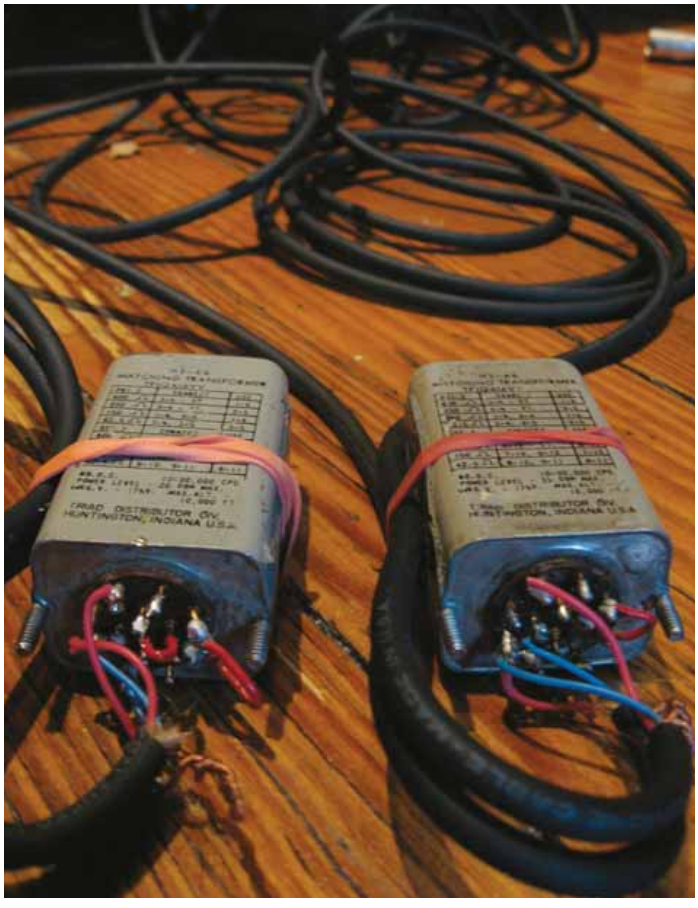
Using Transformers to Transform Audio

A transformer is a device that transfers electrical energy from one circuit to another via inductively coupled conductors - coils of insulated wire wound (most often) around a ferromagnetic core. Transformers are useful in audio recording, as they can block DC voltage and facilitate electrical isolation between gear, but they also shape the sound of signals sent through them by introducing subtle, often very desirable "coloration." This may be a result of any combination of frequency response, time response, distortion or a number other factors for a particular transformer. These effects can be especially attractive when working in the digital realm, where sounds can be perceived as too "cold" or "digital."

We always hear how certain transformers in a piece of recording equipment add to the quality of its sound. If these transformers are so great, why not skip all the electronics and strap bare transformers into the audio path directly? The first time I heard and saw this done was at a mastering session with Nick Blagona in Toronto, when he ran a pretty crispy sounding master through a pair of vintage Marinar transformers that he had lifted from a Neve module. The sound was just right for this record – fat lows, punchy mids and a silky top. I personally hadn't had a chance to do much with this idea until I recently pillaged my repair guy's stock bins, and now I'm hooked on trying all kinds of transformers in all kinds of situations.

What you'll need are 600 ohm to 600 ohm "matching" transformers. These will generally work properly with the gear in our racks. Be careful of center-tapped transformers (center tap to ground). If these are exposed to +48 volts (from phantom power) in your system, they could easily be damaged. Simply wire your transformers up to cables that work with your gear or patchbay and you can insert them anywhere in your line-level signal path.

I've now tried transformers for processing all types of sources, and have fallen in love with many of the sounds I'm getting. My favorites so far have been a pair of vintage Triad HS-66s, as they add a mid-range thickness to the signal that really warms things up without obscuring the lows or the highs. On a full mix they add a heft and three-dimensional quality to the sound that, while certainly not achieving the full effect, leans in the direction of a vintage console. On individual instruments they have a fattening effect that's especially cool on kick drum and bass guitar. Pushing the signal can drive the transformer into distortion – sometimes a desirable lo-fi sound – though the need for an attenuator crops up pretty quickly. In one case I was tracking male/female duet vocals for the Brooklyn group The Loom, and found that the female singer had a strong midrange warmth that made the male voice sound a little thin in that area. By patching in one of the Triads after the compressor in his vocal chain, his sound warmed up just enough to match hers beautifully. Without disrupting the flow of the session, the transformer gave me just that little bit of harmonic complexity that I needed. It was like stirring a little more flour into the gravy, thickening to taste.



A Simple Transformer Explanation

A signal goes into one side of the transformer (usually the side driven is referred to as the primary), and the voltage that results on the output (secondary) is the input multiplied by the turns ratio (neglecting internal losses). The impedance ratio is the square of the turns ratio. Example: a 1:10 step-up transformer on a mic pre input would have a 1:100 impedance ratio - meaning the voltage gain is x10, at a cost of increasing the output impedance by x100. A DI box is an example of going the other way, stepping the voltage down to reduce the driving impedance. The lower the impedance a signal is being driven with, the less susceptible it is to noise. *-SH*

Another interesting pair of transformers were pulled from some odd quad encoder that the Japanese company Sansui was trying to develop in the '70s. As they were attempting to impress the pro audio market, they used some serious matching transformers. These add a harmonic richness to the midrange that can only be described as warm and fuzzy, and they also round off the highs well enough to function almost as a de-esser on certain vocal tracks. I wasn't able to use them with any success on a mix, but on individual tracks they added a strangely satisfying vibe I just couldn't get with any other gear.

A UTC transformer that NYC engineer Matthew Agoglia liberated from a vintage compressor made a female vocal go from rich dark chocolate to three-dimensional licorice, adding a harmonic complexity that gave each syllable its own distinct vibe - way more interesting than it had been before. The same UTC on electric bass added a weight that seemed to get the signal out of the speakers and into the room, and that's a big deal for me when working on my Pro Tools system.

With pairs of matching transformers slowly making their way to my studio, I'm beginning to see the possibility of putting them all in a (shielded) box, wiring them to DB-25 connectors and having them ready to be inserted between my converters and my Dangerous Audio summing box. Buying them in pairs allows me to send stereo stems out through matched left/right pairs, or to run full mixes through them. The cool thing about having multiple pairs is that you can have any number of different flavors on hand, rather than just multiples of the same sound as you would with a console. Then again, there is something to be said for the unifying effect of many of the same transformers. Experiment and see what works for you.

There are all kinds of transformers available, from vintage units by UTC, Triad, Marinar, CineMag and St. Ives to brand new transformers from Carnhill, Jensen, CineMag, Lundahl, Sowter and others. While most of these companies are set up to supply gear manufacturers, I've found they're all very approachable and willing to help a guy like me buy a pair. Most quality 600 ohm to 600 ohm transformers hover just above the $100 mark, so it's a relatively inexpensive way to have some extra audio processing at hand. I highly recommend that anyone who is curious about this try it out, and if you find some cool, obscure transformers with a vibe, do drop a line and let us know! ☮

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