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Curtain Raiser

— simple Sterba curtain antennas

The mere mention of the Sterba curtain antenna evokes visions, or memories, of huge multi-element, broadside antenna arrays once used by the Voice of America, Radio Free Europe, RCA, Mackay Radio, and Press Wireless too many years ago. The objective of these antennas was to concentrate the radiated power in a specific, desired direction. In other words, to get "gain."

For amateur radio use, the directivity and gain objectives need some definition, which, naturally, will be different for different amateurs. For amateur radio use on 20 meters, the bi-directional Sterba curtain does not need to be huge and complicated, nor does it need to be erected at unreasonable heights. W2EEY made the point that because the curtain's vertical radiation pattern is low and the horizontal pattern is broad, the result is a more effective antenna, with gain, that can be erected in a limited space using simple supports, like trees.[1]

For both 20 and 10 meters, the objective at W2JTP was primarily broad directivity to the west coast (not DX), reduced pickup for receiving from W4-land, and reasonable gain. (Another existing antenna, a fixed wire triangle beam, is used to work Florida.) Simplicity and low cost also were important considerations.

The first Sterba curtain at W2JTP was put up for 20 meters, 12 years ago, and is still in operation. As shown in Fig. 1, it is only one wavelength long (about 68 feet) and is one-half wavelength high (about 34 feet). The bottom wires are only 10 to 12 feet above the ground although W2EEY recommends a 1/4- to 5/8-wavelength height. The height at W2JTP was governed by two trees available more or less in the right places for both directivity and height.

Construction

A Sterba curtain is easily constructed using #18 or #17 electric fence wire. This is a copper-clad steel wire, unbelievably strong for its size. It is readily available from Montgomery Ward or Sears Roebuck. A 5,000-foot reel is quite small and not too expensive. Don't try to build the transposed phasing sections with this wire, however, unless you want an experience in frustration. (It is impossible to make them hang straight.) Prefabricated open wire, 450-Ohm transmission line was used instead. This is made of #18 solid copper wire spaced 1-1/8", with the plastic spreaders about 10 inches apart. It is made by Saxton Products of Congers, New York (catalog #C4-100-12), and was purchased from Lafayette Radio in a 100-foot roll. The eight insulators were made from pieces of oak, each 4 inches long and about ¾" square, boiled in paraffin. The feedpoint insulator was made from a scrap piece of printed circuit board, without foil. All connections are soldered, by the way.

A plastic clothesline pulley was installed on each tree about 45 feet above the ground. Halyards were made from ¼" nylon rope. The halyards are continuous loops, handy should a wire break. (It isn't necessary to re-thread the pulley then.) The main reason behind the use of nylon rope is that it stretches. This effectively puts a very necessary "spring" on the antenna to keep it taut and to keep it from breaking when those trees sway

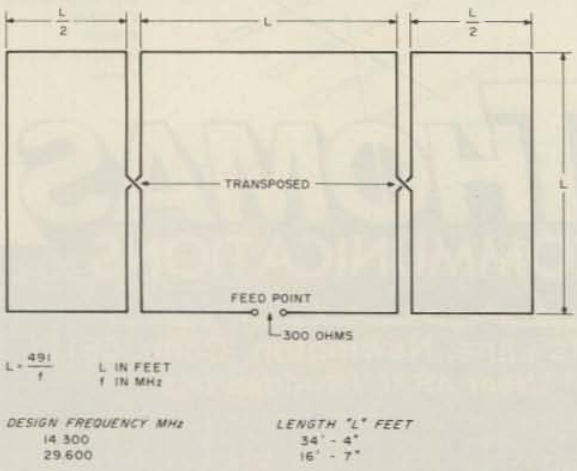

Fig. 1. Sterba curtain schematic diagram.

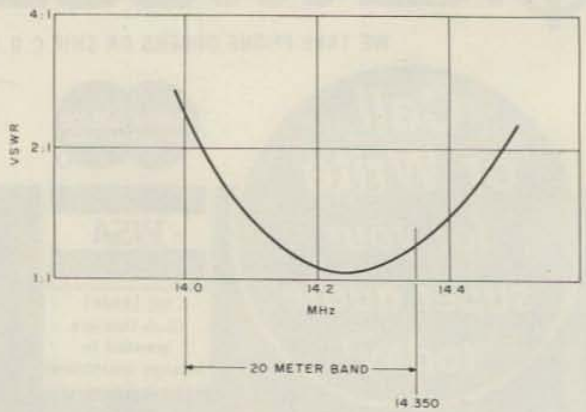

Fig. 2. Measured vswr of 20-meter Sterba curtain.

in the wind.

The antenna is fed with 300-Ohm TV twin-lead, a short length, because it is very light—it won't weigh down the antenna at the feedpoint. About 25 feet from the antenna, a coaxial balun, ½-wavelength long, made from RG-59/U, transforms the 300 Ohms to the desired 75-Ohm coax connection to the rig.

Performance

The antenna element lengths were adjusted until the array resonated at 14,300 kHz. From this the formula was derived. The vswr curve of Fig. 2 was measured with the usual standing wave ratio bridge. The input impedance, at the feedpoint, was measured with an rf impedance bridge, the Antennascope of W2AEF,[2] a grid-dip oscillator, and a digital frequency counter to read the gdo frequency.

The horizontal pattern is quite broad, as predicted by W2EEY, and the pickup off the ends is not significant. Coax relays are used to switch the rig between the Sterba curtain, the Florida triangle beam, and a reference dipole. The gain is apparently about 6 dB, also as predicted by W2EEY.

Now that 10 meters has come alive again, the national FM simplex frequency of 29.60 MHz[3] also has come alive, with cross-country contacts commonplace. Using the formula and the configuration of Fig. 1, a Sterba curtain for 29.60 MHz was put together in one evening. Stretched (again with nylon rope) between a convenient tree and the house, the 10-meter Sterba curtain was erected. The bottom wires vary from about 7 to 12 feet above the ground. A short length of TV 300-Ohm twin-lead runs from the antenna feedpoint to a 4-foot stake where a ½-wavelength coax balun transforms the 300 Ohms to 75 Ohms. RG-59/U is then run underground to the house and rig. Performance? Great! The gain makes my 150-Watts output look like 600. Stations called now come back.

Modifications

How can we improve our 2-section Sterba curtain? Again, "improve" must be defined. If we want more gain, more sections can be added, making a longer array.[4] This will increase the gain at the expense of beamwidth—the beam gets sharper[5] with more sections, which is fine if we are building it for a point-to-point operation. The feed impedance goes down, too, with added sections. (That 300-Ohm feedpoint is darn convenient!)

One possibility yet to be investigated, on 10 meters, is the addition of a reflector array, about 0.2 to 0.25 wavelength behind. (The bi-directional feature of the array described is not important at this station.) Of course, this complicates construction, as 0.2 wavelength at 10 meters is about 6 feet. Gone would be the simplicity and ease of erection of the antenna described. Would it be worth the additional effort to get a few more dB forward? This must be decided, first. ■

References

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3. Herman, S., "Try FM on 29.6 MHz," *73 Magazine*, November, 1978, p. 184.
4. Cousins, G., "A Sterba Curtain for the Low Bands," *CQ Magazine*, November, 1962, p. 47.
5. Staff, "A 'Super DX Antenna' for FM Reception," *Radio Magazine*, February, 1942, p. 11.