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The "German" Quad

—six bands with one antenna

Technical development leads to new and better amateur radio devices all the time, but it seems that in the field of allband antennas a stagnation has been reached. The hams who work all five SW bands mostly have two antennas for this purpose: a longwire for 80 and 40 meters and some kind of a three-band beam (which means "ugly things" on a tower in the garden). From the ham's viewpoint this is ideal, but most do not want to give their neighbors a reason to move at least three blocks away.

In his weekend shack near Bremen (a harbor city in northern Germany), DL3ISA developed a new amateur radio allband antenna. He tested a lot of different configurations and forms until he found a solution which is simple and operates well on 80, 40, 20, 15, and 10 meters—and is even useful for 2 meters.

He took 83 meters of antenna wire and mounted it in the form of a big quad about ten meters (30 feet) above the ground in a horizontal position, so that the ground serves as a reflector for 3.5 and 7 MHz. Each leg of this big quad has a length of 20.7 meters. The feedline is a 60- or 75-Ohm coax cable which is connected to the beginning and the end of the antenna wire in one of the four corners of the quad.

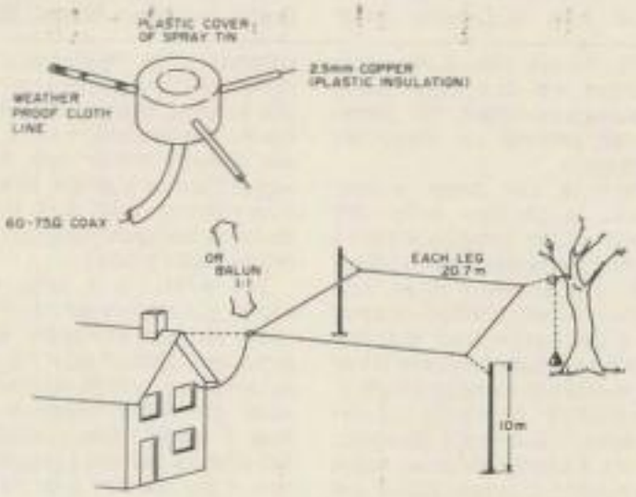

Fig. 1.

A balun (1:1) may be used at the connecting point in case of TVI/BCI, but a long or a deeply ribbed glazed porcelain insulator does an even better job, because it allows for no power loss. The whole connection point should be sprayed with acrylic or otherwise protected against corrosion. DL3ISA put the whole connection into a plastic cup to protect the end of the coax cable against wet weather. (See Fig. 1.)

The length of the transmission line is random, and impedance checks resulted in an impedance of 60 to 90 Ohms at the feedpoint, so that a 75-Ohm coax would be more favorable than 60-Ohm cable.

As a good material with sufficient strength, a 2.5 mm-diameter soft-drawn copper wire with an enamel coating was chosen for this antenna. The guy lines are weatherproof, rayon-filled, plastic clotheslines.

For a European amateur radio station, this antenna should be mounted in an east-west/north-south direction, because the four preferred directions are the extensions of the quad's diagonals. This way, QSOs can be made to the northeast (South Pacific, Japan, etc.), to the northwest (North America), to the southwest (West Africa, South America), and to the southeast (East Africa, Arabia). Of course, this antenna can be fixed in any other direction to work any desired country. On the 15 and 10 meter bands especially, several side lobes between the four main lobes were measured with a beamwidth of 10 to 20 degrees in the horizontal plane.

As a horizontal full-wave loop, this antenna receives only a negligible amount of electrical interference from the surrounding area.

The standing wave ratio was determined by DL3ISA and is shown in Fig. 2. There may be small deviations from the swr due to the local ground conditions. The influence of other antennas is negli-

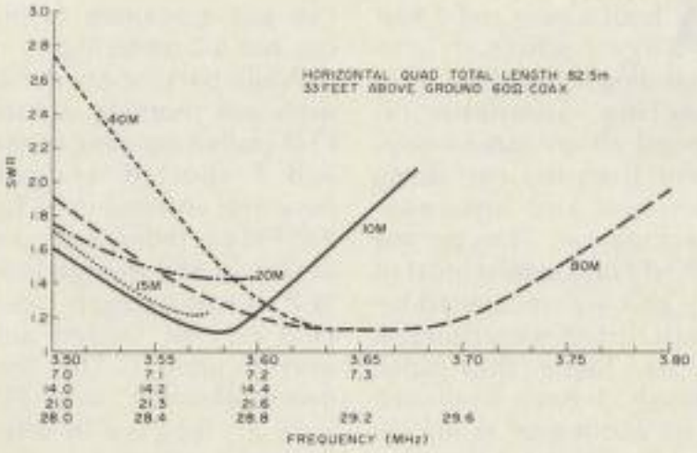

Fig. 2.

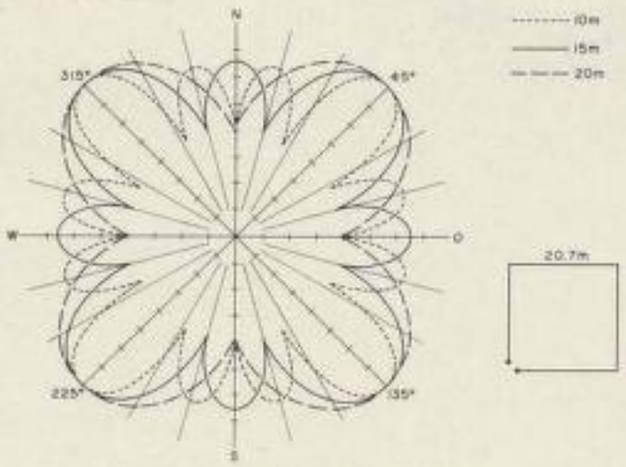

Fig. 3. Antenna height: 10m.

gible if these antennas are in the center of the quad. Parallel mounted antennas outside the quad gave a negative influence on the antenna data in the higher bands. Other antennas should be kept at a distance of at least seven meters from the quad.

The radiation pattern on 80 meters generally is at a high angle, and a radius of 600 miles has been found to be the area covered under normal conditions. The gain relative to a dipole mounted at the same height is around 6 dB; the quad has no directivity on 80m. On 40 meters, the radiation pattern is actually at a lower angle than that on 80 meters, and has no directivity.

On the 20, 15, and 10 meter bands, the radiation pattern is at an extremely low angle (similar to a rhombic antenna). On these bands, four preferential directions have been figured out in poor-to-medium conditions, but with an open band no remarkable directivity has been observed. The horizontal angle of the main lobes is about 30 degrees; the gain was 6 to 10 dB better than a two-element three-band beam at the same height and 12 to 18 dB better than a ground plane antenna. (See Fig. 3.)

Most of the above is just theory. In my practice, the antenna has worked as described only on 10, 15, and 20 meters. On 80 and 40 meters, the radiation has to be almost as low as on the higher bands. My log shows that within a couple of days in December, 1977, I worked the following stations, all on 80 meters SSB: 4Z4, TA1, W3, YK, VO1, JA1, 9M2, CT3, EA9, and C31. The transmitter used had an rf output of about 40-50 Watts PEP, and no clipping or processing was used. The antenna worked just as well for short distances. A gain of at least 2-3 S-units could be observed as compared to a dipole. The antenna could not be tested in QSOs on 40 meters, but comparable results are probable.

DL3ISA found that the antenna works satisfactorily at a height of at least 5 meters above ground. However, the bandwidth on 80 meters becomes insufficient under these conditions.

Near Frankfurt-am-Main, this antenna had been mounted according to the instructions of DL3ISA around a little house at a height of 9 meters. Experimental measurements at this place showed the same results as we had before, even though there was a whole house with all its electrical wiring inside the antenna.

Due to the extremely low angle of radiation, it was possible to work 15 and 20 meter DX to the US east coast and Brazil at a time when Europe was expected to be down from the west for 30 minutes.

A 2 meters test was made with a swr of 1:1.2 to 1:2.0, so that the antenna could be declared as a "six bander" without even a balun. However, the test was only run from 144-146 MHz. The North American band portion running to 148 MHz was not tested.

Taking into account the fact that this allband antenna is good for DX work in the higher bands, works most favorably on 80 and 40 meters, and is no spectacular monster to your neighbor's eyes, it is a real gain for almost any ham. It's also not a bad idea for Field Day.■

LETTERS

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been a member for 40 years and having personally known everyone involved with it for well over 20 of those years, my perspective is good . . . and despite what you may want to believe, not very biased.— Wayne.

CATCH 19

I read your editorial concerning CB infiltration into the ham bands with great interest. You suggested at one point that we track them down with DF equipment, an excellent idea with only one problem . . . what do we do if we catch one?

I had an interesting experience recently along these lines, and it may illustrate the problem we might encounter if we caught one of these interlopers.

I am the editor of New Hampshire's largest circulation newspaper. We are located in Manchester, and reach a wide circulation base. One of our readers called us recently to see if there was anything we might do to help clean up channel 19 in Manchester. It seems that there is one operator who is running more than legal power and splattering over two channels. This operator comes on every night and uses the most obscene, filthy language I have ever heard. He dominates the frequency for hours, and I assure you the language is disgusting.

I thought it might make a good story and, perhaps if something was done, it would serve as a warning to similar operators to avoid such practices. I called the FCC in Boston to see whether they

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