TECHNICAL CORRESPONDENCE

TRACKING RFI

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◊ Here is an interesting case study of what unusual sources of RFI can arise from the neighbors' homes or from one's own station.

I live in a typical suburban setting and I'm blessed with wonderful neighbors. They didn't fuss when I put up my tower, and they are understanding and patient when my signal interferes with their telephone, smoke alarm, TV or whatever. Of course, it helps that area hams were very active during our recent disastrous fire ("Wildfire!" *QST*, Feb 2001, p 96) and they remember that emergency service. Nevertheless, I try to go out of my way to solve their problems and that goodwill is reciprocated. Recently, I noticed that some man-made HF noise sources were not only stronger than ever before, but they were all over the bands from 160 through almost 10 meters! So, I did a bit of fox hunting, and I want to share the unusual sources of noise I found with my neighbors' friendly cooperation.

The worst source of noise was intermittent. After logging the time and amplitude of the signal over several days, I noticed that it seemed to be temperature related—it would appear late in the morning and then disappear late in the afternoon. Using my HF Yagi as a direction finding tool (particularly the deep nulls off the ends of the elements), I was able to establish a bearing toward a neighbor down the block. Using a small shortwave receiver for final pinpointing, I found the source. It's a familiar one to rural residents near ranchers: a high-voltage fence to confine animals. Here, the neighbor across the street had installed one to restrain his German shepherd (an energetic digger). The fence didn't start to interfere until a recent snowfall buried part of the high-voltage wire in a snowdrift. This explained the diurnal variation in the noise signal: only when the snow was actively melting (during the warmest part of the day) was it shorting the fence. Moving a few shovels of snow fixed that problem. This neighbor was especially grateful because he had been seeing "snow" on his television (particularly the lower VHF channels, 2 through 5) for the last few weeks and couldn't figure out where it was coming from. When we turned off his "dog wire," it immediately went away; his gratitude and future cooperation was assured.

Unfortunately, that wasn't the end of the noise problems. The next sources were isolated to a nearby neighbor, who has helped quite patiently in the past when I caused him problems. There was a strong (S9+10 dB) "hashy" source at 19.4 MHz coming from a paper shredder (Royal, Model Orca-9512x). It may be generated by the LED sensor (continuously powered) that triggers the shredder when paper is inserted. A worse offender was a NiCd/NiMH battery charger (Digipower Solutions, Model DPS-2000) that generated harmonics from 2 through 24 MHz every 160 kHz (each one 10-kHz wide). Because their frequency drifted and they were present at all times (his batteries were on constant charge), these signals were a constant source of background noise in many of the HF bands.

There are several lessons to be learned about RFI and neighborhood relations:

1. Always be polite and actively helpful when solving any neighbors' RFI/TVI problems caused by your station. Those neighbors might return the favor one-day.

2. Use a directional antenna (HF beam in this case) and a portable shortwave radio to pinpoint sources. This provides a demonstration for the neighbor when the problem originates in their home.

3. If possible, use the electrical breaker box at the source building to help narrow the noise search to a single branch circuit. (Walking around with a portable radio can be very time consuming, particularly when you are a guest in a neighbor's house.)

4. Emergency communication activities pay off in ways that go beyond the present emergency and generate long-term goodwill in a community.

LOCATE AND FIX POWER-LINE INTERFERENCE

By Gene Preston, K5GP, 4710 Fawn Run, Austin, TX 78735-6403; **k5gp@arrl.net**

◊ I worked for a power company for 28 years as an engineer and helped my company track down radio-noise complaints. Now, I'm retired and help hams here in Austin, Texas, track down their power-line noise. The big problem for both the power company and hams (working together) is to find the exact pole where the noise originates. You can greatly speed things up by helping the power company find the noise source. Start looking for the noise source with a loop-stick antenna on HF (or an AM-band receiver) to find a likely pole. If loose hardware is the problem, the noise will cut in and out with a little motion of the pole and/or wires. *(Do not attempt to move any wires or the pole! Leave that for qualified personnel.—Ed.)* If motion causes the noise to vary, ask the power company to tighten up all the hardware on the pole. This type of noise has the characteristic of going away when it rains. If the noise is present when it rains, try another approach.

If the noise is present when it is raining, the faulty component is probably a bad fuse, bad lightning arrestor or a leaky insulator. It is probably not a bad transformer because oil-filled transformers tend to self-destruct with any internal arcing. Noise intensity from these components does not change with pole movement.

To pinpoint the exact pole for bad components requires a hand-held beam antenna on VHF or UHF in AM or SSB mode. An S-meter is not needed. I use a six-element Yagi on 440 MHz with a Yaesu VX-5R H-T in its AM mode. A 2-meter quad or three-element 2-meter Yagi will work fine. The FM mode will not work. You should be able to hear the noise up to about 100 feet from the source on 144 and 440 MHz.

Once the pole is located, call the power company and schedule them to meet you at that specific pole. Get them to schedule a specific date and time. Your knowledge of the specific source of noise helps in getting this meeting scheduled.

You should be present at the noise site with your receiver listening to the noise when the power company is working on the pole so you can tell them if their work has fixed the problem.

As a professional, I have several suggestions for the power company:

1. Use a "hotstick" to push on different wires and see if they are associated with the noise source.

2. Tighten all the hardware, especially the hardware supporting the main conductors and/or crossarms. They usually have leakage currents that make noise on the galvanized bolts going through the wooden pole.

3. Disconnect the lightning arrestor(s).

4. To test the fuse, install a jumper around the fuse disconnect(s) and then disconnect the fuse from the circuit.

5. Replace the insulators (this is a difficult task and insulators are usually not the problem, unless there is a slack

span with bell insulators). If slack-span bell insulators are the problem, ask the power company to spray WD-40 inside the bell insulators and then tighten up the slack or change out the bell insulators with a single-section fiberglass insulator.

Sweep the beam antenna back and forth across the noise source to help pinpoint the maximum signal location. Rotate the beam polarization to see how the source is polarized. The noise will be greatest when the antenna elements are parallel with the wires immediately connected to the bad component.

Following the above procedures should help expedite the elimination of your power-line noise. Send me e-mail at my address above if you have questions.