

Multiband Half-Wave Delta Loop (MHDL)

A simple 20-10 meter antenna with an 80-30 meter bonus.

by James W. McLelland WA6QBU

While looking through my books for some kind of small antenna that would fit in the attic, I happened upon a short description of half-wave loops. I've always preferred full-wave loops, but a 20 meter one wouldn't fit in my 17' x 25' attic given the fact that I needed to stay away from outside rain gutters, flashing, downspouts, vents and a chimney. As luck would have it, however, I discovered that a half-wave loop fits, with room to spare (I've hung it on my classroom wall as well). While half- and full-wave characteristics are quite different from each other, with the details worked out, the MHDL has proven itself to be an effective indoor reference antenna for the upper (20-10 meter) HF bands. (By the way, there's a slick trick you can use to make it work on 80-30 meters as well.) It's easy to build, requires no alignment, and the XYL can't see it. Try it. This'll be the easiest antenna you've ever built.

Description

The loop is cut for a half wave on 20 meters. Half-wave loops have a very high impedance, in the order of 2,000 ohms, so I needed to bring the impedance down to a more workable value. Using a quarter-wave (including a velocity factor of 0.80) transmission line transformer will drop the impedance to about 50 ohms. I used 300 ohm twin lead (Radio Shack 15-1153) because it works well into a tuner, is inexpensive and has low loss. On 10 meters, the 20 meter half wave becomes a full wave and the impedance drops to about 100 ohms. The feedline is now half-wave and acts as a 1:1 transformer, which your tuner will have no trouble matching. I also found that my tuner could easily resonate and match the MHDL on 17, 15, and 12 meters. If you use a 3/4-wavelength feedline, you can also get an 80-30 meter bonus by shorting the two feedline wires together and tuning it as a top-loaded vertical. This gives you a vertical 3/4 wave on 30 meters, a half wave on 40 meters and a quarter wave on 80 meters. However, you must use a ground to make this mode effective. By the way, it's about 1/8 wave on 160 meters and your tuner might be able to add

enough inductance to make it resonate. Anyway, it's worth a try.

Construction

Using insulated #16 or #18 gauge stranded wire, cut the loop to 35' 4" (see Figure 1). Now cut the 300 ohm feedline to odd multiples of 13' 8" (exactly 41' for the 80-30 meter bonus). Solder the feedline to the loop ends and insulate with shrink tubing. Then, to connect it to the balun on my tuner, I installed two banana plugs (the kind that plug into each other) on the end of 6" pigtails, soldered them to the twin lead, and then insulated them with shrink tubing. You'll be done with the construction phase in less than an hour.

Installation

This is the part where you can really get creative. You might even hide the feedline and convince the XYL that your MHDL is a rosebush trellis, but then you'll have to plant and take care of the roses. I opted to hang

mine horizontally from the rafters. There is no exact shape requirement except to have as much area as possible. I like equilateral triangles, but squares, diamonds, circles and rectangles work just fine. Changing the shape varies the frequency somewhat (plus or minus 1/2 MHz or so) but I just let my tuner fix it. More important is that the loop fits the space you've got no matter what it looks like and what angle it's mounted at—vertical, horizontal, or somewhere in between. One warning: Stay away from metal objects with the MHDL and feedline, and mount it with some kind of insulating material. If you have extra room, try a vertical and a horizontal model, at least for 20-10 meters. Being able to switch back and forth can really be dramatic because the angle of radiation as well as the polarity will be different. Lastly, if you go for the 80-30 bonus, the feedline should be somewhat vertical and stretched out, but the higher part could be horizontal and work OK. In any case, it's a lot better than nothing and it's all hidden indoors.

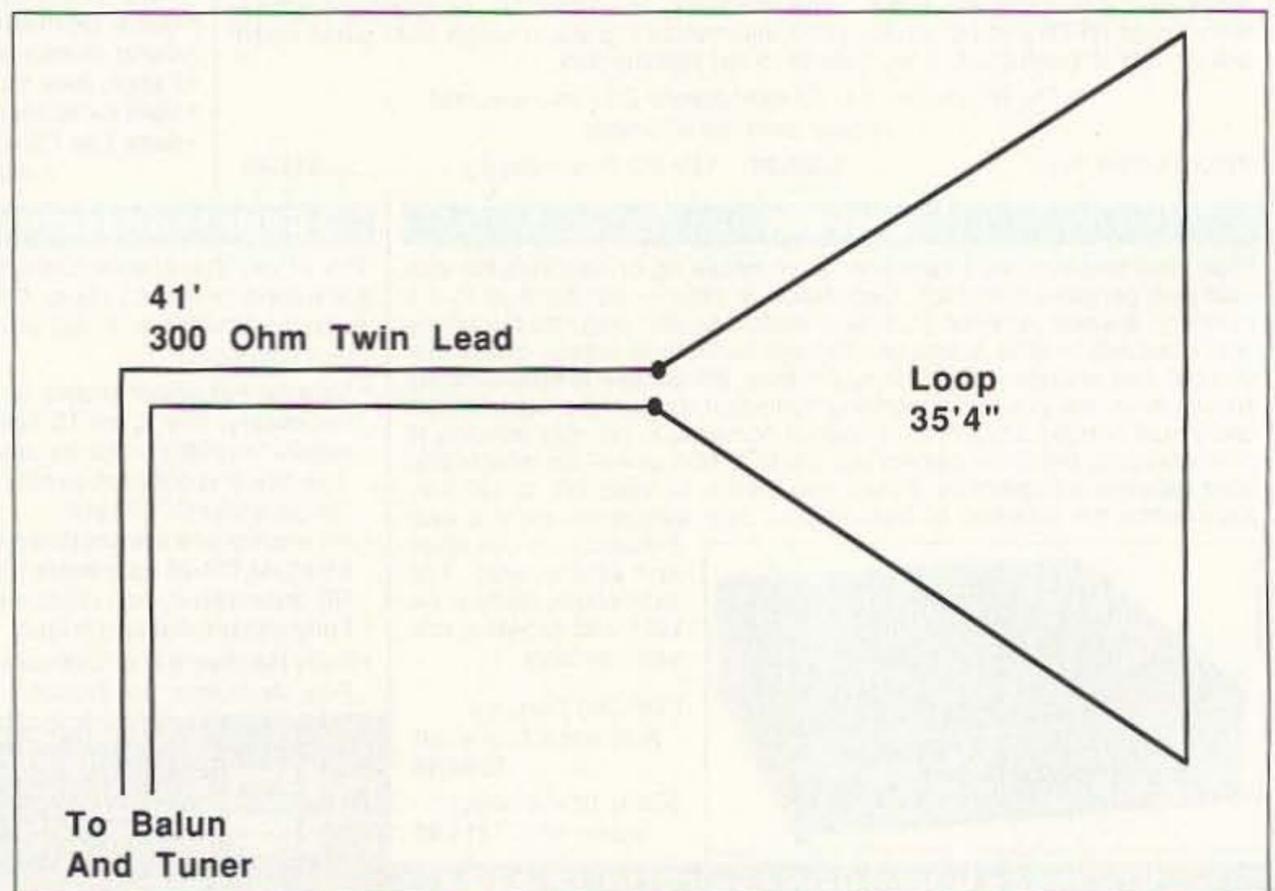


Figure 1. The Multiband Half-Wave Delta Loop.

Parts List

Quietflex #14 antenna wire	36'
Kilowatt 300 ohm twin lead	41'
Shrink tubing, 3/8"	1'
Shrink tubing, 3/16"	1'
Banana plugs	2
Dacron line	50'
Egg insulators	4

Note: All parts needed to build this antenna can be obtained by ordering the Multiband Half-Wave Delta Loop Experimenter's Kit from Antennas West, 1500 N 150 W, Provo UT 84604; Tel. (801) 373-8425. Introductory price w/shipping (40% discount for 73 readers): \$24.

Tuning

There really isn't anything that you need to tweak on the MHDL. Sure, you could use a fancy antenna bridge to trim it for 20 and 10 meters once it's installed, but you've got to use a tuner for the other bands anyway, so why bother? For 20-10 meters, just connect it to the balun terminals and tune for minimum SWR with the lowest power you can (check for a clear frequency first), then look for a QSO. On 80 and 40 meters, plug both banana plugs together into the single-ended "wire" terminal on the tuner and connect it to the best ground you can get. For easy band changes, I keep my setting written on a card next to the tuner. It tunes quite broadly so

one setting for each band gets me close enough to get started, and then touching it up is very easy.

Testing

Does it work? You bet it does! I've worked as far west as central Russia and as far east as Czechoslovakia, or is it the other way around? North to Alaska, and south to Argentina, New Zealand and Australia were also no problem. OK, OK! I know. The bands aren't as good as they used to be, but it still is a pretty good antenna for being in my attic and if you don't like it maybe the XYL can hang clothes on it—hey, wait a minute! I think I've got an idea.

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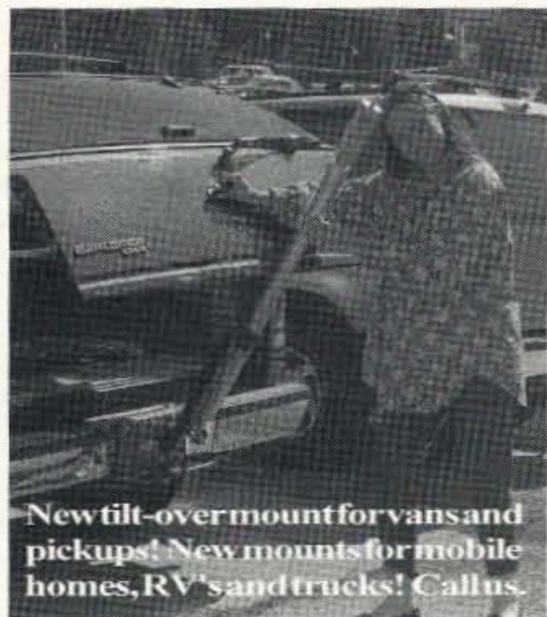
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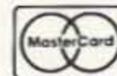
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