MANUAL NO. 01 REV. DATE: 08/2015

DECWAREPILL

PRECISION AUDIO CLARIFIER

MADE IN USA

Models
PAC-S & PAC-G

DESCRIPTION

The Decware Pill is a specially manufactured audio grade bi-polar capacitor who's value is between a hundred and a thousand times larger than the coupling capacitors in your audio components. It is encapsulated between two precision machined RCA jacks using a machined aluminum shell featuring silver & teflon internal conductors.

USE

Intended to be inserted into any line level signal path for use as a filter and clarifier.

There are two types of Pills. Gold (model PAC-G) and Silver (model PAC-S).

The Gold Pill is designed for internet streams, or mid-fi or budget grade digital audio sources. The Silver Pill is designed for use with high resolution digital and analog that was created from digital masters.

BENEFITS

The Gold Pill will make low resolution internet music streams, like Pandora for example, infinitely more listenable. It was invented to make listening to internet radio at work a more enjoyable experience.

The Silver Pill will “fix” 3 out of 4 compromised digital recordings on multiple levels resulting in a more musical playback. It was invented to to impart a more analog feel to high resolution digital recordings and make vinyl pressed from digital masters sound like vinyl pressed from analog masters.

The Pills do not require a battery, power supply or a computer to operate. They are a passive device and 100% reliable and consistent.

HISTORY

The secret of the Decware Pill was stumbled upon during the voicing process of one of our amplifiers quite by accident when an incorrect component type with a value many hundreds of times larger than specified was used to couple an input stage just to see what would happen… *The intent was in trying to voice a pair of input jacks specifically for digital sources in an attempt to "glue all the dots together".*

The resulting effect on the sound was immediately evident. Normally something like this would ruin the sound or at best alter it in some undesirable way or when used inside an amplifier would ruin the intended frequency response and likely raise distortion. However this didn't because by using it outside the amplifier the amplifier is unaffected while the source component or preamp see's a drop in output impedance which improves it's performance in some cases dramatically.

And as one might suspect the physics of charging and discharging such a large device seems to have three effects on the sound:

1) The first effect is like glue that connects all the dots to form a continuos line similar to analog.

2) The second effect is like a natural filter that due to it's size is too slow to reproduce most of the noise induced artifacts that ride on top of the music signal.

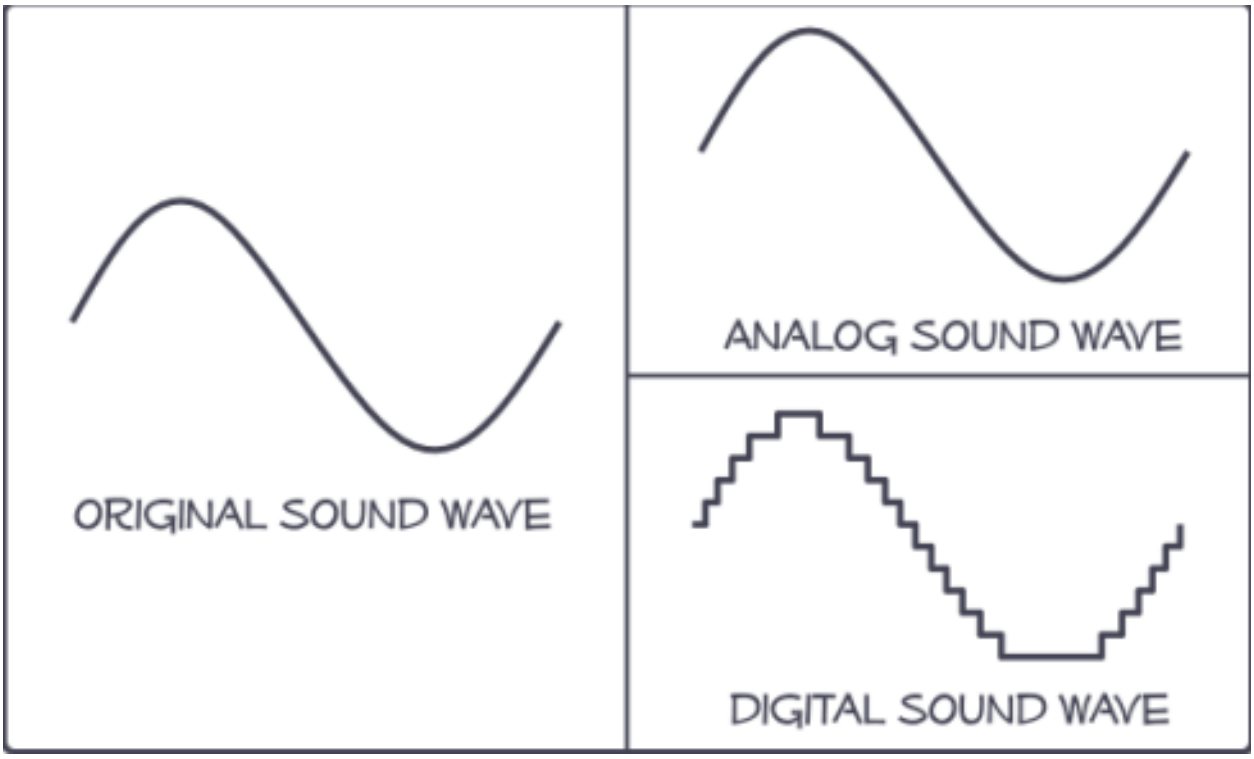
3) The third is shifts in the phase angle across audio frequencies in a way that effects dimensionality with a less forward or "pushed" sound resulting in less timing error* fatigue.

** Timing Error is any change in the phase angle or timing of the original sound source from the time the sound wave hits the diaphragm of the microphone till the time it leaves the voice coil in your loudspeaker; an error that accumulates as a result of all the active and passive components in the signal path between those two points. Suffice it to say that this is the very thing that separates live from reproduced music and vitally all systems have a significant amount of it. Therefor altering it could bring the resulting signal closer to the original intent of the recording just as easily as it could contribute to the problem. While everyones digital music libraries vary, we have found on average 3 out of 4 recordings in our library are improved, as are most of the digital streams we've tried.*

THEORY OF OPERATION

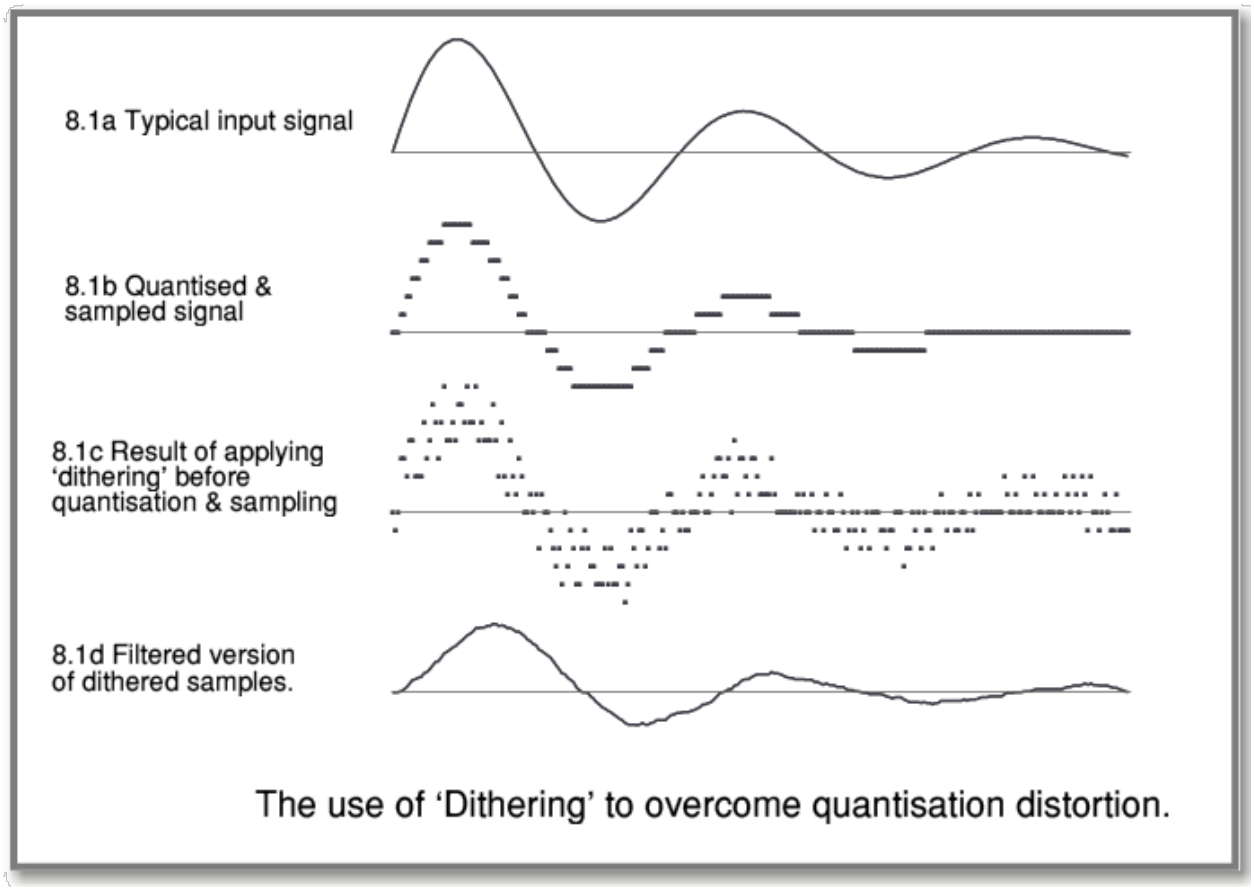
EXTRUSION EFFECT ON DIGITAL WAVEFORMS

To visualize what a Decware Pill does, it helps to understand that all digital waveforms are not alike, yet a common denominator does exist; I call it pulses. The resolution (bit depth and sample rate) of digital determines how many pulses there are - which are then artificially glued together in an attempt to form a continuous line but that line contains throbbing pulses (aliasing) that confuse fast amplifiers with the speed to react in some negative way to those pulses. For example, a fast transparent amplifier would react by reproducing the pulses behind the music and that would be a negative outcome since the idea is not to have any. Let's look at some digital waveforms…



This is the very most basic explanation of the difference between digital and analog sine waves that create the music we hear.

There are however, many ways to process a digital sound wave which partially explains why all DACs don't sound the same.

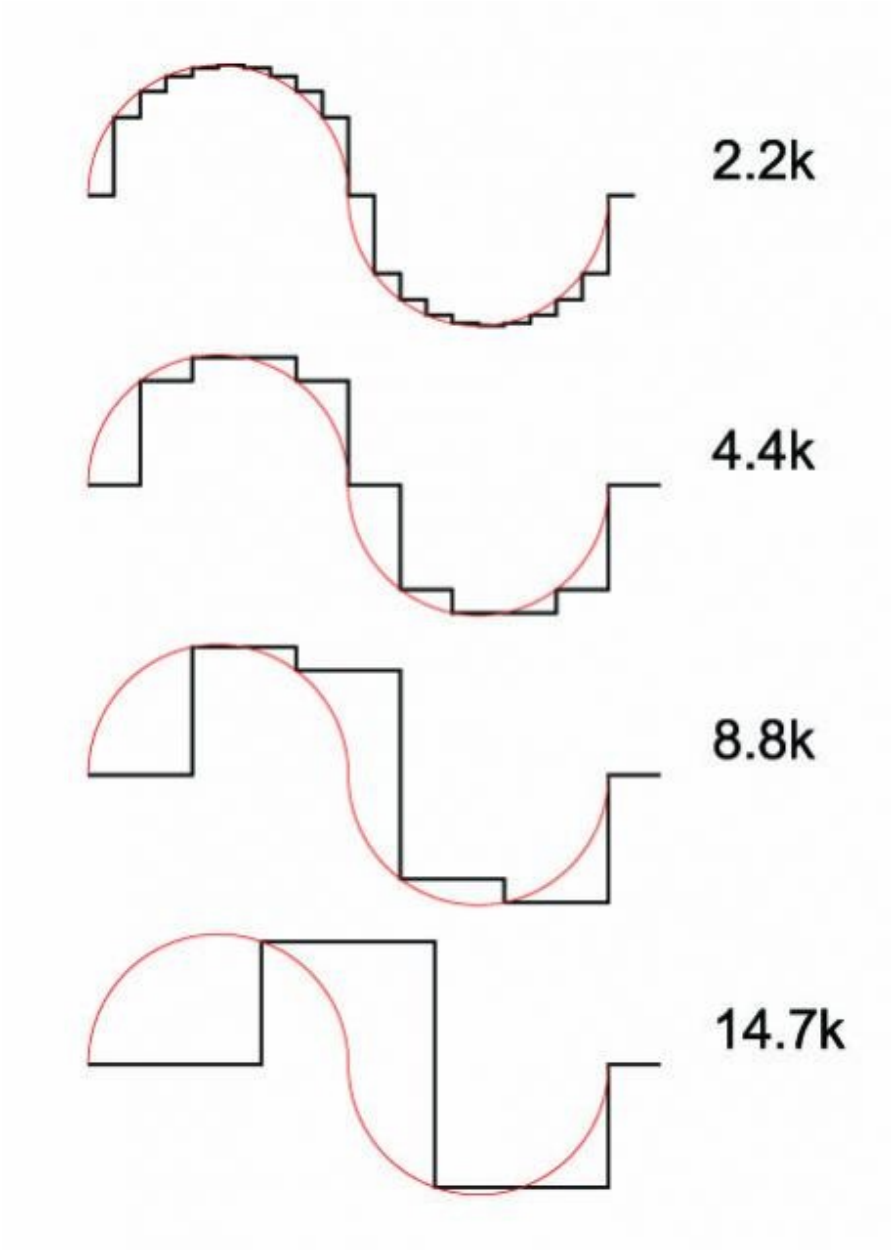


The use of 'Dithering' to overcome quantisation distortion.

Quantization, dithering and filtering are all attempts to get a smooth continuous thread like analog. As you can see, filtering essentially glues all the dots back together and compresses them back into a fine line similar to the original input signal but with a rougher texture.

Through the physics of how the capacitor charges and stores energy at different rates for different frequencies and the resulting time delays aka phase angle shifts it becomes somewhat of an art to design a perfect filter.

Sadly eyes are inferior devices to judge sound quality so perfect results can not be predicted with spice models, you'll have to actually listen to each combination and hear how it effects the sound. With around 40 or 50 combinations to get through it just takes a lot of time and a steady focus on the desired result. There is no free lunch.

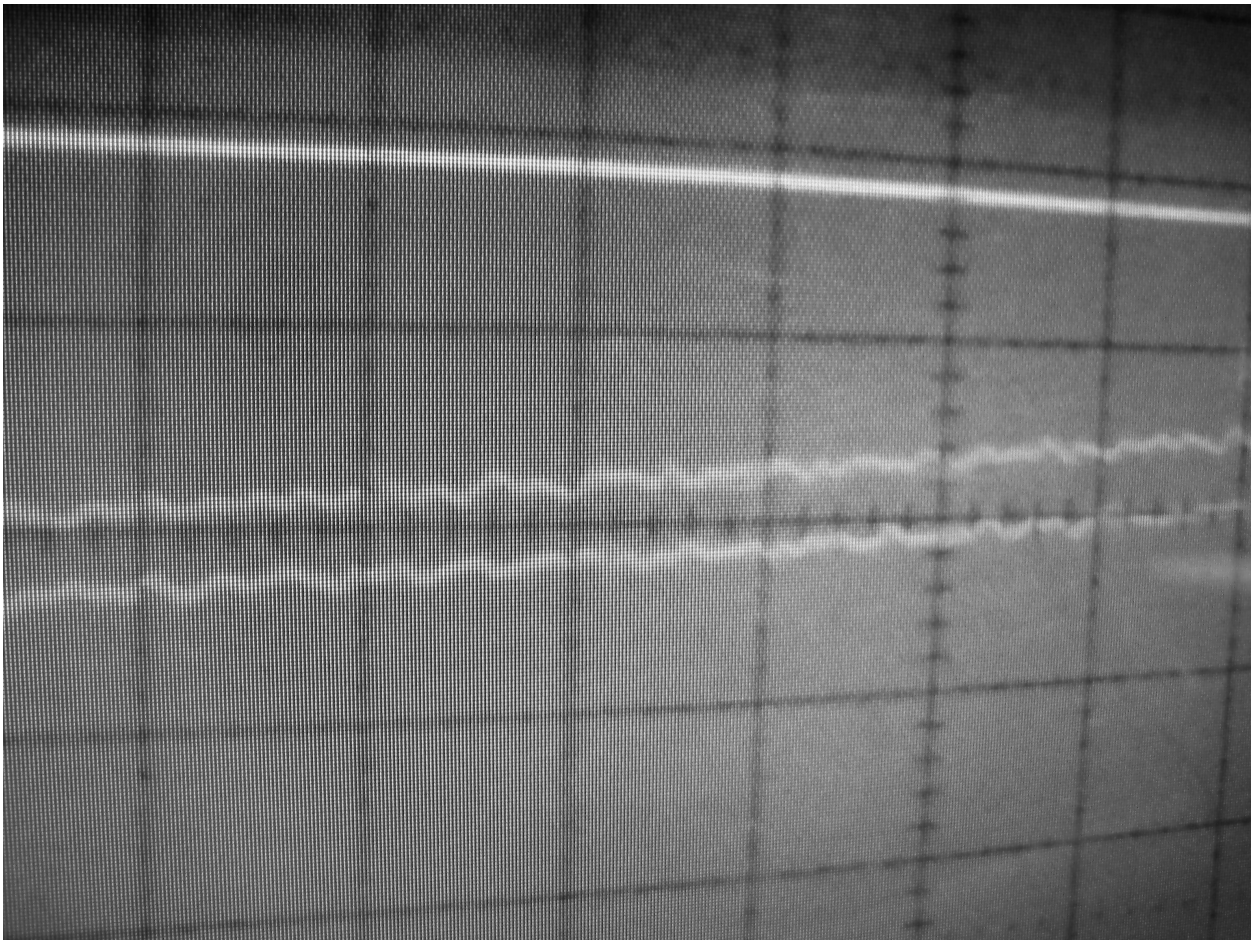


If you look at a digital approximation (black) of an analog wave (red) you can see that the right angles actually create minute increases in amplitude. Even after all the fancy algorithms of todays DSP DACS there still seems to be at minimum an echo of these hard points in the waveform.

By having the perfect filter in place these tiny pulses are less likely to be detected when super fast and super transparent audio equipment is used, thus the digital sources begin to sound more analog.

As you can see, the resolution of digital becomes worse and worse as we get higher in frequency.

No matter how well this is manipulated by your DAC or processor or computer software the end result is an overly complex waveform that looks like a fine line from a distance but when magnified is riddled with complex artifacts that can only be interpreted or measured by todays equipment as noise. This can be see in the next photograph where the top line is an analog waveform and the dual wiggly lines are the digital waveform both set to the same frequency of 535Hz. It should be noted that this is why analog plays louder than digital for a given amount of power since trying to reproduce complex artifacts robs power.



Waveform from analog function generator (top) , vs. Waveform from an Apple iPod (bottom).

The top straight line is a small time slice from a true analog function generator set to 535Hz. The bottom lines are from an oscillator app on an iPod set to the same Hz. We consider this a best case scenario for digital output vs. analog since a sine wave is 20,000 times simpler to reproduce than music.

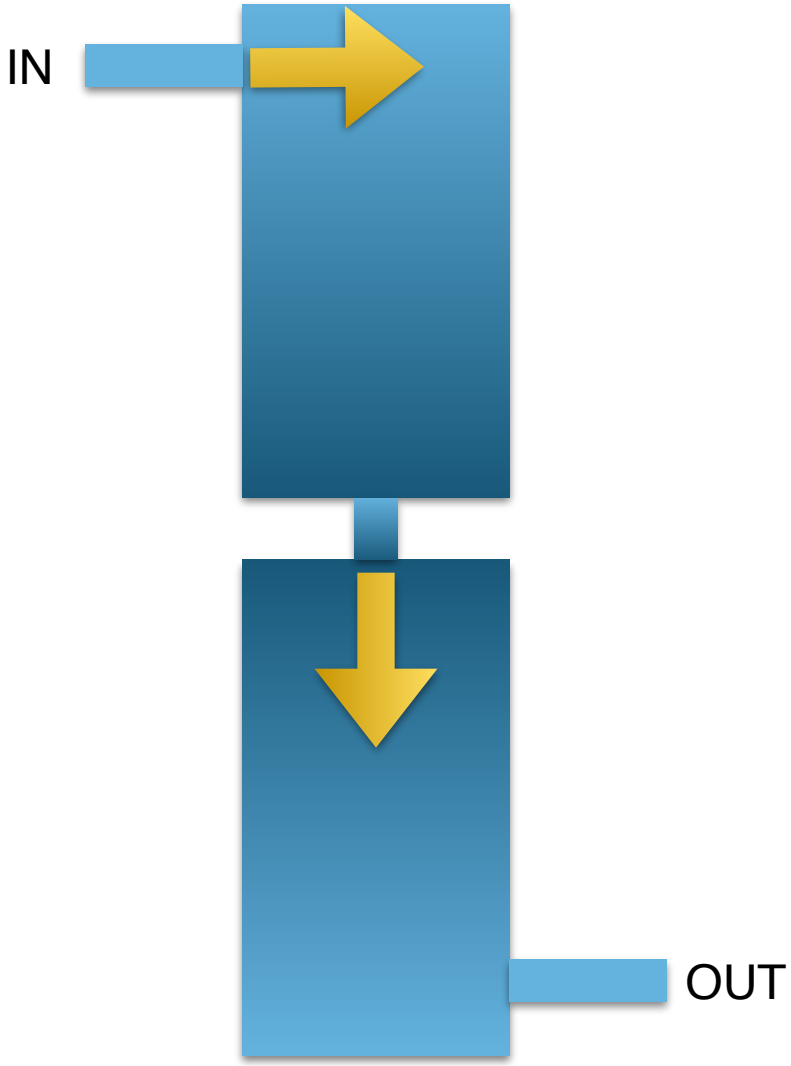
The appearance of two lower lines is the result of a single line that is jumping back and forth between the two potentials.

You can see the complexity of the lower lines from this supposedly pure digital waveform from the iPod app. Most retail audio equipment today has enough negative feedback to smear this line (and the sound) not to mention many power hungry (< 87dB) speakers are no where near fast enough to reproduce what you see here on the scope, instead they reproduce a fuzzy flat line. Efficient crossover-less speakers will reproduce the bottom lines just as you see them.

OK so how do you fix this?

Well if the goal is to get the bottom digital waveform you just saw to look like the top analog waveform we can use the pressure of voltage to help flatten it out.

The way the Decware Pill works can best be understood by comparing voltage/signal to water. Picture two containers like those shown below. The top container has an input pipe which allows the signal to enter expanding into the container until it's full - at which point pressure forces the signal to become extruded through the opening at the bottom. This has a natural averaging effect on the signal. Once it exits the top container it fills the lower container where it is again allowed to expand to the size of the container until it is full and under pressure. Then it becomes extruded a second time from the exit pipe.



In addition to the ability of this device to flatten the line through pressure and average it through expansion and extrusion it also modifies the phase angle across audio frequencies which is a fancy way of describing the differences in the delays that occur at low frequencies vs. high frequencies. It's almost as if this pushing and pulling effect on the timing puts the music closer to what it originally was before it was digitally approximated. Ebb and Flow in the music are restored much of the time .

To our surprise when the Decware Pill was finished, it was discovered it has a similar desirable effect on true analog signals which indicates that part of what is wrong with the sound of both formats lies in the digital masters where noise induced artifacts are buried in the signal.

By removing this noise the sound is more relaxed, more dimensional, less compressed, easier to listen to and seems to actually have more detail and resolution, not less. Not to mention the amplifier is far happier trying to reproduce it which may be where the sonic improvement comes from.

WHAT IT DOES TO THE SOUND

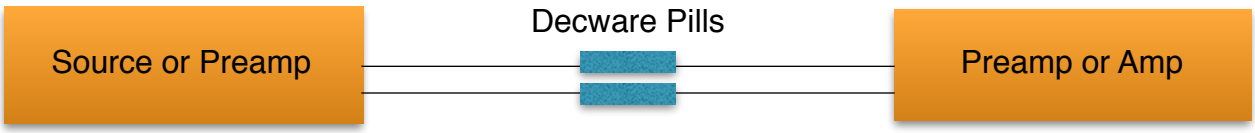
You'll find that any time the sound becomes grainy, flat, and somewhat fatiguing as is often the case with:

Radio, internet streams, consumer grade CD players, or sometimes the problem is embedded in the recording itself. Also vinyl pressings with a similar sound can benefit rather amazingly from a pair of Decware Pills. Direct coupled DAC's such as is common with small USB DACs loose their clinical quality and become musical - a small miracle in some cases. The timing of the music often improves becoming more layered and less forced sounding. The faster your amplification and speakers, the more amazing the effect of the Decware Pills.

You will also find that when the sound is perfect without the Pills, such as is often the case with good recordings and clean incoming power to your gear, it can still improve with the Pills due to the changes in dynamic characteristics, timing, pace, frequency balance, and imaging that are likely to occur between most components.

USING THE Decware Pill

These devices can be inserted anywhere in a line level signal ranging from 1 to 11 volts RMS with peaks not in excess of 30 Volts. No worries, the specs of the Decware Pill easily cover virtually all consumer grade electronics with a large safety margin.



Decware Pills can be used with any stereo to improve sound quality that is less than ideal.

Using the Pills can cure many unexplained sound quality problems.

Decware Pills are non-polarized and fully shielded. It does not matter which direction each Pill is oriented relative to the input and output. That said, each Pill is wired exactly the same so if you find the one way to sound better than the other you can tell which way is which by looking at how the cylinder is made. It is made by using a short and long section joined together so that you can hook both Pills up the same way.

These devices are fully shielded and can be used in any line level application without introducing hum or noise of any kind.

Decware Pills are not a fix all for all your sonic woes, nor are they going work in every system the same way. You will have to determine for yourself if life is better with them installed or without.

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