



Mercury Magnetics

by Trent Salter

With all of the money one can spend on an amplifier, be it boutique, reissue or just a good roadworthy unit there is one area that can be overlooked, the quality of the output transformer. It is essentially the final filter in your amp chassis from the tubes to the speaker, matching the two up so you can make music! Let's talk with Sergio Hamernik and Paul Patronete of **Mercury Magnetics™** to find out what we all need to know about this overlooked most integral part of getting the best overall tone from your rig.

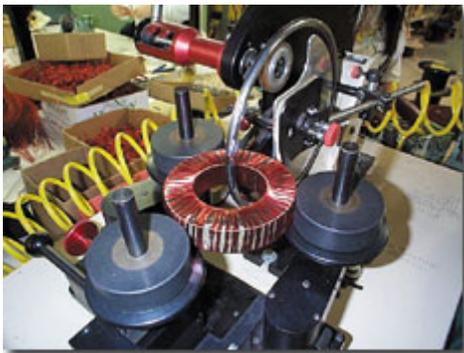
MH: *What services do you offer at Mercury Magnetics?*

MM: We offer new hand-wound transformers and chokes. We also offer a rewinding service for vintage transformers. **Mercury Magnetics™** can rewind a transformer back to its original specs. Founded in Southern California in 1954 and incorporated in 1968, **Mercury Magnetics™** has built a solid reputation on superior quality, reliability and customer satisfaction.

Mercury Magnetics™ has the right combination of experience and a low overhead operation to meet specific requirements. Custom designs, quality assurance and safety standards are included as part of our total customer support with no-nonsense pricing that often beats out standard "off-the-shelf" components, while not being bound to their limitations. **Mercury Magnetics™** has a long standing reputation for quality and reliability. These transformers are not built "offshore" or "south of the border," they are 100% handmade in the USA and are backed by a money back tone satisfaction guarantee. Their line of **Axiom®** transformers are found in some of the finest and best-sounding modern production amps manufactured. We build transformers and maintain a high standard for tone in the tradition of our forefathers, making improvements that they would have made if they had access to today's computer assisted designs and materials.

MH: *To what degree of effort do you extend yourself when restoring a vintage transformer and how does it happen?*

MM: We methodically *unwind* the vintage transformer by hand and document each wind detailing every anomaly and turn. We then *rewind* the transformer by hand so it will sound exactly as it did when it was brand new. The interior of the transformer is new and the exterior of the transformer is maintained so it will look like a vintage transformer and sound vintage as well. We attempt to use every piece of the original tranny that we can use. We DO NOT attempt to improve or alter the original tone or frequency response of the vintage transformer. Our rewinding service is more time consuming and can be more expensive than purchasing a new **Axiom®** transformer. However, with our attention to detail and experience the customer can be assured that their vintage transformer will look AND sound terrific! Professional musicians, technicians and studios regard



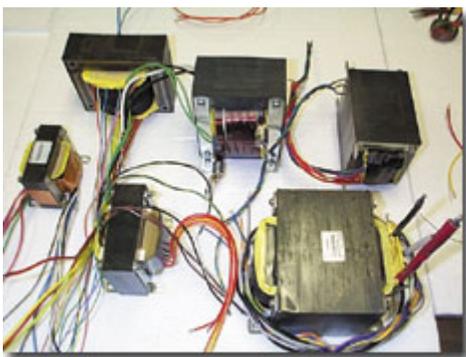
our rewinding services as the best. For transformers, the core material suppliers' industry sets a +/- 20% tolerance on characteristics like permeability to begin with, so most of the industry realizes that anything that's an inductor or transformer has that kind of tolerance unless a particular manufacturer tightens the tolerance up. But when we were dealing with high speed stick winding methods of the '50s and '60s, they didn't really have time to scrutinize each coil, because these coils were wound simultaneously. There could be six or ten coils being wound at the same time. For example, we'd find missing layers, or layers that had a different number of turns than what was specified. So what I did was blueprint a transformer, documenting every layer, the space between turns, the number of turns, type of wire, and in some cases oddball gauges and half sizes. I would also take measurements of dielectric constants, leakage reactance, and other characteristics to be able to clone a transformer. So we ended up providing a service where we would fully rewind and rebuild original vintage transformers. Imagine disassembling the laminations in a core, numbering each one and putting them back in the same sequence.

MH: *Do you believe that an output transformer can decay and lose its tonality over time, and if so why?*

MM: Absolutely. I've proven that point with some of my more cynical, high-end customers, and I did it in such a way that we took a Marshall JTM 45 or a Plexi, I forget which, but the amp had been in England for years and been brought over here. The owner thought that the tone had decayed over time, it seemed darker, lifeless, and the higher frequencies weren't as pronounced. They removed the transformer, and all that I did was rebake it in an oven and drive out the moisture. We put the transformer back into the amp and it was pretty amazing; it became a lot brighter and more detailed from the upper midrange to the upper frequencies. I'm not recommending that anyone start baking their old transformers. What we do with our transformers to avoid that degradation process is use a resin process that hermetically seals the coils. We do it in a vacuum chamber in which the coils are impregnated with the resin material and then we bake it thoroughly. Because of this process, our transformers should way outlast older transformers, including those made today.

Transformers are still being made today with the same mindset, do it as cheaply as possible while offering the customer a decent value for the money. It's correct for the required impedances and matches all of that, but the rest of the details have been omitted because they just don't have the time and budget to do the longer process. Years of research led us to the conclusion that not every aspect of a vintage transformer needed to be copied. There were problems and limitations in their day, so why repeat them? We achieved better results by combining old and new technologies. Making the math work for the best tone characteristics together with improved consistency and longevity is the formula we chose to follow.

There are a lot of vintage amps today with transformers that are going bad simply because they have aged. The tonal quality of the amp is deteriorating along with the transformer. Paper and certain types of varnishes used in these transformers tend to have hygroscopic properties. Moisture is absorbed over time affecting the insulation system and increasing the chance for high voltage breakdowns. To make matters worse, the primary winding voltage is high enough to produce a corona effect whose ions help oxidize this insulation. Over time, reliability and tonality will suffer. Do you believe in transformer cancer?



MH: *In conclusion tell us what you think makes you the best company to work with.*

MM: Our customer service is second to none! Paul Patronete heads the **Axiom**® division. He is an accomplished guitarist and has an experienced ear for vintage tone. Paul is more than happy to help our

customers find the exact transformer to fit their tonal needs. Our website is constantly being updated with vintage and modern transformer versions. We will probably always be 2 or 3 pages short of having all of the various models listed that people may be interested in. Of course, we can't possibly list every one-off we've done. We offer modern, updated versions of many of the classic transformers. We have added impedance taps for many of the classic Fender transformers, which were never originally offered. Having a detailed transformer spec is only the beginning. Breaking down into fine details what materials and assembly techniques were used decades ago help us assure our customers an accurate reproduction of vintage tone. We have carefully selected the best of new and old technology to put performance and quality ahead of economy. Our transformers are hand wound and the cores are hand stacked. Some materials we fabricate in house and others, like our steel laminations, are custom ordered. Because we build them one at a time, **Axiom® Mercury Vintage™** are only available in limited quantities.

There is an audible difference between a budget transformer and an **Axiom® Mercury Vintage™**!



A good output transformer should go beyond its job of impedance matching. An amplifier's overall personality depends on it. A desirable output transformer's distortion has more detail; the harmonics seem even and smooth. Played clean, the transformer should sound natural without harshness. Obviously within the boundaries of the authentic tone characteristic the player is seeking. Better said, we still can't make an apple into an orange. The output transformer is pretty much the last tone filter in a series of components. Other factors like tube quality and speakers can play an important roll as well. Also if you were to look at an amplifier circuit as a modulated power supply, then the quality of a power transformer and choke, if a choke is used in the circuit, it also affects tonality. The ghost note phenomenon would be an example.

A lot of the people modifying Marshall amps don't want their transformer to break up so easily when they really overdrive their amps, and they can have a custom transformer built that will handle gobs of gain and still hold it together. A boutique amp builder might come along and specify a particular classic transformer with a few improvements. It's all passion, really, because this is not by nature a high-dollar, profitable business. In fact, the machines that we use to hand wind the **Axiom®** transformers are from the 1960s.

In the early '80s there were dozens of companies doing what we do in this area, and now there are perhaps 3 or 4. It's frustrating for most transformer makers to have a musician describe to them a desirable tonal characteristic when that can't really be put on paper. You have to at least be able to see things from a musician's perspective. Paul and I have a decent guitar and amp collection, and we try to stay abreast of what's going on. And we also have a lot of walk-ins and a sound room, so people can bring their amps in and play and talk about what they want.

Most of the current transformer manufactures sell them cheap and dirty, their approach is cookie cutter, they offer an okay value for what you get, but they mainly use bottom of the barrel materials. Unfortunately, they are barely in the ballpark of what really needs to be done if someone is serious about getting a vintage tone. If you have an inductance bridge, a simple test is to measure the primary inductance on a vintage unit and then on a new transformer. You'll find that the inductance on the new unit is usually less than half of the vintage transformer. There is no way that transformer can sound like the original, but if you aren't interested in achieving the authentic sound of the past, then everything that's out there today is all right. The devil is in the details, and there is no substitute for doing things by hand. Certain items for our transformers that

I couldn't source elsewhere, I learned to make here, because there just weren't any other sources for them.

As you can see the people at **Mercury Magnetics™** go to great lengths to make their transformers sound good and "correct," not overbuilding them to prove a point. To get that tone back into your amp have your favorite repair shop get you a custom-wound output transformer from **Mercury Magnetics™**. We have only skimmed the surface here in this profile; the power transformer also makes a difference in the performance of your amplifier. **Mercury Magnetics™** also makes transformers and chokes which we will speak with Paul and Sergio about in the future. Until then check out their website at www.MercuryMagnetics.com and never stop learning about your tone!

Information:

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