A Sterba Curtain for the Low Bands

BY GEORGE COUSINS*, VE1TG/W6

If you have the space available and are interested in DX, here is an antenna to consider. The results on 80 and 40 were terrific.

Being one of those poor individuals with a fanatic love of DX, closely followed by contests, I became convinced long ago that the antenna was where I should concentrate my efforts. Having a few acres of ground available, and living on the East coast of Canada, where 80 and 40 meter DX is not too hard to work providing one can get through the QRM, I began to take a good hard look at various types of wire arrays.

The most familiar such arrays are the Vee beams, Rhombics, Lazy H's, and assorted varieties of end-fire, broadside and collinear arrays. There are reams of information on these in any antenna handbook, and one by one they were considered, and rejected for one reason or another. There were not too many more to try, but as usually happens, where there's a will there's also a way.

The Sterba Curtain

In every handbook, usually in one or two sentences, on rare occasions in a short paragraph reference is made to another array, the Sterba Curtain. It is a broadside array made up of a combination of parallel and collinear elements giving excellent gain. It is simple to extend to any size, simple to feed and it's used by commercial short wave installations, so it must be good. Let's take a close look at the possibilities.

I have heard of one or two cases of this antenna being used on the high bands by a few amateurs, but when the low bands are concerned, several very important points must be considered: size, height, materials, cost, *etc.* In order to see what could be done, I first decided on a frequency of operation, 7 megacycles, remembering that this was going to be used in a c.w. contest. Glancing at the basic sketch of the antenna, fig. 1, the dimensions work out to be approximately 66 feet for each half wave section and 33 feet for each quarter wave section. For best results (according to the books) the lowest set of elements should be at least a half wavelength above the ground. Since the antenna is normally hung vertically above the ground, this adds up to something rather staggering—a pair of towers about 120 feet high! This thought was almost enough to discourage me. After thinking about it for awhile I went outside and checked the height of a few maple trees I had down in the field. Three of these were around 40 or 50 feet high and a couple of spruce trees were around 30 feet. The more I looked, the more I wondered what would happen if I strung the antenna with the top string of elements stretched between the tops of the tall maples, and the lower string between the shorter trees. The whole affair would end up hung at about a 45 degree angle to the earth with at least a little height on one set of elements. The others would be pretty low, but maybe this would work out anyway. I built the thing, tried it out, and it did all that I wanted it to, and lots more besides. Interested? Well let's see how to build one.

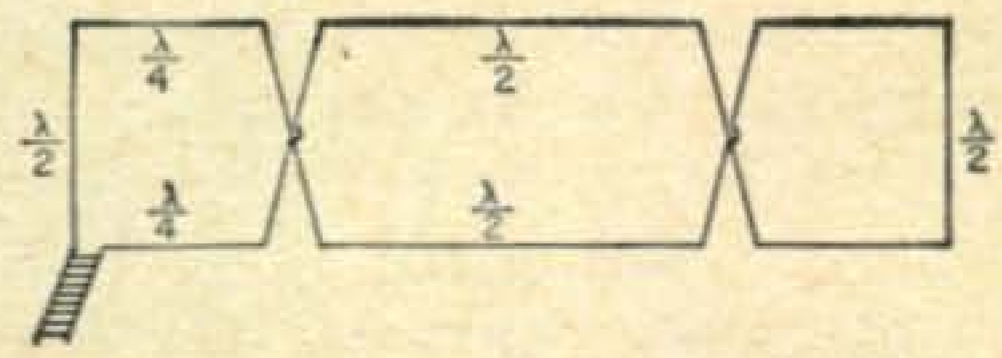

Fig. 1—Basic design of the Sterba Curtain.

Construction

As can be seen from fig. 1, the Sterba can be extended as far as desired so I checked the distance that I had available between the anchor trees and found that I had about 450 feet in a straight line; enough for a string of 5 half wave elements plus the 2 quarter wave sections at the ends. This also allowed reasonably good clearances at the ends, so that tree brances and wires would not end up in a wild entanglement. Enough room was available to place the second string the proper half wave away, so the design was finalized. With an antenna of this size, fed through 600 ohm feeders and a tuner, I didn't consider that the dimensions would be too critical, so I settled

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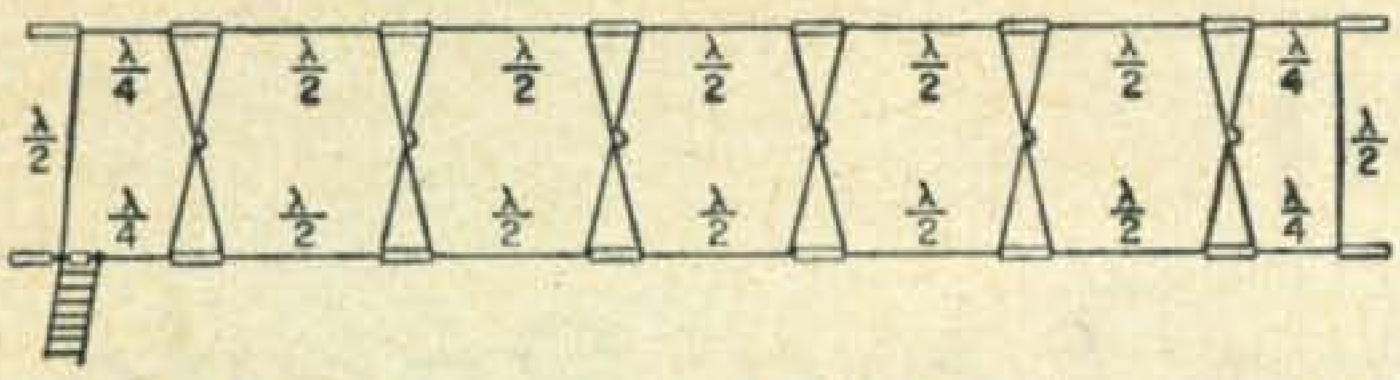

Fig. 2—The final design of the Sterba Curtain at VE1TG. The half wave sections are 66 feet long, the quarter wave sections 33 feet long and the phasing lines 66 feet long.

for those shown in fig. 2, which shows my antenna as it was finally built.

Looks rather immense doesn't it? Well, it is! But remember, you can add or subtract as many of those half wave sections as you wish, depending upon your available space and materials. Figure out the amount of wire you need, and go to it! As can be seen, this one of mine took a total of 1,716 feet of wire, not counting the 600 ohm transmission line, which in my case was 95 feet long.

Materials

Now what about materials? The insulators could be the nice porcelain type, but it's a lot cheaper to buy a few feet of ⅝ inch hardwood dowel, cut it into 6 inch lengths, drill holes in each piece, and then boil them in paraffin wax for about a half hour.

I can hear the next remark, "What nut is going to buy all that expensive wire?" Well now, all you need is wire that is strong enough to support the weight of the antenna itself. This in turn depends upon how many supports the antenna will have and how big you're going to build it. My curtain was supported at 5 main points and it was made entirely of #18 stranded wire with a woven cloth jacket! Not exactly the classic idea of antenna wire, is it? The old idea of #10 or 12 copper wire is fine, if you can get enough of it. But if not, look around for anything else that will do. Check the local utility companies, surplus stores, even junkyards or farm suppliers, for any sort of wire they might have. It's all metal, and it will radiate r.f. Just be sure that all joints are clean and well soldered before you put is up there. Now you have the layout; just put it together as shown in fig. 2. Make very sure that you have only one cross-over in the phasing lines, because if you get one of them mixed up you can see you'll end up with only part of the array in the circuit to the tuner. I used the method shown in fig. 3 for connecting the elements and phasing lines. The lines are looped through a hole in the insulator, wrapped a turn around the insulator, and then soldered to the elements.

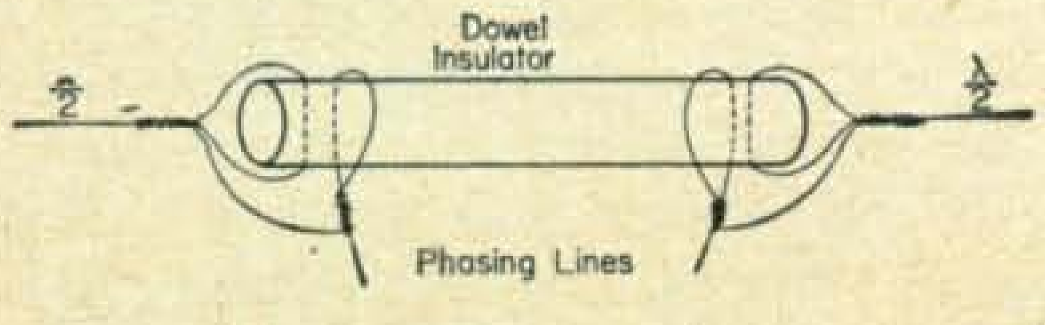

Fig. 3—Method of connecting the phasing time to the elements.

The 600 ohm transmission line is also made up of wood dowel insulators, but of ⅜" diameter stock. The wire I used was #14 copper ground wire with a plastic jacket. A piece of ordinary house wire could be stripped and used. The plastic jacket has no ill effects that I have ever been able to see, and the line is not affected by rain or snow. The rig's loading doesn't seem to change whether the sun is shining or it's pouring rain.

Now about getting the monster assembled—the easiest way (I think) is to build the upper string of elements, attach the phasing lines to this string, and then raise this much up. Incidentally, if you don't like climbing trees, as I don't, attach a light line to a small weight and heave it over the tree and then use this to pull up your main line. A good bet is the use of polypropylene clothes line which won't stretch, rot, or otherwise let you down.

When you get the first set of elements up and secure, assemble the second string and attach the connecting phasing lines (watch that crossover!) and the end sections. Now raise this string as high as you can and attach any side lines in order to keep the sides as nearly a half wave apart as possible. The whole affair will end up hanging at some angle to the ground but this won't matter too much. Just try to get it as high and in the clear as you can. My antenna ended up with some of the bottom elements only about 6 to 10 feet off the ground.

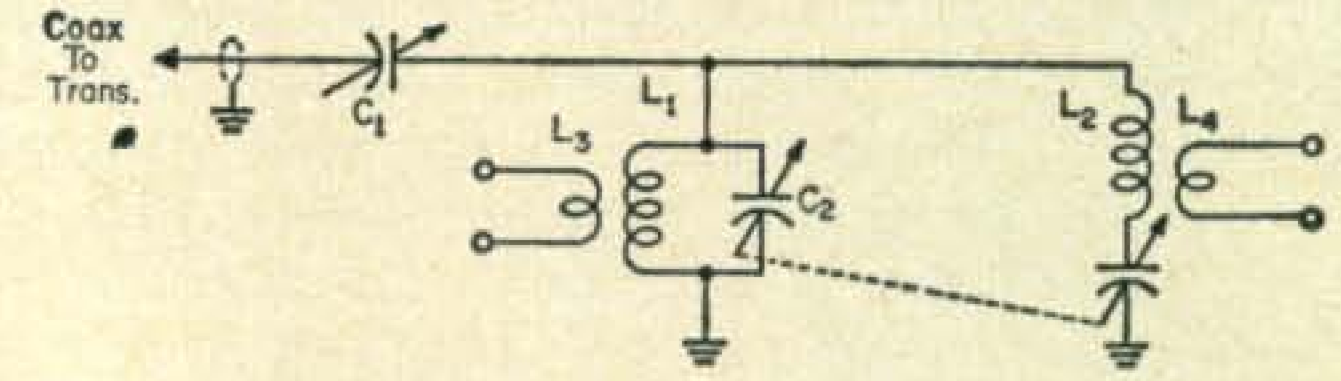

Fig. 4—Circuit of the all-band tuner used with the Sterba Curtain. The circuit was taken from the ARRL Handbook. The coil forms are from a BC-375 tuning unit and wound with #12 plastic covered copper house wire. Capacitor C_1 was scrounged from a TU-12 and is spaced for 150 watts only.

C_1—350 or 450 mmf.	L_2—5½t, 2" d., 1½" long
C_2—300-300 mmf.	L_3—6t, 221/2"d., 1¼" long.
L_1—11t, 2"d., 2¾" long.	L_4—5t, 5½"d., 1¼" long.

Antenna Tuner

Now it's all up, the feedline is attached, so run the line into the shack and hook it onto the tuner. I strongly recommend the all band tuner shown in the ARRL *Antenna Handbook*. The circuit is shown in fig. 4.

If at all possible, reduce the power of the transmitter as low as you can during initial tune up. It doesn't matter what anyone says—it takes time and patience to get the tuner to do the job you want it to do. The entire tuning procedure is aimed at getting as low an s.w.r. on the coax line from the transmitter to the tuner as possible, consistent with proper loading on the final. You should not be satisfied

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with anything higher than 1.5 to 1, and with this tuner you can get it down to 1:1. I've built three of them now, and they all work the same, so take the extra few minutes and do a good job. With this tuner, output is taken from coil L_3 for both 80 and 40 meters, and from either L_3 or L_4 for 20 meters. With modern pi-network transmitters, you'll have to manipulate both capacitors in the tuner, as well as the final and loading controls on the transmitter. I don't think there is any possible way to describe a set procedure for this, as there are so many variables involved. In fact, the best bet would be to use a dummy load on the output of the tuner until you get the thing in line.

I know many people will look askance at the idea of a tuner, but once you find the right settings, put a couple of dials on the capacitors and mark them carefully; it only takes a few seconds to reset the dials when you change bands. In addition to what the tuner does for your transmitted signal, have you heard what a tuner will do for the received signal? Don't malign it; it may make the difference between lost contacts and solid QSOs.

Results

The first evening I put the curtain on the air on 40 meter, the log shows the first QSO was with IT1AGA, who reported the signal was 589 in Palermo. In the next hour, OK1, DM3, UB5, GM3, and OK3 were worked with all reports either 579 or 589. A couple of evenings later, I tuned up on 80 meters, and again tried a one hour session, this time ending with EA4, OK1, G3, DJ5, DM3 and UA3. By some odd coincidence every report was 579, which convinced me that the curtain was doing the job. In the contest it lived up to my hopes by bringing in all districts of G-land, plus other tidbits such as ZC4 and VS9, for quite a decent contest log. Since then most of Europe has been worked on 80 meter and various parts of the world on 40. All this with 150 watts!

Anyway this is all beside the point. The fact remains that for an antenna that is fairly easy to build, non-critical to feed or tune, can be built (within reason) as large or as small as you like, and which will pay off with a real QRM-busting sign, I don't think you can beat the Sterba.

One thing that must be done — a hearty thanks to Ed, VE1ZL, Ray Ortmann, and Al McDonnell for the time they spent slogging around in a cold snow covered field hauling on wires and ropes, and to Gordy, VE1IM, who encouraged me to keep going and finish the thing. ■