

Appendix 9: New Features in v3.5 B

Port Flow Analyzer has had many updates since this user manual was written for the original v3.0 for Windows. These include 3.0 A through v3.0 E, v3.5 and now v3.5 **B**. For the features added to the v3.5, refer to the Readme.doc file (click on Help, then Display Readme.doc File) in the program. Listed here are features introduced in v3.5 B. Also, v3.5 B has a more advanced version we call “Head Porter”. So now there are 3 versions of Port Flow Analyzer:

- Basic Version
- Professional (Pro) Version (includes all Basic features and more advanced Pro features)
- Head Porter Version (includes all Professional features and more advanced Head Porter features)

Here is a listing of the major enhancements and new features for v3.5 B.

Data Recording:

In Test Options, you can now select to record port velocity data at 3 depths in the port. See Figure A41, 47. Head Porter only.

Several enhancements to Port Velocity Report for Head Porter version have been added, to allow more averaging for all possible combinations of recording port velocity. See Figure A42. Head Porter only.

A new Preference to allow for English units of CFM, Deg F, inches of water pressure, etc. but mm valve, lift and engine dimensions has been added. See Figure A43. Head Porter only.

The Electronics or FlowCom screen has been enlarged in its default setting. You can still enlarge to most any size you want by turning on the appropriate Preference setting. See Figure A43-B. All versions.

You can now include a “gauge” (bar graph) for some readings on the Electronics or FlowCom screen. This gives you a graphical representation of the stability of the readings and if the readings are going higher or lower than expected values. See Figure A43-B. Head Porter only.

Data Analysis (including Graphs and Reports):

You can create custom, user defined graphs, where you choose what data gets included. For example, you can graph CFM and Swirl and % Exh/Int on the same graph. See Figure A44, A45. Head Porter only.

Program now allows for graphing Flow results corrected to 2 different test pressures. See Figure A46. Head Porter only.

You have several options to allow for more options for doing Port Velocity Graphs. This is an extension to the feature to be able to record Port Velocity for many more data points. See Figure A47. Head Porter only.

You can now specify if you want the Test Piece picture to be drawn smaller in printouts in portrait mode. (See “Other” category for Test Piece picture.) This can allow for more printed text to be included with the graph on 1 page. NOTE: In landscape mode, the Test Piece picture is always drawn small on the same line as the test title. The Test Piece picture can also be printed in reports. See Figure A48. Head Porter only.

You can now select a single cylinder to make graphs which require a valve lift profile, like Flow Area and Pseudo Flow Velocity. In previous versions, only the Average Flow for the entire head was used. Head Porter only.

You can now request the graph to be printed in a smaller height. This can allow for more printed text to be included with the graph on 1 page. See Figure A49. Pro and Head Porter only.

You can now select a Preference to have the graph NOT autoscale when you first open it. This can be handy if you are using some pre-defined scales and want to keep them for all graphs. Pro and Head Porter only.

Added a graph line thickness between Thin and Thick, called Thin 'Plus'. See Figure A50. All versions.

The graph line styles in the drop down menu of line thicknesses are listed together, with the appropriate check mark by the type currently used. See Figure A50. All versions.

You can now select larger legends (labels) in the graph screen. See Figure A50. Pro and Head Porter only.

Added label to better explain what cylinder or that Average of All Cylinders will be used for Flow Area and Pseudo Flow Velocity graphs. Pro and Head Porter only.

The graph screen now should more completely fill the available screen in most all situations. All versions.

Improved appearance of some printed graphs, especially in Landscape orientation. Previously the graphs had a border drawn around them. On the left side, the border could be broken. On the right side the legend (labels) could also be distorted. Now the border is not drawn in those locations. See Figure A49. All versions.

The graph choices have been simplified by eliminating many of the Int, Exh, and Int & Exh choices into just 1 choice. Now the program looks to a separate input of "Port to Graph" for this setting Int, Exh, and Int & Exh choices. See Figure A45. All versions.

Fixed bug where the Port Velocity Map was not being graphed correctly. Pro and Head Porter only.

Made Overlap Graphs go to zero at start and beginning of graph to look more correct. Pro and Head Porter only.

Fixed bug where graphs for % Exh/Int only showed the first cylinder on the head even though you requested all cylinders to be graphed. Pro and Head Porter only.

Added menu command 'Edit Printed Comments & Data Output' under the File option on the Graph screen in the printing options section. Pro and Head Porter only.

Program now includes more example cam files, the same files included in the new Engine Analyzer v3.4. See Figure A51. Pro and Head Porter only.

Hardware:

Pro version now allows for Performance Trends' motor controller to be used. See Figure A52. Pro and Head Porter only.

Program now allows for a USB switch to be used for starting to record data. This option does not present conflicts with some features of the SuperFlow Flowcom. This is done by purchasing the proper switch from Performance Trends, then going into FlowCom or Electronics screen, clicking on Options at the top, then select the USB Switch Option. You must also set the proper Com Port for the USB Switch under this option also. See Figure A53. All versions.

In the Bench Specs screen, the program now allows for Valve Opener for any Pro version. Pro and Head Porter only.

Added Hot Wire (hot wire anemometer mass air flow sensor) as a Custom Bench Type. See Figure A54. All versions.

Other:

The program now lets you "Filter" tests in the library for finding tests of a certain date, certain file name, etc. Pro and Head Porter only.

When quitting program and you select 'Cancel' for Saving Changes to current test file, now the program keeps program open. Before v3.5B, it continued shutting down. All versions.

The option for using a 2 pulse swirl meter, to be read directly with a FlowCom (no Performance Trends electronics) has been added. In addition, a special calibration factor for this 2 Blade Swirl meter is also possible. Pro and Head Porter only.

Fixed bug where reports may be requested for intake and exhaust ports, but only intake ports were reported. All versions.

Fixed bug where the cylinders you may "Pick" for a report were not being shown clearly (another input was in front of it). All versions.

Fixed bug where FlowCom/Electronics screen could be off screen too high or too far to left. All versions.

Fixed bug where Test Comments were not being shown in the Preview when opening some older Port Flow files. All versions.

Updated a text file to more accurately show Mass Flow correctly for gm/sec and lb/min, and correct for proper air density specs. Pro and Head Porter only.

Program now hides the 'Range' column for bench types which have only 1 range, like EZ Flow, JKM, new Hot Wire, and LFE. See Figure A55. All versions.

Program now shows the Company Logo graphic on the main screen. See Figure A55. Pro and Head Porter only.

Added option to include a Test Piece Pic with your data file. This could be of the head, carb, etc. It is displayed on the main screen and in printouts if you choose to included it from the "Print Options" list (graphs and reports). See Figure A55. Head Porter only.

Program no longer 'nags' as much about using the CFM at 0 lift as Leakage. All versions.

New Example Flow Files have been added to show new features.

Figure A41 More Port Velocity Options

Click on Test Options at Main Screen

New choice for Type of Port Velocity data: Record 9 points across the port (3 rows of 3 positions) at all lift data points.

New option of "Depths in Port" to allow you to record data at different depths in the port, 1 depth (the only choice in previous versions and in the current Pro version), 2 and 3.

Click on Graph button (shown here as "Layout")

Different depths marked as "A", "B" and "C".

Labels let you know which data points are being graphed.

Arrow shows you flow direction.

Slide slide bar left to see all the entry points for port velocity.

Front View (as done before) or new Side View (as shown here. The depth in Front View (A, B, or C) or the depth in Side View is determined by which cell is currently highlighted in the grid. In this case, it is side depth 3 (farthest from viewer).

Figure A42 Port Velocity Reports

First columns of report

No letter indicates depth

Choose this Report Type

Last columns of report

Averages for depths A (blank), B and C

Bottom rows of report.

Averages for all valve lifts at each position and depth across all

	Vel #1	Vel #2	Vel #3	Vel #4	Vel #5	Vel #6	Vel #7 (C)	Vel #8 (C)	Vel #9 (C)	Avg	Avg (B)	Avg (C)
Int #1 .100" Lift	79	75	70	72	53	74	72	66	65	60	55	
Int #1 .200" Lift	113	105	82	80	106	159	79	104	106	118	122	
Int #1 .300" Lift	169	163	183	168	158	215	214	204	171	153	194	
Int #1 .400" Lift	160	18	18	18	18	140	239	166	197	215	205	
Int #1 .500" Lift	255	19	19	19	19	10	161	293	227	231	218	
Int #1 .600" Lift	238	32	32	32	32	0	283	241	238	239	223	
Exh #1 .100" Lift	62	55	71	66	35	81	87	88	68	78	74	
Exh #1 .200" Lift	107	131	168	109	113	104	145	191	140	138	149	
Exh #1 .300" Lift	143	207	192	171	254	187	178	156	181	202	190	
Exh #1 .400" Lift	274	267	156	174	229	275	192	186	213	206	234	
Exh #1 .500" Lift	319	209	323	192	242	252	208	317	252	249	234	
Exh #1 .600" Lift	244	208	329	183	272	194	281	220	248	254	240	
Int #3 .100" Lift	60	76	75	74	74	58	75	68	66	58	58	
Int #3 .200" Lift	134	153	95	139	127	125	150	145	131	112	120	
Int #3 .300" Lift	130	207	107	171	149	201	185	158	156	178	151	
Int #3 .400" Lift	237	203	242	209	178	258	227	201	221	195	204	211
Int #5 .100" Lift	42	71	57	64	48	62	58	53	56	60	57	
Int #5 .200" Lift	82	92	108	117	142	97	122	156	119	119	115	
Int #5 .300" Lift	225	137	186	147	140	144	167	194	163	163	163	
Int #5 .400" Lift	257	137	141	256	198	179	222	242	196	217	214	
Int #5 .500" Lift	290	285	239	161	207	165	223	214	228	230	203	
Int #5 .600" Lift	256	219	238	197	213	284	304	209	235	247	248	
Exh #5 .100" Lift	80	65	61	89	91	76	91	61	75	70	69	
Exh #5 .200" Lift	98	186	168	152	171	105	170	135	153	163	143	
Exh #5 .300" Lift	257	166	229	183	259	148	127	127	222	223	183	
Exh #5 .400" Lift	290	174	256	250	284	277	228	262	244	245	235	
Exh #5 .500" Lift	269	224	169	294	159	236	217	234	224	224	238	
Exh #5 .600" Lift	182	340	267	260	186	265	299	200	265	289	279	
Int #7 .100" Lift	58	49	47	73	48	77	49	52	55	55	64	
Int #7 .200" Lift	100	148	100	77	132	137	137	117	114	126	141	
Int #7 .300" Lift	137	180	139	166	219	132	131	166	161	183	161	
Int #7 .400" Lift	177	213	262	137	255	266	266	195	211	201	194	
Int #7 .500" Lift	260	156	181	245	213	263	228	253	244	218	227	
Int #7 .600" Lift	314	272	234	242	315	271	282	292	265	254	263	
Exh #7 .100" Lift	83	62	54	56	96	52	81	82	75	77	69	
Exh #7 .200" Lift	195	191	199	132	119	149	156	136	158	139	144	
Exh #7 .300" Lift	256	253	131	130	236	233	130	164	184	183	181	
Exh #7 .400" Lift	167	285	226	214	297	295	275	294	235	239	244	
Exh #7 .500" Lift	203	270	320	174	204	219	161	202	227	238	237	
Exh #7 .600" Lift	215	216	178	293	250	263	329	217	238	240	282	
Avg Int .100 Lift	60	68	62	70	55	68	63	60			59	
Avg Int .200 Lift	107	125	96	103	126	129	122	130			120	
Avg Int .300 Lift	179	150	165	155	167	173	174	180			166	
Avg Int .400 Lift	196	186	178	202	223	208	232	206			204	
Avg Int .500 Lift	244	218	227	200	194	207	226	257			220	
Avg Int .600 Lift	256	273	249	189	247	271	290	244			245	
Avg Exh .100 Lift	78	68	70	75	92	72	78	76			72	
Avg Exh .200 Lift	132	169	171	132	132	136	148	143			146	
Avg Exh .300 Lift	205	214	175	179	228	184	165	162			193	
Avg Exh .400 Lift	222	233	201	202	278	250	221	238			228	
Avg Exh .500 Lift	257	252	285	208	234	235	187	253			239	
Avg Exh .600 Lift	219	242	254	236	222	222	279	206			255	

Figure A43 English Units but Using Millimeters for Lift and Dimensions

The screenshot shows two windows of the Port Flow Analyzer software.

Preferences Window:

- General Operation:** Includes "Use Seat Angle to Calc Valve Area" (No), "SF Cal. Test Pres. Corr" (None (match FlowCo)), and "Units" dropdown set to "English with Millimeters".
- Definitions (calcs):** Shows "Avg Flow Coef based on" dropdown set to "Valve OD".
- Test Data Window:** Shows a table of test data for Int #1. The table includes columns: Point, Lift mm, Full CFM, Test Pres ", Flow Pres %, CFM, Stbly +/- %, Swirl, and Vel # (A).

Test Data (Int #1):

Point	Lift mm	Full CFM	Test Pres "	Flow Pres %	CFM	Stbly +/- %	Swirl	Vel # (A)
1	2.00	321.	27.82	20.1	62.7	.24	-1504	80
2	4.00	321.	27.95	40.4	127.8	.28	-1781	113
3	6.00	321.	27.94	57.4	182.5	.80	-1972	169
4	8.00	321.	27.94	70.1	223.3	.50	-2496	161
5	10.00	321.	27.92	77.2	246.2	1.10	-2617	256
6	12.00	321.	28.05	79.1	251.7	.86	-3105	238

Test Comments: Progressive racing. Includes examples. Test Piece picture f

Test Operator: Mark

Test Data Headers: Point, Lift mm, Full CFM, Test Pres ", Flow Pres %, CFM, Stbly +/- %, Swirl, Vel # (A)

The screenshot shows the "Head Specs" window with "Head #, Customer and Comments" and "Intake" and "Exhaust" sections.

Head Specs [Untitled]:

Head #, Customer and Comments:

- Head #:** TRI261
- Customer:** Progressive Racing
- Comments:** Head specs from V2.1 File: VORTEC (some head specs new to v3.0 have been estimated)

Intake:

Layout	1 valve & 1 port
Valve Diameter, mm	51.31
Stem Diameter, mm	8.74
Throat Diameter, mm	45.47
Avg Seat Angle, deg	45
Port Shape	Rectangular
Port Volume, ccs	217
Avg Port Width, mm	33.81
Avg Port Height, mm	50.44
Port Length, mm	127.0

Exhaust:

Layout	1 valve & 1 port
Valve Diameter, mm	40.64
Stem Diameter, mm	8.74
Throat Diameter, mm	35.56
Avg Seat Angle, deg	45
Port Shape	Rectangular
Port Volume, ccs	83
Avg Port Width, mm	26.92
Avg Port Height, mm	40.64
Port Length, mm	76.2

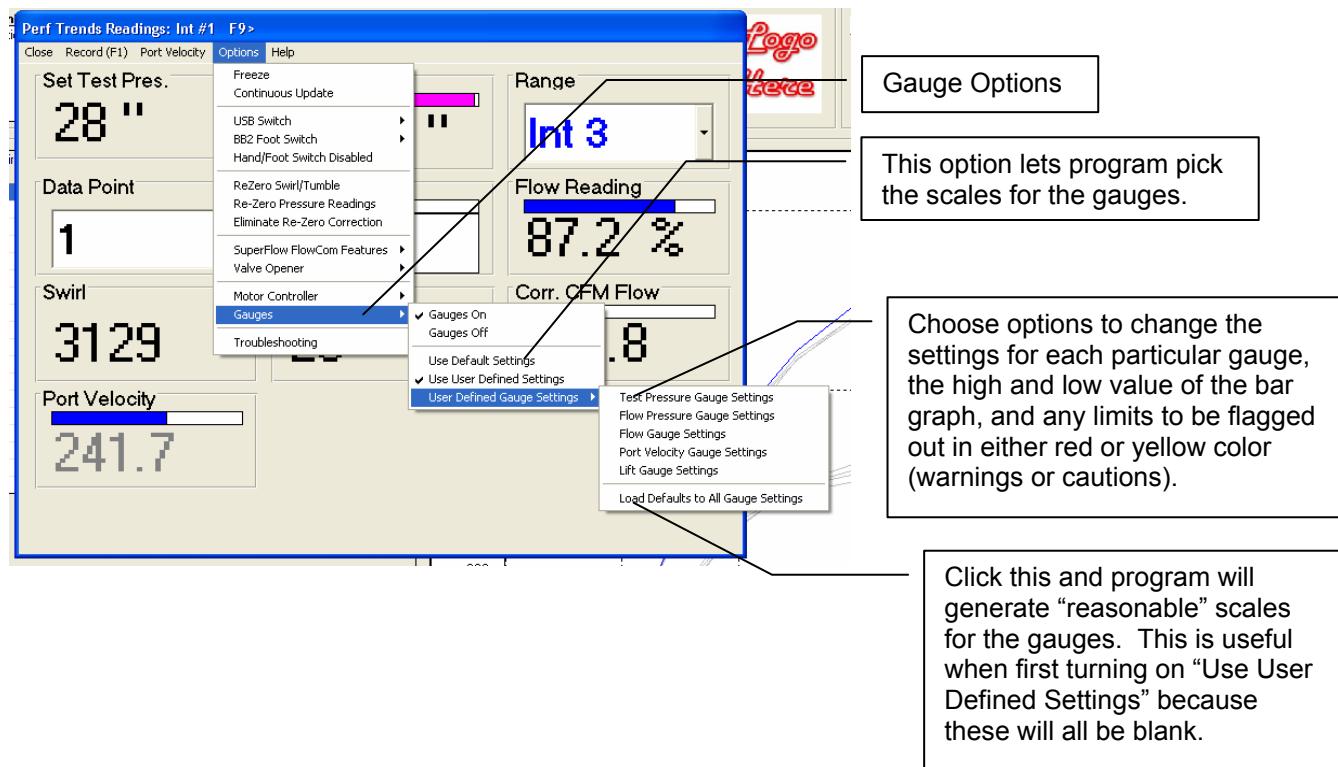
Help: Number of intake valves and ports per cylinder, usually 1 valve and 1 port. Click on arrow to pick from list. p 33

Cylinder Numbering:

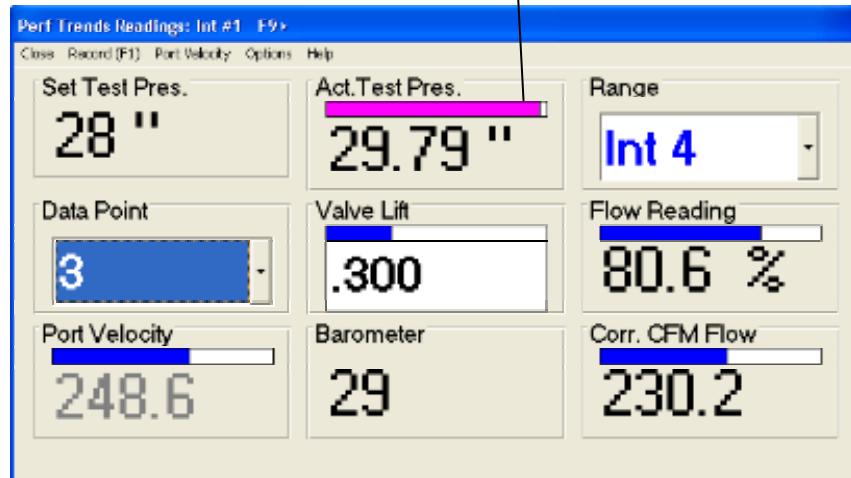
- Number of Cylinders to Test:** 4
- Starting #:** 1
- Step Size:** 2
- Cyl # Preview:** 1, 3, 5, 7

Engine dimensions also in mm

Figure A43-B Bar Gauges for Selected Readings.



Bar gauge with real time updates. This one shown in red because reading went above user defined limit of 29.5. See screen to right for setting scales and limits.



Int Test Pres. Gauge

Gauge Settings

Gauge Starts At
0

Gauge Stops At
32

Change Color at Limits?
Yes

Warn if Above this Level
29.5

Warn if Below this Level
26.5

Notes:

Choose the starting and ending values for the gauge. If you enter 50 for 'Starts At' and 90 for 'Stops At' the gauge will show values from 50 to 90. If you set 'Warn if Above this Level' to 85, then the gauge will turn RED if the number goes above 85.

Keep Specs Cancel Print

Figure A44 Custom, User Defined Graphs

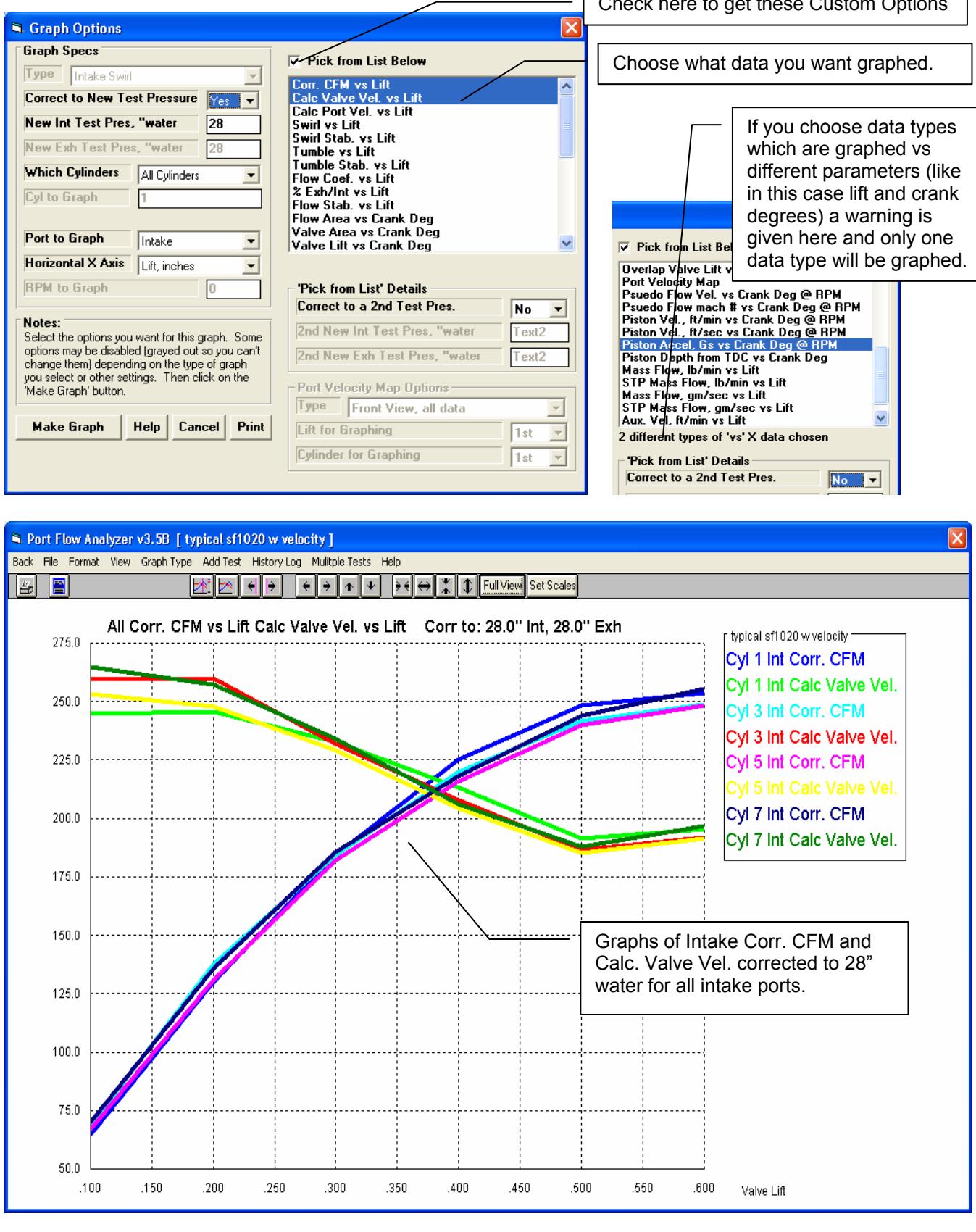


Figure A45 Custom, User Defined Graphs

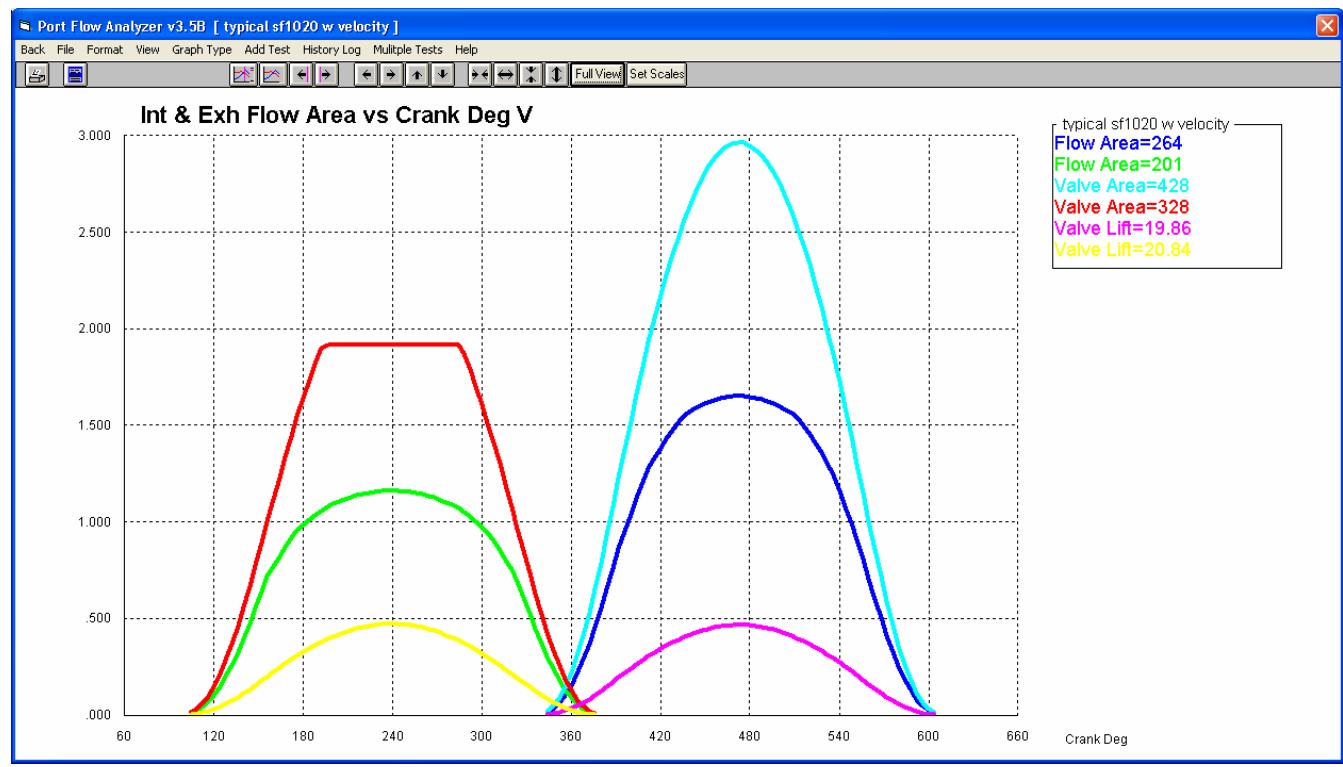
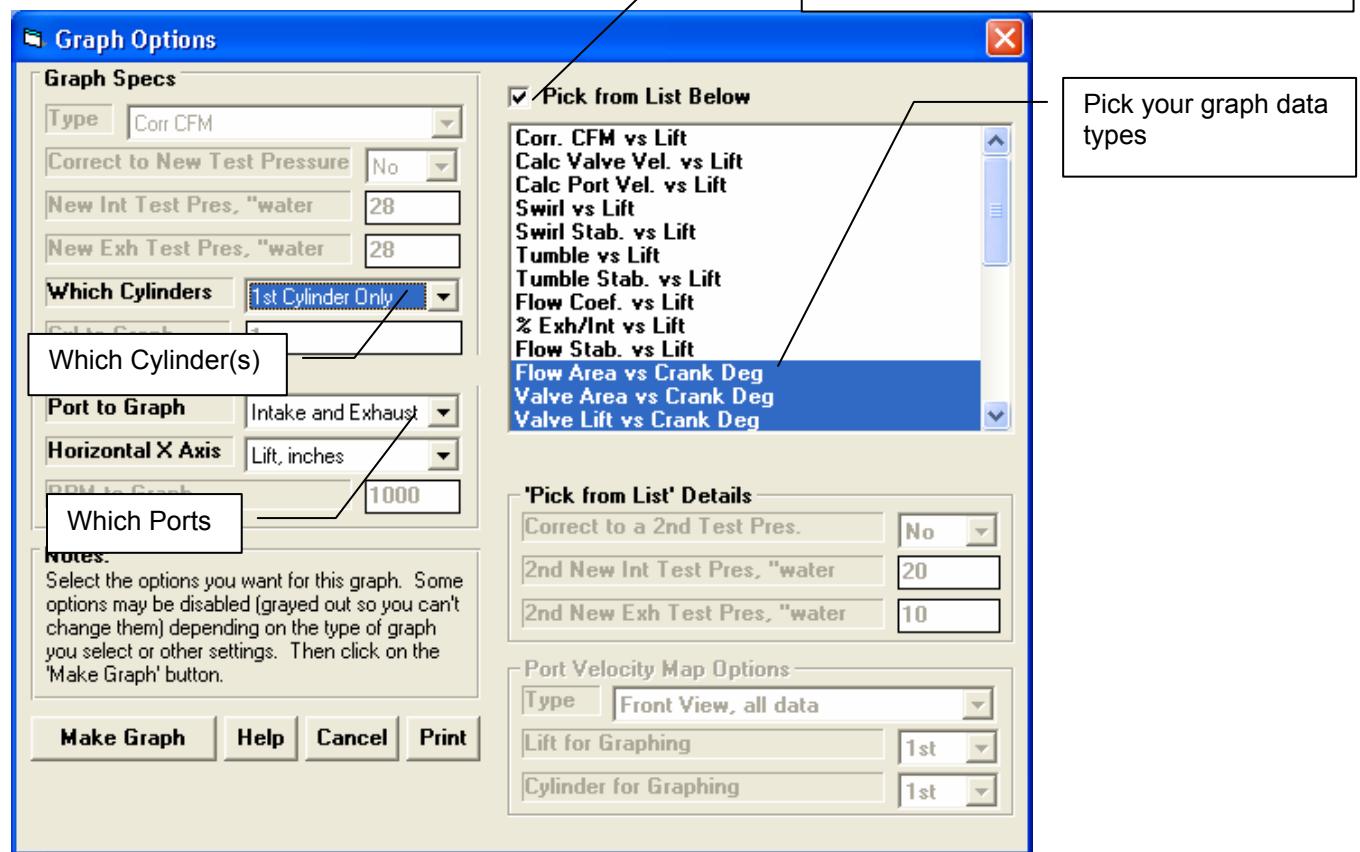


Figure A46 Custom Graph at 2 Test Pressures

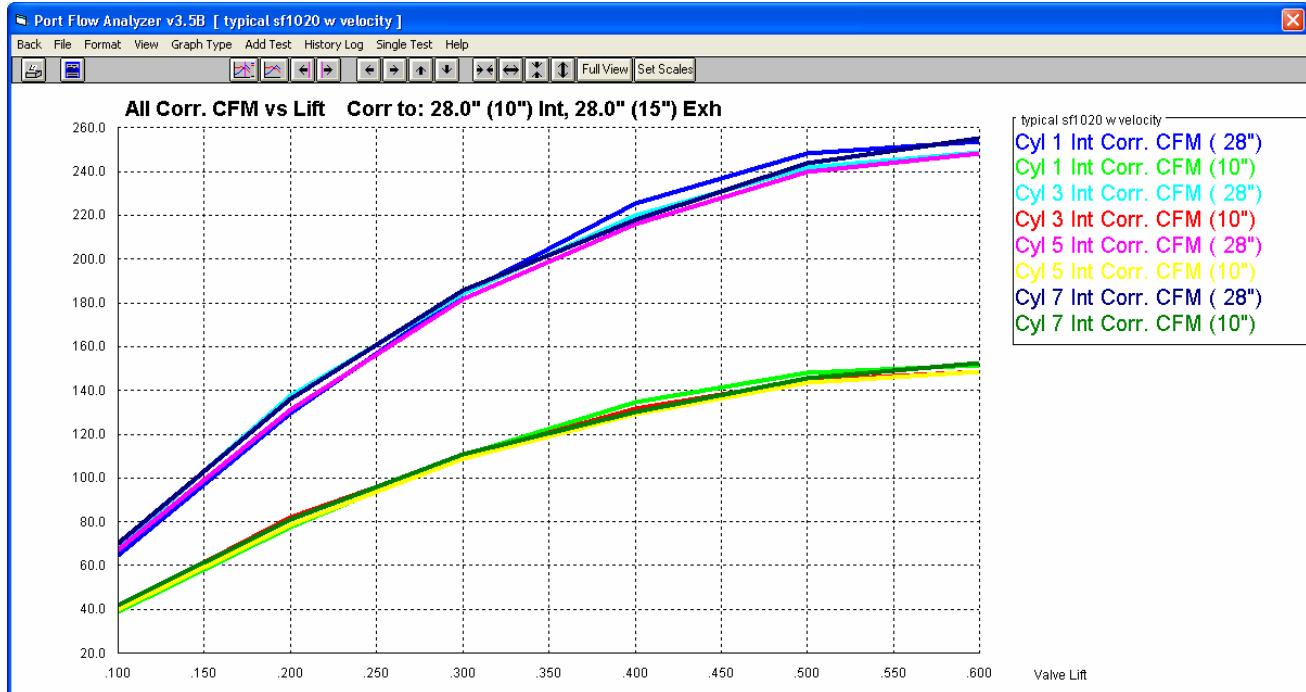
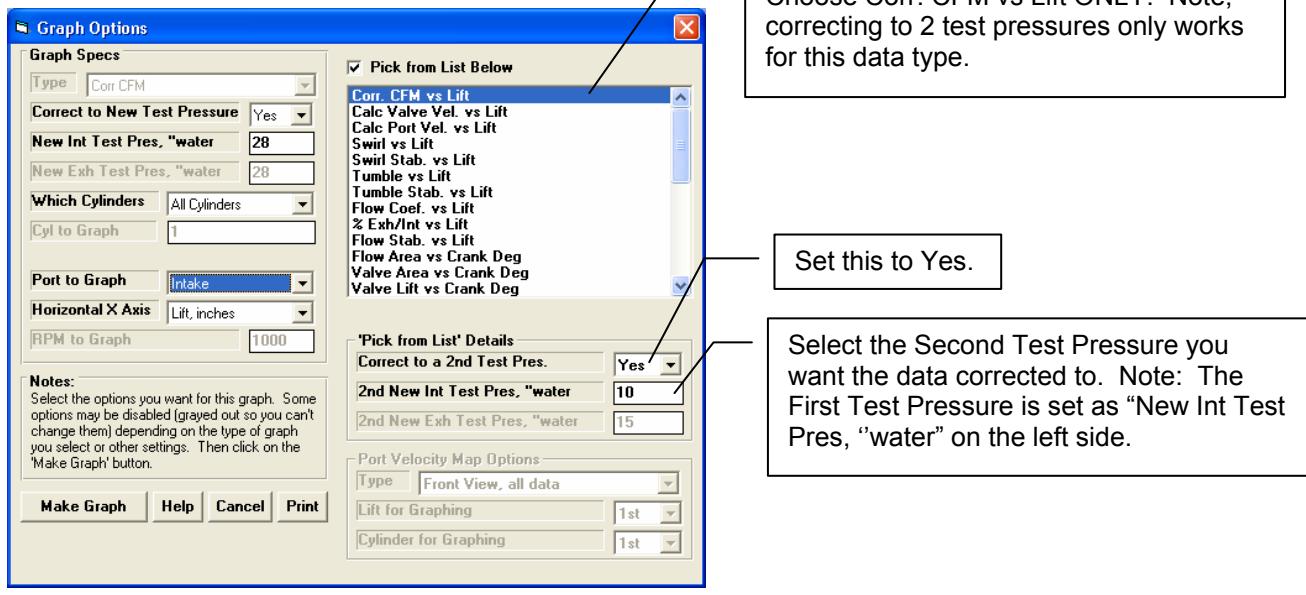


Figure A47 Custom Port Velocity Graphs

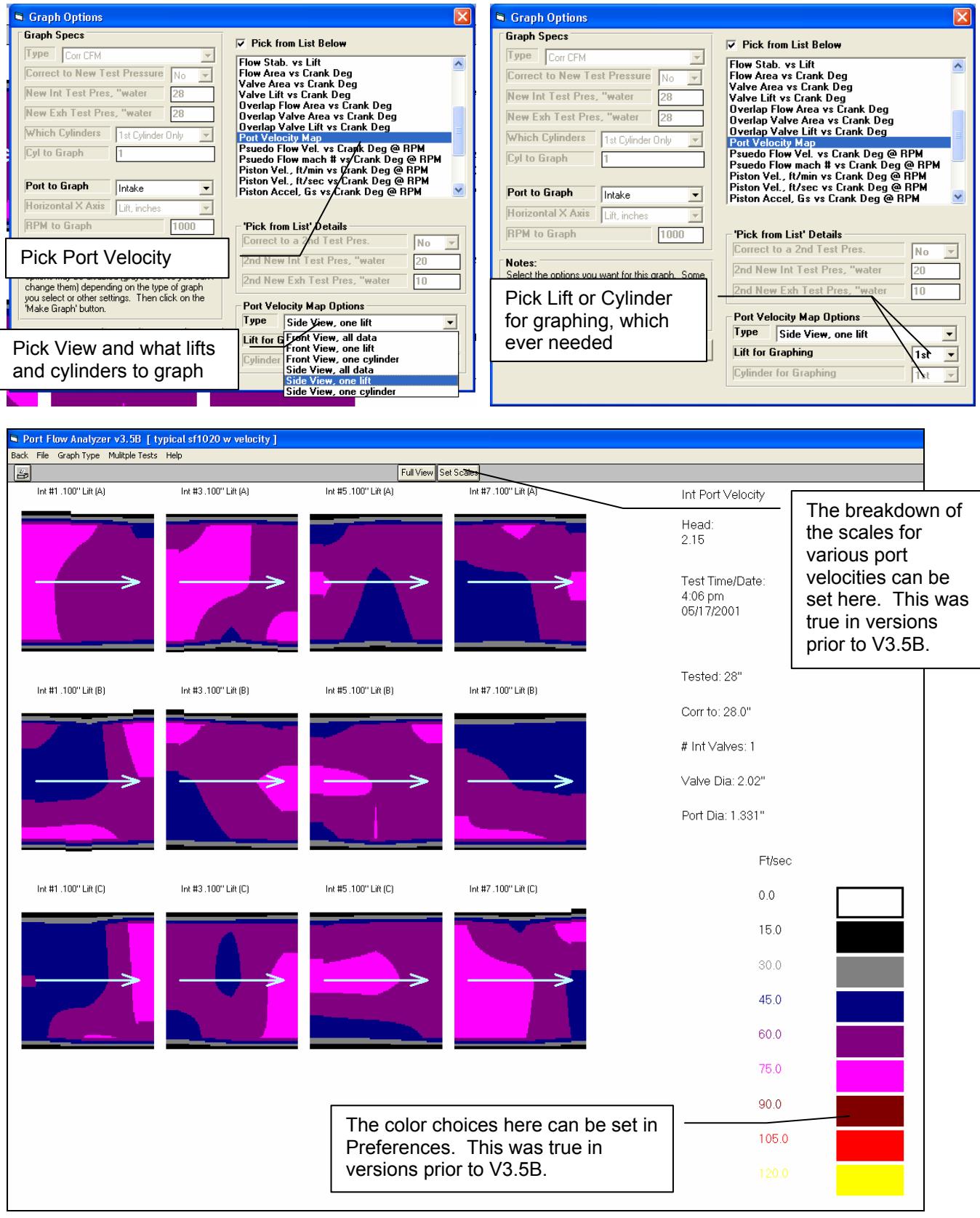


Figure A48 Smaller Test Piece Picture in Portrait Mode Printer Orientation

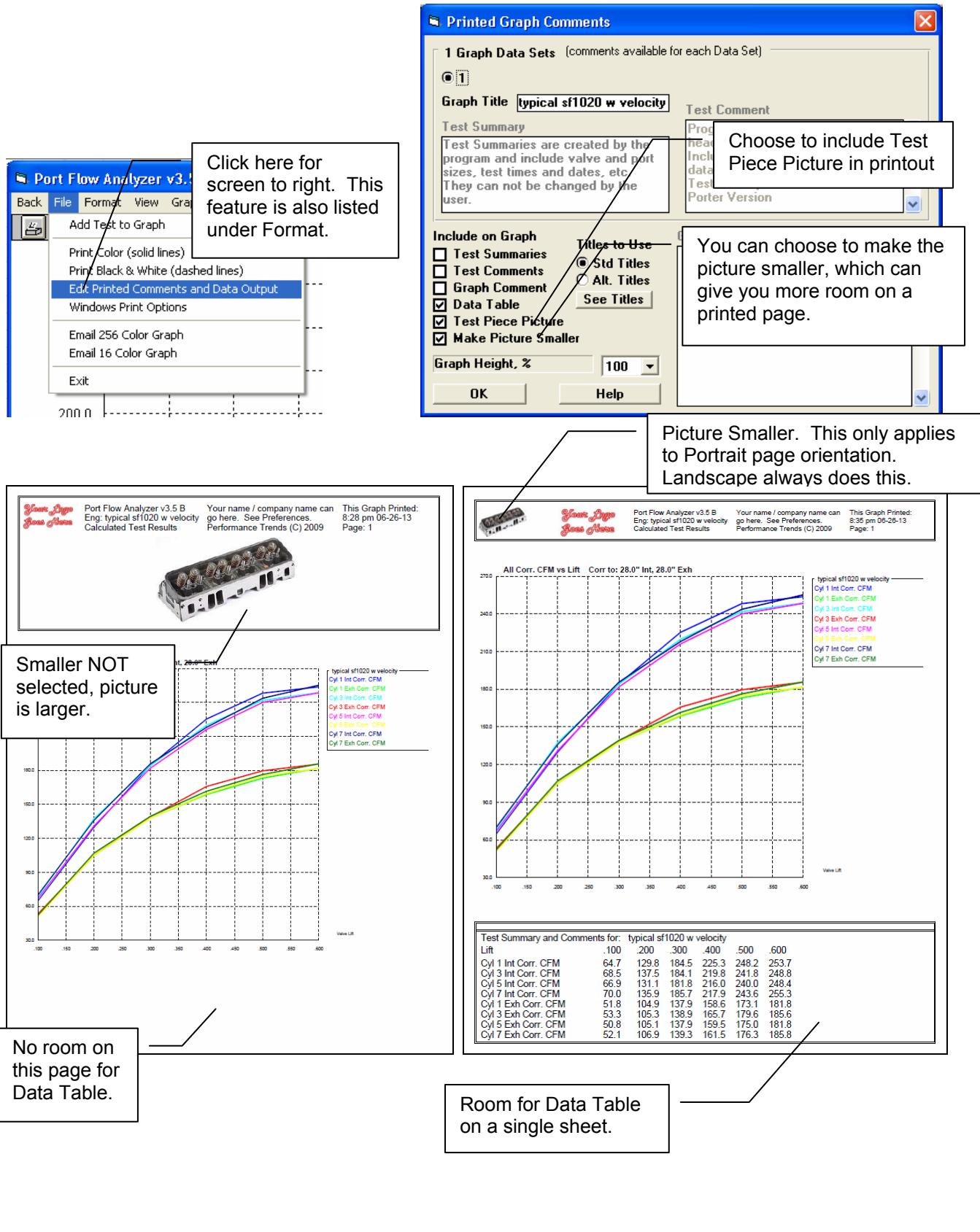


Figure A49 Smaller Graph Fits All Results on 1 Printed Sheet

Printed Graph Comments

1 Graph Data Sets (comments available for each Data Set)

Graph Title typical sf1020 w velocity

Test Summary
Test Summaries are created by the program and include valve and port sizes, test times and dates, etc. They can not be changed by the user.

Test Comment
Progressive racing World Products heads
Includes examples of Port Velocity data and Test Piece picture file for Head Porter Version

Include on Graph

- Test Summaries
- Test Comments
- Graph Comment
- Data Table
- Test Piece Picture
- Make Picture Smaller

Titles to Use

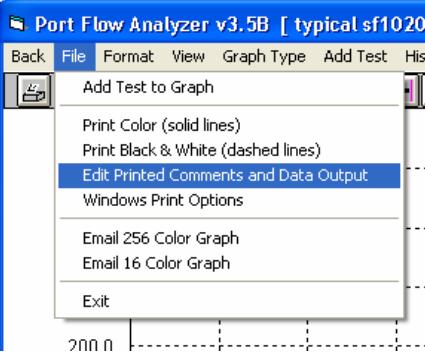
- Std Titles
- Alt. Titles

See Titles

Graph Height, % 85

OK **Help**

Choose a % to reduce the height of the printed graph. This option works in both Portrait and Landscape printer orientations.



Port Flow Analyzer v3.5 B
Eng: typical sf1020 w velocity
Calculated Test Results

Your name / company name can go here. See Preferences.
Performance Trends (C) 2009

This Graph Printed:
8:53 pm 06-26-13
Page: 1

All Corr. CFM vs Lift Corr to: 28.0° Int, 28.0° Exh

typical sf1020 w velocity

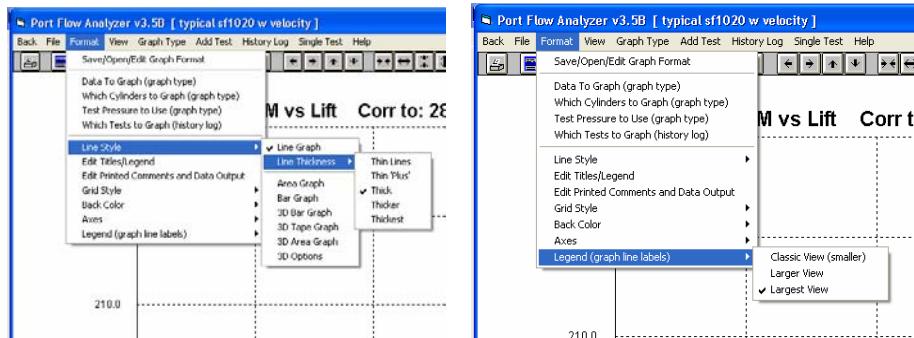
Cyl 1 Int Corr. CFM
Cyl 1 Exit Corr. CFM
Cyl 3 Int Corr. CFM
Cyl 3 Exit Corr. CFM
Cyl 5 Int Corr. CFM
Cyl 5 Exit Corr. CFM
Cyl 7 Int Corr. CFM
Cyl 7 Exit Corr. CFM

Lift	.100	.200	.300	.400	.500	.600
Cyl 1 Int Corr. CFM	64.7	129.8	184.5	225.3	248.2	253.7
Cyl 3 Int Corr. CFM	68.5	137.5	184.1	219.8	241.8	248.8
Cyl 5 Int Corr. CFM	66.9	131.1	181.8	216.0	240.0	248.4
Cyl 7 Int Corr. CFM	70.0	135.9	185.7	217.9	243.6	255.3
Cyl 1 Exit Corr. CFM	51.8	104.9	137.9	158.6	173.1	181.8
Cyl 3 Exit Corr. CFM	53.3	105.3	138.9	165.7	179.6	185.6
Cyl 5 Exit Corr. CFM	50.8	105.1	137.9	159.5	175.0	181.8
Cyl 7 Exit Corr. CFM	52.1	106.9	139.3	161.5	176.3	185.8

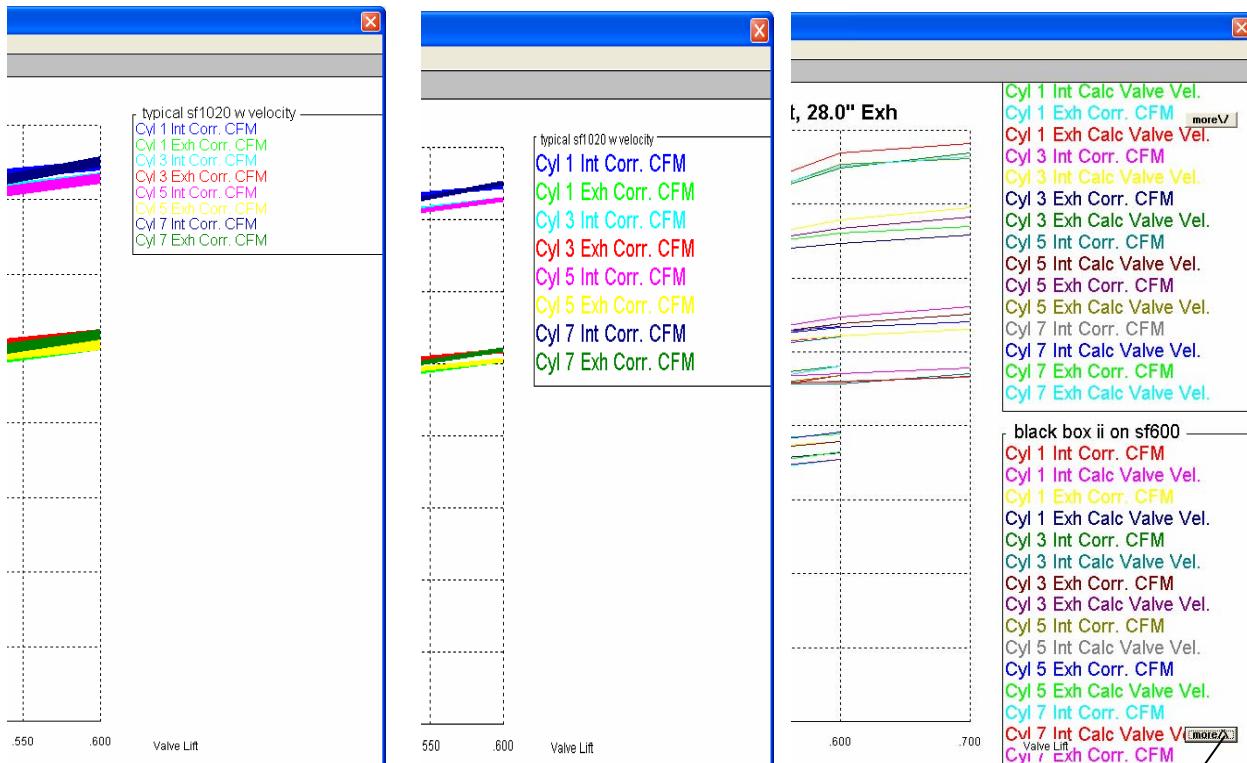
Printed graphs no longer have a border on the left and right sides around the graph. This border often had a slight "jog" in it depending on printer, screen resolution, etc. Now without a border, there is no "jog".

The graph can be printed to include the Data Table even though the Test Piece picture is printed large.

Figure A50 New Graph Features: Line Thickness and Larger Legends



Various combinations of line thickness and Legend Size



If the legend is too large to fit on the screen, "more" buttons appear at top and or bottom. You can click on these buttons to scroll through the labels.

Figure A51 More Example Cams for Engine Specs Screen

Engine Specs [CHEVY-97.LS1]

Back (ok) File Help

Cam Specs		Intake	Exhaust
Centerline, deg	113	121	
Duration @ .050 "	202	210	
Open @ .050 "	-12	46	
Close @ .050 "	34	-16	
Max Lobe Lift, Clc	.278	.281	
Actual Valve Lash,			
Rocker Arm Ratio	1.7	1.7	
Gross Valve Lift, in	.473	.478	
Use Cam File	No	No	
Int File	Pick		
Exh File	Pick		

General Cam Specs

Type: Ex: Stock 97 LS1 SB Chevy
Lift for: Use Specs in this Menu
Lifter: Pick an Example
Ex: Stock 97 LS1 SB Chevy
Total Cam Advance: 4.0 Advance
Designed Valve Lash, in:
Lobe Separation, cam deg: 117.0

General Engine Specs

Bore, in: 3.9 Stroke, in: 3.62
Cyl: 8 C.R.: Clc 10
Connecting Rod Length, in: 6.098
Cu In: 346.0 CCs: 5670.2 Chamber CCs: 78.8

Engine Comments
Stock 97 LS1 small block Chevy

Categories of Cam Examples

Catagories (groups) of Performance Trends' Examples

- Buick - Other Engines
- Cadillac
- Small Block Chevy
- Big Block Chevy
- Chevy 4 Cyl
- Chevy Inline 6 Cyl
- Chevy V-6**
- Other Chevy V-8s
- Chevy Corvair
- Chevy Gen III LS V-8
- Comp Cams All Mopar
- Crane All Mopar

Use Category **Cancel**

Tip: Click on a category in either section to highlight it, then click on the 'Use Category' button, or just Double Click on the category in one step. (Catagories are groups of examples, like a group of Chevy heads, dual examples.)

Examples

Cam Name	Rated Lift	Lifter Profile	Valve Train	Center Line	Dur	Lobe Lift	Valv
Stock CHEVROLET 79-84 V6 231 cid All w/2BC even fire eng. (exh)	.050	MHydFlt	P+RA prd	104	181	.239	na
Stock CHEVROLET 79-83 V6 231 cid All w/4BC turbo even fire eng. (exh)	.050	MHydFlt	P+RA prd	110	194	.256	na
Stock CHEVROLET 85-87 V6 231 cid All w/2BC Export & Canada (exh)	.050	MHydFlt	P+RA prd	104	181	.239	na
Crower 03340 Chevy 262 90° V6 (4.3L) (exh)	.050	MHydFlt	P+RA imp	110	182	.257	na
Crower 03140 Chevy 200 229 90° V6 (3.8L) (exh)	.050	MHydFlt	P+RA imp	110	182	.257	na
Crower 03040 Chevy 173 60° (2.8L) 189 (3.1L) V6 (exh)	.050	MHydFlt	P+RA imp	110	182	.257	na
Stock CHEVROLET L6 63-89 292/4.8-T 292 cid A11 (exh)	.050	MHydFlt	P+RA prd	113	188	.271	na
CompCam 246-HR10 GM 3800/3.8 V6 1996-PRESENT (exh)	.050	MHydRlr	P+RA imp	110	191	.3	na
CompCam 240H Chevy 2.8/3.1/3.4L V-6 1980-95 (exh)	.050	AHydFlt	P+RA imp	104	192	.26	na
CompCam 240H CHEVROLET 2.8L 3.1L 3.4L V-6 1980-1995 (exh)	.050	AHydFlt	P+RA imp	104	192	.26	na
CompCam 240H CHEVY 200-229 V-6 1979-1984 or 90s NOD FIRE RACE (exh)	.050	AHydFlt	P+RA imp	112	200	.26	na

Abbreviations: BIR=Blue Racer CC=Comp Cams Lun=Lunati
Ms=Motorsports Comp Cams Grinds: DEH=Duel-Energy XR/XE=Extreme-Energy NX=Nitrous-HP

Tip: Click on Example to highlight it, then click on 'Pick' or 'Delete' button. Double click to pick Example in 1 step.

Pick **Delete** **Print** **Cancel**

Pick the particular cam from a large list of cams, almost double from what was in earlier versions.

Figure A52 Motor Controller to Control Test Pressure

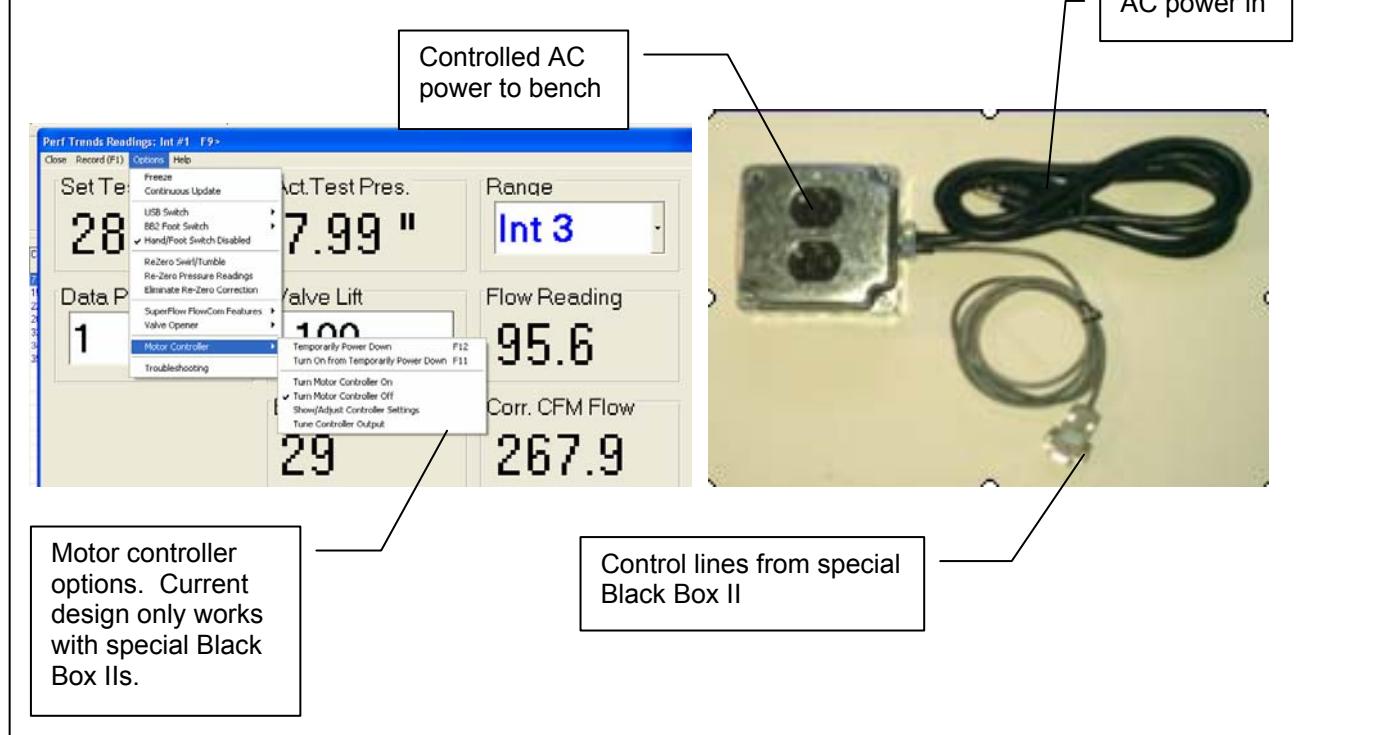


Figure A53 USB Recording Switch

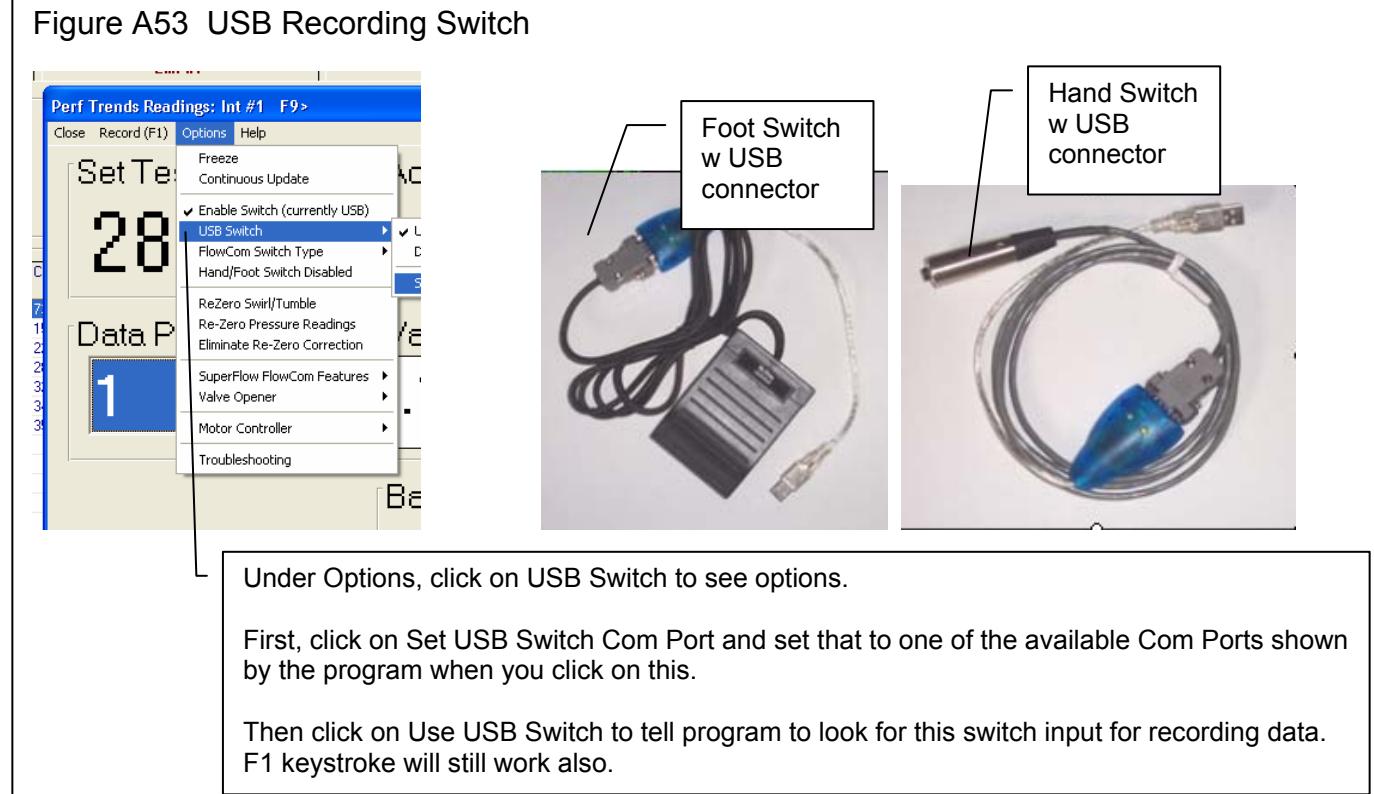


Figure A54 New Bench Type: Hot Wire Anemometer

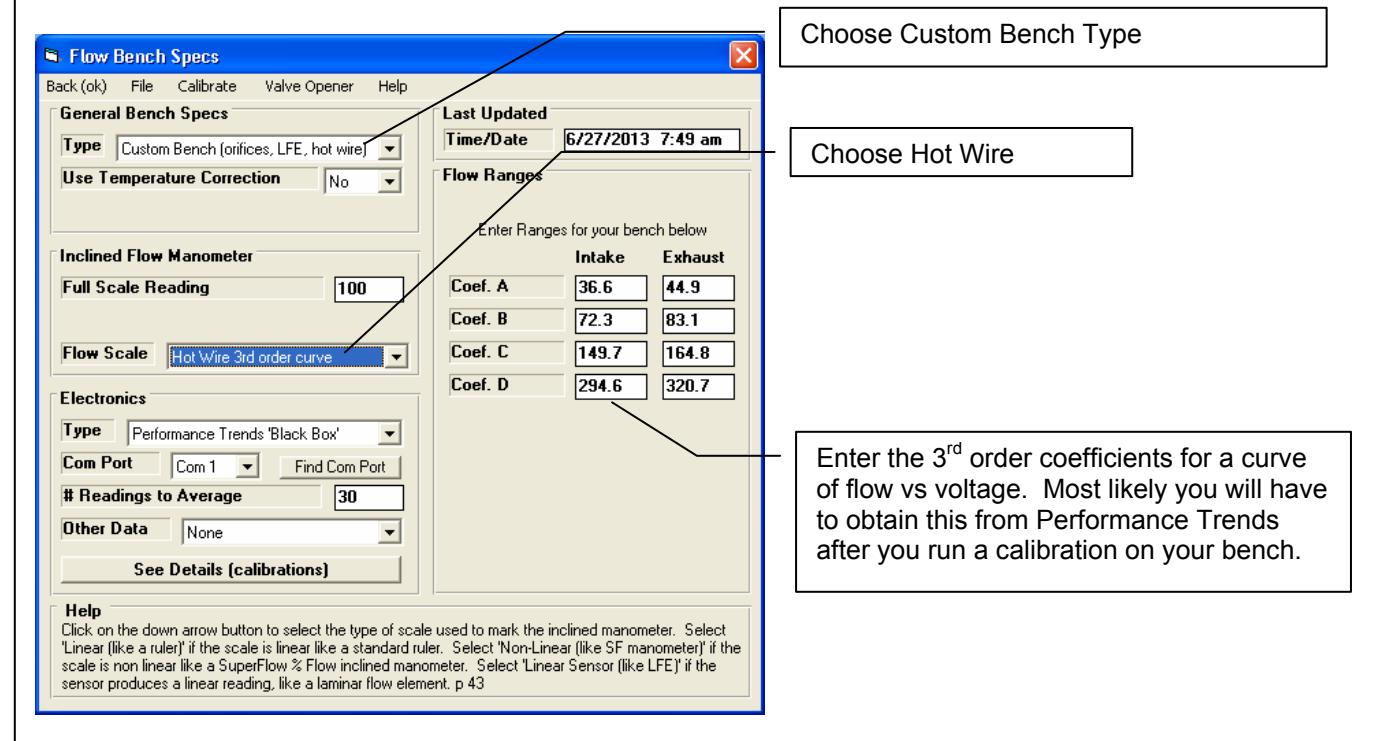


Figure A55 Main Screen: No Range Column for Certain Benches and Logo Picture

