

Q-FIVER

The Official Newsletter of the OH-KY-IN Amateur Radio Society



April ARDF Practice

Conditions were nearly perfect for the March ARDF (on-foot) foxhunt practice session at McFarlan Woods with temperatures some forty plus degrees warmer than the February hunt. Eight teams/ individuals were presented with a realistic training course some 4 kilometers in length. McFarlan woods created a great many obstacles for ARDF including reflections and hilly terrain.

Congratulations to all who attended and special thanks to Matt, Dick, and Brian for assisting with control pickup after the event. Next month Dick, WB4SUV will be setting a course. I get to run, UGH!. Though I think it might be easier than setting the course. Bob, WA6EZV

Here are the results:

Matt Robbins	AA9YH	81 Min.	5	2,4,5,1,3
Brian DeYoung	K4BRI	88 Min.	5	1,5,3,4,2
Dick Arnett	WB4SUV	96 Min.	5	1,5,3,4,2
Marji Garrett	KJ4VKC	145 Min.	3	5,3,1
Ryan Owens	KC8UJ	123 Min.	2	3,2
Cesi & Julianna DiBenedetto	KD8OOB	128 Min.	2	1,3
Brent Shields	KK4HMR	55 Min.	1	1
Pat Maley	KD8PAT	129 Min.	1	3

More pictures on page 4

There will be a workshop to build your own 2m tape measure beam on April 11th at 7:00 PM. The location will be My Neighbor's Place—3150 Harrison Ave. We will have all of the materials needed to construct your very own tape measure beam, except for the coax and connection to your radio. A donation would be helpful as we will be purchasing the materials from our own pockets. Please let me know if you plan to attend so we can have enough materials for everyone to be successful.

73—Brian, K4BRI



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OH-KY-IN Repeaters

146.670 (-) Clifton

146.625 *(-) Withamsville

146.925 *(-) Colerain

443.7625 *(+5) Clifton

A CTCSS (PL) tone of 123.0 Hz is required for access to all OH-KY-IN repeaters. All repeaters also transmit a CTCSS (PL) tone of 123.0 Hz

** Fusion Repeater*

APRS on 144.390 mHz

K8SCH-10 Edgewood WIDEn

K8SCH-9 Clifton WIDEn

Packet on 145.010 mHz

K8SCH-7 Digipeater

For membership information, please contact Nathan Ciufo KA3MTT, 6323 Cinnamon Ridge Dr, Burlington KY 41005, (859) 586-2435 or Email membership@ohkyin.org. Renewals of Club Memberships are due by the end of March. Permission is hereby granted to any amateur radio group to quote or reprint from this publication, if proper source credit is given, unless permission is otherwise reserved.

THE Q-FIVER is now mailed & e-mailed, it's hoped, a week before the club meeting.

Normally copy deadline is the weekend before that. Please send your submissions for THE Q-FIVER (including notice of upgrades & callsign changes) to Brian K4BRI

These may be: snail-mailed to or dropped off at 6901 Backus Drive, Alexandria KY 41001 or telephoned to (859) 635-3095 any time



Oh-Ky-In Life Members

John Phelps N8JTP

Kenneth E Wolf N8WYC

John W Hughes AI4DA

Karl W Kaucher KJ4KWR

Howard Hunt NG8P

2017 Committee Chairs and Appointments

Newcomers/Elmers Net.....	Robert Gulley AK3Q	Q-Fiver Editor	Brian DeYoung, K4BRI
Technical Committee	Brian DeYoung, K4BRI	Field Day.....	Eric Neiheisel N8YC
ARPSC Representative.....	Jerry Shipp W1SCR	Historian	Dale Vanselow KC8HQS
Volunteer Examiners	Brian DeYoung K4BRI	Special Publications	Jo Haltermon KD4PYS
QCEN Representative	Pat Maley KD8PAT	Fox Hunters	Dick Arnett WB4SUV
Membership	Nathan Ciufu KA3MTT	Equipment Mgr	Fred Schneider K9OHE
Fundraising	Bruce Vanselow N8BV	WebMaster	Ryan Williamson W1RYN
Education	Michael Niehaus KD8ZLB	Silent Key	Bruce Vanselow N8BV
Repeater Control Ops Mgr	Bruce Vanselow N8BV	Tech Talk Net Mgr	Bruce Vanselow N8BV
PIO	Ted Morris NC8V	K8SCH QSL Mgr	Bob Frey WA6EZV
Librarian	Howard Alban KD8WOY	TV/RFI	Dick Arnett WB4SUV

The Dayton Hamvention is not far away—have you made your plans yet?

April Calendar

Sun Apr 2	6:30 PM	Newcomers/Elmers Net, 146.67, Topic: Cross Band Repeat —NCS Robert AK3Q
Mon Apr 3	7:00 PM	Technician and General classes—Red Cross building on Dana Ave.
Tue Apr 4	7:30 PM	Club Meeting in St Bernard - Antennas—by club members
Wed Apr 5	9:00 PM	Tech Talk, NCS Robert AK3Q
Sat Apr 8	1:00 PM	Brunch Bunch at Sammy's Craft Burgers and Beers
Sun Apr 9	6:30 PM	Newcomers/Elmers Net, 146.67, Topic: Digital and SDR Web Linking Services —NCS Robert AK3Q
Mon Apr 10	7:00 PM	Technician and General classes—Red Cross building on Dana Ave.
Tue Apr 11	7:00 PM	Antenna building workshop at My Neighbor's place —3150 Harrison Ave.—2m tape measure beam
Wed Apr 12	9:00 PM	Tech Talk, NCS Brian K4BRI
Sat Apr 15	10:00 AM	Monthly Mobile Foxhunt—start at Mt. Storm park in Clifton—setup 9:30—talk in 146.670
Mon Apr 17	7:00 PM	Technician and General classes—Red Cross building on Dana Ave.
Wed Apr 19	9:00 PM	Tech Talk, NCS Dale, KC8HQS
Sat Apr 22	9:00 AM	ARRL VE Exam session at Centennial Hall in St. Bernard
Sun Apr 23	6:30 PM	Newcomers/Elmers Net, 146.67, Topic: HF Radios on the Cheap —NCS Robert AK3Q
Tue Apr 25	7:00 PM	Board of Directors meeting at My Neighbor's place —3150 Harrison Ave.
Wed Apr 26	9:00 PM	Tech Talk, NCS George N3VQW
Sat Apr 29	10:00 AM	Monthly ARDF Style Foxhunt—starts at 10:00 AM—location will be announced
Sun Apr 30	6:30 PM	Newcomers/Elmers Net, 146.67, Topic: Antennas on the Cheap —NCS Robert AK3Q



March 7th 2017 Meeting minutes

President Michael Sein KD8SOH called the meeting to order, commencing with the Pledge of Allegiance followed by self-introductions. Among the 44 in attendance were six guests including our speaker, Scott Yonally N8SY.

Health and Welfare: KD8PAT has recently returned home from emergency abdominal surgery.

Brag Session: There was one upgrade (Technician to General) reported. Brian Hoffman KC8EGV shared that ARES was invited to a table-top exercise earlier today at the Hamilton County Regional Emergency Operations Center.

Program

Scott Yonally N8SY, ARRL Ohio Section Manager, began by putting into context Ohio Section's relationship with the ARRL Field Organization. At one time, there were 50 state sections plus Puerto Rico and Virgin Islands. Over time with the growth of amateur radio, many state sections were split, yielding the present total of 71. Ohio is the largest section, with 28,000 ARRL members. Scott pointed out, however, that as Section Manager, he represents *all* Ohio hams' interests, not just those of ARRL members.

The Ohio Section management team covers nine programmatic areas:

Traffic Manager	WA3EZN, David Maynard
Government Liaison	W2THU, Bob Winston
Affiliated Clubs	KD8MQ, John Meyers
Technical	K8JTK, Jeffrey Kopcak
Public Information	KD8IDJ, John Ross
Official Observers	N8RXX, John Perone
Emergency Commun.	N8PHL, Stan Broadway
Education	K8ZT, Tony Luscre
Scouting Liaison	KC8ITN, Scott Hixon

Information about the Section is shared through the Ohio Section Journal (<http://www.arrl-ohio.org>), regular e-newsletter updates, and via social media (Facebook, Twitter). The Section holds a Newsletter contest, a monthly *ARRL Handbook* giveaway, special Section Manager awards, and a club visit schedule that includes Field Day installations and special club activities. Most Section information can be found via the website, <http://www.arrl-ohio.org>.

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Section Cabinet members traveled 60,000 miles in 2016 on club visits alone. There are currently 108 ARRL Affiliated Clubs within the section, including 43 Special Services Clubs. Ohio hams contributed 70,000 volunteer hours which (at the government estimated rate of \$23/hour) yielded a \$7,600,000 benefit to Ohio.

Scott then addressed the increasing emphasis on hams completing the four basic FEMA Incident Command System courses (ICS-100, ICS-200, ICS-700, ICS-800 [see <https://training.fema.gov/nims/>]). These are considered the cornerstones of basic incident command training, for understanding good emergency response protocols and our potential response roles in emergencies. He gave as an example the rigorous processes the Boston Marathon bombing in 2013 invoked. Within the first hour, the governor declared a state of emergency. In the second hour, the President invoked PATRIOT Act provisions to shut down trains, roads, and air travel; close stores selling firearms and supplies (including Target and Wal-Mart, e.g.), and inhibiting cellular phone communications and redirecting all landlines in the area to 911 only. Within 20 hours, Federal Marshalls began searching private homes (mandatory under the Act). Ham preparations facilitated the in/out communications among responders.

Scott's point was that this event "changed the course of how this country runs," pointing out that even our own "routine" public service events could become "incidents." Ohio hams assisted public service agencies with three major events in the same week in July, 2016: The Republican National Convention, NAACP National Convention, and Toledo Air Show. That the Republican Convention had "no reportable incidents" was attributed to the advance planning and preparedness which included ham radio liaison.

Ohio is the first of its kind to be credentialing hams via its ARRL Section. Ohio ARES credentialing is issued for completing all four basic ICS courses, and the State of Ohio has a credential database which includes those hams along with other certified responders. Those courses are required for participation in ARES-activated events. Ohio's next ARES Leadership Meeting will be April 1, 2017, at Marion Technical College/OSU-Marion Campus. More information is available on the Section website.

Scott then fielded audience questions and received our appreciation for his presentation. The meeting then adjourned to 8:33 for the Business portion.

Business Meeting

Minutes: Minutes of the February meeting were not published in the latest *Q-Fiver*.

Treasurer: Brian DeYoung K4BRI presented the report noting it includes a donation from the Health Department Net, which will be directed to the Repeater Fund. The treasurer's report was approved.

Silent Keys: None reported

Brunch Bunch: Bruce Vanselow N8BV reminded the group the next gathering will be this Saturday, at 1PM, at Freddy's Frozen Custard and Steakburgers, on Redbank Expressway in Madisonville.

Technical Committee: Brian K4BRI reported on their February meeting, where they went over programming commands available for the repeater systems. They also reviewed our existing lease agreements. Next Tuesday, April 14th, they will meet again at the 146.670 repeater site at 7 PM Eastern *Daylight* Time. All repeaters are currently running.

Education: Mike Niehaus KD8ZLB reminded us that our Technician and General Class license courses will start next Monday, March 13th, at 7 PM at the Red Cross Headquarters on Dana Avenue at I-71 starting. Co-instructor Ted Morris NC8V added that the Extra Class sessions, already in process, have four students.

Fox Hunt: Brian K4BRI recapped last month's mobile hunt, held in a small park in Ft. Thomas. This Saturday, March 11th, the next fox hunt will again begin from Mt. Storm Park, with setup at 9:30 AM and 10:00 AM departure. Those wishing to ride-along or borrow equipment should check with Brian for arrangements.

Last month also saw an on-foot ARDF (Amateur Radio Direction Finding)-style hunt, so more folks could get the general idea of ARDF hunts. Another will be held March 25th, at McFarland Woods (Westwood-Northern entrance). Talk-in/monitoring will be on 146.670.

TechTalk Net: Bruce N8BV reminded us the net meets every Wednesday at 9 PM on 146.670, and thanked all those who serve as net control stations.

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Newcomers & Elmers Net: Robert Gulley AK3Q noted that the latest weekly Sunday 6:30PM net was facilitated by Brian K4BRI who presented on Fox Hunting/ARDF. An in-person N&E Net “meet-and-greet” will be held March 25th at 10AM in Centennial Hall, lower level of the St. Bernard City Hall. Folks are asked to RSVP to Robert since refreshments will be provided.

Website: Co-Webmaster George Gardei N3VQW noted that more folks are now adding content, and he encouraged folks to submit more pictures of club events. A problem with our email service has arisen because our host also mounts several websites known for spamming or phishing. This has led many other systems to block *anything* coming through that server, including our emails. Webmaster Ryan Williamson W1RYN pointed out this is a common problem among hosting services at the price point of our contract, but to host the email service ourselves would cost approximately \$150/month.

Digital Group: Convener Jerry Shipp W1SCR reported that the group worked with DMR at the last meeting. Meetings are held every fourth Tuesday of the month in Centennial Hall. The next meeting will be March 28th.

Hamfest: Chair Gary Coffee KB8MYC confirmed the 2017 Hamfest will be held on September 23rd, again at Aiken High School on Belmont Avenue. He will soon send out emails to start up the Committee again.

QCEN: Kitty Hevener W8TDA reminded the group that QCEN’s meetings are held every third Friday of the month at Red Cross Headquarters. The radio room opens at 5:30 PM for socializing and operating and the meetings start at 7:30 PM.

ARES/Health Department Amateur Radio Group: Brian KC8EGV talked briefly about “Winlink Wednesdays.” The next ARES meeting will be held March 31st at the Health Department building on William Howard Taft Rd. There will be some POD (Points of Distribution) exercises this spring; dates are listed at www.hamcoares.net. He also mentioned the statewide ARES conference on April 1st, and suggested folks check around for carpooling opportunities.

Audit Committee: Chair Mike Niehaus KD8ZLB presented the 2016/2017 Audit Committee report on behalf of members John Major KD8MMY, Fred Schneider K9OHE and himself. They met February 12th at Treasurer Brian DeYoung K4BRI’s house, and report finding the paperwork orderly and fully documented, with all accounts in balance. One outstanding check to a member for Field Day propane has been lost, and Brian will ask the Board of Directors for permission to re-issue that disbursement. The Committee’s Report was approved unanimously.

Events and Activities of Interest:

U.S. ARDF Championships: Bob Frey WA6 EZV reported all permits are in order for the 2017 event which OH-KY-IN is co-sponsoring. Meetings are being organized to acquaint folks with the activities and operations at these events so they can help support—or participate in—the hunts. [The 2017 Championship activities will be held July 31-August 6, with courses centered near Miami Whitewater Forest near Harrison, Ohio.]

Ohio State Parks on the Air: This year the event will be held September 9th. OH-KY-IN will participate from East Fork State Park, Turkey Ridge Shelter. Since OH-KY-IN may also participate in other events that day, it’s important to line up volunteers promptly.

Weather Spotter Class: Mike KD8ZLB noted the next class in Hamilton County for SKYWARN will be held April 27th at The Grove of Springfield Township on Winton Rd.

Flying Pig Marathon: Last year this May event used 70 ham volunteers. To register for this year’s events on May 5-7, register as a ham volunteer via the QCEN group with password “HAM.”

Programs: Vice President Ryan Williamson W1RYN presented a calendar of upcoming meeting programs:

April	ANTENNAS—Members talk about their setups and projects
May	Cystic Fibrosis Cycle For Life race presentation (races held September 23 rd)
June	Field Day—Eric Neiheisel N8YC, Chair
July	Annual Picnic; NOTE: this year July 11 th , not July 4 th .

Split the Pot: Winner of \$84 of the \$168 collected was David Sharp NU8H.

The meeting was adjourned at 9:02 PM.

Respectfully Submitted, Ted Morris NC8V for OH-KY-IN

Foxhunting

The March mobile foxhunt had decent weather and a newer hunter wanting to ride along—Brent, KK4HMR.

At the start, our first bearing was about 60 degrees, so we headed north on 75 and cut across the Norwood lateral. Our first thought was the brunch bunch location, but near Red Bank Road it still indicated north, so we ruled that out. We got off at Montgomery road and started homing in north of the mall (where I was spotted by someone I work with—a friend said Holy Cow look at that car, whereas he rolled his eyes and said I Know That Guy). I wanted to rule out some side streets before we went back across I71 (Marji did not agree and of course she was right). Crossing I71 signals really started picking up, and we knew we were very close at the Tesla dealership, but there is no way to get there from here, so we looped south and back north, and finally found Phil right next to the Reagan. And yes, Dick was already there.

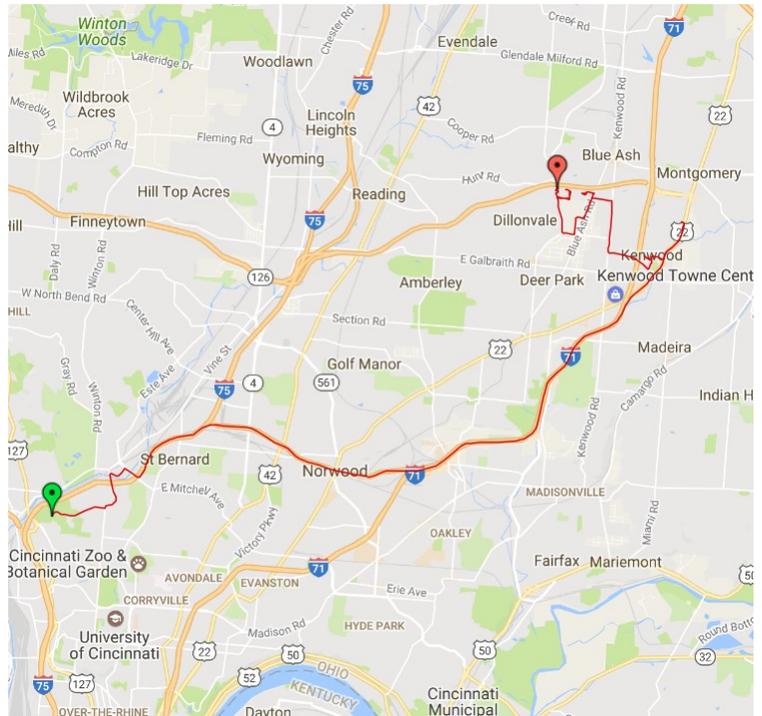
Phil's Summary

Team 1: Dick WB4SUV , Jane KJ4VCW & Alisa
 Time: 29min 55 sec
 Distance: 16.2 mi

Team 2: Brian K4BRI & Marji KJ4ZKC
 Time: 33min 06 sec
 Distance: 18.5 mi

Team 3: Bob WA6EZV & Brent Shields KK4HMR
 Time: 56min 02sec
 Distance: 23.9 mile

Team 4: Bill Corrigan KA8TWB
 Time: 59min 52sec
 Distance: (sorry.. i didn't get his mileage; we ended-up talking for awhile)



Location: Behind a deserted/closed Long John Silver's business
 9100 Plainfield Rd, Blue Ash, OH 45236

Txcr: Yaesu FT-7800 Power: 5-50W Antenna: 2m vertical WX: Sunny & 35F

73, Phil KG8AP

Team Name	1st	2nd	3rd
Brian, K4BRI and Marji, KJ4ZKC	1	1	
Dick, WB4SUV and Janie, KJ4VCW	1	1	
Bob, WA6EZV			1
Bill, KA8TWB			

Brunch Bunch

The Brunch Bunch is going east! Well, northeast this time.

The next Brunch Bunch will be held **Saturday, April 8th, at 1pm**. The location for April is **Sammy's Craft Burgers and Beers in Blue Ash**. The Blue Ash location of Sammy's is at 4767 Creek Road, 45242, at the corner of Creek and Kenwood Roads. Sammy's has both inside and outside seating. Weather permitting, we'll be outside.

For a look at the Sammy's menu as well as a map, go to:
www.sammyscbb.com

Remember that the Brunch Bunch always meets the second Saturday of every month at 1pm at a location to be announced each month. If you can't join us this month, maybe you'll be available to join us in the months ahead.

I'm always looking for suggestions on what restaurant you think might be a good place for the Brunch Bunch to visit soon.

73,Bruce, N8BV



The Elmer's Corner : Working the *Really* Low Bands

Robert AK3Q



Last time around I introduced some ideas on working LF and VLF bands, and in this article I discuss some antenna designs which can be effective for making the most of these big signals.

E or H or Both!

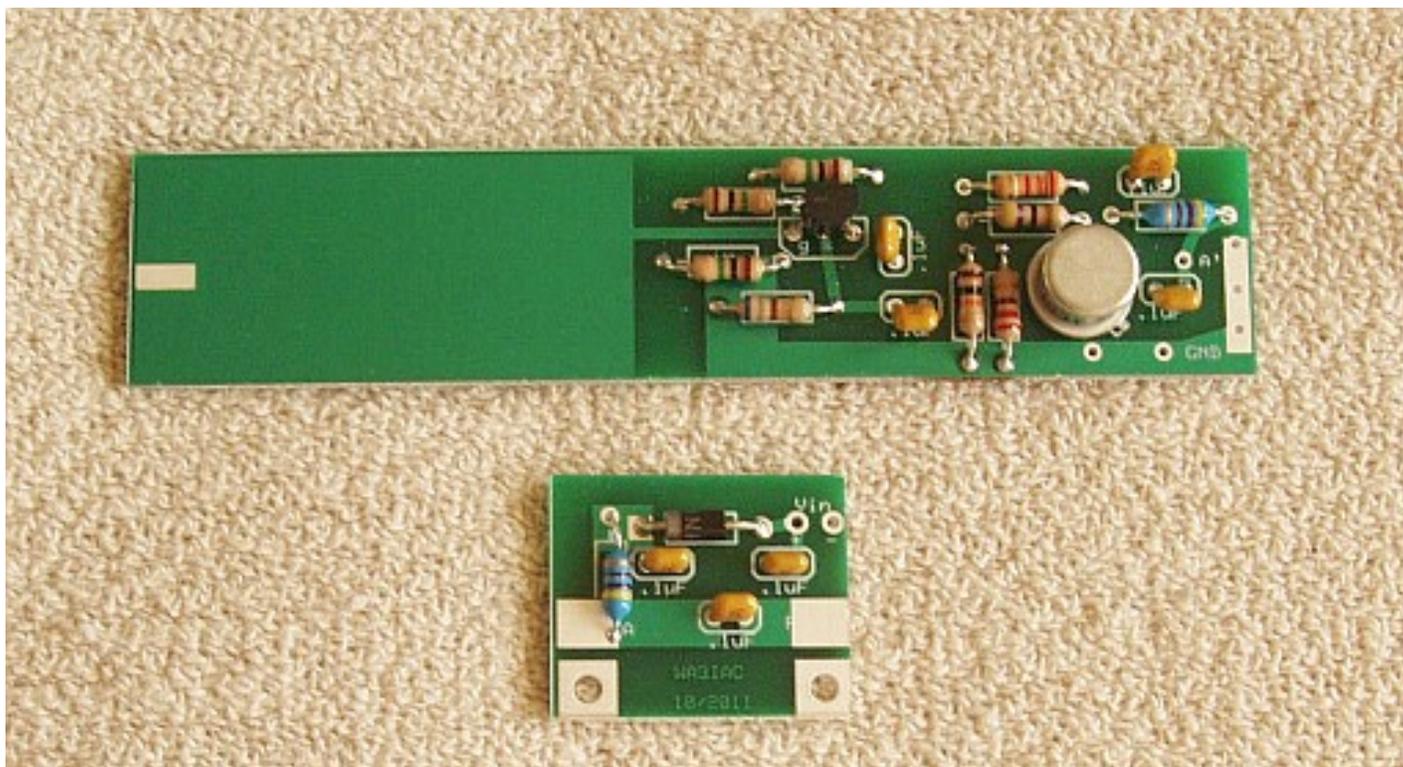
There are two main designs for LF antennas with each one emphasizing a part of the electromagnetic signal. A loop emphasizes the magnetic portion of the field, which makes it particularly useful for attenuating local electrical interference. The nulls are pointed toward the offending sources, which should, at least in theory, help desired signals come through more legible.

Antennas designed for the E-field emphasize the electrical field of a signal. These antennas are typically whips by design, and can be useful in attenuating unwanted H-field, or magnetic, parts of the signal. Note that these only work in close to the radio—they cannot affect interference which comes from a long distance away. The reason for this is both the E- and H- fields stabilize or “re-acquire” their standard 90-degree pattern within about a half-wavelength of their source.

The advantage to having both types of antennas available means one or the other antenna will likely help to reduce local interference, perhaps significantly. At any location there will always be signals with both E- and H- components, so nothing will remove all interference (and beware of exaggerated claims by anyone promoting a particular antenna!).

Keep in mind too that a loop is inherently directional, and assuming one has the ability to rotate the loop, there will be some directivity to the antenna which might help with distant interference. An E-field antenna is omnidirectional, which means it will not have any significant nulls for reception.

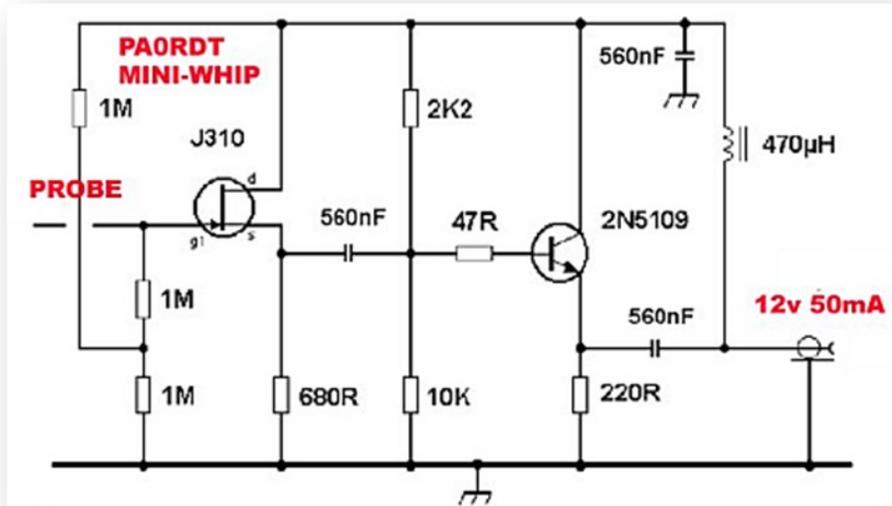
Additionally, it is more likely to be affected by screening effects such as buildings, proximity to the ground, and other sources of interference. Loops on the other hand can be used in tighter quarters, and are often effective even in the home such as in the attic or other suitable places. Passive E-field antennas are tuned similarly to any other standard antenna, but usually with the addition of a pre-selector as mentioned last time for filtering out unwanted broadcast AM signals.



There is another version of the E-field antenna called an active E-field (or an E-field probe) which uses a high impedance buffer amplifier to match the active whip to the low impedance receiver. This allows for a fairly broadband antenna which can also be quite small. Many such antennas are no more than a few feet long. They must be placed outside if at all possible, but can be made quite stealthy due to their small size. They should also be elevated to reduce the effects of ground reflections.

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A popular version is the PAORDT Mini-Whip E-field probe antenna designed by RD Bakker of the Netherlands. This can be purchased as a kit or fully assembled off the Internet. Since I like to build things anyway I got the kit version for under \$20 shipped, and as can be seen here is not particularly complicated to build. Some folks have even gotten the parts and assembled it "dead bug" on a piece of wood. I like printed circuit boards myself, but that is just me.

These are broadband antennas which can extend well up into the HF range, but most people find their limit to be 80 meters or at most 40 meters. Some folks have noted very acceptable response all the way up to 20MHz. Voltage (+12) is fed to the antenna by way of the coax (not included) from a

bias T-network (the small board) located at the receiver. The preamp is fed at the base of the antenna with the DC supply fed through the coax.

Location is everything with these small antennas, and so a lot of experimentation will show where the best placement is at a given location. Keep in mind even slight changes can make a big difference, so take some time to scout out the best spot. We need every advantage we can get!

Loop Antennas

Small loop antennas are fairly common, particularly for AM broadcast bands and used to couple with the internal ferrite bar antenna of most AM radios. The antenna design concept is similar, but we are not looking to couple with an internal antenna in most cases. However, this is not to say this type of system cannot boost signal reception. Ideally the loops will be a bit larger for our purposes here, and while there are numerous designs around, a common design will be mentioned here just for completeness.

Loop antennas tend to be very narrow-banded, meaning they have a high-Q, and so they are useful for blocking a lot of unwanted interference and or intermodulation. This also means re-tuning will be needed quite often, but the trade-off is well worth the advantages.

For the 500kHz band about 15-20 turns of a wire around a 3'-square X-shaped wooden frame is usually sufficient. For the 136kHz band about 30 turns should do. A slight notch along each corner wide enough to hold the turns of wire can keep things in place a bit better, or one could make a notch for each wire if desired. A variable capacitor is used for tuning the loop, and at this size, most operators prefer adding a preamplifier to the circuit to boost reception. As an alternative, a larger loop may be made, say 6'-square, which might be enough to eliminate the need for a preamplifier.

Listening

Whether listening by ear or used in conjunction with software on the computer, there are many interesting signals to be captured at these low frequencies. In addition to CW and Beacons, there are the common QRSS digital modes (differentiated by the length of time each character is transmitted), as well as LF versions of WSJT-X and WSPR for receiving and mapping contacts.

Each area offers a lot of room for investigation, as well as experimentation with an E-field or H-field antenna. Direct comparisons will go a long way in helping to decide which antennas work best with which modes, and there is the opportunity to help others who are experimenting with different transmitter setups to see where their signals are reaching. The WSPR software can be left on overnight with automatic uploads to the mapping site, so users from around the world can tell if you are hearing them. Of course, there is nothing wrong with staying up all night yourself now and again to catch the action live!

Wrap-Up

I hope you will give these bands a try both for amateur bands and for beacon work. There is a lot of activity going on below the AM bands, so give it a go and see how much fun it can be!

From *A Clockwork Orange* to DMR

by Justin Patrick Moore, KE8COY

In last month's episode I explored the genesis of the first song uttered by a computer, *Daisy Bell*, and how that song ended up in *2001: A Space Odyssey*. In this last installment on the history of speech synthesis I'll track the use of the vocoder in popular music on up to its implementation into the DMR radios that are currently a big buzz in the ham community.

In 1968 synth wizard Robert Moog built the first solid state vocoder. Two years later Moog built another musical vocoder, working with Wendy Carlos. This was a ten-band device inspired by Homer Dudley's original designs. The carrier signal came from a Moog modular synthesizer. The modulator was the input from the microphone. The brilliant application of this instrument made its debut appearance in Stanley Kubrick's film *A Clockwork Orange*, where the vocoder sang the vocal part from the fourth movement of Beethoven's Ninth Symphony, the section titled "March from a Clockwork Orange" on the soundtrack. It's something I could sit down and listen to on repeat over and over while enjoying a fine glass of moloko velocet. This was the first recording made with a vocoder and I find it interesting that the two earliest uses of speech synthesis for music ended up in films made by Kubrick. The song "Timesteps", an original piece written by Wendy, is also featured on the soundtrack. She had originally intended to include it as a mere introduction to the vocoder for those who might consider themselves "timid listeners" but Kubrick surprised Wendy by its inclusion in his dystopian masterpiece.

Coming down the road in 1974 was the classic album *Autobahn* by the German krautrockers Kraftwerk. This was the first commercial success for the power-station of a group. Their previous three albums had been highly experimental, though well worth an evening of listening. Kraftwerk's contribution in the popularization of electronic music remains huge. Besides using commercial gear such as a Minimoog, the ARP Odyssey, and EMS Synthi AKS, Kraftwerk were dedicated homebrewers of their own instruments. Listening to the album now I can imagine the band soldering something together in the back of a Volkswagen Westfalia as they cruise down the highway at 120 km/h on to their next gig.

Three years later in 1977 Electric Light Orchestra released the album *Out of the Blue*, much to the delight of discerning listeners everywhere. There is nothing quite like the music of ELO to lift me up out of the melancholy I often find myself in during the middle of winter when spring seems far away. "Mr. Blue Sky" and "Sweet Talking Woman" are songs that toggle the happy switches in my brain. When I hear them things brighten up. This is in no small part to the judicious use of the vocoder. ELO was in love with the vocoder and it can be found littered across their recordings. (As a bit of a phone phreak another favorite cut is "Telephone Line".)

During the 1980's the vocoder started being used in the early hip-hop and rap groups. Dave Tompkins, author of *How to Wreck a Nice Beach: The Vocoder from WWII to Hip-Hop* notes the echo of history in the vocoders use alongside two turntables for the SIGSALY program and how DJs use two turntables to mix and scratch phat beats while a rap MC will drop lyrics over top of the sounds being produced by the vinyl, sometimes processing those vocals through the vocoder. The use of the vocoder continues to present times on hip-hop and jazz fusion albums such as *Black Radio (1 & 2)* from Robert Glasper Experiment.

While the vocoder was enjoying great success in the entertainment industry, its use in telecommunications was still ticking away, though a bit quieter, in the background. Since 1970's most of the tech in this area has focused on linear-predictive coding (LPC). It is a tool used for representing the spectral envelope of a digital signal of speech in compressed form, using the information from a linear predictive model and is a powerful speech analysis technique. When it came out the NSA were among the first to get their paws on it because LPC can be used for secure wireless with a digitized and encrypted voice sent over a narrow channel. The early example of this is Navajo I, a telephone built into a briefcase to be used by government agents. About

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110 of these were produced in the early '80s. Several other vocoder systems are used by the NSA for encryption (that we are allowed to know about).

Phone companies like to use LPC for speech compression because it encodes accurate speech at a low bit rate, saving them bandwidth. This had been Homer Dudley's original intention with his first vocoding experiments back in the 1930's. Now LPC has become the GSM standard protocol for cellular networks. GSM uses a variety of voice codecs that implement the technology to jam 3.1 kHz of audio into 6.5 and 13 kbit/s of transmission. Which is why to my ear, smart phones, for all the cool things they can do with data, apps and GPS, will never sound as good with voice as an old school toll call on copper wires. LPC is also used in VoIP.

LPC has also been used in musical vocoding. Paul Lansky created the computer music piece *notjust-moreidlechatter* using LPC. A 10th order derivative of LPC was used in the popular 1980s Speak & Spell educational toy. These became popular to hack by experimental musicians in a process known as circuit bending, where the toy is taken apart and the connections re-soldered to make sounds not originally intended by the manufactures. This technique was pioneered by Cincinnati maker and musician Q. Reed Ghazala into a high art form. Reed's experimental instruments have been built for Tom Waits, Peter Gabriel, King Crimson's Pat Mastalotto, Faust, Chris Cutler, Towa Tei, Yann Tomita, Blur and many other interesting musicians. And not so interesting ones (to me) such as Madonna. A future edition of *The Music of Radio* will cover his work in detail, but a lot can be found on his website anti-theory.net.

Finally vocoders are utilized in the DMR radios that are currently gaining popularity among hams around the world. In Ohio the regional ARES groups are being encouraged to utilize this mode as another tool in the box. DMR is an open digital mobile radio standard. DMR, along with P25 phase II and NXDN are the main competitor technologies in achieving 6.25 kHz equivalent bandwidth using the proprietary AMBE+2 vocoder. This vocoder type uses multi-band excitation to do it's speech coding. Besides it's use in DMR the AMBE+2 is also used in D-Star, Iridium satellite telephone systems, and OpenSky trunked radio systems.

From what I've heard I didn't really care for the audio quality of DMR, as on cell phones. My ears would rather dig through the mud of the HF bands than listen to the way speech is compressed in these modes. I think the vocoder is better suited to musical studios where it can be used for aesthetic effects. However with the push to use these in ARES, and needing something to play with at OH-KY-IN's digital night on the fourth Tuesday of the month, I do plan on taking the plunge into DMR. And when I do I will know that every time I have a QSO using the DMR platform I will be taking part in a legacy starting with Homer Dudley's insights into human vocal system as a carrier wave for speech. A legacy that stretches across the fields of telecommunication, cryptology and popular music.

Chip Talk: Projects in Speech Synthesis by David Prochnow, Tab Books, 1987.

https://en.wikipedia.org/wiki/Digital_mobile_radio

https://en.wikipedia.org/wiki/Multi-Band_Excitation

[https://en.wikipedia.org/wiki/A_Clockwork_Orange_\(soundtrack\)](https://en.wikipedia.org/wiki/A_Clockwork_Orange_(soundtrack))

...and some other research on the interwebs.



March 2017 DX Spots de KA3MTT

Sun	Mon	Tue	Wed	Thu	Fri	Sat
8P6DR - Barbados thru 4-20 	3D2AG/p - Rotuma thru 4-22	KH2BY - Guam thru 4-10 	AH2P - Guam thru 4-17 			1 J68HZ - St Lucia thru 4-8 <hr/> 9N1MD - Nepal thru 4-30
2 CE0Y - Easter I thru 4-6	3	4 V73 - Marshall Is thru 4-6 	5	6 P29VXG - Papua New Guinea thru 4-12 <hr/> YJ0YM - Vanuatu thru 4-17 <hr/> S79Z - Seychelles thru 4-18	7 J5 - Guinea Bissau thru 4-15 <hr/> FS - St Martin thru 4-16	8
9	10	11 T32 - E Kiribati thru 4-13 <hr/> VP5 - Turks & Caicos Thru 4-18	12 XW4XR - Laos thru 4-26 	13	14 H91IT - Panama thru 4-16 <hr/> T8 - Palau thru 4-21 <hr/> J88PI - St Vincent thru 4-23	15 GT4BRS - Isle of Man thru 4-22 
16	17	18 D4T - Cape Verde Is thru 4-25 	19	20	21 TG9 - Guatemala thru 5-15 	22
23	24 V4 - St Kitts & Nevis thru 5-1 	25 A25UK - Botswana thru 5-6 	26	27	28 E51 - South Cook Is thru 5-13	29 ZF2AB - Cayman Is thru 5-6 
30 E5 - South Cook Is thru 5-12						

OH-KY-IN Amateur Radio Society

Regular monthly meetings are held the first Tuesday of each month at 7:30PM local time at the St Bernard Recreation Hall, 120 Washington Avenue (corner Washington & Tower Aves) in St Bernard, just east of Vine St. Please come in the doors at street level, facing the high school. Visitors are ALWAYS welcome!

The next meeting of the Oh-Ky-In Amateur Radio Society will be Tuesday, April 4th at 7:30 PM

Topic: **Antennas**

Club members will talk about their antenna designs, their setups and some tips and tricks.

OH-KY-IN Amateur Radio Society

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