

A presentation of the SCALEMASTER 5.X Piano Scaling Software.

This Presentation will introduce program operational screens, features and options.



There are even more functions to discus latter in the presentation.

Viewing the tension, inharmonicity and volume curves allows you to see where the problems are and then see the improvement results of you scale alterations

The winding specifications may be printed AT TENSION or AT REST. Some winding vendors prefer using the AT TENSION specifications that account for elongation (string stretch as opposed to tuning stretch) while winding. You need the AT REST version to do the quality assurance acceptance measurements before stringing.

So many of the old pianos were scaled using steel wrap that today will need to be replaced with copper.

The difference in density of the two materials usually requires changes in wrap diameters to compensate for the change in volume.

An older instrument originally scaled at A435 may need to be evaluated at A440 to control tension limits. Volume and inharmonicity are also affected by target pitch.

Not all string winding vendors use the same set of steel and copper wire sizes. You will need to know how close your selected winder can come to you improved "ideal" specifications before you submit the order. SCALEMASTER will present the difference so



Features are user selectable aspects of the program that make it easier of nicer for the user and assist in some of the calculations.

There will be examples of color selections and wire size table editing.

Other features include graphing with lines or dots, type of octaves to use when producing the recommended tuning charts, pitch standard, automatic recalculation options and a few other items.



Internally everything is in inch decimal format, but the displays and print outs may be in any of the 3 formats as needed by you or your vendor.



This tour will walk through a typical edit session to introduce the SCALEMASTER tool from launch.





There is a mix of screen captures from several release versions of SCALEMASTER.x used in the presentation. The older version images are used where there is no significant change.

Your copy of SCALEMASTER will be customized to include you business name as well as serial number. Both pieces of information are needed for free program support.

There is a lot to this page! Some features and functions are available only through this page. They will be noted as the presentation progresses.



File loading and saving is also available on the Data page (Working with Scale Data) and all the load and save screens are very similar

File Locator  Flease kcole the Comments  Comm	Fie OK TTCANORY TTC	
ADDRLBL.DOC ScaleMadel5.exe test01.sci test01.sci toLS TXT W0RK.sci W0RK.tXT W0RK.TXT WRAPS.TXT		
FileLocator vr.0.1 012602		

The Filer Locator screen is common to any of the file loads (open) and will tell you which file its looking for (comments, in this example).

The drop down list box at the top selects the drive. The next box down selects by click and double click the directory and the last box selects the file to load.



The Main Form Views menu has the common views of Tension, Volume, Inharmonicity and Expansion available from the Data page (working with scale data button). It also has a choice to open the scale data page and three 'sanity' checks on the input data.

The speaking length (F7) should show curves that are technically a combination of the curves of the bridges and the vbar (cappo d'astro or agrafffs) curve line. The graphic should smoothly look like the bridges, if not... check the measurements!

Same for the wrap size graph, smooth (ideal) or stair step changes are expected. Something out of place warrants verification.

The tail length graph should look similar to the visual line of the hitch pins in the bass.



Here is one place to set the Unit Of Measurement option

The print menu opens the same print window as the Print Menu buttion

Help (added since this version's screen capture) is a pretty typical help menu with the About, Help File, and User Manual Links.

Se Scale Data			- 10 2
File Print Wew Options Actions PLAND: MASON 5 HANLIN, UPR #13863, REV.1		View Connerts	D: Maradathadalla
File Name CAUB702CVSCALEMASTER/DOS/L5calemasterBack/undedata	WWDRK SCL -	Load Scale Import	Save Scale Export
Vbar Bridge Talz 1 625 23125	0	0	
CALCULATED DATA			
ecaloulate Enlie Soale		Reflech	
Tanala Backsold Mikes			
Territon Breakpoint Yokawa 0.000 0.000 0.000		0.000	

The Scale Data page is the heart of the tool set.

The file, print, view and option menus are very similar to the ones on the main screen and most of the menu items are available by button or check box on the form.

The tree sections are file information and record (note) navigation.

The middle section is the "captured" or physically measured parameters about the string.

The bottom section is all calculated data. These are the resultant parameters calculated from the middle data that is input.

Jumping between this and the Tension, Volume and Inharmonicity graphs is where the alterations to a scale is explored.

For example, maybe you see a significant jump in volume going from the last double wound single unison bass string to the first 2 string unison single wound note. You might experiment with changing the wrap diameter of both notes to reduce the difference and smooth out the curve while ensuring the tension and inharmonicity don't get whacko or the breakpoint % is still low enough (specific scale evaluation topics are under separate presentations)

Scale Data						E BI
File Print View	Options Addians					
PIAND: Working	p v z nadar				View Economic	Dk
File Name CASDA	LEMASTER WORK SCI	L			Load Scale	Save Scale
NOTE NUM	BER 1 Unit o	Measure-			Impost	Expost
CALCULATED D	ATA colculate	[2 Calor	5 Aate Entile Scale	la	Rehesh	
Tension	Вникр	aint	Volume		Inhaminicity	
0.000	0.000	Emmine	0.000	0.	1 0.000	
72 800	77.50	L quadon	Lo.	0.0		

The color scheme in the newest version of this page is a simple inverse of forground and background colors. Thank goodness! This original color scheme is UGLY!

The intent of the color change is to make the user aware that they are in data input vs data edit mode.

In the input mode values "stick" from the present note to the next note displayed.

This allows the user to only input the parameters that have changed (usually length, wrap and tails. Parameters like core size, unison, class, vbar and bridge change less frequently.

Scale Comments	
Scale Comments associated with scale	Load other file
C \SCALEMASTERS\test01.ad	Same
C:\SCALEMASTER5\lest01.tx	
1 [_1	
2 1.2	
3 1.3	
4 1.4	
5 5	
6 L6	
7 L7	
8 [19	
9 L8	
10 L10	
Summer w 0 1 012200	

An example Scale Comments page.

Scale comments are opened from the main page or the data page.

Up to ten 80 character lines are provided.

Some comments might be:

- 1. Note 59 left Tied.
- 2. Hitch pin .173 diameter
- 3. Use .5" step on all double wrap strings

Each line is uniquely edited, but it IS a simple text file that can also be edited in NOTEPAD.

Send To	Information	
Address File	C:\SCALEMASTER5\ADDRL8L.DDC	Load (Save)
Oppor-TUNE-is	r Plano Services	
1595 SW 2006	Ω	
Aloha, OR. 970	œ	
503-642-1993		
www.opportu	ne ist.com	
5		
AddressEdit vn:	0.1.012602	

The Address file is accessible from the main page and data page.

This is a pretty important page to modify! If left unmodified your vendor will send the completed strings to me!

Although the extension for the file is .DOC it is the same as a text file (.txt) and can be edited in NOTEPAD

Production         Production         Production         Coad         Save           Inc         55         9         15         29         51         0           55         59         10         16         32         54         0           67         10         17         35         58         0           77         13         20         41         72         0           13         23         44         78         0           0         0         14         26         48         90         0	State         State <th< th=""><th></th></th<>	
55         9         15         29         51         0           59         10         16         32         54         0           67         10         17         35         58         0           71         12         18         38         62         0           75         13         23         44         76         0           14         26         48         30         0         0	55 9 15 29 59 10 16 32 63 10 17 95	51 0
59         10         16         32         54         0           63         10         17         35         58         0           67         12         18         38         62         0           71         13         20         41         72         0           13         23         44         76         0           0         0         0         0         0           0         0         0         0         0	59 10 16 32 63 10 17 25	131
63         10         17         35         58         0           67         12         16         36         62         0           71         13         20         41         72         0           75         13         23         44         76         0           80         14         26         48         90         0           0         0         0         0         0         0	62 10 17 95	54 0
67         12         18         38         62         0           71         13         20         41         72         0           75         13         23         44         76         0           80         14         26         48         80         0           0         0         0         0         0         0	10 11 10	58 0
71         13         20         41         72         0           75         13         23         44         76         0           60         14         26         46         80         0           0         0         0         0         0         0	67 12 18 38	62 0
75         13         23         44         76         0           60         114         26         46         90         0           0         0         0         0         0         0	71 13 20 41	72 0
EC  14  26  48  90  0 0 0 0 0 0	75 13 23 44	76 0
	14 26 48	90 0
	0	
10	0	
	0	

Editing from with in the program is recommended for this file even though iis a text file and can be edited with NOTEPAD because the number of slots in both the core and wrap wire size sections is critical to the program's data load routines.

But, you can see that you may get a list of wire sizes from your favorite vendor and edit the list.

The default file loaded at program launch is WRAPS.TXT. The program comes with sets of sizes from Schaffs, JD Grandts, and Issacs.

The file is important to verify that the supplier you choose can most closely match the ideal string specs you've determined using SCALEMASTER.



These are the default tolerances recommended. Most of the winders have no problem staying within these specs.

Tolerance Specification is needed to ensure quality as Quality in American Manufacturing is defined as "to specification within agreed tolerance."



The examples of the print outs will follow the discussion of the print and display control page.

Pretty straight forward thoug.

The Scale data is a long form with all of the information (captured and calculated) for each note. I use this print out to know guage changes when I'm putting on the plain wire.

Winding sheet, either at pitch or not (pre-tension). The Mfg Check will include inside and outside wrap diameters (underwrap and overwrap). Comments may be added or not depending on if you wish your vendor to see them.

The 2 types of tuning charts are the Saunderson (NOTE, PARTIAL, TUNE, OFFSET) or the Peterson (NOTE, OCTAVE, OFFSET). The Saunderson type of chart can be used with the RCT and the Veritune systems as well as the Accutuner.

ALTHOUGH.... The charts are a calculated result based on the calculated inharmonicity, I've never used them for a fine tuning.

Scale Data	Display	1.13								
PintInchDec	inal	Pint Inch Fi	actions C	Pint Natio						
2   WOUND 3   WOUND 4   WOUND 5   WOUND 6   WOUND 7   WOUND 8   WOUND 8   WOUND	55 54 53 51 51 51	231 CB 226 CD 218 CD 208 CD 202 CD 196 CD 188 CD	1.000 1.000 1.000 1.000 1.000 1.000 1.000	D.625 D.625 D.625 D.625 D.625 D.625 D.625 D.625	42.750 42.500 42.375 42.125 41.875 41.625 41.375	170.948 181.581 188.579 190.515 199.270 208.178 212.564	23.077 24.513 26.248 27.357 30.509 31.873 32.545	28.592 28.835 28.349 27.193 27.006 26.790 25.975	0.446 0.430 0.397 0.376 0.329 0.323 0.323 0.322	-14.871 -14.383 -13.963 -13.533 -12.316 -11.323 -11.155
8 NOUND 9 I tantrati mPintScale ynd	51	188 CD	1 000	0.625 n 455	41.375	212 564 775 996	32,545 14 595	25.975	0 322	-11 155 -10 667

The print window display is CLUMSY and will be redesigned in a future release. You can scroll through the data and you do get the whole page when it prints.

This example is the scale data in inch decimal. Conversion to inch fraction or meteric can be done on this form before sending to the printer (a button added after the pictured release)

Windi DASCALEM	ng Data D ASTER5\w	isplay indprint.rtf					
• Pint Inch	Decima	C Rinth	nch Fractions (	Print Metric			
Wrapped NOTE NO	String CORE DIA NILL	Specs WRAP DIA XILL	S C A L E for: MASON XATERIAL	M A S T E & HANLIN, LOOP TO URAP INCH	R UFR.#13863, LENGTH OF WRAP INCH	REV.1 AT PITCH TENSION POUNDS	
1 2 3 4 5 5	56 55 55 54 53	238 231 225 218 208 202	Copper Copper Copper Copper Copper Copper	3.250 4.000 4.251 4.500 4.875 5.125	41.375 41.125 40.875 40.750 40.500 40.500	163.53 170.94 181.58 188.57 190.51 195.22	

Example of print display winding specifications at pre-tension (no elongation)

Pitch Standard note#49	)A =	440	Default = 440	Execute
<ul> <li>Graph with DOTS</li> <li>Include Tolerance Lin</li> <li>Automatically Check</li> </ul>	nits in Gra Ior Manul	y C Graph phs acturability	with Lines Display Inhome LOG	Volume and micity in
Slobal Winding Material ( model)	ihange (u	res Note ‡	IT as Ex Wi	ecute Global nding Change
Double Wrap Boundry Double Wrap Step	153 Step	•	Dh Manuf I Show W	ack for acturability AS/IS data
Set Graph, Markers, 8 Color preference	Form		Edit Tunin	g Style

Ah, FEATURES abound on this page!

Here is where the pitch standard is set.

The user defined Wrap Factor ( as a fraction of the specific gravity of copper, If you want to use some wrap material other than steel, copper, silver-Nickel, or alluminum... you'll need to do the research!)

Graph with dots or lines include tolerance limits (useful to know if a string is in but at the edge of wrap tolerance).

Display variations of volume and inharmonicity (log is the default)

GLOBAL winding material change. Oh yea, input the original scale using steel, then change the material on note 1 to copper and then hit the execute. Ever so much easier than note by note.

Double wrap boundary is a somewhat arbitrary value that determines the largest single wrap diameter desired.

Double wrap step standard selections of  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1 or 1  $\frac{1}{2}$  inch distance from the start on the inner (under) wrap and the outter (over) wrap. This definitely affects inharmonicity.

Here is where you may select the graph and forms color scheme to suit you.

Tuning style: select the octave tuning (10:5, 6:3, 4:2, 2:1 etc) for each octave. Changes the calculation results of the tuning chart printouts.



The next set of slides give examples of the outputs



The vertical colored lines are section markers assigned on the Data page to easily track important change points Double wound – single wound, bass – tenor, strut positions

This presents a pretty interesting tension picture especially from bass to tenor. It is but a part of the story as we need to look at the other graphs.



Look at the jump in volume from bass to tenor! Smoothing that out by up sizing the first few tenor guage sizes and reducing the wrap and core on the last of the bass looks to be in order. Then we can deal with the little inconsistancies.



The inharmonicity curve doesn't look too bad, but I'll sacrifice a little here to get a better volume curve.

Better volume curve means less voicing.



Expansion is a representation of the old "stretch" in a piano tuning an is a factor to watch but is ussally not my guiding light like volume might be.

	Display and Print				
	Scale Winding Tuning				
-	Piert Print Scale Winding Data Sheet	Print ETD By Partial Turing Dirat			
	Comments CALPICH	Print ETD By Octave: Tuning Divart			
	Converte	DI			
Scale Data I	Jisplay				187
e-\Piano\PRO/EC	TSYCONTRACT REBUILDSYDwelve	Scendeperk of			
F Pint Inch Decin	al C Plint linch Flactions	C Print Metalo		Send to Printer	
		SCALENAST	E R		
Piano: Deck SCALE, Mean NOTE (CLASS)	er Bros. #13455 (circ) urements in Inches CORE(WRAP  VBAB	(1885) Original Sca (BRIDGE (LENGTH )	le with Steel base TENS  %BRE  W	9 STRINGS NUME  INHARN  EXP.	
1 WOUND 2 WOUND 3 WOUND 4 WOUND	52.0 216 FE 0.75/ 51.0 209 FE 0.75/ 50.0 204 FE 0.75/ 50.0 204 FE 0.75/ 0.25/	1 1.000 55.375 1 1.000 55.125 1 1.000 55.000 1 0.00 55.000	199 975 29 642 2 208 345 31 899 2 221 825 35 103 2 299 642 37 922	27.357 0.192 - 7.4 27.024 0.198 - 7.1 27.220 0.161 - 6.6 27.882 0.154 - 6.4	53 06 82 38
5 WOUND 6 WOUND 7 WOUND	50         0         187         FE         0         750           50         0         181         FE         0         750           50         0         165         FE         0         750           50         0         165         FE         0         750           50         0         164         FE         0         750	1 000 54 625 1 000 54 375 1 000 54 375 1 000 54 125 1 000 53 875	232 343 36 767 3 242 402 38 359 2 224 941 36 596 3 247 210 39 120 3	25 574 0 158 - 6 5 15 300 0 155 - 6 1 12 262 0 165 - 5 8 23 200 0 156 - 5 2	38 92 09 31
RINODND			111 0101 11 1001 1	14 2211 D 1471- E D	INR I

Scale data output display



Winding data display example

	Display and Print	1	3
-	Print Scale Data	Print ETD By Postal Turing Chait Print ETD By Octove Turing Chait	
	DiplayandPrint vn:5.6.0.0.1.11	0104	
ETD By Partial Tunir	g Data Display		
o/Plano/PROJECTS/CONTR	ACT REBUILDS\Decker\ETDP\R	TALM	
		56	end to Plinker
e Venterio de la composición	SCALENAS	T E R	
Electronic Tuning	Device By Partial Tun	ling Guide	
Dackar Bres #1345	5 (circe 1885) Origin	al Scale with S	Steel bass strin
MOTE PART TI	NE CENTS	BOTE PART	TUBE CEBT
A 0 [10] Cf Af 0 [10] Df B 0 [10] Df C 1 [6] G Cf 1 [6] Gf Cf 1 [6] 4	4 0 - 5.8 4 0 - 5.6 7 0 - 5.6 7 0 - 5.8 0 - 5.8 0 - 5.8 0 - 5.8 0 - 5.8	F 4 [1] F# 4 [1] G 4 [1] A 4 [1] A 4 [1]	F 4 9 - F# 4 9 - G 4 9 - G# 4 9 - Å 5 6 9 -

ETD (Saunderson style) tuning chart



This small presentation cannot cover all of the aspects of the program. You may purchase the training video on VHS or DVD for \$10 by sending email to opportuneist.pianoservice@verizon.net

You may submit a Purchase order for the software via http://www.oppor-tuneist.com/page/SCALEMASTER.html . the software comes with the tutorial dvd.

Thank You.

Mark Gallant