CQ REVIEWS:

The Cushcraft ASL 2010 Log-Periodic Antenna

BY PAUL CARR*, N4PC

Well, spring vacation finally came, and it was a welcome relief from my classroom duties. I had been looking forward to this break because it would give me a chance to assemble and build a new antenna. Waiting in my garage was the new Cushcraft ASL 2010 log-periodic system. Since then I have had time to evaluate the system. Here are the results of that evaluation.

What Is A Log-Periodic Antenna?

A log-periodic antenna is a frequency-independent antenna system. These antennas are capable of bandwidths that were impossible a few years ago. This particular system has a 2:1 bandwidth of better than two octaves. This is accomplished by the choice of element length, spacing, and phasing. (All of the elements are fed simultaneously.) The element lengths vary from slightly greater than a half-wave length at the lowest frequency to just less than a half-wave length at the highest frequency. The resulting gain is about constant, and the nominal impedance is about 200 ohms. By using a 4:1 balun an impedance of approximately 50 ohms results. Now for a few specifics about Cushcraft's design.

The ASL 2010

The ASL 2010 is a new product from Cushcraft, and it covers 20, 17, 15, 12, and 10 meters. The antenna consists of eight elements in a log-periodic dipole array. The antenna is fed through a single 50 ohm coaxial cable to a 4:1 balun matching unit (mounted on the boom). The beam is rated at 2000 watts.

The electrical 2:1 bandwidth of the antenna as specified by Cushcraft is from 13.5 MHz to 32 MHz. As I indicated earlier, this is a property of the log-periodic design. I used an MFJ 259 to make SWR measurements across the spectrum and on each of the amateur bands. Never did the SWR exceed 2:1 across the spectrum. The most variation in SWR occurred on 20 meters. The maximum SWR of 1.7:1 was at 14.0 MHz, and the minimum of 1.3:1 was at 14.25 MHz. The SWR results on 10 meters were amazingly flat, never exceeding 1.4:1 across the entire band (see fig. 1).

The published gain figure for the antenna is 6.4 dBd. It is extremely difficult to verify gain figures without a calibrated antenna range, but comparing the results I received with other antennas, I feel the gain figure is about right. The rated front-to-back ratio is stated to be 15– 20 dB. I found no place throughout the spectrum where I felt this information was inaccurate.

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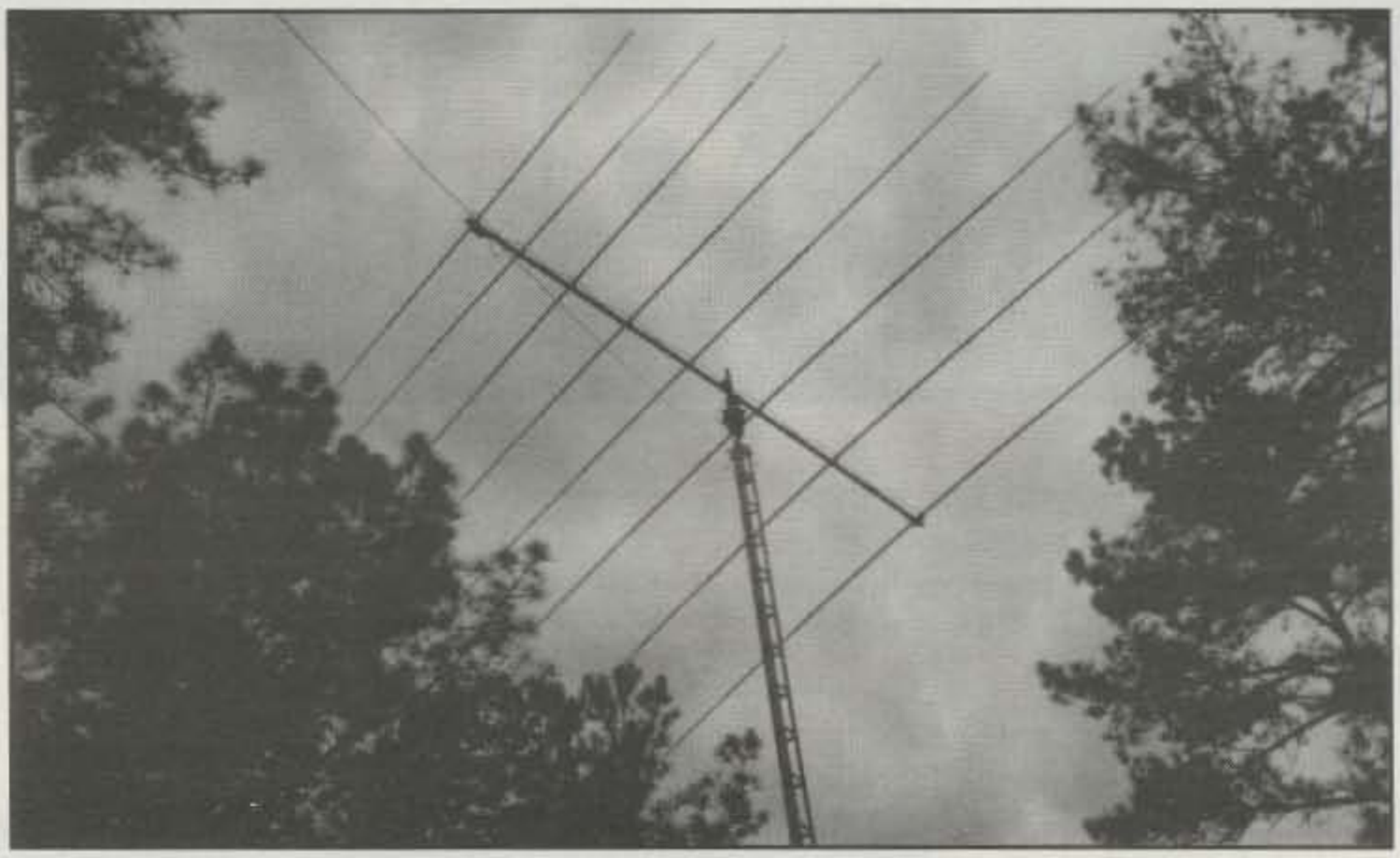


The completed antenna ready to take on the world. Is anyone listening?

Mechanically, the specifications for the beam are a boom length of 18 feet, with a boom diameter of 2 inches. The longest element is 38 feet, and the turning radius is 19.25 feet. The beam accepts a mast diameter of 1.5–2 inches, and the total weight is 55 pounds. The wind loading 10.1 square feet. All the hardware is of the highest quality stainless steel, which we have come to expect from Cushcraft.

Assembly

As you can see from the picture, the antenna

As you can see, there are enough parts here to keep you busy for at least a day. Please note that the flower pots are not included.

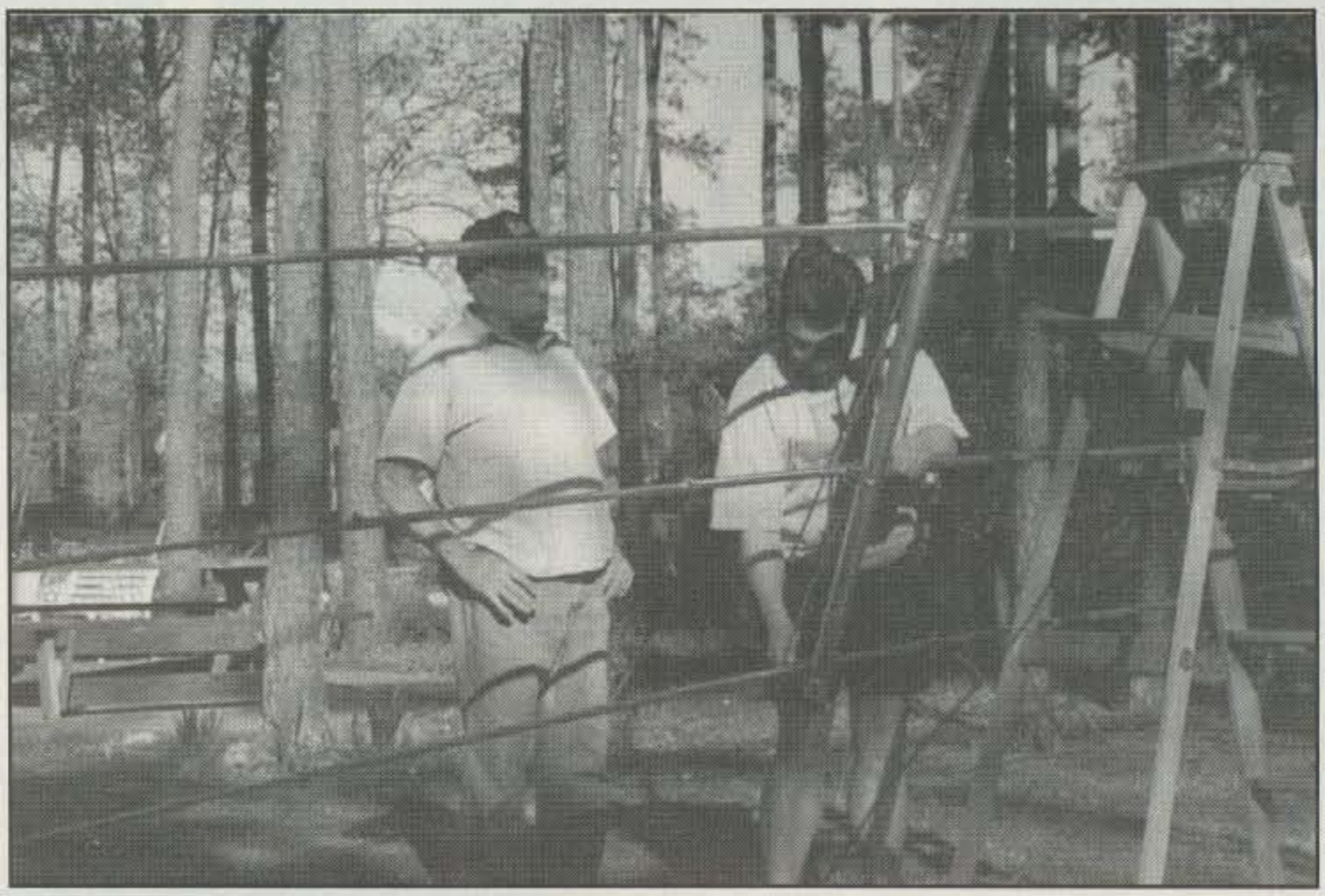
has a very high parts count. Your success depends on your ability to do an accurate inventory of the parts and organize the parts for easy accessibility during the construction phase. If you are working alone during the initial construction phase, allow about one day to assemble the elements and the boom.

There are seven steps listed in the instruction manual. Assemble the boom first. This will give you practice working with hand tools and will let you become used to the way the instructions are written. The boom is in three sections, with the end sections made so they will slip into the center section for a predetermined length and then stop. All that is necessary is to place two locking screws and tighten the compression hose clamps. Place the plastic end covers, and you are finished.

The element construction is next. Begin with the longest element. Carefully measure the overlap specified on the diagram. The total element length is dependent on the proper measurement and assembly of the elements. Continue the element construction as specified in the instruction sheet. Verify the element lengths at least twice.

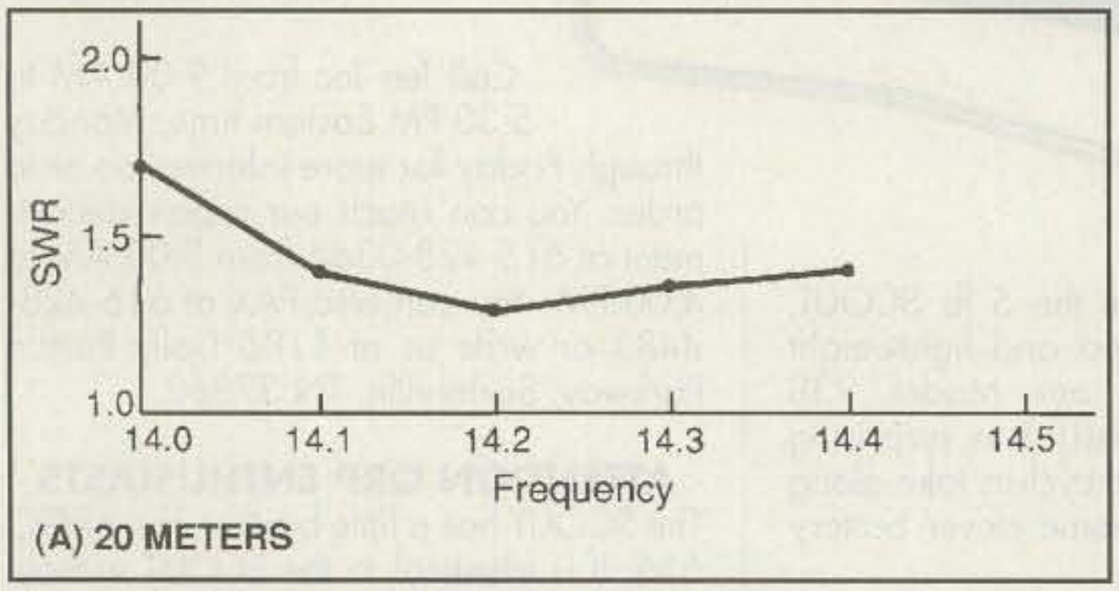
Now you have a decision to make. If you intend to fully assemble the antenna before you place it on the mast, follow the instructions in the booklet. I have a crank-down/tilt-over tower, and I chose to depart from the instructions. Following is how to accomplish the installation.

Carefully measure and mark the location of each element and the boom-to-mast bracket. Next mount the boom-to-mast bracket. Then move all the assembly components to the mast location. Turn the antenna rotor so that it will display the proper direction when the tower is tilted to allow installation. Mount the boom to the mast, verify all the steps, and tighten the mounting hardware.

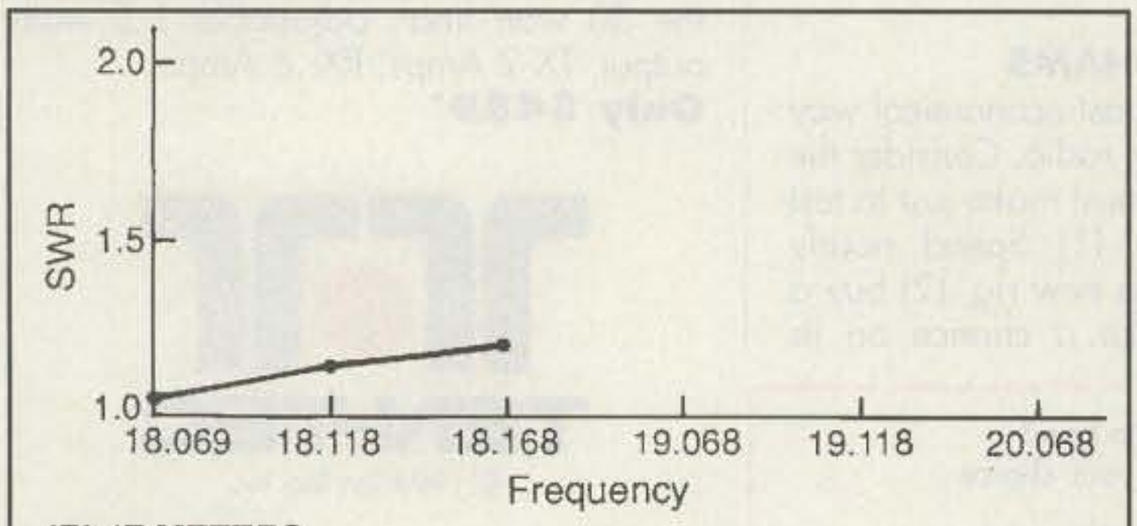


Things will go easier and faster if you can coerce some friends into helping you out. Here Ralph, KE4UAK, puts the finishing touches on some connections, while Harold, W4ZS, supervises the handiwork.

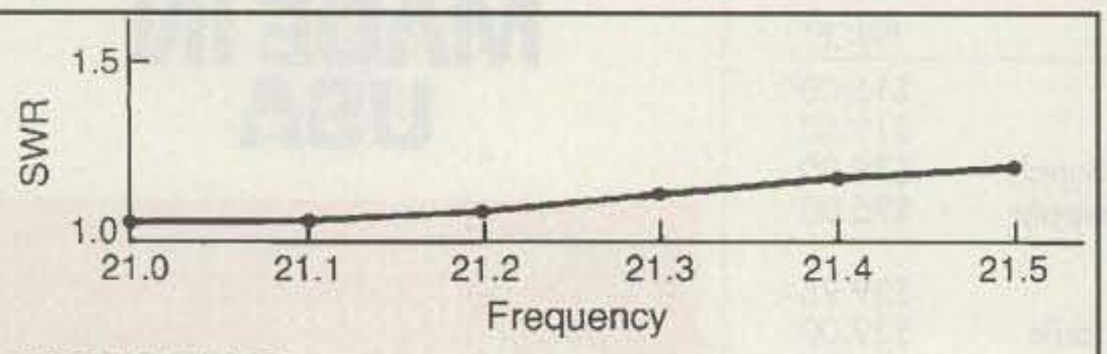
Mount the longest element, and check for proper alignment. Follow by placing the next two longest elements. After you are satisfied that the elements are in the proper position, place the phasing straps in accordance with



(A) 20 METERS

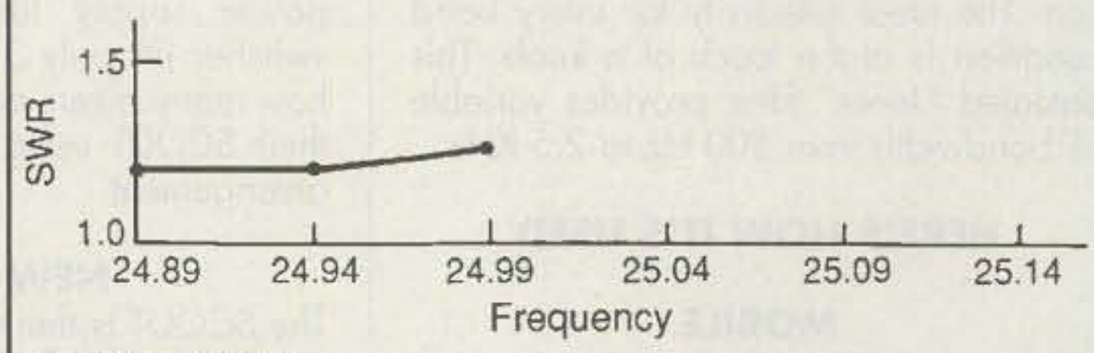


(B) 17 METERS

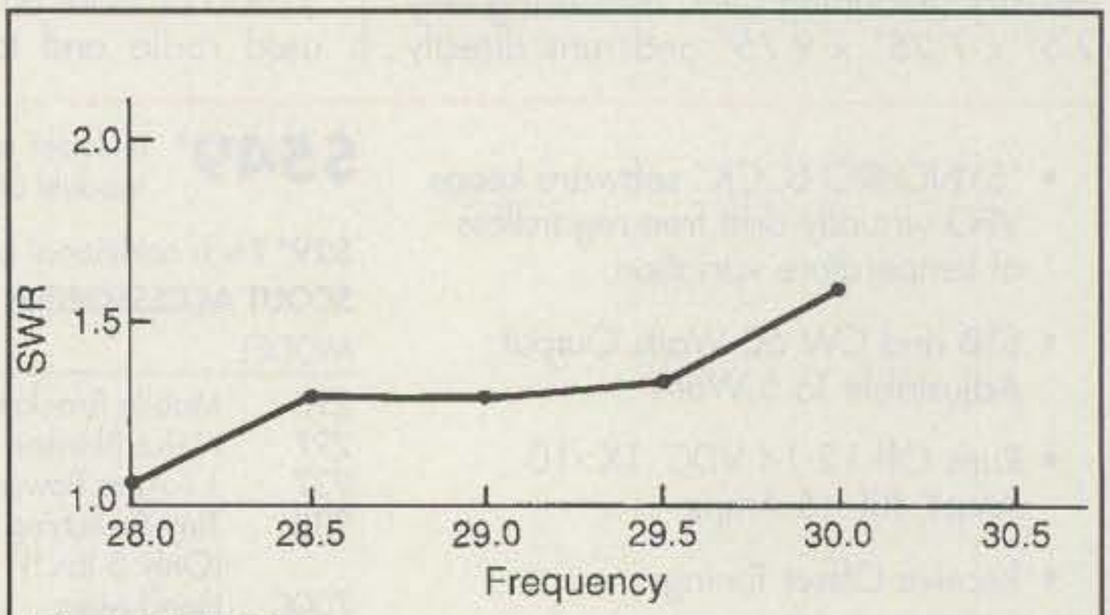


(C) 15 METERS

Fig. 1– These are the SWR curves for each band as I derived them from my QTH.



(D) 12 METERS



(E) 10 METERS

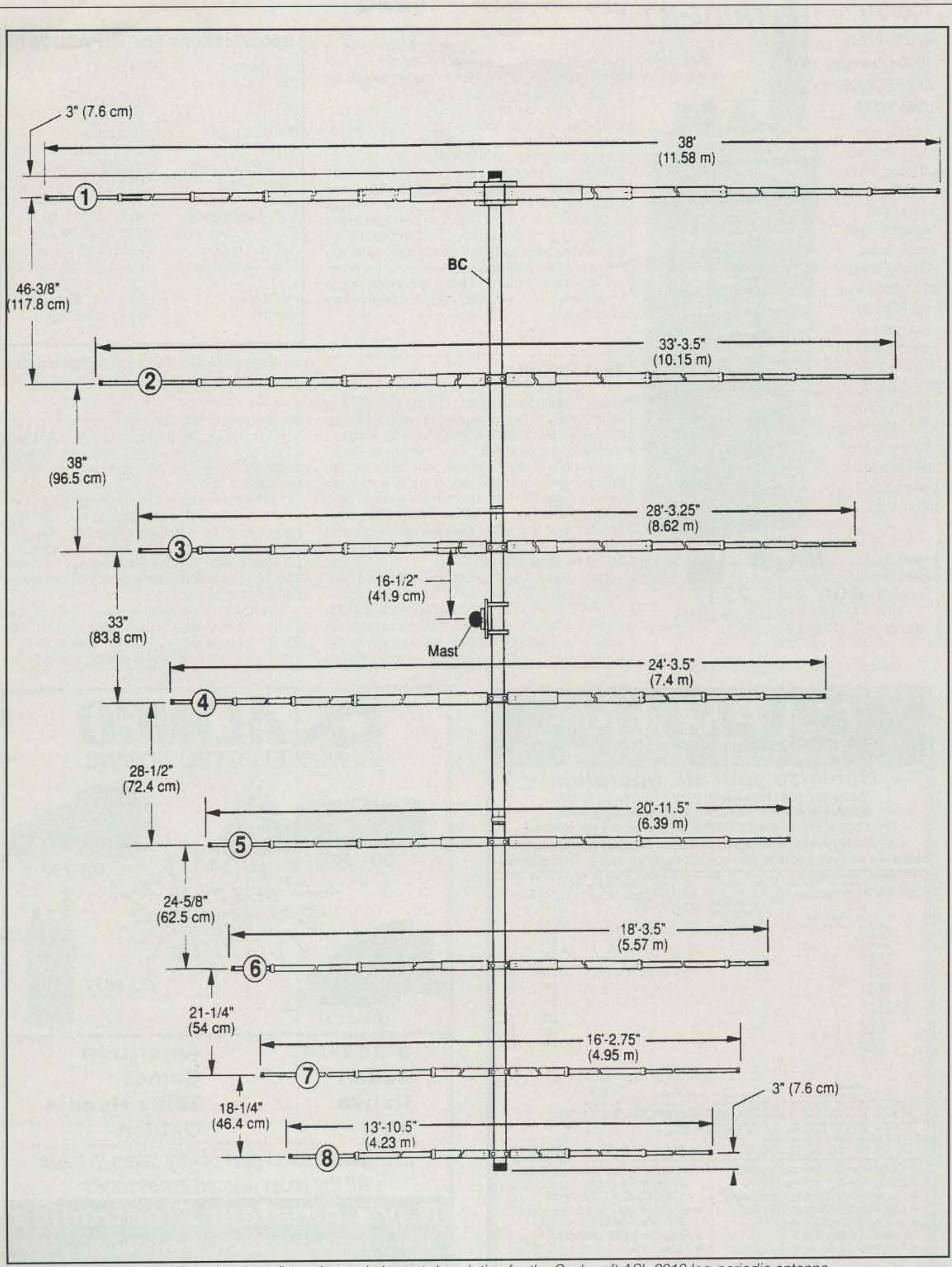


Fig. 2– The overall configuration and element description for the Cushcraft ASL 2010 log-periodic antenna.

the instruction booklet. You now should have three elements in place, and phasing lines between two of the elements. Raise the mast to the vertical position and visually check for proper element-to-boom alignment.

Rotate the assembly 180 degrees, and lower the antenna so that the assembly can be completed. Continue by placing the elements and phasing lines in a longest to shortest pattern until the antenna is completely assembled. Recheck all hardware and elements. Mount the matching network and connect the network output to the antenna. Connect the coax to the matching network (be sure to leave a drip loop) and route the coax to the shack. Raise the antenna to its vertical position and check for proper element alignment. Make any corrections as necessary. You are now ready for preliminary tests.

Specifications For The ASL 2010

Frequency	13.5–32 MHz
No. of elements	8
Forward gain	6.4 dBd
Front-to-back ratio	15–20 dB
2:1 Bandwidth	18.5 MHz
Power rating	2000 watts
3 dB Beam width	65 deg. E plane
Boom length	18 ft. (5.48 m)
Boom diameter	2.0 in. (5.08 cm)
Longest element	38 ft. (11.58 m)
Element center dia.	1.25 in. (3.18 cm)
Turning radius	19.25 ft. (5.86 m)
Mast size range	1.5–2 in. (3.18–5.08 cm)
Wind load	10.1 ft.^{2} (.93 m^2)
Weight	55 lb. (25.5 kg)

Table I– ASL 2010 antenna specifications.

Test Results

I have made many tests on all the bands, and although band conditions have been less than desirable, I am well pleased with all results I received. I feel the antenna performs great, and a plus is the fact that you have instant band-change capabilities. This is a definite benefit if you are interested in multi-band contests such as the CQ World-Wide. For an all-around antenna with good performance and maximum flexibility, I feel that this antenna would be hard to beat.

I would like to add a word about the mechanical stability of the beam. In my part of the country we do not experience great straight-line winds that are seen other places; however, we do experience tremendous rotating winds associated with thunderstorms. I have observed the antenna under such conditions, and I am happy to report that the antenna handled these winds with no problems. If I were describing a sailboat, I would report that she rides well in the water.

If I may insert an aesthetic observation, I am a mathematician by profession, and I find the geometry to be especially pleasing. My XYL shares my opinion. She remarked that she thought it was the prettiest antenna I had ever had, and she has seen plenty of antennas through the years!

The ASL 2010 is manufactured by Cushcraft Corp., 48 Perimeter Road, Manchester, NH 03108 (phone 603-627-7877; FAX 603-627-1764). The retail price of the ASL 2010 is $800.