

Sergio Hamernik

Don't Blow that Tranny!

Part 1 (unedited version)

by DAVID JUNG

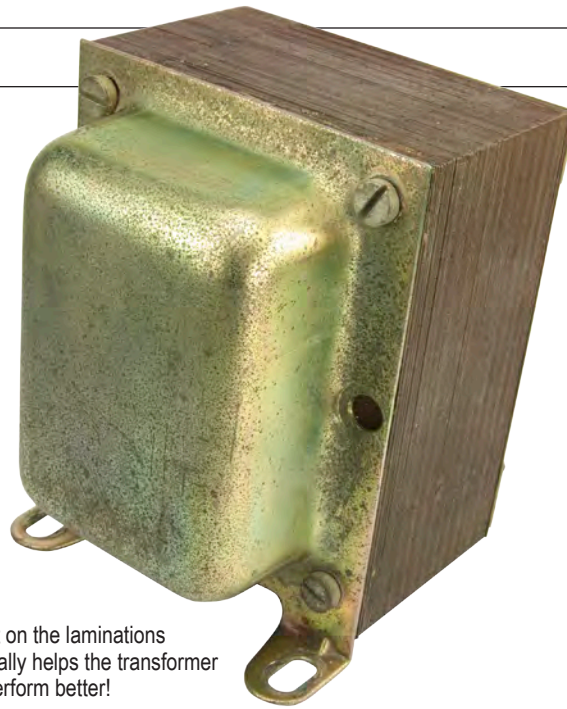
A few months back, we restored a 1960 Vox AC15 to its stellar sonic signature. But as with all vintage amps, you never know when something might go on the fritz!

We had just tightened the last screw and powered up the amp to unleash some ear candy when – major bummer – there was a noticeable loss of signal. After a diagnostic check, everything pointed to the output transformer. So it was off to **Mercury Magnetics** and the meticulous mind of its founder, Sergio Hamernik, to re-wind this 51-year-old piece of harmonic history back to spec.

VG: So... is it all over for this output transformer?

Sergio Hamernik: Well, it appears that it's given up its ghost. A major bummer to say the least! Replacing a transformer in a guitar amp is a similar feat to heart surgery. But it's NOT "All Over Now Baby Blue" because we're going to fix it. And when we do, it'll likely sound better than the original.

This output transformer is an original, from 1960. The late 1950s into the early 1960s was a transitional period for VOX. And one in which their transformers were known to have various failure rates, depending upon which batch ended up on the chassis.



Rust on the laminations actually helps the transformer to perform better!

In your case, someone from the original transformer company had the bright idea of using low-cost wax instead of a varnish dip. No doubt to save their six-pence. To be fair, most transformer companies back then were somewhat ignorant to the unique demand placed on transformers by the guitar amp builders. As a means to inhibit rust on the iron core and also to fortify the insulation of the windings, the industry standard is to dip and bake transformers in varnish, NOT wax. And you know what happens to wax when it heats up!

When we originally opened this amp up, there was wax all over the chassis that had to be scraped out.

There is some merit to using wax if the component doesn't generate much heat above ambient temperatures. Output transformers do not generate much heat by them themselves. Especially when they're working within their design specs – even with the amp cranked. But what the original transformer maker failed to take into consideration was all the tubes packed in there next to the transformers on a limited size chassis. As you might have already experienced when you try to pull a tube from a

powered up amp – they do get really hot.

Class A amps run hot because they're designed to run wide open, no matter where you've set the knobs. Now enclose this or any amp into a box and you have created an ideal environment for a large temperature rise above room temperature. You can practically see the wax dripping off the transformer.

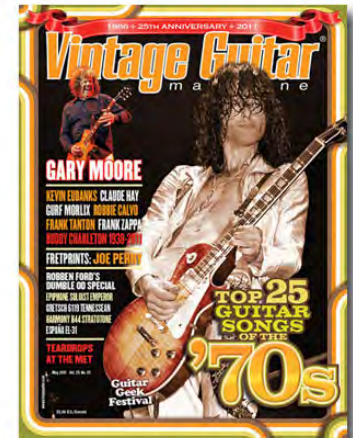
Plus, VOX amps are notorious for getting hot inside the cabinet anyhow.

Yeah, but VOX wasn't the only company that stuffed wax transformers into their hot boxes. As we discovered during the course of rebuilding transformers from old Dynaco, Sunn, Marantz, and a few others, they tried this idea and had their share of failures, too. Using wax as an insulator would never fly today because it's extremely flammable. Is there such a thing as a nonflammable wax candle? Today's amps though are probably the safest they've ever been.

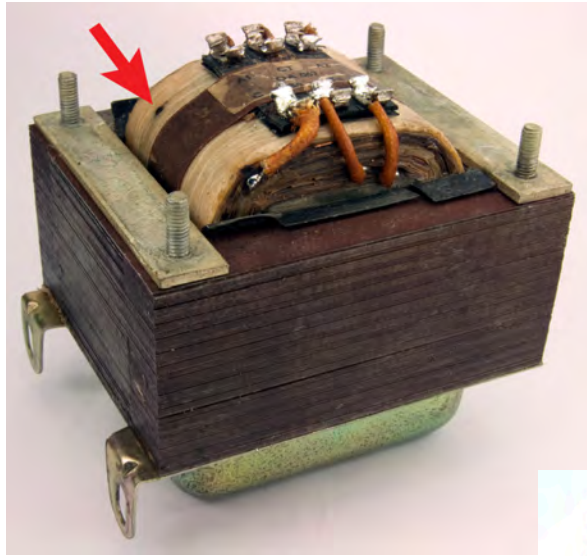
How long did this wax-period last?

A few years of trial-and-error seems to have put a stop to that practice.

The interesting thing is that among the first VOX amps built they used Radiospares transformers. Radiospares were extremely well constructed, varnished and expensive for their day. VOX amps with these transformers are highly sought



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after (“pre-wax debacle era”). However, I don’t believe VOX ever intended on using Radiospares for anything but prototyping and the earliest short-run productions.

Back then Radiospares catalogs were essentially England/Europe’s equivalent of the American Allied/Radio Shack catalog stores. We’ve run across a few early AC30s that came with their full compliment of Radiospares transformers. If they had failed it was due in part by operator error and not the construction of the transformers themselves.

It seemed that shortly after the Radiospares era VOX began to solicit other transformer companies. An early one that comes to mind was Parmeko. Based upon our forensic investigations, Parmeko seems to have been a low-bidder – which was clear by their rather feeble attempt to copy the Radiospares. Also, the Parmeko output transformers were dumbed-down with cheap materials and short-cut winding methods. Their transformers were in no way even close to the Radiospares quality, as their lack of tonality proved.

The engineering of the original Radiospares designs and workmanship are highly respected by us. They’re extraordinary, and for that time they really raised the bar – as demonstrated by Eric Clapton’s sound on the “Blues Breaker” album – a JTM-45 Marshall using the

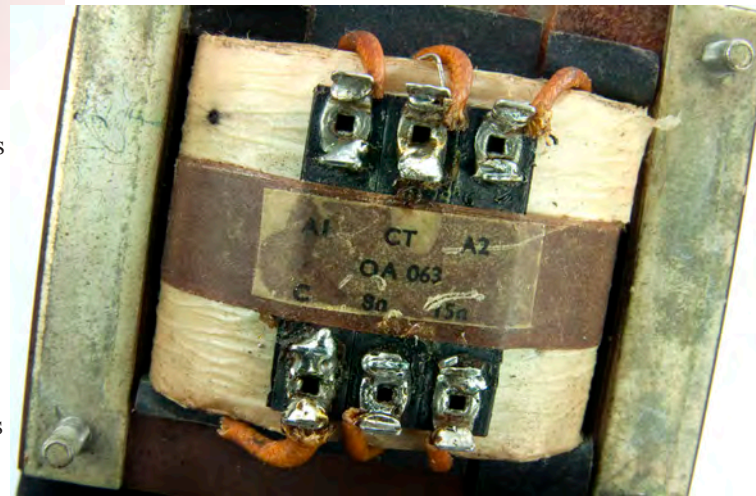
same Radiospares transformers!

What time period are we talking about?

This was during the first year of production for VOX of these amplifiers.

So... the output transformer in this AC15, is that a Parmeko?

No. It’s definitely after Parmeko, which once again marks another transitional period in the company’s history. Soon after Parmeko, VOX found another transformer supplier, Woden, a former military supplier who bid low to get the VOX order. Your transformer shows all of the tell-tale signs of it being a Woden.



The bottom of the transformer. The pin-sized burn mark looks similar to a bullet entry wound. This type of burn is usually the result of a major voltage spike.

Woden had some problems with quality and consistency. So the performance of their amps varied from transformer batch-to-batch. I wouldn’t be surprised if Woden was behind the idea of changing their production run to wax the transformers. Many amp players and collectors are quite fond of these Woden-era amps.

The Beatles era marked another transition for VOX. From Woden to Haddon, and Haddon is generally what people recognize when they think of that Beatles sound. Haddon was another former military contractor, but a step UP in build quality and consistency and

probably cost from the Wodens.

If I were to purchase a vintage AC30, for example, I would look for the ones with Haddon transformers, although I still prefer Radiospares because they consistently give that benchmark tone. When the Beatles and the British rock scene took off in the early ’60s, VOX grew into a big corporate thing. At that point the Haddons were becoming just too expensive – so enters another transition in their transformer suppliers – a lower-cost company called Albion.

Although VOX saved money with Albion, their transformers created an interesting and more aggressive new VOX tone. Sadly, right after the Albion era the company went to Thomas Organ and shifted over to solid-state circuitry. And as we all know those were a part of VOX’s darker years.

The Albions do have a small group of followers that really dig that sound. But when I’m thinking “VOX” I’m really talking about the goose bumps that the Beatles era gave me with the Haddons. George Harrison had no problem overdriving his VOX amps into that unmistakable jangle and sparkle tone. Nor did Brian May with his signature thick and creamy textured sound.

For the record we have cloned Radiospares, Parmeko, Woden, Haddon and Albion transformers from that era and make them available in our catalog.

Did this transformer die because the wax had melted away?

Probably not. This transformer lost its wax at least 40 years ago. But even that’s okay. I have built amps and prototypes in the past where I used unvarnished transformers and they performed just fine. The main purpose varnish or wax is basically to coat the iron core. Rust proofing it because the better the grade of iron the greater the chance for rust to settle in. London fog didn’t help things either. Actually the coil’s insulation itself doesn’t always depend upon the use of varnish. So your transformer probably led its life mostly free of the wax, and it still performed well.

So why did the transformer die?

Transformers are not apt to commit suicide... no matter

how poorly one plays the guitar. Transformers in general are not subject to the effects of aging. Instead, they usually die at the hands of others. Consequently, it's almost always some outside operating condition or an offending part.

There are a few exceptions though. These come from some well-known and liked amplifiers that over the years have fallen victim to self-destructing transformers. Time bombs of a sort stemming from historically problem-laden transformer designs. More often than not inadequate internal insulation systems. An amp that comes to mind is the first generation of *Marshall Majors*. Their power transformers would frequently fail from voltage breakdowns. These transformers were a bit oddball since they didn't appear to follow the build methods of the *Drake* transformers which are found in the 50 and 100 watt amps of the same production era. *Jim Kelly* amps another oddity, they came with power transformers with screaming high B+ voltages and an output transformer built with *no* insulation other than the coating on the magnet wire itself! I believe these were made by the now defunct *Time Magnetics*. Even the transformers from *Ampeg B15s* are frequent visitors/patients to our rewinding / restoration lab. Since these transformers are in cans, and extremely expensive to repair, most clients choose our *ToneClone* replacements as upgrades in tone and reliability over the stock transformers. It's only a matter of time, depending on how many hours are clocked on these amps, before we get that phone call. We see firsthand the failures of transformers like these that are designed without enough insulation to survive the demands a guitar player can put on them.

So was it something else in the amp that's making the transformer work harder or the wrong way?

For your particular transformer we're going to take a series of photographs showing you the rewind/restoration process from beginning to end. In the first photos we'll show how we received the transformer from you. Take a look at the view of the bottom of the transformer. Notice that there is a tiny, pin-sized burn mark on the outer-wrap of the winding. This bothers me. It looks similar to a bullet entry wound.

Transformers in general can withstand a lot of abuse. But if there is something making the transformer

work harder or the wrong way, then something in its operating environment has changed or failed leading to a breakdown. First of all, we noticed fresh re-soldering on the outside of the transformer. The only soldering that should take place are the lead wires to the terminals. There are very fine wires underneath the outer wrap that may get damaged from a lingering soldering irons. We prefer that people keep their dick skimmers away from any original solder joints on the transformer.

With regards to your particular transformer we can narrow the problem down into three categories of investigation:

1. The condition of the components that connect to the input of the transformer.
2. The parts and connections that connect to the output of the transformer.
3. The possibility of rough or mishandling of the transformer.

Could the transformer have failed from a shorted tube?

Not likely. A shorted tube failure will create a different witness mark on the transformer. A shorted tube usually causes half of the primary winding to light up like the heating elements of a toaster. Scorching a larger section of the input coil. Your transformer does not show any signs of that type of failure. Remember you still had some audio coming out of your amp. You'd be hearing crickets instead if the primary winding was shorted or melted.

On the speaker side?

I have a tendency to believe that it's a voltage breakdown due either to a lack of load (no speaker connected), broken connection, or some defect or damage done to the winding itself. Another bit of evidence of course is that your amplifier had partial output – it wasn't completely dead quiet.

Based on how you described the amp sounding it leads me to believe that the failure will be isolated to a small spot on the primary winding as opposed to the coil being completely burned. And I wouldn't be surprised if the output winding still looks like new. Amps that end their life with noisy output generally don't suffer from current (short-circuit) related problems.

That's exactly what I heard when I turned on the amp.

Sometimes if you catch it on time by turning the amp off ASAP you have a chance of saving the transformer. If not, the transformer will eventually fry itself.

So the transformer didn't see a proper load on it.

It probably was exposed to some form of open or partially open load or a connection. Which will cause out-of-control voltage spikes/arcs to take place beyond what the transformer's insulation system is designed to withstand. "Transformers Gone Wild" is not a DVD I would recommend. There are no girls in it!

We can restore the transformer to better-than-new condition. But if you don't find, fix or replace the offending part or bad connection that took it out to begin with *before* you re-install your resurrected tranny, you may to blow it all over again. **VG**

Next month, we'll talk about rewinding a transformer. Sergio Hamernik can be reached via www.MercuryMagnetics.com.



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