

# **Rochester DX Association**



## **June Meeting Presentation 2014 Field Day Planning and Discussion**

**Tuesday, June 17<sup>th</sup>, 7:30pm  
Monroe County EOC  
1190 Scottsville Road**



## Field Day Is Nearly Here!

Some nice weather finally lets you get outside, and you stretch your arms wide...ah yes, the antenna should go right about **there!** And not long after, the calendar creeps to June, and as soon as that page turns, we all know what it means – Field Day is on its way!

Pleasant thoughts of last year's event certainly come back, and we want to continue that feeling. With a winning effort, albeit late in being recognized by the ARRL, we can't help but want to duplicate it if we can. But even that winning effort had some weak aspects to it, so it's natural to want to tweak those. But that's about all that's planned for changes for this year – a couple of tweaks. We want the same general approach that made last year so comfortable and rewarding.

So what would those be?

Well, one will be watching which bands we're on with which stations, to make sure we're not leaving contacts floating in the ether untouched. For example, 15 CW had 167 Q's last year and 15 phone had 24. GOTO had 289 on 15 phone with some nice runs! We obviously weren't watching what was going on. We hope to fix that with some more diligent monitoring.

Another observation flows from the above and triggers a recollection of a prior year. It might have been our record setting 2008 year, and 40 CW had reached its typical 1000 Q milestone earlier than usual, so the operator, Raj N2RD, put the station on 15 using the

40-2CD, and just kept on running. Ever since, we've *said* but seldom acted on the concept that the 40 CW station should more actively be a 40/15 CW station. It also balances the load more evenly, with the other station then being 80/20/10.

Last year we needed more ops than we had to keep the phone station fully active. This year we'll have a single person coordinating the operators for all stations.

Antennas are always and forever an area for improvement. A few modest wire antenna proposals will be discussed to see what can be optimized. We're hoping Lloyd N2PU can convince the Webster FD to bring its ladder truck to the park so we can get our marine line through the flagpole pulley this year. This will put the 40-2CD at the top of the pole where its HFTA plot shows it performs the best. We're also gathering the hardware to mount a cleat much higher up the flagpole to secure the halyard out of reach of casual visitors.

But there are many things that don't need to be tweaked at all. We kind of all just get together, get this, bring that, put it there, and then ultimately marvel at what we've accomplished.

Boy, can't beat that! I'm ready. Am hoping you are. Let's do this again!



# Part 1: Building a 7 Band OCF Dipole

## Experimental SWR vs Band Analysis

N2UJN – Michael Sanchez

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### Genesis: Participate in the K2QZR 80m Net (but no 80m antenna!)

K2QZR factors fairly prominently in my entry into HF Amateur Radio. It was his 2m net that I randomly came across one evening after a long hiatus (nearly 20 years) between passing the Tech license for the first time, and, passing Tech the second time.

It was at that 2m net that I heard K2FX advertise his FT-1000MP; a purchase that led me into HF, and, ultimately to the use of a vertical for 10–17m and a homebuilt 40m, resonant, Dipole.

Then, from last August until June 01 of this year, I have listened intermittently to the venerable K2QZR net on Wednesday evenings. I ignored my MFJ-949E warning to avoid attempting to tune 80m on a 40m dipole only to learn that no amount of tuning (with that tuner) will enable a 40m dipole to transmit on 80m. Probably a good thing. I did use my Antenna Analyzer for the preceding experiments, not my radio transmitter!!

So, as warm weather onset, I resolved to stop just listening to the 80m net and do something to participate in Joe's excellent 80m net.

### But What Antenna?

Clearly, I could build another dipole and string it on the same pole as my 40m dipole. However, my yard would not support 66' in two equal directions. Cuts off on the east leg.

Also, I had picked up a GAP Titan for very low cost which purports to enable the 75m band. However, even if the Titan worked, it is a vertical; primarily for DX.

I gave up briefly and then.....

### The "Buckmaster OCF?"

By random chance, or good fortune, or blessing, one day, I ran across a reference to the "Buckmaster OCF". Never heard of an OCF.

<http://hamcall.net/7bandocf.html#7band>

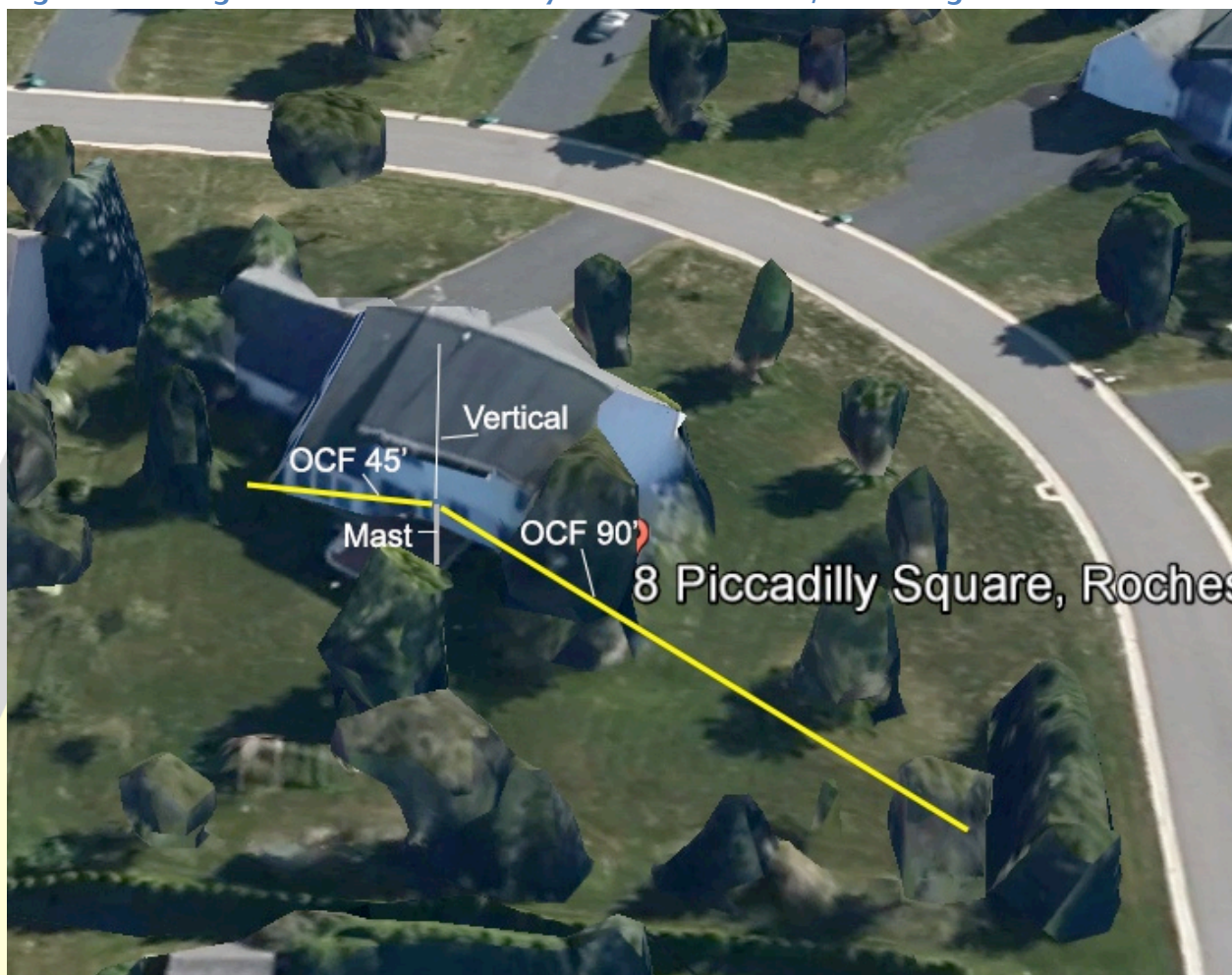
The "Buckmaster OCF" claims to give access to 7 Bands, including 80m....my desired target. But, it purports to also preserve 40m. Several other bands are listed including 20m, 17m, 12m, 10m, 6m. This seems like a dream antenna yes? Too good to be true? Well, I thought if I achieved only two bands: 80m and 40m, I would be ahead....assuming it worked on those two bands.

However, the band support is only one aspect of what caught my eye. The Buckmaster OCF has a leg length of 90'/45', ideal for my backyard + side yard combination. See Figure 1.

I saw the dimensions on the website, and, immediately went outside to measure from my already installed Rohn push up mast to the tree on the east and then to the edge of my side yard on west. Perfect. 90' on the west side with 8' to spare. 45 feet on the tree for the east side with 8 feet to spare. See Figure 1. Here was an antenna, in terms of leg length, designed exactly for my backyard+sideyard.



Figure 1: Google Earth View of Backyard with OCF 90'/45' Design. Perfect fit.



### The Price – Maybe I Should Build It!

I read more about the Buckmaster. Then I read the price. \$299! eHam reviews were universally positive.

In looking at the pictures of the Buckmaster OCF, \$299 seemed a bit high (before I knew anything about it). The antenna looked like just a couple pieces of wire with something in between. So, I looked a little closer at the something in between the two wires. Buckmaster defines the something in between as a “The 300 to 50 Ohm (6:1) balun (also sometimes called an auto-transformer)”.

## 4:1 Current Balun for OCF at 35'

The Buckmaster definition of “something” precipitated an email note to Joe, K2QZR,

“have you ever heard of Buckmaster OCF?”.

Joe’s prompt email return clarified quite a bit → [Yes, he said, I have tried a couple of OCF but Buckmaster is the expensive version. OCF are always fed, as far as I know, with coax. And, if installed at 65’, need 6:1 Balun, but, if installed at 35’, need 4:1. ] (thanks Joe).

From Joe’s note, I now knew I needed a 4:1 Balun. My Rohn mast only goes to 34’. But, what, precisely was a “Balun”, what do they do?

Importantly, how to build one?? Initially, I went off to learn about them. I am busy, and, sometimes build, sometimes buy, mostly depending on how much I might learn. Seemed like learning about “balun” was worth the time invested.

## 4:1 Current Balun Design – Learning First

### W8JI article

A google search returned many, many links of which three were worth reading, and, re-reading. The first is an article from W8JI.

[http://www.w8ji.com/balun\\_single\\_core\\_41\\_analysis.htm](http://www.w8ji.com/balun_single_core_41_analysis.htm)

In this article, two significant and important learning’s are available after multiple readings to sort out the root message. W8JI is clearly a genius, and, his writing is clear, but, it is also prolific. Sorting through the prolific to find the clear was a challenge honestly.

Here are his two messages from that article relevant to OCF dipole:

- a) A good 4:1 Current Balun is both an impedance transformer (50 ohm to 200 ohm), AND, a common mode choke (prevents current on the coax shield back into the house).
- b) In order to be a completely effective common mode choke for BOTH legs of the OCF dipole, a dual toroid design is absolutely required. Since no two halves of a dipole, especially an OCF, have identical common mode currents, each must have a dedicated toroidal transformer/choke.

### N1IW (sk) 4:1 Dual Toroid Current Balun Construction Information

With the above message from W8JI, I proceeded to randomly run across one of the all-time best powerpoint slides in the history of power point.

[www.yccc.org/Articles/Antennas/N1IW/Balun\\_short\\_version.ppt](http://www.yccc.org/Articles/Antennas/N1IW/Balun_short_version.ppt)

In this very photographically detailed Balun/Unun construction document, one can, after several readings, figure out the following:

To build a good, dual core, 2.5kw, 4:1, Current Balun, one needs:

- a) Two Amidon FT-240-61 toroidal cores.
- b) Some 14 or 12 gauge wire. (my personal favorite: Home Depot THNN 14 gauge solid)

- c) Some glass tape (also sold at Amidon).
- d) Some Teflon tubing for wrapping wire (Debbie Supply).
- e) \$24 + \$10 Shipping.

Paradoxically, N1IW construction steps do not include clear wiring method for the dual toroidal transformer after winding is complete. Nor does the document indicate the best way to test the wiring to make sure it is functioning before spending time putting it in the air.

#### 4:1 Dual Toroid Wiring for Transformer Operation

[http://www.ure.es/yabbfiles/Attachments/4\\_A\\_1\\_BALUN\\_EA6XD.GIF](http://www.ure.es/yabbfiles/Attachments/4_A_1_BALUN_EA6XD.GIF)

Recognizing that I did not know how to translate the electrical diagram for what is called the Guanella 4:1 transformer to actual post constructed dual toroid wiring, I found the above reference which is fairly clear. As we shall see, fairly clear is not crystal clear.

#### Figure 2: Wiring a Guanella Dual Core Transformer

ref: <http://www.parc.org.za/publications/Guanella%20Transformer.pdf>.

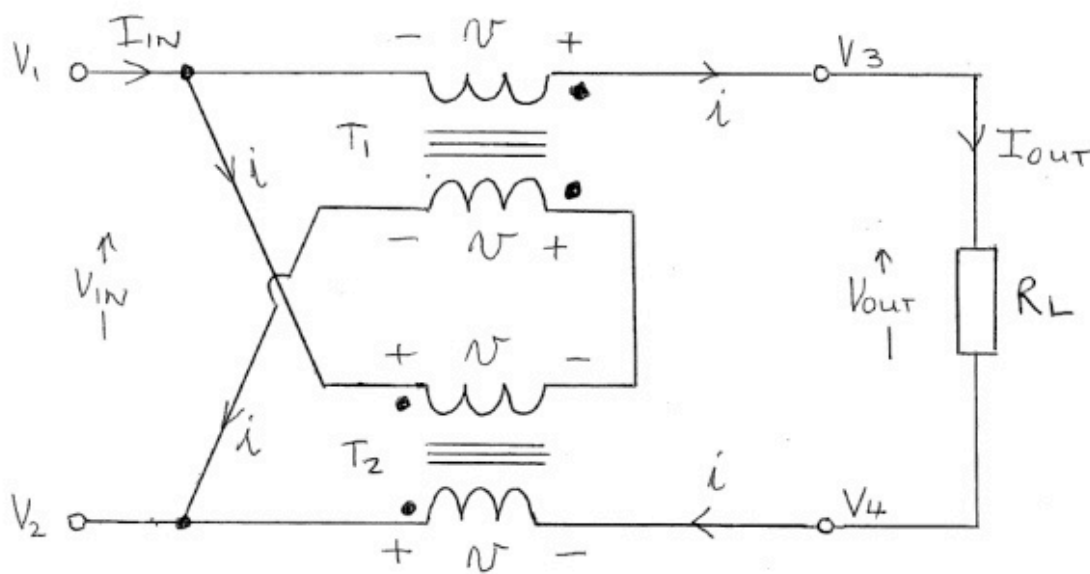


Figure 1: Guanella 4:1 Transformer

#### The Choice To Build the OCF

Learning about the 4:1 Dual Toroidal Core Transformer/Balun/Choke was interesting, and, building one costs about 10X less than the antenna from Buckmaster. Plus, I had purchased 500' of 14 Gauge THNN solid copper wire from Home Depot (\$48) last August and it had survived the winter looking new on the 40m Dipole. I could just extend that to the wire lengths of the 90'/45' OCF'.

The main challenge would be building the Balun, but, the work seemed reasonable.

So, I decided to order two toroids and glass tape from Amidon....\$34 including shipping.

One other factor affected my choice to build. In my limited experience with antenna systems, I understand that the performance of the antenna is local. By that I mean, what Buckmaster was able to get working, may, or may not work at my location.

So, because the entire OCF experiment might fail or sub-perform, I preferred to spend \$34 finding that out rather than \$299.

### **Building the 4:1 Guanella Balun (Transformer/Common Mode Choke).**

I followed the steps and procedure shown in the N1IW after studying the information closely enough to know that the dual toroid built was indeed a 4:1 Current Balun.

#### **Step 1: Wrap Each Toroid in Glass Tape**

Wrapping the metal toroid in glass tape prevents the sharp edges of the toroid from piercing the insulation or tubing around the wire. I studied the pictures, and, followed along....making my own pictures with an eye toward the RDXA newsletter if some success occurred.

**Figure 3: Glass Taping the Toroids**



#### **Step 2: Strip the THNN insulation**

After some experimentation with stripping wire I found a rapid, safe method using a razor blade. I had to strip 4 lengths of about 3.5 feet or so (did not measure). Used a string to get the length by pre-wrapping 8 winds on the toroid, then, cut the wire longer than string for ends.

#### **Step 3: Route the bare wire through Teflon clear tubing.**

From Debbie Supply, a great store, I garnered clear Teflon tubing to flexibly insulate the wire from the toroid and from each of the windings. I chose an inner diameter that resulted in wire not getting stuck due to friction half way through by taking the cut wire with me and trying successive diameter tubing until I found the right one.



#### Step 4: Bifular (new word for me) wrap the toroid.

A dual wire winding is referred to as a Bifular wrap. Fortunately, I used soft, solid, copper wire because I had to do it a few times to get the ends even on each end (input output).

Figure 4: Winding the toroid.



#### Step 5: Wiring and Testing the Transformer

This step was confusing for me. I had a hard time translating the electrical diagram to actual hookup, but, found another reference noted previously for wiring the two toroids into one input/output transformer. To insure proper transformer operation after wiring, I hooked two 100 ohm resistors from Radio Shack to represent the “antenna”. Ideally, this would be transformed to 50 ohm between the feed and ground input to the transformer. The two 100 ohm resistors were actually 193 ohm, and, also, suffered capacitive and inductive reactance at frequencies higher than 1.8 MHz. But, at that frequency, the transformer worked nearly exactly as a 4:1 transformer. So, the wiring was correct! For now anyway.

Figure 5: Testing the Wiring and the Transformer for 4:1

**Step 6: Finalizing the Toroidal Configuration and Wiring for Install.**

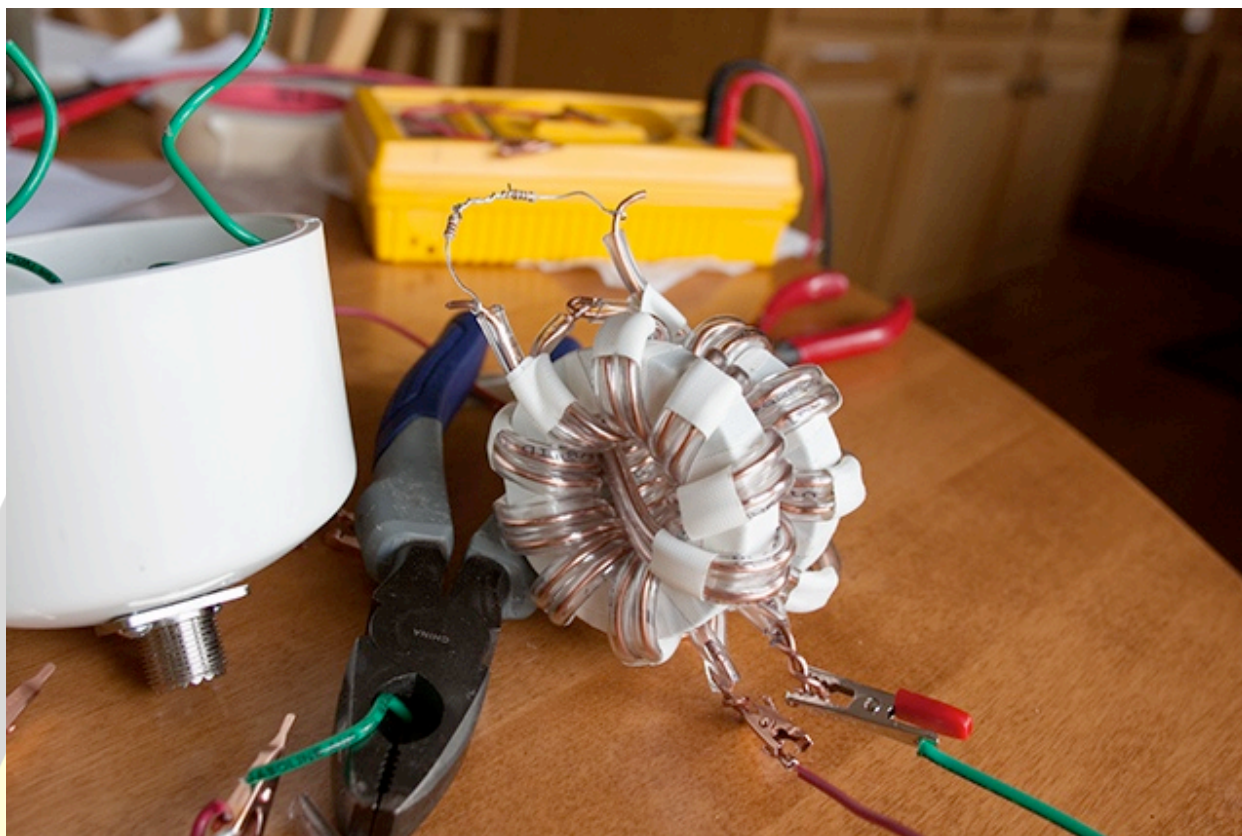
The first time I completely wired up the toroids for install in the home built housing, I marked each wire, then, folded the toroids over, and STILL managed to wire it incorrectly. Unfortunately, I was too confident and soldered all connections before testing the system with the 200 ohm “antenna”. When I did test, the SWR was infinite. This was after several hours of careful work.

At that point, honestly, I almost punted the project.

But, my wife and kids were at the Greek festival, so, I did have some more time. I pulled the entire assembly apart, and, when re-wiring the second time, tested at every single step. Also, when I finished, I did NOT solder all connections. I just looped the soft, solid wire, and, “crimped” the wires together. Works fine and easy to disassemble if need be.

Figure 6: Final Toroidal Configuration Ready for Install in Housing.



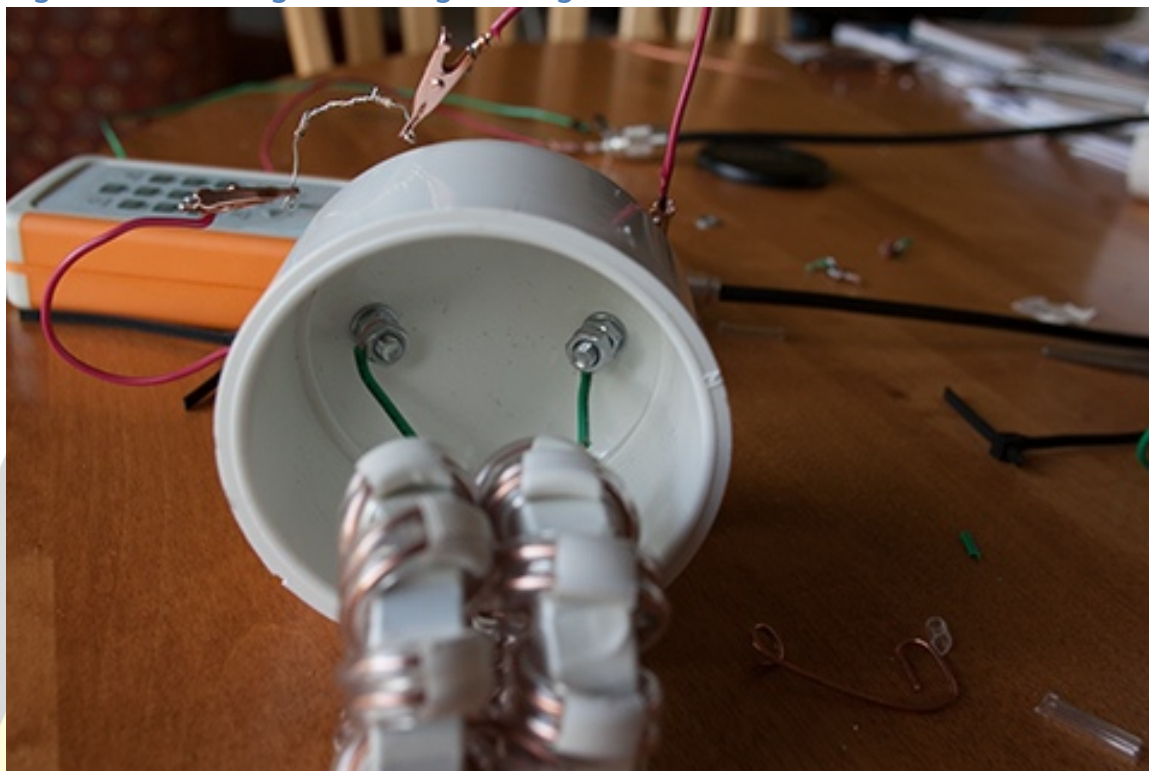


### Installing the Balun in Custom Built PVC Housing.

I had a 3 inch piece of PVC pipe leftover from a toilet exhaust repair some years back. I went to Lowes and found 3" PVC caps, and, bolts and already had an SO-239 connector....just needed small bolts for securing.

Once the housing was built (to be shown), I installed the top wiring first (see Figure 7). Then, at the bottom, I routed a wire through one of the SO-239 holes to the external frame of the SO-239 for ground and soldered. Additionally, I soldered the center feed with a solid piece of THNN 14 emanating from the connector. These were then connected to a "spring" like winding to enable me to connect the bottom of the housing to the Balun, now inside the main part of the housing, and, compress the wiring into the bottom of the housing.

Figure 7: Installing the wiring leading to the antenna terminals.



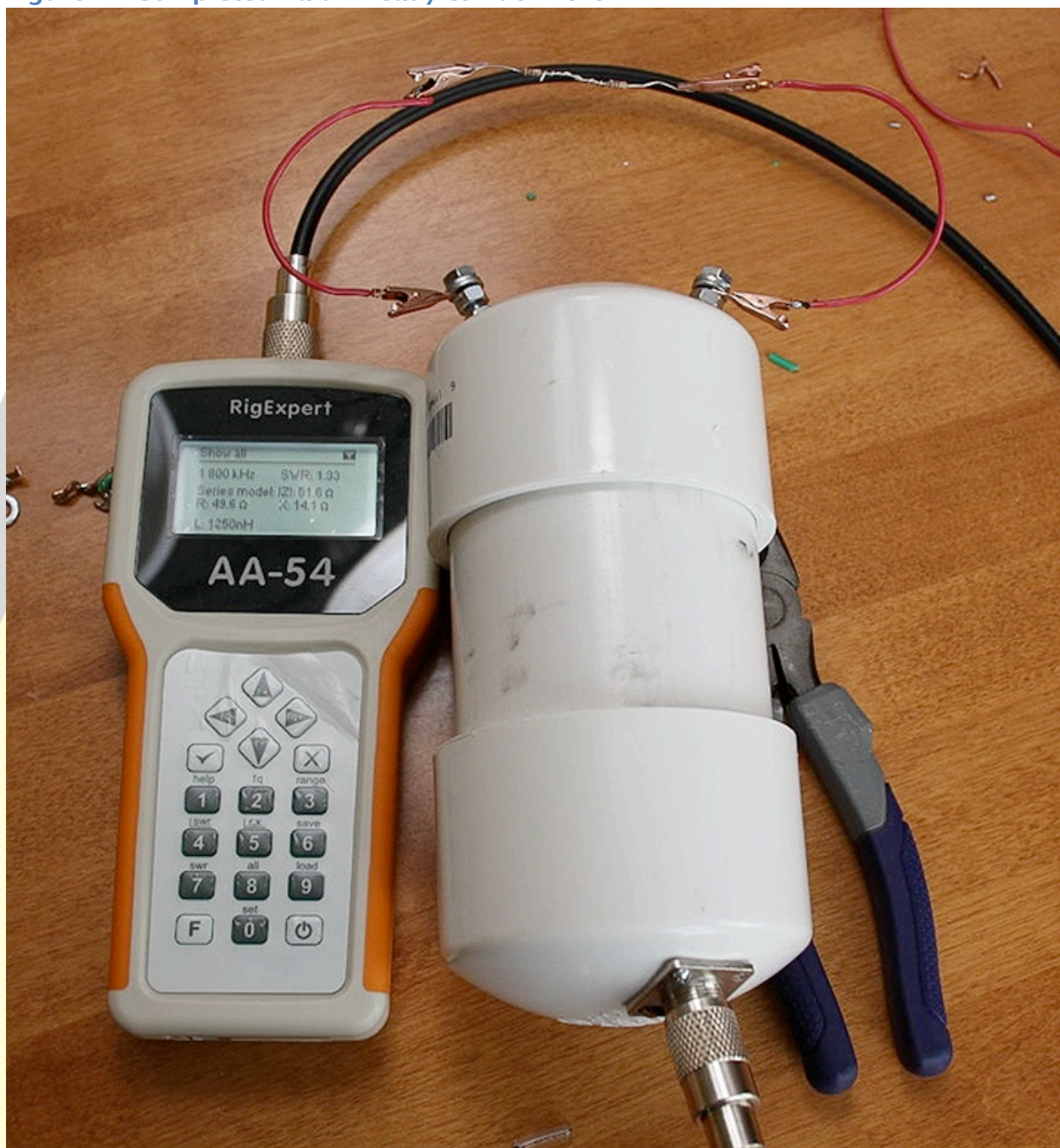
I used the nuts and two wraps of the THNN around the bolt, and tightened hard. No solder.

### Final Balun Installed in Housing, Ready for Waterproofing and Up in the Air!

Testing the wiring at each and every step is critical to ensure that, upon hoisting into the air, it actually works. This is the last step except for water proofing, and, still transforming 193 ohms to 49.7 ohms....good to go. Note, I could reduce weight by cutting the caps shown below. But, only thought about it at the end of the day. So, this 2.5 kw balun beast weighs 2.4 lbs (toroids weigh a bit). I only use 100W....so.....a little overdesign. ☺



**Figure 8: Completed Balun Ready to Put in the Air.**



### **OCF Antenna Performance at 34' Center, 8' Ends.**

I added wire to my 40m Dipole to make up exactly 90' and 45' on each leg. Then, I connected the balun to the wire, and, hoisted the assembly into the air for testing with the RigExpert Antenna Analyzer. Honestly, I literally ran to the basement to hook up the coax and run a scan from 1.8 Mhz to 29 Mhz.

The results were striking, but, showed that all bands that appeared at low SWR, were resonant slightly too low in frequency.

So, I returned outdoors and cut 2' off of each end of the wire, and redid the measurement. Results are below, and, frankly, for me, astounding.

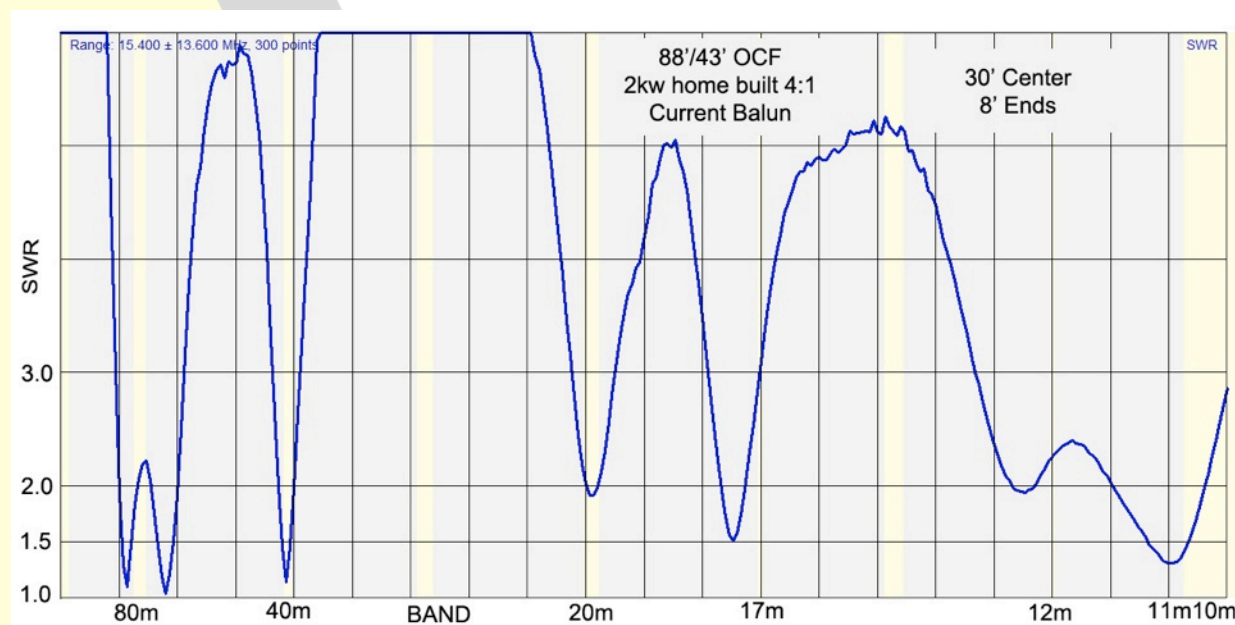
Below, from the SWR data, and counting 17m at SWR of 3.0:1, there are 7 usable bands. I do note that I might, in future, trim a little more off to center up the minima in each band. But, by Sunday pm, this was more than good enough!!

10m, 11m, 12m, 17m, 20m, 40m and 80m. I do count the 11m band, although, I have not tuned into that band in a while, plus, somebody put a strong jammer on Channel 26, which, honestly, used to be interesting to listen to. I did not test the 6m band (not transmit capability).

**The below performance is positively a spectacular result for around \$50.**

Note, my total time invested in learning and doing was around 18 hours of research, building, testing, and confirming. This includes building the balun, the housing and hoisting and testing and waterproofing when done. Note, if I had not wired incorrectly the first time then the total time would be around 16 hours of investment. So, cheap in dollars, but, not in time. The trade is learning.

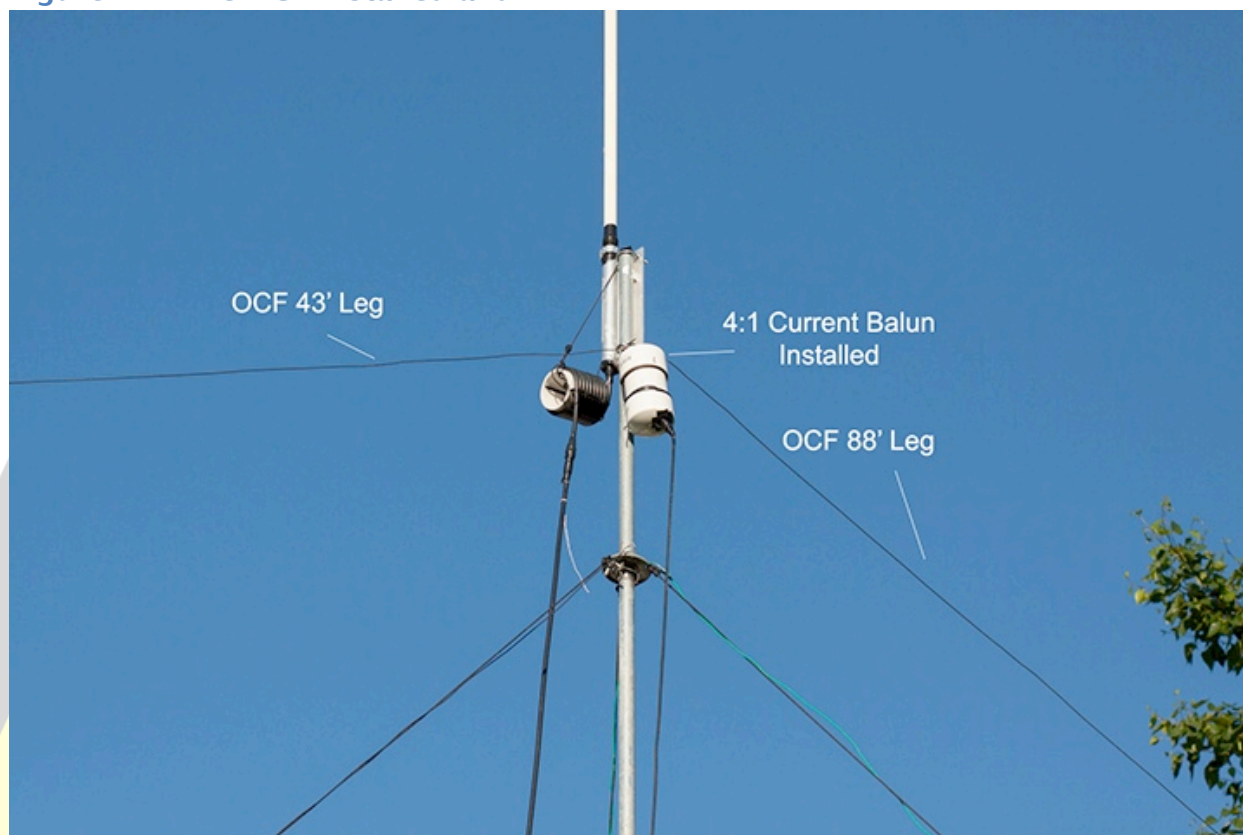
**Figure 9: RigExpert AA-54 Scan 1.8 MHz to 29.0 Mhz .... 7 Bands!!**



### View of the Balun Implementation and OCF Installed

I use a Rohn 9H50 push up mast to support my Solarcon Max 2000 and, added the Off Center Fed Dipole (OCF) to the base of the Solarcon. This replaced the 40m dipole.

Note, at age 54, the push up mast keeps me motivated to work out. Pushing up the last leg is not much different than farm work. ☺

**Figure 10: The OCF Installed and On Air.**

## Part II Preview

The OCF is an incredible antenna from the band access perspective. Plus, now I have a vertical that accesses the same bands as a horizontally polarized antenna for some bands.

However, band access due to low SWR is only an access metric. Low SWR means I can reasonably receive and transmit. It does not mean the signal can get out past my neighborhood.

In Part II I will examine, via simulation, the complex radiation pattern around this antenna as a function of band in order to understand propagation from this antenna. From that, I can guess at performance. Also, I am live testing on air.

Putting Part I and Part II together will fully define the capability of the antenna from performance perspective.

What about fun? Well, if you like project work, and think that is fun, this was great fun!

Getting Slovenia last night on 20m with a 20 over 9 signal report?

Priceless.

N2UJN

Michael Sanchez



# Update on W1AW/2 Operations

Uploads from W1AW/2 (NY) are still in progress.

## W1AW Portable Station QSO Details

Contact details for W1AW/2 in NY between 2014-05-21 00:00:00 and 2014-05-27 23:59:59 are shown in the table below.

Band	CW	Data	Phone	Total
160M	308	0	65	373
80M	647	330	618	1,595
40M	1,442	503	2,111	4,056
30M	1,303	520	0	1,823
20M	2,099	1,105	3,054	6,258
17M	2,211	539	2,785	5,535
15M	1,634	388	1,690	3,712
12M	587	93	397	1,077
10M	90	54	509	653
6M	38	0	82	120
2M	0	0	14	14
Total	10,359	3,532	11,325	25,216





# Batavia Hamfest

**Saturday – July 19, 2014**

**Alexander Firemen Grounds – \$7.00 admission and free tailgating**

10708 Alexander Rd. Route 98, One mile south of Rt 20 , Alexander NY14005



**.Outdoor Flea Market - with the same venue as prior years 6:00am - till**

**Buy / Sell - VE Exam - Ham radio vendors - electronic equipment**

Overnight Camping Allowed - Arrive after 6PM on Friday ( the night before hamfest )

**Hamfest Questions** Contact Luke N2GDU 716-481-5747

**To register for the VE exam -** email John Maxwell [maxwell@acsu.buffalo.edu](mailto:maxwell@acsu.buffalo.edu) or Call 716--404-9256

**.Talk In:** 147.285 PL 141.3 Batavia repeater



## Rochester DX Association

Club Station — W2RDX

Club Website — <http://www.rdxa.com>

This Bulletin is the official publication of the Rochester DX Association and is published monthly, September through June. Email your articles, tips, ham ads, etc. to Andrew, W2FG at [alesny@rochester.rr.com](mailto:alesny@rochester.rr.com) by the second Tuesday of the month for inclusion in that month's issue.

All those with an interest in amateur radio and DXing and contesting are cordially invited to any meeting and to join RDXA. Meetings are held at 19:30 Local time on the 3rd Tuesday of each month, September through June.

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## Membership Dues can be sent to:

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 305 Wood Road  
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Regular Membership	\$20.00
Family Membership	\$5.00
Full-Time Student	\$5.00
Lifetime Membership	\$200.00

**Any other correspondence to: Irv Goodman, AF2K**



## ROC City Net

The premier HF net from  
 Upstate New York

Every Wednesday at  
 8:00 PM (0000 UTC)  
 @ 3826KHz +/-

And Now on 145.11 Bristol  
 Repeater,  
 Sunday @ 7:30 PM  
 Join Us!



**ARRL**  
**100**  
 YEARS