ProRacing Sim, LLC.

Software
Simulations
For Performance And Racing

2005
Summer Specials Edition

Pro Racing Sim LLC

Letter From The President

Dear Engine And Performance Enthusiast,

In this catalog you will find a wide range of engine and vehicle-dynamics simulation software. These products will help you build better engines, find more power, race quicker vehicles, drive with better handing, and as our users tell us all the time, you'll not only uncover the best component combinations for your specific application, you'll have fun doing it!

We offer quality, proven, accurate simulations for any user, regardless of experience or budget limitations. For the casual enthusiast we have developed the *DeskTop™ Series* products that carry a low cost but offer considerable power and ease of use. We also offer simulations that contain many features unique to ProRacing Sim Software. These more advanced *Sim-Series™* packages are aimed at the serious enthusiast and performance professional. In addition, we are very proud to offer "World-Class" simulations designed for the professional racer and engine builder. These tools embody the most advanced simulation technology on the planet, and will help you find the last few elusive horsepower or tenths of second (see pages 6-7 for help in selecting the right simulation for your needs).

Countless hours and millions of dollars have gone into the development and validation of ProRacing Sim software packages. But more importantly, this extraordinary investment not only guarantees that you will be using the most advanced simulation technology possible, but also that our software was crafted by and for racers and enthusiasts, like you! Our simulations continue to evolve and improve, in many cases these enhancements can be credited to the thousands of creative individuals that share their knowledge and experience with us, regardless of whether they are "backyard mechanics" or part of World Champion race teams! We want you to succeed, and we will continue to develop tools that you need to help you realize your goals. Count on it!

Whether you are new to ProRacing Sim or an "old hand" with our software, we are sure you'll find products within these pages that will help you design, test, build, or even just explore performance technology. Use our simulations to design a Pro-Stocker or to simply learn why ProStock engines make prodigious horsepower. Explore the known, unknown, build unique vehicles, find winning combinations—you'll have fun doing it! We guarantee it!

Thank you for your patronage.

Sincerely,

Ron Coleman
President, ProRacing Sim, LLC.

Table Of Contents

What Are ProRacing Simulations?

A simulation is a mathematical model of a real-world process or event. In other words, simulations are comprised of formulas (called algorithums) that encapsulate the physics of real-world activities. By carefully breaking down complex events inside a running

A simulation is a mathematical model of a real-world event.

engine, or as a vehicle moves on a race course, it is possible to develop models that, when properly applied, can accurately determine the energies released and vehicle movement in the original event. And using these same models, it is often possible to predict a future outcome (as in weather prediction) or to analyze an event using different starting conditions (a technique commonly used in our simulations).

ProRacing Sim engine and vehicle simulations let you to test virtually unlimited component combinations for optimum performance, top speeds, most torque, highest horsepower, best lap times, or other results criterion all before you buy a single part! Test camshafts to locate the best grind for your application. Test gear ratios to find the best setup for the 1/4- or 1/8-mile drags, or for any closed-course race track. Test aerodynamics, fuels, even the subtleties of connecting-rod lengths,
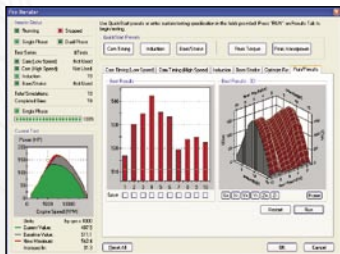
Exclusive *Iterative Testing™* automatically finds the best setup for virtually any application.
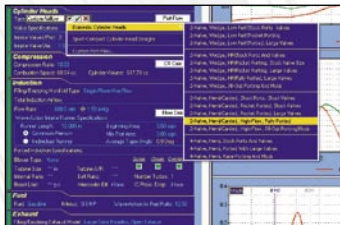
Direct-Click™ Menus and **All-On-Screen™** Component Displays.
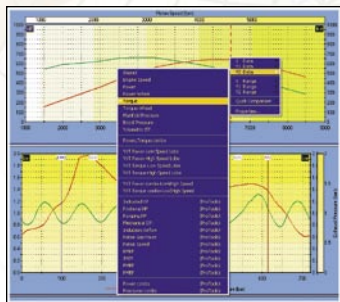
Fully Customizable Graphs display all simulation results.

Unique Software Features

Many of the innovative features in our software are unique to ProRacing simulations. These "exclusives" make our software a real pleasure to use, improve data analysis, and allow you to test more combinations than ever before. Here is a short list of some of these unique features:

- **Direct-Click™ easy point-and-click parts selection—extensive menus and enter your own custom values.**

- **Document Interface lets you test and compare several engines or vehicles at once.**

- **Iterative Testing™ runs a series of tests to find the best combinations, automatically.**

- **QuickStart™ Buttons give one-click access to important program features.**

- **Fully Customizable Graphs display the results and the data ranges you want to see.**

- **Built-In Calculators help you determine compression ratio, cam timing, airflow, and more!**

- **ProPrinting™ comprehensive "presentation" dyno report.**

- **CamManager™ tune all cam-timing variables and see changes on timing diagram.**

intake runner volumes, shock-absorber specifications, and more!

But ProRacing Sim software simulations are much more than math, physics, and data analysis. Every simulation has been designed—from the ground up—to be easy to use! We constantly ask ourselves if each feature or operation is intuitive. If it doesn't pass muster, we make it better, easier, and more understandable. We understand that our software is of little use if you can't easily access or understand features. Our goal is to make sure that every one of our users not only gets the most out of our products, but also *enjoys using them*.

> *...fun to use, with eye-opening results as you learn what works on your specific project.*

So there you have it! State-of-the-art simulation technology that provides accurate results, easily and quickly. Intuitive software that is fun to use, offering eye-opening results as you learn what works and what doesn't in your specific project. You don't need to be a computer expert, a math expert, or even a racing Pro to use and enjoy our simulations. Anyone with an interest in cars, motorcycles, or performance can build and test engines or vehicles using ProRacing software.

How To Select The Right ProRacing Simulations For Your Project!

In This Catalog

ProRacing Sim offers a wide range of engine and vehicle simulation packages. While selecting the right simulation for your needs may seem daunting at first glance, you will find our product-feature tables, detailed product descriptions, and the information provided on these two pages will greatly simplify the selection process.

Individual simulation products are described on pages 18 to 54, your primary source for in-depth information about each package, including built-in features, capabilities, accuracy, and simulation results. For a quick comparison of features within each product category (engine, vehicle-dynamics, etc.), refer to the *Power-Features™* tables on these pages:

Product Selection Overview

ProRacing Sim offers four "levels" of simulation capability. Each step up from our *Basic-Series* simulations adds modeling power, accuracy, and improved data analysis. However, Basic levels can be upgraded to more-advanced versions using simple over-the-phone *Instant Activation™* (see

Dynomation-Series™ **simulations are most comprehensive.**
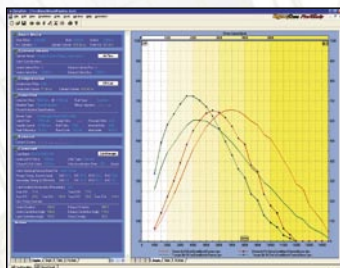
Sim-Series™ **packages combine power with affordability.**
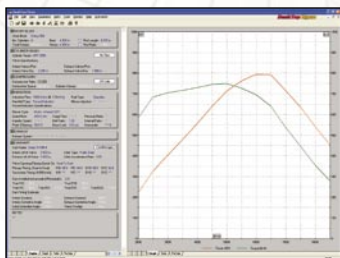
DeskTop-Series™ **simulations offer great value and features.**

the Upgrade Policy on right). The four ProRacing Sim software levels are:

The DeskTop-Basic Series™
The DeskTop Series™
The Sim-Series™
The Dynomation-Series™

The *DeskTop-Basic Series™* provides remarkable simulation power for the lowest possible cost. These packages are extremely easy to use while still offering accurate results. Our *Basic-Series* is the best way to "get your feet wet" with this remarkable technology.

The *DeskTop Series™* offers many professional simulation features but at a cost lower than our Advanced *Sim-Series* packages. *These are not basic simulations*, rather they incorporate powerful simulation technology. While having limited file import, Iterative testing, etc., *DeskTop-Series* simulations combine our most essential high-end simulation features with low cost.

Sim-Series™ offer advanced simulation technology to serious enthusiasts and professionals. Complete data-analysis tools and feature set, including *CamFile* and *FlowFile* import/export, extensive *Iterative* testing, comparisons, *CamManager,™* and much more!

The *Dynomation-Series™* is top-of-the-line simulation technology for the professional builder and designer. These simulations perform exhaustive analysis and offer the highest detail and accuracy. Aimed at the individual/shop or race-team involved in competition, new component design, etc.
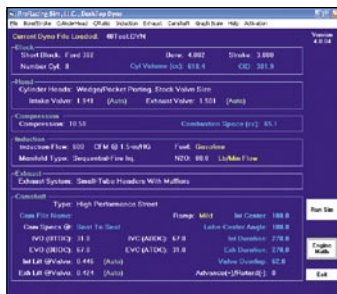
DeskTop-Basic Series™ **delivers low cost, ease of use,** *and* **power.**

DeskTop-Basic Combo Pack™

Special Package Pricing On Our Inexpensive, But Powerful Simulations

DeskTop-Basic Combo Pack™

**FOUR Must-Have Simulations In One Inexpensive Package!!!
Powerful, Accurate, Low Cost, And Easy-To-Use!**

Looking for the ultimate value in performance simulation software? Want to use advanced technology but avoid hard-to-use, cryptic simulations? Until now, you were out of luck.

Introducing the *DeskTop-Basic Combo Pack*. This software bundle provides the absolute *BEST* way for you to pack your PC with quality engine, vehicle, and reaction-time training software. Included are the *DeskTop DynoBasic, DeskTop DragBasic, DeskTop Briggs Dyno,* and the unique *DeskTop Full-Throttle Reaction Timer* simulation. Over $150 of easy-to-use and accurate performance simulations!

There is no other simulation software package on the market that can compare with the *DeskTop-Basic Combo Pack* in cost, features, and capability. Put these essential engine, vehicle, and reaction-time training simulations in your "tool box." All Sims run on any Windows95/98/Me/2000/XP equipped PC—see page 67 for general system requirements.

Includes:
- **DeskTop DynoBasic**
- **DeskTop Briggs Dyno**
- **DeskTop DragBasic**
- **Full Throttle Reaction Timer**

Refer to pages 18, 36 and our website (www.ProRacingSim.com) for more information on the simulations included in this package.

See pages 16 and 32 for comprehensive engine and vehicle simulation *Feature Comparison Tables*.

DeskTop-Basic Combo Pack
Only $74.95 (Retail $149.95)   **SDB-103**

Note: The simulations in this bundle have been designed primarily for Domestic engine/vehicle applications.

DeskTop™ Software Bundle

Special Package Pricing On Our Powerful DeskTop-Series™ Simulations

Comprehensive DeskTop Bundle

More Features Than The *Combo Pack*—Includes DeskTop Dyno For Domestic Engines, DeskTop SC-Dyno For Sport-Compact Engines, DeskTop Drag, And DeskTop FastLap, Plus FREE 2nd Day Shipping!!!

Refer to pages 20, 38, and 46 for more information on the simulations included in this package. See pages 16, 32, and 44 for comprehensive engine and vehicle simulation *Feature Comparison Tables*.

The *DeskTop Bundle* includes more advanced engine and vehicle simulations than the *Basic* versions offered in the *Combo Pack*. All these simulations use ***Direct-Click™*** menus, have expanded menu choices, faster execution times, great graphics, and much more. Includes the *DeskTop Dyno* for domestic engines, *DeskTop SC-Dyno* for Sport-Compact and other modern, high-tech engines, *DeskTop Drag*, and *DeskTop Fast-Lap,* 1/4-mile and closed-course vehicle simulations. You can do it all with this extraordinary bundle! Save $150 over individual simulation pricing, plus get *Free* shipping to anywhere in the continental US! All Sims run on any Windows95/98/Me/2000/XP equipped PC—see page 67 for general system requirements

Includes:
- **DeskTop Dyno**
- **DeskTop SC-Dyno**
- **DeskTop Drag**
- **DeskTop FastLap**

And Free 2nd Day Shipping!

DeskTop Software Bundle
Only $199.95 (Retail $399.80) **MDB-105**

Note: This simulation bundle has been designed for both Domestic and Sport-Compact applications.

Advanced Sim-Series™ Software Bundles

Special Package Pricing On Our Powerful Sim-Series™ Simulations

Complete Sim-Series Simulation Bundles

Engine/Vehicle Simulations, *FREE* CamDisk2005 And *FREE* 2nd Day Shipping! For Both Domestic And Sport-Compact Engine/Vehicle Applications.

Refer to pages 22, 30, 40, and 48 for more information on the simulations included in this package. See pages 16, 32, and 44 for comprehensive engine and vehicle simulation *Feature Comparison Tables*.

This bundle offers the absolutely lowest price on our ***Advanced Sim-Series™*** software packages (even add ***ProTools™ Kits***; see sidebar on next page). These simulations incorporate advanced technology and are designed for the serious enthusiast and performance professional (more features, power and accuracy than offered in the *DeskTop* and *Basic* bundles shown on previous pages).

This comprehensive software package includes the *DynoSim* (or *SC-DynoSim*, see selection info in Sidebar on next page) for engine testing and analysis, *DragSim* for 1/8- and 1/4-mile drag testing, and *FastLapSim* to find the best combination for any

Includes:
- **DynoSim**—Engine Simulation (or **SC-DynoSim**, see next page)
- **DragSim**—DragStrip Vehicle Simulation
- **FastLapSim**—Road Course Simulation
- **Free CamDisk2005™** CamFile-Library CD
- **Free 2nd-Day Shipping!** (free shipping within Continental US)

closed-course road racing or parking-lot slalom. Engine files developed in DynoSim can be easily transferred to DragSim and FastLapSim to test your best engine build-ups in any vehicle on a variety of tracks. Also includes a **Free** *CamDisk2005™* that expands the DynoSim cam testing library to more than 6000 camfiles!

Save over $300 and get **Free 2nd Day Shipping** to any address in the continental United States! All Sims run on any Windows95/98/Me/2000/XP equipped PC—see page 67 for general system requirements.

What Are *ProTools™ Kits***?—All essential features are included in the Advanced versions of our engine and vehicle simulations. However, professional racers, engine builders, and serious enthusiasts demand extended modeling and data analysis. The optional** *ProTools™ Kits* **extend the functionality of all these simulations, adding engine and vehicle analysis, new calculators, graphics,** *ProIterators™***, etc.—see pages 4-5 in this catalog and visit our website (www.ProRacingSim.com) for additional ProTools™ descriptions. Add all three** *ProTools™ Kits* **to this bundle for one low price (Save $60.00!).**

DynoSim Vs. SC-DynoSim—If you primarily work with Domestic engines of traditional V8, 6- and 4-cylinder designs (using either "standard" or racing intake manifolds, like single-plane, dual-plane, or even the late-model LT1, LS1 induction designs), the *DynoSim Domestic Bundle* **is for you. On the other hand, if you build high-tech engines with variable valve timing, 4-valve cylinder heads (such as those on Honda engines), the** *Sport-Compact Sim-Series Bundle* **with the SC-DynoSim is your best choice.**

For <u>Domestic</u> Applications

Advanced Sim-Series™ Bundle
Only $299.95 (Retail $639.80) **MDB-315**

Advanced Sim-Series™ Bundle Including All ProTools Kits™
Only $399.95 (Retail $849.65) **MDB-325**

For <u>Sport-Compact</u> Applications

Advanced Sim-Series™ Bundle
Only $299.95 (Retail $639.80) **MDB-335**

Advanced Sim-Series™ Bundle Including All ProTools Kits™
Only $399.95 (Retail $849.65) **MDB-345**

Drag-Racer's Sim-Series™ Bundles

Includes The Advanced *DynoSim™* Engine Simulation And *DragSim™* 1/8- And 1/4-Mile Drag-Strip Vehicle Simulation

Refer to pages 22 and 40 for more information on the simulations included in this package.

See pages 16 and 32 for comprehensive engine and vehicle simulation *Feature Comparison Tables*.

This bundle offers the lowest price on our *Advanced* engine and drag-racing vehicle-dynamics **Sim-Series™** simulations (even add **ProTools™ Kits**; see sidebar on next page). Perfect for the "straight-line" racing enthusiast, this package incorporates simulation technology designed for the serious enthusiast, racer, and performance professional (more features, power and accuracy than provided in the *Basic-* and *DeskTop-Series* bundles shown on pages 8 and 9).

Use the *DynoSim* engine simulation to build and test virtually any 4-stroke, stock or racing engine (either Domes-

Includes:

- **DynoSim**—Engine Simulation for Domestic applications
- *Or* **SC-DynoSim** for Sport-Compact applications (see selection information in aidebar on next page)
- And **DragSim**—1/8- and 1/4-Mile DragStrip Vehicle-Dynamic Simulation

tic or Sport-Compact, see simulation selection information in sidebar at right). Test cylinder heads, cams, induction systems, exhaust systems, fuels, nitrous, and much more! Then drop your best engine build-ups into *DragSim* for 1/8- or 1/4-mile drag testing. Find the best gear ratios, shift points, driving styles, and more.

This inexpensive *DynoSim-and-DragSim* software bundle will become your own private dyno test cell and drag strip (*Pit Pass* not required!).

All Sims run on any Windows95/98/Me/2000/XP equipped PC—see page 67 for general system requirements.

For <u>Domestic</u> Applications

Advanced Drag-Racer's Bundle
Only $199.95 (Retail $379.95) **MDB-215**

Advanced Drag-Racer's Bundle Including Both ProTools Kits™
Only $299.95 (Retail $429.95) **MDB-225**

For <u>Sport-Compact</u> Applications

Advanced Drag-Racer's Bundle
Only $199.95 (Retail $379.95) **MDB-235**

Advanced Drag-Racer's Bundle Including Both ProTools Kits™
Only $299.95 (Retail $429.95) **MDB-245**

Dynomation-Series™ Professional Bundles

Special Package Pricing On Our Most Powerful, Professional Simulations

Dynomation™ Professional Bundles

Dynomation Advanced Engine Simulation, All Vehicle Simulations, Plus FREE CamDisk2005 And Free 2nd Day Shipping!!

Setting new standards in engine simulation technology, *Dynomation™* allows users to "look inside" a running engine to expose, analyze, and harness the powerful wave dynamics controlling induction and exhaust flow. Explore the effects of runner lengths, port taper angles, header tubing and collector dimensions, cam-timing interactions, and much more.

This *Dynomation Bundle* combines our *Professional-Level* engine simulation with *DragSim*, our Advanced 1/8- and 1/4-mile "straight-line" racing simulation and *FastLapSim* that will help you find the best combination for any closed-course road racing or parking-lot slalom. This is the ultimate
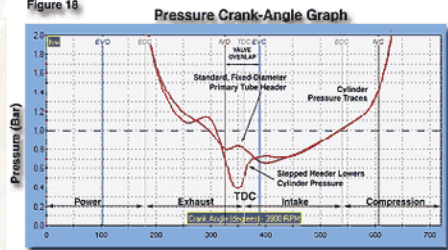
Includes:
- **Dynomation**—Engine Simulation
- **DragSim**—DragStrip Vehicle Simulation
- **FastLapSim**—Road-Course Simulation
- **Free CamDisk2005™** CamFile-Library CD
- **Free 2nd-Day Shipping!** (Free shipping within Continental US)

Note: This simulation bundle has been designed for both Domestic and Sport-Compact applications.

professional simulation bundle at a substantially discounted price (save up to $250!). Plus, this package includes the *CamDisk2005* camfile library that expands Dynomation testing capability to over 6,000 camfiles! Plus you'll get **Free 2nd Day Shipping** to any address in the continental US!

All Sims run on any Windows95/98/Me/2000/XP equipped PC (except Dynomation™ which is not compatible with Windows95)—see page 67 for general system requirements.

Figure 18
Pressure Crank-Angle Graph

Dynomation lets you "look inside" a running engine and analyze gas pressure and flow. This test reveals why stepped headers improved scavenging.

Dynomation™ Pro Bundle
Only $499.95 (Retail $749.95) **MDB-415**

Dynomation™ Pro Bundle Including All ProTools Kits™
Only $699.95 (Retail $1049.95) **MDB-425**

ProTools™ Features: If you are professional engine builder or designer, you will find the additional tools and features supplied in our ProTools™ Kits valuable additions to Dynomation and the other sims in this bundle. Here is a sampling of key ProTools™ Kit contents—see pages 4-5 and visit our website for additional ProTools™ information:

• ProIterator™—An automated testing technology. Adds powerful testing and analysis capability, including custom data ranges, induction-system *Iteration*, areas under the power and torque curves, and more.
• DataZones™—Extends the graphic-display and data-analysis capabilities of all Sims in this bundle.
• Additional Simulation Data And Analysis—View pressures, forces, and other data on the graphs and tables in all the software in this bundle.
• Import FlowPro, CamProPlus, S96, CamDoctor Files—ProTools™ adds the capability to import *FlowPro* flow bench files and a number of Cam Profile files.
• ProPrinting™—Turns testing results into a comprehensive "presentation" report of simulation-derived data.

Selecting An Engine-Dyno Simulation

Choose The Engine Simulation Package That Best Fits Your Requirements

ProRacing Sim, LLC., produces the *DeskTopBasic™* and *DeskTop-Series™* simulations that emphasize ease-of-use and low cost, but still maintain a high degree of accuracy and offer a surprisingly broad range of features. Our more advanced *Sim-Series™* simulations include powerful modeling capabilities that let you "dig deeper" into engine science. Finally, the *Dynomation-Series™* offers the most advanced simulation technolgy and features, and is best suited for engine designers, professional racers, or serious enthusiasts.

Sim- and *Dynomation-Series* simulations are available in *Advanced* and *ProTools™* versions. *ProTools Kits* add features that professional engine builders and Pro Shops need to give them the "edge" over the competition, both in the marketplace and at the race track.

Using The Feature Table

The *Engine Simulation Feature Table* on the opposite page is made up of columns organized into three main categories: 1) *DeskTopBasic™, DeskTop™* and *Sim-Series™* software, 2) *SC-DynoSim™ Sport-Compact* applications, and 3) the Professional *Dynomation™* simulations.

The first category (of four columns) includes engine simulations for domestic engine applications. Modeling capability and *PowerFeatures™* are shown in the left-hand column. A description of each *PowerFeature* can be found starting on page 57.

The second category—over the next three columns—details simulations designed for Sport-Compact applications.

The third category—the last two columns—details the features found in the Professional *Dynomation™* simulations (Dynomation simulations model both Domestic and Sport-Compact engines).

ProTools™ Features

The *ProTools* columns (yellow) illustrate the additional features available when *ProTools* are purchased or activated.

Note: For a complete list of program features, costs, and more, please visit *www.ProRacingSim.com*.

Note: The engine simulation *Power Features™* listed in this table are explained on page 57. Individual simulation packages are detailed elsewhere in this catalog (refer to the *Table Of Contents* on page 3).
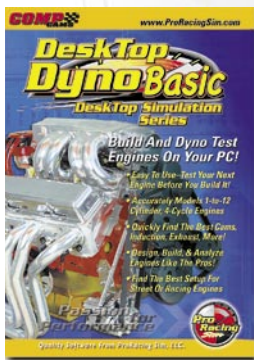
ProRacing Engine Simulations

Engine Simulation Program Features 40 *Power Features*™ (Numbered Items) Described On Page 57	DeskTop And Dyn oSim Engine Simulations				Sport-Compact Engine Simulations			Dynomation *Professional Series* Engine Simulations	
	DeskTop Dyno Basic	DeskTop Dyno	DynoSim Advanced	DynoSim ProTools™	DeskTop SC Dyno	SCDynoSim Advanced	SCDynoSim ProTools™	Dynomation Advanced	Dynomation ProTools™
Dyno-Testing RPM Range	2500 to 8000 rpm	2000 to 8500 rpm	1500 to 11500 rpm	1000 to 14500 rpm	2000 to 8500 rpm	1500 to 11500 rpm	1000 to 14500 rpm	1500 to 11500 rpm	1000 to 14500 rpm
Bore Range Limits	3.00 to 7.00-in	3.00 to 7.00-in	2.50 to 7.00-in	2.00 to 7.00-in	3.00 to 7.00-in	2.50 to 7.00-in	2.00 to 7.00-in	2.50 to 7.00-in	2.00 to 7.00-in
Stroke Range Limits	3.00 to 7.00-in	2.50 to 7.00-in	2.00 to 7.00-in	1.50 to 7.00-in	2.50 to 7.00-in	2.00 to 7.00-in	1.50 to 7.00-in	2.00 to 7.00-in	1.50 to 7.00-in
Includes Color Users Manual	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Best For Domestic Engines	Yes	Yes	Yes	Yes	——	——	——	Yes	Yes
Best For Sport Compact	——	——	——	——	Yes	Yes	Yes	Yes	Yes
Alternate Fuels/Nitrous (1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AirFlow Converter™ (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CamMath QuickCalculator™ (3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Variable Valve Timing (4)	——	——	——	——	Yes	Yes	Yes	Yes	Yes
Advanced C/Ratio Calculator (5)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rod-Length/Ratio Modeling (6)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Forced-Induction Modeling (7)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
High-Speed Simulation (8)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Custom Cylinder-Head Flow (9)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Multi-Page Test Reports (10)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DirectClick™ Menus (11)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Real-Time "What-If" Testing (12)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
U.S./Metric Units (13)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
One-Click QuickCompare™ (14)	——	——	——	——	No	Yes	Yes	Yes	Yes
Test Multiple Engines (15)	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes
On-Graph Comparisons (16)	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Cam Manager™ (17)	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Import CamData™ Files (18)	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes
One-Click *Iterative*™ *Testing* (19)	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Extended Color Displays (20)	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Extended-Data Displays (21)	No	No	No	Yes	No	No	Yes	No	Yes
ProPrinting™ Dyno Reports (22)	No	No	No	Yes	No	No	Yes	No	Yes
ProData™ Tables (23)	No	No	No	Yes	No	No	Yes	No	Yes
Graph DataZones™ (24)	No	No	No	Yes	No	No	Yes	No	Yes
Prolterator™ *Testing* (25)	No	No	No	Yes	No	No	Yes	No	Yes (FE Only)
Analyze Area Under Power And Torque Curves (26)	No	No	No	Yes	No	No	Yes	No	Yes (FE Only)
Full Wave-Action Simulation (27)	No	No	No	No	No	No	No	Yes	Yes
Induction/Exhaust Pressures (28)	No	No	No	No	No	No	No	Yes	Yes
Runner Lengths & Tapers (29)	No	No	No	No	No	No	No	Yes	Yes
Megaphone/Normal Headers (30)	No	No	No	No	No	No	No	Yes	Yes
Piston-Pin Offset Modeling (31)	No	No	No	No	No	No	No	Yes	Yes
3D-Engine Display (32)	No	No	No	No	No	No	No	Yes	Yes
Graph Reticle Synchronized (33)	No	No	No	No	No	No	No	Yes	Yes
Import Cam, And Flow Files (34)	No	No	No	No	No	No	No	Yes	Yes
Import Cam Profile Files (35)	No	No	No	No	No	No	No	No	Yes
Import FlowPro Files (36)	No	No	No	No	No	No	No	No	Yes
Fine And SuperFine Mesh (37)	No	No	No	No	No	No	No	No	Yes
Air-Fuel Ratio Vs. RPM Map (38)	No	No	No	No	No	No	No	No	Yes
Mass-Flow Analysis (39)	No	No	No	No	No	No	No	No	Yes
Dual-Sim (HybridSim™) (40)	No	No	No	No	No	No	No	No	Yes

ProRacing Sim Engine Simulations

Accurate, Easy-To-Use Software For Performance Enthusiasts And Pros

DeskTop DynoBasic™ Engine Simulation

The "Best-Buy" In Easy-To-Use, Engine-Dyno-Sim Software

Note: This simulation has been designed primarily for domestic engine applications. See pages 16-17 for comprehensive engine simulation *Feature Comparisons*.

What You Can Do With *DeskTop DynoBasic*:

- **Build And Test Virtually Any 1-to-12 Cyl, 4-Cycle Engine!**
- **Find The Best Parts For Street Or Racing Applications**
- **Easy Component Selections**
- **Test Alternate Fuels And Nitrous-Oxide Injection!**
- **Display And Print Components And Test Data**
- **Test Carburetors/Injection, Stock & Racing Manifolds**
- **Side-By-Side Engine Tests**
- **Built-In Calculators (Cam, Compression, Airflow)**

DeskTop DynoBasic™ is an easy-to-use engine simulation that combines low cost with excellent predictive accuracy. Use simple component menus to select engine parts or enter your own custom specifications. Then click *Run* and watch the simulation draw power and torque curves and display exact results in an accompanying table. In just minutes, you can compare camshafts, cylinder heads, compression ratios, valve sizes, intake manifolds, fuels, nitrous oxide, exhaust systems, and more! Find out what works and what doesn't, fast!

DeskTop DynoBasic displays power and torque results to within 7% of true

Select components and engine specifications from simple drop-down menus! Begin a simulation by clicking the RUN button.

dyno data. This accuracy is possible because *DynoBasic* incorporates a full-cycle, filling-and-emptying mathematical simulation model known for speed and accuracy across a wide range of engines. Test any 1- to 12-cylinder, 4-cycle engine, perform rapid back-to-back testing, and evaluate a virtually unlimited number of component combinations.

If you've ever asked the question: "How can I find out what works best on my engine without spending a fortune on parts and testing?", *DynoBasic* is your key to locating optimum setups for any application…before you spend a nickel on parts! Save time. Save money. And have fun designing your "ultimate" engine for the street or all-out racing.

There is no other simulation software on the market that compares with the *DeskTop DynoBasic* in low cost and high accuracy. It's is so easy to use, you'll build and test your first engine within minutes of installing the program!

DeskTop DynoBasic runs on any Windows95/98/Me/2000/XP equipped PC—see page 67 for general system requirements.
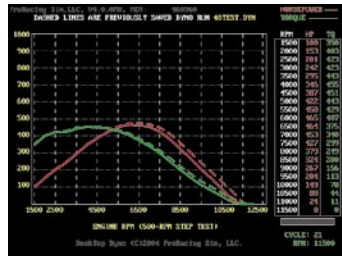
Power and Torque are clearly displayed on the *Results Screen*. Dotted lines show comparisons. Exact values are listed in the table on the right.

Tune These Key Engine Components:

- **Bore And Stroke**
- **Number Of Cylinders**
- **Intake And Exhaust Valve Diameters**
- **Modify Valve-Event Timing, Valve Lift**
- **Change Lobe Centerlines And Durations**
- **Up To 3000cfm Peak Induction Flow**
- **Any Carburetor (multiple or single) or Fuel Injection**
- **Intake Manifolds And Exhaust Systems**
- **Compression Ratios From 6:1 to 18:1**
- **Various Fuels, Including Gasoline, Methanol, More**
- **Nitrous-Oxide With Gasoline**
- **And More!**

DeskTop Dyno™ Engine Simulation

A Low-Cost, Engine Simulation With Advanced Features
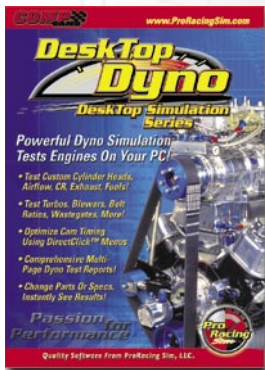
Note: DeskTop Dyno has been designed primarily for domestic engine applications. DeskTop SC-Dyno is best applied to Sport-Compact engine designs. See pages 16-17 for comprehensive engine simulation *Feature Comparisons*.

Additional Features In *DeskTop Dyno*:

- **Higher Simulation Speeds**
- **Hundreds Of New Selections**
- **Ron Length/Ratio Modeling**
- **Switch Between US & Metric**
- **Forced-Induction Roots, Centrifugal, Turbo Modeling**
- ***Direct-Click*™ Custom Menus**
- **Alternate Fuels And Nitrous**
- **Auto-Scaling Graphs**
- **Multi-Page Test Reports**
- **Model Custom Head Flow**
- **Stock & Racing Manifolds**
- **Engine MEPs, Efficiencies**
- **Use *Advanced* Calculators (Cam, Compression, Airflow)**
- **Real-Time "What-If" Testing And Component Display**

The ***DeskTop Dyno™*** (***DeskTop SC-Dyno™*** for Sport-Compact applications) offer significant enhancements over *Basic-level* simulations, including improved performance, extended component testing, custom airflow modeling, forced induction, additional components and selections, and higher predictive accuracy.

Use the *Dynos* to build and test any 1- to 12-cylinder, 4-cycle engine you can imagine! A custom *Direct-Click™* interface (a ProRacing Sim exclusive) simultaneously shows component parts on the left and engine test results on the right. Simple menus let you choose

***DeskTop DynoSim* Vs. DeskTop SC-Dyno—If you primarily work with Domestic engines, the *DynoSim* is for you. On the other hand, if you build the new high-tech engines with variable valve timing, four-valve cylinder heads (similar to Honda engines), the *Sport-Compact Sim* is your best choice.**

from a wide variety of parts, or enter your own custom specs. Instantly display horsepower, torque, VE, and other engine performance data on customizable graphs and tables to within 5% of real-world dyno results.

Designed for engine enthusiasts, these simulation packages can evaluate custom cylinder heads, any cam timing, a wide range of bores and strokes, valve sizes, even analyze connecting-rod length and angularity. Test forced-induction systems, including turbos, roots, and centrifugal blowers. Plus, you'll find several *advanced* built-in tools and calculators like the *Compression-Ratio* and *Cam-Math QuickCalculators.*™ Switch between U.S. and metric units. Even print multi-page, dyno-test reports with all component specs and color power and torque curves.

DeskTop Dyno (and SC-Dyno) run on any Windows95/98/Me/2000/XP equipped PC—see page 67 for general system requirements.

***DeskTop Dyno*™ lets you quickly build and test virtually any engine, even supercharged.**

Tune These Key Engine Components:

- **Bore And Stroke**
- **Number Of Cylinders**
- **Intake/Exhaust Valve Sizes**
- **1, 2, Or 3 Valves Per Port**
- **Valve-Event Timing, Valve Lift**
- **Lobe/Lifter Acceleration**
- **Lobe Centerlines/Durations**
- **Intake/Exhaust Port Designs**
- **Wedge, Canted, Hemi, Pent-roof, And Four-Valve Heads**
- **Accepts Flow-Bench Data**
- **Model Any Stock Or Custom Cylinder Head**
- **Any Carburetor/Fuel Injection**
- **Intake/Exhaust Systems**
- **6:1 to 18:1 Compression**
- **Gasoline, Methanol, More**
- **Nitrous-Oxide, And More!**

Note: This simulation can be easily upgraded with Advanced Features (see page 7). Buy only what you need now, upgrade later!

For <u>Domestic</u> Engines
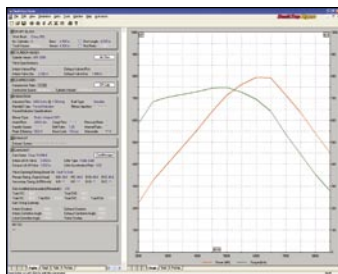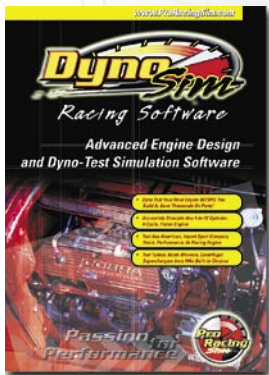
DeskTop Dyno
Only $74.95 (Retail $99.95)   **SD-102**

For <u>Sport-Compact</u> (SC) Engines

DeskTop SC-Dyno
Only $74.95 (Retail $99.95)   **SD-103**

DynoSim™ Advanced Engine Simulation

State-Of-The-Art, Advanced Engine Simulations

Note: DynoSim has been designed primarily for domestic engine applications. SC-DynoSim is best applied to Sport-Compact engine designs. See pages 16-17 for comprehensive engine simulation *Feature Comparisons*.

The Advanced *DynoSim™* (and the *SC-DynoSim™* for Sport-Compact applications) are state-of-the-art engine simulations from the experts at ProRacing Sim. These *Sim-Series™* packages have unprecendented power to find the best component combinations for any engine project. Super-fast simulation routines—combined with breakthrough *Iterative Testing™*—makes *Sim-Series* software the most powerful, comprehensive, and *fun* engine dyno simulations you can buy for under $200!

Build stock, street, performance, or racing engines with an easy-to-use *DirectClick™* Windows interface. Se-

Additional Features In *DynoSim™*:

- **Model/Display/Graph More Simulation Results Data**
- **2.0 to 7.0-in Bores ***
- **1.5 to 7.0-in Strokes ***
- **Model Multiple Engines And Compare (up to 4 engines)**
- **Use Powerful *CamManager™***
- **Change All Cam-Timing Values; See Results Instantly!**
- **Import And Export CamFiles**
- **1000+ CamFiles Supplied**
- **Expand CamFile Library With CamDisk2005 (to 6,000+)**
- **Import And Export Custom Cylinder Head FlowFiles**
- **Use *Iterative Testing™* To Find Optimum Components, Automatically!**
- **Prolterator™ Adds Tuning Options And Data Analysis ***
- **Analyze Area Under Power And Torque Curves ***
- **Graph *DataZones™* ***
- **Highly Accurate, Optimized Filling-And-Emptying Model**

** Indicates *ProTools™* features (see pages 5 and 25 for more info on *ProTools Kit* enhancements).

lect from a wide range of components, various fuels, Nitrous, forced induction, any cylinder head airflow, load/save CamFiles, and much more!.

Software Overview: *DynoSim* incorporates exclusive technology that helps you locate optimum component combinations for any engine application faster and easier than ever before. Using the *QuickIterator,*™ just click one button and watch DynoSim "home in" on the best parts combination for you, automatically! With *ProTools™* (see page 25), run hundreds, thousands, or even millions of tests! The Iterator™ will perform all the testing, keep track of all the results, and display the best combinations for you to review.

User Interface And Features: DynoSim has a terrific user interface, and it is even easier to use with *Quick-Access™* buttons and *DirectClick™* menus. Change parts and specifications simply by clicking on any component shown on screen. Nothing could be easier! All data and graphs can be printed (and previewed) in color on any Windows-compatible printer. You can even model and compare several engines at once; just click on an *Engine Selection Tab* to focus-in and further analyze any engine design.

CamManager™: The *CamManager™* is a powerful, exclusive feature of *DynoSim*, that lets you see cam timing dynamically change as you modify any cam spec. Tune any cam timing point
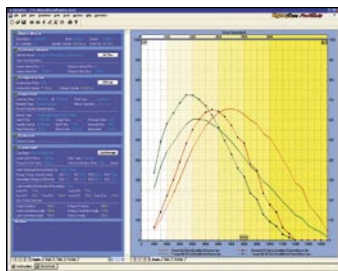
Direct-Click™ **interface shows parts on the left, test results on the right. Model multiple engines, perform on-graph comparisons. All within 5% of true dyno data.**
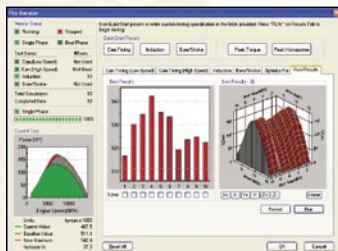
ProIterator™ **performs exhaustive analysis and finds the best parts, automatically.**
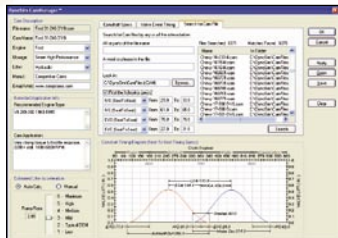
CamManager™ **is a powerful tool that lets you visually fine tune cam timing, lifter acceleration.**

independently and display the results instantly! Use the search capabilities built-in the *CamManger™* to find *CamFiles* that optimize your engine designs. Search through 1000+ CamFiles included with *DynoSim* in less than 10 seconds (on most computer systems)! Expand your CamFile library to 6000+ camfiles with the **CamDisk2005™** (see page 30)!

Technical Overview: *DynoSim* calculates the gas dynamic, thermodynamic, and frictional physics of virtually any 4-cycle internal-combustion engine. Horsepower is determined from an analysis and integration of cylinder pressures from 500 to 14,500rpm (rpm range with *ProTools™*). All basic engine components and specifications are accurately modeled, including bore, stroke, 1-to-12 cylinders, a wide range of cylinder heads and port configurations, valve sizes, compression ratios, naturally-aspirated and forced-induction systems, induction airflow, exhaust systems, and virtually any camshaft timing, valve lift, and *Lifter Acceleration Rate*. American and Metric units are supported, and switching between unit systems is fast and easy.

Users Manual: The *DynoSim* is supplied with a 140+ page, full-color, on-disk **Users Manual** (directly accessible from within the *DynoSim*) that details the features of this comprehensive engine simulation. If you wish, you can download a copy of this manual to review the capabilities of this software before

Use DynoSim To Tune These Key Engine Components/Specs:

- **Bore And Stroke**
- **Number Of Cylinders**
- **Intake/Exhaust Valve Sizes**
- **1, 2, Or 3 Valves Per Port**
- **Built-In And Custom Heads**
- **Any Port Airflow Measured At Any Pressure-Drop/Valve-Lift**
- **Wedge, Canted, Hemi, Pentroof, 4-Valve Heads**
- **Model Any Cylinderhead Flow**
- **Valve Event Timing, Valve Lift**
- **Lobe/Lifter Acceleration**
- **Lobe Centerlines/Durations**
- **Intake/Exhaust Port Designs**
- **Any Carburetor/Fuel Injection**
- **Intake-Systems Modeling**
- **Forced-Induction Modeling**
- **Exhaust-System Modeling**
- **6:1 to 18:1 Compression**
- **Gasoline, Methanol, Nitrous And Other Alternate Fuels**
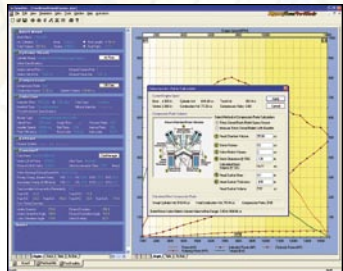
DynoSim **also incorporates several powerful tools, like this easy-to-use** *Compression Ratio QuickCalculator™***.**

you buy! Just visit the Support Page at *www.ProRacingSim.com*.

DynoSim* and *SC-DynoSim* run on any Windows95/98/Me/2000/XP equipped PC—see page 67 for general system requirements.

Important Selection Note:

DynoSim Vs. *SC-DynoSim*—**If you primarily work with Domestic engines using either "standard" or racing intake manifolds, like single-plane, dual-plane, LT1, LS1 inductions, etc., the *DynoSim* is for you. On the other hand, if you build the new high-tech engines with variable valve timing, four-valve cylinder heads (similar to Honda engines), the *Sport-Compact Sim* is your best choice.**

For <u>Domestic</u> Engines

DynoSim™ Advanced
Only $149.95 (Retail $189.95)   **SD-311**

DynoSim™ Advanced
Including ProTools Kit™
Only $199.95 (Retail $249.95)   **SD-321**

For <u>Sport-Compact</u> (SC) Engines

SC-DynoSim™ Advanced
Only $149.95 (Retail $189.95)   **SD-331**

SC-DynoSim™ Advanced
Including ProTools Kit™
Only $199.95 (Retail $249.95)   **SD-341**

ProTools™ Features: If you are a serious enthusiast, racer, or professional engine builder, you will find the additional tools and features supplied in *ProTools™ Kit* a valuable addition to the Advanced Mode of DynSim. Here is a sampling of key *ProTools™ Kit* contents:

• *ProIterator™—An automated testing technology. Adds powerful testing and analysis capability, including custom ranges, induction-system Iteration, areas under the power and torque curves, and more.*
• *DataZones™—Extends the graphic-display and data-analysis capabilities of DynoSim.*
• *Additional Simulation Data And Analysis—View simulated pressures, forces, and other data on the graphs and tables in DynoSim.*
• *ProPrinting™—Turns simulation results into a comprehensive "presentation" report of dyno-test data.*
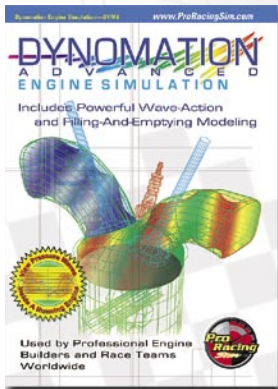
Note: The Advanced versions of these simulations can be easily upgraded over the phone with *ProTools* features (see page 7). Buy what you need now, upgrade later!

Dynomation™ Advanced Engine Simulation

Professional, Wave-Dynamics Engine Simulations

Note:
Dynomation will accurately model both Domestic and Sport-Compact engine applications. See pages 16-17 for comprehensive engine simulation *Feature Comparisons*.

Dynomation™ Key Features:

- Determine Horsepower And Torque With High Accuracy
- Analyze Pressure Waves And Their Affect On Power
- Display Intake And Exhaust Pressures And Flow
- Display Cylinder Pressures
- Modify Runner Lengths And Taper Angles!
- Detect Intake Reversion And Other "Power Robbers"
- Test Header And Collector Lengths And Diameters
- Rod-Length/Pin-Offset
- 3D Engine Display Showing Port And Mass Flow
- CamManager™ Shows Cam Timing & Lobe Acceleration
- Exclusive Iterative Testing™
- Test Fuels And Nitrous
- Import Cam And Head Files
- Import Cam-Profile Files
- Import Flow-Pro™ Files
- Print Parts Setup And Graphs
- Test Carburetors/Injection
- Apply Air/Fuel Ratio Map
- Model/Compare 4 Engines
- Several Built-In Calculators
- And Much More!

Dynomation™ has become widely recognized by professional engine builders and racers as the World's leading wave-dynamics engine simulation package. After nearly 20 years of successful application, continued testing and many improvements by ProRacing Sim software developers, *Dynomation Advanced™* is now available to engine professionals and serious enthusiasts.

Software Overview: Setting new standards in simulation technology, *Dynomation Advanced* allows users to "look inside" a running engine and analyze the powerful wave dynamics controlling induction and exhaust flow.

"Look inside" a running engine and analyze gas pressure and flow. Using advanced methods, Dynomation reveals the gas-dynamic "secrets" of the IC engine.

For the first time, anyone can explore the effects of runner lengths, port taper angles, header tubing and collector dimensions, cam-timing interactions, and much more. No other device or simulation does a better job of helping you understand internal mass flow and its consequences on cylinder filling and emptying.

Dynomation applies this tremendous modeling capability to a virtually unlimited range of engines, from humble single-cylinders to exotic V-12 racing powerplants. Design, build, and test a 1600hp ProStock engines, passenger-car daily drivers, Sport-Compact variable-valve-timing racers, or motorcycle engines (even those with megaphone exhaust systems)!

Dynomation includes state-of-the-art *Forced Induction* modeling. Based on built-in blower-map data for all Turbos, Centrifugals, Roots, and Screw-type superchargers, this in-depth modeling not only allows you to determine optimum

Tune These Engine Components And Specs:

- **Bore, Stroke, Pin Offset, Rod Length, Rod Ratio, No. Cyl.**
- **Wedge, Canted, Hemi, Pentroof, 2- & 4-Valve Heads**
- **Int/Exh Valve Sizes**
- **1, 2, Or 3 Valves Per Port**
- **Flow-Bench Data Modeling**
- **CRatio From 6:1 to18:1**
- **Extensive Intake Modeling**
- **Open/Muffled Exhaust**
- **Any Carburetor/Injection**
- **Intake/Exhaust Port Designs**
- **Intake Runner Length**
- **Taper-Angle Analysis**
- **Turbos And Superchargers**
- **Roots, Screw, Centrifugals**
- **Intercoolers/Efficiency**
- **Gasoline, Methanol, Propane**
- **Nitrous-Oxide W/Gas or Meth.**
- **Straight or Stepped Headers**
- **Tube Size/Length/Taper**
- **Collectors/Megaphones**
- **Mufflers, Catalytic Converters**
- **Minimum Port Areas**
- **In-Block, SOHC, DOHC Cams**
- **Model Standard And Variable Valve Timing Systems (VTEC)**
- **Overhead, Pushrod, Rockers, Any Ratios**
- **Modify All Valve-Event Timing**
- **Lobe Acceleration Modeling**
- **Lobe Centerlines/Durations**
- **Use Cam Profile or 10-Point Timing Methods**
- **Search 6000+ CamFiles**
- **And Much More! Our Most Powerful And Accurate Sim!**

blower selection, A/R Ratios, turbine sizes, and more, but also shows you when surge, overspeed, or choke are occurring!

User Interface And Features:
Dynomation was carefully designed for easy, intuitive use, even for beginners exploring engine dynamics for the first time! An exaggeration? Not at all. Supplied with an easy-to-read, 300-page Users Manual, anyone can learn how finite-amplitude pressure waves move, change, and flow within an engine. *You can easily see charge reversion and in-tune/out-of-tune conditions in the intake and exhaust passages.* Because Dynomation has been so carefully crafted, it is the best educational tool on engine pressure-wave dynamics available anywhere, hands down! And this fact is no better exemplified by the 3D realtime-rendered, cutaway engine available within Dynomation. Piston motion and gas-dynamic flow are rendered and synchronized with wave-dynamics and crank-angle results graphs. Drag a graph pointer and watch the engine move through its cycles, visualizing mass flow, exhaust and intake pressure waves, flow velocities, and more throughout the entire 4-cycle process!

Technical Overview: Dynomation incorporates two distinct engine simulation models: 1) A *Filling-And-Emptying* simulation that provides extremely fast mathematical solutions to engine physics, making this technique a uniquely
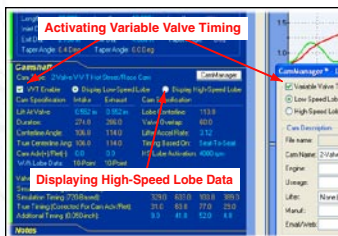
Variable-Valve-Timing modeling can be activated with a single mouse click. To display High-Speed lobe timing, click the *Display High-Speed Lobe* radio button.
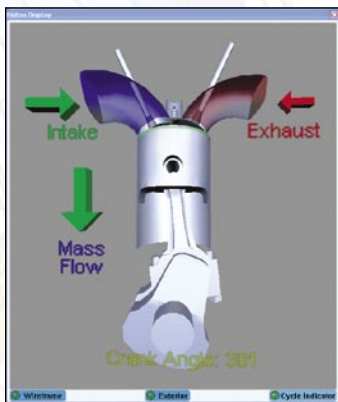
Dynomation includes a real-time, 3D-Engine rendered dynamically showing valve and piston position. Port pressures and velocities are indicated with shades of color and directional arrows. With *ProTools,™* functionality is extended to include *Mass Flow* indicators (flow into and out of the cylinder).

powerful and rapid way to "ballpark" engine design, and 2) A full *Wave-Dynamics Method-Of-Characteristics* simulation that analyzes the complex pressure-wave dynamics and particle flow in intake and exhaust ducting. Using both simulations, you can "home in" on the best port sizes, shapes, runner lengths, header-tubing sizes, cam timing, valve motion, and more!

The Complete Package: Dynomation includes a great deal more. You'll also find hundreds of other features that have become ProRacing Sim's trademarks, including: 1) rapid *Iterative Testing™*, 2) comprehensive *CamManager™,* 3) extensive CamFile, CylinderHead-Flow and Engine-File import, 4) several built-in calculators, 5) multiple-engine analysis, 6) side-by-side, and one-click QuickComparisons™, 7) professional multi-page dyno-test reports, and much more.

Dynomation runs on any Windows98/Me/2000/XP equipped PC (not compatible with Windows95)—see page 67 for other general system requirements.

Dynomation™ Engine Sim
Only $399.95 (Retail $449.95) **SD-411**

Dynomation™ Engine Sim Including ProTools Kit™
Only $599.95 (Retail $649.95) **SD-421**

ProTools™ Features: If you are a racing professional, you will find the additional tools and features supplied in *ProTools™ Kit* a valuable addition to the Advanced Mode of Dynomation. Here is a sampling of key *ProTools™ Kit* contents:

• *ProIterator™—An automated testing technology. Adds powerful testing and analysis capability, including custom ranges, induction-system Iteration, areas under the power and torque curves, and more.*

• *DataZones™—Extends the graphic-display and data-analysis capabilities of Dynomation.*

• *Additional Simulation Data And Analysis—View simulated pressures, forces, and other data on the graphs and tables in Dynomation.*

• *ProPrinting™—Turns simulation results into a comprehensive "presentation" report of dyno-test data.*

Additional ProTools Features In Dynomation: Import Cam Profile files, import Flow-Pro flowbench files, Fine and Superfine Mesh modes, Air-Fuel Ratio Map, Mass-Flow Analysis, Dual-Sim (HybridSim™) modeling.

ProRacing Sim Engine Simulations

Accurate, Easy-To-Use Software For Performance Enthusiasts And Pros

CamDisk2005™ CamFile Extension Library

Add Up To 6000+ CamFiles To ProRacing *Sim-Series*™ And *Dynomation-Series*™ Engine Simulations

Note: *Cam-Disk2005*™ contains over 6000 CamFiles for our *Sim-* and *Dynomation-Series*™ engine simulations (not compatible with *DeskTop-Series* simulations).

What You Can Do With *CamDisk2005*™:

- Expand CamFile Library Of DynoSim Or Dynomation
- Test Up To 6000+ Cams!
- Cams From Numerous Cam Manufacturers
- Covers All Major Engine Families And Applications
- Full 10-Point Timing Provided
- Analyze Lifter Acceleration In DynoSim and Dynomation
- Search All Cams In Seconds!
- Automatically Installs Into Engine Simulation Folders
- All CamFiles Fully Compatible With CamManager™

The new **CamDisk2005™** camfile library contains over 6000 CamFiles from virtually every major cam manufacturer that you can instantly test in our *Sim-* and *Dynomation-Series*™ engine simulations (not compatible with *DeskTop* simulations). You'll find mileage, towing, street performance, drag racing, road racing, and marine camshafts on this comprehensive disk. Save hours of time searching through cam catalogs.

Product Overview: All camfiles included on this disk are automatically installed (in the appropriate directory created when your ProRacing Sim engine

Excel™ spreadsheets are also included. Search and sort all cam data any way you choose.

simulation was installed). CamFiles on this disk combine with the 800-to-1000 camfiles supplied with your simulation to build an extensive camfile library of over 6000 cams that you can search, load, and test in any simulated engine.

Note: The Sport Compact (SC) DynoSim uses a unique camfile format. Because of this, CamDisk2005 adds only 400 CamFiles to the SC-DynoSim library.

The Real Power Of CamDisk2005™: DynoSim and Dynomation incorporate new modeling algorithms that can calculate *Lifter Acceleration Rates* for test cams. In order to complete this lobe-profile analysis, these simulations need access to all ten cam-timing data points (seat-to-seat and 0.050-inch opening and closing points plus peak valve lift for both the intake and exhaust lobes). All camfiles provided on *CamDisk2005™* have complete cam specifications that allow the automatic calculation of Lifter Acceleration. When Lifter Acceleration is known, power and torque can be more accurately predicted for any test engine.

CamDisk2005™ requires the separate purchase and installation of a ProRacing *Sim-* or *Dynomation-Series* engine simulation. Compatible with Windows95/98/Me/2000/XP.

CamDisk2005™ Library
Only $49.95 (Retail $59.95)   **SD-512**

Selecting A Drag-Racing Simulation
Choose The Drag Simulation Package That Best Fits Your Requirements

ProRacing Sim, LLC., produces several drag-racing, vehicle-dynamic simulation software packages. Our **DeskTopBasic™** and **DeskTop-Series™** simulations emphasize ease-of-use and low cost, but still maintain a high degree of accuracy and offer a surprisingly broad range of features. Our more advanced **Sim-Series™** simulations include powerful modeling capabilities that let you "dig deeper" into vehicle/driveline science.

Sim-Series simulations also are available in **Advanced** and **ProTools™** versions; the *ProTools* package (show in the yellow column in the *Feature Table* at right) is packed with features that professional racers, serious enthusiasts, and Pro Shops need to give them the "edge" over the competition, both in the marketplace and on the race track.

Using The Feature Table

The *Drag-Racing Simulation Feature Table* on the next page is organized into two main categories: 1) *DeskTop-Basic™, and DeskTop™ packages*, and 2) *Sim-Series™* applications.

The first category, consisting of two columns, includes our low-cost, yet powerful *DeskTop-Series* drag-racing simulations. Modeling capabilities and **PowerFeatures™** are listed in the left-hand column, and a description of each *PowerFeature* can be found starting on page 62.

The second category—over the last two columns—details features in our *Sim-Series*, drag-racing simulations, both *Advanced* and *ProTools* versions. These packages are full-featured, include additional modeling capability and menu selections, more detailed graphics and printouts, and even include special-purpose tools, like a *Traction Calculator* and *Iterative Testing.™* The *Sim-Series* packages are well suited for the serious enthusiast and professional.

ProTools™ Features

The *DragSim* with **ProTools** (yellow column) illustrates the features available when *ProTools* are purchased or activated.

Note: For a complete list of program features, costs, and more, please visit *www.ProRacingSim.com*.

Note: The drag-racing simulation Power Features™ listed in this table are described on page 62. Individual simulation packages are detailed elsewhere in this catalog (refer to the Table Of Contents on page 3).

ProRacing 1/4- & 1/8-Mile Drag-Race Vehicle Simulations

Drag Race Simulation Program Features 16 *Power Features*™ (Numbered Items) Described on Page 62	DeskTop Simulation Series		DragSim Series	
	DeskTop Drag Basic	DeskTop Drag	DragSim Advanced	DragSim ProTools™
1/4-Mile Drag Testing	Yes	Yes	Yes	Yes
Front- Or Rear-Wheel Drive	Yes	Yes	Yes	Yes
Dragsters, Automobiles, Motorcycles	Yes	Yes	Yes	Yes
Load Engine Simulation Files	Yes	Yes	Yes	Yes
1/4- & 1/8-Mile Drag Testing	No	Yes	Yes	Yes
High-Speed Simulation (1)	No	Yes	Yes	Yes
Pop-Up TimeSlip™ (2)	No	Yes	Yes	Yes
Direct-Click Menus™ (3)	No	Yes	Yes	Yes
Multi-Page DragTest Reports (4)	No	Yes	Yes	Yes
Real-Time "What If" Testing (5)	No	Yes	Yes	Yes
U.S./Metric Units (6)	No	Yes	Yes	Yes
Test Multiple Vehicles (7)	No	No	Yes	Yes
On-Graph Comparisons With Up To Four Vehicles (8)	No	No	Yes	Yes
Extended Color Display (9)	No	No	Yes	Yes
One-Click Iterative™ Testing (10)	No	No	Yes	Yes
Advanced Traction Calculator (11)	No	No	Yes	Yes
ProData™ Graphic Displays Including Full-Track Data (12)	No	No	No	Yes
ProPrinting™ Extended Data Analysis And Reports (13)	No	No	No	Yes
Graph DataZones™ Displays (14)	No	No	No	Yes
ProIterator™ Advanced (Automatic) Testing (15)	No	No	No	Yes
Analyze Area Under Various Data Curves (16)	No	No	No	Yes

Mail-Order/Fax Discount Order Form

Amt		Part	Page	Description	Discount Price
	Simulation Bundles	MDB-103	8	**DeskTop Combo Pack™**	**$74.95**
		MDB-105	9	**DeskTop Software Bundle**	**$199.95**
		MDB-315	10	**Complete DynoSim™ Bundle For Domestic Engines**	**Advanced $299.95**
		MDB-325	10		**ProTools™ $399.95**
		MDB-335	10	**Complete DynoSim™ Bundle For Sport-Compact Engines**	**Advanced $299.95**
		MDB-345	10		**ProTools™ $399.95**
		MDB-215	12	**Drag-Racer's Bundle For Domestic Engines**	**Advanced $199.95**
		MDB-225	12		**ProTools™ $299.95**
		MDB-235	12	**Drag-Racer's Bundle For Sport-Compact Engines**	**Advanced $199.95**
		MDB-245	12		**ProTools™ $299.95**
		MDB-415	14	**Dynomation™ Professional-Series Bundle**	**Advanced $499.95**
		MDB-425	14		**ProTools™ $699.95**
	Individual Engine Sims	SD-101	18	**DeskTop Dyno-Basic™**	**$44.95**
		SD-102	20	**DeskTop Dyno™**	**$74.95**
		SD-103	20	**DeskTop SC-Dyno™**	**$74.95**
		SD-311	22	**DynoSim™ Advanced For Domestic Engines**	**Advanced $149.95**
		SD-321	22		**ProTools™ $199.95**
		SD-331	22	**SC-DynoSim™ Advanced For Sport-Compact Engines**	**Advanced $149.95**
		SD-341	22		**ProTools™ $199.95**
		SD-411	26	**Dynomation™ Professional Engine Simulations**	**Advanced $399.95**
		SD-421	26		**ProTools™ $599.95**
		SD-512	30	**CamDisk2005™ Library**	**$49.95**
	Drag Sims	SD-104	36	**DeskTop Drag-Basic™**	**$44.95**
		SD-105	38	**DeskTop Drag™**	**$74.95**
		SD-303	40	**DragSim™ Advanced Drag-Race Vehicle Simulation**	**Advanced $149.95**
		SD-304	40		**ProTools™ $199.95**
	Road Sims	SD-106	46	**DeskTop FastLap™**	**$74.95**
		SD-306	48	**FastLapSim™ Advanced Road-Race Vehicle Simulation**	**Advanced $149.95**
		SD-307	48		**ProTools™ $199.95**
	Accessories	SD-Demo	52	**ProRacing Sim 2005 Demo**	**FREE**
		DD-600	53	**DeskTop Dynos™ Book**	**$16.95**
		VD-700	54	**Using Computers To Build Horsepower VHS Video**	**$14.95**
				Sub Total Transfer This Amount To Table On Next Page	

Ordering Instructions

Mail/Fax these two pages with your payment (or fill in the Credit-Card Info below) to address/fax shown below. For fastest service, call our order desk at 901-259-2355 or order online at: www.ProRacingSim.com.

	Sub Total Amount From Discount Order Table (Previous Page)

	Shipping Costs
	1) Orders For Software Bundles ONLY (may include other items):
	   Free Shipping To Any US Destination (see below for International)
	2) All Other (Non-Bundle) US Destination Orders:
	   $9.95 Standard, **$14.95** Second Day, **$24.95** Overnight
	3) All Orders (Including Bundles) To International Destinations:
	   $14.95 International Air Mail

	Tennesse Residents Add 9.25% Sales Tax
	Total—Enclose Check/MoneyOrder Or Fill Out Credit-Card Information

Sold To (Name on credit card) _____

Street _____

Suite/Other _____ **Country** _____

City _____ **State** _____ **Zip** _____

Buyers Email _____

Ship To (Leave blank if same) _____

Street _____

Suite/Other _____ **Country** _____

City _____ **State** _____ **Zip** _____

Credit Card Payment Information

Name On Card _____

Card Number ⬜⬜⬜⬜–⬜⬜⬜⬜–⬜⬜⬜⬜–⬜⬜⬜⬜

Expiration Date ____ / ____ / ____ **We Accept:** ☐ **Visa** ☐ **Mastercard**

Phone ( ) ____ - _____ **Signature** _____

ProRacing Sim, LLC., 3400 Democrat Road, #207, Memphis, TN 38118
Order Line: 901-259-2355, Order Fax: 901-375-3443, www.ProRacingSim.com

DeskTop DragBasic™ Vehicle Simulation

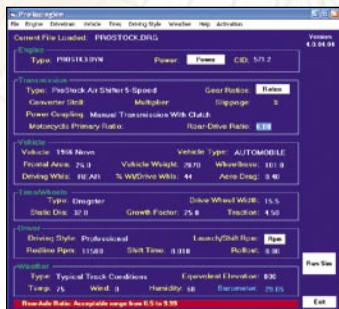**The "Best-Buy" In Easy-To-Use And Accurate Drag-Racing Sims**

Note: *DeskTop DragBasic* will accurately model both Domestic and Sport-Compact vehicles. See pages 32-33 for comprehensive drag-race vehicle-simulation *Feature Comparisons*.

What You Can Do With *DeskTop DragBasic™*:

• **Models 1/4-Mile Drag Races**
• **Design, Build, And Test Any Drag Vehicle In Seconds**
• **Simulates Automobiles, Dragsters, and Motorcycles**
• **Front- Or Rear-Wheel Drive**
• **Accuracy Within 7% Of True Track-Test Data**
• **Display & Print Test Data**
• **Back-To-Back Vehicle Testing**
• **Evaluate Driveline, Gear Ratios, Tires, Wheels, More!**
• **Simple Component Menus**
• **Built-In Error Correction**
• **Find The Best Setup, Fast!**

Components/specs are shown on screen in six category groups.

DeskTop DragBasic™ is an easy-to-use, 1/4-mile, drag-racing vehicle simulation that combines low cost with powerful predictive accuracy. Test front- or rear-wheel drive automobiles, motorcycles, even dragsters. Use simple drop-down menus to select vehicle and driveline components or enter your own custom specifications. Then click run, and watch *DragBasic* display ET, MPH, and draw comprehensive vehicle telemetry to within 7% of true track-test data.

If you've ever asked the question: "How can I find the best setup for drag-racing performance without spending a

fortune on parts?", *DeskTop DragBasic* is your key to finding the lowest ET, best acceleration, and highest top speed. Test gear ratios, vehicle weights, frontal areas, tire traction, launch and shift rpms, clutches, torque converters, engine power, even wind and weather conditions! Find out what works…before you spend a nickel on parts! And have fun designing your "ultimate" street hot rod or all-out drag car.

DeskTop DragBasic uses a comprehensive simulation to determine, inch-by-inch, vehicle performance throughout the 1/4-mile. Yet it is so easy to use, you'll build and test your first vehicle just minutes after installing the program. Perform back-to-back tests, compare a virtually unlimited number of possible combinations, and find the best parts for your vehicle, fast!

There is no other simulation software on the market that can compare with *DeskTop DragBasic* in low cost, ease of use, and simulation accuracy.

DeskTop DragBasic runs on any Windows95/98/Me/2000/XP equipped PC—see page 67 for other general system requirements.

Graphs and tables show vehicle performance, speeds, accelerations, times in gear, and more!

DeskTop DragBasic
Only $44.95 (Retail $69.95)   **SD-104**

Note: This simulation can be easily upgraded with Advanced Features (see page 7). Buy only what you need now, upgrade later!

Tune These Key Vehicle Components:

- **Any Engine Power Curve**
- **Load And Test DeskTop DynoBasic Engine Files**
- **1- to 6-Speed Transmissions**
- **Clutch Or Torque Converter (Any Stall Speed, Slippage)**
- **Any Trans Or Rear-Axle**
- **Any Motorcycle Primary Ratio**
- **Vehicle Weight, Percent On Driving Wheels, Wheelbase**
- **Frontal Area, Aero Drag, Driving Tire Width**
- **Static Tire Size And Growth Factor**
- **Traction, Launch, Shift, Tire Slip, and Redline Rpms**
- **Launch, Rollout, Shift Times**
- **Rollout Staging Distance**
- **Temperature, Humidity, Wind, And Elevation**
- **And More!**

DeskTop Drag™ Vehicle Simulation

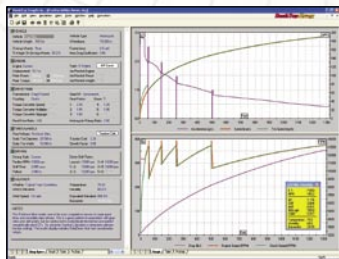**A Low-Cost, Vehicle Simulation With Advanced Features**
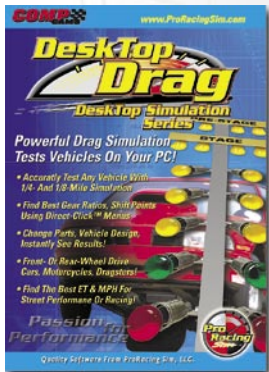
Note: *DeskTop Drag* will accurately model both Domestic and Sport-Compact vehicles. See pages 32-33 for comprehensive drag-race vehicle-simulation *Feature Comparisons*.

Additional Features In *DeskTop Drag™*:

- **Model 1/8- And 1/4-Mile Drag-Racing Events**
- **High-Speed Simulation Shows Test Results Instantly!**
- **True "What-If" Vehicle Testing**
- **See Parts And Results On Side-By-Side Display!**
- ***Pop-Up TimeSlip™* Provides Quick Performance Overview**
- **Direct-Click™ Menus Make Component Selections Easy!**
- **Print Multi-Page Reports**
- **Instantly See The Potential Of Any Component**
- **Test Driveline, Gear Ratios, Tires, Wheels, More!**
- **Error-Checking Interface**
- **Even Test Jet/Rocket Power!**

DeskTop Drag™ offers significant enhancements over DragBasic, including improved accuracy, full 1/4- <u>and</u> 1/8-mile testing, *Direct-Click™* menus for easy parts selection and more. Test a virtually unlimited range of component combinations. Display acceleration, engine speeds, elapsed times, aerodynamic drag, clutch and tire slippage, all to within 5% of real-world, track-test data!

DeskTop Drag™ is a vehicle-dynamic simulation that accurately determines the winning potential of any automobile, dragster, motorcycle, and even jet- and rocket-powered vehicles on your PC! A

Direct-Click™ **interface makes part selections a snap!**

PopUp TimeSlip™ gives you an instant overview of vehicle performance. Model basic, stock-production vehicles all the way up to Top-Fuel dragsters! Examine vehicle performance and telemetry on custom graphs and even review exact data values in detailed results tables. Test transmissions and rear-axle gear ratios, vehicle weights, frontal areas, tire traction, launch and shift rpms, clutches, torque converters, stall speeds, converter slippage, engine power, even wind and weather conditions! Find out what works before you buy expensive parts. Save time. Save money. And have fun designing your "ultimate" drag vehicle for any level of street performance or all-out competition.
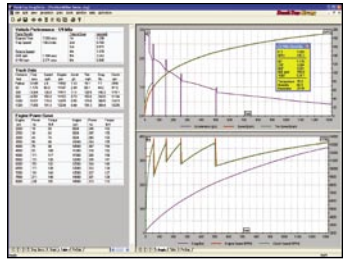
DeskTop Drag also provides several advanced features including multi-page, dyno-test reports with component lists and color vehicle-telemetry graphs, realtime testing, seamless units switching, and more.

DeskTop Drag runs on any Windows95/98/Me/2000/XP equipped PC—see page 67 for other general system requirements.

Flexible interface lets you display any drag-test results you need. A detailed data table complements results graphs.

Tune These Key Vehicle Components:
- **Any Engine Power Curve**
- **Load/Tests Dyno Engine Files**
- **Derive Power Curve From Peak Power/Torque Values**
- **1- to 6-Speed Transmissions**
- **Clutch Or Torque Converter**
- **Stall Speeds And Slippage**
- **Any Trans/Rear-Axle Ratios**
- **Any Motorcycle Primary Ratio**
- **Vehicle Weight, Wheelbase**
- **Frontal Area, Aero Drag, Driving Tire Width**
- **Tire Static Diameter And Tire-Growth Factor**
- **Traction, Launch, Shift, Tire Slip, and Redline Rpms**
- **Launch, Rollout, Shift Times**
- **Rollout Staging Distance**
- **Temperature, Humidity, Wind, And Elevation**
- **Test Jet/Rocket Thrust**
- **A Powerful Vehicle-Dynamics 1/4- And 1/8-Mile Simulation!**

DragSim™ Advanced 1/4- & 1/8-Mile Sim

State-Of-The-Art, Advanced Vehicle-Dynamics Simulations
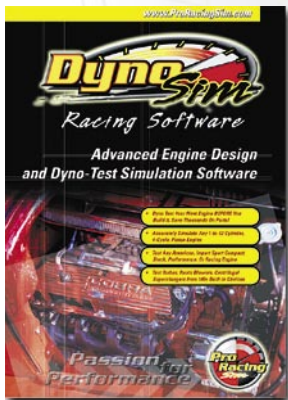
Note: *DragSim* will accurately model both Domestic and Sport-Compact vehicles. See pages 32-33 for comprehensive drag-race vehicle-simulation *Feature Comparisons*.

DragSim™ is a state-of-the-art, 1/4- and 1/8-mile, drag-racing vehicle-dynamics simulation from the experts at ProRacing Sim. With unprecedented speed and accuracy, *DragSim* lets you design, assemble, and track-test any car, motorcycle or dragster. Enter any engine power curve or load engines you've designed in the *DynoSim™* or *Dynomation™* engine simulations. Then evaluate performance through every inch of a simulated drag race. Instantly view ETs and speeds with a ***Pop-Up TimeSlip,*™** detailed telemetry graphs, or comprehensive data tables. Build

Additional Features In *DragSim™*:

- **Build/Test Multiple Vehicles**
- **Use Workbook Tabs To Instantly Switch Vehicles**
- **Compare Up To 4 At Once!**
- **Any Engine Power Curve**
- **Import Engines Built In *DynoSim* Or *Dynomation***
- **Iterative Testing™ Finds Best Setups, Automatically!**
- **Advanced Traction Calculator**
- **Display ProData Tables ***
- **Extended Data Analysis ***
- **Use Graph DataZones™ ***
- **Prolterator Let's You Setup Custom Testing/Analysis! ***
- **Even Analyze Areas Under Telemetry Curves! ***
- **Easy-To-Use, Direct-Click™ Interface/Extended Colors**
- **Optional *ProTools*™ Adds Professional Features**
- **Our Most Powerful Drag-Race Vehicle-Dynamics Simulation!**

** Indicates *ProTools*™ features (see pages 5 and 43 for more info on *ProTools Kit* enhancements).

multiple vehicles and compare of up to four at once. Even use exclusive *Iterative Testing™* to perform multiple tests and find the best setups for virtually any performance or racing application, automatically!

Software Overview: *DragSim™* performs a comprehensive simulation of the physics that act on a vehicle as it accelerates from a standing start to terminal velocity 1/8- or 1/4-mile down the track. The calculated data accurately predicts vehicle performance, inch-by-inch, throughout the entire race. The data displayed is similar to vehicle telemetry graphed by professional data-acquisition systems! You'll clearly see exact elapsed times, speeds, engine and clutch rpms, and much more! Graphs and tables show performance at various increments throughout the race, including rollout, 60 feet, 330 feet, 660 feet (1/8-mile), 1000 feet, and 1320 feet (1/4-mile). ETs and speeds can be compared with other vehicles to help you locate the best component combinations. And you can do all this without spending a dime on parts or track testing!

User Interface And Features: DragSim incorporates a custom user interface built from the ground-up by ProRacing Sim! The main screen combines an attractive *XP-theme* with *QuickAccess™* buttons and *DirectClick™* menus. These professional features let you select and change parts by simply clicking on any component. All vehicle

The DragSim custom *Direct-Click™* interface was built from the ground-up by ProRacing Sim. The main program screen shows components on the left and results on the right. *QuickAccess™* buttons offer convenient access to important features, like the power-curve data entry dialog shown below.
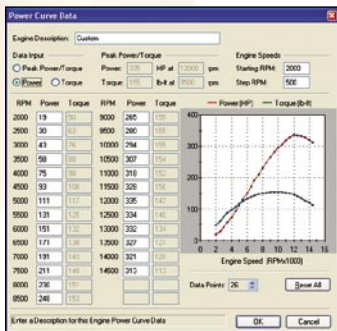
Load *DynoSim* or *Dynomation* engine files for drag testing. Or directly enter any engine power curve in this full-featured data entry dialog. *DragSim* can also derive a power curve from peak HP and Torque values.

components are visible on the left; track-test data is shown on the right. Nothing could be easier! Analyze Engine Rpm, Horsepower, Torque, Clutch RPM, Vehicle Speed and Acceleration, Tire Speed, Tire Slippage, Driving Force At Wheels, Aero Drag, and more! View all test results in full-color graphs. All components and data can be printed in color on any Windows-compatible printer.

While *DragSim™* is extremely sophisticated, it will never overwhelm you with data. For example, an easy-to-read, *Pop-Up TimeSlip™* is always available that provides an instant overview of vehicle performance.

A quick glance will help you make judgments about gear ratios, shift points, vehicle weight, and it can even help you evaluate traction and wheelspin. Similar in appearance a paper time slip, the *Pop-Up TimeSlip™* provides a truly helpful, "at-a-glance" summary of vehicle performance.

1/4 Mile TimeSlip	
E.T.	7.093
MPH	190.2
60'	1.176
330'	3.004
660'	4.551
660 mph	159.0
1000'	5.917
Temperature	75.0
Humidity	60.0
Barometer	29.05

Quick/ProIterators™: *DragSim™* also includes another ProRacing Sim exclusive technology that helps you find optimum combinations for any vehicle faster and easier than ever before. Our *QuickIterator™* allows the *DragSim* to "home in" on the best parts and specs for your needs, automatically (*ProIterator™* is available in the

Tune These Key Vehicle And Driving Specs:
- **Any Engine Power Curve**
- **Plus Import Any DynoSim Or Dynomation Engine**
- **Model Vehicle Weight, % On Driving Wheels, Wheelbase**
- **Frontal Area, Aero Drag, Driving Tire Width**
- **Static Tire Dia/Tire-Growth**
- **1- to 6-Speed Transmissions**
- **Clutch Or Torque Converter**
- **Stall Speeds And Slippage**
- **Any Trans/Rear-Axle Ratios**
- **Any Motorcycle Primary Ratio**
- **Traction, Launch, Shift, And Redline Rpms**
- **Tire Slippage**
- **Launch And Shift Times**
- **Rollout Staging Distance**
- **Temp, Humidity, Wind, Etc.**
- **Even Test Jet/Rocket Power!**
- **Our Most Powerful Vehicle-Dynamics Simulation!**
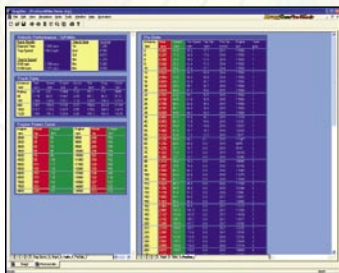
DragSim displays extensive simulation data. *Advanced* data table on the left; *ProTools™* data recorded at intervals during the entire event is shown on right.

ProTools™ Kit, see sidebar on right). Click just one button and *DragSim* will perform hundreds or thousands of test runs! Find the best ET and MPH for any street or racing application.

Technical Overview: This sophisticated vehicle-dynamics simulation accurately models the complex physics involved in 1/8- and 1/4-mile drag racing, including the incredible range of forces that are released at the starting line. Driveline modeling includes automatic or manual transmissions, clutches and torque converters, stall-speeds, launch rpm, shift rpms, up to six transmission gears with virtually any gear ratios, and rear-axle ratios. Vehicle variables include vehicle weight, wheelbase, front- or rear-wheel drive, frontal area, aero drag, tire width and diameter (both static and dynamic). *DragSim* also models rollout distance and time, driving characteristics, ambient temperature, humidity, wind speed, and more! This is our most powerful Drag-Race Simulation.

DragSim™ runs on any Windows95/98/Me/2000/XP equipped PC—see page 67 for other system requirements.

DragSim™ Advanced
Only $149.95 (Retail $189.95) **SD-303**

DragSim™ Advanced Including ProTools Kit™
Only $199.95 (Retail $249.95) **SD-304**

Selecting A Road-Racing Simulation
Choose The Road-Racing Simulation Package That Best Fits Your Needs

ProRacing Sim, LLC., produces three road-racing, vehicle-dynamic simulation software packages. *DeskTop FastLap™* emphasizes ease-of-use and low cost, but still maintains a high degree of accuracy and offers a surprisingly broad range of features. The more advanced *FastLapSim™* packages include powerful modeling capabilities that let you "dig deeper" into vehicle/driveline science.

These *Sim-Series™* simulations are available in *Advanced* and *ProTools™* versions; the *ProTools* package is loaded with all the features that professional racers, serious enthusiasts, and Pro Shops need to give them the "edge" in the marketplace and on the race track.

Using The Feature Table

The *Road-Racing Simulation Feature Table* on the opposite page contains columns that are organized into two main categories: 1) *DeskTop-Series,™* and 2) *Sim-Series™* packages.

The first column includes the low-cost, yet powerful DeskTop-FastLap™ closed-course, road-racing simulation. Modeling capability and *PowerFeatures™* for all simulations versions are listed in the left-hand column. A description of every *PowerFeature* is provided on page 64. And each simulation package is detailed within pages 46 to 51.

The second category shows features in *FastLapSim™*, both *Advanced* and *ProTools (yellow column)* versions. These simulations are packed with features, including additional modeling capability and menu selections, a custom tracks designer called the *Track Editor,™* offer more detailed graphics and printouts, and even include special-purpose tools, like a *Gear Iterator* and *Shock Dyno*. *ProTools Kits* were designed for the serious enthusiast and professional racer.

ProTools™ Features

The *ProTools* column (yellow) in the table details the features added to FastLapSim when *ProTools* have been purchased or activated.
Note: For a complete list of program features, costs, and more, please visit *www.ProRacingSim.com*.

Note: The road-racing simulation *Power Features™* listed in this table are described on page 64. Individual simulation packages are detailed over the next six pages (also, refer to the *Table Of Contents* on page 3).

| ProRacing Sim FastLap Closed-Course Vehicle Simulations			
FastLapSim Simulation Program Features *22 Power Features™* (Numbered Items) Described On Page 64	**DeskTop Series**	**FastLapSim Series**	
	DeskTop FastLap	**FastLapSim Advanced**	**FastLapSim ProTools™**
Test Front- And Rear-Wheel Drive	Yes	Yes	Yes
Multi-Page FastLap Test Reports (1)	Yes	Yes	Yes
Load Dyno, DynoSim, and Dynomation Engine Simulation Files (2)	Yes	Yes	Yes
LapTime Slip™ (3)	Yes	Yes	Yes
Graph Reticle Synchronized With Vehicle Position (4)	Yes	Yes	Yes
DirectClick™ Menus (5)	Yes	Yes	Yes
Comprehensive Suspension Mods (6)	Yes	Yes	Yes
C.G. Calculator (7)	Yes	Yes	Yes
U.S./Metric Units (8)	Yes	Yes	Yes
Track Editor™ Create Your Own Custom Track (9)	No	Yes	Yes
Track Banking (10)	No	Yes	Yes
SimData™ Telemetry Window Synchronized With Graph Reticle (11)	No	Yes	Yes
Real-Time Simulation Dialog (12)	No	Yes	Yes
Test Multiple Vehicles (13)	No	Yes	Yes
On-Graph Comparisons Up To Four Vehicles (14)	No	Yes	Yes
Extended Color Display/Interface (15)	No	Yes	Yes
High-Resolution Testing (16)	No	No	Yes
ProTools™ Data Displays (17)	No	No	Yes
ProPrinting™ Presentation Reports (18)	No	No	Yes
Graph DataZones™ Display (19)	No	No	Yes
Iterative Spring/Damper Testing (20)	No	No	Yes
Iterative Trans-Gear Analysis (21)	No	No	Yes
Track-Segment Can Be Defined And Used In Data Analysis (22)	No	No	Yes

ProRacing Sim Road-Race Simulations

Accurate, Easy-To-Use Software For Performance Enthusiasts And Pros

DeskTop FastLap™ Road-Race Simulation

A Low-Cost, Road-Racing Simulation With Advanced Features
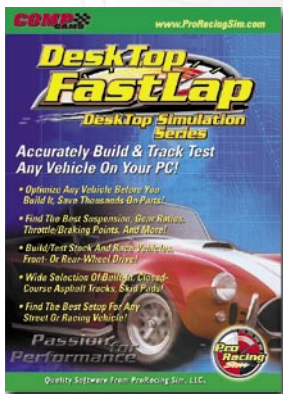
Note: *DeskTop FastLap* will accurately model both Domestic and Sport-Compact vehicles. See pages 44-45 for comprehensive road-race vehicle-simulation *Feature Comparisons*.

What You Can Do With *DeskTop FastLap™*:

- **Design, Build, And Track-Test Any Vehicle In Minutes**
- **Pick From Over 40+ Tracks**
- **Watch Real-Time Track Test From Overhead View**
- **See The Potential Of Any Component Combination**
- **Displays Full Telemetry Data**
- **Pop-Up LapTime Slip™**
- **Test Any Engine Power Curve And/Or Import DeskTop Dyno, DynoSim, or Dynomation Engine Files**
- **Evaluate Wide Range Of Suspension Components**
- **Test Drivelines, Gear Ratios Tires, Wheels, Springs, Shocks And Much More!**
- **Evaluate Wing And Body Aerodynamics, Lift And Drag**
- **Display & Print Vehicle Specs, Telemetry, And Performance**
- **Run Back-To-Back Tests And Find The Best Combinations**
- **Easy-To-Use, Custom Direct-Click™ Data-Entry**
- **CG Calculator**
- **US & Metric Units**
- **Awesome Power, Low Cost!**

DeskTop FastLap™ accurately simulates the unimaginably complex interaction of forces, speeds, and accelerations generated by stock, high-performance, or all-out road-race vehicles. *DeskTop FastLap* derives an optimum driving path, determines braking points and loads, aerodynamics, throttle positions, transmission gears, shift-up and shift-down points, steering input, driver error, and more! Further analysis determines the best possible lap time. Change any component in seconds and run back-to-back tests to "home in" on the ultimate setup for virtually any vehicle on any of

the included 40+ tracks (includes skid pads for vehicle testing).

A Track Window provides an "overhead" view of real-time vehicle movement (understeer, oversteer, acceleration, braking!). Watch your test vehicle traverses every straightaway and turn while it remains fully synchronized with comprehensive telemetry displayed on the results graphs. A *Pop-Up Lap-Time Slip™* offers an instant summary of the performance potential of any vehicle.

DeskTop FastLap also accepts *DeskTop Dyno*, *DynoSim*, and even *Dynomation* engine test files (you can also manually enter any engine power curve). Simply dream up a new combination, and in seconds you can perform an "on track" test and analyze the results!
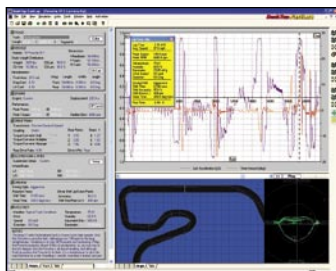
Accurate, easy-to-use, state-of-the-art and great fun; *DeskTop FastLap* is an awesome simulation that, we are sure, will become one of the most valuable additions to your racer's toolkit.

DeskTop FastLap™ will run on any Windows95/98/Me/2000/XP equipped PC—see page 67 for other general system requirements.

DeskTop FastLap shows components on left, test-lap results at top, real-time track action at bottom. Notice *LapTimeSlip™* in upper data window.

Tune These Key Vehicle Components:

- **Any Vehicle, Wheelbase, Weight, Aero Properties**
- **Front/Rear Wheel Track, CG**
- **Front And/Or Rear Wing**
- **Any Engine Power, Load Engine Simulation Test Files**
- **1- to 6-Speed Transmissions**
- **Clutch Or Automatic**
- **Stall Speed And Slippage**
- **Trans And Rear-Axle Ratios**
- **Front- Or Rear-Wheel Drive**
- **Any Spring Rate, Damper, Tires, Brakes**
- **A-Arms, Struts, Swing, Or Custom Suspension**
- **Front And Rear Anti-Roll Bars**
- **Brake Bias Front/Rear**
- **Driving Styles, Driver Error**
- **Driver Steering Response Time, Shift Time**
- **Temperature, Humidity, Wind, Elevation, And More!**

ProRacing Sim Road-Race Simulations

Accurate, Easy-To-Use Software For Performance Enthusiasts And Pros

FastLapSim™ Advanced Road-Race Sim

State-Of-The-Art, Advanced Vehicle-Dynamics Simulations
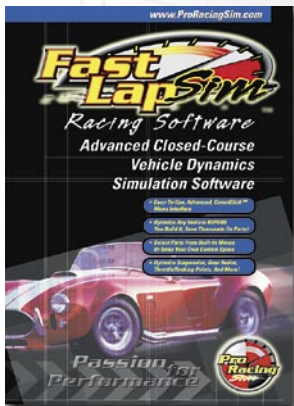
Note:

FastLapSim will accurately model both Domestic and Sport-Compact vehicles. See pages 44-45 for comprehensive road-race vehicle-simulation *Feature Comparisons.*

Additional Features In *FastLapSim™*:

- • **Use Powerful TrackEditor™ To Design Any Closed Course**
- • **Also 40+ Built-In Tracks!**
- • **Custom Tracks Can Have Any Number Of Turns, Any Length**
- • **Build Ovals, Road-Courses, Autocrosses, More!**
- • **Set Any Banking Angle**
- • **With Real-Time Mode Watch Sim Find Best Speeds**
- • **Test Multiple Vehicles And Directly Compare Up To Four**
- • **High-Resolution Mode For Optimum Accuracy ****
- • **Additional ProData Displays ****
- • **ProPrinting Generates Multi-Page Presentation Report ****
- • **Graph *DataZones™* Isolate Important Data ****
- • **Iterative Spring/Damper And Gear-Ratio Analysis ****
- • **Define Track Segments To Focus-In On Part Of Track ****
- • **Our Most Powerful Road-Racing Vehicle Simulation**

Evaluating suspension, tires, gear ratios, camshafts, headers, and the hundreds other components that make up a competitive road-course vehicle is an expensive and never-ending job. *FastLapSim™* lets you accurately simulate vehicle components, try unique combinations, and test the entire race car before you twist a single wrench. Sound impossible? After five years of development ProRacing Sim not only made it possible, but fun to use, too! **Software Overview:** *FastLapSim™* accurately simulates the unimaginably

** Indicates *ProTools™* feature (see pages 5 and 51 for more info on *ProTools Kit* enhancements).

complex interaction of forces, speeds, and accelerations generated by stock, high-performance, or all-out race vehicles. A comprehensive step-by-step analysis of the interrelated physics is performed during every increment of vehicle motion (a full analysis is completed 1000 times per second of track time!). *FastLapSim™* derives an optimum driving path, braking points, speeds, aerodynamics, throttle positions, transmission gears, shift-up and shift-down points, steering input, and more! Further analysis determines the best possible elapsed time for any track. Change any component and in minutes run back-to-back tests to "home in" on the ultimate setup for any vehicle and track. Accurate, easy-to-use, and just plain fun to use; *FastlapSim™* is an awesome simulation that, we are sure, will become one of the most valuable additions to your racer's toolkit.

Direct-Click **Interface And Features:** *FastLapSim™* incorporates ProRacing Sim's custom interface built from the ground-up with an eye-popping look. *QuickAccess™* buttons and *Direct-Click™* menus let you change parts simply by clicking on any component. Nothing could be easier!

A Track Window provides an "overhead" view of real-time vehicle movement (understeer, oversteer, acceleration, braking, everything!). Watch as your test vehicle traverses every
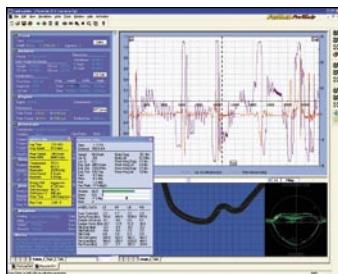
FastLapSim **is an amazing simulation that lets you determine— without twisting a wrench—the performance potential of any vehicle on any closed-course, asphalt track or slalom. Watch your test vehicle traverse turns and straightaways as optimum braking points, throttle, gears, and more are calculated.**
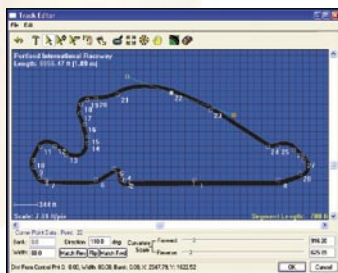
A *What-You-See-Is-What-You-Get* **TrackEditor™ adds real power to FastLapSim. Design your own track, with any number of turns, any radii, and any length straightaways. Run your test vehicle on the newly-designed track and collect, display, and analyze, extensive performance telemetry.**

turn and straightaway remaining fully synchronized with comprehensive telemetry displayed on the results graphs. Zoom-in and out on both Track and Telemetry data to uncover every nuance of vehicle performance. *FastLapSim™* also includes a real-time G-G Diagram that graphically indicates the sum of all forces acting on the vehicle. Use this data, and the extensive chassis-tuning information provided in the over 160-page, color Users Manual, to build the ultimate vehicle for any asphalt, closed-course track.

The *Track Editor™*: You can run any vehicle you've designed on any of the 40+ built-in tracks (includes many of the World's best-known race courses and even testing skid pads). Or design any track you can dream up using a fully-graphic *Track Editor™*! This powerful "application" built into *FastlapSim* lets you construct any track with any number of turns, turn radii, straightaway lengths, track widths, banking, and more. Simply place corner points and the *Track Editor™* draws the interconnecting track. This tool expands the modeling capabilities of *FastlapSim™* to limits of your imagination!

Keep It Simple: ProRacing Sim carefully designed this simulation so that it shows you exactly the level of detail you desire. Start out with an easy-to-read, *Pop-Up Lap-Time Slip™* that offers an instant summary of the performance

Tune These Key Vehicle Components And Specs:
- **Any Closed-Course Track**
- **Any Vehicle, Wheelbase, Weight, Aero Properties**
- **Front/Rear Track Width, CG**
- **Front And/Or Rear Wing Length, Width, Angle**
- **Any Engine Power Curve Or Load DynoSim, Dynomation Engine Files**
- **1- to 6-Speed Transmissions, Clutch Or Automatic**
- **Stall Speed And Slippage**
- **Any Trans Or Rear-Axle Ratio**
- **Front- Or Rear-Wheel Drive**
- **Spring Rates, Dampers, Tires**
- **A-Arms, Struts, Swing, Or Custom Suspension**
- **Front And Rear Anti-Roll Bar**
- **Brake Bias Front/Rear, Pad Areas, Coefficient Of Friction**
- **Driving Styles, Driver Error Considerations**
- **Driver Steering Response Time, Shift Times**
- **Temperature, Humidity, Wind, Elevation, And Even More!**
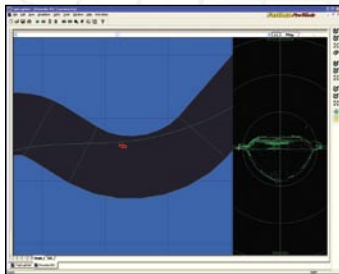
potential of any vehicle. Or open the *SimData™* window for a more in-depth view of vehicle data at each point throughout the "hot lap."

Dig deeper and zoom in on the data display to analyze vehicle movement in minute detail. Move the reticle in the data display, and the *SimData™* window shows the exact numerical values for over *60 vehicle measurements*, including speed, lateral and longitudinal Gs, rpm, hp, torque, yaw, pitch, roll, yaw rate, body drag, body lift, front and rear wing lift and drag, throttle, brake, steering input, trans gear, suspension compliance, spring forces, damper velocities, slip angles, and much more! ProTools adds individual wheel forces and movements to the extensive list of telemetry. From an overview to a "microscopic" analysis; it's all up to you.

FastLapSim™ will run on any Windows95/98/Me/2000/XP equipped PC—see page 67 for other general system requirements.

DeskTop Dynos Book

Best Seller By Simulation Designer Larry Atherton
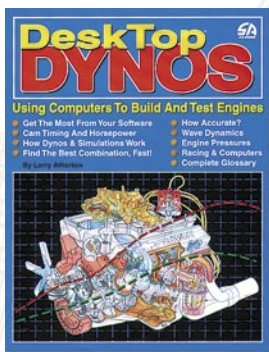
new insight into how you can build more horsepower.

Many readers have said they have learned more from this book than all the magazine articles they have ever read!

DeskTop Dynos™ was written especially for the automotive enthusiast (check out customer comments on page 55 in this catalog and on our web: www.ProRacingSim.com). This easy-to-read guide contains a completely unique look at high-performance engines: *A view from the perspective of the simulation designer.* While most engine builders and enthusiasts developed their skills from years of hands-on tinkering, the background of the simulation expert is thermodynamics, wave dynamics, and the physics of motion.

DeskTop Dynos explains how many of the "mysteries" of the internal-combustion engine can be understood using wave dynamics and other simulation techniques. Without complex math or physics, *DeskTop Dynos* will give you

Sample Contents:

- **Engine & Dyno Basics**
- **The Otto-Cycle Engine**
- **What Dynos Measure**
- **Torque, Power, Horsepower**
- **Simulating Engine Pressures**
- **Indicated Pressures**
- **Crank-Angle Diagram**
- **Volume Diagram**
- **Calculating Horsepower**
- **Calculating Pressures**
- **Indicated HP And MEP**
- **Simulating Frictional Losses**
- **The Growth Of Simulations**
- **Gas-Dynamic Models**
- **Engine Modeling And The PC**
- **The Future Of IC Modeling**
- **Camshaft Science**
- **An Unsteady Flow Machine**
- **Acoustic Vs. Finite-Amplitude**
- **Pressure-Time Histories**
- **Intake Tuning**
- **Exhaust Tuning And More!**

DeskTop Dynos Book
Only $16.95   BK-600

Using Computers To Build Horsepower

65-Minute Look Into Simulation Software—VHS Video
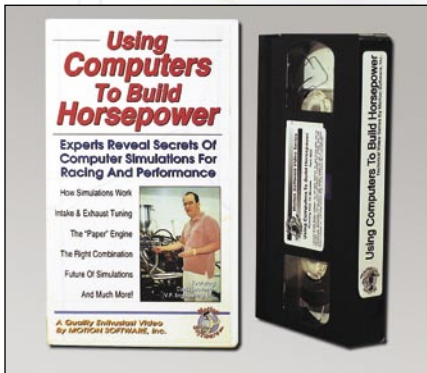
Get The Inside Story From:

Curtis Leaverton, simulation programmer

John Baechtel, engine builder/tester

Paul "Scooter" Brothers, design engineer

Jim McFarland, engine expert, writer

Jeff Smith, engine builder and writer

David Vizard, writer, racer, engine expert

Note: This video is designed to be played on U.S. Standard, NTSC, VHS video players. Produced in 1996.

Video Overview:

- **Building Horsepower**
- **Climbing The Learning Curve**
- **The History Of Simulations**
- **The Evolution Of Wave Analysis**
- **Wave Theory Basics**
- **Exhaust System Tuning**
- **Induction Tuning**
- **Program Assumptions And Accuracy**
- **The Future Of Simulations**
- **A Quality Technical Video From Motion Software**

This fascinating 65-minute, VHS video will show you how computers and computer-simulation programs have become essential tools in performance and racing (check out customer comments on our web: www.ProRacingSim.com). Renown simulation programmer, Curtis Leaverton, is your guide as you move from the basics through an in-depth investigation of this ground-breaking technology.

Noted automotive and racing experts add insight from their unique perspectives and describe how they use this new technology on a daily basis.

Packed with practical advice and tips, this quality video will help you gain insight into any project from a street performer to an all-out Pro Stocker.

Using Computers VHS
Only $14.95   **VC-700**

Customer Comments

We have received thousands of letters from our users about our simulation software and simulation-related products. Here is a small sampling of what our users think about ProRacing Sim products:

"Your software has saved me—and people like me—thousands of dollars, and countless hours of head scratching. This software is probably the single biggest deciding factor in each of the countless setups that I quote to customers each week. Keep up the good work! Don't sell this product to any of my competitors...just kidding. Thanks."
Harland Silky
Mid-Nite Auto Supply

"Great tool; it helped me a lot when I was trying to figure out what I wanted to do with my car."
Quincy

"The DynoSim is within 2% of my actual dyno run!"
John Alfeld

"I purchased your software program to help me find the optimum camshaft profiles for performance packages we are offering at the Harley-Davidson dealership I work for. I wanted to tell you how impressed I am with the accuracy of your program. I have input cylinder head flow numbers along with all the other engine specs and the results I am getting from your program have been within 1hp and 1ftlb torque of what I have been seeing on the dyno. This was an excellent investment."
Ken Mleczko

"I have been using the Dyno for several years and I am a big fan of the software. My Master's thesis involved numerical simulation of combustion. I still can't believe what I have been able to learn by playing with this program. I have built engines using optimized parameters (according to your program) with excellence results. I know it has saved me a lot of time and money - Thanks."
Derek Richner

"I have all of your ProRacing Sim software, and I really enjoy them, especially DragSim and FastLapSim. I also like DynoSim with your CamData library. I am a long time user of Dynomation."
Rod Allard

"I think the DeskTop Dyno and DragStrip are some of the best products I have used. They have helped me save time setting up engine combos. Thanks for these super products."
Alan Adewley

"Great products; best thing since peanut butter!"
Wayne Farabaugh

"Thank you so much for the timely response and excellent service. I appreciate it."
Jeff Servis

"Point of interest—ran a couple of engines that a friend of mine had dynoed and DynoSim hit peak HP and Torque RPMs right on the money and was within 5hp on one and 12 on the other. Pretty impressive! Thanks for a great product and great support."
Lee Foster

Customer Comments

"I tried other engine sims, but the Dyno hit the sweet-spot with the detail and accuracy I wanted at the right price."
Jim McNulty

"Very easy to understand and operate with results in close approximation to actual dyno measurements on my engine."
John Martindale

"I've had your DeskTop Dyno for several years and love using it."
Brandon Gibbs

"I must say that I'm very impressed. I've used the software to test combinations before I've purchased components like heads, cams, etc., but never before was I more thoroughly convinced of the simulation's accuracy until I started tuning the EEC on my 1989, 5.0L Mustang. I setup an engine using the stock cam, compression, induction, etc., and was pleasantly surprised to find that the VE calculations that Dyno came up with were literally IDENTICAL to the values Ford programmed into their ECU for determining load (sea-level load scaling vs RPM). With such good news, I wasn't afraid to use it for my own combination. Using a custom centrifugal blower to model my Kenne Bell 2.2L Blowzilla, actual flowbench data for my heads, cam specs, and an accurate compression ratio, the VE curves that were calculated in the Dyno were uploaded to my car's ECU and the results were fantastic. Excellent product, thanks a lot guys."
Manu "Shaker" Singh

"The Dyno kicks some serious A.... All my friends pile over every Sunday to watch Winston Cup and after the race we are on my computer fighting for dibs on the Dyno!"
Brad Strasser

"I have been building street engines and drag engines for 40 years, and it was always a [guessing process]. But now with the Dyno I know it's right. Since using your software I have managed to put together some very respectable street cars. Some have even made the magazines. I print out a copy of a dyno test for my files and give the customer a copy also, reducing a lot of paperwork. I also use the Dyno in conjunction with the DragStrip Sim. This really helps set up a car and get the most out of any engine buildup. Thank you for making my job easier after all these years."
Jack Morrison

I am very impressed with the results from the Dyno. I have been building performance engines for a number of years and have expended a large sum of money just to find out that one combination or another just doesn't work. I am very fond of this program because it allows me to "test" every conceivable engine combination for a variety of engines with no expense or headaches. You have a wonderful product and I wish you much success in the future."
Douglas McPhail

"Hi. I can't tell you how impressed I am with the Dyno. I have played with it everyday since I got it at Christmas."
Gene Bovaird

"I love your DeskTop Dynos book and software. I've owned Dynomation and Engine Expert for years, but I love the ease and speed of your program. Congratulations to all your staff."
Dave Dion

"Great Tool!"
Jeff Slaughter

Engine Simulation Power-Features

Detail Descriptions of *Power Features* In Table On Page 17

(1) Alternate Fuels/Nitrous Injection: Simulation supports testing various fuels and nitrous-oxide injection. Cylinder pressures, including BMEP (Brake Mean Effective Pressure), are calculated and can be used to determine safe nitrous activation points and flow limits.

(2) AirFlow QuickCalculator™: Several ProRacing engine simulations accept induction airflow (cfm) measured at a pressure drop of either 1.5-In/Hg or 3.0-In/Hg. For those instances where an induction system, injector, or carburetor was flow tested at a different pressure drop—or whenever you would like to convert flow values from one pressure-drop rating to another—the *Airflow QuickCalculator™* will easily perform these conversion functions.

(3) CamMath QuickCalculator™: The basic four valve events (IVO, IVC, EVO, EVC) are needed to pinpoint intake and exhaust valve opening and closing points. Unfortunately, many cam catalogs and other printed materials do not provide this essential information. While timing conversions can be accomplished by hand, the simple *CamMath QuickCalculator™* instantly converts lobe-center angles, intake centerlines, and the duration values into IVO, IVC, EVO, and EVC valve events.

(4) Variable Valve Timing: Modern engines use variable cam timing to optimize power, economy, and other engine characteristics. Selected ProRacing simulations include a Variable Valve Timing model that "switches" between two unique cam profiles when the engine reaches the activation rpm. The cam profiles for each "lobe" and the activation rpm are completely adjustable and can be included as variables in Iterative testing (see #28, *ProIterator™*).

(5) Advanced Compression Ratio Calculator: Easy-to-use, intuitive selections make calculating compression ratio a snap. Enter known values or measured volumes and instantly see the exact compression ratio for any engine.

(6) Connecting-Rod-Length And Rod-Ratio Modeling: Simulation incorporates sophisticated models that model the changes in forces against the cylinderwall and crankshaft that occur when connecting-rod length is modified. You can directly enter any connecting-rod length or rod ratio for analysis. Program displays changes in power, torque, etc.

(7) Forced-Induction Modeling: Adds sophisticated turbocharger, roots, screw, and centrifugal supercharger modeling. Display manifold pressures, modify belt ratios, pressure ratios, A/R ratios, intercooler efficiency, and more! Also includes wastegate modeling.

(8) High-Speed Simulation: Simulation code written in C++ for super-fast execution. Substantially shortens data analysis during Iterative™ (multiple-simulation run) testing.

(9) Custom Cylinder-Head Flow: Allows the direct entry of flow-bench data, permitting accurate modeling of any cylinder head port flow. Cylinder-head flow files are supplied with the simulation and can be saved and loaded. Also, flow files for many additional engines are available from enthusiast groups on the Internet.

(10) Multi-Page Test Reports: Simulation analysis is printed in color on several pages, depending on the simulation package. Component selections, custom data (like cylinder head flow, power curves, etc.), graphic anal-

ysis, and data tables comprise some of the pages. For even more-enhanced printing, see #22, *ProPrinting.*™

(11) Direct-Click™ Component Menus: A completely unique feature on selected ProRacing Sim packages. *Direct-Click™* menus allow you to simply click on any engine/vehicle component to change or modify your selection. This eliminates "hunting" through drop-down menus for the parts you need; just click on the component and make your choice.

(12) Real-Time "What-If" Testing: Many ProRacing simulations show engine or vehicle components on the left side of the main program screen and display simulation results on the right. In addition, these advanced software packages are highly optimized to minimize simulation calculation times. The combination of these two features allow you to analyze more components, quickly modify any combination, and instantly see the results in graphs and tables. This exclusive design sets the standard for interactive "What If" testing.

(13) U.S./Metric Units: Allows rapid display of either U.S. or Metric units. Switching between units system is seamless and instantaneous.

(14) One-Click Quick-Compare™: A time-saving feature that allows you to instantly establish a baseline engine and perform a side-by-side comparison with a single mouse click. This is the fastest way to test component changes and view how they alter engine or vehicle performance.

(15) Test Multiple Engines/Vehicles: A powerful feature that allows testing multiple engines or vehicles at once. Each "open" simulation is available for analysis, and can be brought into focus by simply clicking a tab located at the bottom of the screen. This professional feature saves time, eliminates opening-and-closing multiple simulation files, and permits rapid side-by-side comparisons.

(16) On-Graph Comparisons Of Multiple Simulations: Compare up to four "open" simulations (see previous *Test Multiple Engines/Vehicles*) on any of the graphic displays. Comparisons can consist of any displayable simulation variable, such as horsepower, torque, engine pressures, vehicle speed, engine rpm, longitudinal and lateral acceleration, and much more.

(17) Cam Manager™: A comprehensive tool for entering, displaying, and modifying cam timing and valve lift. Graphic displays show the effects of duration, lift, and lifter acceleration for both seat-to-seat and 0.050-inch valve-timing specifications. Sophisticated algorithms calculate lifter acceleration and optimize simulation accuracy. Save and load CamFiles (many CamFiles are supplied with the simulation and many more are available on an optional *CamDisk* CD, available from ProRacingSim, see page 30).

(18) Import CamData™ Files: Simulation reads CamFiles™ that contain not only valve timing events, lift, and camshaft type, but also cam manufacturer application data, engine family recommendations, contact info, and more. ProRacing Sim advanced engine simulations are supplied with up to several hundred CamFiles, and more are available from ProRacing Sim on our CamDisk CD (see page 30). Allows rapid testing and matching *Iterator*™-derived timing values to actual cam manufacturer's part numbers.

(19) One-Click Iterative Testing™: Iterative™ testing, an exclusive ProRacing Sim feature, is a method of performing multiple tests and locating optimum combinations, automatically. *One-Click Iterative Testing* is a feature of the *QuickIterator*™ incorporated in several ProRacingSim simulations. By simply clicking a single button, the simula-

tion will begin a series of tests and display the best result, all without user intervention (also see #25, *ProIterator*™).

(20) Extended Color Display: Allows user to select optional color sets for the main interface. New color sets are added with each release of most ProRacing Simulations.

(21) Extended-Data Displays: This professional feature is available in the *ProTools*™ *Kit* for many simulations (exclusive feature of ProRacing Sim). Professionals often need additional data beyond power, torque, elapsed time, speeds, and other "basic" measurements to optimize engine and vehicle performance. To provide this data, internal physics models are extended, "in-depth" data is calculated and made available for graphic and table-based displays. Extended data depend on the simulation, but examples include various engine pressures, frictional power consumption, detailed vehicle movement analysis, individual wheel forces and movements, etc.

(22) ProPrinting™: This is a professional feature available in the *ProTools*™ kit for many simulations (exclusive feature of ProRacing Sim). ProPrinting produces custom, full-color, multi-page test reports, including cover pages, tables of contents, your name and/or company name and logo, and even an optional glossary. ProPrinting produces easy-to-read, comprehensive, professional printed test reports that you will be proud to display, present to customers, or keep for a lifetime.

(23) ProData™ Graphic Displays And Tables: This is a professional feature available in the *ProTools*™ kit for many simulations. Includes the calculation and display of additional simulation data, often needed by professional racers and/or engine developers. The ProData Tables display extensive additional data in an easy-to-read format,

and are available in addition to the standard graphs and data tables included in the simulation.

(24) Graph DataZones™: This is a professional feature available in the *ProTools*™ *Kit* for many simulations. Graph DataZones allow you to display additional graph data and/or show ranges for target data values. DataZones can clearly illustrate dangerously high pressures, engine speeds, or almost anything you wish to highlight. DataZones can be displayed in any color(s), and you can automatically select a gradient range between beginning and ending colors.

(25) ProIterator™: *Iterative*™ testing, an exclusive feature of ProRacing Sim software, is an automated method of performing multiple tests and locating optimum combinations. The *ProIterator*, a *ProTools*™ feature, provides maximum flexibility in selecting components and setting up testing criterion. Search for optimum power/torque/acceleration, or locate the component combination that produces maximum "area-under-the-curve" for horsepower, torque, acceleration, or other variables. Once you have established the testing criterion, the *ProIterator* will begin a series of tests and display the best 10 results, all without user intervention (also see #19, *One-Click Iterative Testing*™).

(26) Analyze Area Under Data Curves: Part of the *ProIterator*™ included in the *ProTools*™ *Kit*. While peak values of torque, horsepower, acceleration, and other simulation data focuses on the "absolute maximum," the areas under these curves indicate the greatest "volume" of power or acceleration. Think of this area as the maximum horsepower throughout the rpm range (or acceleration over time). The *ProIterator* can search for the ten best combinations that produce the greatest area under any portion of any selected data curve.

Engine Simulation Power-Features

(27) Full Wave-Action Simulation: Finite-amplitude, wave-dynamics analysis using enhanced *Method-Of-Characteristics* and *Filling-And-Emptying* mathematical models, exclusive features of ProRacing Dynomation software, simulate the complex interactions of pressure waves in the intake and exhaust passages. Since pressure waves significantly affect the flow characteristics within engine ducting, a comprehensive analysis of pressure pulses and how they interact with runner length and taper angles is an essential element in accurately determining mass flow within the IC engine.

(28) Analyze Induction And Exhaust Pressure Waves: Comprehensive graphs and data displayed in tables, often synchronized to the graph-reticle position (indicating the instantaneous crank-angle), are provided in the Dynomation engine simulation. These pressure-wave data-sets are clearly displayed and can be compared with pressure pulses at different engine speeds or even with wave dynamics from a different engine design. This in-depth analysis offers the most detailed analysis "inside" a running engine ever offered in simulation software.

(29) Model Intake Runner Lengths And Taper Angles: The "secrets" to engine performance often lie in the subtle elements of engine design, like the lengths and shapes of induction and exhaust passages. The Dynomation engine simulation allows anyone to test a wide variety of runner lengths and taper angles to determine not only how these critical elements affect engine power throughout the powerband, but also to select optimum shapes for virtually any application.

(30) Megaphone And Normal Header Design Modeling: The Dynomation engine simulation models single or dual exhaust pipes per cylinder, "standard" headers with collectors, and megaphone exhaust systems. All tubing lengths, diameters, and taper angles can be tuned for a variety of applications. Megaphone exhaust systems are often used in racing motorcycle applications, but are occasionally applied to performance automotive applications, also.

(31) Piston-Pin Offset Modeling: The Dynomation engine simulation will model the subtle effects of piston-pin offset on instantaneous piston position, piston dwell and the associated thermodynamic effects, and piston/cylinderwall friction changes due to pin/rod/crank geometry.

(32) Transparent 3D-Engine Pressure-Analysis Display: The Dynomation engine simulation provides a unique and powerful way to visualize the motion of pressure waves within a running engine. A cutaway view of an engine, rendered in real time using sophisticated 3D graphics, synchronizes valve and piston motions to the pressure-crank angle diagram. As you move the reticle across the graph—to any crank angle within the 720 degrees of the 4-cycle process—the motion of the pistons, valves, and pressure waves are displayed. This unprecedented technology allows you to "see inside" the engine, providing the ultimate tool for pressure-wave understanding and analysis.

(33) Graph Reticle Synchronized With Engine Data: Selected ProRacing Simulations have moveable reticle lines on graphs that are synchronized with the underlying data. By moving the reticle over the graph, the corresponding data or vehicle movement will be displayed. This feature is very helpful in analyzing complex vehicle telemetry or engine performance data at any point during the simulation.

(34) Import DynoSim & SC-DynoSim Engine, Cam, & Flow Files: Dynomation can import and test engine, cam, and flow files

from virtually all other ProRacing Sim engine simulations. This makes testing and analysis much easier for those who have developed a library of data files from other "Sim" series products. In addition, Dynomation Advanced and ProTools versions will import engine test files from the previous (DOS) release of Dynomation.

(35) Import CamPro, CamProPlus, S96, and CamDoctor Profile Files: To allow the widest possible modeling power, Dynomation *ProTools* supports the direct import of a number of commonly used cam-profile formats, including CamPro, CamPro+, S96, and Cam-Doctor files. A simple-to-use dialog box helps you assign centerline values and determine valve-open duration from lifter-rise measurements.

(36) Imports FlowPro™ Flow-Bench Test Files: The Dynomation engine simulation models intake and exhaust port flow from measurements taken at a wide variety of pressure drops and valve-lift points. To accommodate the professional that uses Audie Technology software on their flow bench, Dynomation with *ProTools* will directly read FlowPro files. This feature will save you time and eliminate errors in transcribing flow measurements.

(37) Fine And SuperFine Mesh Modes: The Wave-Action simulation calculates gas-dynamics within engine passages by dividing the intake and exhaust passages into small volumes, called meshes, of equal size. The smaller the mesh size, the more rigorous the mathematical analysis. In many cases, the standard *Coarse* mesh is sufficient to accurately analyze gas dynamics within intake and exhaust passages. But, in some cases, a more complete analysis is required to overcome instabilities or odd pressure-wave interactions. This analysis is provided in the *Fine* and *SuperFine* mesh modes available

as *ProTools* options in Dynomation.

(38) Air-Fuel Ratio Vs. Rpm (Map) Modeling: This is a professional feature available in the *ProTools™ Kit* for the Dynomation engine simulation. Model any air/fuel ratio at any rpm testing point by simply entering ratio values in an easy-to-modify fuel "map."

(39) View 3D Engine Mass-Flow Analysis: As described in the *Power Feature* #32, *3D-Engine Pressure Analysis,* Dynomation includes a cutaway view of a engine allowing you to view the motion of the pistons, valves, and pressure/flow within the ports. A professional feature available in the *ProTools™ Kit* extends this powerful modeling technology to include the visualization of mass flow into and out of the cylinders.

(40) Dual-Sim (Hybrid) Engine Modeling: Dynomation includes both the *Filling-And-Emptying* and *Wave-Action* engine simulation models. These complimentary simulation models work together to provide the engine researcher with the greatest flexibly and modeling feedback. A professional feature available in the *ProTools™* kit for Dynomation extends this capability to include a Hybrid model that intelligently combines the results from both simulations to best utilize the strengths of each modeling technique.
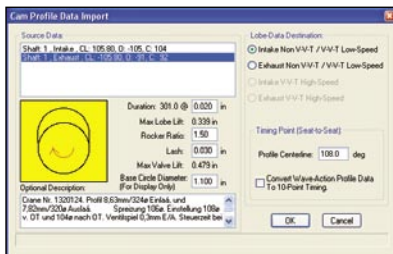
The *Cam-Lobe Profile Import* dialog of Dynomation.

Drag-Strip Vehicle Sim Power-Features

Detail Descriptions of *Power Features* In Table On Page 33

(1) High-Speed Simulation: Simulation code written in C++ for super-fast execution. Substantially shortens data analysis during Iterative™ (multiple-simulation run) testing.

(2) PopUp Time Slip™ and PopUp Lap-Time Slip™: These "Pop-Up" or floating data windows provide easy-to-read overviews of the performance statistics for the currently simulated vehicle. They can be thought of as the electronic counterpart to the paper "time slip" presented to the driver after a race. They show the basic, essential data to determine vehicle performance, such as overall elapsed time, speeds, current weather conditions, driving style, etc.

(3) Direct-Click™ Component Menus: A completely unique feature on selected ProRacing Sim packages. *Direct-Click™* menus allow you to simply click on any engine/vehicle component to change or modify your selection. This eliminates "hunting" through drop-down menus for the parts you need; just click on any component and make your selection.

(4) Multi-Page Test Reports: Simulation analysis is printed in color on several pages, depending on the simulation package. Component selections, detail track results, graphic analysis, and data tables comprise some of the pages. For even more-enhanced printing, see #13, *ProPrinting*.™

(5) Real-Time "What-If" Testing: Many ProRacing simulations show engine or vehicle components on the left side of the main program screen and display simulation results on the right. In addition, these advanced software packages are highly optimized to minimize simulation calculation times. The combination of these two features allow you to analyze more combinations, quickly modify any components, and instantly see the results in graphs and tables. This exclusive design sets the standard for interactive, "What If" testing.

(6) U.S./Metric Units: Allows rapid display of either U.S. or Metric units. Switching between units system is seamless and instantaneous.

(7) Test Multiple Vehicles: A powerful feature that allows the testing of multiple vehicles at once. Each "open" simulation is available for analysis, and can be brought into focus by simply clicking a tab located at the bottom of the screen. This professional feature saves time, eliminates opening-and-closing multiple simulation files, and permits rapid side-by-side comparisons.

(8) On-Graph Comparisons Of Multiple Simulations: Compare up to four "open" simulations (see previous feature *Test Multiple Engines/Vehicles*) on any of the graphic displays. Comparisons can consist of any of the displayable simulation variables, such as horsepower, torque, vehicle speed, engine rpm, acceleration, aero drag, and much more.

(9) Extended Color Display: Allows user selection of optional color sets for the main interface. New color sets are added with each release of most ProRacing Simulations.

(10) One-Click Iterative Testing™: Iterative™ testing, an exclusive feature of ProRacing Sim software, is a method of performing multiple tests and locating optimum combinations, automatically. *One-Click Iterative Testing* is a feature of the *QuickIterator™* incorporated in several ProRacingSim simulations. By simply clicking a single button, the simulation will begin a series of tests and display the best result, all without user intervention (also see #15, *ProIterator™*).

(11) Advanced Traction Calculator:

Helps determine optimum traction values in DragSim when simulating any drag-race vehicle. Simply select how efficiently the tires transfer power to the ground (typically 98-to-99%), and this tool will search for a *Traction* value that produces this degree of tire grip. Improves simulation accuracy; saves time.

(12) ProData™ Graphic Displays And Tables: This is a professional feature available in the *ProTools™ Kit* for many simulations. Includes the calculation and display of additional simulation data, often needed by professional racers and component designers. The *ProData Tables* display extensive additional data (including important vehicle telemetry at small increments throughout the entire 1/8- or 1/4-mile) in an easy-to-read format, and are available in addition to the standard graphs and data tables provided in the simulation.

(13) ProPrinting™: This is a professional feature available in the *ProTools™ Kit* for many simulations (exclusive feature of ProRacing Sim). ProPrinting produces custom, full-color, multi-page test reports, including cover pages, tables of contents, your name and/or company name and logo, and even an optional glossary. ProPrinting produces easy-to-read, comprehensive, professional printed test reports that you will be proud to display, present to customers, or keep for a lifetime.

(14) Graph DataZones™: This is a professional feature available in the *ProTools™ Kit* for many simulations. Graph DataZones allow you to display additional graph data and/or show ranges for target data values. DataZones can clearly illustrate dangerously high forces, engine speeds, or almost anything you wish to highlight. DataZones can be displayed in any color(s), and you can automatically select a gradient range between beginning and ending colors.

(15) ProIterator™: *Iterative™* testing, an exclusive feature of ProRacing Sim software, is an automated method of performing multiple tests and locating optimum combinations automatically. The *ProIterator*, a *ProTools™* feature, provides maximum flexibility in selecting components and setting up the desired testing criterion. Search for optimum power/torque/acceleration, or locate the component combination that produces maximum "area-under-the-curve" for horsepower, torque, acceleration, or other variables. Once you have established the testing criterion, the *ProIterator* will begin a series of tests and display the best 10 results, all without user intervention (also see #10, *One-Click Iterative Testing™*).

16) Analyze Area Under Data Curves: Part of the *ProIterator™* included in the *ProTools™ Kit*. While peak values of torque, horsepower, acceleration, and other simulation data focuses on the "absolute maximum," the areas under these curves indicate the greatest "volume" of power or acceleration. Think of this area as the maximum horsepower throughout the rpm range (or acceleration over time). The *ProIterator* can search for the 10 best combinations that produce the greatest area under any portion of a selected data curve.
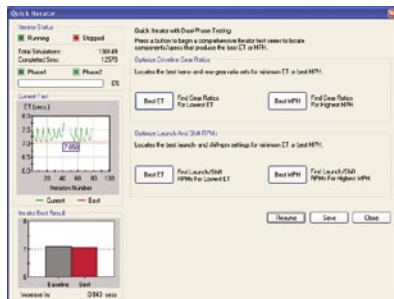
FastLap Vehicle Sim Power-Features

Detail Descriptions of *Power Features* In Table On Page 45

(1) Multi-Page Test Reports: Simulation analysis is printed in color on several pages, depending on the simulation package. Component selections, detail testing results, graphic analysis, and data tables comprise some of the pages. For even more-enhanced printing, see #18, *ProPrinting.™*

(2) Load Engine Simulation Files: Simulation will read engine files and load power and torque data from one or more ProRacing Sim engine simulation packages. Saves time and improves accuracy when entering engine power data in vehicle simulations and other ProRacing Sim software.

(3) PopUp LapTime Slip™: "Pop-Up" or floating data window provides an easy-to-read overview of the performance statistics for the currently simulated vehicle. They can be thought of as the electronic counterpart to the paper "time slip" presented to the driver after a race. They show basic, essential data used to evaluate vehicle performance, such as overall elapsed time, driving style, user selections, and weather conditions.

(4) Graph Reticle Synchronized With Vehicle/Data: Selected ProRacing Simulations have moveable reticle lines on data graphs that are synchronized with underlying data. By moving the reticle over the graph, the corresponding data or vehicle movement will be displayed. This feature is very helpful in analyzing complex vehicle telemetry or engine performance data at any point during the simulation.

(5) Direct-Click™ Component Menus: A completely unique feature on selected ProRacing Sim packages. *Direct-Click™* menus allow you to simply click on any engine/vehicle component shown on screen and change or modify your selection. This

eliminates "hunting" through drop-down menus for the parts you need; just click on the component and make your selection.

(6) Comprehensive Suspension Mods: A principal feature in FastLap that accurately models various aspects of vehicle suspension, spring rates, shock absorbers, motion ratios, brake and tire specifications, sway bars, and more on an individual wheel basis.

(7) Center Of Gravity Calculator (*CG QuickCalculator™*): Finding the CG (Center-of-Gravity) height—and the longitudinal and lateral CG weight distribution—for any vehicle is a simple process using this ProTool *QuickCalculator™* in FastLapSim. Simply enter the values into the appropriate fields (data-entry boxes), and total vehicle weight and all CG values will be calculated.

(8) U.S./Metric Units: Allows rapid display of either U.S. or Metric units. Switching between units system is seamless and instantaneous.

(9) Track Editor™: A ProTool feature available in FastLapSim that allows you to design/build any custom track imaginable, from a super speedway to a parking-lot autocross. Using a fully-graphic editing environment, you build tracks in a *what-you-see-is-what-you-get* interface. Simply click on a precision background grid to place the radii of the turns and the length of the straightaways. The *Track Editor* will draw the track as you build it, turn by turn. After laying-out the basic framework, use the built-in editing tools to fine tune each track element. In minutes, you're ready to lap-test any vehicle on the newly-built track.

(10) Track Banking: Allows individual track-banking angles at each track-definition point.

Banking may be set to any value up to 45-degrees (either right [+] or left [-] banking), even off-camber road surfaces can be simulated. FastLap smoothly graduates the banking angle between track-definition points, creating uniform bank transitions between points.

(11) SimData™ Window: This is a "Pop-Up," floating data window that provides a detailed look at the calculated telemetry for the vehicle throughout the test lap. Data displayed in the *SimData* window is synchronized to the position of a moveable reticle line on the data graphs (see #4, *Graph Reticle*). This display, along with moveable graph reticles, makes it much easier to analyze complex vehicle telemetry data at any point during the simulation.

(12) Real-Time Simulation Dialog: A unique feature in the Advanced and ProTools versions of FastLapSim. Allows you to view the simulation process realtime. Watch the simulation zero-in on the best braking points and corner speeds, see suspension movement, G-forces, and more!

(13) Test Multiple Vehicles: A powerful feature that allows the testing of multiple vehicles at once. Each "open" simulation is available for analysis, and can be brought into focus by simply clicking a tab located at the bottom of the screen. This professional feature saves time, eliminates opening-and-closing multiple simulation files, and permits rapid side-by-side comparisons.

(14) On-Graph Comparisons Of Multiple Simulations: Compare up to four "open" simulations (see previous *Test Multiple Engines/Vehicles*) on any of the graphic displays. Comparisons can consist of any of the displayable simulation variables, such as horsepower, torque, engine rpm, vehicle speed, longitudinal and lateral acceleration, and much more.

(15) Extended Color Display: Allows user selection of optional color sets for the main interface. New color sets are added with each release of most ProRacing Simulations.

(16) High-Resolution Testing: A ProTools™ feature in FastLapSim. Includes additional mathematical routines that perform a more in-depth analysis of every corner, all braking points, all suspension movement and forces applied to the test vehicle. This calculation-intensive analysis, when activated by the user, predicts lap times and vehicle performance data with high accuracy (additional calculation time is required). If you need the highest accuracy possible, *High-Resolution Testing* can help you achieve your goals.

(17) ProData™ Graphic Displays And Tables: This is a professional feature available in the *ProTools™ Kit* for FastLapSim. Includes the calculation and display of additional simulation data, often needed by professional racers and/or engine developers. *ProData™* adds individual wheel speeds, longitudinal forces, suspension compression, spring forces, damper velocity, damper force, slip angle, slip ratio, slip total, vertical load, and rolling resistance. This data is provided in addition to the standard graphs and data tables included in the simulation.

(18) ProPrinting™: This is a professional feature available in the *ProTools™ Kit* (exclusive feature of ProRacing Sim). *ProPrinting* produces custom, full-color, multi-page test reports, including cover pages, tables of contents, your name and/or company name and logo, and even an optional glossary. ProPrinting gives you easy-to-read, comprehensive, professional printed test reports that you will be proud to display, present to customers, or keep for a lifetime.

(19) Graph DataZones™: This is a professional feature available in the *ProTools™ Kit* for FastLapSim. Graph *DataZones* allow you

to display additional graph data and/or show ranges for target data values. DataZones can clearly illustrate dangerously high forces, engine speeds, or almost anything you wish to highlight. *DataZones* can be shown in any color(s), and you can automatically select a gradient range between beginning and ending colors.

(20) Iterative Spring/Damper Testing™: This FastLapSim ProTool™ will help you select the most appropriate shock absorber for any spring rate. The Iterator tests dampers with the current spring, performing a spring/shock dyno simulation and selecting a combination that effectively dampens the spring (without overdamping). Iterative Spring/Damper testing is an indispensable tool for zeroing-in on the best shock combinations.

(21) Iterative Trans-Gear Analysis™: This amazing FastLapSim ProTool™ performs a quick iteration using the current vehicle set-up and simulation test data to find the best transmission ratios for the test vehicle. The gear iterator uses three main data sources: 1) the engine and trans setup, 2) estimated top speed, and 3) estimated corner-exit speeds. The Gear Iterator determines gear ratios through an iterative process that includes: 1) maintaining gear-to-gear transitions at peak engine power, 2) optimizing corner exit speeds for maximum vehicle acceleration, and several other factors. The FastLap Gear Iterator will help you minimize the guesswork and endless calculations by providing a good starting point for further gearbox "tweaking."

(22) Track-Segment Data Analysis: A ProTool available in FastLapSim that defines portions of the track as "segments." Segments can be used to analyze vehicle entrance and exit speeds, average speeds, and other vehicle telemetry. Unique colors can be applied to each segment, making vi-

sual identification easier. Up to 30 segments can be defined for each track.
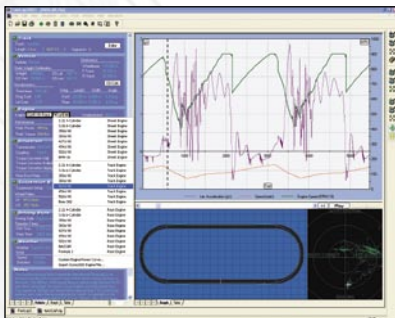
FastLapSim incorporates a clean, intuitive user interface. If you wish to change a component, simply click on the component name and select a new component from a pop-up *DirectClick*™ menu.

Segment	Time secs	Average Speed	Entry Speed	Exit Speed	Entry rpm	Exit rpm
1	0.13.72	69.0	57.1	80.0	4088	4504
2	0.2693	83.9	80.8	87.0	4584	5002
3	0.16.99	114.8	87.0	142.6	5002	6766
4	0.5618	143.7	142.6	144.8	6766	6678
5	0.4805	125.6	144.8	106.3	6678	4768
6	0.1100	104.6	106.3	102.9	4927	4768
7	0.789	100.1	102.9	97.2	4768	4512
8	0.1865	93.7	97.2	90.2	4512	4222
9	0.1894	91.3	90.2	92.4	4222	4336
10	0.1619	93.0	92.4	93.5	4336	4423
11	0.11.218	112.5	93.5	131.4	4423	6247
12	0.6944	103.8	131.4	76.2	6247	4263
13	0.1476	73.2	76.2	70.2	4263	3910
14	0.1.53	67.4	70.2	64.6	3910	4469
15	0.1107	62.7	64.6	60.9	4469	4250
16	0.1496	65.0	60.9	69.0	4250	4916
17	0.1.67	66.7	69.0	64.4	4916	4463
18	0.6186	69.0	64.4	74.3	4463	5230
19	0.6286	86.6	74.3	98.9	5230	5690
20	0.17.706	97.9	98.8	96.9	5690	4508
21	0.1294	94.6	96.9	92.4	4500	4203
22	0.1.53	89.0	92.4	85.6	4203	3988
23	0.1835	82.7	85.6	79.8	3988	4513
24	0.1.638	81.1	79.8	82.5	4513	4684
25	0.2122	87.6	82.5	92.7	4684	5339
26	0.14.118	89.1	92.7	95.4	5339	4020
27	0.3.217	88.9	95.4	76.5	4020	4391
28	0.5124	62.3	76.5	48.2	4391	4063
29	0.6177	45.4	48.2	42.6	4063	4704
30	0.15.337	43.9	42.6	57.1	4704	4088

With *ProTools*™ activated, FastLapSim displays an additional *ProData*™ table of segment times, helpful in professional track tuning efforts. Up to 30 segments can be defined for any track.

Guarantee, Privacy, Program Requirements

Privacy And Security:

ProRacing Sim Software strongly believes in ensuring your privacy. Purchasing on our website, by mail, or over the phone is safe and secure. Your personal information is always restricted and remains private. We only use the information we receive to process your order—and nothing else. ProRacing Sim Software will never sell or rent your personal information to others. If you have any questions or comments about our privacy policy, please send an email to: latherton@proracingsim.com.

Please note that ProRacing Sim Software employs other companies to perform functions on our behalf. Examples include maintaining SSL security during the transmission of information over the Internet and the processing of some credit card payments. These other companies only have access to information needed to perform their functions, and are bound by law not use any of this information for any other purposes.

Guarantee Of Product Satisfaction:

To help ProRacing Sim, LLC., customers become fully acquainted with our software and its capabilities, we offer a demo disc at no charge (pay just shipping and handling). This demo disc contains functional versions of our DynoSim, Dynomation, DragSim, and FastLapSim software (only the type of engines/vehicles that can be simulated are restricted). Customers can use these demos to determine if ProRacing Sim software is suitable for their requirements.
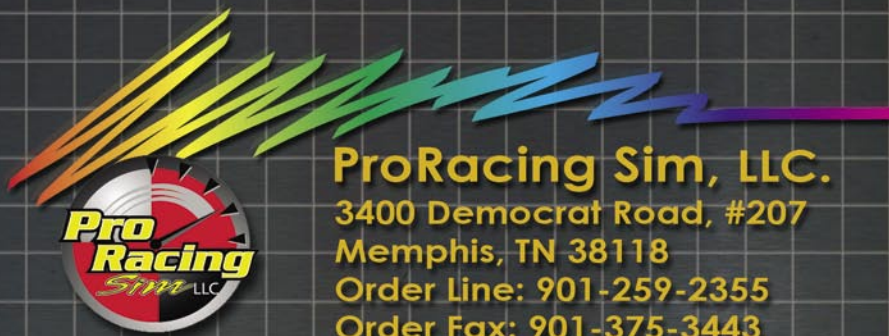
After you have made a purchase, any ProRacing software package can be returned, providing it has not been opened (the shrink-wrap or protective label has NOT been removed). Upon receipt and inspection, customers will receive a full refund of their purchase price. Shipping and handling charges are not refundable.

You are responsible for shipping unopened software to ProRacing Sim (please call 901-259-2355 for authorization before you return any unopened product).

General Software Requirements:

*   **Any PC system capable of running Windows95/98/Me/NT/2000/XP (Dynomation™ is not compatible with Windows95). A faster system processor improves simulation speed.**

*   **Minimum SVGA video monitor/card capability (800 x 600), however, 1024 x 768 or higher resolution recommended to better display graphs and component information.**

*   **Typical software install requires approximately 100-MBytes of hard disk space.**

*   **A CD-ROM drive**

*   **A Mouse**

*   **A Windows-compatible printer required for test-report printouts.**

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