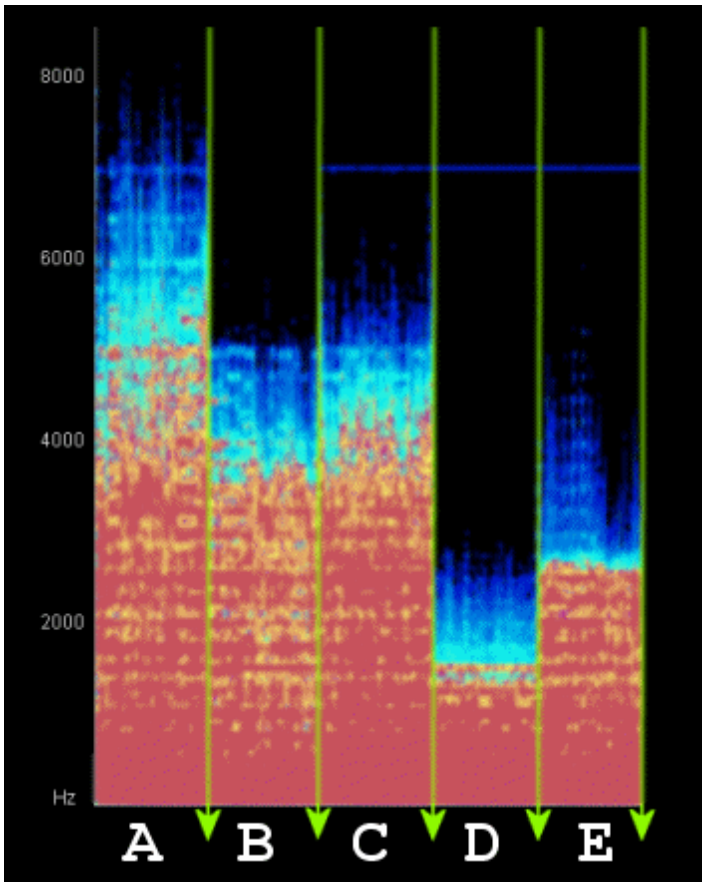
Phil's Fidelity Increase Mod
Application Notes 1
VERSION 2 (changes are in purple)

1. Fidelity Analysis:

Spectral analysis was performed on my fidelity modified R75 (please refer to the graph below). The colors represent strength (at each subsequent frequency) with red corresponding to ~30 dB and blue to ~5 dB. Using pseudo dual 15-kHz filters yielded ~7250 Hz of bandwidth (see 'A' below). Using 15-kHz and 6-kHz filters yielded ~5750 Hz of bandwidth (see 'C' below). Using dual 2.4-kHz filters yielded ~2750 Hz of bandwidth (see 'D' below). Using dual 2.4-kHz filters detuned by 1.2 kHz (as per Cookbook) yielded ~4000 Hz of bandwidth (see 'E' below). Note that –6 dB attenuation points are used to specify filters; however, a strong signal attenuated to a fourth of its original level is often still audible. The blue line at 7000 Hz may be an artifact.



2. DSP Functioning:

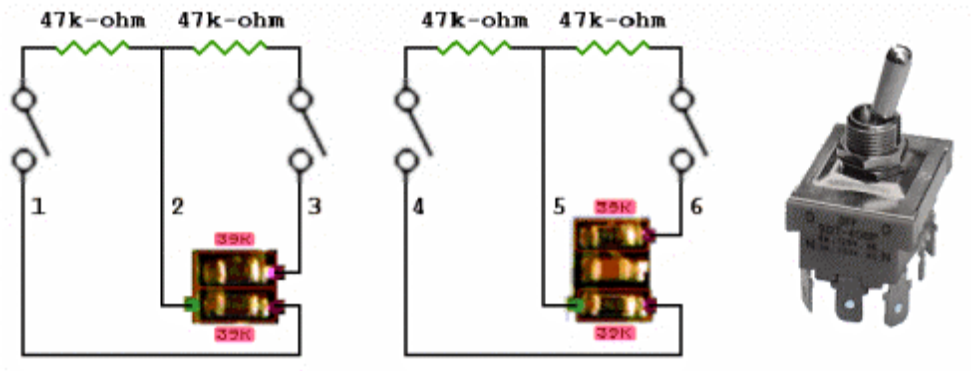
The second plot (see 'B' above) is the result of using pseudo dual 15-kHz filters with DSP NR engaged at its lowest setting of one. This plot [when compared with 'A' above] suggests that the DSP is able to function up to 5000 Hz. Frequencies (signal and noise) beyond this point are lost by engaging the DSP (this can be very useful). Using a carrier as a heterodyne, further testing revealed that the ANF was effective up to ~5000 Hz as well.

3. Resistor Options:

Adding four 47k-ohm resistors in parallel theoretically yields ~5500 Hz of fidelity. In reality 5500 Hz represents the –6 dB drop point of each active two-pole low-pass filter. Combined these filters provide –80 dB per decade drop-off meaning that a 55000 Hz signal is attenuated to one-hundred-millionth of its original size. Another viable option is adding four 100k-ohm resistors in parallel for a theoretical yield of ~4200 Hz of fidelity.

4. Switch Option:

Although I feel a switch is totally unnecessary it is still an option for those wanting to change between stock and fidelity-enhanced sound modes. A 4PST (4-pole single-toggle) switch and its placement on lines 1, 3, 4, and 6 are shown below.



5. Latest Thinking:

The 47k-ohm resistors provide incredible MW fidelity using the "dual" 15 kHz filters. There are however two drawbacks. First, there is some high-pitched noise on SSB. Twisting the dual-PBTs in opposite directions [bandwidth narrowing] will attenuate the noise. Secondly, strong adjacent carriers on the shortwave bands show up as 5 kHz heterodynes. Turning the inner PBT [SAM-mode] or using the ANF will attenuate the heterodyne. Due to the possibility of aliasing-related distortion the "dual" 15 kHz filters should not be used with the DSP ON [ANF or NR].

During testing 90k-ohm resistors were substituted for a theoretical cutoff of 4304 Hz. Craig, the audio expert at Kiwa Electronics, has since noted that this cutoff is a good balance between enhanced fidelity and heterodyne attenuation. The 90k-ohm resistors seem fairly ideal for enhancing fidelity of the R75.

The fidelity mod will significantly increase high-frequency audio response in the ICOM R75. This modification is meant to enhance the Sync-AM and AM-AGC modifications. An external speaker, such as the amplified computer type with tone control, is recommended.

6. KIWA ELECTRONICS

Kiwa Electronics offers the "Fidelity Increase Mod" using an audio bandwidth of 4300 Hz. For shortwave listening I recommend their "Synchronous Detector Upgrade" [$45.00] and "High Fidelity Audio Filter Upgrade" [$35.00]. Kiwa Electronics offers professional modifications at good prices. Their web address is:

http://www.kiwa.com/R75.html

7. Comments:

I can be reached at just_rtfm@yahoo.com with any comments. dr phil :)

'You are part of the Rebel Alliance and a traitor.'

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