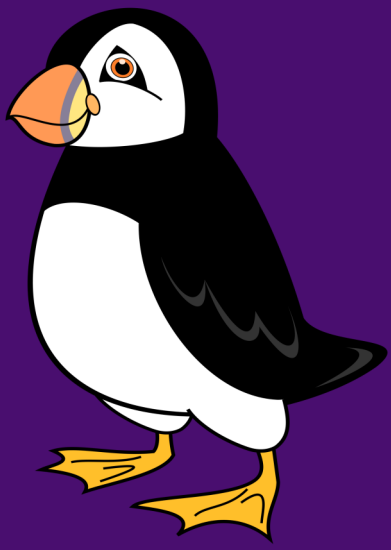


Puffin Quick Start

- Connect the music source, like a turntable or CD player, to the Puffin's input.
- Then connect the Puffin's output to your main stereo device, like an integrated amp or active speakers.
- The Puffin has three controls: the Standby button, the Knob, and the Select (arrow) button. The Standby turns the Puffin on and off. The Knob quickly rotates through settings. The Select button chooses the function or setting.
- With your main system volume adjusted low, turn on the Puffin. If using a turntable, you can start playing music as the default gain setting is for typical vinyl usage.
- If using a moving coil cartridge, scroll down the menu screen to Set? and then choose the MC 56dB preset.
- If you are using a CD player or other line output music device, scroll to Set? and adjust to the CD –4dB preset for the correct amplification. Otherwise you will have a very loud output, as the Puffin amplifies an otherwise already large audio signal.
- Always have your system's master volume control adjusted low when changing the Gain setting or loading presets on the Puffin to prevent loud surprises. The Standby button is also a great emergency mute button in an unexpected loud music event.
- Other than some care with gain changes, just have fun with the Puffin. You can't break anything and can always revert to a default preset with the Set? function. So feel free to experiment.

1. Volume

Typically the Volume will be left at 100% and a system master volume control will be used elsewhere. But it can be used as a cue mute when changing records and cleaning the stylus as well as a volume control for a minimalist system. Select and rotate the knob CW (clockwise) one click for Mute. Rotating CCW (counterclockwise) will attenuate the signal. Another method is keeping the Volume set to 50%, which then permits fast adjustment of volume depending on mood or source material.

An asterisk will indicate a clipping event at the output stage (DAC). If this is only occasional, it will be handled gracefully by the DSP, but if it occurs often then you should adjust Gain lower. You can reset this clipping alert by pressing the Select button twice.

CCW: Muted, 0.2%, 0.4%, 0.7%, 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%, 10%, 12%, 14%, 17%, 20%, 22%, 25%, 28%, 31%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 71%, 77%, 84%, 92%, **100%**, Muted :CW

2. Gain

Get your sound source well matched to your stereo system with the Puffin's wide range of gain settings: from -4dB for high level inputs (CDs, DACs) to 72dB gain (low output moving coils). 40dB is a typical gain setting for most phono setups. Remember to always turn down the main system volume when adjusting the gain to prevent loud surprises.

When switching between gain settings there's a half second delay, in which the Puffin mutes the output and allows settling to occur to prevent any thumps. Normally it is suggested to use the presets in 'Set?': MM, MC, CD, or PC, and then adjust the 'Gain' from there.

An asterisk will indicate a clipping event at the input stage (ADC), and it indicates that you should adjust Gain lower. You can reset this clipping alert by pressing the Select button twice.

CCW: -4dB, 0dB, 4dB, 8dB, 12dB, 16dB, 20dB, 24dB, 28dB, 32dB,
36dB, **40dB**, 44dB, 48dB, 52dB, 56dB, 60dB, 64dB, 68dB, 72dB :CW

3. Tilt

Tilt may be the most useful of the four tone controls. Like a seesaw, it pivots the frequency response around 800Hz, the fulcrum frequency. This quickly adjusts toward either a warmer or brighter sound character. Go higher for more detail or lower for more warmth. When changing records, the Tilt will be the easiest way to get the right sound to your ear, as it can quickly fix the mix. For example, try –2 with a thin sounding recording or +2 with a dark sounding recording.

CCW [warmer]: -6, -5, -4, -3, -2, -1, **+0**, +1, +2, +3, +4, +5, +6 :[brighter] CW

4. Air

Air is a higher frequency treble control (above 8kHz) that is intended as a cartridge loading adjustment. This will help extend frequency response of high inductance moving magnet cartridges, but can also tame other overly bright cartridges or other sources. It is an improved substitute for capacitive loading techniques on MM carts or over damped MC loads searching for a “sweet spot”. Works great for non-phono sources as well.

CCW [less air]: -6, -5, -4, -3, -2, -1, **+0**, +1, +2, +3, +4, +5, +6 :[more air] CW

5. Treble

This is a treble shelving control with a corner frequency of 3kHz. It adjusts in 1dB steps.

CCW [less treble]: -6, -5, -4, -3, -2, -1, **+0**, +1, +2, +3, +4, +5, +6 :[more treble] CW

6. Bass

This is a bass shelving control with a corner frequency of 300Hz. It adjusts in 1dB steps.

CCW [less bass]: -6, -5, -4, -3, -2, -1, **+0**, +1, +2, +3, +4, +5, +6 :[more bass] CW

7. BassBoost

Adds an adaptive boost (relative to Bass setting) with a corner frequency of 100Hz.

Select: **OFF** or ON

8. Hi (High Frequency Filter)

This is a 4th order Butterworth filter to attenuate higher frequencies. It is extremely flexible at reducing surface noise on old LPs and 78s. It is also useful at adjusting the frequency response combined with the previous tone controls, Treble and Air. Adjust by taste and give your ears a break from unnecessary fatigue. You can even recreate the moving magnet resonance happening between 9kHz to 11kHz which can add life to the sound. To experiment, try Air +3 and Hi 11kHz with any type of input—even moving coils or CDs.

CCW: 5kHz, 7kHz, 8kHz, 9kHz, 10kHz, 11kHz, 12kHz, 13kHz, 15kHz, **20kHz**, 30kHz, 48kHz :CW

9. Lo (Low Frequency Filter)

This is a 4th order Butterworth filter to attenuate lower frequencies. While mainly it is used to eliminate vinyl rumble and tonearm resonances, it can be adjusted higher for use with old LPs and 78s. It can also be adjusted to 100Hz or higher to reduce mains hum which may be present on many older recordings.

CCW: 5Hz, 10Hz, 15Hz, 20Hz, **25Hz**, 30Hz, 35Hz,
40Hz, 45Hz, 50Hz, 70Hz, 100Hz, 200Hz, 400Hz :CW

10. Mode

There is one stereo mode and three monaural modes. The monaural modes are either: Mono, Left, or Right. Mono sums both the left and right channels. This may lower noise by summing out of phase pops and clicks. Sometimes previous groove damage to one channel or the other means that using the Left or Right modes may provide superior sound. You can quickly rotate through these three settings to determine the best setting, particularly for a noisy recording. You can also use Left and Right modes for a fresh album experience with a stereo recording. You'll hear things otherwise hidden in a stereo mix. Classic stereo recordings like Beatles and Hendrix are recommended.

CCW: **Stereo**, Mono, Left, Right :CW (360 mode)

11. Grade

This function determines a letter grade for an album side based on scratches, vinyl surface noise, and groove wear. It works best in conjunction with your own ears. Uses: sorting duplicate copies, confirming your best sounding records, determining records that are candidates for replacement, and providing an objective assessment that can be used for sale or trade. Even determine cartridge performance for a given media type or type of groove wear, as different stylus geometries will grade differently.

Grade uses the same detection algorithm as Magic, but Magic - whether ON or OFF - doesn't affect the grade. The grade is determined by *time divided by defects*, so any length recording may be graded. The calculated value will normally vary as the record plays. This is due to the randomness of some wear and because defects become more apparent during quieter passages - to both our ears and the algorithm. So a more dynamic record, like many classical ones, will be graded more strictly.

Once the music starts and has faded in completely, select 'go!'. Do it in this manner to avoid all the noise in the outer groove. The spinning animation now lets us know that the process has started, and after ten seconds the initial grade will show. This grade will continue to average over the course of the album side. Finally, stop the grade function just as - or immediately before - the record starts to fade out to get your final letter grade. Always do your best to stop before the runout groove as even on clean records this is one of the noisiest areas and will affect your grade. Once you've stopped and the final grade is displayed, the Grade function is ready to start again. It behaves like a resetting stopwatch.

Values: A+, A, A-, B+, B, B-, C+, C, C-, D+, D, D-, F
Select: **go! (ready)** or Animation (running)

12. Magic

This function gently lessens many of the small pops and clicks normally heard during vinyl playback. It consists of a click detector that monitors the music for outlier, transient sound events which are then flagged. An algorithm then determines whether the flagged event was likely noise or musical in nature - perhaps a trumpet or drum snare. Once it has determined that the event was noise, a selective filter is engaged for around half a millisecond. So the Magic function is not processing 100% of the audio like a normal DSP filter, and actually may only be filtering a few seconds of audio per album side. This gentle method makes the record sound cleaner with fewer artifact distractions, and doesn't have a processed sound at all since very little processing is actually done. It will make your best records sound transcendent and some of the well worn ones will be much more listenable. It is recommended to be left on all the time.

Select: **OFF** or ON

13. fx effects or f(x)

Use nonlinear transfer functions of classic analog sounds. 'Tube' has very dominant 2nd harmonic distortion like a 300B triode vacuum tube with as much as 7%THD at full signal. 'Tape' has a dominant 3rd harmonic distortion like classic Amperex tape machines (3.5%THD at full signal). Amazingly, the high levels of distortion may not be noticeable to many listeners. A benefit of the 'Tape' setting is additional clipping headroom. PinkNoise is a pink noise source suitable for testing room equalization using an octave real-time analyzer. Many octave RTA apps are available for free using your phone or tablet.

CCW: **OFF**, Tube 2H, Tape 3H, PinkNoise :CW

14. DeRumble

In the stereo LP era, many mix mastering consoles used elliptic equalizers: filters that normalize the bass phase relationships and make the low frequencies monaural. LP manufacturability was improved in this way as records were less prone to skip and also had greater recording capacity. Furthermore, stereo perception at these low frequencies is poor and can be unpleasant sounding. The Puffin's DeRumble function is a similar filter at 200Hz with a 12dB/octave slope. It is like a speaker crossover with frequencies less than 200Hz in mono and frequencies greater than 200Hz in stereo.

The usefulness of this type of filter as a rumble filter during vinyl playback was first mentioned in 1979 by J.P. Macaulay in Wireless World. A great deal of rumble content is unwanted vertical stylus movement caused by: the tonearm resonance, the turntable bearing, the vinyl media's ripples and warps, and external vibration to the turntable itself. Summing these out-of-phase signals greatly attenuates them and can even make some nasty warps completely disappear. It can also greatly isolate your turntable from the surrounding environment and less prone to footfalls and less than ideal turntable locations.

DeRumble is recommended for all thinner vinyl LPs and works best in conjunction with the **Lo** filter set to 25Hz or higher. It only functions in **Mode**:Stereo, otherwise it is bypassed.

Select: **OFF** or ON

15. RoomEQ

This filter compensates for the room's main resonance that ends up muddying the bass. The filter itself is a narrow 6dB cut filter (Q=2.6). Just roll with 300Hz or use a free octave RTA on your phone and the Puffin's **fx**:PinkNoise function to find where it is located in your listening space. Most RTA apps usually have peak search on as default, so couldn't be easier. The staggered OFFs between the different frequencies (200Hz to 400Hz) are so that you can switch back and forth (before and after) for best fine tuning by ear as needed.

CCW: 200Hz, OFF, 225Hz, OFF, 250Hz, OFF, 275Hz, **OFF**, 300Hz, OFF, 325Hz, OFF, 350Hz, OFF, 375Hz, OFF, 400Hz, OFF :CW (360 mode)

16. Load

This is the Puffin's input impedance and will almost always be left at 47k. For moving coil users, the 200 ohms setting will provide a very good load for a wide range of moving coils (though HOMCs should use 47k). For those looking to tweak the sound of the cartridge - historically a hit and miss procedure through loading methods - use Puffin's Air instead.

200 ohms can also be used to attenuate the input when the -4dB gain setting has level clipping due to a source with non-standard line levels (some DACs or proaudio devices). But it is suggested to lower the output on the source device if possible for best fidelity, as 47k is an ideal load for line level devices.

Select: **47k** or 200 ohms

17. Balance

This provides balance control between the left and right channel in 2dB steps.

CCW: L15,L14,L13,L12,L11,L10,L09,L08,L07,L06,L05,L04,L03,L02,L01,**+00**,
R01,R02,R03,R04,R05,R06,R07,R08,R09,R10,R11,R12,R13,R14,R15 :CW

18. Fine Balance

Adjusts the left channel in +/- 0.3dB steps to match the right channel. This can correct small imbalances due to cartridge and tonearm tolerances. Playing a mono record, select **Mode**:Stereo and **Phase**:Null. Then adjust Fine Balance for maximum cancellation. Note: some high frequency content will remain and is normal, due to slight phase differences in the higher frequencies.

CCW: -L9,-L8,-L7,-L6,-L5,-L4,-L3,-L2,-L1,**+00**,+L1,+L2,+L3,+L4,+L5,+L6,+L7,+L8,+L9 :CW

19. Phase

This has four settings: Normal, Invert, Mixed, and Null. Normal is the same phase as the incoming signal while the Invert mode has the phase reversed. Mixed phase has the two channels 180 degrees out of phase. It can be used to troubleshoot speaker wiring or for an interesting stereo effect. Null subtracts the two channels from each other and helps adjust Fine Balance. Null also permits full support of the Vertical format for some very old records.

CCW: **Normal**, Invert, Mixed, Null :CW (360 mode)

20. Out

The Out menu option switches between the usual analog RCA outputs and an optional digital coax SPDIF output - an upgrade feature for the Puffin for those wanting to bypass the internal DAC and use their own DAC.

Select: **Analog** or SPDIF

21. EQ

For most vinyl users, Phono will be the only setting ever used. Meanwhile for sources like CDs or digital music it should be set to Line In, which is a flat response. For enthusiasts with older LPs and 78s, the alternate EQ settings will provide proper equalization for best sound from these records. The bottom menu EQ setting even allows custom record equalizations, with adjustable turnover, bass shelf, and roll-off. The default custom setting is the RCA RIAA standard: 500R-13.7. If you can sort out the critical turnover frequency, then many times the bass shelf and roll-off can be adjusted by ear. For older recordings, also use the LO and HI filters to limit the frequency response.

CCW: Line In, **Phono,** Teldec LP, London LP, AES LP, NAB LP, Columbia LP, CCIR 78, Columbia 78, Blm300 78, Eur500 78, Eur250 78, *Custom* :CW

Turnover	**Bass Shelf**	**Roll-off**		**Presets**
000 (Hz)	X (+12dB)	-0 (dB)	-11 (dB)	Line In: Flat
150 (Hz)	C (+14dB)	-3 (dB)	-12 (dB)	Phono (RIAA): 500R-13.7
200 (Hz)	A (+16dB)	-5 (dB)	-12.3 (dB)	Teldec/DGG LP: 500R-10.5
250 (Hz)	B (+18dB)	-5.5 (dB)	-12.7 (dB)	London LP: 500C-12.3
300 (Hz)	R (+20dB)	-6 (dB)	-13.7 (dB)	AES LP: 400N-12
350 (Hz)	N (15Hz)	-7 (dB)	-14.6 (dB)	NAB LP: 500A-16
400 (Hz)		-8 (dB)	-15 (dB)	Columbia LP: 500C-16
450 (Hz)		-9 (dB)	-16 (dB)	CCIR 78: 350N-10.5
500 (Hz)		-10 (dB)	-17 (dB)	Columbia 78: 300N-10.5
630 (Hz)		-10.5(dB)	-18 (dB)	Blumlein 300 78: 300N-0
800 (Hz)				European 500 78: 500N-0
1000 (Hz)				European 250 78: 250N-0

Time constant = (1 ÷ Turnover) ÷ 6.2832

Turnover = 1 ÷ (Time constant × 6.2832)

22. Set?

You can load four factory default presets and save four of your own. To save a User setting, choose the User slot and press the Puffin's Standby (on/off) button. Note that the gain setting can be drastically changed (76dB dynamic range), so make sure you have your system volume turned very low when loading presets. After a load or save, this function will default to OFF again. Settings are saved to Flash (non-volatile) when you: adjust the Gain, turn the Puffin off, load a preset, or save a preset. You can cycle power (press Standby button twice) for a Flash save at anytime.

CCW: **OFF**, MM 40dB, MC 56dB, PC 16dB, CD -4dB,
User 01, User 02, User 03, User 04 :CW (360 mode)

User 1 Settings Notes

User 2 Settings Notes

User 3 Settings Notes

User 4 Settings Notes

Signal Levels

The Puffin routes the signal in the follow way:

Input -> Adjustable Analog Gain -> ADC (Analog-Digital Converter) ->

DSP (Digital Signal Processing) -> DAC (Digital-Analog Converter) -> Output

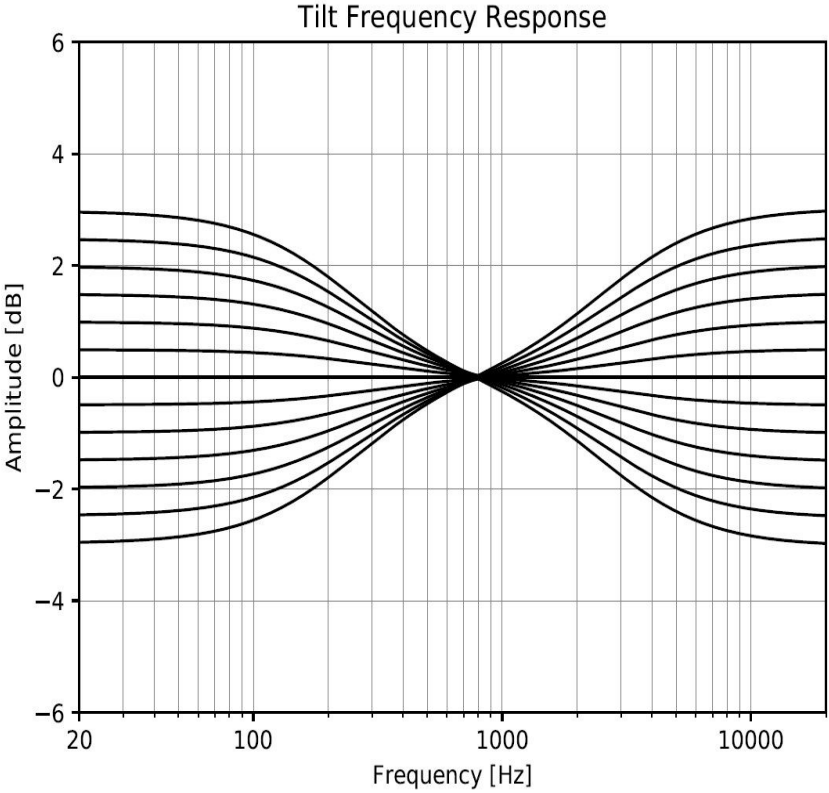
The Puffin signal levels can be monitored between Set? and Volume. These show a dB full scale (dBFS) value, so -00.0 is the max signal the Puffin can handle at that stage in the Puffin, and this is always a negative value referenced to zero. The more negative, the smaller it is.

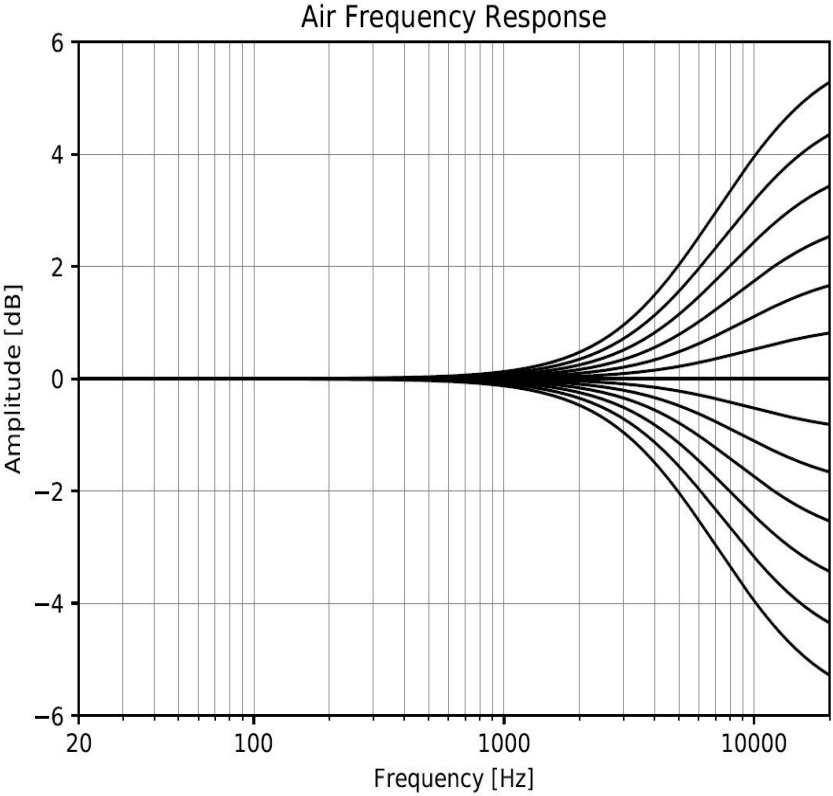
The Select button can change between the Average Mode (indicated by 'av') and Peak Mode (indicated by 'pk'). Peaks can easily happen with vinyl pops, and these clip events don't harm the Puffin and are handled gracefully and not sent downstream. Any DAC clipping is handled in the DSP floating point math and causes no issues other than small amounts of higher order distortion. The main goal is to avoid distortion caused from constant clipping. For reference, -20.0 to -10.0 is a good target for Average signal level range at the DAC.

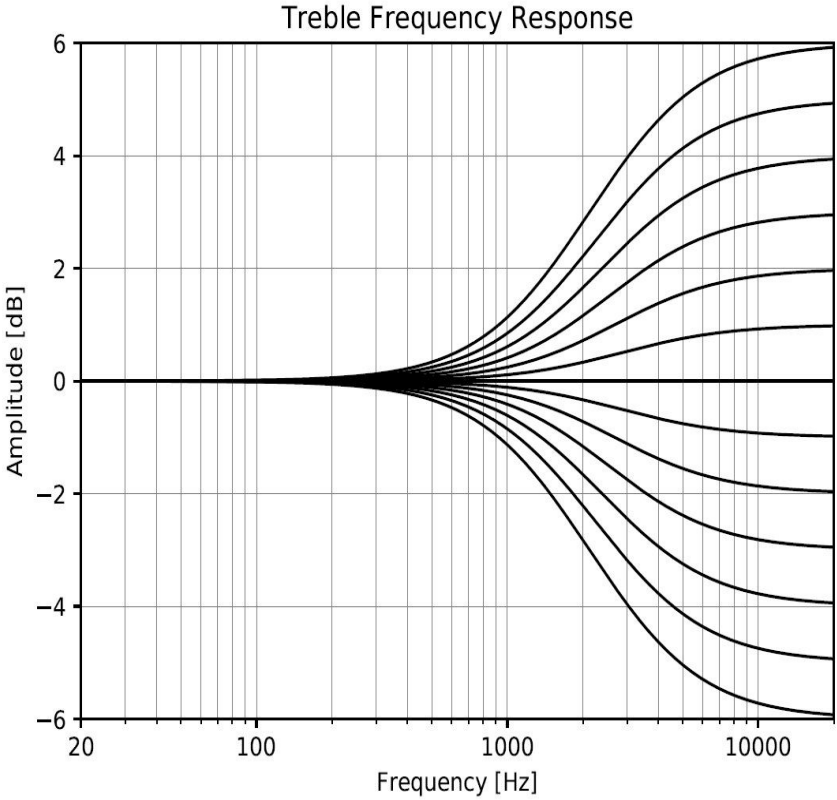
- If -00.0 peak signals regularly occur at either the left or right ADC (indicted by 'A'), lower the Puffin's Gain. A clip detect asterisk will also appear at Gain.
- If -00.0 peak signals regularly occur at either the left or right DAC (indicated by 'D'), lower the Puffin's Gain or Volume. A clip detect asterisk will also appear at Volume.

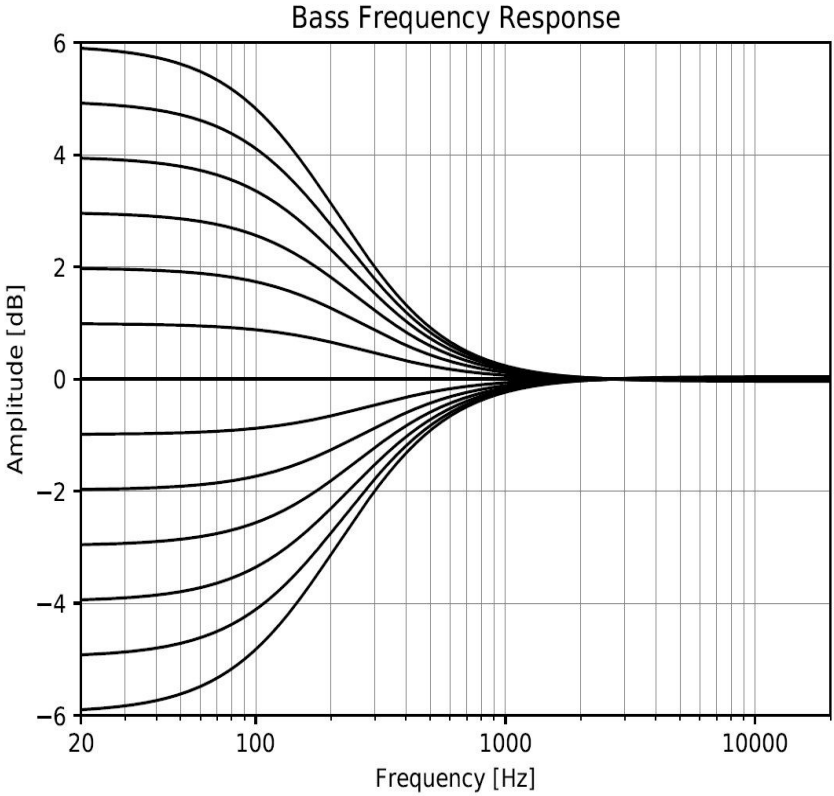
Specifications

- Works with all record players and cartridges. Suitable gain settings (-4dB to 72dB) for moving coil carts (0.25mV), HOMCs (2mV), standard MM (4mV), all the way to CDs and DACs (2V).
- Max input and output: 2Vrms
- Input impedance: 47k ohms (50pF) selectable to 200 ohms (1nF) for moving coils
- Output impedance: 1k loads and up, but will drive some sensitive headphones
- Analog gain stage: NJM2122M
- ADC: Texas Instruments PCM1808
- DAC: Texas Instruments PCM5102A
- DSP: ARM Cortex M4 80MHz with 32-bit FPU
- Digital conversion done with 24 bit resolution at 96kHz sampling rate


Tilt Frequency Response
Amplitude [dB]
6
4
2
0
−2
−4
−6
20
100
1000
10000
Frequency [Hz]


Air Frequency Response
Amplitude [dB]
6
4
2
0
−2
−4
−6
20
100
1000
10000
Frequency [Hz]


Treble Frequency Response
Amplitude [dB]
6
4
2
0
−2
−4
−6
20
100
1000
10000
Frequency [Hz]


Bass Frequency Response
Amplitude [dB]
6
4
2
0
−2
−4
−6
20
100
1000
10000
Frequency [Hz]