Jensen GLX Report

The following is a comparative report that looks at the Jensen GLX along with product offerings from two other manufacturers. It is important to state that these comparisons are presented as a tool for professionals to make informed decisions before specifying a product or making a purchase for a particular task. Although all of the material presented is factual, for legal reasons should be considered as 'our opinion'. We encourage readers to seek out additional information from other sources.

It is also important to state that these companies are, in our opinion, well established and valuable industry competitors and this report should not in any way denigrate their status. Jensen is not in any way associated with these competitors. All tests were performed on an Audio Precision ATS2 multi-purpose audio analyzer under the same conditions for all products.

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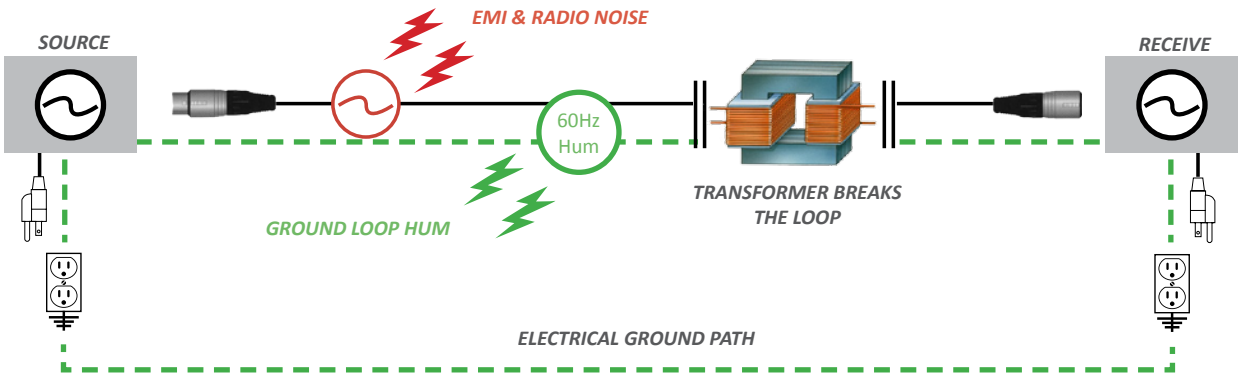
Introduction

The Jensen GLX™ is a balanced line level isolator. This means that it is intended to be used with a buffered signal with an output that ranges between -30dB and +15dB. When creating this document, we looked into the products that are currently sold on the market and identified a couple that we think provide a good scope as to what and how the GLX will deliver a significantly better overall performance.

About Transformers

Inside each of these devices is a transformer. These passive devices do the heavy lifting by isolating the input from the output, as they block stray DC and allow AC in the form of audio to pass. As a general rule, the larger the transformer, the more gain and the lower frequency it can handle before it saturates. Steel core transformers will often handle more gain than a nickel core transformer, but do so at the expense of greater low frequency distortion and other sonically displeasing artifacts. Developing a small, yet great sounding transformer is extremely challenging. It is a matter of balancing trade-offs in order to come up with the best overall design. This in fact is what the GLX brings forth. Enjoy the read.



Specifications Summary

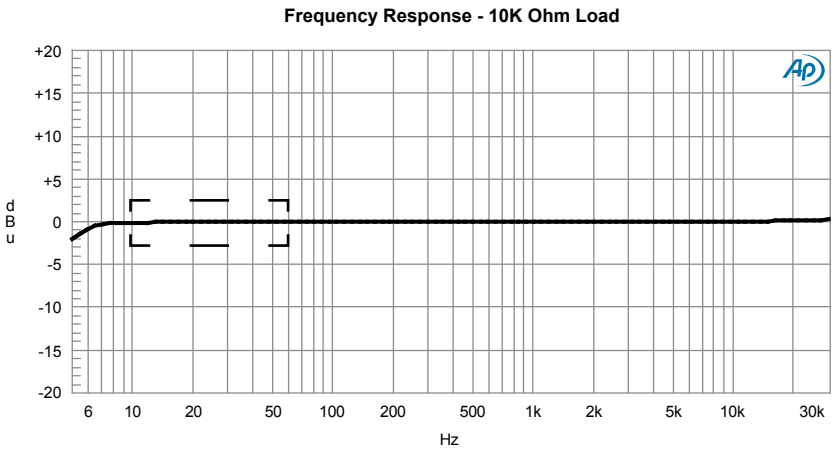
This page summarizes the performance of the three isolators and looks at some of the more critical aspects that one should consider when evaluating performance. One of the reoccurring themes is evaluating the low frequency performance. This is important because the most difficult region for an audio transformer to perform is in the low bass region and this is also where most of the energy lies when producing sound. You will note that the Jensen GLX is not only linear down to 10Hz, but at 20Hz it also exhibits 1/10th the distortion of the Lundahl and 1/100th the distortion of the Sescom. This is not all: It also exhibits significantly less distortion at low levels indicating that musical passages with varying dynamics will likely sound more musical. Humans are also more sensitive to low frequency phase shift and both the GLX and the Lundahl perform extremely well at 20Hz while the Sescom is clearly less accurate in this area.

		Jensen GLX	Lundahl LL1584	Sescom IL-19
Frequency Response @ 0 db		10Hz ~ 30kHz	10Hz ~ 30kHz	40Hz ~ 30kHz
Distortion @	20Hz	.001%	.01%	.1%
	250Hz	.001%	.1%	.1%
	500Hz	.001%	.08%	.08%
	1kHz	.0005%	.05%	.05%
	5kHz	.0003%	.008%	.008%
Distortion @	-30dB	.006%	.5%	.3%
	-10dB	.001%	.2%	.2%
	0dB	.002%	.08%	.2%
	+4dB	.005%	.06%	.3%
	+15dB	.05%	.05%	.6%
Phase Shift @ 20Hz		0°	0°	20°
CMR @ 60Hz		-105dB	-105dB	-105dB
Noise (Residual)		<115dB (-130dB)	<115dB (-130dB)	<115dB (-130dB)
Construction		Steel	Steel	Plastic
Warranty		3 Years	1 Year	90 Days
Price - Estimated Street		**$60**	**$130**	**$60**

* Prices in US dollars

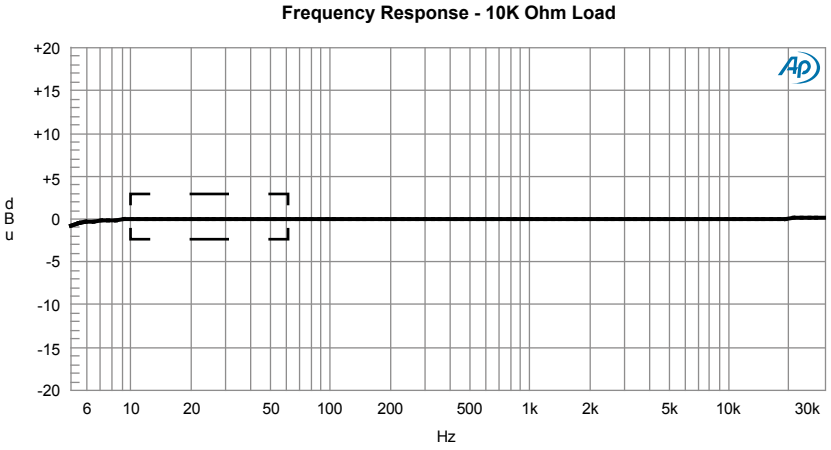
Freqency Response

The frequency response is measured to verify the bandwidth of the isolator to ensure that it can pass audio at all frequencies. These tests employ a 10k load which is typical in a PA system where one feeds the output from a mixing console or into the isolator and then into a powered speaker.



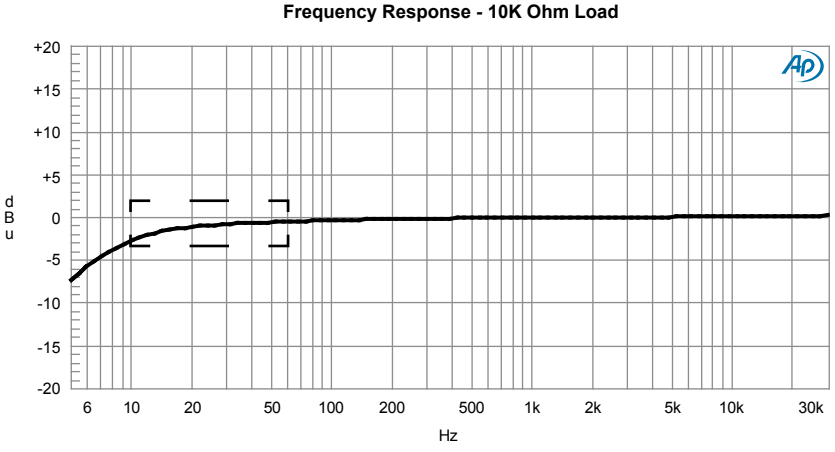
Jensen GLX

The Jensen GLX shows a ruler flat response from 10Hz to 30kHz which is more than sufficient for most audio applications. Yet if you look closely, it actually goes down below 10Hz which is very good for such a compact device.



Lundahl LL1584

Like the GLX, the Lundahl extends down to 10Hz in the low frequency range, which is excellent. Both the Jensen and the Lundahl display a virtually identical frequency response curve.

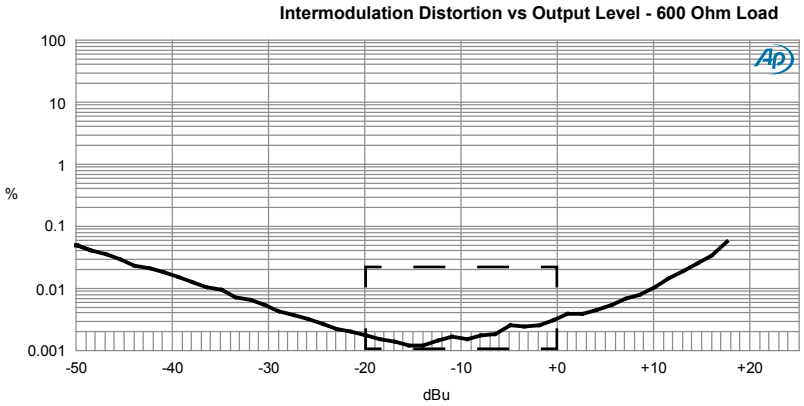


Sescom IL-19

The Sescom's frequency response begins to falter at 50Hz and severely drops below 20Hz. This indicates potential phase shift problems.

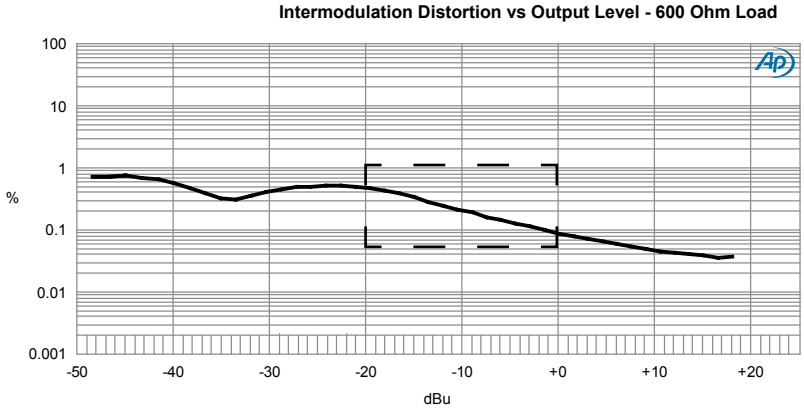
Signal handling – Distortion versus output

Measuring distortion versus output indicates the isolator's ability to handle various signal levels. This test is typically done by injecting a 1kHz signal into the device. It is important to determine the 'intended working range' in order to evaluate the performance. As these balanced isolators are primarily designed for signals that range between -30dB and +15dB, one should look at this region to determine performance.



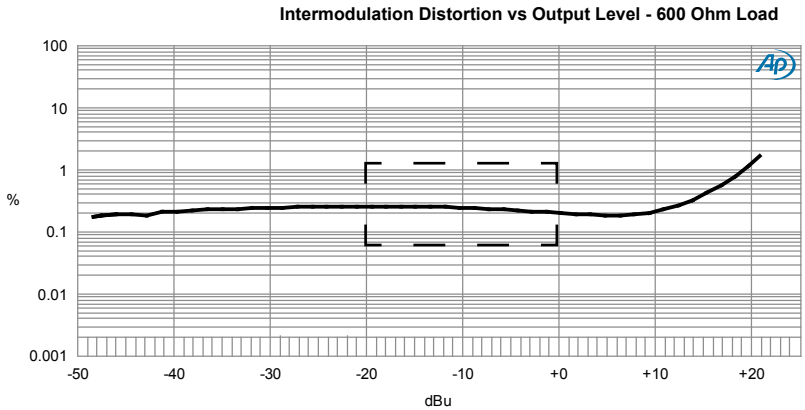
Jensen GLX

At 30Hz, the Jensen GLX exhibits less than .005% distortion and maintains this level to +4dB before it rises to 0.05% at +15dB.



Lundahl LL1584

At 30Hz, the Lundahl begins with over .5% distortion and slowly falls to 0.1% at 0dB and then to .05% at +15dB. Compared to the Jensen, this is a magnitude of 100 times more distortion in the all-important bass region.

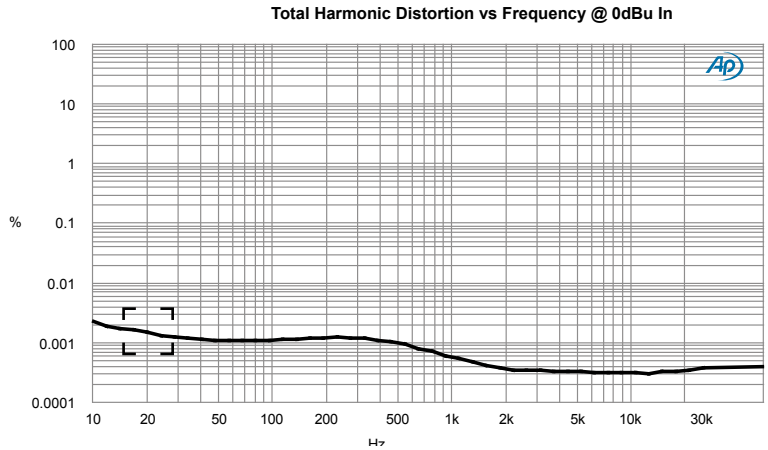


Sescom IL-19

At 30Hz, the Sescom begins with just under .5% distortion and maintains this level of distortion to +10dB. At +15dB it rises to nearly 1% distortion. This indicates a magnitude of 100 times more distortion in the all-important bass region.

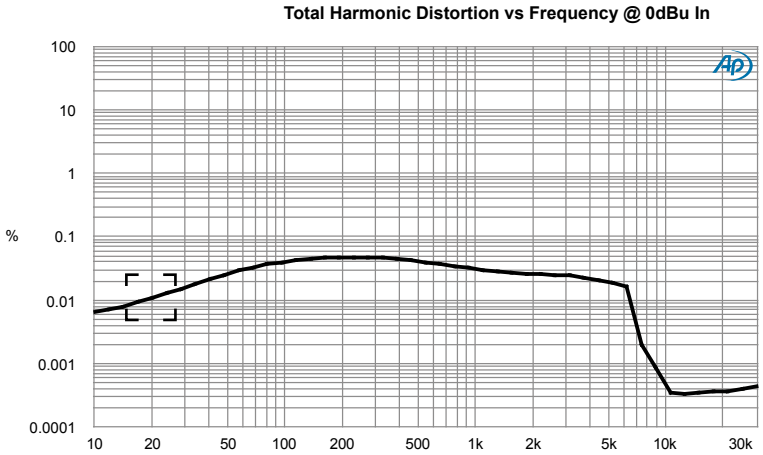
Distortion vs Frequency

Measuring distortion at various frequencies is likely the most telling test one can apply as it indicates how the isolator will perform depending on the program material. For instance, if merely isolating a voice for a conference, one would look for low distortion from 200Hz to 5kHz. If passing music, you would expect low distortion from 20Hz and up in order to properly reproduce bass. These tests were conducted at 0dB.



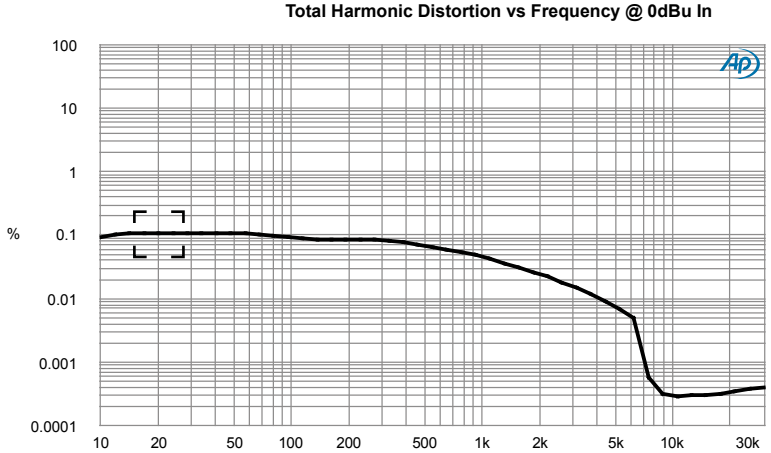
Jensen GLX

The Jensen GLX is exceptionally good at 0.001% distortion at 20Hz. But what is truly amazing is that the distortion stays at this level up to 500Hz and then drops to below .0005% distortion above 1kHz.



Lundahl LL1584

The Lundahl performs reasonably well at 20Hz with .01% distortion but rises significantly in the midrange and tapers back down at 10kHz.

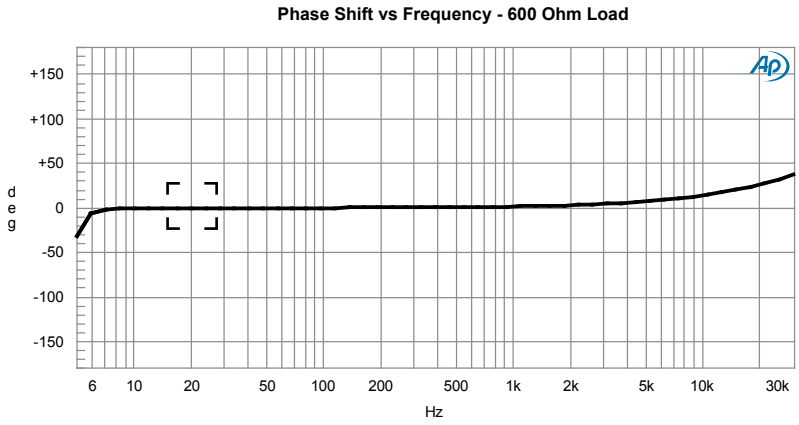


Sescom IL-19

The Sescom exhibits the most distortion at .1% beginning at 10Hz and remains at this level until it reaches 1kHz where it eventually drops down to a more usable level.

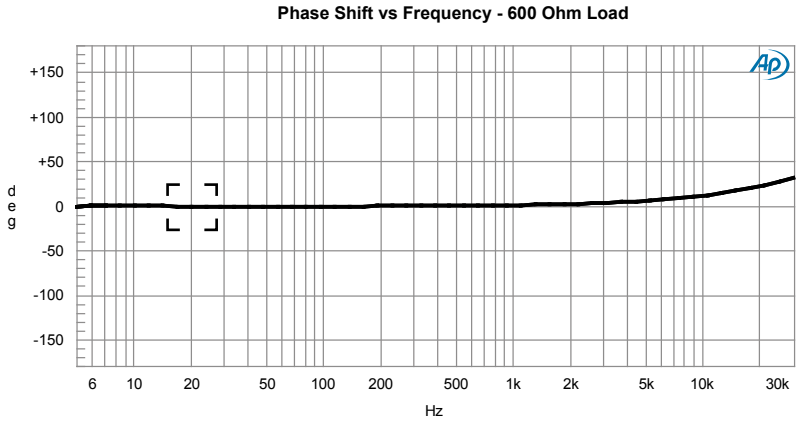
Phase Shift vs Frequency

Audio transformer pioneer Deane Jensen discovered that phase shift is often the root cause for low quality audio in a transformer. Think of it as playing a triad (three notes simultaneously) but having the audio device spit the three notes out at different times. By extending the frequency response at the two extremes, phase shift can be reduced. Phase shift is most audible in the low frequency region due to the longer wavelengths.



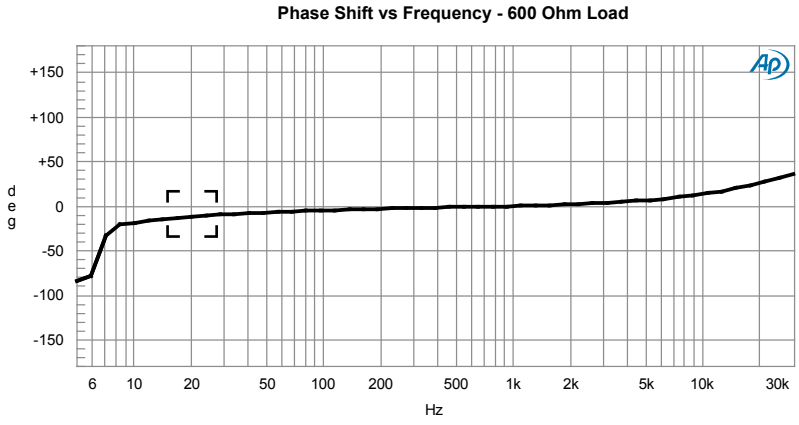
Jensen GLX

The Jensen GLX exhibits zero phase shift down to 10Hz and like the others, sees a rise above 5kHz.



Lundahl LL1584

The Lundahl is virtually identical to the Jensen GLX, which is quite impressive considering the compact size.

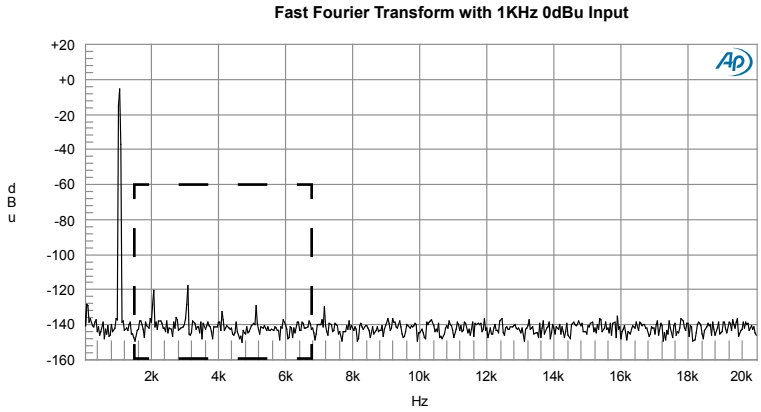


Sescom IL-19

The Sescom is only phase accurate from 100Hz to 5kHz, with increasing phase shift to -18º at 20Hz and worse below.

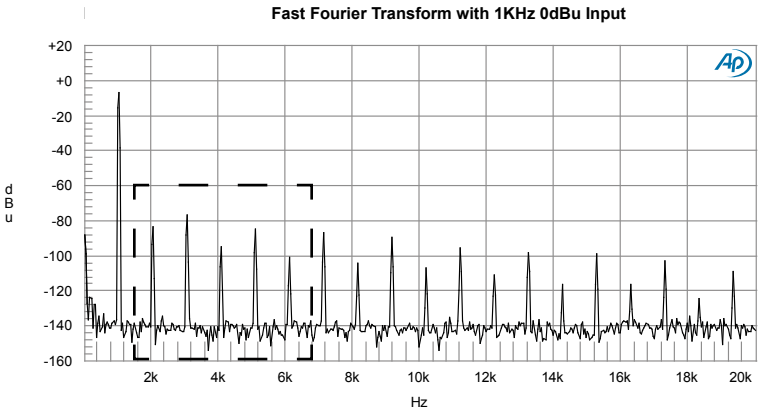
Fast Fourier Transform (FFT)

This is probably the most telling test when it comes to 'measuring' sound quality. A 1kHz signal is sent into the isolator and the resulting harmonics are then evaluated. When the harmonic component is high compared to the signal, this indicates a significant degree of coloration. If the harmonics are presented in a smooth, even-order descending cascade, one can predict a nice warm tone. If on the other hand, the harmonics are 'jagged' or up and down in an odd-order sequence, the tone will be harsh.



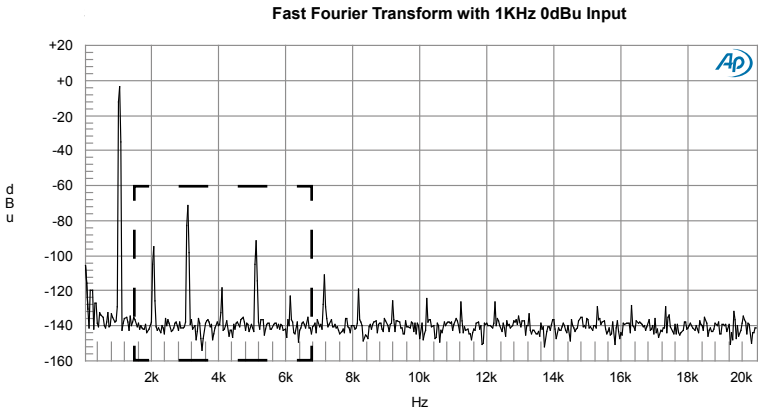
Jensen GLX

The Jensen GLX's first noticeable harmonic is 120dB below the input signal level. A cascade of virtually inaudible even harmonics follows. This indicates the GLX will reproduce the original signal with very little coloration.



Lundahl LL1584

The Lundahl suffers terribly with respect to odd-order harmonic generation with 1st and 2nd order harmonics barely less than 80dB below the source level. This can be attributed to the transformer's small size prematurely saturating. This means that the Lundahl will severely color the sound.

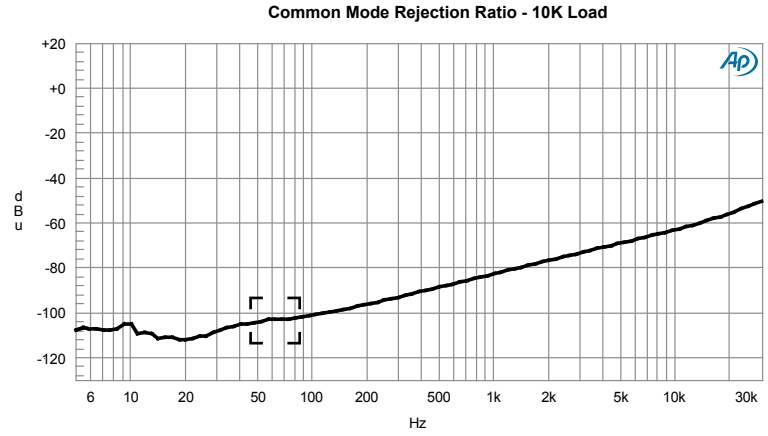


Sescom IL-19

The Sescom also suffers from severe 1st and 2nd order harmonics at around 70dB below the source level. The sequence of odd-order harmonics can be attributed to the steel core transformer which will sound harsh and colored.

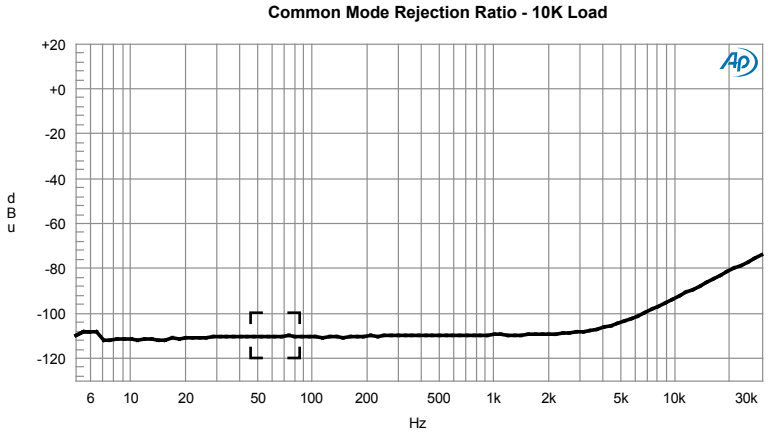
Common Mode Rejection Ratio (CMRR)

Common mode noise can be loosely identified as the hum that is generated from a so called ground loop. This manifests itself between 50Hz and 60Hz depending on the electrical system. (Europe 220V/50Hz, America 120V/60Hz). One should expect greater than 90dB of hum elimination in this 50 ~ 60 Hertz range in order to ensure that the residual hum is masked by the audio signal.



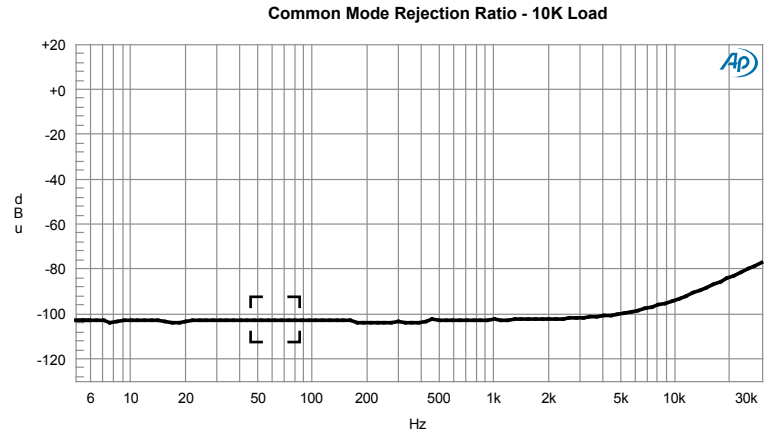
Jensen GLX

The Jensen GLX shows very good common noise rejection in the desired range between 50Hz and 60Hz at better than -100dB, but is less effective in higher frequencies.



Lundahl LL1584

The Lundahl is impressive with better than 100dB of noise rejection in the 50Hz to 60Hz region, all the way up to 5kHz.

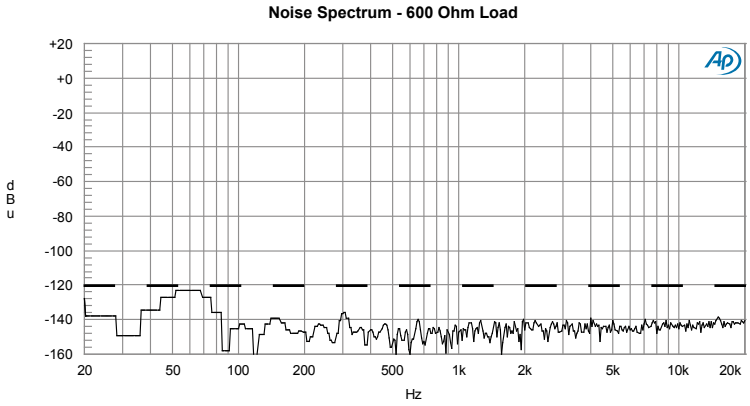


Sescom IL-19

The Sescom IL-19 is also very good in the target 50Hz to 60Hz region and remains below 100dB to 5kHz.

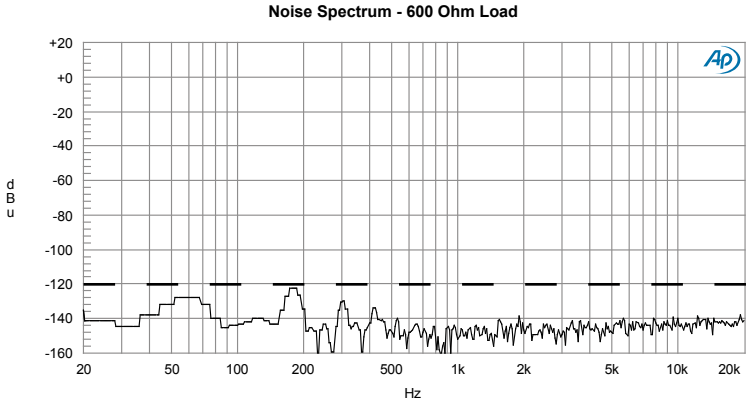
Noise Spectrum

As all of these isolators are passive, there should be very little, if any, noise present. Residual noise or self-noise is usually only encountered with active devices that have some form of amplification. The residual noise measured here is below the range that can be measured. Instead, we are seeing the noise that is likely being emitted by florescent lights, dimmers and power supplies in the lab. It is important to pay attention to the noise in the 50Hz to 60Hz region as this is the alternating current frequency of a typical electrical system and relates to the hum that is caused by so-called ground loops.



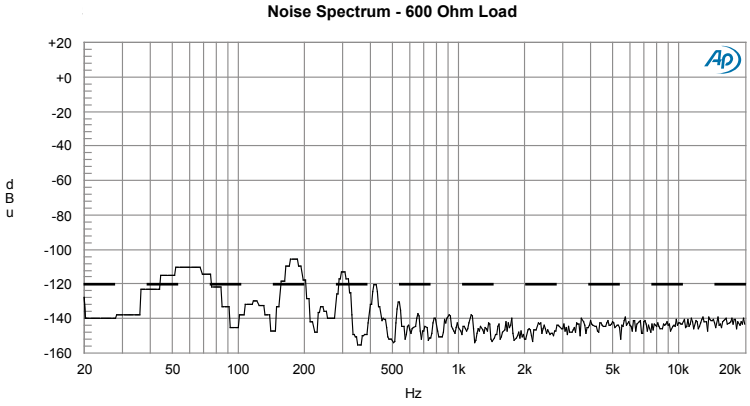
Jensen GLX

Residual noise in the GLX is on average about 130dB below the 0dB signal level, or significantly lower than most audio systems are able to deliver. The GLX employs a heavy steel enclosure to keep noise out.



Lundahl LL1584

The same rings true here with the more expensive Lundahl. Noise is very low at approximately 130dB below the 0dB mark. The Lundahl employs a die-cast body with a copper shield wrapper to keep noise out.



Sescom IL-19

The Sescom exhibits 20dB more noise in the 50Hz to 60Hz region over the Jensen and Lundahl isolators. This can likely be attributed to the plastic body that does not protect against electro-magnetic fields.

Construction

As with any product, durability is directly proportional to the quality of the construction. Solid steel for instance, is generally tougher than plastic and when cold from being out in a truck all night, it will not crack under stress. The other benefit with steel or metals in general is that most provide excellent shielding against external magnetic fields. These can wreak havoc by interfering with the sensitive magnetic bridge (transformer function) that transfers the audio signal from the primary to the secondary and eliminates much of the noise.

Jensen GLX

- *The GLX is made from 16 gauge steel with a durable powder coat finish.*
- *The GLX employs a larger transformer. As a rule, a larger transformer will deliver better bass performance and will be able to handle significantly more gain with less distortion.*
- *The transformer, ground lift switch and XLRs in the GLX are PC mounted for easy servicing. The ground lift switch is a further advantage when attempting to eliminate buzz and hum when a ground loop may be present.*

Lundahl LL1584

- *The Lundahl is equipped with a zinc cast barrel with a copper foil shield.*
- *The Lundahl is sealed shut making it difficult to repair. The barrel size indicates a very small transformer.*

Sescom IL-19

- *The Sescom is made from molded plastic.*
- *The Sescom suspends the transformer between wires with black 'goop' to hold it in place.*