

# Magneto Audio Labs VariOhm

## Microphone Impedance Converter

HUGH ROBJOHN'S

In the days of yore — and we're talking 40 or 50 years ago, really — microphones used to be designed to operate in a 'matched impedance' environment with their preamplifiers, and usually at quite low impedances, such as 30Ω. This mode of connectivity is all about maximising the transfer of power from the source to the destination, and essentially came from the practices employed in the telephone industry upon which pro audio was conceived and developed. The benefit of the impedance-matched interface in the telecoms world at that time was that the power generated by a telephone's microphone was passed in the most efficient way possible to another telephone's earpiece in a predominantly passive system.

However, eventually common sense prevailed in the professional audio world, and microphone interfaces evolved into a matched-voltage configuration. We're not interested in passing power around the place — everything is powered and active anyway — and all we need to do is make sure the alternating voltage generated by

If you're searching for the perfect match of mic and preamp, this useful gadget could help you achieve it...

the microphone, which represents the audio signal, is passed as accurately as possible to the microphone preamplifier. To that end, we generally use output devices with low source impedances, and detect the voltage generated by the source with a relatively high-impedance destination. The general rule of thumb is that the destination should have about 10 times the impedance of the source. Consequently, the vast majority of microphones have output impedances of 150-200Ω, and most microphone preamps have an input impedance of 1500-2400kΩ.

### Why Change Impedance?

That's all fine and dandy in theory... but the real world likes to throw in a few curve-balls now and then. Some long-serving microphones, like the classic Shure SM57, were originally designed to work with 1960s mic preamps presenting a 300-600Ω input impedance, and forcing them to work into higher impedance loads does affect their

tonality and the sense of space and room that they capture.

A lot of modern capacitor microphones are equipped with active electronic output stages, of course, such as Neumann's TLM designs, and in these cases the input impedance of the preamp has little effect on performance. However, quite a lot of capacitor mics — especially the older ones — employ output transformers, as do a lot of dynamic microphones (and those that don't feed the output straight from the voice coil anyway). In these cases, the input impedance of the preamplifier can have quite a pronounced and audible effect because it determines the 'loading' seen by the voltage generator — whether that's the microphone capsule itself or the impedance-converter electronics — and that often affects how the microphone performs! Typically, changing the loading affects the tonality because it alters the resonance peaks in the coupling



transformers, and it often also affects the sense of space that the microphone picks up, almost like a very transparent compressor in some ways.

The problem is that the specific effect of changing output and input impedances on microphones is complex and usually quite difficult to predict. Moreover, because different mics and different preamps have different impedances, plugging a mic into a different preamp (or a different mic into the same preamp) can often produce a surprising change in sound character, beyond that which might be expected from the different mic or preamp alone.

Of course, experienced recording engineers and producers usually discover this effect for themselves early on in their careers, and that's why many often have personal favourite combinations of particular preamps which they use with particular mics. It's also why some equipment tends to sound different to others. For example, although the 'standard' input impedance for a mic preamp is between 1500Ω and 2400Ω, most high-end mic preamps tend to have significantly higher input impedances. The Millennia HV3C preamp has an input impedance of nearly 7000Ω, for instance, and the Grace Design m201 is over 8000Ω. AEA's own ribbon mic preamps present an impedance of over 18,000Ω, and most of the later Rupert Neve-designed preamps present well over 5000Ω. In general, the higher the impedance, the less load on the mic and the better the overall performance — especially in terms of transient distortion, and that seems appropriate for high-end applications. But, as I've already mentioned, a lot of classic mics were designed for a different age and a different way of interfacing, and they do sound different when presented with lower impedances.

As a result, over the last decade or so it has become increasingly common to find mic preamp designs with switchable input-impedance options. Many end-users find this a useful facility, as it allows some additional adjustment of tonal colour in a very different way to a normal EQ. Again, it's often hard to predict exactly

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## Magneto Audio Labs VariOhm £300

### PROS

- Entirely passive.
- Easy to hook up between mic and preamp.
- Useful phantom-power defeat and polarity inversion facilities.
- Allows the audible effects of impedance loading to be explored quickly, easily and safely.

### CONS

- Adding anything between mic and preamp *potentially* increases noise and distortion.

### SUMMARY

An old idea made very practical, and in a way that allows it to be used as an easy add-on to a fixed-impedance preamp. And if the impedance variations don't deliver the sound you're after, maybe the nice transformers it inserts into the signal path will anyway!



As the VariOhm is a passive device, its rear panel isn't exactly feature-packed!

» what will happen when changing the impedance setting, but usually one particular configuration sounds distinctly more appropriate than another for a given microphone and application.

Of course, that doesn't help anyone who has a preamp with a fixed input impedance... and that's where Magneto Audio Labs come in, with their interesting VariOhm. This is an entirely passive device — no mains or battery power required — that plugs between a microphone and a preamp, and provides the ability to change the input impedance, so that the user can find a combination that sounds appealing.

### Overview

The VariOhm is a half-rack width, 1U-high black box made from extruded aluminium. The rear panel has two XLR connectors to accept the signal from a microphone and to pass it on (at microphone level) to the microphone preamp. The front panel isn't much more complicated either! A 'magic-eye' push-button provides a hard bypass mode, while two large toggle switches allow the phantom power pass-through to be disabled and the signal polarity to be inverted. (The normal position for both switches is down, providing correct absolute polarity and passing phantom power). The most important control is the central rotary switch, which allows the impedance seen by the microphone to be changed between any of six different settings: 2400Ω, 1200Ω, 600Ω, 300Ω, 200Ω and 50Ω.

Operation is as simple as plugging the microphone into the VariOhm, connecting the VariOhm output to the mic preamp, and then setting the controls as required. The

### Alternatives

Lots of preamplifiers include variable input-impedance options, but I don't know of similar stand-alone mic-impedance switchers.

phantom-power switch is a useful facility that provides an additional level of protection for a ribbon mic against phantom power, and the polarity inversion is handy if your preamp doesn't already have that facility... but in general, I doubt these two switches would be used very much. However, the bypass and impedance switches will be used extensively. I found that I tended to switch quickly between the different settings to see which I favoured most, and then used the bypass switch to provide a 'sanity check', by comparing the standard mic-to-preamp sound character with whatever alternative impedance combination I had dialled up with the VariOhm.

Of course, adding anything into the signal path between the delicate output of a microphone and the sensitive input of a preamp *risks* introducing noise and distortion. However, I didn't notice any significant ill-effects — although it's sensible to keep the VariOhm away from strong mains transformers to avoid unwanted hum pickup — and the tonal benefits completely outweigh any theoretical technical degradations.

Internally, the VariOhm is very simple, but nicely put together. The front-panel controls are mounted on a small, vertical glass-fibre circuit board connected to the main horizontal circuit board on the base of the unit via a couple of short ribbon cables. The circuitry basically comprises two metal-screened microphone transformers, each with multiple taps on their windings, and the few switches I've already mentioned. The transformer windings are connected to the front-panel switch in such a way that they can be arranged in various series and parallel combinations to achieve the required impedance loading. It's that simple — but the devil is in the detail, of course, and Magneto's Bob Reardon has obviously done a nice job in finding good transformers and putting the VariOhm together. You can see a brief interview

with Bob, talking about the VariOhm, on SOS TV, recorded at the NAMM 2010 exhibition ([www.soundonsound.com/news?NewsID=11859](http://www.soundonsound.com/news?NewsID=11859))

Besides having the ability to present different load impedances to your microphones, the VariOhm is also a microphone transformer in a box! As we all know, transformers tend to add a little character or 'iron' to the sound of a microphone, and in this case the transformer sound is pretty subtle — but it's definitely there. So if you have a modern, transformerless capacitor microphone and a modern, transformerless mic preamp, the overall sound might seem to be slightly sterile. Inserting the VariOhm into the signal path might be just the ticket for putting a little harmonic richness and transformer 'iron' back into the sound, and that's certainly an additional appeal of this device.

Given my own tastes in equipment and acoustic recording, I tend to choose microphone preamps that have a relatively high input impedance. However, my Focusrite ISA428 does have switchable impedance modes and I do make use of them, particularly when using dynamic microphones and capacitor mics with output transformers — because doing so often reveals sonically interesting tonal variations and colours that are sometimes musically useful.

The VariOhm's impedance options focus on the bottom end of the impedance spectrum, and in my experience that's where the strongest colorations and sound characters tend to be found. There's no doubt that this is an interesting and unusual box that does exactly what it claims, and is well worth checking out. **///**

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