The MFJ Cobweb antennas provide good multiband HF performance in a compact, lightweight, and stealthy package. This antenna could fill multiple roles for the active amateur who needs to cover many bands with good performance from a small package.

**How They Did It**

The Cobwebs are essentially horizontal half-wave, center-fed dipoles bent into an almost square shape with what would be the ends separated by fiberglass insulators. The concept is similar to that of the almost omnidirectional, horizontally polarized VHF “Halo” mobile antennas from the 1950s and 60s. The VHF Halos were formed from self-supporting tubing bent into a circular shape, while the Cobweb’s longer dipoles are made of stranded wire supported by a fiberglass X-shaped frame.

This version of the Cobweb consists of six parallel-connected dipoles, all sharing the same support structure. An additional fiberglass rod supports an impedance-matching transformer at the common feed point, as well as a ferrite-bead common-mode choke. The bent shape of the dipoles results in a feed impedance of close to 12.5 Ω at resonance, which is matched to 50 Ω coax cable through the 4:1 transformer.

**How It Plays**

To get a handle on the expected performance, I generated EZNEC models of the 20-meter element and compared its pattern and tuning to a straight 20-meter dipole made from the same size and type of wire, and both a half wavelength above medium ground. The azimuth patterns are shown together in Figure 8. While the Cobweb gives up 1.6 dB in peak gain in the broadside directions, it gains 5.1 dB in the direction of the dipole ends compared to the straight dipole. So while not perfect, it is within about 2/3 of an S-unit of being perfectly omnidirectional — far closer than a dipole at a reasonable height. Peak gain is higher than the typical vertical monopole.

All things being equal, shortening a dipole through loading or bending invariably leads to a lowering of input impedance at resonance and reduced SWR bandwidth. Figure 9 shows the modeled SWR of both antennas over the 20-meter band. In my experience, parallel-connected dipoles also exhibit reduced SWR bandwidth on the higher-frequency bands. Both effects are at play here on 17 meters and up. Of course, in the real world, we will usually have a run of coaxial cable between the antenna and the radio, and any coax losses will reduce the SWR variation as seen at the station. In my test arrangement, I had about 75 feet of RG-8X marine-rated coax between the antenna and station.

My approximate measured 2:1 SWR bandwidth on each band at the station end is shown in Table 3.

<table>
<thead>
<tr>
<th>Band</th>
<th>Approximate 2:1 SWR Bandwidth (kHz) Measured at the Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Meters</td>
<td>245</td>
</tr>
<tr>
<td>17 Meters</td>
<td>195</td>
</tr>
<tr>
<td>15 Meters</td>
<td>180</td>
</tr>
<tr>
<td>12 Meters</td>
<td>240</td>
</tr>
<tr>
<td>10 Meters</td>
<td>230</td>
</tr>
<tr>
<td>6 Meters</td>
<td>360</td>
</tr>
</tbody>
</table>

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Figure 8 — EZNEC azimuth plot of a model of the 20-meter Cobweb dipole (blue) compared to that of a straight wire half-wave dipole (red). Both are at a half wave above EZNEC medium ground. Note that, while the Cobweb gives up a bit in the broadside direction, it gains considerably in the “off the ends” direction.

Figure 9 — EZNEC modeled 20-meter SWR plot of the two antennas of Figure 8. The shortening of the Cobweb antenna (red trace) through bending results in a reduction of the SWR bandwidth compared to a full-size dipole (blue trace), as shown. This happens to almost any shortened or reduced-size antenna.

approximate because I generally trimmed the antenna toward the low end of the band, so a future user would be able to trim more if desired for their location and frequency preferences. Thus, my measured lower SWR frequency sometimes extended below the lower band edge. The data was taken with my RigExpert AA-54 antenna analyzer. While the 2:1 SWR bandwidth on some bands was less than the full band, most were easily within the 3:1 range of the internal trimming antenna tuners in many radios.

I found that, in addition to the recommended 5/32-inch nut driver, a 5/32-inch box wrench was quite helpful for holding the nylon-filled nuts while I tightened the wire supports.

Installation at final operating height will be different at each location. One limitation that's not immediately obvious is that the antenna must be mounted on the top of the mast — there is no access to the mast above the Cobweb’s hub. This wasn’t a problem for me, as the Cobweb was the only antenna on the mast. I used a TV-type strap-on chimney mount along with a 5-foot steel TV mast to support the antenna. It was light enough that I could just carry the assembled antenna up the ladder as I went without any problems — on the other hand, I wasn’t going very high.

As with boats on land, antennas at ground level always look larger than they do at their final position. The antenna can’t be called invisible, but I give it good marks for stealth. The thin wires can barely be seen in just the right light, and the dull finished gray fiberglass supports are not dramatically visible either. My wife, Nancy, thinks I should paint those shiny straps that came with the chimney mount to match the red brick, however.

Documentation
The Cobweb antenna is supplied with a nine-page Instruction Manual that includes the assembly and adjustment procedures. The manual is illustrated with line drawings that describe each assembly step. The instructions were generally adequate, although a few steps took some visualizing to decide about the intended parts orientation. I did have an issue with the description of how to mount the matching transformer assembly.

At the time the manual was written, apparently the transformers for the two power levels were quite different. The high-power unit was larger and had two mounting bolts. The low-power unit used a single bolt. They are thus assembled somewhat differ-
ently, and the specified mast mounting arrangement is different to adjust the balance for the additional weight of the high-power transformer. The transformer supplied with my antenna had a single mounting bolt and thus appeared to be a low-power unit.

I spent time on the phone with the helpful dealer, who arranged with MFJ to send me the correct transformer. Much to my surprise, the new transformer was the same as the original. After some detective work on the phone with the MFJ product team, I was told that the high- and low-power transformers are now packaged identically, except for cable color — gold for high power. It appears that they made a product change, and when I built the review antenna, the manual had not yet caught up.

Once past that distraction, I found that the step-by-step assembly instructions were clear. Each step has a check-off box to help you keep track of progress. The preliminary tuning instructions — recommended to be completed at the 6-foot level — were straightforward, but took a long time, because some wires were considerably longer than needed, and it is important that they not be cut shorter than desired. I used an antenna analyzer through a length of coax just long enough so that I could view the readings outside of the very close near field to avoid detuning. A final tuning step is needed with the antenna at (or near) its final location, so leave the preliminary tuning set at, or just below, the bottom of each band.

**On the Air at W1ZR**

I had an opportunity to compare the Cobweb to my usual antennas. For 20, 15, 10, and 6 meters, I usually use my three-element triband Yagi, with a 6-meter coupled resonator, at a height of about 33 feet. For 17 and 12 meters, I had a coupled resonator dipole at about the same height as the Cobweb. I would expect to see more than an S-unit stronger signals from the Yagi, if pointed toward the other station, and close to the same signal strength on the dipole. I found I could make the contacts with strong stations with the Cobweb as easily as I could with the beam.

Unfortunately, during the test period, I didn’t have much opportunity to make contacts on the higher-frequency bands, due to poor propagation conditions. On 6 meters, I checked some nearby beacons, as well as W1AW on 50.35 MHz and found performance as I would expect — one to two S-units below my higher coupled-resonator Yagi.

Amateurs who are looking for a compact, stealthy, and reasonably performing horizontal antenna won’t be disappointed in the Cobweb. It isn’t a competitor to a multiband Yagi, but can stand up next to a full-size dipole at the same height on all six bands. For the ham with full-size dipoles, this could also be used as a gap filler for stations in the dipole’s nulls, or for bands that didn’t make it to the top of your dipole priority list.

Even the Yagi user might find this antenna helpful for events requiring contacts in multiple directions, or to spot stations off axis before swinging the beam. I could also see this as an antenna for ARRL Field Day, perhaps on the top of a push-up mast supported by perpendicular 80- and 40-meter inverted-V antennas. There are lots of possibilities.

**Manufacturer:** MFJ, 308 Industrial Park Rd., Starkville, MS 39759; www.mfjenterprises.com. **Price:** MFJ-1836H, $260; MFJ-1836, $230; MFJ-1838, $400.

**Notes**

2. The default EZNEC “medium” ground has a conductivity of 0.005 S/m and a relative dielectric constant of 13.