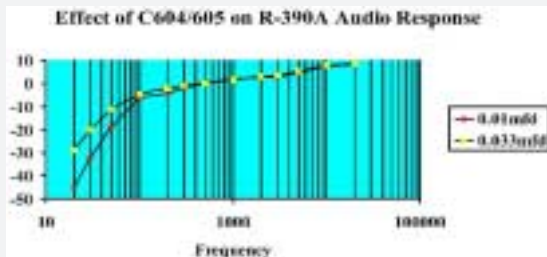


By Jan Skirrow

Improving the R-390A Audio Response

I've followed with interest all the discussions on various mailing lists about ways of improving the R-390A's audio. I don't like making modifications unless they are easily reversed, and I'm sure they are worthwhile. At the same time, I assume the designers knew what they were doing, and that things I consider inadequate almost always reflect design trade-offs to meet the specified mission. Also, making a change in one place can have unexpected effects elsewhere. Design is, after all, a series of trade-offs and compromises.



I like to measure things, so I tried a couple of quick and dirty measurements.

Replace C604/605

First, Chuck Rippel suggested a simple and easily reversed mod to the audio deck to improve the sound. He suggested replacing C604 and C605 (which are 0.01mfd, 300vdc) with 0.022 mfd or larger, and with a higher working voltage rating. I replaced them with 0.033 - 400vdc units.

The chart above shows the frequency response of the amplifier for the two cap values. The vertical axis is dbm. The audio generator was coupled to pin 2 of V507 (with the tube removed) through a 0.47mfd cap. The output was

measured across a 600 ohm resistor, with the input level/volume control set to give 0 dbm (0.77vac) at 500 Hz. The audio generator output is flat over the range.

Simply replacing these two capacitors gives quite a low frequency boost. I also tried replacing C549 in the i.f. deck with a 0.033mfd. However this resulted in no further measureable improvement.

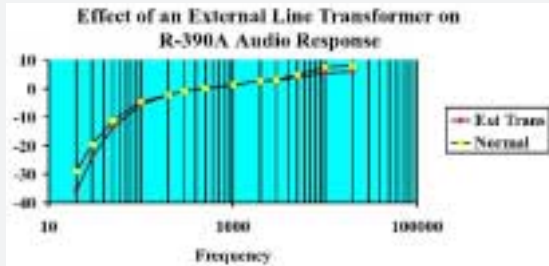
Use a Good Quality 600 ohm to 4(8) ohm Transformer

Second, I was curious about whether or not there was much of an impact on audio performance achieved by using a high quality 600 to 4 (or 8) ohm output transformer (such as the new Hammond transformer) compared to the inexpensive audio line transformer many of us use now. Working on the basis that no transformer - no matter how good - can restore what the R-390A circuit and output transformer taketh away, and given that I didn't have an example of a "good" transformer, I decided to measure the frequency response on the normal 600 ohm output, and then measure it through an inexpensive add-on audio line transformer at 4 ohms. If the performance was comparable to the "barefoot" output, no other transformer could do any better. You can't add back in what ain't there.

Problem, however, was to do this easily given that the measurement conditions would not be comparable. So I connected two audio line transformers back to back so that I could still measure at 600 ohms. Any differences in performance would be doubled from what you'd

get using a single transformer driving a speaker.

There is a noticeable difference, as shown in the chart below, but magnified by the reality that the sound is going through two line transformers. Taking this into account, there is about 3 db difference at 20 Hz and, with measurement



error, essentially nothing at the top end. So adding an external transformer degrades the sound somewhat. It is possible that a better quality transformer would result in less difference.

Whether you'd notice it or not is another thing. At best it would add to degradation, but certainly wouldn't improve anything.

I did check that the audio line transformer was not saturating at any power level the R-390A could deliver.

Conclusion

Replace the caps - significant low frequency improvement for almost no money. Save your money on the expensive 600 to 4(8) ohm transformer. I have no way to measure it, but I expect the cap change, combined with a decent loudspeaker would give good performance for what is, after all, a communications receiver! The audio amplifier would need a better output transformer to give substantial performance improvement.










Yet, as our Glass Audio buddies keep telling us, it's all in how it sounds. So if you want the Hammond transformer, go for it!

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