

Natural Radio

News, Comments and Letters About Natural Radio

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Power Line Noise, Initial Measurements – Due to the way the weeks fell on the calendar, we had an early deadline this month which caught me a bit off guard. But in spite of that and a bumper crop of mosquitoes that love the bright sunlight, I did manage to throw a quick loop together and do some quick measurements under the distribution lines that run through my back yard. I'll put up the spectrum analysis image on my website as it is too detailed to display here. (naturalradiolab.com)

My pickup device was a 10 inch square loop with 20 turns of wire, connected directly to the balanced microphone input of my Zoom H4N recorder. I then used the spectrum analysis display in Sony Sound Forge to display the signal analysis. This wasn't a scientific design, just a quick, first-attempt setup used to test the concept. Thus, the measurements were imprecise and my measuring setup needs to be improved as the hum is only 20-40 db. above background noise. I'll need to build either a bigger loop, use more turns of wire, or both. I opted to measure the magnetic component of the power line noise, since a loop is directional and will pick up the power line with better rejection of other noise. Also, my WR-3 doesn't have a flat response, so I thought it would be easier to get a flat response from a loop.

The results weren't what I expected, but they explain why removing hum and buzz is so difficult. I had originally thought that the 60 Hz fundamental would be the strongest with increasing harmonics tapering off in level. What I measured was a 60 Hz. fundamental with only odd harmonics visible. Up to the 11th harmonic, they harmonics were only a few db. down from the fundamental, and the intensity dropped at a slow rate after that, which may or may not be due to the response of the loop.

The other interesting thing I found was a strong signal at about 690 Hz. It was slightly stronger than the 60 Hz. signal, and had both odd and even harmonics present that were as strong as the fundamental initially, then slightly tapering off in strength. More measurements are necessary to see if the 690 Hz. signal is local, or perhaps some weird artifact in my measuring setup.

I don't know if the results are accurate at this point, but I plan on building a larger loop with more turns to increase the S/N ratio. I don't think there is enough stray capacitance at these frequencies to be affecting the high frequency response, but I'll revisit the loop antenna formulas just to be sure.

More measurements are in order, first on other distribution lines to see if the 690 Hz. signal is present elsewhere; then on some high voltage transmission lines to see if my assumption is correct that there should be less harmonic content radiated from these lines.

As I gather more information, I'll post it on the website at naturalradiolab.com.