The DX Magazine TECHNICAL

Power Line Noise

Suggestions for Locating and Eliminating Pesky QRN

Compiled by Fred Ho pengarten K1VR

With the sunspot count declining, and interest in the low bands increasing, I hope you find the following exchange of messages as interesting as I do. Thanks to N6TV, N6XI, W3XU, W6QHS, KØSF, and VE5VA for contributing their knowledge and field experiences. It is hard to find stories such as these in books. It all began with a query and story I put out on the internet contest reflector.

Subject: Power Line Noise

As long as people enjoy telling power-line noise war stories, here's mine—along with a question.

I had a noise from the Northeast. As you may know, that's an important direction from New England. Can you spell E*U*R*O*P*E ?

I kept records. Lordy I kept records, but the appearance of the noise wouldn't correlate against time of day, weather, month, or anything I could figure out. The power company's designated guy came one day and couldn't find anything.

I played tape recordings over the phone to him. He came back and we got lucky. Using an old CAB (Civil Aeronautics Board) aircraft band (118-136 MHz) radio with an AM detector, and handheld four-element beam with wooden handle, he found—on the next block North, north side of street, and four houses East, a little old lady with an electric blanket which was arcing. She turned it on only when she went to sit in her favorite living-room chair for reading or sewing, which might be in the middle of the night when she couldn't sleep, or a sunny afternoon, or anytime—randomly. The Edison man, ever so gently, graciously, and with great kindness, took a lap blanket away from a little old lady. Slightly hard of hearing, she never heard the buzzing from the arcing.

Our best guess is that we may have saved her life. A likely eventuality was that she might fall asleep with the blanket on, it would catch fire and burn her. Given her age, she might not have survived the burn-induced shock.

The guy from Boston Edison still uses the blanket when he teaches electrical safety classes.

Amateur radio—a public service!

And now the question. I've frequently seen folks writing on this subject say something like: "Add an AM detector to your two-meter radio and find the source using a portable Yagi." Anyone got a quick-and-dirty substitute? I'm just a humble suburban lawyer, to whom "adding an AM detector" doesn't come easily. I've also never seen a battery powered CAB AM radio at a flea market. Ideas?

(s) Fred Ho pengarten K1VR

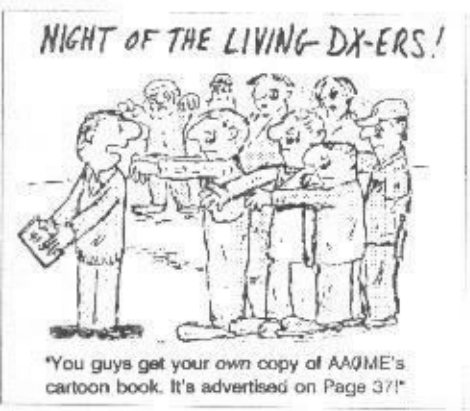
Two good portable radios with AM detectors come to mind. The first is the Sony Pro-80 sold by HRO and others for around $350. Continuous coverage 150 KHz to 216 MHz (requires supplied transverter for frequencies above 108 MHz). AM/FM/SSB/CW (both sides of carrier). No S-meter. 40 memories. Good sensitivity everywhere.

The other is the Yupiteru MVT-7100, for around $650. nine-segment LCD S-meter, much smaller and lighter. 100 KHz to 1.650 GHz, AM/FM/SSB/CW (one side of carrier). Poor sensitivity below 2 MHz, below average below 30 MHz, average to good above 30 MHz. 1000 memories.

Before you buy a new Sony Pro-80, talk to me. I'll make you a deal on my old one now that I have the Yupiteru.

(s) Bob Wilson N6TV

A lot of the current two-meter handies switch to AM when tuned to the



"You guys get your own copy of AA0ME's cartoon book. It's advertised on Page 37!"

aircraft band (118-135 MHz). For example, my Icom IC-P2A/T works that way. I haven't used it as an RFI sniffer yet, but it probably would work.

P.S. Mine's for sale. (I'm in the market for a dual-bander!)

(s) Rick Tavan N6XI

I have used a 27-MHz CB walkie talkie with a 500-microvolt meter across the speaker (lousy AGC on these things), and it has never failed me in identifying the pole from which the noise was emanating. It might or might not have worked in distinguishing a building versus a pole as the noise source. Fortunately, have never had other than true line noise. But the Radio Shack CB HT is a simple expedient to the VHF/UHF devices that, in ambiguous cases, will of course be a lot better.

Motto: "Small antennas, down on the ground, in New England are better than big ones high in the sky anywhere else."

(s) Bill Remington W3XU

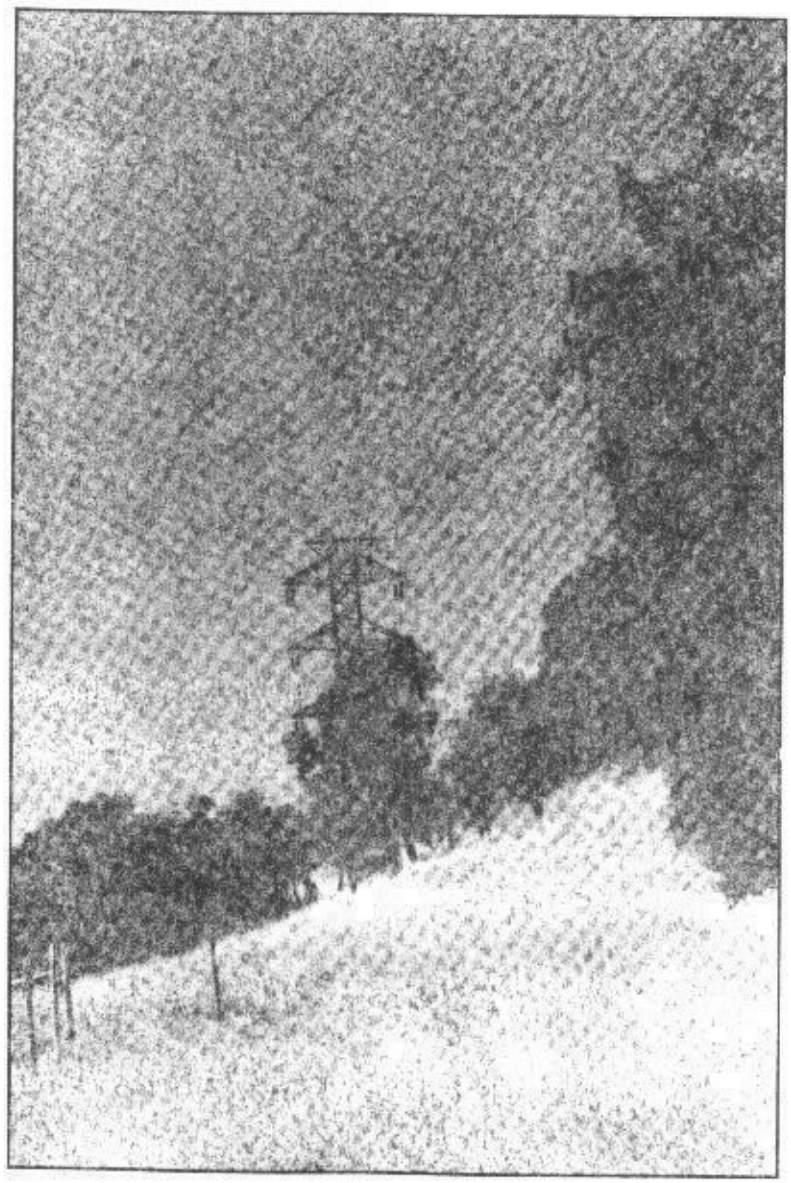
The 118-136 MHz aircraft band uses AM. Any radio that receives that band will have an AM detector that can be used for noise location. AM is used in part so that multiple signals can be heard at the same time, so as not to miss a weak emergency call.

Our local power company guy uses a TV set with an recreational vehicle TV antenna, and watches the noise in the picture, which is also AM.

(s) Dave Leeson W6QHS

W6NL

Last winter, I queried the field for help fixing a high-tension power-line noise problem. My problem was mid-voltage distribution out of a substation. I've had a lot of experience working with the utilities with this stuff, so I thought I would pass on my lessons from the school of hard knocks.



The true offending source was not on the really big lines four miles away (I don't know the KV), but on the intermediate lines running out of a sub-station 1.5 miles away. There were three sets of LAPP bell insulators that were arcing across through the ceramic glue that holds the tie stud (I hate those bell insulators). Sure enough, these were old insulators made in 1954 and 1960. I finally discovered this noise in April, after four months of casual hunting.

The crew replaced the bells with a one-piece design that did not use the series bell pin-and-clevis attachment. They tightened hardware, and replaced the line disconnect, but the "bells" were the offenders (as they have always been for me at other QTHs). There is a star washer available to insure continuity from pin to clevis, but my crew did not have them. The new, one-piece insulator is preferred.

Here is an after-action report of lessons learned:

✓ Use a two-meter or other VHF receiver with AM noise detector, a 4-6 element Yagi and hunt the source **yourself**. Work from your QTH, and work out omnidirectionally from ground zero. Do not discount your own, or neighbors' homes (My experience is 10% are from noisy appliances). I use a modified Heath HW-202 with AM and homebrew six-element W2PV Yagi design. I have a 1 dB NF LNA, but I seldom need it. The Yagi is cumbersome, but with it, not only can I find the pole, but sometimes I can find the exact piece of hardware through careful triangulation. I've never been wrong on a pole; sometimes I get the piece of hardware right.

✓ Check over time, and correlate that the source is indeed the one you're hearing. This is not hard if an actual arc or hiss is seen or heard, but small, inaudible arcs will be low amplitude. If the pole is in a distribution network about

your QTH, it could very well be the one, but be sure before you cry wolf. I know that inaudible arcs can go two miles, but that's about it.

✓ If you're positive, call it in. Give the exact location, and a pole number if available. There should be no need to get FCC, or others involved.

✓ Fixing power line noise is somewhere between re-stocking the employee pop machine, and removing "lost dog" signs from power poles. You must be patient, but be persistent. I reported my problem in late April, but the problem was not fixed until 2 August. My service guy followed up every three weeks or so. He told me up front it would be a while; the ground has been extremely wet in MN, and he did not want to stick the truck. If nothing happens after three months and numerous calls, then you need to write letters (utility management, copy FCC, and BBB). I've never had to write and involve others, but, another ham in St. Paul did—to fix **really big** lines. Tact was not this fellow's strong point, however.

✓ Know the day the work is scheduled. Check the day of their arrival to make sure noise is present. If the noise is intermittent, and it rained a day before, the noise could be gone, and your credibility is shot. If it's there, **be at the site with detector in hand.** If you want to guarantee the problem won't be fixed properly, don't bother showing up when the crew arrives.

✓ Troubleshoot in this order: insulators, disconnects, lighting arrestors, line components. Insulators arc through and are either solid, or intermittent; lightning arrestors usually arc internally and are continuous. The tech will most likely have a 300 MHz "super snoop" noise detector, whose three-element Yagi is too broad to locate a specific piece of hardware. They will then use a portable "snoop," IR, or ultrasonic detector from inside the bucket crane, and check all pieces close-up. Use your six-element Yagi to help. My guy chucked his snoop and used my HW-202 because I had a S meter. I've not used a 440 rig, but I think a 440 rig with a 12-element Yagi would be great.

✓ Once they have fixed the first problem, keep kicking the pole or guy wire until the line is quiet. In my case, they were noisy. When done, you could kick that pole to death and not hear anything.

✓ A letter of thanks to the crew's boss after successful completion goes a long way. Can you think of a more thankless job?

As of 3 August, things are quiet. It was fun to hear summer Europeans again from black-hole land on 75 meters, as well as weak, puny VK sidebanders oblivious to DX. I've even managed to make Mark KØKX jealous, which is a change in status quo.

Motto: "It's only a hobby."

(s) Steve Fraasch KØSF

Subject: Re: Line Noise Follow-Up

On Tuesday, 3 Aug 1993, Steve Fraasch KØSF wrote: "Last winter, I queried the field for help fixing a high-tension power-line noise problem..."

I thought I would pass on my lessons from the school of hard knocks. I'll add a few comments to your lessons based upon three cases that I dealt with several years ago.

The use of VHF/UHF equipment with SSB/AM receive capability **is essential** (I can't stress this enough). As you get closer, higher and higher frequencies really help pinpoint the source.

A local ham was getting complaints from neighbours that he was interfering with their radios, etc. But at the same time he was getting S9++ buzz on all bands to the point that he could only hear the strongest of stations. Three or four of us converged on his place and took an initial beam heading from his HF rig. It said north-west. So we all drove around NW of his place and couldn't find anything. We all went back to his place and I took my two-meter SSB rig into his house and hooked it up to his two-meter beam. No doubt about it—due **south.** Off we went and found a house one block south of him that was radiating like crazy.

We called in the DOC and they called in the power company. The house was a duplex that had been converted into a four-plex. The two basement suites each had their own electrical panel. As soon as they opened the door to one of the two suites they could hear the panel was arcing. Fixed the panel and all was quiet. The kicker was that the occupant of the suite was deaf! It could have been disastrous.

Don't forget all supporting hardware. Two of the problems I've had with noise were caused by:

- A staple that was one of several intended to hold a ground wire to the bottom of a support beam. It caused a phenomenal amount of noise from six blocks away and one whack with a rubber mallet (wielded by a power company employee) fixed it.

- A bolt and nut that hold up the V-shaped support to which the main wooden crossbar is attached (this crossbar then has the insulators and power lines on top). Over time the nut had worked itself loose and had fallen off. The chief of the power company crew thanked me profusely for complaining! If that puppy had given way there would have been on the order of 150kV hanging loose in a residential back alley.

During this visit they also fixed three cracked insulators at different places along the line. I thanked them profusely when they were done!

(s) Pete Hardie VE5VA

Comment by K1VR: Aren't these guys the best?