

The VPI Avenger Phono Owners Manual



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Introduction

When Harry Weisfeld reviewed the Genesis Phono, he was mesmerized. He said that it is “so enjoyable, so easy to listen to, and so revealing I feel almost compelled to turn it on.... If you have the money, this is a must-have combination and I cannot imagine getting more information out of the grooves. World class phono and fully recommended with no negatives I can find.” (Except the price!)

So, we called our good friend, Gary Koh, the Chief Designer at Genesis and asked him if he could design one for VPI..... *at a quarter of the price!*

Operating Principles

The Avenger Phono embodies “do no wrong” and is designed and built to be **as simple as possible and no simpler**. This means, plug-n-play and enjoy your music! No loading choices to make, no adjustments, and no tweaking needed.



Grounding

The battery-powered design of the Avenger Phono means that it is not grounded. Hence, to protect the input of the Avenger Phono from static build-up on the turntable, we have provided a grounding plug and cable.

This is a high-quality silver/Teflon cable terminated with a high-quality US Plug. Attach one end to the ground post of your VPI turntable, and plug the other end into a power socket that is on the same circuit as your preamplifier.

Input and Output

The two upper RCA sockets on the inside are the inputs, and the two lower RCA sockets on the outside are the outputs. The Avenger Phono is designed for low-output moving coil cartridges.

Battery Power

The circuitry of the Avenger Phono has been designed to have minimal warm-up requirements. Hence, we recommend that it be turned on only when you are ready to play.

A fresh set of alkaline AA's would give you about 200 hours of play time before your listening experience will begin to be diminished, and up to 350 hours before you may find that you need to have them replaced.

We recommend using ordinary alkaline AA batteries. This is because alkaline AA batteries are 1.5V each, and twenty of them will provide the ideal +/-1.5V power supply needed. Rechargeable batteries, on the other hand, are mostly 1.2V. Hence, you may experience diminished dynamics from the start using rechargeables. Nevertheless, the Avenger Phono will operate just fine as long as the voltage is over 9V from the 10 AA batteries.

An optional external power supply is available for wall-based power.

The Technology

Design

The moving-coil phono stage arguably has one of the toughest jobs of any of the electronic components of a hifi-system. It has to take a tiny, delicate signal from the phono cartridge and amplify the voltage by at least 1,000 times (typically 60dB of gain @1kHz) for a low-output moving coil cartridge.

What's worse is that because of RIAA equalization, it needs to amplify the bass frequencies even more. The same phono stage needs a gain factor of over 10,000x @20Hz (80dB of gain). At 20kHz, gain is just 100x or 40dB – a difference of 40dB between 20Hz to 20kHz. Hence, huge headroom is needed.

Despite amplifying the cartridge signal by over 60dB, the phonestage also has to be low-noise across a broad spectrum. Otherwise, any noise will be amplified together with the music. You can't filter this noise either, as the filter is unable to distinguish between music and the noise and only throw out noise.

Due to the delicate nature of the signal from the phono cartridge, it has to be handled with kid gloves. Hence, it is also extremely important to do no harm to the signal.

The Avenger Phono incorporates only a single high-gain/variable gain amplification stage and is completely isolated using a battery power supply. It implements the RIAA de-emphasis required as part of the variable gain architecture.

An absolute minimum of components is used. But because there are so few components, each part has to have quality beyond reproach. Every component used on left and right is tightly hand-toleranced far beyond manufacturing tolerance and broad-frequency spectrum matched.

Hand-selected components

Extremely high quality components are used: Dale 0.1% military-grade metal-film resistors; Nichicon Fine Gold electrolytic capacitors and Panasonic organic polymer



capacitors; Nichicon Muse bipolar capacitors; Wima polypropylene and Vishay styrene film capacitors. All hook-up wires are silver-plated copper with a PTFE dielectric.

Starting with these extreme-quality components, we further hand-select and match them in every single unit we build.

This is the **hidden cost** of the Avenger Phono as many expensive components will be discarded when they are not within the precision required. It also takes a lot of time to hand-select and hand-match components.

In the RIAA equalization circuit, capacitors are precision matched to 0.5% of the target. Resistors are measured to verify that they meet precision specifications and discarded when they do not!

The Myth of “Cartridge Loading”

Instead of providing a myriad of loading options, the design of the Avenger Phono eliminates the need for cartridge loading.

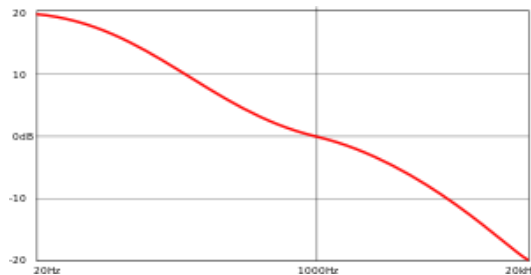
There is extensive talk about cartridge loading being necessary to reduce a 32dB resonance spike in the high frequencies. However, many of those graphs shown in the marketing literature of phono stages don't show the frequency scale where this spike occurs – which is always above 100kHz.

This ultrasonic resonance overloads the input to the phono stage and results in harshness and distortion. When loading is introduced to reduce this resonance, you will hear the sonic characteristics of the load (and likely the switches used) which may reduce transparency and introduce distortions (including euphonic distortion). Remember, the music signal at this point is in the range of 0.2mV to 0.8mV – that's millivolts. And the cartridge will have to generate the current to drive the load.

Since this resonance resides above 100kHz, it will be filtered out by the RIAA de-emphasis curve and will not be seen at

the output. At 20kHz, the RIAA curve filters the input signal down by 20dB.

Hence, “high-frequency noise swamping the preamp” is just an excuse. The high-frequency noise swamps the phono stage and should not be represented at the output if the RIAA de-emphasis is correctly implemented.



RIAA de-emphasis curve on playback

A moving-coil cartridge is a very tiny electrical generator. A small enough load needs to be driven by the cartridge. If it is too high (a low impedance), the load makes the generator work harder and sucks the detail, resolution and dynamics out of the music.

Taking things back to first principles – the first thing to do is to make sure that there is enough ultrasonic headroom so that the resonance spike does not overload the input. Then, make sure that RFI and EMI are well controlled internally, and finally, we amplify the signal with RIAA de-emphasis.

With the Avenger Phono, gain at 1 kHz is 62dB. Following the RIAA de-emphasis curve, 20Hz is amplified by 82dB and 20kHz is amplified by 42dB. Taking the RIAA curve up the frequency range beyond 20kHz, any resonance will be at least 59dB below the musical signal.

Magically, the resonance peak is no longer an issue.

Specifications

- Dimensions: W 11" x H3"x D 7.5"
- Weight: 10 lbs (4.5 kg)
- Input Sensitivity: 0.4 mV to 1.2 mV
- Gain: RIAA: 62dB @1kHz
- Input and Outputs: Gold-plated RCA
- Finish: "Avenger" black acrylic and aluminium

