

IRCA Technical Column

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The JPS ANC-4 ANTENNA NOISE CANCELLER

by Harry Helms and Nick Hall-Patch

The ANC-4 is essentially a phasing unit which takes a signal from a noise antenna and allows one to adjust its amplitude and phase so that it exactly cancels out locally generated electrical noise which is received by the primary antenna along with the desired signal. The combined signal is then sent on to the receiver, and the listener may hear stations which would otherwise be well below local interference from computers, TV's and nearby electrical equipment.

Some of the manufacturer's specifications are as follows:

Operating Frequency Range:	100 kHz to 80 MHz.
Signal Loss, Main Antenna to Radio:	6 dB worst case.
RF Input Level, Main Antenna:	3 Vrms maximum.
Noise Cancellation:	Typically 40 dB or better.
Input Power:	+11 VDC to +16 VDC @ 150 mA, reverse polarity protected
Size:	1.7"H x 6"W x 4.3"D
Weight:	2 pounds

The noise antenna on the ANC-4 can either be the whip antenna mounted on top of its case, or be a user supplied antenna connected to an SO-239 connector on the back panel. We tested it using the whip antenna, and connected a Quantum Loop to the back panel "Main Antenna Input" connector (also an SO-239). We ran the "Radio Output" connector to the antenna input of a Drake R8, and proceeded to use the system in what Nick claimed was the noisy environment of a hotel room in the San Diego area. In fact, although a random wire on the balcony had received plenty of noise earlier, it was difficult to find a MW channel at night which had a weak enough signal to be covered by the local noise---not unless the Quantum Loop was rotated to receive maximum noise. Under those conditions, the noise antenna did deliver more of a noise signal than the loop did, so we had something to work with.

The ANC-4 has four front panel controls in addition to a power switch with an LED indicator. The "frequency range" switch was pushed in for listening below 20 MHz. The "phase range switch" extends the range of the noise phase control, and was left in position A as advised by the manual. Then the "noise phase" and "noise gain" controls were adjusted until there was a null in the noise level. The noise phase control can require quite a light touch at times, but those who have used phasing units before will readily recognize the interaction between the two controls; otherwise, one will have to learn by doing. It's often a good idea to start with both controls set at the halfway mark, then adjust one, then the other for minimum noise level as indicated on the receiver's S-meter. Once one starts to hear

desired signals coming through the local noise, further adjustments need to be done “by ear” as the S-meter is no longer a reliable indicator. If one doesn’t get a null with the “A” position, change it & try again from 12 o’clock positions of noise phase & noise gain. When the unit is switched off, the main antenna is switched directly to the receiver, which is useful for comparisons.

So how did it work? There is no doubt that the ANC-4 nulled noise under the test conditions, but not always as spectacularly as we had hoped. Quality of reception was improved on 880 kHz by the easy elimination of nearby TVI; a Mexican signal on 820 also became more readable once general electrical noise was nulled. In both cases, however, the desired signal was already audible in the noise before the adjustments were made. On the other hand, signals on 1570 were inaudible below the noise unless the ANC-4 was used. But one had to be very careful not to adjust the settings so that both noise and desired signal were not eliminated together. In this relatively benign listening environment, there seemed to be only about a 12 dB range between signals which were strong enough to be readable without noise cancellation, and signals which ended up too weak to be readable once the noise had been cancelled.

There was often difficulty in maintaining a null on the noise when trying to monitor skywave signals. One would need to keep adjusting the amplitude and phase controls in order to keep the null as deep as possible. This difficulty was not noted by other reviewers, and may have been due to the noise antenna receiving a good deal of the desired signal as well. In addition, there was the possibility of actually increasing the noise level by incorrect adjustment of the controls. It was also noted that a null established on one frequency needed to be readjusted when the radio was tuned even 20 kHz away on the BCB.

The Quantum Loop tuned up to 7 MHz, so we tried to eliminate noise at the higher frequencies, and met with some success on strongish signals like WWV on 5 MHz. Again, nulls needed to be chased after the first adjustment. A major disappointment was that it was difficult to dig any but the strongest long wave beacons out from under the hash. At these lower frequencies, the noise level was strong enough to require nulling by the loop, and the ANC-4 didn’t help as much as on the higher frequencies.

Some listeners have used the ANC-4 for phasing out undesired stations or local sideband splatter (see a recent report on rec.radio.shortwave by Walt Novinger). Although this is possible using the Quantum Loop while listening to local signals, it really shines much better in its intended function as a noise canceller.

This was an hour long test in an unfamiliar listening environment, which was probably not entirely fair to the ANC-4; it might have worked better with a random external wire as the main antenna in this case. It is not a device which can be used to its optimum within minutes of taking it out of its box, and, like the various phasing units, it is likely to become more useful with practice in handling the controls. Harry feels that it is superior to any noise limiter or blanker circuit he has ever used.

The ANC-4 also acts as a fairly decent active antenna for HF using the noise antenna, and is useable with transceivers of up to 150 watts PEP as well as receivers. It is listed at US\$175 and is available from Universal Shortwave. Further information available from:

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