Radio Shack *has been a mainstay supplier of parts and components for all electronics hobbyists. In this very practical article Author Chuck Elliott reaches into the other side of the tracks (CB-land), and modifies one of Radio Shack's "good buddy" Yagis for ten and fifteen meter amateur use.*

Converting the Radio Shack Crossbow III C.B. Beam for 10 and 15 Meter Use

BY CHUCK ELLIOTT*, W8URK

Amateur radio magazines are currently filled with antenna stories . . . and this is another antenna story.

But before you say "ugh" and flip the page, read two more paragraphs.

This antenna can be either a semi-homebrew three-element 10 meter or a two-element 15-meter Yagi beam that's easy to build in less than two hours and all the parts are available locally in one place.

And the cost is less than $40.

The rapidly approaching sunspot cycle 21 has created a new interest in both the 10 and 15 meter bands and many radio amateurs are looking for effective but inexpensive beams to take advantage of the uncrowded and wide open communications possibilities.

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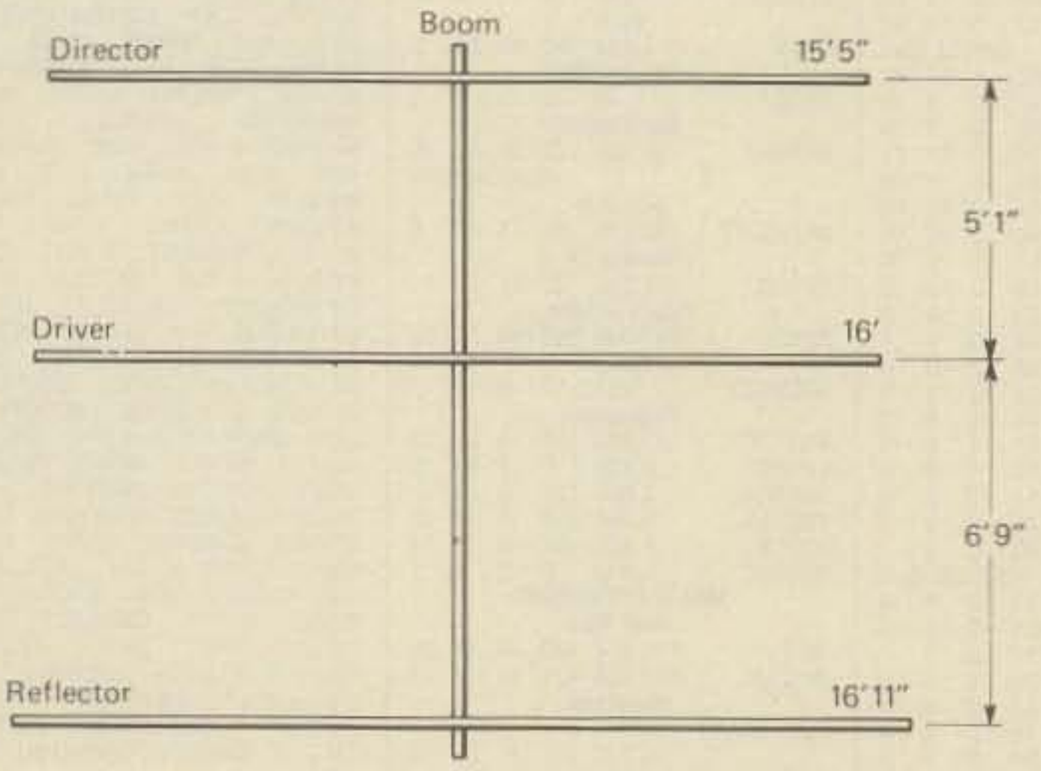


Fig. 1 — The ten meter configuration.

This beam has many advantages over other homebrew beam ideas and beats the price of most commercial amateur beam antennas.

First, the wind resistance is minimal and the beam itself is exceptionally lightweight. So you don't need one of those super-expensive heavy-duty rotators.

Any rotator large enough to handle a television antenna will do the job.

Another plus for this antenna is an extremely short boom length (12 feet), which must be a major consideration for those with limited room or a mounting problem.

And finally, all the parts, from element rods to screws, come boxed up in one neat package available at your neighborhood Radio Shack store.

The test antenna started life under the Radio Shack name of *Crossbow III* (21-933), a three-element 11-meter beam with a price of just $39.95.

There's no problem building the beam, either, since you follow Radio Shack's instructions. After all, the professional design engineer who gave birth to the antenna is the same guy who wrote the book on putting it together.

Radio Shack's instructions are well written in plain English and there are plenty of illustrations. Remember, the antenna was designed for a CBer to build and, as a rule, CBers don't know much theory.

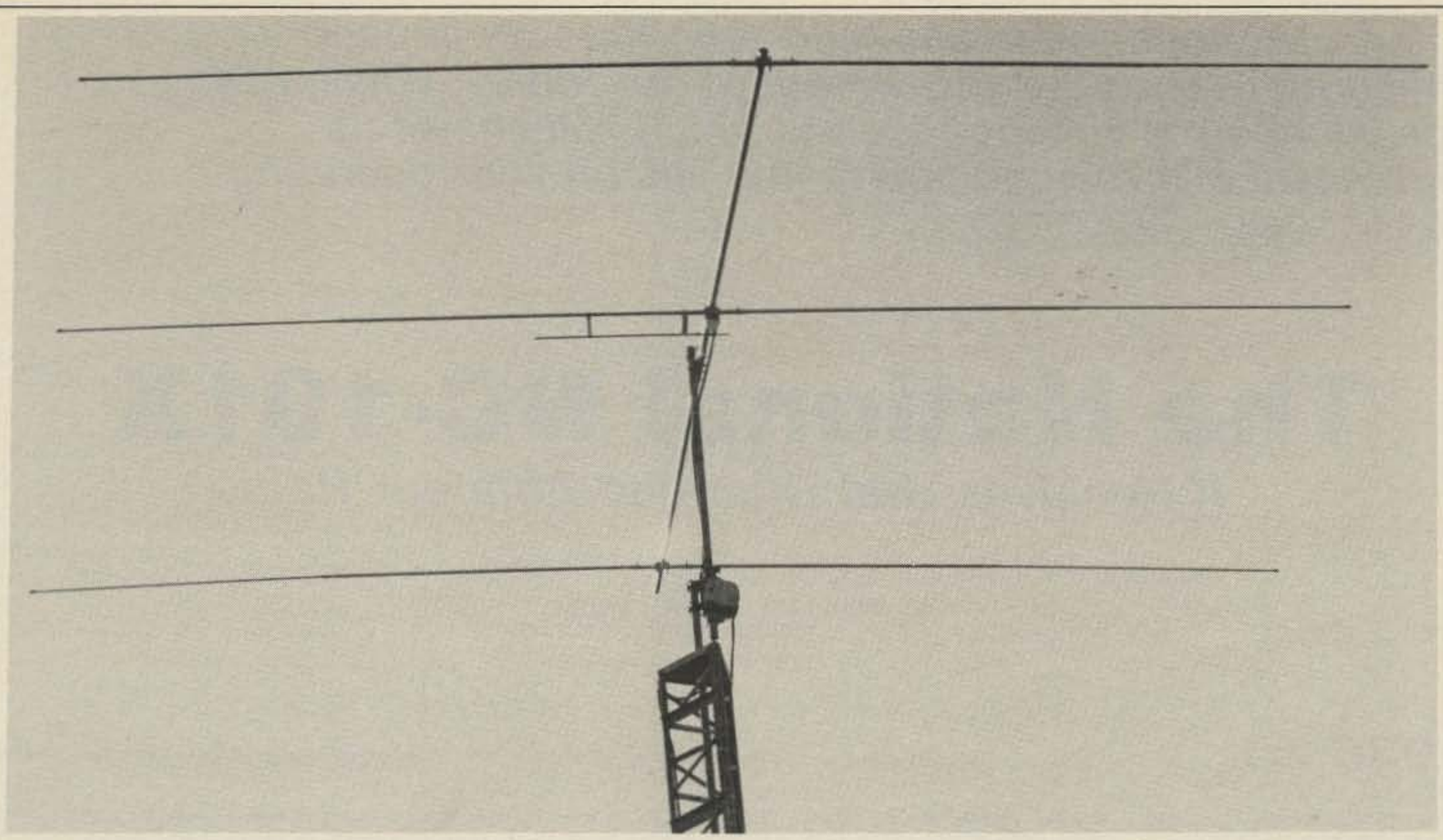
Beams are usually mounted atop towers and towers are expensive.

For those without the funds to invest (or the willingness to spend) fairly large dollars for a tower, the *Crossbow III* instructions give a couple of ideas how to mount the beam without a tower.

Tools are no real problem, either.

All it takes to build the antenna is a screwdriver, a couple of wrenches and an electric drill.

The drill is needed when constructing the beam elements.



This is the Radio Shack Crossbow III *beam antenna converted to 10 meters. The antenna is lightweight and can be easily turned with a television rotator. Note the gamma match on the driven (center) element* must *be facing down. (Photo by Chuck Elliott, W8URK)*

The original antenna has pre-drilled holes for the 11-meter band. But the holes don't line up when the beam is used on either 10 or 15 meters.

Before getting into construction notes, there are a couple of facts you should know.

First, forget everything you've ever read or heard about the ideal height of a beam antenna. On paper, the ideal would seem to be "the higher, the better."

But in practice, things aren't always as perfect as they are on paper. The best place to mount the antenna is wherever you can mount it and at whatever height you can get it. A beam antenna is so much more effective than a dipole or long wire or vertical, that even mounted under less than perfect conditions, it will out perform all else.

During experiments with the antenna used for this story, a good match (1.2 to 1) was achieved with the beam mounted only 12-feet above the ground.

The s.w.r. did not change when the antenna was mounted atop an old 33-foot tower.

And that's important to know. Because it's easier to tune the antenna when you can work from a step ladder than climbing a tower.

And, if you are forced to mount the antenna near the ground, you can be fairly certain it will work.

During antenna testing at the 12-foot level, several European and South American stations were worked with a QRPp rig (five watts input).

The purpose of this article is to show you how to convert the Radio Shack *Crossbow III* (or any Yagi CB antenna for that matter) from 11 meters to either the 10 or 15 meter band.

Radio Shack engineers and technical writers have done all the original work. And they did a good job. So why not take advantage of their know-how?

And a fellow ham by the name of Edward M. Knoll, W3FQJ, wrote a book entitled "Ham and CB Antenna Dimension Chart," that gives all the necessary measurements.

All this article has done is to combine the knowledge of the experts and report on test results using their knowledge.

After building the beam to Radio Shack specifications, here's what you do to get it working in the sideband portion (28.500 to 28.800 MHz) of the 10 meter band.

The antenna seems to be very broad banded, matching 1.4 to 1 from 28.500 to 29.400 MHz.

See fig. 1.

Shorten the driven element to 16-feet, eight on each side of the boom. Do not cut off elements to obtain proper length.

Remove the screws holding the two end pieces of tubing and slide the tubing towards the boom. When proper length is achieved, retap the hole with the drill and secure the sections with the screw.

The reflector is the longest element in the array, 11 inches longer than the driven element. The shortest element is the director, seven inches shorter than the driven element.

Again, element lengths should be equal on either side of the boom. Alter lengths as with the driven element.

Many amateurs feel the spacing between the elements isn't as critical as the element length. That may be true, but since this is my article, I'll also specify the element spacing.

The distance between the driver and the director is five feet, one inch. The spacing between the driver and reflector is six

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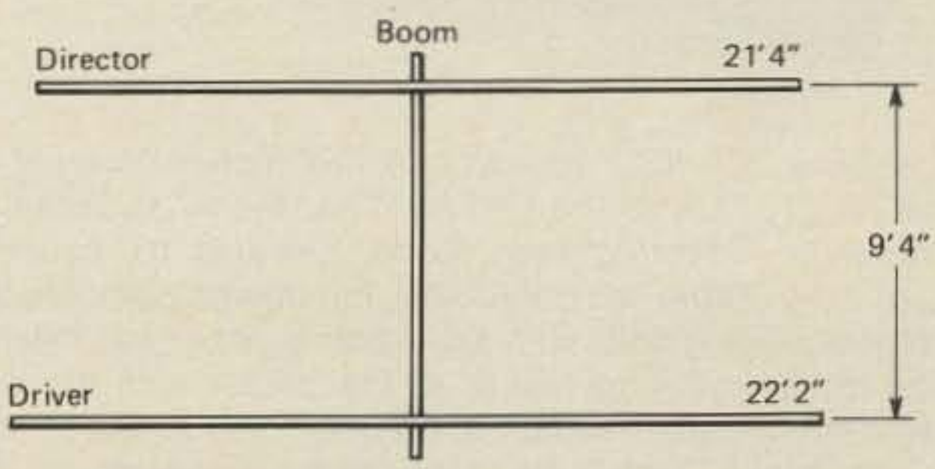

Fig. 2 — The fifteen meter configuration.

Crossbow III *(from page 29)*

feet, nine inches.

Radio Shack's *Crossbow III* beam also can be converted into a two-element, 15-meter antenna utilizing a driven element with either a director or reflector.

My personal preference is the driver-director combination which produced excellent results with QRPp gear putting out about 1.2 watts.

The construction of the two-element, 15-meter beam does require a little scrounging. Both elements must be extended more than the original CB specifications.

You may be able to adapt some of the tubing from the unused element of the CB beam, but four pieces of additional tubing needed for the test antenna came from a used TV antenna that a local TV shop seemed happy to give away.

The 15-meter elements are spaced (see fig. 2) nine feet, four inches apart. After constructing the center boom and the driver and director elements according to Radio Shack instructions, extend each element length by sliding the additional tubing into each end of the already constructed element.

The overall length of the driven element should be 22 feet, two inches. The director is 10 inches shorter. Secure added sections by drilling a starter hole and inserting a sheet-metal screw.

During testing with the 10-meter three-element Yagi, we talked with an east coast station who said he burned out a *Crossbow II* converted to 10 meters with 700 watts.

So a quick call was made to Radio Shack's home office in Fort Worth, Texas, to promotion and publicity manager Hy Siegel, K9CCN/5, who said the antenna should be able to handle about 200 watts.

There is an old saying that power corrupts and that absolute power corrupts absolutely.

The saying seems to be as true in amateur radio as it does with politicans, who were originally the target of the power statement.

A couple of hundred watts of p.e.p. will cover up a multitude of antenna sins. A couple of thousand watts of p.e.p. will hide the sins even better.

However, this antenna was constructed for use with a QRPp rig that was to have five watts input, four watts out in the a.m. mode and 10 watts p.e.p. sideband.

This QRPp rig—a converted Radio Shack TRC-449—and the converted Radio Shack antenna made a good combination because F2YT in France gave an S-5 report and DK6CR in Germany gave an S-9 report.

Even nearby stations worked on groundwave gave S-7 and S-9 reports and even an S-5 report at 50 miles.

During the first six weeks on the air with the QRPp rig and beam combination, I worked countries in Europe, Central and South America, as well as a dozen or so of the states, including Hawaii.

So, I decided that if I could chalk up that kind of a total with no more effort than it took, I was running too much power.

So, back to the work bench and soldering iron. The TRC-449 was detuned to 400 milliwatts d.c. and 900 milliwatts p.e.p. on sideband.

Back on the air, and during the next 30 days, the flea power total went from ground zero to nearly 200 stations worked in 26 states and 15 Central and South American countries.

Right now, my monoband 10 meter outfit is the converted Radio Shack TRC-449 powered by an unconverted Radio Shack regulated 12-volt power supply and the converted Radio *Crossbow III* beam.

And the funniest part about this outfit is that the folks from Radio Shack keep telling me they aren't in the amateur radio business.

Oh yeah? CQ