Turn Your Vertical Antenna into a Rotatable Beam

Laser-like 3-degree beamwidth thanks to a carbon fiber slotted sleeve.

Jay Kolinsky, NE2Q

Many hams who use vertical antennas are dissatisfied with their performance, compared to their buddies who use directional beam-type antennas that concentrate their RF emissions over a narrow area of 50 to 80 degrees. There is no doubt that the azimuth antenna pattern for vertical radiators is basically a perfect circle. Your transmitted RF is spreading equally over a 360-degree circle. This is a significant waste of energy because you talk to only a station in a pinpointed area. Using a vertical antenna for receiving demonstrates that signals are received from all directions, just like interference, man-made, and atmospheric noise. Most of us have heard two common phrases: "Verticals radiate poorly in all directions" and "Verticals are very noisy antennas."

My First Antenna

I read the full-page advertisements by Gotham that used to appear in *QST*. The ads featured the V-80 vertical. I ordered one, and it came in a long, skinny carton. It consisted of two aluminum tubes, one smaller than the other to telescope into the larger tube. It was held together at the joint with a hose clamp and was about 21 feet long when fully assembled. There was also an air-wound coil about 3 inches in diameter. The idea was to put an alligator clip on the center of the coax feed line and tap the coil at different points for operations on 10 through 80 meters. I installed the antenna on the side of my father's summer home in Mohegan Lake, New York, and it worked. I made contacts but heard very few signals outside of the US. I used it until 1962, when I built a two-element 20-meter quad antenna using bamboo arms with a fiberglass tape coating. The quad outperformed my V-80 on 20 meters.

I've always been a creative thinker and developed new products over the years. Some of my early inventions are in the Smithsonian Institution in Washington, DC, and I even have a few US patents. One day, I was thinking about the shortcomings of verticals. I wondered, "How about turning a single vertical element into a narrow beamwidth directive aerial?"

Figure 1 — The carbon fiber tube placed over Jay Kolinsky's, NE2Q, magnetic mount antenna on his car.

Carbon Fiber to the Rescue

I heard someone mention that carbon fiber tubing will distort RF antenna patterns, which made me realize that a sleeve of carbon fiber slipped over a vertical element might severely restrict RF from escaping from a vertical. I quickly obtained a 10-foot tube of carbon fiber 2 inches in diameter and decided to experiment. I installed my ¼-wave, 2-meter magnet-mount vertical antenna on the center of the roof of my car, and took readings with my field strength meter 50 feet away. I ran 25 W and recorded the 20% field strength needle

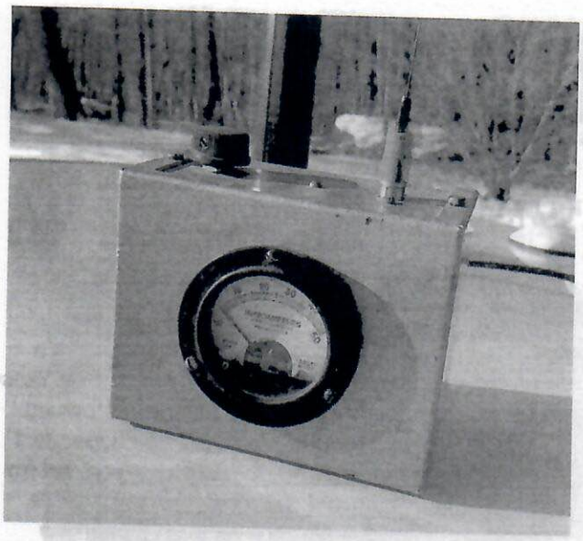

Figure 2 — The field strength meter displays no reading.

deflection. Then I slipped a 20-inch-long carbon fiber tube over the 19-inch whip, as shown in Figure 1, and I was shocked. The field strength meter showed no reading at all, as shown in Figure 2, even with 100 W to the antenna.

The Slot

I quickly removed the carbon fiber tube and headed to my basement for my table saw. I cut a 1/16-inch-long slot across the entire length of the 20-inch tube, as shown in Figure 3. My theory was that the slot would allow the RF to escape through the narrow opening and in the direction of the slot. I placed the slotted sleeve back over the magnet mount and did more field strength tests. I carefully rotated the slot in the tubing so it would face the exact direction of the field strength meter. To my amazement, the field strength meter pinned at full max. I started to lower the transmitter power and was able to get the same reading I got with no sleeve installed on 25 W, but now I was transmitting with only 1 W! Obviously, the theory proved to work, and I now have a vertical beam that would send my RF to a very narrow portion of the globe depending on where the open slot was facing.

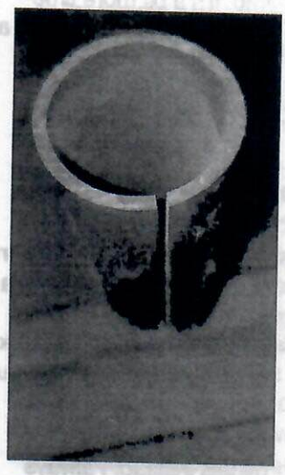

Figure 3 — The carbon fiber tube with a 1/16-inch-long slot cut down the length of the entire tube.

Narrow Beamwidth

Calculations for a 2-inch-diameter pipe show a circumference of about 6.8 inches. Because there are 112 individual 1/16-inch segments in a 6.8-inch circumference, a 1/16-inch slot provides close to a mind-boggling 3-degree vertical plane beamwidth. This is significantly smaller than typical results with common beam antennas and provides concentrations of RF energy into very narrow portions of the globe when using this concept with HF verticals.

On-the-Air 20-Meter Performance

I like to chat with distant DX stations, so I tried the slotted sleeve concept on a new 1/4-wave 20-meter vertical ground plane antenna with the base about 1/2 wave above ground. With the open slot facing Europe, it outperformed my five-element 20-meter Yagi by an astounding 5 to 6 S-units. Receiving was very quiet, and the power line and atmospheric noise were eliminated over a 357-degree arc. I am now working on a small direct current motor that will allow remote rotation of the slotted sleeve to any part of the globe. The concept is easy to duplicate, and I suggest that anyone who has been disappointed by their vertical try their own slotted sleeve. After 2 years of use on 20 meters, many hams have asked what the name of the antenna is. For short, I call it the LLS (Loof Lirpa Slot).

Caution: Extreme RF Exposure

Do not stand near the open slot when running more than 5 W because you will probably exceed the RF energy exposure levels referenced by the FCC mandates.

All photos provided by the author.

Jay Kolinsky, NE2Q, was licensed in 1958 and is still very active on most of the HF bands. Ham radio was the principal factor for Jay to start his own electronics manufacturing company, Kolin Industries, Inc. at the age of 22. His first product was the NL-1 noise limiter advertised in *QST* in 1962. He has several inventions, including the electronic sirens used worldwide on most fire and security alarm systems. Jay can be reached at **ne2q@arrl.net**.

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