Appendix 11: New Features in v 3.9

Engine Analyzer Pro has had many updates since this user manual was written for the original v2.1 for Windows. These include v2.1 B, v2.1C, v2.1D, v3.3, v3.5 and now v3.9. Here is a brief listing of some of the features new since v3.5 was released, including Version 3.9:

New Features:

The screen for opening standard Engine Analyzer Example Cams now shows the Gross Valve Lift and Lobe Separation for the cam you selected if you right click on the selected cam. Fig A44.

The screen for opening standard Engine Analyzer Example components now lets you select to only show components which match up to 3 criteria you have selected at the bottom of the screen. For example, you can choose to only show “Crower” cams with a lobe lift greater than .330 inches. Fig A44.

The screen to pick a Category of standard Engine Analyzer examples is now more intuitively obvious as to how it works, and it also remembers your last choices which will save time when you use this feature often. Fig A43.

We’ve now added 'Chain Calc These Cams' button when displaying standard Engine Analyzer example cams. This will have the program calculate performance for all cams in the list which meet the criteria of ‘Show Examples Only Fitting These Limits'. Fig A44.

You can include a graphics file, which could be your company logo, when printing graphs and reports. This file is loaded in via the Preferences screen. Fig A45 and Fig A49.

You can include add dyno power curves which you have entered manually to a graph. This lets you make comparisons between actual dyno performance and the Engine Analyzer Pro’s simulated results. Soon we will be exporting power runs from our Dyno DataMite software to the Engine Analyzer Pro. The default location for these files is the “engine” folder in the Engine Analyzer Pro v3.9 folder. Fig A48.

You can now import Cam Analyzer files almost seamlessly. The Pro will now install the cam nearly exactly as measured, even if the lobe is asymmetric. Fig A56.

You can now email results as a simple text file now in Print Options, which does not require a PDF writer program like Adobe Acrobat.

Program now remembers the ASCII file name and path, and which data channels have been selected to be output in an ASCII file.

Program now better accommodates the first column in printouts if the title in the left column is very long, like for a chain calculation. Fig A44.

A new Preference has been added under "General Operation, cont" tab to let you hide the Progress Bar during calculations. This lets you minimize the program during calculations to work with other programs, which can be very handy when doing long chain calculations. Fig A45.

We’ve now added Delete Row and Insert Row buttons to the Flow Table screens in Head Specs. Fig A47.

You can now select to include the torque and HP data when you print out RPM data graphs as long as there are torque and/or HP data on the graph. Fig A49.

The program now has a separate ASCII File command in the Output Screen to make it more obvious you can export the data as ASCII data.

Now program can now better find newer versions of Acrobat or Acrobat Reader to display the user’s manual, supplements, and more. You can also ‘browse’ to find Adobe Acrobat in the Preferences screen. Also, the program now allows other “PDF Writing” programs produce PDF files for emailing, other than just Adobe programs.

Program now better remembers the printer you have selected and landscape vs portrait when you click on Windows Printer Setup in various screens.

Some printouts now use a proportional font for better printouts.

Program now remembers its screen position and window size and restores it when it is opened again.

Now program should require you to 'Allow' it to run in Vista (same as right click on desktop icon, then select Run As Administrator'). This should make the program more Vista compatible.

New Inputs:

The program now lets you enter various types of ethanol fuels, like E85, and other percents of ethanol and gasoline. It now also has a Richness factor input which makes it easier to pick different types of fuels and richness factors. Fig A50.

You can now specify a variable cam timing, or Variable Valve Timing (VVT). This lets you specify a particular RPM where the program switches from the base cam timing to a modified cam timing and lift. This can be for the intake and/or cam profiles. Fig A53.

You can now specify an amount of Asymmetry to a cam profile being created in the program. Fig A52.

You can now specify up to 6 break points in spark curve. It was previously limited to just 4.

We've added a "Clc" button for Lobe Lift being calculated from Gross Valve Lift and Rocker Arm Ratio in the Cam Specs.

We've added several general intake manifold types. These choices let you pick a manifold type and the program will estimate various measurements based on the engine size and intake port size in the Head Specs screen. You can see what the program has estimated for these specs. Then if you change the type to "Use Specs Below", you can modify these to your liking. Fig A51.

The Centrifugal Superchargers now have a Max Airflow input. This allows the program to better fine tune the supercharger performance map within its calculations.

We've added hundreds of new standard Engine Analyzer Example cams, including Comp Cams, Crower, Isky, Lunati, Harley Davidson, and production cams. Hundreds of these are for stock engines courtesy of John Holm. Many thanks John. Many of the Harley Davidson cams are courtesy of Stephen Mullen of S&P Mullen Enterprises, Inc www.Nightrider.com or www.tuneyourharley.com . Many thanks Stephen.

We've added several new standard Engine Analyzer Example cam categories, especially Imports. Fig A43.

You can now specify .053" lift for rating cam events (like Harley Davidson cams).

We've added an option to import Other Format Files for Head files, like .flw and .dfw files from Desktop Dyno (tm) and DynoSim (tm). Hundreds of compatible head files with flow data, valve sizes, and some with port volume (not available with typical Desktop Dyno or D ynoSim files) are available via Stan Weiss at http://users.erols.com/srweiss/tablehdc.htm You can purchase a CD from Stan with all the files or just visit his site for free info for your particular heads. I believe if you purchase the CD, everything will be in the correct format and you may have additional data not free on the website, like port volume. Note: Not all head files have port volume, material, etc. Fig A54.

We've added an option to import Other Format Files for Cam files, like .cam and .scm files from Desktop Dyno (tm) and DynoSim (tm). Fig A55.

Program now has section for storing comments about the valve train dynamics specs.

We've added several new Chevy LSx and LTx example files of both Components and Total Engines courtesy of Aaron Anderson. Many thanks Aaron.

We've added many example Garrett turbocharger files, courtesy of Bjørn Deildok of SWR Performance, Norway. Many thanks Bjorn.

We've added the ability to calculate turbo turbine Nozzle Diameter based on exhaust turbine flow data.

The program now asks if you want to use an unrecognized cam file format. This can help if you have a file which is not ***exactly*** the correct format but still useable.

New Outputs:

We've added Sq In Area and Port Volume to the Head Specs screen.

We've added a new Preference under "Calculations, cont" tab to let you pick the number of decimal places to use to display torque and HP. This does NOT improve the accuracy of the calculations. Fig A46.

We've added 2 new Preferences to allow all or user selected outputs to be displayed in Metric units. Fig A46.

We've modified the Preference setting of 'Include Averages in Chain Results' to 'Chain Results Include' either No Averages, Average Tq and HP, and now Avgs + Engine Masters Challenge. The Chain Calculations now include the engine Displacement in CID with Idle Vacuum to provide the info necessary for this calculation. The calculation is:

Engine Masters Challenge Score = (Avg Tq + Avg HP) x 1000 / cid

The Average torque and HP is calculated over the RPM range you have selected to calculate. The Engine Masters Challenge rules can change from year to year, and will determine the RPM range. You can also rank your chain results based on this EMC Score. See Fig A44 for results and Fig A45 for the Preference Setting.

Accuracy Improvements:

We've improved the accuracy of Roots Supercharger simulation at very low RPMs which would typically produce very low boost levels.

We've made some improvements to the calculation about the amount of boost or exhaust pressure required to blow the valves off their seat.

We've made some improvements to the tables of Spring Force vs Spring Height, available in the Valve Train Dynamics screen.

We've added a Preference for Filter (smooth) Cam Lobe File data. Since Cam File data can come from many different sources, it may be best to set this to Yes, especially if you are doing Valve Train Dynamics. Fig A45.

If you are using a Cam Lobe File for either the intake or exhaust lobe, then the velocity and acceleration data for this lobe will be filtered also.

We've increased the "Number of Cam Bearings" allowed up to 40 (was 20) for calculating Bearing Size Coef. in Short Block Specs.

We've fixed a bug where direct acting OHC buckets would show valve toss at very low RPM (less than 1000) due to math problem.

We've refined the blow-by calculations, so that the amount of leakage also reflects a loss of fuel energy due to lost fuel.

The program now allows for up to 20 degrees cam advance or retard.

We've made refinements to the Estimated Idle Vacuum in the Special Calculations section. Now it is based on the Barometer setting in the Calculation Conditions screen, supercharger type, and some other refinements.

We've added a Preference to have Cranking Compression calculated by cranking RPM, barometric pressure, and cylinder leakage, or just the simpler v3.5 and earlier versions. For a little background, if there is any leakage as specified in the Short Block Specs screen, that bleeds off cranking compression. The faster you spin the engine to recording cranking compression, the less time available to leak and the higher the pressure. Also, the higher the barometric pressure, obviously the higher the cranking compression. Fig A46.

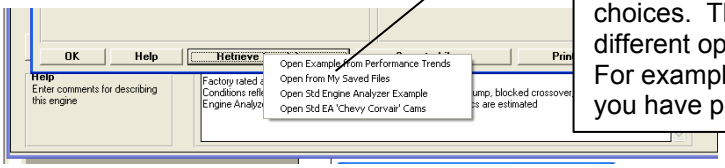
Lifts at TDC are now done with NO lash, to better match what most cam grinders report.

We're now doing a more precise simulation of the difference between aluminum vs cast iron heads for Knock Index difference.

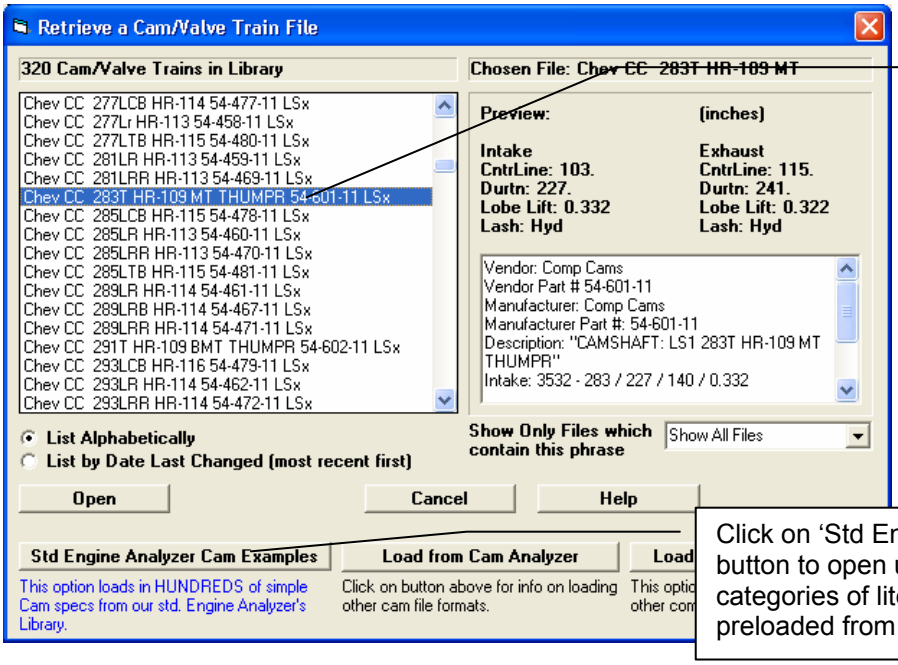
We've increased the Piston Speed limit above which program says is Impossibly High because materials and technology have made huge improvements over the years.

We've made some refinements to the Cam Profiles created by the EA Pro to more precisely time them to the nearest 0.1 deg.

Figure A43 New Features for Using Standard Engine Example Component Files

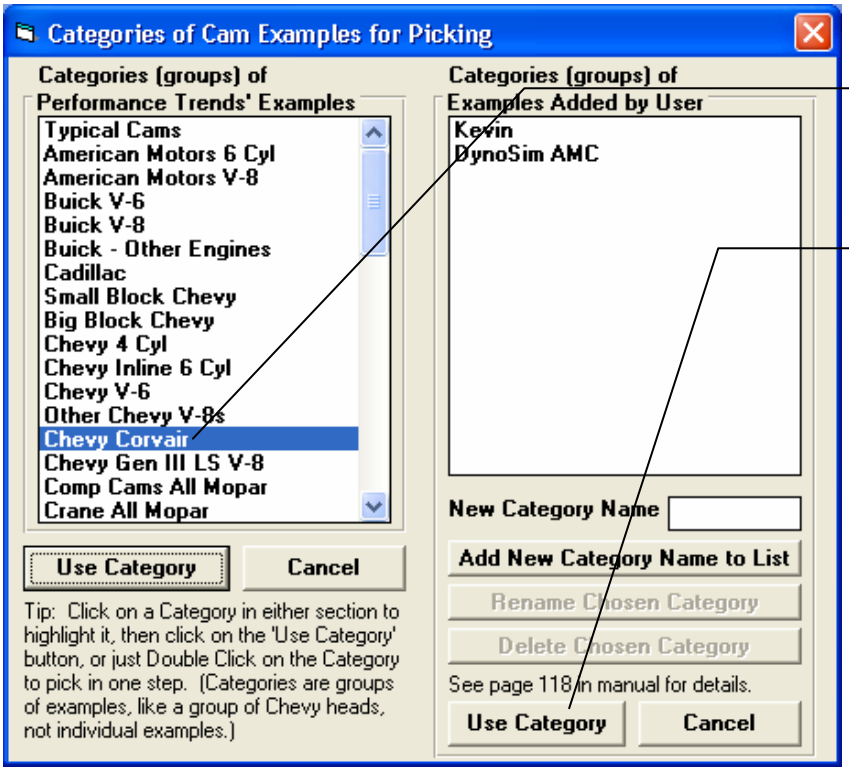


Click on Retrieve from Library and you are presented with choices. This list of options can grow as you choose different options at the next 'Retrieve' screen show below. For example, the 'Corvair…' choice is presented because you have picked a 'Corvair…' cam in the past.



Just to contrast the 'Std Engine Analyzer Example' files from 'Engine Analyzer ***Pro'*** files, the ***Pro*** files are listed in this section, and when you click on them, a preview is shown to the right. Most all the commands and options above the 'Std Engine..' button relate to ***Pro*** files which typically contain more detail than the 'Std Engine Analyzer…' examples.

Click on 'Std Engine Analyzer Cam Examples' button to open up the screen below, showing categories of literally thousands of cam specs preloaded from which you can choose.

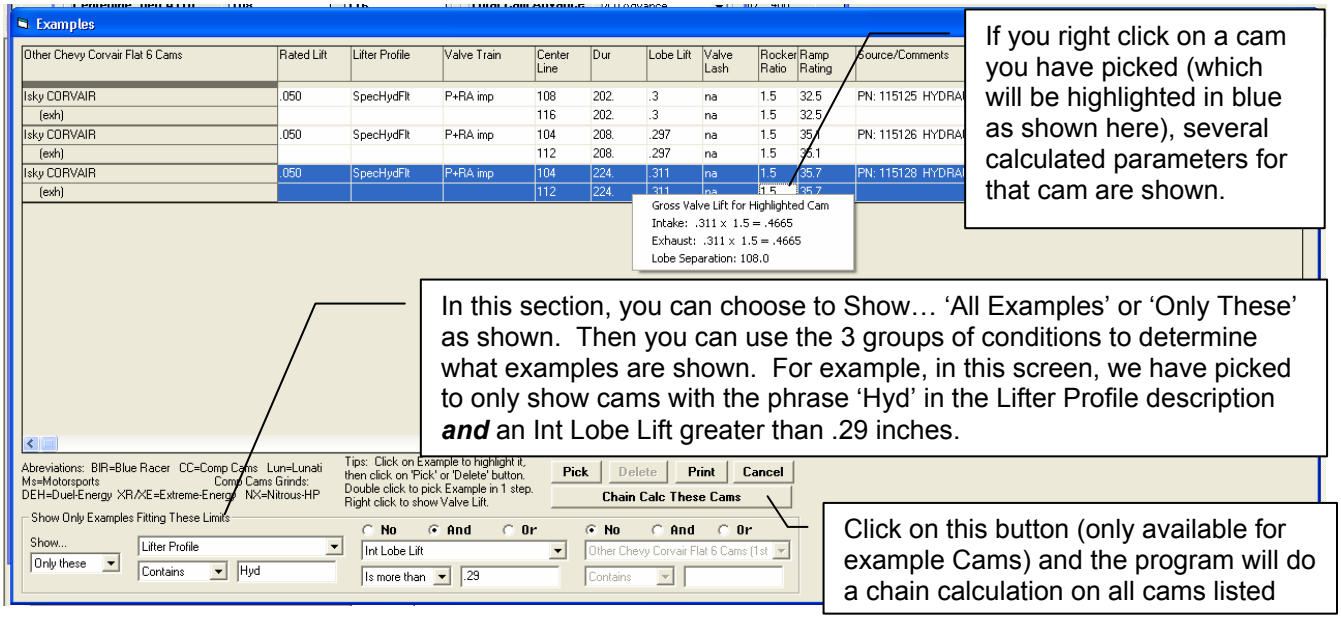


Pick a Category of Std Engine Analyzer Example file, then click the Use Category button.

Now there's a Use Category and Cancel button in this section for Examples Added by User. They act the same as the original Use Category and Cancel button in the Performance Trends' Examples section to the left.

Note: You typically add Examples if you have our Standard Engine Analyzer program and have linked the Pro and Std programs in EA Pro's Preferences. When you save a Cam /Valve Train file in the Pro, you are saving it in EA Pro format. Note: You can also add a Category and "Other Format" cam files as shown in Figure A55

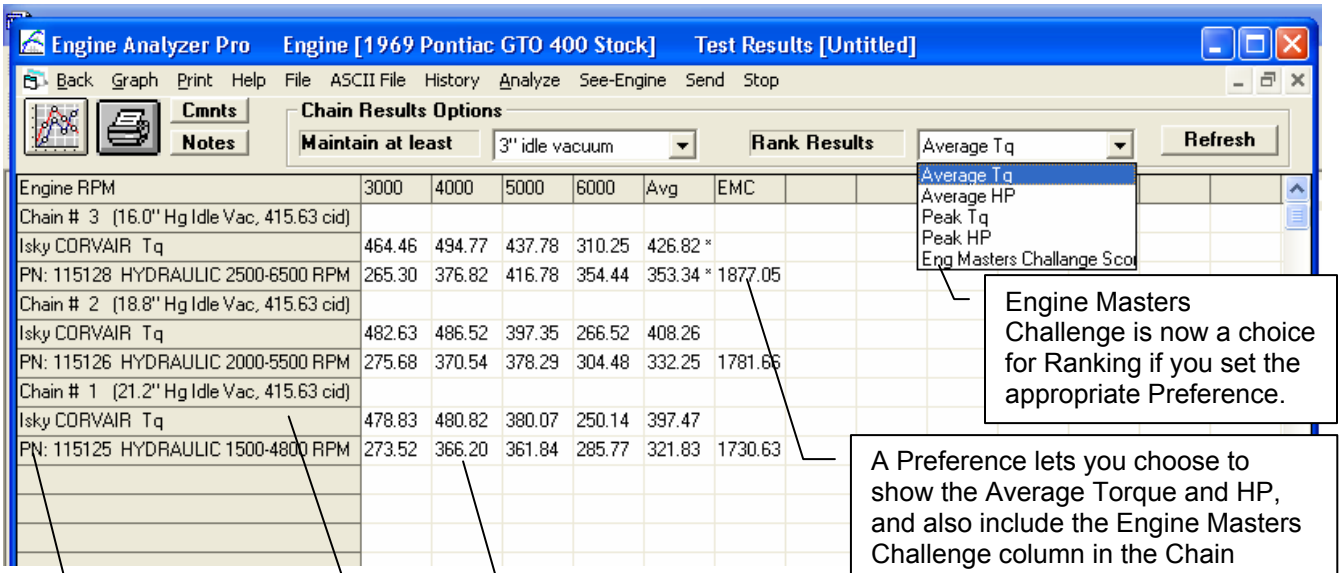
Figure A44 New Features for Using Standard Engine Example Component Files, cont



If you right click on a cam you have picked (which will be highlighted in blue as shown here), several calculated parameters for that cam are shown.

In this section, you can choose to Show… 'All Examples' or 'Only These' as shown. Then you can use the 3 groups of conditions to determine what examples are shown. For example, in this screen, we have picked to only show cams with the phrase 'Hyd' in the Lifter Profile description ***and*** an Int Lobe Lift greater than .29 inches.

Click on this button (only available for example Cams) and the program will do a chain calculation on all cams listed



Engine Masters Challenge is now a choice for Ranking if you set the appropriate Preference.

A Preference lets you choose to show the Average Torque and HP, and also include the Engine Masters Challenge column in the Chain Calculation results.

All these torque and HP results (and Engine Masters Challenge Score) are shown to 2 decimal places because that Preference has been turned. If that Preference was not turned on, these numbers would have been shown to the nearest whole number, that 366.20 would be shown as

The program now better expands this first column to fit all the descriptive data given.

Results for the Cam Examples you choose to keep in the screen above. Note that these are ranked by 'Average Tq' by any of the 5 choices in the 'Rank Results' combo list. The 'Eng Masters Challenge Score' is only possible if you've turned it on in Preferences.

Figure A45 New Preference Settings

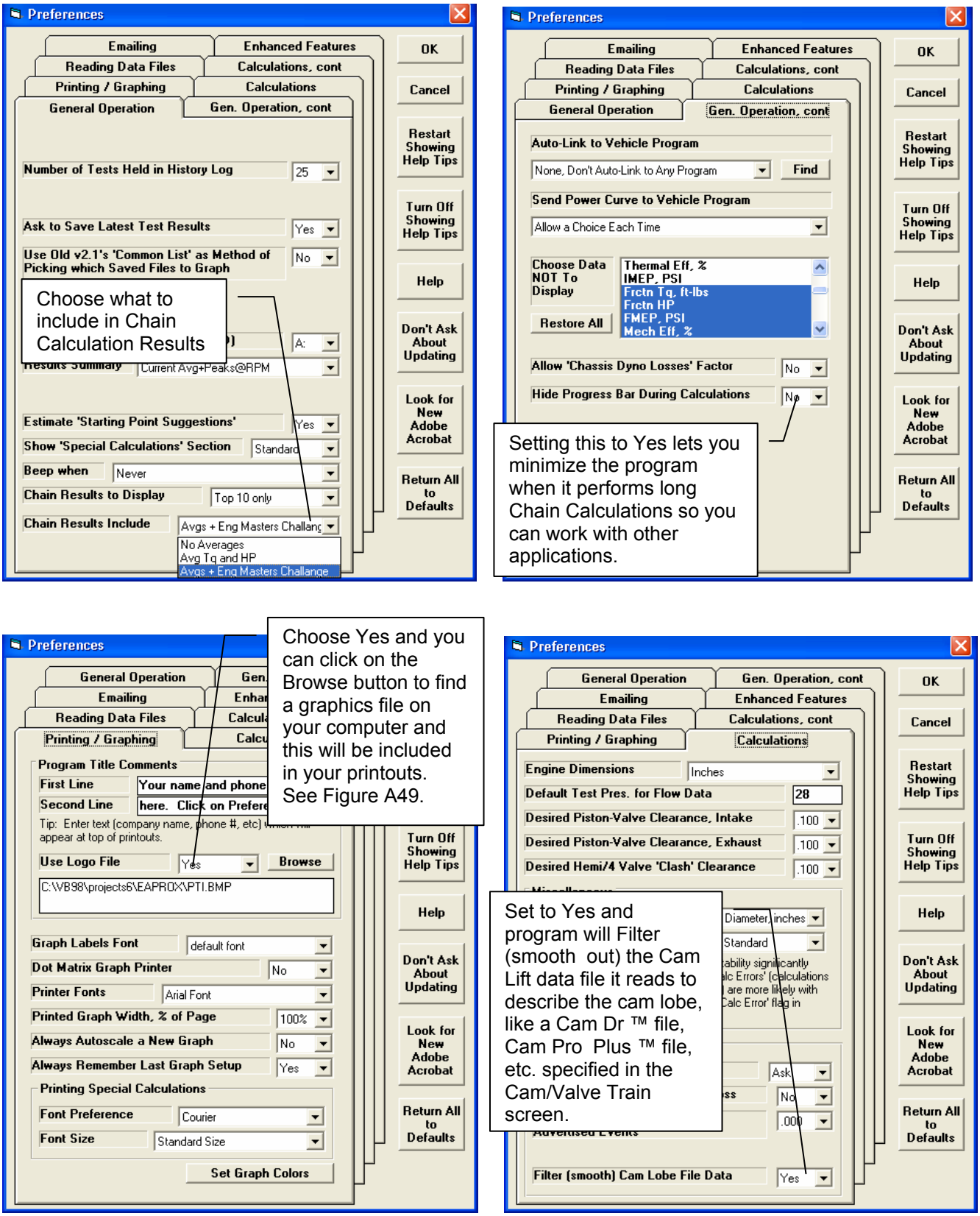


Figure A46 Options in Preferences Under 'Calculations, cont' Tab

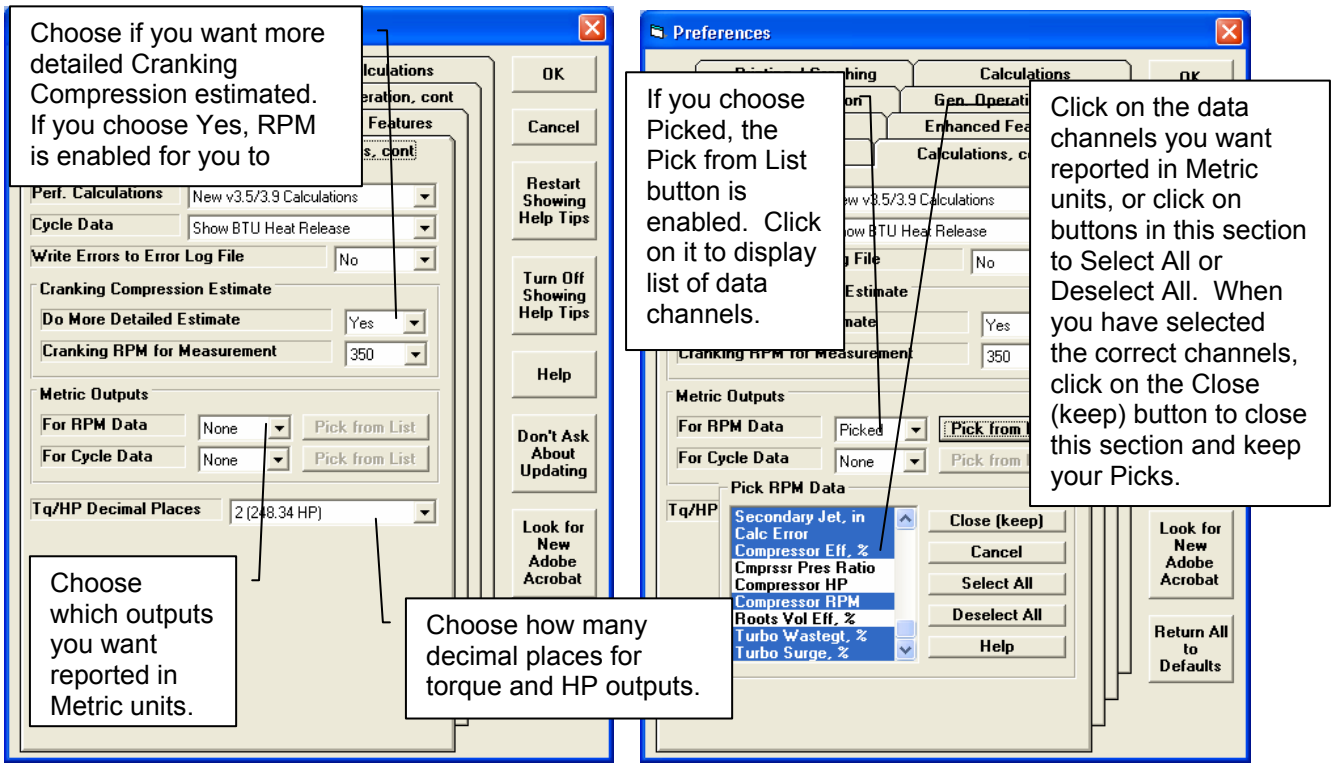


Figure A47 Flow Data Table Screen (from Head Specs Screen), New Commands

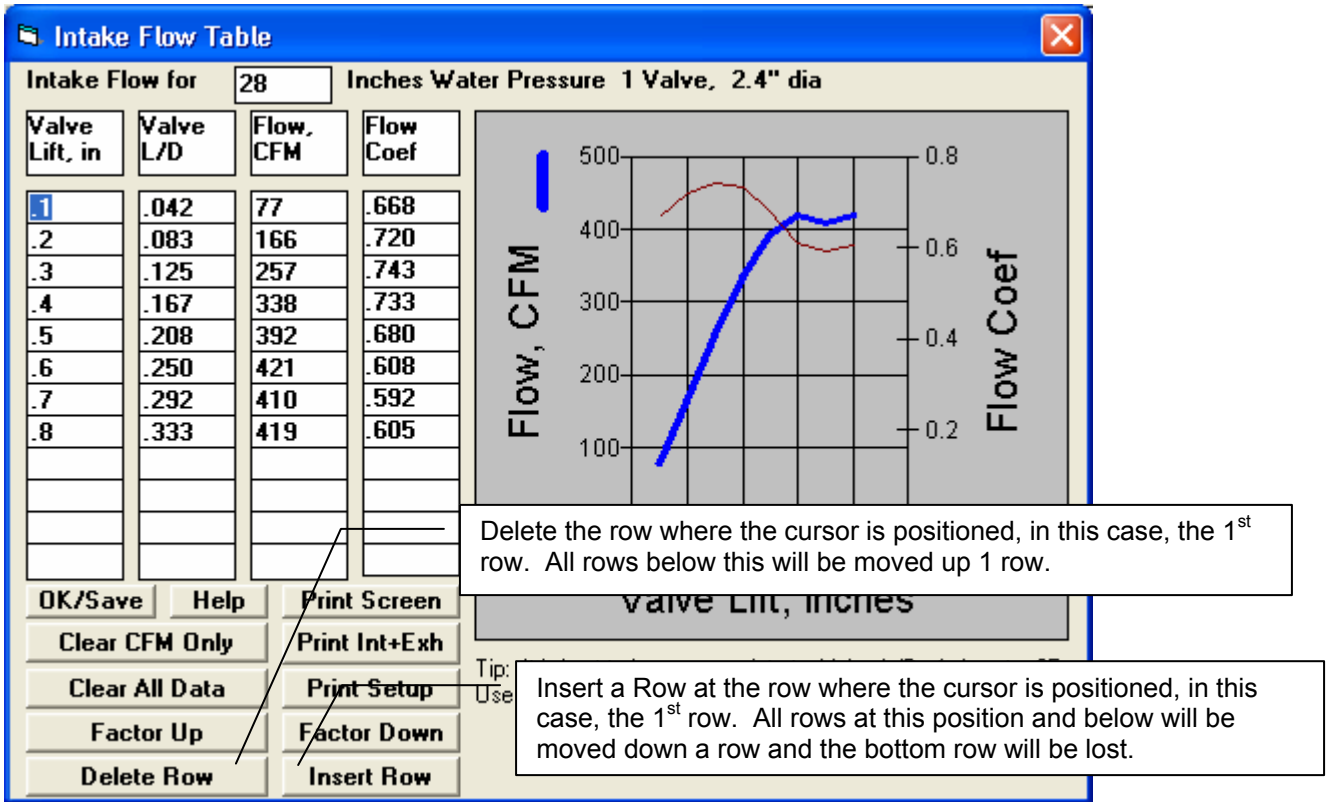
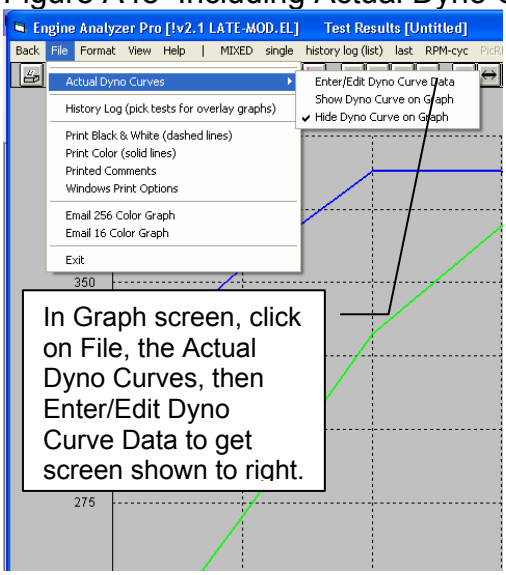
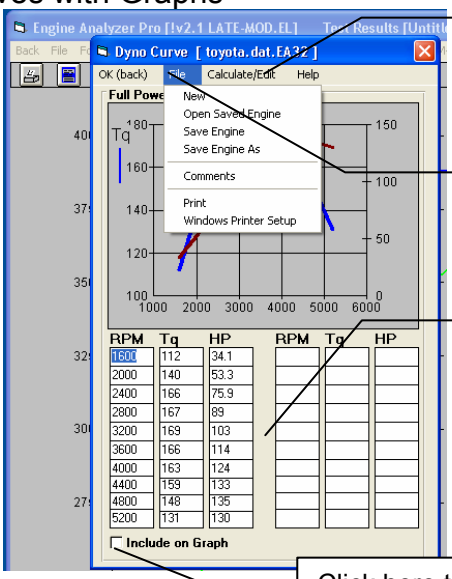


Figure A48 Including Actual Dyno Curves with Graphs



In Graph screen, click on File, the Actual Dyno Curves, then Enter/Edit Dyno Curve Data to get screen shown to right.



Click here to calculate an approximate power curve. You can then edit those data points.

Click on File for these options to Open or Save this data set.

Type in your RPM, torque and/or HP data points. Once you have entered 2, the 3rd input is calculated and filled in for you.

Click here to include this data on the graph with Engine Analyzer Pro calculated data, as shown below.

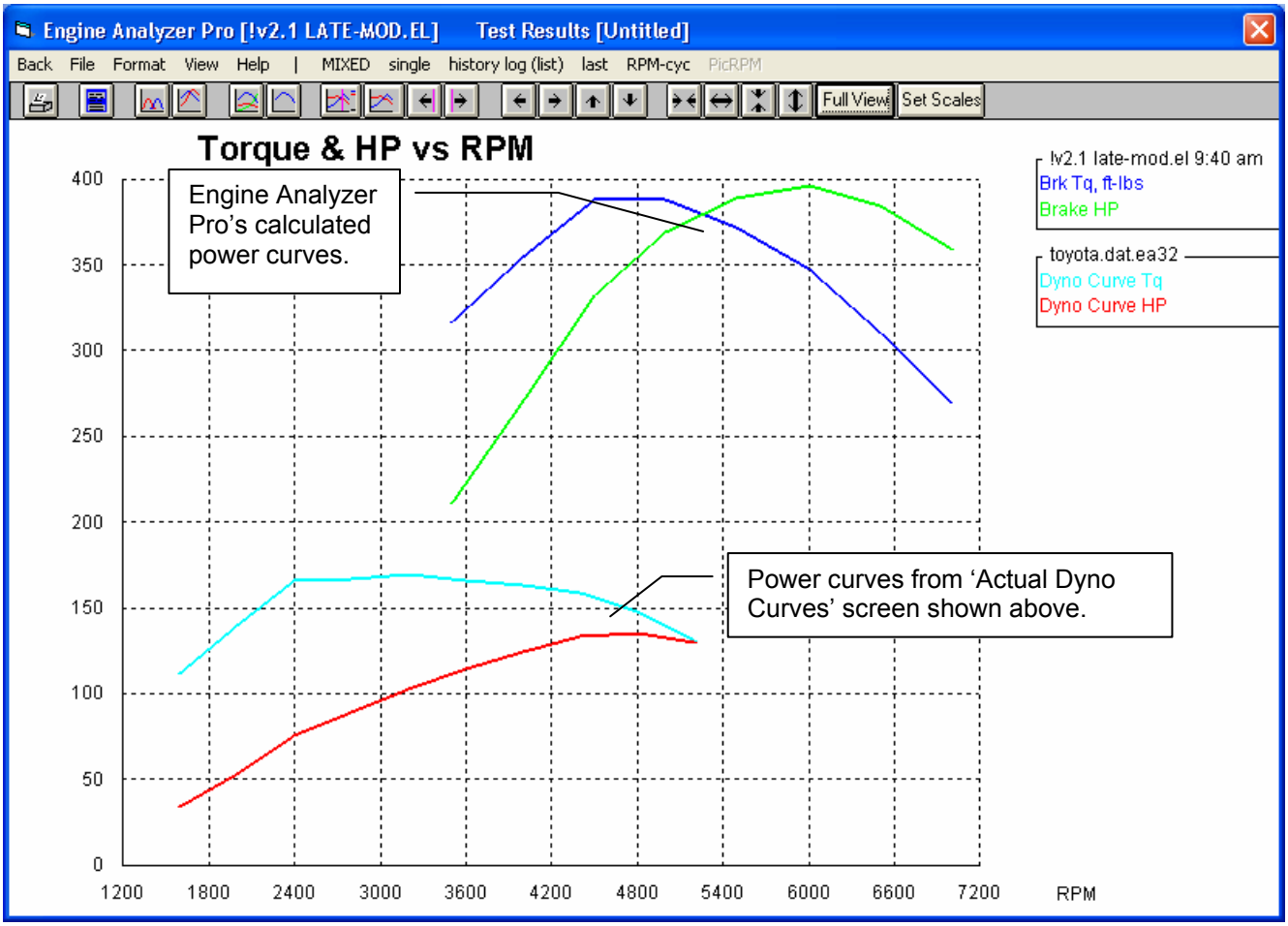


Figure A49 Including a Torque and HP Data Table with the Printed Graph

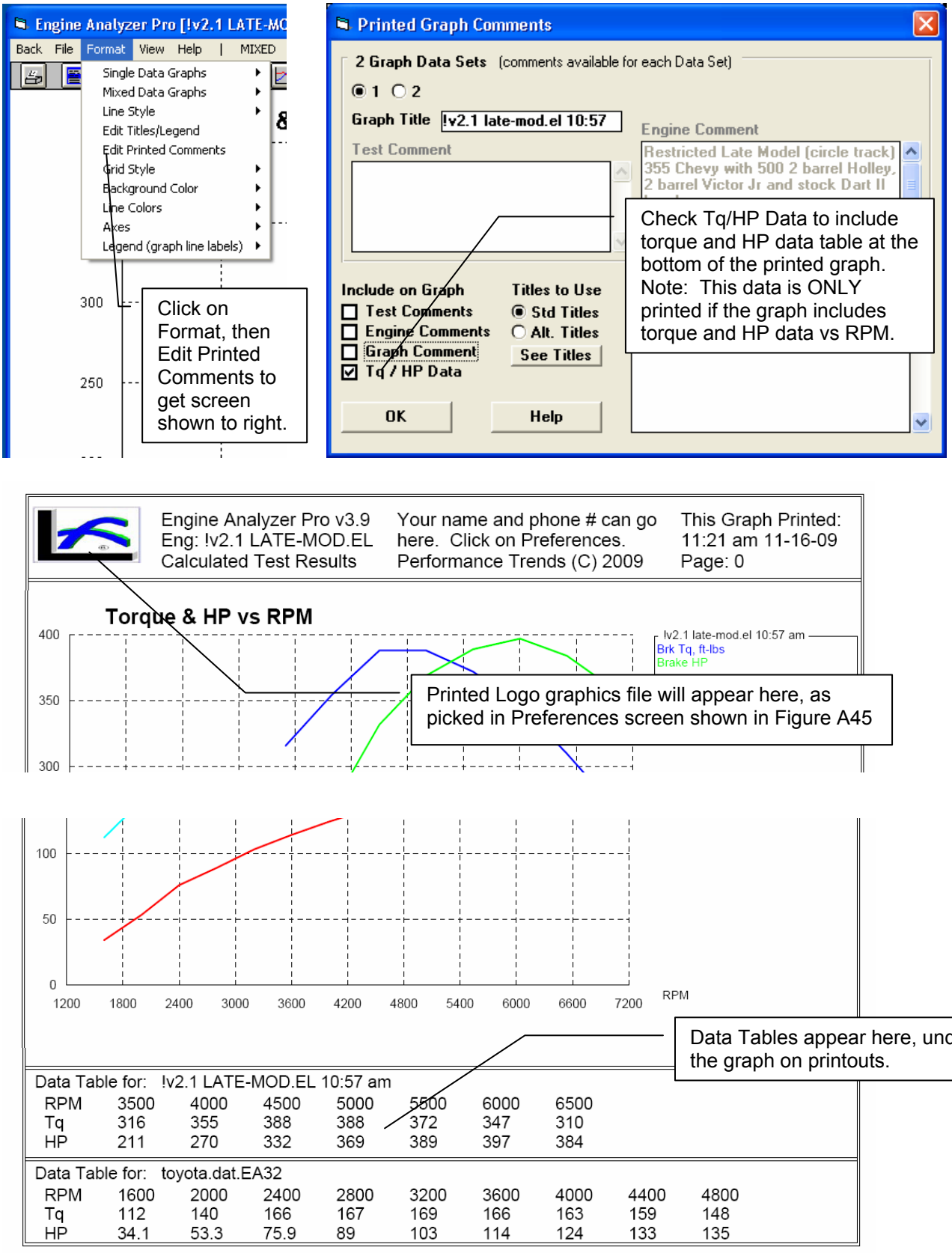


Figure A50 New Ethanol Fuel Choices (like E85) and Separate Richness Setting.

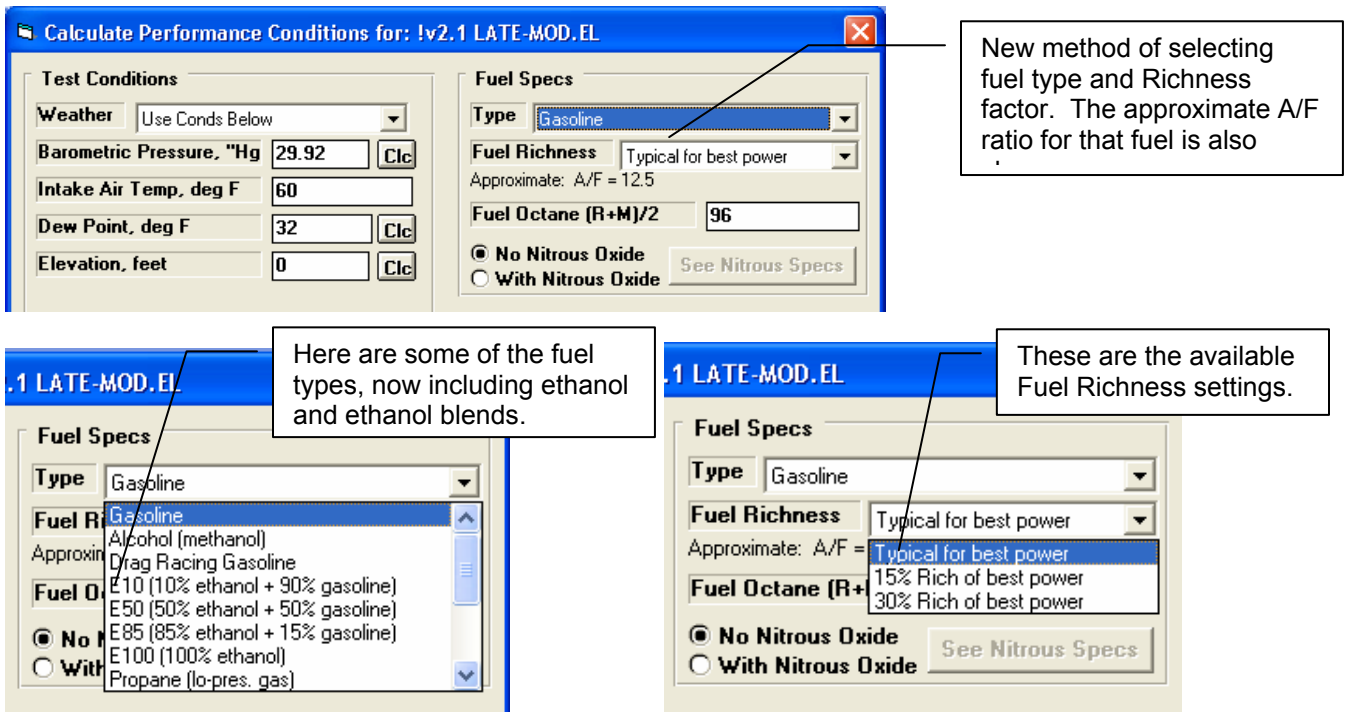


Figure A51 Picking a “Typical” Manifold Type in the Intake Specs Screen.

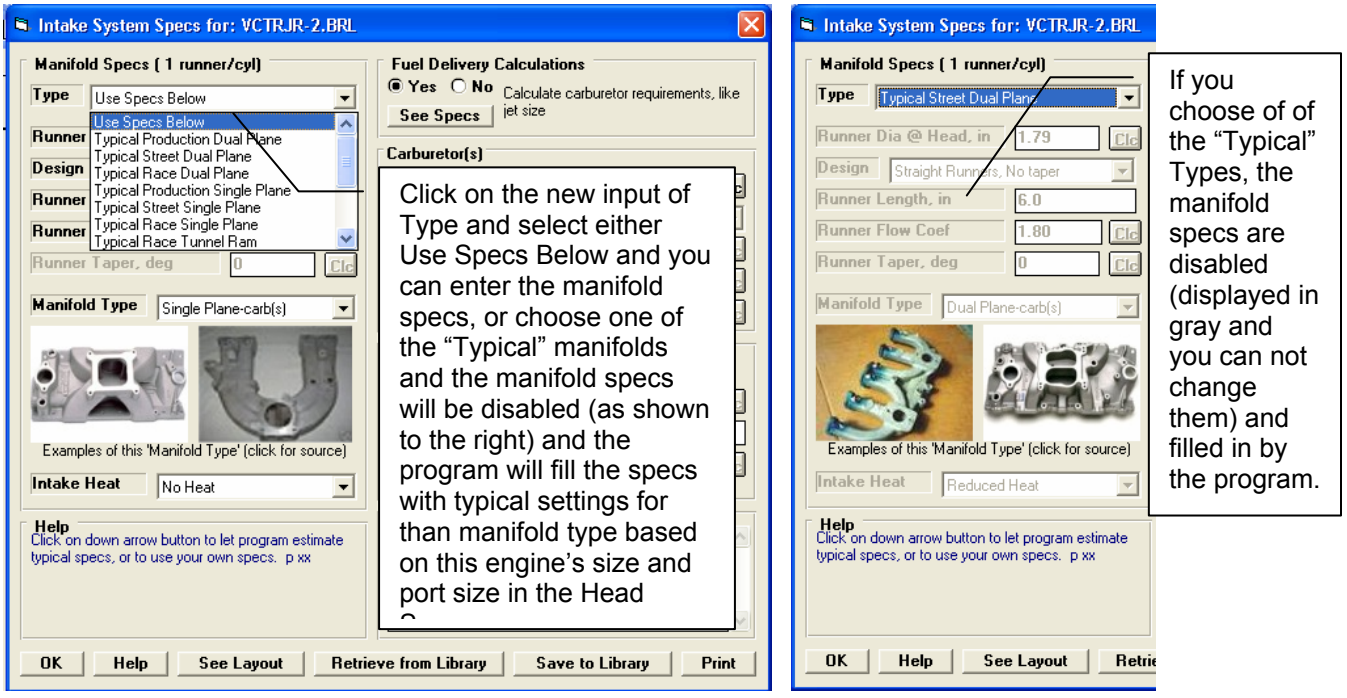
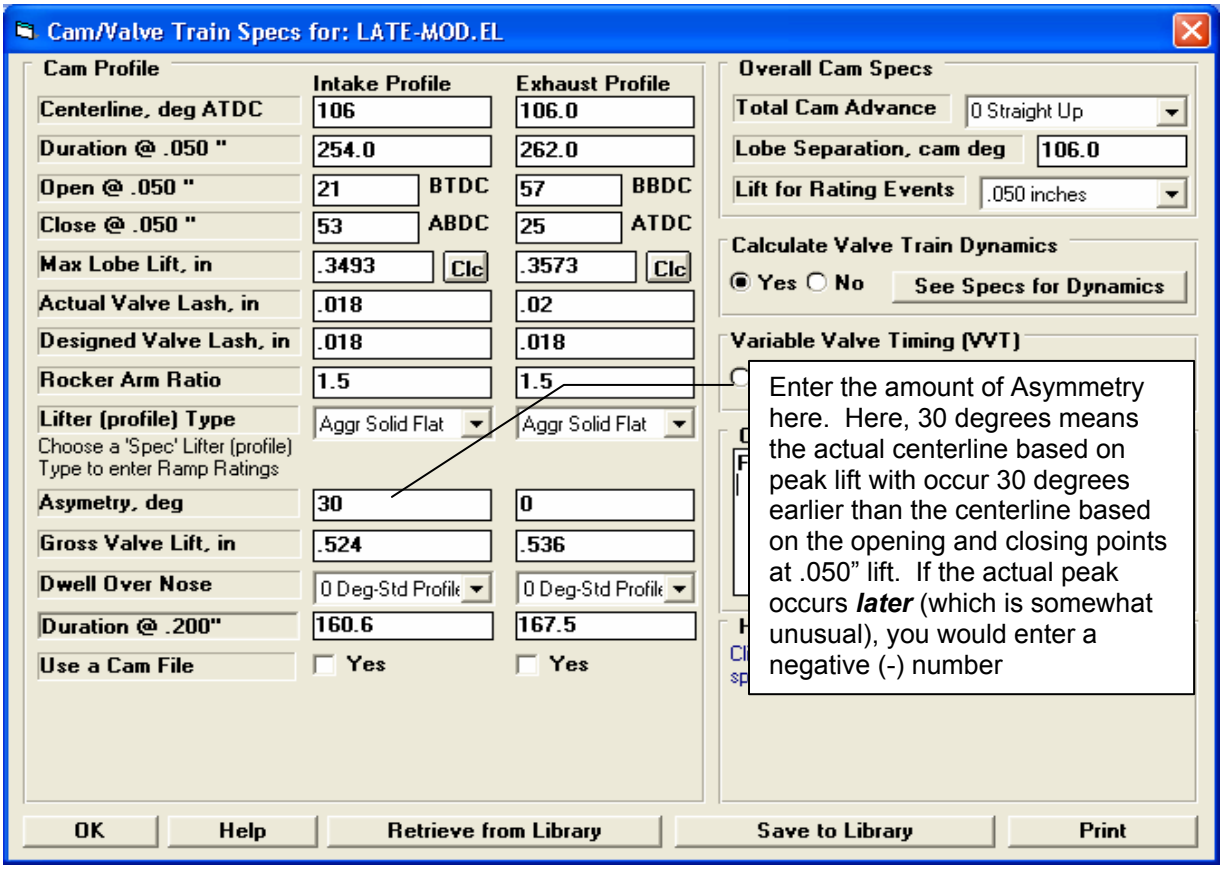


Figure A52 Asymmetric Cam Profiles



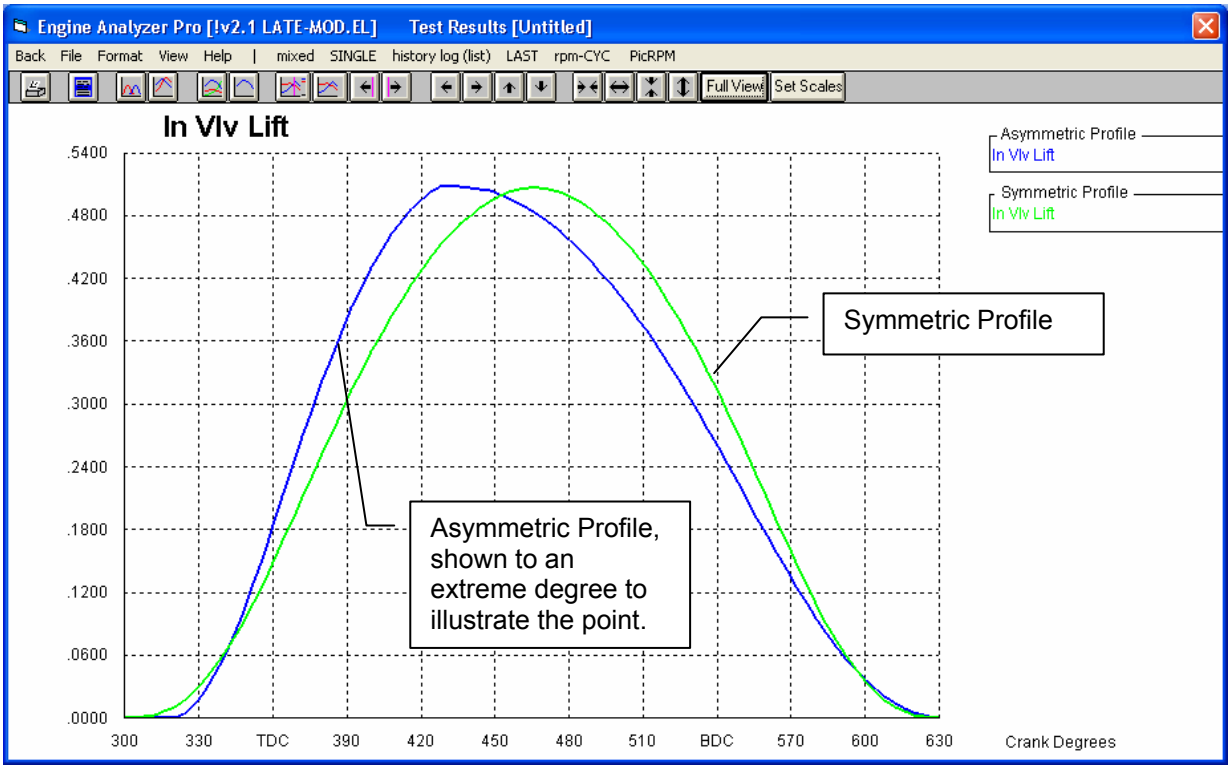


Figure A53 Variable Valve Timing (VVT) Feature

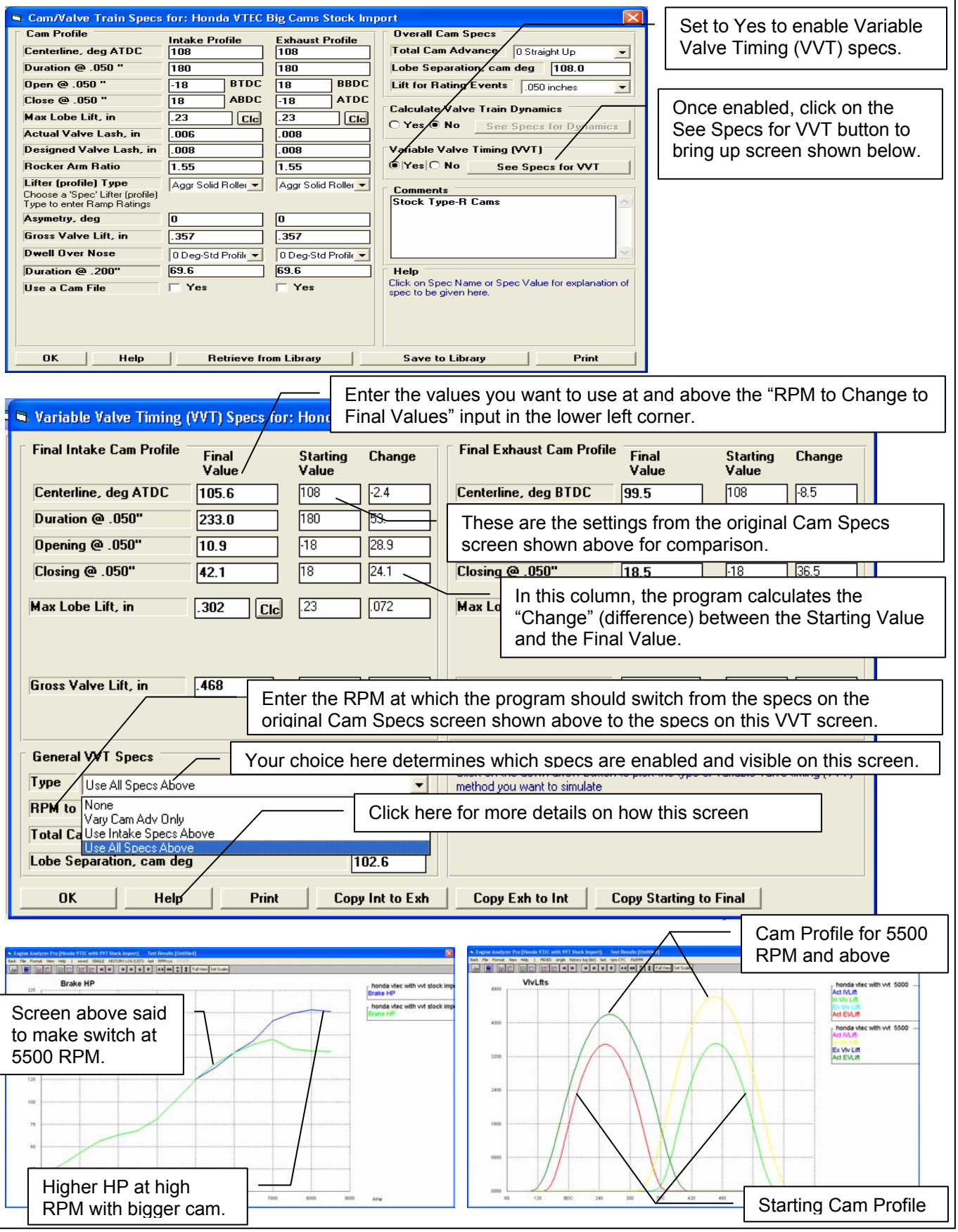


Figure A54 Importing an "Other Format Head File"

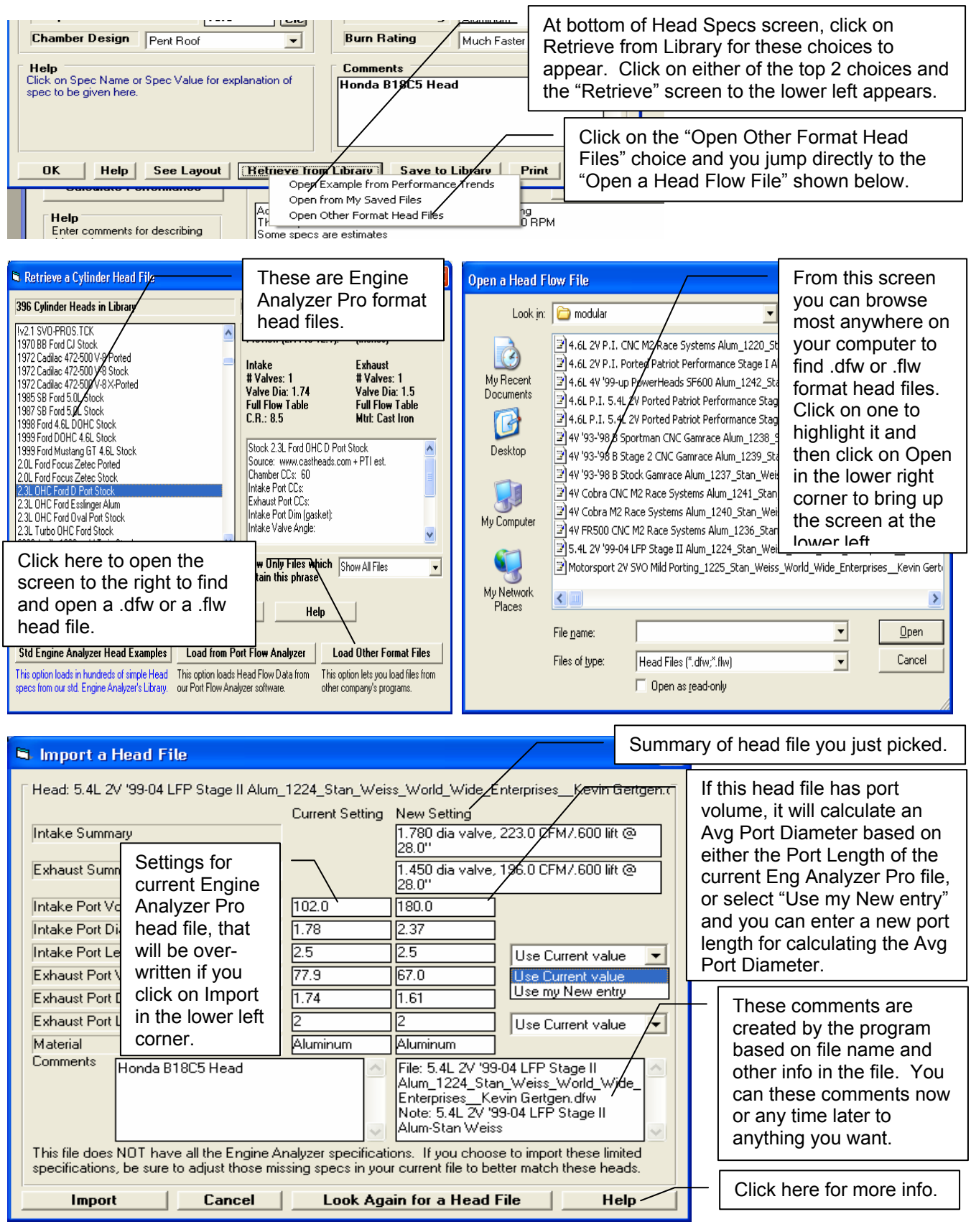
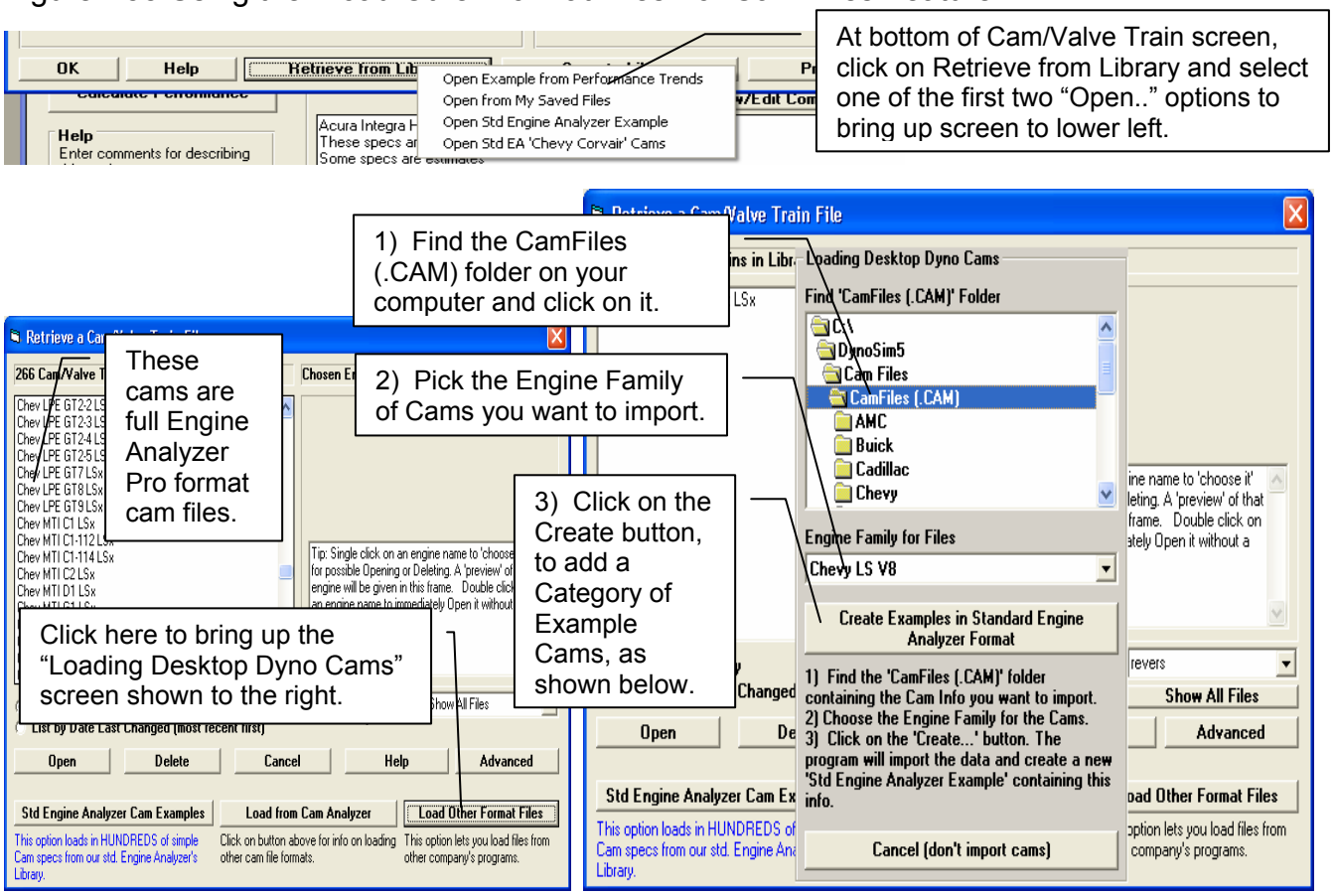
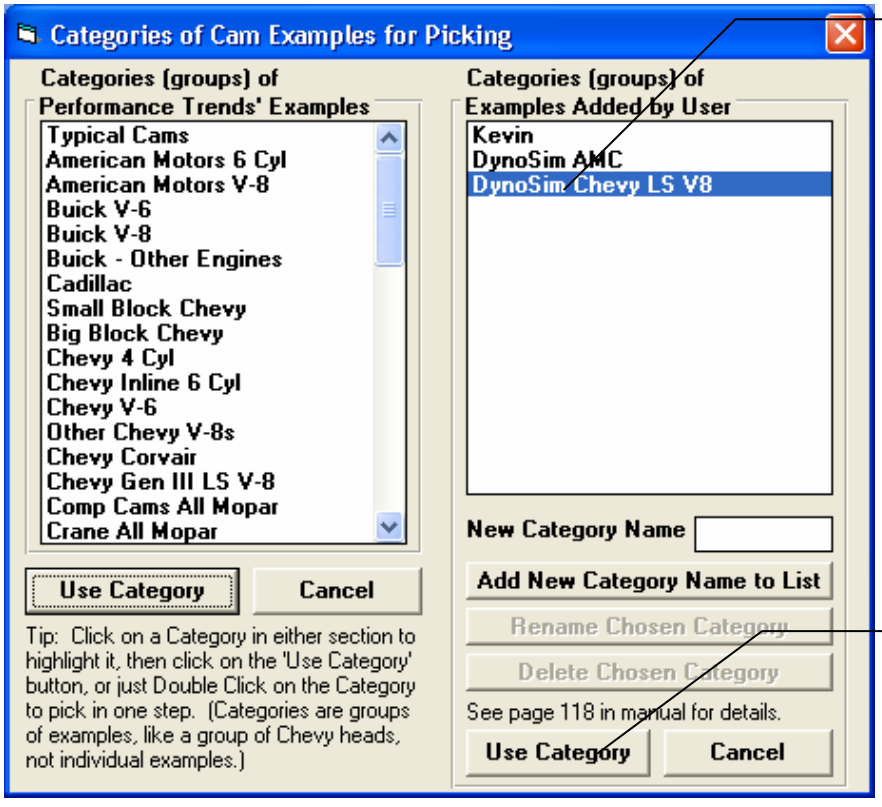


Figure A55 Using the "Load Other Format Files" for Cam Files Feature



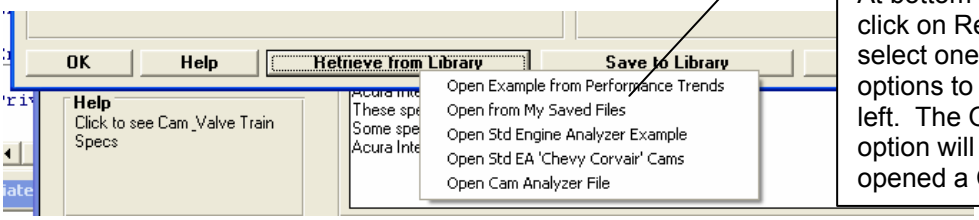


The program will find all cam files for the particular Engine Family you chose from all the sub folders under the CamFiles (.cam) folder you found on your computer (or most anywhere you can browse to on your computer like a network location, memory stick, etc.)

It will then create a Category in the Std Engine Analyzer examples, where you can compare and pick from all these cams. You can also use all features available to Std Engine Analyzer examples, as outlined in Figure A44.

Highlight this new Category under "Examples Added by User" and click on Use Category to view all these imported cams.

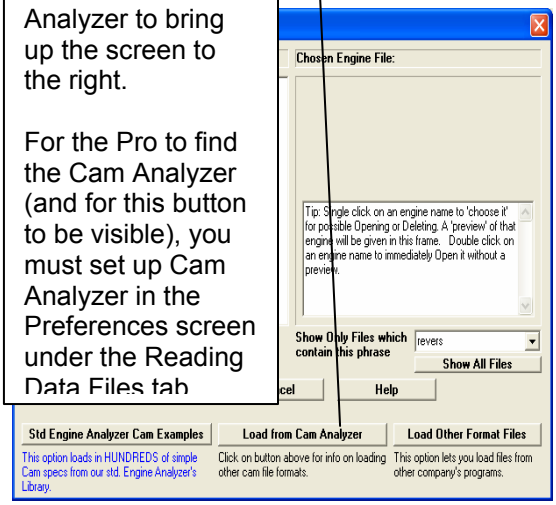
Figure A56 Importing a Cam File from Cam Analyzer

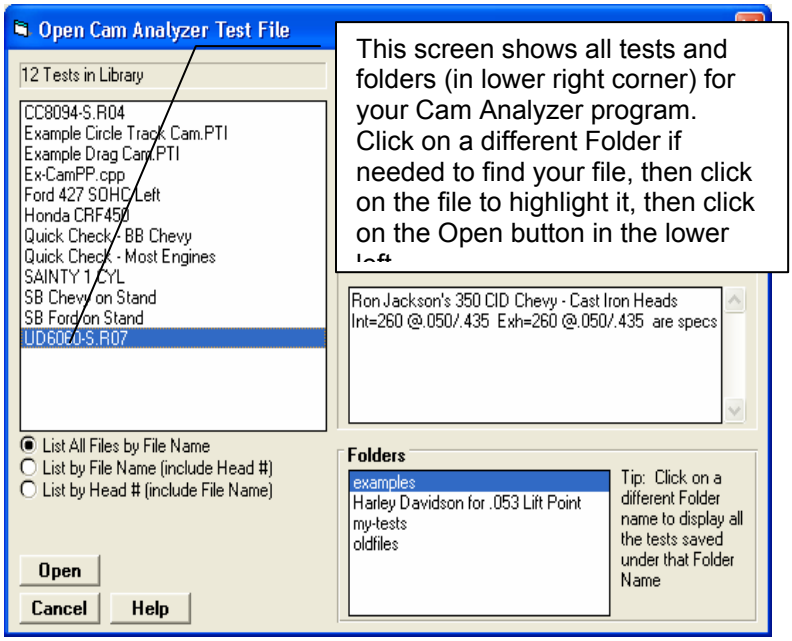


At bottom of Cam/Valve Train screen, click on Retrieve from Library and select one of the first two "Open.." options to bring up screen to lower left. The Open Cam Analyzer File option will appear once you've opened a Cam Analyzer file via this

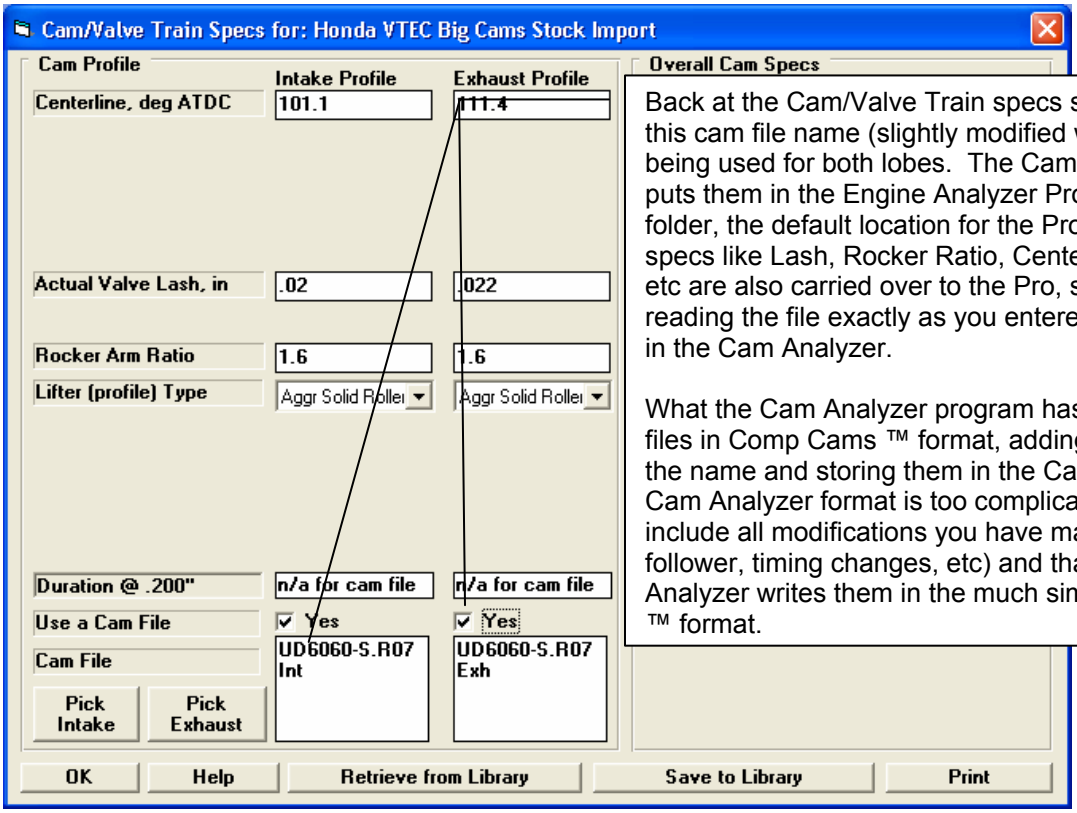
At the Retrieve screen click on Load from Cam Analyzer to bring up the screen to the right.

For the Pro to find the Cam Analyzer (and for this button to be visible), you must set up Cam Analyzer in the Preferences screen under the Reading Data Files tab





This screen shows all tests and folders (in lower right corner) for your Cam Analyzer program. Click on a different Folder if needed to find your file, then click on the file to highlight it, then click on the Open button in the lower



Back at the Cam/Valve Train specs screen, you will see this cam file name (slightly modified with "Int" or "Exh") being used for both lobes. The Cam Analyzer program puts them in the Engine Analyzer Pro's "CamFiles" folder, the default location for the Pro's cam files. Other specs like Lash, Rocker Ratio, Centerline, Comments, etc are also carried over to the Pro, so the Pro should be reading the file exactly as you entered it or measured it in the Cam Analyzer.

What the Cam Analyzer program has done is created 2 files in Comp Cams ™ format, adding "Int" and "Exh" to the name and storing them in the CamFiles folder. Raw Cam Analyzer format is too complicated and may not include all modifications you have made (like virtual follower, timing changes, etc) and that is why the Cam Analyzer writes them in the much simpler Comp Cams ™ format.