude of the camera.					X
Object Height	Hold down the LEFT mouse button and move the mouse toward the top or bottom of the screen to change the height of the selected object.	X	X	X	X	
Duplicate Object	Hold down the CONTROL Key and click with the left mouse button to make a copy of the selected object.	X	X	X	X	
Rotate Object	Hold down the SHIFT key and move the mouse left and right to rotate the selected object.			X	X	
Cluster Size	Use the ',' and '.' Keys to change the number of trees in the cluster.	X	X			
Object Size	Use the "K" and "L" keys to change the size of the selected object.	X	X	X	X	
Snap to Ground	Use the "S" key to snap the object to the ground.	X	X	X	X	
End Action	Press ESCAPE to end the current action	X	X	X	X	X

RACETRACK EDITOR PAGE

The Racetrack Editor Page allows you to add, remove, or modify **scenery objects** in the current racetrack.

A **scenery object**Error! Bookmark not defined. is a building, wall, cone, moving object, etc. that is located in the track. For purposes of this manual, the term "scenery object" does not include trees or other foliage. Trees have different properties and have their own edit page (*see "Tree Editor Page" on page 50*). Animated objects are also a subcategory of their own; everything in this section applies to them, but

there are some additional details you will need to learn about them. *See "Animated Objects" on page 46 for more info.*

Some scenery objects are actually composed from multiple objects. For example, you construct a fence by joining together many short fence segments. Roads and paths are another example. The advantage of using smaller elements to create a larger structure is the greater freedom you have in creating original landscape designs. When you want to create a custom track, it's more practical to reposition several smaller "building blocks" than to work with a set of large, "complete" objects. For example, it's difficult to run a divider along a complex, winding course when the only curbs available are meant to surround an oval track.

Having said that, let's turn to the Racetrack Editor page:
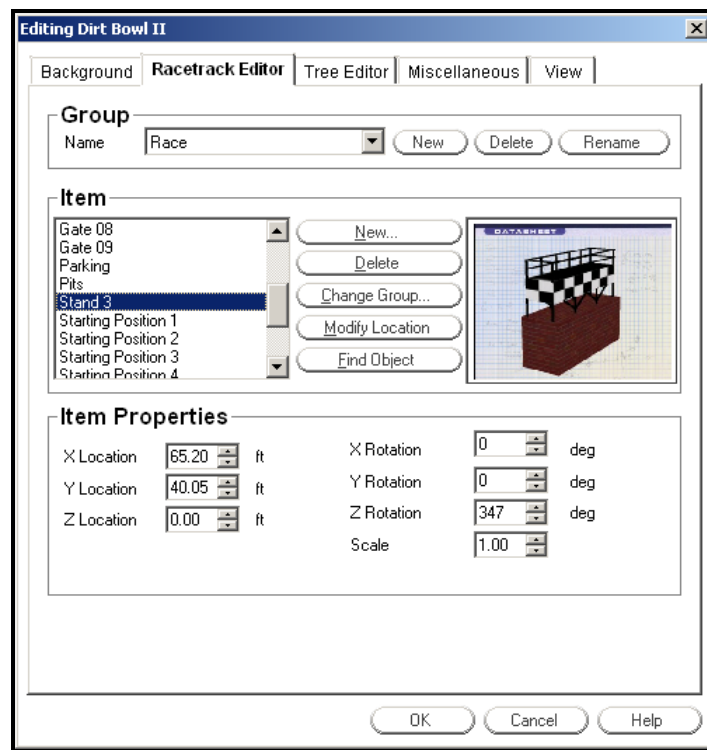
GROUP

Each racetrack scenery object (building, wall, jump, cone, etc.) belongs to a *group*. You don't *see* the actual groups in your track; you only see the scenery objects. Groups are just a convenient way to collect related objects together for easier editing, which is especially helpful when editing a racetrack containing a large number of objects. You can place all your scenery objects in a single group, or have many groups, each corresponding to a category of object. You can also have groups with no objects in them.

*Please Note: Certain objects **must** exist within a group titled "Race".* First create the "Race" group using the **New** command (described below), then place the following objects in it:

- Gates

- Driver's Stand

- Pit Area

- Finish Line

- Starting Positions

- Parking Area

The controls in the "Group" segment of the Racetrack Editor page help you to manage groups, and are described below.

NAME

This box displays the name of the current group. Any changes that you make will apply only to the objects in this group. If you want to edit objects in a different group, select the group you want to edit from the pull-down list.

NEW

This button will create a new group for this track. You will be able to put objects into the new group. When you click this button, RealRace will prompt you for a new group name. To add items (scenery objects) to the newly created group, click on the "New" button in the "Item" controls below.

DELETE

This button will delete the selected group and all of that group's contents. If there is only one group active at the track, RealRace will not allow it to be deleted. Every racetrack must have at least one group.

RENAME

This button will allow you to rename the selected group.

ITEM

The controls in the "Item" segment of the Racetrack Editor let you edit the contents of the current group. The box on the left-hand side of the "Item" segment lists every scenery object in the group. To see a preview of an object, select it from the list. The buttons (New, Delete, Change Group,**Error! Bookmark not defined.** etc.) let you edit the items in the current group.

NEW

This button will bring up the "Add New Items" page, which has a list of scenery items that can be added to this track.
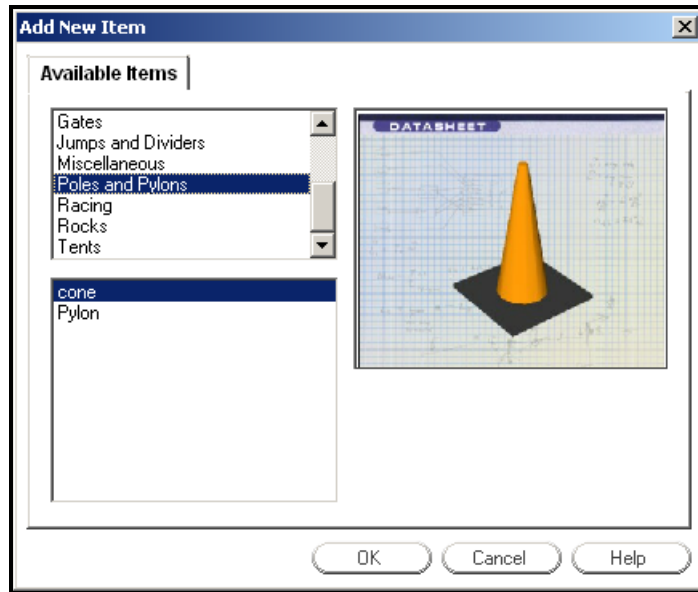
The top list contains *categories* of scenery objects. The bottom list contains all scenery objects that fall into the current category. When you change the category selection in the top list, the list of objects will change correspondingly.

For example, clicking on the "Poles and Pylons" category will bring up the "cone" and the "pylon" objects in the scenery objects listings.

To add a particular scenery object to the current group:

- Select the scenery object's category in the top list (e.g., "Poles and Pylons").

- Select the scenery object from the bottom list (e.g., "cone").

- Click OK. (Or, click Cancel to return to the **Racetrack Editor** without adding a new object.)

- After you click "OK", RealRace will temporarily return you to the main view. You will see the new scenery object, highlighted in bright yellow, in your landscape. Move your mouse to position the scenery object where you want, then click the left mouse button to "lock" the object's position. *See "Racetrack Editing Shortcuts" on page 39 for shortcuts when adding a new object.*

- When you "lock" the position of the new object, RealRace will return to the **Racetrack Editor** page.

If you want to change the location further, either edit the coordinates of the new object using the X, Y and Z position fields (*see "Item Properties" on page 44*), or use the **Modify Location**Error! Bookmark not defined. button.

DELETE

Click this button to remove the selected item from this group. The object will no longer appear in the racetrack. If you want to restore the item later, you will have to add a new item, and reposition, resize and reorient the new item to match the old.

CHANGE GROUP

This button is used to move the selected item to a new Group. When you click "Change Group," RealRace will prompt you to pick a new group for this item:
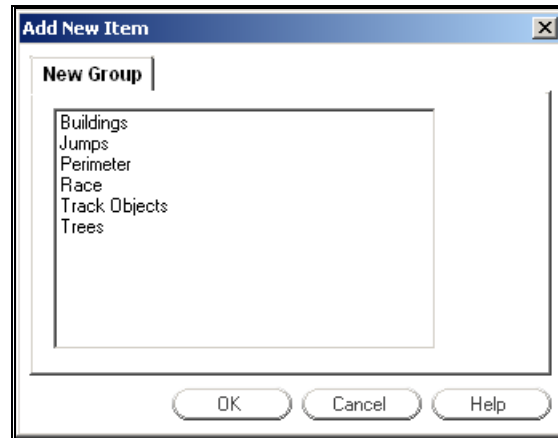
Click **OK** to move the item to the new group, or **Cancel** to return to the **Racetrack Editor** without changing groups.

MODIFY LOCATION

This button is used to move the physical location of the selected item. To do so, select the item that you wish to move and click on the **Modify Location** button. RealRace will temporarily return you to the main view, where you will see the selected item highlighted. Using the mouse, move the object to the desired location. When it is positioned to suit your preference, click the mouse to "lock in" the new position. Then, the Racetrack Editor page will reappear.

Using **Modify Location** to move objects may not work well if you want to make precise "tweaks" to object locations. You can also move objects by directly specifying the X, Y and Z coordinates of their locations. *See "Item Properties" on page 44.*

See "Racetrack Editing Shortcuts" on page 39 for shortcuts when adding a new object.

FIND OBJECT

Use this button to help you find an item in the racetrack. Click on the **Find Object** button and then the window will temporarily disappear. Click on the object that you are interested in. The dialog will then reappear with that object selected in the list.

ITEM PROPERTIES

These controls let you directly edit the position, size, and orientation of every scenery object.

The X, Y and Z location controls are helpful for "tweaking" object positions. To create a rough layout of object positions, you may find it more useful to set the object positions using the mouse (**Modify Location** button, *see "Item" on page 42*).

X LOCATION

Use this to set the actual X coordinate of the object's location, assuming that the ground forms an X-Y plane. Changing this value will move the object parallel to the ground.

Y LOCATION

Use this to set the actual Y coordinate of the object's location, assuming that the ground forms an X-Y plane. Changing this value will move the object parallel to the ground, in a different direction from X. You can move the object to any location by combining X and Y movements.

Z LOCATION

Use this to set the height of the object above (or below) ground. Increasing this value will move the object up (away from the ground). Decreasing this value will lower the object towards the ground. If you want, you can even partially "sink" objects into the ground.

The Rotation controls set the orientation of each object. To achieve exactly the rotation you want, you may need to combine X, Y and Z rotations. This process may seem counterintuitive when you begin, but with a little practice it becomes easier.

X ROTATION

By changing this value, you will rotate your object around an axis parallel to the ground. That is, your object will rotate like a car wheel or plane prop, not like an upright top or helicopter main rotor. Try changing the X rotation on a sample object to see what this does.

Y ROTATION

Like X rotation, changing Y rotation will also rotate your object around an axis parallel to the ground. However, the rotation axis is different. Again, try changing the Y Rotation on a sample object to view the functionality.

Z ROTATION

Changing the Z rotation angle will rotate your object around the up/down axis. That is, your object will turn like an upright top, or helicopter main rotor, not like a car wheel or plane prop.

SCALE

This parameter controls the physical size, or scale, of the selected object. Increasing the scale will cause the object to grow in size. Conversely, decreasing the scale will cause the object to decrease in size.

ANIMATE OBJECT…

This button is only present when you have selected an animated object in the Item list. Click on it to open a dialog that controls the selected object's behavior. *See "Animated Objects" below for details.*

This button is only present when you have selected an animated object in the Item list. Each animated objects has a stoplight associated with it (except for the Teeter Totter Ramp Bottom and, of course, the Stoplight itself). Click on the **Set Stoplight Position** button to relocate the selected object's stoplight, the same way you move other objects in the **ATE (Advanced Terrain Editor)**.

Both human and computer-controlled players use the stoplight to gauge the status of its associated object. By placing the stoplight far enough in advance of the object itself (e.g., piston table), drivers can see that the object is passable or not passable, and make driving decisions accordingly. Otherwise, by the time they get to the object in question, it will be too late to react. For this reason it is imperative that you enter accurate information in the animated object's **Passable Angles/Position** fields (more on this later).

REMOVE STOPLIGHT

This button is only present when you have selected an animated object in the Item list. It removes the stoplight associated with that item.

As noted in "Set Stoplight Position" above, stoplights are very important because computer-controlled opponents use them to know when animated objects are passable. If you remove a stoplight that you shouldn't, it will cause the computer players to malfunction when they encounter the associated object. However, not all stoplights are required. For example, if there are several animated objects clumped together and moving in time, only one stoplight is really needed to inform cars when all of those objects are passable. In that case, you can safely remove all of those objects' stoplights except one.

ANIMATED OBJECTS

Animated objects are different from all other scenery objects—once you place them on the track, they move through a range of motion that you control! For example, some objects twist, some raise and lower, and some even act like a seesaw!

Let's walk through the controls you'll use to manipulate this type of object. First, let's look at the **Animate Object…** dialog:

This menu allows you to control the selected object's range of motion, its speed, and more. It appears only when you select an animated object with a customizable range of motion. Please note that each animated object on the track has its own independent set of values—the **Animate Object…** dialog controls only the currently selected object.

ENABLE ANGLES/POSITIONS 1 AND 2

This box is always checked. It enables the object to move between Angle/Position 1 and Angle/Position 2 (see below for more info).

ANGLE/POSITION

The **Angle/Position** item exists within each of the three "Angle"/"Position" groups. Whether you see "Angle" or "Position" items depends on the type of animated object you've selected. The idea is the same in both cases. Think of the three **Angle/Position** items as stopping points that the object will move between, as different floors are to an elevator.

For example, let's animate a pitching ramp. Once you've placed it on the track and clicked the **Animate Object…** button, enter "0" in the **Angle** box under "Angle 1". Then enter "45" in the **Angle** box under "Angle 2". Click **OK** and return to the racetrack. You will see the ramp raise and lower between 0 degrees (Angle 1) and 45 degrees (Angle 2). If you enter a value of, say, 90 in the **Angle** box under "Angle 3", the ramp will rise to an angle of 90 deg. (Angle 3) next before returning to 0 deg. (Angle 1).

Note the following:

- Angle/Position 3 does not necessarily need to be a greater value than Angle/Position 1 and/or 2.

- You must check the **Enable** box in the "Angle/Position 3" group before entering any data in that group. The objects default to only two stopping points.

- If the object you're animating (e.g., Piston Table) uses "positions" instead of "angles", everything works the same way. If you enter "0" for Position 1 and "5" for Position 2, the table will raise and lower between 0 ft. and 5 ft.

PAUSE

Just like the **Angle/Position** item described above, this control exists within each of the three "Angle/Position" groups. **Pause** controls how long the selected object remains at each Angle/Position before moving to the next one.

Continuing with the example of the pitching ramp from the **Angle/Position** section above, entering a value of "2" for Angle 1 will cause the ramp to remain at a 0 degree angle for 2 seconds. Entering a value of "5" for Angle 2 will cause the ramp to stay at 45 degrees for 5 seconds.

Note that this value does not need to be the same for the different Angles/Positions. That means you can create an object that stays in its "up" position for a longer time than it stays on the ground, and vice versa.

TRANSIT TIME

Just like the **Angle/Position** and **Pause** items described above, this control exists within each of the three "Angle/Position" groups. **Transit Time** controls how long the selected object takes to move to the given Angle/Position from its previous location.

Continuing once again with the example of the pitching ramp from the **Angle/Position** section above, entering a value of "1" for Angle 1 will cause the ramp to take 1 second to rotate down to 0 degrees (Angle 1) from its last fixed position (45 degrees at Angle 2). Entering a value of "3" for Angle 2 will cause the ramp to take 3 seconds to rotate up to 45 degrees (Angle 2) from 0 (Angle 1).

Note that this value does not need to be the same for the different Angles/Positions. That means you can create an object that moves up much more quickly than it moves down, and vice versa.

USE ACCELERATION CURVE

Use this box to control whether or not animated objects accelerate smoothly from a complete stop to their transition speed.

DELAY FROM START

All animated objects begin their motion cycle at the same time. If you input identical **Pause** and **Transit Time** values for all of the objects on your track, then every single one will begin and end its movements at the same time. But what if you want to stagger objects, so that the pitching ramp you encounter first always begins rising a half second before the piston table farther down the track?

The **Delay from Start** option provides a method of delaying an object's movement by the specified amount of time. RealRace uses the value you enter here as an offset from the internal clock. For example, let's say you have two turnstiles at opposite sides of the track, and you want them both to move at the same speed but want the

second one to start moving 5 seconds after the first one. You would leave the delay value at "0" for the first turnstile, and enter a value of "5" for the second turnstile.

Note that the delay value is based completely on the simulation's internal clock—*it is not relative to other objects*. If you have placed three objects and you want each one to begin moving one second later than the one before it, you cannot enter a value of "1" for both the second and third objects. If you do, they will both start moving at the same time: exactly one second after the first object. Instead, you must enter "0" for the first object, "1" for the second object, and "2" for third one. That way, the first object starts moving at the beginning of the cycle (0 second delay), the second object starts moving one second later, and the third object starts moving after a two second delay, effectively staggering all three objects by one second increments.

PASSABLE ANGLES/POSITION

The **Passability** options are crucial pieces of information. The computer-controlled opponents use this data to determine when it is safe to pass the selected object. Note: this section does not apply to the Teeter Totter Ramp Bottom and Animation Stop Light, since they do not have definable ranges of motion.

Each animated object has a range of motion that you define (*see "Angle/Position" above*). Most of the time, cars can only pass an object while it passes through a certain portion of that range. For instance, a pitching ramp at 90 degrees is the same as a wall! Therefore, you might define the passable range for a pitching ramp as the span between 0 and 45 deg. Likewise, if a piston table is spanning a gap in the track and acting as a bridge, the passable range for that object will be only the very top of its full range.

Note the following:

- The animated stoplight is based entirely on the information you input here. *See **Set Stoplight Position** under "Racetrack Editor Page" on page 40 to learn more about how the stoplight object works.*

- Entering incorrect passability information will prevent computer-controlled opponents from passing the obstacle during a race.

WARNING TIME

This option allows you to adjust the response of the object's stoplight. Since it deals largely with the behavior of the animated stoplight, you should make sure you read **Set Stoplight Position** *under "Racetrack Editor Page" on page 40 before continuing.*

Warning Time works as a time value offset. For example, if a turnstile's stoplight is placed 30 feet before the turnstile, it will turn green when the object is passable and red when it is not. But even though the light is green when a car passes it, by the time the car reaches the turnstile it may be closed again.

You can compensate for this type of delay using the **Warning Time** item. Make the warning time equal to the amount of time it takes a car to get from the stoplight to the actual object while traveling at a typical speed for the given section of track. That way, the stoplight will reflect what the status of the animated object will be when the car actually arrives there, instead of the current status (which is oftentimes much less useful).

TEST OBJECT

This option allows you to test an animated object by locking it in the specified angle/position. For example, if you're placing a piston table and want to know if 7 feet is too high a value to use for Position 2, do the following: check the **Test Object** box, enter a value of "7", and return to the track. Instead of moving through its usual range of motion, the table will be held steady at a height of 7 ft. Now you can drive around the object, check its appearance from all sides, and decide if the value is too high (or too low).

Note that the table will not start moving again until you uncheck its **Test Object** box.

SET STOPLIGHT POSITION

This button is located on the **Racetrack Editor Page**. You should experiment with stoplight placement once you've completed the **Animate Object…** dialog (see above). This is an important step—do not ignore it.

*For more information, refer to **Set Stoplight Position** under"Racetrack Editor Page" on page 40.*

ANIMATED OBJECT TIPS

- Slower, smoother moving objects work better than rapid, spasmodically moving objects.

- Place animated objects so they don't physically overlap other objects, either animated or stationary.

- Experiment with different uses for the items. For example, a piston table can function as a bridge across a chasm while in its "up" position, thereby effectively mimicking a bridge that is "out" while in its "down" position. Pitching ramps can serve as barriers, or you can place them such that cars must hit the ramp while it's at a certain angle in order to make it across a gap or over an obstacle.

- The passability range for a given type of animated object isn't always the same; it can vary under different circumstances. For example, an item type might be passable in its "up" position when placed in one location and passable while all the way "down" when placed in another location. Don't get trapped into thinking that each object type has only one passable range that never changes.

- Be creative! Animated objects are meant to be played with, so just have fun with them.

ERROR! BOOKMARK NOT DEFINED.TREE EDITOR PAGE

The **Tree Editor** Page allows you to edit, or modify the trees, foliage, people, and other "2D" objects in the current track. The tree editor is similar to the **Racetrack Editor** (*see "Racetrack Editor" on page 40*), but has a few differences.

As with scenery objects, each of the tree items belongs to a "group" and each "group" can be modified separately.

In fact, you can put trees in the same group with other scenery objects. For example, you can have a tree and a building in the same group. That way, when you turn that group on or off, the building and the trees will toggle together.

Let's now take a look at the **Tree Editor** page:
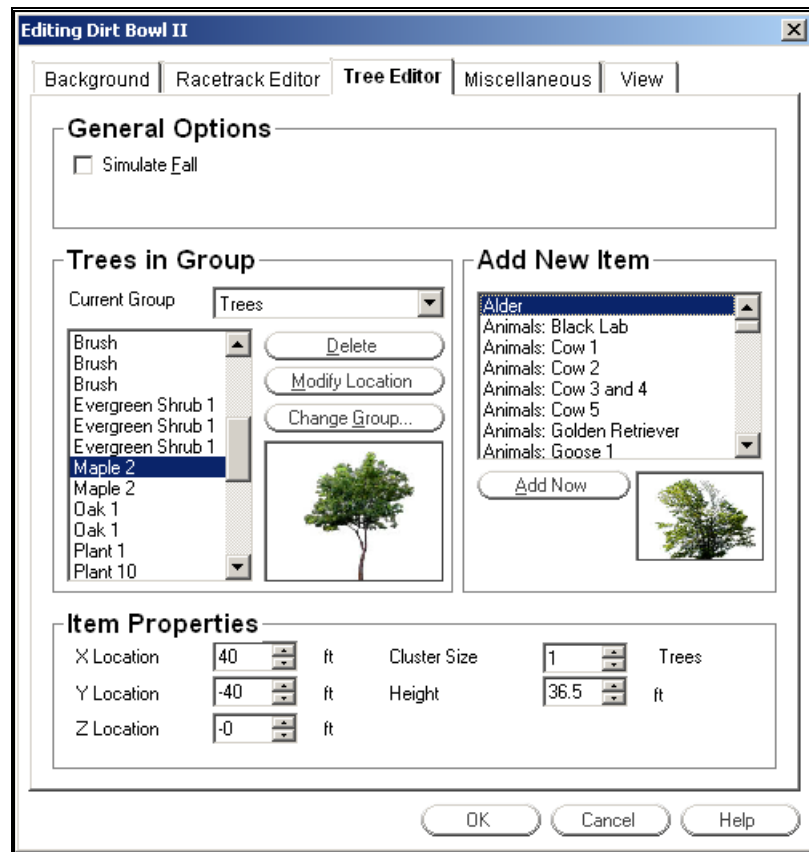
SIMULATE FALL

Click this checkbox if you would like the trees and foliage to assume an autumn-like appearance. If the box is checked, the trees will assume fall coloring, and the leaves will turn from green to various shades of red, brown and gold.

CURRENT GROUP

Like the scenery objects, all trees/foliage belong to a "group". Select the tree group that you wish to edit.

When you select a group, the box to the lower left displays a list of the trees in the group. You can select a tree from the group to edit.

DELETE

Removes the selected tree or foliage from the current track.

MODIFY LOCATIONERROR! BOOKMARK NOT DEFINED.

This button is used to move the physical location of the selected item. Select the item that you wish to move and click on the **Modify Location** button. RealRace will temporarily return you to the main view, where you will see the selected object (tree, bush, etc.) highlighted in yellow. Using the mouse, move the object to the desired

location. When you have positioned the item, click the mouse button to "lock in" the new position. RealRace will then return you to the **Tree Editor** page.

CHANGE GROUP*ERROR! BOOKMARK NOT DEFINED.*

This button is used to move the selected item to a new group. When you click **Change Group**, RealRace will prompt you to pick a new group for this item:
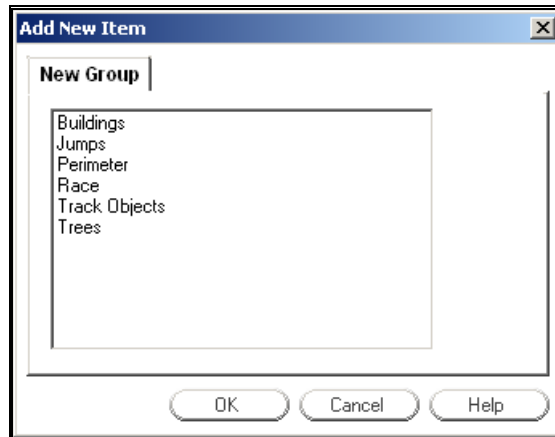
Click **OK** to move the item to the new group, or **Cancel** to return to the **Tree Editor** without changing groups.

ADD NEW ITEM*ERROR! BOOKMARK NOT DEFINED.*

This displays a complete list of the trees and plants that may be added to the racetrack. Selecting an item on the list will bring up a graphic representation of the respective item.

ADD NOW

Click on this button to add the selected item to the racetrack. When you click this button, RealRace will temporarily return you to the main view, where you will see the new item highlighted in yellow. Move your mouse to position the item. When you are finished, click the mouse to "lock in" the new position. RealRace will then return you to the **Tree Editor**.

ITEM PROPERTIES

These controls let you directly edit the position, size, orientation and height of trees, foliage, etc.

The X, Y and Z location controls are helpful for "tweaking" object positions. For doing a rough layout of object positions, you may find it more useful to set object positions using the mouse.

X LOCATION

Use this to set the actual X coordinate of the tree's location, assuming that the ground forms an X-Y plane. Changing this value will move the tree parallel to the ground.

Y LOCATION

Use this to set the actual Y coordinate of the tree's location, assuming that the ground forms an X-Y plane. Changing this value will move the tree parallel to the ground, in a different direction from X. You can move the tree to any location by combining X and Y movements.

Z LOCATION

Use this to set the height of the tree above (or below) ground. Increasing this value will move the tree up off the ground. Decreasing this value will move the tree down towards ground. If you want, you can even partially "sink" trees into the ground.

CLUSTER SIZE*Error! Bookmark not defined.*

Trees can be organized into "clusters", or groves that you can add/move/delete as a unit. This control adjusts the number of trees in the cluster.

HEIGHT

Indicates how tall the tree is.

MISCELLANEOUS PAGE

This page is used to adjust the lighting at the racetrack. You can adjust the lighting that reflects from the vehicles, and the terrain as well.
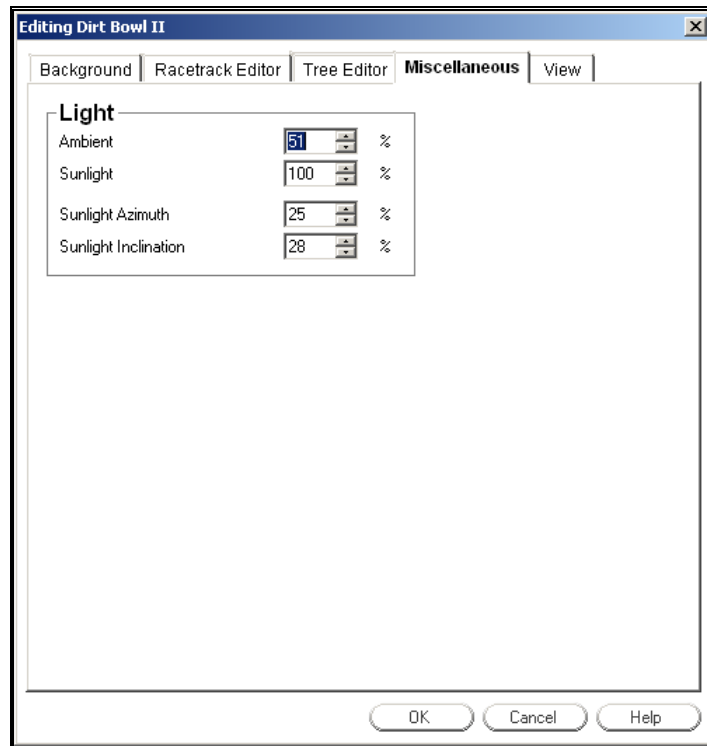
AMBIENTERROR! BOOKMARK NOT DEFINED.

Use this field to adjust the ambient lighting that is present. "Ambient" lighting is diffuse lighting that does not cast a shadow. Decreasing the value will make the contrast between light and dark much greater. Increasing the value will make the dark areas of the objects brighter and decrease contrast.

SUNLIGHT

Use this field to adjust the amount of sunlight at the racetrack. Higher values mean that there is increased light at the site.

SUNLIGHT AZIMUTH

This parameter controls the location of the sun along the horizon. By changing this value, you can move the sun from north, to east, to south, etc.

SUNLIGHT INCLINATION

This parameter controls the height of the sun above the horizon. Higher values mean the sun is higher in the sky. You can simulate mid-day lighting by using a high inclination. A low inclination simulates early morning or late afternoon.

VIEW PAGE

This tab provides information on adjusting the view.
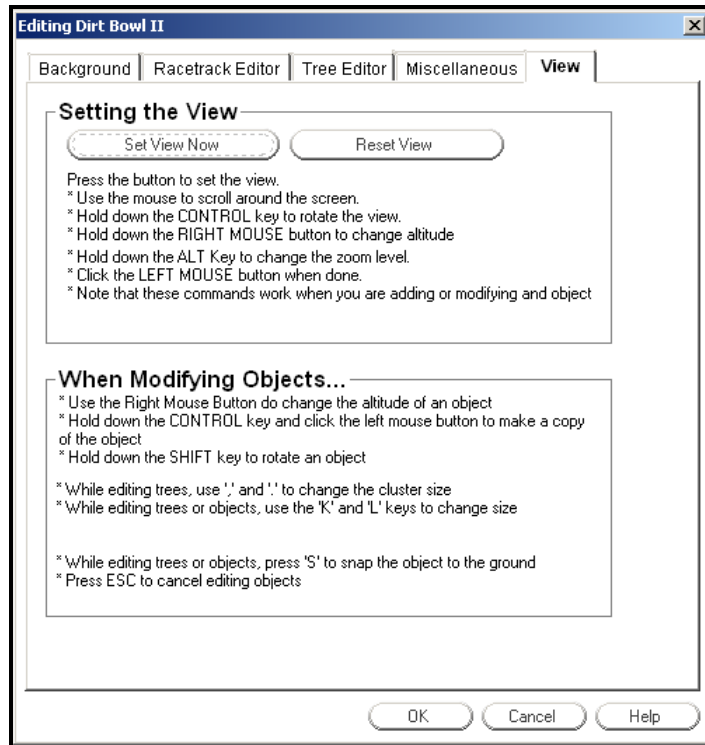
SET VIEW NOW

Click on this button to set the vantage point for the main window while editing. *See "Racetrack Editing Shortcuts" on page 39 for shortcuts when changing the view.*

Note that this feature affects the view only while in the **ATE**. As soon as you exit, your view will return to its state prior to opening the **ATE**.

RESET VIEW

Click on this button to return to the default view.

ITEM VISIBILITY

Use this item to determine whether to show or hide scenery objects in the racetrack. Selecting this item creates a submenu with a list of items you can show (make visible) or hide (remove from visibility). To show items, select them (check them in the submenu). Conversely, to hide items uncheck them.

There are two important concepts that will help you use this command effectively.

First, the items on the submenu list are *groups*, not individual objects. Groups are collections of racetrack objects (obstacles, trees, jumps, fences, etc.) that you can create and modify when you edit a racetrack (*see "Terrain Editor"***Error! Bookmark not defined.** *on page 37, "Tree Editor Page" on page 50*). So, when you edit a track, you may want to try to organize your scenery objects into groups that make sense to show or hide as a unit. For example, if you plan on sharing your racetracks with

other RealRace users, and you have a large number of objects in a racetrack, some users may want to turn off some objects and leave others active.

Second, this item only controls the visibility of objects that are already in the current racetrack. It does not add or delete any objects from the track. You can add or delete scenery objects by editing the racetrack (*see "Edit (Current Racetrack)..." on page 35*).

ERROR! BOOKMARK NOT DEFINED.SHOW TREES

This item lets you determine whether or not the trees/foliage will be visible. This is the universal controller of all the trees/foliage. If this item is not checked, then the trees/foliage will not be visible. However, please note that even if this item is checked, trees/foliage may still be turned off if they are part of a group that is disabled via the **Item Visibility** item described above.

If you wish to modify the trees or foliage, select **Edit (Current Racetrack)…** and click the **Tree Editor** tab (*see "Tree Editor Page" on page 50*).

ERROR! BOOKMARK NOT DEFINED.SET STARTING POSITION

Select this item to adjust the starting position for the vehicle. This will also be used as the default position that the car will return to each time you hit the spacebar to reset.

To adjust the starting position, click on the **Set Starting Position** item. This will bring up an overhead view**Error! Bookmark not defined.** of the racetrack. Using the mouse, position the pointer at the desired starting position and click one time. This will set the actual beginning position. To adjust the starting heading,**Error! Bookmark not defined.** or direction the car will face, move the mouse left or right to rotate the vehicle accordingly. When satisfied with the heading, click the mouse once again. This will "lock" in the heading (starting direction) of the car.

ERROR! BOOKMARK NOT DEFINED.EXIT

Exit the program entirely.

ERROR! BOOKMARK NOT DEFINED.RACETRACK MRU

The last items on the **Racetrack** menu**Error! Bookmark not defined.** (**1 Previous Track**, **2 Previous Track**, etc.) are names of racetracks you have previously used. In the graphic below, the user is currently driving at a racetrack named "Parking Lot", and has previously driven at "Dirt Bowl II", "Pig Pen I", and "Asphalt Challenge Oval I":
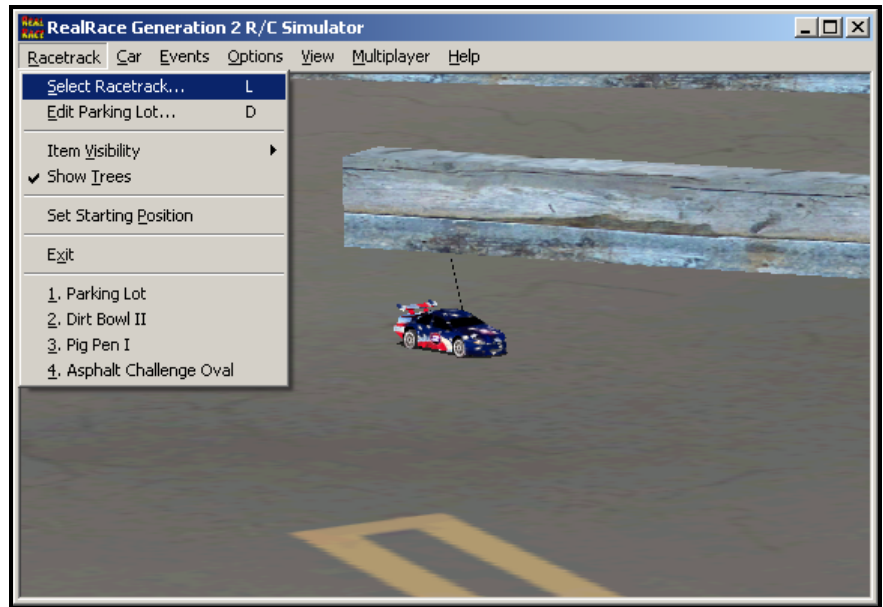
If you select one of these racetracks, RealRace will reload that track. This is a shortcut that lets you rapidly switch between tracks without using the **Select Racetrack…** item.

CHAPTER 6. THE CAR MENU

CAR MENU OVERVIEW

This menu accesses all car-related features and options. When you open the **Car** menu, your display will be similar to the following:
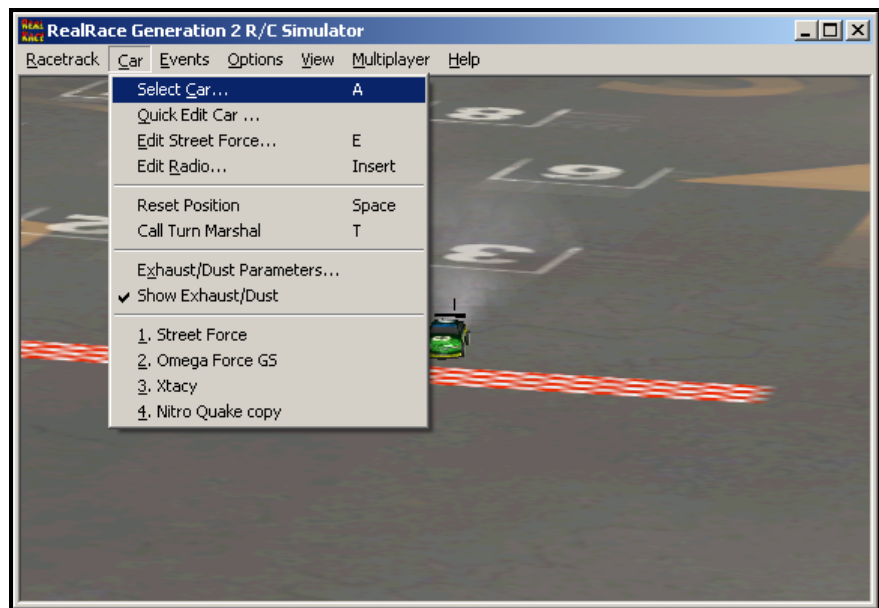
The items in this menu are:

- Select Car…

- Quick Edit Car…

- Edit (Current Car)…

- Edit Radio…

- Reset Position

- Call Turn Marshal

- Exhaust/Dust Parameters…

- Show Exhaust/Dust

- Car MRU

ERROR! BOOKMARK NOT DEFINED.CAR SELECTION…

When you select **Car Selection…,** the following dialog appears:
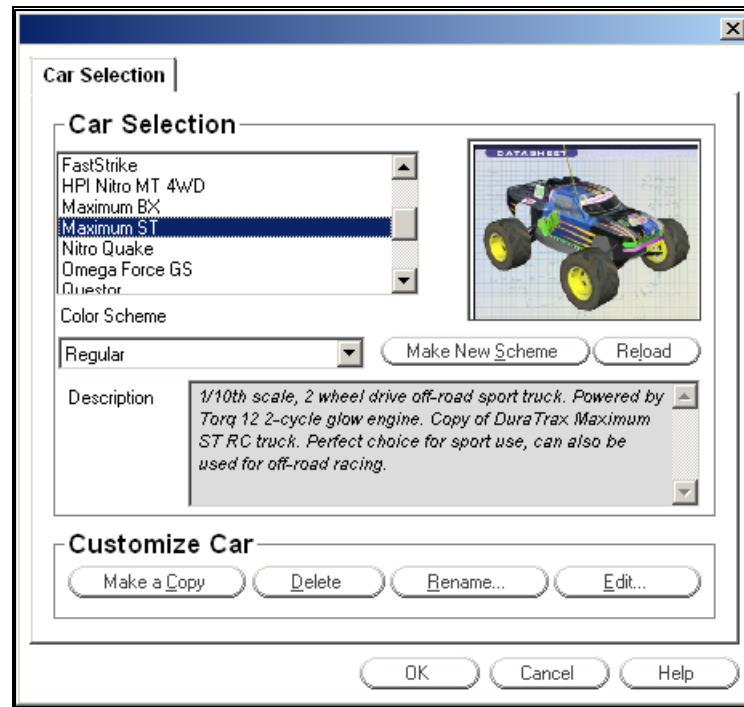
The main purpose of this dialog is to help you select the car you wish to drive. This dialog also enables you to choose a paint/decal scheme for your vehicle as well.

CAR SELECTION

From the list in the upper left side of the dialog, select the car that you want to drive. Off-road options include everything from the .21-powered Axis 4WD buggy to the Maximum ST 2WD sport truck with Torq 12 engine to the big Nitro Quake monster truck. For on-road action, try the Street Force with .12 2-cycle engine or the powerful .26 4-stroke Omega Force GS. Electric equivalents to many of these cars are available as well. Every car has its own unique driving characteristics as well as several color schemes.

The panel in the upper right side shows a graphic representation of the selected vehicle.

COLOR SCHEMEERROR! BOOKMARK NOT DEFINED.

From this list, select a trim scheme, for the car that you have selected. You may also create your own trim scheme using a third-party bitmap editor (not included with the RealRace software), as long as your editor supports the Targa (".tga") format. *For more information on creating your own trim scheme, see "Creating A Custom Color Scheme" on page 62.*

MAKE NEW SCHEME

This button is used to add a new trim scheme for the selected car.

RELOAD

This button is used to apply the created trim scheme to the selected car. This is mainly used when testing your color scheme to see how it looks on the vehicle. You can save the file using the image editor, then switch to RealRace and click Reload. The color scheme will then be reloaded into RealRace from disk instead of from memory, ensuring you see the most recent version. Note that the Reload feature only works if the color scheme is already listed in the "color scheme" dropdown box; if it is a brand new color scheme, restart RealRace instead).

DESCRIPTION

This box describes the currently selected model. Consult this box to view details such as the engine size, the scale of the car, whether it is two- or four-wheel drive, and its intended driving environment.

MAKE A COPY OF A CAR

RealRace will not allow you to change any of the default or standard vehicles on the RealRace CD. You can, however, make a copy of a vehicle from the CD, and edit the copy. Use this button to copy the selected vehicle. RealRace will prompt you for a name of the new vehicle; you can use any name that is not already in use by another car.

DELETE CAR

Delete the selected car. You can only delete models that you (or another RealRace user) have created. You cannot delete a vehicle from the RealRace CD.

RENAME CAR

Rename the selected model. You can only rename a car that you or another RealRace user has created.

EDIT CAR

Edit the selected car. You can only edit a vehicle that you (or another RealRace user) have created. You cannot edit any car from the RealRace CD. If you want to edit a car from the CD, make a copy of the model first.

RealRace offers you unparalleled vehicle editing capabilities. You can adjust almost any physical characteristic of your car, and instantly see the results of your changes in the car's driving performance. *See "Chapter 15. Customizing and Tuning Your Car" on page 147 for a complete explanation.*

Note that you can make your car "Read Only" by using Windows Explorer. RealRace will not allow you to edit any vehicle that has this flag set.

CREATING A CUSTOM COLOR SCHEME

RealRace allows you to create a custom paint/decal scheme for your car. The color schemes you create are limited only by your imagination.

However, only individuals that own, and know how to use, a third-party bitmap editing program such as Adobe® Photoshop®, should attempt to create a custom color scheme. Your editor must be able to read and edit Targa (".tga") files.

To create a custom color scheme, click on the "Make New Scheme" button. Next, designate a new name for the custom color scheme. RealRace will then advise you as to the storage location of the file that will be used to create the new trim scheme.

To access the file that contains the custom color scheme, open Windows Explorer and then the RealRace folder followed by the "Color Schemes" directory. This will bring up all of the color schemes that have been stored in RealRace. The name of the vehicle will precede the name that you have selected for your custom color scheme. Click on the file for which you wish to modify the trim scheme.

DO NOT ALTER THE NAME OF THIS FILE, AS REALRACE MAY NOT BE ABLE TO CORRELATE THE COLOR SCHEME WITH THE CAR.

TIPS FOR COLOR SCHEMES

- A quick and easy way to change a color scheme is to replace one color with another. Photoshop has a command that can easily do this called "Replace Color".

- Make sure you save the file as 32 bit TGA files so that the Alpha Channels are preserved (See below).

- You are only allowed a single Alpha Channel.

- Do NOT change the resolution**Error! Bookmark not defined.** of the image.

- Other formats (JPG, BMP, etc) are not allowed.

ALPHA CHANNELS

Almost all of the color schemes for the cars incorporate an Alpha Channel, which defines what areas of the color scheme are opaque and what areas are transparent. White portions of the alpha channel will be 100% opaque and Black portions of the alpha channel will be 100% transparent. Shades in-between will be partially transparent.

Consult your manual for the image editor you are using to determine how to use Alpha Channels.

Note: RealRace uses TGA files instead of the more common BMP format since BMP formats do not support alpha channels.

QUICK EDIT CAR…

This item will allow you to customize the features of your car that you can usually adjust with a "turn of the wrench" at trackside in real life. Examples include wheel alignment, tire choice, and shock springs.

You can do all basic car editing using this dialog. We suggest you use this option instead of the full Edit menu described below unless you are serious about measuring your own cars to use in the simulation.

Read "Quick Edit" on page 148 to go through all of the Quick Edit items one at a time.

EDIT (CURRENT CAR)...

Click this item to customize the selected car. This will bring up the same menu as the **Edit Car** section in the **Select Car** item; however, this is a faster way to access the Car Editing dialogs.

RealRace offers you unparalleled car editing capabilities. You can adjust almost any physical characteristic of your vehicle, and instantly see the results of your changes in the car's driving performance.

Note: you can only edit a vehicle that you have created. To edit cars from the RealRace CD, you must first make a copy of the car.

See "Chapter 15. Customizing and Tuning Your Car" on page 147 for a comprehensive guide to car editing.

Note that you can make your vehicle "Read Only" by using Windows Explorer. RealRace will not allow you to edit any car that has been set as Read Only.

EDIT RADIO...

Select this item to set up the software radio you use to control RealRace. Note that you can only edit the radio for cars that you have created. RealRace will not allow you to set up the radio for any vehicles from the RealRace CD.

Alternatively, you can access the Radio Setup**Error! Bookmark not defined.** page by pressing the keyboard's "Insert" key.

RealRace offers you extensive radio setup options. *See "Chapter 12. Setting up the Radio" on page 125 to learn more.*

RESET POSITION

Click on this item to reset the car to the starting point. You can accomplish the same task by pressing the keyboard's space bar.

If you want to change the initial position, select "Set Starting Position**Error! Bookmark not defined.**" in the "Racetrack" menu.

CALL TURN MARSHAL

Click on this item to set your car on its wheels again if—or rather when—it becomes overturned. This option is also useful for turning your car around if you become trapped in a corner or against a wall. You can access this same feature by pressing the "T" key on your keyboard.

EXHAUST/DUST ERROR! BOOKMARK NOT DEFINED.PARAMETERS

This item allows you to customize the car exhaust and the dust kicked up by its wheels. Exhaust is automatically scaled to take into account the different engine displacements and types. Also, wet and dry dirt can be configured separately from each other, and they are set up to behave differently by default.

To display exhaust and dust, click on the **Show Exhaust/Dust** item.

EXHAUST/DUST OPTIONS

This dialog displays all of the available exhaust and dust options. RealRace will automatically apply these settings to all of the cars.

COLOR

You can set the exhaust/dust color using the rectangular panel to the right of the "Exhaust Color" or "Dust Color" label. The panel displays the current exhaust/dust color; clicking on the panel brings up a color palette. If you want to change the color, select a new color and click **OK**. The new color will appear in the panel.

DENSITY

This displays the thickness or opacity of the exhaust/dust. Increasing the value will increase the thickness of the exhaust/dust, thereby making it more difficult to see

through. Please note thicker exhaust/dust may slow down the frame rate,**Error! Bookmark not defined.** since it requires additional rendering power from your computer.

FADE RATE

This indicates the speed at which the exhaust/dust dissipates. Lower values mean that the exhaust dissipates more slowly, so the exhaust/dust will take longer to disappear from the screen. Please note lower percentages may slow down the frame rate, since persistent exhaust/dust requires additional rendering power from your computer.

RATE

This refers to the rate at which the exhaust/dust is produced. The higher the value, the more rapidly exhaust/dust is produced. Higher values may slow down the frame rate, since more exhaust/dust requires additional rendering power.

SIZE

This is the actual size of the exhaust/dust. Larger values will increase the physical size of the exhaust/dust, however, they may also slow down the frame rate as well due to the need for additional rendering power.

RESET DEFAULTS

Click on this button to return to the default exhaust/dust settings.

ERROR! BOOKMARK NOT DEFINED.CAR MRU

The final items in the **Car** menu indicate the most recently used**Error! Bookmark not defined.** vehicles. The first item is the car you are currently driving; successive items are cars you have previously operated. You can load a car by selecting it from this list. This is a shortcut that allows you to switch between favorite vehicles without using the Select Car… menu item above (*see "Car Selection…" on page 60*).

CHAPTER 7. EVENTS

EVENT MENU OVERVIEW

An **event** is an organized driving contest with a set of rules. RealRace G2 currently supports two types of events: Lap Racing and Timed Racing. You can play either of these events alone, or with other RealRace G2 users over a network or the Internet.

To participate in an event alone, all you have to do is start the event. RealRace will do the rest.

If you want to compete with additional RealRace G2 users, you must first start a multiplayer**Error! Bookmark not defined.** session *(see "Chapter 10. The Multiplayer Menu" on page 111).* When everyone has joined the session, the session host will start the event. This enrolls every member of the multiplayer session in the event. If any multiplayer session members want to leave the event, they can do so while remaining a part of the multiplayer session.

You can only run one event at a time. This applies to multiplayer sessions as well.

The Event menu accesses all events and event-related options. When you open the menu, the items are:

- Start Event

- End Current Event

- Leave Current Event

- Edit Opponents…

- End Training**Error! Bookmark not defined.**

Some of these items will be "grayed out" if they do not apply to the current situation. For example, you cannot end the current event unless there is already an event running; consequently the **End Current Event** will be grayed out.

START EVENT

Here you will select the type of race you wish to run. Your choices are:

- Lap Racing

- Timed Racing

The following sections describe in detail how to start each event, what all the options do, the rules for both event types, and more.

If you are interested in running a multiplayer "spec race" that includes only stock cars, you can approximate the "spec" requirement in the simulation by agreeing to use only cars customized with the Quick Edit page (*see "Quick Edit Car…" on page 62*). For example, if all racers use only the Quick Edit page, this will prevent someone from entering a .12 size car with a .21 size engine!

EVENT START-UP DIALOG

When you select either **Lap Racing** or **Timed Racing** from the **Events** menu, the following start-up dialog appears (if you choose **Timed Racing**, the dialog will look slightly different):

YOUR NAME

This field allows you to select a name you will use during this contest. If you have any multiplayer**Error! Bookmark not defined.** partners, this is the name they will see. You can choose any name or nickname you like.

EVENT INSTRUCTIONS

This button provides information regarding the Lap Racing or Timed Racing event, depending on which one you have chosen.

GATE GRAPHIC

This option allows you to choose the graphic that marks the location of racing gates. You can select from the following:

- X Ground Markers

- Flags

- Pylons

- Cones

- No Graphic

NUMBER OF LAPS/TIME FOR RACE

This option varies depending on which type of race you have chosen:

- For a Lap Race, select the number of laps each player must complete.

- For a Timed Race, select how many minutes the race should last before competitors must finish the lap they are on.

COUNTDOWN TO START

RealRace executes a brief countdown between the time you click **OK** on this dialog and the time the race actually starts. The purpose of this countdown is to allow you

to get your bearings at the starting line and be prepared to race. Use this control to set the duration (in seconds) of the countdown.

COMPETITORS

Use this control to choose your opponent(s) for the race. To include an opponent in the race, simply click on the checkbox by that opponent's name. To remove an opponent from the race, clear the checkbox (again, by clicking on the checkbox).

The list displays the following information about each opponent:

- **Name** – Name of competitor. You'll be listed here under the name you provided in the **Your Name** field.

- **Car** – Type of car each competitor will be driving.

- **Type** – Each competitor is designated as either "Racer" (human-controlled) or "Computer" (computer-controlled). This item indicates which is which.

- **Start Position** – This displays the starting position of each driver. Position 1 should always be the lead position, although the specific layout of the subsequent positions can vary by track (they might be laid out in rows of two, or staggered, or even in single-file).

If you double-click on an opponent, the simulation will open the **Opponent Info** dialog. Before you attempt to modify an opponent, *read "Edit Opponents..." on page 75 to learn more about computer-controlled opponents and how you can customize them or create your own.*

Note that the number of computer opponents you can race at one time depends upon how powerful your computer is. More powerful computers can handle more competitors because each opponent requires your PC to perform an additional set of physics calculations, just like it does for your own car. If you find that your frame rate drops noticeably during a race, try using fewer computer-controlled competitors.

Also, note that computer-controlled opponents are not available during a multiplayer event. Therefore, if you are hosting a multiplayer session or have joined one, the **Competitors** listbox will not include any computer players.

UP AND DOWN BUTTONS

Use these buttons to alter the starting position of the currently selected driver. For example, to move yourself from starting position 2 to position 3, click on your name in the **Competitors** list, and then click the **Up** button. Note that these buttons will move you to the next available starting position--you cannot "bump" another player by moving into their position. You must first move the other player down to a lower, unoccupied start position. Example: if you are in starting position 2 and someone else is in position 1, clicking the **Down** button will have no effect unless you move the other player first.

READY STATUS

In a single-player event, this text box is unused. In a multiplayer event, it works differently depending on whether you are the host or a client:

- Host: Displays a message informing you whether or not all event participants have reported that they are "Ready" to begin the race.

- Client: Displays "Ready" or "Not Ready", depending on which status you have selected.

MULTIPLAYER CHAT

This feature allows multiplayer participants to "talk" with each other via the simulation. When you enter a message in the small text input window near the bottom and press <Enter>, your message will be displayed in the larger text box above on everyone else's screen, with your name attached so they know it is from you. Note that RealRace does not support private chats; every chat message is visible to all multiplayer participants.

Using the chat feature can help everyone arrive at an agreement on things like how long a race should last and who is going to participate. Obviously, though, you can discuss anything you like.

This feature is disabled during single-player events.

START

If you are running a single-player event, you will see a **Start** button at the bottom right of the event dialog. Click it to begin the race.

If you are part of a multiplayer event, however, read whichever of the following two items applies.

WAITING/START

If you are a multiplayer host, you will see a button labeled "Waiting" at the bottom right of the event dialog. It will be grayed out. When all the event participants have indicated they are "Ready" to begin the race, this button will change to "Start".

Note that the status of this button will reflect the message in the **Ready Status** box described above.

READY/NOT READY

If you are a multiplayer client, you will see a button labeled "Ready" at the bottom right of the event dialog. By clicking this button, you indicate to the multiplayer host that you are ready to begin the race. Once you have clicked **Ready**, the text on the button will change to "Not Ready". If for any reason you change your mind and wish to reverse your status, simply click the **Not Ready** button and your status will change appropriately.

When all the other clients (if any) have clicked the **Ready** button, the host will be free to start the event.

Note that the status of this button will be the exact opposite of the message displayed in the **Ready Status** box described above. The reason is that the status box displays your current status, while the button shows what your status will become if you click it.

GENERAL EVENT INFORMATION

The Lap Racing and the Timed Racing events share the majority of their rules and options. This section specifies the common details of how both event types work.

STARTING A LAP/TIMED RACING EVENT

A racing competition can be run in either a single player or multiplayer environment. In both cases, the person who starts the event chooses the participants and other race options such as gate graphic type and number of laps/time limit.

RealRace automatically applies the options you choose and keeps track of each player's standing in the race (i.e., 1st place, 2nd place, etc.). An announcer's voice will signal the beginning of the race by shouting, "Go!"

For a walkthrough of the process for starting a basic race, *see "Racing Against Computer Opponents" on page 17.*

NUMBER OF PLAYERS

A Lap Racing event can normally include between one and eight competitors.

In practice, however, you may be limited to fewer than eight competitors. Consider the following situations:

- If your racetrack has fewer than eight starting markers, you will be limited to the same number of players. All "out-of-the box" tracks in RealRace have at least eight starting markers, but a custom track may not. You can add more starting markers by editing your track *(see "Racetrack Editor Page" on page 40).*

- If you are racing against computer-controlled opponents, you may find that on slower computers, you may not be able to use as many opponents without slowing the simulation frame rate. Computer-controlled opponents place more demands on your system than do multiplayer opponents.

If you are experiencing difficulties with graphics rendering or overall "jumpiness", try reducing the number of computer-controlled opponents in your event.

Note: although 8 players are allowed in an event, the event gadget will only display the first 6. Rest assured that all players will be included in the end-of-race summary.

LAP COMPLETION

The racecourse is marked by a series of **gates**. If the host so chooses, the gates will be visible on the track (the host can select from a variety of **gate graphics**, or choose to make the gates invisible.) A car successfully completes a lap, by navigating through *each of the gates, **in order**,* and then crossing the finish line. (The finish line acts as the final gate in the sequence.) You are not allowed to "cut" gates—if you miss a gate, you will not receive credit for passing through subsequent gates, until you return and pass through the gate you missed. To get credit for a gate, you must pass around the inside corner of the gate. When you successfully pass a gate, you will hear a tone, and you will see a visible marker move from the gate you just passed to the next gate.

PIT STOPS

If your car does not have enough fuel to complete the race, you will need to pit. This can happen if completing the race requires more fuel than you started with, and you have the **Can Run out of Fuel** option turned on *(see "Miscellaneous" on page 86).*

The **Pit Area** is a white square marked on the ground. During a race, flags will mark its four corners. Drive your car fully inside the square and come to a complete stop. For your car to successfully pit, you must keep it completely stopped within the pit

area for about three seconds. When pitting has completed, the announcer will say, "Go!" This is your signal that your car is refueled and you may continue the race. (Note that the pit area is inoperative except during race events.)

See "Racing Tips" on page 74 for hints on making successful pit stops.

EVENT GADGET

During an event, the **Event Gadget** will appear on your screen. This Gadget displays useful information about the race. You can close it at any time by clicking on the red "X" on its top left corner.

*Please read "*Event Gadget*" on page 104 for information about this important feature.*

TURN MARSHAL

The Turn Marshal works a little differently during an event than it does the rest of the time. In a race, the Turn Marshal also works automatically—RealRace senses when you are overturned or stuck against a wall, and will call the Turn Marshal for you so that you can get on your way. You can still call the Turn Marshal manually, though, too.

PARKING AREA

The Parking Area is used to hold spectators' cars during an event. When a race begins, any cars that are not participating in the event—including yours, if you're just watching the race—are placed in the Parking Area. This holds true for both single-player and multiplayer sessions. If your car is in Parking, you cannot drive it, but you are free to change viewpoints (see "Chapter 9. The View Menu" on page 93) to get a better view of the race action. As soon as the event ends, you can resume control of your vehicle.

The Parking Area is a square marked on the ground in white much like the Pit Area. Unlike the Pit, though, the Parking Area is located outside of the race path (for obvious reasons).

RACE EVENT SUMMARY

As soon as an event finishes, RealRace displays a summary dialog that lists the players' standing, name, time, and status. You'll also notice that there are tabs at the top for each of the racers. Click on the desired player's name to bring up a page listing that opponent's individual lap times as well as the average lap time.

RACING INSTRUCTIONS

The Lap Racing and Timed Racing events are actually quite similar to each other. Things like pit stops, lap completion, and the turn marshal work the exact same way in both events. The only real difference is how race duration and a winner are determined.

LAP RACING

The Lap Racing event is a race around the course that ends when all players complete the specified number of laps (or run out of fuel). The first player to finish

the required number of laps wins the race. Subsequent places (2nd, 3rd, etc.) are awarded based on finishing order.

TIMED RACING

In Timed Racing, each racer drives as many laps around the racecourse as possible. The event ends when:

- The specified time limit expires, *and*

- All players complete the lap they were on when time expired (or run out of fuel).

The player who completes the most laps in the least amount of time wins the race.

For example, if Terence finishes 5 laps in 1:13 and Jane D. finishes 4 laps in 1:08, Terence is the winner because he finished more laps (even though his finish time was longer). On the other hand, if Jane D. finishes 4 laps in 1:08 and Jaime also completes 4 laps but takes 1:19 to do it, Jane D. is the winner since she completed the same number of laps in less time.

In other words, the formula for determining the winner is:

- If one player completes more laps than anyone else, that player wins.

- If two or more players tie for the highest number of laps, the player with the lowest time wins.

All subsequent finishers are ranked using the same criteria.

RACING TIPS

- The Turn Marshal can sometimes be used to your advantage during a race. If you drastically overshoot a turn or jump and end up completely on the wrong side of the course, it might save you a little time to let the Turn Marshal relocate you, rather than attempting to retrace your steps and drive all the way back to where you made the mistake in the first place. Just don't become too dependent and end up using the Turn Marshal to compensate for poor driving skills!

- Each car consumes fuel at a different rate; it will be up to you to discover how long you can drive a particular car between pit stops. You might try making several dry runs before a race to plan out your pit strategy for a given course. You can also use the Advanced NavGuide™ to display your remaining fuel during a race (and any other time). *See "Advanced NavGuides Gadget" on page 101 to learn how.*

- Before a race, be sure to carefully choose a line that you wish to follow through the course. Then, during a race, adhere to that line to the best of your abilities. If you have difficulty staying on your chosen path, slow down a bit until you are able to regain it. It is better to pick a good line and stick to it than to zip around at full speed, driving erratically and crashing into barriers.

END CURRENT EVENT

Select this item to end the current event.

This option will be "grayed out" if there are no events taking place, or if you are not allowed to end the event. (Only the person who starts the event is allowed to end it.)

ERROR! BOOKMARK NOT DEFINED.LEAVE CURRENT EVENT

Select this item to leave an event that you *did not* start.

You can select this item if you are part of a multiplayer**Error! Bookmark not defined.** event, and you are not the host. This item is grayed out if:

- You are the host of a multiplayer event (you can only exit**Error! Bookmark not defined.** by selecting "End Current Event", which ends the event for everyone); or

- You are the only participant in this event.

If you leave the event, you will remain part of the multiplayer session. You will be able to drive, and you can watch the event continue, but you cannot re-enter the event.

EDIT OPPONENTS…

Opponents are computer-controlled competitors that you can race against. They use the same cars and the same RealPhysics™ that you do. They can even drive a car that you build!

If you want to participate in races as soon as you install the simulation, RealRace will not disappoint. It includes built-in opponents for each track on the RealRace CD, and they are all ready to go at the click of your mouse. And when you're ready to take the racing competitions a step farther, RealRace will allow you to create and customize as many of your own computer-controlled opponents as you like! Each opponent will drive differently than other opponents, based on its settings.

An important factor in determining an opponent's unique behavior is its raceline. Racelines are described in detail in the *Racelines* section below.

Like human drivers, computer-controlled competitors can be skillful, mediocre, or inferior. Their skills can even be improved using a built-in training feature! You will find the computer-controlled opponents to be worthy adversaries—you can tailor them to match your abilities and update them as your own skills improve so that they progress alongside you!

You will use the **Edit Opponents…** dialog to control all of the computer-controlled opponent features. The dialog contains two pages:

- Opponent Info

- Racelines

Each of these is described in a section below.

OPPONENT INFO

The **Opponent Info** dialog will help you manage your computer-controlled opponents. It allows you to add, delete, edit, and train them. Here we will describe the function of each control on this page. For a walkthrough of the actual opponent creation process, which is a beginner-level skill, read this section first and then read *"How do I...create a new computer-controlled opponent on an existing track?" on page 134.*

AVAILABLE OPPONENTS

This control displays the name, associated track, and average lap time (if trained) for each available opponent. Use this control to select one of the available opponents by clicking on its name. If this box is empty, there are no opponents associated with the current racetrack.

EDIT

Click to begin editing the currently selected opponent. You must click this button before RealRace will let you modify any of the opponent's settings. If the **Edit** button is grayed out, that means the currently selected opponent is one of the built-in competitors—the simulation will not let you edit any of the opponents that come on the RealRace CD.

SAVE

Click to save any changes you've made to the currently selected opponent. Note that you must first press the **Edit** button before you can make any changes. This button will be grayed out if you have selected a built-in competitor.

DELETE

Click to delete the currently selected opponent. Note that RealRace will not allow you to delete any of the built-in opponents that come on the RealRace CD; if you have selected one, this button will be grayed out.

NEW

Click to begin creating a new computer-controlled opponent. Once the opponent is complete, any race events taking place on this track will list it with the other competitors.

NAME

The name of the opponent currently selected in the **Available Opponents** control above. If you have clicked the **New** or **Edit** button, you can name/rename the competitor here. Otherwise this control will be unchangeable.

CAR

The car driven by the opponent currently selected in the **Available Opponents** control above. If you have clicked the **New** or **Edit** button, you can choose a car for the competitor here; otherwise, this dropdown box will be unchangeable.

COLOR

The color scheme for the car driven by the opponent. If you have clicked the **New** or **Edit** button, you can choose a color scheme for the competitor here; otherwise, this dropdown box will be unchangeable.

RACELINE

The raceline used by the opponent. See the *Racelines* section below to learn about them and what they do. If you have clicked the **New** or **Edit** button, you can choose a raceline for the competitor here; otherwise, this dropdown box will be unchangeable.

AGGRESSION

This slider controls the driving style of the currently selected opponent. When tuned toward the "Passive" end of the scale, the competitor is lighter on the throttle and also tries harder to avoid touching other cars. When tuned toward the "Vengeful" end, on the other hand, the opponent is more aggressive in its throttle use and is more likely to make contact with other vehicles.

If you have clicked the **New** or **Edit** button, you can move this slider; otherwise, it will be unchangeable.

SKILL

This slider controls the actual driving skill of the opponent. When tuned toward "Newbie", the opponent makes mistakes more frequently and has a harder time navigating the course. When tuned toward the "Expert" end, the competitor makes fewer driving mistakes and requires the turn marshal's intervention less often, resulting in faster lap times (as a general rule).

If you have clicked the **New** or **Edit** button, you can move this slider; otherwise, it will be unchangeable.

LAPS TRAINED

Displays the total number of training laps completed by the currently selected opponent. For more information on the built-in competitor optimization feature, *see "How do I...optimize an opponent?" on page 137.*

BEST TIME

Displays the best lap time that the opponent has achieved during training. For more information on the built-in competitor optimization feature, see *"How do I...optimize an opponent?" on page 137.*

AVERAGE TIME

Displays the opponent's average lap time, based on all training laps it has completed. For more information on the built-in competitor optimization feature, see *"How do I...optimize an opponent?" on page 137.*

TRAIN…

Click to begin training the currently selected opponent. If the **Train…** button is grayed out, that means the currently selected opponent is one of the built-in competitors—the simulation will not let you edit any of the opponents that come on the RealRace CD.

To learn more about the built-in competitor optimization feature and how to use it, see *"How do I...optimize an opponent?" on page 137.*

RESET…

Click this button to undo any training completed by the currently selected opponent. The opponent will revert to the state it was in immediately after being created; this will almost definitely result in a competitor that performs poorly compared to its trained version. ***Note: you cannot undo this operation!*** Be sure you really want to reset the opponent before you eliminate what could potentially be the result of hundreds of laps worth of training.

To learn more about the built-in competitor optimization feature and how to use it, see *"How do I...optimize an opponent?" on page 137.*

RACELINES

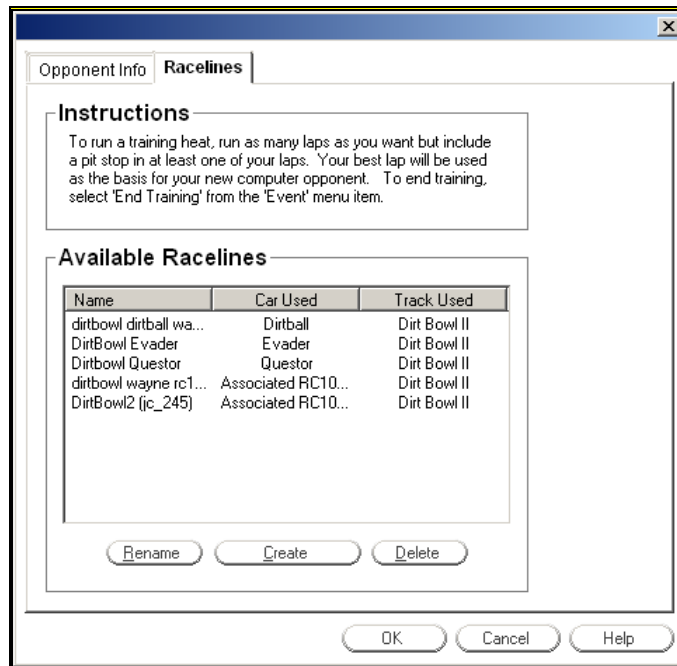Computer-controlled opponents are based on racelines. A raceline guides a computer player through a racecourse. For example, does the opponent try to cut to the inside on gate 2 and veer wide at gate 5? Does it approach the jump at an angle or hit it straight on? The opponent's raceline determines this type of behavior. Basically, a raceline is the route a computer car will try to follow around the course. However, it is not a rigid path; such things as swerving to avoid a collision as well as the settings of the **Aggression** and **Skill** sliders on the **Opponent Info** page can affect how closely the opponent follows its assigned raceline.

An unlimited number of opponents can use each raceline. If you want to create several competitors who all follow the same basic raceline but exhibit different driving styles, you can do just that. However, since racelines are an attribute of computer-controlled opponents, each opponent can be assigned only one.

The **Racelines** dialog page allows you to create new racelines and rename or delete existing ones. This section of the manual provides a detailed description of the accompanying dialog controls. If you want to customize or create new racelines, you should read this first. Afterwards, you can refer to *"How do I…create a new raceline to be used by* one or more computer-controlled cars?*" on page 138* to find a step-by-step walkthrough of the actual raceline creation process.

INSTRUCTIONS

It is important that you follow these instructions when creating a raceline. If you do not, opponents using the raceline may not function properly, especially during longer races.

AVAILABLE RACELINES

This control displays the name, car used, and track used for each available raceline. Use this control to select one of the available racelines by clicking on its name or

elsewhere on the same line. If this box is empty, there are no racelines associated with the current track.

RENAME

Rename the currently selected raceline.

CREATE

Create a new raceline. This involves driving around the course while the simulation observes you. For instructions on how this process works, refer to *"How do I...create a new raceline to be used by* one or more computer-controlled cars?*" on page 138*

Note: choosing this option will immediately place you at the start line. Therefore, make sure you select the desired car and track for your new raceline before clicking the **Create** button.

DELETE

Delete the currently selected raceline.

FOR MORE EVENT INFORMATION

If you are interested in learning more about events and everything you can do pertaining to them, *see "Chapter 14. Advanced Racing Features" on page 133.* It covers such topics as creating new opponents, customizing and training existing competitors, and rerouting the race path on a track.

CHAPTER 8. THE OPTIONS MENU

OPTIONS MENU OVERVIEW

The **Options** menu controls several RealRace program features. Items in this menu include:
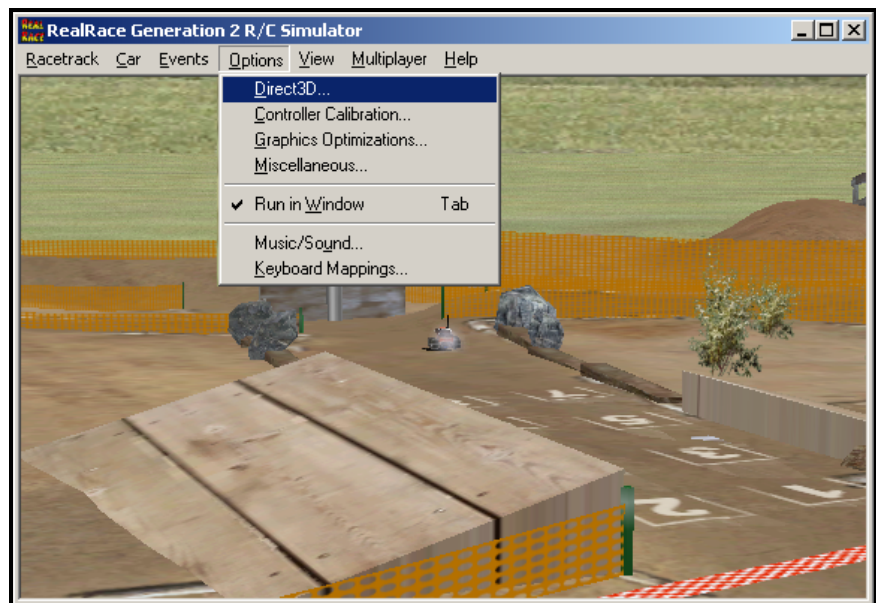
- Direct 3D…
- Controller Calibration…
- Graphics Optimizations…
- Miscellaneous…
- Run in Window
- Music/Sound…
- Keyboard Mappings…**Error! Bookmark not defined.**

DIRECT3D

Select this item to control settings for your 3D video card.**Error! Bookmark not defined.**

CURRENT MODE

This displays the current screen width, the height and the bits per pixel. Additionally, if your monitor's current refresh rate**Error! Bookmark not defined.** is known, it will also be displayed.

ADAPTER

If you have more than one Direct3D compatible video card, they will both be listed here. Please choose the card you wish to use.

RENDERING DEVICE

Each card can have different devices, although most cards will only offer the HAL interface.

USE HARDWARE VERTEX PROCESSING*ERROR! BOOKMARK NOT DEFINED.* IF AVAILABLE

Check this box if you wish to use the hardware vertex processing. Most of the time you want this option enabled. If you experience difficulties with the graphics, try disabling this option. If disabling this option fixes your problem, then contact your video card manufacture and notify them of this difficulty.

You can look in the **Graphics Optimizations** dialog (*See "Graphics Optimizations" on page 85 to see if your card supports Hardware Vertex Processing*).

RENDERING MODE

RealRace Generation 2 can be run in Window**Error! Bookmark not defined.** mode, or in Full Screen**Error! Bookmark not defined.** Mode.

WINDOW MODE*ERROR! BOOKMARK NOT DEFINED.*

The Window mode screen size is dictated by the settings that you have selected in the Display Properties for your monitor. If run in the Window Mode, the RealRace menus will always appear at the top of the screen for easy access. You can at any time change the resolution**Error! Bookmark not defined.** of the desktop by going to Start Menu/Settings/Control Panel/Display.

*Please note: if you are using a 32 Bit Color*Error! Bookmark not defined. ***display mode for your desktop, it will not render as quickly as choosing a 16 Bit Color***Error! Bookmark not defined. ***display mode.***

FULL SCREEN MODE

Selecting this option will allow RealRace to use the entire monitor screen. If you are running in Full Screen Mode, the RealRace menus will not appear on the screen. To access the menu, press either the ESCape key or the ALT key on the keyboard.

RESOLUTION

In full screen mode only, you can use this control to adjust the screen resolution and color depth. If your frame rate**Error! Bookmark not defined.** is unacceptably low, you can improve it by reducing the resolution or color depth. This will reduce some of the rendering required of your video card.

Resolution determines both the sharpness of the picture and how many colors will be used to render the picture. To illustrate resolution, here is the same image of a vehicle at two different resolutions.

800 x 600 Resolution   *1600 x 1200 Resolution*

Notice how much clearer the higher resolution picture is. The problem with high resolutions is that on some computers, it makes the program run much slower. Selecting the ideal resolution for your computer requires a delicate balance between quality and speed.

*REFRESH RATE*ERROR! BOOKMARK NOT DEFINED.

Adjust the refresh rate of you monitor (Full Screen Mode only).

This controls only the *refresh* rate, not the *frame* rate.

Refresh rate is the number of times per second that your monitor retraces its video display. Your video hardware (monitor and graphics card) dictates what refresh rates you can use.

Frame rate is the number of times per second that RealRace creates a different picture to display on your monitor. Frame rate is determined by the speed of your CPU and graphics card, and how many RealRace options are activated.

Use this control to set the refresh rate for Full Screen Mode. If RealRace is unable to determine what refresh rates your card supports, this control will display "0." Higher refresh rates have less "flicker" and usually cause less eyestrain.

*For suggestions on increasing RealRace's frame rate, see "*Improving RealRace G2 Performance*" on page 251.*

We suggest that you test a variety of resolutions and color options to achieve the optimum performance and setup for your system.

ERROR! BOOKMARK NOT DEFINED.CONTROLLER CALIBRATION

This page lets you set up your controller, and verify that your controller is operating correctly. This is an important dialog. If your controller is not calibrated correctly, your car will perform erratically.
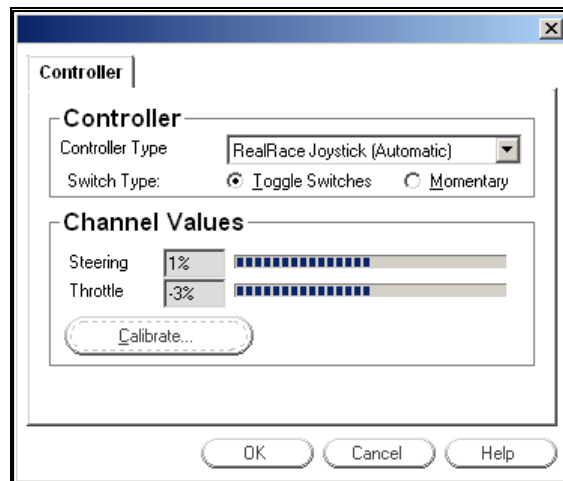
*Appearance of the Controller Calibration dialog in Joystick mode***Error! Bookmark not defined.**

CONTROLLER TYPE

Select the controller type that you wish to use. If you are using a third-party controller, make sure you select it from this dropdown box. Otherwise, you will only

see two RealRace controller items: one labeled "Automatic" and one labeled "Manual". If you're using the controller that came with RealRace, you should never need to alter this setting—simply leave it on the Automatic option. (Basically, the Automatic setting installs an entry for itself in the Windows® Gaming Options menu, and the Manual setting uses whatever entry is already present.)

SWITCH TYPE

Select the switch type that your controller supports. A description of the switch types follows.

- **Toggle Switches** – If your controller uses a two- (or more) position switch that remains in whichever position you place it, select **Toggle Switches**.

- **Momentary** – If your controller has a spring-loaded button or similar mechanism that exists in its primary position except for when you physically hold it in its second position, select **Momentary**. An example is a button that is always up except for when you hold it down. The pistol-grip RealRace controller uses this type of switch.

CHANNEL VALUES

This preview window shows you the input channels as they are read in real time from your controller or joystick. If you move the controller's steering wheel/throttle (or the physical sticks, depending on your controller type) and the meters on the screen do not move, then your controller is not set up correctly. If the bar graphs move in the wrong direction or do not move all the way to the extremes, then you may not have calibrated the joystick correctly and should retry.

CALIBRATE

Click on the "Calibrate" button to initiate the calibration sequence, and then follow the onscreen instructions to complete the process. You will need to calibrate your controller the first time you run RealRace, and periodically thereafter.

GRAPHICS OPTIMIZATIONS

Select this item to access the Graphics Optimizations dialog:
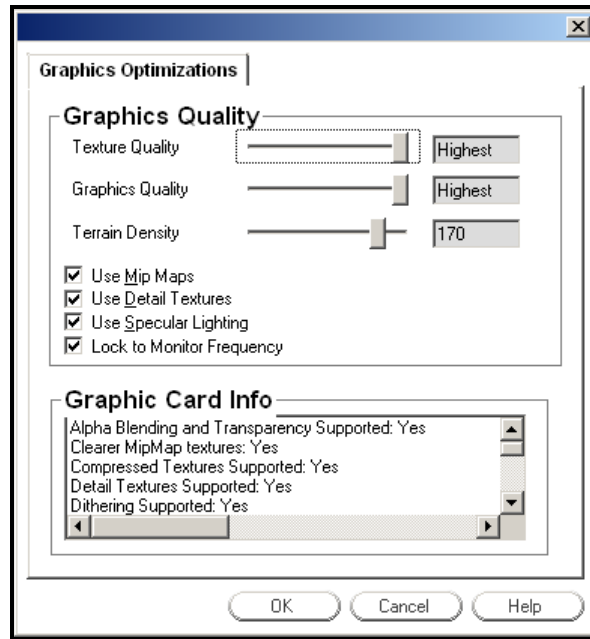
This dialog controls a wide variety of the graphics performance options for RealRace.

RealRace Generation 2 attempts to optimize your system's performance on its own; however, these controls will enable you to further fine-tune the simulation to suit your personal taste.

TEXTURE QUALITY SLIDER

This slider controls the texture quality of RealRace. Moving the slider to the right will increase the texture resolution.**Error! Bookmark not defined.** Higher resolutions will improve the realistic appearance, however, they may also slow down the frame rate as well.

GRAPHICS QUALITY SLIDER

This slider controls several graphics aspects of the RealRace simulation (for example, shadow quality), allowing you to tweak the simulation for optimum performance. Higher graphics quality will improve the realism, however, it may also slow down the frame rate as well.

TERRAIN DENSITY SLIDER

Increasing the values of the Terrain Density will increase the resolution of the terrain thereby giving it a more life-like appearance. Higher resolution will improve the realism, however, it may also slow down the frame rate as well.

USE MIPMAPSERROR! BOOKMARK NOT DEFINED.

Click this check box to activate the MipMaps feature. Turning this feature "off" may cause unwanted "sparkling" on distant objects, or on object surfaces that are viewed at large angles. Using MipMaps improves realism, but may slow down your computer's frame rate.

Click this check box to use detailed textures at your racetrack. This increases the detail and sharpness on surfaces (the ground in particular). Using the detailed textures feature improves realism, but may slow down your computer's frame rate.

USE SPECULAR LIGHTING

Click this check box to use the Specular Lighting feature. This feature makes smooth objects appear shiny in reflected light.   Using the Specular Lighting feature improves realism, but may slow down the frame rate.

GRAPHICS CARD INFO

This panel displays information pertaining to your graphics card. This is an easy way to determine whether or not your current graphics card will support a certain feature or function.

MISCELLANEOUS

Select this item to access the **Miscellaneous** options dialog:
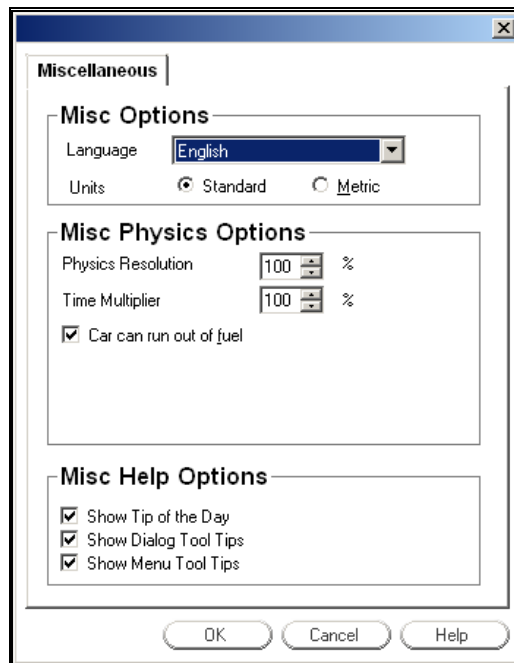
This dialog allows you to adjust miscellaneous options such as language, units of measure, physics performance,**Error! Bookmark not defined.** etc.

LANGUAGE

This indicates the language that RealRace will use in all of its dialogs. The language that appears here will reflect the language that was selected during the installation process.

UNITS

This will determine how the units of measure for editing vehicles will be displayed. Your options are standard (SAE) and metric (SI). This setting does not affect the units of measure as displayed in the Advanced NavGuides. You can set Advanced NavGuides units using the **Edit Gadget** page. (To edit Gadgets, select **Edit Gadgets** from the **Gadget** submenu in RealRace's **View** menu.)

PHYSICS RESOLUTION*ERROR! BOOKMARK NOT DEFINED.*

Adjusts how fast the physics are calculated. The higher the percentage, the more smoothly the car responds to aerodynamic and ground forces.

Setting this parameter higher requires more computing power; 100% will work fine on most computers. However, on slower systems you may need to lower this value below 100% to maintain a normal frame rate.

There is usually no need to exceed 100%. Setting the percentage above 100% may slow down frame rate.

TIME MULTIPLIER

Indicates the percentage to adjust RealRace's visual time base. Reducing this value allows you to create a "slow-motion" effect. This slow-motion effect can be useful when learning a new course or practicing high-speed maneuvers, as you can slow the car's reaction time.

CAR CAN RUN OUT OF FUEL*ERROR! BOOKMARK NOT DEFINED.*

Check this box to allow your vehicle to run out of fuel. If left unchecked, the model will be able to run indefinitely. To adjust the size of the fuel tank, or battery, power, access the car editing dialogs. To do so, choose the **Select Car** item in the **Car** menu.

SHOW TIP OF THE DAY*ERROR! BOOKMARK NOT DEFINED.*

Click on this check box to turn "on/off" the RealRace Tip of the Day. These tips are a sequence of helpful hints and tips on using RealRace. These tips often call attention to overlooked, yet important, features and options. *See also "Tip of the Day" on page 123.*

SHOW DIALOG TOOL TIPS

Click on this check box to turn "on/off" the tooltips in RealRace. The tooltips are the yellow popup windows that appear when you place the mouse arrow over a dialog item or control.

SHOW MENU TOOL TIPS

Click on this check box to turn "on/off" the tooltips in RealRace. The tooltips are the yellow popup windows that appear when you place the mouse arrow over a menu item.

ERROR! BOOKMARK NOT DEFINED.RUN IN WINDOW

Select this item to determine whether RealRace Generation 2 will run in the Window Mode**Error! Bookmark not defined.** or in Full Screen**Error! Bookmark not defined.** Mode. If checked, RealRace will run in the Window Mode. If unchecked, the program will run in Full Screen Mode.

Please note, not all video cards support Full Screen or Windowed Modes. You may only use modes that your video card is capable of supporting.

MUSIC/SOUND

Music and sound effects**Error! Bookmark not defined.** add another dimension to your simulation experience. You can choose to drive to background music or you can listen to the ambient**Error! Bookmark not defined.** sounds of a local track. If you want some random "jeering," then turn on the random effects.**Error! Bookmark not defined.** If you have a slow sound card or a slow machine, you may not be able to turn "on" all of the sound effect options.
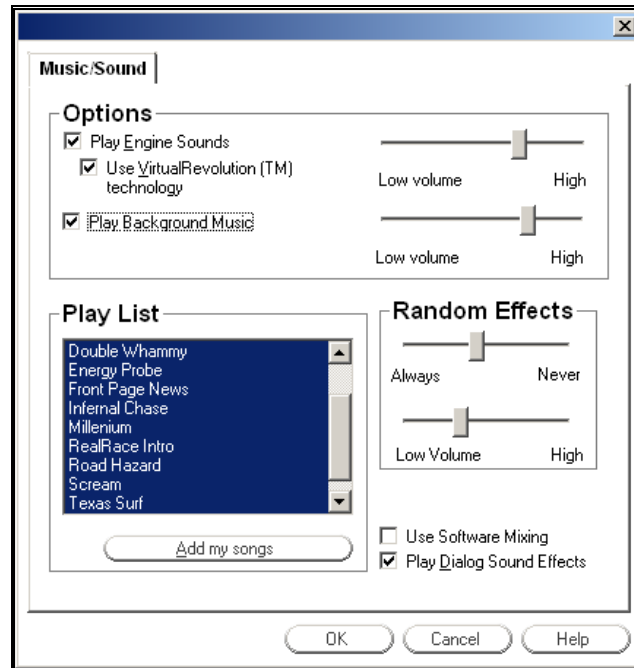
PLAY ENGINE SOUNDS

Select whether or not to play the engine sounds. Engine sounds are an important part of the simulation; they give you an audible indication of your car's speed and contact (or lack thereof) with the ground.

You will appreciate the Doppler-correct engine sounds as your car goes screaming by you!

ENGINE SOUNDS VOLUME SLIDER

Use this slider to adjust the sound levels of the engines in the simulation.

USE VIRTUALREVOLUTION TECHNOLOGY

VirtualRevolution engine technology makes the engine sound correct at both idle and full power and everywhere in between. This sounds the best, but can require more memory and will slow down the frame rate on slower computers.

PLAY BACKGROUND MUSIC

Select whether or not to play the CD-quality background music. This can slow down the rendering speed. Use this option only if you have a fast computer.

MUSIC VOLUME SLIDER

This slider is used to adjust the sound levels of the background music in the simulation.

PLAY LIST

Select which songs and ambient background tracks to play. Highlight songs on the play list to turn them "on".

ADD MY SONGS

RealRace Generation 2 even allows you to add your own music to the simulation. To do so, copy the desired MP3 file to the "**C:\PROGRAM FILES\REALRACE\Songs**" directory and then restart the program. The song should appear on the play list.

RANDOM EFFECTS SLIDER

This slider displays the frequency of the "random" sound effects. Adjust the slider to make them occur as in/frequently as you would like.

RANDOM EFFECTS VOLUME SLIDER

This slider displays the volume of the Random Effects.

USE SOFTWARE MIXING*ERROR! BOOKMARK NOT DEFINED.*

This box indicates whether to use the CPU or the Sound Card to mix the audio. By turning on Software Mixing, you force the CPU to do the mixing, which may be a little slower, but also might sound a little better. By default this option is disabled.

PLAY DIALOG SOUND EFFECTS

Select whether or not to play the sound effects while navigating the dialogs.

ERROR! BOOKMARK NOT DEFINED.KEYBOARD MAPPINGS

RealRace allows you to access menu and other commands from your computer's keyboard. A key that invokes a command is called a "quick key" or "hot key". These keys provide a quicker way of accessing functions or features.

For example, pressing the "F2" key incrementally zooms your view towards the car. This is exactly the same result that arises if you select "Zoom In**Error! Bookmark not defined.**" from the RealRace View menu. Consequently, we say that "F2" is a hot key for the Zoom In command.

RealRace G2 comes with a default set of hot keys. You can use these defaults, or re-map the hot keys however you want. Almost every key on your keyboard can be assigned to control a function of RealRace G2. You can access this feature by selecting this menu item.

When you select "Keyboard Mappings…" the following dialog will appear:
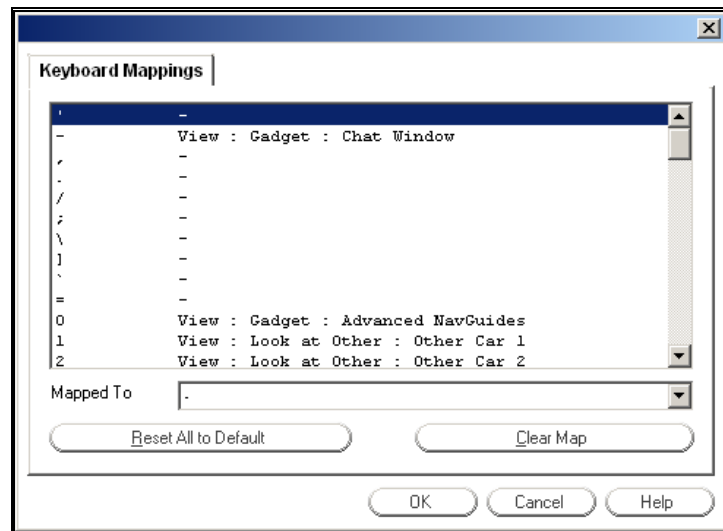
To map a key, simply select from the list the key you want to map. Then, use the "Mapped To" pull-down list to select the command you want the key to perform.

RESET ALL TO DEFAULT

This button will reset all keyboard mappings to their default settings. This will eliminate any custom settings that you have created. *See "Default Keyboard Map" on page 129 for a list of the default key mappings.*

CLEAR MAP

This button removes any assignments that you have given to the selected key, etc. Unlike the "Reset All to Default" button, this selection only effects one selection at a time.

CHAPTER 9. THE VIEW MENU

VIEW MENU OVERVIEW

The **View** menu controls all options and settings for *views*. **Views** describe two things: *what you are looking at*, and *where you are looking from.*

RealRace G2 allows you to create and modify multiple views. The main RealRace window is called the **main view**. Picture-in-picture**Error! Bookmark not defined.** windows (see graphic below) are called **viewports**. You can create multiple viewports, each with independent view locations, directions and styles; you can resize and reposition viewports.

To create or modify views, access the **View** menu. When you open the pull-down menu, you will see the following items:

- Change Active View**Error! Bookmark not defined.**

- Create New View**Error! Bookmark not defined.**

- Zoom Reset

- Zoom In

- Zoom Out

- Driver at Fixed Position

- Driver in Car**Error! Bookmark not defined.**

- Driver Behind Car (Chase)**Error! Bookmark not defined.**

- Look at My Car

- Look at Location

- Look at Other

- Quick Look

- Gadget

- Driver and Viewport Options…

CHANGE ACTIVE VIEW

Select this item to change the active view.

The *active view* is the view (main window or viewport) that will be affected when you use a view menu command (zoom, viewpoint location change, etc.). Only one view at a time is active.

The submenu displays a list of all currently open views. The current active view is checked. You can change the active view by selecting a different (unchecked) view from the list.

Alternatively, you can select the active view by moving your pointer to the desired view and clicking the mouse. When a viewport becomes active, its border will change colors.

If you want to create additional views, use the **Create New View** item (below).

CREATE NEW VIEW

Select this item to create a new viewport.

Once you create a new viewport, you can resize or reposition it by dragging with your mouse. You can also fully adjust all the viewport's properties (zoom level, vantage point options, etc.), independently of any properties of the main window or other viewports. You can create as many independent viewport windows as your video card and processor will allow (creating extra viewports does require additional computing power).

MOVE A VIEWPORT

To relocate a viewport, position the mouse pointer on the viewport's title tab. Press and hold down the left button and drag the viewport to the desired location.

SIZE A VIEWPORT

To resize the viewport, position the pointer along one of the inside edges of the viewport. Click and hold the left button of the mouse, and drag with the mouse to enlarge or shrink the viewport. The size is fully adjustable to suit your personal taste.

VANTAGE POINTS

To change the vantage point options and features, use the commands in the **View** menu (or their keyboard equivalents).   Before you run any view menu commands, make sure the viewport is active by clicking on it or using the **Change Active View** command. *See "Change Active View" on page 94 for more information.*

CLOSE VIEWPORT

To close a viewport, click on the red "X" in the viewport's title tab.

VIEWPORT OPTIONS

To bring up the **Driver and Viewport** options, click on the red circle in the viewport's title tab. Alternatively, you can select the "Driver and Viewport Options" item in the **View** menu. You can find out more about viewport properties in *"Driver and Viewport Options" on page 105*.

ZOOM RESET

This selection resets the zoom magnification level. This is useful if you are zoomed way in or way out and want to return quickly to the default level of magnification (set in Driver and Viewport Options). To set this, select **Driver and Viewport Options** from the **View** menu; when a dialog appears press the "Viewport" tab. Set

the value using **minimum car size**Error! Bookmark not defined. in the Auto Zoom section.

You can also reset the zoom level by pressing F1.

ZOOM IN

This selection will zoom in on the car. Alternatively, the F2 key has the same effect. RealRace will incrementally zoom in on the car each time the function key: F2 is pressed or Zoom In is selected.

ZOOM OUT

This selection will zoom out from the car. Alternatively, you can use the F3 key to achieve the same affect. Each time this option is selected the program will zoom out, incrementally, from the car, thus giving a larger perspective of the area surrounding your vehicle.

DRIVER AT FIXED POSITION

This selection will bring up all of the available options for the driver at the fixed position. There are a number of available selections:

- Set to Default View Position**Error! Bookmark not defined.**

- Set to Current Car Position

- Set with Overhead View**Error! Bookmark not defined.**

- Set to Last Fixed Position

- Set with Mouse

- Set Current position as Default

- Named Positions

SET TO DEFAULT VIEW POSITION

This selection will return the viewpoint to the default position for particular track you're using. The default position is the driver's stand. Alternatively, you may also press the F4 key to **Set to Default View Position** as well.

If however, you wish to change the location of the default view, choose the **Set Current Position as Default** selection.

SET TO CURRENT CAR POSITION

This selection will move your vantage point to the current car position. The car will continue its movement, however, your viewpoint will remain fixed at the former vehicle location.

If you would like your vantage point to follow along with the car, select the **Driver in Car**Error! Bookmark not defined. view or **Driver Behind Car (Chase)**Error!

Bookmark not defined. view (*see...Driver in Car (below a page)... or "Driver Behind " on page 98*).

Alternatively, you can press the F11 key to **Set to Current Car Position**.

SET WITH OVERHEAD VIEW

When you select this option, RealRace will bring up an overhead view of the racetrack. Move the mouse pointer to the desired vantage point and click. This will set your vantage point.

Alternatively, you can use the F7 key to **Set with Overhead View**.

SET TO LAST FIXED POSITION

This selection will undo the most recent vantage point modification. In other words, RealRace will reset your viewpoint to its previous position.

SET WITH MOUSE

This selection allows you to fully adjust the vantage point using your mouse. You may also press the function: F8 key to do so.

After selecting this option, or pressing F8, you may move the mouse forward and backward to move towards or away, respectively, from your car. Moving the mouse left or right will cause the viewpoint to circle around the car. You may also adjust the viewpoint up or down using the wheel on the mouse. If your mouse doesn't have a wheel, simply hold down the right mouse button while you move the mouse forward and back.

When you are satisfied with your vantage point, click the button to "lock" this position.

SET CURRENT POSITION AS DEFAULT

Select this option to set the current position as the new default viewing position for the current track. Initially, the driver's stand is the default viewpoint position.

NAMED POSITIONS

RealRace lets you store vantage points for future use. Select this option to store a position, or to bring up a list of the stored positions. The stored positions are only available for the racetracks in which they were stored. In other words, the list of Named Positions is unique for each track.

NAMED POSITIONS

This indicates any positions that are stored for the currently selected racetrack. To switch to a view from this list, select its name and click **OK**.

SAVE NEW POSITION

Click this button to assign the current view a name and save it for future use. This button will bring up the New Name dialog box. Insert a name for the position and click **OK**.

MODIFY POSITION

Saves the current view as the position currently selected in the **Named Positions** list. In doing so, RealRace overwrites the currently selected position, so use this feature cautiously.

DELETE POSITION

This button will delete the selected position from the list of named positions.

DRIVER IN CAR

Select this item to place the vantage point inside the vehicle, as if you are actually driving the car.

Alternatively, you can set Driver in Car by pressing the function: F5 key.

DRIVER BEHIND CAR (CHASE)

Select this option to bring up the chase view. This viewpoint will always remain behind the car being driven.

Alternatively, you can set **Driver Behind Car (Chase)** by pressing the function: F6 key.

MOVING DRIVER

Selecting this item brings up the moving driver options. Unless you select the **No Movement** option, the **Moving Driver** causes your viewpoint to move as if you were walking towards, or around, the vehicle. The moving driver options are:

- No Movement
- Circle Around Car
- Walks Toward Car

NO MOVEMENT

Selecting this option halts driver movement, if active. This returns you to a fixed view.

CIRCLE AROUND CAR

Selecting this option will cause the driver to circle around the car. The driver options for the walking movements, etc. may be found in the **Driver and Viewport Options** section of this manual.

WALK TOWARDS CAR

This will move the driver towards the car. The walking speed, and other driver options, may be found in the **Driver and Viewport Options** section of this manual.

LOOK AT MY CAR

Select this option to look at the car that you are driving. Alternatively, you may press the function: F9 key as well.

LOOK AT LOCATION

Select this option to look at a specific location. Alternatively, you may press the function: F10 key as well. When selected, move the mouse to choose the location that you wish to view. Once you are satisfied with the location, click on the mouse to set this position.
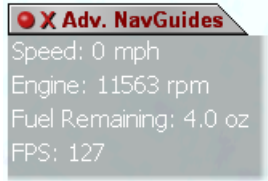
LOOK AT OTHER
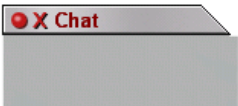
Select this option to look at another object (car) at the racetrack, if applicable. If there are no other cars present selecting this option will not reveal a list of "others" to view. However, if there are "others" to view, you can select the desired vehicle from the list.

GADGET

Select this option to bring up the Gadget options. The list of Gadget items is as follows:

Gadget	Preview
Advanced NavGuides shows you a wide array of detailed information about your car and its environment, and is extremely customizable. *See "Advanced NavGuides Gadget" on page 101*.	

Chat Gadget lets you communicate with other players in a multiplayer session. *See "Chat " on page 104.*	
Event Gadget displays important race information during and after an event, including race clock and number of laps completed. Click on the red arrow in the Gadget's bottom right corner to turn the Event Gadget Extension on/off. Unlike the main Gadget, the extension displays information about each of the event participants. *See "Event Gadget" on page 104.*

Event Gadget

Event Gadget Extension |

EDIT GADGETS

SAVE OPTIONS

Choose whether to use the same Gadget layout for all tracks, or whether you want RealRace to remember the layout for each track individually.

VISIBLE GADGETS

Check/uncheck these items to turn the respective Gadgets on/off in the main display.

SHADE BACKGROUND

Controls the opacity of the onscreen Gadgets. If you set it to 100%, the Gadget backgrounds will be completely black and you won't be able to see anything through them. At 0%, the Gadget backgrounds are completely transparent and only the Gadget's text shows up.

Default value is 30%.

MESSAGE FONT SIZE

This item controls the font size used by RealRace messages. Messages are the text displays that pop up at various times to provide status reports and other information based on what is currently happening in the simulation. Examples include: instructions on how to set the view (when you press F8); multiplayer session information; and lap times as they occur during a race.

If you want to change the font size used by the Advanced NavGuides Gadget, you can do so on its properties page (*see "Advanced NavGuides Gadget" on page 101*).

Default value is 17%.

CHAT FONT SIZE

This item controls the font size used by the Chat Gadget (*see "Chat Gadget" on page 104*).

Default value is 17%.

HIDE ALL GADGETS

This selection chooses whether or not to display the selected Gadgets on the screen. While the Gadgets will still remain active, they will not be visible when this selection is checked. Alternatively, you may press the "H" key on the keyboard to select this option.

ADVANCED NAVGUIDES GADGET

This Gadget allows you to view an array of detailed information about your vehicle and its environment.
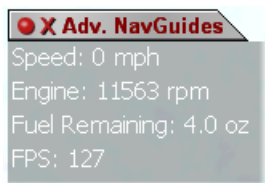
ADVANCED NAVGUIDES PROPERTIES

Click on the Red Circle to bring up properties for this Gadget. First, from the list at the top of the dialog, decide which items you want to appear in the Advanced NavGuides. Check an item to include it in the onscreen display.

RE-SORT BY NAME

Sorts the item list into alphabetical order by name. This is useful when you have extensively reordered the list using the **Up** and **Down** buttons.

RESET ALL

Resets all items to their default state, erasing any customization you have done.

UP

Moves the currently selected item up one slot in the list.

DOWN

Moves the currently selected item down one slot in the list.

SHOW VISIBLE ONLY

Hides all unchecked items in the list above, leaving only those items that you have selected. This is helpful when you want to customize the items you've chosen without scrolling through extraneous items.

DESCRIPTION

Provides a more detailed explanation of the currently selected item.

COLOR

Sets the color for the selected item. Click on the color box to change the color.

FONT SIZE

Sets the font size for the selected item

SHOW ONLY WHEN…

If checked, the item is only displayed if the value falls between the two values.

CHANGE COLOR WHEN…

If checked, the font for the selected item changes to a new color when that item's value is between the two specified numbers. Click on the color box at the end of the line to choose the new item color.

AVAILABLE OPTIONS

Option	Description
Car: Heading of Car	Check this item to display the compass direction of the car.
Engine: RPM	Check this item to display the current RPM of the engine before any gear reduction that may be applicable.
Engine: Fuel Remaining	Check this item to display the amount of fuel remaining.
Engine: Battery Remaining	Check this item to display the capacity remaining in the battery.
Engine: Current Draw	Check this item to display the amount of current that the motor is drawing.
Engine: Voltage	Check this item to display the electric potential (measured in Volts) across the electric motor.
Car: Ground Speed	Check this item to display the current ground speed of the car.
Driver: Distance to Car	Check this item to display the distance between the driver and the car.
Driver: Look Direction	Check this item to display the direction that the driver is looking. This is displayed in degrees, as they would appear on a compass. Whereas "0" degrees is North, "90" degrees is East, "180" degrees is South and "270" degrees is West.
Driver: Height Above Ground	Check this item to display the height of the driver above the terrain.
System: Frames Per Second	This is the number of frames per second (FPS) that are displayed on your monitor.
Driver: Field of View	Check this item to display the field of view angle for the main viewport.
Driver: Zoom Magnification	Check this item to display the amount of magnification that is used for the main viewport in RealRace. A level

	of 1 roughly represents normal eyesight.
Car: X Position of Car	Check this item to display the physical location of the car in regards to the X-axis of the racetrack.
Car: Y Position of Car	Check this item to display the physical location of the car in regards to the Y-axis of the racetrack.
Car: Distance Above Ground	Check this item to display the vertical distance between the car and the terrain.
Engine: Motor Efficiency	Check this item to display the efficiency of the electric motor. Electric motors are never 100% efficient since some energy is lost to heat.
Engine: Power In	Check this item to display power going into the engine from the battery, expressed in HP. This applies to electric engines only. Power is calculated as Current x Voltage. Note: this value will not equal Power Out since electric motors are not 100% efficient. See note in Motor Efficiency above.
Engine: Power Out	Check this item to display power output of the engine, expressed in HP. Power is calculated as Torque x RPM.
Car: Left Front Tire On	Check this item to display the surface type the left front tire is touching (e.g., sticky asphalt, wet dirt, grass, etc.)
Car: Right Front Tire On	Check this item to display the surface type the right front tire is touching (e.g., sticky asphalt, wet dirt, grass, etc.)
Car: Left Rear Tire On	Check this item to display the surface type the left rear tire is touching (e.g., sticky asphalt, wet dirt, grass, etc.)
Car: Right Rear Tire On	Check this item to display the surface type the right rear tire is touching (e.g., sticky asphalt, wet dirt, grass, etc.)

CHAT GADGET

If this selection is checked, a chat window will appear on the screen. The chat window enables you to exchange messages with other RealRace users during a multiplayer**Error! Bookmark not defined.** session. *For more information, see "Send Chat Message" on page 120.*
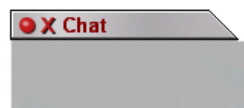
EVENT GADGET

This Gadget displays useful information as a race progresses, or it displays statistics from the most recent event if no races are currently running. You can close it at any time by clicking on the red "X" on its top left corner.

Main Event Gadget, with Extension turned off

Following is a guide to reading the Gadget (from left to right, top to bottom):

- **Name** – Shows your chosen name for this race.

- **Race Clock** – The clock in the upper right shows the current race time. While you're racing, this is effectively the same as your own time. However, please note that this clock continues displaying the race time until all players have finished. Therefore, when the race is over, it shows the total race duration, *which is not necessarily the same as your finish time*.

- **Current standing** – Tells you what place you hold (1st, 2nd, etc.). This field is updated each time a competitor crosses the finish line.

- **Laps completed** – Displays the number of laps you have completed so far. This display will vary slightly depending on the type of race (Lap or Timed—*see "Racing Instructions" on page 73*).

- **Event Gadget Extension** – Click on the red arrow to toggle the Gadget's extension on/off. The extension provides much the same information as the main Gadget, but it includes all event participants. From left to right, it lists each player's position, name, number of laps, most recent lap time, and status.

Event Gadget Extension

Please note that the main Event Gadget displays information for the competitor currently being viewed (*see "Look at Other" on page 99*). Usually this is you. However, even if you are participating in an event, if you choose "Look at Other" the Gadget will show information about your opponent instead of you (although your stats will still appear in the Extension along with everyone else's).

ERROR! BOOKMARK NOT DEFINED.DRIVER AND VIEWPORT OPTIONS

This selection will allow you to customize the various properties of the active viewport. These options are also available by clicking on the small red circle in the viewport's title tab.

DRIVER OPTIONS PAGE

This page is used to modify a variety of options regarding the "driver".
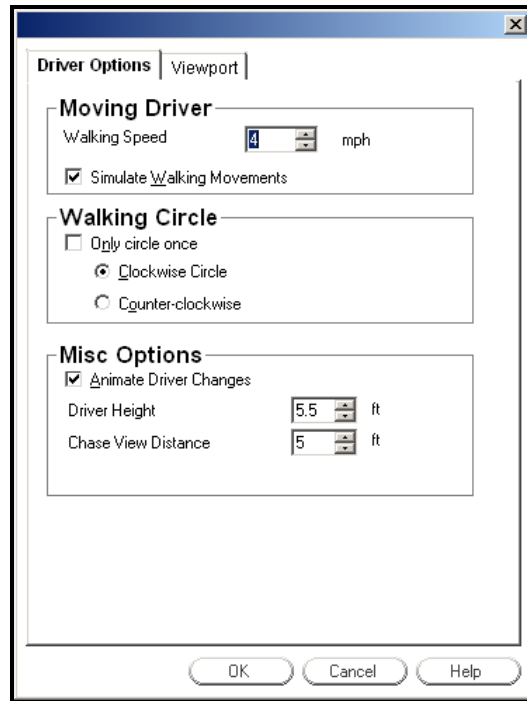
WALKING SPEED

This is used to adjust the walking speed of RealRace's optional "Moving Driver" feature (*see* "Moving Driver*" on page 98*).

SIMULATE WALKING MOVEMENTS

This check box determines whether or not you would like to simulate actual walking movements. If you check this box, the view will "bob" up and down slightly as if you were truly walking.

WALKING CIRCLE

This is used to adjust the motion of the circling driver.

ONLY CIRCLE ONCE

If checked, the driver will only circle the vehicle one time (in the direction specified by the clockwise/counterclockwise buttons). If unchecked, the driver viewpoint will continuously circle the car.

CLOCKWISE CIRCLE

Click this option if you want the driver to circle the car in a clockwise direction.

COUNTER-CLOCKWISE CIRCLE

Click this option if you want the driver to circle the car in a counterclockwise direction.

ANIMATE DRIVER CHANGES

Click this option to smoothly animate changes in the driver's position—for example, switching from the default position to the Driver Behind Car (Chase) view. If unchecked, the driver will move very quickly from one viewpoint to another.

DRIVER HEIGHT

This is used to adjust the height of the driver's vantage point above the terrain.

CHASE VIEW DISTANCE

This determines the distance at which the car is viewed from behind. This is active in the chase car mode (F6).

VIEWPORT PAGE

These options are used to adjust a variety of features for the viewports. Note: some of these features are not applicable to the Main View. If you have not created at least one viewport, most of these options will be grayed out.
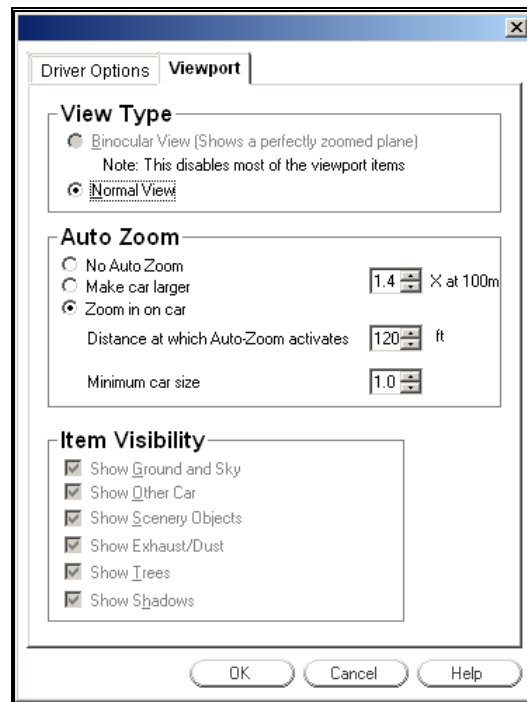
VIEW TYPE

Select a view type for this viewport. Note: **Binocular View**Error! Bookmark not defined. is only available for viewports, not for the RealRace main window.

BINOCULAR VIEW

The **Binocular View** option will show a perfectly zoomed vehicle. You will see the car as if you were looking through a pair of binoculars. In **Binocular View**, the background of the viewport**Error! Bookmark not defined.** box becomes

transparent. This is a visual indicator so that you are aware that this viewport is using "binocular vision".

Binocular View is a great way to see the suspension system at work**Error! Bookmark not defined.** on a car that is too far away to see in the Main View. Although not realistic, it can be interesting, and occasionally helpful (depending on the zoom level in the main view), to witness the car's behavior close up.

NO AUTO ZOOM

Clicking this check box will disable the Auto Zoom features.

MAKE CAR LARGER

Clicking this check box will make the car appear larger at a distance of 100meters. The size of the car is determined in the dialog box to the right of the check box.

AUTO ZOOM

Clicking this check box will activate RealRace's Auto Zoom**Error! Bookmark not defined.** feature. The Auto zoom, as the name suggests, will automatically increase the magnification on the car as it moves farther away from the driver. This will assist you in preventing the car from becoming too small to see.

If this box is not checked, RealRace will maintain the same zoom level. Therefore, the cars will actually become smaller as they drive farther away.

ZOOM IN ON CAR

Clicking on this check box will cause the Auto Zoom feature to become active when the car goes beyond a determined distance. For more information, please see the "Distance at Which Auto Zoom Activates" below.

DISTANCE AT WHICH AUTO ZOOM ACTIVATES

This indicates the distance at which the Auto Zoom feature will be activated. If the vehicle is closer than the specified distance, the Auto Zoom feature will be disabled.

MINIMUM CAR SIZE*ERROR! BOOKMARK NOT DEFINED.*

This indicates the minimum size of the car when using the Auto Zoom feature. To return a car to this default size, press the function: F1 key.

ITEM VISIBILITY

Selecting these check boxes will show the respective items in the viewport. Please note: these options will not be available if you have selected **Binocular View**. The additional item visibility increases the realism of the viewport; however, it may also slow down the frame rate, since it requires additional processing.

SHOW GROUND AND SKY

Selecting this check box will cause the sky and ground to be visible in the viewport.

SHOW OTHER CAR

Selecting this check box will make other cars (including multiplayer**Error! Bookmark not defined.** vehicles) visible in the viewport.

SHOW SCENERY OBJECTS

Selecting this check box will display the scenery items (rocks, cones, etc.) in the viewport.

SHOW SMOKE/EXHAUST

Selecting this check box will display the exhaust from your vehicle.

SHOW TREES

Selecting this check box will display the trees/foliage in the viewport.

SHOW SHADOWS

Selecting this check box will display the shadows of objects and the cars.

ERROR! BOOKMARK NOT DEFINED.CHAPTER 10. THE MULTIPLAYER MENU

MULTIPLAYER MENU OVERVIEW

As the name suggests, the Multiplayer feature provides you with the option to drive and race with others—in fact, you can have up to seven additional drivers in a multiplayer session. The other drivers can be across the street, around the block, or around the world.

You can link up with multiplayer partners over a LAN (Local Area Network), or over the Internet. You will need a TCP/IP connection, either through your LAN or an ISP (Internet Service Provider).

Every multiplayer session requires one member to serve as **host**.**Error! Bookmark not defined.** The host initiates the multiplayer session, and is the only one who can terminate it. When the host starts a session, the other players join**Error! Bookmark not defined.** in.

You access multiplayer features using the Multiplayer menu. When you open the menu, you will see several options:

- Search…

- Host …

- Publish Hosting Information…

- Join…

- Disconnect

- Send Chat Message

- Player Summary…

- Viewport for Each Player

Options are grayed out if they do not currently apply. For example, you can't disconnect from a multiplayer session if you haven't joined one yet.

When you participate in multiplayer sessions, the menu commands you will access depend on whether you are the host or a joiner, and if you are a joiner, whether or not you already know about a specific session you want to join.

Depending on what options you and your partners use, you can have a **private session** that is only open to players who know the host's IP address. (A computer's **IP** address is its Internet "postal code"—it tells other computers on the Internet how to contact that computer. The following sections will explain more about IP addresses when necessary.)

Alternatively, you can have a **public session** using our **list server**. The list server is a publicly available list of open RealRace sessions. We are currently providing this service to all RealRace G2 owners, free of charge. Using the list server, any other RealRace G2 user, anywhere in the world, can find out about your session and join.

IMPORTANT INFORMATION ABOUT THE LIST SERVER: **At the time of this writing we are providing the list server service on a trial basis. This service may be modified, interrupted or cancelled at any time without notice. In particular, we make no warranty about the reliability of this service. To use this service you must register your product and may need to obtain product updates. Inclusion of this manual on your RealRace CD does not imply that this service will be available at the time you purchase this product. Moreover, we reserve the right**

to bar any individual user, or all users at individual IP addresses or domains, from using the list server. We may do this in the case of abusive behavior.

*For hosting, use the **Host** command (see "Host" on page 115).*

*If you want to join a specific multiplayer session and know the IP address of the host, use the **Join** command (see "Join" on page 118).*

*If you want to search for open sessions on the Internet, use the **Search** command (see "Search" on page 113).*
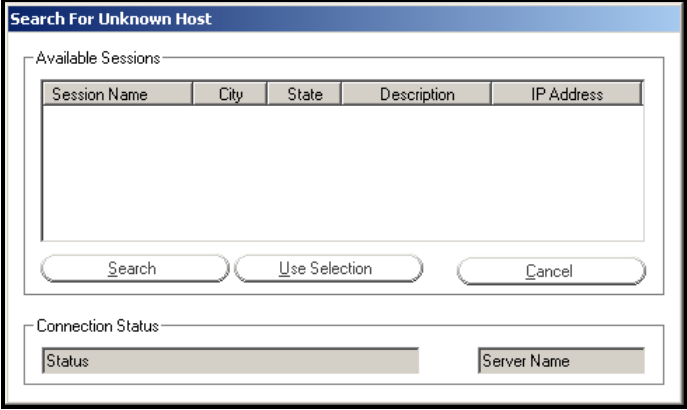
SEARCH

Use this command to search the Internet for open RealRace multiplayer sessions. This option is great if you're just looking for new racing partners, or if a friend is hosting a session but you don't know his IP address.

Note that when you use this command, you will only see sessions that have been registered on our list server.

When you select **Search…** from the **Multiplayer** menu, you will see the following dialog:

The list of available sessions will initially be empty. To search for sessions, click **Search**. After searching, the dialog will display a list of sessions:

To join a session, click on the session listing to select (highlight) it, and then click
Use Selection. If none of the sessions interest you (or if the list is empty, meaning
that there are no open sessions now), click **Cancel** to return to driving.

If you click Use Selection, the following dialog will appear:

In the **Search Parameters** panel, the IP box contains the IP address of the session
host's**Error! Bookmark not defined.** computer. You don't need to change this;
RealRace automatically fills in the IP address for you. Now, click **Start Search**.
When you see the session you want to join appear in the **Search Results**, click **Stop
Search**, select the session in the **Search Results**, and click **Join**. At this point,
RealRace should connect you to the session. Your racetrack (and other settings) may
change to conform to that used by the host.

Note that when you connect to a public session, you must do two separate searches.
The first, from the **Search for Unknown Host** page, searches our list server for
registered sessions. The second search, from the Select a Session to Join page,

searches the host's IP address for open sessions. This second search verifies that the session is still running. It also makes sure you are getting the right session (since there may be two or more sessions running at the same IP address).

Please exercise courtesy when you join a public session. For example, if the session description says "Stock cars only please," please don't join to drive a custom vehicle.

Finally, please note that at the time of this writing, we are providing the list server on a trial basis only. This service may be modified, interrupted or discontinued at any time without notice. *Please see the important information on the list server at the end of "Multiplayer Menu Overview".*

HOST

Every multiplayer session requires one participant to serve as host. If you are the host, you will be the one who starts the session; when you leave the session, RealRace will arbitrarily choose another participant to take over as host, thereby preventing the session from ending for everyone. You will also be the one who starts and ends events (Lap Racing and Timed Racing).

Once you start the session, other players can join it.

You have the option of making your session **public** or **private**.

- Public: you can "broadcast" your session to our **list server**. This publicly announces your session to other RealRace users around the world. Anyone can then join your session (assuming you haven't exceeded the maximum number of session members).

- Private: you can keep your session off the list server, and privately tell your partners that you are starting a session. Then, only the people you invite will know about your session.

The choice is completely up to you. The procedures for starting public and private sessions are very similar.

Whichever option you select, in order to join your session, your partners will need to know the IP (Internet Protocol) address of your computer. (Exception: if you are holding the session over a LAN, the other players don't need to know your IP address.) For a public session, your partners can get your IP from the list server. For a private session, you must provide the IP address directly to your partners. (You can find out your IP when you start the session. RealRace will display your IP in the main view.)

ERROR! BOOKMARK NOT DEFINED.SELECT PROVIDER

To start a session, first make sure that you are connected to the network you will use (LAN or Internet). Then, select the **Host…** item. The following dialog will appear:
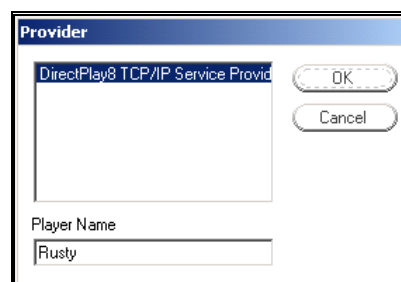
PROVIDER

First, choose the provider you want to use to make the connection. Most users will select TCP/IP, which means to connect means to connect via the Internet. RealRace will then display your IP number.

PLAYER NAME
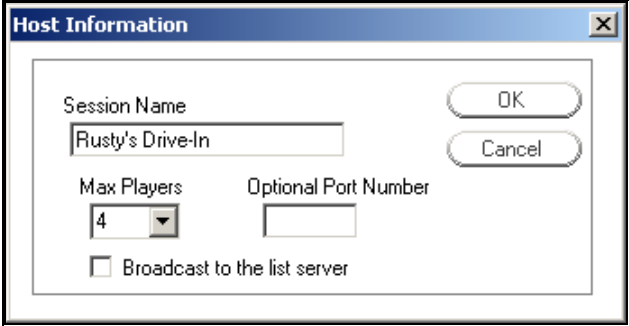
Finally, enter a name (your name, or a nickname) into the Player Name field.

Then, click **OK**. This will bring up the **Host Information** screen.

HOST INFORMATION

SESSIONERROR! BOOKMARK NOT DEFINED. NAME

In this field, enter a name for the session that you will be hosting. (Note that this is the name of your session, not necessarily your personal name. You might find it useful to use a descriptive name such as "Timed Racing at Parking Lot".)

MAX PLAYERS

Set the maximum number of players you want in your session. Currently, no RealRace G2 multiplayer session can have more than eight members. You may want to set this to a lower number if you are using a slower computer, or just want to limit your session to a few friends.

OPTIONAL PORT NUMBER

For some users that are behind firewalls, you may want to use a port other than the default port (which is **6073**). Most users should leave this field blank.

BROADCAST TO THE LIST SERVER

If you check this box, your session will be posted on our list server. This means that other RealRace G2 users can find out about your session and IP address, and join.**Error! Bookmark not defined.** This might be a good option if you are looking for new partners to race with. If you check this box, you will be prompted for session information (see next section).

If you leave this box unchecked, your session will not be posted on our list server. You will have to directly provide your IP address to your multiplayer partners (through phone, email, chat**Error! Bookmark not defined.** room, or whatever

means you wish). This may be a good option if you want to limit your session to a private group of friends.

If you don't want to broadcast your session information now, you can do so after the start of the session (see next section).

Finally, please note that at the time of this writing, we are providing the list server on a trial basis only. This service may be modified, interrupted or discontinued at any time without notice. *Please see the important information on the list server at the end of "Multiplayer Menu Overview".*
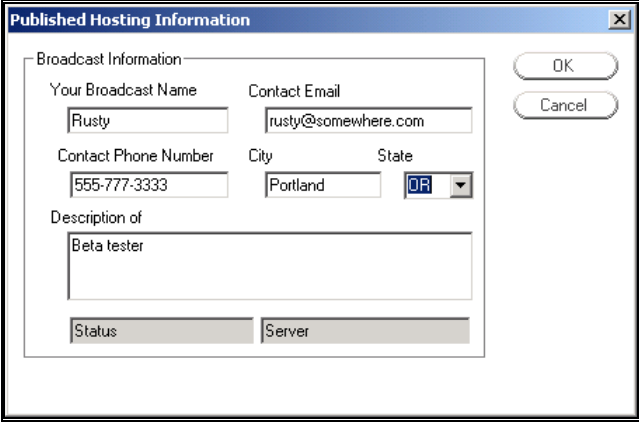
For more information about broadcasting, see "Publish Host Information" on page 117.

PUBLISH HOST INFORMATION

You can make your session public (placed on the list server) when you first start the session (*see "Host Information" on page 116*). Alternatively, you can do this while the session is in progress by selecting this menu item.

Whenever you broadcast your session to the list server, RealRace G2 will prompt you for session information:

The information you provide will be visible to other RealRace G2 users who have access to the list server. *CAUTION!!!* Most of the information you provide here is optional, and is meant to let other users know about your session. We suggest you exercise common sense in deciding what information to give out. In particular, we strongly suggest that you exercise caution so as NOT to release sensitive information about yourself (home address, unlisted phone number, RealRace serial number, etc.).

When you click **OK** your session information will be posted on the list server.

Finally, please note that at the time of this writing, we are providing the list server on a trial basis only. This service may be modified, interrupted or discontinued at any time without notice. *Please see the important information on the list server at the end of "Multiplayer Menu Overview".*

JOIN

Select this option to 'join' a Multiplayer event.

Before you can join a session, you need two things:

- A network connection (through a modem, LAN, etc.); and

- The IP address of the session host (unless the session is taking place over a LAN [Local Area Network]).

You get an IP address either from the host directly (for a private session), or from our list server (for a public session, *see "Search" on page 113*). When you're ready to join, select "Join…" This will open the following dialog:

ERROR! BOOKMARK NOT DEFINED.SELECT PROVIDER

To start a session, first make sure that you are connected to the network you will use (LAN or Internet). Then, select the "Host…" item. The following dialog will appear:
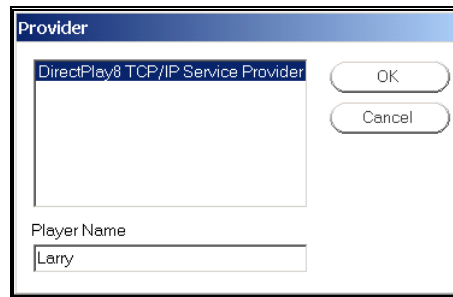
PROVIDER

First, choose the provider you want to use to make the connection. Most users will select TCP/IP, which means to connect via the Internet.

PLAYER NAME

Finally, enter a name (your name, or a nickname) into the Player Name field. Then, click **OK**.

FIND A SESSION

After you have chosen a provider, the following dialog appears.

IP NUMBER

This box needs to have the IP address of the host computer. How this number gets in the box depends on how you found out about the session.

- If you are connecting to the host over a LAN, you don't need to fill in the IP address here.

- If you found out about a public session from the list server, RealRace will automatically fill in the IP address for you here. *For more information about the list server see "Multiplayer Menu Overview" on page 111.*

- If you found out about a session some other way, the host must provide you with the IP address, and you must manually enter it here. This is the usual procedure for a private session.

So, you only need to enter an IP here if you are having a private session over the Internet.

Are you connecting using a modem, and don't have a second line to call your friends with your IP number? No problem. Just have all your partners visit http://www.knifeedge.com. Knife Edge Software**Error! Bookmark not defined.** maintains a chat room for RealRace users. You can log on and pass on your IP number there.

If you have an IP address that never changes (e.g., many cable modem users) you can just give out your IP address once. However, if you dial up to an ISP, in most cases you will get a different IP number every time you log on. You will have to pass the new number on to your friends.

PORT NUMBER

Input the port number if you are attempting to participate in a Multiplayer event and your computer is behind a firewall or NAT. The Port Number will route your

computer's data through the firewall. *This port needs to match the port that the host is using.*

START SEARCH

Click this button to start searching for a host computer (if running RealRace G2 on a LAN connection).

SEARCH RESULTS

This will display the results of your search.

JOIN

Select the Multiplayer group that you wish to join and click here to do so.

DISCONNECT

Select this item to disconnect, or exit,**Error! Bookmark not defined.** the Multiplayer event.

SEND CHAT MESSAGE

This item enables you to chat with other participants. Alternatively, you can also bring up the chat window by pressing the "Enter" key on the keyboard. In either case, a transparent pane appears with the word "Chat" in its title tab. Type in the message you wish to send and press "Enter" once again. Please note: all messages are displayed for all participants. There are no "private" chats.

PLAYER SUMMARY

Select this option to bring up the Multiplayer summary. This summary will display information about the other participants at the event.
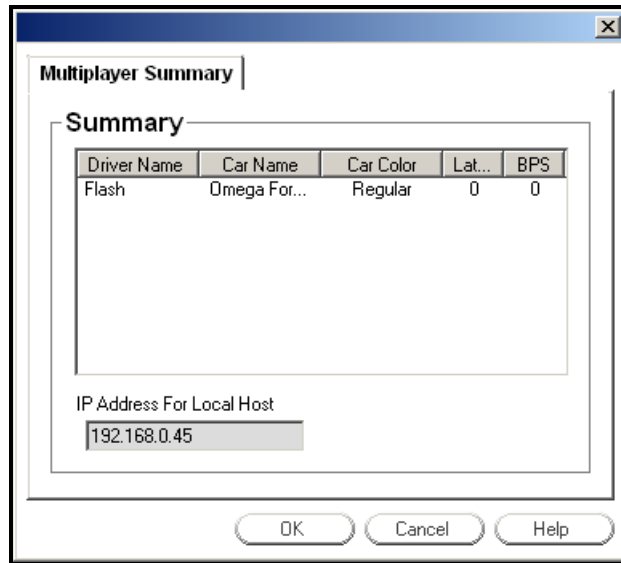
VIEWPORT FOR EACH PLAYER

If you select this item, RealRace will open viewports that look at each of your multiplayer partners. You will get one viewport**Error! Bookmark not defined.** per partner. Any open viewports you currently have will be unaffected.

CHAPTER 11. THE HELP MENU

HELP MENU OVERVIEW

Should you experience any difficulties (or just want to find out more about RealRace G2 and its features), the **Help** menu has several resources to assist you. When you open the pull-down menu, you will see several options:
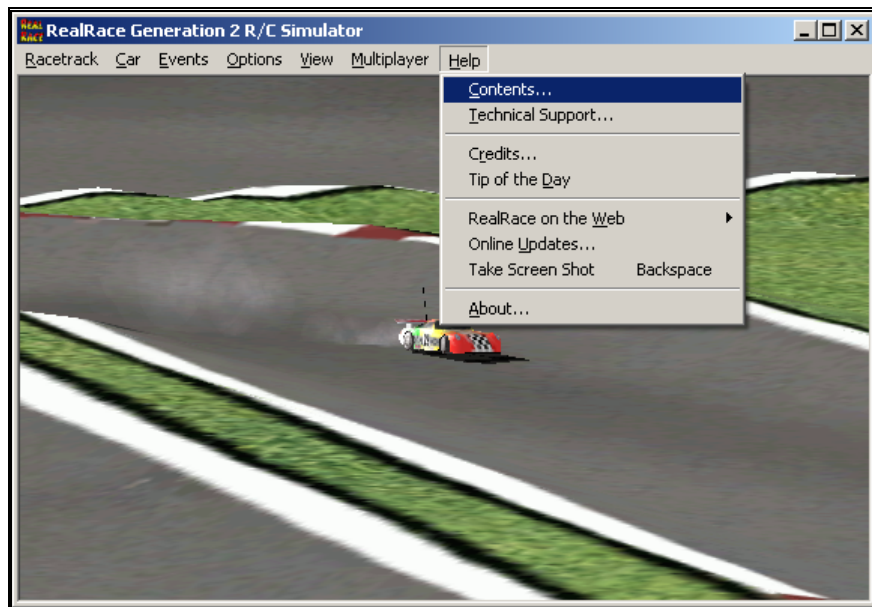
- Contents…
- Technical Support…**Error! Bookmark not defined.**
- Credits…
- Tip Of the Day
- RealRace on the Web
- Online Updates…
- Take Screen Shot
- About…

CONTENTS

This opens up RealRace's help files. The help files contain information similar to this manual.

TECHNICAL SUPPORT

If you should have any difficulties running RealRace, consult this item. You can access online troubleshooting information, or contact RealRace technical support.

CREDITS

Select this item to see the names of some of the people who contributed to RealRace G2.

TIP OF THE DAY

Tip of the Day is a sequence of helpful tips and hints about using RealRace G2. You can set tips to appear each time you run RealRace, or read all the tips in one sitting. Tip of the Day will introduce you to many great RealRace features you may not have noticed.

REALRACE ON THE WEB

REALRACE G2 SWAP PAGE

This web page is the place to go when you want to swap custom racetracks, cars, paint/decal schemes, opponents, etc. Everything on the Swap page is created and submitted by other RealRace users. Visit it often, as there is sure to be plenty of new content.

See it now: http://www.realrace.com/swap

REALRACE WEB SITE

This is the main web site for RealRace G2.

See it now: http://www.realrace.com

DURATRAX WEB SITE

This is the web site for DuraTrax, the publishers of RealRace G2.

See it now: http://www.duratrax.com

KNIFE EDGE SOFTWARE*ERROR! BOOKMARK NOT DEFINED.* WEB SITE

This is the web site for Knife Edge Software, the developers of RealRace G2.

See it now: http://www.knifeedge.com

*CHATERROR! BOOKMARK NOT DEFINED. **WITH OTHER REALRACE USERS***

Go here to chat with other RealRace users and to hook up for some great Multiplayer**Error! Bookmark not defined.** Action.

See it now: http://www.knifeedge.com/chat.htm

ONLINE UPDATES

This menu launches the RealRace Control Panel.**Error! Bookmark not defined.** *See "Appendix C. RealRace Control Panel" on page 235.*

SCREEN SHOT

Create a screen shot of RealRace's current display. Alternatively, you can hit the keyboard's "Backspace" key.

You can take more than one screen shot while you're driving. The screen shot files are saved to C:\Program Files\RealRace.

CHAPTER 12. SETTING UP THE RADIO

REALRACE FUTABA® CONTROLLER

RealRace is sold with a realistic Futaba pistol-grip controller. In addition to the throttle and steering controls, this controller offers a switch (usually used to control steering dual rates).

Futaba Controller

RADIO SETUP PAGE

The **"Radio Setup"** page provides you with the means to configure your controller to your personal preferences. You can access this page by selecting "Edit Radio…" from the Car menu.
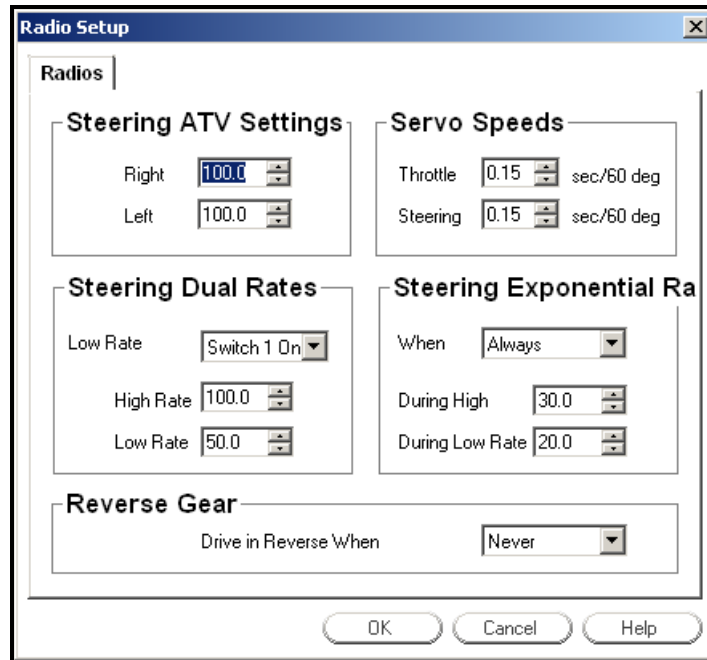
Here is a list of items in this dialog.

STEERING ATV SETTINGS

ATV stands for *Adjustable Travel Volume*. A servo that has ATV allows you to adjust the maximum travel of the servo. By adjusting the servo ATV, you can constrain the amount of steering you have available.

The "Right" field controls the amount of available steering when turning to the right. Similarly, "Left" adjusts available leftward steer. Both values are given as a percentage of nominal ("out of the box") servo travel.

SERVO SPEEDS

You can adjust the speed at which each servo travels in response to radio input. Enter the time (in seconds) that each servo will take to travel through an angle of 60 degrees. Smaller values mean that the servos respond more quickly to input. Larger values mean that the servos travel more slowly.

STEERING DUAL RATES

Most RealRace cars offer **dual steering rates**. This means that your car has two different steering modes, which you can toggle using your controller. The two modes are called **low rate** and **high rate**. The difference is that in low rate mode, the car steers less in response to the same control input.

Why have two rates? Steering tends to become more sensitive at high speeds. On the track, you generally use low rates at high speed, to give smoother turning. Use high rates at low speed, to get smaller turning circles.

Using the "Low Rates When" list, you can specify how you want to switch between rates. Use "High Rate" to adjust the maximum steer travel you want in high rate. (A larger value gives more travel, and hence more sensitive steering.) Similarly, you can adjust the "Low Rate" sensitivity.

STEERING EXPONENTIAL RATES

A servo has an **exponential rate** when the amount of servo travel is not directly proportional to the amount of controller input. In other words, the servo is *less sensitive* to controller input for *smaller control input values*. The servo is *more sensitive* to controller input for *larger control input values*.

RealRace allows you to use exponential rates for steering. Using exponential rates makes steering softer (less twitchy), especially at high speeds.

Use the list labeled "When" to specify when you want to use exponential rates. You can use exponential rates while in high or low rate mode, or not at all if you prefer.

Under "High Rate" and "Low Rate", enter the amount of exponential you want to use in these modes. The rule is, the larger the number you enter, the more exponential. This means that steering will be much softer around steering center, but much more dramatic at the end of the control throws.

REVERSE GEAR

You can add a reverse gear to any car in RealRace. Note that if you want to edit the radio for a car that comes on the RealRace G2 CD, you must first make a copy of the car and edit the copy instead (*see "Car Selection…" on page 60*).

To add reverse capability to a car, perform the following steps:

1. Select the car from the **Select Car…** dialog. Make a copy of it if necessary.

2. Select **Car/Edit Radio…** or press the "Ins" key on your keyboard.

3. In the **Drive in Reverse When** dropdown box, select the method you will use to enable reverse. You can use the button on your RealRace controller as well as certain keys on the keyboard, in either their "up" or "down" positions. You can even drive in reverse "Always" if you like, just for kicks.

Please note the following when using the reverse gear feature:

- By default, the RealRace controller's button is mapped to Steering Dual Rates. If you want to use the button to enable reverse instead, we recommend changing the Dual Rates option to use another key; or, you can simply disable it altogether.

- Reverse is always disabled during race events. It will be enabled again automatically as soon as the event ends.

CHAPTER 13. USING THE KEYBOARD TO ACCESS REALRACE COMMANDS

ERROR! BOOKMARK NOT DEFINED.KEYBOARD MAPPING (HOT KEYS)

RealRace allows you to access menu and other commands from your computer's keyboard. A key that invokes a command is called a **quick key** or **hot key**. These keys provide a quicker way of accessing functions or features.

For example, pressing the "F2" key incrementally zooms your view towards the vehicle. This is exactly the same result that arises if you select **Zoom In**Error! Bookmark not defined. from the RealRace **View** menu. Consequently, we say that "F2" is a hot key for the Zoom In command.

RealRace G2 comes with a default set of hot keys. You can use these defaults, or re-map the hot keys however you want. Almost every key on your keyboard can be assigned to control a function of RealRace G2.

Please note when a particular menu has a hot key, it will appear to the right of the menu selection.

DEFAULT KEYBOARD MAP

The table below contains a list of every key that can be assigned to a RealRace command. Alongside, you can find the default mapping for this key.

Assignable Keys	Default Mappings	Where to find information on this command
` (tick)	N/A	
-	Chat Window	"Chat " on page 104
'	N/A	
.	N/A	
/	N/A	
;	N/A	
\	N/A	
]	N/A	

[	N/A	
=	N/A	
0	View: Advanced NavGuides	"Advanced NavGuides " on page 101
1	View: Look At Other Car 1	"Look at Other" on page 99
2	View: Look At Other Car 2	"Look at Other" on page 99
3	View: Look At Other Car 3	"Look at Other" on page 99
4	View: Look At Other Car 4	"Look at Other" on page 99
5	N/A	
6	N/A	
7	N/A	
8	N/A	
9	N/A	
A	Car: Select Car	*"Car Selection..." on page 60*
B	N/A	
C	N/A	
D	Racetrack: Edit Racetrack	"Edit (Current Racetrack)…" on page 35
E	Car: Edit Car	"Edit (Current Car)…" on page 63
F	N/A	
G	N/A	
H	View: Gadget: Hide All Gadgets	"Hide All Gadgets" on page 101
I	N/A	
J	N/A	
K	N/A	
L	Racetrack: Select Racetrack	"Select Racetrack…" on page 34
M	N/A	
N	View: Create New View	"Create New View" on page 95
O	View: Driver and Viewport Options	"Driver and Viewport Options" on page 105
P	N/A	
Q	N/A	
R	N/A	
S	N/A	
T	Car: Call Turn Marshal	"Show Trees" on page 56
U	N/A	
V	N/A	
W	N/A	
X	N/A	
Y	N/A	
Z	N/A	
Backspace	Help: Take screen shot	"Screen Shot" on page 124
Delete	N/A	
End	N/A	
Enter	Multiplayer: Send Chat Message	"Send Chat Message" on page 120
F1	View: Zoom Reset	"Zoom Reset" on page 95

F2	View: Zoom In	"Zoom In" on page 96
F3	View: Zoom Out	"Zoom Out" on page 96
F4	View: Driver at Fixed Position: Set to Driver's Stand	"Set To " on page 96
F5	View: Driver in Car	"Driver in Car" on page 98
F6	View: Driver behind Car (Chase)	"Driver Behind " on page 98
F7	View: Driver at Fixed Position: Set with Overhead View	"Set with Overhead View" on page 97
F8	View: Driver at Fixed Position: Set with Mouse	"Set with Mouse" on page 97
F9	View: Look at my Car	"Look at My " on page 99
F10	View: Look at Location	"Look at Location" on page 99
F11	View: Driver at Fixed Position: Set to Current Car Position	"Set to Current Car Position" on page 96
F12	View: Driver at Fixed Position: Named Positions	"Named Positions" on page 97
Home	N/A	
Insert	Edit Radio	"Edit Radio…" on page 63
Num pad -	N/A	
Num pad *	N/A	
Num pad .	N/A	
Num pad /	N/A	
Num pad +	N/A	
Num pad 1	N/A	
Num pad 2	N/A	
Num pad 3	N/A	
Num pad 4	N/A	
Num pad 5	N/A	
Num pad 6	N/A	
Num pad 7	N/A	
Num pad 8	N/A	
Num pad 9	N/A	
Page down	N/A	
Page up	N/A	
Up arrow	N/A	
Down arrow	N/A	
Right arrow	N/A	
Left arrow	N/A	
Space bar	Car: Reset Position	"Reset Position" on page 63
Tab	Options: Run in Window	"Run in Window" on page 88

Keys marked "N/A" (Not Assigned) have no default mapping.

CUSTOMIZING THE KEYBOARD MAP

You can customize the keyboard map by selecting **Keyboard Mappings**…**Error! Bookmark not defined.** from the RealRace G2 **Options** menu. *For more information about using this command, please see "Keyboard Mappings" on page 90.*

CHAPTER 14. ADVANCED RACING FEATURES

HOW DO I…

In *"Chapter 3. Getting Started" on page 7*, you learned some fundamental skills such as how to run a basic race using RealRace's built-in computer opponents, create and use viewports, and how to add track objects. Now you'll learn about the truly amazing features that RealRace has in store for the more experienced user.

All of the capabilities we are going to examine in this chapter fit into one of the categories listed on the skill chart below. You can refer to it to get an idea of how difficult each task is compared to the others, and also what previous experience each one requires. The skills are ranked from 1 to 4: 1 is a beginner-level skill and 4 represents a master-level skill.

Skill	Skill Level	Prerequisite Skills	Required Third Party Software	Reference
A. Race using standard out-of-the-box opponents	1	—	None	"How do I…race on a standard RealRace racetrack against out-of-the-box opponents?" on page 134
B. Create new opponent cars	1	**A**	None	"How do I…create a new computer-controlled opponent on an existing track?" on page 134
C. Create new racelines	2	**A, B**	None	"How do I…create a new raceline to be used by one or more computer-controlled cars?" on page 138
D. Rearrange race gates and other objects on existing track	3	**A, B***, **C***	None	"How do I …add/move/delete scenery objects?" on page 141

E. Create new track	4	**A**, **B***, **C***, **D***	Bitmap editor	"Appendix A. Creating a New Racetrack" on page 193

*This action only required to race computer-controlled opponents on given track.

Please note that in formatting this chapter we've dedicated a separate section to each advanced racing feature you might want to learn about. The section titles take the form of an answer to the question, "How do I…*perform a specific task*?" They are also sorted roughly by difficulty level. You can most easily navigate the "How do I" list by using this manual's table of contents; within the table, click on the page number of the desired "How do I…" section. The page numbers in the table are hyperlinked to the corresponding manual sections.

…RACE ON A STANDARD REALRACE RACETRACK AGAINST OUT-OF-THE-BOX OPPONENTS?

If all you want to do is race against out-of-the-box computer-controlled opponents on one of the racetracks included on the RealRace CD, you don't need to do anything special. *Simply refer to "Racing Against Computer Opponents" on page 17 for a walkthrough of the process.* You'll be racing around the track in no time!

Alternatively, you can refer to "Chapter 7. Events" on page 67 for more detailed instructions on how to start an event, including descriptions of all the options available to you.

…CREATE A NEW COMPUTER-CONTROLLED OPPONENT ON AN EXISTING TRACK?

Creating your own competitors can add greatly to your enjoyment of this simulation. For an explanation of computer-controlled opponents and how they work, in addition to a detailed description of the controls you will use to create a new one, *please read "Edit Opponents…" on page 75 before continuing with this section.* Then, come back here for a hands-on walkthrough of the opponent creation process, utilizing the information you just learned.

REQUIREMENTS

The track for which you want to create a new computer-controlled opponent must meet two requirements before you can begin:

1. **Race gates must be laid out on the new track.** If this hasn't already been done, either by you or by the original track creator, then you *must* perform this step. Events cannot take place without a race path to follow, making opponent creation pointless. Laying out the racecourse is an advanced skill. For instructions, *see "How do I…reroute the race path on an existing track?" on page 142.*

2. **At least one raceline must exist for the track.** Computer-controlled opponents require a raceline, just as they require a car and a color scheme. Therefore, if no racelines exist for the given course, you *must* establish at least one. Creating a new raceline is an intermediate skill.

For instructions, *read "How do I...create a new raceline to be used by one or more computer-controlled cars?" on page 138.*

Don't panic! All of the tracks that come on the RealRace CD meet these two prerequisites. However, if you modify their race gate layout, you will need to create at least one new raceline to match. Also, custom tracks created by other users may or may not meet these two requirements.

OPPONENT CREATION WALKTHROUGH
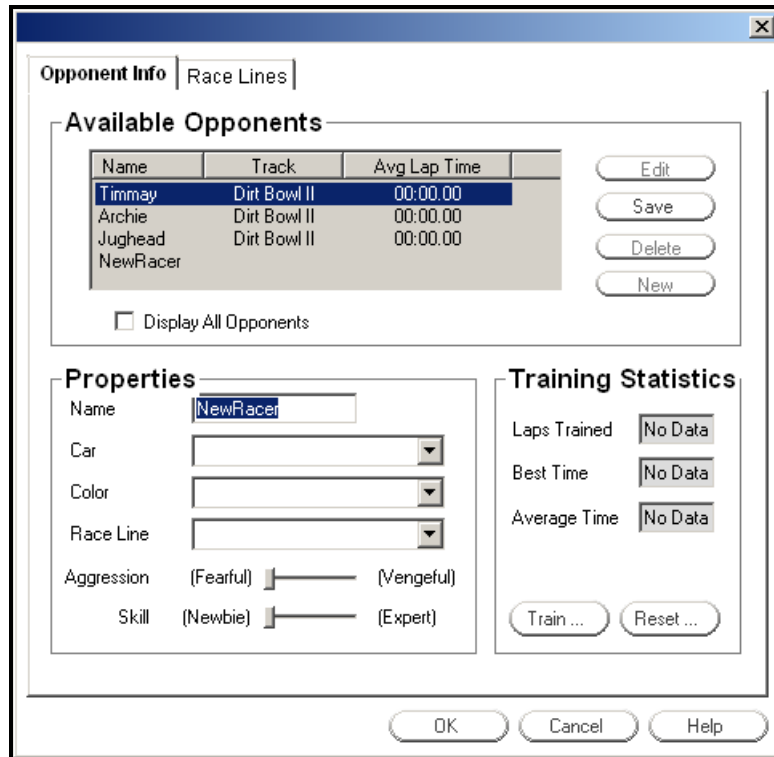
To create your new computer-controlled opponent, perform the following steps:

1. Switch to the racetrack for which you want to create an opponent. *Note:* Each opponent works only on the racetrack where it was created.

2. Open the **Events/Edit Opponents…** dialog.

3. Click the **New** button.

4. Enter a name for the opponent. This can be anything you like, from something straightforward to something humorous.

5. Select a car from the dropdown box. This is the car your new opponent will drive when it races.

6. Select a color scheme. You can choose from whatever schemes are available for the selected car from Step 5, including custom schemes if you have any. This selection box will be blank until you've chosen a car.

7. Select one of the racelines that exist for this track. For additional general information on racelines, *see "Racelines" on page 79.* To learn

how to create your own racelines, *refer to "How do I...create a new raceline to be used by* one or more computer-controlled cars?*" on page 138.*

8. Adjust the **Aggression** slider to the desired level. *See "Opponent Info" on page 76 for an explanation of this slider's function.*

9. Adjust the **Skill** slider to the desired level. *See "Opponent Info" on page 76 for an explanation of this slider's function.*

10. Click **Save**. You have successfully created a new computer-controlled opponent! It will now be available to participate in race events on the current track.

11. *Optional:* If you would like to train your new opponent to improve its performance, *please read "How do I...optimize an opponent?" on page 137.* You can train the opponent now or at any time in the future.

12. Click **OK** to exit the **Edit Opponents…** dialog.

Your new opponent is complete! It will now be listed as a potential competitor in the event startup dialogs.

…CREATE A NEW COMPUTER-CONTROLLED OPPONENT ON A TRACK WITHOUT RACE GATES?

RealRace will not allow you to create an opponent on a track that does have race gates. Moreover, you can't use racelines that are "left over" from a previous gate layout, since a leftover line would cause the competitor to try to follow the old course.

Consequently, you will have to lay out race gates before creating new opponents. *Please refer to "How do I...create a new computer-controlled opponent on an existing track?" on page 134 and follow the instructions there.* That section will ensure that you fulfill all the preliminary requirements and then show you how to create a new opponent.

…CUSTOMIZE AN EXISTING COMPUTER-CONTROLLED OPPONENT?

You can edit one of the existing opponents using the **Events/Edit Opponents…** menu item. Once you've opened that dialog, simply perform the following steps:

1. Select the desired competitor from the **Available Opponents** listbox.

2. Click the **Edit** button

3. Modify whichever items you like within the **Properties** group. For information on what each of the controls does, *see "Opponent Info" on page 76.*

4. When you're done making changes, click **Save**.

From now on, whenever you choose this opponent to participate in an event, its behavior and attributes will reflect your changes.

To make sure the opponent you wish to edit is listed in the **Available Opponents** box, switch to that competitor's track before opening the **Edit Opponents…** dialog.

Note: You cannot edit built-in opponents that come with RealRace. The **Edit** button will be grayed out if you select one of them.

…OPTIMIZE AN OPPONENT?

OVERVIEW OF SELF-TRAINING FEATURE

RealRace includes an automated opponent training feature that is designed to optimize the computer-controlled opponents' lap times. It works by allowing the chosen opponent to drive laps around the course as if it were running a one-car time trial. That is, the opponent runs a single-car race (your car will be moved to the Parking area).

During the training laps, the competitor car experiments with different driving styles and techniques, and attempts to improve its lap times. For example, if the competitor car "wipes out" on a hairpin turn, on subsequent laps it will learn to drive more slowly on that section of track. At the end of the training laps, the competitor car will remember what it learned during training, and apply that knowledge during subsequent races.

The process of self-training can be time consuming. If you wish, you can intervene at any time to stop the training run. If left alone, the opponent car will complete 100 laps before finishing. The training process is completely automated, and the competitor will make pit stops as necessary. Therefore, we suggest beginning the procedure and leaving to do something else while allowing the simulation to run.

The computer-controlled opponent will learn from whatever training it has completed—you do not have to allow it to complete 100 laps before seeing any benefit from the training. Normally, more laps the opponent car completes, the better its race times will be. You must normally allow the opponent to complete several laps before you will see any noticeable improvement in the opponent's performance. Allowing the opponent to complete its full 100 laps will normally give the best results.

The training process is cumulative. If you stop training an opponent and begin training it again another day, it will pick up where it left off the first time and build on the knowledge it already possesses. You can even train a given opponent for an additional 100 laps once it has finished the first set, if you so desire. However, you will eventually reach a point where additional training laps will not noticeably improve the opponent's performance.

Note: During training it is common, and perfectly normal, for opponent lap times to get worse before they improve. If training an opponent caused its lap times to decrease, simply resume training.

TRAINING PROCEDURE WALKTHROUGH

For more detailed information on the dialog controls that operate the training process and what each of them does, *refer to "Opponent Info" on page 76.*

To train an opponent, perform the following steps. Please note that you cannot train a built-in opponent.

1. Each opponent is based on a single racetrack. Switch to the racetrack for the opponent you wish to train.

2. Open the **Events/Edit Opponents…** dialog.

3. Select the competitor you wish to train by clicking on its name in the **Available Opponents** listbox.

4. Click the **Train** button to start the automated training process.

5. The opponent will now carry out its self-training laps. As mentioned above, this process is entirely automated—while it is running, you will only be able to watch, until the car completes its 100 laps or you manually end the training.

6. If you want to stop training the opponent before it completes 100 laps, select **Events/End Current Event** to stop the training procedure. As explained above, the computer player will benefit from whatever training it has completed, provided it is more than a very small number of laps.

You have now returned to the regular driving environment. If you wish to view training statistics for the newly trained opponent, select **Events/Edit Opponents…** and view the information displayed in the **Training Statistics** group.

…CUSTOMIZE A COMPUTER-CONTROLLED OPPONENT'S VEHICLE?

If you customize an opponent's car directly, it will change that vehicle for everyone else who uses it, too—including other opponents and even you! This can result in unexpected behavior when you select that car to drive yourself or when you race against other competitors who use the same car.

The best way to customize an opponent's car is to make a copy of the one they're currently using, make the desired changes to it, and make the opponent use the new car. We suggest including the name of the opponent somewhere in the new car title so that it is clear which opponent uses which car.

If you need help with any of these steps, consult the following references:

For information on copying a car, *see "Car Selection…" on page 60*.

For information on customizing cars, *see "Chapter 15. Customizing and Tuning Your Car" on page 147*.

For information on modifying an opponent to use a different car, *see "Opponent Info" on page 76*.

…CREATE A NEW RACELINE TO BE USED BY ONE OR MORE COMPUTER-CONTROLLED CARS?

Racelines are an integral part of computer-controlled opponents. For an explanation of racelines and what they do, in addition to a detailed description of the controls you will use to create a new raceline, *please read "Racelines" on page 79 before continuing with this section*. Then, come back here for a hands-on walkthrough of

the raceline creation process, utilizing the information you just learned. Note that creating a new raceline is an intermediate skill.

REQUIREMENTS

Every computer-controlled opponent is assigned a single raceline, which it uses to navigate the course. Racelines, in turn, are based on a given track's gate layout; therefore, if you have rearranged the race gates on the currently selected track, you must provide at least one new raceline based on the new gate layout for opponents to use. If you do not provide an updated raceline, the opponents will not know where to go—instead, they will behave erratically and probably end up driving in circles. Any racelines using a previous gate layout will be unusable and should be deleted.

Note: If the currently selected track doesn't have any race gates at all, you must add them before continuing. RealRace will not allow you to create a raceline without any gates. *Jump to "How do I...reroute the race path* on an existing *track?" on page 142 if this applies to you and follow the instructions there before attempting to create a raceline.*

OVERVIEW OF CREATION PROCESS

To create a new raceline, you will drive a car around the chosen track a number of times, letting RealRace observe and base the new raceline on your driving. You can drive as many laps as you want, up to a maximum of 50. RealRace constructs a raceline from your best laps (based on lap time), so be sure to include at least one good lap. Once you're satisfied with your performance, you can end the training process; if you complete all 50 laps, however, the simulation will end training automatically.

Creating a raceline operates much like a single-player racing event. To begin, your car is positioned at the starting line, and after the countdown you "race" around the track until you're satisfied with your performance. It is crucial that you follow the instructions and include at least one pit stop during your training laps.

The goal of the entire process is to provide computer-controlled opponents with a path to follow as they navigate the course. You are literally "leading by example." For best results, you should attempt to follow the best possible line through all the turns, jumps, dips, straightaways, etc.

RACELINE CREATION WALKTHROUGH
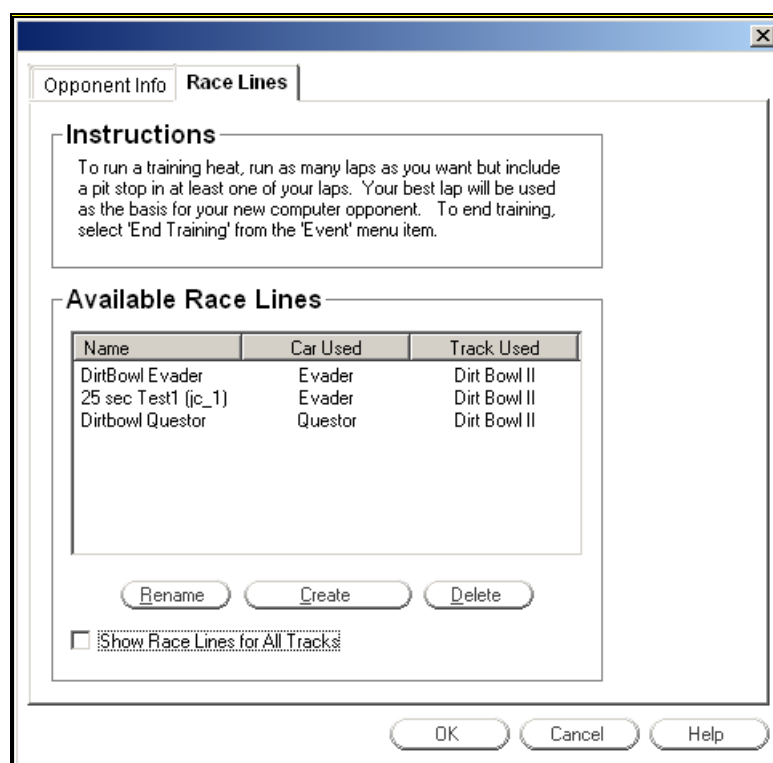
To create a new raceline, perform the following steps:

1. Switch to the racetrack for which you want to create a raceline.
   Note: Each raceline works only on the racetrack where it was created.

2. From the **Select Car…** dialog, select the same car you wish opponents using this raceline to drive.

3. Open the **Events/Edit Opponents…** dialog.

4. Switch to the **Racelines** tab by clicking on its tab.

5. Click the **Create** button. Doing so will place you at the starting line, with the training session about to begin, so be prepared.

6. Create the raceline by driving around the course, attempting to follow the best possible line through the course. Be sure to include at least one good lap, and also include at least one pit stop.

7. Select **Events/End Training** to end the training process.

8. Name your new raceline. You should call it something meaningful, such as "16 Sec Dirtball BJ". Bear in mind that you can rename it later if necessary. It can also be helpful to include an abbreviation of the track name in the title.

Congratulations! You've successfully completed a new raceline. To use it, simply follow the process for creating a new opponent and choose your raceline from the **Racelines** dropdown box (*see "How do I…create a new computer-controlled opponent on a track* without race gates?*" on page 136*). Alternatively, you can simply edit an existing opponent and modify its raceline selection to use your newly created one (*see "How do I…customize an existing computer-controlled opponent?" on page 136*).

…ADD A COMPUTER-CONTROLLED OPPONENT TO A BRAND NEW TRACK?

Adding opponents to a brand new track is no different than adding them to a pre-existing track. The only thing to keep in mind is that a racecourse must meet two specific requirements before you can create an opponent, and a new track is probably less likely to meet these conditions than a course that has been in use for a while.

To learn more, *read "How do I…create a new computer-controlled opponent on an existing track?" on page 134.*

…PRODUCE MORE CHALLENGING OPPONENTS?

For best results when racing, follow these guidelines. They will help you create more challenging opponents and, hopefully, a more enjoyable racing experience.

1. When creating racelines, it is better to drive slowly and adhere to a good line throughout the course than to try to get a fast time and drive erratically in the process. Remember that an opponent using a slow raceline can always be trained to turn in faster lap times, but a poorly driven race path is inherently limiting.

2. When creating racelines, we recommend completing your required pit stop during the first lap. Among other things, this allows you to get it out of the way and concentrate fully on your driving.

3. When creating or customizing opponents, always use the same car that was used to create your chosen raceline. The simulation will allow you to use whichever car you like, but other vehicles won't perform as well as the one on which the raceline was based.

4. During a race, use the same track conditions that existed when you created the chosen opponent's raceline. *Refer to "Background Page" on page 36… for more information on how to customize track conditions.*

5. Make use of the built-in opponent training feature. *See "How do I…optimize an opponent?" on page 137.*

…ADD/MOVE/DELETE SCENERY OBJECTS?

To interact with scenery and track objects, use the built-in **Advanced Terrain Editor (ATE)**. It will allow you to rearrange walls and barriers, add trees and jumps, remove sections of fence, and much more. To learn how it works, *see "Edit (Current Racetrack)…" on page 35.*

If you want to learn how rearranging race gates affects the race path, *see "How do I…reroute the race path on an existing track?" on page 142.*

…USE ANIMATED OBJECTS?

Animated objects work the same way as regular scenery objects, *so make sure you've read "Racetrack Editor Page" on page 40.* The only difference is that they simply have an additional level of options beyond what most objects offer. For specific instructions on animated objects, *refer to "Animated Objects" on page 46.*

…REROUTE THE RACE PATH ON AN EXISTING TRACK?

RealRace will allow you to alter the race path on any racetrack. There are several reasons you might want to do this:

- To add an extra turn to a course that you otherwise enjoy.

- To change the direction of the race, so that cars must drive clockwise instead of counter-clockwise, for example.

- To design a completely new race path on the track, such as a slalom type of course.

Basically, any time you want the cars to follow a different path during a race, you must reroute the race path. If all you want to do is race on the standard tracks that come on the RealRace CD, you should skip this section.

The race path is marked by a series of **race gates**. Race gates are objects similar to jumps, trees, or cones, but they serve a different purpose. Most other objects are added to the track for the express purpose of either interacting with your car (e.g., ramps, barriers) and/or contributing aesthetically to the track (e.g., shrubs, flag fence). The purpose of gates, on the other hand, is to:

- Determine the race path used during racing events (this is what RealRace goes by); and

- Serve as visual indicators, so racers know where to go during a race. Note: gate markers are visible only when a **gate graphic** is selected in the Event start-up dialog. They are never visible outside of an event. *See "Event Start-Up Dialog" on page 68 for more information on gate graphics.*

Therefore, you reroute the race path by rearranging the race gates to mark your chosen course. You also add/move/delete race gates the same way you add/move/delete other objects: by using the built-in **Advanced Terrain Editor**. To learn about the **ATE**, *read "Edit (Current Racetrack)…" on page 35.*

You can place race gates in one of two ways: You can either use the **Modify Location** command to move one of the existing gates to the new location you've chosen, or you can simply delete the old gate and add a new one at the desired position. The end result is the same either way, so use whichever approach you find easiest.

WHERE TO PUT THE RACE GATES

As a rule, it is best to place gates on all the corners of the track. After all, the curves and turns are what really define a course—without them, the path would merely be one long straightaway. Therefore your primary concern is to ensure that racers drive successfully around each corner. If they do that, the rest pretty much falls into place.

Note: Placing gates on all the corners will also effectively detect and prevent "cutting".

You may also want to place gates on a couple of the straight sections on the track. If you're worried about drivers leaving the track at those points, it's a good way to make sure they stay on the path. Plus, having gates between corners that are located far apart will help show drivers where to go next (provided a gate marker graphic is chosen at the start of the race, as mentioned above).

It is essential that the gates be placed in sequential order. The **ATE** contains 30 different gate objects, numbered 1 through 30. The first gate a driver encounters after starting a race needs to be Gate 1, and it should be lined up with the finish line. Gate 2 is the next gate a car will encounter if it follows your new race path, and so on, until you reach the finish line. The finish line itself acts as the final race gate, so you do not need to place one there. Note that you do not need to place all 30 gates on a track. In many cases, you won't even use half of that amount. But we provide you with 30 just in case you need them.

INSIDE CORNERS VS. OUTSIDE CORNERS

As you observe a gate in the **ATE**, you'll notice that it consists of a pair of posts, each with a number printed at the top. If you look closely, you'll also notice that one of the posts is labeled "Inside Corner" while the other is marked "Outside Corner." You must position the Inside Corner of the gate at the inside corner of the turn (or the inside edge of the track itself on straightaways).

On something like an oval track, you can easily differentiate between the inside and outside corners. The inside of each corner is the one closest to the infield, or center of the track, and the outside is the one farthest away from the center. On a more complex course with lots of twists and turns, though, determining which is which can be difficult. This is especially true with a "figure eight" type of track!

Think of it this way: if you picture each turn as a section of a circle, the inside corner post should go on the side closest to the center of the imaginary circle. In the case of the figure eight track, the gates should be positioned such that all the inside corner markers are located on the two center "islands", and the outside corner markers should end up along the outermost edge of the race path.

HELPFUL HINTS

- Before you begin moving gates around, plan out where you want the new path to go. It is helpful to actually sketch your proposed route on a piece of paper, so you can work out any problems at the start and refer to your diagram as you go. You can also number the gates on your sketch to reduce the risk of placing them out of order or duplicating a certain gate number on your track.

- Do not divide the Pit Area with a set of gates. By this we mean do not place gates such that part of the Pit Area is on one side of the gates and the rest of the pit is on the other side of the gates. Dividing the pit in this way causes the computer-controlled opponents to malfunction when attempting to pit. It is also a good idea to avoid dividing the area directly in front of the Pit Area (the "approach").

- Be careful to place only one of each gate number! For example, there should be only one Gate 1 on the course, one Gate 2, etc.

- Remember to put Gate 1 directly on the finish line. You can refer to any of RealRace's built-in tracks for an example of how to do this. If you don't line up Gate 1 with the finish line, laps will not be counted properly during a race.

- All of the Starting Positions must be placed between the last and first gates on your course. Basically what this means is that you must place the Starting Positions before the Finish Line/Gate 1, and you must make sure the last gate in your sequence is not so close to the Finish Line that some of the starting markers end up behind it.

- For an excellent example of how you can modify an existing track to create a new one simply by moving some of its objects, take a look at the Asphalt Challenge Hair-pin and Asphalt Challenge Oval tracks. Both courses are identical except for barrier placement and the location of the race gates. This demonstrates how you can rearrange objects (including race gates) using the **ATE** to put a new race path on a track.

- When rerouting the race path, you will probably need to move the finish line and starting positions as well. Remember to place them appropriately once you're done changing the path.

- Remember that anytime you change a track's race path, you will also need to create new racelines to match. To learn how, *refer to "How do I...create a new raceline to be used by* one or more computer-controlled cars?*" on page 138*.

- To learn how gates function in the context of a race, *see "General Event Information" on page 71*.

…LAYOUT A RACE PATH ON A BRAND NEW TRACK?

Laying out a race path on a brand new track is no different than rerouting the path on an existing track. The only difference is that there are no previous gates to reuse or delete. *Read the section above, "How do I...reroute the race path on an existing track?" on page 142 for more information.*

Note: All events, whether part of a multiplayer session or based on computer-controlled opponents, require a designated race path. If the selected track does not contain one, you cannot start a race.

…CREATE A NEW TRACK FROM SCRATCH?

Creating a completely new track is a master-level skill. You should make sure you have experience performing all the other tasks listed in the skill chart (*see "How do I..." on page 133*) before you attempt to create a new track.

For instructions on making a new racecourse, *read "Appendix A. Creating a New Racetrack" on page 193*.

…IMPORT A NEW TRACK CREATED BY ANOTHER USER?

You can download tracks created by other RealRace G2 users. Once you import a track into RealRace, you can do everything with it that you can do with the built-in

courses: race on it, edit its scenery objects, add computer-controlled opponents, rearrange the gate layout, etc. *See "Uploading the Finished Track Archive" on page 207 for more information on how to find additional racetracks.*

Please note that if you want to load a partially complete track that you or another user are in the process of creating, *you should skip this section and read "Loading Your Track into RealRace" on page 199 instead.*

To load a complete track into RealRace, perform the following steps:

1. Copy the three .bmp files that came with the new track into your "\CustomRaceTracks" directory.

2. Copy the .track file into your "\Tracks" directory.

3. Start RealRace

4. From the **Select Racetrack…** dialog, choose the name of the new track.
   Note: This will always be the same as the name of the .track file.

You are now driving on the new track! If you wish to add, delete, or relocate objects on the new track, you can do that using the built-in **Advanced Terrain Editor** (*see "Edit (Current Racetrack)…" on page 35*).

Note: if you want to be able to race against other RealRace owners on the new track, it must include a path laid out using race gates. You can check for the existence of race gates using the **ATE (Advanced Terrain Editor)**; if you need to add gates, *refer to "How do I…reroute the race path on an existing track?" on page 142.* Additionally, if you want to race against computer-controlled opponents on the new track, it must include both race gates and at least one opponent. *See "Edit Opponents…" on page 75 for more information on computer opponents.*

…IMPORT OR SHARE A RACELINE/OPPONENT/CAR/COLOR SCHEME?

RealRace users can share all of these data types with each other using two different methods:

- The official RealRace swap site
- Private file sharing

OFFICIAL REALRACE SWAP SITE

Users can post their own creations and download other users' files by visiting the RealRace swap site at http://www.realrace.com/swap. This is a public site; be aware that if you upload your work to the swap site, it will be viewed by many different people.

PRIVATE FILE SHARING

You can share the RealRace content you create with anyone else you know using existing file transfer technologies. For example, you can pass a modified car type to your neighbor across the street on a disk; you can email your new opponent and raceline to a friend on the other side of the world; and you can share your custom

color schemes with other RealRace users on your network. You can obtain custom data created by other users in the same ways.

FILE LOCATIONS

Each of the different content file types resides in its own directory. Note that unless you changed the settings during installation, RealRace is installed on your hard drive in the directory "C:\Program Files\RealRace".

If you want to share your creations with other users, the following descriptions tell you where to find the appropriate files. If you want to import custom data from other users and use it in your copy of RealRace, use the following descriptions as a guide and copy the files to the appropriate directories. Then start RealRace (or restart if already running) and the new content will be available!

RACELINES

Racelines have the filename extension ".mln". They reside in "C:\Program Files\RealRace\Tracks\TrackName", where TrackName is the name of the track the raceline uses.

OPPONENTS

Opponents have the filename extension ".competitor". They reside in "C:\Program Files\RealRace\Tracks\TrackName", where TrackName is the name of the track the competitor uses.

CARS

Custom cars have the filename extension ".car". They reside in "C:\Program Files\RealRace\Cars".

COLOR SCHEMES

Color schemes have the filename extension ".tga". They reside in "C:\Program Files\RealRace\ColorSchemes".

Note: racelines/opponents/cars/color schemes that come on the RealRace CD do not exist in these directories. Therefore, the only files you will find are those you have created in RealRace or copied here manually.

…ADD OIL SLICKS AND ICE PATCHES TO A TRACK?

Oil slicks and ice patches are not objects that you can place on a track using the ATE like a rock or a finish line. Oil and ice are actual terrain textures like wet dirt or grass. As such, you must use the same techniques as you use to create a new track from scratch.

Creating racetracks from scratch is a master-level skill. To learn more, *read "Appendix A. Creating a New Racetrack" on page 193.*

Or, if you're already an experienced track creator, *skip directly to "*Surface Map*" on page 196.*

CHAPTER 15. CUSTOMIZING AND TUNING YOUR CAR

INTRODUCTION

RealRace allows you to create and modify your own cars. Using its exclusive RealPhysics™ technology, RealRace takes the actual physical description of the car and models the physics using that information.

There are many variables that can affect a car's performance. For example, wheel toe-in can affect cornering, while shock preload can affect ride height.

RealRace offers two different levels of car setup:

- **Quick Edit** – Allows you to change only the types of items you can control with a "turn of the wrench" at trackside (wheel alignment, tire choice, shock springs, etc.)

- **Full Setup** – Lets you control virtually anything about your car, including the size/shape of suspension system elements, Ackerman angles, car aerodynamics properties, differential types, car weight, etc.

Subsequent sections describe both editing modes in detail. Also, if you would prefer to use the metric system of measurement instead of standard English units while editing your cars, you can switch between them in the **Options**/**Miscellaneous** menu dialog. *See "Miscellaneous" on page 86.*

To quick edit your car, select "Quick Edit…" from the Car menu. To use Full Setup, select "Edit (current car name…) from the Car menu.

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)*" on page 209.*

*** Please be aware that disassembling your car for measurement purposes might cause damage to your car if done incorrectly. Knife Edge Software and DuraTrax will **NOT** be responsible for any damages caused by your car or to your car as a result of taking these measurements. If you don't want to risk damaging your car, then do not physically measure its attributes.*

ACCURATE MEASUREMENTS ARE CRUCIAL

RealRace allows you unprecedented freedom to simulate *your* car. You can edit almost any property of the simulated cars, even the size and shape of suspension system components.

However, if you choose to measure/weigh a car for use in RealRace, there's an important point you need to remember.

Real R/C cars are built using careful design, and to very tight tolerances. If you were to randomly change the sizes of various parts in your car, it probably wouldn't drive as well.

Consequently, when you measure a car for input into RealRace, *accurate measurements are crucial* to getting the most out of the simulation.

This is especially true for properties that you adjust in "Full Setup" mode, like suspension system parts, wheel hardware dimensions, etc. Typically, you need to measure these distances to *at least* 0.1" accuracy, usually better. The greater your accuracy in measuring, the greater the accuracy in your model's performance in RealRace.

We suggest that to measure a car:

- Choose a good, solid, well-lit work area, free from clutter and distractions.
- Use a good quality postage-type scale to weigh items.
- Use high quality calipers (diagram below) to measure distances.

Don't skimp here. Patience and care in taking accurate measurements will reward you with much more realistic performance.

QUICK EDIT

Quick Edit allows you to quickly modify the types of parameters that you can adjust with a "turn of the wrench" at trackside. To determine the differences between a "Quick Edit" and a "Full Setup", *please see* "Quick Edit Car…" *on page 62.*

Note: RealRace will not let you directly edit any car from the RealRace CD. To edit one of these "default" vehicles, you must first make a copy of the car, then edit the copy. You can copy a car in the "Car Selection" page (Car menu, "Select Car…"). *See "Car Selection..." on page 60.*

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)" on page 209.

Quick Edit Car

Suspension To Edit	Front
Tire Selection	Omega Force GS Front Tire
Spring Rate (Soft) — (Firm)	19.4 lbs/In
Spring Maximum Length	1.000 in
Spring Minimum Length	0.335 in
Left Spring Preload (Soft) — (Firm)	0.300 in
Right Spring Preload (Soft) — (Firm)	0.300 in
Wheel Camber Angle	-1.00 deg
Wheel Toe In Angle	2.00 deg
Shock Oil Weight (10 wt) — (80 wt)	80 Wt
Differential Slippage (Loose) — (Locked)	2.00 ft lbs
Gear Reduction	8.0
Brake Adjustment (Low) — (High)	70.00 %

Comprehensive Guide to R/C Car Set-Up

OK   Cancel   Help

SUSPENSION TO EDIT

Choose either the front or rear suspension. If you select "Front," the edit controls (Tire Selection, Spring Rate, etc.) will adjust the properties of the car's front end. Conversely, you can adjust the properties of the rear end by selecting "Rear."

TIRE SELECTION

Choose the tire you want to use.

SPRING RATE

Spring Rate is defined as the amount of force the spring exerts per inch of travel. Springs with higher rates are stiffer (harder to squeeze); springs with lower rates are easier to compress.

Stiffer springs may be better for rough tracks. Conversely, softer springs are better for smoother tracks.

You can measure spring rate using a postage scale. Here are two different methods:

- Method 1: Place the spring on top of the scale. Then, push the top of the spring down exactly one inch. The reading on the scale, taken while you are holding the spring down, is the value you should enter for spring rate.

- Method 2: Measure the length of the spring, uncompressed. Write this length down. Then, compress the spring as far as possible, measure the length and write it down. (The compressed length will obviously be shorter than the uncompressed length.) Next, place the spring on top of

the scale, and push down on the spring, compressing it as far as possible. Once the spring is compressed, be careful not to put any extra downward force on it. Read the weight registered on the scale, and write it down. Finally, use the formula:
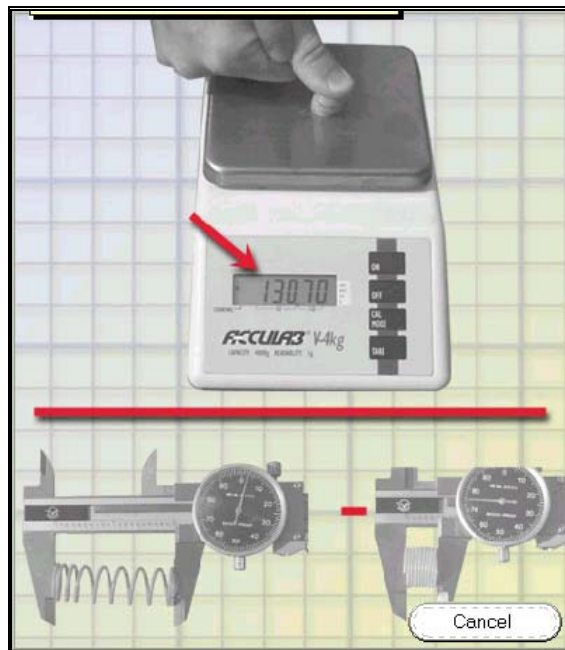
W = weight from scale

UL = uncompressed length (see diagram below ["Spring Maximum Length"])

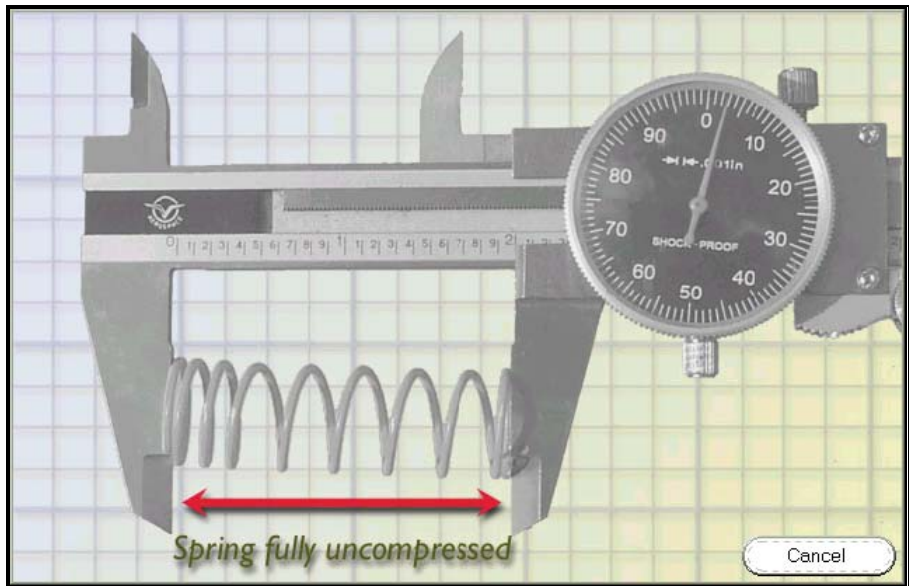CL = compressed length (see diagram below ["Spring Minimum Length"])

Spring Rate = W/(UL – CL)

Again, if you choose method 2 above, be sure to push the spring only as hard as needed to compress it all the way, and no harder.

SPRING MAXIMUM LENGTH

This is the length of the spring when it is completely uncompressed.

Spring fully uncompressed

SPRING MINIMUM LENGTH

This is the length of the spring when it is fully compressed.

Fully compress spring
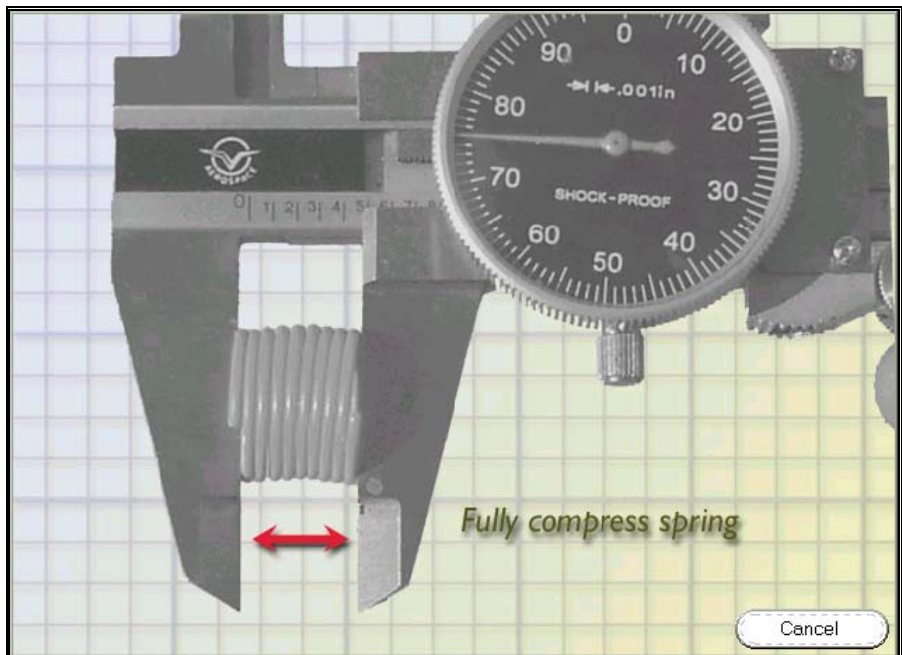
LEFT SPRING PRELOAD*Error! Bookmark not defined.*

Many shocks have an adjustment called **spring preload**, which controls the ride height of the car. The upper end of the spring rests on a ring, which can be moved up or down to make the spring tighter or looser at maximum travel.

To adjust the preload in RealRace, measure the distance between the minimum preload position, and the position you are using in your car (see diagram below).

RIGHT SPRING PRELOAD

This parameter controls the amount of **spring preload** in the right shock. For a description of preload, see "Left Spring Preload" above.

WHEEL CAMBER ANGLE

Wheel **camber** is angle at which wheels "tilt" inward or outward (see diagram).

When the top of a wheel tilts inward towards the car body, we say that the wheel has *negative* camber. Conversely, outward tilting wheels have *positive* camber. In practice, wheels should almost always have negative camber. You generally want between –1 and -3 degrees of camber in a R/C car wheel.
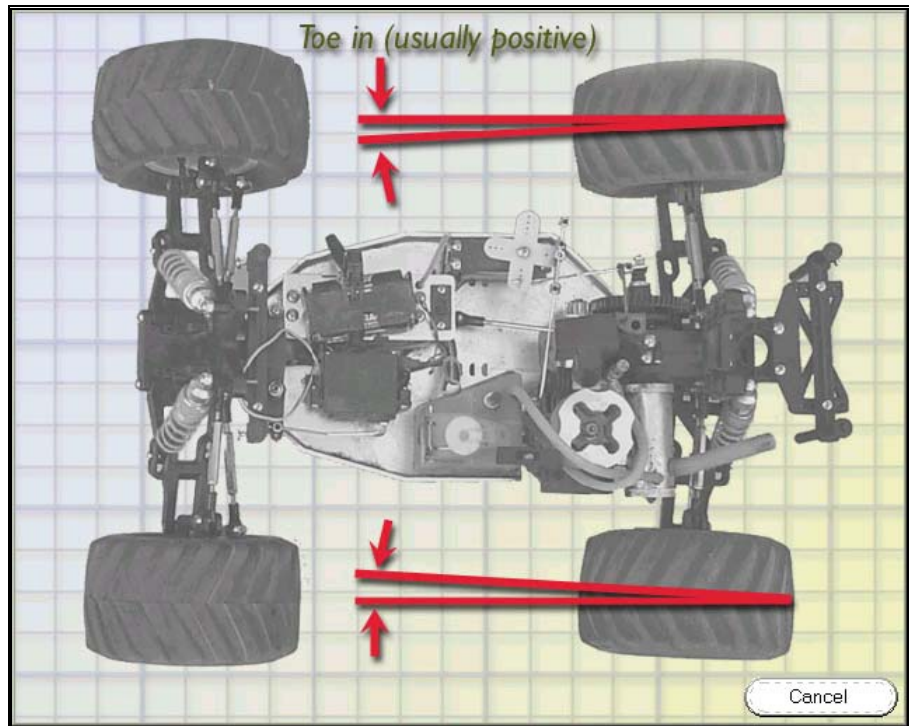

Camber is usually a negative value
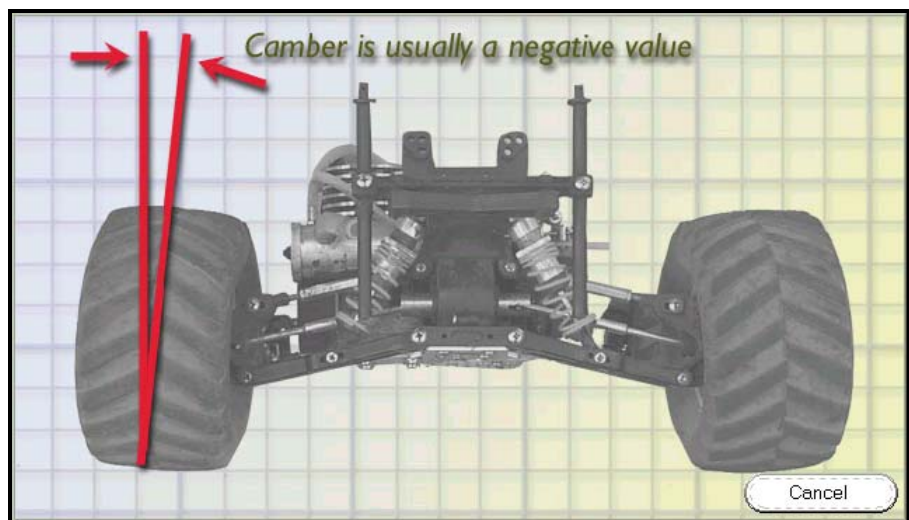
WHEEL TOE- IN ANGLE

Toe-in is the angle at which a wheel, viewed from above the car, points in towards or out from the car body (see diagram below). When the wheel points in toward the

body, we say that it has positive toe-in. A wheel that points away from the body has *negative* toe-in.

Almost all car wheels have positive toe-in. Greater toe-in will increase stability, but will decrease the car's cornering ability ("bite" on turns).

SHOCK OIL WEIGHT

This is the weight of the shock oil in the shock. Increasing the weight will make the suspension stiffer for big jumps, but will decrease traction for small bumpy tracks.

The value of this parameter may not exactly match the weight of the oil you are using in your R/C car. This is because the true damping force depends not only on oil weight, but on the shock piston size and the size and shape of the shock piston valve as well. RealRace does not model the latter two properties. However, by varying the shock oil weight you can find a value that will make the simulated shocks dampen much like the real ones.

DIFFERENTIAL SLIPPAGE

Use this control to set the amount of slippage allowed by a ball differential. Alternatively, you can use this parameter to simulate a slipper clutch. Loosen the differential to keep the wheels from spinning out under high acceleration and to reduce current draw from batteries during acceleration.

GEAR REDUCTION

This is the amount of gear reduction in the whole car. A gear reduction of 7.8, for example, would mean that the motor completes 7.8 revolutions for every one revolution of the wheels. If the vehicle is equipped with a two-speed transmission, this control selects the gear reduction for the first gear.

Brake Adjustment

Use this control to adjust the maximum amount of braking force available. Too little braking force makes it difficult to slow the vehicle; too much force can cause the wheels to lock up while braking.

Comprehensive Guide to R/C Car Set-up

Clicking this button will open the guide to R/C car set-up that we have included as part of RealRace. You can also find the guide in the manual. *See "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)" on page 209.*

Full Setup

Unlike "Quick Edit", Full setup lets you adjust any property of your car. *Before you use this feature, we suggest that you read "Accurate Measurements Are Crucial" on page 148.*

You can begin a full setup session using either of two methods:

- Select the vehicle you want to edit as the current vehicle, and then click "Edit (current vehicle)…" in the "Car" menu.

- Click on "Select Car…" in the "Car" menu. When you see the "Car Selection" page, select the vehicle you want to edit, and then click the "Edit" button.

Regardless of which method you use, follow the on-screen instructions when you start an editing session. When the session opens you will see the Car Setup page. This page contains basic information about your vehicle.

Note: RealRace will not let you directly edit any car from the RealRace CD. To edit one of these "default" cars, you must first make a copy of the car, then edit the copy. You can copy a car in the "Car Selection" page (Car menu, "Select Car…"). *See "Car Selection..." on page 60.*

*This page is only available when you are using the "Full Setup" feature. To determine the differences between a "Quick Edit" and a "Full Setup", see "*Quick Edit Car…" on page 62.

For More Information on tuning your R/C Car, be sure to read "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)*" on page 209.*

Error! Bookmark not defined.Car Setup Page

This page is the basic starting point for editing your car. Its main purpose is to allow you to edit your car's description.
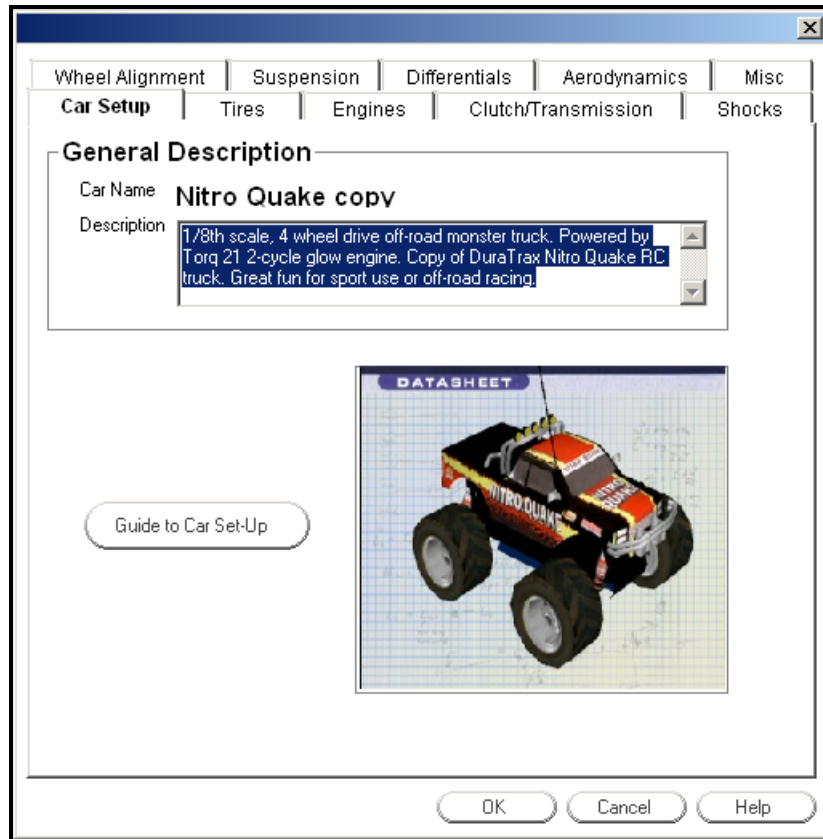
CAR NAME

This displays the name of the vehicle you are editing. You selected this name when you created the car. We suggest that you choose a new, distinct name for every car you create and edit. This will prevent you from confusing like cars.

DESCRIPTION

In this box, enter comments that describe the car you created and its modifications. Descriptive comments are really helpful when you have more than one model with the same visual appearance.

GUIDE TO CAR SET-UP

This button opens the Comprehensive Guide to R/C Car Set-Up in a window for you to read. The same text is also included in Appendix A of this manual.

ERROR! BOOKMARK NOT DEFINED.TIRES PAGE

This page lets you select tires for your car, and edit the tire properties.

*This page is only available when you are using the "Full Edit**Error! Bookmark not defined.**".
To determine the differences between a "Quick Edit**Error! Bookmark not defined.**" and a
"Full Edit", see "Quick Edit Car..." on page 62.*

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)" on page 209.
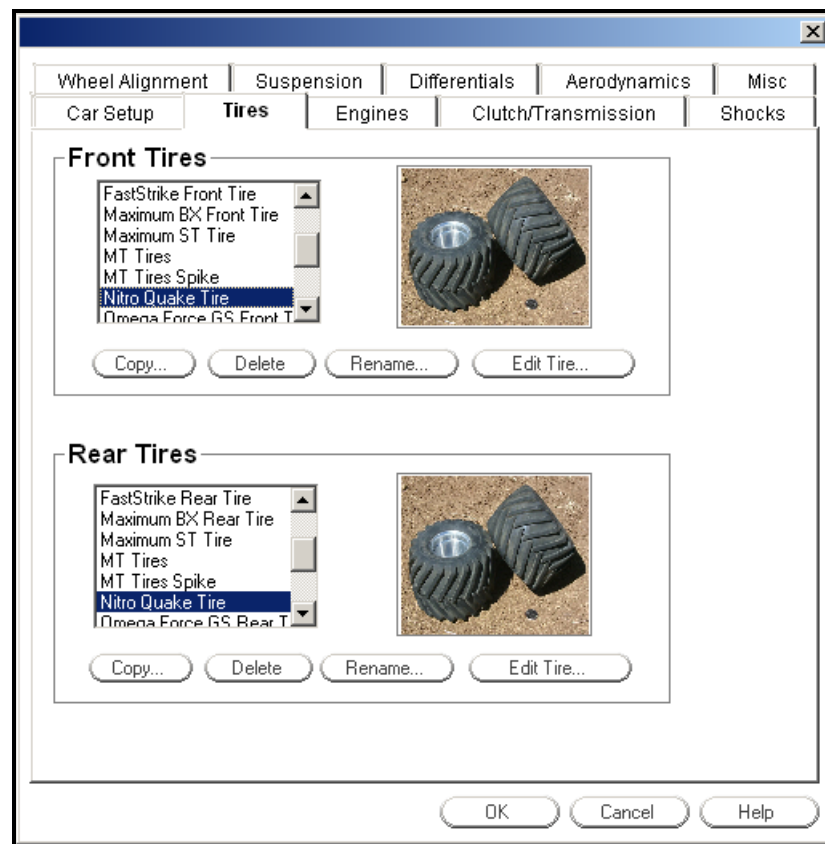
*TIRE*ERROR! BOOKMARK NOT DEFINED. *SELECTION*

Select the tires you want on the front and rear tires.

COPY

Copy the selected tire to a new file. Note that you cannot edit any tire that comes on the RealRace CD; you must first make a copy of the tire, and then edit the copy.

DELETE

Delete the tire. Please note the following:

- This will delete the tire for *all* the cars that are currently using it.

- You cannot delete any tire that comes on the RealRace CD; you can only delete custom tires that you (or another RealRace user) created.

RENAME

Renames the tire. Note that you cannot rename any tire that comes on the RealRace CD; you can only rename custom tires that you (or another RealRace user) created.

Edit the current tire. Please note the following:

- This will edit the tire for *all* the cars that are currently using it.

- You cannot edit any tire that comes on the RealRace CD; you can only edit custom tires that you (or another RealRace user) created.

For more information, *see "*Tire Edit Page*" on page 157 for more information.*

TIRE EDIT PAGE

This page lets you adjust the dimension of the tires.

This page is only available when you are using the "Full Edit". To determine the differences between a "Quick Edit" and a "Full Edit", see "Quick Edit Car…" on page 62.

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)*" on page 209.*

TIRE NAME

This shows the name of the tire you are editing.

TREAD TYPE

Enter the type of tread to use. Note when choosing a tread type you should also try to match the size of the tire you are using. This will make the simulation more accurate. For instance, don't take big monster truck tires and put them on a small 2WD buggy.

DESCRIPTION

This box contains a brief description of the selected tread type's properties.

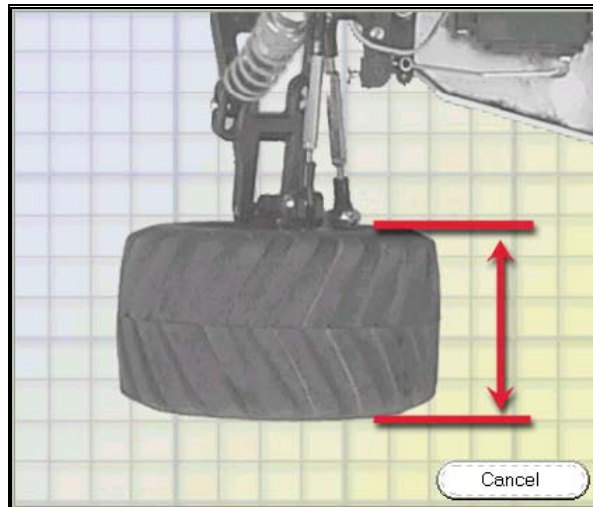### TIRE DIAMETER

Enter the diameter of your tire (see diagram).
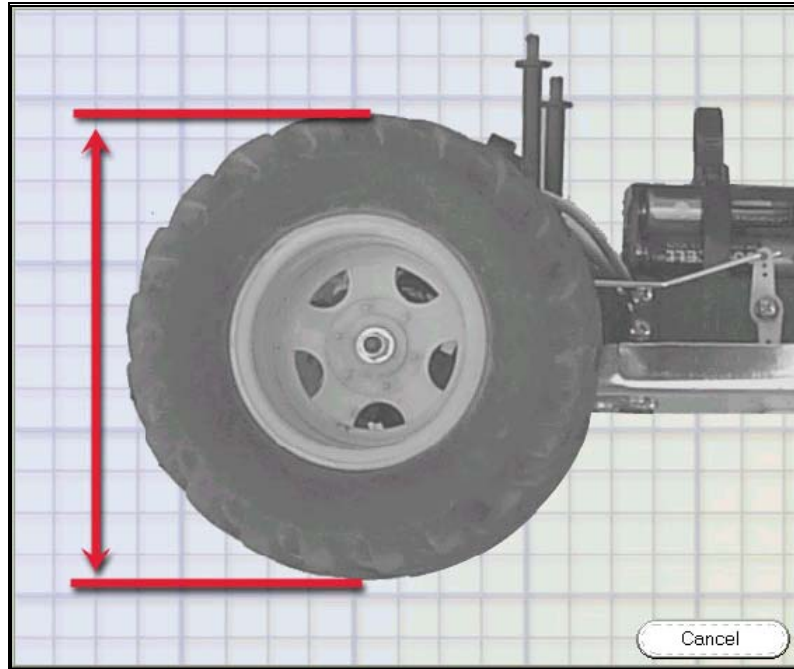
TREAD WIDTH
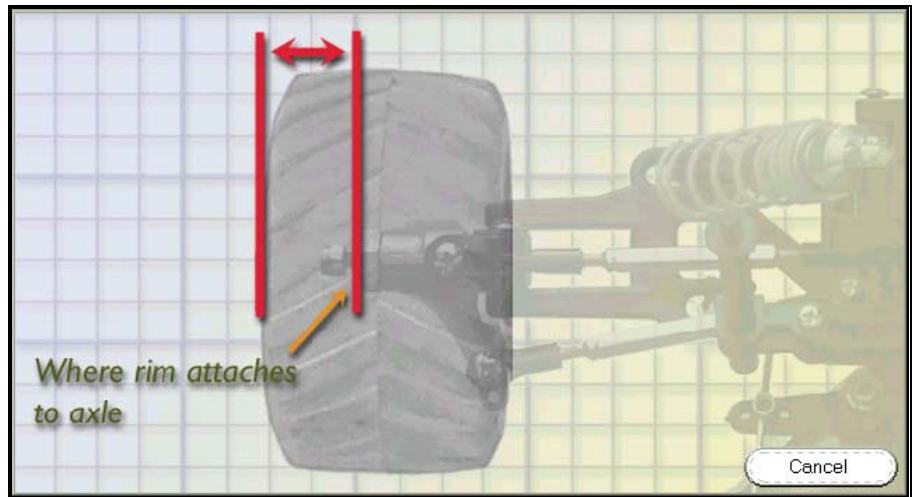
Enter the width of your tire's tread (see diagram).

TIRE WEIGHT WITH RIM

Enter the total weight of your tire, including the rim.

Enter the distance from the outside of the tire, to the place where the hub of the car attaches to the tire rim.

ENGINES PAGE

This page lets you replace or modify your car's power plant.

*This page is only available when you are using the "Full Edit". To determine the differences between a "Quick Edit" and a "Full Edit", see "*Quick Edit Car…*" on page 62.*

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)*" on page 209.*

INTERNAL COMBUSTION ENGINE (NITRO!)

Wheel Alignment	Suspension	Differentials	Aerodynamics	Misc
Car Setup	Tires	**Engines**	Clutch/Transmission	Shocks

These settings apply to the entire car, not a particular engine.

Power Plant　[Internal Combustion Engine ▼]

Fuel

Fuel Tank Size　[5.0 ⬍] oz　　Fuel Consumption [1.70 ⬍] oz/min

Attributes

Sound Profile　[21 Nitro Crusher ▼]

Torque Curve　[Nitro .21 Two Stroke ▼]

Percent Torque　[80 ⬍] %

(OK)　(Cancel)　(Help)

ELECTRIC MOTOR OPTION

POWER PLANT

Use this to choose between an internal combustion engine and an electric motor.
When you make this selection, other controls will appear or disappear on the page,
depending on what you have chosen.**Error! Bookmark not defined.**

FUEL TANK SIZE (NITRO ONLY)

Select the capacity of the fuel tank.

FUEL CONSUMPTION (NITRO ONLY)

Select the rate at which the engine consumes fuel.

SOUND PROFILE

Select the engine sound that is most like your car.

TORQUE CURVE

Select the torque curve that best describes your engine.

PERCENT TORQUE

Adjusts the engine torque as a percentage of its normal value. A number over 100% will give you more torque than the engine usually provides, and a value below 100% will give you less.

NUMBER OF CELLS (ELECTRIC ONLY)

Choose the number of cells in the battery pack.

CELL TYPE (ELECTRIC ONLY)

Choose the cell type and capacity.

TYPE (ELECTRIC ONLY)

Select an electric motor type.

ADVANCE TIMING ERROR! BOOKMARK NOT DEFINED.(ELECTRIC ONLY)

Choose the timing for the electric motor. By advancing the motor timing, you can make the motor run faster; however, the motor will be less efficient.

VIEW PERFORMANCE (ELECTRIC ONLY)

This button opens a dialog that lets you view the performance specifications of your electric motor. You can alter your engine parameters and view the resulting performance change on this graph. *See "Electric Motor Performance" on page 162 for more information.*
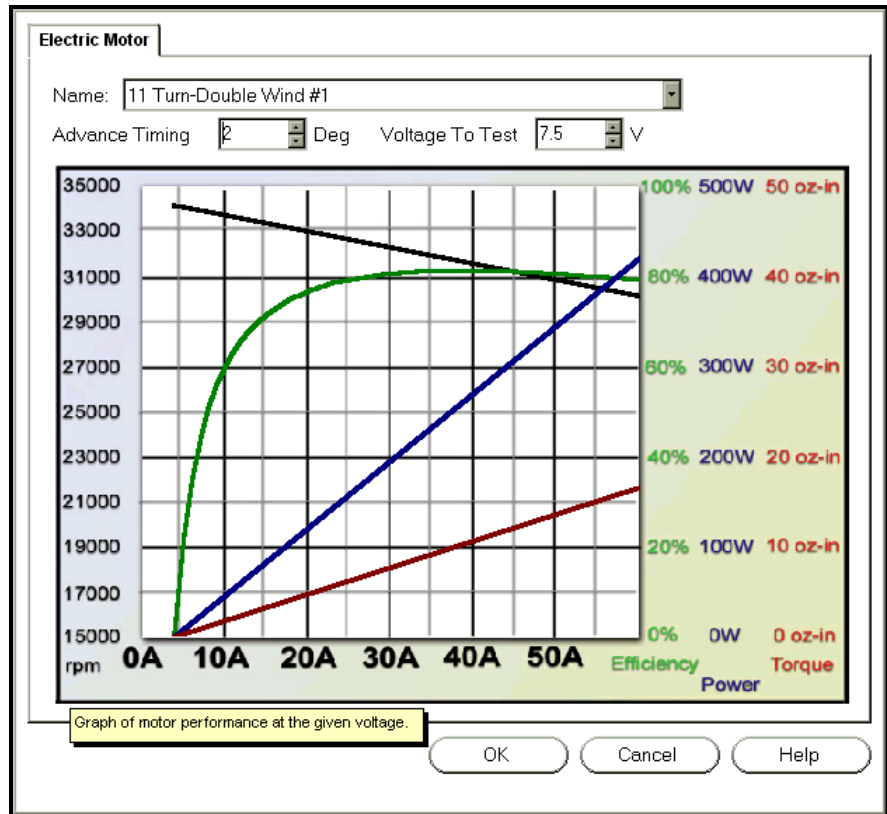
ELECTRIC MOTOR PERFORMANCE PAGE

This page lets you view the performance specifications of the electric motor. Use this to help choose the motor and timing to use for your particular application. To get the longest run time, you should try to run your motor where it is most efficient.

*This page is only available when you are using the "Full Edit**Error! Bookmark not defined.**". To determine the differences between a "Quick Edit**Error! Bookmark not defined.**" and a "Full Edit", see "*Quick Edit Car…*" on page 62.*

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)*" on page 209.*

Graph of motor performance at the given voltage.

NAME

Choose the motor you want to use for this car. The graph**Error! Bookmark not defined.** will display that motor's performance graph.

ADVANCE TIMING

Choose the timing for the electric motor. You can make a motor run faster by advancing the timing; however, the motor will be less efficient.

VOLTAGE TO TEST

This determines the voltage at which to view the graph. This chart assumes that the motor is 'magically' held at this voltage at all the different current ratings.

CLUTCH/TRANSMISSION PAGE

This page lets you adjust your car's clutch and transmission.

*This page is only available when you are using the "Full Edit". To determine the differences between a "Quick Edit" and a "Full Edit", see "*Quick Edit Car…*" on page 62.*

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)*" on page 209.*

CLUTCH TYPE

Choose whether the car has a clutch.

MINIMUM RPMERROR! BOOKMARK NOT DEFINED. TO PARTIALLY ENGAGE

Choose the engine speed (in RPM) at which the clutch starts to engage.

MINIMUM RPM TO FULLY ENGAGE

This is the engine speed (in RPM) at which the clutch is fully engaged.

TRANSMISSION TYPE

Choose whether the car has a two-speed clutch. For single geared cars (one speed only), click **None**.

SHIFT SPEED

Choose the engine speed (in RPM) at which the car shifts from first gear to second gear.

Choose the amount of gear reduction *in the whole drive train* when in the car is in 2nd gear. *Example*: a gear reduction of 6.5 means that the motor completes 6.5 revolutions for every one revolution of the wheels.

GEAR REDUCTION

This is the amount of gear reduction in the whole drive train. (For cars with two-speed transmissions, enter the gear reduction when the car is in first gear.) *Example*: a gear reduction of 7.8 means that the motor completes 7.8 revolutions for every one revolution of the wheels.

SHOCK PAGE

This page lets you adjust the shocks for your car. To measure several of the items on this page, you will need to remove the shock(s) from the car.

This page is only available when you are using the "Full Edit". To determine the differences between a "Quick Edit" and a "Full Edit", see "Quick Edit Car..." on page 62.

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)" on page 209.

SHOCK TO EDIT

Choose either the front or rear. If you select "Front," the edit controls (Maximum Length, Oil Weight, etc.) will adjust the properties of the front shocks. Conversely, you can adjust the properties of the rear shocks by selecting "Rear."

SPRING RATE

The **spring rate** (or **spring force** constant) is defined as the amount of force the spring exerts per inch of travel. Springs with higher rates are stiffer (harder to squeeze); springs with lower rates are easier to compress.

Stiffer springs may be better for rough tracks. Conversely, softer springs are better for smoother tracks.

You can measure spring rate using a postage scale. Here are two different methods:

- Method 1: Place the spring on top of the scale. Then, push the top of the spring down exactly one inch. The reading on the scale, taken while you are holding the spring down, is the value you should enter for spring rate.

- Method 2: Measure the length of the spring, uncompressed. Write this length down. Then, compress the spring as far as possible, measure the length and write it down. (The compressed length will obviously be shorter than the uncompressed length.) Next, place the spring on top of the scale, and push down on the spring, compressing it as far as possible. Once the spring is compressed, be careful not to put any extra downward force on it. Read the weight registered on the scale, and write it down. Finally, use the formula:
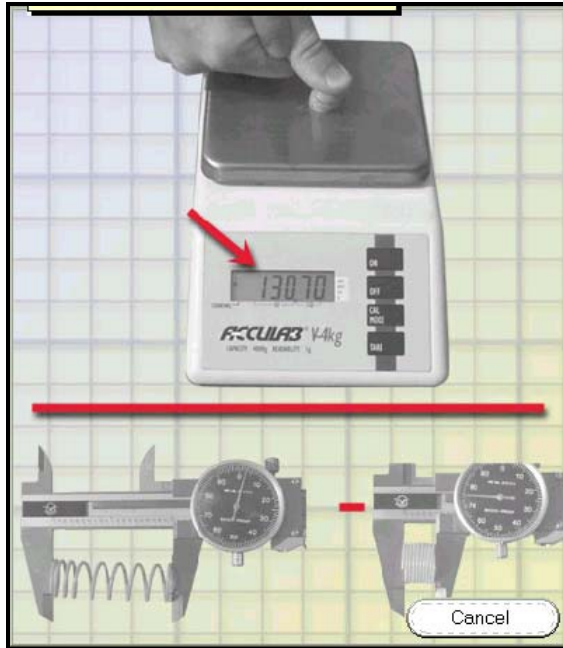
  W = weight from scale

  UL = uncompressed length (see diagram below ["Spring Maximum Length"])

  CL = compressed length (see diagram below ["Spring Minimum Length"])

  Spring Rate = W/(UL – CL)

Again, if you choose method 2 above, be sure to push the spring only as hard as needed to compress it all the way, and no harder.

SHOCK OIL WEIGHT

This is the weight of the shock oil in the shock. Increasing the weight will make the suspension stiffer for big jumps, but will decrease traction for small bumpy tracks.

Matching the value of this parameter to the weight of the oil you are using in your R/C care may not result in identical shock performance. This is because the true damping force depends not only on oil weight, but also on the shock piston size and the size and shape of the shock piston valve as well. RealRace does not model the latter two properties. However, by varying the shock oil weight you can find a value that will make the simulated shocks dampen much like the real ones.
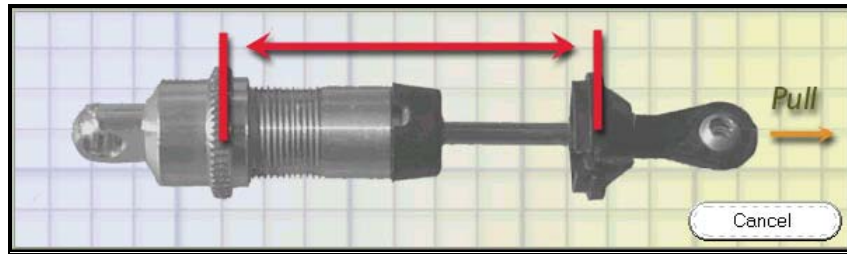
MAXIMUM LENGTH

Length of the shock with the shock fully extended. To measure this, remove the shock from the car, and measure from top pin center to bottom pin center (as in the diagram).
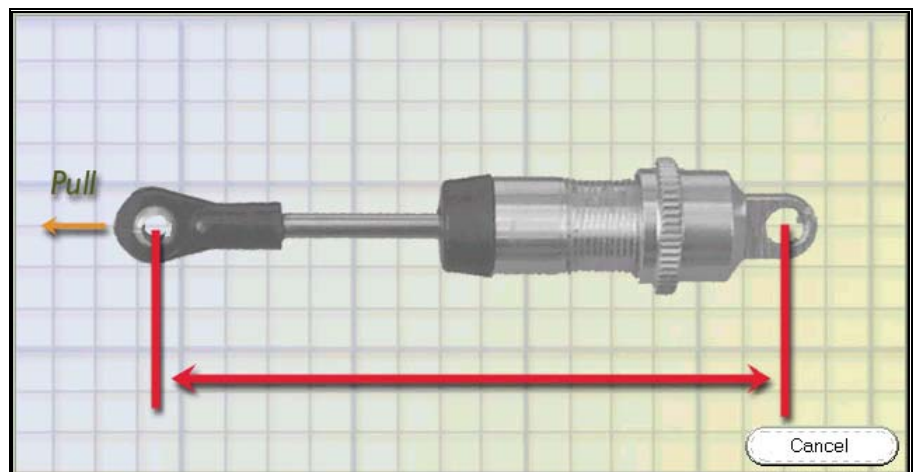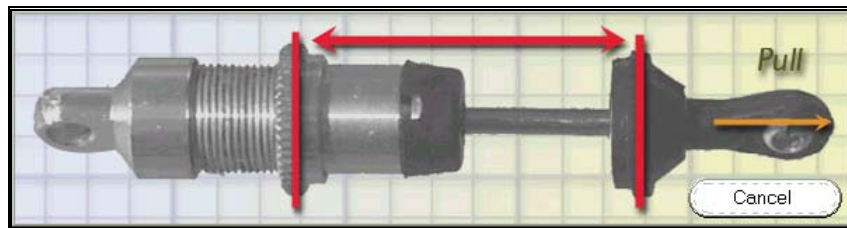
MAX SPRING LENGTH FROM ADJUSTER – EXTENDED

To measure this parameter:

- Remove the shock from the car. (You may also need to remove the spring from the shock.)

- Extend the shock piston as far as it will go.

- Set the shock preload to its minimum possible value (that is, move the adjustable spring stop as close to the upper shock pin as it will go.

- With the shock in this position, measure how far the spring could stretch, if it were mounted on the shock (see diagram).

MIN SPRING LENGTH FROM ADJUSTER – EXTENDED

Measure this parameter exactly as you did the previous parameter, except set the preload to its maximum possible value (farthest from the upper shock pin, see diagram below).

SPRING EQUILIBRIUM LENGTH

This is the length of the spring when it is completely uncompressed. To measure this, you will need to first remove the spring from the shock.

Spring fully uncompressed

Cancel
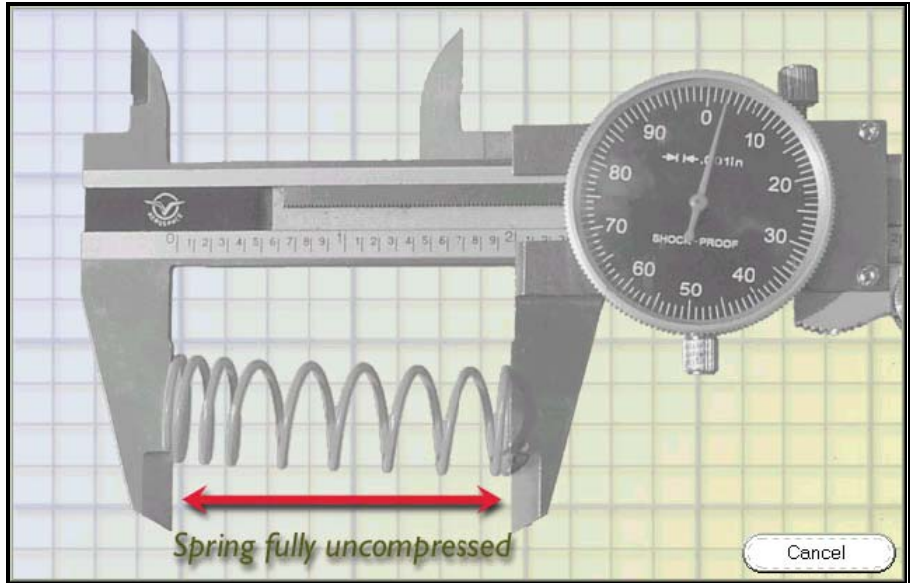
SPRING MINIMUM LENGTH

This is the length of the spring when it is fully compressed. Make sure the spring is removed from the shock first.

Fully compress spring

Cancel
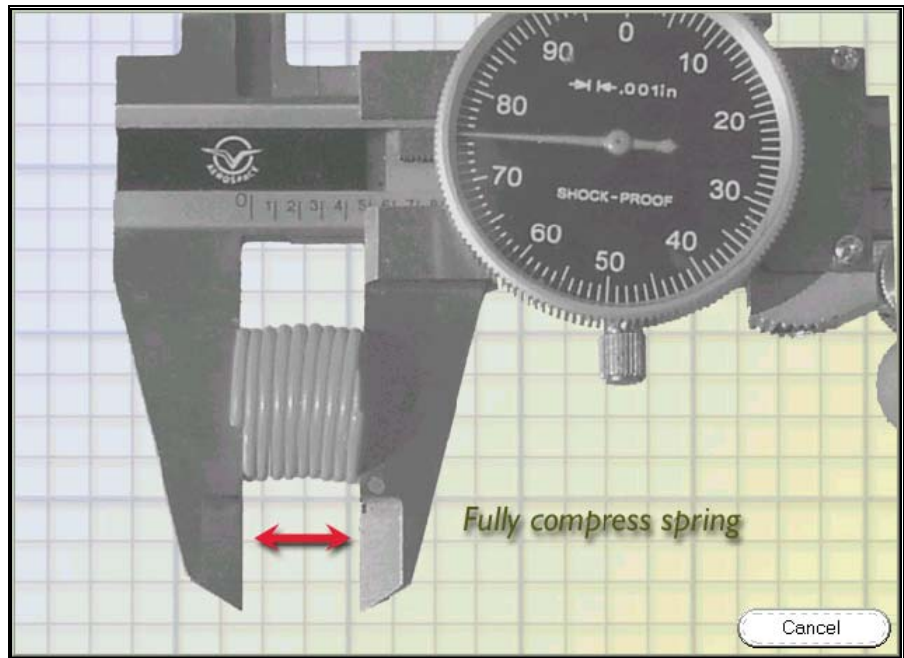
MAXIMUM SPRING LENGTH WITH SHOCK COMPRESSED

To measure this parameter:

- Remove the shock from the car. (You will also need to remove the spring from the shock.)

- Compress the shock piston as far as it will go.

- Set the shock preload to its minimum possible value (that is, move the adjustable spring stop as close to the upper shock pin as it will go.

- With the shock in this position, measure how far the spring could stretch, if it were mounted on the shock (see diagram).

LEFT SPRING PRE-LOAD

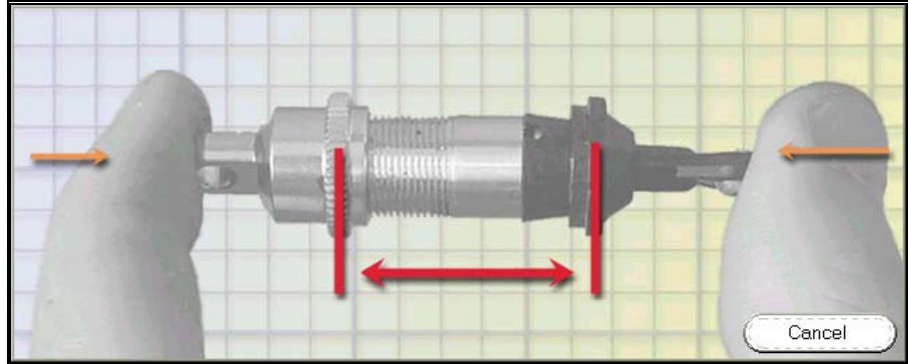Enter the amount of spring pre-load in the left shock. Most shocks have an adjustable clip or ring that controls the tension in the spring. The preload is the distance this stopper is moved from its minimum position (closest to the upper shock pin). Use this to adjust the ride height of the car.

RIGHT SPRING PRE-LOAD

Enter the amount of spring pre-load in the right shock. Most shocks have an adjustable clip or ring that controls the tension in the spring. The preload is the distance this stopper is moved from its minimum position (closest to the upper shock pin). Use this to adjust the ride height of the car.

WHEEL ALIGNMENT PAGE

This page lets you adjust the wheel alignment options for your car.

This page is only available when you are using the "Full Edit". To determine the differences between a "Quick Edit" and a "Full Edit", see "Quick Edit Car…" on page 62.

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)*" on page 209.*

SUSPENSION*ERROR! BOOKMARK NOT DEFINED.* TO EDIT

Choose either the front or rear suspension. If you select "Front", the controls on this page will adjust the front wheels. Similarly, "Rear" causes the controls to adjust the rear wheels.

CAMBER ANGLE

Wheel **camber** is angle at which wheels "tilt" inward or outward (see diagram).

When the top of a wheel tilts inward towards the car body, we say that the wheel has *negative* camber. Conversely, outward tilting wheels have *positive* camber. In practice, wheels should almost always have negative camber. You generally want between –1 and -3 degrees of camber in a R/C car wheel.

Camber is usually a negative value

Cancel
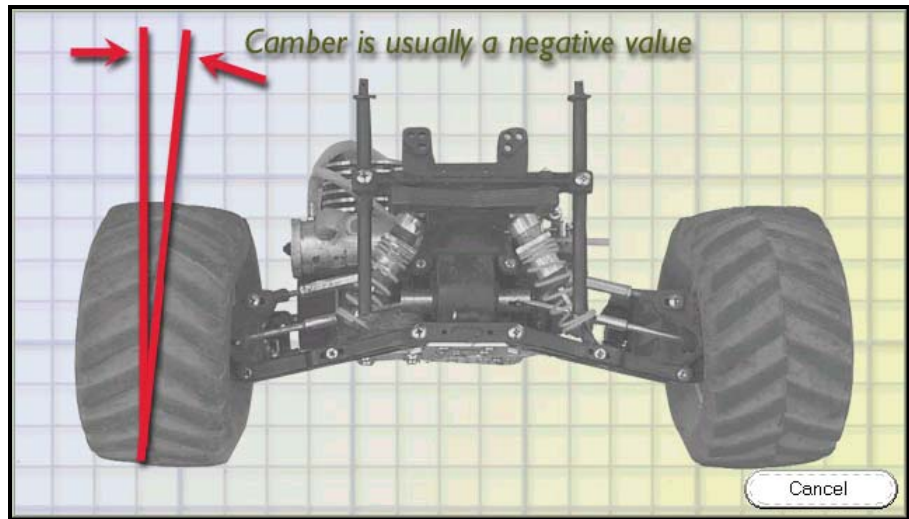
CASTER ANGLE

Caster is the angle formed by the kingpin and the chassis. A car with a larger caster angle will have increased steering force when entering turns but less when exiting turns. Conversely, a car with a smaller caster angle will have less steering force when entering turns but more when exiting turns.

You can also think of caster as the angle of the axis that the wheels rotate around when you steer them back and forth. Bicycle front wheels usually have a large caster angle.

Caster angles are virtually always greater than, or equal to, zero.
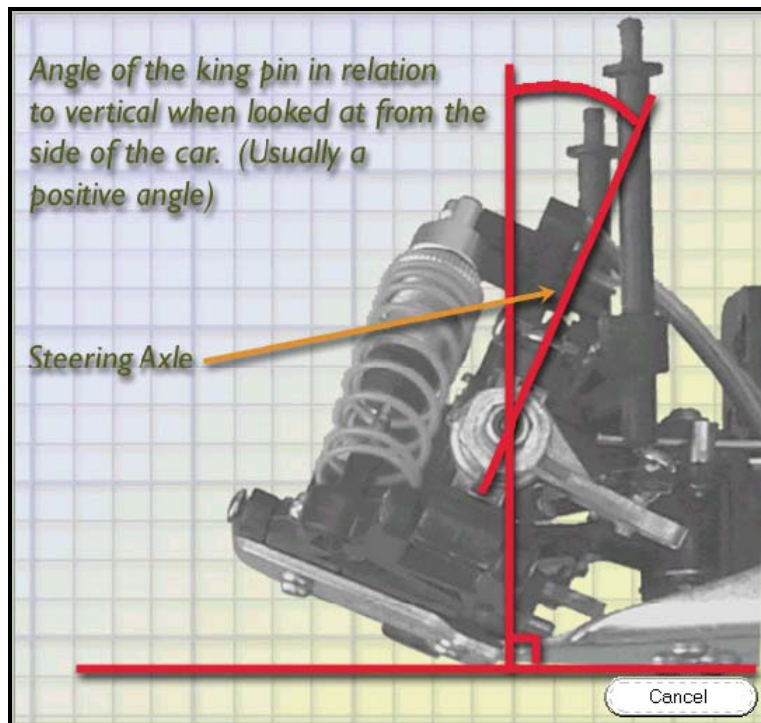
Angle of the king pin in relation to vertical when looked at from the side of the car. (Usually a positive angle)

Steering Axle

Cancel

TOE-IN ANGLE

Toe-in is the angle at which a wheel, viewed from above the car, points in towards or out from the car body (see diagram below). When the wheel points in toward the body, we say that it has positive toe-in. A wheel that points away from the body has *negative* toe-in.

Almost all car wheels have positive toe-in. Greater toe-in will increase stability, but will decrease the car's cornering ability ("bite" on turns).
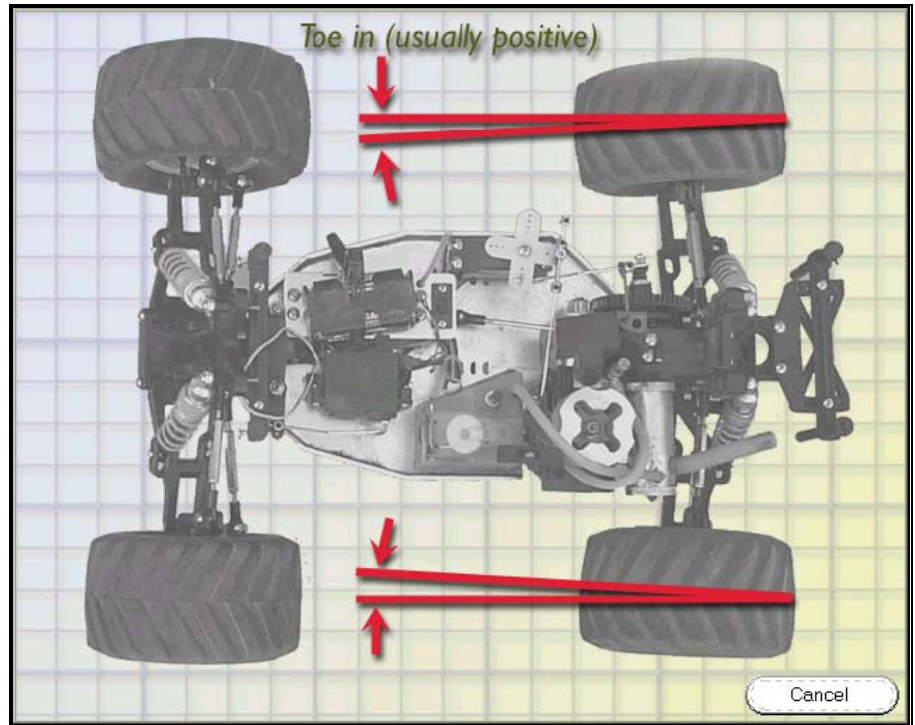
CHASSIS KICK-UP ANGLE

Kick-up is the angle of the front suspension to the chassis.

Lower suspension arm hinge

Cancel
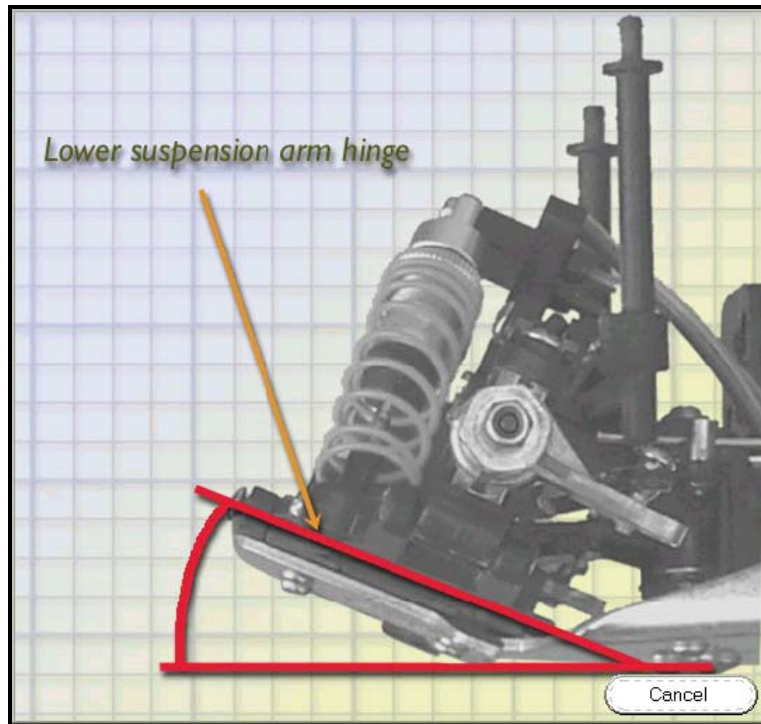
*MAXIMUM STEER ANGLE*ERROR! BOOKMARK NOT DEFINED. *– WHEEL TURNED IN*

This is the angle of the tire**Error! Bookmark not defined.** when the tire points in towards the car, as far as it will go. This value is always positive.

Inside steering angle
Positive Angle

Cancel
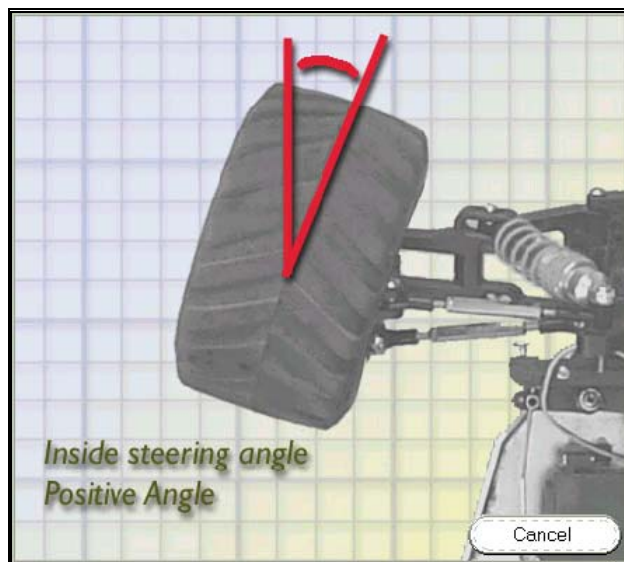
MAXIMUM STEER ANGLE – WHEEL TURNED OUT

This is the angle of the tire when the tire points away from the car, as far as it will go. This value is always positive. For most R/C cars, this angle will be different from "Maximum Steer Angle**Error! Bookmark not defined.** – Wheel Turned In" (above)—often by at least several degrees.

Outside steering angle
Positive Angle

Cancel
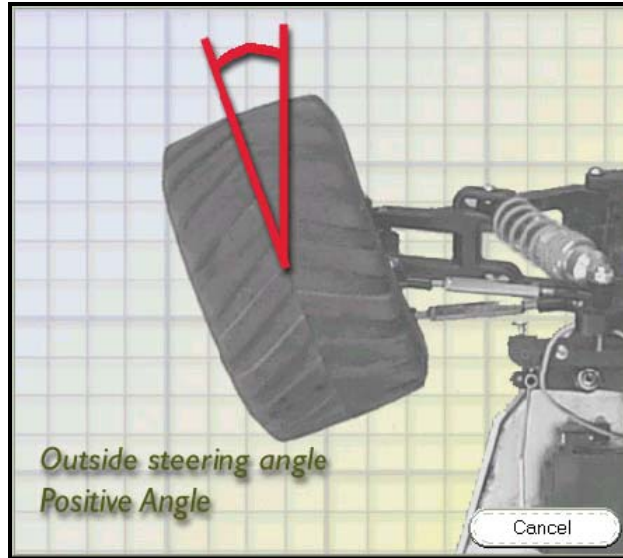
WHEEL BASE

This is the distance from the center of the front tire to the center of the rear tire.

Cancel
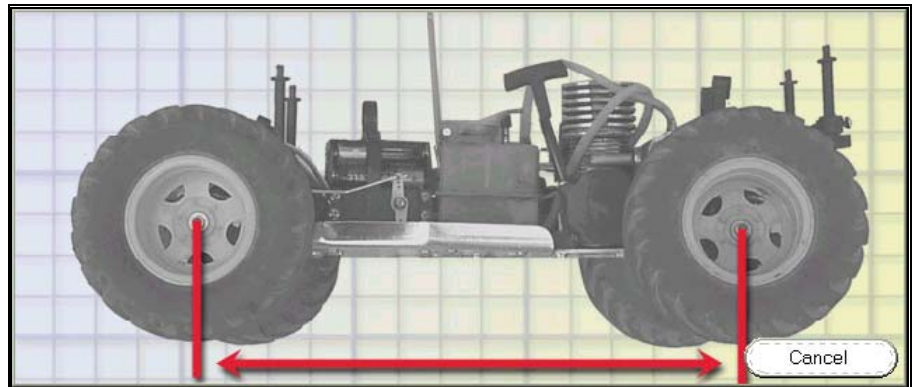
ERROR! BOOKMARK NOT DEFINED.SUSPENSION PAGE

This page lets you modify the suspension geometry. *Careful!* Don't modify any of these values for stock cars (cars that came on the RealRace CD), since small changes can cause the car to suddenly behave badly. Instead, use this page only when you measure the dimensions of your own car.

When you do measure your own car, be *very, very* careful to make accurate measurements. Small measurement errors (sometimes even 1/10 inch) can cause the car to behave badly.

You may (or may not) find it easier to make these measurements by removing the wheels and shocks.

Note that in the following sections, a "vertical" distance is measured in an up-down direction, when the car is upright on a flat surface. A "horizontal" distance should be measured in a direction parallel to the surface the car is resting on. If you are asked to measure distance between two objects, measure from the object centers (*e.g.*, from bolt center to bolt center).

This page is only available when you are using the "Full Edit". For the differences between a Quick Edit and a Full Edit, see "Quick Edit Car…" on page 62.

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)" on page 209.

SUSPENSION TO EDIT

Choose front or rear end of the car. If you choose "Front," the edit controls will adjust the front-end suspension dimensions; if you choose "Rear" the controls will edit the rear end.

VERTICAL DISTANCE FROM CHASSIS TO LOWER SHOCK PIN

First, find the lower suspension arm and place it in a level position. Next, find the lower shock pin (the part of the shock that connects to the suspension arm). Carefully measure the vertical distance between this pin and the bottom of the chassis floor (see diagram). Note that if your car has a kick back angle (as in the diagram), you will need to make sure that you are measuring from the pin *all the way down to the same level as the bottommost, flat part of the chassis*. Enter this distance.
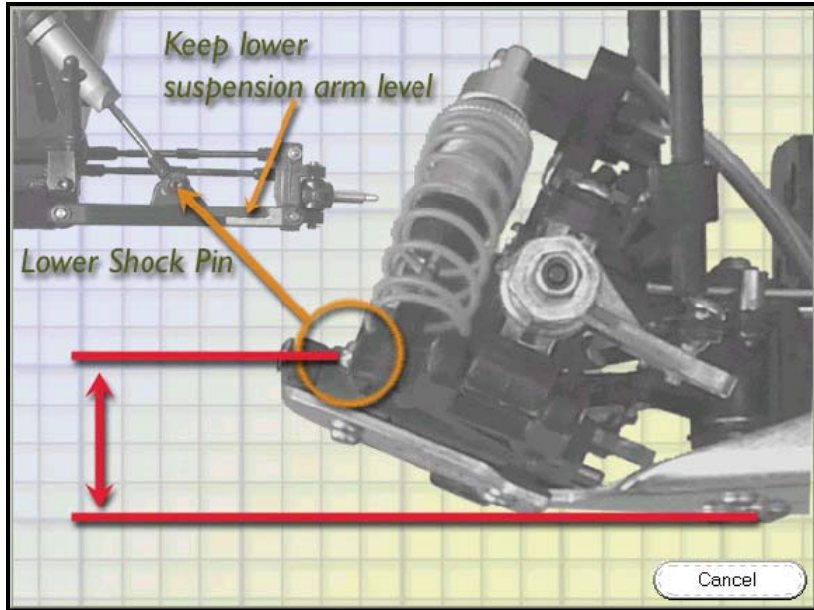
HORIZONTAL DISTANCE FROM SUSPENSION ARM HINGE TO HUB

First, find the hinge where the lower suspension arm attaches to the car chassis. Make sure the arm is level, then measure the *horizontal* distance between the hinge, and the very end of the suspension arm (where the wheel hub attaches to the suspension arm). By "horizontal", you want to hold your ruler or calipers parallel to the table or floor surface, perpendicular to the direction the car is pointing (see diagram below). In other words, looking down on your car, hold the ruler or calipers in *exactly the same direction* as the red, double pointed arrow in the figure.
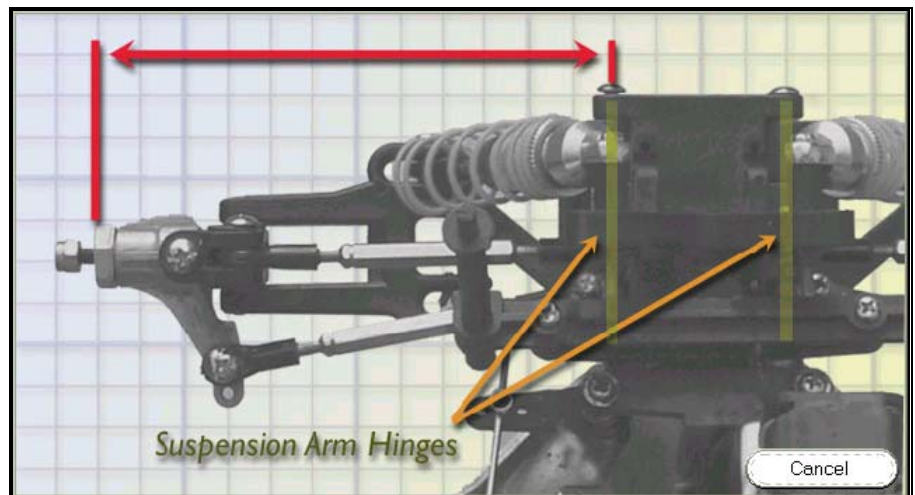
DISTANCE BETWEEN LOWER SUSPENSION ARM*ERROR! BOOKMARK NOT DEFINED.* HINGES

Looking from the front of the car (or rear, if you are measuring the rear end suspension), find the hinges that connect the left and right lower suspension arms to the chassis. Measure the distance between these hinges (bolt center to bolt center, as in the diagram below). Enter the distance into this box.

Lower suspension arm hinges
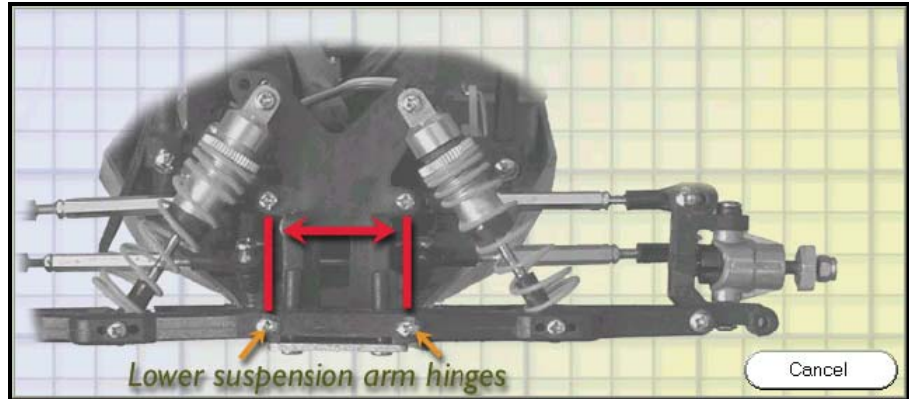
HORIZONTAL OFFSET FROM LOWER SHOCK PIN TO AXLE *ERROR! BOOKMARK NOT DEFINED.*

To take this measurement, look at the suspension arms from the top of the car. *Important*--make sure that you are looking straight at the suspension arms and not necessarily the car (especially if your car has kick-up).

As you look at the suspension arms, imagine a straight line passing through both of the lower shock pins (see the long red line in the top half of the diagram below). Measure the horizontal distance between this line and the hub.

In this case, by "horizontal" we mean that your ruler or calipers should be along the direction shown by the red arrow in the lower part of the diagram. So, if your car has more kick-up you will need to tilt your ruler or calipers more.

If the shock pins are in front of the hub, then the value of this distance is negative. If the shock pins are behind the hub, then the value is positive.

Looking straight down on suspension arms

Lower Shock Pins

Note: When the wheel hub is in front of shock pin, the value is positive, otherwise it is negative (the above example would be negative)
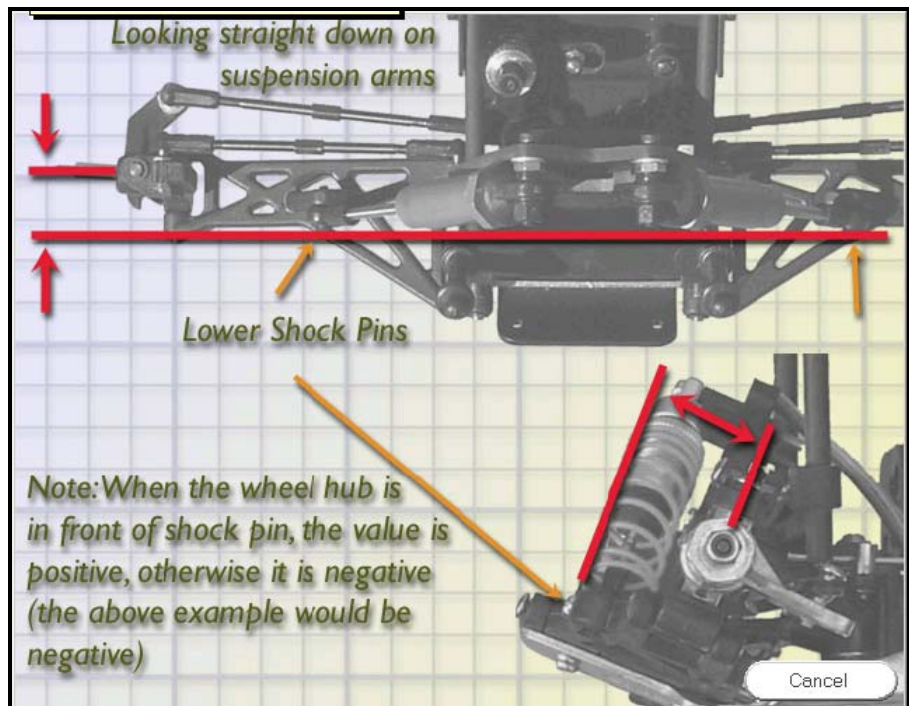
VERTICAL OFFSET FROM LOWER SHOCK PIN TO AXLE

To take this measurement, look at the suspension arms from the front of the car (or rear, if you are measuring the rear suspension). *Important*—make sure that you are looking straight at the suspension arms and not necessarily the car (especially if you car has kick-up).

As you look at the suspension arms, imagine a straight line passing through both of the lower shock pins (see the long red line in the top half of the diagram below). Measure the *vertical* distance between this line and the hub.

In this case, by "vertical" we mean that your ruler or calipers should be along the direction shown by the red arrow in the lower part of the diagram. So, if your car has more kick-up you will need to tilt your ruler or calipers more.

If the hub is below the shock pins, then the value of this distance is negative. If the hub is above the shock pins, then the value is positive.
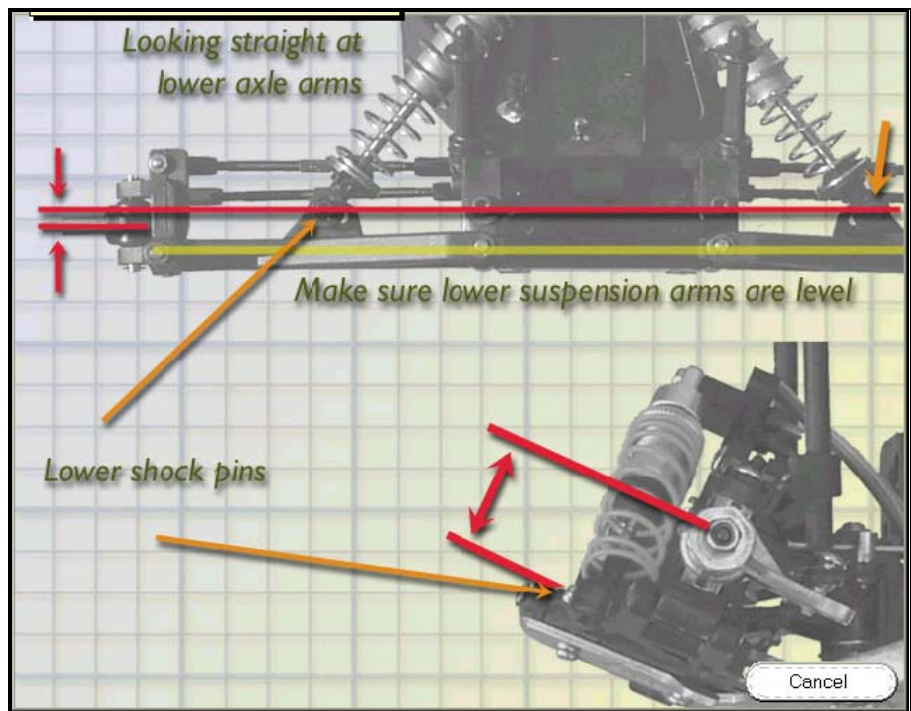
UPWARD SUSPENSION TRAVEL DISTANCE

This parameter specifies how far upwards the hub can travel. First, remove the shock from the car. Also, make sure that you are looking straight at the suspension arms and not necessarily straight at the car. (This is important if the suspension has kick-up). Then move the suspension arms so that they are level.

Hold a ruler or calipers to the hub. Now move the suspension arm up to its highest possible position and note the change in distance with the ruler or calipers. Enter this distance in the box.

Remove Shock First!

Make sure lower suspension arm is level

Cancel

DOWNWARD SUSPENSION TRAVEL DISTANCE

This is basically the reverse of the previous measurement. Again, make sure the shock is not attached to the car. Also make sure that you are looking straight at the suspension arms and not necessarily straight at the car. (This is important if the suspension has kick-up). Then make sure the suspension arms are level.

Hold a ruler or calipers to the hub. Now move the suspension arm up to its lowest possible position and note the change in distance with the ruler. Enter that distance.

(Distance is usually negative)

Remove Shock First!

Make sure lower suspension arm is level

Cancel
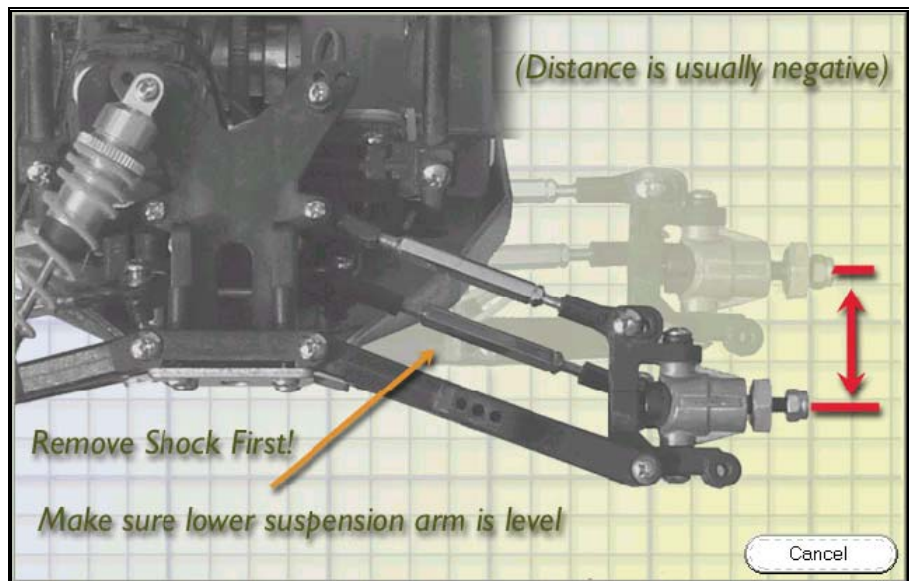
STATIC SHOCK LENGTH

This is the distance between the upper and lower shock pin with the suspension arm held level. Look from the front of the car (or rear, if you are measuring the rear suspension) and be sure you are looking straight at the suspension arms and not necessarily straight at the car. (This is important if your suspension has kick-up).

Then make sure the suspension arm is level. Measure the distance from the lower to the upper shock pin.

DISTANCE FROM KINGPIN TO HUB

To make this measurement, look straight down on the suspension arms. Make sure you are looking directly at the suspension arms and not necessarily the car. (This is important if your suspension has kick-up). Then measure the *horizontal* distance from the kingpin to the wheel hub. By horizontal, we mean that the ruler or calipers should be parallel to the table or floor surface, and also parallel to the wheel axle.
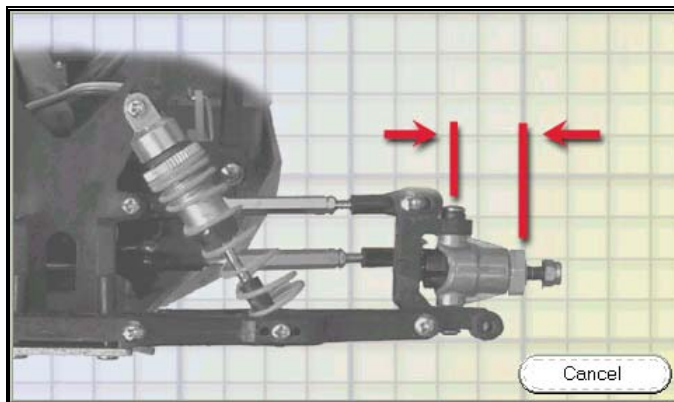
HORIZONTAL DISTANCE BETWEEN UPPER SHOCK MOUNTS*ERROR! BOOKMARK NOT DEFINED.*

This is the distance between the upper shock pins, looking straight at the car from the front (or rear). Measure from pin center to pin center.
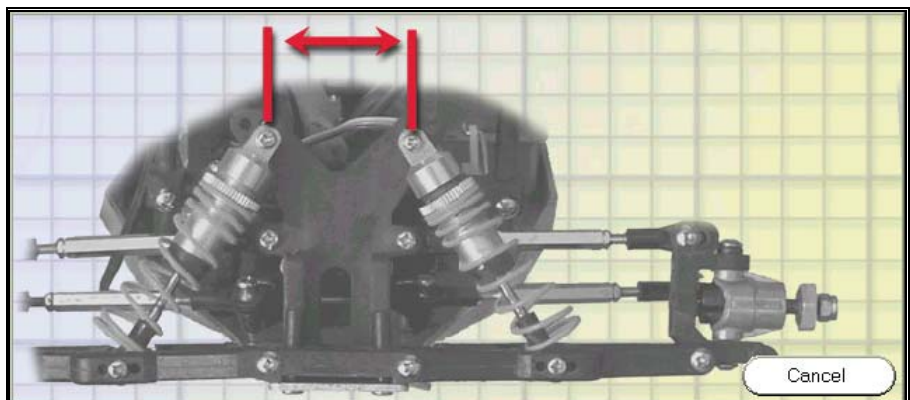
HORIZONTAL DISTANCE BETWEEN LOWER SHOCK MOUNTS

To measure this, first make sure that the lower suspension arms are level. Then, looking from the front (or rear) of the car, measure the distance between the lower shock pins (pin center to pin center). Make sure that you are looking straight at the suspension arms and not necessarily straight at the car. (This is important if your suspension has kick-up).

Make sure lower suspension arms are level
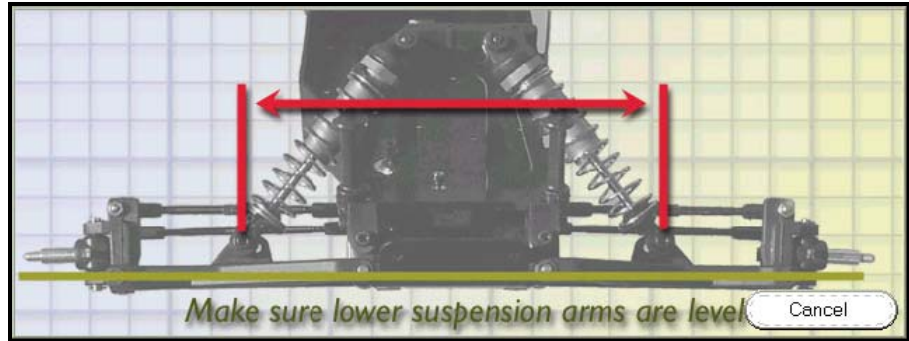
HEIGHT OF LOWER MOUNT POSTS*ERROR! BOOKMARK NOT DEFINED.*

On most cars, the lower shock pin attaches directly to the center of the lower suspension arm. However, some cars have a small "post" or tab on the lower suspension arm where the lower shock pin attaches. This parameter indicates the height of that post or tab.

If your shocks do attach directly to the center of the lower suspension arm, enter zero for this parameter. If, however, there is a post or tab (as in diagram), you will need to measure the vertical distance from the center of the arm to the center of the lower shock pin. Make sure that you are looking straight at the suspension arms and not necessarily straight at the car. (This is important if the suspension has kick-up). Then make sure the suspension arms are level. Now measure the *vertical* distance between the center of the suspension arm and the lower shock pin. In this case, by vertical we mean along the kick-up direction.

Make sure lower suspension arm is level
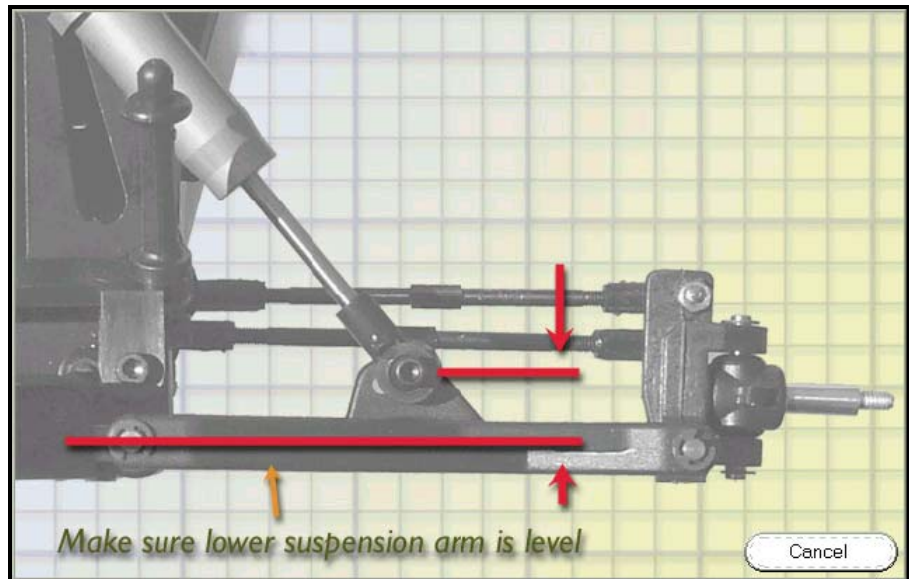
ERROR! BOOKMARK NOT DEFINED.DIFFERENTIAL PAGE

This page lets you modify the drive train elements.

This page is only available when you are using the "Full Edit". For the differences between a Quick Edit and a Full Edit, see "Quick Edit Car…" on page 62.

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)" on page 209.

DRIVE TYPE

- Rear Wheel Drive**Error! Bookmark not defined.** – The motor powers the rear wheels only.

- Four Wheel Drive**Error! Bookmark not defined.** – The motor powers all four wheels.

CAR HAS CENTER GEAR DIFFERENTIAL*ERROR! BOOKMARK NOT DEFINED.*

Some 4WD cars have a simple belt to split torque between the front and rear axles. For these cars, leave the "Car Has Center Gear Differential" box unchecked.

Other 4WD cars use a true gear differential to split torque between front and rear axles. (This is also called "all-wheel drive.") For these cars, check the box.

All-wheel drive is more expensive. Cars with this feature handle better on dry, smooth road surfaces, but may get poorer traction in poor or off-road conditions.

DIFFERENTIAL GREASE*ERROR! BOOKMARK NOT DEFINED.*

Adjusts the weight of the grease inside the center differential. A higher value will make the car handle less like an AWD vehicle and more like a "regular" 4WD.

AXLE*ERROR! BOOKMARK NOT DEFINED.*

Choose either the front or rear suspension. If you select "Front", the edit controls will adjust the front end, and vice versa.

DIFFERENTIAL TYPE

A differential splits engine torque and sends it to two different places (in this case the two wheels.) You can see the effect of a differential in your car by lifting it off the ground, then rotating one of the rear wheels. The other wheel will begin to rotate in the opposite direction, exactly the opposite of what you would expect if the wheels were connected by a solid axle! This motion is caused by the internal working of the differential. R/C cars usually use one of two differential types:

- Gear Differential – Typically used in less expensive or low performance cars. This type does not allow you to adjust the differential slippage.

- Ball Differential – Typically used in higher performance cars. This type of differential allows you to adjust the amount of slippage.

DIFFERENTIAL GREASE

Adjusts the weight of the grease inside the axle differential. A higher value will cause the differential to act a little less "differential-like", and more like a solid axle.

Higher grease values will give better traction in slippery conditions. Lower values will give less drag on smooth, dry roads.

DIFFERENTIAL SLIPPAGE

If you have a ball differential, use this control to adjust the amount of slippage. Lower values will cause the diff to slip a little when you apply a large torque.

You can also use this control to simulate a slipper clutch, like you would find in an electric car. Loosen the differential to keep the wheels from spinning out under high acceleration and to reduce current draw from batteries during acceleration.

DRIVE TRAIN FRICTION

Adjusts the amount of friction in the drive train. This is pre-calculated for each particular car, but you can modify the percentage here. Set this to 100% to use the "factory" setting.

AERODYNAMICS PAGE

This page lets you adjust the aerodynamic properties of your car.

This page is only available when you are using the "Full Edit". To determine the differences between a "Quick Edit" and a "Full Edit", see "Quick Edit Car..." on page 62.

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)*" on page 209.*

FRONTAL DRAG PERCENT

RealRace cars come with a pre-computed aerodynamic drag coefficient. You can adjust the frontal drag coefficient up or down by varying the percentage here. A value of 100% will use what RealRace thinks is best for this type of car.

DOWNFORCE PERCENT

Modify the pre-calculated downforce by entering a percent here. A value of 100% will use what RealRace thinks is best for this type of car.

SIDEFORCE PERCENT

Modify the pre-calculated side drag by entering a percent here. A value of 100% will use what RealRace thinks is best for this type of car.

FRONTAL AREA

This is the total area of the car when looking at the front of the car. A good way to estimate this value is to multiply the width of the car by the height of the car.
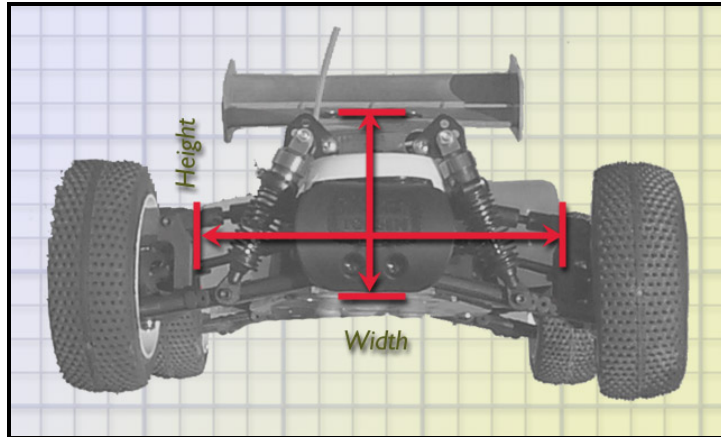
TOP AREA

This is the total area of the car when looking at the top of the car.   A good way to approximate this value is to multiply the length of the car by the width of the car.
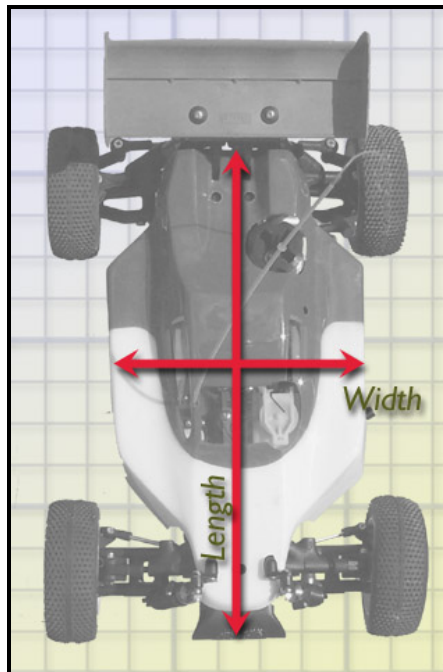
SIDE AREA

This is the total area of the car when viewed from the side of the car. You can approximate this value by multiplying the length of the car by the height of the car. Then, multiply this value by 0.6.
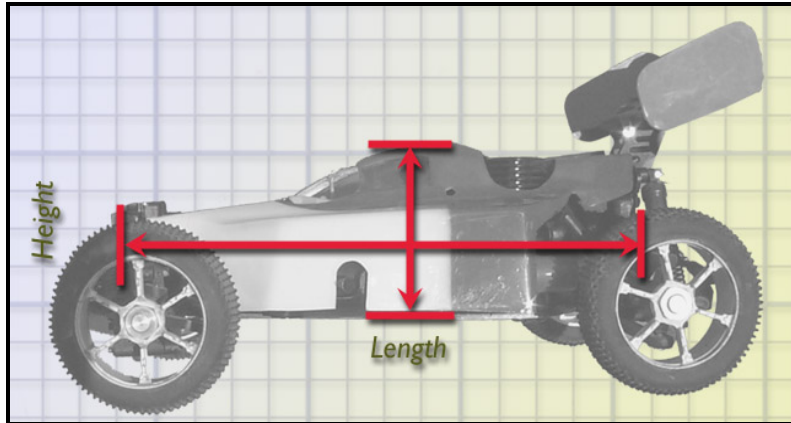
HAS REAR WING

Choose whether the car has a horizontal rear wing.

WINGERROR! BOOKMARK NOT DEFINED. TOP AREA

This is the overall area of the wing when viewed from the top. You can determine this by multiplying the length of the fin by its width.
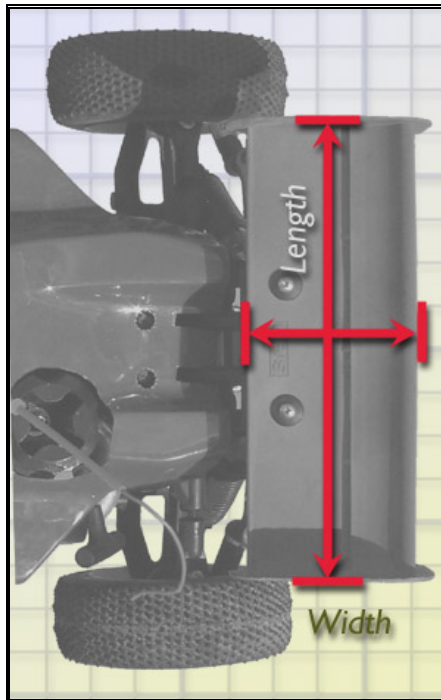
WING SIDE AREA

This is the total area of the wing when looking at the side.   If there are no vertical wing sides, then enter 0 in the dialog box. Otherwise, you can approximate this value by multiplying the length of the wing side by its height.
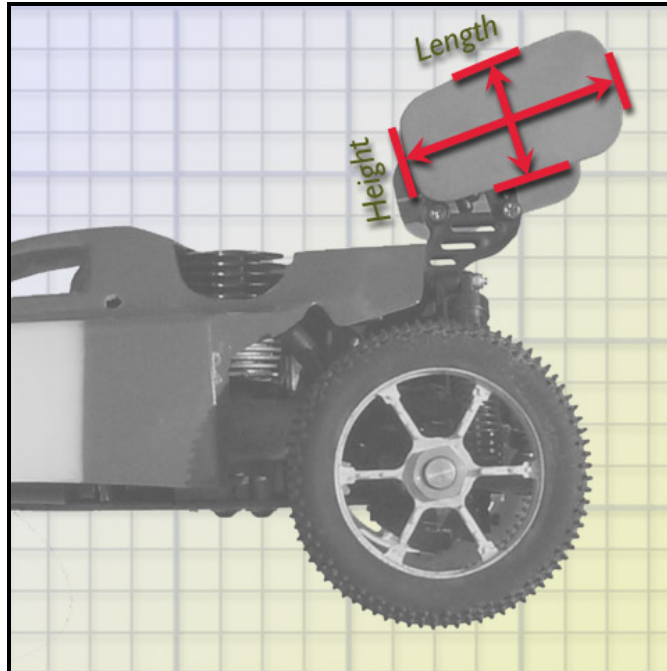
WING ANGLE

Enter the average angle of attack for the wing when viewed from the side. This angle will always be positive.
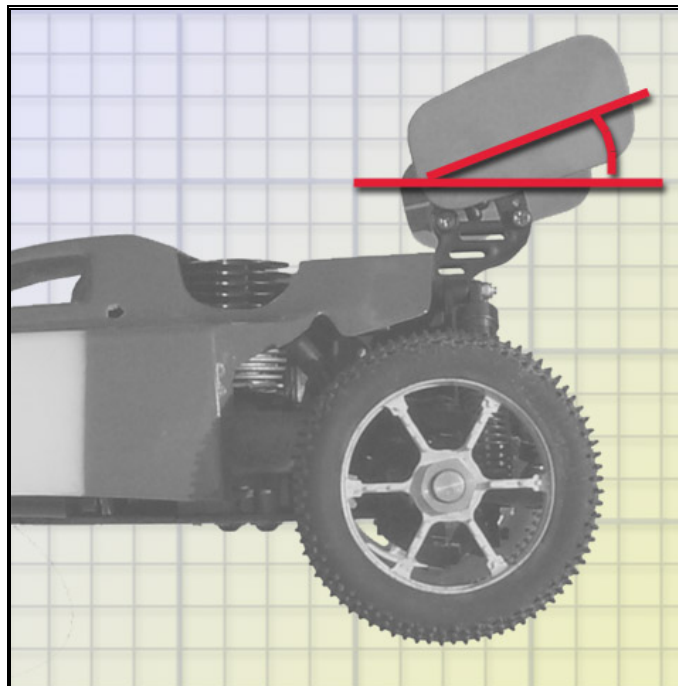
WING LOCATION Y

Enter the horizontal location of the wing as measured from the center of the rear wheel. This value will be positive if the wing is in front of the center point of the rear wheel and will be negative if the wing is behind the center point.

If the fin is behind the rear axle then the value is negative (Like this example)
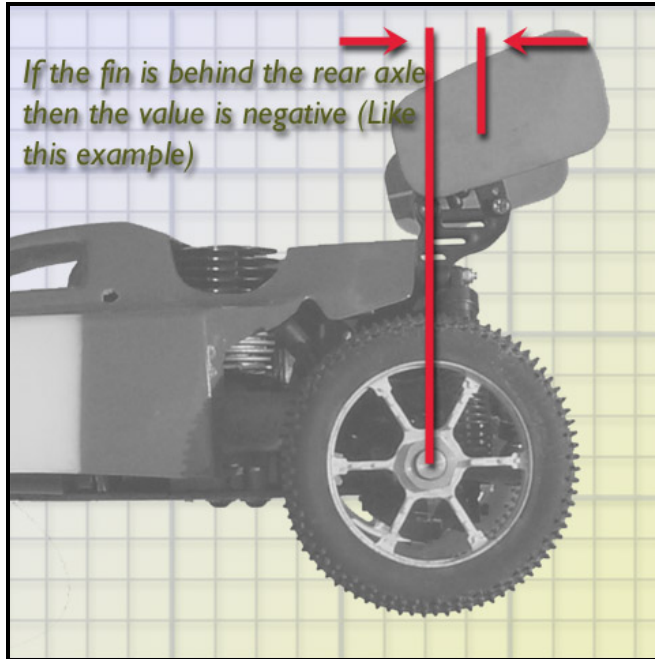
WING LOCATION Z

The vertical location of the wing as measured from the center of the rear wheel. This value will always be positive.

Make sure rear suspension arms are held level.
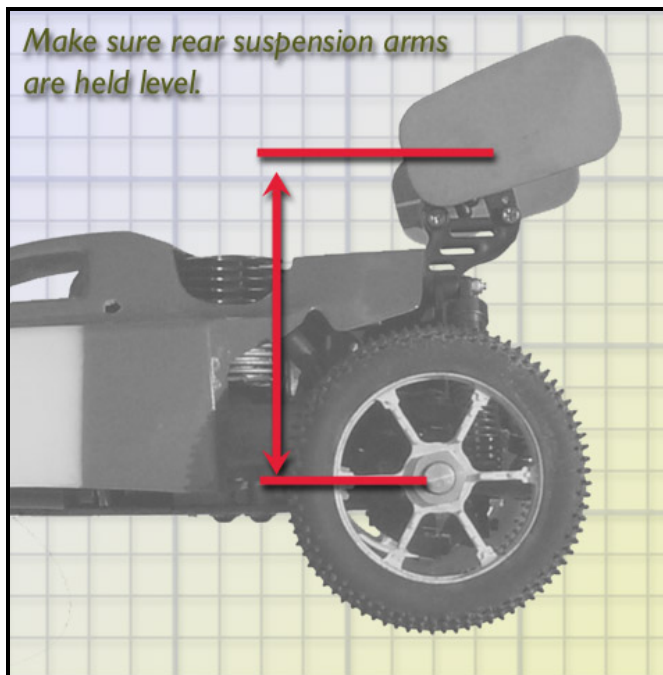
MISCELLANEOUS PAGE

This page lets you adjust miscellaneous properties of your car.

*This page is only available when you are using the "Full Edit". To determine the differences between a "Quick Edit" and a "Full Edit", see "*Quick Edit Car…*" on page 62.*

For More Information on tuning your R/C Car, be sure to read the "Appendix B. Comprehensive Guide to R/C Car Set-Up (Bonus Section!)*" on page 209.*

SETTING THE INERTIA

Inertia is the amount that an object resists changes in its rotation speed. If an object has a high inertia, it is difficult to get the object to start rotating. Once the object is rotating, it is difficult to stop the rotation.

RealRace pre-computes a pitch, roll and yaw inertia for every car. However, your car may roll, pitch or yaw a little more or less easily than the default cars in RealRace.

Use these controls to "tweak" your car's inertia up or down. Set the values to 100% to use the pre-computed inertia values. Use values less than (greater than) 100% to set inertia smaller than (greater than) the pre-computed values.

YAW INERTIA

Adjusts the inertia for the yaw axis. Yaw means rotating the car as if by steering. If you hang your car by a string attached to the car roof, and spin the car around, you are yawing the car. A value of 100% represents the pre-calculated value for this car. Increasing the value to 120% makes it harder for your car to yaw; 80% makes it easier for your car to yaw.

PITCH INERTIA

Adjusts the inertia for the pitch axis. Pitch means front-rear up-down rotations. If you balance your car by placing fingers underneath the left and right sides of your car, and rock the car nose and tail up and down like a seesaw, you are pitching the car. A value of 100% represents the pre-calculated value for this car. Increasing the value to 120% makes it harder for your car to pitch; 80% makes it easier for your car to pitch.

ROLL INERTIA

Adjusts the inertia for the roll axis. Roll means rotations around the car's center axis. If your balance your car by placing fingers under the front and rear bumpers, and pivot the car back and forth, you are rolling the car. A value of 100% represents the pre-calculated value for this car. Increasing the value to 120% makes it harder for your car to roll; 80% makes it easier for your car to roll.

CENTER OF MASS – RIGHT

Right to Left location of the Center of Mass as measured from the middle of the car. This will ideally be "0" meaning that the car is balanced directly on center.

CENTER OF MASS – FORWARD

Forward Location of the Center of Mass as measured from the rear axle. This will always be a positive value. You can measure this value by finding the point where the car balances on your fingertips.
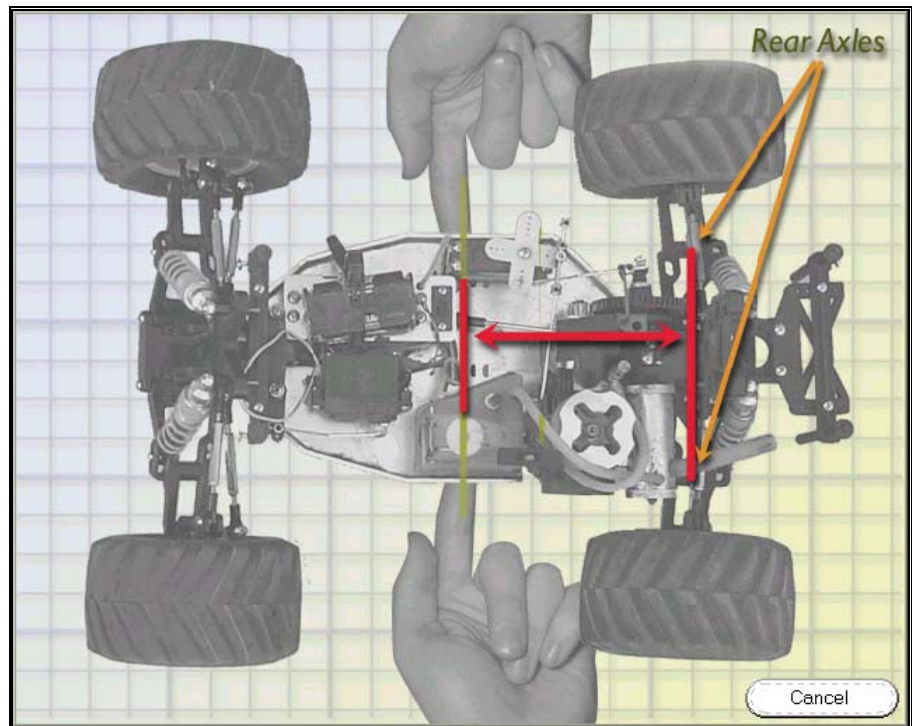
CENTER OF MASS – UP

Upward location of the center of mass as measured from the chassis floor. You can measure this by hanging the car from its front wheels by a string. If you were to continue a line down from the string through the car, it would be where this line intersects the forward CG location. This will always be a positive value.
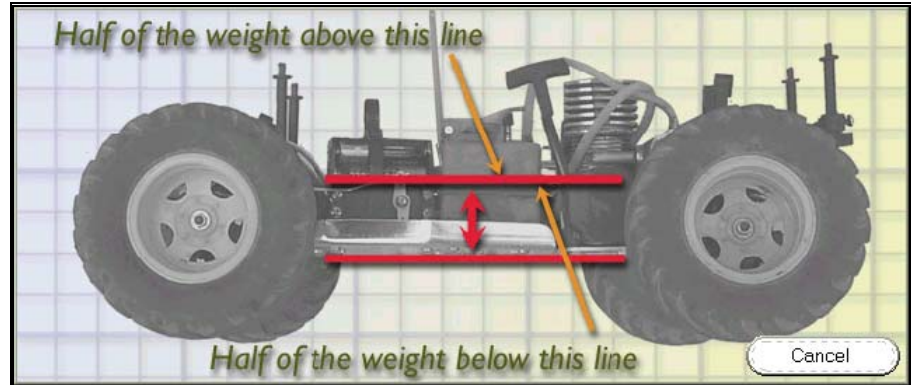
BRAKE TYPE

Choose whether the car has brakes.

MAX BRAKING TORQUE

Use this control to adjust the maximum amount of braking force available. Too little braking force makes it difficult to slow the vehicle; too much force can cause the wheels to lock up while braking.

WEIGHT WITH FUEL

Enter the weight of the car (including fuel or batteries).

APPENDIX A. CREATING A NEW RACETRACK

INTRODUCTION

If you're an advanced user, and you want unlimited control over your racecourse, RealRace offers you a powerful, incredible feature: you can create entirely new tracks, from the ground up. For example, you can control:

- **Elevation**—put bumps, hills, and dips wherever you want them.

- **Terrain Surface Types**—make your car tires "feel" dirt, pavement, etc., wherever you want to put them.

- **Ground Appearance**—put brown where you want dirt, green where you want grass.

- **Layout your racecourse**—you can create or change the course that cars will follow during a race (even computer-controlled cars!!!).

- **Create and position scenery items**—add buildings, pylons, jumps, etc.

You can create a track all your own, create and train computer-controlled opponents to race on it, and share it all with your friends. *Your imagination is the only limit.*

There are two levels of track creation/customization:

- **RealRace ATE™**—using nothing but RealRace's built-in **Advanced Terrain Editor**, you can reposition landscape objects, jumps, etc., and change course layouts on existing tracks.

- **Create new tracks**—by using a third-party bitmap editor (like Adobe® Photoshop®)—not included—you can create new tracks, or edit the topography, surface qualities, etc. of existing tracks.

The first type of customization (using the **ATE**) is easier, and you can get started on this right away. *However, if you want to create a whole new track, please be aware that this is a much more advanced skill than the simple editing you can do in the RealRace ATE.* Making a good track will require patience and care. (To use an R/C analogy, it is much like assembling a model car as opposed to driving a "ready-to-run" model.) Also, the greater your familiarity and skill with image editing software, the more easily you will be able to translate your ideas into reality. Rest assured, though, that if you are committed to seeing the process through, the payoff is well worth it. The potential to race on your finished handiwork and share it with others is a thrilling prospect.

Let's take another look at the skill chart from *"Chapter 14. Advanced Racing Features" on page 133*. The following skills are ranked from 1 to 4: 1 is a beginner-level skill and 4 represents a master-level skill.

Skill	Skill Level	Prerequisite Skills	Required Third Party Software	Reference
A. Race using standard out-of-the-box opponents	1	—	None	"How do I…race on a standard RealRace racetrack against out-of-the-box opponents?" on page 134
B. Create new opponent cars	1	**A**	None	"How do I…create a new computer-controlled opponent on an existing track?" on page 134
C. Create new racelines	2	**A**, **B**	None	"How do I…create a new raceline to be used by one or more computer-controlled cars?" on page 138
D. Rearrange race gates and other objects on existing track	3	**A**, **B***, **C***	None	"How do I …add/move/delete scenery objects?" on page 141
E. Create new track	4	**A**, **B***, **C***, **D***	Bitmap editor	"Appendix A. Creating a New Racetrack" on page 193

*This action only required to race computer-controlled opponents on given track.

If all you want to do is move track objects or change a course layout, you don't need to read any further; *you should jump to "How do I…add/move/delete scenery objects?" on page 141 and read that instead.* This chapter deals exclusively with creating a brand new track. If, however, you want to experiment with creating/editing the tracks themselves, read the following sections. You should also make sure you are well acquainted with all of the other skills listed in the chart above before continuing.

This chapter includes the following sections:

- Steps for Creating a Track

- Editing the Elevation, Surface, and Texture Maps

- Loading Your Track into RealRace

- Placing Objects on your Track

- Track Editing Guidelines

- Adding Computer-Controlled Opponents

- Sharing Your Track

We recommend that you read through the entire chapter before actually creating a brand new track. That way you can get a sense of what the entire process entails and, hopefully, avoid making some common mistakes.

STEPS FOR CREATING A TRACK

To create a new track, you must perform the following basic steps:

1. Design the ground appearance
2. Assign ground surface properties
3. Create the terrain topography
4. Place objects on your track

Each RealRace track is defined by four different files. Every track needs all four files to work correctly. These files correspond to the steps above as follows:

Filename	File type	How to Edit	Function
YourTrack~ElevationMap.bmp	Bitmap	Third-party bitmap editor	Specifies the track topography
YourTrack~SurfaceMap.bmp	Bitmap	Third-party bitmap editor	Specifies the track terrain types
YourTrack~TextureMap.bmp	Bitmap	Third-party bitmap editor	Texture graphic which is overlaid on the track
Your Track.track	Text	Built-in **Advanced Terrain Editor**	Records location of all track objects (e.g., pylons, barriers, jumps)

As you can see, three of the track files are bitmap (.bmp) files, which you must edit using a third-party bitmap editor, such as Adobe Photoshop. You will need to store these three files in the "\CustomRaceTracks" subdirectory in your RealRace folder. If you didn't change any of the RealRace settings during installation, then this folder will be "C:\Program Files\RealRace\CustomRaceTracks". ***Please note:*** when you create the .bmp files, the name you use before the "~" symbol will become the name of the track terrain they represent. Spaces are allowed in this portion of the filename (e.g., "Big Jump~ElevationMap.bmp").

The fourth track file is a text file that the RealRace **ATE** generates automatically—you will never need to edit it manually. It will be placed in the "\Tracks" subdirectory in your RealRace folder (e.g., "C:\Program Files\RealRace\Tracks").

We have provided sample .bmp files of all three map types. They are found in the "\CustomRaceTracks" subdirectory described above. We will refer to these sample images in the sections that follow, so please locate them before reading any further.

EDITING THE TEXTURE, SURFACE, AND ELEVATION MAPS

First, note that all three of the track bitmap files use a bird's-eye view of the track. Keep this in mind as you go through the following sections and view the examples.

TEXTURE MAP

First, let's examine the Texture Map. This image is overlaid on your track to give the track its appearance. Paint the dirt whatever shade of brown you like, make the grass look like real grass, add tire marks and painted lines on top of the asphalt, or whatever else you want to do to enhance the look of your track. You can make it as

realistic or as simple as you like. Basically, any graphics you see on a track that aren't part of a scenery object or shadow come from this file. Without it, your track would have no color to give it realism. It might have banked corners, and cars would respond appropriately whether driving on dirt or grass, but there would be no colors to show where the dirt or pavement ends and the grass begins.

Please open the sample file "BigJump-TextureMap.bmp" in your editor to see an example of what a Texture Map looks like. Notice how the race path is painted to look like dirt, while surrounding areas are a different shade and include some vegetation.

Note that the Texture Map is unique among the three racetrack bitmaps in that RealRace treats it as an actual image. The Texture Map does nothing except determine the appearance of the track—it will not affect the behavior of the track or its terrain in any way. This differs from the Surface and Elevation Maps, which are translated into track data based on the colors they contain for each set of coordinates (more on them later).

The design of the Texture Map opens up an exciting possibility: you can actually import photos, or portions thereof, to enhance the appearance of your track! *See the Texture Map Tips section below to learn how you can benefit from this capability.*

The best way to make a brand new texture image is to start with the Big Jump sample image (BigJump~TextureMap.bmp) and save it as your own Texture Map with a different name. Then, either modify the existing image or wipe the slate clean and start fresh, but avoid changing the image's attributes. This will help ensure that you preserve the necessary file format, which is explained below.

FILE FORMAT

The Texture Map, like the other two bitmap files, is required to fit a pre-determined format. The Texture Map must be a 24-bit .bmp image in order to work properly in RealRace. However, a variety of sizes are acceptable, including 256x256, 512x512, 1024x1024, and 2048x2048. The Big Jump sample is 2048x2048. The other two files, which we will discuss in their respective sections, have different requirements.

TEXTURE MAP TIPS

- Obtain an aerial view photograph of your local track to use as your Texture Map. You can incorporate it as-is (assuming it fits the file format requirements), or use it as a starting point and touch it up as you see fit.

- Import close-up photos of individual surface types to achieve the ultimate in realism for your track. Use a picture of real grass for the grass portions of your course, and include an image straight from your local parking lot or street corner to represent the paved areas of your track.

SURFACE MAP

Next, let's look at the Surface Map file. Before we go any further, please open the sample Surface Map file, "BigJump~SurfaceMap.bmp", in your bitmap editor. We will be referring to it below.

There are seven different types of terrain available in RealRace:

- Sticky Pavement

- Dry Pavement

- Grass

- Loose Dry Dirt

- Wet Dirt

- Oil

- Ice

The purpose of the Surface Map is to define which of these seven terrain types RealRace should apply to each location on the track. Without it, your track would have color and would possess slopes and dips, but cars would respond the same way whether they were driving on dirt, pavement, grass, or ice.

The Surface Map accomplishes its task by providing RealRace with a color-coded map of the track and assigning a particular color to each of the terrain types. Then, when your car wheels touch a part of the track that is colored the appropriate shade of gray for grass, for example, in the Surface Map, they will behave as if they are in contact with a grass surface. View the "SampleSurfaceMap.bmp" file to learn what colors signify which terrain types.

When you look at the sample Surface Map, what you are seeing is a chart of the terrain types for the Big Jump track. You'll notice that Big Jump's Surface Map consists of only two colors, and hence makes use of only two terrain types. (Your track, of course, can use as many of the terrains as you like.) You'll also notice that the darker area, which represents wet dirt, corresponds to the actual designated race path; that's because the track's creator intended for the cars to drive on wet dirt while racing and to drive on loose dirt when veering off the designated course, thus simulating a well-maintained real-life R/C track. It is worth noting that most tracks will not include all seven surface types.

The colors used to signify the terrain types are very specific. Merely "coming close" to them when creating your own track won't work. Therefore, you should use your editor's Color Picker/Eyedropper tool to "suck up" one of the seven usable colors from the SampleSurfaceMap.bmp we opened earlier and apply that color to your own image.

The best way to make a new surface type image is to start with the Big Jump sample image (BigJump~SurfaceMap.bmp) and save it as your own Surface Map with a different name. Then, modify the existing image without changing its attributes. This will help ensure that you preserve the necessary file format, which is explained below.

FILE FORMAT

The Surface Map must be a 1024x1024 256-color grayscale .bmp file in order to work properly.

SURFACE MAP TIPS

- The easiest way to fill in the colors on the Surface Map is to use your editor's Color Fill/Paint Bucket tool to fill an entire area all at once. To accomplish this, we suggest you draw an outline of the area you want to fill, using the intended fill color, then simply select the Paint Bucket tool and click inside the outline.

- Remember to use the exact colors from the SampleSurfaceMap.bmp, or your Surface Map won't work!

ELEVATION MAP

Now let's examine the last of the three bitmap files, the Elevation Map file. This image determines the elevation at any given point on your track. Without this file, your track would be totally flat, like a tabletop. The track might be nicely painted, and cars would respond appropriately when their tires were driving on different surface types like grass and dirt, but there would be no hills, moguls, dips, etc.

Open the sample file "BigJump~ElevationMap.bmp" in your editor to see an example of what this file type can look like. The Elevation Map is a grayscale bitmap that uses a very simple principle: darker pixels represent lower elevations, and lighter pixels represent higher altitudes. In other words, the lighter the shade of gray at any given coordinate in this image, the higher that point on the racetrack will be. Pure white represents the maximum possible elevation, and pure black is the lowest level any part of the track can reach. (*Note: You will rarely—if ever—need to use either of these extremes when designing a track.*)

Using the Elevation Map you can fashion jumps, dips, banked corners, grooves, washboard ridges, canyons, and any other type of 3D terrain you can imagine. Feel free to experiment and see what you can come up with. It might prove helpful to begin by making small changes to the sample in order to see the effect of some simple edits. For instructions on how to load your changes into RealRace to test them, even when a track is incomplete, *see "Loading Your Track into RealRace" on page 199.*

For a better understanding of how this file works, look again at the sample image. Note that the map is darkest where the racecourse itself runs. The areas outside the race path, however, are a lighter color. That's because on the Big Jump track, the actual race path is recessed compared to the surrounding areas, which have a higher elevation. That doesn't mean all your tracks have to follow this form, though. In fact, you could easily do just the opposite, and make the designated race path raised up with drop-offs on either side. We are merely providing an example of how the Elevation Map corresponds to an actual RealRace track.

Note also that the Big Jump race path is not all one color—it is slightly lighter in certain places, most noticeably the upper left corner. An off-road track like this one would be boring if it were all one altitude. So, when you make an off-road track, bear in mind that it's a good idea to vary the elevation of your chosen race path and not just the landscape surrounding it.

The best way to make a new elevation image is to start with the Big Jump sample image (BigJump~ElevationMap.bmp) and save it as your own Elevation Map with a different name. Then, modify the existing image without changing its attributes. This will help ensure that you preserve the necessary file format, which is explained below.

FILE FORMAT

The Elevation Map, like the other two bitmap files, is required to fit a pre-determined format. The Elevation Map must be a 1024x1024 256-color grayscale .bmp in order to work. The other two files, which we will discuss in their respective sections, have different requirements.

ELEVATION MAP TIPS

- Have patience; this step is quite possibly the most difficult part of creating a new track.

- Don't wait until you're done creating an entire Elevation Map to test it out. It's a good idea to load the map after making some changes and make sure your actions are having the effect you think they are.

- Avoid drastic changes in color. These cause abrupt altitude changes (i.e., cliffs, mesas, etc.), which you probably won't find at your local track. Instead, use some in-between colors to smooth the transition. One useful method is to use your editor's **gradient tool**, if it has one.*

- Even slight differences in shade in the Elevation Map are very noticeable in RealRace. Therefore, start small when creating bumps or dips—you can always make a contrast between areas more pronounced if you don't like the results.

- Sometimes you will want to lighten or darken an area without changing it too drastically, and you may not have a specific shade in mind. In these cases, try using your editor's **dodge** and/or **burn** tools, respectively, if they exist.* They can make your job much easier.

Note: Photoshop will not allow you to use the gradient, dodge, or burn tools on a grayscale or indexed color bitmap. To get around this, you can temporarily convert the file to an RGB image, use the desired tool(s), and convert the file back to its original format when you're finished.

LOADING YOUR TRACK INTO REALRACE

Each new track must be loaded into RealRace, using the process described below, before it can be used. Actually, a track doesn't necessarily need to be finished before you load it into the simulation. Why would you want to load an incomplete track? When you are creating your own course from scratch, we recommend that you load it into RealRace near the beginning of the track-creation process so that you may observe and test your changes as you progress. This will be explained further below.

LOADING A TRACK FOR THE FIRST TIME

If your track has never been loaded in RealRace before, you must follow the instructions in this section. You will have to perform this procedure *once and only once* for each course. After that, you can edit the track files as often as you like, and RealRace will already know which ones to load.

These instructions apply to both complete and incomplete tracks. An incomplete track is one that is missing at least one of the 3 required bitmap files and/or the **Advanced Terrain Editor** file (e.g., "Your Track~ElevationMap.bmp" or "Your Track.track", respectively). Loading partially complete tracks is a good way to view your own or someone else's work in progress, which can help you spot mistakes while it is still early enough to fix them easily.

To load a track into RealRace for the first time, perform the following steps:

1. Copy all of the existing track .bmp files to your "\CustomRaceTracks" directory. If you are attempting to load an incomplete track, you may or may not have all three of these files.
   Note: Without all three .bmp files present in the "\CustomRaceTracks" directory, the track will not load. Therefore, simply copy the corresponding Big Jump sample files to take the place of whichever files you're missing, and rename them to match your track name.

Whichever map files you do this for will obviously display Big Jump's characteristics until you replace them with your own maps.

2. In RealRace, from the **Select Racetrack…** dialog, click **Make A Copy**.

3. Name the copy before clicking **OK**. This will be the name of your new track. We suggest giving it a meaningful and descriptive name, so that you can easily tell it apart from other tracks.

4. Select your new track from the **Racetrack Selection** dropdown box and click **OK** to load it.

5. From the **Racetrack** menu, select **Edit Yourtrackname…**

6. In the editing dialog, click on **Edit Terrain…**. From the **Terrain Style** dropdown box, select the name of your track data. This will be the same name you used for your 3 bitmap files (e.g., "Big Jump" for "Big Jump~TextureMap.bmp"). *If you get an error at this step, please refer to step 1 above.* This one step will load all three .bmp files, assuming they are named correctly.

7. Click **OK**.

You should now be driving on the new track! Note that once you've successfully loaded a track of your own creation using this method, it will contain the same track and scenery objects as the course it was copied from in step 2 above. This is normal. You can relocate objects as desired, or simply delete them all and start fresh with new ones. *See "Placing Objects on your Track" on page 200.*

EDITING AND RELOADING YOUR TRACK

Now that you've learned the basics of editing the track bitmap files, and have successfully loaded your new track into RealRace, you can continue making changes to the .bmp files and testing the results using a process similar to the one described below:

1. Edit the track file(s).

2. Reload the track in RealRace.

3. Drive around on the track, observing the effects of your most recent changes.

4. Repeat.

If you want to avoid quitting and restarting RealRace every single time you edit your track, there is a shortcut. Simply choose a *different* track from the **Select Racetrack…** menu, wait for it to load, and then select your own track again. When it loads, you will find that your latest saved changes have taken effect.

Whenever you're ready to move on and start working on a different Map, just go ahead and begin editing the proper file. You won't need to repeat the first-time loading process for new tracks.

PLACING OBJECTS ON YOUR TRACK

Adding objects is the last required step to successfully completing a new racetrack. Track objects add realism and make your track more visually appealing. It would look pretty barren without any! RealRace supports collision detection for all objects

as well. If you run into a hay bale or other obstacle, your car will stop like you would expect. And when your car hits a jump, it will behave just like it would in real life! On top of merely improving the look of your track, certain objects are actually required for racing event functionality (more on this later).

You will use RealRace's built-in **Advanced Terrain Editor** to add objects to your track. For instructions on the **ATE**'s controls, *see "Racetrack Editing Shortcuts" on page 39 and "Racetrack Editor Page" on page 40.*

We recommend considering the following items for your track:

- **Perimeter Fence**—You may or may not want to include a fence or brick wall around the perimeter of your track. It is certainly not required, but these items provide a boundary that helps prevent vehicles from inadvertently leaving the course. They are also appealing visually.

- **Barriers**—Objects such as railroad ties, curbs, and corrugated pipe are an effective means of designating the race path for a given course. Dividers are not required; it is a matter of taste whether you prefer a more open course or one where the racers are obligated to follow the route you've established. Sometimes adding barriers only around sharp corners, to help contain wipeouts, is all you need.

- **Jumps**—Used in moderation, jumps can really add a lot of excitement to a course. Obviously, not every course needs a jump, and they are only intended for placement on off-road tracks, but you have complete freedom to use them as you see fit.

- **Trees/Shrubbery**—Foliage goes a long way toward making a track seem more life-like, even when used sparingly. You'll find quite a variety of trees and shrubs available for your track.

- **Race Objects**—If you want to race on your course at all, you will need to add race objects such as gates, starting positions, and a finish line. These objects are required whether you want to race alone, with other multiplayer partners, or against computer-controlled opponents. For more information on making your track race-worthy, *see "How do I…reroute the race path on an existing track?" on page 142.* Also, it is important that you create a new group called "Race" in the editor to hold these objects. *See "Group" under "Racetrack Editor Page" on page 40 for more details.*

For further guidelines and some helpful suggestions regarding object placement, *please read the "Track Editing Guidelines" section below.*

TRACK EDITING GUIDELINES

RealRace gives you immense, unprecedented freedom to create a brand new race environment exactly as you imagine it. With care and practice, you can produce high-quality tracks. However, it is also possible to create unrealistic tracks that do not drive well. Observing some basic rules will help you avoid a number of common track-design pitfalls.

Following are some general guidelines that apply to all aspects of your track. You may consider them suggestions rather than strict requirements, but we do recommend you follow them.

- If you give a track a feature that a real-life track wouldn't have, your car may drive poorly. For example, sharp ridges or abrupt walls in the car's path and obstacles that are elevated off of the ground will cause problems with your course.

- Certain unrealistic cases should be avoided altogether because of how the simulation will react. Examples of these types of situations include very low obstacles (items which are "buried" mostly beneath the ground surface) and objects that "float" above the ground.

ITEM PLACEMENT DOS AND DON'TS

In addition to the general guidelines already listed, please observe the following specific rules. You should view these as requirements instead of mere suggestions.

1. Avoid unnecessary obstacles on the race path.

Tip 1: Obstacle on race path

2. Make sure objects touch the ground—avoid open "pockets" below them. In the **ATE**, the Z-coordinate affects object altitude. Adjust it so that the bottom of each object is touching or slightly below the surface of the track (*see "Racetrack Editor Page" on page 40*). See screenshots below:

Tip 2: Object altitude/surface contact: WRONG.

Tip 2: Object altitude/surface contact: RIGHT!

3. Avoid "pits" that can trap cars. Basically, you want to avoid any area that a vehicle could enter and be unable to exit, either because there is no way out or because there is not enough room to turn around. An example is a fence placed at the bottom of a steep hill.
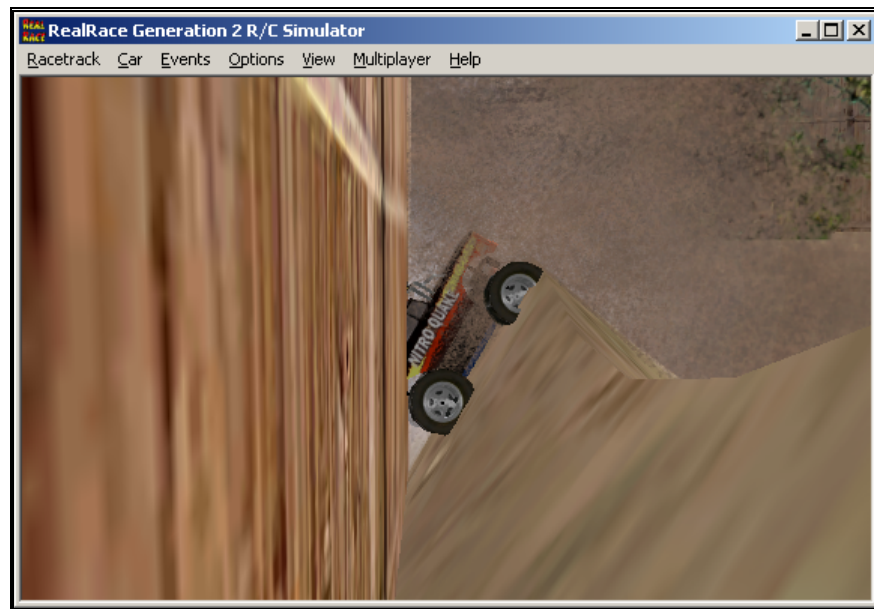
Tip 3: A car-trapping "pit".

4. Avoid low obstacles. A good rule of thumb is that obstacles should be at least 1/2 - 2/3 the height of your car; otherwise, your car may behave unrealistically when it makes contact with the object.

5. When adding a moving obstacle, you must input the correct Passability information. It is important to accurately gauge the times that the obstacle is "open" so that computer-controlled opponents can navigate the course. For more information on animated objects and how to control them, *refer to "Animated Objects" on page 46*.

6. Follow the terrain when adding items. For example, a 2x6 board should not cut straight through a hill simply because the terrain is uneven. When lining up several objects of the same type, as in 2x6 boards, try to use shorter sections of the object and match them up in such a way that you can follow the curve of the terrain. See the example screenshots below:

Tip 6: Front view

In this picture, we have two sets of joining 2x6 boards. Both look like they are resting properly on the ground. You can see that the set farthest from the car are not lined up very well with each other, though. The top board is protruding significantly through the lower, angled board. When placing objects, you should take care to line them up more carefully, like the set of boards closest to the car.

Now let's look at these two sets of boards from the opposite side:
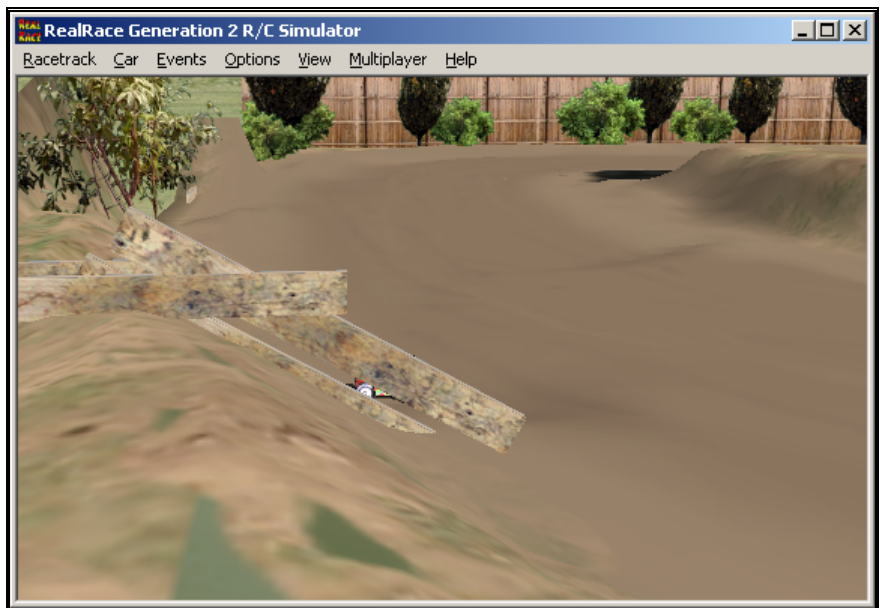
Tip 6: Rear view

Notice that, in addition to not being lined up well with each other, the lower, angled board in the "wrong" set (now closest to the camera) is

not even touching the ground! This demonstrates how important it is to view objects from several different angles when placing them on your track. Appearances can be deceiving, and objects that look like they are lined up properly are frequently incorrect.

The bottom line is that making good tracks requires effort and care. If you are dedicated and follow the rules and suggestions we've outlined above, you will be much happier with the outcome of your labors.

ADDING COMPUTER-CONTROLLED OPPONENTS

Now that you've finished creating your own track, you may add computer-controlled opponents to the course and then race against them. Multiplayer events, however, *do not* require this step.

For a complete discussion of the process for adding computer-controlled opponents and how it relates to track layout, *please see "How do I…create a new computer-controlled opponent on an existing track?" on page 134.*

SHARING YOUR TRACK

Once you've completed your track, tested it out, and maybe even added some computer-controlled opponents, you're ready to share your handiwork with other RealRace users. In turn, you can download and explore the efforts of other users just like you.

REQUIRED FILES

Each RealRace track is defined by four different files. Every track needs all four files to work correctly, so you must be careful to include them all when sharing your track. The four files are:

1. Elevation Map ("Your Track~ElevationMap.bmp")
2. Surface Map ("Your Track~SurfaceMap.bmp")
3. Texture Map ("Your Track~SurfaceMap.bmp")
4. **ATE** track object file ("Your Track.track")

The first three bitmap files are located in your "\CustomRaceTracks" directory. The fourth file is located in your "\Tracks" directory.

PACKAGING YOUR TRACK

After you've located all four files listed above, you need to compress them in a .zip file. A .zip file is a single archive file that is capable of holding numerous other files as well as compressing those files so that they take up less space. These features are helpful when sharing files with others because you only have to worry about a single file, and also because smaller files take less time to upload/download.

You will need a special program to create a .zip file. **WinZip**® is one example of such a program. It is popular and easy to use. You can learn more about it at http://www.winzip.com.

UPLOADING THE FINISHED TRACK ARCHIVE

There are several ways you can share a track with other RealRace users. If you want to make your creation available for the entire world to see, you can upload it to one or more "swap sites", which are websites created for the sole purpose of allowing RealRace users to share tracks. If you upload your track to a swap site, anyone who visits that site will be able to download and use your track. On the other hand, if you only want to share your new track with a couple of friends, you can deliver it to them directly, via email, disk, etc.

You can find the official **RealRace G2 Swap Page** website by starting RealRace and selecting **Help/RealRace on the Web/RealRace G2 Swap Page**. Alternatively, you can manually open your web browser and go to http://www.realrace.com/swap. In addition to the official page, some RealRace users have set up their own dedicated swap pages. You can find links to some of them on the official Knife Edge website (http://www.knifeedge.com), and any search engine should be able to help you locate some as well.

APPENDIX B. COMPREHENSIVE GUIDE TO R/C CAR SET-UP (BONUS SECTION!)

COMPREHENSIVE GUIDE TO R/C CAR SET-UP

Most of this chapter was written and is copyrighted by Scott Guyatt. Scott has been gracious enough to allow us to include this guide in the RealRace Manual. Most of the concepts that Scott talks about are directly applicable to RealRace, but some will be more applicable to you when you are out on the track.

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Now having said that, let's move on to *Chapter One - Introduction.*

CHAPTER ONE - INTRODUCTION

This booklet is designed to help you learn about setting up, maintaining and driving radio controlled off-road buggies and trucks. Although primarily directed at off-road racing, much of the discussion here can be related to on-road as well. R/C racing is a complex business - and like any motor sport, it can take an individual many years to learn the intricacies of building and setting up R/C cars.

The most important word in learning about car setup is compromise. Altering one part of your car will always affect another. You will almost always have to make some kind of compromise between two conflicting requirements. The second most important word in learning about car setup is practice. The only real way to learn is to alter your car, drive it, alter it again, drive it again etc.

This publication is not designed to take the place of practice, or experimentation - nor should it be considered to be infallible. What we hope to achieve, however, is to give you some ideas to contribute towards your learning about car setup.

I have been racing off-road buggies for over 10 years and in that time**Error! Bookmark not defined.** have achieved much both on and off the track within the sport in Australia. I make no claim to know everything there is to know about R/C

racing, but have collected some knowledge of car preparation and setup during that period. It is this knowledge that I hope to pass on to you.

During my R/C career, I have raced in all classes, with cars from such diverse manufacturers as Tamiya, Kyosho, Marui, Mugen, Schumacher, Team Losi, Yokomo, Team Associated, Traxxas etc. I have used electrical gear (including motors, batteries, speed controllers and radios) from just about every major manufacturer. I trust that I will be able to translate some of the information I have been lucky enough to glean through this wide experience into useable data for you.

I take this opportunity to wish you all the very best in your R/C racing. Remember above all that we're here for fun. Race hard, but race clean and walk off the driver's stand with a smile on your face.

CHAPTER TWO - GLOSSARY OF TERMS

ANTI-ROLL BAR

An anti-roll bar is a wire device fitted to the car which limits, or prevents the car 'body rolling' from side to side through corners.

ANTI-SQUAT

See also (Caster). Anti-squat is generally used on the rear suspension**Error! Bookmark not defined.** of the car and refers to the angle of the rear suspension arm hinge pins in relation to the chassis.

CAMBER

Camber refers to the angle of a wheel in relation to the vertical (perpendicular). 'Negative' camber means that the top of the wheel leans in towards the center of the car, whilst 'Positive' camber refers to the situation when the top of the wheel leans out - away from the center of the car.

CASTER

A hard one to explain! Caster refers to the angle of the front king pin in relation to the vertical. The king pin may be either a solid pin, or imaginary line through the center of the steering**Error! Bookmark not defined.** block. Castor is measured in degrees and generally refers to the angle which the king pin leans back from the front of the car. A typical castor angle for a two-wheel drive buggy or truck is 25 degrees. A four-wheel drive buggy may vary from 5 to 20 degrees.

DROP

To put in simply, drop refers to the amount your suspension arms hang down.

PISTONS

A piston is a crucial part of the internal mechanism of a shock absorber. The piston is mounted on the end of the 'shock shaft' and is typically a thin plastic disc with a number of holes drilled in it. Changing the piston for one with either larger, or smaller holes or a different number of holes can have a dramatic effect on the performance of the shock absorber.

RIDE HEIGHT

Ride Height refers to the distance between the ground and the bottom of your car's chassis when it is at rest. To check ride height - work your car's suspension up and down a few times, then drop it onto a flat surface from a height of about 12 inches. Some manufacturers will give you a reference point for checking ride height - e.g. Rear suspension arms level, or Drive shafts level. This can help you easily compare your ride height settings time after time.

SHOCKS

Error! Bookmark not defined. The shocks, shock absorbers, or dampers are silicon oil filled 'cylinders' used to slow the motion of the springs supporting the car's suspension. Shock absorbers can generally be adjusted by either altering the internal configuration (see Piston) or be using oil of differing viscosity (or 'thickness').

SWAY BAR

See (Anti-Roll Bar)

TOE

Toe is the angle of the wheels in relation to the centerline of the chassis. Toe-in refers to the setting when the wheels point 'inward' whilst Toe-out refers to the setting when the wheels point 'outward'. You can check 'Toe' by placing a ruler against each wheel - if the ruler points inward - that's Toe-In.

WHEELBASE

Wheelbase is the distance between the front and rear axles of your car.

CHAPTER THREE - HOW DO I GO ABOUT IT?

As we've already discussed, learning to tune your car is about practice. There are, however, some basic ground rules, which we can lay down to help you when you go to practice, or tune your car. Take note of these:

BASIC SETUP

Try to develop for yourself a stock, or basic setup. These are the settings you should use every time you go to a new track, or anytime the conditions at your track are much different from normal (e.g. new dirt, new track layout etc). In most cases, your standard setup should be the kit settings. Manufacturers spend a lot of time establishing a good basic setup - trust them. If, however, you find some small changes that really suit your driving style, adopt them into your basic setup.

BE AN INDIVIDUAL

It's good to share setup information with others - particularly if they're using the same equipment as you. It's important to recognize however, that each individual drives a little differently, and prefers a different balance to their car. Once you've reached a ballpark setup (usually tires, shocks and springs) do the fine-tuning on

your own. Don't worry if you're not using exactly the same settings as the guy next to you - you're just as likely to be right as he/she is!

WRITE IT DOWN

Get a notebook to take with you to the track. When you change your car make a note of what you changed, what affect the change had, and the track conditions at the time of the change. Pretty soon you'll build up a good database of information about what tuning adjustments do to your car's handling.

Ideally, many manufacturers now produce blank setup sheets for their cars. These setup sheets let you mark all your settings in a simple, easy to understand manner. I'd suggest you grab a blank sheet, do some photocopies and keep them in a folder in your track box. Then after each race day you can make a note of what settings you ended up using and what the track conditions were like. Again - you'll soon build up a database of setups for different tracks and track conditions.

DON'T BE AFRAID TO ASK

Never fear asking for help. If you've got some difficulty adapting your car to strange conditions, you're just not sure how to change it to get more steering (or less!) - ask. Most racers are happy to help those less experienced than them - until you start beating them! Look around for someone whose car is running hot - and ask him/her for advice.

CHANGE ONE THING AT A TIME

One of the most important rules of car set-up is to make changes one at a time. If you change tires, and suspension settings - how will you know which cured your steering problem? If you raise ride height and add a stiffer spring - how will you know which cured your jumping problem? My advice is to always make one change at a time - then try the car. If it doesn't work - change back, and try something else. This is the most effective way to track down the correct settings - and at the same time to learn about setting up your car.

ERROR! BOOKMARK NOT DEFINED.CHAPTER FOUR - CHOOSING THE RIGHT TIRE

The choice of tires is probably the single most crucial factor in getting your car to handle well. If you choose the wrong tires, there is often very little you can do to retrieve the situation. We'll cover a number of variables at work in determining the correct tire choice - hopefully helping you to 'guess' correctly the first time you run on a new track or surface.

Let's initially concentrate on rear tire choice - front tires will be considered separately towards the end of this chapter. I won't treat truck tires differently - most of the tires listed here have an equivalent in the truck tire range. You just need to check with your retailer as to the approximate truck equivalent.

COMPOUND

The 'compound' or 'softness' of the tire can often have a major impact on it's performance. Each different tire manufacturer has their own range of tire rubber - giving different names to each different compound.

The first thing to realize about tire compound is that softer is not necessarily better. The new generation 'super soft' compounds work only in certain situations. Super soft tires should be used when the track reaches 'blue groove' conditions. This is when there is practically no dust on the racing surface - just a rock hard, concrete like surface where the racing line comes up 'blue' from deposited rubber. In these conditions tire traction is mostly generated by the rubber compound in use and it is then that super soft tires should be used.

In general, the soft compound tires will perform best. Well packed track surfaces with some loose material on the surface are particularly well suited to these types of tires. Dusty conditions also suit soft tires.

Medium compound tires can be most effectively used when the track condition is bad. When predominantly loose material is on the surface, when the track starts to break up into 'rubble' or in moderately wet conditions, medium compound tires should be your first choice.

Hard tires are rarely used. Only if the track is particularly wet/muddy, or if the track surface is grass, or some similar multi-surface, should hard compound tires be used.

TIRE PROFILE

The profile or 'carcass shape' of the tire is another crucial element in choosing the right tire for your car and track conditions. Tire profile can be roughly categorized into two alternatives - 'square' or 'rounded'. There are other profiles, and some tires which fit in between the two extremes, but let's not get too carried away.

A square tire is one which has a flat 'crown'. That is, a tire which will stand on it's own on your pit table and where most of the tire surface sits in contact with the table surface. Square profile tires almost always provide excellent forward traction (due to large contact patch).

In smooth track conditions, square tires can also provide excellent 'through corner' traction. These tires suffer most when tracks start to break up, or in conditions where the car is constantly sliding sideways. In these types of condition square tires can slide unpredictably, or can 'catch and edge' in ruts and holes - causing the car to flip, or get out of shape.

A 'rounded' tire is extremely predicable through corners, and excellent in rough, rutted conditions. Whilst not so good at generating forward traction in smooth conditions, the rounded tire is almost universally chosen when the going gets rough

There are also a number of tires that can be considered to be 'in between'. It's not really rounded, yet not completely square and is often a good compromise tire.

TREAD PATTERN

Of course, the most obvious difference between one tire and the next is the tread pattern. We'll not get into arguments about which company makes the best tread pattern, but will simply categories the most commonly available tires, and give some description of the conditions in which they're put to best use.

BUGGY/TRUCK REAR TIRES

Buggy and Truck rear tires are mostly fairly similar in appearance (and often name

MICROSPIKE

These tires are used when track conditions reach, or approach 'blue groove' status (see above). When the track is almost dust free, and fairly smooth, reach for a set of these tires.

FUZZY

These tires are most suited to hard packed, but slightly dusty track surfaces. Also work well in blue groove conditions, and can be OK in looser conditions. One of these tires should definitely be in your pit box.

MINISPIKE

Perhaps the best compromise tire of all, these will work in almost all conditions. This tire choice is most risky in blue groove conditions when low contact patch can count against them.

STUD/STUBBY

These tires are at their ultimate in loose, broken conditions. When the previously smooth track starts to deteriorate, grab a set of studs out of your box. Surprisingly perhaps, these tires have also been known to perform exceptionally well in well packed track conditions. Again, a tire of this type is well worth having in the pit box.

STEP PIN

These tires are perhaps the ultimate compromise tire. Whilst at their best in looser conditions, step pins also work well in broken, messy track surfaces and the mini-step in particular works well in anything up to blue groove conditions. One of these should probably be in your arsenal.

2WD/TRUCK FRONT TIRES

Most 2wd or truck front tires are of the 'ribbed' variety. That is, they feature a series of vertical ribs running the length of the tire. The differences are in the width of tire, shape, height and width of ribs, or external reinforcing braces. 2wd front tires are particularly an individual preference. You should keep a couple of different pairs of front tires in your box, but don't be too concerned about what other people are using - run the front tires which give the level of front grip you feel comfortable with. As a general rule of thumb, run the hardest compound tire you can which provides the necessary traction. There are many setup options in your car which can assist in providing steering - exercise these before moving to softer tires.

STANDARD RIBS

These tires feature 4 square, upright rubber ribs with no external reinforcing or bracing. Standard rib tires are the most commonly used front tire. The tire shape will work in almost all conditions, with compound choice being the critical factor. In looser conditions, opt for the medium or hard compound front tires. These will help the tire ribs 'stand up' under cornering pressure and produce more consistent front

grip. In dusty, or harder track surface conditions, a slightly softer compound may be necessary to generate necessary traction.

SUPPORTED RIBS

These tires use either 'shaped' ribs or external bracing to help the tire ribs 'stand up' under extreme pressure. In general, these tires can be used in a softer compound and are at their best in hard packed, or blue groove conditions.

4WD FRONT TIRES

4wd front tires are a much easier choice than rear tires. There are only a limited number of options, and choice of front tire very much depends on rear tire choice. There are a number of 'rules' however, which should be followed.

Always run a front tire with the same overall 'diameter' as the rear tire. If you feel the need, you can manufacture 4wd front tires by cutting up a set of rear tires, removing a strip from the center of the tire, and re-glueing the 'outer halves' using good quality superglue. I do not recommend this course of action. 'Manufactured' front tires are difficult to do, prone to disintegration, and not particularly beneficial in any case. In 7 years of 4wd modified racing, I have never encountered the need to manufacture front tires.

FOAM INSERTS

Most rear tires (with exception of 'hard' compound tires) will require the use of a foam insert. In most cases, these will be provided with the tires. Foam inserts can generally be used as supplied, with just a minor modification. Cutting the square edge of the outside of a foam insert can produce a slightly 'softer' tire sidewall and slightly more 'rounded' profile when using square tires. This can help to make the tires more consistent through corners, and less likely to 'grab' and roll in rutted conditions.

Softer tires also require more 'dense' foam inserts. If you are planning on using the 'super soft' compound tires, you should try to make sure that you have a set of 'dense' foams at your disposal.

Front tires too, will often require foam inserts. In particular soft, and super soft compound tires should always use inserts. You can, however, sometimes get away without inserts in a medium compound tire. Running no insert will result in a slightly 'softer' tire that behaves almost like a tire compound in between medium and soft. Sometimes worth a try if you can't quite settle on the right front tire compound.

CHAPTER FIVE - SHOCKS AND SPRINGS

Shock absorbers and springs are universally the most misunderstood, yet critical part of any car suspension**Error! Bookmark not defined.** - particularly an off-road R/C buggy. When your car can be jumping up to three feet into the air and flying anything up to 10 feet before landing, it's important that your shock absorbers and springs can control the car on landing. The difficulty is that those same shocks and springs have to help the car get around corners, and manage over innumerable smaller bumps, ruts, holes and lumps of rock and dirt. Sounds like quite a feat!

Perhaps more than any other part of the car setup, choosing the right combination of shock absorber and spring setup is a compromise. You need to weigh very carefully the need to get the car through the corners - for which low ride height, stiff springs and 'hard' dampers can help - with the need to help the car soak up bumps and jumps (high ride height, softer springs and lighter damping!). Let's start by taking a look at the shock absorbers and how they work - what each adjustment does.

SHOCK ABSORBERS

It is the shock absorbers' job to control the car's suspension. While the springs keep the car off the ground, the shocks must control, or slow down, the spring's action. Just how much to slow down that action is the great dilemma in setting up shock absorbers.

A shock absorber typically contains a number of parts: the shock body keeps it all together and contains the shock oil; the shock shaft protrudes from the shock body and connects the piston at one end, and the suspension arm at the other. Shock seals keep all the oil on the inside (where it belongs), while the volume compensator makes allowance for the oil that is displaced when the shock shaft and piston enter the shock body. The 'damping' effect of a shock absorber comes from the resistance of the piston to moving through the oil-filled shock body.

The variable parts of a shock absorber are the length of the overall unit, length of shock shaft, travel limiters on shock shaft (both inside and outside the shock body), the piston attached to the shock shaft, and finally the viscosity (thickness) of the silicone shock oil used to fill the shock body. Let's take a look at each of these adjustments and the likely effect on your car.

SHOCK OIL

Shock Oil is the simplest, most universally used adjustment to the shock absorber. Using thicker shock oil will help to 'slow down' the suspension motion of the car while lighter oil will do the opposite - letting the suspension react more quickly to the demands of the track. Thicker oil is most often used when track conditions are smooth, and hard packed and traction is high. In these conditions suspension movement detracts from the handling of the car.

Thicker oil is also useful for controlling the car when landing off big jumps. When the going gets rough - if there are numerous ruts and holes or a lot of small jumps, or if the track is particularly slippery - lighter shock oil should be used. This will let the car react more quickly to the track - helping to keep the tires in contact with the track.

Shock oil viscosity (or thickness) is measured in 'weights'. The higher the number, the thicker the oil. While most companies' shock oil is reasonably close to each other's, there are some slight variations. Why? I have no idea! The solution is to try and always use oil of the same brand. It doesn't particularly matter which brand of oil you use, but you should try to always use the same brand.

SHOCK PISTONS

Shock Pistons are a bit of a black art as far as many racers are concerned. Variables in shock pistons include the size, and number of holes in the piston. Pistons with larger holes allow the shock oil to travel through more quickly, while smaller holes will slow the travel of oil through the piston. The difficulty is in knowing how to using this adjustment. In most conditions, your car's standard piston configuration

will be fine. When the track is particularly rough, with lots of small to medium bumps and holes, pistons with larger, or more, holes will be helpful. When the track is smooth, or if it has big jumps or drop-offs, smaller holed pistons could be the way to go.

What is important to remember is that pistons and shock oil have a very close relationship. Sometimes if you change one, you need to change to other. An example of this would be that when fitting larger holed pistons to your car your should probably use slightly thicker shock oil. Most manufacturers offer a range of pistons for their shock absorbers and there are a number of aftermarket alternatives.

Alternatively, some drivers**Error! Bookmark not defined.** have taken to drilling different sized holes in their shock pistons. This is particularly common amongst team drivers to make very small adjustments. Such fine adjustment is not really necessary for the majority of us and should be left as a last resort. Similarly, the use of 'dual stage' pistons which have a different action on the up stroke when compared to the down stroke is probably not advisable for drivers early in their R/C career. If you wish to try some of these options - then it is probably best to consult the local 'pro' driver. They'll be happy to help you figure out what to try.

TRAVEL LIMITERS

Travel Limiters are small spacers placed over the shock shafts to limit the travel of the shock absorber. Limiters placed outside the shock body limit the 'up travel' of the shock absorber, while placing spacers inside the shock body limit the down travel (and hence overall length) of the shock absorber. This is not an adjustment commonly used - once set it's usually forgotten.

Adding travel limiters to the inside of the shock absorber can be particularly useful on a very smooth track, while a track with big jumps will probably see some drivers adding limiters to the outside of the shock absorber - to prevent 'bottoming out' of the chassis on landing. Again, this is an adjustment not commonly used in the early stages of your racing. Set the shock limiters according to the manufacturers' suggestions and you'll be fairly close.

SHOCK SHAFTS

Shock shafts can sometimes be changed to longer, or shorter units if more, or less overall travel is required. This type of adjustment is used only very rarely or in extreme circumstances on a very small range of cars. Again, the best advice is to consult your local 'pro' driver and see whether they are using longer, or shorter shock shafts.

SPRINGS

Springs are a very useful adjustment for the suspension of your car. Springs vary in length, and 'stiffness'. A 'stiffer' spring is harder to compress between your fingers than a 'softer' spring. Stiffer springs will tend to hold the car up off the ground more, while softer springs can allow the car to ride lower, and to 'roll' from side to side more.

SPRINGS, JUMPS AND BUMPS

Springs are often changed to reflect the size and shape of bumps and jumps on a track. If your track is relatively smooth with lots of big jumps, you should try a

slightly stiffer spring - to help the car land off jumps without bottoming out. On the other hand, if the track has lots of bumps and ruts, but no real large jumps - you can try a softer spring - to let the suspension soak up the little bumps without effecting the chassis balance too much.

SPRINGS AND HANDLING

Oddly enough, the springs you choose can have a large impact on handling of your car. Changing to stiffer springs will generally result in lower traction at that end of the car - e.g. putting a stiffer spring on the front of your car will often give you slightly less steering while adding a softer spring to the rear can give more rear grip - to a point. Amazingly, in some conditions, the opposite can be true - stiffer springs can add traction.

If you are racing on a high traction track, sometimes adding a stiffer spring can give you more traction by helping the suspension to keep more pressure on the tires. Remember this one if you're on a high traction track. Most importantly remember that when you're choosing springs - there's a compromise between handling and ability to cope with bumps and jumps. You've got to experiment a little to find the right combination for each track!

SPRING CLIPS AND SPACERS

Many people adjust the 'compression' or 'pre-load' of their springs by either adding spring clips to the shock body, or moving the 'spring collar' up or down the shock body. This adjustment is only for adjusting the ride height of your car. Adjusting the spring compression does not 'stiffen' or 'soften' your springs. For more discussion of ride height and its effect on handling - see Chapter 4 (Suspension Geometry).

It's good to have a range of springs to choose from. Most manufacturers color code their springs to help you identify stiffer and softer springs.

SHOCK MOUNT POSITIONS

R/C cars offer differing standards of tuning options from manufacturer to manufacturer. Almost without exception they all offer alternate mounting options for shock absorbers. Mostly, the options relate to the distance along the suspension arm that the shock mounts, or the angle of the shock (by altering the top shock mount position). These two options provide various responses in terms of the handling of your car. Let's take a look:

Moving the bottom of the shock along the suspension arm basically affects the 'stiffness' and 'drop' of the suspension. Moving the shock mount further out results in a suspension that appears both 'stiffer' (sprung) and 'harder' (damped). Conversely moving the shock inward gives a softer feel. The reason for this is simple. The easiest way to explain this is to think back to the playground seesaw of your childhood. Remember that even if the people on either end don't weigh the same - simply by moving the heavier person closer to the center - the seesaw can be made to balance. It's simply a question of leverage. As the shock moves out along the arm, it can bring greater leverage to bear on the suspension arm. Moving the bottom of the shock along the arm also affects the suspension drop - further out equals less drop, further in equals more drop. Suspension drop is covered in depth in Section (6) of this book.

Moving the top of the shock absorber has a more subtle effect on the car's suspension. What is changing here is the angle of action of the shock absorber. Changing the angle makes the shock absorber more, or less, progressive. A

progressive suspension setup describes the situation where the suspension becomes stiffer as the shock/spring/suspension is compressed. Leaning the shock absorber over further results in a more progressive suspension. This is useful in landing off big jumps (helps stop the car from bottoming out), handling on smooth tracks, handling in high-speed corners. Standing the shocks straighter helps in rough conditions, or tracks with lots of quick changes of direction. Adding interest to this setup option is the fact that leaning the shocks in gives some degree of anti-roll effect while standing them straight up encourages, or allows, more chassis roll. The shock angle you choose can thus be closely related to the use of an anti-roll bar (see Chapter 6).

CHAPTER SIX - SUSPENSION GEOMETRY

Trying to explain suspension geometry is not an easy thing. We'll try to give you an overall picture of what 'geometry' is and does - and give you some general hints on what changes affect the handling of your car. More than any other section of this book, the motto for this chapter must be: change your car, practice, change your car, practice, change your car, practice..... You sometimes just have to make a change to the car and try it - and do your best to pick out the difference.

Suspension geometry refers to a lot of things. Basically, it is the various angles and mounting points of wheels, axles, suspension arms and uprights. Shock absorber mounting positions can also be considered to be suspension geometry but we've already covered them in Section (4) so we won't do it again. Words most commonly heard when talking about suspension geometry are camber, caster, ride height and toe-in. If you don't understand what's meant by these terms - look them up in the Glossary (Section 2) before you go any further.

CAMBER

Camber is probably the easiest component of suspension geometry to adjust - if your car is fitted with turnbuckles or some kind of threaded rod for an upper suspension link. Here are some general rules of thumb.

FRONT CAMBER

On the front of your car or truck - adding negative camber will, in general, slightly increase steering**Error! Bookmark not defined.** up to a certain point - and then decrease it after that. That point is around 3-4 degrees. I would suggest that you start with about 2 degrees of negative camber (whatever the car) and NEVER adjust it more than 1 degree either way. Running more negative camber will simply take away too much steering and add unpredictability to your car's handling, while running positive camber of any kind is generally not a great idea. Positive camber can induce unstable handling - and a particular loss of traction for the outside tire in any corner (and the outside tire is the one that does about 80% of the work).

REAR CAMBER

On the rear things get a little more complicated. We need to consider both driving traction and cornering traction. Driving traction is what gets us going in a straight line - the more you have, the faster you can accelerate. Cornering traction is what helps the car to track around corners - without the back of the car spinning out. In general, the most driving traction comes with the tires at 0 degrees camber - neither

positive or negative. This is because the tire is flat to the track with the most possible amount of rubber touching for more grip.

Unfortunately, cornering traction can be enhanced by adding a little negative camber - just like the front of the car. Interestingly enough, most cars will run fairly consistently with around 2 degrees of negative camber on the rear. Again - as per the front, I would suggest that you adjust this by only 1 degree either way. Again, NEVER run positive camber – it will lead to unpredictable driving traction - and probably a lot of spinouts in corners.

CAMBER LINK MOUNTING POSITIONS

Many modern R/C racecars have some options for mounting the camber links in different positions. Manufacturers spend a lot of time**Error! Bookmark not defined.** testing the cars and the kit settings will be the most consistent for the vast majority of racing conditions. There are no valid generalizations that I can give you to help decide when and how to change the mounting location of your camber links. Suffice to say, that I believe firmly that you should trust the manufacturers judgment in this matter. If you feel the need to try some other options - then try the holes immediately adjacent to the standard position. Really, it is a case of trial and error.

CASTER AND ANTI-SQUAT

Caster and Anti-Squat are basically the same thing - except that caster refers to the angle of the suspension 'upright' (and is generally used in reference to front suspension) while anti-squat refers to the angle from horizontal of the whole suspension arm mounting pin (and is generally used in reference to rear suspension). Let's take a look.

Caster adjustment on the front of most buggies is by using different front uprights. In most cases, 2wd cars run between 20 and 30 degrees of caster, while 4wd cars run a bit less - typically 10 to 15 degrees. This is another instance where your manufacturer has done a lot of work to find the best answer - in general you should trust them. However, there are some generalizations that can be made. Adding caster (leaning the uprights further back) will generally give less initial turn-in, but more on-power steering and better straight line stability, while decreasing caster will generally add some turn-in, but at the expense of on-power steering and straight line stability.

The other possibility is that your car may be fitted with a 'variable caster' or 'active caster' setup. This means that as the suspension compresses, or extends, the caster automatically changes. While common in on-road cars, variable (or 'active') caster is less common on the dirt

Anti-squat adjustments are available on the rear of most modern buggies and trucks. Anti-squat is typically adjusted by either replacing the rear suspension arm mounts, or placing washers or wedges under one end or the other of the mount before tightening the mounting screws. This results in a change in the angling the suspension arm - lifting the front edge of the arm higher than the rear edge. Anti-squat does exactly what you might guess by its name - it prevents the rear end of the car from squatting under power as the car accelerates and weight transfers rearwards. Anti-squat does also have some other effects (as with any adjustment – there is always a trade off). Let's take a look at the effect of altering anti-squat on both acceleration and cornering.

ADDING ANTI-SQUAT

If you add anti-squat, your car will (in general) get more 'driving traction' and hence accelerate faster. When you come out of corners, you will be able to use more throttle and your car will be more stable. But (and it's a BIG but), when you back off to turn into a corner, your car will have less rear grip. This might result in your car spinning out when you back off the throttle. Adding anti-squat also affects the way your car drives through bumps on the track. If the track is bumpy right where you want to accelerate, anti-squat is not a good thing - it will make the rear of your car very 'bouncy'. On the other hand, if the rough stuff is in a place where you are cruising on constant throttle, or even decelerating, then anti-squat will actually help your car to 'cruise' through the bumps more smoothly.

DECREASING ANTI-SQUAT

When you decrease anti-squat you lose rear 'driving' traction. Your car will be a little more prone to power slides and fishtails. However, you will have more traction on a trailing throttle - resulting in your car being more stable into corners. It will also accelerate better through bumpy parts of the track.

TOE

The adjustment of toe is one of the most useful fine-tuning aids in making your car handle just how you like it. On the front of your car, lengthening or shortening the steering rods adjusts toe; while on the rear it is usually adjusted by changing the suspension arm mounts, or using different hub carriers or suspension uprights.

Essentially, toe adjustment works like this: Adding toe-in (front of wheels point inward) adds straight-line stability, while adding toe-out (front of wheels point outward) tends to make the car wander a little. Like all suspension geometry adjustments - this is only true up to a certain point - beyond which the results are generally unpredictable. Let's look at that in a little more detail.

FRONT ADJUSTMENT

Changing toe on the front wheels is probably the best way to get that last little fine tuning adjustment right. Adding a little toe-in will reduce turn in slightly, and produce a car that tracks well in a straight line. On the other hand, reducing toe-in, or adding a little (very little) toe-out can provide a slight increase in steering. As with all suspension adjustments - go a little at a time. Front toe adjustment should never exceed 3 degrees negative, or 1-degree positive.

REAR ADJUSTMENT

Due to the nature of rear toe-in (adjusted by replacing suspension mounts or hub carriers/uprights), adjustment of rear toe-in is quite uncommon. Just as with the front adjustment, more toe-in will add traction and stability, while less will promote sliding and instability. Rear toe-in should probably never exceed 4 degrees negative or be less than 2 degrees negative. Most modern cars are supplied at 3 degrees negative and will never need to be changed.

The other interesting part of rear toe adjustment is that some cars use different suspension arm mounts to achieve the adjustment, while others use different suspension uprights to make the change. The first case (suspension arm mounts) is called 'inboard toe-in' because adjustment is made at the inboard end of the suspension arm and affects the whole arm. Altering the upright is called 'outboard

toe-in' because (you guessed it) it's making an adjustment at the outboard end of the arm. Inboard toe-in can produce slightly different handling characteristics to outboard toe-in in rough track conditions.

RIDE HEIGHT

Ride height describes the distance between the track surface and the underside of your car's chassis. Sounds simple. The simple truth is, ride height adjustment can sometimes be easy to get wrong - and can have a devastating effect on your car.

Fortunately, there are some relatively simple rules that you can follow to help make sure you get the ride height correct - most of the time.

First, let's accept this basic fact: Ride height is controlled by the amount of pre-load applied to your springs through the use of spring spacers, or the movement of an adjustable spring collar. Adding spring spacers does not stiffen the spring - it just lifts the car higher off the ground. You can also adjust ride height by using travel limiters inside the shock absorber or by selecting different shock mounting positions on some cars. Basically though - spring pre-load is it.

SIMPLE RULE 1

Always run the car with the chassis level. That is - the ride height at the front must equal the ride height at the rear. While there may be some very odd circumstances where you'll want to run the front higher than the rear (or some even more odd circumstances where you'll want to run the front lower than the rear), it is true for most conditions that the car will be most consistent if the front and rear ride heights are equal.

SIMPLE RULE 2

The rougher the track, the higher the ride height must be. As the race day progresses, if the track starts to break up - one very simple method of adjusting your car to cope with the changing conditions is to slightly (and I emphasize the word slightly) raise ride height. Make adjustments on the spring collars of about 2 mm per time.

SIMPLE RULE 3

Tthe higher the traction, the lower the ride height. If traction is very high (wet track, or good grippy clay, or 'blue groove' conditions) your car will handle best (and resist traction rolling) with a lower ride height. If the track is very grippy, and very rough - then you've got a typical suspension tuning situation - you need to compromise.

SIMPLE RULE 4

Remember that changing tires can drastically change ride height. Always be aware that when you change your tires - you might have to re-adjust your ride height.

ANTI-ROLL BARS

Anti-roll bars (or 'sway bars' as they are sometimes known) do one thing. Prevent, or inhibit a cars natural tendency to have chassis 'roll' or 'lean' towards the outside of a turn. A lot of the car weight wants to keep going straight ahead - thus throwing more weight onto the right side (or outside) suspension and cause the whole car to 'lean' over.

The anti-roll bar prevents this lean by transferring some of the 'leaning force' across to the other side of the car. Anti-roll bars (as the name suggests) help your car to sit 'flatter' through corners. Anti-roll bars are most useful in high grip, smooth track conditions - and probably in high-speed corners too.

In lower grip, or rougher conditions, anti-roll bars can take away grip from the end of the car you use them on, or simply prevent the suspension from working as freely as it possibly can.

Variables with anti-roll bars include the thickness of the bar, the location of the anti-roll bar mount on the suspension arm, and the location of the mounting joint on the anti-roll bar. Basically it's like this - to 'stiffen' the bar (or increase it's effectiveness) use a thicker anti-roll bar, mount the anti-roll bar further out on the suspension arms, or mount the connecting joint further 'up' the bar (closer to the bend). To 'soften' the anti-roll bar - do the opposite: use a thinner bar, mount closer to the center of the car, or further out along the bar itself.

Note that for testing purposes, if you've got an anti-roll bar fitted to your car and you want to disconnect it, you can simply disconnect one end of the bar. That will remove the 'anti-roll' effect and leave you free to try without it. In racing situations, it's always safer to completely remove the anti-roll bar from the car if you don't want to use it.

On a 4wd it is a very good idea to have an anti-roll bar available for the rear of your car. In my experience, 4wd cars use an anti-roll bar at least 50% of the time. 4wd electric cars are different from 2wd in that the saddle pack battery setup means that more weight is distributed further out along the chassis - thus increasing chassis roll.

On a 2wd you are not going to use an anti-roll bar anywhere near as often. You should be able to race very happily without any form of anti-roll bar on your 2wd (although having said that - a soft anti-roll bar is a very good tuning tool to have - particularly on fast, smooth, high grip tracks.

I have personally never seen an anti-roll bar used on a Truck. Not sure why - perhaps trucks tend to sit flatter due to different shock mounting positions. If you're a truck racer there's certainly no need to rush out a pick up an anti-roll bar.

Other ways to get anti-roll: you can also get some kind of anti-roll effect from using different shock mount positions. This topic is covered in Section (5). Remember though, if you change the shock mount positions to get better anti-roll effect - you'll probably upset some other part of the suspension setup.

SUSPENSION DROP

Suspension drop is adjusted by the use of shock travel limiters inside the shock, or by mounting the shocks in different positions on the tower or arm. Simply put, more drop is useful on a rough track, or sometimes in case of a slippery surface. More drop can also help your car to land better after big jumps. Less drop results in sharper handling and is best used on a smooth, high-speed track. Less drop will help your car to change direction more quickly.

CHAPTER SEVEN - WHEELBASE & WEIGHT DISTRIBUTION

Wheelbase and weight distribution are inextricably linked. They are also very useful fine tuning tools. Many modern cars include the ability to alter both wheelbase and

weight distribution within the framework of the standard car. Additionally, there are many manufacturers offering longer, or shorter chassis options for their cars.

WEIGHT DISTRIBUTION

When you're building your car, you should always do your best to have weight evenly balanced across the car (from side to side). A car that is not balanced from side to side will struggle to jump, accelerate or handle consistently. Side to side weight balance is not a tuning option. You should get it evenly balanced and forget it.

Altering weight balance from front to rear is both more easily achieved, and more useful as a tuning tool. Basically it works like this:

MORE WEIGHT TO FRONT

More weight toward the front of the car equals more steering, and less rear grip. Moving the weight up front will also tend to encourage your car to jump more nose down, and stop the car from 'wheel standing' in extreme traction conditions. The easiest way to achieve a change in weight balance is by moving batteries forward in the chassis. Alternately, you can relocate electrical components further forwards but this is both difficult and time consuming. Battery placement is the way to go.

MORE WEIGHT TO REAR

Moving weight toward the rear of the car does fundamentally the opposite. Adds rear traction, takes away steering, makes the car more stable under both acceleration and braking and can encourage some degree of wheel standing in extreme traction or rough conditions. Rearward weight balance can also help the car to jump a little flatter if it is jumping 'nose down'. Altering weight balance to the rear is achieved in the same way - by moving batteries backwards within the car.

As an alternative - you might want to add more weight to front or rear without taking weight away from the other end (this is what happens when you move the batteries around). In this situation, seriously consider adding some small lead weights (mag wheel balance weights) or coins. Add this weight at the extreme end of the chassis, and as low as possible. Many 2wd cars and trucks have a perfectly shaped hollow inside the front bulkhead for this purpose. Adding a little weight (probably no more than 10 grams) to the front of your car can add a little more steering, and help the car to jump and little more 'nose low' but without taking away rear traction.

WHEELBASE

Wheelbase can be altered in two different ways (well, there are probably more, but only two common ways). The first is to add a longer, or shorter, chassis to the car. The second is to move the rear axle**Error! Bookmark not defined.** forward, or backward by relocating spacers on the outer hinge pin. These two adjustments do completely different things. Let's take a look at exactly what.

CHANGING CHASSIS LENGTH

Changing your chassis is a major operation. It's not practical in all cars, but is commonly done with some of the major brands. Adding a longer chassis will give you more balance, more stability in high speed corners, slightly more rear traction, slightly slower turn in, better stability on rough tracks, and better jumping.

Conversely, adding a shorter chassis will give you more steering and quicker response through corners - particularly when you have to change direction from left to right (and maybe back again). Longer chassis are most often used in a truck, and on bigger, faster tracks. The short chassis option is mostly used only on short, tight, twisty tracks (and usually only with a 2wd buggy).

CHANGING REAR AXLE LOCATION

Most modern R/C buggies have the ability to alter wheelbase by changing the spacing of the rear axle. Some cars have two options (short/long) while others will have a medium wheelbase option. What is important is to recognize that altering wheelbase in this fashion has directly the opposite effect to altering wheelbase by changing chassis length! Why? Because the alteration in wheelbase is so minor, the real effect of altering wheelbase in this fashion is to alter the car's weight distribution. Moving the axle back (longer wheelbase) is, in effect, moving the center of gravity of the car closer to the front axle (almost like moving the battery a little forward). Conversely, moving the axle forward is just like putting more weight over the rear wheels. If you want to know what this adjustment will do to the handling of your car - see Section (7.1) regarding weight distribution. A simple rule of thumb - move the axle forward for more rear traction, backward for less.

CHAPTER EIGHT - TRANSMISSION/GEARBOX

The transmission of your R/C car is a piece of fine mechanical design and should be maintained carefully. I don't intend to go into great detail here about how to clean, or rebuild transmission components - your instruction manual should cover that. Suffice to say that you should keep bearings, gears and diffs as clean and smooth as possible. Let's take a look at your transmission and see just what kind of tuning options you might have.

GEAR RATIO

The primary tuning option relating to your car's transmission is the ability to change gear ratio by using different spur gears or pinions. Before we talk about the effect of gear ratio changes, let's spend a moment sorting out the terminology.

Gear ratios are most often quoted in the form "7.8 to 1". This can be represented in writing as 7.8:1. This means that the motor must rotate 7.8 times for the car's driven wheels to complete one full revolution. Gear ratios can be calculated by dividing the number of teeth on the spur gear by the number of teeth on the pinion and multiplying the result by the internal ratio of the gearbox. Most instruction manuals should tell you the internal ratio of your car's gearbox

The formula for calculating gear ratios looks like this:

```
(# teeth on spur / # teeth on pinion)  X   Internal
Gearbox Ratio = Gear Ratio
```

We've already seen how gear ratios can be represented as numbers (e.g. 7.8:1). The tricky part is in describing ratio changes in general. If you put a bigger pinion on the car, the ratio will change to a small number (say 7.4:1). While the numerical figure has become smaller, the actual gear ratio 7.4:1 is said to be a 'higher' ratio than '7.8:1'. Similarly, moving to a smaller pinion will produce a 'lower' ratio (say 8.2:1). Without wanting to confuse you, changing the spur gear has the opposite

effect. A smaller spur gear will result in a 'higher' gear ratio, and a larger spur gear will give you a 'lower' gear ratio. Confused? Stay with me.

Gear ratio changes do a couple of things. Let's look at both the 'lower' and 'higher' gear ratios separately to see what we find.

A lower gear ratio will mostly give you more run time and more acceleration. It's also generally easier on your motor.

A higher gear ratio will generally give you more top speed, and less run time. It's also tougher on your motor. Once you get to a certain ratio point (lets call it the 'optimum ratio') continuing to change to a higher ratio will do nothing but damage. It will result in your motor overheating and being damaged, and in extreme cases, your car may actually go slower.

How's that? Did you understand it all? Have another read, and think about it carefully. Then look at this simple chart, which might help make things clearer.

Bigger pinion = smaller spur = higher gear ratio = gearing up = more top speed = less acceleration = less run time = harder on motor

Smaller pinion = bigger spur = lower gear ratio = gearing down = less top speed = more acceleration = more run time = better for motor

Hope that helps! For help on choosing your actual gear ratio for any given motor or track, consult your instruction manual, or check with the local fast guys - they'll help you.

DIFFERENTIAL

Your buggy or truck gearbox (transmission) is fitted with a differential. The purpose of the differential is to allow the wheels to turn at slightly different speeds. This is necessary to help the car turn corners. When you car turns a corner, the outside wheel has to travel further than the inside wheel - thus it needs to turn slightly faster to keep up. Differentials (or diffs) in model cars are typical of two kinds. Entry-level cars often use 'gear diffs' while more competition-oriented manufacturers use 'ball diffs'. Both work in the same way, and largely achieve the same thing.

Ball Diffs are, however, slightly adjustable. By slightly increasing or decreasing the tension on the diff screw (see your instruction manual for details on how) you can make the diff 'looser' or 'tighter' A tighter diff is one that is hard to turn. Tighter diffs help your car to put down power coming out of corners and in a straight line, while looser diffs help your car to turn corners better. If you loosen the diff too far, it will allow the diff to slip. Make no mistake - this is a bad thing. Diff slip damages the components of the diff and is inconsistent. Your instruction manual will describe how to tell if your diff is slipping or not. I never recommend running any diff slip - that's what a slipper clutch is for (what's a slipper clutch? Read on).

SLIPPER CLUTCHES, HYDRADRIVES AND VISCODRIVES

The slipper clutch, hydradrive and viscodrive all have one aim in mind - to help you put the power to the ground more effectively. Most modern R/C cars (well, the race oriented ones anyway) come fitted with a slipper clutch as standard. Let's take a look at the use of a slipper clutch, and then the hydra/visco drive option.

SLIPPER CLUTCHES

Slipper clutches are designed to do exactly what you might think by their name - slip. When you jam on the throttle, the slipper clutch is designed to slip a little before transmitting all that horsepower to your overstressed rear tires. The slipper clutch (or 'clutch' as it's usually known) helps when the track is slippery, or rough, or when you bolt in an enormous motor. The best way to set your clutch is to loosen it right up ('back it off' is the term you'll mostly hear) and place your car on the main straight at your track. When you pull the trigger to accelerate away, the car should move slowly off, with the transmission emitting a loud 'whining' noise. That's the clutch slipping. Now slowly tighten the clutch about 1/2 a turn at a time (trying a full throttle take off after each adjustment) until the clutch only slips for about 3 feet. This is going to be a fairly good setting for most tracks. If the track has particularly high traction, or if you're not having any problems with too much wheelspin - you might even like to run the clutch tighter still. I would recommend against locking the clutch entirely. Just tighten it enough so that there is no slip on acceleration. This will still allow the clutch to slip when your car comes down hard off a jump - or through rough sections of the track - thus protecting the transmission.

VISCODRIVE & HYDRADRIVE

The hydradrive and viscodrive basically carry out the same function. If the truth were told, it's not easy to understand exactly how these items perform, but basically, they're like a more advanced version of the slipper clutch. They are designed to assist in smooth delivery of power. Each is fluid filled and adjustable. Each is at its best in rough, or broken track conditions. Each manufacturer provides good instructions on setting up and using their product, or failing that, there are plenty of pro drivers around who can help. My advice to you is to follow the manufacturers instructions to the letter. Leave the hydradrive/viscodrive on at all times unless the track is very smooth and offers high traction. Then you could consider running without it.

CHAPTER NINE - CHOOSING & CARING FOR YOUR MOTOR

Motors are the driving force behind your R/C car. You need to take care of your motor and treat it with respect. In this section, I'll give you some basic, no nonsense guidelines for caring for your motor, and some simple rules for choosing your motor once you graduate into the modified ranks. I'm not a technical guru, and I don't intend to get technical here. Let me just say this. I've raced at the top level of modified in Australia with some success using exactly the simple guidelines I'm going to present to you here. Some may disagree with my assessment, but I'm here to tell you this stuff works in real life - good enough for me.

MOTOR CARE

540 motors are very easy to care for. After each race, brush the loose dirt/dust off the endbell. After every second or third race, add one drop of light machine oil to each bushing (Mobil 1 is ideal but any light machine oil will do the job). After every second race event, take the motor out of the car, and spray it out with R/C motor cleaner. Don't run the motor while spraying it; don't dip in water, or any other cleaning solvents. When you've finished spraying out the motor, add a drop of oil to each bushing and work the oil in (by turning the shaft by hand a few times). Then add a drop of Break-In fluid or Commutator drops to each brush (inside the motor)

and run on a four cell pack for about 30 seconds. Now replace in your car. That's it. Simple, quick, and reliable. If you want more performance from your motor, you can use commutator drops (again, stick with name brands). My advise would be to use them sparingly - certainly only one drop at a time - and preferably only on big race days.

Race Day maintenance of a modified motor is not much more difficult than a 540. After about every three races or so, pull the motor from the car. Start by brushing loose dirt from the end bell and can. Next, remove the brush springs and slide the brushes out. Spray a little motor cleaner spray onto a cotton swab, and slide it into the brush hood - pressing firmly to ensure good contact with the commutator. Now rotate the commutator a couple of times. Repeat this process about 3 or 4 times (with clean swabs each time) ensuring that you do both brush hoods. Now get a new cotton swab, and again spray with motor cleaner. Use the cotton swab as a cleaning stick - wiping the face of the brush clean of any debris or carbon build up. Take a very fine pointed file (or a specialist comm cleaning stick) and smooth the sharp edges of the brush. Don't do this on your own for the first time - ask someone experienced to help you. Put the motor back together and back in the car. That's it. Don't oil bearings, or spray out the insides of the motor with spray - you can do more harm than good.

After every second race day (or approximately 10 runs), you should disassemble the motor entirely, and give it a full clean. Here's a basic procedure to follow:

1. Remove the motor from car, brush off any loose dirt/dust.

2. Remove brush springs and slide brushes out of hoods.

3. Take hobby knife and mark the can and end bell to ensure you get the timing right when you re-assemble the motor.

4. Loosen timing ring screws (on top of motor) taking care not to damage the capacitors. Twist endbell and remove from can. Place the complete endbell on a clean, clear section of your workbench next to the brush springs.

5. Take the motor shims off the top of the armature and place next to the endbell. Be sure to make a note of how many spacers there are and what order they may be in. There will probably be a fiber washer closest to the commutator - this is to trap oil and grease that may leak down from the endbell bearing.

6. Remove the armature by hand from the can. Set it aside on the bench after removing any shims from the shaft. Check inside the can for more shims (they'll often fall off the shaft and stick to magnets) and place all shaft end shims together on your clear area. Set the can down next to them (again remember to count how many shims there are on that end).

7. Liberally spray the armature with motor cleaner until runoff is clean (do this over a rubbish bin, or outside - it's not good stuff to get on your carpet). Spray a cotton swab and carefully clean all areas of the commutator.

8. Use a clean tissue to wipe out dust and dirt from inside the motor can and endbell. Do not use spray.

9. Check motor bearings for wear and dirt. To do this, put the armature through the bearing from outside the can or endbell (do one at a time) and spin the armature. If the armature spins freely and quietly - you're fine. If it grinds to a noisy, quick halt - chances are your bearings are either very dirty, or worn out.

10. You can try cleaning your bearings if you like. Remove the bearing from the can/endbell using a motor bearing tool. Then clean as per other bearings in your car. Oil lightly with a good quality bearing oil (Mobil 1 is a good alternative) and replace carefully. If you're not confident about this, ask for help.

11. If you decide that the bearing is worn out (or you try to clean it and it just doesn't improve) then it's time for new bearings. Replacement bearings are available from a number of companies and can be fitted using a motor bearing tool. Again, if you're not confident - ask for help.

12. When you are done with all this - reassemble the motor - taking care to get the shims in the correct location, and put the timing back to the original mark. At this stage I'd recommend fitting new brushes - although if your brushes are still smooth, clean and a nice consistent copper color they're probably ok. Look at the side of the brush - if it is discolored at all (maybe purplish, blue or off-white) then its time to replace the brush - no argument. Solder new brushes on where the old ones come off. As always - ask for help if you're not sure.

13. You're done!

After two cleaning cycles (about 20 runs), I'd recommend that you consider having your commutator re-trued. This is done using a purpose built motor lathe (often with a diamond tip). Lathes can cost between $300 and $700 so the odds are you won't have one yourself. Many hobby shops have motor lathes and can do this for you. In fact, a number of hobby shops offer a full motor rebuild service - including clean, re-true and replace brushes. Ask around.

MODIFIED MOTOR BRUSH SELECTION

When you're using a modified motor you'll quickly discover that there are a range of motor brushes available for you to use. These might be called soft, hard, cut, timed, serrated, silver, copper etc. Pretty confusing. Let's try and give you some very simple guidelines.

BRUSH COMPOUND

Brushes are known as hard or soft. You might liken brushes to tires. The softer the compound, the greater the performance, but the greater the wear rate. With brushes however, the performance gain is small, and the increase in wear is great. Only when you are seeking the ultimate little extra in horsepower is it worth considering a soft brush. The fact is -they're probably not worth the hassle. You need to clean your motor more often, and change brushes more often - sometimes after just 2 or 3 runs. I recommend that you always use hard compound brushes.

BRUSH MATERIAL

Brushes are a copper color because copper is one of the ingredients of the average brush. There is a whole cocktail of other ingredients that go into every brush. One of the more common ingredients is silver. Brushes with a high silver content are generally expected to perform better - although as with softer brushes there is usually a trade off for both brush and motor wear. Again, a standard material, standard compound brush is the best choice for consistency and life of the motor.

BRUSH SHAPE

Brushes can come with different shaped (or 'cut') faces. Some have half the face cut away, others have a slot across the center, or a hole drilled in the center. There's even a brush called the 'H Cut' (guess what the face of that looks like!). All of these 'cuts' are designed for different purposes - often for 'stock' racing, or even for on-road. For off-road racing, you are better off sticking to a standard, full-faced brush. Some otherwise full-faced brushes in recent years have a series of small grooves, or serrations across the face. These serrations are designed to help the brush run-in faster. These types of brushes are OK.

LAY DOWN BRUSHES

A standard modified motor uses standard 'upright' brushes. That describes the brush that is taller than it is wide. Some motors are available with 'lay down' brushes (like a normal brush tipped on its side). Additionally, some manufacturers offer 'lay down' conversion kits for standard modified motors. In some conditions, lay down brushes can offer a slight performance gain. It's hard to say when, where and what those conditions exactly are - it's mostly a case of experimentation.

In general, let me say this. I very, very rarely use anything other than a standard, full faced, hard, upright brush. Many, many races around the world are won with this type of brush - and you will never go wrong.

MOTOR SELECTION

In 540, or spec classes, motor choice is very, very easy. Just take it out of the box and bolt it into the car. That's it. When you're racing modified however, it's a whole different story. Choice in motor wind is almost infinite and there are certainly no hard, fast rules. There are, however, some general guidelines to help you choose a good strong motor. Remember - these guidelines are general only - there will always be exceptions.

The less turns of wire on a motor (e.g. 11 turns compared to 15 turns), the faster it will generally be. However, it will also be generally tougher on batteries, and harder to drive. Higher turn motors will be easier on batteries, and generate more torque - allowing you to gear higher.

The more strands of wire on a motor (e.g. triple compared to double), the more top end it will generally have (very general statements here). A multi-strand motor will generally be easier on batteries, and smoother to accelerate. You will generally be able to gear it higher (thus the higher top speed). But (and it's a BIG but) you probably won't get stump-pulling acceleration out of it. That's where low strand count motors are strong (singles and double). I have to stress this again - this is a very general understanding.

In years gone by, the choices were fairly simple. The more power you wanted, the lower the number of turns, and strands you opted for. Something like an 11 Double would have been considered to be an enormous motor. That is no longer true. New motor winding technology has meant that multi-strand motors like 15*6 or 11*7 are more common (and incredibly fast). Still, here's a rough guide to motors for each class:

2WD

When you're choosing a 2wd motor, steer clear of stump-pulling torque. Remember you've only got two tires in contact with the ground. Try to run multi-wind motors

like triples, or quads (or even quin or sextuples) and generally stay around the 11-12-13 turn range (once you've got some experience). For tighter tracks, or higher grip, you might try a 12 double. When you first start out, a 13 Triple or Quad will be an excellent, consistent choice.

4WD

For four wheel drive**Error! Bookmark not defined.** - you need a little more grunt. This is exactly where double (and sometimes single) wind motors come in handy. Try an 11 or 12 turn double. Remember though, 4wd is tougher on batteries - you'll need to use a lower gear ratio than with an equivalent motor in your 2wd. If you've got RC2000 cells and want ultimate horsepower - seriously consider something in the 10 turn range - probably a triple or quad. Save this last option for when you've done heaps of practice.

TRUCK

Like the 4wd, trucks demand a little more from your motor than the 2wd. Often you'll need to run a double, or maybe triple wind motor. For trucks try to stay in the 12 to 13 turn range. You'll get the best combination of performance and run time. Really low turn motors (10, 11) struggle in a truck because of the very high load involved. You'll chew through brushes and wear out your motor like you won't believe if you stray too low in turns.

CHAPTER TEN - DRIVING THE BEAST

After all this effort of setting up your car, you've still got to drive it. If I could tell you exactly how to become a perfect driver, I'd be a pro racer on my way to the Worlds. The fact is we can't all drive like the pros. We can, however, all improve ourselves. Here are a few tips to keep in mind when you're striving to improve your driving:

1. KNOW EXACTLY WHERE YOU WANT TO DRIVE.

Sounds simple doesn't it. This means - go for a walk around the track before racing starts - look out for nasty holes or bumps - figure out where to hit the jumps and exactly (like down to the inch) what you want your racing line to be. When you go out to drive, try to remember everything that you decided on earlier. Don't try and think of the whole track in one go - just concentrate on the corner you're on now and the next 2 or three corners. If you notice yourself getting off your chosen line - it's easy to fix - SLOW DOWN until you're back where you want to be.

2. WHEN YOU HAVE YOUR FIRST RUN AT A NEW TRACK, TAKE THE FIRST FEW LAPS SLOWLY.

Try different lines - figure out where your car is best over the jumps and bumps. If you're having trouble on one particular jump try different lines, different throttle openings - keep experimenting until you have a method of consistently negotiating the whole track.

3. WATCH OTHERS DRIVE.

Next time you're at a big race, take some time to watch the 2wd or 4wd modified races. Pick out the fast guys and watch them closely. Look at the lines they take, listen for their throttle movements (especially when the car is in the air). I'll guarantee you - they will be smooth on the throttle, and gentle with the steering. They'll also be utterly consistent. What you need to learn is this - if your car is consistently on your chosen racing line - you'll never crash, and you'll win more than you'll lose. Simple huh?

4. IF YOU'RE ATTENDING A BIG RACE

Ttry to draw out a complete map of the track on paper. Mark in corners, jumps, ruts, holes and bumps. Mark in your preferred line and make notes to yourself about things to remember for each corner or jump. Take it home, and spend a little time the night before the race just reading through the comments - memorizing the whole track - exactly as you want to drive it.

5. YOU MUST PRACTICE!

Race on your own, get to club races, drive with other (and better) drivers, race on-road whatever. The more you drive, the better you will drive - provided that you think about what you are doing and strive to improve.

CHAPTER ELEVEN - MONEY

R/C car racing can be a bottomless pit for your money if you let it. My advice to you is to think very carefully before you spend your hard earned bucks on new gear. It is better to be careful with your spending, enjoy your racing and stay in the sport for many years, than to spend heaps of money, become disillusioned and give up after a few months.

Don't rush out to buy every option part manufactured for your car. Good car performance is much more a case of practice and hard work, than it is a case of spending money indiscriminately. There are certainly things you should consider buying - but be sensible and approach it from a cost benefit basis. Here's a rough priority for spending money on your car:

1. Ball bearings for wheels and transmission. Bearings will enhance run time, performance, reliability and strength. If your car doesn't have them - they are your first priority.

2. Spare batteries and radio crystals. If you're racing with just one battery, you should make it a priority to get a couple more. Three is OK, but five (enough so that you have a fresh pack for each race on each race day) is ideal. You don't need high dollar matched packs. While we're on the topic of electronics - pick up a spare set of radio crystals as well. To race you'll need at least two pairs - preferably three. They're cheap - and if you look after them they'll last a long time.

3. Spare pinion/spur gears. The ability to alter gear ratio is very important. Pinions and spurs are relatively cheap - always carry a range.

4. Spare Tires. Tires are a very important (possibly the most important) tuning tool you have. As you can afford it - try to build up a range of tire choices

5. Electronic Speed Control. If you're struggling with a manual speed control - this will turn your life around. Electronics give more power, more run time, and much more reliability. Best of all, if you sell your old car, you can move your electronic speed control straight into your new one.

6. Spare springs/shock oil. Most manufacturers offer a choice of softer, or stiffer springs for your car. Pick up some optional springs and shock oil to help you tune it. Usually it's best to get the spring/shock oil that is slightly softer, and slightly stiffer than the kit parts.

7. Reliability Parts. By reliability parts, I mean items that will make your car to be stronger, break down less, or be more consistent - not necessarily to perform better. Things like titanium turnbuckles, or 'captive' ball joints.

8. Performance Parts. Performance parts are items that help your car to run better or more efficiently. Lightweight transmission parts, optional graphite chassis parts, different tuning options such as anti-roll bars, or different toe/anti-squat blocks.

9. Appearance Parts. If you've still got money left over - you might want to make your car look better. Anodized aluminum screw sets, different bodies, wings, wheels, sticker sets, etc. The options are almost endless.

Let me say one more thing on this topic. If you're running a cheap low-end buggy not specifically made for racing, it's best for you not to spend too much money trying to hop up your buggy and make it competitive. Instead you should concentrate on saving for a better car. Even a well looked after second hand racecar is a good investment. If you want to go faster - concentrate on items that you can move into another car if/when you save the $$$. Things like batteries, electronic speed controls, radio gear etc.

CHAPTER TWELVE - ELECTRONICS & RADIO GEAR

One important policy I've always used when buying electronic gear is to get the absolute best equipment I can afford. Electronic gear is not cheap - and you don't want to have to replace it after a year or so if you find that your gear is not up to the task. A good quality electronic setup will last a long time - and deliver good performance. You don't need to buy the ultimate top of the line equipment - but good mid-range gear that is from a name, quality manufacturer. Here's a suggested list for your consideration:

One other important note about radio/electronics: the manufacturers who've built your equipment understand everything about it. They designed it, built it, service it, etc. Listen to their instructions. The instruction sheet/booklet you got with your gear is the only advice you should listen to!

CHAPTER THIRTEEN - WHERE TO FROM HERE?

We've covered a lot of ground in these pages. You might not have understood it all, and you almost certainly won't remember it all. Let me encourage you to go back to Section 3 and seek to follow the basic guidelines we presented there. Use this book as a reference, but remember, there is no substitute for practice, and personal

experience. Don't believe something just because I tell you it's true. Go out and prove, or disprove, it for yourself.

Most of all, remember that R/C racing is an enjoyable activity. I'm not trying to take that joy away by making it all hard work - just to help you to get your car going a little better, and to therefore enjoy it more. The most enjoyable races for me are those when my car handles just like I want it to. The search to make every race like that has led me to collecting the information that's contained in this book.

If you need more help, again let me encourage you - just ask. Ask the guy pitting next to you, ask the local pro. If you want parts or accessories for your car contact your local R/C shop - preferably one that supports racing at your local club or track.

I hope you've enjoyed reading this book and I hope it helps you to enjoy your R/C racing more. I wish you every success in your R/C career.

This section was contributed by Scott Guyatt, and used by permission.

ERROR! BOOKMARK NOT DEFINED.APPENDIX C. REALRACE CONTROL PANEL

REALRACE CONTROL PANEL

The RealRace Control Panel is a separate application that is designed to work in conjunction with RealRace G2.
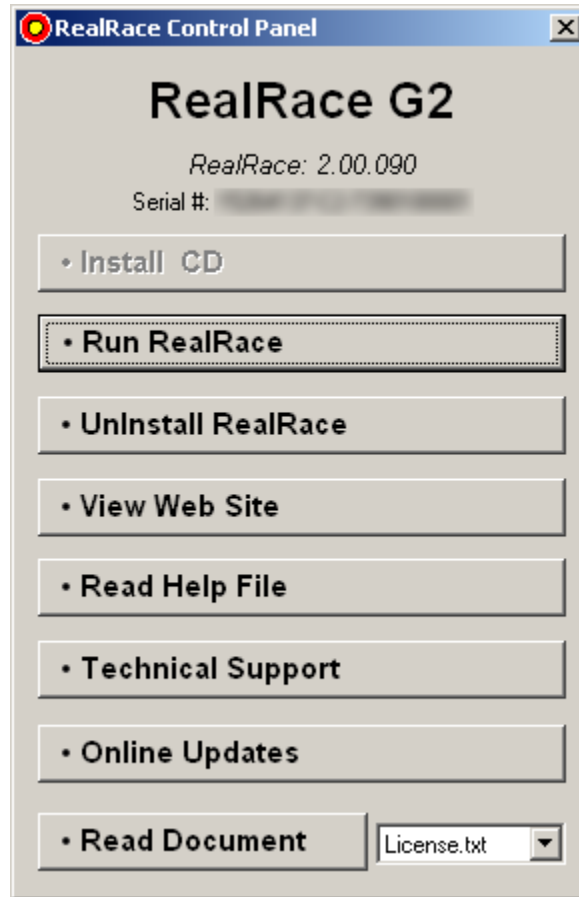
RUNNING THE CONTROL PANEL

There are three ways to run the RealRace Control Panel.

- Insert the CD into the drive. If Auto-Play is active, then the RealRace Control Panel will start on its own.

- If RealRace is already installed, click the "Start" button in the Windows Task Bar. In the Start menu, select Programs/RealRace/Control Panel.

- If RealRace is already running, choose "Online Updates…" from the Help menu.

RUNNING REALRACE

To start running RealRace, press the **Run RealRace** button on the Control Panel. (Note: if RealRace is already running, the Control Panel will not let you start up a second RealRace window.)

ERROR! BOOKMARK NOT DEFINED.UNINSTALLING REALRACE

To Uninstall RealRace G2, press the **Uninstall Program** Button. The following dialog will appear:
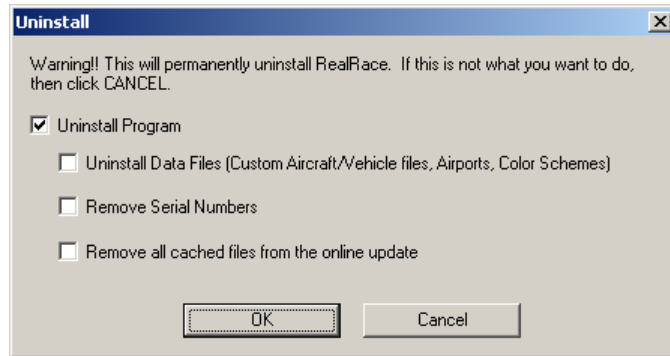
We suggest that you use this method, *not* the "Add/Remove Programs" feature in Windows, to uninstall RealRace G2. Doing so through the RealRace control panel will ensure that all necessary RealRace files are removed.

UNINSTALL PROGRAM

Choose this option to uninstall only the RealRace program itself.

UNINSTALL DATA FILES

Choose this option to uninstall any user files such as your created racetracks, customized vehicles, color schemes, songs etc. *Be careful with this option!* You could lose a lot of your work by inadvertently uninstalling these files.

REMOVE SERIAL NUMBERS

Choose this option to remove all RealRace serial numbers from your system.

REMOVE CACHED FILES

Choose this to option to remove all cached download files from your system. If you uninstall these files, future downloads may take a little longer.

VIEW WEB SITE

Opens up your web browser and loads the official RealRace G2 website (http://www.realrace.com).

READ HELP FILE

Press the **Read Help File** button to bring up the help file for RealRace G2.

ERROR! BOOKMARK NOT DEFINED.TECHNICAL SUPPORT

Press the **Technical Support** button to bring up technical support information about your system. If you encounter any problems with RealRace, this information can help you to resolve it on your own, or can help the DuraTrax Support Staff to diagnose the problem.
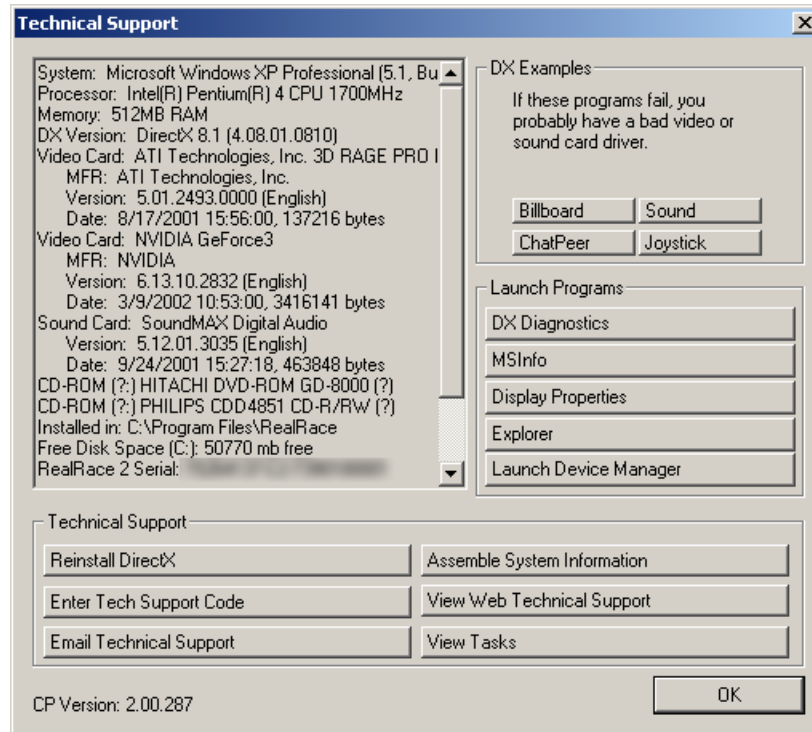
SYSTEM INFORMATIONERROR! BOOKMARK NOT DEFINED.

This displays a list of the critical system information. Before you email technical support, or report a bug with the software, *please* be sure to cut and paste this information into your email. This will be of great assistance to them in diagnosing the difficulty.

DX EXAMPLES

Press these buttons to run example DirectX programs written by Microsoft. They are very basic programs that test your DirectX installation and hardware. If these samples don't run correctly, then your problem lies either with your DirectX installation, or with your hardware drivers (usually video or sound).

To resolve these problems you should first contact your video/sound card manufacture for updated drivers. ***This is very important***. Card manufacturers frequently update their drivers to fix problems that arise when used with programs like RealRace. Even if you just bought a new computer system there may be a new, updated driver available for download.

If you are sure you have the latest drivers, you may need to reinstall DirectX, or update your version.

DX DIAGNOSTICS

This brings up Microsoft's DXDIAG utility. Using this utility can further help diagnose your system. (Important: if you send us information about your system to help us diagnose a problem, please *do not* use DXDIAG to generate that information. Instead, please use the "Assemble System Information" feature [see above]. The "Assemble System Information" output file contains more information than the DXDIAG output.)
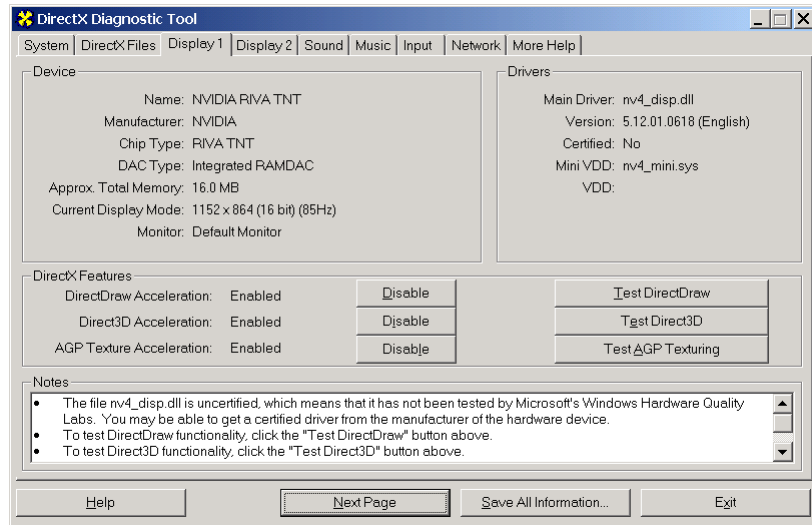
MSINFO

This option will run MSInfo. This will give you even more information about your system. This program is not always installed on your computer, but normally comes with programs such as Microsoft® Office®.
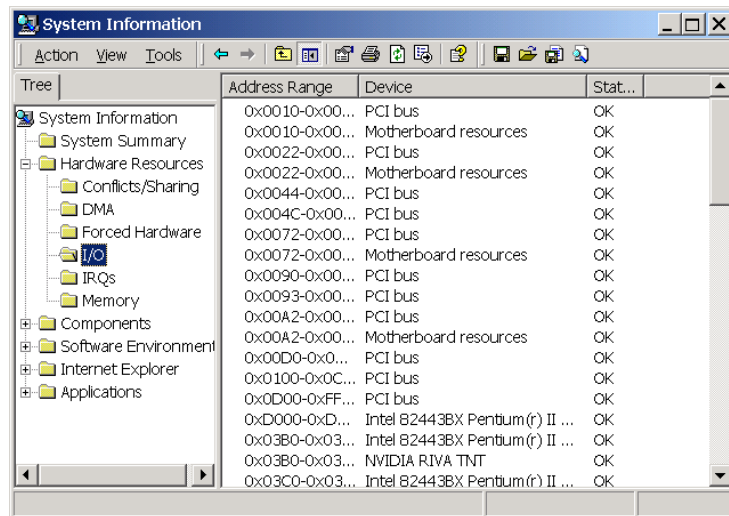
DISPLAY PROPERTIES

This brings up your monitor's display properties. You can use this page to change the resolution**Error! Bookmark not defined.** of your desktop.
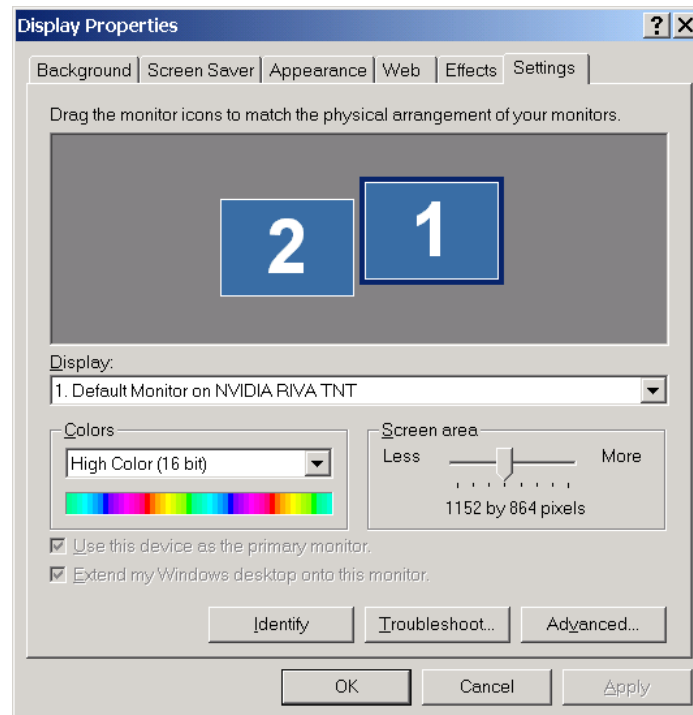
EXPLORER

This button launches Windows Explorer. This Microsoft Windows utility can help you locate, move and backup your files.
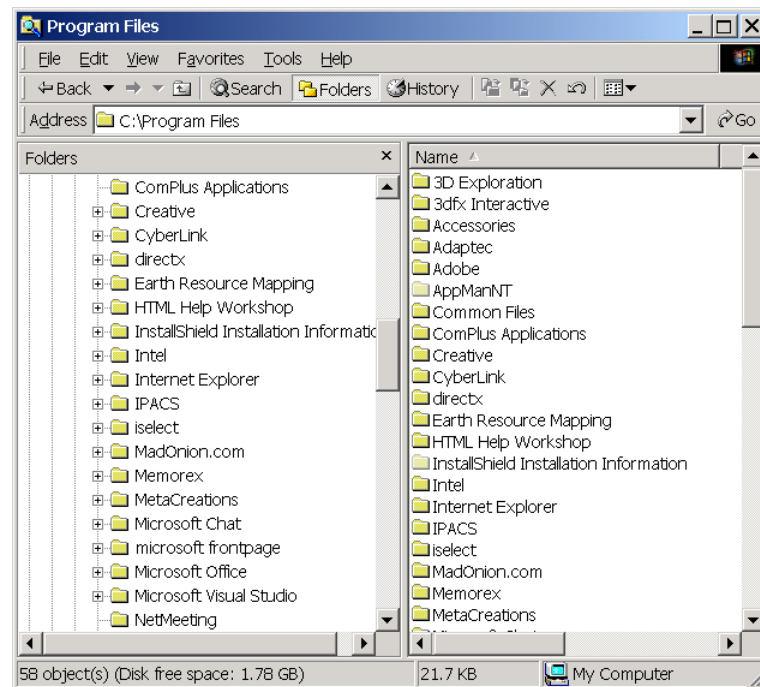
LAUNCH DEVICE MANAGER

This button launches the Device Manager. This Microsoft Windows utility will help you determine driver dates, as well as installing and updating video and sound card drivers.
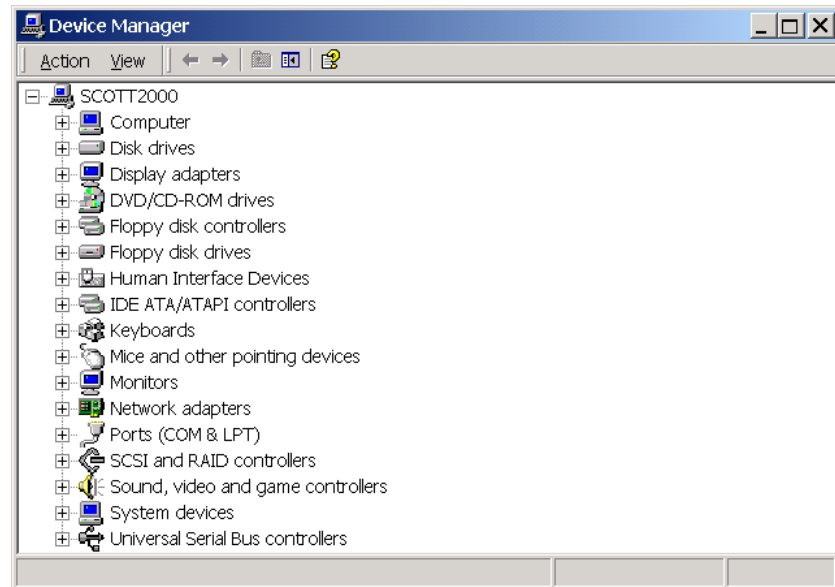
REINSTALL DIRECTX

Choose this option to reinstall DirectX. Occasionally this will fix corrupted installations.

ASSEMBLE SYSTEM INFORMATION

Choose this option to collect critical information about your system, and about your RealRace settings. You may find this information useful if you try to troubleshoot problems on your own. Moreover, if needed you can cut and paste this information into an email to DuraTrax Technical Support. When you use the online registration to register RealRace, this is the hardware information that is sent to DuraTrax.
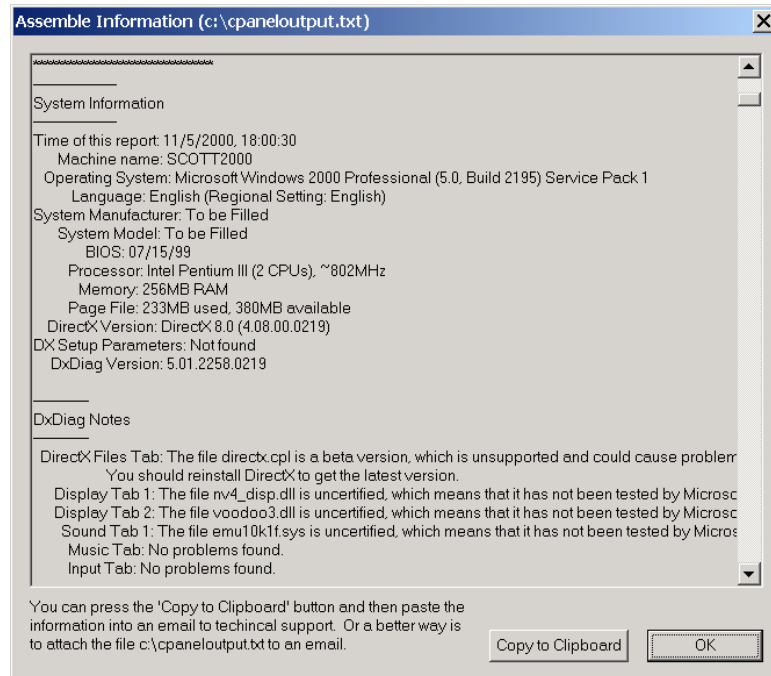
ENTER TECHNICAL SUPPORT CODE

Choose this option to enter a technical support code. If you do encounter problems running RealRace, our Technical Support team may supply you with a code to input here. Entering this code will help them diagnose or resolve your problem.

VIEW WEB TECHNICAL SUPPORT

Choosing this option will open a browser window, and take you to a web site that contains the most up-to-date technical support information for RealRace G2.

EMAIL TECHNICAL SUPPORT

This gives you the email address rrsupport@duratrax.com to which you can email your problems. If you do email us, please be sure to attach the **Assemble System Information** output to your email.

VIEW TASKS

This shows you a list of all tasks that are running. Some tasks can interfere with RealRace and may need to be closed. Our Technical Support team will be glad to help you close problem tasks.

ONLINE UPDATES

This lets you update your version of RealRace. *Please see "Online Updates" on page 242 for more details.*

READ DOCUMENT

This lets you view important documents that come with RealRace. Select the document you would like to read from the dropdown box to the right and then click the **Read Document** button.

ONLINE UPDATES

We are proud to bring you a cutting edge way to keep your RealRace G2 program updated to the latest version. Gone are the days of self-extracting EXEs, lost files, or cumbersome web sites. Just a single button click will download the latest version and install it correctly.
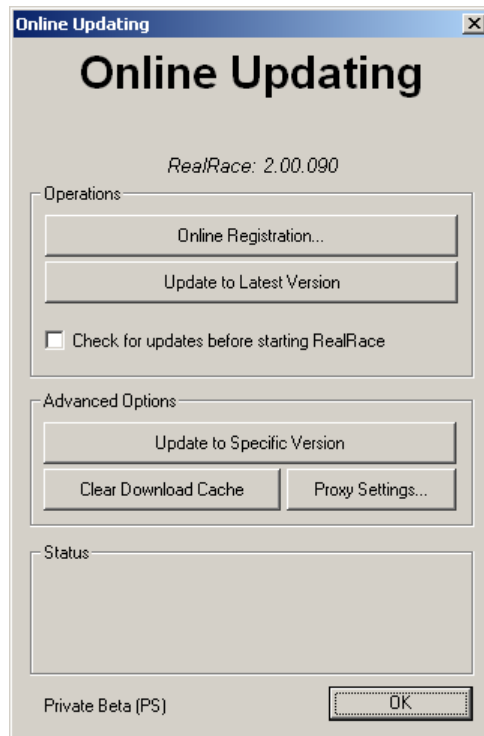
REGISTRATION

The first thing you must do before you can use any of the online functions is to register the program with Duratrax.**Error! Bookmark not defined.**

Please enter in all the correct registration. If you forget your password, contact DuraTrax Support. To do so, email them at rrsupport@duratrax.com or telephone them at 217-398-8970. They will confirm your identity, and issue you a new password.

HARDWARE INFORMATION

RealRace offers you the option of automatically sending us information pertaining to your system hardware and settings when you register. It will do so if you leave the "Send Hardware Information" box checked when you register.

This information will assist us more rapidly in diagnosing any problems you may encounter later, should you need to contact Technical Support.**Error! Bookmark not defined.** Consequently, we suggest that you leave this box checked when registering.

This feature is entirely optional. If you uncheck the box, RealRace will not send us any information about your system. Or, you can view exactly what information RealRace will send us before you decide. To view this information, click the **Technical Support** button on the RealRace Control Panel.**Error! Bookmark not defined.** When the **Technical Support** page appears, click **Assemble System Information**.

UPDATING TO THE LATEST VERSION

After registering (you only need to register once), you can update to the latest version. This will download all necessary files and correctly install the upgrade.

CHECK FOR LATEST UPDATES BEFORE RUNNING REALRACE

If you check this box, then every time you run the RealRace Control Panel, the panel will check to see if there is a newer version of RealRace available. If so, the Control Panel will then ask you if you want to download and install it. Note: Your PC must be connected to the Internet in order to do so.

ADVANCED OPTIONS

UPDATE TO SPECIFIC VERSION
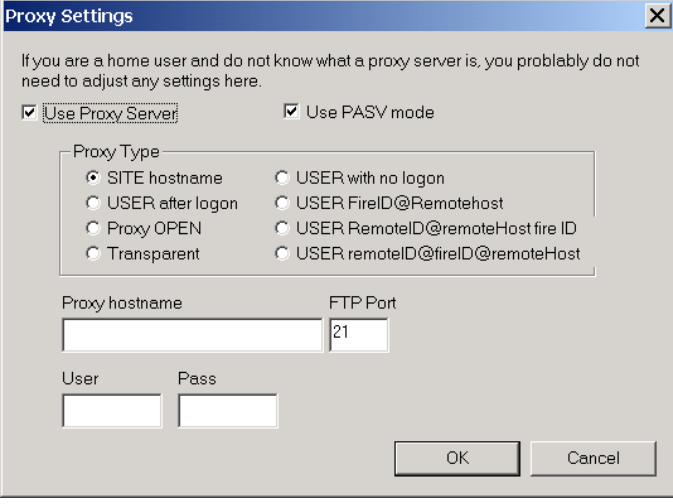
If you are having problems with a version you just downloaded, you can actually *go backwards* and retrieve a previous version. If the previous version fixes your problem, please contact our technical support team at rrsupport@duratrax.com and let them know about the problem you encountered.
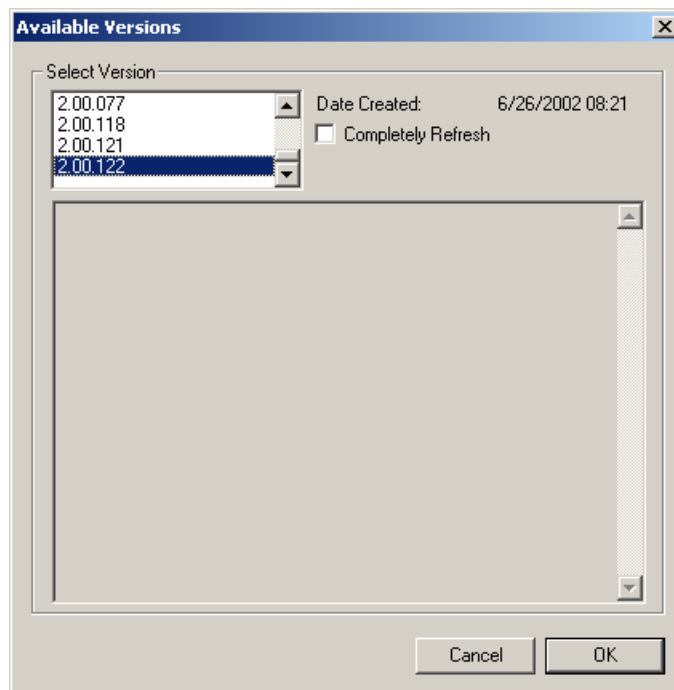
CLEAR DOWNLOAD CACHE*ERROR! BOOKMARK NOT DEFINED.*

Some times files can become corrupted on download. If you are having problems with the Online Upgrades, try removing all cached files using this option, then choosing **Update to Specific Version** and select the **Completely Refresh** option.

If you are behind a firewall that restricts FTP access, you may need to change the proxy settings in order for **RealRace** to get the latest updates. *Most home users will keep the Proxy Server OFF.*

If you do need to use the proxy server, contact your network administrator to determine which settings to use.

PROBLEMS UPDATING?

Here are some possible problems that might occur when updating.
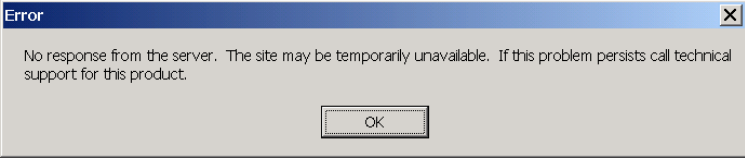
BAD INTERNET CONNECTION

You either don't have access to the Internet (You can double check this with your browser), or the FTP server is unavailable. Try reaching the Internet with your browser. If you are behind a proxy server, then adjust the proxy settings.

SERVER UNAVAILABLE

The server may be down or may be overloaded. Please try again later. If this problem persists, contact technical support and explain your problem.

APPENDIX D. IF YOU EXPERIENCE DIFFICULTIES WITH REALRACE G2…

IN GENERAL

This simulator is on the cutting edge of technology, and runs using advanced hardware. Consequently, there is always the possibility you may experience some difficulties. Should the need arise, we provide extensive resources to help.

Besides providing the best R/C simulator, we sincerely feel that we provide the best, most extensive product support for any R/C simulator. Since cards, drivers, operating systems, etc. are always changing, we work hard to keep our support up to date on the latest issues and problems RealRace G2 users might encounter.

This section starts with a summary of the various sources of RealRace G2 information, support, and problem solving help that you can access. Then, we'll show you some **simple but powerful steps** that can resolve or prevent most RealRace G2 problems. Finally, if these steps don't solve your problem, we'll show you the most effective ways to acquire additional assistance.

HOW TO GET HELP AND INFORMATION

As a RealRace G2 user, you have access to an incredible amount of information about this product. Much of this information can help you resolve problems, or correctly access and use program features. Here's where you can find it:

- **The manual**. You can solve most common RealRace problems by following the instructions in later sections of this chapter. Additionally, other manual chapters explain RealRace G2's features in greater detail.

- **Online Help**. You can access all of this manual's material directly from RealRace G2's Help menu. This help file is indexed and searchable.

- Visit our product **Knowledge Base** at http://www.gpsoftware.com. This great resource is an indexed, searchable collection of articles that describes solutions to almost every known problem with RealRace, RealFlight, and our other software products. This is the very same information database that our product support technicians refer to when assisting customers.

- Visit the Knife Edge Software**Error! Bookmark not defined. Message Boards** at http://www.knifeedge.infopop.net. This is a place where owners of RealRace, RealFlight, and other Knife Edge products post questions, comments and responses. Sometimes our product support technicians, and product developers from Knife Edge, post replies and announcements as well. You may find a thread that discusses the same difficulties that you are experiencing.

- Contact our **Product Support** department by email at rrsupport@duratrax.com by phone or postal mail at:

  Duratrax Product Support
  1610 Interstate Drive
  Champaign, IL 61822
  Voice phone: (217) 398-8970
  FAX phone: (217) 398-7721

  They are specially trained, and have a lot of resources, to help you resolve problems with RealRace G2.

- Visit the home page of Knife Edge Software, the makers of RealRace, RealFlight, and other R/C simulation products, at http://www.knifeedge.com. On this page, you can link to the **Knife Edge Chat**Error! Bookmark not defined. **Room**, where you can chat live with other RealRace or RealFlight users. Sometimes product developers from Knife Edge hang out here as well. (Please note, however, that due to time, staffing and other constraints we usually cannot provide problem troubleshooting assistance in the chat room.)

BEFORE YOU DO ANYTHING ELSE…

If you are experiencing any difficulties with RealRace G2, you should always try the steps below first. These steps really do cure most problems our users experience. Even if you aren't having a problem, these same steps often help make RealRace, and your computer, work better.

Here are the steps you should take (instructions for each step follow):

- Update your video and sound card drivers (see instructions below).

- Update to the latest version of RealRace G2.

- If the problem persists, run the DirectX**Error! Bookmark not defined.** test programs.

- If these steps don't work, read on to the next section.

Update Your Drivers

Before you do anything else, you should make sure you have updated your video and sound drivers. Updating drivers can cure a large number of problems encountered by RealRace users.

A **driver** is a software program that controls your video or sound card. Each card manufacturer provides drivers for its own cards. To work correctly, RealRace relies on your video and sound card drivers.

It is very important to use the latest available driver for your card. Card manufacturers *frequently* release updated drivers to fix problems that occur when the driver is used with programs such as RealRace G2. The driver that came with your new computer, or on your Windows CD, or on a CD included with the new card you just bought, may not be the latest version.

If you don't know how to update drivers, you can find instructions in our Knowledge Base article ***Q01-1038, How to Update Drivers***, at http://www.gpsoftware.com/kb/q01-1038.htm. This page will take you through the process step-by-step, and has links to driver download sites for most manufacturers.

Update to the Latest Version of RealRace G2

As we regularly release program updates, the difficulty that you are seeing may already be fixed in an update. Even if you just bought RealRace, you should update to the latest version.

*To update, use the RealRace control panel****Error! Bookmark not defined.*** *(see "Appendix C. RealRace Control Panel" on page 235).*

Run the DirectX Test Programs

If you have updated your drivers and *RealRace* to the latest versions, and your problem persists, you should try to run the DirectX samples that come with RealRace.

The DirectX samples (**Billboard**,**Error! Bookmark not defined. Sound**, etc.) are test programs written by Microsoft. These samples ship with DirectX, and are designed to check whether your DirectX installation, video/sound cards and drivers, etc., are working correctly. They should work on any DirectX 8.1 compliant driver.

You can run the samples using the RealRace Control Panel. Open the Control Panel, click "Technical Support,**Error! Bookmark not defined.**" and then look for the "DX Examples" box. Click a button to run a sample program.

The most important sample is **Billboard**, which tests your video card and driver. If you are having *any* graphics difficulty in RealRace G2 (including RealRace G2 "freezing" your system so that you have to reboot), look for the same problem in Billboard. If the problem occurs only after you have run RealRace G2 for a long time, make sure to run **Billboard** for a comparable length of time.

If your RealRace G2 problem also occurs in **Billboard**, the problem lies with your video driver, not RealRace G2. To resolve the problem, try finding updated drivers for your card (see above). If the problem still occurs with the latest drivers, you will need to report this problem to the card manufacturer. Be sure to tell them that you tested the card by using **Billboard**. Please note: in rare cases, a newer video driver may have more problems than a previous version. After exhausting all other options, you might try obtaining an older driver from the manufacturer to eliminate this possible cause as well.

If These Steps Don't Work…

If the steps above don't work, please read on to the next section.

IF YOU NEED ADDITIONAL ASSISTANCE…

You've updated drivers, updated RealRace G2, and your system successfully runs the DirectX sample programs, and you are still having problems. What next?

As a first step, we suggest checking our knowledge base at http://www.gpsoftware.com. This is an easy to use, searchable, browsable database of known problems and solutions for RealRace, RealFlight, and our other software products. This is the same database that our Product Support technicians use when helping customers. So, we are constantly updating the knowledge base to address new problems as we discover them. In many cases you will be able to find an article that gives clear, concise instructions for resolving your difficulty.

You may also want to check the Knife Edge Message Boards at http://www.knifeedge.infopop.net. This is a place where owners of RealRace, RealFlight, and other Knife Edge products post questions, comments and responses about problems. You may find a discussion thread about the problem you are experiencing.

You can also contact Product Support at DuraTrax**Error! Bookmark not defined.** via email at: rrsupport@duratrax.com.

IMPORTANT. If you do contact Product Support, you can help us enormously by providing detailed information about your computer system. Since your problem may only occur on a particular video or sound card, particular driver version, etc., we may need this information to help us diagnose your problem. To get your system information, use the RealRace Control Panel (from RealRace G2, select "Online Updates" from the **Help** menu). In the control panel, click the **Technical Support** button, followed by the **Assemble System Information** button. This will create a file called "c:\cpaneloutput.txt", which contains your system information. You can attach this file to an email.

EXAMPLES OF COMMON PROBLEMS AND SOLUTIONS

IF YOU DON'T SEE YOUR PROBLEM IN THIS CHAPTER…

This chapter contains a few examples of common problems and concerns that RealRace users have experienced.

Remember that we can never provide a complete list of problems and solutions in a program manual. That's because RealRace—and the computers, cards and drivers it uses—are constantly evolving. As such, we maintain a detailed Knowledge Base at http://www.gpsoftware.com. By keeping our Knowledge Base online, we can provide you with the latest information about resolving problems that RealRace users are currently experiencing. So, if you don't see your difficulty described in this chapter, please check the Knowledge Base.

In this chapter, we've simply tried to pick a very short list of the most asked about issues.

MY COMPUTER "FREEZES" WHEN I RUN REALRACE, AND I NEED TO REBOOT TO REGAIN CONTROL.

Sometimes, you may also notice sound skipping or repeating, or experience a computer reboot while driving. To resolve this type of problem, you must update the drivers for your video and sound cards. *This is very important*. Card manufacturers

regularly update their drivers to fix this type of problem. Even the driver that came with your new computer may not be the most recent.

Sometimes a card manufacturer will offer a choice between a "recommended" driver, and another driver (variously called "special purpose", "alternate", or "beta" driver). If RealRace G2 "freezes" with the "recommended" driver, try using the alternate driver instead.

If you are sure you are using the latest drivers, and have followed all the other steps in the previous section (update RealRace G2, test DirectX) and are still having difficulty with your computer locking up while running RealRace, please contact DuraTrax Technical Support.

IMPROVING REALRACE G2 PERFORMANCE

During installation, RealRace G2 analyzes your computer's hardware specifications. RealRace G2 then tries to optimize its configuration to best take advantage of that hardware, and achieve the best possible performance.

However, if the performance is less than you'd expect, you can adjust some of RealRace G2's settings to improve the simulation speed and frame rate:

- Ensure that the drivers for the video and sound cards are up-to-date.

- Turn off all other programs, especially virus checkers and network applications (such as Instant Messengers) while running RealRace G2. Use CTRL-ALT-DELETE to ensure that nothing else is running in the background.

- Run the simulation in **Full Screen**Error! Bookmark not defined. Mode (in the **Options** menu, uncheck the **Run in Window**Error! Bookmark not defined. option). Alternatively, if you are running in Window Mode**Error! Bookmark not defined.** (**Run in Window** option is checked), alter the screen resolution**Error! Bookmark not defined.** from 32-bit to 16-bit color. Also, decrease the size of the RealRace window.

- Reduce the texture quality.**Error! Bookmark not defined.** This can have a profound effect on cards that do not have a high texture memory.**Error! Bookmark not defined.** You can adjust texture quality on the Graphics Optimization page (*See "Graphics Optimizations" on page 85)*

- Decrease the terrain density**Error! Bookmark not defined.** using the **Graphics Optimizations** page (*See "Graphics Optimizations" on page 85)*

- Eliminate the **Racetrack Objects Shadow** using the **Graphics Optimizations** page (*See "Graphics Optimizations" on page 85)*

- Eliminate the **Detail Textures**Error! Bookmark not defined. using the **Graphics Optimizations** page (*See "Graphics Optimizations" on page 85)*

- Reduce the number of open Gadgets. Click the "X" on each Gadget that you wish to close.

- Eliminate the **Exhaust/Dust** option. Uncheck this item from the **Car** menu.

- Disable the trees. In the **Racetrack** menu, uncheck the **Show Trees**Error! Bookmark not defined. option (this will make all trees and foliage disappear from your track). *(See "Show Trees" on page 56)*

- Reduce the number of computer opponents in a race.

CAR IS DRIVING "WEIRD", "TWITCHY", TOO MUCH/LITTLE SENSITIVITY, ETC.

Not quite driving correctly?

- Dual Rates, exponential, or other radio settings may inadvertently be active. Check the radio settings (Car menu, "Edit Radio…").

- Try driving a stock car (car that came on the RealRace CD). If the stock car drives fine, your problem may be that the "weird" car has an unusual setup.

CAR TRACTION IS TOO LOOSE/STICKY

- Check the "Track Conditions" setting for the racetrack (Racetrack menu, "Edit (name of track)…", "Background" page). This control is meant to simulate the effects of poor weather or track surface. Adjust this slider up/down to increase/decrease traction and other handling properties.

- Check that you are driving on the racetrack surface itself, not the surrounding terrain. RealRace cars sense the terrain type they are driving on and adjust traction to match. The track itself may be asphalt/wet dirt, while some areas off the track may be dry, dusty dirt or gravel.

OTHER COMMON PROBLEMS

Here are some other things you may want to keep an eye out for.

- Check the CD for scratches or blemishes. Even minor scratches or fingerprints can cause random problems that appear to be program bugs.

- Make sure your hard drive has at least 30MB of space available. To check this:

  1. Double click on the "My Computer" icon on your desktop;

  2. Right click on your main hard drive (usually drive "C:");

  3. When a popup menu appears, select "Properties";

  4. In the dialog that appears, view the amount of space available on the drive.

  If you need additional space, try emptying the Recycle Bin.

- Ensure that all other programs are closed prior to starting RealRace. RealRace works best when it is the only program running.

- If all else fails, try rebooting your computer. Occasionally, Windows (particularly 98 and ME) may become unstable after continuous use. A simple reboot may clear up any difficulties.

- Ensure that your computer is running in at least 16-bit color resolution.**Error! Bookmark not defined.** You can verify this by right clicking on the Windows desktop and selecting "Properties". Then, click on the "Settings" tab and check the color palette box.

GLOSSARY OF TERMS

3D Acceleration

3D operations require huge amounts of calculations. Modern video cards offload many of these calculations to the card, rather than performing the calculations directly on your computer's CPU. This speeds up the simulation and allows for faster frame rates, thereby increasing the realism of the simulation.

Active View

The *Active View* is the view that all commands in the View menu act on. Only one view at a time is active. You can make a view active by clicking on it with the mouse. When you want to control a view's properties, you must first make it the *Active View*.

Advanced NavGuides

A gadget that displays continuously updated information about your car and its environment. The *Advanced NavGuides* gadget is extremely customizable.

Aggression

An attribute of a computer-controlled opponent. You can adjust the aggression of any opponent. Opponents with lower aggression tend to avoid other cars and drive more tentatively. More aggressive opponents drive more recklessly and more vindictively. Opponents with medium aggression are more oblivious to other vehicles.

Anti-Roll Bar

An anti-roll bar is a wire device fitted to the car which limits or prevents the car 'body rolling' from side to side through corners.

Anti-Squat

See also (Caster). Anti-squat is generally used on the rear suspension of the car and refers to the angle of the rear suspension arm hinge pins in relation to the chassis.

Arm

This is defined as the distance from the point of attachment to the weight.

Artificial Intelligence (AI)

The means by which RealRace controls computer-generated opponents. RealRace uses knowledge of the racecourse, raceline, and the locations and speeds of other vehicles to drive around the track using realistic race tactics.

ATE

ATE is the abbreviation for the term *Advanced Terrain Editor*. The ATE provides the ability to adjust the track in virtually any manner desired. The driver can add trees, selecting the type, size and color; add, move, size and orient buildings, walls and other scenery objects; position and orient the finish line and starting positions; even choose the amount and type of lighting at the racetrack.

Auto-Play

When enabled, Windows automatically detects when a CD-ROM is inserted and runs the specific program on the CD-ROM.

Bilinear Textures

Smoothes textured pixels together. This can cause a blurry appearance but can also improve the overall appearance.

Bitmap Editor

A computer program (such as Paintshop Pro™ or Adobe® Photoshop®) capable of editing bitmap files, such as ".bmp" files. Such a program is required to create custom racetracks in RealRace. To edit color schemes, you will additionally need an editor capable of editing ".tga" files.

Camber

Camber refers to the angle of a wheel in relation to the vertical (perpendicular). 'Negative' camber means that the top of the wheel leans in towards the center of the car, whilst 'Positive' camber refers to the situation when the top of the wheel leans out - away from the center of the car.

Caster

A hard one to explain! Caster refers to the angle of the front king pin in relation to the vertical. The king pin may be either a solid pin, or imaginary line through the center of the steering block. Caster is measured in degrees and generally refers to the angle which the king pin leans back from the front of the car. A typical caster angle for a two-wheel drive buggy or truck is 25 degrees. A four-wheel drive buggy may vary from 5 to 20 degrees.

CG

CG is the abbreviation for the phrase *Center Of Gravity*. This is the point at which the vehicle balances fore to aft, and side-to-side. The location of this point is crucial to how the vehicle drives.

Collision Detection

RealRace G2 cars sense when they touch walls, obstacles, and other cars (computer generated and multiplayer), and "bump" accordingly.

Computer-Controlled Opponent

A race competitor provided by the RealRace program. Opponents follow racelines but can move away from racelines to respond to race conditions (for example, swerving to avoid oncoming cars). RealRace allows you to edit almost any property of a computer-controlled opponent, including its raceline, personality characteristics, vehicle type and setup.

Control Panel

The RealRace G2 *Control Panel* is useful for many aspects of the G2 program. For details on the purpose and functionality of the *Control Panel*, *See "Appendix C. RealRace Control Panel" on page 235.*

Controller

A device used to control a vehicle in RealRace G2. Currently, all new versions of RealRace G2 ship with the pistol-grip controller from Futaba.

Direct3D Technology

Used to render the 3D image when you have an accelerated graphics card. It works best on faster computers.

DirectX

A technology created by Microsoft that controls graphics and sound operations.

Dithering

Blends the pixels together to produce a smoother image. This can also simulate colors that may not be available to you.

Driver

A software program that controls a card (e.g., video or sound card) in your computer. The card's manufacturer usually provides its *Driver* as well. Manufacturers frequently update their *Drivers* to fix bugs, or make their cards compatible with new software and hardware. You can often find an updated driver for your video or sound card by visiting the web site of the card's manufacturer, and following links to "Drivers," "Support," "Downloads", or "Upgrades."

Drop

To put it simply, drop refers to the amount your suspension arms hang down.

Event

An organized driving competition with a set of rules. RealRace Generation 2 currently supports two types of events: Lap Racing and Timed Racing. You can play events by yourself or with other RealRace users over the Internet. You can start an event using the "*Event*" menu.

Exponential

A feature commonly found on computer radios that desensitizes the servo when the controller's steering wheel and throttle control are close to their neutral position. The further the control movement, the faster the servos will respond.

Frame Rate

Frame Rate is the number of times per second that RealRace creates a different picture to display on your monitor. *Frame rate* is determined by the speed of your CPU and graphics card, and how many RealRace options you turn on. This is not the same as refresh rate, which is the number of times per second that your monitor retraces an image on its screen.

Full Setup

Allows you to edit every single parameter about the car. This is for advanced users or adventurous novices. You will not be able to race a "Full Edited" car in a "spec race."

This prevents racers from putting a .21 engine in a .10 truck race! If the Race Manager allows unlimited racing, then you can race a car that has been modified using the Full Edit feature.

Futaba

Maker of quality R/C products, including the gameport controller that is shipped with RealRace G2.

Gadget

An onscreen display that shows you continuously updated information about your vehicle, or lets you control RealRace features using mouse clicks.

Gates

Gates are markers that define the boundaries of a racecourse. You can insert, remove, or reposition race gates using RealRace's built-in track editor.

Group

A collection of scenery objects or foliage objects in your racetrack. Every object in the racetrack must belong to one *Group*. You can place all your track's scenery objects in a single *Group*, or create multiple *Groups* to place objects in categories with related objects.

HAL Device

A hardware-accelerated 3D video card driver. "*HAL*" is an abbreviation for the phrase "Hardware Abstraction Layer" that uses software drivers to communicate between RealRace's software and the hardware of the PC.

Host

In RealRace G2, every multiplayer session requires one player to serve as Host. The *Host* starts the session, and then the other players join. Other players can leave the session whenever they want, but only the host can terminate the entire session. The host must start any multiplayer event (Lap Racing, Timed Racing).

IP Address

Whenever your computer is connected to the Internet, it has an *IP* address. This number is a string of digits and periods, and looks something like "123.43.6.78". The *IP* address is like an Internet "zip code" that tells other computers where to look for your computer. Depending on your Internet connection, your *IP* address may always be the same, or may change each time you connect to the Internet. For other RealRace G2 users to join your Multiplayer session, they must obtain your *IP* address. You can either provide it to them directly, or post it through the RealRace list server.

Joystick

A device that connects to your computer, and is used to control the simulated car. The Pistol-Grip Controller that comes with RealRace G2 is considered a *Joystick*.

Lap Racing

An event (driving competition) in which drivers race around a closed course.

List Server

RealRace G2's Multiplayer function lets you publicly "post" your session, so that any RealRace G2 user, anywhere in the world, can find out about your session and join you (assuming you have not reached the enrollment limit of your session). The place where you post is called a *List Server*. Use of the *List Server* is completely optional. You can preserve privacy by not posting your session, and privately communicating your IP address to your selected multiplayer partners.

Low Rates

A switch on the radio that causes the servos to move much smaller extremes, thus making the model respond more slowly.

Multiplayer

A feature of Microsoft's DirectX technology that allows you to connect with other RealRace G2 users over a network.

Multiplayer Session

A network connection between RealRace G2 users that allows each user to drive in the same "virtual world," and allows all participants to see and interact with each other's vehicles.

Pistons

A piston is a crucial part of the internal mechanism of a shock absorber. The piston is mounted on the end of the 'shock shaft' and is typically a thin plastic disc with a number of holes drilled in it. Changing the piston for one with either larger, or smaller holes or a different number of holes can have a dramatic effect on the performance of the shock absorber.

Pitch Axis

A pitch is a front-rear up-down rotation of the car. If you balance your car by placing fingers under the left and right sides of your car, and rock the car nose and tail up and down like a seesaw, you are pitching the car.

Plumb String

When you measure your car for RealRace, some measurements require that you have a reference line running straight up and down. To make such a line, we tie a weight to the free end of a string, and let the weight dangle. Because the string is then "plumb" (oriented straight up and down), we call it a "*Plumb String*". A Plumb String is particularly useful in measuring a vehicle's center of gravity.

Private Session

A multiplayer session that is not published on our list server. For a private session, the host must distribute his/her IP address to each participant, who must manually enter this information to join.

Public Session

A multiplayer session that is published on a list server.

Quick Edit

Only allows select parameters to be edited. These are parameters that are likely to be changed by a "turn of the wrench" at trackside.

This is for Novice and Advanced users.

Race

An organized racing event, in which RealRace keeps track of times, standings, and results, and enforces race rules (for example, cutting). You can start a race using the Event menu. Races can contain computer-generated opponents, or multiplayer opponents.

Raceline

In RealRace, the path followed by a computer-controlled opponent. You can create your own custom racelines.

RAM

Random Access Memory

RealPhysics

This is RealRace's exclusive physics modeling technology. *RealPhysics* authentically replicates the actual physics of model cars by calculating hundreds of thousands of floating point operations each second while delivering sizzling real time performance.

RealRace G2

This is the next generation R/C Car Simulator produced by DuraTrax.

Refresh Rate

The number of times per second that your monitor retraces an image on its screen. This is different from the Frame Rate.

Resolution

When used in the context of screen *Resolution*, this term describes the picture quality of the screen. Lower *Resolutions* will produce an image that is not as sharp as higher *Resolutions*.

Ride Height

Ride Height refers to the distance between the ground and the bottom of your car's chassis when it is at rest. To check ride height, work your car's suspension up and down a few times, then drop it onto a flat surface from a height of about 12 inches. Some manufacturers will give you a reference point for checking ride height, e.g., Rear suspension arms level, or Drive shafts level. This can help you easily compare your ride height settings time after time.

Roll Axis

A roll is a rotation around the car's center axis. If you balance your car by placing fingers under the front and rear bumpers, and rock the car back and forth, you are rolling the car.

Servo

The electromechanical device that moves the throttle or steering mechanisms of the car according to commands from the receiver. This device does the physical work inside the vehicle.

Session

See "Multiplayer Session."

Shocks

The shocks, shock absorbers, or dampers are silicone oil filled "cylinders" used to slow the motion of the springs supporting the car's suspension. Shock absorbers can generally be adjusted by either altering the internal configuration (see Piston) or by using oil of differing viscosity (or "thickness").

Skill

An attribute of a computer-controlled opponent. You can adjust the skill of any opponent. Opponents with a high skill level have faster race times than opponents with lower skill levels, all other factors being equal.

Sound Card

A card inside your computer that controls audio (what you hear over your computer speakers). Most sound cards plug into your computer's motherboard. You can upgrade your sound card (or the software driver that controls it) without getting a new computer.

Specular Highlights

A graphics rendering technique that makes surfaces appear reflective, or "shiny", in direct light (e.g., sunlight).

Starting Marker

A starting marker is a visible graphic placed upon the racetrack on which cars start a race. You can insert, remove, or reposition starting markers using RealRace's built-in track editor. Note that you must have at least one starting marker for every car in a race.

Sway Bar

See (Anti-Roll Bar).

Toe

Toe is the angle of the wheels in relation to the centerline of the chassis. Toe-in refers to the setting when the wheels point "inward" whilst toe-out refers to the setting when the wheels point "outward". You can check toe by placing a ruler against each wheel. If the ruler points inward, that's toe-in.

Tooltip

A yellow popup window that appears when you hold the mouse cursor over a RealRace G2 menu item or dialog item. The text in the *Tooltip* window describes the item's function.

Training

After creating an opponent and providing a raceline, you must train your opponent to get optimal race performance. Training is fully automated. During training, your opponent will learn about the particular track and use that knowledge to develop a race strategy.

Trees

Some elements of a RealRace G2 landscape are inserted and removed using the Tree editor page of the Advanced Terrain Editor. These include trees, bushes, people and animals.

Video Card

A card inside your computer that produces the images on your video monitor. Most modern 3D video cards have accelerated 3D operations—that is, they perform numerical calculations for rendering a 3D scene, to free up your computer's CPU to perform other tasks. The video card plugs into your computer's motherboard. You can upgrade your video card (or the software driver that controls it) without replacing your computer.

Viewport

A picture-in-picture display inset within the RealRace main display. Each *Viewport* is independently adjustable and serves as its own unique "window on the world". The number of *Viewports* that may be created is only limited by the power of your processor.

VirtualRevolution

This is the exclusive sound technology used by RealRace G2. As with the original RealRace program, the sounds are Doppler-correct, however, if the user's sound card supports it, surround sound is also available.

Wheelbase

Wheelbase is the distance between the front and rear axles of your car

Yaw Axis

YAW means rotating the car as if by steering. If you hang your car by a string attached to the car roof, and spin the car around, you are yawing the car.

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