

I've always been interested in putting an audio transformer in negative feedback or be driven from a negative impedance, as Audio Precision has used this technique to get remarkable results from a custom Jensen. But what if you used it on a cheap transformer, I mean a *really* cheap transformer like this tiny Xicon unit? (bottom transformer in the picture.) About USD\$4.

<https://octopart.com/42tl0ll-rc-xicon-3964894l>

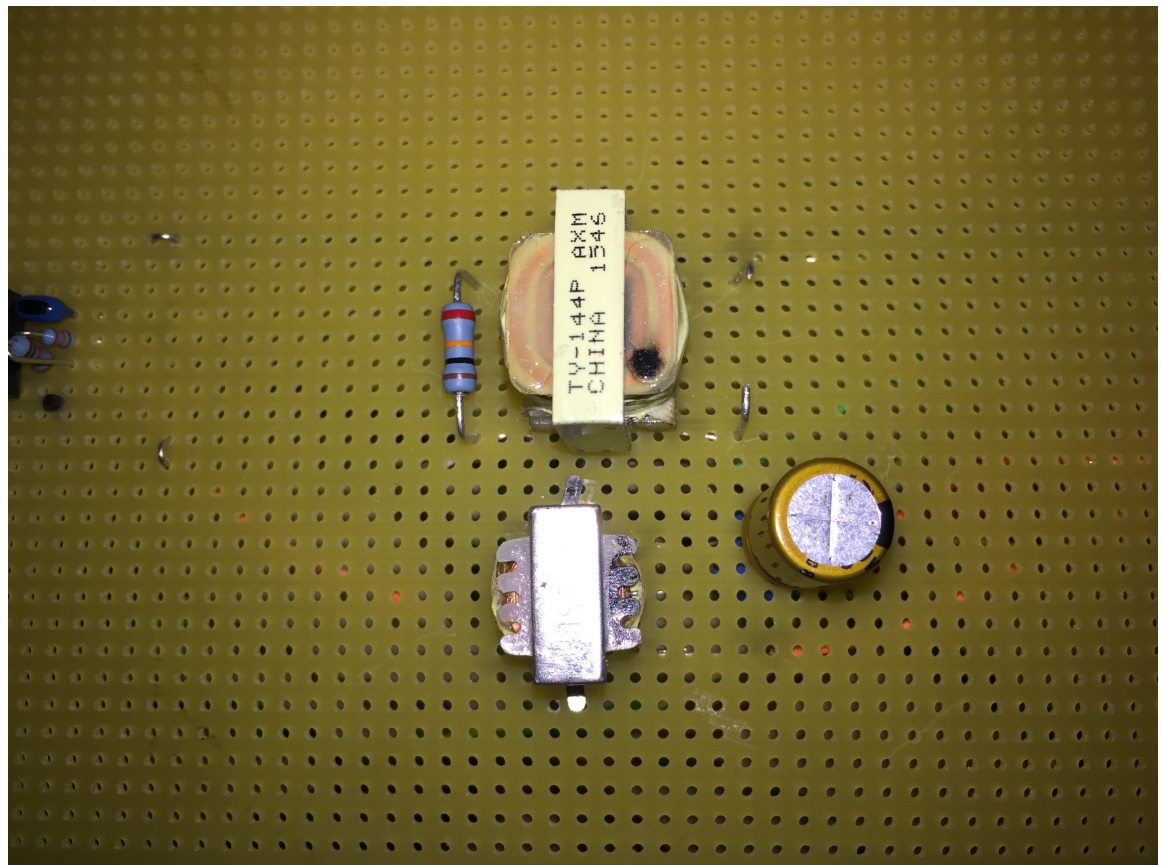
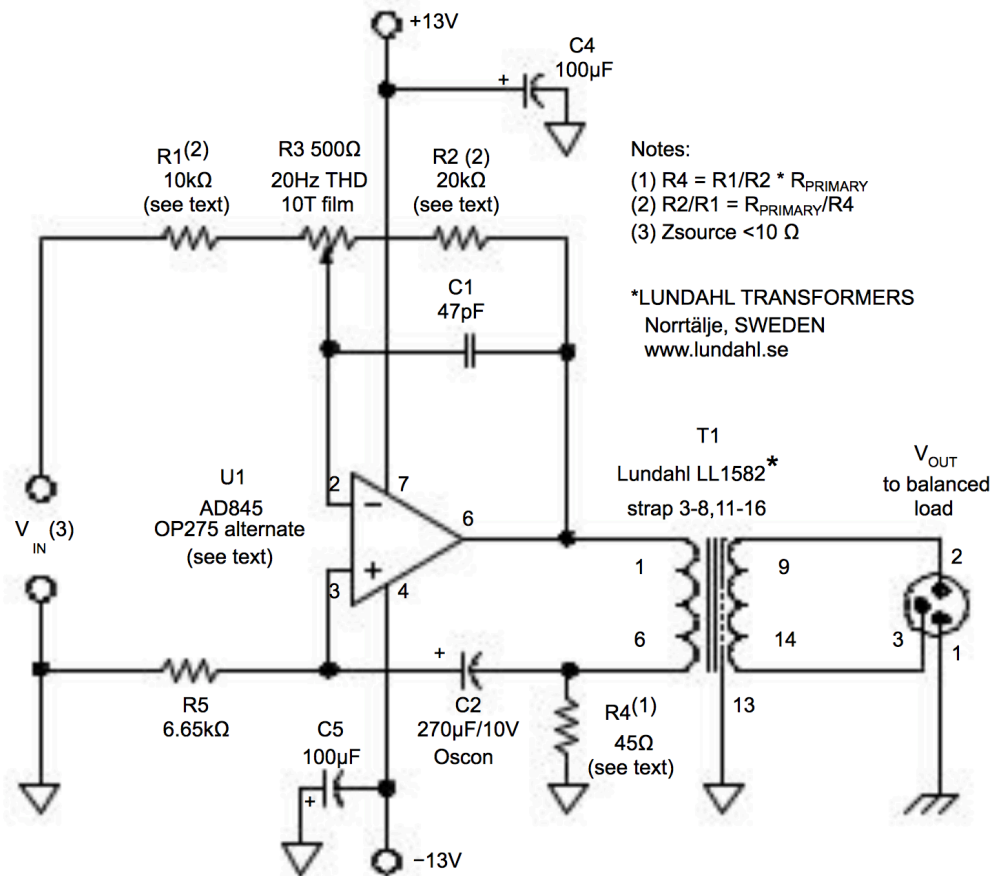


Figure 1. Triad (top) and Xicon (bottom) transformers.

This is the basic circuit. You have to adjust some values based on the DCR of the transformer as seen in the notes section.



Squarewave response is a good overall indicator of performance. Apologies for the low quality of these photos, I'm no Jim Williams (RIP).

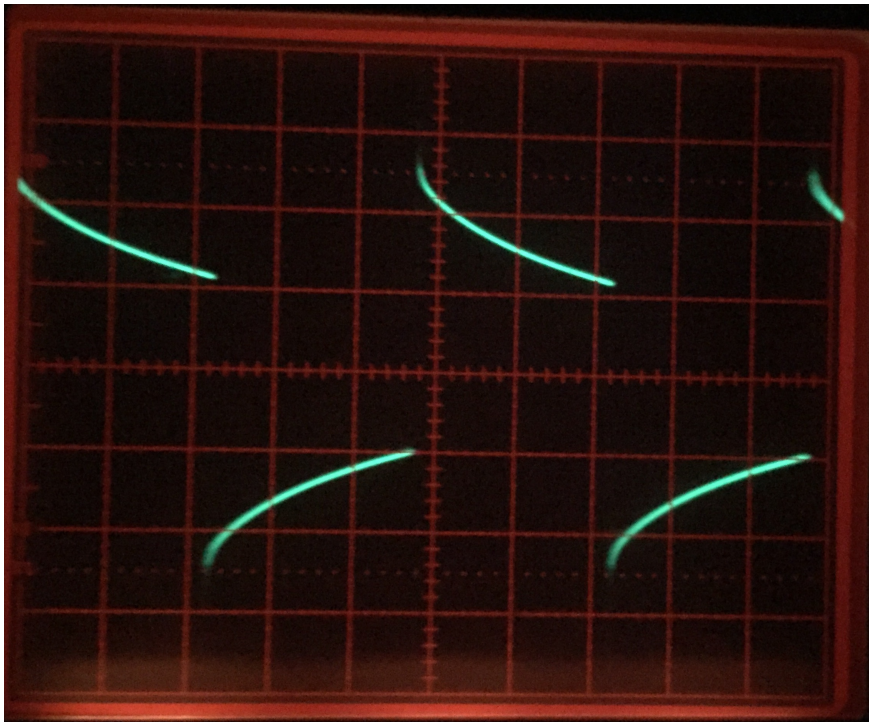


Figure 2. 100Hz @ IV no feedback

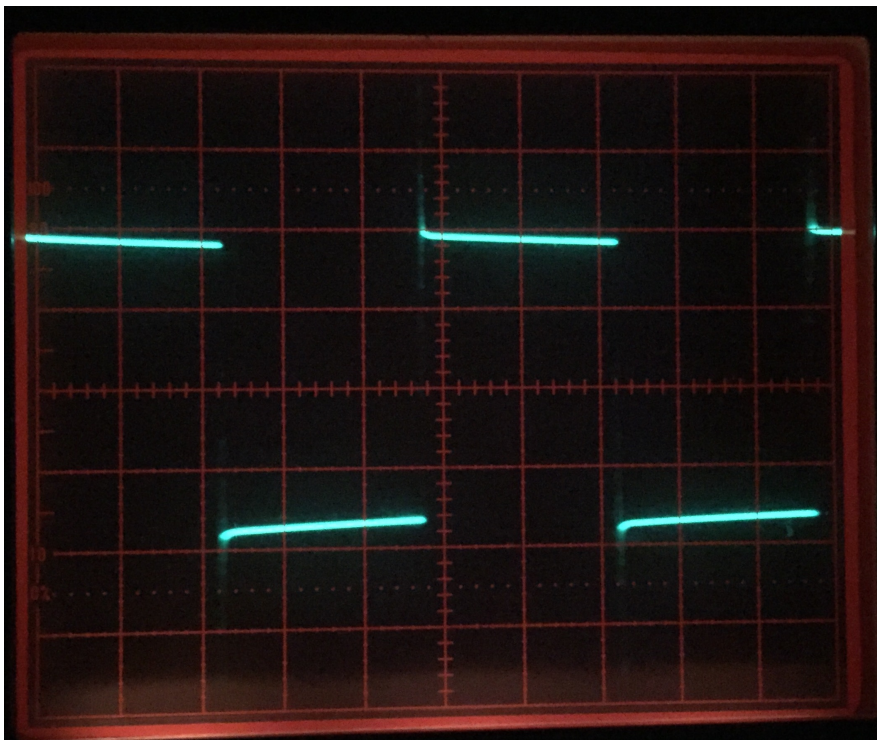


Figure 3 100Hz @ IV with feedback.

Not bad, right? For one opamp and a handful of passive components. As the squarewave shows, the low frequency rolloff is almost perfect now.



Figure 4 Frequency response without feedback.

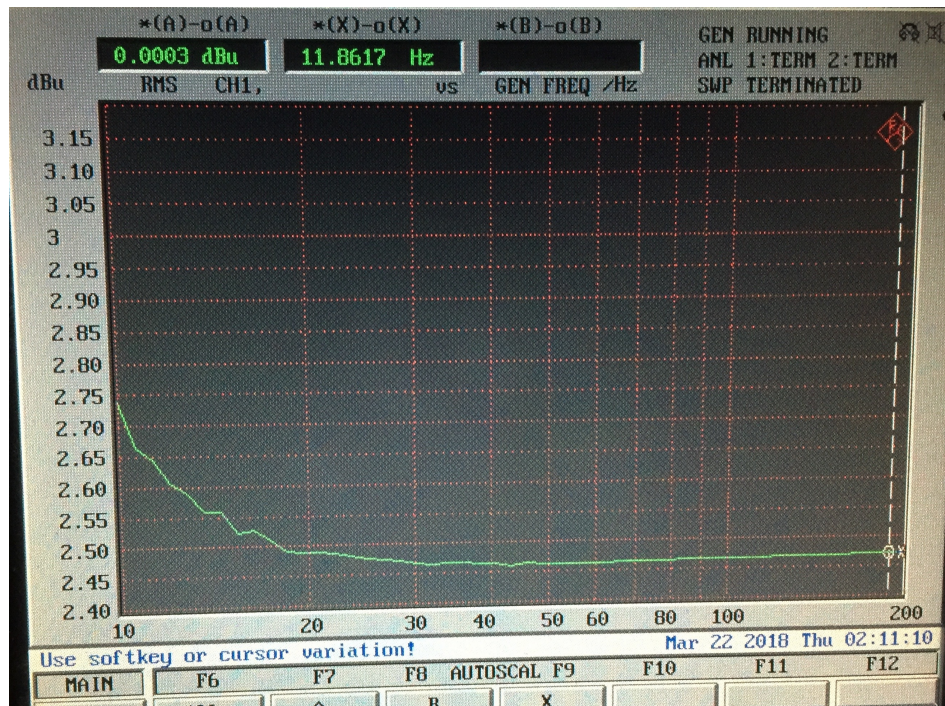


Figure 5. Frequency response with feedback.

Keen observers will note the response is actually *rising* as the frequency decreases, which is a sign of the devil, but the overall concept works as expected.

But what about distortion? (apologies once again for the poor pictures, use of RF VNA for audio measurements, etc....)

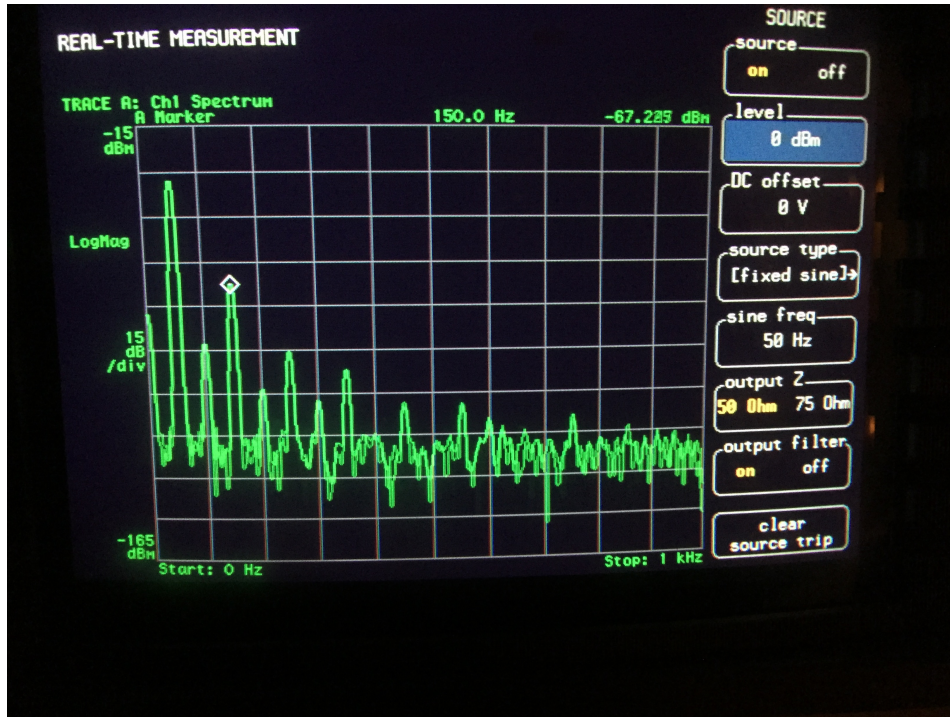


Figure 6. 50Hz @ 0dBm without feedback.

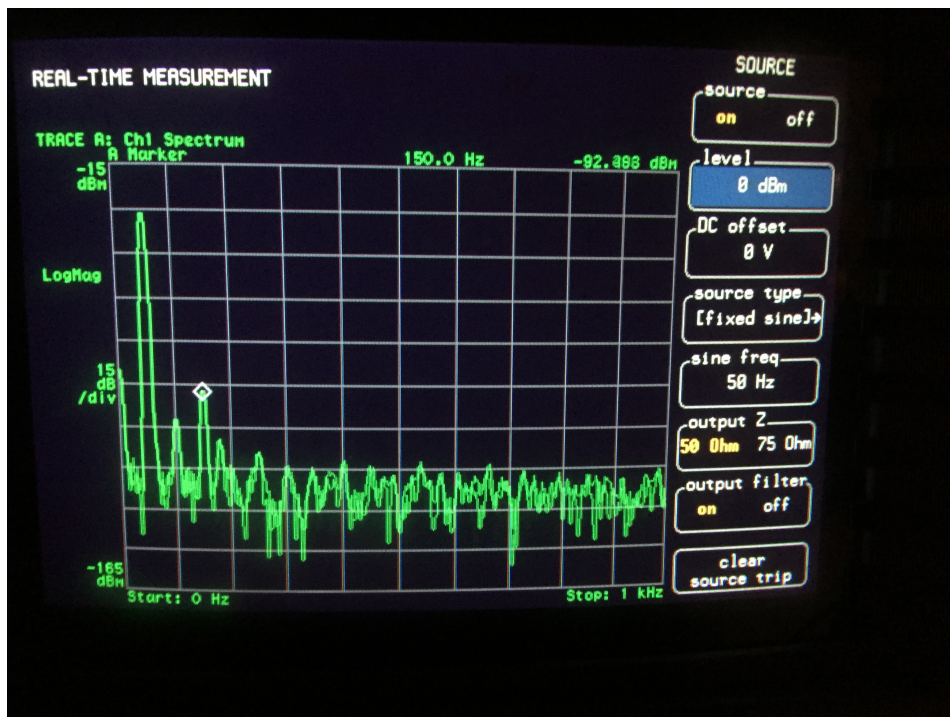


Figure 7. 50 Hz @ 0dBm with feedback.

Now, the cynical observer with opine that one of the things that makes transformers desirable *is* the distortion and here we are taking all of the fun out of it, but as a proof of concept for an extremely cheap part, I was surprised how well it worked.

DC

24 March 2018