IMPROVING YOUR "EARS"

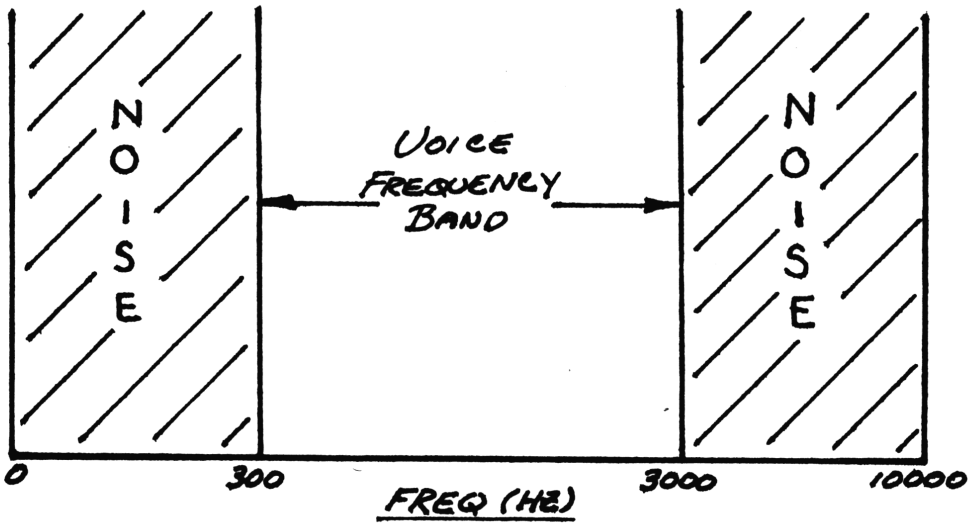
by JS

How many times have you had your receiver cranked up all the way trying to pull in that weak station, only to have it covered up by hash, hiss, and other atmospheric noise? Using a receive booster or increasing receiver sensitivity gets you more signal, but it pulls up the noise too. Very limited improvement.

The automatic noise limiters and noise blankers available as original equipment are generally good for nothing except that their panel switches can be used for something else.

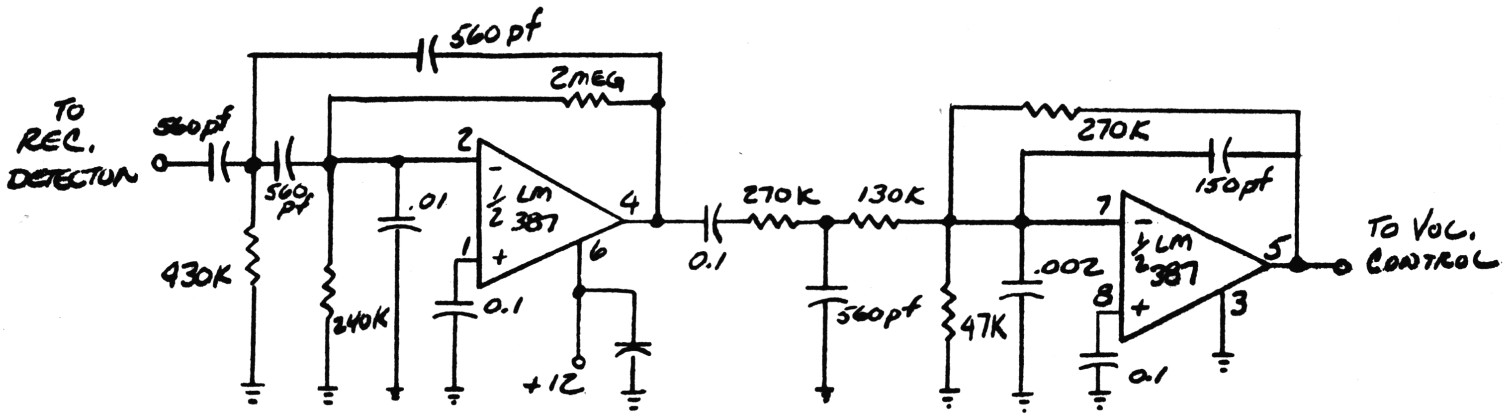
In my mind, the best way to improve your "ears" is to boost the audio signal and reduce the noise (i.e. improve the SIGNAL-TO-NOISE RATIO).

How do we do this? EASY! Let's start by looking at the diagram below:



The frequency spectrum of transmitted audio is shown above, and can contain all frequencies from about 50 Hz to 10 KHz. Voice frequencies fall between 300 Hz and 3 KHz. Anything outside this "band" is unwanted noise. A simple way to filter out this noise is to hook a graphic equalizer into your rig's receive section. (Vol. 23, Pgs. 12 and 60). By using the equalizer as a "band-pass" filter to "boost" voice and "cut" noise, the signal-to-noise (S/N) ratio can be improved by almost 20 dB! AND...when you consider that a 3dB increase in S/N ratio reduces the noise by half (voice seems twice as loud), you begin to understand what a 20 dB improvement can mean.

For those people who don't have or don't want to buy an equalizer, construct the circuit below to obtain about the same result:



RECEIVE SPEECH FILTER (300HZ - 3KHZ BANDPASS)

In addition, 02A chassis owners should try the Active-tracking Noise Filter Mod in Vol. 9, Pg 27 Experiment with the capacitor value. I liked 0.1 mfd best.

COMPRESSION/EXPANSION

"Companders" like the VSB-I can provide significant noise reduction in receive. In essence, companding involves "compressing" the dynamic range of the audio in transmit, and "expanding" it in receive. This system was originally developed to reduce noise on multiplexed telephone lines, and can give up to a 30 dB increase in S/N ratio. Compression raises average modulation, which makes a station sound louder (especially on AM). Commercial broadcasters have been using this technique for years. VSB-I compresses 2:1 and expands 1:2. DX Products 321A compresses 3:1, which seems to be the practical limit as 4:1 is definitely too much.

Unfortunately expanding an uncompressed signal actually increases the noise.

DOLBY™ NOISE REDUCTION

Won't work - forget it!

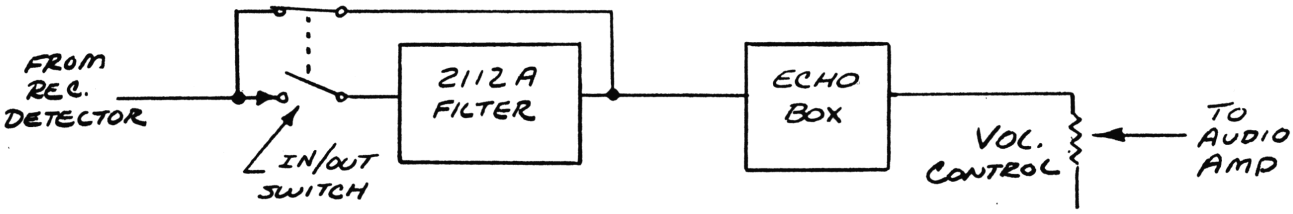
"PHASE-COHERENT" FILTERS

A phase-coherent filter like the DX PROUDCTS 2112A/B (available from SELMAN ENTERPRISES) effectively noise-reduces both normal and compressed audio. The front panel mounted "Peaking" control swings the filter to better "lock-onto" individual voice frequencies. Completely knocks out hetrodynes in SSB mode. Gives excellent 45 dB S/N improvement!! ANTI-BLAST control on "B" model protects speakers.

ECHO

If echo works in transmit, then why not in receive????

Just for kicks, I wired an echo box into my receiver at the volume control as below:



An improvement in voice recovery was especially noticeable on weak stations (less than 3 S-units). Short delay times worked best. Using 2112A and ECHO together produced the best overall results as 2112A's 45 dB noise reduction was effectively DOUBLED by the echo. This is because the listener is hearing everything TWICE. Adding ECHO to a signal that already had it produced some pretty weird sounds, especially when delay times were out of sync.

In conclusion, it's possible to achieve tremendous improvement in receiver performance by using the above techniques. Hearing is believing.