Looking for the benefits of a beam antenna for HF, but don't have room for a monster on your roof? Consider Traffie Technology's HX-5B five-band HEX beam.

CQ Reviews:

The Five-Band "HEX Beam"

BY LEW McCOY,* W1ICP

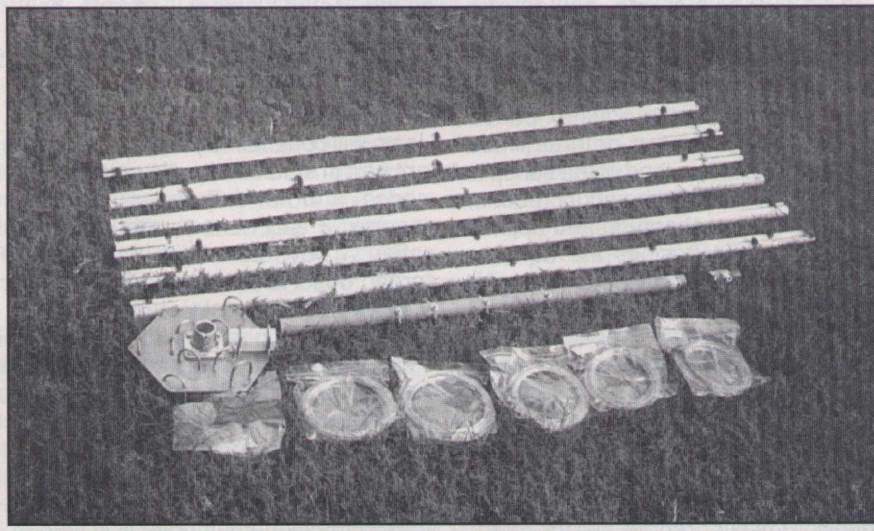
A few months back I got on 17 meters one morning and I ran into Mike Traffie, N1HXA, who just happens to manufacture the HEX beam. I had not been aware of this beam, nor did I have any information on it. Mike was kind enough to run a few checks with me, and I was somewhat astounded to see four very solid S units on my receiver's meter when we checked his antenna for front to back. This was on 18,154 kHz. Unlike many hams who talk about S units and decibels, I have calibrated my receiver in microvolts and then translated to decibels. It so happens that I really have 6 dB per S unit on 18 MHz. This meant that Mike's HEX beam was showing me a 24 dB front-to-back ratio—rather astounding for a 2-element beam.

Being an antenna nut, I asked Mike for more information about the HEX beam. He referred me to his web page (see the manufacturer's information at the end of this article), and all the details showed up there. I called Mike and asked if he would like a review in *CQ* and he said he would.

We put up a five-band job, 20 through 10, at KI7ZZ's house. I am not allowed beams in the restricted park where I live. (However, Mike has since sent me a 10 and 15 meter HEX beam which I did manage to install here; I plan to review this super small beam in a future issue of *CQ*).

The assembly of the HEX beam at Don's house took a little over an hour and then it took another hour or so to get it up on the tower at about 40 feet. My first step was to check the SWR and bandwidth, and I was pleasantly surprised. I could provide curves in this review, but quite simply, the SWR did not go above 1.7:1 on any of the bands except the very high end of 10 meters, where it was 2:1 (which makes this an excellent contest antenna). The transceiver we were using had a built-in tuner, but in no instance was it necessary to use the tuner.

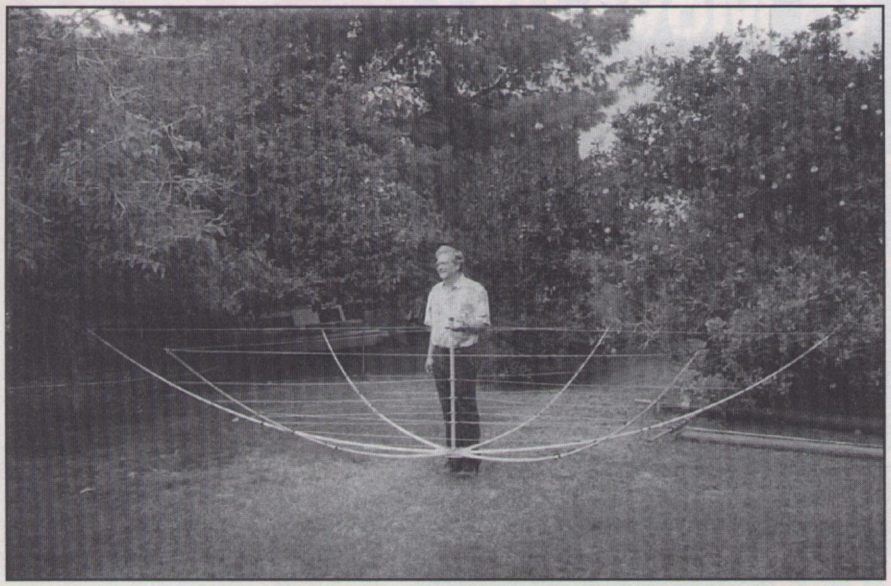
Briefly, the five-band antenna consists of five dipoles with reflectors, no traps or any other devices. Before going further, I should describe the size of this antenna. A regular 2-element Yagi for these frequencies would have elements on the order of 33 to 36 feet, usually on a 10 foot or longer boom. This means a turning radius of at least 18 feet or a diameter of more than 30 feet. The configuration of the HEX beam is just about half the size of the Yagi, with a turning radius of only 9.4 feet. Thus, by any standard its small size is a real plus—less windloading, light weight, and many other features, as we will see.



Here are the parts of the five-band HEX beam. The poly rods are of space- age technology material and are very strong. The hub, which supports the antenna, is at the bottom left.

A word about windloading: An antenna with this configuration is always going to be in a minimal configuration in heavy winds. This is because it is a completely symmetrical antenna, so windloading is not even a factor to consider (see photos). Another important point I should touch on here: With trap beams there is always a sacrifice in gain because of element spacing. Optimum gain in Yagis is always obtained with optimum spacing. In this five-band HEX beam this does not appear to be a problem. That may seem like a very unusu-

*Technical Representative, CQ, 5565 E. Baseline Rd. #1607, Mesa, AZ 85208
e-mail: <lewmccoy@uswest.net>



KI7ZZ is shown here with the completed five-band HEX beam. Note the symmetrical aspect of the antenna, which vastly reduces any wind-loading problems. The total weight of this five- bander is about 20 pounds.

al statement, but in actual use, the configuration of this HEX beam does *not* depend on spacing for gain.

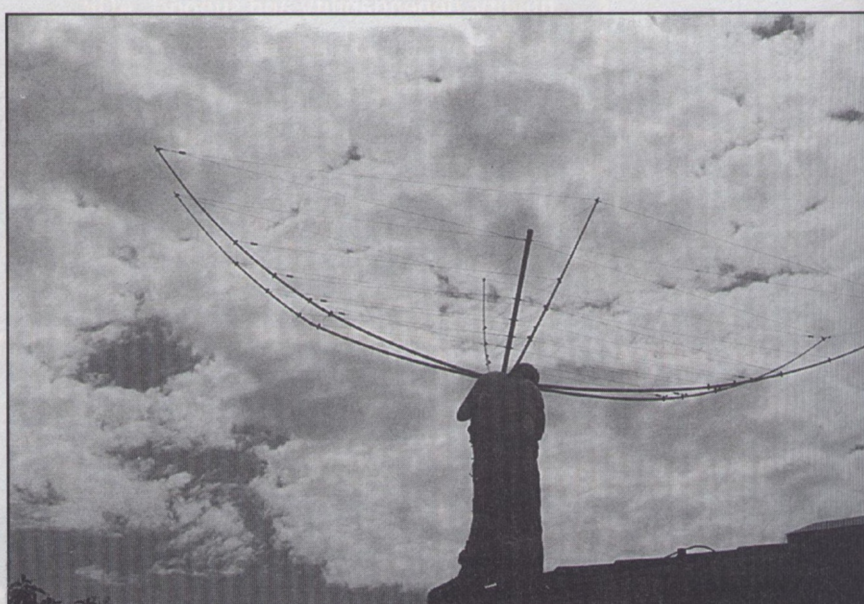
The proof of the pudding, of course, is in performance, so let me give you some of the results of that first hour or two. We first got on 10 meters and checked with some of the DX stations. VK7VU, in Australia, gave us 18 to 24 dB front to back, and this figure was repeated on both stateside and DX stations. There was a huge pile-up on a station in Saipan, so I thought I would try to break it with our 100 watts. The pile-up was huge by any standard, but it only took two calls to nail the DX station. It was the just about the same story on all the other bands—at least 12 dB front to back on some bands and as much as 24 dB on others. All these tests were made on sky wave.

Next I used the antenna, again with 100 watts, in the CQ World-Wide DX Contest. We gave it a real workout on 20 and 15 meters. In no case, in no pile-up, did it take more than four calls to make contact—and this was at 100 watts. The CQ WW is an excellent place to test a new antenna (and I must add, this contest is also lots of fun!). The pile-ups are frequent, and it's easy to make assumptions about an antenna's performance. I am not in the least afraid to state that the HEX beam's performance was, and is, outstanding. From my very first time on the air I have always been a DXer. It's a real pleasure to use an antenna that makes pile-ups easy to beat—and only running 100 watts input.

A single antenna, one band, is similar to two letter "W"s, one of the Ws being the driven element and the other the reflector. To visualize the antenna, the feed point is at the center of the top junction of the letter W of the driven element. Immediately behind this feed point is the reflector, which is a parasitic element. The antenna is a very close-spaced array, with the feed point of the driven element only an inch or so from the center of the reflector. The antenna is supported by specially made fiberglass rods. These are not ordinary poly rods, but what I would call space-age technology; they are very, very strong.

In the multiband configuration we tested, the driven elements all are connected to the center column, and a 50 ohm coaxial line is connected at the top of the column. The fiberglass poles are mounted on a circular plate, and these are used to support the various dipoles. These fiberglass rods are drawn up by the antenna wires so that the antenna looks like an upside down umbrella (see photos). A pipe or mast is used to support the antenna structure on a rotator, and because of the antenna's light weight, an ordinary TV rotator can be used to turn the antenna. The five-band version we tested comes in at 20 pounds. Again, construction time took less than an hour and the antenna was up and rotating within two hours of opening the package. The instructions are very clear and easy to follow.

Trying to understand the reason this antenna works so well is rather difficult. Such close spacing of two elements can justify the classification "super gain," but in this case there has to be more than simple gain involved. If you go way back in beam history and look in the old ARRL antenna manuals, you will find that maximum gain occurs at very close spacing—as I recall, 0.05 wavelength spacing. What gives me a problem, though, is not just the gain, but the apparent shaping of the radiated signal. Keep in mind that gain is obtained by shaping the radiated signal. Just from observation on my part, it would appear



On the roof, getting ready to mount the antenna on the mast.

there is some form of compression of the RF in desired skywave angles. Some antenna people might question that statement, but it is difficult to argue with results. It's like that old statement "been there, done that," but in this case results speak for themselves.

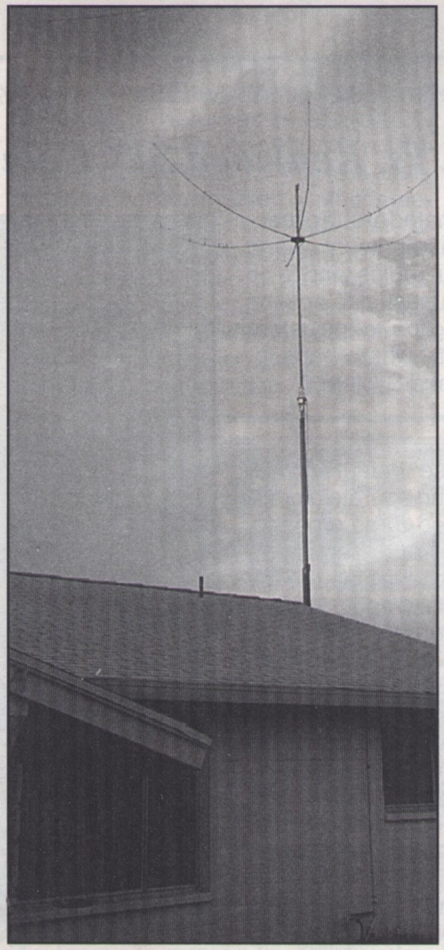
You might ask, what about computer programs such as NEC? From my viewpoint, and heaven knows I have done enough computer programming and modeling, the configuration of this antenna makes it difficult to obtain reliable results. Again, the bottom line here, when all is said and done, is that the antenna is a very good performer.

I cannot help but relate an experience I had with antennas back in the late 1940s. Clarence Moore, the inventor (or discoverer) of the quad beam, came back from Ecuador. He had worked for a missionary in the Quito area, and they had a high-power radio station at about 10,000 feet above sea level. Moore had put up a Yagi, but when they applied power, the aluminum elements actually caught fire and burned. This happened because of the extremely high voltage and the corona effect prevalent in high altitudes—in this case 10 KW at 10,000 feet, and that's high altitude. In searching for a way to avoid the RF voltages, Moore came up with a full-wave loop antenna, or if you will, a single-element quad. The antenna performed marvelously, so he added a director.

In those days, 10 meters was hotter than a Saturday night special, and when Moore came back to his home in Indiana, he put up a two-element quad and showed up on 28,500 kHz. There were several of us who laid claim to 28.5 simply because the DX portion of the band was 28.0 to 28.5. The DX would call CQ and start listening for the U.S. at 28.500. Suddenly Moore showed up and started "stealing" DX from us. I might add that we didn't get mad or get even, but were open-minded enough to go down and visit him and see what he was using. Well, several of us converted to quads and were more than happy.

Shortly after that I went to work at the ARRL. I asked then-Technical Director George Grammer how come they didn't show much on the quad in the *Handbook* or other literature. His answer was that they had tested a single quad loop and it only showed 1.8 dB gain over a dipole. They had never tested a quad beam! I got a supply of bamboo and built several quads, and I must say they outperformed many of those early Yagis.

What does all of this have to do with a review of the HEX beam? Quite simply, from my experience so far I firmly



Up in the air ready to work the world. And it does!

believe that the HEX beam is a new approach to a very good skywave antenna. I don't have an antenna range, but after checking the performance of this antenna versus Yagis of known gain, from skywave performance I would stick my neck out and state that the antenna has at least six decibels of gain over a dipole, and possibly more on some attack angles.

Some readers may question ice or wind loading. In the case of ice, these antennas have withstood heavy icing conditions such as those which have dragged down Yagis.

The HEX antennas are very lightweight, simple to erect and as I said, can be rotated with an ordinary TV rotor. Going even further, in many cases hams have a problem putting up a beam because the beam extends over a neighbor's property. This antenna, with its small diameter, may be an answer to this dilemma. Also, you do not need a heavy-duty tower nor rotator.

When doing a review I do not usually quote from the manufacturer's literature. However, in this case the following description from the manufacturer's web page best describes this antenna:

The Hexagonal Array

With the HEX Beam, two intense flattened fields are phased and coupled to provide a high level of performance in a compact package. Thus the completed array is half normal size; the HEX Beam's elements are full size. To repeat, no loading devices are used. The HEX Beam's small size and enhanced performance at low heights make a substantial saving possible in tower and rotor cost. The array is direct feed with 50-ohm line. The HEX Beam is built to handle 1500 watts. Its unobtrusive appearance is an asset in sensitive locations.

I was very impressed by the HEX beam. If I had to rate beams on a 1 to 10 scale, I would give this antenna a solid 10. Many models are available, including single banders and multiple-band units such as the one I used, which sells for $599.

The HX5-B is made by Traffie Technology, 421 Jones Hill Road, Ashby, MA 01431 (toll-free 1-888-599-BEAM). Brochures are available on request. For more details, see the Traffie Technology website at <http://www.hexbeam.com>. ■