



Cover Story

Simple project for a matching box.

Page 1

Dayton Hamvention® Coverage ... Page 4

Local Amateur News ... Page 5

Need PowerPole Connectors? See page 3 ... Page 3

The Greensboro Amateur Radio Association

Feed Line

Providing Amateur Radio news for the Triad



Volume 18, No. 5

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May, 2009

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Building a 40m to 17m Matching Box for QRP End Fed Dipoles

by Will Ravenel, AI4VE

I've been looking for QRP antenna ideas on the web ever since buying a used FT-817 on eHam.net in March. My ideal for a QRP antenna had to be efficient, portable, and easily erected. The end-fed dipole seemed to fit the bill. This antenna is a half wave dipole cut using the same $468f/\text{Freq}$ (in MHz) as other dipoles and has the same current and voltage distribution as the center fed dipoles we are all familiar with. A center fed half wave dipole has a feed point impedance of about 70 ohms and is resonant at the frequency it is cut for (feed point impedance is purely resistive, no reactance). An end fed half wave dipole on the other hand has an impedance at the feed point that includes reactance and is from 2500 to 5000 ohms. This requires a matching network to transform the high impedance to something near the 50 ohms expected by the transceiver.

The end fed half wave dipole is a popular QRP portable antenna for several reasons. First, like all half wave dipoles, it is an efficient RF radiator and in field testing has proved more effective than several well known shortened verticals for portable operation. Second, it can be erected in multiple configurations

depending on the environment and desired radiation pattern - vertical or sloper with only one suspension point, inverted L, inverted V, or horizontal with two suspension points. Third, it is lightweight and compact making it easy to pack for portability. Fourth, with a proper matching network it can be connected directly to a QRP transceiver eliminating the need for a feed line.

There is at least one commercial manufacturer of end fed half wave dipoles. Par Electronics makes a series of high quality and reasonably priced end fed single band antennas with fixed matching networks for amateur and military use. These are rated for operation at 100 Watts or more. The company also makes one multi-band (40/20/10 m) QRP antenna with an adjustable matching network. This antenna is rated for use at up to 25 watts but uses one trap and is not quite as efficient or broadband as the single band antennas. The Par Electronics EndFedz antennas are very highly rated and have many satisfied users.

I was looking for a multi-band matching network design that could be home built, however, and I found one designed by Steve Yates, AA5TB, that seemed to meet my needs. His mini QRP matching box will tune wires cut for 40m to 17m and will easily handle 5 watts (it has been operated at 25 watts but

pushing it beyond that is probably not a good idea). The design and some interesting reading on end fed antennas can be found at www.aa5tb.com/antennas.html. The matching network is basically an L-C circuit with an 8:1 impedance transformer. For the circuit, see figure 1 below.

Steve's design uses a 20 - 160 pF ϵ polyvaricon variable capacitor. I found them at Hendricks Electronics, <http://www.qrpkits.com/>, where they use them in their balanced tuner kit and sell four for \$10.00 - not bad. Each is a dual capacitor with a 60 pF and 160 pF section. The design also called for a T-50-2 toroid core which I found at the Raleigh hamfest. The vendor DebCo Electronics, and they <http://safe.dhwd.com/cgi-bin/debco/index.html> where these cores are priced 2 for \$1.25. I bought four. (see next page for figures 2 and 3)

The most expensive part of the project was the box. Any suitably sized box would work, but I liked the size and looks of the

Continued on Page 2 >

NEXT MEETING May 25

The next meeting of the Greensboro Amateur Radio Assoc. will be May 25, at the Golden Corral Steak House, 4404 Landview Dr, Greensboro, NC 27407, off Wendover Ave. near Sam's Club. The program will be on Field Day.

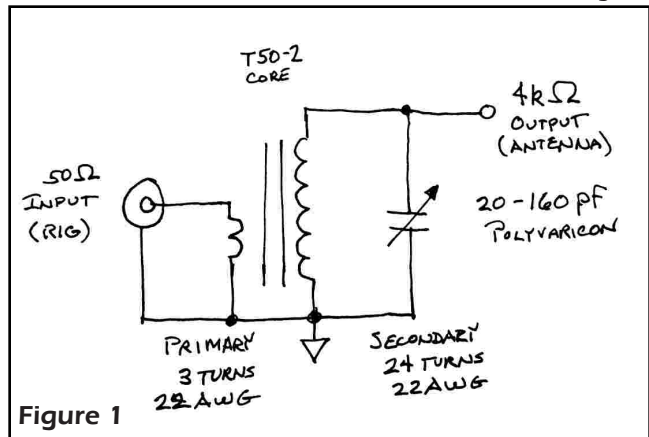


Figure 1



Figure 2



Figure 3

metal Pomona model 2391 metal box that Steve used and found one at Mouser Electronics (www.mouser.com) for \$28.00 (kind of steep, but they are so cool). The box comes with BNC connectors on each end - Male and Female. (See figure 4) The female connector was replaced with a banana jack that I had in my junk box. I shortened the post inside the box to make more room for the components. Banana jacks can be bought at Radio Shack, where I bought the magnet wire needed to wind the impedance transformer. They have a pack of three spools (22, 26, and 30 gauge - Part No. 278-1345 for \$6.59).

Construction is straightforward. The 24 secondary windings of the transformer are

to the banana jack center conductor and the center tab connected to ground. (The right tab is for the 60pf section and is not used). See figure 6 below.

To test the result, I connected a 33 foot wire (half wave on 20m) to the banana

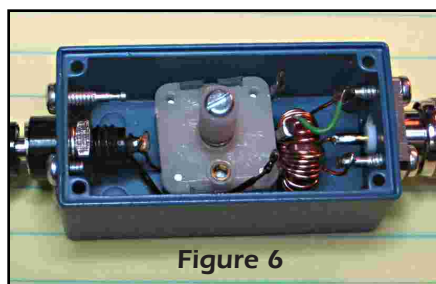


Figure 6

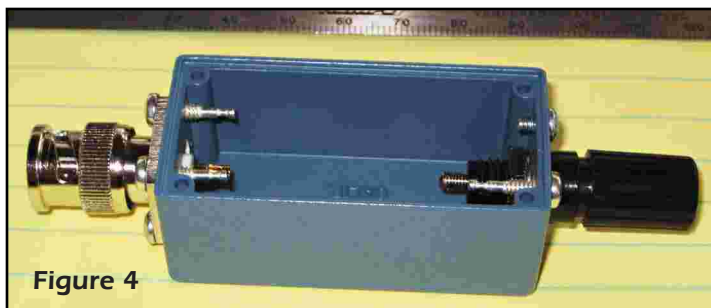


Figure 4

wound first followed by the 3 primary windings. The high impedance antenna input will connect to the secondary winding and the primary winding will reduce the impedance by a factor of 8:1 for connection to the radio. The result looks like figure 5 to the right.

The transformer is installed in the box with one primary lead soldered to ground and the other soldered to the BNC center conductor. One secondary lead is soldered to the banana jack center conductor and the other to ground. The capacitor is installed next with the left tab connected

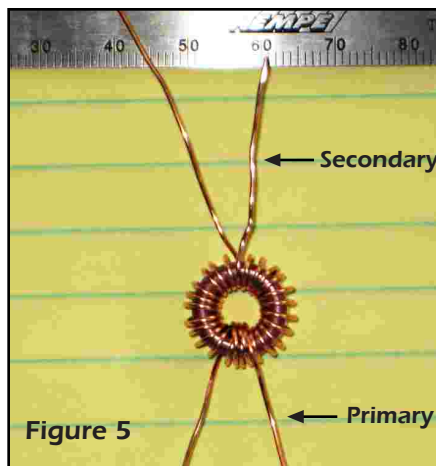


Figure 5



jack and pulled the other end up into a tree. With an MFJ 259b Antenna Analyzer connected to the BNC I set the frequency to 14.028 and adjusted the capacitor for lowest SWR. As seen below the result was 1:1.3 SWR, 45 ohms resistance, and 12 ohms inductive reactance.

I connected the matching unit directly to the antenna jack on the FT817 and worked stations in New Hampshire and Oklahoma with five watts CW. If you add up the components you'll see that the project cost a total of about \$47 not counting the wire. The Parz single band antennas cost \$52 to \$64 for the single band models and the 10/20/40m multiband model costs \$69. The single band versions handle at least 100 W while the multiband antenna is rated at 25 W.

So should I have just bought a Par EndFedz? It wouldn't be a bad choice since after factoring in the wire cost and construction time the Pars EndFedz are a very good deal. But then I wouldn't have had the fun of building it myself, wouldn't have learned anything about how they work, and I wouldn't have a matching box tunable on more bands (40 - 17m). Also the \$47 dollars spent includes components for three more matching units or similar projects (minus boxes). So overall I think I came out well ahead by doing it myself ... and it works!

All photos by Will, AI4VE

GARA Meeting Minutes



Regular Meeting Minutes April 27, 2009

The Greensboro Amateur Radio Association held its regular meeting on April 27th at the Golden Corral on Landview Drive near I40 and Wendover Avenue.

Will Ravenel, AI4VE, called the meeting to order at 7:15 PM. Will conducted the meeting in place of Chris Thompson, K4HC, who was not in attendance due to an illness.

We had twenty-one members and nine visitors present. Ernie, NC4EW, said that Arch, KT4AT, still has not submitted a bill for the repeater repairs. Tom Forrest, N4GVK, asked Ernie to send Arch E-mail requesting a bill so we can close this matter.

Al Allred, K4ZKQ, said that we are doing well.

Roy Smith, N4BYU, said the inventory needs to have the component prices updated. Will suggested this be addressed at the next board meeting.

approve the minutes as published by Roy Smith, N4BYU, Seconded by John Strandberg, AJ4BT. Minutes were approved as published.

Allen Bradley, KD4IUN, needs volunteers for the Wrangler soccer tournament on May 24 & 25.

Ken Weaman, WB2RFK, needs volunteers for the Tour to Furniture bike ride on August 1.

Tom Forrest, N4GVK, needs input for the Newsletter. Cutoff date is the 2nd Tuesday of the month.

Dan Yemiola, AI8O, gave the presentation on Grid Squares

Respectfully submitted by Greg Spencer, KG4UQV, GARA Secretary

Board Meeting Minutes

The Greensboro Amateur Radio Association Board of Directors held their monthly meeting on May 11, 2009 at the home of Will Ravenel, AI4VE.

Chris Thompson, K4HC, called the meeting to order at 7:00 PM.

In attendance were Chris Thompson, K4HC; Will Ravenel, AI4VE; Al Allred, K4ZKQ; Roy Smith, N4BYU; Dave Touvell, KN4ZO and Greg Spencer, KG4UQV.

Roy proposed eliminating the speed dial for most members and just using it for Police and other emergency calls and we retain it for any member who would like to still use it.

Will forwarded a message from Jesse Lindley, N4BFD, who said the weather radio is back from the factory after some upgrades and should be reinstalled next week.

Al forwarded a message from Ernie Wall, NC4EW, that "bills are paid, one renewal and bank account is in good shape". Al added that the finances are better than projected mostly due to new members.

Roy wanted to know if we are still going to keep the 440 machine D-Star. Chris said that we are still in the trial

phase and have not committed but it looks like we will at some point and it will be brought before the club before anything definite is done. Arch, KT4AT, is still perfecting the gateway for his controller.

Will asked if we are planning on doing another open house this summer. Chris said that he will check on that with John Standberg, AJ4BT.

We will most likely have a program on Field Day at the May Meeting. Will moved that we close the meeting and Dave seconded

Respectfully submitted by Greg Spencer, KG4UQV, GARA Secretary

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Vice-President Will Ravenel, AI4VE

Treasurer Ernie Wall, NC4EW

Secretary Greg Spencer, KG4UQV

Financial Al Allred, K4ZKQ

Engineering Chairman Jesse Lindley, N4BFD

Operations Roy Smith, N4BYU

Member at Large Clark Doggett, KG4HOM

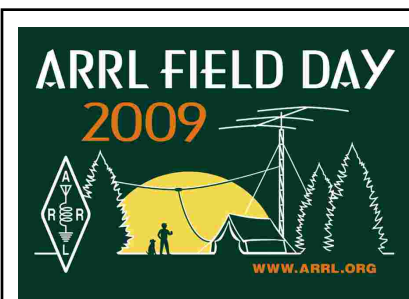
Member at Large Dave Touvell, KN4ZO

Appointed Positions:

News letter editor and Webmaster:

Tom Forrest, N4GVK

"The Feed Line" is ©2009 by the Greensboro Amateur Radio Association and published monthly. Our address is P.O. Box 7054, Greensboro, NC 27417. The purpose of the newsletter is to provide the club and prospective members information about the club and amateur radio in general. Material and information should reach the editor by the first Friday of the month for the next edition of the newsletter. Opinions expressed in "The Feed Line" do not necessarily represent the views of the officers, directors, editor or members of the Greensboro Amateur Radio Association. Material may be reproduced, provided proper credit is given to GARA.



**Field Day 2009
is coming.**

The event will, once again, be sponsored by Guilford County ARES and will be held at the Summerfield Community Park, June 27 - 28. Come out and join in the fun!

2009 ARRL National Convention and Dayton Hamvention®



Photo by Will Ravennell, AI4VE

DAYTON HAMVENTION® – Attendees look over the exhibits at the 2009 Hamvention®

From ARRL

DAYTON – With wet skies on Saturday morning, the 2009 ARRL National Convention and Dayton Hamvention® started a second day. The first day -- a beautiful sunny day with a slight breeze and few clouds -- saw crowds funnel through the many entrances at Hara Arena in search of a new antenna, a new radio, another addition for the shack. Hordes of hams perused the flea market aisles, dreaming of bargains. Dayton: The stuff that dreams are made of (with apologies to Sam Spade).

There is nowhere in the amateur universe as big as the Dayton Hamvention. This year, the Dayton Amateur Radio Association (DARA), sponsors of Hamvention, are definitely dreaming big. From the Hamvention theme -- DREAM: Digital Radio Enabling Amateurs to do More -- to the youngsters taking their Technician license exams to forum attendees to bargain hunters, Hamvention visitors are definitely dreaming big.

A massive forum schedule is one of the key features of the Dayton Hamvention. In keeping with this year's theme, there are numerous forums featuring digital radio. ARRL Publications Manager and QST Editor Steve Ford, WB8IMY, is

presenting a form on digital contesting. Tying in with this, Shelby Sommerville, K4WW, led a forum on RTTY, both from the operations side and from the contesting side. ARRL Southeastern Division Director Greg Sarratt, W4OZK, piloted a multi-level forum on D-STAR.

Richard Garriott, W5KWQ, experienced his dream of going into space last year. This year, Garriott a guest of the ARRL and AMSAT here at Dayton, telling the convention crowds about his journey to a place that most of us can only dream about. Ever gracious, Garriott spent time with ARRL Youth Editor Duncan MacLachlan, KU0DM, in addition to speaking and signing autographs at the ARRL EXPO area, the ARRL Youth Lounge, and ARRL and AMSAT forums. He also spoke at a Saturday afternoon forum about how he fulfilled his lifelong dream of experiencing space travel. By combining Amateur Radio and spaceflight, not only did Garriott realize his dream, he made the dreams of more than 200 hams come true when he spoke with them from the International Space Station (ISS).

The ARRL EXPO is definitely the place to be at Hara Arena. The publication sales table is a hotbed of activity, with hams picking up the latest League publications

and Field Day shirts, hats and pins. Operators are flocking over to W1AW/8; every ham who operates or visits the Special Event station receives a certificate.

The busiest place in the ARRL EXPO is definitely the kit building area. Led by ARRL Lab Testing Engineer Bob Allison, WB1GCM, with assistance from QEX Editor Larry Wolfgang, WR1B, and ARRL Instructors, hams (and non-hams, too!) are sitting down in front of a circuit board and soldering iron to build either a 24 hour clock or electronic keyer. "We are seeing a lot of people of all ages - including a large number of kids -- coming over to build. A large majority have never built a kit before. They are so excited to be able to build something that they can use immediately." Allison pointed out that ham parents are bringing in their non-licensed children to build kits: "The little ones are having a blast, and the parents are so proud that their kids are getting interested in Amateur Radio through the kit building projects."

The ARRL National Convention has an expanded IARU exhibit area this year. Led by new IARU President Tim Ellam, VE6SH, and Vice President Ole Garpestad, LA2AR, the booth is staffed

Continued on next page >

FOR SALE

Power, Supply & Meter

Antenna, dual band, power meter and Astron RS-20M power supply - \$65; Icom IC208 dual-bander - \$75; Comet CMX-3RS in-line UHF/VHF SWR and power meter - \$75. Call Fred Blackman, W4FB, at 336-841-4338.

Heath HW-101 \$150.00

This is the classic, top-selling Heathkit transceiver. Complete with matching power supply, microphone, and speaker, along with the original instruction manual and extra tubes. (I last used this rig approximately 25 years ago. To make this classic transceiver operational, electrolytic capacitors should be replaced.) Contact Pete, W8LOG, at 336-852-8791 or at pkauber@triad.rr.com

Alinco 5watt vhf/uhf with high capacity battery, remote mike/speaker/controller; charger, 1/4 wave mag mount, and vox operated head set. It is in good condition (enclosed .jpg). My interests lie elsewhere than ham radio. \$130 K4CJZ, Chuck, 887-9023



New Interim EC For Guilford Co. Appointed

Recently **John Doggett, AJ4DV**, resigned as Emergency Coordinator for Guilford County ARES, citing work responsibilities. John performed a great job while he was EC and he will be greatly missed.

In the interim, it has been announced that **Dan O'Connell, KJ4FWU**, has been appointed as interim EC. AEC Roy Smith, N4BYU, made the announcement May 16. Roy and AEC Tom Forrest, N4GVK, will be assisting.

GARA Member Elected to District Office

Pilot International, NC District has elected GARA member **Vashti Forrest, KA4DGS**, as their District Lt. Governor for 2009-2010 at their convention held in Greensboro May 1-3. Her year-long duties will commence at the PI International Convention in San Diego, CA in July.

Pilot International champions the prevention, treatment and possible cure of brain related disorders. The districts 30 clubs sponsor community-based assistance, including BrainMinders prevention training and Project Lifesaver monitoring for those with brain impairment.

Get Well ...

Foy Flowers, W4FOY, recently had shoulder surgery and is home and doing well.

Continuing get well wishes are offered for **GARA member Charles Lyons, NT1J**. Charles has returned home and will continue stroke rehab.

Dayton from page 4

by representatives from the three IARU Regions: The Deutscher Amateur Radio Club (DARC) from Germany is representing Region 1, the ARRL is representing Region 2 and the Japan Amateur Radio League (JARL) is representing Region 3.

"It is exciting to see how many people are coming over and visiting us," Ellam said. "With the JARL processing applications for the IARU's Worked All Continent (WAC) and 5-Band WAC awards, there has been a steady flow of amateurs here." In addition to the WAC awards, the DARC is sponsoring a world flag identification contest and the ARRL is offering a RUFZ CW copying competition throughout the event.

"It's certainly well known that hams from all over the world come to Dayton for the Hamvention," said ARRL International Vice President Rod Stafford, W6ROD. "We truly have an international flavor in the ARRL EXPO though, as this is the first time that we have had representatives from all three IARU regions to be with the IARU booth. We hope as many hams as possible can stop by and visit with IARU representatives from all corners of the globe."

For those dreaming of new products, there are close to 35 new products that ARRL Technical Editor Joel Hallas, W1ZR, has found -- so far. From a 2 meter transverter module for the Elecraft K3 to a traditional hexagonal five

band Yagi from DX Engineering to antenna tuners from Ten-Tec and Palstar, there is a wide variety of the latest in ham radio gear to satisfy even the most hard-to-please ham.

The flea market has seen brisk business, even with the damp weather. A bargain hunter's paradise, the flea market is considered by the ultimate bargain shopper as ham radio paradise. Aisles and aisles of tables populate a parking lot full of shoppers seeking the best deal, with the vendors doing a brisk business in unloading their many treasures.

While it's said that you can find anything at Dayton, no one has yet to spot a statue of a falcon reputed to contain priceless jewels. But since this is Dayton, anything is possible if you just dream.

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Area Activities

FOURTH MONDAY – at 6:30 PM, the Greensboro Amateur Radio Association have their regular monthly meeting at the Golden Corral, 4404 Landview Dr, Greensboro, NC 27407, off Wendover Ave, near Sam's Club. Please plan to gather at 6:30 PM for dinner. The meeting is scheduled to start at 7:15 PM

CLUB NETS:

SUNDAYS – weekly at 9 PM, the **GARA News and Information Net**. This net features NewsLine and is on the 145.150, W4GSO repeater. Roy Smith, N4BYU is always looking for net controls. Contact him if you would like to help.

THURSDAYS – The **Guilford County ARES Net** meets on the 145.150 repeater (100 Hz. tone) at 9 PM.

TUESDAYS – at 8 PM, the **2 Meter SSB Net** meets on 144.225 Mhz. USB. Chris Thompson, K4HC is the net control station. (Not operational present time)

WEDNESDAYS – The **Guilford Amateur Society** holds their weekly net on the 145.250, W4GG repeater with an 88.5 Hz. tone. Jim Hightower, W4JLH is the net control.

TUESDAYS – at 8:30 PM The **Triad SkyWarn Net** meets on the 147.225, K4ITL repeater, no tone required.

OTHER ACTIVITIES :

FIRST MONDAY – The **Guilford County A.R.E.S.** monthly meeting is held at 1002 Meadowood St. off W. Wendover Ave, in the EMS building, beginning at 7 PM.

THIRD MONDAY – at 6:15 PM The **Guilford Amateur Society** holds their monthly meeting at Tex & Shirley's Restaurant in Fiendly Shopping Center. Eat at 6:15 PM and the business meeting begins at 7 PM.

THURSDAY – at 11:15 AM, Greensboro Hams get together for lunch. Thursday lunch group is meeting at the K&W Cafeteria, 300 Forum VI Mall at Friendly Shopping Center. Talk-in is on the 145.150, W4GSO repeater with a 100 Hz. tone.

EVERY FRIDAY – at 8 PM (approximately) Greensboro Hams get together for coffee at Guilford College (summer location till Daylight Savings time changes)

Technical Forum Sundays at 7:30 - 145.15 repeater

The W4VEC Testing Schedule May to Dec. 2009

June	13, 2009
July	11, 2009
August	8, 2009
September	12, 2009
October	10, 2009
November	14, 2009
December	12, 2009

Location: #3 Centerview Dr, Hickory Building, Greensboro, NC 27407

Time: 9:00 A.M.

Contact: Glenda Nicholson

Phone: 336-674-3810

E-mail: ag4nc@bellsouth.net

Save The Date

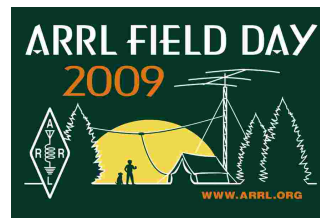
The annual **Doggett cook-out** will be **Sept. 26, 2009.**

Save the date and plan to attend for some yummy **BBQ**
More information to come.

GARA REPEATERS

145.150 Mhz - minus offset
100 Hz. Tone

442.8625 Mhz. + offset
Digital D-Star



June 27 - 28, 2009

Greensboro Amateur Radio Association

P.O. Box 7054

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Web:
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