

### Problem with CAT-line generated noise

We made a small DX-pedition to Lord Howe Island together with OH2YY in Feb 2015. Our call was VK9LC. During the operation we noticed significant noise on higher bands, highest on 10m. We observed that the noise was connected to our computers. When logging program TR4W was running, noise level on 10m SSB was S3 but when the program was closed, noise level was S0.

We had some ferrite toroids available but adding them to the CAT-cable didn't help much. Our USB/RS232 converters were Deltaco UC- 232C9, which are based on FTDI chipset. When trying another type of USB to serial converter the noise disappeared. But the converter was otherwise unreliable. From time to time logging program had to be rebooted. That converter was based on Profilic chipset and had been problematic already during our earlier trips.

After returning back home the problem was analyzed. The weak point was the supplied USB-extension cable. Testing with three different USB-cables proved that there are huge differences between them. With the best cable noise attenuation was 3 S-units (18dB) compared to the supplied cable. Best result was achieved when the converter was plugged directly to laptops USB-connector, without the extension cable. Routing to K3-radio was with standard RE232 extension cable with D9 connectors.



In the lab test 1.5 long wire antenna was connected directly to K3. This proved to be more sensitive than the case experienced on the VK9LC. Instead of S3 noise level reading was S7. By eliminating USB-extension cable noise level dropped to S4. So there was still S4 noise left, independently if the logging program was running or not. That base noise was gone when the USB/RS232 converter was removed.

The base noise was of common mode type as adding ferrite toroids to RS232 extension cable could attenuate that noise. Two snap-in beads dropped by 2S-unit or 12 dB. By having 5 turns on FT240-61 toroid, the noise dropped by 3 S-units to S1. The measurement was made with Lenovo ThinkPad X200. Testing the same with HP laptop gave 1 S-unit better results. It seems that this common mode noise is computer based and can be curried with common mode chokes, if needed.

The reason, why this noise problem happened, was that our antennas were very close to the radios and computers, only about 12-15m away. We didn't recognize the problem in our home installations where antennas are further away. At LHI, if we had quality USB extension cable or extension on RS232 side the noise would have been negligible.

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