End-Fed Dipole *Lite*: Taking Kurt's Design to the Field

By Richard Fisher, KI6SN

Krusty Ol' Kurt N. Sterba's *Aerials* column in the August edition of ***WorldRadio Online*** sure got the attention of this trail-friendly radio enthusiast.

"What we have here is a coax-fed dipole, except that we don't have the coax hanging down from the center . . . Instead the feedline coax comes from one end of the antenna. Simple but elegant."

A dipole that is fed to the transceiver or tuner at one end and needing only one support at the other? Backpackers have got to like that. What could be more perfect for the trail?

Kurt went on to explain how he had been inspired by a design by James E. Taylor, W2OZH, published in 1991. After making critical refinements and improvements, Kurt would go on to come up with an end-fed dipole design of his own.

Taylor's "Resonant Feed-Line Dipole" employs a quarter-wavelength of wire and a quarter-wavelength of coaxial cable to form a half-wave dipole that's fed at one end. Mr. Sterba took a good idea and made it even better.

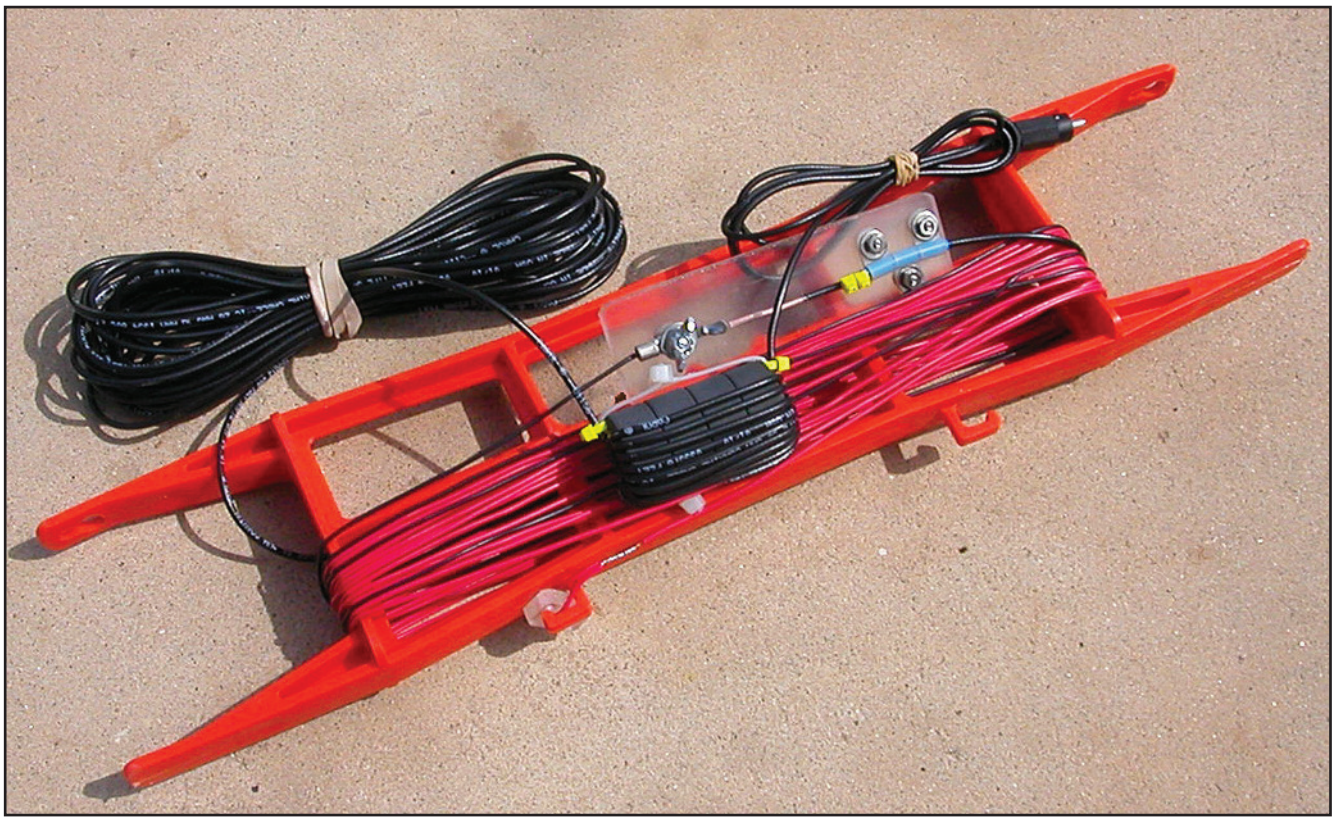
The theory behind this remarkable design is detailed in Kurt's August column. <http://worldradiomagazine.com/wro_issues/2010/WRO_08_2010.pdf> If you haven't read it, please do so – it'll make what follows so much easier to understand.

Theory Into Practice

One of the antenna's secret weapons is an RF choke positioned one-quarter wavelength down the coaxial cable from the dipole's center point. It's what establishes the resonant part of the coax, leaving a non-resonant length of 50-ohm RG-58 to connect to your transceiver or tuner.

Instead of employing W2OZH's six-inch-diameter air-wound coil choke, though, Kurt opted to use a much smaller coil for a 20-meter version with 10-turns of coax wound through two F240-61 stacked toroids. Much more efficient and reliable.

Unfortunately, the F240-61s are rather large ferrites to accommodate heavy duty RG-58 coax. That combination can



All wound up and ready to go, the trail-friendly version of Kurt N. Sterba's End-Fed Dipole Lite fits easily in a backpack and won't weigh you down on the trail. *(Photos courtesy of KI6SN)*

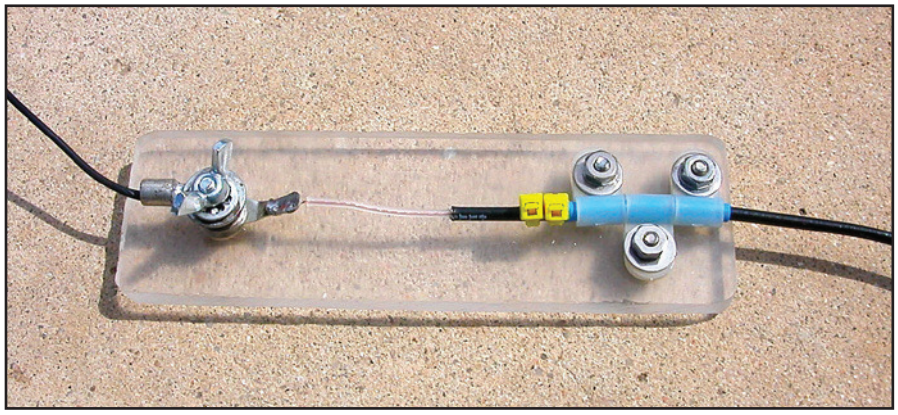
Stacked F114-61A toroids are one of the secret weapons of the trail-friendly End Fed Dipole Lite. Nylon wire ties hold the ferrite cores and coax in place.

weigh down a hiker in a real hurry.

Is there a way to duplicate this antenna in a trail-friendly configuration – light and durable with a small backpack "footprint?" Once again Kurt came through, describing an end-fed dipole "using RG-174U (50 ohm) cable and a toroid core choke just adequate for (a) five or 10-watt transmitter. RG-174U is a tenth-of-an-inch outer diameter."

In addition to much lighter coax, this trail-friendly design replaces the large F240-61 toroids with much smaller and lighter F114A-61s. The antenna measurements and choke requirements for this tidier version are the same as for the home-based higher power version.

With an *end-fed dipole lite,* though, we would really be in T-FR business.



Quarter-inch thick Plexiglass was used to secure the center point of the KI6SN trail-friendly version of Kurt's End-Fed Dipole Lite. The 40-meter single wire portion of the antenna can be easily changed for other bands by removing the wing nut, left, and attaching a quarter-wave wire for another band.

Gathering the Pieces

The parts list for the KI6SN trail-friendly 40-meter version of Kurt's design is pretty spartan: 40-feet of RG-174U, four F114-61A toroids, about 35-feet of No. 22 stranded hook-up wire, a couple of pieces of one-quarter-inch Plexiglass, nylon wire ties, and a handful of nuts-bolts-and-washers. You'll need some elbow grease, as well.

Several parts houses carry F114-61A toroids. I got mine from Palomar Engineers in Escondido, California. <http://www.palomar-engineers.com/> They're pretty inexpensive and shipped overnight.

The RG-174U was found locally, but this lightweight coax is carried by many distributors and is readily found on the Internet.

The hook-up wire came right from RadioShack (RS 278-1224). There are three 25-foot-long rolls of the stranded wire in the package, so you'll have to splice two rolls together to get the necessary length for a 40-meter quarter-wave wire. *No big deal.*

The Plexiglass for the dipole's center connection point – one-quarter inch thick and shaped rectangularly to 4.75-by-1.25

inches – can be found along with the other assorted hardware needed at most home improvement stores.

Let's Go . . .

OK, time to get building. I was shooting for a resonant frequency of 7.040 MHz – a popular T-FR hangout on 40 meters. A half-wave at that frequency is: 468/7.040, or 66.48 feet. Divide that by two to get a quarter-wave and you'll have 33.24 feet. That's about 33-feet, 3-inches – our magic number for both the quarter-wave resonant portion of the RG-174U and for the quarter-wave single wire. We'd have several feet of non-resonant coax beyond the choke point to connect to the transceiver or tuner, but we'll get into that later.

We started by stacking the four toroids atop one another and cinching them with nylon wire ties. Next, the "center" connection point of the RG-174U was prepared by carefully cutting the coax's black outer plastic insulation with a knife and exposing about 1.5 inches of the coax's braid. We next cut away the outer braid with a small pair of scissors, leaving just the insulated center conductor. After stripping away a bit of the center conductor insulation, we added a solder lug to the end of the inner conductor. At the center point of the antenna, the coax's outer braid isn't connected to anything.

The total exposed portion of the insulated center conductor (center conductor plus solder lug) is two inches from where the braid ends.

Next, we soldered together the ends of two rolls of the 25-foot-long stranded No. 22 wire. Since there are two inches of coax center conductor exposed at the Plexiglass insulator, we'd have to subtract two inches from the quarter wave measurement for the single wire (that's 33-feet, 3-inches minus 2-inches, or 33-feet, 1-inch). That's how long the single wire would need to be.

We'd need to factor in the length of a solder lug on one end of the single wire and a loop of the wire through a small Plexiglass insulator at the other end. Then: Measure twice. Cut once.

Time to make the Plexiglass center connection point. After cutting and shaping the plastic, we drilled four holes:

- One for a bolt-washers-wing nut combination that would be the connection point between the RG-174U center conductor and the single wire part of the antenna.
- Three other holes would accom-

The Plexiglass center piece is the connection point for the RG-174U coax and No. 22 stranded hook-up wire in the trail-friendly End-Fed Dipole Lite.

A piece of string was used at the RF choke point of the RG-174U coax to tie-off the EFD about four-feet above the ground. Non-resonant coax leading from the bottom of the toroid stack goes to the transceiver or tuner.

modate nuts, bolts and washers to mount three small plastic cable clamps to keep the RG-174U firmly in place on the Plexiglass.

Finally, it was time to measure one-quarter wave of coax to determine the point at which to slide the toroid stack into place to make the RF choke.

We precisely measured from the braid ending point on the Plexiglass down the coaxial line 33-feet, 3-inches. At that point we wound 10-turns of the RG-174U through the toroid stack and secured the lash-up with a couple of small, yellow nylon wire ties. The coax length that was left over would be used to reach the feed point at the transceiver or tuner.

With this end-fed dipole, the coax is connected at the transceiver or tuner just as you would any conventional center-fed dipole.

I wanted to be able to make this a multi-band field antenna, so the single quarter-wave wire is connected to the coax inner conductor on the Plexiglass using a wing nut. Just disconnect the 40-meter wire, put on, say, a 20-meter wire and reposition the toroids along the coaxial line at one-quarter wave for 14 MHz. You're good to go. *Pretty cool.*

But Will It Work?

After soldering an RCA-style plug to the end of the coax for the transceiver/tuner feed point, it was time to take Kurt's trail-friendly End Fed Dipole Lite to the field for a smoke test. To make things easy to handle, we wrapped the entire antenna on an orange plastic wire/rope organizer from the hardware store. It would fit nicely in our backpack and unfurled easily.

In the back yard, the single wire end of the dipole – with insulator – was hoisted about 20-feet into a tree. The coaxial end was tied-off at the RF choke point about four feet above ground. The remainder of the coax was fed through a tuner to a NorCal-40A QRP transceiver powered by a 12-volt gel-cel battery.

Running a little less than one-watt, the end-fed dipole tuned up beautifully – no problem achieving a 1:1 SWR. It was mid-afternoon on a Friday. Forty meters was pretty noisy and void of signals. *Let's hope for the best.*

Eureka!

After a couple of CQs, we hooked up with Bill Ferrell, WB6CRM, several hundred miles away in West Sacramento, California. *Wow, it's working – even under these lousy conditions and at less than one watt output.*

Next, Brian Hunt, KØDTJ, came back from Half Moon Bay up the California coast. We chatted solidly for about a half hour, despite the QRN (static) and QSB (fading). His Elecraft K3, inverted V antenna and operating skills did a great job pulling me through. He is several hundred miles from me, as well.

It was proof positive this antenna *really works*. Perfect for the trail and what fun to use.

For any dipole fan who wants to try a no-nonsense antenna that's easy to build, carry and put up and take down in the field, look no further. This trail-friendly version of Kurt's EFD is a beautiful performer.