WEATHER BALLOON VERTICALS

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With a CW DX contest coming up, I wanted to have a really effective antenna system for 80 and 40 meters. As my backyard is not very large, it was obvious that a vertical antenna of some type was needed. I was reading through back issues of 73 and other magazines getting ideas on antenna designs, when I found an interesting article on theoretical performance of 5/8 wavelength verticals, which supposedly would give maximum lowest-angle radiation on the first major lobe of radiation.

This was just what I needed. The article went on to state that if the antenna wavelength was increased any further than 5/8 wavelength, the major radiation lobe would begin to decrease in strength, although it would give a still lower radiation angle. I decided to shoot for the 5/8 wavelength goal, as this would give approximately 14-degree vertical radiation, very useful for DX.

I purchased an 8 ft diameter weather balloon from Edmund Scientific Co., 150 Edscorp Building, Barrington NJ 08007, for $2 postpaid. It's made of Neoprene and holds helium very well.

I bought a small cannister of helium. Don't forget to obtain a suitable fitting for the nozzle opening. The welder threw in a fitting with my helium, provided that I return it with the empty cannister.

My neighbor, WB4NFX, opened the cannister valve with a wrench while I held the balloon tight around the fitting. We filled it slowly, making sure no gas was escaping. At 3½ ft diameter, the cannister was empty, but the balloon was floating! We tied the balloon neck with heavy string in two places, as shown in Fig. 1. Watch your ceiling! Mine is made of a rough-finish plaster with sharp projections protruding perilously. No accidents here, though.

I measured 162 ft of wire. I tied one end to the balloon, the other to an insulator anchored to a 5 lb brick. The antenna wire was fed to the center conductor of RG–58/U coax, the coax shield

Balloon dia, ft.	Gas vol, cu. ft.	Lift power, lb (with He at 32° F)	Lift power, lb (with He at 70° F)
2	4	1/4	1/4
3	14	1	3/4
4	33	2	2
5	65	4	4
6	113	7	7
7	180	12	11
8	268	18	17
9	381	26	24
10	523	36	33
11	696	48	44
12	904	62	58
13	1150	79	73
14	1436	99	92
15	1767	122	113
16	2144	148	137

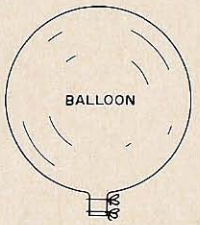

Fig. 1. Balloon lift and helium fill requirements. Note string is tied twice on balloon neck.

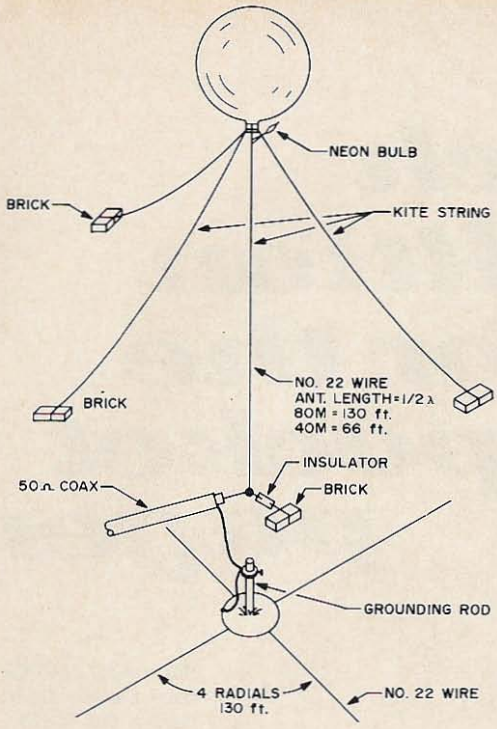

Fig. 2. Kite-string "guys" will hold balloon well even in wind. Be sure to ground the coax lead to an earthrod.

connected to a rod driven into the ground beside the brick, four 130 ft radials were connected to the ground rod and left lying on the ground, each radial 90 degrees apart. (See Fig. 2.)

With this 5/8 wavelength vertical, a matching network is necessary, so I jury-rigged a tuner with some B & W coilstock and a transmitting-type variable capacitor. Tapping off turns on the coilstock with alligator clips, we obtained our lowest swr, which was about 4:1! Band: 80m.

We had a QSO on CW with W6EAC in San Mateo, who gave us an RST of 559! It was obvious that the Apache's 180W just wasn't doing its thing for us.

Recalling in some gray matter that a half-wave vertical offers a better match to 50Ω coax, I hurriedly ran out into the backyard with a tape measure and cut off 32 ft of the wire. Don't forget to hold the balloon! Back in the shack, we removed the tuner and connected the coax directly to the transmitter's SO-239 connector. We tuned up and called W6EAC again on 80m. RST was 589 and peaking 599 through the QSB!

At the end of our QSO, the plate current went wild. Running out back again (I was huffing and puffing by this time), I was amazed to see that the balloon was at 2000 ft and still rising, trailing 100 ft of wire!

I made the mistake of using 30-gage wire, and the rf burned the wire in two!

Another balloon and another cannister of helium later, we prepared a second antenna. Again, WB4NFX opened the cannister as I held the balloon tight against the fitting. Using 22-gage wire this time, *and a* ball of kite string as a safety measure, the balloon went up without a hitch. An NE-2 neon bulb was attached to the wire just under the balloon and would tell me if the wire burnt up again. 130 ft of wire was used, which is a half-wavelength on 80m.

The same antenna was used on 40m, also with good results. However, bear in mind that 130 ft of wire is one wavelength on 40m, and the major lobe of radiation has decreased in power – 66 ft of wire would have given better results on 40.

The helium balloon will remain aloft for 2–3 days. Three kite-string "guy wires" would hold such a balloon in a fixed position in wind. Most ham "contests" last only 48 hours, so the balloons should be filled just before the start of an event.

In the VP7AS pileup on 40m, I only had to wait once before he answered my call. In previous pileups, I've waited a BUNCH! When I reduced power from 180W to 35W, my RST changed from 589 to 579.

All QSOs were made with 180W input. I've often wondered what a kW would do to signal reports.

The following chart will give you an idea of the helium required, balloon diameters, and lifting characteristics.

K4EPI will use balloon verticals in future contests. These will be mainly on 80 and 40m. A half-wave balloon vertical on 160m has not been tried, but should perform better than a dipole. Perhaps this is all W1BB needs to get that 100th country on 160!

...K4EPI■