

The Link

Newsletter of the Durham FM Association



November 2020



President's Corner

I continue to enjoy hearing new voices on our repeaters. It gives me even more satisfaction to have those new voices become regulars on our nets. While I am disappointed that we haven't gotten a chance to meet in person, I am hopeful that we will be able to do so before too long. In the meantime, we can continue to do more work to make the club more inviting to new members and to strengthen the community for those of us who have been around for a little while longer.

With that in mind, the board discussed the following two topics at our latest board meeting. The first is drafting a code of conduct for the club. We welcome everyone to participate in our club activities on the repeaters, mailing list, and in-person events. That the invitation includes everyone is particularly true for our repeaters and mailing list where anyone in the world with an Internet connection can participate. Often, we are making that invitation to people we don't already know well. By adopting a code of conduct, we can signal to potential participants what they can expect from our community. My hope is that by knowing what to expect, people will be more willing to jump on board.

I've seen codes of conduct work well for other organizations, and we're taking inspiration from work done by the ARRL and other maker/hacker communities. An example from another community that I participate in is the Contributor Covenant for Free and Open Source software projects. Implementing a code of conduct will be more than just writing the document. We'll also have to learn how to communicate about the code, and hold ourselves accountable as a community. Please let me know your thoughts, and thank you for joining me on this journey.

We'd also like to expand the corp of net control operators for our Thursday night net. This is a great opportunity to do a little bit more talking on the radio, lead us in discussions on interesting topics, fulfill one of the net objects of practicing net operations, and be the voice of the club. You can have all these benefits for little more time invested than you would just checking in. There is no need to be bashful, anyone can be net control. All we require of you is enthusiasm and a willingness to learn. We'll provide advice and a net script. Let me know, and I'll slot you into the schedule.

These are the two things that we worked on this month, but certainly not the only work that we could be doing in this area. Let me know if you have a topic that we should take up next.

A Convenience Store Based Antenna

By George Ure, AC7X

Ham radio operators world-wide would love an antenna that is cheap, easily built out of locally available parts – and outperforms both standard dipole antennas and other commonly-built wires. Well, here it is....

After almost a year of modeling our ideas for a “Super Antenna” the design was locked. It was built and put on the air during the CQ Worldwide contest last week.

It was a pile-up buster. (To non hams: it kicked-ass!)

In a space of 1/2-hour, I logged Portugal, Aruba, Italy, and somewhere in ITU Zone 29 (roughly Azerbaijan. Plus, uncountable contacts state-side. And when these basic signal contacts were done, had a nice +30dB over S-9 on C.W. (amp on, NY area from Texas).

All on an antenna you can make for about \$65-bucks and a few hours work.
The “Secret Sauce”

Every antenna builder/designer claims they have some “secret sauce.” I’m no different. EXCEPT that I have run my “secret sauce” through countless iterations modeling.

Setting up modeling software is important for proper evaluation. In EZ-NEC (pro), careful attention was paid to setting up both the ground conditions (Real- High Accuracy) as well as the reference antenna (2.15 dBi) which enables dBd (decibels relative to a free-space (isotropic) dipole.

>>>> The “secret sauce” after all these iterations? Antennas work best when there are multiple conductors on one side of a center feedpoint. Usually, a couple of dB!

At the center, all these additional wires are connected together. At the far end of the antenna, they’re 3 to 6-inches apart but NOT tied together. The effect disappears if you do that...
Walk-through of the Secret

With a simplest dipole (like for 20 meters), you have two pieces of wire, each ~16.7 feet long. These are hung in the modeling software (as a flat-top) at 50-feet. Signal source is attached: Center conductor to one side, braid or opposite side of ladder line to the other.

And it will work. Very well, though it depends on aim. You see, the traditional dipole antenna fires broadside (perpendicular) to the antenna. Since it has significant lobes when plotted, the antenna has up to 5.36 dBd in broadside directions, but will perform poorly 90-degrees to those lobes. The 5.36 db is “pulled in” from the end lobes.

The Dipole is not perfect, though. Significant energy is “wasted” going “straight up.” The effect (top hat pattern) is more or less pronounced depending on elevation above ground. Fine on 40

and 80 meters, where NIVIS (near vertical incident skywave) is desirable. But not on 20 where the best take-off angles are low to the horizon for long distance coverage.

The area in yellow, here, shows the “wasted” signal from a dipole that doesn’t help with long distance communications. Great stateside, but in Europe or Africa? Not so much.

Now, let’s take the exact same antenna elevation and tweak. We’re going to add a couple of wires on one side. All wires tied at the center, 3-inches apart at the ends (and not connected out there).

See what happens? Our performance for long distance work improves! A LOT! 1.48 dB. Effectively we pull from the (marginally useful top hat area and redirect it down toward the horizon.

What my crude drawing shows (Blue arrows) is that energy has been taken from the vertical lobe and has been redirected down to the more useful (for long distances) 20-degree take-off angle.

See? We pick up almost 1 1/2 dBd Adding two additional 16.7 foot pieces of wire.

Now let’s get to work optimizing! Spoiler alert! Using a single 49 foot run on the “hot” side and three 90-foot wires on the other this antenna begins to rock...
OCFD & Windom’s Work Better

Since the “secret sauce” is additional wires on the “cold side” the “regular dipole” becomes even more unbalanced. We can then exploit in the following design:

Which results in a marvelous signal on 20 meters! (And OK on 40, plus very good on 80...too!):

As should be evident, with the Off-Center-Fed Dipole (OCFD) (also called a Windom, by some, though a Windom uses a single -wire feed) we have “squished” the vertical lobe down and increased the low take-off energy...dramatically. In fact, here’s a performance comparison in table form:

This is based on the hot side wire being 49-feet long and the three cold side wires being 90-feet long. Different elevations will yield differences, but the AC7X Super Antenna wins every time.

I call this the 49-3X-90 design. 49 feet on one side, three times 90 feet on the other. It’s a convenient way to keep track of dozens of designs when optimizing. Just use a standard elevation and ground.

You Need Open Wire Feedline

Ladder line is fine, too: 300 or 450 ohms, your choice. 300 MIGHT be better, but barely measurable. Ladder line has much lower loss at high standing wave ratios than coax.

Before you run out and build one, realize this is the ONE fly in the ointment: while it will work dandy on 3.5 and 14 MHz band with a 2:1 balun, you will need an antenna tuner and open wire feedline to nail 40. This is because on 40 meters, the antenna impedance is around 273 ohms.

On 20 meters, a 2:1 balun will give under 2-to-1 SWR across the whole band. But not get better than 3 1/2 to on 40 without “help” which is why the ladder line tuner.

On the other hand, as a high-performance (and good gain) antenna on the 20-meter band, the antenna is hard to beat. Better than my beam (*which has a broken trap) by far! From the bottom of 20 (1.85 : 1) though the top (1.54 : 1), the SWR is flat at 14.2 MHz. You can't beat them numbers with a stick!

Convenience Store Insulators

The first version I put up employed a commercial ladder line center insulator. Broke in the first good wind. Use of 20 percent infill in innards of the plastic molding was the cause of failure identified.

This means you will want to use something more solid. A super-tough plastic like Delrin is great. But, have you priced that stuff? Wow!

A trip to the local convenience store paid off, though. A super-tough piece of antenna insulator, one-half inch thick, is widely available. Although people buy them mistaking them for 1/2" to 3/4" thick "cutting boards" not as antenna insulator raw stock. Go figure. World's full of heathens, though, ain't it?

Off to the shop, where we rip off the rounded edges...

Which led to Learning #2: Table saws leave ugly melted plastic sticking to the edges:

You can peel most of this off by hand easily enough. Some touch-up on the belt sander brings it back to useable.

For following cuts, I was bright-enough to use the band saw. You will want to lay out your "cutting board insulator" something like this:

Yeah – I know. Not a "standard looking" insulator. But, here's another "crackpot theory" for you:

On most antenna insulators, people twist wires "back on themselves." I know "the books" say this doesn't matter, but instead of "back on themselves" I chose to set up a "belt" approach for all wires.

The wires go in the outer hole, around the back, and out the next one. This way, there is no "conductor reversal."

Same thing with the ladder line: Goes through the three belt-like openings which were cut on the milling machine.

Just before assembly, the insulators looked like this:

At the center insulator, everything ties together at the two bolts. They go immediately to holes about 5/8ths inch apart. On the "special side" of the antenna, there are spacers every 20-feet, or so to keep things from twisting up too much. It wants to without them.

To keep the spreaders in place, I put a large drop of 5-minute epoxy at each spreader-wire joint on the top wire ONLY. I've tried small zip-ties, but they slide. These will over time – if you show up with a D-6 Cat to pull 'em...

The wire used is el cheapo electrical supply house (or eBay overstock 500' rolls are cheap) #14 stranded THHN. Sautéed lightly in rosin flux and then tossed into a telegraph splice if needed. On the ends, sautéed wires are crimped into ring terminals that land on stainless bolts. After being properly dressed with solder flowed into each. (Can you guess who was hungry when writing?)

So there you have it: The AC7X Secret Sauce Antenna – the 49-3X-90 – and how to build one on the cheap.

When I get some time in TinkerCAD, I will draw up something more elegant – designed for printing in ABS – and will put it up as an .STL file both here and over on our <https://ultra-make.com> 3D printing site.

That design will likely have additional “belt loops” and I’ll try to fit it all in the 220 mm X 220 mm footprint of the Ender 3 type printers. Not everyone has a CR-10 MAX yet. But you do believe in Printer Claus, right? Make sure Printer Claus lands on your tower before the next lock down and brings? Filament and antenna wire, Rudolph?

Oh...and Dummy loads for people in W-6 and W-2 land.

Write when you get rich (or make DXCC),

George@Ure.net (AC7X)

New Amateur Radio Podcast. What Hams Do-KB6NU

From: ARRL via Ed Best

What Hams Do is a new amateur radio podcast being produced by the Eastern Pennsylvania (EPA) section of the ARRL. Spearheaded by Jay Silber, WA2AUR, EPA Section Public Information Coordinator, there are currently two episodes available, with a third on the way.

Episode #1, “The Future of Ham Radio,” discusses how young people are getting involved in ham radio. Silber found that “young people are definitely getting involved, but in ways that just might surprise you.” There’s also a video version of this episode.

Episode #2, “We ‘re Ready,” describes how amateur radio operators are right in the thick of the response to COVID-19.

The next episode, "Minorities in Amateur Radio," is set to premiere this Sunday on YouTube. This episode will explore the myths and facts about race in ham radio.

I was a little confused by the episode numbering. Silber explained, however, that there will be audio versions of all of the podcasts and video versions of only some episodes.

Here is a link to get you started -> <https://epa-arri.org/podcast-1/>

The Link Classified

FOR SALE

Astron VS-70M 70A variable output linear DC Power Supply

Good working condition. Very low hours. Never run much above 5A

Rated 70A at 50% duty cycle, 57A continuous at 13.8VDC.

Independent analog voltage and current meters with backlighting.

Controls for adjusting voltage 0-15VDC or current 0-70A allow operations in either constant voltage or constant current mode.

Purchased for a project that was never started and has been in clean, dry storage ever since.

\$240

Thank you!

Glenn Walters KO4GOL
 gwwalters@gmail.com
 Mobile: (919) 451-1750

If you have items to buy or sell, send your ad to: Martin, KA5JUJ

martin@brody1.com 919-260-0632

There are no conventions or hamfests in our area, in the near future

Minutes of Last Club Meeting

Durham FM Association (DFMA)

DFMA Over-the-Air Meeting – 10/06/2020 – Dan, KR4UB, Secretary

Location: 147.225 & 145.450MHz PL 82.15 DFMA Repeater

Attending: KM4MBG, Jack; KU4GC, Dee; KN4EOO, Rick; N4JQR, J.R.; KO4HGS, Billy; W4OFZ, Banks; KF4PAB, Lenore; K2RRT, Mark; N8VNR, Kevin; KR4UB, Dan; N2XZF, Paul; KW4KZ, Chuck

A total of 12 attending, with 12 of them currently licensed hams.

President - Jack, KM4MBG opened the DFMA club over-the-air meeting net at 7 pm with check-ins and called for brief officer reports to be followed by a rag chew session.

ANNOUNCEMENTS

Jack reported that volunteer opportunities continue to be available, namely the vice president slot and the DFMA Link Newsletter Editor which Martin KA5JUU has superbly filled, but would like to retire from.

REPORTS

President - Jack reported that the Durham County Emergency Center contact, Taylor is moving on to a new position.

Vice President – vacant

Treasurer – Lenore, KF4PAB provided the treasurer's report. 102 members' dues are current.

Secretary – Dan, KR4UB called for any member comments on the minutes published in the DFMA Link newsletter; nothing heard.

Repeater Manager – Charlie, NC4CD not present; Jack commented that reports have been received regarding audio problems in the linking between the 147.225 and 145.450 repeaters.

AuxComm EC – Shawn, K4CTD not present; No new report.

DurHamFest – Dee, KU4GC reported he is still hoping DurHamFest will happen next spring, but nothing yet to report.

Field Day Coordinator – Dave, W4SAR not present; No new report.

The club meeting portion of the net was closed and the rag chew session comments were as follows:

KM4MBG, Jack led off with reference to the annual Christmas Dinner meeting tradition of member reports of progress made or not, on past New Year's resolutions and resolutions for the next year.

Jack suggested as a rag chew topic for tonight's meeting that participants report on intended projects or areas members are hoping to accomplish or learn about.

On Jack's personal list was a kit he had ordered sometime back and just received today, a FPGA (Field Programmable Gate Array) kit that he would like to do some signal processing in hardware.

KU4GC, Dee's project given to him by his son, is a keyboard synthesizer with many fancy features that he hopes to learn how to play.

N4JQR, J.R. is working on the usual list of chores, some being radio activity and working on the computer.

KO4HGS, Billy just got his license a few weeks ago and now is learning how to put it to use.

W4OFZ, Bank's current project is to make a 6M antenna that would not be too obvious, using 450 ohm ladder line and asked for hints and tips. Paul, N2XZF reported he had just completed such an antenna and will give it to Banks.

KF4PAB, Lenore always has a huge number of projects she would like to do including a half dozen or so paintings, gardening, and sewing and is pleased to have a large list to choose from.

K2RRT, Mark's big project for this year was to get his license (completed in July) and has put up antennas ranging from 70cm to 160m, set up FT-8, Echolink and next project is a Shari kit to add AllStar node to his Pi 4. Mark asked about alternatives available to join the club rather than paper application.

Jack responded applicants can mail the form, or just send the information on the form via email to Jack at km4mbg@km4mbg.org.

N8VNR, Kevin has been playing with SVXLink which is a Linux port of Echolink services. An RTL-SDR dongle can be used as a cross band receiver. Kevin had also just discovered the Shari kit reported above and thought this might be a good topic for a club presentation. He has some computer upgrade projects underway as well as a NVDM hotspot on order.

KR4UB, Dan's HamPiE group involvement has led him to put a Raspberry Pi 4 on order and is also interested in the capabilities of the Intel NUC processor. With so many processors in mind he has decided to come up with yet another ham acronym "YACs" or Yet Another Computer. He has recently added another toy to his ham station which is an automatic "anti-monopolizer" countdown timer to tell him when to "wrap it up" as it is surprising how fast a couple minutes can go by while commenting during the rag chew portion of the net..

Jack responded regarding the "YAC" comment above, that there is a term called "Yac- Shaving" referring to a project that has gotten out of control and taking more time than ever planned.

N2XZF, Paul was going to talk about his recently built 6M J-Pole antenna in which he found the measurements in an internet article were off by about 6 to 8". He helped Dewey, WA4AHR with some antenna and coax problems with his Vector antenna analyzer.

KW4KZ, Chuck reported Mary and the little doggie Dewey say hello. So far as New Year's resolutions his wire antenna is up and he has been using it on 80 and 40M. QSL cards have been coming to the house and Mary and he are designing a custom QSL card.

Dee commented that he has made his own cards and duplicated them using a color printer at Kinkos or Office Depot.

Jack, KM4MBG called for and a motion was made to adjourn the October club meeting.

Meeting adjourned at 7:45 pm.

Minutes of Last Board Meeting

Durham FM Association (DFMA)

DFMA Board Meeting Report – 10/20/2020 – Dan KR4UB, Secretary

Location: Big Blue Button Video Conference

Attending: (y) Jack, KM4MBG - president; vacant - vice president; (y) Lenore, KF4PAB - treasurer; (y) Dan, KR4UB - secretary; (n) Charlie, NC4CD - repeater mgr; (n) Shawn, K4CTD - AuxComm; (y) Dee, KU4GC - DurHamFest chair ; (n) Dave, W4SAR - Field Day; (n) Martin, KA5JUU Link Editor; At-Large Board Members: (y) David, KW4XL; (y) Paul, N2XZF; (n) Chuck, KW4KZ; (n) Karen, KD4YJZ. Guest: Wilson, W4BOH; Kevin, N8VNR.

President – Jack, KM4MBG called the meeting to order at 7:05 pm with the call for officer reports.

REPORTS & DISCUSSIONS:

President – Jack reported that volunteer opportunities continue to be available, namely the vice president slot and the DFMA Link Newsletter Editor which Martin KA5JUU has superbly filled, but would like to retire from.

Vice President – vacant. Regarding club meeting presentations at the DFMA Over the Air Club/Net Meetings, Jack suggested a format change to include pre-recorded presentations sent to members to view prior to the net meeting. The net would then include a discussion of the presentation.

Treasurer – Lenore, KF4PAB provided the treasurer's report. 112 members' dues are current.

Secretary – Dan, KR4UB called for any comments on the minutes published in the DFMA Link newsletter; nothing heard.

Repeater Manager – Charlie, NC4CD not present; Jack commented that reports have been received regarding audio problems in the linking between the 147.225 and 145.450 repeaters. Echolink has been down also. The APRS I-Gates have gone back on the air at the Durham County EOC and Gibbs Lane sites. Charlie is planning to do some more linking work using radios and also include a link to the VA repeater site.

DurHamFest - Dee, KU4GC, nothing new to report.

Auxcomm – Shawn, K4CTD unable to attend.

Field Day Coordinator - Dave, W4SAR not present.

NEW Discussion:

MCU - Jack asked if any winterization work needs to be done on the MCU. Wilson recommended the anti-freeze be checked in the vehicle and generator engines. They are run on occasion. The batteries have failed in the MCU and he plans to order a replacement for the failed antenna actuator . Dan, KR4UB volunteered to help with the winterizing checks.

Jack opened for discussion the first agenda topic, the need for an Acceptable Use Policy for the repeaters. There have been some unfortunate occurrences on the area repeaters this year.

Dan, KR4UB FCC License Trustee for the W4UNC repeater entered the discussion at this point adding that the problem of not having a published Acceptable Use Policy adopted by the repeater legal owners, the club Board of Directors, puts repeater license trustees in an awkward situation as follows:

1. If occurrences on the repeater is an FCC violation, the trustee action is clear. Per FCC rules the trustee must shut the repeater down.
2. But for other situations that may be offensive, annoying to other users of the repeater, reflecting poorly on the club, and such repeaters if located on the property not owned by the club, could be placed in jeopardy due to adverse publicity. The question becomes where is the line drawn in the sand for curtailing such transmissions. The trustee or control ops appointed by the trustee currently have no guidance on what, if any action should be taken on these matters.
3. Without a published, communicated Acceptable Use Policy that applies to all, any action taken against an offending individual could be ruled arbitrary and discriminatory solely due the lack of a prior adopted and communicated acceptable use policy.
4. A quick google search shows many amateur radio clubs already have well worded Acceptable Use Policies that cover situations that have occurred on our repeaters. No new invention is required to develop a good policy.

Dan went on to list several clubs such as the [Arizona Repeater Association, Inc](#) and the [Alamo Radio Society](#) that have short, succinct acceptable use policies.

Comments from the Board:

1. Jack, KM4MBG commented that based on his involvement in other clubs and software development organizations that the adoption of behavior and conduct policies has in fact strengthened the organization, fostering more people to join in and work together in a better way.
2. Lenore, KF4PAB commented she is strongly in favor of adopting a policy; it is long overdue and that such policies should apply at meetings and other venues.
3. Kevin, N8VNR strongly supported and noted that many professional organizations have such policies in place and that speakers invited to present will not speak at a conference unless a code of conduct is present. The [Triangle Linux Users Group has such a policy](#) on their website, and on the agenda slides at every meeting.
4. Paul, N2XZF commented the rules should be short, succinct to be understandable, enforceable and published in newsletters, groups.io and respective club sites so those exercising poor judgement can't claim lack of knowledge of such policies.
5. Dee, KU4GC is for adopting such policy given there may be situations of difficulty. Dan commented recent FCC rulings have determined that repeaters are private property and that

repeater owners can exercise the same private property rights as required as noted in the [Northeast Iowa Radio Amateur Association Repeater Conduct and attached FCC letter](#).

6. Dave, KW4XL is in favor with short and succinct policy and publishing in places listed above. He further commented that the ARRL has a published code of conduct.
7. Dan asked all board members to explore other club's policies to find good examples of short and succinct policies. A Google search on "[amateur radio repeater acceptable use policy](#)" lists many club policies. This will take some homework and the larger membership and repeater community should be engaged in putting such a policy in place. After all 99% of the repeater users heard on the repeaters are excellent models and reflect well on the amateur radio community. This topic will be on the agenda for discussion at the next Orange County Radio Amateur Board of Directors meeting.

Jack opened for discussion the next agenda item, Net Controls for the DFMA Thursday Night Net. The first Thursday of the month position is open. The club needs more volunteers to run the net. Kevin, N8VNR brought up that having a larger pool of volunteers to fill the schedule voids and also to provide the opportunity for more club members to become involved would be good. Dee, KU4GC gave some background on lessons learned in past net control selections for the board to consider. The net control pool concept would ensure training opportunities and scripts are available to the new volunteers. Jack will ask members having interest in becoming net controls to contact him.

Kevin, N8VNR suggested and others board members concurred that some adjustment is needed to the net scripts regarding the AuxComm portion to improve the flow of the net.

Jack called for a resolution to adjourn, and was made by Dan, KR4UB and approved with the meeting ending at 8:40pm.