

NEWSLETTER ARCHIVES

A QUANTATIVE COMPARISON OF TWO HF ANTENNAS

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The antenna comparison being reported was between a commercial Chelcom 136ft multi-band windom designed for 80m to 10m and a home brew 260ft full size windom designed for 160m to 10m.

The comparison was triggered by suspicions raised by local signal reports during a slow morse/QRP contest that the newly installed multi-band windom at G0VYN did not seem to be putting in nearly as strong a signal across town locally on 80m as might have been expected judging by reports exchanged between other locals during the contest and from more distant contest participants who often seemed to be stronger locally than Mike. However, generally the other local stations were mainly located to the south and western part of the town and somewhat closer together whereas G0VYN is located in Pound Hill on the NE side of the town. So, the question was raised - is the G0VYN antenna performing badly despite apparently giving reasonable results on more distant stations or is the observed local effect due to local ground wave propagation losses and/or relative antenna orientation?

Reliable comparisons between different antennas are notoriously difficult especially when they are on different sites and even more so when the comparison relies on reports from other stations; however, an attempt was made in this case to try a different method based on comparison of received signal strength on each antenna simultaneously from the same distant station. The method derives from the fact that G3KAU and G3GRO who are located about half a mile apart, both use FT990 transceivers and it had been noticed the "S" meter readings at each station were remarkably close on the LF bands despite the fact that G3KAU uses a 160m full size windom (albeit with the ends bent down somewhat) and the relevant antenna G3GRO is a 80m version of the windom and the antenna orientation at approximately at 90 degrees to each other. This is due in part due to the fact that on the LF bands at the relatively low antenna heights (35-40ft), the antenna polar diagrams in the horizontal plane tend towards being omni directional. In addition, "S" meter calibration tests on both transceivers against a precision signal generator showed that unusually for "bamboo boxes", the absolute sensitivity at S9 on both meters was very close indeed (1 or 2 dB), and the scale calibrations from S9 up to S9+55dB were also very accurate in that the deviations from a true log scale were small, again, 1 or 2dB. The "S" meter scale below S9 down to about S5 showed an average of approximately 4dB per "S" point at G3GRO and 5dB at G3KAU although below S5 the scale accuracy dropped rapidly below that down to around only 2dB per "S" point or so. Thus the calibration of the two "S" meters allowed an accurately known comparison of received signal strengths from two different antennas at two locations. The final requirement was to ensure that the signals measured at the two antennas were from the same station and were recorded simultaneously to avoid propagation variations (ie. QSB etc.). To achieve the latter, the FT990 from the G3GRO QTH was taken to the antenna at G0VYN and a 2m talk-back link established to G3KAU. Signals strengths were then measured simultaneously on a number of reasonably strong stations on 80m, 40m, and 20m by identifying each received station via the 2m link, comparing signal strengths via 2m and then repeating the measurement several times to produce an average. The main bands of interest were 80m and 40m but 20m was included out of interest although it was considered that multiple lobes in the antenna patterns would make comparisons less relevant at the higher frequency band.

Results

Well, the first thing to say is that there is nothing wrong with the G0VYN windom antenna, - much to Mike's relief ! The received signals at both antennas on 80m and 40m were remarkably similar to within 1 or 2dB or so most of the time allowing for the inevitable slight effects of QSB although the LF band conditions at the time were pretty stable. The comparison antenna at G3KAU has been in use for some time and is known to have good performance. There was a greater variation in signal strengths on 20m as was expected; on some stations the G3KAU antenna was

slightly the better and sometimes the G0VYN antenna would be the best, but interestingly, often the signal variation under QSB would cause the signal received at one station alternately to be stronger than the other by perhaps 6dB or more, but then the situation would reverse and the dip in signal at one would coincide with a peak at the other. This of course is the basis of the "space diversity" technique long used by commercial point to point radio links both at HF and the microwave bands.

And finally a note from Derek, G3GRO

Trotting out an old personal hobbyhorse of mine, it is high time that manufacturers of transceivers for the amateur radio market provided something better than the traditional "S" meter which in most cases is pretty useless!! There is no apparent current standard adopted by manufacturers as to what S9 should be nor for the scaling despite the original intention that it should be approximately 6dB per "S" point. In my experience, most meters depart wildly from a true logarithmic response over the scale and from one transceiver to another. I must say that I was very surprised to find how good the FT990 was, admittedly on a sample of only two. Considering how many fancy "bells and whistles" are included and the number of parameters displayed on the LCD display of many current transceivers such as power output, SWR, compression level and even spectrum analysis, it is a great shame that a better absolute signal strength indicator is not provided which would turn the station transceiver into a useful measurement tool for the type of task reported above. By all means retain the traditional "S" meter scales for those who prefer it, but at least provide the option of a scale calibrated in dB relative to a microvolt at the antenna input, or preferably, in dBm. This would be very simple to do digitally and even offers the prospect of individual calibration using PROM as is now very common in commercial test equipment etc. and lends itself to automated calibration methods at the factory. End of beef!--UK dealers please note. How about it Martin et al?

73 de G0VVN, G3KAU and G3GRO

MAIN INDEX