

# PhonoEQ

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This version of PhonoEQ is a fully working prototype DEMO of later upcoming DSP software (standalone/plugin-in) and was prototyped using Cycling 74's Max/MSP.



This prototype software takes audio input either from selected ADC device or audio file (aiff, aif, snd, au, wav) and allows filter the signal before output to the selected DAC device or file. List of fixed phono eq presets listed in attachment 1.

EQ curve accuracy is good compared to best digital filters out there when sampling frequency is 44.1kHz (around  $\pm 0.33$ dB) or 48kHz (around  $\pm 0.225$ dB). Higher sampling frequency improves the accuracy → at 96kHz error is less than  $\pm 0.01$ dB and at 192kHz less than 0.0006dB (all in range of 20Hz-20kHz). Magnitude errors (common sample rates) for RIAA de-emphasis filter is shown in attachment 2.

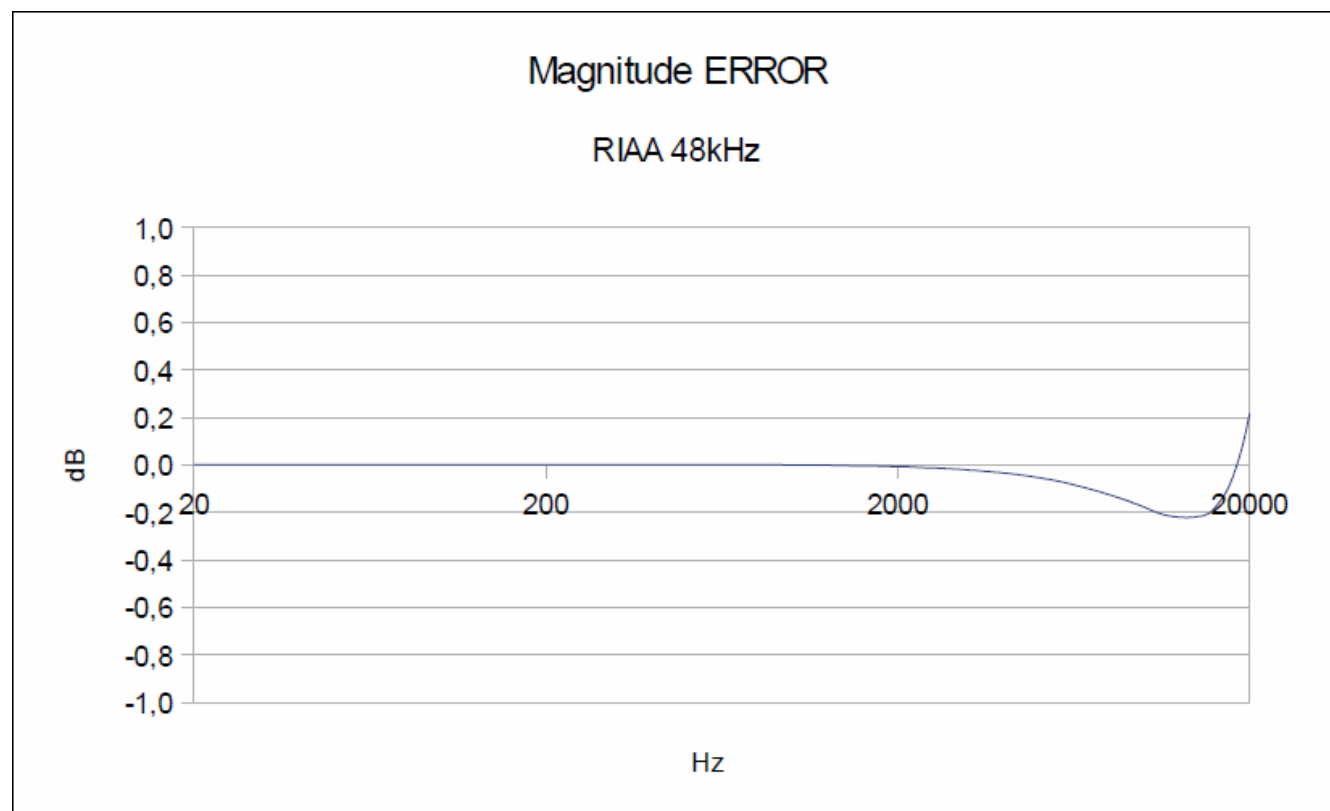
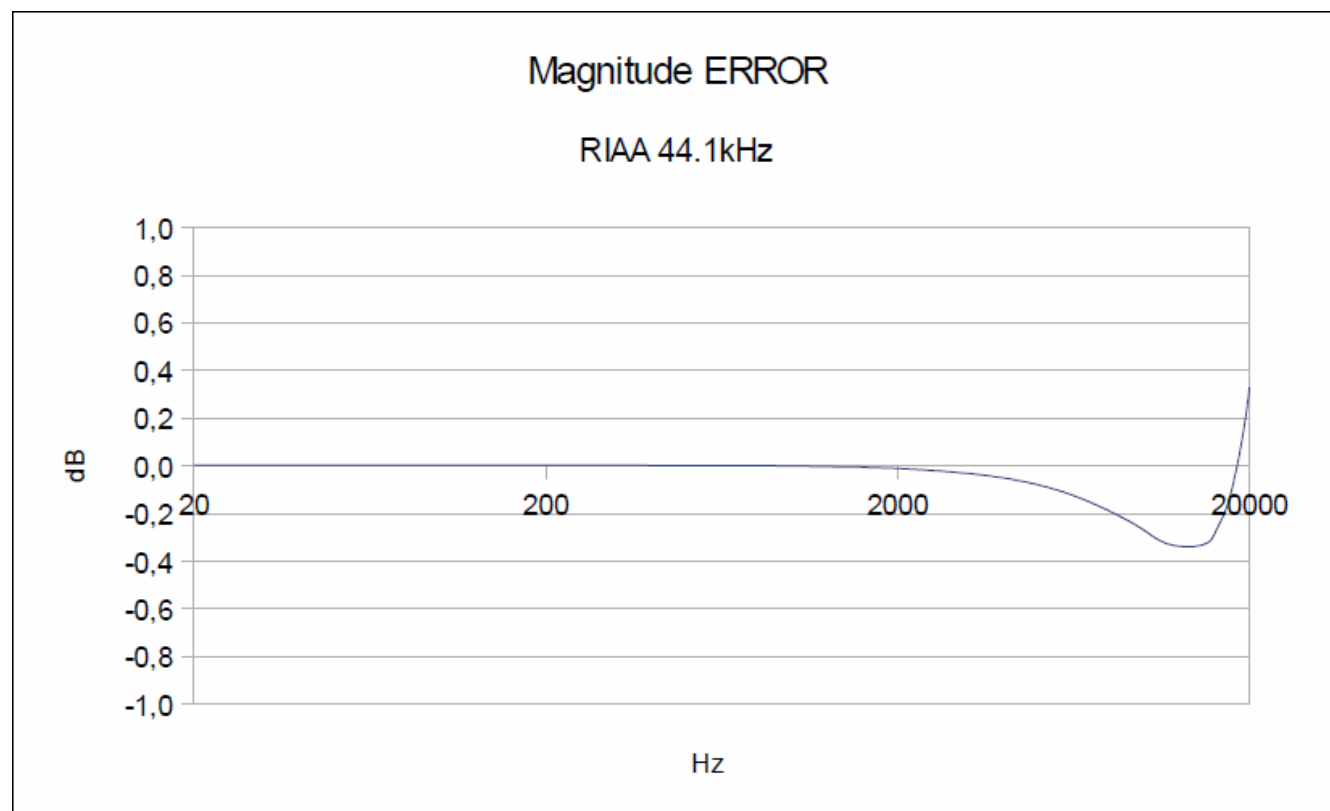
Feature	Function
DSP	- configure audio device, I/O ports and more
Filter ON/OFF	- enable/disable processing of selected filters
Reset	- set everything to their default values (= <custom> preset)
Input Level	- adjust gain for incoming signal (-12-+18dB)
Balance	- adjust L/R balance of incoming signal (0 to +6dB L R)
In meters	- shows input level in dB scale -inf to 0dB range: -1.0 – 1.0 display: 20 LEDs, 3dB/LED steps
Bass Rolloff	- 7 step selection for bass rolloff frequency
Bass Boost Turnover	- 11 step selection for barr boost turnover frequency
Treble Cut Turnover	- 11 step selection for treble cut turnover frequency
Preset	- 39 pre-made phono presets, <Custom> preset allows to manual adjust BR/BBT/TCT. Custom preset can't be saved.
Equalization	- shows the form of the active eq curve - selected additional filters nor gain changes are not presented
Normalized	- when selected, adjusts the filter gain coefficients to give 0dB gain at 1 kHz
IEC Pole	- enable/disable IEC pole at 20Hz
Neumann Pole	- enable/disable Neumann pole at 50kHz
Rumble Filter	- enable/disable Rumble filter 4 <sup>th</sup> order Butterworth HighPass, 24dB/oct at 20Hz

Remove RIAA	- when enabled, removes RIAA equalization from incoming signal (usable when recording non-RIAA record through RIAA pre-amp/circuit)
<b>Feature</b>	<b>Function</b>
Play:Open	- open file for playback
Play:▶■	- play/stop playing selected file
Record:Open	- open file to record to, must be opened before recording
Record:●	- record/stop recording, highlighted when recording ongoing
Time display	- shows recording time
Filter Gain	- adjust output gain through filter gain coefficients, in use when filter processing enabled
Level display	- shows current output level for L/R channels in dB scale
Out meters	- shows output attenuation in dB scale -20dB to 0dB range: -1.0 – 1.0 display: 20 LEDs, 1dB/LED steps
Power switch	- enable/disable audio output engine

Attachment 1:

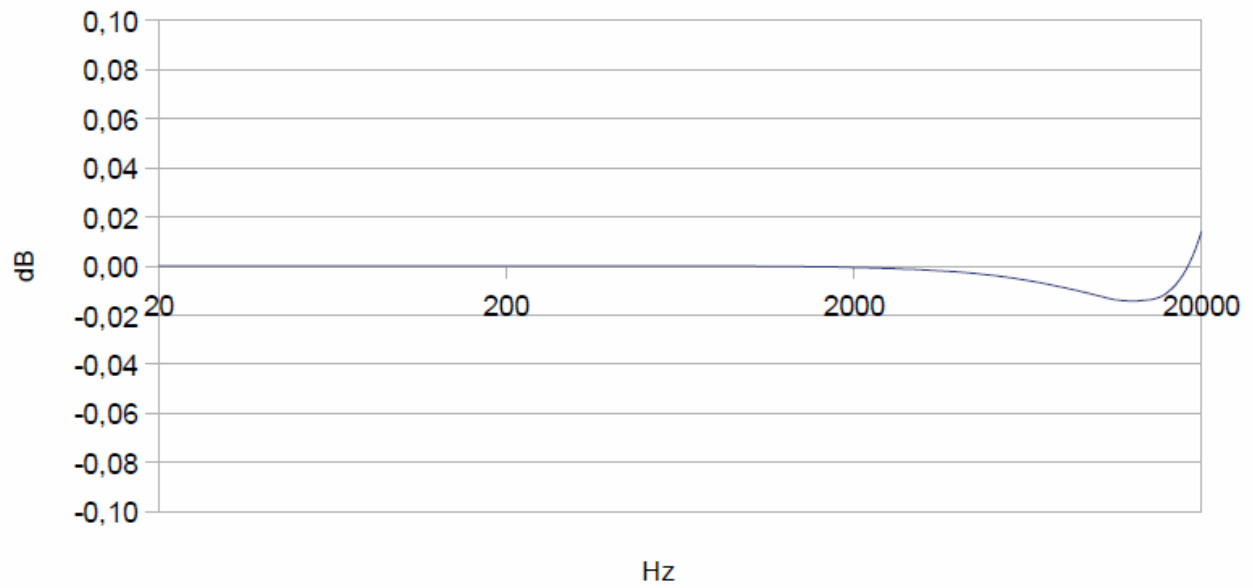
#	Name	TC	BB	BR Hz	EXT	t1	t2	t3	t4
1	629	629					0.000253	0.159155	
2	Blumlein, HMV	250	500	50			0.000637	0.003183	
3	Capitol 1942, MGM, Victor 1947-1952	2500	500			0.000064	0.000318	0.159155	
4	CCIR	3183	354			0.000050	0.000450	0.159155	
5	CCIR, TELDEC, DIN45533/36/37	3180	500	50		0.000050	0.000318	0.003183	
6	Columbia (Eng), EMI 1931,	250					0.000637	0.159155	
7	Columbia 1925	5800	200			0.000027	0.000796	0.159155	
8	Columbia 1938, N78	1600	300			0.000099	0.000531	0.159155	
9	Columbia American 1925, Victor 1925 (some)	6360	200	40		0.000025	0.000796	0.003979	
10	Columbia LP M33	1590	500	100		0.000100	0.000318	0.001592	
11	Concert Hall until 1952, Oiseau-Lyre until	3400	500			0.000047	0.000318	0.159155	
12	Decca	3400	150			0.000047	0.001061	0.159155	
13	Decca 1934	2500	375			0.000064	0.000424	0.159155	
14	Decca FFRR 1949, EMI	5800	375			0.000027	0.000424	0.159155	
15	Decca FFRR 1949, EMI, Victor 1925 (some)	6360	375			0.000025	0.000424	0.159155	
16	Early 78 (mid 30's), US mid 30		400	70			0.000398	0.002274	
17	Early 78, Brunswick, Parlophone		500				0.000318	0.159155	
18	early Decca	5800	150			0.000027	0.001061	0.159155	
19	early LP	1590	500			0.000100	0.000318	0.159155	
20	early LP, NAB, NARTB	1600	500			0.000099	0.000318	0.159155	
21	early RCA	2500	800			0.000064	0.000199	0.159155	
22	EMI	2500	500	70		0.000064	0.000318	0.002274	
23	eRIAA	2122	500	50	50000	0.000075	0.000318	0.00318	0.00000318
24	FFRR	3000	500	100		0.000053	0.000318	0.001592	
25	FFRR 1951	2000	300			0.000080	0.000531	0.159155	
26	FFRR 1953	3000	450	100		0.000053	0.000354	0.001592	
27	IEC Eq No.1=BS(SP)	3183	354	50		0.000050	0.000450	0.003183	
28	IEC-RIAA	2122	500	50	20	0.000075	0.000318	0.00318	0.0795
29	LONDON frrr	3180	500			0.000050	0.000318	0.159155	
30	London FFRR 1949, FFRR 78	6360	250	40		0.000025	0.000637	0.003979	
31	London/Decca frrr	3183	500	100		0.000050	0.000318	0.001592	
32	NAB	1590	500	71		0.000100	0.000318	0.002242	
33	NARTB	1590	500	60		0.000100	0.000318	0.002720	
34	old AES 1951, Decca 1934, Mercury	2500	400			0.000064	0.000398	0.159155	
35	Old RCA	3000	629	10		0.000053	0.000253	0.015915	
36	RIAA, RCA Victor & IEC No.98	2122	500	50		0.000075	0.000318	0.00318	
37	Victor 1938-1947	5800	500			0.000027	0.000318	0.159155	
38	Westrex		200				0.000796	0.159155	
39	<custom>								

Above data has been collected from several internet sources. Time constant t3 for missing BR frequency is set to 0.159155 (1Hz).



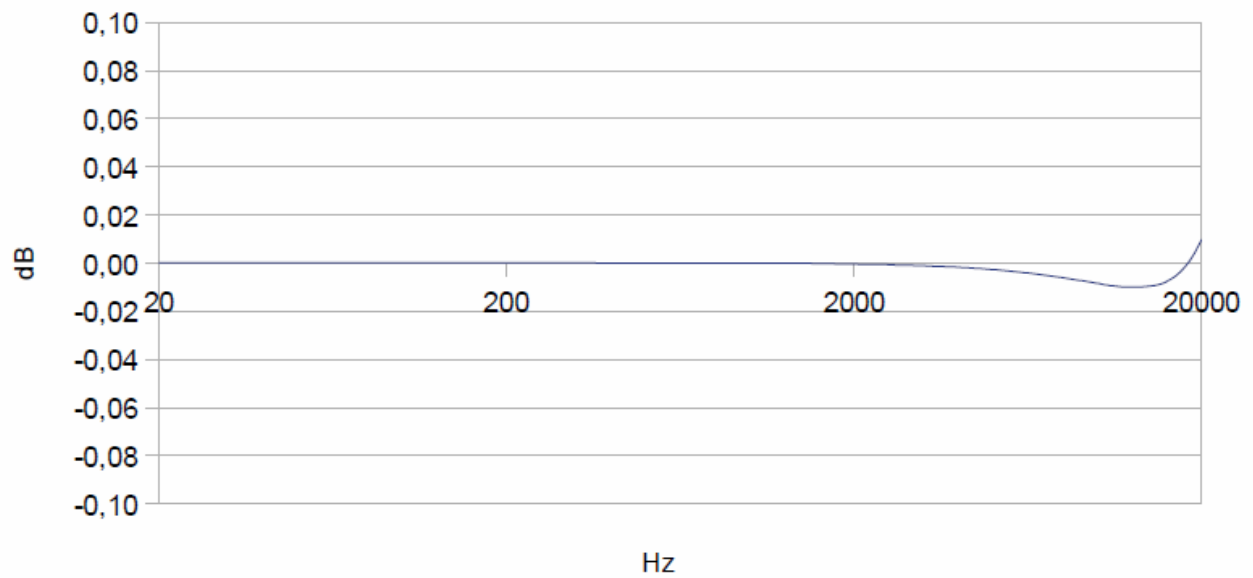
## Magnitude ERROR

RIAA 88.2kHz



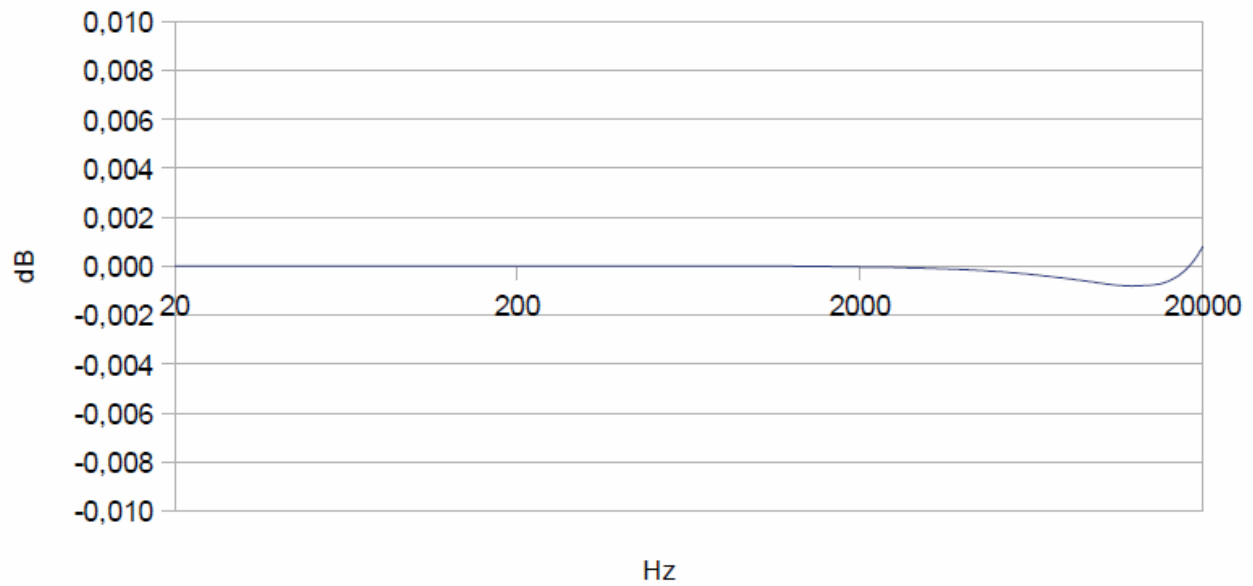
## Magnitude ERROR

RIAA 96kHz



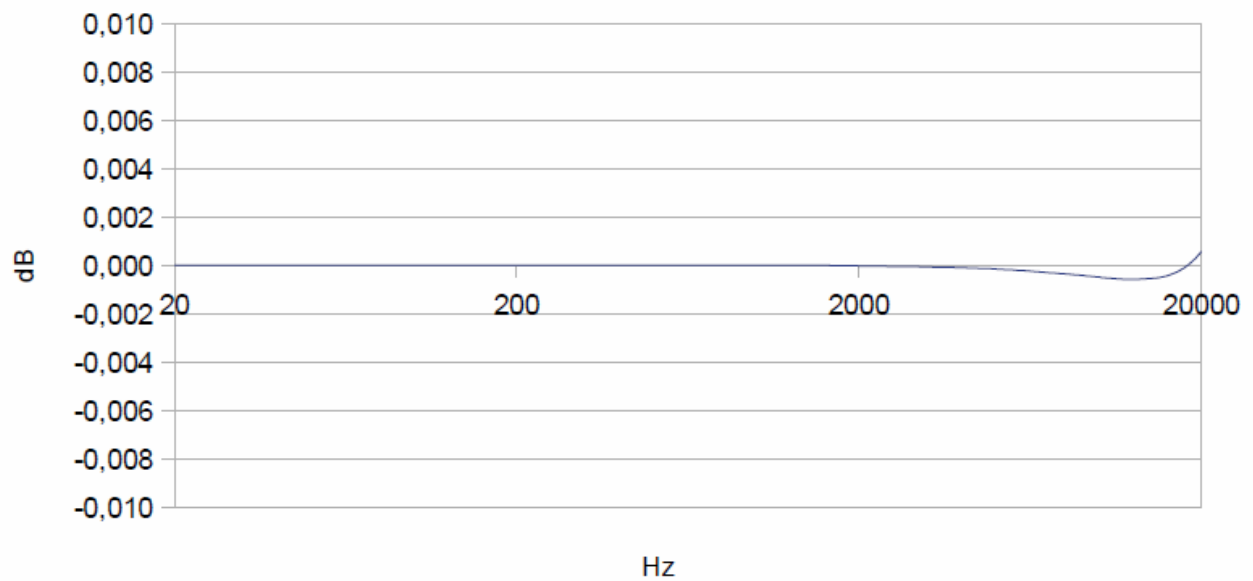
## Magnitude ERROR

RIAA 176,4kHz



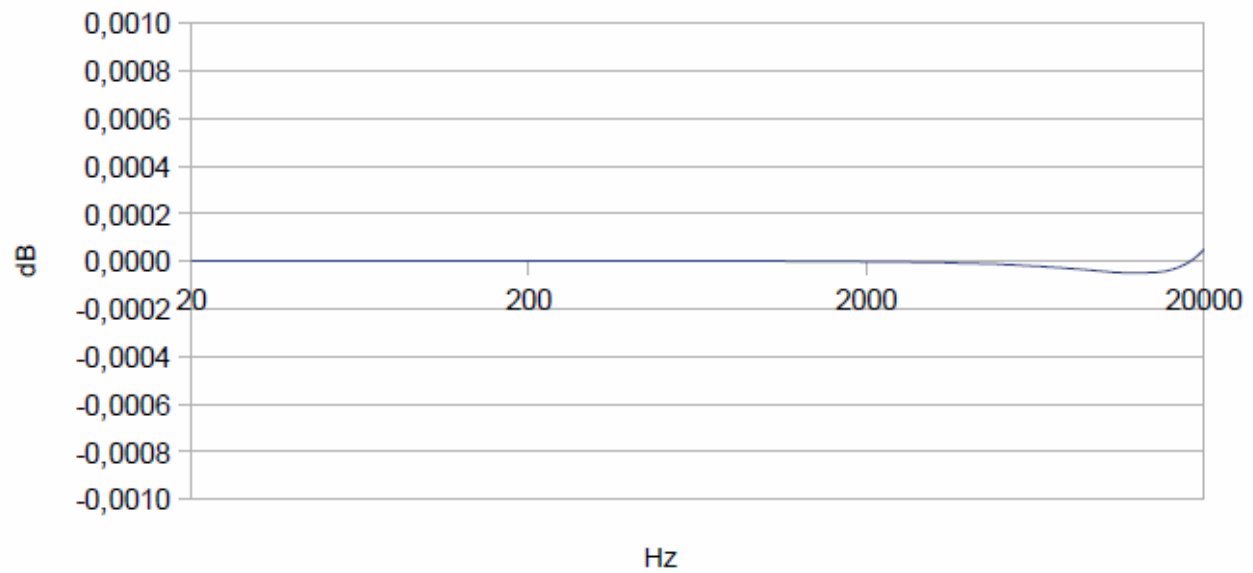
## Magnitude ERROR

RIAA 192kHz



## Magnitude ERROR

RIAA 352.8kHz



## Magnitude ERROR

RIAA 384kHz

